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EXHAUST EMISSIONS FROM GASOLINE-POWERED VEHICLES ABOVE 6,000-LB GROSS VEHICLE WEIGHT

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
Ann Arbor, Michigan 48105

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by

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ABSTRACT

This is the third in a series of projects concerned with emissions from gasoline-powered vehicles above 6,000 pounds gross vehicle weight sponsored by the Environmental Protection Agency. The first of the three-phase project was a broad emission characterization study of four 1969 trucks under a wide variety of engine speeds, power levels, and both stationary- and chassis-operated engines. Emission rates of hydrocarbons, carbon monoxide, and nitric oxide were expressed in mass units of grams per minute, per pound of fuel, and per bhp-hr. In addition to the steady-state emission maps, a number of transient accelerations and decelerations were studied using a variety of simulated vehicle inertias. The second phase was a four-vehicle study of the effect of four different road routes on emission rates. The road routes were sufficiently different to be distinct, yet were considered representative of actual truck driving. The final phase was a nine-truck evaluation of an experimental 23-mode test procedure using both stationary- and chassis-operated engines. The characterization studies determined that power output level consistently influenced all emissions more than any other variable and illustrated the need to measure emissions at increments approaching 10- to 15-percent power intervals. Speed had a relatively minor effect on emission rates. Acceleration at wide open throttle against sizeable inertia produced emissions that were representative of some steady-state conditions. The different road routes, stop-and-go, and slow, intermediate, and high speed had a significant influence on reducing hydrocarbons with increase in engine speed, vehicle speed, and duty (power) level. The opposite trend was found for NO_x with minimum hydrocarbon, CO, and NO_x emissions at constant speed cruise in the neighborhood of 20 to 30 mph. Both stationary and chassis dynamometer versions of the experimental 23-mode test procedure was found to be workable with excellent run-to-run repeatability and satisfactory chassis-to-stationary agreement. The three phases of this project generated a large body of data that is summarized in the report and included in some detail in a number of appendices.

FOREWORD

This project was initiated by the Heavy Duty Vehicle Section, PDB, Environmental Protection Agency, Office of Air Programs, Mobile Source Pollution Control Program, Division of Emission Control Technology, 2565 Plymouth Road, Ann Arbor, Michigan 48105. The engineering effort on which this report is based was accomplished by Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas, under contract number EHS 70-110. The author, Mr. Karl J. Springer, was the Project Leader of the research and development work. This project began on June 30, 1970 and was completed April 30, 1972.

The principal engineers associated with this project were Mr. Clifford D. Tyree, responsible for characterization and road studies, and Mr. Melvin N. Ingalls, who supervised the laboratory test activities during evaluation of the experimental 23-mode test procedure.

The Project Officer cognizant of this project was Mr. John Bozek, Chief, Heavy Duty Vehicle Section, PDB, Environmental Protection Agency, Office of Air Programs, Mobile Source Pollution Control Program, Division of Emission Control Technology, 2565 Plymouth Road, Ann Arbor, Michigan 48105. This project was identified within Southwest Research Institute as No. 11-2877-01.

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I. INTRODUCTION

Heavy-duty vehicles, classed as those above 6,000 pounds gross vehicle weight (lb-GVW) by the Environmental Protection Agency (EPA) have come under closer scrutiny by government and industry within the past year. Though there is less knowledge regarding the role of the gasoline-powered engine in heavy-duty vehicle (HDV) operation than say light-duty (cars), the EPA and its forerunner, the National Air Pollution Control Administration (NAPCA), have sponsored a continuing long-range activity.

Southwest Research Institute's Emissions Research Laboratory has been privileged to have conducted a major portion of this research beginning in June 1967. Past efforts included acquisition of baseline emissions data from 150 gasoline and LPG fueled spark-ignited engine-powered trucks and buses using three experimental road-like chassis dynamometer procedures. To acquire the emissions, a special truck version of the constant volume sampler (CVS) was used which permitted expression of contaminants on a mass basis. The results of the survey are contained in the SwRI final report[(1)*] which concluded that the three proposed experimental nonconstant speed cycles were not recommended for use in testing emissions from heavy-duty vehicles powered by spark-ignited engines. The findings of these earlier studies were summarized in AIChE and SAE papers[(2,3)] which described the preparations and baseline data results, respectively.

The second major work in this continuing program compared road route hydrocarbon (HC), carbon monoxide (CO), and nitric oxide (NO) emissions to chassis dynamometer by the Federal nine-mode constant speed cycle (FTP)[(4)] for six trucks of various sizes and makes. Using a CVS with results expressed in grams per pound of fuel (g/lb fuel), the current Federal cycle was subjected to a number of modifications to investigate their effect on the road–nine-mode cycle results with the engine chassis- and stationary-operated. Also explored were the potentialities of operating an engine at its peak torque rpm at a variety of power modes.

The second major work in this series resulted in a final report titled "Studies of Emissions from Gasoline Powered Vehicles Above 6,000 lb GVW," dated July 1970.[(5)] This report, along with Reference 1, are recommended reading for background and related findings to those in this report. Both earlier reports are continually referred to throughout this report, as it is assumed that the reader does or can have access to them if necessary.

The third project in this series is described in this report and differs somewhat from previous efforts. Emphasis was placed on the fundamental emissions behavior from gasoline HDV both in the laboratory and on the road. It culminated in the demonstration of an experimental 23-mode procedure using both stationary- and chassis-operated engines.

*Superscript numbers in parentheses refer to the List of References at the end of this report.

II. OBJECTIVE AND APPROACH

The primary objective of this project was to gain knowledge of the fundamental emissions behavior of gasoline engines in HDV applications. This was accomplished in two steps.

The first step involved operating four different engines under a wide variety of engine speeds and loads simulating the entire engine use spectrum. Mass emission rates of HC, CO, and NO in terms of grams per minute (g/min), grams per pound of fuel consumed (g/lb fuel), and grams per observed brake horsepower output (g/bhp) were used to plot "emission maps" as a function of speed and power output. These same engines, powering trucks, were then similarly operated on a chassis dynamometer. In addition to steady-state measurements, a variety of transient acceleration deceleration conditions were simulated and the mass emission rate determined. From this, the effect of power, speed, and type of operation on emission rates could be established.

The second step was to operate four trucks on four different road routes to determine what effect this would have on emission rates. Using the CVS to obtain dilute exhaust samples for analysis, stop-and-go, slow-speed, intermediate-speed, and high-speed courses were studied with an additional emission rate, grams per mile (g/mi) employed. From this study, answers to questions of the effect of route, effect of driver, etc., on emissions were available. Data were also obtained to construct histograms of the percent of time at various vehicle speed, engine speed, and intake manifold vacuums (power).

The secondary objective was to demonstrate the feasibility of a modal-type experimental test procedure. A 23-mode procedure was formulated on the basis of the previous work and explored with nine stationary- and chassis-operated 1970 or 1971 engines. In running these nine engines, problems in procedure, instrumentation, dynamometry, calculation, and expression were identified.

III. EXHAUST SAMPLING, ANALYSIS, AND INSTRUMENTATION

Two basic types of exhaust sampling techniques were used during this program. The most familiar set of instruments used was the nondispersive infrared (NDIR) sampling train for raw exhaust gases specified in the *Federal Register*[4] for the nine-mode cycle (FTP). This system is described first. Another technique used was the Constant Volume Sampler (CVS) for diluted exhaust gases and the related analyzers. In the final series of tests, a different combination of instruments was used to evaluate the experimental 23-mode procedure.

A. Nine-Mode Continuous Sampling, Analysis, and Instrumentation

The exhaust gas sampling and analysis for the nine-mode cycle or FTP was with a system similar to that shown in Figure 1. The system meets the requirements and specifications established in the Federal regulations[1] for heavy-duty exhaust sampling. A component description of the system is detailed in the above referenced Federal regulations. Nominal full-scale concentration levels for the five NDIR analyzers are as follows:

(1) Low-Range HC–1000 ppm hexane
(2) High-Range HC–10,000 ppm hexane
(3) CO–11 percent
(4) CO_2–15 percent
(5) NO–4000 ppm.

Although nitric oxide is not included in the current Federal regulations relating to gasoline HDV's, this contaminant was importance from a research standpoint.

The output of each analyzer is fed to strip-chart recorders. The concentrations from each trace are obtained from the continuous traces by hand as specified in the nine-mode FTP. The average concentrations are then transferred to computer cards for further processing to obtain composite values for HC, CO, and NO.

The computer system, shown to the right of the NDIR cart in Figure 1, was designed and assembled by SwRI. This computer utilizes a Data General Super Nova, 8K central processor, and a Computer Products

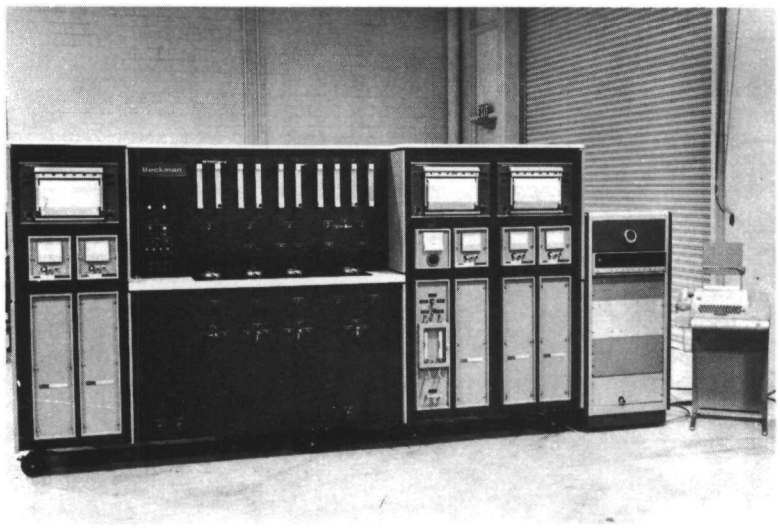


FIGURE 1. CONTINUOUS NDIR SAMPLING/ANALYSIS/COMPUTER SYSTEM USED FOR NINE-MODE FTP TESTS

Series RTP 7410 multiplex. The computer program was also prepared by Institute personnel. This computer system was very helpful during this program to determine nine-mode FTP results immediately after completion of the tests. The reliability and repeatability of the on-line computer has been shown to be equal or better than manual chart reading and computer reduction of data.

Figure 2 shows a similar, but smaller, NDIR system for nine-mode FTP sampling and analysis to the one shown in Figure 1. This cart is located in cell three of the Army Laboratory, the site of all stationary engine operation. Both NDIR carts were subjected to a rigorous calibration according to exacting EPA requirements. Both static and dynamic gas simulator tests were run on both carts by Mr. Matt Macocha during the period of September-November, 1971.

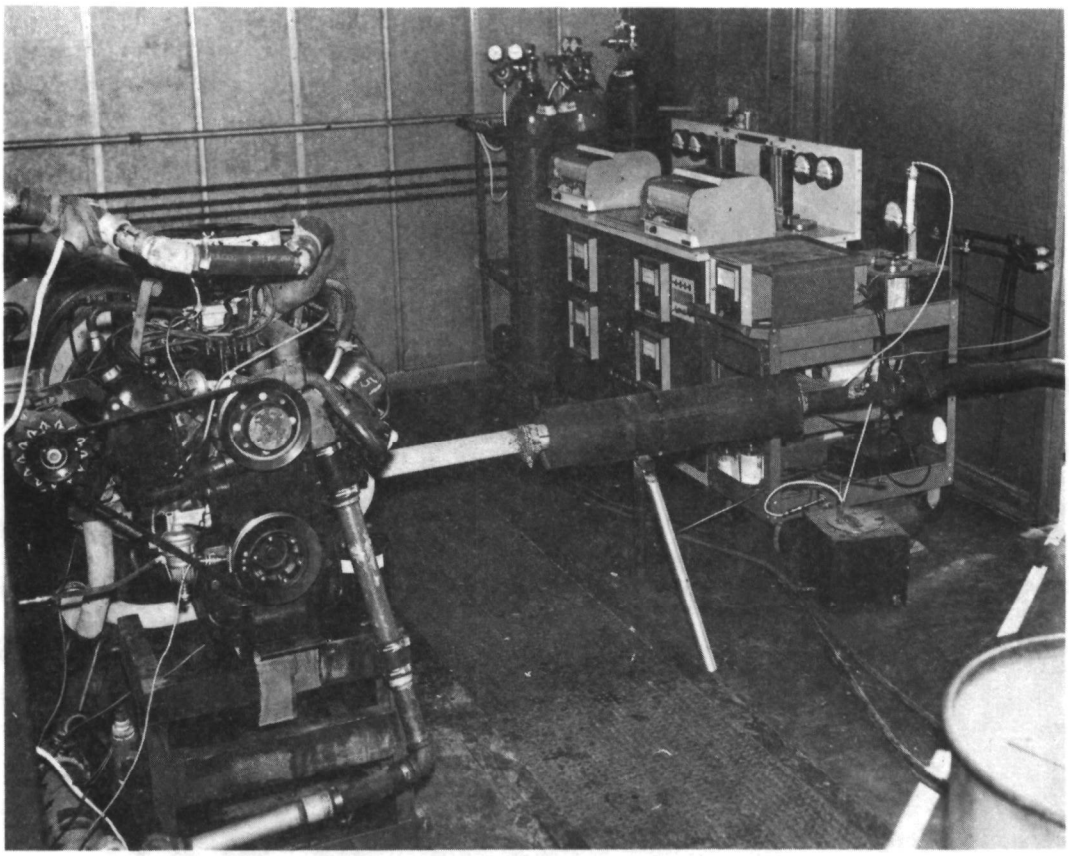


FIGURE 2. CONTINUOUS NDIR SAMPLING AND ANALYSIS SYSTEM USED IN NINE-MODE FTP OF STATIONARY-OPERATED ENGINE

Recheck of calibrations and instrument response was accomplished periodically during the course of this project by EPA. More frequent calibrations of all NDIR and FIA instruments were made to assure optimum accuracy. One of the EPA checks was to name an unknown to ±1 percent, a difficult requirement since the basic detector is only specified to ±1 percent by the manufacturer. Suffice to say that no tests were made until initial calibrations were satisfactorily completed and an EPA acceptance of time response obtained.

B. Constant Volume Sampler and Analytical Equipment

This sampling system was an EPA development using the integrated plastic (Tedlar) bag collection technique. The sampler has a nominal flow rate of 600 cubic feet per minute (cfm). The mixture of diluent air plus exhaust gas making up the total flow is cooled in a two-pass stainless steel air-to-air heat exchanger. This sampler is an enlarged version of the original EPA prototype automotive CVS. It was built and calibrated in a previous project and described in an earlier final report.[1]

Figure 3 shows the truck-size CVS located adjacent to a stationary-operated gasoline HDV engine. The CVS is in the corner of the test cell and to the immediate right is the group of NDIR and FIA analyzers, recorders, and associated sampling equipment to continuously analyze the CO, HC, CO_2, and NO in the diluted exhaust stream. Although not visible in Figure 3, the sample is obtained in front of the CVS blower at the same sample point used for bag sampling. This is shown in Figure 4, a schematic of the truck-size CVS as used in this project.

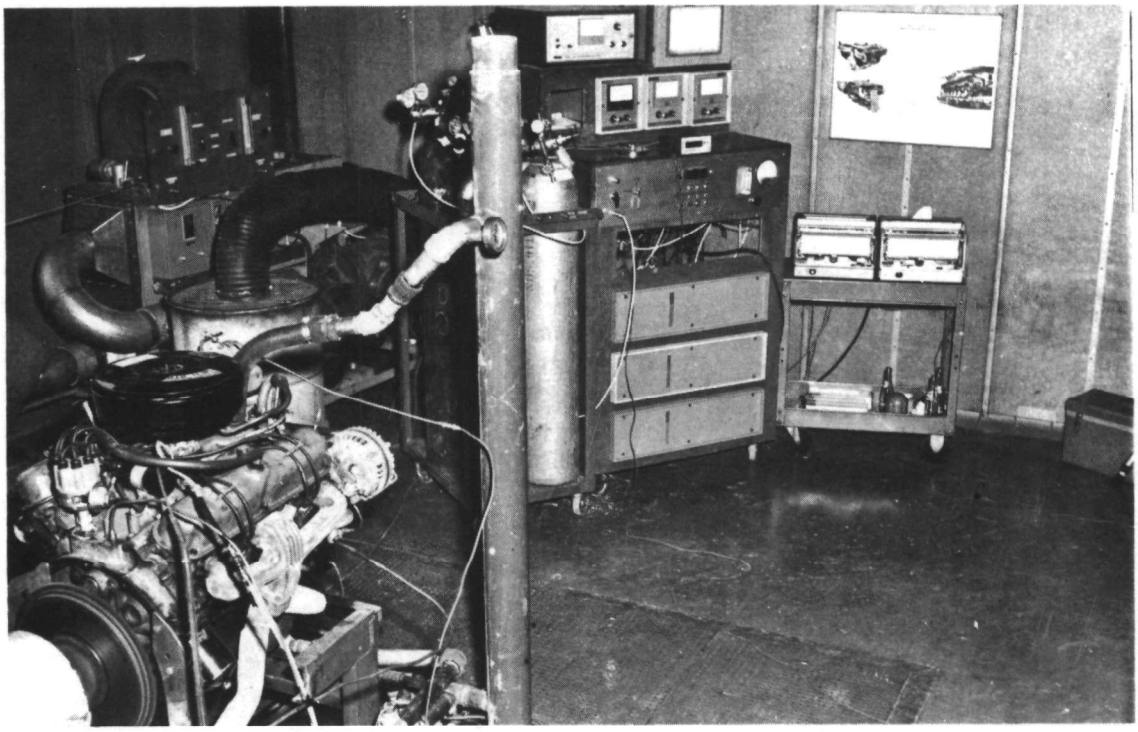


FIGURE 3. CVS AND INSTRUMENTATION USED TO ANALYZE DILUTE EXHAUST DURING CHARACTERIZATION STUDIES–STATIONARY-OPERATED ENGINE

Improvements made in the CVS for this project were to incorporate the latest type of diluent air filters as specified in the Federal regulations[6] for the passenger car, light-duty CVS. One other change, made to the system to accommodate sustained periods at high power levels, was to relocate the exhaust gas entrance. As described in the preceding project[5], the exhaust entrance was at a 90-deg angle to the diluent airflow and near the charcoal filters. These charcoal filters received heat damage at sustained operation at high power levels and the paper filters added would not survive these heat levels. So, the exhaust entrance was relocated in the 8-in. duct leaving the filter plenum box at a 45-deg angle. Located in this position, the limiting factor for sustained power levels was the ability of the heat exchanger to maintain the inlet blower temperature below 160°F.

Calibration of the CVS was accomplished using an orifice plate made according to the specifications of the **American Society of Mechanical Engineers Flow Section Handbook**[7] as the primary element. With a Meriam Micro-Manometer to measure the change in pressure in 0.001 in. of water increments, the flow was calculated. Temperature and pressure were measured at inlet conditions to the positive displacement blower, and the airflow measured at the upstream orifice plate was plotted against inlet conditions. Calibration of the airflow at the beginning and end of the project was within experimental test repeatability.

The CVS was used during dynamometer and road evaluation procedures. The only differences in the operation of the CVS was the power source. For road evaluation, a 25-kW trailer-mounted generator set was used to provide power for the CVS and related test equipment. Figure 5 shows photographs of two of the four trucks prepared for road route evaluations. Note the CVS is carried onboard the truck and the 25-kW generator is pulled behind the truck.

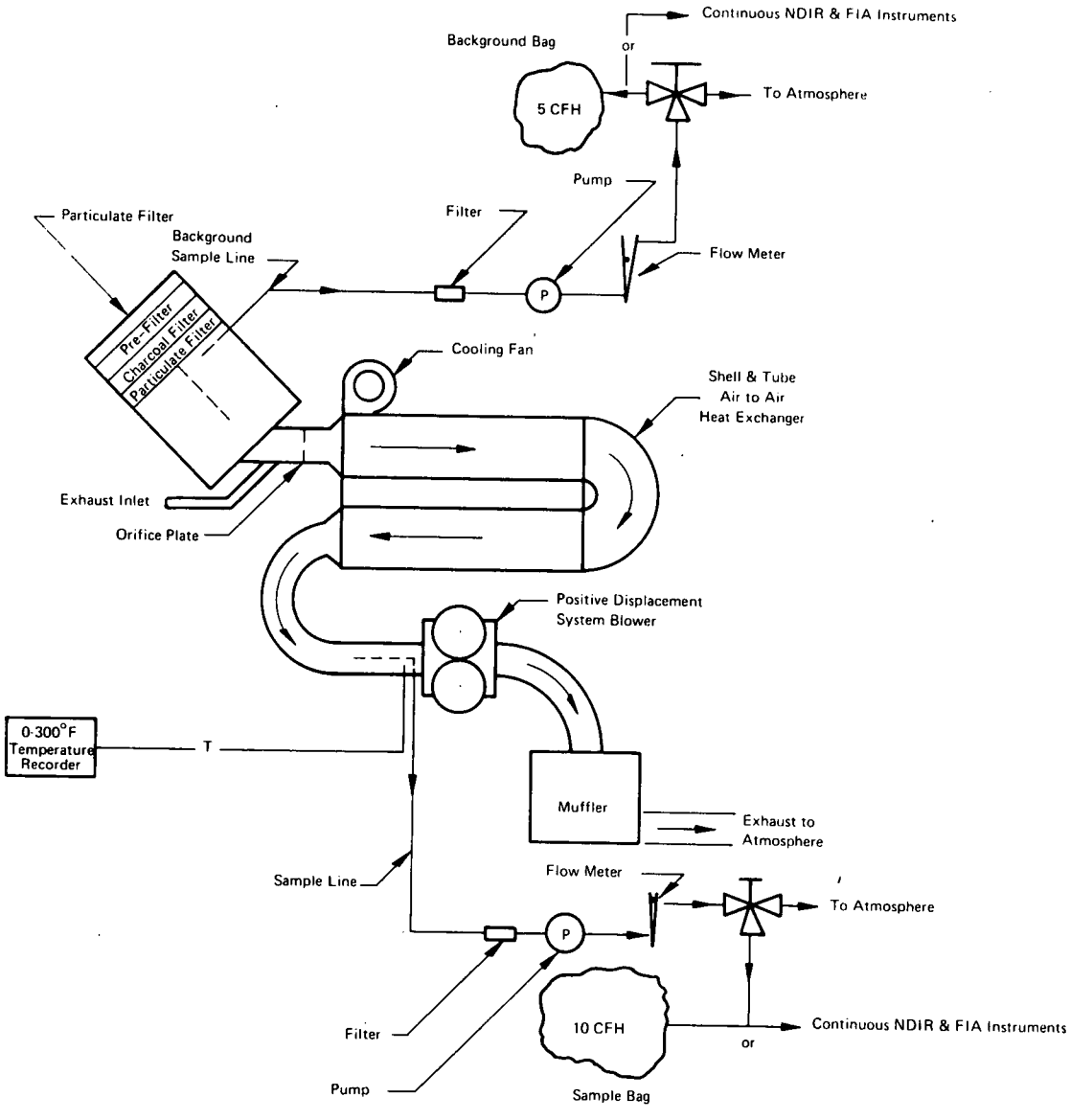


FIGURE 4. SCHEMATIC OF REVISED TRUCK VERSION
OF CONSTANT VOLUME SAMPLER

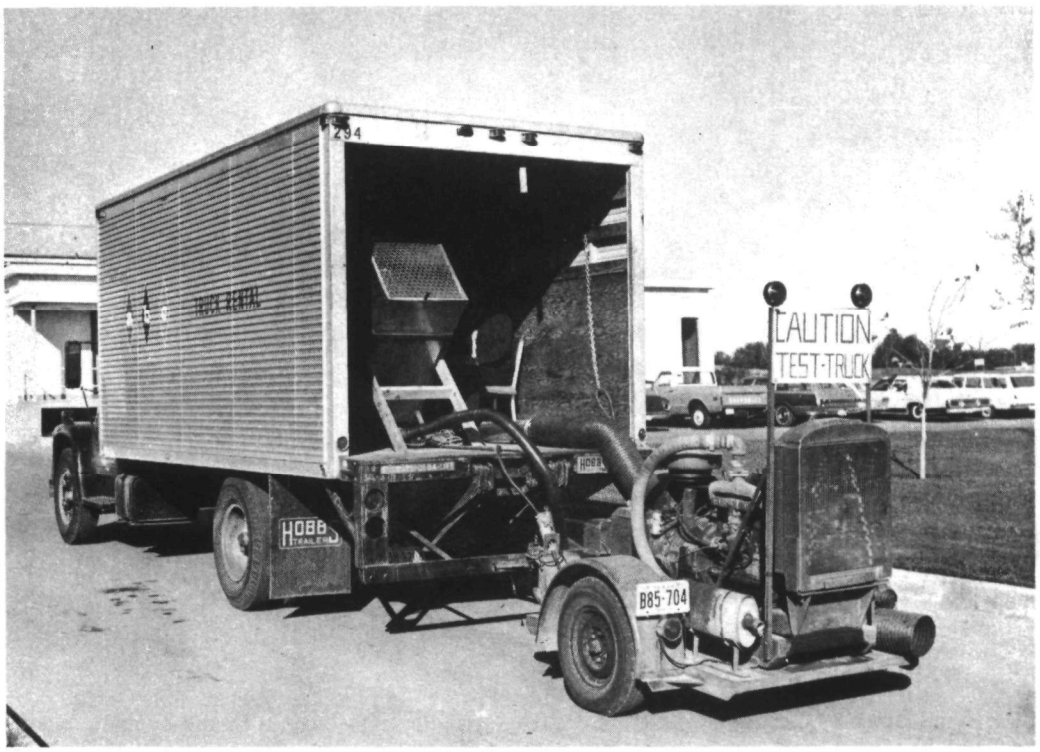


FIGURE 5. TRUCKS PREPARED FOR ROAD OPERATION WITH CVS AND 25-KW GENERATOR

The exhaust contaminants were analyzed with a Beckman 400 flame ionization analyzer (FIA) for HC, and NDIR, CO, CO_2, and NO. Full-scale values were as follows:

	Range–Full-Scale Value		
HC-FIA, ppm C	X10–100	X100–1,000	X1000–10,000
CO, ppm	R-1–3.7	R-2–4608	R-3–1998
CO_2, percent	R-1–16.73	R-2–3.18	R-3–1.83
NO, ppm	R-1–4,000	R-2–2,000	R-3–746

Chemiluminescence (CL) was not available for use until the road studies were started, and therefore the CVS data taken during the four engine-vehicle characterization studies were limited to nitric oxide by NDIR. Bag samples were not analyzed, except for the closed FTP, since the dilute concentrations were continuously monitored at the inlet of the CVS blower. Accordingly, there was no problem in measuring NO in the exhaust, the major oxide of nitrogen in combustion. Later studies were made with a Thermal Electron Corp. (TECO) Model 10A CL analyzer in the NO_x configuration ($NO + NO_2$). This type of instrument, provided by EPA, is featured in the most recent Federal regulations on automobile NO_x and a complete description of the system is given in the applicable *Federal Register.*[6] The CL method was most helpful during both the nine-mode FTP and the road studies using dilute bags.

C. Experimental 23-Mode Instrumentation

Prior to the laboratory study of the emissions from gasoline HDV engines by the 23-mode procedure, all emissions in this project had been measured using a CVS. Either bag samples or continuous dilute samples were taken at the entrance to the CVS blower. This method permitted measurement during both constant speed-load as well as transient acceleration-deceleration and circumvented some of the inherent problems with raw exhaust sampling for HC analysis by FIA and the difficult problem of exhaust mass rate measurement. Direct measurement of airflow into a carbureted engine is normally thought to interfere with carburetion and influence emission rates. Such measurements are extremely complex during transients, making the CVS an excellent sampling method for research purposes.

The use of direct stream, raw exhaust, emission sampling, and analysis instruments has ample precedent in the case of NDIR type analyzers in which a fairly dry, clean sample is analyzed. To measure CO, CO_2, and NO by NDIR, the usual continuous NDIR cart used for nine-mode FTP work was used. Although both NDIR HC analyzers (low- and high-range) were left in the system, HC by this method was of secondary importance since it is known to grossly understate the HC concentrations in most modes of engine operation. The required method is to use the FIA on the direct tailpipe raw exhaust that has not been cooled below the dew point of the water vapor contained therein. Condensation of water causes severe operational problems and it also is indicative of possible losses of some unburned hydrocarbons by condensation. For gasoline engine exhaust, the industry accepted practice is to hold the sample, sample lines, and FIA analyzer at about 150°F and, of course, no ice-water condensate trap is employed. Good operability at this temperature with an SwRI design HC analyzer had been found on another project dealing with off-road sources for EPA.

In the case of this project, it was felt that the implications of the procedure and the utilization of the results required the use of a widely available, commercially manufactured, FIA typified by the Beckman Model 400. This unit is essentially the laboratory standard for dilute bag CVS samples for light duty and was used throughout the earlier portion of this project. The approach was to make use of this analyzer without modification and thereby reduce criticism of the procedure as having to "use an instrument that no one else had." The instrument is housed in a cabinet which is automatically maintained at 120°F. Though it may be possible to raise the interior temperature to say 150°F, this was not done. The expected concentrations in raw exhaust meant that the sample flow to the burner would be excessive at the usual sample backpressure levels. A smaller sample capillary with about one-half the flow capacity was warranted to reduce upscale calibration sensitivity. Knowing this would pose some operational difficulties, the instrument was left unmodified for purposes of the test series.

To improve time response, the 400 FIA unit was located adjacent to a laboratory type oven in which was located the sample pump, particulate filter, and sample-calibrate valve. A fairly short stainless steel sample line, heated by a cylindrical heater, was controlled to maintain a 150°F gas temperature while oven temperature was held at 150°F. The sample probe was of standard design for auto exhaust and located adjacent to the probes used for the CO, CO_2, and NO sample.

To monitor the sample bypass flow, a small rotameter was connected to the effluent from the 400 FIA. Since the water vapor was still in the exhaust and as it tends to condense in the rotameter at room temperature, a small ice trap was added before the rotameter but after the sample was split from the main stream and forced through the sample capillary. This is standard laboratory practice when a flowmeter is used to help monitor sample bypass flow.

After the third engine-vehicle was evaluated using the instrument system described previously, a Thermal Electron Corp. (TECO) Model 10A chemiluminescent NO_x-NO analyzer was furnished by the Project Officer for use in measuring NO_x. At the heart of this item is the potential NO_2 at idle and light load conditions, not measured by the NDIR yet, when multiplied by the weighting factor, can be appreciable. The TECO instrument was installed next to the NDIR NO instrument and the NO sample, obtained via a separate line from the exhaust pipe, split after the ice-water trap but before the Drierite column. Part of the sample went directly into the TECO and the remainder was sent into the NDIR by way of the Drierite column. Since water vapor has a sizeable positive interference on the NDIR NO reading, a bone dry sample, commonly achieved by a chemical drying agent such as Aquasorb or Drierite has been standard practice. This item, however, has always been a controversial step in sample preparation and the recent trend has been, where possible, to use the chemiluminescent method which does not require it.

The TECO and other commercial chemiluminescent analyzers, however, were not designed to handle raw undiluted exhaust and, like the FIA, suffer from operational difficulties if the majority of the water vapor is not removed. The current chemiluminescent analyzers operate at room temperature and do well with highly diluted exhaust such as from CVS or with atmospheric samples. Raw exhaust contains the water vapor from combustion along with the intake air humidity and removal via an ice-water-type trap is necessary to prevent filling or coating the sample lines and capillary, leading to the reaction chamber, with water.

NO_2 is readily absorbed by water and the efficiency depends on residence and contact area. As the lesser of two evils, an ice-water-type trap with minimal residence time and water-to-sample contact time was used to prevent the sampling lines and other tubing, capillary, etc., within the instrument from becoming water logged. In practice, the same trap used for the NDIR was employed.

On several occasions, the effect of the trap on NO_2 was checked by flowing a known concentration of NO_2 span gas through the system at various times during the run with the trap wet and the fiberglass particulate filter "dirty." From this, it was found that on an average about 10 to 15 percent of the NO_2 was lost, making all measurements of NO_2 subject to this error. The only "fix" that seems reasonable would be to heat the sample line, pump, etc., from point of sample to entrance of the sample into the reaction chamber. This will be fairly difficult to do with the TECO and other instruments of that type embodying the Ford design while the EPA design, as being built by SwRI, will be easier to do.

Figures 6 and 7 show a number of views of the instruments used with the 23-mode procedure for stationary- and chassis-operated engines. The tall cabinet in Figure 6 houses the TECO CL and Beckman NDIR NO instrument and flow system recorder, etc. This cabinet is located to the right of the continuous NDIR cart shown earlier. To the right of this cabinet is a tan-colored laboratory oven in which the FIA HC pump, filter flow switching valve, etc., were located and held at 150°F. The low instrument to the right of the oven in one view is the Beckman 400 FIA HC analyzer. One view shows the fuel weigh scale, beaker, weights, etc., in front of the engine for fuel consumption measurement.

Figure 7 shows the same set of instruments located in the high bay gasoline chassis dynamometer area of the Emissions Research Laboratory. One view shows the continuous NDIR cart and CL-NO_x, NO-NDIR

FIGURE 6. INSTRUMENTATION USED TO MEASURE RAW EXHAUST DURING 23-MODE PROCEDURE TEST–STATIONARY-OPERATED ENGINE

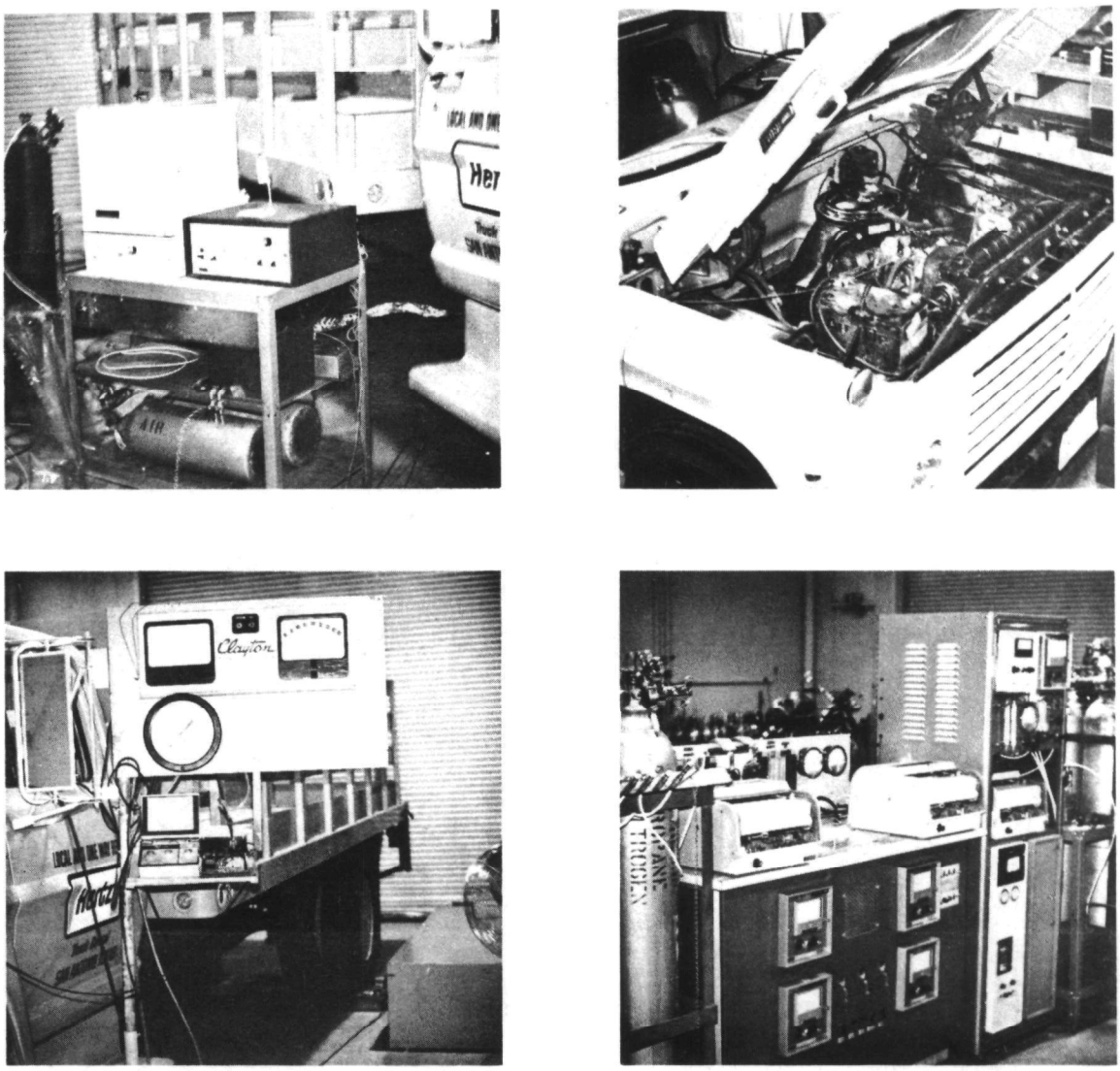


FIGURE 7. INSTRUMENTATION USED TO MEASURE RAW EXHAUST DURING 23-MODE PROCEDURE TEST–CHASSIS-OPERATED ENGINE

cabinet. Another view shows the oven and FIA instrument used for HC analysis adjacent to a truck. Note the insulated sample line running to the rear of the truck cab. The other two views are of one of the nine trucks mounted on the chassis dynamometer and prepared for test. Note the large round vacuum gauge in the dynamometer control panel. This gauge was used in the stationary dynamometer runs and was then carried with the engine for chassis testing. This vacuum gauge was the primary instrument for running identical flywheel power levels on the chassis dynamometer since engine power output is very difficult to obtain on a chassis-installed engine.

D. Road Route Instrumentation

Transducers and related test equipment were similar laboratory devices used in original studies on the San Antonio road route.[5] Fuel measurements were taken with fuel scales and timers. Manifold vacuum was measured with Bourdon-tube-type vacuum gauge calibrated against a column of mercury. Engine rpm was measured with Sun electronic tachometers calibrated against the Standard Electric Tach used as a readout on the stationary dynamometer. During the road route evaluation engine rpm, manifold vacuum, throttle position, and wheel speed were recorded on strip-chart recorders. The engine rpm was measured as described above. Manifold vacuum levels were converted to DC signals via a Statham strain gauge transducer. Throttle position was obtained via a linear potentiometer. Vehicle speed was measured using a Labeco fifth wheel.

While the last truck was being evaluated on the road courses, a direct digital data acquisition system was being demonstrated. This digital data acquisition system, a Metrodata 620A, was used successfully and SwRI has purchased a similar system for use on future projects. The 620A system is portable, lightweight, 18 lb, and records 20 channels of data. Two of the 20 channels record hours, minutes, and seconds. The data acquisition rate is 2.4 scans per second. One scan is defined as obtaining data from each of the 20 channels and recording it on magnetic tape, providing 48 recordings or data points per second.

Figures 8 and 9 document the use of transducers, strip-chart recorders, and fuel consumption measuring equipment typically installed in a gasoline truck during the road study. The equipment shown in Figure 8 was relocated from the seat to the van with recorders, etc., operated by the technician who rode in the van and operated the CVS. The Metrodata portable magnetic tape data recorder was also located in the van adjacent to the CVS operator. Fuel container and three-way valve remained in the truck cab as shown.

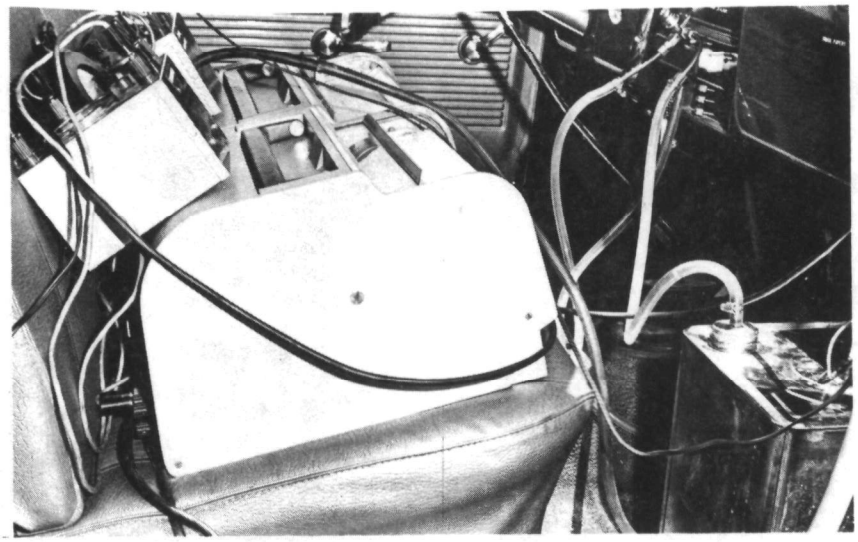


FIGURE 8. MANIFOLD VACUUM, VEHICLE AND ENGINE SPEED, AND THROTTLE POSITION INSTRUMENTATION AND RECORDERS

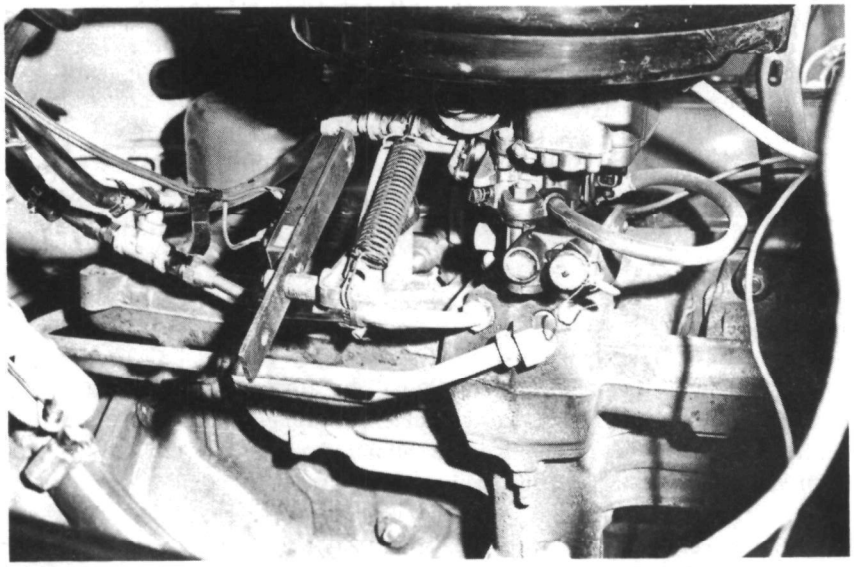


FIGURE 9. ENGINE CARBURETOR THROTTLE POSITION LINEAR TRANSDUCER

IV. DESCRIPTION OF DYNAMOMETERS

The two dynamometers used during this project were an all-electric Eaton Dynamatic stationary dynamometer and a Clayton CT-200 with an SwRI-designed inertia system and motoring capability.

A. Stationary Dynamometer

The all-electric Eaton Dynamatic dynamometer used in this project is located in the U.S. Army Fuels and Lubricants Research Laboratory at SwRI. The dynamometer and a typical engine installation are shown in Figures 2 and 3. This dynamometer is capable of 300 hp absorbing from 2100 to 5000 rpm and 50 hp motoring with a maximum speed of 3500 rpm for motoring.

B. Chassis Dynamometer and Inertia System

The SwRI chassis dynamometer system used in this and previous projects was a modified Clayton CT-200 series dynamometer shown in Figures 10 and 11. Up to 200 hp may be absorbed with this water brake-type of absorber. This system incorporates a 50-hp, three-phase, AC electric motor that, when engaged, will maintain a constant rear wheel speed during power and closed throttle (CT) operation. The electric motor is coupled to the front roll of the chassis dynamometer with a positive drive belt. The vehicle engine speed can be changed by changing vehicle rear wheel speeds either by operating in a different transmission drive gear or changing motor drive pulleys.

The dynamometer also has a research-type inertia capability which can be connected to simulate weights ranging from 1,500 to 16,00 lb at 250-lb increments. This somewhat unique arrangement is shown in Figure 10 and is the same system used in the previous two gasoline HDV projects sponsored by EPA.

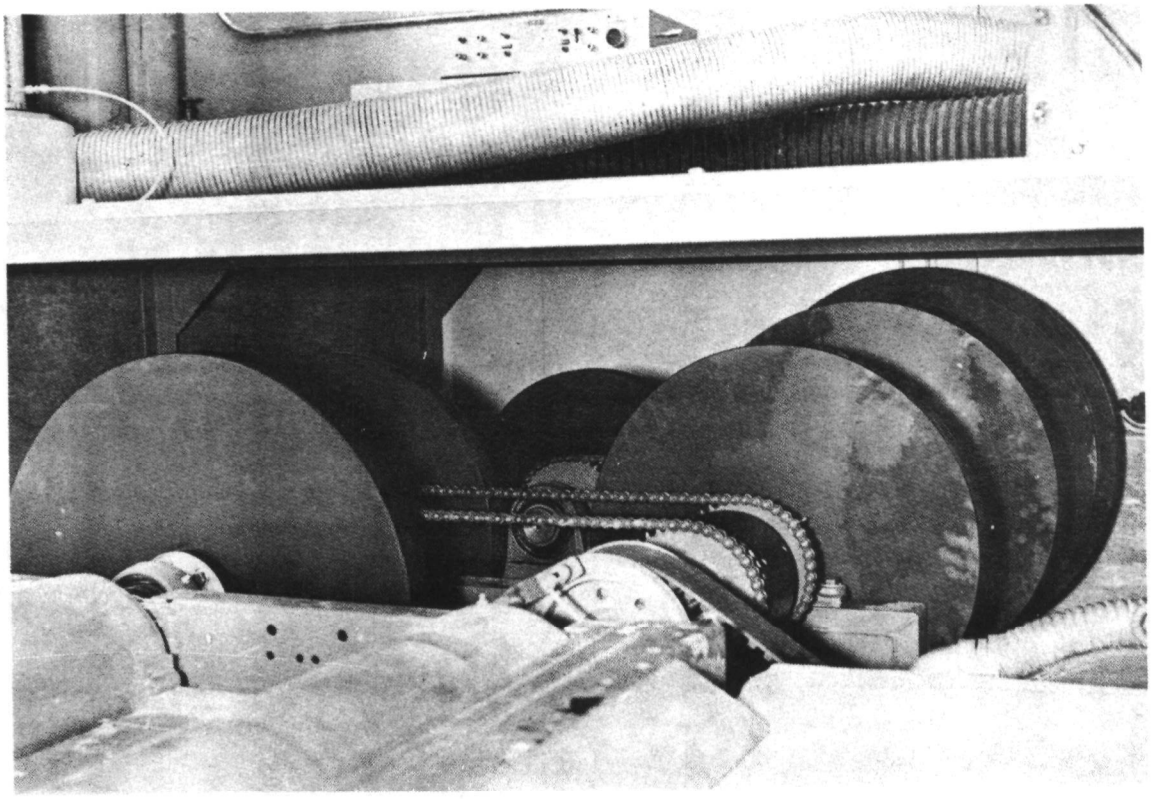


FIGURE 10. SOLID DISC FLYWHEEL INERTIA SYSTEM CAPABLE OF SIMULATING 1,500- TO 16,000-LB INERTIA IN 250-LB INCREMENTS

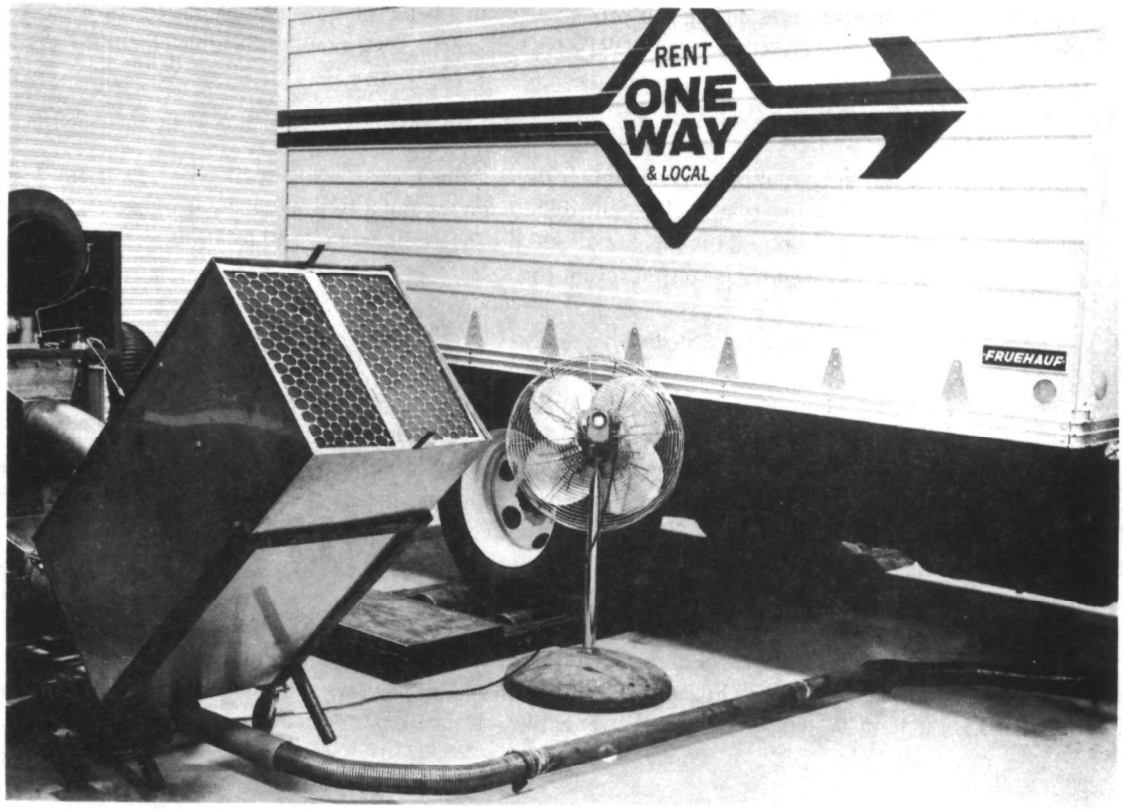


FIGURE 11. CVS AND INSTRUMENTATION USED TO MEASURE EMISSIONS FROM CHASSIS-OPERATED ENGINES

Figure 11 shows two views of two of the four trucks evaluated during the characterization and road phases of the project. The top photograph shows a 1969 IHC 304 CID truck prepared for test by the CVS which is located to the left and at the rear of the truck. In the background may be seen the low-range instrument cart used to analyze continuously obtained dilute samples of exhaust taken from the CVS blower inlet. The lower view is a side view of a 1969 Ford 300 CID truck mounted on the dynamometer rolls. In the foreground is the CVS dilution air filter housing containing the prescribed particulate and activated charcoal filters for cleanup of the diluent. Note the stainless steel exhaust pipe located on the floor connecting the engine exhaust to an offset Tee below the filter plenum.

V. DESCRIPTION OF TEST VEHICLES AND PREPARATIONS

A. Vehicles-Engines Tested

A total of 14 different vehicles were used to obtain emissions data for this program. Four vehicles and their engines were used in obtaining the extensive emissions characterization on the chassis and stationary dynamometers. Two of these vehicles were also used in the road route evaluation. Two additional vehicles were required due to the unavailability of two originally tested trucks. Nine trucks were used in the stationary and chassis evaluation of the experimental 23-mode procedure. Table 1 is a chronological listing of the trucks used during this program. None of the vehicles were selected on the basis of their emission rates, etc., but rather reflect a randomly obtained sample of in-service units. Because of the extensive outage period for most of the tests, rental-lease vehicles were used except in two cases.

TABLE 1. DESCRIPTION OF GASOLINE-POWERED TRUCKS TESTED

Truck	Year	Make	GVW	CID	Cyl.	Body	Date	Mileage	Source
Stationary-Chassis Emission Characterization Trucks									
1	1969	Chevrolet	10,000	250	I-6	Stake	10-70	21,800	Avis
2	1969	IHC	24,000	304	V-8	Stake	2-71	24,000	ABC
3	1969	Ford	15,000	300	I-6	Van	3-71	17,000	Ryder
4	1969	Dodge(1)	23,000	318	V-8	Stake	5-71	33,000	O. R. Mitchell
Road Route Trucks									
1	1969	Dodge(1,2)	23,000	318	V-8	Stake	8-71	33,000	O. R. Mitchell
2	1969	Ford(2)	15,000	300	I-6	Van	9-71	18,000	Ryder
3	1969	IHC	22,000	304	V-8	Van	10-71	33,500	ABC
4	1969	Chevrolet	18,000	350	V-8	Van	11-71	9,100	E-Z Haul
Experimental 23-Mode Procedure Trucks									
1	1970	Ford(1,3)	10,000	300	I-6	Stake	8-71	8,200	Hertz
1A	1970	Ford(1)	15,000	300	I-6	Van	11-71	9,600	Ryder
2	1970	Ford(1,3)	7,500	240	I-6	Pickup	8-71	22,500	Hertz
3	1969	Dodge(1,2)	23,000	318	V-8	Stake	9-71	33,500	O. R. Mitchell
4	1970	White(1)	30,000	400	I-6	Tractor	11-71	25,300	ABC
5	1971	Ford(1)	23,000	330	V-8	Stake	11-71	800	Hertz
6	1970	Chevrolet(1)	18,000	350	V-8	Van	12-71	11,300	E-Z Haul
7	1970	IHC(1)	16,000	345	V-8	Van	12-71	9,800	ABC
8	1971	IHC(1)	32,000	478	V-8	Tractor	1-72	20,200	ABC
9	1970	Chevrolet(1,3)	14,000	292	I-6	Van	1-72	5,000	City Parks and Recreation Dept.

(1) Emission control equipped.
(2) Emissions characterization test vehicle.
(3) Automatic transmission equipped.

B. Vehicle-Engine Preparation

The four trucks used in the emissions characterization study received new plugs, points, condenser, fuel filters, and oil change prior to any emissions testing. Carburetors were replaced on the Ford and Dodge at the start of testing. The distributor was also replaced on the Dodge. The vehicles selected for this program were generally in above-average vehicle-engine condition.

The vehicles used in the road route study required only a minor tune-up. As noted previously, two of the four vehicles were the same ones used in the characterization study and required no adjustments during the minor tune-up. The other two vehicles were selected because of their condition and were in above-average condition. The 1969 Dodge truck was the only vehicle which required in-chassis preparation. The truck was leased as a "cab and chassis" without a body.

Except for the 1969 Dodge, which incidentally was "emission control equipped," the vehicles used in the 23-mode evaluation were 1970 or later model year trucks. Other than to insure the engines were tuned to factory specifications, they required no maintenance. In all uncontrolled vehicles with the 1969 Ford, IHC, and Chevrolet 350 and 250 CID engines, the engines were adjusted to factory specifications. The 1969 Dodge and all 1970 and 1971 model year vehicles were adjusted to factory specifications and tune adjustments given on the required EPA (formerly HEW) tune-up specification sticker on the engine.

C. Fuel Description

The fuel used during all emissions tests met the requirements of the *Federal Register*.[4] A typical fuel analysis of the fuel used and purchased locally is given in Table 2.

TABLE 2. INSPECTION OF LEADED PREMIUM MOTOR GASOLINE USED FOR ALL TESTS

Gravity, deg API(D287)	59.3
Distillation Range (D 86)	
Initial Boiling Point, °F	88
5% Point, °F	116
10% Point, °F	127
20% Point, °F	150
30% Point, °F	175
40% Point, °F	200
50% Point, °F	220
60% Point, °F	235
70% Point, °F	254
80% Point, °F	276
90% Point, °F	305
95% Point, °F	327
End Point	340
% Recovery	98.0
% Residue	1.0
% Loss	1.0
Octane No., Research (D1656)	103.4
Total Sulfur, % wt (D1266)	0.004
Reid Vapor Pressure, psi (D323)	9.1
Hydrocarbon Composition (D1319)	
Olefins, %	0.4
Aromatics, %	27.3
Saturates, %	72.3
Lead (Organic) g/gal (D526)	3.271
Phosphorus, Theory	0.0
Oxidation Stability (D525)	600+
Existent Gum, mg (D381)	0.6

VI. DESCRIPTION OF ROAD ROUTES

A. Purpose of Four Road Routes

In the previous project, it was reported[5] that operation over the San Antonio road route, a composite of many types of driving, resulted in CVS emissions not substantially different from CVS closed cycle nine-mode FTP results. This was a somewhat unexpected result, and it was wondered whether the cause was the selection of the route or coincidence. One question was concerned with whether or not *any* road course operation would relate as well. Or, put another way, it is the CVS method of sampling and analysis sensitive to road operation? To answer some of these questions and to determine the effects of type road operation, etc., on emission rate, four routes were formulated to be grossly different yet somewhat representative and realistic of common types of everyday driving. There was no attempt made on any of the routes selected to represent any Federal cycle or previously conceived road routes.

B. Route Description

In selecting the four road routes, the criterion was to make the driving pattern for each road route as unique as possible yet retain realism to actual driving. The four road routes, shown in Figures 12 through 15, were in the immediate vicinity of Southwest Research Institute. In two of the four routes, sampling terminated at the Emissions Laboratory entrance.

1. Stop-and-Go Route

Figure 12 shows the 22 stops made in one complete circuit covering 4.434 miles. In order to obtain a 15-min minimum sampling time, two complete circuits of the course were made. When accelerating from any stop, the driver would start in the normal low gear (second gear) and accelerate at WOT to the "normal" shift point. The driver then shifted into third gear and accelerated at WOT to 25 mph. He maintained this 25-mph speed, the maximum speed for this route, until CT deceleration and braking were required for the next stop. The procedure was then repeated.

2. Slow-Speed Route

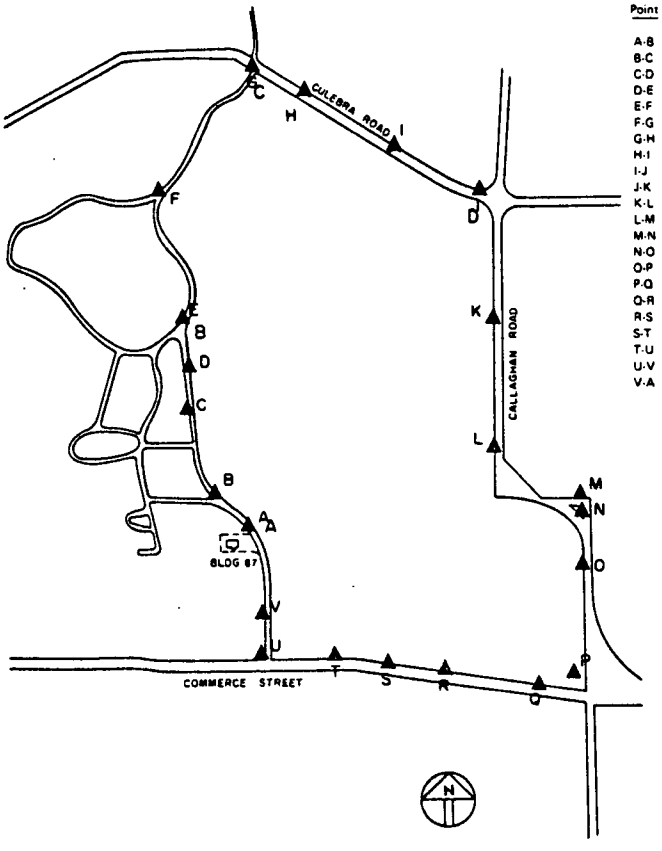
Figure 13 illustrates the road route for the slow-speed course. The basic course was the same as the stop-and-go route of Figure 12. The only difference was that all stops were eliminated except the three posted stop signs for traffic control. A speed of 25 to 30 mph was maintained during the road route. Again, the course was driven twice for one complete test in order to achieve the minimum 15-min sampling time.

3. Intermediate-Speed Route

Figure 14 shows the intermediate-speed road route. As shown in Figure 14, point E is the only traffic stop sign on the route. Points B, C, and F are traffic yield areas. With a speed of 40 to 45 mph around the course, two circuits were necessary to obtain the desired sampling time.

4. High-Speed Route

The high-speed road route (50 to 60 mph), shown in Figure 15, was driven on an interstate four-lane highway. The sampling began at point A and was diverted only during the turnaround at point I. Sampling for the high-speed route terminated at point C for a total distance traveled of 17.28 miles. The truck continues to point J, the back entrance to SwRI. One complete circuit was required to obtain the minimum sampling time.



Point	Mileage, Point-to-Point	Mileage, Cumulative
A-B	0.104	0.104
B-C	0.120	0.224
C-D	0.118	0.342
D-E	0.120	0.462
E-F	0.227	0.689
F-G	0.325	1.014
G-H	0.112	1.126
H-I	0.203	1.329
I-J	0.181	1.510
J-K	0.229	1.739
K-L	0.240	1.979
L-M	0.245	2.224
M-N	0.021	2.245
N-O	0.116	2.361
O-P	0.204	2.565
P-Q	0.079	2.644
Q-R	0.190	2.834
R-S	0.109	2.943
S-T	0.105	3.048
T-U	0.140	3.188
U-V	0.073	3.251
V-A	0.183	3.434

FIGURE 12. STOP-AND-GO ROUTE (25 mph max)

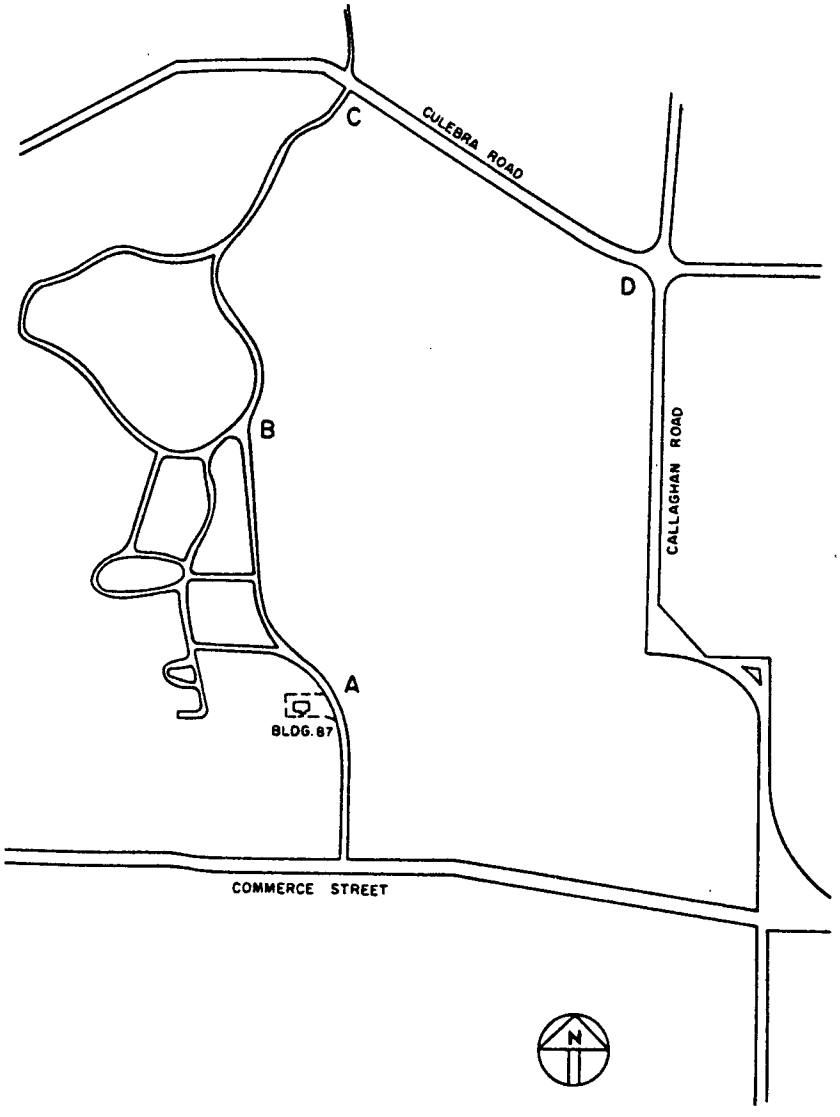
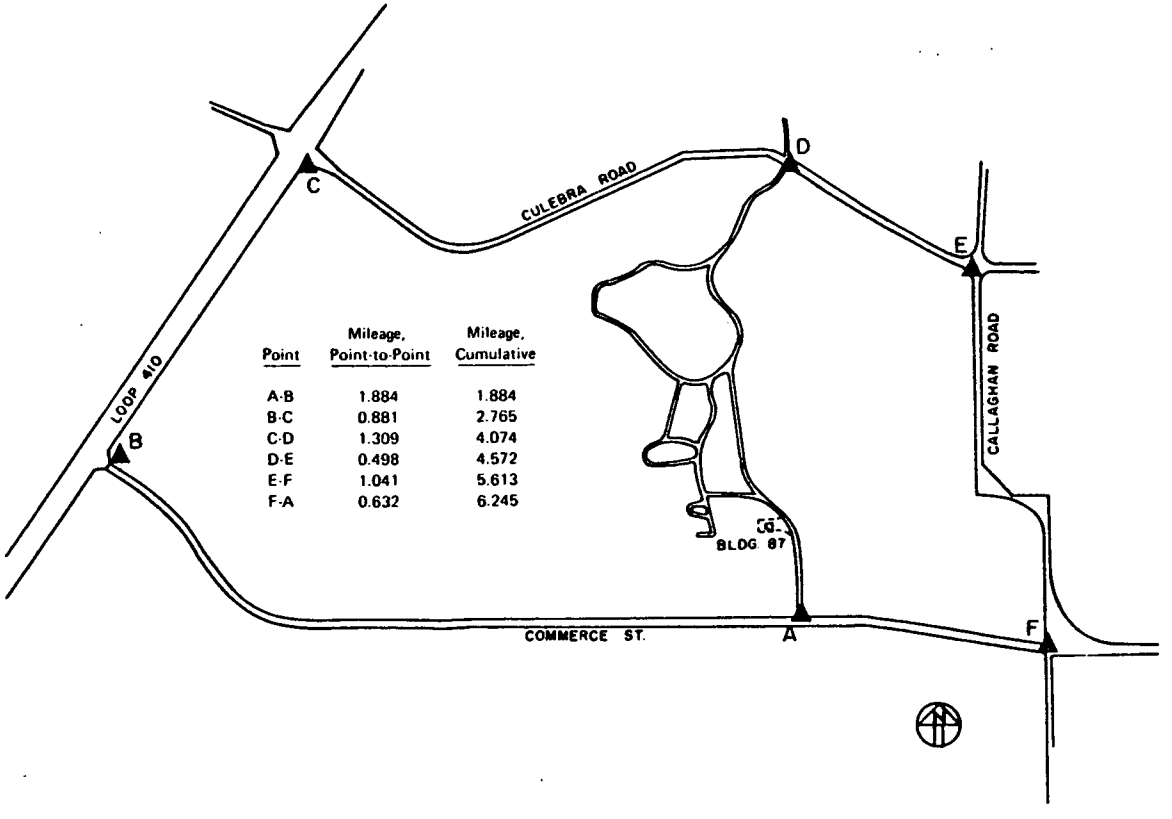
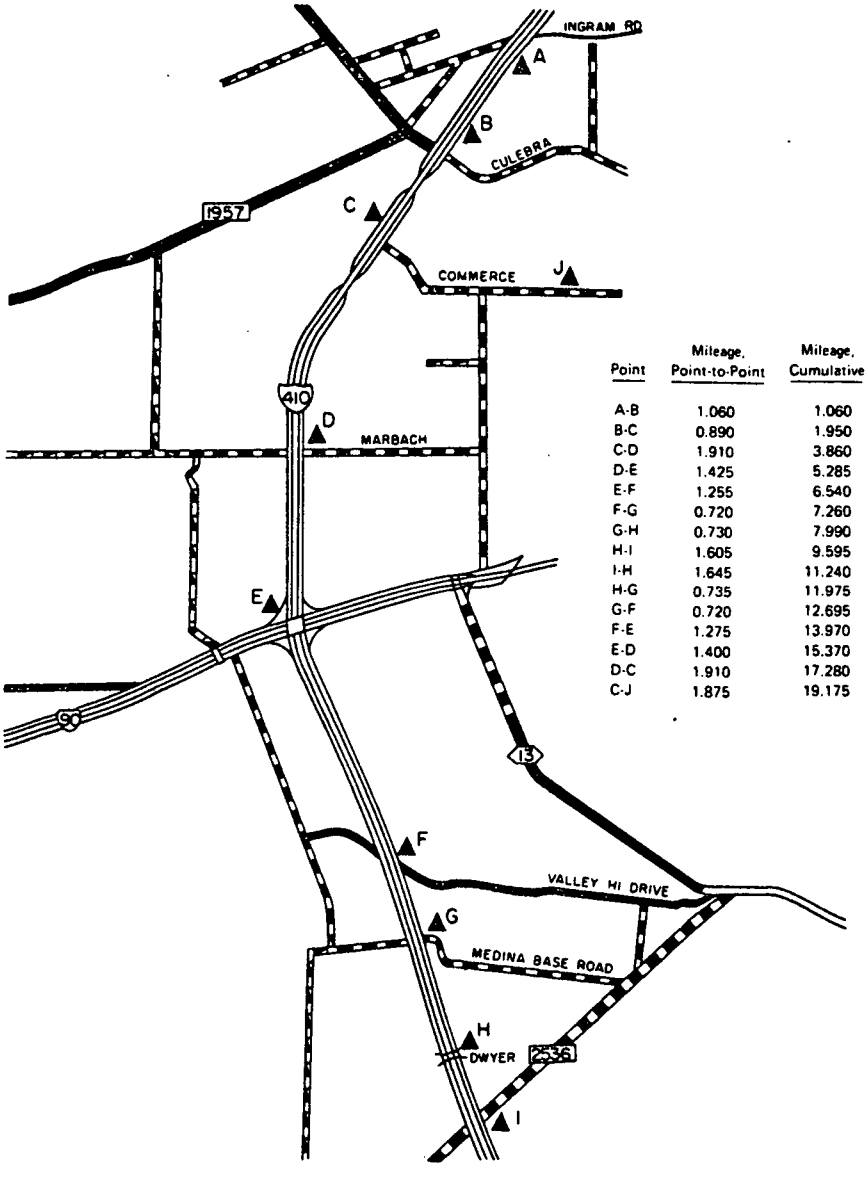


FIGURE 13. SLOW-SPEED ROAD ROUTE (25 to 30 mph)



Point	Mileage, Point-to-Point	Mileage, Cumulative
A-B	1.884	1.884
B-C	0.881	2.765
C-D	1.309	4.074
D-E	0.498	4.572
E-F	1.041	5.613
F-A	0.632	6.245

FIGURE 14. MEDIUM-SPEED ROAD ROUTE (40 to 45 mph)



Point	Mileage, Point-to-Point	Mileage, Cumulative
A-B	1.060	1.060
B-C	0.890	1.950
C-D	1.910	3.860
D-E	1.425	5.285
E-F	1.255	6.540
F-G	0.720	7.260
G-H	0.730	7.990
H-I	1.605	9.595
I-H	1.645	11.240
H-G	0.735	11.975
G-F	0.720	12.695
F-E	1.275	13.970
E-D	1.400	15.370
D-C	1.910	17.280
C-J	1.875	19.175

FIGURE 15. HIGH-SPEED ROAD ROUTE (50 to 60 mph)

5. Alternative Intermediate-Speed Route

In addition to the four road routes evaluated, an additional route was added. The maximum speed and the distance traveled remained as they were in the original route. The modification was the location of the route, now on the high-speed course. Referring to Figure 15, the route started at point B, continued to point H and then returned to point C. This route's total mileage was 12.970 as compared to 12.490 for the standard intermediate-speed route. However, sampling was limited to vehicle speeds above 40 mph only. This sampling limitation effectively made the distance traveled the same as the intermediate-speed route. Distance was obtained on each road route via a Labeco Magnetic Counter.

VII. TEST PROCEDURES AND CALCULATION METHODS

There were four basic test procedures and calculation methods used during this program. Listed below are the test procedures and the basic calculation method used for each major item of study.

Test Procedure	Test Procedure and Calculation Method
Characterization	Direct mass via CVS, continuous raw concentration via nine-mode
Road route study	Direct mass via CVS bags
23-Mode evaluation	Brake specific via raw concentration and measured power

The test procedure and method of calculation are discussed in detail for each major portion of study.

A. Emission Characterization of Four Vehicles-Engines

1. Stationary Dynamometer Tests

The engine was removed from the truck and mounted on a stationary test bed. Using the CVS, a sample was taken at the inlet to the blower and analyzed continuously for CO, NO, and CO_2 via NDIR and HC by FIA during the following conditions:

(a) Map of load and speed at 1000 (1250), 1500, 2000, 2500, 3000, and 3500 rpm in 10-percent power output increments from 0 to 100 percent power. Closed throttle motoring tests at each speed and cold, warm, and hot idle conditions were also run. This map was made at each speed in increasing load increments and then in decreasing load increments to assure reliability of the data point and to study history effect. Each mode required 3 min; the first 15 to 30 sec to set load and speed controls, the next 90 to 105 sec to stabilize with emissions recorded and averaged over the last 1 min of each mode's run. The results were reduced to g/min, g/lb fuel and, where power was produced, in g/bhp-hr.

(b) Replicate Federal nine-mode constant speed procedures (FTP) were run using the required continuous raw exhaust NDIR sampling and analysis train. The charts were read and reduced following standard practice and reported in ppm HC and NO and percent CO. Simultaneously, a CVS bag sample was obtained for the entire 20-min run (closed cycle), read using suitably spanned FIA HC, NDIR NO, CO, and CO_2 instruments and calculated in terms of grams per test. The current nine-mode Federal test procedure is described in Table 3 with the chassis version listed below the stationary schedule. It is in reality a six-mode engine exercise.

TABLE 3. CURRENT FEDERAL NINE-MODE CONSTANT SPEED PROCEDURE FOR HEAVY-DUTY GASOLINE TRUCKS

Sequence Number	Manifold Vacuum	Time in Mode, sec	Cumulative Time, sec	Weighting Factors
1	Idle	70	70 (1:10)	0.036
2	16 in. Hg	23	93 (1:33)	0.089
3	10 in. Hg	44	137 (2:17)	0.257
4	16 in. Hg	23	160 (2:40)	0.089
5	19 in. Hg	17	177 (2:57)	0.047
6	16 in. Hg	23	200 (3:20)	0.089
7	3 in. Hg	34	234 (3:54)	0.283
8	16 in. Hg	23	257 (4:17)	0.089
9	Closed Throttle	43	300 (5:00)	0.021
Engine Speed, 2000 ± 100 rpm.				
An initial 5-min idle, two warmup cycles, and two hot cycles constitute a complete dynamometer run.				

2. **Chassis Dynamometer Operation**

With the engine reinstalled in vehicle, the following tests were run:

(a) Run replicate Federal nine-mode constant speed procedures using the chassis dynamometer version of the stationary procedure. This was mainly a repeat of item 1(b) except the engine was installed in the vehicle. Concentration values for the test for CO, NO, and HC were obtained. Simultaneous CVS bag results were also obtained and expressed in grams per test.

(b) Obtain a modified emissions map at 1000 (1250), 2000, and 3000 rpm throughout the 0- to 100-percent output range using manifold vacuum versus percent power as determined during 1 (a) for operation of the vehicle. Cold, warm, and hot idle emissions were obtained as well as various CT constant speeds within capability of the chassis machine. Three-min modes were run and g/min was the method of expression.

(c) Transient operation during wide open throttle acceleration of the vehicle using several inertias simulating the empty vehicle, loaded vehicle, and moderately loaded vehicle were studied. The accelerations through the gears were made starting in low gear, starting in second, starting in third, etc., with normal upshifting through all speed ranges. Such operation resulted in accelerations ranging from very short up to relatively long, during which time the continuous CVS sample was monitored for CO, CO_2, and NO by NDIR and HC by FIA. Engine rpm, vehicle mph, and engine vacuum were measured continuously on a strip chart. Mass emissions during each acceleration were determined by obtaining a time average or mean emission value and dividing this by the time length of the acceleration to express the contaminant on a g/min basis. Repetitive accelerations were run to study repeatability of results.

(d) Transient operation during CT deceleration was studied. The deceleration was in high gear from high engine speed down to as low an engine speed as possible, prior to driveline chatter, with rpm and mph continuously monitored by strip chart. CVS dilute traces acquired during the rundown were time-averaged (mean), multiplied by the appropriate density and CVS airflow to determine g/min CO, CO_2, NO, and HC. Several inertia simulations of empty, moderately loaded, and loaded vehicle weight were run and run repetitively to study repeatability. Charts were read on 1-sec intervals manually.

3. **Fuel Rate, Power Output, Etc.**

Fuel rates were obtained by measuring the elapsed time to consume a known weight of fuel. Observed brake horsepower was calculated from direct flywheel torque at a given engine condition. At a given engine condition on the stationary dynamometer, the manifold vacuum was also recorded. Since there is no convenient means of directly measuring flywheel torque of an engine mounted in a chassis, the manifold vacuum levels recorded for a given engine condition on the stationary dynamometer were used as an acceptable method of establishing the power condition on a chassis dynamometer.

Mass results were arrived at by using the CVS sampler with a sample bag flow rate at 10 scfh and background flow at 5 scfh. Inlet temperature at the Roots blower was continuously recorded on a strip-chart recorder during each test. The average temperature at the blower inlet for each test was determined from the temperature trace. By using a table listing the temperature versus scfm determined for this system, average airflow during each test was obtained. With the concentrations, densities, and airflow known, mass results were then computed using formulae equivalent to those given in the *Federal Register*[6] for light-duty CVS results.

B. Four Truck Road Routes Study

The four road routes studied in this project were all adjacent to SwRI, making the experiments as rapid and repeatable as possible. The truck was prepared for road operation by performing a minor tune-up and adjustment to factory specifications. Next, the vehicle was weighed empty and after loading with the CVS, trailer hitch, and other items of equipment. Drums of water were added to bring the loaded weight to that equal to the empty weight plus one-half of the payload (difference between GVW and empty weight).

Transducers for throttle position, intake manifold vacuum, engine speed, and vehicle speed were then installed and connected to suitable bridge circuits, etc., for display on two two-pen Texas Instruments wide chart, overlapping pen, strip-chart recorders. These millivoltage signals were connected to an analog-type digital magnetic tape recorder during test of the last truck. A description of this item and its data rate was given in Section III of this report.

Fuel consumption during each road route was obtained by weighing a 5-gal size fuel container before and after each run. A three-way valve allowed the vehicle to operate on tank fuel during operation on other than the road route. Elapsed time was measured during each test with a stopwatch. Mass results were arrived at using the CVS sampler with a sample bag flow rate at 10 scfh and background flow at 5 scfh. Inlet temperature at the Roots blower was continuously recorded on a strip-chart recorder during each test. The average temperature at the inlet to the blower for each test was determined from the temperature trace. By using a table listing temperature vs scfm, determined for this system, average airflow during each test was obtained. With the concentrations, densities, and airflow known, mass results were then computed as per the earlier referenced *Federal Register*[6] formulae for light-duty CVS.

C. Experimental 23-Mode Evaluation

The experimental 23-mode procedure was born from the desire to make gasoline and diesel engine emissions test procedures as similar as possible in terms of operating conditions and methods of expression. The philosophy was that in many cases the gasoline and diesel engines in trucks above 6000-lb GVW, especially between 16,000- and 26,000-lb, are in direct competition and, consequently, their emission of air pollution should be directly or as directly comparable as possible. The speed-load mapping carried out in the initial phase of this project pointed toward the need to have a variety of power points throughout zero to full load. The 13-mode California and ARB procedure for diesel engines features measurement at zero, 25, 50, 75, and 100 percent power at two speeds plus low idle, repeated three times. The previously reported values for the four gasoline engines of this project mapped at 10-percent power points clearly indicate the need for finer power levels than the EMA diesel procedure in order to adequately define HC, CO, and NO_x emission rates.

1. Basis for and Description of 23-Mode Procedure

A decision was reached with the Project Officer to investigate a 21-mode procedure contained in the 23-mode schedule described in Table 4. The 21-mode procedure was quite similar to the EMA 13-mode diesel schedule except with the addition of four more power points or modes at 12-1/2, 37-1/2, 62-1/2, and 87-1/2 percent power at both speeds. There was lengthy discussion over the choice of engine speeds since there is no such thing as rated speed for gasoline engines in the sense of a truck diesel engine. By this is meant that a gasoline engine rated to produce a given hp at say 4400 or 4600 rpm is really unusable as a real operational upper speed. Governed speed and rated speed for those engines thus advertised or sold with governors run the gamut from about 2/3 to 3/4 of the advertised top speed and, for a number of makes, optional speed governing can be obtained at a variety of speeds for the same engine. Clearly, the same rated and intermediate-speed definitions used with the diesel did not apply to the gasoline engine in truck operation.

The current nine-mode FTP is at constant 2000 ± 100-rpm engine speed and was described in Table 3. Overall evaluations of the five trucks operated over the San Antonio HDV road route, see Reference 5, illustrated that the overall average speed was nearer 1500 to 1600 rpm. Though the route included all types

of driving, no attempt was made to base the route on a national driving pattern survey as none was or is available for trucks. However, the trucks "drove traffic" and included 50-mph operation as well as stop-and-go. The four engine emissions characterization "maps," described later in Section VIII of this report, illustrated that engine speed had only a second order type importance on emission rates in terms of g/min, g/bhp-hr, or g/lb fuel, and that to be of importance a difference in speeds of at least 1000 rpm was evident.

Because of the lack of definitive analysis of the 1962 Ethyl truck and bus survey data[8] or rigorous evaluation of the five-truck SwRI road results[5], it was mutually agreed to operate at an upper speed of 2500 rpm and a lower speed of 1500 rpm. This provided 500 rpm above and below the FTP and would suffice for purposes of the test. Incidentally, many but not most automotive diesel engines operate over about a 1000-rpm span between rated and peak torque speed, especially the higher speed mid-range diesels in urban-suburban use.

TABLE 4. DESCRIPTION OF EXPERIMENTAL 23-MODE TEST PROCEDURE FOR GASOLINE-POWERED HDV STATIONARY- OR CHASSIS-OPERATED

Mode Number	Mode Description	Engine Speed	Percent Power	Weighting Factor
1	Idle	Per spec.	0	0.067
2	No Load	1500	0	0.040
3	Part Load	1500	12.5	0.040
4	Part Load	1500	25	0.040
5	Part Load	1500	37.5	0.040
6	Part Load	1500	50	0.040
7	Part Load	1500	62.5	0.040
8	Part Load	1500	75	0.040
9	Part Load	1500	87.5	0.040
10	WOT	1500	100	0.040
11	CT	1500	0	0.040
12	Idle	Per spec.	0	0.067
13	WOT	2500	100	0.040
14	Part Load	2500	87.5	0.040
15	Part Load	2500	75	0.040
16	Part Load	2500	62.5	0.040
17	Part Load	2500	50	0.040
18	Part Load	2500	37.5	0.040
19	Part Load	2500	25	0.040
20	Part Load	2500	12.5	0.040
21	No Load	2500	0	0.040
22	CT	2500	0	0.040
23	Idle	Per spec.	0	0.067

The resulting 21-mode experimental schedule thereby included many more loads than the nine-mode FTP, one of its severest criticisms, but lacked any transient modes or simulated transients. Mode nine of the FTP is a 43-sec constant speed, closed throttle deceleration or motoring condition that is maintained at 2000 rpm. This mode, in terms of concentrations, is a substantial contributor of HC and to a lesser extent CO. At first thought, the CT condition in the FTP is seen as absurd, simulating a truck going down a very long hill with the foot off the throttle pedal. On closer examination, the CT mode is one the engine is continually experiencing. Each time the driver releases the pedal during shifting or slowing down, there is a momentary, quasi-constant speed deceleration at CT. Unlike cars, trucks during this coast period tend to remain longer at a quasi-constant speed due to the inertia of the heavier vehicle. That the engine experiences some CT constant or nearly constant speed deceleration, there is no question. The main question is how much and to what extent this mode should be weighted relative to the other modes.

The first tests on the initial engine used to "shake down" the new procedure were quite revealing in that the HC at CT at 1500 or 2500 rpm were on the order of 35,000 to 70,000 ppm C, 10 times the highest concentrations at all other modes including idle. Even with the lower airflow through the engine, the exhaust volume times these very high concentrations resulted in mass emission rates that were up to four times greater than any of the other modes. This confirmed the trends established during the 21-truck characterization project and resulted in the inclusion of a CT at 1500 and 2500 rpm. Thus, a 23-mode test evolved. Actually, the emission rates at either speed under CT conditions could be used without a great deal of concern or a single 2000-rpm CT condition could have been used.

It may be argued that the 23-mode or any similar procedure is merely an engine exercise that does not relate to road driving. There is no vehicle speed-time trace to follow as with automobiles. It does not include the transient nonsteady speeds and loads encountered in acceleration and deceleration. In defense of the engine exercise approach, it must be noted that a single engine may be applied in situations that go from 6001-lb GVW up to over 60,000-lb GVW. It was this fact, pointed out graphically in the 150-vehicle evaluation of the proposed Ethyl driving schedules based on GVW, that illustrated the impractical nature of speed-time type schedules for heavy-duty vehicles. (See Reference 1, the original SwRI-EPA sponsored HDV-gasoline procedural development project for complete details.) As a result of this project,

the Ethyl schedules were discarded in favor of a single type of test that encompasses all heavy-duty engines but expresses mass emissions in terms of power produced, the great equalizer.

Incidentally, the four-truck chassis dynamometer characterization data, described later in this report (Section VIII), illustrated the fact that other steady-state speeds and loads in the map adequately reflect the levels encountered when accelerating at WOT against a range of inertias. Large inertia flywheels and/or programmable all-electric stationary-chassis dynamometers are required to simulate real road driving, adding to the complexity of measurement of a group of sources that represent a fraction of the mobile source pollution. Development of accurate and reliable vehicle-engine use of weighting factors is the key to utilizing the mode type procedure and making the composite results conform to reality.

For purposes of this project, weighting factors were assigned the various modes on the same basis used by the EMA and California ARB in the diesel procedure, namely 20 percent at idle and the remaining 80 percent evenly distributed to the speed-load conditions (80/20 or 4 percent per mode). These are listed on Table 4. This assignment is no more nor no less arbitrary than the EMA schedule and certainly satisfactory for purposes of this project. Though the engines do compete, it is quite likely this mostly arbitrary weighting should and will be revised as additional analysis of existing road data is made. One of the joys of the mode method is it permits very simple recomputation of composite values using the basic concentrations so that any combination of modes and weighting factors may be considered. This allows the laboratory measurements to be utilized in a variety of ways without requiring expensive and time-consuming retest.

2. Operational Notes

In actual operation, the 23-minute procedure was preceded by a 10-min operation at 2000 rpm, half-load to warm up the engine. During the last few minutes, the analyzers were zeroed and spanned, ice-water traps drained and filters renewed. The engine then began the initial idle mode of the 23-mode test. In practice, the test was not difficult since the first minute of each 3-min mode was allocated to adjust engine speed and load, the second minute was devoted to engine-emissions stabilization, and the final minute the emissions were continuously recorded and integrated to determine model concentrations.

More than 3 min may be used at the center idle, mode 12, to do maintenance on the sampling and analysis equipment. Normally, as soon as the first closed throttle was complete, Mode 11, the HC system, was purged with zero N_2 while other instruments were spanned and zeroed. Then the HC instrument was spanned and zeroed, water traps were drained, filters replaced, and all instruments rechecked for zero and span before starting the idle, Mode 12. At any mode during the test, the instruments could be zeroed and spanned, if desired, as long as it was done during the first 1-1/2 min of the mode. In practice, the ice-water traps were drained after the 5th and 17th modes of the test.

3. Calculation Methods–9- and 23-Mode in g/bhp-hr

With the advent of HDV gasoline and diesel emission standards in California expressed as g/bhp-hr, a method of calculation was devised whereby the concentration values for the nine-mode FTP could be expressed on a mass brake specific basis. The method as described in the California Air Resources Board regulations[9] was used. It should be noted that the carbon balance method requires the measurement of fuel rate to the engine during the nine-mode procedure. This in itself is no small task to do with accuracy even if done after the test is over, due to the short mode times and the uneven fuel delivery to the float-bowl of the carburetor during light or no load conditions such as modes one, five, and nine. This is necessary to compute exhaust flow rate without actually measuring inlet or exhaust flow rates, both difficult to do on a gasoline engine without disturbing emissions behavior. Also, to compute brake specific emissions rates, power output at the flywheel of the engine must be measured for those conditions which produce power. This is restricted to the 10- and 16-in. Hg vacuum conditions in the nine-mode FTP.

The 23-mode cycle data calculations were essentially the same as the California ARB 9-mode calculations. Since HC was measured directly in ppm-carbon, a change in the equation converting ppm-C hydrocarbons to g/hr was made. The equation used is the same as that shown in the EMA "Spark Ignition Engine Emission Test Procedure"[10] (undated).

The measured volumetric concentrations were converted to g/hr emission rates using a "total carbon" method shown below:

$$\text{23-Mode HC (g/hr)} = \frac{\text{measured HC (ppm C)}}{10{,}000} \times \frac{\text{fuel flow (g/hr)}}{\text{total carbon emission (\%)}}$$

$$\text{9-Mode HC (g/hr)} = 11.2 \times \frac{\text{measured HC (ppm hexane)}}{10{,}000} \times \frac{\text{fuel flow (g/hr)}}{\%\,CO + \%\,CO_2 + 10.8 \times \frac{HC}{10{,}000}}$$

$$CO\ (g/hr) = 2.02 \times \text{measured CO (\%)} \times \frac{\text{fuel flow (g/hr)}}{\text{total carbon emissions (\%)}}$$

$$NO_2\ (g/hr) = 3.32 \times \text{measured NO (\%)} \times \frac{\text{fuel flow (g/hr)}}{\text{total carbon emissions (\%)}}$$

where

$$\text{Total carbon emissions} = \text{measured } CO_2\ (\%) + \text{measured CO (\%)} + \frac{\text{measured HC (ppm C)}}{10{,}000}$$

The power output and emissions in g/hr for each mode were then multiplied by the weighting factor for that mode. Each emission type was then summed for the 9 or 23 modes and divided by the weighted sum of the power output to obtain g/BHP-hr.

A relatively straightforward computer program was written to facilitate the computation of both 9- and 23-mode emission results for expression in terms of g/bhp-hr. The charts were hand-integrated, a fairly simple operation since the steady-state emission concentrations are essentially straight lines even during CT at constant speed.

VIII. FOUR ENGINE-VEHICLE EXHAUST CHARACTERIZATION RESULTS

In characterizing the emission rates from the four 1969 engines-trucks studied, the following conditions were studied:

- Steady State — Emissions at 10-percent power increments from 0 to 100 percent power at 1000 (or 1250), 1500, 2000, 2500, 3000, and 3500 rpm on stationary dynamometer and at 1000 (or 1250), 2000, and 3000 rpm on chassis dynamometer.

  Emissions at closed throttle constant engine speed and low idle rpm on stationary and chassis dynamometers.

- Transient — Emissions during wide open throttle accelerating starting in various transmission gears against various simulated vehicle inertias on chassis dynamometer.

  Emissions during closed throttle deceleration by various simulated vehicle inertias on chassis dynamometer.

- Nine-Mode FTP — Emissions via NDIR cart per FTP and closed cycle CVS on stationary and chassis dynamometers.

A common expression of emission rate to all the above conditions is grams of HC, CO, or NO per minute. Grams per lb of fuel consumed was the next most common means of expression with transient conditions excepted. Grams per bhp-hr, the brake specific emission rate, was used where useful power was measurable on the stationary dynamometer steady-state runs with equivalent power levels employed for the similarly run chassis conditions.

This results section contains a graphical portrayal of the emissions behavior of the four engines studied.

A. 1969 Chevrolet 250 CID Engine

The results for this engine, powering a 10,000-lb GVW stake body truck, will be described in the order just mentioned.

1. Steady-State Emission Rates

Figures 16, 17, and 18 summarize the emissions behavior for the speed and power points measured and constitute "emission maps" for HC, Figure 16, and CO and NO, Figures 17 and 18. Plotted are data taken at 1000, 2000, and 3000 rpm, both stationary- and chassis-operated. The relationship for all graphs is that of g/min, g/lb fuel, and g/bhp-hr against percent of power.

Several overall statements may be made regarding Figures 16 through 18. First, power was the single most important variable affecting all three emissions, regardless of the method of expression used. And that to define the behavior of the engine, emissions should be measured at fairly close power intervals approaching 10 percent power. The effect on HC was significant as the power level reached wide open throttle (100 percent) at all speeds. This was even more dramatic for CO versus high output levels per Figure 17. Power levels of 50- to 90-percent maximum load resulted in maximum NO while no load produced the lowest levels.

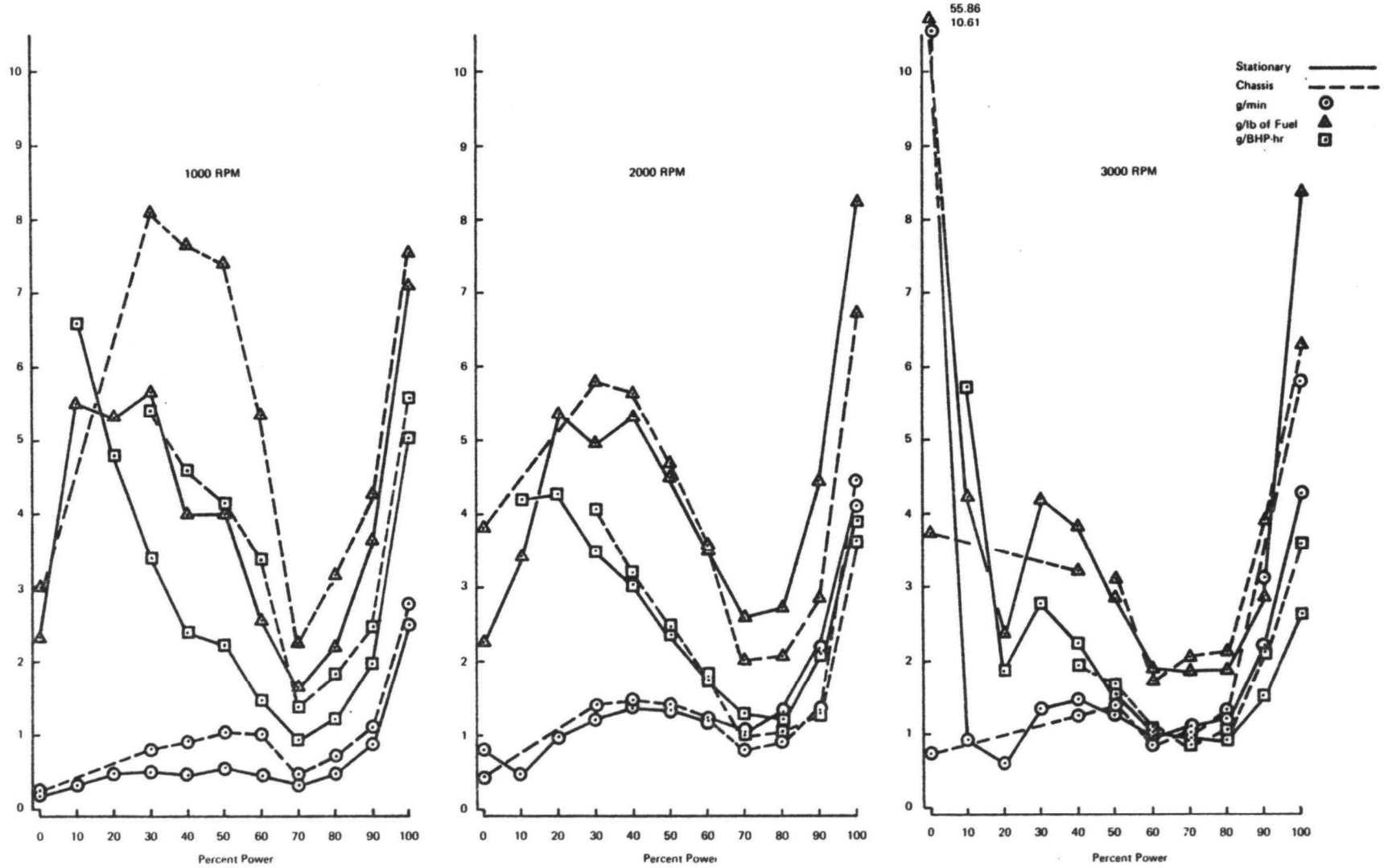


FIGURE 16. HYDROCARBON CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 CHEVROLET 250-CID ENGINE AT 1000, 2000, AND 3000 RPM

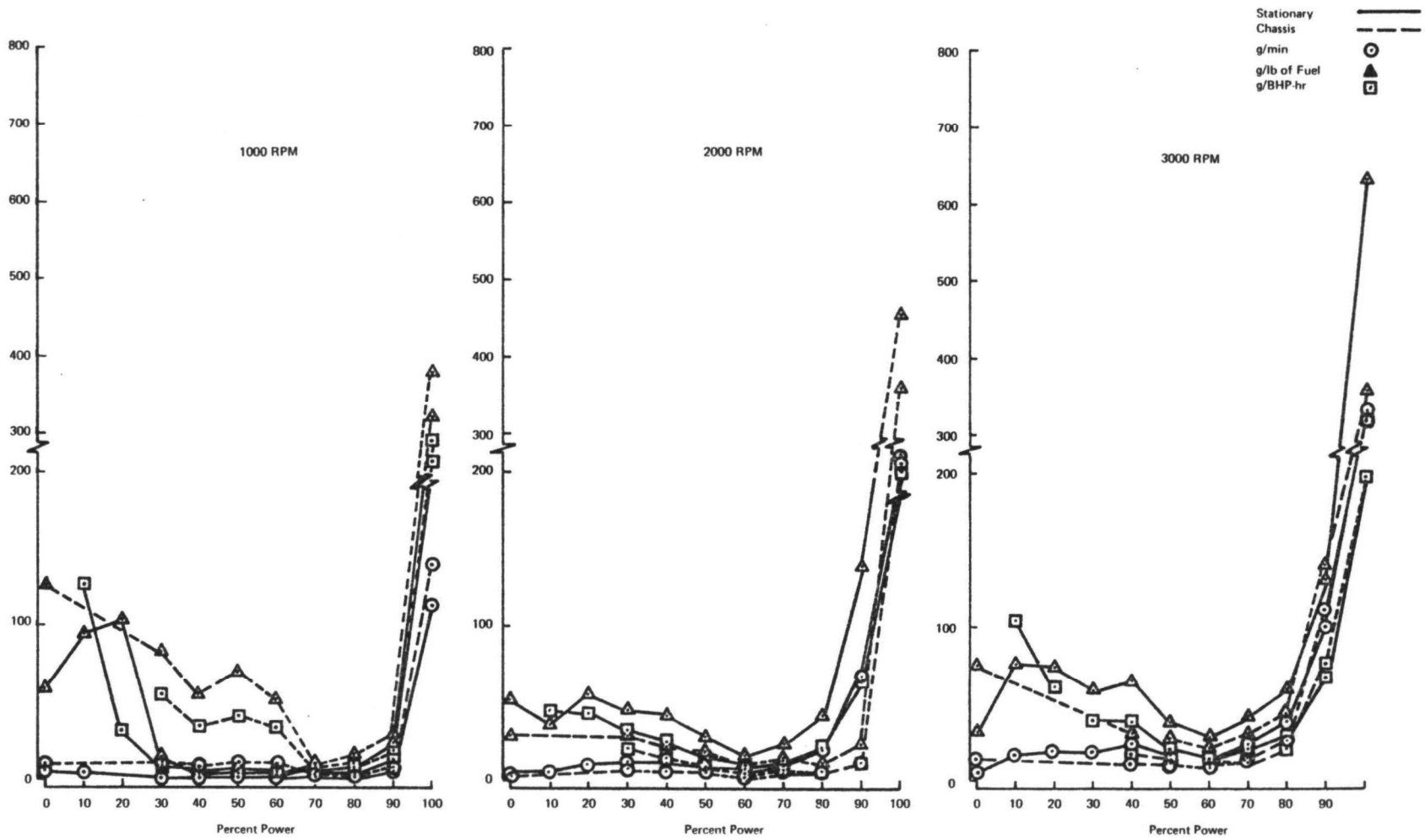


FIGURE 17. CARBON MONOXIDE CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 CHEVROLET 250-CID ENGINE AT 1000, 2000, AND 3000 RPM

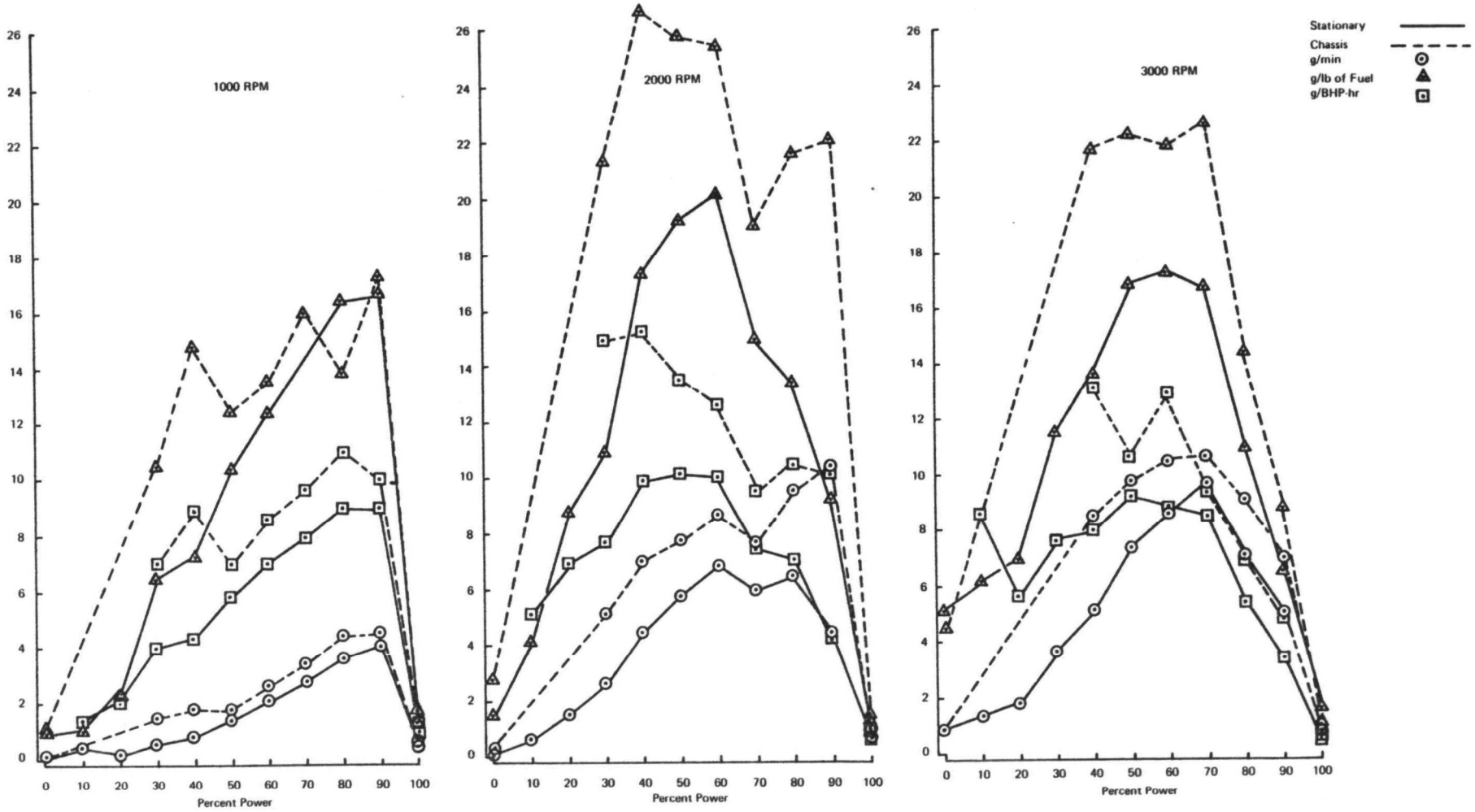


FIGURE 18. NITRIC OXIDE CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 CHEVROLET 250-CID ENGINE AT 1000, 2000, AND 3000 RPM

Second, the effect of speed was substantially less important on emissions of CO, Figure 17, and nitric oxide, Figure 18. The peak production of NO seemed to coincide with lower power conditions as speed was increased but the magnitude of CO and NO was little affected by gross changes in engine speed. Engine speed had more influence on HC at less than 50-percent load with the peak HC occurring at lower power levels, approaching zero load, as the speed was increased.

The third point of interest is the generally excellent agreement between stationary, solid curve, and chassis, broken curve. The agreement was better at 2000 and 3000 rpm than at 1000 rpm in most cases except oxides of nitrogen. There are many possible reasons for the disparity between chassis- and stationary-operated data. Although the same instruments were used, the engine did operate in a somewhat different environment as well as atmosphere. The values "track" well in most instances and, for example, if chassis was low relative to stationary, it rarely reversed as load is increased.

For purposes of compactness, the summary curves contain emission rates plotted as g/min, circle, g/lb fuel, triangle, and g/bhp-hr, square. It happens that a scale of zero up to about 20 to 30 is satisfactory to plot all three methods of expression. There is no significance in g/min being lower than g/bhp-hr or both being lower on the graphs than g/lb fuel. What is of interest is the relative sensitivity of the various means of expression and this may be seen by the slope of the curves. Both g/lb fuel (heat input basis) and g/bhp-hr (work output basis) have about equal sensitivity as would be expected, while g/min normally is a relatively flatter response to load variations.

Close examination of the graphs in Figures 16 to 18 reveals that no data are plotted for 10-, 20-, and 30-percent load conditions for the chassis dynamometer. This is because the transmission and drive-train losses and extraordinary chassis dynamometer difficulties precluded operation at the lowest power levels for some vehicles. If it were not for the spread in the NO results between chassis and stationary dynamometers, the small differences noted in HC and CO might be passed off as the error in the load setting on the chassis dynamometer inherent in using manifold vacuum instead of direct power measurements. There is not enough information available to conclude what effect location of the engine—inside the engine compartment versus on the open stationary dynamometer—had on emissions.

Another steady-state condition studied was the closed throttle operation at constant speed. This is a motoring condition and is principally a producer of HC and some CO. As shown in Figure 19, HC and CO, in g/min, were fairly flat versus engine speed, with less than satisfactory correlation in the HC by stationary and chassis operation. CO was not grossly different but HC emissions were significantly higher, about twice, when the engine was operated on a test stand. This difference was also noted in the closed throttle mode of the respective nine-mode FTP runs and is felt to reflect only this engine's characteristics. The amount of nitric oxide produced during the closed throttle condition was very small—less than 1 g/min. Although CO during CT deceleration was similar to CO below 80-percent power output, HC was two to ten times higher than that found during speed and load mapping. The importance of Figure 19 is the lack of sensitivity in HC production as the speed was varied over a broad range.

The last steady-state condition of interest was idle operation. The results were as follows for the Chevrolet 250 engine.

	Hydrocarbons		Carbon Monoxide	
Run No.	g/min	g/lb fuel	g/min	g/lb fuel
1	0.10	1.00	15.11	151
2	0.27	3.38	10.40	130
Avg	0.19	2.19	12.76	141

Idle operation is important because it usually represents a significant amount of vehicle operation. Measurement of NO at idle was precluded because of the highly dilute mixture available by the CVS. This study was complete before the chemiluminescent type analyzer was available. Idle NO is best measured in an

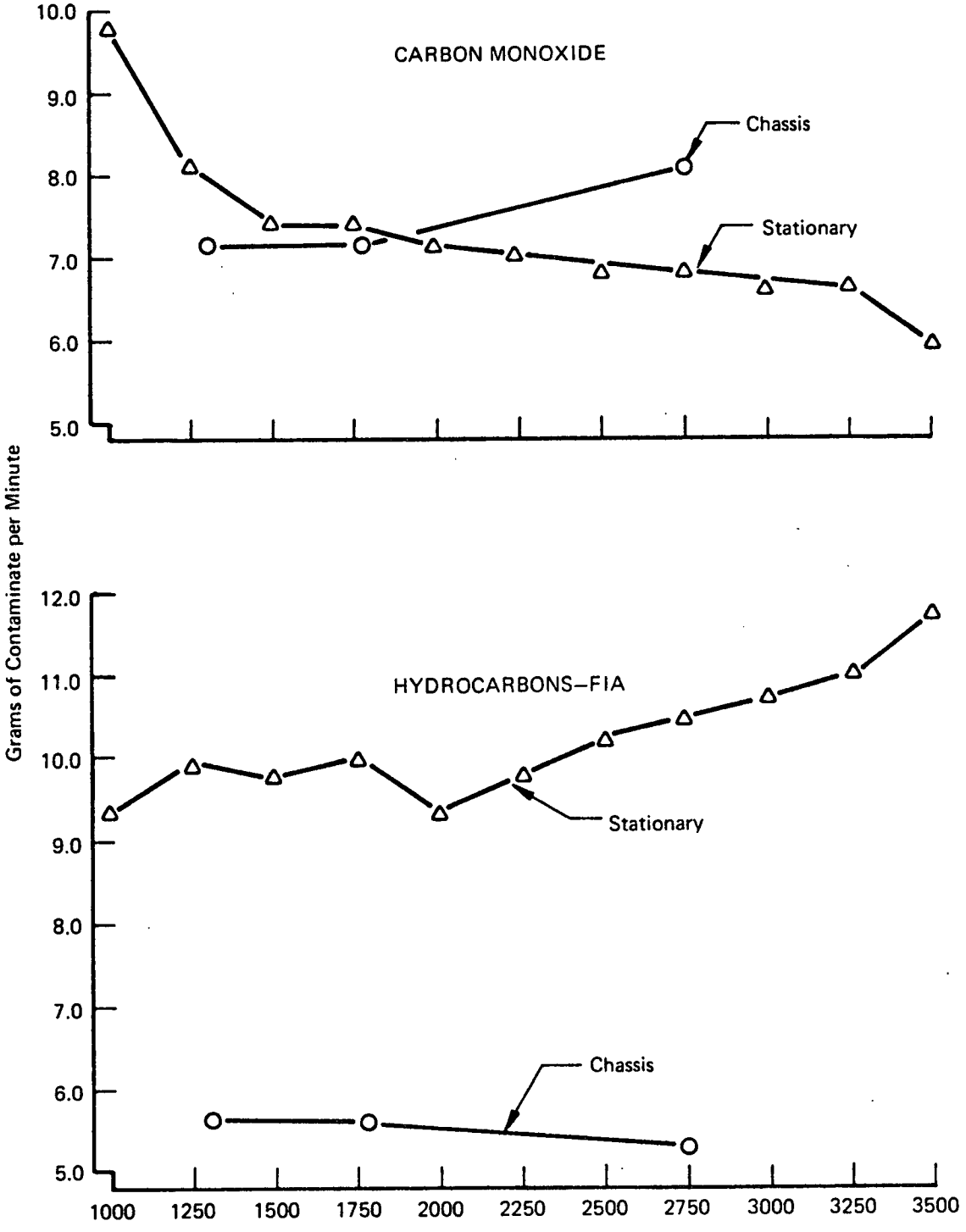


FIGURE 19. CVS RESULTS FOR CLOSED THROTTLE (CONSTANT SPEED) DECELERATION, 1969 CHEVY 250-CID, I-6

undiluted form because it is not produced in quantity during this, or the closed throttle condition, in CVS sampled form sufficient for detection by NDIR.

2. Transient Emission Rates

Figures 20 and 21 illustrate by means of bar graphs the emission rates, in g/min, that occur during acceleration and deceleration. These tests were all conducted with the engines operated in trucks on the chassis dynamometer at 4000, 7000, and 10,000 lb of inertia simulation. The objective was to determine the level of the emissions produced during "typical" accelerations using normal driver habit. Each sequence started with zero rear wheel speed. The engine was then accelerated at wide open throttle (WOT) to 3000 rpm in each gear. During the shifting sequence, the operator shifted gears in a "typical" manner. The only exception to the above was starting in third gear with 10,000 lb of inertia. To start a truck rolling from a full stop with full payload in third gear is unlikely and hard on the engine-drive train. In this instance, the driver was allowed to have the rear wheels rolling at 5 mph before the WOT acceleration.

Emission results were obtained only during the power portion of this procedure. That is, no integration was made during the shifting sequence. The concentrations for each individual acceleration were added and averaged and then converted to g/min as described previously. To briefly illustrate the effect of inertia, the bar graph of the minimum emission level is superimposed on the taller bar depicting the maximum level observed regardless of inertia simulated. Using g/min via CVS as the method to express the rates, it appears that the amount of inertia simulation had little significance during acceleration tests (Figure 20). The second group of bars for a given inertia is similar to the first except the driver starts in second instead of first. Likewise, the third group of bars is similar except the driver starts in third gear with wheels rolling at 5 mph.

As would be expected, the emission rate was a function of the transmission gear in which the engine was started, though for equal top speeds, i.e., fourth gear, the rates were essentially the same for all three contaminants. The "stairstep-up" as the vehicle is operated in each successively higher gear range just means the vehicle operated longer and differently in a higher emission-producing condition.

In comparing the emissions produced during the accelerations relative to the steady-state power conditions shown previously in Figures 16, 17, and 18, WOT acceleration caused a large increase of HC and CO while NO was about the same as that found by mapping. HC was about the same as the CT conditions, both constant speed and nonconstant speed. The overall general average for the accelerations was about 6 to 8 g/min as compared to 2 to 3 g/min for steady-state results and 6 to 10 g/min for CT deceleration. Results for carbon monoxide during the acceleration were ten times the nominal values below 80 percent power recorded in steady-state conditions. Above 80 percent power, the magnitudes were similar.

Results for the nonconstant speed deceleration were obtained on the chassis dynamometer only. The closed throttle decelerations consisted of engine rundown from 3000 to 500 engine rpm in contrast to a constant speed deceleration discussed earlier. Figure 21 shows HC and CO for third and fourth gear as the inertia was increased. NO was very low, less than 50-ppm concentration, and was not converted into mass units.

During a constant speed closed throttle (as exists in the current Federal procedure), the nominal emissions values for the stationary dynamometer were 10 g/min of HC and 7 g/min of CO below 80 percent power. Figure 21 shows that the nonconstant speed deceleration exceeds the constant speed results for HC only during fourth gear with 10,000-lb simulation. The CO emissions were higher in every case for the nonconstant speed relative to the constant speed deceleration by a factor of two.

3. Nine-Mode FTP Results

These data were obtained to round out the emissions characterization study for each engine. Several of the modes in the nine-mode procedure were run as part of the steady-state "mapping" and the others are close to one or more of the mapped conditions.

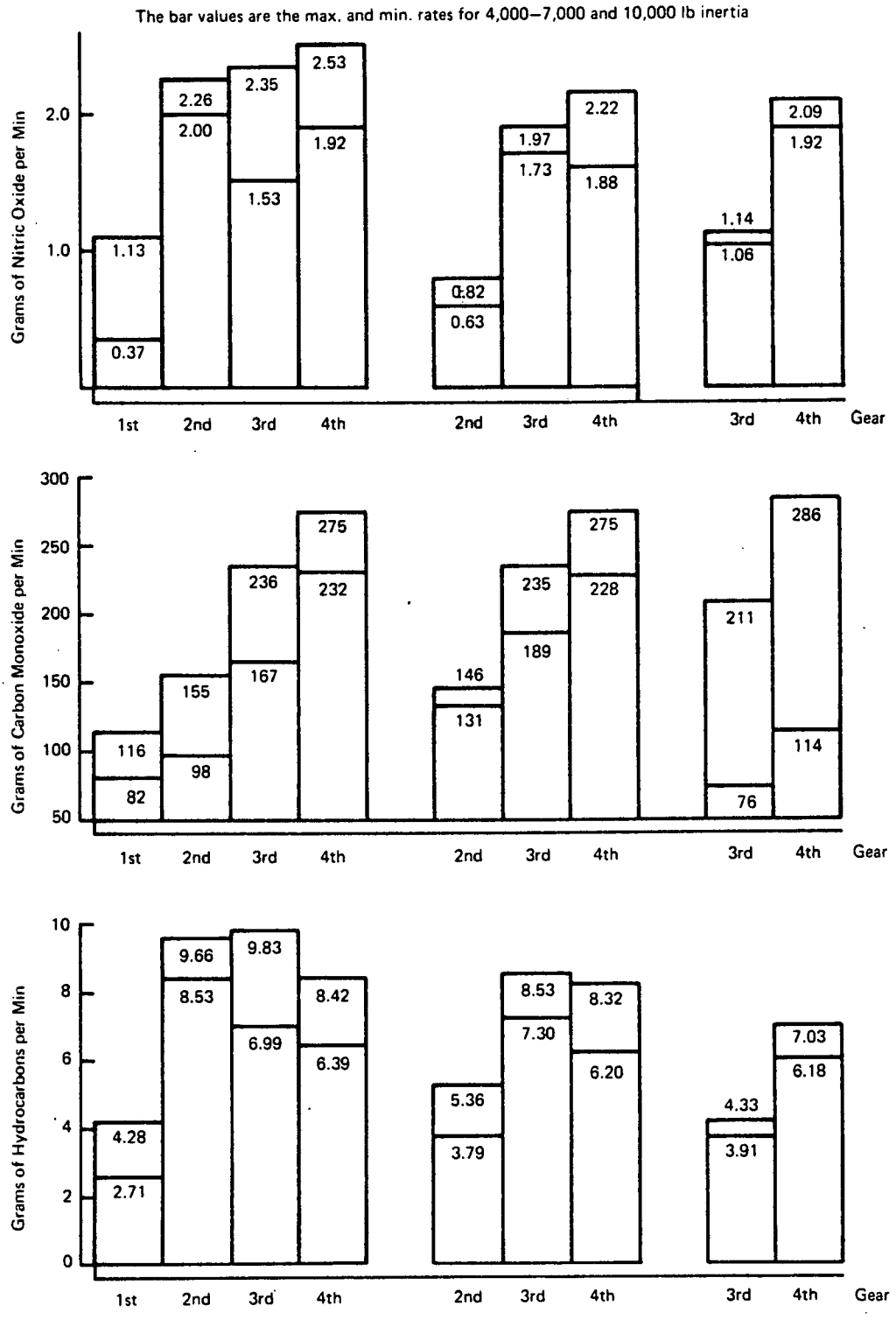


FIGURE 20. EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE ACCELERATION AGAINST INERTIA AT WIDE OPEN THROTTLE

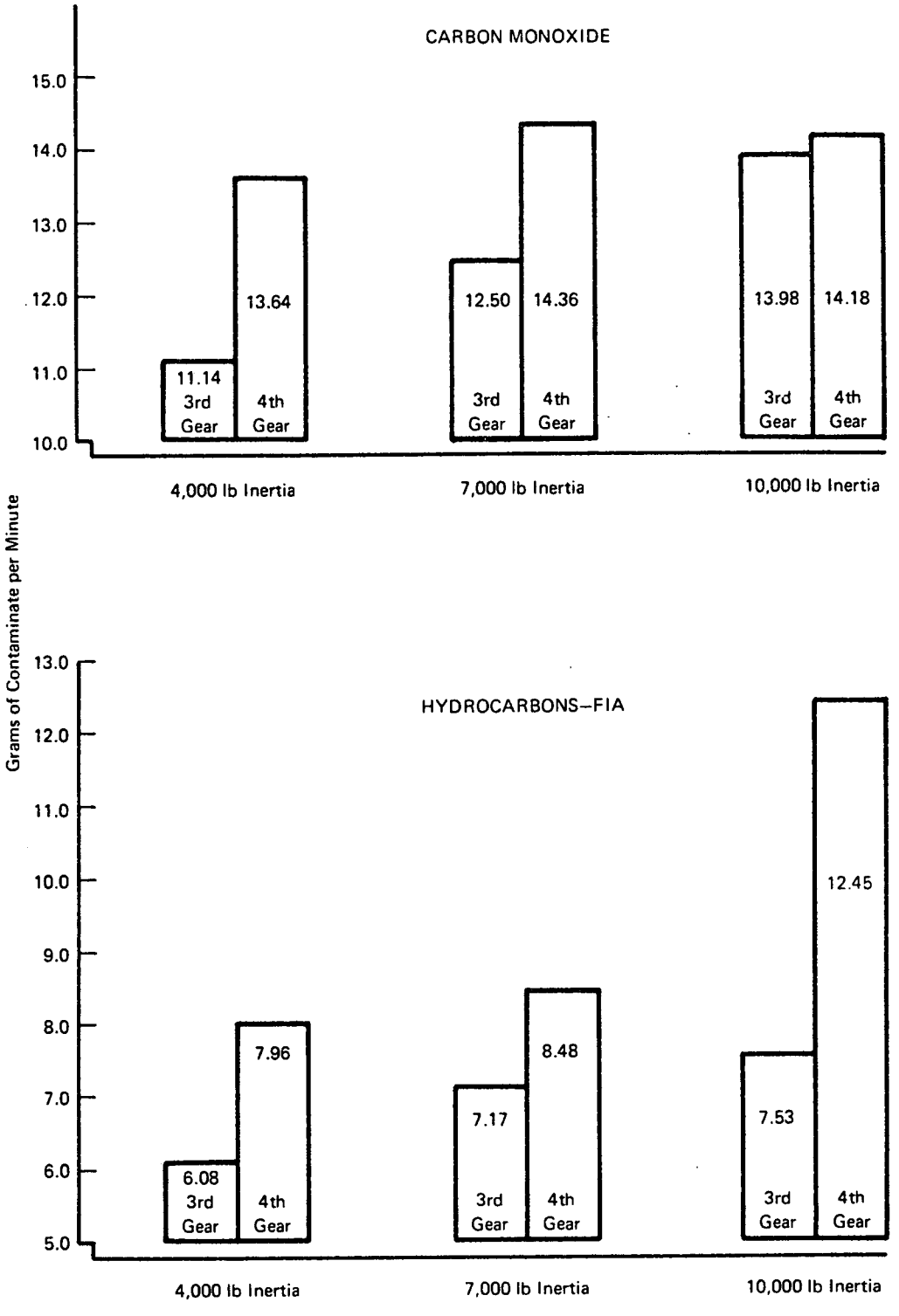


FIGURE 21. CVS RESULTS FOR CLOSED THROTTLE DECELERATION (NONCONSTANT SPEED), 1969 CHEVY 250-CID, I-6

The results of the Federal cycle tests are listed in Table 5. The usual continuous NDIR concentration values are shown first for the stationary and then the chassis dynamometer operation. The chassis results are lower for CO and higher for NO while HC was about the same on the average. Also

TABLE 5. CONTINUOUS AND CVS RESULTS–FEDERAL CYCLE

1969 Chevrolet, 250 CID

Date	Dynamometer	Continuous Sampler			CVS, g/lb fuel			Fuel wt, lb
		HC, ppm Hex	CO, %	NO, ppm	HC	CO	NO	
12-70	Stationary	221	0.89	2609	9.90	57.5	7.60	4.37
12-70	Stationary	236	0.96	2620	8.82	53.9	8.58	4.38
12-70	Stationary	243	1.19	2480	9.76	60.0	9.44	4.35
12-70	Stationary	236	1.11	2206	8.20	57.7	8.70	4.32
	Avg	234	1.04	2479	9.17	57.3	8.58	4.36
2-71	Chassis	232	0.76	2975	N.D.	N.D.	N.D.	N.D.
2-71	Chassis	220	0.80	2740	9.16	55.8	11.64	3.85
2-71	Chassis	218	0.82	2760	10.62	59.8	13.25	3.50
2-71	Chassis	215	0.80	2807	9.67	56.0	12.29	3.75
	Avg	221	0.80	2821	9.82	57.2	12.41	3.70
Avg Chassis		221	0.80	2821	9.82	57.2	12.41	3.70
Avg Stationary		234	1.04	2479	9.17	57.3	8.58	4.36

listed are the mass results obtained by the CVS operated during the entire 20-min run (closed cycle). Fairly good agreement between the HC and CO results was achieved, while NO was lower on the stationary than in the chassis similar to the continuous NDIR results. This disparity in the NO results was found during the steady-state mapping and was commented on earlier.

B. 1969 IHC 304 CID Engine

The order of presentation and discussion of the results of this engine, powering a 24,000-lb GVW stake body truck, will be similar to the previous subsection.

1. Steady-State Emission Rates

Figures 22, 23, and 24. summary "emission maps," depict the HC, CO, and NO behavior of this engine at 1250, 2000, and 3000 rpm. These graphs are plotted identically to Figures 16 through 18 already discussed. Essentially the same three major comments regarding the effect of power, effect of speed, and the agreement between chassis and stationary results can be made. In addition to power being the most important single factor on emission rates, power had a somewhat more predictable effect on HC at low and high powers (maximum HC). But, light loads at 2000 and 3000 rpm produced more HC than at WOT.

Though CO was substantial at WOT, per Figure 23, it was higher in g/bhp-hr at light loads at 2000 and 3000 rpm. Though the power effect did not produce maximum NO at 1250 rpm until WOT, maximum NO was observed at 90 percent power, 2000 rpm, and at 80 percent power, 3000 rpm. The peak NO value shifted with speed about 10 percent for a 1000-rpm speed change.

The speed effect was essentially nil on overall HC productivity, while CO and NO peaks and overall distribution increased as speed increased. These effects were of somewhat less consequence on the emission rates relative to power. Taken together, the power effect can be modified some depending on the speed as shown by the difference in the shape of the emission curves at 1250 rpm versus say 3000 rpm for CO, Figure 23.

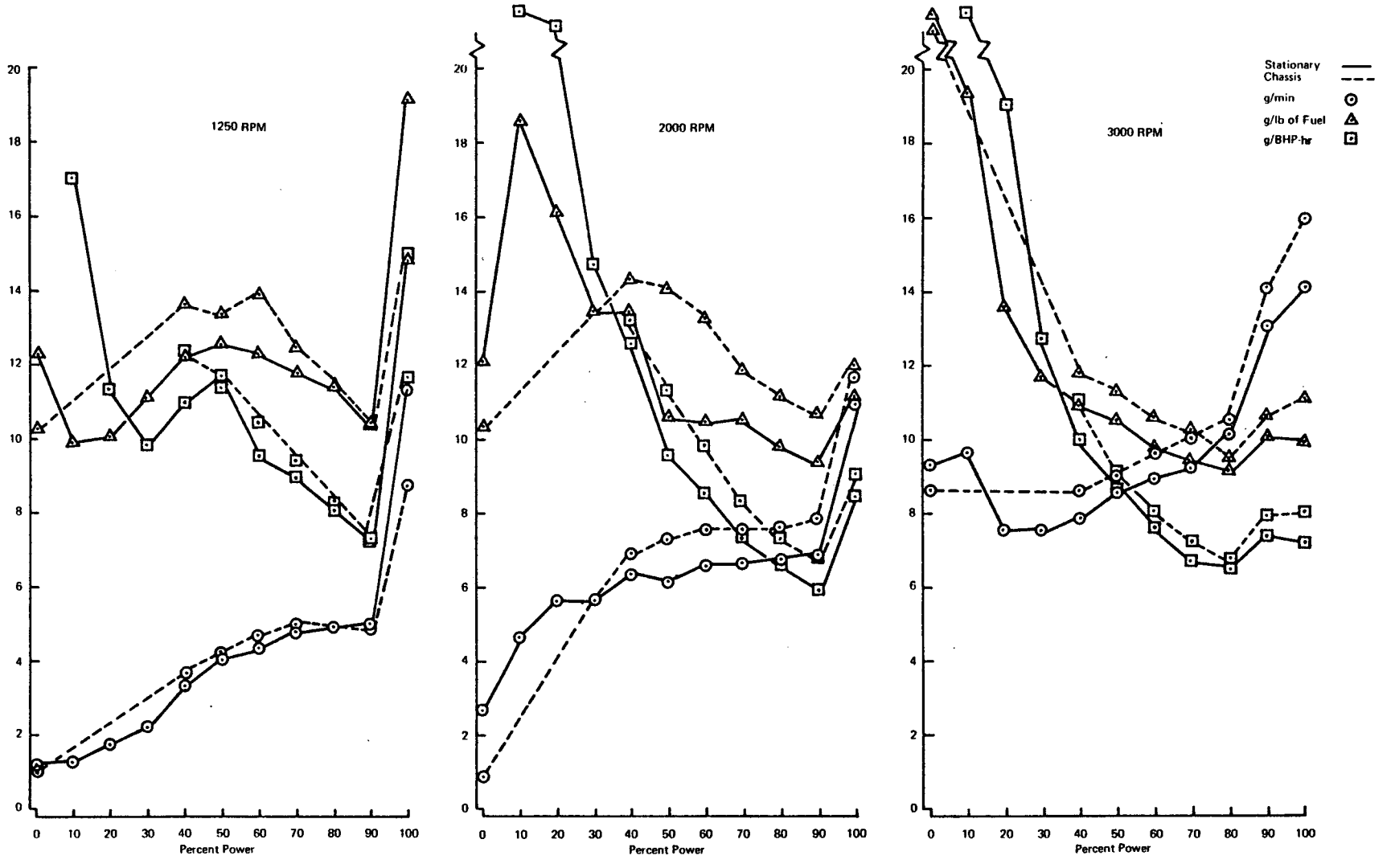


FIGURE 22. HYDROCARBON CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 IHC 304-CID ENGINE AT 1250, 2000, AND 3000 RPM

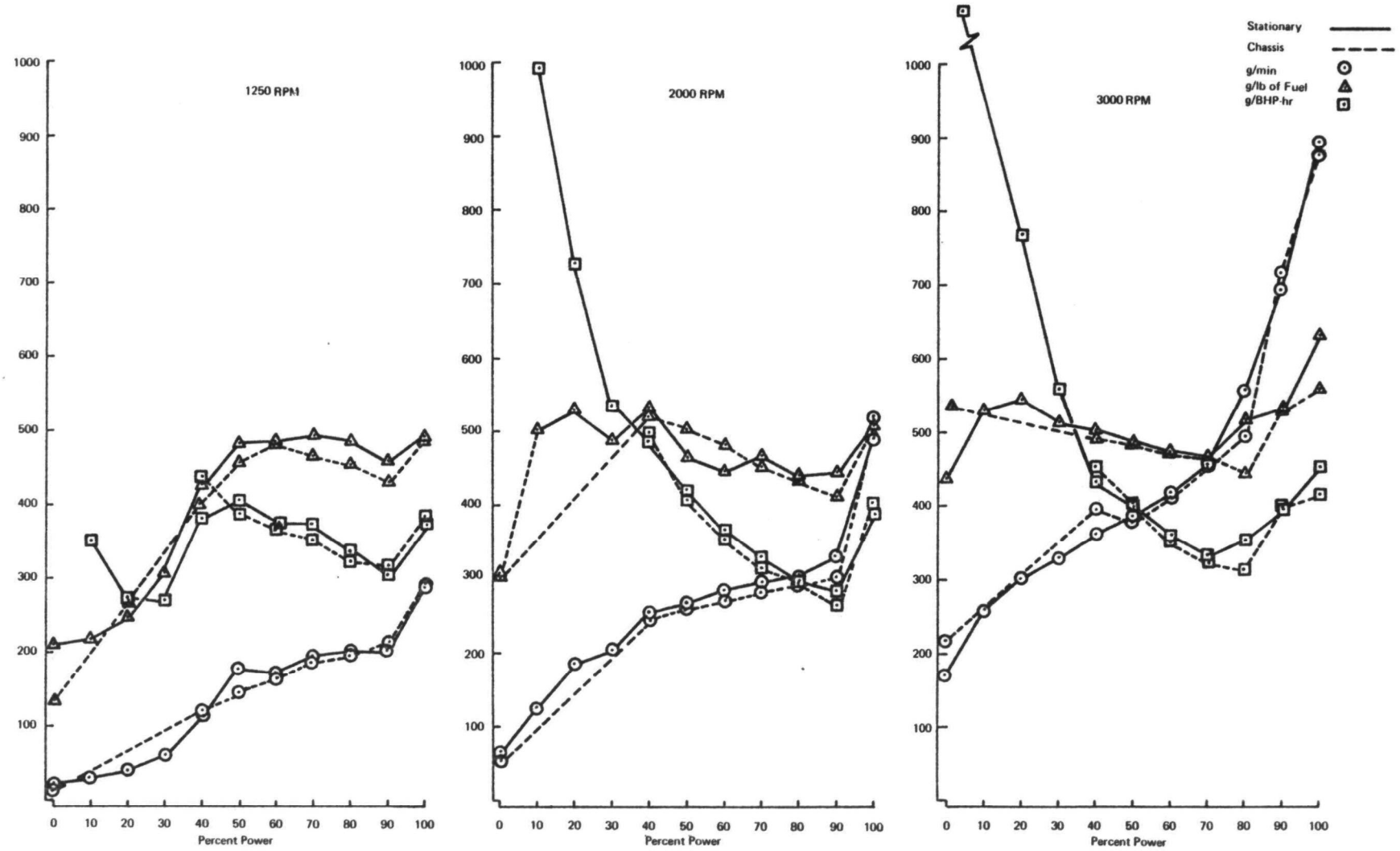


FIGURE 23. CARBON MONOXIDE CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 IHC 304-CID ENGINE AT 1250, 2000, AND 3000 RPM

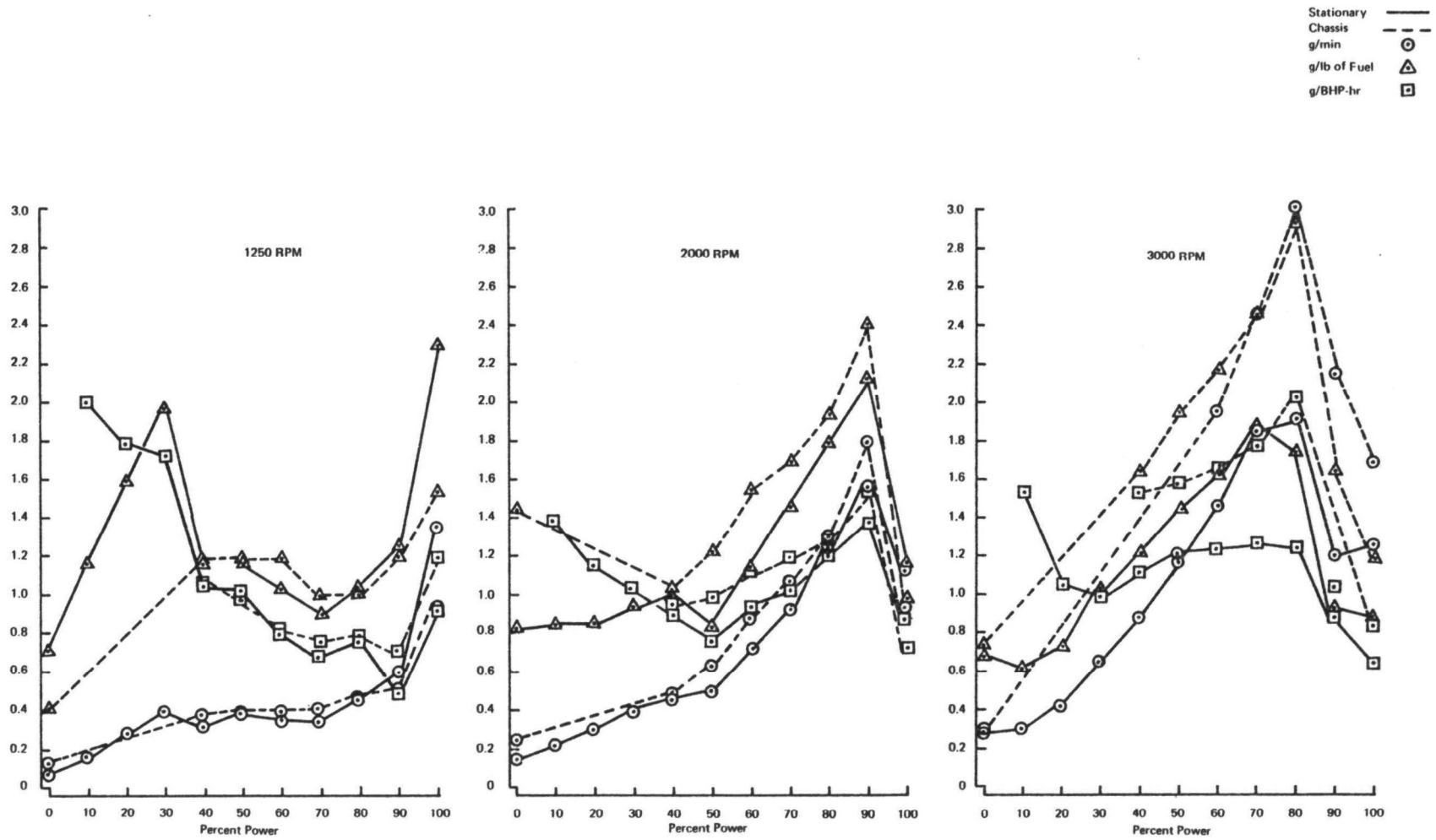


FIGURE 24. NITRIC OXIDE CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 IHC 304-CID ENGINE AT 1250, 2000, AND 3000 RPM

The stationary-to-chassis correlation of the emission rates was much better for this engine than the 250 CID Chevy. Nitric oxide, Figure 24, shows the largest difference yet, an improvement over the Chevy engine. Greatest differences were found at loads below 50 percent. As mentioned earlier, 10-, 20-, and 30-percent power simulation on the SwRI dynamometer could not be satisfactorily achieved and with only the no load condition, a suitable chassis curve in this region is difficult to draw.

The results of the constant speed operation at closed throttle are shown in Figure 25. The constant speed closed throttle results indicate that the emission results are higher for both HC and CO with the engine in the chassis. In comparing the CT operation with the power condition, there is a similarity in HC values. However, the CT operation was from 5 to 100 times lower in CO relative to most power conditions on a g/min basis. The relatively flat curves in Figure 25, though not as flat as for the Chevy, illustrate the lack of a significant speed effect under CT conditions.

Idle operation results are listed below for the 304 CID IHC engine.

	Hydrocarbons		Carbon Monoxide	
Run No.	g/min	g/lb fuel	g/min	g/lb fuel
1	1.63	40.75	6.55	164
2	1.63	33.00	7.00	140
Avg	1.63	36.88	6.77	152

Idle is measured under raw exhaust sampling conditions for other engines in the third major portion of this study. Only in this way can NO_x be measured with satisfactory precision. The run-to-run repeatability of the above CVS HC and CO data is satisfactory. Idle is the least repeatable of all modes of operation and generally all one can do is measure it at several distinct times and use an arithmetic average value.

2. Transient Emission Rates

Transient conditions investigated included a variety of nonconstant speed WOT accelerations and CT decelerations. Figures 26 and 26a show via bar graphs the effect of inertia and the gear in which acceleration was begun on the g/min of HC, CO, and NO produced.

The objective was to determine the level of the emissions produced during "typical" accelerations using normal driver habit. Each sequence started with zero rear wheel speed. The engine was then accelerated at WOT to 3000 rpm in each gear. During the shifting sequence, the operator shifted gears in a "typical" manner.

This truck was equipped with a five-speed transmission and a two-speed rear axle. Both "low" and "high" rear axle positions were studied. Figures 26 and 26a begin with operation in the high and low axle range starting from zero mph or rest and accelerating to 3000 rpm in the gear indicated. The second group of bars for a given inertia is similar to the first except the driver starts in second instead of first. Likewise, the third and fourth groups of bars are similar except the driver starts in third gear or fourth gear. The minimum level, shortest bar, for the indicated range of inertias studied is superimposed on the maximum level or bar observed for all inertias tried. Considering all the acceleration results, an interesting stairstep pattern of higher CO and NO g/min with higher transmission gear ranges is noted. This trend is not so pronounced with HC, though the initial acceleration consistently produced lower g/min than did later acceleration in the higher gears. It seemed, regardless of inertia, that after the initial acceleration was over, operation in higher and higher gears had little effect on HC. Though the reason for this is not understood, it is felt that the previous closed throttle, during actual changing of gear position while the clutch is disengaged, may have an important bearing on emissions, especially HC.

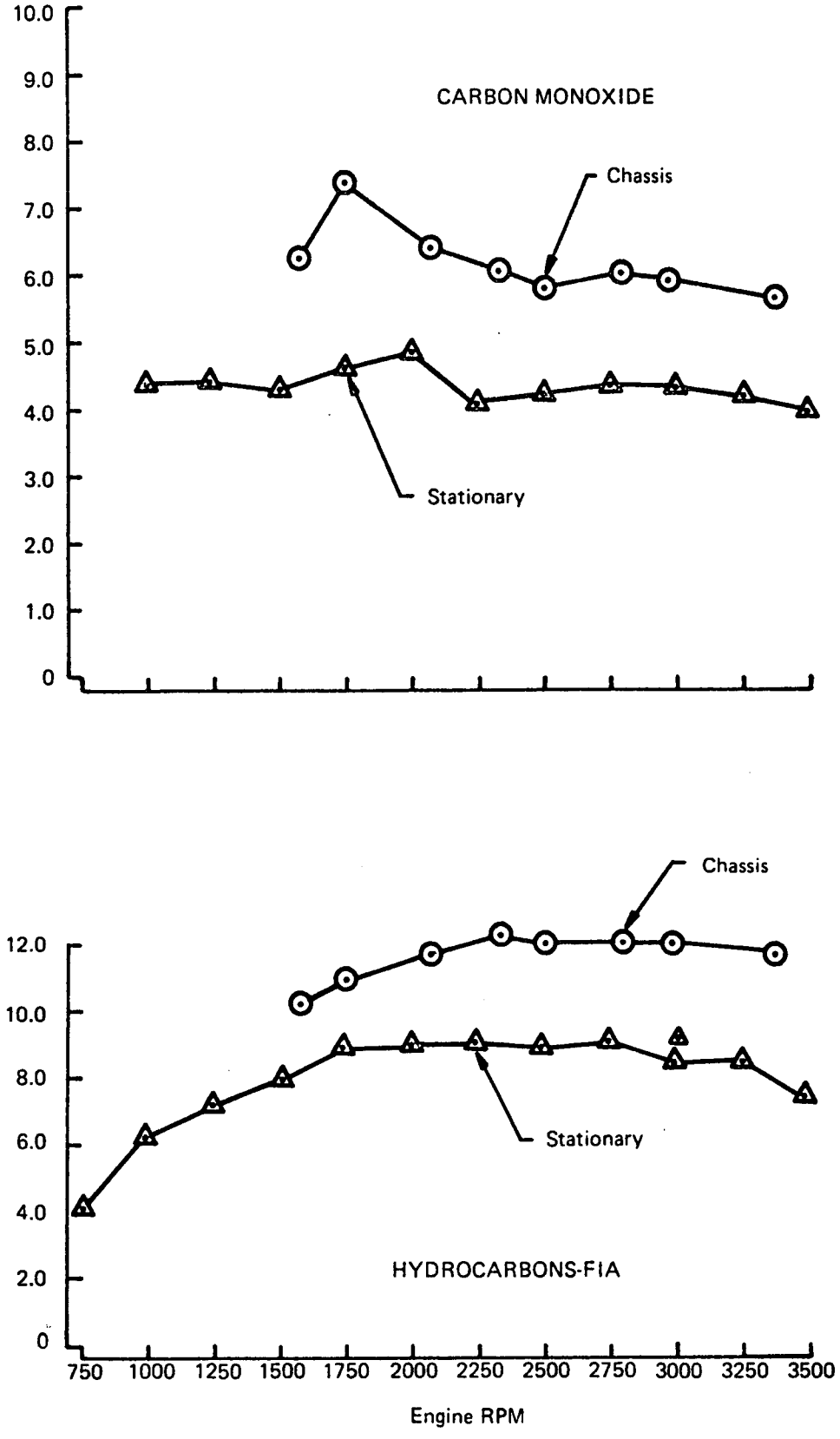


FIGURE 25. CVS RESULTS FOR CLOSED THROTTLE (CONSTANT SPEED) DECELERATION FOR 1969 IHC 304-CID, V-8

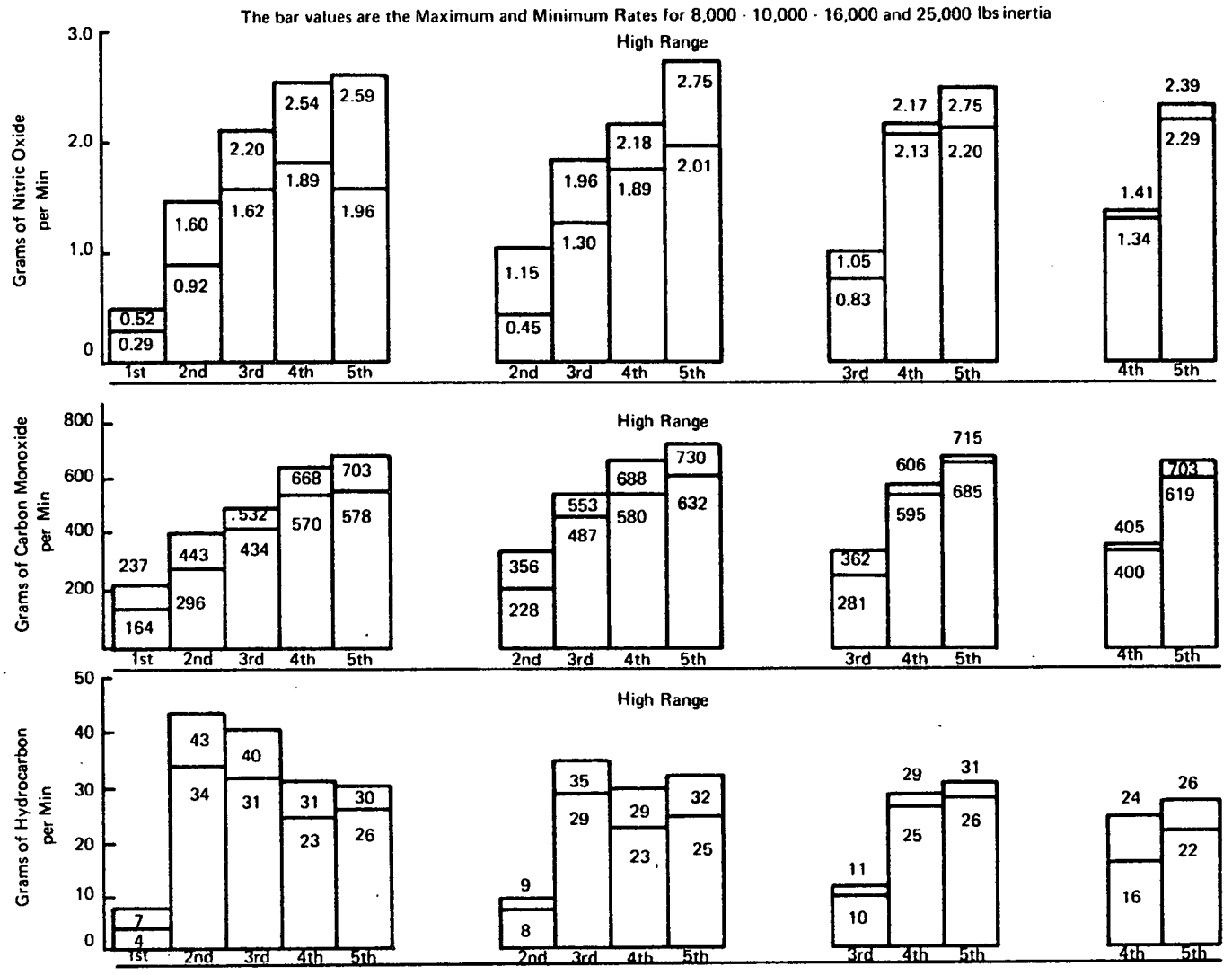


FIGURE 26. EMISSIONS FOR 1969 IHC 304-CID ENGINE ACCELERATION AGAINST INERTIA AT WIDE OPEN THROTTLE

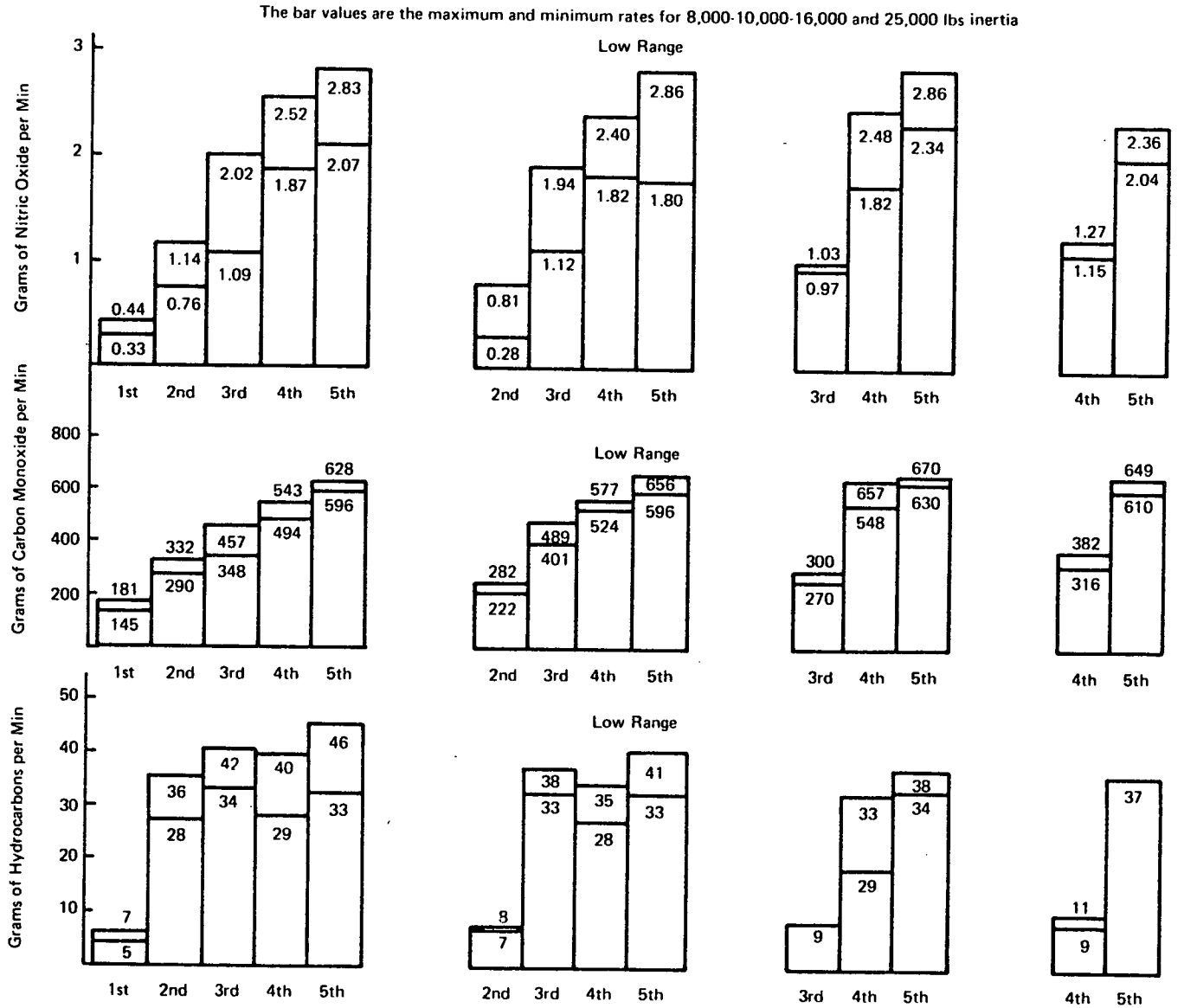


FIGURE 26a. EMISSIONS FOR 1969 IHC 304-CID ENGINE ACCELERATION AGAINST INERTIA AT WIDE OPEN THROTTLE

HC, overall, was in the range of 20 to 30 g/min (except initial accelerations of five to eight) and increases in inertia had essentially no effect. These levels may be compared to those depicted for speeds and loads in Figure 22 which were less than 15 g/min and overall nearer to 7 or 8 g/min and to CT (steady state of around 10 g/min, Figure 25).

It is difficult to assess the transient accel CO contribution relative to power and CT operation. An average of 400 g/min (usual range of 200 to 600 g/min) was obtained, regardless of inertia, to which CT performance of say 6 g/min (Figure 25) and up to 1000 g/min under speed and load mapping (Figure 23) may be compared.

Nitric oxide from the WOT accels, like CO, varied greatly from 0.5 to 2.5 g/mile, say 1.5 to 2 g/mile, and, like HC and CO, inertia had little effect on emissions behavior. This level may be compared to the speed-load map of Figure 24 which overall was similar in g/min. CT operation at constant speed was typically less than 0.5 g/min.

The other transient condition, the nonconstant speed CT deceleration consisted of engine rundown from 3000 to 750 engine rpm in contrast to a constant speed deceleration discussed earlier. Figure 27 shows HC and CO for third and fourth gear as the inertia was increased. NO was very low, less than 50-ppm concentration, and was not converted into mass units.

Considering CO first, the mass rate of emission in g/min showed a decrease as the inertia simulation increased. Emissions in high range were slightly lower than in low range for a given transmission gear while an overall decrease in grams CO per minute was noted when operating fifth relative to fourth gear. The higher inertia, higher gear, or high axle range all had the effect of lengthening rundown time. The HC g/min, per Figure 27, seemed little affected by any of these factors.

Comparing these results to those on Figure 25 for steady-state CT, CO was significantly higher (general average of 30 g/min versus 6 g/min at steady state) and HC was about the same during the road-like CT deceleration versus constant engine speed CT operation. The CO output depicted on Figure 27 was more typical of that during light power conditions.

3. Nine-Mode FTP Results

Two sampling techniques were employed to obtain emission data while operating the engines as specified in the *Federal Register*. One method, continuous sampling, is the method specified in the *Register*. The second method, CVS, is conducted simultaneously with the continuous technique.

Emission results of the two sampling procedures is shown in Table 6. Comparing the average results of three runs for both sampling techniques indicates less than a 5-percent difference in the amount of contaminant produced between stationary and chassis procedure. The continuous sampling method indicates that chassis results were lower for CO, higher for HC, and about the same for NO relative to the stationary procedure. The CVS agreed with the continuous for HC but showed a reversal for CO and NO. However, as mentioned before, the differences between stationary and chassis procedures by either continuous or CVS was less than 5 percent.

In reviewing the concentrations obtained during the FTP, the HC concentrations appear to be "typical" for a precontrolled engine. However, the CO concentrations are extremely high and are not felt to represent the "typical" IHC 304 engine. The values obtained are very repeatable and the abnormal values cannot be attributed to instrumentation. During the initial tune-up, the original carburetor was replaced with a factory new one. Precautions were taken to insure basic engine conditions were set according to manufacturers' specifications. With the high concentrations of CO, there was a corresponding abnormally low concentration of NO relative to typical precontrolled engines.

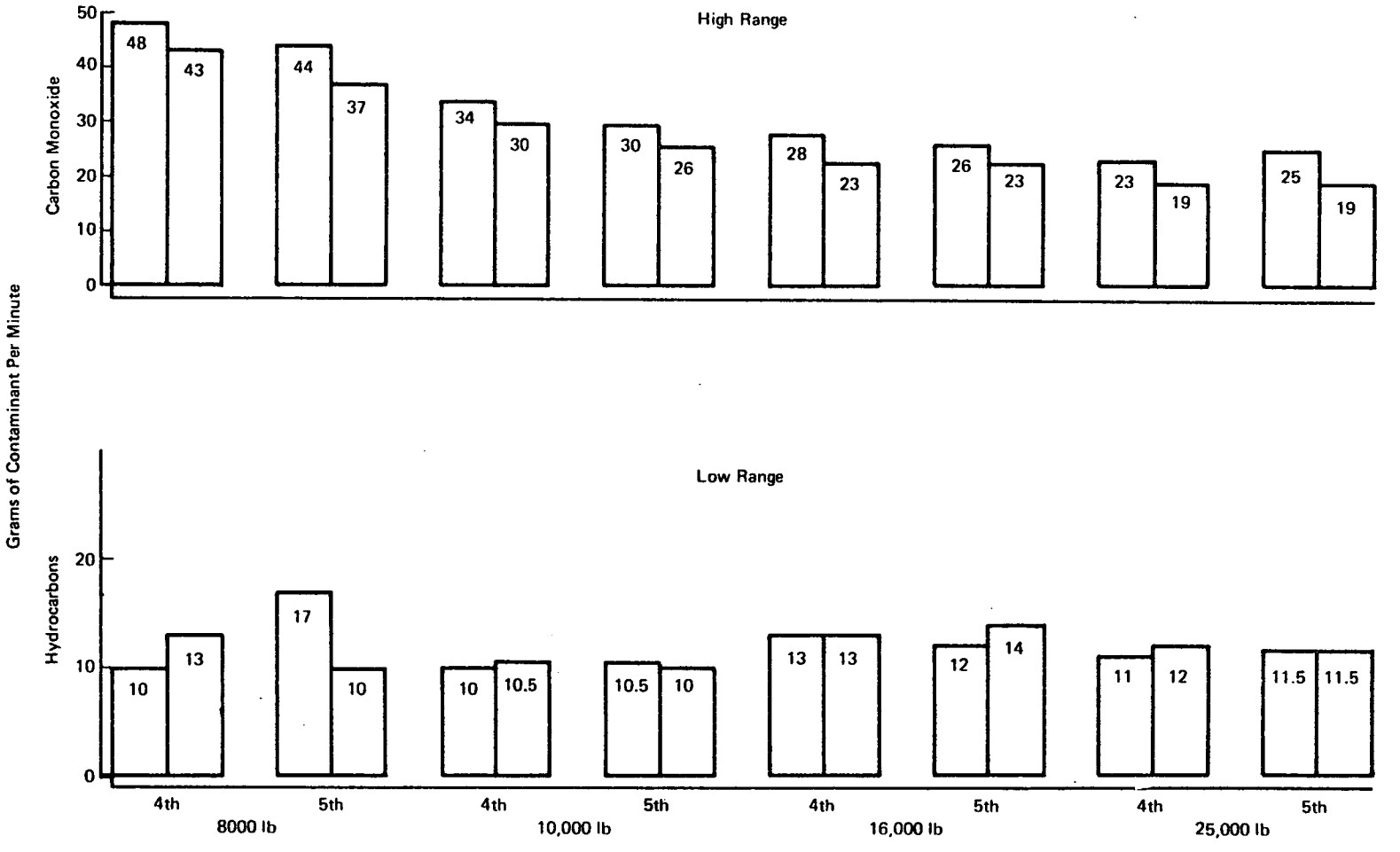


FIGURE 27. CVS RESULTS FOR CLOSED THROTTLE DECELERATION (NONCONSTANT SPEED) FOR 1959 IHC 304-CID, V-8

TABLE 6. CONTINUOUS AND CVS RESULTS–FEDERAL CYCLE

1969 IHC, 304 CID

Date	Dynamometer	Continuous Sampler			CVS, g/lb fuel			Fuel wt, lb
		HC, ppm Hex	CO, %	NO, ppm	HC	CO	NO	
3-8-71	Stationary	616	9.90	224	18.19	478	1.06	7.20
3-8-71	Stationary	596	9.85	222	17.78	397	1.04	7.20
3-8-71	Stationary	616	9.91	217	17.93	388	1.02	7.25
	Avg	609	9.75	221	17.97	421	1.04	7.22
3-16-71	Chassis	661	9.32	226	20.10	448	0.87	6.88
3-16-71	Chassis	596	9.21	235	18.17	446	0.88	6.88
3-17-71	Chassis	595	9.40	227	17.32	460	1.09	6.87
	Avg	617	9.31	229	18.53	451	0.95	6.88
Avg Stationary		609	9.75	221	17.97	421	1.04	7.22
Avg Chassis		617	9.31	229	18.53	451	0.95	6.88

C. 1969 Ford 300 CID Engine

Steady-state, transient, and nine-mode FTP results are presented in this section for a 1969 Ford 300 CID engine powering a 15,000-lb GVW van body truck.

1. Steady-State Emission Rates

Figures 28, 29, and 30 show the average HC, CO, and NO emission behavior at 1250-, 2000- and 3000-rpm engine speed. Much the same general comments may be offered regarding these emission maps as for the Chevy and IHC engines already discussed. Power level continues to be the dominant factor in emission production. In general, the HC curves are lower at light to medium power (10 to 50 percent power) and are greatest at no load and above 50 percent power.

CO acted more like the 250 Chevy engine in that at light loads, the production rate was fairly steady. Like the other two engines, CO at high power was grossly higher than at low loads. Note the significant break in CO at the 60-percent power point (1250 and 2000 rpm) and the 50-percent power point (3000 rpm). NO was quite predictable with maximum levels occurring at 50-percent power level. This characteristic was not observed in the previous two engines.

Engine speeds for the two previous engines included a 3500-rpm condition. However, this particular engine had a governor which limited engine rpm to 3250 rpm. Accordingly, 3000 rpm was the highest speed employed. The overall effect of speed was to shift downward slightly the preponderance of HC data as the speed was increased with the opposite effect noticed for NO. NO showed a more definite speed effect with an almost doubling of the map values between 1250 and 3000 rpm. This is the first instance of a substantial speed effect presented so far. The CO rates, per Figure 29, were practically insensitive to speed variations overall.

The chassis and stationary results "tracked" satisfactorily based on previous similar experience. Somewhat surprising was the close, almost one to one, agreement between the two methods of engine operation for NO which was always different for the other two engines. CO performed as expected with fairly close agreement. HC, which generally exhibits fairly close correlation between chassis and stationary, had the greatest differences as may be noted by the broken versus the solid curves on Figure 28.

The CT constant speed motoring condition emission results are shown in Figure 31 for CO and HC. Both HC and CO results for stationary operation were higher than the chassis results during the constant speed CT. In comparing the CT operation with power conditions, the CT HC results were higher in all cases except at idle rpm. The maximum CT HC value of 14 g/min was about double maximum

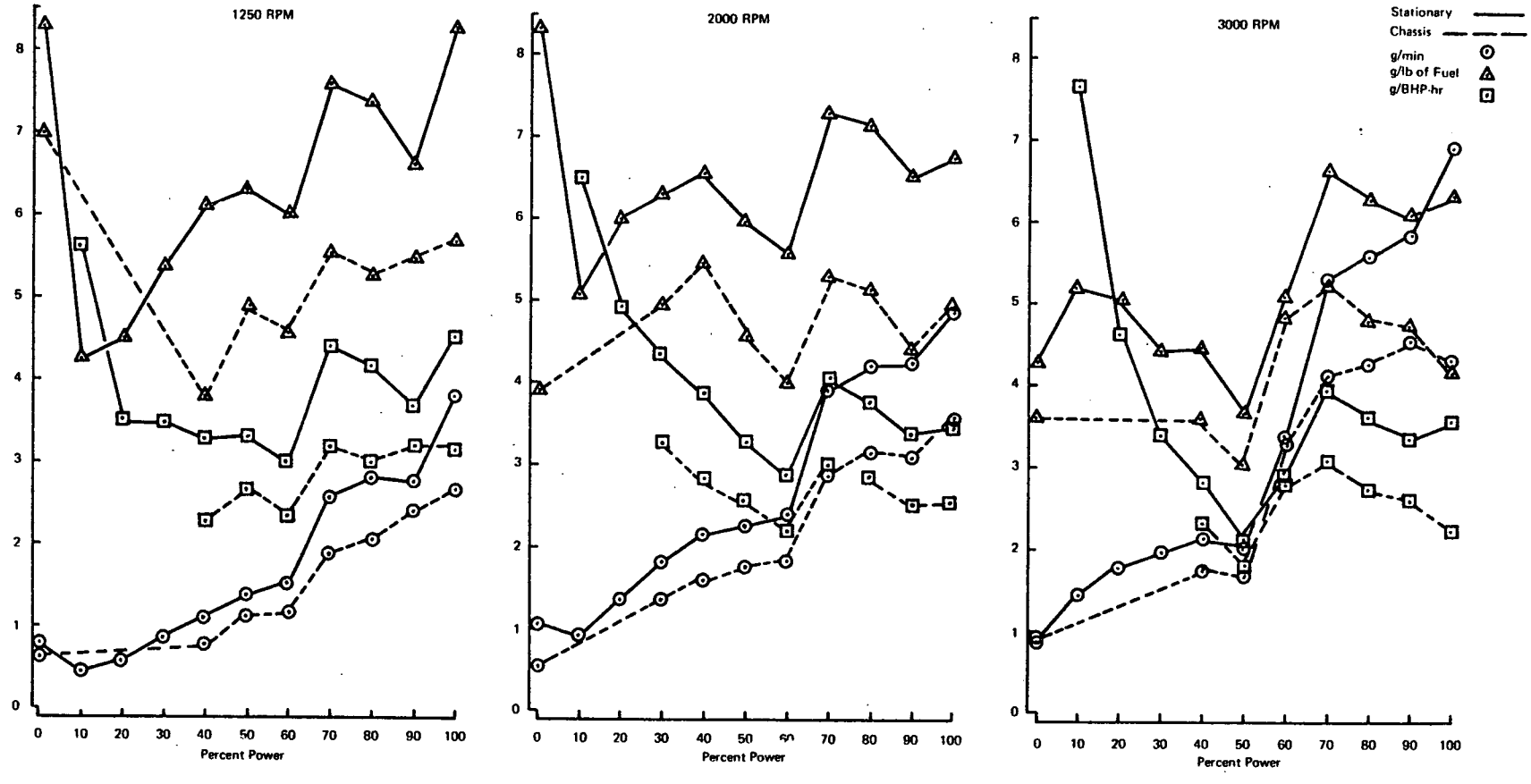


FIGURE 28. HYDROCARBON CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 FORD 300-CID ENGINE AT 1250, 2000, AND 3000 RPM

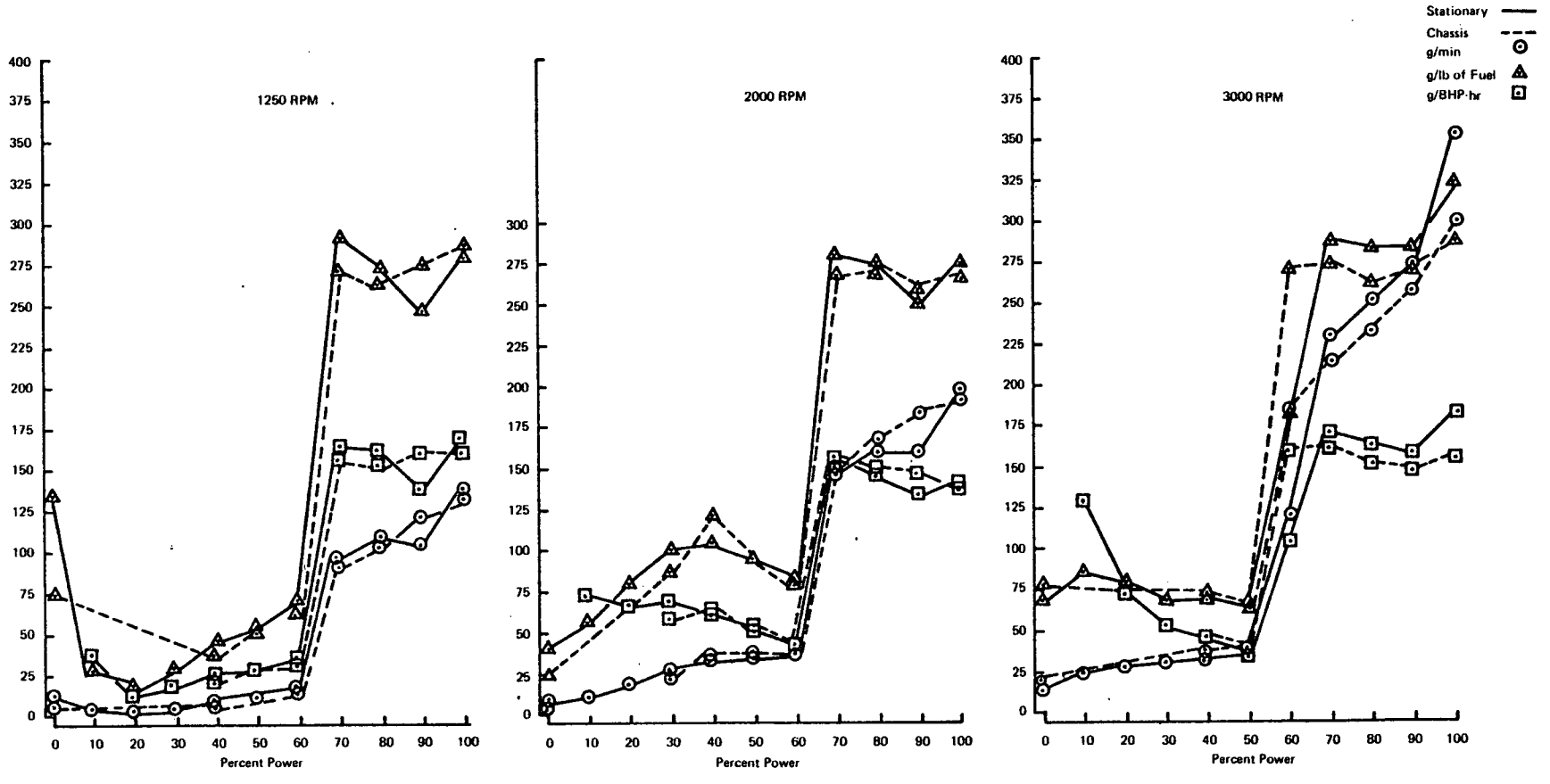


FIGURE 29. CARBON MONOXIDE CHARACTERIZATION ON STATONARY AND CHASSIS DYNAMOMETERS FOR A 1969 FORD 300-CID ENGINE AT 1250, 2000, AND 3000 RPM

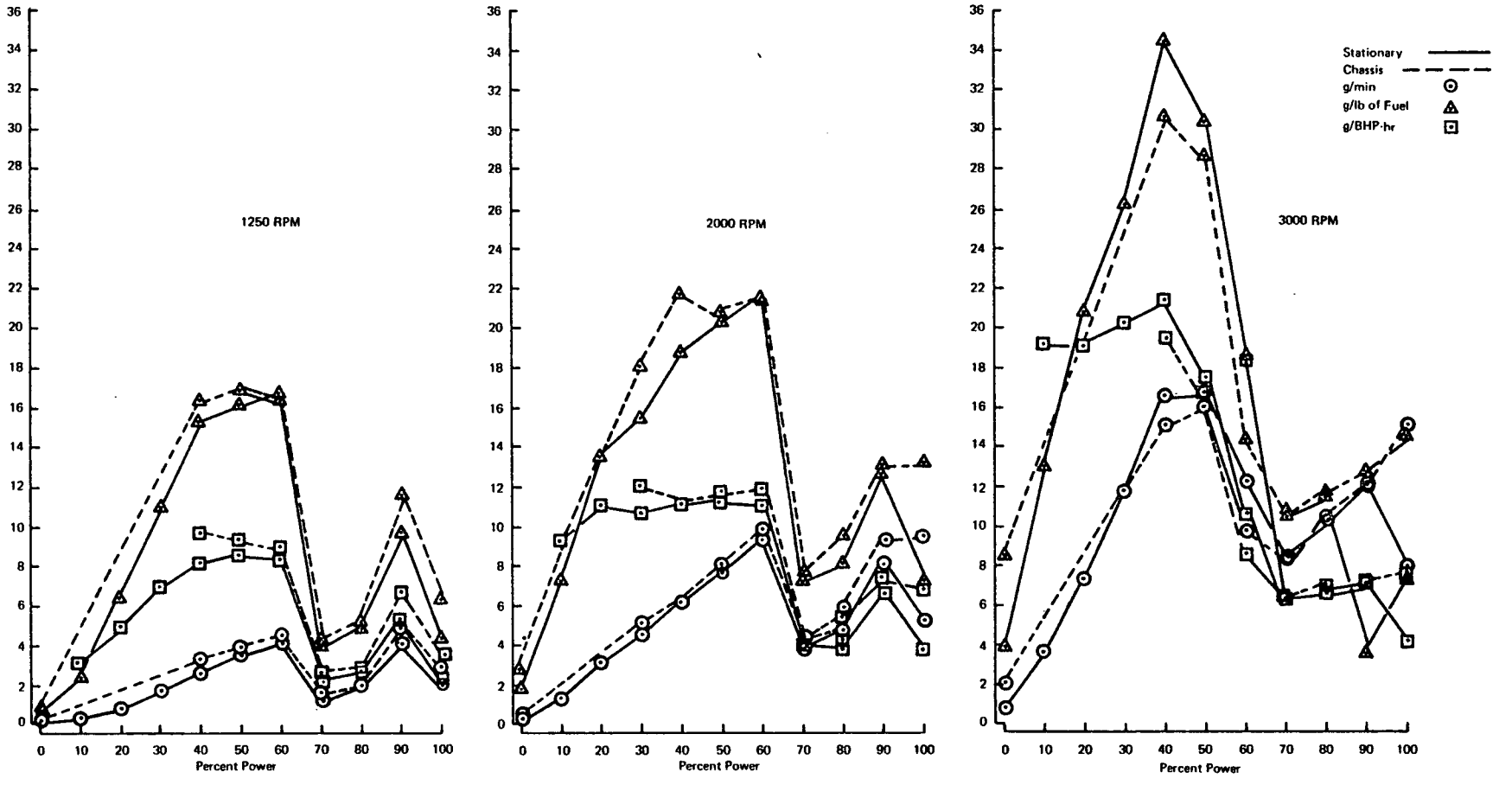


FIGURE 30. NITRIC OXIDE CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 FORD 300-CID ENGINE AT 1250, 2000, AND 3000 RPM

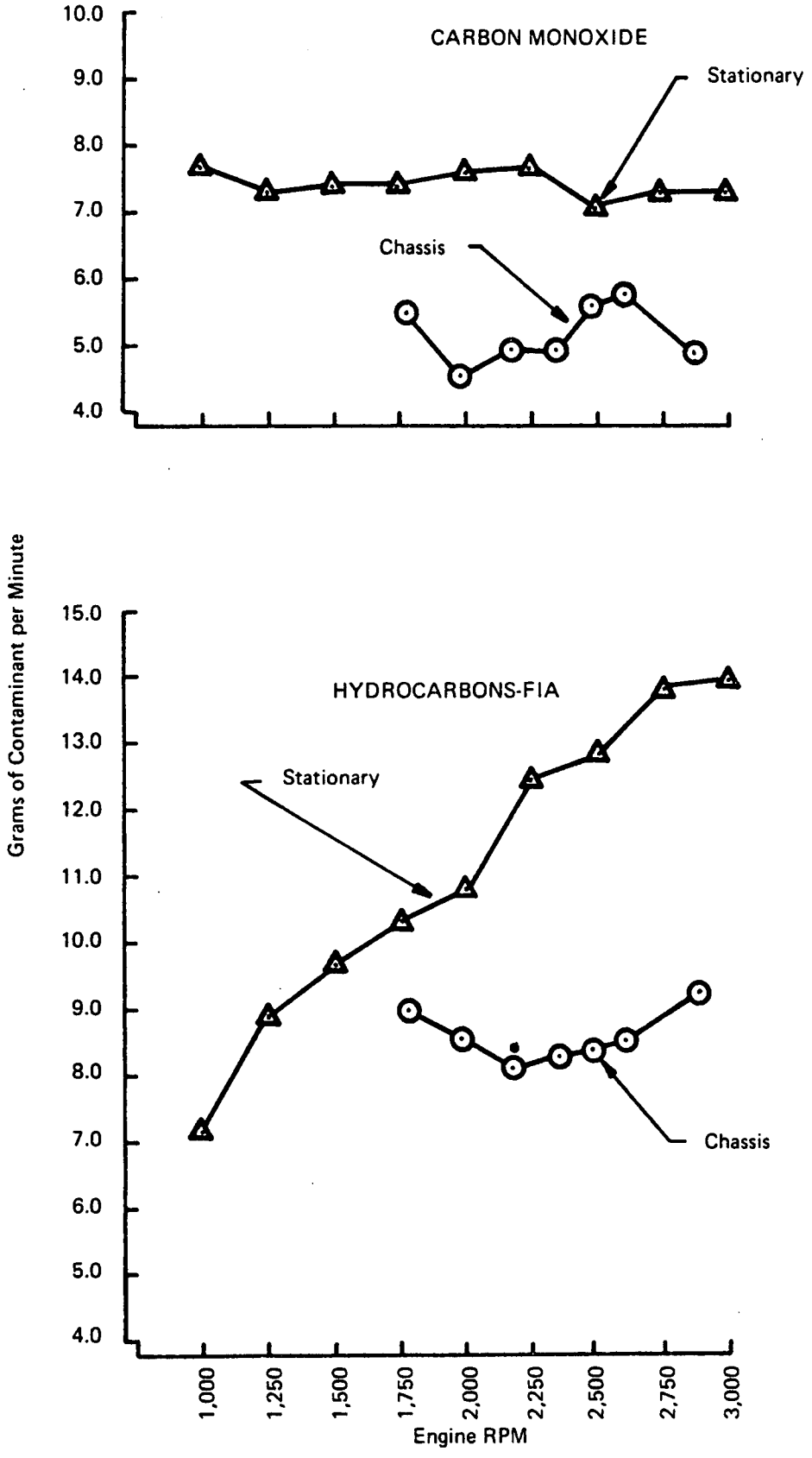


FIGURE 31. CVS RESULTS FOR CLOSED THROTTLE (CONSTANT SPEED) DECELERATION FOR A 1969 FORD 300-CID I-6

power HC value of 7 g/min. The CO results obtained during the CT operation do not represent CO results during power conditions. The maximum CO during CT of 9.5 g/min was substantially lower than the maximum during a power condition of 360 g/min. The nitric oxide results for CT operation are too small to graph and do not represent NO emissions during power conditions.

Of particular interest was the fairly steep increase in exhaust HC as the engine speed was increased. The chassis HC data and the CO data by both methods of operation were fairly flat. Exactly why the stationary CT operated HC results increase as they do is unknown. Later tests by the FTP confirm the differences shown in Figure 31 of higher HC and CO for the stationary-operated relative to the chassis-operated engine.

The final, but none the less important, steady-state mode measured was idle. The results were as follows:

	Hydrocarbons		Carbon Monoxide	
Run No.	g/min	g/lb fuel	g/min	g/lb fuel
1	0.54	13.75	7.71	196
2	0.44	6.28	11.88	170
Avg	0.49	10.02	9.80	183

The importance of the above emissions are not so much in their emission rate, in g/min, but are of concern because of the relatively high percentage of idle of trucks in urban-suburban duty. Estimates in the neighborhood of 20- to 25-percent idle time for gasoline HDV's are fairly common. More detailed information will be given in a later section covering direct stream analysis of nine trucks which includes NO_x.

2. Transient Emission Rates

Figures 32 and 33 are bar graph representations of acceleration and deceleration emission rates for the 300 CID Ford engine operating in a truck on the SwRI research chassis dynamometer. As explained earlier, the acceleration emission rates of Figure 32 show the range of HC and CO, in g/min, of typical WOT accelerations against a variety of inertias including 13,000, 16,000 and 25,000 lb. The minimum level or bar is superimposed on the maximum bar or rate for operation in the different gears noted. The first group of bars indicates the emission values obtained starting from zero mph or rest and accelerating to 3000 rpm in first gear and on through the shift pattern. The second group of bars for a given inertia is similar except the driver starts in second. Likewise, the third group starts in third.

In general, variations in inertia had little influence on the emissions produced. The lowest level of emissions occurred during the first acceleration, i.e., starting from rest, regardless of the gear started in. The maximum level of emissions nearly always occurred during the second acceleration. The HC emission values obtained during the acceleration sequence were no greater than those produced during steady-state power conditions.

Variations in inertia had little effect on CO and NO. Like CO, NO was at a maximum during the last acceleration. The maximum level of NO produced during steady state was 17 g/min (60-percent load, 3000 rpm) as compared with 12.6 for the acceleration. The nonconstant speed CT deceleration operation consisted of maintaining the engine at 3000 engine rpm until the emissions stabilized and then decelerating, at CT, to 750 engine rpm. This CT operation was completed for both third and fourth gears using 8,000-, 13,000-, and 16,000-lb simulated inertia. As shown in Figure 33, the inertia had little or no effect on HC emissions for either third or fourth gear CT deceleration operation. HC results obtained for the nonconstant speed CT were similar to the results obtained during power conditions. The CO results for CT operation reached a maximum level of 8.8 g/min in comparison to 360 g/min maximum for power conditions. The NO was below 50 ppm and was not converted into mass units.

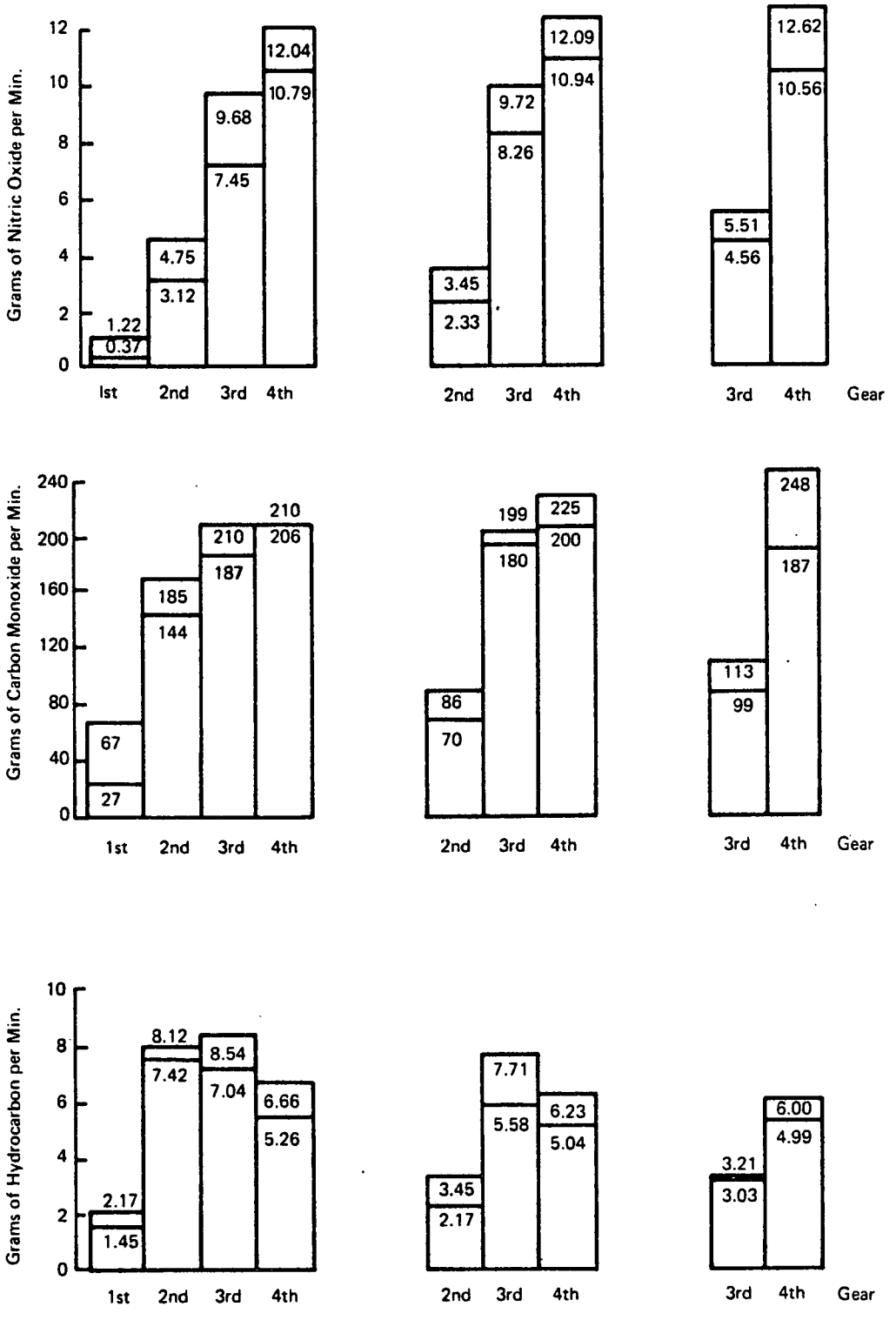


FIGURE 32. EMISSIONS FOR 1969 FORD 300-CID ENGINE ACCELERATION AGAINST INERTIA AT WIDE OPEN THROTTLE

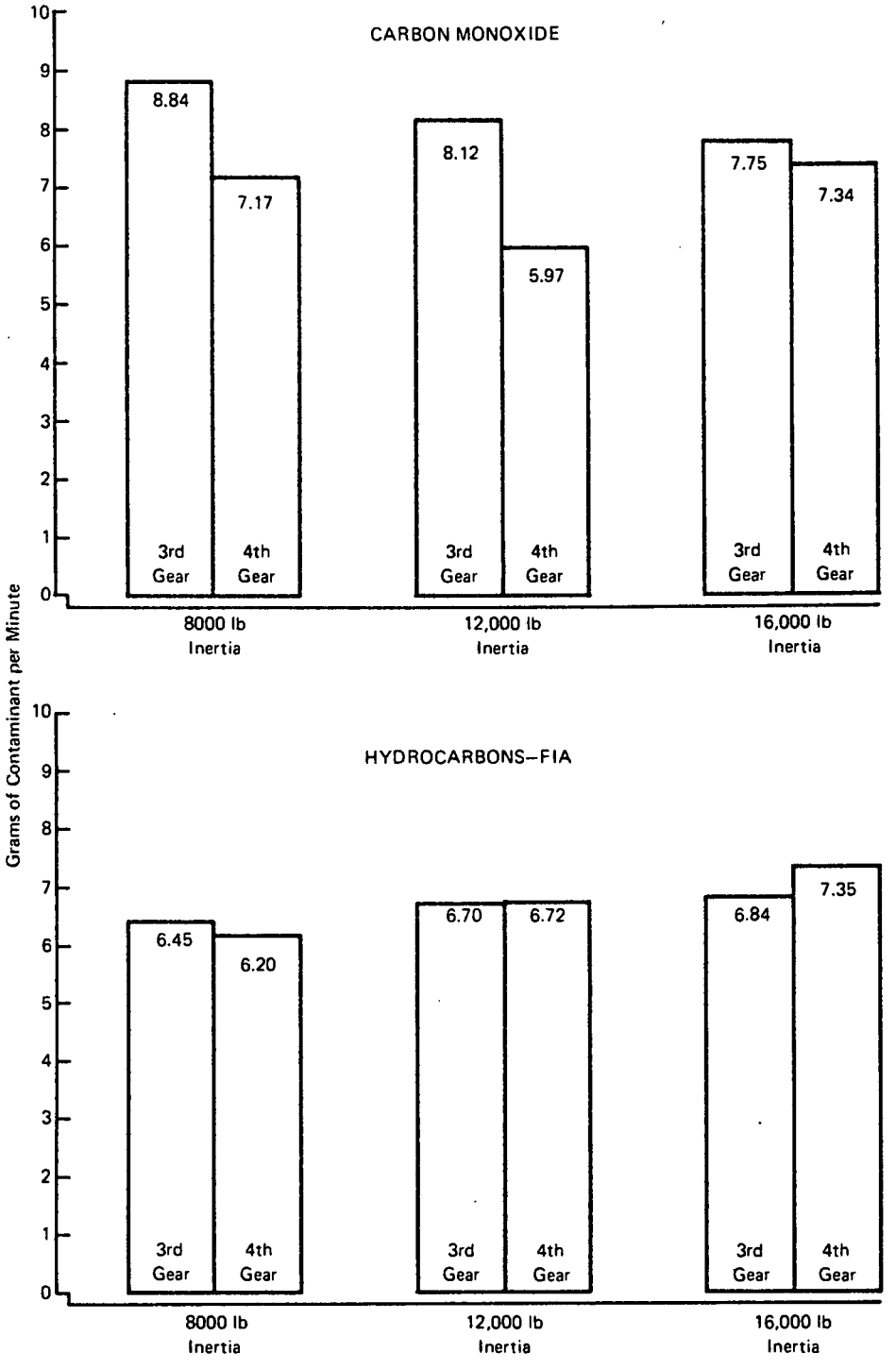


FIGURE 33. CVS RESULTS FOR CLOSED THROTTLE DECELERATION (NONCONSTANT SPEED)–1969 FORD 300-CID I-6

In comparing the nonconstant speed deceleration with the constant speed CT operation (see Figures 33 and 31), there is a similarity for CO, but not for HC. The HC results for the deceleration were 6.7 g/min as compared to a maximum of 14 g/min during constant speed CT. The CO average for the nonconstant speed was 7.5 as compared to about 8 g/min (stationary) and 5 g/min (chassis) constant speed CT. In general, for this engine for CT operation, either constant or nonconstant speed, the emission values obtained for HC were similar to emission values obtained during power conditions. CT produced only about 3 percent of the maximum CO recorded during power conditions.

3. Nine-Mode FTP Results

Emission results for the two methods used to determine nine-mode FTP emissions are shown in Table 7. In comparing the averages for the stationary and chassis results for the continuous method, the largest difference is for NO with the chassis results being higher. The HC spread was the next largest with chassis results being highest. There was very little difference for CO with the stationary results a little higher.

TABLE 7. CONTINUOUS AND CVS RESULTS–FEDERAL CYCLE

1969 Ford, 300 CID, I-6

Date	Dynamometer	Continuous Sampler			CVS, g/lb fuel			Fuel wt, lb
		HC, ppm Hex	CO, %	NO, ppm	HC	CO	NO	
Warm Start								
4-27-71	Stationary	238	2.58	2042	11.60	148	6.83	5.10
4-27-71	Stationary	231	2.55	2255	11.61	144	7.08	5.18
4-28-71	Stationary	222	2.48	1858	11.50	147	6.74	5.42
	Avg	230	2.54	2052	11.57	146	6.88	5.23
5-6-71	Chassis	252	2.45	2354	8.28	152	8.23	5.19
5-7-71	Chassis	240	2.52	2474	7.02	128	7.48	5.12
	Avg	246	2.49	2414	7.65	140	7.86	5.16
Avg Stationary (warm)		230	2.54	2052	11.57	146	6.88	5.23
Avg Chassis (warm)		246	2.49	2414	7.65	140	7.86	5.16
Cold Start								
4-27-71	Stationary	246	2.65	1900	12.00	144	7.28	5.37
4-28-71	Stationary	254	2.72	2036	11.24	151	6.62	5.06
4-29-71	Stationary	230	2.55	1886	11.80	151	6.91	5.44
	Avg	243	2.64	1941	11.68	149	6.94	5.29
5-7-71	Chassis	258	2.52	2330	7.47	134	7.96	6.40
5-8-71	Chassis	250	2.52	2404	8.56	149	7.91	5.61
	Avg	254	2.52	2367	8.02	142	7.94	6.00
Avg Stationary (cold)		243	2.64	1941	11.68	149	6.94	5.29
Avg Chassis (cold)		254	2.52	2367	8.02	142	7.94	6.00

The CVS method indicates the same trend for CO and NO with the chassis producing the higher NO and lower CO emissions. The HC results for the CVS method had the largest spread for the two sampling techniques. HC results for the two sampling techniques reversed in that the stationary procedure produced higher emissions than the chassis for the CVS sampling procedure. There is no apparent simple explanation for the HC reversal.

As a result of interest expressed by the Project Officer in "cold start" emissions, several additional FTP runs were made to investigate the "cold start" effect. By "cold start" is meant the engine was maintained at a temperature between 68° to 86°F for 12 hr prior to the Federal test and that the sampling started when the engine was first cranked. The current Federal procedure specifies a 1-hr soak followed by 5 min of operation at 1000 ± 100 rpm and no load before start of the test. This means the engine was in a semiwarmed-up condition prior to the emissions test. Two chassis runs and three stationary runs were made

from a "cold start" and the results are also shown in Table 7. For this engine on this test procedure, there was little difference between "cold start" and "warm start" cycle emission results as measured by both sampling methods.

D. 1969 Dodge 318 CID Engine

This subsection presents the emissions characterization data for the last of the four 1969 engines in HDV application studied.

1. Steady-State Emission Rates

Figures 34, 35, and 36 depict in summary fashion the HC, CO, and NO emissions behavior for this engine throughout the power range of zero to 100 percent at 1250, 2000, and 3000 rpm. Continuing the theme already discussed for the other three engines, power had the greatest single influence on emission rates. The HC rate was greatly affected as load was decreased to zero with levels at zero and 10 percent power—even higher than at 100 percent power, the other major power level for high rates of HC production. The characteristic "dished" curve with minimum HC emissions between 20 and 80 percent power is quite evident from the curves.

CO behavior, per Figure 35, resembles the other three engines, specifically the IHC and the Ford with higher levels at zero load and a distinct point of inflection at 70 percent power. Above 70-percent load, the CO increased dramatically while up to that point, it was progressively decreased from the light load condition. This graph is ample evidence of the need for fairly close increment power levels when studying exhaust emission behavior.

NO continued to "go through a maximum" at around 50 to 60 percent of power. As with the 300 CID Ford, this engine had a distinct decrease in NO emission rate at 90 percent (1250 rpm), 80 percent (2000 rpm), and 70 percent (3000 rpm). Like CO, the effect of power on NO demonstrates the importance of small increments of power, approaching 10 percent, when defining the emissions characteristics of a carbureted gasoline engine.

Speed had a much smaller effect on emission rates than power output and variations in speed were similar in end result on emissions to the other three engines. An increase in speed had a slight but discernible effect on producing lower HC overall. CO, on the other hand, was not noticeably affected by speed of operation. Only for NO emissions did engine speed show a marked effect. As with the IHC and Ford engines, the higher the speed, the higher the emission rates, regardless of the method of expression. The effect was not as great for this engine as the Ford in that the 3000-rpm levels were less than twice the 1250-rpm rates.

The correlation between stationary and chassis results are satisfactory overall. Agreement may be termed excellent for both CO and HC curves in many instances while NO at 2000 and 3000 rpm looked like the Chevy and IHC engines, especially at light to moderate power outputs. It is evident that there are a number of factors which can and probably do have an influence on emissions that are varied when an engine is operated in an open test cell (stationary) and in the engine compartment of a truck. The physical installation features as well as the variations in inlet air condition have not been adequately researched and understood to offer a satisfactory explanation. More of this problem can be seen in later discussions on the FTP and the experimental 23-mode procedure.

Another constant speed condition investigated on both chassis and stationary dynamometers was closed throttle at constant engine speed (motoring). As shown on Figure 37, relatively flat HC response to variations in speed was measured regardless of the way in which the engine was operated. The highest level of HC produced during CT operation, 12 g/min, exceeded the HC level obtained during other steady-state conditions, 10.6 g/min. Fairly substantial differences between the CO levels were found with stationary, about twice the level of chassis results. However, the highest CO level observed during the CT operation

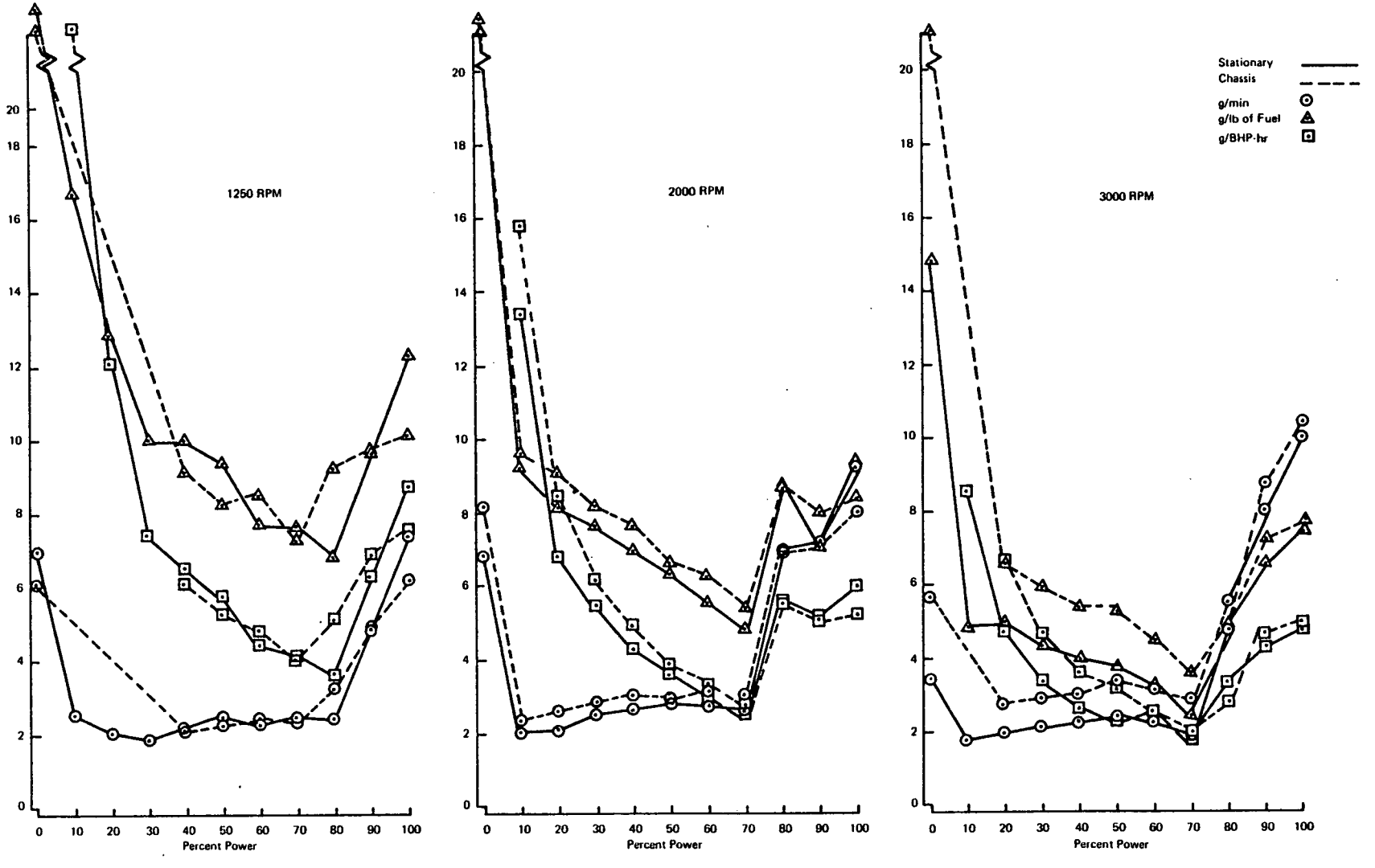


FIGURE 34. HYDROCARBON CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 DODGE 318-CID ENGINE AT 1250, 2000, AND 3000 RPM

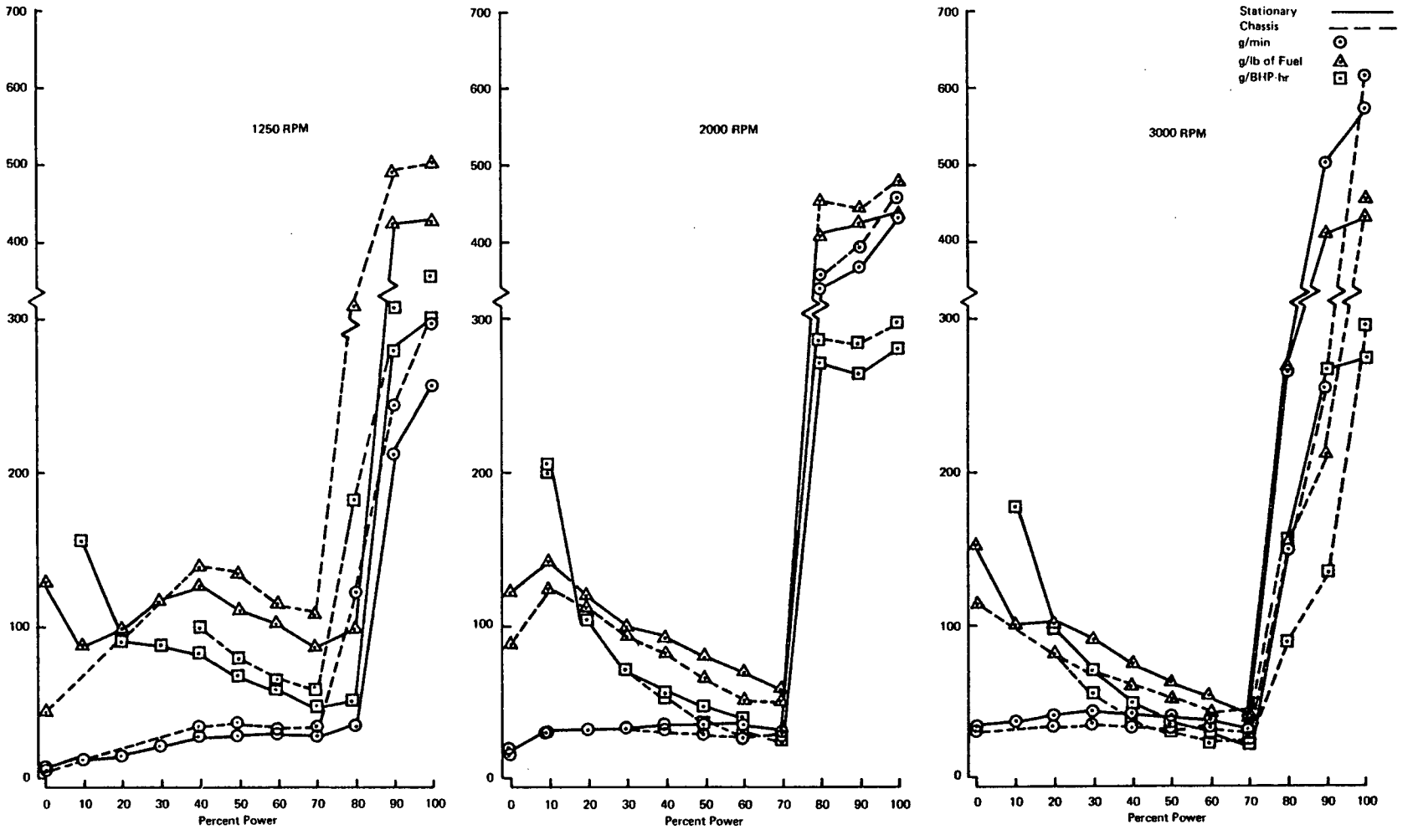


FIGURE 35. CARBON MONOXIDE CHARACTERIZATION ON STATONARY AND CHASSIS DYNAMOMETERS FOR A 1969 DODGE 318-CID ENGINE AT 1250, 2000, AND 3000 RPM

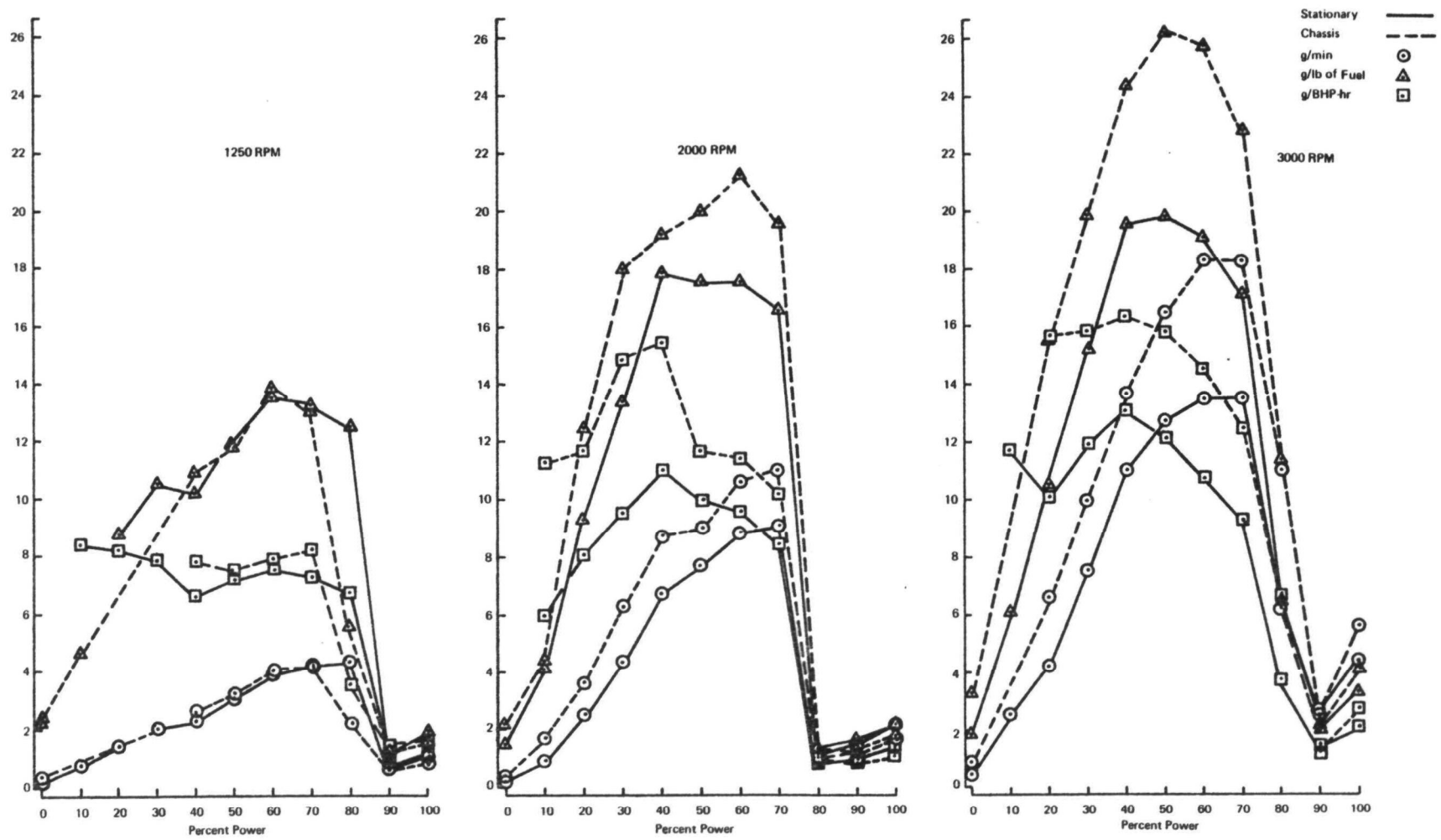


FIGURE 36. NITRIC OXIDE CHARACTERIZATION ON STATIONARY AND CHASSIS DYNAMOMETERS FOR A 1969 DODGE 318-CID ENGINE AT 1250, 2000, AND 3000 RPM

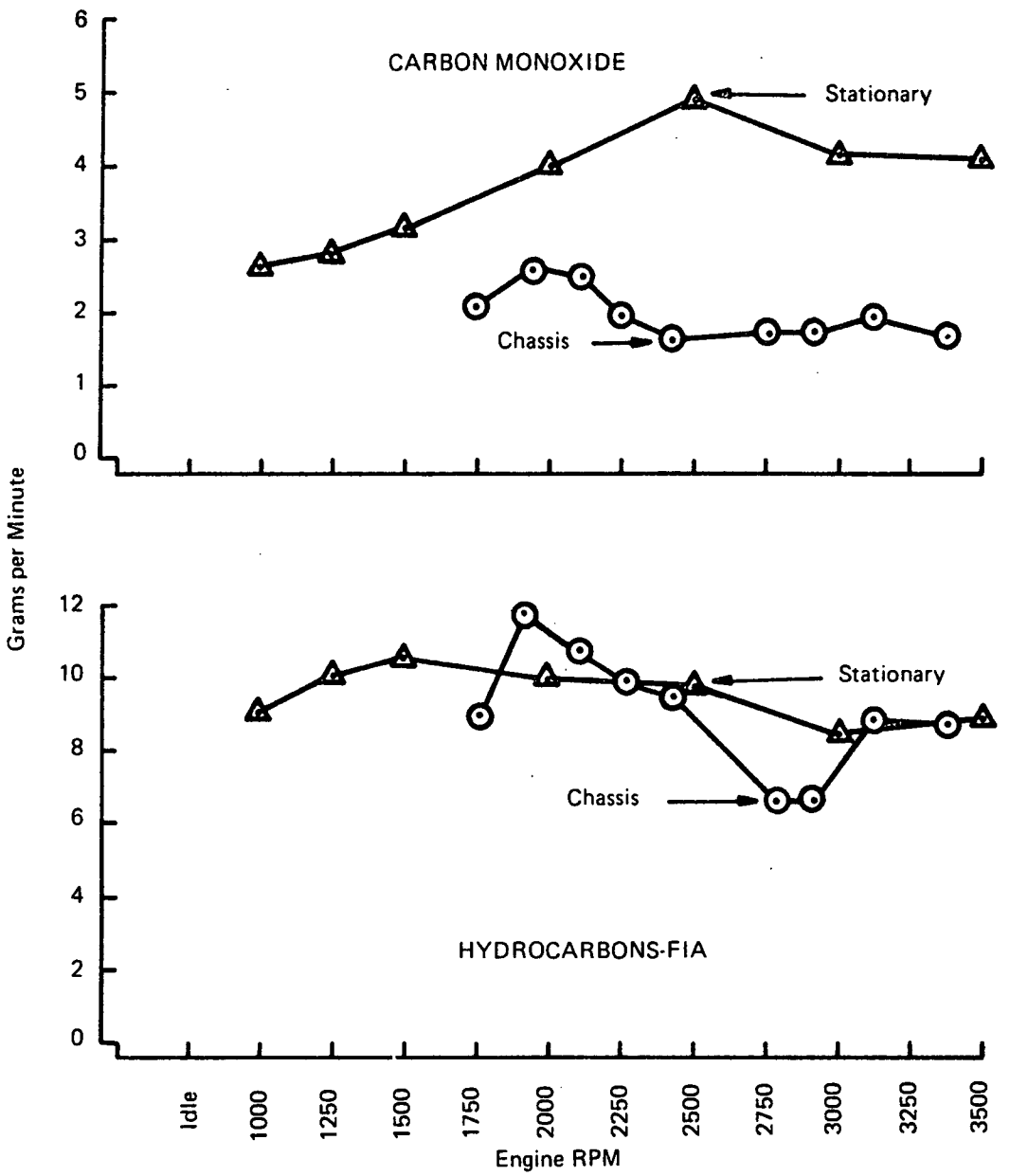


FIGURE 37. CONSTANT VOLUME SAMPLER RESULTS AT CLOSED THROTTLE FOR 1969 DODGE 318-CID V-8

was lower than any condition monitored during steady-state conditions. The NO levels during the CT operation, in terms of concentrations, were very low and were not converted to mass units.

The final steady-state test was at engine idle with the following results:

	Hydrocarbons		Carbon Monoxide	
Run No.	g/min	g/lb fuel	g/min	g/lb fuel
1	1.90	47.50	2.03	50
2	1.27	21.17	1.50	25
Avg	1.59	34.34	1.77	38

Idle HC and CO rates were very similar for the four engines studied in this phase of the project. HC ranged from 0.19 to 1.63 g/min and 2.19 to 36.88 g/lb fuel. CO ranged from 1.77 to 12.76 g/min and 38 to 141 g/lb fuel. More information on exhaust HC, CO, and NO is given in Section X of this report for the nine-engine study of the 23-mode experimental test procedure.

2. Transient Emission Rates

Figures 38 and 39 are bar graph representations of the range of levels of HC, CO, and NO when the 318 CID Dodge engine was operated against various levels of inertia during road-like accelerations and decelerations. The bar graphs in Figure 38 show minimum, superimposed on the maximum, levels for a variety of inertias including 13,000, 16,000, and 25,000 lb.

The first group of bars indicates the emission values obtained starting from zero mph or rest and accelerating to 3000 rpm in first gear and on through the shift pattern. The second group of bars for a given inertia is similar except the driver starts in second. Likewise, the third group starts in third gear. In general, the HC results for the three inertia weights were similar regardless of the gear shifting sequence. The overall average was 10.9 g/min, higher than observed during steady-state power conditions.

Also shown in Figure 38 are the results for CO during acceleration. The general trend is the same with an average for all conditions of over 300 g/min. This is representative of the steady-state levels above 70 percent power shown in Figure 35. The maximum CO in g/min during the accelerations occurred during the fourth gear acceleration. NO, produced during the accelerations through the gears, had an overall average of 4 g/min for all conditions studied. This may be compared with a maximum NO produced during steady-state conditions of 15.3 g/min.

Results for the nonconstant speed CT deceleration are shown in Figure 39 and were obtained only on the chassis dynamometer. The nonconstant speed CT procedure consisted of maintaining the engine at 3000 engine rpm until the emission levels stabilized and then to decelerate at CT to 750 engine rpm. This CT operation was run at three different inertia weights: 13,000, 16,000, and 25,000 lb. The HC and CO levels were similar for 13,000- and 16,000-lb inertia. At 25,000-lb inertia, there was an increase in both HC and CO.

In comparing the HC levels for the nonconstant speed deceleration, Figure 39, and the constant speed, Figure 37, CT conditions, the constant speed CT was slightly higher. Making the same comparison for the CO results, the deceleration results are higher than the constant speed results. Even though the deceleration was higher for CO, the emission rate was far less than the CO levels obtained during steady-state power conditions.

3. Nine-Mode FTP Results

Emission results for the CVS and continuous sampling techniques are shown in Table 8. In comparing the average continuous sampling results obtained on the stationary and chassis dynamometers,

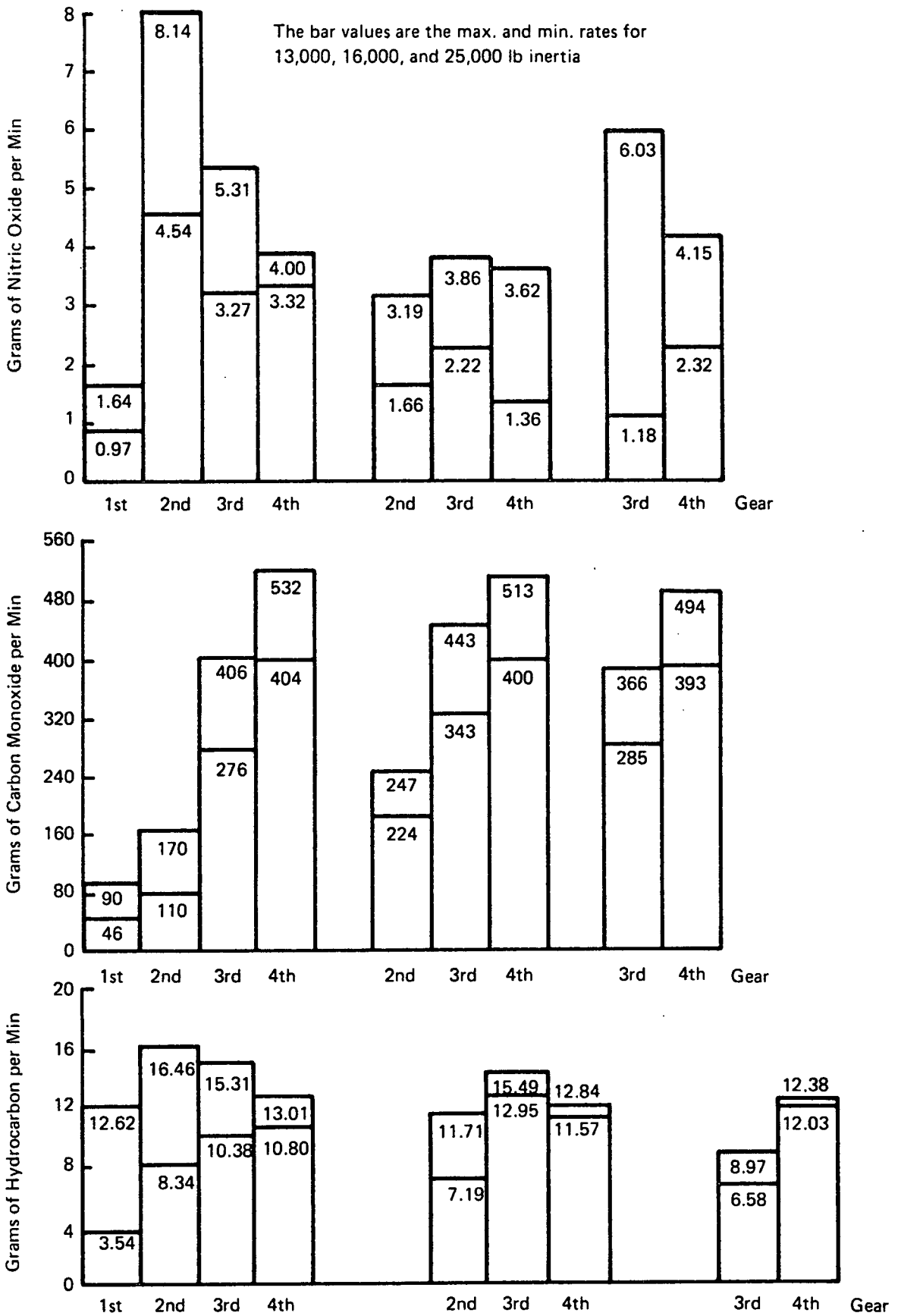


FIGURE 38. EMISSIONS FOR 1969 DODGE 318-CID ENGINE ACCELERATION AGAINST INERTIA AT WIDE OPEN THROTTLE

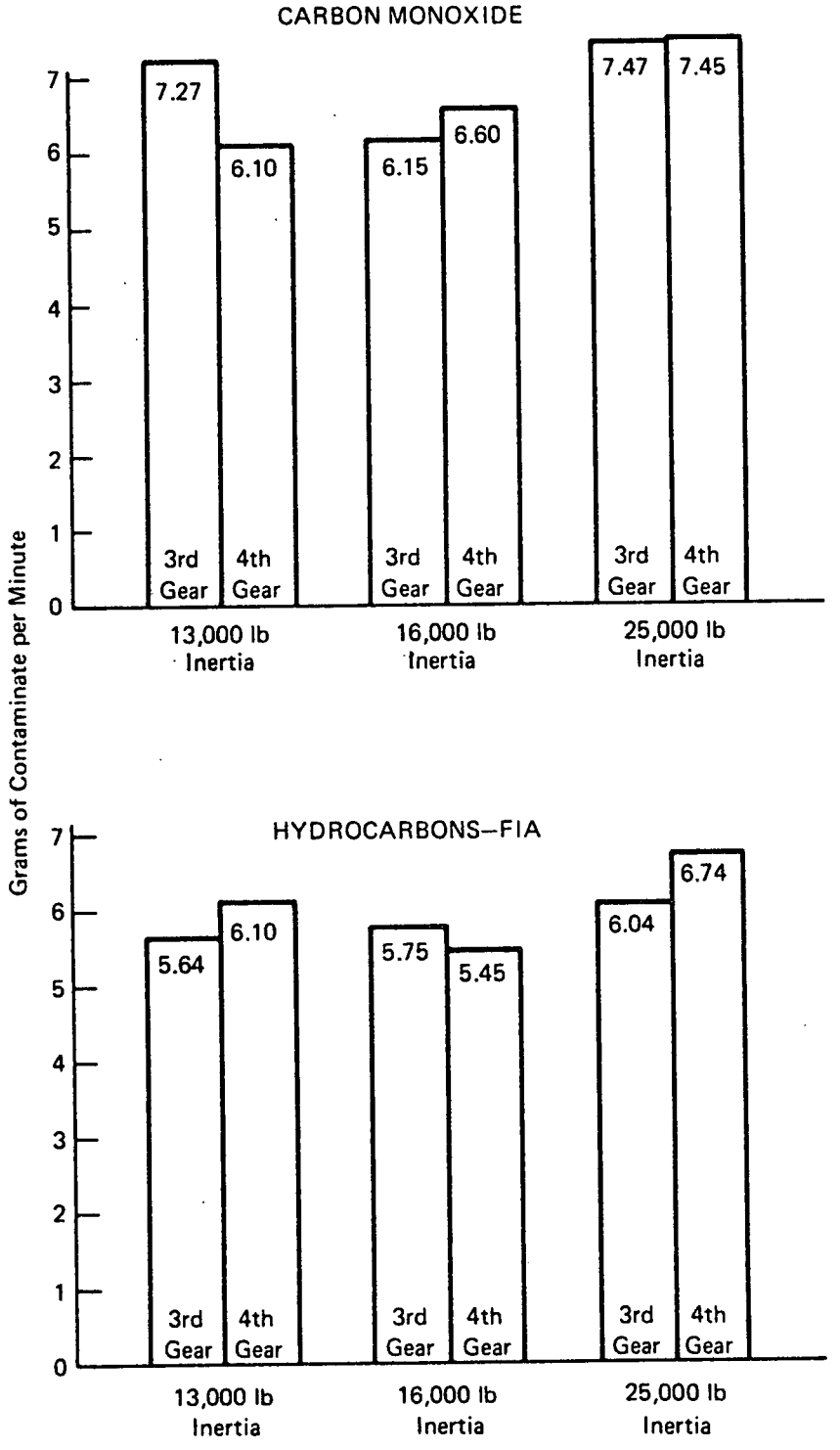


FIGURE 39. RESULTS FOR CLOSED THROTTLE DECELERATION (NONCONSTANT SPEED)–1969 DODGE 318-CID

TABLE 8. CONTINUOUS AND CVS RESULTS–FEDERAL CYCLE

1969 Dodge 318 CID, V-8 Engine

Date	Dynamometer	Continuous Sampler			CVS, g/lb fuel			Fuel wt, lb
		HC, ppm Hex	CO, %	NO, ppm	HC	CO	NO	
Warm Start								
6-24-71	Stationary	246	3.40	1531	11.86	212	6.13	6.04
6-25-71	Stationary	245	3.50	1407	11.07	205	5.28	6.12
6-25-71	Stationary	250	3.34	1597	13.33	204	5.87	6.05
	Avg	247	3.41	1512	12.09	207	5.76	6.07
7-1-71	Chassis	269	3.11	1577	13.04	204	4.93	6.09
7-2-71	Chassis	278	2.91	1690	13.45	188	6.77	6.02
7-2-71	Chassis	273	2.94	1711	13.32	195	5.56	6.00
	Avg	273	2.97	1659	13.27	196	5.75	6.04
Avg Stationary (warm)		247	3.41	1512	12.09	207	5.76	6.09
Avg Chassis (warm)		273	2.97	1659	13.27	196	5.75	6.04
Cold Start								
6-24-71	Stationary	257	3.59	1237	11.91	199	5.16	6.35
6-25-71	Stationary	233	3.52	1342	10.58	180	3.02	6.38
	Avg	245	3.56	1290	11.25	190	4.09	6.37
7-1-71	Chassis	286	2.66	1819	14.09	189	5.63	6.43
7-2-71	Chassis	265	2.84	1614	13.00	180	5.33	6.29
	Avg	276	2.75	1717	13.56	185	5.48	6.36
Avg Stationary (cold)		245	3.56	1290	11.25	190	4.09	6.37
Avg Chassis (cold)		276	2.75	1717	13.56	185	5.48	6.36

the CO and NO results show the largest difference, about 15 percent. The chassis procedure had higher CO and lower NO. The relationship of higher CO accompanied by lower NO with the continuous sampling technique was supported by the CVS results. The HC results were slightly higher on the stationary dynamometer relative to the chassis and this trend was also supported by the CVS results.

Continued interest by the Project Officer in the effect of a "cold start" on emissions resulted in the running of several such procedures during the stationary and chassis tests. "Cold start" was defined earlier as meaning the engine was maintained at a temperature between 68° to 86°F for 12 hr prior to the Federal test and that the sampling was started when the engine was first cranked. The current Federal procedure specifies a 1-hr soak followed by 5 min of operation 1000 ± 100 rpm and no load before start of the test. This means the engine was in a semiwarmed-up condition prior to the emissions test. Two chassis and stationary runs were made from a "cold start" and the results are shown at the bottom of Table 8. For this engine on this test procedure, there was little difference between "cold start" and "warm start" cycle emission results as measured by both sampling methods.

E. Summary

Several recurring themes were discussed in this section dealing with emissions behavior under a broad spectrum of engine operation. The power output at which the engine was operated had the greatest single influence on the resulting mass emission rates. This fact was established during the work with the first engine, and confirmed by each of the other three engines studied. The effect of load can be so dramatic on HC, CO, and NO that fairly small power increments, approximately 10 to 15 percent, are needed to adequately define emission behavior. Generally, HC was high at very low and very high power while the opposite was true for NO, the peak occurring between 40 and 70 percent power. CO emission rates were relatively constant until load was increased to 60 to 90 percent of full power, at which time a very dramatic increase occurred.

Engine speed, on the other hand, had essentially no effect on CO, only a slight effect on HC and sometimes an effect on NO. An increase in speed from 1250 rpm to 3000 rpm brought about an overall increase in NO of from 50 to 100 percent on certain engines while HC would be reduced only slightly. Overall, the speed effect may be considered as secondary in importance with differences in speed of less than 1000 rpm of little overall consequence in light of the substantial effect power consistently has on *all* three emissions.

The agreement between stationary- and chassis-operated engine emission rates was within the limits expected based on previous and more recent similar work. The chassis results normally were well within ±20 percent of the stationary. In many cases, the chassis operation gave emission rates that were better than ±10 percent of the stationary. CO and HC usually agreed better than did NO, which was affected by inlet air humidity along with other factors common to HC and CO such as the open laboratory test cell engine operation versus that in a confined engine compartment with radiator and fan.

The three methods of expression, g/min, g/lb fuel, and g/bhp-hr, were all useful in summarizing emissions behavior. Grams per minute was particularly helpful in comparisons with idle, constant speed closed throttle, acceleration, and deceleration emission rates. These conditions either produce no usable power or the power and fuel consumption are extremely difficult to measure as in the case of rapid transient operation. Idle rates were important because most suggested urban-suburban duty cycles include 20 to 25 percent idle time.

Compared to the other steady-state emission levels, constant speed closed throttle motoring, as in the nine-mode FTP, produced HC equal to or in excess of other conditions while CO was of minor importance and NO was negligible.

Acceleration at WOT against substantial inertia, as in a partially loaded vehicle field situation, produced HC, CO, and NO of the general magnitudes found during the steady-state speed-load "maps." HC during the transient deceleration conditions at CT was in the usual range found during the speed-load "maps." The effect of inertia was important but less so than expected with the CVS and other experimental procedures and expression on a g/min basis. On the basis of this work, it seemed that the specific amount of inertia was of minor importance as long as there was plenty of inertia simulated, say one-half the GVW or better.

Two, of several, conclusions may be drawn from this. One is that steady-state conditions, including motoring at closed throttle, can adequately represent the emissions behavior of a gasoline-powered HDV given suitable weighting factors based on road operation. The other is that transient acceleration-deceleration according to a mph versus time schedule might be employed to represent the emissions behavior of the vehicle. Though the first conclusion has simplicity and straightforward usefulness in emissions research, the second has the measure of field realism that gives it appeal. To run transient conditions and develop emission rates on a g/bhp-hr basis will require a substantial amount of research and instrumental development along with dynamometer inertia capability. Another real stumbling block pointed out in SwRI's initial truck procedural development project (Reference 1) was the insurmountable task of determining the GVW or inertia for a given engine displacement. Currently, no set rule is available and the size (CID) and maximum power of an engine bears little relationship to the application and GVW.

In conclusion, the reader is invited to utilize the data in tabular and graphical form contained in Appendices A through G. The summarized results presented in this section were averaged based on multiple runs and detailed data shown in Appendix A. Appendix B illustrates the relationship of intake manifold vacuum and fuel consumption to power output of the four engines. Appendices C through E are each series of graphs in which g/min, g/lb fuel, and g/bhp-hr are plotted against percent power. These curves are more complete than that given in the text tables and graphs and include operation at 1500, 2500, and 3500 rpm. Appendix F lists in tabular form the transient acceleration ana deceleration data summarized in bar chart form in the text. Appendix G contains the computer results for the repetitive nine-mode FTP showing modal results in raw concentration as well as weighted form for both the stationary- and chassis-operated engines. The detailed results given in these appendices will permit further study of the emissions characteristics of gasoline engines in HDV application.

IX. ROAD STUDY RESULTS

The intent of this rather limited four-vehicle study was to investigate the effect of grossly different types of driving on mass emissions rates. By "type of driving" is meant grossly different road use patterns classified basically as follows:

- Stop-and-Go — Repetitive WOT accel-CT decel-idle simulating congested downtown traffic—maximum speed 25 mph
- Slow Speed — A light load cruise constant speed condition simulating no traffic/residential operation—speed 25 to 30 mph
- Intermediate — A moderate load cruise condition simulating arterial type driving—speed 40 to 45 mph
- High Speed — A relatively high-load high-speed cruise like on an expressway-freeway—speed 50 to 60 mph.

These routes were described in detail in an earlier section and repeated here, as they form the basis of the discussion that follows. This discussion will consider the effect of the route, the major variable, and as a substudy, the effect of driver. Also, data summaries of the distribution of vehicle speed, engine speed, and intake manifold vacuum are included to give an insight on how the vehicle operated over each route.

A. Effect of Road Route on Mass Emissions

The principal means of expression used in this discussion will be g/min, g/lb fuel, and g/mi. Since the four trucks studied exhibited fairly similar response to changes in road routes, the summary graphs (Figures 40 to 48) are prepared showing all vehicles on each.

1. Hydrocarbon Emission Rates

Figures 40, 41, and 42 show the g/mile, g/min, and g HC/lb fuel consumed for the four trucks. The stop-and-go results are shown first followed by the slow-, intermediate-, and high-speed routes. In addition to these four road routes evaluated, an additional route was added for the Chevrolet. This route was a modified intermediate route. The maximum speed and the distance traveled remain as they were in the original route. The modification was the location of the route. The route was moved to a portion of the interstate highway used for high-speed operation. Recall that the usual intermediate route had several deceleration-acceleration modes to negotiate the corners of the rectangular course.

The alternative route total mileage was 12.97 as compared to 12.49 for the intermediate route. However, sampling was limited to vehicle speeds above 40 mph, making the distance traveled the same as the standard route.

A fairly consistent decrease in HC as route speed was increased is noted on Figure 40. This downward trend is repeated in Figures 41 and 42 in terms of g/min and HC/lb fuel. The emission rates, shown as single points, designated by the letter "A", were lower than those obtained on the intermediate route. The difference between the alternative and the intermediate route was that the alternative had fewer transient conditions.

This very striking and fairly consistent decrease in HC emission rate as vehicle speed, engine speed, and power level increased indicates the significance of route operation. The potential

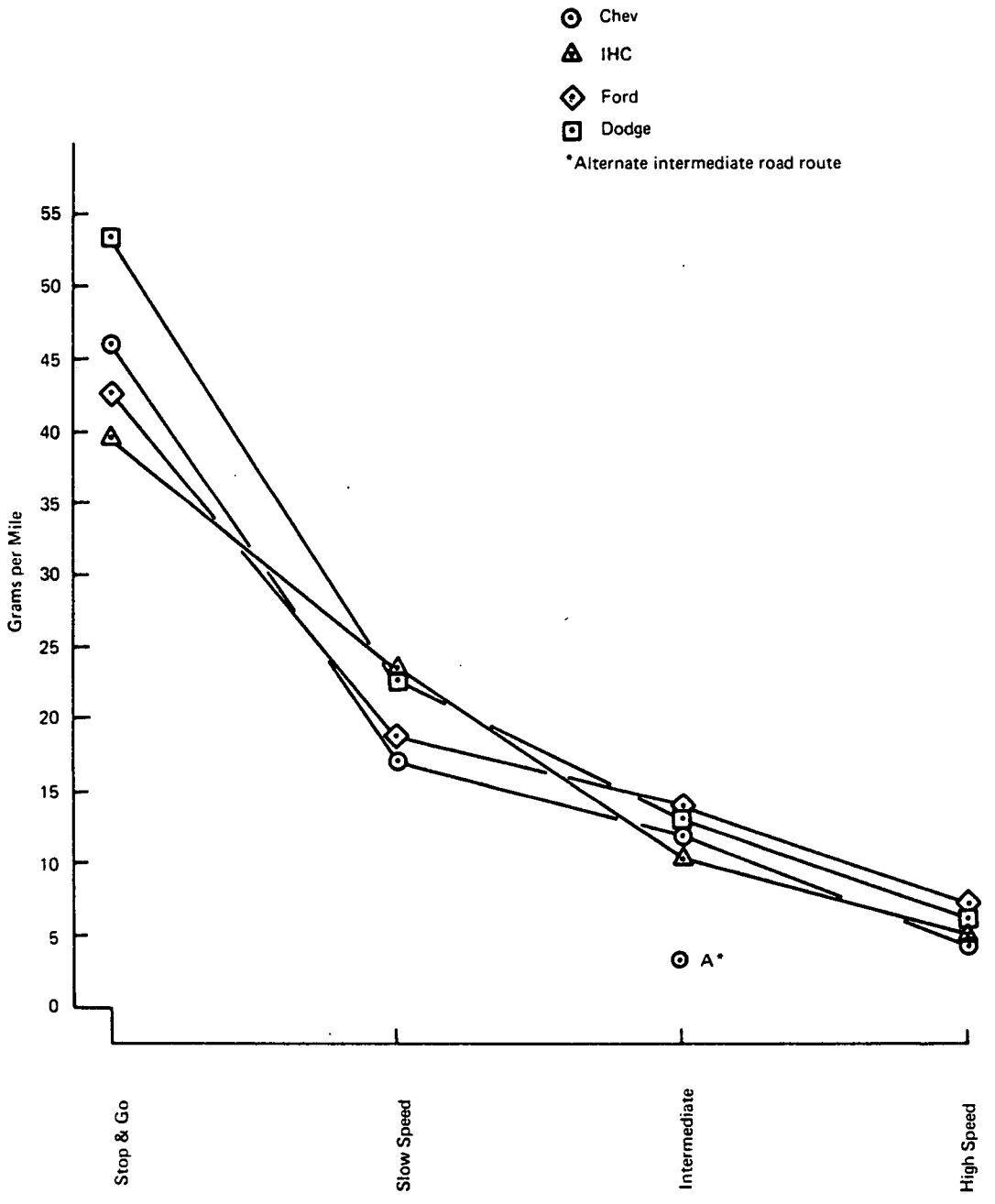


FIGURE 40. EFFECT OF ROAD ROUTE OPERATION ON HYDROCARBON EMISSION–G/MI

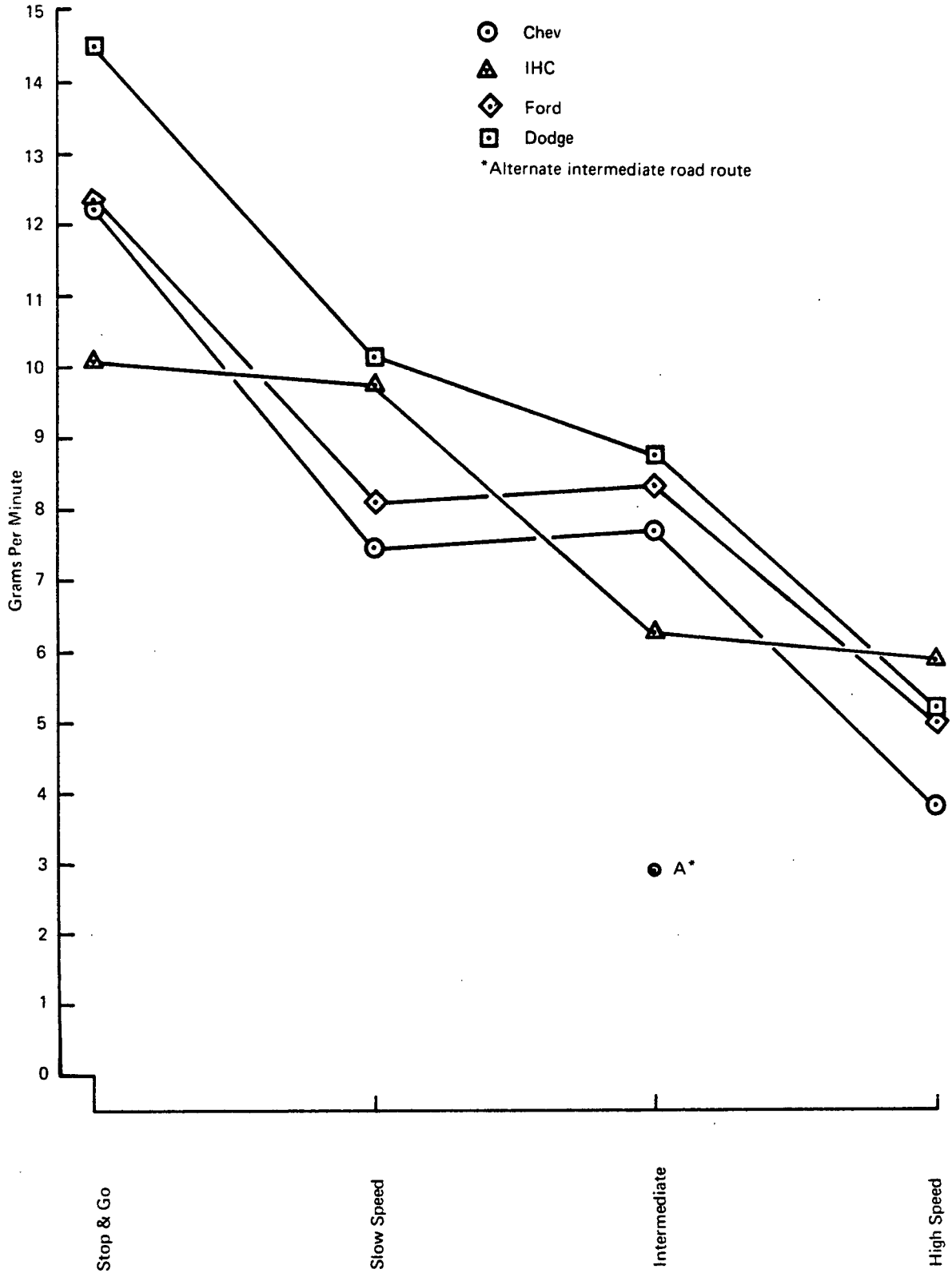


FIGURE 41. EFFECT OF ROAD OPERATION ON HYDROCARBON EMISSION–G/MIN

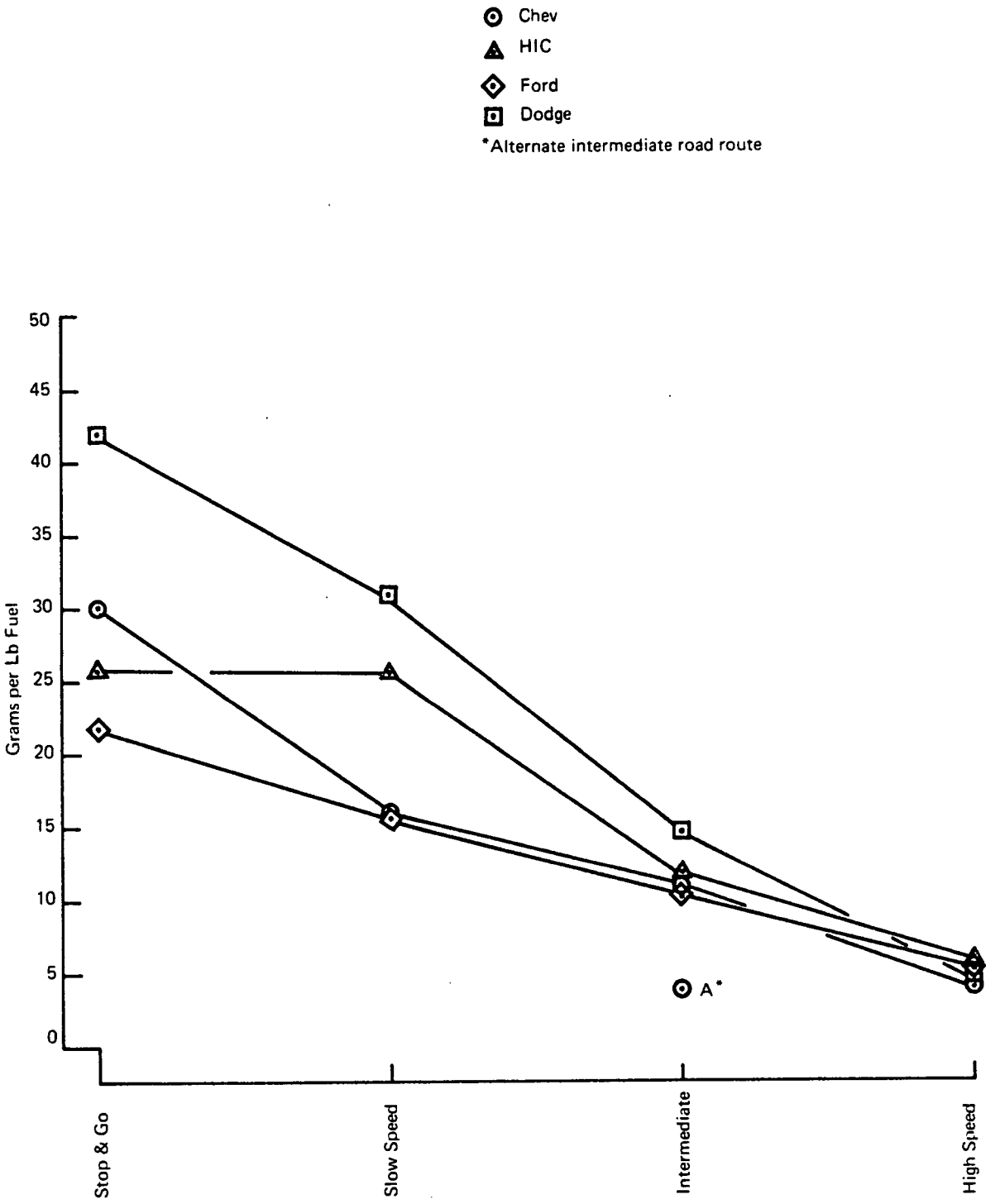


FIGURE 42. EFFECT OF ROAD OPERATION ON HYDROCARBON EMISSION–G/LB FUEL

ramifications of these findings are considerable, ranging from education of drivers and fleet operators in training and route selection to the revision of traffic patterns in urban areas, speed limits, traffic signals, and signs.

2. Carbon Monoxide Emission Rates

Figures 43, 44, and 45 depict the CO emission rates for the four different road routes. In terms of g/mi driven, in Figure 43, one truck, the Ford, showed a significant decrease in emission rate as the route speed and duty level increased. The other three trucks showed some decrease between the stop-and-go and the other routes. Fairly mixed behavior in terms of increases and decreases of CO as a function of route may be noted on Figures 44 and 45. Three of the trucks act similar while the Dodge runs somewhat counter. It seems that the alternate intermediate route produced the minimum rate of CO from the Chevrolet 350 CID truck. Overall, it may be noted that for three of the four vehicles, an increase in route speed and duty factor resulted in an overall reduction on the basis of g/mi and g CO/lb fuel burned.

3. Oxides of Nitrogen Emission Rates

Overall, this contaminant increased, sometimes dramatically, as the route was varied from stop-and-go to high speed. In terms of g/mi (Figure 46), it is interesting to see that stop-and-go operation was a fairly significant producer of NO_x for two vehicles, the Dodge and IHC. Minimum NO_x, in g/mi, occurred at slow speed, which would be expected. Figures 47 and 48 are consistent with one point an exception in increasing NO_x with increased engine speed, fuel input, and power output. These results were not altogether unexpected and may be shown to agree quite well with the work reported in Section VIII.

The alternative intermediate for the 350 Chevrolet resulted in higher emission rates than the original intermediate road course. The three sets of curves for the three emissions are all trying to say something. Namely, high speed is not best nor is stop-and-go the optimum point to operate for lowest overall emission rates of all three contaminants. On the basis of these data from only four vehicles, the single best compromise route or driving course would be around 20 to 30 mph without any stops or acceleration-deceleration. Both driver training and traffic planning can have a measurable effect on approaching this utopian goal and represent other viable ways to achieving clean air.

B. Effect of Driver on Mass Emissions

The question is always asked, What was the driver effect? Because of the cruise, steady-state constraints made on the slow-, intermediate-, and high-speed routes, any driver effect on these would be negligible. However, on the stop-and-go course, the driver can exercise some discretion and might have some influence on the emission rate. To investigate such a possible effect, five drivers were used to operate the Dodge truck over the stop-and-go route repetitively and in a somewhat random order.

Each driver was instructed when accelerating from any stop, to start in the normal low gear (second gear) and accelerate at WOT to the "normal" shift point. The driver then shifted into third gear and accelerates at WOT to 25 mph. He maintains this 25-mph speed, the maximum speed for this route, until deceleration and braking are required for the next stop. The procedure was then repeated. With 44 complete stops for each run, it is not difficult to see how time or some other factor could vary from one driver to another. Some examples of driver techniques that could influence sampling time are as follows:

- Time needed to change gears
- Amount of time spent at each stop
- Amount of brake effort used to stop, etc.

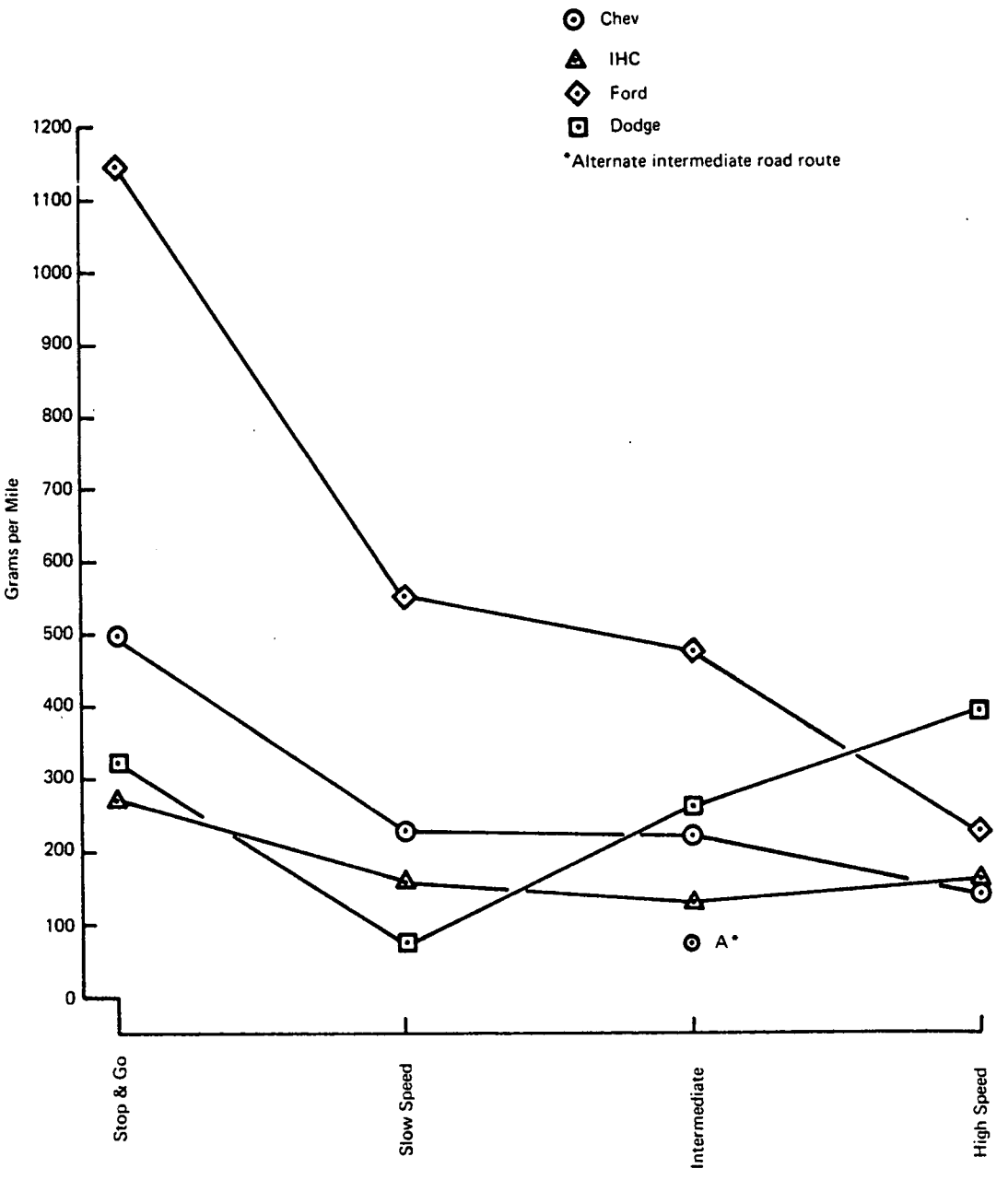


FIGURE 43. EFFECT OF ROAD ROUTE OPERATION ON CARBON MONOXIDE EMISSION–G/MI

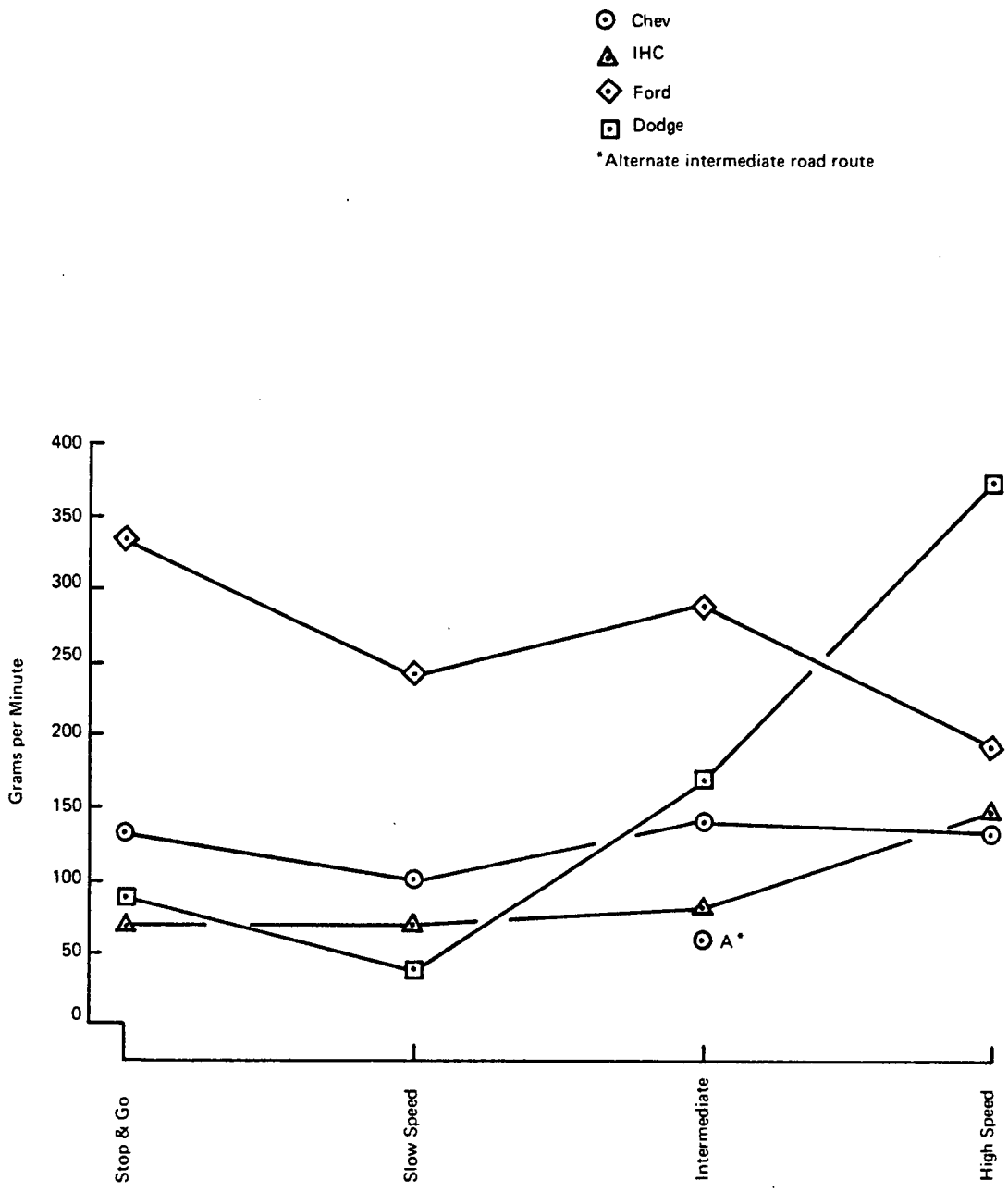


FIGURE 44. EFFECT OF ROAD ROUTE OPERATION ON CARBON MONOXIDE EMISSION–G/MIN

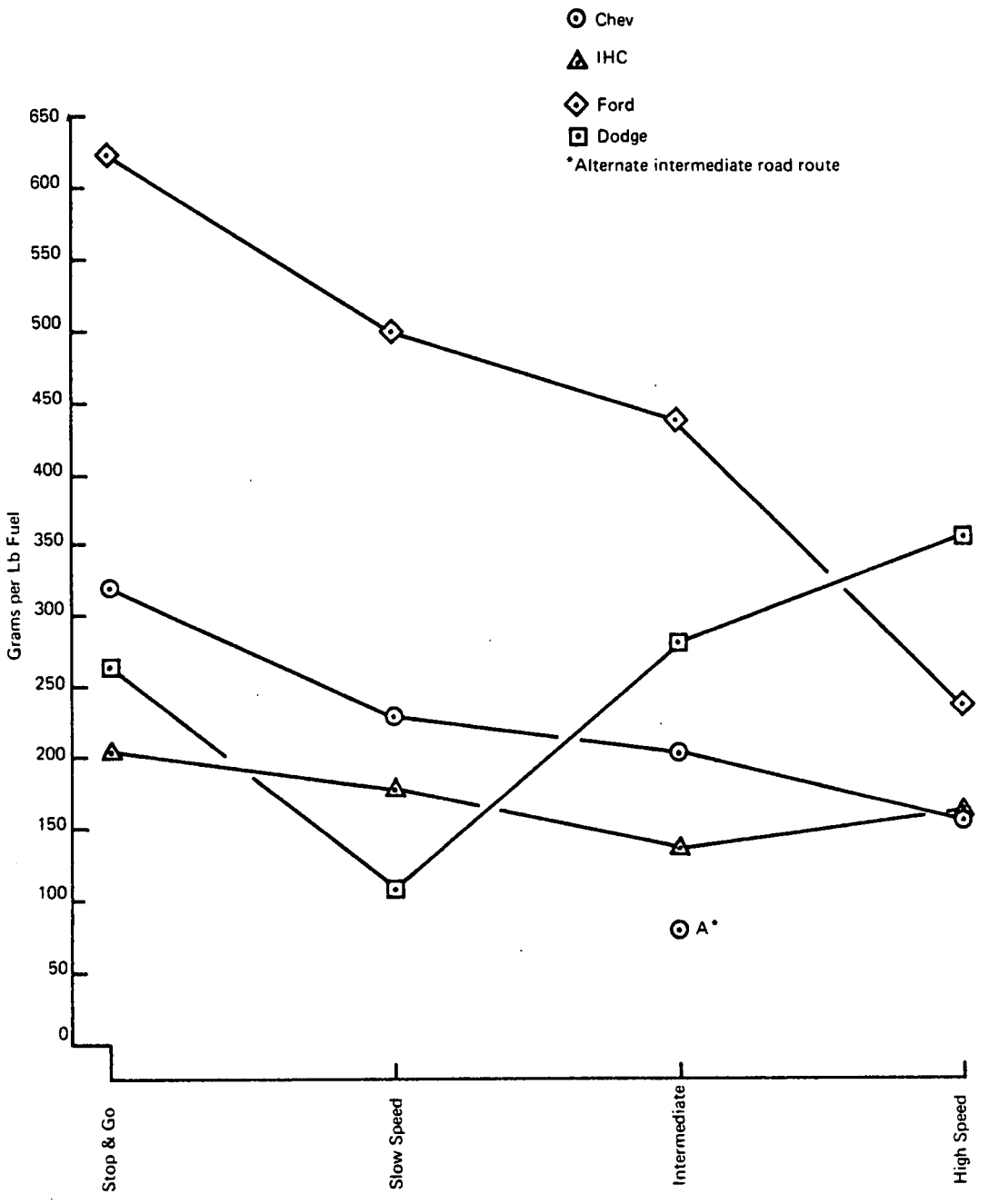


FIGURE 45. EFFECT OF ROAD ROUTE OPERATION ON CARBON MONOXIDE EMISSION–G/LB FUEL

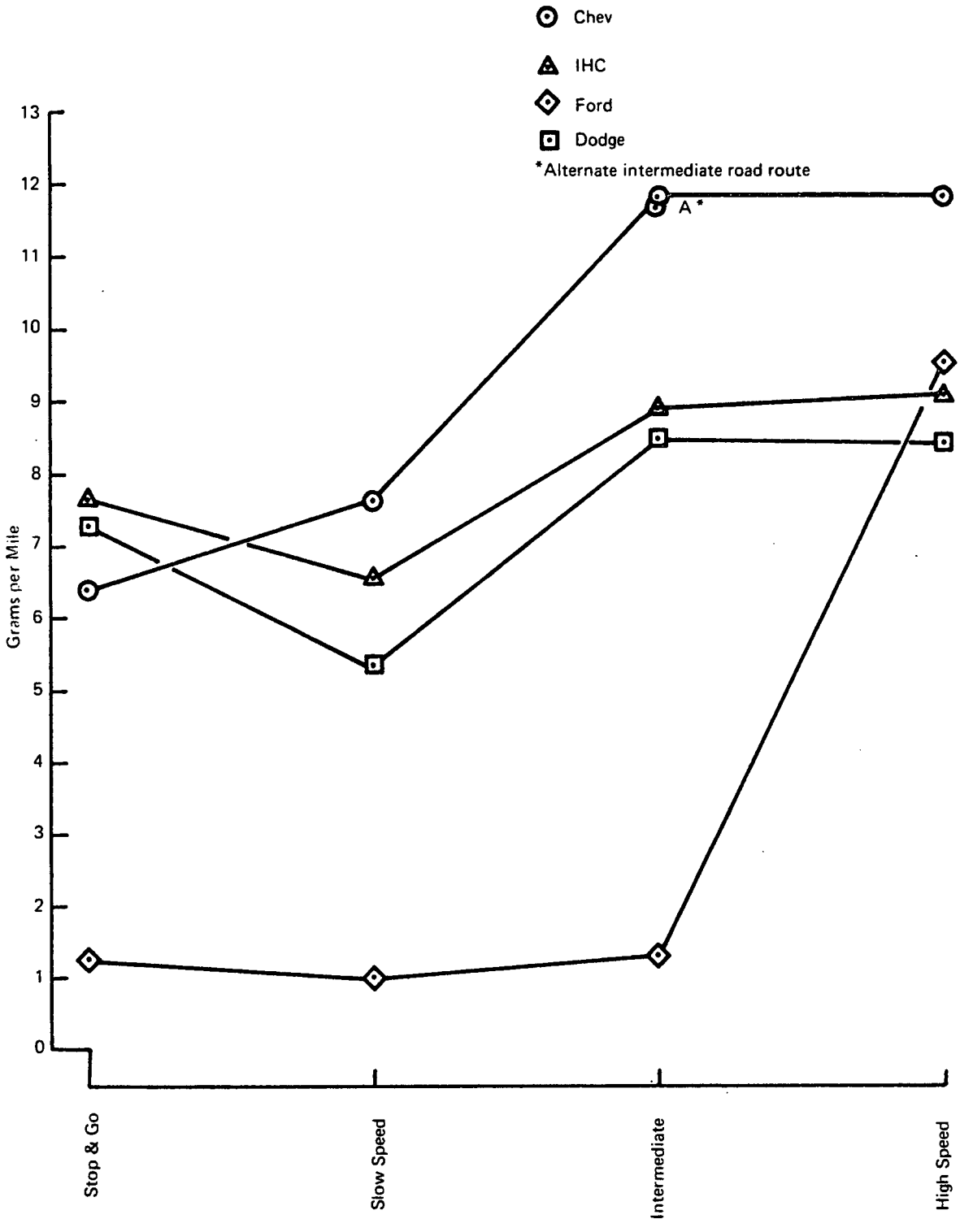


FIGURE 46. EFFECT OF ROAD ROUTE OPERATION ON NITRIC OXIDE EMISSION–G/MI

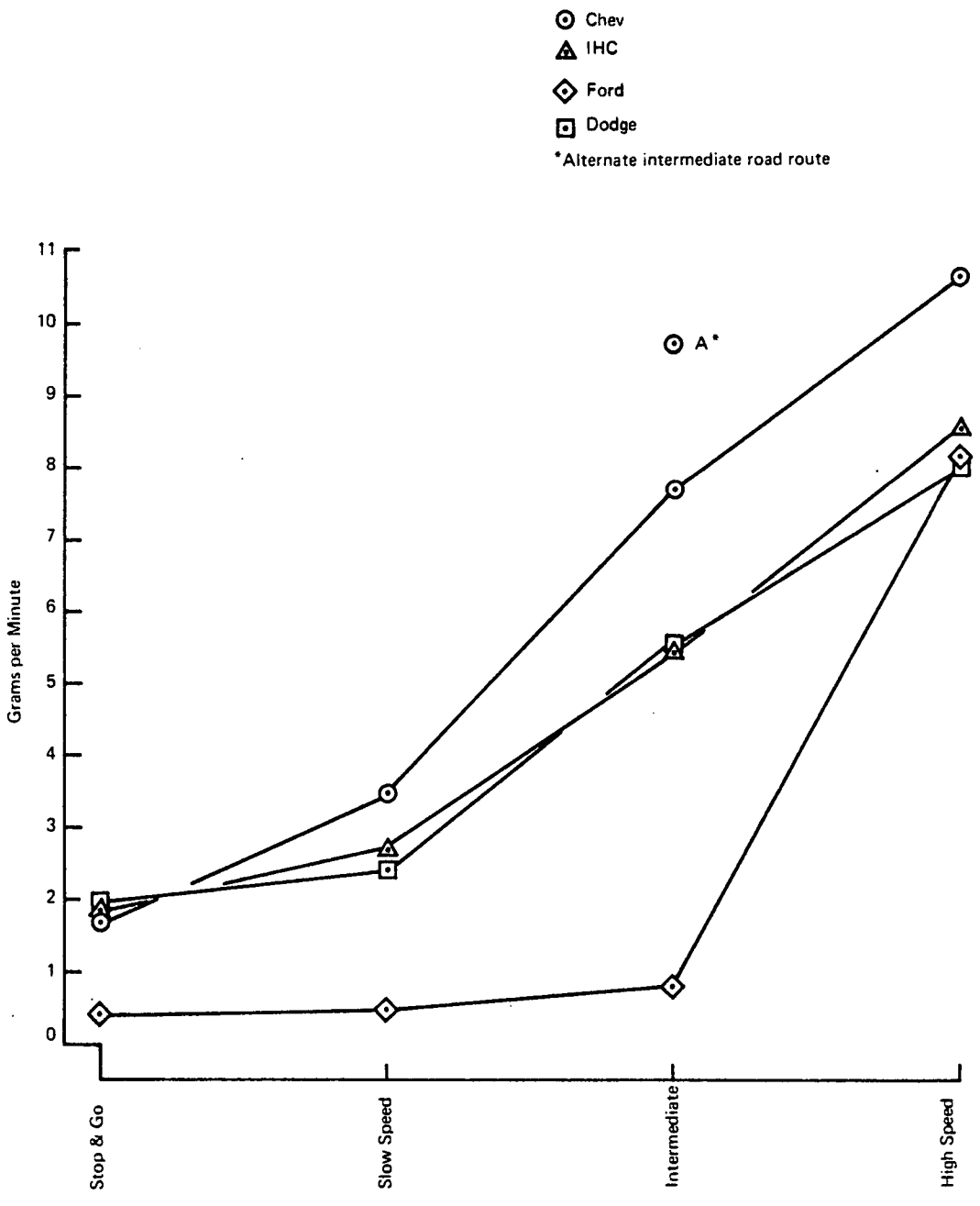


FIGURE 47. EFFECT OF ROAD ROUTE OPERATION ON NITRIC OXIDE EMISSION–G/MIN

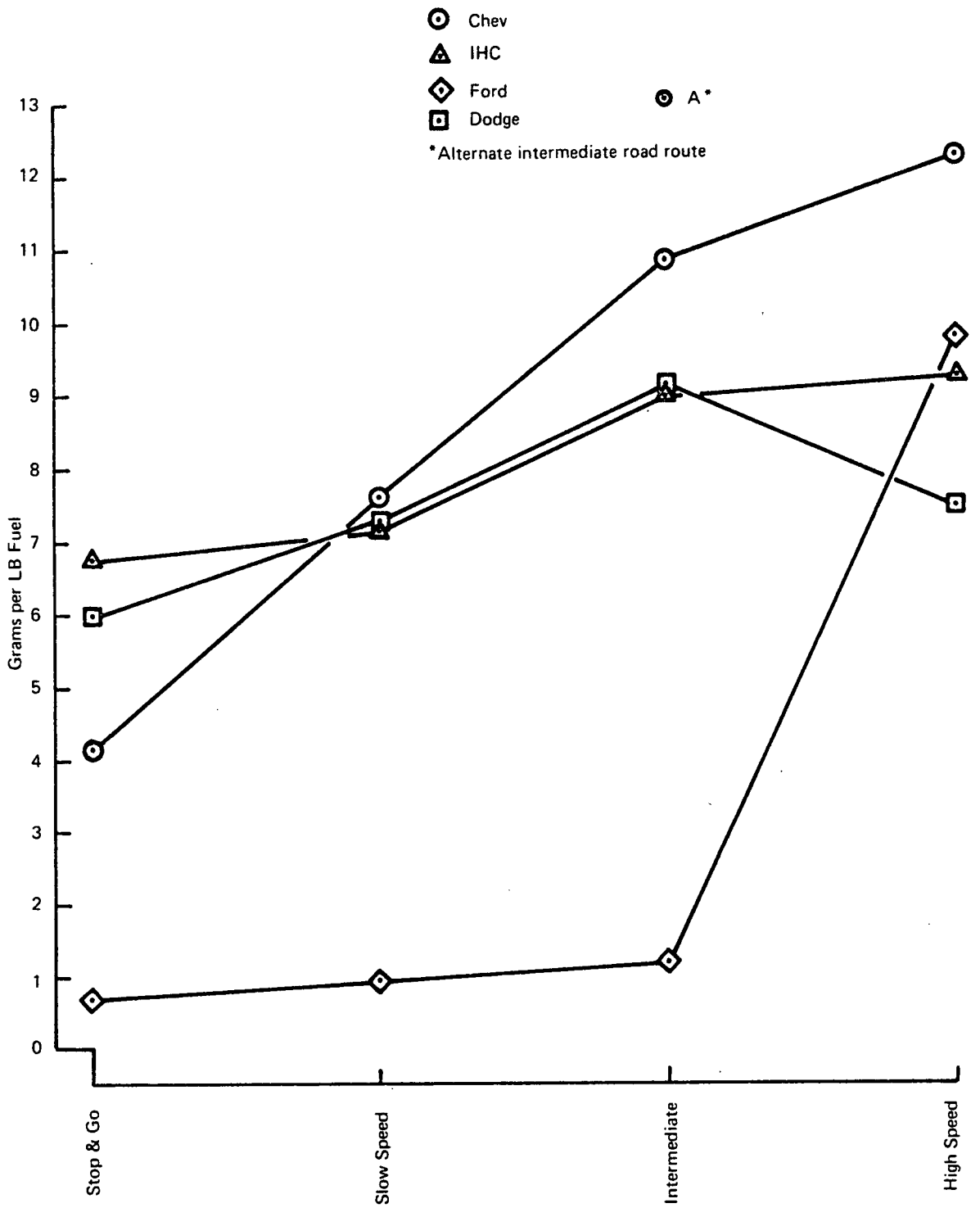


FIGURE 48. EFFECT OF ROAD ROUTE OPERATION ON NITRIC OXIDE EMISSION–G/LB FUEL

TABLE 9. EFFECT OF DRIVER ON STOP-AND-GO ROAD ROUTE EMISSION RATES

Vehicle	Driver	Hydrocarbons, grams per			Carbon Monoxide, grams per			Oxides of Nitrogen, grams per		
		mi	min	lb fuel	mi	min	lb fuel	mi	min	lb fuel
Dodge	A (Bob)	40	11	24	517	138	312	6.4	1.7	3.8
	B (Bill)	38	10	23	492	130	295	5.7	1.5	3.4
	C (Ernest)	40	11	25	463	126	288	5.2	1.4	3.2
	D (Willie)	29	7	18	402	105	254	5.4	1.4	3.4
	E (Ernie)	40	11	25	531	148	328	4.1	1.2	2.7
Ford	A (Bob)	43	12	17	1538	445	844	1.2	0.4	0.7
	B (Gilbert)	30	8	17	1501	404	818	1.3	0.3	0.7
IHC	A (Gus)	40	10	26	313	80	205	10.4	2.7	6.8
	B (Bob)	42	10	28	288	71	194	8.4	2.1	5.7
Chev	A (Ernie)	46	12	29	497	134	319	6.4	1.7	4.1
	B (Bill)	53	14	32	529	136	318	7.4	1.9	4.5
	C (Bob)	51	14	30	527	146	315	8.3	2.3	4.9

The results of this series of tests are summarized in the top portion of Table 9 in terms of g/mi, g/min and g/lb fuel. Operation by driver D resulted in noticeably lower HC emission levels than the other four. As pointed out in the previous subsection, hydrocarbons were the most sensitive emission under stop-and-go light load operation followed by CO, which was also lower for driver D.

A one-way analysis of variance on the HC and CO rates for the five drivers was made to determine if this was of statistical importance. This analysis indicated a significant difference between drivers which on further examination was found to be due entirely to driver D. A one-way analysis of variance on the other four drivers, deleting driver D, showed no significant difference between drivers.

Driver D was a less experienced truck driver than the other four and was less aggressive in his driving habit. He tended to drive the trucks more as if they were his own, not wanting anything to break or to have an accident. This apparent timidity was expressed in more conservative driving. He was easier during the accels and decels, both HC and CO producers.

From the five-driver study of the Dodge truck, the overall result was that most drivers operate the truck over the stop-and-go course sufficiently similar to produce emission results that were statistically similar. The remaining three trucks were always driven with driver A (Bob) from the Dodge tests but in a different order. Shown in Table 10, Bob was driver A for the Ford, driver B for the IHC, and driver C for the Chevrolet trucks. Except for the Ford HC, the HC and all other emissions were fairly similar over the stop-and-go course for all drivers.

TABLE 10. COMPARISON OF ROAD OPERATING DATA BY PORTABLE DATA LOGGER AND HAND-READ– 350 CID CHEVROLET

Road Course	Data Method	Data Points	Mean Values		
			Vehicle Speed, mph	Engine Speed, rpm	Manifold Vacuum, in. Hg
Stop-and-Go	Hand	771	13.8	1863	15.4
	Portable	22,794	12.7	1748	11.3
Slow Speed	Hand	477	22.4	1763	14.0
	Portable	12,156	22.4	1704	12.5
High Speed	Hand	576	40.6	2792	11.4
	Portable	17,076	39.7	2712	10.8

C. Engine-Vehicle Operation Data

Strip-chart recorders were used during all runs on all routes for all trucks to continuously record vehicle speed, engine speed, intake manifold vacuum, and throttle position. Selected traces representing an average or typical operation of the vehicle were hand-read on 2-sec intervals (vehicle speed, engine speed, and manifold vacuum) and computer reduced to determine more about the actual engine-vehicle field operation. These results were quite informative though tedious to obtain.

Accordingly, a portable high-speed data logging magnetic tape recorder was obtained and used during the road operation of the last truck, the 350 CID Chevrolet.

Presented in this section are histograms illustrating the percentage of time that the engine rpm, manifold vacuum, and wheel speed were at specific increments for all routes and all trucks.

1. Hand-Read–Computer Reduced Road Operating Data

Figures 49 through 52 depict the percent of time the four vehicles and engines spent in a particular engine rpm, vehicle mph, or manifold vacuum increment. To summarize the data, all trucks are included in these histograms with the minimum percent time or bar superimposed over the maximum percent time or bar. Considering all four graphs together, the grossly different operational history for the four-truck fleet illustrates the grossly different nature of the routes.

2. Portable Data Logger–Computer Reduced Road Operating Data

During the evaluation of the Chevrolet truck, a Metrodata DL620A digital data system was used in conjunction with the strip-chart recorders. The 620A system is a 20-channel data acquisition system. Of the 20 channels, two were dedicated to recording hours, minutes, and seconds. Thus, 18 discrete channels were left for data acquisition. The maximum recording rate for this system was 2.4 record scans per second. A record scan consists of obtaining data from unique channels. This means that the scan rate was 48 channels per second. Three of the vehicle's four parameters–engine rpm, wheel speed, and manifold vacuum–were recorded on the 620A system at the same time that the strip-chart records were being made. For this evaluation, six channels were assigned to each of the three parameters.

Table 10 lists mean values of mph, rpm, and manifold vacuum for the Chevrolet truck operating over the stop-and-go, slow-, and high-speed routes. The mean values via the portable automatic data logger with some 12,156 to 22,794 data points may be directly compared to the mean values obtained by hand-reading the charts (477 to 771 points).

Though the stop-and-go values are different, i.e., the portable results are lower than the manual methods, the slow- and high-speed data demonstrate almost a one-to-one correlation. The portable automatic data logger method of acquisition of engine-vehicle operation characteristics has been shown to be substantially equivalent to the manual method if not superior. The rapid data rate is able to follow transients that may be missed by the coarser time basis used in manual chart reading. This is the best explanation for the differences found during stop-and-go results.

3. Alternate Intermediate Road Route Data

Though the stop-and-go, slow-, and high-speed routes resulted in histograms that were expected, the intermediate route resulted in more operation at 0 to 20 mph and 0 to 2 in. of vacuum than was originally anticipated. Apparently the deceleration-coast-acceleration back to speed at each of the four corners of the course had a greater influence than expected. To eliminate the eight cornering manuevers required in the original intermediate route, the alternative course was laid out on the high-speed course and sampling restricted to the prescribed steady-state cruise condition.

Figure 53 is a histogram comparing the alternative route to the original intermediate course. The portable data logging system was used exclusively. The difference in routes is quite noticeable with 23 percent instead of 49 percent of the time spent between 0 and 8 in. Hg. manifold vacuum, a high power span. Fewer transient conditions in the alternative route are evident based on percent time at various engine speeds and vehicle speeds. In summary, the eight corner manuevers made the intermediate speed course more of a mixture of transient and steady-state speeds than expected. The effect of a more nearly constant cruise on emissions was discussed in a previous subsection.

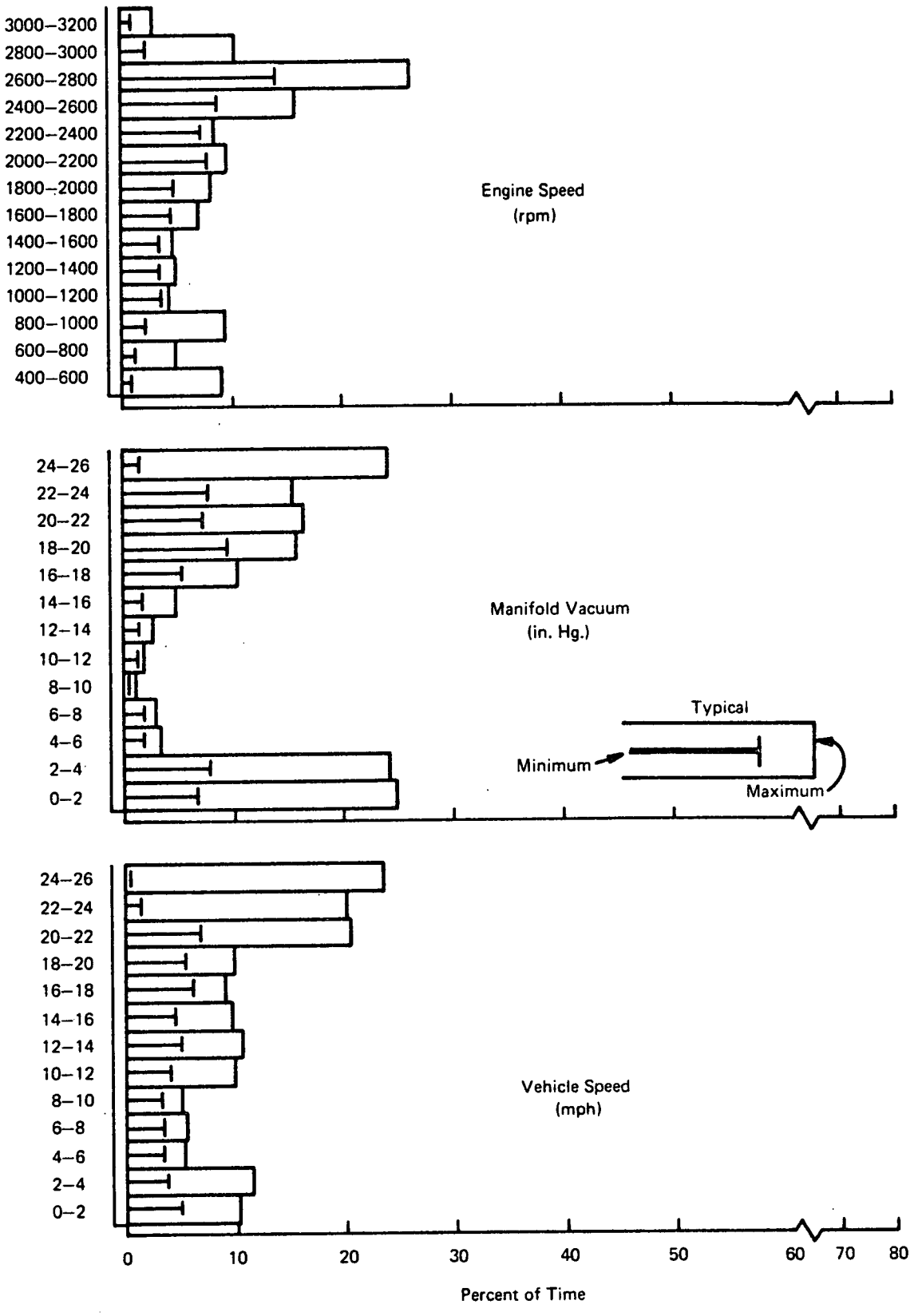


FIGURE 49. FOUR-TRUCK ENGINE-VEHICLE OPERATING DATA STOP-AND-GO ROAD ROUTE

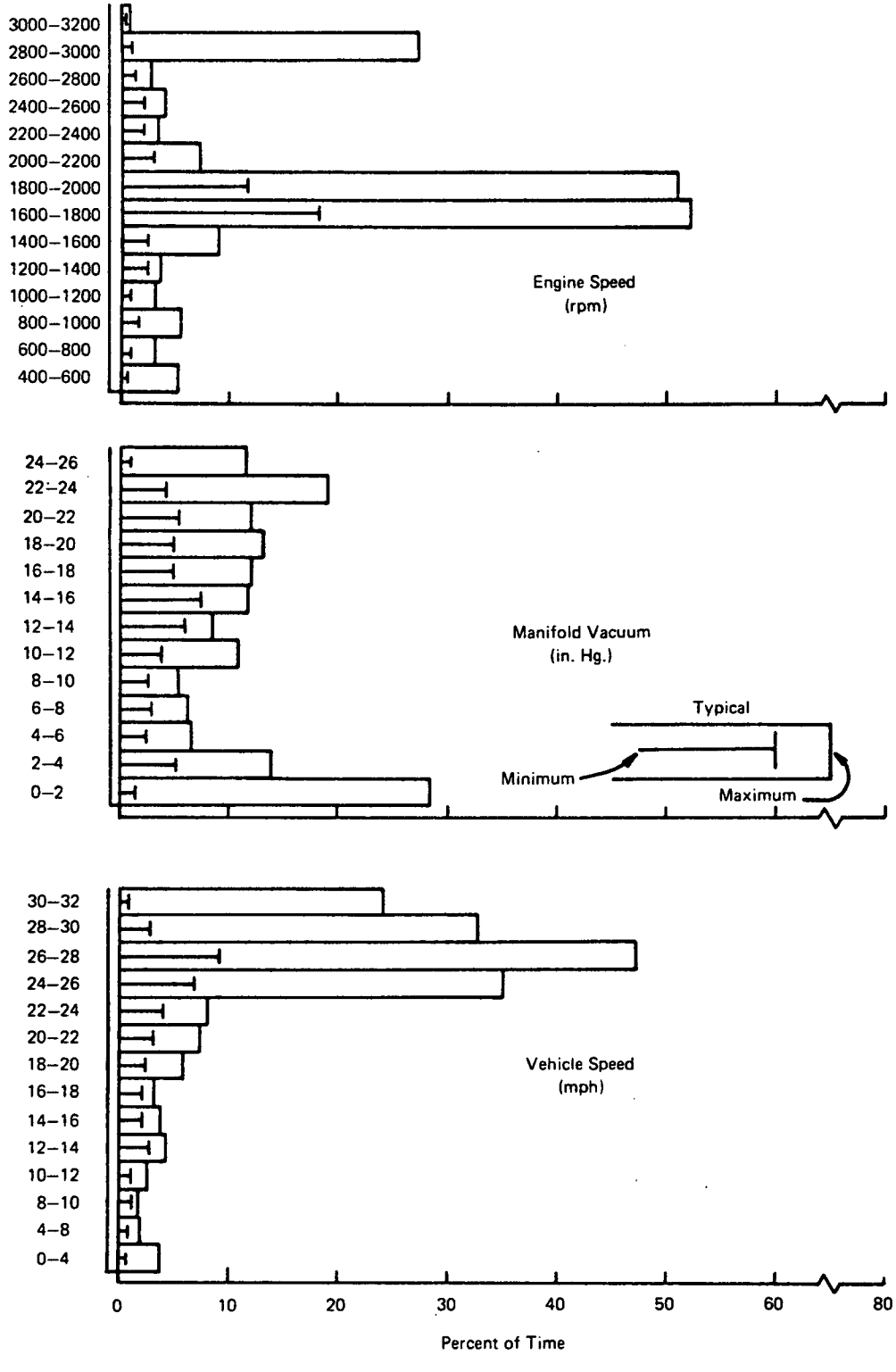


FIGURE 50. FOUR-TRUCK ENGINE-VEHICLE OPERATING DATA SLOW-SPEED ROAD ROUTE

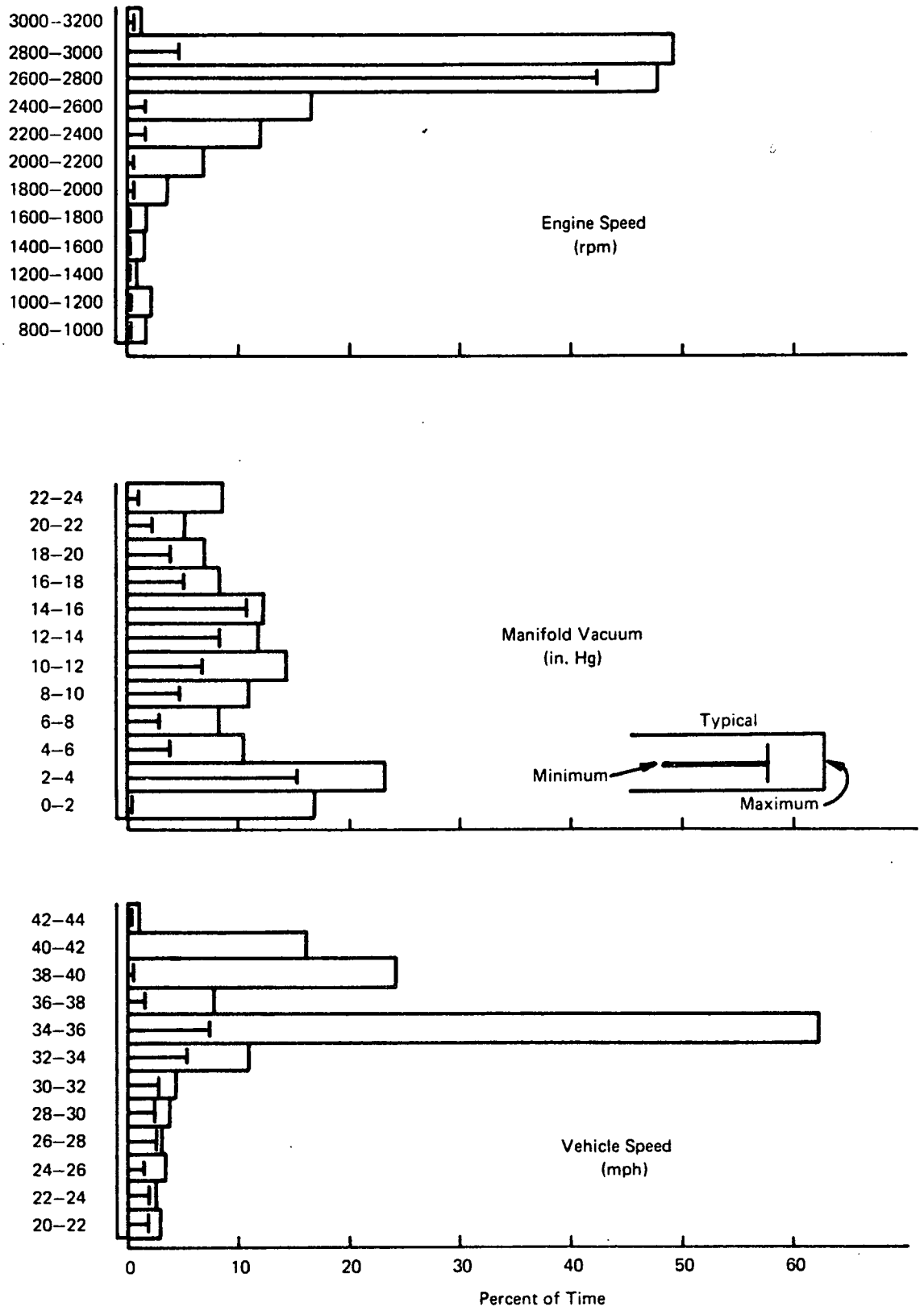


FIGURE 51. FOUR-TRUCK ENGINE-VEHICLE OPERATING DATA INTERMEDIATE-SPEED ROAD ROUTE

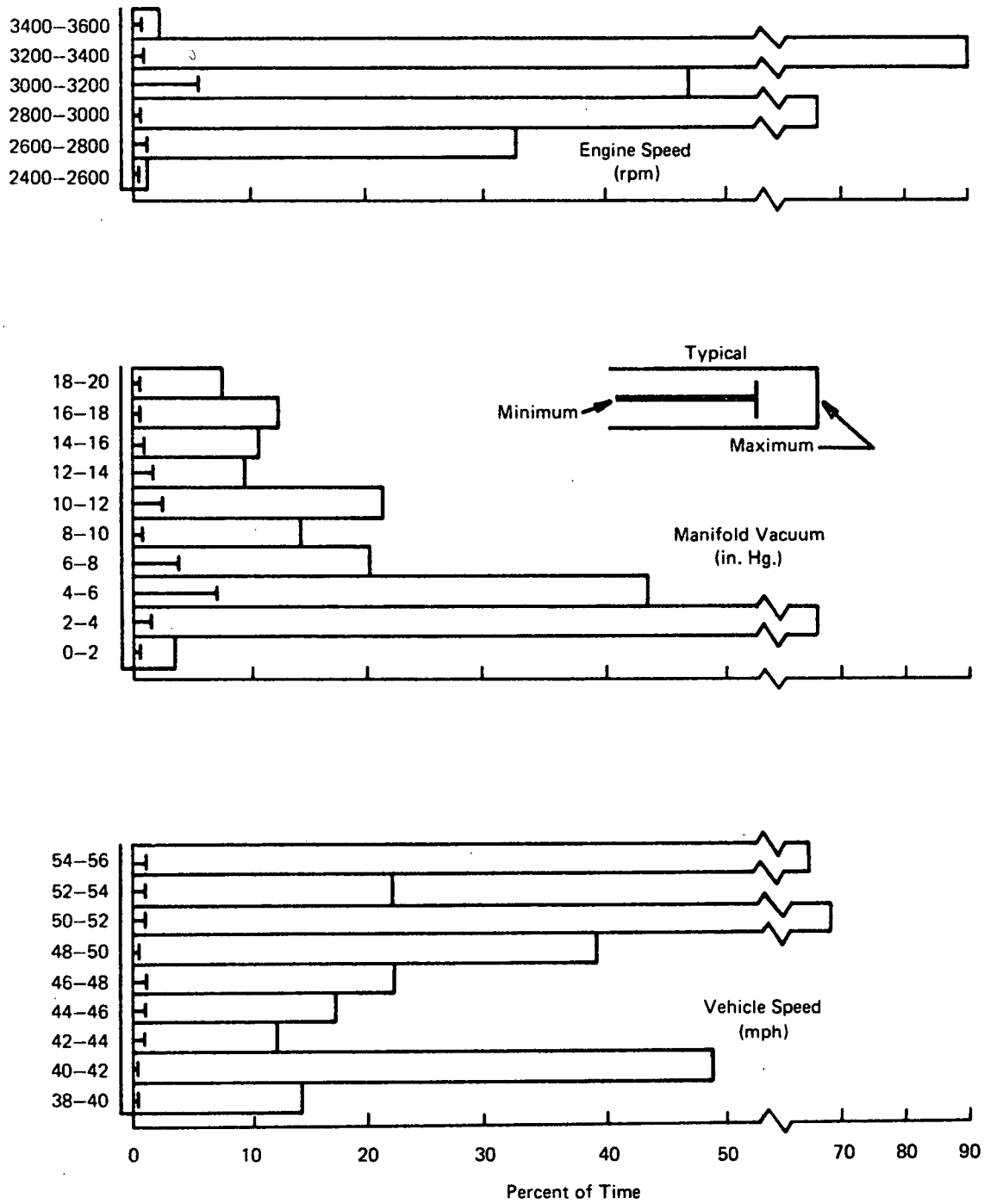


FIGURE 52. FOUR-TRUCK ENGINE-VEHICLE OPERATING DATA HIGH-SPEED ROAD ROUTE

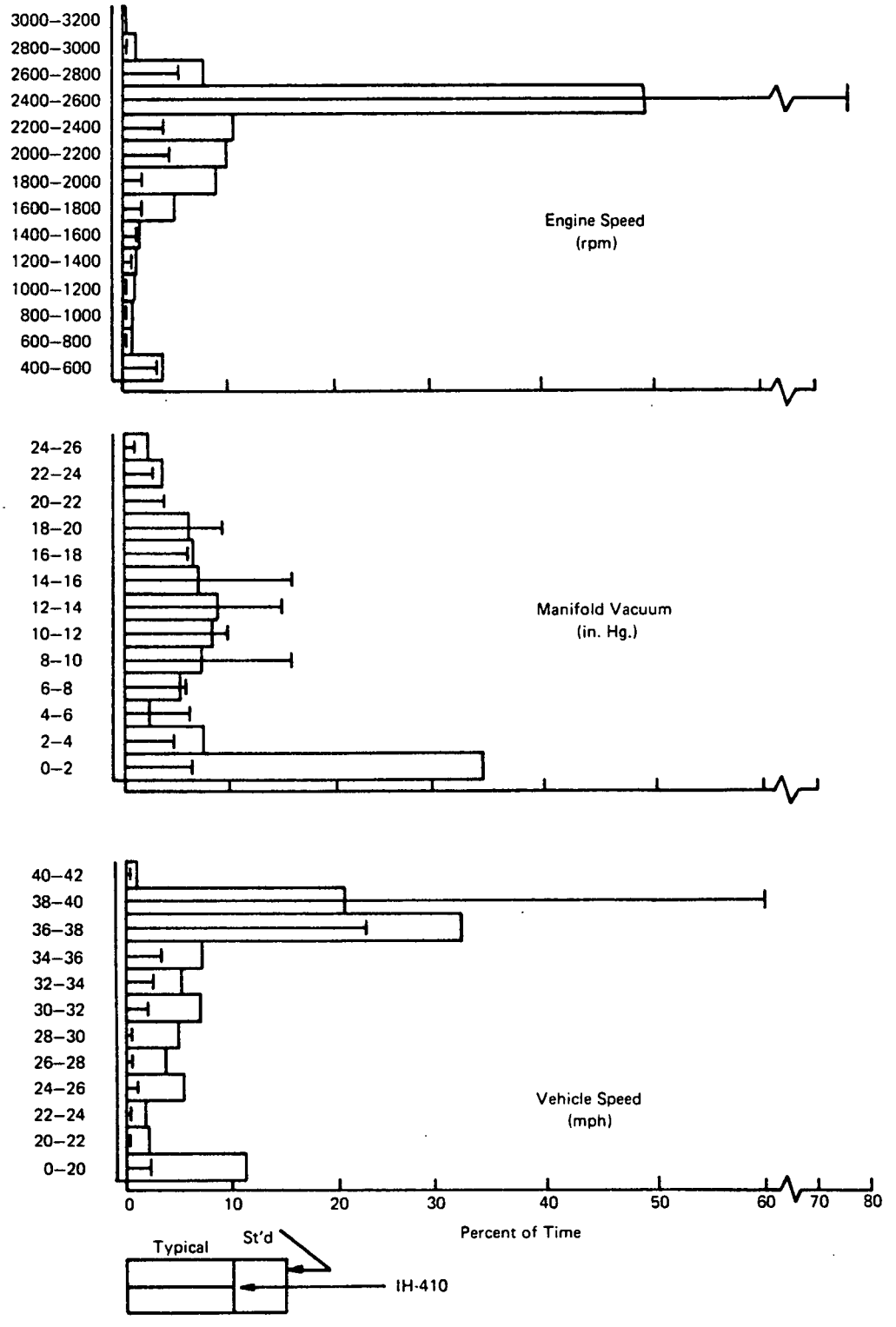


FIGURE 53. COMPARISON OF INTERMEDIATE-SPEED ROAD ROUTES
CHEVROLET ENGINE-VEHICLE OPERATING DATA

D. Relationship of Road Results to Laboratory Characterization

Though not a specific objective of this study, this subsection will attempt to relate the various road courses to the stationary and chassis dynamometer operation described in Section VIII. Only the first truck, the Dodge, can be treated with any confidence since it was run on the road immediately after operation in the laboratory. The Ford and IHC trucks were delayed several months in their operation. The 250 CID Chevrolet truck was sold and had to be replaced by a larger van powered by a 350 CID engine.

1. 1969 318 CID Dodge Truck

A review of the Dodge intake manifold vacuum histograms was made to gain some insight on the average power required to maintain the road route speed. As anticipated, the stop-and-go route required the lowest power followed by slow speed, then intermediate and the highest power output for the high-speed road route. It was unnecessary to operate this truck at WOT for any length of time to maintain the speed for the high-speed road route. From the review of the vacuum data, a general classification of each route was made relative to the previous stationary and chassis dynamometer work:

(1)	Stop-and-Go	Transients
(2)	Slow Speed	Steady State–Low Power
(3)	Intermediate Speed	Steady State–Medium Power
(4)	High Speed	Steady State–High Power

For purposes of this analysis, it is assumed that the reader has a working knowledge of Section VIII of this report dealing with emissions characterization at steady-state and transient conditions. It was pointed out in Section VIII that HC results for transients and CT motoring exceeded steady-state conditions on a g/min basis. As mentioned earlier in this section, there was a nominal two to one decrease in HC (g/min) and four to one decrease in HC (g/mi and g/lb fuel) as the route speed and duty level were increased. The steady-state emissions data of Section VIII agree nicely with the slow- and intermediate-speed road routes on a g/min basis. Based on the observed manifold vacuum, the data from Section VIII predict that the high-speed road route would be at least the same general magnitude, if not higher, than the slow- and intermediate-speed road routes on a g/min basis. This HC trend was not observed during the road operation and the reason for this possible discrepancy is not known at this time.

CO rates, expressed on a g/min basis obtained during acceleration on the chassis dynamometer for different simulated inertia weights, were discussed in Section VIII. The CO produced starting from rest in second gear, accelerating and then shifting into third gear was 247 g/min in second gear and 378 g/min in third gear compared to a nominal 80 g/min for steady-state conditions below 70 percent power. The power required for the slow-speed road route was well below 70 percent level and the trend established on the chassis dynamometer agrees with road results.

As shown earlier in this section, the effect of the driving patterns on the NO_x was an increase of NO_x as the road route speed and load increased. The maximum NO_x level occurred for the intermediate road route. The road route trend, i.e., the maximum level of NO being produced at a medium to high power level, is consistent with the results described in Section VIII. The relatively high values of NO_x for the stop-and-go condition are consistent with the transient values also presented and commented on in Section VIII.

2. **1969 Ford 300 CID**

In general, comparing the contaminant trends of the road routes with the trends established on the stationary and chassis dynamometers during steady-state and transient conditions, good agreement was found. As an example, for HC, the trend was to higher emission levels at the slower road route speeds. The highest level of HC was produced during the stop-and-go road route. Previous dynamometer work with the engine established that transient conditions, acceleration or deceleration, produced higher HC levels than obtained during steady-state conditions.

3. **1969 Chevrolet 350 CID**

The four engines for which a thorough characterization was made established that HC levels were higher during transient than steady-state conditions. The histograms of manifold vacuum showed the alternate intermediate route had fewer transient conditions than the intermediate route. The slightly lower HC levels for the alternate route relative to the high-speed route was consistent with the expected trend.

From previous emission characterization work, reducing the acceleration time effectively reduced the CO levels, which was the trend observed. That is, the alternate intermediate route contained more steady-state running time than the original route. Also, the trend of higher CO levels for the high-speed route relative to the alternate intermediate-speed route was consistent with expected steady-state trends of higher CO levels for the higher power levels. Much the same comment regarding NO_x behavior on the road relative to the steady-state emission maps made in the dynamometer laboratory can be made as for the Dodge. Though the trucks and engines were not identical, the general trend was prevalent of increased NO_x with duty or power up to a point and then decreased NO_x as duty or power was further increased.

E. Summary

This four-truck study of the effect of road routes on emission rates has resulted in a number of important findings:

(1) The type of road course over which a truck is driven had a significant effect on the emission rates. HC uniformly decreased with an increase in route speed and duty (power). A smaller but still noticeable decrease in CO was found when the trucks were run at cruise speeds instead of over the stop-and-go course. As the speed and duty level increased, the CO decreased in most cases. NO_x, on the other hand, increased as road speed and duty increased to equal and occasionally exceed the stop-and-go NO_x.

(2) The results of the road work agree fairly well with the laboratory dynamometer studies for emission characterization. The stop-and-go emissions tended to agree with the transient acceleration and deceleration rates. The variations in speed and duty level could be related back to the effect of power on emission rates discussed in Section VIII though sustained operation at extremely light or extremely heavy loads was not included.

(3) Manual reading of strip-chart and portable magnetic tape data logging of engine speed, vehicle speed, and manifold vacuum was successfully used to obtain operational information about the trucks and various courses. The use of histograms to display percent time in various speeds and loads was helpful in relating emissions behavior to road operation.

(4) The effect of driver on emissions from the stop-and-go course in four out of five cases was found to have no statistical influence. The driver can have a positive effect

on reducing emissions but more study of this item is definitely needed. This along with traffic planning to maintain the optimum constant 20 to 30 mph route speed with few or no stops is speculated to have as big an effect on emissions as vehicle inspection and maintenance.

A fairly large amount of data was accumulated during the course of the road study. It has been summarized and included as Appendix H to this report. It is organized by truck starting with the Dodge, then the Ford, IHC, and last the Chevy. Contained in each subsection are tables listing the CVS emission data for each run, each driver, on each course. A copy of the computer printout detailing the road operating data and the percent time in various speeds, vacuums, and rpms is included. For more information on this subject, please refer to Appendix H.

X. EXPERIMENTAL 23-MODE RESULTS

This section describes the results obtained with nine HDV stationary- and chassis-operated engines with an experimental 23-mode procedure as well as the nine-mode FTP. The sequence of operation was nine-mode in chassis, remove engine and operate on stationary dynamometer nine-mode FTP. Then the 23-mode tests were made. The engine was reinstalled in the vehicle and more 23-mode tests made on the chassis dynamometer.

Table 1, in Section V of this report, listed the nine vehicles-engines, all 1970 or later model year, studied. These were given a truck number to facilitate discussion since make and model engine is of little importance. An attempt was made to use a variety of make, displacement, and driveline arrangements (some had automatic transmission) that power a variety of vehicle GVW's in different applications. These same trucks and engines were tested by the FTP for the purpose of correlating the chassis dynamometer version of FTP to the Federally specified stationary test bed method. This project, Contract EHS 70-113 was a surveillance project of emission control equipped 1970 and 1971 gasoline HDV and the results of the correlation and its supporting data will be covered in the final report on that project.

In addition to a discussion of the emissions results, some remarks regarding operational difficulties and a brief study of oxides of nitrogen measurement in raw exhaust by NDIR and CL methods will be presented.

A. Emission Results

This subsection will cover the 23-mode mass emission results first followed by the nine-mode FTP, in terms of grams of contaminant per brake-horsepower-hour.

1. Experimental 23-Mode

Table 11 lists the average results of HC, CO, NO (NDIR) and NO_x (CL) by the 23-mode procedure.

TABLE 11. EXPERIMENTAL 23-MODE STATIONARY AND CHASSIS AVERAGE RESULTS(1)

Truck	Emissions, g/bhp-hr											
	HC (FIA)			CO (NDIR)			NO_2 (NDIR)(2)			NO_2 (CL)(3)		
	Sta.	Chassis	% Diff.(4)	Sta.	Chassis	% Diff.	Sta.	Chassis	% Diff.	Sta.	Chassis	% Diff.
1	5.65	(6)		88.9	(6)		11.46	(6)		(5)	(5)	
1a	(7)	7.84		(7)	132.0		(7)	8.72		(5)	(5)	
2	7.44	8.04	8.1	63.3	56.0	-11.5	10.72	11.33	0.6	(5)	(5)	
3	7.73	10.30(8)	33.3	158.8	212.1	33.9	6.83	6.02	-11.8	6.89	6.32	-8.3
4	4.03	4.84	20.0	71.0	98.6	38.9	10.81	9.43	-12.8	(5)	(5)	
5	5.98	6.37(8)	6.5	59.3	61.2	3.2	8.91	10.59	18.9	8.48	10.00	17.9
6	4.48	3.83	-14.3	81.0	81.4	0.5	5.78	6.63	14.8	5.17	6.10	18.0
7	6.24	8.05	29.1	76.6	99.2	28.2	13.29	11.47	-13.6	12.97	11.14	-14.1
8	6.89	5.08	-26.3	894	74.2	-17.0	11.77	12.40	5.4	11.02	11.30	2.5
9	5.93	7.28	22.8	67.4	71.4	5.9	14.70	16.03	9.0	14.79	15.18	2.6

(1) All readings are observed, NO_2 uncorrected for humidity.
(2) NO_2 (NDIR) based on NO readings of Beckman NDIR analyzer.
(3) NO_2 (CL) based on NO_x readings of TECO CL analyzer.
(4) % Difference = chassis-stationary results/stationary results.
(5) No data because CL was not available or being repaired.
(6) No chassis test due to excessive slip in automatic transmission.
(7) No stationary test, demonstration of chassis test with alternate vehicle.
(8) FIA "zero load" and closed throttle readings estimated from FIA-NDIR relationship.

The values are averages of two, and where possible, three complete 23-mode tests for each engine-vehicle on both stationary and chassis dynamometer. Run-to-run repeatability was excellent in general. The relative dispersion of data was less than 5 percent in over one-half the runs. Relative dispersion is the range of data values divided by the average value and expressed as a percentage. For normally

distributed data, 5-percent relative dispersion would give values within ±2.5 percent of the average. Relative dispersion is used here rather than a percentage about the mean since there were not enough data to show the normal distribution. The emission levels showed a spread of less than 10 percent between runs 92 percent of the time. Agreement between chassis and stationary dynamometer tests varies considerably. The difference between chassis and stationary results for HC emissions varies between −26 percent and +33.3 percent. Carbon monoxide emission level differences vary between −17 and +39 percent. Observed nitric oxide concentration differences vary between −14 and +19 percent. These differences are shown in Table 11.

The oxides of nitrogen values are observed and uncorrected for humidity. Correction to 75 grains of moisture per pound of dry air was not made since an empirical relationship for the 23-mode procedure is not available at this writing. The absolute humidity listed on the run sheet summaries in Appendix I may be used to correct oxides of nitrogen to a standard value when a suitable correction value is determined.

With exception of Truck 1, where separately operated CT runs were made, and Truck 2, where WOT at 1500 rpm (Mode 10) could not be run in the chassis and stationary results had to be used, tests were made in accord with the 23-mode, 3-min per mode, test schedule described in an earlier section. Occasionally the chassis dynamometer could simulate only one closed throttle without pulley change necessitating a rerun of that part of the test including two modes in front of and the idle which followed.

Complete mode data are given in Appendix I of this report. A computer printout is included for every run, stationary and then chassis. Also included are printout sheets based on NO_x measured by the TECO chemiluminescence instrument. For ease in locating the run data, the computer printouts are grouped by truck number. A divider page summarizes the tests results and is helpful in assessing run-to-run repeatability. Also listed is the absolute humidity for each run for use in correcting the observed oxides of nitrogen to 75 grains or some other reference.

2. Nine-Mode FTP Results

Table 12 lists the brake specific emission rates for the nine trucks when operated on the nine-mode FTP. Raw exhaust concentrations along with fuel rate and power output are utilized in the calculational procedure adopted by the California ARB for 1973-1975 HDV gasoline. As a point of reference, the 1973 California limits are 40 g CO and 16 g HC plus NO_2 per bhp-hr. In 1975, these limits are 25 for CO and 5 for HC plus NO_2 on a brake specific basis.

TABLE 12. NINE-MODE FEDERAL CYCLE STATIONARY AND CHASSIS AVERAGE RESULTS

Truck	Emissions, g/bhp-hr(1)											
	HC			CO			NO_2, Obs			NO_2, Corr		
	Sta.	Chassis	% Diff.(2)	Sta.	Chassis	% Diff.	Sta.	Chassis	% Diff.	Sta.	Chassis	% Diff.
1	1.57	1.80	14.6	58.3	41.0	−17.3	11.73	9.47	−19.3	12.96	9.40	−27.5
2	1.87	2.36	26.2	17.3	23.2	34.2	10.27	12.28	19.6	11.00	12.30	11.8
3	3.75	3.51	−6.5	200.8	149.7	−25.5	8.30	8.69	4.7	8.26	8.32	0.8
4	1.10	1.51	37.6	47.6	57.9	21.5	9.26	11.20	20.9	8.43	10.58	25.4
5	1.53	1.81	18.0	54.6	50.1	−8.1	6.96	7.62	9.5	6.14	6.99	13.9
6	0.83	1.04	25.2	73.9	80.6	6.7	4.28	3.99	−6.9	3.75	3.46	−7.9
7	2.50	2.54	1.6	47.1	60.7	28.9	16.76	13.62	−18.7	13.51	12.84	−5.0
8	2.08	1.71	−17.8	59.3	46.3	−21.9	10.20	9.72	−4.7	10.66	8.07	−24.3
9	1.57	1.64	4.5	33.6	30.3	−9.8	19.21	20.39	17.9	15.52	17.92	15.5

(1) Per California ARB Calculation Procedure for 1973-1975 Heavy-Duty Gasoline Engines based on readings by NDIR.
(2) % Difference = (chassis-stationary)/stationary.

The run-to-run repeatability, while good, was not as good as the 23-mode procedure. Approximately one-third of the tests showed a relative dispersion or data spread of less than 5 percent. Sixty percent of the time, the run-to-run repeatability was less than 10 percent. Most of the remaining tests fell within 10- to 15-percent dispersion though a few trucks for one or more emissions were outside this repeatability. Again, for normally distributed data, this would mean that the values were within ±5 to ±7.5 percent of the mean.

The agreement between chassis and stationary tests for the nine-mode procedure also varied considerably. The HC difference between chassis and stationary results varied between −18 and +38 percent. The CO difference varies between −26 and +34 percent. The difference in observed NO_2 was between −19 and +21 percent, and on a corrected basis between −28 and +25 percent.

Appendix J contains the computer printout sheets for the numerous nine-mode tests performed. As in Appendix I, the runs are grouped by truck number with chassis results first followed by the stationary operation, the chronological order followed. Each group of data printouts is preceded by a summary table listing overall run results. These are helpful in examining run-to-run repeatability.

B. Operational Difficulties

The major difficulties encountered in performing the test may be of more concern than the test data itself. Regardless of the difficulties described in the later sections, the test procedure had many advantages in simplicity, repeatability, and cost effectiveness that are not available by the nine-mode test or any other HDV test known.

1. Dynamometer and Related Engine-Vehicle Operation

The aim of the chassis- and stationary-operated engine tests was to show that both types of engine operation could be made with the 23-mode schedule and instrument system. The operability of the engine in both types of installations must be termed a success overall and relatively compatible. Operation on a stationary dynamometer can be fairly tricky at the no load and light loads. It would be nice to be able to declutch the engine from the dynamometer at zero load and at low idle much as it would operate in the truck during shifting and at rest. In this regard, the chassis dynamometer is much preferred for realism.

Operation at constant speed on a variable load schedule, including the closed throttle motoring condition, is quite easily obtained on most quality all-electric, motoring-absorbing dynamometers typified by the Eaton Dynomatic unit used in these tests. In this regard, the chassis dynamometer was equally good and control was equivalent. During power-producing modes, however, there is no simple, direct method for measuring the flywheel power output. This is the largest single drawback to chassis operation of the engine. A simple solution, at least for surveillance test purposes, is to use manufacturer's curves relating intake manifold vacuum to flywheel power output. Or, as an alternative, fuel rate versus power output could be used much the same way as the chassis version of the 13-mode EMA-ARB diesel emissions test procedure does. Certification tests in the chassis on a direct power output basis, without reliance on such a curve for each engine displacement, would be very difficult.

Closed throttle operation on chassis machines is not difficult if it is the all-electric motoring type. The SwRI machine was used with some difficulty in that speeds were obtained by changing drive motor gripbelt pulley sizes. In a number of the nine trucks, acceptable operation was achieved by pre-adjusting the speed for the 1500-rpm condition and then downshifting the transmission to achieve 2500-rpm engine speed. This method was not as precise as the stationary procedure and ±150 rpm was considered acceptable during CT motoring. Recall that the effect of speed on emission rates at CT motoring was minor, as pointed out in Section VIII.

On a few trucks, it was necessary to run the last CT, mode 22, after readjustment of the drive pulley ratio. Two modes preceding the CT and the idle following were also run to make sure the CT readings were not jeopardized by being run after the remainder of the test procedure. The first truck, equipped with an automatic transmission, could not complete the 23-mode cycle because of slippage in the transmission. The slippage was so severe at intake manifold vacuum below about 11 in. of mercury at 1500 and 2500 rpm that the test had to be terminated. Another truck of similar displacement, GVW, etc., was obtained, unit 1A, but with standard transmission and no problems were incurred. Truck 2, also equipped with automatic transmission, would automatically, internally actuated, downshift at WOT, 1500 rpm. Another automatic transmission vehicle, unit number 9, also had difficulty in running the 87.5 percent and WOT modes at 1500 rpm because it would internally downshift.

Some, as much as half, variation in emissions between stationary- and chassis-operated engines is due to the run-to-run repeatability of the 23-mode test. Though repeatability on either dynamometer would many times be within 5-percent relative dispersion, repeatability was termed good with a 10-percent relative dispersion. Recall that relative dispersion is an expression of total data range. For normally distributed data, 10-percent relative dispersion indicates data values within ±5 percent of the mean. The chassis to stationary correlation of the 23-mode test was somewhat better than the nine-mode FTP as was run-to-run repeatability, but may not be acceptable for some purposes such as certification relative to quality audit, inspection, and surveillance type requirements. Many factors other than procedure and instruments enter into the possible cause(s) and explanation. Nothing is clear cut in that all obvious points in the procedure are standardized and emissions were not always greater or lower on the chassis relative to the stationary dynamometer. The major item not standardized was that of the immediate environment in which the engine operates. In one instance, the engine was mounted in the open with cooling accomplished by a remote heat exchanger. That same engine, in the vehicle, was surrounded by sheet metal shrouds, fenders, hood and has air at varying temperature blown at varying speeds over the engine and air inlet by a fan-radiator cooling system. Though the same truck exhaust system was used and the engines were mounted on rubber mounts, the stationary location was different enough from the chassis to account for the differences in results. It is submitted that chassis operation is more realistic of road operation than the stationary operation and that this is a definite advantage for operation in the vehicle instead of on a test bed.

2. **Instruments**

In actual operation, the Beckman 400 FIA unburned hydrocarbon instrument gave the most problems and was the instrument most in need of development. The first problem was the extreme sensitivity of the upscale calibration due to the higher than usual levels typified by raw instead of 10 to 15:1 diluted exhaust. A fairly simple fix to this problem would involve replacing the standard capillary with a smaller capillary and inserting an additional filter after the fiberglass filter to keep the sample as clean as possible and thereby keep the smaller capillary from plugging up. A small fritted stainless steel cartridge type has been used with great success on SwRI HC analyzers.

The second problem was that the 120°F cabinet temperature was too low and after prolonged operation of say 15 to 20 min, momentary downward deflections in FIA output, commonly called "spikes," would be noticed even though the bypass sample flow was steady and the pump flow even. The problem was traced to water droplets forming in the sample capillary, located in the 120° F cabinet, which feeds the FIA burner. Rather than increase the instrument cabinet or the capillary temperature and endanger the electronics or risk the problem of capillary mass flow rate variations due to uneven or erratic temperature environment, the simple solution was to merely replace the sample flow with air zero gas during the minute used to change load or speed and the first half of the minute used for stabilization. As a result, the instrument is purged with zero gas half of the time and, of course, the time response and rechecking of the zero could be established. The remaining 1.5 min of the 3-min mode were ample for HC sampling and analysis.

The third problem area, and one that has no easy solution, was the inability of the FIA to quickly return to zero after analysis of a sample of exhaust taken during the closed throttle motoring conditions. The levels of 35,000 to 70,000 ppm C tended to remain in the entire system and several minutes of purge was necessary to return to a near zero condition. The two CT modes were located before idle modes, themselves no small producer of HC, at the middle and end of the test schedule. Actually, to reestablish a true zero required sometimes on the order of 5 to 10 min. The instrument would rezero, however, and to eliminate possible interference of the residual CT mode on the following idle, a prolonged period of 7 min was given over to changing filters, draining ice pots, zero and upscaling of all instruments before proceeding to the idle mode. One solution to this problem would be to leave the closed throttle operation to last in the schedule. This is essentially what was done in this program but a possible simplification would be to run a single CT at 2000 rpm at the conclusion of the entire test, making the schedule consist of 22 modes.

These HC instrument difficulties are probably the major reason that Beckman does not recommend their FIA instruments for use on raw gasoline exhaust. It is also probably one of the reasons for the use of the CVS in light duty. The problem of slow return to zero after a high HC reading could be overcome by merely rescheduling the CT-mode(s), however, since they need not be located within the cycle as is the present procedure.

Another difficulty that occurred was in the measurement of NO_x (NO and NO_2). Assuming CL is desired in order to measure NO plus NO_2, then modification of the CL will be necessary to permit direct analysis of raw exhaust. Either a water trap (ice-water) with its inherent problem of solubility of NO_2 in water and its loss or a heated sample system and instrument interior will be needed to prevent water from collecting in the instrument. Once the sample is admitted into the reaction chamber, the low vacuum prevents condensation and no great difficulty is expected. Such an instrument is not, however, currently marketed and use of CL on raw exhaust will require a modified sampling system.

In summary of this topic, raw exhaust sampling and analysis requires precautions with FIA and CL instruments not encountered with atmospheric or diluted samples. The problems can be overcome by operational was well as fairly straightforward instrument modifications. Additional development, beyond the scope of this project, appears necessary followed by proof test.

3. Calculations

The calculations required for the 23-mode test procedure are fairly straightforward and posed no great difficulty. Chart reading is quite easy since most all conditions are straight line readings over a 1-min period unlike the seven-mode light-duty test. One beauty of the 23-mode schedule is that the basic measurements may be recomputed in a wide variety of ways with results in terms of grams per mode, per minute, per pound of fuel, etc.; different weighting factors and deletion of entire modes can be made to further utilize the emissions data. This has to be one of the greatest advantages of the engine exercise approach.

Another is the direct applicability of the schedule for emissions control technology development. The current CVS procedure for light-duty vehicles allows little insight into those areas of operation in most need of reduction since only a single test number results. The speed-load map affords the researcher ample specific values to pinpoint effectiveness of control methods and to arrive at the optimum cost-effective improvement.

As in most procedures, the influence of inlet air humidity on oxides of nitrogen formation is not understood for the 23-mode procedure. Since work done by various organizations[11] in this area has resulted in empirical relationships between an engine's NO_x behavior versus humidity that appear procedure influenced, the calculations of 23-mode NO_2 rates were based on observed values. Until such a factor is developed, correction of the observed values does not appear justified. Humidity levels were measured during each run and were provided for future use.

C. Oxides of Nitrogen by NDIR and CL

Few, if any, simultaneous measurements have been made of gasoline HDV engine raw exhaust by NDIR (NO) and CL (NO_x and NO) prior to this study. A TECO CL instrument, described in an earlier section of this report, was operated side-by-side with a Beckman NDIR instrument beginning with Truck No. 3. Data were obtained routinely by both methods on the remaining trucks with the exception of unit 4—due to a faulty TECO amplifier. There are a number of ways of analyzing the data taken during the operation of Trucks 3, 5, 6, 7, 8, and 9 and contained on the printouts in Appendix I.

Table 13 is a summary of the 23-mode NDIR and CL results for all trucks, all runs in as-measured concentrations. Note that the CL and NDIR results agree rather well throughout the 23 modes of operation. These are averaged results and the agreement for a specific engine can be more or less as shown on Appendix Tables K-1 through K-6.

TABLE 13. OXIDES OF NITROGEN BY NDIR AND CL–23-MODE TEST
ALL TRUCKS AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level, %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	37	23	29	6	60	29	36	7
2	1500	0	100	96	105	9	180	141	156	15
3	1500	12.5	430	410	425	15	558	485	504	19
4	1500	25	1165	1089	1134	45	1145	1038	1071	33
5	1500	37.5	1842	1750	1779	29	1874	1783	1811	28
6	1500	50	2338	2289	2312	23	2304	2225	2261	36
7	1500	62.5	2525	2448	2479	31	2498	2388	2415	27
8	1500	75	2316	2192	2237	45	2345	2207	2237	30
9	1500	87.5	1675	1571	1588	17	1552	1400	1407	7
10	1500	100	738	611	626	15	765	621	633	12
11	1500	CT	150	11	18	7	105	8	12	4
12	Idle	0	139	26	34	8	118	32	39	7
13	2500	100	699	654	673	19	883	763	782	19
14	2500	87.5	1648	1520	1538	18	1766	1648	1663	15
15	2500	75	2539	2419	2456	37	2585	2443	2487	44
16	2500	62.5	2976	2992	3003	11	2997	2928	2960	32
17	2500	50	2807	2914	2941	27	2860	2805	2836	31
18	2500	37.5	2329	2373	2383	10	2359	2311	2342	31
19	2500	25	1670	1548	1579	31	1742	1605	1639	34
20	2500	12.5	874	769	791	22	985	851	875	24
21	2500	0	313	222	237	15	421	312	332	20
22	2500	CT	121	14	24	10	77	6	9	3
23	2500	0	116	52	74	22	112	33	40	7

Note: $NO_2 = NO_x - NO$ by chemiluminescence.

Though direct comparison of NO by NDIR to NO by CO is of interest, the most important comparison is between NO by NDIR and NO_x (NO plus NO_2) by CL. Figure 54 is a scatter plot of NO_x by CL versus NO by NDIR. The circled points are for stationary engine tests, the squares are for chassis-operated engines. This plot indicates fairly close agreement. The 45-deg line represents perfect, or one-to-one correlation. If anything, the CL NO_x concentrations were slightly lower than NDIR.

This trend is also noted if the brake specific values on Table 11 are averaged. For the six engines run both ways, the overall average of 10.21 g NO_2/bhp-hr by NDIR versus 9.89 g NO_2/bhp-hr by CL (stationary) and 10.52 g NO_2/bhp-hr by NDIR versus 10.01 g NO_2/bhp-hr (chassis) show the near equivalence of the two methods. It was beyond the scope of this procedural evaluation to explore the possible reasons for the slight discrepancy. In light of many years of experience in trying to measure oxides of nitrogen, this agreement must be termed satisfactory.

There was a possibility that NDIR would understate the oxides of nitrogen in raw gasoline engine exhaust for a variety of plausible reasons. This definitely was not found. One major reason was the relatively minor amount of NO_2 found in the raw exhaust. Only at idle, very light, and sometimes very heavy load, where the NO concentrations are fractions of that found at other speeds and power levels, did NO_2 amount to a sizeable fraction of the NO_x. Figure 55 is a bar chart representation of the chassis and stationary average NO + NO_2 for all trucks by mode (power and speed). This representation is based on an average of individual engine results shown in Appendix Figures K-1 through K-6. Note that for all practical purposes NO_2 remains essentially constant throughout the range of speeds and loads encompassed by the 23-mode test.

As mentioned in an earlier section on instrumentation, the removal of combustion water from the CL exhaust sample by an ice-water trap also had the undesirable effect of removing about 15 percent of the NO_2. An alternative, possibly better approach, would be to keep the raw exhaust sample above its dew point by heating the sample lines to about 175°F. This was not attempted since it would require modification

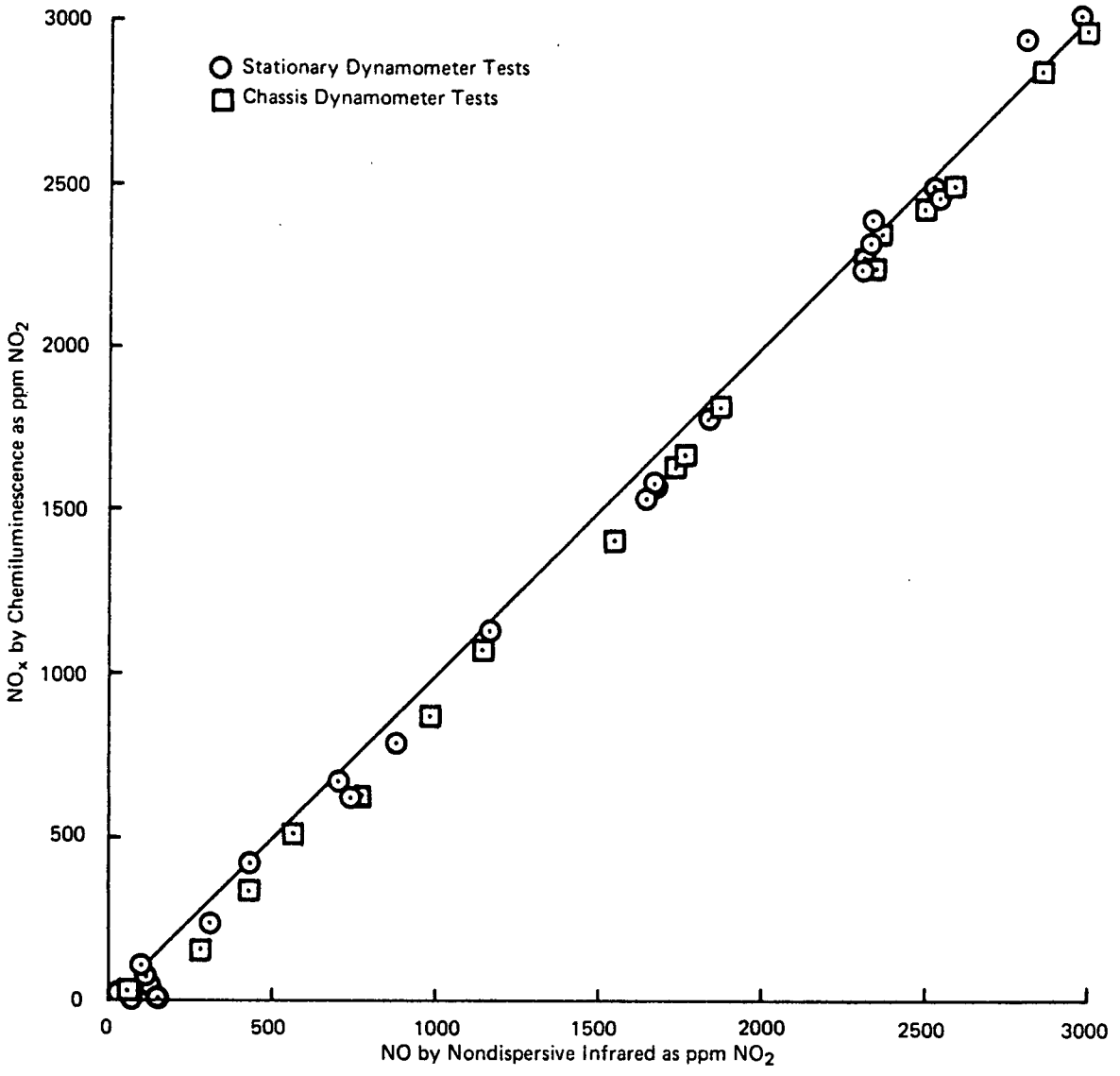


FIGURE 54. CORRELATION OF SIMULTANEOUSLY MEASURED NO_X BY CHEMILUMINESCENCE AND NO BY NDIR IN RAW EXHAUST DURING 23-MODE TEST–SIX-TRUCK AVERAGE

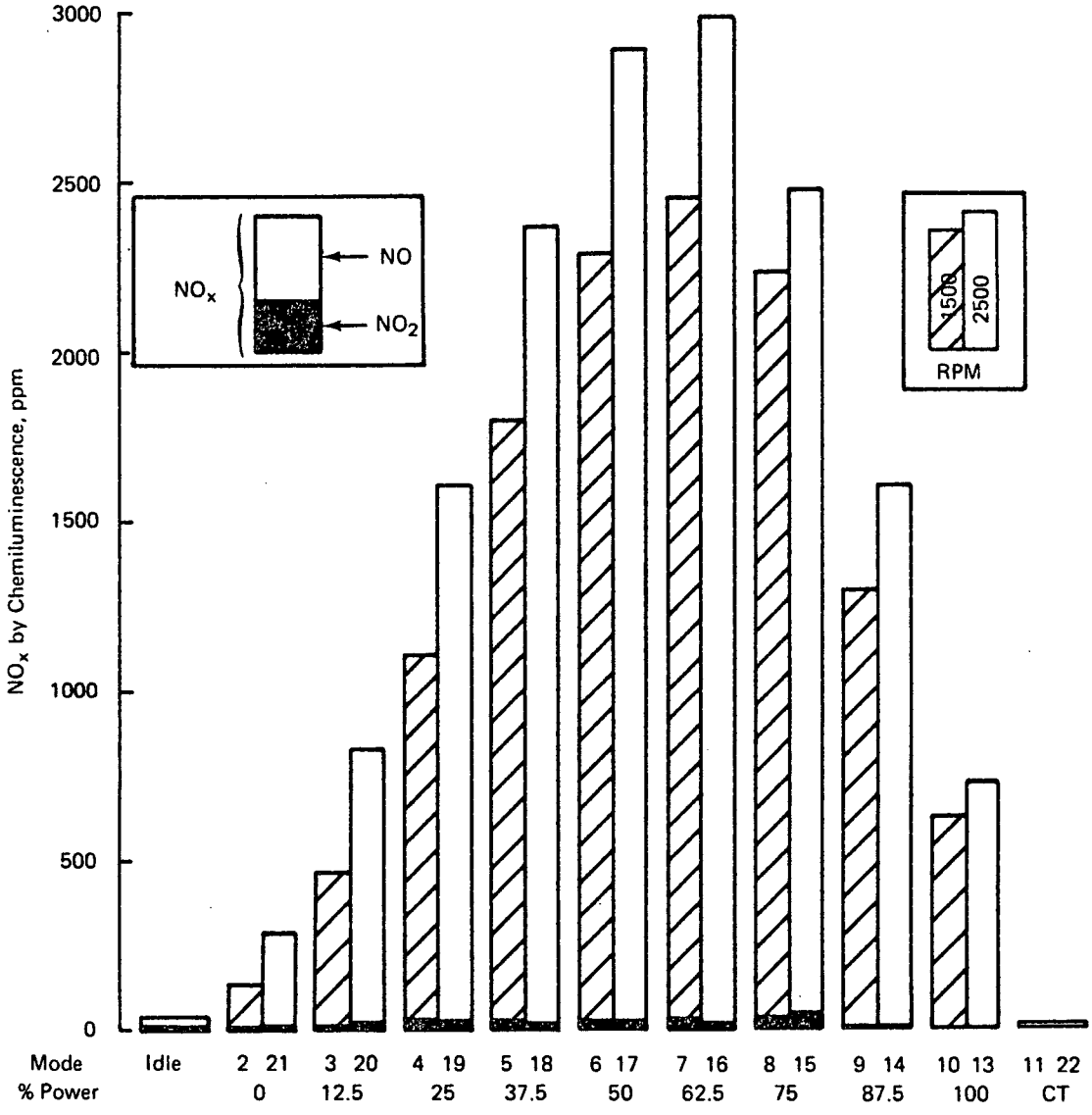


FIGURE 55. EXPERIMENTAL 23-MODE NO-NO_X BY CHEMILUMINESCENCE–SIX-TRUCK AVERAGE

of the TECO CL instrument. The EPA CL design is expected to be much simpler to alter for heated sample lines than the TECO unit. As with other phases and subphases of this entire project, there are a number of other ways to analyze and interpret the results. Accordingly, the reader is encouraged to utilize the data in the appendices.

In summary of this section, the 23-mode test procedure seems to work equally well on chassis- and stationary-operated engines. The run-to-run repeatability on either dynamometer is better than that by the current nine-mode FTP which is usually taken to be satisfactory if repetitive runs agree within ±10 percent of the mean. Chassis to stationary correlation was also somewhat better than the nine-mode FTP with ±25-percent limits of agreement. Most 23-mode tests agreed within ±20 percent. The chassis test is felt to be more realistic though both types of engine operation are important for research, durability, certification, and surveillance-inspection.

Basically, minor operational difficulties were encountered with dynamometry and most instruments. The attempt to use an unmodified commercially available widely used FIA (Beckman 400) HC analyzer met with only limited success. Either the instrument must be modified to operate at 150° to 175°F to prevent condensation of the water of combustion or a high temperature FIA, reduced to 150° to 175°F, is needed. Special attention must be given the hang-up and resulting slow return to zero of the FIA after encountering the very high concentrations at closed throttle motoring.

The brief study of oxides of nitrogen measurements by NDIR and CL indicated that both did the job with some disadvantages. The CL is preferred as it attempts to measure NO plus NO_2 (NO_x) without the use of a chemical drying agent. This was not accomplished without difficulty since the water of combustion in the raw exhaust must not be allowed to reach its dew point and condense. If this occurs, the CL instrument becomes completely inoperative. The preferred solution will be to heat the sample handling system up to the reaction chamber to maintain the exhaust at about 175°F. The alternative method of an ice-water trap results in loss of about 15 percent of the NO_2 by absorption with the condensate. The EPA CL design is expected to be easier to modify than the Ford design used in the TECO instrument.

XI. SUMMARY AND CONCLUSIONS

The project can be best summarized in three sections that coincide with the three major phases of work. Statements of a conclusive nature are offered where appropriate.

A. Emissions Characterization

An extensive series of tests were made with four gasoline-powered HDV engines operated on a stationary test bed and in the vehicle while on chassis dynamometer. The intent of these tests was to investigate the emissions behavior of gasoline engines used in trucks and buses above 6000-lb GVW. Principal emissions of interest were hydrocarbons, carbon monoxide, and nitric oxide. Both steady-state and transient conditions were measured using a truck-size constant volume sampler.

The major finding was that power output of the engine was the most consistent and grossly significant influence on all emissions of interest. The characteristic behavior with an increase in load was a concave-shaped curve of CO and HC with highest emission rates at no load and full load. The opposite was found for NO with the maximum values occurring at 40 to 70 percent power usually at minimum HC and CO with lowest levels observed at zero and full power. Power increments approaching 10 percent over the no load to full power range would be necessary to define emissions behavior during steady-state operation. Another finding was that engine speed had much less effect on emissions behavior on a mass basis (g/min, g/lb fuel, g/bhp-hr). Nitric oxide was increased on several of the trucks but other emissions were little affected.

The emissions during acceleration and deceleration were found in general to reflect but not to exceed the emissions under steady-state conditions. This means that steady-state conditions, if properly selected and weighted, could be employed to represent the total emissions of a gasoline engine to the atmosphere. The steady-state measurements are much easier and repeatable to obtain and permit expression on a brake specific basis directly. Emission measurements, power output, and exhaust flow or fuel rate are substantially more difficult to accomplish. One interesting result was that as long as a substantial inertia was used, say over half the vehicle's GVW, the amount of inertia seemed to have less than anticipated effect on emissions.

Chassis and stationary results did and did not agree well. Although run-to-run repeatability was excellent, differences in emissions behavior of as much as ±25 percent, usually ±10 to 15 percent, were found between stationary-and chassis-operated engines.

B. Road Route Studies

A stop-and-go, slow-, intermediate-, and high-speed road courses were investigated to determine the effect operation on different types of routes would have on mass emissions. Grams per mile, grams per minute, and grams per lb fuel of HC were highest during stop and go and uniformly decreased as vehicle speed and duty (load) increased. CO was less affected by road route, while NO increased as route speed and duty level increased. Evaluation of road data of engine speed, vehicle speed and manifold vacuum, relative to that in the characterization studies, resulted in emissions trends that were quite similar. The characteristic emissions behavior with power output (intake manifold vacuum) was comparable though it was not intended to simulate very low or very high power conditions during the road studies.

The four-truck study indicated that driving pattern does have a substantial effect on emissions and that 20- to 30-mph cruise, quasi-steady throttle, was optimum for lowest overall emissions on a mass basis. A limited study of driver effect on the stop-and-go results indicated that how the driver operates his truck could also have a significant influence on emission rates. These findings have ramifications in the entire area of traffic planning, fleet operation, and driver training. It is speculated that this could prove to be as important as the vehicle inspection and maintenance programs that many groups are advocating.

C. Experimental 23-Mode Test Procedure

Nine truck engines, 1970 or later model year, were used to evaluate an experimental 23-mode test schedule for HC, CO, and NO_x emissions. Engines were operated both stationary and chassis installed and the results expressed in g/bhp-hr. Run-to-run repeatability was better than the current nine-mode Federal Test Procedure in which ±10 percent variations in replicate runs are considered satisfactory. Agreement between stationary- and chassis-operated engine emissions was also better than the FTP, run on these same engines, but on the order of ±25 percent with ±15 percent most of the time. Much remains to be known about the emissions behavior of engines in open test cells on stationary dynamometers relative to the close confines of an engine compartment with fan and radiator. For realism, the chassis-operated engine is preferred.

Some operational problems were encountered, not all of which were solved. Automatic transmissions caused more problems on the chassis machine while simulation of light loads may be tricky on both machines, depending on their design and operational flexibility. Instrument problems centered about the hydrocarbon analyzer used. A commercially available Beckman 400 FIA unit was used unmodified with a number of difficulties due to combustion water in the raw exhaust and slow return to zero after the extremely high concentrations encountered during closed throttle. This instrument, in its current state, must either be modified or replaced to achieve operation at the desired 150° F.

Simultaneous measurement of NO by NDIR and NO-NO_x by CL methods was made on six trucks and the results reported. NO_2 as NO_2 was a tiny, almost negligible, fraction of the NO_x (NO + NO_2) in the raw exhaust except at low NO_x conditions such as idle, no load, and full load. Even then, it was only a part of a low concentration relative to other power points. However, idle is thought to represent 20 to 25 percent of a truck's operation, making such levels of more importance. The only drawback to the use of CL is the problem of combustion water in the sample condensing in the sampling system rendering the analyzer, intended for dilute bag samples or atmospheric analysis, completely inoperative after a brief period of operation. One alternative is to use an ice-water bath, which can absorb in the neighborhood of 15 percent of the NO_2 in the sample. The other alternative is to heat the sampling system up to the CL reactor which may pose problems with current commercial CL instruments. Both NDIR and CL have some disadvantages though the CL does attempt to measure NO_x (NO plus NO_2) and does not require a chemical drying agent in the sample line. On this basis, CL would be the preferred method.

It is hoped that reviewing this summary has interested the reader in the body of this report where the important points are described in more detail. Appended to this report are data summaries, run results, and detailed information, data, graphs, etc., to permit analysis by other methods or for other purposes.

XII. RECOMMENDATIONS

As is the case with many exploratory programs such as the one described in this report, a number of additional avenues of work are uncovered. The following recommendations are offered for consideration:

(1) A multi-modal procedure in which emissions are measured at power increments approaching 10 percent at two speeds is recommended for gasoline engine emissions tests. Closed throttle should be included at one or two speeds.

(a) The exact power increments, engine speeds, and weighting factors for each mode should be based on the best available road data. The only body of data known, the Ethyl Truck and Bus Survey, was done 10 years ago and may need to be verified as to its authenticity of truck operational characteristics currently in use.

(b) Additional road studies to define percent time at various engine speeds, intake manifold vacuums, vehicle speeds, etc., should be obtained using modern portable magnetic tape data loggers similar to the one used in this project. One test approach would be to drive traffic in a number of cities in a number of trucks. Another would be to instrument trucks in normal fleet use and let the driver follow his usual route and habit.

(c) The test procedure should be of the same, if not identical, form as a diesel procedure, except where obvious engine differences and application dictate otherwise, since many diesel engines, mostly mid-range, are in direct competition with gasoline engines. This will require additional information on how diesel engines operate in trucks (road data) as well as procedural development studies along with procedural evaluation.

(d) For realism, a chassis-operated engine procedure is suggested with a stationary version for use in engine improvement, device evaluation, and control technology studies. In any event, a chassis procedure must be included to permit inspection and surveillance testing.

(2) Hydrocarbon and oxides of nitrogen measurement methodology deserves more study, development, and proof test for use with raw gasoline exhaust.

(a) Additional studies are needed to either modify the widely used Beckman 400 FIA or to demonstrate that a high temperature HC analyzer, operated at 150° to 175°F, gives equivalent or acceptable results with raw exhaust and that hang-up of HC from the closed throttle, high HC levels, can be minimized. Oxygen synergism and sample flow-burner flows should be optimized for raw gasoline exhaust HC analysis.

(b) Though NO by NDIR is a workable method, CL promises to be an improvement attempting to measure NO_2 as well as NO. An experimental investigation of the feasibility of heating all sample lines to the reaction chamber proper is recommended as this would appear to be the best long-range solution to difficulties of raw exhaust analysis. A sample temperature of about 175°F would seem appropriate to prevent condensation. The EPA design is more amenable to heated sample system than the Ford design, used by TECO, and would be the suggested CL instrument design for modification.

(3) A thorough and broad-based investigation into all facets of the influence of driving patterns and driver habits on exhaust emissions should be made not only for trucks but automobiles. This is probably the one most important long-range recommendation to result from the project.

(a) Driving patterns are of importance as they can be controlled and modified to some extent by governmental traffic directors, highway planners, fleet operators, dispatchers, and

ultimately the driver himself. The study should include all these factors and result in guidelines to assist these commonly involved people and functions in implementing a program designed to reduce air pollution once the vehicle is placed into use. This will require experimental studies similar to but greatly expanded over those reported in this project.

(b) Driver habit was shown by a brief study in this project to have potential for reduced emissions of air pollutants. The way the driver operates his vehicle apparently can and does have an influence which could equal that of maintenance. Much more must be done to determine what the limits of this influence might be and to determine guidelines that would be helpful to driver training. The driver effect is probably sensitive to driving pattern and vehicle power-to-weight ratio among other factors.

(c) Consideration should be given to driving aids to influence the driver to operate his vehicle in an optimum manner for low emissions. This could take the form of a manifold vacuum gauge to indicate power request since this engine variable has consistently been shown to have the greatest single impact on the principal emissions.

(4) The multi-modal test procedure, recommendation 1, may prove to be a satisfactory test method for certification and compliance purposes. In the event such a procedure is adopted or considered for adoption, at least two other major areas of effort will be needed. First, a data base using the specific procedure will be necessary to determine what levels currently produced engines emit. Second, some idea as to the practical feasibility of control technology is needed to assess the cost-effectiveness of meeting projected goals. It goes without saying that the contribution of the gasoline engine in trucks and buses should be assessed as to its impact or contribution to air pollution. Limits should be placed based on air quality considerations and the gasoline-powered trucks ratable portion thereto.

It is evident from the tenor of these recommendations that this project did not complete our understanding of emissions behavior of gasoline-powered trucks and buses. It has moved us one step higher on the learning curve. The program merits continuation without delay.

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APPENDIX A

FOUR ENGINE-VEHICLE EMISSIONS CHARACTERIZATION RESULTS IN TABULAR FORM

TABLE A-1. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE
STATIONARY OPERATED–1000 RPM AND IDLE

January 20, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.28	6.69	0.07	–	–	–	3.11	74.33	0.78			
	2	0.17	4.46	0.07	–	–	–	1.88	49.55	0.78			
	3	0.17	3.47	0.07	–	–	–	1.88	38.55	0.78			
	4	0.22	6.81	0.17	–	–	–	2.44	75.66	1.89			
	Avg	0.21	5.36	0.10	–	–	–	2.33	59.52	1.05	18.5	0.0	0.09
10	1	0.34	6.92	0.07	6.80	138.40	1.40	5.66	115.33	1.16			
	2	0.33	5.64	0.06	6.60	112.80	1.20	5.50	94.00	1.00			
	Avg	0.33	6.28	0.44	6.60	125.60	1.30	5.50	104.66	1.08	18.5	3.0	0.06
20	1	0.45	3.32	0.15	4.50	33.20	1.50	5.00	36.88	1.66			
	2	0.51	2.69	0.25	5.10	26.90	2.50	5.66	29.88	2.77			
	Avg	0.48	3.00	0.20	4.80	30.00	2.00	5.33	33.33	2.22	17.9	6.0	0.09
30	1	0.46	0.69	0.64	3.06	3.06	4.27	5.11	7.66	7.11			
	2	0.57	1.46	0.54	3.80	3.80	3.60	6.33	16.22	6.00			
	Avg	0.51	1.07	0.59	3.40	7.13	3.94	5.66	11.88	6.55	15.0	9.0	0.09
40	1	0.45	0.62	0.93	2.25	3.10	4.65	3.75	5.17	7.75			
	2	0.51	0.62	1.01	2.55	3.10	5.05	4.25	5.17	8.42			
	Avg	0.48	0.62	0.87	2.40	3.10	4.35	4.00	5.17	7.25	14.0	12.0	0.12
50	1	0.56	0.81	1.88	2.23	3.23	7.51	4.00	5.78	13.42			
	2	0.56	0.82	1.02	2.23	3.27	4.07	4.00	5.85	7.28			
	Avg	0.56	0.81	1.45	2.23	3.23	5.79	4.00	5.78	10.36	12.0	15.0	0.14
60	1	0.22	1.21	2.18	0.73	4.03	7.26	1.29	7.11	12.82			
	2	0.67	1.02	2.04	2.23	3.40	6.80	3.94	6.00	12.00			
	Avg	0.44	1.11	2.11	1.46	3.69	7.02	2.59	6.53	12.41	7.2	18.0	0.17
70	1	0.33	1.60	2.87	0.94	4.57	2.68	1.65	8.00	14.35			
	2	0.33	1.83	2.67	0.94	5.22	2.68	1.65	9.15	13.35			
	Avg	0.33	1.71	2.77	0.94	4.88	7.91	1.65	8.55	13.85	3.5	21.0	0.20
80	1	0.49	1.98	3.87	1.22	4.95	9.67	2.23	9.00	17.59			
	2	0.50	1.61	3.36	1.24	4.02	8.39	2.27	7.32	15.27			
	Avg	0.49	1.79	3.61	1.22	4.47	9.02	2.23	8.14	16.40	2.0	24.0	0.22
90	1	0.75	3.34	4.43	1.67	7.42	9.85	3.09	13.80	18.30			
	2	1.03	8.37	3.64	2.29	18.61	8.09	4.25	34.58	15.04			
	Avg	0.89	5.85	4.03	1.98	13.00	8.96	3.67	24.17	16.65	0.1	27.0	0.24
100	1	2.46	120.70	0.51	4.91	241.23	1.02	6.99	342.89	1.45			
	2	2.57	105.82	0.74	5.13	211.49	1.48	7.30	300.62	2.10			
	Avg	2.51	113.26	0.62	5.02	226.36	1.24	7.13	321.76	1.76	0	30.0	0.35
Idle (700 rpm)	1	0.09	15.31	–				0.9	153.1				0.10
	2	0.11	15.53	–				1.10	155.3				0.10
	3	0.09	14.49	–				0.9	144.9				0.10
	Avg	0.10	15.11	–				1.0	151.8		15.5	0.0	0.10
Closed throttle	1	9.69	10.51	–	–	–	–	193.80	210.20	–			
	2	9.23	11.94	–	–	–	–	184.60	238.80	–			
	3	9.69	9.19	–	–	–	–	193.80	183.80	–			
	4	8.86	9.44	–	–	–	–	177.20	188.80	–			
	Avg	9.36	10.27					187.20	205.40		21	0.0	0.05

TABLE A-2. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE
STATIONARY OPERATED–1500 RPM

December 3, 1970

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.11	2.23	0.14	–	–	–	1.22	24.77	1.55			
	2	0.05	0.81	0.10	–	–	–	0.55	9	1.11			
	3	0.06	0.67	0.10	–	–	–	0.66	7.44	1.11			
	4	0.11	1.98	0.10	–	–	–	1.22	22	1.11			
	Avg	0.08	1.45	0.11	–	–	–	0.88	16.11	1.22	20.2	–	0.09
10	1	0.54	2.12	0.15	6.88	27.00	1.91	5.40	21.20	1.50			
	2	0.56	1.09	0.53	7.13	13.88	6.75	5.60	10.90	5.30			
	Avg	0.55	1.60	0.34	7.00	20.38	4.33	5.50	16.00	3.40	19.0	4.7	0.10
20	1	0.98	4.29	0.75	6.24	27.32	4.78	8.16	35.75	6.25			
	2	0.91	1.08	0.89	5.79	6.88	5.67	9.10	9.00	7.42			
	Avg	0.94	2.68	0.82	5.99	17.07	5.22	7.83	22.33	6.83	17.5	9.4	0.12
30	1	1.57	20.23	1.81	6.67	85.90	7.69	9.81	126.43	11.31			
	2	1.41	6.60	1.66	5.99	28.02	7.05	8.81	41.25	10.37			
	Avg	1.49	13.41	1.74	6.33	57.02	7.39	9.31	83.81	10.87	16.4	14.1	0.16
40	1	1.67	9.82	2.04	5.32	31.27	6.50	9.28	54.55	11.33			
	2	1.70	9.25	2.18	5.41	29.45	6.94	9.44	51.38	12.11			
	Avg	1.68	9.53	2.11	5.35	30.35	6.71	9.33	52.94	11.72	14.5	18.8	0.18
50	1	1.77	11.57	2.48	4.51	29.46	6.31	7.69	50.30	10.78			
	2	1.86	13.21	2.40	4.74	33.64	6.11	8.09	57.43	10.43			
	Avg	1.81	12.39	2.44	4.61	31.55	6.21	7.86	53.86	10.61	12.6	23.6	0.23
60	1	2.19	26.39	2.48	4.65	56.00	5.26	8.42	89.96	9.54			
	2	0.95	20.78	3.14	2.01	44.10	6.66	3.65	79.92	12.07			
	Avg	1.57	23.58	2.81	3.33	50.04	5.96	6.04	90.69	10.80	10.7	28.3	0.26
70	1	2.35	37.74	3.39	4.27	68.66	6.17	7.58	121.74	10.93			
	2	1.98	14.09	2.47	3.60	25.63	4.49	6.39	45.45	7.97			
	Avg	2.16	25.91	2.93	3.93	47.14	5.34	6.97	83.58	9.45	7.5	33.0	0.31
80	1	2.32	39.03	4.19	3.69	62.13	6.67	6.62	111.51	11.97			
	2	1.72	40.10	2.79	2.73	63.83	4.44	4.91	114.57	7.97			
	Avg	2.02	39.56	3.49	3.21	62.98	5.56	5.77	113.02	9.97	5.0	37.7	0.35
90	1	2.30	26.68	6.06	3.25	37.74	8.57	6.39	74.11	16.83			
	2	1.88	13.50	5.72	2.66	19.10	8.09	5.22	37.50	15.89			
	Avg	2.09	20.09	5.89	2.96	28.42	8.33	5.80	55.80	16.36	3.2	42.4	0.36
100	1	5.07	227.90	2.20	6.45	290.19	2.80	9.75	438.27	4.23			
	2	5.08	238.00	0.43	6.47	303.00	0.55	9.77	458.00	1.19			
	Avg	5.07	233.00	1.32	6.45	297.00	1.68	9.75	448.00	2.54	0.0	47.1	0.52
Closed throttle	1	9.75	7.84	–	–	–	–	243.75	196.00				
	2	9.23	9.82	–	–	–	–	230.75	245.50				
	3	9.69	7.75	–	–	–	–	242.25	193.75				
	4	10.44	7.95	–	–	–	–	261.00	198.75				
	Avg	9.77	8.30	–	–	–	–	244.25	207.50		22.5	0.0	0.04

TABLE A-3. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE STATIONARY OPERATED–2000 RPM

January 18, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.11	0.83	0.15	–	–	–	1.22	9.22	1.66			
	2	0.22	1.43	0.19	–	–	–	2.44	15.88	2.11			
	3	0.11	0.81	0.07	–	–	–	1.22	9.00	0.77			
	4	0.38	2.37	0.14	–	–	–	4.22	26.33	1.55			
	Avg	0.21	1.36	0.14	–	–	–	2.33	15.11	1.55	20.5	0.0	0.09
10	1	0.60	7.05	0.62	5.25	61.75	5.43	4.28	50.35	4.43			
	2	0.49	5.31	0.51	4.29	46.51	4.46	3.50	37.92	3.64			
	3	0.56	6.11	0.60	4.90	53.52	5.25	4.00	43.68	4.28			
	4	0.27	1.98	0.61	2.36	17.34	5.34	1.92	14.14	4.35			
	Avg	0.48	5.11	0.58	4.20	44.75	5.08	3.42	36.50	4.14	20.4	6.9	0.14
20	1	0.98	9.44	1.61	4.29	41.34	7.05	5.38	52.44	8.94			
	2	0.96	9.82	1.57	4.20	43.01	6.87	5.27	54.55	8.72			
	3	0.94	9.59	1.63	4.11	42.00	7.13	5.16	53.27	9.05			
	4	1.02	11.12	1.51	4.46	48.70	6.61	5.60	61.77	8.38			
	Avg	0.98	9.99	1.58	4.29	43.75	6.92	5.38	55.50	8.77	18.4	13.7	0.18
30	1	1.19	10.95	3.13	3.47	31.95	9.13	4.91	45.24	12.93			
	2	1.22	10.34	1.70	3.56	30.17	4.96	5.04	42.72	7.02			
	3	1.16	9.53	3.06	3.39	27.81	8.92	4.79	39.38	12.64			
	4	1.23	12.84	2.72	3.59	37.47	7.93	5.08	53.06	11.24			
	Avg	1.20	10.91	2.65	3.50	31.83	7.73	4.96	45.08	10.95	16.6	20.6	0.24
40	1	1.44	10.05	4.57	3.15	21.99	10.00	5.54	38.65	17.57			
	2	1.31	7.44	4.76	2.86	16.28	10.41	5.04	28.61	18.31			
	3	1.37	10.29	4.57	2.99	22.52	10.00	5.27	39.57	17.57			
	4	1.43	16.56	4.16	3.13	36.24	9.10	5.50	63.69	16.00			
	Avg	1.39	11.08	4.51	3.04	24.25	9.87	5.34	42.61	17.34	14.7	27.4	0.26
50	1	1.31	7.73	5.93	2.29	13.53	10.38	4.36	25.76	19.76			
	2	1.34	7.38	6.12	2.34	12.92	10.71	4.46	24.60	20.40			
	3	1.41	9.98	5.77	2.46	17.47	10.10	4.70	33.26	19.23			
	4	1.35	10.37	5.32	2.36	18.15	9.31	4.50	34.56	17.73			
	Avg	1.35	8.86	5.78	2.36	15.51	10.12	4.50	29.53	19.26	13.0	34.3	0.30
60	1	1.44	3.80	7.22	2.10	5.54	10.53	4.23	11.17	21.23			
	2	1.12	7.46	6.85	1.63	10.89	9.99	3.29	21.94	20.14			
	3	1.12	5.07	6.87	1.63	7.39	10.02	3.29	14.91	20.20			
	4	1.13	5.63	6.49	1.64	8.21	9.47	3.32	16.55	19.08			
	Avg	1.20	5.49	6.85	1.75	8.01	9.99	3.52	16.14	20.14	10.4	41.1	0.34
70	1	1.20	13.11	6.01	1.50	16.39	7.51	3.00	32.77	15.02			
	2	0.86	8.90	6.22	1.08	11.13	7.78	2.15	22.25	15.55			
	3	0.84	7.91	6.09	1.05	9.89	7.61	2.10	19.77	15.22			
	4	1.27	8.76	5.64	1.59	10.95	7.05	3.17	21.90	14.10			
	Avg	1.04	9.67	5.99	1.30	12.09	7.49	2.60	24.17	14.97	7.1	47.9	0.40
80	1	1.48	24.43	6.15	1.62	26.73	6.73	3.08	50.89	12.81			
	2	1.36	17.34	6.71	1.49	18.97	7.34	2.83	36.12	13.97			
	3	1.08	14.79	6.83	1.18	16.18	7.47	2.25	30.81	14.22			
	4	1.37	24.03	6.12	1.49	26.29	6.70	2.85	50.06	12.75			
	Avg	1.32	20.14	6.45	1.44	22.04	7.06	2.75	41.95	13.43	4.7	54.8	0.48
90	1	2.27	62.14	4.81	2.21	60.45	4.68	4.63	126.81	9.81			
	2	2.10	55.27	5.28	2.04	53.76	5.13	4.28	112.79	10.77			
	3	2.34	70.26	4.51	2.28	68.34	4.39	4.77	143.38	9.20			
	4	2.03	82.51	3.42	1.97	80.26	3.33	4.14	168.38	6.97			
	Avg	2.18	67.54	4.50	2.12	65.70	4.37	4.44	137.83	9.18	2.9	61.7	0.49
100	1	4.19	231.15	0.56	3.67	202.46	0.49	8.38	462.30	1.12			
	2	4.05	224.58	0.73	3.55	196.71	0.64	8.10	449.16	1.46			
	3	4.03	225.58	0.70	3.53	197.58	0.61	8.06	451.16	1.40			
	4	4.24	232.67	0.68	3.71	203.79	0.60	8.48	465.34	1.36			
	Avg	4.13	228.49	0.66	3.62	200.13	0.58	8.26	456.98	1.32	0.0	68.5	0.50
Closed throttle	1	9.13	7.84	–	–	–	–	228.13	196.00	–			
	2	9.27	7.61	–	–	–	–	231.75	190.25	–			
	3	9.69	7.14	–	–	–	–	242.25	178.50	–			
	4	9.36	7.27	–	–	–	–	234.00	181.75	–			
	Avg	9.36	7.46	–	–	–	–	234.00	186.50	–	24.0	0.0	0.04

TABLE A-4. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE
STATIONARY OPERATED–2500 RPM

December 2, 1970

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.23	1.44	0.32	–	–	–	1.53	9.60	2.13			
	2	0.28	3.86	0.37	–	–	–	1.86	25.73	2.60			
	3	0.22	1.20	0.24	–	–	–	1.46	8.00	1.60			
	4	0.43	6.50	0.23	–	–	–	2.86	43.33	1.53			
	Avg	0.29	3.25	0.29	–	–	–	1.93	21.66	1.96	21.7	–	0.15
10	1	0.87	10.51	1.06	6.12	74.01	7.46	4.35	52.55	5.30			
	2	1.97	7.18	3.40	13.87	50.56	23.94	9.85	35.90	17.00			
	Avg	1.42	8.84	2.23	10.00	62.25	15.70	7.10	44.20	11.15	20.3	8.5	0.20
20	1	1.24	9.86	2.27	4.36	34.71	7.99	5.39	42.87	9.87			
	2	1.59	7.96	5.67	5.60	28.02	19.96	6.91	34.61	24.65			
	Avg	1.41	8.91	3.97	4.96	31.37	13.98	6.13	38.74	17.26	18.8	17.0	0.23
30	1	1.56	10.92	4.14	3.66	25.94	9.83	5.77	40.44	15.33			
	2	1.68	19.54	7.31	3.94	46.41	17.36	6.22	72.37	27.07			
	Avg	1.62	15.23	5.72	3.80	35.75	13.42	6.00	56.41	21.18	17.0	25.5	0.27
40	1	1.65	10.84	6.29	2.90	19.08	11.07	5.16	33.87	19.66			
	2	1.95	21.91	8.69	3.43	38.57	15.30	6.09	68.46	27.16			
	Avg	1.80	16.75	7.49	3.17	29.49	13.19	5.62	52.34	23.41	14.5	34.0	0.32
50	1	1.58	9.58	8.47	2.22	13.49	11.93	4.16	25.21	22.29			
	2	1.91	9.15	9.65	2.69	12.89	13.59	5.03	24.08	25.39			
	Avg	1.74	9.36	9.06	2.45	13.18	12.76	4.58	24.63	23.84	13.0	42.6	0.38
60	1	1.46	8.39	9.93	1.71	9.85	11.65	3.40	19.51	23.09			
	2	1.34	8.53	10.24	1.57	10.01	12.02	3.12	19.84	23.81			
	Avg	1.40	8.46	10.08	1.64	9.93	11.83	3.25	19.67	23.44	10.6	51.1	0.43
70	1	1.62	16.54	10.07	1.63	16.64	10.13	3.06	31.21	19.00			
	2	1.43	12.74	10.32	1.43	12.82	10.38	2.70	24.03	19.47			
	Avg	1.52	14.64	10.19	1.52	14.73	10.25	2.87	27.62	19.23	8.0	59.6	0.53
80	1	2.14	29.70	9.25	1.88	26.14	8.14	3.69	51.21	15.95			
	2	0.23	24.75	10.25	0.20	21.79	9.02	0.40	42.67	17.67			
	Avg	1.18	27.22	9.75	1.04	23.96	8.58	2.03	46.93	16.81	5.8	68.1	0.58
90	1	3.38	85.03	7.58	2.64	66.60	5.94	4.89	123.23	10.98			
	2	0.43	54.61	10.25	0.34	42.78	8.03	0.62	79.14	14.85			
	Avg	1.90	69.82	8.91	1.49	54.69	6.98	2.75	101.19	12.91	4.0	76.6	0.69
100	1	7.08	355.16	1.00	4.98	250.11	0.70	8.43	422.81	1.19			
	2	7.28	346.55	1.26	5.13	244.05	0.89	8.67	412.56	1.50			
	Avg	7.18	350.85	1.13	5.06	247.08	0.79	8.55	417.68	1.35	1.1	85.2	0.84
Closed throttle	1	10.25	7.79	–	–	–	–	256.25	194.75	–			
	2	10.34	6.58	–	–	–	–	258.50	164.50	–			
	3	9.69	6.52	–	–	–	–	242.25	163.00	–			
	4	10.59	6.67	–	–	–	–	264.75	166.75	–			
	Avg	10.22	6.89	–	–	–	–	255.50	172.25	–	24.5	0.0	0.04

TABLE A-5. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE STATIONARY OPERATED–3000 RPM

January 14, 1971–January 15, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.39	9.05	0.39	–	–	–	2.29	53.23	2.29			
	2	0.61	17.96	0.38	–	–	–	3.58	105.64	2.23			
	3	0.22	5.93	0.45	–	–	–	1.29	34.88	2.64			
	4	0.85	20.66	0.30	–	–	–	5.00	121.52	1.76			
	Avg	0.51	13.40	0.38				3.04	78.82	2.23	21.5	–	0.17
10	1	1.46	28.36	1.36	9.02	175.24	8.40	6.63	128.90	6.18			
	2	0.89	14.07	1.31	5.49	86.94	8.09	4.04	63.95	5.95			
	3	0.87	15.88	1.29	5.37	98.12	7.97	3.95	72.18	5.86			
	4	0.48	8.92	1.49	2.96	55.11	9.20	2.18	40.54	6.77			
	Avg	0.93	16.80	1.36	5.74	103.81	8.41	4.22	76.36	6.18	20.0	9.7	0.22
20	1	0.16	31.54	2.23	0.49	97.44	6.88	0.61	121.30	8.57			
	2	1.08	13.66	2.31	3.33	42.20	7.13	4.15	52.53	8.88			
	3	0.38	22.71	1.29	1.17	70.16	3.98	1.46	87.34	4.96			
	4	0.84	9.83	1.49	2.59	30.37	4.60	3.23	37.80	5.73			
	Avg	0.61	19.43	1.83	1.88	60.03	5.65	2.34	74.73	7.03	18.6	19.4	0.26
30	1	1.33	15.37	5.00	2.73	31.65	10.29	4.15	48.03	15.62			
	2	1.36	18.98	4.40	2.80	39.09	9.06	4.25	59.31	13.75			
	3	1.68	30.82	2.45	3.46	63.48	5.04	5.25	96.31	7.65			
	4	1.04	10.91	2.92	2.14	22.47	6.01	3.25	34.09	9.12			
	Avg	1.35	19.02	3.69	2.78	39.17	7.60	4.21	59.43	11.53	16.7	29.1	0.32
40	1	1.68	30.80	5.67	2.59	47.57	8.75	4.42	81.05	14.92			
	2	1.44	22.02	5.82	2.22	34.01	8.99	3.78	57.94	15.31			
	3	1.18	16.66	4.28	1.82	25.73	6.61	3.10	43.84	11.26			
	4	1.54	28.57	4.99	2.37	44.13	7.70	4.05	75.18	13.13			
	Avg	1.46	24.51	5.19	2.25	37.86	8.01	3.84	64.50	13.65	14.2	38.8	0.38
50	1	1.18	14.90	8.40	1.45	18.41	8.40	2.68	33.86	19.09			
	2	1.29	13.97	8.19	1.59	17.26	8.19	2.93	31.75	18.61			
	3	1.26	15.57	7.08	1.55	19.24	7.08	2.86	35.38	16.09			
	4	1.31	22.51	6.03	1.61	27.81	6.03	2.97	51.15	13.70			
	Avg	1.26	16.73	7.42	1.55	20.67	9.16	2.86	38.02	16.86	12.1	48.5	0.44
60	1	1.06	15.07	8.76	1.09	15.52	9.02	2.12	30.14	17.52			
	2	0.89	12.78	8.99	0.91	13.16	9.25	1.78	25.56	17.98			
	3	1.19	19.70	8.87	1.22	20.28	9.13	2.38	39.40	17.74			
	4	0.66	9.44	8.04	0.67	9.72	8.28	1.32	18.88	16.08			
	Avg	0.95	14.24	8.66	0.97	14.66	8.91	1.90	28.48	17.32	10.1	58.2	0.50
70	1	1.29	38.20	4.90	1.13	33.72	4.32	2.22	65.86	8.44			
	2	1.33	29.12	7.52	1.17	25.70	6.63	2.29	50.20	12.96			
	3	1.06	19.16	9.44	0.93	16.91	8.33	1.82	33.03	16.27			
	4	0.69	10.72	9.80	0.60	9.46	8.65	1.18	18.48	16.89			
	Avg	1.09	24.30	9.71	0.96	21.45	8.57	1.87	41.89	16.74	8.1	67.9	0.58
80	1	0.78	27.01	5.91	0.60	20.86	4.56	1.21	42.20	9.23			
	2	1.55	56.56	6.62	1.19	43.68	5.11	2.42	88.37	10.34			
	3	1.29	34.87	7.45	0.99	26.93	5.75	2.01	54.48	11.64			
	4	1.19	35.11	8.30	0.91	27.11	6.41	1.85	53.29	12.96			
	Avg	1.20	38.38	7.07	0.92	29.64	5.46	1.87	59.96	11.04	5.7	77.9	0.64
90	1	1.85	94.59	3.48	1.27	64.94	2.38	2.40	122.84	4.51			
	2	2.62	124.24	4.67	1.79	85.30	3.20	3.40	161.35	6.06			
	3	2.38	94.36	5.61	1.63	64.78	3.85	3.09	122.54	7.28			
	4	2.02	90.07	6.43	1.38	61.84	4.41	2.62	116.97	8.35			
	Avg	2.22	100.81	5.05	1.52	69.21	3.46	2.88	130.92	6.55	3.7	87.4	0.77
100	1	4.53	334.93	0.72	2.79	206.95	0.44	4.48	331.21	0.71			
	2	4.08	347.25	0.83	2.52	214.57	0.51	4.03	343.81	0.82			
	3	4.16	293.51	0.90	2.57	181.36	0.55	4.11	290.09	0.89			
	4	4.40	318.24	0.92	2.71	196.64	0.56	4.35	315.08	0.91			
	Avg	4.29	323.48	0.84	2.65	199.88	0.51	4.24	320.27	0.83	1.8	97.1	1.01
Closed throttle	1	10.31	6.18	–	–	–	–	206.20	123.60	–			
	2	10.92	5.93	–	–	–	–	218.40	118.60	–			
	3	10.85	6.06	–	–	–	–	217.00	121.20	–			
	4	11.08	6.02	–	–	–	–	221.60	120.40	–			
	Avg	10.69	6.05	–	–	–	–	213.80	121.00	–	25.0	0.0	0.05

TABLE A-6. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE
STATIONARY OPERATED–3500 RPM

December 4, 1970

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	1.05	25.42	0.55	–	–	–	5.00	121.04	2.61			
	2	0.66	15.78	0.76	–	–	–	3.14	75.14	3.61			
	3	0.75	15.87	0.81	–	–	–	3.57	75.57	3.85			
	4	0.99	25.58	0.62	–	–	–	4.71	121.80	2.95			
	Avg	0.86	20.66	0.68	–	–	–	4.11	98.38	3.25	21.4	–	0.21
10	1	2.13	31.71	1.93	12.15	181	11.01	7.89	117.44	7.14			
	2	1.80	21.89	5.04	10.27	125	28.75	6.67	81.07	18.66			
	Avg	1.31	26.80	3.48	7.47	153	19.85	4.85	99.26	12.89	20.0	10.5	0.27
20	1	2.31	29.25	5.68	6.58	83.37	16.19	6.79	86.03	16.71			
	2	2.11	20.45	7.26	6.01	52.29	20.69	6.20	16.15	21.35			
	Avg	2.21	24.85	6.47	6.30	70.83	18.44	6.50	73.09	19.03	18.3	21.0	0.34
30	1	2.29	33.42	7.77	4.35	63.50	14.76	6.03	87.95				
	2	2.12	21.65	12.54	4.03	41.13	23.83	5.58	56.97	33.00			
	Avg	2.20	27.53	10.15	4.18	52.30	19.28	5.79	72.45	26.71	16.6	31.5	0.38
40	1	2.46	35.53	11.19	3.51	50.62	15.94	5.35	77.24	24.33			
	2	1.98	19.61	14.21	2.82	27.94	20.25	4.30	42.63	30.89			
	Avg	2.22	27.57	12.70	3.16	39.28	18.10	4.83	59.93	27.61	14.4	42.1	0.46
50	1	2.39	39.86	14.56	2.72	45.43	16.60	4.43	73.81	26.96			
	2	1.67	25.39	14.85	1.90	28.94	16.93	3.09	47.02	27.50			
	Avg	2.03	32.63	14.71	2.31	37.19	16.77	3.76	60.43	27.24	12.6	52.6	0.54
60	1	2.43	41.19	16.41	2.31	15.59	15.33	3.98	67.52	26.90			
	2	1.69	24.74	15.63	1.61	14.85	14.85	2.77	40.56	25.62			
	Avg	2.06	32.97	16.02	1.96	31.32	15.21	3.38	54.05	26.26	10.7	63.2	0.61
70	1	2.79	55.36	17.42	2.27	45.07	14.18	4.10	81.41	25.62			
	2	1.78	31.47	15.18	1.45	25.62	12.36	2.62	46.28	22.32			
	Avg	2.28	43.42	16.30	1.86	35.35	13.27	3.35	63.85	23.97	8.9	73.7	0.68
80	1	4.16	116.89	14.79	2.96	83.26	10.53	5.47	154	19.46			
	2	3.01	77.75	12.22	2.14	55.38	8.70	3.96	102	16.08			
	Avg	3.58	97.32	13.51	2.55	69.32	9.62	4.71	128	17.78	7.0	84.2	0.76
90	1	5.96	168.38	13.29	3.77	107	8.41	6.34	179	14.13			
	2	3.92	101.77	11.19	2.48	64.44	7.09	4.17	108	11.90			
	Avg	4.94	135.07	12.24	3.13	85.52	7.75	5.26	144	13.02	4.7	94.8	0.94
100	1	8.81	483.06	1.39	5.02	275	0.79	7.47	409	1.18			
	2	8.16	440.31	1.59	4.65	251	0.91	6.92	373	1.35			
	Avg	8.48	462	1.49	4.83	263	0.85	7.19	392	1.26	2.4	105.3	1.18
Closed throttle	1	12.29	6.87	–	–	–	–	246	137	–			
	2	11.07	5.57	–	–	–	–	221	111	–			
	3	12.29	5.73	–	–	–	–	246	115	–			
	4	11.31	5.52	–	–	–	–	226	110	–			
	Avg	11.68	5.92	–	–	–	–	234	118	–	24.5	0.0	0.05

TABLE A-7. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE STATIONARY OPERATED–NO LOAD

November 24, 1970

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
1000	1	0.28	6.69	0.07	3.11	74.33	0.78		
	2	0.17	4.46	0.07	1.88	49.55	0.78		
	3	0.17	3.47	0.07	1.88	38.55	0.78		
	4	0.22	6.81	0.17	2.44	75.66	1.89		
	Avg	0.21	5.36	0.10	2.32	59.52	1.05	18.5	0.09
1250	1	0.22	5.19	0.10	2.44	57.66	1.11		
	2	0.11	2.43	0.08	1.22	27.00	0.89		
	3	0.06	1.22	0.07	0.66	13.55	0.77		
	4	0.22	4.79	0.09	2.44	53.22	1.00		
	Avg	0.15	3.41	0.09	1.69	37.86	0.93	19.4	0.09
1500	1	0.11	2.23	0.14	1.10	22.30	1.40		
	2	0.05	0.81	0.10	0.50	8.10	1.10		
	3	0.06	0.67	0.10	0.60	6.70	1.10		
	4	0.11	1.98	0.10	1.10	19.80	1.10		
	Avg	0.08	1.45	0.11	0.83	14.23	1.18	20.2	0.10
1750	1	0.38	1.39	0.07	3.16	11.58	0.58		
	2	0.06	0.61	0.07	0.50	5.08	0.58		
	3	0.11	0.81	0.10	0.91	6.75	0.83		
	4	0.11	0.82	0.07	0.91	6.83	0.58		
	Avg	0.16	0.91	0.08	1.37	7.56	0.64	20.7	0.12
2000	1	0.11	0.83	0.15	0.91	6.91	1.25		
	2	0.22	1.43	0.19	1.83	11.91	1.58		
	3	0.11	0.81	0.07	0.91	6.75	0.58		
	4	0.38	2.37	0.14	3.16	19.75	1.17		
	Avg	0.21	1.36	0.14	1.70	11.33	1.15	21.4	0.12
2250	1	0.22	1.60	0.31	1.69	12.30	2.38		
	2	0.49	4.54	0.14	3.76	34.92	1.07		
	3	0.28	1.86	0.24	2.15	14.30	1.84		
	4	0.34	1.83	0.24	2.61	14.07	1.84		
	Avg	0.33	2.45	0.23	2.55	18.90	1.78	21.5	0.13
2500	1	0.23	1.44	0.32	1.53	9.60	2.13		
	2	0.28	3.86	0.39	1.86	25.73	2.60		
	3	0.22	1.20	0.24	1.46	8.00	1.60		
	4	0.43	6.50	0.23	2.86	43.33	1.53		
	Avg	0.29	3.25	0.29	1.93	21.66	1.96	21.7	0.15
2750	1	0.16	3.38	0.28	1.06	22.53	1.86		
	2	0.75	13.27	0.23	5.00	88.46	1.53		
	3	0.34	5.75	0.39	2.26	38.33	2.60		
	4	0.61	10.44	0.39	4.06	69.60	2.60		
	Avg	0.46	8.21	0.32	3.10	54.73	2.14	21.6	0.15
3000	1	0.39	9.05	0.39	2.29	53.23	2.29		
	2	0.61	17.96	0.38	3.58	105.64	2.23		
	3	0.22	5.93	0.45	1.29	34.88	2.64		
	4	0.85	20.66	0.30	5.00	121.52	1.76		
	Avg	0.51	13.40	0.38	3.04	78.82	2.23	21.5	0.17
3250	1	0.48	12.70	0.44	2.28	60.47	2.09		
	2	0.81	21.61	0.44	3.85	102.90	2.09		
	3	0.78	15.76	0.39	3.71	75.04	1.86		
	4	0.77	17.93	0.53	3.66	85.38	2.52		
	Avg	0.71	17.00	0.45	3.63	80.94	2.14	21.5	0.21
3500	1	1.05	25.42	0.55	5.00	121.04	2.61		
	2	0.66	15.78	0.76	3.14	75.14	3.61		
	3	0.75	15.87	0.81	3.57	75.57	3.85		
	4	0.99	25.58	0.62	4.71	121.80	2.95		
	Avg	0.86	20.66	0.68	4.11	98.38	3.25	21.4	0.21

TABLE A-8. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE CHASSIS OPERATED–1000 RPM AND IDLE

December 23, 1970

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.28	10.78	0.07	–	–	–	3.38	134.75	0.88			
	2	0.22	9.28	0.07	–	–	–	2.75	116.00	0.88			
	3	0.22	7.58	0.14	–	–	–	2.75	94.75	1.75			
	4	0.28	12.60	0.09	–	–	–	3.38	157.50	1.23			
	Avg	0.24	10.06	0.09	–	–	–	3.00	125.75	1.13	19.1	0.0	0.08
10 & 20								No Data					
30	1	0.55	0.80	1.07	3.66	5.33	7.13	5.50	8.00	10.70			
	2	0.94	7.25	1.24	6.26	48.33	8.26	9.40	72.50	12.40			
	3	0.82	6.37	1.06	5.46	42.46	7.06	8.20	63.70	10.60			
	4	0.94	10.97	0.84	6.26	73.13	5.60	9.40	109.70	8.40			
	Avg	0.81	8.35	1.05	5.40	55.66	7.00	8.10	83.50	10.50	15.0	9.0	0.10
40	1	0.72	1.21	1.70	3.60	6.05	8.50	6.00	10.08	14.16			
	2	0.94	3.39	2.02	4.70	16.95	10.10	7.83	28.25	16.83			
	3	0.99	9.48	1.69	4.95	47.40	8.45	8.25	79.00	14.08			
	4	1.05	12.60	1.53	5.25	63.00	7.65	8.75	105.00	12.75			
	Avg	0.92	6.67	1.78	4.60	33.35	8.90	7.66	55.58	14.83	14.0	12.0	0.12
50	1	0.94	2.63	1.85	3.75	10.51	7.39	6.71	18.78	13.21			
	2	1.03	13.23	1.46	4.11	52.88	5.83	7.35	94.50	10.42			
	3	1.10	11.13	1.86	4.39	44.49	7.43	7.85	79.50	13.28			
	4	1.09	13.13	1.75	4.35	52.48	6.99	7.78	93.78	12.50			
	Avg	1.04	10.03	1.75	4.16	40.09	6.99	7.42	71.64	12.50	12.0	15.0	0.14
60	1	0.94	6.47	2.65	3.13	21.55	8.82	4.94	34.05	13.94			
	2	1.08	13.13	2.05	3.60	52.48	6.82	5.68	69.10	10.79			
	3	1.05	10.30	2.24	3.49	34.31	7.46	5.52	54.21	11.79			
	4	1.08	10.98	3.38	3.60	36.57	11.26	5.68	57.78	17.79			
	Avg	1.02	9.97	2.58	3.39	33.21	8.59	5.37	52.47	13.58	7.2	18.0	0.19
70	1	0.44	1.99	3.61	1.25	5.68	10.30	2.09	9.47	17.19			
	2	0.43	2.15	3.68	1.22	6.13	10.50	2.05	10.23	17.52			
	3	0.55	2.18	3.92	1.57	6.22	11.19	2.62	10.38	18.66			
	4	0.49	1.97	2.29	1.39	5.62	6.53	2.33	9.38	10.90			
	Avg	0.48	2.07	3.38	1.37	5.91	9.65	2.28	9.85	16.09	3.5	21.0	0.21
80	1	0.70	2.37	4.17	1.75	5.92	10.42	3.04	10.30	18.13			
	2	0.70	3.23	4.19	1.75	8.07	10.47	3.04	14.04	18.21			
	3	0.76	4.74	4.30	1.90	11.84	10.74	3.30	20.61	18.69			
	4	0.65	3.43	4.03	1.62	8.57	10.07	2.83	14.91	17.52			
	Avg	0.73	3.57	4.42	1.82	8.92	11.04	3.17	15.52	19.21	2.0	24.0	0.23
90	1	1.02	3.34	4.63	2.26	7.42	10.29	3.92	12.84	17.81			
	2	1.07	9.28	4.53	2.37	20.63	10.07	4.11	35.69	17.42			
	3	1.09	4.78	4.75	2.42	10.63	10.56	4.19	18.38	18.27			
	4	1.25	13.56	4.15	2.78	30.15	9.22	4.81	52.15	15.96			
	Avg	1.11	7.99	4.51	2.47	17.76	10.03	4.27	30.73	17.34	0.10	27.0	0.26
100	1	2.79	140.20	0.46	5.57	280.21	0.92	7.54	378.91	1.24			
	2	2.82	136.71	0.54	5.63	273.23	1.08	7.62	369.48	1.46			
	3	2.81	144.14	0.37	5.61	288.08	0.74	7.59	389.56	1.00			
	4	2.81	140.14	0.45	5.61	280.09	0.89	7.59	378.75	1.22			
	Avg	2.80	140.25	0.45	5.59	280.31	0.89	7.57	379.05	1.22	0	30.0	0.37
Idle (700 rpm)	1	0.26	10.8	–	–	–	–	3.25	135.00	–			
	2	0.20	10.2	–	–	–	–	2.50	127.50	–			
	3	0.20	10.8	–	–	–	–	2.50	135.00	–			
	4	0.25	9.8	–	–	–	–	3.12	122.50	–			
	Avg	0.27	10.4	–	–	–	–	3.38	130.00	–	16.2	0.0	0.08

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-9. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE
CHASSIS OPERATED–2000 RPM

November 22, 1970

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.49	3.43	0.31	–	–	–	4.45	31.18	2.81			
	2	0.44	3.02	0.31	–	–	–	4	27.45	2.81			
	3	0.39	3.66	0.31	–	–	–	3.54	33.27	2.81			
	4	0.38	2.63	0.31	–	–	–	3.45	23.90	2.81			
	Avg	0.42	3.18	0.31	–	–	–	3.86	28.95	2.81	21.5	0.0	0.11
10 & 20								No Data					
30	1	1.33	5.22	5.16	3.88	15.23	15.05	5.54	21.75	21.50			
	2	1.43	5.40	6.37	4.17	15.75	18.59	5.95	22.50	26.54			
	3	1.44	8.63	4.16	4.20	25.18	12.14	6.00	35.95	17.33			
	4	1.41	8.32	4.75	4.11	24.28	13.86	5.87	34.66	19.79			
	Avg	1.40	6.89	5.11	4.08	20.11	14.91	5.83	28.70	21.29	16.6	20.6	0.24
40	1	1.38	5.05	6.73	3.02	11.05	14.73	5.31	19.42	25.88			
	2	1.46	5.74	6.31	3.19	12.56	13.81	5.61	22.08	24.27			
	3	1.35	5.12	6.35	2.95	11.20	13.90	5.19	19.69	24.42			
	4	1.29	7.46	8.47	2.82	16.33	18.54	4.96	28.69	32.58			
	Avg	1.47	5.84	6.96	3.21	12.78	15.23	5.65	22.46	26.77	14.7	27.4	0.26
50	1	1.26	4.99	7.93	2.21	8.73	13.88	4.20	16.63	26.43			
	2	1.39	4.63	7.97	2.43	8.11	13.95	4.63	15.43	26.56			
	3	1.40	5.29	7.64	2.45	9.26	13.37	4.66	17.63	25.46			
	4	1.59	6.19	7.47	2.78	10.84	13.07	5.30	20.63	24.90			
	Avg	1.41	5.27	7.75	2.47	9.22	13.56	4.70	17.56	25.83	13.0	34.3	0.30
60	1	1.19	3.92	8.77	1.73	5.72	12.79	3.50	11.52	25.79			
	2	1.21	3.43	8.90	1.76	5.00	12.98	3.55	10.08	26.17			
	3	1.23	3.49	8.70	1.79	5.09	12.69	3.61	10.26	25.58			
	4	1.25	4.17	8.33	1.82	6.08	12.15	3.67	12.26	24.50			
	Avg	1.22	3.75	8.67	1.78	5.47	12.65	3.58	11.02	25.50	10.4	41.1	0.34
70	1	0.96	5.07	7.68	1.20	6.34	9.60	2.40	12.67	19.20			
	2	0.72	2.82	7.67	0.90	3.52	9.59	1.80	7.05	19.17			
	3	0.75	5.45	7.82	0.94	6.81	9.78	1.87	13.62	19.55			
	4	0.82	6.79	7.42	1.02	8.49	9.28	2.05	16.97	18.55			
	Avg	0.81	5.03	7.64	1.01	6.29	9.55	2.02	12.57	19.10	7.1	47.9	0.40
80	1	0.96	4.67	9.85	1.05	5.11	10.78	2.18	10.61	22.38			
	2	0.88	4.70	9.77	0.96	5.14	10.69	2	10.68	22.20			
	3	0.94	5.34	9.45	1.03	5.84	10.34	2.13	12.13	21.47			
	4	0.92	6.21	9.11	1.01	6.79	9.97	2.09	14.11	20.70			
	Avg	0.92	5.23	9.54	1.01	5.72	10.44	2.09	11.88	21.68	4.7	54.8	0.44
90	1	1.36	9.78	10.70	1.32	9.51	10.41	2.89	20.80	22.76			
	2	1.35	10.35	10.48	1.31	10.07	10.19	2.87	22.02	22.29			
	3	1.45	11.44	10.17	1.41	11.13	9.89	3.08	24.34	21.63			
	4	1.25	11.47	10.30	1.21	11.16	10.02	2.65	24.40	21.91			
	Avg	1.35	10.76	10.41	1.31	10.47	10.13	2.87	22.89	22.14	2.9	61.7	0.47
100	1	4.21	237.96	1.00	3.68	208.43	0.87	6.37	360.54	1.51			
	2	4.51	237.29	1.22	3.99	207.84	1.07	6.83	359.53	1.84			
	3	4.67	243.09	0.84	4.09	212.92	0.74	7.07	368.31	1.27			
	4	4.46	238.62	1.13	3.90	209.01	0.99	6.75	361.54	1.71			
	Avg	4.46	239.24	1.04	3.90	209.55	0.91	6.75	362.48	1.57	0.0	68.5	0.66

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-10. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE
CHASSIS OPERATED–3000 RPM

February 4, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.76	13.27	0.98	–	–	–	3.80	66.35	4.90			
	2	0.69	13.85	0.87	–	–	–	3.45	69.25	4.35			
	3	0.71	14.70	0.85	–	–	–	3.55	73.50	4.25			
	4	1.87	16.63	0.91	–	–	–	9.35	83.15	4.55			
	Avg	0.75	14.61	0.90	–	–	–	3.75	73.05	4.50	21	–	0.20
10, 20, & 30								No Data					
40	1	1.68	14.27	8.01	2.59	22.04	12.37	4.30	36.58	20.53			
	2	1.14	10.31	8.87	1.76	15.92	13.70	2.92	26.43	22.74			
	3	1.22	11.35	8.69	1.88	17.53	13.42	3.12	29.10	22.28			
	4	1.12	11.34	8.42	1.73	17.51	13.00	2.87	29.07	21.58			
	Avg	1.26	11.81	8.49	1.94	18.24	13.11	3.23	30.28	21.73	14.2	38.8	0.34
50	1	1.63	13.62	9.94	2.01	16.83	12.28	3.70	30.95	22.59			
	2	0.96	10.67	9.76	1.18	13.18	12.06	2.18	24.25	22.18			
	3	0.63	10.44	9.96	0.77	12.90	12.30	1.43	23.72	22.63			
	4	0.91	10.85	9.47	1.12	13.40	11.70	2.06	24.65	21.52			
	Avg	1.38	11.39	9.78	1.70	14.07	12.08	3.13	25.88	22.22	12.0	48.5	0.44
60	1	1.27	13.11	11.05	1.30	16.20	13.65	2.64	27.31	23.02			
	2	0.60	9.53	10.49	0.61	11.77	12.96	1.25	19.85	21.85			
	3	0.83	9.46	9.80	0.85	11.69	12.11	1.72	19.70	20.41			
	4	0.61	9.92	10.57	0.62	12.25	13.06	1.27	20.66	22.02			
	Avg	0.83	10.50	10.47	0.85	10.76	10.72	1.72	21.87	21.81	10.1	58.5	0.48
70	1	1.37	16.80	11.03	1.20	14.83	9.73	2.91	35.74	23.46			
	2	0.79	14.72	9.87	0.69	12.99	8.71	1.68	31.31	21			
	3	0.86	9.83	10.53	0.75	8.67	9.26	1.82	20.91	22.40			
	4	0.91	17.43	11.32	0.80	15.38	9.99	1.93	37.08	24.08			
	Avg	0.98	14.69	10.68	0.86	12.94	9.42	2.08	31.29	22.72	8.1	67.9	0.47
80	1	1.78	33.84	9.47	1.37	26.13	7.31	2.82	53.71	15.03			
	2	1.15	25.45	9.17	0.88	19.65	7.08	1.82	40.39	14.55			
	3	1.09	24.66	8.97	0.84	19.04	6.92	1.73	39.14	14.23			
	4	1.33	25.04	8.86	1.02	19.34	6.84	2.11	39.74	14.06			
	Avg	1.34	27.24	9.11	1.03	21.04	7.03	2.12	43.23	14.46	5.7	77.7	0.63
90	1	3.30	106.44	7.76	2.26	73.07	5.32	4.12	133.05	9.70			
	2	2.26	82.82	7.28	1.55	56.86	4.99	2.82	103.52	9.10			
	3	3.36	131.13	6.44	2.30	90.03	4.42	4.20	163.91	8.05			
	4	3.60	131.03	6.93	2.47	89.96	4.75	4.50	163.78	8.66			
	Avg	3.13	112.85	7.10	2.14	77.48	4.87	3.91	141.06	8.87	3.7	87.4	0.80
100	1	6.80	343.65	0.91	4.20	212.34	0.56	7.39	373.53	0.98			
	2	5.39	348.96	1.06	3.33	215.62	0.65	5.85	379.30	1.15			
	3	5.54	287.37	1.03	3.42	177.57	0.63	6.02	312.35	1.11			
	4	5.49	349.59	1.15	3.39	216.01	0.71	5.96	379.98	1.25			
	Avg	5.81	332.39	1.03	3.59	205.39	0.63	6.31	361.29	1.11	1.8	97.1	0.92

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-11. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE CHASSIS OPERATED–NO LOAD

February 1, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
1000	1	0.28	10.8	0.15	3.11	120	1.66		
	2	0.22	9.3	0.10	2.44	103.33	1.11		
	3	0.22	12.6	0.07	2.44	140	0.77		
	4	0.28	7.6	0.07	3.11	84	0.77		
	Avg	0.25	10.1	0.10	2.77	112.22	1.11	18.8	0.09
1250	1	0.22	2.8	0.07	2.44	31.11	0.77		
	2	0.22	6.3	0.10	2.44	70	1.11		
	3	0.22	5.1	0.10	2.44	56.66	1.11		
	4	0.28	5.9	0.09	3.11	65.55	1		
	Avg	0.24	5	0.09	2.66	55.55	1.00	19.9	0.09
1500	1	0.11	3	0.15	1.10	30.00	1.5		
	2	0.22	5.5	0.07	2.20	55	0.70		
	3	0.17	2.7	0.10	1.70	27	1.00		
	4	0.17	3	0.10	1.70	30	1.00		
	Avg	0.17	3.6	0.11	1.70	36	1.10	20.7	0.10
1750	1	0.28	2.2	0.17	2.33	18.33	1.41		
	2	0.28	2.0	0.17	2.33	16.66	1.41		
	3	0.28	2.9	0.17	2.33	24.16	1.41		
	4	0.33	2.6	0.10	2.75	21.66	0.83		
	Avg	0.28	2.4	0.15	2.33	20.00	1.25	21	0.12
2000	1	0.50	3.4	0.31	4.16	28.33	2.58		
	2	0.44	3.0	0.39	3.66	25	3.25		
	3	0.39	3.7	0.31	3.25	30.83	2.58		
	4	0.39	2.6	0.31	3.25	21.66	2.58		
	Avg	0.43	3.2	0.31	3.58	26.66	2.58	21.5	0.12
2250	1	0.45	6.7	0.46	3.46	51.53	3.53		
	2	0.44	4.6	0.48	3.38	35.38	3.69		
	3	0.55	7.1	0.48	4.23	54.61	3.69		
	4	0.44	6.4	0.31	3.38	49.23	2.38		
	Avg	0.47	6.4	0.43	3.61	49.23	3.03	21.7	0.13
2500	1	0.55	8.0	0.45	3.66	53.33	3		
	2	0.54	9	0.45	3.60	60.00	3		
	3	0.56	9.2	0.48	3.73	61.33	3.20		
	4	0.55	7.9	0.48	3.66	52.66	3.20		
	Avg	0.55	8.5	0.46	3.66	56.99	3.06	21.8	0.15
2750	1	0.66	11.9	0.69	3.66	66.11	3.83		
	2	0.65	13.3	0.61	3.61	73.88	3.38		
	3	0.72	12.8	0.69	4	71.11	3.83		
	4	0.60	9.8	0.69	3.33	54.44	3.83		
	Avg	0.66	11.9	0.67	3.66	66.11	3.72	21.7	0.18
3000	1	0.76	13.3	0.99	3.61	63.33	4.71		
	2	0.69	13.9	0.88	3.28	66.19	4.19		
	3	0.72	14.7	0.86	3.42	70.00	4.09		
	4	0.87	16.6	0.92	4.14	79.04	4.38		
	Avg	0.76	14.61	0.91	3.61	69.57	4.33	21.4	0.21
3250	1	0.70	14.8	1.14	3.33	70.47	5.42		
	2	0.64	13.3	1.18	3.04	63.33	5.61		
	3	0.77	13.8	1.16	3.66	65.71	5.52		
	4	0.88	18.8	1.07	4.19	89.52	5.09		
	Avg	0.75	15.2	1.18	3.55	72.38	5.41	21.2	0.21
3500	1	1.34	31.7	1.25	6.38	150.95	5.95		
	2	1.53	37.4	1.30	7.28	178.09	6.19		
	3	1.58	46.2	1.13	7.52	220	5.38		
	4	1.61	44.4	1.08	7.66	211.42	5.14		
	Avg	1.47	39.9	1.19	6.12	166.25	4.95	21.0	0.24

TABLE A-12. EMISSION RATES FOR 1969 CHEVROLET 250-CID ENGINE CHASSIS OPERATED–CLOSED THROTTLE

January 29, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
575	1	0.51	15.47	0.08	8.50	258	1.33		
	2	0.56	15.33	0	9.33	256	0		
	Avg	0.54	15.40	0.04	8.92	257	0.66	19.5	0.06
1650	1	6.79	5.08	0.08	113	85	1.33		
	2	7.56	6.31	0.08	126	105	1.33		
	Avg	7.18	5.70	0.08	120	95	1.33	22.6	0.06
1800	1	7.10	5.32	0.08	118	89	1.33		
	2	7.04	5.34	0.08	117	89	1.33		
	Avg	7.07	5.33	0.08	118	89	1.33	23.4	0.06
2700	1	8.27	5.71	0.16	138	95	2.67		
	2	7.95	4.87	0.08	133	81	1.33		
	Avg	8.11	5.29	0.12	135	88	2.00	24.5	0.06

TABLE A-13. EMISSION RATES FOR 1969 IHC 304-CID ENGINE STATIONARY OPERATED–1250 RPM AND IDLE

February 22, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	1.24	21.15	0.07	–	–	–	12.40	212	0.70			
	2	1.21	20.06	0.07	–	–	–	12.10	201	0.70			
	Avg	1.23	20.61	0.07	–	–	–	12.30	206	0.70	21.5	0.0	0.10
10	1	1.32	31.06	0.14	17.60	414	1.87	11.00	259	1.17			
	2	1.23	26.17	0.14	16.40	349	1.87	10.25	218	1.17			
	3	1.27	28.01	0.15	16.93	373	2.00	9.77	215	1.15			
	4	1.29	27.85	0.15	7.20	371	2.00	9.23	214	1.15			
	Avg	1.28	28.27	0.15	17.07	377	2.00	9.85	217	1.15	19.9	4.5	0.13
20	1	1.61	32.47	0.31	10.62	214	2.04	10.06	203	1.94			
	2	1.82	50.91	0.24	12.00	336	1.58	10.71	299	1.41			
	3	1.56	32.82	0.32	10.29	216	2.11	9.75	205	2.00			
	4	1.90	50.37	0.21	12.53	332	1.38	11.18	296	1.24			
	Avg	1.72	41.64	0.27	11.34	275	1.78	10.12	245	1.59	18.3	9.1	0.17
30	1	2.22	59.44	0.39	9.79	262	1.72	11.10	297	1.95			
	2	2.25	62.70	0.38	9.93	277	1.68	11.25	314	1.90			
	3	2.19	61.22	0.39	9.66	270	1.72	10.95	306	1.95			
	4	2.21	62.61	0.38	9.75	276	1.68	11.05	313	1.90			
	Avg	2.22	61.49	0.39	9.79	271	1.72	11.10	307	1.95	16.6	13.6	0.20
40	1	3.44	100.61	0.31	11.40	335	1.03	13.76	402	1.24			
	2	3.36	124.96	0.30	11.14	414	0.99	12.44	463	1.11			
	3	3.09	111.04	0.32	10.24	368	1.06	11.44	411	1.18			
	4	3.35	124.23	0.31	11.10	411	1.03	12.41	460	1.15			
	Avg	3.31	115.21	0.31	10.97	381	1.03	12.26	427	1.15	14.6	18.1	0.27
50	1	4.18	155.66	0.38	11.09	414	1.01	13.48	502	1.23			
	2	4.01	156.04	0.37	10.65	414	0.98	12.53	488	1.16			
	3	3.90	146.06	0.39	10.35	388	1.04	12.19	456	1.22			
	4	4.06	157.51	0.37	10.78	419	0.98	12.69	492	1.16			
	Avg	4.04	153.82	0.38	10.73	409	1.01	12.62	481	1.18	12.6	22.6	0.32
60	1	4.31	158.69	0.38	9.54	352	0.84	12.68	467	1.12			
	2	4.21	176.78	0.29	9.32	392	0.64	12.03	505	0.82			
	3	4.42	167.90	0.46	9.79	372	1.02	13.39	509	1.39			
	4	4.33	181.35	0.30	1.59	401	0.67	12.02	504	0.83			
	Avg	4.32	171.18	0.36	9.56	379	0.80	12.34	489	1.02	10.8	27.1	0.35
70	1	5.04	190.37	0.38	9.55	360	0.72	12.92	488	0.97			
	2	4.57	207.78	0.29	8.66	394	0.55	11.42	519	0.72			
	3	4.82	188.49	0.45	9.13	356	0.85	12.35	483	1.15			
	4	4.50	205.58	0.30	8.53	390	0.57	10.71	489	0.71			
	Avg	4.73	198.06	0.36	8.96	375	0.68	11.82	495	0.90	8.4	31.7	0.40
80	1	5.23	202.66	0.44	8.67	336	0.73	12.45	483	1.04	7.1		
	2	4.64	210.49	0.45	7.69	348	0.75	10.79	489	1.04	6.1		
	3	5.01	202.90	0.48	8.30	336	0.80	11.65	472	1.11	7.0		
	4	4.70	204.70	0.43	7.79	340	0.71	10.93	476	1.00	6.2		
	Avg	4.90	205.19	0.45	8.12	340	0.75	11.39	477	1.04	6.6	36.2	0.43
90	1	4.99	193.40	0.66	7.36	285	0.97	10.18	394	1.34	4.8		
	2	4.87	201.07	0.64	7.18	296	0.94	9.93	410	1.30	3.9		
	3	4.71	197.02	0.66	6.94	290	0.97	10.23	428	1.43	4.3		
	4	5.46	246.00	0.42	8.05	363	0.62	11.86	534	0.91	4.4		
	Avg	5.01	209.37	0.60	7.39	308	0.88	10.43	436	1.25	4.4	40.7	0.48
100	1	9.65	290.01	0.78	12.81	385	1.04	16.35	492	1.32	2.3		
	2	11.84	287.97	1.75	15.72	382	2.32	20.41	496	3.02	2.2		
	3	12.06	282.50	1.56	16.01	376	2.07	20.44	478	2.64	2.4		
	4	11.78	286.44	1.36	15.64	380	1.81	20.31	494	2.34	2.3		
	Avg	11.33	286.73	1.36	15.04	381	1.81	19.20	486	2.30	2.3	45.2	0.59
Closed throttle	1	7.18	4.86	0	–	–	–	144	97.20	0			
	2	7.20	4.08	0.07	–	–	–	144	81.60	1.40			
	Avg	7.19	4.47	0.04	–	–	–	144	89.40	0.80	24.2	0	0.05
Idle (500 rpm)	1	1.65	6.63	0.07	–	–	–	41.25	165	1.75			
	2	1.60	6.46	0	–	–	–	40.00	161	–			
	Avg	1.63	6.55	0.04	–	–	–	40.75	164	1	18.0	0	0.04

TABLE A-14. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
STATIONARY OPERATED–1500 RPM

February 22, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	1.29	22.84	0.07	–	–	–	10.75	190.33	0.58			
	2	1.27	21.99	0.07	–	–	–	10.58	183.25	0.58			
	Avg	1.28	22.42	0.07	–	–	–	10.66	186.83	0.58	21.7	0.0	0.12
10	1	1.90	49.81	0.24	20.73	545	2.62	11.18	292	1.41		55.5	
	2	1.75	50.18	0.24	19.09	545	2.62	10.29	295	1.41			
	3	1.41	32.24	0.24	15.38	349	2.62	10.84	190	1.84			
	4	1.83	51.18	0.16	19.96	556	1.75	10.76	301	0.94			
	Avg	1.72	45.85	0.22	18.76	502	2.40	10.23	353	1.69	20	5.5	0.13
20	1	2.39	64.90	0.39	13.04	355	2.13	11.38	309	1.86			
	2	2.33	71.28	0.30	12.71	387	1.64	11.10	339	1.43			
	3	2.29	69.69	0.31	12.49	382	1.69	10.90	332	1.48			
	4	2.47	73.94	0.37	13.47	404	2.02	11.23	336	1.68			
	Avg	2.37	69.95	0.34	12.93	382	1.85	11.29	333	1.62	18.3	11.0	0.21
30	1	3.83	134.91	0.31	13.93	491	1.13	12.35	435	1.00			
	2	4.43	152.65	0.23	16.11	556	0.84	14.77	509	0.77			
	3	4.13	138.16	0.31	15.02	502	1.13	13.77	461	1.03			
	4	4.49	131.37	0.30	16.33	476	1.09	14.97	438	1.00			
	Avg	4.22	139.27	0.29	15.35	505	1.05	14.07	464	0.97	16.4	16.5	0.30
40	1	4.91	171.94	0.31	13.27	465	0.84	14.44	506	0.91			
	2	4.89	180.11	0.30	13.22	486	0.82	13.97	515	0.86			
	3	4.84	160.92	0.30	13.08	435	0.82	13.83	460	0.86			
	4	4.98	179.79	0.37	13.46	486	1.00	14.23	514	1.06			
	Avg	4.91	173.19	0.32	13.27	468	0.86	14.03	495	0.91	14.5	22.2	0.35
50	1	5.42	201.69	0.31	11.91	444	0.68	13.55	504	0.78			
	2	5.13	207.34	0.37	11.27	545	0.81	12.83	518	0.93			
	3	5.34	181.01	0.30	11.74	398	0.66	13.69	464	0.77			
	4	5.32	206.45	0.36	11.69	453	0.79	13.30	516	0.90			
	Avg	5.30	199.12	0.34	11.65	437	0.75	13.25	498	0.85	12.7	27.3	0.40
60	1	5.82	228.98	0.38	10.46	411	0.68	12.93	509	0.84			
	2	5.44	237.25	0.37	9.77	426	0.66	12.09	527	0.82			
	3	5.93	205.26	0.46	10.65	369	0.83	13.48	467	1.05			
	4	5.69	234.32	0.36	10.22	421	0.65	12.64	521	0.80			
	Avg	5.72	226.45	0.39	10.28	406	0.70	12.71	503	0.87	10.7	33.4	0.45
70	1	5.93	241.67	0.44	9.24	377	0.69	12.35	503	0.92			
	2	5.27	240.33	0.45	8.21	374	0.70	12.61	511	0.96			
	3	5.99	209.69	0.43	9.34	327	0.67	12.74	446	0.91			
	4	5.51	241.66	0.45	8.59	377	0.70	11.02	483	0.90			
	Avg	5.68	233.34	0.44	8.85	363	0.69	11.83	486	0.92	9.0	38.5	0.48
80	1	5.93	241.64	0.60	8.09	330	0.81	11.40	465	1.15			
	2	5.32	246.62	0.58	7.25	337	0.79	10.23	274	1.12			
	3	6.00	219.17	0.50	8.18	299	0.68	11.54	421	0.96			
	4	5.69	248.83	0.64	7.76	340	0.87	10.94	479	1.23			
	Avg	5.74	239.07	0.58	7.83	326	0.79	11.04	460	1.12	7.0	44.0	0.52
90	1	5.71	239.59	0.80	6.94	291	0.97	10.38	436	1.45			
	2	5.60	242.56	0.79	6.80	295	0.96	10.18	441	1.44			
	3	5.73	216.58	0.87	6.96	264	1.06	10.23	387	1.55			
	4	5.85	244.67	0.84	7.11	298	1.02	10.64	445	1.53			
	Avg	5.72	233.33	0.83	6.94	283	1.01	10.40	424	1.51	4.7	49.4	0.55
100	1	11.79	356.76	1.37	12.82	388	1.49	16.38	496	1.90			
	2	12.44	352.75	1.22	13.52	384	1.33	17.04	483	1.67			
	3	12.02	311.46	1.28	13.07	338	1.39	16.47	427	1.75			
	4	10.33	382.56	0.65	11.23	416	0.71	14.35	531	0.90			
	Avg	11.65	350.88	1.13	12.66	382	1.23	16.18	487	1.57	3.0	55.2	0.72
Closed throttle	1	7.91	4.44	0	–	–	–	158	88.80	0			
	2	7.99	4.24	0.10	–	–	–	160	84.80	2.00			
	Avg	7.95	4.34	0.05	–	–	–	159	86.80	1.00	24.7	0.0	0.05

TABLE A-15. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
STATIONARY OPERATED–2000 RPM

February 23, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	2.11	51.55	0.14	–	–	–	12.41	303	0.82			
	2	2.02	52.33	0.14	–	–	–	11.88	308	0.82			
	Avg	2.07	51.94	0.14	–	–	–	12.17	306	0.82	21.5	0.0	0.17
10	1	3.38	113.73	0.17	26.68	898	1.34	13.52	455	0.68			
	2	5.65	165.61	0.23	–	1307	1.82	–	662	0.92			
	3	3.72	97.79	0.23	29.37	772	1.82	14.88	391	0.92			
	4	5.85		0.21	46.18		1.66	23.40		0.84			
	Avg	4.65	125.71	0.21	36.71	992	1.39	18.60	502	0.84	19.5	7.6	0.25
20	1	5.43	185.25	0.31	21.43	731	1.22	15.51	529	0.89			
	2	4.81	162.35	0.30	18.99	641	1.18	13.74	463	0.86			
	3	6.13	194.94	0.23	24.20	770	0.91	17.51	557	0.66			
	4	6.27	194.53	0.30	24.75	768	1.18	17.91	557	0.86			
	Avg	5.66	184.27	0.29	22.34	727	1.15	16.17	526	0.83	17.7	15.2	0.35
30	1	5.58	198.61	0.38	14.56	518	0.99	13.29	474	0.90			
	2	5.72	211.61	0.43	14.92	552	1.12	13.62	505	1.02			
	3	5.60	215.27	0.37	14.61	562	0.97	13.33	512	0.88			
	4	5.70	195.65	0.37	14.87	510	0.97	13.57	467	0.88			
	Avg	5.65	205.29	0.39	14.74	535	1.02	13.45	488	0.93	16.1	23.0	0.42
40	1	5.87	249.93	0.46	11.40	485	0.89	12.49	532	0.98			
	2	6.17	245.57	0.55	11.98	477	1.07	13.13	523	1.17			
	3	6.20	246.25	0.45	12.04	478	0.87	13.19	523	0.96			
	4	7.11	261.85	0.37	13.81	508	0.72	15.13	557	0.79			
	Avg	6.34	250.90	0.46	12.31	487	0.89	13.49	534	0.98	14.5	30.9	0.47
50	1	6.13	266.43	0.52	9.55	415	0.81	10.57	459	0.90			
	2	5.99	263.64	0.50	9.34	411	0.76	10.33	455	0.86			
	3	6.38	266.69	0.44	9.94	416	0.68	11.00	460	0.76			
	4	6.12	282.21	0.51	9.54	440	0.79	10.55	486	0.88			
	Avg	6.16	269.74	0.49	9.60	420	0.76	10.62	466	0.84	13.0	38.5	0.58
60	1	6.61	283.33	0.71	8.62	370	0.92	10.49	449	1.23			
	2	6.28	271.17	0.63	8.79	354	0.82	9.97	430	1.00			
	3	6.78	285.12	0.81	8.84	372	1.05	10.76	452	1.29			
	4	6.65	292.01	0.71	8.67	381	0.92	10.56	463	1.13			
	Avg	6.58	282.91	0.72	8.58	369	0.93	10.44	449	1.14	10.9	46.0	0.63
70	1	6.77	290.77	0.97	7.56	325	1.08	10.75	462	1.55			
	2	6.27	286.55	0.84	7.00	320	0.93	9.95	456	1.33			
	3	7.02	292.32	1.03	7.84	326	1.15	11.14	463	1.63			
	4	6.42	311.29	0.84	7.17	348	0.93	10.19	494	1.33			
	Avg	6.62	295.23	0.92	7.39	330	1.02	10.51	468	1.46	9.0	53.7	0.63
80	1	6.88	294.77	1.23	6.69	287	1.19	9.97	428	1.78			
	2	6.41	296.72	1.20	6.23	289	1.16	9.29	430	1.74			
	3	7.13	303.02	1.30	6.93	295	1.26	10.33	439	1.88			
	4	6.70	324.14	1.20	6.51	315	1.16	9.71	470	1.74			
	Avg	6.78	304.66	1.23	6.59	296	1.19	9.83	442	1.78	7.0	61.7	0.69
90	1	6.78	311.87	1.58	5.87	270	1.36	9.16	422	2.14			
	2	6.85	366.79	1.47	5.93	318	1.27	9.26	496	1.99			
	3	6.93	311.29	1.63	6.00	270	1.41	9.36	420	2.20			
	4	7.02	332.57	1.54	6.07	288	1.33	9.49	450	2.08			
	Avg	6.90	330.63	1.56	5.97	286	1.35	9.32	447	2.11	4.8	69.3	0.74
100	1	10.39	505.08	0.97	8.10	394	0.76	10.71	521	1.00			
	2	10.38	469.19	0.85	8.09	366	0.66	10.70	484	0.88			
	3	11.68	478.75	1.59	9.11	373	1.24	12.04	494	1.64			
	4	11.18	544.60	1.07	8.72	425	0.83	11.53	562	1.10			
	Avg	10.91	499.41	1.12	8.51	390	0.87	11.25	514	1.15	3.6	76.9	0.97
Closed throttle	1	8.70	5.04	0.10	–	–	–	174	101	2.00			
	2	8.83	4.44	0.07	–	–	–	177	88.80	1.40			
	Avg	8.77	4.74	0.09	–	–	–	175	94.80	1.80	25.3	0.0	0.05

TABLE A-16. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
STATIONARY OPERATED–2500 RPM

February 24, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	5.42	118	0.17	–	–	–	21.68	472	0.68			
	2	7.43	116	0.23	–	–	–	29.72	464	0.92			
	Avg	6.43	117	0.20	–	–	–	25.70	468	0.80	21.4	0.0	0.25
10	1	7.99	187	0.23	47.94	1122	1.38	22.82	534	0.65			
	2	6.97	180	0.28	41.82	1080	1.68	19.91	514	0.80			
	3	6.97	183	0.24	41.82	1098	2.04	19.91	522	0.68			
	4	7.01	179	0.30	42.06	1074	1.80	20.02	511	0.85			
	Avg	7.24	182	0.26	43.41	1094	1.73	20.68	520	0.74	19.3	10.0	0.35
20	1	8.13	253	0.31	24.39	759	0.93	22.58	550	0.67			
	2	7.08	241	0.37	21.24	723	1.11	15.39	523	0.80			
	3	6.88	246	0.37	20.64	738	1.11	14.95	535	0.80			
	4	7.32	253	0.37	21.96	759	1.11	15.91	550	0.80			
	Avg	7.35	248	0.36	22.06	745	1.07	15.97	539	0.78	17.6	20.0	0.46
30	1	6.62	301	0.45	13.24	557	0.90	12.26	557	0.83			
	2	6.78	288	0.44	13.56	533	0.88	12.55	533	0.81			
	3	6.60	289	0.44	13.20	535	0.88	12.22	535	0.81			
	4	6.71	301	0.52	13.42	557	1.04	12.42	557	0.96			
	Avg	6.68	295	0.46	13.36	546	0.93	12.37	546	0.85	16.1	30.0	0.54
40	1	6.86	323	0.67	10.29	485	1.01	11.43	538	1.12			
	2	7.08	302	0.72	10.62	453	1.08	11.80	503	1.20			
	3	6.89	304	0.66	10.34	456	0.99	11.48	507	1.10			
	4	6.96	313	0.71	10.44	470	1.07	11.60	522	1.18			
	Avg	6.95	311	0.69	10.42	466	1.04	11.58	518	1.15	14.5	40.0	0.60
50	1	7.40	277	1.03	8.88	332	1.24	10.00	374	1.39			
	2	7.49	283	0.93	8.99	340	1.12	10.12	382	1.25			
	3	7.44	327	1.02	8.93	392	1.22	10.05	441	1.37			
	4	7.48	337	0.98	8.98	404	1.18	10.10	455	1.32			
	Avg	7.45	306	0.99	8.95	367	1.19	10.06	413	1.33	12.6	50.0	0.74
60	1	7.91	303	1.30	7.91	303	1.30	9.88	378	1.62			
	2	7.03	291	1.13	7.03	291	1.13	8.78	363	1.41			
	3	7.92	345	1.37	7.92	345	1.37	9.90	431	1.71			
	4	8.66	354	1.18	8.66	354	1.18	10.82	442	1.47			
	Avg	7.88	323	1.25	7.88	323	1.25	9.85	403	1.56	10.6	60.0	0.80
70	1	8.20	317	0.99	7.02	271	0.84	10.12	391	1.22			
	2	7.67	305	1.38	6.57	261	1.18	9.46	376	1.70			
	3	8.16	363	1.62	6.99	311	1.38	10.07	448	2.00			
	4	7.54	374	1.45	6.46	321	1.24	9.30	462	1.79			
	Avg	7.89	340	1.36	6.76	291	1.16	9.74	419	1.67	8.7	70.0	0.81
80	1	8.37	332	1.98	6.27	249	1.48	10.33	410	2.44			
	2	7.94	301	1.76	5.95	226	1.32	9.80	372	2.17			
	3	8.48	379	1.89	6.36	284	1.41	10.46	468	2.33			
	4	8.09	414	1.67	6.06	311	1.25	9.99	511	2.06			
	Avg	8.22	357	1.83	6.16	268	1.37	10.14	440	2.25	6.5	80.0	0.81
90	1	9.49	331	1.65	6.32	221	1.10	9.49	331	1.65			
	2	9.44	340	1.70	6.29	227	1.13	9.44	340	1.70			
	3	9.23	446	1.99	6.15	297	1.32	9.23	446	1.99			
	4	10.04	584	1.36	6.69	389	0.90	10.04	584	1.36			
	Avg	9.55	425	1.68	6.36	284	1.11	9.55	425	1.68	4.0	90.0	1.00
100	1	11.68	518	0.94	7.00	311	0.56	9.65	428	0.78			
	2	12.27	503	1.03	7.36	302	0.61	10.14	415	0.85			
	3	12.38	632	1.06	7.42	379	0.63	10.23	522	0.87			
	4	11.58	680	0.94	6.94	408	0.56	9.57	562	0.77			
	Avg	11.98	583	0.99	7.18	350	0.59	9.90	482	0.81	3.0	100.0	1.21
Closed throttle	1	8.98	4.44	0.10	–	–	–	180	88.80	2.00			
	2	8.38	4.04	0	–	–	–	168	80.80	0.0			
	Avg	8.68	4.24	0.05	–	–	–	174	84.80	1.00	25.5	0.0	0.05

TABLE A-17. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
STATIONARY OPERATED–3000 RPM

February 25, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	10.07	174	0.31	–	–	–	25.82	446	0.79			
	2	8.49	168	0.23	–	–	–	21.77	431	0.59			
	Avg	9.28	171	0.27	–	–	–	23.79	438	0.69	20.9	0.0	0.39
10	1	9.55	258	0.23	48.47	1310	1.16	19.48	524	0.46			
	2	9.31	276	0.37	47.25	1401	1.87	19.00	563	0.75			
	3	9.77	263	0.31	49.59	1335	1.62	19.93	535	0.63			
	4	9.48	249	0.30	48.12	1264	1.52	19.34	508	0.61			
	Avg	9.52	260	0.30	48.36	1328	1.54	19.42	531	0.61	18.5	11.8	0.49
20	1	7.09	306	0.37	18.16	784	0.94	12.89	557	0.67			
	2	7.71	297	0.45	19.75	761	1.15	14.01	540	0.81			
	3	7.78	303	0.37	19.93	776	0.94	14.14	551	0.67			
	4	7.29	298	0.45	18.67	763	1.15	13.25	542	0.81			
	Avg	7.46	301	0.41	19.13	771	1.05	13.56	547	0.74	17.4	23.4	0.55
30	1	7.24	340	0.59	12.26	576	1.00	11.31	531	0.92			
	2	7.85	329	0.78	13.30	557	1.32	12.26	514	1.21			
	3	7.58	333	0.66	12.84	564	1.12	11.84	520	1.03			
	4	7.32	324	0.58	12.40	549	0.98	11.43	506	0.90			
	Avg	7.49	331	0.65	12.70	562	1.10	11.71	517	1.01	15.6	35.4	0.64
40	1	7.70	373	0.88	9.74	472	1.11	10.69	518	1.22			
	2	7.82	363	0.75	9.90	459	0.95	10.86	504	1.04			
	3	7.96	353	0.84	10.07	447	1.06	11.05	490	1.16			
	4	7.93	360	1.05	10.04	456	1.33	11.01	500	1.45			
	Avg	7.85	362	0.88	9.94	459	1.11	10.90	502	1.22	13.9	47.4	0.72
50	1	8.59	409	1.36	8.76	417	1.39	10.60	505	1.67			
	2	8.74	393	1.09	8.91	401	1.11	10.79	485	1.34			
	3	8.51	379	1.05	8.68	387	1.07	10.50	468	1.29			
	4	8.25	388	1.21	8.41	395	1.23	10.18	479	1.49			
	Avg	8.52	392	1.18	8.69	400	1.20	10.51	484	1.45	12.1	58.8	0.81
60	1	8.56	424	1.56	7.25	359	1.32	9.61	476	1.75			
	2	9.12	427	1.30	7.73	362	1.10	10.24	435	1.46			
	3	9.25	415	1.39	7.84	352	1.18	10.39	466	1.56			
	4	8.69	426	1.56	7.36	361	1.32	9.76	479	1.75			
	Avg	8.90	422	1.45	7.55	359	1.23	10.00	474	1.62	10.1	70.8	0.89
70	1	8.95	467	1.70	6.48	338	1.23	9.13	477	1.73			
	2	9.12	468	2.21	6.61	339	1.60	9.30	478	2.25			
	3	9.60	448	1.62	6.95	325	1.17	9.79	457	1.65			
	4	9.22	473	1.80	6.68	343	1.30	9.40	483	1.83			
	Avg	9.22	464	1.83	6.68	336	1.33	9.40	473	1.86	8.1	82.8	0.98
80	1	9.75	710	1.96	6.21	452	1.25	8.78	640	1.77			
	2	11.05	514	1.83	7.03	327	1.16	9.95	463	1.65			
	3	10.62	494	1.74	6.76	314	1.11	9.57	445	1.57			
	4	9.44	510	2.14	6.01	325	1.36	8.51	459	1.93			
	Avg	10.22	557	1.92	6.50	355	1.22	9.20	502	1.73	5.7	94.3	1.11
90	1	12.02	673	1.26	6.79	381	0.71	9.25	519	0.97			
	2	13.92	699	1.22	7.86	395	0.69	10.71	538	0.94			
	3	13.69	686	1.04	7.73	387	0.59	10.53	528	0.80			
	4	12.55	725	1.27	7.09	409	0.72	9.65	558	0.98			
	Avg	13.05	696	1.20	7.37	393	0.68	10.03	535	0.92	3.1	106.3	1.30
100	1	13.23	946	1.22	6.71	480	0.62	9.38	671	0.87			
	2	14.18	944	1.09	7.19	479	0.55	10.06	670	0.77			
	3	14.76	759	1.50	7.49	385	0.76	10.47	538	1.06			
	4	14.13	939	1.17	7.17	476	0.59	10.02	666	0.83			
	Avg	14.08	897	1.25	7.14	455	0.63	9.99	636	0.89	1.2	118.8	1.41
Closed throttle	1	7.80	4.06	0	–	–	–	156	81	0			
	2	8.78	4.58	0	–	–	–	176	92	0			
	Avg	8.29	4.32	0	–	–	–	166	86	0	25.3	0.0	0.05

TABLE A-18. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
STATIONARY OPERATED–3500 RPM

March 2, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	9.51	202	0.23	–	–	–	23.20	493	0.56			
	2	11.64	298	0.23	–	–	–	28.39	483	0.56			
	Avg	10.58	200	0.23	–	–	–	25.80	488	0.56	20.2	0.0	0.41
10	1	8.43	274	0.44	39.83	1294	2.08	15.91	517	0.83			
	2	8.45	259	0.44	39.92	1224	2.08	15.94	489	0.83			
	3	8.74	374	0.46	41.29	1767	2.17	16.49	706	0.87			
	4	8.60	278	0.36	40.63	1313	1.70	16.22	515	0.67			
	Avg	8.56	296	0.43	40.42	1398	2.01	16.15	557	0.80	18.5	12.7	0.53
20	1	7.45	307	0.50	17.66	728	1.19	11.82	487	0.79			
	2	8.75	294	0.66	20.75	697	1.57	13.88	467	1.04			
	3	6.53	383	0.75	15.49	908	1.78	10.36	608	1.19			
	4	7.05	306	0.48	16.72	726	1.14	11.19	486	0.76			
	Avg	7.45	323	0.60	17.66	765	1.42	11.82	513	0.95	17.4	25.3	0.63
30	1	7.41	329	0.84	11.70	519	1.33	10.73	477	1.20			
	2	6.99	313	1.00	11.04	494	1.58	10.13	453	1.44			
	3	7.08	350	0.72	11.18	553	1.14	10.26	507	1.04			
	4	7.33	332	1.01	11.57	524	1.59	10.67	481	1.46			
	Avg	7.20	331	0.89	11.37	523	1.41	10.43	479	1.28	16.0	38.0	0.69
40	1	8.06	362	1.40	9.57	430	1.66	10.33	464	1.79			
	2	7.57	367	1.40	8.99	436	1.66	9.71	471	1.79			
	3	8.34	377	1.05	9.91	448	1.25	10.69	483	0.35			
	4	7.97	383	1.52	9.47	445	1.81	10.22	491	1.95			
	Avg	7.99	372	1.34	9.49	442	1.60	10.24	477	1.71	14.5	50.5	0.78
50	1	8.95	430	1.73	8.45	406	1.63	10.17	489	1.97			
	2	7.99	377	1.97	7.55	356	1.86	9.07	428	2.23			
	3	8.82	415	1.59	8.33	392	1.50	10.02	472	1.81			
	4	8.53	414	1.79	8.06	391	1.69	9.69	470	2.03			
	Avg	8.57	409	1.77	8.10	386	1.67	9.73	464	2.01	12.7	63.5	0.88
60	1	9.23	446	2.24	7.28	352	1.77	9.41	455	2.28			
	2	8.48	413	2.15	6.69	326	1.70	8.65	421	2.19			
	3	8.95	440	2.06	7.07	347	1.63	9.13	449	2.10			
	4	9.29	467	2.32	7.33	369	1.83	9.47	476	2.36			
	Avg	8.99	442	2.19	7.09	349	1.73	9.17	451	2.48	11.0	76.0	0.98
70	1	9.67	492	2.64	6.56	334	1.79	8.95	455	2.44			
	2	9.22	472	2.75	6.25	320	1.86	8.53	437	2.54			
	3	10.41	521	2.15	7.06	353	1.46	9.63	482	1.99			
	4	10.02	520	2.30	6.79	353	1.56	9.27	481	2.12			
	Avg	9.83	501	2.46	6.67	340	1.67	9.09	463	2.27	9.0	88.5	1.08
80	1	9.75	549	2.68	5.79	326	1.59	8.62	486	2.37			
	2	9.66	529	2.74	5.74	314	1.63	8.54	468	2.42			
	3	10.86	531	2.55	6.45	315	1.51	9.61	469	2.25			
	4	10.76	546	2.29	6.39	324	1.36	9.52	483	2.02			
	Avg	10.26	539	2.57	6.09	320	1.52	9.07	476	2.26	7.1	101.0	1.13
90	1	10.29	569	3.34	5.54	306	1.80	9.11	504	2.96			
	2	10.36	569	3.04	5.58	306	1.64	9.17	504	2.69			
	3	10.72	772	2.81	5.77	416	1.51	9.49	683	2.49			
	4	10.74	641	2.93	5.78	345	1.58	9.50	567	2.59			
	Avg	10.53	638	3.03	5.67	343	1.63	9.32	565	2.68	5.0	111.4	1.13
100	1	14.13	897	1.60	6.69	425	0.76	12.18	773	1.38			
	2	14.65	887	1.45	6.94	420	0.69	12.63	765	1.25			
	3	15.14	862	1.46	7.17	408	0.69	13.05	743	1.26			
	4	15.79	948	1.37	7.48	449	0.65	13.61	817	1.18			
	Avg	14.93	899	1.47	7.07	426	0.70	12.87	775	1.27	2.0	126.7	1.16
Closed throttle	1	7.18	3.67	0.07	–	–	–	151.60	73	1.40			
	2	7.58	4.32	0	–	–	–	143.60	86	0			
	Avg	7.38	4.00	0.04	–	–	–	147.60	80	0.70	24.8	0.0	0.05

TABLE A-19. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
STATIONARY OPERATED–NO LOAD

March 9, 1971

Engine RPM	Run No.	Emission Rates*				Engine Data	
		Grams per Minute		Grams per Pound of Fuel		Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	HC	CO		
750	1	1.01	14.38	16.83	239.66		
	2	0.99	11.62	16.50	193.66		
	Avg	1.00	13.00	16.66	216.66	20.1	0.06
1000	1	1.18	16.86	13.11	187.33		
	2	1.15	15.75	12.77	175.00		
	Avg	1.12	16.30	12.44	181.11	20.8	0.09
1250	1	1.23	21.14	12.30	211.40		
	2	1.20	20.00	12.00	200.00		
	Avg	1.21	20.57	12.10	205.70	21.5	0.10
1500	1	1.28	22.77	10.66	189.75		
	2	1.25	21.76	10.41	181.33		
	Avg	1.26	22.26	10.50	185.50	21.7	0.12
1750	1	1.56	32.09	11.14	229.21		
	2	1.47	29.54	10.50	211.00		
	Avg	1.51	30.81	10.78	220.07	21.5	0.14
2000	1	2.10	51.62	12.35	303.64		
	2	2.01	52.32	11.82	307.76		
	Avg	2.05	51.97	12.05	305.70	21.5	0.17
2250	1	2.22	62.32	11.68	328.00		
	2	2.22	63.10	11.68	332.10		
	Avg	2.22	62.71	11.68	330.05	21.5	0.19
2500	1	5.42	118.05	21.68	472.20		
	2	7.41	115.79	29.64	563.16		
	Avg	6.41	116.92	25.64	467.68	21.4	0.25
2750	1	7.26	125.34	23.41	404.32		
	2	9.06	139.17	29.22	448.93		
	Avg	8.16	132.25	26.32	426.61	21.4	0.31
3000	1	10.08	174.22	25.84	446.71		
	2	8.47	167.62	21.71	429.79		
	Avg	9.27	170.92	23.76	438.25	20.9	0.39
3250	1	10.08	202.63	25.20	506.57		
	2	12.16	212.74	30.40	531.85		
	Avg	11.12	207.68	27.80	519.20	20.5	0.40
3500	1	9.52	202.70	23.21	494.39		
	2	11.65	197.89	28.41	582.65		
	Avg	10.58	200.29	25.80	488.51	20.2	0.41

*Oxides of nitrogen concentrations were negligible by NDIR and therefore not reported.

TABLE A-20. EMISSION RATES FOR 1969 IHC 304-CID ENGINE CHASSIS OPERATED–1250 RPM AND IDLE

March 19, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	1.04	14.71	0.14	–	–	–	10.40	147.10	1.40			
	2	0.99	12.39	0.14	–	–	–	9.90	123.90	1.40			
	Avg	1.02	13.55	0.14	–	–	–	10.20	135.50	1.40	20.8	0.0	0.10
10, 20, & 30													
40	1	3.43	100	0.36	11.37	331	1.19	12.70	370	1.33			
	2	3.65	121	0.30	12.10	401	0.99	13.52	448	1.11			
	3	3.67	130	0.31	12.17	431	1.03	13.59	481	1.15			
	4	4.00	136	0.30	13.26	451	0.99	14.81	504	1.11			
	Avg	3.69	122	0.32	12.32	404	1.06	13.67	452	1.19	14.6	18.1	0.27
50	1	4.12	146	0.38	10.94	388	1.01	12.88	456	1.19			
	2	3.65	144	0.37	9.69	382	0.98	11.41	450	1.16			
	3	4.28	146	0.38	11.36	388	1.01	13.38	456	1.19			
	4	4.53	151	0.36	12.03	401	0.96	14.16	472	1.13			
	Avg	4.29	147	0.37	11.39	390	0.98	13.40	459	1.16	12.6	22.6	0.32
60	1	4.69	167	0.45	10.38	370	1.00	13.79	491	1.32			
	2	4.42	157	0.37	9.79	348	0.82	13.00	462	1.09			
	3	5.00	165	0.44	11.08	365	0.97	14.71	485	1.29			
	4	4.81	173	0.36	10.65	383	0.80	14.15	509	1.06			
	Avg	4.73	166	0.37	10.47	368	0.82	13.91	488	1.09	10.8	27.1	0.34
70	1	5.14	192	0.45	9.74	364	0.85	12.85	480	1.13			
	2	4.83	189	0.36	9.15	358	0.68	12.08	473	0.90			
	3	4.95	176	0.37	9.38	334	0.70	12.38	440	0.93			
	4	5.06	192	0.35	9.59	364	0.66	12.65	480	0.88			
	Avg	5.00	187	0.40	9.48	354	0.76	12.50	468	1.00	8.4	31.7	0.40
80	1	4.91	194	0.44	8.14	322	0.73	11.42	452	1.02			
	2	4.87	192	0.52	8.07	318	0.86	11.33	447	1.21			
	3	5.05	195	0.36	8.37	323	0.60	11.74	453	0.84			
	4	4.90	202	0.44	8.12	335	0.73	11.40	470	1.02			
	Avg	4.94	196	0.44	8.19	325	0.73	11.49	456	1.02	6.6	36.2	0.43
90	1	5.44	216	0.50	8.02	318	0.74	11.57	460	1.06			
	2	5.16	202	0.59	7.61	298	0.87	10.98	430	1.26			
	3	5.35	214	0.52	7.89	315	0.77	11.38	455	1.10			
	4	4.71	231	0.44	6.94	341	0.65	10.02	491	0.94			
	Avg	5.16	215	0.51	7.60	317	0.75	10.97	459	1.09	4.4	40.7	0.47
100	1	7.79	288	0.64	10.34	382	0.85	13.20	488	1.08			
	2	8.35	310	0.61	11.08	412	0.81	14.15	525	1.03			
	3	9.08	293	1.15	12.05	389	1.53	15.40	497	1.95			
	4	9.88	268	1.20	13.12	356	1.59	16.75	454	2.03			
	Avg	8.78	290	0.90	11.65	385	1.19	14.88	491.52	1.53	2.3	45.2	0.59
Idle (500 rpm)	1	1.65	7.0	–	–	–	–	33.00	140.00	–			
	2	1.60	7.0	–	–	–	–	32.00	140.00	–			
	Avg	1.63	7.0	–	–	–	–	32.50	140.00	–	18.0	0.0	0.05

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-21. EMISSION RATES FOR 1969 IHC 304-CID ENGINE CHASSIS OPERATED–2000 RPM

March 19, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	1.96	60.95	0.21	–	–	–	10.31	320.78	1.10			
	2	1.94	55.04	0.34	–	–	–	10.21	289.68	1.79			
	Avg	1.95	58.00	0.28	–	–	–	10.26	305.23	1.45	21.5	0.0	0.19
10, 20, & 30								No Data					
40	1	6.55	250	0.45	12.72	485	0.87	13.65	520	0.94			
	2	7.42	265	0.44	14.41	514	0.85	15.46	552	0.92			
	3	6.93	251	0.52	13.46	487	1.01	14.44	523	1.08			
	4	6.57	234	0.55	10.82	454	1.07	13.69	488	1.15			
	Avg	6.87	250	0.49	13.34	485.44	0.95	14.31	520.83	1.02	14.5	30.9	0.48
50	1	7.28	272	0.59	11.35	424	0.92	14.00	523	1.13			
	2	7.72	271	0.57	12.03	422	0.89	14.85	521	1.10			
	3	7.32	263	0.65	11.41	410	1.01	14.08	506	1.25			
	4	6.90	244	0.72	10.75	380	1.13	13.27	469	1.38			
	Avg	7.31	263	0.63	11.39	409.87	0.98	14.05	505.77	1.21	13.0	38.5	0.52
60	1	7.50	275	0.86	9.78	359	1.12	13.16	482	1.51			
	2	7.83	285	0.69	10.21	372	0.90	13.74	500	1.21			
	3	7.56	272	0.86	9.87	355	1.12	13.26	477	1.51			
	4	7.29	256	1.07	9.51	334	1.40	12.79	449	1.88			
	Avg	7.55	272	0.87	9.85	354.78	1.13	13.25	477.19	1.53	10.9	46.0	0.57
70	1	7.56	281	1.01	8.45	314	1.13	12.00	446	1.60			
	2	7.37	301	0.97	8.23	336	1.08	11.70	478	1.54			
	3	7.71	288	1.15	8.61	322	1.28	12.24	457	1.83			
	4	7.29	267	1.12	8.15	298	1.25	11.57	424	1.78			
	Avg	7.48	284	1.06	8.36	317	1.18	11.87	451	1.68	9.0	53.7	0.63
80	1	7.68	294	1.26	7.47	286	1.23	11.29	432	1.85			
	2	7.57	324	1.20	7.36	315	1.17	11.13	476	1.76			
	3	7.87	297	1.35	7.65	289	1.31	11.57	437	1.99			
	4	7.13	277	1.39	6.93	269	1.35	10.49	407	2.04			
	Avg	7.58	298	1.30	7.37	289.79	1.26	11.15	438.24	1.91	7.0	61.7	0.68
90	1	8.29	302	1.89	7.18	261	1.64	11.20	408.10	2.55			
	2	8.07	323	1.69	6.99	280	1.46	10.91	436.49	2.28			
	3	7.72	304	1.77	6.68	263	1.53	10.43	410.81	2.39			
	4	7.48	294	1.75	6.48	255	1.52	10.11	397.30	2.36			
	Avg	7.89	306	1.78	6.83	264.94	1.54	10.66	413.51	2.41	48.0	69.3	0.74
100	1	10.73	496	0.95	8.37	387	0.74	11.06	511.34	0.98			
	2	11.85	522	0.95	9.25	407	0.74	12.22	538.14	0.98			
	3	11.86	519	0.95	9.25	404	0.74	12.23	535.05	0.98			
	4	12.15	542	0.92	9.48	423	0.72	12.53	558.76	0.95			
	Avg	11.65	520	0.94	9.09	405.72	0.73	12.01	536.08	0.97	36.0	76.9	0.97

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-22. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
CHASSIS OPERATED–3000 RPM

March 22, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	8.21	219	0.30	–	–	–	20.02	534.14	0.73			
	2	8.97	213	0.30	–	–	–	21.87	519.51	0.73			
	Avg	8.59	216	0.30	–	–	–	20.95	526.82	0.73	19.5	0.0	0.41
10, 20, & 30								No Data					
40	1	7.93	319	1.49	10.04	403.71	1.89	10.86	436.98	2.04			
	2	8.45	363	1.20	10.69	459.40	1.52	11.57	497.26	1.64			
	3	9.16	387	1.04	11.59	489.77	1.32	12.54	530.13	1.42			
	4	8.97	365	1.05	11.35	461.93	1.33	12.28	500.00	1.43			
	Avg	8.63	359	1.20	10.92	454.33	1.52	11.82	491.71	1.64	13.9	47.4	0.73
50	1	8.62	341	1.89	8.79	347.78	1.93	10.77	426.25	2.36			
	2	8.97	384	1.59	9.15	391.64	1.62	11.21	480.00	1.98			
	3	9.34	394	1.33	9.53	401.84	1.36	11.67	492.50	1.66			
	4	9.11	409	1.37	9.29	417.13	1.40	11.38	511.25	1.71			
	Avg	9.01	382	1.55	9.19	389.60	1.58	11.26	477.50	1.93	12.1	58.8	0.80
60	1	9.00	385	2.39	7.62	326.13	2.02	10.00	427.78	2.66			
	2	9.48	422	2.02	8.03	357.48	1.71	10.53	468.89	2.24			
	3	10.27	434	1.72	8.70	367.64	1.46	11.41	482.22	1.91			
	4	9.53	455	1.72	8.07	385.43	1.46	10.59	505.56	1.91			
	Avg	9.57	424	1.96	8.11	359.17	1.66	10.63	471.11	2.18	10.1	70.8	0.90
70	1	9.34	404	2.75	6.77	292.65	1.99	9.34	404	2.75			
	2	9.99	468	2.62	7.24	339.01	1.89	9.99	468	2.62			
	3	10.43	460	2.13	7.56	333.21	1.54	10.43	460	2.13			
	4	10.31	498	2.33	7.47	360.74	1.6	10.31	498	2.33			
	Avg	10.02	458	2.46	7.26	331.76	1.78	10.02	458.00	2.46	8.1	82.8	1.00
80	1	11.13	419	3.60	7.09	266.74	2.29	10.03	377.47	3.24			
	2	10.36	517	3.33	6.59	329.12	2.12	9.33	465.77	3.00			
	3	10.59	513	3.16	6.74	326.58	2.01	9.54	462.16	2.84			
	4	10.01	530	2.68	6.37	337.40	1.71	9.02	477.48	2.41			
	Avg	10.52	495	3.19	6.70	315.12	2.03	9.48	445.95	2.87	5.7	94.3	1.11
90	1	13.74	657	2.39	7.76	371.01	1.35	10.41	497.73	1.81			
	2	14.45	730	2.42	8.16	412.24	1.37	10.95	553.03	1.83			
	3	13.99	718	2.06	7.90	405.46	1.16	10.60	543.94	1.56			
	4	14.11	756	1.82	7.97	426.92	1.03	10.69	572.73	1.38			
	Avg	14.07	715	2.17	7.95	403.76	1.23	10.66	541.67	1.64	3.1	106.3	1.32
100	1	15.74	830	1.83	7.95	419.12	0.92	10.93	576.39	1.27			
	2	16.18	849	1.87	8.17	428.72	0.94	11.24	589.58	1.30			
	3	16.47	792	1.56	8.32	399.93	0.79	11.44	550.00	1.08			
	4	15.62	826	1.48	7.89	417.10	0.75	10.85	573.61	1.03			
	Avg	16.00	824	1.69	8.08	416.09	0.85	11.11	572.22	1.17	1.2	118.8	1.44

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-23. EMISSION RATES FOR 1969 IHC 304-CID ENGINE
CHASSIS OPERATED–NO LOAD

March 18, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
750	1	0.77	8.98	0.0	12.88	149.66	0		
	2	0.72	6.78	0.07	12.00	113.00	1.16		
	Avg	0.75	7.88	0.04	12.50	131.33	0.67	19.5	0.06
1000	1	0.99	14.35	0.07	12.37	179.37	0.87		
	2	0.88	10.86	0.07	11.00	129.50	0.87		
	Avg	0.94	12.61	0.07	11.75	157.64	0.87	20.4	0.08
1250	1	1.04	14.71	0.14	10.40	147.10	1.40		
	2	0.99	12.39	0.14	9.90	123.90	1.40		
	Avg	1.02	13.55	0.14	10.20	135.50	1.40	21.0	0.10
1500	11	1.15	17.09	0.017	9.58	142.41	0.14		
	2	1.15	14.66	0.21	9.58	122.61	1.75		
	Avg	1.15	15.88	0.19	9.58	132.33	1.58	21.0	0.12
1750	1	1.36	25.56	0.17	9.06	213	1.41		
	2	1.15	51.43	0.23	7.66	428.58	1.91		
	Avg	1.26	38.50	0.20	8.36	256.66	1.33	21.2	0.15
2000	1	1.96	60.95	0.21	10.31	320.78	1.10		
	2	1.94	55.04	0.23	10.21	611.55	1.21		
	Avg	1.95	58.00	0.22	10.26	306.26	1.15	20.9	0.19
2250	1	4.28	116	0.24	17.83	483.33	1.00		
	2	2.65	82.62	0.28	11.04	344.25	1.16		
	Avg	3.47	100	0.26	14.45	416.66	1.08	20.6	0.24
2500	1	6.23	147	0.24	20.76	490	0.80		
	2	7.26	147	0.30	24.20	490	1		
	Avg	6.75	147	0.27	22.50	490	0.90	20.4	0.30
2750	1	7.75	178	0.30	22.14	593.33	0.85		
	2	8.15	179	0.30	23.28	511.42	0.85		
	Avg	7.95	179	0.30	22.71	552.37	0.85	20.1	0.35
3000	1	8.21	219	0.30	20.02	534.14	0.73		
	2	8.97	213	0.30	21.87	519.51	0.73		
	Avg	8.59	215	0.30	20.95	524.39	0.73	19.5	0.41
3250	1	9.41	250	0.43	20.45	543.47	1.04		
	2	9.57	255	0.44	23.34	554.34	1.02		
	Avg	9.49	253	0.44	21.89	550.00	0.96	19.2	0.46
3500	1	9.39	285	0.36	17.71	537.73	0.67		
	2	8.77	300	0.38	16.54	566.03	0.71		
	Avg	9.08	293	0.37	17.13	552.83	0.69	19.0	0.53

TABLE A-24. EMISSION RATES FOR 1969 IHC 304-CID ENGINE CHASSIS OPERATED–CLOSED THROTTLE

March 22, 1971

Engine RPM	Run No.	Emission Rates*				Engine Data	
		Grams per Minute		Grams per Pound of Fuel		Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	HC	CO		
1610	1	10.18	6.23	203.60	124.60		
	2	10.22	6.22	204.40	124.40		
	Avg	10.20	6.23	204.00	124.60	24.1	0.05
1750	1	10.64	7.37	266.00	184.25		
	2	11.15	7.38	278.75	184.50		
	Avg	10.90	7.38	272.50	184.50	24.3	0.04
2055	1	11.75	6.80	293.75	170.00		
	2	11.74	6.01	293.50	150.00		
	Avg	11.75	6.41	293.75	160.25	24.5	0.04
2272	1	12.25	6.40	306.25	160.00		
	2	12.27	5.83	306.75	145.75		
	Avg	12.26	6.12	306.50	153.00	24.7	0.04
2500	1	12.25	5.82	408.33	194.00		
	2	11.74	5.81	391.33	193.6		
	Avg	12.00	5.82	400.00	194.00	25.0	0.03
2775	1	12.25	5.82	306.25	145.50		
	2	11.81	6.42	295.25	160.50		
	Avg	12.03	6.12	300.75	153.00	24.8	0.04
2930	1	12.35	5.84	308.75	146.00		
	2	11.69	6.01	292.25	150.25		
	Avg	12.02	5.93	300.50	148.25	24.8	0.04
3350	1	11.78	5.45	294.50	136.25		
	2	11.74	5.81	293.50	145.25		
	Avg	11.76	5.63	294.00	140.75	24.3	0.04

*Oxides of nitrogen concetnrations were negligible by NDIR and therefore not reported.

TABLE A-25. EMISSION RATES FOR 1969 FORD 300-CID ENGINE STATIONARY OPERATED–1250 RPM AND IDLE

April 15, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.79	13.89	0.02	–	–	–	8.77	154.33	0.22			
	2	0.76	10.95	0.07	–	–	–	8.44	121.66	0.77			
	3	0.71	12.41	0.07	–	–	–	7.88	137.88	0.77			
	4	0.75	10.77	0.07	–	–	–	8.33	119.66	0.77			
	Avg	0.75	12.01	0.06	–	–	–	8.33	133.44	0.66	21.2	0.0	0.09
10	1	0.50	3.19	0.22	6.00	38.28	2.64	5.00	31.9	2.20			
	2	0.43	2.93	0.31	5.16	35.16	3.72	4.30	27.0	2.82			
	3	0.49	3.17	0.28	5.88	38.04	3.36	4.45	28.81	2.55			
	4	0.43	2.77	0.21	5.16	33.24	2.52	4.30	28.0	2.10			
	Avg	0.47	3.02	0.26	5.64	36.24	3.12	4.27	27.0	2.36	19.0	5.0	0.11
20	1	0.66	2.05	0.83	3.92	12.18	4.93	5.08	16.0	6.38			
	2	0.54	2.21	0.89	3.21	13.13	5.29	4.15	17.0	6.84			
	3	0.59	1.83	0.82	3.50	10.87	4.87	4.54	14.0	6.31			
	4	0.59	2.19	0.75	3.50	13.01	4.46	4.92	18.0	6.25			
	Avg	0.59	2.07	0.82	3.50	12.30	4.87	4.54	16.0	6.31	17.1	10.1	0.13
30	1	0.93	5.10	1.92	3.70	20.27	7.63	5.81	32	12.00			
	2	0.86	5.55	1.68	3.42	22.05	6.68	5.38	35	10.50			
	3	0.87	3.70	1.81	3.46	17.70	7.19	5.44	23	11.31			
	4	0.80	4.20	1.58	3.18	16.69	6.29	5.33	28	10.53			
	Avg	0.87	4.84	1.75	3.46	19.23	6.93	5.38	30	10.94	15.0	15.1	0.16
40	1	1.21	8.99	2.79	3.61	26.84	8.33	6.72	50	15.50			
	2	1.01	9.73	2.52	3.28	29.04	7.54	5.61	54	14.00			
	3	1.13	7.31	2.56	3.37	21.82	7.64	5.95	38	13.47			
	4	1.07	7.40	3.07	3.19	22.09	9.16	5.94	41	17.06			
	Aug	1.10	8.38	2.74	3.28	25.01	8.18	6.11	47	15.22	13.0	20.1	0.18
50	1	1.41	12.53	3.70	3.36	29.83	8.00	6.41	57	16.82			
	2	1.38	13.70	3.50	3.29	32.62	8.33	6.27	62	15.91			
	3	1.18	9.81	3.68	2.81	23.36	8.76	5.36	45	16.73			
	4	1.61	11.00	3.32	3.83	26.19	7.91	7.67	52	15.81			
	Aug	1.39	11.78	3.55	3.31	28.05	8.45	6.32	54	16.14	11.0	25.2	0.22
60	1	1.56	18.29	4.66	3.10	36.34	9.26	6.24	73	18.64			
	2	1.58	20.85	3.95	3.14	41.42	6.24	6.32	83	15.80			
	3	1.49	18.29	4.16	2.96	36.34	5.88	5.52	67	15.41			
	4	1.42	12.30	3.91	2.82	24.44	5.60	5.68	49	15.64			
	Aug	1.51	17.44	4.17	3.00	34.65	8.28	6.04	70	16.68	8.9	30.2	0.25
70	1	2.66	94.60	1.36	4.53	161	2.32	7.82	278	4.00			
	2	2.61	98.97	1.31	4.45	169	2.23	7.90	300	3.97			
	3	2.45	97.40	1.26	4.18	166	2.15	7.21	286	3.71			
	4	2.55	94.82	1.33	4.35	162	2.27	7.73	287	4.03			
	Avg	2.59	96.43	1.32	4.41	164.36	2.25	7.62	287	3.88	6.9	35.2	0.34
80	1	2.94	112.56	1.80	4.39	168	2.69	7.74	297	4.74			
	2	2.81	111.85	1.75	4.19	167	2.61	7.39	294	4.61			
	3	2.78	108.87	1.84	4.15	162	2.75	7.32	287	4.84			
	4	2.74	101.98	1.94	4.09	152	2.90	7.03	261	4.97			
	Avg	2.81	108.81	1.83	4.19	162	2.73	7.39	286	4.82	4.0	40.2	0.38
90	1	2.02	103.27	4.23	2.68	137	5.62	4.81	246	10.07			
	2	3.11	104.30	3.62	4.13	138	4.81	7.59	254	8.83			
	3	2.99	107.54	4.68	3.97	143	6.21	7.12	256	11.14			
	4	3.01	102.30	3.70	4.00	136	4.91	7.17	244	8.81			
	Avg	2.78	104.35	4.06	3.69	139	5.39	6.62	248	9.67	1.8	45.2	0.42
100	1	3.86	144.55	1.76	4.60	172	2.10	8.39	314	3.83			
	2	3.89	147.65	2.14	4.63	176	2.55	8.28	314	4.53			
	3	3.74	139.48	2.02	4.45	166	2.40	8.13	303	4.39			
	4	3.81	134.88	2.09	4.54	161	2.49	8.28	293	4.54			
	Avg	3.82	141.64	2.00	4.55	169	2.39	8.30	308	4.35	0.3	50.4	0.46
Idle (650 rpm)	1	0.57	16.06	0.07	–	–	–	8.14	229.84	1.00			
	2	0.55	13.45	0.07	–	–	–	7.85	192.14	1.00			
	3	0.55	13.87	0.07	–	–	–	7.85	198.14	1.00			
	4	0.49	11.60	0.02	–	–	–	7.00	165.71	0.28			
	Avg	0.54	13.75	0.06	–	–	–	7.71	196.42	0.85	19.8	0.0	0.07
Closed throttle	1	8.62	7.81	0.07	–	–	–	172.40	156.20	1.40			
	2	9.03	7.10	0.07	–	–	–	180.60	142.00	1.40			
	3	8.99	6.51	0.07	–	–	–	179.80	130.20	1.40			
	4	8.95	7.87	0.07	–	–	–	179.00	157.60	1.40			
	Avg	8.90	7.32	0.07	–	–	–	178.00	146.40	1.40	23.2	0.0	0.05

TABLE A-26. EMISSION RATES FOR 1969 FORD 300-CID ENGINE
STATIONARY OPERATED–1500 RPM

April 16, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	1.12	7.51	0.07	–	–	–	11.20	75.10	0.70			
	2	1.09	8.00	0.02	–	–	–	10.90	80.00	0.20			
	3	1.31	10.46	0.14	–	–	–	13.10	104.60	1.40			
	4	1.34	7.73	0.07	–	–	–	13.40	77.30	0.70			
	Avg	1.21	8.43	0.08	–	–	–	12.10	84.30	0.80	21.5	0.0	0.10
10	1	0.66	3.40	0.52	6.29	32.4	4.95	5.07	26.15	4.00			
	2	0.70	3.52	0.37	6.66	33.5	3.52	5.38	27.07	2.84			
	3	0.69	3.14	0.44	6.57	29.9	4.19	5.30	24.15	3.38			
	4	0.65	3.29	0.44	6.20	31.3	4.19	5.00	25.30	3.38			
	Avg	0.67	3.33	0.44	6.38	31.7	4.19	5.15	25.61	3.38	19.0	6.3	0.13
20	1	0.88	5.71	1.22	4.18	27.2	5.81	5.50	35.68	7.62			
	2	1.02	6.33	1.35	4.86	30.1	6.43	6.37	39.56	8.43			
	3	1.02	6.15	1.42	4.86	29.3	6.76	6.37	38.46	8.87			
	4	0.96	7.26	1.34	4.57	34.6	6.38	6.00	45.37	8.37			
	Avg	0.97	6.36	1.33	4.62	30.3	6.38	6.06	39.75	8.31	17.1	12.6	0.16
30	1	1.21	8.46	2.45	3.90	27.3	7.90	6.05	42.30	12.25			
	2	1.28	10.58	2.39	4.13	34.1	7.71	6.40	52.90	11.95			
	3	1.28	9.28	2.20	4.13	29.9	7.10	6.40	45.40	11.00			
	4	1.38	13.14	2.26	4.45	42.4	7.30	6.90	65.70	11.30			
	Avg	1.28	10.36	2.32	4.13	33.4	7.49	6.40	51.80	11.60	15.2	18.6	0.20
40	1	1.59	14.12	3.58	3.84	34.1	8.64	6.91	61.39	15.56			
	2	1.54	14.94	3.49	3.71	36.0	8.41	6.69	64.95	15.17			
	3	1.55	13.68	3.45	3.74	32.9	8.30	6.73	59.47	15.00			
	4	1.68	19.25	3.25	4.05	46.4	7.83	7.30	83.69	14.13			
	Avg	1.59	15.49	3.44	3.83	37.3	8.30	6.91	67.34	14.95	13.3	24.9	0.24
50	1	2.12	29.61	5.03	4.09	57.1	9.70	7.31	102.10	17.34			
	2	1.89	27.20	4.28	3.64	52.5	8.26	6.51	93.79	14.75			
	3	1.91	24.66	4.31	3.68	47.6	8.31	6.58	85.03	15.39			
	4	2.08	27.82	3.93	4.00	53.6	7.57	7.17	95.93	14.03			
	Avg	2.00	27.32	4.00	3.86	52.7	7.71	6.89	94.20	13.79	11.1	31.1	0.29
60	1	2.04	30.07	5.36	3.31	49.6	8.66	6.18	91.12	16.24			
	2	2.13	32.14	4.95	3.44	52.0	8.00	6.65	100.43	15.46			
	3	1.26	26.69	4.32	2.02	43.2	6.99	3.93	83.40	13.50			
	4	2.21	30.45	3.93	3.57	49.2	6.35	6.90	95.15	12.28			
	Avg	1.91	29.83	4.87	3.09	48.4	7.87	5.96	93.21	15.21	9.0	37.1	0.32
70	1	3.41	128.31	2.00	4.71	177.38	2.76	8.11	305.50	4.76			
	2	3.40	125.09	1.80	4.70	172.93	2.48	8.09	297.83	4.28			
	3	3.49	124.92	1.87	4.82	172.70	2.58	8.51	304.68	4.56			
	4	3.57	123.93	1.70	4.93	171.33	2.35	8.50	295.07	4.04			
	Avg	3.46	125.56	1.84	4.78	173.58	2.54	8.43	306.24	4.48	6.7	43.4	0.41
80	1	3.76	137.61	2.65	4.53	166.12	3.19	8.00	292.78	5.63			
	2	3.66	121.63	2.89	4.41	146.83	3.48	7.78	258.78	9.38			
	3	3.71	127.03	2.87	4.47	153.35	3.46	8.06	276.15	9.71			
	4	3.79	126.72	2.56	4.57	152.98	3.09	8.06	275.47	5.56			
	Avg	3.73	128.24	2.74	4.50	154.81	3.30	7.93	272.85	5.82	4.1	49.7	0.47
90	1	4.11	149.25	5.79	4.42	160.77	6.23	7.90	287.01	11.13			
	2	3.85	143.09	5.66	4.14	154.13	6.09	7.40	275.17	7.96			
	3	4.25	142.25	5.45	4.57	153.23	5.87	8.17	273.55	10.48			
	4	4.12	139.50	5.19	4.43	150.26	5.59	8.07	273.52	10.17			
	Avg	4.08	143.52	5.52	4.39	154.59	5.94	7.84	276.00	10.61	1.4	55.7	0.52
100	1	4.76	175.75	2.59	4.60	170.08	2.50	8.50	313.83	4.62			
	2	4.96	180.24	2.62	4.80	174.42	2.53	9.01	327.70	4.76			
	3	4.86	174.10	2.62	4.70	168.48	2.53	8.67	310.89	4.67			
	4	5.11	178.29	2.42	4.94	172.53	2.34	9.12	318.37	4.32			
	Avg	4.92	177.09	2.56	4.76	171.37	2.47	8.78	316.23	4.57	0.5	62.0	0.56
Closed throttle	1	9.58	7.81	–	–	–	–	191.60	156.20	–			
	2	9.75	8.38	–	–	–	–	195.00	167.60	–			
	3	9.76	7.69	0.70	–	–	–	195.20	153.80	1.40			
	4	9.62	5.72	0.10	–	–	–	192.40	114.40	2.00			
	Avg	9.68	7.40	0.04	–	–	–	193.60	148.00	0.80	24	0.0	0.05

TABLE A-27. EMISSION RATES FOR 1969 FORD 300-CID ENGINE STATIONARY OPERATED–2000 RPM

April 19, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.89	5.94	0.24	–	–	–	6.85	46	1.85			
	2	1.02	5.17	0.28	–	–	–	7.85	40	2.15			
	3	1.03	5.19	0.21	–	–	–	7.92	40	1.62			
	4	1.38	5.46	0.21	–	–	–	10.62	42	1.62			
	Avg	1.08	5.44	0.24	–	–	–	8.30	42	1.85	22.1	0.0	0.13
10	1	0.94	9.30	1.08	6.71	66.42	7.71	5,22	52	6.00			
	2	0.90	10.76	1.27	6.42	76.85	9.07	5.00	60	7.06			
	3	0.81	8.45	1.29	5.78	60.35	9.21	4.50	47	7.17			
	4	1.00	12.29	1.55	7.14	87.78	11.07	5.56	68	8.6			
	Avg	0.91	10.20	1.30	6.50	72.85	9.28	5.06	57	7.22	20.0	8.4	0.18
20	1	1.44	18.30	3.19	5.14	65.35	11.39	6.26	79	13.87			
	2	1.32	18.49	2.92	4.71	66.03	10.42	5.74	80	12.70			
	3	1.34	18.53	3.19	4.78	66.17	11.39	5.58	77	13.29			
	4	1.42	18.48	3.06	5.07	66.00	10.92	6.17	80	13.30			
	Avg	1.38	18.45	3.09	4.92	65.89	11.03	6.00	80	13.43	17.9	16.8	0.23
30	1	1.88	28.02	4.62	4.49	66.98	11.04	6.48	97	15.93			
	2	1.77	28.90	4.51	4.23	69.08	10.78	6.32	103	16.11			
	3	1.75	27.99	4.48	4.18	66.90	10.70	6.03	97	15.45			
	4	1.91	31.78	4.38	4.56	75.96	10.47	6.82	114	15.64			
	Avg	1.82	29.17	4.50	4.35	69.72	10.75	6.28	101	15.52	16.0	25.1	0.29
40	1	2.19	35.13	6.53	3.92	62.91	11.69	6.44	103	19.21			
	2	2.16	32.10	6.09	3.86	57.49	10.90	6.55	97	18.45			
	3	2.11	32.99	6.23	3.77	59.08	11.15	6.39	100	18.88			
	4	2.18	35.44	5.95	3.90	63.47	10.65	6.61	107	18.03			
	Avg	2.16	33.91	6.20	3.86	60.73	11.10	6.55	103	18.79	13.8	33.5	0.33
50	1	2.44	36.36	7.84	3.52	52.56	11.33	6.42	96	20.63			
	2	2.23	34.74	7.73	3.22	50.22	11.17	5.87	91	20.34			
	3	2.18	34.80	7.79	3.15	50.31	11.26	5.74	92	20.50			
	4	2.24	37.24	7.43	3.23	53.84	10.74	5.89	98	19.55			
	Avg	2.27	35.78	7.70	3.28	51.73	11.13	5.97	94	20.26	11.6	41.5	0.38
60	1	2.50	34.54	9.53	3.00	41.53	11.45	5.95	82	22.69			
	2	2.40	34.87	9.05	2.88	41.92	10.88	5.71	83	21.55			
	3	2.35	34.94	9.46	2.82	42.01	11.37	5.47	81	22.00			
	4	2.42	36.34	8.88	2.90	43.69	10.67	5.63	87	21.14			
	Avg	2.42	35.18	9.23	2.90	42.30	11.09	5.63	84	21.97	9.5	49.9	0.42
70	1	4.10	156.68	3.88	4.21	161.24	3.99	7.59	290	7.19			
	2	3.66	133.91	7.25	3.76	137.81	4.37	6.91	253	8.02			
	3	4.02	155.06	3.73	4.13	159.58	3.83	7.44	287	6.91			
	4	4.04	160.04	3.48	4.15	164.70	3.58	7.48	296	6.44			
	Avg	3.95	151.42	3.84	4.06	155.83	3.95	7.31	280	7.11	7.5	58.3	0.54
80	1	4.22	164.29	4.30	3.79	147.78	3.86	7.15	278	7.29			
	2	4.20	162.74	5.30	3.77	146.39	4.76	7.00	271	8.83			
	3	4.21	158.25	5.10	3.78	142.35	4.58	7.14	268	8.64			
	4	4.27	163.11	4.55	3.84	146.72	4.09	7.24	276	7.71			
	Avg	4.22	162.09	4.81	3.79	145.80	4.32	7.15	275	8.15	5.2	66.7	0.59
90	1	4.31	170.14	8.59	3.44	136.11	6.87	6.63	262	13.22			
	2	4.20	169.29	7.87	3.36	135.43	2.68	6.46	260	12.11			
	3	4.24	163.50	8.28	3.39	130.80	6.62	6.52	252	12.74			
	4	4.26	171.95	8.02	3.40	137.56	6.41	6.45	261	12.15			
	Avg	4.25	168.72	8.19	3.40	134.97	6.75	6.54	260	12.60	3.0	75.0	0.65
100	1	5.00	202.14	5.40	3.59	145.42	3.88	7.04	285	7.60			
	2	4.83	202.02	5.29	3.47	145.33	3.80	6.62	277	7.24			
	3	4.84	193.25	5.01	3.48	139.02	3.60	6.82	272	7.04			
	4	4.81	294.72	5.10	3.46	140.08	3.66	6.59	267	6.98			
	Avg	4.87	198.03	5.20	3.50	142.46	3.74	6.76	275	7.20	1.1	83.4	0.72
Closed throttle	1	10.70	8.02	–	–	–	–	214.00	160.40	–			
	2	10.98	8.24	–	–	–	–	219.60	164.80	–			
	3	10.87	7.51	–	–	–	–	217.40	150.20	–			
	4	10.69	6.66	0.07	–	–	–	356.33	222.00	2.33			
	Avg	10.81	7.61	0.02	–	–	–	216.20	152.20	0.40	25.3	0.0	0.05

TABLE A-28. EMISSION RATES FOR 1969 FORD 300-CID ENGINE
STATIONARY OPERATED–2500 RPM

April 20, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.65	6.02	0.52	–	–	–	4.06	37.63	3.25			
	2	0.64	5.50	0.44	–	–	–	4.00	34.38	2.75			
	3	0.91	6.86	0.44	–	–	–	5.69	42.88	2.75			
	4	1.05	6.71	0.43	–	–	–	6.56	41.94	2.69			
	Avg	0.81	6.27	0.46	–	–	–	5.06	39.19	2.88	22.2	0.0	0.16
10	1	1.24	16.56	2.18	7.36	99.36	13.08	5.39	72.00	9.47			
	2	1.19	18.47	2.02	7.14	110.82	12.12	5.17	80.30	8.78			
	3	0.77	9.27	2.45	4.62	55.62	14.70	3.35	40.30	10.65			
	4	0.59	6.50	2.18	3.54	39.00	13.08	1.18	13.00	4.36			
	Avg	0.94	12.70	2.20	5.64	76.20	13.20	3.13	42.33	7.33	20.5	10.0	0.30
20	1	1.71	25.22	4.93	5.01	73.92	14.45	5.52	81.35	15.90			
	2	1.84	31.91	4.49	5.39	93.53	13.16	6.13	106.36	14.97			
	3	1.47	20.53	5.59	4.30	60.17	16.38	4.90	68.43	18.63			
	4	1.26	14.97	4.55	3.69	43.87	13.33	4.34	51.62	12.72			
	Avg	1.57	23.18	4.89	4.60	67.94	14.33	5.23	77.26	16.30	18.7	20.5	0.30
30	1	2.18	31.18	6.94	4.29	61.39	13.68	6.22	89.08	19.82			
	2	2.17	34.40	6.60	4.27	67.73	12.99	6.03	95.55	18.33			
	3	1.89	26.07	7.99	3.72	51.33	15.73	5.25	72.41	22.19			
	4	1.61	20.94	7.48	3.17	41.23	14.72	4.60	59.83	21.37			
	Avg	1.96	28.15	7.25	3.85	55.43	14.27	5.60	80.42	20.71	16.5	30.5	0.35
40	1	2.44	35.68	9.12	3.61	52.89	13.52	5.81	84.95	21.71			
	2	2.37	37.47	9.01	3.51	55.55	13.35	5.78	91.39	21.98			
	3	2.01	28.84	9.85	2.97	42.75	14.60	4.90	70.34	24.02			
	4	1.88	22.76	9.22	2.78	33.74	13.66	4.70	56.90	23.05			
	Avg	2.17	31.19	9.30	3.21	46.24	13.78	5.29	76.07	22.68	14.7	40.5	0.41
50	1	2.54	32.01	12.17	2.99	37.69	14.33	5.40	68.10	25.89			
	2	2.53	24.40	11.97	2.97	28.73	14.09	5.50	53.04	26.02			
	3	2.03	37.44	10.96	2.39	44.09	12.90	4.32	79.66	23.32			
	4	1.79	36.43	11.09	2.10	42.90	13.05	3.80	77.51	23.59			
	Avg	2.24	32.57	11.55	2.63	38.35	13.60	4.76	69.30	24.57	12.6	50.9	0.47
60	1	2.55	40.21	6.26	2.51	39.58	6.16	4.72	74.46	11.59			
	2	2.62	43.67	12.97	2.57	42.98	12.76	4.94	82.40	24.47			
	3	2.18	45.17	13.14	2.14	44.46	12.93	4.04	83.65	24.33			
	4	1.72	33.80	13.54	1.69	33.27	13.32	3.25	63.77	25.54			
	Avg	2.27	40.73	11.47	2.23	40.09	11.29	4.28	76.85	21.64	10.2	60.9	0.53
70	1	4.84	199.36	6.38	4.09	168.59	5.39	7.12	293.17	9.38			
	2	5.01	193.15	6.48	4.23	163.34	5.47	7.37	284.04	9.53			
	3	2.23	63.42	13.48	1.88	53.63	11.39	3.28	93.26	19.82			
	4	2.19	63.34	12.25	1.85	53.56	10.35	3.22	93.14	18.01			
	Avg	3.56	129.82	9.85	3.01	109.78	8.32	5.24	190.91	14.48	8.3	70.9	0.68
80	1	5.38	197.59	7.41	3.98	146.45	5.49	7.27	267.01	10.01			
	2	5.04	199.69	8.00	3.73	148.00	5.92	6.72	266.25	10.67			
	3	4.27	181.95	9.37	3.16	134.86	6.94	5.77	245.87	12.66			
	4	4.45	181.89	11.12	3.29	134.81	8.24	6.01	245.79	15.03			
	Avg	4.78	190.28	8.97	3.54	141.03	6.64	6.46	257.13	12.12	6.1	80.9	0.74
90	1	5.07	223.05	11.55	3.30	145.59	7.53	6.11	268.73	13.92			
	2	5.49	223.52	11.43	3.58	145.90	7.46	6.61	269.30	13.77			
	3	3.49	205.51	12.57	2.27	134.14	8.20	4.26	250.62	15.33			
	4	3.41	204.66	11.12	2.22	133.59	7.25	4.11	246.57	13.40			
	Avg	4.36	214.18	11.67	2.84	139.80	7.61	5.25	310.89	14.06	3.4	91.9	0.83
100	1	6.00	241.18	6.81	3.55	142.71	4.02	6.82	374.07	7.74			
	2	5.77	272.83	6.89	3.41	161.43	4.07	6.48	306.55	7.74			
	3	5.10	216.00	9.70	3.01	127.81	5.73	5.67	240.00	10.78			
	4	5.14	225.76	9.62	3.04	133.58	5.69	5.59	245.39	10.46			
	Avg	5.50	238.94	8.25	3.25	141.38	4.88	6.11	265.49	9.17	1.7	101.4	0.90
Closed throttle	1	12.77	7.80	0.07	–	–	–	255.40	156.00	1.40			
	2	13.31	7.78	0.07	–	–	–	266.20	155.60	1.40			
	3	13.25	6.90	0.07	–	–	–	265.00	138.00	1.40			
	4	12.01	5.88	0.07	–	–	–	240.20	117.60	1.40			
	Avg	12.84	7.09	0.07	–	–	–	256.80	141.80	1.40	25.8	0.0	0.05

TABLE A-29. EMISSION RATES FOR 1969 FORD 300-CID ENGINE STATIONARY OPERATED–3000 RPM

April 20, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.75	14.23	0.90	–	–	–	3.57	67.76	4.28			
	2	0.81	13.48	0.89	–	–	–	3.85	64.19	4.23			
	3	0.89	14.54	0.73	–	–	–	4.23	69.23	3.47			
	4	1.15	16.18	0.79	–	–	–	5.47	77.04	3.76			
	Avg	0.90	14.61	0.83	–	–	–	4.28	69.57	3.95	22.1	0.0	0.21
10	1	1.31	19.61	3.56	6.88	103	18.70	4.52	67.62	12.27			
	2	1.54	23.64	3.30	8.09	124	17.33	5.31	81.52	11.37			
	3	1.41	24.78	4.07	7.40	130	21.38	5.03	88.50	14.53			
	4	1.59	31.18	3.69	8.35	164	19.38	5.48	107.51	12.72			
	Avg	1.46	24.80	3.66	7.67	130	19.22	5.21	88.57	13.07	20.4	11.4	0.28
20	1	1.59	25.95	6.91	4.17	68.14	18.14	4.41	72.08	19.18			
	2	1.83	29.12	7.39	4.80	76.64	19.40	5.22	83.20	21.11			
	3	1.79	28.28	7.63	4.70	74.25	20.03	5.11	80.80	21.80			
	4	1.81	28.31	7.21	4.75	74.33	18.93	5.17	80.88	20.60			
	Avg	1.77	27.92	7.29	4.64	73.31	19.14	5.05	79.77	20.82	18.7	22.9	0.35
30	1	1.87	28.12	15.66	3.21	48.41	26.91	4.45	66.95	37.28			
	2	2.08	29.08	10.34	3.58	50.06	17.80	4.95	69.23	24.61			
	3	2.07	32.13	11.29	3.56	55.31	19.43	3.69	57.37	20.16			
	4	1.93	33.57	10.00	3.32	57.79	17.21	4.70	81.87	24.39			
	Avg	1.99	30.73	11.82	3.42	52.90	20.35	4.42	68.28	26.26	16.8	34.9	0.45
40	1	2.12	34.02	18.78	2.74	44.11	24.35	4.32	69.42	38.32			
	2	2.05	32.03	19.81	2.65	41.53	25.68	4.27	66.72	41.27			
	3	2.20	35.45	14.05	2.85	45.96	18.21	4.48	72.34	28.67			
	4	2.20	34.83	13.73	2.85	45.16	17.80	4.58	72.56	28.60			
	Avg	2.14	34.08	16.59	2.77	44.19	21.51	4.45	71.00	34.56	14.9	46.3	0.48
50	1	1.67	30.91	16.76	1.74	32.13	17.42	3.03	56.20	21.38			
	2	2.33	35.52	17.60	2.42	36.93	18.30	4.23	64.58	32.00			
	3	2.00	36.39	16.12	2.08	37.83	16.76	3.57	64.98	28.78			
	4	2.09	36.47	16.63	2.17	37.91	17.29	3.80	66.30	30.23			
	Avg	2.02	34.82	16.78	2.10	36.20	17.44	3.67	63.30	30.50	13.01	57.7	0.55
60	1	2.05	56.03	15.19	1.77	48.62	13.18	3.25	88.93	24.11			
	2	4.99	195.23	7.67	4.33	169.42	6.65	7.44	291.38	11.44			
	3	5.63	187.35	8.67	4.88	162.58	7.53	8.40	275.51	12.95			
	4	2.23	45.48	17.25	1.93	39.47	14.97	3.43	69.96	26.53			
	Avg	3.37	121.02	12.20	2.92	105.02	10.58	5.10	183.36	18.48	11.45	69.1	0.66
70	1	5.25	222.33	9.05	3.91	165.56	6.74	6.73	285.03	11.60			
	2	5.29	218.61	7.54	3.94	162.79	5.61	6.61	273.26	9.42			
	3	5.25	241.49	9.48	3.91	179.83	7.06	6.64	305.68	12.00			
	4	5.33	242.09	8.09	3.97	180.28	6.02	6.34	288.20	9.63			
	Avg	5.31	231.13	8.54	3.95	172.12	6.35	6.63	288.91	10.67	9.7	80.6	0.80
80	1	5.39	238.13	10.53	3.49	154.34	6.82	6.19	273.71	12.10			
	2	5.87	249.88	7.54	3.80	161.96	4.89	6.59	280.76	8.47			
	3	5.58	266.91	9.99	3.62	172.99	6.47	6.26	299.89	11.22			
	4	5.63	258.32	10.33	3.65	167.43	6.69	6.11	280.78	11.22			
	Avg	5.62	253.31	10.21	3.64	164.18	6.62	6.31	284.61	11.47	7.2	92.6	0.89
90	1	5.38	253.67	13.81	3.10	146.34	7.96	5.60	264.23	14.38			
	2	5.93	269.09	11.28	3.42	155.24	6.51	6.11	277.41	11.62			
	3	6.12	289.27	11.84	3.53	166.88	6.83	6.37	301.32	12.33			
	4	6.03	282.75	11.85	3.48	163.12	6.84	6.28	294.53	12.34			
	Avg	5.86	273.69	12.29	3.38	157.89	7.09	6.10	285.09	12.80	5.4	104.0	0.96
100	1	6.78	361.55	8.87	3.52	187.94	4.61	6.16	328.68	8.06			
	2	6.99	337.46	7.99	3.63	175.42	4.15	6.41	309.59	7.33			
	3	6.71	355.52	6.91	3.49	184.81	3.59	6.10	323.18	6.28			
	4	7.12	368.98	8.07	3.70	171.81	4.19	6.47	335.43	7.33			
	Avg	6.90	353.36	7.96	3.59	183.69	4.14	6.33	324.18	7.30	2.6	115.4	1.09
Closed throttle	1	14.86	7.80	0.07	–	–	–	249.66	130.00	1.16			
	2	14.91	7.34	0.07	–	–	–	248.50	122.33	1.16			
	3	14.30	6.70	0.07	–	–	–	286.00	134.00	1.16			
	4	11.96	7.38	0.07	–	–	–	239.20	147.60	1.16			
	Avg	14.00	7.31	0.07	–	–	–	255.84	146.20	1.16	25.8	0.0	0.05

TABLE A-30. EMISSION RATES FOR 1969 FORD 300-CID ENGINE STATIONARY OPERATED–NO LOAD

April 23, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
1000	1	0.57	14.34	0.02	7.12	179.25	0.25		
	2	0.55	12.81	0.07	6.87	160.12	0.87		
	3	0.55	13.24	0.07	6.87	165.50	0.87		
	4	0.54	11.41	0.02	6.75	142.62	0.25		
	Avg	0.54	12.95	0.05	6.75	161.87	0.62	20.4	0.08
1250	1	0.79	13.89	0.02	8.77	154.33	0.22		
	2	0.76	10.95	0.07	8.44	121.66	0.77		
	3	0.71	12.41	0.07	7.88	137.88	0.77		
	4	0.75	10.77	0.07	8.33	119.66	0.77		
	Avg	0.75	12.01	0.06	8.33	133.44	0.66	21.2	0.09
1500	1	1.12	10.46	0.07	11.20	104.60	0.70		
	2	1.09	7.73	0.02	10.90	77.30	0.20		
	3	1.31	7.51	0.14	13.10	75.10	1.40		
	4	1.34	8.00	0.07	13.40	80.00	0.70		
	Avg	1.21	8.45	0.08	12.10	84.50	0.80	21.5	0.10
1750	1	0.95	6.57	0.14	7.91	54.75	1.16		
	2	1.40	4.25	0.16	12.72	38.63	1.45		
	3	1.25	5.22	0.14	10.41	43.58	1.16		
	4	1.17	4.37	0.21	9.75	36.41	1.75		
	Avg	1.19	5.10	0.16	9.91	42.50	1.45	21.9	0.12
2000	1	0.89	5.94	0.24	6.84	45.92	1.84		
	2	1.02	5.17	0.28	7.84	39.76	2.15		
	3	1.03	5.19	0.21	7.92	39.92	1.61		
	4	1.38	5.46	0.21	10.61	42.00	1.61		
	Avg	1.08	5.44	0.24	8.30	41.84	1.84	22.1	0.13
2250	1	1.05	9.06	0.38	7.00	60.40	2.53		
	2	1.29	8.41	0.28	8.60	56.06	1.86		
	3	1.35	8.84	0.07	9.00	58.93	0.46		
	4	1.43	7.90	0.27	9.53	52.66	1.80		
	Avg	1.28	8.55	0.25	8.53	57.00	1.66	22.2	0.15
2500	1	0.65	6.02	0.52	4.06	37.62	3.25		
	2	0.64	5.50	0.44	4	34.37	2.75		
	3	0.91	6.86	0.44	5.68	42.87	2.75		
	4	1.05	6.71	0.43	6.56	41.93	2.68		
	Avg	0.81	6.27	0.46	5.06	39.18	2.87	22.2	0.16
2750	1	0.65	9.48	0.68	3.61	52.66	3.77		
	2	0.80	10.52	0.67	4.21	55.36	3.52		
	3	1.01	10.23	0.59	5.61	56.83	3.27		
	4	1.04	11.43	0.63	5.77	63.50	3.50		
	Avg	0.88	10.42	0.64	4.88	57.88	3.55	22.2	0.18
3000	1	0.75	14.23	0.90	3.57	67.76	4.28		
	2	0.81	13.48	0.89	4.05	67.40	4.45		
	3	0.89	14.54	0.73	4.23	69.23	3.47		
	4	1.15	16.18	0.79	5.47	77.04	3.76		
	Avg	0.90	14.61	0.83	4.28	69.57	3.95	22.1	0.21
Idle	1	0.57	16.06	0.07	8.14	229.84	1.00		
	2	0.55	13.45	0.07	7.85	192.14	1.00		
	3	0.55	13.87	0.07	7.85	198.14	1.00		
	4	0.49	11.60	0.02	7.00	165.71	0.28		
	Avg	0.54	13.75	0.06	7.71	196.42	0.85	19.8	0.07

TABLE A-31. EMISSION RATES FOR 1969 FORD 300-CID ENGINE
CHASSIS OPERATED–1250 RPM AND IDLE

May 11, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.83	8.27	0.07	–	–	–	9.22	91.88	0.77			
	2	0.54	6.58	0.07	–	–	–	6.00	73.11	0.77			
	3	0.60	6.28	0.07	–	–	–	6.66	69.77	0.77			
	4	0.55	5.28	0.07	–	–	–	6.11	58.66	0.77			
	Avg	0.63	6.60	0.07	–	–	–	7.00	73.33	0.77	21.2	0.0	0.09
10, 20, & 30								No Data					
40	1	0.76	8.14	2.93	2.27	24.30	8.75	3.80	40.70	14.65			
	2	0.81	7.03	3.43	2.42	20.99	10.24	4.05	35.15	17.15			
	3	0.87	6.38	3.25	2.60	19.04	9.70	4.58	33.58	17.11			
	4	0.59	7.07	3.44	1.76	21.10		2.95	35.35	17.20			
	Avg	0.76	7.16	3.26	2.26	21.37	9.73	3.80	35.80	16.30	13.0	20.1	0.20
50	1	1.12	12.82	3.67	2.67	30.52	8.74	4.87	55.74	15.96			
	2	1.18	12.18	3.83	2.81	29.00	9.12	5.13	52.95	16.65			
	3	1.09	10.52	3.92	2.60	25.05	9.33	4.74	45.74	17.04			
	4	1.13	11.07	4.13	2.69	26.36	9.83	4.91	48.13	17.96			
	Avg	1.13	12.18	3.89	2.69	29.00	9.26	4.91	52.96	16.92	11.0	25.2	0.23
60	1	1.26	15.31	4.30	2.50	30.42	8.54	4.85	58.88	16.54			
	2	1.27	16.67	4.50	2.52	33.12	8.94	4.88	64.12	17.31			
	3	1.21	15.29	4.59	2.40	30.38	9.12	4.65	58.81	17.65			
	4	1.01	15.52	4.67	2.01	30.83	9.28	3.88	59.69	17.95			
	Avg	1.19	15.70	4.52	2.36	31.19	8.98	4.58	60.38	16.38	8.9	30.2	0.26
70	1	2.03	92.23	1.30	3.46	157.21	2.22	5.97	271.26	3.82			
	2	2.06	100.79	1.46	3.51	171.80	2.49	8.06	296.44	4.29			
	3	1.95	91.74	1.50	3.32	156.38	2.56	5.74	269.82	4.41			
	4	1.53	91.70	1.46	2.61	156.31	2.49	4.64	277.88	4.42			
	Avg	1.89	92.12	1.43	3.22	157.02	2.43	5.56	270.94	4.21	6.9	35.2	0.34
80	1	2.25	102.50	2.16	3.36	152.99	3.22	5.77	262.82	5.54			
	2	2.20	100.79	1.99	3.28	150.43	2.97	5.64	258.44	5.10			
	3	2.13	102.70	1.89	3.18	153.28	2.82	5.46	263.33	4.84			
	4	1.67	91.70	1.83	2.49	136.87	2.73	4.39	241.33	4.69			
	Avg	2.06	102.45	1.97	3.07	152.91	2.94	5.28	262.69	5.05	4.0	40.2	0.39
90	1	2.59	116.69	4.73	3.44	154.90	6.28	5.59	265.20	10.75			
	2	2.61	124.21	5.57	3.46	164.88	7.39	5.93	282.30	12.66			
	3	2.47	122.73	5.09	3.28	162.92	6.76	5.61	278.93	11.57			
	4	1.99	119.79	5.02	2.64	159.01	6.66	4.52	272.25	11.40			
	Avg	2.42	120.86	5.10	3.1	160.43	6.77	5.50	274.68	11.59	1.8	45.2	0.44
100	1	2.85	129.90	2.75	3.39	154.64	3.27	6.06	276.38	5.85			
	2	2.97	137.66	3.22	3.54	163.88	3.83	6.46	299.26	7.00			
	3	2.70	134.29	2.88	3.21	159.87	3.43	5.74	285.72	6.13			
	4	2.23	136.82	3.09	1.19	162.88	3.68	4.74	291.11	6.57			
	Avg	2.69	134.67	2.99	3.20	160.32	3.56	5.72	286.53	6.36	0.3	50.4	0.47
Idle (650 rpm)	1	0.55	15.47	0.07	–	–	–	7.86	221.00	1.00			
	2	0.44	8.19	0.07	–	–	–	6.29	117.00	1.00			
	3	0.38	11.47	0.07	–	–	–	5.43	163.86	1.00			
	4	0.39	12.39	0.07	–	–	–	5.57	177.00	1.00			
	Avg	0.44	11.88	0.07	–	–	–	6.28	169.71	1.00	19.5	0.0	0.07

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-32. EMISSION RATES FOR 1969 FORD 300-CID ENGINE
CHASSIS OPERATED–2000 RPM

May 11, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.60	3.55	0.31	–	–	–	4.28	25.37	2.27			
	2	0.54	3.08	0.35	–	–	–	3.85	22.00	2.50			
	3	0.44	3.36	0.52	–	–	–	3.14	24.00	3.71			
	4	0.64	3.28	0.35	–	–	–	4.57	23.42	2.50			
	Avg	0.55	3.31	0.38	–	–	–	3.92	23.64	2.71	22.0	0.0	0.14
10 & 20								No Data					
30	1	1.01	23.20	4.84	2.41	55.46	11.57	3.61	82.86	17.29			
	2	1.47	25.64	5.21	3.51	61.29	12.45	5.25	91.57	18.61			
	3	1.54	23.10	5.16	3.68	55.22	12.33	5.50	82.50	18.43			
	4	1.53	24.98	5.02	3.66	59.71	12.00	5.46	89.21	17.93			
	Avg	1.38	24.23	5.06	3.29	57.92	12.09	4.93	86.54	18.07			
40	1	1.32	34.62	5.99	2.36	62.01	10.73	4.55	119.38	20.66			
	2	1.66	36.33	6.48	2.97	65.09	11.61	5.72	125.28	22.34			
	3	1.67	33.15	6.59	2.99	59.37	11.80	5.76	114.31	22.72			
	4	1.72	36.28	6.18	3.08	64.98	11.06	5.93	125.10	21.31			
	Avg	1.59	35.02	6.31	2.84	62.72	11.30	5.48	120.76	21.76	13.8	33.5	0.29
50	1	1.35	37.39	7.74	1.95	54.06	11.19	3.46	95.87	19.85			
	2	1.90	37.92	8.02	2.75	54.82	11.60	4.87	97.23	20.56			
	3	1.92	36.26	8.35	2.78	52.57	12.07	4.92	92.97	21.41			
	4	1.92	36.54	8.36	2.78	52.83	12.09	4.92	93.69	21.44			
	Avg	1.78	37.03	8.12	2.57	53.53	11.74	4.56	94.95	20.82	11.6	41.5	0.39
60	1	1.49	36.55	9.22	1.79	43.95	11.09	3.24	79.46	10.04			
	2	1.93	35.01	9.84	2.32	42.10	11.83	4.20	76.11	21.39			
	3	1.90	34.90	10.28	2.28	41.96	12.36	4.13	75.87	22.35			
	4	2.03	36.71	10.27	2.44	44.14	12.35	4.41	79.80	22.33			
	Avg	1.84	35.79	9.90	2.21	43.03	11.90	4.00	77.80	21.52	9.5	49.9	0.46
70	1	2.32	145.57	4.36	2.38	149.81	4.49	4.22	264.67	7.93			
	2	3.10	149.28	3.94	3.19	153.93	4.05	5.64	271.42	7.16			
	3	3.13	150.68	4.41	3.22	155.07	4.54	5.69	273.96	8.02			
	4	3.14	144.71	4.43	3.23	148.93	4.56	5.71	263.11	8.05			
	Avg	2.92	147.56	4.26	3.00	151.86	4.38	5.31	268.29	7.75	7.6	58.3	0.55
80	1	2.64	175.94	5.96	2.37	158.26	5.36	4.26	283.77	9.61			
	2	3.44	169.55	5.67	3.09	152.52	5.10	5.55	273.47	9.15			
	3	3.19	166.24	6.14	2.87	149.54	5.52	5.15	268.13	9.90			
	4	3.48	162.00	5.92	3.13	145.73	5.33	5.61	261.29	9.55			
	Avg	3.19	168.43	5.92	2.87	151.51	5.32	5.15	271.66	9.55	5.2	66.7	0.62
90	1	2.42	192.18	9.50	1.94	153.74	7.60	3.41	270.68	13.38			
	2	3.27	182.46	9.29	2.62	145.97	7.43	4.61	256.99	13.08			
	3	3.40	178.39	9.17	2.72	142.71	7.34	4.79	251.25	12.92			
	4	3.45	179.39	9.30	2.76	143.92	7.44	4.86	252.66	13.10			
	Avg	3.13	184.10	9.31	2.50	147.28	7.45	4.41	259.30	13.11	3.1	75.0	0.71
100	1	3.18	204.56	9.46	2.29	147.17	6.81	4.42	284.11	13.14			
	2	3.77	194.09	9.21	2.71	139.63	6.63	5.24	269.57	12.79			
	3	3.55	184.22	9.52	2.53	132.53	6.85	4.93	255.86	13.22			
	4	3.78	188.79	9.84	2.72	135.82	7.08	5.25	262.21	13.67			
	Avg	3.57	192.91	9.51	2.56	138.78	6.84	4.96	267.93	13.21	1.1	83.4	0.72

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-33. EMISSION RATES FOR 1969 FORD 300-CID ENGINE CHASSIS OPERATED–3000 RPM

May 11, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	0.90	18.95	2.09	–	–	–	3.60	75.80	8.36			
	2	1.06	20.66	2.07	–	–	–	4.24	82.64	8.28			
	3	0.90	19.61	2.37	–	–	–	3.60	78.44	9.48			
	4	0.75	17.37	2.02	–	–	–	3.00	69.48	8.08			
	Avg	0.90	19.11	2.13	–	–	–	3.60	76.44	8.52	22.1	0.0	0.25
40	1	1.95	35.56	15.23	2.53	46.11	19.75	3.98	72.57	31.08			
	2	1.73	34.23	15.90	2.24	44.39	20.62	3.53	69.86	32.45			
	3	1.72	34.76	13.90	2.23	45.07	18.02	3.51	70.94	28.37			
	4	1.60	35.99	15.12	2.07	46.67	19.61	3.27	73.45	30.86			
	Avg	1.75	35.14	15.04	2.27	45.56	19.50	3.57	71.71	30.69	14.9	46.3	0.49
50	1	1.84	39.50	15.34	1.91	41.07	15.95	3.29	70.54	27.39			
	2	1.67	37.35	16.83	1.74	38.83	17.50	2.98	66.70	30.05			
	3	1.68	38.08	15.96	1.75	39.59	16.59	3.00	68.00	28.50			
	4	1.61	36.16	15.99	1.68	37.59	16.62	2.88	64.57	28.53			
	Avg	1.70	37.77	16.03	1.77	39.27	16.66	3.04	67.45	28.63	13.0	57.7	0.56
60	1	1.43	147.99	15.68	1.24	128.43	13.61	2.10	217.63	23.06			
	2	3.83	194.70	8.06	3.32	168.96	6.99	5.63	286.32	11.85			
	3	3.97	197.27	7.95	3.45	171.19	6.90	5.84	290.10	11.69			
	4	3.85	197.67	7.40	3.34	171.54	6.42	5.66	290.69	10.88			
	Avg	3.27	184.41	9.77	2.84	160.03	8.48	4.81	271.19	14.37	11.4	69.1	0.68
70	1	4.20	218.95	8.38	3.13	163.05	6.24	5.32	277.15	10.60			
	2	4.22	211.61	8.06	3.14	157.58	6.00	5.34	267.86	10.20			
	3	4.02	212.18	8.47	2.99	158.01	6.31	5.09	268.58	10.72			
	4	4.19	221.01	8.36	3.12	164.58	6.23	5.30	279.76	10.58			
	Avg	4.16	215.94	8.32	3.09	160.80	6.19	5.27	273.34	10.53	9.7	80.5	0.79
80	1	4.10	235.03	10.68	2.66	152.34	6.92	4.61	264.08	12.00			
	2	4.37	228.51	10.46	2.83	148.11	6.78	4.91	256.75	11.75			
	3	4.29	233.80	10.85	2.78	151.54	7.03	4.82	262.70	12.19			
	4	4.35	239.19	10.34	2.82	155.03	6.70	4.89	268.75	11.62			
	Avg	4.28	234.13	10.58	2.77	151.75	6.85	7.81	263.07	11.89	7.2	92.6	0.89
90	1	4.49	259.70	12.36	2.59	149.83	7.13	4.68	270.52	12.88			
	2	4.45	256.62	12.11	2.57	148.05	6.99	4.64	267.29	12.61			
	3	4.58	255.96	12.31	2.64	147.67	7.10	4.77	266.63	12.82			
	4	4.70	265.09	11.93	2.71	152.94	6.88	4.90	276.14	12.43			
	Avg	4.56	259.34	12.18	2.63	149.62	7.02	4.75	270.15	12.69	5.4	104.0	0.96
100	1	4.01	296.42	15.15	2.08	154.09	7.88	3.86	285.02	14.57			
	2	4.30	291.66	14.36	2.24	151.62	7.46	4.13	280.44	13.81			
	3	4.37	293.87	16.15	2.27	152.77	8.40	4.20	282.57	15.53			
	4	4.64	318.44	14.89	2.41	165.54	7.74	4.46	306.19	14.32			
	Avg	4.33	300.10	15.14	2.25	156.00	7.87	4.16	288.56	14.56	2.67	115.4	1.04

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-34. EMISSION RATES FOR 1969 FORD 300-CID ENGINE CHASSIS OPERATED–NO LOAD

May 12, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
1000	1	0.55	11.91	0.07	6.87	148.87	0.87		
	2	0.38	8.77	0.07	4.75	109.62	0.87		
	3	0.44	10.16	0.07	5.50	127.00	0.87		
	4	0.39	7.63	0.07	4.87	95.37	0.87		
	Avg	0.44	9.61	0.07	5.50	120.12	0.87	20.2	0.08
1250	1	0.83	8.27	0.07	9.22	91.89	0.77		
	2	0.54	6.58	0.07	6.00	73.11	0.77		
	3	0.60	6.28	0.07	6.66	69.78	0.77		
	4	0.55	5.28	0.07	6.11	58.67	0.77		
	Avg	0.63	6.60	0.07	7.00	73.36	0.77	20.8	0.09
1500	1	0.83	3.35	0.14	7.54	30.45	1.27		
	2	0.27	4.72	0.07	2.45	42.91	0.64		
	3	0.77	5.68	0.14	7.00	51.64	1.27		
	4	0.66	3.69	0.14	6.00	33.55	1.27		
	Avg	0.63	4.36	0.12	5.72	39.64	1.09	21.0	0.11
1750	1	0.77	2.97	0.31	6.41	24.75	2.58		
	2	0.76	2.91	0.21	6.33	24.25	1.75		
	3	1.04	2.80	0.29	8.66	23.33	2.41		
	4	0.98	3.75	0.21	8.16	31.25	1.75		
	Avg	0.88	3.10	0.25	7.33	25.83	2.08	21.2	0.12
2000	1	0.60	3.28	0.35	4.28	23.42	2.50		
	2	0.54	3.36	0.31	3.85	24.00	2.21		
	3	0.44	3.55	0.52	3.14	25.35	3.71		
	4	0.64	3.08	0.35	4.57	22.00	2.50		
	Avg	0.55	3.31	0.38	3.92	23.64	2.71	21.4	0.14
2250	1	0.60	4.82	0.57	3.75	30.12	3.56		
	2	0.32	4.48	0.77	2.00	28.00	4.81		
	3	0.33	4.10	0.59	2.06	25.62	3.68		
	4	0.53	4.35	0.69	3.31	27.18	4.31		
	Avg	0.44	4.43	0.65	2.75	27.68	4.06	21.6	0.16
2500	1	0.38	7.54	0.98	2.00	39.68	5.15		
	2	0.48	7.55	0.96	2.52	39.73	5.05		
	3	0.32	7.55	0.75	1.68	39.73	3.94		
	4	0.48	8.32	0.94	2.52	43.78	4.94		
	Avg	0.41	7.74	0.90	2.15	40.73	4.73	21.6	0.19
2750	1	0.70	11.22	1.42	3.18	51.00	6.45		
	2	0.64	14.97	1.42	2.90	68.04	6.45		
	3	0.70	11.96	1.53	3.18	54.36	6.95		
	4	0.74	12.42	1.40	3.36	56.45	6.36		
	Avg	0.69	12.64	1.44	3.13	57.45	6.54	21.4	0.22
3000	1	1.06	19.61	2.09	4.24	78.44	8.36		
	2	0.90	17.37	2.07	3.60	69.48	8.28		
	3	0.90	18.95	2.37	3.60	75.80	9.48		
	4	0.75	20.66	2.02	3.00	82.64	8.08		
	Avg	0.90	19.14	2.13	3.60	76.56	8.52	21.1	0.25
Idle	1	0.55	15.47	0.07	7.85	221.00	1.00		
	2	0.44	8.19	0.07	6.28	117.00	1.00		
	3	0.38	11.47	0.07	5.42	163.85	1.00		
	4	0.39	12.39	0.07	5.57	177.00	1.00		
	Avg	0.45	11.88	0.07	6.42	169.71	1.00	19.2	0.07

TABLE A-35. EMISSION RATES FOR 1969 FORD 300-CID ENGINE
CHASSIS OPERATED–CLOSED THROTTLE

May 11, 1971

Engine RPM	Run No.	Emission Rates*				Engine Data	
		Grams per Minute		Grams per Pound of Fuel		Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	HC	CO		
2874	1	8.90	4.19	148.33	69.83		
	2	9.56	5.68	159.33	94.67		
	Avg	9.23	4.94	153.83	82.33	25.8	0.06
2608	1	8.27	5.72	137.83	95.33		
	2	8.76	5.88	146.00	98.00		
	Avg	8.52	5.80	142.00	96.67	25.8	0.06
2449	1	8.32	5.91	166.40	118.20		
	2	8.48	5.33	169.60	106.60		
	Avg	8.40	5.62	168.00	112.40	25.8	0.05
2289	1	8.36	3.99	167.00	79.80		
	2	8.24	4.91	164.80	98.20		
	Avg	8.30	4.45	166.00	89.00	25.6	0.05
2185	1	8.29	4.25	138.17	70.83		
	2	7.93	5.69	132.17	94.83		
	Avg	8.11	4.97	135.17	82.83	25.3	0.06
1955	1	9.52	4.82	190.40	96.40		
	2	7.53	4.23	150.60	84.60		
	Avg	8.53	4.52	170.60	90.40	25.1	0.05
1785	1	9.08	5.29	227.0	132.25		
	2	8.92	5.69	223.0	142.25		
	Avg	9.00	5.49	225.0	137.25	24.5	0.04

*Oxides of nitrogen concentrations were negligible by NDIR and therefore not reported.

TABLE A-36. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE
STATIONARY OPERATED–1250 RPM AND IDLE

June 11, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	6.98	5.91	0.10	–	–	–	139.6	118.2	2			
	2	6.46	7.32	0.10	–	–	–	161.5	183	2.5			
	3	7.14	6.42	0.12	–	–	–	142.8	128.4	2.4			
	4	7.12	6.86	0.10	–	–	–	142.8	171.5	2.5			
	Avg	6.92	6.38	0.11	–	–	–	138.40	127.60	2.20	21.9	0.0	0.05
10	1	2.75	11.62	0.45	33.00	139.44	5.40	17.18	72.63	2.81			
	2	2.31	14.77	0.60	27.72	177.24	7.20	15.40	98.46	4.00			
	3	3.14	13.56	0.81	37.68	162.72	9.72	22.42	96.85	5.78			
	4	1.83	11.81	0.95	21.96	141.72	11.40	14.07	90.85	7.31			
	Avg	2.50	12.94	0.70	30.00	155.30	8.40	16.66	86.26	4.66	19.5	5.0	0.15
20	1	1.59	13.92	1.04	9.32	81.64	6.09	9.94	87.00	6.50			
	2	2.26	17.26	1.53	13.25	101.23	8.97	13.29	101.53	9.00			
	3	2.50	13.94	1.14	14.66	81.75	6.68	15.62	87.12	7.13			
	4	1.93	16.57	1.85	11.31	97.18	10.85	12.06	103.56	11.56			
	Avg	2.07	15.42	1.39	12.14	90.43	8.15	12.93	96.37	8.68	18.3	10.23	0.16
30	1	1.70	17.80	1.99	6.69	70.12	7.83	8.95	93.68	10.47			
	2	1.93	20.10	1.98	7.60	79.18	7.80	9.19	95.71	9.43			
	3	1.81	25.01	1.99	7.13	98.52	7.83	10.05	138.94	11.05			
	4	2.13	25.98	2.02	8.39	102.35	7.95	11.83	144.33	11.22			
	Avg	1.89	22.22	1.99	7.44	87.53	7.83	9.95	116.95	10.47	16.3	15.23	0.19
40	1	2.02	26.27	1.03	5.99	77.91	3.05	8.78	114.22	4.48			
	2	2.16	28.90	2.70	6.40	85.71	8.00	10.80	144.50	13.50			
	3	2.34	28.77	2.62	6.94	85.32	7.77	10.64	130.77	11.90			
	4	2.27	26.93	2.60	6.73	79.87	7.71	10.32	122.49	11.82			
	Avg	2.19	27.71	2.23	6.49	82.18	6.61	9.95	125.95	10.14	14.4	20.23	0.22
50	1	2.27	24.36	2.39	5.34	57.38	5.63	8.73	93.69	9.19			
	2	2.26	29.66	3.22	5.32	69.87	7.58	8.69	114.07	12.38			
	3	2.43	30.22	3.55	5.72	71.18	8.36	9.72	120.88	14.20			
	4	2.82	30.99	3.20	6.64	73.00	7.53	11.28	123.96	12.80			
	Avg	2.44	28.65	3.09	5.74	67.49	7.27	9.38	110.19	11.88	12.4	25.47	0.26
60	1	1.39	28.67	3.82	2.73	56.45	7.52	4.74	98.86	13.17			
	2	2.39	28.65	4.45	4.70	56.41	8.76	7.97	95.50	14.83			
	3	2.51	31.77	3.60	4.94	62.55	7.08	8.65	109.55	12.41			
	4	2.65	28.97	3.28	5.21	57.05	7.44	9.46	103.46	13.50			
	Avg	2.23	29.69	3.91	4.39	58.46	7.70	7.69	102.37	13.48	10.6	30.47	0.29
70	1	2.54	25.69	4.27	4.30	33.44	7.22	7.93	80.28	13.34			
	2	2.32	30.00	4.69	3.92	50.75	7.93	7.25	93.75	14.65			
	3	2.52	25.56	4.15	4.26	33.24	7.02	8.12	82.45	13.38			
	4	2.39	28.64	3.99	4.04	48.45	6.75	7.46	89.50	12.46			
	Avg	2.44	27.47	4.25	4.13	46.47	7.19	7.62	85.84	13.28	8.5	35.47	0.32
80	1	2.62	50.47	4.84	3.88	74.83	7.18	7.48	144.20	13.82			
	2	2.33	34.30	5.01	3.45	50.85	7.43	6.47	95.27	13.91			
	3	2.31	24.78	3.75	3.42	36.74	5.56	6.24	66.97	10.13			
	4	2.51	30.27	4.44	3.72	35.03	6.58	6.78	86.48	12.68			
	Avg	2.44	34.95	4.51	3.62	51.82	6.69	6.77	97.08	12.52	6.3	40.47	0.36
90	1	4.62	220.52	0.50	6.06	289	0.66	9.05	432.39	0.98			
	2	4.89	219.16	0.74	6.42	288	0.97	9.78	438.32	1.48			
	3	4.62	190.76	0.58	6.06	251	0.76	9.24	381.52	1.16			
	4	5.08	219.22	0.51	6.67	287	0.67	10.16	438.44	1.02			
	Avg	4.80	212.00	0.58	6.30	278	0.76	9.60	424.00	1.16	4.3	45.71	0.50
100	1	6.91	240.39	1.40	8.18	284	1.66	11.51	400.65	2.33			
	2	6.96	279.04	0.96	8.24	230	1.14	11.60	465.06	1.60			
	3	8.19	158.51	1.05	9.69	306	1.24	13.42	423.78	1.72			
	4	7.49	249.93	1.03	8.86	296	1.22	12.48	416.55	1.71			
	Avg	7.38	256.96	1.11	8.73	304.03	1.31	12.30	428.26	1.85	0.4	50.71	0.60
Closed throttle	1	10.10	1.69	0.14	–	–	–	202.00	33.80	2.80			
	2	9.98	2.42	0.07	–	–	–	199.60	48.40	1.40			
	3	10.01	2.94	0.09	–	–	–	200.20	58.80	1.80			
	4	9.92	4.00	0.07	–	–	–	198.40	80.00	1.40			
	Avg	10.01	2.77	0.10	–	–	–	200.20	54.40	2.00	24.5	0.0	0.05
Idle (650 rpm)	1	2.52	2.03	0.26	–	–	–	50.40	40.60	5.20			
	2	1.80	2.05	0.07	–	–	–	45.00	51.25	1.75			
	3	1.68	1.68	0.02	–	–	–	42.00	42.00	0.50			
	4	1.61	1.61	0.02	–	–	–	32.20	32.20	0.40			
	Avg	1.90	2.03	0.09	–	–	–	47.50	50.75	2.25	21.5	0.0	0.04

TABLE A-37. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE
STATIONARY OPERATED–1500 RPM

June 11, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	7.56	10.46	0.14	–	–	–	63.00	87.16	1.16			
	2	8.09	11.99	0.14	–	–	–	73.54	109.00	1.27			
	3	9.63	8.32	0.14	–	–	–	87.54	75.63	1.27			
	4	8.10	10.18	0.14	–	–	–	73.63	92.54	1.27			
	Avg	8.35	10.24	0.14	–	–	–	75.90	93.09	1.27	21.7	0.0	0.11
10	1	3.22	15.55	0.74	29.27	141	6.72	20.12	97.18	4.62			
	2	4.02	14.55	0.73	36.54	132	6.63	25.12	90.93	4.56			
	3	3.66	12.54	0.37	33.27	114	3.36	22.87	78.37	2.31			
	4	2.92	13.32	0.36	26.54	121	3.27	17.17	78.35	2.11			
	Avg	3.70	13.99	0.55	33.63	127	5.00	23.12	87.43	3.43	19.4	6.6	0.16
20	1	2.02	54.03	0.97	9.00	242	4.34	10.10	270	4.85			
	2	2.29	24.15	1.35	10.25	108	6.04	11.45	121	6.75			
	3	1.88	22.40	0.80	8.41	100	3.58	9.89	118	4.21			
	4	1.94	25.03	0.80	10.25	112	3.58	10.21	132	4.21			
	Avg	2.03	31.40	0.98	9.08	141	4.38	10.15	157	4.90	17.9	13.4	0.20
30	1	2.35	30.43	2.73	7.05	91	8.19	10.22	132	11.87			
	2	2.41	33.90	2.77	7.23	102	8.31	10.04	141	11.54			
	3	2.25	28.67	1.47	6.75	86	2.41	9.38	119	5.13			
	4	2.19	29.22	1.37	6.57	88	4.11	9.13	122	5.71			
	Avg	2.30	30.55	2.08	6.90	92	6.24	9.58	127	8.67	15.9	20.0	0.24
40	1	2.58	29.64	3.74	5.57	64	8.07	8.90	102	12.90			
	2	2.69	34.22	4.11	5.81	74	8.87	9.61	122	14.68			
	3	2.50	32.65	2.19	5.40	70	4.73	8.93	117	7.82			
	4	1.76	28.99	2.22	3.80	63	4.79	6.29	104	7.93			
	Avg	2.38	31.37	3.06	5.14	68	6.60	8.50	112	10.93	13.6	27.8	0.28
50	1	2.73	30.76	5.26	4.90	55	9.45	8.27	93	15.94			
	2	2.77	33.89	4.84	4.98	61	8.69	8.66	106	15.13			
	3	2.47	26.75	2.67	4.44	48	4.80	7.72	84	8.34			
	4	2.59	29.12	2.59	4.65	52	4.65	8.09	91	8.09			
	Avg	2.64	30.12	3.84	4.74	54	6.90	8.25	94	12.00	11.6	33.4	0.32
60	1	2.83	27.82	5.90	4.25	42	8.85	7.86	77	16.39			
	2	2.55	34.32	5.66	3.83	51	8.49	7.08	95	15.72			
	3	2.57	28.43	3.15	3.86	43	4.73	7.14	79	8.75			
	4	2.65	27.96	2.89	3.98	42	4.34	7.36	78	8.03			
	Avg	2.65	29.63	4.40	3.98	44	6.60	7.36	82	12.22	9.6	40.0	0.36
70	1	2.47	28.04	5.92	3.10	35	7.43	5.88	67	14.10			
	2	2.65	28.07	5.29	3.33	35	6.64	6.46	68	12.90			
	3	2.45	31.11	3.13	3.08	39	3.93	5.98	76	7.63			
	4	2.54	35.44	2.92	3.19	44	3.67	6.35	89	7.30			
	Avg	2.52	30.66	4.31	3.16	38	5.41	6.15	75	10.48	7.2	47.8	0.41
80	1	5.16	246.12	0.69	5.80	277	0.78	8.60	410	1.15			
	2	5.47	194.08	0.74	6.15	218	0.83	9.43	335	1.28			
	3	5.17	268.90	0.34	5.81	302	0.38	8.91	464	0.59			
	4	4.99	253.14	0.40	5.61	284	0.45	8.75	444	0.70			
	Avg	5.19	240.56	0.54	5.83	270	0.61	8.95	415	.93	5.3	53.4	0.58
90	1	5.74	276.67	0.75	5.72	276	0.75	8.96	432	1.17			
	2	5.91	235.64	0.68	5.89	235	0.68	9.09	363	1.04			
	3	5.71	281.86	0.40	5.69	286	0.40	8.78	453	.66			
	4	5.89	287.47	0.40	5.87	287	0.40	9.06	442	.61			
	Avg	5.81	270.38	0.55	5.79	269	0.55	8.93	416	.84	3.2	60.20.65	
100	1	10.19	324.10	3.36	9.15	291	3.02	13.77	438	4.54			
	2	11.88	352.31	1.21	10.67	316	1.09	16.05	476	1.63			
	3	11.44	341.79	1.65	10.28	307	1.48	15.45	462	2.22			
	4	8.19	327.98	1.96	7.36	295	1.76	11.06	443	2.64			
	Avg	10.42	336.59	2.04	9.36	302	1.83	14.08	455	2.75	0.6	66.8	0.74
Closed throttle	1	11.71	3.14	0.24	–	–	–	292.75	88.50	6.00			
	2	10.46	4.56	0.07	–	–	–	209.20	91.20	1.40			
	3	9.98	2.79	0.09	–	–	–	199.60	55.80	1.80			
	4	10.18	1.86	0.16	–	–	–	203.60	37.20	3.20			
	Avg	10.59	3.09	0.15	–	–	–	211.80	61.80	3.00	25.0	0.0	0.05

TABLE A-38. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE
STATIONARY OPERATED–2000 RPM

June 15, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	6.08	17.84	0.30	–	–	–	38	111.5	1.87			
	2	6.85	19.19	0.14	–	–	–	48.92	137.07	1			
	3	7.56	16.96	0.30	–	–	–	54	121.14	2.14			
	4	6.69	17.04	0.16	–	–	–	47.78	121.71	1.14			
	Avg	6.82	18.07	0.22	–	–	–	45.46	120.46	1.46	21.5	0.0	0.15
10	1	1.72	30.39	0.88	11.34	200	5.80	7.48	132	3.83			
	2	2.22	35.30	0.94	14.64	233	6.20	10.09	160	4.27			
	3	2.02	31.81	0.99	13.32	210	6.53	9.18	145	4.50			
	4	2.19	27.41	0.73	14.44	181	4.81	9.95	125	3.32			
	Avg	2.03	31.22	0.90	13.38	206	5.93	9.23	142	4.09	19.3	9.1	0.22
20	1	2.30	35.10	2.43	10.59	113	7.80	8.52	130	9.00			
	2	2.20	34.27	2.59	7.06	110	8.31	8.14	132	9.96			
	3	1.94	30.53	2.36	6.22	98	7.57	7.19	113	8.74			
	4	1.96	28.30	2.40	6.29	91	7.70	7.26	105	8.88			
	Avg	2.10	32.05	2.51	6.74	103	8.05	7.77	119	9.30	17.5	18.7	0.27
30	1	2.65	32.35	5.10	5.72	70	11.00	8.03	98	15.45			
	2	2.62	37.64	4.50	5.65	81	9.71	7.94	114	13.64			
	3	2.31	34.21	4.72	4.99	74	10.19	7.00	104	14.30			
	4	2.29	28.20	3.18	4.94	61	6.86	7.16	88	9.94			
	Avg	2.52	33.10	4.38	5.44	71	9.45	7.64	100	13.27	15.4	27.8	0.33
40	1	2.86	34.93	7.53	4.64	57	12.21	7.33	90	19.31			
	2	2.83	37.10	6.44	4.59	60	10.44	7.26	95	17.08			
	3	2.43	37.72	6.33	3.94	61	10.26	6.57	102	17.11			
	4	2.52	30.54	6.70	4.09	50	10.86	6.81	83	18.11			
	Avg	2.65	35.05	6.75	4.30	57	10.95	6.97	92	17.76	13	37	0.38
50	1	2.90	35.75	7.72	3.74	46	9.96	6.74	81	17.95			
	2	3.06	37.86	6.91	3.95	49	8.92	7.12	88	16.07			
	3	2.62	35.56	8.09	3.38	46	10.44	5.95	81	18.39			
	4	2.65	32.20	8.09	3.42	42	10.44	6.02	73	18.39			
	Avg	2.80	35.34	7.70	3.61	46	9.94	6.36	80	17.50	11.1	46.5	0.44
60	1	2.90	33.20	8.91	3.13	36	9.62	5.80	66	17.82			
	2	2.93	35.86	8.86	3.16	39	9.56	5.86	72	17.72			
	3	2.63	33.53	8.91	2.84	36	9.62	5.37	68	18.18			
	4	2.61	37.30	8.46	2.82	40	9.13	5.33	76	17.27			
	Avg	2.77	34.97	8.79	2.99	38	9.49	5.54	70	17.58	9.0	55.6	0.50
70	1	2.68	27.58	9.75	2.57	26	9.03	4.96	51	18.06			
	2	3.01	37.70	9.07	2.79	35	8.40	5.38	67	16.20			
	3	2.37	29.99	9.15	2.19	28	8.47	4.39	56	16.94			
	4	2.49	32.33	8.31	2.31	30	7.69	4.53	59	15.11			
	Avg	2.64	31.90	9.07	2.44	30	8.40	4.80	58	16.49	6.7	64.8	0.55
80	1	7.35	346	1.13	5.88	277	0.90	9.19	433	1.41			
	2	6.99	339	1.03	5.59	271	0.82	8.85	429	1.30			
	3	6.20	347	1.20	5.03	281	0.97	7.75	434	1.50			
	4	6.20	325	1.13	5.03	264	0.92	7.85	411	1.43			
	Avg	6.99	339	1.12	5.59	271	0.90	8.73	429	1.40	4.9	75.0	0.80
90	1	7.50	370	1.32	5.40	266	0.95	8.93	440	1.57			
	2	7.80	384	1.35	5.61	276	0.97	8.86	436	1.53			
	3	6.42	372	1.47	4.62	268	1.06	7.30	423	1.67			
	4	6.71	349	1.40	4.83	251	1.01	7.71	401	1.61			
	Avg	7.11	369	1.38	5.12	265	0.99	8.17	424	1.59	2.8	83.4	0.87
100	1	8.90	441	1.71	5.77	286	1.11	9.08	455	1.74			
	2	9.16	441	1.11	5.94	286	0.72	9.35	455	1.13			
	3	8.21	434	1.98	5.32	281	1.28	8.29	438	2.00			
	4	10.75	414	3.98	6.97	268	2.58	10.64	410	3.94			
	Avg	9.25	433	2.20	5.99	281	1.43	9.34	437	2.22	1.1	92.6	0.99
Closed throttle	1	11.10	1.86	0.0	–	–	–	222.00	37.20	0			
	2	8.48	3.17	0.14	–	–	–	169.60	63.40	2.80			
	3	7.82	4.46	0.07	–	–	–	156.40	89.20	1.40			
	4	11.52	5.88	0.0	–	–	–	230.40	117.60	0			
	Avg	9.73	3.84	0.05	–	–	–	194.60	76.80	1.00	25.4	0.0	0.05

TABLE A-39. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE STATIONARY OPERATED–2500 RPM

June 16, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	4.88	30.86	0.46	–	–	–	24	154.30	2.30			
	2	4.98	27.68	0.28	–	–	–	26.21	145.68	1.47			
	3	5.55	27.04	0.27	–	–	–	29.21	142.31	1.42			
	4	5.16	31.09	0.26	–	–	–	25.81	155.45	1.30			
	Avg	5.14	29.17	0.32	–	–	–	25.70	145.85	1.60	21.5	0.0	0.20
10	1	2.15	32.94	1.23	11.73	180	6.71	7.68	118	4.39			
	2	2.20	37.23	1.86	12.00	203	10.15	6.83	124	6.20			
	3	2.04	38.49	1.41	11.13	210	7.69	6.58	124	4.55			
	4	2.23	42.05	1.53	12.16	229	8.35	7.19	136	4.94			
	Avg	2.15	37.67	1.50	11.73	205	8.18	7.07	126	5.00	19.4	11.0	0.30
20	1	2.20	36.14	2.31	6.03	99	6.33	7.10	117	6.55			
	2	2.20	38.77	3.80	6.03	106	10.41	6.47	114	11.18			
	3	2.31	41.95	3.44	6.33	115	9.42	7.00	127	10.42			
	4	2.52	44.34	3.15	6.90	121	8.63	7.41	130	9.26			
	Avg	2.33	40.30	3.17	6.38	110	8.68	7.06	122	9.61	17.5	21.9	0.33
30	1	2.75	37.29	6.17	5.02	68	11.25	7.05	96	15.82			
	2	2.64	42.58	6.19	4.81	78	11.29	6.60	106	15.48			
	3	2.60	37.53	6.10	4.74	68	11.12	6.67	96	15.64			
	4	2.68	43.78	5.77	4.89	80	10.52	5.17	109	14.43			
	Avg	2.66	40.29	6.05	4.85	73	11.03	6.82	103	15.51	15.4	32.9	0.39
40	1	2.49	43.38	8.24	3.41	59	11.29	5.30	92	17.53			
	2	2.79	45.95	8.38	3.82	63	11.48	5.58	92	16.76			
	3	2.82	44.90	8.53	3.86	62	11.68	6.27	100	18.96			
	4	2.80	42.40	8.49	3.84	58	11.63	5.83	68	17.69			
	Avg	2.67	44.15	8.41	3.66	60	11.52	5.56	92	17.52	13.3	43.8	0.48
50	1	2.80	43.39	9.95	3.07	48	10.89	5.38	83	19.13			
	2	2.86	38.79	10.35	3.13	42	11.33	5.50	75	19.90			
	3	3.08	42.56	11.34	3.37	47	12.32	5.81	80	21.40			
	4	2.90	40.54	10.62	3.18	44	11.63	5.47	76	20.04			
	Avg	2.91	41.32	10.56	3.19	45	11.56	5.49	78	19.92	11.3	54.8	0.53
60	1	2.83	39.36	11.08	2.58	36	10.12	4.88	68	19.10			
	2	2.84	38.21	11.60	2.59	35	10.59	3.66	63	19.02			
	3	3.06	42.57	11.79	2.79	39	10.77	5.10	71	19.65			
	4	3.24	38.01	11.24	2.96	35	10.26	5.40	63	18.73			
	Avg	2.99	39.53	11.42	2.73	36	10.43	4.98	66	19.03	9.4	65.7	0.60
70	1	2.82	42.13	11.30	2.21	33	8.84	4.03	60	16.14			
	2	3.04	39.32	12.07	2.38	31	9.44	4.47	58	17.75			
	3	2.87	36.82	12.77	2.25	29	9.99	4.22	54	18.78			
	4	3.10	38.77	10.74	2.43	30	8.40	4.63	58	16.03			
	Avg	2.95	39.26	11.72	2.31	31	9.17	4.34	58	17.24	7.6	76.7	0.68
80	1	5.27	227	4.32	3.61	155	2.96	6.43	277	5.27			
	2	6.43	288	2.80	4.41	197	1.92	7.31	327	3.18			
	3	6.81	326	2.44	4.66	223	1.67	8.51	408	3.05			
	4	5.75	233	3.90	3.94	160	2.67	6.93	281	4.70			
	Avg	6.01	268	3.37	4.12	184	2.31	7.24	323	4.06	5.7	87.6	0.83
90	1	7.79	456	1.88	4.74	277	1.14	7.79	456	1.88			
	2	8.06	431	1.92	4.90	262	1.17	7.83	418	1.86			
	3	8.01	426	1.87	4.87	259	1.14	7.42	394	1.73			
	4	8.20	440	1.58	4.99	268	0.96	7.88	423	1.52			
	Avg	8.01	438	1.81	4.87	267	1.11	7.70	421	1.74	3.7	98.6	1.04
100	1	11.81	510	5.64	6.44	278	3.08	10.09	336	4.82			
	2	10.46	527	2.62	5.71	287	1.43	8.86	447	2.22			
	3	9.65	504	2.83	5.26	275	1.54	8.18	427	2.40			
	4	10.72	531	2.64	5.85	290	1.44	8.86	439	2.18			
	Avg	10.66	518	3.38	5.81	283	1.84	8.96	435	2.84	1.6	110.0	1.19
Closed throttle	1	8.18	1.86	0.07	–	–	–	163.6	37	1.40			
	2	7.71	2.60	0.0	–	–	–	154.2	52	0			
	3	10.55	5.73	0.07	–	–	–	211	113	1.40			
	4	8.90	6.08	0.07	–	–	–	178.00	122	1.40			
	Avg	8.84	4.07	0.05	–	–	–	176.8	81	1.00	25.5	0.0	0.05

TABLE A-40. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE
STATIONARY OPERATED–3000 RPM

June 17, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	3.09	36.79	0.43	–	–	–	12.88	153	1.79			
	2	2.97	36.30	0.44	–	–	–	12.91	158	1.91			
	3	3.07	31.28	0.44	–	–	–	13.35	136	1.91			
	4	4.51	34.23	0.36	–	–	–	19.61	149	1.57			
	Avg	3.41	34.65	0.42	–	–	–	14.83	151	1.83	20.8	0.0	0.23
10	1	1.90	34.94	2.71	9.05	166	12.90	5.14	94	7.32			
	2	1.39	40.30	3.02	6.62	192	14.38	3.86	112	8.39			
	3	1.88	36.44	1.93	8.95	174	9.19	5.08	98	5.22			
	4	2.00	36.68	2.12	9.52	175	10.10	5.56	102	5.89			
	Avg	1.79	37.09	2.45	8.52	177	11.67	4.84	100	6.62	18.9	12.6	0.37
20	1	1.90	45.57	3.76	4.54	109	8.99	4.75	114	9.40			
	2	2.13	36.54	4.54	5.09	87	10.85	5.33	91	11.35			
	3	2.18	39.64	4.03	5.21	95	9.63	5.45	98	10.08			
	4	1.62	41.86	4.44	3.87	100	10.61	4.05	105	11.10			
	Avg	1.97	40.90	4.19	4.71	98	10.02	4.93	102	10.48	17.2	25.1	0.40
30	1	2.27	50.39	7.22	3.61	80	11.49	4.63	103	14.73			
	2	2.16	39.72	7.51	3.44	63	11.95	4.50	83	15.65			
	3	2.26	38.73	7.71	3.60	62	12.27	4.52	77	15.42			
	4	1.75	46.95	7.34	2.79	75	11.68	3.65	98	15.29			
	Avg	2.11	43.95	7.45	3.36	70	11.86	4.31	90	15.20	15.1	37.7	0.49
40	1	2.16	39.54	10.62	2.58	47	12.67	3.79	52	18.63			
	2	2.39	36.13	10.98	2.85	43	13.10	4.27	65	19.61			
	3	2.44	38.53	11.81	2.91	46	14.09	4.21	66	20.36			
	4	1.93	48.36	10.48	2.30	58	12.50	3.57	90	19.41			
	Avg	2.23	40.64	10.97	2.66	48	13.09	3.98	73	19.59	13.2	50.3	0.56
50	1	2.50	42.76	12.27	2.38	41	11.70	3.97	68	19.48			
	2	2.56	36.39	13.20	2.44	35	12.59	4.00	57	20.63			
	3	2.65	35.70	12.88	2.53	34	12.29	4.14	56	20.13			
	4	1.98	42.00	12.41	1.89	40	11.84	3.19	68	20.02			
	Avg	2.42	39.29	12.69	2.31	37	12.11	3.78	61	19.83	11.2	62.9	0.64
60	1	2.42	42.12	12.73	1.93	34	10.13	3.46	60	18.19			
	2	2.41	34.25	13.77	1.92	27	10.96	3.60	51	20.55			
	3	2.48	34.71	14.27	1.97	28	11.36	3.35	47	19.28			
	4	1.83	38.43	13.31	1.46	31	10.59	2.58	54	18.78			
	Avg	2.29	37.38	13.52	1.82	30	10.76	3.23	53	19.04	9.2	75.4	0.71
70	1	1.85	31.65	12.92	1.26	22	8.82	2.34	45	16.35			
	2	2.03	32.39	13.54	1.38	22	9.23	2.60	42	17.36			
	3	1.98	29.79	14.86	1.35	20	10.13	2.51	38	18.81			
	4	1.77	34.07	12.74	1.21	23	8.69	2.27	44	16.33			
	Avg	1.91	31.98	13.52	1.30	22	9.22	2.42	40	17.11	7.0	88.0	0.79
80	1	4.51	161.23	9.22	2.69	96	5.50	4.90	175	10.02			
	2	5.31	178.00	8.85	3.17	106	5.09	5.59	187	9.32			
	3	7.43	404.86	2.70	4.43	242	1.61	7.15	389	2.60			
	4	5.07	310.10	2.03	3.02	185	1.21	5.07	310	2.03			
	Avg	5.58	264.00	6.24	3.32	157	3.72	5.69	269	6.37	6.0	100.6	0.98
90	1	8.11	492.15	2.71	4.30	261	1.44	6.65	403	2.22			
	2	8.30	532.19	2.60	4.40	282	1.38	6.86	440	2.15			
	3	8.45	462.76	2.51	4.48	246	1.33	5.99	383	2.07			
	4	7.08	523.92	2.93	3.76	278	1.55	5.80	430	2.40			
	Avg	7.99	503.00	2.59	4.24	267	1.37	6.55	412	2.12	4.2	113.1	1.22
100	1	10.09	591.45	3.92	4.82	282	1.87	7.88	462	3.06			
	2	9.98	606.95	3.98	4.76	290	1.90	7.74	47	3.09			
	3	10.86	525.53	4.61	5.18	251	2.20	7.93	383	3.36			
	4	9.11	571.22	4.72	4.35	129	2.25	6.55	411	3.40			
	Avg	10.01	574.00	4.31	4.78	274	2.06	7.53	432	3.21	2.4	125.7	1.33
Closed throttle	1	8.40	2.23	0.0	–	–	–	168.00	44.60	0			
	2	8.22	2.41	0.14	–	–	–	205.50	60.25	3.50			
	3	8.98	5.55	0.09	–	–	–	179.60	111.00	1.80			
	4	7.89	5.32	0.0	–	–	–	157.80	106.40	0			
	Avg	8.38	3.88	0.06	–	–	–	167.60	77.60	1.20	25.7	0.0	0.05

TABLE A-41. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE STATIONARY OPERATED–3500 RPM

June 21, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	3.65	20.37	0.68	–	–	–	12.59	70	2.34			
	2	4.14	19.79	0.61	–	–	–	13.35	64	1.97			
	3	3.87	39.45	0.66	–	–	–	12.90	132	2.20			
	4	6.82	36.08	0.73	–	–	–	22.00	116	2.35			
	Avg	4.62	28.95	0.67	–	–	–	15.40	97	2.23	19.5	0.0	0.30
10	1	1.63	44.30	2.86	6.52	177	11.44	3.79	103	6.65			
	2	1.70	45.76	3.79	6.80	183	15.16	4.05	109	9.02			
	3	2.16	52.66	2.89	8.64	211	11.56	5.27	128	7.05			
	4	2.10	46.66	3.95	8.40	187	15.80	4.77	106	8.98			
	Avg	1.90	47.34	3.37	7.60	189	13.48	4.42	110	7.84	17.6	15.0	0.43
20	1	1.79	61.88	5.07	3.93	136	11.14	3.51	121	9.94			
	2	1.48	47.59	4.88	3.25	105	10.72	3.02	97	9.96			
	3	2.09	55.12	4.24	4.59	121	9.31	4.35	115	8.83			
	4	2.41	48.17	5.81	5.29	106	12.76	5.02	100	12.10			
	Avg	1.94	53.19	4.75	4.26	117	10.43	3.96	109	9.69	16.4	27.3	0.49
30	1	1.85	50.04	6.38	2.69	73	9.27	3.30	89	11.39			
	2	1.79	47.98	8.04	2.60	70	11.68	3.20	86	14.35			
	3	2.09	52.68	7.96	3.04	77	11.56	3.80	96	14.47			
	4	2.40	44.38	9.08	3.49	64	13.19	4.29	79	16.21			
	Avg	2.03	48.77	7.86	2.95	71	11.42	3.63	87	14.04	14.8	41.3	0.56
40	1	1.94	36.15	12.73	2.09	39	13.71	2.85	53	18.72			
	2	1.72	45.61	11.73	1.85	49	12.64	2.65	70	18.05			
	3	2.09	43.78	11.70	2.25	47	12.60	3.27	68	18.28			
	4	2.32	38.34	14.07	2.50	41	15.16	3.57	59	21.64			
	Avg	2.01	40.97	12.55	2.17	44	13.52	3.05	62	19.02	12.7	55.7	0.66
50	1	1.95	35.45	14.31	1.70	31	12.50	3.67	49	19.60			
	2	1.91	32.44	14.11	1.67	28	12.32	2.58	44	19.06			
	3	1.33	26.96	14.61	1.16	24	12.76	1.66	34	18.26			
	4	2.05	33.51	16.00	1.79	29	13.97	2.70	44	21.05			
	Avg	1.81	32.09	14.76	1.58	28	12.89	2.38	43	19.42	10.7	68.7	0.76
60	1	1.79	29.74	14.49	1.31	22	10.60	2.21	37	17.88			
	2	1.81	35.51	14.51	1.32	26	10.62	2.21	43	17.69			
	3	1.89	32.98	14.56	1.38	24	10.65	2.30	40	17.54			
	4	2.14	33.35	16.41	1.57	24	12.01	2.64	41	20.25			
	Avg	1.91	32.89	14.99	1.40	24	10.97	2.33	40	18.28	8.8	82.0	0.82
70	1	2.09	55.72	14.13	1.32	35	8.92	2.27	61	15.57			
	2	2.27	58.49	13.80	1.43	37	8.71	2.44	63	14.83			
	3	2.25	63.50	14.50	1.42	40	9.15	2.39	68	15.42			
	4	1.91	47.62	15.61	1.20	30	9.85	2.03	51	16.60			
	Avg	2.13	56.33	14.51	1.34	36	9.16	2.29	61	15.60	6.7	95.0	0.93
80	1	8.69	549	2.70	4.77	301	1.48	7.12	450	2.21			
	2	8.61	499	2.52	4.72	274	1.38	6.77	393	1.98			
	3	8.49	536	2.77	4.66	294	1.52	6.63	418	2.16			
	4	8.29	526	2.94	4.55	289	1.61	6.37	405	2.26			
	Avg	8.52	528	2.73	4.67	290	1.49	6.76	419	2.17	5.3	109.3	1.26
90	1	9.18	568	2.83	4.48	277	1.38	6.70	415	2.07			
	2	8.68	541	2.58	4.24	265	1.26	6.33	395	1.88			
	3	8.77	546	2.88	4.28	267	1.40	6.40	399	2.10			
	4	9.06	573	3.21	4.43	280	1.56	6.57	415	2.33			
	Avg	8.92	557	2.88	4.36	272	1.40	6.51	407	2.10	4.1	122.7	1.37
100	1	10.63	631	3.52	4.34	258	1.43	7.13	423	2.36			
	2	10.79	652	3.50	4.41	267	1.43	7.24	438	2.34			
	3	10.29	632	4.07	4.20	258	1.66	6.72	413	2.66			
	4	9.91	616	3.94	4.05	252	1.61	6.56	408	2.60			
	Avg	10.40	633	3.76	4.25	259	1.53	6.88	419	2.49	2.6	146.7	1.51
Closed throttle	1	8.39	2.23	0.09	–	–	–	167.80	44.60	1.80			
	2	8.90	2.23	0.07	–	–	–	178.00	44.60	1.40			
	3	8.39	4.24	0.23	–	–	–	167.80	84.80	4.60			
	4	8.55	4.41	0.0	–	–	–	171.00	88.20	0			
	Avg	8.89	4.04	0.09	–	–	–	177.80	80.80	1.80	25.8	0.0	0.05

TABLE A-42. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE STATIONARY OPERATED–NO LOAD

June 18, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
1000	1	6.24	2.22	0.07	104.00	37.00	1.17		
	2	5.87	3.72	0.09	97.83	62.00	1.50		
	3	6.73	3.72	0.07	96.14	53.14	1.00		
	4	7.00	3.32	0.14	87.50	41.50	1.75		
	Avg	6.46	3.24	0.09	92.29	46.29	1.29	21.9	0.07
1250	1	6.98	5.91	0.10	77.56	65.67	1.11		
	2	6.46	7.32	0.10	71.78	81.33	1.11		
	3	7.14	6.42	0.12	79.33	71.33	1.33		
	4	8.10	10.18	0.14	90.00	113.11	1.55		
	Avg	7.17	6.38	0.12	79.66	70.89	1.27	21.9	0.09
1500	1	7.56	10.46	0.14	63.00	87.17	1.17		
	2	8.09	11.99	0.16	73.55	109.00	1.45		
	3	9.63	8.32	0.14	87.55	75.64	1.27		
	4	7.12	6.86	0.10	64.73	62.36	0.91		
	Avg	8.10	10.23	0.14	73.64	93.00	1.27	21.7	0.11
1750	1	7.63	8.83	0.21	54.50	63.07	1.50		
	2	7.98	9.95	0.21	61.34	76.54	1.62		
	3	8.53	7.72	0.21	60.93	55.14	1.50		
	4	8.08	10.15	0.16	57.71	72.50	1.14		
	Avg	8.05	9.16	0.19	57.50	65.43	1.36	21.6	0.14
2000	1	6.08	17.84	0.30	38.00	111.50	1.88		
	2	7.10	19.19	0.14	44.38	119.94	0.88		
	3	7.56	16.96	0.30	54.00	121.14	2.14		
	4	6.69	17.04	0.16	41.81	113.60	1.07		
	Avg	6.85	17.75	0.22	45.67	118.33	1.47	21.5	0.15
2250	1	5.31	24.01	0.39	29.50	133.39	2.17		
	2	6.22	20.61	0.30	38.88	128.81	1.88		
	3	6.55	20.02	0.30	38.53	117.76	1.77		
	4	6.52	22.13	0.30	36.22	122.94	1.67		
	Avg	6.15	21.69	0.32	36.18	127.59	1.88	21.6	0.17
2500	1	4.88	30.86	0.46	24.40	154.30	2.30		
	2	4.98	27.68	0.28	31.13	173.00	1.75		
	3	5.55	27.04	0.27	29.21	142.32	1.42		
	4	5.10	31.09	0.26	25.50	155.45	1.30		
	Avg	5.07	29.16	0.31	26.84	153.47	1.63	21.5	0.19
2750	1	3.86	34.62	0.34	17.54	157.36	1.55		
	2	3.59	28.56	0.41	17.10	136.00	1.95		
	3	5.82	28.75	0.44	29.10	142.85	2.20		
	4	4.35	30.78	0.34	20.71	146.57	1.62		
	Avg	4.40	30.67	0.38	20.95	146.05	1.81	21.1	0.21
3000	1	3.09	36.79	0.43	12.88	153.29	1.79		
	2	2.97	36.30	0.44	12.91	157.83	1.91		
	3	3.07	31.28	0.44	13.35	136.00	1.91		
	4	4.55	34.23	0.36	19.78	148.83	1.57		
	Avg	3.42	34.65	0.41	14.25	144.38	1.71	20.8	0.24
3250	1	2.92	20.13	0.54	10.81	74.56	2.00		
	2	2.75	19.06	0.51	10.19	70.59	1.89		
	3	3.36	36.18	0.59	12.44	134.00	2.19		
	4	3.82	39.15	0.52	14.69	150.58	2.00		
	Avg	3.22	28.63	0.54	11.93	106.04	2.00	20.3	0.27
3500	1	3.65	20.37	0.68	12.59	70.24	2.34		
	2	4.14	19.79	0.61	13.35	63.84	1.97		
	3	3.87	39.15	0.66	12.90	130.50	2.20		
	4	6.82	36.08	0.73	22.00	116.39	2.35		
	Avg	4.62	28.84	0.67	15.40	96.13	2.23	19.5	0.30

TABLE A-43. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE CHASSIS OPERATED–1250 RPM AND IDLE

July 7, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	5.55	4.02	0.17	–	–	–	46.25	33.50	1.41			
	2	6.51	6.60	0.41	–	–	–	54.25	55.00	3.41			
	Avg	6.03	5.31	0.29	–	–	–	50.25	44.25	2.41	21.9	0.0	0.12
10, 20, & 30								No Data					
40	1	2.44	36.98	2.44	7.23	109.67	7.23	10.16	154.08	10.16			
	2	1.92	37.78	2.28	5.69	112.05	6.76	8.00	157.41	9.50			
	3	2.05	28.99	2.99	6.08	85.98	8.86	8.54	120.79	12.45			
	4	2.19	34.49	2.58	6.49	102.29	7.65	9.12	143.70	10.75			
	Avg	2.15	34.55	2.57	6.37	102.41	7.62	8.98	143.29	10.79	14.4	20.23	0.24
50	1	2.48	38.67	3.17	5.84	91.13	7.47	9.18	143.22	11.74			
	2	2.01	36.42	3.19	4.73	85.82	7.51	7.44	134.88	11.81			
	3	2.24	33.97	3.25	5.27	80.05	7.65	8.29	125.81	12.03			
	4	2.23	33.14	3.10	5.25	78.09	7.30	8.25	122.74	11.48			
	Avg	2.24	35.55	3.18	5.28	83.77	7.47	8.29	131.66	11.76	12.4	25.46	0.27
60	1	3.16	34.11	3.90	6.22	67.21	7.68	10.89	117.62	13.44			
	2	2.11	35.84	4.01	4.15	70.67	7.90	7.27	123.58	13.82			
	3	2.29	30.74	4.07	4.51	60.57	8.01	7.89	106	14.03			
	4	2.31	32.00	4.09	4.55	63.05	8.05	7.96	110.34	14.10			
	Avg	2.47	33.17	4.02	4.87	66.35	7.86	8.50	114.38	13.84	10.6	30.45	0.29
70	1	2.61	34.56	4.36	4.41	58.47	10.27	8.12	108	13.62			
	2	2.14	37.47	3.66	3.62	63.40	6.19	6.68	117.09	11.43			
	3	2.27	31.81	4.55	3.84	53.82	7.69	7.09	99.40	14.21			
	4	2.34	33.76	4.15	3.95	57.12	7.02	7.31	105.50	12.96			
	Avg	2.34	34.40	4.18	4.01	58.61	8.23	7.30	108.25	13.05	8.5	35.46	0.32
80	1	2.94	90.16	2.90	4.35	133.70	4.30	7.36	237.26	7.63			
	2	3.04	90.81	4.30	4.50	134.66	6.37	8.00	238.97	11.31			
	3	2.78	93.27	2.20	4.12	138.31	3.26	7.31	245.44	5.78			
	4	4.20	212	0.52	6.22	314.38	0.77	11.05	557.89	1.36			
	Avg	3.24	122.00	2.15	5.17	180.91	3.19	8.52	321.57	5.66	6.3	40.46	0.38
90	1	5.97	227	0.65	7.83	298.09	0.85	11.70	445.09	1.27			
	2	4.47	276	0.31	5.86	362.44	0.40	8.76	541.17	0.60			
	3	4.67	238	0.90	6.13	312.54	1.18	9.15	466.66	1.76			
	4	4.64	231	0.51	6.09	303.34	0.66	9.09	452.94	1			
	Avg	4.94	243.00	0.59	6.84	330.26	0.79	9.68	476.47	1.18	4.2	45.69	0.51
100	1	6.09	290	0.86	7.20	343.26	1.01	10.15	483.33	1.43			
	2	6.01	334	0.97	7.11	395.34	1.14	10.01	556.66	1.61			
	3	6.66	295	0.80	7.88	349.18	0.94	11.10	491.66	1.33			
	4	6.04	269	0.95	7.14	318.40	1.12	10.06	448.33	1.58			
	Avg	6.20	297.00	0.90	7.49	351.54	1.04	10.08	495.00	1.47	0.4	50.69	0.60
Idle (650 rpm)	1	1.03	1.34	–	–	–	–	17.17	22.33	–			
	2	1.50	1.68	–	–	–	–	25.0	28.0	–			
	Avg	1.27	1.51	–	–	–	–	21.17	25.17	–	21.5	0.0	0.06

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-44. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE CHASSIS OPERATED–2000 RPM

July 8, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	8.70	16.01	0.55	–	–	–	48.33	88.94	3.05			
	2	7.56	15.59	0.21	–	–	–	42.00	86.61	1.16			
	Avg	8.13	15.80	0.38	–	–	–	45.16	87.77	2.11	21.5	0.0	0.18
10	1	2.34	31.05	2.21	15.37	204.05	14.52	9.36	124.20	8.84			
	2	2.16	29.47	1.71	14.19	193.66	11.23	8.64	117.88	6.84			
	3	2.55	30.60	1.08	16.75	201.09	7.10	10.20	122.40	4.32			
	4	2.55	32.27	1.86	16.75	212.07	12.22	10.20	129.08	7.44			
	Avg	2.40	30.85	1.71	15.77	202.73	11.23	9.60	123.40	6.82	19.4	9.13	0.25
20	1	2.59	31.23	3.68	8.33	100.47	11.83	8.93	107.68	12.68			
	2	2.41	32.13	3.45	7.75	103.36	11.09	8.31	110.79	11.89			
	3	2.75	33.33	3.78	8.84	107.22	12.16	9.48	114.93	13.03			
	4	2.74	31.09	3.55	8.81	100.02	11.41	9.44	107.20	12.24			
	Avg	2.62	31.95	3.61	8.42	102.78	11.61	9.03	110.17	12.44	17.6	18.65	0.29
30	1	2.86	34.68	5.59	6.17	74.87	12.06	8.17	99.09	15.97			
	2	2.64	33.70	5.58	5.70	72.75	12.04	7.54	99.08	15.94			
	3	3.08	30.46	8.24	6.65	65.76	17.79	8.80	87.02	23.54			
	4	2.81	31.27	5.70	6.06	67.51	12.30	8.02	89.34	16.28			
	Avg	2.85	32.53	6.27	6.15	70.23	13.53	8.14	92.94	17.91	15.4	27.79	0.35
40	1	2.98	35.09	7.43	4.84	52.72	12.07	7.45	87.72	18.57			
	2	2.91	33.03	7.42	4.72	53.66	12.05	7.27	82.57	18.55			
	3	3.18	31.14	8.02	5.16	50.59	13.03	7.95	77.85	20.05			
	4	3.13	31.01	7.80	5.08	50.38	12.67	7.82	77.52	19.50			
	Avg	3.05	32.57	8.67	4.95	52.91	14.08	7.62	81.42	19.17	13.1	36.93	0.40
50	1	2.88	29.50	9.17	3.72	38.10	11.84	6.40	65.55	20.37			
	2	3.06	29.43	9.11	3.95	38.01	11.76	6.80	65.40	20.24			
	3	2.88	28.46	8.69	3.72	36.76	11.22	6.40	63.24	19.31			
	4	3.06	27.69	9.00	3.95	35.76	11.62	6.80	61.53	20.00			
	Avg	2.97	28.77	8.99	3.83	37.16	11.61	6.60	63.93	19.97	11.1	46.45	0.45
60	1	3.07	26.25	10.60	3.31	28.33	11.44	6.14	52.50	21.20			
	2	3.16	27.48	10.63	3.41	29.66	11.47	6.32	54.96	21.26			
	3	3.15	24.29	10.67	3.39	26.21	11.51	6.30	48.58	20.74			
	4	3.17	24.72	10.39	3.42	26.68	11.21	6.30	49.44	20.78			
	Avg	3.14	25.69	10.57	3.39	27.72	11.40	6.28	51.38	21.14	9.0	55.59	0.50
70	1	2.99	29.43	10.58	2.77	27.27	9.80	5.33	52.55	18.89			
	2	2.91	35.73	10.71	2.69	33.11	9.92	5.19	63.80	19.12			
	3	3.08	23.77	11.20	2.85	22.03	10.38	5.50	42.44	20			
	4	3.08	23.18	11.25	2.85	21.48	10.42	5.50	41.39	20.08			
	Avg	3.02	28.03	10.93	2.79	25.98	10.13	5.39	50.04	19.52	6.8	64.73	0.56
80	1	6.30	329.40	1.01	5.03	263.48	0.80	7.97	416.96	1.27			
	2	6.82	386.13	1.14	5.45	308.86	0.91	8.63	488.77	1.44			
	3	7.11	359.76	1.01	5.68	287.76	0.80	9	455.39	1.27			
	4	7.28	357.65	1.11	5.82	286.08	0.89	9.21	452.72	1.40			
	Avg	6.88	358.00	1.07	5.50	286.36	0.85	8.70	453.45	1.34	5.1	75.01	0.79
90	1	6.57	376.46	1.19	4.72	270.86	0.85	7.46	427.79	1.35			
	2	7.62	419.24	1.27	5.48	301.64	0.91	8.65	476.40	1.44			
	3	6.69	399.85	1.20	4.81	287.69	0.86	7.60	454.37	1.36			
	4	7.19	383.62	1.12	5.17	276.01	0.80	8.17	435.93	1.27			
	Avg	7.02	395.00	1.19	5.05	284.20	0.85	7.97	448.62	1.35	2.9	83.39	0.88
100	1	6.91	411.98	1.69	4.48	267.14	1.09	7.19	429.14	1.76			
	2	8.26	493.60	1.67	5.35	320.06	1.08	8.60	514.16	1.73			
	3	8.33	464.53	1.55	5.40	301.21	1.00	8.67	483.88	1.61			
	4	8.68	463.73	1.70	5.62	300.70	1.10	9.04	483.05	1.77			
	Avg	8.05	458.00	1.65	5.21	296.98	1.06	8.37	477.55	1.71	1.1	92.53	0.96

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-45. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE
CHASSIS OPERATED–3000 RPM

July 8, 1971

Power Level, %	Run No.	Emission Rates									Engine Data		
		Grams per Minute			Grams per BHP-Hr			Grams per Pound of Fuel			Man. Vac, in. Hg	Flywheel Obs BHP*	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO	HC	CO	NO			
0	1	5.82	29.75	0.83	–	–	–	21.55	110.18	3.07			
	2	5.58	31.10	0.91	–	–	–	20.66	115.18	3.37			
	Avg	5.70	30.22	0.87	–	–	–	21.05	112.68	3.22	20.8	0.0	0.27
10								No Data					
20	1	3.10	36.09	6.33	7.41	86.27	15.13	7.38	85.92	15.07			
	2	2.64	33.69	6.58	6.31	80.53	15.72	6.28	80.21	15.66			
	3	2.47	33.43	6.73	5.90	79.91	16.08	5.88	79.59	16.02			
	4	2.87	32.43	6.58	6.86	77.52	15.72	6.83	77.21	15.66			
	Avg	2.77	33.91	6.56	6.62	81.05	15.66	6.59	80.73	15.61	17.1	25.1	0.42
30	1	3.46	33.58	10.56	5.50	53.44	16.80	6.92	67.16	21.12			
	2	2.66	33.31	10.59	4.23	53.01	16.85	5.32	66.62	21.18			
	3	2.87	32.78	9.23	4.57	52.17	14.69	5.74	65.56	18.46			
	4	2.79	38.09	9.33	4.44	60.62	14.85	5.58	76.18	18.66			
	Avg	2.95	34.44	9.93	4.69	54.81	15.80	5.90	68.88	19.86	15.0	37.7	0.50
40	1	3.12	32.03	13.85	3.72	38.20	16.52	5.57	57.19	24.73			
	2	2.96	33.23	14.33	3.53	39.64	17.09	5.92	59.33	25.58			
	3	3.14	30.25	14.02	3.74	36.08	16.72	5.60	54.01	25.03			
	4	2.86	37.27	12.41	3.41	44.45	14.80	5.10	66.55	22.16			
	Avg	3.02	33.20	13.65	3.60	39.60	16.28	5.39	59.28	24.37	13.2	50.3	0.56
50	1	3.79	31.47	16.91	3.61	30.02	16.13	6.01	49.95	26.84			
	2	3.01	30.75	17.27	2.87	29.33	16.47	4.77	48.80	27.41			
	3	3.13	29.93	16.50	2.98	28.55	15.73	4.96	47.50	26.19			
	4	3.49	36.97	15.52	3.33	35.26	14.80	5.53	58.68	24.63			
	Avg	3.35	32.28	16.55	3.19	30.79	15.79	5.31	51.23	26.26	11.2	62.9	0.63
60	1	3.21	29.07	18.55	2.55	23.13	14.76	4.52	40.94	26.12			
	2	3.02	30.21	18.48	2.40	24.04	14.70	4.25	42.54	26.02			
	3	3.30	29.36	18.36	2.62	23.36	14.61	4.64	41.35	25.85			
	4	3.28	32.98	17.82	2.61	26.24	14.18	4.61	46.45	25.09			
	Avg	3.20	30.40	18.30	2.55	24.19	14.56	4.50	42.81	25.77	9.1	75.4	0.71
70	1	3.06	32.46	18.76	2.08	22.13	12.79	3.82	40.57	23.45			
	2	2.75	33.63	19.26	1.87	22.92	13.13	3.43	42.03	24.07			
	3	2.93	37.42	18.96	1.99	25.51	12.92	3.66	46.77	23.70			
	4	2.73	33.85	16.07	1.86	23.07	10.96	3.41	42.31	20.08			
	Avg	2.87	34.34	18.26	1.96	23.41	12.45	3.58	42.92	22.82	7.0	88	0.80
80	1	4.25	152.63	5.94	2.53	91.03	3.54	4.38	157.35	6.12			
	2	4.82	112.59	14.25	2.87	67.15	8.49	4.96	116.07	14.69			
	3	5.12	160.16	11.86	3.05	95.52	7.07	5.27	165.11	12.22			
	4	4.72	197.25	12.14	2.81	117.64	7.24	4.86	203.35	12.51			
	Avg	4.73	149.00	11.04	2.82	88.86	6.58	4.87	153.60	11.38	6.0	100.6	0.97
90	1	8.47	246.75	2.42	4.49	130.90	1.28	7.05	205.62	2.02			
	2	8.64	514.27	2.53	4.58	272.82	1.34	7.20	428.55	2.11			
	3	9.03	487.23	2.41	4.79	258.47	1.27	7.52	406.02	2.01			
	4	8.74	568.04	2.41	4.63	301.34	1.27	7.28	473.36	2.01			
	Avg	8.72	254.00	2.44	4.62	134.74	1.29	7.26	211.66	2.03	4.2	113.1	1.20
100	1	10.22	536.14	3.76	4.87	255.91	1.79	7.57	397.14	2.78			
	2	10.17	616.09	3.65	4.85	294.07	1.74	7.53	456.36	2.70			
	3	10.90	603.53	8.39	5.20	288.08	4.00	8.07	447.05	6.21			
	4	10.47	717.16	6.60	4.99	342.31	3.15	7.75	531.22	4.88			
	Avg	10.44	618.23	5.60	4.98	295.09	2.67	7.73	457.94	4.15	2.1	125.7	1.35

*Measured during stationary dynamometer runs at equivalent manifold vacuum and fuel rate.

TABLE A-46. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE CHASSIS OPERATED–NO LOAD

July 9, 1971

Engine RPM	Run No.	Emission Rates						Engine Data	
		Grams per Minute			Grams per Pound of Fuel			Man. Vac, in. hg	Fuel Rate, lb/min
		HC	CO	NO	HC	CO	NO		
1000	1	4.00	1.71	0.07	50.00	21.38	0.88		
	2	3.92	3.04	0.24	49.00	38.00	3.00		
	Avg	3.96	2.38	0.16	49.50	29.75	2.00	21.9	0.08
1250	1	5.55	4.02	0.17	42.69	30.92	1.31		
	2	6.51	6.60	0.41	50.08	50.77	3.15		
	Avg	6.03	5.31	0.29	46.38	40.85	2.23	21.9	0.13
1500	1	7.97	6.56	0.21	61.31	50.46	1.62		
	2	8.70	6.73	0.17	66.92	51.77	1.31		
	Avg	8.39	6.65	0.19	64.54	51.15	1.46	21.7	0.13
1750	1	9.16	8.94	0.48	61.07	59.60	3.20		
	2	8.56	10.14	0.19	57.07	67.60	1.27		
	Avg	8.86	9.54	0.29	59.07	63.60	1.93	21.6	0.15
2000	1	8.70	16.01	0.55	45.79	84.26	2.89		
	2	7.56	15.59	0.21	39.79	82.05	1.11		
	Avg	8.13	15.80	0.38	42.79	83.16	2.00	21.5	0.19
2250	1	7.95	20.30	0.71	39.75	101.50	3.55		
	2	6.73	22.69	0.45	33.65	113.45	2.25		
	Avg	7.34	21.50	0.58	36.70	107.50	2.90	21.6	0.20
2500	1	5.97	25.82	0.47	27.14	117.36	2.14		
	2	5.79	27.00	0.51	26.32	122.73	2.32		
	Avg	5.88	26.41	0.49	26.73	120.05	2.23	21.5	0.22
2750	1	4.97	27.25	0.65	20.71	113.54	2.71		
	2	5.33	30.23	0.75	22.21	125.96	3.13		
	Avg	5.15	28.74	0.70	21.46	119.75	2.92	21.1	0.24
3000	1	5.82	29.75	0.83	21.56	110.19	3.07		
	2	5.58	31.10	0.91	20.67	115.19	3.37		
	Avg	5.70	30.43	0.87	21.11	112.70	3.22	20.8	0.27
3250	1	5.35	30.94	1.19	17.83	103.13	3.97		
	2	6.45	29.87	1.20	21.50	99.57	4.00		
	Avg	5.90	30.41	1.20	19.67	101.37	4.00	20.3	0.30
3500	1	8.16	30.28	1.69	23.31	86.51	4.83		
	2	6.45	31.27	1.58	18.43	89.34	4.51		
	Avg	7.31	30.78	1.64	20.89	87.94	4.69	19.5	0.35

TABLE A-47. EMISSION RATES FOR 1969 DODGE 318-CID ENGINE
CHASSIS OPERATED–CLOSED THROTTLE

July 9, 1971

Engine RPM	Run No.	Emission Rates*				Engine Data	
		Grams per Minute		Grams per Pound of Fuel		Man. Vac, in. Hg	Fuel Rate, lb/min
		HC	CO	HC	CO		
3370	1	8.64	1.66	172.80	33.20	–	0.05
3353	2	8.80	1.66	176.00	33.20	–	
3361	Avg	8.72	1.66	174.40	33.20	24.8	
3110	1	9.23	1.87	184.60	37.40	–	0.05
3100	2	9.11	1.87	182.20	37.40	–	
3105	Avg	9.17	1.87	183.40	37.40	25.1	
2996	1	6.69	1.66	111.50	27.66	–	0.06
2599	2	6.78	1.66	113.00	27.66	–	
2797	Avg	6.74	1.66	112.33	27.66	25.5	
2835	1	6.78	1.50	113	25.00	25.4	0.06
2830	2	6.72	1.84	112	30.66	25.4	
2832	Avg	6.75	1.66	112.50	27.66	25.4	
2430	1	9.53	1.48	158.83	24.66	25.6	0.06
2427	2	10.08	1.84	168.00	30.66	25.6	
2428	Avg	9.79	1.66	163.16	27.66	25.6	
2265	1	10.16	2.23	169.33	37.16	25.6	0.06
2262	2	9.61	1.66	160.16	27.66	25.6	
2263	Avg	9.88	1.94	164.66	32.33	25.6	
2095	1	11.13	2.50	222.60	50.00	25.5	0.05
2095	2	10.58	2.43	211.60	48.60	25.6	
2095	Avg	10.85	2.45	217.00	49.00	25.5	
1930	1	11.89	2.63	237.80	52.60	25.4	0.05
1925	2	11.89	2.63	237.80	52.60	25.3	
1927	Avg	11.89	2.63	237.80	52.60	25.4	
1755	1	8.83	1.65	147.16	27.50	25.1	0.06
1753	2	8.45	2.21	140.83	36.83	25.1	
1754	Avg	8.63	1.94	143.83	32.33	25.1	

*Oxides of nitrogen concentrations were negligible by NDIR and therefore not reported.

APPENDIX B

FOUR ENGINE-VEHICLE CHARACTERIZATION STUDY
ENGINE DATA IN GRAPHICAL FORM

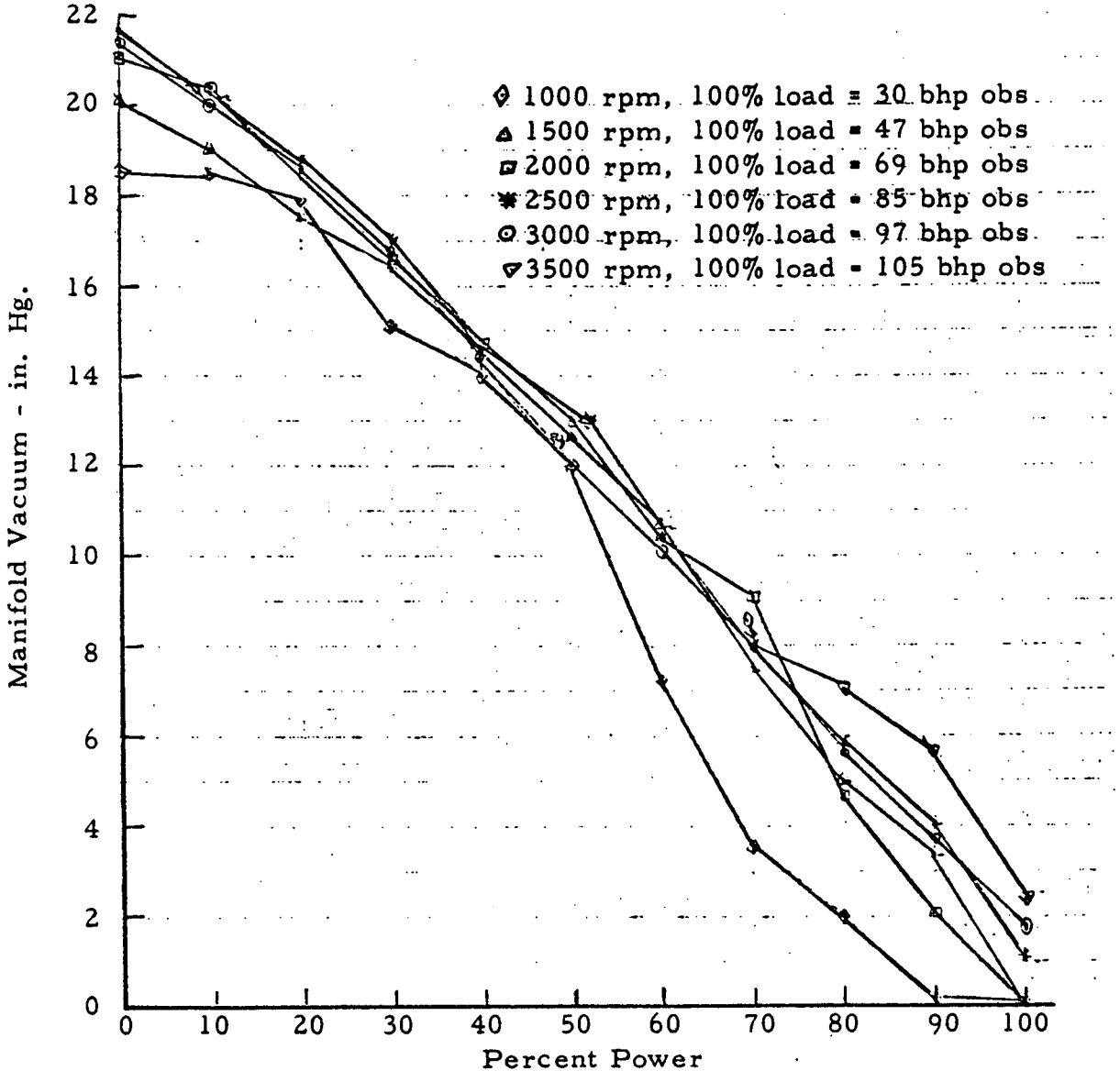

FIGURE B-1. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 CHEVROLET 250-CID, I-6 ENGINE–STATIONARY DYNAMOMETER

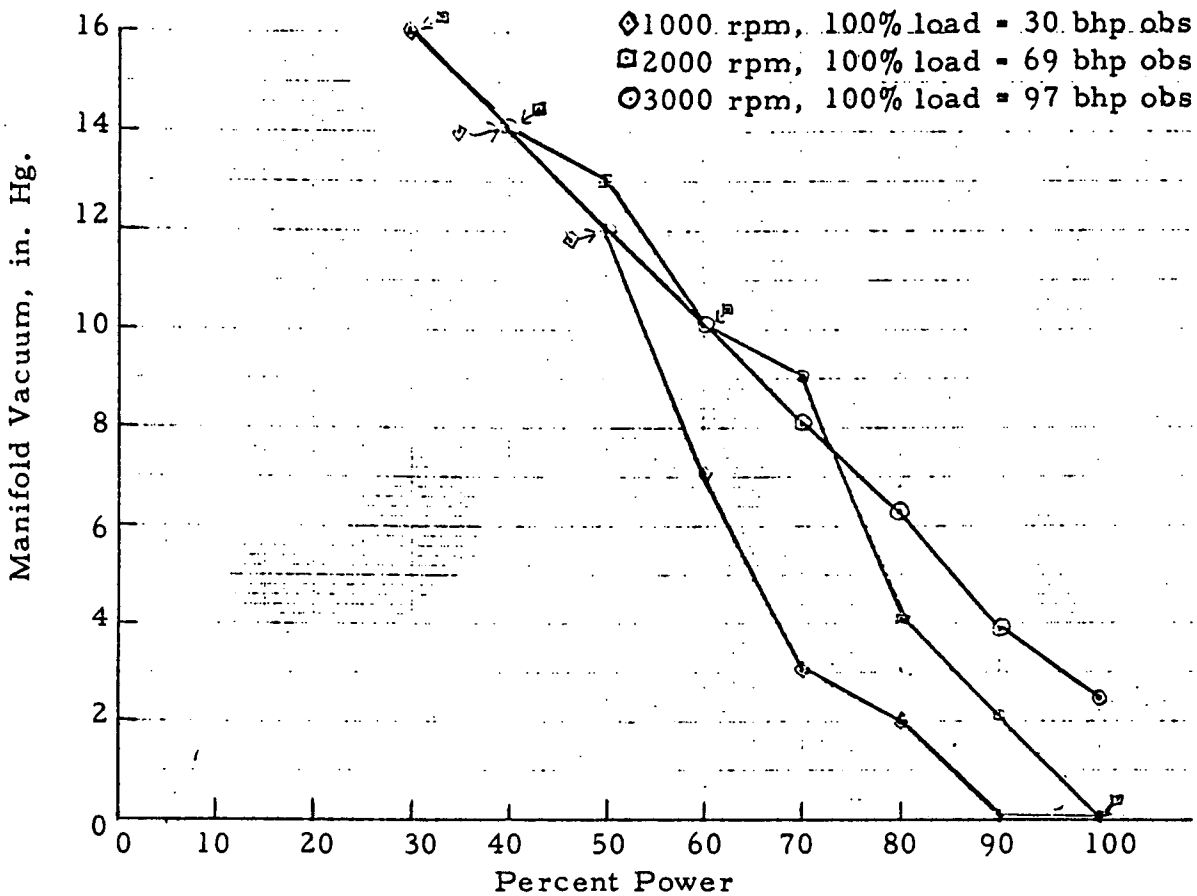

FIGURE B-2. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 CHEVROLET 250-CID, I-6 ENGINE–CHASSIS DYNAMOMETER

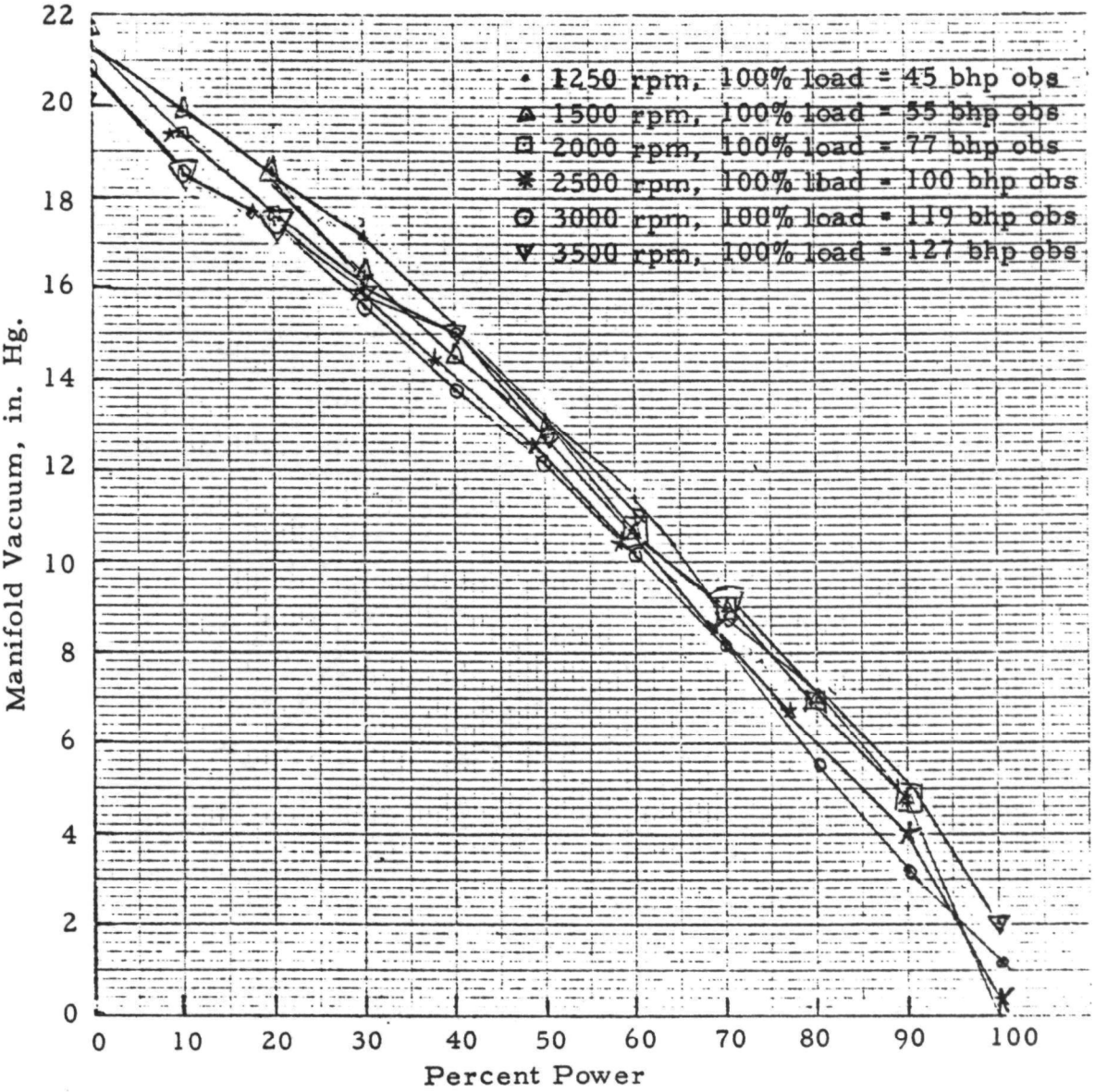

FIGURE B-3. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 IHC 304-CID, V8 ENGINE–STATIONARY DYNAMOMETER

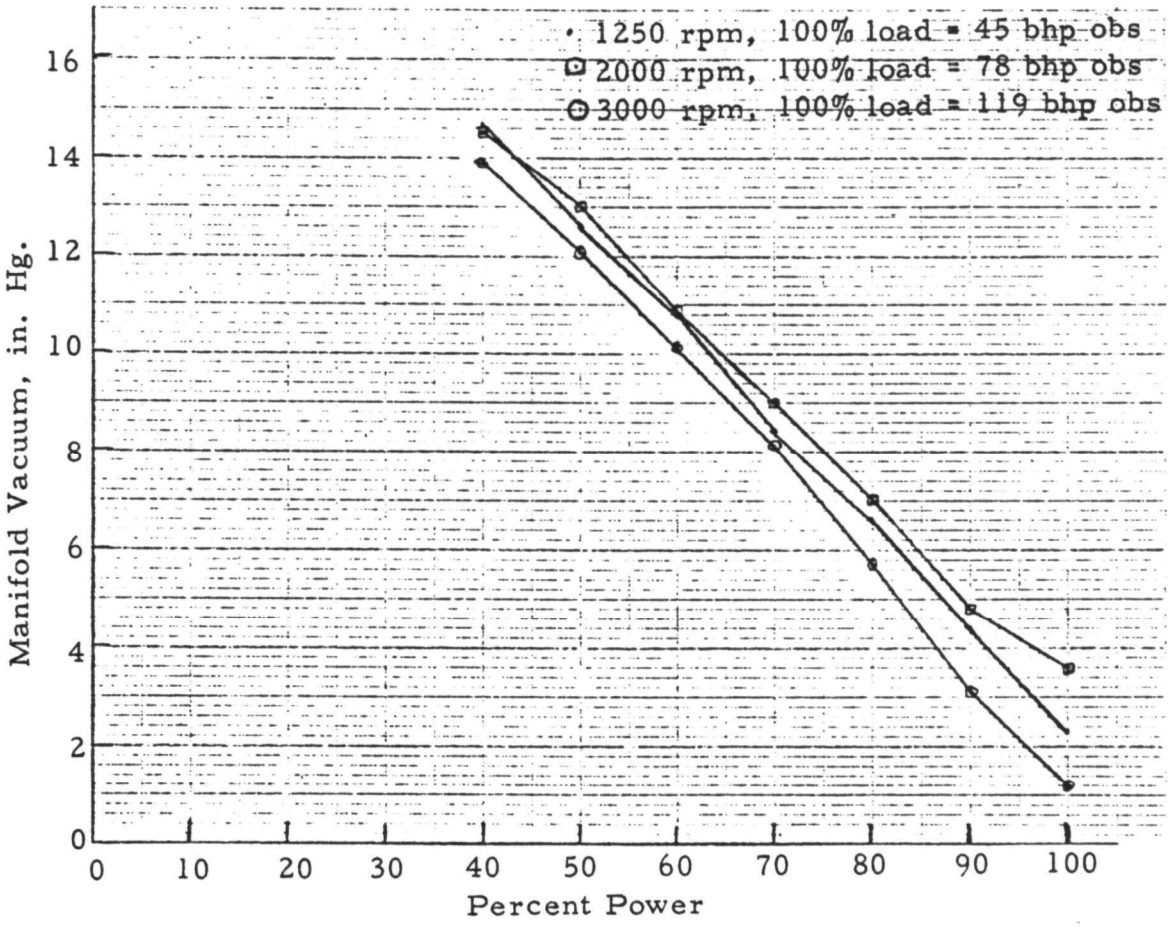

FIGURE B-4. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 IHC 304-CID, V8 ENGINE–CHASSIS DYNAMOMETER

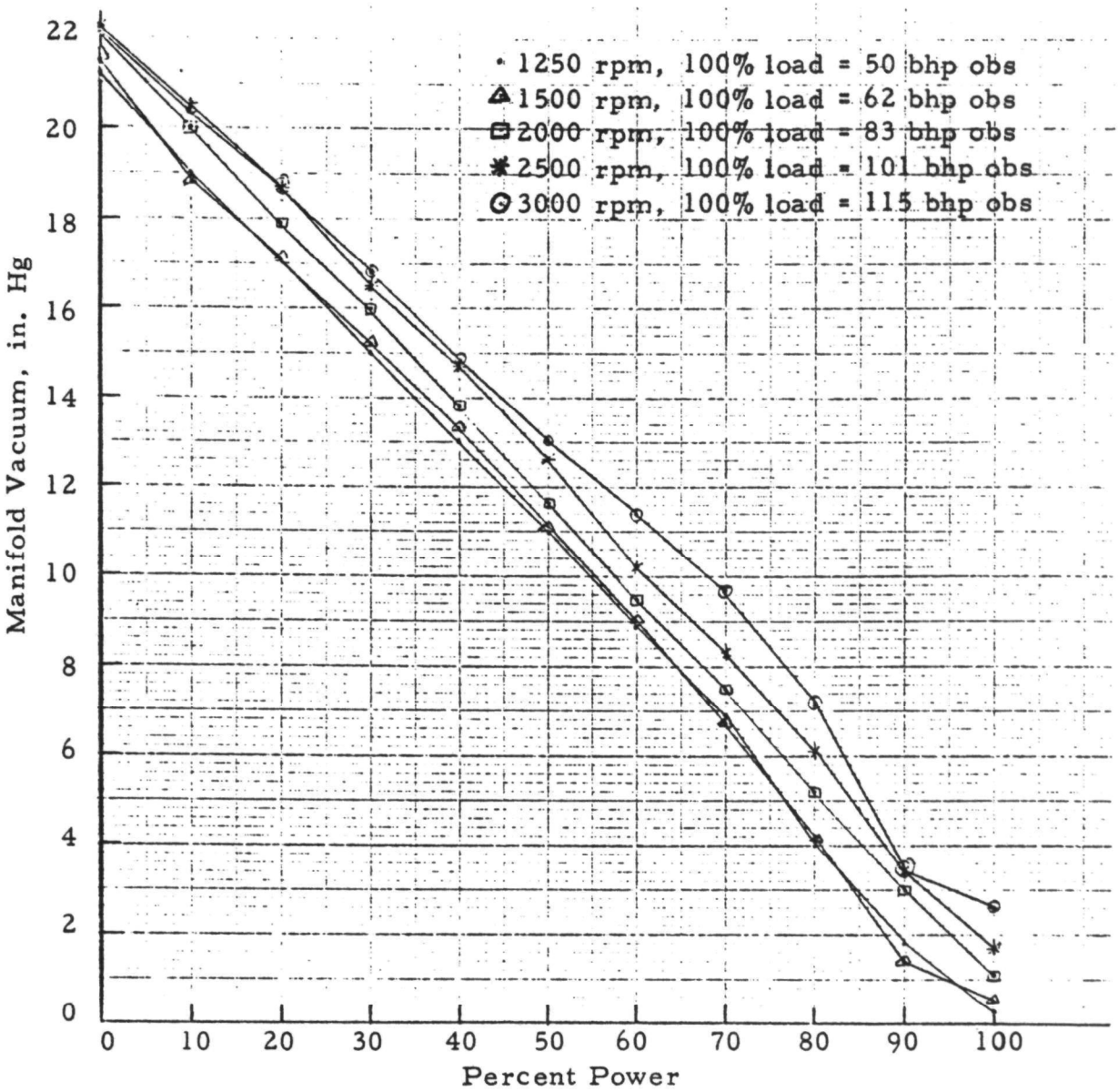

FIGURE B-5. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 FORD 300-CID, I-6 ENGINE–STATIONARY DYNAMOMETER

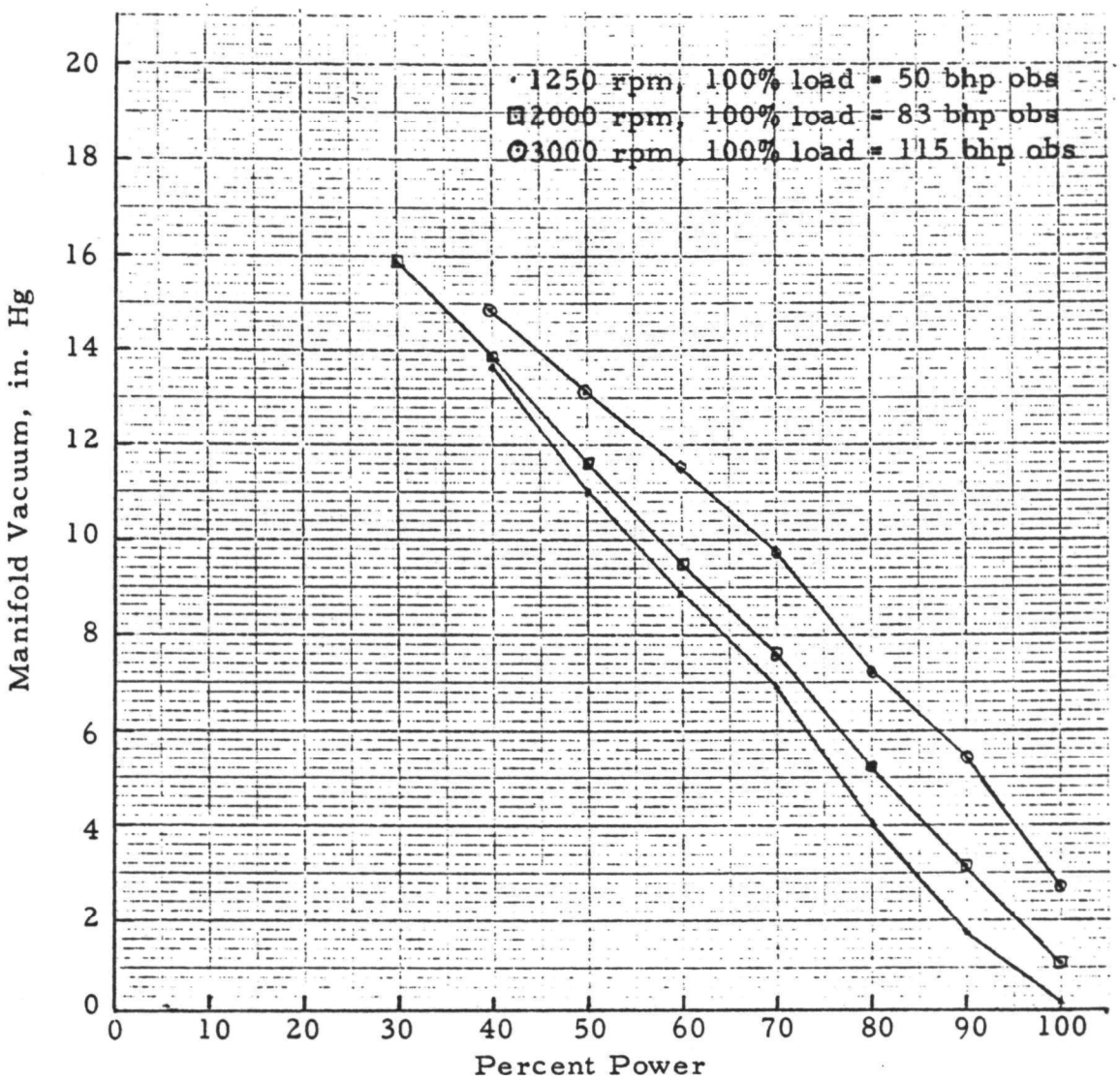

FIGURE B-6. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 FORD 300-CID, I-6 ENGINE–CHASSIS DYNAMOMETER

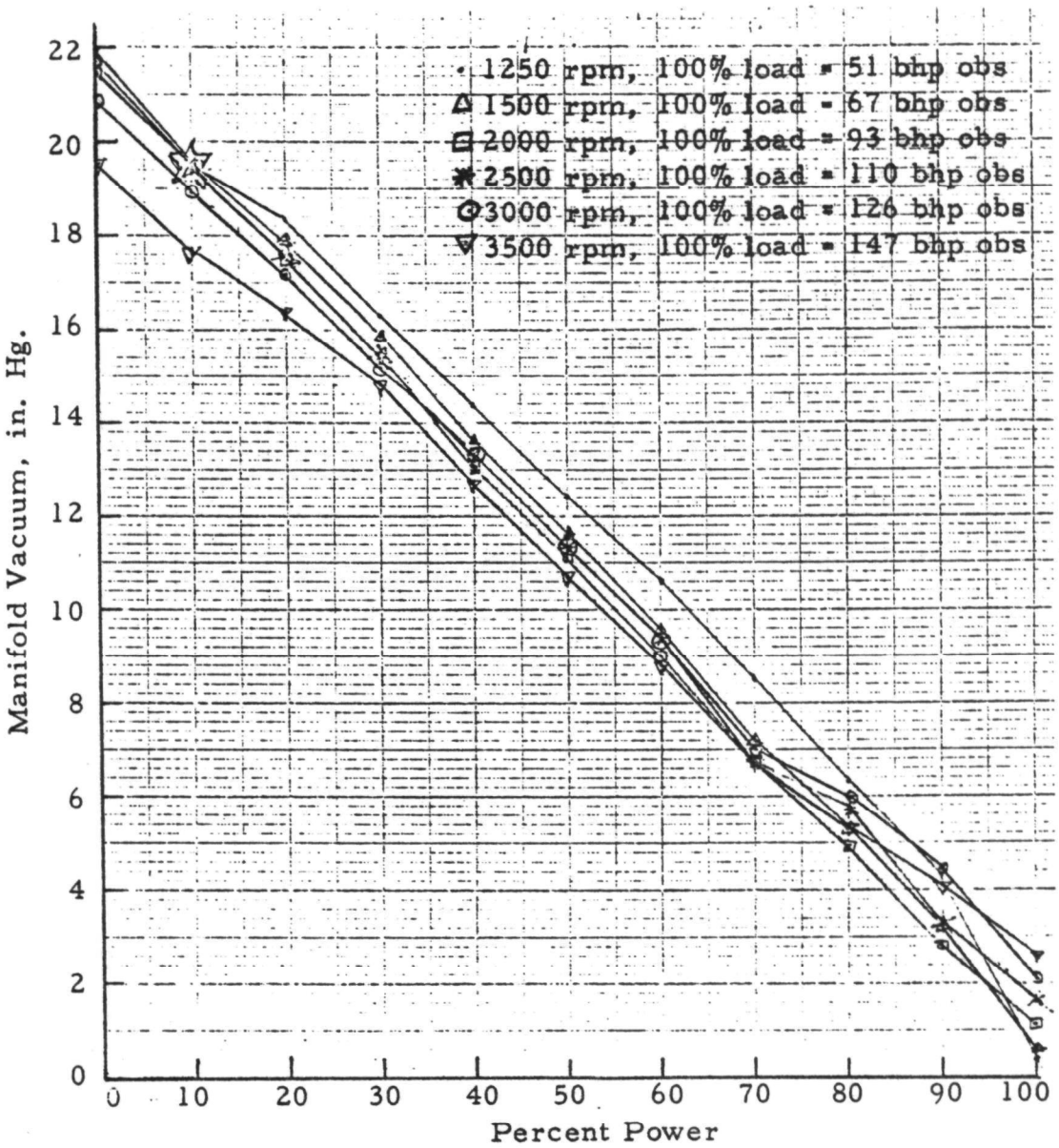

FIGURE B-7. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 DODGE 318-CID, V8 ENGINE–STATIONARY DYNAMOMETER

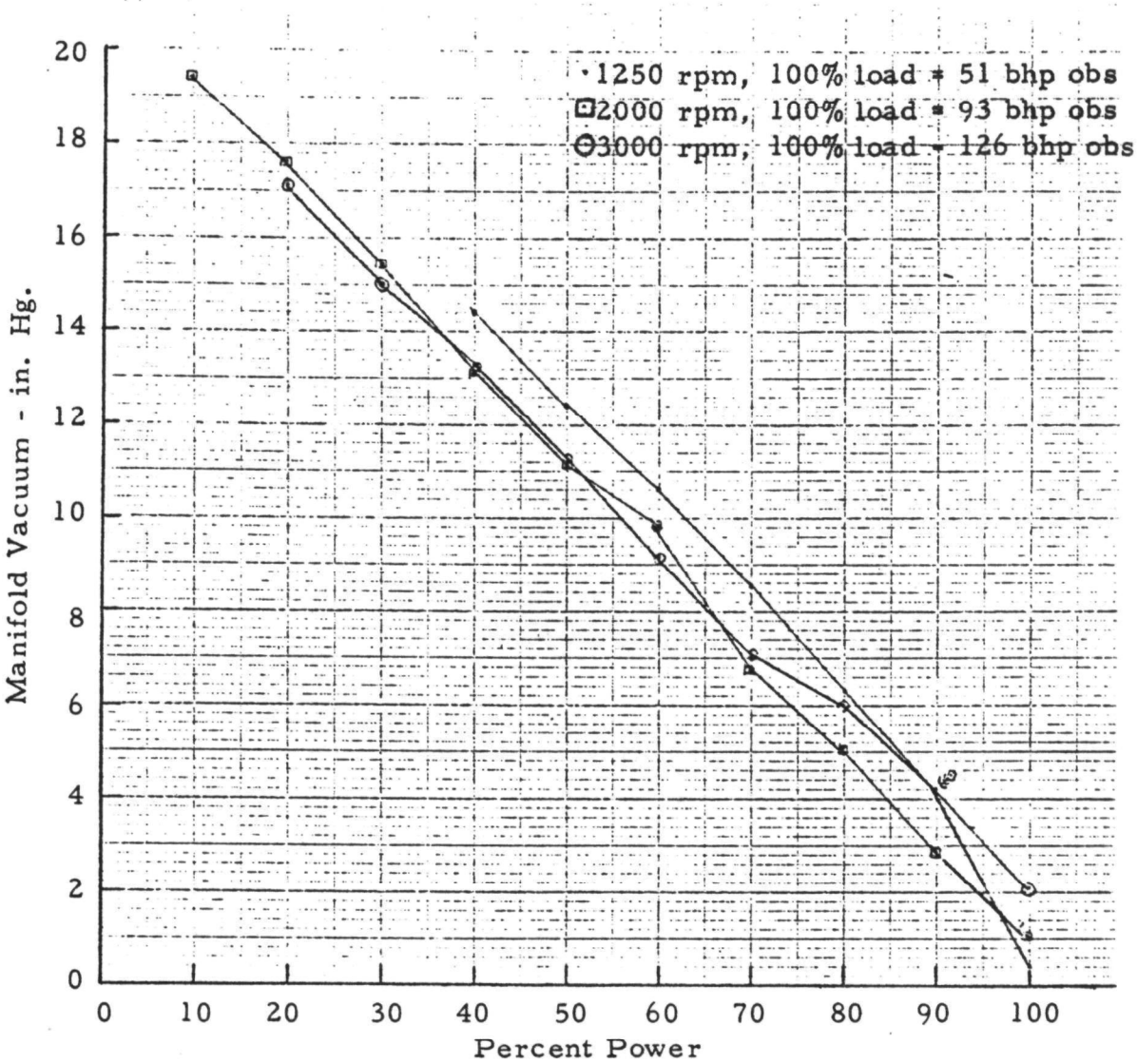

FIGURE B-8. MANIFOLD VACUUM VS PERCENT POWER FOR A 1969 DODGE 318-CID, V8 ENGINE–CHASSIS DYNAMOMETER

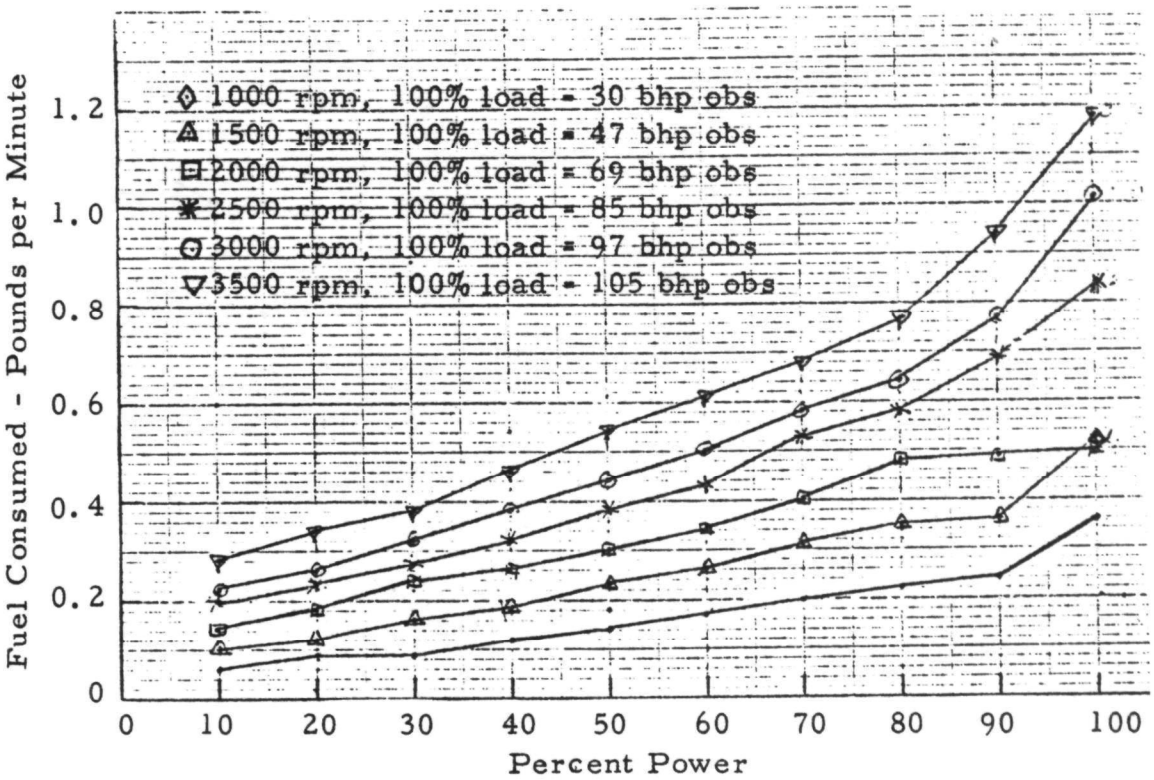

FIGURE B-9. FUEL CONSUMED VS PERCENT POWER FOR A 1969 CHEVROLET 250-CID, V8 ENGINE–STATIONARY DYNAMOMETER

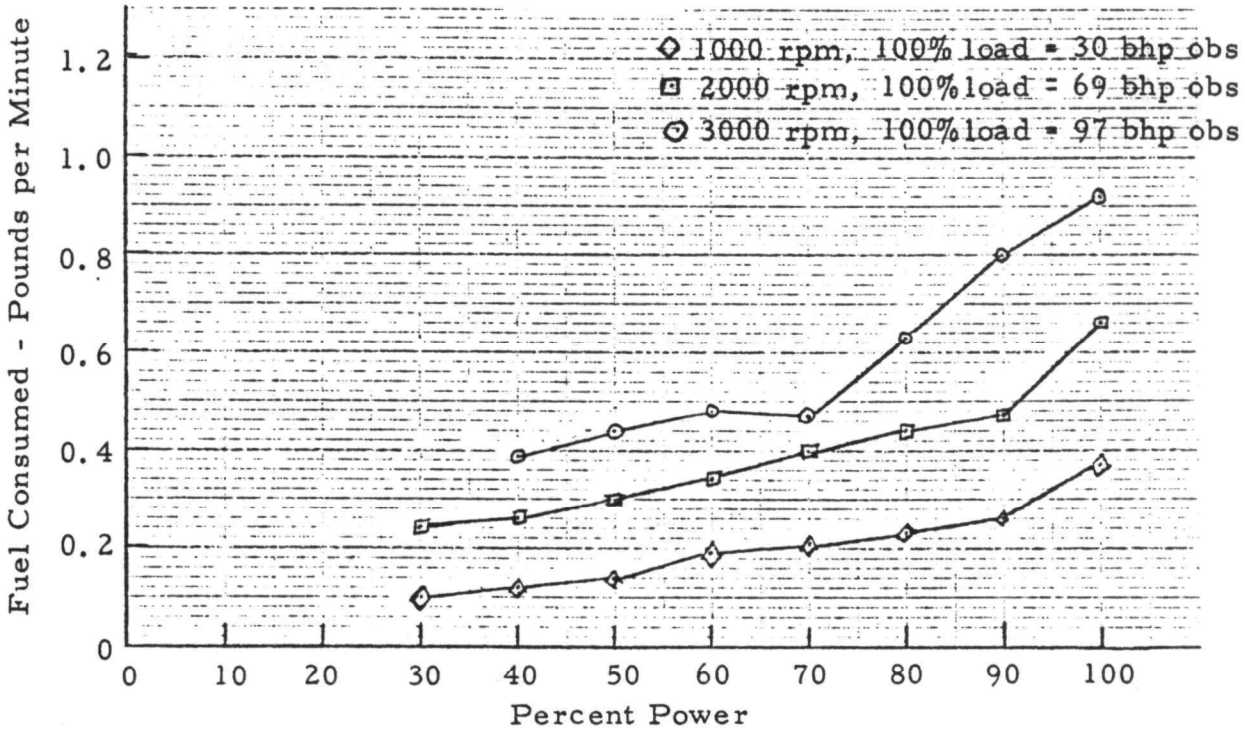

FIGURE B-10. FUEL CONSUMED VS PERCENT POWER FOR A 1969 CHEVROLET 250-CID, V8 ENGINE–CHASSIS DYNAMOMETER

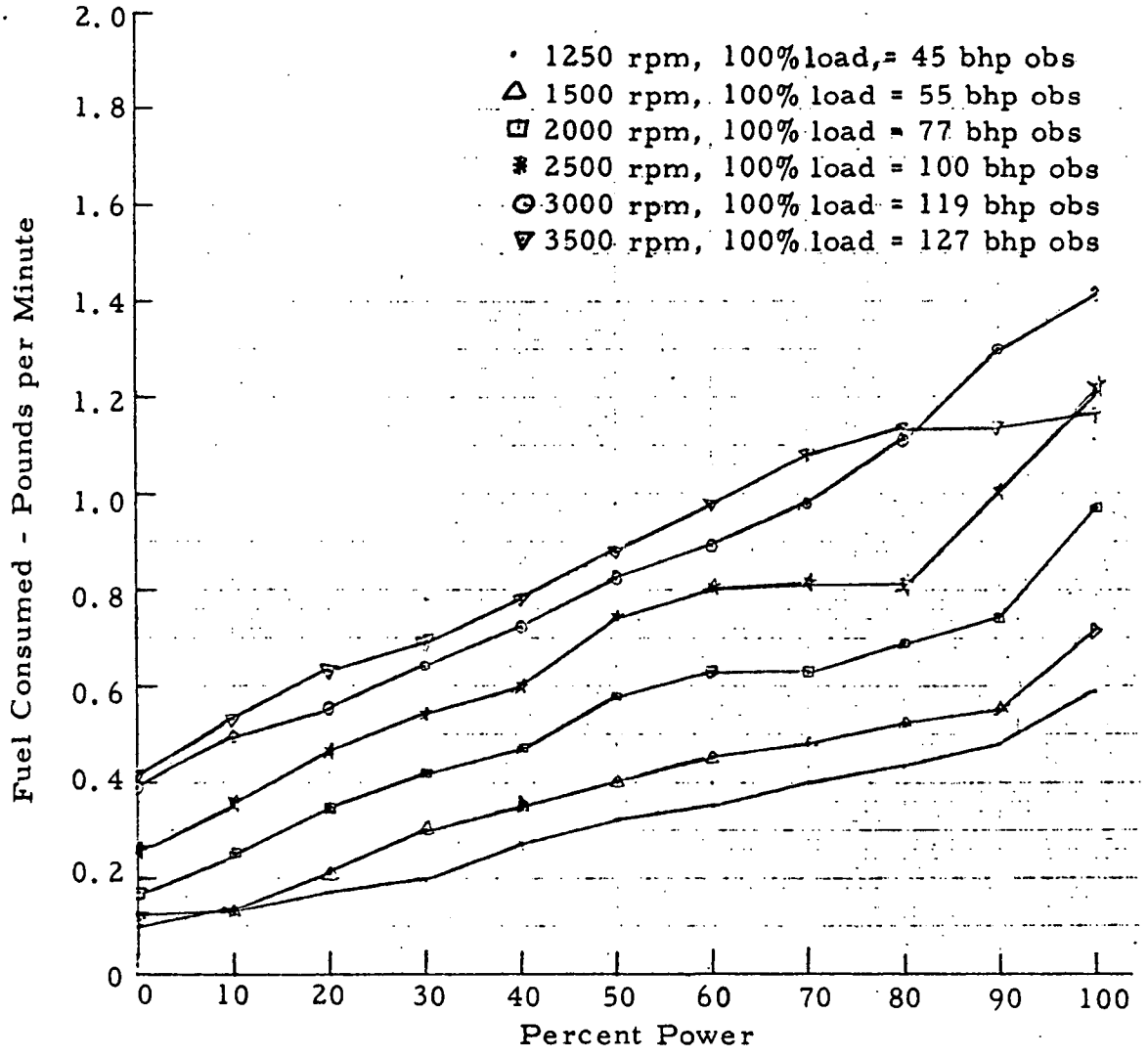

FIGURE B-11. FUEL CONSUMED VS PERCENT POWER FOR A 1969 IHC 304-CID, V8 ENGINE–STATIONARY DYNAMOMETER

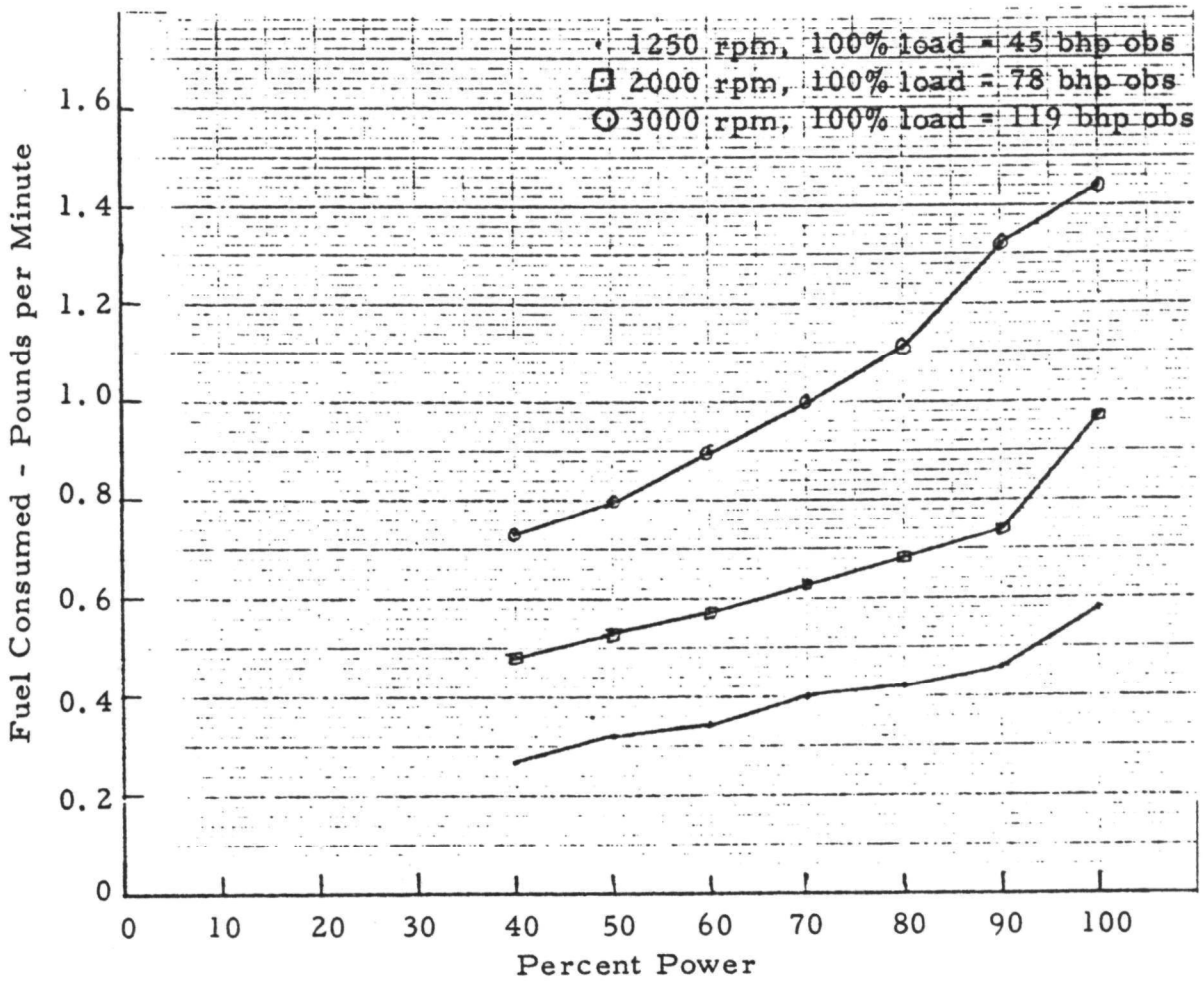

FIGURE B-12. FUEL CONSUMED VS PERCENT POWER FOR A 1969 IHC 304-CID, V8 ENGINE–CHASSIS DYNAMOMETER

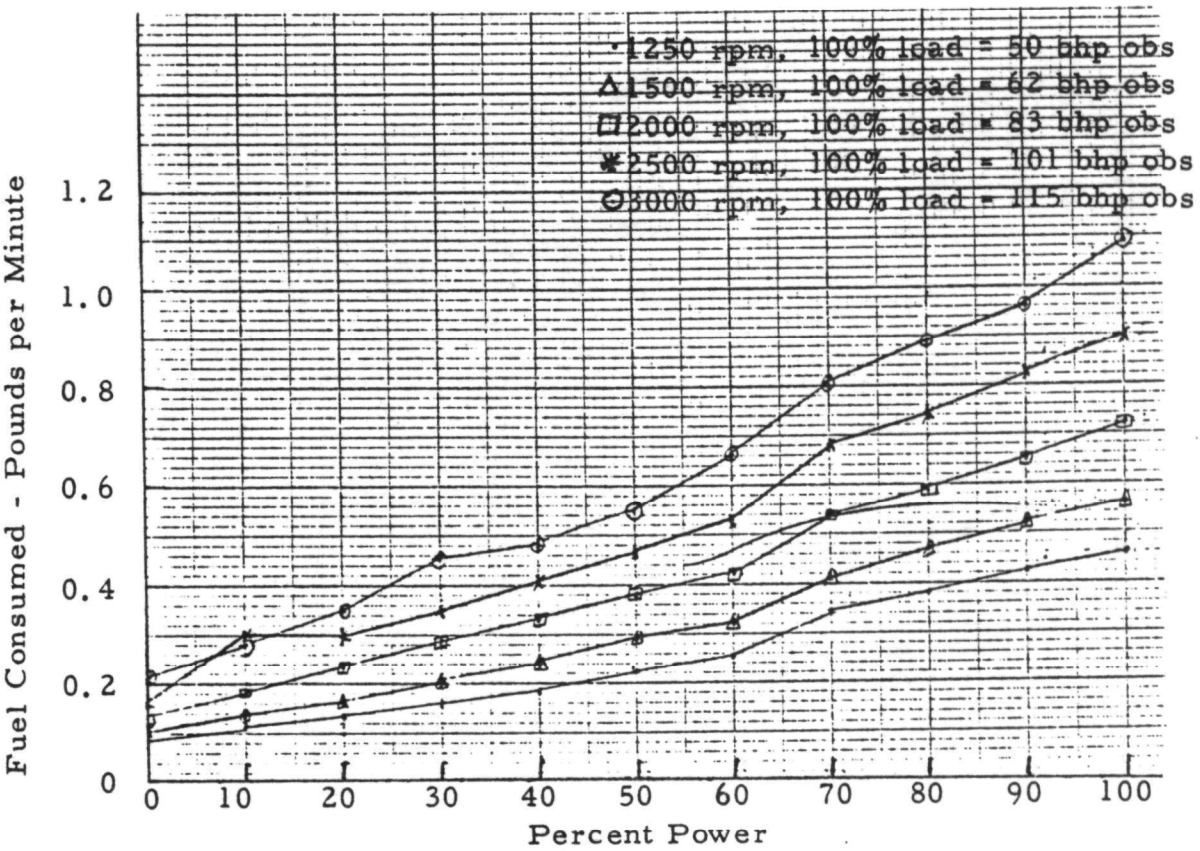

FIGURE B-13. FUEL CONSUMED VS PERCENT POWER FOR A 1969 FORD 300-CID, I-6 ENGINE–STATIONARY DYNAMOMETER

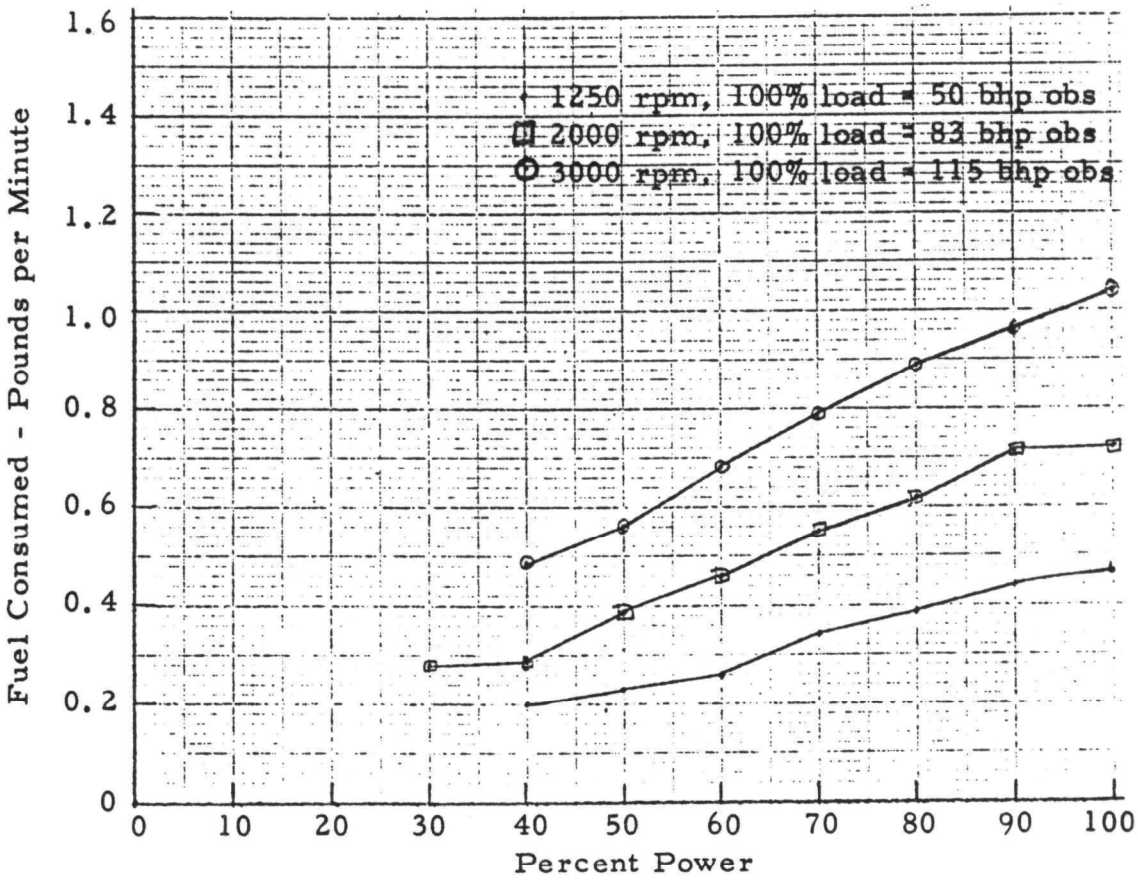

FIGURE B-14. FUEL CONSUMED VS PERCENT POWER FOR A 1969 FORD 300-CID, I-6 ENGINE–CHASSIS DYNAMOMETER

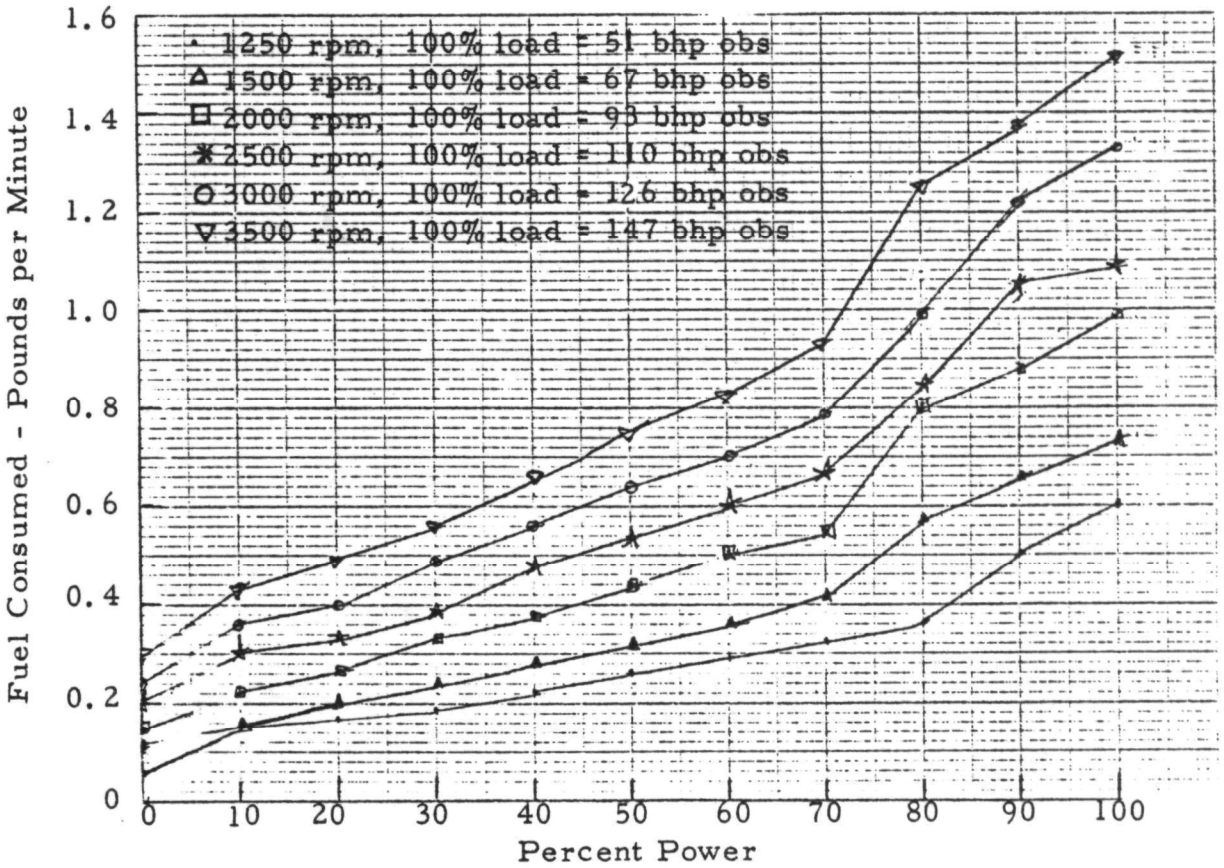

FIGURE B-15. FUEL CONSUMED VS PERCENT POWER FOR A 1969 DODGE 318-CID, V8 ENGINE–STATIONARY DYNAMOMETER

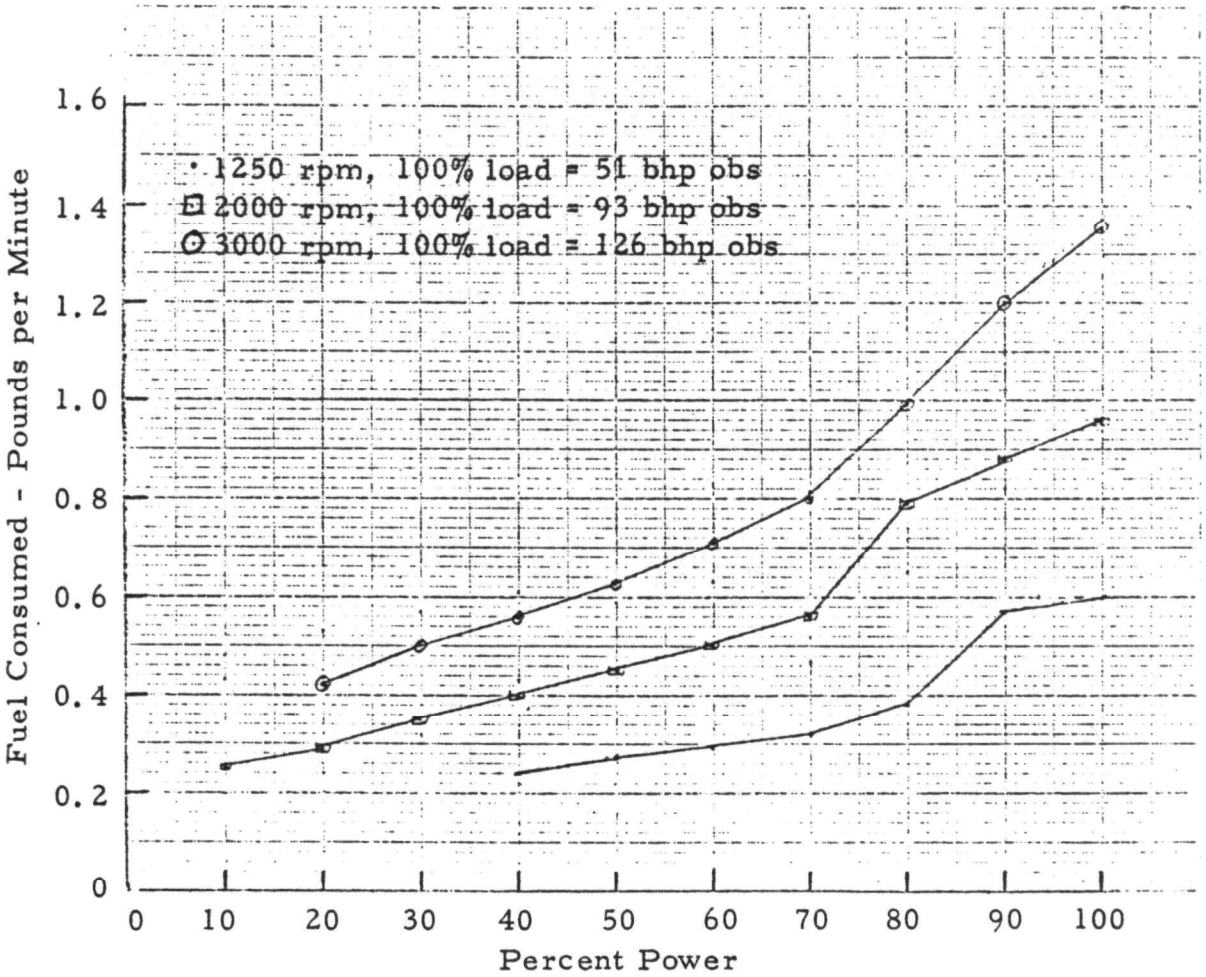

FIGURE B-16. FUEL CONSUMED VS PERCENT POWER FOR A 1969 DODGE 318-CID, V8 ENGINE–CHASSIS DYNAMOMETER

APPENDIX C

FOUR ENGINE-VEHICLE EMISSION RATES, GRAMS PER MINUTE IN GRAPHICAL FORM

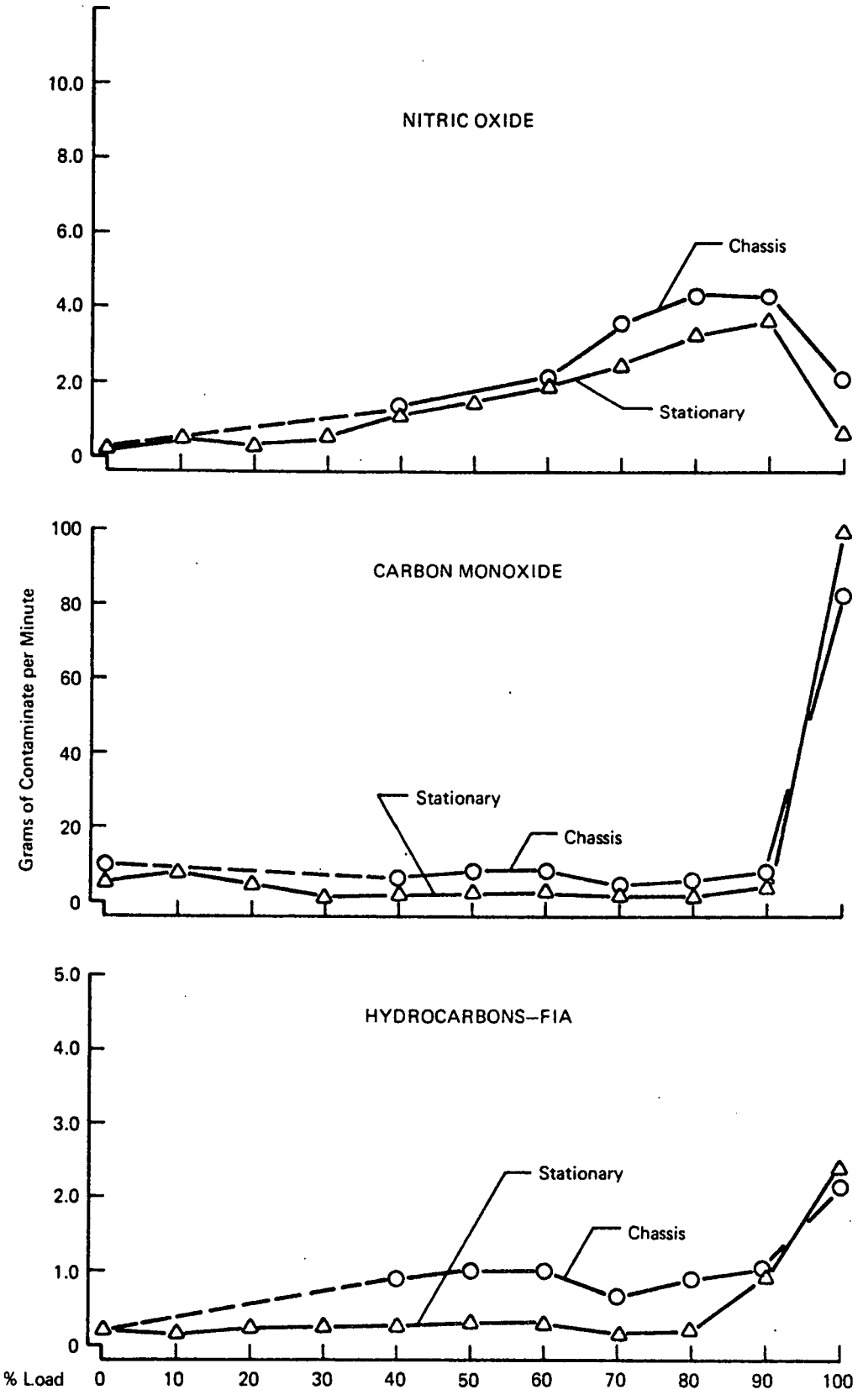

FIGURE C-1. GRAMS/MINUTE EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–1000 RPM

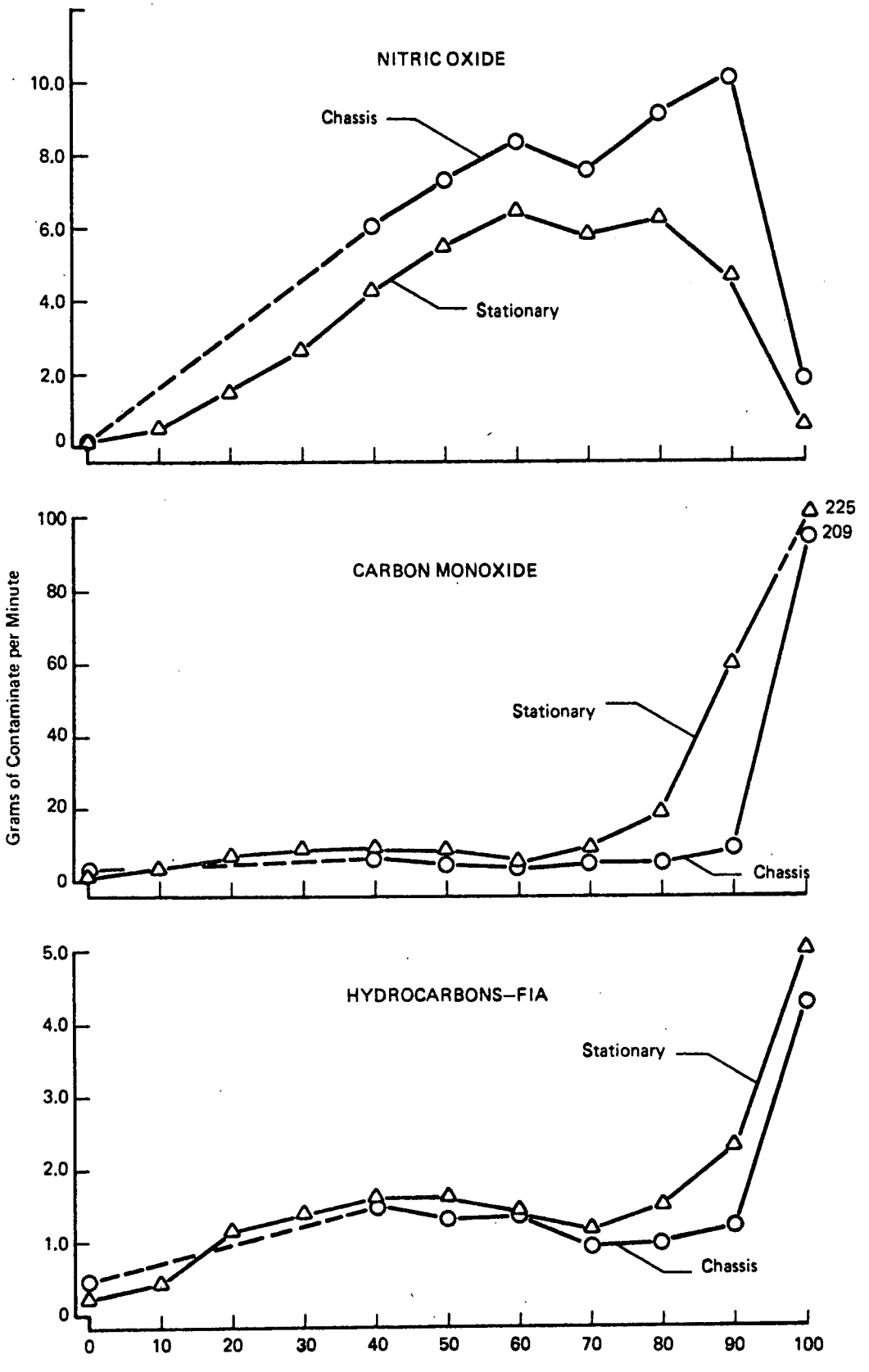

FIGURE C-2. GRAMS/MINUTE EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–2000 RPM

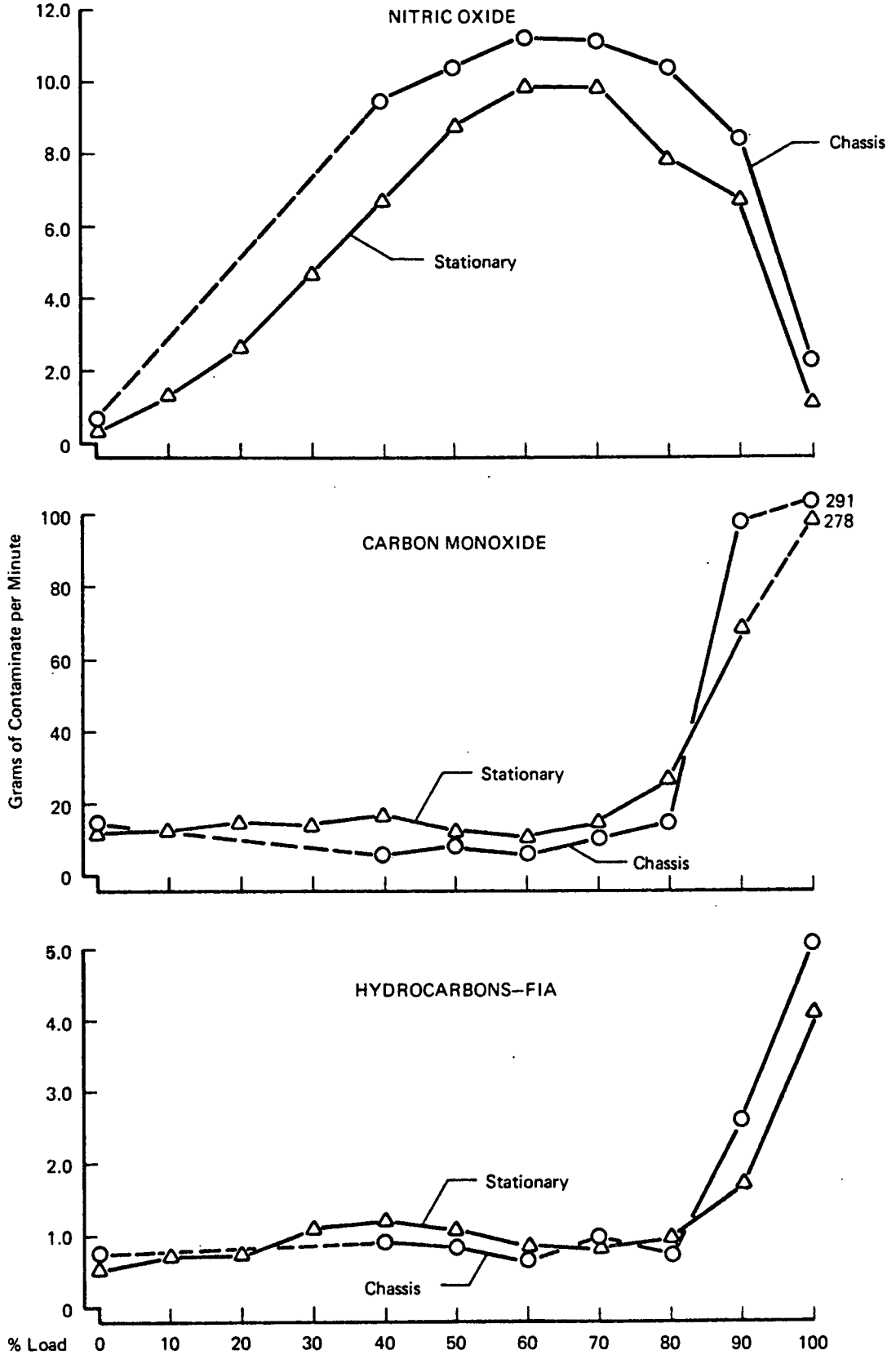

FIGURE C-3. GRAMS/MINUTE EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–3000 RPM

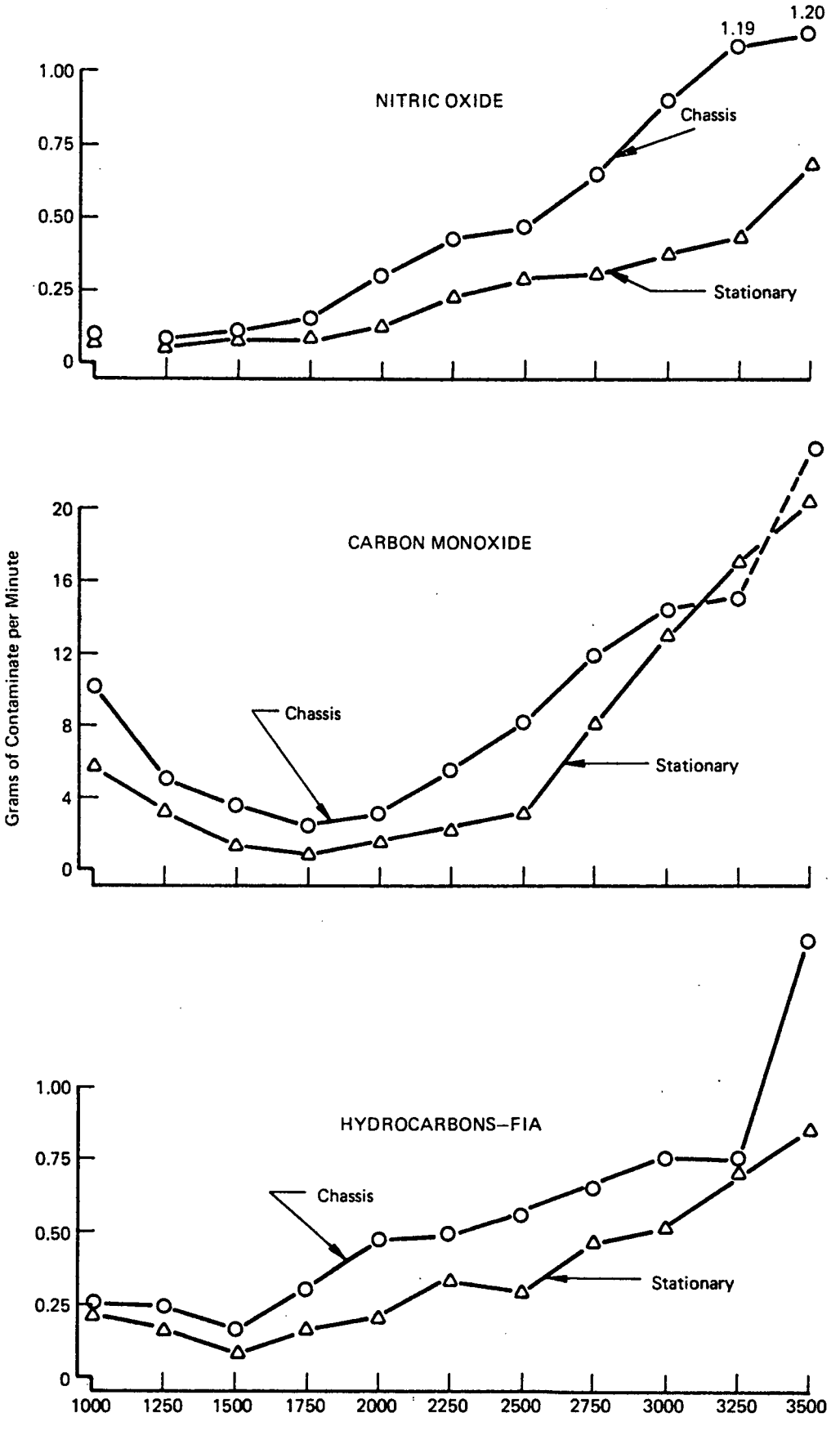

FIGURE C-4. GRAMS/MINUTE EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–NO LOAD

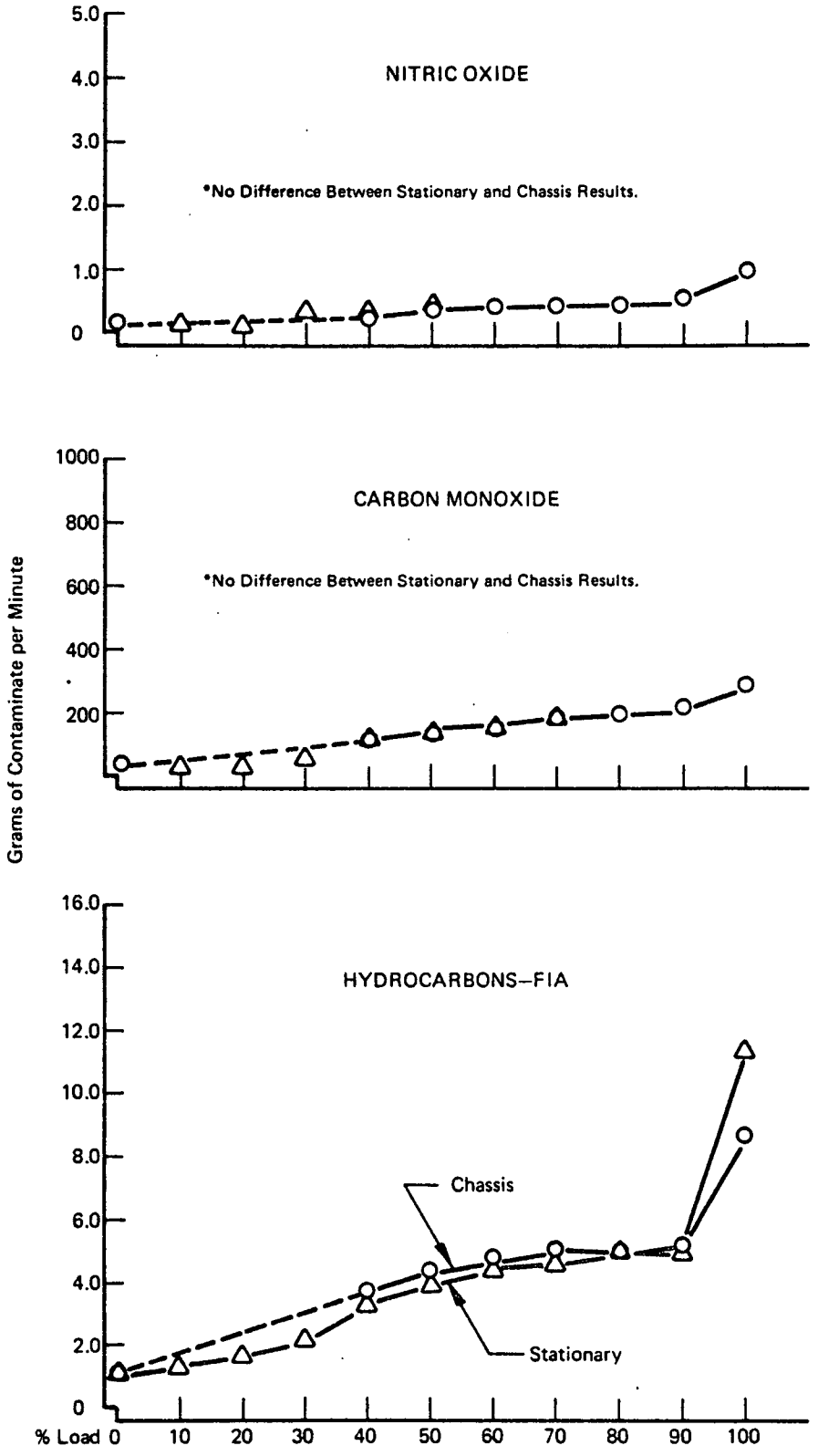

FIGURE C-5. GRAMS/MINUTE EMISSIONS FOR 1969 IHC 304-CID ENGINE–1250 RPM

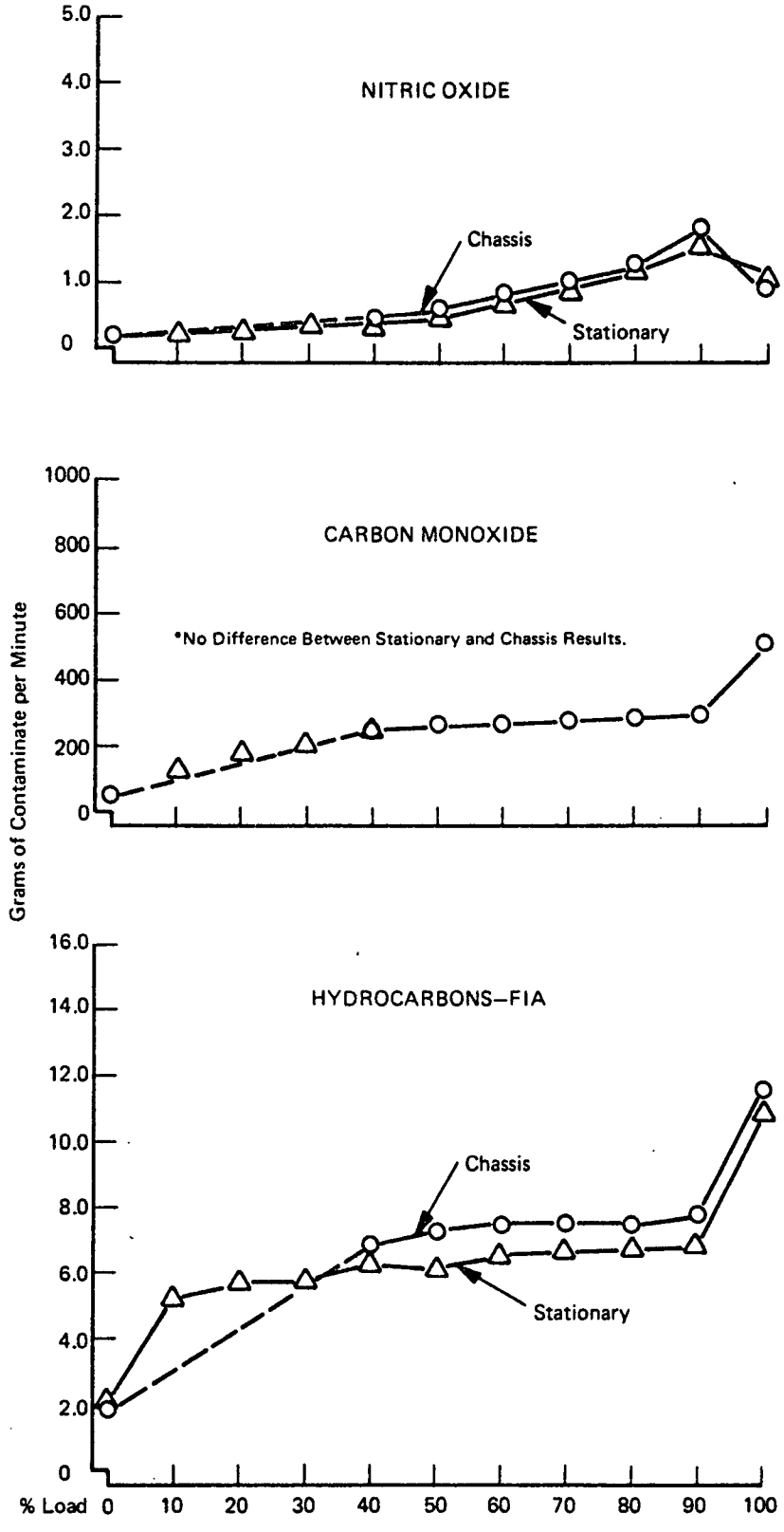

FIGURE C-6. GRAMS/MINUTE EMISSIONS FOR 1969 IHC 304-CID ENGINE–2000 RPM

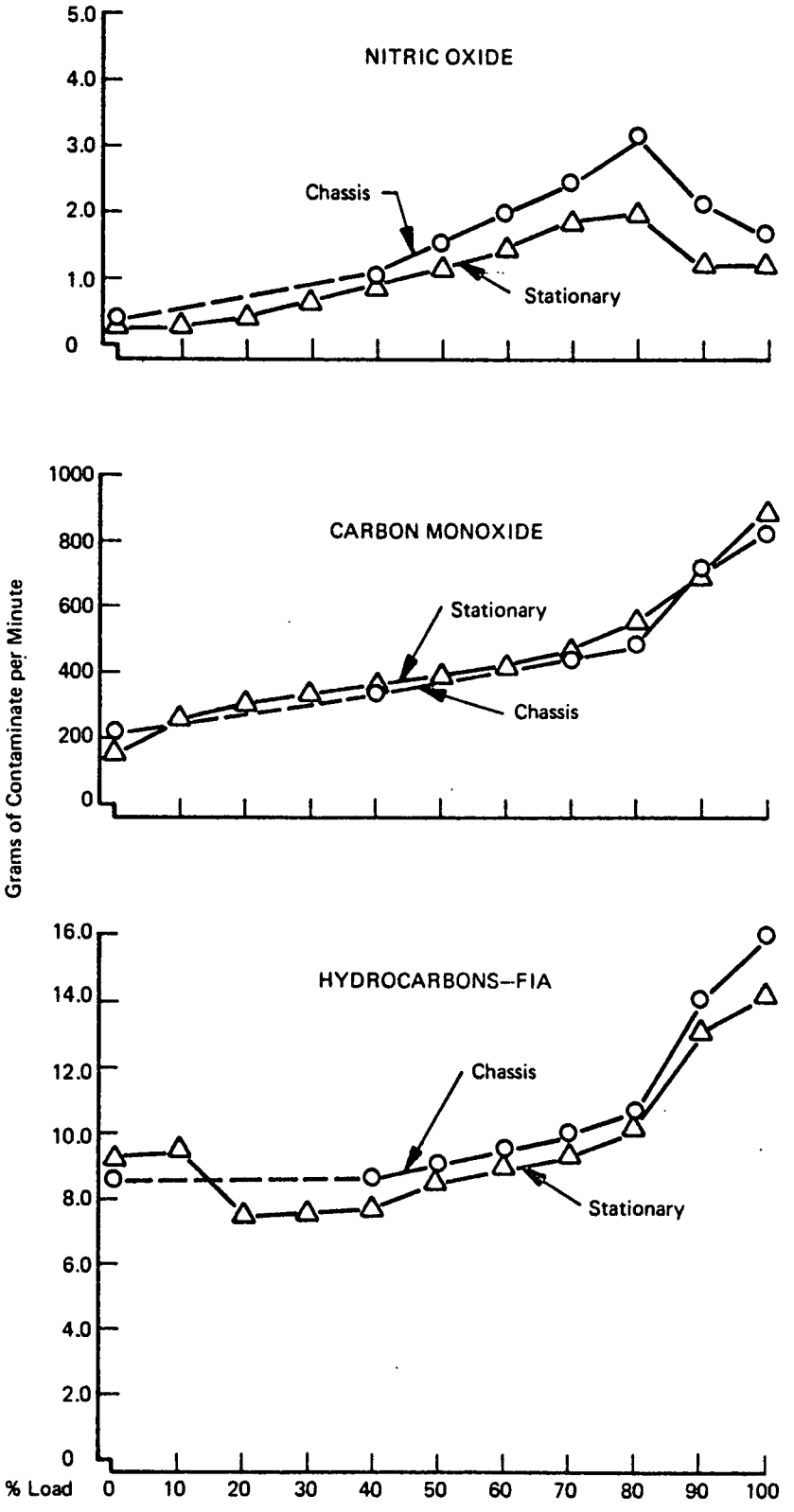

FIGURE C-7. GRAMS/MINUTE EMISSIONS FOR 1969 IHC 304-CID ENGINE–3000 RPM

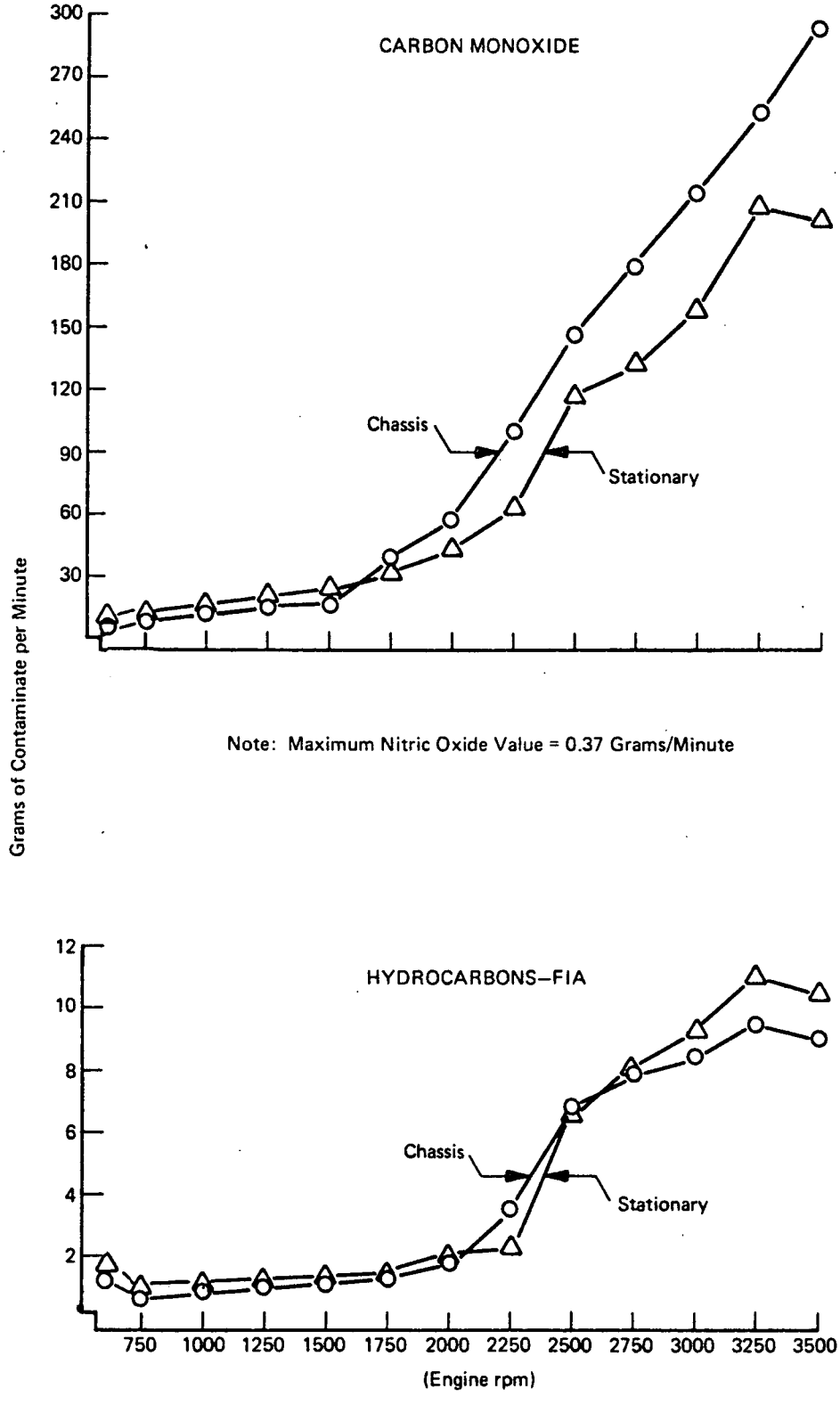

FIGURE C-8. GRAMS/MINUTE EMISSIONS FOR 1969 IHC 304-CID ENGINE–NO LOAD

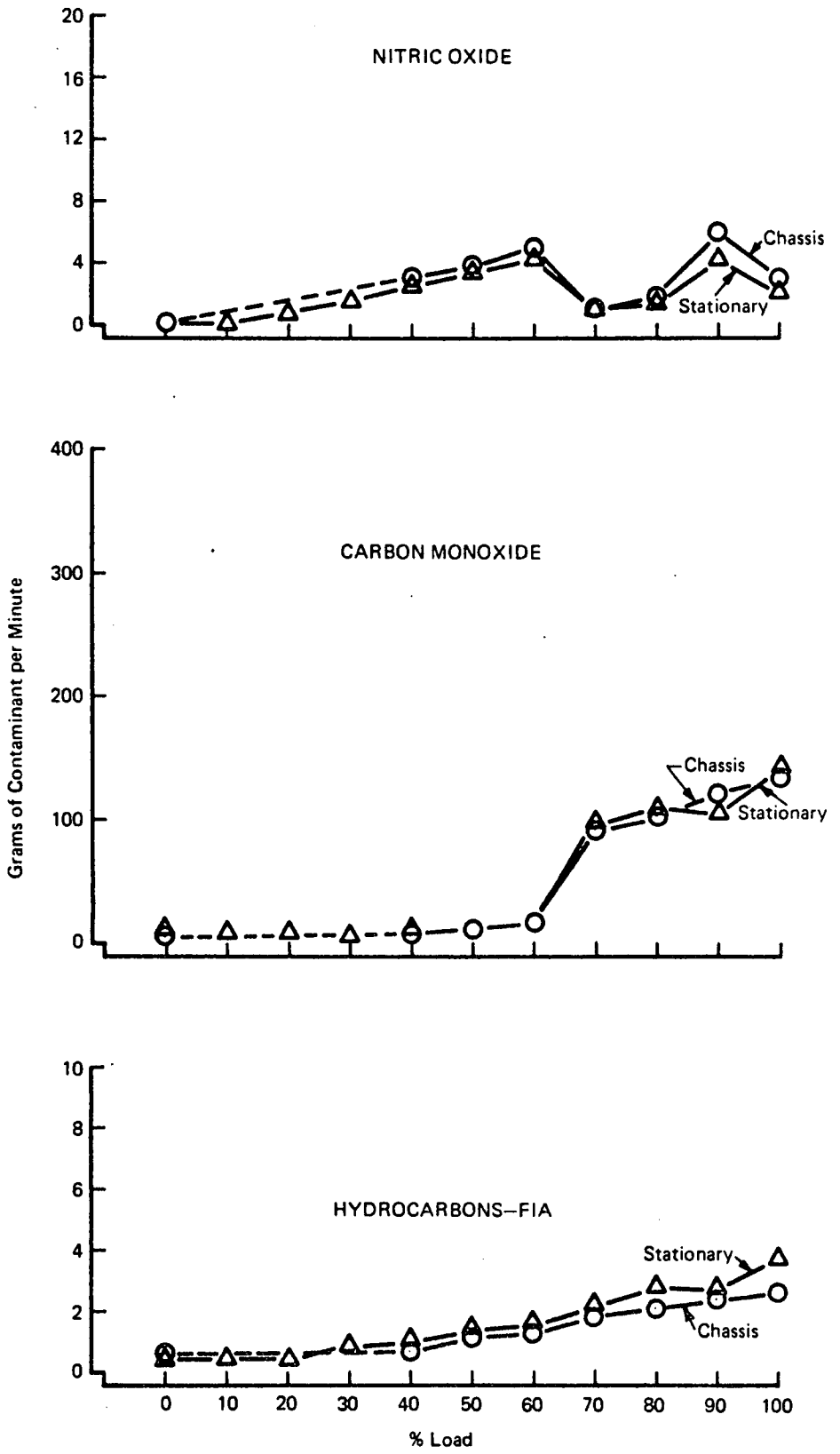

FIGURE C-9. GRAMS/MINUTE EMISSIONS FOR 1969 FORD 300-CID ENGINE–1250 RPM

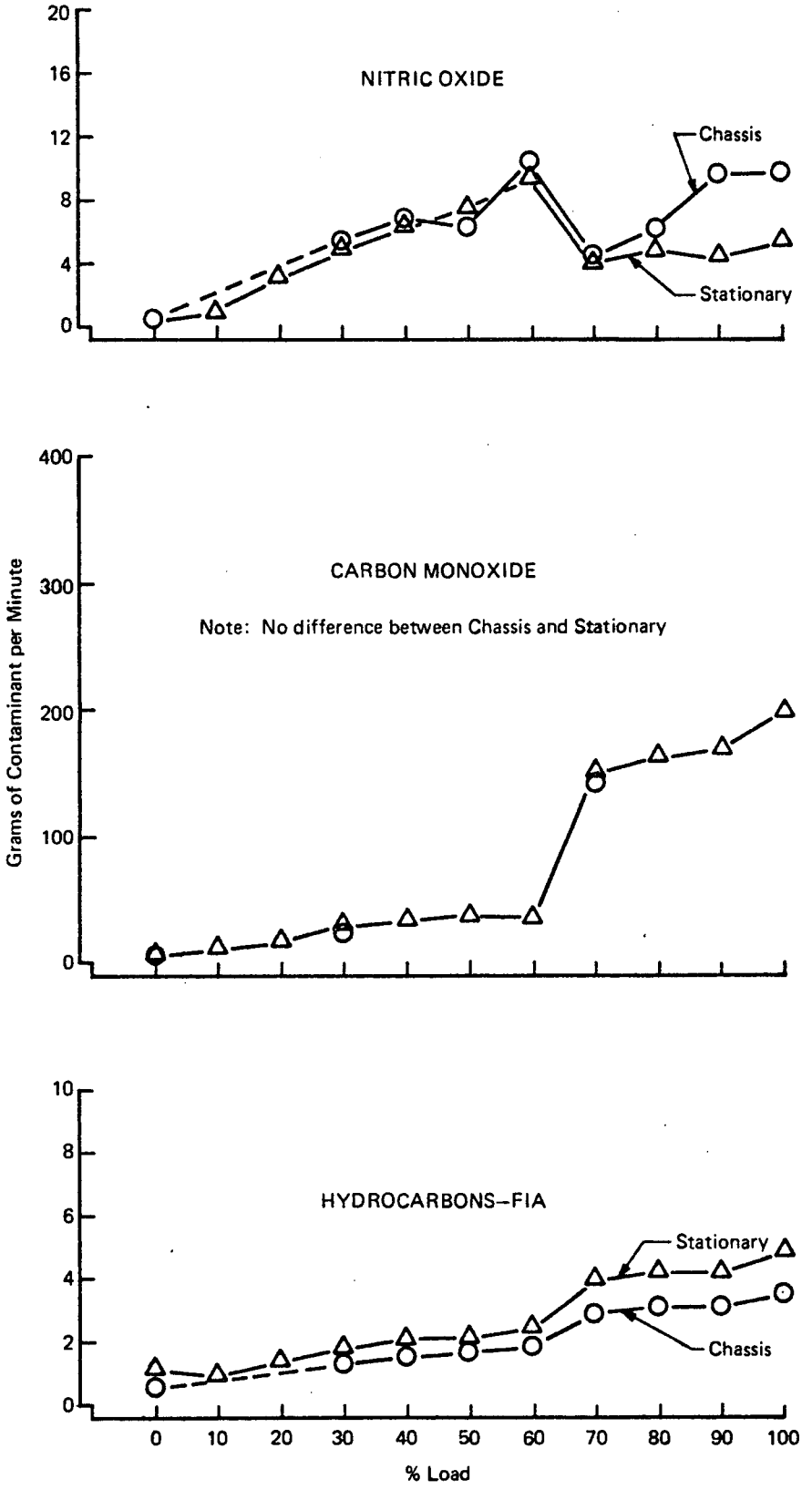

FIGURE C-10. GRAMS/MINUTE EMISSIONS FOR 1969 FORD 300-CID ENGINE–2000 RPM

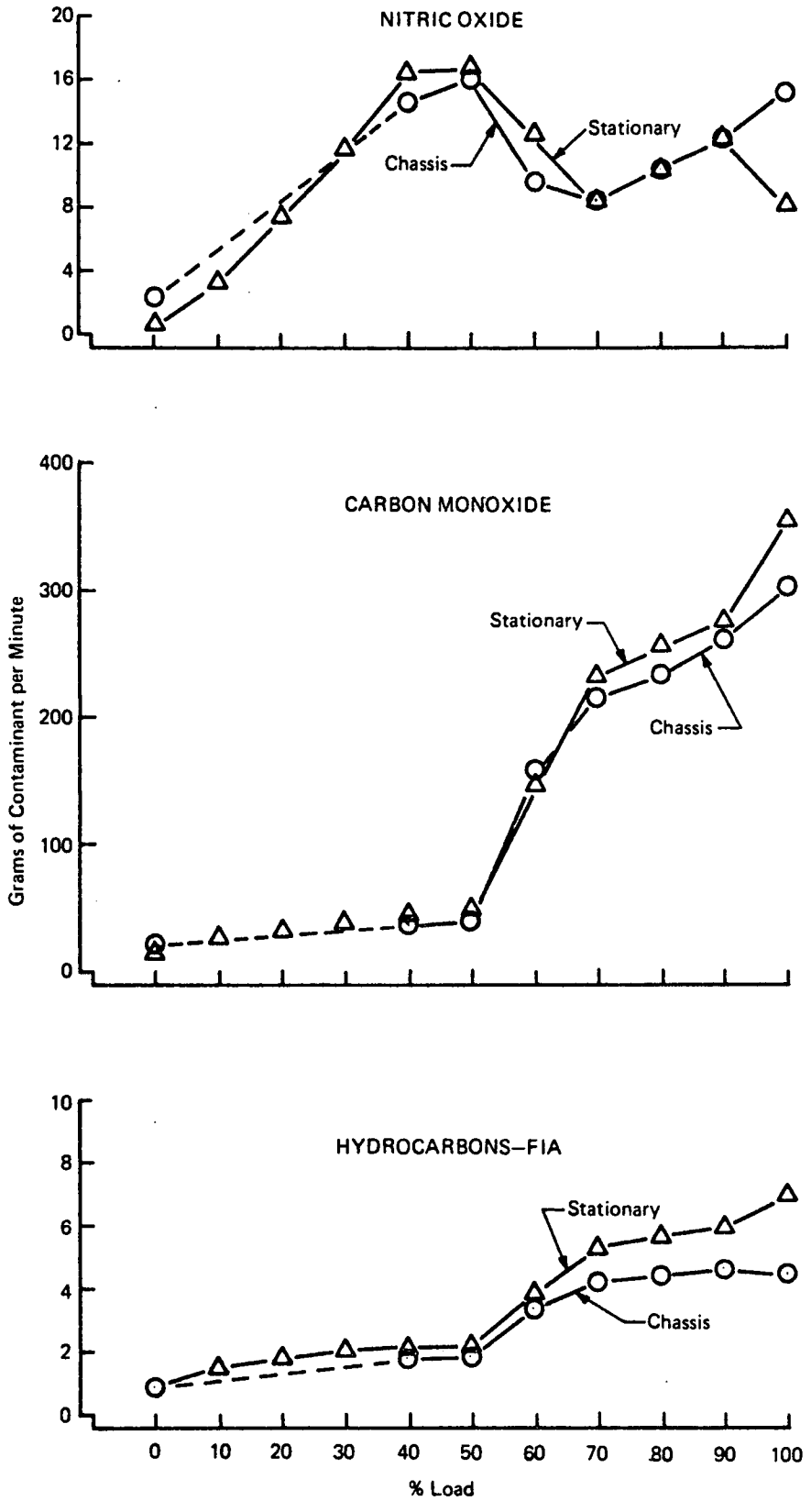

FIGURE C-11. GRAMS/MINUTE EMISSIONS FOR 1969 FORD 300-CID ENGINE–3000 RPM

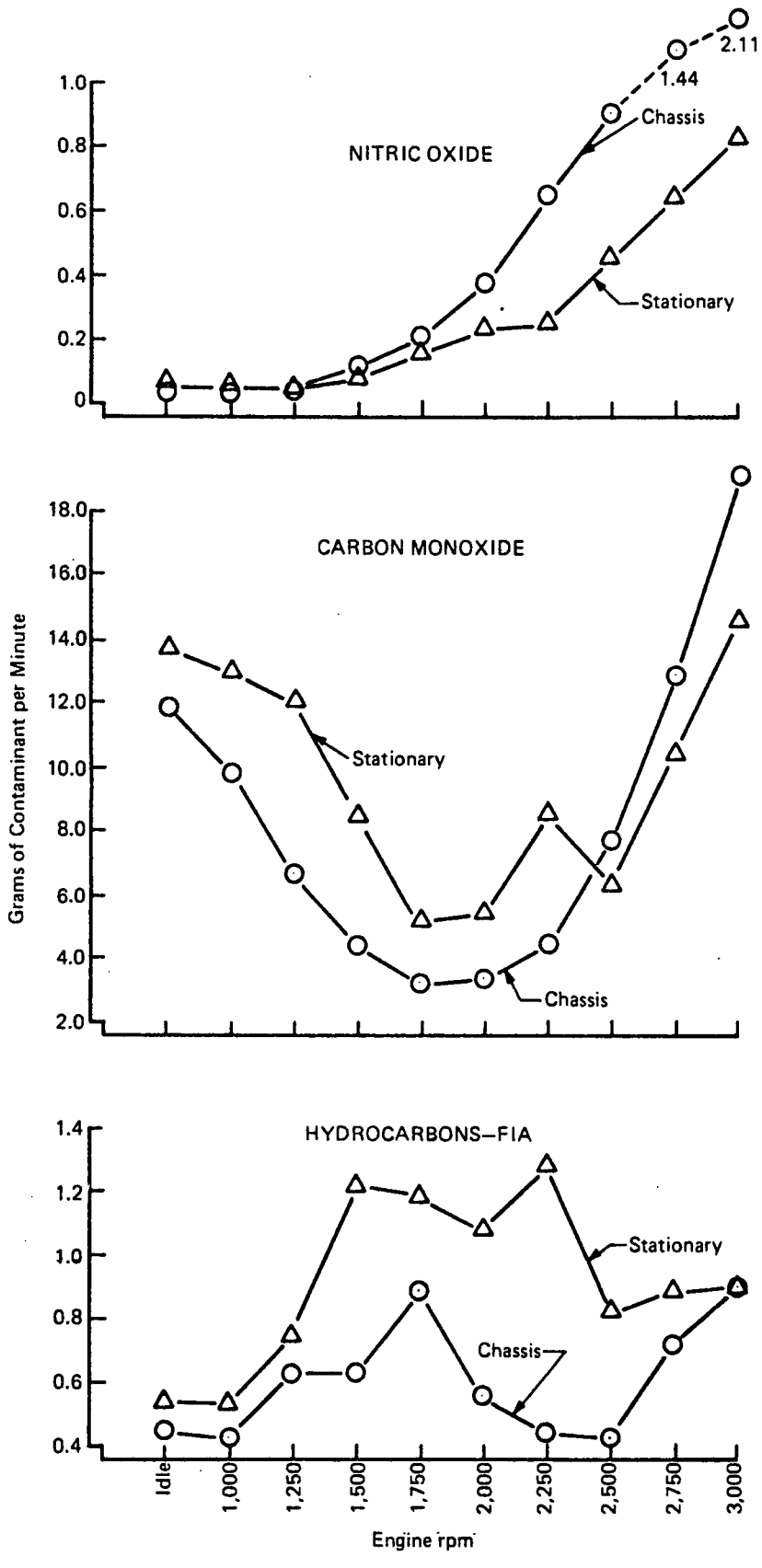

FIGURE C-12. GRAMS/MINUTE EMISSIONS FOR 1969 FORD 300-CID ENGINE–NO LOAD

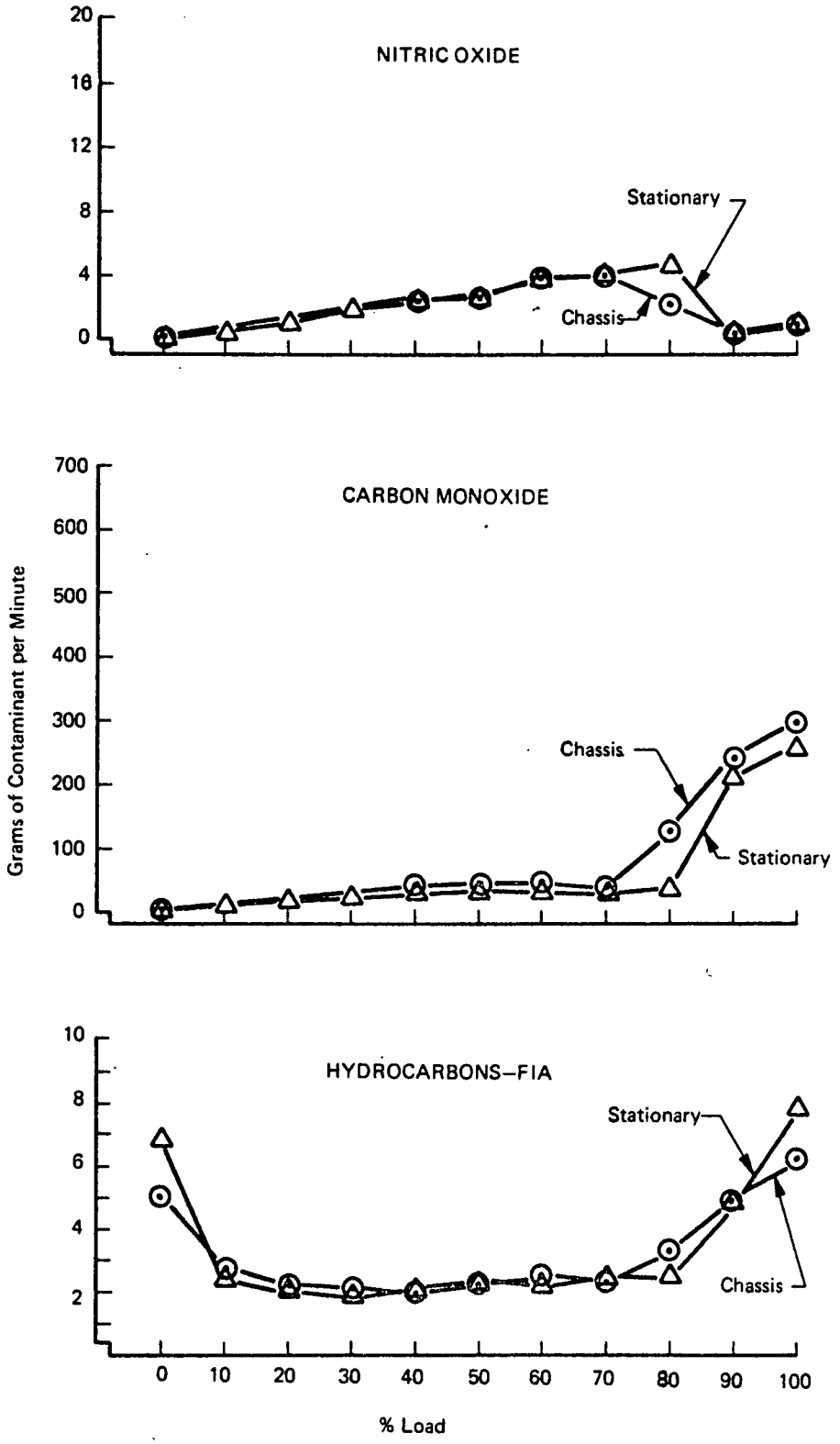

FIGURE C-13. GRAMS/MINUTE EMISSIONS FOR 1969 DODGE 318-CID ENGINE–1250 RPM

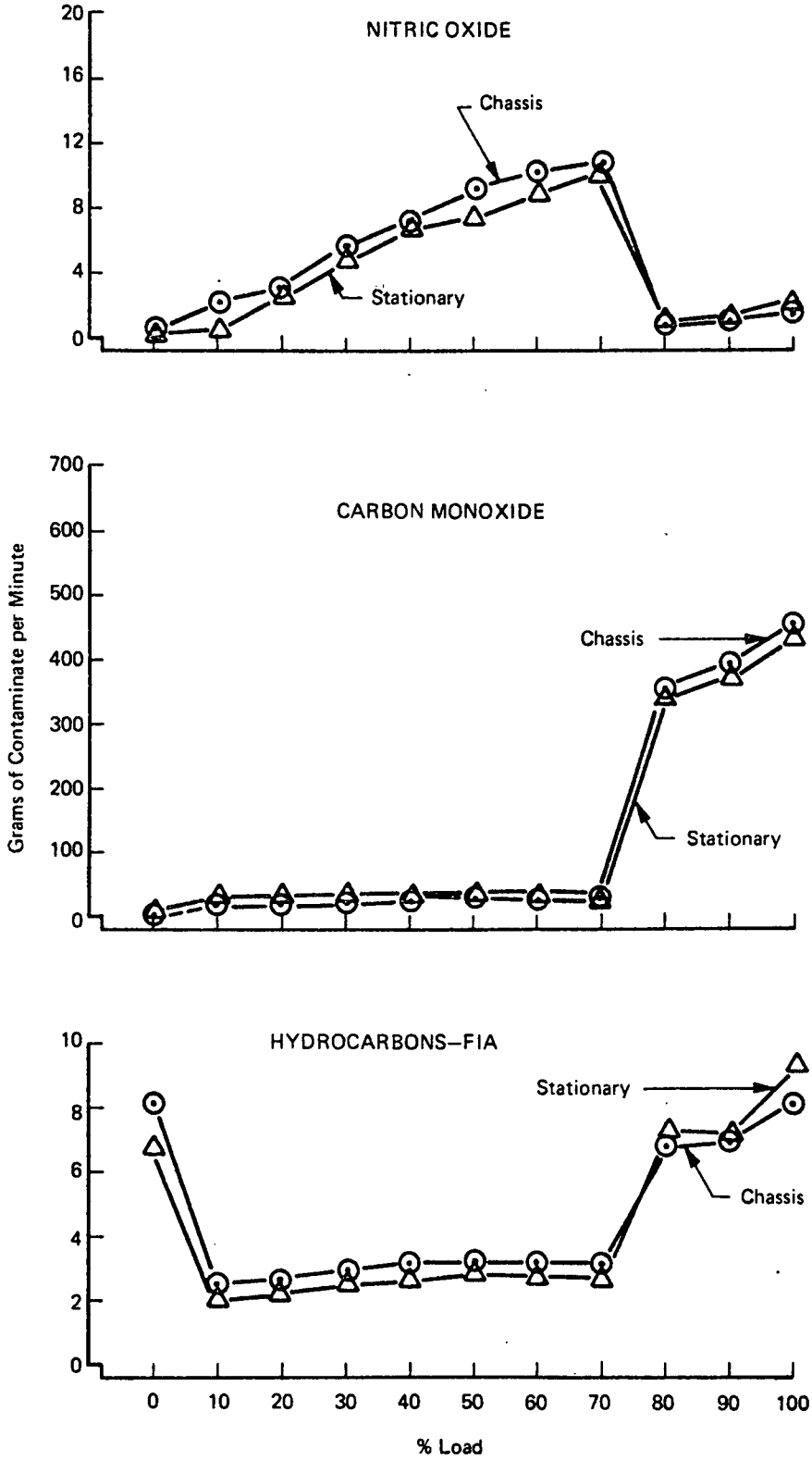

FIGURE C-14. GRAMS/MINUTE EMISSIONS FOR 1969 DODGE 318-CID ENGINE–2000 RPM

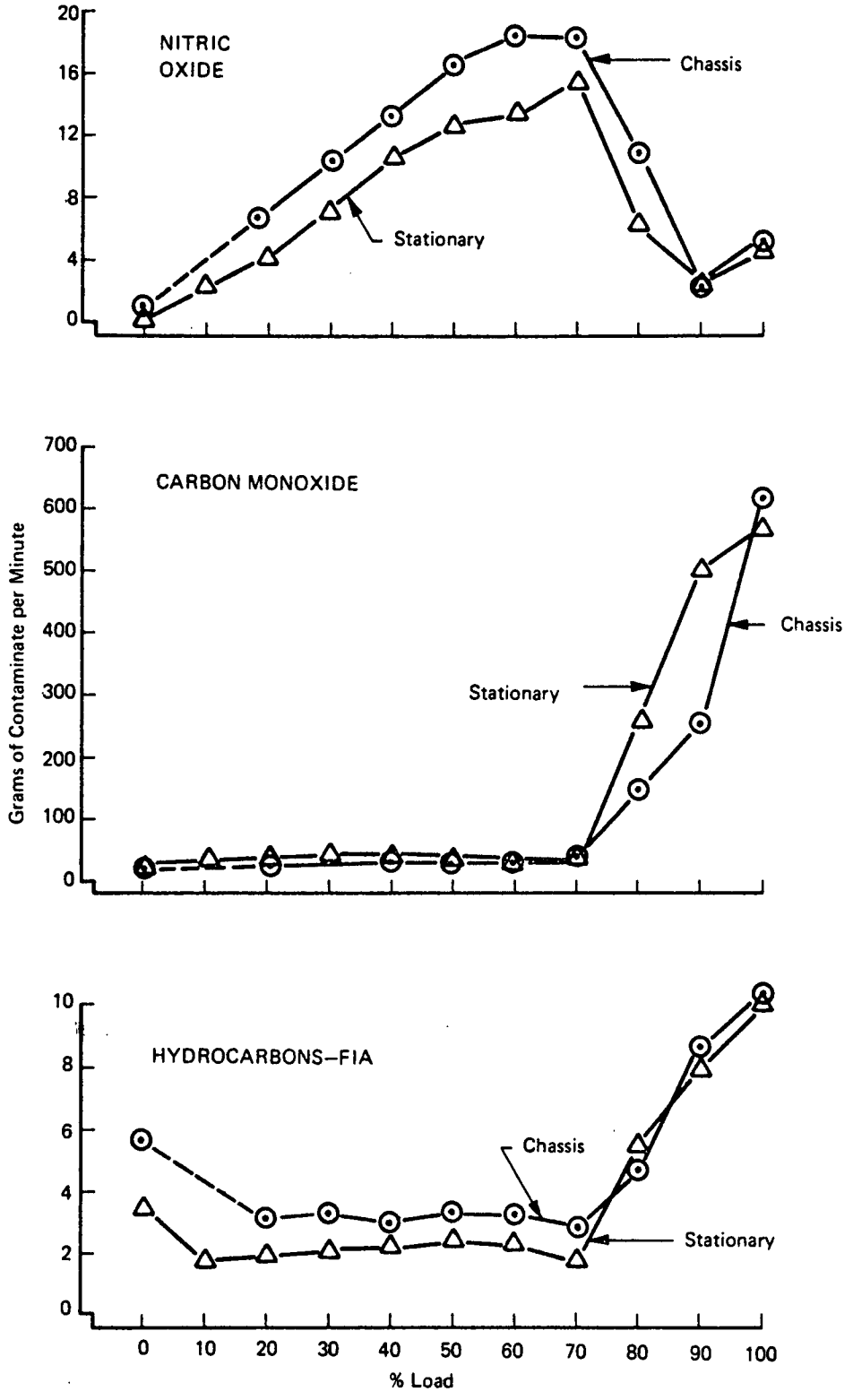

FIGURE C-15. GRAMS/MINUTE EMISSIONS FOR 1969 DODGE 318-CID ENGINE–3000 RPM

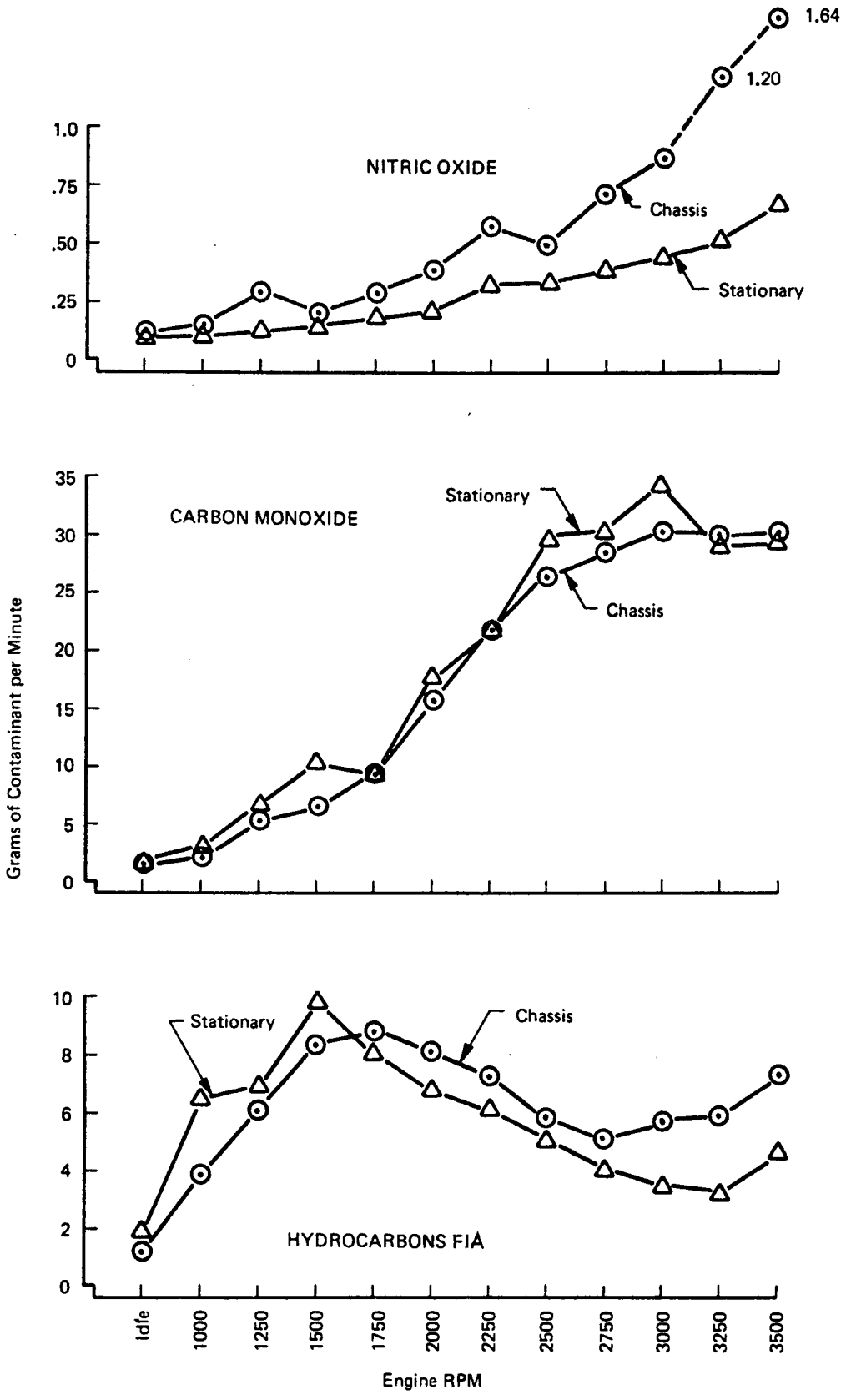

FIGURE C-16. GRAMS/MINUTE EMISSIONS FOR 1969 DODGE 318-CID ENGINE—NO LOAD

APPENDIX D

FOUR ENGINE-VEHICLE EMISSION RATES, GRAMS PER POUND OF FUEL IN GRAPHICAL FORM

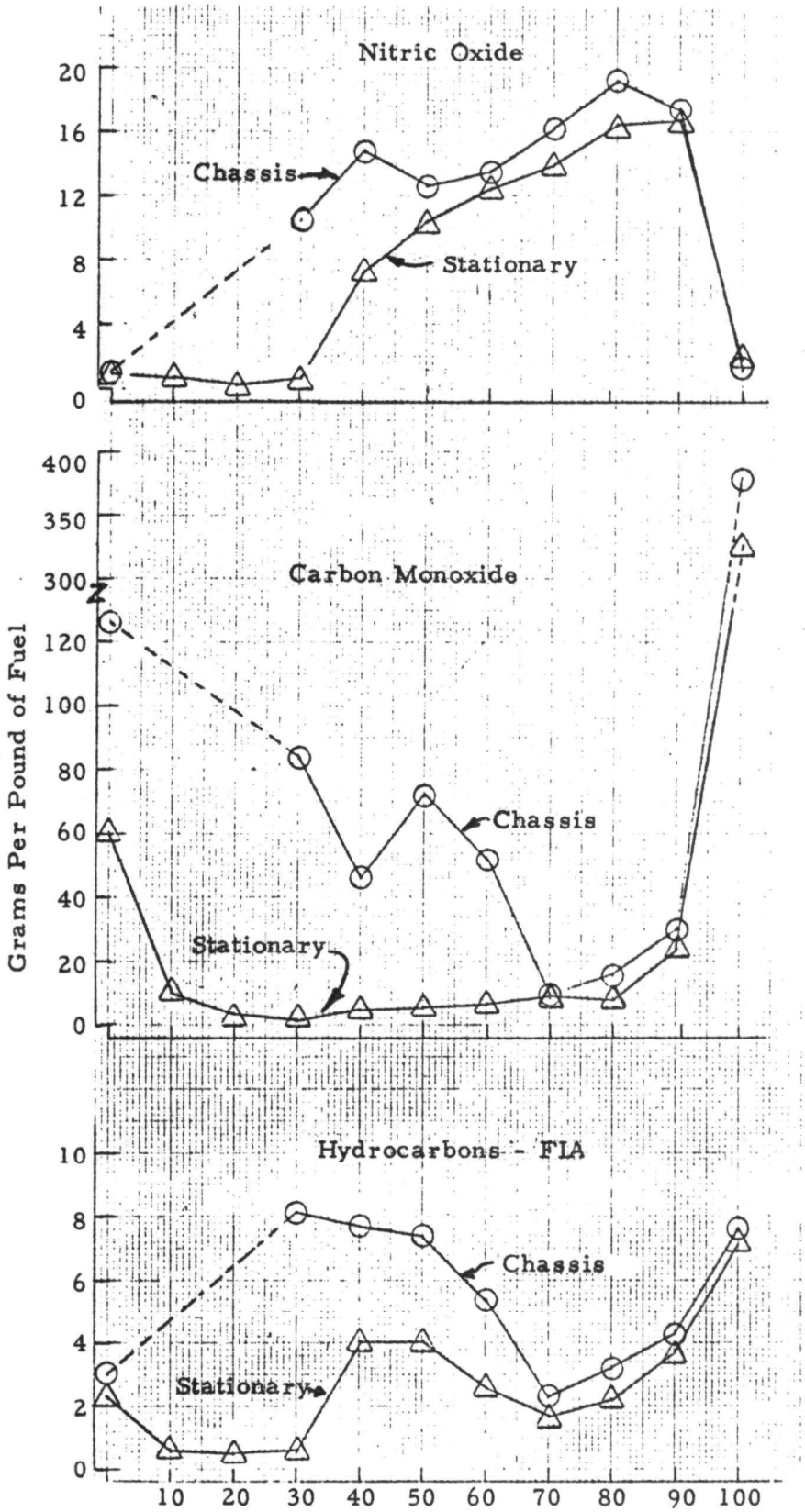

FIGURE D-1. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE – 1000 RPM

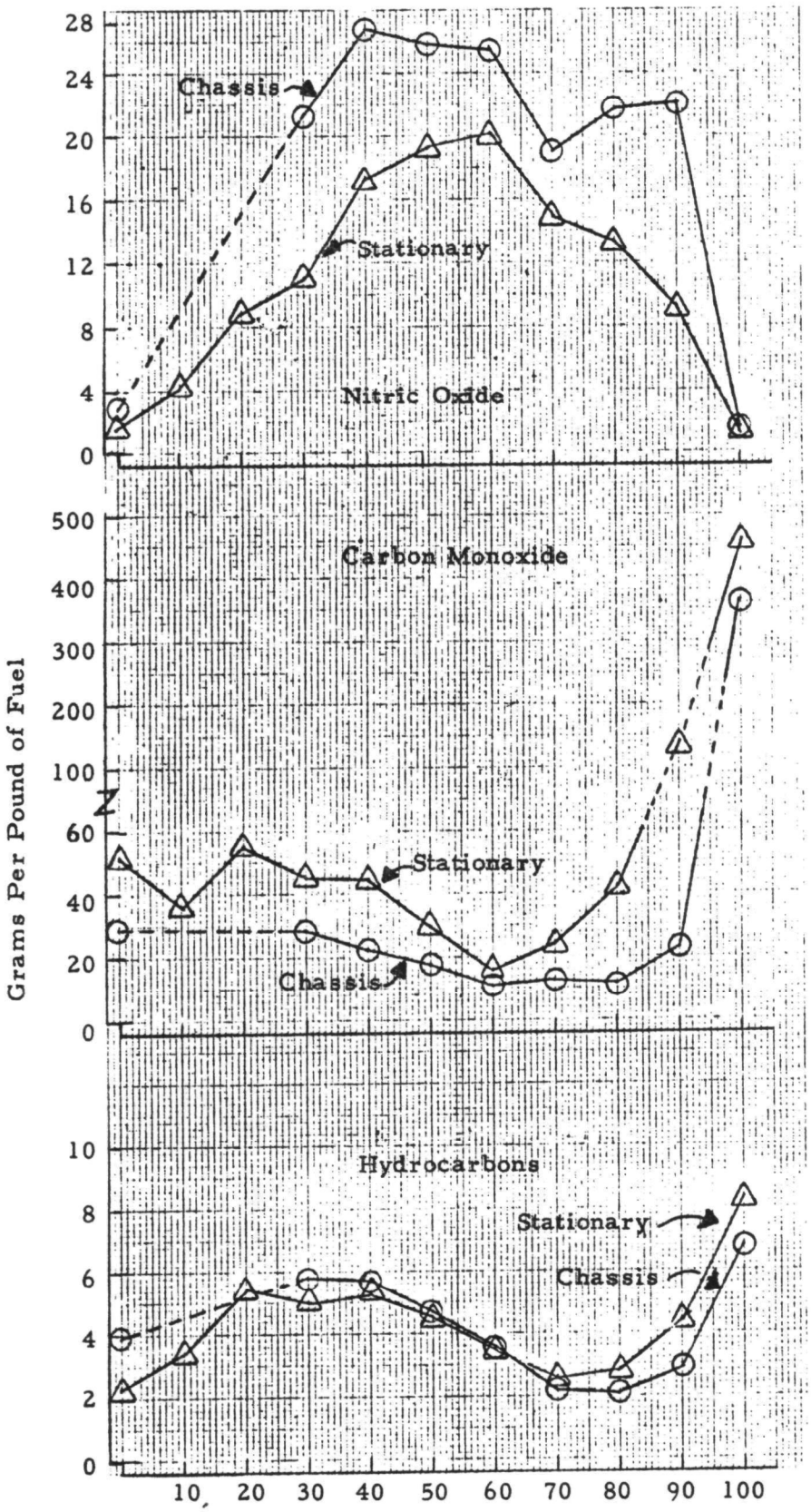

FIGURE D-2. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–2000 RPM

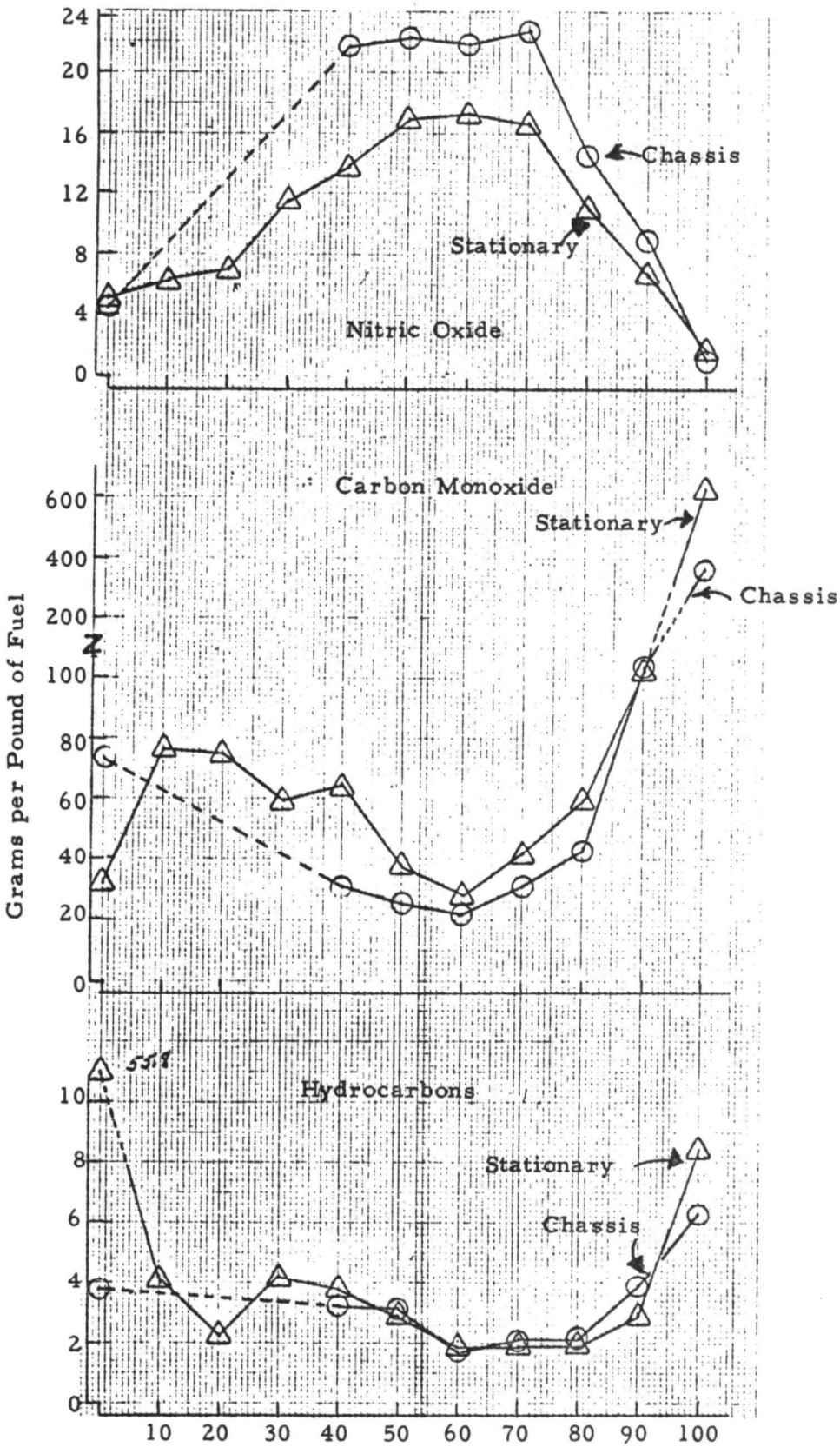

FIGURE D-3. GRAMS/POUND OF FUEL EMISSIONS FOR
1969 CHEVROLET 250-CID ENGINE–3000 RPM

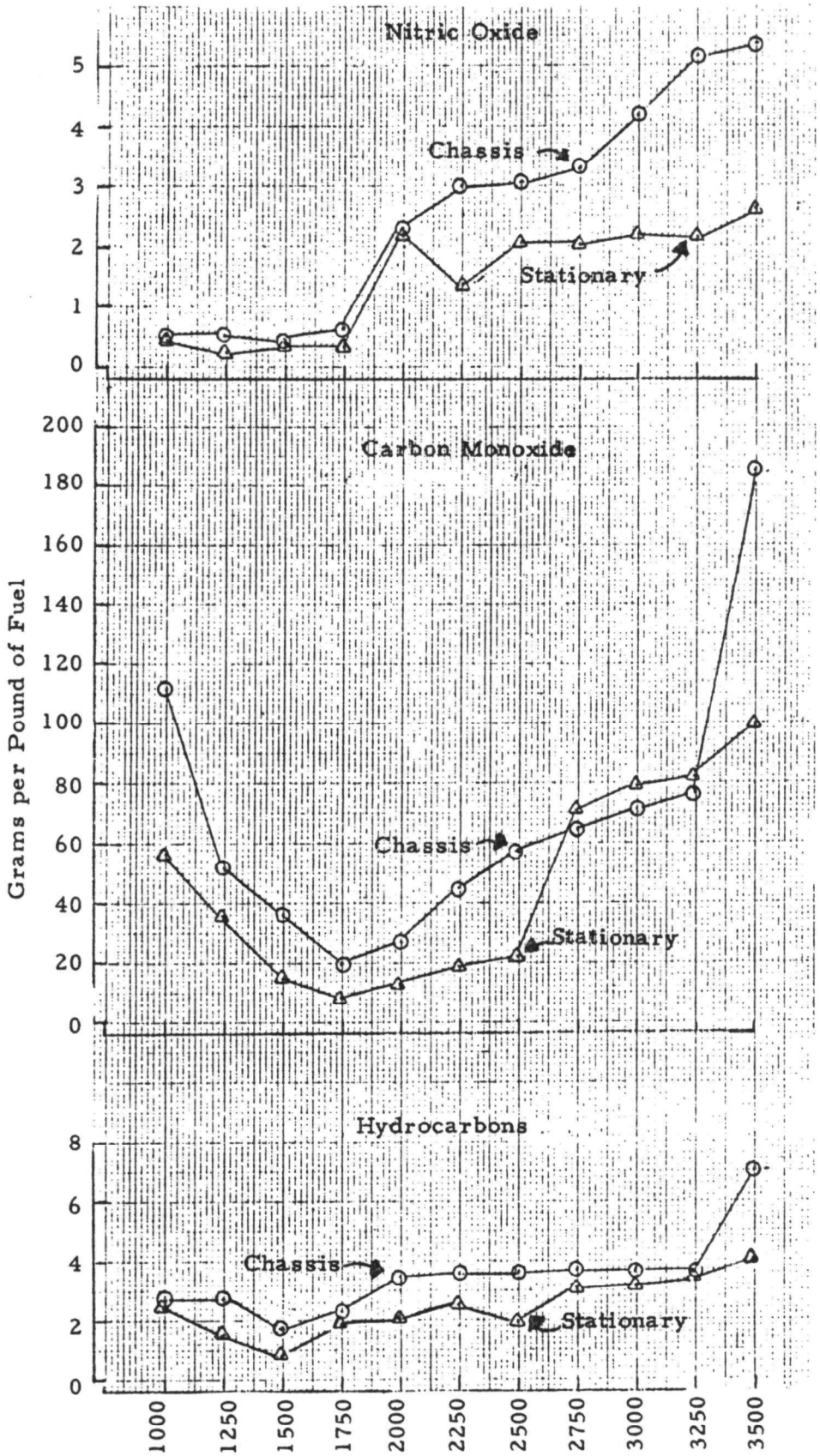

FIGURE D-4. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–NO LOAD

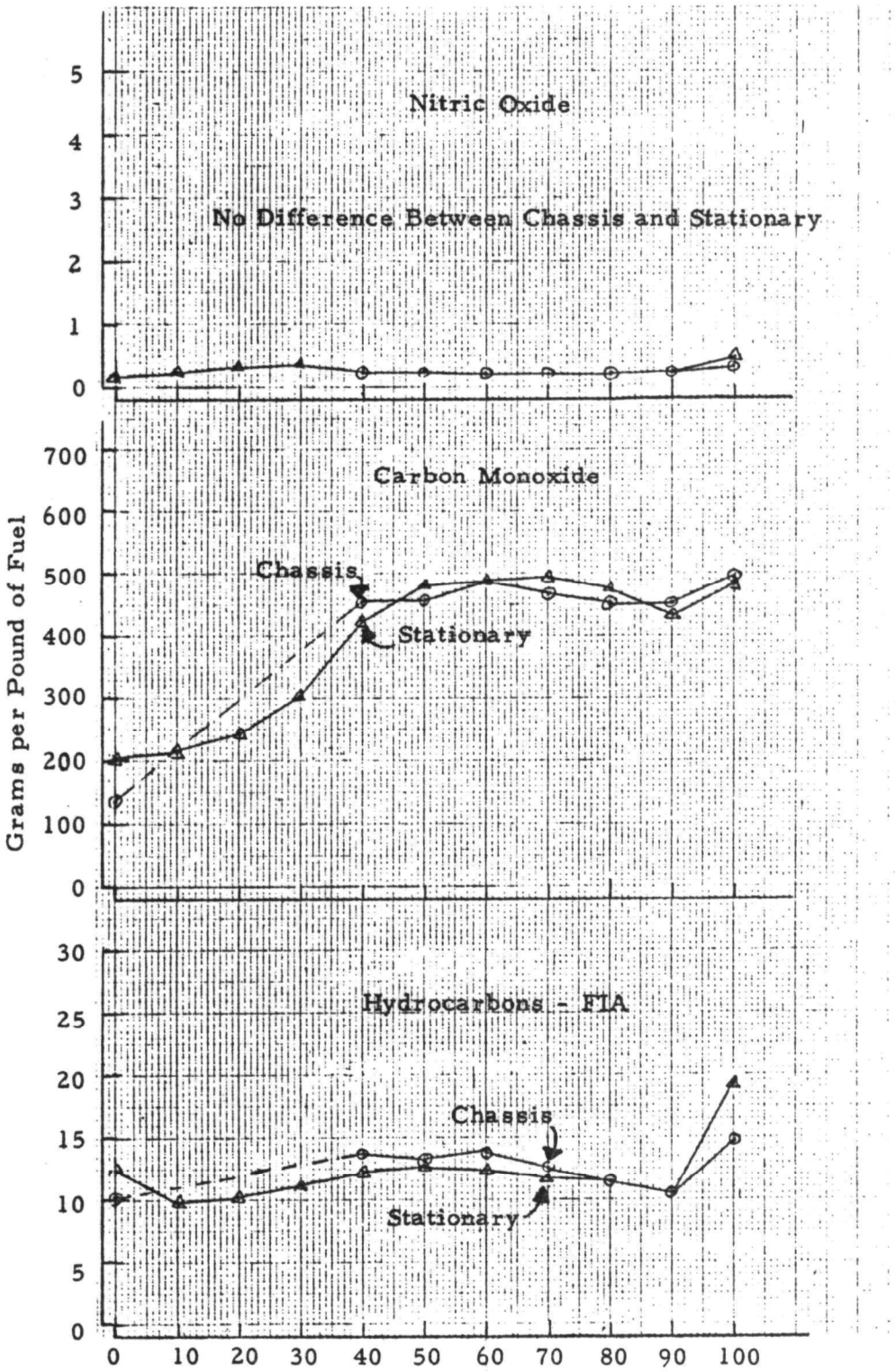

FIGURE D-5. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 IHC 304-CID ENGINE–1250 RPM

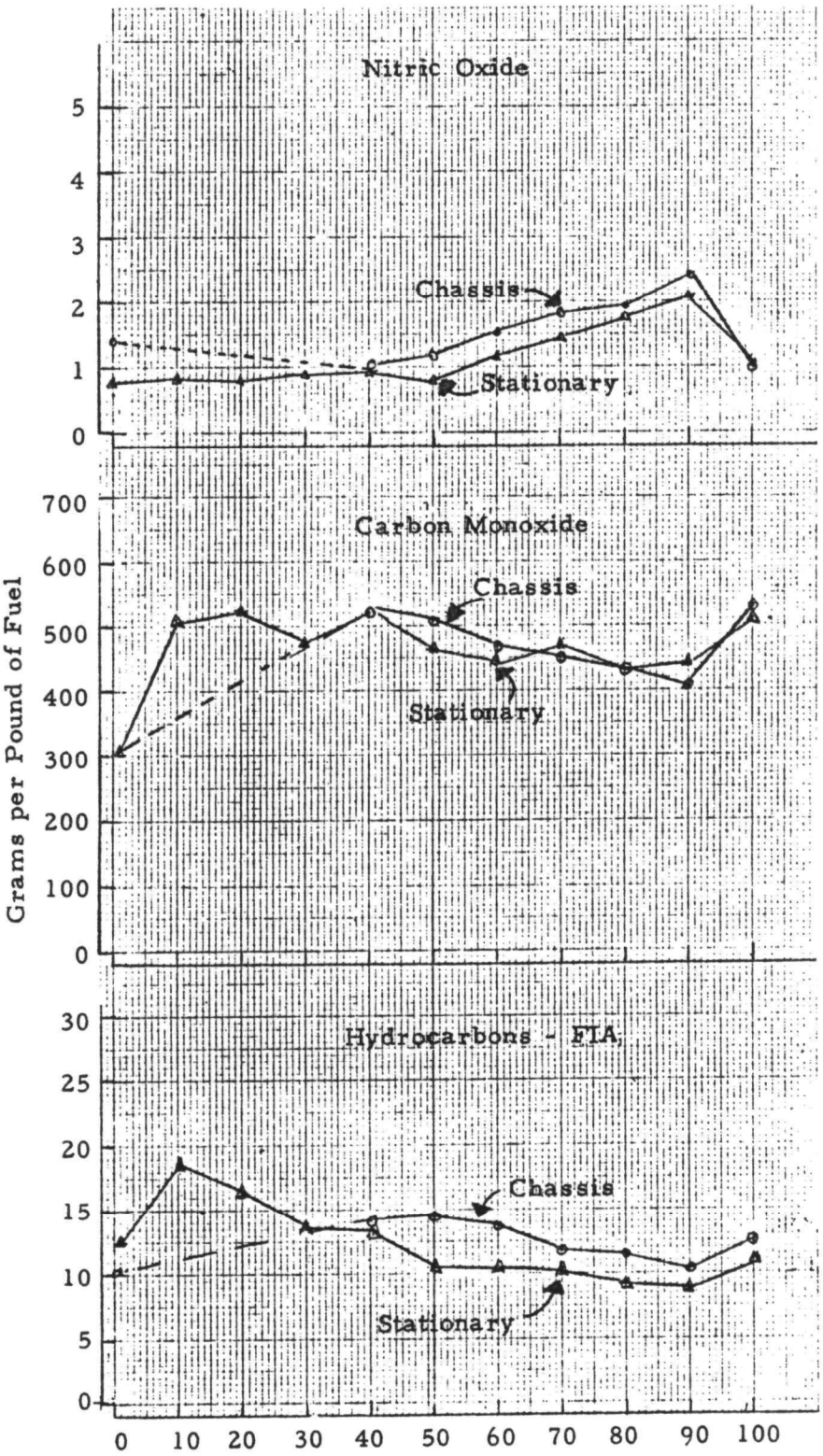

FIGURE D-6. GRAMS/POUND OF EMISSIONS FOR 1969 IHC 304-CID ENGINE–2000 RPM

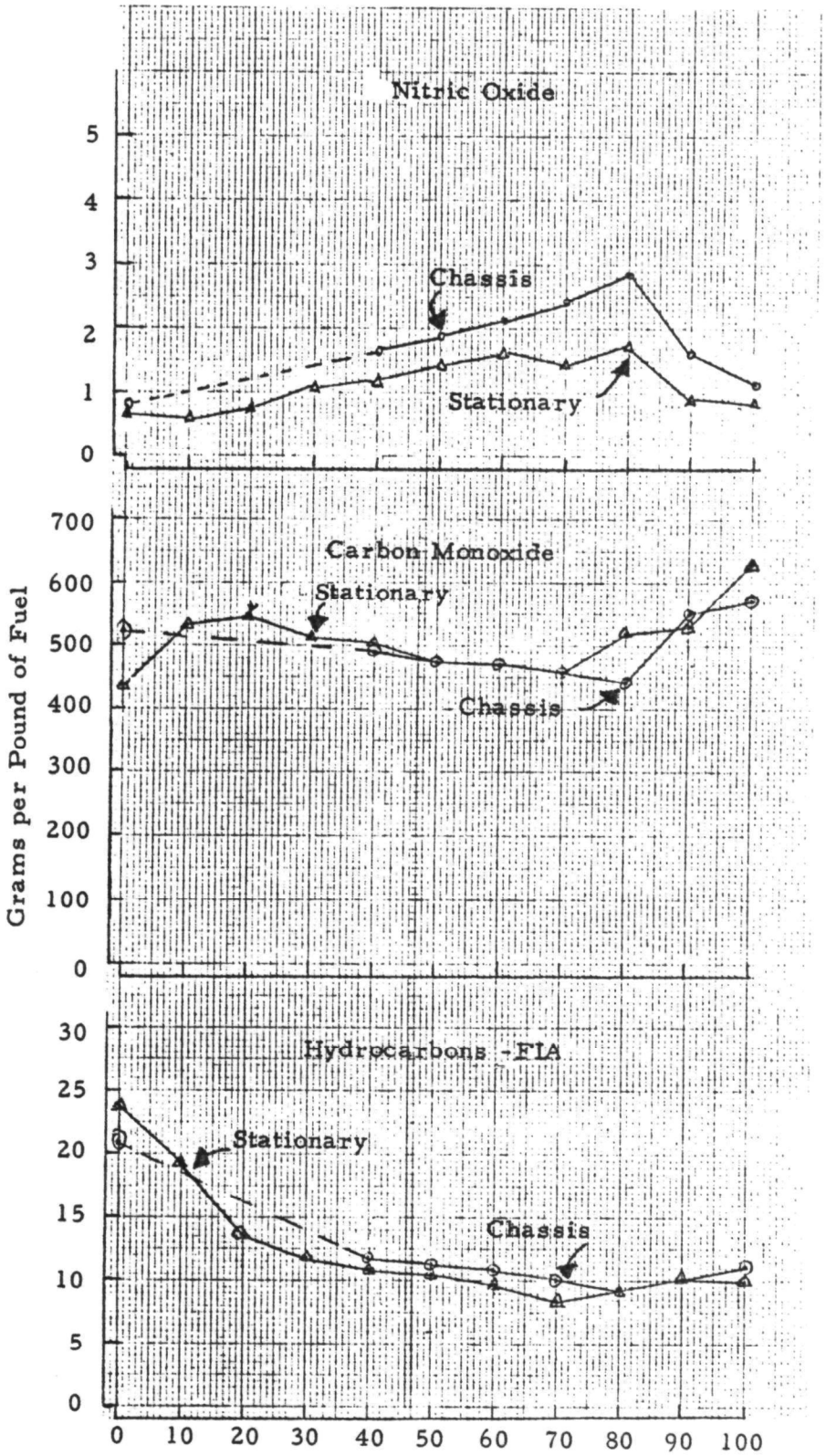

FIGURE D-7. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 IHC 304-CID ENGINE–3000 RPM

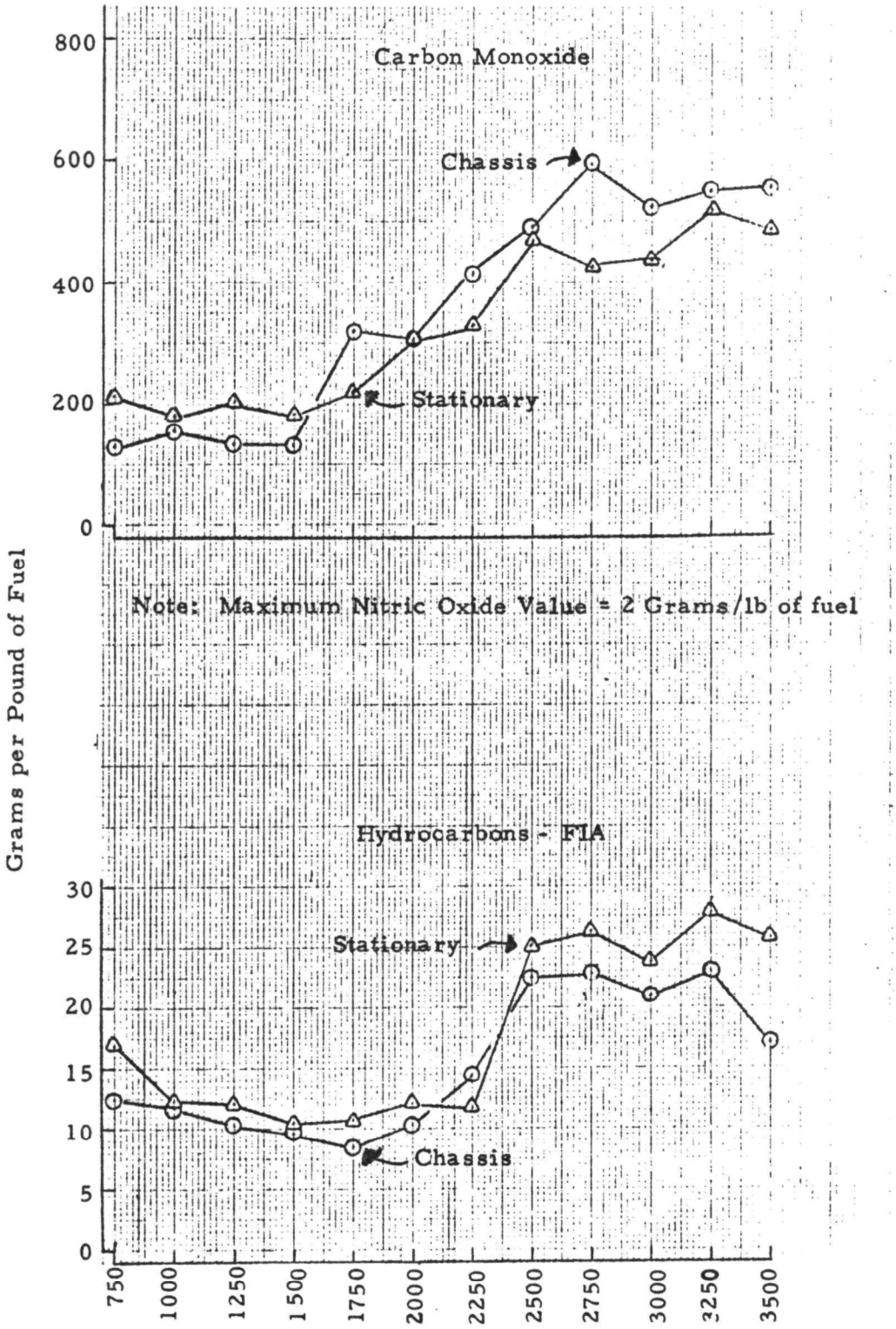

FIGURE D-8. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 IHC 304-CID ENGINE–NO LOAD

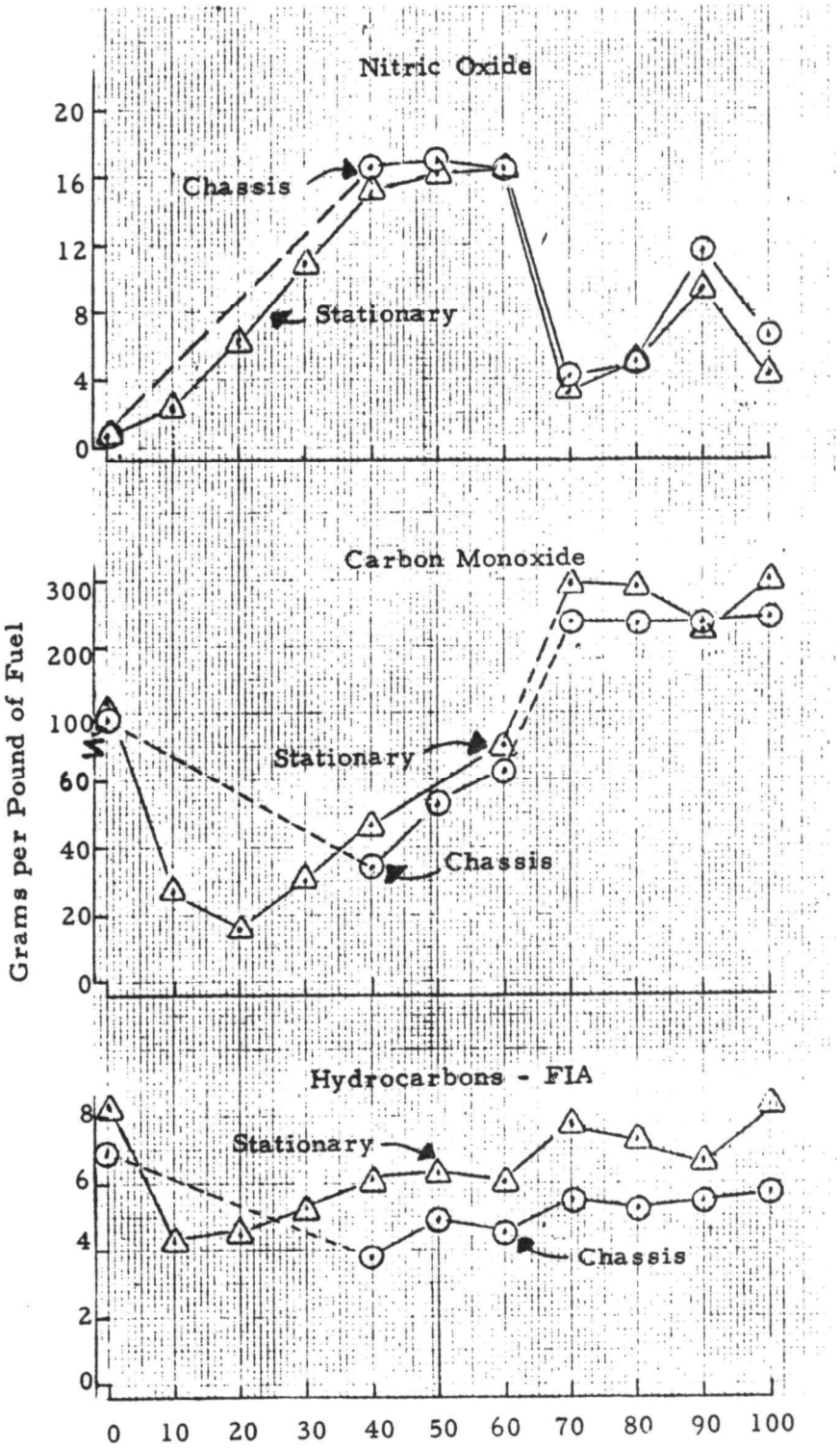

FIGURE D-9. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 FORD 300-CID ENGINE–1250 RPM

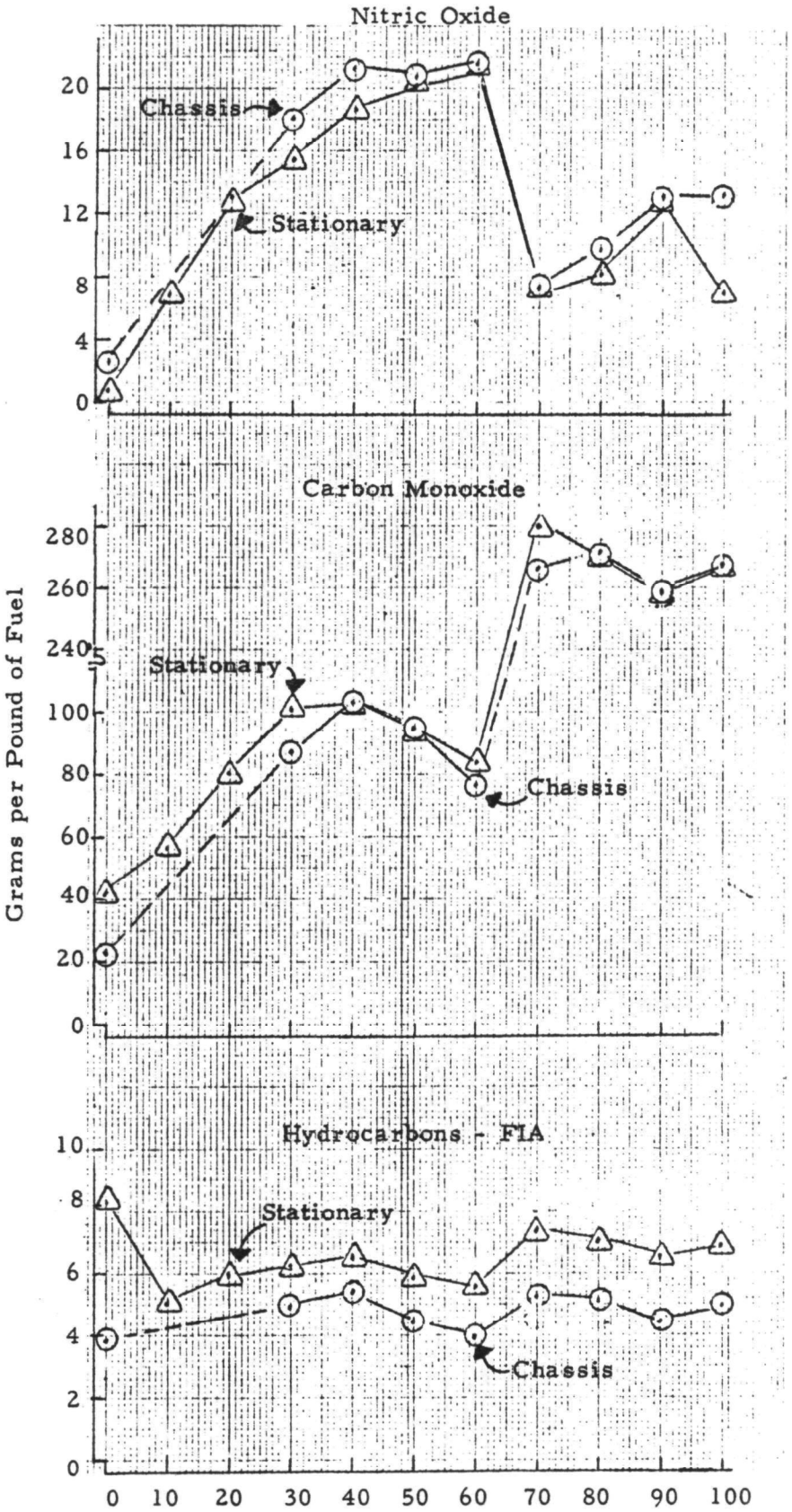

FIGURE D-10. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 FORD 300-CID ENGINE–2000 RPM

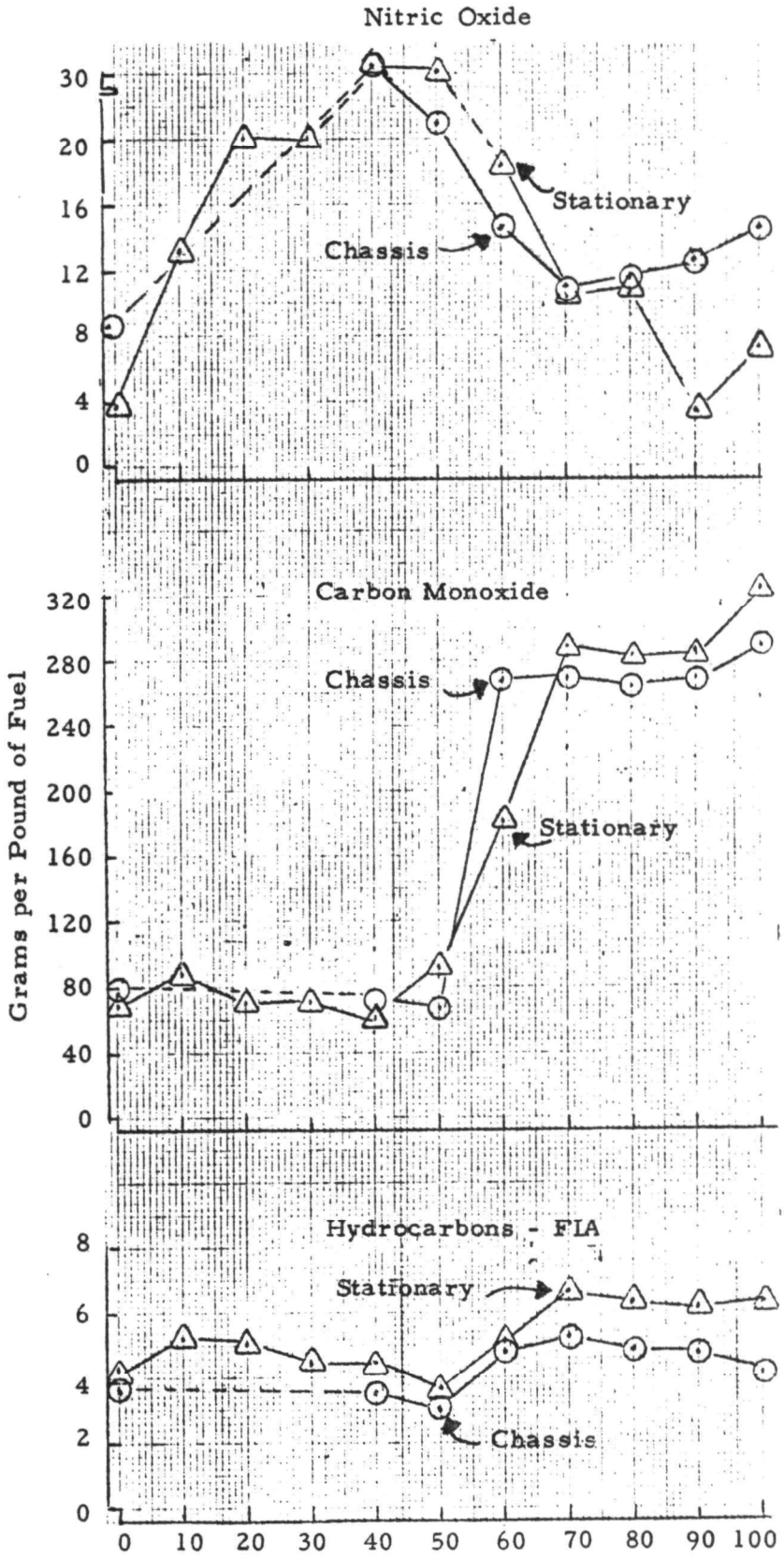

FIGURE D-11. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 FORD 300-CID ENGINE–3000 RPM

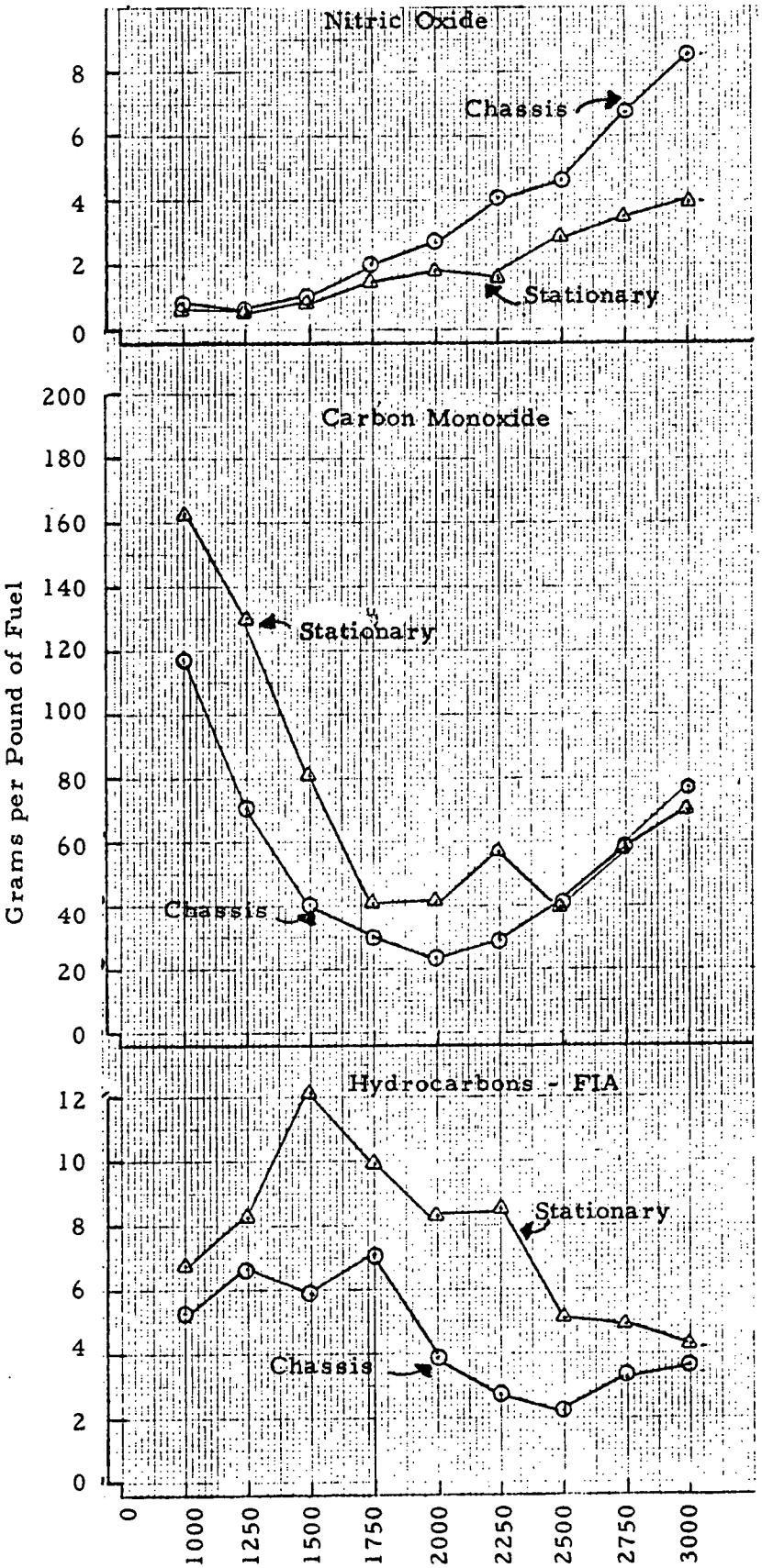

FIGURE D-12. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 FORD 300-CID ENGINE–NO LOAD

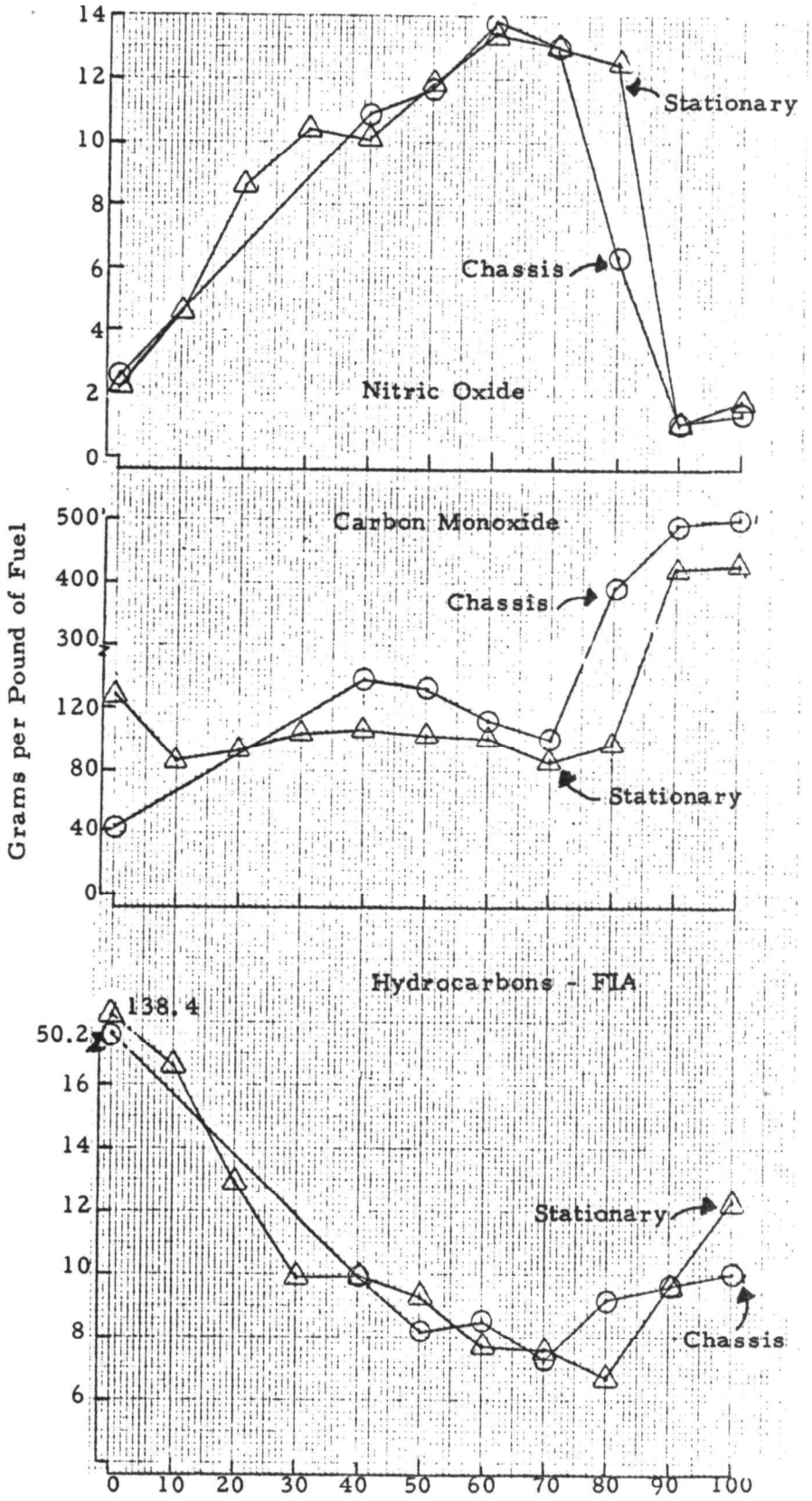

FIGURE D-13. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 DODGE 318-CID ENGINE–1250 RPM

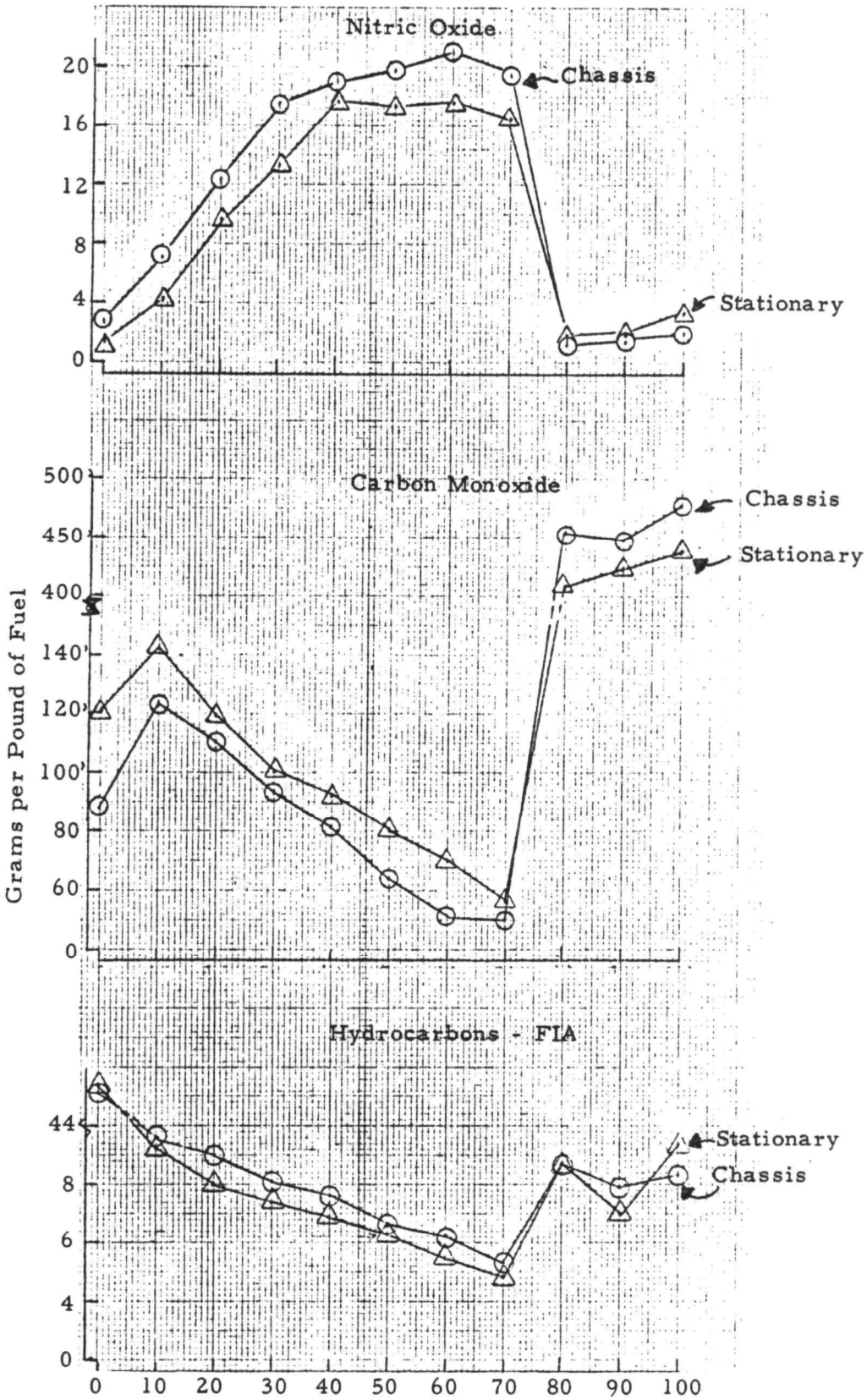

FIGURE D-14. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 DODGE 318-CID ENGINE–2000 RPM

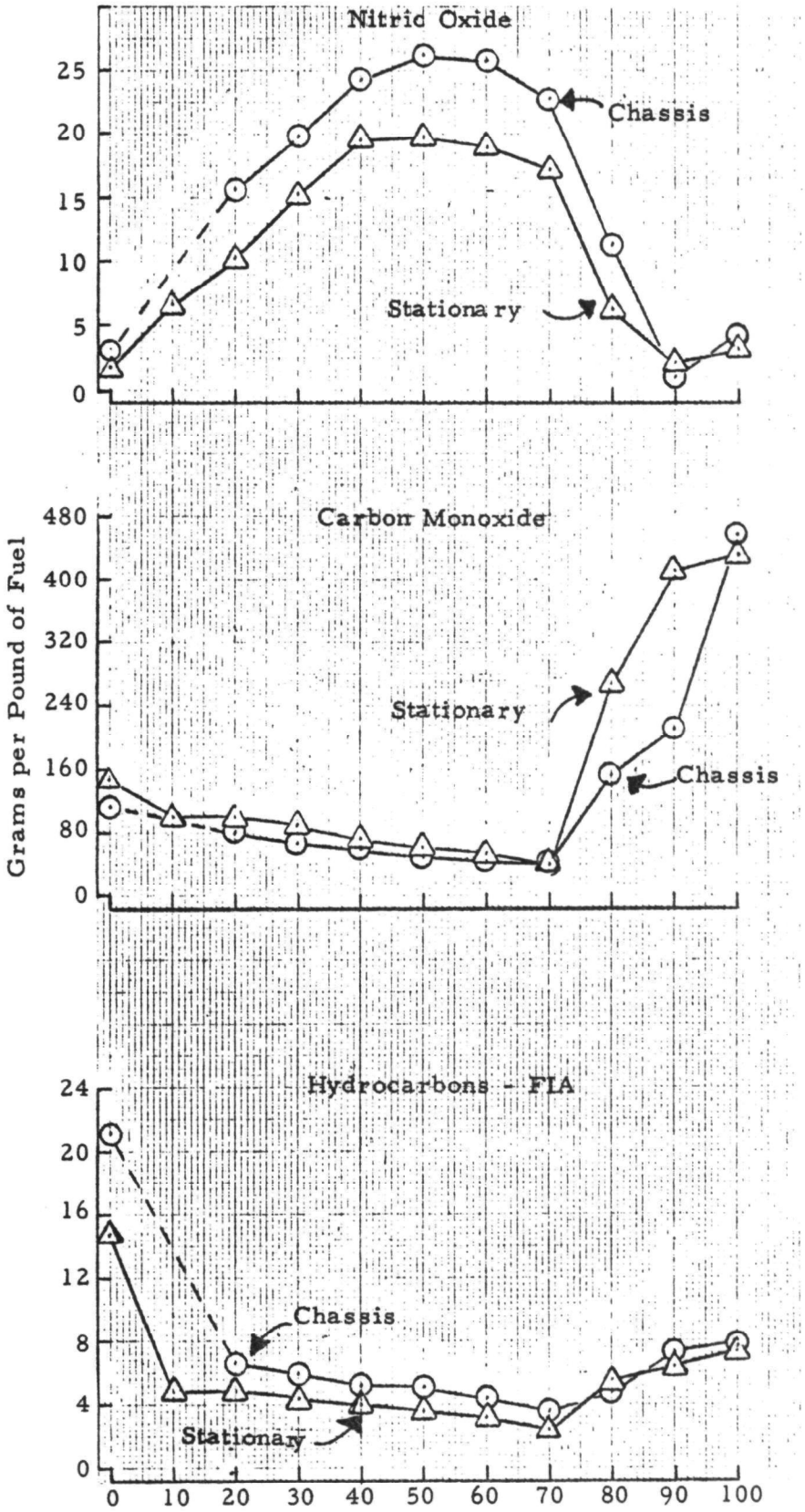

FIGURE D-15. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 DODGE 318-CID ENGINE–3000 RPM

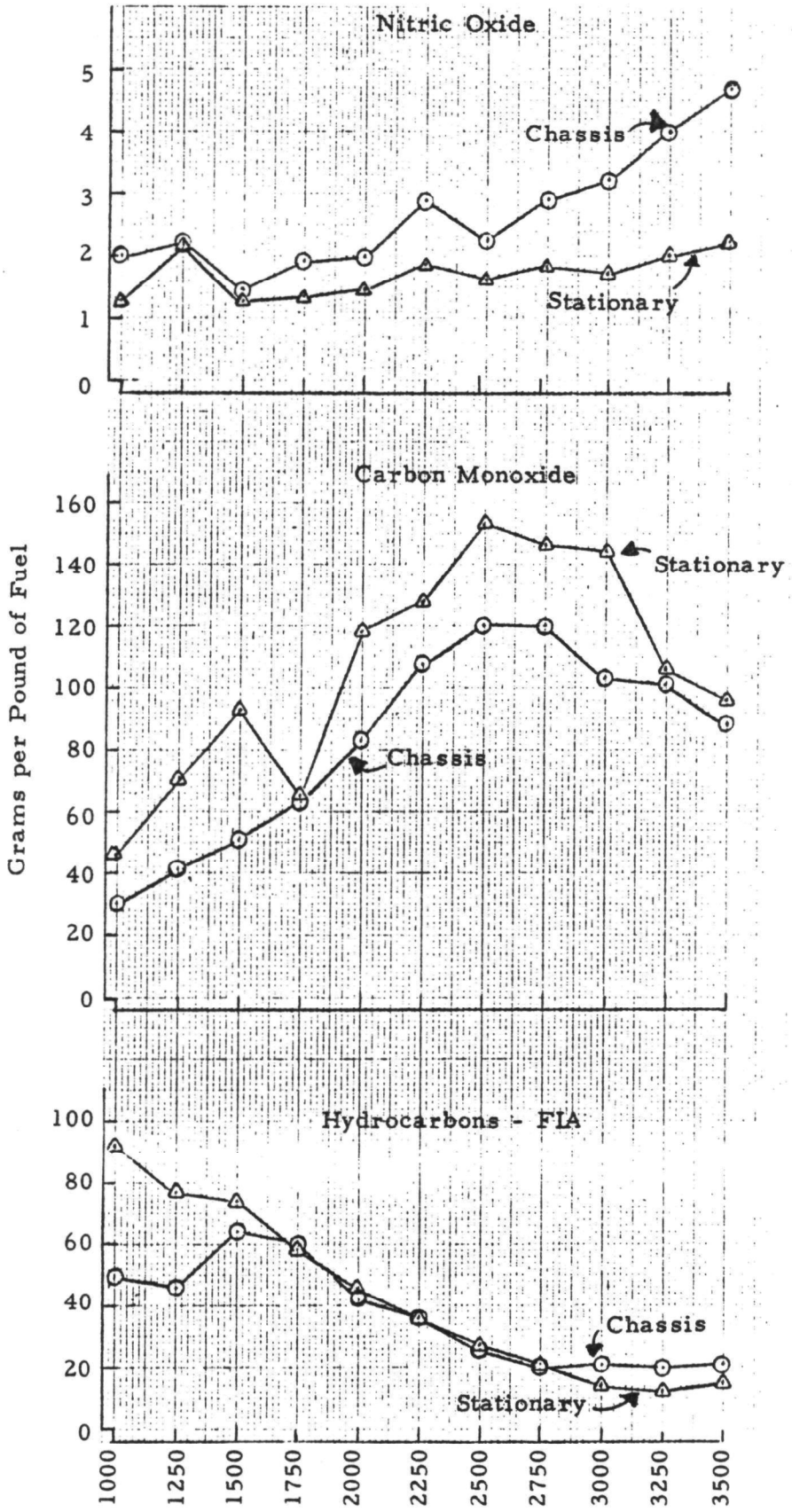

FIGURE D-16. GRAMS/POUND OF FUEL EMISSIONS FOR 1969 DODGE 318-CID ENGINE–NO LOAD

APPENDIX E

FOUR ENGINE-VEHICLE EMISSION RATES, GRAMS PER BHP-HR IN GRAPHICAL FORM

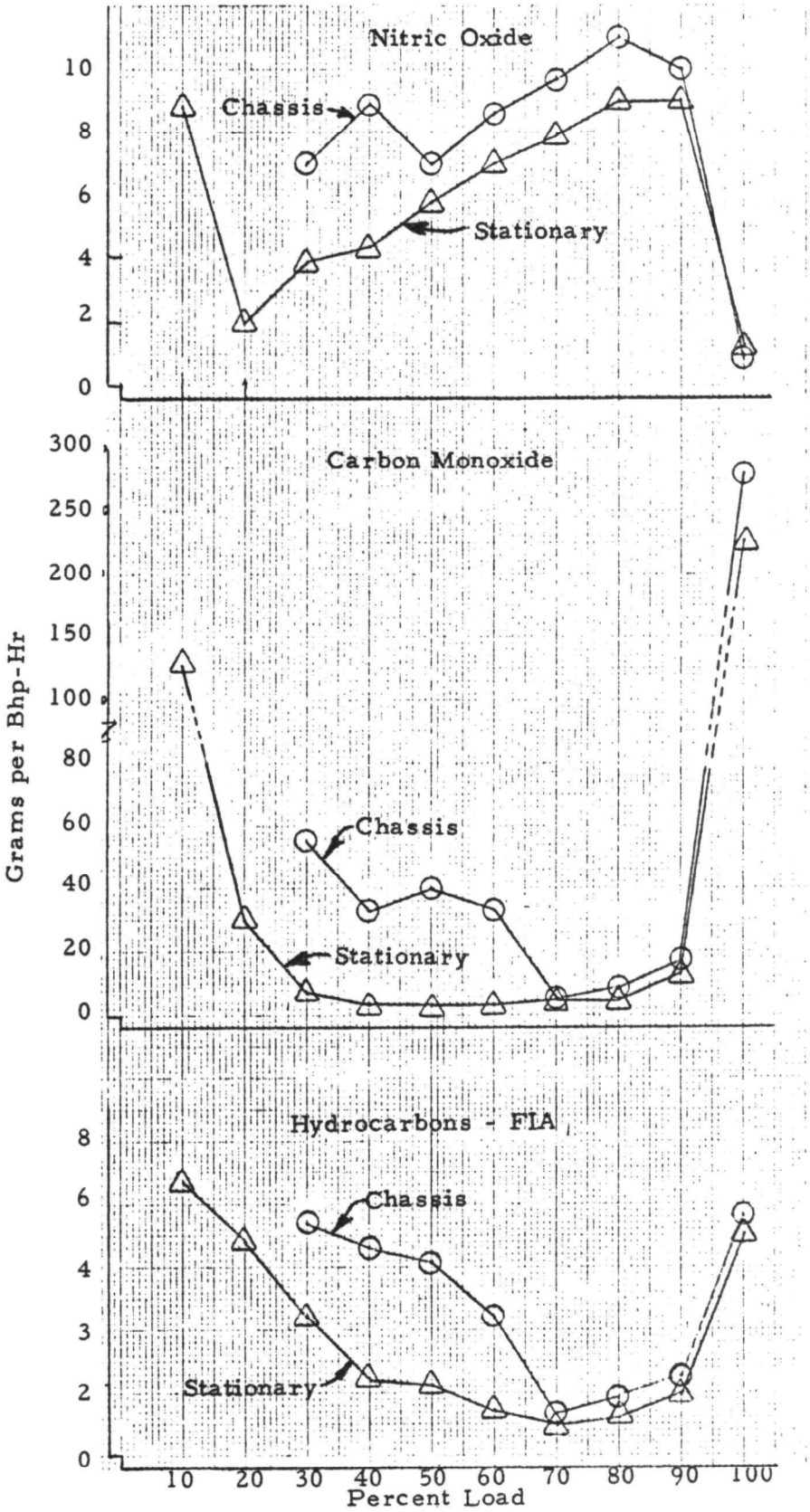

FIGURE E-1. GRAMS/BHP-HOUR EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–1000 RPM

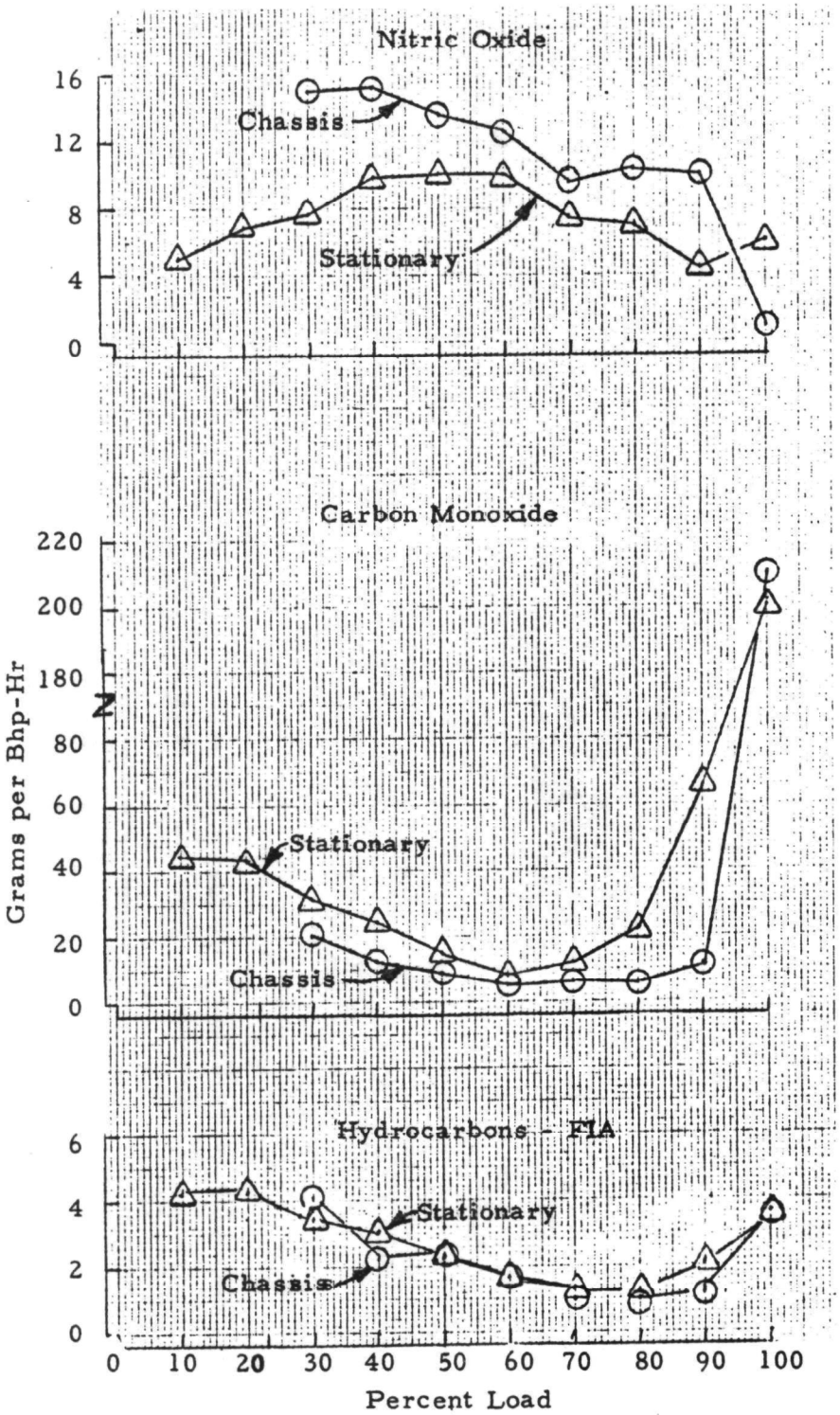

FIGURE E-2. GRAMS/BHP-HOUR EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–2000 RPM

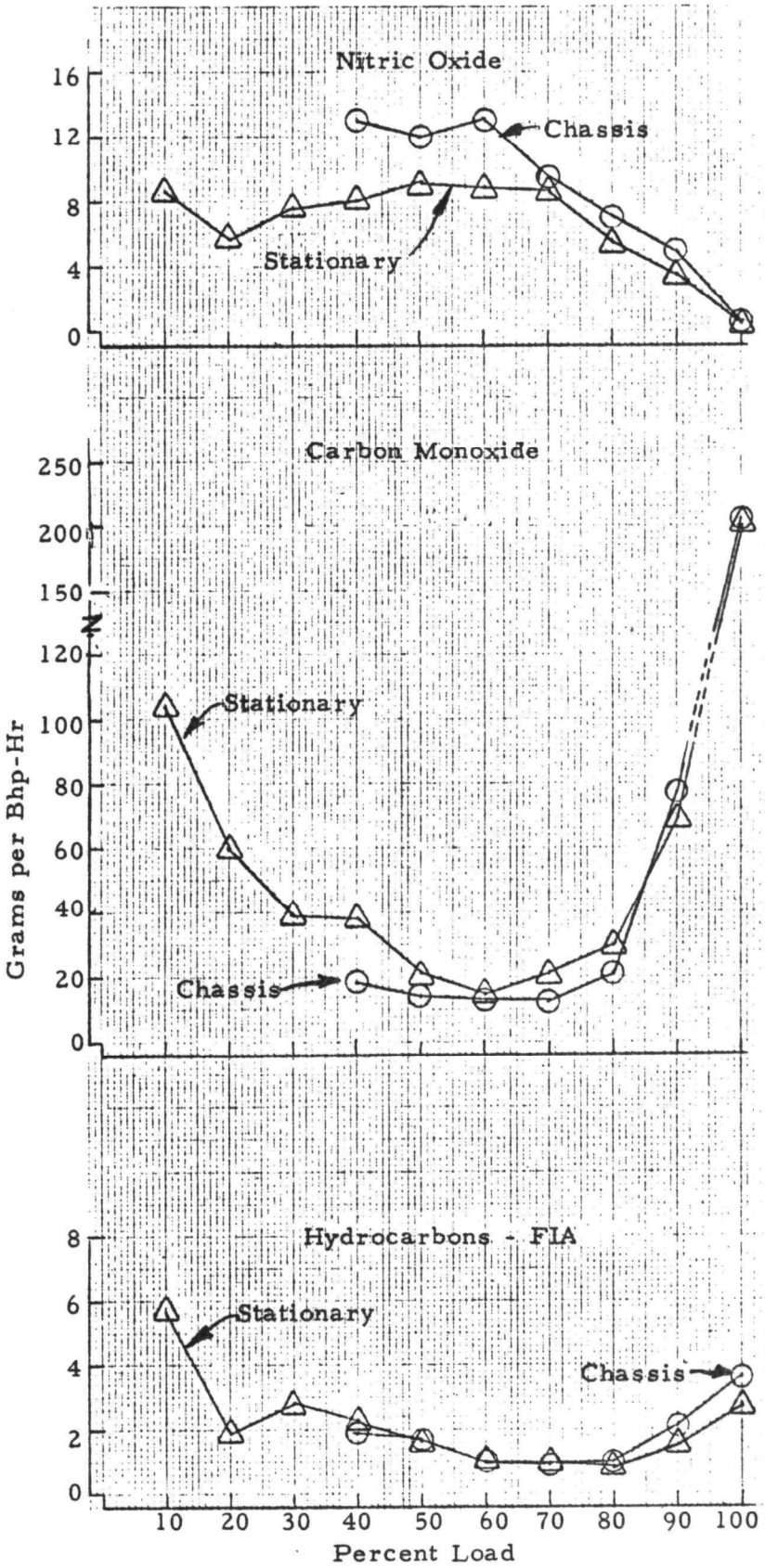

FIGURE E-3. GRAMS/BHP-HOUR EMISSIONS FOR 1969 CHEVROLET 250-CID ENGINE–3000 RPM

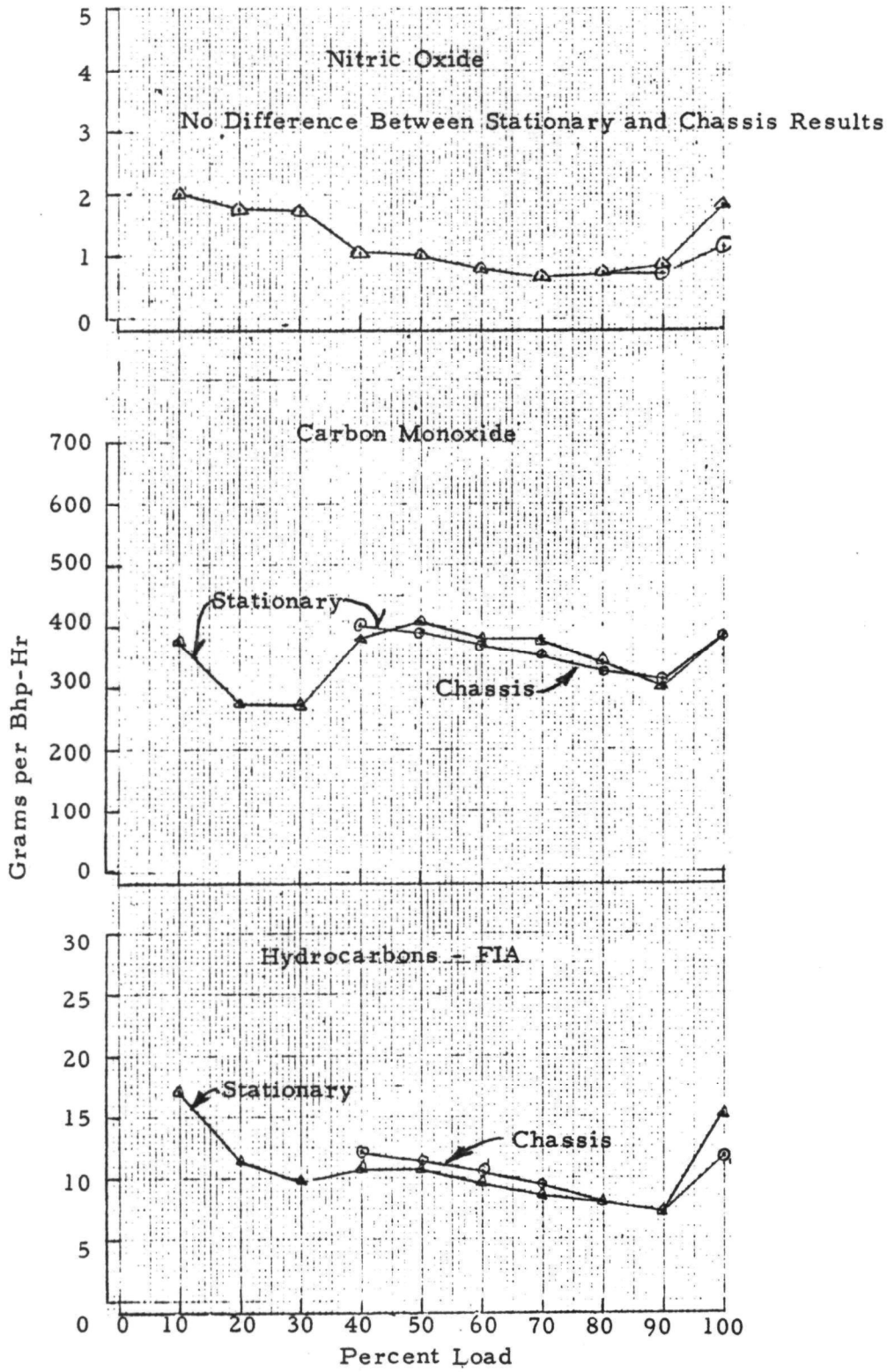

FIGURE E-4. GRAMS/BHP-HOUR EMISSIONS FOR
1969 IHC 304-CID ENGINE–1250 RPM

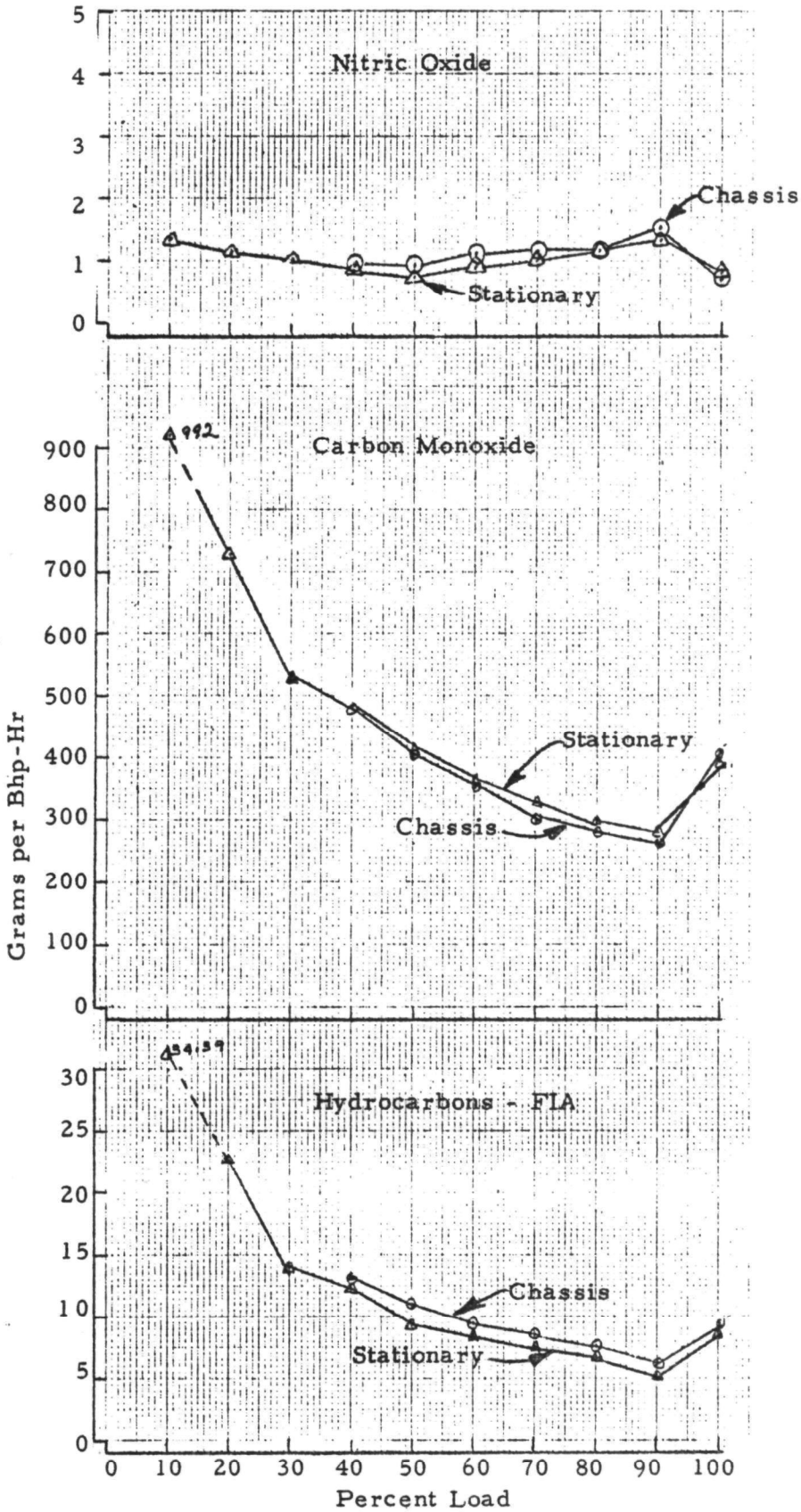

FIGURE E-5. GRAMS/BHP-HOUR EMISSIONS FOR 1969 IHC 304-CID ENGINE–2000 RPM

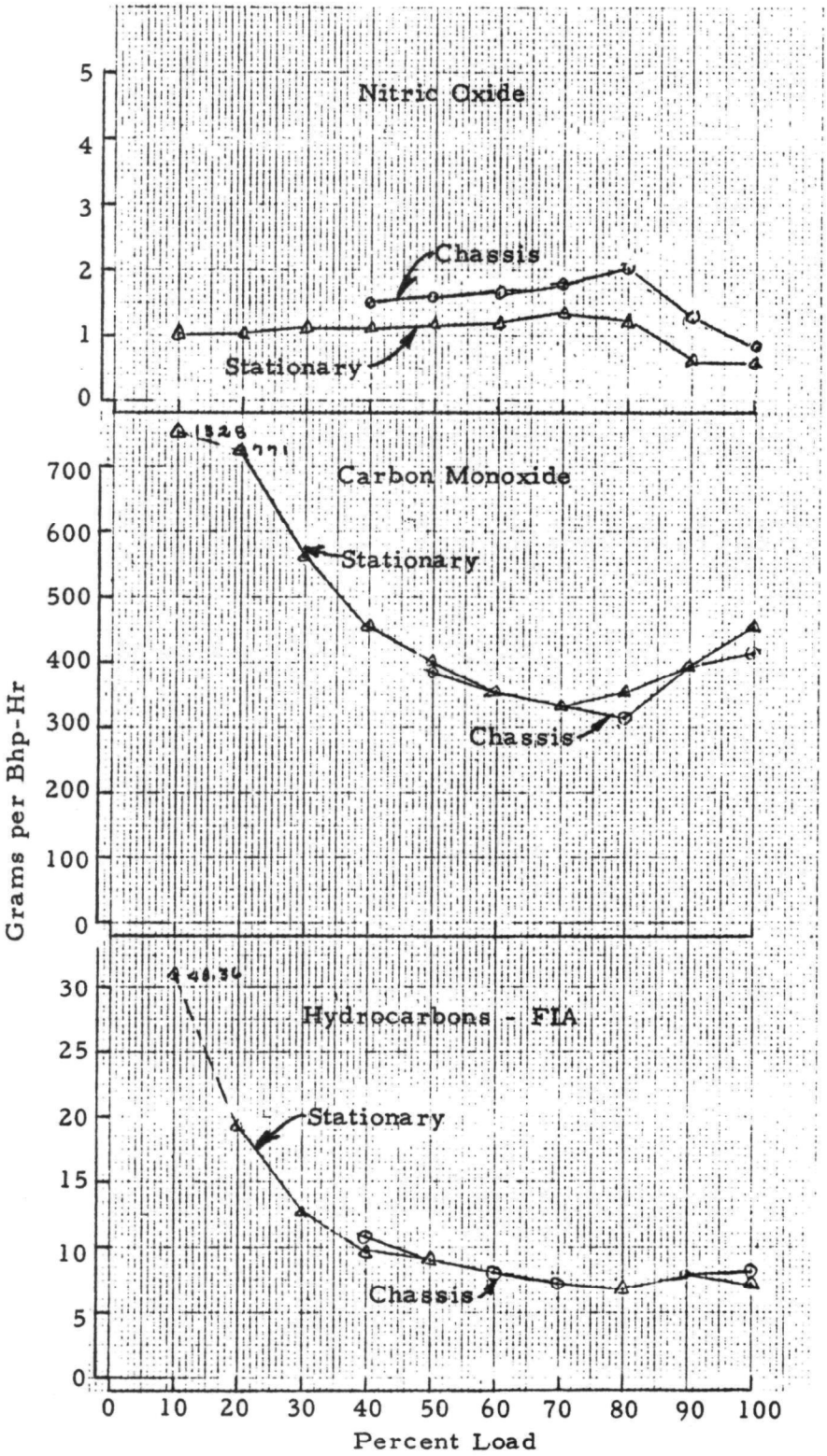

FIGURE E-6. GRAMS/BHP-HOUR EMISSIONS FOR
1969 IHC 304-CID ENGINE–3000 RPM

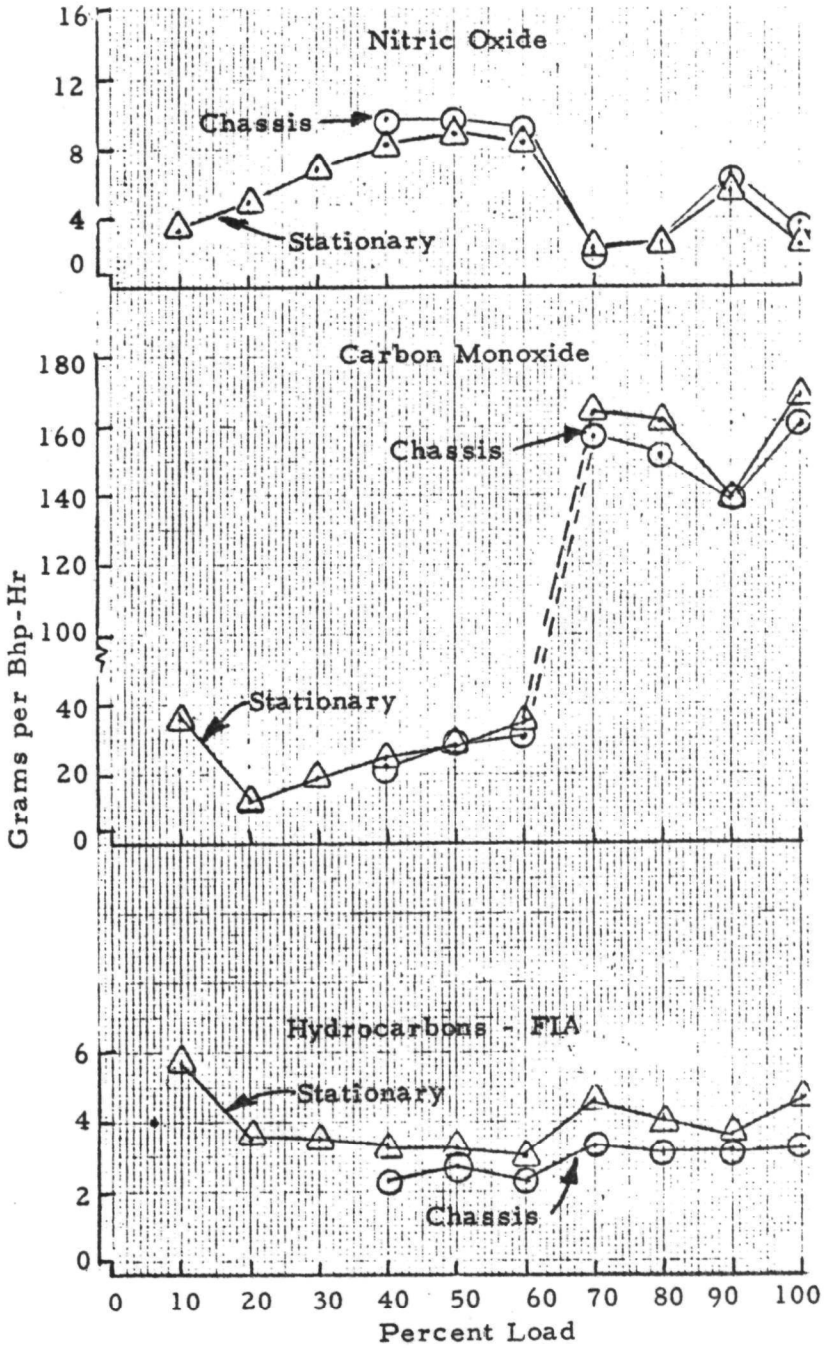

FIGURE E-7. GRAMS/BHP-HOUR EMISSIONS FOR 1969 FORD 300-CID ENGINE–1250 RPM

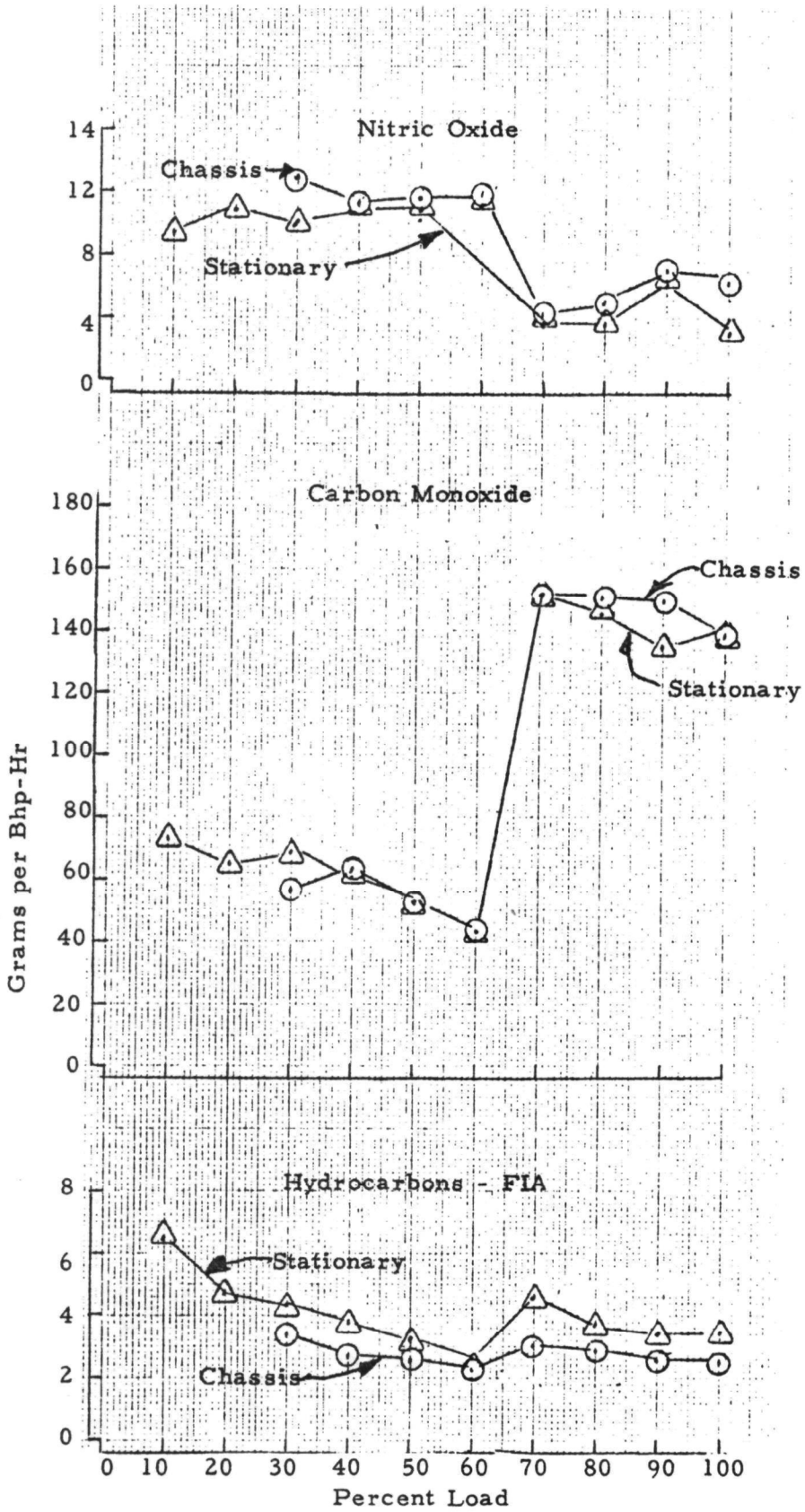

FIGURE E-8. GRAMS/BHP-HOUR EMISSIONS FOR 1969 FORD 300-CID ENGINE–2000 RPM

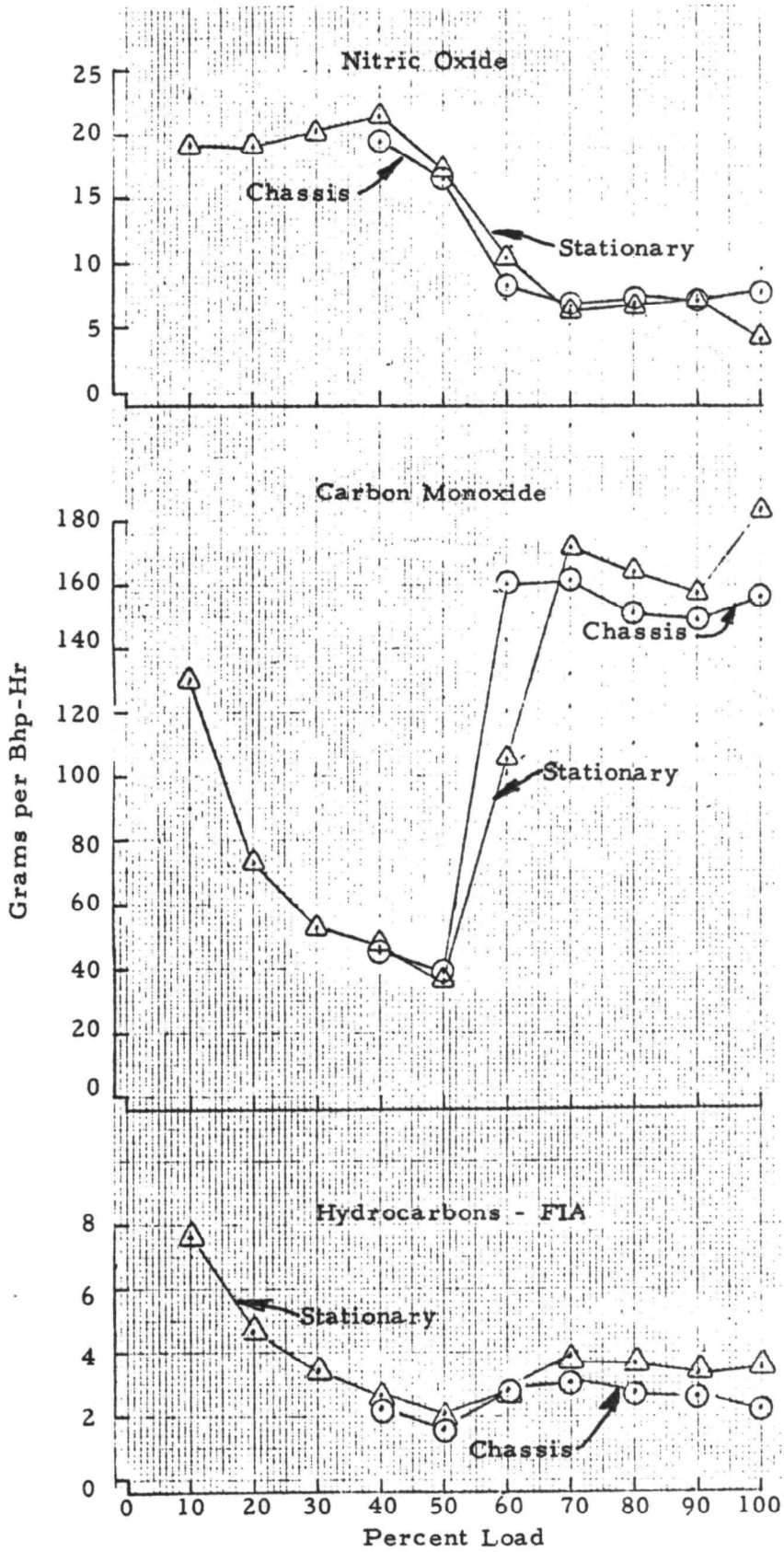

FIGURE E-9. GRAMS/BHP-HOUR EMISSIONS FOR
1969 FORD 300-CID ENGINE–3000 RPM

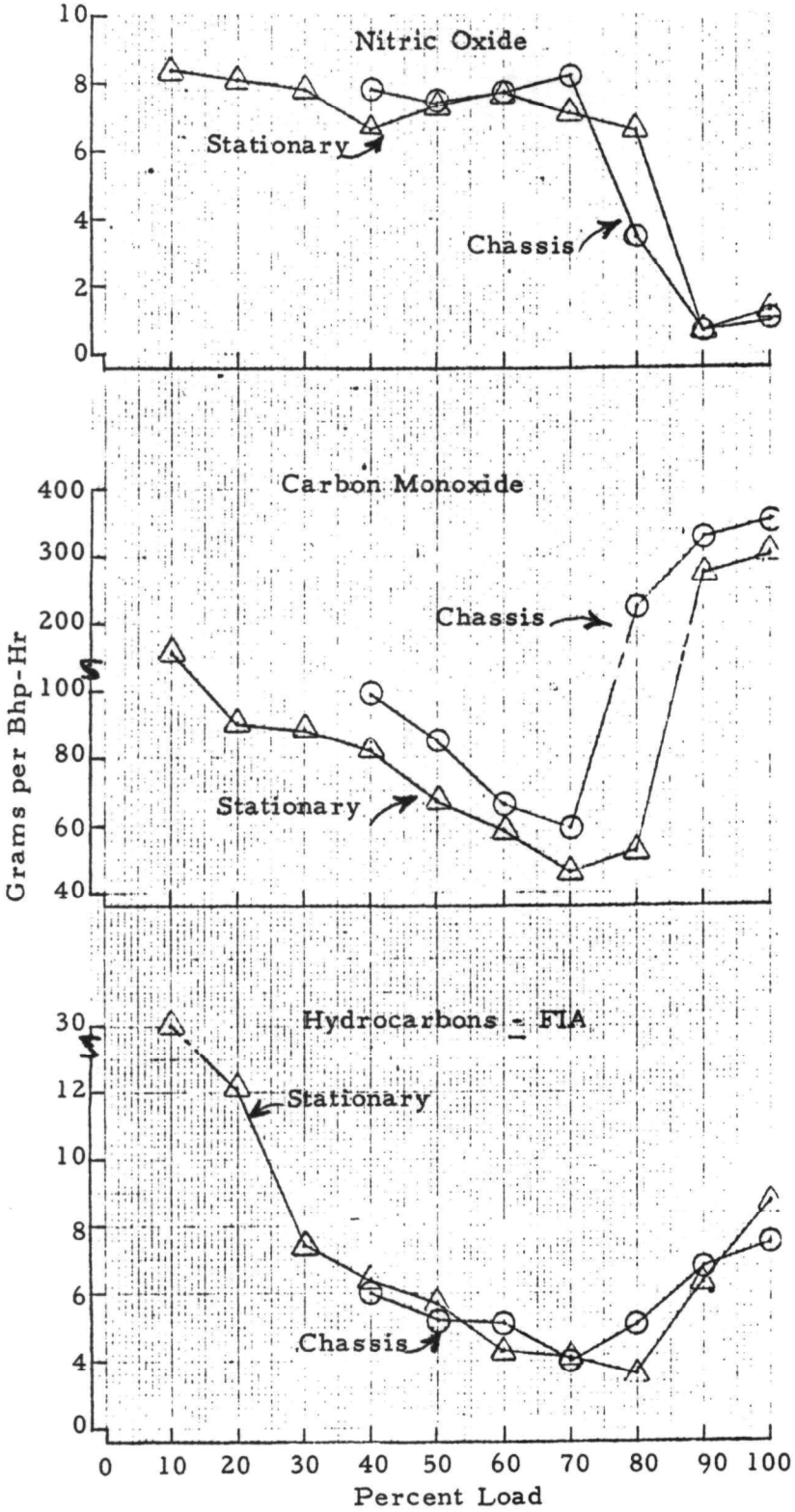

FIGURE E-10. GRAMS/BHP-HOUR EMISSIONS FOR 1969 DODGE 318-CID ENGINE–1250 RPM

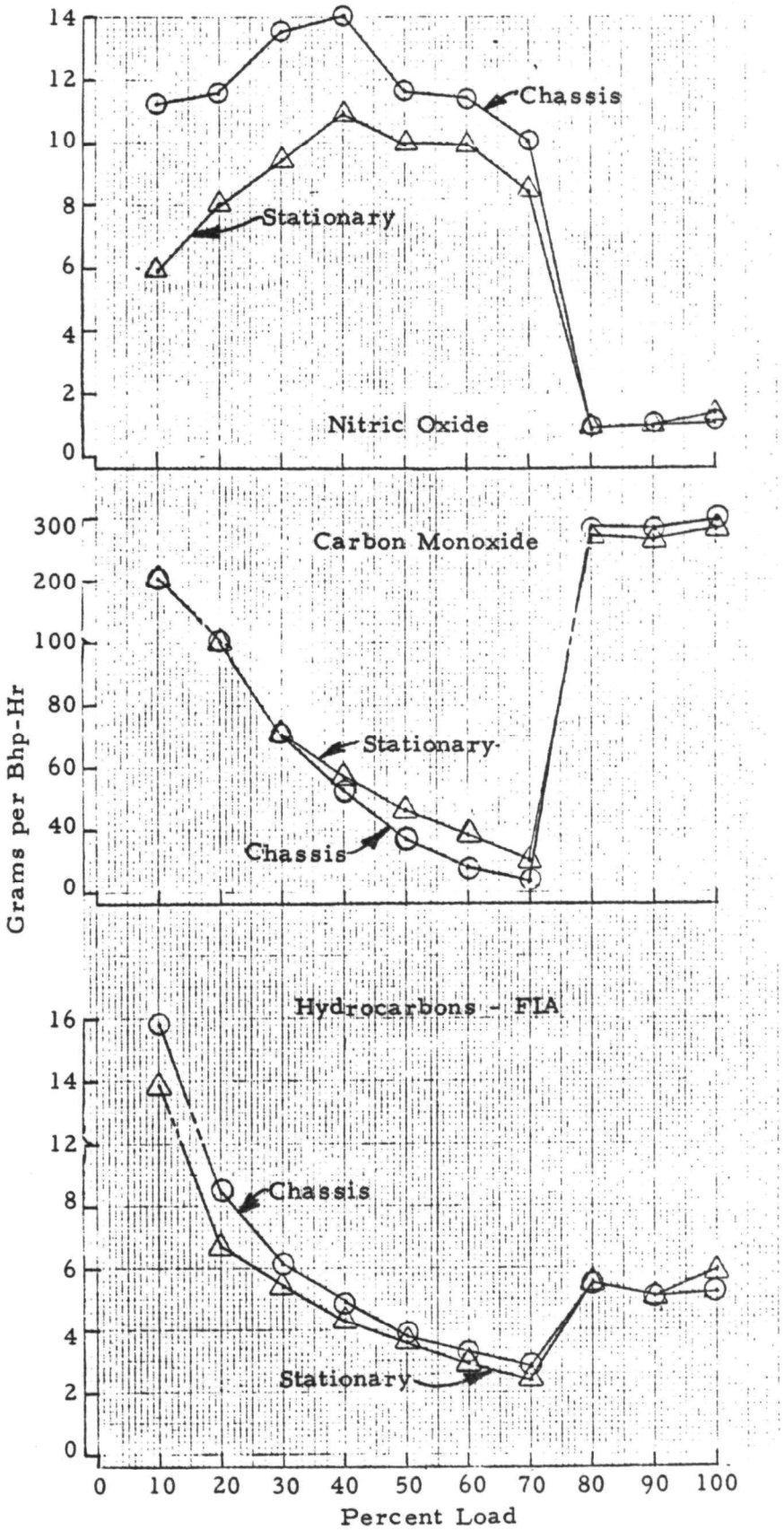

FIGURE E-11. GRAMS/BHP-HOUR EMISSIONS FOR 1969 DODGE 318-CID ENGINE–2000 RPM

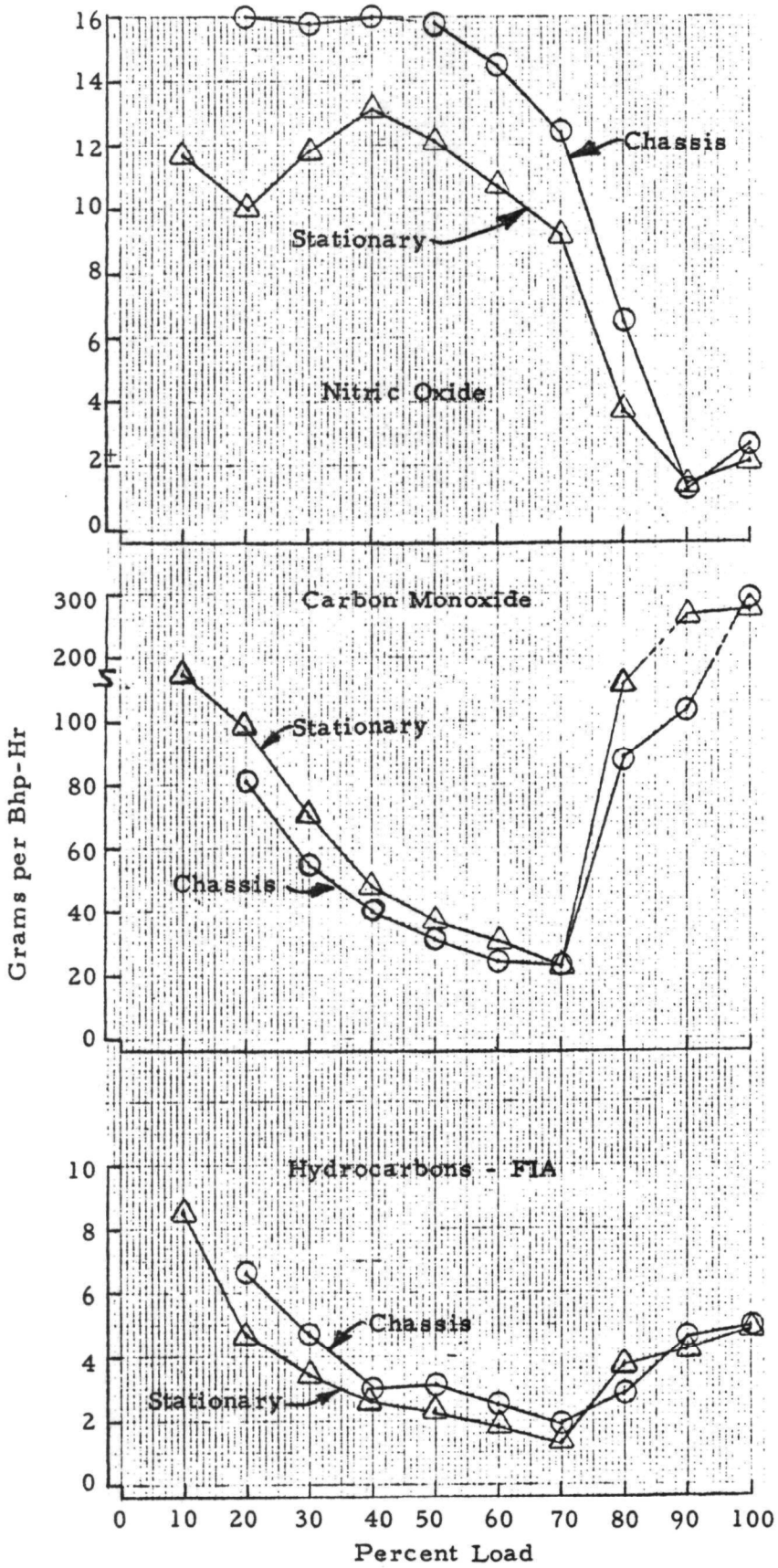

FIGURE E-12. GRAMS/BHP-HOUR EMISSIONS FOR 1969 DODGE 318-CID ENGINE–3000 RPM

APPENDIX F

FOUR ENGINE-VEHICLE EMISSION CHARACTERIZATION TRANSIENT CONDITION RATES

TABLE F-1. ACCELERATION AGAINST 4000 POUNDS OF INERTIA AT WOT FROM 500 TO 3000 RPM FOR A 1969 CHEVROLET 250-CID, 10,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	2.46	102	0.75	7.08	94	2.34	10.04	176	2.63	8.48	229	2.65
	Conc/Mode	221	4,493	31	635	4,154	97	900	7,786	109	760	10,127	110
	Time in Gear, sec	3	3	3	2	2	2	5	5	5	11	11	11
2	Grams/Min	2.49	54	1.28	12.29	97	2.82	9.48	160	2.29	8.51	233	2.46
	Conc/Mode	223	2,396	53	1,100	4,281	117	850	7,086	95	763	10,297	102
	Time in Gear, sec	3	3	3	2	2	2	5	5	5	11	11	11
3	Grams/Min	3.17	89	0.62	9.60	104	1.61	9.98	166	2.13	8.27	235	2.47
	Conc/Mode	286	3,968	26	866	4,649	67	900	7,387	89	746	10,465	103
	Time in Gear, sec	3	3	3	2	2	2	5	5	5	11	11	11
	Average g/min	2.71	82	0.88	9.66	98	2.26	9.83	167	2.35	8.42	232	2.53
1	Grams/Min				3.73	116	0.82	7.29	191	2.01	8.28	218	2.20
	Conc/Mode				337	5,163	34	654	8,509	84	748	9,725	92
	Time in Gear, sec				4	4	4	5	5	5	11	11	11
2	Grams/Min				3.88	149	0.64	8.68	186	1.93	8.35	237	2.24
	Conc/Mode				352	6,657	27	786	8,352	81	759	10,609	94
	Time in Gear, sec				4	4	4	5	5	5	11	11	11
	Average g/min				3,81	133	0.73	8.30	189	1.97	8.32	228	2.22
3	Grams/Min							3.85	163	1.05	7.71	238	2.12
	Conc/Mode							350	7,319	44	700	10,670	89
	Time in Gear, sec							9	9	9	11	11	11
1	Grams/Min							3.96	142	1.07	6.34	226	2.04
	Conc/Mode							361	6,350	45	578	10,140	86
	Time in Gear, sec							8	8	8	11	11	11
	Average g/min							3.91	76	1.06	7.03	114	2.08

TABLE F-2. ACCELERATION AGAINST 7000 POUNDS OF INERTIA AT WOT FROM 500 TO 3000 RPM FOR A 1969 CHEVROLET 250-CID, 10,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	2.61	107	0.24	8.02	138	1.63	8.04	198	2.16	6.81	248	1.96
	Conc/Mode	236	4,780	10	725	6,174	68	727	8,834	90	616	11,074	82
	Time in Gear, sec	3	3	3	2	2	2	7	7	7	19	19	19
2	Grams/Min	2.64	127	0.46	8.27	161	2.80	9.05	197	1.92	7.37	250	2.09
	Conc/Mode	235	5,576	19	735	7,036	115	804	8,627	79	655	10,979	86
	Time in Gear, sec	3	3	3	2	2	2	7	7	7	18	18	18
3	Grams/Min	2.16	113	0.41	9.29	165	2.07	8.85	207	2.00	7.53	327	2.07
	Conc/Mode	205	4,998	17	833	7,299	86	793	9,174	83	675	11,450	86
	Time in Gear, sec	3	3	3	2	2	2	7	7	7	17	17	17
	Average g/min	2.47	116	0.37	8.53	155	2.17	8.65	201	1.99	7.24	275	2.04
1	Grams/Min				4.80	120	0.65	8.48	210	1.95	7.16	257	1.85
	Conc/Mode				432	5,315	27	764	9,344	81	645	11,403	77
	Time in Gear, sec				4	4	4	7	7	7	18	18	18
2	Grams/Min				6.59	148	0.57	8.48	212	1.82	7.36	257	2.06
	Conc/Mode				595	6,605	22	766	9,425	76	665	11,451	86
	Time in Gear, sec				4	4	4	6	6	6	17	17	17
3	Grams/Min				4.68	125	0.67	8.62	208	2.06	7.35	257	2.13
	Conc/Mode				423	5,567	28	780	9,277	86	665	11,456	89
	Time in Gear, sec				4	4	4	6	6	6	18	18	18
	Average g/min				5.36	131	0.63	8.52	210	1.94	7.29	257	2.01
1	Grams/Min							4.01	179	1.19	6.80	251	2.01
	Conc/Mode							362	7,985	50	615	11,197	84
	Time in Gear, sec							12	12	12	17	17	17
2	Grams/Min							4.17	171	1.17	7.00	261	2.17
	Conc/Mode							377	7,629	49	633	11,644	91
	Time in Gear, sec							12	12	12	17	17	17
3	Grams/Min							3.79	177	1.07	6.22	259	2.09
	Conc/Mode							343	7,896	45	563	11,554	87
	Time in Gear, sec							12	12	12	17	17	17
	Average g/min							3.99	176	1.14	6.67	257	2.09

TABLE F-3. ACCELERATION AGAINST 10,000 POUNDS OF INERTIA AT WOT FROM 500 TO 3000 RPM FOR A 1969 CHEVROLET 250-CID, 10,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	N.D.*	95	0.70	8.90	159	1.31	6.43	236	1.59	6.49	268	2.00
	Conc/Mode	N.D.	4,191	29	800	7,038	72	578	10,453	66	584	11,903	83
	Time in Gear, sec	3	3	3	3	3	3	15	15	15	33	33	33
2	Grams/Min	4.28	67	1.28	10.05	129	2.33	7.08	242	1.61	6.33	268	1.87
	Conc/Mode	390	2,997	54	916	5,814	94	645	10,895	68	577	12,059	79
	Time in Gear, sec	3	3	3	3	3	3	14	14	14	32	32	32
3	Grams/Min	N.D.	90	1.36	9.23	160	2.37	7.47	230	1.67	6.36	280	1.90
	Conc/Mode	N.D.	4,092	58	850	7,264	101	688	10,463	71	586	12,727	81
	Time in Gear, sec	3	3	3	3	3	3	13	13	13	31	31	31
	Average g/min	4.28	84	1.13	9.39	149	2.00	6.99	236	1.53	6.39	272	1.92
1	Grams/Min				3.10	132	0.85	6.80	234	1.74	6.11	276	1.83
	Conc/Mode				285	5,975	36	625	10,607	74	562	12,510	78
	Time in Gear, sec				5	5	5	12	12	12	31	31	31
2	Grams/Min				4.55	146	0.77	7.73	234	1.69	6.15	270	1.92
	Conc/Mode				420	6,662	33	713	10,664	72	567	12,269	82
	Time in Gear, sec				6	6	6	12	12	12	32	32	32
3	Grams/Min				3.73	161	0.84	7.37	238	1.75	6.34	279	1.89
	Conc/Mode				345	7,359	36	682	10,877	75	586	12,730	81
	Time in Gear, sec				6	6	6	11	11	11	30	30	30
	Average g/min				3.79	146	0.82	7.30	235	1.73	6.20	274	1.88
1	Grams/Min							3.73	197	1.03	6.08	290	1.86
	Conc/Mode							343	8,949	44	560	13,158	79
	Time in Gear, sec							20	20	20	31	31	31
2	Grams/Min							4.65	206	1.14	6.13	281	1.98
	Conc/Mode							431	9,417	49	568	12,821	85
	Time in Gear, sec							19	19	19	29	29	29
3	Grams/Min							4.62	229	1.16	6.34	286	1.91
	Conc/Mode							429	10,483	50	589	13,089	82
	Time in Gear, sec							20	20	20	28	28	28
	Average g/min							4.33	211	1.10	6.18	286	1.92

*No data.

TABLE F-4. DECELERATION AGAINST INERTIA FROM 3000 TO 500 RPM FOR A 1969 CHEVROLET 250-CID, 10,000-LB GVW STAKE TRUCK

Run No.	Item	3rd Gear		4th Gear		3rd Gear		4th Gear		3rd Gear		4th Gear	
		HC	CO	HC	CO	HC	CO	HC	CO	HC	CO	HC	CO
		4,000-lb Inertia				7,000-lb Inertia				10,000-lb Inertia			
1	Grams/Min	5.92	10.85	7.84	13.61	7.06	11.65	8.42	14.48	7.70	13.88	12.45	14.22
	Conc/Mode	539	487	726	622	645	525	793	673	713	634	1188	671
	Time in Gear, sec	18	18	30	30	25	25	51	51	48	48	83	83
2	Grams/Min	6.26	11.20	7.84	14.18	7.32	12.95	8.67	14.31	7.97	13.75	12.97	14.15
	Conc/Mode	572	505	731	652	675	589	817	665	743	632	1251	673
	Time in Gear, sec	19	19	31	31	26	26	50	50	47	47	83	83
3	Grams/Min	6.05	11.37	8.19	13.14	7.13	12.89	8.36	14.29	6.92	14.31	11.93	14.18
	Conc/Mode	555	514	762	602	661	589	795	670	647	660	1143	670
	Time in Gear, sec	18	18	31	31	26	26	51	51	47	47	83	83
	Average g/min	6.08	11.14	7.96	13.65	7.17	12.50	8.48	14.36	7.53	13.98	12.45	14.18

TABLE F-5. ACCELERATION AGAINST 8000 POUNDS OF INERTIA AT WOT IN LOW RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	8.00	144	0.70	41.27	315	1.10	34.57	303	1.01	37.82	488	1.90	42.63	580	2.39
	Conc/Mode	737	6,539	29	3,800	14,289	47	3,183	13,757	43	3,483	22,182	81	3,925	26,360	102
	Time in Gear, sec	4	4	4	3	3	3	3	4	3	6	6	7	6	6	5
2	Grams/Min	N.D.	178	0.32	28.95	253	0.61	48.87	387	1.17	43.17	493	1.99	44.31	587	2.41
	Conc/Mode	N.D.	8,111	14	2,666	11,471	26	4,500	17,593	50	3,975	22,406	85	4,080	26,657	103
	Time in Gear, sec	N.D.	5	4	3	3	3	3	3	3	6	6	6	5	5	6
3	Grams/Min	6.73	178	0.23	38.00	303	0.58	41.27	345	1.10	37.64	501	1.73	39.64	620	2.86
	Conc/Mode	620	8,101	10	3,500	13,790	25	3,800	15,678	47	3,466	22,740	74	3,650	28,140	122
	Time in Gear, sec	4	4	3	3	3	3	3	3	4	6	6	6	6	6	6
	Average g/min	7.37	167	0.41	36.07	290	0.76	41.57	345	1.09	39.54	494	1.87	42.19	596	2.55
1	Grams/Min				6.75	197	0.72	32.04	423	1.33	32.58	524	2.18	41.65	613	2.74
	Conc/Mode				622	8,966	31	2,950	19,235	57	3,000	23,801	93	3,780	27,863	117
	Time in Gear, sec				5	4	5	3	3	3	6	6	6	5	5	5
2	Grams/Min				5.65	210	0.82	36.19	397	1.55	36.55	547	2.41	42.13	608	2.84
	Conc/Mode				520	9,533	35	3,333	18,031	66	3,366	24,826	103	3,880	27,598	121
	Time in Gear, sec				5	5	5	3	3	3	6	6	6	5	5	5
3	Grams/Min				12.71	259	0.86	33.66	384	1.56	24.56	555	2.56	41.27	566	3.02
	Conc/Mode				1,170	11,790	37	3,100	17,458	65	2,262	25,189	109	3,800	25,710	129
	Time in Gear, sec				4	5	4	4	3	4	6	6	6	5	5	5
	Average g/min				8.37	222	0.80	33.96	401	1.48	31.23	542	2.38	41.48	596	2.86
1	Grams/Min							9.31	272	0.84	38.32	646	1.80	32.82	682	2.18
	Conc/Mode							857	166	36	3,592	27,660	77	3,575	29,220	93
	Time in Gear, sec							7	7	7	6	6	6	6	6	6
2	Grams/Min							9.69	257	1.03	30.22	571	2.02	30.28	641	2.25
	Conc/Mode							892	11,022	44	2,783	24,483	86	3,525	27,456	96
	Time in Gear, sec							7	7	7	6	6	6	6	6	6
3	Grams/Min							8.82	281	1.05	32.48	754	1.66	39.16	688	2.60
	Conc/Mode							812	12,040	45	2,991	32,305	71	3,606	29,468	111
	Time in Gear, sec							7	7	7	6	6	6	5	5	6
	Average g/min							9.27	270	0.97	33.67	657	1.82	34.09	715	2.34
1	Grams/Min										9.94	361	1.26	35.65	629	1.80
	Conc/Mode										915	16,413	54	3,283	2,859	77
	Time in Gear, sec										15	15	15	6	6	6
2	Grams/Min										9.83	280	1.01	40.44	588	2.14
	Conc/Mode										905	12,705	43	3,724	267	91
	Time in Gear, sec										15	16	15	5	5	5
3	Grams/Min										9.86	306	1.19	35.65	609	2.18
	Conc/Mode										908	13,882	51	3,283	27,655	93
	Time in Gear, sec										15	15	15	6	6	6
	Average g/min										9.87	316	1.15	37.25	609	2.23

TABLE F-6. ACCELERATION AGAINST 8000 POUNDS OF INERTIA AT WOT IN HIGH RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	5.14	168	0.49	55.38	261	1.08	39.64	438	1.69	32.29	583	2.44	30.19	6.72	2.74
	Conc/Mode	473	7,610	21	5,100	11,839	46	3,650	19,886	72	2,973	26,484	104	2,780	30,522	117
	Time in Gear, sec	4	4	4	3	3	3	4	4	4	13	13	12	13	13	13
2	Grams/Min	9.58	150	0.54	45.97	271	0.89	46.28	446	1.71	31.05	527	2.60	30.76	684	2.79
	Conc/Mode	882	6,795	23	4,233	12,301	38	4,262	20,249	73	2,859	23,915	111	2,833	31,055	119
	Time in Gear, sec	4	4	4	4	3	3	4	4	5	13	12	13	12	13	13
3	Grams/Min	1.95	173	0.54	28.59	348	0.96	35.18	502	1.66	30.54	601	2.60	29.81	67.8	2.25
	Conc/Mode	180	7,858	25	2,633	15,801	41	3,240	22,818	71	2,812	27,304	111	2,745	30,810	96
	Time in Gear, sec	4	4	4	3	3	3	5	5	5	11	12	12	11	12	13
	Average g/min	5.56	168	0.52	43.31	261	0.97	40.37	462	1.68	31.29	570	2.54	30.25	178	2.59
1	Grams/Min				7.06	281	0.39	35.51	528	1.26	28.78	604	1.97	32.11	715	2.62
	Conc/Mode				650	12,052	17	3,270	22,614	54	2,650	25,854	84	2,957	30,615	112
	Time in Gear, sec				6	6	6	5	5	5	13	13	13	13	13	13
2	Grams/Min				9.31	221	0.58	35.29	547	1.42	29.22	858	2.13	32.04	713	2.74
	Conc/Mode				857	9,484	25	3,250	23,411	61	2,691	26,747	91	2,950	30,533	117
	Time in Gear, sec				6	7	6	5	4	5	12	12	12	12	12	12
3	Grams/Min				27.03	181	0.39	30.84	488	1.24	29.09	602	2.20	30.72	727	2.89
	Conc/Mode				2,489	7,737	17	2,840	20,902	53	2,679	25,763	94	2,829	31,142	123
	Time in Gear, sec				6	5	5	5	4	4	12	12	12	12	12	12
	Average g/min				8.19	228	0.45	33.88	521	1.30	29.03	688	2.10	31.62	718	275
1	Grams/Min							9.44	266	0.84	29.09	613	2.27	32.08	723	2.72
	Conc/Mode							869	11,373	36	2,679	26,253	97	2,954	30,980	116
	Time in Gear, sec							10	10	10	12	12	13	13	13	13
2	Grams/Min							12.09	261	0.84	29.68	596	2.32	31.08	722	2.60
	Conc/Mode							1,113	11,183	36	2,733	25,530	99	2,862	30,923	111
	Time in Gear, sec							11	11	11	10	12	12	12	13	12
3	Grams/Min							9.64	315	0.82	27.60	630	2.16	27.74	721	2.48
	Conc/Mode							888	13,523	35	2,542	26,989	92	2,554	30,880	106
	Time in Gear, sec							11	11	11	13	13	13	12	13	12
4	Grams/Min							9.37	287	0.84	27.37	584	2.18	32.22	692	2.49
	Conc/Mode							863	13,079	36	2,520	26,520	93	2,967	31,412	106
	Time in Gear, sec							11	11	11	12	12	12	12	12	12
	Average g/min							19.87	283	0.83	28.79	606	2.18	30.78	715	2.57
1	Grams/Min										12.21	391	1.43	31.49	680	237
	Conc/Mode										1,124	17,766	61	2,900	30,882	101
	Time in Gear, sec										30	29	30	13	13	13
2	Grams/Min										28.78	404	1.34	10.66	490	2.39
	Conc/Mode										2,650	18,348	57	982	22,245	102
	Time in Gear, sec										29	28	29	12	13	13
3	Grams/Min										7.68	401	1.47	26.36	688	2.41
	Conc/Mode										707	18,212	63	2,427	31,238	103
	Time in Gear, sec										29	29	29	13	13	13
	Average g/min										16.22	399	1.41	22.83	619	2.39

TABLE F-7. ACCELERATION AGAINST 10,000 POUNDS OF INERTIA AT WOT IN LOW RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	7.61	151	0.39	29.77	294	0.94	35.24	390	1.44	37.48	519	2.44	39.63	626	2.72
	Conc/Mode	707	6,499	17	2,766	13,457	40	3,275	17,865	62	3,483	23,805	105	3,683	28,695	116
	Time in Gear, sec	5	5	5	3	3	3	4	4	4	9	9	9	8	9	8
2	Grams/Min	6.97	152	0.30	27.98	337	0.77	36.59	448	1.09	30.02	555	2.12	35.44	629	2.40
	Conc/Mode	648	6,989	13	2,600	15,453	33	3,400	20,520	47	2,790	25,442	91	3,293	28,850	103
	Time in Gear, sec	5	5	5	3	3	3	4	4	4	10	10	9	8	8	8
3	Grams/Min	5.92	159	0.30	26.90	326	0.75	30.80	446	1.05	28.93	554	2.02	62.42	618	2.46
	Conc/Mode	550	7,273	13	2,500	14,936	32	2,862	20,451	45	2,688	25,373	87	5,800	28,338	106
	Time in Gear, sec	5	5	5	3	3	3	4	4	4	9	9	9	8	5	8
	Average g/min	6.83	151	0.33	28.21	319	0.82	34.21	428	1.19	32.14	543	2.19	45.83	624	2.53
1	Grams/Min				8.99	246	0.30	34.30	448	1.10	32.57	544	2.06	36.20	630	2.18
	Conc/Mode				836	11,273	13	3,187	20,514	47	3,027	24,945	88	3,364	28,888	93
	Time in Gear, sec				6	6	6	4	4	4	9	9	10	7	7	8
2	Grams/Min				7.41	239	0.25	40.36	462	1.29	32.22	490	2.04	35.98	622	2.46
	Conc/Mode				689	10,949	11	3,750	21,165	55	2,994	22,451	87	3,343	28,508	105
	Time in Gear, sec				5	5	5	4	4	4	9	9	9	7	7	8
3	Grams/Min				8.38	226	0.30	33.63	406	0.98	32.94	538	2.16	35.28	615	2.46
	Conc/Mode				779	10,345	13	3,125	18,590	42	3,061	24,649	92	3,278	28,164	106
	Time in Gear, sec				6	6	5	4	5	5	9	9	9	7	7	8
	Average g/min				8.26	237	0.28	36.69	439	1.12	32.57	524	2.09	35.82	622	2.37
1	Grams/Min							9.28	282	1.08	29.33	558	2.41	38.04	634	2.75
	Conc/Mode							862	12,920	46	2,725	25,556	103	3,535	29,045	117
	Time in Gear, sec							10	10	10	10	10	10	7	7	7
2	Grams/Min							9.31	302	0.91	28.52	556	2.41	38.74	635	2.91
	Conc/Mode							865	13,850	39	2,650	25,471	103	3,600	29,111	124
	Time in Gear, sec							10	10	10	10	10	10	7	8	7
3	Grams/Min							10.03	317	1.10	28.10	529	2.61	36.60	621	2.93
	Conc/Mode							932	14,533	47	2,611	24,242	111	3,400	28,452	125
	Time in Gear, sec							10	10	9	9	9	9	8	8	8
	Average g/min							9.54	300	1.03	28.65	548	2.48	37.79	630	2.86
1	Grams/Min										11.11	3.76	1.38	36.65	640	2.18
	Conc/Mode										1,032	17,236	59	3,406	29,339	93
	Time in Gear, sec										24	24	24	8	8	8
2	Grams/Min										11.45	377	1.22	37.93	628	2.34
	Conc/Mode										1,064	17,271	52	3,525	28,805	100
	Time in Gear, sec										24	24	24	8	8	7
3	Grams/Min										11.25	393	1.22	37.93	679	2.58
	Conc/Mode										1,045	18,032	52	3,525	31,119	110
	Time in Gear, sec										23	23	24	8	7	8
	Average g/min										11.27	382	1.27	37.50	649	2.36

TABLE F-8. ACCELERATION AGAINST 10,000 POUNDS OF INERTIA AT WOT IN HIGH RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	6.81	188	0.32	37.48	392	0.96	32.90	443	1.75	24.00	587	2.49	25.86	679	2.37
	Conc/Mode	633	8,611	14	3,483	17,944	41	3,057	20,302	75	2,230	26,920	106	2,403	31,106	101
	Time in Gear, sec	5	5	5	3	4	4	7	7	7	20	20	19	19	20	20
2	Grams/Min	5.92	184	0.25	31.21	378	0.84	32.73	523	1.72	24.67	593	2.42	26.81	695	2.46
	Conc/Mode	550	8,421	11	2,900	17,319	36	3,041	23,971	74	2,292	27,164	104	2,491	31,864	106
	Time in Gear, sec	5	5	5	4	4	4	6	7	7	20	20	20	18	20	18
3	Grams/Min	7.23	205	0.30	34.17	410	0.96	28.35	437	1.40	25.18	823	2.21	27.33	691	2.46
	Conc/Mode	672	9,381	13	3,175	18,784	41	2,635	20,026	60	2,340	37,720	95	2,540	31,651	106
	Time in Gear, sec	5	5	5	4	4	4	7	7	7	20	19	19	20	19	19
	Average g/min	6.65	192	0.29	34.29	393	0.92	31.33	434	1.62	24.61	668	2.37	26.67	688	2.43
1	Grams/Min				9.08	253	0.65	31.29	505	1.99	24.72	576	2.30	25.56	680	2.30
	Conc/Mode				844	11,602	28	2,908	23,143	85	2,297	26,418	98	2,375	31,170	99
	Time in Gear, sec				8	8	7	6	7	6	19	19	19	18	18	18
2	Grams/Min				9.10	243	0.65	30.84	469	1.92	24.63	580	1.90	26.37	685	2.60
	Conc/Mode				846	11,158	28	2,866	21,472	82	2,289	26,582	81	2,450	31,401	112
	Time in Gear, sec				8	7	8	6	6	7	19	19	19	19	19	19
3	Grams/Min				9.87	316	0.75	40.71	486	1.92	24.86	583	2.35	24.92	698	2.44
	Conc/Mode				917	14,467	32	3,783	22,271	82	2,310	26,728	100	2,316	31,994	105
	Time in Gear, sec				8	8	8	6	6	6	19	19	19	18	18	18
	Average g/min				9.35	271	0.68	34.28	487	1.94	24.73	580	2.18	25.61	688	2.45
1	Grams/Min							11.02	354	0.96	24.43	582	2.46	28.42	669	2.20
	Conc/Mode							1,024	16,245	41	2,270	26,680	106	2,641	30,675	103
	Time in Gear, sec							16	16	16	20	20	20	18	18	18
2	Grams/Min							10.49	360	1.22	26.87	599	1.92	26.75	693	1.99
	Conc/Mode							975	16,520	52	2,497	27,474	82	2,486	31,760	85
	Time in Gear, sec							18	18	17	19	19	19	19	18	19
3	Grams/Min							10.98	371	0.98	24.83	6.03	2.01	23.54	694	2.23
	Conc/Mode							1,020	17,013	42	2,307	27,663	86	2,187	31,785	95
	Time in Gear, sec							16	17	16	19	19	19	19	19	19
	Average g/min							10.83	362	1.05	25.37	595	2.13	26.23	685	2.20
1	Grams/Min										20.44	425	1.43	28.28	681	2.49
	Conc/Mode										1,899	19,470	61	2,628	31,235	107
	Time in Gear, sec										47	47	47	19	19	19
2	Grams/Min										14.14	393	1.15	25.58	738	2.20
	Conc/Mode										1,314	17,988	49	2,377	33,817	94
	Time in Gear, sec										47	47	47	18	18	18
3	Grams/Min										30.16	409	1.32	21.62	697	2.27
	Conc/Mode										2,803	18,765	56	2,009	31,942	97
	Time in Gear, sec										48	48	48	19	19	19
4	Grams/Min										29.67	396	1.45	26.90	695	2.21
	Conc/Mode										2,757	18,140	62	2,506	31,893	94
	Time in Gear, sec										46	47	47	18	18	18
	Average g/min										23.60	405	1.34	25.59	703	2.29

TABLE F-9. ACCELERATION AGAINST 12,000 POUNDS OF INERTIA AT WOT IN LOW RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	4.39	216	0.52	26.13	415	1.08	39.14	459	1.75	34.37	572	2.78	40.40	655	3.00
	Conc/Mode	395	9,095	22	2,350	17,493	45	3,520	19,342	73	2,091	24,100	116	3,633	27,890	125
	Time in Gear, sec	6	7	7	4	4	4	5	4	5	11	11	11	9	9	9
2	Grams/Min	5.65	199	0.28	34.47	386	0.91	42.04	492	1.70	33.97	571	2.61	38.61	667	2.81
	Conc/Mode	508	8,390	12	3,100	16,284	38	3,780	20,725	71	3,055	24,089	109	3,472	28,111	117
	Time in Gear, sec	4	5	4	3	3	3	5	4	5	11	10	11	9	9	9
3	Grams/Min	6.44	149	0.26	39.62	400	0.81	40.50	507	1.40	34.26	594	2.26	36.51	676	2.26
	Conc/Mode	585	6,278	11	3,600	16,880	34	3,680	21,318	59	3,113	25,023	95	3,317	28,471	95
	Time in Gear, sec	4	4	4	3	3	3	5	4	5	11	11	10	9	9	9
4	Grams/Min	3.71	169	0.45	30.18	388	1.00	40.52	504	1.56	34.62	598	2.53	38.81	692	2.80
	Conc/Mode	335	7,106	19	2,767	16,368	42	3,660	21,244	65	3,127	25,206	106	3,505	29,162	117
	Time in Gear, sec	4	5	5	3	3	3	5	4	5	11	11	11	9	9	9
	Average g/min	5.05	183	0.38	32.60	397	0.95	40.55	491	1.80	34.31	584	2.56	35.58	673	2.72
1	Grams/Min				8.21	248	0.57	30.85	452	1.49	32.87	581	2.43	39.22	676	2.57
	Conc/Mode				750	10,475	24	2,820	19,032	63	3,005	24,466	103	3,585	28,496	109
	Time in Gear, sec				6	6	6	5	5	5	10	10	9	7	8	8
2	Grams/Min				7.74	249	1.09	32.82	486	1.77	49.63	591	2.43	39.04	691	2.31
	Conc/Mode				707	10,499	46	3,000	20,494	75	4,536	24,916	103	3,568	29;128	98
	Time in Gear, sec				6	6	6	5	5	5	10	10	10	8	8	8
3	Grams/Min				6.80	284	0.75	39.15	470	1.90	32.52	604	5.24	38.95	685	2.16
	Conc/Mode				625	11,989	32	3,600	19,827	81	2,990	25,463	223	3,581	28,872	92
	Time in Gear, sec				6	6	5	4	4	4	10	10	10	8	8	8
	Average g/min				7.58	260	0.80	34.27	469	1.72	38.34	592	3.37	39.07	684	2.35
1	Grams/Min							10.47	341	1.06	28.01	617	225	29.77	687	2.39
	Conc/Mode							976	14,678	46	2,611	26,594	97	2,775	29,651	103
	Time in Gear, sec							10	10	10	10	10	10	8	8	8
2	Grams/Min							9.15	315	1.02	32.67	609	2.25	37.08	700	2.31
	Conc/Mode							853	13,560	44	3,045	26,240	97	3,456	30,172	100
	Time in Gear, sec							10	10	10	10	10	10	8	8	8
3	Grams/Min							8.11	304	1.18	31.33	606	2.29	45.87	708	2.34
	Conc/Mode							756	13,123	51	2,920	26,140	99	4,275	30,522	101
	Time in Gear, sec							10	10	10	10	10	10	8	8	8
	Average g/min							9.24	320	1.09	30.67	611	228	37.57	698	2.35
1	Grams/Min										15.36	288	1.63	33.22	696	2.62
	Conc/Mode										1,445	16,874	71	3,125	30,279	114
	Time in Gear, sec										25	25	25	8	8	8
2	Grams/Min										27.42	414	1.60	35.46	695	2.64
	Conc/Mode										2,579	17,999	70	3,336	30,236	115
	Time in Gear, sec										25	25	25	7	8	8
3	Grams/Min										22.74	342	1.42	34.02	690	1.90
	Conc/Mode										2,139	14,882	62	3,200	30,017	83
	Time in Gear, sec										25	25	25	7	8	8
	Average g/min										21.84	381	1.55	34.23	694	2.38

TABLE F-10. ACCELERATION AGAINST 12,000 POUNDS OF INERTIA AT WOT IN HIGH RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	4.13	221	0.40	28.07	461	1.14	36.0	541	2.30	26.89	608	2.69	27.19	762	2.47
	Conc/Mode	375	9,334	17	2,550	19,429	48	3,271	22,809	97	2,443	25,627	113	2,470	32,118	104
	Time in Gear, sec	5	5	5	4	4	4	7	7	8	23	23	22	24	24	24
2	Grams/Min	8.49	189	0.37	35.18	461	1.13	33.58	493	1.77	25.03	644	2.24	21.94	531	228
	Conc/Mode	779	7,957	16	3,225	19,426	48	3,078	20,784	75	2,295	27,134	95	2,011	22,366	97
	Time in Gear, sec	5	5	5	4	4	4	7	7	7	22	27	22	23	24	24
3	Grams/Min	5.50	225	0.32	42.51	458	1.12	34.35	572	2.02	43.97	660	2.30	26.77	732	235
	Conc/Mode	511	9,501	14	3,950	19,315	48	3,192	24,130	87	4,049	27,815	99	2,488	30,849	101
	Time in Gear, sec	5	5	5	4	4	4	7	7	7	22	22	22	22	22	22
	Average g/min	6.04	212	0.36	35.25	460	1.13	33.31	535	2.03	31.83	637	2.41	25.30	642	2.37
1	Grams/Min				8.75	270	1.25	32.19	557	2.11	24.73	625	1.94	27.02	732	2.16
	Conc/Mode				816	11,637	54	3,000	23,995	91	2,305	26,937	84	2,518	31,571	93
	Time in Gear, sec				8	8	8	6	7	7	20	20	20	16	10	16
2	Grams/Min				9.45	270	0.92	31.92	452	1.97	24.83	652	1.90	28.18	712	2.06
	Conc/Mode				881	11,619	40	2,975	19,465	85	2,315	28,094	82	2,627	30,676	89
	Time in Gear, sec				8	8	8	6	7	7	20	20	20	15	16	16
3	Grams/Min				10.09	324	0.93	31.65	574	2.04	25.37	620	2.20	27.36	736	2.32
	Conc/Mode				940	13,958	40	2,950	24,734	88	2,365	26,722	95	2,550	31,722	100
	Time in Gear, sec				8	8	8	6	7	7	20	20	20	15	15	15
	Average g/min				9.43	288	1.03	31.92	528	2.04	24.97	632	2.01	27.52	727	2.18
1	Grams/Min							10.56	352	1.23	24.85	635	1.97	28.72	735	2.39
	Conc/Mode							984	15,186	53	2,316	27,387	85	2,677	31,709	103
	Time in Gear, sec							18	18	18	19	20	19	15	15	15
2	Grams/Min							9.62	334	1.41	24.59	649	2.06	28.13	751	2.11
	Conc/Mode							897	14,423	61	2,292	27,977	89	2,622	32,377	91
	Time in Gear, sec							18	17	18	19	20	19	15	15	15
3	Grams/Min							9.33	466	1.25	24.40	649	2.16	29.43	746	2.20
	Conc/Mode							870	20,081	54	2,274	27,974	93	2,743	32,180	95
	Time in Gear, sec							18	18	18	19	20	19	15	15	15
	Average g/min							9.83	384	1.33	24.61	644	2.06	28.76	744	2.23
1	Grams/Min										11.09	362	1.14	28.17	717	2.06
	Conc/Mode										1,043	15,762	50	2,650	31,189	90
	Time in Gear, sec										52	51	52	15	15	15
2	Grams/Min										11.15	387	1.31	28.52	735	2.02
	Conc/Mode										1,049	16,832	57	2,683	31,961	88
	Time in Gear, sec										51	51	51	15	15	15
3	Grams/Min										11.86	394	1.24	27.01	742	1.79
	Conc/Mode										1,116	17,126	54	2,541	32,280	78
	Time in Gear, sec										50	50	50	15	15	15
	Average g/min										11.37	381	1.23	34.23	731	1.96

TABLE F-11. ACCELERATION AGAINST 16,000 POUNDS OF INERTIA AT WOT IN LOW RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	6.52	173	0.32	35.16	308	1.04	39.17	383	1.79	34.65	521	2.30	36.72	630	2.12
	Conc/Mode	606	7,946	14	3,267	14,110	45	3,640	17,549	77	3,220	23,872	99	3,412	28,888	91
	Time in Gear, sec	5	5	5	3	3	3	5	5	3	10	10	10	8	8	9
2	Grams/Min	2.42	86	0.44	29.76	309	1.38	40.62	422	2.07	33.58	535	2.44	35.51	623	2.07
	Conc/Mode	225	3,936	19	2,766	14,198	59	3,775	19,338	89	3,120	24,514	105	3,300	28,554	89
	Time in Gear, sec	4	4	4	3	3	3	4	4	4	10	10	10	8	8	8
3	Grams/Min	5.47	176	0.37	29.06	346	1.00	41.70	429	1.79	38.14	555	2.21	37.50	631	2.02
	Conc/Mode	508	8,056	16	2,700	15,863	43	3,875	19,670	77	3,544	25,450	95	3,485	28,928	87
	Time in Gear, sec	4	4	4	3	3	3	4	4	4	9	10	10	7	8	8
	Average g/min	4.80	145	0.37	31.33	321	1.14	40.50	411	1.88	35.46	537	2.32	36.58	628	2.07
1	Grams/Min				8.95	233	0.51	38.47	450	1.58	36.35	541	1.93	40.69	642	1.93
	Conc/Mode				832	10,667	25	3,575	20,614	68	3,378	24,798	83	3,781	29,386	83
	Time in Gear, sec				5	6	5	4	4	4	9	9	10	8	8	8
2	Grams/Min				4.21	229	0.35	38.09	420	1.23	32.93	557	1.72	36.92	642	1.65
	Conc/Mode				391	10,474	15	3,540	19,246	53	3,060	25,537	74	3,431	29,412	71
	Time in Gear, sec				5	6	5	5	4	4	10	10	8	8	8	8
3	Grams/Min				9.04	233	0.63	38.87	398	1.51	35.24	556	1.81	37.46	654	1.81
	Conc/Mode				840	10,662	27	3,612	18,261	65	3,275	25,467	78	3,481	29,982	78
	Time in Gear, sec				5	6	5	4	4	4	10	10	10	8	8	8
	Average g/min				7.40	232	0.50	38.48	423	1.44	34.84	551	1.82	38.36	646	1.80

TABLE F-12. ACCELERATION AGAINST 16,000 POUNDS OF INERTIA AT WOT IN HIGH RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	7.06	2.08	0.21	32.55	440	1.25	34.20	490	2.00	26.31	798	2.21	24.35	667	1.86
	Conc/Mode	656	9,525	9	3,025	20,178	54	3,178	22,449	86	2,445	36,585	95	2,727	30,588	80
	Time in Gear, sec	5	5	4	4	3	4	7	6	5	20	20	20	15	15	15
2	Grams/Min	7.30	184	0.34	33.36	499	1.42	35.34	541	1.83	26.76	604	1.60	29.30	690	1.93
	Conc/Mode	678	8,422	15	3,100	22,861	61	3,284	24,786	79	2,487	27,664	69	2,723	31,614	83
	Time in Gear, sec	5	4	5	4	4	4	6	6	6	19	19	20	15	15	15
3	Grams/Min	5.46	152	0.58	37.12	376	1.37	36.82	489	1.77	27.38	584	2.14	30.52	672	2.09
	Conc/Mode	507	6,965	25	3,450	17,245	59	3,421	22,399	76	2,544	26,757	92	2,826	30,806	90
	Time in Gear, sec	5	5	5	4	4	4	7	7	7	19	19	20	15	15	15
	Average g/min	7.27	181	0.37	31.33	438	1.36	35.55	507	1.87	26.82	662	1.98	29.72	676	1.96
1	Grams/Min				9.08	285	1.12	34.20	403	1.65	27.30	587	2.09	30.25	519	2.00
	Conc/Mode				844	13,039	48	3,178	18,481	71	2,537	26,919	90	2,811	23,807	86
	Time in Gear, sec				8	8	8	7	7	7	19	19	19	14	14	14
2	Grams/Min				8.80	289	0.67	36.13	539	1.60	27.98	598	1.93	30.09	672	2.21
	Conc/Mode				818	13,255	29	3,357	24,693	69	2,600	27,426	83	2,796	30,784	95
	Time in Gear, sec				8	8	7	7	7	7	19	19	19	14	14	14
3	Grams/Min				9.48	287	0.72	38.82	540	1.60	26.96	610	1.81	29.09	706	1.81
	Conc/Mode				881	13,159	31	3,143	24,746	69	2,505	27,937	78	2,703	32,379	78
	Time in Gear, sec				7	8	8	7	7	7	19	19	19	14	15	15
	Average g/min				9.12	287	0.84	34.72	494	1.62	27.41	598	1.94	29.81	632	2.01

TABLE F-13. ACCELERATION AGAINST 25,000 POUNDS OF INERTIA AT WOT IN LOW RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	5.44	212	0.28	32.04	348	0.93	35.08	446	1.85	28.80	519	2.62	30.53	623	2.78
	Conc/Mode	502	9,644	12	2,960	15,867	40	3,240	20,339	79	2,660	23,628	113	2,820	28,363	119
	Time in Gear, sec	6	6	6	3	3	3	5	6	5	14	14	14	12	12	12
2	Grams/Min	5.56	174	0.42	28.51	293	1.10	36.45	449	2.22	28.84	533	2.45	34.30	614	2.50
	Conc/Mode	514	7,909	18	2,633	13,338	47	3,367	20,453	95	2,664	24,275	105	3,168	27,961	107
	Time in Gear, sec	5	5	5	3	3	3	6	6	6	14	15	15	11	11	11
3	Grams/Min	10.42	156	0.63	27.42	354	1.03	35.62	475	1.99	28.69	540	2.50	32.70	631	2.62
	Conc/Mode	962	7,120	27	2,533	16,125	44	3,290	21,635	85	2,650	24,594	107	3,020	28,761	112
	Time in Gear, sec	4	4	4	3	3	3	5	5	5	14	14	14	12	12	12
	Average g/min	7.14	181	0.44	29.32	332	1.02	35.72	457	2.02	28.78	531	2.52	32.51	623	2.63
1	Grams/Min				8.98	281	0.72	35.19	478	1.77	26.14	590	2.11	33.27	650	2.32
	Conc/Mode				829	12,787	31	3,250	21,779	76	2,414	26.88	90	3,073	29,605	99
	Time in Gear, sec				6	6	6	5	5	5	14	14	14	11	11	11
2	Grams/Min				8.15	240	0.70	34.86	481	1.94	29.65	569	2.22	33.17	661	220
	Conc/Mode				753	10,950	30	3,220	21,923	83	2,739	25,933	95	3,064	30,096	94
	Time in Gear, sec				6	6	6	5	5	5	14	14	14	11	11	11
3	Grams/Min				8.12	325	1.03	39.30	509	2.13	28.72	573	2.62	32.38	658	2.67
	Conc/Mode				750	14,785	44	3,630	23,190	91	2,653	26,106	112	2,991	29,978	114
	Time in Gear, sec				6	6	6	5	5	5	14	14	14	11	11	11
	Average g/min				8.42	282	0.82	36.45	489	1.94	28.17	577	2.32	32.94	656	2.40

TABLE F-14. ACCELERATION AGAINST 25,000 POUNDS OF INERTIA AT WOT IN HIGH RANGE FROM 500 TO 3000 RPM FOR A 1969 IHC 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear			5th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	5.51	285	0.42	33.02	407	1.42	32.05	512	2.15	24.15	586	2.27	26.50	683	2.43
	Conc/Mode	509	12,972	18	3,050	18,560	61	2,960	23,318	92	2,231	26,685	97	2,448	31,136	104
	Time in Gear, sec	4	4	5	4	4	5	10	9	9	29	29	29	25	24	24
2	Grams/Min	3.96	215	0.39	32.75	430	1.63	33.38	521	2.29	23.09	568	1.96	25.69	696	1.99
	Conc/Mode	366	9,791	17	3,025	19,571	70	3,083	23,731	98	2,133	25,862	84	2,373	31,698	85
	Time in Gear, sec	4	4	5	4	4	5	9	9	9	29	29	29	22	22	22
3	Grams/Min	4.84	230	0.33	33.56	478	1.66	32.11	538	2.24	23.41	609	2.08	25.83	7.05	1.86
	Conc/Mode	447	10,476	14	3,100	21,783	71	2,966	24,516	96	2,162	27,765	89	2,386	32,129	84
	Time in Gear, sec	4	4	5	4	4	5	9	9	10	29	28	28	22	22	23
4	Grams/Min	2.92	216	0.63	36.70	455	1.70	33.62	557	2.11	23.61	621	1.26	26.53	727	1.94
	Conc/Mode	2,700	9,851	27	3,390	20,734	73	3,105	25,354	90	2,181	28,295	54	2,450	33,111	83
	Time in Gear, sec	4	4	5	4	4	4	9	9	9	29	28	28	22	23	22
	Average g/min	4.31	237	0.44	34.01	443	1.60	32.79	532	2.19	23.57	596	1.89	26.14	703	2.08
1	Grams/Min				10.08	399	1.14	29.72	518	2.03	22.94	606	1.89	25.23	729	2.08
	Conc/Mode				931	18,193	49	2,745	23,588	87	2,119	27,599	81	2,331	33,219	89
	Time in Gear, sec				7	7	7	10	9	10	29	29	29	22	22	22
2	Grams/Min				9.35	318	1.24	28.04	575	2.06	22.89	547	1.99	24.90	722	2.15
	Conc/Mode				864	14,467	53	2,590	26,205	88	2,114	24,889	85	2,300	32,891	92
	Time in Gear, sec				9	10	9	10	9	10	28	28	28	22	22	22
3	Grams/Min				9.13	352	1.07	28.64	565	1.80	23.80	639	1.80	24.73	737	2.06
	Conc/Mode				843	16,043	46	2,645	25,750	77	2,198	29,096	77	2,284	33,578	88
	Time in Gear, sec				9	9	9	10	10	10	28	28	28	22	22	22
	Average g/min				9.52	356	1.15	28.80	553	1.96	23.21	597	1.89	24.95	729	2.10

TABLE F-15. DECELERATION AGAINST INERTIA FROM 3000 TO 750 RPM IN LOW RANGE FOR A 1969 IHC, 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	4th Gear		5th Gear		4th Gear		5th Gear	
		HC	CO	HC	CO	HC	CO	HC	CO
		8,000-lb Inertia				10,000-lb Inertia			
1	Grams/Min	9.41	49	19.06	44	10.93	29	10.60	28
	Conc/Mode	868	2269	1747	1994	1016	1372	985	1299
	Time in Gear, sec	22	22	25	25	39	39	51	51
2	Grams/Min	10.13	51	14.61	42	11.07	29	10.34	27
	Conc/Mode	926	2298	1342	1910	1029	1331	961	1228
	Time in Gear, sec	21	21	25	25	38	38	51	51
3	Grams/Min	9.41	45	16.01	47	11.06	31	10.66	27
	Conc/Mode	870	2037	1477	2115	1028	1406	991	1228
	Time in Gear, sec	21	21	26	26	39	39	50	50
	Average g/min	9.65	48	16.56	44	11.02	30	10.53	27
		16,000-lb Inertia				25,000-lb Inertia			
1	Grams/Min	12.30	28	11.75	26	11.45	24	11.47	26
	Conc/Mode	1143	1280	1092	1170	1058	1089	1059	1175
	Time in Gear, sec	39	39	54	54	58	58	75	75
2	Grams/Min	13.28	29	11.82	25	11.71	23	11.50	24
	Conc/Mode	1234	1327	1099	1163	1082	1030	1062	1076
	Time in Gear, sec	39	39	52	52	56	56	77	77
3	Grams/Min	13.53	28	12.61	26	12.00	22	11.52	25
	Conc/Mode	1257	1291	1170	1180	1109	982	1064	1134
	Time in Gear, sec	39	39	51	51	56	56	76	76
	Average g/min		28		26	11.72	23	11.50	25

TABLE F-16. DECELERATION AGAINST INERTIA FROM 3000 TO 750 RPM IN HIGH RANGE FOR A 1969 IHC, 304-CID, 24,000-LB GVW STAKE TRUCK

Run No.	Item	4th Gear		5th Gear		4th Gear		5th Gear	
		HC	CO	HC	CO	HC	CO	HC	CO
		8,000-lb Inertia				10,000-lb Inertia			
1	Grams/Min	17.54	42	N.D.	N.D.	10.59	26	10.37	26
	Conc/Mode	1616	1911	N.D.	N.D.	984	1180	964	1211
	Time in Gear, sec	29	29	N.D.	N.D.	60	60	74	74
2	Grams/Min	11.71	43	9.96	35	10.55	26	8.90	28
	Conc/Mode	1074	1934	917	1596	981	1193	827	1304
	Time in Gear, sec	29	29	33	33	60	60	75	75
3	Grams/Min	10.35	43	10.50	39	10.44	25	10.28	23
	Conc/Mode	961	1937	967	1756	970	1104	955	1037
	Time in Gear, sec	29	29	35	35	61	61	76	75
	Average g/min	13.20	43	10.23	37	10.53	26	9.85	26
		16,000-lb Inertia				25,000-lb Inertia			
1	Grams/Min	12.24	24	14.76	23	11.57	18	10.58	19
	Conc/Mode	1137	1091	1372	1083	1064	805	977	881
	Time in Gear, sec	63	63	84	84	123	123	120	120
2	Grams/Min	12.05	23	13.45	21	11.86	21	11.43	19
	Conc/Mode	1120	1047	1250	984	1095	940	1056	878
	Time in Gear, sec	63	63	81	81	92	92	116	116
3	Grams/Min	14.65	23	12.62	24	11.50	20	12.46	18
	Conc/Mode	1361	1034	1173	1087	1062	895	1151	809
	Time in Gear, sec	63	63	82	82	91	91	122	122
	Average g/min	12.98	23	13.61	23	11.64	20	11.49	19

TABLE F-17. ACCELERATION AGAINST 8000 POUNDS OF INERTIA AT WOT FROM 650 TO 3000 RPM FOR A 1969 FORD, 300-CID, 15,000-LB GVW VAN TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	2.80	73.60	0.39	7.99	160	2.91	8.72	211	6.95	6.74	194	10.58
	Conc/Mode	262	3,394	17	753	7,480	127	822	9,847	303	635	9,016	461
	Time in Gear, sec	4	4	4	3	3	3	6	6	6	14	14	14
2	Grams/Min	1.50	58.43	0.39	7.22	172	3.60	7.93	203	7.74	6.66	207	10.65
	Conc/Mode	140	2,678	17	671	7,876	155	737	9,306	333	619	9,516	458
	Time in Gear, sec	4	4	4	3	3	3	7	7	7	13	14	13
3	Grams/Min	2.22	66.78	0.32	9.16	178.11	2.86	8.97	218	7.65	6.58	229	11.16
	Conc/Mode	210	3,108	14	865	8,289	125	847	10,156	334	621	10,696	487
	Time in Gear, sec	3	4	4	3	3	3	6	7	7	13	13	13
1	Grams/Min	2.89	49.63	0.50	7.94	145.88	3.69	8.59	203	8.03	6.48	227	11.41
	Conc/Mode	272	2,299	22	746	6,758	142	807	9,415	349	609	10,537	496
	Time in Gear, sec	4	3	4	3	3	3	7	7	7	15	14	15
2	Grams/Min	2.17	50.58	0.69	7.83	153	3.95	8.34	192	8.01	6.27	210	10.01
	Conc/Mode	204	2,343	30	736	7,094	172	784	8,927	348	589	9,745	435
	Time in Gear, sec	4	4	4	3	3	3	7	7	7	14	16	14
3	Grams/Min	2.55	42.39	0.71	8.23	140	4.81	8.09	199	7.94	6.43	226	10.88
	Conc/Mode	240	1,964	31	773	6,495	209	760	9,264	345	604	10,510	473
	Time in Gear, sec	4	4	4	3	3	3	7	7	7	14	14	14
	Average g/min	2.17	67	0.37	8.12	170	3.12	8.54	210	7.45	6.66	210	10.79
1	Grams/Min				3.80	77	3.57	8.12	208	8.32	6.23	224	11.39
	Conc/Mode				357	3,552	155	762	9,641	361	585	10,350	494
	Time in Gear, sec				4	5	4	6	6	6	14	15	14
2	Grams/Min				3.34	91	3.43	7.43	187	8.04	6.17	216	10.77
	Conc/Mode				314	4,567	149	697	8,651	349	579	9,982	467
	Time in Gear, sec				5	6	5	5	7	7	14	14	14
3	Grams/Min				3.22	81.07	3.20	7.59	202	8.41	6.28	235	10.65
	Conc/Mode				302	3,750	139	712	9,380	365	589	10,897	462
	Time in Gear, sec				4	5	4	4	6	6	14	14	14
1	Grams/Min							3.34	107	5.08	6.01	210	10.22
	Conc/Mode							314	4,974	221	565	9,743	444
	Time in Gear, sec							14	14	15	14	14	14
2	Grams/Min							3.03	N.D.	4.00	6.02	N.D.	10.40
	Conc/Mode							285		174	566		452
	Time in Gear, sec							13		13	14		13
3	Grams/Min							3.16	114	4.20	6.00	210	10.18
	Conc/Mode							296	5,301	182	562	9,706	441
	Time in Gear, sec							13	14	13	14	14	14
4	Grams/Min							3.32	118	4.90	5.97	223	11.46
	Conc/Mode							312	5,474	213	561	10,350	498
	Time in Gear, sec							13	13	13	15	14	15
	Average g/min							3.21	113	4.56	6.00	248	10.56

TABLE F-18. ACCELERATION AGAINST 12,000 POUNDS OF INERTIA AT WOT FROM 650 TO 3000 RPM FOR A 1969 FORD, 300-CID, 15,000-LB GVW VAN TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	1.71	38.25	0.34	7.54	141.18	4.07	7.11	191.86	7.81	5.77	206.15	10.63
	Conc/Mode	160	1764	15	705	6510	176	665	8847	338	540	9506	460
	Time in Gear, sec	5	5	5	4	4	4	10	10	10	20	20	20
2	Grams/Min	1.57	18.89	1.36	7.43	129	5.16	7.09	181	8.64	5.17	207	11.30
	Conc/Mode	150	886	60	707	6064	227	675	8479	380	492	9702	497
	Time in Gear, sec	5	5	5	4	4	4	10	10	10	20	20	20
3	Grams/Min	1.07	23.66	1.96	7.30	163	3.66	6.92	188.29	8.21	5.19	205	11.50
	Conc/Mode	102	1103	86	690	7613	160	654	8776	359	491	9576	503
	Time in Gear, sec	5	5	5	4	4	4	10	10	10	20	20	20
	Average g/min	1.45	26.93	1.22	7.42	144	4.29	7.04	187	8.22	5.38	206	11.14
1	Grams/Min				1.92	73.60	1.61	6.57	202	10.05	5.32	206	12.24
	Conc/Mode				181	3420	70	619	9400	438	502	9602	534
	Time in Gear, sec				8	8	8	10	10	10	20	20	20
2	Grams/Min				2.45	73.38	2.66	6.66	190	10.00	5.22	204	12.11
	Conc/Mode				231	3410	116	628	8822	436	492	9476	528
	Time in Gear, sec				7	8	8	9	9	9	18	19	18
3	Grams/Min				2.15	62.00	1.73	6.53	188	9.12	5.55	204	11.92
	Conc/Mode				204	2890	76	618	8754	399	523	9508	521
	Time in Gear, sec				7	7	7	10	9	9	20	20	18
	Average g/min				2.17	69.66	2.33	5.58	193	9.72	5.36	204	12.09
1	Grams/Min							3.33	108	5.34	5.46	191	12.01
	Conc/Mode							313	4998	232	513	8845	522
	Time in Gear, sec							22	22	21	18	18	18
2	Grams/Min							2.89	95.27	5.43	5.26	178	10.71
	Conc/Mode							273	4427	237	496	8287	467
	Time in Gear, sec							21	21	21	21	21	21
3	Grams/Min							2.87	92.88	4.75	5.17	193	10.99
	Conc/Mode							271	4316	207	488	8965	479
	Time in Gear, sec							22	22	22	21	21	21

TABLE F-19. ACCELERATION AGAINST 16,000 POUNDS OF INERTIA AT WOT FROM 650 TO 3000 RPM FOR A 1969 FORD, 300-CID, 15,000-LB GVW VAN TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	0.83	78.99	0.25	5.58	169	3.67	7.54	185	9.31	5.32	202	12.17
	Conc/Mode	78	3626	11	520	7791	158	702	8520	401	496	9298	524
	Time in Gear, sec	4	6	4	4	4	4	12	11	11	25	25	25
2	Grams/Min	2.26	53.63	0.69	9.38	188	5.85	6.69	184	9.66	5.19	207	12.29
	Conc/Mode	211	2462	30	873	8667	252	623	8450	416	483	9532	529
	Time in Gear, sec	5	5	5	4	4	4	11	11	11	25	24	25
3	Grams/Min	2.07	66.27	0.41	8.54	199	4.73	7.44	199	10.19	5.26	209	12.70
	Conc/Mode	193	3042	18	795	9163	204	693	9169	439	490	9634	547
	Time in Gear, sec	5	5	5	4	4	4	11	11	11	25	25	25
	Average g/min	1.72	66	0.45	7.83	185	4.75	7.22	189	9.69	5.26	2.06	12.05
1	Grams/Min				2.98	80.97	2.67	4.96	167	9.64	5.03	203	12.52
	Conc/Mode				278	3717	115	555	7667	415	469	9341	539
	Time in Gear, sec				8	8	8	11	11	11	25	25	25
2	Grams/Min				2.13	88.23	2.51	6.09	179	9.24	4.88	193	11.24
	Conc/Mode				199	4050	108	567	8215	398	455	8858	484
	Time in Gear, sec				8	9	8	12	11	11	27	26	26
3	Grams/Min				2.51	64.70	2.34	6.61	194	9.78	5.21	206	12.17
	Conc/Mode				234	2970	101	620	8923	421	485	9497	524
	Time in Gear, sec				8	8	8	11	11	11	25	25	25
	Average g/min				2.54	78	2.50	5.89	180	9.55	5.04	200	11.98
1	Grams/Min							3.11	105.94	4.43	4.94	208	12.22
	Conc/Mode							290	4863	191	460	9546	526
	Time in Gear, sec							25	25	25	24	24	24
2	Grams/Min							3.34	123	5.94	5.09	208	11.87
	Conc/Mode							311	5657	256	474	9546	511
	Time in Gear, sec							23	23	23	24	24	24
3	Grams/Min							2.97	107	5.71	5.21	211	13.77
	Conc/Mode							277	4934	246	485	9690	593
	Time in Gear, sec							23	24	23	24	24	24

TABLE F-20. DECELERATION AGAINST INERTIA FROM 3000 TO 750 RPM FOR A 1969 FORD, 300-CID, 15,000-LB GVW VAN TRUCK

Run No.	Item	3rd Gear		4th Gear		3rd Gear		4th Gear		3rd Gear		4th Gear	
		HC	CO	HC	CO	HC	CO	HC	CO	HC	CO	HC	CO
		8,000-lb Inertia				12,000-lb Inertia				16,000-lb Inertia			
1	Grams/Min	6.38	9.04	4.90	6.91	6.89	8.11	7.05	7.29	7.03	7.65	7.10	7.43
	Conc/Mode	600	419	548	318	649	377	665	339	658	353	664	343
	Time in Gear, sec	23	23	39	39	36	36	51	51	42	42	63	63
2	Grams/Min	6.47	8.53	6.63	6.90	6.67	8.31	6.66	7.41	6.88	7.95	7.50	7.41
	Conc/Mode	602	391	624	321	616	385	628	345	644	367	720	342
	Time in Gear, sec	24	24	40	40	36	36	54	54	42	42	61	61
3	Grams/Min	6.49	8.96	7.09	7.70	6.55	7.93	6.84	7.16	6.61	7.65	7.67	7.43
	Conc/Mode	604	411	668	358	613	366	647	334	618	353	718	343
	Time in Gear, sec	20	20	42	42	36	36	52	52	42	42	63	63
	Average g/min	6.45	8.85	6.20	7.17	6.70	8.12	6.85	7.29	6.84	7.75	7.42	7.42

TABLE F-21. ACCELERATION AGAINST 12,000 POUNDS OF INERTIA AT WOT FROM 650 TO 3000 RPM FOR A 1969 DODGE, 318-CID, 23,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	7.64	67.84	0.74	8.85	74.06	6.61	10.25	227.71	4.50	13.48	13.48	418.44
	Conc/Mode	713	3,119	32	825	3,405	285	956	10,468	194	1,257	1,257	19,236
	Time in Gear, sec	4	4	4	4	4	5	8	8	8	15	15	15
2	Grams/Min	4.89	60.38	0.91	11.80	106.61	5.09	10.30	297.70	3.72	12.30	12.30	392.47
	Conc/Mode	463	2,819	40	1,117	4,977	223	975	13,897	163	1,165	1,165	18,321
	Time in Gear, sec	4	4	4	3	3	3	8	7	7	17	17	17
3	Grams/Min	5.58	48.04	1.26	10.14	149.95	3.93	11.88	304.87	3.95	13.27	13.27	401.84
	Conc/Mode	537	2,278	56	975	7,110	175	1,143	14,455	176	1,276	1,276	19,053
	Time in Gear, sec	4	4	4	4	4	4	7	7	7	17	17	17
	Average g/min	6.03	58.75	0.97	10.26	110.20	5.21	10.81	276.76	4.05	13.01	13.01	404.25
1	Grams/Min				6.31	284.50	3.25	14.48	382.46	3.66	12.89	449.41	3.30
	Conc/Mode				600	13,322	143	1,375	17,909	161	1,224	21,044	145
	Time in Gear, sec				5	5	5	8	8	8	17	17	17
2	Grams/Min				7.65	230.32	3.12	13.50	380.66	3.30	13.07	383.59	3.33
	Conc/Mode				730	10,785	138	1,288	17,825	146	1,247	17,962	147
	Time in Gear, sec				5	4	5	8	8	8	17	17	17
3	Grams/Min				7.62	226.81	1.20	15.18	372.04	4.02	12.55	437.31	3.82
	Conc/Mode				725	10,637	53	1,444	17,448	177	1,194	20,509	168
	Time in Gear, sec				4	5	4	8	8	8	17	17	17
	Average g/min				7.19	247.21	2.52	14.38	378.38	3.66	12.84	423.43	3.48
1	Grams/Min							6.12	354.57	4.45	13.05	421.76	7.62
	Conc/Mode							582	16,629	196	1,241	19,780	335
	Time in Gear, sec							11	11	11	17	18	17
2	Grams/Min							7.05	377.61	3.46	11.71	423.41	4.45
	Conc/Mode							665	17,546	151	1,103	19,674	194
	Time in Gear, sec							10	11	10	18	18	18
	Average g/min							6.58	366.09	3.95	12.38	422.58	6.03

TABLE F-22. ACCELERATION AGAINST 16,000 POUNDS OF INERTIA AT WOT FROM 650 TO 3000 RPM FOR A 1969 DODGE, 318-CID, 23,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	3.33	53.07	0.86	7.67	53.26	4.07	7.78	279.26	1.59	9.46	409.54	
	Conc/Mode	317	2,489	38	730	2,498	179	740	13,097	70	900	19,207	
	Time in Gear, sec	6	6	6	5	5	5	10	10	10	21	21	
2	Grams/Min	3.40	46.28	2.12	8.58	144.44	2.91	13.31	345.58	3.93	11.98	402.39	
	Conc/Mode	325	2,181	94	820	6,806	129	1,272	16,283	174	1,145	18,960	
	Time in Gear, sec	6	6	6	5	5	5	9	9	9	20	20	
3	Grams/Min	3.85	49.12	2.06	8.52	131.24	6.27	10.33	357.68	4.22	11.91	415.85	
	Conc/Mode	371	2,329	92	820	6,223	279	994	16,959	188	1,145	19,717	
	Time in Gear, sec	7	7	7	5	5	5	9	9	9	20	20	
4	Grams/Min	3.60	35.74	1.53	8.59	149.18	4.93	10.10	331.73	3.36	11.37	399.73	
	Conc/Mode	3.57	1,744	70	850	7,279	226	1,000	16,186	154	1,125	19,504	
	Time in Gear, sec	7	7	7	4	4	4	9	9	9	20	20	
	Average g/min	3.54	46.05	1.64	8.34	119.53	4.54	10.38	328.56	3.27	11.10	406.87	
1	Grams/Min				6.70	219.27	3.28	11.93	360.81	3.68	11.83	417.42	3.35
	Conc/Mode				650	10,479	147	1,156	17,243	165	1,147	19,948	150
	Time in Gear, sec				4	4	4	8	9	8	18	19	18
2	Grams/Min				7.30	264.61	2.02	13.27	336.62	3.75	11.71	389.81	3.41
	Conc/Mode				712	12,726	91	1,294	16,189	169	1,142	18,747	154
	Time in Gear, sec				4	4	4	9	9	8	19	19	18
3	Grams/Min				8.02	222.29	4.27	13.64	333.75	4.14	11.37	394.86	4.10
	Conc/Mode				787	10,759	194	1,339	16,154	188	1,116	19,112	186
	Time in Gear, sec				4	4	4	9	9	9	19	19	19
	Average g/min				7.34	235.39	3.19	12.95	343.72	3.86	11.64	400.70	3.62
1	Grams/Min							6.69	319.35	2.40	11.61	368.54	3.87
	Conc/Mode							657	15,457	109	1,139	17,838	176
	Time in Gear, sec							13	13	13	19	19	19
2	Grams/Min							7.13	319.59	2.64	12.17	402.72	4.55
	Conc/Mode							696	15,370	119	1,187	19,368	205
	Time in Gear, sec							13	13	13	19	19	19
3	Grams/Min							6.62	312.59	2.62	12.31	409.58	4.03
	Conc/Mode							650	15,130	119	1,208	19,824	183
	Time in Gear, sec							13	13	13	20	19	20
	Average g/min							6.81	317.18	2.55	12.03	393.61	4.15

TABLE F-23. ACCELERATION AGAINST 25,000 POUNDS OF INERTIA AT WOT FROM 650 TO 3000 RPM FOR A 1969 DODGE, 318-CID, 23,000-LB GVW STAKE TRUCK

Run No.	Item	1st Gear			2nd Gear			3rd Gear			4th Gear		
		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	Grams/Min	12.49	84.56	2.05	13.02	100.80	15.03	12.38	388.67	8.14	11.08	528.69	5.97
	Conc/Mode	1,158	3,864	88	1,207	4,606	644	1,147	17,757	349	1,027	24,157	256
	Time in Gear, sec	6	6	6	7	7	7	15	15	15	60	60	60
2	Grams/Min	11.55	84.58	0.18	14.49	187.15	5.04	16.43	404.16	3.61	8.92	548.9	2.47
	Conc/Mode	1,100	3,973	8	1,380	8,791	222	1,565	18,984	159	850	25,780	109
	Time in Gear, sec	6	6	6	5	5	5	15	15	15	63	63	63
3	Grams/Min	12.45	91.58	3.09	18.37	166.99	7.49	16.62	414.21	6.13	11.23	528.41	4.54
	Conc/Mode	1,186	4,302	136	1,750	7,844	330	1,583	19,456	270	1,070	24,820	200
	Time in Gear, sec	7	7	7	4	5	4	15	15	15	57	58	57
4	Grams/Min	14.00	98.74	0.55	19.90	223.23	5.01	16.13	416.05	3.39	11.99	520.52	2.62
	Conc/Mode	1,330	4,624	24	1,890	10,453	220	1,532	19,482	149	1,139	24,374	115
	Time in Gear, sec	5	5	5	5	5	5	14	15	14	62	60	62
	Average g/min	12.62	89.86	1.46	16.44	169.54	8.14	15.39	405.77	5.31	10.80	531.63	3.90
1	Grams/Min				13.38		1.29	16.17		2.23	11.31		2.57
	Conc/Mode				1,283	N.D.	57	1,550	N.D.	99	1,084	N.D.	114
	Time in Gear, sec				9		9	14		14	62		62
2	Grams/Min				11.02	199.37	1.63	14.78	448.50	1.09	11.77	520.13	2.91
	Conc/Mode				1,065	9,498	73	1,428	21,366	49	1,137	24,778	130
	Time in Gear, sec				10	10	10	14	14	14	31	31	31
3	Grams/Min				10.73	248.98	2.05	15.52	437.67	3.33	11.64	506.86	3.67
	Conc/Mode				1,037	11,861	92	1,500	20,850	149	1,125	24,146	164
	Time in Gear, sec				8	8	8	13	13	13	30	30	30
	Average g/min				11.71	224.17	1.66	15.49	443.08	2.22	11.57	513.49	1.36
1	Grams/Min							10.11	323.55	1.40	12.38	493.28	2.35
	Conc/Mode							969	15,293	62	1,187	23,315	104
	Time in Gear, sec							29	29	29	30	29	30
2	Grams/min							8.08	264.72	1.13	12.19	489.96	2.32
	Conc/Mode							775	12,512	50	1,169	23,158	103
	Time in Gear, sec							30	30	30	31	30	31
3	Grams/Min							8.71	266.34	1.02	12.23	499.85	2.30
	Conc/Mode							842	12,688	46	1,182	23,812	103
	Time in Gear, sec							30	30	30	31	32	31
	Average g/min							8.97	284.87	1.18	12.26	494.36	2.32

TABLE F-24. DECELERATION AGAINST INERTIA FROM 3000 TO 750 RPM FOR A 1969 DODGE, 318-CID, 23,000-LB GVW STAKE TRUCK

Run No.	Item	3rd Gear		4th Gear		3rd Gear		4th Gear		3rd Gear		4th Gear	
		HC	CO	HC	CO	HC	CO	HC	CO	HC	CO	HC	CO
		12,000-lb Inertia				16,000-lb Inertia				25,000-lb Inertia			
1	Grams/Min	5.78	6.91	6.45	6.39	5.70	5.94	5.70	7.15	22.20	29.60	26.85	29.96
	Conc/Mode	550	324	598	292	525	270	547	338	5121	1395	2566	1412
	Time in Gear, sec	24	24	40	40	30	30	58	58	55	55	114	114
2	Grams/Min	5.41	7.55	6.45	4.84	5.70	6.28	5.17	6.02	24.97	29.88	26.67	30.32
	Conc/Mode	515	354	617	228	533	290	500	287	2401	1417	2564	1438
	Time in Gear, sec	24	24	40	40	30	30	58	58	55	55	116	116
3	Grams/Min	5.73	7.35	5.97	5.56	5.86	6.24	5.51	6.68	25.31	30.18	27.29	29.16
	Conc/Mode	545	345	577	265	553	290	528	316	2434	1431	2624	1383
	Time in Gear, sec	24	24	40	40	30	30	60	60	54	54	121	121
	Average g/min	5.64	7.27	6.29	5.60	5.75	6.15	5.46	6.62	24.16	29.88	26.93	29.81

APPENDIX G

FOUR ENGINE-VEHICLE EMISSIONS CHARACTERIZATION COMPUTER PRINTOUTS OF FEDERAL NINE-MODE EMISSIONS TESTS–STATIONARY AND CHASSIS

TABLE G-1. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–STATIONARY DYNAMOMETER

DEC 09 70 69 CHEV 250 6 STATIONARY 3998 RUN-1 PROJECT 11-2877-01 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	295.	6.400	10.510	38.	1.033	304.	6.615	39.	0.036	10.976	0.238	1.413
	2 16 HG	143.	0.750	14.310	2165.	0.977	139.	0.732	2115.	0.089	12.435	0.065	188.277
	3 10 HG	107.	0.400	14.310	2886.	0.991	106.	0.396	2861.	0.257	27.262	0.101	735.334
	4 16 HG	125.	0.850	14.420	2302.	0.967	120.	0.822	2228.	0.089	10.768	0.073	198.313
	5 19 HG	107.	0.850	14.420	1077.	0.969	103.	0.823	1043.	0.047	4.874	0.038	49.060
	6 16 HG	125.	0.890	14.420	2443.	0.966	120.	0.860	2361.	0.089	10.754	0.076	210.179
	7 3 HG	75.	0.400	14.420	2930.	0.986	73.	0.394	2889.	0.283	20.934	0.111	817.852
	8 16 HG	108.	0.600	14.530	2565.	0.970	104.	0.582	2488.	0.089	9.324	0.051	221.463
	9 C.T.	5301.	4.300	5.700	179.	1.068	5662.	4.592	191.	0.021	118.905	0.096	4.015
	SUM----------(CYCLE COMPOSITE)----------										226.237	0.853	2425.910
CYCLE 2													
	1 IDLE	295.	6.400	10.510	38.	1.033	304.	6.615	39.	0.036	10.976	0.238	1.413
	2 16 HG	115.	0.580	14.420	2532.	0.977	112.	0.566	2474.	0.089	10.004	0.050	220.271
	3 10 HG	75.	0.290	14.310	3175.	0.997	74.	0.289	3167.	0.257	19.227	0.074	813.954
	4 16 HG	107.	0.660	14.310	2647.	0.982	105.	0.648	2601.	0.089	9.358	0.057	231.502
	5 19 HG	97.	0.980	14.310	1123.	0.972	94.	0.953	1092.	0.047	4.435	0.044	51.347
	6 16 HG	115.	0.660	14.420	2573.	0.974	112.	0.643	2508.	0.089	9.977	0.057	223.235
	7 3 HG	66.	0.420	14.310	3056.	0.993	65.	0.417	3036.	0.283	18.561	0.118	859.437
	8 16 HG	110.	0.800	14.310	2499.	0.977	107.	0.782	2443.	0.089	9.572	0.069	217.479
	9 C.T.	6017.	4.500	4.930	211.	1.060	6378.	4.770	223.	0.021	133.947	0.100	4.697
	SUM----------(CYCLE COMPOSITE)----------										226.060	0.810	2623.340
CYCLE 3													
	1 IDLE	295.	6.400	10.510	38.	1.033	304.	6.615	39.	0.036	10.976	0.238	1.413
	2 16 HG	115.	0.890	14.310	2523.	0.974	112.	0.867	2458.	0.089	9.974	0.077	218.824
	3 10 HG	70.	0.300	14.180	3412.	1.006	70.	0.301	3434.	0.257	18.107	0.077	882.630
	4 16 HG	115.	0.970	14.310	2459.	0.971	111.	0.942	2389.	0.089	9.947	0.083	212.701
	5 19 HG	102.	1.280	14.180	1025.	0.971	99.	1.243	995.	0.047	4.655	0.058	46.787
	6 16 HG	115.	0.950	14.310	2556.	0.972	111.	0.923	2485.	0.089	9.954	0.082	221.240
	7 3 HG	66.	0.580	14.310	2930.	0.988	65.	0.573	2895.	0.283	18.459	0.162	819.509
	8 16 HG	111.	1.050	14.310	2523.	0.969	107.	1.018	2446.	0.089	9.578	0.090	217.716
	9 C.T.	5847.	4.770	4.930	233.	1.063	6220.	5.074	247.	0.021	130.626	0.106	5.205
	SUM----------(CYCLE COMPOSITE)----------										222.281	0.976	2626.029
CYCLE 4													
	1 IDLE	295.	6.400	10.510	38.	1.033	304.	6.615	39.	0.036	10.976	0.238	1.413
	2 16 HG	115.	0.750	14.310	2531.	0.979	112.	0.734	2478.	0.089	10.021	0.065	220.555
	3 10 HG	70.	0.270	14.050	3453.	1.016	71.	0.274	3510.	0.257	18.292	0.070	902.318
	4 16 HG	115.	0.810	14.310	2540.	0.977	112.	0.791	2481.	0.089	10.001	0.070	220.892
	5 19 HG	106.	1.170	14.180	1140.	0.974	103.	1.140	1110.	0.047	4.854	0.053	52.213
	6 16 HG	115.	0.900	14.310	2548.	0.974	112.	0.876	2482.	0.089	9.970	0.078	220.918
	7 3 HG	61.	0.420	14.310	3001.	0.994	60.	0.417	2983.	0.283	17.161	0.118	844.282
	8 16 HG	106.	0.790	14.310	2499.	0.978	103.	0.772	2445.	0.089	9.230	0.068	217.616
	9 C.T.	5351.	4.240	5.200	203.	1.106	5923.	4.693	224.	0.021	124.388	0.098	4.718
	SUM----------(CYCLE COMPOSITE)----------										214.897	0.861	2684.930
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------										226.149	0.832	2524.625
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------										218.589	0.919	2655.480

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(226.149)	+ 0.65*(218.589)	=	221.235	PPM
CO	0.35*(0.832)	+ 0.65*(0.919)	=	0.888	PERCENT
NO(K)	0.35*(2524.625)	+ 0.65*(2655.480)	=	2609.680	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-2. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–STATIONARY DYNAMOMETER

DEC 10 70 69 CHEV 250 6 STATIONARY 3998 RUN 1 PROJECT 11-2877-01 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	465.	8.430	9.470	51.	1.022	475.	8.615	52.	0.036	17.109	0.310	1.876
	2 16 HG	151.	0.660	14.310	2349.	0.979	147.	0.646	2300.	0.089	13.163	0.057	204.780
	3 10 HG	89.	0.210	14.050	3365.	1.017	90.	0.213	3423.	0.257	23.272	0.054	879.907
	4 16 HG	120.	0.760	14.420	2396.	0.971	116.	0.738	2327.	0.089	10.372	0.065	207.107
	5 19 HG	107.	0.980	14.420	1065.	0.965	103.	0.945	1027.	0.047	4.853	0.044	48.304
	6 16 HG	120.	0.770	14.420	2443.	0.970	116.	0.747	2371.	0.089	10.369	0.066	211.099
	7 3 HG	63.	0.420	14.310	2817.	0.993	62.	0.417	2799.	0.283	17.721	0.118	792.399
	8 16 HG	115.	0.990	14.310	2396.	0.971	111.	0.961	2327.	0.089	9.940	0.085	207.113
	9 C.T.	6284.	4.580	4.480	245.	1.069	6721.	4.898	262.	0.021	141.146	0.102	5.502
	SUM----------(CYCLE COMPOSITE)----------										247.948	0.905	2558.093
CYCLE 2													
	1 IDLE	465.	8.430	9.470	51.	1.022	475.	8.615	52.	0.036	17.109	0.310	1.876
	2 16 HG	133.	0.930	14.310	2388.	0.971	129.	0.903	2320.	0.089	11.504	0.080	206.568
	3 10 HG	79.	0.280	14.180	3843.	1.006	79.	0.281	3868.	0.257	20.436	0.072	994.142
	4 16 HG	125.	1.040	14.310	2349.	0.968	121.	1.007	2276.	0.089	10.779	0.089	202.564
	5 19 HG	107.	1.180	14.310	1008.	0.965	103.	1.139	973.	0.047	4.856	0.053	45.749
	6 16 HG	115.	0.840	14.420	2443.	0.968	111.	0.813	2367.	0.089	9.917	0.072	210.682
	7 3 HG	61.	0.350	14.310	2895.	0.996	60.	0.348	2884.	0.283	17.202	0.098	816.420
	8 16 HG	115.	0.850	14.310	2540.	0.975	112.	0.829	2478.	0.089	9.987	0.073	220.595
	9 C.T.	6100.	4.560	4.770	238.	1.063	6485.	4.848	253.	0.021	136.196	0.101	5.313
	SUM----------(CYCLE COMPOSITE)----------										237.990	0.953	2703.912
CYCLE 3													
	1 IDLE	465.	8.430	9.470	51.	1.022	475.	8.615	52.	0.036	17.109	0.310	1.876
	2 16 HG	124.	0.930	14.310	2309.	0.972	120.	0.904	2245.	0.089	10.733	0.080	199.864
	3 10 HG	79.	0.330	14.180	3384.	1.004	79.	0.331	3400.	0.257	20.401	0.085	873.887
	4 16 HG	115.	1.060	14.310	2364.	0.968	111.	1.027	2290.	0.089	9.917	0.091	203.869
	5 19 HG	106.	1.180	14.310	1122.	0.965	102.	1.139	1083.	0.047	4.811	0.053	50.927
	6 16 HG	120.	0.910	14.310	2572.	0.973	116.	0.885	2503.	0.089	10.397	0.078	222.843
	7 3 HG	52.	0.420	14.420	2974.	0.987	51.	0.414	2936.	0.283	14.529	0.117	830.973
	8 16 HG	115.	1.110	14.310	2419.	0.967	111.	1.073	2340.	0.089	9.900	0.095	208.264
	9 C.T.	5723.	4.510	4.770	191.	1.097	6283.	4.951	209.	0.021	131.960	0.103	4.404
	SUM----------(CYCLE COMPOSITE)----------										229.760	1.016	2596.910
CYCLE 4													
	1 IDLE	465.	8.430	9.470	51.	1.022	475.	8.615	52.	0.036	17.109	0.310	1.876
	2 16 HG	133.	0.830	14.310	2475.	0.975	129.	0.809	2413.	0.089	11.543	0.072	214.813
	3 10 HG	79.	0.230	14.180	3522.	1.008	79.	0.231	3551.	0.257	20.471	0.059	912.687
	4 16 HG	120.	0.810	14.420	2483.	0.969	116.	0.785	2407.	0.089	10.355	0.069	214.269
	5 19 HG	106.	1.130	14.310	1088.	0.967	102.	1.093	1052.	0.047	4.819	0.051	49.466
	6 16 HG	124.	0.860	14.310	2443.	0.974	120.	0.838	2381.	0.089	10.758	0.074	211.961
	7 3 HG	57.	0.330	14.310	2867.	0.997	56.	0.329	2859.	0.283	16.090	0.093	809.320
	8 16 HG	115.	1.020	14.310	2459.	0.970	111.	0.989	2385.	0.089	9.930	0.088	212.345
	9 C.T.	5671.	4.510	4.600	214.	1.117	6335.	5.038	239.	0.021	133.040	0.105	5.020
	SUM----------(CYCLE COMPOSITE)----------										234.119	0.924	2631.760

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 242.969 0.929 2631.003

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 231.939 0.970 2614.335

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(242.969) + 0.65*(231.939)	=	235.800	PPM
CO	0.35*(0.929) + 0.65*(0.970)	=	0.956	PERCENT
NO(K)	0.35*(2631.003) + 0.65*(2614.335)	=	2620.169	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-3. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–STATIONARY DYNAMOMETER

DEC 10 70 69 CHEV 250 6 STATIONARY 3998 RUN-2 PROJECT 11-2877-01 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	509.	8.320	8.930	51.	1.063	541.	8.844	54.	0.036	19.479	0.318	1.951
	2 16 HG	151.	0.580	14.530	2499.	0.967	146.	0.561	2418.	0.089	13.005	0.049	215.240
	3 10 HG	93.	0.240	14.310	3423.	0.997	92.	0.239	3415.	0.257	23.850	0.061	877.868
	4 16 HG	120.	0.880	14.530	2302.	0.960	115.	0.845	2210.	0.089	10.255	0.075	196.742
	5 19 HG	111.	1.180	14.420	1065.	0.958	106.	1.130	1020.	0.047	4.999	0.053	47.971
	6 16 HG	125.	0.880	14.530	2467.	0.959	119.	0.844	2368.	0.089	10.679	0.075	210.768
	7 3 HG	79.	0.830	14.420	2765.	0.971	76.	0.806	2687.	0.283	21.727	0.228	760.451
	8 16 HG	120.	1.180	14.420	2272.	0.957	114.	1.130	2176.	0.089	10.228	0.100	193.665
	9 C.T.	5654.	4.420	5.140	226.	1.077	6092.	4.762	243.	0.021	127.943	0.100	5.114
	SUM----------(CYCLE COMPOSITE)----------										242.170	1.062	2509.773
CYCLE 2													
	1 IDLE	509.	8.320	8.930	51.	1.063	541.	8.844	54.	0.036	19.479	0.318	1.951
	2 16 HG	125.	1.010	14.420	2341.	0.962	120.	0.972	2253.	0.089	10.711	0.086	200.601
	3 10 HG	79.	0.280	14.420	3463.	0.990	78.	0.277	3428.	0.257	20.101	0.071	881.159
	4 16 HG	125.	1.110	14.420	2396.	0.959	119.	1.065	2299.	0.089	10.675	0.094	204.635
	5 19 HG	115.	1.330	14.420	1077.	0.953	109.	1.267	1026.	0.047	5.152	0.059	48.258
	6 16 HG	129.	1.230	14.420	2256.	0.955	123.	1.175	2155.	0.089	10.970	0.104	191.861
	7 3 HG	79.	0.880	14.310	2391.	0.977	77.	0.860	2336.	0.283	21.851	0.243	661.358
	8 16 HG	125.	1.340	14.310	2203.	0.959	119.	1.285	2113.	0.089	10.672	0.114	188.089
	9 C.T.	5822.	4.500	4.790	258.	1.087	6334.	4.895	280.	0.021	133.015	0.102	5.894
	SUM----------(CYCLE COMPOSITE)----------										242.631	1.195	2383.811
CYCLE 3													
	1 IDLE	509.	8.320	8.930	51.	1.063	541.	8.844	54.	0.036	19.479	0.318	1.951
	2 16 HG	116.	0.350	14.420	2325.	0.985	114.	0.344	2290.	0.089	10.169	0.030	203.828
	3 10 HG	79.	0.370	14.420	3453.	0.987	77.	0.365	3408.	0.257	20.039	0.093	875.924
	4 16 HG	124.	1.400	14.310	2256.	0.957	118.	1.340	2160.	0.089	10.566	0.119	192.246
	5 19 HG	115.	1.610	14.310	1082.	0.951	109.	1.531	1029.	0.047	5.142	0.071	48.387
	6 16 HG	129.	1.300	14.310	2349.	0.960	123.	1.248	2255.	0.089	11.025	0.111	200.762
	7 3 HG	75.	0.870	14.420	2688.	0.970	72.	0.844	2609.	0.283	20.605	0.239	738.498
	8 16 HG	124.	1.520	14.180	2225.	0.961	119.	1.462	2140.	0.089	10.615	0.130	190.485
	9 C.T.	6149.	4.410	4.570	254.	1.080	6645.	4.766	274.	0.021	139.563	0.100	5.765
	SUM----------(CYCLE COMPOSITE)----------										247.208	1.214	2437.849
CYCLE 4													
	1 IDLE	509.	8.320	8.930	51.	1.063	541.	8.844	54.	0.036	19.479	0.318	1.951
	2 16 HG	118.	1.160	14.310	2347.	0.965	113.	1.120	2266.	0.089	10.140	0.099	201.685
	3 10 HG	84.	0.350	14.420	3512.	0.987	82.	0.345	3467.	0.257	21.314	0.088	891.169
	4 16 HG	124.	1.230	14.310	2349.	0.962	119.	1.184	2261.	0.089	10.626	0.105	201.301
	5 19 HG	115.	1.520	14.310	1094.	0.954	109.	1.450	1044.	0.047	5.158	0.068	49.068
	6 16 HG	124.	1.160	14.420	2419.	0.958	118.	1.111	2317.	0.089	10.573	0.098	206.273
	7 3 HG	79.	0.850	14.310	2791.	0.978	77.	0.831	2730.	0.283	21.873	0.235	772.781
	8 16 HG	124.	1.320	14.310	2427.	0.960	119.	1.267	2329.	0.089	10.594	0.112	207.366
	9 C.T.	5513.	4.710	4.670	239.	1.117	6159.	5.261	267.	0.021	129.339	0.110	5.607
	SUM----------(CYCLE COMPOSITE)----------										239.101	1.238	2537.205

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 242.401 1.129 2446.792

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 243.155 1.226 2497.527

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(242.401) + 0.65*(243.155)	=	242.891	PPM
CO	0.35*(1.129) + 0.65*(1.226)	=	1.192	PERCENT
NO(K)	0.35*(2446.792) + 0.65*(2497.527)	=	2479.770	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-4. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–STATIONARY DYNAMOMETER

DEC 10 70 69 CHEV 250 6 STATIONARY 3998 RUN 3 PROJECT 11-2877-01 S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	474.	8.630	8.840	51.	1.060	502.	9.156	54.	0.036	18.104	0.329	1.947
	2 16 HG	150.	0.700	14.530	1170.	0.963	144.	0.674	1127.	0.089	12.868	0.060	100.377
	3 10 HG	97.	0.230	14.490	3019.	0.985	95.	0.226	2975.	0.257	24.573	0.058	764.818
	4 16 HG	125.	0.930	14.530	2092.	0.958	119.	0.891	2004.	0.089	10.661	0.079	178.435
	5 19 HG	107.	1.050	14.530	897.	0.955	102.	1.003	857.	0.047	4.806	0.047	40.295
	6 16 HG	125.	0.850	14.530	2287.	0.960	120.	0.816	2197.	0.089	10.690	0.072	195.584
	7 3 HG	71.	0.650	14.530	2404.	0.971	68.	0.631	2334.	0.283	19.512	0.178	660.663
	8 16 HG	115.	1.220	14.530	2040.	0.949	109.	1.158	1937.	0.089	9.722	0.103	172.470
	9 C.T.	5586.	4.440	4.660	227.	1.172	6272.	4.985	254.	0.021	131.724	0.104	5.352
	SUM----------(CYCLE COMPOSITE)----------										242.663	1.033	2119.946
CYCLF 2													
	1 IDLE	474.	8.630	8.840	51.	1.060	502.	9.156	54.	0.036	18.104	0.329	1.947
	2 16 HG	125.	1.090	14.530	2150.	0.953	119.	1.039	2049.	0.089	10.605	0.092	182.417
	3 10 HG	79.	0.280	14.530	3120.	0.982	77.	0.275	3066.	0.257	19.951	0.070	787.965
	4 16 HG	120.	1.150	14.530	2077.	0.951	114.	1.094	1976.	0.089	10.165	0.097	175.939
	5 19 HG	107.	1.380	14.530	841.	0.945	101.	1.304	795.	0.047	4.754	0.061	37.373
	6 16 HG	120.	1.100	14.530	2077.	0.953	114.	1.048	1980.	0.089	10.181	0.093	176.228
	7 3 HG	68.	0.790	14.530	2277.	0.966	65.	0.763	2201.	0.283	18.604	0.216	622.976
	8 16 HG	120.	1.300	14.530	2070.	0.947	113.	1.231	1960.	0.089	10.115	0.109	174.487
	9 C.T.	5734.	4.520	4.630	192.	1.108	6355.	5.009	212.	0.021	133.458	0.105	4.468
	SUM----------(CYCLF COMPOSITE)----------										235.941	1.175	2163.805
CYCLE 3													
	1 IDLE	474.	8.630	8.840	51.	1.060	502.	9.156	54.	0.036	18.104	0.329	1.947
	2 16 HG	124.	1.130	14.530	2076.	0.952	118.	1.075	1976.	0.089	10.507	0.095	175.920
	3 10 HG	84.	0.350	14.530	3138.	0.980	82.	0.343	3075.	0.257	21.156	0.088	790.347
	4 16 HG	124.	1.400	14.420	2362.	0.950	117.	1.330	2245.	0.089	10.490	0.118	199.828
	5 19 HG	115.	1.570	14.420	897.	0.945	108.	1.485	848.	0.047	5.112	0.069	39.878
	6 16 HG	124.	1.290	14.530	2120.	0.947	117.	1.221	2007.	0.089	10.452	0.108	178.710
	7 3 HG	70.	0.420	14.530	2325.	0.978	68.	0.411	2275.	0.283	19.388	0.116	643.958
	8 16 HG	120.	1.190	14.530	2165.	0.950	114.	1.131	2057.	0.089	10.151	0.100	183.153
	9 C.T.	5267.	4.420	4.850	199.	1.137	5990.	5.027	226.	0.021	125.804	0.105	4.753
	SUM----------(CYCLE COMPOSITE)----------										231.168	1.133	2218.497
CYCLE 4													
	1 IDLE	474.	8.630	8.840	51.	1.060	502.	9.156	54.	0.036	18.104	0.329	1.947
	2 16 HG	124.	1.010	14.530	2180.	0.955	118.	0.965	2083.	0.089	10.549	0.085	185.464
	3 10 HG	84.	0.390	14.530	3203.	0.978	82.	0.381	3134.	0.257	21.127	0.098	805.629
	4 16 HG	124.	1.300	14.420	2046.	0.953	118.	1.239	1951.	0.089	10.525	0.110	173.663
	5 19 HG	120.	1.590	14.310	957.	0.951	114.	1.513	910.	0.047	5.368	0.071	42.810
	6 16 HG	124.	1.130	14.530	2225.	0.952	118.	1.075	2118.	0.089	10.507	0.095	188.546
	7 3 HG	70.	0.230	14.530	2443.	0.985	68.	0.226	2406.	0.283	19.513	0.064	681.008
	8 16 HG	124.	1.430	14.310	2098.	0.956	118.	1.367	2006.	0.089	10.556	0.121	178.605
	9 C.T.	5405.	4.510	4.530	233.	1.148	6209.	5.180	267.	0.021	130.389	0.108	5.620
	SUM----------(CYCLE COMPOSITE)----------										236.640	1.085	2263.296

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 239.302 1.104 2141.875

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 233.904 1.109 2240.897

FOUR CYCLF COMPOSITE - REPORTED VALUES -

HC	0.35*(239.302)	+	0.65*(233.904)	=	235.794	PPM
CO	0.35*(1.104)	+	0.65*(1.109)	=	1.107	PERCENT
NO(K)	0.35*(2141.875)	+	0.65*(2240.897)	=	2206.239	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-5. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–CHASSIS DYNAMOMETER

FEB 05 71 69 CHEV 250 6 CHASSIS 3998 RUN 1 PROJECT 11-2377-01 R K = 1.0000

FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1												
1 IDLE	214.	5.580	9.700	35.	1.139	243.	6.360	39.	0.036	8.781	0.228	1.436
2 16 HG	191.	0.610	13.750	2407.	1.017	184.	0.620	2449.	0.089	16.391	0.055	217.973
3 10 HG	126.	0.140	13.750	3579.	1.038	130.	0.145	3718.	0.257	33.644	0.037	955.651
4 16 HG	164.	0.610	13.750	2602.	1.018	167.	0.621	2650.	0.089	14.870	0.055	235.936
5 19 HG	144.	0.610	13.850	1230.	1.013	145.	0.618	1246.	0.047	6.857	0.029	58.575
6 16 HG	172.	0.610	13.850	2627.	1.011	173.	0.616	2656.	0.089	15.477	0.054	236.399
7 3 HG	89.	0.190	13.750	3077.	1.040	92.	0.197	3200.	0.283	26.196	0.055	905.699
8 16 HG	167.	0.860	13.750	2511.	1.009	168.	0.868	2535.	0.089	15.007	0.077	225.652
9 C.T.	4245.	3.810	6.420	202.	1.123	4767.	4.279	226.	0.021	100.127	0.089	4.764
SUM----------(CYCLE COMPOSITE)----------										237.354	0.683	2842.089
CYCLE 2												
1 IDLE	214.	5.580	9.700	35.	1.139	243.	6.360	39.	0.036	8.781	0.228	1.436
2 16 HG	200.	0.980	13.540	2353.	1.010	202.	0.990	2379.	0.089	17.991	0.088	211.665
3 10 HG	135.	0.170	13.750	3684.	1.037	140.	0.176	3820.	0.257	35.983	0.045	981.948
4 16 HG	176.	0.800	13.750	2585.	1.011	177.	0.808	2613.	0.089	15.838	0.071	232.630
5 19 HG	163.	0.860	13.750	1305.	1.010	164.	0.868	1318.	0.047	7.737	0.040	61.950
6 16 HG	181.	0.860	13.750	2503.	1.008	182.	0.867	2524.	0.089	16.248	0.077	224.696
7 3 HG	94.	0.220	13.750	3133.	1.038	97.	0.228	3253.	0.283	27.628	0.064	920.835
8 16 HG	176.	1.040	13.750	2503.	1.002	176.	1.042	2509.	0.089	15.707	0.092	223.381
9 C.T.	3946.	3.590	6.820	226.	1.125	4443.	4.042	254.	0.021	93.312	0.084	5.344
SUM----------(CYCLE COMPOSITE)----------										239.228	0.794	2863.889
CYCLE 3												
1 IDLE	237.	6.230	9.590	141.	1.119	265.	6.969	157.	0.036	9.545	0.250	5.678
2 16 HG	190.	0.830	13.750	2407.	1.009	191.	0.837	2428.	0.089	17.062	0.074	216.157
3 10 HG	130.	0.170	13.750	3802.	1.037	134.	0.176	3944.	0.257	34.664	0.045	1013.792
4 16 HG	172.	0.790	13.750	2602.	1.011	174.	0.799	2632.	0.089	15.488	0.071	234.312
5 19 HG	153.	0.730	13.850	1270.	1.008	154.	0.736	1280.	0.047	7.250	0.034	60.187
6 16 HG	172.	0.730	13.750	2652.	1.013	174.	0.740	2688.	0.089	15.521	0.065	239.316
7 3 HG	90.	0.210	13.750	3285.	1.039	92.	0.218	3414.	0.283	26.177	0.061	966.230
8 16 HG	167.	0.910	13.750	2552.	1.007	168.	0.917	2572.	0.089	14.981	0.081	228.938
9 C.T.	3923.	3.710	6.710	235.	1.142	4366.	4.237	268.	0.021	91.706	0.089	5.637
SUM----------(CYCLE COMPOSITE)----------										232.398	0.774	2970.251
CYCLE 4												
1 IDLE	237.	6.230	9.390	141.	1.119	265.	6.969	157.	0.036	9.545	0.250	5.678
2 16 HG	190.	0.920	13.750	2487.	1.005	191.	0.925	2501.	0.089	17.009	0.082	222.645
3 10 HG	126.	0.160	13.750	3770.	1.038	130.	0.166	3914.	0.257	33.619	0.042	1005.930
4 16 HG	167.	0.780	13.750	2568.	1.012	169.	0.789	2600.	0.089	15.049	0.070	231.419
5 19 HG	153.	0.910	13.850	1329.	1.002	153.	0.911	1331.	0.047	7.205	0.042	62.591
6 16 HG	172.	0.740	13.850	2602.	1.006	173.	0.744	2619.	0.089	15.408	0.066	233.092
7 3 HG	85.	0.170	13.750	3770.	1.041	88.	0.176	3925.	0.283	25.045	0.050	1110.821
8 16 HG	163.	0.870	13.750	2602.	1.009	164.	0.878	2627.	0.089	14.647	0.078	233.818
9 C.T.	2936.	3.560	6.890	241.	1.131	4341.	4.028	272.	0.021	91.163	0.084	5.727
SUM----------(CYCLE COMPOSITE)----------										228.693	0.764	3111.725

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 238.291 0.739 2852.989

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 230.545 0.771 3040.988

FOUR CYCLE COMPOSITE = REPORTED VALUES =

HC	0.35*(238.291) + 0.65*(230.545)	=	233.256	PPM
CO	0.35*(0.739) + 0.65*(0.771)	=	0.760	PERCENT
NO(K)	0.35*(2852.989) + 0.65*(3040.988)	=	2975.188	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-6. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–CHASSIS DYNAMOMETER

FEB 05 71 69 CHEV 250 6 CHASSIS 3998 RUN 2 PROJECT 11-2877-01 B K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	268.	7.210	9.150	35.	1.111	297.	8.014	38.	0.036	10.724	0.288	1.400
	2 16 HG	181.	0.980	13.940	2299.	0.991	179.	0.971	2279.	0.089	15.970	0.086	202.855
	3 10 HG	126.	0.220	14.030	3485.	1.015	127.	0.223	3539.	0.257	32.869	0.057	909.693
	4 16 HG	167.	0.920	14.030	2407.	0.988	165.	0.909	2379.	0.089	14.690	0.080	211.735
	5 19 HG	145.	0.910	14.110	1101.	0.984	142.	0.896	1084.	0.047	6.712	0.042	50.968
	6 16 HG	167.	0.890	14.110	2407.	0.984	164.	0.875	2368.	0.089	14.625	0.077	210.801
	7 3 HG	81.	0.240	14.110	3021.	1.012	82.	0.243	3059.	0.283	23.215	0.068	865.841
	8 16 HG	163.	0.920	14.110	2463.	0.983	160.	0.904	2421.	0.089	14.264	0.080	215.549
	9 C.T.	4003.	3.430	7.090	171.	1.104	4421.	3.788	189.	0.021	92.846	0.079	3.966
	SUM----------(CYCLE COMPOSITE)----------										225.940	0.862	2672.811
CYCLE 2													
	1 IDLE	268.	7.210	9.150	35.	1.111	297.	8.014	38.	0.036	10.724	0.288	1.400
	2 16 HG	181.	0.780	14.110	2407.	0.986	178.	0.769	2374.	0.089	15.894	0.068	211.373
	3 10 HG	117.	0.140	14.110	3547.	1.013	118.	0.141	3595.	0.257	30.475	0.036	923.917
	4 16 HG	163.	0.860	14.110	2455.	0.985	160.	0.847	2418.	0.089	14.294	0.075	215.287
	5 19 HG	146.	0.890	14.110	1201.	0.985	143.	0.877	1183.	0.047	6.762	0.041	55.631
	6 16 HG	163.	0.830	14.110	2455.	0.986	160.	0.818	2421.	0.089	14.308	0.072	215.507
	7 3 HG	81.	0.200	14.110	3086.	1.014	82.	0.202	3129.	0.283	23.247	0.057	885.708
	8 16 HG	153.	0.930	14.110	2423.	0.983	150.	0.914	2383.	0.089	13.395	0.081	212.132
	9 C.T.	3951.	3.570	6.950	212.	1.115	4406.	3.981	236.	0.021	92.529	0.083	4.964
	SUM----------(CYCLE COMPOSITE)----------										221.633	0.805	2725.922
CYCLE 3													
	1 IDLE	218.	6.080	10.150	69.	1.080	235.	6.566	74.	0.036	8.476	0.236	2.682
	2 16 HG	181.	0.880	14.030	1785.	0.988	178.	0.870	1764.	0.089	15.927	0.077	157.072
	3 10 HG	121.	0.190	14.030	3610.	1.017	123.	0.193	3671.	0.257	31.629	0.049	943.670
	4 16 HG	163.	0.940	14.030	2407.	0.988	161.	0.928	2378.	0.089	14.332	0.082	211.653
	5 19 HG	144.	0.820	14.110	1101.	0.988	142.	0.810	1087.	0.047	6.687	0.038	51.128
	6 16 HG	163.	0.830	14.110	2431.	0.986	160.	0.818	2397.	0.089	14.308	0.072	213.400
	7 3 HG	80.	0.240	14.110	3021.	1.012	81.	0.243	3059.	0.283	22.930	0.068	865.907
	8 16 HG	158.	0.980	14.030	2455.	0.987	155.	0.967	2423.	0.089	13.879	0.086	215.659
	9 C.T.	3704.	3.470	7.190	201.	1.121	4155.	3.892	225.	0.021	87.260	0.081	4.735
	SUM----------(CYCLE COMPOSITE)----------										215.432	0.793	2665.909
CYCLE 4													
	1 IDLE	218.	6.080	10.150	69.	1.080	235.	6.566	74.	0.036	8.476	0.236	2.682
	2 16 HG	176.	0.900	14.030	2360.	0.988	173.	0.889	2332.	0.089	15.482	0.079	207.604
	3 10 HG	112.	0.170	14.030	3547.	1.018	114.	0.173	3612.	0.257	29.317	0.044	928.486
	4 16 HG	153.	0.810	14.110	2503.	0.987	151.	0.800	2472.	0.089	13.449	0.071	220.031
	5 19 HG	144.	0.950	14.110	1101.	0.983	141.	0.934	1083.	0.047	6.657	0.043	50.902
	6 16 HG	159.	0.980	14.110	2384.	0.981	159.	0.961	2339.	0.089	14.235	0.085	208.212
	7 3 HG	108.	0.170	14.110	3578.	1.013	109.	0.172	3625.	0.283	30.966	0.048	1025.900
	8 16 HG	163.	1.020	14.030	2407.	0.995	160.	1.005	2371.	0.089	14.294	0.089	211.078
	9 C.T.	3748.	3.330	7.140	164.	1.128	4228.	3.756	185.	0.021	88.794	0.078	3.885
	SUM----------(CYCLE COMPOSITE)----------										221.674	0.777	2856.785

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 223.786 0.833 2699.367

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 218.553 0.785 2762.347

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(223.786)	+ 0.65*(218.553)	=	220.385	PPM
CO	0.35*(0.833)	+ 0.65*(0.785)	=	0.802	PERCENT
NO(K)	0.35*(2699.367)	+ 0.65*(2762.347)	=	2740.304	PPM

DILUTION FACTOR = 100.0/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-7. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–CHASSIS DYNAMOMETER

FEB 05 71 69 CHEV 250 6 CHASSIS 3998 RUN 3 PROJECT 11-2877-01 9 K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	244.	5.710	9.480	57.	1.106	270.	7.427	63.	0.036	9.723	0.267	2.271
	2 16 HG	181.	1.030	13.940	2321.	0.989	179.	1.019	2297.	0.089	15.943	0.090	204.447
	3 10 HG	132.	0.230	14.110	3652.	1.009	133.	0.232	3685.	0.257	34.236	0.059	947.215
	4 16 HG	169.	1.050	13.940	2384.	0.989	167.	1.039	2359.	0.089	14.889	0.092	210.039
	5 19 HG	148.	0.950	14.030	1185.	0.988	146.	0.939	1171.	0.047	6.877	0.044	55.068
	6 16 HG	163.	1.050	13.940	2384.	0.990	161.	1.039	2361.	0.089	14.367	0.092	210.132
	7 3 HG	79.	0.240	14.110	3113.	1.012	80.	0.243	3153.	0.283	22.645	0.068	892.344
	8 16 HG	163.	1.210	13.940	2408.	0.984	160.	1.191	2371.	0.089	14.289	0.106	211.094
	9 C.T.	3938.	3.470	6.950	192.	1.170	4413.	3.888	215.	0.021	92.681	0.081	4.518
	SUM----------(CYCLE COMPOSITE)----------										225.655	0.903	2737.131
CYCLE 2													
	1 IDLE	244.	6.710	9.480	57.	1.106	270.	7.427	63.	0.036	9.723	0.267	2.271
	2 16 HG	172.	0.890	14.030	2432.	0.989	170.	0.880	2405.	0.089	15.140	0.078	214.074
	3 10 HG	108.	0.240	14.030	3610.	1.016	109.	0.243	3669.	0.257	28.210	0.062	942.945
	4 16 HG	161.	0.980	14.110	2553.	0.991	158.	0.961	2505.	0.089	14.063	0.085	223.004
	5 19 HG	135.	0.800	14.110	1101.	0.989	133.	0.791	1089.	0.047	6.277	0.037	51.196
	6 16 HG	159.	0.970	14.110	2479.	0.982	155.	0.952	2434.	0.089	13.809	0.084	216.661
	7 3 HG	89.	0.370	14.110	2859.	1.007	89.	0.372	2880.	0.283	25.377	0.105	815.218
	8 16 HG	152.	0.990	14.030	2553.	0.987	150.	0.977	2520.	0.089	13.353	0.086	224.291
	9 C.T.	3915.	3.370	7.230	219.	1.103	4319.	3.717	241.	0.021	90.702	0.078	5.073
	SUM----------(CYCLE COMPOSITE)----------										216.657	0.886	2694.738
CYCLE 3													
	1 IDLE	212.	6.010	10.150	81.	1.083	229.	6.511	87.	0.036	8.268	0.234	3.159
	2 16 HG	181.	0.930	14.110	2384.	0.981	177.	0.912	2340.	0.089	15.814	0.081	208.290
	3 10 HG	112.	0.170	14.110	3567.	1.012	113.	0.172	3612.	0.257	29.154	0.044	928.503
	4 16 HG	163.	0.980	14.110	2455.	0.981	159.	0.961	2409.	0.089	14.235	0.085	214.413
	5 19 HG	136.	0.960	14.110	1135.	0.983	133.	0.944	1115.	0.047	6.289	0.044	52.487
	6 16 HG	153.	0.840	14.110	2503.	0.986	150.	0.828	2469.	0.089	13.436	0.073	219.807
	7 3 HG	80.	0.240	14.110	3105.	1.012	81.	0.243	3144.	0.283	22.930	0.068	889.984
	8 16 HG	158.	0.990	14.030	2503.	0.986	155.	0.976	2469.	0.089	13.874	0.086	219.801
	9 C.T.	3745.	3.220	7.340	203.	1.115	4178.	3.593	226.	0.021	87.755	0.075	4.756
	SUM----------(CYCLE COMPOSITE)----------										211.758	0.794	2741.203
CYCLE 4													
	1 IDLE	212.	6.010	10.150	81.	1.083	229.	6.511	87.	0.036	8.268	0.234	3.159
	2 16 HG	196.	0.870	14.030	2360.	0.988	183.	0.860	2333.	0.089	16.366	0.076	207.664
	3 10 HG	117.	0.140	14.030	3705.	1.019	119.	0.142	3776.	0.257	30.647	0.036	970.500
	4 16 HG	158.	0.840	14.030	2553.	0.991	156.	0.833	2531.	0.089	13.945	0.074	225.342
	5 19 HG	140.	0.780	14.110	1264.	0.989	138.	0.771	1250.	0.047	6.512	0.036	58.794
	6 16 HG	163.	0.800	14.110	2590.	0.987	160.	0.789	2557.	0.089	14.323	0.070	227.589
	7 3 HG	80.	0.250	14.110	3161.	1.012	80.	0.253	3200.	0.283	22.922	0.071	905.728
	8 16 HG	153.	0.950	14.030	2544.	0.988	151.	0.938	2514.	0.089	13.458	0.083	223.788
	9 C.T.	3859.	3.360	6.720	219.	1.153	4452.	3.876	252.	0.021	93.498	0.081	5.306
	SUM----------(CYCLE COMPOSITE)----------										219.943	0.764	2827.864

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 221.156 0.895 2715.935

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 215.851 0.779 2784.534

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(221.156)	+ 0.65*(215.851)	=	217.708	PPM
CO	0.35*(0.895)	+ 0.65*(0.779)	=	0.820	PERCENT
NO(K)	0.35*(2715.935)	+ 0.65*(2784.534)	=	2760.524	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-8. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 CHEVROLET 250-CID–CHASSIS DYNAMOMETER

FEB 05 71 69 CHEV 250 6 CHASSIS 3996 RUN 4 PROJECT 11-2877-01 P K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	A D J U S T E D HC	CO	NO(K)	WEIGHTING FACTOR	W E I G H T E D HC	CO	NO(K)
CYCLE 1													
	1 IDLE	204.	6.110	9.480	35.	1.136	231.	6.945	39.	0.036	8.348	0.250	1.432
	2 16 HG	167.	0.820	13.850	2344.	1.004	167.	0.823	2353.	0.089	14.924	0.073	209.477
	3 10 HG	108.	0.160	13.850	3536.	1.032	111.	0.165	3650.	0.257	28.651	0.042	938.052
	4 16 HG	153.	0.720	13.940	2553.	1.002	153.	0.721	2559.	0.089	13.649	0.064	227.763
	5 19 HG	135.	0.720	13.940	1101.	1.003	135.	0.722	1105.	0.047	6.368	0.033	51.941
	6 16 HG	158.	0.790	13.940	2503.	0.999	157.	0.789	2502.	0.089	14.056	0.070	222.680
	7 3 HG	80.	0.230	13.940	3057.	1.025	82.	0.235	3134.	0.283	23.214	0.066	887.069
	8 16 HG	153.	0.950	13.940	2408.	0.994	152.	0.944	2394.	0.089	13.542	0.084	213.132
	9 C.T.	3820.	3.430	7.150	134.	1.115	4266.	3.827	149.	0.021	89.599	0.080	3.140
	SUM----------(CYCLE COMPOSITE)----------										212.344	0.765	2754.718
CYCLE 2													
	1 IDLE	204.	6.110	9.480	35.	1.136	231.	6.945	39.	0.036	8.348	0.250	1.432
	2 16 HG	174.	0.840	13.940	2344.	0.996	175.	0.837	2335.	0.089	15.610	0.074	207.897
	3 10 HG	117.	0.160	13.940	3641.	1.024	119.	0.163	3732.	0.257	30.820	0.042	959.129
	4 16 HG	158.	0.880	13.940	2503.	0.996	157.	0.876	2494.	0.089	14.013	0.078	221.991
	5 19 HG	135.	0.740	14.030	1117.	0.996	134.	0.737	1113.	0.047	6.325	0.034	52.333
	6 16 HG	143.	0.830	14.030	2471.	0.991	161.	0.823	2450.	0.089	14.386	0.073	218.098
	7 3 HG	85.	0.250	13.940	3190.	1.024	87.	0.256	3267.	0.283	24.638	0.072	924.655
	8 16 HG	153.	1.010	13.940	2479.	0.992	151.	1.002	2460.	0.089	13.514	0.089	218.966
	9 C.T.	3930.	3.510	7.020	151.	1.113	4376.	3.909	168.	0.021	91.915	0.082	3.531
	SUM----------(CYCLE COMPOSITE)----------										219.572	0.796	2808.036
CYCLE 3													
	1 IDLE	208.	6.160	10.150	59.	1.077	225.	6.638	74.	0.036	8.107	0.238	2.676
	2 16 HG	181.	0.860	13.940	2445.	0.995	180.	0.856	2434.	0.089	16.036	0.076	216.626
	3 10 HG	117.	0.180	13.940	3620.	1.024	119.	0.184	3707.	0.257	30.798	0.047	952.923
	4 16 HG	163.	0.880	13.940	2568.	0.996	162.	0.876	2556.	0.089	14.451	0.078	227.672
	5 19 HG	144.	0.790	14.030	1221.	0.994	143.	0.785	1214.	0.047	6.730	0.036	57.070
	6 16 HG	163.	0.970	13.940	2491.	0.993	161.	0.963	2473.	0.089	14.406	0.085	220.164
	7 3 HG	80.	0.260	13.940	3104.	1.024	81.	0.266	3179.	0.283	23.189	0.075	899.753
	8 16 HG	153.	1.050	13.940	2528.	0.991	151.	1.040	2505.	0.089	13.495	0.092	222.989
	9 C.T.	3761.	3.330	7.060	194.	1.144	4234.	3.695	210.	0.021	88.932	0.077	4.421
	SUM----------(CYCLE COMPOSITE)----------										216.149	0.808	2804.297
CYCLE 4													
	1 IDLE	200.	6.160	10.150	81.	1.077	225.	6.638	87.	0.036	8.107	0.238	3.142
	2 16 HG	172.	0.850	13.940	2334.	0.993	170.	0.843	2367.	0.089	15.202	0.083	210.711
	3 10 HG	108.	0.190	13.940	3672.	1.024	110.	0.194	3763.	0.257	28.439	0.050	967.197
	4 16 HG	159.	0.810	13.940	2552.	0.995	157.	0.805	2540.	0.089	13.998	0.072	226.104
	5 19 HG	135.	0.740	14.030	1184.	0.996	134.	0.737	1180.	0.047	6.325	0.034	55.472
	6 16 HG	153.	0.930	13.940	2511.	0.995	152.	0.925	2498.	0.089	13.551	0.082	222.401
	7 3 HG	80.	0.220	13.940	3183.	1.025	82.	0.225	3264.	0.283	23.222	0.063	923.958
	8 16 HG	153.	1.010	13.940	2562.	0.992	151.	1.002	2532.	0.089	13.514	0.089	225.414
	9 C.T.	3808.	3.340	7.160	194.	1.120	4266.	3.741	217.	0.021	89.590	0.078	4.564
	SUM----------(CYCLE COMPOSITE)----------										211.951	0.809	2838.967

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 215.958 0.780 2781.377

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 214.050 0.805 2821.632

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(215.958) + 0.65*(214.050) =	214.718	PPM
CO	0.35*(0.780) + 0.65*(0.805) =	0.796	PERCENT
NO(K)	0.35*(2781.377) + 0.65*(2821.632) =	2807.543	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-9. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 INTERNATIONAL HARVESTER 304-CID–STATIONARY DYNAMOMETER

MAR-03-71 69 INTL 304CID V8 9-MODE STATIONARY S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1189.	2.320	10.530	64.	1.117	1328.	2.592	71.	0.036	47.838	0.093	2.574
	2 16 HG	499.	9.630	8.400	157.	1.054	526.	10.152	165.	0.089	46.820	0.903	14.730
	3 10 HG	453.	8.220	8.930	293.	1.071	485.	8.809	314.	0.257	124.774	2.264	80.704
	4 16 HG	494.	9.860	8.270	178.	1.055	521.	10.410	187.	0.089	46.419	0.926	16.726
	5 19 HG	412.	8.590	8.750	143.	1.074	442.	9.233	153.	0.047	20.813	0.433	7.224
	6 16 HG	499.	9.020	8.340	183.	1.082	540.	9.768	198.	0.089	48.096	0.869	17.638
	7 3 HG	401.	9.630	8.340	224.	1.067	427.	10.276	239.	0.283	121.099	2.908	67.646
	8 16 HG	494.	9.780	8.240	169.	1.061	524.	10.378	179.	0.089	46.657	0.923	15.961
	9 C.T.	5412.	3.590	5.060	84.	1.141	6179.	4.098	95.	0.021	129.760	0.086	2.014
	SUM----------(CYCLE COMPOSITE)----------										632.280	9.408	225.221
CYCLE 2													
	1 IDLE	1189.	2.320	10.530	64.	1.117	1328.	2.592	71.	0.036	47.838	0.093	2.574
	2 16 HG	531.	10.030	8.200	157.	1.051	558.	10.547	165.	0.089	49.697	0.938	14.694
	3 10 HG	455.	8.420	8.750	265.	1.077	490.	9.076	285.	0.257	126.050	2.332	73.414
	4 16 HG	503.	9.780	8.240	169.	1.060	532.	10.372	179.	0.089	47.383	0.923	15.951
	5 19 HG	468.	8.770	8.600	143.	1.074	503.	9.426	153.	0.047	23.642	0.443	7.223
	6 16 HG	504.	9.780	8.140	156.	1.068	538.	10.446	166.	0.089	47.914	0.929	14.830
	7 3 HG	394.	9.280	8.340	228.	1.081	426.	10.037	246.	0.283	120.605	2.840	69.791
	8 16 HG	494.	9.500	8.070	169.	1.085	536.	10.315	183.	0.089	47.740	0.918	16.332
	9 C.T.	5299.	3.550	5.040	92.	1.156	6128.	4.105	106.	0.021	128.693	0.086	2.234
	SUM----------(CYCLE COMPOSITE)----------										639.566	9.505	217.048
CYCLE 3													
	1 IDLE	537.	3.470	11.010	77.	1.088	584.	3.775	83.	0.036	21.036	0.135	3.016
	2 16 HG	519.	9.470	8.300	169.	1.066	553.	10.100	180.	0.089	49.263	0.898	16.041
	3 10 HG	449.	8.220	8.940	292.	1.079	484.	8.871	315.	0.257	124.541	2.280	80.993
	4 16 HG	499.	9.910	8.340	169.	1.048	523.	10.387	177.	0.089	46.549	0.924	15.765
	5 19 HG	463.	8.800	8.600	147.	1.074	497.	9.451	157.	0.047	23.372	0.444	7.420
	6 16 HG	504.	9.820	8.140	156.	1.066	537.	10.474	166.	0.089	47.844	0.932	14.808
	7 3 HG	394.	9.390	8.430	237.	1.070	421.	10.047	253.	0.283	119.314	2.843	71.770
	8 16 HG	502.	9.990	8.140	182.	1.060	532.	10.591	192.	0.089	47.365	0.942	17.172
	9 C.T.	5320.	3.980	5.110	80.	1.128	6005.	4.492	90.	0.021	126.108	0.094	1.896
	SUM----------(CYCLE COMPOSITE)----------										605.397	9.496	228.885
CYCLE 4													
	1 IDLE	537.	3.470	11.010	77.	1.089	584.	3.775	83.	0.036	21.036	0.135	3.016
	2 16 HG	522.	9.630	8.300	173.	1.060	553.	10.208	183.	0.089	49.247	0.908	16.321
	3 10 HG	449.	8.220	8.940	292.	1.079	484.	8.871	315.	0.257	124.541	2.280	80.993
	4 16 HG	499.	9.910	8.140	160.	1.063	530.	10.539	170.	0.089	47.232	0.938	15.144
	5 19 HG	415.	8.740	8.680	143.	1.074	445.	9.388	153.	0.047	20.952	0.441	7.219
	6 16 HG	500.	9.790	8.240	169.	1.060	530.	10.373	179.	0.089	47.201	0.923	15.954
	7 3 HG	396.	9.500	8.360	219.	1.071	424.	10.175	234.	0.283	120.034	2.879	66.382
	8 16 HG	505.	10.020	8.100	156.	1.061	536.	10.639	165.	0.089	47.724	0.946	14.742
	9 C.T.	5334.	3.970	5.090	92.	1.129	6025.	4.484	103.	0.021	126.537	0.094	2.182
	SUM----------(CYCLE COMPOSITE)----------										604.508	9.547	221.957

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 635.923 9.457 221.134

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 604.953 9.522 225.421

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(635.923)	+ 0.65*(604.953)	=	615.792	PPM
CO	0.35*(9.457)	+ 0.65*(9.522)	=	9.499	PERCENT
NO(K)	0.35*(221.134)	+ 0.65*(225.421)	=	223.921	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-10. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 IHC 304-CID–STATIONARY DYNAMOMETER

MAR-03-71 69 INTL 304CID V8 9-MODE STATIONARY S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1232.	2.240	12.980	51.	0.939	1157.	2.104	47.	0.036	41.677	0.075	1.725
	2 16 HG	455.	10.220	10.550	157.	0.897	408.	9.175	140.	0.089	36.354	0.816	12.544
	3 10 HG	420.	8.630	9.140	307.	1.042	437.	8.996	320.	0.257	112.529	2.312	82.253
	4 16 HG	484.	10.350	8.340	183.	1.032	499.	10.692	189.	0.089	44.494	0.951	16.823
	5 19 HG	411.	9.350	8.750	143.	1.045	429.	9.775	149.	0.047	20.196	0.459	7.026
	6 16 HG	474.	10.310	8.240	170.	1.042	494.	10.749	177.	0.089	43.985	0.956	15.775
	7 3 HG	376.	9.910	8.480	224.	1.047	393.	10.381	234.	0.283	111.473	2.938	66.409
	8 16 HG	474.	10.220	8.240	170.	1.046	495.	10.690	177.	0.089	44.127	0.951	15.826
	9 C.T.	5452.	3.390	5.120	93.	1.141	6223.	3.869	106.	0.021	130.686	0.081	2.229
	SUM----------(CYCLE COMPOSITE)----------										585.525	9.542	220.614
CYCLE 2													
	1 IDLE	1232.	2.240	12.980	51.	0.939	1157.	2.104	47.	0.036	41.677	0.075	1.725
	2 16 HG	529.	10.240	8.240	170.	1.040	550.	10.657	176.	0.089	49.002	0.948	15.747
	3 10 HG	440.	8.630	9.000	307.	1.051	462.	9.074	322.	0.257	118.900	2.332	82.960
	4 16 HG	489.	10.260	8.240	183.	1.043	510.	10.704	190.	0.089	45.405	0.952	16.992
	5 19 HG	420.	9.390	8.580	143.	1.048	440.	9.845	149.	0.047	20.698	0.462	7.047
	6 16 HG	494.	10.220	8.340	183.	1.036	512.	10.597	189.	0.089	45.589	0.943	16.888
	7 3 HG	387.	10.030	8.450	224.	1.044	404.	10.475	233.	0.283	114.388	2.964	66.209
	8 16 HG	490.	10.420	7.910	170.	1.062	520.	11.069	180.	0.089	46.328	0.985	16.073
	9 C.T.	5417.	3.460	5.300	94.	1.125	6098.	3.895	105.	0.021	128.061	0.081	2.222
	SUM----------(CYCLE COMPOSITE)----------										610.053	9.746	225.865
CYCLE 3													
	1 IDLE	631.	3.430	11.010	77.	1.081	682.	3.709	83.	0.036	24.558	0.133	2.998
	2 16 HG	539.	10.430	8.000	156.	1.050	566.	10.961	163.	0.089	50.414	0.975	14.591
	3 10 HG	435.	8.800	8.930	301.	1.050	457.	9.246	316.	0.257	117.467	2.376	81.282
	4 16 HG	487.	10.360	8.070	169.	1.052	512.	10.904	177.	0.089	45.621	0.970	15.831
	5 19 HG	441.	10.020	8.230	143.	1.057	466.	10.592	151.	0.047	21.911	0.497	7.105
	6 16 HG	487.	10.380	8.310	169.	1.033	503.	10.730	174.	0.089	44.807	0.955	15.549
	7 3 HG	381.	10.160	8.370	224.	1.046	398.	10.628	234.	0.283	112.789	3.007	66.312
	8 16 HG	495.	10.390	8.010	164.	1.055	522.	10.965	173.	0.089	46.493	0.975	15.403
	9 C.T.	5576.	3.490	5.100	106.	1.122	6259.	4.029	118.	0.021	131.445	0.084	2.498
	SUM----------(CYCLE COMPOSITE)----------										595.519	9.977	221.572
CYCLE 4													
	1 IDLE	631.	3.430	11.010	77.	1.081	682.	3.709	83.	0.036	24.568	0.133	2.998
	2 16 HG	530.	10.490	7.750	143.	1.067	575.	11.203	152.	0.089	51.231	0.997	13.592
	3 10 HG	435.	8.740	9.030	306.	1.045	454.	9.137	319.	0.257	116.874	2.348	82.215
	4 16 HG	502.	10.420	7.970	169.	1.056	530.	11.010	178.	0.089	47.210	0.979	15.893
	5 19 HG	459.	10.230	8.340	129.	1.039	477.	10.632	134.	0.047	22.422	0.499	6.301
	6 16 HG	489.	10.420	8.140	169.	1.044	510.	10.886	176.	0.089	45.471	0.968	15.714
	7 3 HG	381.	10.060	8.480	224.	1.041	396.	10.478	233.	0.283	112.303	2.965	66.026
	8 16 HG	479.	10.380	8.010	169.	1.057	506.	10.972	178.	0.089	45.063	0.976	15.899
	9 C.T.	5448.	3.550	5.110	106.	1.135	6186.	4.031	120.	0.021	129.919	0.084	2.527
	SUM----------(CYCLE COMPOSITE)----------										595.065	9.953	221.169

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 597.789 9.644 223.240

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 595.292 9.965 221.370

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35*(597.789) + 0.65*(595.292) = 596.166 PPM
CO 0.35*(9.644) + 0.65*(9.965) = 9.853 PERCENT
NO(K) 0.35*(223.240) + 0.65*(221.370) = 222.024 PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-11. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 IHC 304-CID–STATIONARY DYNAMOMETER

MAR-03-71 69 INTL 304CID V8 9-MODE STATIONARY S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1617.	1.870	10.090	51.	1.135	1835.	2.123	57.	0.036	66.091	0.076	2.084
	2 16 HG	464.	10.300	8.040	143.	1.059	491.	10.908	151.	0.089	43.735	0.970	13.478
	3 10 HG	425.	8.630	8.930	293.	1.058	449.	9.131	310.	0.257	115.569	2.346	79.674
	4 16 HG	489.	10.350	8.140	153.	1.047	512.	10.841	160.	0.089	45.586	0.964	14.263
	5 19 HG	449.	9.910	8.430	129.	1.045	469.	10.360	134.	0.047	22.061	0.486	6.339
	6 16 HG	494.	10.480	7.940	156.	1.057	522.	11.081	164.	0.089	46.487	0.986	14.680
	7 3 HG	387.	10.030	8.430	210.	1.045	404.	10.490	219.	0.283	114.553	2.968	62.160
	8 16 HG	499.	10.350	7.940	157.	1.061	529.	10.991	166.	0.089	47.162	0.978	14.838
	9 C.T.	5355.	3.350	5.130	94.	1.151	6168.	3.859	96.	0.021	129.531	0.081	2.031
	SUM----------(CYCLE COMPOSITE)----------										630.780	9.860	209.551
CYCLE 2													
	1 IDLE	1617.	1.870	10.090	51.	1.135	1835.	2.123	57.	0.036	66.091	0.076	2.084
	2 16 HG	524.	10.220	8.240	159.	1.041	545.	10.648	176.	0.089	48.593	0.947	15.672
	3 10 HG	430.	8.530	8.930	321.	1.061	456.	9.054	340.	0.257	117.310	2.327	87.573
	4 16 HG	484.	10.290	8.140	193.	1.050	508.	10.805	192.	0.089	45.235	0.961	17.103
	5 19 HG	530.	10.440	7.940	129.	1.055	559.	11.023	136.	0.047	26.302	0.518	6.401
	6 16 HG	499.	10.440	8.140	183.	1.043	520.	10.891	190.	0.089	46.331	0.969	16.991
	7 3 HG	387.	10.030	8.480	224.	1.042	403.	10.453	233.	0.283	114.142	2.958	68.066
	8 16 HG	509.	10.480	7.750	161.	1.070	545.	11.223	172.	0.089	48.513	0.998	15.345
	9 C.T.	5387.	3.640	5.180	96.	1.131	6093.	4.117	108.	0.021	127.972	0.086	2.280
	SUM----------(CYCLE COMPOSITE)----------										640.493	9.344	229.520
CYCLE 3													
	1 IDLE	695.	3.240	11.130	77.	1.074	746.	3.479	82.	0.036	26.872	0.125	2.977
	2 16 HG	540.	10.410	8.140	201.	1.041	562.	10.837	209.	0.089	50.033	0.964	18.623
	3 10 HG	445.	8.840	8.930	283.	1.048	466.	9.267	296.	0.257	119.900	2.381	76.251
	4 16 HG	499.	10.380	8.070	164.	1.050	524.	10.907	172.	0.089	46.667	0.970	15.337
	5 19 HG	469.	10.010	8.370	143.	1.044	489.	10.455	149.	0.047	23.025	0.491	7.020
	6 16 HG	494.	10.290	8.170	183.	1.047	517.	10.774	191.	0.089	46.034	0.958	17.053
	7 3 HG	381.	9.910	8.480	219.	1.047	398.	10.377	229.	0.283	112.911	2.936	64.902
	8 16 HG	514.	10.500	7.530	156.	1.087	558.	11.417	169.	0.089	49.742	1.016	15.096
	9 C.T.	5442.	3.660	5.090	90.	1.133	6170.	4.150	102.	0.021	129.589	0.087	2.143
	SUM----------(CYCLE COMPOSITE)----------										604.774	9.932	219.405
CYCLE 4													
	1 IDLE	695.	3.240	11.130	77.	1.074	746.	3.479	82.	0.036	26.872	0.125	2.977
	2 16 HG	565.	10.500	7.940	165.	1.050	593.	11.032	173.	0.089	52.834	0.981	15.429
	3 10 HG	454.	8.950	8.840	292.	1.050	476.	9.400	306.	0.257	122.549	2.415	78.820
	4 16 HG	504.	10.440	8.010	169.	1.052	530.	10.990	177.	0.089	47.219	0.978	15.833
	5 19 HG	474.	9.910	8.400	143.	1.045	495.	10.362	149.	0.047	23.295	0.487	7.027
	6 16 HG	499.	10.290	8.140	183.	1.048	523.	10.793	191.	0.089	46.582	0.960	17.083
	7 3 HG	386.	9.910	8.480	191.	1.046	404.	10.373	199.	0.283	114.349	2.935	56.582
	8 16 HG	499.	10.400	7.940	193.	1.060	528.	11.024	193.	0.089	47.076	0.981	17.264
	9 C.T.	5305.	3.580	5.230	97.	1.137	6033.	4.071	110.	0.021	126.701	0.085	2.316
	SUM----------(CYCLE COMPOSITE)----------										607.481	9.951	213.335

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 635.636 9.852 219.535

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 606.127 9.942 216.370

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(635.636) + 0.65*(606.127) =	616.455	PPM
CO	0.35*(9.852) + 0.65*(9.942) =	9.910	PERCENT
NO(K)	0.35*(219.535) + 0.65*(216.370) =	217.478	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-12. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 IHC 304-CID–CHASSIS DYNAMOMETER

MAR 16 71 69 INTL 304 V8 CHASSIS 11-2877-01 RUN1 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	1077.	0.470	11.240	51.	1.147	1235.	0.539	58.	0.036	44.483	0.019	2.106
	2 16 HG	526.	10.030	8.340	157.	1.041	547.	10.445	163.	0.089	48.753	0.929	14.551
	3 10 HG	484.	8.530	8.930	265.	1.057	511.	9.016	280.	0.257	131.481	2.317	71.988
	4 16 HG	534.	10.220	8.340	183.	1.033	552.	10.564	189.	0.089	49.129	0.940	16.836
	5 19 HG	455.	9.280	8.600	157.	1.055	480.	9.799	165.	0.047	22.582	0.460	7.792
	6 16 HG	541.	10.140	8.340	183.	1.036	560.	10.506	189.	0.089	49.888	0.935	16.875
	7 3 HG	415.	9.280	8.750	279.	1.047	434.	9.723	292.	0.283	123.061	2.751	82.733
	8 16 HG	524.	10.140	8.340	183.	1.037	543.	10.520	189.	0.089	48.384	0.936	16.897
	9 C.T.	4117.	1.770	6.730	63.	1.202	4949.	2.127	75.	0.021	103.937	0.044	1.590
	SUM----------(CYCLE COMPOSITE)----------										621.703	9.335	231.372
CYCLE 2													
	1 IDLE	1077.	0.470	11.240	51.	1.147	1235.	0.539	58.	0.036	44.483	0.019	2.106
	2 16 HG	391.	10.030	8.430	183.	1.045	408.	10.487	191.	0.089	36.386	0.933	17.030
	3 10 HG	468.	8.420	9.140	279.	1.046	489.	8.811	291.	0.257	125.871	2.264	75.038
	4 16 HG	529.	10.140	8.430	183.	1.030	545.	10.448	188.	0.089	48.515	0.929	16.783
	5 19 HG	455.	9.170	8.750	157.	1.048	477.	9.616	164.	0.047	22.426	0.451	7.738
	6 16 HG	529.	10.140	8.340	183.	1.037	548.	10.516	189.	0.089	48.827	0.935	16.891
	7 3 HG	415.	9.390	8.680	265.	1.048	435.	9.849	277.	0.283	123.195	2.787	78.666
	8 16 HG	526.	10.140	8.340	183.	1.037	545.	10.518	189.	0.089	48.561	0.936	16.895
	9 C.T.	4312.	2.110	6.640	70.	1.173	5061.	2.476	82.	0.021	106.299	0.052	1.725
	SUM----------(CYCLE COMPOSITE)----------										604.568	9.310	232.875
CYCLE 3													
	1 IDLE	1133.	0.580	11.840	77.	1.085	1230.	0.629	83.	0.036	44.289	0.022	3.009
	2 16 HG	519.	10.030	8.340	156.	1.042	540.	10.451	162.	0.089	48.131	0.930	14.467
	3 10 HG	474.	9.280	9.030	265.	1.022	484.	9.488	270.	0.257	124.550	2.438	69.632
	4 16 HG	524.	10.030	8.340	196.	1.041	545.	10.447	204.	0.089	48.575	0.929	18.169
	5 19 HG	449.	9.170	8.680	156.	1.054	473.	9.670	164.	0.047	22.254	0.454	7.731
	6 16 HG	524.	10.030	8.340	183.	1.041	545.	10.447	190.	0.089	48.575	0.929	16.964
	7 3 HG	411.	9.060	8.680	265.	1.061	436.	9.621	281.	0.283	123.520	2.722	79.642
	8 16 HG	514.	9.910	8.340	196.	1.046	538.	10.375	205.	0.089	47.892	0.923	18.262
	9 C.T.	4216.	1.730	1.730	68.	2.028	8551.	3.509	137.	0.021	179.591	0.073	2.896
	SUM----------(CYCLE COMPOSITE)----------										687.381	9.425	230.777
CYCLE 4													
	1 IDLE	1133.	0.580	11.840	77.	1.085	1230.	0.629	83.	0.036	44.289	0.022	3.009
	2 16 HG	514.	9.780	8.430	183.	1.045	537.	10.220	191.	0.089	47.806	0.909	17.020
	3 10 HG	469.	8.420	9.030	278.	1.054	494.	8.881	293.	0.257	127.139	2.282	75.362
	4 16 HG	514.	9.910	8.340	196.	1.046	538.	10.375	205.	0.089	47.892	0.923	18.262
	5 19 HG	446.	9.060	8.750	169.	1.053	469.	9.546	178.	0.047	22.086	0.448	8.369
	6 16 HG	516.	9.910	8.340	196.	1.046	540.	10.373	205.	0.089	48.071	0.923	18.259
	7 3 HG	401.	8.950	8.680	183.	1.067	427.	9.550	195.	0.283	121.099	2.702	55.264
	8 16 HG	514.	10.140	8.340	196.	1.038	533.	10.528	203.	0.089	47.498	0.937	18.112
	9 C.T.	4169.	1.660	1.660	65.	2.073	8645.	3.442	134.	0.021	181.545	0.072	2.830
	SUM----------(CYCLE COMPOSITE)----------										687.428	9.222	216.491

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 613.135 9.322 232.124

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 687.405 9.323 223.634

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(613.135)	+ 0.65*(687.405)	=	661.410	PPM
CO	0.35*(9.322)	+ 0.65*(9.323)	=	9.323	PERCENT
NO(K)	0.35*(232.124)	+ 0.65*(223.634)	=	226.605	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-13. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 IHC 304-CID CHASSIS DYNAMOMETER

MAR 16 71 69 INTL 304 V8 CHASSIS 11-2877-01 RUN 2 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1274.	0.280	11.480	51.	1.115	1421.	0.312	56.	0.036	51.172	0.011	2.048
	2 16 HG	446.	9.910	8.600	183.	1.033	460.	10.237	189.	0.089	41.004	0.911	16.824
	3 10 HG	435.	8.530	9.370	279.	1.028	447.	8.769	286.	0.257	114.927	2.253	73.712
	4 16 HG	474.	10.140	8.540	183.	1.026	486.	10.411	187.	0.089	43.315	0.926	16.723
	5 19 HG	420.	9.170	9.030	170.	1.030	432.	9.451	175.	0.047	20.345	0.444	8.235
	6 16 HG	484.	10.030	8.540	196.	1.029	498.	10.330	201.	0.089	44.368	0.919	17.967
	7 3 HG	391.	9.500	8.840	265.	1.034	404.	9.830	274.	0.283	114.504	2.782	77.605
	8 16 HG	479.	9.910	8.540	210.	1.034	495.	10.254	217.	0.089	44.114	0.912	19.340
	9 C.T.	3709.	1.730	7.000	60.	1.221	4530.	2.113	73.	0.021	95.140	0.044	1.539
	SUM----------(CYCLE COMPOSITE)----------										568.892	9.205	233.995
CYCLE 2													
	1 IDLE	1274.	0.280	11.480	51.	1.115	1421.	0.312	56.	0.036	51.172	0.011	2.048
	2 16 HG	479.	9.630	8.600	183.	1.040	498.	10.022	190.	0.089	44.368	0.891	16.950
	3 10 HG	435.	8.420	9.370	279.	1.032	448.	8.689	287.	0.257	115.377	2.233	74.000
	4 16 HG	479.	9.910	8.600	210.	1.030	493.	10.211	216.	0.089	43.926	0.908	19.258
	5 19 HG	471.	8.840	9.140	183.	1.030	485.	9.111	188.	0.047	22.815	0.428	8.864
	6 16 HG	484.	9.910	8.600	210.	1.029	498.	10.207	216.	0.089	44.368	0.908	19.250
	7 3 HG	387.	9.500	8.750	265.	1.041	403.	9.897	276.	0.283	114.101	2.800	78.131
	8 16 HG	484.	10.030	8.540	196.	1.029	498.	10.330	201.	0.089	44.368	0.919	17.967
	9 C.T.	4326.	1.730	7.650	64.	1.099	4756.	1.902	70.	0.021	99.890	0.039	1.477
	SUM----------(CYCLE COMPOSITE)----------										580.387	9.142	237.949
CYCLE 3													
	1 IDLE	2317.	0.310	11.920	77.	0.994	2304.	0.308	76.	0.036	82.969	0.011	2.757
	2 16 HG	479.	10.140	8.600	183.	1.022	489.	10.363	187.	0.089	43.570	0.922	16.645
	3 10 HG	435.	9.060	9.370	279.	1.009	438.	9.142	281.	0.257	112.807	2.349	72.352
	4 16 HG	484.	10.140	8.680	183.	1.015	491.	10.301	185.	0.089	43.761	0.916	16.546
	5 19 HG	420.	9.060	9.030	170.	1.034	434.	9.374	175.	0.047	20.425	0.440	8.267
	6 16 HG	489.	10.030	8.600	196.	1.025	501.	10.283	200.	0.089	44.619	0.915	17.884
	7 3 HG	381.	9.500	8.680	265.	1.047	399.	9.951	277.	0.283	112.952	2.816	78.562
	8 16 HG	484.	10.030	8.540	196.	1.029	498.	10.330	201.	0.089	44.368	0.919	17.967
	9 C.T.	3964.	1.840	6.210	61.	1.270	5037.	2.338	77.	0.021	105.777	0.049	1.627
	SUM----------(CYCLE COMPOSITE)----------										611.252	9.340	232.611
CYCLE 4													
	1 IDLE	2317.	0.310	11.920	77.	0.994	2304.	0.308	76.	0.036	82.969	0.011	2.757
	2 16 HG	484.	10.030	8.540	183.	1.029	498.	10.330	188.	0.089	44.368	0.919	16.775
	3 10 HG	440.	8.420	9.370	292.	1.031	453.	8.686	301.	0.257	116.658	2.232	77.418
	4 16 HG	489.	10.030	8.540	196.	1.029	503.	10.326	201.	0.089	44.809	0.919	17.960
	5 19 HG	420.	9.170	8.930	183.	1.038	435.	9.518	189.	0.047	20.490	0.447	8.928
	6 16 HG	489.	10.030	8.600	196.	1.025	501.	10.283	200.	0.089	44.619	0.915	17.884
	7 3 HG	381.	9.280	8.930	265.	1.037	395.	9.624	274.	0.283	111.821	2.723	77.776
	8 16 HG	484.	9.910	8.480	196.	1.038	502.	10.295	203.	0.089	44.749	0.916	18.121
	9 C.T.	3834.	1.660	7.280	64.	1.183	4537.	1.964	75.	0.021	95.295	0.041	1.590
	SUM----------(CYCLE COMPOSITE)----------										605.783	9.125	239.213

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 574.640 9.173 235.972

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 608.517 9.233 235.912

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(574.640)	+ 0.65*(608.517)	=	596.660	PPM
CO	0.35*(9.173)	+ 0.65*(9.233)	=	9.212	PERCENT
NO(K)	0.35*(235.972)	+ 0.65*(235.912)	=	235.933	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-14. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 IHC 304-CID–CHASSIS DYNAMOMETER

MAR 17 71 69 INTL 304 V8 CHASSIS 11-2877-01 RUN 3 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	1488.	0.640	10.550	51.	1.162	1729.	0.743	59.	0.036	62.253	0.026	2.133
	2 16 HG	479.	10.030	8.430	169.	1.038	497.	10.416	175.	0.089	44.272	0.927	15.620
	3 10 HG	448.	8.420	9.140	279.	1.048	469.	8.825	292.	0.257	120.680	2.268	75.155
	4 16 HG	484.	10.140	8.430	183.	1.034	500.	10.485	189.	0.089	44.542	0.933	16.841
	5 19 HG	415.	8.950	9.780	157.	0.986	409.	8.826	154.	0.047	19.235	0.414	7.277
	6 16 HG	484.	10.140	8.430	183.	1.034	500.	10.485	189.	0.089	44.542	0.933	16.841
	7 3 HG	396.	9.630	8.600	246.	1.047	414.	10.087	257.	0.283	117.389	2.854	72.923
	8 16 HG	488.	10.140	8.480	183.	1.030	502.	10.444	188.	0.089	44.736	0.929	16.776
	9 C.T.	4429.	2.020	6.050	66.	1.224	5422.	2.473	80.	0.021	113.872	0.051	1.696
	SUM----------(CYCLE COMPOSITE)----------										611.525	9.339	225.266
CYCLE 2													
	1 IDLE	1488.	0.640	10.550	51.	1.162	1729.	0.743	59.	0.036	62.253	0.026	2.133
	2 16 HG	484.	10.220	8.340	169.	1.037	502.	10.605	175.	0.089	44.701	0.943	15.608
	3 10 HG	481.	8.630	9.140	270.	1.037	499.	8.954	280.	0.257	128.265	2.301	71.999
	4 16 HG	494.	10.030	8.430	183.	1.037	512.	10.404	189.	0.089	45.606	0.925	16.894
	5 19 HG	425.	9.500	8.840	161.	1.032	438.	9.804	166.	0.047	20.616	0.460	7.809
	6 16 HG	491.	10.140	8.480	183.	1.029	505.	10.442	188.	0.089	45.001	0.929	16.772
	7 3 HG	396.	9.630	8.600	246.	1.047	414.	10.087	257.	0.283	117.389	2.854	72.923
	8 16 HG	484.	10.220	8.340	183.	1.037	502.	10.605	189.	0.089	44.701	0.943	16.901
	9 C.T.	4157.	2.110	6.910	63.	1.164	4839.	2.456	73.	0.021	101.633	0.051	1.540
	SUM----------(CYCLE COMPOSITE)----------										610.169	9.438	222.584
CYCLE 3													
	1 IDLE	1289.	0.740	11.600	77.	1.085	1398.	0.803	83.	0.036	50.355	0.028	3.008
	2 16 HG	524.	10.030	8.430	183.	1.034	542.	10.380	189.	0.089	48.263	0.923	16.855
	3 10 HG	440.	8.630	9.030	265.	1.049	461.	9.054	278.	0.257	118.642	2.327	71.455
	4 16 HG	489.	10.140	8.430	183.	1.033	505.	10.481	189.	0.089	44.984	0.932	16.834
	5 19 HG	420.	9.280	8.750	169.	1.047	439.	9.720	177.	0.047	20.675	0.456	8.319
	6 16 HG	494.	10.030	8.430	183.	1.037	512.	10.404	189.	0.089	45.606	0.925	16.894
	7 3 HG	386.	9.390	8.680	265.	1.051	405.	9.872	278.	0.283	114.846	2.793	78.845
	8 16 HG	489.	10.220	8.340	183.	1.037	507.	10.601	189.	0.089	45.145	0.943	16.895
	9 C.T.	4331.	3.840	7.180	69.	1.052	4558.	4.041	72.	0.021	95.720	0.084	1.524
	SUM----------(CYCLE COMPOSITE)----------										584.242	9.417	230.633
CYCLE 4													
	1 IDLE	1289.	0.740	11.600	77.	1.085	1398.	0.803	83.	0.036	50.355	0.028	3.008
	2 16 HG	494.	10.140	8.340	169.	1.039	513.	10.544	175.	0.089	45.720	0.938	15.641
	3 10 HG	444.	8.630	9.140	278.	1.040	462.	8.980	289.	0.257	118.738	2.307	74.345
	4 16 HG	484.	10.140	8.340	196.	1.040	503.	10.552	203.	0.089	44.829	0.939	18.154
	5 19 HG	410.	9.060	8.750	156.	1.056	433.	9.573	164.	0.047	20.361	0.449	7.747
	6 16 HG	489.	9.780	8.340	183.	1.053	515.	10.307	192.	0.089	45.867	0.917	17.165
	7 3 HG	391.	9.500	8.680	251.	1.046	409.	9.944	262.	0.283	115.827	2.814	74.354
	8 16 HG	494.	10.220	8.240	169.	1.047	475.	10.707	177.	0.089	42.331	0.952	15.757
	9 C.T.	4244.	2.140	6.640	69.	1.179	5005.	2.524	81.	0.021	105.120	0.053	1.709
	SUM----------(CYCLE COMPOSITE)----------										589.153	9.401	227.882

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 610.847 9.388 223.925

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 586.697 9.409 229.258

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(610.847)	+ 0.65*(586.697)	=	595.150	PPM
CO	0.35*(9.388)	+ 0.65*(9.409)	=	9.402	PERCENT
NO(K)	0.35*(223.925)	+ 0.65*(229.258)	=	227.391	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-15. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–STATIONARY DYNAMOMETER

APR 27 71 69 FORD 300 STATIONARY RUN 2 S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	511.	3.060	12.630	51.	0.985	503.	3.015	50.	0.036	18.131	0.108	1.832
	2 16 HG	141.	1.730	14.180	1904.	0.954	134.	1.650	1816.	0.089	11.973	0.146	161.681
	3 10 HG	115.	1.430	14.140	2948.	0.968	111.	1.384	2853.	0.257	28.509	0.355	733.398
	4 16 HG	125.	1.840	14.310	2136.	0.943	117.	1.735	2015.	0.089	10.498	0.154	179.401
	5 19 HG	107.	1.350	14.530	1217.	0.946	101.	1.277	1151.	0.047	4.759	0.060	54.135
	6 16 HG	128.	1.870	14.310	2004.	0.942	120.	1.762	1888.	0.089	10.737	0.156	168.115
	7 3 HG	133.	4.940	12.090	1876.	0.989	131.	4.789	1855.	0.283	37.244	1.355	525.341
	8 16 HG	126.	2.020	14.050	1996.	0.954	120.	1.927	1904.	0.089	10.700	0.171	169.506
	9 C.T.	5290.	2.450	7.800	219.	0.984	5198.	2.412	215.	0.021	109.167	0.050	4.527
	SUM----------(CYCLE COMPOSITE)----------										241.822	2.560	1997.941
CYCLE 2													
	1 IDLE	511.	3.060	12.630	51.	0.985	503.	3.015	50.	0.036	18.131	0.108	1.809
	2 16 HG	133.	1.380	14.180	1961.	0.949	126.	1.785	1862.	0.089	11.244	0.158	165.797
	3 10 HG	107.	1.520	14.310	2966.	0.954	102.	1.451	2832.	0.257	26.257	0.373	727.849
	4 16 HG	115.	1.790	14.310	2125.	0.945	108.	1.693	2010.	0.089	9.681	0.150	178.894
	5 19 HG	102.	1.270	14.530	1313.	0.949	96.	1.205	1245.	0.047	4.550	0.056	58.579
	6 16 HG	122.	1.770	14.310	2181.	0.945	115.	1.674	2063.	0.089	10.272	0.149	183.638
	7 3 HG	135.	4.640	12.220	1904.	0.988	133.	4.584	1881.	0.283	34.953	1.297	532.406
	8 16 HG	120.	1.880	14.180	2180.	0.950	114.	1.787	2072.	0.089	10.155	0.159	184.482
	9 C.T.	5295.	2.480	7.520	174.	1.005	5266.	2.494	175.	0.021	110.592	0.052	3.675
	SUM----------(CYCLE COMPOSITE)----------										235.838	2.505	2037.133
CYCLE 3													
	1 IDLE	514.	2.970	13.180	129.	0.952	489.	2.829	122.	0.036	17.628	0.101	4.424
	2 16 HG	129.	1.840	14.180	2113.	0.951	122.	1.750	2010.	0.089	10.924	0.155	178.933
	3 10 HG	106.	1.890	14.180	3110.	0.951	100.	1.798	2959.	0.257	25.920	0.462	760.486
	4 16 HG	120.	1.940	14.310	2279.	0.940	112.	1.825	2144.	0.089	10.049	0.162	190.858
	5 19 HG	105.	1.730	14.420	1369.	0.941	99.	1.628	1289.	0.047	4.691	0.075	60.584
	6 16 HG	120.	1.870	14.310	2210.	0.943	113.	1.763	2084.	0.089	10.072	0.156	185.501
	7 3 HG	133.	4.790	12.220	1814.	0.982	130.	4.706	1782.	0.283	36.979	1.331	504.365
	8 16 HG	120.	1.940	14.310	2120.	0.944	113.	1.737	2001.	0.089	10.082	0.154	178.120
	9 C.T.	5107.	2.720	7.460	427.	1.011	5165.	2.751	431.	0.021	108.477	0.057	9.069
	SUM----------(CYCLE COMPOSITE)----------										234.824	2.660	2072.344
CYCLE 4													
	1 IDLE	514.	2.970	13.180	129.	0.952	489.	2.829	122.	0.036	17.628	0.101	4.424
	2 16 HG	129.	1.480	14.420	2061.	0.947	122.	1.402	1953.	0.089	10.881	0.124	173.845
	3 10 HG	111.	1.720	14.310	2948.	0.948	105.	1.631	2795.	0.257	27.053	0.419	718.496
	4 16 HG	120.	1.980	14.310	2249.	0.939	112.	1.860	2113.	0.089	10.036	0.165	188.101
	5 19 HG	106.	1.570	14.420	1413.	0.946	100.	1.486	1337.	0.047	4.715	0.069	62.858
	6 16 HG	138.	1.990	14.180	2047.	0.946	130.	1.882	1936.	0.089	11.621	0.167	172.386
	7 3 HG	133.	4.730	12.340	1918.	0.976	129.	4.610	1873.	0.283	36.767	1.304	530.227
	8 16 HG	120.	1.900	14.420	2203.	0.935	112.	1.777	2060.	0.089	9.991	0.158	183.422
	9 C.T.	5545.	2.550	7.690	273.	0.969	5376.	2.472	264.	0.021	112.912	0.051	5.559
	SUM----------(CYCLE COMPOSITE)----------										241.608	2.563	2039.321

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 238.830 2.533 2017.537

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 238.216 2.611 2055.833

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(238.830) + 0.65*(238.216) =	238.431	PPM
CO	0.35*(2.533) + 0.65*(2.611) =	2.584	PERCENT
NO(K)	0.35*(2017.537) + 0.65*(2055.833) =	2042.429	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-16. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–STATIONARY DYNAMOMETER

APR 27 71 69 FORD 300 STATIONARY RUN 3 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	449.	3.150	12.820	64.	0.974	437.	3.069	62.	0.036	15.751	0.110	2.245
	2 16 HG	143.	1.710	14.310	2165.	0.946	135.	1.618	2049.	0.089	12.046	0.144	182.378
	3 10 HG	122.	1.560	14.180	2948.	0.960	117.	1.498	2832.	0.257	30.124	0.385	727.928
	4 16 HG	129.	1.850	14.180	2226.	0.951	122.	1.759	2117.	0.089	10.920	0.156	188.440
	5 19 HG	113.	1.530	14.130	1387.	0.965	109.	1.477	1339.	0.047	5.128	0.069	62.944
	6 16 HG	136.	1.910	14.180	2165.	0.948	129.	1.812	2054.	0.089	11.484	0.161	182.826
	7 3 HG	126.	4.790	12.220	2055.	0.982	123.	4.708	2020.	0.283	35.051	1.332	571.666
	8 16 HG	125.	2.040	14.180	2143.	0.945	118.	1.928	2026.	0.089	10.519	0.171	180.341
	9 C.T.	5567.	2.530	7.360	197.	0.990	5514.	2.506	195.	0.021	115.809	0.052	4.098
	SUM----------(CYCLE COMPOSITE)----------										246.835	2.583	2102.869
CYCLE 2													
	1 IDLE	449.	3.150	12.820	64.	0.974	437.	3.069	62.	0.036	15.751	0.110	2.245
	2 16 HG	138.	1.860	14.180	2181.	0.950	131.	1.767	2072.	0.089	11.671	0.157	184.453
	3 10 HG	107.	1.520	14.180	3166.	0.963	103.	1.463	3049.	0.257	26.484	0.376	783.637
	4 16 HG	125.	3.000	14.090	2302.	0.922	115.	2.766	2122.	0.089	10.258	0.246	188.917
	5 19 HG	115.	1.760	14.270	1312.	0.949	109.	1.670	1245.	0.047	5.131	0.078	58.538
	6 16 HG	120.	1.640	14.310	2365.	0.950	114.	1.558	2247.	0.089	10.148	0.138	200.007
	7 3 HG	127.	4.840	12.220	2033.	0.981	124.	4.749	1994.	0.283	35.266	1.344	564.547
	8 16 HG	118.	1.950	14.310	2302.	0.943	111.	1.746	2172.	0.089	9.912	0.155	193.376
	9 C.T.	5077.	2.700	8.100	169.	0.970	4929.	2.621	164.	0.021	103.524	0.055	3.446
	SUM----------(CYCLE COMPOSITE)----------										228.148	2.661	2179.169
CYCLE 3													
	1 IDLE	386.	3.240	13.060	116.	0.960	370.	3.111	111.	0.036	13.346	0.112	4.010
	2 16 HG	129.	1.730	14.310	2451.	0.946	122.	1.638	2320.	0.089	10.870	0.145	206.539
	3 10 HG	109.	1.950	14.310	3250.	0.941	102.	1.835	3059.	0.257	26.371	0.471	786.297
	4 16 HG	117.	1.750	14.310	2499.	0.947	110.	1.657	2366.	0.089	9.861	0.147	210.625
	5 19 HG	102.	1.360	14.420	1591.	0.953	97.	1.296	1516.	0.047	4.570	0.060	71.285
	6 16 HG	113.	1.690	14.310	2443.	0.949	107.	1.604	2318.	0.089	9.545	0.142	206.367
	7 3 HG	124.	4.740	12.340	2143.	0.976	121.	4.630	2093.	0.283	34.278	1.310	592.417
	8 16 HG	120.	2.010	14.180	2348.	0.946	113.	1.903	2223.	0.089	10.111	0.169	197.856
	9 C.T.	4940.	2.670	7.580	224.	1.017	5026.	2.716	227.	0.021	105.558	0.057	4.786
	SUM----------(CYCLE COMPOSITE)----------										224.514	2.617	2280.188
CYCLE 4													
	1 IDLE	386.	3.240	13.060	116.	0.960	370.	3.111	111.	0.036	13.346	0.112	4.010
	2 16 HG	125.	1.610	14.310	2499.	0.950	118.	1.530	2376.	0.089	10.577	0.136	211.472
	3 10 HG	122.	1.490	14.420	3326.	0.947	115.	1.412	3152.	0.257	29.720	0.362	810.259
	4 16 HG	120.	1.730	14.420	2491.	0.940	112.	1.627	2343.	0.089	10.046	0.144	208.544
	5 19 HG	102.	1.560	14.530	1657.	0.937	95.	1.555	1553.	0.047	4.493	0.073	72.995
	6 16 HG	115.	1.750	14.310	2443.	0.947	108.	1.657	2313.	0.089	9.694	0.147	205.934
	7 3 HG	115.	4.440	12.340	2228.	0.987	113.	4.384	2197.	0.283	32.136	1.240	621.776
	8 16 HG	111.	1.700	14.310	2515.	0.948	105.	1.613	2386.	0.089	9.374	0.143	212.410
	9 C.T.	5407.	2.530	7.550	231.	0.989	5349.	2.503	228.	0.021	112.349	0.052	4.799
	SUM----------(CYCLE COMPOSITE)----------										231.739	2.413	2352.203

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 237.491 2.622 2141.019

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 228.127 2.515 2316.195

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(237.491)	+ 0.65*(228.127)	=	231.404	PPM
CO	0.35*(2.622)	+ 0.65*(2.515)	=	2.553	PERCENT
NO(K)	0.35*(2141.019)	+ 0.65*(2316.195)	=	2254.884	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING INC.

TABLE G-17. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–STATIONARY DYNAMOMETER

APR 28 71 69 FORD 300 STATIONARY RUN 1 S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	847.	3.840	12.430	64.	0.949	804.	3.647	60.	0.036	28.964	0.131	2.188
	2 16 HG	147.	1.920	14.750	1598.	0.913	134.	1.754	1460.	0.089	11.954	0.156	129.954
	3 10 HG	97.	1.800	14.530	2195.	0.933	90.	1.680	2048.	0.257	23.268	0.431	526.539
	4 16 HG	97.	1.300	15.430	1999.	0.895	86.	1.164	1790.	0.089	7.734	0.103	159.391
	5 19 HG	61.	0.520	12.810	1170.	1.103	67.	0.574	1291.	0.047	3.164	0.026	60.700
	6 16 HG	89.	1.230	15.430	2099.	0.898	79.	1.104	1885.	0.089	7.115	0.098	167.817
	7 3 HG	107.	5.210	12.710	1631.	0.939	100.	4.895	1532.	0.283	29.454	1.385	433.737
	8 16 HG	89.	1.380	15.430	2092.	0.894	79.	1.233	1870.	0.089	7.082	0.109	166.484
	9 C.T.	5253.	2.280	8.350	210.	0.956	5023.	2.180	200.	0.021	105.487	0.045	4.217
	SUM----------(CYCLE COMPOSITE)----------										229.227	2.489	1651.030
CYCLE 2													
	1 IDLE	847.	3.840	12.430	64.	0.949	804.	3.647	60.	0.036	28.964	0.131	2.188
	2 16 HG	107.	1.480	15.430	2048.	0.890	95.	1.317	1823.	0.089	8.478	0.117	162.287
	3 10 HG	84.	1.460	15.090	2930.	0.911	76.	1.330	2670.	0.257	19.673	0.341	686.244
	4 16 HG	89.	1.410	15.430	2113.	0.893	79.	1.259	1887.	0.089	7.076	0.112	167.999
	5 19 HG	71.	0.960	15.620	1295.	0.896	63.	0.860	1160.	0.047	2.991	0.040	54.556
	6 16 HG	93.	1.470	15.430	2196.	0.891	82.	1.310	1957.	0.089	7.378	0.116	174.230
	7 3 HG	107.	5.710	12.710	1806.	0.924	98.	5.280	1670.	0.283	28.001	1.494	472.618
	8 16 HG	93.	1.520	15.370	2195.	0.893	83.	1.357	1960.	0.089	7.394	0.120	174.526
	9 C.T.	5639.	2.430	8.200	195.	0.935	5273.	2.272	182.	0.021	110.742	0.047	3.829
	SUM----------(CYCLE COMPOSITE)----------										220.701	2.522	1898.482
CYCLE 3													
	1 IDLE	367.	2.110	13.630	103.	0.961	352.	2.028	99.	0.036	12.702	0.073	3.565
	2 16 HG	120.	1.660	15.260	2143.	0.893	107.	1.484	1915.	0.089	9.547	0.132	170.506
	3 10 HG	102.	1.710	15.090	2791.	0.903	92.	1.544	2520.	0.257	23.674	0.396	647.808
	4 16 HG	120.	1.850	15.260	2039.	0.888	106.	1.644	1812.	0.089	9.492	0.146	161.286
	5 19 HG	88.	1.140	15.620	1277.	0.890	78.	1.015	1137.	0.047	3.682	0.047	53.440
	6 16 HG	111.	1.730	15.260	2120.	0.892	99.	1.544	1892.	0.089	8.817	0.137	168.413
	7 3 HG	129.	5.140	12.940	1855.	0.926	119.	4.762	1718.	0.283	33.825	1.347	486.410
	8 16 HG	120.	1.990	15.090	2076.	0.897	107.	1.695	1862.	0.089	9.580	0.150	165.737
	9 C.T.	5747.	2.610	7.890	193.	0.941	5410.	2.457	181.	0.021	113.620	0.051	3.815
	SUM----------(CYCLE COMPOSITE)----------										224.944	2.483	1860.983
CYCLE 4													
	1 IDLE	367.	2.110	13.630	103.	0.961	352.	2.028	99.	0.036	12.702	0.073	3.565
	2 16 HG	120.	1.730	15.090	2091.	0.901	108.	1.559	1885.	0.089	9.627	0.138	167.765
	3 10 HG	102.	1.710	15.260	2921.	0.893	91.	1.528	2610.	0.257	23.426	0.392	670.878
	4 16 HG	111.	1.750	15.090	2203.	0.901	100.	1.577	1985.	0.089	8.905	0.140	176.748
	5 19 HG	88.	1.070	15.620	1362.	0.892	78.	0.954	1215.	0.047	3.690	0.044	57.120
	6 16 HG	115.	1.740	15.260	2226.	0.892	102.	1.552	1985.	0.089	9.130	0.138	176.732
	7 3 HG	115.	5.070	12.940	1968.	0.929	106.	4.712	1829.	0.283	30.251	1.333	517.698
	8 16 HG	111.	1.910	15.260	2180.	0.887	98.	1.695	1935.	0.089	8.769	0.150	172.225
	9 C.T.	5771.	2.680	7.820	174.	0.942	5436.	2.524	163.	0.021	114.162	0.053	3.442
	SUM----------(CYCLE COMPOSITE)----------										220.667	2.465	1946.176

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 221.964 2.505 1774.756

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 222.806 2.474 1903.579

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(221.964)	+ 0.65*(222.806)	=	222.511	PPM
CO	0.35*(2.505)	+ 0.65*(2.474)	=	2.485	PERCENT
NO(K)	0.35*(1774.756)	+ 0.65*(1903.579)	=	1858.491	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-18. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–CHASSIS DYNAMOMETER

1969 TRUCK 94877 5-6-71 CID300 GVW 15000 W/D=71/76 K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	275.	3.019	12.670	89.	1.001	275.	3.023	89.	0.036	9.916	0.108	3.209
	2 16 HG	151.	1.463	13.770	2115.	0.988	149.	1.446	2091.	0.089	13.288	0.128	186.122
	3 10 HG	128.	1.292	13.670	3193.	1.003	128.	1.296	3203.	0.257	33.000	0.333	823.198
	4 16 HG	132.	1.296	13.780	2395.	0.995	131.	1.289	2383.	0.089	11.691	0.114	212.122
	5 19 HG	104.	0.836	13.910	1434.	1.004	104.	0.839	1439.	0.047	4.908	0.039	67.676
	6 16 HG	133.	1.339	13.860	2333.	0.988	131.	1.323	2305.	0.089	11.697	0.117	205.186
	7 3 HG	130.	4.584	11.470	2049.	1.042	135.	4.781	2137.	0.283	38.371	1.353	604.792
	8 16 HG	130.	1.322	13.810	2430.	0.992	129.	1.311	2411.	0.089	11.481	0.116	214.621
	9 C.T.	5061.	1.960	7.050	226.	1.074	5437.	2.105	242.	0.021	114.188	0.044	5.099
	SUM----------(CYCLE COMPOSITE)----------										248.542	2.356	2322.029
CYCLE 2													
	1 IDLE	275.	3.019	12.670	89.	1.001	275.	3.023	89.	0.036	9.916	0.108	3.209
	2 16 HG	160.	1.562	13.690	2187.	0.986	157.	1.640	2158.	0.089	14.052	0.145	192.075
	3 10 HG	128.	1.274	13.730	3258.	0.999	127.	1.273	3256.	0.257	32.884	0.327	837.003
	4 16 HG	135.	1.480	13.730	2410.	0.992	133.	1.468	2390.	0.089	11.919	0.130	212.790
	5 19 HG	109.	0.841	14.010	1467.	0.996	108.	0.838	1462.	0.047	5.106	0.039	68.720
	6 16 HG	140.	1.524	13.790	2348.	0.986	138.	1.502	2315.	0.089	12.287	0.133	206.083
	7 3 HG	134.	4.696	11.350	2185.	1.047	140.	4.918	2288.	0.283	39.722	1.392	647.715
	8 16 HG	128.	1.448	13.760	2413.	0.991	126.	1.435	2392.	0.089	11.296	0.127	212.961
	9 C.T.	5159.	2.020	6.880	238.	1.077	5556.	2.175	256.	0.021	116.695	0.045	5.383
	SUM----------(CYCLE COMPOSITE)----------										253.880	2.451	2385.944
CYCLE 3													
	1 IDLE	254.	3.102	13.000	205.	0.978	248.	3.033	200.	0.036	8.943	0.109	7.218
	2 16 HG	155.	1.648	13.690	2181.	0.987	153.	1.627	2154.	0.089	13.624	0.144	191.710
	3 10 HG	129.	1.270	13.820	3309.	0.993	128.	1.261	3287.	0.257	32.938	0.324	844.916
	4 16 HG	136.	1.555	13.790	2412.	0.985	134.	1.532	2376.	0.089	11.927	0.136	211.540
	5 19 HG	113.	1.142	13.850	1548.	0.997	112.	1.138	1543.	0.047	5.295	0.053	72.540
	6 16 HG	139.	1.551	13.770	2419.	0.986	137.	1.530	2386.	0.089	12.206	0.136	212.425
	7 3 HG	137.	4.622	11.390	2276.	1.047	143.	4.839	2382.	0.283	40.593	1.369	674.387
	8 16 HG	129.	1.542	13.630	2410.	0.997	128.	1.537	2403.	0.089	11.449	0.136	213.895
	9 C.T.	5090.	2.091	6.840	310.	1.083	5514.	2.265	335.	0.021	115.814	0.047	7.053
	SUM----------(CYCLE COMPOSITE)----------										252.792	2.458	2435.688
CYCLE 4													
	1 IDLE	254.	3.102	13.000	205.	0.978	248.	3.033	200.	0.036	8.943	0.109	7.218
	2 16 HG	159.	1.631	13.790	2337.	0.981	156.	1.600	2293.	0.089	13.885	0.142	204.091
	3 10 HG	129.	1.304	13.850	2428.	0.990	127.	1.291	2404.	0.257	32.833	0.331	617.973
	4 16 HG	138.	1.634	13.830	2474.	0.979	135.	1.601	2424.	0.089	12.036	0.142	215.780
	5 19 HG	115.	1.068	13.900	1660.	0.996	114.	1.063	1653.	0.047	5.383	0.049	77.708
	6 16 HG	139.	1.655	13.770	2476.	0.983	136.	1.627	2434.	0.089	12.163	0.144	216.663
	7 3 HG	139.	4.716	11.420	2371.	1.041	144.	4.909	2468.	0.283	40.952	1.389	698.543
	8 16 HG	134.	1.552	13.750	2571.	0.988	132.	1.533	2541.	0.089	11.787	0.136	226.156
	9 C.T.	5063.	2.129	6.980	380.	1.073	5432.	2.284	407.	0.021	114.092	0.047	8.563
	SUM----------(CYCLE COMPOSITE)----------										252.076	2.494	2272.697

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 251.211 2.404 2353.987

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 252.434 2.476 2354.192

FOUR CYCLE COMPOSITE = REPORTED VALUES =

HC 0.35*(251.211) + 0.65*(252.434) = 252.006 PPM
CO 0.35*(2.404) + 0.65*(2.476) = 2.451 PERCENT
NO(K) 0.35*(2353.987) + 0.65*(2354.192) = 2354.120 PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-19. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–CHASSIS DYNAMOMETER

1969 TRUCK 94877 5-7-71 CID300 GVW 15000 W/D=71/76 K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	223.	3.093	10.620	52.	1.168	260.	3.614	60.	0.036	9.382	0.130	2.187
	2 16 MG	140.	1.343	13.860	2301.	0.987	138.	1.326	2272.	0.089	12.304	0.118	202.240
	3 10 MG	116.	1.332	13.610	3248.	1.006	116.	1.341	3270.	0.257	30.016	0.344	840.458
	4 16 MG	120.	1.274	13.830	2490.	0.993	119.	1.265	2473.	0.089	10.609	0.112	220.143
	5 19 MG	99.	0.752	13.920	1595.	1.006	99.	0.757	1605.	0.047	4.684	0.035	75.470
	6 16 MG	124.	1.290	13.750	2518.	0.998	123.	1.287	2512.	0.089	11.014	0.114	223.655
	7 3 MG	125.	4.775	11.280	2077.	1.050	131.	5.016	2181.	0.283	37.162	1.419	617.494
	8 16 MG	120.	1.290	13.800	2516.	0.994	119.	1.283	2503.	0.089	10.625	0.114	222.777
	9 C.T.	4796.	2.002	6.550	189.	1.138	5462.	2.280	215.	0.021	114.713	0.047	4.520
	SUM----------(CYCLE COMPOSITE)----------										240.512	2.437	2408.949
CYCLE 2													
	1 IDLE	223.	3.093	10.620	52.	1.168	260.	3.614	60.	0.036	9.382	0.130	2.187
	2 16 MG	148.	1.621	13.730	2210.	0.986	145.	1.598	2179.	0.089	12.992	0.142	194.009
	3 10 MG	119.	1.297	13.680	3298.	1.002	119.	1.300	3307.	0.257	30.673	0.334	850.105
	4 16 MG	124.	1.479	13.710	2449.	0.994	123.	1.470	2434.	0.089	10.972	0.130	216.714
	5 19 MG	101.	0.929	13.950	1507.	0.998	100.	0.927	1504.	0.047	4.739	0.043	70.714
	6 16 MG	128.	1.540	13.710	2341.	0.991	126.	1.527	2322.	0.089	11.299	0.135	206.663
	7 3 MG	124.	4.767	11.260	2198.	1.052	130.	5.017	2313.	0.283	36.932	1.419	654.657
	8 16 MG	123.	1.510	13.790	2481.	0.987	121.	1.491	2450.	0.089	10.814	0.132	218.133
	9 C.T.	4813.	2.142	6.460	223.	1.139	5482.	2.440	254.	0.021	115.135	0.051	5.334
	SUM----------(CYCLE COMPOSITE)----------										242.942	2.520	2418.520
CYCLE 3													
	1 IDLE	235.	3.412	11.310	140.	1.092	256.	3.728	152.	0.036	9.244	0.134	5.507
	2 16 MG	142.	1.550	13.730	2252.	0.989	140.	1.533	2227.	0.089	12.501	0.136	198.262
	3 10 MG	121.	1.308	13.680	3345.	1.002	121.	1.311	3353.	0.257	31.172	0.336	861.764
	4 16 MG	128.	1.542	13.790	2555.	0.986	126.	1.521	2520.	0.089	11.237	0.135	224.312
	5 19 MG	103.	0.970	13.910	1664.	0.999	102.	0.969	1663.	0.047	4.838	0.045	78.174
	6 16 MG	130.	1.487	13.740	2478.	0.991	128.	1.474	2457.	0.089	11.471	0.131	218.673
	7 3 MG	129.	4.831	11.210	2745.	1.053	135.	5.089	2364.	0.283	38.456	1.440	669.268
	8 16 MG	125.	1.408	13.790	2613.	0.991	123.	1.395	2589.	0.089	11.026	0.124	230.506
	9 C.T.	4705.	2.150	6.560	265.	1.140	5364.	2.451	302.	0.021	112.663	0.051	6.345
	SUM----------(CYCLE COMPOSITE)----------										242.614	2.535	2492.814
CYCLE 4													
	1 IDLE	235.	3.412	11.310	140.	1.092	256.	3.728	152.	0.036	9.244	0.134	5.507
	2 16 MG	139.	1.576	13.710	2278.	0.989	137.	1.560	2254.	0.089	12.245	0.138	200.691
	3 10 MG	118.	1.347	13.700	3359.	0.999	117.	1.346	3358.	0.257	30.324	0.346	863.207
	4 16 MG	125.	1.577	13.720	2534.	0.990	123.	1.561	2509.	0.089	11.015	0.138	223.315
	5 19 MG	103.	0.946	13.880	1583.	1.002	103.	0.948	1586.	0.047	4.852	0.044	74.584
	6 16 MG	129.	1.555	13.660	2497.	0.994	128.	1.546	2483.	0.089	11.420	0.137	221.061
	7 3 MG	130.	4.803	11.350	2322.	1.043	135.	5.013	2423.	0.283	38.400	1.418	685.890
	8 16 MG	93.	1.448	13.730	2655.	0.996	92.	1.442	2645.	0.089	8.246	0.128	235.411
	9 C.T.	4595.	2.152	6.490	325.	1.157	5318.	2.490	376.	0.021	111.678	0.052	7.898
	SUM----------(CYCLE COMPOSITE)----------										237.428	2.539	2517.569

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 241.727 2.479 2413.735

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 240.021 2.537 2505.192

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(241.727)	+ 0.65*(240.021)	=	240.618	PPM
CO	0.35*(2.479)	+ 0.65*(2.537)	=	2.517	PERCENT
NO(K)	0.35*(2413.735)	+ 0.65*(2505.192)	=	2473.182	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-20. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–STATIONARY DYNAMOMETER–COLD START PROCEDURE

APR 27 71 69 FORD 300 STATIONARY RUN 1 S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1232.	3.510	11.920	25.	0.963	1186.	3.476	24.	0.036	42.715	0.125	0.866
	2 16 HG	151.	1.230	14.420	1539.	0.954	144.	1.173	1468.	0.089	12.821	0.104	130.679
	3 10 HG	133.	1.790	13.910	2302.	0.969	129.	1.736	2232.	0.257	33.155	0.446	573.858
	4 16 HG	120.	1.160	14.530	2048.	0.951	114.	1.103	1948.	0.089	10.161	0.098	173.426
	5 19 HG	85.	0.480	14.790	1147.	0.958	81.	0.460	1099.	0.047	3.830	0.021	51.692
	6 16 HG	118.	1.180	14.650	2049.	0.943	111.	1.113	1932.	0.089	9.909	0.099	171.983
	7 3 HG	147.	5.240	11.840	1618.	0.991	145.	5.197	1604.	0.283	41.263	1.470	454.174
	8 16 HG	125.	1.470	14.420	1947.	0.948	118.	1.394	1846.	0.089	10.550	0.124	164.329
	9 C.T.	4998.	2.180	7.750	154.	1.019	5083.	2.221	156.	0.021	106.757	0.046	3.296
	SUM----------(CYCLE COMPOSITE)----------										271.164	2.536	1724.306
CYCLE 2													
	1 IDLE	1232.	3.610	11.920	25.	0.963	1186.	3.476	24.	0.036	42.715	0.125	0.866
	2 16 HG	41.	1.390	14.380	2016.	0.959	39.	1.333	1935.	0.089	3.499	0.118	172.245
	3 10 HG	112.	1.420	14.310	2748.	0.957	107.	1.359	2631.	0.257	27.565	0.349	676.339
	4 16 HG	115.	1.390	14.490	2121.	0.947	108.	1.316	2008.	0.089	9.694	0.117	178.791
	5 19 HG	93.	0.850	14.750	1283.	0.949	88.	0.806	1217.	0.047	4.149	0.037	57.239
	6 16 HG	115.	1.380	14.480	2121.	0.948	109.	1.308	2010.	0.089	9.703	0.116	178.966
	7 3 HG	143.	5.080	11.920	1752.	0.992	141.	5.040	1738.	0.283	40.152	1.426	491.933
	8 16 HG	125.	1.690	14.380	1975.	0.944	118.	1.595	1864.	0.089	10.502	0.141	165.933
	9 C.T.	5308.	2.320	7.590	170.	1.001	5314.	2.322	170.	0.021	111.601	0.048	3.574
	SUM----------(CYCLE COMPOSITE)----------										259.582	2.481	1925.890
CYCLE 3													
	1 IDLE	367.	2.780	13.060	129.	0.976	358.	2.715	125.	0.036	12.903	0.097	4.535
	2 16 HG	139.	1.480	14.310	2011.	0.954	126.	1.412	1919.	0.089	11.296	0.125	170.808
	3 10 HG	120.	2.010	14.050	2689.	0.954	114.	1.919	2567.	0.257	29.449	0.493	659.915
	4 16 HG	120.	1.700	14.310	2032.	0.948	113.	1.612	1927.	0.089	10.128	0.143	171.508
	5 19 HG	115.	1.400	14.420	1400.	0.951	109.	1.331	1331.	0.047	5.141	0.062	62.587
	6 16 HG	124.	2.700	14.130	2054.	0.928	115.	2.507	1907.	0.089	10.248	0.223	169.764
	7 3 HG	142.	5.330	11.940	1758.	0.982	139.	5.236	1727.	0.283	39.482	1.481	488.804
	8 16 HG	120.	2.450	14.180	1989.	0.933	112.	2.286	1856.	0.089	9.968	0.203	165.231
	9 C.T.	5023.	2.420	8.370	195.	0.956	4854.	2.338	188.	0.021	101.934	0.049	3.957
	SUM----------(CYCLE COMPOSITE)----------										230.559	2.880	1897.113
CYCLE 4													
	1 IDLE	367.	2.780	13.060	129.	0.976	358.	2.715	125.	0.036	12.903	0.097	4.535
	2 16 HG	133.	1.660	14.310	2003.	0.948	126.	1.574	1900.	0.089	11.230	0.140	169.126
	3 10 HG	111.	1.250	14.310	2983.	0.963	106.	1.203	2873.	0.257	27.475	0.309	738.375
	4 16 HG	160.	1.620	14.310	2054.	0.948	151.	1.536	1947.	0.089	13.501	0.136	173.329
	5 19 HG	97.	0.880	14.530	1307.	0.951	93.	0.846	1257.	0.047	4.385	0.039	59.086
	6 16 HG	120.	2.240	14.310	2157.	0.931	111.	2.087	2010.	0.089	9.952	0.185	178.899
	7 3 HG	134.	5.240	12.090	1779.	0.976	130.	5.114	1736.	0.283	37.016	1.447	491.434
	8 16 HG	125.	1.990	14.190	1968.	0.947	118.	1.884	1863.	0.089	10.536	0.167	165.885
	9 C.T.	5235.	2.440	7.110	173.	1.036	5428.	2.530	179.	0.021	113.993	0.053	3.767
	SUM----------(CYCLE COMPOSITE)----------										240.995	2.577	1984.440
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------										265.373	2.509	1825.098
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------										235.774	2.729	1940.776

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(265.373)	+ 0.65*(235.774)	=	246.134	PPM
CO	0.35*(2.509)	+ 0.65*(2.729)	=	2.652	PERCENT
NO(K)	0.35*(1825.098)	+ 0.65*(1940.776)	=	1900.289	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-21. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–STATIONARY DYNAMOMETER–COLD START PROCEDURE

APR 28 71 69 FORD 300 STATIONARY RUN 8] S K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	559.	3.180	12.340	51.	0.997	557.	3.172	50.	0.036	20.077	0.114	1.831
	2 16 HG	143.	1.920	13.770	1772.	0.974	139.	1.870	1726.	0.089	12.398	0.166	153.634
	3 10 HG	115.	1.810	13.910	2834.	0.970	111.	1.756	2750.	0.257	28.686	0.451	706.925
	4 16 HG	125.	1.910	14.050	1947.	0.957	119.	1.829	1864.	0.089	10.654	0.162	165.957
	5 19 HG	107.	1.470	14.220	1344.	0.962	102.	1.414	1293.	0.047	4.838	0.066	60.776
	6 16 HG	125.	1.840	13.910	2033.	0.968	121.	1.782	1969.	0.089	10.779	0.158	175.314
	7 3 HG	125.	4.900	11.840	1890.	1.005	125.	4.925	1899.	0.283	35.558	1.393	537.650
	8 16 HG	130.	2.110	13.910	1947.	0.959	124.	2.025	1868.	0.089	11.106	0.180	166.338
	9 C.T.	5542.	2.530	7.360	155.	0.992	5500.	2.510	153.	0.021	115.502	0.052	3.230
	SUM----------(CYCLE COMPOSITE)----------										249.602	2.747	1971.660
CYCLE 2													
	1 IDLE	559.	3.180	12.340	51.	0.997	557.	3.172	50.	0.036	20.077	0.114	1.831
	2 16 HG	138.	1.940	13.770	1940.	0.973	134.	1.889	1889.	0.089	11.961	0.168	168.148
	3 10 HG	111.	1.730	14.050	2808.	0.964	107.	1.668	2708.	0.257	27.512	0.428	695.982
	4 16 HG	126.	2.020	13.770	2077.	0.972	122.	1.963	2019.	0.089	10.901	0.174	179.696
	5 19 HG	108.	1.540	14.090	1326.	0.968	104.	1.490	1283.	0.047	4.914	0.070	60.338
	6 16 HG	130.	1.940	13.820	2018.	0.971	126.	1.884	1959.	0.089	11.236	0.167	174.424
	7 3 HG	133.	4.870	11.840	1925.	1.005	133.	4.897	1935.	0.283	37.851	1.385	547.848
	8 16 HG	125.	2.100	13.770	1975.	0.969	121.	2.036	1914.	0.089	10.786	0.181	170.427
	9 C.T.	5350.	2.510	6.820	153.	1.046	5599.	2.627	160.	0.021	117.597	0.055	3.363
	SUM----------(CYCLE COMPOSITE)----------										252.837	2.746	2002.061
CYCLE 3													
	1 IDLE	464.	2.780	12.820	70.	0.985	457.	2.740	68.	0.036	16.464	0.098	2.483
	2 16 HG	133.	1.860	13.770	1975.	0.976	129.	1.816	1929.	0.089	11.562	0.161	171.705
	3 10 HG	115.	1.570	13.910	2965.	0.978	112.	1.536	2901.	0.257	28.918	0.394	745.591
	4 16 HG	129.	2.030	13.770	2025.	0.971	125.	1.972	1967.	0.089	11.154	0.175	175.100
	5 19 HG	115.	1.590	14.050	887.	0.968	111.	1.540	859.	0.047	5.235	0.072	40.382
	6 16 HG	133.	2.050	13.480	2011.	0.989	131.	2.029	1990.	0.089	11.716	0.180	177.162
	7 3 HG	133.	4.790	11.920	1946.	1.002	133.	4.803	1951.	0.283	37.746	1.359	552.293
	8 16 HG	129.	2.130	13.770	2088.	0.968	124.	2.062	2021.	0.089	11.117	0.183	179.945
	9 C.T.	6215.	2.510	6.950	198.	0.972	6041.	2.439	192.	0.021	126.864	0.051	4.041
	SUM----------(CYCLE COMPOSITE)----------										260.781	2.677	2048.708
CYCLE 4													
	1 IDLE	464.	2.780	12.820	70.	0.985	457.	2.740	68.	0.036	16.464	0.098	2.483
	2 16 HG	133.	1.980	13.770	2076.	0.972	129.	1.926	2019.	0.089	11.516	0.171	179.759
	3 10 HG	111.	1.660	13.910	3001.	0.975	108.	1.619	2928.	0.257	27.836	0.416	752.578
	4 16 HG	129.	1.990	13.770	2105.	0.972	125.	1.936	2047.	0.089	11.169	0.172	182.262
	5 19 HG	111.	1.460	14.050	1223.	0.973	108.	1.420	1190.	0.047	5.076	0.066	55.938
	6 16 HG	133.	2.070	13.770	2061.	0.969	129.	2.007	1999.	0.089	11.481	0.178	177.923
	7 3 HG	133.	4.840	11.920	1932.	1.001	133.	4.845	1934.	0.283	37.681	1.371	547.373
	8 16 HG	129.	2.280	13.770	1997.	0.963	124.	2.196	1924.	0.089	11.061	0.195	171.245
	9 C.T.	5595.	2.300	7.190	216.	1.008	5640.	2.318	217.	0.021	118.454	0.048	4.573
	SUM----------(CYCLE COMPOSITE)----------										250.742	2.719	2074.139

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 251.220 2.746 1986.861

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 255.762 2.698 2061.423

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(251.220)	+ 0.65*(255.762)	=	254.172	PPM
CO	0.35*(2.746)	+ 0.65*(2.698)	=	2.715	PERCENT
NO(K)	0.35*(1986.861)	+ 0.65*(2061.423)	=	2035.326	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-22. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–STATIONARY DYNAMOMETER–COLD START PROCEDURE

APR 29 71 69 FORD 300 STATIONARY RUN 1 S K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	CONCENTRATION AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	569.	4.240	12.430	25.	0.956	544.	4.054	23.	0.036	19.586	0.145	0.860
	2 16 HG	151.	1.450	14.660	1690.	0.932	140.	1.352	1576.	0.089	12.533	0.120	140.271
	3 10 HG	122.	1.790	14.180	2255.	0.953	116.	1.706	2151.	0.257	29.896	0.438	552.845
	4 16 HG	125.	1.240	14.840	2099.	0.929	116.	1.152	1951.	0.089	10.343	0.102	173.694
	5 19 HG	99.	0.730	15.090	1187.	0.932	82.	0.680	1106.	0.047	3.900	0.031	52.018
	6 16 HG	115.	1.200	15.260	2143.	0.907	104.	1.088	1944.	0.089	9.284	0.096	173.017
	7 3 HG	125.	4.960	12.470	1657.	0.961	120.	4.767	1592.	0.283	34.003	1.349	450.745
	8 16 HG	120.	1.610	14.790	1961.	0.922	110.	1.484	1808.	0.089	9.848	0.132	160.937
	9 C.T.	4997.	2.350	8.160	182.	0.984	4918.	2.313	179.	0.021	103.286	0.048	3.761
	SUM----------(CYCLE COMPOSITE)----------										232.682	2.466	1708.150
CYCLE 2													
	1 IDLE	569.	4.240	12.430	25.	0.956	544.	4.054	23.	0.036	19.586	0.145	0.860
	2 16 HG	125.	2.250	14.790	1982.	0.903	112.	2.032	1790.	0.089	10.050	0.180	159.362
	3 10 HG	107.	1.580	14.530	2800.	0.939	100.	1.484	2630.	0.257	25.832	0.381	675.984
	4 16 HG	115.	1.520	14.790	2114.	0.925	106.	1.406	1955.	0.089	9.468	0.125	174.051
	5 19 HG	96.	1.070	15.090	1332.	0.921	88.	0.986	1227.	0.047	4.159	0.046	57.713
	6 16 HG	120.	1.650	14.790	2033.	0.920	110.	1.519	1872.	0.089	9.835	0.135	166.634
	7 3 HG	125.	5.000	12.470	1883.	0.959	119.	4.799	1807.	0.283	33.958	1.358	511.545
	8 16 HG	120.	1.700	14.790	2004.	0.919	110.	1.563	1842.	0.089	9.820	0.139	163.996
	9 C.T.	5060.	2.630	8.130	156.	0.972	4920.	2.557	151.	0.021	103.339	0.053	3.185
	SUM----------(CYCLE COMPOSITE)----------										226.050	2.566	1913.334
CYCLE 3													
	1 IDLE	348.	2.870	13.480	77.	0.948	330.	2.721	73.	0.036	11.880	0.097	2.628
	2 16 HG	133.	1.770	14.660	2011.	0.924	122.	1.635	1858.	0.089	10.940	0.145	165.418
	3 10 HG	120.	1.640	14.660	2343.	0.928	111.	1.523	2640.	0.257	28.647	0.391	678.713
	4 16 HG	165.	1.570	14.790	2091.	0.920	151.	1.445	1924.	0.089	13.516	0.128	171.294
	5 19 HG	106.	1.270	14.940	1344.	0.924	97.	1.173	1242.	0.047	4.604	0.055	58.378
	6 16 HG	124.	1.800	14.660	2120.	0.923	114.	1.663	1958.	0.089	10.196	0.148	174.326
	7 3 HG	139.	4.840	12.590	1870.	0.957	123.	4.632	1789.	0.283	34.942	1.311	506.527
	8 16 HG	125.	1.910	14.660	2054.	0.920	115.	1.758	1890.	0.089	10.242	0.156	168.297
	9 C.T.	5094.	2.710	7.590	171.	1.003	5112.	2.720	171.	0.021	107.370	0.057	3.604
	SUM----------(CYCLE COMPOSITE)----------										232.339	2.491	1929.189
CYCLE 4													
	1 IDLE	348.	2.870	13.480	77.	0.948	330.	2.721	73.	0.036	11.880	0.097	2.628
	2 16 HG	133.	1.770	14.660	2098.	0.924	122.	1.635	1939.	0.089	10.940	0.145	172.575
	3 10 HG	111.	1.710	14.660	2808.	0.927	102.	1.585	2604.	0.257	26.456	0.407	669.273
	4 16 HG	120.	1.890	14.660	1989.	0.921	110.	1.741	1832.	0.089	9.842	0.155	163.131
	5 19 HG	111.	1.560	14.790	1271.	0.924	102.	1.441	1174.	0.047	4.821	0.067	55.206
	6 16 HG	125.	2.020	14.650	2010.	0.917	114.	1.853	1844.	0.089	10.206	0.164	164.119
	7 3 HG	129.	4.930	12.590	1961.	0.954	123.	4.704	1871.	0.283	34.838	1.331	529.603
	8 16 HG	129.	2.600	14.530	2025.	0.907	117.	2.360	1838.	0.089	10.424	0.210	163.642
	9 C.T.	5214.	2.650	7.610	166.	0.995	5190.	2.637	165.	0.021	108.996	0.055	3.470
	SUM----------(CYCLE COMPOSITE)----------										228.406	2.635	1923.650

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 229.366 2.516 1810.742

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 230.373 2.563 1926.420

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(229.366)	+ 0.65*(230.373)	=	230.020	PPM
CO	0.35*(2.516)	+ 0.65*(2.563)	=	2.547	PERCENT
NO(K)	0.35*(1810.742)	+ 0.65*(1926.420)	=	1885.932	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-23. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–CHASSIS DYNAMOMETER–COLD START PROCEDURE

1969 TRUCK 94877 5-7-71 CID300 GVW 15000 W/D=71/76 K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1296.	2.524	10.070	77.	1.138	1476.	2.874	87.	0.036	53.136	0.103	3.157
	2 16 MG	143.	1.020	13.890	2009.	0.998	142.	1.016	2001.	0.089	12.679	0.090	178.132
	3 10 MG	119.	1.491	13.380	2665.	1.017	121.	1.516	2710.	0.257	31.110	0.389	696.724
	4 16 MG	114.	0.816	13.950	2534.	1.001	114.	0.817	2537.	0.089	10.159	0.072	225.820
	5 19 MG	80.	0.435	13.950	1304.	1.017	81.	0.442	1326.	0.047	3.824	0.020	62.346
	6 16 MG	117.	0.921	13.850	2397.	1.004	117.	0.925	2407.	0.089	10.458	0.082	214.266
	7 3 MG	132.	5.033	11.170	1784.	1.048	138.	5.277	1870.	0.283	39.168	1.493	529.366
	8 16 MG	116.	1.004	13.840	2430.	1.002	116.	1.006	2435.	0.089	10.347	0.089	216.759
	9 C.T.	4509.	1.714	7.020	199.	1.137	5129.	1.949	226.	0.021	107.713	0.040	4.753
	SUM----------(CYCLE COMPOSITE)----------										278.597	2.383	2131.325
CYCLE 2													
	1 IDLE	1296.	2.524	10.070	77.	1.138	1476.	2.874	87.	0.036	53.136	0.103	3.157
	2 16 MG	142.	1.450	13.710	2065.	0.993	141.	1.441	2052.	0.089	12.561	0.128	182.671
	3 10 MG	117.	1.452	13.610	3000.	1.002	117.	1.455	3007.	0.257	30.147	0.374	773.006
	4 16 MG	123.	1.378	13.750	2357.	0.995	122.	1.371	2345.	0.089	10.893	0.122	208.738
	5 19 MG	97.	0.763	13.930	1515.	1.005	97.	0.767	1523.	0.047	4.585	0.036	71.618
	6 16 MG	128.	1.414	13.690	2306.	0.997	127.	1.410	2300.	0.089	11.364	0.125	204.736
	7 3 MG	126.	4.820	11.260	1976.	1.050	132.	5.062	2075.	0.283	37.450	1.432	587.314
	8 16 MG	121.	1.351	13.660	2395.	1.002	121.	1.354	2400.	0.089	10.794	0.120	213.653
	9 C.T.	4805.	1.992	6.650	235.	1.129	5428.	2.250	265.	0.021	113.991	0.047	5.575
	SUM----------(CYCLE COMPOSITE)----------										284.923	2.489	2250.472
CYCLE 3													
	1 IDLE	235.	3.544	11.410	173.	1.079	253.	3.824	186.	0.036	9.130	0.137	6.721
	2 16 MG	148.	1.594	13.640	2072.	0.993	147.	1.583	2058.	0.089	13.084	0.140	183.184
	3 10 MG	124.	1.428	13.660	3087.	0.999	123.	1.427	3085.	0.257	31.850	0.366	792.925
	4 16 MG	131.	1.588	13.680	2369.	0.992	129.	1.575	2350.	0.089	11.566	0.140	209.175
	5 19 MG	111.	0.948	13.900	1609.	1.000	111.	0.948	1609.	0.047	5.219	0.044	75.654
	6 16 MG	131.	1.575	13.640	2302.	0.995	130.	1.567	2291.	0.089	11.603	0.139	203.907
	7 3 MG	129.	4.799	11.290	2138.	1.048	135.	5.031	2241.	0.293	38.278	1.424	634.420
	8 16 MG	128.	1.416	13.690	2475.	0.997	127.	1.412	2468.	0.089	11.363	0.125	219.725
	9 C.T.	4601.	2.168	6.790	376.	1.129	5194.	2.447	424.	0.021	109.086	0.051	8.914
	SUM----------(CYCLE COMPOSITE)----------										241.183	2.570	2334.630
CYCLE 4													
	1 IDLE	235.	3.544	11.410	173.	1.079	253.	3.824	186.	0.036	9.130	0.137	6.721
	2 16 MG	150.	1.637	13.560	2190.	0.997	149.	1.632	2183.	0.089	13.312	0.145	194.367
	3 10 MG	123.	1.342	13.690	3274.	1.000	123.	1.342	3275.	0.257	31.624	0.345	841.775
	4 16 MG	131.	1.552	13.620	2498.	0.997	130.	1.547	2491.	0.089	11.628	0.137	221.748
	5 19 MG	106.	0.965	13.900	1615.	1.000	106.	0.965	1615.	0.047	4.983	0.045	75.920
	6 16 MG	128.	1.511	13.610	2442.	0.999	127.	1.510	2441.	0.089	11.389	0.134	217.281
	7 3 MG	127.	4.786	11.170	2266.	1.058	134.	5.065	2398.	0.283	38.039	1.433	678.716
	8 16 MG	125.	1.468	13.660	2565.	0.998	124.	1.465	2559.	0.089	11.102	0.130	227.829
	9 C.T.	4899.	2.239	6.330	355.	1.138	5575.	2.548	404.	0.021	117.087	0.053	8.484
	SUM----------(CYCLE COMPOSITE)----------										248.299	2.563	2472.846

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 281.760 2.436 2190.898

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 244.741 2.566 2403.738

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(281.760)	+ 0.65*(244.741)	=	257.697	PPM
CO	0.35*(2.436)	+ 0.65*(2.566)	=	2.521	PERCENT
NO(K)	0.35*(2190.898)	+ 0.65*(2403.738)	=	2329.244	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-24. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 FORD, 300-CID–CHASSIS DYNAMOMETER– COLD START PROCEDURE

1969 TRUCK 94877 5-8-71 CID300 GVW 15000 W/D=71/76 K = 1.0000

FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1												
1 IDLE	809.	2.925	10.670	81.	1.119	905.	3.161	90.	0.036	32.594	0.113	3.263
2 16 HG	196.	1.364	13.780	1981.	0.988	193.	1.347	1957.	0.089	17.237	0.119	174.222
3 10 HG	135.	1.493	13.370	2742.	1.016	137.	1.517	2787.	0.257	35.273	0.390	716.438
4 16 HG	122.	0.801	13.950	2622.	1.001	122.	0.801	2625.	0.089	10.871	0.071	233.643
5 19 HG	96.	0.426	13.990	1319.	1.014	87.	0.432	1337.	0.047	4.099	0.020	62.878
6 16 HG	118.	0.803	13.950	2647.	1.001	118.	0.804	2650.	0.089	10.517	0.071	235.925
7 3 HG	133.	4.935	11.220	1802.	1.048	139.	5.173	1889.	0.283	39.459	1.464	534.627
8 16 HG	116.	0.871	13.960	2538.	0.998	115.	0.869	2534.	0.089	10.309	0.077	225.558
9 C.T.	4566.	1.758	6.940	213.	1.137	5192.	1.999	242.	0.021	109.044	0.041	5.086
SUM----------(CYCLE COMPOSITE)----------										269.406	2.370	2191.644
CYCLE 2												
1 IDLE	809.	2.925	10.670	81.	1.119	905.	3.161	90.	0.036	32.594	0.113	3.263
2 16 HG	146.	1.331	13.760	2204.	0.994	145.	1.323	2191.	0.089	12.919	0.117	195.037
3 10 HG	118.	1.396	13.660	3123.	1.001	118.	1.397	3126.	0.257	30.356	0.359	803.417
4 16 HG	121.	1.366	13.770	2528.	0.994	120.	1.358	2513.	0.089	10.707	0.120	223.701
5 19 HG	95.	0.936	13.870	1643.	1.004	95.	0.939	1649.	0.047	4.483	0.044	77.538
6 16 HG	125.	1.337	13.760	2467.	0.995	124.	1.331	2456.	0.089	11.076	0.118	218.605
7 3 HG	123.	4.919	11.260	2041.	1.046	128.	5.148	2136.	0.283	36.436	1.457	604.608
8 16 HG	117.	1.219	13.840	2530.	0.994	116.	1.212	2516.	0.089	10.358	0.107	223.998
9 C.T.	4785.	2.062	6.630	267.	1.130	5408.	2.330	301.	0.021	113.575	0.048	6.337
SUM----------(CYCLE COMPOSITE)----------										262.508	2.468	2356.507
CYCLE 3												
1 IDLE	230.	3.933	11.570	208.	1.051	241.	4.137	218.	0.036	8.709	0.148	7.876
2 16 HG	142.	1.547	13.710	2254.	0.990	140.	1.532	2232.	0.089	12.519	0.136	198.730
3 10 HG	114.	1.395	13.710	3231.	0.997	113.	1.392	3224.	0.257	29.236	0.357	828.617
4 16 HG	123.	1.484	13.760	2465.	0.990	121.	1.470	2442.	0.089	10.846	0.130	217.363
5 19 HG	97.	0.874	13.960	1583.	0.999	96.	0.873	1582.	0.047	4.558	0.041	74.391
6 16 HG	125.	1.472	13.750	2467.	0.991	123.	1.459	2446.	0.089	11.032	0.129	217.745
7 3 HG	124.	4.848	11.360	2174.	1.041	129.	5.050	2264.	0.283	36.559	1.429	640.972
8 16 HG	122.	1.451	13.750	2540.	0.992	121.	1.440	2521.	0.089	10.778	0.128	224.400
9 C.T.	4968.	2.252	6.330	318.	1.130	5618.	2.546	359.	0.021	117.986	0.053	7.552
SUM----------(CYCLE COMPOSITE)----------										242.227	2.555	2417.650
CYCLE 4												
1 IDLE	230.	3.933	11.570	208.	1.051	241.	4.137	218.	0.036	8.709	0.148	7.876
2 16 HG	139.	1.596	13.740	2327.	0.987	137.	1.575	2297.	0.089	12.212	0.140	204.450
3 10 HG	117.	1.408	13.700	3343.	0.997	116.	1.405	3336.	0.257	30.006	0.361	857.355
4 16 HG	123.	1.528	13.750	2521.	0.989	121.	1.512	2495.	0.089	10.837	0.134	222.119
5 19 HG	105.	1.034	13.830	1756.	1.002	105.	1.036	1760.	0.047	4.948	0.048	82.758
6 16 HG	127.	1.570	13.710	2538.	0.990	125.	1.555	2515.	0.089	11.200	0.138	223.841
7 3 HG	124.	4.852	11.320	2320.	1.044	129.	5.068	2423.	0.283	36.659	1.434	685.891
8 16 HG	121.	1.455	13.750	2677.	0.992	120.	1.444	2657.	0.089	10.689	0.128	236.488
9 C.T.	4777.	2.303	6.510	407.	1.130	5402.	2.604	460.	0.021	113.457	0.054	9.665
SUM----------(CYCLE COMPOSITE)----------										238.721	2.589	2530.448

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 265.957 2.429 2274.076

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 240.474 2.572 2474.049

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(265.957) + 0.65*(240.474) =	249.393	PPM
CO	0.35*(2.429) + 0.65*(2.572) =	2.522	PERCENT
NO(K)	0.35*(2274.076) + 0.65*(2474.049) =	2404.059	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-25. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–STATIONARY DYNAMOMETER

JUNE 24 71 69 DODGE 318CID FEDERAL CYCLE AFTER 1HR SOAK STATIONARY K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1228.	0.661	12.170	80.	1.048	1287.	0.693	83.	0.036	46.360	0.024	3.020
	2 16 MG	208.	1.459	13.430	2072.	1.008	209.	1.470	2088.	0.089	18.661	0.130	185.893
	3 10 MG	103.	1.185	13.480	2562.	1.022	105.	1.211	2619.	0.257	27.061	0.311	673.115
	4 16 MG	129.	1.654	13.480	1983.	1.003	129.	1.660	1990.	0.089	11.523	0.147	177.142
	5 19 MG	127.	2.287	13.000	759.	1.015	128.	2.322	770.	0.047	6.060	0.109	36.220
	6 16 MG	134.	1.749	13.340	1978.	1.009	135.	1.766	1997.	0.089	12.042	0.157	177.767
	7 3 MG	178.	6.978	9.850	354.	1.071	190.	7.477	379.	0.283	53.980	2.116	107.354
	8 16 MG	144.	2.106	13.160	1861.	1.009	145.	2.125	1878.	0.089	12.933	0.189	167.144
	9 C.T.	3536.	1.893	8.930	98.	1.058	3743.	2.004	103.	0.021	78.618	0.042	2.178
	SUM----------(CYCLE COMPOSITE)----------										267.242	3.228	1529.838
CYCLE 2													
	1 IDLE	1228.	0.661	12.170	80.	1.048	1287.	0.693	83.	0.036	46.360	0.024	3.020
	2 16 MG	163.	1.777	13.340	1971.	1.006	164.	1.788	1984.	0.089	14.603	0.159	176.581
	3 10 MG	107.	1.464	13.330	2572.	1.022	109.	1.497	2630.	0.257	28.124	0.384	676.037
	4 16 MG	139.	2.206	13.080	1844.	1.011	140.	2.231	1865.	0.089	12.515	0.198	166.026
	5 19 MG	138.	2.777	12.850	772.	1.007	139.	2.798	778.	0.047	6.536	0.131	36.567
	6 16 MG	140.	1.970	13.230	1930.	1.009	141.	1.988	1947.	0.089	12.576	0.176	173.369
	7 3 MG	174.	7.065	9.860	353.	1.067	185.	7.543	376.	0.283	52.576	2.134	106.663
	8 16 MG	141.	2.199	13.120	1819.	1.008	142.	2.218	1835.	0.089	12.660	0.197	163.335
	9 C.T.	3326.	2.023	9.130	112.	1.055	3511.	2.135	118.	0.021	73.743	0.044	2.483
	SUM----------(CYCLE COMPOSITE)----------										259.697	3.453	1504.085
CYCLE 3													
	1 IDLE	762.	1.089	12.920	135.	1.014	773.	1.105	137.	0.036	27.840	0.039	4.932
	2 16 MG	170.	1.887	13.250	1948.	1.008	171.	1.903	1964.	0.089	15.259	0.169	174.854
	3 10 MG	108.	1.495	13.310	2524.	1.022	110.	1.529	2582.	0.257	28.394	0.393	663.580
	4 16 MG	136.	1.945	13.260	1871.	1.008	137.	1.961	1886.	0.089	12.205	0.174	167.915
	5 19 MG	135.	2.626	12.940	783.	1.007	135.	2.644	788.	0.047	6.389	0.124	37.059
	6 16 MG	136.	2.089	13.230	1867.	1.005	136.	2.100	1877.	0.089	12.169	0.186	167.068
	7 3 MG	174.	7.105	9.850	385.	1.066	185.	7.580	410.	0.283	52.537	2.145	116.247
	8 16 MG	141.	2.262	13.150	1736.	1.004	141.	2.272	1744.	0.089	12.607	0.202	155.218
	9 C.T.	3279.	1.900	9.330	135.	1.049	3440.	1.993	141.	0.021	72.240	0.041	2.974
	SUM----------(CYCLE COMPOSITE)----------										239.643	3.477	1489.850
CYCLE 4													
	1 IDLE	762.	1.089	12.920	135.	1.014	773.	1.105	137.	0.036	27.840	0.039	4.932
	2 16 MG	161.	1.722	13.480	2074.	0.998	160.	1.720	2071.	0.089	14.314	0.153	184.396
	3 10 MG	103.	1.439	13.580	2655.	1.006	103.	1.447	2671.	0.257	26.634	0.372	686.561
	4 16 MG	131.	1.816	13.530	2061.	0.994	130.	1.806	2049.	0.089	11.595	0.160	182.429
	5 19 MG	131.	2.599	13.090	985.	0.997	130.	2.593	982.	0.047	6.143	0.121	46.196
	6 16 MG	137.	2.068	13.350	1998.	0.997	136.	2.063	1993.	0.089	12.166	0.183	177.430
	7 3 MG	171.	6.964	9.870	436.	1.071	183.	7.459	467.	0.283	51.836	2.111	132.168
	8 16 MG	132.	2.119	13.120	1914.	1.012	133.	2.145	1937.	0.089	11.893	0.190	172.462
	9 C.T.	3142.	1.954	9.450	175.	1.049	3296.	2.050	183.	0.021	69.226	0.043	3.855
	SUM----------(CYCLE COMPOSITE)----------										231.652	3.376	1590.433
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------										263.469	3.340	1516.961
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------										235.647	3.426	1540.142

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(263.469)	+ 0.65*(235.647)	=	245.385	PPM
CO	0.35*(3.340)	+ 0.65*(3.426)	=	3.396	PERCENT
NO(K)	0.35*(1516.961)	+ 0.65*(1540.142)	=	1532.029	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-26. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–STATIONARY DYNAMOMETER

JUNE-25-71 69 DODGE 318CID 9-MODE FED CYCLE 1HR SOAK STATIONARY K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	CONCENTRATION CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	1327.	0.780	12.890	88.	0.985	1307.	0.768	86.	0.036	47.079	0.027	3.122
	2 16 MG	138.	1.870	14.000	1799.	0.961	132.	1.797	1729.	0.089	11.806	0.159	153.911
	3 10 MG	103.	1.427	14.140	2426.	0.968	99.	1.382	2350.	0.257	25.648	0.355	604.119
	4 16 MG	129.	1.803	14.160	1919.	0.953	123.	1.719	1830.	0.089	10.951	0.153	162.916
	5 19 MG	179.	2.291	13.920	697.	0.950	170.	2.177	662.	0.047	7.994	0.102	31.129
	6 16 MG	137.	2.123	13.980	1719.	0.954	130.	2.026	1640.	0.089	11.639	0.180	146.046
	7 3 MG	181.	7.804	10.370	302.	1.002	181.	7.821	302.	0.283	51.336	2.213	85.658
	8 16 MG	141.	2.221	13.910	1691.	0.955	134.	2.122	1616.	0.089	11.992	0.188	143.825
	9 C.T.	3978.	2.127	9.360	137.	0.985	3918.	2.095	134.	0.021	82.290	0.044	2.834
	SUM----------(CYCLE COMPOSITE)----------										260.742	3.425	1333.564
CYCLE 2													
	1 IDLE	1327.	0.780	12.890	88.	0.985	1307.	0.768	86.	0.036	47.079	0.027	3.122
	2 16 MG	169.	2.232	13.840	1715.	0.957	161.	2.137	1642.	0.089	14.406	0.190	146.197
	3 10 MG	100.	1.384	14.170	2481.	0.968	96.	1.340	2403.	0.257	24.893	0.344	617.598
	4 16 MG	139.	2.024	14.030	1860.	0.954	132.	1.931	1775.	0.089	11.807	0.171	157.998
	5 19 MG	141.	2.521	13.740	828.	0.956	134.	2.412	792.	0.047	6.341	0.113	37.239
	6 16 MG	143.	2.177	13.970	1730.	0.953	136.	2.074	1648.	0.089	12.130	0.184	146.754
	7 3 MG	183.	7.754	10.460	380.	0.997	182.	7.735	379.	0.283	51.665	2.189	107.283
	8 16 MG	146.	2.456	13.830	1795.	0.952	139.	2.340	1710.	0.089	12.332	0.208	152.240
	9 C.T.	3922.	2.212	9.300	198.	0.990	3884.	2.190	196.	0.021	81.564	0.046	4.117
	SUM----------(CYCLE COMPOSITE)----------										262.272	3.475	1372.551
CYCLE 3													
	1 IDLE	794.	1.306	13.500	198.	0.965	766.	1.251	191.	0.036	27.611	0.045	6.885
	2 16 MG	159.	2.093	14.100	1802.	0.946	150.	1.981	1705.	0.089	13.395	0.176	151.811
	3 10 MG	112.	1.684	14.090	2461.	0.963	107.	1.622	2370.	0.257	27.726	0.416	609.243
	4 16 MG	139.	2.046	14.000	1924.	0.955	132.	1.955	1838.	0.089	11.822	0.174	163.639
	5 19 MG	154.	2.608	13.680	804.	0.957	147.	2.496	769.	0.047	6.927	0.117	36.165
	6 16 MG	143.	2.262	13.860	1932.	0.957	136.	2.165	1849.	0.089	12.184	0.192	164.620
	7 3 MG	180.	7.749	10.400	420.	1.002	180.	7.765	420.	0.283	51.049	2.197	119.115
	8 16 MG	144.	2.358	13.750	1890.	0.961	138.	2.266	1816.	0.089	12.319	0.201	161.691
	9 C.T.	3707.	2.171	9.430	233.	0.998	3702.	2.168	232.	0.021	77.744	0.045	4.886
	SUM----------(CYCLE COMPOSITE)----------										240.781	3.567	1418.060
CYCLE 4													
	1 IDLE	794.	1.306	13.500	198.	0.955	766.	1.261	191.	0.036	27.611	0.045	6.885
	2 16 MG	157.	2.040	14.030	1892.	0.952	149.	1.943	1802.	0.089	13.312	0.172	160.426
	3 10 MG	109.	1.630	14.120	2496.	0.963	104.	1.570	2404.	0.257	26.984	0.403	617.917
	4 16 MG	141.	2.281	13.890	1929.	0.955	134.	2.178	1842.	0.089	11.984	0.193	163.960
	5 19 MG	139.	2.727	13.660	903.	0.955	132.	2.605	862.	0.047	6.242	0.122	40.556
	6 16 MG	144.	2.296	13.900	1787.	0.953	137.	2.189	1713.	0.089	12.222	0.194	152.532
	7 3 MG	179.	7.474	10.510	497.	1.004	179.	7.504	499.	0.283	50.866	2.123	141.232
	8 16 MG	138.	2.209	13.950	1939.	0.953	131.	2.106	1849.	0.089	11.713	0.187	164.585
	9 C.T.	3394.	2.019	10.100	262.	0.981	3330.	1.981	257.	0.021	69.947	0.041	5.399
	SUM----------(CYCLE COMPOSITE)----------										230.886	3.486	1453.497

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 261.507 3.450 1353.058

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 235.833 3.526 1435.778

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(261.507) + 0.65*(235.833)	=	244.819	PPM
CO	0.35*(3.450) + 0.65*(3.526)	=	3.500	PERCENT
NO(K)	0.35*(1353.058) + 0.65*(1435.778)	=	1406.326	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-27. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–STATIONARY DYNAMOMETER

JUNE 25 71 69 DODGE 318CID 9-MODE FED CYCLE 1HR SOAK STATIONARY K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1006.	0.898	12.980	181.	1.005	1011.	0.903	182.	0.036	36.428	0.032	6.554
	2 16 HG	151.	1.675	13.680	1920.	0.987	149.	1.654	1896.	0.089	13.273	0.147	168.778
	3 10 HG	118.	1.394	13.880	2581.	0.986	116.	1.374	2545.	0.257	29.904	0.353	654.094
	4 16 HG	139.	1.783	13.920	2020.	0.969	134.	1.727	1957.	0.089	11.989	0.153	174.233
	5 19 HG	135.	2.204	13.730	944.	0.968	130.	2.133	913.	0.047	6.142	0.100	42.952
	6 16 HG	138.	1.567	14.130	2239.	0.962	132.	1.508	2155.	0.089	11.823	0.134	191.829
	7 3 HG	181.	6.924	10.710	668.	1.009	182.	6.987	674.	0.283	51.695	1.977	190.787
	8 16 HG	145.	2.459	13.890	2075.	0.949	137.	2.334	1969.	0.089	12.249	0.207	175.292
	9 C.T.	3794.	2.024	9.580	439.	0.987	3745.	1.997	433.	0.021	78.546	0.041	9.100
	SUM----------(CYCLE COMPOSITE)----------										252.152	3.148	1613.621
CYCLE 2													
	1 IDLE	1006.	0.898	12.880	181.	1.005	1011.	0.903	182.	0.036	36.428	0.032	6.554
	2 16 HG	249.	1.987	13.850	2061.	0.959	237.	1.906	1977.	0.089	21.179	0.169	176.008
	3 10 HG	123.	1.697	14.010	2569.	0.967	118.	1.641	2484.	0.257	30.574	0.421	638.593
	4 16 HG	149.	2.134	13.890	2110.	0.959	142.	2.046	2023.	0.089	12.718	0.182	180.114
	5 19 HG	166.	2.759	13.600	1090.	0.956	158.	2.639	1042.	0.047	7.462	0.124	49.003
	6 16 HG	153.	2.144	13.980	2041.	0.952	145.	2.042	1944.	0.089	12.975	0.191	173.087
	7 3 HG	188.	7.332	10.470	632.	1.011	190.	7.414	639.	0.283	53.801	2.098	180.863
	8 16 HG	154.	2.272	13.680	1951.	0.967	149.	2.199	1889.	0.089	13.264	0.195	168.049
	9 C.T.	3911.	2.166	9.360	469.	0.988	3866.	2.141	463.	0.021	81.196	0.044	9.736
	SUM----------(CYCLE COMPOSITE)----------										269.601	3.450	1582.011
CYCLE 3													
	1 IDLE	824.	1.212	13.530	459.	0.964	795.	1.169	442.	0.036	28.625	0.042	15.945
	2 16 HG	166.	1.944	13.960	2059.	0.959	159.	1.865	1975.	0.089	14.176	0.166	175.838
	3 10 HG	121.	1.585	14.050	2620.	0.968	117.	1.534	2537.	0.257	30.114	0.394	652.061
	4 16 HG	147.	2.018	13.970	2086.	0.957	140.	1.932	1998.	0.089	12.531	0.172	177.832
	5 19 HG	141.	2.584	13.600	1078.	0.963	135.	2.490	1038.	0.047	6.387	0.117	48.832
	6 16 HG	147.	2.065	13.870	1975.	0.962	141.	1.988	1901.	0.089	12.595	0.176	169.224
	7 3 HG	182.	7.047	10.530	659.	1.017	185.	7.170	670.	0.283	52.409	2.029	189.768
	8 16 HG	147.	2.189	13.760	1878.	0.965	141.	2.114	1813.	0.089	12.635	0.188	161.427
	9 C.T.	3656.	2.114	9.670	460.	0.988	3612.	2.089	454.	0.021	75.857	0.043	9.544
	SUM----------(CYCLE COMPOSITE)----------										245.333	3.329	1600.475
CYCLE 4													
	1 IDLE	824.	1.212	13.530	459.	0.964	795.	1.169	442.	0.036	28.625	0.042	15.945
	2 16 HG	166.	1.915	14.080	2087.	0.952	158.	1.824	1988.	0.089	14.078	0.162	176.993
	3 10 HG	115.	1.603	14.160	2569.	0.961	110.	1.540	2469.	0.257	28.407	0.395	634.599
	4 16 HG	147.	2.128	14.060	2060.	0.948	139.	2.019	1954.	0.089	12.412	0.179	173.949
	5 19 HG	152.	2.605	13.810	1031.	0.949	144.	2.472	978.	0.047	6.780	0.116	45.993
	6 16 HG	143.	2.027	14.060	2060.	0.952	136.	1.930	1961.	0.089	12.118	0.171	174.575
	7 3 HG	184.	7.361	10.500	667.	1.008	185.	7.422	672.	0.283	52.509	2.100	190.346
	8 16 HG	147.	2.182	13.870	1943.	0.959	140.	2.092	1863.	0.089	12.546	0.186	165.838
	9 C.T.	3524.	2.047	9.900	481.	0.984	3469.	2.015	473.	0.021	72.851	0.042	9.943
	SUM----------(CYCLE COMPOSITE)----------										240.331	3.397	1588.186

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 260.877 3.299 1597.816

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 242.832 3.363 1594.331

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(260.877)	+ 0.65*(242.832)	=	249.148	PPM
CO	0.35*(3.299)	+ 0.65*(3.363)	=	3.341	PERCENT
NO(K)	0.35*(1597.816)	+ 0.65*(1594.331)	=	1595.551	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-28. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–CHASSIS DYNAMOMETER

JULY 1-71 69 DODGE 318CID V8 DODGE FED 9-MODE AFTER1HRSOAK CHA 6F/74 K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1360.	0.677	12.280	49.	1.029	1399.	0.696	50.	0.036	50.394	0.025	1.815
	2 16 HG	157.	1.802	14.010	1865.	0.961	150.	1.732	1793.	0.089	13.435	0.154	159.595
	3 10 HG	110.	0.729	14.560	2775.	0.963	106.	0.702	2674.	0.257	27.249	0.180	687.416
	4 16 HG	145.	2.394	13.850	1517.	0.953	138.	2.283	1446.	0.089	12.307	0.203	128.764
	5 19 HG	154.	3.023	13.550	886.	0.952	146.	2.878	843.	0.047	6.892	0.135	39.651
	6 16 HG	135.	1.626	14.360	2053.	0.946	127.	1.539	1943.	0.089	11.372	0.136	172.950
	7 3 HG	180.	6.942	10.830	321.	1.000	180.	6.944	321.	0.283	50.956	1.965	90.871
	8 16 HG	146.	2.120	14.100	1917.	0.946	138.	2.006	1814.	0.089	12.300	0.178	161.505
	9 C.T.	4351.	1.821	7.910	87.	1.072	4666.	1.953	93.	0.021	97.997	0.041	1.959
	SUM----------(CYCLE COMPOSITE)----------										282.904	3.020	1444.532
CYCLE 2													
	1 IDLE	1360.	0.677	12.280	49.	1.029	1399.	0.696	50.	0.036	50.394	0.025	1.815
	2 16 HG	142.	1.855	14.190	1974.	0.949	134.	1.761	1874.	0.089	12.000	0.156	166.817
	3 10 HG	107.	0.755	14.730	3163.	0.952	101.	0.719	3012.	0.257	26.192	0.184	774.280
	4 16 HG	142.	2.133	14.120	1927.	0.945	134.	2.015	1821.	0.089	11.946	0.179	162.113
	5 19 HG	152.	2.564	13.870	947.	0.946	143.	2.427	896.	0.047	6.763	0.114	42.137
	6 16 HG	150.	2.346	14.070	1815.	0.941	141.	2.208	1708.	0.089	12.565	0.196	152.045
	7 3 HG	177.	7.078	10.720	307.	1.003	177.	7.102	308.	0.283	50.263	2.009	87.180
	8 16 HG	151.	2.416	13.990	1901.	0.943	142.	2.280	1794.	0.089	12.685	0.202	159.704
	9 C.T.	4211.	1.595	8.270	95.	1.064	4484.	1.698	101.	0.021	94.176	0.035	2.124
	SUM----------(CYCLE COMPOSITE)----------										276.968	3.105	1548.219
CYCLE 3													
	1 IDLE	1063.	1.095	13.480	163.	0.955	1015.	1.046	155.	0.036	36.564	0.037	5.606
	2 16 HG	146.	1.953	14.200	1975.	0.945	138.	1.846	1867.	0.089	12.287	0.164	166.212
	3 10 HG	110.	1.054	14.730	2998.	0.943	103.	0.993	2827.	0.257	26.659	0.255	726.599
	4 16 HG	140.	2.116	14.170	1970.	0.942	131.	1.995	1857.	0.089	11.747	0.177	165.306
	5 19 HG	148.	2.493	14.010	1097.	0.940	139.	2.344	1031.	0.047	6.542	0.110	48.494
	6 16 HG	142.	2.075	14.270	1971.	0.937	133.	1.946	1848.	0.089	11.852	0.173	164.517
	7 3 HG	181.	7.380	10.590	318.	1.001	181.	7.392	318.	0.283	51.309	2.092	90.146
	8 16 HG	162.	2.312	14.040	1966.	0.943	152.	2.180	1854.	0.089	13.601	0.194	165.059
	9 C.T.	4132.	1.501	8.480	115.	1.058	4375.	1.589	121.	0.021	91.885	0.033	2.557
	SUM----------(CYCLE COMPOSITE)----------										262.450	3.238	1534.500
CYCLE 4													
	1 IDLE	1063.	1.095	13.480	163.	0.955	1015.	1.046	155.	0.036	36.564	0.037	5.606
	2 16 HG	156.	1.700	14.270	2178.	0.948	147.	1.612	2065.	0.089	13.167	0.143	183.844
	3 10 HG	112.	0.688	14.810	3276.	0.949	106.	0.653	3109.	0.257	27.323	0.167	799.217
	4 16 HG	142.	1.730	14.350	2194.	0.943	133.	1.632	2070.	0.089	11.923	0.145	184.232
	5 19 HG	152.	2.403	13.990	1196.	0.944	143.	2.269	1129.	0.047	6.745	0.106	53.079
	6 16 HG	150.	1.823	14.340	2185.	0.940	141.	1.714	2055.	0.089	12.558	0.152	182.939
	7 3 HG	183.	7.242	10.610	386.	1.004	183.	7.277	387.	0.283	52.045	2.059	109.778
	8 16 HG	159.	2.071	14.130	2136.	0.945	150.	1.957	2019.	0.089	13.378	0.174	179.726
	9 C.T.	4089.	1.552	8.500	171.	1.059	4330.	1.643	181.	0.021	90.935	0.034	3.802
	SUM----------(CYCLE COMPOSITE)----------										264.643	3.021	1702.229

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 279.946 3.062 1496.376

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 263.547 3.129 1618.364

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(279.946) + 0.65*(263.547) =	269.286	PPM
CO	0.35*(3.062) + 0.65*(3.129) =	3.106	PERCENT
NO(K)	0.35*(1496.376) + 0.65*(1618.364) =	1575.668	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-29. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–CHASSIS DYNAMOMETER

1969 DODGE 7-2-71 CID318 GVW 23000 W/D=70/75 K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS MEASURED CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	1784.	0.535	11.770	71.	1.038	1852.	0.555	73.	0.036	66.688	0.019	2.654
	2 16 HG	143.	0.933	14.330	2194.	0.969	138.	0.904	2127.	0.089	12.343	0.080	189.376
	3 10 HG	109.	0.400	14.640	3478.	0.969	104.	0.387	3371.	0.257	26.908	0.099	866.556
	4 16 HG	133.	1.298	14.430	2297.	0.952	126.	1.236	2187.	0.089	11.275	0.110	194.728
	5 19 HG	209.	1.882	14.110	1056.	0.949	197.	1.786	1002.	0.047	9.279	0.083	47.111
	6 16 HG	127.	1.137	14.540	2325.	0.951	120.	1.081	2211.	0.089	10.750	0.096	196.804
	7 3 HG	177.	6.474	11.290	423.	0.985	174.	6.378	416.	0.283	49.348	1.804	117.934
	8 16 HG	149.	2.050	14.190	1952.	0.943	140.	1.933	1840.	0.089	12.505	0.172	163.831
	9 C.T.	4140.	1.700	8.050	90.	1.084	4489.	1.843	97.	0.021	94.279	0.038	2.049
	SUM----------(CYCLE COMPOSITE)----------										293.378	2.506	1781.046
CYCLE 2													
	1 IDLE	1784.	0.535	11.770	71.	1.038	1852.	0.555	73.	0.036	66.688	0.019	2.654
	2 16 HG	137.	1.359	14.440	2121.	0.949	130.	1.290	2014.	0.089	11.580	0.114	179.280
	3 10 HG	103.	0.585	14.500	3202.	0.953	98.	0.557	3053.	0.257	25.245	0.143	784.823
	4 16 HG	129.	1.541	14.440	2103.	0.944	121.	1.455	1996.	0.089	10.845	0.129	176.804
	5 19 HG	140.	2.141	14.200	1004.	0.940	131.	2.013	943.	0.047	6.186	0.094	44.367
	6 16 HG	130.	1.520	14.500	2141.	0.941	122.	1.431	2015.	0.089	10.893	0.127	179.408
	7 3 HG	181.	7.246	10.770	302.	0.993	179.	7.202	300.	0.283	50.912	2.038	84.947
	8 16 HG	142.	2.020	14.270	2045.	0.939	133.	1.897	1921.	0.089	11.873	0.168	170.997
	9 C.T.	3959.	1.541	8.380	99.	1.079	4275.	1.664	106.	0.021	89.788	0.034	2.245
	SUM----------(CYCLE COMPOSITE)----------										284.013	2.871	1625.529
CYCLE 3													
	1 IDLE	1436.	1.015	12.790	212.	0.976	1402.	0.991	207.	0.036	50.483	0.035	7.452
	2 16 HG	150.	1.559	14.380	2103.	0.946	141.	1.475	1990.	0.089	12.634	0.131	177.131
	3 10 HG	108.	0.686	14.790	3254.	0.950	102.	0.652	3094.	0.257	26.391	0.167	795.169
	4 16 HG	135.	1.701	14.420	2098.	0.940	126.	1.599	1973.	0.089	11.300	0.142	175.623
	5 19 HG	200.	2.447	13.960	999.	0.941	188.	2.304	940.	0.047	8.850	0.109	44.210
	6 16 HG	139.	1.652	14.470	2184.	0.938	130.	1.550	2050.	0.089	11.613	0.138	182.469
	7 3 HG	184.	7.399	10.650	333.	0.996	183.	7.374	331.	0.283	51.879	2.086	93.926
	8 16 HG	145.	2.050	14.250	2068.	0.939	136.	1.926	1943.	0.089	12.125	0.171	172.940
	9 C.T.	4002.	1.445	8.420	146.	1.076	4309.	1.556	157.	0.021	90.504	0.032	3.301
	SUM----------(CYCLE COMPOSITE)----------										275.803	3.014	1652.226
CYCLE 4													
	1 IDLE	1436.	1.015	12.790	212.	0.976	1402.	0.991	207.	0.036	50.483	0.035	7.452
	2 16 HG	147.	1.581	14.370	2195.	0.946	139.	1.496	2077.	0.089	12.383	0.133	184.907
	3 10 HG	108.	0.685	14.760	3360.	0.952	102.	0.652	3201.	0.257	26.444	0.167	822.716
	4 16 HG	133.	1.672	14.410	2212.	0.942	125.	1.575	2084.	0.089	11.152	0.140	185.487
	5 19 HG	140.	2.563	13.970	1087.	0.941	131.	2.412	1023.	0.047	6.194	0.113	48.094
	6 16 HG	137.	1.713	14.430	2169.	0.939	128.	1.609	2037.	0.089	11.454	0.143	181.353
	7 3 HG	185.	7.423	10.630	375.	0.997	184.	7.401	373.	0.283	52.206	2.094	105.823
	8 16 HG	143.	2.055	14.240	2099.	0.940	134.	1.932	1973.	0.089	11.966	0.171	175.643
	9 C.T.	3840.	1.428	8.540	182.	1.081	4154.	1.545	196.	0.021	87.251	0.032	4.135
	SUM----------(CYCLE COMPOSITE)----------										259.537	3.032	1715.615

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 238.696 3.689 1703.287

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 272.670 3.023 1683.920

FOUR CYCLE COMPOSITE = REPORTED VALUES =

HC	0.35*(289.696)	+ 0.65*(272.670)	=	278.279	PPM
CO	0.35*(2.689)	+ 0.65*(3.023)	=	2.906	PERCENT
NO(K)	0.35*(1703.287)	+ 0.65*(1683.920)	=	1690.699	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

RETRO-CHEM COMPUTING, INC.

TABLE G-30. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–CHASSIS DYNAMOMETER

JULY 2-71 69 DODGE 318CID 9-MODE FED CYCLE 2-HRSOAK CHASSIS K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1138.	0.627	12.680	76.	1.019	1160.	0.639	77.	0.036	41.767	0.023	2.789
	2 16 HG	152.	0.908	14.450	2265.	0.962	146.	0.873	2179.	0.089	13.017	0.077	193.984
	3 10 HG	116.	0.410	14.630	3471.	0.969	112.	0.397	3364.	0.257	28.894	0.102	864.601
	4 16 HG	142.	1.466	14.440	2244.	0.946	134.	1.386	2123.	0.089	11.956	0.123	188.947
	5 19 HG	174.	1.924	14.220	1035.	0.943	164.	1.815	976.	0.047	7.715	0.085	45.891
	6 16 HG	134.	1.266	14.590	2224.	0.943	126.	1.194	2107.	0.089	11.252	0.106	187.599
	7 3 HG	187.	7.000	10.940	390.	0.990	185.	6.932	386.	0.283	52.407	1.961	109.299
	8 16 HG	159.	2.119	14.240	2028.	0.937	149.	1.985	1900.	0.089	13.262	0.176	169.161
	9 C.T.	4442.	1.850	7.770	98.	1.074	4773.	1.988	105.	0.021	100.248	0.041	2.211
	SUM----------(CYCLE COMPOSITE)----------										280.523	2.698	1764.487
CYCLE 2													
	1 IDLE	1138.	0.627	12.680	76.	1.019	1160.	0.639	77.	0.036	41.767	0.023	2.789
	2 16 HG	145.	1.321	14.560	2284.	0.942	136.	1.245	2153.	0.089	12.168	0.110	191.681
	3 10 HG	112.	0.496	15.010	3447.	0.942	105.	0.467	3249.	0.257	27.138	0.120	835.247
	4 16 HG	142.	1.539	14.560	2311.	0.936	132.	1.441	2164.	0.089	11.835	0.128	192.622
	5 19 HG	149.	2.214	14.240	1073.	0.935	139.	2.070	1003.	0.047	6.547	0.097	47.153
	6 16 HG	142.	1.600	14.510	2263.	0.937	133.	1.500	2122.	0.089	11.850	0.133	188.859
	7 3 HG	185.	7.217	10.830	342.	0.990	183.	7.148	338.	0.283	51.860	2.023	95.871
	8 16 HG	154.	2.154	14.300	2079.	0.932	143.	2.009	1939.	0.089	12.786	0.178	172.611
	9 C.T.	4336.	1.665	8.040	102.	1.069	4638.	1.781	109.	0.021	97.401	0.037	2.291
	SUM----------(CYCLE COMPOSITE)----------										273.356	2.892	1729.127
CYCLE 3													
	1 IDLE	1117.	1.181	13.330	133.	0.958	1070.	1.132	127.	0.036	38.545	0.040	4.589
	2 16 HG	155.	1.611	14.420	2255.	0.941	146.	1.517	2124.	0.089	12.994	0.135	189.053
	3 10 HG	116.	0.645	14.920	3374.	0.943	109.	0.608	3183.	0.257	28.128	0.156	818.154
	4 16 HG	141.	1.740	14.460	2250.	0.936	132.	1.629	2107.	0.089	11.752	0.145	187.545
	5 19 HG	151.	2.510	14.120	1040.	0.933	140.	2.342	970.	0.047	6.622	0.110	45.614
	6 16 HG	144.	1.734	14.500	2226.	0.934	134.	1.619	2079.	0.089	11.971	0.144	185.063
	7 3 HG	190.	7.470	10.670	305.	0.992	188.	7.413	302.	0.283	53.364	2.098	85.663
	8 16 HG	153.	2.136	14.320	2052.	0.932	142.	1.991	1913.	0.089	12.694	0.177	170.260
	9 C.T.	4203.	1.528	9.360	118.	1.061	4460.	1.621	125.	0.021	93.668	0.034	2.629
	SUM----------(CYCLE COMPOSITE)----------										269.744	3.040	1688.574
CYCLE 4													
	1 IDLE	1117.	1.181	13.330	133.	0.958	1070.	1.132	127.	0.036	38.545	0.040	4.589
	2 16 HG	157.	1.513	14.450	2210.	0.939	147.	1.516	2077.	0.089	13.134	0.134	184.882
	3 10 HG	120.	0.722	14.920	3309.	0.940	112.	0.679	3113.	0.257	29.017	0.174	800.162
	4 16 HG	144.	1.741	14.450	2274.	0.936	134.	1.631	2120.	0.089	12.007	0.145	189.622
	5 19 HG	150.	2.508	14.110	1029.	0.933	140.	2.342	961.	0.047	6.584	0.110	45.167
	6 16 HG	147.	1.734	14.500	2226.	0.933	137.	1.619	2078.	0.089	12.218	0.144	185.024
	7 3 HG	192.	7.372	10.690	370.	0.994	190.	7.329	367.	0.283	54.025	2.074	104.111
	8 16 HG	163.	2.033	14.340	2147.	0.933	152.	1.897	2004.	0.089	13.542	0.169	179.380
	9 C.T.	4094.	1.478	8.530	171.	1.059	4336.	1.565	181.	0.021	91.057	0.032	3.803
	SUM----------(CYCLE COMPOSITE)----------										270.133	3.025	1695.744

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 276.940 2.775 1746.807

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 269.938 3.033 1692.159

FOUR CYCLE COMPOSITE = REPORTED VALUES =

HC	0.35*(276.940)	+ 0.65*(269.938)	=	272.389	PPM
CO	0.35*(2.775)	+ 0.65*(3.033)	=	2.943	PERCENT
NO(K)	0.35*(1746.807)	+ 0.65*(1692.159)	=	1711.286	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-31. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–STATIONARY DYNAMOMETER–COLD START PROCEDURE

JUNE 24 71 69 DODGE 318CID FEDERAL CYCLE COLD-START STATIONARY K = 1.0000

	FEDERAL MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	1207.	1.042	11.650	78.	1.076	1298.	1.121	83.	0.036	46.758	0.040	3.021
	2 16 HG	133.	0.665	13.090	1181.	1.068	142.	0.710	1262.	0.089	12.651	0.063	112.344
	3 10 HG	111.	0.778	13.390	2381.	1.043	115.	0.811	2483.	0.257	29.760	0.208	638.382
	4 16 HG	155.	2.479	12.990	1349.	1.007	156.	2.496	1358.	0.089	13.893	0.222	120.920
	5 19 HG	142.	2.300	12.960	789.	1.016	144.	2.338	802.	0.047	6.784	0.109	37.698
	6 16 HG	127.	1.303	13.210	1606.	1.035	131.	1.349	1663.	0.089	11.707	0.120	148.052
	7 3 HG	197.	7.452	9.800	539.	1.055	207.	7.864	569.	0.283	58.840	2.225	160.988
	8 16 HG	170.	2.769	12.830	540.	1.007	171.	2.788	543.	0.089	15.237	0.248	48.400
	9 C.T.	4724.	2.625	7.040	450.	1.077	5091.	2.828	484.	0.021	106.913	0.059	10.184
	SUM----------(CYCLE COMPOSITE)----------										302.548	3.297	1279.993
CYCLE 2													
	1 IDLE	1207.	1.042	11.650	78.	1.076	1298.	1.121	83.	0.036	46.758	0.040	3.021
	2 16 HG	154.	1.450	13.220	1204.	1.027	158.	1.489	1237.	0.089	14.083	0.132	110.107
	3 10 HG	103.	1.410	13.350	2284.	1.023	105.	1.443	2337.	0.257	27.094	0.370	600.817
	4 16 HG	132.	2.129	13.200	1562.	1.006	132.	2.142	1572.	0.089	11.923	0.190	139.914
	5 19 HG	124.	2.369	13.060	1295.	1.008	125.	2.389	1305.	0.047	5.877	0.112	61.379
	6 16 HG	138.	2.117	13.130	1456.	1.011	139.	2.140	1472.	0.089	12.421	0.190	131.052
	7 3 HG	187.	7.920	9.580	497.	1.055	197.	8.356	524.	0.283	55.840	2.364	148.409
	8 16 HG	150.	2.579	13.030	513.	1.001	150.	2.582	513.	0.089	13.367	0.229	45.715
	9 C.T.	3657.	2.271	8.590	546.	1.060	3877.	2.407	578.	0.021	81.429	0.050	12.157
	SUM----------(CYCLE COMPOSITE)----------										258.696	3.682	1252.576
CYCLE 3													
	1 IDLE	604.	1.102	12.980	52.	1.022	617.	1.126	53.	0.036	22.229	0.040	1.913
	2 16 HG	165.	2.006	13.090	1198.	1.016	167.	2.038	1217.	0.089	14.920	0.181	108.331
	3 10 HG	113.	1.821	13.310	2285.	1.010	114.	1.840	2310.	0.257	29.359	0.473	593.692
	4 16 HG	141.	2.245	13.140	1734.	1.005	141.	2.258	1744.	0.089	12.623	0.200	155.238
	5 19 HG	138.	2.840	12.880	1496.	1.003	138.	2.850	1501.	0.047	6.508	0.133	70.559
	6 16 HG	147.	2.528	12.950	1259.	1.008	148.	2.550	1270.	0.089	13.198	0.226	113.042
	7 3 HG	180.	7.259	9.890	496.	1.057	190.	7.675	524.	0.283	53.859	2.172	148.414
	8 16 HG	148.	2.267	13.120	524.	1.006	148.	2.280	527.	0.089	13.251	0.202	46.916
	9 C.T.	3562.	2.028	8.980	628.	1.055	3758.	2.140	662.	0.021	78.934	0.044	13.916
	SUM----------(CYCLE COMPOSITE)----------										244.885	3.676	1252.025
CYCLE 4													
	1 IDLE	604.	1.102	12.980	52.	1.022	617.	1.126	53.	0.036	22.229	0.040	1.913
	2 16 HG	159.	1.923	13.210	881.	1.010	160.	1.944	890.	0.089	14.305	0.173	79.266
	3 10 HG	111.	1.861	13.250	2259.	1.013	112.	1.886	2290.	0.257	28.925	0.484	588.667
	4 16 HG	143.	2.252	13.110	1675.	1.007	144.	2.259	1687.	0.089	12.823	0.201	150.209
	5 19 HG	133.	2.724	12.910	1452.	1.005	133.	2.739	1460.	0.047	6.287	0.129	68.643
	6 16 HG	140.	2.319	13.080	1110.	1.007	141.	2.335	1118.	0.089	12.554	0.207	99.540
	7 3 HG	174.	7.150	10.000	483.	1.053	183.	7.532	508.	0.283	51.879	2.131	144.009
	8 16 HG	140.	2.128	13.180	454.	1.007	141.	2.143	457.	0.089	12.550	0.190	40.700
	9 C.T.	3427.	1.954	9.080	661.	1.053	3611.	2.059	696.	0.021	75.847	0.043	14.629
	SUM----------(CYCLE COMPOSITE)----------										237.403	3.603	1187.579

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 285.622 3.490 1266.284

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 241.144 3.640 1219.802

FOUR CYCLE COMPOSITE = REPORTED VALUES =

HC	0.35*(285.622) + 0.65*(241.144)	=	256.711	PPM
CO	0.35*(3.490) + 0.65*(3.640)	=	3.587	PERCENT
NO(K)	0.35*(1266.284) + 0.65*(1219.802)	=	1236.071	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-32. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–STATIONARY DYNAMOMETER–COLD START PROCEDURE

JUNE 25 71 69 DODGE 318CID FEDERAL 9-MODE COLD-START STATIONARY K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	402.	2.791	12.890	4115.	0.985	396.	2.749	4053.	0.036	14.256	0.098	145.929
	2 16 HG	114.	0.478	14.490	1550.	0.976	111.	0.466	1513.	0.089	9.905	0.041	134.679
	3 10 HG	100.	0.785	14.480	2405.	0.967	96.	0.759	2327.	0.257	24.875	0.195	598.259
	4 16 HG	136.	1.804	14.440	1762.	0.936	127.	1.688	1649.	0.089	11.331	0.150	146.806
	5 19 HG	135.	3.182	13.760	417.	0.935	126.	2.977	390.	0.047	5.936	0.139	18.338
	6 16 HG	120.	1.380	14.590	1851.	0.940	112.	1.298	1741.	0.089	10.049	0.115	155.014
	7 3 HG	201.	7.311	11.030	399.	0.972	195.	7.113	385.	0.283	55.346	2.013	109.366
	8 16 HG	147.	2.913	13.950	1370.	0.937	137.	2.731	1284.	0.089	12.266	0.243	114.319
	9 C.T.	5894.	3.369	6.320	69.	1.009	5947.	3.399	69.	0.021	124.893	0.071	1.462
	SUM----------(CYCLE COMPOSITE)----------										268.861	3.069	1424.676
CYCLE 2													
	1 IDLE	402.	2.791	12.890	4115.	0.985	396.	2.749	4053.	0.036	14.256	0.098	145.929
	2 16 HG	141.	1.631	14.460	1829.	0.939	132.	1.532	1719.	0.089	11.794	0.136	152.991
	3 10 HG	96.	1.415	14.440	2469.	0.950	91.	1.345	2347.	0.257	23.456	0.345	603.279
	4 16 HG	135.	2.395	14.150	1742.	0.935	126.	2.241	1630.	0.089	11.244	0.199	145.098
	5 19 HG	120.	2.635	14.050	574.	0.935	112.	2.465	537.	0.047	5.277	0.115	25.242
	6 16 HG	128.	2.080	14.350	1794.	0.933	119.	1.942	1675.	0.089	10.637	0.172	149.093
	7 3 HG	174.	7.834	10.790	263.	0.973	169.	7.626	256.	0.283	47.936	2.158	72.455
	8 16 HG	155.	2.912	13.850	1476.	0.937	145.	2.728	1383.	0.089	12.927	0.242	123.100
	9 C.T.	4225.	2.539	8.870	62.	0.986	4166.	2.504	61.	0.021	87.502	0.052	1.284
	SUM----------(CYCLE COMPOSITE)----------										225.033	3.523	1419.474
CYCLE 3													
	1 IDLE	748.	1.464	13.850	87.	0.942	704.	1.379	81.	0.036	25.371	0.049	2.950
	2 16 HG	152.	2.266	14.290	1811.	0.930	141.	2.107	1684.	0.089	12.584	0.187	149.937
	3 10 HG	100.	1.832	14.340	2343.	0.943	94.	1.728	2211.	0.257	24.254	0.444	568.288
	4 16 HG	134.	2.133	14.340	1816.	0.932	124.	1.988	1693.	0.089	11.119	0.177	150.698
	5 19 HG	125.	2.882	14.040	675.	0.928	116.	2.676	626.	0.047	5.455	0.125	29.457
	6 16 HG	136.	2.186	14.350	1767.	0.930	126.	2.033	1643.	0.089	11.257	0.180	146.268
	7 3 HG	172.	8.062	10.670	310.	0.974	167.	7.852	301.	0.283	47.411	2.222	85.450
	8 16 HG	138.	2.339	14.240	1556.	0.931	128.	2.179	1450.	0.089	11.446	0.194	129.062
	9 C.T.	3851.	2.258	9.550	98.	0.977	3763.	2.206	95.	0.021	79.028	0.046	2.011
	SUM----------(CYCLE COMPOSITE)----------										227.929	3.627	1264.126
CYCLE 4													
	1 IDLE	748.	1.464	13.850	87.	0.942	704.	1.379	81.	0.036	25.371	0.049	2.950
	2 16 HG	154.	2.083	14.440	1891.	0.926	142.	1.930	1752.	0.089	12.700	0.171	155.953
	3 10 HG	102.	1.762	14.440	2478.	0.939	95.	1.655	2328.	0.257	24.632	0.425	598.416
	4 16 HG	131.	2.172	14.340	1872.	0.931	122.	2.023	1743.	0.089	10.859	0.180	155.183
	5 19 HG	129.	2.943	13.990	704.	0.929	119.	2.735	654.	0.047	5.635	0.128	30.753
	6 16 HG	137.	2.230	14.370	1800.	0.927	127.	2.068	1669.	0.089	11.309	0.184	148.589
	7 3 HG	173.	8.201	10.630	345.	0.972	168.	7.971	335.	0.283	47.589	2.255	94.903
	8 16 HG	134.	2.410	14.230	1745.	0.930	124.	2.242	1624.	0.089	11.099	0.199	144.541
	9 C.T.	3699.	2.147	9.950	145.	0.965	3571.	2.072	139.	0.021	74.997	0.043	2.939
	SUM----------(CYCLE COMPOSITE)----------										224.194	3.638	1334.232

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 246.947 3.296 1421.575

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 226.061 3.633 1299.179

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(246.947)	+ 0.65*(226.061)	=	233.371	PPM
CO	0.35*(3.296)	+ 0.65*(3.633)	=	3.515	PERCENT
NO(K)	0.35*(1421.575)	+ 0.65*(1299.179)	=	1342.018	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-33. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID-CHASSIS DYNAMOMETER-COLD START PROCEDURE

JULY 1-71 69 DODGE 318CID 9-MODE FED CYCLE COLD START CHASSIS W/069/77 K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CONCENTRATION CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	ADJUSTED CO	ADJUSTED NO(K)	WEIGHTING FACTOR	WEIGHTED HC	WEIGHTED CO	WEIGHTED NO(K)
CYCLE 1													
	1 IDLE	604.	1.283	12.800	51.	1.028	621.	1.319	52.	0.036	22.370	0.047	1.888
	2 16 HG	239.	0.687	14.370	1944.	0.968	231.	0.665	1882.	0.089	20.600	0.059	167.565
	3 10 HG	136.	0.565	14.580	3199.	0.966	131.	0.545	3090.	0.257	33.765	0.140	794.241
	4 16 HG	144.	1.196	14.620	2170.	0.943	135.	1.128	2046.	0.089	12.087	0.100	182.156
	5 19 HG	171.	2.292	14.030	959.	0.943	161.	2.163	810.	0.047	7.586	0.101	38.110
	6 16 HG	130.	0.988	14.700	2297.	0.945	122.	0.934	2172.	0.089	10.940	0.083	193.309
	7 3 HG	201.	6.185	11.080	405.	1.007	202.	6.232	408.	0.283	57.319	1.763	115.494
	8 16 HG	149.	1.750	14.450	2060.	0.936	139.	1.638	1929.	0.089	12.416	0.145	171.667
	9 C.T.	5352.	2.365	6.370	137.	1.087	5820.	2.572	148.	0.021	122.232	0.054	3.128
	SUM----------(CYCLE COMPOSITE)----------										299.321	2.495	1667.563
CYCLE 2													
	1 IDLE	604.	1.283	12.800	51.	1.028	621.	1.319	52.	0.036	22.370	0.047	1.888
	2 16 HG	522.	1.137	14.560	2281.	0.924	482.	1.050	2107.	0.089	42.928	0.093	187.584
	3 10 HG	108.	0.472	14.930	3577.	0.948	102.	0.447	3393.	0.257	26.334	0.115	872.211
	4 16 HG	132.	1.404	14.540	2329.	0.942	124.	1.323	2195.	0.089	11.072	0.117	195.363
	5 19 HG	142.	1.942	14.300	1082.	0.940	133.	1.825	1017.	0.047	6.274	0.085	47.806
	6 16 HG	129.	1.305	14.580	2367.	0.943	120.	1.231	2232.	0.089	10.746	0.109	198.729
	7 3 HG	177.	6.406	10.800	338.	1.021	180.	6.544	345.	0.283	51.170	1.851	97.715
	8 16 HG	144.	1.944	14.280	2186.	0.941	135.	1.829	2057.	0.089	12.061	0.162	183.094
	9 C.T.	4125.	1.767	9.200	132.	1.071	4417.	1.892	141.	0.021	92.777	0.039	2.968
	SUM----------(CYCLE COMPOSITE)----------										275.735	2.623	1787.362
CYCLE 3													
	1 IDLE	1920.	1.027	12.440	155.	0.964	1852.	0.990	149.	0.036	66.695	0.035	5.384
	2 16 HG	134.	1.469	14.420	2309.	0.947	126.	1.392	2188.	0.089	11.302	0.123	194.765
	3 10 HG	97.	0.579	14.850	3590.	0.951	92.	0.550	3414.	0.257	23.711	0.141	877.585
	4 16 HG	126.	1.495	14.490	2403.	0.943	118.	1.410	2266.	0.089	10.576	0.125	201.714
	5 19 HG	150.	2.184	14.110	1226.	0.943	141.	2.061	1157.	0.047	6.653	0.096	54.381
	6 16 HG	130.	1.529	14.510	2445.	0.940	122.	1.438	2299.	0.089	10.883	0.128	204.689
	7 3 HG	175.	6.414	10.760	397.	1.024	179.	6.569	406.	0.283	50.728	1.859	115.081
	8 16 HG	153.	1.945	14.300	2222.	0.939	143.	1.826	2087.	0.089	12.789	0.162	185.745
	9 C.T.	4169.	1.668	8.270	165.	1.065	4442.	1.777	175.	0.021	93.297	0.037	3.692
	SUM----------(CYCLE COMPOSITE)----------										286.640	2.710	1843.040
CYCLE 4													
	1 IDLE	1920.	1.027	12.440	155.	0.964	1852.	0.990	149.	0.036	66.695	0.035	5.384
	2 16 HG	144.	1.489	14.400	2454.	0.947	136.	1.411	2325.	0.089	12.145	0.125	206.985
	3 10 HG	92.	0.643	14.860	3592.	0.948	87.	0.610	3408.	0.257	22.435	0.156	875.970
	4 16 HG	122.	1.607	14.500	2455.	0.939	114.	1.509	2306.	0.089	10.200	0.134	205.255
	5 19 HG	151.	2.255	14.080	1214.	0.943	142.	2.127	1145.	0.047	6.695	0.099	53.826
	6 16 HG	132.	1.556	14.540	2488.	0.937	123.	1.459	2333.	0.089	11.018	0.129	207.674
	7 3 HG	171.	6.407	10.790	444.	1.022	174.	6.552	454.	0.283	49.491	1.854	128.504
	8 16 HG	158.	1.817	14.370	2468.	0.938	148.	1.705	2316.	0.089	13.198	0.151	206.157
	9 C.T.	4111.	1.540	8.540	203.	1.054	4335.	1.624	214.	0.021	91.040	0.034	4.495
	SUM----------(CYCLE COMPOSITE)----------										282.920	2.722	1894.254

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 287.528 2.559 1727.462

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 284.780 2.716 1868.647

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(287.528)	+ 0.65*(284.780)	=	285.742	PPM
CO	0.35*(2.559)	+ 0.65*(2.716)	=	2.661	PERCENT
NO(K)	0.35*(1727.462)	+ 0.65*(1868.647)	=	1819.232	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

TABLE G-34. RESULTS FROM FEDERAL NINE-MODE TEST PROCEDURE ON A 1969 DODGE, 318-CID–CHASSIS DYNAMOMETER–COLD START PROCEDURE

JULY-2-71 69 DODGE 318CID 9-MODE FEDERAL COLD START CHASSIS W/D=70/75 K = 1.0000

	FEDERAL MODE	CONCENTRATION HC	CO	AS CO2	MEASURED NO(K)	DILUTION FACTOR	ADJUSTED HC	CO	NO(K)	WEIGHTING FACTOR	WEIGHTED HC	CO	NO(K)
CYCLE 1													
	1 IDLE	770.	2.400	12.540	87.	0.995	766.	2.388	86.	0.036	27.583	0.085	3.116
	2 16 HG	189.	0.303	14.450	1783.	0.979	185.	0.296	1746.	0.089	16.473	0.026	155.411
	3 10 HG	124.	0.561	14.580	2771.	0.967	119.	0.542	2679.	0.257	30.817	0.139	688.664
	4 16 HG	141.	1.170	14.790	2090.	0.933	131.	1.092	1951.	0.089	11.718	0.097	173.703
	5 19 HG	164.	2.501	14.170	742.	0.929	152.	2.325	689.	0.047	7.165	0.109	32.419
	6 16 HG	127.	0.894	14.900	2102.	0.936	118.	0.837	1968.	0.089	10.584	0.074	175.167
	7 3 HG	206.	6.795	11.200	451.	0.978	201.	6.648	441.	0.283	57.029	1.881	124.577
	8 16 HG	155.	1.728	14.670	1936.	0.923	143.	1.595	1787.	0.089	12.739	0.142	159.120
	9 C.T.	5448.	2.842	5.990	134.	1.098	5986.	3.123	147.	0.021	125.724	0.065	3.092
	SUM----------(CYCLE COMPOSITE)----------										299.847	2.621	1515.593
CYCLE 2													
	1 IDLE	770.	2.400	12.540	87.	0.995	766.	2.388	86.	0.036	27.583	0.085	3.116
	2 16 HG	136.	0.965	14.970	2087.	0.935	127.	0.902	1952.	0.089	11.323	0.080	173.765
	3 10 HG	102.	0.421	14.960	3300.	0.948	96.	0.399	3131.	0.257	24.874	0.102	804.772
	4 16 HG	137.	1.580	14.740	2045.	0.924	126.	1.461	1891.	0.089	11.276	0.130	168.330
	5 19 HG	136.	2.132	14.410	847.	0.928	126.	1.978	786.	0.047	5.932	0.093	36.947
	6 16 HG	127.	1.254	14.800	2158.	0.931	118.	1.168	2010.	0.089	10.530	0.103	178.930
	7 3 HG	181.	7.067	11.070	399.	0.979	177.	6.924	390.	0.283	50.188	1.959	110.635
	8 16 HG	151.	2.205	14.340	1822.	0.929	140.	2.048	1692.	0.089	12.486	0.182	150.669
	9 C.T.	4085.	1.881	8.280	123.	1.063	4345.	2.000	130.	0.021	91.245	0.042	2.747
	SUM----------(CYCLE COMPOSITE)----------										245.442	2.779	1629.916
CYCLE 3													
	1 IDLE	1343.	1.028	13.170	159.	0.958	1286.	0.984	152.	0.036	46.321	0.035	5.484
	2 16 HG	137.	1.404	14.570	2082.	0.940	128.	1.320	1957.	0.089	11.465	0.117	174.243
	3 10 HG	103.	0.596	15.020	3225.	0.939	96.	0.560	3030.	0.257	24.876	0.143	778.908
	4 16 HG	126.	1.531	14.620	2113.	0.934	117.	1.430	1973.	0.089	10.475	0.127	175.679
	5 19 HG	147.	2.192	14.320	980.	0.930	136.	2.040	912.	0.047	6.432	0.095	42.881
	6 16 HG	134.	1.524	14.630	2157.	0.933	125.	1.422	2013.	0.089	11.130	0.126	179.163
	7 3 HG	179.	7.174	10.860	392.	0.990	177.	7.105	388.	0.283	50.171	2.010	109.872
	8 16 HG	145.	2.162	14.300	1918.	0.933	135.	2.017	1789.	0.089	12.043	0.179	159.302
	9 C.T.	3888.	1.715	8.510	164.	1.068	4155.	1.833	175.	0.021	87.265	0.038	3.680
	SUM----------(CYCLE COMPOSITE)----------										260.182	2.875	1629.216
CYCLE 4													
	1 IDLE	1343.	1.028	13.170	159.	0.958	1286.	0.984	152.	0.036	46.321	0.035	5.484
	2 16 HG	146.	1.610	14.540	2124.	0.935	136.	1.505	1986.	0.089	12.153	0.134	176.809
	3 10 HG	109.	0.706	15.120	3193.	0.930	101.	0.656	2969.	0.257	26.053	0.168	763.192
	4 16 HG	132.	1.631	14.600	2189.	0.931	123.	1.520	2040.	0.089	10.949	0.135	181.571
	5 19 HG	145.	2.464	14.250	1019.	0.927	134.	2.284	944.	0.047	6.318	0.107	44.406
	6 16 HG	134.	1.667	14.680	2154.	0.926	124.	1.543	1994.	0.089	11.043	0.137	177.525
	7 3 HG	184.	7.279	10.880	420.	0.985	181.	7.171	413.	0.283	51.299	2.029	117.097
	8 16 HG	144.	1.996	14.470	2070.	0.928	133.	1.852	1921.	0.089	11.894	0.164	170.981
	9 C.T.	3857.	1.546	8.680	205.	1.064	4106.	1.646	218.	0.021	86.239	0.034	4.583
	SUM----------(CYCLE COMPOSITE)----------										262.273	2.947	1641.652
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------										272.644	2.700	1572.755
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------										261.227	2.911	1635.434

FOUR CYCLE COMPOSITE - REPORTED VALUES -

HC	0.35*(272.644)	+ 0.65*(261.227)	=	265.223	PPM
CO	0.35*(2.700)	+ 0.65*(2.911)	=	2.837	PERCENT
NO(K)	0.35*(1572.755)	+ 0.65*(1635.434)	=	1613.496	PPM

DILUTION FACTOR = 14.5/(CO2+0.5*CO+10.8*HC)

PETRO-CHEM COMPUTING, INC.

APPENDIX H

EFFECT OF DIFFERENT TYPES OF ROAD OPERATION ON MASS EMISSION RATES

TABLE H-1. EFFECT OF ROAD ROUTE ON MASS EMISSION RATES–1969 DODGE 318-CID, 24,000-LB GVW TRUCK

Date	Run No.	Miles	Sampling Time (Min)	Weight of Fuel	Total Grams HC	Total Grams CO	Total Grams NO_x	Grams per Mile HC	Grams per Mile CO	Grams per Mile NO_x	Grams per Minute HC	Grams per Minute CO	Grams per Minute NO_x	Grams per lb. of Fuel HC	Grams per lb. of Fuel CO	Grams per lb. of Fuel NO_x
						STOP AND GO										
8-10-71	1	6.868	25.46	8.31	370	2186	53	53.85	318.2	7.75	14.53	85.84	2.07	44.51	263.0	6.40
8-10-71	2	6.868	24.87	8.35	362	2239	47	52.76	325.9	6.90	14.57	90.01	1.87	43.40	268.1	5.59
	Avg.	6.868	25.16	8.33	366	2213	50	53.31	322.1	7.27	14.55	87.93	1.98	43.96	265.1	5.99
						SLOW SPEED										
8-9-71	1	6.868	15.56	5.39	198	555	41	28.82	80.9	6.04	12.72	35.69	2.67	36.72	103.03	7.69
8-9-71	2	6.868	15.27	5.01	181	541	40	26.31	78.7	5.87	11.84	35.41	2.64	36.07	107.92	8.05
8-9-71	3	6.868	15.46	4.98	164	551	39	23.81	80.2	5.64	10.58	35.63	2.51	32.83	110.60	7.78
8-9-71	4	6.868	15.47	5.16	169	609	34	24.67	88.7	4.94	10.95	39.39	2.19	32.84	118.09	6.57
8-9-71	5	6.868	15.42	4.91	152	565	39	22.09	82.3	5.62	9.84	36.66	2.51	30.91	115.12	7.87
8-9-71	6	6.868	15.11	4.83	161	569	39	23.40	82.9	5.67	10.64	37.67	2.58	33.28	117.86	8.07
8-9-71	7	6.868	15.29	5.09	144	576	36	21.04	83.8	5.25	9.45	37.66	2.36	28.38	113.13	7.08
8-4-71	2	6.868	15.37	4.94	138	474	30	20.07	69.0	4.44	8.97	30.83	1.98	27.90	95.94	6.17
8-4-71	3	6.868	15.37	5.13	119	509	35	17.26	74.2	5.03	7.71	33.12	2.25	23.11	99.24	6.73
8-4-71	4	6.868	15.37	5.18	139	505	35	20.26	73.5	5.13	9.05	32.82	2.29	26.86	97.40	6.81
	Avg.	6.868	15.37	5.06	157	545	37	22.77	79.4	5.36	10.14	35.46	2.40	30.89	107.83	7.28
						INTERMEDIATE SPEED										
8-10-71	1	12.49	19.31	11.39	169	3165	108	13.56	253.4	8.63	8.77	163.92	5.58	14.87	277.9	9.46
8-10-71	2	12.49	19.15	11.55	168	3350	105	13.44	268.2	8.43	8.77	174.95	5.50	14.54	290.07	9.12
8-10-71	3	12.49	19.46	11.74	171	3173	100	13.66	254.0	8.03	8.77	163.04	5.16	14.53	270.25	8.55
8-10-71	4	12.49	19.12	11.78	168	3258	109	12.42	260.9	8.76	8.77	170.4	5.73	14.23	276.6	9.29
	Avg.	12.49	19.26	11.61	169	3237	106	13.27	259.1	8.46	8.77	168.07	5.49	14.54	278.70	9.11
						HI SPEED										
8-11-71	1	17.28	16.91	20.95	83	6276	136	4.82	363.1	7.85	4.93	371.1	8.02	3.97	299.5	6.47
8-12-71	1	17.28	17.56	18.22	137	6286	138	7.90	358.0	7.96	7.78	358.0	7.83	7.49	363.8	7.55
8-12-71	2	17.28	17.36	19.40	12	6457	140	0.68	373.7	8.08	0.68	371.9	8.04	0.61	332.83	7.20
8-12-71	3	17.28	20.34	19.35	153	7982	166	8.86	461.9	9.63	7.53	392.42	8.18	7.91	412.50	8.60
	Avg.	17.28	18.04	19.48	96	6851	145	5.56	389.1	8.38	5.23	373.56	8.01	4.99	352.15	7.45

TABLE H-2. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 DODGE 318-CID, 24,000-LB GVW TRUCK

11/11/71 STOP AND GO DODGE (1504) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1918.8497	904.3740	32.9791	752	4000.0000	150.0000	3850.0000
MV	2	15.1055	9.2265	.3365	752	25.2500	.5000	24.7500
SPD	3	15.0363	8.7935	.3207	752	36.3333	.3333	36.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
0 - 200	1	.13
200 - 400	6	.80
400 - 600	114	15.16
600 - 800	25	3.32
800 - 1000	10	1.33
1000 - 1200	31	4.12
1200 - 1400	29	3.86
1400 - 1600	30	3.99
1600 - 1800	27	3.59
1800 - 2000	36	4.79
2000 - 2200	71	9.44
2200 - 2400	62	8.24
2400 - 2600	119	15.82
2600 - 2800	128	17.02
2800 - 3000	9	1.20
3000 - 3200	15	1.99
3200 - 3400	7	.93
3400 - 3600	8	1.06

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	140	18.62
2 - 4	69	9.18
4 - 6	8	1.06
6 - 8	18	2.39
8 - 10	3	.40
10 - 12	12	1.60
12 - 14	17	2.26
14 - 16	5	.66
16 - 18	60	7.98
18 - 20	134	17.82
20 - 22	54	7.18
22 - 24	50	6.65
24 - 26	182	24.20
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	102	13.56
2 - 4	38	5.05
4 - 6	30	3.99
6 - 8	34	4.52
8 - 10	23	3.06
10 - 12	37	4.92
12 - 14	33	4.39
14 - 16	28	3.72
16 - 18	56	7.45
18 - 20	61	8.11
20 - 22	58	7.71
22 - 24	97	12.90
24 - 26	152	20.21
26 - 28	1	.13
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	1	.13
34 - 36	0	0.00
36 - 38	1	.13
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-2. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 DODGE 318-CID, 24,000-LB GVW TRUCK (Cont'd)

11/15/71 STOP AND GO DODGE (1408) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2123.1534	775.9866	29.2461	704	+100.0000	200.0000	3900.0000
MV	2	14.5748	9.4762	.3571	704	25.7500	.7500	25.0000
SPD	3	15.7499	9.1803	.3460	704	126.8667	0.0000	126.8667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 200 - 400	2	.28
400 - 600	25	3.55
600 - 800	20	2.84
800 - 1000	22	3.13
1000 - 1200	32	4.55
1200 - 1400	38	5.40
1400 - 1600	37	5.26
1600 - 1800	39	5.54
1800 - 2000	36	5.11
2000 - 2200	71	10.09
2200 - 2400	61	8.66
2400 - 2600	101	14.35
2600 - 2800	116	16.48
2800 - 3000	43	6.11
3000 - 3200	14	1.99
3200 - 3400	15	2.13
3400 - 3600	14	1.99

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< in.Hg 0 - 2	104	14.77
2 - 4	105	14.91
4 - 6	15	2.13
6 - 8	23	3.27
8 - 10	7	.99
10 - 12	15	2.13
12 - 14	18	2.56
14 - 16	18	2.56
16 - 18	33	4.69
18 - 20	82	11.65
20 - 22	52	7.39
22 - 24	63	8.95
24 - 26	169	24.01
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL mph	COUNT	PERCENT
< 0 - 2	55	7.81
2 - 4	38	5.40
4 - 6	28	3.98
6 - 8	37	5.26
8 - 10	27	3.84
10 - 12	40	5.68
12 - 14	39	5.54
14 - 16	35	4.97
16 - 18	62	8.81
18 - 20	65	9.23
20 - 22	56	7.95
22 - 24	87	12.36
24 - 26	109	15.48
26 - 28	21	2.98
28 - 30	4	.57
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-3. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 DODGE 318-CID, 24,000-LB GVW TRUCK

07/28/71 SLOW SPEED DODGE (1768) RUN NO. 4

VAR NO		MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1754.5362	266.0689	9.6215	884	3450.0000	750.0000	2700.0000
MV	2	16.2547	6.5586	.2206	884	25.5000	1.5000	24.0000
SPD	3	24.2296	6.0147	.2023	884	32.3333	0.0000	32.3333

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 600	8	.90
600 - 800	21	2.38
800 - 1000	8	.90
1000 - 1200	25	2.83
1200 - 1400	25	2.83
1400 - 1600	576	65.16
1600 - 1800	129	14.59
1800 - 2000	31	3.51
2000 - 2200	27	3.05
2200 - 2400	26	2.94
2400 - 2600	3	.34
2600 - 2800	3	.34
2800 - 3000	1	.11
3000 - 3200	1	.11
3200 - 3400		
3400 - 3600		

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	10	1.13
2 - 4	53	6.00
4 - 6	21	2.38
6 - 8	19	2.15
8 - 10	51	5.77
10 - 12	69	7.81
12 - 14	74	8.37
14 - 16	92	10.41
16 - 18	101	11.43
18 - 20	109	12.33
20 - 22	86	9.73
22 - 24	53	6.00
24 - 26	146	16.52
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	11	1.24
2 - 4	7	.79
4 - 6	7	.79
6 - 8	8	.90
8 - 10	9	1.02
10 - 12	16	1.81
12 - 14	19	2.15
14 - 16	18	2.04
16 - 18	18	2.04
18 - 20	24	2.71
20 - 22	26	2.94
22 - 24	43	4.86
24 - 26	110	12.44
26 - 28	427	48.30
28 - 30	138	15.61
30 - 32	1	.11
32 - 34	2	.23
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-3. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 DODGE 318-CID, 24,000-LB GVW TRUCK (Cont'd)

08/09/71 SLOW SPEED (1800) RUN NO. 7

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1899.1389	263.7697	8.7923	900	2925.0000	1100.0000	1825.0000
MV	2	15.5479	5.9558	.1985	900	24.0000	1.0000	23.0000
SPD	3	23.1796	5.8060	.1935	900	28.0000	0.0000	28.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 1000	4	.44
1000 - 1200	22	2.44
1200 - 1400	18	2.00
1400 - 1600	121	13.44
1600 - 1800	588	65.33
1800 - 2000	39	4.33
2000 - 2200	33	3.67
2200 - 2400	44	4.89
2400 - 2600	23	2.56
2600 - 2800	8	.89
2800 - 3000		

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	14	1.56
2 - 4	36	4.00
4 - 6	22	2.44
6 - 8	32	3.56
8 - 10	44	4.89
10 - 12	120	13.33
12 - 14	69	7.67
14 - 16	98	10.89
16 - 18	86	9.56
18 - 20	121	13.44
20 - 22	102	11.33
22 - 24	150	16.67
24 - 26	6	.67
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	10	1.11
2 - 4	9	1.00
4 - 6	7	.78
6 - 8	8	.89
8 - 10	13	1.44
10 - 12	12	1.33
12 - 14	34	3.78
14 - 16	22	2.44
16 - 18	22	2.44
18 - 20	19	2.11
20 - 22	35	3.89
22 - 24	59	6.56
24 - 26	227	25.22
26 - 28	417	46.33
28 - 30	6	.67
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-4. INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 DODGE 318-CID, 24,000-LB GVW TRUCK

11/18/71 INTERMEDIATE DODGE (748) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2756.0829	183.1035	4.4681	374	2975.0000	500.0000	2475.0000
MV	2	10.6036	5.6778	.2936	374	25.2500	1.7500	23.5000
SPD	3	39.0481	2.9054	.1502	374	44.3333	4.6667	39.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
400 - 600	1	.27
800 - 1000	1	.27
1600 - 1800	1	.27
2000 - 2200	1	.27
2200 - 2400	1	.27
2400 - 2600	6	1.60
2600 - 2800	179	47.86
2800 - 3000	184	49.20

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	1	.27
2 - 4	57	15.24
4 - 6	39	10.43
6 - 8	30	8.02
8 - 10	40	10.70
10 - 12	54	14.44
12 - 14	44	11.76
14 - 16	44	11.76
16 - 18	29	7.75
18 - 20	16	4.28
20 - 22	8	2.14
22 - 24	4	1.07
24 - 26	8	2.14
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	1	.27
6 - 8	0	0.00
8 - 10	0	0.00
10 - 12	0	0.00
12 - 14	1	.27
14 - 16	0	0.00
16 - 18	0	0.00
18 - 20	1	.27
20 - 22	0	0.00
22 - 24	0	0.00
24 - 26	1	.27
26 - 28	0	0.00
28 - 30	1	.27
30 - 32	0	0.00
32 - 34	1	.27
34 - 36	1	.27
36 - 38	34	9.09
38 - 40	178	47.59
40 - 42	152	40.64
42 - 44	1	.27
44 - 46	2	.53
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-5. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 DODGE 318-CID, 24,000-LB GVW TRUCK

08/12/71 HIGH SPEED 69 DODGE (1996) 318 CID RUN NO. 2

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	3094.9950	231.0096	7.3088	999	5150.0000	1325.0000	3825.0000
MV	2	6.1727	3.7311	.1180	999	25.5000	0.0000	25.5000
SPD	3	53.6777	3.3445	.1058	999	57.0000	28.3333	28.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
1200 - 1400	1	.10
1600 - 1800	1	.10
1800 - 2000	9	.90
2000 - 2200	6	.60
2200 - 2400	7	.70
2400 - 2600	9	.90
2600 - 2800	8	.80
2800 - 3000	87	8.71
3000 - 3200	622	62.26
3200 - 3400	244	24.42
3400 - 3600	3	.30

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	2	.20
2 - 4	202	20.22
4 - 6	433	43.34
6 - 8	198	19.82
8 - 10	62	6.21
10 - 12	50	5.01
12 - 14	17	1.70
14 - 16	5	.50
16 - 18	2	.20
18 - 20	7	.70
20 - 22	2	.20
22 - 24	0	0.00
24 - 26	19	1.90
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	0	0.00
6 - 8	0	0.00
8 - 10	0	0.00
10 - 12	0	0.00
12 - 14	0	0.00
14 - 16	0	0.00
16 - 18	0	0.00
18 - 20	0	0.00
20 - 22	0	0.00
22 - 24	0	0.00
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	2	.20
30 - 32	4	.40
32 - 34	4	.40
34 - 36	3	.30
36 - 38	3	.30
38 - 40	3	.30
40 - 42	3	.30
42 - 44	5	.50
44 - 46	3	.30
46 - 48	5	.50
48 - 50	9	.90
50 - 52	49	4.90
52 - 54	216	21.62
54 - 56	626	62.66
56 - 58	64	6.41
58 - 60	0	0.00

TABLE H-6. EFFECT OF DRIVER ON STOP AND GO ROAD ROUTE EMISSION RATES–1969 DODGE 318-CID TRUCK

Date	Run No.	Miles	Sampling Time (Min)	Weight of Fuel	Total Grams			Grams per Mile			Grams per Minute			Grams per Lb of Fuel		
					HC	CO	NO_x	HC	CO	NO_x	HC	CO	NO_x	HC	CO	NO_x
							DRIVER A									
11-11-71	1	6.868	25.62	12.15	302	2689	48	44.10	392	7.01	11.82	105	1.88	24.93	221	3.96
11-11-71	2	6.868	26.05	11.13	274	3554	46	39.90	518	6.68	10.52	136	1.76	24.62	319	4.12
11-11-71	3	6.868	25.55	11.39	270	4587	43	39.29	668	6.20	10.56	180	1.67	23.69	403	3.74
11-11-71	4	6.868	25.69	11.07	250	3368	39	36.35	490	5.61	9.72	131	1.50	22.55	304	3.48
	Avg	6.868	25.73	11.44	274	3550	44	39.91	517	6.38	10.66	138	1.70	23.95	312	3.83
							DRIVER B									
11-11-71	5	6.868	24.57	11.82	211	3310	45	30.72	482	6.59	8.59	135	1.84	17.85	280	3.83
11-11-71	6	6.868	26.16	11.51	231	4526	43	33.57	659	6.24	8.83	173	1.64	20.03	393	3.72
11-12-71	1	6.868	26.60	11.69	268	3376	37	39.08	492	5.44	10.09	127	1.41	22.96	289	3.20
11-12-71	2	6.868	26.30	11.39	305	3126	37	44.36	455	5.46	11.59	119	1.43	26.75	274	3.29
11-12-71	3	6.868	26.05	11.12	253	2958	37	36.79	431	5.32	9.70	114	1.40	22.72	266	3.28
11-12-71	4	6.868	25.95	11.21	289	3154	36	42.05	459	5.29	11.13	122	1.40	25.76	281	3.24
11-12-71	5	6.868	26.12	11.56	259	3224	37	37.67	469	5.36	9.91	123	1.41	22.38	279	3.18
	Avg	6.868	25.96	11.47	259	3382	39	37.75	492	5.67	9.98	130	1.50	22.64	295	3.39
							DRIVER C									
11-15-71	1	6.868	24.75	11.10	271	3120	36	39.39	454	5.28	10.93	126	1.47	24.38	281	3.27
11-15-71	2	6.868	25.28	10.82	281	3349	35	40.88	488	5.15	11.11	132	1.40	25.95	310	3.27
11-15-71	3	6.868	25.30	11.24	270	3066	34	39.25	446	5.02	10.65	121	1.36	23.98	273	3.07
	Avg	6.868	25.11	11.05	274	3178	35	39.84	463	5.15	10.90	126	1.41	24.77	288	3.20
							DRIVER D									
11-15-71	4	6.868	26.23	10.77	196	2592	29	28.47	377	4.28	7.46	99	1.12	18.16	241	2.73
11-15-71	5	6.868	26.55	11.01	201	2960	40	29.25	431	5.85	7.57	111	1.51	18.25	269	3.65
11-15-71	6	6.868	26.18	10.83	194	2723	41	28.23	397	6.03	7.41	104	1.58	17.90	251	3.83
	Avg	6.868	26.32	10.87	197	2758	37	28.65	402	5.39	7.48	105	1.40	18.10	254	3.40
							DRIVER E									
11-16-71	1	6.868	24.40	11.41	260	3249	32	37.92	473	4.61	10.67	133	1.30	22.83	285	2.78
11-16-71	2	6.868	24.55	11.03	265	3558	28	38.61	518	3.03	10.80	145	1.13	24.04	312	2.51
11-16-71	3	6.868	24.62	10.88	290	4246	29	42.19	618	4.25	11.77	172	1.19	26.63	390	2.68
11-16-71	4	6.868	25.20	10.95	276	3533	30	40.14	514	4.39	10.94	140	1.20	25.17	323	2.75
	Avg	6.868	24.69	11.07	273	3647	30	39.72	531	4.07	11.05	148	1.21	24.92	328	2.68

TABLE H-7. EFFECT OF ROAD ROUTE ON MASS EMISSION RATES–1969 FORD 300-CID, 15,000-LB GVW TRUCK

Date	Run No.	Miles	Sampling Time (min)	Weight of Fuel	Total Grams HC	Total Grams CO	Total Grams NOx	Grams per Mile HC	Grams per Mile CO	Grams per Mile NO_x	Grams per Minute HC	Grams per Minute CO	Grams per Minute NO_x	Grams per lb. of Fuel HC	Grams per lb. of Fuel CO	Grams per lb. of Fuel NO_x
							STOP AND GO									
Driver: A																
10-11-71	1	6.868	23.63	12.35	279	N.D.	8.60	40.76	N.D.	1.25	11.85	N.D	0.36	22.67	N.D	0.70
10-11-71	2	6.868	23.60	12.30	294	7,568	8.35	42.85	1101	1.22	12.47	320	0.35	23.93	615	0.68
10-12-71	1	6.868	23.95	13.03	304	8,219	8.42	44.33	1196	1.23	12.71	343	0.35	23.37	630	0.65
	Avg	6.868	23.73	12.56	292	7,894	8.46	42.65	1149	1.23	12.34	332	0.35	23.32	623	0.68
Driver: B																
9-29-71	4	6.868	27.67	12.95	221	6,416	8.10	32.14	934	1.18	7.98	231	0.29	17.04	495	0.63
10-12-71	2	6.868	25.80	12.01	199	6,778	8.34	29.02	986	1.21	7.73	262	0.32	16.60	564	0.69
10-12-71	3	6.868	24.67	12.70	205	N.D.	9.84	29.92	N.D.	1.43	8.33	N.D	0.40	16.18	N.D	0.76
	Avg	6.868	26.05	12.55	208	6,597	8.76	30.36	960	1.27	8.01	247	0.34	16.61	530	0.69
							SLOW SPEED									
10-12-71	1	6.868	14.53	7.89	139	3,896	6.93	20.27	567	1.01	9.58	268	0.48	17.64	493	0.89
10-13-71	1	6.868	16.49	7.56	123	4,340	7.16	17.91	631	1.04	7.46	263	0.43	16.27	574	0.95
10-13-71	2	6.868	16.22	7.29	117	3,133	6.48	17.18	456	0.94	7.28	193	0.40	16.19	429	0.89
	Avg	6.868	15.75	7.58	126	3,790	6.86	18.45	551	1.00	8.11	241	0.44	16.70	499	0.91
							INTERMEDIATE SPEED									
10-14-71	3	12.49	20.04	13.75	173	6,088	15.67	13.88	487	1.25	8.49	298	0.77	12.60	442	1.14
10-14-71	4	12.49	20.64	14.06	188	6,701	16.71	15.07	536	1.34	9.12	324	0.81	13.39	476	1.19
10-14-71	5	12.49	20.72	12.63	151	5,028	15.48	12.16	402	1.24	7.33	242	0.75	12.02	389	1.23
	Avg	12.49	20.47	13.48	171	5,939	15.95	13.70	475	1.28	8.31	288	0.78	12.67	436	1.19
							HIGH SPEED									
10-15-71	1	17.28	20.50	16.78	116	3,886	166.89	6.69	224	9.66	5.64	189	8.14	6.89	231	9.95
10-15-71	2	17.28	20.00	16.65	93	3,733	160.55	5.41	216	9.30	4.67	186	8.03	5.61	224	9.64
10-15-71	3	17.28	20.19	16.87	103	4,266	167.55	5.98	246	9.70	5.11	211	8.30	6.12	252	9.93
10-15-71	4	17.28	20.30	16.88	97	3,868	161.62	5.64	223	9.35	4.80	190	7.96	5.77	229	9.58
		17.28	20.25	16.80	102	3,938	164.15	5.93	227	9.50	5.06	194	8.11	6.10	234	9.78

TABLE H-8. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK

09/29/71 STOP AND GO FORD (1490) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2076.6982	772.0750	28.4012	739	4675.0000	500.0000	4175.0000
MV	2	14.0316	8.4413	.3105	739	24.5000	.7500	23.7500
SPD	3	15.5602	8.6996	.3200	739	25.6667	0.0000	25.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 400 - 600	1	.14
600 - 800	15	2.03
800 - 1000	110	14.88
1000 - 1200	37	5.01
1200 - 1400	24	3.25
1400 - 1600	21	2.84
1600 - 1800	27	3.65
1800 - 2000	46	6.22
2000 - 2200	50	6.77
2200 - 2400	53	7.17
2400 - 2600	73	9.88
2600 - 2800	225	30.45
2800 - 3000	9	1.22
3000 - 3200	11	1.49
3200 - 3400	15	2.03
3400 - 3600	15	2.03

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	51	6.90
2 - 4	156	21.11
4 - 6	29	3.92
6 - 8	19	2.57
8 - 10	6	.81
10 - 12	9	1.22
12 - 14	10	1.35
14 - 16	19	2.57
16 - 18	43	5.82
18 - 20	151	20.43
20 - 22	107	14.48
22 - 24	129	17.46
24 - 26	10	1.35
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	91	12.31
2 - 4	24	3.25
4 - 6	32	4.33
6 - 8	26	3.52
8 - 10	30	4.06
10 - 12	32	4.33
12 - 14	32	4.33
14 - 16	62	8.39
16 - 18	48	6.50
18 - 20	38	5.14
20 - 22	57	7.71
22 - 24	64	8.66
24 - 26	203	27.47
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-8. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK (Cont'd)

10/11/71 STOP AND GO FORD (1428) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2231.8820	700.6389	26.2576	712	4750.0000	850.0000	3900.0000
MV	2	13.9445	8.4047	.3150	712	24.5000	1.2500	23.2500
SPD	3	16.4368	8.6487	.3241	712	27.3333	0.0000	27.3333

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
800 - 1000	46	6.46
1000 - 1200	57	8.01
1200 - 1400	20	2.81
1400 - 1600	27	3.79
1600 - 1800	32	4.49
1800 - 2000	46	6.46
2000 - 2200	59	8.29
2200 - 2400	58	8.15
2400 - 2600	55	7.72
2600 - 2800	137	19.24
2800 - 3000	130	18.26
3000 - 3200	23	3.23
3200 - 3400	9	1.26
3400 - 3600	8	1.12

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	26	3.65
2 - 4	182	25.56
4 - 6	25	3.51
6 - 8	12	1.69
8 - 10	9	1.26
10 - 12	12	1.69
12 - 14	22	3.09
14 - 16	25	3.51
16 - 18	40	5.62
18 - 20	96	13.48
20 - 22	119	16.71
22 - 24	120	16.85
24 - 26	24	3.37
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	73	10.25
2 - 4	28	3.93
4 - 6	23	3.23
6 - 8	26	3.65
8 - 10	23	3.23
10 - 12	26	3.65
12 - 14	35	4.92
14 - 16	60	8.43
16 - 18	43	6.04
18 - 20	39	5.48
20 - 22	48	6.74
22 - 24	63	8.85
24 - 26	200	28.09
26 - 28	25	3.51
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-8. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK (Cont'd)

10/12/71 STOP AND GO FORD (1440) CHASSIS DRIVER A RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2136.0764	661.8725	24.6665	720	4150.0000	600.0000	3550.0000
MV	2	12.9217	8.6380	.3219	720	24.0000	.7500	23.2500
SPD	3	16.4100	8.4899	.3164	720	30.6667	0.0000	30.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 600	1	.14
600 - 800	51	7.08
800 - 1000	48	6.67
1000 - 1200	30	4.17
1200 - 1400	37	5.14
1400 - 1600	52	7.22
1600 - 1800	38	5.28
1800 - 2000	64	8.89
2000 - 2200	51	7.08
2200 - 2400	67	9.31
2400 - 2600	211	29.31
2600 - 2800	48	6.67
2800 - 3000	17	2.36
3000 - 3200	2	.28
3200 - 3400	1	.14
3400 - 3600		

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	67	9.31
2 - 4	186	25.83
4 - 6	15	2.08
6 - 8	11	1.53
8 - 10	8	1.11
10 - 12	16	2.22
12 - 14	24	3.33
14 - 16	22	3.06
16 - 18	34	4.72
18 - 20	96	13.33
20 - 22	127	17.64
22 - 24	108	15.00
24 - 26	6	.83
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	70	9.72
2 - 4	26	3.61
4 - 6	18	2.50
6 - 8	30	4.17
8 - 10	30	4.17
10 - 12	27	3.75
12 - 14	50	6.94
14 - 16	51	7.08
16 - 18	43	5.97
18 - 20	42	5.83
20 - 22	43	5.97
22 - 24	86	11.94
24 - 26	184	25.56
26 - 28	8	1.11
28 - 30	3	.42
30 - 32	9	1.25
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-9. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK

10/12/71 SLOW SPEED FORD (862) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1877.9002	377.4151	18.1794	431	3450.0000	0.0000	3450.0000
MV	2	12.4939	7.1487	.3443	431	23.1250	1.0000	22.1250
SPD	3	26.2900	6.7663	.3259	431	31.0000	0.0000	31.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
0 - 200	1	.23
400 - 600	1	.23
800 - 1000	17	3.94
1000 - 1200	9	2.09
1200 - 1400	11	2.55
1400 - 1600	7	1.62
1600 - 1800	31	7.19
1800 - 2000	299	69.37
2000 - 2200	14	3.25
2200 - 2400	11	2.55
2400 - 2600	11	2.55
2600 - 2800	5	1.16
2800 - 3000	8	1.86
3000 - 3200	4	.93
3200 - 3400	1	.23
3400 - 3600	1	.23

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	29	6.73
2 - 4	59	13.69
4 - 6	22	5.10
6 - 8	31	7.19
8 - 10	25	5.80
10 - 12	26	6.03
12 - 14	34	7.89
14 - 16	35	8.12
16 - 18	36	8.35
18 - 20	41	9.51
20 - 22	56	12.99
22 - 24	37	8.58
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	6	1.39
2 - 4	3	.70
4 - 6	2	.46
6 - 8	6	1.39
8 - 10	1	.23
10 - 12	5	1.16
12 - 14	11	2.55
14 - 16	8	1.86
16 - 18	15	3.48
18 - 20	8	1.86
20 - 22	13	3.02
22 - 24	13	3.02
24 - 26	11	2.55
26 - 28	24	5.57
28 - 30	156	36.19
30 - 32	149	34.57
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-9. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK (Cont'd)

10/13/71 SLOW SPEED FORD (1032) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1677.4709	457.2448	20.1291	516	3800.0000	550.0000	3250.0000
MV	2	13.5424	6.8054	.2996	516	23.0000	1.7500	21.2500
SPD	3	23.3689	8.2418	.3628	516	32.0000	0.0000	32.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 400 - 600	1	.19
600 - 800	11	2.13
800 - 1000	42	8.14
1000 - 1200	20	3.88
1200 - 1400	23	4.46
1400 - 1600	46	8.91
1600 - 1800	151	29.26
1800 - 2000	169	32.75
2000 - 2200	13	2.52
2200 - 2400	11	2.13
2400 - 2600	11	2.13
2600 - 2800	8	1.55
2800 - 3000	3	.58
3000 - 3200	1	.19
3200 - 3400	2	.39
3400 - 3600	1	.19

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	4	.78
2 - 4	72	13.95
4 - 6	38	7.36
6 - 8	28	5.43
8 - 10	22	4.26
10 - 12	39	7.56
12 - 14	37	7.17
14 - 16	32	6.20
16 - 18	51	9.88
18 - 20	85	16.47
20 - 22	55	10.66
22 - 24	53	10.27
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	17	3.29
2 - 4	5	.97
4 - 6	13	2.52
6 - 8	7	1.36
8 - 10	14	2.71
10 - 12	5	.97
12 - 14	16	3.10
14 - 16	18	3.49
16 - 18	17	3.29
18 - 20	13	2.52
20 - 22	19	3.68
22 - 24	26	5.04
24 - 26	56	10.85
26 - 28	66	12.79
28 - 30	151	29.26
30 - 32	72	13.95
32 - 34	1	.19
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-10. INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK

10/14/71 INTERMEDIATE FORD (1244) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2395.4944	461.4109	18.4270	627	3300.0000	775.0000	2525.0000
MV	2	11.5112	7.1895	.2871	627	24.1250	.1500	23.9750
SPD	3	34.0356	9.7774	.3905	627	42.6667	0.0000	42.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
600 - 800	3	.48
800 - 1000	15	2.39
1000 - 1200	18	2.87
1200 - 1400	6	.96
1400 - 1600	9	1.44
1600 - 1800	8	1.28
1800 - 2000	17	2.71
2000 - 2200	47	7.50
2200 - 2400	64	10.21
2400 - 2600	111	17.70
2600 - 2800	309	49.28
2800 - 3000	9	1.44
3000 - 3200	8	1.28
3200 - 3400	3	.48

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	54	8.61
2 - 4	105	16.75
4 - 6	33	5.26
6 - 8	18	2.87
8 - 10	37	5.90
10 - 12	67	10.69
12 - 14	61	9.73
14 - 16	62	9.89
16 - 18	50	7.97
18 - 20	42	6.70
20 - 22	34	5.42
22 - 24	59	9.41
24 - 26	5	.80
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	10	1.59
2 - 4	3	.48
4 - 6	7	1.12
6 - 8	4	.64
8 - 10	6	.96
10 - 12	7	1.12
12 - 14	1	.16
14 - 16	14	2.23
16 - 18	8	1.28
18 - 20	10	1.59
20 - 22	10	1.59
22 - 24	11	1.75
24 - 26	8	1.28
26 - 28	16	2.55
28 - 30	11	1.75
30 - 32	20	3.19
32 - 34	36	5.74
34 - 36	41	6.54
36 - 38	46	7.34
38 - 40	146	23.29
40 - 42	207	33.01
42 - 44	5	.80
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-10. INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK (Cont'd)

10/14/71 INTERMEDIATE FORD (1196) RUN NO. 4

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2453.8880	375.8666	15.3703	598	3050.0000	900.0000	2150.0000
MV	2	11.1836	6.9423	.2839	598	23.8750	1.7500	22.1250
SPD	3	34.5608	8.2960	.3392	598	43.3333	0.0000	43.3333

PERCENT OF TIME RPM AT LEVEL	COUNT	PERCENT
< 800 - 1000	5	.84
1000 - 1200	7	1.17
1200 - 1400	5	.84
1400 - 1600	10	1.67
1600 - 1800	11	1.84
1800 - 2000	26	4.35
2000 - 2200	38	6.35
2200 - 2400	83	13.88
2400 - 2600	96	16.05
2600 - 2800	269	44.98
2800 - 3000	47	7.86
3000 - 3200	1	.17

PERCENT OF TIME MV AT LEVEL	COUNT	PERCENT
< 0 - 2	4	.67
2 - 4	177	29.60
4 - 6	26	4.35
6 - 8	18	3.01
8 - 10	22	3.68
10 - 12	46	7.69
12 - 14	67	11.20
14 - 16	71	11.87
16 - 18	51	8.53
18 - 20	42	7.02
20 - 22	28	4.68
22 - 24	46	7.69
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT LEVEL	COUNT	PERCENT
< 0 - 2	3	.50
2 - 4	3	.50
4 - 6	1	.17
6 - 8	2	.33
8 - 10	4	.67
10 - 12	1	.17
12 - 14	8	1.34
14 - 16	11	1.84
16 - 18	8	1.34
18 - 20	8	1.34
20 - 22	12	2.01
22 - 24	11	1.84
24 - 26	8	1.34
26 - 28	20	3.34
28 - 30	19	3.18
30 - 32	16	2.68
32 - 34	35	5.85
34 - 36	51	8.53
36 - 38	49	8.19
38 - 40	149	24.92
40 - 42	172	28.76
42 - 44	7	1.17
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-11. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK

10/11/71 HIGH SPEED FORD (1098) CHASSIS RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	3281.0565	85.8671	3.6647	549	3425.0000	2350.0000	1075.0000
MV	2	9.5410	4.8147	.2055	549	22.5000	3.5000	19.0000
SPD	3	50.4827	.7274	.0310	549	51.6667	46.6667	5.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
2200 - 2400	1	.18
2400 - 2600	2	.36
2600 - 2800	1	.18
2800 - 3000	3	.55
3000 - 3200	21	3.83
3200 - 3400	520	94.72
3400 - 3600	1	.18

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	38	6.92
4 - 6	136	24.77
6 - 8	65	11.84
8 - 10	85	15.48
10 - 12	50	9.11
12 - 14	40	7.29
14 - 16	59	10.75
16 - 18	58	10.56
18 - 20	9	1.64
20 - 22	7	1.28
22 - 24	2	.36
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	0	0.00
6 - 8	0	0.00
8 - 10	0	0.00
10 - 12	0	0.00
12 - 14	0	0.00
14 - 16	0	0.00
16 - 18	0	0.00
18 - 20	0	0.00
20 - 22	0	0.00
22 - 24	0	0.00
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	3	.55
48 - 50	69	12.57
50 - 52	477	86.89
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-11. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 FORD 300-CID, 15,000-LB GVW TRUCK (Cont'd)

10/15/71 HIGH SPEED 70 FORD (1094) RUN NO. 2

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	3244.3727	55.9176	2.4019	542	3350.0000	2900.0000	450.0000
MV	2	9.2119	4.8275	.2074	542	25.0000	2.5000	22.5000
SPD	3	49.8638	.7295	.0313	542	51.3333	46.0000	5.3333

PERCENT OF TIME RPM AT LEVEL	COUNT	PERCENT
<		
2900 - 3000	1	.18
3000 - 3200	39	7.20
3200 - 3400	502	92.62

PERCENT OF TIME MV AT LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	109	20.11
4 - 6	46	8.49
6 - 8	78	14.39
8 - 10	71	13.10
10 - 12	76	14.02
12 - 14	63	11.62
14 - 16	56	10.33
16 - 18	25	4.61
18 - 20	8	1.48
20 - 22	2	.37
22 - 24	3	.55
24 - 26	5	.92
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	0	0.00
6 - 8	0	0.00
8 - 10	0	0.00
10 - 12	0	0.00
12 - 14	0	0.00
14 - 16	0	0.00
16 - 18	0	0.00
18 - 20	0	0.00
20 - 22	0	0.00
22 - 24	0	0.00
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	17	3.14
48 - 50	187	34.50
50 - 52	338	62.36
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-12. EFFECT OF ROAD ROUTE ON MASS EMISSION RATES–1969 IHC 304-CID, 22,000-LB GVW TRUCK

Date	Run No.	Miles	Sampling Time (min)	Weight of Fuel	Total Grams			Grams per Mile			Grams per Minute			Grams per lb. of Fuel		
					HC	CO	NO_x	HC	CO	NO_x	HC	CO	NO_x	HC	CO	NO_x
								STOP AND GO								
Driver A																
10-27-71	1	6.868	28.31	10.81		1634	53		238	7.69		57.72	1.87		151	4.88
10-27-71	2	6.868	27.79	10.32		1986	53		289	7.71		71.47	1.91		192	5.13
10-27-71	3	6.868	28.20	10.68		2016	52		294	7.62		71.50	1.86		189	4.90
10-27-71	4	6.868	28.91	11.46		2017	53		294	7.75		69.76	1.84		176	4.65
	Avg	6.868	28.30	10.82		1913	53		279	7.69		67.61	1.87		177	4.89
Driver A																
11-2-71	1	6.868	26.85	10.37	274	2116	72	39.95	308	10.47	10.22	78.80	2.68	26.46	204	6.93
11-2-71	2	6.868	26.79	10.47	273	2197	70	39.80	320	10.20	10.20	82.02	2.61	26.11	210	6.69
11-2-71	3	6.868	26.70	10.66	266	2141	72	38.78	312	10.44	9.98	80.20	2.69	24.99	201	6.73
	Avg	6.868	26.78	10.50	271	2151	71	39.51	313	10.37	10.13	80.34	2.66	25.85	205	6.78
Driver B																
11-1-71	1	6.868	28.20	10.30	292	2046	59	42.52	298	8.55	10.36	72.56	2.08	28.35	199	5.69
11-2-71	2	6.868	28.18	10.07	282	1937	57	41.01	282	8.25	9.99	68.73	2.01	27.97	192	5.63
11-3-71	3	6.868	27.75	10.31	300	2070	58	43.74	301	8.41	10.83	74.58	2.08	29.14	201	5.60
11-4-71	4	6.868	27.60	10.29	277	1853	55	40.40	270	8.06	10.05	67.14	2.01	26.97	180	5.38
11-5-71	5	6.868	27.56	10.08	291	2005	61	42.41	292	8.86	10.56	72.77	2.21	28.90	199	6.04
11-5-71	6	6.868	27.36	10.07	282	1963	59	41.02	286	8.52	10.30	71.74	2.14	27.98	195	5.81
	Avg	6.868	27.78	10.19	287	1979	58	41.85	288	8.44	10.35	71.25	2.09	28.22	194	5.69
								SLOW SPEED								
10-28-71	1	6.868	16.07	6.39	165	1204	46	24.09	175	6.69	10.30	74.91	2.85	25.89	188	7.18
10-28-71	2	6.868	16.26	6.26	158	1129	43	22.94	164	6.32	9.69	69.45	2.67	25.17	180	6.93
10-28-71	3	6.868	16.32	6.24	153	1077	41	22.32	157	5.91	9.40	65.97	2.49	24.57	173	6.51
10-28-71	4	6.868	16.29	6.22	157	1115	46	22.80	162	6.69	9.61	68.45	2.82	25.18	179	7.38
10-28-71	5	6.868	16.45	6.23	162	1104	45	23.64	161	6.58	9.87	67.09	2.75	26.06	177	7.25
10-28-71	6	6.868	16.55	6.23	158	1061	45	23.00	155	6.53	9.54	64.14	2.71	25.35	170	7.19
10-28-71	7	6.868	16.33	6.21	161	1011	46	23.38	147	6.65	9.83	61.94	2.80	25.86	163	7.35
10-28-71	8	6.868	16.43	6.09	162	1122	46	23.61	163	6.76	9.87	68.29	2.83	26.62	184	7.63
	Avg	6.868	16.34	6.23	160	1103	45	23.22	161	6.52	9.76	67.53	2.74	25.59	177	7.18

TABLE H-12. EFFECT OF ROAD ROUTE ON MASS EMISSION RATES–1969 IHC 304-CID, 22,000-LB GVW TRUCK (Cont'd)

Date	Run No.	Miles	Sampling Time (min)	Weight of Fuel	Total Grams			Grams per Mile			Grams per Minute			Grams per lb. of Fuel		
					HC	CO	NO_x	HC	CO	NO_x	HC	CO	NO_x	HC	CO	NO_x
								INTERMEDIATE SPEED								
10-29-71	1	12.49	20.49	12.68	132	1773	105	10.58	142	8.39	6.45	86.52	5.11	10.42	140	8.26
10-29-71	2	12.49	20.25	12.38	125	1607	109	10.04	129	8.63	6.19	79.38	5.33	10.13	130	8.71
10-29-71	3	12.49	20.31	12.17	132	1660	109	10.57	133	8.71	6.50	81.73	5.36	10.85	136	8.94
10-29-71	4	12.49	20.54	12.55	132	1692	105	10.61	135	8.38	6.45	82.39	5.09	10.56	135	8.33
10-29-71	5	12.49	20.36	12.20	131	1522	125	10.50	118	10.00	6.44	74.77	6.13	10.75	125	10.24
10-29-71	6	12.49	20.25	12.04	122	1593	110	9.79	128	8.82	6.04	78.65	5.44	10.16	132	9.15
10-29-71	7	12.49	20.22	12.60	119	1633	111	9.51	131	8.90	5.87	80.74	5.50	9.42	130	8.82
10-29-71	8	12.49	20.20	12.21	129	1807	115	10.35	145	9.24	6.40	89.46	5.71	10.59	148	9.45
	Avg	12.49	20.33	12.35	128	1661	111	10.24	133	8.88	6.29	81.71	5.46	10.36	134	8.99
								HIGH SPEED								
10-30-71	1	17.28	18.26	17.29	105	2574	141	6.09	149	8.18	5.77	141.	7.74	6.09	149	8.17
10-30-71	2	17.28	18.18	17.15	107	2821	145	6.21	163	8.38	5.90	155.	7.97	6.25	164	8.44
10-30-71	3	17.28	18.60	17.25	110	2799	148	6.36	162	8.59	5.91	150.	7.98	6.37	162	8.60
10-30-71	4	17.28	18.46	16.00	108	2944	165	6.26	170	9.55	5.86	159.	8.94	6.77	184	10.32
10-30-71	5	17.28	18.39	17.11	110	2466	154	6.37	143	8.90	5.98	134.	8.36	6.43	144	8.99
10-30-71	6	17.28	18.31	17.00	111	2825	164	6.43	164	9.47	6.07	154	8.93	6.54	166	9.62
10-30-71	7	17.28	18.33	16.78	103	2549	162	5.97	147	9.40	5.63	139	8.86	6.15	152	9.68
10-30-71	8	17.28	18.25	17.19	109	2738	172	6.31	158	9.97	5.97	150	9.44	6.34	159	10.03
	Avg	17.28	18.35	16.97	108	2715	156	6.25	157	9.06	5.89	148	8.53	6.38	160	9.23

TABLE H-13. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 IHC 304-CID, 22,000-LB GVW TRUCK

11/02/71 STOP AND GO 70 IHC (1574) DRIVER RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2000.5725	757.8021	27.0299	786	3350.0000	450.0000	2900.0000
MV	2	13.0196	8.9783	.3202	786	24.5000	1.0000	23.5000
SPD	3	12.7186	7.0784	.2525	786	33.0000	0.0000	33.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 400 - 600	62	7.89
600 - 800	27	3.44
800 - 1000	26	3.31
1000 - 1200	24	3.05
1200 - 1400	34	4.33
1400 - 1600	39	4.96
1600 - 1800	57	7.25
1800 - 2000	66	8.40
2000 - 2200	75	9.54
2200 - 2400	56	7.12
2400 - 2600	80	10.18
2600 - 2800	138	17.56
2800 - 3000	81	10.31
3000 - 3200	16	2.04
3200 - 3400	5	.64

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	158	20.10
2 - 4	114	14.50
4 - 6	16	2.04
6 - 8	12	1.53
8 - 10	5	.64
10 - 12	12	1.53
12 - 14	17	2.16
14 - 16	52	6.62
16 - 18	75	9.54
18 - 20	73	9.29
20 - 22	73	9.29
22 - 24	131	16.67
24 - 26	48	6.11
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	89	11.32
2 - 4	46	5.85
4 - 6	41	5.22
6 - 8	44	5.60
8 - 10	42	5.34
10 - 12	39	4.96
12 - 14	95	12.09
14 - 16	73	9.29
16 - 18	58	7.38
18 - 20	79	10.05
20 - 22	168	21.37
22 - 24	11	1.40
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	1	.13
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-13. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA – 1969 IHC 304-CID, 22,000-LB GVW TRUCK (Cont'd)

11/01/71 STOP AND GO 70 IHC (1612) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1912.1898	773.4920	27.2451	806	3000.0000	100.0000	2900.0000
MV	2	13.1945	9.3933	.3309	806	24.8750	.7500	24.1250
SPD	3	12.4628	6.9888	.2462	806	22.6667	0.0000	22.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 0 - 200	1	.12
400 - 600	60	7.44
600 - 800	51	6.33
800 - 1000	27	3.35
1000 - 1200	44	5.46
1200 - 1400	45	5.58
1400 - 1600	39	4.84
1600 - 1800	42	5.21
1800 - 2000	65	8.06
2000 - 2200	71	8.81
2200 - 2400	62	7.69
2400 - 2600	72	8.93
2600 - 2800	138	17.12
2800 - 3000	85	10.55
3000 - 3200	4	.50

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	237	29.40
2 - 4	41	5.09
4 - 6	13	1.61
6 - 8	16	1.99
8 - 10	11	1.36
10 - 12	16	1.99
12 - 14	6	.74
14 - 16	22	2.73
16 - 18	92	11.41
18 - 20	79	9.80
20 - 22	56	6.95
22 - 24	114	14.14
24 - 26	103	12.78
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	78	9.68
2 - 4	59	7.32
4 - 6	49	6.08
6 - 8	51	6.33
8 - 10	43	5.33
10 - 12	56	6.95
12 - 14	81	10.05
14 - 16	74	9.18
16 - 18	61	7.57
18 - 20	75	9.31
20 - 22	165	20.47
22 - 24	14	1.74
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-14. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA – 1969 IHC 304-CID, 22,000-LB GVW TRUCK

10/28/71 SLOW SPEED IHC (996) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1639.7088	519.7733	23.2916	498	2950.0000	25.0000	2925.0000
MV	2	10.5881	8.7192	.3907	498	23.7500	.2500	23.5000
SPD	3	20.4933	7.8302	.3509	498	27.6667	.3333	27.3333

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
0 - 200	24	4.82
400 - 600	15	3.01
600 - 800	4	.80
800 - 1000	6	1.20
1000 - 1200	7	1.41
1200 - 1400	17	3.41
1400 - 1600	29	5.82
1600 - 1800	249	50.00
1800 - 2000	63	12.65
2000 - 2200	44	8.84
2200 - 2400	16	3.21
2400 - 2600	13	2.61
2600 - 2800	9	1.81
2800 - 3000	2	.40

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	150	30.12
2 - 4	46	9.24
4 - 6	13	2.61
6 - 8	17	3.41
8 - 10	12	2.41
10 - 12	25	5.02
12 - 14	39	7.83
14 - 16	39	7.83
16 - 18	21	4.22
18 - 20	21	4.22
20 - 22	24	4.82
22 - 24	91	18.27
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	33	6.63
2 - 4	8	1.61
4 - 6	7	1.41
6 - 8	5	1.00
8 - 10	7	1.41
10 - 12	12	2.41
12 - 14	18	3.61
14 - 16	19	3.82
16 - 18	16	3.21
18 - 20	26	5.22
20 - 22	38	7.63
22 - 24	34	6.83
24 - 26	153	30.72
26 - 28	122	24.50
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-14. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 IHC 304-CID, 22,000-LB GVW TRUCK (Cont'd)

10/28/71 SLOW SPEED IHC (966) RUN NO. 2

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1675.0518	404.4889	18.4049	483	2875.0000	25.0000	2850.0000
MV	2	11.0675	8.4953	.3866	483	23.7500	.2500	23.5000
SPD	3	21.0531	6.7486	.3071	483	28.3333	.3333	28.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 0 - 200	1	.21
200 - 400	1	.21
400 - 600	17	3.52
600 - 800	5	1.04
800 - 1000	7	1.45
1000 - 1200	14	2.90
1200 - 1400	13	2.69
1400 - 1600	52	10.77
1600 - 1800	245	50.72
1800 - 2000	58	12.01
2000 - 2200	29	6.00
2200 - 2400	14	2.90
2400 - 2600	18	3.73
2600 - 2800	8	1.66
2800 - 3000	1	.21

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	123	25.47
2 - 4	49	10.14
4 - 6	19	3.93
6 - 8	15	3.11
8 - 10	13	2.69
10 - 12	17	3.52
12 - 14	51	10.56
14 - 16	35	7.25
16 - 18	25	5.18
18 - 20	27	5.59
20 - 22	25	5.18
22 - 24	84	17.39
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	12	2.48
2 - 4	7	1.45
4 - 6	9	1.86
6 - 8	8	1.66
8 - 10	6	1.24
10 - 12	14	2.90
12 - 14	21	4.35
14 - 16	20	4.14
16 - 18	14	2.90
18 - 20	27	5.59
20 - 22	38	7.87
22 - 24	39	8.07
24 - 26	170	35.20
26 - 28	94	19.46
28 - 30	4	.83
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-14. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 IHC 304-CID, 22,000-LB GVW TRUCK (Cont'd)

10/28/71 SLOW SPEED IHC (968) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1668.5950	359.5600	16.3436	484	2900.0000	475.0000	2425.0000
MV	2	11.2443	8.9473	.4067	484	23.7500	.2500	23.5000
SPD	3	21.0895	6.5141	.2963	484	33.3333	.3333	33.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
400 - 600	11	2.27
600 - 800	8	1.65
800 - 1000	6	1.24
1000 - 1200	12	2.48
1200 - 1400	15	3.10
1400 - 1600	50	10.33
1600 - 1800	273	56.40
1800 - 2000	48	9.92
2000 - 2200	30	6.20
2200 - 2400	11	2.27
2400 - 2600	12	2.48
2600 - 2800	7	1.45
2800 - 3000	1	.21

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	142	29.34
2 - 4	47	9.71
4 - 6	14	2.89
6 - 8	5	1.03
8 - 10	12	2.48
10 - 12	14	2.89
12 - 14	34	7.02
14 - 16	40	8.26
16 - 18	25	5.17
18 - 20	21	4.34
20 - 22	28	5.74
22 - 24	102	21.07
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	6	1.24
2 - 4	10	2.07
4 - 6	8	1.65
6 - 8	6	1.24
8 - 10	11	2.27
10 - 12	12	2.48
12 - 14	24	4.96
14 - 16	19	3.93
16 - 18	14	2.89
18 - 20	32	6.61
20 - 22	33	6.82
22 - 24	35	7.23
24 - 26	201	41.53
26 - 28	72	14.88
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	1	.21
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-15. INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 IHC 304-CID, 22,000-LB GVW TRUCK

10/29/71 INTERMEDIATE 70 IHC (1168) RUN NO. 8

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2592.2089	464.7747	19.2325	584	3350.0000	25.0000	3325.0000
MV	2	10.0479	7.4987	.3103	584	25.0000	1.2500	23.7500
SPD	3	31.8248	5.6294	.2329	584	38.6667	4.0000	34.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
0 - 200	9	1.54
600 - 800	2	.34
800 - 1000	2	.34
1000 - 1200	2	.34
1200 - 1400	1	.17
1400 - 1600	4	.68
1600 - 1800	10	1.71
1800 - 2000	12	2.05
2000 - 2200	26	4.45
2200 - 2400	27	4.62
2400 - 2600	46	7.88
2600 - 2800	247	42.29
2800 - 3000	185	31.68
3000 - 3200	7	1.20
3200 - 3400	4	.68

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	99	16.95
2 - 4	106	18.15
4 - 6	23	3.94
6 - 8	34	5.82
8 - 10	36	6.16
10 - 12	39	6.68
12 - 14	49	8.39
14 - 16	71	12.16
16 - 18	30	5.14
18 - 20	23	3.94
20 - 22	14	2.40
22 - 24	26	4.45
24 - 26	34	5.82
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	2	.34
6 - 8	2	.34
8 - 10	3	.51
10 - 12	0	0.00
12 - 14	4	.68
14 - 16	3	.51
16 - 18	7	1.20
18 - 20	10	1.71
20 - 22	17	2.91
22 - 24	15	2.57
24 - 26	20	3.42
26 - 28	18	3.08
28 - 30	22	3.77
30 - 32	25	4.28
32 - 34	63	10.79
34 - 36	363	62.16
36 - 38	9	1.54
38 - 40	1	.17
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-16. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 IHC 304-CID, 22,000-LB GVW TRUCK

10/30/71 HIGH SPEED 70 IHC (1028) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2934.2899	171.1603	7.5496	514	3600.0000	1675.0000	1925.0000
MV	2	4.3079	4.5226	.1995	514	25.1250	1.3750	23.7500
SPD	3	46.6038	2.7638	.1219	514	50.3333	22.3333	28.0000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
1600 - 1800	1	.19
2400 - 2600	7	1.36
2600 - 2800	101	19.65
2800 - 3000	163	31.71
3000 - 3200	241	46.89

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	17	3.31
2 - 4	347	67.51
4 - 6	70	13.62
6 - 8	20	3.89
8 - 10	3	.58
10 - 12	12	2.33
12 - 14	13	2.53
14 - 16	9	1.75
16 - 18	12	2.33
18 - 20	0	0.00
20 - 22	0	0.00
22 - 24	3	.58
24 - 26	8	1.56
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	0	0.00
6 - 8	0	0.00
8 - 10	0	0.00
10 - 12	0	0.00
12 - 14	0	0.00
14 - 16	0	0.00
16 - 18	0	0.00
18 - 20	0	0.00
20 - 22	0	0.00
22 - 24	1	.19
24 - 26	0	0.00
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	1	.19
38 - 40	0	0.00
40 - 42	19	3.70
42 - 44	64	12.45
44 - 46	91	17.70
46 - 48	114	22.18
48 - 50	202	39.30
50 - 52	22	4.28
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-17. EFFECT OF ROAD ROUTE ON MASS EMISSION RATES–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK

Date	Run No.	Miles	Sampling Time (min)	Weight of Fuel	Total Grams HC	Total Grams CO	Total Grams NO_x	Grams per Mile HC	Grams per Mile CO	Grams per Mile NO_x	Grams per Minute HC	Grams per Minute CO	Grams per Minute NO_x	Grams per lb. of Fuel HC	Grams per lb. of Fuel CO	Grams per lb. of Fuel NO_x
							STOP AND GO									
Driver: A																
11-26-71	1	6.868	25.79	10.82	308	3377	45	44.81	492	6.56	11.93	131	1.75	28.44	312	4.16
11-26-71	2	6.868	25.39	10.66	318	3400	45	46.34	495	6.49	12.54	134	1.76	29.86	319	4.18
11-26-71	3	6.868	25.56	10.60	315	3465	43	45.88	505	6.28	12.33	136	1.69	29.73	327	4.07
	Avg	6.868	25.58	10.69	314	3414	44	45.68	497	6.44	12.27	134	1.73	29.34	319	4.14
Driver: B																
11-29-71	1	6.868	27.05	11.30	458	3614	52	66.66	526	7.52	16.93	134	1.91	40.52	320	4.57
11-29-71	2	6.868	26.61	12.13	381	3598	51	55.43	524	7.48	14.31	135	1.93	31.38	297	4.24
11-29-71	3	6.868	26.66	11.18	342	3572	50	49.78	520	7.31	12.82	134	1.88	30.55	319	4.49
11-29-71	4	6.868	27.00	11.17	278	3753	51	40.46	546	7.41	10.29	139	1.89	24.88	336	4.56
	Avg	6.868	26.83	11.45	365	3634	51	53.08	529	7.43	13.59	136	1.90	31.83	318	4.47
Driver: C																
11-30-71	1	6.868	24.56	11.52	332	3534	59	48.37	515	8.53	13.53	144	2.38	28.84	307	5.08
11-30-71	2	6.868	24.82	11.37	355	3719	58	51.63	542	8.40	14.29	150	2.32	31.19	327	5.07
11-30-71	3	6.868	25.10	11.58	354	3591	54	51.56	523	7.85	14.11	143	2.15	30.58	310	4.66
	Avg	6.868	24.83	11.49	347	3615	57	50.52	527	8.26	13.98	146	2.28	30.20	315	4.94
							SLOW SPEED									
11-30-71	1	6.868	15.55	7.01	122	1631	53	17.80	237	7.65	7.86	105	3.38	17.44	233	7.49
11-30-71	2	6.868	15.45	6.87	114	1550	53	16.53	226	7.77	7.35	100	3.45	16.53	226	7.77
11-30-71	3	6.868	15.28	6.92	110	1567	52	15.95	228	7.59	7.17	103	3.41	15.83	226	7.53
	Avg	6.868	15.43	6.93	115	1583	53	16.76	230	7.67	7.46	103	3.41	16.60	228	7.60

TABLE H-17. EFFECT OF ROAD ROUTE ON MASS EMISSION RATES–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK (Cont'd)

Date	Run No.	Miles	Sampling Time (min)	Weight of Fuel	Total Grams HC	Total Grams CO	Total Grams NO_x	Grams per Mile HC	Grams per Mile CO	Grams per Mile NO_x	Grams per Minute HC	Grams per Minute CO	Grams per Minute NO_x	Grams per lb. of Fuel HC	Grams per lb. of Fuel CO	Grams per lb. of Fuel NO_x
							INTERMEDIATE SPEED									
12-1-71	1	12.49	19.44	13.51	150	2737	147	11.99	219	11.80	7.71	141	7.58	11.09	203	10.91
12-1-71	2	12.49	19.12	13.66	143	2771	143	11.46	222	11.47	7.49	145	7.49	10.48	203	10.49
12-1-71	3	12.49	19.22	13.65	146	2761	152	11.66	221	12.17	7.58	143	7.91	10.67	202	11.14
12-1-71	4	12.49	19.04	13.62	141	2735	144	11.29	219	11.55	7.41	144	7.58	10.35	201	10.59
12-3-71	1	12.49	19.02	13.60	159	2700	151	12.74	216	12.10	8.37	142	7.95	11.70	199	11.12
	Avg	12.49	19.17	13.61	148	2741	147	11.83	219	11.82	7.71	143	7.70	10.86	202	10.85
							IH-410 INTERMEDIATE SPEED									
12-3-71	1	12.49	15.01	11.76	39.20	771	140	3.14	61.73	11.22	2.61	51.37	9.34	3.33	65.57	11.92
12-3-71	2	12.49	14.95	11.18	41.06	836	154	3.29	66.95	12.35	2.75	55.93	10.32	3.67	74.80	13.80
12-3-71	3	12.49	14.97	11.15	46.51	976	152	3.72	78.18	12.15	3.11	65.23	10.14	4.17	87.57	13.62
12-3-71	4	12.49	15.02	11.47	43.55	834	137	3.49	66.80	10.96	2.90	55.55	9.12	3.80	72.74	11.94
12-3-71	5	12.49	15.17	10.64	44.65	996	148	3.58	79.72	11.82	2.94	65.64	9.74	4.20	93.58	13.88
	Avg	12.49	15.02	11.24	42.99	883	146	3.44	70.68	11.70	2.86	58.74	9.72	3.83	78.85	13.03
							HIGH SPEED									
12-6-71	2	17.28	19.12	16.89	70.40	2485	204	4.07	144	11.82	3.68	130	10.69	4.17	147	12.10
12-6-71	3	17.28	19.26	16.84	75.97	2552	206	4.40	148	11.93	3.95	133	10.71	4.51	152	12.24
12-6-71	4	17.28	19.25	16.53	74.86	2658	202	4.33	154	11.69	3.89	138	10.50	4.53	161	12.22
12-6-71	5	17.28	19.14	16.58	72.67	2537	205	4.21	147	11.85	3.80	133	10.70	4.38	153	12.36
	Avg	17.28	19.19	16.71	73.48	2558	204	4.25	148	11.82	3.83	134	10.65	4.40	153	12.23

TABLE H-18. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK
HAND READ–COMPUTER REDUCED

11/29/71 STOP AND GO 69 CHEV (1560) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1820.6090	826.2632	29.5850	780	3300.0000	350.0000	2950.0000
MV	2	15.4172	9.2083	.3297	780	26.1250	.5000	25.6250
SPD	3	13.7427	7.9147	.2834	780	36.6667	1.0000	35.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 200 - 400	1	.13
400 - 600	137	17.56
600 - 800	23	2.95
800 - 1000	13	1.67
1000 - 1200	27	3.46
1200 - 1400	34	4.36
1400 - 1600	33	4.23
1600 - 1800	65	8.33
1800 - 2000	46	5.90
2000 - 2200	61	7.82
2200 - 2400	55	7.05
2400 - 2600	144	18.46
2600 - 2800	95	12.18
2800 - 3000	13	1.67
3000 - 3200	21	2.69
3200 - 3400	12	1.54

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	135	17.31
2 - 4	60	7.69
4 - 6	23	2.95
6 - 8	12	1.54
8 - 10	9	1.15
10 - 12	7	.90
12 - 14	12	1.54
14 - 16	15	1.92
16 - 18	99	12.69
18 - 20	109	13.97
20 - 22	46	5.90
22 - 24	64	8.21
24 - 26	166	21.28
26 - 28	23	2.95
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	34	4.36
2 - 4	115	14.74
4 - 6	39	5.00
6 - 8	37	4.74
8 - 10	39	5.00
10 - 12	26	3.33
12 - 14	77	9.87
14 - 16	66	8.46
16 - 18	51	6.54
18 - 20	56	7.18
20 - 22	61	7.82
22 - 24	157	20.13
24 - 26	13	1.67
26 - 28	1	.13
28 - 30	0	0.00
30 - 32	1	.13
32 - 34	0	0.00
34 - 36	5	.64
36 - 38	2	.26
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-18. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK HAND
READ–COMPUTER REDUCED (Cont'd)

11/24/71 STOP AND GO 69 CHEV (1542) RUN NO. 2

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1863.3543	808.7508	29.1264	771	3350.0000	350.0000	3000.0000
MV	2	15.3966	9.0470	.3258	771	25.7500	.6250	25.1250
SPD	3	13.8491	7.4074	.2668	771	35.6667	1.3333	34.3333

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
200 - 400	1	.13
400 - 600	114	14.79
600 - 800	23	2.98
800 - 1000	21	2.72
1000 - 1200	30	3.89
1200 - 1400	34	4.41
1400 - 1600	40	5.19
1600 - 1800	42	5.45
1800 - 2000	47	6.10
2000 - 2200	73	9.47
2200 - 2400	63	8.17
2400 - 2600	135	17.51
2600 - 2800	101	13.10
2800 - 3000	9	1.17
3000 - 3200	21	2.72
3200 - 3400	17	2.20

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	137	17.77
2 - 4	43	5.58
4 - 6	13	1.69
6 - 8	31	4.02
8 - 10	10	1.30
10 - 12	16	2.08
12 - 14	20	2.59
14 - 16	10	1.30
16 - 18	71	9.21
18 - 20	112	14.53
20 - 22	65	8.43
22 - 24	61	7.91
24 - 26	182	23.61
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	11	1.43
2 - 4	111	14.40
4 - 6	46	5.97
6 - 8	43	5.58
8 - 10	26	3.37
10 - 12	48	6.23
12 - 14	78	10.12
14 - 16	56	7.26
16 - 18	53	6.87
18 - 20	62	8.04
20 - 22	70	9.08
22 - 24	160	20.75
24 - 26	6	.78
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	1	.13
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-18. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK HAND
READ–COMPUTER REDUCED (Cont'd)

11/29/71 STOP AND GO 69 CHEV (1536) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1879.8828	835.7912	30.1590	768	3350.0000	150.0000	3200.0000
MV	2	15.2414	9.2099	.3323	768	25.8750	.2500	25.6250
SPD	3	13.3655	7.8028	.2816	768	35.6667	.3333	35.3333

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 0 - 200	1	.13
400 - 600	115	14.97
600 - 800	30	3.91
800 - 1000	21	2.73
1000 - 1200	26	3.39
1200 - 1400	29	3.78
1400 - 1600	35	4.56
1600 - 1800	56	7.29
1800 - 2000	45	5.86
2000 - 2200	57	7.42
2200 - 2400	62	8.07
2400 - 2600	91	11.85
2600 - 2800	136	17.71
2800 - 3000	22	2.86
3000 - 3200	18	2.34
3200 - 3400	24	3.13

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	145	18.88
2 - 4	45	5.86
4 - 6	25	3.26
6 - 8	23	2.99
8 - 10	7	.91
10 - 12	5	.65
12 - 14	13	1.69
14 - 16	17	2.21
16 - 18	69	8.98
18 - 20	116	15.10
20 - 22	61	7.94
22 - 24	65	8.46
24 - 26	177	23.05
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	69	8.98
2 - 4	75	9.77
4 - 6	40	5.21
6 - 8	44	5.73
8 - 10	31	4.04
10 - 12	48	6.25
12 - 14	65	8.46
14 - 16	53	6.90
16 - 18	62	8.07
18 - 20	46	5.99
20 - 22	76	9.90
22 - 24	150	19.53
24 - 26	7	.91
26 - 28	1	.13
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	1	.13
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-19. STOP AND GO ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK
AUTOMATIC DATA LOGGER

STOP AND GO TIME 002848 RUN 2 (FILE 2 OF REEL 4257)

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1747.6519	848.5010	5.6201	22794	3315.0000	0.0000	3315.0000
MV	2	11.3391	9.3692	.0621	22794	24.9750	0.0000	24.9750
SPD	3	12.6968	7.6836	.0509	22794	24.6667	0.0000	24.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 0 - 200	318	1.40
200 - 400	196	.86
400 - 600	4150	18.21
600 - 800	606	2.66
800 - 1000	547	2.40
1000 - 1200	669	2.93
1200 - 1400	910	3.99
1400 - 1600	1162	5.10
1600 - 1800	1630	7.15
1800 - 2000	1664	7.30
2000 - 2200	1641	7.20
2200 - 2400	1995	8.75
2400 - 2600	4444	19.50
2600 - 2800	1688	7.41
2800 - 3000	364	1.60
3000 - 3200	661	2.90
3200 - 3400	149	.65

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	7988	35.04
2 - 4	1386	6.08
4 - 6	617	2.71
6 - 8	390	1.71
8 - 10	278	1.22
10 - 12	253	1.11
12 - 14	309	1.36
14 - 16	405	1.78
16 - 18	3220	14.13
18 - 20	2955	12.96
20 - 22	1264	5.55
22 - 24	1933	8.48
24 - 26	1796	7.88
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	2084	9.14
2 - 4	2755	12.09
4 - 6	1580	6.93
6 - 8	1237	5.43
8 - 10	1212	5.32
10 - 12	1292	5.67
12 - 14	2191	9.61
14 - 16	1698	7.45
16 - 18	1441	6.32
18 - 20	1385	6.08
20 - 22	1710	7.50
22 - 24	3979	17.46
24 - 26	230	1.01
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-20. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK HAND
READ–COMPUTER REDUCED

11/30/71 SLOW SPEED 69 CHEV (872) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1716.0550	476.5691	22.8235	436	3250.0000	475.0000	2775.0000
MV	2	13.5227	7.5011	.3592	436	25.5000	.7500	24.7500
SPD	3	21.8242	6.7464	.3231	436	33.3333	1.6667	31.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 400	24	5.50
400 - 600	4	.92
600 - 800	9	2.06
800 - 1000	8	1.83
1000 - 1200	11	2.52
1200 - 1400	25	5.73
1400 - 1600	227	52.06
1600 - 1800	69	15.83
1800 - 2000	15	3.44
2000 - 2200	6	1.38
2200 - 2400	13	2.98
2400 - 2600	10	2.29
2600 - 2800	11	2.52
2800 - 3000	2	.46
3000 - 3200	2	.46
3200 - 3400		

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	38	8.72
2 - 4	40	9.17
4 - 6	21	4.82
6 - 8	14	3.21
8 - 10	29	6.65
10 - 12	33	7.57
12 - 14	23	5.28
14 - 16	54	12.39
16 - 18	53	12.16
18 - 20	29	6.65
20 - 22	31	7.11
22 - 24	25	5.73
24 - 26	46	10.55
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	2	.46
2 - 4	18	4.13
4 - 6	6	1.38
6 - 8	6	1.38
8 - 10	5	1.15
10 - 12	8	1.83
12 - 14	17	3.90
14 - 16	15	3.44
16 - 18	13	2.98
18 - 20	16	3.67
20 - 22	12	2.75
22 - 24	40	9.17
24 - 26	134	30.73
26 - 28	142	32.57
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	2	.46
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-20. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK HAND
READ–COMPUTER REDUCED (Cont'd)

11/30/71 SLOW SPEED 69 CHEV (954) RUN NO. 3

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1763.0398	485.6591	22.2368	477	3200.0000	450.0000	2750.0000
MV	2	13.9807	7.5815	.3471	477	26.2500	.7500	25.5000
SPD	3	22.3588	6.7255	.3079	477	38.3333	1.6667	36.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
< 400 - 600	23	4.82
600 - 800	9	1.89
800 - 1000	7	1.47
1000 - 1200	10	2.10
1200 - 1400	12	2.52
1400 - 1600	15	3.14
1600 - 1800	145	30.40
1800 - 2000	185	38.78
2000 - 2200	18	3.77
2200 - 2400	13	2.73
2400 - 2600	7	1.47
2600 - 2800	15	3.14
2800 - 3000	10	2.10
3000 - 3200	6	1.26
3200 - 3400	2	.42

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
< 0 - 2	52	10.90
2 - 4	27	5.66
4 - 6	21	4.40
6 - 8	23	4.82
8 - 10	20	4.19
10 - 12	33	6.92
12 - 14	31	6.50
14 - 16	51	10.69
16 - 18	55	11.53
18 - 20	46	9.64
20 - 22	46	9.64
22 - 24	12	2.52
24 - 26	59	12.37
26 - 28	1	.21
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
< 0 - 2	1	.21
2 - 4	16	3.35
4 - 6	5	1.05
6 - 8	9	1.89
8 - 10	7	1.47
10 - 12	10	2.10
12 - 14	17	3.56
14 - 16	15	3.14
16 - 18	14	2.94
18 - 20	19	3.98
20 - 22	17	3.56
22 - 24	34	7.13
24 - 26	108	22.64
26 - 28	191	40.04
28 - 30	13	2.73
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	1	.21
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-21. SLOW SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969
CHEVROLET 350-CID, 18,000-LB GVW TRUCK
AUTOMATIC DATA LOGGER

12/ 1/71 SLOW SPEED TIME 1520 RUN 3 (FILE 3 OF REEL 2914)

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	1704.0063	500.3780	4.5384	12156	3225.0000	40.0000	3185.0000
MV	2	12.4744	7.5465	.0684	12156	24.9750	0.0000	24.9750
SPD	3	22.4191	7.0538	.0640	12156	29.2000	.3333	28.8667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
0 - 200	12	.10
200 - 400	60	.49
400 - 600	733	6.03
600 - 800	188	1.55
800 - 1000	228	1.88
1000 - 1200	259	2.13
1200 - 1400	314	2.58
1400 - 1600	626	5.15
1600 - 1800	5524	45.44
1800 - 2000	2772	22.80
2000 - 2200	232	1.91
2200 - 2400	266	2.19
2400 - 2600	244	2.01
2600 - 2800	271	2.23
2800 - 3000	303	2.49
3000 - 3200	115	.95
3200 - 3400	4	.07

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	1906	15.68
2 - 4	739	6.08
4 - 6	514	4.23
6 - 8	499	4.10
8 - 10	745	6.13
10 - 12	939	7.72
12 - 14	701	5.77
14 - 16	1349	11.10
16 - 18	1641	13.50
18 - 20	1171	9.63
20 - 22	626	5.15
22 - 24	501	4.12
24 - 26	825	6.79
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	166	1.37
2 - 4	402	3.31
4 - 6	196	1.61
6 - 8	190	1.56
8 - 10	185	1.52
10 - 12	199	1.64
12 - 14	396	3.26
14 - 16	415	3.41
16 - 18	374	3.08
18 - 20	351	2.89
20 - 22	363	2.99
22 - 24	724	5.96
24 - 26	2857	23.50
26 - 28	5033	41.40
28 - 30	305	2.51
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-22. INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 CHEVROLET 350-CID, 18,000-LB GVW TRUCK

12/03/71 MED SPEED TIME 0905 45 MAX RUN 1

VAR NO		MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2221.2123	521.9671	4.1126	16110	3205.0000	405.0000	2600.0000
MV	2	9.0236	7.4047	.0583	16110	24.9750	0.0000	24.9750
SPD	3	31.6953	9.1115	.0718	16110	40.6667	.0667	40.6000

PERCENT OF TIME
RPM AT

LEVEL			COUNT	PERCENT
		<		
0.	-	200.	0	0.00
200.	-	400.	0	0.00
400.	-	600.	651	4.04
600.	-	800.	130	.81
800.	-	1000.	148	.92
1000.	-	1200.	167	1.04
1200.	-	1400.	219	1.36
1400.	-	1600.	248	1.54
1600.	-	1800.	748	4.64
1800.	-	2000.	1361	8.45
2000.	-	2200.	1553	9.64
2200.	-	2400.	1644	10.20
2400.	-	2600.	7779	48.29
2600.	-	2800.	1210	7.51
2800.	-	3000.	204	1.27
3000.	-	3200.	46	.29
3200.	-	3400.	2	.01
3400.	-	3600.	0	0.00

PERCENT OF TIME MV AT

LEVEL			COUNT	PERCENT
		<		
0.	-	1.	1641	10.19
1.	-	2.	3707	23.01
2.	-	3.	942	5.85
3.	-	4.	228	1.42
4.	-	5.	97	.60
5.	-	6.	286	1.78
6.	-	7.	336	2.09
7.	-	8.	490	3.04
8.	-	9.	437	2.71
9.	-	10.	644	4.00
10.	-	11.	612	3.80
11.	-	12.	722	4.48
12.	-	13.	658	4.08
13.	-	14.	689	4.28
14.	-	15.	740	4.59
15.	-	16.	378	2.35
16.	-	17.	474	2.94
17.	-	18.	555	3.45
18.	-	19.	502	3.12
19.	-	20.	575	3.57
20.	-	21.	239	1.48
21.	-	22.	259	1.61
22.	-	23.	376	2.33
23.	-	24.	184	1.14
24.	-	25.	339	2.10
25.	-	26.	0	0.00
26.	-	27.	0	0.00
27.	-	28.	0	0.00
28.	-	29.	0	0.00
29.	-	30.	0	0.00

PERCENT OF TIME WS AT

LEVEL			COUNT	PERCENT
		<		
0.	-	2.	369	2.29
2.	-	4.	157	.97
4.	-	6.	71	.44
6.	-	8.	52	.32
8.	-	10.	55	.34
10.	-	12.	158	.98
12.	-	14.	241	1.50
14.	-	16.	185	1.15
16.	-	18.	206	1.28
18.	-	20.	348	2.16
20.	-	22.	333	2.07
22.	-	24.	300	1.86
24.	-	26.	859	5.33
26.	-	28.	590	3.66
28.	-	30.	788	4.89
30.	-	32.	1100	6.83
32.	-	34.	823	5.11
34.	-	36.	1132	7.03
36.	-	38.	5008	31.09
38.	-	40.	3244	20.14
40.	-	42.	91	.56
42.	-	44.	0	0.00
44.	-	46.	0	0.00
46.	-	48.	0	0.00
48.	-	50.	0	0.00
50.	-	52.	0	0.00
52.	-	54.	0	0.00
54.	-	56.	0	0.00
56.	-	58.	0	0.00
58.	-	60.	0	0.00

TABLE H-22. INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 CHEVROLET 350-CID, 18,000-LB GVW TRUCK (Cont'd)

12/ 3/71 MED SPEED (IH 410) 45 MAX TIME 1530 RUN 5 (FILE NO. 4)

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2438.7867	342.7050	2.9224	13752	3230.0000	405.0000	2825.0000
MV	2	12.5802	5.2781	.0450	13752	24.9750	0.0000	24.9750
SPD	3	35.7064	6.0737	.0518	13752	40.1333	.3333	39.8000

PERCENT OF TIME
RPM AT

LEVEL	COUNT	PERCENT
<		
0. - 200.	0	0.00
200. - 400.	0	0.00
400. - 600.	213	1.55
600. - 800.	31	.23
800. - 1000.	52	.38
1000. - 1200.	47	.34
1200. - 1400.	97	.71
1400. - 1600.	110	.80
1600. - 1800.	133	.97
1800. - 2000.	155	1.13
2000. - 2200.	126	.92
2200. - 2400.	180	1.31
2400. - 2600.	11845	86.13
2600. - 2800.	676	4.92
2800. - 3000.	41	.30
3000. - 3200.	24	.17
3200. - 3400.	22	.16
3400. - 3600.	0	0.00

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0. - 1.	438	3.18
1. - 2.	267	1.94
2. - 3.	80	.58
3. - 4.	132	.96
4. - 5.	392	2.85
5. - 6.	477	3.47
6. - 7.	426	3.10
7. - 8.	351	2.55
8. - 9.	363	2.64
9. - 10.	1200	8.73
10. - 11.	867	6.30
11. - 12.	846	6.15
12. - 13.	699	5.08
13. - 14.	839	6.10
14. - 15.	1637	11.90
15. - 16.	1195	8.69
16. - 17.	1181	8.59
17. - 18.	595	4.33
18. - 19.	408	2.97
19. - 20.	453	3.29
20. - 21.	309	2.25
21. - 22.	211	1.53
22. - 23.	98	.71
23. - 24.	118	.86
24. - 25.	170	1.24
25. - 26.	0	0.00
26. - 27.	0	0.00
27. - 28.	0	0.00
28. - 29.	0	0.00
29. - 30.	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0. - 2.	18	.13
2. - 4.	113	.82
4. - 6.	43	.31
6. - 8.	34	.25
8. - 10.	32	.23
10. - 12.	32	.23
12. - 14.	105	.76
14. - 16.	167	1.21
16. - 18.	51	.37
18. - 20.	44	.36
20. - 22.	51	.37
22. - 24.	51	.37
24. - 26.	113	.82
26. - 28.	69	.50
28. - 30.	83	.60
30. - 32.	79	.57
32. - 34.	76	.55
34. - 36.	391	2.84
36. - 38.	8942	65.02
38. - 40.	3238	23.55
40. - 42.	15	.11
42. - 44.	0	0.00
44. - 46.	0	0.00
46. - 48.	0	0.00
48. - 50.	0	0.00
50. - 52.	0	0.00
52. - 54.	0	0.00
54. - 56.	0	0.00
56. - 58.	0	0.00
58. - 60.	0	0.00

TABLE H-23. ALTERNATE INTERMEDIATE SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 CHEVROLET 350-CID, 18,000-LB GVW TRUCK–AUTOMATIC DATA LOGGER

12/03/71 MED SPEED (IH410) TIME 1000 45 MAX RUN 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2454.1930	301.8792	2.6198	13278	2870.0000	440.0000	2430.0000
MV	2	11.3254	5.1475	.0447	13278	24.9750	0.0000	24.9750
SPD	3	36.4284	5.6685	.0492	13278	40.5333	0.0000	40.5333

PERCENT OF TIME
RPM AT

LEVEL	COUNT	PERCENT
<		
0. - 200.	0	0.00
200. - 400.	0	0.00
400. - 600.	74	.56
600. - 800.	27	.20
800. - 1000.	87	.66
1000. - 1200.	104	.78
1200. - 1400.	84	.63
1400. - 1600.	112	.84
1600. - 1800.	139	1.05
1800. - 2000.	122	.92
2000. - 2200.	156	1.17
2200. - 2400.	217	1.63
2400. - 2600.	11746	88.46
2600. - 2800.	394	2.97
2800. - 3000.	16	.12
3000. - 3200.	0	0.00
3200. - 3400.	0	0.00
3400. - 3600.	0	0.00

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0. - 1.	347	2.61
1. - 2.	367	2.76
2. - 3.	134	1.01
3. - 4.	256	1.93
4. - 5.	458	3.45
5. - 6.	688	5.18
6. - 7.	496	3.74
7. - 8.	685	5.16
8. - 9.	687	5.17
9. - 10.	818	6.16
10. - 11.	690	5.20
11. - 12.	1456	10.97
12. - 13.	1293	9.74
13. - 14.	1357	10.22
14. - 15.	636	4.79
15. - 16.	722	5.44
16. - 17.	357	2.69
17. - 18.	512	3.86
18. - 19.	366	2.76
19. - 20.	281	2.12
20. - 21.	191	1.44
21. - 22.	127	.96
22. - 23.	162	1.22
23. - 24.	83	.63
24. - 25.	109	.82
25. - 26.	0	0.00
26. - 27.	0	0.00
27. - 28.	0	0.00
28. - 29.	0	0.00
29. - 30.	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0. - 2.	6	.05
2. - 4.	44	.33
4. - 6.	37	.28
6. - 8.	29	.22
8. - 10.	44	.33
10. - 12.	138	1.04
12. - 14.	81	.61
14. - 16.	80	.60
16. - 18.	35	.26
18. - 20.	47	.35
20. - 22.	45	.34
22. - 24.	40	.30
24. - 26.	111	.84
26. - 28.	63	.47
28. - 30.	48	.36
30. - 32.	64	.48
32. - 34.	92	.69
34. - 36.	158	1.19
36. - 38.	6575	49.52
38. - 40.	5492	41.36
40. - 42.	49	.37
42. - 44.	0	0.00
44. - 46.	0	0.00
46. - 48.	0	0.00
48. - 50.	0	0.00
50. - 52.	0	0.00
52. - 54.	0	0.00
54. - 56.	0	0.00
56. - 58.	0	0.00
58. - 60.	0	0.00

TABLE H-24. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 CHEVROLET 350-CID, 18,000-LB GVW TRUCK HAND READ–COMPUTER REDUCED

12/06/71 HIGH SPEED CHEV (1090) RUN NO. 1

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2792.2309	181.1838	7.5493	576	3175.0000	600.0000	2575.0000
MV	2	11.3765	5.9721	.2488	576	25.7500	1.2500	24.5000
SPD	3	40.5752	3.4637	.1452	576	44.0000	7.3333	36.6667

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
600 - 800	1	.17
1000 - 1200	1	.17
1200 - 1400	1	.17
1600 - 1800	1	.17
1800 - 2000	1	.17
2000 - 2200	1	.17
2200 - 2400	3	.52
2400 - 2600	7	1.22
2600 - 2800	193	33.51
2800 - 3000	360	62.50
3000 - 3200	7	1.22

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	5	.87
2 - 4	98	17.01
4 - 6	36	6.25
6 - 8	16	2.78
8 - 10	42	7.29
10 - 12	144	25.00
12 - 14	40	6.94
14 - 16	34	5.90
16 - 18	70	12.15
18 - 20	57	9.90
20 - 22	11	1.91
22 - 24	10	1.74
24 - 26	13	2.26
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	0	0.00
6 - 8	1	.17
8 - 10	0	0.00
10 - 12	0	0.00
12 - 14	2	.35
14 - 16	0	0.00
16 - 18	1	.17
18 - 20	1	.17
20 - 22	1	.17
22 - 24	2	.35
24 - 26	1	.17
26 - 28	0	0.00
28 - 30	2	.35
30 - 32	2	.35
32 - 34	3	.52
34 - 36	3	.52
36 - 38	8	1.39
38 - 40	87	15.10
40 - 42	287	49.83
42 - 44	166	28.82
44 - 46	9	1.56
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-24. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 CHEVROLET 350-CID, 18,000-LB GVW TRUCK HAND READ–COMPUTER REDUCED (Cont'd)

12/06/71 HIGH SPEED CHEV (1178) RUN NO.

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2805.0509	119.2422	4.9133	589	3425.0000	1750.0000	1675.0000
MV	2	10.1694	6.0074	.2475	589	25.8750	1.1250	24.7500
SPD	3	40.9305	3.1792	.1310	589	43.6667	4.0667	39.6000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
1600 - 1800	1	.17
1800 - 2000	1	.17
2000 - 2200	1	.17
2200 - 2400	4	.68
2400 - 2600	5	.85
2600 - 2800	189	32.09
2800 - 3000	386	65.53
3200 - 3400	1	.17
3400 - 3600	1	.17

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	14	2.38
2 - 4	131	22.24
4 - 6	46	7.81
6 - 8	28	4.75
8 - 10	49	8.32
10 - 12	102	17.32
12 - 14	38	6.45
14 - 16	55	9.34
16 - 18	74	12.56
18 - 20	30	5.09
20 - 22	9	1.53
22 - 24	4	.68
24 - 26	9	1.53
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	0	0.00
2 - 4	0	0.00
4 - 6	1	.17
6 - 8	0	0.00
8 - 10	1	.17
10 - 12	0	0.00
12 - 14	0	0.00
14 - 16	1	.17
16 - 18	0	0.00
18 - 20	1	.17
20 - 22	1	.17
22 - 24	0	0.00
24 - 26	2	.34
26 - 28	1	.17
28 - 30	0	0.00
30 - 32	1	.17
32 - 34	0	0.00
34 - 36	3	.51
36 - 38	3	.51
38 - 40	78	13.24
40 - 42	282	47.88
42 - 44	214	36.33
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

TABLE H-25. HIGH SPEED ROUTE ENGINE AND VEHICLE OPERATING DATA–1969 CHEVROLET 350-CID, 18,000-LB GVW TRUCK AUTOMATIC DATA LOGGER

12/ 6/71 HIGH SPEED (IH 410) 50 MAX TIME 1030 RUN 1 (FILE NO. 5

VAR	NO	MEAN	S.D.	S.E. OF MEAN	SAMPLE	MAXIMUM	MINIMUM	RANGE
RPM	1	2712.2997	333.3389	2.5509	17076	3215.0000	405.0000	2810.0000
MV	2	10.7537	5.8827	.0450	17076	24.9750	0.0000	24.9750
SPD	3	39.7470	6.2103	.0475	17076	44.4667	.0667	44.4000

PERCENT OF TIME RPM AT

LEVEL	COUNT	PERCENT
<		
400 - 600	201	1.18
600 - 800	18	.11
800 - 1000	12	.07
1000 - 1200	35	.20
1200 - 1400	38	.22
1400 - 1600	71	.42
1600 - 1800	117	.69
1800 - 2000	147	.86
2000 - 2200	120	.70
2200 - 2400	153	.90
2400 - 2600	777	4.55
2600 - 2800	8153	47.75
2800 - 3000	7174	42.01
3000 - 3200	59	.35
3200 - 3400	1	.01

PERCENT OF TIME MV AT

LEVEL	COUNT	PERCENT
<		
0 - 2	744	4.36
2 - 4	2882	16.88
4 - 6	1026	6.01
6 - 8	432	2.53
8 - 10	1362	7.98
10 - 12	4194	24.56
12 - 14	997	5.84
14 - 16	1184	6.93
16 - 18	2127	12.46
18 - 20	1617	9.47
20 - 22	174	1.02
22 - 24	265	1.55
24 - 26	72	.42
26 - 28	0	0.00
28 - 30	0	0.00
30 - 32	0	0.00
32 - 34	0	0.00
34 - 36	0	0.00
36 - 38	0	0.00
38 - 40	0	0.00
40 - 42	0	0.00
42 - 44	0	0.00
44 - 46	0	0.00
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

PERCENT OF TIME WS AT

LEVEL	COUNT	PERCENT
<		
0 - 2	78	.46
2 - 4	89	.52
4 - 6	34	.20
6 - 8	19	.11
8 - 10	30	.18
10 - 12	52	.30
12 - 14	97	.57
14 - 16	69	.40
16 - 18	33	.19
18 - 20	42	.25
20 - 22	42	.25
22 - 24	45	.26
24 - 26	90	.53
26 - 28	79	.46
28 - 30	71	.42
30 - 32	65	.38
32 - 34	71	.42
34 - 36	68	.40
36 - 38	268	1.57
38 - 40	2840	16.63
40 - 42	7989	46.78
42 - 44	4752	27.83
44 - 46	153	.90
46 - 48	0	0.00
48 - 50	0	0.00
50 - 52	0	0.00
52 - 54	0	0.00
54 - 56	0	0.00
56 - 58	0	0.00
58 - 60	0	0.00

APPENDIX I

EXPERIMENTAL 23-MODE TEST PROCEDURE COMPLETE COMPUTER PRINTOUT OF MODE DATA FOR NINE TRUCKS-ENGINES

EXPLANATION OF 23-MODE COMPUTER PRINTOUT

Column	Column Label	Explanation
1	Mode	Mode Number (1-23)
2	Speed	Engine Speed in RPM
3	Dynamometer Load	Measured Dynamometer Load in Ft-Lbs
4	HP	Horsepower Calculated from Dynamometer Load and Speed using Equation: $HP = \frac{(ft\text{-}lbs) \times RPM}{5252}$
5	Man. Vac.	Measured Manifold Vacuum in inches of Mercury
6	Fuel Rate MIN	Minutes Required for Engine to Use Amount of Fuel Shown in Column 7 (Measured)
7	Fuel Rate OZ	Measured Ounces of Fuel Used in Time Shown in Column 6
8	Fuel Rate GM/HR	Fuel Rate in Grams per Hour calculated from Equation: $GM/HR = 1701. \times \frac{oz}{MIN}$
9	HC	Measured Hydrocarbon Emission Concentration (PPMC)
10	CO	Measured Carbon Monoxide Emission Concentration,% by Volume
11	CO_2	Measured Carbon Dioxide Emission Concentration,% by Volume
12	NO	Measured Nitrogen Oxide Emission Concentration, ppm
13	Calculated Gram/Hr HC	Calculated Hydrocarbon Emission Concentration in Grams/Hr
14	Calculated Gram/Hr CO	Calculated Carbon Monoxide Emission Concentration in Grams/Hr
15	Calculated Gram/Hr NO_2	Calculated Nitrogen Dioxide Emission Concentration in Grams/Hr
16	WT. FAC.	Weighting Factor for Each Mode
17	HP	Weighted Horsepower HP (Column 4) times Weighting Factor (Column 16)
18	Weighted Gram/Hr HC	Column 13 x Weighting Factor
19	Weighted Gram/Hr CO	Column 14 x Weighting Factor
20	Weighted Gram/Hr NO_2	Column 15 x Weighting Factor

TABLE I-1. 23 MODE CYCLE STATIONARY DYNAMOMETER TEST RESULTS
Correlation Truck No. 1

Engine: Ford 300 CID, 6 cyl. Vehicle: 1970 Ford, 10,000 GVW Stake

			Emission Rate, Gr/bhp-hr			
Date	Run	Dynamometer	HC	CO	NO_2 Observed NDIR	Humidity, grains/lb dry air
8-3-71	1	Stationary	5.52	84.5	11.86	106.0
8-3-71	2	Stationary	5.82	90.3	11.45	105.5
8-3-71	3	Stationary	5.62	92.1	11.06	122.0
		Average	5.65	88.9	11.46	
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg.}}\right) \times 100$			5.3	8.6	6.8	

TABLE I-2. 23 MODE CYCLE CHASSIS DYNAMOMETER TEST RESULTS
Correlation Truck No. 1A

Engine: Ford 300 CID, 6 cyl. Vehicle: 15,000-lb GVW Van

			Emission Rate, Gr/bhp-hr			
Date	Run	Dynamometer	HC	CO	NO_2 Observed NDIR	Humidity, grains/lb dry air
11-2-71	1	Chassis	8.06	131.0	8.69	75
11-2-71	2	Chassis	8.08	132.9	8.67	83
11-2-71	3	Chassis	7.39	132.0	8.80	73
		Average	7.84	132.0	8.72	
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg.}}\right) \times 100$			8.8	1.5	1.5	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
8-03-71 RUN 1 FORD 300 CID 6 CORRELATION TRUCK 1

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	17.4	1.88	2.00	1810	3500	3.480	12.71	64	37.2	854	2.3	.067	0.0	2.48	56.9	.2
2	1500	0.0	0	20.0	1.80	2.00	1840	3800	.150	12.59	64	54.7	44	3.1	.040	0.0	2.19	1.7	.1
3	1500	25.9	7	18.8	1.20	3.00	4252	1820	.210	13.77	643	54.7	127	64.1	.040	.3	2.19	5.1	2.6
4	1500	51.8	15	16.4	1.05	3.00	4860	1700	.130	14.05	1444	57.6	89	162.4	.040	.6	2.30	3.6	6.5
5	1500	77.7	22	13.9	1.12	4.00	6075	1540	.130	13.48	1862	68.0	116	272.8	.040	.9	2.72	4.6	10.9
6	1500	103.6	30	11.0	1.16	5.00	7332	1300	.130	13.33	2211	70.1	142	394.0	.040	1.2	2.81	5.7	15.8
7	1500	129.5	37	8.4	1.17	6.00	8723	1120	.130	13.48	2302	71.2	167	485.8	.040	1.5	2.85	6.7	19.4
8	1500	155.4	44	4.6	1.12	7.00	10631	950	.440	13.48	1618	72.1	674	407.5	.040	1.8	2.88	27.0	16.3
9	1500	181.3	52	2.0	1.13	9.00	13548	1700	3.840	12.22	1065	141.9	6475	295.1	.040	2.1	5.68	259.0	11.8
10	1500	207.2	59	0.0	2.12	18.00	14442	2900	4.400	12.34	1083	245.9	7538	304.9	.040	2.4	9.84	301.5	12.2
11	1500	0.0	0	23.7	1.76	2.00	1933	33000	3.330	5.27	117	536.0	1093	6.3	.067	0.0	35.75	72.9	.4
12	-0	0.0	0	17.8	2.00	2.00	1701	4400	5.450	11.72	64	42.5	1063	2.1	.040	0.0	1.70	42.5	.1
13	2500	142.8	92	2.5	2.12	30.00	24071	2300	4.640	12.71	1574	314.4	12833	717.8	.040	3.7	12.60	513.3	28.7
14	2500	168.7	80	5.8	1.08	13.00	20475	1550	3.430	12.71	1774	184.0	9678	720.0	.040	3.2	7.36	387.1	28.8
15	2500	144.6	69	8.4	1.07	11.00	17487	1250	2.280	13.48	2515	137.6	5070	914.2	.040	2.8	5.50	202.8	36.8
16	2500	120.5	57	11.0	1.03	9.00	14863	1840	1.800	13.77	3001	173.6	3430	940.0	.040	2.3	6.94	137.2	37.6
17	2500	96.4	46	13.7	1.08	8.00	12600	2040	1.300	14.18	3083	163.4	2110	822.3	.040	1.8	6.56	84.4	32.9
18	2500	72.3	34	15.8	1.10	7.00	10825	2100	1.040	14.31	3029	145.6	1527	647.3	.040	1.4	5.82	61.1	27.9
19	2500	48.2	23	17.8	1.20	6.00	8505	1160	.250	14.31	2948	67.2	293	567.2	.040	.9	2.69	11.7	22.7
20	2500	24.1	11	20.0	1.27	5.00	6697	740	.250	14.31	1425	33.9	231	216.5	.040	.5	1.35	9.2	8.7
21	2500	0.0	0	21.3	1.27	4.00	5357	720	.420	14.66	274	25.5	300	32.8	.040	0.0	1.02	12.0	1.3
22	2600	0.0	0	25.6	1.89	2.00	1800	35000	2.840	3.99	170	606.9	1012	9.8	.040	0.0	24.28	40.5	.4
23	-0	0.0	0	17.8	2.14	2.00	1553	3700	3.480	12.82	143	33.5	727	4.3	.067	0.0	2.23	48.5	.3

CYCLE COMPOSITE HC 5.518 GRAM/BHP HR

CO 84.467 GRAM/BHP HR

NO2 11.863 GRAM/BHP HR

BSFC .644 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
8-03-71 RUN 2 FORD 300 CID 6 CORRELATION TRUCK 1

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	17.3	1.74	2.00	1855	3400	4.540	12.71	77	37.8	1014	2.8	.067	0.0	2.52	68.0	.2
2	1500	0.0	0	20.0	1.44	2.00	2362	1400	.470	14.42	157	22.0	144	8.2	.040	0.0	.88	6.0	.3
3	1500	25.9	7	19.0	1.33	3.00	3837	1600	.280	13.91	406	42.8	151	36.0	.040	.3	1.71	6.0	1.4
4	1500	51.8	15	16.8	1.36	4.00	5003	2200	.210	14.31	1540	74.7	144	173.5	.040	.6	2.99	5.8	6.9
5	1500	77.7	22	14.2	1.12	4.00	6075	1600	.150	13.63	2121	69.7	132	306.9	.040	.9	2.79	5.3	12.3
6	1500	103.6	30	11.5	1.14	5.00	7147	1630	.150	13.48	2540	84.5	157	437.0	.040	1.2	3.38	6.3	17.5
7	1500	129.5	37	9.5	1.03	5.00	8257	1800	.150	14.18	3166	102.4	172	598.2	.040	1.5	4.10	6.9	23.9
8	1500	155.4	44	4.7	1.15	7.00	10354	1000	.470	13.48	1738	73.7	700	425.2	.040	1.8	2.95	28.0	17.0
9	1500	181.3	52	2.1	1.05	8.00	12960	1600	4.070	12.47	930	124.2	6380	239.6	.040	2.1	4.97	255.2	9.6
10	1500	207.2	59	0.0	1.08	9.00	14175	3100	4.740	12.59	1241	249.1	7644	331.1	.040	2.4	9.96	307.8	13.2
11	1500	0.0	0	23.7	1.76	2.00	1933	33000	3.330	5.27	117	536.0	1093	6.3	.067	0.0	35.75	72.9	.4
12	-0	0.0	0	17.4	1.87	2.00	1819	4900	6.500	11.60	38	48.0	1285	1.2	.040	0.0	1.92	51.4	.0
13	2500	142.8	92	2.5	1.03	15.00	24772	2600	4.480	12.04	1520	371.6	14374	721.3	.040	3.7	14.87	575.2	28.4
14	2500	168.7	80	5.8	1.08	13.00	20475	1900	4.350	12.47	1647	228.7	10577	678.2	.040	3.2	9.15	423.1	27.1
15	2500	144.6	69	8.8	1.02	10.00	16676	1700	2.320	13.34	2467	179.2	4440	863.4	.040	2.8	7.17	177.6	34.5
16	2500	120.5	57	11.7	1.08	9.00	14175	2100	1.410	13.63	2714	189.0	3472	810.9	.040	2.3	7.56	138.9	32.4
17	2500	96.4	46	13.7	1.10	8.00	12371	2200	1.450	13.91	2869	174.7	2326	756.3	.040	1.8	6.99	93.0	30.3
18	2500	72.3	34	16.0	1.15	7.00	10354	2400	1.340	14.05	2714	164.0	1743	546.4	.040	1.4	6.34	71.7	23.9
19	2500	48.2	23	17.7	1.05	5.00	8100	1040	.250	13.91	2564	59.1	287	483.4	.040	.9	2.36	11.5	19.3
20	2500	24.1	11	19.9	1.04	4.00	6542	810	.250	14.18	1425	36.5	228	213.3	.040	.5	1.46	9.1	8.5
21	2500	0.0	0	21.5	1.01	3.00	5052	1000	.440	14.53	582	33.5	248	64.8	.040	0.0	1.34	11.4	2.6
22	2500	0.0	0	25.6	1.89	2.00	1800	35000	2.840	3.44	170	606.4	1012	9.8	.040	0.0	24.28	40.5	.4
23	-0	0.0	0	17.8	1.40	2.00	1791	3700	4.350	12.47	64	38.5	915	2.2	.067	0.0	2.57	61.0	.1

CYCLE COMPOSITE HC 5.816 GRAM/BHP HR

CO 90.274 GRAM/BHP HR

NO2 11.445 GRAM/BHP HR

BSFC .638 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
8-03-71 RUN 3 FORD 300 CID 6 CORRELATION TRUCK 1

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	17.3	1.86	2.00	1829	5000	5.460	11.60	64	50.6	1214	2.2	.067	0.0	3.38	81.3	.1
2	1500	0.0	0	20.0	1.48	2.00	2299	2700	1.040	14.42	143	39.3	321	6.4	.040	0.0	1.57	12.8	.3
3	1500	25.9	7	19.0	1.28	3.00	3987	1700	.150	13.63	493	48.6	87	46.8	.040	.3	1.94	3.5	1.9
4	1500	51.8	15	16.8	1.04	3.00	4407	2100	.150	14.42	1539	69.7	101	164.6	.040	.6	2.79	4.0	6.8
5	1500	77.7	22	14.2	1.16	4.00	5866	1700	.130	13.77	2120	70.9	109	293.4	.040	.9	2.83	4.4	11.7
6	1500	103.6	30	11.5	1.20	5.00	7087	1400	.130	13.48	2302	72.2	135	393.9	.040	1.2	2.89	5.4	15.8
7	1500	129.5	37	9.5	1.03	5.00	8257	1230	.150	13.48	2302	73.8	182	458.9	.040	1.5	2.95	7.3	18.4
8	1500	155.4	44	4.7	1.02	6.00	10096	1040	.130	13.77	1799	74.3	188	424.7	.040	1.8	2.97	7.5	17.1
9	1500	181.3	52	2.1	1.06	8.00	12838	1540	3.470	12.71	1048	124.9	5507	273.4	.040	2.1	5.00	220.3	10.9
10	1500	207.2	59	6.0	1.08	9.00	14175	3000	4.160	12.71	1241	247.7	6937	340.1	.040	2.4	9.91	277.5	13.6
11	1500	0.0	0	23.7	1.76	2.00	1933	33000	3.330	5.27	117	536.0	1093	6.3	.067	0.0	35.75	72.9	.4
12	-0	0.0	0	17.9	1.88	2.00	1810	4100	5.400	11.92	116	41.8	1113	3.9	.040	0.0	1.67	44.5	.2
13	2500	142.8	92	2.5	1.02	15.00	25015	2700	7.650	12.04	1482	337.5	14318	615.1	.040	3.7	13.50	772.7	24.6
14	2500	168.7	80	5.8	1.07	13.00	20666	1500	3.700	13.18	1618	182.0	9070	651.4	.040	3.2	7.28	362.8	26.1
15	2500	144.6	69	8.8	1.01	10.00	16842	1100	2.020	13.63	2419	117.5	4360	858.2	.040	2.8	4.70	174.4	34.3
16	2500	120.5	57	11.7	1.06	9.00	14442	2000	1.480	13.77	2791	181.1	3622	839.0	.040	2.3	7.24	144.9	33.6
17	2500	96.4	46	13.7	1.10	8.00	12371	2300	1.630	14.18	2869	177.4	2539	734.6	.040	1.8	7.10	101.6	29.4
18	2500	72.3	34	16.0	1.00	6.00	10206	2300	1.230	14.42	2842	147.8	1597	606.4	.040	1.4	5.91	63.9	24.3
19	2500	48.2	23	17.7	1.04	5.00	8178	1100	.280	14.31	2765	61.2	315	510.7	.040	.9	2.45	12.6	20.4
20	2500	24.1	11	19.9	1.12	4.00	6075	900	.280	14.31	1539	37.2	234	211.4	.040	.5	1.49	9.4	8.5
21	2500	0.0	0	21.5	1.00	3.00	5103	1860	.550	14.79	522	61.1	365	57.0	.040	0.0	2.45	14.6	2.3
22	2500	0.0	0	25.6	1.89	2.00	1800	35000	2.840	3.99	170	606.9	1012	9.8	.040	0.0	24.28	40.5	.4
23	-0	0.0	0	17.5	1.89	2.00	1800	3800	4.590	12.47	116	39.2	957	4.0	.067	0.0	2.62	63.8	.3

CYCLE COMPOSITE HC 5.619 GRAM/BHP HR

CO 92.102 GRAM/BHP HR

NO2 11.083 GRAM/BHP HR

BSFC .636 LB/BHP HR

PROJECT 11-2877-01
11-2-71 RUN 1 FORD 300 CID 6 CORRELATION TRUCK 1A CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	590	0.0	0	18.7	1.29	1.50	2058	3950	4.590	12.22	38	41.4	1112	1.5	.067	0.0	2.76	74.2	.1
2	1500	0.0	0	20.5	1.06	2.00	3209	4950	1.340	14.05	104	100.0	547	6.9	.040	0.0	4.00	21.9	.3
3	1500	28.0	8	18.0	1.06	3.00	4814	2700	.740	14.18	1048	85.6	474	110.3	.040	.3	3.42	18.9	4.4
4	1500	54.5	16	16.1	1.13	4.00	6021	2800	1.050	14.18	1444	108.7	823	186.1	.040	.6	4.35	32.9	7.4
5	1500	81.5	23	13.5	1.35	5.50	6930	2450	1.410	13.91	1841	130.9	1264	271.3	.040	.9	5.24	50.6	10.9
6	1500	108.5	31	11.1	1.23	6.00	8248	3050	1.700	13.77	1925	160.4	1806	336.2	.040	1.2	6.42	72.3	13.4
7	1500	135.5	39	8.4	1.23	7.00	9680	2850	1.770	13.63	1940	175.9	2207	407.7	.040	1.5	7.04	88.3	16.3
8	1500	163.0	47	5.5	1.06	8.00	12838	3750	5.400	11.60	721	277.1	8060	176.8	.040	1.9	11.08	322.4	7.1
9	1500	190.0	54	2.0	1.11	10.00	15324	3050	5.080	11.72	1540	273.2	9143	458.0	.040	2.2	10.93	367.2	18.3
10	1500	217.0	62	0.0	1.15	11.00	16270	3450	5.780	11.36	523	366.5	10834	161.0	.040	2.5	14.66	433.3	6.4
11	1500	0.0	0	22.8	2.38	2.50	1787	48500	3.790	8.43	117	507.7	801	4.1	.067	0.0	33.86	53.5	.3
12	590	0.0	0	18.7	1.13	1.50	2258	3450	4.930	11.84	117	52.0	1310	5.1	.040	0.0	2.08	52.4	.2
13	2500	213.0	101	2.8	.72	11.00	25987	3100	5.140	11.84	752	465.9	15606	375.4	.040	4.1	18.64	624.2	15.0
14	2500	186.5	89	4.2	.86	11.50	22746	2850	4.840	11.93	1501	380.1	13039	664.8	.040	3.6	15.20	521.6	26.6
15	2500	160.0	76	7.2	1.00	12.00	20412	3350	4.980	11.93	1246	346.5	11907	509.1	.040	3.0	15.86	476.3	20.4
16	2500	133.0	63	9.8	1.23	11.00	15212	2100	1.630	13.91	2516	202.8	3180	806.8	.040	2.5	8.11	127.2	32.3
17	2500	106.5	51	12.6	1.30	10.00	13085	2550	1.540	13.91	2589	211.8	2667	714.0	.040	2.0	8.47	106.7	28.6
18	2500	80.0	38	15.1	1.39	9.00	11014	2800	1.840	13.91	2326	192.4	2554	530.5	.040	1.5	7.70	102.1	21.2
19	2500	53.5	25	17.5	1.60	8.50	9037	3000	2.110	13.63	1862	169.0	2401	348.3	.040	1.0	6.76	96.0	13.9
20	2500	26.5	13	19.4	1.60	7.00	7442	2850	1.800	13.91	1521	132.6	1642	234.4	.040	.5	5.30	67.7	9.4
21	2500	0.0	0	21.3	1.87	6.00	5458	2250	1.340	14.18	582	78.0	938	67.0	.040	0.0	3.12	37.5	2.7
22	2500	0.0	0	24.4	1.51	2.00	2253	67000	2.730	6.21	130	465.2	744	6.2	.040	0.0	38.61	31.8	.2
23	590	0.0	0	19.0	1.25	1.50	2041	4450	4.740	12.04	170	52.6	1131	6.7	.067	0.0	3.51	75.5	.4

CYCLE COMPOSITE HC 8.056 GRAM/BHP HR

CO 130.975 GRAM/BHP HR

NO2 8.644 GRAM/BHP HR

BSFC .666 LB/BHP HR

PROJECT 11-2877-01
11-2-71 RUN 2 FORD 300 CID 6 CORRELATION TRUCK 1A CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	590	0.0	0	19.0	1.36	1.50	1876	4100	5.240	11.60	51	44.5	1159	1.8	.067	0.0	2.97	77.3	.1
2	1500	0.0	0	20.6	1.07	2.00	3174	5800	1.380	14.05	117	115.2	564	7.7	.040	0.0	4.61	22.1	.3
3	1500	28.0	8	18.5	1.22	3.00	4183	2850	.640	14.42	674	77.7	352	61.0	.040	.3	3.11	14.1	2.4
4	1500	54.5	16	16.1	1.24	4.00	5487	3050	.850	14.42	1501	107.5	605	175.6	.040	.6	4.30	24.2	7.0
5	1500	81.5	23	13.8	1.40	5.50	6682	3200	1.230	14.42	1904	133.9	1040	264.5	.040	.9	5.36	41.6	10.6
6	1500	108.5	31	11.0	1.24	6.00	8231	3300	1.630	13.91	2033	171.1	1708	350.0	.040	1.2	6.85	68.3	14.0
7	1500	135.5	39	8.4	1.25	7.00	9526	3200	1.730	13.91	2033	191.0	2086	402.8	.040	1.5	7.64	83.4	16.1
8	1500	163.0	47	5.5	1.06	8.00	12838	4000	5.400	11.72	674	243.1	7993	164.0	.040	1.9	11.72	319.7	6.6
9	1500	190.0	54	2.1	1.14	10.00	14921	3700	5.240	11.72	1618	318.6	9113	462.5	.040	2.2	12.74	364.5	18.5
10	1500	217.0	62	0.0	1.17	11.00	15992	4200	5.840	11.48	538	378.6	10635	160.9	.040	2.5	15.14	425.4	6.4
11	1500	0.0	0	22.8	1.35	1.50	1890	50000	3.840	8.43	130	545.6	857	4.7	.067	0.0	36.39	57.2	.3
12	590	0.0	0	18.7	1.35	1.50	1890	4200	5.080	11.92	130	45.6	1113	4.7	.040	0.0	1.82	44.5	.2
13	2500	213.0	101	2.7	.71	11.00	26354	2800	5.240	11.72	768	428.0	16180	389.4	.040	4.1	17.12	647.2	15.6
14	2500	186.5	89	4.1	.84	11.50	23287	2650	4.980	11.84	1501	361.2	13712	679.4	.040	3.6	14.45	548.5	27.2
15	2500	160.0	76	7.1	1.00	12.00	20412	3000	5.140	11.72	1241	356.4	12350	440.2	.040	3.0	14.27	494.0	19.6
16	2500	133.0	63	9.8	1.23	11.00	15212	1850	1.730	13.48	2492	182.8	3453	817.4	.040	2.5	7.31	138.1	32.7
17	2500	106.5	51	12.5	1.30	10.00	13085	2250	1.300	13.77	2540	142.5	2246	721.5	.040	2.0	7.70	89.9	28.9
18	2500	80.0	38	15.1	1.40	9.00	10935	2450	1.870	13.48	2302	171.8	2649	536.0	.040	1.5	6.87	105.9	21.4
19	2500	53.5	25	17.5	1.56	8.50	9268	2600	2.110	13.48	1904	152.0	2492	369.7	.040	1.0	6.08	99.7	14.8
20	2500	26.5	13	19.4	1.63	7.00	7305	2500	1.840	13.77	1444	115.1	1712	220.8	.040	.5	4.61	68.5	8.8
21	2500	0.0	0	21.2	1.90	6.00	5372	6000	1.410	14.05	613	200.7	953	68.0	.040	0.0	8.03	38.1	2.7
22	2500	0.0	0	24.8	1.55	2.00	2145	57000	2.780	5.96	143	866.4	854	7.2	.040	0.0	34.66	34.1	.4
23	590	0.0	0	19.0	.91	1.50	2804	3800	4.740	11.92	157	62.5	1575	8.6	.067	0.0	4.17	105.1	.6

CYCLE COMPOSITE HC 8.083 GRAM/BHP HR

CO 132.898 GRAM/BHP HR

NO2 8.670 GRAM/BHP HR

BSFC .670 LB/BHP HR

PROJECT 11-2877-01
11-2-71 RUN 3 FORD 300 CID 6 CORRELATION TRUCK 1A CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	590	0.0	0	18.8	1.29	1.50	1978	3750	4.790	11.84	64	43.6	1125	2.5	.067	0.0	2.91	75.1	.2
2	1500	0.0	0	20.8	1.06	2.00	3209	5300	1.270	14.05	130	107.3	519	8.7	.040	0.0	4.29	20.8	.3
3	1500	28.0	8	18.4	1.15	3.00	4437	2400	.580	14.42	865	69.4	341	83.6	.040	.3	2.80	13.6	3.3
4	1500	54.5	16	16.3	1.27	4.00	5357	2650	.850	14.31	1501	92.0	596	173.1	.040	.6	3.68	23.9	6.9
5	1500	81.5	23	13.8	1.40	5.50	6682	2800	1.200	14.18	1968	114.5	1034	278.8	.040	.9	4.78	41.4	11.2
6	1500	108.5	31	11.0	1.24	6.00	8231	2850	1.520	14.05	2055	147.4	1594	354.1	.040	1.2	5.92	63.8	14.2
7	1500	135.5	39	8.4	1.23	7.00	9680	2700	1.410	13.91	2055	167.7	1769	423.6	.040	1.5	6.71	70.7	16.9
8	1500	163.0	47	5.4	1.05	8.00	12960	2750	5.140	11.84	628	206.0	7851	154.2	.040	1.9	8.24	314.1	6.2
9	1500	190.0	54	2.1	1.14	10.00	14921	3250	4.930	11.84	1548	283.7	8692	463.2	.040	2.2	11.35	347.7	18.5
10	1500	217.0	62	0.0	1.15	11.00	16270	3450	5.610	11.48	567	322.0	10575	175.8	.040	2.5	12.88	423.0	7.0
11	1500	0.0	0	22.4	1.41	1.50	1810	49000	3.740	8.48	143	516.4	807	5.0	.067	0.0	34.45	53.8	.3
12	590	0.0	0	18.7	1.43	1.50	1784	4000	5.080	11.43	143	41.0	1052	4.4	.040	0.0	1.64	42.1	.2
13	2500	213.0	101	2.8	.71	11.00	26354	2800	5.240	11.60	784	429.8	16401	399.6	.040	4.1	17.14	656.0	16.0
14	2500	186.5	89	4.0	.83	11.50	23568	2650	5.030	11.72	1540	367.1	14074	708.2	.040	3.6	14.68	563.0	28.3
15	2500	160.0	76	7.2	1.00	12.00	20412	2450	5.140	11.72	1241	350.0	12438	488.4	.040	3.0	14.00	497.5	14.6
16	2500	133.0	63	9.7	1.20	11.00	15592	1850	1.700	13.63	2420	105.4	3451	807.4	.040	2.5	7.44	138.0	32.3
17	2500	106.5	51	12.5	1.29	10.00	13186	2200	1.660	13.63	2565	187.0	2851	723.4	.040	2.0	7.48	114.0	29.0
18	2500	80.0	38	15.1	1.39	9.00	11014	2450	1.910	13.63	2302	170.4	2642	533.4	.040	1.5	6.84	107.7	21.3
19	2500	53.5	25	17.5	1.59	8.50	9093	2600	2.180	13.48	1904	148.5	2515	361.1	.040	1.0	5.94	100.6	14.4
20	2500	26.5	13	19.5	1.63	7.00	7305	2350	1.870	13.63	1463	109.1	1754	225.5	.040	.5	4.36	70.1	9.0
21	2500	0.0	0	21.2	1.87	6.00	5458	1900	1.410	14.05	643	66.3	993	74.5	.040	0.0	2.65	39.7	3.0
22	2500	0.0	0	24.9	1.55	2.00	2145	57000	2.820	6.05	157	858.7	858	7.8	.040	0.0	34.35	34.3	.3
23	590	0.0	0	19.0	1.27	1.50	2009	3800	4.640	11.43	170	44.9	1120	6.7	.067	0.0	3.00	74.7	.4

CYCLE COMPOSITE HC 7.392 GRAM/BHP HR

CO 132.018 GRAM/BHP HR

NO2 8.801 GRAM/BHP HR

BSFC .665 LB/BHP HR

TABLE I-3. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 2

Engine: Ford 240 CID, 6 cyl. Vehicle: 1970 Ford, 7500 GVW Pickup

			Emission Rate, Gr/bhp-hr			
Date	Run	Dynamometer	HC	CO	NO_2 Observed NDIR	Humidity grains/lb dry air
9-20-71	1	Stationary	7.80	61.2	10.58	63.0
9-20-71	2	Stationary	7.08	65.5	10.85	56.5
		Average	7.44	63.3	10.72	
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg.}}\right) \times 100$			9.7	6.8	2.5	
9-30-71	1	Chassis	7.171	54.1	11.09	71.5
10-1-71	1	Chassis	8.811	59.4	11.27	71.5
10-1-71	2	Chassis	8.135	54.7	11.62	67.0
		Average	8.04	56.0	11.33	
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg.}}\right) \times 100$			20.4	9.5	4.7	
Average Stationary			7.44	63.3	10.72	
Average Chassis			8.04	56.0	11.33	
Difference: (Chassis-Stationary)			0.60	-7.3	0.61	
Percent Difference: (Difference/Stationary) x 100			8.1	-11.5	5.7	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
9-20-71 RUN 1 FORD 240 CID CORREL. TRUCK 2 STATIONARY DYNO.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	16.0	1.42	1.50	1797	3200	1.450	14.18	104	36.0	330	3.4	.067	0.0	2.40	22.0	.3
2	1500	0.0	0	19.8	1.48	2.50	2873	2600	1.660	14.05	157	46.8	603	4.4	.040	0.0	1.87	24.1	.4
3	1500	15.5	4	18.7	1.56	3.00	3271	1650	.180	14.31	363	36.8	81	26.4	.040	.2	1.47	3.2	1.1
4	1500	30.7	9	17.8	1.47	3.50	4050	4350	1.800	13.91	628	104.1	412	52.3	.040	.4	4.36	36.5	2.1
5	1500	46.3	13	16.0	1.46	4.00	4660	4500	1.540	13.77	447	132.6	447	47.6	.040	.5	5.31	37.4	3.4
6	1500	61.5	18	13.7	1.43	4.50	5353	3850	.770	14.31	1332	133.3	538	153.1	.040	.7	5.33	21.5	6.1
7	1500	77.0	22	7.6	1.32	5.50	7087	650	.150	13.91	1100	32.6	152	183.2	.040	.9	1.30	6.1	7.3
8	1500	107.5	31	3.1	1.46	7.50	8738	1200	.340	14.05	1540	72.0	473	306.8	.040	1.2	2.88	18.4	12.3
9	1500	42.2	26	5.0	1.38	6.50	8012	600	.150	13.77	1351	34.4	174	257.1	.040	1.1	1.38	6.9	10.3
10	1500	123.0	35	.2	1.27	8.50	11385	4100	4.450	12.22	582	273.3	5442	128.8	.040	1.4	10.93	234.7	5.2
11	1500	0.0	0	22.4	1.04	1.00	1636	62000	1.230	4.25	64	607.9	244	2.1	.067	0.0	40.55	16.3	.1
12	-0	0.0	0	16.0	1.60	1.50	1545	1600	.280	14.42	104	17.2	61	3.7	.040	0.0	.69	2.4	.1
13	2500	138.0	66	2.0	.77	4.00	14882	3250	5.350	11.60	548	374.0	12438	228.5	.040	2.6	14.46	447.5	4.1
14	2500	120.7	57	5.3	1.17	10.00	14538	1100	.280	14.31	2256	44.0	560	241.3	.040	2.3	3.46	22.4	24.7
15	2500	103.5	44	6.8	1.14	4.00	12865	300	.150	13.91	1440	27.4	277	603.2	.040	2.0	1.10	11.1	24.1
16	2500	86.3	41	4.7	1.20	8.00	11340	250	.150	13.63	2033	20.5	244	554.4	.040	1.6	.82	10.0	22.2
17	2500	69.0	33	13.2	1.28	7.00	4302	1000	.180	13.77	2346	66.2	241	526.7	.040	1.3	2.65	4.6	21.1
18	2500	51.7	25	16.1	1.34	6.00	7616	2150	.210	14.05	2714	113.1	223	474.1	.040	1.0	4.53	8.4	14.0
19	2500	34.5	16	18.2	1.33	5.00	6345	2600	.470	14.31	2077	110.5	404	243.2	.040	.7	4.42	16.1	11.7
20	2500	17.2	8	20.3	1.28	4.00	5316	3100	1.300	14.18	1083	104.4	884	121.0	.040	.3	4.17	35.4	4.8
21	2500	0.0	0	22.3	1.22	3.00	4183	3200	1.440	13.91	238	82.8	1014	20.4	.040	0.0	3.31	40.5	.8
22	2500	0.0	0	24.8	2.18	2.00	1561	50000	2.020	7.46	104	538.4	440	3.7	.040	0.0	21.55	17.6	.1
23	-0	0.0	0	16.0	1.55	1.50	1646	2100	.340	14.42	90	23.0	86	3.3	.067	0.0	1.54	5.8	.2

CYCLE COMPOSITE HC 7.745 GRAM/BHP HR

CO 61.181 GRAM/BHP HR

NO2 10.580 GRAM/BHP HR

BSFC .741 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
09-20-71 RUN2 FORD 240 CID CORREL. TRUCK 2 STATIONARY DYNO.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	16.0	1.42	1.50	1797	2900	.610	14.42	117	34.0	145	4.6	.067	0.0	2.27	9.6	.3
2	1500	0.0	0	19.7	1.48	2.50	2873	700	.130	13.91	104	6.1	54	7.1	.040	0.0	.25	2.1	.3
3	1500	15.5	4	18.7	1.56	3.00	3271	1550	.180	14.18	341	34.4	82	24.3	.040	.2	1.40	3.3	1.2
4	1500	30.7	9	17.6	1.47	3.50	4050	4250	1.800	13.77	705	107.6	421	54.3	.040	.4	4.30	36.8	2.4
5	1500	46.3	13	16.1	1.46	4.00	4660	4450	1.800	13.91	980	128.4	1044	43.4	.040	.5	5.13	42.0	3.8
6	1500	61.5	18	13.8	1.43	4.50	5353	3450	.430	14.31	1444	135.2	643	164.1	.040	.7	5.41	25.7	6.6
7	1500	77.0	22	7.7	1.32	5.50	7087	750	.150	13.91	1241	37.6	152	206.6	.040	.9	1.50	6.1	8.3
8	1500	42.2	26	5.1	1.38	6.50	8012	650	.150	13.63	1444	37.6	175	277.4	.040	1.1	1.50	7.0	11.1
9	1500	107.5	31	3.1	1.46	7.50	8738	1200	.340	13.91	1658	72.7	477	333.6	.040	1.2	2.91	14.1	13.3
10	1500	123.0	35	0.0	1.27	8.50	11385	3400	5.560	11.48	420	254.7	7336	41.1	.040	1.4	10.14	293.4	3.6
11	1500	0.0	0	22.4	1.04	1.00	1636	40000	1.340	4.37	40	444.8	301	3.3	.067	0.0	24.66	20.1	.2
12	-0	0.0	0	16.0	1.60	1.50	1545	1350	.250	14.05	143	14.4	56	5.2	.040	0.0	.60	2.2	.2
13	2500	138.0	66	2.0	.77	4.00	14882	3100	5.670	11.60	548	350.6	12453	224.5	.040	2.6	14.02	518.1	4.0
14	2500	120.7	57	5.3	1.17	10.00	14538	1100	.470	14.42	2256	106.6	420	725.4	.040	2.3	4.26	36.8	24.0
15	2500	103.5	44	6.8	1.14	4.00	12865	300	.150	14.18	2077	26.4	271	617.8	.040	2.0	1.08	10.4	24.7
16	2500	86.3	41	4.7	1.20	8.00	11340	250	.150	13.77	2143	20.3	244	578.6	.040	1.6	.81	9.4	23.1
17	2500	69.0	33	13.2	1.28	7.00	4302	1000	.180	13.91	2442	65.6	238	542.4	.040	1.3	2.62	9.5	21.7
18	2500	51.7	25	15.4	1.34	6.00	7616	2100	.210	14.05	2816	110.5	223	442.1	.040	1.0	4.42	8.4	14.7
19	2500	34.5	16	18.2	1.33	5.00	6345	2750	.520	14.31	2121	116.4	445	248.1	.040	.7	4.66	17.8	11.4
20	2500	17.2	8	20.3	1.28	4.00	5314	3200	1.410	14.18	1152	106.4	452	127.8	.040	.3	4.28	38.1	5.1
21	2500	0.0	0	22.2	1.22	3.00	4183	3150	2.210	13.77	274	80.4	1146	23.8	.040	0.0	3.23	45.4	1.0
22	2500	0.0	0	24.8	2.18	2.00	1561	53000	2.140	7.37	143	558.5	455	5.0	.040	0.0	22.34	14.2	.2
23	-0	0.0	0	16.3	1.55	1.50	1646	2200	.470	14.42	90	24.0	103	3.3	.067	0.0	1.60	6.4	.2

CYCLE COMPOSITE HC 7.077 GRAM/BHP HR

CO 65.476 GRAM/BHP HR

NO2 10.847 GRAM/BHP HR

BSFC .741 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
9-30-71 RUN 1 FORD 240 CID CORREL. TRUCK 2 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	15.8	1.16	1.50	2200	1150	.210	14.18	77	17.4	64	3.4	.067	0.0	1.16	4.3	.3
2	1500	0.0	0	14.5	1.23	2.50	3457	2500	1.040	14.31	156	55.2	486	11.4	.040	0.0	2.21	14.5	.5
3	1500	15.5	4	18.4	1.32	3.00	3846	4450	2.110	14.18	245	102.8	485	20.3	.040	.2	4.11	34.4	.8
4	1500	30.7	9	17.3	1.40	3.50	4721	4450	1.440	14.18	537	110.4	878	39.4	.040	.4	4.43	35.1	1.6
5	1500	46.3	13	15.5	1.55	4.00	4340	5100	1.340	14.42	447	137.6	730	84.3	.040	.5	5.50	29.2	3.6
6	1500	61.5	18	13.2	1.47	4.50	5207	4500	.610	14.53	1482	150.3	412	164.3	.040	.7	6.01	16.5	6.6
7	1500	77.0	22	7.0	1.32	5.50	7097	550	.130	14.31	1134	26.4	128	184.1	.040	.9	1.08	5.1	7.4
8	1500	42.2	26	4.3	1.28	6.50	8638	650	.130	14.42	1520	38.4	155	248.3	.040	1.1	1.54	6.2	11.4
9	1500	107.5	31	2.4	1.37	7.50	4312	700	.180	14.78	1758	43.4	225	361.6	.040	1.2	1.73	4.0	14.5
10	1500	123.0	35	.4	1.27	8.50	11385	2730	4.250	12.70	680	180.5	5675	144.2	.040	1.4	7.22	227.0	6.0
11	1500	0.0	0	22.5	1.85	2.50	2299	24000	.350	7.46	64	540.3	154	4.8	.067	0.0	36.04	10.6	.3
12	-0	0.0	0	15.7	1.66	1.50	1537	1300	.180	14.42	117	13.6	38	4.1	.040	0.0	.54	1.5	.2
13	2500	138.0	66	1.8	.84	4.50	14237	2750	4.020	12.59	816	313.3	4252	308.7	.040	2.6	12.53	370.1	12.3
14	2500	120.7	57	4.6	.75	8.50	14278	1600	.670	14.31	2032	203.7	1723	854.0	.040	2.3	8.15	68.4	34.4
15	2500	103.5	44	6.3	.85	7.50	15009	550	.180	14.31	2055	56.8	375	704.0	.040	2.0	2.27	15.0	28.2
16	2500	86.3	41	8.7	1.00	7.00	11407	250	.130	13.77	1883	21.4	225	534.6	.040	1.6	.86	4.0	21.4
17	2500	69.0	33	12.3	1.15	6.00	8875	550	.160	13.91	1904	34.6	141	347.4	.040	1.3	1.38	7.6	15.9
18	2500	51.7	25	15.6	1.11	5.00	7662	1750	.210	13.91	2372	93.8	227	422.1	.040	1.0	3.75	9.1	16.9
19	2500	34.5	16	17.9	1.02	4.00	6671	1950	.350	14.31	1841	87.6	317	274.5	.040	.7	3.50	12.7	11.0
20	2500	17.2	8	20.0	.95	3.00	5372	2450	1.040	14.18	1031	84.8	762	118.5	.040	.3	3.39	30.5	4.7
21	2500	0.0	0	21.6	1.08	3.00	4725	2300	1.200	14.18	613	64.6	734	61.6	.040	0.0	2.78	24.3	2.5
22	2500	0.0	0	24.6	1.74	2.00	1955	24000	1.230	5.88	77	523.5	500	5.1	.040	0.0	20.94	20.0	.2
23	-0	0.0	0	15.8	1.52	1.50	1674	1350	.310	14.05	116	15.6	73	4.5	.067	0.0	1.04	4.8	.3

CYCLE COMPOSITE HC 7.283 GRAM/BHP HR

CO 54.021 GRAM/BHP HR

NO2 11.085 GRAM/BHP HR

BSFC .748 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
10-01-71 RUN 1 FORD 240 CID CORREL. TRUCK 2 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	15.8	1.16	1.50	2200	2000	.690	14.79	77	28.2	168	3.6	.067	0.0	1.88	11.2	.2
2	1500	0.0	0	19.5	1.23	2.50	3457	1500	2.020	14.66	210	30.8	838	14.3	.040	0.0	1.23	33.5	.6
3	1500	15.5	4	18.6	1.32	3.00	3866	3950	2.140	14.31	321	90.7	992	24.5	.040	.2	3.63	39.7	1.0
4	1500	30.7	9	17.3	1.60	3.50	3721	5200	2.180	14.05	377	115.5	978	27.8	.040	.4	4.62	39.1	1.1
5	1500	46.3	13	15.5	1.55	4.00	4390	4450	1.980	14.31	752	116.7	1049	65.5	.040	.5	4.67	42.0	2.6
6	1500	61.5	18	13.2	1.47	4.50	5207	4100	1.040	14.66	1205	132.1	709	128.9	.040	.7	5.28	28.4	5.2
7	1500	77.0	22	7.0	1.32	5.50	7087	800	.130	14.66	1170	38.1	125	185.1	.040	.9	1.53	5.0	7.4
8	1500	92.2	26	4.3	1.28	6.50	8638	850	.150	14.66	1579	49.3	176	304.0	.040	1.1	1.97	7.0	12.2
9	1500	107.5	31	2.4	1.37	7.50	9312	1250	.210	14.79	1820	77.0	261	372.0	.040	1.2	3.08	10.4	14.9
10	1500	123.0	35	.4	1.27	8.50	11385	2730	4.100	12.90	700	179.9	5459	153.2	.040	1.4	7.20	218.3	6.1
11	1500	0.0	0	22.5	1.05	2.50	2299	35000	.420	6.02	130	799.1	182	9.2	.067	0.0	49.96	12.1	.6
12	-0	0.0	0	15.7	1.66	1.50	1537	1650	.150	14.31	238	17.3	32	8.3	.040	0.0	.69	1.3	.3
13	2500	138.0	66	1.8	.84	4.50	14237	3000	3.430	12.47	832	345.6	4145	318.2	.040	2.6	13.82	365.8	12.7
14	2500	120.7	57	4.6	.75	8.50	14278	1450	.850	14.18	1489	246.9	2174	836.1	.040	2.3	9.88	87.0	33.4
15	2500	103.5	49	6.3	.85	7.50	15009	800	.250	14.31	2099	82.0	518	714.4	.040	2.0	3.28	20.7	28.6
16	2500	86.3	41	8.7	1.00	7.00	11907	400	.130	13.48	1968	34.9	229	564.9	.040	1.6	1.40	9.2	22.8
17	2500	69.0	33	12.3	1.15	6.00	8875	400	.180	13.77	2166	56.9	230	454.6	.040	1.3	2.28	9.2	18.2
18	2500	51.7	25	15.6	1.11	5.00	7662	1450	.210	13.91	2467	104.4	227	438.4	.040	1.0	4.17	9.1	17.5
19	2500	34.5	16	17.9	1.02	4.00	6671	2300	.440	14.18	1925	103.3	399	287.1	.040	.7	4.13	16.0	11.5
20	2500	17.2	8	20.0	.95	3.00	5372	2700	1.410	14.18	947	91.4	965	106.5	.040	.3	3.66	38.6	4.3
21	2500	0.0	0	21.6	1.08	3.00	4725	2600	1.700	13.77	567	78.1	1032	56.5	.040	0.0	3.12	41.3	2.3
22	2500	0.0	0	24.6	1.74	2.00	1955	29000	1.410	4.84	197	619.7	609	14.0	.040	0.0	24.79	24.3	.6
23	-0	0.0	0	15.8	1.52	1.50	1679	2100	.610	13.63	238	24.4	143	9.2	.067	0.0	1.63	9.5	.6

CYCLE COMPOSITE HC 8.700 GRAM/BHP HR

CO 59.434 GRAM/BHP HR

NO2 11.275 GRAM/BHP HR

BSFC .798 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
10-01-71 RUN 2 FORD 240 CID CORREL. TRUCK 2 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	-0	0.0	0	15.8	1.16	1.50	2200	2050	.490	14.31	130	30.1	145	6.3	.067	0.0	2.00	9.7	.4
2	1500	0.0	0	19.5	1.23	2.50	3457	2650	.180	14.42	279	61.6	85	21.5	.040	0.0	2.47	3.4	.9
3	1500	15.5	4	18.6	1.32	3.00	3866	4400	1.980	13.77	349	105.1	955	27.7	.040	.2	4.20	38.2	1.1
4	1500	30.7	9	17.3	1.60	3.50	3721	5000	1.410	13.77	768	115.0	887	58.6	.040	.4	4.60	35.5	2.3
5	1500	46.3	13	15.5	1.55	4.00	4390	5150	1.450	14.05	1117	141.2	803	101.6	.040	.5	5.65	32.1	4.1
6	1500	61.5	18	13.2	1.47	4.50	5207	4650	.390	14.42	1759	158.5	269	199.1	.040	.7	6.34	10.7	8.0
7	1500	77.0	22	7.0	1.32	5.50	7087	650	.130	14.18	1332	32.0	129	218.0	.040	.9	1.28	5.2	8.7
8	1500	92.2	26	4.3	1.28	6.50	8638	1000	.180	14.31	1718	59.2	215	337.7	.040	1.1	2.37	8.6	13.5
9	1500	107.5	31	2.4	1.37	7.50	9312	850	.280	14.42	1841	53.5	366	385.0	.040	1.2	2.14	14.2	15.4
10	1500	123.0	35	.4	1.27	8.50	11385	2730	4.200	12.30	720	185.3	5759	162.2	.040	1.4	7.41	230.3	6.5
11	1500	0.0	0	22.5	1.05	2.50	2299	25000	.280	6.13	26	645.0	146	2.2	.067	0.0	43.02	9.7	.1
12	-0	0.0	0	15.7	1.66	1.50	1537	1800	.130	13.91	77	19.5	28	2.8	.040	0.0	.78	1.1	.1
13	2500	138.0	66	1.8	.84	4.50	14237	2800	3.740	12.59	881	323.3	8840	337.7	.040	2.6	12.93	353.6	13.5
14	2500	120.7	57	4.6	.75	8.50	14278	1950	.770	14.31	2032	233.6	1964	852.0	.040	2.3	9.35	78.6	34.1
15	2500	103.5	49	6.3	.85	7.50	15009	700	.250	14.42	2099	71.3	514	709.6	.040	2.0	2.85	20.6	28.4
16	2500	86.3	41	8.7	1.00	7.00	11907	300	.130	14.05	1968	25.1	220	547.5	.040	1.6	1.01	8.8	21.9
17	2500	69.0	33	12.3	1.15	6.00	8875	650	.150	13.91	1820	40.8	190	379.6	.040	1.3	1.63	7.6	15.2
18	2500	51.7	25	15.6	1.11	5.00	7662	1950	.250	14.18	2468	102.2	265	429.3	.040	1.0	4.09	10.6	17.2
19	2500	34.5	16	17.9	1.02	4.00	6671	1900	.390	14.31	2011	85.1	353	299.1	.040	.7	3.40	14.1	12.0
20	2500	17.5	8	20.0	.95	3.00	5372	2400	1.010	14.18	1083	83.6	710	125.2	.040	.3	3.34	28.4	5.0
21	2500	0.0	0	21.6	1.08	3.00	4725	2500	1.660	13.91	508	74.7	1002	50.4	.040	0.0	2.99	40.1	2.0
22	2500	0.0	0	24.6	1.74	2.00	1955	26500	1.380	5.16	77	563.8	593	5.4	.040	0.0	22.55	23.7	.2
23	-0	0.0	0	15.8	1.52	1.50	1679	1700	.470	14.05	117	19.4	108	4.4	.067	0.0	1.30	7.2	.3

CYCLE COMPOSITE HC 8.135 GRAM/BHP HR

CO 54.699 GRAM/BHP HR

NO2 11.615 GRAM/BHP HR

BSFC .798 LB/BHP HR

TABLE I-4. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 3

Engine: Dodge 318 CID, V8 Vehicle: 1969 Dodge 23,000-lb GVW Van

			Emission Rate, Gr/bhp-hr				Humidity
					NO_2 Observed		grains/lb
Date	Run	Dynamometer	HC	CO	NDIR	CL	dry air
10-28-71	1	Stationary	7.45	164.4	6.79	6.78	111.0
10-28-71	2	Stationary	8.68	162.5	7.04	7.07	102.0
10-28-71	3	Stationary	7.04	149.6	6.65	6.82	103.0
		Average	7.73	158.8	6.83	6.89	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			21.3	9.3	5.7	4.2	
11-5-71	1	Chassis	10.80	208.2	5.94	6.28	58.0
11-5-71	2	Chassis	10.00	217.5	6.22	6.50	58.0
11-5-71	3	Chassis	10.10	210.7	5.91	6.17	56.5
		Average	10.30	212.1	6.02	6.32	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			7.7	4.4	5.1	5.2	
Average Stationary			7.73	158.8	6.83	6.89	
Average Chassis			10.30	212.7	6.02	6.32	
Difference: (Chassis - Stationary)			2.57	53.9	-.81	-.57	
Percent Difference: (Difference/Stationary) x 100			33.3	33.9	-11.8	-8.3	

PROJECT 11-2877-01
10-28-71 RUN1 DODGE 318 CID V8 CORRELATION TRUCK 3 STATIONARY DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.37	1.50	1862	6600	5.670	8.60	51	82.3	1429	2.1	.067	0.0	5.49	95.3	.1
2	1500	0.0	0	21.0	1.20	2.50	3594	6500	.790	12.82	170	162.1	373	14.1	.090	0.0	6.48	14.9	.6
3	1500	29.0	8	19.6	1.01	2.50	4210	2700	.790	13.48	464	78.5	434	44.8	.090	.3	3.14	17.4	1.8
4	1500	58.0	17	17.7	1.05	3.50	5670	2900	1.870	13.33	1066	106.2	1383	124.5	.090	.7	4.25	55.3	5.2
5	1500	87.0	25	15.2	1.10	4.50	6459	3000	2.020	13.33	1590	133.4	1814	227.3	.090	1.0	5.34	72.6	9.1
6	1500	116.0	33	12.7	1.13	5.50	8279	2650	1.410	13.63	2055	143.4	1541	369.1	.090	1.3	5.73	61.6	14.8
7	1500	144.0	41	10.1	1.13	6.50	9785	2300	1.270	13.63	2077	148.7	1659	445.9	.090	1.6	5.95	66.4	17.8
8	1500	173.0	49	6.7	1.03	7.00	11560	1950	1.410	13.63	1618	148.0	2161	407.6	.090	2.0	5.92	86.4	16.3
9	1500	202.0	58	4.0	1.01	10.50	17684	3150	8.220	9.50	224	308.9	16281	72.9	.090	2.3	12.35	651.2	2.9
10	1500	219.0	63	.2	1.11	13.50	20688	4000	10.140	8.60	279	432.3	22139	100.1	.090	2.5	17.29	885.6	4.0
11	1500	0.0	0	24.3	1.11	1.00	1532	53000	3.610	4.84	183	590.7	813	6.8	.067	0.0	39.40	54.2	.5
12	600	0.0	0	20.2	1.34	1.50	1904	7300	6.440	9.64	159	82.7	1474	6.0	.090	0.0	3.31	58.9	.2
13	2500	227.0	108	2.2	1.03	19.50	32203	3250	8.450	9.03	307	571.8	31806	179.3	.090	4.3	22.87	1272.2	7.2
14	2500	207.0	99	3.5	1.07	18.00	28615	2700	8.220	9.50	224	429.5	26411	118.3	.090	3.9	17.18	1056.4	4.7
15	2500	178.0	85	6.2	1.13	13.50	20322	1600	1.440	13.63	1482	206.7	5063	635.6	.090	3.4	8.27	202.5	25.4
16	2500	148.0	70	9.1	1.01	9.50	16000	1500	.670	14.18	2372	160.0	1444	840.0	.090	2.8	6.40	57.7	33.6
17	2500	118.0	56	11.7	1.06	8.50	13640	1950	1.050	13.91	2492	175.5	1909	744.6	.090	2.2	7.02	76.4	29.8
18	2500	89.0	42	14.3	1.06	7.50	12035	2100	1.340	13.33	2166	169.4	2189	581.6	.090	1.7	6.79	87.6	23.3
19	2500	59.0	28	17.1	1.13	6.50	9785	2250	1.840	13.33	1388	143.0	2362	292.9	.090	1.1	5.72	94.5	11.7
20	2500	29.5	14	19.4	1.01	4.50	7579	2200	2.020	13.33	768	107.1	1986	124.1	.090	.6	4.28	79.4	5.0
21	2500	0.0	0	21.4	1.02	3.50	5837	3300	2.280	12.94	307	123.9	1729	38.3	.090	0.0	4.95	69.1	1.5
22	2500	0.0	0	25.3	1.08	1.00	1575	70500	2.360	3.20	157	880.6	595	6.5	.090	0.0	35.22	23.8	.3
23	600	0.0	0	20.0	1.26	1.50	2025	6850	5.960	10.43	157	81.2	1428	6.2	.067	0.0	5.42	95.2	.4

CYCLE COMPOSITE HC 7.499 GRAM/BHP HR

CO 164.405 GRAM/BHP HR

NO2 6.788 GRAM/BHP HR

BSFC .669 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
10-28-71 RUN1 DODGE 318 CID V8 CORRELATION TRUCK 3 STATIONARY DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.37	1.50	1862	6600	5.670	8.60	35	82.3	1429	1.4	.067	0.0	5.49	95.3	.1
2	1500	0.0	0	21.0	1.20	2.50	3594	6500	.790	12.82	145	162.1	373	12.0	.090	0.0	6.48	14.9	.5
3	1500	29.0	8	19.6	1.01	2.50	4210	2700	.790	13.48	435	78.5	434	42.0	.090	.3	3.14	17.4	1.7
4	1500	58.0	17	17.7	1.05	3.50	5670	2900	1.870	13.33	1225	106.2	1383	148.9	.090	.7	4.25	55.3	6.0
5	1500	87.0	25	15.2	1.10	4.50	6459	3000	2.020	13.33	1525	133.4	1814	225.1	.090	1.0	5.34	72.6	9.0
6	1500	116.0	33	12.7	1.13	5.50	8279	2650	1.410	13.63	2050	143.4	1541	368.2	.090	1.3	5.73	61.6	14.7
7	1500	144.0	41	10.1	1.13	6.50	9785	2300	1.270	13.63	2075	148.7	1659	445.5	.090	1.6	5.95	66.4	17.8
8	1500	173.0	49	6.7	1.03	7.00	11560	1950	1.410	13.63	1550	148.0	2161	390.5	.090	2.0	5.92	86.4	15.6
9	1500	202.0	58	4.0	1.01	10.50	17684	3150	8.220	9.50	130	308.9	16281	42.3	.090	2.3	12.35	651.2	1.7
10	1500	219.0	63	.2	1.11	13.50	20688	4000	10.140	8.60	160	432.3	22139	64.6	.090	2.5	17.29	885.6	2.6
11	1500	0.0	0	24.3	1.11	1.00	1532	53000	3.610	4.84	62	590.7	813	2.3	.067	0.0	39.40	54.2	.2
12	600	0.0	0	20.2	1.34	1.50	1904	7300	6.440	9.64	36	82.7	1474	1.4	.090	0.0	3.31	58.9	.1
13	2500	227.0	108	2.2	1.03	19.50	32203	3250	8.450	9.03	260	571.8	31806	151.4	.090	4.3	22.87	1272.2	6.1
14	2500	207.0	99	3.5	1.07	18.00	28615	2700	8.220	9.50	140	429.5	26411	100.3	.090	3.9	17.18	1056.4	4.0
15	2500	178.0	85	6.2	1.13	13.50	20322	1600	1.440	13.63	1525	206.7	5063	654.1	.090	3.4	8.27	202.5	26.2
16	2500	148.0	70	9.1	1.01	9.50	16000	1500	.670	14.18	2550	160.0	1444	403.0	.090	2.8	6.40	57.7	36.1
17	2500	118.0	56	11.7	1.06	8.50	13640	1950	1.050	13.91	2600	175.5	1909	776.4	.090	2.2	7.02	76.4	31.1
18	2500	89.0	42	14.3	1.06	7.50	12035	2100	1.340	13.33	2300	169.4	2189	617.6	.090	1.7	6.79	87.6	24.7
19	2500	59.0	28	17.1	1.13	6.50	9785	2250	1.840	13.33	1400	143.0	2362	295.4	.090	1.1	5.72	94.5	11.8
20	2500	29.5	14	19.4	1.01	4.50	7579	2200	2.020	13.33	688	107.1	1986	111.2	.090	.6	4.28	79.4	4.4
21	2500	0.0	0	21.4	1.02	3.50	5837	3300	2.280	12.94	210	123.9	1729	26.2	.090	0.0	4.95	69.1	1.0
22	2500	0.0	0	25.3	1.08	1.00	1575	70500	2.360	3.20	43	880.6	595	1.8	.090	0.0	35.22	23.8	.1
23	600	0.0	0	20.0	1.26	1.50	2025	6850	5.960	10.43	39	81.2	1428	1.5	.067	0.0	5.42	95.2	.1

CYCLE COMPOSITE HC 7.499 GRAM/BHP HR

CO 164.405 GRAM/BHP HR

NO2 6.768 GRAM/BHP HR

PROJECT 11-2877-01
10-28-71 RUN2 DODGE 318 CID V8 CORRELATION TRUCK 3 STATIONARY DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.9	1.42	1.50	1797	7150	6.440	9.78	77	75.9	1380	2.7	.067	0.0	5.06	92.1	.2
2	1500	0.0	0	21.5	1.23	2.50	3457	12000	1.300	11.84	117	289.3	633	9.4	.090	0.0	11.57	25.3	.4
3	1500	29.0	8	19.7	1.00	2.50	4252	3200	1.120	13.48	508	91.2	645	48.1	.090	.3	3.65	25.8	1.9
4	1500	58.0	17	17.7	1.04	3.50	5725	3000	2.080	13.06	1083	111.2	1558	133.3	.090	.7	4.45	62.3	5.3
5	1500	87.0	25	15.3	1.06	4.50	7221	2900	1.480	13.33	1638	134.2	1851	251.7	.090	1.0	5.37	74.1	10.1
6	1500	116.0	33	12.7	1.11	5.50	8428	2850	1.730	13.48	1968	155.0	1901	355.4	.090	1.3	6.20	76.0	14.2
7	1500	144.0	41	9.9	1.14	6.50	9699	2550	1.380	13.91	2121	159.1	1739	439.3	.090	1.6	6.36	69.6	17.6
8	1500	173.0	49	6.7	1.01	7.00	11789	2150	1.340	13.77	1759	165.4	2082	449.2	.090	2.0	6.62	83.3	18.0
9	1500	202.0	58	4.3	1.05	10.50	17010	3450	8.110	9.50	274	326.8	15520	87.8	.090	2.3	13.07	620.8	3.5
10	1500	219.0	63	.2	1.11	13.50	20688	4500	10.350	8.54	307	481.4	22364	109.0	.090	2.5	19.25	894.6	4.4
11	1500	0.0	0	24.3	1.07	1.00	1590	58500	3.330	4.64	210	672.4	774	8.0	.067	0.0	44.88	51.6	.5
12	600	0.0	0	20.0	1.35	1.50	1890	6950	6.250	9.78	251	78.5	1427	9.4	.090	0.0	3.14	57.1	.4
13	2500	227.0	108	2.2	1.13	19.50	29354	3550	9.170	8.84	279	567.4	29607	148.1	.090	4.3	22.70	1184.3	5.9
14	2500	207.0	99	3.7	1.01	17.50	24473	2950	8.110	9.37	251	489.1	27163	138.2	.090	3.9	19.57	1086.5	5.5
15	2500	178.0	85	6.2	1.13	13.50	20322	1650	1.640	13.63	1658	217.4	4242	727.1	.090	3.4	8.72	169.7	29.1
16	2500	148.0	70	9.1	1.00	9.50	16159	1650	.700	13.91	2468	180.5	1546	896.2	.090	2.8	7.22	61.9	35.8
17	2500	118.0	56	11.8	1.06	8.20	13159	2100	1.090	13.77	2616	183.4	1923	729.4	.090	2.2	7.33	76.9	29.2
18	2500	89.0	42	14.2	1.07	7.50	11923	2300	1.450	13.48	2188	180.4	2304	571.3	.090	1.7	7.24	92.1	22.9
19	2500	59.0	28	17.1	1.17	6.50	9450	2400	1.800	13.33	1482	147.6	2236	302.5	.090	1.1	5.90	89.4	12.1
20	2500	29.5	14	19.6	.99	4.50	7732	2400	2.180	13.06	752	114.9	2199	124.7	.090	.6	4.79	88.0	5.0
21	2500	0.0	0	21.5	1.02	3.50	5837	3600	2.400	12.82	307	134.4	1816	38.2	.090	0.0	5.34	72.6	1.5
22	2500	0.0	0	25.3	1.08	1.50	2362	70000	2.320	3.08	157	1333.7	843	9.4	.090	0.0	53.35	35.7	.4
23	600	0.0	0	20.0	1.50	1.50	1701	6750	5.960	9.78	157	69.9	1248	5.4	.067	0.0	4.67	83.2	.4

CYCLE COMPOSITE HC 8.684 GRAM/BHP HR

CO 162.458 GRAM/BHP HR

NO2 7.041 GRAM/BHP HR

BSFC .658 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
10-28-71 RUN2 DODGE 318 CID V8 CORRELATION TRUCK 3 STATIONARY DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.9	1.42	1.50	1797	7150	6.990	9.78	37	75.9	1380	1.3	.067	0.0	5.06	92.1	.1
2	1500	0.0	0	21.5	1.23	2.50	3457	12000	1.300	11.84	99	289.3	633	7.5	.090	0.0	11.57	25.3	.3
3	1500	29.0	8	19.7	1.00	2.50	4252	3200	1.120	13.98	990	91.2	645	46.9	.090	.3	3.65	25.8	1.9
4	1500	58.0	17	17.7	1.09	3.50	5725	3000	2.080	13.06	1000	111.2	1558	123.1	.090	.7	4.45	62.3	4.9
5	1500	87.0	25	15.3	1.06	4.50	7221	2900	1.980	13.33	1650	134.2	1851	253.6	.090	1.0	5.37	74.1	10.1
6	1500	116.0	33	12.7	1.11	5.50	8428	2850	1.730	13.98	2000	155.0	1901	361.2	.090	1.3	6.20	76.0	14.4
7	1500	144.0	41	9.9	1.14	6.50	9699	2550	1.380	13.41	2200	159.1	1739	455.7	.090	1.6	6.36	69.6	18.2
8	1500	173.0	49	6.7	1.01	7.00	11789	2150	1.340	13.77	1750	165.4	2082	446.9	.090	2.0	6.62	83.3	17.9
9	1500	202.0	58	4.3	1.05	10.50	17010	3450	8.110	4.50	150	326.8	15520	47.2	.090	2.3	13.07	620.8	1.9
10	1500	219.0	63	.2	1.11	13.50	20688	4500	10.350	8.54	170	481.4	22364	60.4	.090	2.5	19.25	894.6	2.4
11	1500	0.0	0	24.3	1.07	1.00	1590	58500	3.330	4.64	61	672.9	774	2.3	.067	0.0	44.88	51.6	.2
12	600	0.0	0	20.0	1.35	1.50	1890	6450	6.250	9.78	39	78.5	1427	1.5	.090	0.0	3.14	57.1	.1
13	2500	227.0	108	2.2	1.13	19.50	29354	3550	4.170	8.84	230	567.4	24607	122.0	.090	4.3	22.70	1184.3	4.9
14	2500	207.0	99	3.7	1.01	17.50	24473	2450	8.110	9.37	140	484.1	27163	104.6	.090	3.9	19.57	1086.5	4.2
15	2500	178.0	85	6.2	1.13	13.50	20322	1650	1.540	13.63	1700	217.9	4242	745.5	.090	3.4	8.72	169.7	29.8
16	2500	148.0	70	9.1	1.00	9.50	16159	1650	.700	13.91	2700	180.5	1546	480.4	.090	2.8	7.22	61.9	39.2
17	2500	118.0	56	11.8	1.06	8.20	13159	2100	1.040	13.77	2800	183.4	1923	811.7	.090	2.2	7.33	76.9	32.5
18	2500	89.0	42	14.2	1.07	7.50	11923	2300	1.450	13.48	2350	180.9	2304	613.6	.090	1.7	7.24	92.1	24.5
19	2500	59.0	28	17.1	1.17	6.50	9450	2400	1.800	13.33	1450	147.6	2236	296.0	.090	1.1	5.90	89.4	11.8
20	2500	29.5	14	19.6	.99	4.50	7732	2400	2.180	13.06	700	119.9	2199	116.1	.090	.6	4.74	88.0	4.6
21	2500	0.0	0	21.5	1.02	3.50	5837	3600	2.400	12.82	200	134.9	1816	24.9	.090	0.0	5.39	72.6	1.0
22	2500	0.0	0	25.3	1.08	1.50	2362	70000	2.320	3.08	50	1333.7	893	3.2	.090	0.0	53.35	35.7	.1
23	600	0.0	0	20.0	1.50	1.50	1701	6750	5.960	9.78	41	69.9	1248	1.4	.067	0.0	4.67	83.2	.1

CYCLE COMPOSITE HC 8.684 GRAM/BHP HR

CO 162.458 GRAM/BHP HR

NO2 7.072 GRAM/BHP HR

PROJECT 11-2877-01
10-28-71 RUN3 DODGE 318 CID V8 CORRELATION TRUCK 3 STATIONARY DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.7	1.45	1.50	1760	7700	6.860	9.50	77	79.1	1423	2.6	.067	0.0	5.28	94.9	.2
2	1500	0.0	0	21.4	1.25	2.50	3402	11500	.930	12.34	157	271.3	443	12.3	.090	0.0	10.85	17.7	.5
3	1500	29.0	8	19.7	.99	2.50	4295	2700	1.300	13.77	508	75.6	735	47.2	.090	.3	3.02	29.4	1.9
4	1500	58.0	17	17.7	1.05	3.50	5670	3200	2.020	13.48	1170	114.7	1462	139.2	.090	.7	4.59	58.5	5.6
5	1500	87.0	25	15.2	1.07	4.50	7154	3150	1.440	13.63	1658	141.9	1765	247.4	.090	1.0	5.67	70.6	9.9
6	1500	116.0	33	12.6	1.10	5.50	8505	2900	1.630	13.77	2055	157.2	1785	369.8	.090	1.3	6.29	71.4	14.8
7	1500	144.0	41	10.0	1.15	6.50	9614	2650	1.410	13.91	2120	163.5	1757	439.2	.090	1.6	6.54	70.3	17.4
8	1500	173.0	49	6.7	1.01	7.00	11789	2250	1.380	14.00	1774	170.0	2106	446.2	.090	2.0	6.80	84.2	17.8
9	1500	202.0	58	4.3	1.03	10.50	17390	3500	8.220	9.64	292	333.3	15811	92.3	.090	2.3	13.33	632.5	3.7
10	1500	219.0	63	.2	1.08	13.50	21262	4400	10.030	8.75	335	486.8	22414	123.0	.090	2.5	19.47	896.5	4.9
11	1500	0.0	0	24.3	1.15	1.00	1479	60000	3.330	4.85	224	625.9	702	7.8	.067	0.0	41.75	46.8	.5
12	600	0.0	0	20.1	1.40	1.50	1822	6850	6.130	10.09	197	73.8	1335	7.1	.090	0.0	2.95	53.4	.3
13	2500	227.0	108	2.2	1.05	19.50	31590	3500	4.390	9.14	344	585.6	31737	193.4	.090	4.3	23.42	1269.5	7.8
14	2500	207.0	99	4.1	1.39	17.50	21415	2450	8.530	9.64	265	342.1	14984	102.0	.090	3.4	13.69	599.4	4.1
15	2500	178.0	85	6.3	1.01	9.50	16000	1300	1.040	13.91	1996	137.5	2328	683.2	.090	3.4	5.50	93.1	27.3
16	2500	148.0	70	9.1	1.17	9.50	13812	1550	.700	14.05	2540	143.6	1310	781.4	.090	2.8	5.75	52.4	31.3
17	2500	118.0	56	11.8	1.23	8.50	11755	2000	.810	14.05	2684	156.1	1277	696.8	.090	2.2	6.24	51.1	27.9
18	2500	89.0	42	14.2	1.35	7.50	9450	2250	1.300	13.63	2302	140.3	1637	476.6	.090	1.7	5.61	65.5	19.1
19	2500	59.0	28	17.1	1.48	6.50	7471	2300	1.540	13.63	1618	111.2	1553	259.7	.090	1.1	4.45	62.1	10.4
20	2500	29.5	14	19.6	1.36	4.50	5628	2300	2.080	13.48	823	82.0	1498	97.4	.090	.6	3.28	59.9	3.9
21	2500	0.0	0	21.5	1.08	3.50	5512	2500	2.280	13.18	335	87.7	1616	39.0	.090	0.0	3.51	64.6	1.6
22	2500	0.0	0	25.3	1.32	1.50	1933	73000	2.360	3.13	224	1103.3	720	11.2	.090	0.0	44.13	28.8	.4
23	600	0.0	0	20.0	1.38	1.50	1849	6200	6.140	10.25	210	67.2	1355	7.6	.067	0.0	4.48	90.4	.5

CYCLE COMPOSITE HC 7.745 GRAM/BHP HR

CO 144.540 GRAM/BHP HR

NO2 6.646 GRAM/BHP HR

BSFC .606 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
10-28-71 RUN3 DODGE 318 CID V8 CORRELATION TRUCK 3 STATIONARY DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.7	1.45	1.50	1760	7700	6.860	9.50	36	79.1	1423	1.2	.067	0.0	5.28	94.9	.1
2	1500	0.0	0	21.4	1.25	2.50	3402	11500	.930	12.34	118	271.3	443	9.2	.090	0.0	10.85	17.7	.4
3	1500	29.0	8	19.7	.99	2.50	4295	2700	1.300	13.77	500	75.6	735	46.5	.090	.3	3.02	29.4	1.9
4	1500	58.0	17	17.7	1.05	3.50	5670	3200	2.020	13.48	1175	114.7	1462	139.8	.090	.7	4.59	58.5	5.6
5	1500	87.0	25	15.2	1.07	4.50	7154	3150	1.440	13.63	1750	141.9	1765	261.7	.090	1.0	5.67	70.6	10.5
6	1500	116.0	33	12.6	1.10	5.50	8505	2900	1.630	13.77	2150	157.2	1785	386.9	.090	1.3	6.29	71.4	15.5
7	1500	144.0	41	10.0	1.15	6.50	9614	2650	1.410	13.91	2200	163.5	1757	450.6	.090	1.6	6.54	70.3	18.0
8	1500	173.0	49	6.7	1.01	7.00	11789	2250	1.380	14.00	1750	170.0	2106	438.9	.090	2.0	6.80	84.2	17.6
9	1500	202.0	58	4.3	1.03	10.50	17390	3500	8.220	9.64	140	333.3	15811	44.3	.090	2.3	13.33	632.5	1.8
10	1500	219.0	63	.2	1.08	13.50	21262	4400	10.030	8.75	195	486.8	22414	71.6	.090	2.5	19.47	896.5	2.9
11	1500	0.0	0	24.3	1.15	1.00	1479	60000	3.330	4.85	51	625.9	702	1.8	.067	0.0	41.75	46.8	.1
12	600	0.0	0	20.1	1.40	1.50	1822	6850	6.130	10.09	37	73.8	1335	1.3	.090	0.0	2.95	53.4	.1
13	2500	227.0	108	2.2	1.05	19.50	31590	3500	4.390	9.14	305	585.6	31737	164.4	.090	4.3	23.42	1269.5	6.8
14	2500	207.0	99	4.1	1.39	17.50	21415	2450	8.530	9.64	215	342.1	14984	82.8	.090	3.4	13.69	599.4	3.3
15	2500	178.0	85	6.3	1.01	9.50	16000	1300	1.040	13.91	2100	137.5	2328	737.3	.090	3.4	5.50	93.1	29.5
16	2500	148.0	70	9.1	1.17	9.50	13812	1550	.700	14.05	2900	143.6	1310	892.2	.090	2.8	5.75	52.4	35.7
17	2500	118.0	56	11.8	1.23	8.50	11755	2000	.810	14.05	3050	156.1	1277	790.4	.090	2.2	6.24	51.1	31.6
18	2500	89.0	42	14.2	1.35	7.50	9450	2250	1.300	13.63	2500	140.3	1637	517.6	.090	1.7	5.61	65.5	20.7
19	2500	59.0	28	17.1	1.48	6.50	7471	2300	1.540	13.63	1650	111.2	1553	264.9	.090	1.1	4.45	62.1	10.6
20	2500	29.5	14	19.6	1.36	4.50	5628	2300	2.080	13.48	780	82.0	1498	92.3	.090	.6	3.28	59.9	3.7
21	2500	0.0	0	21.5	1.08	3.50	5512	2500	2.280	13.18	205	87.7	1616	23.4	.090	0.0	3.51	64.6	1.0
22	2500	0.0	0	25.3	1.32	1.50	1933	73000	2.360	3.13	43	1103.3	720	2.2	.090	0.0	44.13	28.8	.1
23	600	0.0	0	20.0	1.38	1.50	1849	6200	6.140	10.25	41	67.2	1355	1.5	.067	0.0	4.48	90.4	.1

CYCLE COMPOSITE HC 7.745 GRAM/BHP HR

CO 144.540 GRAM/BHP HR

NO2 6.823 GRAM/BHP HR

PROJECT 11-2877-01
11-5-71 RUN 1 DODGE 318 CID V8 CORRELATION TRUCK 3 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.39	1.50	1836	7300	6.690	9.03	26	81.7	1501	1.0	.067	0.0	5.45	100.1	.1
2	1500	0.0	0	20.5	1.33	3.00	3837	20000	.470	10.09	157	611.0	290	15.9	.040	0.0	24.44	11.6	.6
3	1500	29.0	8	19.8	1.37	3.50	4346	15500	.640	12.34	420	463.6	387	41.7	.040	.3	18.54	15.5	1.7
4	1500	58.0	17	17.8	1.26	4.00	5400	3650	1.090	13.77	1206	129.5	781	142.0	.040	.7	5.18	31.2	5.7
5	1500	87.0	25	15.2	1.23	5.00	6415	3400	1.660	13.77	1883	149.1	1470	274.1	.040	1.0	5.96	58.8	11.0
6	1500	116.0	33	12.8	1.21	6.00	8435	3100	1.910	13.77	2055	163.5	2035	359.8	.040	1.3	6.54	81.4	14.4
7	1500	144.0	41	10.0	1.26	7.50	10125	2800	2.050	13.63	1947	177.6	2627	410.0	.040	1.6	7.11	105.1	16.4
8	1500	173.0	49	6.7	1.27	9.00	12054	2500	2.080	13.77	1638	187.2	3146	407.1	.040	2.0	7.49	125.8	16.3
9	1500	202.0	58	4.2	.94	10.50	14001	4000	10.350	8.48	117	395.2	20658	38.3	.040	2.3	15.81	826.3	1.5
10	1500	219.0	63	.2	.99	12.50	21477	5400	10.900	8.34	147	586.3	23907	71.0	.040	2.5	23.45	956.3	2.8
11	1500	0.0	0	24.3	1.80	2.00	1840	56000	3.380	3.95	90	818.6	998	4.4	.067	0.0	54.60	66.6	.3
12	600	0.0	0	19.8	1.47	1.50	1736	6950	6.790	8.93	77	73.5	1450	2.7	.040	0.0	2.94	58.0	.1
13	2500	227.0	108	2.2	.75	15.50	35154	5000	10.900	8.14	170	899.6	39612	101.5	.040	4.3	35.98	1584.5	4.1
14	2500	207.0	99	3.7	.80	15.00	31844	3750	10.500	8.34	117	622.4	35205	64.3	.040	3.9	24.90	1408.2	2.6
15	2500	178.0	85	6.2	1.02	14.50	24181	2250	2.470	13.00	850	335.9	8458	441.2	.040	3.4	13.44	338.3	17.6
16	2500	148.0	70	9.1	1.23	13.00	17478	2500	2.280	13.34	1883	282.3	5201	706.0	.040	2.8	11.29	208.0	28.2
17	2500	118.0	56	11.7	1.43	12.00	14274	2750	2.040	13.33	2011	250.9	3760	609.2	.040	2.2	10.04	150.4	24.4
18	2500	89.0	42	14.2	1.55	11.00	12072	2900	2.320	13.33	1990	214.6	3549	500.2	.040	1.7	8.78	142.0	20.0
19	2500	59.0	28	17.1	1.34	8.00	10155	2850	1.980	13.48	1548	183.8	2580	342.3	.040	1.1	7.35	103.2	13.7
20	2500	29.0	14	19.5	1.14	5.00	7461	3100	1.800	13.63	845	146.4	1723	136.1	.040	.6	5.88	68.9	6.4
21	2500	0.0	0	21.0	1.09	4.00	6242	8000	1.520	12.82	335	329.8	1266	45.8	.040	0.0	13.19	50.6	1.8
22	2500	0.0	0	25.3	1.03	1.00	1651	39000	1.120	3.68	38	740.3	429	2.4	.040	0.0	29.61	17.2	.1
23	600	0.0	0	20.0	1.43	1.50	1784	8000	6.440	9.03	64	85.1	1492	2.3	.067	0.0	5.68	99.5	.2

CYCLE COMPOSITE HC 10.796 GRAM/BHP HR

CO 208.206 GRAM/BHP HR

NO2 5.937 GRAM/BHP HR

BSFC .714 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
11-5-71 RUN 1 DODGE 318 CID V8 CORRELATION TRUCK 3 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.39	1.50	1836	7300	6.690	9.03	25	81.7	1501	.9	.067	0.0	5.45	100.1	.1
2	1500	0.0	0	20.5	1.33	3.00	3837	20000	.470	10.09	170	611.0	290	17.2	.040	0.0	24.44	11.6	.7
3	1500	29.0	8	19.8	1.37	3.50	4346	15500	.640	12.34	430	463.6	387	42.7	.040	.3	18.54	15.5	1.7
4	1500	58.0	17	17.8	1.26	4.00	5400	3650	1.090	13.77	1288	129.5	781	151.7	.040	.7	5.18	31.2	6.1
5	1500	87.0	25	15.2	1.23	5.00	6415	3400	1.660	13.77	2088	149.1	1470	304.0	.040	1.0	5.96	58.8	12.2
6	1500	116.0	33	12.8	1.21	6.00	8435	3100	1.910	13.77	2325	163.5	2035	407.2	.040	1.3	6.54	81.4	16.3
7	1500	144.0	41	10.0	1.26	7.50	10125	2800	2.050	13.63	2163	177.6	2627	455.6	.040	1.6	7.11	105.1	18.2
8	1500	173.0	49	6.7	1.27	9.00	12054	2500	2.080	13.77	1788	187.2	3146	444.4	.040	2.0	7.49	125.8	17.8
9	1500	202.0	58	4.2	.94	10.50	14001	4000	10.350	8.48	99	395.2	20658	32.4	.040	2.3	15.81	826.3	1.3
10	1500	219.0	63	.2	.99	12.50	21477	5400	10.900	8.34	170	586.3	23907	61.3	.040	2.5	23.45	956.3	2.5
11	1500	0.0	0	24.3	1.80	2.00	1840	56000	3.380	3.95	11	818.6	998	.6	.067	0.0	54.60	66.6	.0
12	600	0.0	0	19.8	1.47	1.50	1736	6950	6.790	8.93	37	73.5	1450	1.3	.040	0.0	2.94	58.0	.1
13	2500	227.0	108	2.2	.75	15.50	35154	5000	10.900	8.14	180	899.5	39612	107.5	.040	4.3	35.98	1584.5	4.3
14	2500	207.0	99	3.7	.80	15.00	31844	3750	10.500	8.34	115	622.4	35205	63.4	.040	3.9	24.90	1408.2	2.5
15	2500	178.0	85	6.2	1.02	14.50	24181	2250	2.470	13.00	850	335.9	8458	421.4	.040	3.4	13.44	338.3	16.9
16	2500	148.0	70	9.1	1.23	13.00	17478	2500	2.280	13.34	2038	282.3	5201	764.1	.040	2.8	11.29	208.0	30.6
17	2500	118.0	56	11.7	1.43	12.00	14274	2750	2.040	13.33	2163	250.9	3760	655.2	.040	2.2	10.04	150.4	26.2
18	2500	89.0	42	14.2	1.55	11.00	12072	2900	2.320	13.33	2113	214.6	3549	531.3	.040	1.7	8.78	142.0	21.3
19	2500	59.0	28	17.1	1.34	8.00	10155	2850	1.980	13.48	1675	183.8	2580	358.7	.040	1.1	7.35	103.2	14.3
20	2500	29.0	14	19.5	1.14	5.00	7461	3100	1.800	13.63	850	146.4	1723	133.8	.040	.6	5.88	68.4	5.4
21	2500	0.0	0	21.0	1.09	4.00	6242	8000	1.520	12.82	320	329.8	1266	43.8	.040	0.0	13.19	50.6	1.8
22	2500	0.0	0	25.3	1.03	1.00	1651	39000	1.120	3.68	10	740.3	429	.6	.040	0.0	29.61	17.2	.0
23	600	0.0	0	20.0	1.43	1.50	1784	8000	6.440	9.03	36	85.1	1492	1.3	.067	0.0	5.68	99.5	.1

CYCLE COMPOSITE HC 10.796 GRAM/BHP HR

CO 208.206 GRAM/BHP HR

NO2 6.286 GRAM/BHP HR

PROJECT 11-2877-01
11-5-71 RUN 2 DODGE 318 CID V8 CORRELATION TRUCK 3 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.43	1.50	1784	7400	7.520	8.84	13	77.2	1585	.4	.067	0.0	5.16	105.7	.0
2	1500	0.0	0	20.5	1.19	2.50	3574	18500	.470	9.93	130	534.7	277	12.6	.040	0.0	21.59	11.1	.5
3	1500	29.0	8	19.8	1.02	2.50	4169	16000	.580	11.92	344	473.1	346	34.2	.040	.3	18.92	13.9	1.4
4	1500	58.0	17	17.6	1.09	3.50	5462	3200	1.450	13.48	1206	114.6	1044	143.3	.040	.7	4.58	42.0	5.7
5	1500	87.0	25	15.2	1.08	4.50	7087	3050	1.870	13.63	1820	134.8	1694	271.0	.040	1.0	5.47	67.8	10.8
6	1500	116.0	33	12.5	.97	5.00	8768	2750	2.140	13.48	1990	151.7	2385	344.4	.040	1.3	6.07	95.4	14.6
7	1500	144.0	41	10.0	.97	6.00	10522	2500	2.210	13.48	1904	165.0	2947	417.3	.040	1.6	6.60	117.4	16.7
8	1500	173.0	49	6.7	1.08	8.00	12600	2330	2.180	13.63	1658	183.0	3459	432.3	.040	2.0	7.32	138.3	17.3
9	1500	202.0	58	4.2	1.04	12.00	18727	3700	10.400	8.48	90	354.4	20437	24.2	.040	2.3	14.40	817.5	1.2
10	1500	219.0	63	.2	1.04	14.00	21848	4700	10.900	8.14	143	526.3	24656	53.3	.040	2.5	21.05	986.2	2.1
11	1500	0.0	0	24.2	1.00	1.00	1701	51000	3.470	4.11	51	684.2	940	2.3	.067	0.0	45.63	62.7	.2
12	600	0.0	0	20.1	.96	1.00	1772	6950	6.940	9.14	77	73.4	1481	2.7	.040	0.0	2.94	59.2	.1
13	2500	227.0	108	2.3	1.03	22.00	34332	4500	11.000	8.24	183	830.3	41000	112.4	.040	4.3	33.21	1640.0	4.5
14	2500	207.0	99	3.8	1.05	20.00	32400	3200	10.560	8.34	117	539.4	35454	65.3	.040	3.9	21.58	1418.4	2.6
15	2500	178.0	85	6.2	1.00	14.00	27216	2120	2.470	13.00	960	356.6	10040	536.0	.040	3.4	14.26	403.6	21.4
16	2500	148.0	70	9.0	.93	10.00	18290	2300	2.320	13.48	1947	262.4	5347	737.4	.040	2.8	10.50	213.9	29.5
17	2500	118.0	56	11.7	.99	9.00	15464	2450	2.440	13.48	2077	234.4	4715	654.6	.040	2.2	9.37	188.6	26.4
18	2500	89.0	42	14.2	1.05	8.00	12460	2600	2.440	13.48	2033	208.3	3448	540.6	.040	1.7	8.33	137.9	21.6
19	2500	59.0	28	17.0	1.01	6.00	10105	2500	2.210	13.63	1618	157.0	2804	337.4	.040	1.1	6.28	112.1	13.5
20	2500	29.5	14	19.5	.90	4.00	7560	3000	1.940	13.77	897	141.7	1850	140.7	.040	.6	5.67	74.0	5.6
21	2500	0.0	0	20.9	1.10	4.00	6185	9500	1.730	12.71	377	381.8	1405	50.3	.040	0.0	15.27	56.2	2.0
22	2500	0.0	0	25.3	1.03	1.00	1651	38500	1.450	3.56	51	717.6	546	3.2	.040	0.0	28.70	21.8	.1
23	600	0.0	0	20.0	1.36	1.50	1876	7400	6.640	9.25	77	83.5	1513	2.4	.067	0.0	5.57	100.4	.2

CYCLE COMPOSITE HC 10.002 GRAM/BHP HR

CO 217.440 GRAM/BHP HR

NO2 6.222 GRAM/BHP HR

BSFC .738 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
11-5-71 RUN 2 DODGE 318 CID V8 CORRELATION TRUCK 3 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CONCENTRATION AS MEASURED CO	CONCENTRATION AS MEASURED CO2	CONCENTRATION AS MEASURED NO	CALCULATED GRAM/HR HC	CALCULATED GRAM/HR CO	CALCULATED GRAM/HR NO2	WT. FAC.	WEIGHTED GRAM/HR HP	WEIGHTED GRAM/HR HC	WEIGHTED GRAM/HR CO	WEIGHTED GRAM/HR NO2
1	600	0.0	0	19.8	1.93	1.50	1789	7900	7.520	8.84	34	77.2	1585	1.2	.067	0.0	5.15	105.7	.1
2	1500	0.0	0	20.5	1.19	2.50	3574	18500	.470	9.93	155	539.7	277	15.0	.090	0.0	21.59	11.1	.6
3	1500	29.0	8	19.8	1.02	2.50	4169	16000	.580	11.92	365	973.1	346	35.8	.090	.3	18.92	13.9	1.9
4	1500	58.0	17	17.6	1.09	3.50	5462	3200	1.450	13.98	1250	119.6	1099	198.6	.090	.7	9.58	42.0	5.9
5	1500	87.0	25	15.2	1.08	4.50	7087	3050	1.870	13.63	1900	136.8	1699	282.9	.090	1.0	5.97	67.8	11.3
6	1500	116.0	33	12.5	.97	5.00	8768	2750	2.140	13.98	2136	151.7	2385	391.2	.090	1.3	6.07	95.9	15.6
7	1500	199.0	41	10.0	.97	6.00	10522	2500	2.210	13.98	2025	165.0	2997	493.8	.090	1.6	6.60	117.9	17.8
8	1500	173.0	49	6.7	1.08	8.00	12600	2330	2.180	13.63	1760	183.0	3459	458.9	.090	2.0	7.32	138.3	18.4
9	1500	202.0	58	4.2	1.09	12.00	18727	3700	10.400	8.48	95	359.9	20937	30.7	.090	2.3	14.40	817.5	1.2
10	1500	219.0	63	.2	1.09	19.00	21848	4700	10.900	8.14	151	526.3	24656	56.1	.090	2.5	21.05	986.2	2.2
11	1500	0.0	0	24.2	1.00	1.00	1701	51000	3.470	4.11	13	684.2	990	.6	.067	0.0	45.63	62.7	.0
12	600	0.0	0	20.1	.96	1.00	1772	6950	6.990	9.14	36	73.4	1481	1.3	.090	0.0	2.94	54.2	.1
13	2500	227.0	108	2.3	1.03	22.00	36332	4500	11.000	8.24	190	830.3	41000	114.4	.090	4.3	33.21	1640.0	4.7
14	2500	207.0	99	3.8	1.05	20.00	32400	3200	10.560	8.34	121	539.4	35459	67.7	.090	3.9	21.58	1438.4	2.7
15	2500	178.0	85	6.2	1.00	16.00	27216	2120	2.470	13.00	970	356.6	10090	591.6	.090	3.4	14.26	403.6	21.7
16	2500	148.0	70	9.0	.93	10.00	18290	2300	2.320	13.48	2050	262.4	5347	776.6	.090	2.8	10.50	213.9	31.1
17	2500	118.0	56	11.7	.94	9.00	15664	2450	2.440	13.48	2175	234.4	4715	690.8	.090	2.2	9.37	188.6	27.6
18	2500	89.0	42	14.2	1.05	8.00	12460	2600	2.440	13.48	2137	208.3	3948	568.3	.090	1.7	8.33	157.9	22.7
19	2500	59.0	28	17.0	1.01	6.00	10105	2500	2.210	13.63	1725	157.0	2804	359.7	.090	1.1	6.28	112.1	14.4
20	2500	29.5	14	19.5	.90	4.00	7560	3000	1.440	13.77	895	141.7	1850	140.3	.090	.6	5.67	74.0	5.6
21	2500	0.0	0	20.9	1.10	4.00	6185	4500	1.730	12.71	330	381.8	1405	44.0	.090	0.0	15.27	56.2	1.8
22	2500	0.0	0	25.3	1.03	1.00	1651	38500	1.450	3.56	11	717.6	546	.7	.090	0.0	28.70	21.8	.0
23	600	0.0	0	20.0	1.36	1.50	1876	7400	6.640	9.25	36	83.5	1513	1.3	.067	0.0	5.57	100.9	.1

CYCLE COMPOSITE HC 10.002 GRAM/BHP HR

CO 217.440 GRAM/BHP HR

NO2 6.502 GRAM/BHP HR

PROJECT 11-2877-01
11-5-71 RUN 3 DODGE 318 CID V8 CORRELATION TRUCK 3 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CONCENTRATION AS MEASURED CO	CONCENTRATION AS MEASURED CO2	CONCENTRATION AS MEASURED NO	CALCULATED GRAM/HR HC	CALCULATED GRAM/HR CO	CALCULATED GRAM/HR NO2	WT. FAC.	WEIGHTED GRAM/HR HP	WEIGHTED GRAM/HR HC	WEIGHTED GRAM/HR CO	WEIGHTED GRAM/HR NO2
1	600	0.0	0	19.8	1.45	1.50	1760	7150	6.440	8.68	13	77.0	1510	.5	.067	0.0	5.14	100.7	.0
2	1500	0.0	0	20.5	1.12	2.50	3747	18700	.350	9.93	130	584.4	221	13.5	.090	0.0	23.37	8.8	.5
3	1500	29.0	8	19.7	1.01	2.50	4210	15500	.470	11.92	344	468.2	287	35.0	.090	.3	18.73	11.5	1.4
4	1500	58.0	17	17.7	1.10	3.50	5412	2900	1.010	13.77	1223	104.2	733	145.4	.090	.7	4.17	29.3	5.8
5	1500	87.0	25	15.2	1.08	4.50	7087	3050	1.520	13.77	1425	138.6	1345	240.5	.090	1.0	5.54	55.8	11.6
6	1500	116.0	33	12.7	.99	5.00	8591	2950	1.910	13.48	1889	161.6	2113	361.7	.090	1.3	6.46	84.5	14.5
7	1500	199.0	41	10.0	1.01	6.00	10105	2550	2.050	13.48	1862	163.2	2651	395.8	.090	1.6	6.53	106.0	15.8
8	1500	173.0	49	6.7	1.11	8.00	12259	2200	2.110	13.48	1598	170.6	3305	411.5	.090	2.0	6.82	132.2	16.5
9	1500	202.0	58	4.3	1.12	12.00	18225	3450	10.560	8.43	90	325.2	20107	28.3	.090	2.3	13.01	804.3	1.1
10	1500	219.0	63	.2	1.07	19.00	22256	4500	11.100	8.14	170	508.6	25344	63.8	.090	2.5	20.35	1013.8	2.6
11	1500	0.0	0	24.3	.96	1.00	1772	53000	3.330	3.88	64	750.7	953	3.0	.067	0.0	50.07	63.5	.2
12	600	0.0	0	19.8	.98	1.00	1736	6800	6.860	8.93	64	71.7	1460	2.3	.090	0.0	2.87	58.4	.1
13	2500	227.0	108	2.2	1.05	22.00	35640	4900	11.000	8.24	170	885.1	40138	101.9	.090	4.3	35.41	1605.5	4.1
14	2500	207.0	99	3.8	1.07	20.00	31794	3150	10.500	8.34	104	522.9	35205	57.1	.090	3.9	20.91	1408.2	2.3
15	2500	178.0	85	6.2	1.25	16.00	21773	2100	2.470	13.00	930	282.6	8073	415.5	.090	3.4	11.30	322.9	16.6
16	2500	148.0	70	9.1	.95	10.00	17905	2300	2.360	13.63	1904	253.9	5263	647.9	.090	2.8	10.16	210.5	27.9
17	2500	118.0	56	11.8	1.00	9.00	15309	2550	2.480	13.33	2011	243.0	4774	636.3	.090	2.2	9.72	191.0	25.5
18	2500	89.0	42	14.1	1.04	8.00	13085	2650	2.400	13.33	2011	216.8	3466	546.2	.090	1.7	8.67	138.6	21.8
19	2500	59.0	28	17.2	1.05	6.00	9720	2650	2.050	13.63	1559	161.5	2524	315.6	.090	1.1	6.46	101.0	12.6
20	2500	29.0	14	19.7	.93	4.00	7316	3250	1.870	13.63	784	150.3	1746	120.4	.090	.6	6.01	69.9	4.8
21	2500	0.0	0	21.0	1.09	4.00	6242	10800	1.550	12.71	377	434.5	1274	51.0	.090	0.0	17.38	51.0	2.0
22	2500	0.0	0	25.3	1.03	1.00	1651	33500	1.200	3.74	77	667.4	483	5.1	.090	0.0	26.69	19.3	.2
23	600	0.0	0	20.5	1.38	1.50	1849	7450	6.570	8.84	40	85.3	1519	3.4	.067	0.0	5.69	101.3	.2

CYCLE COMPOSITE HC 10.105 GRAM/BHP HR

CO 210.736 GRAM/BHP HR

NO2 5.414 GRAM/BHP HR

BSFC .713 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
11-5-71 RUN 3 DODGE 318 CID V8 CORRELATION TRUCK 3 CHASSIS DYNA.

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CONCENTRATION AS MEASURED CO	CONCENTRATION AS MEASURED CO2	CONCENTRATION AS MEASURED NO	CALCULATED GRAM/HR HC	CALCULATED GRAM/HR CO	CALCULATED GRAM/HR NO2	WT. FAC.	WEIGHTED GRAM/HR HP	WEIGHTED GRAM/HR HC	WEIGHTED GRAM/HR CO	WEIGHTED GRAM/HR NO2
1	600	0.0	0	19.8	1.45	1.50	1760	7150	6.440	8.68	31	77.0	1510	1.1	.067	0.0	5.14	100.7	.1
2	1500	0.0	0	20.5	1.12	2.50	3747	18700	.350	9.93	166	584.4	221	17.2	.090	0.0	23.37	8.8	.7
3	1500	29.0	8	19.7	1.01	2.50	4210	15500	.470	11.92	375	468.2	287	37.6	.090	.3	18.73	11.5	1.5
4	1500	58.0	17	17.7	1.10	3.50	5412	2900	1.010	13.77	1250	104.2	733	144.0	.090	.7	4.17	29.3	6.0
5	1500	87.0	25	15.2	1.08	4.50	7087	3050	1.520	13.77	2050	138.6	1345	304.3	.090	1.0	5.54	55.8	12.4
6	1500	116.0	33	12.7	.94	5.00	8591	2950	1.910	13.48	2150	161.6	2113	341.0	.090	1.3	6.46	84.5	15.6
7	1500	199.0	41	10.0	1.01	6.00	10105	2550	2.050	13.48	2000	163.2	2651	425.1	.090	1.6	6.53	106.0	17.0
8	1500	173.0	49	6.7	1.11	8.00	12259	2200	2.110	13.48	1675	170.6	3305	431.2	.090	2.0	6.82	132.2	17.2
9	1500	202.0	58	4.3	1.12	12.00	18225	3450	10.560	8.43	98	325.2	20107	30.7	.090	2.3	13.01	804.3	1.2
10	1500	219.0	63	.2	1.07	19.00	22256	4500	11.100	8.14	171	508.6	25344	64.2	.090	2.5	20.35	1013.8	2.6
11	1500	0.0	0	24.3	.96	1.00	1772	53000	3.330	3.88	11	750.7	953	.5	.067	0.0	50.07	63.5	.0
12	600	0.0	0	19.8	.98	1.00	1736	6800	6.860	8.93	36	71.7	1460	1.3	.090	0.0	2.87	58.4	.1
13	2500	227.0	108	2.2	1.05	22.00	35640	4900	11.000	8.24	199	885.1	40138	116.3	.090	4.3	35.41	1605.5	4.7
14	2500	207.0	99	3.8	1.07	20.00	31794	3150	10.500	8.34	116	522.9	35205	63.4	.090	3.9	20.91	1408.2	2.6
15	2500	178.0	85	6.2	1.25	16.00	21773	2100	2.470	13.00	965	282.6	8073	431.1	.090	3.4	11.30	322.4	17.2
16	2500	148.0	70	9.1	.95	10.00	17905	2300	2.360	13.63	2000	253.9	5263	733.0	.090	2.8	10.16	210.5	29.3
17	2500	118.0	56	11.8	1.00	9.00	15309	2550	2.480	13.33	2112	243.0	4774	668.2	.090	2.2	9.72	191.0	26.7
18	2500	89.0	42	14.1	1.04	8.00	13085	2650	2.400	13.33	2075	216.8	3466	563.6	.090	1.7	8.67	138.6	22.5
19	2500	59.0	28	17.2	1.05	6.00	9720	2650	2.050	13.63	1562	161.5	2524	316.1	.090	1.1	6.46	101.0	12.6
20	2500	29.0	14	19.7	.93	4.00	7316	3250	1.870	13.63	740	150.3	1746	113.6	.090	.6	6.01	69.9	4.5
21	2500	0.0	0	21.0	1.09	4.00	6242	10800	1.550	12.71	320	434.5	1274	43.2	.090	0.0	17.38	51.0	1.7
22	2500	0.0	0	25.3	1.03	1.00	1651	33500	1.200	3.74	11	667.4	483	.7	.090	0.0	26.69	19.3	.0
23	600	0.0	0	20.5	1.38	1.50	1849	7450	6.570	8.84	36	85.3	1519	1.4	.067	0.0	5.69	101.3	.1

CYCLE COMPOSITE HC 10.105 GRAM/BHP HR

CO 210.736 GRAM/BHP HR

NO2 6.172 GRAM/BHP HR

TABLE I-5. 23 MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS
Correlation Truck No. 4

Engine: White 400 CID, 6 cyl. Vehicle: 1970 30,000-lb GVW Tractor

			Emission Rate, Gr/bhp-hr			
Date	Run	Dynamometer	HC	CO	NO_2 Observed NDIR	Humidity grains/lb dry air
11-22-71	1	Stationary	3.94	75.2	10.65	76.5
11-22-71	2	Stationary	4.13	66.7	10.97	78.0
		Average	4.03	71.0	10.81	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			4.6	12.0	3.0	
11-30-71	1	Chassis	4.87	98.8	9.53	47.0
11-30-71	2	Chassis	4.81	98.4	9.32	52.0
		Average	4.84	98.6	9.43	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			1.2	4.1	2.2	
Average Stationary			4.03	71.0	10.81	
Average Chassis			4.84	98.6	9.43	
Difference: (Chassis - Stationary)			0.81	27.6	-1.38	
Percent Difference: (Difference/Stationary) x 100			20.0	38.9	-12.8	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
11-22-71 RUN 1 WHITE 400 CID 6 CYL. CORREL. TRUCK 4 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	630	0.0	0	20.0	1.35	1.50	1890	4700	9.780	11.13	64	41.5	1746	1.4	.067	0.0	2.77	116.5	.1
2	1500	0.0	0	20.7	1.17	3.50	5088	2200	3.470	13.33	117	65.8	2046	11.6	.040	0.0	2.63	83.8	.5
3	1500	37.0	11	18.2	1.16	4.50	6544	2150	2.470	13.63	224	84.4	2354	24.2	.040	.4	3.37	94.2	1.2
4	1500	73.5	21	15.4	1.06	5.00	8024	1950	2.180	14.05	523	95.3	2151	84.8	.040	.8	3.81	86.0	3.4
5	1500	110.5	32	13.8	1.06	6.00	9628	2100	2.480	13.91	784	121.8	2406	151.0	.040	1.3	4.87	116.2	6.0
6	1500	147.5	42	11.7	1.07	7.00	11128	1950	2.250	14.18	1152	130.5	3042	256.0	.040	1.7	5.22	121.7	10.2
7	1500	184.5	53	9.5	1.04	8.00	12484	1850	1.480	14.31	1539	140.2	3031	387.2	.040	2.1	5.61	121.2	15.5
8	1500	221.5	63	7.2	1.03	9.50	15689	2050	2.470	13.48	1135	193.1	5651	355.0	.040	2.5	7.72	226.1	14.2
9	1500	258.0	74	4.8	1.04	10.00	16356	1850	2.050	14.31	1820	182.9	4044	547.3	.040	2.9	7.32	163.7	23.9
10	1500	295.0	84	0.0	1.43	16.00	14032	680	1.550	14.18	2210	81.9	3772	883.9	.040	3.4	3.28	150.9	35.4
11	1500	0.0	0	23.8	1.33	1.00	1274	44000	3.660	6.82	183	407.5	615	5.1	.067	0.0	27.18	41.0	.3
12	630	0.0	0	19.4	1.07	1.50	2385	4800	5.140	11.42	103	65.1	1421	8.2	.040	0.0	2.60	56.8	.3
13	2500	316.0	150	.4	.47	14.00	33314	1400	2.420	13.33	2325	284.6	11441	1564.2	.040	6.0	11.38	474.6	62.8
14	2500	276.0	131	3.7	1.05	17.00	27540	800	.430	14.53	3573	141.8	3324	2102.2	.040	5.3	5.67	133.2	84.1
15	2500	237.0	113	6.6	1.03	15.00	24772	1100	1.550	14.31	2845	170.6	4857	1440.4	.040	4.5	6.83	144.3	54.6
16	2500	147.5	44	9.0	1.03	13.00	21464	1100	.470	14.53	3001	151.3	2645	1370.3	.040	3.8	6.05	107.8	54.8
17	2500	158.0	75	11.7	.44	11.00	18400	1400	1.870	14.31	2256	162.1	4375	867.4	.040	3.0	6.44	175.0	34.7
18	2500	118.5	56	14.1	1.04	10.00	16356	1550	2.360	13.77	1637	155.7	4788	545.8	.040	2.3	6.23	141.5	21.8
19	2500	79.0	38	16.5	1.12	9.00	13664	1600	2.820	13.77	1187	130.6	4649	321.6	.040	1.5	5.22	185.9	12.9
20	2500	39.5	19	18.7	1.28	8.00	10631	1800	2.730	13.77	537	114.7	3515	113.6	.040	.8	4.54	140.6	4.5
21	2500	0.0	0	20.6	1.10	5.00	7232	1350	2.180	14.05	377	63.8	2081	54.1	.040	0.0	2.55	83.2	2.4
22	2500	0.0	0	25.4	1.00	1.00	1701	72000	3.380	4.84	243	744.2	753	10.7	.040	0.0	31.77	30.1	.4
23	630	0.0	0	19.7	1.42	1.50	1747	4850	5.500	11.72	265	44.2	1128	8.4	.067	0.0	3.28	75.2	.6

CYCLE COMPOSITE HC 3.441 GRAM/BHP HR

CO 75.173 GRAM/BHP HR

NO2 10.648 GRAM/BHP HR

BSFC .546 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
11-22-71 RUN 2 WHITE 400 CID 6 CYL. CORREL. TRUCK 4 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	630	0.0	0	19.7	1.29	1.50	1978	5700	6.570	10.78	51	62.9	1465	1.4	.067	0.0	4.20	47.7	.1
2	1500	0.0	0	20.7	1.23	3.50	4840	2750	3.750	12.44	117	78.5	2161	11.1	.040	0.0	3.14	86.4	.4
3	1500	37.0	11	18.2	1.17	4.50	6542	2450	2.640	13.63	251	46.8	2146	32.4	.040	.4	3.87	85.8	1.3
4	1500	73.5	21	16.1	1.07	5.00	7444	2100	1.440	14.18	552	102.2	1407	84.2	.040	.8	4.04	76.3	3.6
5	1500	110.5	32	13.8	1.04	6.00	9813	2100	2.210	14.18	881	124.1	2639	172.4	.040	1.3	4.47	105.6	6.4
6	1500	147.5	42	11.7	1.03	7.00	11560	1400	1.910	14.31	1314	133.8	2718	307.3	.040	1.7	5.35	108.7	12.3
7	1500	184.5	53	9.4	1.04	8.00	13085	1750	1.380	14.53	1862	142.4	2268	502.4	.040	2.1	5.69	90.7	20.1
8	1500	221.5	63	7.2	1.01	9.00	15157	2050	2.640	13.77	1388	187.0	4865	420.4	.040	2.5	7.48	194.6	16.8
9	1500	258.0	74	5.1	1.05	10.00	16200	1800	1.700	14.31	2121	180.1	3436	704.6	.040	2.9	7.20	137.4	28.2
10	1500	295.0	84	0.0	1.20	14.00	19895	800	1.440	14.05	2256	48.8	4839	424.4	.040	3.4	3.45	143.6	37.0
11	1500	0.0	0	23.7	1.04	1.00	1636	51000	3.840	6.30	210	547.3	832	7.5	.067	0.0	36.51	55.5	.5
12	630	0.0	0	19.7	1.06	1.50	2407	5000	6.130	11.24	147	67.3	1668	8.8	.040	0.0	2.69	66.7	.4
13	2500	316.0	150	.4	1.04	20.00	32712	1250	2.730	13.42	2340	251.2	11084	1561.5	.040	6.0	10.05	443.4	62.5
14	2500	276.0	131	3.4	1.06	17.00	27280	640	.770	14.53	3453	122.5	2761	2034.4	.040	5.3	4.90	110.4	81.4
15	2500	237.0	113	6.6	1.02	15.00	25015	1000	1.520	14.53	2741	154.4	4756	1435.2	.040	4.5	6.20	140.2	57.4
16	2500	147.5	44	8.7	1.03	13.00	21464	950	.810	14.24	3002	124.4	2238	1363.3	.040	3.8	5.20	84.5	54.5
17	2500	158.0	75	11.7	1.04	11.50	18804	1250	1.340	14.66	2344	145.8	3157	404.7	.040	3.0	5.83	126.3	36.4
18	2500	118.5	56	14.2	1.06	10.00	16047	1400	1.800	14.31	1698	138.3	3541	554.7	.040	2.3	5.53	143.6	22.3
19	2500	79.0	38	16.6	1.15	9.00	13312	1600	2.080	14.31	1205	128.7	3380	321.8	.040	1.5	5.15	135.2	12.9
20	2500	39.5	19	18.8	1.14	7.00	10445	1650	2.080	14.31	674	104.1	2651	141.2	.040	.8	4.16	106.0	5.6
21	2500	0.0	0	20.6	1.11	5.00	7662	950	1.630	14.53	307	44.8	1552	48.0	.040	0.0	1.79	62.1	1.9
22	2500	0.0	0	25.3	1.43	1.50	1784	64000	3.420	4.64	238	823.0	824	4.4	.040	0.0	32.92	33.0	.4
23	630	0.0	0	19.8	1.02	1.00	1668	5300	6.020	11.24	210	44.7	1140	6.5	.067	0.0	3.31	76.0	.4

CYCLE COMPOSITE HC 4.125 GRAM/BHP HR

CO 66.654 GRAM/BHP HR

NO2 10.471 GRAM/BHP HR

BSFC .545 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
11-30-71 RUN 1 WHITE 400 CID 6 CYL. CORREL. TRUCK 4 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	590	0.0	0	19.0	1.29	1.50	1978	5500	6.140	11.60	40	59.3	1348	3.2	.067	0.0	3.46	84.4	.2
2	1500	0.0	0	20.0	1.06	3.50	5617	2700	3.330	13.77	183	87.3	2175	14.6	.040	0.0	3.49	87.0	.8
3	1500	37.0	11	18.5	1.03	4.00	6604	3180	3.700	13.33	251	121.1	2846	31.7	.040	.4	4.84	113.8	1.3
4	1500	73.5	21	16.2	1.04	5.00	8178	3000	3.140	13.63	552	143.3	3078	87.5	.040	.8	5.73	123.1	3.5
5	1500	110.5	32	14.0	1.01	6.00	10105	3150	3.520	13.48	848	183.8	4150	164.3	.040	1.3	7.35	166.0	6.6
6	1500	147.5	42	11.4	1.03	7.00	11560	3100	3.380	13.63	1117	206.4	4557	247.5	.040	1.7	8.28	182.3	9.4
7	1500	184.5	53	4.5	1.06	8.00	12838	2450	2.870	14.05	1520	220.0	4323	376.3	.040	2.1	8.80	172.4	15.1
8	1500	221.5	63	7.4	1.03	9.00	14863	2850	3.840	13.48	1205	240.6	6544	337.8	.040	2.5	9.62	261.4	13.5
9	1500	258.0	74	5.2	1.05	10.00	16200	2400	3.330	13.77	1501	270.2	6266	464.2	.040	2.9	10.81	250.7	18.6
10	1500	295.0	84	0.0	1.03	13.00	21464	2500	2.600	14.18	2346	315.2	4621	1002.8	.040	3.4	12.61	244.8	40.1
11	1500	0.0	0	23.7	1.47	1.00	1157	44000	3.150	6.73	103	463.4	447	2.4	.067	0.0	30.91	29.8	.2
12	590	0.0	0	19.0	1.53	2.00	2224	5450	3.930	12.44	117	64.6	1014	5.0	.040	0.0	2.78	40.5	.2
13	2500	316.0	150	.4	1.01	20.00	33683	1550	3.520	13.48	2077	304.3	13441	1353.4	.040	6.0	12.17	558.4	54.2
14	2500	276.0	131	3.4	1.01	16.00	26447	1150	1.520	14.53	3344	141.7	5118	1878.4	.040	5.3	7.67	204.7	75.1
15	2500	237.0	113	6.4	1.04	15.00	24534	1500	2.210	14.31	2584	220.8	6570	1245.0	.040	4.5	8.83	262.8	50.6
16	2500	147.5	44	9.2	1.05	13.00	21060	1650	1.730	14.53	2843	211.6	4481	1210.2	.040	3.8	8.46	174.2	48.4
17	2500	158.0	75	11.4	1.02	11.00	18344	2000	2.560	14.18	2033	216.6	5600	730.4	.040	3.0	8.66	224.0	29.2
18	2500	118.5	56	14.4	1.04	10.00	16356	2300	3.100	13.91	1520	218.2	5441	478.8	.040	2.3	8.73	237.6	19.2
19	2500	79.0	38	16.8	1.15	9.00	13312	2450	3.460	13.48	997	187.6	5661	253.5	.040	1.5	7.50	226.4	10.1
20	2500	39.5	19	18.4	1.09	7.00	10424	3100	4.400	12.44	420	141.4	5501	86.3	.040	.8	7.67	220.0	3.5
21	2500	0.0	0	19.8	1.11	6.00	9146	3100	4.400	12.44	243	161.5	4630	50.7	.040	0.0	6.46	185.2	2.0
22	2500	0.0	0	25.3	1.74	2.00	1955	25000	2.140	6.47	64	440.0	761	3.7	.040	0.0	17.60	30.4	.1
23	590	0.0	0	19.0	1.42	1.50	1747	4000	4.160	12.59	90	41.4	880	3.1	.067	0.0	2.80	58.7	.2

CYCLE COMPOSITE HC 4.872 GRAM/BHP HR

CO 48.755 GRAM/BHP HR

NO2 4.531 GRAM/BHP HR

BSFC .604 LB/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

11-30-71 RUN 2 WHITE 400 CID 6 CYL. CORREL. TRUCK 4 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	590	0.0	0	19.1	1.37	1.50	1862	5500	5.140	11.72	90	58.8	1111	3.2	.067	0.0	3.92	74.1	.2
2	1500	0.0	0	19.8	1.15	3.50	5177	3150	3.150	13.63	170	95.4	1927	17.1	.040	0.0	3.82	77.1	.7
3	1500	37.0	11	18.7	1.17	4.00	5815	3150	2.600	14.05	238	108.0	1800	27.1	.040	.4	4.32	72.0	1.1
4	1500	73.5	21	16.2	1.02	5.00	8338	3150	3.140	13.63	552	153.7	3096	89.4	.040	.8	6.15	123.8	3.6
5	1500	110.5	32	14.0	1.03	6.00	9909	3000	3.560	13.48	784	171.4	4109	148.7	.040	1.3	6.86	164.4	5.9
6	1500	147.5	42	11.9	1.02	7.00	11674	2900	3.470	13.48	1031	196.4	4746	231.8	.040	1.7	7.85	189.8	9.3
7	1500	184.5	53	9.5	1.03	8.00	13212	2700	2.920	13.91	1463	208.6	4557	375.3	.040	2.1	8.34	182.3	15.0
8	1500	221.5	63	7.4	1.02	9.00	15009	2800	3.610	13.33	1277	244.0	6356	369.5	.040	2.5	9.76	254.2	14.8
9	1500	258.0	74	5.2	1.03	10.00	16515	2600	2.920	13.77	1618	253.3	5747	523.4	.040	2.9	10.13	229.9	20.9
10	1500	295.0	84	0.0	1.00	12.00	20412	2200	2.560	14.05	2256	266.8	6272	908.4	.040	3.4	10.67	250.9	36.3
11	1500	0.0	0	23.7	1.51	1.00	1126	63000	2.470	6.47	104	450.9	429	2.5	.067	0.0	30.07	28.6	.2
12	590	0.0	0	19.0	1.18	1.50	2162	5400	4.540	12.22	117	67.5	1146	4.9	.040	0.0	2.70	45.8	.2
13	2500	316.0	150	.8	1.01	20.00	33683	1750	3.470	13.33	2077	347.2	13909	1368.3	.040	6.0	13.89	556.3	54.7
14	2500	276.0	131	3.9	1.01	16.00	26997	1200	1.480	14.53	3336	200.5	4994	1850.3	.040	5.3	8.02	199.8	74.0
15	2500	237.0	113	6.9	1.03	15.00	24772	1500	2.640	14.05	2279	220.7	7845	1113.0	.040	4.5	8.83	313.8	44.5
16	2500	197.5	94	9.2	1.04	13.00	21262	1600	1.730	14.53	2842	207.2	4525	1221.8	.040	3.8	8.29	181.0	48.9
17	2500	158.0	75	11.9	1.01	11.00	18526	2000	2.640	14.05	1990	219.4	5849	724.7	.040	3.0	8.77	234.0	29.0
18	2500	118.5	56	14.4	1.08	10.00	15750	2250	3.100	13.77	1463	207.3	5769	447.5	.040	2.3	8.29	230.8	17.9
19	2500	79.0	38	16.8	1.13	9.00	13548	2260	3.660	13.63	964	174.8	5718	247.5	.040	1.5	6.99	228.7	9.9
20	2500	39.5	19	18.9	1.05	7.00	11340	3200	4.500	12.94	435	204.3	5804	92.2	.040	.8	8.17	232.2	3.7
21	2500	0.0	0	19.7	1.05	6.00	9720	3200	4.450	13.06	335	174.4	4400	60.6	.040	0.0	6.98	196.0	2.4
22	2500	0.0	0	25.3	1.74	2.00	1955	25000	2.140	6.47	64	440.0	761	3.7	.040	0.0	17.60	30.4	.1
23	590	0.0	0	19.0	1.42	1.50	1797	4000	4.160	12.59	90	41.9	880	3.1	.067	0.0	2.80	58.7	.2

CYCLE COMPOSITE HC 4.812 GRAM/BHP HR

CO 48.379 GRAM/BHP HR

NO2 4.320 GRAM/BHP HR

BSFC .601 LB/BHP HR

TABLE I-6. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 5

Engine: Ford 330 CID, V8 Vehicle: 1971 23,000-lb GVW Stake

Date	Run	Dynamometer	Emission Rate, Gr/bhp-hr HC	CO	NO_2 Observed NDIR	CL	Humidity grains/lb dry air
12-7-71	1	Stationary	6.00	58.2	9.12	8.63	53.0
12-7-71	2	Stationary	5.95	60.3	8.70	8.33	58.0
		Average	5.98	59.3	8.91	8.48	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			0.9	3.5	4.7	3.5	
12-21-71	1	Chassis	6.68	59.0	10.51	9.91	45.0
12-21-71	2	Chassis	6.37	62.8	10.69	10.01	34.0
12-21-71	3	Chassis	6.05	61.7	10.57	10.07	32.0
		Average	6.37	61.2	10.59	10.00	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			9.9	6.2	1.7	1.6	
Average Stationary			5.98	59.3	8.91	8.48	
Average Chassis			6.37	61.2	10.59	10.00	
Difference: (Chassis - Stationary)			0.39	1.9	1.68	1.52	
Percent Difference: (Difference/Stationary) x 100			6.5	3.2	18.9	17.9	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

12-07-71 RUN 1 FORD 330 CID V8 CORREL. TRUCK 5 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.7	1.01	1.00	1684	4650	2.920	10.55	38	56.2	713	1.5	.067	0.0	3.75	47.5	.1
2	1500	0.0	0	19.5	1.02	2.50	4169	4750	.100	8.75	90	212.4	90	13.4	.040	0.0	8.49	3.6	.5
3	1500	30.5	9	17.2	1.13	3.50	5269	1700	.100	9.87	251	88.3	105	43.3	.040	.3	3.53	4.2	1.7
4	1500	60.5	17	16.0	1.09	4.00	6242	1550	.180	11.01	800	85.3	200	146.1	.040	.7	3.41	8.0	5.8
5	1500	90.5	26	13.9	1.14	5.00	7461	1700	.210	11.48	1618	106.9	267	337.9	.040	1.0	4.28	10.7	13.5
6	1500	121.0	35	11.7	1.14	6.00	8953	1700	.250	11.84	1947	124.1	369	472.0	.040	1.4	4.97	14.8	18.9
7	1500	151.0	43	9.2	1.14	7.00	10445	1500	.280	12.47	2099	121.5	458	564.2	.040	1.7	4.86	18.3	22.6
8	1500	182.0	52	5.5	1.08	8.00	12600	1000	.350	13.06	1968	93.3	659	609.4	.040	2.1	3.73	26.4	24.4
9	1500	212.0	61	4.2	1.06	9.50	15245	900	2.140	13.77	737	85.8	4119	233.1	.040	2.4	3.43	164.8	9.3
10	1500	242.0	69	0.0	1.06	11.00	17652	1040	2.600	13.42	848	113.9	5750	308.2	.040	2.8	4.55	230.0	12.3
11	1500	0.0	0	24.0	1.43	1.50	1784	39500	.250	4.11	117	848.1	108	8.3	.067	0.0	56.57	7.2	.6
12	600	0.0	0	19.5	1.36	1.50	1876	3670	2.480	11.24	130	48.9	667	5.7	.040	0.0	1.96	26.7	.2
13	2500	245.0	117	1.9	1.04	18.00	29440	2450	3.610	12.94	964	429.5	12783	561.0	.040	4.7	17.18	511.3	22.4
14	2500	214.0	102	3.4	1.01	16.00	26447	2230	4.450	12.47	832	350.5	14130	434.2	.040	4.1	14.02	565.2	17.4
15	2500	184.0	88	5.2	1.07	14.00	22256	770	.430	14.42	1820	111.1	2710	871.7	.040	3.5	4.44	108.4	34.9
16	2500	153.0	73	8.0	1.12	12.00	18225	500	.310	14.05	2256	63.2	792	447.3	.040	2.9	2.53	31.7	37.9
17	2500	123.0	59	10.7	1.08	10.00	15750	500	.470	13.18	2166	57.5	1091	826.7	.040	2.3	2.30	43.7	33.1
18	2500	92.0	44	13.3	1.02	8.00	13341	260	.350	12.82	1598	26.3	715	536.4	.040	1.8	1.05	28.6	21.5
19	2500	61.0	29	15.7	1.09	7.00	10924	260	.280	7.81	1100	35.0	761	491.5	.040	1.2	1.40	30.5	19.7
20	2500	30.5	15	17.7	1.15	6.00	8875	260	.210	11.24	567	20.1	328	145.6	.040	.6	.80	13.1	5.8
21	2500	0.0	0	19.6	1.02	4.00	6671	1100	.130	9.64	197	74.3	177	44.2	.040	0.0	2.97	7.1	1.8
22	2500	0.0	0	24.8	1.76	2.00	1933	41500	.210	2.42	104	1183.2	121	9.8	.040	0.0	47.33	4.8	.4
23	600	0.0	0	19.5	1.01	1.00	1684	3900	2.520	11.01	117	47.2	616	4.7	.067	0.0	3.15	41.1	.3

CYCLE COMPOSITE HC 6.002 GRAM/BHP HR

CO 58.242 GRAM/BHP HR

NO2 9.123 GRAM/BHP HR

BSFC .651 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

12-07-71 RUN 1 FORD 330 CID V8 CORREL. TRUCK 5 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.7	1.01	1.00	1684	4650	2.920	10.55	23	56.2	713	.9	.067	0.0	3.75	47.5	.1
2	1500	0.0	0	19.5	1.02	2.50	4169	4750	.100	8.75	78	212.4	90	11.6	.040	0.0	8.49	3.6	.5
3	1500	30.5	9	17.2	1.13	3.50	5269	1700	.100	9.87	245	88.3	105	42.3	.040	.3	3.53	4.2	1.7
4	1500	60.5	17	16.0	1.09	4.00	6242	1550	.180	11.01	770	85.3	200	140.7	.040	.7	3.41	8.0	5.6
5	1500	90.5	26	13.9	1.14	5.00	7461	1700	.210	11.48	1320	106.9	267	275.7	.040	1.0	4.28	10.7	11.0
6	1500	121.0	35	11.7	1.14	6.00	8953	1700	.250	11.84	1400	124.1	369	460.6	.040	1.4	4.97	14.8	18.4
7	1500	151.0	43	9.2	1.14	7.00	10445	1500	.280	12.47	2037	121.5	458	547.6	.040	1.7	4.86	18.3	21.9
8	1500	182.0	52	5.5	1.08	8.00	12600	1000	.350	13.06	1900	93.3	659	588.3	.040	2.1	3.73	26.4	23.5
9	1500	212.0	61	4.2	1.06	9.50	15245	900	2.140	13.77	640	85.8	4119	202.5	.040	2.4	3.43	164.8	8.1
10	1500	242.0	69	0.0	1.06	11.00	17652	1040	2.600	13.42	700	113.9	5750	254.4	.040	2.8	4.55	230.0	10.2
11	1500	0.0	0	24.0	1.43	1.50	1784	39500	.250	4.11	70	848.1	108	5.0	.067	0.0	56.57	7.2	.3
12	600	0.0	0	19.5	1.36	1.50	1876	3670	2.480	11.24	270	48.9	667	11.9	.040	0.0	1.96	26.7	.5
13	2500	245.0	117	1.9	1.04	18.00	29440	2450	3.610	12.94	938	429.5	12783	545.9	.040	4.7	17.18	511.3	21.8
14	2500	214.0	102	3.4	1.01	16.00	26447	2230	4.450	12.47	775	350.5	14130	404.4	.040	4.1	14.02	565.2	16.2
15	2500	184.0	88	5.2	1.07	14.00	22256	770	.430	14.42	1738	111.1	2710	832.4	.040	3.5	4.44	108.4	33.3
16	2500	153.0	73	8.0	1.12	12.00	18225	500	.310	14.05	2175	63.2	792	913.3	.040	2.9	2.53	31.7	36.5
17	2500	123.0	59	10.7	1.08	10.00	15750	500	.470	13.18	2125	57.5	1091	811.1	.040	2.3	2.30	43.7	32.4
18	2500	92.0	44	13.3	1.02	8.00	13341	260	.350	12.62	1513	26.3	715	507.8	.040	1.8	1.05	28.6	20.3
19	2500	61.0	29	15.7	1.09	7.00	10924	260	.280	7.81	1037	35.0	761	463.4	.040	1.2	1.40	30.5	18.6
20	2500	30.5	15	17.7	1.15	6.00	8875	260	.210	11.24	520	20.1	328	133.5	.040	.6	.80	13.1	5.3
21	2500	0.0	0	19.6	1.02	4.00	6671	1100	.130	9.64	135	74.3	177	30.3	.040	0.0	2.97	7.1	1.2
22	2500	0.0	0	24.8	1.76	2.00	1933	41500	.210	2.42	64	1183.2	121	6.1	.040	0.0	47.33	4.8	.2
23	600	0.0	0	19.5	1.01	1.00	1684	3900	2.520	11.01	280	47.2	616	11.2	.067	0.0	3.15	41.1	.4

CYCLE COMPOSITE HC 6.002 GRAM/BHP HR

CO 58.242 GRAM/BHP HR

NO2 8.627 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

12-07-71 RUN 2 FORD 330 CID V8 CORREL. TRUCK 5 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	610	0.0	0	19.5	.98	1.00	1736	3450	2.820	11.60	13	40.6	670	.5	.067	0.0	2.71	44.7	.0
2	1500	0.0	0	19.5	1.03	2.50	4129	5150	.150	8.75	77	225.8	133	11.2	.040	0.0	9.03	5.3	.4
3	1500	30.5	9	17.2	1.14	3.50	5222	1580	.130	9.78	224	82.0	136	38.6	.040	.3	3.28	5.4	1.5
4	1500	60.5	17	16.0	1.10	4.00	6185	1600	.280	11.36	752	83.9	296	130.9	.040	.7	3.35	11.9	5.2
5	1500	90.5	26	13.9	1.13	5.00	7527	1600	.310	11.36	1314	101.8	398	277.6	.040	1.0	4.07	15.9	11.1
6	1500	121.0	35	11.7	1.14	6.00	8953	1820	.390	12.09	1968	128.7	557	462.0	.040	1.4	5.15	22.3	18.5
7	1500	151.0	43	9.2	1.15	7.00	10354	1580	.390	12.47	2077	125.7	627	548.4	.040	1.7	5.03	25.1	21.9
8	1500	182.0	52	5.5	1.09	8.00	12484	960	.390	12.47	1968	92.5	759	629.6	.040	2.1	3.70	30.4	25.2
9	1500	212.0	61	3.4	1.02	9.50	15843	960	2.320	13.18	660	97.5	4761	222.6	.040	2.4	3.90	190.4	8.9
10	1500	242.0	69	0.0	1.07	11.00	17487	960	2.440	13.77	832	103.0	5286	296.2	.040	2.8	4.12	211.4	11.8
11	1500	0.0	0	23.9	.41	1.00	1869	38600	.310	4.54	130	828.4	134	4.3	.067	0.0	55.25	4.0	.6
12	610	0.0	0	19.7	1.27	1.50	2009	4200	2.470	11.36	130	57.2	817	5.4	.040	0.0	2.29	32.7	.2
13	2500	245.0	117	1.9	1.00	18.00	30618	2350	3.790	13.06	947	421.1	13720	563.4	.040	4.7	16.85	548.8	22.5
14	2500	214.0	102	3.4	1.00	16.00	27216	2150	4.400	12.71	800	337.7	13962	417.2	.040	4.1	13.51	558.5	16.7
15	2500	184.0	88	5.2	1.06	14.00	22466	700	.430	14.65	1779	100.5	2697	847.9	.040	3.5	4.02	107.9	33.9
16	2500	153.0	73	8.0	1.11	12.00	18389	260	.310	14.31	2266	32.6	786	940.4	.040	2.9	1.31	31.4	37.6
17	2500	123.0	59	10.7	1.08	10.00	15750	260	.420	13.63	2165	29.1	949	804.3	.040	2.3	1.16	38.0	32.2
18	2500	92.0	44	13.3	1.01	8.00	13473	260	.390	13.06	1638	26.0	788	543.7	.040	1.8	1.04	31.5	21.7
19	2500	61.0	29	15.7	1.10	7.00	10825	200	.250	12.32	1100	17.2	434	314.0	.040	1.2	.69	17.4	12.6
20	2500	30.5	15	17.7	1.15	6.00	8875	260	.180	11.48	537	19.7	276	135.4	.040	.6	.79	11.0	5.4
21	2500	0.0	0	19.6	.47	4.00	7014	950	.130	10.25	224	63.6	176	49.8	.040	0.0	2.54	7.0	2.0
22	2500	0.0	0	24.8	1.22	1.50	2091	40500	.210	2.37	90	1277.5	134	9.4	.040	0.0	51.10	5.4	.4
23	610	0.0	0	19.7	.98	1.00	1736	5100	3.420	10.89	90	59.7	809	3.5	.067	0.0	3.98	54.0	.2

CYCLE COMPOSITE HC 5.947 GRAM/BHP HR

CO 60.268 GRAM/BHP HR

NO2 8.697 GRAM/BHP HR

BSFC .658 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
12-07-71 RUN 2 FORD 330 CID V8 CORREL. TRUCK 5 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	610	0.0	0	19.5	.98	1.00	1736	3950	2.820	11.60	19	40.6	670	.7	.067	0.0	2.71	44.7	.0
2	1500	0.0	0	19.5	1.03	2.50	4129	5150	.150	8.75	100	225.8	133	14.6	.040	0.0	9.03	5.3	.6
3	1500	30.5	9	17.2	1.14	3.50	5222	1580	.130	9.78	230	82.0	136	39.6	.040	.3	3.28	5.4	1.6
4	1500	60.5	17	16.0	1.10	4.00	6185	1600	.280	11.36	720	83.9	296	125.3	.040	.7	3.35	11.9	5.0
5	1500	90.5	26	13.9	1.13	5.00	7527	1600	.310	11.36	1287	101.8	398	271.8	.040	1.0	4.07	15.9	10.9
6	1500	121.0	35	11.7	1.14	6.00	8953	1820	.390	12.09	1900	128.7	557	446.0	.040	1.4	5.15	22.3	17.8
7	1500	151.0	43	9.2	1.15	7.00	10354	1580	.390	12.47	2000	125.7	627	528.1	.040	1.7	5.03	25.1	21.1
8	1500	182.0	52	5.5	1.09	8.00	12484	960	.390	12.47	1400	92.5	759	607.8	.040	2.1	3.70	30.4	24.3
9	1500	212.0	61	3.9	1.02	9.50	15843	960	2.320	13.18	550	97.5	4761	185.5	.040	2.4	3.90	190.4	7.4
10	1500	242.0	69	0.0	1.07	11.00	17487	960	2.440	13.77	688	103.0	5286	245.0	.040	2.8	4.12	211.4	9.8
11	1500	0.0	0	23.9	.91	1.00	1869	38600	.310	4.54	12	828.4	134	.4	.067	0.0	55.25	4.0	.1
12	610	0.0	0	19.7	1.27	1.50	2009	4200	2.470	11.36	24	57.2	817	1.1	.040	0.0	2.29	32.7	.0
13	2500	245.0	117	1.9	1.00	18.00	30618	2350	3.790	13.06	926	421.1	13720	550.9	.040	4.7	16.85	548.8	22.0
14	2500	214.0	102	3.4	1.00	16.00	27216	2150	4.400	12.71	775	337.7	13962	404.2	.040	4.1	13.51	558.5	16.2
15	2500	184.0	88	5.2	1.06	14.00	22466	700	.430	14.65	1700	100.5	2647	810.2	.040	3.5	4.02	107.9	32.4
16	2500	153.0	73	8.0	1.11	12.00	18389	260	.310	14.31	2212	32.6	786	922.1	.040	2.9	1.31	31.4	36.9
17	2500	123.0	59	10.7	1.08	10.00	15750	260	.420	13.63	2150	29.1	449	798.7	.040	2.3	1.16	38.0	31.9
18	2500	92.0	44	13.3	1.01	8.00	13473	260	.390	13.06	1600	26.0	788	531.1	.040	1.8	1.04	31.5	21.2
19	2500	61.0	29	15.7	1.10	7.00	10825	200	.250	12.32	1062	17.2	439	303.1	.040	1.2	.69	17.4	12.1
20	2500	30.5	15	17.7	1.15	6.00	8875	260	.180	11.48	510	14.7	276	128.6	.040	.6	.79	11.0	5.1
21	2500	0.0	0	19.6	.97	4.00	7014	950	.130	10.25	182	63.6	176	40.5	.040	0.0	2.54	7.0	1.6
22	2500	0.0	0	24.8	1.22	1.50	2091	40500	.210	2.37	50	1277.5	134	5.2	.040	0.0	51.10	5.4	.2
23	610	0.0	0	19.7	.98	1.00	1736	5100	3.420	10.89	25	59.7	809	1.0	.067	0.0	3.98	54.0	.1

CYCLE COMPOSITE HC 5.947 GRAM/BHP HR

CO 60.268 GRAM/BHP HR

NO2 8.330 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
12-21-71 RUN 1 FORD 330 CID V8 CORREL. TRUCK 5 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	18.2	1.31	1.50	1998	5000	2.180	9.50	64	80.0	704	3.4	.067	0.0	5.33	47.0	.2
2	1500	0.0	0	18.8	1.03	3.00	4954	4500	.050	8.60	143	245.0	55	25.8	.040	0.0	9.80	2.2	1.0
3	1500	30.5	9	17.2	1.09	3.50	5462	1400	.050	8.75	321	85.5	62	65.1	.040	.3	3.42	2.5	2.6
4	1500	60.5	17	16.0	1.01	3.50	5895	1500	.130	10.66	582	80.8	141	104.1	.040	.7	3.23	5.7	4.2
5	1500	90.5	26	13.8	1.01	4.50	7579	1850	.130	11.72	1820	116.5	165	380.5	.040	1.0	4.66	6.6	15.2
6	1500	121.0	35	11.7	1.00	5.50	9355	1950	.210	12.34	2349	143.1	311	572.5	.040	1.4	5.73	12.5	22.9
7	1500	151.0	43	9.1	1.06	6.50	10431	1900	.250	12.59	2442	152.1	404	662.3	.040	1.7	6.08	16.2	26.5
8	1500	182.0	52	5.5	1.02	7.50	12507	1250	.210	12.44	2302	117.8	400	720.1	.040	2.1	4.71	16.0	28.8
9	1500	212.0	61	4.0	1.08	10.00	15750	1050	2.020	13.77	832	104.0	4043	273.7	.040	2.4	4.16	161.7	10.9
10	1500	242.0	69	0.0	1.17	12.00	17446	1250	2.050	13.77	1117	136.8	4531	405.8	.040	2.8	5.47	181.2	16.2
11	1500	0.0	0	24.5	1.28	1.50	1993	38000	.150	3.20	77	1059.4	84	7.1	.067	0.0	70.66	5.6	.5
12	600	0.0	0	19.0	1.00	1.00	1701	5200	2.870	9.93	104	66.4	740	4.4	.040	0.0	2.66	29.6	.2
13	2500	245.0	117	.8	1.03	18.00	29726	2700	3.840	12.82	1277	474.1	13620	744.4	.040	4.7	18.96	544.8	29.8
14	2500	214.0	102	3.4	1.04	16.50	26487	2550	4.480	12.22	832	344.3	15553	427.1	.040	4.1	15.77	622.1	17.1
15	2500	184.0	88	5.2	1.02	12.50	20846	800	.810	14.66	2166	107.2	2143	964.0	.040	3.5	4.29	87.7	38.6
16	2500	153.0	73	7.9	1.04	12.00	18727	590	.420	14.31	2639	74.7	1074	1104.4	.040	2.9	2.99	43.0	44.4
17	2500	123.0	59	10.8	1.09	10.00	15606	670	.520	13.63	2516	73.5	1153	916.9	.040	2.3	2.94	46.1	36.7
18	2500	92.0	44	13.2	1.13	10.00	15053	400	.440	13.06	1440	44.5	988	734.5	.040	1.8	1.78	39.5	29.4
19	2500	61.0	29	15.6	1.07	7.00	11128	260	.250	12.47	1296	22.7	441	375.7	.040	1.2	.91	17.6	15.0
20	2500	30.5	15	17.5	1.05	5.50	8410	260	.180	11.60	705	19.6	274	176.6	.040	.6	.78	11.0	7.1
21	2500	0.0	0	18.9	1.22	5.50	7668	250	.130	10.78	377	17.5	184	87.8	.040	0.0	.70	7.4	3.5
22	2500	0.0	0	24.4	1.24	1.50	1978	37000	.210	2.70	40	1107.1	127	8.4	.040	0.0	44.24	5.1	.4
23	600	0.0	0	19.2	1.01	1.00	1684	5000	3.930	10.09	117	58.0	921	4.5	.067	0.0	3.87	61.4	.3

CYCLE COMPOSITE HC 6.675 GRAM/BHP HR

CO 58.988 GRAM/BHP HR

NO2 10.508 GRAM/BHP HR

BSFC .661 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
12-21-71 RUN 1 FORD 330 CID V8 CORREL. TRUCK 5 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	18.2	1.31	1.50	1998	5000	2.180	9.50	32	80.0	704	1.7	.067	0.0	5.33	47.0	.1
2	1500	0.0	0	18.8	1.03	3.00	4954	4500	.050	8.60	133	245.0	55	24.0	.040	0.0	9.80	2.2	1.0
3	1500	30.5	9	17.2	1.09	3.50	5462	1400	.050	8.75	310	85.5	62	62.4	.040	.3	3.42	2.5	2.5
4	1500	60.5	17	16.0	1.01	3.50	5895	1500	.130	10.66	570	80.8	141	102.0	.040	.7	3.23	5.7	4.1
5	1500	90.5	26	13.8	1.01	4.50	7579	1850	.130	11.72	1725	116.5	165	360.6	.040	1.0	4.66	6.6	14.4
6	1500	121.0	35	11.7	1.00	5.50	9355	1950	.210	12.34	2325	143.1	311	566.6	.040	1.4	5.73	12.5	22.7
7	1500	151.0	43	9.1	1.06	6.50	10431	1900	.250	12.59	2425	152.1	404	644.5	.040	1.7	6.08	16.2	25.8
8	1500	182.0	52	5.5	1.02	7.50	12507	1250	.210	12.44	2325	117.8	400	727.3	.040	2.1	4.71	16.0	24.1
9	1500	212.0	61	4.0	1.08	10.00	15750	1050	2.020	13.77	770	104.0	4043	253.3	.040	2.4	4.16	161.7	10.1
10	1500	242.0	69	0.0	1.17	12.00	17446	1250	2.050	13.77	1000	136.8	4531	363.3	.040	2.8	5.47	181.2	14.5
11	1500	0.0	0	24.5	1.28	1.50	1993	38000	.150	3.20	8	1059.4	84	.7	.067	0.0	70.66	5.6	.0
12	600	0.0	0	19.0	1.00	1.00	1701	5200	2.870	9.93	35	66.4	740	1.5	.040	0.0	2.66	29.6	.1
13	2500	245.0	117	.8	1.03	18.00	29726	2700	3.840	12.82	1150	474.1	13620	670.4	.040	4.7	18.96	544.8	26.8
14	2500	214.0	102	3.4	1.04	16.50	26487	2550	4.480	12.22	750	344.3	15553	385.0	.040	4.1	15.77	622.1	15.4
15	2500	184.0	88	5.2	1.02	12.50	20846	800	.810	14.66	2075	107.2	2143	923.5	.040	3.5	4.29	87.7	36.9
16	2500	153.0	73	7.9	1.04	12.00	18727	590	.420	14.31	2500	74.7	1074	1051.0	.040	2.9	2.99	43.0	42.0
17	2500	123.0	59	10.8	1.09	10.00	15606	670	.520	13.63	2400	73.5	1153	874.6	.040	2.3	2.94	46.1	35.0
18	2500	92.0	44	13.2	1.13	10.00	15053	400	.440	13.06	1875	44.5	988	692.1	.040	1.8	1.78	39.5	27.7
19	2500	61.0	29	15.6	1.07	7.00	11128	260	.250	12.47	1175	22.7	441	340.6	.040	1.2	.91	17.6	13.6
20	2500	30.5	15	17.5	1.05	5.50	8410	260	.180	11.60	640	19.6	274	160.4	.040	.6	.78	11.0	6.4
21	2500	0.0	0	18.9	1.22	5.50	7668	250	.130	10.78	310	17.5	184	72.2	.040	0.0	.70	7.4	2.9
22	2500	0.0	0	24.4	1.24	1.50	1978	37000	.210	2.70	33	1107.1	127	3.3	.040	0.0	44.24	5.1	.1
23	600	0.0	0	19.2	1.01	1.00	1684	5000	3.930	10.09	33	58.0	921	1.3	.067	0.0	3.87	61.4	.1

CYCLE COMPOSITE HC 6.675 GRAM/BHP HR

CO 58.988 GRAM/BHP HR

NO2 9.411 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

12-21-71 RUN 2 FORD 330 CID V8 CORREL. TRUCK 5 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.3	1.31	1.50	1998	5700	4.500	9.78	64	74.8	1192	2.8	.067	0.0	4.99	79.5	.2
2	1500	0.0	0	19.2	1.03	3.00	4954	3300	.150	9.14	143	170.0	156	24.5	.040	0.0	6.80	6.2	1.0
3	1500	30.5	9	17.5	1.09	3.50	5462	1500	.130	10.09	307	79.0	138	53.7	.040	.3	3.16	5.5	2.1
4	1500	60.5	17	16.0	1.01	3.50	5895	1350	.250	10.78	670	71.3	267	117.4	.040	.7	2.85	10.7	4.7
5	1500	90.5	26	13.8	1.01	4.50	7579	1750	.210	11.84	1447	108.5	263	400.7	.040	1.0	4.34	10.5	16.0
6	1500	121.0	35	11.5	1.01	5.50	9263	1850	.280	12.34	2420	133.8	409	581.2	.040	1.4	5.35	16.4	23.2
7	1500	151.0	43	9.1	1.00	6.50	11056	1750	.420	12.71	2492	145.4	705	687.5	.040	1.7	5.82	28.2	27.5
8	1500	182.0	52	5.5	.98	7.50	13018	1200	.310	13.18	2492	114.8	599	791.3	.040	2.1	4.59	24.0	31.7
9	1500	212.0	61	4.0	1.00	10.00	17010	900	2.080	14.05	865	94.4	4406	301.2	.040	2.4	3.78	176.2	12.0
10	1500	242.0	69	0.0	1.19	12.00	17153	1050	2.020	13.91	1188	112.3	4365	421.9	.040	2.8	4.49	174.6	16.9
11	1500	0.0	0	24.3	1.30	1.50	1963	38000	.280	3.31	104	1004.2	150	9.2	.067	0.0	67.32	10.0	.6
12	600	0.0	0	19.2	1.01	1.00	1684	7400	4.020	10.09	117	83.9	921	4.4	.040	0.0	3.36	36.8	.2
13	2500	245.0	117	2.3	1.02	18.00	30018	2600	3.660	13.18	1369	456.4	12978	797.9	.040	4.7	18.26	519.1	31.9
14	2500	214.0	102	3.5	1.00	16.50	28066	2450	4.880	12.34	865	393.7	15841	461.5	.040	4.1	15.75	633.7	18.5
15	2500	184.0	88	5.1	.96	12.50	22148	850	1.120	14.53	2122	119.6	3185	991.7	.040	3.5	4.79	127.4	39.7
16	2500	153.0	73	8.0	1.16	12.00	17597	510	.420	14.18	2589	61.3	1014	1032.4	.040	2.9	2.45	40.8	41.3
17	2500	123.0	59	10.6	1.07	10.00	15847	560	.520	13.77	2516	62.1	1164	925.6	.040	2.3	2.48	46.6	37.0
18	2500	92.0	44	13.2	1.26	10.00	13500	338	.470	13.18	1968	33.3	937	644.6	.040	1.8	1.33	37.5	25.8
19	2500	61.0	29	15.8	1.08	7.00	11025	170	.210	12.47	1314	14.8	368	378.8	.040	1.2	.59	14.7	15.2
20	2500	30.5	15	17.5	1.01	5.50	9263	216	.210	11.72	768	16.7	329	147.6	.040	.6	.67	13.2	7.4
21	2500	0.0	0	18.9	1.26	5.50	7484	230	.150	10.78	377	15.7	207	85.5	.040	0.0	.63	8.3	3.4
22	2500	0.0	0	25.0	1.32	1.50	1933	38000	.280	2.64	104	1093.0	163	9.9	.040	0.0	43.72	6.5	.4
23	600	0.0	0	19.3	.97	1.00	1754	7100	4.740	9.50	130	83.3	1123	5.1	.067	0.0	5.55	74.9	.3

CYCLE COMPOSITE HC 6.372 GRAM/BHP HR

CO 62.838 GRAM/BHP HR

NO2 10.641 GRAM/BHP HR

BSFC .668 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

12-21-71 RUN 2 FORD 330 CID V8 CORREL. TRUCK 5 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.3	1.31	1.50	1998	5700	4.500	9.78	28	74.8	1192	1.2	.067	0.0	4.99	79.5	.1
2	1500	0.0	0	19.2	1.03	3.00	4954	3300	.150	9.14	115	170.0	156	14.7	.040	0.0	6.80	6.2	.8
3	1500	30.5	9	17.5	1.09	3.50	5462	1500	.130	10.09	280	79.0	138	44.0	.040	.3	3.16	5.5	2.0
4	1500	60.5	17	16.0	1.01	3.50	5895	1350	.250	10.78	620	71.3	267	108.7	.040	.7	2.85	10.7	4.3
5	1500	90.5	26	13.8	1.01	4.50	7579	1750	.210	11.84	1875	108.5	263	385.9	.040	1.0	4.34	10.5	15.4
6	1500	121.0	35	11.5	1.01	5.50	9263	1850	.280	12.34	2388	133.8	409	573.5	.040	1.4	5.35	16.4	22.9
7	1500	151.0	43	9.1	1.00	6.50	11056	1750	.420	12.71	2425	145.4	705	669.0	.040	1.7	5.82	28.2	26.8
8	1500	182.0	52	5.5	.98	7.50	13018	1200	.310	13.18	2375	114.8	599	754.2	.040	2.1	4.59	24.0	30.2
9	1500	212.0	61	4.0	1.00	10.00	17010	900	2.080	14.05	740	94.4	4406	257.6	.040	2.4	3.78	176.2	10.3
10	1500	242.0	69	0.0	1.19	12.00	17153	1050	2.020	13.91	1025	112.3	4365	364.0	.040	2.8	4.49	174.6	14.6
11	1500	0.0	0	24.3	1.30	1.50	1963	38000	.280	3.31	11	1004.2	150	1.0	.067	0.0	67.32	10.0	.1
12	600	0.0	0	19.2	1.01	1.00	1684	7400	4.020	10.09	31	83.9	921	1.2	.040	0.0	3.36	36.8	.0
13	2500	245.0	117	2.3	1.02	18.00	30018	2600	3.660	13.18	1250	456.4	12978	728.5	.040	4.7	18.26	519.1	29.1
14	2500	214.0	102	3.5	1.00	16.50	28066	2450	4.880	12.34	788	393.7	15841	420.4	.040	4.1	15.75	633.7	16.8
15	2500	184.0	88	5.1	.96	12.50	22148	850	1.120	14.53	2050	119.6	3185	956.0	.040	3.5	4.79	127.4	38.3
16	2500	153.0	73	8.0	1.16	12.00	17597	510	.420	14.18	2500	61.3	1014	996.9	.040	2.9	2.45	40.8	39.9
17	2500	123.0	59	10.6	1.07	10.00	15847	560	.520	13.77	2500	62.1	1164	914.7	.040	2.3	2.48	46.6	36.8
18	2500	92.0	44	13.2	1.26	10.00	13500	338	.470	13.18	1700	33.3	937	556.8	.040	1.8	1.33	37.5	22.3
19	2500	61.0	29	15.8	1.08	7.00	11025	170	.210	12.47	1188	14.8	368	342.5	.040	1.2	.59	14.7	13.7
20	2500	30.5	15	17.5	1.01	5.50	9263	216	.210	11.72	720	16.7	329	185.3	.040	.6	.67	13.2	7.4
21	2500	0.0	0	18.9	1.26	5.50	7484	230	.150	10.78	325	15.7	207	73.7	.040	0.0	.63	8.3	2.9
22	2500	0.0	0	25.0	1.32	1.50	1933	38000	.280	2.64	10	1093.0	163	.9	.040	0.0	43.72	6.5	.0
23	600	0.0	0	19.3	.97	1.00	1754	7100	4.740	9.50	31	83.3	1123	1.2	.067	0.0	5.55	74.9	.1

CYCLE COMPOSITE HC 6.372 GRAM/BHP HR

CO 62.838 GRAM/BHP HR

NO2 10.014 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

12-21-71 RUN 3 FORD 330 CID V8 CORREL. TRUCK 5 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	18.5	1.34	1.50	1904	3350	3.470	10.43	64	44.8	938	2.8	.067	0.0	2.99	62.5	.2
2	1500	0.0	0	19.5	1.18	3.00	4325	3900	.150	8.84	143	179.8	140	21.9	.040	0.0	7.19	5.6	.9
3	1500	30.5	9	17.8	1.18	3.50	5045	1200	.130	10.09	321	58.6	128	52.0	.040	.3	2.34	5.1	2.1
4	1500	60.5	17	16.0	.98	3.50	6075	1350	.150	10.78	690	74.1	166	125.8	.040	.7	2.96	6.7	5.0
5	1500	90.5	26	13.8	1.09	4.50	7022	1750	.250	11.42	1489	99.5	287	375.6	.040	1.0	3.98	11.5	15.0
6	1500	121.0	35	11.6	1.05	5.50	8910	1950	.390	12.47	2444	133.1	538	553.8	.040	1.4	5.32	21.5	22.2
7	1500	151.0	43	9.1	1.11	6.50	9461	1650	.420	12.71	2444	123.6	636	607.9	.040	1.7	4.94	25.4	24.3
8	1500	182.0	52	5.4	1.03	7.50	12386	1150	.310	13.18	2468	104.7	570	746.0	.040	2.1	4.19	22.8	29.8
9	1500	212.0	61	4.0	1.07	10.00	15897	850	2.080	14.18	881	82.7	4086	284.5	.040	2.4	3.31	163.5	11.4
10	1500	242.0	69	0.0	1.19	12.00	17153	1050	1.940	9.34	1259	157.5	5878	627.0	.040	2.8	6.30	235.1	25.1
11	1500	0.0	0	24.3	1.31	1.50	1998	37000	.250	3.35	103	987.2	135	9.1	.067	0.0	65.85	9.0	.6
12	600	0.0	0	18.6	1.07	1.00	1590	4750	2.780	10.55	130	54.7	647	5.0	.040	0.0	2.19	25.9	.2
13	2500	245.0	117	2.2	1.02	18.00	30018	2550	3.660	13.06	1369	453.6	12792	808.5	.040	4.7	18.14	511.7	32.3
14	2500	214.0	102	3.5	.98	16.50	28639	2300	4.790	12.59	881	374.1	15736	475.7	.040	4.1	14.96	629.4	19.0
15	2500	184.0	88	5.1	.99	12.50	21477	700	.810	14.79	2166	95.9	2243	985.6	.040	3.5	3.84	89.7	39.4
16	2500	153.0	73	8.0	1.11	12.00	18389	475	.420	14.66	2516	57.7	1031	1015.4	.040	2.9	2.31	41.3	40.6
17	2500	123.0	59	10.7	1.06	10.00	16047	530	.520	13.41	2444	58.7	1164	899.0	.040	2.3	2.35	46.6	36.0
18	2500	92.0	44	13.3	1.25	10.00	13608	320	.440	13.48	1925	31.2	867	623.3	.040	1.8	1.25	34.7	24.9
19	2500	61.0	29	15.8	1.07	7.00	11128	220	.250	12.59	1170	14.0	437	336.1	.040	1.2	.76	17.5	13.4
20	2500	30.5	15	17.6	1.04	5.50	8996	215	.260	11.42	721	15.9	387	176.5	.040	.6	.63	15.5	7.1
21	2500	0.0	0	18.9	1.20	5.50	7796	165	.180	11.24	349	11.2	248	79.0	.040	0.0	.45	9.9	3.2
22	2500	0.0	0	25.0	1.33	1.50	1918	37500	.330	2.76	40	1051.8	187	8.4	.040	0.0	42.07	7.5	.3
23	600	0.0	0	18.8	1.01	1.00	1684	5200	4.210	10.25	103	58.5	956	3.8	.067	0.0	3.90	63.8	.3

CYCLE COMPOSITE HC 6.048 GRAM/BHP HR

CO 61.665 GRAM/BHP HR

NO2 10.567 GRAM/BHP HR

BSFC .662 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

12-21-71 RUN 3 FORD 330 CID V8 CORREL. TRUCK S CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	MIN.	FUEL RATE OZ.	GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	HP	WEIGHTED GRAM/HR HC	CO	NO2
1	600	0.0	0	18.5	1.39	1.50	1904	3350	3.470	10.43	31	99.8	938	1.4	.067	0.0	2.99	62.5	.1
2	1500	0.0	0	19.5	1.18	3.00	4325	3900	.150	8.84	141	179.8	140	21.6	.040	0.0	7.19	5.6	.9
3	1500	30.5	9	17.8	1.18	3.50	5045	1200	.130	10.09	305	58.6	128	99.4	.040	.3	2.34	5.1	2.0
4	1500	60.5	17	16.0	.48	3.50	6075	1350	.150	10.78	665	79.1	166	121.2	.040	.7	2.96	6.7	4.8
5	1500	90.5	26	13.8	1.09	4.50	7022	1750	.250	11.92	1087	99.5	287	356.4	.040	1.0	3.98	11.5	14.3
6	1500	121.0	35	11.6	1.05	5.50	8910	1950	.340	12.47	2350	133.1	538	532.5	.040	1.4	5.32	21.5	21.3
7	1500	151.0	43	9.1	1.11	6.50	9961	1650	.420	12.71	2375	123.6	636	590.8	.040	1.7	4.94	25.4	23.6
8	1500	182.0	52	5.4	1.03	7.50	12386	1150	.310	13.18	2372	104.7	570	716.9	.040	2.1	4.19	22.8	28.7
9	1500	212.0	61	4.0	1.07	10.00	15897	850	2.080	14.18	735	82.7	4086	237.3	.040	2.4	3.31	163.5	9.5
10	1500	242.0	69	0.0	1.19	12.00	17153	1050	1.440	9.39	1125	157.5	5878	560.3	.040	2.8	6.30	235.1	22.4
11	1500	0.0	0	29.3	1.31	1.50	1448	37000	.250	3.35	11	987.2	135	1.0	.067	0.0	65.85	9.0	.1
12	600	0.0	0	18.6	1.07	1.00	1590	4760	2.780	10.55	35	54.7	647	1.3	.040	0.0	2.19	25.9	.1
13	2500	245.0	117	2.2	1.02	18.00	30018	2550	3.560	13.06	1262	453.6	12792	745.3	.040	4.7	18.14	511.7	29.8
14	2500	214.0	102	3.5	.48	16.50	28639	2300	4.740	12.59	745	374.1	15736	429.2	.040	4.1	14.96	629.4	17.2
15	2500	184.0	88	5.1	.99	12.50	21477	700	.810	14.79	2112	95.9	2243	961.0	.040	3.5	3.84	89.7	38.4
16	2500	153.0	73	8.0	1.11	12.00	18389	475	.420	14.66	2550	57.7	1031	1024.1	.040	2.9	2.31	41.3	41.2
17	2500	123.0	59	10.7	1.06	10.00	16047	530	.520	13.91	2950	58.7	1164	901.2	.040	2.3	2.35	46.6	36.0
18	2500	92.0	44	13.3	1.25	10.00	13608	320	.440	13.44	1850	31.2	867	599.1	.040	1.8	1.25	34.7	24.0
19	2500	61.0	29	15.8	1.07	7.00	11128	220	.250	12.59	1112	14.0	437	314.4	.040	1.2	.76	17.5	12.8
20	2500	30.5	15	17.6	1.09	5.50	8496	215	.260	11.92	675	15.9	307	165.2	.040	.6	.63	15.5	6.6
21	2500	0.0	0	18.9	1.20	5.50	7796	165	.180	11.24	305	11.2	248	69.0	.040	0.0	.45	9.9	2.8
22	2500	0.0	0	25.0	1.33	1.50	1918	37500	.330	2.76	91	1051.8	187	8.5	.040	0.0	42.07	7.5	.3
23	600	0.0	0	18.8	1.01	1.00	1684	5200	4.210	10.25	33	58.5	956	1.2	.067	0.0	3.90	63.8	.1

CYCLE COMPOSITE HC 6.048 GRAM/BHP HR

CO 61.665 GRAM/BHP HR

NO2 10.073 GRAM/BHP HR

TABLE I-7. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 6

Engine: Chevrolet 350 CID, V8 Vehicle: 1970 18,000-lb GVW Van

Date	Run	Dynamometer	Emission Rate, Gr/bhp-hr HC	CO	NO_2 Observed NDIR	CL	Humidity grains /lb dry air
12-14-71	1	Stationary	4.37	81.8	5.63	5.22	91.5
12-14-71	2	Stationary	4.49	84.0	6.03	5.13	91.0
12-14-71	3	Stationary	4.57	77.2	5.68	5.16	90.0
		Average	4.48	81.0	5.78	5.17	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			4.5	8.4	6.9	1.7	
12-22-71	1	Chassis	3.83	80.4	6.32	5.55	41.5
12-27-71	1	Chassis	3.84	82.4	6.95	6.65	73.0
		Average	3.83	81.4	6.63	6.10	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			0.3	2.5	9.6	18.0	
Average Stationary			4.48	81.0	5.78	5.17	
Average Chassis			3.83	81.4	6.63	6.10	
Difference: (Chassis - Stationary)			-0.65	0.4	0.85	0.93	
Percent Difference: (Difference/Stationary) x 100			-14.3	0.5	14.8	18.0	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
12-19-71 RUN 1 CHEVROLET 350 CID V8 CORREL. TRUCK 6 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	20.2	.92	1.00	1899	1150	1.910	10.25	0	18.1	997	0.0	.067	0.0	1.20	29.8	0.0
2	1500	0.0	0	21.9	1.05	2.50	9050	930	.210	9.78	13	17.9	171	1.7	.090	0.0	.69	6.8	.1
3	1500	32.0	9	18.9	1.10	3.50	5912	350	.180	10.93	130	17.8	185	21.9	.090	.9	.71	7.9	.9
4	1500	69.0	18	16.9	1.12	4.50	6839	295	.990	11.89	321	16.9	993	59.2	.090	.7	.66	19.7	2.9
5	1500	96.0	27	19.9	1.13	5.50	8279	330	.610	12.59	582	20.6	771	120.9	.090	1.1	.83	30.8	9.8
6	1500	128.0	37	12.3	1.17	6.50	9950	390	.790	13.06	752	23.2	1021	170.5	.090	1.5	.93	40.8	6.8
7	1500	160.0	46	9.6	1.16	7.50	10998	925	.810	13.18	1117	33.3	1292	290.6	.090	1.8	1.33	51.3	11.6
8	1500	192.0	55	6.5	1.20	8.50	12099	530	.610	13.18	1658	46.1	1072	479.1	.090	2.2	1.85	42.9	19.2
9	1500	229.0	69	9.7	.97	9.50	16659	890	9.590	12.99	251	86.6	8925	81.1	.090	2.6	3.46	357.0	3.2
10	1500	256.0	73	.2	.96	11.50	20377	1350	5.610	11.60	920	158.6	13313	163.8	.090	2.9	6.39	532.5	6.6
11	1500	0.0	0	29.9	1.25	1.50	2091	26000	.180	3.11	157	901.0	126	18.1	.067	0.0	60.10	8.4	1.2
12	500	0.0	0	20.7	1.00	1.00	1701	2900	.700	8.89	157	50.2	295	9.0	.090	0.0	2.01	9.8	.9
13	2500	265.0	126	.9	1.09	21.50	33552	1600	6.070	11.29	920	307.3	23599	267.8	.090	5.0	12.29	991.9	10.7
14	2500	232.0	110	5.0	1.09	19.00	29650	900	5.190	12.97	238	150.8	17393	132.9	.090	4.9	6.03	695.7	5.3
15	2500	199.0	95	6.9	1.31	16.00	20776	190	.200	19.18	2967	27.9	583	1181.8	.090	3.8	1.10	23.3	47.3
16	2500	169.0	78	9.3	1.28	19.00	18605	100	.280	13.91	1925	13.1	791	837.3	.090	3.1	.52	29.6	33.5
17	2500	132.5	63	11.7	1.25	12.00	16330	70	.280	13.91	1482	8.1	651	565.9	.090	2.5	.32	26.0	22.6
18	2500	99.0	47	19.2	1.23	10.00	13829	35	.250	13.77	969	3.5	498	315.6	.090	1.9	.19	19.9	12.6
19	2500	66.0	31	16.7	1.17	8.00	11631	30	.250	13.33	523	2.6	432	198.7	.090	1.3	.10	17.3	5.9
20	2500	33.0	16	18.9	1.10	6.00	9278	25	.210	12.59	363	1.8	307	87.3	.090	.6	.07	12.3	3.5
21	2500	0.0	0	20.7	1.06	9.00	6919	230	.180	10.66	265	13.6	215	52.0	.090	0.0	.59	8.6	2.1
22	2500	0.0	0	25.0	1.53	1.50	1668	37000	.100	.82	157	1335.6	73	18.8	.090	0.0	53.92	2.9	.8
23	500	0.0	0	20.7	1.09	1.00	1636	1800	.670	9.37	69	28.8	217	3.9	.067	0.0	1.92	19.9	.2

CYCLE COMPOSITE HC 9.370 GRAM/BHP HR

CO 81.765 GRAM/BHP HR

NO2 5.628 GRAM/BHP HR

BSFC .692 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
12-19-71 RUN 1 CHEVROLET 350 CID V8 CORREL. TRUCK 6 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	20.2	.92	1.00	1899	1150	1.910	10.25	25	18.1	997	1.3	.067	0.0	1.20	29.8	.1
2	1500	0.0	0	21.9	1.05	2.50	9050	930	.210	9.78	59	17.9	171	7.9	.090	0.0	.69	6.8	.3
3	1500	32.0	9	18.9	1.10	3.50	5912	350	.180	10.93	183	17.8	185	30.9	.090	.9	.71	7.9	1.2
4	1500	69.0	18	16.9	1.12	4.50	6839	295	.990	11.89	380	16.9	993	70.0	.090	.7	.66	19.7	2.8
5	1500	96.0	27	19.9	1.13	5.50	8279	330	.610	12.59	620	20.6	771	128.8	.090	1.1	.83	30.8	5.2
6	1500	128.0	37	12.3	1.17	6.50	9950	390	.790	13.06	790	23.2	1021	187.8	.090	1.5	.93	40.8	6.7
7	1500	160.0	46	9.6	1.16	7.50	10998	925	.810	13.18	1125	33.3	1282	292.7	.090	1.8	1.33	51.3	11.7
8	1500	192.0	55	6.5	1.20	8.50	12099	530	.610	13.18	1675	46.1	1072	489.0	.090	2.2	1.85	42.9	19.9
9	1500	229.0	69	9.7	.97	9.50	16659	890	9.590	12.99	185	86.6	8925	59.8	.090	2.6	3.46	357.0	2.9
10	1500	256.0	73	.2	.96	11.50	20377	1350	5.610	11.60	270	158.6	13313	105.3	.090	2.9	6.39	532.5	4.2
11	1500	0.0	0	29.9	1.25	1.50	2091	26000	.180	3.11	9	901.0	126	.5	.067	0.0	60.10	8.4	.0
12	500	0.0	0	20.7	1.00	1.00	1701	2900	.700	8.89	21	50.2	295	1.2	.090	0.0	2.01	9.8	.0
13	2500	265.0	126	.9	1.09	21.50	33552	1600	6.070	11.29	913	307.3	23599	263.3	.090	5.0	12.29	991.9	10.5
14	2500	232.0	110	5.0	1.09	19.00	29650	900	5.190	12.97	238	150.8	17393	132.9	.090	4.9	6.03	695.7	5.3
15	2500	199.0	95	6.9	1.31	16.00	20776	190	.200	19.18	2963	27.9	583	1179.8	.090	3.8	1.10	23.3	47.2
16	2500	169.0	78	9.3	1.28	19.00	18605	100	.280	13.91	1713	13.1	791	795.1	.090	3.1	.52	29.6	29.8
17	2500	132.5	63	11.7	1.25	12.00	16330	70	.280	13.91	1350	8.1	651	515.5	.090	2.5	.32	26.0	20.6
18	2500	99.0	47	19.2	1.23	10.00	13829	35	.250	13.77	890	3.5	498	275.0	.090	1.9	.19	19.9	11.0
19	2500	66.0	31	16.7	1.17	8.00	11631	30	.250	13.33	965	2.6	432	132.2	.090	1.3	.10	17.3	5.3
20	2500	33.0	16	18.9	1.10	6.00	9278	25	.210	12.59	243	1.8	307	58.5	.090	.6	.07	12.3	2.3
21	2500	0.0	0	20.7	1.06	9.00	6919	230	.180	10.66	108	13.6	215	21.2	.090	0.0	.59	8.6	.8
22	2500	0.0	0	25.0	1.53	1.50	1668	37000	.100	.82	9	1335.6	73	.5	.090	0.0	53.92	2.9	.0
23	500	0.0	0	20.7	1.09	1.00	1636	1800	.670	9.37	26	28.8	217	1.9	.067	0.0	1.92	19.9	.1

CYCLE COMPOSITE HC 9.370 GRAM/BHP HR

CO 81.765 GRAM/BHP HR

NO2 5.222 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
12-19-71 RUN 2 CHEVROLET 350 CID V8 CORREL. TRUCK 6 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	20.5	.98	1.00	1736	1150	1.390	10.66	0	16.5	388	0.0	.067	0.0	1.10	25.9	0.0
2	1500	0.0	0	21.0	1.07	2.50	3979	900	.280	9.93	0	15.5	219	0.0	.090	0.0	.62	8.8	0.0
3	1500	32.0	9	17.6	1.10	3.50	5912	360	.350	11.01	130	17.1	336	20.5	.090	.9	.68	13.9	.8
4	1500	69.0	18	16.0	1.19	4.50	6719	320	.520	12.39	321	16.7	597	55.5	.090	.7	.67	21.9	2.2
5	1500	96.0	27	19.0	1.13	5.50	8279	365	.790	12.92	567	22.9	938	118.1	.090	1.1	.92	37.5	9.7
6	1500	128.0	37	12.2	1.13	6.50	9785	395	.850	13.33	800	27.2	1181	182.8	.090	1.5	1.09	47.3	7.3
7	1500	160.0	46	9.9	1.19	7.50	11191	980	.850	13.33	1205	37.8	1350	319.7	.090	1.8	1.51	59.0	12.6
8	1500	192.0	55	6.5	1.15	8.50	12573	590	.690	13.33	1738	52.9	1159	517.1	.090	2.2	2.12	46.3	20.7
9	1500	229.0	69	9.5	.95	9.50	17010	1150	9.980	12.59	279	110.6	9676	89.1	.090	2.6	4.42	387.0	3.6
10	1500	256.0	73	.2	.95	11.50	20591	1950	5.780	11.72	935	169.2	13625	168.5	.090	2.9	6.77	545.0	6.7
11	1500	0.0	0	29.0	1.35	1.50	1890	29000	.250	3.02	183	888.3	155	18.6	.067	0.0	59.25	10.3	1.2
12	500	0.0	0	20.2	1.09	1.00	1636	3000	.470	9.03	156	50.1	158	8.6	.090	0.0	2.00	6.3	.3
13	2500	265.0	126	.9	1.09	21.50	33552	1550	6.020	11.03	920	302.3	23719	271.9	.090	5.0	12.09	948.6	10.9
14	2500	232.0	110	9.2	1.09	19.00	29650	1000	5.080	12.22	265	170.9	17986	149.9	.090	4.9	6.82	699.5	6.0
15	2500	199.0	95	6.2	1.28	16.00	21262	155	.280	13.77	2967	23.9	855	1238.1	.090	3.8	.99	39.2	49.5
16	2500	169.0	78	8.7	1.30	19.00	18318	160	.250	13.77	2098	20.9	659	909.1	.090	3.1	.84	26.9	36.9
17	2500	132.5	63	10.9	1.27	12.00	16072	80	.250	13.98	1579	9.9	591	613.3	.090	2.5	.37	23.6	24.5
18	2500	99.0	47	13.5	1.23	10.00	13829	95	.250	13.33	1135	9.6	519	383.6	.090	1.9	.18	20.6	15.3
19	2500	66.0	31	16.0	1.20	8.00	11390	30	.210	13.33	598	2.5	355	166.2	.090	1.3	.10	14.2	6.6
20	2500	33.0	16	18.9	1.12	6.00	9112	35	.210	12.97	349	2.5	305	83.2	.090	.6	.10	12.2	3.3
21	2500	0.0	0	20.9	1.01	9.00	6737	280	.180	10.55	251	17.5	228	52.2	.090	0.0	.70	9.1	2.1
22	2500	0.0	0	29.7	1.69	1.50	1556	38500	.150	.40	117	1361.3	107	13.7	.090	0.0	54.45	4.3	.5
23	500	0.0	0	20.2	1.05	1.00	1620	2700	.520	9.19	103	99.0	171	5.6	.067	0.0	2.99	11.9	.9

CYCLE COMPOSITE HC 9.985 GRAM/BHP HR

CO 83.950 GRAM/BHP HR

NO2 6.025 GRAM/BHP HR

BSFC .692 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
12-14-71 RUN 2 CHEVROLET 350 CID V8 CORREL. TRUCK 6 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	20.5	.98	1.00	1736	1150	1.340	10.66	26	16.5	388	1.2	.067	0.0	1.10	25.9	.1
2	1500	0.0	0	21.0	1.07	2.50	3974	400	.280	9.93	52	15.5	219	6.7	.040	0.0	.62	8.8	.3
3	1500	32.0	9	17.6	1.10	3.50	5412	260	.350	11.01	192	17.1	336	30.3	.040	.4	.68	13.4	1.2
4	1500	64.0	18	16.0	1.14	4.50	6714	320	.520	12.34	355	16.7	547	61.4	.040	.7	.67	21.9	2.5
5	1500	96.0	27	14.0	1.13	5.50	8279	365	.740	12.42	550	22.9	938	114.6	.040	1.1	.92	37.5	4.6
6	1500	128.0	37	12.2	1.13	6.50	9785	395	.850	13.33	760	27.2	1181	173.6	.040	1.5	1.09	47.3	6.9
7	1500	160.0	46	9.4	1.14	7.50	11191	480	.850	13.33	1100	37.8	1350	287.2	.040	1.8	1.51	54.0	11.5
8	1500	192.0	55	6.5	1.15	8.50	12573	540	.640	13.33	1625	52.9	1159	483.5	.040	2.2	2.12	46.3	19.3
9	1500	224.0	64	4.5	.95	9.50	17010	1150	4.480	12.59	162	110.6	9676	51.7	.040	2.6	4.42	387.0	2.1
10	1500	256.0	73	.2	.95	11.50	20591	1450	5.780	11.72	250	169.2	13625	96.9	.040	2.9	6.77	545.0	3.4
11	1500	0.0	0	24.0	1.35	1.50	1890	24000	.250	3.02	6	888.3	155	.6	.067	0.0	59.25	10.3	.0
12	500	0.0	0	20.2	1.04	1.00	1636	3000	.470	9.03	20	50.1	158	1.1	.040	0.0	2.00	6.3	.0
13	2500	265.0	126	.9	1.09	21.50	33552	1550	6.020	11.03	415	302.3	23714	268.7	.040	5.0	12.09	948.6	10.7
14	2500	232.0	110	4.2	1.09	19.00	29650	1000	5.080	12.22	260	170.4	17486	147.1	.040	4.4	6.82	699.5	5.9
15	2500	199.0	95	6.2	1.20	16.00	21262	155	.280	13.77	2150	23.4	855	1079.0	.040	3.8	.94	34.2	43.2
16	2500	164.0	78	8.7	1.30	14.00	18318	160	.250	13.77	1800	20.9	654	774.9	.040	3.1	.84	26.4	31.2
17	2500	132.5	63	10.9	1.27	12.00	16072	80	.250	13.48	1275	9.4	591	495.2	.040	2.5	.37	23.6	19.8
18	2500	99.0	47	13.5	1.23	10.00	13829	45	.250	13.33	855	4.6	514	289.0	.040	1.9	.18	20.6	11.6
19	2500	66.0	31	16.0	1.20	8.00	11340	30	.210	13.33	485	2.5	355	139.8	.040	1.3	.10	14.2	5.4
20	2500	33.0	16	18.4	1.12	6.00	9112	35	.210	12.47	260	2.5	305	62.0	.040	.6	.10	12.2	2.5
21	2500	0.0	0	20.4	1.01	4.00	6737	280	.180	10.55	108	17.5	228	22.5	.040	0.0	.70	9.1	.9
22	2500	0.0	0	24.7	1.64	1.50	1556	38500	.150	.40	4	1361.3	107	.4	.040	0.0	54.45	4.3	.0
23	500	0.0	0	20.2	1.05	1.00	1620	2700	.520	9.14	28	44.0	171	1.5	.067	0.0	2.94	11.4	.1

CYCLE COMPOSITE HC 4.485 GRAM/BHP HR

CO 83.450 GRAM/BHP HR

NO2 5.126 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
12-14-71 RUN 3 CHEVROLET 350 CID V8 CORREL. TRUCK 6 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	20.5	1.03	1.00	1651	900	1.050	10.78	0	12.5	294	0.0	.067	0.0	.83	19.6	0.0
2	1500	0.0	0	21.0	1.13	2.50	3763	280	.130	12.22	0	8.5	80	0.0	.040	0.0	.34	3.2	0.0
3	1500	32.0	9	17.6	1.12	3.50	5316	470	.210	11.01	104	22.2	200	16.3	.040	.4	.89	8.0	.7
4	1500	64.0	18	16.0	1.10	4.50	6459	310	.420	11.01	377	18.8	515	76.0	.040	.7	.75	20.6	3.0
5	1500	96.0	27	14.0	1.11	5.50	8428	310	.770	12.22	552	20.1	1007	118.6	.040	1.1	.80	40.3	4.7
6	1500	128.0	37	11.7	1.14	6.50	9699	360	.700	14.94	997	22.3	875	204.8	.040	1.5	.89	35.0	8.2
7	1500	160.0	46	9.2	1.15	7.50	11093	430	.700	13.63	1351	33.2	1091	346.2	.040	1.8	1.33	43.7	13.8
8	1500	192.0	55	6.2	1.16	8.50	12464	500	.580	13.48	1862	44.2	1035	546.1	.040	2.2	1.77	41.4	21.8
9	1500	224.0	64	4.2	.48	9.50	16489	1250	5.350	12.34	293	115.7	10003	90.0	.040	2.6	4.63	400.1	3.6
10	1500	256.0	73	0.0	1.00	11.50	19561	1500	5.900	11.84	428	164.0	13032	173.5	.040	2.9	6.56	521.3	6.9
11	1500	0.0	0	24.0	1.51	1.50	1690	30000	.130	2.81	183	853.4	75	17.3	.067	0.0	56.92	5.0	1.2
12	500	0.0	0	20.0	1.05	1.00	1620	4000	.250	9.03	40	66.9	85	5.0	.040	0.0	2.68	3.4	.2
13	2500	265.0	126	.9	1.38	21.50	26501	1550	6.130	11.24	406	234.4	18725	203.8	.040	5.0	9.38	749.0	8.2
14	2500	232.0	110	3.4	1.08	19.00	29925	1050	5.350	12.09	224	179.1	18433	126.8	.040	4.4	7.16	737.3	5.1
15	2500	199.0	95	6.0	1.33	16.00	20463	180	.280	13.91	2516	25.9	815	1203.1	.040	3.8	1.04	32.6	48.1
16	2500	164.0	78	8.5	1.31	14.00	18179	110	.250	13.77	1440	14.3	654	856.0	.040	3.1	.57	26.2	34.2
17	2500	132.5	63	10.4	1.28	12.00	15447	70	.250	13.77	1444	8.0	574	545.0	.040	2.5	.32	23.0	21.8
18	2500	99.0	47	13.4	1.25	10.00	13608	35	.210	13.48	964	3.5	422	318.0	.040	1.9	.14	16.9	12.7
19	2500	66.0	31	15.9	1.18	8.00	11532	20	.210	13.33	538	1.7	361	152.1	.040	1.3	.07	14.4	6.1
20	2500	33.0	16	18.3	1.12	6.00	9112	25	.180	12.59	293	1.8	259	69.4	.040	.6	.07	10.4	2.8
21	2500	0.0	0	20.3	1.11	4.00	6130	450	.150	9.78	51	27.7	186	10.4	.040	0.0	1.11	7.4	.4
22	2500	0.0	0	24.6	1.63	1.50	1565	41000	.050	.23	0	1465.3	36	0.0	.040	0.0	58.61	1.4	0.0
23	500	0.0	0	20.2	1.04	1.00	1636	6000	.250	8.60	0	103.8	87	0.0	.067	0.0	6.93	5.8	0.0

CYCLE COMPOSITE HC 4.571 GRAM/BHP HR

CO 77.198 GRAM/BHP HR

NO2 5.683 GRAM/BHP HR

BSFC .620 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
12-14-71 RUN 3 CHEVROLET 350 CID V8 CORREL. TRUCK 6 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	20.5	1.03	1.00	1651	900	1.050	10.78	0	12.5	294	0.0	.067	0.0	.83	19.6	0.0
2	1500	0.0	0	21.0	1.13	2.50	3763	280	.130	12.22	53	8.5	80	5.3	.040	0.0	.34	3.2	.2
3	1500	32.0	9	17.6	1.12	3.50	5316	470	.210	11.01	155	22.2	200	24.3	.040	.4	.89	8.0	1.0
4	1500	64.0	18	16.0	1.10	4.50	6459	310	.420	11.01	360	18.8	515	72.6	.040	.7	.75	20.6	2.4
5	1500	96.0	27	14.0	1.11	5.50	8428	310	.770	12.22	610	20.1	1007	109.6	.040	1.1	.80	40.3	4.4
6	1500	128.0	37	11.7	1.14	6.50	9699	360	.700	14.94	830	22.3	875	170.5	.040	1.5	.89	35.0	6.8
7	1500	160.0	46	9.2	1.15	7.50	11093	430	.700	13.63	1125	33.2	1091	288.3	.040	1.8	1.33	43.7	11.5
8	1500	192.0	55	6.2	1.16	8.50	12464	500	.580	13.48	1625	44.2	1035	476.6	.040	2.2	1.77	41.4	19.1
9	1500	224.0	64	4.2	.48	9.50	16489	1250	5.350	12.34	153	115.7	10003	47.0	.040	2.6	4.63	400.1	1.9
10	1500	256.0	73	0.0	1.00	11.50	19561	1500	5.900	11.84	240	164.0	13032	87.1	.040	2.9	6.56	521.3	3.5
11	1500	0.0	0	24.0	1.61	1.50	1690	30000	.130	2.81	4	853.4	75	.4	.067	0.0	56.92	5.0	.0
12	500	0.0	0	20.0	1.05	1.00	1620	4000	.250	9.03	25	66.9	85	1.4	.040	0.0	2.68	3.4	.1
13	2500	265.0	126	.9	1.38	21.50	26501	1550	6.130	11.24	420	234.4	18725	210.9	.040	5.0	9.38	749.0	8.4
14	2500	232.0	110	3.4	1.08	19.00	29925	1050	5.350	12.09	255	179.1	18433	144.4	.040	4.4	7.16	737.3	5.8
15	2500	199.0	95	6.0	1.33	16.00	20463	180	.280	13.91	2350	25.9	815	1123.7	.040	3.8	1.04	32.6	44.9
16	2500	164.0	78	8.5	1.31	14.00	18179	110	.250	13.77	1850	14.3	654	795.8	.040	3.1	.57	26.2	31.8
17	2500	132.5	63	10.4	1.28	12.00	15447	70	.260	13.77	1375	8.0	574	519.0	.040	2.5	.32	23.0	20.8
18	2500	99.0	47	13.4	1.25	10.00	13608	35	.210	13.48	910	3.5	422	300.2	.040	1.9	.14	16.9	12.0
19	2500	66.0	31	15.9	1.18	8.00	11532	20	.210	13.33	540	1.7	361	152.7	.040	1.3	.07	14.4	6.1
20	2500	33.0	16	18.3	1.12	6.00	9112	25	.180	12.59	270	1.8	259	64.0	.040	.6	.07	10.4	2.6
21	2500	0.0	0	20.3	1.11	4.00	6130	450	.150	9.78	95	27.7	186	19.4	.040	0.0	1.11	7.4	.8
22	2500	0.0	0	24.6	1.63	1.50	1565	41000	.050	.23	13	1465.3	36	1.5	.040	0.0	58.61	1.4	.1
23	500	0.0	0	20.2	1.04	1.00	1636	6000	.250	8.60	28	103.8	87	1.6	.067	0.0	6.93	5.8	.1

CYCLE COMPOSITE HC 4.571 GRAM/BHP HR

CO 77.198 GRAM/BHP HR

NO2 5.155 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

12-22-71 RUN 1 CHEVROLET 350 CID V8 CORREL. TRUCK 6 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.5	.96	1.00	1772	2200	2.360	11.92	51	26.9	583	2.1	.067	0.0	1.79	38.9	.1
2	1500	0.0	0	21.0	1.08	2.50	3938	950	.150	9.50	103	18.3	123	13.9	.090	0.0	.73	9.9	.6
3	1500	32.0	9	17.7	.97	3.50	6138	310	.310	11.98	335	16.1	325	97.7	.090	.9	.69	13.0	2.3
4	1500	69.0	18	16.1	1.08	5.00	7875	290	.490	12.97	582	19.6	600	117.2	.090	.7	.58	29.0	9.7
5	1500	96.0	27	19.2	1.00	5.50	9355	290	.610	13.06	752	16.9	892	170.6	.090	1.1	.66	33.7	6.8
6	1500	128.0	37	12.1	1.02	6.00	10006	250	.670	13.63	997	17.5	995	231.2	.090	1.5	.70	37.8	9.2
7	1500	160.0	46	9.9	1.01	7.00	11789	290	.810	13.98	1351	23.9	1397	369.3	.090	1.8	.96	53.9	19.8
8	1500	192.0	55	6.9	.99	7.50	12886	930	.790	13.63	1909	38.9	1336	565.2	.090	2.2	1.59	53.5	22.6
9	1500	229.0	69	9.5	1.09	11.50	17996	920	9.880	12.59	279	99.0	10073	99.7	.090	2.6	3.76	902.9	3.8
10	1500	256.0	73	.2	1.08	13.50	21262	1950	5.780	11.89	906	173.5	13979	161.3	.090	2.9	6.99	559.0	6.5
11	1500	0.0	0	29.6	1.15	1.00	1979	27000	.180	3.95	69	630.9	85	5.0	.067	0.0	92.08	5.7	.3
12	500	0.0	0	19.6	1.12	1.00	1519	1700	1.950	10.66	90	21.0	362	3.7	.090	0.0	.89	19.5	.1
13	2500	265.0	126	1.0	1.07	23.00	36569	1950	5.290	11.89	582	306.9	22617	909.0	.090	5.0	12.28	909.7	16.9
14	2500	232.0	110	9.9	1.01	18.00	30315	850	9.210	12.99	293	199.5	19958	171.1	.090	9.9	5.98	598.3	6.8
15	2500	199.0	95	6.9	1.03	13.00	21969	290	.150	13.63	2992	37.3	971	1286.7	.090	3.8	1.99	18.8	51.5
16	2500	169.0	78	8.8	.99	11.00	18900	190	.180	13.63	1718	19.1	997	779.8	.090	3.1	.77	19.9	31.2
17	2500	132.5	63	11.1	1.00	10.00	17010	95	.180	13.63	1223	11.7	998	999.8	.090	2.5	.97	17.9	20.0
18	2500	99.0	97	13.6	1.03	9.00	19863	70	.150	13.98	752	7.6	330	272.1	.090	1.9	.31	13.2	10.9
19	2500	66.0	31	16.2	1.06	7.50	12035	50	.150	13.06	881	9.6	276	266.9	.090	1.3	.18	11.0	10.7
20	2500	33.0	16	18.5	.97	5.50	9695	50	.180	12.59	508	3.8	275	127.3	.090	.6	.15	11.0	5.1
21	2500	0.0	0	20.9	1.00	9.00	6809	130	.100	10.55	170	8.3	129	36.0	.090	0.0	.33	5.2	1.9
22	2500	0.0	0	25.9	.96	1.00	1772	36000	.050	1.28	51	1293.9	36	6.1	.090	0.0	51.75	1.5	.2
23	500	0.0	0	19.5	.95	1.00	1791	2300	2.080	10.55	77	32.0	585	3.6	.067	0.0	2.19	39.0	.2

CYCLE COMPOSITE HC 3.826 GRAM/BHP HR

CO 80.995 GRAM/BHP HR

NO2 6.315 GRAM/BHP HR

BSFC .679 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

12-22-71 RUN 1 CHEVROLET 350 CID V8 CORREL. TRUCK 6 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.5	.96	1.00	1772	2200	2.360	11.92	28	26.9	583	1.1	.067	0.0	1.79	38.9	.1
2	1500	0.0	0	21.0	1.08	2.50	3938	950	.150	9.50	82	18.3	123	11.1	.090	0.0	.73	9.9	.9
3	1500	32.0	9	17.7	.97	3.50	6138	310	.310	11.98	320	16.1	325	55.2	.090	.9	.69	13.0	2.2
4	1500	69.0	18	16.1	1.08	5.00	7875	290	.490	12.97	530	19.6	600	106.7	.090	.7	.58	29.0	9.3
5	1500	96.0	27	19.2	1.00	5.50	9355	290	.610	13.06	680	16.9	892	159.2	.090	1.1	.66	33.7	6.2
6	1500	128.0	37	12.1	1.02	6.00	10006	250	.670	13.63	925	17.5	995	219.5	.090	1.5	.70	37.8	8.6
7	1500	160.0	46	9.9	1.01	7.00	11789	290	.810	13.98	1200	23.9	1397	328.0	.090	1.8	.96	53.9	13.1
8	1500	192.0	55	6.9	.99	7.50	12896	930	.790	13.63	1900	38.9	1336	539.3	.090	2.2	1.59	53.5	21.9
9	1500	229.0	69	9.5	1.09	11.50	17996	920	9.880	12.59	203	99.0	10073	68.9	.090	2.6	3.76	902.9	2.8
10	1500	256.0	73	.2	1.08	13.50	21262	1950	5.780	11.89	310	173.5	13979	123.2	.090	2.9	6.99	559.0	9.9
11	1500	0.0	0	29.6	1.15	1.00	1979	27000	.180	3.95	9	630.9	85	.3	.067	0.0	92.08	5.7	.0
12	500	0.0	0	19.6	1.12	1.00	1519	1700	1.950	10.66	29	21.0	362	1.2	.090	0.0	.89	19.5	.0
13	2500	265.0	126	1.0	1.07	23.00	36569	1950	5.290	11.89	500	306.9	22617	351.3	.090	5.0	12.28	909.7	19.1
14	2500	232.0	110	9.9	1.01	18.00	30315	850	9.210	12.99	275	199.5	19958	160.6	.090	9.9	5.98	598.3	6.9
15	2500	199.0	95	6.9	1.03	13.00	21969	290	.150	13.63	2250	37.3	971	1161.8	.090	3.8	1.99	18.8	46.5
16	2500	169.0	78	8.8	.99	11.00	18900	190	.180	13.63	1950	19.1	997	658.2	.090	3.1	.77	19.9	26.3
17	2500	132.5	63	11.1	1.00	10.00	17010	95	.180	13.63	1025	11.7	998	918.9	.090	2.5	.97	17.9	16.8
18	2500	99.0	97	13.6	1.03	9.00	19863	70	.150	13.98	650	7.6	330	235.2	.090	1.9	.31	13.2	9.9
19	2500	66.0	31	16.2	1.06	7.50	12035	50	.150	13.06	775	9.6	276	239.3	.090	1.3	.18	11.0	9.9
20	2500	33.0	16	18.5	.97	5.50	9695	50	.180	12.59	950	3.8	275	112.8	.090	.6	.15	11.0	9.5
21	2500	0.0	0	20.9	1.00	9.00	6809	130	.100	10.55	153	8.3	129	32.9	.090	0.0	.33	5.2	1.3
22	2500	0.0	0	25.9	.96	1.00	1772	36000	.050	1.28	3	1293.9	36	.9	.090	0.0	51.75	1.5	.0
23	500	0.0	0	19.5	.95	1.00	1791	2300	2.080	10.55	26	32.0	585	1.2	.067	0.0	2.19	39.0	.1

CYCLE COMPOSITE HC 3.826 GRAM/BHP HR

CO 80.995 GRAM/BHP HR

NO2 5.596 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

12-27-71 RUN 1 CHEVROLET 350 CID V8 CORREL. TRUCK 6 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.5	.93	1.00	1829	1600	1.980	11.13	38	22.1	551	1.7	.067	0.0	1.97	36.8	.1
2	1500	0.0	0	20.0	1.02	2.50	9169	600	.020	9.25	90	26.8	18	13.9	.090	0.0	1.07	.7	.5
3	1500	32.0	9	17.7	1.05	3.50	5670	285	.230	11.29	265	19.1	229	93.9	.090	.9	.56	9.2	1.7
4	1500	69.0	18	16.1	1.20	5.00	7087	295	.360	12.09	920	13.9	913	79.2	.090	.7	.56	16.5	3.2
5	1500	96.0	27	19.2	1.10	5.50	8505	265	.520	12.99	659	16.7	662	138.0	.090	1.1	.67	26.5	5.5
6	1500	128.0	37	12.1	1.08	6.00	9950	285	.580	13.98	832	19.1	786	185.3	.090	1.5	.74	31.9	7.9
7	1500	160.0	46	9.9	1.07	7.00	11128	335	.700	13.33	1188	26.5	1119	312.1	.090	1.8	1.06	99.8	12.5
8	1500	192.0	55	6.9	.99	7.50	12886	965	.610	19.79	1697	38.8	1028	970.0	.090	2.2	1.55	91.1	18.8
9	1500	229.0	69	9.5	1.03	11.50	18992	1250	5.190	12.22	251	135.9	11355	90.3	.090	2.6	5.92	959.2	3.6
10	1500	256.0	73	.2	1.11	13.50	20688	1600	5.780	11.72	391	187.9	13677	152.1	.090	2.9	7.50	547.1	6.1
11	1800	0.0	0	29.6	1.16	1.00	1966	26000	.130	3.95	77	616.9	62	6.1	.067	0.0	91.15	9.2	.9
12	500	0.0	0	19.5	1.09	1.00	1561	1750	1.550	10.93	90	22.5	902	3.8	.090	0.0	.90	16.1	.2
13	2500	265.0	126	1.0	1.13	23.00	39622	1700	5.550	10.78	693	356.7	23529	997.9	.090	5.0	19.27	991.0	17.9
14	2500	232.0	110	9.9	1.09	18.00	29990	950	9.590	11.89	391	169.8	16388	232.0	.090	9.9	6.79	655.5	9.3
15	2500	199.0	95	6.9	1.03	13.00	21969	215	.130	12.82	2719	35.6	935	1991.3	.090	3.8	1.92	17.9	59.7
16	2500	169.0	78	8.8	1.00	11.00	18711	135	.130	12.82	2166	19.5	379	1037.9	.090	3.1	.78	15.2	91.5
17	2500	132.0	63	11.1	1.01	10.00	16892	90	.150	12.82	1658	11.7	393	719.3	.090	2.5	.97	15.7	28.6
18	2500	99.0	97	13.6	1.06	9.00	19992	65	.150	12.71	1170	7.3	390	936.0	.090	1.9	.29	13.6	17.9
19	2500	66.0	31	16.2	1.08	7.50	11812	95	.130	12.22	690	9.3	251	219.0	.090	1.3	.17	10.0	8.8
20	2500	33.0	16	18.5	.97	5.50	9695	55	.130	11.72	377	9.5	219	101.8	.090	.6	.18	8.5	9.1
21	2500	0.0	0	20.6	1.02	9.00	6671	135	.070	9.78	193	9.1	96	32.1	.090	0.0	.37	3.8	1.3
22	2500	0.0	0	25.9	1.05	1.00	1620	35000	.050	1.19	38	1196.2	35	9.3	.090	0.0	97.85	1.9	.2
23	500	0.0	0	19.5	.98	1.00	1736	2250	2.080	9.25	69	33.8	631	3.2	.067	0.0	2.25	92.1	.2

CYCLE COMPOSITE HC 3.839 GRAM/BHP HR

CO 82.936 GRAM/BHP HR

NO2 6.999 GRAM/BHP HR

BSFC .661 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

12-27-71 RUN 1 CHEVROLET 350 CID V8 CORREL. TRUCK 6 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/MR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/MR HP	HC	CO	NO2
1	500	0.0	0	19.5	.93	1.00	1829	1600	1.980	11.13	29	22.1	551	1.3	.067	0.0	1.47	36.8	.1
2	1500	0.0	0	20.0	1.02	2.50	4169	600	.020	9.25	79	26.8	18	11.7	.040	0.0	1.07	.7	.5
3	1500	32.0	9	17.7	1.05	3.50	5670	285	.230	11.29	245	19.1	229	40.1	.040	.4	.56	9.2	1.6
4	1500	64.0	18	16.1	1.20	5.00	7087	245	.360	12.09	390	13.9	413	73.6	.040	.7	.56	16.5	2.9
5	1500	96.0	27	14.2	1.10	5.50	8505	265	.520	12.94	610	16.7	662	127.7	.040	1.1	.67	26.5	5.1
6	1500	128.0	37	12.1	1.08	6.00	9450	285	.580	13.48	770	19.1	786	171.5	.040	1.5	.76	31.4	6.9
7	1500	160.0	46	9.4	1.07	7.00	11128	335	.700	13.33	1075	26.6	1119	282.4	.040	1.8	1.06	44.8	11.3
8	1500	192.0	55	6.4	.99	7.50	12886	465	.610	14.79	1587	38.8	1028	439.6	.040	2.2	1.55	41.1	17.6
9	1500	224.0	64	4.5	1.03	11.50	18992	1250	5.190	12.22	177	135.4	11355	63.6	.040	2.6	5.42	454.2	2.5
10	1500	256.0	73	.2	1.11	13.50	20688	1600	5.780	11.72	295	187.4	13677	114.7	.040	2.9	7.50	547.1	4.6
11	1500	0.0	0	24.6	1.16	1.00	1466	26000	.130	3.45	6	616.9	62	.5	.067	0.0	41.15	4.2	.0
12	500	0.0	0	19.5	1.09	1.00	1561	1750	1.550	10.43	27	22.5	402	1.2	.040	0.0	.90	16.1	.0
13	2500	265.0	126	1.0	1.13	23.00	34622	1700	5.550	10.78	605	356.7	23524	421.5	.040	5.0	14.27	941.0	16.9
14	2500	232.0	110	4.4	1.04	18.00	29440	450	4.540	11.84	365	169.8	16388	216.5	.040	4.4	6.79	655.5	8.7
15	2500	199.0	95	6.4	1.03	13.00	21469	215	.130	12.82	2750	35.6	435	1511.1	.040	3.8	1.42	17.4	60.4
16	2500	164.0	78	8.8	1.00	11.00	18711	135	.130	12.82	2137	19.5	379	1024.0	.040	3.1	.78	15.2	41.0
17	2500	132.0	63	11.1	1.01	10.00	16842	90	.150	12.82	1600	11.7	393	689.3	.040	2.5	.47	15.7	27.6
18	2500	99.0	47	13.6	1.06	9.00	14442	65	.150	12.71	1112	7.3	340	414.4	.040	1.9	.29	13.6	16.6
19	2500	66.0	31	16.2	1.08	7.50	11812	45	.130	12.22	680	4.3	251	216.9	.040	1.3	.17	10.0	8.6
20	2500	33.0	16	18.5	.97	5.50	9645	55	.130	11.72	375	4.5	214	101.3	.040	.6	.18	8.5	4.1
21	2500	0.0	0	20.6	1.02	4.00	6671	135	.070	9.78	145	9.1	96	32.6	.040	0.0	.37	3.8	1.3
22	2500	0.0	0	25.4	1.05	1.00	1620	35000	.050	1.19	4	1146.2	35	.4	.040	0.0	47.85	1.4	.0
23	500	0.0	0	19.5	.98	1.00	1736	2250	2.080	9.25	29	33.8	631	1.4	.067	0.0	2.25	42.1	.1

CYCLE COMPOSITE HC 3.834 GRAM/BHP HR

CO 82.436 GRAM/BHP HR

NO2 6.654 GRAM/BHP HR

TABLE I-8. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 7

Engine: 1970 IHC 345, V8 Vehicle: 1970 16,000-lb GVW Van

Date	Run	Dynamometer	Emission Rate, Gr/bhp-hr HC	CO	NO_2 Observed NDIR	CL	Humidity grains/lb dry air
1-7-72	1	Stationary	6.14	77.7	13.00	12.78	36.0
1-7-72	2	Stationary	6.56	80.4	13.39	12.99	28.0
1-7-72	3	Stationary	6.02	71.8	13.47	13.15	28.0
		Average	6.24	76.6	13.29	12.97	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			8.8	11.3	3.5	2.9	
1-21-72	1	Chassis	8.22	98.0	11.52	11.18	35.0
1-21-72	2	Chassis	7.89	100.4	11.43	11.10	45.0
		Average	8.05	99.2	11.47	11.14	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			4.2	2.44	0.8	0.7	
Average Stationary			6.24	76.6	13.29	12.97	
Average Chassis			8.05	99.2	11.47	11.14	
Difference: (Chassis - Stationary)			1.81	22.6	-1.82	-1.83	
Percent Difference: (Difference/Stationary) x 100			29.1	28.2	-13.6	-14.1	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

1-07-72 RUN 1 IMC 345 CID V8 CORRELATION TRUCK 7 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.4	1.03	1.00	1651	6700	6.640	10.55	51	62.0	1240	1.6	.067	0.0	4.13	82.7	.1
2	1500	0.0	0	21.8	1.06	2.50	4012	3900	4.070	13.63	143	86.5	1823	10.5	.040	0.0	3.46	72.9	.4
3	1500	33.4	10	20.0	1.05	3.00	4860	2900	3.240	14.31	537	79.0	1783	48.6	.040	.4	3.16	71.3	1.9
4	1500	66.8	19	17.4	.98	3.50	6075	2250	1.520	14.44	1637	81.9	1118	197.9	.040	.8	3.28	44.7	7.9
5	1500	100.0	29	15.2	1.02	4.50	7504	2200	1.550	14.44	2256	98.8	1406	336.4	.040	1.1	3.95	56.2	13.5
6	1500	134.0	38	12.6	.96	5.00	8859	1850	.840	15.62	3138	98.2	954	552.9	.040	1.5	3.93	38.2	22.1
7	1500	167.0	48	9.5	1.00	6.00	10206	2300	.700	14.44	3664	147.9	909	782.3	.040	1.9	5.92	36.4	31.3
8	1500	200.0	57	7.0	1.02	7.50	12507	2550	1.870	14.79	2589	188.6	2793	635.6	.040	2.3	7.54	111.7	25.4
9	1500	234.0	67	4.2	.97	7.50	13152	2500	1.840	14.66	2842	196.3	2918	740.4	.040	2.7	7.85	116.7	29.6
10	1500	267.0	76	0.0	1.06	11.00	17652	3200	4.480	12.94	1501	309.7	4735	482.3	.040	3.1	12.39	389.4	19.3
11	1500	0.0	0	24.7	1.02	1.00	1668	77500	4.120	4.94	156	768.8	826	5.1	.067	0.0	51.28	55.1	.3
12	500	0.0	0	19.0	1.02	1.00	1668	8000	7.260	10.43	130	72.2	1323	3.4	.040	0.0	2.89	52.9	.2
13	2500	267.0	127	1.4	.99	19.00	32645	2450	5.140	11.84	1065	555.9	14755	666.2	.040	5.1	22.23	790.2	26.6
14	2500	234.0	111	3.7	1.07	17.00	27025	1850	2.250	13.48	2448	314.1	7718	1662.0	.040	4.5	12.57	308.7	66.5
15	2500	200.0	95	6.5	.97	12.00	21043	1900	2.020	13.77	3001	250.2	5373	1312.0	.040	3.8	10.01	214.9	52.5
16	2500	167.0	79	9.0	1.01	10.00	16842	1200	.550	13.91	4147	138.6	1283	1590.4	.040	3.2	5.54	51.3	63.6
17	2500	134.0	64	12.3	1.00	8.50	14458	1400	.440	14.05	4047	137.9	976	1323.3	.040	2.6	5.52	34.0	52.9
18	2500	100.0	48	14.9	.98	7.00	12150	1450	.700	14.18	3166	117.3	1143	850.0	.040	1.9	4.69	45.7	34.0
19	2500	66.8	32	17.5	.97	5.50	9645	1650	1.040	14.18	2165	103.1	1376	444.1	.040	1.3	4.12	55.0	18.0
20	2500	33.4	16	19.5	1.05	5.00	8100	1650	1.480	14.18	1100	84.5	1530	186.9	.040	.6	3.38	61.2	7.5
21	2500	0.0	0	21.7	1.01	3.50	5895	1250	1.380	14.18	405	47.0	1048	50.5	.040	0.0	1.88	41.9	2.0
22	2500	0.0	0	25.7	1.00	1.00	1701	80000	2.480	3.27	117	489.7	620	4.8	.040	0.0	39.59	24.8	.2
23	500	0.0	0	19.3	.97	1.00	1754	7900	6.020	10.25	117	81.2	1250	4.0	.067	0.0	5.42	83.4	.3

CYCLE COMPOSITE HC 6.136 GRAM/BHP HR

CO 77.667 GRAM/BHP HR

NO2 13.001 GRAM/BHP HR

BSFC .570 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-07-72 RUN 1 IMC 345 CID V8 CORRELATION TRUCK 7 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.4	1.03	1.00	1651	6700	6.640	10.55	36	62.0	1240	1.1	.067	0.0	4.13	82.7	.1
2	1500	0.0	0	21.8	1.06	2.50	4012	3900	4.070	13.63	115	86.5	1823	8.5	.040	0.0	3.46	72.9	.3
3	1500	33.4	10	20.0	1.05	3.00	4860	2900	3.240	14.31	485	79.0	1783	43.9	.040	.4	3.16	71.3	1.8
4	1500	66.8	19	17.4	.98	3.50	6075	2250	1.520	14.44	1575	81.9	1118	190.4	.040	.8	3.28	44.7	7.6
5	1500	100.0	29	15.2	1.02	4.50	7504	2200	1.550	14.44	2262	98.8	1406	337.3	.040	1.1	3.95	56.2	13.5
6	1500	134.0	38	12.6	.96	5.00	8859	1850	.840	15.62	3200	98.2	954	563.8	.040	1.5	3.93	38.2	22.6
7	1500	167.0	48	9.5	1.00	6.00	10206	2300	.700	14.44	3400	147.9	909	832.7	.040	1.9	5.92	36.4	33.3
8	1500	200.0	57	7.0	1.02	7.50	12507	2550	1.870	14.79	2650	188.6	2793	650.5	.040	2.3	7.54	111.7	26.0
9	1500	234.0	67	4.2	.97	7.50	13152	2500	1.840	14.66	2950	196.3	2918	769.0	.040	2.7	7.85	116.7	30.8
10	1500	267.0	76	0.0	1.06	11.00	17652	3200	4.480	12.94	1450	309.7	4735	465.9	.040	3.1	12.39	389.4	18.6
11	1500	0.0	0	24.7	1.02	1.00	1668	77500	4.120	4.94	17	768.8	826	.6	.067	0.0	51.28	55.1	.0
12	500	0.0	0	19.0	1.02	1.00	1668	8000	7.260	10.43	37	72.2	1323	1.1	.040	0.0	2.89	52.9	.0
13	2500	267.0	127	1.4	.99	19.00	32645	2450	5.140	11.84	885	555.9	14755	553.6	.040	5.1	22.23	790.2	22.1
14	2500	234.0	111	3.7	1.07	17.00	27025	1850	2.250	13.48	2800	314.1	7718	1578.6	.040	4.5	12.57	308.7	63.1
15	2500	200.0	95	6.5	.97	12.00	21043	1900	2.020	13.77	2850	250.2	5373	1246.0	.040	3.8	10.01	214.9	49.8
16	2500	167.0	79	9.0	1.01	10.00	16842	1200	.550	13.91	4300	136.6	1283	1649.0	.040	3.2	5.54	51.3	66.0
17	2500	134.0	64	12.3	1.00	8.50	14458	1400	.440	14.05	4050	137.4	976	1324.3	.040	2.6	5.52	34.0	53.0
18	2500	100.0	48	14.9	.98	7.00	12150	1450	.700	14.18	3100	117.3	1143	832.3	.040	1.9	4.69	45.7	33.3
19	2500	66.8	32	17.5	.97	5.50	9645	1650	1.040	14.18	2075	103.1	1376	430.5	.040	1.3	4.12	55.0	17.2
20	2500	33.4	16	19.5	1.05	5.00	8100	1650	1.480	14.18	1012	84.5	1530	172.0	.040	.6	3.38	61.2	6.9
21	2500	0.0	0	21.7	1.01	3.50	5895	1250	1.380	14.18	360	47.0	1048	44.9	.040	0.0	1.88	41.9	1.8
22	2500	0.0	0	25.7	1.00	1.00	1701	80000	2.480	3.27	13	489.7	620	.5	.040	0.0	39.59	24.8	.0
23	500	0.0	0	19.3	.97	1.00	1754	7900	6.020	10.25	38	81.2	1250	1.3	.067	0.0	5.42	83.4	.1

CYCLE COMPOSITE HC 6.136 GRAM/BHP HR

CO 77.667 GRAM/BHP HR

NO2 12.778 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

1-07-72 RUN 2 IMC 345 CID V8 CORRELATION TRUCK 7 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.3	.98	1.00	1736	7000	6.500	9.93	64	70.9	1330	2.2	.067	0.0	4.73	88.7	.1
2	1500	0.0	0	21.7	1.06	2.50	4012	4100	3.700	12.94	143	96.5	1759	11.2	.040	0.0	3.86	70.3	.4
3	1500	33.4	10	19.8	1.01	3.00	5052	3200	2.080	13.77	612	100.0	1313	63.5	.040	.4	4.00	52.6	2.5
4	1500	66.8	19	17.2	.95	3.50	6267	3000	1.300	14.18	1657	119.1	1043	218.5	.040	.8	4.77	41.7	8.7
5	1500	100.0	29	14.9	1.00	4.50	7654	2750	1.300	14.05	2443	134.7	1286	397.3	.040	1.1	5.39	51.5	15.4
6	1500	134.0	38	12.2	.95	5.00	8453	2400	.640	14.42	3344	140.4	756	654.3	.040	1.5	5.62	30.3	24.4
7	1500	167.0	48	9.0	.98	6.00	10414	2300	.520	13.77	3789	165.0	753	902.2	.040	1.9	6.60	30.1	36.1
8	1500	200.0	57	6.8	.96	7.50	13289	2700	1.870	13.77	2614	225.5	3165	724.9	.040	2.3	9.02	126.2	29.0
9	1500	234.0	67	3.8	.95	7.50	13429	2200	1.730	13.63	2921	184.6	3012	835.9	.040	2.7	7.59	120.5	33.4
10	1500	267.0	76	0.0	1.02	11.00	18344	3000	4.930	12.09	1425	317.7	10547	501.1	.040	3.1	12.71	421.9	20.0
11	1500	0.0	0	24.6	.95	1.00	1791	75000	3.700	5.05	183	826.4	824	6.7	.067	0.0	55.12	54.9	.4
12	500	0.0	0	19.3	1.01	1.00	1684	7500	6.370	8.68	156	79.9	1372	5.5	.040	0.0	3.20	54.9	.2
13	2500	267.0	127	1.9	.97	19.00	33319	2600	5.660	11.84	947	490.5	21190	593.2	.040	5.1	19.62	847.6	23.7
14	2500	234.0	111	3.6	1.09	17.00	26529	1900	2.440	13.63	2869	310.0	8042	1554.1	.040	4.5	12.40	321.7	62.2
15	2500	200.0	95	6.4	.95	12.00	21486	2000	2.140	13.91	2922	264.4	5716	1282.7	.040	3.8	10.58	228.6	51.3
16	2500	167.0	79	8.7	1.03	10.00	16515	1400	.580	14.18	4147	155.2	1299	1526.0	.040	3.2	6.21	51.9	61.0
17	2500	134.0	64	12.0	.97	8.50	14406	1650	.550	14.31	4113	163.7	1102	1354.7	.040	2.6	6.55	44.1	54.2
18	2500	100.0	48	14.7	1.00	7.00	11907	1650	.700	14.31	3279	129.5	1109	854.2	.040	1.9	5.18	44.4	34.2
19	2500	66.8	32	17.5	.95	5.50	9848	2050	1.060	14.31	2325	129.7	1342	488.4	.040	1.3	5.19	53.7	19.5
20	2500	33.4	16	19.2	1.03	5.00	8257	1800	1.550	14.31	1187	92.7	1612	202.4	.040	.6	3.71	64.5	8.1
21	2500	0.0	0	21.5	.98	3.50	6075	1250	1.450	14.42	420	47.5	1112	53.0	.040	0.0	1.90	44.5	2.1
22	2500	0.0	0	25.5	.96	1.00	1772	82000	2.400	3.35	183	1041.5	616	7.7	.040	0.0	41.66	24.6	.3
23	500	0.0	0	19.3	1.02	1.00	1668	7200	5.900	10.66	183	69.5	1150	5.4	.067	0.0	4.63	76.7	.4

CYCLE COMPOSITE HC 6.559 GRAM/BHP HR

CO 80.433 GRAM/BHP HR

NO2 13.391 GRAM/BHP HR

BSFC .581 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-07-72 RUN 2 IHC 345 CID V8 CORRELATION TRUCK 7 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CONCENTRATION AS MEASURED CO	CONCENTRATION AS MEASURED CO2	CONCENTRATION AS MEASURED NO	CALCULATED GRAM/HR HC	CALCULATED GRAM/HR CO	CALCULATED GRAM/HR NO2	WT. FAC.	WEIGHTED GRAM/HR HP	WEIGHTED GRAM/HR HC	WEIGHTED GRAM/HR CO	WEIGHTED GRAM/HR NO2
1	500	0.0	0	19.3	.98	1.00	1736	7000	6.500	9.93	36	70.9	1330	1.2	.067	0.0	4.73	88.7	.1
2	1500	0.0	0	21.7	1.06	2.50	4012	4100	3.700	12.94	105	96.5	1759	8.2	.040	0.0	3.86	70.3	.3
3	1500	33.4	10	19.8	1.01	3.00	5052	3200	2.080	13.77	545	100.0	1313	56.5	.040	.4	4.00	52.5	2.3
4	1500	66.8	19	17.2	.95	3.50	6267	3000	1.300	14.18	1537	119.1	1043	202.7	.040	.8	4.77	41.7	8.1
5	1500	100.0	29	14.9	1.00	4.50	7654	2750	1.300	14.05	2337	134.7	1286	380.1	.040	1.1	5.39	51.5	15.2
6	1500	134.0	38	12.2	.95	5.00	8953	2400	.640	14.42	3450	140.4	756	670.2	.040	1.5	5.62	30.3	26.8
7	1500	167.0	48	9.0	.98	6.00	10414	2300	.520	13.77	3900	165.0	753	928.7	.040	1.9	6.60	30.1	37.1
8	1500	200.0	57	6.8	.96	7.50	13289	2700	1.870	13.77	2550	225.5	3155	707.1	.040	2.3	9.02	126.2	28.3
9	1500	234.0	67	3.8	.95	7.50	13429	2200	1.730	13.63	2900	189.6	3012	829.9	.040	2.7	7.59	120.5	33.2
10	1500	267.0	76	0.0	1.02	11.00	18344	3000	4.930	12.09	1275	317.7	10547	448.3	.040	3.1	12.71	421.9	17.9
11	1500	0.0	0	24.6	.95	1.00	1791	75000	3.700	5.05	17	826.4	824	.6	.067	0.0	55.12	54.9	.0
12	500	0.0	0	19.3	1.01	1.00	1684	7500	6.370	8.68	39	74.9	1372	1.4	.040	0.0	3.20	54.9	.1
13	2500	267.0	127	1.9	.97	14.00	33314	2600	5.560	11.84	787	490.5	21140	493.0	.040	5.1	19.62	847.6	19.7
14	2500	234.0	111	3.6	1.09	17.00	26529	1900	2.440	13.63	2700	310.0	8042	1462.5	.040	4.5	12.40	321.7	58.5
15	2500	200.0	95	6.4	.95	12.00	21484	2000	2.140	13.91	2750	264.4	5716	1207.2	.040	3.8	10.58	228.6	48.3
16	2500	167.0	79	8.7	1.03	10.00	16515	1400	.580	14.18	4350	155.2	1299	1600.7	.040	3.2	6.21	51.9	64.0
17	2500	134.0	64	12.0	.97	8.50	14496	1650	.550	14.31	4150	163.7	1102	1366.9	.040	2.6	6.55	44.1	54.7
18	2500	100.0	48	14.7	1.00	7.00	11907	1650	.700	14.31	3250	124.5	1109	846.6	.040	1.9	5.18	44.4	33.9
19	2500	66.8	32	17.5	.95	5.50	9848	2050	1.050	14.31	2182	124.7	1342	458.3	.040	1.3	5.19	53.7	18.3
20	2500	33.4	16	19.2	1.03	5.00	8257	1800	1.550	14.31	1072	92.7	1612	183.2	.040	.6	3.71	64.5	7.3
21	2500	0.0	0	21.5	.98	3.50	6075	1250	1.450	14.42	320	47.5	1112	40.4	.040	0.0	1.90	44.6	1.6
22	2500	0.0	0	25.5	.96	1.00	1772	82000	2.400	3.35	13	1041.5	616	.5	.040	0.0	41.66	24.6	.0
23	500	0.0	0	19.3	1.02	1.00	1668	7200	5.900	10.66	39	69.5	1150	1.3	.067	0.0	4.63	76.7	.1

CYCLE COMPOSITE HC 6.559 GRAM/BHP HR

CO 80.433 GRAM/BHP HR

NO2 12.994 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

1-07-72 RUN 3 IHC 345 CID V8 CORRELATION TRUCK 7 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CONCENTRATION AS MEASURED CO	CONCENTRATION AS MEASURED CO2	CONCENTRATION AS MEASURED NO	CALCULATED GRAM/HR HC	CALCULATED GRAM/HR CO	CALCULATED GRAM/HR NO2	WT. FAC.	WEIGHTED GRAM/HR HP	WEIGHTED GRAM/HR HC	WEIGHTED GRAM/HR CO	WEIGHTED GRAM/HR NO2
1	500	0.0	0	19.3	1.06	1.00	1605	7650	6.710	10.25	64	69.3	1227	1.9	.067	0.0	4.62	81.8	.1
2	1500	0.0	0	21.7	1.09	2.50	3901	4200	3.140	13.48	170	95.9	1471	12.9	.040	0.0	3.84	58.8	.5
3	1500	33.4	10	19.8	1.02	3.00	5003	3500	2.140	14.18	659	105.0	1297	65.7	.040	.4	4.20	51.9	2.6
4	1500	66.8	19	17.2	.96	3.50	6202	2750	1.300	14.42	1618	106.6	1018	208.3	.040	.8	4.26	40.7	8.3
5	1500	100.0	29	14.9	1.01	4.50	7579	2800	1.270	14.53	2444	132.0	1209	382.4	.040	1.1	5.28	48.4	15.3
6	1500	134.0	38	12.2	.96	5.00	8859	2550	.610	14.94	3429	142.9	641	637.2	.040	1.5	5.72	27.6	25.5
7	1500	167.0	48	9.0	.99	6.00	10309	2150	.470	14.53	3884	145.7	643	873.7	.040	1.9	5.83	25.7	34.9
8	1500	200.0	57	6.9	1.00	7.50	12757	2400	1.800	14.18	2639	188.8	2860	689.1	.040	2.3	7.55	114.4	27.6
9	1500	234.0	67	4.0	.95	7.50	13429	2150	1.590	14.05	3001	182.1	2720	843.9	.040	2.7	7.28	108.8	33.8
10	1500	267.0	76	0.0	1.05	11.00	17820	2950	4.590	12.71	1618	298.8	9390	544.0	.040	3.1	11.95	375.6	21.8
11	1500	0.0	0	24.6	.97	1.00	1754	74000	3.700	5.50	157	781.7	790	5.5	.067	0.0	52.14	52.7	.4
12	500	0.0	0	19.4	1.07	1.00	1590	7400	6.440	10.43	130	66.8	1174	3.4	.040	0.0	2.67	47.0	.2
13	2500	267.0	127	1.4	1.07	14.00	30205	2400	4.980	12.34	1135	412.8	17303	648.2	.040	5.1	16.51	692.1	25.9
14	2500	234.0	111	3.4	1.10	17.00	26288	1400	2.080	13.91	3029	228.2	6848	1638.4	.040	4.5	9.13	273.9	65.6
15	2500	200.0	95	6.5	.98	12.00	20829	1750	1.840	14.14	3138	225.1	4780	1334.9	.040	3.8	9.00	191.2	53.4
16	2500	167.0	79	8.7	.97	10.00	17536	1050	.550	14.42	4147	122.1	1292	1601.6	.040	3.2	4.89	51.7	64.1
17	2500	134.0	64	12.1	1.00	8.50	14458	1600	.610	14.66	4113	149.4	1155	1274.5	.040	2.6	6.00	46.2	51.2
18	2500	100.0	48	14.4	.97	7.00	12275	1750	.840	14.66	3222	136.6	1403	835.0	.040	1.9	5.46	56.1	33.4
19	2500	66.8	32	17.5	.95	5.50	9848	2000	1.270	14.53	2256	123.1	1579	461.0	.040	1.3	4.92	63.2	18.4
20	2500	33.4	16	19.4	1.04	5.00	8178	1750	1.730	14.53	1205	87.1	1739	199.1	.040	.6	3.48	69.6	8.0
21	2500	0.0	0	21.7	1.01	3.50	5895	1350	1.660	14.66	335	48.4	1201	39.8	.040	0.0	1.93	48.0	1.6
22	2500	0.0	0	25.5	1.00	1.00	1701	83000	2.560	3.45	157	984.6	615	4.2	.040	0.0	39.46	24.6	.2
23	500	0.0	0	19.3	1.02	1.00	1668	6800	6.140	10.89	143	63.9	1174	4.5	.067	0.0	4.26	78.3	.3

CYCLE COMPOSITE HC 6.018 GRAM/BHP HR

CO 71.767 GRAM/BHP HR

NO2 13.467 GRAM/BHP HR

BSFC .569 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-07-72 RUN 3 IHC 345 CID V8 CORRELATION TRUCK 7 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CONCENTRATION AS MEASURED CO	CONCENTRATION AS MEASURED CO2	CONCENTRATION AS MEASURED NO	CALCULATED GRAM/HR HC	CALCULATED GRAM/HR CO	CALCULATED GRAM/HR NO2	WT. FAC.	WEIGHTED GRAM/HR HP	WEIGHTED GRAM/HR HC	WEIGHTED GRAM/HR CO	WEIGHTED GRAM/HR NO2
1	500	0.0	0	19.3	1.06	1.00	1605	7650	6.710	10.25	35	69.3	1227	1.1	.067	0.0	4.62	81.8	.1
2	1500	0.0	0	21.7	1.09	2.50	3901	4200	3.140	13.48	123	95.9	1471	9.3	.040	0.0	3.84	58.8	.4
3	1500	33.4	10	19.8	1.02	3.00	5003	3500	2.140	14.18	565	105.0	1297	56.3	.040	.4	4.20	51.9	2.3
4	1500	66.8	19	17.2	.96	3.50	6202	2750	1.300	14.42	1537	106.6	1018	147.8	.040	.8	4.26	40.7	7.4
5	1500	100.0	29	14.9	1.01	4.50	7579	2800	1.270	14.53	2238	132.0	1209	350.2	.040	1.1	5.28	48.4	14.0
6	1500	134.0	38	12.2	.96	5.00	8859	2550	.610	14.94	3400	142.9	641	632.7	.040	1.5	5.72	27.6	25.3
7	1500	167.0	48	9.0	.99	6.00	10309	2150	.470	14.53	3900	145.7	643	877.3	.040	1.9	5.83	25.7	35.1
8	1500	200.0	57	6.9	1.00	7.50	12757	2400	1.800	14.18	2500	188.8	2860	652.8	.040	2.3	7.55	114.4	26.1
9	1500	234.0	67	4.0	.95	7.50	13429	2150	1.590	14.05	2950	182.1	2720	829.5	.040	2.7	7.28	108.8	33.2
10	1500	267.0	76	0.0	1.05	11.00	17820	2950	4.590	12.71	1500	298.8	9390	504.4	.040	3.1	11.95	375.6	20.2
11	1500	0.0	0	24.6	.97	1.00	1754	74000	3.700	5.50	16	781.7	790	.6	.067	0.0	52.14	52.7	.0
12	500	0.0	0	19.4	1.07	1.00	1590	7400	6.440	10.43	37	66.8	1174	1.1	.040	0.0	2.67	47.0	.0
13	2500	267.0	127	1.4	1.07	14.00	30205	2400	4.980	12.34	1075	412.8	17303	613.4	.040	5.1	16.51	692.1	24.6
14	2500	234.0	111	3.4	1.10	17.00	26288	1400	2.080	13.91	2950	228.2	6848	1546.2	.040	4.5	9.13	273.9	63.8
15	2500	200.0	95	6.5	.98	12.00	20829	1750	1.840	14.18	3050	225.1	4780	1302.3	.040	3.8	9.00	191.2	52.1
16	2500	167.0	79	8.7	.97	10.00	17536	1050	.550	14.42	4250	122.1	1292	1641.4	.040	3.2	4.89	51.7	65.7
17	2500	134.0	64	12.1	1.00	8.50	14458	1600	.610	14.66	4200	149.4	1155	1306.6	.040	2.6	6.00	46.2	52.3
18	2500	100.0	48	14.4	.97	7.00	12275	1750	.840	14.66	3150	136.6	1403	816.4	.040	1.9	5.46	56.1	32.7
19	2500	66.8	32	17.5	.95	5.50	9848	2000	1.270	14.53	2137	123.1	1579	436.7	.040	1.3	4.92	63.2	17.5
20	2500	33.4	16	19.4	1.04	5.00	8178	1750	1.730	14.53	1062	87.1	1739	175.4	.040	.6	3.48	69.6	7.0
21	2500	0.0	0	21.7	1.01	3.50	5895	1350	1.660	14.66	255	48.4	1201	30.3	.040	0.0	1.93	48.0	1.2
22	2500	0.0	0	25.5	1.00	1.00	1701	83000	2.560	3.45	13	984.6	615	.5	.040	0.0	39.46	24.6	.0
23	500	0.0	0	19.3	1.02	1.00	1668	6800	6.140	10.89	39	63.9	1174	1.2	.067	0.0	4.26	78.3	.1

CYCLE COMPOSITE HC 6.018 GRAM/BHP HR

CO 71.767 GRAM/BHP HR

NO2 13.145 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-21-72 RUN 1 IMC 345 CID V8 CORRELATION TRUCK 7 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.5	1.17	1.50	2181	5400	6.020	10.43	64	69.3	1561	2.7	.067	0.0	4.62	104.1	.2
2	1500	0.0	0	21.2	1.18	2.50	3604	4400	2.420	13.33	130	95.0	1274	9.3	.040	0.0	3.80	50.9	.4
3	1500	33.4	10	18.5	1.05	3.50	5670	3550	2.140	13.91	964	122.7	1499	110.6	.040	.4	4.91	59.8	4.4
4	1500	66.8	19	17.4	1.00	3.50	5953	3650	2.210	13.91	1277	131.8	1612	153.1	.040	.8	5.27	64.5	6.1
5	1500	100.0	29	14.3	.97	4.50	7841	3650	2.520	13.77	1820	172.9	2412	286.3	.040	1.1	6.92	96.6	11.5
6	1500	134.0	38	11.4	1.00	5.50	9355	2750	1.980	14.18	2492	156.5	2277	471.0	.040	1.5	6.26	91.1	18.8
7	1500	167.0	48	8.4	1.01	6.50	10947	2500	1.380	14.42	3166	170.5	1901	716.9	.040	1.9	6.82	76.1	28.7
8	1500	200.0	57	6.2	.99	7.50	12886	4100	3.290	13.33	1618	310.2	5029	406.5	.040	2.3	12.41	201.2	16.3
9	1500	234.0	67	3.0	.97	8.00	14029	3100	2.780	13.63	2121	260.1	4712	590.8	.040	2.7	10.40	188.5	23.6
10	1500	267.0	76	0.0	1.08	11.00	17325	3700	5.350	11.72	1463	367.6	10736	482.5	.040	3.1	14.70	429.4	19.3
11	1500	0.0	0	24.2	.98	2.00	3471	61000	3.930	6.38	104	1290.4	1679	7.3	.067	0.0	86.07	112.0	.5
12	500	0.0	0	19.2	1.16	1.50	2200	5750	5.840	10.78	104	73.6	1509	4.4	.040	0.0	2.94	60.4	.2
13	2500	267.0	127	1.3	1.01	17.00	28631	3100	5.720	11.60	1048	503.4	18764	565.0	.040	5.1	20.14	750.6	22.6
14	2500	234.0	111	4.2	1.05	16.00	25920	2400	2.780	13.77	2664	370.5	8669	1365.4	.040	4.5	14.82	346.8	54.6
15	2500	200.0	95	6.8	1.03	12.00	19817	2500	2.520	13.77	2791	299.5	6099	1110.2	.040	3.8	11.98	244.0	44.4
16	2500	167.0	79	9.3	1.04	10.00	16356	1950	1.040	14.53	4147	201.7	2277	1423.9	.040	3.2	8.07	91.1	57.0
17	2500	134.0	64	11.6	.96	8.00	14175	2250	1.230	14.42	3944	200.9	2219	1170.7	.040	2.6	8.04	88.7	46.8
18	2500	100.0	48	14.3	1.00	7.50	12757	2400	1.630	14.31	3138	184.2	2596	821.4	.040	1.9	7.57	103.8	32.9
19	2500	66.8	32	16.6	1.03	7.50	12386	2550	2.140	14.05	2256	192.1	3256	564.1	.040	1.3	7.68	130.2	22.6
20	2500	33.4	16	18.7	.97	5.00	8768	2650	2.640	13.91	1277	138.2	2781	221.1	.040	.6	5.53	111.2	8.8
21	2500	0.0	0	21.1	1.02	3.50	5837	2350	2.280	14.05	363	82.8	1623	42.5	.040	0.0	3.31	64.9	1.7
22	2500	0.0	0	24.8	1.10	1.50	2320	63000	2.180	4.94	40	1088.9	761	5.2	.040	0.0	43.56	30.4	.2
23	500	0.0	0	19.2	1.08	1.50	2362	5800	5.030	11.48	104	80.2	1405	4.8	.067	0.0	5.35	93.7	.3

CYCLE COMPOSITE HC 8.223 GRAM/BHP HR

CO 98.016 GRAM/BHP HR

NO2 11.518 GRAM/BHP HR

BSFC .591 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
1-21-72 RUN 1 IMC 345 CID V8 CORRELATION TRUCK 7 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.5	1.17	1.50	2181	5400	6.020	10.43	47	69.3	1561	2.0	.067	0.0	4.62	104.1	.1
2	1500	0.0	0	21.2	1.18	2.50	3604	4400	2.420	13.33	117	95.0	1274	8.4	.040	0.0	3.80	50.9	.3
3	1500	33.4	10	18.5	1.05	3.50	5670	3550	2.140	13.91	900	122.7	1499	103.3	.040	.4	4.91	59.8	4.1
4	1500	66.8	19	17.4	1.00	3.50	5953	3650	2.210	13.91	1175	131.8	1612	140.4	.040	.8	5.27	64.5	5.6
5	1500	100.0	29	14.3	.97	4.50	7841	3650	2.520	13.77	1700	172.9	2412	267.4	.040	1.1	6.92	96.5	10.7
6	1500	134.0	38	11.4	1.00	5.50	9355	2750	1.980	14.18	2500	156.5	2277	472.5	.040	1.5	6.26	91.1	18.4
7	1500	167.0	48	8.4	1.01	6.50	10947	2500	1.380	14.42	3200	170.5	1901	724.6	.040	1.9	6.82	76.1	29.0
8	1500	200.0	57	6.2	.99	7.50	12886	4100	3.290	13.33	1575	310.2	5029	345.7	.040	2.3	12.41	201.2	15.8
9	1500	234.0	67	3.0	.97	8.00	14029	3100	2.780	13.63	2075	260.1	4712	578.0	.040	2.7	10.40	188.5	23.1
10	1500	267.0	76	0.0	1.08	11.00	17325	3700	5.350	11.72	1400	367.6	10736	461.7	.040	3.1	14.70	429.4	18.5
11	1500	0.0	0	24.2	.98	2.00	3471	61000	3.930	6.38	22	1290.4	1679	1.5	.067	0.0	86.07	112.0	.1
12	500	0.0	0	19.2	1.16	1.50	2200	5750	5.840	10.78	50	73.6	1509	2.1	.040	0.0	2.94	60.4	.1
13	2500	267.0	127	1.3	1.01	17.00	28631	3100	5.720	11.60	950	503.4	18764	512.2	.040	5.1	20.14	750.6	20.5
14	2500	234.0	111	4.2	1.05	16.00	25920	2400	2.780	13.77	2500	370.5	8669	1281.3	.040	4.5	14.82	346.8	51.3
15	2500	200.0	95	6.8	1.03	12.00	19817	2500	2.520	13.77	2650	299.5	6099	1054.1	.040	3.8	11.98	244.0	42.2
16	2500	167.0	79	9.3	1.04	10.00	16356	1950	1.040	14.53	4350	201.7	2277	1443.6	.040	3.2	8.07	91.1	59.7
17	2500	134.0	64	11.6	.96	8.00	14175	2250	1.230	14.42	3900	200.9	2219	1156.1	.040	2.6	8.04	88.7	46.2
18	2500	100.0	48	14.3	1.00	7.50	12757	2400	1.630	14.31	3050	184.2	2596	798.4	.040	1.9	7.57	103.8	31.4
19	2500	66.8	32	16.6	1.03	7.50	12386	2550	2.140	14.05	2125	192.1	3256	531.4	.040	1.3	7.68	130.2	21.3
20	2500	33.4	16	18.7	.97	5.00	8768	2650	2.640	13.91	1175	138.2	2781	203.4	.040	.6	5.53	111.2	8.1
21	2500	0.0	0	21.1	1.02	3.50	5837	2350	2.280	14.05	310	82.8	1623	36.3	.040	0.0	3.31	64.9	1.6
22	2500	0.0	0	24.8	1.10	1.50	2320	63000	2.180	4.94	14	1088.9	761	.8	.040	0.0	43.56	30.4	.0
23	500	0.0	0	19.2	1.08	1.50	2362	5800	5.030	11.48	53	80.2	1405	2.4	.067	0.0	5.35	93.7	.2

CYCLE COMPOSITE HC 8.223 GRAM/BHP HR

CO 98.016 GRAM/BHP HR

NO2 11.175 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-21-72 RUN 2 IMC 345 CID V8 CORRELATION TRUCK 7 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.6	1.15	1.50	2219	5750	6.570	8.84	51	79.8	1842	2.4	.067	0.0	5.32	122.9	.2
2	1500	0.0	0	21.3	1.16	2.50	3666	3900	2.790	13.48	129	85.8	1240	9.4	.040	0.0	3.43	49.6	.4
3	1500	33.4	10	18.9	1.06	3.50	5617	3300	2.140	14.05	832	112.2	1470	93.9	.040	.4	4.49	58.8	3.8
4	1500	66.8	19	17.4	1.00	3.50	5953	3300	2.140	13.77	1259	121.0	1585	153.2	.040	.8	4.84	63.4	6.1
5	1500	100.0	29	14.3	.97	4.50	7841	3300	2.360	13.77	1883	158.2	2285	299.7	.040	1.1	6.33	91.4	12.0
6	1500	134.0	38	11.4	.98	5.50	9546	3100	1.870	14.05	2589	182.3	2222	505.6	.040	1.5	7.29	88.9	20.2
7	1500	167.0	48	8.4	1.03	6.50	10734	2800	1.230	14.18	3365	191.6	1700	764.3	.040	1.9	7.66	68.0	30.6
8	1500	200.0	57	6.2	.96	7.50	13289	3200	3.420	13.06	1657	253.1	5465	435.2	.040	2.3	10.12	218.6	17.4
9	1500	234.0	67	3.0	.99	8.00	13795	2900	2.690	13.48	2223	242.2	4538	616.3	.040	2.7	9.69	181.5	24.7
10	1500	267.0	76	0.0	1.06	11.00	17652	3700	5.610	11.48	1482	374.1	11457	497.4	.040	3.1	14.96	458.3	19.9
11	1500	0.0	0	24.2	1.17	2.00	2908	59000	4.120	6.47	117	1040.4	1467	6.8	.067	0.0	69.39	97.9	.5
12	500	0.0	0	19.3	1.11	1.50	2299	5350	5.560	10.78	103	72.9	1530	4.7	.040	0.0	2.92	61.2	.2
13	2500	267.0	127	1.2	1.00	17.00	28917	3100	5.720	11.48	1065	512.0	19082	583.9	.040	5.1	20.48	763.3	23.4
14	2500	234.0	111	4.2	1.10	16.00	24742	2550	2.820	13.63	2614	377.7	8437	1285.4	.040	4.5	15.11	337.5	51.4
15	2500	200.0	95	6.8	1.03	12.00	19817	2600	2.970	13.48	2515	308.4	7115	990.3	.040	3.8	12.33	284.6	39.6
16	2500	167.0	79	9.3	1.03	10.00	16515	2050	1.160	14.31	4147	216.0	2469	1450.5	.040	3.2	8.64	98.7	58.0
17	2500	134.0	64	11.6	.97	8.00	14029	2300	1.230	14.42	4014	203.2	2195	1177.3	.040	2.6	8.13	87.8	47.1
18	2500	100.0	48	14.3	1.03	7.50	12386	2400	1.700	14.31	3111	182.4	2617	787.3	.040	1.9	7.32	104.7	31.5
19	2500	66.8	32	16.6	1.09	7.50	11704	2600	2.210	13.91	2211	185.8	3190	524.5	.040	1.3	7.43	127.6	21.0
20	2500	33.4	16	18.7	.97	5.00	8768	2700	2.730	13.77	1241	141.2	2883	215.4	.040	.6	5.65	115.3	8.6
21	2500	0.0	0	21.0	.98	3.50	6075	2125	2.280	14.05	348	78.0	1691	42.4	.040	0.0	3.12	67.7	1.7
22	2500	0.0	0	24.7	1.06	1.50	2407	68500	2.280	4.45	40	1214.2	816	5.3	.040	0.0	48.57	32.7	.2
23	500	0.0	0	19.4	1.07	1.50	2385	6050	5.140	11.48	103	83.8	1437	4.7	.067	0.0	5.59	95.9	.3

CYCLE COMPOSITE HC 7.886 GRAM/BHP HR

CO 100.372 GRAM/BHP HR

NO2 11.430 GRAM/BHP HR

BSFC .585 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-21-72 RUN 2 IMC 345 CID V8 CORRELATION TRUCK 7 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.6	1.15	1.50	2219	5750	6.570	8.84	46	79.8	1842	2.1	.067	0.0	5.32	122.9	.1
2	1500	0.0	0	21.3	1.16	2.50	3666	3900	2.740	13.48	115	85.8	1240	8.4	.040	0.0	3.43	49.6	.3
3	1500	33.4	10	18.9	1.06	3.50	5617	3300	2.140	14.05	738	112.2	1470	83.3	.040	.4	4.49	58.8	3.3
4	1500	66.8	19	17.4	1.00	3.50	5953	3300	2.140	13.77	1125	121.0	1585	136.4	.040	.8	4.84	63.4	5.5
5	1500	100.0	29	14.3	.97	4.50	7891	3300	2.360	13.77	1725	158.2	2285	274.6	.040	1.1	6.33	91.4	11.0
6	1500	134.0	38	11.4	.98	5.50	9546	3100	1.870	14.05	2550	182.3	2222	498.0	.040	1.5	7.29	88.9	19.9
7	1500	167.0	48	8.4	1.03	6.50	10734	2800	1.230	14.18	3250	191.6	1700	738.2	.040	1.9	7.66	68.0	29.5
8	1500	200.0	57	6.2	.96	7.50	13289	3200	3.420	13.06	1487	253.1	5465	390.5	.040	2.3	10.12	218.6	15.6
9	1500	234.0	67	3.0	.99	8.00	13745	2900	2.690	13.48	2650	242.2	4538	734.7	.040	2.7	9.69	181.5	29.4
10	1500	267.0	76	0.0	1.06	11.00	17652	3700	5.610	11.48	1312	374.1	11457	440.4	.040	3.1	14.96	458.3	17.6
11	1500	0.0	0	24.2	1.17	2.00	2408	59000	4.120	6.47	23	1040.4	1467	1.3	.067	0.0	69.39	97.9	.1
12	500	0.0	0	19.3	1.11	1.50	2249	5350	5.560	10.78	51	72.9	1530	2.3	.040	0.0	2.92	61.2	.1
13	2500	267.0	127	1.2	1.00	17.00	28917	3100	5.720	11.48	950	512.0	14082	520.4	.040	5.1	20.48	763.3	20.8
14	2500	234.0	111	4.2	1.10	16.00	24742	2550	2.820	13.63	2487	377.7	8437	1222.4	.040	4.5	15.11	337.5	48.9
15	2500	200.0	95	6.8	1.03	12.00	19817	2600	2.470	13.48	2350	308.4	7115	925.3	.040	3.8	12.33	284.6	37.0
16	2500	167.0	79	9.3	1.03	10.00	16515	2050	1.160	14.31	4250	216.0	2469	1486.6	.040	3.2	8.64	98.7	59.5
17	2500	134.0	64	11.6	.97	8.00	14029	2300	1.230	14.42	4100	203.2	2145	1202.5	.040	2.6	8.13	87.8	48.1
18	2500	100.0	48	14.3	1.03	7.50	12386	2400	1.700	14.31	3000	182.4	2617	759.2	.040	1.9	7.32	104.7	30.4
19	2500	66.8	32	16.6	1.09	7.50	11704	2600	2.210	13.41	2050	185.8	3140	486.3	.040	1.3	7.43	127.6	19.5
20	2500	33.4	16	18.7	.97	5.00	8768	2700	2.730	13.77	1150	141.2	2883	144.6	.040	.6	5.65	115.3	8.0
21	2500	0.0	0	21.0	.98	3.50	6075	2125	2.280	14.05	315	78.0	1641	38.4	.040	0.0	3.12	67.7	1.5
22	2500	0.0	0	24.7	1.06	1.50	2407	68500	2.280	4.45	14	1214.2	816	.8	.040	0.0	48.57	32.7	.0
23	500	0.0	0	19.4	1.07	1.50	2385	6050	5.140	11.48	53	83.8	1437	2.4	.067	0.0	5.59	95.9	.2

CYCLE COMPOSITE HC 7.886 GRAM/BHP HR

CO 100.372 GRAM/BHP HR

NO2 11.096 GRAM/BHP HR

TABLE I-9. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 8

Engine: IHC 478 CID, V8 Vehicle: 1971 IHC 32,000-lb GVW Tractor

Date	Run	Dynamometer	Emission Rate, Gr/bhp-hr HC	CO	NO_2 Observed NDIR	CL	Humidity grains/lb dry air
1-19-72	1	Stationary	6.78	93.6	11.43	10.63	86.0
1-19-72	2	Stationary	6.99	85.2	12.11	11.40	91.5
		Average	6.89	89.4	11.77	11.02	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg}}\right) \times 100$			3.1	9.4	5.8	7.0	
2-2-72	2	Chassis	5.39	77.0	10.32	9.38	60.5
2-3-72	1	Chassis	4.77	71.4	14.47	13.21	11.5
		Average	5.08	74.2	12.40	11.30	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			12.2	7.5	33.5	33.9	
Average Stationary			6.89	89.4	11.77	11.02	
Average Chassis			5.08	74.2	12.40	11.30	
Difference: (Chassis - Stationary)			-1.81	-15.2	0.63	0.28	
Percent Difference: (Difference/Stationary) x 100			-26.3	-17.0	5.4	2.5	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

1-19-72 RUN 1 1970 IHC 478 CID V8 TRUCK 8 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.0	1.00	1.50	2551	13000	3.790	10.78	0	209.0	1231	0.0	.067	0.0	13.99	82.1	0.0
2	1500	0.0	0	21.2	1.07	9.00	6359	3700	5.080	11.60	0	138.0	3827	0.0	.090	0.0	5.52	153.1	0.0
3	1500	97.5	19	18.9	1.02	5.00	8379	2700	2.020	13.77	170	190.9	2129	29.9	.090	.5	5.63	85.2	1.2
4	1500	99.5	27	17.7	1.19	7.50	10766	2700	1.590	19.05	579	182.7	2173	130.1	.090	1.1	7.31	86.9	5.2
5	1500	192.0	91	19.9	1.20	9.00	12757	2500	1.380	19.18	1205	201.7	2299	322.8	.090	1.6	8.07	90.0	12.9
6	1500	189.0	59	11.3	1.15	10.00	19856	2050	.770	19.18	1989	201.0	1525	647.3	.090	2.2	8.09	61.0	25.9
7	1500	236.0	67	8.3	1.07	11.00	17987	2000	.690	13.77	2590	239.9	1597	1009.3	.090	2.7	9.58	61.9	90.9
8	1500	283.0	81	6.1	1.05	12.00	19533	2650	1.520	13.77	2992	332.8	3856	1038.9	.090	3.2	13.31	159.2	91.6
9	1500	331.0	95	3.0	1.08	15.50	29912	2200	1.950	13.63	2893	351.0	9673	1506.0	.090	3.8	19.09	186.9	60.2
10	1500	378.0	108	0.0	1.08	22.00	39811	9000	6.990	11.01	969	780.1	25370	300.9	.090	9.3	31.20	1019.8	12.0
11	1500	0.0	0	29.5	1.27	2.00	2668	59000	2.020	9.27	103	1232.5	931	7.8	.067	0.0	82.21	62.1	.5
12	500	0.0	0	19.5	1.35	2.00	2520	13000	2.870	11.60	103	207.7	926	5.5	.090	0.0	8.31	37.1	.2
13	2500	362.0	172	1.9	1.05	30.00	98370	3000	6.370	11.36	705	809.8	39520	627.9	.090	6.9	32.19	1380.8	25.1
14	2500	317.0	151	9.2	1.03	29.00	39635	1750	2.980	13.63	2765	925.9	12193	2239.2	.090	6.0	17.09	987.7	89.9
15	2500	272.0	129	6.8	1.05	21.00	33859	1000	.930	19.92	3001	219.2	9117	2183.5	.090	5.2	8.77	169.7	87.3
16	2500	226.0	108	9.3	1.08	19.00	29925	1000	.690	19.66	2892	199.3	2512	1833.5	.090	9.3	7.77	100.5	73.3
17	2500	181.0	86	11.6	1.07	16.00	25936	900	.580	19.79	2325	198.1	1928	1270.0	.090	3.9	5.92	77.1	50.8
18	2500	136.0	65	19.3	1.09	13.00	21262	950	.690	19.79	1718	130.1	1771	781.2	.090	2.6	5.20	70.8	31.2
19	2500	90.5	93	16.6	1.01	10.00	16892	950	.850	19.53	980	103.9	1869	359.1	.090	1.7	9.19	79.7	19.2
20	2500	95.5	22	18.8	1.11	9.00	13792	1250	1.950	19.66	391	106.2	2988	110.3	.090	.9	9.25	99.5	9.9
21	2500	0.0	0	20.6	1.03	6.00	9909	1300	2.110	19.31	90	77.8	2552	17.9	.090	0.0	3.11	102.1	.7
22	2500	0.0	0	29.7	1.38	2.00	2979	31500	1.230	9.11	0	918.0	729	0.0	.090	0.0	36.72	29.0	0.0
23	500	0.0	0	19.3	1.15	1.50	2228	11000	3.970	11.72	0	150.5	959	0.0	.067	0.0	10.09	69.0	0.0

CYCLE COMPOSITE HC 6.783 GRAM/BHP HR

CO 93.695 GRAM/BHP HR

NO2 11.925 GRAM/BHP HR

BSFC .698 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-19-72 RUN 1 1970 IHC 478 CID V8 TRUCK 8 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	19.0	1.00	1.50	2551	13000	3.790	10.78	29	209.0	1231	1.3	.067	0.0	13.99	82.1	.1
2	1500	0.0	0	21.2	1.07	9.00	6359	3700	5.080	11.60	72	138.0	3827	8.9	.090	0.0	5.52	153.1	.9
3	1500	97.5	19	18.9	1.02	5.00	8379	2700	2.020	13.77	229	190.9	2129	39.5	.090	.5	5.63	85.2	1.6
4	1500	99.5	27	17.7	1.19	7.50	10766	2700	1.590	19.05	600	182.7	2173	139.8	.090	1.1	7.31	86.9	5.9
5	1500	192.0	91	19.9	1.20	9.00	12757	2500	1.380	19.18	1125	201.7	2299	301.9	.090	1.6	8.07	90.0	12.1
6	1500	189.0	59	11.3	1.15	10.00	19856	2050	.770	19.18	1825	201.0	1525	593.9	.090	2.2	8.09	61.0	23.8
7	1500	236.0	67	8.3	1.07	11.00	17987	2000	.690	13.77	2300	239.9	1597	919.0	.090	2.7	9.58	61.9	36.6
8	1500	283.0	81	6.1	1.05	12.00	19533	2650	1.520	13.77	2187	332.8	3856	911.8	.090	3.2	13.31	159.2	36.5
9	1500	331.0	95	3.0	1.08	15.50	29912	2200	1.950	13.63	2600	351.0	9673	1377.3	.090	3.8	19.09	186.9	55.1
10	1500	378.0	108	0.0	1.08	22.00	39811	9000	6.990	11.01	380	780.1	25370	296.0	.090	9.3	31.20	1019.8	9.8
11	1500	0.0	0	29.5	1.27	2.00	2668	59000	2.020	9.27	5	1232.5	931	.9	.067	0.0	82.21	62.1	.0
12	500	0.0	0	19.5	1.35	2.00	2520	13000	2.870	11.60	30	207.7	926	1.6	.090	0.0	8.31	37.1	.1
13	2500	362.0	172	1.9	1.05	30.00	98370	3000	6.370	11.36	675	809.8	39520	601.2	.090	6.9	32.19	1380.8	29.0
14	2500	317.0	151	9.2	1.03	29.00	39635	1750	2.980	13.63	2987	925.9	12193	2009.6	.090	6.0	17.09	987.7	80.9
15	2500	272.0	129	6.8	1.05	21.00	33859	1000	.930	19.92	2800	219.2	9117	2037.2	.090	5.2	8.77	169.7	81.5
16	2500	226.0	108	9.3	1.08	19.00	29925	1000	.690	19.66	2650	199.3	2512	1709.6	.090	9.3	7.77	100.5	68.9
17	2500	181.0	86	11.6	1.07	16.00	25936	900	.580	19.79	2250	198.1	1928	1229.0	.090	3.9	5.92	77.1	49.2
18	2500	136.0	65	19.3	1.09	13.00	21262	950	.690	19.79	1688	130.1	1771	767.5	.090	2.6	5.20	70.8	30.7
19	2500	90.5	93	16.6	1.01	10.00	16892	950	.850	19.53	987	103.9	1869	356.6	.090	1.7	9.19	79.7	19.3
20	2500	95.5	22	18.8	1.11	9.00	13792	1250	1.950	19.66	950	106.2	2988	126.9	.090	.9	9.25	99.5	5.1
21	2500	0.0	0	20.6	1.03	6.00	9909	1300	2.110	19.31	170	77.8	2552	33.8	.090	0.0	3.11	102.1	1.9
22	2500	0.0	0	29.7	1.38	2.00	2979	31500	1.230	9.11	7	918.0	729	.7	.090	0.0	36.72	29.0	.0
23	500	0.0	0	19.3	1.15	1.50	2228	11000	3.970	11.72	32	150.5	959	1.5	.067	0.0	10.09	69.0	.1

CYCLE COMPOSITE HC 6.783 GRAM/BHP HR

CO 93.695 GRAM/BHP HR

NO2 10.626 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

1-19-72 RUN 2 1970 IHC 478 CID V8 TRUCK 8 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CU	NO2
1	500	0.0	0	18.5	1.00	1.50	2551	29000	1.980	10.93	38	913.5	689	2.2	.067	0.0	27.58	96.0	.1
2	1500	0.0	0	19.8	1.07	9.00	6359	2950	2.110	13.91	170	95.8	1666	22.1	.090	0.0	3.83	66.7	.9
3	1500	97.5	19	18.9	1.02	5.00	8379	2900	1.800	19.92	278	122.2	1851	97.0	.090	.5	9.89	79.0	1.9
4	1500	99.5	27	17.0	1.19	7.50	10766	2350	1.950	19.53	689	156.0	1995	151.9	.090	1.1	6.29	77.8	6.1
5	1500	192.0	91	19.3	1.20	9.00	12757	2350	1.050	19.53	1387	189.6	1711	371.5	.090	1.6	7.58	68.9	19.9
6	1500	189.0	59	11.9	1.15	10.00	19856	2000	.520	19.53	2032	199.8	1023	657.2	.090	2.2	7.79	90.9	26.3
7	1500	236.0	67	8.9	1.07	11.00	17987	1700	.520	19.92	2689	196.7	1216	1033.2	.090	2.7	7.87	98.6	91.3
8	1500	283.0	81	6.2	1.05	12.00	19533	2000	.700	19.92	2975	255.0	1803	1259.3	.090	3.2	10.20	72.1	50.9
9	1500	331.0	95	3.0	1.08	15.50	29912	2250	1.630	19.18	2892	392.6	5013	1936.5	.090	3.8	13.70	200.5	57.5
10	1500	378.0	108	0.0	1.08	22.00	39811	3750	6.710	11.29	993	712.9	25798	310.9	.090	9.3	28.99	1029.9	12.9
11	1500	0.0	0	29.9	1.27	2.00	2668	50000	1.800	3.70	103	1270.6	929	8.7	.067	0.0	89.75	61.6	.6
12	500	0.0	0	19.0	1.35	2.00	2520	23500	2.900	10.78	111	381.3	787	6.0	.090	0.0	15.25	31.5	.2
13	2500	362.0	172	1.9	1.05	30.00	98370	3600	6.310	11.29	800	812.9	39539	719.7	.090	6.9	32.52	1381.6	28.8
14	2500	317.0	151	9.2	1.03	29.00	39635	1700	2.180	13.63	2892	921.6	10922	2390.3	.090	6.0	16.87	936.9	93.6
15	2500	272.0	129	6.8	1.05	21.00	33859	1000	.790	19.31	3083	223.5	3391	2287.5	.090	5.2	8.99	133.6	91.5
16	2500	226.0	108	9.3	1.08	19.00	29925	1050	.990	19.92	2892	209.3	1973	1880.5	.090	9.3	8.37	78.9	75.2
17	2500	181.0	86	11.6	1.07	16.00	25936	1000	.520	19.53	2396	167.9	1769	1335.5	.090	3.9	6.72	70.5	53.9
18	2500	136.0	65	19.3	1.09	13.00	21262	1050	.550	19.53	1779	197.0	1556	827.0	.090	2.6	5.88	62.2	33.1
19	2500	90.5	93	16.6	1.01	10.00	16892	1900	.700	19.55	1065	109.7	1551	387.9	.090	1.7	9.39	62.1	15.5
20	2500	95.5	22	18.9	1.11	9.00	13792	1250	1.230	19.53	993	108.5	2157	192.1	.090	.9	9.39	86.3	5.7
21	2500	0.0	0	20.6	1.03	6.00	9909	1350	1.910	19.31	237	81.8	2338	97.7	.090	0.0	3.27	93.5	1.9
22	2500	0.0	0	29.7	1.38	2.00	2979	18500	.770	9.27	25	669.3	559	3.0	.090	0.0	26.57	22.3	.1
23	500	0.0	0	19.3	1.15	1.50	2228	18000	2.970	11.13	69	252.3	891	3.0	.067	0.0	16.83	56.1	.2

CYCLE COMPOSITE HC 6.992 GRAM/BHP HR

CO 85.299 GRAM/BHP HR

NO2 12.118 GRAM/BHP HR

BSFC .698 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-19-72 RUN 2 1970 IMC 478 CID V8 TRUCK 8 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.5	1.00	1.50	2551	24000	1.980	10.43	21	413.5	689	1.2	.067	0.0	27.58	46.0	.1
2	1500	0.0	0	19.8	1.07	4.00	6359	2450	2.110	13.91	142	95.8	1666	18.4	.040	0.0	3.83	66.7	.7
3	1500	47.5	14	18.9	1.02	5.00	8379	2400	1.800	14.42	245	122.2	1851	41.4	.040	.6	4.89	74.0	1.7
4	1500	94.5	27	17.0	1.19	7.50	10766	2350	1.450	14.53	625	156.0	1945	137.8	.040	1.1	6.24	77.8	5.5
5	1500	142.0	41	14.3	1.20	9.00	12757	2350	1.050	14.53	1250	189.6	1711	334.8	.040	1.6	7.58	68.4	13.4
6	1500	189.0	54	11.4	1.15	10.00	14856	2000	.520	14.53	2025	194.8	1023	654.9	.040	2.2	7.79	40.9	26.2
7	1500	236.0	67	8.4	1.07	11.00	17487	1700	.520	14.42	2650	196.7	1216	1018.2	.040	2.7	7.87	48.6	40.7
8	1500	283.0	81	6.2	1.05	12.00	19533	2000	.700	14.42	2950	255.0	1803	1248.7	.040	3.2	10.20	72.1	49.9
9	1500	331.0	95	3.0	1.08	15.50	24412	2250	1.630	14.18	2850	342.6	5013	1440.5	.040	3.8	13.70	200.5	57.6
10	1500	378.0	108	0.0	1.08	22.00	34811	3750	6.710	11.24	388	712.4	25748	244.7	.040	4.3	28.49	1029.9	9.8
11	1500	0.0	0	24.4	1.27	2.00	2648	50000	1.800	3.70	8	1270.6	424	.7	.067	0.0	84.75	61.6	.0
12	500	0.0	0	19.0	1.35	2.00	2520	23500	2.400	10.78	28	381.3	787	1.5	.040	0.0	15.25	31.5	.1
13	2500	362.0	172	1.9	1.05	30.00	48370	3000	6.310	11.24	712	812.9	34539	640.5	.040	6.9	32.52	1381.6	25.6
14	2500	317.0	151	4.2	1.03	24.00	34635	1700	2.180	13.63	2600	421.6	10922	2141.0	.040	6.0	16.87	436.9	85.6
15	2500	272.0	129	6.8	1.05	21.00	33859	1000	.740	14.31	2900	223.5	3341	2151.8	.040	5.2	8.94	133.6	86.1
16	2500	226.0	108	9.3	1.08	14.00	29925	1050	.440	14.42	2650	204.3	1973	1753.4	.040	4.3	8.37	78.9	70.1
17	2500	181.0	86	11.6	1.07	16.00	25436	1000	.520	14.53	2250	167.9	1764	1254.1	.040	3.4	6.72	70.5	50.2
18	2500	136.0	65	14.3	1.04	13.00	21262	1050	.550	14.53	1650	147.0	1556	767.0	.040	2.6	5.88	62.2	30.7
19	2500	90.5	43	16.6	1.01	10.00	16842	1000	.700	14.55	975	109.7	1551	355.2	.040	1.7	4.39	62.1	14.2
20	2500	45.5	22	18.9	1.11	4.00	13792	1250	1.230	14.53	445	108.5	2157	128.3	.040	.9	4.34	86.3	5.1
21	2500	0.0	0	20.6	1.03	6.00	4909	1350	1.410	14.31	200	81.8	2338	40.2	.040	0.0	3.27	93.5	1.6
22	2500	0.0	0	24.7	1.38	2.00	2474	18500	.770	4.27	8	664.3	559	.4	.040	0.0	26.57	22.3	.0
23	500	0.0	0	19.3	1.15	1.50	2228	18000	2.470	11.13	24	252.3	841	1.3	.067	0.0	16.83	56.1	.1

CYCLE COMPOSITE HC 6.992 GRAM/BHP HR

CO 85.244 GRAM/BHP HR

NO2 11.396 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

2-02-72 RUN 2 1970 IMC 478 CID V8 TRUCK 8 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.0	1.34	2.00	2539	3700	2.470	7.65	77	85.5	1386	6.4	.067	0.0	5.70	92.4	.4
2	1500	0.0	0	20.4	1.19	4.00	5718	1800	1.380	12.47	143	73.4	1136	14.3	.040	0.0	2.93	45.4	.8
3	1500	47.5	14	18.9	1.37	6.00	7450	2400	2.360	12.22	238	120.6	2396	34.7	.040	.6	4.83	95.9	1.6
4	1500	94.5	27	17.4	1.20	6.00	8505	2500	2.020	12.94	464	139.8	2282	86.1	.040	1.1	5.59	91.3	3.4
5	1500	142.0	41	14.3	1.24	8.00	10474	2400	1.300	13.63	1277	173.6	1900	306.7	.040	1.6	6.94	76.0	12.3
6	1500	189.0	54	11.4	1.34	10.00	12484	2200	.670	13.91	2077	188.7	1161	591.4	.040	2.2	7.55	46.4	23.7
7	1500	236.0	67	8.4	1.40	12.00	14580	2050	.440	13.91	2689	205.4	840	844.3	.040	2.7	8.21	35.6	35.8
8	1500	283.0	81	6.2	1.26	12.00	16200	1950	.340	13.91	3112	217.9	880	1154.7	.040	3.2	8.72	35.2	46.2
9	1500	331.0	95	3.0	1.32	16.00	20618	2400	1.520	13.77	2739	318.6	4076	1207.3	.040	3.8	12.75	163.1	48.3
10	1500	378.0	108	0.0	1.24	20.00	26372	3650	5.460	11.01	537	555.3	18315	271.2	.040	4.3	22.21	732.6	10.8
11	1500	0.0	0	24.0	1.24	2.00	2637	24000	1.450	2.70	117	1084.8	1046	14.5	.067	0.0	72.36	73.1	1.0
12	500	0.0	0	19.3	1.33	2.00	2558	5250	3.380	8.34	130	109.7	1426	4.0	.040	0.0	4.39	57.0	.4
13	2500	362.0	172	2.0	1.22	30.00	41828	2500	5.840	11.36	847	599.3	28277	713.8	.040	6.9	23.97	1131.1	28.6
14	2500	317.0	151	4.3	1.28	24.00	31844	1500	1.870	13.91	3056	300.3	7563	2031.3	.040	6.0	12.01	302.5	81.3
15	2500	272.0	129	6.8	1.28	20.00	26578	800	.580	14.42	3222	141.0	2065	1885.3	.040	5.2	5.64	82.6	75.4
16	2500	226.0	108	9.3	1.16	16.00	23462	1000	.580	14.53	2843	154.3	1807	1456.0	.040	4.3	6.17	72.3	58.2
17	2500	181.0	86	11.6	1.24	16.00	21048	1200	.670	14.53	2444	165.3	1864	1117.4	.040	3.4	6.61	74.6	44.7
18	2500	136.0	65	14.6	1.13	12.00	18064	1350	1.120	14.42	1759	155.6	2607	673.0	.040	2.6	6.22	104.3	26.9
19	2500	90.5	43	16.6	1.38	12.00	14791	1400	1.660	13.77	1031	133.0	3185	326.2	.040	1.7	5.32	127.4	13.0
20	2500	45.5	22	18.9	1.20	8.00	11340	1700	2.440	12.59	406	126.8	3677	100.6	.040	.9	5.07	147.1	4.0
21	2500	0.0	0	19.7	1.61	10.00	10565	1700	2.560	12.09	335	121.2	3687	79.3	.040	0.0	4.85	147.5	3.2
22	2500	0.0	0	24.7	1.37	2.00	2483	17000	1.680	2.37	64	734.2	1466	4.2	.040	0.0	29.37	58.6	.4
23	500	0.0	0	19.4	1.50	2.00	2268	3700	3.480	8.43	157	65.7	1427	4.3	.067	0.0	4.38	95.2	.6

CYCLE COMPOSITE HC 5.385 GRAM/BHP HR

CO 77.021 GRAM/BHP HR

NO2 10.320 GRAM/BHP HR

BSFC .584 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

2-02-72 RUN 2 1970 IMC 478 CID V8 TRUCK 8 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.0	1.34	2.00	2539	3700	2.470	7.65	26	85.5	1386	2.0	.067	0.0	5.70	92.4	.1
2	1500	0.0	0	20.4	1.19	4.00	5718	1800	1.380	12.47	100	73.4	1136	13.5	.040	0.0	2.93	45.4	.5
3	1500	47.5	14	18.9	1.37	6.00	7450	2400	2.360	12.22	175	120.6	2396	24.2	.040	.5	4.83	95.9	1.2
4	1500	94.5	27	17.4	1.20	6.00	8505	2500	2.020	12.94	350	139.8	2282	65.0	.040	1.1	5.59	91.3	2.6
5	1500	142.0	41	14.3	1.24	8.00	10474	2400	1.300	13.63	1100	173.6	1900	264.2	.040	1.6	6.94	76.0	10.6
6	1500	189.0	54	11.4	1.34	10.00	12484	2200	.670	13.91	1850	188.7	1161	526.8	.040	2.2	7.55	46.4	21.1
7	1500	236.0	67	8.4	1.40	12.00	14580	2050	.440	13.91	2425	205.4	840	804.6	.040	2.7	8.21	35.6	32.3
8	1500	283.0	81	6.2	1.26	12.00	16200	1950	.340	13.91	2900	217.9	880	1076.1	.040	3.2	8.72	35.2	43.0
9	1500	331.0	95	3.0	1.32	16.00	20618	2400	1.520	13.77	2500	318.6	4076	1101.4	.040	3.8	12.75	163.1	44.1
10	1500	378.0	108	0.0	1.24	20.00	26372	3650	5.460	11.01	400	555.3	18315	202.0	.040	4.3	22.21	732.6	8.1
11	1500	0.0	0	24.0	1.24	2.00	2637	24000	1.450	2.70	12	1084.8	1046	1.5	.067	0.0	72.36	73.1	.1
12	500	0.0	0	19.3	1.33	2.00	2558	5250	3.380	8.34	36	109.7	1426	2.5	.040	0.0	4.39	57.0	.1
13	2500	362.0	172	2.0	1.22	30.00	41828	2500	5.840	11.36	770	599.3	28277	612.8	.040	6.9	23.97	1131.1	24.5
14	2500	317.0	151	4.3	1.28	24.00	31844	1500	1.870	13.91	2850	300.3	7563	1844.4	.040	6.0	12.01	302.5	75.8
15	2500	272.0	129	6.8	1.28	20.00	26578	800	.580	14.42	3150	141.0	2065	1843.2	.040	5.2	5.64	82.6	73.7
16	2500	226.0	108	9.3	1.16	16.00	23462	1000	.580	14.53	2600	154.3	1807	1331.5	.040	4.3	6.17	72.3	53.3
17	2500	181.0	86	11.6	1.24	16.00	21048	1200	.670	14.53	2300	165.3	1864	1051.6	.040	3.4	6.61	74.6	42.1
18	2500	136.0	65	14.6	1.13	12.00	18064	1350	1.120	14.42	1550	155.6	2607	593.0	.040	2.6	6.22	104.3	23.7
19	2500	90.5	43	16.6	1.38	12.00	14791	1400	1.660	13.77	900	133.0	3185	283.4	.040	1.7	5.32	127.4	11.4
20	2500	45.5	22	18.9	1.20	8.00	11340	1700	2.440	12.59	245	126.8	3677	73.1	.040	.9	5.07	147.1	2.9
21	2500	0.0	0	19.7	1.61	10.00	10565	1700	2.560	12.09	210	121.2	3687	44.7	.040	0.0	4.85	147.5	2.0
22	2500	0.0	0	24.7	1.37	2.00	2483	17000	1.680	2.37	6	734.2	1466	.4	.040	0.0	29.37	58.6	.0
23	500	0.0	0	19.4	1.50	2.00	2268	3700	3.480	8.43	37	65.7	1427	2.2	.067	0.0	4.38	95.2	.1

CYCLE COMPOSITE HC 5.385 GRAM/BHP HR

CO 77.021 GRAM/BHP HR

NO2 9.377 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT

2-03-72 RUN 1 1970 IHC 478 CID V8 TRUCK 8 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.0	1.33	2.00	2558	3200	3.980	7.56	77	69.0	1739	5.5	.067	0.0	4.60	115.7	.4
2	1500	0.0	0	20.4	1.13	4.00	6021	950	.580	12.34	196	44.0	542	30.1	.040	0.0	1.76	21.7	1.2
3	1500	47.5	14	18.9	1.28	6.00	7973	2050	2.520	11.72	335	113.2	2810	61.4	.040	.5	4.53	112.4	2.5
4	1500	94.5	27	17.4	1.10	6.00	9278	1950	1.870	12.22	705	126.7	2453	152.0	.040	1.1	5.07	98.1	6.1
5	1500	142.0	41	14.3	1.16	8.00	11731	2100	1.380	12.82	1677	171.0	2269	453.3	.040	1.6	6.84	90.8	18.1
6	1500	189.0	54	11.4	1.24	10.00	13718	1750	.640	13.06	2589	173.0	1278	849.8	.040	2.2	6.92	51.1	34.0
7	1500	236.0	67	8.4	1.31	12.00	15582	1600	.470	13.06	3166	182.1	1081	1196.4	.040	2.7	7.28	43.2	47.9
8	1500	283.0	81	6.2	1.19	12.00	17153	1500	.350	13.18	3602	188.1	886	1499.5	.040	3.2	7.52	35.5	60.0
9	1500	331.0	95	3.0	1.32	16.00	20618	1900	1.300	13.18	3222	267.0	3691	1503.4	.040	3.8	10.68	147.6	60.1
10	1500	378.0	108	0.0	1.28	20.00	26578	3000	5.500	10.78	721	480.9	17810	383.7	.040	4.3	19.24	712.4	15.3
11	1500	0.0	0	24.0	1.75	2.00	1444	14500	.310	3.20	183	568.3	245	23.8	.067	0.0	37.91	16.4	1.6
12	500	0.0	0	19.3	1.52	2.00	2238	14500	1.050	5.27	210	417.7	611	20.1	.040	0.0	16.71	24.4	.8
13	2500	362.0	172	2.0	1.22	30.00	41828	2500	5.610	11.60	1048	598.9	27148	833.5	.040	6.9	23.96	1085.9	33.3
14	2500	317.0	151	4.3	1.27	24.00	32145	1450	1.700	9.17	3602	423.2	10021	3489.9	.040	6.0	16.93	400.9	139.6
15	2500	272.0	129	6.8	1.25	20.00	27216	780	.440	14.31	3416	142.7	1811	2378.3	.040	5.2	5.71	72.4	95.1
16	2500	226.0	108	9.3	1.12	16.00	24300	870	.440	14.31	3602	142.5	1456	1458.6	.040	4.3	5.70	58.2	78.3
17	2500	181.0	86	11.6	1.28	16.00	21262	950	.440	14.31	3110	135.6	1413	1473.4	.040	3.4	5.42	56.5	59.0
18	2500	136.0	65	14.6	1.11	12.00	18389	1000	.700	14.31	2420	121.7	1721	977.8	.040	2.6	4.87	68.8	39.1
19	2500	90.5	43	16.6	1.31	12.00	15582	1050	.470	13.77	1648	110.2	2057	591.7	.040	1.7	4.41	82.3	23.7
20	2500	45.5	22	18.4	1.15	8.00	11833	1150	1.300	12.82	674	95.6	2183	186.0	.040	.4	3.82	87.3	7.4
21	2500	0.0	0	19.7	1.64	10.00	10372	1200	1.800	12.34	508	87.3	2645	122.7	.040	0.0	3.49	105.8	4.9
22	2500	0.0	0	24.7	1.37	2.00	2483	17000	.770	2.59	143	834.3	763	23.3	.040	0.0	33.37	30.5	.4
23	500	0.0	0	19.4	2.15	3.00	2373	2400	3.240	8.48	184	57.3	1243	12.4	.067	0.0	3.82	86.3	.8

CYCLE COMPOSITE HC 4.766 GRAM/BHP HR

CO 71.415 GRAM/BHP HR

NO2 14.468 GRAM/BHP HR

BSFC .598 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

2-03-72 RUN 1 1970 IHC 478 CID V8 TRUCK 8 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	500	0.0	0	18.0	1.33	2.00	2558	3200	3.980	7.56	27	69.0	1739	1.4	.067	0.0	4.60	115.7	.1
2	1500	0.0	0	20.4	1.13	4.00	6021	950	.580	12.34	142	44.0	542	21.8	.040	0.0	1.76	21.7	.4
3	1500	47.5	14	18.9	1.28	6.00	7973	2050	2.520	11.72	230	113.2	2810	42.1	.040	.5	4.53	112.4	1.7
4	1500	94.5	27	17.4	1.10	6.00	9278	1950	1.870	12.22	600	126.7	2453	129.4	.040	1.1	5.07	98.1	5.2
5	1500	142.0	41	14.3	1.16	8.00	11731	2100	1.380	12.82	1500	171.0	2269	405.4	.040	1.6	6.84	90.8	16.2
6	1500	189.0	54	11.4	1.24	10.00	13718	1750	.640	13.06	2487	173.0	1278	816.3	.040	2.2	6.92	51.1	32.7
7	1500	236.0	67	8.4	1.31	12.00	15582	1600	.470	13.06	3000	182.1	1081	1133.6	.040	2.7	7.28	43.2	45.3
8	1500	283.0	81	6.2	1.19	12.00	17153	1500	.350	13.18	3450	188.1	886	1436.2	.040	3.2	7.52	35.5	57.4
9	1500	331.0	45	3.0	1.32	16.00	20618	1900	1.300	13.18	3050	267.0	3691	1423.2	.040	3.8	10.68	147.6	56.9
10	1500	378.0	108	0.0	1.28	20.00	26578	3000	5.500	10.78	510	480.9	17810	271.4	.040	4.3	19.24	712.4	10.9
11	1500	0.0	0	24.0	1.75	2.00	1444	14500	.310	3.20	11	568.3	245	1.5	.067	0.0	37.91	16.4	.1
12	500	0.0	0	19.3	1.52	2.00	2238	14500	1.050	5.27	25	417.7	611	2.4	.040	0.0	16.71	24.4	.1
13	2500	362.0	172	2.0	1.22	30.00	41828	2500	5.610	11.60	900	598.9	27148	715.8	.040	6.9	23.96	1085.9	28.6
14	2500	317.0	151	4.3	1.27	24.00	32145	1450	1.700	9.17	3350	423.2	10021	3245.7	.040	6.0	16.93	400.9	129.8
15	2500	272.0	129	6.8	1.25	20.00	27216	780	.440	14.31	3750	142.7	1811	2277.5	.040	5.2	5.71	72.4	91.1
16	2500	226.0	108	9.3	1.12	16.00	24300	870	.440	14.31	3350	142.5	1456	1821.6	.040	4.3	5.70	58.2	72.4
17	2500	181.0	86	11.6	1.28	16.00	21262	950	.440	14.31	2850	135.6	1413	1350.7	.040	3.4	5.42	56.5	54.0
18	2500	136.0	65	14.6	1.11	12.00	18389	1000	.700	14.31	2125	121.7	1721	858.6	.040	2.6	4.87	68.8	34.3
19	2500	90.5	43	16.6	1.31	12.00	15582	1050	.470	13.77	1450	110.2	2057	505.3	.040	1.7	4.41	82.3	20.2
20	2500	45.5	22	18.4	1.15	8.00	11833	1150	1.300	12.82	470	95.6	2183	129.7	.040	.4	3.82	87.3	5.2
21	2500	0.0	0	19.7	1.64	10.00	10372	1200	1.800	12.34	245	87.3	2645	71.2	.040	0.0	3.49	105.8	2.8
22	2500	0.0	0	24.7	1.37	2.00	2483	17000	.770	2.59	6	834.3	763	1.0	.040	0.0	33.37	30.5	.0
23	500	0.0	0	19.4	2.15	3.00	2373	2400	3.240	8.48	37	57.3	1243	2.4	.067	0.0	3.82	86.3	.2

CYCLE COMPOSITE HC 4.766 GRAM/BHP HR

CO 71.415 GRAM/BHP HR

NO2 13.211 GRAM/BHP HR

TABLE I-10. 23-MODE CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 9

Engine: Chevrolet 292 CID, 6 cyl. Vehicle: 1970 Chevrolet 14,000-lb GVW Van

			Emission Rate, Gr/bhp-hr				Humidity
					NO_2 Observed		grains/lb
Date	Run	Dynamometer	HC	CO	NDIR	CL	dry air
1-26-72	1	Stationary	5.97	65.7	14.56	15.01	56.5
1-26-72	2	Stationary	5.91	68.0	14.78	14.91	68.5
1-26-72	3	Stationary	5.90	68.4	14.75	14.44	73.0
		Average	5.93	67.4	14.70	14.79	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			1.2	4.0	1.5	3.9	
1-28-72	2	Chassis	6.58	70.2	16.60	15.47	36.5
1-29-72	1	Chassis	7.97	72.5	15.46	14.88	49.0
		Average	7.28	71.4	16.03	15.18	
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg.}}\right) \times 100$			19.1	3.2	7.1	3.9	
Average Stationary			5.93	67.4	14.70	14.79	
Average Chassis 7.28			7.28	71.4	16.03	15.18	
Difference: (Chassis - Stationary)			1.35	4.0	1.33	0.39	
Percent Difference: (Difference/Stationary) x 100			22.8	5.9	9.0	2.6	

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-26-72 RUN 1 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	HP	WEIGHTED GRAM/HR HC	CO	NO2
1	600	0.0	0	20.9	1.27	1.00	1339	8150	9.980	11.84	69	61.9	769	1.6	.067	0.0	9.13	51.0	.1
2	1500	0.0	0	21.0	1.21	2.00	2812	9500	.550	13.06	196	183.9	215	12.6	.090	0.0	7.39	8.6	.5
3	1500	26.0	7	18.6	1.38	3.00	3698	2250	.100	13.91	913	58.9	52	78.7	.090	.3	2.39	2.1	3.1
4	1500	59.5	16	16.3	1.43	4.00	4758	1850	.100	13.91	2396	62.0	68	266.6	.090	.6	2.48	2.7	10.7
5	1500	81.0	23	13.7	1.30	4.50	5888	1950	.100	14.05	3633	80.0	83	495.1	.090	.9	3.20	3.3	19.8
6	1500	109.0	31	11.3	1.20	5.00	7087	1800	.100	14.18	3726	88.2	99	606.3	.090	1.2	3.53	4.0	24.3
7	1500	135.0	39	8.7	1.12	5.50	8353	1850	.420	14.18	3307	109.5	479	620.3	.090	1.5	4.18	19.2	24.8
8	1500	163.5	47	5.7	1.03	6.00	9909	2050	1.010	14.18	3001	131.9	1313	641.3	.090	1.9	5.28	52.5	25.7
9	1500	189.5	54	3.6	1.06	7.00	11233	2200	1.200	14.31	3029	157.1	1731	718.1	.090	2.2	6.28	69.2	28.7
10	1500	218.0	62	0.0	1.18	11.00	15857	3650	6.570	13.32	930	285.7	10390	241.7	.090	2.5	11.43	415.6	9.7
11	1500	0.0	0	24.4	1.34	1.00	1264	70000	2.780	5.75	183	572.2	459	5.0	.067	0.0	38.16	30.6	.3
12	600	0.0	0	20.9	1.29	1.00	1319	10000	9.930	11.72	169	79.7	799	9.2	.090	0.0	2.99	29.8	.2
13	2500	208.0	99	2.0	1.08	17.00	26775	2850	7.260	10.89	864	413.9	21300	416.6	.090	4.0	16.56	852.0	16.7
14	2500	181.0	86	5.1	1.54	16.50	18225	1650	1.700	14.31	2869	185.9	3869	1073.2	.090	3.4	7.44	154.8	42.9
15	2500	156.0	74	7.2	1.67	16.00	16297	1550	1.200	14.66	3166	157.7	2467	1069.6	.090	3.0	6.31	98.7	42.8
16	2500	129.0	61	8.9	1.48	12.00	13792	570	.130	14.42	4147	53.8	248	1300.0	.090	2.5	2.15	9.9	52.0
17	2500	109.0	50	11.5	1.44	10.00	11812	950	.130	14.53	4147	76.1	210	1102.2	.090	2.0	3.04	8.4	44.1
18	2500	77.0	37	14.4	1.38	8.00	9861	1050	.150	14.53	4147	70.0	202	918.3	.090	1.5	2.80	8.1	36.7
19	2500	52.0	25	17.4	1.30	6.00	7851	1150	.250	14.42	3394	61.1	268	598.3	.090	1.0	2.44	10.7	23.9
20	2500	25.0	12	19.7	1.09	4.00	6242	950	.250	14.53	1946	39.9	212	271.1	.090	.5	1.59	8.5	10.8
21	2500	0.0	0	21.5	1.12	3.00	4556	5700	.150	13.48	567	182.9	97	60.4	.090	0.0	7.32	3.9	2.4
22	2500	0.0	0	26.0	1.31	1.00	1298	75000	4.64	12.09	170	673.5	421	5.1	.090	0.0	26.94	16.8	.2
23	600	0.0	0	20.4	1.46	1.00	1165	10500	4.350	12.09	170	69.9	585	3.8	.067	0.0	4.67	39.0	.3

CYCLE COMPOSITE HC 5.972 GRAM/BHP HR

CO 65.718 GRAM/BHP HR

NO2 14.556 GRAM/BHP HR

BSFC .572 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
1-26-72 RUN 1 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	HP	WEIGHTED GRAM/HR HC	CO	NO2
1	600	0.0	0	20.9	1.27	1.00	1339	8150	9.980	11.84	43	61.9	769	1.1	.067	0.0	9.13	51.0	.1
2	1500	0.0	0	21.0	1.21	2.00	2812	9500	.550	13.06	165	183.9	215	10.6	.090	0.0	7.39	8.6	.9
3	1500	26.0	7	18.6	1.38	3.00	3698	2250	.100	13.91	465	58.9	52	79.6	.090	.3	2.39	2.1	3.0
4	1500	59.5	16	16.3	1.43	4.00	4758	1850	.100	13.91	2375	62.0	68	264.3	.090	.6	2.48	2.7	10.6
5	1500	81.0	23	13.7	1.30	4.50	5888	1950	.100	14.05	3400	80.0	83	517.8	.090	.9	3.20	3.3	20.7
6	1500	109.0	31	11.3	1.20	5.00	7087	1800	.100	14.18	3850	88.2	99	626.5	.090	1.2	3.53	4.0	25.1
7	1500	135.0	39	8.7	1.12	5.50	8353	1850	.420	14.18	3350	109.5	479	628.4	.090	1.5	4.18	19.2	25.1
8	1500	163.5	47	5.7	1.03	6.00	9909	2050	1.010	14.18	3150	131.9	1313	673.1	.090	1.9	5.29	52.5	26.9
9	1500	189.5	54	3.6	1.06	7.00	11233	2200	1.200	14.31	3150	157.1	1731	796.8	.090	2.2	6.28	69.2	29.9
10	1500	218.0	62	0.0	1.18	11.00	15857	3650	6.570	13.32	845	285.7	10390	219.6	.090	2.5	11.43	415.6	8.8
11	1500	0.0	0	24.4	1.34	1.00	1264	70000	2.780	5.75	11	572.2	459	.3	.067	0.0	38.16	30.6	.0
12	600	0.0	0	20.9	1.29	1.00	1319	10000	9.930	11.72	45	79.7	799	1.1	.090	0.0	2.99	29.8	.0
13	2500	208.0	99	2.0	1.08	17.00	26775	2850	7.260	10.89	735	413.9	21300	359.4	.090	4.0	16.56	852.0	14.2
14	2500	181.0	86	5.1	1.54	16.50	18225	1650	1.700	14.31	2750	185.9	3869	1029.7	.090	3.4	7.44	154.8	41.1
15	2500	156.0	74	7.2	1.67	16.00	16297	1550	1.200	14.66	3100	157.7	2467	1047.3	.090	3.0	6.31	98.7	41.9
16	2500	129.0	61	8.9	1.48	12.00	13792	570	.130	14.42	4500	53.8	248	1410.6	.090	2.5	2.15	9.9	56.4
17	2500	109.0	50	11.5	1.44	10.00	11812	950	.130	14.53	4400	76.1	210	1302.4	.090	2.0	3.04	8.4	52.1
18	2500	77.0	37	14.4	1.38	8.00	9861	1050	.150	14.53	4750	70.0	202	1051.8	.090	1.5	2.80	8.1	42.1
19	2500	52.0	25	17.4	1.30	6.00	7851	1150	.250	14.42	3300	61.1	268	581.8	.090	1.0	2.44	10.7	23.3
20	2500	25.0	12	19.7	1.09	4.00	6242	950	.250	14.53	1800	39.9	212	250.8	.090	.5	1.59	8.5	10.0
21	2500	0.0	0	21.5	1.12	3.00	4556	5700	.150	13.48	97	182.9	97	47.9	.090	0.0	7.32	3.9	1.9
22	2500	0.0	0	26.0	1.31	1.00	1298	75000	2.320	4.64	13	673.5	421	.4	.090	0.0	26.94	16.8	.0
23	600	0.0	0	20.4	1.46	1.00	1165	10500	4.350	12.09	42	69.9	585	.9	.067	0.0	4.67	39.0	.1

CYCLE COMPOSITE HC 5.972 GRAM/BHP HR

CO 65.718 GRAM/BHP HR

NO2 15.007 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-26-72 RUN 2 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	HP	WEIGHTED GRAM/HR HC	CO	NO2
1	600	0.0	0	20.3	1.25	1.00	1361	8900	9.590	11.60	50	67.1	791	1.3	.067	0.0	9.48	49.4	.1
2	1500	0.0	0	21.2	1.22	2.00	2789	12000	.890	12.34	50	231.9	347	3.2	.090	0.0	9.28	13.9	.1
3	1500	26.0	7	18.8	1.39	3.00	3671	2600	.310	14.42	770	63.7	153	62.6	.090	.3	2.55	6.1	2.5
4	1500	59.5	16	16.5	1.40	4.00	4860	2350	.230	14.42	2480	76.7	152	268.8	.090	.6	3.07	6.1	10.8
5	1500	81.0	23	14.1	1.30	4.50	5888	2150	.130	14.31	3700	86.4	106	493.5	.090	.9	3.46	4.2	19.7
6	1500	109.0	31	11.3	1.16	5.00	7332	1750	.160	14.18	3830	88.4	163	642.3	.090	1.2	3.54	6.5	25.7
7	1500	135.0	39	8.8	1.09	5.50	8583	1600	.390	14.18	3240	93.2	459	636.5	.090	1.5	3.73	18.4	25.5
8	1500	163.5	47	5.9	1.00	6.00	10206	1850	.930	14.05	3100	124.5	1264	692.6	.090	1.9	4.98	50.6	27.7
9	1500	189.5	54	3.4	1.03	7.00	11560	2000	1.450	13.91	2990	148.6	2176	737.5	.090	2.2	5.94	87.0	29.5
10	1500	218.0	62	0.0	1.17	11.00	15992	3500	6.640	10.78	660	315.0	12071	147.2	.090	2.5	12.60	482.8	7.9
11	1500	0.0	0	24.3	1.36	1.00	1251	65000	2.440	5.39	50	567.3	430	1.4	.067	0.0	37.84	28.7	.1
12	600	0.0	0	20.3	1.30	1.00	1308	9000	9.740	11.72	50	67.8	722	1.3	.090	0.0	2.71	28.9	.1
13	2500	208.0	99	2.0	1.12	17.00	25819	3050	7.100	10.55	645	438.6	20623	307.9	.090	4.0	17.54	824.9	12.3
14	2500	181.0	86	5.0	1.52	16.50	18465	1700	1.700	14.31	2990	194.0	3919	1132.9	.090	3.4	7.76	156.8	45.3
15	2500	156.0	74	7.2	1.68	16.00	16200	1600	1.120	14.53	3430	163.9	2318	1166.9	.090	3.0	6.56	92.7	46.7
16	2500	129.0	61	8.7	1.49	12.00	13699	630	.130	14.42	4147	59.1	246	1290.7	.090	2.5	2.36	9.8	51.6
17	2500	109.0	50	11.4	1.45	10.00	11731	920	.130	14.31	4147	74.3	212	1111.4	.090	2.0	2.97	8.5	44.5
18	2500	77.0	37	14.4	1.41	8.00	9651	1100	.150	14.42	4147	72.3	199	905.2	.090	1.5	2.99	8.0	36.2
19	2500	52.0	25	17.2	1.29	6.00	7912	1300	.280	14.31	3633	69.4	304	648.3	.090	1.0	2.79	12.2	25.9
20	2500	25.0	12	19.6	1.10	4.00	6185	1100	.280	14.42	2032	45.9	236	281.8	.090	.5	1.84	9.4	11.3
21	2500	0.0	0	21.4	1.11	3.00	4597	5400	.190	13.48	705	174.7	124	75.7	.090	0.0	6.99	5.0	3.0
22	2500	0.0	0	25.9	1.31	1.00	1298	54000	2.250	6.13	224	508.8	428	7.0	.090	0.0	20.35	17.1	.3
23	600	0.0	0	20.4	1.38	1.00	1233	9500	4.020	12.22	210	68.1	582	5.0	.067	0.0	4.54	38.8	.3

CYCLE COMPOSITE HC 5.909 GRAM/BHP HR

CO 68.021 GRAM/BHP HR

NO2 14.776 GRAM/BHP HR

BSFC .574 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
1-26-72 RUN 2 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	20.3	1.25	1.00	1361	8400	4.590	11.60	41	67.1	741	1.1	.067	0.0	4.48	49.4	.1
2	1500	0.0	0	21.2	1.22	2.00	2789	12000	.890	12.34	110	231.9	347	7.1	.040	0.0	9.28	13.9	.3
3	1500	26.0	7	18.8	1.39	3.00	3671	2600	.310	14.42	887	63.7	153	72.1	.040	.3	2.55	6.1	2.9
4	1500	54.5	16	16.5	1.40	4.00	4860	2350	.230	14.42	2400	76.7	152	260.2	.040	.6	3.07	6.1	10.4
5	1500	81.0	23	14.1	1.30	4.50	5888	2150	.130	14.31	3650	86.4	106	486.9	.040	.9	3.46	4.2	19.5
6	1500	109.0	31	11.3	1.16	5.00	7332	1750	.160	14.18	3850	88.4	163	645.7	.040	1.2	3.54	6.5	25.8
7	1500	135.0	39	8.8	1.09	5.50	8583	1600	.390	14.18	3200	93.2	459	619.1	.040	1.5	3.73	18.4	24.8
8	1500	163.5	47	5.9	1.00	6.00	10206	1850	.930	14.05	3050	124.5	1264	681.5	.040	1.9	4.98	50.6	27.3
9	1500	189.5	54	3.4	1.03	7.00	11560	2000	1.450	13.41	2900	148.6	2176	715.3	.040	2.2	5.94	87.0	28.6
10	1500	218.0	62	0.0	1.17	11.00	15992	3500	6.640	10.78	770	315.0	12071	230.1	.040	2.5	12.60	482.8	9.2
11	1500	0.0	0	24.3	1.36	1.00	1251	65000	2.440	5.39	10	567.3	430	.3	.067	0.0	37.84	28.7	.0
12	600	0.0	0	20.3	1.30	1.00	1308	9000	4.740	11.72	42	67.8	722	1.1	.040	0.0	2.71	28.9	.0
13	2500	208.0	99	2.0	1.12	17.00	25819	3050	7.100	10.55	800	438.6	20623	381.9	.040	4.0	17.54	824.9	15.3
14	2500	181.0	86	5.0	1.52	16.50	18465	1700	1.700	14.31	2700	199.0	3919	1023.0	.040	3.4	7.76	156.8	40.9
15	2500	156.0	74	7.2	1.68	16.00	16200	1600	1.120	14.53	3150	163.9	2318	1071.6	.040	3.0	6.56	92.7	42.9
16	2500	129.0	61	8.7	1.49	12.00	13699	630	.130	14.42	4400	59.1	246	1369.5	.040	2.5	2.36	4.8	54.8
17	2500	104.0	50	11.4	1.45	10.00	11731	420	.130	14.31	4850	74.3	212	1299.8	.040	2.0	2.97	8.5	52.0
18	2500	77.0	37	14.4	1.41	8.00	9651	1100	.150	14.42	4650	72.3	199	1014.9	.040	1.5	2.89	8.0	40.6
19	2500	52.0	25	17.2	1.29	6.00	7912	1300	.280	14.31	3350	69.9	304	597.8	.040	1.0	2.79	12.2	23.9
20	2500	25.0	12	19.6	1.10	4.00	6185	1100	.280	14.42	1700	45.9	236	235.7	.040	.5	1.84	9.4	9.4
21	2500	0.0	0	21.4	1.11	3.00	4597	5400	.140	13.48	500	174.7	124	53.7	.040	0.0	6.99	5.0	2.1
22	2500	0.0	0	25.9	1.31	1.00	1248	54000	2.250	6.13	13	508.8	428	.4	.040	0.0	20.35	17.1	.0
23	600	0.0	0	20.4	1.38	1.00	1233	9500	4.020	12.22	41	68.1	582	1.0	.067	0.0	4.54	38.8	.1

CYCLE COMPOSITE HC 5.909 GRAM/BHP HR

CO 68.021 GRAM/BHP HR

NO2 14.907 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-26-72 RUN 3 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	20.5	1.29	1.00	1319	9000	4.590	12.22	26	67.0	690	.6	.067	0.0	4.47	46.0	.0
2	1500	0.0	0	21.0	1.22	2.00	2789	12500	.550	12.71	143	240.2	214	9.1	.040	0.0	9.61	8.5	.4
3	1500	26.0	7	18.8	1.39	3.00	3671	3050	.280	14.66	1014	73.4	136	81.1	.040	.3	2.94	5.4	3.2
4	1500	54.5	16	16.5	1.42	4.00	4742	2350	.230	14.53	2614	75.1	148	277.3	.040	.6	3.00	5.9	11.1
5	1500	81.0	23	13.9	1.28	4.50	5980	2250	.130	14.53	3852	90.4	106	513.8	.040	.9	3.62	4.2	20.6
6	1500	109.0	31	11.3	1.18	5.00	7208	2150	.130	14.42	4014	105.0	128	650.5	.040	1.2	4.20	5.1	26.0
7	1500	135.0	39	8.5	1.09	5.50	8583	2000	.670	14.31	3279	113.1	765	615.5	.040	1.5	4.52	30.6	24.6
8	1500	163.5	47	5.9	1.01	6.00	10105	1850	.930	14.31	3222	121.2	1231	700.8	.040	1.9	4.85	49.2	28.0
9	1500	189.5	54	3.4	1.05	7.00	11340	2150	1.340	14.31	3083	153.7	1435	731.6	.040	2.2	6.15	77.4	29.3
10	1500	218.0	62	0.0	1.18	11.00	15857	3600	6.710	11.01	865	315.7	11887	251.9	.040	2.5	12.63	475.5	10.1
11	1500	0.0	0	24.3	1.38	1.00	1233	61500	2.250	5.63	143	540.3	399	4.2	.067	0.0	36.04	26.6	.3
12	600	0.0	0	20.3	1.33	1.00	1279	9000	3.930	12.47	143	66.5	587	3.5	.040	0.0	2.66	23.5	.1
13	2500	208.0	99	2.0	1.10	17.00	26288	2950	7.020	10.43	736	437.0	21007	362.0	.040	4.0	17.48	840.3	14.5
14	2500	181.0	86	4.8	1.52	16.50	18465	1700	1.840	13.91	2663	197.2	4311	1025.4	.040	3.4	7.89	172.4	41.0
15	2500	156.0	74	7.1	1.67	16.00	16297	1550	1.120	14.42	3279	160.9	2349	1130.4	.040	3.0	6.44	94.0	45.2
16	2500	129.0	61	8.8	1.49	12.00	13699	610	.150	14.31	4147	57.5	286	1298.9	.040	2.5	2.30	11.4	52.0
17	2500	104.0	50	11.4	1.45	10.00	11731	840	.180	14.31	4147	71.6	293	1107.8	.040	2.0	2.86	11.7	44.3
18	2500	77.0	37	14.3	1.40	8.00	9720	1000	.150	14.31	4147	66.8	202	919.1	.040	1.5	2.67	8.1	36.8
19	2500	52.0	25	17.3	1.28	6.00	7973	1100	.280	14.31	3482	59.7	307	627.0	.040	1.0	2.39	12.3	25.1
20	2500	25.0	12	19.6	1.10	4.00	6185	1000	.280	14.31	1925	42.1	238	269.1	.040	.5	1.68	9.5	10.8
21	2500	0.0	0	21.5	1.09	3.00	4682	5200	.150	13.48	567	172.0	100	62.3	.040	0.0	6.88	4.0	2.5
22	2500	0.0	0	25.9	1.30	1.00	1308	53000	2.140	5.46	103	517.5	422	5.9	.040	0.0	20.70	16.9	.2
23	600	0.0	0	20.4	1.35	1.00	1260	9000	3.840	12.22	156	66.9	576	3.8	.067	0.0	4.46	38.4	.3

CYCLE COMPOSITE HC 5.897 GRAM/BHP HR

CO 68.412 GRAM/BHP HR

NO2 14.750 GRAM/BHP HR

BSFC .572 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
1-26-72 RUN 3 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 STATIONARY DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	20.5	1.29	1.00	1319	9000	4.590	12.22	40	67.0	690	1.0	.067	0.0	4.47	46.0	.1
2	1500	0.0	0	21.0	1.22	2.00	2789	12500	.550	12.71	155	240.2	214	9.9	.040	0.0	9.61	8.5	.4
3	1500	26.0	7	18.8	1.39	3.00	3671	3050	.280	14.66	912	73.4	136	72.9	.040	.3	2.94	5.4	2.9
4	1500	54.5	16	16.5	1.42	4.00	4742	2350	.230	14.53	2412	75.1	148	255.9	.040	.6	3.00	5.9	10.2
5	1500	81.0	23	13.9	1.28	4.50	5980	2250	.130	14.53	3650	90.4	106	486.8	.040	.9	3.62	4.2	19.5
6	1500	109.0	31	11.3	1.18	5.00	7208	2150	.130	14.42	3850	105.0	128	624.0	.040	1.2	4.20	5.1	25.0
7	1500	135.0	39	8.5	1.09	5.50	8583	2000	.670	14.31	3050	113.1	765	572.5	.040	1.5	4.52	30.6	22.9
8	1500	163.5	47	5.9	1.01	6.00	10105	1850	.930	14.31	3000	121.2	1231	652.5	.040	1.9	4.85	49.2	26.1
9	1500	189.5	54	3.4	1.05	7.00	11340	2150	1.340	14.31	2850	153.7	1435	676.3	.040	2.2	6.15	77.4	27.1
10	1500	218.0	62	0.0	1.18	11.00	15857	3600	6.710	11.01	695	315.7	11887	202.4	.040	2.5	12.63	475.5	8.1
11	1500	0.0	0	24.3	1.38	1.00	1233	61500	2.250	5.63	9	540.3	399	.3	.067	0.0	36.04	26.6	.0
12	600	0.0	0	20.3	1.33	1.00	1279	9000	3.930	12.47	41	66.5	587	1.0	.040	0.0	2.66	23.5	.0
13	2500	208.0	99	2.0	1.10	17.00	26288	2950	7.020	10.43	650	437.0	21007	319.7	.040	4.0	17.48	840.3	12.8
14	2500	181.0	86	4.8	1.52	16.50	18465	1700	1.840	13.91	2475	197.2	4311	953.0	.040	3.4	7.89	172.4	38.1
15	2500	156.0	74	7.1	1.67	16.00	16297	1550	1.120	14.42	3050	160.9	2349	1051.4	.040	3.0	6.44	94.0	42.1
16	2500	129.0	61	8.8	1.49	12.00	13699	610	.150	14.31	4300	57.5	286	1346.8	.040	2.5	2.30	11.4	53.9
17	2500	104.0	50	11.4	1.45	10.00	11731	840	.180	14.31	4850	71.6	293	1295.7	.040	2.0	2.86	11.7	51.8
18	2500	77.0	37	14.3	1.40	8.00	9720	1000	.150	14.31	4600	66.8	202	1019.5	.040	1.5	2.67	8.1	40.8
19	2500	52.0	25	17.3	1.28	6.00	7973	1100	.280	14.31	3300	59.7	307	594.3	.040	1.0	2.39	12.3	23.8
20	2500	25.0	12	19.6	1.10	4.00	6185	1000	.280	14.31	1750	42.1	238	244.6	.040	.5	1.68	9.5	9.8
21	2500	0.0	0	21.5	1.09	3.00	4682	5200	.150	13.48	425	172.0	100	46.7	.040	0.0	6.88	4.0	1.9
22	2500	0.0	0	25.9	1.30	1.00	1308	53000	2.140	5.46	12	517.5	422	.4	.040	0.0	20.70	16.9	.0
23	600	0.0	0	20.4	1.35	1.00	1260	9000	3.840	12.22	42	66.9	576	1.0	.067	0.0	4.46	38.4	.1

CYCLE COMPOSITE HC 5.897 GRAM/BHP HR

CO 68.412 GRAM/BHP HR

NO2 14.436 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-28-72 RUN 2 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	20.0	1.40	1.50	1822	6250	4.980	11.60	103	66.2	1066	3.6	.067	0.0	4.42	71.1	.2
2	1500	0.0	0	20.5	1.32	2.50	3222	16000	.550	12.71	265	346.9	241	14.1	.040	0.0	13.87	9.6	.8
3	1500	26.0	7	18.8	1.29	3.00	3956	4900	.240	14.31	897	128.5	154	78.1	.040	.3	5.14	6.1	3.1
4	1500	54.5	16	16.4	1.70	5.50	5503	2450	.150	14.66	2188	89.6	111	265.5	.040	.6	3.58	4.4	10.6
5	1500	81.0	23	13.9	1.10	4.00	6185	2250	.130	14.42	3138	94.2	110	436.1	.040	.9	3.77	4.4	17.4
6	1500	109.0	31	11.3	1.06	4.50	7221	1750	.130	14.42	3365	85.8	129	547.9	.040	1.2	3.43	5.2	21.9
7	1500	135.0	39	8.6	1.46	7.50	8738	1550	.180	14.31	3001	92.5	217	594.5	.040	1.5	3.70	8.7	23.8
8	1500	163.5	47	5.8	1.07	8.50	13513	1860	.580	14.42	3160	165.5	1042	933.5	.040	1.9	6.62	41.7	37.3
9	1500	189.5	54	3.5	1.03	9.50	15689	2220	1.640	13.95	2930	220.3	3287	965.2	.040	2.2	8.81	131.5	38.6
10	1500	218.0	62	0.0	1.05	13.00	21060	3350	6.750	10.70	600	396.7	16146	235.9	.040	2.5	15.87	645.8	9.4
11	1500	0.0	0	24.3	1.55	1.50	1646	42000	1.300	4.36	64	701.2	438	3.5	.067	0.0	46.77	29.2	.2
12	600	0.0	0	20.3	1.50	1.50	1701	5000	4.300	11.92	117	50.9	884	4.0	.040	0.0	2.03	35.3	.2
13	2500	208.0	99	2.0	1.30	20.00	26169	3200	6.440	11.01	1314	471.3	19158	642.4	.040	4.0	18.85	766.3	25.7
14	2500	181.0	86	4.9	1.40	20.00	17405	1650	1.120	14.53	3542	186.8	2561	1331.4	.040	3.4	7.47	102.5	53.3
15	2500	156.0	74	7.1	1.78	17.00	16246	1500	.610	14.79	3757	156.7	1287	1303.1	.040	3.0	6.27	51.5	52.1
16	2500	129.0	61	8.8	1.32	11.00	14175	580	.130	14.18	4147	57.2	259	1358.3	.040	2.5	2.29	10.4	54.3
17	2500	104.0	50	11.4	1.38	10.00	12326	785	.100	13.91	4147	68.7	177	1204.6	.040	2.0	2.75	7.1	48.2
18	2500	77.0	37	14.4	1.35	8.00	10080	940	.130	14.18	4147	65.8	184	963.5	.040	1.5	2.63	7.4	38.5
19	2500	52.0	25	17.3	1.24	6.00	8231	850	.150	14.31	3394	48.1	171	637.6	.040	1.0	1.92	6.9	25.5
20	2500	25.0	12	19.6	1.11	4.50	6846	1000	.150	14.42	2188	47.0	142	341.5	.040	.5	1.88	5.7	13.7
21	2500	0.0	0	21.4	1.18	3.50	5045	7500	.180	13.63	816	254.9	126	93.4	.040	0.0	10.40	5.0	3.8
22	2500	0.0	0	25.9	1.46	1.50	1748	12000	.850	3.81	130	357.9	512	12.9	.040	0.0	14.31	20.5	.5
23	600	0.0	0	20.4	1.69	1.50	1510	5850	4.350	12.09	148	51.9	774	5.8	.067	0.0	3.46	52.0	.4

CYCLE COMPOSITE HC 6.583 GRAM/BHP HR

CO 70.177 GRAM/BHP HR

NO2 16.595 GRAM/BHP HR

BSFC .638 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE
1-28-72 RUN 2 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	20.0	1.40	1.50	1822	6250	4.980	11.60	43	66.2	1066	1.5	.067	0.0	4.42	71.1	.1
2	1500	0.0	0	20.5	1.32	2.50	3222	16000	.550	12.71	200	346.9	241	14.4	.040	0.0	13.87	9.6	.6
3	1500	26.0	7	18.8	1.29	3.00	3956	4900	.240	14.31	715	128.5	154	62.2	.040	.3	5.14	6.1	2.5
4	1500	54.5	16	16.4	1.70	5.50	5503	2450	.150	14.66	1850	89.6	111	224.5	.040	.6	3.58	4.4	9.0
5	1500	81.0	23	13.9	1.10	4.00	6185	2250	.130	14.42	2800	94.2	110	389.2	.040	.9	3.77	4.4	15.6
6	1500	109.0	31	11.3	1.06	4.50	7221	1750	.130	14.42	3000	85.8	129	488.4	.040	1.2	3.43	5.2	19.5
7	1500	135.0	39	8.6	1.46	7.50	8738	1550	.180	14.31	2650	92.5	217	524.4	.040	1.5	3.70	8.7	21.0
8	1500	163.5	47	5.8	1.07	8.50	13513	1860	.580	14.42	2800	165.5	1042	827.2	.040	1.9	6.62	41.7	33.1
9	1500	189.5	54	3.5	1.03	9.50	15689	2220	1.640	13.95	2300	220.3	3287	757.7	.040	2.2	8.81	131.5	30.3
10	1500	218.0	62	0.0	1.05	13.00	21060	3350	6.750	10.70	170	396.7	16146	66.8	.040	2.5	15.87	645.8	2.7
11	1500	0.0	0	24.3	1.55	1.50	1646	42000	1.300	4.36	5	701.2	438	.3	.067	0.0	46.77	29.2	.0
12	600	0.0	0	20.3	1.50	1.50	1701	5000	4.300	11.92	50	50.9	884	1.7	.040	0.0	2.03	35.3	.1
13	2500	208.0	99	2.0	1.30	20.00	26169	3200	6.440	11.01	1150	471.3	19158	562.3	.040	4.0	18.85	766.3	22.5
14	2500	181.0	86	4.9	1.40	20.00	17405	1650	1.120	14.53	3250	186.8	2561	1221.6	.040	3.4	7.47	102.5	48.9
15	2500	156.0	74	7.1	1.78	17.00	16246	1500	.610	14.79	3550	156.7	1287	1231.3	.040	3.0	6.27	51.5	44.3
16	2500	129.0	61	8.8	1.32	11.00	14175	580	.130	14.18	4250	57.2	259	1392.0	.040	2.5	2.29	10.4	55.7
17	2500	104.0	50	11.4	1.38	10.00	12326	785	.100	13.91	4650	68.7	177	1350.7	.040	2.0	2.75	7.1	54.0
18	2500	77.0	37	14.4	1.35	8.00	10080	940	.130	14.18	4600	65.8	184	1068.7	.040	1.5	2.63	7.4	42.7
19	2500	52.0	25	17.3	1.24	6.00	8231	850	.150	14.31	3250	48.1	171	610.6	.040	1.0	1.92	6.9	24.4
20	2500	25.0	12	19.6	1.11	4.50	6846	1000	.150	14.42	1450	47.0	142	304.3	.040	.5	1.88	5.7	12.2
21	2500	0.0	0	21.4	1.18	3.50	5045	7500	.180	13.63	650	254.9	126	74.8	.040	0.0	10.40	5.0	3.0
22	2500	0.0	0	25.9	1.46	1.50	1748	12000	.850	3.81	15	357.9	512	1.5	.040	0.0	14.31	20.5	.1
23	600	0.0	0	20.4	1.69	1.50	1510	5850	4.350	12.09	56	51.9	774	1.7	.067	0.0	3.46	52.0	.1

CYCLE COMPOSITE HC 6.583 GRAM/BHP HR

CO 70.177 GRAM/BHP HR

NO2 15.474 GRAM/BHP HR

PROJECT 11-2877-01 PROCEDURAL DEVELOPMENT
1-29-72 RUN 1 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.42	2.00	1772	6700	5.500	11.13	90	68.6	1138	3.1	.067	0.0	4.58	75.9	.2
2	1500	0.0	0	20.5	1.08	2.00	3150	18000	.440	12.47	251	385.5	140	17.8	.040	0.0	15.42	7.6	.7
3	1500	26.0	7	18.8	1.31	3.00	3895	6200	.400	14.31	848	157.5	205	71.5	.040	.3	6.30	8.2	2.4
4	1500	54.5	16	16.4	1.05	3.00	4860	3150	.180	14.53	2165	101.4	118	232.5	.040	.6	4.08	4.7	9.3
5	1500	81.0	23	13.9	1.16	4.00	5866	2800	.130	14.53	3222	109.4	103	420.0	.040	.9	4.40	4.1	16.8
6	1500	109.0	31	11.3	1.17	5.00	7264	1500	.130	14.53	3512	73.6	129	572.3	.040	1.2	2.94	5.2	22.4
7	1500	135.0	39	8.6	1.41	6.00	7238	1400	.250	14.31	2948	43.2	248	480.3	.040	1.5	3.73	4.9	19.2
8	1500	163.5	47	6.0	2.44	16.00	10430	2200	.640	14.42	3110	157.4	425	738.6	.040	1.9	6.29	37.0	29.5
9	1500	189.5	54	3.5	1.03	9.50	15684	2650	1.720	13.95	2680	260.4	3421	876.0	.040	2.2	10.44	136.8	35.0
10	1500	218.0	62	0.0	1.05	13.00	21060	3800	6.750	10.70	500	448.8	16105	196.1	.040	2.5	17.95	644.2	7.8
11	1500	0.0	0	24.5	1.18	1.00	1442	54500	1.540	4.45	116	715.4	386	4.6	.067	0.0	47.71	25.8	.3
12	600	0.0	0	19.8	1.44	2.00	1710	9000	4.640	11.72	143	88.4	436	4.7	.040	0.0	3.56	37.4	.2
13	2500	208.0	99	2.3	1.02	16.00	26682	4150	6.640	10.84	1170	617.1	19443	577.6	.040	4.0	24.68	747.7	23.1
14	2500	181.0	86	4.9	1.11	12.00	18384	2250	1.340	14.53	3365	257.1	3043	1276.4	.040	3.4	10.28	123.7	51.1
15	2500	156.0	74	7.1	1.05	10.00	16200	2100	.740	14.79	3664	216.1	1538	1252.0	.040	3.0	8.65	61.5	50.1
16	2500	129.0	61	8.8	.44	8.00	13745	860	.100	14.42	4147	80.4	140	1245.7	.040	2.5	3.24	7.6	51.8
17	2500	104.0	50	11.4	1.10	8.00	12371	1100	.100	14.42	4147	93.0	171	1164.2	.040	2.0	3.72	6.8	46.6
18	2500	77.0	37	14.4	.44	6.00	10304	1250	.100	14.31	4147	88.7	143	976.5	.040	1.5	3.55	5.7	39.1
19	2500	52.0	25	17.3	1.23	6.00	8248	1200	.150	14.66	3222	66.7	168	544.5	.040	1.0	2.67	6.7	23.8
20	2500	25.0	12	19.2	1.00	4.00	6804	1390	.150	14.66	2032	63.3	138	307.1	.040	.5	2.53	5.5	12.3
21	2500	0.0	0	21.2	1.30	4.00	5234	8800	.210	14.18	768	301.6	145	87.4	.040	0.0	12.06	5.8	3.5
22	2500	0.0	0	25.5	1.01	1.00	1684	33000	1.140	4.11	103	648.5	460	6.7	.040	0.0	25.94	18.4	.3
23	600	0.0	0	19.8	1.04	1.00	1636	9000	4.640	11.84	156	84.5	889	4.4	.067	0.0	5.63	54.3	.3

CYCLE COMPOSITE HC 7.470 GRAM/BHP HR

CO 72.514 GRAM/BHP HR

NO2 15.458 GRAM/BHP HR

BSFC .620 LB/BHP HR

23 MODE CALCULATIONS USING NO2 MEASURED BY CHEMILUMINESCENCE

1-29-72 RUN 1 1970 CHEVROLET 292 CID 6 CYL. TRUCK 9 CHASSIS DYNAMOMETER

MODE	SPEED	DYNA. LOAD	HP	MAN. VAC.	FUEL RATE MIN.	FUEL RATE OZ.	FUEL RATE GM/HR	CONCENTRATION AS MEASURED HC	CO	CO2	NO	CALCULATED GRAM/HR HC	CO	NO2	WT. FAC.	WEIGHTED GRAM/HR HP	HC	CO	NO2
1	600	0.0	0	19.8	1.92	2.00	1772	6700	5.500	11.13	93	68.6	1138	1.9	.067	0.0	9.58	75.9	.1
2	1500	0.0	0	20.5	1.08	2.00	3150	18000	.990	12.97	200	385.5	190	19.2	.090	0.0	15.92	7.6	.6
3	1500	26.0	7	18.8	1.31	3.00	3895	6200	.900	19.31	715	157.5	205	60.3	.090	.3	6.30	8.2	2.9
4	1500	59.5	16	16.9	1.05	3.00	9860	3150	.180	19.53	1850	101.9	118	198.7	.090	.6	9.08	9.7	7.9
5	1500	81.0	23	13.9	1.16	9.00	5866	2800	.130	19.63	2800	109.9	103	365.0	.090	.9	9.90	9.1	19.6
6	1500	109.0	31	11.3	1.17	5.00	7269	1500	.130	19.53	3000	73.6	129	488.9	.090	1.2	2.99	5.2	19.6
7	1500	135.0	39	8.6	1.91	6.00	7238	1900	.250	19.31	2650	93.2	298	931.7	.090	1.5	3.73	9.9	17.3
8	1500	163.5	47	6.0	2.49	16.00	10930	2200	.690	19.92	2800	157.9	925	665.0	.090	1.9	6.29	37.0	26.6
9	1500	189.5	54	3.5	1.03	9.50	15689	2650	1.720	13.95	2300	260.9	3921	751.8	.090	2.2	10.99	136.8	30.1
10	1500	218.0	62	0.0	1.05	13.00	21060	3800	6.750	10.70	170	998.8	16105	66.7	.090	2.5	17.95	699.2	2.7
11	1500	0.0	0	24.5	1.18	1.00	1492	59500	1.590	9.95	5	715.9	386	.2	.067	0.0	97.71	25.8	.0
12	600	0.0	0	19.8	1.99	2.00	1710	9000	9.690	11.72	50	88.9	936	1.6	.090	0.0	3.56	37.9	.1
13	2500	208.0	99	2.3	1.02	16.00	26682	9150	6.690	10.89	1150	617.1	19993	567.7	.090	9.0	29.68	797.7	22.7
14	2500	181.0	86	9.9	1.11	12.00	18389	2250	1.390	19.53	3250	257.1	3093	1232.8	.090	3.9	10.28	123.7	99.3
15	2500	156.0	74	7.1	1.05	10.00	16200	2100	.790	19.79	3550	216.1	1538	1213.0	.090	3.0	8.65	61.5	98.5
16	2500	129.0	61	8.8	.99	8.00	13795	860	.100	19.92	9250	80.9	190	1327.9	.090	2.5	3.29	7.6	53.1
17	2500	109.0	50	11.9	1.10	8.00	12371	1100	.100	19.92	9650	93.0	171	1305.9	.090	2.0	3.72	6.8	52.2
18	2500	77.0	37	19.9	.99	6.00	10309	1250	.100	19.31	9600	88.7	193	1083.2	.090	1.5	3.55	5.7	93.3
19	2500	52.0	25	17.3	1.23	6.00	8298	1200	.150	19.66	3250	66.7	168	599.7	.090	1.0	2.67	6.7	29.0
20	2500	25.0	12	19.2	1.00	9.00	6809	1390	.150	19.66	1950	63.3	138	299.7	.090	.5	2.53	5.5	11.8
21	2500	0.0	0	21.2	1.30	9.00	5239	8800	.210	19.18	650	301.6	195	79.0	.090	0.0	12.06	5.8	3.0
22	2500	0.0	0	25.5	1.01	1.00	1689	33000	1.160	9.11	15	698.5	960	1.0	.090	0.0	25.99	18.9	.0
23	600	0.0	0	19.8	1.09	1.00	1636	9000	9.690	11.89	56	89.5	889	1.8	.067	0.0	5.63	59.3	.1

CYCLE COMPOSITE HC 7.970 GRAM/BHP HR

CO 72.519 GRAM/BHP HR

NO2 19.877 GRAM/BHP HR

OUTPUT FILE LINE LIMIT EXCEEDED
ERROR NUMBER 0089 DETECTED BY OUTPTC AT ADDRESS 007910
CALLED FROM TW23 AT 000376

ERROR SUMMARY

ERROR	TIMES
0089	0001

APPENDIX J

NINE-MODE FEDERAL TEST PROCEDURE RESULTS EXPRESSED AS GRAMS PER BHP-HR EMISSIONS BASED ON RAW EXHAUST NDIR CONCENTRATIONS BY CALIFORNIA ARB METHOD FOR NINE TRUCKS-ENGINES

EXPLANATION OF 9 MODE COMPUTER PRINTOUT

1. Column Explanation

Column	Column Title	Explanation
1	Mass Mode	Mode Number and Inlet Vacuum (inches of Mercury)
2	As Measured HC	Measured Hydrocarbon Emissions, ppm or n-hexane
3	As Measured CO	Measured Carbon Monoxide Emissions in Percent
4	As Measured CO_2	Measured Carbon Dioxide Emissions in Percent
5	As Measured NO	Measured Nitrogen Oxide Emissions in ppm
6	Total Carbon	The Percentage of Exhaust Gas That is Carbon Containing Gases
7	Fuel Cons.	Engine Fuel Consumption in Grams/Hr.
8	Adjusted (Mass)HC	Hydrocarbon Emissions in Grams/Hr Calculated from Measured HC
9	Adjusted (Mass)CO	Carbon Monoxide Emissions in Grams/Hr Calculated from Measured CO
10	Adjusted (Mass)NO_2	Nitrogen Dioxide Emissions in Grams/Hr Calculated from Measured NO
11	WT. FACT.	Weighting Factor for Each Mode
12	Weighted (Mass)HC	Hydrocarbon Emissions in Grams/Hr Times the Weighting Factor
13	Weighted (Mass)CO	Carbon Monoxide Emissions in Grams/Hr Times the Weighting Factor
14	Weighted (Mass) NO_2(K)	Oxides of Nitrogen Emissions as NO_2 in Grams/Hr Times the Weighting Factor
15	HP	Engine Horsepower from Dynamometer

2. Line Explanation

Line Starting	Explanation
Sum --Cycle Composite	Grams/BHP-HR for cycle, Sumation of Each Weighted Emission Type Divided by the Sumation of Horsepower Times Weighting Factor, i. e. $\frac{\sum_{1}^{9} \text{Emission} \times \text{W.F.}}{\sum_{1}^{9} \text{HP} \times \text{W.F.}}$

Line Starting	Explanation
Average Sum - (Composite Values for Cycles 1 and 2)	$\frac{\text{SUM (cycle 1) + SUM (Cycle 2)}}{2}$ Grams/BHP-HR
Average Sum - (Composite Values for Cycles 3 and 4)	$\frac{\text{SUM (cycle 3) + SUM (cycle 4)}}{2}$
Four Cycle Composite	Composite of All Four Cycles in Grams/BHP-HR Using Formula Shown,

TABLE J-1. CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 1

Engine: Ford 300 CID, 6 cyl. Vehicle: 1970 Ford, 10,000 GVW Stake

Date	Run	Dynamometer	Emissions Grams/BHP-HR HC	CO	NO_2 Obs.	NO_2 Corr.
8-5-71	1	Stationary	1.53	58.0	11.58	12.92
8-6-71	1	Stationary	1.64	57.2	11.68	12.86
8-6-71	2	Stationary	1.59	60.1	11.89	13.09
		Average	1.57	58.3	11.73	12.96
Percent spread $= \left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			6.4	5.1	2.6	1.8
8-11-71	1	Chassis	1.69	39.6	8.87	8.81
8-11-71	2	Chassis	1.83	41.0	10.01	9.94
8-11-71	3	Chassis	1.88	41.6	9.53	9.46
		Average	1.80	41.0	9.47	9.40
Percent spread $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			11.1	4.9	11.6	12.0
Average Stationary			1.57	58.3	11.73	12.96
Average Chassis			1.80	41.0	9.47	9.40
Difference (Chassis - Stationary)			0.23	-17.3	-2.26	-3.56
Percent Difference $\frac{\text{Chassis - Stationary}}{\text{Stationary}} \times 100$			14.6	-29.7	-19.3	-27.5

8-5-71 TRUCK 1 1970 FORD 300CID 6 STAT. RUN1 P2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	186	4.508	11.77	86	16.479	2009	25	1110	3	.036	.9	40	.1	0
2 16 MG	74	.247	12.92	1686	13.247	7071	44	266	299	.089	3.9	24	26.6	22
3 10 MG	64	.281	13.42	2795	14.770	10840	56	447	730	.257	14.5	115	187.7	46
4 16 MG	50	.253	13.15	2022	13.457	7071	29	269	353	.089	2.6	24	31.4	22
5 19 MG	52	.247	13.89	1574	14.213	5316	22	202	195	.047	1.0	4	9.2	11
6 16 MG	51	.302	13.17	2434	13.527	7071	30	318	422	.089	2.7	28	37.6	22
7 3 MG	62	2.446	12.34	1129	15.353	16717	74	6480	408	.283	21.4	1834	115.5	67
8 16 MG	44	.295	13.24	1842	13.583	7071	26	310	318	.089	2.3	26	28.3	22
9 C.T.	4142	3.757	6.35	130	14.580	2021	643	1052	6	.021	13.5	22	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	54	11.2	
CYCLE 2														
1 IDLE	186	4.509	11.77	86	16.479	2009	25	1110	3	.036	.9	40	.1	0
2 16 MG	72	.271	12.97	2108	13.319	7071	43	291	372	.089	3.8	26	33.1	22
3 10 MG	59	.302	13.40	2961	13.766	10840	52	480	774	.257	13.4	123	198.9	46
4 16 MG	44	.274	13.11	2183	13.432	7071	26	291	382	.089	2.3	26	34.0	22
5 19 MG	48	.284	13.95	1466	14.286	5316	20	213	181	.047	.9	10	8.5	11
6 16 MG	46	.271	13.23	2345	13.551	7071	27	286	406	.089	2.4	25	36.2	22
7 3 MG	67	3.468	12.35	1095	15.840	16717	74	7370	382	.283	22.3	2086	108.2	67
8 16 MG	35	.287	13.14	2306	13.515	7071	21	303	401	.089	1.8	27	35.6	22
9 C.T.	4052	3.687	6.84	172	14.953	2021	613	1007	8	.021	12.9	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.6	61	11.6	
CYCLE 3														
1 IDLE	194	5.143	11.61	137	16.463	2009	26	1230	5	.036	.9	44	.2	0
2 16 MG	70	.277	13.11	2091	13.463	7071	41	294	365	.089	3.7	26	32.5	22
3 10 MG	56	.311	13.42	3029	13.791	10840	49	494	790	.257	12.7	127	203.1	46
4 16 MG	43	.277	13.17	2379	13.493	7071	25	293	414	.089	2.2	26	36.8	22
5 19 MG	46	.287	13.84	1475	14.227	5316	19	217	183	.047	.9	10	8.6	11
6 16 MG	44	.274	13.13	2395	13.452	7071	26	291	418	.089	2.3	26	37.2	22
7 3 MG	62	3.220	12.32	892	15.607	16717	74	6967	317	.283	21.0	1972	89.8	67
8 16 MG	33	.291	13.13	2438	13.457	7071	19	309	425	.089	1.7	27	37.9	22
9 C.T.	3929	3.571	7.01	203	14.824	2021	600	983	9	.021	12.6	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.5	58	11.4	
CYCLE 4														
1 IDLE	194	5.143	11.61	137	16.463	2009	26	1230	5	.036	.9	44	.2	0
2 16 MG	72	.265	13.09	2210	13.433	7071	42	282	384	.089	3.8	25	34.4	22
3 10 MG	59	.303	13.38	3077	13.747	10840	52	483	806	.257	13.4	124	207.0	46
4 16 MG	46	.266	13.17	2503	13.486	7071	27	282	436	.089	2.4	25	38.8	22
5 19 MG	48	.271	13.92	1506	14.243	5316	20	204	187	.047	.9	10	8.8	11
6 16 MG	44	.261	13.17	2502	13.479	7071	26	277	436	.089	2.3	25	38.8	22
7 3 MG	60	3.246	12.39	1016	15.701	16717	72	6981	359	.283	20.2	1976	101.6	67
8 16 MG	36	.278	13.17	2443	13.487	7071	21	294	425	.089	1.9	26	37.8	22
9 C.T.	4076	3.718	6.75	181	14.870	2021	620	1021	8	.021	13.0	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.5	58	11.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.6	58	11.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.5	58	11.7	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.5) = 1.525 (MASS)
CO 0.35(58) + 0.65(58) = 58.0 (MASS)
NO2 0.35(11.4) + 0.65(11.7) = 11.576 (MASS)

8-06-71 RUN 1 TRUCK 1 1970 FORD 300CID 6 STAT. P2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	149	3.536	11.10	66	14.747	2009	23	970	3	.036	.8	36	.1	0
2 16 MG	66	.188	12.43	1641	12.689	7071	41	212	304	.089	3.7	19	27.0	22
3 10 MG	57	.173	12.48	2601	12.715	10840	54	248	736	.257	14.0	77	189.2	46
4 16 MG	45	.186	12.56	1911	12.795	7071	28	208	351	.089	2.5	18	31.2	22
5 19 MG	50	.202	13.59	1374	13.846	5316	22	157	175	.047	1.0	7	8.2	11
6 16 MG	46	.187	12.62	2027	12.857	7071	28	208	370	.089	2.5	18	32.9	22
7 3 MG	67	3.111	11.50	982	14.683	16717	85	7155	371	.283	24.2	2025	105.0	67
8 16 MG	45	.198	12.97	2486	13.217	7071	27	214	442	.089	2.4	19	39.3	22
9 C.T.	3825	3.272	6.14	160	13.543	2021	639	986	8	.021	13.4	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.6	57	11.1	
CYCLE 2														
1 IDLE	149	3.536	11.10	66	14.747	2009	23	970	3	.036	.8	35	.1	0
2 16 MG	72	.203	12.72	1959	13.001	7071	44	223	354	.089	3.9	20	31.5	22
3 10 MG	55	.211	12.64	2666	12.930	10840	52	357	742	.257	13.3	92	190.7	46
4 16 MG	43	.203	12.73	2105	12.979	7071	26	223	361	.089	2.3	20	33.9	22
5 19 MG	50	.220	13.64	1387	13.914	5316	21	170	176	.047	1.0	8	8.3	11
6 16 MG	44	.199	12.81	2138	13.057	7071	27	218	384	.089	2.4	19	34.2	22
7 3 MG	67	3.200	11.61	1046	14.882	16717	84	7261	390	.283	23.9	2055	110.4	67
8 16 MG	35	.222	12.74	2183	13.000	7071	21	244	394	.089	1.9	22	35.1	22
9 C.T.	3777	3.290	6.33	161	13.699	2021	624	980	8	.021	13.1	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.6	59	11.4	
CYCLE 3														
1 IDLE	183	4.770	11.10	127	16.068	2009	26	1205	5	.036	.9	43	.2	0
2 16 MG	73	.198	12.76	2080	13.037	7071	44	217	375	.089	3.9	19	33.3	22
3 10 MG	57	.195	12.65	2755	12.907	10840	54	331	768	.257	13.8	85	197.4	46
4 16 MG	46	.200	12.69	2146	12.940	7071	28	221	389	.089	2.5	20	34.7	22
5 19 MG	52	.212	13.54	1488	13.808	5316	22	165	190	.047	1.1	8	8.9	11
6 16 MG	46	.199	12.75	2203	12.999	7071	28	219	398	.089	2.5	19	35.4	22
7 3 MG	67	3.114	11.61	1037	14.746	16717	85	7107	389	.283	24.0	2011	110.1	67
8 16 MG	38	.218	12.74	2220	13.044	7071	23	239	399	.089	2.1	21	35.5	22
9 C.T.	3759	3.298	6.29	166	13.648	2021	623	987	8	.021	13.1	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.6	57	11.6	
CYCLE 4														
1 IDLE	183	4.770	11.10	127	16.068	2009	26	1205	5	.036	.9	43	.2	0
2 16 MG	73	.199	12.71	2199	12.988	7071	45	219	388	.089	4.0	19	34.5	22
3 10 MG	59	.207	12.84	2854	13.111	10840	55	346	783	.257	14.0	89	201.3	46
4 16 MG	46	.205	12.74	2194	12.995	7071	28	225	396	.089	2.5	20	35.3	22
5 19 MG	54	.219	13.74	1449	14.017	5316	23	168	182	.047	1.1	6	8.6	11
6 16 MG	48	.200	12.82	2292	13.072	7071	29	219	412	.089	2.6	19	36.6	22
7 3 MG	64	3.040	11.73	1045	14.839	16717	81	6918	391	.283	22.9	1958	110.6	67
8 16 MG	54	.197	11.34	2821	11.595	7071	37	243	571	.089	3.3	22	50.8	22
9 C.T.	3960	3.390	6.14	172	13.807	2021	649	1002	8	.021	13.6	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	56	12.2	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.6	56	11.2	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.6	57	11.9	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.6) = 1.637 (MASS)
CO 0.35(58) + 0.65(57) = 57.2 (MASS)
NO2 0.35(11.2) + 0.65(11.9) = 11.680 (MASS)

8-06-71 RUN2 TRUCK 1 1970 FORD 300CID 6 STAT. P2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	173	4.479	10.88	55	15.546	2009	25	1169	2	.036	.9	42	.1	0
2 16 MG	62	.181	12.66	1821	12.908	7071	38	200	331	.089	3.4	18	29.5	22
3 10 MG	53	.174	12.69	2832	12.921	10840	50	295	789	.257	12.8	76	202.7	46
4 16 MG	43	.182	12.75	2074	12.978	7071	26	200	375	.089	2.3	18	33.4	22
5 19 MG	49	.197	13.72	1464	13.970	5316	21	151	185	.047	1.0	7	8.7	11
6 16 MG	44	.187	12.85	2125	13.085	7071	27	204	381	.089	2.4	18	33.9	22
7 3 MG	69	3.448	11.60	1292	15.143	16717	85	7734	474	.283	24.1	2189	134.0	67
8 16 MG	32	.194	12.80	2186	13.029	7071	19	213	394	.089	1.7	19	35.1	22
9 C.T.	3669	3.165	6.40	129	13.528	2021	614	955	6	.021	12.9	20	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	61	12.2	
CYCLE 2														
1 IDLE	173	4.479	10.88	55	15.546	2009	25	1169	2	.036	.9	42	.1	0
2 16 MG	66	.186	12.73	2163	12.987	7071	40	205	391	.089	3.6	18	34.8	22
3 10 MG	53	.189	12.73	2653	12.976	10840	50	319	736	.257	12.7	82	189.1	46
4 16 MG	43	.183	12.84	1972	13.069	7071	26	200	354	.089	2.3	18	31.5	22
5 19 MG	47	.191	13.65	1531	13.892	5316	20	148	195	.047	.9	7	9.1	11
6 16 MG	46	.192	12.92	2137	13.162	7071	28	208	381	.089	2.5	19	33.9	22
7 3 MG	73	3.542	11.74	1255	15.361	16717	89	7787	453	.283	25.2	2204	128.3	67
8 16 MG	36	.199	12.87	1791	13.108	7071	22	217	321	.089	1.9	19	28.5	22
9 C.T.	3835	3.375	6.07	95	13.587	2021	639	1014	5	.021	13.4	21	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	62	11.6	
CYCLE 3														
1 IDLE	176	4.702	11.26	93	16.152	2009	25	1181	4	.036	.9	43	.1	0
2 16 MG	67	.184	12.80	1967	13.056	7071	41	201	354	.089	3.6	18	31.5	22
3 10 MG	55	.206	12.81	2731	13.075	10840	51	345	752	.257	13.1	89	193.2	46
4 16 MG	44	.183	12.87	2206	13.101	7071	27	200	395	.089	2.4	18	35.2	22
5 19 MG	55	.222	13.84	1305	14.171	5316	23	168	163	.047	1.1	8	7.6	11
6 16 MG	46	.184	12.95	2264	13.184	7071	28	199	403	.089	2.5	18	35.9	22
7 3 MG	68	3.393	11.66	1145	15.126	16717	84	7575	420	.283	23.8	2144	118.9	67
8 16 MG	35	.206	12.84	2207	13.134	7071	21	224	394	.089	1.9	20	35.1	22
9 C.T.	3744	3.263	6.10	127	13.461	2021	638	990	6	.021	13.4	21	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	61	11.7	
CYCLE 4														
1 IDLE	176	4.702	11.26	93	16.152	2009	25	1181	4	.036	.9	43	.1	0
2 16 MG	71	.194	12.83	2044	13.101	7071	43	212	366	.089	3.8	19	32.6	22
3 10 MG	58	.218	12.84	2778	13.141	10840	54	363	761	.257	13.8	93	195.5	46
4 16 MG	43	.187	12.78	2233	13.013	7071	26	205	403	.089	2.3	18	35.9	22
5 19 MG	50	.206	13.80	1408	14.060	5316	21	157	177	.047	1.0	7	8.3	11
6 16 MG	43	.185	12.81	2204	13.041	7071	26	203	397	.089	2.3	18	35.3	22
7 3 MG	62	3.143	11.65	1201	14.860	16717	78	7142	449	.283	22.1	2021	126.9	67
8 16 MG	48	.181	13.33	2418	13.563	7071	28	191	417	.089	2.5	17	37.2	22
9 C.T.	3703	3.370	6.17	132	13.539	2021	619	1016	7	.021	13.0	21	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	58	12.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.6	62	11.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.6	59	11.4	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.6) = 1.592 (MASS)
CO 0.35(42) + 0.65(59) = 60.1 (MASS)
NO2 0.35(11.9) + 0.65(11.9) = 11.893 (MASS)

8-11-71 TRUCK 1 1970 FORD 300CID 6 CHASSIS RUN1 P2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	167	4.550	11.79	93	16.520	2009	23	1118	4	.036	.8	40	.1	0
2 16 MG	73	.222	13.26	1526	13.561	7071	43	234	264	.089	3.8	21	23.5	22
3 10 MG	58	.198	13.04	2657	13.301	10840	53	326	719	.257	13.6	84	184.8	46
4 16 MG	50	.220	13.16	1600	13.434	7071	29	234	280	.089	2.6	21	24.4	22
5 19 MG	53	.253	14.24	1011	14.550	5316	22	187	123	.047	1.0	4	5.8	11
6 16 MG	49	.219	13.24	1707	13.512	7071	29	232	297	.089	2.4	21	26.4	22
7 3 MG	50	2.070	12.49	648	14.614	16717	64	4783	254	.283	18.1	1354	71.8	67
8 16 MG	40	.238	13.22	1728	13.501	-0	0	0	0	.089	0.0	0	0.0	22
9 C.T.	4247	2.448	5.78	147	13.419	2021	725	912	7	.021	15.2	19	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.5	40	8.6	
CYCLE 2														
1 IDLE	167	4.550	11.79	93	16.520	2009	23	1118	4	.036	.8	40	.1	0
2 16 MG	101	.225	13.25	1789	13.584	7071	59	237	309	.089	5.2	21	27.5	22
3 10 MG	71	.199	12.96	2766	13.236	10840	65	329	752	.257	16.7	85	193.3	46
4 16 MG	61	.220	13.14	1778	13.426	7071	36	234	311	.089	3.2	21	27.7	22
5 19 MG	88	.279	14.31	1027	14.684	5316	36	204	123	.047	1.7	10	5.8	11
6 16 MG	59	.219	13.35	1928	13.628	7071	34	224	332	.089	3.1	20	29.6	22
7 3 MG	57	1.974	12.44	629	14.476	16717	74	4605	241	.283	20.9	1303	68.2	67
8 16 MG	45	.243	13.15	1791	13.442	-0	0	0	0	.089	0.0	0	0.0	22
9 C.T.	4326	3.046	5.90	181	13.658	2021	717	922	9	.021	15.1	19	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	34	9.0	
CYCLE 3														
1 IDLE	221	5.533	11.36	147	17.132	2009	29	1311	6	.036	1.0	47	.2	0
2 16 MG	104	.235	13.26	1768	13.607	7071	61	247	305	.089	5.4	22	27.1	22
3 10 MG	73	.206	12.95	2766	13.235	10840	67	341	752	.257	17.2	88	193.3	46
4 16 MG	62	.233	13.04	1780	13.340	7071	37	244	312	.089	3.3	22	27.8	22
5 19 MG	68	.260	14.18	1075	14.513	5316	28	142	131	.047	1.3	4	6.1	11
6 16 MG	59	.223	13.33	1859	13.617	7071	34	234	320	.089	3.1	21	28.5	22
7 3 MG	60	2.051	12.34	582	14.446	16717	77	4778	223	.283	21.9	1352	63.1	67
8 16 MG	47	.235	13.11	1850	13.346	-0	0	0	0	.089	0.0	0	0.0	22
9 C.T.	4281	3.073	5.80	186	13.446	2021	718	930	9	.021	15.1	20	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	40	8.9	
CYCLE 4														
1 IDLE	221	5.533	11.34	147	17.132	2009	29	1311	6	.036	1.0	47	.2	0
2 16 MG	107	.224	13.22	1821	13.560	7071	62	236	315	.089	5.6	21	28.1	22
3 10 MG	75	.196	12.97	2797	13.247	10840	69	324	760	.257	17.7	83	195.3	46
4 16 MG	64	.220	13.08	1868	13.369	7071	38	235	328	.089	3.4	21	29.2	22
5 19 MG	69	.263	14.09	1108	14.428	5316	28	196	136	.047	1.3	9	6.4	11
6 16 MG	61	.221	13.27	1887	13.557	7071	36	233	327	.089	3.2	21	29.1	22
7 3 MG	58	1.984	12.51	571	14.557	16717	75	4602	218	.283	21.1	1302	61.6	67
8 16 MG	46	.240	13.12	1800	13.410	-0	0	0	0	.089	0.0	0	0.0	22
9 C.T.	4221	3.040	5.81	149	13.409	2021	713	926	10	.021	15.0	19	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	34	8.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.6	39	8.8	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.7	40	8.9	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.7) = 1.690 (MASS)
CO 0.35(39) + 0.65(40) = 39.6 (MASS)
NO2 0.35(8.8) + 0.65(8.9) = 8.868 (MASS)

8-11-71 TRUCK 1 1970 FORD 300CID 6 CHASSIS RUN2 P2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	177	4.844	11.69	86	16.725	2009	24	1175	3	.036	.9	42	.1	0
2 16 MG	95	.249	13.96	2124	14.312	7071	53	249	348	.089	4.7	22	31.0	22
3 10 MG	66	.226	13.20	2867	13.497	10840	59	367	764	.257	15.3	94	196.5	46
4 16 MG	60	.251	13.51	1863	13.826	7071	34	259	316	.089	3.1	23	28.2	22
5 19 MG	64	.294	14.40	1097	14.763	5316	26	214	131	.047	1.2	10	6.2	11
6 16 MG	60	.252	13.46	1915	13.777	7071	34	261	326	.089	3.1	23	29.0	22
7 3 MG	59	2.051	12.64	698	14.755	16717	75	4694	263	.283	21.2	1326	74.3	67
8 16 MG	49	.273	13.43	1861	13.756	7071	28	283	318	.089	2.5	25	28.3	22
9 C.T.	4134	3.193	6.02	141	13.678	2021	684	953	7	.021	14.4	20	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.7	41	10.1	
CYCLE 2														
1 IDLE	177	4.844	11.69	86	16.725	2009	24	1175	3	.036	.9	42	.1	0
2 16 MG	113	.273	13.61	1856	14.005	7071	64	278	311	.089	5.7	25	27.7	22
3 10 MG	82	.239	13.39	3023	13.718	10840	73	382	793	.257	18.7	98	203.8	46
4 16 MG	72	.256	13.61	2097	13.944	7071	41	262	353	.089	3.6	23	31.4	22
5 19 MG	81	.375	14.62	1213	15.082	5316	32	267	142	.047	1.5	13	6.7	11
6 16 MG	70	.261	13.81	2179	14.147	7071	39	264	362	.089	3.5	23	32.2	22
7 3 MG	62	2.007	12.71	590	14.784	16717	79	4584	221	.283	22.2	1297	62.7	67
8 16 MG	52	.276	13.51	1890	13.842	7071	30	285	321	.089	2.6	25	28.5	22
9 C.T.	4048	3.152	6.11	148	13.688	2021	678	940	7	.021	14.2	20	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.9	40	10.0	
CYCLE 3														
1 IDLE	229	5.715	11.49	111	17.452	2009	30	1329	4	.036	1.1	48	.2	0
2 16 MG	109	.263	13.63	1900	14.011	7071	62	268	318	.089	5.5	24	28.3	22
3 10 MG	82	.235	13.34	3059	13.684	10840	73	376	805	.257	18.7	97	206.8	46
4 16 MG	71	.256	13.57	1997	13.903	7071	40	263	337	.089	3.6	23	30.0	22
5 19 MG	79	.300	14.45	1212	14.835	5316	32	217	144	.047	1.5	10	6.8	11
6 16 MG	66	.253	13.60	2028	13.924	7071	38	260	342	.089	3.3	23	30.4	22
7 3 MG	65	2.075	12.64	552	14.785	16717	82	4739	207	.283	23.3	1341	58.6	67
8 16 MG	56	.270	13.67	2113	14.000	7071	32	275	354	.089	2.8	25	31.5	22
9 C.T.	4106	3.188	6.25	170	13.872	2021	670	938	8	.021	14.1	20	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.9	41	10.0	
CYCLE 4														
1 IDLE	229	5.715	11.49	111	17.452	2009	30	1329	4	.036	1.1	48	.2	0
2 16 MG	104	.260	13.58	1829	13.958	7071	62	266	308	.089	5.5	24	27.4	22
3 10 MG	81	.239	13.35	3011	13.676	10840	72	383	792	.257	18.5	98	203.6	46
4 16 MG	69	.260	13.46	1925	13.795	7071	40	269	328	.089	3.5	24	29.2	22
5 19 MG	75	.299	14.44	1155	14.820	5316	30	217	138	.047	1.4	10	6.5	11
6 16 MG	68	.267	13.58	1487	13.920	7071	39	274	335	.089	3.4	24	29.8	22
7 3 MG	65	2.088	12.64	572	14.748	16717	82	4765	215	.283	23.3	1346	60.7	67
8 16 MG	55	.272	13.50	2099	13.831	7071	31	281	356	.089	2.8	25	31.7	22
9 C.T.	3628	3.303	6.61	174	13.831	2021	594	975	8	.021	12.5	20	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	41	9.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.8	40	10.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.9	41	10.0	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.8) + 0.65(1.9) = 1.833 (MASS)
CO 0.35(40) + 0.65(41) = 41.0 (MASS)
NO2 0.35(10.1) + 0.65(10.0) = 10.014 (MASS)

8-11-71RUN 3 TRUCK 1 1970 FORD 300CID 6 CHASSIS P2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	194	5.061	11.51	86	16.781	2009	26	1224	3	.036	.9	44	.1	0
2 16 MG	94	.262	13.37	1575	13.734	7071	54	272	269	.089	4.8	24	24.0	22
3 10 MG	75	.237	13.16	2679	13.478	10840	68	385	715	.257	17.4	94	183.8	46
4 16 MG	67	.254	13.52	2019	13.846	7071	38	262	342	.089	3.4	23	30.5	22
5 19 MG	69	.310	14.45	1053	14.835	5316	28	224	125	.047	1.3	11	5.9	11
6 16 MG	64	.256	13.54	1876	13.865	7071	37	264	318	.089	3.3	23	28.3	22
7 3 MG	61	1.968	12.67	755	14.704	16717	78	4520	245	.283	22.0	1279	80.6	67
8 16 MG	51	.272	13.47	1835	13.797	7071	29	282	312	.089	2.6	25	27.8	22
9 C.T.	4056	3.124	6.21	169	13.714	2021	669	930	8	.021	14.1	20	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	40	9.7	
CYCLE 2														
1 IDLE	194	5.061	11.51	86	16.781	2009	26	1224	3	.036	.9	44	.1	0
2 16 MG	111	.291	13.58	1812	13.991	7071	63	297	304	.089	5.6	26	27.1	22
3 10 MG	83	.267	13.40	2833	13.757	10840	73	425	741	.257	18.8	109	190.5	46
4 16 MG	73	.285	13.67	1947	14.034	7071	41	290	326	.089	3.7	26	29.0	22
5 19 MG	89	.356	14.53	1088	14.942	5316	35	255	128	.047	1.7	12	6.0	11
6 16 MG	69	.281	13.76	2044	14.116	7071	39	284	340	.089	3.4	25	30.3	22
7 3 MG	65	2.044	12.75	609	14.864	16717	82	4644	227	.283	23.2	1314	64.4	67
8 16 MG	57	.292	13.75	2026	14.104	7071	32	296	337	.089	2.8	26	30.0	22
9 C.T.	4272	3.213	6.05	125	13.877	2021	697	945	6	.021	14.6	20	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.9	41	9.6	
CYCLE 3														
1 IDLE	230	5.691	11.44	103	17.379	2009	30	1329	4	.036	1.1	48	.1	0
2 16 MG	112	.290	13.54	1757	14.001	7071	63	296	295	.089	5.6	26	26.2	22
3 10 MG	82	.271	13.34	2860	13.750	10840	72	432	749	.257	18.6	111	192.4	46
4 16 MG	71	.289	13.42	1847	13.786	7071	41	299	315	.089	3.6	27	28.0	22
5 19 MG	73	.324	14.44	1027	14.843	5316	29	234	122	.047	1.4	11	5.7	11
6 16 MG	67	.285	13.55	1848	13.907	7071	38	293	312	.089	3.4	26	27.8	22
7 3 MG	64	2.102	12.66	519	14.831	16717	81	4786	194	.283	22.9	1354	55.0	67
8 16 MG	54	.291	13.66	2032	14.009	7071	31	297	341	.089	2.7	26	30.3	22
9 C.T.	4140	3.161	6.19	149	13.822	2021	678	934	7	.021	14.2	20	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.9	42	9.3	
CYCLE 4														
1 IDLE	230	5.691	11.44	103	17.379	2009	30	1329	4	.036	1.1	48	.1	0
2 16 MG	106	.292	13.58	1825	13.986	7071	60	298	306	.089	5.3	27	27.3	22
3 10 MG	81	.274	13.37	2871	13.731	10840	72	437	752	.257	18.4	112	193.4	46
4 16 MG	72	.291	13.42	1903	13.789	7071	41	301	324	.089	3.7	27	28.8	22
5 19 MG	91	.321	14.38	1150	14.799	5316	37	233	137	.047	1.7	11	6.4	11
6 16 MG	68	.287	13.54	1945	13.900	7071	39	295	328	.089	3.4	26	29.2	22
7 3 MG	66	2.122	12.63	533	14.823	16717	83	4834	200	.283	23.6	1346	56.5	67
8 16 MG	57	.294	13.52	2046	13.876	7071	33	303	346	.089	2.9	27	30.8	22
9 C.T.	4229	3.160	6.18	154	13.907	2021	688	928	7	.021	14.5	14	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.9	43	9.5	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.8	40	9.7	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.9	42	9.4	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.8) + 0.65(1.9) = 1.877 (MASS)
CO 0.35(40) + 0.65(42) = 41.6 (MASS)
NO2 0.35(9.7) + 0.65(9.4) = 9.625 (MASS)

TABLE J-2. CHASSIS DYNAMOMETER TEST RESULTS
Correlation Truck No. 2

Engine: Ford 240 CID, 6 cyl.

Vehicle: 1970 Ford, 7500-lb GVW Pickup

Date	Run	Dynamometer	Emissions Grams/BHP-HR HC	CO	NO_2 Obs.	NO_2 Corr.
8-24-71	2	Chassis	2.63	19.7	14.72	14.62
8-25-71	3	Chassis	2.43	26.6	13.14	12.89
8-26-71	1	Chassis	2.42	22.0	14.68	14.74
8-26-71	2	Chassis	2.49	21.6	14.49	14.55
		Average	2.48	22.75	14.25	14.20
Percent spread $= \left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			8.1	30.7	11.2	11.1
9-2-71	1	Stationary	2.17	21.3	7.39	8.34
9-2-71	2	Stationary	2.08	17.4	10.13	11.43
9-2-71	3	Stationary	1.83	16.2	9.92	11.19
		Average	2.03	18.33	9.13	10.32
Percent spread $= \left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			19.7	27.3	28.5	29.9
9-21-71	1	Stationary	1.85	16.8	11.87	12.20
9-21-71	2	Stationary	1.81	15.7	11.86	12.19
9-21-71	3	Stationary	1.51	16.2	10.36	10.65
		Average	1.7	16.33	11.40	11.68
Percent spread $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			17.6	6.2	13.2	13.3
9-27-71	1	Chassis	2.37	27.6	9.80	9.91
9-27-71	2	Chassis	2.23	21.7	10.80	10.92
9-27-71	3	Chassis	2.16	23.2	10.15	10.26
9-27-71	4	Chassis	2.24	21.9	10.40	10.51
		Average	2.25	23.75	10.30	10.40
Percent spread $= \left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			8.9	25.3	5.8	9.7
Average Stationary			1.87	17.33	10.27	11.00
Average Chassis			2.36	23.25	12.28	12.30
Difference (Chassis - Stationary)			0.49	5.92	2.01	1.30
Percent Difference, $\frac{\text{Chassis-Stationary}}{\text{Stationary}} \times 100$			26.2	34.2	19.6	11.8

8-24-71 RUN 2 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	142	3.016	13.40	110	14.569	1745	17	642	4	.036	.6	23	.1	0
2 16 MG	186	.706	14.53	1863	15.437	5954	80	550	239	.089	7.2	49	21.2	19
3 10 MG	64	.146	14.00	1443	14.215	8703	44	181	293	.257	11.3	46	75.4	29
4 16 MG	154	.600	14.72	2088	15.486	5954	66	466	267	.089	5.9	41	23.7	19
5 19 MG	174	2.362	14.00	691	16.550	4682	55	1350	65	.047	2.6	63	3.1	8
6 16 MG	164	.753	14.63	2025	15.666	5954	72	582	257	.089	6.4	52	22.9	19
7 3 MG	94	.300	14.77	2614	15.172	12694	88	507	726	.283	24.9	143	205.5	45
8 16 MG	151	.653	14.75	2098	15.566	5954	65	505	266	.089	5.8	45	23.7	19
9 C.T.	3561	2.911	8.19	168	14.947	1718	458	676	6	.021	9.6	14	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.7	18	13.8	
CYCLE 2														
1 IDLE	142	3.016	13.40	110	16.569	1745	17	642	4	.036	.6	23	.1	0
2 16 MG	170	.768	14.56	2037	15.512	5954	73	545	260	.089	6.5	53	23.1	19
3 10 MG	56	.148	13.93	1613	14.138	8703	39	184	330	.257	9.9	47	84.7	29
4 16 MG	149	.636	14.63	2230	15.427	5954	64	446	286	.089	5.7	44	25.4	19
5 19 MG	164	2.259	14.01	797	16.446	4682	52	1299	75	.047	2.6	61	3.5	8
6 16 MG	162	.850	14.62	2090	15.645	5954	69	653	264	.089	6.1	58	23.6	19
7 3 MG	95	.454	14.74	2628	15.297	12694	88	761	724	.283	25.0	215	204.9	45
8 16 MG	150	.685	14.70	2195	15.547	5954	64	530	279	.089	5.7	47	24.8	19
9 C.T.	3268	2.704	8.34	202	14.573	1718	431	644	8	.021	9.1	14	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	21	14.3	
CYCLE 3														
1 IDLE	92	1.182	14.58	165	15.861	1745	11	263	6	.036	.4	9	.2	0
2 16 MG	168	.684	14.61	2053	15.475	5954	72	532	262	.089	6.4	47	23.3	19
3 10 MG	56	.150	14.02	1810	14.230	8703	38	185	368	.257	9.4	48	94.4	29
4 16 MG	148	.655	14.64	2144	15.455	5954	64	510	277	.089	5.7	46	24.6	19
5 19 MG	165	2.180	14.04	877	16.398	4682	53	1257	83	.047	2.5	59	3.9	8
6 16 MG	162	.744	14.63	2162	15.604	5954	69	616	274	.089	6.2	55	24.4	19
7 3 MG	93	.412	14.74	2673	15.252	12694	87	693	739	.283	24.5	146	209.0	45
8 16 MG	144	.688	14.66	2230	15.504	5954	62	534	284	.089	5.5	48	25.3	19
9 C.T.	3230	2.715	8.40	176	14.603	1718	426	645	7	.021	8.9	14	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.6	14	14.9	
CYCLE 4														
1 IDLE	92	1.182	14.58	155	15.861	1745	11	263	6	.036	.4	9	.2	0
2 16 MG	166	.687	14.57	2045	15.436	5954	72	535	268	.089	6.4	48	23.9	19
3 10 MG	57	.152	14.09	1837	14.304	8703	39	187	371	.257	10.0	48	95.4	29
4 16 MG	147	.628	14.60	2309	15.387	5954	64	491	297	.089	5.7	44	26.4	19
5 19 MG	165	2.202	13.99	902	16.370	4682	53	1272	86	.047	2.5	60	4.0	8
6 16 MG	161	.782	14.58	2262	15.536	5954	69	605	288	.089	6.2	54	25.6	19
7 3 MG	101	.506	14.69	2771	15.305	12694	94	848	763	.283	26.6	240	215.9	45
8 16 MG	150	.794	14.57	2282	15.526	5954	64	615	291	.089	5.7	55	25.4	19
9 C.T.	3213	2.805	8.46	274	14.735	1718	420	661	11	.021	8.8	14	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	21	15.3	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.7 14 14.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.6 20 15.1

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.7) + 0.65(2.6) = 2.626 (MASS)
CO 0.35(14) + 0.65(20) = 19.7 (MASS)
NO2 0.35(14.0) + 0.65(15.1) = 14.715 (MASS)

8-25-71 RUN 3 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	88	1.623	14.23	74	15.948	1745	11	359	3	.036	.4	13	.1	0
2 16 MG	146	.434	14.55	1948	15.142	5954	64	345	254	.089	5.7	31	22.6	19
3 10 MG	42	.142	13.96	1464	14.147	8703	29	176	299	.257	7.4	46	76.4	29
4 16 MG	124	.511	14.61	2024	15.260	5954	56	403	262	.089	5.0	36	23.4	19
5 19 MG	150	2.110	13.96	743	16.232	4682	48	1229	71	.047	2.3	58	3.3	8
6 16 MG	145	.654	14.53	2018	15.341	5954	63	513	260	.089	5.6	46	23.1	19
7 3 MG	84	.516	14.68	2370	15.287	12694	78	844	653	.283	22.1	245	184.4	45
8 16 MG	133	.677	14.67	2003	15.391	5954	58	529	257	.089	5.1	47	22.9	19
9 C.T.	3401	2.476	7.90	102	14.044	1718	446	612	4	.021	9.8	13	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.3	20	13.1	
CYCLE 2														
1 IDLE	88	1.623	14.23	74	15.948	1745	11	359	3	.036	.4	13	.1	0
2 16 MG	160	.714	14.58	1879	15.472	5954	69	559	240	.089	6.1	50	21.4	19
3 10 MG	43	.145	14.09	1543	14.281	8703	29	178	322	.257	7.5	46	82.4	29
4 16 MG	138	.731	14.60	2004	15.480	5954	54	568	256	.089	5.3	51	22.8	19
5 19 MG	155	2.216	13.99	766	16.373	4682	50	1280	73	.047	2.3	60	3.4	8
6 16 MG	150	.906	14.56	1917	15.628	5954	64	697	242	.089	5.7	62	21.6	19
7 3 MG	84	.625	14.62	2356	15.340	12694	82	1045	447	.283	23.1	296	183.2	45
8 16 MG	133	.752	14.56	2007	15.456	5954	57	585	257	.089	5.1	52	22.8	19
9 C.T.	3371	2.627	8.08	114	14.348	1718	452	635	5	.021	9.5	13	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.4	24	13.1	
CYCLE 3														
1 IDLE	81	.984	14.57	96	15.641	1745	10	222	4	.036	.4	8	.1	0
2 16 MG	159	.709	14.48	1941	15.361	5954	69	555	250	.089	6.1	44	22.2	19
3 10 MG	44	.144	14.00	1665	14.192	8703	30	178	339	.257	7.8	46	87.1	29
4 16 MG	134	.650	14.52	2104	15.420	5954	41	510	272	.089	4.4	45	24.2	19
5 19 MG	157	2.138	13.92	858	16.228	4682	51	1246	82	.047	2.4	59	3.4	8
6 16 MG	144	.711	14.54	2101	15.412	5954	64	555	269	.089	5.7	44	24.0	19
7 3 MG	103	1.385	14.37	2053	15.846	12694	92	2238	545	.283	26.1	633	154.3	45
8 16 MG	135	.726	14.55	2101	15.422	5954	58	566	269	.089	5.2	50	24.0	19
9 C.T.	3398	2.617	8.11	118	14.397	1718	454	631	5	.021	9.5	13	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.5	35	12.5	
CYCLE 4														
1 IDLE	81	.984	14.57	96	15.641	1745	10	222	4	.036	.4	8	.1	0
2 16 MG	156	.529	14.58	2059	15.277	5954	68	416	266	.089	6.1	37	23.7	19
3 10 MG	47	.147	13.94	1742	14.138	8703	32	183	356	.257	8.3	47	91.5	29
4 16 MG	132	.602	14.52	2166	15.265	5954	58	474	280	.089	5.1	42	25.0	19
5 19 MG	151	2.132	13.92	819	16.215	4682	49	1244	79	.047	2.3	56	3.7	8
6 16 MG	143	.725	14.47	2101	15.349	5954	62	568	271	.089	5.5	51	24.1	19
7 3 MG	91	.704	14.51	2382	15.716	12694	84	1185	655	.283	23.9	335	185.5	45
8 16 MG	132	.728	14.49	2048	15.361	5954	57	570	270	.089	5.1	51	24.0	19
9 C.T.	3264	2.591	8.11	130	14.226	1718	441	632	5	.021	9.3	13	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.4	29	13.8	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.4 22 13.1

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.5 29 13.2

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.4) + 0.65(2.5) = 2.428 (MASS)
CO 0.35(22) + 0.65(29) = 26.6 (MASS)
NO2 0.35(13.1) + 0.65(13.2) = 13.137 (MASS)

8-26-71 RUN 1 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	98	2.546	13.57	98	16.222	1745	12	553	3	.036	.4	20	.1	0
	2 16 MG	156	.652	14.42	1952	15.240	5954	68	515	253	.089	6.1	46	22.5	19
	3 10 MG	43	.186	13.80	1557	14.032	8703	30	233	321	.257	7.7	60	82.4	29
	4 16 MG	136	.625	14.51	2109	15.282	5954	59	492	273	.089	5.3	44	24.3	19
	5 19 MG	152	2.161	13.93	789	16.255	4682	49	1257	75	.047	2.3	59	3.5	8
	6 16 MG	151	.818	14.45	2056	15.431	5954	65	638	263	.089	5.8	57	23.4	19
	7 3 MG	84	.479	14.65	2501	15.219	12694	78	805	693	.283	22.2	228	196.0	45
	8 16 MG	133	.711	14.53	2058	15.385	5954	58	556	264	.089	5.1	49	23.5	19
	9 C.T.	3334	2.852	8.20	121	14.653	1718	438	675	5	.021	9.2	14	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.3	21	13.8	
CYCLE 2															
	1 IDLE	98	2.546	13.57	98	16.222	1745	12	553	3	.036	.4	20	.1	0
	2 16 MG	168	.742	14.40	1948	15.323	5954	73	582	258	.089	6.5	52	22.9	19
	3 10 MG	47	.185	13.88	1809	14.116	8703	32	230	370	.257	8.3	59	95.2	29
	4 16 MG	143	.643	14.46	2180	15.257	5954	63	507	282	.089	5.6	45	25.1	19
	5 19 MG	169	2.191	13.84	857	16.203	4682	51	1279	82	.047	2.4	60	3.9	8
	6 16 MG	150	.801	14.46	2101	15.423	5954	65	625	269	.089	5.8	56	24.0	19
	7 3 MG	86	.514	14.57	2639	15.177	12694	81	868	733	.283	22.8	246	207.4	45
	8 16 MG	132	.653	14.49	2220	15.286	5954	58	514	287	.089	5.1	46	25.6	19
	9 C.T.	3247	2.699	8.23	144	14.436	1718	433	649	6	.021	9.1	14	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.4	22	14.8	
CYCLE 3															
	1 IDLE	90	1.196	14.41	125	15.703	1745	11	268	5	.036	.4	10	.2	0
	2 16 MG	157	.586	14.38	2145	15.136	5954	69	466	280	.089	6.2	41	24.9	19
	3 10 MG	46	.183	13.87	1779	14.103	8703	32	228	364	.257	8.2	59	93.7	29
	4 16 MG	142	.712	14.42	2171	15.285	5954	62	560	281	.089	5.5	50	25.0	19
	5 19 MG	156	2.310	13.73	808	16.208	4682	50	1348	77	.047	2.4	63	3.6	8
	6 16 MG	153	.821	14.38	2144	15.366	5954	66	643	276	.089	5.9	57	24.5	19
	7 3 MG	82	.460	14.56	2650	15.109	12694	77	781	739	.283	21.8	221	209.2	45
	8 16 MG	135	.716	14.39	2206	15.252	5954	59	565	286	.089	5.3	50	25.4	19
	9 C.T.	3258	2.679	8.23	142	14.429	1718	435	644	6	.021	9.1	14	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.4	21	14.9	
CYCLE 4															
	1 IDLE	90	1.196	14.41	125	15.703	1745	11	268	5	.036	.4	10	.2	0
	2 16 MG	164	.584	14.45	2227	15.211	5954	72	462	289	.089	6.4	41	25.8	19
	3 10 MG	49	.184	13.82	1842	14.057	8703	34	230	379	.257	8.7	59	97.4	29
	4 16 MG	144	.647	14.46	2312	15.263	5954	63	510	299	.089	5.6	45	26.7	19
	5 19 MG	159	2.142	13.81	916	16.174	4682	52	1282	88	.047	2.4	60	4.1	8
	6 16 MG	155	.851	14.35	2141	15.368	5954	67	666	282	.089	6.0	59	25.1	19
	7 3 MG	93	.661	14.49	2545	15.251	12694	87	1111	709	.283	24.5	315	200.6	45
	8 16 MG	136	.726	14.42	2265	15.243	5954	59	571	293	.089	5.3	51	26.1	19
	9 C.T.	3224	2.599	8.18	161	14.260	1718	435	632	6	.021	9.1	13	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.5	24	14.9	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.4 22 14.3

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.4 22 14.9

FOUR CYCLE COMPOSITE = REPORTED VALUES = HC 0.35(2.4) + 0.65(2.4) = 2.422 (MASS)
CO 0.35(22) + 0.65(22) = 22.0 (MASS)
NO2 0.35(14.3) + 0.65(14.9) = 14.683 (MASS)

8-26-71 RUN 2 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	100	2.473	13.63	95	14.211	1745	12	538	3	.036	.4	19	.1	0
	2 16 MG	154	.687	14.44	1893	15.243	5954	67	540	245	.089	6.0	46	21.8	19
	3 10 MG	41	.144	14.01	1519	14.198	8703	28	178	304	.257	7.2	46	74.4	29
	4 16 MG	140	.627	14.53	2074	15.308	5954	61	493	268	.089	5.4	44	23.8	19
	5 19 MG	158	2.113	13.48	810	16.264	4682	51	1229	77	.047	2.4	58	3.6	8
	6 16 MG	151	.682	14.61	2090	15.455	5954	65	531	267	.089	5.8	47	23.8	19
	7 3 MG	85	.472	14.24	2488	15.324	12694	79	790	684	.283	22.3	224	193.6	45
	8 16 MG	137	.697	14.60	2070	15.445	5954	59	543	265	.089	5.3	46	23.6	19
	9 C.T.	3380	2.789	8.12	129	14.559	1718	447	665	5	.021	9.4	14	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.4	20	13.6	
CYCLE 2															
	1 IDLE	100	2.473	13.63	95	16.211	1745	12	538	3	.036	.4	19	.1	0
	2 16 MG	169	.596	14.59	2045	15.369	5954	73	466	263	.089	6.5	42	23.4	19
	3 10 MG	47	.145	13.97	1705	14.166	8703	32	180	348	.257	8.3	46	89.4	29
	4 16 MG	146	.647	14.60	2145	15.405	5954	63	505	275	.089	5.6	45	24.5	19
	5 19 MG	162	2.099	14.00	814	16.274	4682	52	1220	78	.047	2.5	57	3.7	8
	6 16 MG	158	.829	14.53	2017	15.530	5954	68	442	257	.089	6.0	57	22.9	19
	7 3 MG	88	.493	14.79	2592	15.378	12694	81	822	710	.283	23.0	233	201.0	45
	8 16 MG	133	.612	14.66	2210	15.416	5954	58	477	283	.089	5.1	42	25.2	19
	9 C.T.	3396	2.500	8.23	139	14.348	1718	454	603	6	.021	9.5	13	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.5	20	14.3	
CYCLE 3															
	1 IDLE	88	1.053	14.57	145	15.718	1745	11	236	5	.036	.4	9	.2	0
	2 16 MG	163	.612	14.61	2096	15.348	5954	71	478	269	.089	6.3	43	23.9	19
	3 10 MG	52	.144	14.01	1868	14.210	8703	36	178	380	.257	9.2	46	97.6	29
	4 16 MG	144	.596	14.62	2239	15.372	5954	62	466	288	.089	5.6	42	25.6	19
	5 19 MG	160	2.055	14.10	985	14.328	4682	51	1140	94	.047	2.4	56	4.4	8
	6 16 MG	154	.677	14.58	2232	15.423	5954	67	528	286	.089	5.9	47	25.5	19
	7 3 MG	91	.536	14.76	2622	15.394	12694	84	893	718	.283	23.8	253	203.1	45
	8 16 MG	134	.648	14.61	2226	15.403	5954	58	506	286	.089	5.2	45	25.4	19
	9 C.T.	3305	2.541	8.33	166	14.440	1718	440	611	7	.021	9.2	13	.1	0
	SUM----------(CYCLE COMPOSITE)----------											2.6	20	14.9	
CYCLE 4															
	1 IDLE	88	1.053	14.57	145	15.718	1745	11	236	5	.036	.4	9	.2	0
	2 16 MG	168	.600	14.56	2189	15.341	5954	73	470	282	.089	6.5	42	25.1	19
	3 10 MG	53	.144	13.98	1949	14.181	8703	36	179	397	.257	9.4	46	102.1	29
	4 16 MG	148	.686	14.57	2259	15.416	5954	64	535	290	.089	5.7	48	25.8	19
	5 19 MG	159	2.170	13.98	844	16.322	4682	51	1257	80	.047	2.4	59	3.8	8
	6 16 MG	157	.780	14.53	2217	15.440	5954	68	606	283	.089	6.0	54	25.2	19
	7 3 MG	98	.747	14.59	2504	15.443	12694	90	1240	683	.283	25.5	351	193.4	45
	8 16 MG	135	.680	14.54	2240	15.366	5954	59	532	288	.089	5.2	47	25.6	19
	9 C.T.	3347	2.478	8.24	185	14.347	1718	454	598	7	.021	9.5	13	.2	0
	SUM----------(CYCLE COMPOSITE)----------											2.6	24	14.7	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.4 20 13.9

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.5 22 14.8

FOUR CYCLE COMPOSITE = REPORTED VALUES = HC 0.35(2.4) + 0.65(2.5) = 2.493 (MASS)
CO 0.35(20) + 0.65(22) = 21.6 (MASS)
NO2 0.35(13.9) + 0.65(14.8) = 14.491 (MASS)

9-02-71 RUN 1 TRUCK 2 1970 FORD 240CID6 STAT. 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	92	1.887	12.31	67	14.296	1745	13	465	3	.036	.5	17	.1	0
2 16 MG	140	.445	14.29	1393	14.886	5954	63	360	185	.089	5.6	32	16.5	19
3 10 MG	36	.145	13.79	924	13.474	8703	25	182	141	.257	6.5	47	44.1	29
4 16 MG	126	.531	14.38	1397	15.047	5954	56	424	182	.089	5.0	38	16.2	19
5 19 MG	146	2.115	13.67	509	15.943	4682	48	1255	50	.047	2.3	59	2.3	8
6 16 MG	133	.565	14.28	1394	14.989	5954	59	453	184	.089	5.3	40	16.4	19
7 3 MG	77	.715	14.35	1363	15.148	12694	72	1210	379	.283	20.5	343	107.3	45
8 16 MG	130	.723	14.32	1215	15.183	5954	57	573	158	.089	5.1	51	14.1	19
9 C.T.	3097	1.947	8.12	74	13.412	1718	444	504	3	.021	9.3	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	23	8.1	
CYCLE 2														
1 IDLE	92	1.887	12.31	67	14.296	1745	13	465	3	.036	.5	17	.1	0
2 16 MG	135	.393	14.32	1508	14.799	5954	61	271	201	.089	5.4	24	17.9	19
3 10 MG	36	.136	13.74	846	13.415	8703	25	172	176	.257	6.5	44	45.1	29
4 16 MG	127	.482	14.36	1482	14.979	5954	57	387	146	.089	5.0	34	17.4	19
5 19 MG	150	2.069	13.74	599	15.471	4682	49	1225	58	.047	2.3	56	2.7	8
6 16 MG	135	.501	14.38	1495	15.027	5954	60	401	147	.089	5.3	36	17.5	19
7 3 MG	79	.440	14.37	1500	15.095	12694	74	1087	419	.283	21.1	306	118.5	45
8 16 MG	125	.492	14.38	1498	15.007	5954	56	394	147	.089	4.9	35	17.6	19
9 C.T.	2771	1.714	8.49	118	13.147	1718	404	451	5	.021	8.5	9	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	21	8.7	
CYCLE 3														
1 IDLE	71	.267	13.50	1058	13.844	1745	10	68	44	.036	.4	2	1.6	0
2 16 MG	134	.399	14.24	995	14.784	5954	60	325	133	.089	5.4	29	11.8	19
3 10 MG	36	.142	13.83	1040	14.011	8703	25	176	214	.257	6.4	46	55.1	29
4 16 MG	128	.501	14.33	985	14.469	5954	57	403	130	.089	5.1	36	11.6	19
5 19 MG	153	1.779	13.82	974	15.764	4682	51	1067	46	.047	2.4	50	4.5	8
6 16 MG	135	.616	14.24	985	15.022	5954	60	493	130	.089	5.3	44	11.5	19
7 3 MG	78	.780	14.34	979	15.204	12694	73	1315	271	.283	20.6	372	76.8	45
8 16 MG	126	.462	14.39	982	14.988	5954	56	371	130	.089	5.0	33	11.5	19
9 C.T.	3037	1.948	8.32	1154	13.548	1718	431	499	49	.021	9.1	10	1.0	0
SUM----------(CYCLE COMPOSITE)----------											2.2	23	6.8	
CYCLE 4														
1 IDLE	71	.247	13.50	1058	13.844	1745	10	68	44	.036	.4	2	1.6	0
2 16 MG	132	.317	14.34	990	14.800	5954	59	258	132	.089	5.3	23	11.8	19
3 10 MG	39	.140	13.72	1048	13.402	8703	27	177	218	.257	7.0	45	56.0	29
4 16 MG	128	.506	14.30	987	14.944	5954	57	407	131	.089	5.1	36	11.6	19
5 19 MG	150	1.940	13.69	978	15.742	4682	50	1162	46	.047	2.3	55	4.5	8
6 16 MG	127	.475	14.22	993	14.832	5954	57	385	132	.089	5.1	34	11.8	19
7 3 MG	73	.576	14.37	984	15.025	12694	69	483	276	.283	19.5	276	78.1	45
8 16 MG	124	.462	14.34	986	14.934	5954	55	372	130	.089	4.9	33	11.6	19
9 C.T.	2797	1.649	8.34	1190	13.010	1718	414	440	52	.021	8.7	9	1.1	0
SUM----------(CYCLE COMPOSITE)----------											2.1	19	6.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.2	22	8.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.2	21	6.8	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.2) + 0.65(2.2) = 2.171 (MASS)
CO 0.35(22) + 0.65(21) = 21.3 (MASS)
NO2 0.35(8.4) + 0.65(6.8) = 7.394 (MASS)

9-02-71 RUN-2 TRUCK 2 1970 FORD 240CID6 STAT. 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	71	.774	13.39	126	14.241	1745	10	192	5	.036	.4	7	.2	0
2 16 MG	127	.429	14.40	1499	14.966	5954	57	345	198	.089	5.0	31	17.6	19
3 10 MG	27	.121	13.76	889	13.410	8703	19	153	185	.257	4.9	39	47.5	29
4 16 MG	118	.471	14.41	1592	15.008	5954	52	377	208	.089	4.7	34	18.5	19
5 19 MG	142	1.993	13.86	452	16.006	4682	47	1178	43	.047	2.2	55	3.0	8
6 16 MG	129	.450	14.47	1620	15.059	5954	57	359	213	.089	5.1	32	18.9	19
7 3 MG	47	.572	14.55	1590	15.144	12694	63	465	441	.283	17.7	273	124.8	45
8 16 MG	118	.429	14.48	1629	15.086	5954	52	382	213	.089	4.6	34	19.0	19
9 C.T.	2899	1.829	8.44	157	13.400	1718	416	474	7	.021	8.7	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.0	19	9.1	
CYCLE 2														
1 IDLE	71	.774	13.39	126	14.241	1745	10	192	5	.036	.4	7	.2	0
2 16 MG	128	.375	14.54	1577	15.073	5954	57	299	207	.089	5.0	27	18.4	19
3 10 MG	31	.122	13.88	940	14.035	8703	22	153	194	.257	5.5	34	49.7	29
4 16 MG	120	.431	14.57	1663	15.131	5954	53	343	217	.089	4.7	30	19.3	19
5 19 MG	141	1.666	14.15	822	15.468	4682	46	987	80	.047	2.2	46	3.4	8
6 16 MG	126	.381	14.57	1746	15.087	5954	54	304	224	.089	5.0	27	20.4	19
7 3 MG	71	.518	14.62	1743	15.215	12694	66	873	483	.283	18.8	247	136.6	45
8 16 MG	120	.439	14.59	1750	15.159	5954	53	348	228	.089	4.7	31	20.3	19
9 C.T.	2613	1.535	8.65	207	13.007	1718	387	410	9	.021	8.1	9	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.0	17	9.9	
CYCLE 3														
1 IDLE	82	.185	13.54	203	13.814	1745	12	47	9	.036	.4	2	.3	0
2 16 MG	123	.309	14.50	1667	14.942	5954	55	249	221	.089	4.9	22	19.6	19
3 10 MG	36	.140	13.91	989	14.089	8703	25	175	203	.257	6.4	45	52.1	29
4 16 MG	121	.436	14.51	1709	15.077	5954	54	348	224	.089	4.8	31	19.9	19
5 19 MG	147	1.744	14.05	842	15.453	4682	48	1034	44	.047	2.3	44	3.9	8
6 16 MG	128	.540	14.45	1681	15.178	5954	56	468	219	.089	5.0	42	19.5	19
7 3 MG	71	.613	14.53	1712	15.220	12694	66	1033	474	.283	18.8	292	134.2	45
8 16 MG	122	.458	14.56	1709	15.150	5954	54	364	222	.089	4.8	32	19.8	19
9 C.T.	2672	1.402	8.45	259	12.738	1718	404	382	12	.021	8.5	8	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.0	19	9.9	
CYCLE 4														
1 IDLE	82	.185	13.54	203	13.814	1745	12	47	9	.036	.4	2	.3	0
2 16 MG	129	.301	14.24	1711	14.680	5954	59	247	230	.089	5.2	22	20.5	19
3 10 MG	43	.135	13.85	948	14.031	8703	30	169	195	.257	7.7	43	50.2	29
4 16 MG	125	.426	14.53	1768	15.091	5954	55	340	232	.089	4.9	30	20.6	19
5 19 MG	149	1.783	13.96	782	15.904	4682	49	1060	76	.047	2.3	50	3.6	8
6 16 MG	118	.294	14.31	1844	14.731	5954	53	240	247	.089	4.8	21	22.0	19
7 3 MG	84	.491	14.43	2051	15.012	12694	80	839	576	.283	22.5	237	163.0	45
8 16 MG	116	.352	14.45	1814	14.927	5954	52	284	240	.089	4.6	25	21.4	19
9 C.T.	2860	1.592	8.41	237	13.091	1718	420	422	10	.021	8.8	9	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.2	16	11.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.0	18	9.5	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.1	18	10.5	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.0) + 0.65(2.1) = 2.084 (MASS)
CO 0.35(18) + 0.65(18) = 17.7 (MASS)
NO2 0.35(9.5) + 0.65(10.5) = 10.132 (MASS)

9-02-71 RUN-3 TRUCK 2 1970 FORD 240 CID6 STAT. 11-2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	94	.163	13.55	59	13.761	1795	6	92	2	.036	.2	2	.1	0
2 16 MG	111	.213	14.71	1636	15.043	5954	49	170	215	.089	4.4	15	19.1	19
3 10 MG	24	.135	14.00	810	14.161	8703	17	168	165	.257	4.2	43	42.5	29
4 16 MG	110	.316	14.74	1661	15.175	5954	48	250	216	.089	4.3	22	19.3	19
5 19 MG	135	1.477	14.44	815	16.063	4682	44	870	74	.047	2.1	41	3.7	8
6 16 MG	119	.332	14.74	1687	15.201	5954	52	263	219	.089	4.6	23	19.5	19
7 3 MG	66	.502	14.83	1689	15.403	12694	61	836	462	.283	17.2	236	130.8	45
8 16 MG	115	.410	14.80	1670	15.334	5954	50	322	215	.089	4.5	29	19.2	19
9 C.T.	2846	1.524	8.62	96	13.218	1718	414	400	4	.021	8.7	8	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	16	9.3	
CYCLE 2														
1 IDLE	94	.163	13.55	59	13.761	1795	6	92	2	.036	.2	2	.1	0
2 16 MG	116	.257	14.61	1688	14.991	5954	51	206	223	.089	4.6	18	19.8	19
3 10 MG	25	.138	14.05	893	14.215	8703	17	171	182	.257	4.4	44	46.6	29
4 16 MG	116	.425	14.74	1784	15.290	5954	51	334	231	.089	4.5	30	20.5	19
5 19 MG	136	1.914	14.32	711	16.281	4682	44	1054	68	.047	2.1	50	3.2	8
6 16 MG	126	.422	14.79	1760	15.348	5954	55	331	227	.089	4.9	29	20.2	19
7 3 MG	67	.540	14.77	1689	15.402	12694	62	932	462	.283	17.5	264	130.8	45
8 16 MG	110	.380	14.74	1736	15.239	5954	48	300	225	.089	4.3	27	20.0	19
9 C.T.	2949	1.946	8.71	118	13.861	1718	409	492	5	.021	8.6	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.9	17	9.6	
CYCLE 3														
1 IDLE	54	.345	13.93	148	14.333	1795	7	85	6	.036	.3	3	.2	0
2 16 MG	116	.274	14.67	1687	15.069	5954	51	219	221	.089	4.6	19	19.7	19
3 10 MG	24	.137	13.93	928	14.093	8703	17	171	190	.257	4.3	44	48.9	29
4 16 MG	112	.394	14.63	1798	15.135	5954	44	306	235	.089	4.4	27	20.9	19
5 19 MG	136	1.800	14.19	751	16.137	4682	44	1055	72	.047	2.1	50	3.4	8
6 16 MG	119	.383	14.62	1773	15.132	5954	52	304	232	.089	4.7	27	20.6	19
7 3 MG	62	.466	14.71	1764	15.243	12694	58	784	488	.283	16.4	222	138.0	45
8 16 MG	109	.344	14.68	1820	15.142	5954	48	273	238	.089	4.3	24	21.1	19
9 C.T.	2790	1.645	8.81	163	13.468	1718	399	424	7	.021	8.4	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	16	10.0	
CYCLE 4														
1 IDLE	54	.345	13.93	148	14.333	1795	7	85	6	.036	.3	3	.2	0
2 16 MG	115	.289	14.53	1785	14.943	5954	51	233	236	.089	4.6	21	21.0	19
3 10 MG	25	.141	13.89	1026	14.058	8703	17	176	211	.257	4.5	45	54.2	29
4 16 MG	108	.360	14.56	1804	15.037	5954	48	288	237	.089	4.3	26	21.1	19
5 19 MG	136	1.731	14.16	845	16.038	4682	44	1021	82	.047	2.1	46	3.8	8
6 16 MG	123	.413	14.57	1866	15.116	5954	54	329	244	.089	4.8	29	21.7	19
7 3 MG	64	.512	14.67	1771	15.251	12694	60	861	484	.283	16.9	244	138.5	45
8 16 MG	110	.362	14.64	1804	15.121	5954	49	288	236	.089	4.3	26	21.0	19
9 C.T.	2766	1.642	8.66	169	13.289	1718	400	429	7	.021	8.4	9	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	16	10.3	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.9 16 9.4

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.8 16 10.2

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.9) + 0.65(1.8) = 1.833 (MASS)
CO 0.35(16) + 0.65(16) = 16.2 (MASS)
NO2 0.35(9.4) + 0.65(10.2) = 9.915 (MASS)

9-21-71 RUN-1 TRUCK 2 1970 FORD 240 CID6 STAT. 11-2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	97	1.221	14.87	96	16.196	1795	12	266	3	.036	.4	10	.1	0
2 16 MG	138	.352	14.74	2007	15.241	5954	60	278	260	.089	5.4	25	23.2	19
3 10 MG	22	.152	14.16	1419	14.336	8703	15	186	286	.257	3.9	48	73.5	29
4 16 MG	128	.476	14.67	2023	15.284	5954	54	375	262	.089	5.0	33	23.3	19
5 19 MG	154	1.836	14.22	924	16.222	4682	50	1070	89	.047	2.3	50	4.2	8
6 16 MG	136	.440	14.65	2055	15.237	5954	60	347	267	.089	5.3	31	23.7	19
7 3 MG	61	.446	14.71	1971	15.272	12694	57	833	544	.283	16.1	236	153.9	45
8 16 MG	118	.365	14.72	2153	15.212	5954	52	289	280	.089	4.6	26	24.9	19
9 C.T.	2368	2.115	9.54	191	14.212	1718	321	516	8	.021	6.7	11	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	17	12.0	
CYCLE 2														
1 IDLE	97	1.221	14.87	96	16.196	1795	12	266	3	.036	.4	10	.1	0
2 16 MG	141	.318	14.51	2142	14.980	5954	63	255	283	.089	5.6	23	25.2	19
3 10 MG	23	.152	14.08	1346	14.257	8703	16	187	273	.257	4.0	46	70.1	29
4 16 MG	127	.410	14.59	2044	15.137	5954	56	326	273	.089	5.0	29	24.3	19
5 19 MG	157	1.720	14.15	1006	16.040	4682	51	1014	97	.047	2.4	46	4.6	8
6 16 MG	142	.477	14.61	2110	15.240	5954	62	376	274	.089	5.5	34	24.4	19
7 3 MG	62	.462	14.66	2006	15.189	12694	58	780	557	.283	16.4	221	157.5	45
8 16 MG	127	.470	14.63	2121	15.237	5954	56	371	275	.089	4.9	33	24.5	19
9 C.T.	2630	2.039	9.24	138	14.119	1718	358	501	6	.021	7.5	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.9	17	12.1	
CYCLE 3														
1 IDLE	92	.720	14.60	145	15.419	1795	12	165	5	.036	.4	6	.2	0
2 16 MG	142	.408	14.62	2074	15.181	5954	62	323	270	.089	5.6	29	24.0	19
3 10 MG	23	.155	14.10	1397	14.280	8703	16	191	283	.257	4.0	49	72.6	29
4 16 MG	131	.447	14.61	2094	15.198	5954	57	354	272	.089	5.1	31	24.2	19
5 19 MG	154	1.661	14.22	1018	16.047	4682	50	979	99	.047	2.4	46	4.6	8
6 16 MG	141	.458	14.61	2093	15.220	5954	62	362	272	.089	5.5	32	24.2	19
7 3 MG	58	.450	14.71	1997	15.223	12694	54	758	553	.283	15.3	215	156.5	45
8 16 MG	125	.436	14.67	2122	15.241	5954	55	344	275	.089	4.9	31	24.5	19
9 C.T.	2606	1.802	9.25	141	13.866	1718	362	451	6	.021	7.6	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.9	16	12.1	
CYCLE 4														
1 IDLE	92	.720	14.60	145	15.419	1795	12	165	5	.036	.4	6	.2	0
2 16 MG	136	.299	14.49	2066	14.931	5954	61	237	274	.089	5.4	21	24.3	19
3 10 MG	21	.150	14.03	1281	14.203	8703	14	186	241	.257	3.7	48	67.0	29
4 16 MG	125	.341	14.58	1959	15.106	5954	55	311	256	.089	4.9	28	22.8	19
5 19 MG	152	1.622	14.20	1054	15.986	4682	50	960	102	.047	2.3	45	4.8	8
6 16 MG	139	.421	14.57	2080	15.141	5954	61	334	272	.089	5.4	30	24.2	19
7 3 MG	56	.505	14.59	1870	15.155	12694	53	854	520	.283	14.9	242	147.2	45
8 16 MG	124	.480	14.53	1791	15.144	5954	55	381	234	.089	4.9	34	20.8	19
9 C.T.	2598	1.659	8.87	133	13.335	1718	375	432	6	.021	7.9	9	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	17	11.4	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.9 17 12.1

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.8 17 11.8

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.9) + 0.65(1.8) = 1.849 (MASS)
CO 0.35(17) + 0.65(17) = 16.8 (MASS)
NO2 0.35(12.1) + 0.65(11.8) = 11.871 (MASS)

9-21-71 RUN-2 TRUCK 2 1970 FORD 240 CID6 STAT. 11-2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	81	.913	14.16	92	15.160	1745	10	212	4	.036	.4	8	.1	0
2 16 MG	124	.268	14.23	1958	14.632	5954	57	220	265	.089	5.0	20	23.5	19
3 10 MG	19	.136	13.69	1258	13.847	8703	13	173	263	.257	3.4	44	67.5	29
4 16 MG	125	.431	14.36	1921	14.426	5954	56	347	254	.089	5.0	31	22.6	19
5 19 MG	146	1.509	14.05	1040	15.717	4682	49	408	103	.047	2.3	43	4.8	8
6 16 MG	129	.370	14.35	2092	14.859	5954	58	299	278	.089	5.2	27	24.8	19
7 3 MG	62	.502	14.44	1889	15.009	12694	59	858	530	.283	16.6	243	150.1	45
8 16 MG	117	.409	14.48	1883	15.015	5954	52	328	248	.089	4.6	29	22.1	19
9 C.T.	2817	1.888	8.63	77	13.560	1718	400	483	3	.021	8.4	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.9	17	11.6	
CYCLE 2														
1 IDLE	81	.913	14.16	92	15.160	1745	10	212	4	.036	.4	6	.1	0
2 16 MG	131	.289	14.33	1999	14.760	5954	59	235	268	.089	5.3	21	23.8	19
3 10 MG	18	.134	13.91	1230	14.063	8703	12	168	253	.257	3.2	43	64.4	29
4 16 MG	127	.418	14.40	2031	14.955	5954	57	336	268	.089	5.0	30	23.9	19
5 19 MG	152	1.731	13.98	974	15.875	4682	50	1031	95	.047	2.4	46	4.5	8
6 16 MG	136	.447	14.43	2052	15.024	5954	60	358	270	.089	5.4	32	24.0	19
7 3 MG	59	.470	14.48	1991	15.014	12694	56	803	559	.283	15.8	227	158.2	45
8 16 MG	121	.394	14.42	2035	14.945	5954	54	317	269	.089	4.8	28	24.0	19
9 C.T.	2644	1.926	8.82	102	13.602	1718	374	491	4	.021	7.9	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	16	11.9	
CYCLE 3														
1 IDLE	127	1.459	14.12	126	15.716	1745	16	327	5	.036	.6	12	.2	0
2 16 MG	135	.348	14.39	1993	14.884	5954	60	281	245	.089	5.4	25	23.6	19
3 10 MG	21	.134	13.87	1300	14.029	8703	15	170	268	.257	3.7	44	68.6	29
4 16 MG	126	.421	14.44	2074	14.997	5954	56	338	273	.089	5.0	30	24.3	19
5 19 MG	154	1.533	14.14	1036	15.839	4682	51	915	102	.047	2.4	43	4.8	8
6 16 MG	135	.429	14.51	2078	15.085	5954	60	342	272	.089	5.3	30	24.2	19
7 3 MG	53	.424	14.49	1955	14.971	12694	50	726	550	.283	14.2	206	155.7	45
8 16 MG	116	.414	14.45	2097	14.989	5954	52	332	277	.089	4.6	30	24.6	19
9 C.T.	2442	1.880	9.41	239	13.927	1718	337	468	10	.021	7.1	10	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	16	12.0	
CYCLE 4														
1 IDLE	127	1.459	14.12	126	15.716	1745	16	327	5	.036	.6	12	.2	0
2 16 MG	138	.306	14.47	2045	14.925	5954	62	247	271	.089	5.5	22	24.1	19
3 10 MG	22	.137	13.85	1259	14.011	8703	15	172	260	.257	3.9	44	66.7	29
4 16 MG	121	.350	14.45	2061	14.931	5954	54	282	273	.089	4.8	25	24.3	19
5 19 MG	147	1.643	14.18	1003	15.982	4682	48	972	94	.047	2.3	46	4.6	8
6 16 MG	134	.431	14.44	2046	15.014	5954	60	345	269	.089	5.3	31	24.0	19
7 3 MG	51	.391	14.51	1966	14.956	12694	48	670	554	.283	13.7	190	156.8	45
8 16 MG	118	.408	14.52	2093	15.055	5954	52	326	275	.089	4.7	29	24.5	19
9 C.T.	2604	1.743	8.79	126	13.345	1718	375	453	5	.021	7.9	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	15	11.9	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.9 17 11.7

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.8 15 11.4

FOUR CYCLE COMPOSITE - REPORTED VALUES = HC 0.35(1.9) + 0.65(1.8) = 1.802 (MASS)
CO 0.35(17) + 0.65(15) = 15.7 (MASS)
NO2 0.35(11.7) + 0.65(11.9) = 11.861 (MASS)

9-21-71 RUN-3 TRUCK 2 1970 FORD 240 CID6 STAT. 11-2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	87	1.505	14.27	86	15.869	1745	11	334	3	.036	.4	12	.1	0
2 16 MG	127	.325	14.52	1971	14.982	954	9	42	42	.089	.8	4	3.7	19
3 10 MG	67	.380	14.46	1847	14.912	8703	44	448	368	.257	11.3	115	94.5	29
4 16 MG	122	.450	14.54	1882	15.122	5954	54	358	246	.089	4.8	32	21.9	19
5 19 MG	146	1.538	14.23	1234	15.926	4682	48	913	121	.047	2.3	43	5.7	8
6 16 MG	133	.417	14.58	2075	15.141	19	0	1	1	.089	.0	0	.1	19
7 3 MG	43	.750	14.57	1846	15.386	12694	58	1250	506	.283	16.5	354	143.1	45
8 16 MG	115	.543	14.53	1546	15.217	5954	50	445	201	.089	4.5	40	17.9	19
9 C.T.	2824	2.169	8.82	87	14.039	1718	387	536	4	.021	8.1	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	22	10.5	
CYCLE 2														
1 IDLE	87	1.505	14.27	86	15.869	1745	11	334	3	.036	.4	12	.1	0
2 16 MG	135	.325	14.60	2022	15.071	954	10	42	42	.089	.9	4	3.8	19
3 10 MG	22	.148	14.04	1361	14.212	8703	15	183	277	.257	3.9	47	71.1	29
4 16 MG	120	.391	14.60	2053	15.121	5954	53	311	268	.089	4.7	28	23.9	19
5 19 MG	155	1.633	14.34	1043	16.140	4682	50	957	100	.047	2.4	45	4.7	8
6 16 MG	137	.449	14.59	2087	15.187	19	0	1	1	.089	.0	0	.1	19
7 3 MG	57	.431	14.66	2027	15.153	12694	53	729	564	.283	15.1	206	159.5	45
8 16 MG	119	.425	14.61	2123	15.164	5954	52	337	277	.089	4.7	30	24.6	19
9 C.T.	2789	2.110	8.97	111	14.092	1718	381	520	4	.021	8.0	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	19	10.6	
CYCLE 3														
1 IDLE	94	1.435	14.31	131	15.847	1745	12	319	5	.036	.4	11	.2	0
2 16 MG	140	.327	14.54	2058	15.018	954	10	42	43	.089	.9	4	3.9	19
3 10 MG	23	.149	14.16	1362	14.334	8703	16	183	275	.257	4.0	47	70.6	29
4 16 MG	127	.418	14.59	2043	15.145	5954	56	332	267	.089	5.0	30	23.7	19
5 19 MG	151	1.728	14.20	1009	16.091	4682	49	1016	47	.047	2.3	48	4.6	8
6 16 MG	132	.427	14.58	2106	15.150	19	0	1	1	.089	.0	0	.1	19
7 3 MG	55	.516	14.65	1910	15.225	12694	51	869	529	.283	14.5	246	149.6	45
8 16 MG	119	.420	14.58	2025	15.129	5954	52	334	265	.089	4.7	30	23.5	19
9 C.T.	2864	2.081	8.84	117	14.014	1718	393	515	5	.021	8.3	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	16	10.1	
CYCLE 4														
1 IDLE	94	1.435	14.31	131	15.847	1745	12	319	5	.036	.4	11	.2	0
2 16 MG	134	.353	14.62	2035	15.118	954	9	45	43	.089	.8	4	3.8	19
3 10 MG	21	.148	14.05	1328	14.221	8703	14	183	270	.257	3.7	47	69.3	29
4 16 MG	128	.440	14.58	2065	15.158	5954	56	349	269	.089	5.0	31	24.0	19
5 19 MG	155	1.809	14.21	950	16.186	4682	50	1057	91	.047	2.4	50	4.3	8
6 16 MG	137	.442	14.60	2137	15.190	19	0	1	1	.089	.0	0	.1	19
7 3 MG	52	.451	14.63	1996	15.137	12694	49	764	556	.283	13.8	216	157.3	45
8 16 MG	120	.437	14.64	2122	15.207	5954	53	346	276	.089	4.7	31	24.5	19
9 C.T.	2685	1.926	8.93	137	13.756	1718	376	486	6	.021	7.9	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.4	15	10.4	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.6 18 10.5

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.4 15 10.3

FOUR CYCLE COMPOSITE - REPORTED VALUES = HC 0.35(1.6) + 0.65(1.4) = 1.507 (MASS)
CO 0.35(18) + 0.65(15) = 16.2 (MASS)
NO2 0.35(10.5) + 0.65(10.3) = 10.356 (MASS)

9-27-71 RUN 1 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	107	2.356	13.50	75	15.972	1745	13	520	3	.036	.5	19	.1	0
2 16 MG	160	.629	15.06	1380	15.862	5954	67	477	172	.089	6.0	42	15.3	19
3 10 MG	70	.370	14.91	1494	15.356	8703	44	424	281	.257	11.4	109	72.2	29
4 16 MG	148	1.000	14.96	1303	16.120	5954	61	746	160	.089	5.4	66	14.2	19
5 19 MG	154	2.234	14.38	457	16.780	4682	48	1259	42	.047	2.3	59	2.0	8
6 16 MG	150	.692	15.10	1563	15.954	5954	63	522	194	.089	5.6	46	17.2	19
7 3 MG	94	.729	15.14	1601	15.971	12694	84	1170	422	.283	23.7	331	119.6	45
8 16 MG	154	1.034	14.78	1117	15.980	5954	64	778	138	.089	5.7	69	12.3	19
9 C.T.	3433	2.009	7.05	69	12.767	1718	517	546	3	.021	10.4	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.6	28	9.3	
CYCLE 2														
1 IDLE	107	2.356	13.50	75	15.972	1745	13	520	3	.036	.5	19	.1	0
2 16 MG	175	.729	14.48	1527	15.848	5954	73	551	190	.089	6.5	44	16.4	19
3 10 MG	47	.145	14.59	1399	14.806	8703	31	196	273	.257	8.0	50	70.2	29
4 16 MG	145	.748	15.00	1562	15.955	5954	61	602	194	.089	5.4	54	17.2	19
5 19 MG	151	2.325	14.28	481	16.768	4682	47	1311	45	.047	2.2	62	2.1	8
6 16 MG	162	1.209	14.74	1393	16.174	5954	67	849	170	.089	5.9	80	15.2	19
7 3 MG	91	.740	14.42	1715	15.808	12694	82	1281	457	.283	23.2	363	129.4	45
8 16 MG	154	.464	14.81	1121	15.945	5954	44	731	139	.089	5.7	65	12.4	19
9 C.T.	3106	2.206	7.42	73	12.480	1718	460	590	3	.021	9.7	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.5	28	9.7	
CYCLE 3														
1 IDLE	101	1.044	14.40	97	15.553	1745	13	237	4	.036	.5	9	.1	0
2 16 MG	165	.801	14.93	1416	15.909	5954	69	606	176	.089	6.2	54	15.7	19
3 10 MG	43	.143	14.57	1551	14.754	8703	28	170	304	.257	7.3	44	78.0	29
4 16 MG	153	1.068	14.80	1462	16.033	5954	64	801	180	.089	5.7	71	16.0	19
5 19 MG	157	2.227	14.34	524	16.737	4682	44	1258	49	.047	2.3	59	2.3	8
6 16 MG	158	.892	14.86	1646	15.923	5954	66	674	204	.089	5.9	60	18.2	19
7 3 MG	73	.629	15.12	1838	15.828	12694	46	1019	489	.283	18.6	288	138.5	45
8 16 MG	144	.915	14.90	1355	15.971	5954	60	689	168	.089	5.4	61	14.4	19
9 C.T.	2941	2.084	7.33	76	12.540	1718	444	574	3	.021	9.4	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	24	10.4	
CYCLE 4														
1 IDLE	101	1.044	14.40	97	15.553	1745	13	237	4	.036	.5	9	.1	0
2 16 MG	158	.687	15.00	1553	15.858	5954	66	521	194	.089	5.9	46	17.2	19
3 10 MG	72	.584	14.71	1427	14.972	8703	46	468	268	.257	11.7	172	68.9	29
4 16 MG	144	.491	14.85	1433	16.002	5954	62	745	177	.089	5.5	66	15.8	19
5 19 MG	18	.100	14.54	98	14.459	4682	6	65	10	.047	.3	3	.5	8
6 16 MG	153	1.355	14.72	1301	16.240	5954	63	1003	158	.089	5.6	89	14.1	19
7 3 MG	74	.839	15.00	1762	15.919	12694	46	1351	466	.283	18.7	382	132.0	45
8 16 MG	156	.967	14.65	1113	15.785	5954	66	737	139	.089	5.9	66	12.4	19
9 C.T.	2742	1.490	7.10	75	12.105	1718	444	570	4	.021	9.3	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.3	31	9.6	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.5 28 9.5

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.3 26 10.0

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.5) + 0.65(2.3) = 2.372 (MASS)
CO 0.35(28) + 0.65(28) = 27.6 (MASS)
NO2 0.35(9.5) + 0.65(10.0) = 9.804 (MASS)

9-27-71 RUN-2 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	71	1.099	13.48	98	14.656	1745	9	264	4	.036	.3	10	.1	0
2 16 MG	151	.470	14.26	1543	14.843	5954	68	380	205	.089	6.0	34	18.2	19
3 10 MG	36	.136	13.79	1310	13.945	8703	25	171	271	.257	6.5	44	69.7	29
4 16 MG	135	.509	14.39	1582	15.045	5954	60	407	208	.089	5.3	36	18.5	19
5 19 MG	150	1.469	13.80	511	15.931	4682	49	1169	50	.047	2.3	55	2.3	8
6 16 MG	162	.866	14.29	1468	15.331	5954	70	679	189	.089	6.3	60	16.8	19
7 3 MG	49	.512	14.50	1884	15.087	12694	45	870	526	.283	18.4	246	148.9	45
8 16 MG	139	.690	14.39	1587	15.230	5954	61	545	206	.089	5.4	46	18.3	19
9 C.T.	2806	1.950	6.66	81	11.640	1718	464	581	4	.021	9.7	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	20	10.7	
CYCLE 2														
1 IDLE	71	1.099	13.48	98	14.656	1745	9	264	4	.036	.3	10	.1	0
2 16 MG	143	.667	14.37	1519	15.213	5954	71	527	197	.089	6.4	47	17.6	19
3 10 MG	37	.142	14.03	1430	14.212	8703	25	176	241	.257	6.5	45	74.7	29
4 16 MG	147	.783	14.37	1545	15.312	5954	64	615	199	.089	5.7	55	17.8	19
5 19 MG	159	1.957	13.93	616	16.059	4682	52	1153	60	.047	2.4	54	2.8	8
6 16 MG	160	.819	14.41	1561	15.401	5954	69	639	200	.089	6.2	57	17.8	19
7 3 MG	72	.581	14.52	1846	15.179	12694	67	981	513	.283	19.1	278	145.1	45
8 16 MG	142	.816	14.42	1545	15.389	5954	62	638	198	.089	5.5	57	17.7	19
9 C.T.	2855	1.953	6.93	84	11.466	1718	459	566	4	.021	9.4	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.3	22	10.8	
CYCLE 3														
1 IDLE	69	.831	13.96	107	14.866	1745	9	197	4	.036	.3	7	.2	0
2 16 MG	163	.654	14.36	1572	15.190	5954	72	518	205	.089	6.4	46	18.2	19
3 10 MG	35	.136	13.96	1345	14.134	8703	24	169	279	.257	6.2	43	71.7	29
4 16 MG	149	.777	14.37	1583	15.308	5954	65	610	204	.089	5.8	54	18.2	19
5 19 MG	158	2.141	13.80	508	16.112	4682	51	1257	49	.047	2.4	59	2.3	8
6 16 MG	158	.836	14.37	1523	15.377	5954	69	654	196	.089	6.1	58	17.4	19
7 3 MG	74	.597	14.49	1918	15.167	12694	69	1009	533	.283	19.6	286	150.8	45
8 16 MG	141	.753	14.43	1580	15.335	5954	61	591	204	.089	5.5	53	18.1	19
9 C.T.	2728	1.930	6.95	87	11.826	1718	444	566	4	.021	9.3	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.3	23	10.9	
CYCLE 4														
1 IDLE	69	.831	13.96	107	14.866	1745	9	197	4	.036	.3	7	.2	0
2 16 MG	164	.786	14.36	1482	15.323	5954	71	617	191	.089	6.4	55	17.0	19
3 10 MG	35	.136	13.91	1396	14.084	8703	24	170	286	.257	6.2	44	73.6	29
4 16 MG	145	.751	14.39	1613	15.298	5954	63	590	208	.089	5.6	53	18.6	19
5 19 MG	158	2.114	13.84	541	16.125	4682	51	1240	52	.047	2.4	58	2.5	8
6 16 MG	157	.781	14.43	1577	15.381	5954	68	611	203	.089	6.1	54	18.0	19
7 3 MG	73	.595	15.50	1956	16.124	12694	64	867	511	.283	18.2	245	144.7	45
8 16 MG	141	.694	14.45	1642	15.296	5954	61	546	212	.089	5.5	49	18.9	19
9 C.T.	2808	2.010	7.02	95	12.063	1718	448	578	4	.021	9.4	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	21	10.8	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.2 21 10.8

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.2 22 10.8

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.2) + 0.65(2.2) = 2.232 (MASS)
CO 0.35(21) + 0.65(22) = 21.7 (MASS)
NO2 0.35(10.8) + 0.65(10.8) = 10.796 (MASS)

9-27-71 RUN 3 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	93	2.348	13.09	90	15.538	1745	12	533	3	.036	.4	19	.1	0
2 16 MG	148	.683	14.64	1289	15.483	5954	64	531	165	.089	5.7	47	14.6	19
3 10 MG	33	.144	14.29	1140	14.470	8703	22	175	228	.257	5.7	45	58.5	29
4 16 MG	137	.685	14.76	1458	15.593	5954	59	528	185	.089	5.2	47	16.4	19
5 19 MG	142	2.072	14.25	478	16.475	4682	45	1189	45	.047	2.1	56	2.1	8
6 16 MG	152	.856	14.75	1391	15.770	5954	64	653	174	.089	5.7	58	15.5	19
7 3 MG	69	.634	14.44	1709	15.649	12694	63	1039	460	.283	17.7	294	130.3	45
8 16 MG	134	.745	14.81	1402	15.700	5954	57	571	177	.089	5.1	51	15.7	19
9 C.T.	2693	1.423	6.89	71	11.721	1718	442	569	3	.021	9.3	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.1	23	9.3	
CYCLE 2														
1 IDLE	93	2.348	13.09	90	15.538	1745	12	533	3	.036	.4	19	.1	0
2 16 MG	155	.738	14.84	1412	15.745	5954	66	564	177	.089	5.8	50	15.8	19
3 10 MG	35	.147	14.48	1304	14.465	8703	23	176	267	.257	6.0	45	66.0	29
4 16 MG	141	.794	14.94	1488	15.846	5954	59	601	185	.089	5.3	53	16.5	19
5 19 MG	155	2.180	14.34	516	16.687	4682	49	1236	48	.047	2.3	58	2.3	8
6 16 MG	152	.797	14.92	1503	15.881	5954	64	604	187	.089	5.7	54	16.6	19
7 3 MG	69	.593	15.09	1805	15.748	12694	62	949	483	.283	17.6	269	136.7	45
8 16 MG	143	.810	14.89	1420	15.854	5954	60	614	177	.089	5.4	55	15.8	19
9 C.T.	2955	2.103	6.99	78	12.284	1718	463	594	4	.021	9.7	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.1	23	9.9	
CYCLE 3														
1 IDLE	79	.894	14.44	108	15.419	1745	10	204	4	.036	.4	7	.1	0
2 16 MG	157	.733	14.88	1479	15.783	5954	66	559	185	.089	5.9	50	16.5	19
3 10 MG	35	.159	14.49	1350	14.681	8703	23	183	264	.257	6.0	47	68.3	29
4 16 MG	141	.746	14.95	1556	15.848	5954	59	566	194	.089	5.3	50	17.3	19
5 19 MG	154	2.167	14.33	513	16.663	4682	48	1230	48	.047	2.3	58	2.2	8
6 16 MG	154	.884	14.88	1564	15.930	5954	64	467	194	.089	5.7	59	17.3	19
7 3 MG	72	.564	15.06	1826	15.702	12694	65	921	490	.283	18.4	261	138.7	45
8 16 MG	139	.759	14.93	1541	15.839	5954	59	576	192	.089	5.2	51	17.1	19
9 C.T.	2778	1.953	7.21	84	12.163	1718	439	557	4	.021	9.2	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.1	22	10.2	
CYCLE 4														
1 IDLE	79	.894	14.44	108	15.419	1745	10	204	4	.036	.4	7	.1	0
2 16 MG	155	.600	14.94	1658	15.707	5954	66	459	209	.089	5.9	41	18.6	19
3 10 MG	39	.161	14.48	1565	14.483	8703	26	193	308	.257	6.7	50	79.1	29
4 16 MG	141	.683	14.94	1516	15.775	5954	60	521	190	.089	5.3	46	16.9	19
5 19 MG	149	1.983	14.41	690	16.554	4682	47	1133	65	.047	2.2	53	3.0	8
6 16 MG	150	.719	14.97	1669	15.851	5954	63	546	208	.089	5.6	49	18.5	19
7 3 MG	77	.782	14.87	1890	15.735	12694	70	1274	506	.283	19.7	361	143.3	45
8 16 MG	145	.922	14.40	1140	15.500	5954	71	715	148	.089	6.3	64	13.2	19
9 C.T.	2650	1.814	6.48	85	11.456	1718	437	540	4	.021	9.2	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	25	10.7	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.1 23 9.6

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.2 23 10.5

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.1) + 0.65(2.2) = 2.163 (MASS)
CO 0.35(23) + 0.65(23) = 23.2 (MASS)
NO2 0.35(9.6) + 0.65(10.5) = 10.151 (MASS)

9-27-71 RUN-4 TRUCK 2 1970 FORD 240CID6 CHASSIS 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	74	1.347	13.82	75	15.267	1745	9	316	3	.036	.3	11	.1	0
2 16 MG	149	.489	14.77	1441	15.420	5954	64	381	141	.089	5.7	34	17.0	19
3 10 MG	36	.132	14.31	1282	14.481	8703	24	160	256	.257	6.2	41	65.7	29
4 16 MG	141	.698	14.78	1517	15.630	5954	60	537	192	.089	5.4	48	17.1	19
5 19 MG	151	2.030	14.28	535	16.473	4682	48	1165	50	.047	2.3	55	2.4	8
6 16 MG	155	.846	14.82	1450	15.833	5954	65	643	181	.089	5.8	57	16.1	19
7 3 MG	66	.512	15.00	1797	15.583	12694	60	842	486	.283	17.0	238	137.5	45
8 16 MG	145	.803	14.68	1270	15.640	5954	62	618	161	.089	5.5	55	14.3	19
9 C.T.	2635	1.772	6.68	51	11.298	1718	449	544	3	.021	9.4	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.1	20	9.9	
CYCLE 2														
1 IDLE	74	1.367	13.82	75	15.267	1745	9	316	3	.036	.3	11	.1	0
2 16 MG	163	.704	14.83	1477	15.715	5954	69	543	186	.089	6.2	46	16.5	19
3 10 MG	39	.137	14.42	1444	14.599	8703	26	165	246	.257	6.7	42	73.4	29
4 16 MG	145	.763	14.83	1461	15.750	5954	61	583	183	.089	5.5	52	16.3	19
5 19 MG	155	2.033	14.33	758	16.530	4682	49	1163	71	.047	2.3	55	3.4	8
6 16 MG	155	.769	14.93	1581	15.866	5954	65	583	147	.089	5.8	52	17.6	19
7 3 MG	71	.715	14.89	1746	15.682	12694	64	1169	483	.283	18.2	331	136.6	45
8 16 MG	167	.873	14.62	1096	15.673	5954	71	670	138	.089	6.3	60	12.3	19
9 C.T.	2935	2.052	7.09	61	12.312	1718	459	578	3	.021	9.6	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.2	24	10.1	
CYCLE 3														
1 IDLE	74	.954	14.35	92	15.389	1745	9	220	3	.036	.3	8	.1	0
2 16 MG	164	.665	14.84	1533	15.682	5954	70	510	193	.089	6.2	45	17.2	19
3 10 MG	40	.133	14.35	1381	14.526	8703	27	161	275	.257	6.9	41	70.6	29
4 16 MG	150	.816	14.77	1573	15.748	5954	64	623	197	.089	5.7	55	17.6	19
5 19 MG	157	2.114	14.27	530	16.554	4682	50	1208	50	.047	2.3	57	2.3	8
6 16 MG	161	.839	14.78	1533	15.793	5954	68	639	192	.089	6.1	57	17.1	19
7 3 MG	78	.588	14.93	1878	15.602	12694	71	966	507	.283	20.1	273	143.6	45
8 16 MG	149	.929	14.76	1515	15.850	5954	63	705	189	.089	5.6	63	16.8	19
9 C.T.	2812	1.974	7.09	75	12.101	1718	447	566	4	.021	9.4	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.3	22	10.5	
CYCLE 4														
1 IDLE	74	.959	14.35	92	15.389	1745	9	220	3	.036	.3	8	.1	0
2 16 MG	158	.711	14.82	1535	15.702	5954	67	545	193	.089	6.0	48	17.2	19
3 10 MG	40	.132	14.37	1387	14.545	8703	27	160	276	.257	6.9	41	70.8	29
4 16 MG	148	.782	14.78	1597	15.722	5954	63	598	201	.089	5.6	53	17.9	19
5 19 MG	158	2.150	14.22	521	16.541	4682	50	1229	49	.047	2.4	58	2.3	8
6 16 MG	158	.780	14.82	1555	15.771	5954	67	595	195	.089	5.9	53	17.3	19
7 3 MG	77	.523	14.92	1953	15.526	12694	71	864	530	.283	20.0	244	150.0	45
8 16 MG	147	.854	14.77	1580	15.783	5954	62	651	198	.089	5.5	58	17.6	19
9 C.T.	2600	1.825	7.19	88	11.823	1718	423	536	4	.021	8.9	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.3	21	10.8	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.2 22 10.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.3 22 10.6

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.2) + 0.65(2.3) = 2.238 (MASS)
CO 0.35(22) + 0.65(22) = 21.9 (MASS)
NO2 0.35(10.0) + 0.65(10.6) = 10.399 (MASS)

TABLE J-3. NINE MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS
Correlation Truck No. 3

Engine: Dodge 318 CID, V8

Vehicle: 1969 Dodge 23,000-lb GVW Van

Date	Run	Dynamometer	Emissions, Gr/Bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
10-19-71	2	Stationary	3.88	210.2	7.14	8.08
10-20-71	1	Stationary	3.76	202.5	7.52	7.05
10-20-71	2	Stationary	3.72	198.2	9.27	8.92
10-20-71	3	Stationary	3.66	192.2	9.26	8.98
		Average	3.75	200.8	8.30	8.26
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg}}\right) \times 100$			6.0	9.0	25.6	23.4
10-12-71	1	Chassis	3.79	152.4	8.50	8.14
10-12-71	2	Chassis	3.31	146.2	8.61	8.25
10-12-71	4	Chassis	3.43	150.6	8.95	8.58
		Average	3.51	149.7	8.69	8.32
Percent spread: $\left(\frac{\text{Max-Min}}{\text{Avg}}\right) \times 100$			13.7	4.1	5.2	5.2
Average Stationary			3.75	200.8	8.30	8.26
Average Chassis			3.51	149.7	8.69	8.32
Difference: (Chassis - Stationary)			-.24	-51.1	0.39	0.06
Percent Difference: (Difference/Stationary) x 100			-6.5	-25.5	4.7	0.8

10-19-71 RUN-2 TRUCK 3 1969 DODGE 318C1D STAT. 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	359	6.838	9.90	99	17.126	1838	93	1482	9	.036	1.6	53	.1	0
2 16 MG	177	2.037	13.91	1843	15.638	9172	116	2413	359	.089	10.3	215	31.9	28
3 10 MG	128	1.069	14.11	2580	15.317	13745	129	1938	769	.257	33.1	498	197.5	55
4 16 MG	148	2.200	13.57	1681	15.930	9172	95	2559	321	.089	8.5	226	28.6	28
5 19 MG	181	2.606	13.35	908	16.151	6300	79	2053	118	.047	3.7	97	5.5	14
6 16 MG	149	2.391	13.51	1648	16.062	9172	95	2758	322	.089	8.5	246	28.7	28
7 3 MG	218	10.379	8.95	263	19.064	26906	345	29589	123	.283	97.5	8374	34.9	83
8 16 MG	165	2.859	13.33	1245	16.367	9172	104	3236	232	.089	9.2	288	20.6	28
9 C.T.	5420	4.046	4.29	194	14.190	1744	746	1005	8	.021	15.7	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											3.9	208	7.2	
CYCLE 2														
1 IDLE	359	6.838	9.90	99	17.126	1838	93	1482	9	.036	1.6	53	.1	0
2 16 MG	181	2.279	13.90	1665	15.879	9172	117	2660	319	.089	10.4	237	28.4	28
3 10 MG	150	2.721	13.31	1891	16.193	13745	143	4665	533	.257	36.6	1199	137.0	55
4 16 MG	155	2.681	13.34	1628	16.188	9172	98	3068	306	.089	8.8	273	27.3	28
5 19 MG	142	2.604	13.37	823	16.127	6300	62	2055	107	.047	2.9	97	5.0	14
6 16 MG	155	2.593	13.41	1684	16.170	9172	98	2971	317	.089	8.8	264	28.2	28
7 3 MG	219	10.286	8.46	287	18.983	26906	348	29451	135	.283	98.4	8335	38.2	83
8 16 MG	165	2.924	13.25	1924	16.352	9172	104	3313	265	.089	9.2	295	23.6	28
9 C.T.	5300	4.031	4.31	225	14.065	1744	736	1010	9	.021	15.5	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											4.0	223	6.0	
CYCLE 3														
1 IDLE	400	6.679	10.33	217	17.440	1838	97	1422	8	.036	1.7	51	.3	0
2 16 MG	189	2.438	13.30	1634	15.942	9172	122	2833	312	.089	10.8	252	27.8	28
3 10 MG	135	1.306	14.08	2735	15.532	13745	134	2335	604	.257	34.4	600	204.5	55
4 16 MG	148	2.418	13.48	1667	16.058	9172	95	2790	316	.089	8.4	248	28.1	28
5 19 MG	132	2.291	13.60	832	16.034	6300	58	1818	109	.047	2.7	85	5.1	14
6 16 MG	153	2.662	13.30	1582	16.127	9172	97	3058	299	.089	8.7	272	26.6	28
7 3 MG	206	9.740	8.64	289	18.642	26906	333	28513	139	.283	94.2	8069	39.2	83
8 16 MG	169	2.777	13.26	1533	16.214	9172	104	3173	288	.089	9.2	282	25.6	28
9 C.T.	5033	3.943	4.42	251	13.744	1744	712	1007	11	.021	15.0	21	.2	0
SUM----------(CYCLE COMPOSITE)----------											3.8	205	7.5	
CYCLE 4														
1 IDLE	400	6.678	10.33	217	17.440	1838	97	1422	8	.036	1.7	51	.3	0
2 16 MG	181	2.364	13.40	1636	15.959	9172	117	2744	312	.089	10.4	244	27.8	28
3 10 MG	135	1.434	14.04	2667	15.620	13745	133	2549	779	.257	34.2	655	200.2	55
4 16 MG	152	2.636	13.40	1650	16.200	9172	96	3015	310	.089	8.6	268	27.6	28
5 19 MG	149	2.660	13.41	901	16.231	6300	65	2086	116	.047	3.0	98	5.5	14
6 16 MG	152	2.580	13.48	1669	16.224	9172	96	2946	313	.089	8.6	262	27.4	28
7 3 MG	212	10.100	8.57	322	18.899	26906	338	29046	152	.283	95.7	8220	43.1	83
8 16 MG	164	2.873	13.22	1544	16.330	9172	103	3260	288	.089	9.2	290	25.6	28
9 C.T.	5036	3.953	4.37	316	13.762	1744	715	1012	13	.021	15.0	21	.3	0
SUM----------(CYCLE COMPOSITE)----------											3.9	210	7.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											3.9	216	6.6	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											3.9	207	7.4	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.9) + 0.65(3.9) = 3.883 (MASS)
CO 0.35(216) + 0.65(207) = 210.2 (MASS)
NO2 0.35(6.6) + 0.65(7.4) = 7.144 (MASS)

10-20-71 RUN-1 TRUCK 3 1969 DODGE 318C1D STAT 11-2877-01 K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	366	6.416	10.66	81	17.471	1838	93	1363	3	.036	1.6	49	.1	0
2 16 MG	175	1.397	13.99	2242	15.576	9172	115	1662	438	.089	10.3	148	39.0	28
3 10 MG	127	.642	14.46	3301	15.239	13815	129	1176	954	.257	33.1	302	255.3	55
4 16 MG	144	1.649	14.19	2240	15.995	9172	92	1910	426	.089	8.2	170	38.0	28
5 19 MG	137	2.965	14.04	1060	16.253	6329	60	1624	137	.047	2.8	76	6.4	14
6 16 MG	142	1.758	14.20	2194	16.111	9172	91	2022	415	.089	8.1	180	36.4	28
7 3 MG	212	10.305	8.63	180	19.164	26906	333	29226	64	.283	94.3	8271	23.2	83
8 16 MG	159	2.474	13.88	1813	16.526	9172	99	2774	334	.089	8.8	247	29.7	28
9 C.T.	5074	3.997	4.30	115	13.777	1744	719	1022	5	.021	15.1	21	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.8	196	8.4	
CYCLE 2														
1 IDLE	366	6.416	10.66	81	17.471	1838	93	1363	3	.036	1.6	49	.1	0
2 16 MG	175	1.667	14.14	2147	15.996	9172	112	1931	409	.089	10.0	172	36.4	28
3 10 MG	134	1.344	14.34	2856	15.829	13815	131	2369	828	.257	33.7	609	212.7	55
4 16 MG	146	2.027	14.12	2059	16.305	9172	92	2303	365	.089	8.2	205	34.2	28
5 19 MG	174	1.741	14.21	1202	16.139	6329	76	1379	156	.047	3.6	65	7.4	14
6 16 MG	144	2.052	14.14	2107	16.348	9172	90	2326	392	.089	8.1	207	34.9	28
7 3 MG	204	9.840	9.06	224	19.120	26906	322	27971	105	.283	91.0	7916	29.6	83
8 16 MG	158	2.402	14.06	1827	16.633	9172	98	2476	334	.089	8.7	236	29.8	28
9 C.T.	4969	3.992	4.29	130	13.649	1744	711	1030	6	.021	14.9	22	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.7	197	6.0	
CYCLE 3														
1 IDLE	386	6.844	10.64	135	17.901	1838	94	1419	5	.036	1.6	51	.2	0
2 16 MG	174	1.543	14.32	2243	16.051	9172	111	1781	435	.089	9.9	154	36.7	28
3 10 MG	146	2.379	13.93	2361	16.467	13815	137	4032	658	.257	35.3	1036	169.0	55
4 16 MG	150	2.167	14.17	2052	16.499	9172	93	2433	379	.089	8.3	217	33.7	28
5 19 MG	140	2.117	14.16	1191	16.428	6329	60	1647	152	.047	2.8	77	7.2	14
6 16 MG	148	2.071	14.13	2094	16.361	9172	93	2345	390	.089	8.3	209	34.7	28
7 3 MG	211	10.288	8.68	219	19.196	26906	331	29129	102	.283	93.7	8243	28.8	83
8 16 MG	158	2.422	14.00	1905	16.593	9172	98	2704	350	.089	8.7	241	31.1	28
9 C.T.	4822	4.001	4.50	159	13.709	1744	687	1028	7	.021	14.4	22	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.8	213	7.1	
CYCLE 4														
1 IDLE	386	6.844	10.64	135	17.901	1838	94	1419	5	.036	1.6	51	.2	0
2 16 MG	171	1.743	14.23	2126	16.158	9172	109	1999	401	.089	9.7	176	35.7	28
3 10 MG	128	.896	14.57	2113	15.604	13815	127	1602	621	.257	32.6	412	159.6	55
4 16 MG	146	1.984	14.24	2135	16.402	9172	91	2241	396	.089	8.1	199	35.3	28
5 19 MG	171	2.441	13.94	1081	16.566	6329	73	1884	137	.047	3.4	89	6.4	14
6 16 MG	148	2.111	14.17	2071	16.441	9172	92	2379	384	.089	8.2	212	34.1	28
7 3 MG	209	10.248	8.74	249	19.264	26906	327	28913	115	.283	92.5	8162	32.7	83
8 16 MG	160	2.501	13.99	1068	16.664	9172	99	2781	341	.089	8.8	247	30.4	28
9 C.T.	4748	3.970	4.50	184	13.598	1744	682	1029	8	.021	14.3	22	.2	0
SUM----------(CYCLE COMPOSITE)----------											3.7	199	6.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											3.8	196	8.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											3.8	206	7.0	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.8) + 0.65(3.8) = 3.755 (MASS)
CO 0.35(196) + 0.65(206) = 202.5 (MASS)
NO2 0.35(8.4) + 0.65(7.0) = 7.524 (MASS)

10-20-71 RUN-2 TRUCK 3 1969 DODGE 318C1D STAT. 11-2877-01 K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	368	6.747	10.34	99	17.484	1838	93	1433	3	.036	1.6	52	.1	0
	2 16 MG	167	1.415	14.01	2337	15.605	9172	110	1680	956	.089	9.8	150	40.6	28
	3 10 MG	128	1.070	14.28	3278	15.488	13745	127	1918	966	.257	32.7	493	248.2	55
	4 16 MG	145	2.108	13.85	2108	16.115	9172	92	2424	398	.089	8.2	216	35.5	28
	5 19 MG	164	2.728	13.46	1023	16.365	6300	71	2121	131	.047	3.3	100	6.1	14
	6 16 MG	145	2.113	13.86	2118	16.130	9172	92	2427	400	.089	8.2	216	35.6	28
	7 3 MG	203	9.476	8.65	201	18.345	26406	333	28074	98	.283	94.4	7945	27.7	83
	8 16 MG	153	2.374	13.61	1963	16.149	9172	97	2724	370	.089	8.7	242	32.9	28
	9 C.T.	5030	3.800	4.34	157	13.572	1744	724	986	7	.021	15.2	21	.1	0
	SUM----------(CYCLE COMPOSITE)----------											3.8	196	8.4	
CYCLE 2															
	1 IDLE	368	6.747	10.34	99	17.484	1838	93	1433	3	.036	1.6	52	.1	0
	2 16 MG	171	1.401	13.88	2263	15.666	9172	112	1893	440	.089	10.0	169	39.1	28
	3 10 MG	123	.882	14.23	3344	15.245	13745	124	1606	1016	.257	31.4	413	261.1	55
	4 16 MG	144	2.201	13.81	2080	16.167	9172	92	2522	392	.089	8.1	224	34.9	28
	5 19 MG	158	2.563	13.58	1089	16.314	6300	68	1999	140	.047	3.2	94	6.6	14
	6 16 MG	144	2.246	13.75	2077	16.152	9172	92	2576	392	.089	8.2	229	34.9	28
	7 3 MG	204	10.241	8.41	244	18.927	26406	333	29552	115	.283	94.2	8363	32.6	83
	8 16 MG	153	2.552	13.57	1970	16.287	9172	96	2903	368	.089	8.6	258	32.8	28
	9 C.T.	4927	3.816	4.33	189	13.467	1744	715	998	8	.021	15.0	21	.2	0
	SUM----------(CYCLE COMPOSITE)----------											3.7	204	9.2	
CYCLE 3															
	1 IDLE	385	6.555	10.33	221	17.301	1838	96	1407	8	.036	1.6	51	.3	0
	2 16 MG	177	1.982	13.80	2168	15.973	9172	114	2299	413	.089	10.1	205	36.8	28
	3 10 MG	120	.887	14.32	3352	15.337	13745	120	1606	997	.257	31.0	413	256.3	55
	4 16 MG	141	2.070	13.91	2144	16.132	9172	90	2377	414	.089	8.0	212	36.4	28
	5 19 MG	148	2.522	13.70	1140	16.382	6300	64	1959	152	.047	3.0	92	7.1	14
	6 16 MG	142	2.048	13.92	2165	16.171	9172	90	2404	408	.089	8.0	214	36.3	28
	7 3 MG	204	9.845	8.60	281	18.715	26406	328	28736	134	.283	93.0	8132	38.0	83
	8 16 MG	154	2.467	13.68	1960	16.313	9172	97	2802	366	.089	8.6	249	32.6	28
	9 C.T.	5023	3.684	4.18	233	13.299	1744	738	974	10	.021	15.5	21	.2	0
	SUM----------(CYCLE COMPOSITE)----------											3.7	199	9.2	
CYCLE 4															
	1 IDLE	385	6.555	10.33	221	17.301	1838	96	1407	8	.036	1.6	51	.3	0
	2 16 MG	174	1.967	13.77	2216	15.925	9172	112	2288	424	.089	10.0	204	37.7	28
	3 10 MG	124	.842	14.23	3431	15.306	13745	125	1709	1023	.257	32.1	439	262.9	55
	4 16 MG	137	1.765	14.06	2301	15.973	9172	88	2047	439	.089	7.8	182	39.0	28
	5 19 MG	147	2.410	13.66	1180	16.429	6300	63	2022	150	.047	3.0	95	7.1	14
	6 16 MG	141	2.026	13.92	2249	16.098	9172	90	2332	425	.089	8.0	208	37.9	28
	7 3 MG	201	9.760	8.80	335	18.777	26406	323	28250	159	.283	91.3	7995	45.1	83
	8 16 MG	156	2.655	13.57	1993	16.393	9172	98	3001	370	.089	8.7	267	32.9	28
	9 C.T.	4876	3.839	4.44	281	13.545	1744	703	998	12	.021	14.8	21	.3	0
	SUM----------(CYCLE COMPOSITE)----------											3.7	196	9.6	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 3.8 200 9.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 3.7 197 9.4

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.8) + 0.65(3.7) = 3.716 (MASS)
CO 0.35(200) + 0.65(197) = 198.2 (MASS)
NO2 0.35(9.0) + 0.65(9.4) = 9.269 (MASS)

10-20-71 RUN-3 TRUCK 3 1969 DODGE 318C1D STAT 11-2877-01 K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	367	6.693	10.33	112	17.419	1838	93	1427	4	.036	1.6	51	.1	0
	2 16 MG	172	1.348	14.09	2362	15.624	9172	113	1599	460	.089	10.1	142	41.0	28
	3 10 MG	126	.769	14.34	3424	15.249	13815	128	1408	1030	.257	32.9	362	264.7	55
	4 16 MG	146	2.084	13.95	2123	16.144	9172	93	2387	399	.089	8.2	212	35.5	28
	5 19 MG	145	2.477	13.80	1085	16.434	6329	63	1927	139	.047	2.9	91	6.5	14
	6 16 MG	144	2.044	14.07	2128	16.270	9172	91	2328	398	.089	8.1	207	35.4	28
	7 3 MG	207	9.873	8.66	205	18.757	26406	333	28609	98	.283	94.1	8046	27.6	83
	8 16 MG	153	2.288	13.88	2014	16.333	9172	96	2595	376	.089	8.6	231	33.5	28
	9 C.T.	4830	3.804	4.38	148	13.400	1744	704	1000	6	.021	14.8	21	.1	0
	SUM----------(CYCLE COMPOSITE)----------											3.8	196	9.2	
CYCLE 2															
	1 IDLE	367	6.693	10.33	112	17.419	1838	93	1427	4	.036	1.6	51	.1	0
	2 16 MG	172	1.644	14.21	2334	16.040	9172	110	1844	443	.089	9.8	164	39.4	28
	3 10 MG	123	.850	14.57	3341	15.553	13815	122	1525	985	.257	31.4	392	253.2	55
	4 16 MG	141	1.973	14.21	2213	16.335	9172	89	2238	413	.089	7.9	199	36.7	28
	5 19 MG	168	2.528	13.87	1075	16.479	6329	72	1999	136	.047	3.4	92	6.4	14
	6 16 MG	137	1.791	14.22	2257	16.159	9172	87	2054	425	.089	7.8	183	37.9	28
	7 3 MG	199	9.403	8.87	247	18.488	26406	324	27643	119	.283	91.8	7823	33.8	83
	8 16 MG	151	2.413	13.92	2011	16.446	9172	94	2710	371	.089	8.4	241	33.0	28
	9 C.T.	4779	3.770	4.56	192	13.441	1744	692	984	8	.021	14.5	21	.2	0
	SUM----------(CYCLE COMPOSITE)----------											3.7	190	9.1	
CYCLE 3															
	1 IDLE	369	6.630	10.47	181	17.499	1838	93	1407	6	.036	1.6	51	.2	0
	2 16 MG	168	1.837	13.99	2166	16.008	9172	108	2126	412	.089	9.6	189	36.7	28
	3 10 MG	122	.941	14.44	3321	15.513	13815	122	1693	982	.257	31.3	435	252.3	55
	4 16 MG	139	1.951	14.15	2219	16.251	9172	88	2224	416	.089	7.8	198	37.0	28
	5 19 MG	134	2.350	13.91	1152	16.405	6329	58	1831	148	.047	2.7	86	6.4	14
	6 16 MG	140	1.971	14.07	2234	16.192	9172	89	2255	420	.089	7.9	201	37.4	28
	7 3 MG	201	9.577	8.81	258	18.604	26406	326	27978	124	.283	92.1	7918	35.1	83
	8 16 MG	158	2.772	13.70	1850	16.643	9172	98	3086	338	.089	8.7	275	30.1	28
	9 C.T.	4800	3.845	4.37	203	13.399	1744	700	1011	9	.021	14.7	21	.2	0
	SUM----------(CYCLE COMPOSITE)----------											3.7	194	9.0	
CYCLE 4															
	1 IDLE	369	6.630	10.47	181	17.499	1838	93	1407	6	.036	1.6	51	.2	0
	2 16 MG	165	1.644	14.08	2359	15.902	9172	107	1915	452	.089	9.5	170	40.2	28
	3 10 MG	116	.786	14.46	3420	15.371	13815	117	1427	1020	.257	30.0	367	262.3	55
	4 16 MG	138	1.923	14.11	2238	16.182	9172	88	2202	421	.089	7.8	196	37.5	28
	5 19 MG	160	2.324	13.83	1150	16.327	6329	69	1820	148	.047	3.3	86	7.0	14
	6 16 MG	135	1.759	14.18	2252	16.085	9172	86	2026	426	.089	7.7	180	37.9	28
	7 3 MG	197	9.401	8.87	315	18.484	26406	321	27643	152	.283	90.9	7823	43.1	83
	8 16 MG	152	2.499	13.82	1985	16.483	9172	95	2809	367	.089	8.4	250	32.6	28
	9 C.T.	4740	3.818	4.48	250	13.417	1744	690	1002	11	.021	14.5	21	.2	0
	SUM----------(CYCLE COMPOSITE)----------											3.6	190	9.6	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 3.7 193 9.4

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 3.6 192 9.3

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.7) + 0.65(3.6) = 3.657 (MASS)
CO 0.35(193) + 0.65(192) = 192.2 (MASS)
NO2 0.35(9.2) + 0.65(9.3) = 9.257 (MASS)

10-12-71 RUN-1 TRUCK 3 1969 DODGE 318C1D CHASSIS 11-2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	398	6.135	10.54	37	17.105	1701	44	1232	1	.036	1.6	44	.0	0
2 16 MG	289	1.399	13.87	1917	15.581	8591	178	1558	351	.089	15.9	139	31.2	28
3 10 MG	146	.501	14.21	3134	14.869	13341	147	908	934	.257	37.7	233	239.9	55
4 16 MG	152	1.230	14.13	2253	15.524	8591	94	1375	414	.089	8.4	122	36.8	28
5 19 MG	167	2.092	13.74	963	16.012	6449	75	1702	129	.047	3.5	80	6.1	14
6 16 MG	147	1.242	14.11	2123	15.511	8591	91	1390	390	.089	8.1	124	34.7	28
7 3 MG	178	7.395	10.48	332	18.067	25675	283	21228	157	.283	80.2	6006	44.3	83
8 16 MG	154	1.756	13.95	2045	15.872	8591	93	1920	367	.089	8.3	171	32.7	28
9 C.T.	4553	3.250	3.74	62	11.947	2049	875	1126	4	.021	18.4	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.8	144	8.8	
CYCLE 2														
1 IDLE	398	6.135	10.54	37	17.105	1701	44	1232	1	.036	1.6	44	.0	0
2 16 MG	201	1.437	14.03	1987	15.684	8591	123	1590	361	.089	11.0	142	32.2	28
3 10 MG	145	.600	14.30	3118	15.057	13341	144	1074	917	.257	37.0	276	235.7	55
4 16 MG	155	1.413	14.08	2114	15.660	8591	95	1566	385	.089	8.5	139	34.3	28
5 19 MG	162	2.111	13.78	990	16.066	6449	73	1712	132	.047	3.4	80	6.2	14
6 16 MG	153	1.449	14.09	2121	15.704	8591	94	1601	385	.089	8.3	143	34.3	28
7 3 MG	182	7.549	10.31	324	18.056	25675	290	21684	153	.283	82.0	6137	43.3	83
8 16 MG	156	1.849	13.96	2023	15.977	8591	94	2008	361	.089	8.4	179	32.1	28
9 C.T.	4669	3.335	3.64	48	12.018	2049	892	1149	3	.021	18.7	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.7	149	8.7	
CYCLE 3														
1 IDLE	342	6.243	10.60	44	17.212	1701	38	1246	1	.036	1.4	45	.1	0
2 16 MG	486	1.560	13.44	1981	16.025	8591	242	1689	353	.089	26.0	150	31.4	28
3 10 MG	154	.799	14.32	2969	15.285	13341	151	1409	860	.257	38.7	362	221.1	55
4 16 MG	157	1.482	14.08	2193	15.732	8591	96	1635	398	.089	8.5	145	35.4	28
5 19 MG	162	2.458	13.61	967	16.243	6449	72	1971	127	.047	3.4	93	6.0	14
6 16 MG	154	1.506	14.06	2101	15.732	8591	94	1661	381	.089	8.4	148	33.4	28
7 3 MG	180	7.598	10.25	313	18.042	25675	287	21841	148	.283	81.2	6181	41.8	83
8 16 MG	155	7.756	13.25	2038	21.173	8591	70	6357	275	.089	6.3	566	24.4	28
9 C.T.	4539	3.308	3.65	46	11.860	2049	878	1154	3	.021	18.4	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											4.0	160	8.2	
CYCLE 4														
1 IDLE	342	6.243	10.60	44	17.212	1701	38	1246	1	.036	1.4	45	.1	0
2 16 MG	195	1.815	13.76	1888	15.786	8591	119	1995	341	.089	10.6	178	30.4	28
3 10 MG	145	.629	14.38	3128	15.166	13341	143	1118	914	.257	36.7	287	234.8	55
4 16 MG	157	1.654	13.98	2106	15.804	8591	96	1816	380	.089	8.5	162	33.8	28
5 19 MG	171	2.217	13.75	1139	16.152	6449	76	1788	151	.047	3.6	84	7.1	14
6 16 MG	155	1.679	14.07	2030	15.916	8591	94	1831	364	.089	8.3	163	32.4	28
7 3 MG	179	7.611	10.25	310	18.054	25675	285	21844	146	.283	80.7	6187	41.4	83
8 16 MG	156	1.840	13.88	2031	15.908	8591	94	2029	364	.089	8.4	181	32.4	28
9 C.T.	4324	3.240	3.82	63	11.750	2049	845	1148	4	.021	17.7	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.4	152	8.4	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 3.7 146 8.8

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 3.8 156 8.4

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.7) + 0.65(3.8) = 3.791 (MASS)
CO 0.35(146) + 0.65(156) = 152.4 (MASS)
NO2 0.35(8.8) + 0.65(8.4) = 8.498 (MASS)

10-12-71 RUN-2 TRUCK 3 1969 DODGE 318C1D CHASSIS 11-2877-01 K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	366	6.470	10.95	67	17.815	1701	39	1248	2	.036	1.4	45	.1	0
2 16 MG	175	1.324	14.60	2076	16.113	8591	105	1426	367	.089	9.3	127	32.7	28
3 10 MG	127	.537	15.04	3287	15.714	13341	121	921	924	.257	31.0	237	238.1	55
4 16 MG	136	1.341	14.74	2227	16.278	8591	80	1430	390	.089	7.2	127	34.7	28
5 19 MG	160	2.126	14.47	1005	16.769	6449	69	1652	128	.047	3.2	76	6.0	14
6 16 MG	134	1.376	14.44	2192	16.461	8591	78	1451	380	.089	7.0	129	33.8	28
7 3 MG	168	7.750	11.02	377	18.451	25675	255	21209	170	.283	72.1	6002	48.0	83
8 16 MG	146	1.840	14.74	2181	16.738	8591	84	1408	372	.089	7.5	170	33.1	28
9 C.T.	4594	3.323	3.84	77	12.125	2049	870	1134	4	.021	18.3	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.3	144	8.8	
CYCLE 2														
1 IDLE	366	6.470	10.95	67	17.815	1701	39	1248	2	.036	1.4	45	.1	0
2 16 MG	184	1.547	14.68	2125	16.446	8591	108	1654	369	.089	9.6	147	32.8	28
3 10 MG	134	.597	15.24	3312	16.002	13341	125	1005	917	.257	32.2	258	235.6	55
4 16 MG	150	1.652	14.84	2241	16.654	8591	87	1721	384	.089	7.7	153	34.2	28
5 19 MG	148	2.144	14.57	1108	16.928	6449	84	1650	140	.047	4.0	76	6.6	14
6 16 MG	148	1.633	14.89	2174	16.683	8591	85	1649	372	.089	7.6	151	33.1	28
7 3 MG	171	7.724	11.17	371	19.079	25675	258	20997	166	.283	72.9	5942	46.9	83
8 16 MG	147	1.890	14.73	2123	16.779	8591	84	1455	361	.089	7.5	174	32.1	28
9 C.T.	4624	3.381	3.96	80	12.335	2049	860	1134	4	.021	18.1	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.3	146	8.7	
CYCLE 3														
1 IDLE	356	6.477	11.29	72	18.151	1701	37	1226	2	.036	1.3	44	.1	0
2 16 MG	187	1.950	14.61	2041	16.762	8591	107	2019	347	.089	9.6	180	30.9	28
3 10 MG	136	.682	15.19	3144	16.019	13341	127	1147	883	.257	32.6	295	227.0	55
4 16 MG	147	1.547	14.88	2243	16.586	8591	85	1614	394	.089	7.6	144	35.1	28
5 19 MG	150	2.378	14.48	1157	17.020	6449	64	1820	146	.047	3.0	86	6.8	14
6 16 MG	144	1.570	14.81	2226	16.536	8591	84	1648	384	.089	7.5	147	34.2	28
7 3 MG	170	7.833	11.01	346	19.027	25675	257	21352	155	.283	72.7	6042	43.9	83
8 16 MG	150	1.959	14.71	2091	16.831	8591	86	2020	354	.089	7.6	180	31.5	28
9 C.T.	4544	3.396	4.06	82	12.385	2049	846	1135	5	.021	17.8	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.3	146	8.6	
CYCLE 4														
1 IDLE	356	6.477	11.29	72	18.151	1701	37	1226	2	.036	1.3	44	.1	0
2 16 MG	186	1.768	14.67	2041	16.639	8591	108	1844	350	.089	9.6	164	31.1	28
3 10 MG	136	.655	15.23	3271	16.032	13341	127	1101	904	.257	32.6	283	232.2	55
4 16 MG	152	1.472	14.61	2066	16.746	8591	87	2044	352	.089	7.8	182	31.3	28
5 19 MG	150	2.395	14.44	1060	16.997	6449	64	1836	134	.047	3.0	86	6.3	14
6 16 MG	148	1.730	14.85	2168	16.740	8591	85	1793	369	.089	7.6	160	32.4	28
7 3 MG	170	7.661	11.05	354	18.895	25675	254	21029	160	.283	73.2	5951	45.2	83
8 16 MG	149	1.936	14.70	2098	16.797	8591	85	2000	356	.089	7.6	178	31.7	28
9 C.T.	4536	3.366	4.06	103	12.325	2049	845	1130	6	.021	17.7	24	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.3	147	8.5	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 3.3 144 8.8

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 3.3 147 8.5

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.3) + 0.65(3.3) = 3.310 (MASS)
CO 0.35(144) + 0.65(147) = 146.2 (MASS)
NO2 0.35(8.8) + 0.65(8.5) = 8.606 (MASS)

10-12-71 RUN-4 TRUCK 3 1969 DODGE 318C10 CHASSIS 11-2877-01 K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	377	6.471	10.56	68	17.438	1701	41	1275	2	.036	1.5	46	.1	0
	2 16 MG	167	1.295	14.22	2183	15.645	8591	102	1432	347	.089	9.1	127	35.3	28
	3 10 MG	123	.597	14.55	3361	15.280	13341	120	1053	474	.257	30.9	271	250.4	55
	4 16 MG	140	1.566	14.33	2200	16.047	8591	84	1694	341	.089	7.5	151	34.8	28
	5 19 MG	141	2.153	14.05	967	16.355	6449	62	1715	127	.047	2.9	81	5.9	14
	6 16 MG	139	1.529	14.41	2223	16.089	8591	83	1649	344	.089	7.4	147	35.1	28
	7 3 MG	170	7.729	10.64	359	18.553	25675	263	21606	165	.283	74.6	6115	46.7	83
	8 16 MG	148	1.877	14.30	2120	16.337	8591	87	1994	370	.089	7.8	177	32.9	28
	9 C.T.	4925	3.344	3.88	45	12.543	2049	401	1103	5	.021	18.9	23	.1	0
	SUM----------(CYCLE COMPOSITE)----------											3.3	148	9.2	
CYCLE 2															
	1 IDLE	377	6.471	10.56	68	17.438	1701	41	1275	2	.036	1.5	46	.1	0
	2 16 MG	192	1.638	14.33	2131	16.175	8591	114	1757	376	.089	10.2	156	33.4	28
	3 10 MG	138	.758	14.66	3303	15.567	13341	132	1312	440	.257	34.0	337	241.5	55
	4 16 MG	148	1.570	14.45	2279	16.180	8591	88	1684	402	.089	7.8	150	35.8	28
	5 19 MG	151	2.306	14.13	1100	16.599	6449	66	1810	142	.047	3.1	85	6.7	14
	6 16 MG	146	1.654	14.42	2149	16.232	8591	87	1768	386	.089	7.7	157	34.3	28
	7 3 MG	173	7.642	10.71	359	18.589	25675	268	21461	165	.283	75.7	6073	46.6	83
	8 16 MG	152	1.856	14.40	2255	16.420	8591	89	1962	392	.089	7.9	175	34.9	28
	9 C.T.	4799	3.336	4.02	101	12.539	2049	878	1101	5	.021	18.4	23	.1	0
	SUM----------(CYCLE COMPOSITE)----------											3.5	149	9.0	
CYCLE 3															
	1 IDLE	377	6.514	10.87	49	17.791	1701	40	1258	2	.036	1.5	45	.1	0
	2 16 MG	190	1.743	14.30	2088	16.248	8591	113	1862	367	.089	10.0	166	32.6	28
	3 10 MG	136	.697	14.75	3361	15.544	13341	130	1205	955	.257	33.5	310	245.3	55
	4 16 MG	150	1.706	14.42	2290	16.288	8591	89	1818	401	.089	7.9	162	35.7	28
	5 19 MG	148	2.342	14.14	1055	16.642	6449	64	1833	136	.047	3.0	86	6.4	14
	6 16 MG	147	1.676	14.49	2207	16.325	8591	87	1782	386	.089	7.7	159	34.3	28
	7 3 MG	175	7.834	10.67	344	18.693	25675	269	21735	157	.283	76.2	6151	44.4	83
	8 16 MG	149	1.953	14.38	2112	16.494	8591	87	2055	365	.089	7.7	183	32.5	28
	9 C.T.	4709	3.314	3.99	104	12.340	2049	872	1107	6	.021	18.3	23	.1	0
	SUM----------(CYCLE COMPOSITE)----------											3.4	151	8.4	
CYCLE 4															
	1 IDLE	377	6.514	10.87	69	17.791	1701	40	1258	2	.036	1.5	45	.1	0
	2 16 MG	194	1.905	14.24	2101	16.355	8591	114	2021	366	.089	10.2	180	32.6	28
	3 10 MG	136	.793	14.73	3288	15.670	13341	130	1364	929	.257	33.3	350	238.4	55
	4 16 MG	147	1.613	14.52	2293	16.292	8591	87	1718	401	.089	7.7	154	35.7	28
	5 19 MG	162	2.444	14.06	967	16.683	6449	70	1912	124	.047	3.3	90	5.8	14
	6 16 MG	146	1.671	14.42	2224	16.249	8591	86	1785	390	.089	7.7	159	34.7	28
	7 3 MG	178	7.831	10.64	350	18.663	25675	274	21762	140	.283	77.6	6159	45.2	83
	8 16 MG	150	1.947	14.35	2137	16.479	8591	88	2071	370	.089	7.8	184	32.9	28
	9 C.T.	4741	3.331	3.99	111	12.441	2049	875	1108	6	.021	18.4	23	.1	0
	SUM----------(CYCLE COMPOSITE)----------											3.5	152	8.8	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 3.4 149 9.1

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 3.5 152 8.9

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(3.4) + 0.65(3.5) = 3.432 (MASS)
CO 0.35(149) + 0.65(152) = 150.6 (MASS)
NO2 0.35(9.1) + 0.65(8.9) = 8.952 (MASS)

TABLE J-4. NINE MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS
Correlation Truck No. 4

Engine: White 400 CID, 6 cyl. Vehicle: 1970 30,000-lb GVW Tractor

Date	Run	Dynamometer	Emissions, Gr/bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
11-23-71	2	Stationary	1.13	56.0	8.36	7.55
11-23-71	3	Stationary	1.05	43.7	9.39	8.60
11-23-71	4	Stationary	1.11	43.1	10.04	9.16
		Average	1.10	47.6	9.26	8.43
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			7.0	27.1	18.1	19.1
11-8-71	2	Chassis	1.51	56.7	11.76	10.77
11-9-71	1	Chassis	1.47	57.4	10.34	9.91
11-9-71	2	Chassis	1.55	59.5	11.49	11.05
		Average	1.51	57.9	11.20	10.58
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			5.1	4.8	12.6	10.8
Average Stationary			1.10	47.6	9.26	8.43
Average Chassis			1.51	57.9	11.20	10.58
Difference: (Chassis - Stationary)			0.41	10.3	1.94	2.15
Percent Difference: (Difference/Stationary) x 100			37.6	21.5	20.9	25.4

11-23-71 RUN 2 TRUCK 4 1970 WHITE 400 CID 6 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	183	6.286	11.07	104	17.554	1848	22	1337	4	.036	.8	48	.1	0
2 16 MG	92	1.897	14.05	1124	16.046	11990	77	2863	279	.089	6.9	255	24.8	26
3 10 MG	73	1.474	14.40	2043	15.953	6850	35	1279	241	.257	9.0	329	74.9	63
4 16 MG	77	2.223	14.04	879	16.346	11990	63	3294	214	.089	5.6	293	19.1	26
5 19 MG	62	2.042	14.17	410	16.279	16281	69	4125	136	.047	3.3	194	6.4	8
6 16 MG	73	2.200	14.13	1117	16.409	11990	60	3247	271	.089	5.3	284	24.1	26
7 3 MG	44	2.070	13.64	1956	15.758	22367	70	5935	922	.283	19.8	1680	260.9	103
8 16 MG	73	2.467	13.47	755	16.516	11990	59	3618	182	.089	5.3	322	16.2	26
9 C.T.	4686	4.326	6.46	137	15.847	834	274	460	2	.021	5.8	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	62	7.8	
CYCLE 2														
1 IDLE	183	6.286	11.07	104	17.554	1848	22	1337	4	.036	.8	48	.1	0
2 16 MG	94	1.835	14.32	1152	16.257	11990	78	2734	282	.089	6.9	243	25.1	26
3 10 MG	82	2.665	13.91	1289	16.664	6850	38	2213	176	.257	9.7	569	45.2	63
4 16 MG	82	2.445	14.10	751	16.634	11990	66	3560	180	.089	5.9	317	16.0	26
5 19 MG	67	2.126	14.29	414	16.488	16281	74	4241	136	.047	3.5	199	6.4	8
6 16 MG	78	2.382	14.04	1300	16.506	11990	63	3445	314	.089	5.6	311	27.9	26
7 3 MG	47	1.844	13.99	2096	15.935	22367	74	5370	977	.283	20.4	1520	276.4	103
8 16 MG	79	3.240	13.56	594	16.885	11990	63	4647	140	.089	5.6	414	12.5	26
9 C.T.	4670	4.307	6.62	142	15.971	834	273	454	2	.021	5.7	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.2	66	7.5	
CYCLE 3														
1 IDLE	210	6.442	14.20	129	20.869	1848	21	1152	4	.036	.7	41	.1	0
2 16 MG	94	2.028	14.12	1046	16.255	11990	82	3022	256	.089	7.3	269	22.8	26
3 10 MG	74	1.282	14.57	2069	15.932	6850	36	1113	245	.257	9.2	286	75.9	63
4 16 MG	75	2.102	14.23	852	16.413	11990	61	3102	207	.089	5.5	276	18.4	26
5 19 MG	64	2.080	14.18	371	16.329	16281	71	4189	123	.047	3.4	147	5.8	8
6 16 MG	77	2.410	14.01	938	16.503	11990	63	3537	226	.089	5.6	315	20.1	26
7 3 MG	38	.914	14.33	2618	15.285	22367	62	2702	1272	.283	17.6	765	359.9	103
8 16 MG	73	2.331	14.07	769	16.480	11990	59	3426	186	.089	5.3	305	16.5	26
9 C.T.	4613	4.255	6.62	157	15.857	834	272	452	3	.021	5.7	9	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	46	9.5	
CYCLE 4														
1 IDLE	210	6.442	11.20	129	17.869	1848	24	1346	4	.036	.9	48	.2	0
2 16 MG	94	1.990	14.14	1092	16.282	11990	78	2960	267	.089	6.9	263	23.8	26
3 10 MG	77	1.553	14.53	1877	16.166	6850	37	1329	264	.257	9.4	342	67.9	63
4 16 MG	80	2.371	14.07	836	16.527	11990	65	3475	201	.089	5.8	304	17.9	26
5 19 MG	67	2.258	14.10	391	16.430	16281	74	4520	129	.047	3.5	212	6.0	8
6 16 MG	77	2.332	14.12	956	16.535	11990	63	3416	230	.089	5.6	304	20.5	26
7 3 MG	43	1.723	13.88	2164	15.649	22367	64	4974	1027	.283	19.5	1406	290.6	103
8 16 MG	74	2.387	14.12	777	16.587	11990	60	3485	186	.089	5.3	310	16.6	26
9 C.T.	4614	4.174	6.68	176	15.837	834	272	444	3	.021	5.7	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	58	8.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.1	64	7.6	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.1	56	8.8	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.1) + 0.65(1.1) = 1.128 (MASS)
CO 0.35(64) + 0.65(52) = 56.0 (MASS)
NO2 0.35(7.6) + 0.65(8.8) = 8.356 (MASS)

11-23-71 RUN 3 TRUCK 4 1970 WHITE 400 CID 6 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	184	6.275	10.93	98	17.404	1848	22	1346	3	.036	.8	48	.1	0
2 16 MG	90	1.763	14.22	1113	16.080	11990	75	2655	276	.089	6.7	236	24.5	26
3 10 MG	69	1.020	14.51	2147	15.605	6850	34	904	313	.257	8.7	232	80.4	63
4 16 MG	75	2.083	14.14	925	16.304	11990	62	3094	226	.089	5.5	275	20.1	26
5 19 MG	65	2.277	13.46	330	16.307	16281	73	4592	104	.047	3.4	216	5.1	8
6 16 MG	71	2.191	14.09	951	16.318	11990	58	3193	232	.089	5.2	284	20.6	26
7 3 MG	33	.871	14.32	2524	15.227	22367	54	2584	1233	.283	15.4	731	349.0	103
8 16 MG	67	2.030	14.27	803	16.372	11990	55	3003	195	.089	4.9	267	17.4	26
9 C.T.	4727	4.299	6.44	138	15.894	834	278	456	2	.021	5.8	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.0	42	9.4	
CYCLE 2														
1 IDLE	184	6.275	10.93	98	17.404	1848	22	1346	3	.036	.8	48	.1	0
2 16 MG	96	2.089	14.03	982	16.223	11990	79	3119	241	.089	7.1	278	21.4	26
3 10 MG	70	1.056	14.62	2241	15.752	6850	34	428	324	.257	8.8	234	83.2	63
4 16 MG	74	2.139	14.14	879	16.359	11990	61	3167	214	.089	5.4	282	19.0	26
5 19 MG	62	2.103	14.11	338	16.280	16281	69	4248	112	.047	3.3	200	5.3	8
6 16 MG	73	2.130	14.12	891	16.329	11990	60	3159	217	.089	5.3	281	19.3	26
7 3 MG	31	.715	14.30	2624	15.048	22367	52	2147	1295	.283	14.6	608	366.4	103
8 16 MG	69	2.085	14.21	871	16.370	11990	57	3085	212	.089	5.0	275	18.9	26
9 C.T.	4716	4.279	6.71	142	16.082	834	274	448	2	.021	5.8	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.0	40	9.7	
CYCLE 3														
1 IDLE	200	6.314	11.29	128	17.820	1848	23	1323	4	.036	.8	48	.2	0
2 16 MG	92	1.472	14.18	1079	16.251	11990	76	2939	264	.089	6.8	262	23.5	26
3 10 MG	74	1.236	14.70	2178	16.016	6850	35	1068	309	.257	9.1	274	79.5	63
4 16 MG	76	2.072	14.27	930	16.424	11990	62	3055	225	.089	5.5	272	20.1	26
5 19 MG	64	2.172	14.23	361	16.471	16281	71	4337	118	.047	3.3	204	5.6	8
6 16 MG	73	2.273	14.21	968	16.562	11990	59	3324	233	.089	5.3	296	20.7	26
7 3 MG	36	1.132	14.21	2338	15.381	22367	59	3325	1129	.283	16.6	941	319.4	103
8 16 MG	74	2.513	14.04	744	16.633	11990	60	3654	178	.089	5.3	326	15.8	26
9 C.T.	4401	4.277	6.57	163	16.140	834	284	446	3	.021	6.0	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	48	8.4	
CYCLE 4														
1 IDLE	200	6.314	11.29	128	17.820	1848	23	1323	4	.036	.8	48	.2	0
2 16 MG	94	2.122	14.14	1033	16.364	11990	77	3141	251	.089	6.9	280	22.4	26
3 10 MG	71	1.006	14.81	2380	15.893	6850	34	876	341	.257	8.8	225	87.5	63
4 16 MG	75	2.106	14.32	840	16.507	11990	61	3040	215	.089	5.4	275	19.1	26
5 19 MG	62	1.989	14.40	391	16.451	16281	69	3966	128	.047	3.2	186	6.0	8
6 16 MG	74	2.282	14.25	1056	16.612	11990	60	3327	253	.089	5.3	296	22.5	26
7 3 MG	35	.842	14.43	2642	15.310	22367	57	2485	1281	.283	16.2	703	362.7	103
8 16 MG	83	2.328	14.19	785	16.608	11990	67	3395	188	.089	6.0	302	16.7	26
9 C.T.	4874	4.174	6.74	182	16.180	834	281	435	3	.021	5.9	9	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	42	9.8	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.0	41	9.6	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.1	45	9.3	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.0) + 0.65(1.1) = 1.051 (MASS)
CO 0.35(41) + 0.65(45) = 43.7 (MASS)
NO2 0.35(9.6) + 0.65(9.3) = 9.389 (MASS)

11-23-71 RUN 4 TRUCK 4 1970 WHITE 400 CID 6 STATIONARY K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	164	5.797	11.53	106	17.504	1848	19	1236	4	.036	.7	45	.1	0
2 16 MG	86	1.683	14.25	1160	16.026	11990	72	2544	288	.089	6.4	226	25.6	26
3 10 MG	69	.907	14.67	2322	15.652	6850	34	802	337	.257	8.7	206	86.7	63
4 16 MG	73	1.937	14.25	963	16.266	11990	60	2884	236	.089	5.4	257	21.0	26
5 19 MG	64	2.164	14.14	334	16.373	16281	71	4347	110	.047	3.4	204	5.2	8
6 16 MG	73	2.071	14.23	939	16.380	11990	60	3062	228	.089	5.3	273	20.3	26
7 3 MG	35	1.000	14.18	2471	15.218	22367	58	2469	1206	.283	16.3	840	341.2	103
8 16 MG	69	2.011	14.33	901	16.416	11990	56	2967	218	.089	5.0	264	19.4	26
9 C.T.	4456	4.342	6.65	134	15.804	834	263	463	2	.021	5.5	10	.0	0
SUM----------(CYCLE COMPOSITE)----------											1.0	42	9.5	
CYCLE 2														
1 IDLE	164	5.797	11.53	106	17.504	1848	19	1236	4	.036	.7	45	.1	0
2 16 MG	93	1.821	14.28	1112	16.201	11990	77	2722	273	.089	6.9	242	24.3	26
3 10 MG	75	1.208	14.59	2044	15.879	6850	36	1053	300	.257	9.3	271	77.1	63
4 16 MG	75	2.061	14.26	887	16.402	11990	61	3043	215	.089	5.5	271	19.2	26
5 19 MG	66	2.108	14.32	338	16.499	16281	73	4202	111	.047	3.4	147	5.2	8
6 16 MG	75	2.147	14.24	1071	16.468	11990	61	3158	259	.089	5.4	281	23.0	26
7 3 MG	37	.985	14.32	2507	15.345	22367	60	2400	1213	.283	17.1	821	343.3	103
8 16 MG	71	2.153	14.29	779	16.520	11990	58	3157	188	.089	5.1	281	16.7	26
9 C.T.	4303	4.281	6.42	132	15.848	834	254	455	2	.021	5.3	10	.0	0
SUM----------(CYCLE COMPOSITE)----------											1.1	44	9.3	
CYCLE 3														
1 IDLE	208	6.511	11.20	120	17.936	1848	24	1355	4	.036	.9	49	.1	0
2 16 MG	91	1.402	14.36	1008	16.350	11990	75	2817	245	.089	6.7	251	21.8	26
3 10 MG	75	1.044	14.73	2342	15.855	6850	36	911	343	.257	9.3	234	88.2	63
4 16 MG	75	2.069	14.29	922	16.440	11990	61	3048	223	.089	5.5	271	19.9	26
5 19 MG	64	2.077	14.24	347	16.386	16281	71	4169	114	.047	3.3	196	5.4	8
6 16 MG	74	2.149	14.16	934	16.389	11990	61	3176	227	.089	5.4	283	20.2	26
7 3 MG	40	.854	14.97	2963	15.367	22367	65	2511	1432	.283	18.5	711	405.2	103
8 16 MG	74	2.444	14.08	831	16.604	11990	60	3565	199	.089	5.3	317	17.7	26
9 C.T.	4393	4.355	6.84	160	15.939	834	257	460	3	.021	5.4	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	42	10.5	
CYCLE 4														
1 IDLE	208	6.511	11.20	120	17.936	1848	24	1355	4	.036	.9	49	.1	0
2 16 MG	101	2.401	13.98	939	16.440	11990	82	3526	227	.089	7.3	314	20.2	26
3 10 MG	81	1.413	14.54	2109	16.040	6850	34	1219	299	.257	10.0	313	76.8	63
4 16 MG	80	2.320	14.16	919	16.556	11990	65	3394	221	.089	5.8	302	19.7	26
5 19 MG	67	2.219	14.17	347	16.461	16281	74	4433	114	.047	3.5	208	5.4	8
6 16 MG	76	2.263	14.13	899	16.475	11990	62	3327	217	.089	5.5	296	19.3	26
7 3 MG	47	.733	14.56	2472	15.344	22367	77	2158	1438	.283	21.7	611	407.1	103
8 16 MG	77	2.468	14.10	801	16.651	11990	62	3540	191	.089	5.5	314	17.0	26
9 C.T.	4043	4.207	7.17	168	15.743	834	240	450	3	.021	5.0	9	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.2	44	10.3	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.1	43	9.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.1	43	10.4	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.1) + 0.65(1.1) = 1.104 (MASS)
CO 0.35(43) + 0.65(43) = 43.1 (MASS)
NO2 0.35(9.4) + 0.65(10.4) = 10.040 (MASS)

11-08-71 RUN-2 TRUCK 4 1970 WHITE 400 CID 6 CHASSIS K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	238	6.135	8.60	111	14.992	1848	33	1528	5	.036	1.2	55	.2	0
2 16 MG	112	2.702	12.52	762	15.343	11990	98	4265	198	.089	8.7	380	17.6	26
3 10 MG	98	1.468	13.26	1400	15.334	6850	49	1776	282	.257	12.6	456	72.4	63
4 16 MG	95	3.084	12.52	729	15.707	11990	81	4756	185	.089	7.2	423	16.4	26
5 19 MG	87	3.044	12.51	318	15.648	16281	101	6348	110	.047	4.8	301	5.2	8
6 16 MG	92	3.111	12.60	719	15.810	11990	78	4766	181	.089	7.0	424	16.1	26
7 3 MG	55	.665	13.40	3361	14.624	22367	94	2054	1707	.283	26.7	581	483.0	103
8 16 MG	87	3.477	12.45	683	16.021	11990	73	5256	170	.089	6.5	466	15.1	26
9 C.T.	4223	3.875	4.50	166	12.436	834	305	505	4	.021	6.4	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	56	11.4	
CYCLE 2														
1 IDLE	238	6.135	8.60	111	14.992	1848	33	1528	5	.036	1.2	55	.2	0
2 16 MG	121	3.063	12.59	748	15.784	11990	103	4700	189	.089	9.2	418	16.8	26
3 10 MG	99	2.109	13.47	1924	15.686	6850	48	1860	279	.257	12.4	478	71.7	63
4 16 MG	96	3.221	12.73	793	16.055	11990	80	4859	197	.089	7.1	434	17.5	26
5 19 MG	88	3.096	12.69	369	15.881	16281	101	6411	126	.047	4.7	301	5.9	8
6 16 MG	93	3.115	12.77	793	15.985	11990	78	4720	197	.089	7.0	420	17.6	26
7 3 MG	55	.595	14.14	3552	14.794	22367	93	1817	1783	.283	26.4	514	504.6	103
8 16 MG	87	3.553	12.63	731	16.277	11990	72	5287	174	.089	6.4	471	15.9	26
9 C.T.	4147	3.826	4.66	205	12.465	834	299	497	4	.021	6.3	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	56	11.8	
CYCLE 3														
1 IDLE	259	5.958	9.32	186	15.558	1848	34	1430	7	.036	1.2	51	.3	0
2 16 MG	119	3.097	12.75	787	15.976	11990	100	4695	196	.089	8.9	418	17.5	26
3 10 MG	98	2.092	13.60	1423	15.798	6850	48	1832	277	.257	12.2	471	71.1	63
4 16 MG	96	3.399	12.69	749	16.188	11990	80	5078	184	.089	7.1	456	16.4	26
5 19 MG	90	3.119	12.75	363	15.966	16281	103	6425	123	.047	4.8	302	5.8	8
6 16 MG	99	3.365	12.79	732	16.247	11990	78	5002	179	.089	6.9	445	16.0	26
7 3 MG	60	.627	14.21	3538	14.902	22367	101	1401	1763	.283	28.5	538	498.4	103
8 16 MG	90	3.519	12.65	718	16.266	11990	74	5240	176	.089	6.6	466	15.6	26
9 C.T.	3994	3.847	4.79	218	12.451	834	288	500	5	.021	6.0	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	57	11.7	
CYCLE 4														
1 IDLE	259	5.958	9.32	186	15.558	1848	34	1430	7	.036	1.2	51	.3	0
2 16 MG	136	3.314	12.61	735	16.071	11990	114	4994	182	.089	10.1	445	16.2	26
3 10 MG	110	2.056	13.59	1991	15.765	6850	54	1805	287	.257	13.8	464	73.8	63
4 16 MG	106	3.405	12.70	739	16.214	11990	88	5085	181	.089	7.8	453	16.1	26
5 19 MG	96	3.224	12.70	382	16.028	16281	109	6615	129	.047	5.1	311	6.1	8
6 16 MG	98	3.205	12.79	781	16.101	11990	82	4821	193	.089	7.3	429	17.2	26
7 3 MG	59	.528	14.23	3635	14.822	22367	100	1610	1821	.283	28.2	455	515.4	103
8 16 MG	91	3.572	12.65	707	16.320	11990	76	5301	172	.089	6.7	472	15.3	26
9 C.T.	3938	3.799	4.76	225	12.812	834	287	500	5	.021	6.0	10	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	56	12.0	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.5	56	11.6	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.5	57	11.8	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.5) + 0.65(1.5) = 1.512 (MASS)
CO 0.35(56) + 0.65(57) = 56.7 (MASS)
NO2 0.35(11.6) + 0.65(11.8) = 11.761 (MASS)

11-09-71 RUN 1 TRUCK 4 1970 WHITE 400 CID 6 CHASSIS K = 1.00

	MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	263	6.274	8.27	71	14.828	1848	37	1579	3	.036	1.3	57	.1	0
	2 16 MG	112	2.560	12.51	637	15.141	11990	99	4082	167	.089	8.8	363	14.9	26
	3 10 MG	92	1.909	13.91	1728	15.918	6850	44	1659	247	.257	11.4	426	63.4	63
	4 16 MG	90	2.903	12.59	660	15.590	11990	78	4510	169	.089	6.9	401	15.0	26
	5 19 MG	81	2.796	12.58	268	15.463	16281	96	5947	94	.047	4.5	279	4.4	8
	6 16 MG	87	3.051	12.55	604	15.695	11990	74	4708	153	.089	6.6	419	13.6	26
	7 3 MG	53	.904	13.76	2871	14.721	22367	90	2774	1448	.283	25.5	785	409.8	103
	8 16 MG	85	3.227	12.52	643	15.839	11990	72	4935	162	.089	6.4	439	14.4	26
	9 C.T.	4189	3.757	4.32	112	12.601	834	311	502	2	.021	6.5	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.4	58	9.7	
CYCLE 2															
	1 IDLE	263	6.274	8.27	71	14.828	1848	37	1579	3	.036	1.3	57	.1	0
	2 16 MG	121	2.873	12.69	658	15.649	11990	104	4934	167	.089	9.2	395	14.9	26
	3 10 MG	100	2.079	13.38	1686	15.567	6850	49	1848	246	.257	12.7	475	63.3	63
	4 16 MG	99	3.242	12.62	614	16.019	11990	83	4977	153	.089	7.4	443	13.6	26
	5 19 MG	90	3.112	12.62	275	15.829	16281	104	6466	94	.047	4.9	304	4.4	8
	6 16 MG	95	3.236	12.63	619	15.969	11990	80	4908	154	.089	7.1	437	13.7	26
	7 3 MG	57	.685	14.17	3086	14.917	22367	96	2075	1536	.283	27.1	587	434.8	103
	8 16 MG	88	3.484	12.58	592	16.154	11990	73	5222	146	.089	6.5	465	13.0	26
	9 C.T.	4051	3.747	4.54	121	12.712	834	298	503	3	.021	6.3	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.5	58	10.1	
CYCLE 3															
	1 IDLE	241	5.986	9.35	124	15.596	1848	32	1433	5	.036	1.2	52	.2	0
	2 16 MG	121	3.094	12.77	628	15.995	11990	102	4685	156	.089	9.0	417	13.9	26
	3 10 MG	98	2.100	13.56	1701	15.766	6850	48	1843	245	.257	12.3	479	63.1	63
	4 16 MG	97	3.210	12.81	612	16.125	11990	81	4822	151	.089	7.2	429	13.4	26
	5 19 MG	89	3.124	12.73	277	15.955	16281	102	6450	94	.047	4.8	303	4.4	8
	6 16 MG	94	3.281	12.75	600	16.133	11990	78	4926	148	.089	7.0	438	13.2	26
	7 3 MG	56	.648	14.24	3170	14.948	22367	94	1959	1575	.283	26.6	554	445.7	103
	8 16 MG	88	3.548	12.64	581	16.283	11990	73	5277	142	.089	6.5	470	12.6	26
	9 C.T.	3960	3.757	4.58	141	12.614	834	293	502	3	.021	6.2	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.5	57	10.3	
CYCLE 4															
	1 IDLE	241	5.986	9.35	124	15.596	1848	32	1433	5	.036	1.2	52	.2	0
	2 16 MG	118	3.113	12.82	678	16.060	11990	99	4695	168	.089	8.8	418	15.0	26
	3 10 MG	99	2.078	13.68	1749	15.865	6850	48	1812	258	.257	12.3	466	66.3	63
	4 16 MG	99	3.303	12.79	658	16.200	11990	82	4938	162	.089	7.3	439	14.4	26
	5 19 MG	89	3.403	12.70	289	16.199	16281	100	6409	96	.047	4.7	325	4.5	8
	6 16 MG	93	3.175	12.84	674	16.115	11990	77	4772	166	.089	6.9	425	14.8	26
	7 3 MG	59	.627	14.34	3329	15.031	22367	98	1885	1645	.283	27.8	533	465.4	103
	8 16 MG	91	3.544	12.66	619	16.242	11990	75	5268	151	.089	6.7	469	13.5	26
	9 C.T.	3836	3.802	4.75	160	12.645	834	282	505	3	.021	5.9	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.5	57	10.8	
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.5	58	9.9	
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.5	57	10.6	

FOUR CYCLE COMPOSITE - REPORTED VALUES = HC 0.35(1.5) + 0.65(1.5) = 1.469 (MASS)
CO 0.35(58) + 0.65(57) = 57.4 (MASS)
NO2 0.35(9.9) + 0.65(10.6) = 10.343 (MASS)

11-09-71 RUN 2 TRUCK 4 1970 WHITE 400 CID 6 CHASSIS K = 1.00

	MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	231	5.691	8.30	93	14.240	1848	34	1492	4	.036	1.2	54	.1	0
	2 16 MG	112	2.750	11.91	672	14.781	11990	102	4506	181	.089	9.1	401	16.1	26
	3 10 MG	98	1.888	12.78	1856	14.774	6850	51	1768	286	.257	13.1	454	73.4	63
	4 16 MG	97	3.172	11.92	686	15.147	11990	86	5055	180	.089	7.6	450	16.0	26
	5 19 MG	87	3.132	11.90	285	15.126	16281	105	6810	102	.047	4.9	320	4.8	8
	6 16 MG	92	3.137	11.98	651	15.216	11990	81	4993	170	.089	7.2	444	15.2	26
	7 3 MG	57	.774	13.17	3099	14.006	22367	102	2497	1643	.283	28.4	707	465.0	103
	8 16 MG	88	3.344	11.90	615	15.389	11990	77	5342	154	.089	6.8	475	14.2	26
	9 C.T.	4041	3.788	4.20	126	12.406	834	308	514	3	.021	6.5	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	60	11.0	
CYCLE 2															
	1 IDLE	231	5.691	8.30	93	14.240	1848	34	1492	4	.036	1.2	54	.1	0
	2 16 MG	120	2.962	12.14	687	15.232	11990	106	4710	180	.089	9.4	414	16.0	26
	3 10 MG	98	2.035	12.85	1778	14.991	6850	50	1878	270	.257	12.9	483	69.3	63
	4 16 MG	96	3.235	12.08	660	15.419	11990	84	5082	170	.089	7.4	452	15.2	26
	5 19 MG	88	3.210	11.99	289	15.295	16281	105	6902	102	.047	4.9	324	4.8	8
	6 16 MG	93	3.189	12.04	655	15.379	11990	81	5022	170	.089	7.2	447	15.1	26
	7 3 MG	59	.669	13.33	3233	14.063	22367	105	2149	1707	.283	29.7	608	483.1	103
	8 16 MG	89	3.481	12.00	634	15.577	11990	77	5412	162	.089	6.8	482	14.4	26
	9 C.T.	4038	3.758	4.28	133	12.399	834	304	511	3	.021	6.4	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	60	11.2	
CYCLE 3															
	1 IDLE	243	5.985	8.81	125	15.057	1848	33	1484	5	.036	1.2	53	.2	0
	2 16 MG	118	3.075	12.03	686	15.232	11990	104	4884	179	.089	9.3	435	16.0	26
	3 10 MG	99	1.998	12.93	1817	15.035	6850	51	1839	275	.257	13.0	473	70.6	63
	4 16 MG	97	3.279	12.04	653	15.474	11990	84	5132	168	.089	7.5	457	15.0	26
	5 19 MG	90	3.218	12.02	284	15.335	16281	107	6901	100	.047	5.0	324	4.7	8
	6 16 MG	93	3.163	12.14	656	15.393	11990	81	4961	170	.089	7.2	442	15.1	26
	7 3 MG	57	.613	13.34	3326	14.015	22367	102	1976	1762	.283	28.8	559	498.7	103
	8 16 MG	89	3.524	11.92	629	15.590	11990	77	5492	161	.089	6.8	489	14.3	26
	9 C.T.	3944	3.774	4.31	139	12.344	834	298	516	3	.021	6.3	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.5	54	11.5	
CYCLE 4															
	1 IDLE	243	5.985	8.81	125	15.057	1848	33	1484	5	.036	1.2	53	.2	0
	2 16 MG	116	3.075	12.06	722	15.260	11990	102	4880	188	.089	9.1	434	16.8	26
	3 10 MG	98	2.054	12.87	1823	15.030	6850	50	1841	276	.257	12.9	486	70.9	63
	4 16 MG	95	3.312	11.99	680	15.405	11990	83	5207	176	.089	7.4	463	15.6	26
	5 19 MG	88	3.230	11.93	321	15.255	16281	105	6963	114	.047	4.9	327	5.3	8
	6 16 MG	93	3.306	12.05	669	15.456	11990	81	5180	172	.089	7.2	461	15.3	26
	7 3 MG	56	.689	13.36	3909	14.009	22367	100	1900	1807	.283	28.3	538	511.4	103
	8 16 MG	91	3.608	11.89	638	15.596	11990	78	5603	163	.089	7.0	499	14.5	26
	9 C.T.	3783	3.718	4.42	170	12.224	834	284	512	4	.021	6.1	11	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.5	60	11.8	
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.6	60	11.1	
	AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.5	59	11.7	

FOUR CYCLE COMPOSITE - REPORTED VALUES = HC 0.35(1.6) + 0.65(1.5) = 1.546 (MASS)
CO 0.35(60) + 0.65(59) = 59.5 (MASS)
NO2 0.35(11.1) + 0.65(11.7) = 11.404 (MASS)

TABLE J-5. NINE MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS
Correlation Truck No. 5

Engine: Ford 330 CID, V8

Vehicle: 1971 23,000-lb GVW Stake

Date	Run	Dynamometer	Emissions, Gr/Bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
12-6-71	1	Stationary	1.51	52.8	6.90	6.49
12-6-71	2	Stationary	1.55	58.9	6.64	5.68
12-6-71	3	Stationary	1.54	52.1	7.34	6.24
		Average	1.53	54.6	6.96	6.14
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			2.9	12.4	9.9	13.2
11-11-71	1	Chassis	1.91	51.2	7.51	6.85
11-11-71	2	Chassis	1.74	49.1	7.66	7.05
11-11-71	3	Chassis	1.78	50.1	7.69	7.07
		Average	1.81	50.1	7.62	6.99
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			9.5	4.1	2.3	3.2
Average Stationary			1.53	54.6	6.96	6.14
Average Chassis			1.81	50.1	7.62	6.99
Difference: (Chassis - Stationary)			0.28	-4.5	0.66	0.85
Percent Difference: (Difference/Stationary) x 100			18.0	-8.1	9.5	13.9

12-06-71 RUN 1 TRUCK 5 1971 FORD 330 CID V8 STAT K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	317	2.252	10.19	24	12.784	1967	55	700	1	.036	2.0	25	.0	0
2 16 MG	76	.327	10.47	749	11.379	6639	50	385	145	.089	4.4	34	12.9	23
3 10 MG	73	.328	12.08	2004	12.487	8342	55	443	444	.257	14.0	114	114.2	54
4 16 MG	43	.314	10.82	677	11.180	6643	29	380	135	.089	2.6	34	12.0	23
5 19 MG	40	.129	8.91	125	9.136	13815	152	394	63	.047	7.2	19	2.9	3
6 16 MG	46	.321	11.07	851	11.441	6639	30	376	164	.089	2.7	33	14.6	23
7 3 MG	49	2.544	13.08	448	15.677	23462	82	7641	446	.283	23.2	2177	140.3	86
8 16 MG	31	.248	10.48	775	11.311	6639	20	353	151	.089	1.8	31	13.4	23
9 C.T.	2712	.446	3.40	37	7.325	1537	637	210	3	.021	13.4	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	53	6.7	
CYCLE 2														
1 IDLE	317	2.252	10.19	24	12.784	1967	55	700	1	.036	2.0	25	.0	0
2 16 MG	74	.417	11.02	840	11.522	6639	51	485	161	.089	4.5	43	14.3	23
3 10 MG	73	.432	12.27	1474	12.781	8342	53	570	428	.257	13.7	146	109.4	54
4 16 MG	46	.304	10.42	703	11.274	6643	31	365	134	.089	2.7	32	12.3	23
5 19 MG	86	.136	9.04	164	9.264	13815	144	409	81	.047	6.7	14	3.8	3
6 16 MG	48	.404	11.28	1141	11.736	6639	30	462	214	.089	2.7	41	14.1	23
7 3 MG	54	2.644	13.05	440	15.807	23462	40	8042	488	.283	25.4	2240	138.1	86
8 16 MG	35	.354	11.14	717	11.632	6639	23	412	137	.089	2.0	37	12.2	23
9 C.T.	2565	.444	4.04	48	7.304	1537	604	212	3	.021	12.7	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	57	6.7	
CYCLE 3														
1 IDLE	184	2.404	11.00	67	13.613	1967	31	703	3	.036	1.1	25	.1	0
2 16 MG	66	.433	11.10	895	11.604	6639	42	500	170	.089	3.8	45	15.1	23
3 10 MG	66	.443	12.25	1481	12.764	8342	48	585	430	.257	12.4	150	110.5	54
4 16 MG	43	.311	11.15	944	11.507	6643	28	365	183	.089	2.5	33	16.3	23
5 19 MG	88	.143	8.44	162	9.228	13815	148	432	81	.047	6.9	20	3.8	3
6 16 MG	42	.337	11.15	946	11.532	6639	27	342	181	.089	2.4	35	16.1	23
7 3 MG	47	2.414	13.21	1032	15.675	23462	74	7244	513	.283	22.3	2046	145.1	86
8 16 MG	24	.301	11.08	825	11.412	6639	14	354	154	.089	1.7	31	14.2	23
9 C.T.	2657	.472	4.04	70	7.382	1537	620	144	5	.021	13.0	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.4	52	6.9	
CYCLE 4														
1 IDLE	184	2.404	11.00	67	13.613	1967	31	703	3	.036	1.1	25	.1	0
2 16 MG	66	.448	11.04	858	11.574	6639	42	542	163	.089	3.8	48	14.5	23
3 10 MG	64	.415	12.20	2048	12.684	8342	47	551	447	.257	12.1	142	114.9	54
4 16 MG	40	.357	11.05	871	11.450	6643	26	422	164	.089	2.3	38	15.0	23
5 19 MG	154	.145	8.87	184	9.181	13815	260	441	92	.047	12.2	21	4.3	3
6 16 MG	45	.345	11.10	1008	11.444	6639	24	403	193	.089	2.6	36	17.2	23
7 3 MG	44	2.386	13.18	1064	15.614	23462	82	7240	533	.283	23.3	2044	150.9	86
8 16 MG	24	.336	11.30	848	11.667	6639	18	386	170	.089	1.6	34	15.1	23
9 C.T.	2655	.476	3.47	84	7.313	1537	625	202	6	.021	13.1	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	51	7.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.5	55	6.7	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.5	52	7.0	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.5) + 0.65(1.5) = 1.506 (MASS)
CO 0.35(55) + 0.65(52) = 52.8 (MASS)
NO2 0.35(6.7) + 0.65(7.0) = 6.896 (MASS)

12-06-71 RUN 2 TRUCK 5 1971 FORD 330 CID V8 STAT K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	247	3.142	10.87	58	14.274	1967	38	874	3	.036	1.4	31	.1	0
2 16 MG	62	.428	11.14	858	11.635	6639	40	443	163	.089	3.5	44	14.5	23
3 10 MG	68	.849	12.36	1702	13.282	8342	48	1077	355	.257	12.3	277	91.2	54
4 16 MG	40	.409	11.34	767	11.792	6643	25	469	145	.089	2.3	42	12.9	23
5 19 MG	143	.174	8.46	167	9.243	13815	238	538	82	.047	11.2	25	3.4	3
6 16 MG	46	.423	11.27	1065	11.743	6639	29	483	200	.089	2.6	43	17.8	23
7 3 MG	54	3.024	13.08	963	16.162	23462	88	8867	464	.283	24.8	2504	131.3	86
8 16 MG	51	.536	11.33	773	11.921	6639	32	603	143	.089	2.8	54	12.7	23
9 C.T.	2622	.480	3.62	50	6.932	1537	651	215	4	.021	13.7	5	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	65	6.1	
CYCLE 2														
1 IDLE	247	3.142	10.87	58	14.274	1967	38	874	3	.036	1.4	31	.1	0
2 16 MG	61	.473	11.30	812	11.834	6639	38	536	151	.089	3.4	48	13.5	23
3 10 MG	67	.531	12.51	1444	13.113	8342	48	682	421	.257	12.3	175	108.2	54
4 16 MG	40	.402	11.35	846	11.744	6643	25	461	154	.089	2.3	41	14.2	23
5 19 MG	184	.185	8.44	144	9.374	13815	304	551	73	.047	14.3	26	3.4	3
6 16 MG	44	.412	11.40	946	11.860	6639	28	466	176	.089	2.5	41	15.6	23
7 3 MG	55	2.714	13.31	1032	16.088	23462	90	8010	500	.283	25.4	2267	141.4	86
8 16 MG	30	.418	11.44	874	11.840	6639	14	471	162	.089	1.7	42	14.4	23
9 C.T.	2725	.527	3.74	65	7.260	1537	646	225	5	.021	13.6	5	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	57	6.7	
CYCLE 3														
1 IDLE	172	2.770	11.46	80	14.416	1967	26	763	4	.036	.9	27	.1	0
2 16 MG	63	.481	11.36	928	11.909	6639	34	542	172	.089	3.5	48	15.3	23
3 10 MG	66	.636	12.54	1953	13.247	8342	47	804	408	.257	12.0	204	104.9	54
4 16 MG	42	.381	11.36	924	11.786	6643	27	437	174	.089	2.4	39	15.5	23
5 19 MG	117	.225	9.40	273	9.751	13815	186	644	128	.047	8.7	30	6.0	3
6 16 MG	44	.408	11.38	910	11.836	6639	28	462	164	.089	2.5	41	15.1	23
7 3 MG	54	2.784	13.35	1001	16.142	23462	88	8148	482	.283	24.8	2306	136.3	86
8 16 MG	35	.446	11.41	874	11.844	6639	22	503	163	.089	1.4	45	14.5	23
9 C.T.	2719	.444	3.41	77	7.346	1537	637	211	5	.021	13.4	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	54	6.6	
CYCLE 4														
1 IDLE	172	2.770	11.46	80	14.416	1967	26	763	4	.036	.9	27	.1	0
2 16 MG	66	.508	11.37	917	11.944	6639	41	570	164	.089	3.7	51	15.1	23
3 10 MG	66	.477	12.60	2126	13.148	8342	47	611	448	.257	12.1	157	115.1	54
4 16 MG	43	.406	11.42	964	11.872	6643	27	462	181	.089	2.4	41	16.1	23
5 19 MG	125	.186	9.11	181	9.431	13815	205	550	88	.047	9.6	26	4.1	3
6 16 MG	45	.343	11.41	940	11.852	6639	28	445	174	.089	2.5	40	15.6	23
7 3 MG	53	2.688	13.44	1036	16.185	23462	86	7871	449	.283	24.4	2227	141.1	86
8 16 MG	31	.419	11.48	932	11.932	6639	14	471	172	.089	1.7	42	15.3	23
9 C.T.	2687	.536	3.87	48	7.308	1537	633	228	7	.021	13.3	5	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	56	6.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.6	61	6.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.5	58	6.8	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.5) = 1.551 (MASS)
CO 0.35(61) + 0.65(58) = 58.9 (MASS)
NO2 0.35(6.4) + 0.65(6.8) = 6.641 (MASS)

12-06-71 RUN 3 TRUCK 5 1971 FORD 330 CID V8 STAT K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	188	2.782	11.07	62	14.055	1967	29	786	3	.036	1.1	28	.1	0
2 16 MG	60	.332	11.01	887	11.407	6639	39	390	171	.089	3.5	35	15.3	23
3 10 MG	66	.395	12.20	2015	12.666	8342	49	525	441	.257	12.5	135	113.2	54
4 16 MG	41	.361	11.13	877	11.535	6693	27	423	169	.089	2.4	38	15.0	23
5 19 MG	132	.155	8.90	180	9.198	13815	222	470	90	.047	10.4	22	4.2	3
6 16 MG	43	.370	11.15	1058	11.566	6639	28	429	202	.089	2.5	38	17.9	23
7 3 MG	53	2.629	13.06	998	15.741	23462	88	7900	499	.283	25.0	2236	139.8	86
8 16 MG	31	.372	11.26	864	11.665	6639	20	428	163	.089	1.8	38	14.5	23
9 C.T.	2646	.504	3.69	68	7.052	1537	646	222	5	.021	13.6	5	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	55	6.9	
CYCLE 2														
1 IDLE	188	2.792	11.07	62	14.055	1967	29	786	3	.036	1.1	28	.1	0
2 16 MG	61	.430	11.11	833	11.606	6639	39	497	158	.089	3.5	44	14.1	23
3 10 MG	68	.399	12.25	2171	12.722	8342	50	528	473	.257	12.8	136	121.5	54
4 16 MG	43	.366	11.16	924	11.572	6693	28	428	187	.089	2.5	38	16.6	23
5 19 MG	77	.164	9.01	172	9.257	13815	129	494	85	.047	6.0	23	4.0	3
6 16 MG	43	.342	11.08	924	11.468	6639	28	400	178	.089	2.5	36	15.8	23
7 3 MG	52	2.635	13.19	1086	15.781	23462	87	7613	536	.283	24.5	2154	151.7	86
8 16 MG	31	.391	11.31	932	11.734	6639	20	447	175	.089	1.7	40	15.6	23
9 C.T.	2629	.568	3.83	82	7.237	1537	625	244	6	.021	13.1	5	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	54	7.3	
CYCLE 3														
1 IDLE	149	2.417	11.34	92	13.918	1967	24	690	4	.036	.8	25	.2	0
2 16 MG	63	.454	11.11	840	11.632	6639	40	523	169	.089	3.6	47	15.0	23
3 10 MG	68	.401	12.29	2179	12.764	8342	50	529	473	.257	12.8	136	121.6	54
4 16 MG	43	.338	11.16	927	11.544	6693	28	346	178	.089	2.5	35	15.4	23
5 19 MG	135	.167	8.84	175	9.153	13815	228	509	88	.047	10.7	24	4.1	3
6 16 MG	44	.335	11.17	910	11.553	6639	28	389	174	.089	2.5	35	15.5	23
7 3 MG	52	2.376	13.21	1103	15.642	23462	87	7149	544	.283	24.7	2037	155.4	86
8 16 MG	31	.323	11.21	912	11.566	6639	20	375	174	.089	1.8	33	15.5	23
9 C.T.	2633	.614	3.47	47	7.328	1537	614	218	7	.021	13.0	5	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	51	7.4	
CYCLE 4														
1 IDLE	149	2.417	11.34	92	13.918	1967	24	690	4	.036	.8	25	.2	0
2 16 MG	60	.421	11.08	917	11.566	6639	39	488	175	.089	3.4	43	15.6	23
3 10 MG	65	.367	12.28	2194	12.717	8342	48	486	478	.257	12.3	125	122.8	54
4 16 MG	41	.325	11.11	965	11.479	6693	27	383	187	.089	2.4	34	16.6	23
5 19 MG	170	.175	8.83	192	9.189	13815	286	531	96	.047	13.5	25	4.5	3
6 16 MG	46	.365	11.12	998	11.535	6639	30	424	181	.089	2.6	38	16.1	23
7 3 MG	49	2.358	13.24	1130	15.651	23462	82	7140	562	.283	23.3	2021	159.2	86
8 16 MG	32	.336	11.13	1003	11.501	6639	21	392	192	.089	1.8	35	17.1	23
9 C.T.	2626	.517	4.06	117	7.413	1537	610	217	8	.021	12.8	5	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.6	50	7.6	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.5 55 7.1

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.6 51 7.5

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.5) + 0.65(1.6) = 1.543 (MASS)
CO 0.35(55) + 0.65(51) = 52.1 (MASS)
NO2 0.35(7.1) + 0.65(7.5) = 7.336 (MASS)

11-11-71 RUN 1 TRUCK 5 1971 FORD 330 CID V8 CHASSIS K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	443	1.808	10.58	94	12.866	1967	76	558	5	.036	2.7	20	.2	0
2 16 MG	110	.309	11.58	741	12.008	6639	68	345	136	.089	6.1	31	12.1	23
3 10 MG	107	.382	12.46	2003	13.458	8342	74	478	412	.257	19.1	123	105.9	54
4 16 MG	69	.288	11.74	882	12.153	6693	43	320	161	.089	3.8	29	14.4	23
5 19 MG	198	.259	10.12	266	10.593	13815	289	682	115	.047	13.6	32	5.4	3
6 16 MG	66	.240	11.83	877	12.141	6639	40	319	169	.089	3.6	28	14.1	23
7 3 MG	74	2.605	13.85	1102	16.535	23462	118	7467	519	.283	33.3	2113	146.4	86
8 16 MG	55	.297	11.88	988	12.236	6639	33	326	178	.089	3.0	29	15.8	23
9 C.T.	2951	.396	3.70	109	7.283	1537	698	169	8	.021	14.6	4	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.1	52	6.8	
CYCLE 2														
1 IDLE	443	1.808	10.58	94	12.866	1967	76	558	5	.036	2.7	20	.2	0
2 16 MG	94	.353	11.65	886	12.105	6639	58	391	161	.089	5.1	34	14.4	23
3 10 MG	96	.418	12.91	2171	13.432	8342	67	524	448	.257	17.2	135	115.0	54
4 16 MG	64	.302	11.77	940	12.141	6693	40	336	181	.089	3.5	30	16.1	23
5 19 MG	117	.260	10.24	248	10.676	13815	170	680	128	.047	8.0	32	6.0	3
6 16 MG	63	.305	11.81	991	12.183	6639	38	336	179	.089	3.4	30	16.0	23
7 3 MG	69	2.517	13.42	1169	16.512	23462	110	7225	551	.283	31.1	2046	156.1	86
8 16 MG	51	.310	11.86	1046	12.225	6639	31	340	189	.089	2.8	30	16.8	23
9 C.T.	3030	.416	3.73	158	7.418	1537	703	174	11	.021	14.8	4	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.9	51	7.3	
CYCLE 3														
1 IDLE	269	2.005	11.06	220	13.356	1967	44	596	11	.036	1.6	21	.4	0
2 16 MG	89	.425	11.72	960	12.241	6639	54	466	173	.089	4.8	41	15.4	23
3 10 MG	91	.427	12.46	2273	13.485	8342	63	534	467	.257	16.2	137	120.0	54
4 16 MG	60	.321	11.80	1045	12.186	6693	37	356	191	.089	3.3	32	17.0	23
5 19 MG	97	.255	10.37	331	10.730	13815	140	663	141	.047	6.6	31	6.7	3
6 16 MG	60	.327	11.75	1020	12.142	6639	37	361	185	.089	3.3	32	16.5	23
7 3 MG	66	2.493	13.41	1239	16.474	23462	105	7172	586	.283	29.8	2030	165.8	86
8 16 MG	50	.318	11.85	1118	12.222	6639	30	349	202	.089	2.7	31	17.9	23
9 C.T.	3072	.409	3.72	204	7.447	1537	710	171	14	.021	14.9	4	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.8	51	7.7	
CYCLE 4														
1 IDLE	269	2.005	11.06	220	13.356	1967	44	596	11	.036	1.6	21	.4	0
2 16 MG	87	.368	11.68	961	12.142	6639	53	406	174	.089	4.7	36	15.5	23
3 10 MG	93	.441	12.44	2270	13.481	8342	64	551	466	.257	16.6	142	119.8	54
4 16 MG	60	.316	11.73	1057	12.111	6693	37	363	194	.089	3.3	31	17.3	23
5 19 MG	139	.200	9.49	335	9.840	13815	214	567	166	.047	10.3	27	7.3	3
6 16 MG	63	.341	11.72	1090	12.129	6639	39	377	198	.089	3.4	34	17.6	23
7 3 MG	70	2.540	13.74	1231	16.406	23462	112	7338	584	.283	31.7	2077	165.4	86
8 16 MG	50	.321	11.84	1162	12.216	6639	30	352	208	.089	2.7	31	18.5	23
9 C.T.	3065	.413	3.71	237	7.433	1537	710	173	16	.021	14.9	4	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.9	52	7.8	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.0 51 7.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.9 51 7.8

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.0) + 0.65(1.9) = 1.912 (MASS)
CO 0.35(51) + 0.65(51) = 51.2 (MASS)
NO2 0.35(7.0) + 0.65(7.8) = 7.508 (MASS)

11-11-71 RUN 2 TRUCK S 1970 FORD 330 CID V8 CHASISS K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	220	2.311	10.69	99	13.239	1697	32	598	9	.036	1.1	22	.1	0
2 16 MG	87	.255	11.67	882	12.019	6639	59	286	162	.089	5.8	25	14.4	23
3 10 MG	92	.250	12.86	2099	13.209	8392	65	319	990	.257	16.7	82	113.1	59
4 16 MG	59	.291	11.80	971	12.155	6693	36	329	178	.089	3.2	29	15.8	23
5 19 MG	118	.179	9.97	202	10.271	13815	178	973	90	.047	8.4	22	4.2	3
6 16 MG	60	.273	11.80	985	12.138	6639	37	302	179	.089	3.3	27	15.9	23
7 3 MG	65	2.459	13.79	1150	16.269	23962	105	7151	551	.283	29.7	2029	155.9	86
8 16 MG	97	.251	11.75	930	12.052	6639	29	279	170	.089	2.6	25	15.1	23
9 C.T.	3026	.335	3.51	96	7.113	1537	732	196	7	.021	15.4	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.8	49	7.2	
CYCLE 2														
1 IDLE	220	2.311	10.69	99	13.239	1697	32	598	9	.036	1.1	22	.1	0
2 16 MG	80	.357	11.82	979	12.263	6639	49	390	176	.089	4.3	35	15.7	23
3 10 MG	86	.365	12.89	2196	13.348	8392	60	461	995	.257	15.5	118	119.4	59
4 16 MG	55	.338	11.82	1012	12.217	6693	39	379	189	.089	3.0	33	16.9	23
5 19 MG	106	.193	10.08	253	10.387	13815	158	519	112	.047	7.4	24	5.3	3
6 16 MG	55	.312	11.91	1065	12.281	6639	33	391	191	.089	3.0	30	17.0	23
7 3 MG	63	2.455	13.88	1178	16.403	23962	101	7093	559	.283	28.6	2007	158.3	86
8 16 MG	93	.249	11.74	959	12.035	6639	27	277	176	.089	2.4	25	15.6	23
9 C.T.	2979	.323	3.57	136	7.110	1537	721	191	10	.021	15.1	3	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	49	7.4	
CYCLE 3														
1 IDLE	215	1.815	11.25	186	13.297	1697	31	468	8	.036	1.1	17	.3	0
2 16 MG	76	.360	11.87	1052	12.312	6639	46	392	188	.089	4.1	35	16.8	23
3 10 MG	83	.353	12.95	2233	13.393	8392	58	444	962	.257	14.9	114	118.7	59
4 16 MG	53	.314	11.87	1086	12.241	6693	32	347	197	.089	2.9	31	17.5	23
5 19 MG	116	.185	10.02	298	10.330	13815	174	500	132	.047	8.2	23	6.2	3
6 16 MG	56	.300	11.87	1083	12.230	6639	34	329	195	.089	3.0	29	17.4	23
7 3 MG	62	2.438	13.85	1238	16.355	23962	100	7065	590	.283	28.2	1999	166.9	86
8 16 MG	43	.251	11.77	998	12.067	6639	26	279	182	.089	2.4	25	16.2	23
9 C.T.	2978	.319	3.58	176	7.115	1537	720	139	13	.021	15.1	3	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.7	49	7.7	
CYCLE 4														
1 IDLE	215	1.815	11.25	186	13.297	1697	31	468	8	.036	1.1	17	.3	0
2 16 MG	83	.385	11.86	1099	12.335	6639	50	419	196	.089	4.5	37	17.5	23
3 10 MG	88	.381	12.87	2322	13.346	8392	62	481	982	.257	15.8	124	123.8	59
4 16 MG	59	.359	11.88	1131	12.298	6693	36	389	209	.089	3.2	35	18.2	23
5 19 MG	79	.176	10.30	345	10.561	13815	116	465	150	.047	5.4	22	7.0	3
6 16 MG	56	.325	11.86	1167	12.245	6639	34	356	210	.089	3.0	32	18.7	23
7 3 MG	66	2.462	13.92	1258	16.453	23962	105	7092	596	.283	29.8	2007	168.5	86
8 16 MG	45	.286	11.75	1105	12.085	6639	28	317	202	.089	2.5	28	17.9	23
9 C.T.	2899	.327	3.65	211	7.108	1537	702	143	15	.021	14.7	3	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.7	50	8.0	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.8	49	7.3	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.7	49	7.9	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.8) + 0.65(1.7) = 1.739 (MASS)
CO 0.35(49) + 0.65(49) = 49.1 (MASS)
NO2 0.35(7.3) + 0.65(7.9) = 7.663 (MASS)

11-11-71 RUN-3 TRUCK S 1970 FORD 330 CID V8 CHASISS K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	236	1.979	10.85	76	13.089	1697	34	518	3	.036	1.2	19	.1	0
2 16 MG	88	.271	11.59	888	11.956	6639	55	304	164	.089	4.9	27	14.6	23
3 10 MG	93	.305	12.75	2133	13.155	8392	66	391	949	.257	17.0	100	115.4	59
4 16 MG	59	.282	11.72	1010	12.066	6693	37	316	186	.089	3.3	28	16.6	23
5 19 MG	159	.188	9.82	219	10.179	13815	234	516	96	.047	11.0	24	4.5	3
6 16 MG	59	.300	11.72	985	12.089	6639	36	333	180	.089	3.2	30	16.0	23
7 3 MG	66	2.460	13.65	1181	16.101	23962	107	7205	569	.283	30.3	2039	160.9	86
8 16 MG	45	.350	11.77	997	12.169	6639	27	386	181	.089	2.4	34	16.1	23
9 C.T.	3076	.356	3.42	117	7.098	1537	746	156	8	.021	15.7	3	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.9	50	7.4	
CYCLE 2														
1 IDLE	236	1.979	10.85	76	13.089	1697	34	518	3	.036	1.2	19	.1	0
2 16 MG	77	.381	11.62	985	12.089	6639	47	423	180	.089	4.2	38	16.0	23
3 10 MG	87	.397	12.76	2216	13.251	8392	61	505	963	.257	15.8	130	119.0	59
4 16 MG	59	.367	11.78	1030	12.205	6693	33	407	188	.089	3.0	36	16.7	23
5 19 MG	127	.210	9.91	271	10.257	13815	192	571	121	.047	9.0	27	5.7	3
6 16 MG	55	.335	11.82	1047	12.214	6639	33	368	189	.089	3.0	33	16.8	23
7 3 MG	64	2.467	13.77	1170	16.306	23962	103	7170	559	.283	29.2	2029	158.2	86
8 16 MG	92	.380	11.86	1020	12.285	6639	25	415	183	.089	2.3	37	16.3	23
9 C.T.	2972	.371	3.60	136	7.181	1537	712	160	10	.021	15.0	3	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	51	7.5	
CYCLE 3														
1 IDLE	206	1.929	11.22	160	13.371	1697	29	495	7	.036	1.1	18	.2	0
2 16 MG	81	.405	11.76	1047	12.252	6639	49	443	188	.089	4.4	39	16.8	23
3 10 MG	86	.408	12.82	2257	13.321	8392	60	516	969	.257	15.5	133	120.6	59
4 16 MG	56	.376	11.82	1083	12.256	6693	34	415	196	.089	3.0	37	17.5	23
5 19 MG	139	.217	9.90	282	10.262	13815	202	590	126	.047	9.5	28	5.9	3
6 16 MG	58	.358	11.87	1077	12.291	6639	35	391	193	.089	3.1	35	17.2	23
7 3 MG	63	2.432	13.76	1222	16.260	23962	102	7084	585	.283	28.8	2006	165.7	86
8 16 MG	97	.369	12.03	1171	12.450	6639	28	397	207	.089	2.5	35	18.5	23
9 C.T.	3067	.365	3.61	173	7.287	1537	724	156	12	.021	15.2	3	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.8	50	7.8	
CYCLE 4														
1 IDLE	206	1.929	11.22	160	13.371	1697	29	495	7	.036	1.1	18	.2	0
2 16 MG	81	.415	11.88	1087	12.382	6639	49	449	193	.089	4.3	40	17.2	23
3 10 MG	86	.406	12.96	2313	13.459	8392	60	508	976	.257	15.3	131	122.3	59
4 16 MG	57	.358	11.89	1136	12.310	6693	35	393	205	.089	3.1	35	18.3	23
5 19 MG	92	.218	10.13	308	10.447	13815	136	582	135	.047	6.4	27	6.4	3
6 16 MG	57	.386	12.04	1156	12.488	6639	34	415	204	.089	3.0	37	18.2	23
7 3 MG	63	2.466	13.94	1225	16.479	23962	100	7094	579	.283	28.4	2008	163.9	86
8 16 MG	95	.401	12.05	1168	12.500	6639	27	430	206	.089	2.4	38	18.3	23
9 C.T.	2983	.379	3.69	183	7.286	1537	705	159	13	.021	14.8	3	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.7	50	7.8	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.8	50	7.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.7	50	7.8	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.8) + 0.65(1.7) = 1.776 (MASS)
CO 0.35(50) + 0.65(50) = 50.1 (MASS)
NO2 0.35(7.4) + 0.65(7.8) = 7.687 (MASS)

TABLE J-6. NINE-MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 6

Engine: Chevrolet 350 CID, V8 Vehicle: 1970 18,000-lb GVW Van

Date	Run	Dynamometer	Emissions, Gr/Bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
12-10-71	1	Stationary	0.80	73.9	4.30	3.74
12-10-71	2	Stationary	0.83	74.5	4.20	3.90
12-10-71	3	Stationary	0.86	73.3	4.35	3.61
		Average	0.83	73.9	4.28	3.75
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			7.0	1.6	3.4	7.7
11-23-71	1	Chassis	1.08	81.0	3.99	3.47
11-24-71	1	Chassis	1.02	79.0	4.05	3.55
11-24-71	3	Chassis	1.03	81.7	3.92	3.35
		Average	1.04	80.6	3.99	3.46
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			6.0	3.4	3.3	5.6
Average Stationary			0.83	73.9	4.28	3.75
Average Chassis			1.04	80.6	3.99	3.46
Difference: (Chassis - Stationary)			0.21	6.7	-.29	0.29
Percent Difference: (Difference/Stationary) x 100			25.2	9.1	-6.9	-7.9

12-10-71 RUN 1 TRUCK 6 1970 CHEV 350 CID V8 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	52	1.187	10.90	53	12.143	1694	8	334	2	.036	.3	12	.1	0
2 16 MG	21	.537	12.09	714	12.650	9278	17	796	174	.089	1.5	71	15.5	76
3 10 MG	29	.576	12.82	1855	13.427	14126	34	1224	648	.257	8.8	315	166.5	30
4 16 MG	12	.470	12.47	674	12.953	9278	10	680	160	.089	.9	61	14.3	76
5 19 MG	12	.229	10.59	247	10.832	6214	8	265	47	.047	.4	12	2.2	63
6 16 MG	11	.502	12.84	592	13.354	9278	9	705	137	.089	.8	63	12.2	76
7 3 MG	59	4.881	12.06	384	17.005	26423	103	15320	148	.283	29.1	4336	56.1	98
8 16 MG	11	.410	12.63	749	13.052	9278	9	589	177	.089	.8	52	15.7	76
9 C.T.	1695	.275	4.05	63	6.156	1620	500	146	6	.021	10.5	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.8	75	4.3	
CYCLE 2														
1 IDLE	52	1.187	10.90	53	12.143	1694	8	334	2	.036	.3	12	.1	0
2 16 MG	21	.556	12.28	760	12.859	9278	17	810	182	.089	1.5	72	16.2	76
3 10 MG	28	.552	12.91	1677	13.492	14126	33	1167	583	.257	8.4	300	149.8	30
4 16 MG	12	.432	12.41	666	12.855	9278	10	630	160	.089	.9	56	14.2	76
5 19 MG	12	.215	10.61	241	10.838	6214	8	249	46	.047	.4	12	2.2	63
6 16 MG	10	.477	12.65	690	13.138	9278	8	680	162	.089	.7	61	14.4	76
7 3 MG	58	4.906	12.13	379	17.099	26423	100	15314	194	.283	28.4	4334	55.0	98
8 16 MG	23	.415	12.72	617	13.160	9278	18	591	144	.089	1.6	53	12.9	76
9 C.T.	1819	.289	4.00	71	6.254	1620	528	151	6	.021	11.1	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.8	75	4.0	
CYCLE 3														
1 IDLE	43	1.194	11.07	102	12.310	1694	7	332	5	.036	.2	12	.2	0
2 16 MG	20	.549	12.30	750	12.866	9278	16	792	180	.089	1.4	71	16.0	76
3 10 MG	27	.561	12.96	1773	13.550	14126	32	1181	614	.257	8.1	304	157.7	30
4 16 MG	13	.440	12.59	704	13.044	9278	10	632	166	.089	.9	56	14.8	76
5 19 MG	13	.219	10.62	258	10.853	6214	8	253	49	.047	.4	12	2.3	63
6 16 MG	12	.538	12.84	783	13.391	9278	9	753	180	.089	.8	67	16.0	76
7 3 MG	57	4.809	12.28	469	17.151	26423	98	14966	240	.283	27.8	4235	67.9	98
8 16 MG	23	.440	12.71	640	13.175	9278	18	626	150	.089	1.6	56	13.3	76
9 C.T.	1873	.281	3.94	99	6.244	1620	544	147	9	.021	11.4	3	.2	0
SUM----------(CYCLE COMPOSITE)----------											.8	74	4.4	
CYCLE 4														
1 IDLE	43	1.194	11.07	102	12.310	1694	7	332	5	.036	.2	12	.2	0
2 16 MG	20	.529	12.25	740	12.801	9278	16	775	178	.089	1.4	69	15.8	76
3 10 MG	26	.530	12.91	1642	13.468	14126	31	1123	572	.257	7.8	289	146.9	30
4 16 MG	15	.443	12.48	729	12.939	9278	12	642	174	.089	1.1	57	15.4	76
5 19 MG	13	.245	10.84	357	11.099	6214	8	277	66	.047	.4	13	3.1	63
6 16 MG	12	.531	12.67	831	13.214	9278	9	753	194	.089	.8	67	17.2	76
7 3 MG	56	4.775	12.24	477	17.075	26423	97	14926	245	.283	27.5	4224	69.4	98
8 16 MG	15	.387	12.56	722	12.963	9278	12	560	172	.089	1.1	50	15.3	76
9 C.T.	1846	.242	3.92	128	6.206	1620	540	154	11	.021	11.3	3	.2	0
SUM----------(CYCLE COMPOSITE)----------											.8	73	4.3	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- .8 75 4.2

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- .8 73 4.4

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(.8) + 0.65(.8) = .803 (MASS)
CO 0.35(75) + 0.65(73) = 73.9 (MASS)
NO2 0.35(4.2) + 0.65(4.4) = 4.303 (MASS)

12-10-71 RUN 2 TRUCK 6 1970 CHEV 350 CID V8 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	41	.932	10.39	58	11.366	1694	7	281	3	.036	.2	10	.1	0
2 16 MG	23	.681	12.29	862	12.996	9278	18	982	204	.089	1.6	87	18.2	76
3 10 MG	32	.555	12.96	1617	13.550	14126	37	1169	560	.257	9.6	300	143.6	30
4 16 MG	15	.443	12.58	640	13.039	9278	12	637	151	.089	1.1	57	13.5	76
5 19 MG	15	.212	10.69	247	10.918	6214	10	244	47	.047	.4	11	2.2	63
6 16 MG	13	.638	12.42	920	13.572	9278	10	881	209	.089	.9	78	18.6	76
7 3 MG	62	4.485	12.21	412	17.262	26423	106	15414	209	.283	30.1	4362	59.3	98
8 16 MG	12	.364	12.77	638	13.152	9278	9	526	149	.089	.8	47	13.3	76
9 C.T.	1900	.235	3.78	61	6.067	1620	568	127	5	.021	11.9	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.9	76	4.1	
CYCLE 2														
1 IDLE	41	.932	10.39	58	11.366	1694	7	281	3	.036	.2	10	.1	0
2 16 MG	23	.537	12.48	758	13.042	9278	18	772	174	.089	1.6	69	15.4	76
3 10 MG	29	.521	13.08	1671	13.632	14126	34	1091	575	.257	8.6	280	147.7	30
4 16 MG	14	.416	12.64	663	13.071	9278	11	596	156	.089	1.0	53	13.9	76
5 19 MG	14	.144	10.84	289	11.044	6214	9	220	54	.047	.4	10	2.5	63
6 16 MG	14	.791	12.72	1044	13.526	9278	11	1096	238	.089	1.0	98	21.2	76
7 3 MG	61	4.722	12.40	483	17.188	26423	105	14663	247	.283	29.7	4150	69.8	98
8 16 MG	12	.376	12.90	616	13.289	9278	9	530	143	.089	.8	47	12.7	76
9 C.T.	1930	.252	3.92	71	6.256	1620	560	132	6	.021	11.8	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.8	72	4.3	
CYCLE 3														
1 IDLE	44	1.118	11.20	91	12.371	1694	8	309	4	.036	.3	11	.1	0
2 16 MG	21	.652	12.60	800	13.275	9278	16	921	186	.089	1.5	84	16.5	76
3 10 MG	28	.449	13.01	1635	13.539	14126	33	1052	566	.257	8.4	270	145.6	30
4 16 MG	12	.407	12.64	713	13.110	9278	10	582	168	.089	.8	52	14.9	76
5 19 MG	13	.171	10.58	254	10.765	6214	8	199	50	.047	.4	9	2.3	63
6 16 MG	12	.617	12.82	910	13.450	9278	9	860	208	.089	.8	77	18.5	76
7 3 MG	59	4.463	12.23	407	17.257	26423	101	15350	207	.283	28.6	4344	58.6	98
8 16 MG	12	.337	12.73	627	13.080	9278	10	483	148	.089	.8	43	13.1	76
9 C.T.	1469	.250	3.74	81	6.167	1620	574	133	7	.021	12.2	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.8	75	4.1	
CYCLE 4														
1 IDLE	44	1.118	11.20	91	12.371	1694	8	309	4	.036	.3	11	.1	0
2 16 MG	21	.448	12.44	750	12.961	9278	17	720	178	.089	1.5	64	15.9	76
3 10 MG	28	.605	13.18	1772	13.815	14126	32	1250	602	.257	8.2	321	154.6	30
4 16 MG	13	.414	12.83	736	13.258	9278	10	585	171	.089	.9	52	15.2	76
5 19 MG	13	.181	10.88	282	11.075	6214	8	205	53	.047	.4	10	2.5	63
6 16 MG	12	.439	12.80	725	13.252	9278	9	621	169	.089	.8	55	15.0	76
7 3 MG	60	4.485	12.26	419	17.310	26423	103	15371	212	.283	29.0	4350	60.1	98
8 16 MG	13	.363	12.91	713	13.287	9278	10	512	165	.089	.9	46	14.7	76
9 C.T.	1929	.251	3.96	110	6.244	1620	556	130	9	.021	11.7	3	.2	0
SUM----------(CYCLE COMPOSITE)----------											.8	75	4.3	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- .9 74 4.2

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- .8 75 4.2

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(.9) + 0.65(.8) = .834 (MASS)
CO 0.35(74) + 0.65(75) = 74.5 (MASS)
NO2 0.35(4.2) + 0.65(4.2) = 4.200 (MASS)

12-10-71 RUN 3 TRUCK 6 1970 CHEV 350 CID V8 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(R)	MP
CYCLE 1														
1 IDLE	54	1.200	11.16	55	12.418	1694	8	331	2	.036	.3	12	.0	0
2 16 MG	22	.651	12.33	674	12.905	9278	18	800	161	.089	1.6	71	14.3	76
3 10 MG	30	.529	13.04	1920	13.601	14126	35	1110	962	.257	9.0	285	170.1	30
4 16 MG	19	.422	12.78	712	13.217	9278	11	598	166	.089	1.0	53	14.8	76
5 19 MG	32	.227	10.84	228	11.102	6214	20	257	42	.047	.9	12	2.0	03
6 16 MG	12	.437	12.73	710	13.180	9278	9	621	166	.089	.8	55	14.8	76
7 3 MG	63	4.900	12.29	406	17.258	26423	108	15164	206	.263	30.6	4285	58.4	46
8 16 MG	14	.375	12.83	716	13.220	9278	11	532	167	.089	1.0	47	14.8	76
9 C.T.	1860	.269	4.07	65	6.348	1620	532	139	8	.021	11.2	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.9	76	4.4	
CYCLE 2														
1 IDLE	54	1.200	11.16	55	12.418	1694	8	331	2	.036	.3	12	.1	0
2 16 MG	23	.542	12.63	730	13.097	9278	16	776	172	.089	1.6	64	15.3	76
3 10 MG	30	.543	13.07	1804	13.645	14126	35	1135	820	.257	8.4	292	154.3	30
4 16 MG	16	.420	12.79	738	13.227	9278	13	595	172	.089	1.1	53	15.3	76
5 19 MG	22	.176	10.76	238	10.900	6214	14	203	45	.047	.7	10	2.1	03
6 16 MG	15	.427	12.85	724	13.293	9278	12	602	168	.089	1.0	54	14.9	76
7 3 MG	63	5.061	12.24	389	17.364	26423	107	15552	146	.263	30.4	4401	55.6	46
8 16 MG	25	.394	12.93	675	13.351	9278	19	653	156	.089	1.7	44	13.4	76
9 C.T.	1850	.253	4.04	60	6.344	1620	553	124	5	.021	11.6	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.9	76	4.2	
CYCLE 3														
1 IDLE	45	1.122	11.22	77	12.391	1694	7	310	3	.036	.2	14	.1	0
2 16 MG	24	.624	12.67	920	13.320	9278	19	878	213	.089	1.7	78	18.4	76
3 10 MG	29	.521	13.12	1676	13.672	14126	34	1087	576	.257	8.6	274	147.4	30
4 16 MG	17	.408	12.71	690	13.136	9278	13	582	162	.089	1.2	52	14.4	76
5 19 MG	16	.209	10.90	321	11.126	6214	10	236	66	.047	.5	14	2.6	03
6 16 MG	16	.553	13.08	1139	13.650	9278	12	764	257	.089	1.1	68	22.4	76
7 3 MG	62	4.521	12.59	462	17.178	26423	107	14047	246	.263	30.2	3475	64.7	46
8 16 MG	18	.396	12.93	613	13.345	9278	14	556	141	.089	1.2	44	12.6	76
9 C.T.	1446	.246	3.89	71	6.238	1620	566	129	6	.021	11.4	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											.9	64	4.4	
CYCLE 4														
1 IDLE	45	1.122	11.22	77	12.391	1694	7	310	3	.036	.2	14	.1	0
2 16 MG	23	.498	12.57	730	13.093	9278	18	713	172	.089	1.6	63	15.3	76
3 10 MG	29	.556	13.15	1807	13.737	14126	33	1155	617	.257	8.6	297	158.6	30
4 16 MG	16	.428	12.75	735	13.195	9278	13	608	172	.089	1.1	54	15.3	76
5 19 MG	15	.194	11.06	275	11.270	6214	9	216	58	.047	.4	10	2.4	03
6 16 MG	15	.430	12.90	709	13.346	9278	12	604	164	.089	1.0	54	14.6	76
7 3 MG	62	5.106	12.18	414	17.355	26423	106	15704	205	.263	24.4	4144	54.6	46
8 16 MG	15	.361	12.97	766	13.347	9278	12	507	177	.089	1.0	45	15.7	76
9 C.T.	1413	.234	4.04	96	6.340	1620	547	121	8	.021	11.5	3	.4	0
SUM----------(CYCLE COMPOSITE)----------											.8	76	4.3	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											.9	75	4.3	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											.9	75	4.4	

FOUR CYCLE COMPOSITE = REPORTED VALUES = HC 0.35(.9) + 0.65(.9) = .861 (MASS)
CO 0.35(75) + 0.65(73) = 73.3 (MASS)
NO2 0.35(4.3) + 0.65(4.4) = 4.347 (MASS)

11-23-71 RUN 1 TRUCK 6 1970 CHEV 350 CID V8 CHASSIS K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(R)	MP
CYCLE 1														
1 IDLE	41	1.992	11.72	56	13.610	1694	13	444	2	.036	.5	17	.0	0
2 16 MG	33	.713	11.74	667	12.489	9278	27	1070	165	.089	2.4	95	14.7	76
3 10 MG	44	.934	12.24	1521	13.317	14126	44	2002	534	.257	11.3	514	137.4	30
4 16 MG	21	.626	12.02	747	12.671	9278	17	929	162	.089	1.5	83	14.4	76
5 19 MG	25	.275	10.23	256	10.532	6214	17	326	51	.047	.8	15	2.4	03
6 16 MG	18	.606	12.03	706	12.655	9278	15	897	172	.089	1.3	81	15.3	76
7 3 MG	40	5.134	11.34	396	16.526	26423	161	16547	211	.263	44.4	4442	55.5	46
8 16 MG	18	.540	12.20	732	12.759	9278	15	793	177	.089	1.3	71	15.7	76
9 C.T.	1712	.366	4.88	64	7.045	1620	436	164	6	.021	9.2	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.1	82	4.1	
CYCLE 2														
1 IDLE	41	1.992	11.72	56	13.610	1694	13	444	2	.036	.5	17	.0	0
2 16 MG	79	.662	11.93	653	12.671	9278	60	979	154	.089	5.3	87	14.1	76
3 10 MG	54	.883	12.66	1558	13.607	14126	64	1852	537	.257	17.4	476	138.1	30
4 16 MG	36	.584	12.30	710	12.923	9278	29	847	149	.089	2.6	75	13.1	76
5 19 MG	33	.254	10.46	274	10.755	6214	21	302	64	.047	1.0	14	2.4	03
6 16 MG	29	.567	12.35	659	12.948	9278	23	821	157	.089	2.1	73	14.1	76
7 3 MG	91	5.035	11.47	390	16.603	26423	162	16186	206	.263	46.4	4564	54.2	46
8 16 MG	25	.503	12.37	696	12.900	9278	20	731	166	.089	1.8	65	14.8	76
9 C.T.	1737	.356	4.89	68	7.122	1620	449	164	5	.021	9.3	3	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.3	87	3.4	
CYCLE 3														
1 IDLE	60	1.472	11.54	63	13.077	1694	9	385	3	.036	.3	14	.1	0
2 16 MG	30	.629	12.04	705	12.701	9278	25	928	171	.089	2.2	83	15.2	76
3 10 MG	34	.836	12.67	1507	13.543	14126	48	1761	522	.257	16.2	453	134.1	30
4 16 MG	19	.547	12.30	682	12.868	9278	15	747	163	.089	1.4	71	14.5	76
5 19 MG	38	.312	10.55	244	10.903	6214	24	359	46	.047	1.1	17	2.1	03
6 16 MG	19	.627	12.25	694	12.948	9278	15	772	167	.089	1.4	65	14.4	76
7 3 MG	77	4.847	11.61	400	16.540	26423	137	15755	212	.263	36.4	4454	55.4	46
8 16 MG	18	.504	12.40	748	12.923	9278	14	731	178	.089	1.3	65	15.9	76
9 C.T.	1858	.370	4.76	71	7.137	1620	472	170	5	.021	9.9	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.0	80	3.4	
CYCLE 4														
1 IDLE	60	1.472	11.54	63	13.077	1694	9	385	3	.036	.3	14	.1	0
2 16 MG	28	.594	11.91	719	12.534	9278	23	888	177	.089	2.1	79	15.7	76
3 10 MG	31	.761	12.65	1605	13.444	14126	36	1615	560	.257	9.4	415	143.4	30
4 16 MG	18	.532	12.26	721	12.811	9278	15	778	173	.089	1.3	65	15.4	76
5 19 MG	22	.289	10.67	281	10.983	6214	14	330	53	.047	.7	16	2.5	03
6 16 MG	17	.525	12.27	724	12.813	9278	14	768	174	.089	1.2	66	15.5	76
7 3 MG	76	4.909	11.62	344	16.611	26423	135	15774	208	.283	38.3	4464	56.4	46
8 16 MG	18	.492	12.49	739	13.001	9278	14	709	175	.089	1.3	63	15.6	76
9 C.T.	1865	.380	4.80	67	7.144	1620	470	173	5	.021	9.4	4	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.0	74	4.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											1.2	84	4.0	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											1.0	80	4.0	

FOUR CYCLE COMPOSITE = REPORTED VALUES = HC 0.35(1.2) + 0.65(1.0) = 1.081 (MASS)
CO 0.35(84) + 0.65(80) = 81.0 (MASS)
NO2 0.35(4.0) + 0.65(4.0) = 3.490 (MASS)

11-24-71 RUN 1 TRUCK 6 1970 CHEV 350 CID V8 CHASSIS K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	52	1.276	10.94	67	12.272	1694	8	356	3	.036	.3	13	.1	0
	2 16 MG	27	.620	12.28	678	12.929	9278	22	899	162	.089	1.9	80	14.4	76
	3 10 MG	33	.838	12.90	1521	13.774	14126	38	1736	518	.257	9.7	446	133.1	30
	4 16 MG	19	.500	12.49	685	13.011	9278	15	720	162	.089	1.4	64	14.4	76
	5 19 MG	25	.276	10.72	265	11.023	6214	16	314	50	.047	.7	15	2.3	63
	6 16 MG	21	.539	12.57	707	13.132	9278	17	769	166	.089	1.5	68	14.8	76
	7 3 MG	80	5.102	11.90	428	17.088	26423	139	15936	220	.283	39.2	4510	62.2	98
	8 16 MG	21	.462	12.59	737	13.075	9278	17	662	174	.089	1.5	59	15.5	76
	9 C.T.	1848	.329	4.82	101	7.145	1620	469	151	8	.021	9.9	3	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	80	3.9	
CYCLE 2															
	1 IDLE	52	1.276	10.94	67	12.272	1694	8	356	3	.036	.3	13	.1	0
	2 16 MG	33	.590	12.34	666	12.966	9278	26	853	158	.089	2.4	76	14.1	76
	3 10 MG	39	.784	12.87	1602	13.696	14126	45	1633	549	.257	11.6	420	141.0	30
	4 16 MG	24	.484	12.46	718	12.970	9278	19	699	171	.089	1.7	62	15.2	76
	5 19 MG	29	.256	10.67	269	10.957	6214	18	293	51	.047	.9	14	2.4	63
	6 16 MG	22	.489	12.51	677	13.023	9278	18	704	160	.089	1.6	63	14.3	76
	7 3 MG	78	4.946	12.03	454	17.060	26423	135	15474	233	.283	38.3	4374	66.1	98
	8 16 MG	22	.450	12.72	641	13.194	9278	17	639	161	.089	1.5	57	14.4	76
	9 C.T.	1917	.327	4.83	95	7.227	1620	481	148	7	.021	10.1	3	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	78	4.1	
CYCLE 3															
	1 IDLE	59	1.385	11.17	106	12.619	1694	9	376	5	.036	.3	14	.2	0
	2 16 MG	31	.572	12.31	663	12.915	9278	25	830	158	.089	2.2	74	14.1	76
	3 10 MG	35	.780	12.94	1567	13.758	14126	40	1618	534	.257	10.3	416	137.3	30
	4 16 MG	20	.482	12.54	718	13.044	9278	16	693	170	.089	1.4	62	15.1	76
	5 19 MG	21	.260	10.92	301	11.203	6214	13	291	55	.047	.6	14	2.6	63
	6 16 MG	20	.497	12.54	696	13.059	9278	16	713	164	.089	1.4	63	14.6	76
	7 3 MG	75	5.003	11.99	436	17.074	26423	130	15640	224	.283	36.8	4426	63.4	98
	8 16 MG	19	.463	12.71	747	13.194	9278	15	658	174	.089	1.3	59	15.5	76
	9 C.T.	1922	.326	4.79	107	7.192	1620	485	148	8	.021	10.2	3	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	78	4.0	
CYCLE 4															
	1 IDLE	59	1.385	11.17	106	12.619	1694	9	376	5	.036	.3	14	.2	0
	2 16 MG	31	.569	12.28	733	12.882	9278	25	828	175	.089	2.2	74	15.6	76
	3 10 MG	37	.805	12.92	1606	13.765	14126	43	1669	547	.257	10.9	429	140.6	30
	4 16 MG	22	.484	12.57	746	13.078	9278	17	694	176	.089	1.6	62	15.6	76
	5 19 MG	22	.271	10.98	313	11.275	6214	14	302	57	.047	.6	14	2.7	63
	6 16 MG	21	.499	12.55	728	13.067	9278	17	709	172	.089	1.5	63	15.3	76
	7 3 MG	80	5.045	11.90	450	17.081	26423	139	15920	231	.283	39.2	4505	65.4	98
	8 16 MG	20	.462	12.71	757	13.194	9278	16	656	177	.089	1.4	58	15.7	76
	9 C.T.	1941	.338	4.77	114	7.204	1620	489	154	9	.021	10.3	3	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	80	4.1	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.0 79 4.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.0 79 4.1

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.0) + 0.65(1.0) = 1.018 (MASS)
CO 0.35(79) + 0.65(79) = 79.0 (MASS)
NO2 0.35(4.0) + 0.65(4.1) = 4.059 (MASS)

11-24-71 RUN 3 TRUCK 6 1970 CHEV 350 CID V8 CHASSIS K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	49	.896	10.28	67	11.229	1694	8	273	3	.036	.3	10	.1	0
	2 16 MG	30	.773	11.93	669	12.735	9278	24	1138	162	.089	2.2	101	14.4	76
	3 10 MG	36	.995	12.60	1496	13.634	14126	42	2082	515	.257	10.7	535	132.3	30
	4 16 MG	19	.600	12.33	657	12.951	9278	15	868	156	.089	1.4	77	13.4	76
	5 19 MG	24	.360	10.78	274	11.166	6214	15	405	51	.047	.7	14	2.4	63
	6 16 MG	19	.617	12.36	637	12.998	9278	15	890	151	.089	1.4	79	13.4	76
	7 3 MG	89	5.307	11.47	377	16.873	26423	156	16788	196	.283	44.2	4751	56.5	98
	8 16 MG	19	.548	12.57	622	13.139	9278	15	782	146	.089	1.3	70	13.0	76
	9 C.T.	1778	.430	4.76	68	7.110	1620	454	148	5	.021	9.5	4	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.1	86	3.7	
CYCLE 2															
	1 IDLE	49	.896	10.28	67	11.229	1694	8	273	3	.036	.3	10	.1	0
	2 16 MG	29	.643	12.15	618	12.874	9278	23	1009	148	.089	2.1	90	13.2	76
	3 10 MG	36	.923	12.81	1507	13.772	14126	41	1912	513	.257	10.6	491	131.4	30
	4 16 MG	19	.571	12.45	670	13.042	9278	15	821	158	.089	1.3	73	14.1	76
	5 19 MG	19	.328	10.84	277	11.189	6214	12	368	51	.047	.6	17	2.4	63
	6 16 MG	18	.575	12.49	636	13.084	9278	14	824	150	.089	1.3	73	13.3	76
	7 3 MG	82	5.236	11.64	386	16.965	26423	143	16474	200	.283	40.5	4662	56.5	98
	8 16 MG	18	.504	12.52	671	13.043	9278	14	724	158	.089	1.3	64	14.1	76
	9 C.T.	1815	.428	4.77	72	7.158	1620	460	146	5	.021	9.7	4	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	84	3.8	
CYCLE 3															
	1 IDLE	162	.421	9.53	85	10.126	1694	30	142	5	.036	1.1	5	.2	0
	2 16 MG	28	.650	12.15	691	12.830	9278	23	949	166	.089	2.0	85	14.8	76
	3 10 MG	33	.885	12.76	1541	13.681	14126	38	1846	528	.257	9.8	474	135.8	30
	4 16 MG	18	.549	12.37	701	12.938	9278	14	795	167	.089	1.3	71	14.4	76
	5 19 MG	18	.333	10.84	307	11.192	6214	11	373	57	.047	.5	18	2.7	63
	6 16 MG	17	.563	12.38	700	12.961	9278	14	814	166	.089	1.2	74	14.8	76
	7 3 MG	77	5.025	11.76	407	16.868	26423	135	15900	212	.283	38.2	4500	59.4	98
	8 16 MG	18	.501	12.51	665	13.030	9278	14	721	162	.089	1.3	64	14.4	76
	9 C.T.	1806	.398	4.66	82	7.008	1620	468	186	6	.021	9.8	4	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	81	3.4	
CYCLE 4															
	1 IDLE	162	.421	9.53	85	10.126	1694	30	142	5	.036	1.1	5	.2	0
	2 16 MG	36	.613	12.06	707	12.712	9278	29	904	171	.089	2.6	80	15.2	76
	3 10 MG	37	.839	12.85	1622	13.724	14126	43	1734	554	.257	11.0	446	142.4	30
	4 16 MG	22	.521	12.47	715	13.015	9278	18	750	169	.089	1.6	67	15.1	76
	5 19 MG	22	.325	10.89	295	11.239	6214	14	363	54	.047	.6	17	2.5	63
	6 16 MG	19	.529	12.41	703	12.955	9278	15	758	167	.089	1.4	67	14.9	76
	7 3 MG	75	4.933	11.85	423	16.864	26423	132	15613	220	.283	37.2	4418	62.3	98
	8 16 MG	20	.503	12.47	734	12.995	9278	16	725	174	.089	1.4	65	15.5	76
	9 C.T.	1857	.403	4.67	89	7.079	1620	476	186	7	.021	10.0	4	.1	0
	SUM----------(CYCLE COMPOSITE)----------											1.0	79	4.1	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.1 85 3.7

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.0 80 4.0

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.1) + 0.65(1.0) = 1.029 (MASS)
CO 0.35(85) + 0.65(80) = 81.7 (MASS)
NO2 0.35(3.7) + 0.65(4.0) = 3.922 (MASS)

TABLE J-7. NINE-MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 7

Engine: IHC 345 CID, V8

Vehicle: 1970 IHC, 16,000-lb GVW Van

Date	Run	Dynamometer	Emissions, Gr/Bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
1-4-72	1	Stationary	2.66	50.0	16.98	14.52
1-4-72	2	Stationary	2.42	44.7	16.76	13.32
1-4-72	3	Stationary	2.42	46.7	16.54	12.70
		Average	2.50	47.1	16.76	13.51
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			9.6	11.2	2.6	13.5
12-16-71	1	Chassis	2.54	60.3	13.71	12.43
12-16-71	2	Chassis	2.49	59.9	13.77	12.96
12-16-71	3	Chassis	2.60	61.8	13.38	13.13
		Average	2.54	60.7	13.62	12.84
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			4.3	3.1	2.9	5.5
Average Stationary			2.50	47.1	16.76	13.51
Average Chassis			2.54	60.7	13.62	12.84
Difference: (Stationary - Chassis)			0.04	13.6	-3.14	-0.67
Percent Difference: (Difference/Stationary) x 100			1.6	28.9	-18.7	-5.0

01-04-72 RUN 1 TRUCK 7 1971 IHC 345 CID V8 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	494	6.916	9.75	73	17.081	1918	48	1549	3	.036	1.7	56	.1	0
2 16 MG	232	1.002	13.96	2816	15.113	9308	160	1247	576	.089	14.2	111	51.2	31
3 10 MG	144	.457	13.79	4144	14.424	13677	174	875	1305	.257	44.8	225	335.3	59
4 16 MG	173	1.399	13.48	2734	15.565	9308	116	1689	543	.089	10.3	150	48.3	31
5 19 MG	151	1.817	13.77	1491	15.750	6024	45	1404	189	.047	3.0	66	8.9	14
6 16 MG	164	1.385	14.03	2793	16.592	9308	110	1670	554	.089	9.8	149	49.3	31
7 3 MG	129	2.074	13.15	2977	15.367	19722	144	5340	1269	.283	52.1	1525	359.0	88
8 16 MG	172	2.835	13.23	1992	16.251	9308	110	3280	377	.089	9.8	292	33.5	31
9 C.T.	6345	3.328	4.38	114	14.747	1660	740	881	4	.021	16.0	19	.1	0
SUM----------(CYCLE COMPOSITE)----------											3.1	50	17.1	
CYCLE 2														
1 IDLE	484	6.915	9.75	73	17.081	1918	48	1549	3	.036	1.7	56	.1	0
2 16 MG	183	1.243	13.44	2706	15.391	9308	124	1520	544	.089	11.0	135	48.4	31
3 10 MG	131	.499	13.63	4136	14.470	13677	134	953	1298	.257	35.6	245	333.5	59
4 16 MG	162	2.110	13.63	2316	15.925	9308	104	2483	448	.089	9.4	221	39.9	31
5 19 MG	131	1.808	13.92	1456	15.769	6024	56	1395	145	.047	2.6	66	8.7	14
6 16 MG	150	1.414	14.00	2701	15.578	9308	100	1709	536	.089	8.9	152	47.7	31
7 3 MG	117	2.044	13.20	2979	15.342	19722	154	5298	1269	.283	44.8	1499	359.2	88
8 16 MG	140	1.516	14.03	2657	15.697	9308	93	1816	523	.089	8.3	162	46.6	31
9 C.T.	5562	3.446	4.81	144	14.743	1660	700	896	5	.021	14.7	19	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.6	49	17.1	
CYCLE 3														
1 IDLE	394	6.795	11.48	104	17.208	1918	44	1530	4	.036	1.4	55	.1	0
2 16 MG	172	1.114	14.36	2739	15.356	9308	117	1359	551	.089	10.4	121	49.1	31
3 10 MG	124	.478	13.44	4110	14.452	13677	131	914	1291	.257	33.8	235	331.9	59
4 16 MG	144	1.444	13.46	2474	15.315	9308	94	2238	480	.089	8.7	199	42.8	31
5 19 MG	133	1.450	13.72	1559	15.203	6024	53	1434	194	.047	2.5	67	9.3	14
6 16 MG	142	1.222	14.02	2839	15.395	9308	94	1492	570	.089	8.6	133	50.7	31
7 3 MG	118	2.174	13.22	2934	15.515	19722	154	5595	1240	.283	43.5	1583	350.9	88
8 16 MG	141	1.918	13.80	2503	15.770	9309	93	2168	440	.089	8.3	193	43.7	31
9 C.T.	5555	3.494	4.24	152	14.456	1660	705	891	4	.021	14.8	19	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.5	50	17.0	
CYCLE 4														
1 IDLE	348	6.795	10.14	103	17.204	1914	39	1530	4	.036	1.4	55	.1	0
2 16 MG	171	1.274	13.34	2541	15.421	9309	115	1556	531	.089	10.3	138	47.3	31
3 10 MG	121	.501	13.40	4082	14.532	13677	124	952	1276	.257	32.8	245	327.8	59
4 16 MG	144	2.044	13.55	2267	15.458	9309	97	2428	442	.089	8.7	216	39.3	31
5 19 MG	145	1.738	13.79	1434	15.452	6024	43	1351	204	.047	2.5	64	9.8	14
6 16 MG	142	1.347	14.14	2724	15.450	9308	95	1629	541	.089	8.5	145	48.2	31
7 3 MG	104	2.078	13.25	2441	15.445	19722	134	5340	1255	.283	43.7	1517	355.3	88
8 16 MG	142	1.416	13.33	2537	15.749	9308	44	2161	446	.089	8.3	192	44.2	31
9 C.T.	5243	3.959	5.04	213	14.705	1660	643	903	4	.021	13.4	19	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	50	16.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.9	50	17.1	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.5	50	16.4	

FOR CYCLE COMPOSITE - REPORTED VALUES = HC 0.35(2.4) + 0.65(2.5) = 2.455 (MASS)
CO 0.35(50) + 0.65(50) = 50.0 (MASS)
NO2 0.35(17.1) + 0.65(16.4) = 16.976 (MASS)

01-04-72 RUN 2 TRUCK 7 1971 IHC 345 CID V8 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	443	6.846	10.55	103	17.254	1918	40	1494	4	.036	1.5	54	.1	0
2 16 MG	175	1.241	14.23	2822	15.460	9308	114	1226	546	.089	10.2	109	48.4	31
3 10 MG	123	.445	14.43	4144	15.014	13677	125	837	1253	.257	32.2	215	322.0	59
4 16 MG	142	2.314	14.22	2874	16.203	9308	101	2604	532	.089	9.0	232	47.4	31
5 19 MG	124	1.240	14.34	1553	16.314	6024	51	1329	141	.047	2.4	62	9.0	14
6 16 MG	141	1.342	14.75	2775	16.244	9308	90	1553	528	.089	8.1	138	47.0	31
7 3 MG	117	2.021	14.00	3481	16.147	19722	146	4990	1250	.283	41.5	1412	353.8	88
8 16 MG	145	2.119	14.40	2414	16.674	9309	91	2389	447	.089	8.1	213	39.8	31
9 C.T.	5311	3.754	5.24	224	14.725	1660	644	853	4	.021	14.0	18	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	47	16.8	
CYCLE 2														
1 IDLE	433	6.844	10.55	103	17.254	1919	40	1494	4	.036	1.5	54	.1	0
2 16 MG	177	1.203	14.24	2743	16.134	9309	114	1398	524	.089	10.1	124	46.6	31
3 10 MG	130	.459	14.66	4131	15.244	13677	121	832	1230	.257	31.0	214	316.1	59
4 16 MG	149	1.676	14.46	2755	16.597	9308	44	1785	513	.089	8.3	159	45.7	31
5 19 MG	126	1.450	14.57	1547	16.566	6024	51	1366	147	.047	2.4	64	8.8	14
6 16 MG	143	1.341	14.89	2945	16.445	9308	41	1541	535	.089	8.1	142	47.6	31
7 3 MG	106	1.340	14.30	3165	16.364	19722	143	4747	1266	.283	40.5	1343	358.4	88
8 16 MG	162	2.344	14.41	2288	16.959	9308	43	2643	417	.089	8.3	235	37.1	31
9 C.T.	5520	3.472	5.03	189	14.864	1660	640	874	7	.021	14.5	18	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.4	45	16.6	
CYCLE 3														
1 IDLE	423	6.654	10.86	162	17.453	1918	39	1443	6	.036	1.4	52	.2	0
2 16 MG	184	1.223	14.43	2757	16.344	9308	117	1403	521	.089	10.4	125	46.4	31
3 10 MG	123	.416	14.72	4144	15.244	13677	123	753	1232	.257	31.7	143	316.7	59
4 16 MG	147	1.427	14.40	2582	16.446	9308	43	1628	484	.089	8.3	145	43.1	31
5 19 MG	125	1.557	14.65	1514	16.443	6024	51	1226	146	.047	2.4	58	9.2	14
6 16 MG	143	1.247	14.99	2900	16.388	9308	44	1431	547	.089	7.9	127	48.7	31
7 3 MG	107	1.466	14.22	3159	16.332	19722	145	4835	1264	.283	41.0	1360	359.1	88
8 16 MG	143	1.463	14.48	2610	16.647	9308	44	2098	483	.089	7.9	187	43.0	31
9 C.T.	5344	3.804	5.15	209	14.726	1660	675	866	8	.021	14.2	18	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.4	44	16.7	
CYCLE 4														
1 IDLE	423	6.654	10.86	162	17.453	1918	39	1443	6	.036	1.4	52	.2	0
2 16 MG	174	1.198	14.43	2775	16.216	9308	112	1389	529	.089	10.0	124	47.1	31
3 10 MG	123	.451	14.66	4144	15.244	13677	124	817	1234	.257	31.8	210	317.2	59
4 16 MG	151	1.444	14.75	2726	16.557	9308	45	1847	509	.089	8.5	166	45.3	31
5 19 MG	127	1.717	14.63	1645	16.434	6024	52	1267	202	.047	2.4	60	9.5	14
6 16 MG	143	1.290	14.95	2852	16.344	9308	41	1474	538	.089	8.1	132	47.8	31
7 3 MG	104	1.952	14.18	3144	16.246	19722	144	4787	1267	.283	40.8	1355	358.6	88
8 16 MG	138	1.534	14.88	2744	16.565	9308	47	1743	512	.089	7.7	155	45.6	31
9 C.T.	5227	3.793	5.29	225	14.728	1660	640	864	8	.021	13.9	18	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.4	44	16.8	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.4	46	16.7	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.4	44	16.8	

FOR CYCLE COMPOSITE - REPORTED VALUES = HC 0.35(2.4) + 0.65(2.4) = 2.419 (MASS)
CO 0.35(46) + 0.65(44) = 44.7 (MASS)
NO2 0.35(16.7) + 0.65(16.8) = 16.756 (MASS)

01-04-72 RUN 3 TRUCK 7 1971 IHC 345 CID V8 STATIONARY K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	337	6.969	10.16	92	17.443	1918	41	1544	3	.036	1.5	56	.1	0
2 16 MG	171	1.280	14.38	2645	15.845	9308	113	1519	516	.089	10.0	135	45.4	31
3 10 MG	122	.475	14.25	4144	14.857	13677	126	883	1267	.257	32.3	227	325.5	59
4 16 MG	145	1.756	14.33	2552	16.244	9308	94	2033	486	.089	8.3	181	43.2	31
5 19 MG	127	1.462	14.24	1465	16.259	6024	53	1394	180	.047	2.5	65	8.5	14
6 16 MG	143	1.462	14.53	2701	16.146	9308	92	1702	517	.089	8.2	152	46.0	31
7 3 MG	105	1.946	13.82	3132	15.480	19722	147	4882	1291	.283	41.7	1382	365.5	88
8 16 MG	136	1.775	14.44	2596	16.361	9308	86	2040	490	.089	7.7	182	43.6	31
9 C.T.	5040	3.281	5.12	154	14.364	1660	655	883	6	.021	13.8	19	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.4	46	17.0	
CYCLE 2														
1 IDLE	337	6.469	10.16	92	17.443	1918	41	1544	3	.036	1.5	56	.1	0
2 16 MG	194	1.861	14.38	2415	16.380	9308	117	2067	456	.089	10.4	184	40.6	31
3 10 MG	122	.452	14.45	4144	15.034	13677	124	831	1252	.257	31.9	213	321.7	59
4 16 MG	143	1.409	14.66	2755	16.223	9308	92	1633	525	.089	8.2	145	46.7	31
5 19 MG	127	1.613	14.56	1615	16.310	6024	53	1203	198	.047	2.5	57	9.3	14
6 16 MG	142	1.345	14.67	2754	16.169	9308	92	1564	527	.089	8.1	139	46.9	31
7 3 MG	110	1.953	14.05	3145	16.122	19722	151	4826	1277	.283	42.7	1366	361.5	88
8 16 MG	137	1.575	14.67	2661	16.393	9308	97	1806	502	.089	7.8	161	44.6	31
9 C.T.	5045	3.224	5.11	144	14.354	1660	656	892	6	.021	13.8	19	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.5	45	16.8	
CYCLE 3														
1 IDLE	280	5.427	11.22	115	17.449	1918	34	1316	4	.036	1.2	47	.2	0
2 16 MG	174	1.280	14.77	2667	16.238	9308	112	1482	508	.089	9.9	132	45.2	31
3 10 MG	127	.521	14.62	4123	15.278	13677	127	942	1225	.257	32.7	242	314.9	59
4 16 MG	154	2.029	14.44	2391	16.645	9308	96	2286	443	.089	8.6	203	39.4	31
5 19 MG	127	1.710	14.55	1564	16.347	6024	52	1269	191	.047	2.5	60	9.0	14
6 16 MG	143	1.376	14.71	2799	16.240	9308	92	1593	533	.089	8.2	142	47.4	31
7 3 MG	110	2.099	14.02	2956	16.238	19722	150	5150	1192	.283	42.3	1457	337.3	88
8 16 MG	137	1.936	14.52	2356	16.604	9308	87	2042	441	.089	7.7	186	39.3	31
9 C.T.	4435	3.513	5.38	154	14.115	1660	637	835	6	.021	13.4	18	.1	0
SUM----------(CYCLE COMPOSITE)----------											2.4	48	16.1	
CYCLE 4														
1 IDLE	240	5.427	11.22	115	17.449	1918	44	1316	4	.036	1.2	47	.2	0
2 16 MG	171	1.114	14.69	2834	15.944	9308	111	1315	548	.089	9.9	117	48.7	31
3 10 MG	123	.532	14.37	4143	15.035	13677	125	978	1241	.257	32.2	251	321.6	59
4 16 MG	150	1.842	14.39	2507	16.444	9308	95	2163	471	.089	8.5	193	41.9	31
5 19 MG	122	1.695	14.40	1582	16.227	6024	51	1271	207	.047	2.4	60	9.7	14
6 16 MG	133	1.299	14.70	2844	16.149	9308	90	1512	544	.089	8.0	135	48.4	31
7 3 MG	106	2.036	13.95	2470	16.130	19722	145	5038	1208	.283	41.2	1426	341.8	88
8 16 MG	135	1.499	14.63	2709	16.275	9308	46	1732	514	.089	7.7	154	45.8	31
9 C.T.	4313	3.447	6.05	274	14.165	1660	544	817	11	.021	11.4	17	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.4	46	16.6	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.4	46	16.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.4	47	16.3	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.4) + 0.65(2.4) = 2.421 (MASS)
CO 0.35(46) + 0.65(47) = 46.7 (MASS)
NO2 0.35(16.4) + 0.65(16.3) = 16.535 (MASS)

12-16-71 RUN 1 TRUCK 7 1971 IHC 345 CID V8 CHASSIS K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	141	5.745	11.57	109	17.521	2454	34	1625	5	.036	1.1	59	.2	0
2 16 MG	171	2.051	13.37	1959	16.246	9087	107	2323	365	.089	9.6	207	32.5	31
3 10 MG	136	.852	14.28	3477	15.279	12886	128	1452	1030	.257	33.0	373	264.6	59
4 16 MG	151	2.139	13.48	2032	16.142	9087	95	2426	379	.089	8.5	216	33.7	31
5 19 MG	135	2.204	13.40	1110	16.155	6014	56	1661	137	.047	2.6	78	6.4	14
6 16 MG	152	2.155	13.47	2010	16.239	9087	95	2428	372	.089	8.5	216	33.1	31
7 3 MG	120	2.312	13.24	2771	16.176	19968	164	5779	1136	.283	46.9	1636	321.4	88
8 16 MG	148	2.414	13.68	1874	16.259	9087	93	2731	348	.089	8.2	243	30.9	31
9 C.T.	3207	4.522	7.42	158	15.446	2419	564	1434	8	.021	11.8	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	59	14.0	
CYCLE 2														
1 IDLE	191	5.745	11.57	109	17.521	2454	34	1625	5	.036	1.1	59	.2	0
2 16 MG	175	2.205	14.00	1416	16.349	9087	109	2464	353	.089	9.7	219	31.4	31
3 10 MG	134	1.017	14.42	3632	15.536	12886	128	1698	447	.257	32.8	437	256.2	59
4 16 MG	155	2.419	13.88	1894	16.446	9087	96	2697	347	.089	8.5	240	30.9	31
5 19 MG	138	2.444	13.82	1091	16.443	6014	56	1415	132	.047	2.6	85	6.2	14
6 16 MG	157	2.282	14.05	1980	16.502	9087	97	2538	362	.089	8.6	226	32.2	31
7 3 MG	124	2.332	13.43	2763	16.396	19968	169	5737	1117	.283	47.9	1629	316.2	88
8 16 MG	151	2.533	13.81	1839	16.504	9087	93	2817	336	.089	8.3	251	29.9	31
9 C.T.	3247	4.509	7.36	182	15.365	2419	571	1434	10	.021	12.0	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	61	13.6	
CYCLE 3														
1 IDLE	143	5.934	11.62	114	17.762	2454	30	1656	5	.036	1.1	60	.2	0
2 16 MG	174	2.348	13.92	1835	16.461	9087	111	2618	336	.089	9.8	233	29.9	31
3 10 MG	134	.949	14.44	3442	15.594	12886	129	1668	1005	.257	33.1	429	256.3	59
4 16 MG	155	2.436	13.91	1911	16.513	9087	96	2708	349	.089	8.5	241	31.1	31
5 19 MG	140	2.441	13.93	1086	16.562	6014	57	1795	131	.047	2.7	84	6.2	14
6 16 MG	155	2.391	13.98	1975	16.538	9087	95	2654	360	.089	8.5	236	32.1	31
7 3 MG	124	2.233	14.00	2808	16.367	19968	169	5503	1137	.283	48.0	1557	321.4	88
8 16 MG	147	2.543	13.69	1842	16.433	9087	103	2843	338	.089	9.2	255	30.1	31
9 C.T.	3212	4.509	7.49	146	15.490	2419	545	1422	8	.021	11.4	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	60	13.7	
CYCLE 4														
1 IDLE	143	5.934	11.62	114	17.762	2454	30	1656	5	.036	1.1	60	.2	0
2 16 MG	175	2.307	13.94	1832	16.434	9087	108	2576	336	.089	9.6	229	29.9	31
3 10 MG	135	1.018	14.38	3629	15.545	12886	126	1705	999	.257	32.5	438	256.7	59
4 16 MG	152	2.341	13.94	1986	16.445	9087	94	2613	364	.089	8.4	233	32.4	31
5 19 MG	134	2.244	13.87	1081	16.311	6014	56	1709	132	.047	2.6	80	6.2	14
6 16 MG	154	2.327	13.89	1929	16.385	9087	97	2607	355	.089	8.6	232	31.6	31
7 3 MG	122	2.242	14.07	2789	16.444	19968	166	5499	1124	.283	47.0	1556	318.2	88
8 16 MG	164	2.634	13.61	1802	16.421	9087	102	2944	331	.089	9.0	262	29.5	31
9 C.T.	3147	4.464	7.56	145	15.466	2419	558	1410	8	.021	11.7	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	60	13.6	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.5	60	13.8	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.5	60	13.7	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.5) + 0.65(2.5) = 2.538 (MASS)
CO 0.35(60) + 0.65(60) = 60.3 (MASS)
NO2 0.35(13.8) + 0.65(13.7) = 13.705 (MASS)

12-14-71 RUN 2 TRUCK 7 1971 IHC 345 CID VR CHASSIS K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	188	6.100	11.50	126	17.803	2454	24	1698	6	.036	1.0	61	.2	0
2 16 MG	172	2.211	14.07	1990	16.467	9087	106	2465	346	.089	9.5	219	30.8	31
3 10 MG	135	.909	14.45	3725	15.505	12886	127	1524	1028	.257	32.5	392	264.1	59
4 16 MG	155	2.332	14.15	1756	16.649	9087	95	2571	354	.089	8.4	229	31.5	31
5 19 MG	134	2.380	14.18	1049	16.705	6014	54	1731	128	.047	2.5	81	6.0	14
6 16 MG	156	2.347	14.20	1962	16.715	9087	95	2577	354	.089	8.5	229	31.5	31
7 3 MG	122	2.209	13.46	2475	16.340	19468	157	5464	1149	.283	47.4	1546	330.9	88
8 16 MG	152	2.633	14.04	1353	16.837	9087	92	2870	333	.089	8.2	255	29.6	31
9 C.T.	3205	4.483	7.73	146	15.474	2419	554	1348	8	.021	11.6	29	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	59	14.0	
CYCLE 2														
1 IDLE	188	6.100	11.50	126	17.803	2454	24	1698	6	.036	1.0	61	.2	0
2 16 MG	175	2.265	14.21	1934	16.444	9087	107	2495	350	.089	9.5	222	31.2	31
3 10 MG	134	.999	14.56	3232	15.734	12886	123	1456	1017	.257	31.6	426	261.3	59
4 16 MG	154	2.362	14.23	2014	16.758	9087	94	2597	363	.089	8.3	230	32.3	31
5 19 MG	134	2.422	14.29	1113	16.847	6014	54	1747	132	.047	2.5	82	6.2	14
6 16 MG	156	2.353	14.28	2012	16.801	9087	94	2571	361	.089	8.4	229	32.2	31
7 3 MG	122	2.275	13.98	2317	16.387	19468	157	5400	1140	.283	47.1	1585	322.5	88
8 16 MG	153	2.568	14.09	1933	16.823	9087	93	2802	347	.089	8.2	249	30.9	31
9 C.T.	3174	4.521	7.46	171	15.413	2419	544	1343	9	.021	11.4	29	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	60	13.8	
CYCLE 3														
1 IDLE	186	5.750	11.94	133	17.991	2454	24	1593	6	.036	1.0	57	.2	0
2 16 MG	175	2.341	14.24	1889	16.770	9087	106	2562	340	.089	9.5	228	30.2	31
3 10 MG	136	1.065	14.54	3554	15.902	12886	124	1754	989	.257	31.4	451	254.2	59
4 16 MG	154	2.409	14.36	1990	16.935	9087	93	2611	355	.089	8.2	232	31.6	31
5 19 MG	134	2.334	14.35	1144	16.933	6014	54	1686	134	.047	2.6	79	6.4	14
6 16 MG	154	2.410	14.27	1964	16.852	9087	94	2625	352	.089	8.5	234	31.3	31
7 3 MG	124	2.268	14.16	2423	16.561	19468	146	5524	1130	.283	47.0	1563	319.8	88
8 16 MG	155	2.578	14.17	1904	16.915	9087	94	2797	340	.089	8.4	249	30.2	31
9 C.T.	4217	4.440	7.85	146	15.764	2419	553	1376	8	.021	11.6	29	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	60	13.6	
CYCLE 4														
1 IDLE	146	5.750	11.94	133	17.991	2454	24	1593	6	.036	1.0	57	.2	0
2 16 MG	174	2.370	14.21	1592	16.772	9087	108	2544	341	.089	9.6	231	30.4	31
3 10 MG	134	1.021	14.56	3712	15.731	12886	124	1649	1004	.257	32.8	437	259.4	59
4 16 MG	157	2.380	14.24	2004	16.740	9087	95	2602	361	.089	8.5	232	32.1	31
5 19 MG	133	2.337	14.32	1143	16.905	6014	55	1684	136	.047	2.6	79	6.4	14
6 16 MG	154	2.331	14.20	2018	16.782	9087	96	2550	363	.089	8.5	227	32.3	31
7 3 MG	122	2.266	14.05	2420	16.449	19468	146	5557	1137	.283	46.9	1573	321.7	88
8 16 MG	153	2.571	14.14	1943	16.885	9087	92	2793	343	.089	8.2	249	30.6	31
9 C.T.	4151	4.354	7.40	174	15.657	2419	545	1359	9	.021	11.5	29	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.5	60	13.8	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.5	59	13.9	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.5	60	13.7	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.5) + 0.65(2.5) = 2.494 (MASS)
CO 0.35(59) + 0.65(60) = 59.9 (MASS)
NO2 0.35(13.9) + 0.65(13.7) = 13.774 (MASS)

12-14-71 RUN 3 TRUCK 7 1971 IHC 345 CID VR CHASSIS K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	145	6.187	11.19	122	17.548	2454	30	1744	6	.036	1.1	63	.2	0
2 16 MG	174	2.172	13.92	1812	16.194	9087	112	2463	338	.089	10.0	219	30.1	31
3 10 MG	142	.463	14.25	3547	15.356	12886	133	1615	944	.257	34.3	415	255.4	59
4 16 MG	159	2.334	13.98	1954	16.445	9087	98	2549	340	.089	8.7	231	30.3	31
5 19 MG	134	2.257	14.10	1049	16.544	6014	56	1661	127	.047	2.6	78	6.0	14
6 16 MG	157	2.352	14.15	1952	16.472	9087	96	2494	355	.089	8.6	222	31.6	31
7 3 MG	124	2.376	13.78	2694	16.294	19468	176	5882	1048	.283	49.7	1665	310.8	88
8 16 MG	156	2.584	13.96	1908	16.712	9087	95	2938	326	.089	8.5	253	29.0	31
9 C.T.	3224	4.466	7.34	165	15.243	2419	572	1428	9	.021	12.0	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	61	13.4	
CYCLE 2														
1 IDLE	145	6.187	11.19	122	17.548	2454	30	1744	6	.036	1.1	63	.2	0
2 16 MG	190	2.407	14.04	1793	16.641	9087	110	2455	323	.089	9.8	236	28.8	31
3 10 MG	142	1.014	14.41	3604	15.579	12886	132	1698	990	.257	33.8	436	254.3	59
4 16 MG	160	2.462	14.12	1822	16.755	9087	97	2697	328	.089	8.6	240	29.2	31
5 19 MG	142	2.427	14.10	1044	16.680	6014	57	1768	125	.047	2.7	83	5.9	14
6 16 MG	143	2.444	14.08	1871	16.700	9087	99	2686	338	.089	8.8	239	30.1	31
7 3 MG	127	2.408	13.84	2644	16.345	19468	173	5928	1029	.283	49.1	1678	305.3	88
8 16 MG	157	2.590	14.09	1837	16.850	9087	95	2822	324	.089	8.4	251	29.3	31
9 C.T.	3371	4.446	7.39	174	15.203	2419	547	1445	9	.021	11.5	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	63	13.2	
CYCLE 3														
1 IDLE	143	6.076	11.73	147	17.944	2454	30	1659	7	.036	1.1	60	.2	0
2 16 MG	185	2.427	14.04	1811	16.667	9087	113	2673	328	.089	10.1	238	29.2	31
3 10 MG	141	1.008	14.50	3657	15.640	12886	130	1675	999	.257	33.4	431	256.9	59
4 16 MG	160	2.525	14.04	1825	16.738	9087	97	2769	329	.089	8.7	246	29.3	31
5 19 MG	143	2.323	14.18	1081	16.457	6014	54	1694	130	.047	2.7	80	6.1	14
6 16 MG	143	2.476	14.11	1866	16.742	9087	99	2711	336	.089	8.8	241	29.9	31
7 3 MG	127	2.315	13.97	2757	16.422	19468	173	5686	1113	.283	48.9	1609	315.0	88
8 16 MG	154	2.796	13.91	1737	16.878	9087	96	3041	410	.089	8.5	271	27.6	31
9 C.T.	2491	4.442	7.49	188	15.162	2419	534	1432	10	.021	11.2	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	62	13.4	
CYCLE 4														
1 IDLE	143	6.006	11.73	147	17.944	2454	30	1659	7	.036	1.1	60	.2	0
2 16 MG	184	2.479	14.09	1782	16.768	9087	112	2714	321	.089	9.9	242	28.5	31
3 10 MG	145	1.090	14.45	3556	15.647	12886	133	1808	969	.257	34.3	465	249.1	59
4 16 MG	162	2.479	14.13	1912	16.784	9087	98	2711	344	.089	8.7	241	30.6	31
5 19 MG	143	2.467	14.19	1089	16.801	6014	57	1777	129	.047	2.7	83	6.1	14
6 16 MG	145	2.523	14.15	1863	16.851	9087	100	2748	334	.089	8.9	245	29.7	31
7 3 MG	140	2.214	14.04	2818	16.344	19468	177	5447	1140	.283	50.2	1542	322.5	88
8 16 MG	154	2.711	13.98	1788	16.862	9087	95	2951	320	.089	8.5	263	28.5	31
9 C.T.	2998	4.429	7.69	194	15.346	2419	529	1410	10	.021	11.1	30	.2	0
SUM----------(CYCLE COMPOSITE)----------											2.6	61	13.4	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)----------											2.6	62	13.3	
AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)----------											2.6	62	13.4	

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.6) + 0.65(2.6) = 2.598 (MASS)
CO 0.35(62) + 0.65(62) = 61.8 (MASS)
NO2 0.35(13.3) + 0.65(13.4) = 13.380 (MASS)

TABLE J-8. NINE-MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 8

Engine: IHC 478 CID, V8

Vehicle: 1971 IHC 32,000-lb GVW Tractor

Date	Run	Dynamometer	Emissions, Gr/Bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
1-19-72	1	Stationary	2.35	61.3	12.15	12.61
1-19-72	2	Stationary	1.80	57.9	8.25	8.70
		Average	2.08	59.3	10.20	10.66
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			26.5	5.7	38.2	36.7
1-19-72	3	Chassis	1.74	45.9	10.03	8.33
1-19-72	4	Chassis	1.67	46.6	9.40	7.81
		Average	1.71	46.3	9.72	8.07
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			4.1	1.5	6.5	6.4
Average Stationary			2.08	59.3	10.20	10.66
Average Chassis			1.71	46.3	9.72	8.07
Difference: (Chassis - Stationary)			-0.37	-13.0	-0.48	-2.59
Percent Difference: (Difference/Stationary) x 100			-17.8	-21.9	-4.7	-24.3

1-19-72 RUN 1 TRUCK 8 1970 IHC 478 CID V8 STATIONARY K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1															
	1 IDLE	593	4.621	11.30	118	16.561	1560	63	879	4	.036	2.3	32	.1	0
	2 16 MG	143	.925	14.34	1003	15.419	16270	169	1972	351	.089	15.0	175	31.3	47
	3 10 MG	94	.440	14.32	2326	14.912	24969	176	1657	1293	.257	45.3	426	332.3	90
	4 16 MG	94	.969	14.44	1116	15.511	16270	110	2053	389	.089	9.8	183	34.6	47
	5 19 MG	89	1.840	14.22	402	16.156	11812	73	2717	98	.047	3.4	128	4.6	21
	6 16 MG	85	.847	14.49	1070	15.429	16270	100	1804	375	.089	8.9	161	33.3	47
	7 3 MG	100	2.521	13.46	2609	16.089	36332	253	11500	1956	.283	71.6	3254	553.6	136
	8 16 MG	82	1.062	14.52	1107	15.671	16270	95	2227	382	.089	8.5	198	34.0	47
	9 C.T.	3799	2.904	5.18	135	12.187	2637	921	1269	10	.021	19.3	27	.2	0
	SUM----------(CYCLE COMPOSITE)----------											2.3	58	12.9	
CYCLE 2															
	1 IDLE	593	4.621	11.30	118	16.561	1560	63	879	4	.036	2.3	32	.1	0
	2 16 MG	151	.960	14.48	1058	15.603	16270	176	2022	366	.089	15.7	180	32.6	47
	3 10 MG	100	.510	14.53	2334	15.148	24969	185	1698	1277	.257	47.4	436	328.3	90
	4 16 MG	92	.864	14.62	1100	15.583	16270	108	1822	381	.089	9.6	162	33.9	47
	5 19 MG	91	1.799	14.40	393	16.297	11812	74	2634	95	.047	3.5	124	4.4	21
	6 16 MG	88	.843	14.62	1100	15.608	16270	103	1880	381	.089	9.1	167	33.9	47
	7 3 MG	104	2.607	13.56	2595	16.279	36332	260	11753	1923	.283	73.6	3326	544.1	136
	8 16 MG	86	1.140	14.57	1066	15.803	16270	99	2371	364	.089	8.8	211	32.4	47
	9 C.T.	2755	2.551	6.79	118	12.316	2637	661	1103	8	.021	13.9	23	.2	0
	SUM----------(CYCLE COMPOSITE)----------											2.3	59	12.7	
CYCLE 3															
	1 IDLE	551	4.246	11.83	142	16.671	1560	58	803	4	.036	2.1	29	.2	0
	2 16 MG	158	.807	14.56	1188	15.538	16270	185	1707	413	.089	16.5	152	36.8	47
	3 10 MG	102	.552	14.54	2184	15.202	24969	188	1831	1191	.257	48.2	471	306.1	90
	4 16 MG	87	.871	14.68	930	15.645	16270	101	1830	321	.089	9.0	163	28.6	47
	5 19 MG	80	1.395	14.62	463	16.101	11812	66	2067	113	.047	3.1	97	5.3	21
	6 16 MG	82	1.039	14.60	1500	15.728	16270	95	2171	515	.089	8.5	193	45.9	47
	7 3 MG	104	2.709	13.60	2217	16.421	36332	258	12107	1628	.283	72.9	3426	460.9	136
	8 16 MG	97	2.674	13.81	721	16.589	16270	107	5298	235	.089	9.5	471	20.9	47
	9 C.T.	3848	2.914	5.33	131	12.400	2637	917	1252	9	.021	19.2	26	.2	0
	SUM----------(CYCLE COMPOSITE)----------											2.4	63	11.4	
CYCLE 4															
	1 IDLE	551	4.246	11.83	142	16.671	1560	58	803	4	.036	2.1	29	.2	0
	2 16 MG	143	1.227	14.41	1206	15.791	16270	145	2554	413	.089	14.7	227	36.7	47
	3 10 MG	94	.647	14.44	2172	15.189	24969	173	2149	1185	.257	44.5	552	304.7	90
	4 16 MG	97	1.183	14.62	1070	15.908	16270	111	2444	363	.089	9.9	218	32.3	47
	5 19 MG	88	1.921	14.38	446	16.346	11812	71	2796	107	.047	3.3	131	5.0	21
	6 16 MG	87	1.217	14.56	1337	15.871	16270	100	2520	455	.089	8.9	224	40.5	47
	7 3 MG	102	2.563	13.58	2461	16.253	36332	255	11573	1826	.283	72.3	3275	516.9	136
	8 16 MG	87	1.476	14.44	969	16.010	16270	99	3030	327	.089	8.8	270	29.1	47
	9 C.T.	4147	3.118	4.65	149	12.301	2637	1008	1350	11	.021	21.2	28	.2	0
	SUM----------(CYCLE COMPOSITE)----------											2.3	62	12.2	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 2.3 58 12.8

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 2.4 63 11.8

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(2.3) + 0.65(2.4) = 2.396 (MASS)
CO 0.35(58) + 0.65(63) = 61.3 (MASS)
NO2 0.35(12.8) + 0.65(11.8) = 12.148 (MASS)

1-19-72 RUN 2 TRUCK 8 1970 IHC 478 CID V8 STATIONARY K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1															
	1 IDLE	[illegible]	2.293	10.78	102	14.287	1560	147	445	4	.036	7.1	17	.1	0
	2 16 MG	73	.723	14.33	446	15.132	16270	88	1570	352	.089	7.8	140	31.3	47
	3 10 MG	62	.424	14.20	2198	14.641	24969	12	144	124	.257	3.0	37	31.9	90
	4 16 MG	71	.776	14.52	1110	15.333	16270	94	1659	390	.089	7.5	148	34.7	47
	5 19 MG	65	1.588	14.31	394	15.968	11812	54	2373	47	.047	2.5	112	4.5	21
	6 16 MG	67	.757	14.50	1101	15.329	16270	90	1623	388	.089	7.1	144	34.5	47
	7 3 MG	91	2.536	13.37	2514	16.044	36332	241	11625	1472	.283	65.5	3290	558.0	136
	8 16 MG	77	.939	14.53	1136	15.551	16270	90	1982	395	.089	8.0	176	35.1	47
	9 C.T.	2436	2.533	5.13	126	11.724	2637	714	1151	4	.021	15.0	24	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	52	9.2	
CYCLE 2															
	1 IDLE	[illegible]	2.293	10.78	102	14.487	1560	147	445	4	.036	7.1	17	.1	0
	2 16 MG	81	.974	14.42	1539	15.467	16270	72	2071	538	.089	6.4	149	47.9	47
	3 10 MG	93	.442	14.40	1649	15.442	24969	17	308	48	.257	4.3	79	22.7	90
	4 16 MG	94	1.275	14.49	405	15.857	16270	108	2643	308	.089	9.6	235	27.4	47
	5 19 MG	84	1.540	14.42	650	16.041	11812	69	2343	158	.047	3.2	110	7.4	21
	6 16 MG	92	1.550	14.33	2054	15.979	16270	105	3198	696	.089	9.3	284	61.9	47
	7 3 MG	161	3.138	13.39	1737	16.431	36332	247	13821	1260	.283	69.9	3911	356.5	136
	8 16 MG	101	2.699	13.92	692	16.328	16270	113	5433	226	.089	10.0	484	20.1	47
	9 C.T.	3035	2.504	6.07	107	11.857	2637	754	1127	8	.021	15.9	24	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.7	67	6.4	
CYCLE 3															
	1 IDLE	1345	3.117	11.61	121	16.202	1560	147	606	4	.036	5.3	22	.1	0
	2 16 MG	154	1.141	14.50	1305	15.779	16270	189	2243	447	.089	16.9	204	39.8	47
	3 10 MG	104	.597	14.54	2202	15.249	24969	19	147	120	.257	4.9	51	30.4	90
	4 16 MG	102	1.337	14.50	935	15.947	16270	117	2755	317	.089	10.4	245	28.2	47
	5 19 MG	92	1.830	14.37	515	16.299	11812	75	2679	124	.047	3.5	126	5.8	21
	6 16 MG	91	.938	14.62	1252	15.656	16270	106	1969	432	.089	9.4	175	38.4	47
	7 3 MG	106	2.900	13.53	2069	16.544	36332	261	12864	1508	.283	73.8	3641	426.9	136
	8 16 MG	94	1.592	14.28	404	15.974	16270	107	3276	306	.089	9.5	292	27.2	47
	9 C.T.	3046	2.365	5.94	120	11.615	2637	725	1094	9	.021	16.3	23	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.9	60	7.5	
CYCLE 4															
	1 IDLE	1345	3.117	11.61	121	16.202	1560	147	606	4	.036	5.3	22	.1	0
	2 16 MG	157	1.158	14.48	1047	15.808	16270	181	2408	375	.089	16.1	214	33.4	47
	3 10 MG	104	.559	14.53	2429	15.201	24969	19	185	132	.257	4.9	46	34.0	90
	4 16 MG	97	.974	14.61	1161	15.689	16270	113	2040	400	.089	10.0	182	35.6	47
	5 19 MG	88	1.910	14.35	403	16.355	11812	71	2796	97	.047	3.3	131	4.5	21
	6 16 MG	92	1.051	14.61	1139	15.760	16270	106	2142	390	.089	9.5	195	34.7	47
	7 3 MG	105	2.941	13.57	2628	16.224	36332	263	11494	1954	.283	74.5	3253	552.9	136
	8 16 MG	92	1.170	14.60	1140	15.869	16270	106	2423	388	.089	9.4	216	34.5	47
	9 C.T.	3041	2.590	6.14	145	12.014	2637	749	1148	11	.021	15.7	24	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.9	54	9.2	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.6 59 8.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.9 57 8.4

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.9) = 1.796 (MASS)
CO 0.35(59) + 0.65(57) = 57.9 (MASS)
NO2 0.35(8.0) + 0.65(8.4) = 8.250 (MASS)

71 INTL TRUCK 8 ABC 503 RUN-3 GVW32000 W/D=57/78 S K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	1660	.880	5.20	51	7.873	2560	605	578	6	.036	21.8	21	.2	0
2 16 MG	62	.800	12.51	768	13.377	11760	61	1421	224	.089	5.4	126	19.9	47
3 10 MG	71	.450	13.18	2325	13.707	17487	101	1160	985	.257	26.1	298	253.1	90
4 16 MG	61	1.190	12.71	811	13.466	11760	58	2024	227	.089	5.1	180	20.2	47
5 19 MG	53	1.510	12.34	265	13.907	8298	35	1820	52	.047	1.7	86	2.5	21
6 16 MG	62	1.030	12.90	843	13.497	11760	58	1748	235	.089	5.2	156	20.9	47
7 3 MG	98	2.250	13.06	2800	15.416	29023	207	8557	1750	.283	58.5	2422	495.3	136
8 16 MG	66	1.200	13.06	897	14.331	11760	61	1989	244	.089	5.4	177	21.7	47
9 C.T.	1049	.350	4.34	48	5.823	2484	501	302	14	.021	10.5	6	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.8	44	10.5	
CYCLE 2														
1 IDLE	1660	.880	5.20	51	7.873	2560	605	578	6	.036	21.8	21	.2	0
2 16 MG	64	1.120	12.75	742	13.434	11760	60	1904	208	.089	5.4	170	18.5	47
3 10 MG	71	.420	13.48	2412	13.477	17487	99	1061	1002	.257	25.6	273	257.5	90
4 16 MG	62	1.060	13.06	897	14.187	11760	58	1775	247	.089	5.1	158	22.0	47
5 19 MG	57	1.670	12.47	265	14.202	8298	37	1971	51	.047	1.8	93	2.4	21
6 16 MG	62	1.050	13.06	854	14.177	11760	58	1759	235	.089	5.1	157	20.9	47
7 3 MG	106	2.520	12.94	2443	15.574	29023	221	9486	1511	.283	62.6	2685	427.7	136
8 16 MG	66	1.040	12.48	870	14.041	11760	62	1753	241	.089	5.5	156	21.5	47
9 C.T.	1029	.340	4.54	79	5.941	2484	478	285	11	.021	10.0	6	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.8	47	9.7	
CYCLE 3														
1 IDLE	1704	1.200	6.56	51	9.600	2560	509	646	5	.036	18.3	23	.2	0
2 16 MG	66	1.050	12.82	768	13.441	11760	62	1789	215	.089	5.5	159	19.1	47
3 10 MG	66	.440	13.48	2373	13.441	17487	92	1111	985	.257	23.7	285	253.1	90
4 16 MG	62	1.140	13.06	865	14.317	11760	57	1974	236	.089	5.1	176	21.0	47
5 19 MG	44	1.700	12.34	251	14.142	8298	62	2015	44	.047	2.9	95	2.3	21
6 16 MG	62	1.220	13.06	800	14.347	11760	57	2020	218	.089	5.1	180	19.4	47
7 3 MG	102	2.240	13.18	2739	15.580	29023	213	8617	1694	.283	60.2	2439	479.4	136
8 16 MG	71	.460	13.18	919	14.217	11760	66	1604	252	.089	5.9	143	22.5	47
9 C.T.	879	.430	4.79	109	6.169	2484	396	350	15	.021	8.3	7	.3	0
SUM----------(CYCLE COMPOSITE)----------											1.7	44	10.3	
CYCLE 4														
1 IDLE	1704	1.200	6.56	51	9.600	2560	509	646	5	.036	18.3	23	.2	0
2 16 MG	66	1.100	12.82	752	13.441	11760	62	1868	210	.089	5.5	166	18.7	47
3 10 MG	66	.350	13.63	2483	14.051	17487	92	880	1026	.257	23.6	226	263.7	90
4 16 MG	62	1.210	13.06	848	14.337	11760	57	2005	231	.089	5.1	178	20.6	47
5 19 MG	57	1.420	12.59	307	14.072	8298	38	1691	60	.047	1.8	80	2.8	21
6 16 MG	62	1.160	13.06	800	14.287	11760	57	1929	219	.089	5.1	172	19.5	47
7 3 MG	107	2.640	13.06	2443	15.866	29023	219	9440	1484	.283	62.0	2813	419.9	136
8 16 MG	71	1.120	13.18	897	14.377	11760	65	1851	244	.089	5.8	165	21.7	47
9 C.T.	1008	.350	4.59	85	6.029	2484	465	291	12	.021	9.8	6	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	48	9.7	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.8 45 10.1

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.7 46 10.0

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.8) + 0.65(1.7) = 1.738 (MASS)
CO 0.35(45) + 0.65(46) = 45.9 (MASS)
NO2 0.35(10.1) + 0.65(10.0) = 10.031 (MASS)

71 INTL TRUCK 8 ABC 503 RUN-4 GVW32000 W/D=57/78 S K = 1.00

MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	HP
CYCLE 1														
1 IDLE	1661	.740	6.64	51	9.174	2560	519	417	5	.036	18.7	15	.2	0
2 16 MG	72	.930	12.71	726	13.718	11760	69	1610	207	.089	6.2	143	18.4	47
3 10 MG	71	.490	13.33	2180	13.847	17487	100	1246	911	.257	25.7	320	234.1	90
4 16 MG	62	.970	13.06	845	14.047	11760	58	1635	240	.089	5.2	145	21.3	47
5 19 MG	44	1.630	12.34	224	14.023	8298	32	1948	44	.047	1.5	92	2.1	21
6 16 MG	57	1.140	13.06	741	14.262	11760	53	1899	203	.089	4.7	169	18.1	47
7 3 MG	102	2.650	13.06	2428	15.820	29023	210	9820	1479	.283	59.3	2779	418.5	136
8 16 MG	66	1.170	13.33	859	14.571	11760	60	1907	230	.089	5.3	170	20.5	47
9 C.T.	938	.470	4.59	71	6.073	2484	430	388	10	.021	9.0	8	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	48	9.2	
CYCLE 2														
1 IDLE	1661	.740	6.64	51	9.174	2560	519	417	5	.036	18.7	15	.2	0
2 16 MG	66	.930	12.94	710	13.441	11760	62	1585	199	.089	5.5	141	17.7	47
3 10 MG	66	.430	13.68	2341	14.181	17487	91	1071	958	.257	23.4	275	246.3	90
4 16 MG	62	1.150	13.18	810	14.347	11760	57	1898	220	.089	5.0	169	19.6	47
5 19 MG	53	1.590	12.78	264	14.427	8298	34	1847	50	.047	1.6	87	2.4	21
6 16 MG	57	1.180	13.18	789	14.422	11760	52	1944	214	.089	4.6	173	19.0	47
7 3 MG	102	2.750	13.33	2412	16.140	29023	205	9458	1436	.283	58.0	2816	406.2	136
8 16 MG	71	1.360	13.48	865	14.917	11760	63	2166	226	.089	5.6	193	20.2	47
9 C.T.	930	.400	4.68	84	6.084	2484	425	330	11	.021	8.9	7	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	49	9.2	
CYCLE 3														
1 IDLE	1661	1.120	6.18	59	9.094	2560	524	637	6	.036	18.9	23	.2	0
2 16 MG	75	.940	13.18	747	14.201	11760	70	1572	205	.089	6.2	140	18.3	47
3 10 MG	71	.460	13.77	2302	14.307	17487	97	1136	934	.257	25.0	292	240.1	90
4 16 MG	62	1.080	13.33	784	14.477	11760	56	1772	211	.089	5.0	158	18.8	47
5 19 MG	53	1.390	12.82	274	14.267	8298	35	1633	53	.047	1.6	77	2.5	21
6 16 MG	62	1.170	13.33	800	14.567	11760	56	1908	214	.089	5.0	170	19.1	47
7 3 MG	98	2.320	13.48	2655	15.906	29023	200	8551	1608	.283	56.7	2420	455.2	136
8 16 MG	66	1.340	13.48	854	14.841	11760	58	2138	225	.089	5.2	190	20.0	47
9 C.T.	975	.430	4.78	88	6.263	2484	433	344	12	.021	9.1	7	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	44	9.8	
CYCLE 4														
1 IDLE	1661	1.120	6.18	59	9.094	2560	524	637	6	.036	18.9	23	.2	0
2 16 MG	71	1.140	13.06	731	14.327	11760	65	1973	199	.089	5.8	176	17.7	47
3 10 MG	71	.430	13.91	2372	14.417	17487	96	1054	955	.257	24.8	271	245.5	90
4 16 MG	62	1.160	13.33	854	14.557	11760	56	1893	229	.089	5.0	168	20.4	47
5 19 MG	57	1.390	12.82	284	14.272	8298	37	1633	55	.047	1.7	77	2.6	21
6 16 MG	62	1.160	13.33	837	14.557	11760	56	1893	224	.089	5.0	168	20.0	47
7 3 MG	98	2.580	13.33	2372	16.016	29023	199	9444	1427	.283	56.3	2673	403.9	136
8 16 MG	62	1.170	13.48	892	14.717	11760	55	1889	237	.089	4.9	168	21.1	47
9 C.T.	1010	.410	4.79	90	6.291	2484	447	327	12	.021	9.4	7	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.7	47	9.2	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.7 49 9.2

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.7 46 9.5

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.7) + 0.65(1.7) = 1.672 (MASS)
CO 0.35(49) + 0.65(45) = 46.6 (MASS)
NO2 0.35(9.2) + 0.65(9.5) = 9.400 (MASS)

TABLE J-9. NINE-MODE FEDERAL CYCLE STATIONARY AND CHASSIS DYNAMOMETER TEST RESULTS

Correlation Truck No. 9

Engine: Chevrolet 292 CID, 6 cyl.

Vehicle: 1970 Chevrolet 14,000-lb GVW Van

Date	Run	Dynamometer	Emissions, Gr-Bhp-hr HC	CO	NO_2 Obs.	NO_2 Corr.
1-25-72	1	Stationary	1.52	29.9	19.19	15.85
1-25-72	2	Stationary	1.61	37.3	19.22	15.18
		Average	1.57	33.6	19.21	15.52
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			5.8	22.0	1.6	4.3
1-21-72	1	Chassis	1.65	32.5	20.38	17.91
1-21-72	2	Chassis	1.62	28.0	20.39	17.92
		Average	1.64	30.3	20.39	17.92
Percent spread: $\left(\frac{\text{Max - Min}}{\text{Avg}}\right) \times 100$			1.8	14.9	0.1	0.1
Average Stationary			1.57	33.6	19.21	15.52
Average Chassis			1.64	30.3	20.39	17.92
Difference: (Chassis - Stationary)			0.07	-3.3	1.18	2.4
Percent Difference: (Difference/Stationary) x 100			4.5	-9.8	6.1	15.5

1-25-72 RUN 1 TRUCK 9 1970 CHEV 292 CID 6 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	326	5.996	11.33	114	17.178	2058	94	1330	5	.036	1.6	48	.2	0
2 16 MG	114	.176	14.14	3930	14.489	7087	62	174	638	.089	5.6	15	56.8	25
3 10 MG	63	.264	13.78	3832	14.112	10522	53	398	949	.257	13.6	102	243.8	47
4 16 MG	67	.163	14.27	4111	14.506	7087	37	161	667	.089	3.3	14	59.3	25
5 19 MG	56	.288	14.48	2071	14.828	5045	21	148	234	.047	1.0	9	11.0	11
6 16 MG	65	.176	14.40	4050	14.646	7087	35	172	651	.089	3.1	15	57.9	25
7 3 MG	79	.180	13.63	3105	13.895	16843	107	441	1250	.283	30.4	125	353.6	75
8 16 MG	56	.151	14.49	4144	14.701	7087	30	147	663	.089	2.7	13	59.0	25
9 C.T.	4372	3.116	6.59	214	14.428	1242	422	542	6	.021	8.9	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	8	14.7	
CYCLE 2														
1 IDLE	326	5.996	11.33	114	17.178	2058	94	1330	5	.036	1.6	48	.2	0
2 16 MG	99	.153	14.21	3807	14.470	7087	54	151	619	.089	4.8	13	55.1	25
3 10 MG	60	.219	13.99	4038	14.274	10522	50	326	988	.257	12.7	84	254.0	47
4 16 MG	66	.163	14.39	4103	14.624	7087	36	160	660	.089	3.2	14	58.8	25
5 19 MG	59	.225	14.49	2228	14.779	5045	23	155	253	.047	1.1	7	11.9	11
6 16 MG	62	.176	14.41	4098	14.653	7087	34	172	658	.089	3.0	15	58.6	25
7 3 MG	81	2.192	13.63	3116	15.909	16843	96	4688	1095	.283	27.2	1327	309.9	75
8 16 MG	58	.166	14.49	4141	14.719	7087	31	161	662	.089	2.8	14	58.9	25
9 C.T.	4452	3.031	6.81	269	14.649	1242	423	519	8	.021	8.9	11	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.5	36	18.9	
CYCLE 3														
1 IDLE	293	5.396	11.79	181	17.502	2058	39	1282	7	.036	1.4	46	.3	0
2 16 MG	100	.158	14.33	3974	14.596	7087	54	155	641	.089	4.8	14	57.0	25
3 10 MG	61	.241	14.02	4008	14.327	10522	50	358	977	.257	12.9	92	251.2	47
4 16 MG	63	.155	14.46	4104	14.683	7087	34	151	658	.089	3.0	13	58.5	25
5 19 MG	53	.236	14.52	2158	14.813	5045	20	162	244	.047	1.0	8	11.5	11
6 16 MG	58	.159	14.35	4123	14.572	7087	32	156	666	.089	2.8	14	59.3	25
7 3 MG	76	2.055	13.80	3217	15.937	16843	90	4387	1129	.283	25.5	1242	319.4	75
8 16 MG	57	.164	14.52	4058	14.746	7087	31	159	648	.089	2.7	14	57.6	25
9 C.T.	4615	3.121	6.54	224	14.645	1242	438	535	6	.021	9.2	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.5	34	19.1	
CYCLE 4														
1 IDLE	293	5.396	11.79	181	17.502	2058	39	1282	7	.036	1.4	46	.3	0
2 16 MG	99	.151	14.31	4031	14.563	7087	51	148	651	.089	4.6	13	58.0	25
3 10 MG	58	.219	14.12	4144	14.402	10522	47	323	1005	.257	12.2	83	258.3	47
4 16 MG	64	.173	14.45	4111	14.692	7087	35	169	658	.089	3.1	15	58.6	25
5 19 MG	64	.242	14.61	2252	14.921	5045	24	165	253	.047	1.1	8	11.9	11
6 16 MG	65	.193	14.59	4144	14.853	7087	35	186	656	.089	3.1	17	58.4	25
7 3 MG	77	2.082	13.83	3148	15.995	16843	91	4429	1118	.283	25.7	1253	316.4	75
8 16 MG	58	.170	14.58	4099	14.813	7087	31	164	651	.089	2.8	16	57.9	25
9 C.T.	4744	3.306	6.50	262	14.930	1242	442	556	7	.021	9.3	12	.2	0
SUM----------(CYCLE COMPOSITE)----------											1.5	34	19.2	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.6 22 19.3

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.5 34 19.1

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.5) = 1.516 (MASS)
CO 0.35(22) + 0.65(34) = 29.9 (MASS)
NO2 0.35(19.3) + 0.65(19.1) = 19.193 (MASS)

1-25-72 RUN 2 TRUCK 9 1970 CHEV 292 CID 6 STATIONARY K = 1.00

MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1														
1 IDLE	297	5.050	11.21	118	16.581	2058	41	1266	5	.036	1.5	46	.2	0
2 16 MG	100	.143	13.39	3747	13.641	7087	58	150	646	.089	5.2	13	57.5	25
3 10 MG	59	.206	13.13	3650	13.400	10522	52	327	952	.257	13.3	84	244.5	47
4 16 MG	62	.146	13.57	3842	13.783	7087	36	152	664	.089	3.2	13	59.1	25
5 19 MG	71	.211	13.68	2066	13.968	5045	29	154	248	.047	1.3	7	11.6	11
6 16 MG	59	.148	13.61	3989	13.822	7087	34	153	678	.089	3.0	14	60.4	25
7 3 MG	78	2.140	12.97	3018	15.194	16843	97	4792	1111	.283	27.4	1356	314.3	75
8 16 MG	57	.142	13.72	4042	13.924	7087	32	146	641	.089	2.9	13	61.5	25
9 C.T.	4523	3.040	6.31	208	14.235	1242	442	536	6	.021	9.3	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	36	18.9	
CYCLE 2														
1 IDLE	297	5.050	11.21	118	16.581	2058	41	1266	5	.036	1.5	46	.2	0
2 16 MG	92	.148	13.69	3847	13.937	7087	52	152	653	.089	4.7	14	58.1	25
3 10 MG	57	.223	13.30	3806	13.585	10522	49	349	979	.257	12.7	90	251.5	47
4 16 MG	63	.152	13.76	3948	13.980	7087	34	156	673	.089	3.2	14	59.9	25
5 19 MG	52	.217	13.90	2150	14.173	5045	21	156	254	.047	1.0	7	11.9	11
6 16 MG	61	.147	13.78	4070	13.993	7087	35	150	684	.089	3.1	13	60.9	25
7 3 MG	81	2.214	13.02	3015	15.321	16843	100	4916	1100	.283	28.2	1391	311.4	75
8 16 MG	59	.166	13.80	3735	14.030	7087	33	169	626	.089	3.0	15	55.7	25
9 C.T.	4534	3.123	6.27	168	14.240	1242	441	548	5	.021	9.3	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	37	19.0	
CYCLE 3														
1 IDLE	333	5.247	11.27	149	16.877	2058	45	1292	6	.036	1.6	47	.2	0
2 16 MG	105	.186	13.63	3947	13.929	7087	60	191	670	.089	5.3	17	59.6	25
3 10 MG	67	.172	13.58	4123	13.824	10522	57	264	1042	.257	14.7	68	267.8	47
4 16 MG	67	.168	13.75	3712	13.990	7087	38	172	624	.089	3.4	15	55.6	25
5 19 MG	57	.240	13.84	2311	14.142	5045	23	173	274	.047	1.1	8	12.9	11
6 16 MG	71	.584	13.65	3672	14.311	7087	34	584	604	.089	3.5	52	53.7	25
7 3 MG	85	2.270	13.05	3022	15.412	16843	104	5011	1046	.283	29.4	1418	310.3	75
8 16 MG	59	.204	13.83	3534	14.098	7087	33	207	540	.089	3.0	18	52.5	25
9 C.T.	4580	3.110	6.27	174	14.326	1242	445	545	5	.021	9.3	11	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.7	34	19.0	
CYCLE 4														
1 IDLE	333	5.247	11.27	149	16.877	2058	45	1292	6	.036	1.6	47	.2	0
2 16 MG	100	.158	13.74	3882	14.006	7087	57	161	652	.089	5.0	14	58.0	25
3 10 MG	61	.295	13.18	3879	13.541	10522	53	463	1001	.257	13.6	119	257.2	47
4 16 MG	69	.159	13.74	4024	13.974	7087	34	163	678	.089	3.5	14	60.4	25
5 19 MG	62	.226	13.83	2154	14.123	5045	25	163	255	.047	1.2	8	12.0	11
6 16 MG	65	.170	13.78	4070	14.020	7087	37	174	683	.089	3.3	15	60.8	25
7 3 MG	81	2.068	13.05	3188	15.205	16843	100	4627	1172	.283	28.4	1310	331.8	75
8 16 MG	57	.158	13.83	4120	14.050	7087	32	161	690	.089	2.9	14	61.4	25
9 C.T.	4479	3.158	6.31	228	14.305	1242	436	554	7	.021	9.1	12	.1	0
SUM----------(CYCLE COMPOSITE)----------											1.6	36	19.7	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.6 37 19.0

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.6 38 19.4

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.6) = 1.613 (MASS)
CO 0.35(37) + 0.65(38) = 37.3 (MASS)
NO2 0.35(19.0) + 0.65(19.4) = 19.220 (MASS)

1-21-72 RUN 1 TRUCK 9 1970 CHEV 292 CID 6 CHASSIS K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	171	4.977	11.08	134	16.242	1718	20	1063	5	.036	.7	38	.2	0
	2 16 MG	92	.132	13.05	3527	13.281	7431	58	149	655	.089	5.1	13	58.3	25
	3 10 MG	53	.124	12.71	3254	12.891	11129	51	216	933	.257	13.2	56	239.7	47
	4 16 MG	63	.130	13.16	3707	13.358	7431	39	146	685	.089	3.5	13	60.9	25
	5 19 MG	132	.183	1327.00	1709	1327.326	5103	1	1	2	.047	.0	0	.1	11
	6 16 MG	64	.381	13.13	3553	13.580	7431	39	421	645	.089	3.5	37	57.4	25
	7 3 MG	75	1.410	12.40	3080	14.891	17685	100	4582	1214	.283	28.2	1297	343.7	75
	8 16 MG	53	.128	13.11	3875	13.295	7431	33	145	719	.089	3.0	13	64.0	25
	9 C.T.	2726	2.724	5.83	182	11.448	1659	441	794	9	.021	9.3	17	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	35	19.3	
CYCLE 2															
	1 IDLE	171	4.977	11.08	134	16.242	1718	20	1063	5	.036	.7	38	.2	0
	2 16 MG	96	.132	13.26	3635	13.496	7431	59	147	665	.089	5.3	13	59.1	25
	3 10 MG	60	.131	12.87	3501	13.066	11129	57	225	990	.257	14.7	58	254.4	47
	4 16 MG	72	.132	13.28	3747	13.490	7431	44	147	644	.089	4.0	13	61.8	25
	5 19 MG	112	.147	13.46	1724	13.778	5103	46	147	214	.047	2.2	7	10.3	11
	6 16 MG	67	.130	13.36	3728	13.562	7431	41	144	678	.089	3.7	13	60.4	25
	7 3 MG	73	1.564	13.04	3254	14.688	17685	98	3816	1303	.283	27.9	1080	368.7	75
	8 16 MG	58	.133	13.37	3846	13.566	7431	36	147	704	.089	3.2	13	63.1	25
	9 C.T.	2947	2.785	6.04	244	12.058	1659	454	774	11	.021	9.5	16	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.7	29	20.6	
CYCLE 3															
	1 IDLE	193	5.572	10.82	137	16.600	1718	22	1165	5	.036	.8	42	.2	0
	2 16 MG	92	.165	13.30	3630	13.564	7431	56	183	660	.089	5.0	16	58.8	25
	3 10 MG	58	.135	12.43	3634	13.128	11129	55	231	1023	.257	14.2	59	262.9	47
	4 16 MG	66	.152	13.38	3837	13.603	7431	40	168	696	.089	3.6	15	61.9	25
	5 19 MG	67	.225	13.64	2031	13.937	5103	27	166	247	.047	1.3	8	11.6	11
	6 16 MG	65	.130	13.35	3834	13.550	7431	40	144	648	.089	3.6	13	62.1	25
	7 3 MG	72	1.578	13.04	3230	14.696	17685	97	3836	1240	.283	27.5	1086	365.2	75
	8 16 MG	58	.131	13.32	3867	13.514	7431	36	146	706	.089	3.2	13	62.8	25
	9 C.T.	2981	2.854	5.97	230	12.043	1659	460	794	11	.021	9.7	17	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	30	20.7	
CYCLE 4															
	1 IDLE	193	5.572	10.82	137	16.600	1718	22	1165	5	.036	.8	42	.2	0
	2 16 MG	94	.138	13.33	3710	13.570	7431	58	153	675	.089	5.1	14	60.0	25
	3 10 MG	42	.135	12.87	3626	13.072	11129	59	232	1025	.257	15.2	60	263.4	47
	4 16 MG	71	.128	13.32	4042	13.525	7431	44	142	737	.089	3.9	13	65.6	25
	5 19 MG	90	.244	13.54	2024	13.931	5103	37	181	246	.047	1.7	8	11.6	11
	6 16 MG	69	.186	13.31	3854	13.571	7431	42	206	701	.089	3.8	18	62.4	25
	7 3 MG	82	1.993	12.81	3114	14.842	17685	109	4781	1230	.283	30.9	1353	348.0	75
	8 16 MG	61	.133	13.40	3995	13.599	7431	37	147	725	.089	3.3	13	64.5	25
	9 C.T.	2899	2.795	6.00	235	11.926	1659	452	785	11	.021	9.5	16	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.7	36	20.5	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.6 32 19.9

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.7 33 20.6

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.7) = 1.651 (MASS)
CO 0.35(32) + 0.65(33) = 32.5 (MASS)
NO2 0.35(19.9) + 0.65(20.6) = 20.376 (MASS)

1-21-72 RUN 2 TRUCK 9 1970 CHEV 292 CID 6 CHASSIS K = 1.00

	MASS MODE	CONCENTRATION AS MEASURED HC	CO	CO2	NO	TOTAL CARBON	FUEL CONS.	ADJUSTED (MASS) HC	CO	NO2	WT. FACT.	WEIGHTED (MASS) HC	CO	NO2(K)	MP
CYCLE 1															
	1 IDLE	162	5.070	11.42	126	16.665	1718	19	1056	4	.036	.7	38	.2	0
	2 16 MG	84	.129	13.50	3378	13.720	7431	51	141	607	.089	4.5	13	54.1	25
	3 10 MG	53	.122	13.12	3245	13.299	11129	50	206	902	.257	12.8	53	231.7	47
	4 16 MG	64	.125	13.70	3728	13.894	7431	38	135	662	.089	3.4	12	58.9	25
	5 19 MG	133	.184	13.76	1828	14.088	5103	54	135	220	.047	2.5	6	10.3	11
	6 16 MG	65	.130	13.72	3629	13.920	7431	39	140	643	.089	3.5	12	57.2	25
	7 3 MG	73	1.501	13.52	3240	15.100	17685	96	3551	1274	.283	27.1	1005	362.0	75
	8 16 MG	60	.133	13.74	3792	13.938	7431	36	143	671	.089	3.2	13	59.7	25
	9 C.T.	2890	2.583	6.01	214	11.714	1659	458	734	10	.021	9.6	16	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	27	14.5	
CYCLE 2															
	1 IDLE	162	5.070	11.42	126	16.665	1718	19	1056	4	.036	.7	38	.2	0
	2 16 MG	90	.251	13.67	3567	14.018	7431	53	269	628	.089	4.8	24	55.9	25
	3 10 MG	62	.128	13.18	3640	13.375	11129	58	215	1014	.257	14.8	55	262.0	47
	4 16 MG	72	.133	13.76	3814	13.971	7431	43	143	674	.089	3.8	13	59.9	25
	5 19 MG	78	.196	14.03	1767	14.310	5103	31	141	209	.047	1.5	7	9.8	11
	6 16 MG	72	.132	13.84	3833	14.050	7431	43	141	673	.089	3.8	13	59.9	25
	7 3 MG	75	1.671	13.38	3175	15.132	17685	98	3945	1232	.283	27.8	1116	348.6	75
	8 16 MG	58	.133	13.84	3936	14.036	7431	34	142	692	.089	3.1	13	61.6	25
	9 C.T.	2966	2.681	6.31	260	12.144	1659	452	737	12	.021	9.5	15	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	30	20.1	
CYCLE 3															
	1 IDLE	194	5.322	11.21	137	16.742	1718	22	1103	5	.036	.8	40	.2	0
	2 16 MG	92	.274	13.63	3547	14.008	7431	55	249	633	.089	4.9	27	56.4	25
	3 10 MG	59	.132	13.24	3595	13.486	11129	55	220	985	.257	14.0	57	253.1	47
	4 16 MG	71	.124	13.82	3972	14.026	7431	42	138	644	.089	3.7	12	62.2	25
	5 19 MG	101	.218	13.44	1818	14.267	5103	40	158	216	.047	1.9	7	10.1	11
	6 16 MG	69	.242	13.70	3905	14.017	7431	41	254	687	.089	3.6	23	61.2	25
	7 3 MG	77	1.661	13.33	3273	15.074	17685	101	3936	1275	.283	28.6	1114	360.8	75
	8 16 MG	56	.131	13.76	3924	13.951	7431	33	141	695	.089	3.0	13	61.8	25
	9 C.T.	2960	2.630	6.07	254	11.897	1659	462	741	12	.021	9.7	16	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	31	20.3	
CYCLE 4															
	1 IDLE	194	5.322	11.21	137	16.742	1718	22	1103	5	.036	.8	40	.2	0
	2 16 MG	94	.138	13.63	3615	13.870	7431	56	149	643	.089	5.0	13	57.2	25
	3 10 MG	59	.133	13.14	3704	13.337	11129	55	224	1026	.257	14.2	58	263.7	47
	4 16 MG	67	.136	13.71	3824	13.918	7431	40	147	674	.089	3.6	13	60.4	25
	5 19 MG	94	.260	13.87	1748	14.232	5103	38	188	214	.047	1.8	9	10.1	11
	6 16 MG	67	.132	13.77	3945	13.974	7431	40	142	646	.089	3.6	13	62.0	25
	7 3 MG	73	1.278	13.55	3472	14.907	17685	97	3063	1368	.283	27.5	867	387.0	75
	8 16 MG	60	.140	13.84	3967	14.045	7431	36	150	697	.089	3.2	13	62.0	25
	9 C.T.	3012	2.767	6.15	257	12.170	1659	460	762	12	.021	9.7	16	.2	0
	SUM----------(CYCLE COMPOSITE)----------											1.6	24	21.1	

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 1 AND 2)---------- 1.6 29 19.8

AVERAGE SUM---(COMPOSITE VALUES FOR CYCLES 3 AND 4)---------- 1.6 27 20.7

FOUR CYCLE COMPOSITE - REPORTED VALUES - HC 0.35(1.6) + 0.65(1.6) = 1.622 (MASS)
CO 0.35(29) + 0.65(27) = 28.0 (MASS)
NO2 0.35(19.8) + 0.65(20.7) = 20.390 (MASS)

APPENDIX K

MEASUREMENT OF OXIDES OF NITROGEN IN RAW EXHAUST BY CHEMILUMINESCENCE METHOD COMPARED TO THE NONDISPERSIVE INFRARED METHOD–DATA FROM SELECTED TRUCKS

TABLE K-1. OXIDES OF NITROGEN BY NDIR AND CL-23-MODE TEST
TRUCK NO. 3, AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	70	29	36	7	17	24*	33*	9
2	1500	0	148	112	119	7	139	157	164	7
3	1500	12.5	493	465	475	10	373	382	390	8
4	1500	25	1106	1062	1133	71	1212	1246	1263	17
5	1500	37.5	1612	1612	1642	30	1876	2012	2025	13
6	1500	50	2026	2058	2067	9	2011	2179	2204	25
7	1500	62.5	2106	2146	2158	12	1890	2050	2063	13
8	1500	75	1719	1658	1683	25	1631	1709	1741	32
9	1500	87.5	265	137	138	1	99	94	97	3
10	1500	100	307	168	182	14	170	156	164	8
11	1500	CT	206	36	58	22	68	8	12	4
12	Idle	0	202	31	46	15	73	27	37	10
13	2500	100	312	258	265	7	174	173	188	15
14	2500	87.5	247	197	198	1	113	114	117	3
15	2500	75	1696	1742	1775	33	927	915	928	13
16	2500	62.5	2460	2717	2717	0	1911	2017	2029	12
17	2500	50	2566	2875*	2925*	50*	2033	2137	2150	13
18	2500	37.5	2219	2367	2367	0	2011	2100	2108	8
19	2500	25	1496	1500	1500	0	1592	1646	1654	8
20	2500	12.5	784	721	723	2	849	827	828	1
21	2500	0	316	200	205	5	363	312	323	11
22	2500	CT	179	42	46	4	55	8	10	2
23	Idle	0	175	34	40	6	69	27	36	9

Note: $NO_2 = NO_x - NO$ by chemiluminescence

*Value from one run not used in computing average.

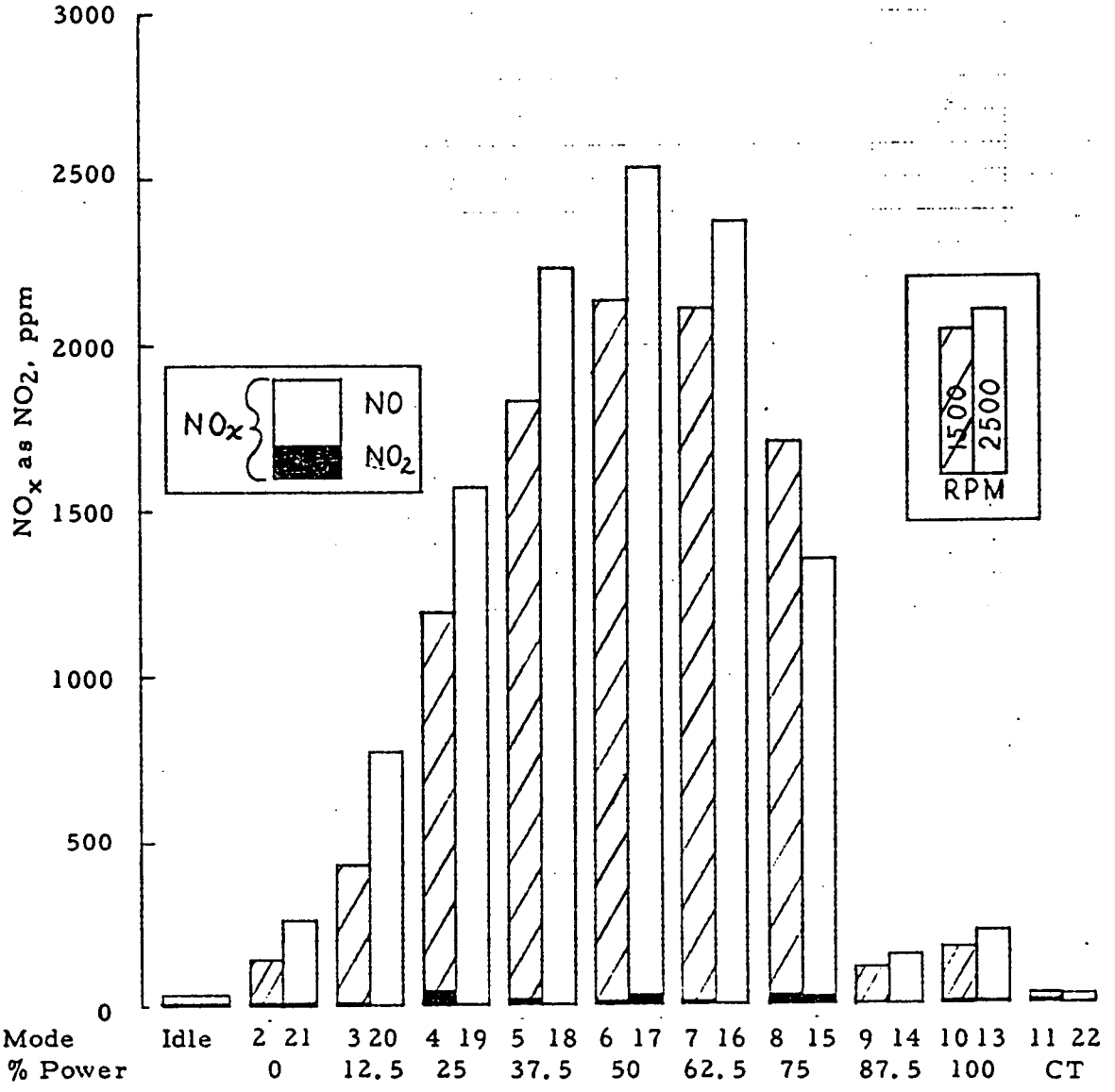

FIGURE K-1. EXPERIMENTAL 23-MODE NO-NO_x
BY CHEMILUMINESCENCE–TRUCK NO. 3

TABLE K-2. OXIDES OF NITROGEN BY NDIR AND CL-23-MODE TEST
TRUCK NO. 5, AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	25	15	21	6	64	22	31	9
2	1500	0	83	73	89	16	143	102	130	28
3	1500	12.5	238	215	238	23	316	263	298	35
4	1500	25	776	675	745	70	647	568	623	55
5	1500	37.5	1466	1239	1304	65	1919	1742	1829	87
6	1500	50	1958	1825	1900	75	2404	2296	2354	58
7	1500	62.5	2088	1975	2025	50	2476	2317	2408	91
8	1500	75	1968	1850	1900	50	2421	2292	2357	65
9	1500	87.5	698	560	595	35	859	725	748	23
10	1500	100	840	688	694	6	1188	1025	1050	25
11	1500	CT	124	8	10	2	95	4	10	6
12	Idle	0	130	16	26	10	117	23	34	11
13	2500	100	956	888	932	44	1338	1217	1221	4
14	2500	87.5	816	761	775	14	859	760	778	18
15	2500	75	1700	1712	1719	7	2151	2008	2079	71
16	2500	62.5	2256	2150	2163	13	2581	2483	2517	34
17	2500	50	2166	2112	2137	25	2492	2417	2450	33
18	2500	37.5	1618	1532	1557	25	1961	1775	1808	33
19	2500	25	1100	975	1048	73	1211	1113	1158	45
20	2500	12.5	552	460	515	55	731	625	678	53
21	2500	0	210	129	159	30	368	267	313	46
22	2500	CT	97	19	57	38	95	3	7	4
23	Idle	0	104	160	265	105	117	20	32	12

Note: $NO_2 = NO_x - NO$ by chemiluminescence.

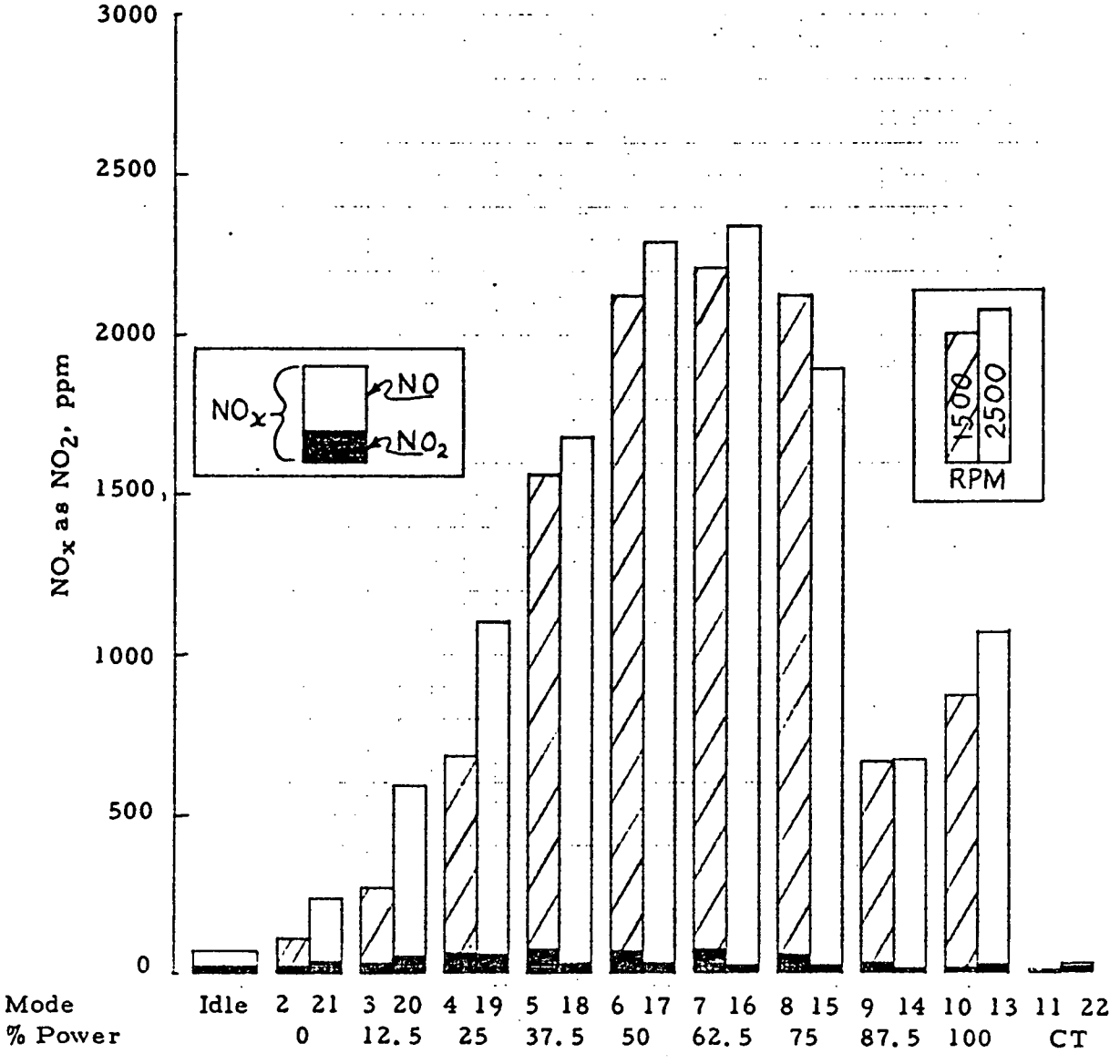

FIGURE K-2. EXPERIMENTAL 23-MODE NO-NO_x
BY CHEMILUMINESCENCE–TRUCK NO. 5

TABLE K-3. OXIDES OF NITROGEN BY NDIR AND CL-23-MODE TEST
TRUCK NO. 6, AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	0	10	17	7	45	17	29	12
2	1500	0	4	41	55	14	97	43	81	38
3	1500	12.5	121	158	177	19	300	240	283	43
4	1500	25	340	343	375	22	501	410	460	50
5	1500	37.5	567	520	560	40	706	605	645	40
6	1500	50	850	743	777	34	915	803	848	45
7	1500	62.5	1224	1067	1117	50	1270	1125	1138	13
8	1500	75	1753	1558	1633	75	1801	1650	1694	44
9	1500	87.5	274	160	167	7	265	179	190	11
10	1500	100	444	238	253	15	399	295	303	8
11	1500	CT	174	3	5	2	71	3	5	2
12	Idle	0	134	21	22	1	90	19	28	9
13	2500	100	373	408	416	8	613	575*	605*	30*
14	2500	87.5	242	249	251	2	342	313	320	7
15	2500	75	2483	2283	2407	125	2603	2450	2500	50
16	2500	62.5	2004	1767	1788	21	1942	1775	1794	19
17	2500	50	1502	1288	1333	45	1441	1281	1313	32
18	2500	37.5	1021	847	868	21	961	857	881	24
19	2500	25	651	472	497	25	786	693	728	35
20	2500	12.5	335	231	258	27	443	380	413	33
21	2500	0	189	81	104	23	157	116	149	33
22	2500	CT	91	3	7	4	45	1	3	2
23	Idle	0	56	21	27	6	71	17	28	11

Note: $NO_2 = NO_x - NO$ by chemiluminescence.

*Value from one run not used in computing average.

TABLE K-4. OXIDES OF NITROGEN BY NDIR AND CL-23-MODE TEST
TRUCK NO. 7, AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	60	27	36	9	58	41	47	6
2	1500	0	152	109	114	5	130	110	116	6
3	1500	12.5	603	517	532	15	898	813	819	6
4	1500	25	1637	1529	1550	21	1268	1138	1150	12
5	1500	37.5	2381	2245	2279	34	1851	1700	1713	13
6	1500	50	3328	3333	3350	17	2540	2525	2525	0
7	1500	62.5	3822	3850	3900	50	3265	3225	3225	0
8	1500	75	2614	2517	2567	50	1637	1525	1531	6
9	1500	87.5	2939	2900	2933	33	2172	2056	2063	7
10	1500	100	1541	1438*	1475*	37*	1472	1350	1356	6
11	1500	CT	165	10	17	7	111	18	22	4
12	Idle	0	139	28	38	10	104	46	51	5
13	2500	100	1054	915*	931*	16*	1057	931	950	19
14	2500	87.5	2940	2800	2817	17	2639	2475	2494	19
15	2500	75	3021	2867	2883	17	2653	2500	2500	0
16	2500	62.5	4147	4267	4300	33	4147	4275	4300	25
17	2500	50	4102	4133	4133	0	3981	3975	4000	25
18	2500	37.5	3222	3167	3167	0	3124	3000	3025	25
19	2500	25	2249	2066	2131	65	2233	2062	2087	25
20	2500	12.5	1164	1029	1049	20	1259	1130	1163	33
21	2500	0	386	297	312	15	472	305	312	7
22	2500	CT	152	9	13	4	90	12	14	2
23	Idle	0	148	32	39	7	104	50	53	3

Note: $NO_2 = NO_x - NO$ by chemiluminescence.

*Values from one run not used in computing average.

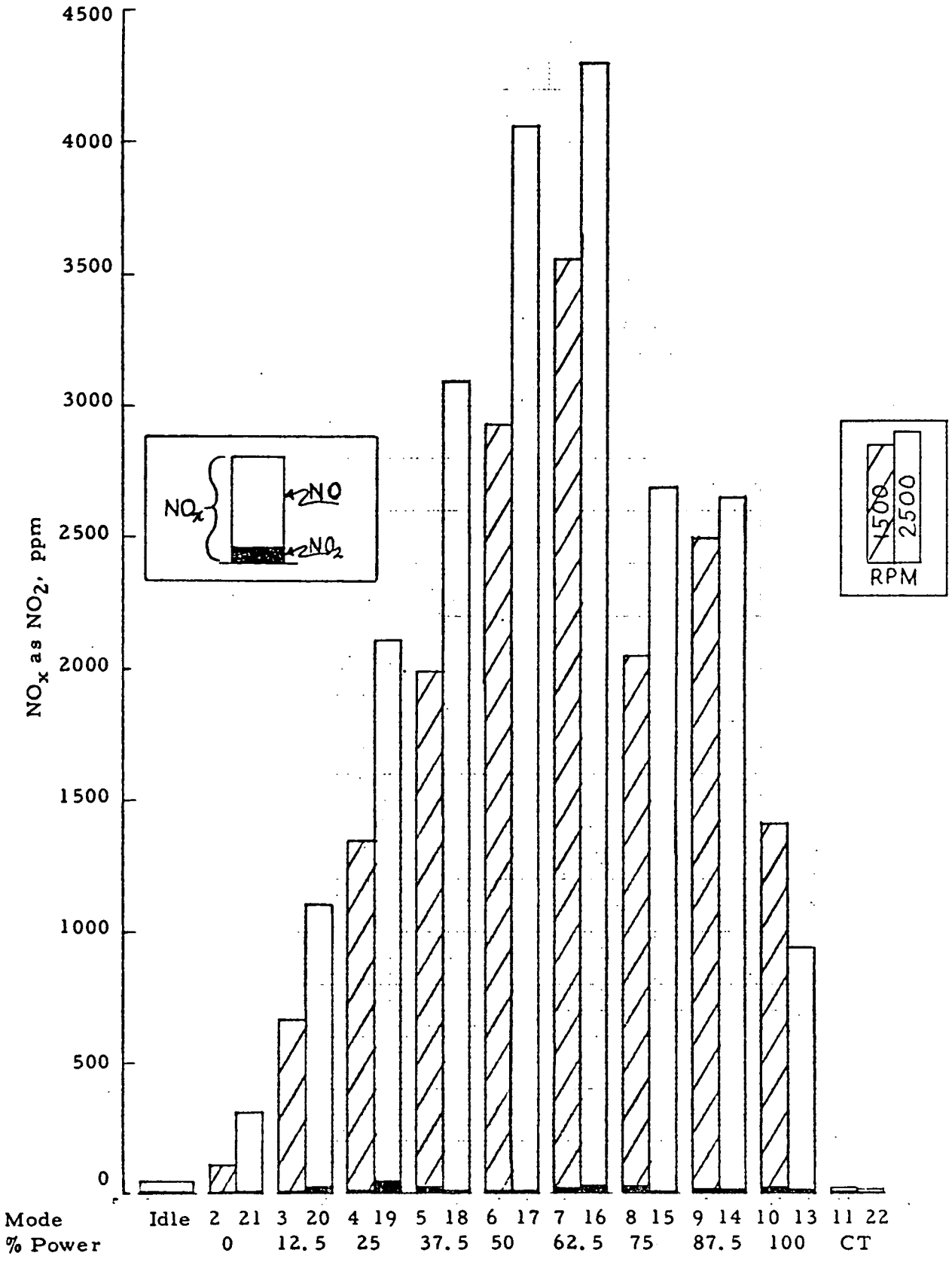

FIGURE K-4. EXPERIMENTAL 23-MODE NO-NO_x
BY CHEMILUMINESCENCE–TRUCK NO. 7

TABLE K-5. OXIDES OF NITROGEN BY NDIR AND CL-23-MODE TEST
TRUCK NO. 8, AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	19	19	23	4	81	25	26	1
2	1500	0	85	103	107	4	169	110	112	2
3	1500	12.5	224	232	237	5	275	187	193	6
4	1500	25	634	598	612	14	539	417	430	13
5	1500	37.5	1296	1181	1188	7	1392	1204	1204	0
6	1500	50	2011	1925	1925	0	2277	2062	2083	21
7	1500	62.5	2615	2450	2475	25	2882	2642	2658	16
8	1500	75	2734	2550	2569	19	3247	3017	3033	26
9	1500	87.5	2843	2700	2725	25	2935	2717	2717	0
10	1500	100	479	381	384	3	614	435	443	8
11	1500	CT	103	4	7	3	152	8	12	4
12	Idle	0	107	26	29	3	170	29	33	4
13	2500	100	753	678	694	16	953	807	819	12
14	2500	87.5	2804	2506	2544	38	3275	3043	3067	24
15	2500	75	3042	2825	2850	25	3501	3333	3383	50
16	2500	62.5	2842	2650	2650	0	3252	2933	2950	17
17	2500	50	2361	2225	2250	25	3064	2517	2533	16
18	2500	37.5	1749	1656	1669	13	1952	1767	1796	29
19	2500	25	1023	975	981	6	1302	108	1104	21
20	2500	12.5	442	438	448	10	544	287	298	11
21	2500	0	164	180	185	5	411	244	249	5
22	2500	CT	13	5	7	2	95	4	6	2
23	Idle	0	32	26	31	5	181	32	36	4

Note: $NO_2 = NO_x - NO$ by chemiluminescence.

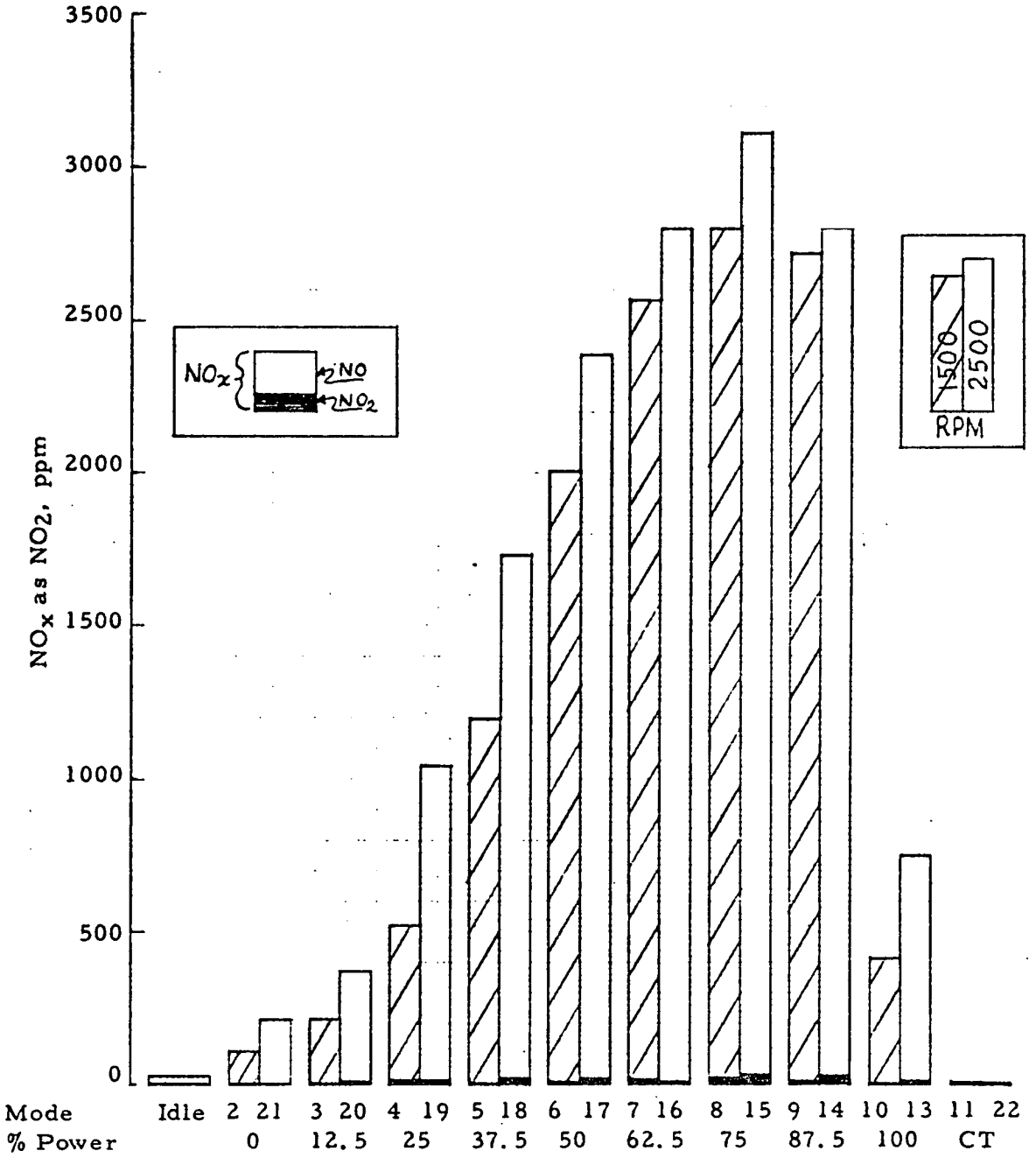

FIGURE K-5. EXPERIMENTAL 23-MODE NO-NO_x
BY CHEMILUMINESCENCE–TRUCK NO. 8

TABLE K-6. OXIDES OF NITROGEN BY NDIR AND CL-23-MODE TEST
TRUCK NO. 9, AVERAGE CONCENTRATIONS

Mode No.	Engine rpm	Power Level %	Stationary Results, ppm				Chassis Results, ppm			
			NDIR	Chemiluminescence			NDIR	Chemiluminescence		
			NO	NO	NO_x	NO_2	NO	NO	NO_x	NO_2
1	Idle	0	47	36	41	5	94	45	49	4
2	1500	0	130	137	143	6	402	321	333	12
3	1500	12.5	899	870	888	18	1188	1022	1043	21
4	1500	25	2497	2329	2396	67	2703	2447	2500	53
5	1500	37.5	3728	3700	3700	0	3502	3433	3450	17
6	1500	50	3857	3850	3850	0	3675	3483	3550	67
7	1500	62.5	3292	3200	3200	0	3204	2967	3000	33
8	1500	75	3108	3017	3067	50	3332	3050	3066	16
9	1500	87.5	3034	2967	2967	0	2982	2627	2627	0
10	1500	100	818	753	770	17	745	467	483	16
11	1500	CT	125	7	10	3	135	9	14	5
12	Idle	0	121	36	43	7	152	48	53	5
13	2500	100	748	775*	800*	25	1165	875	908	33
14	2500	87.5	2841	2604	2642	38	3367	3183	3200	17
15	2500	75	3292	3083	3100	17	3674	3450	3533	83
16	2500	62.5	4147	4400	4400	0	4147	4083	4167	84
17	2500	50	4147	4850	4867	17	4147	4500	4567	67
18	2500	37.5	4147	4667	4667	0	4147	4367	4433	66
19	2500	25	3503	3300	3317	17	3327	3033	3100	67
20	2500	12.5	1968	1733	1750	17	2084	1854	1867	13
21	2500	0	613	447	458	11	753	627	647	20
22	2500	CT	192	6	13	5	84	8	14	6
23	Idle	0	179	36	42	6	131	50	55	5

Note: $NO_2 = NO_x - NO$ by chemiluminescence.

*Values from one run not used in computing averages.

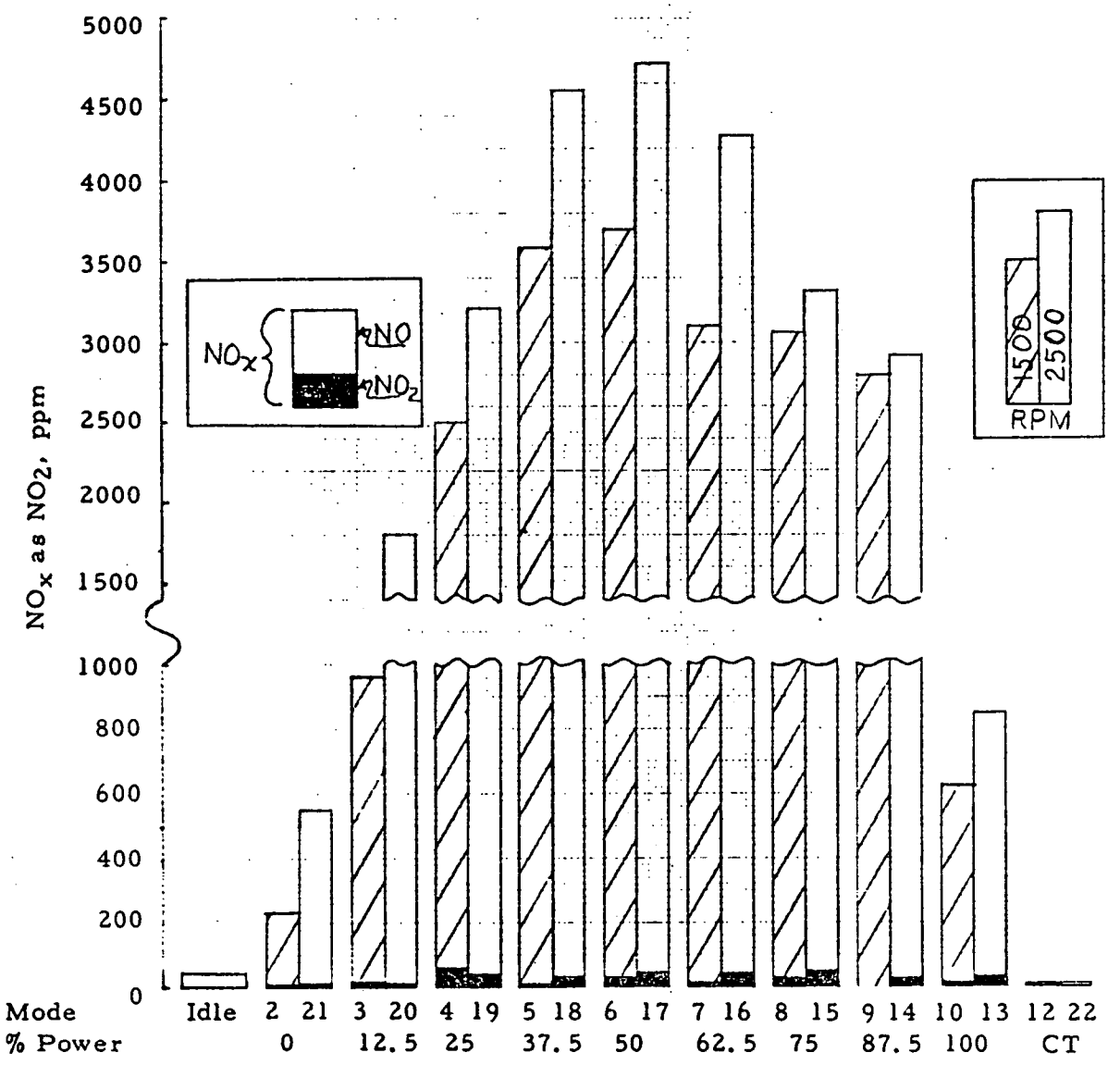

FIGURE K-6. EXPERIMENTAL 23-MODE NO-NO_x
BY CHEMILUMINESCENCE–TRUCK NO. 8

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. APTD-1520	2.	3. RECIPIENT'S ACCESSION NO. PB-220 365
4. TITLE AND SUBTITLE Exhaust Emissions from Gasoline-Powered Vehicles Above 6,000-lb Gross Vehicle Weight		5. REPORT DATE April 1972
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Karl J. Springer and Clifford D. Tyree		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Southwest Research Institute, Post Office Drawer 28510, San Antonio, Texas 78284		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. EHS 70-110
12. SPONSORING AGENCY NAME AND ADDRESS ENVIRONMENTAL PROTECTION AGENCY, Mobile Source Pollution Control Program, Heavy Duty Vehicle Section, Ann Arbor, Michigan 48105		13. TYPE OF REPORT AND PERIOD COVERED Final
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

In an effort to gain knowledge of the fundamental emissions behavior or gasoline engines in HDV applications, a nine-truck evaluation of an experimental 23-mode test procedure was conducted, using both stationary- and chassis-operated engines. The characterization studies determined that power output level consistently influenced all emissions more than any other variable and illustrated the need to measure emissions at increments approaching 10- to 15-percent power intervals. Speed had a relatively minor effect on emission rates. Acceleration at wide open throttle against sizeable inertia produced emissions that were representative of some steady-state conditions, The different road routes, stop-and-go, and slow, intermediate, and high speed had a significant influence on reducing hydrocarbons with increase in engine speed, vehicle speed, and duty (power) level. The opposite trend was found for NO_x with minimum hydrocarbon, CO, and NO_x emissions at constant speed cruise in the neighborhood of 20 to 30 mph. Both stationary and chassis dynamometer versions of the experimental 23-mode test procedure was found to be workable with excellent run-to-run repeatability and satisfactory chassis-to-stationary agreement. The three phases of this project generated a large body of data that is summarized in the report and included in some detail in a number of appendices.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air pollution	Carbon monoxide	Heavy duty vehicles	13B
Gasoline engines	Nitrogen oxide	Road routes	
Emission	Dynamometer	23-mode procedure	
Exhaust emissions	Simulation		
Hydrocarbons	Tests		
	Vehicles		

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