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Technical Report

1972-73 Heavy-Duty Engine Baseline Program and NOx Emission Standard Development

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Zachary Diatchun

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Abstract

The Environmental Protection Agency was mandated by the 1977 Clean Air Act Amendments to determine the statutory NOx emission standard for 1985 heavy-duty engines. The standard was to be based on a 75 percent reduction from the average measured emissions from uncontrolled (1972-73 model year) gasoline-fueled heavy-duty engines.

To establish the amount of NOx emissions from the uncontrolled heavy-duty gasoline-fueled engines, ECTD began a baseline testing program. This program consisted of four sections: 1) engine procurement, 2) restorative maintenance, 3) testing the engine emission levels using the transient test procedure, and 4) determination of the average measured emissions.

Twenty-six engines were tested with 73 valid tests to obtain the average NOx emissions. Based on the results of these emission tests, the average NOx emission level is 6.8 g/BHP-hr. The CAAA of 1977 calls for a 75 percent reduction in NOx emissions as the statutory emission standard; complying with this requirement the 75 percent reduction prescribed yields a heavy-duty engine NOx emission standard of 1.7 g/BHP-hr.

Contributing Authors

The project engineers were Timothy Cox and Glenn Passavant. Special recognition is due Leon Jones and the heavy-duty testing group: Vincent Crowell, Timothy Davis, Stephen Halfyard, Michael Matthews, Lawrence Navarre, and Edson Taylor. Their expertise and daily efforts were instrumental in the successful completion of the baseline program.

Recognition is also due Zachary Diatchun. Using his electronics expertise he made modifications to the EPA transient controller which were instrumental in reducing the void test rate, thus ensuring the timely completion of the baseline program.

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Glossary of Acronyms

A/C	- Advisory Circular
BS	- Brake Specific
BSFC	- Brake Specific Fuel Consumption
CAAA	- Clean Air Act Amendments
CFV	- Constant Flow Venturi
CO	- Carbon Monoxide
CO_2	- Carbon Dioxide
CVS	- Constant Volume Sample
EG&G	- EG&G Automotive Research, San Antonio, Texas
ECTD	- Emission Control Technology Division
EPA	- U.S. Environmental Protection Agency
FTP	- Federal Test Procedure
GVWR	- Gross Vehicle Weight Rating
g/BHP-hr	- Grams per Brake Horsepower per Hour
HC	- Hydrocarbons
HD	- Heavy-Duty
HDV	- Heavy-Duty Vehicle
LDT	- Light-Duty Truck
MVEL	- Motor Vehicle Emissions Laboratory
MVMA	- Motor Vehicle Manufacturers Association
MY	- Model Year
NOx	- Oxides of Nitrogen
OEM	- Original Equipment Manufacturer
OMSAPC	- EPA Office of Mobile Source Air Pollution Control
SCI	- Systems Control, Incorporated, Livonia, Michigan
SI	- Spark Ignition
SwRI	- Southwest Research Institute, San Antonio, Texas

I. Introduction and Background

The 1977 Amendments to the Clean Air Act, Section 202(a)(3)(ii) require that beginning in model year 1985, both gasoline-fueled and diesel heavy-duty engines meet an emission standard for oxides of nitrogen which represents at least a 75 percent reduction "from the average of the actually measured emissions from heavy-duty gasoline-fueled vehicles or engines, [emphasis added] or any class or category thereof, manufactured during the baseline model year." Part (v) of the same subsection goes on to define baseline model year as ". . . the model year immediately preceding the model in which Federal standards applicable to such vehicle or engine, or class or category thereof, first applied with respect to such pollutant."

In order to determine the "baseline" level of NOx emissions--that is, the level which existed before there were Federal regulations for NOx control-- EPA tested engines from two different model years. While the 1973 model year was the last year before Federal NOx regulations were enacted, some manufacturers anticipated the change and voluntarily installed NOx controls on their 1973 models. Therefore, our baseline sample consists of both 1972 and 1973 vehicles and engines, depending on which model year immediately preceded NOx controls on a given engine family.

The goal of this program was to measure the actual NOx emission levels for a predetermined sample of 1972-73 heavy-duty gasoline-fueled engines and sales-weight the results of these tests to determine the average emissions for the 1972-73 model year. To be consistent with the intent of the Act, 1973 model year sales-weightings were used.

This report is divided into two main parts: the text and the appendix. The text of the report discusses the selection and procurement efforts of ECTD and its contractors, as well as the engine preparation and testing programs at EPA/MVEL and Southwest Research Institute. The last section includes a presentation and discussion of the 1972-73 emission data used in determining the 75 percent reduction which is used to determine the statutory NOx emission standard for 1985.

The appendix to this report contains more detailed information on the procurement contracts and specific procurement, inspection, and preparation data for the baseline engines, as well as test data on the baseline engines.

II. Test Program Discussion

A. Vehicle/Engine Selection and Procurement

1. Introduction

ECTD devised a test program for the procurement and testing of twenty-five to thirty 1973 heavy-duty vehicles. The test program

involved both ECTD and three ECTD contractors. They were Systems Control, Inc., of Livonia, Michigan, Southwest Research Institute of San Antonio, Texas, and EG&G Automotive Research of San Antonio, Texas. Procurement of test vehicles was accomplished by ECTD, EG&G, and Systems Control, Inc., while the actual testing of the engines was done by ECTD and Southwest Research Institute. These next sections describe the selection and procurement activities of ECTD, EG&G, and SCI in obtaining the heavy-duty test engines for the NOx baseline. Section two details how ECTD determined what vehicles/engines to procure and test. Section three describes the selection criteria used and the selection process. Section four describes the procurement actions used to obtain test vehicles. Section five contains a discussion of the baseline vehicle procurement problems encountered. The last section summarizes the procurement activities and provides the results of vehicle procurement.

2. 1973 Sales Data and Sampling Plan

ECTD's first step in beginning a test program for determining the baseline NOx emission levels of 1973 heavy-duty gasoline engines was to decide which 1973 heavy-duty engines should be tested. To do this it was necessary to collect the engine sales data for each manufacturers 1973 model year sales. This sales data, shown in Table II-A-1, was supplied by the vehicle/engine manufacturers and MVMA at the request of ECTD, beginning in October 1977. The market shares for each of the manufacturers engine lines were determined from this data.

Using this sales information, a sampling plan was constructed to determine which engines, and how many of each engine line, would be statistically desirable if twenty-five to thirty engines were tested. The sampling plan shown in Table II-A-2 was constructed by multiplying the market percentage of each engine by thirty and then using the integer range around that number. For example, the market percentage of the GM 350-4 is 10.67 percent and (0.1067) x (30) = 3.20. Therefore, three to four, GM 350-4 engines are desired for the sample. The sample was further constrained by limiting the total number of engines tested for a manufacturer to the manufacturers share of the sample, (shown in Table II-A-2 as the total engines required for a manufacturer).

Having finalized the sampling plan, the next step was to determine the means by which the desired engines could be procured for testing. Two methods for procuring engines were considered when ECTD began to formulate a test program in the fall of 1977 for the 1969 heavy-duty HC and CO baseline and the 1973 heavy-duty NOx baseline. Engines could be supplied by the manufacturers or obtained from in-use vehicles. The manufacturer supplied engines would have been new non-production engines built as near to 1969 and 1973 specifications as possible. However, there was no guarantee that these engines would have been close enough to 1969 and 1973 specifications to make them acceptable. Due to the non-

Table II-A-1

Heavy-Duty Vehicle 1973 Sales Data

Manufacturer	Engine	Unit Sales	% of Market	NOx Control	Engine Sold in Both LDT and HDV
Chrysler	225	1,000	0.24	No	Yes
	318	3,000	0.71	No	Yes
	360	1,000	0.24	No	Yes
	361	3,500	0.83	No	No
	413	14,500	3.42	No	No
	400	2,000	0.47	Yes	Yes
	440	24,000	5.67	Yes	No
		49,000			
Ford	300	9,100	2.15	Yes	Yes
	360	32,000	7.56	Yes	Yes
	390	17,900	4.23	Yes	Yes
	460	1,500	0.35	Yes	Yes
	330	33,400	7.89	Yes	No
	361	31,800	7.51	Yes	No
	391	12,800	3.02	Yes	No
	477	2,400	0.57	Yes	No
	534	2,300	0.54	Yes	No
		143,200			
GM	350-4	45,200	10.67	Yes	Yes
	350-2	50,900	12.02	Yes	No
	292	4,000	0.94	No	Yes
	454	11,200	2.64	No	Yes
	366	32,000	7.56	No	No
	427	13,500	3.19	No	No
		156,800			
IH	304	3,100	0.73	No	Yes
	345	38,200	9.02	No	Yes
	392	19,200	4.53	Yes	Yes
	478	3,000	0.71	Yes	No
	549	1,500	0.35	No	No
		65,000			
Other mfgs.		9,500	2.24		
Market Total		423,500	100%		

Table II-A-2

Heavy-Duty Sampling Plan

Manufacturer	Engine	% of Market	Model Year	Sampling Target Range (30 Vehicle Sample)
Chrysler	440	5.67	72	1-2
(11.58%)	413	3.42	73	1-2
(total	361	0.83	73	0-1
required = 4)	318	0.71	73	0-1
	400	0.47	72	0-1
	360	0.24	73	0-1
	225	0.24	73	0-1
Ford	330	7.89	72	2-3
(33.82%)	360	7.56	72	2-3
(total	361	7.51	72	2-3
required = 10)	390	4.23	72	1-2
	391	3.02	72	0-1
	300	2.15	72	0-1
	477	0.57	72	0-1
	534	0.54	72	0-1
	460	0.35	72	0-1
GM	350-2	12.02	72	3-4
(37.02%)	350-4	10.67	72	3-4
(total	366	7.56	73	2-3
required = 11)	427	3.19	73	0-1
	454	2.64	73	0-1
	292	0.94	73	0-1
IH	345	9.02	73	2-3
(15.34%)	392	4.53	72	1-2
(total	304	0.73	73	0-1
required = 5)	478	0.71	72	0-1
	549	0.35	73	0-1
Total		97.76%		30 vehicles

availability of some original equipment carburetors and distributors it was unlikely that the 1969 and 1973 specifications could have been met, especially by all four manufacturers on all engine lines. This alternative was rejected by OMSAPC for the reasons cited above and for another important reason. EPA interpreted the provisions of the 1977 Clean Air Act Amendments to mean actual production engines should be tested and not new engines built to 1969 and 1973 specifications.

To comply with this interpretation of Congressional intent, a program was undertaken to procure actual in-use 1969 and 1973 heavy-duty engines. The 1969 engines were procured and tested to establish the HC and CO baseline. This program is reported in another SDSB Technical Report entitled "1969 Heavy-Duty Engine Program and 1983 Emission Standards Development" dated May, 1979.1/ The engines sought for the baseline were selected based on overall engine operating condition and closeness to OEM configurations but not on vehicle body type, function, or usage pattern. It should be noted that some 1973 heavy-duty vehicles which were sold nationwide did have NOx controlled engines. EPA made the decision in March 1979, (See EPA letter to MVMA in Appendix) that in those instances where a 1973 engine did have NOx control, then an equivalent 1972 engine (absent the NOx control) would be substituted. Those 1973 engines which were NOx controlled are shown in Table II-A-1. In those cases, a 1972 model year engine was procured and tested instead of the 1973 engine.

3. Selection Criteria and Selection Process

EPA and SCI had the task of procuring 1972-73 heavy-duty vehicles (GVWR over 8,500 lbs.) while EG&G, to establish a LDT NOx baseline, had the task of procuring 1972-73 light-duty trucks with GVWRs of 6,001-8,500 lbs. The connection between these two procurements is that some of the engine lines were sold in both heavy-duty vehicles and light-duty trucks. This is shown in Table II-A-1. This fact allowed EPA to supplement the procurement of heavy-duty engines with engines obtained from light-duty trucks. These light-duty truck engines were identical to engines sold in heavy-duty trucks. EPA had used 1969 light-duty truck engines to supplement the 1969 heavy-duty HC and CO baseline and continued this practice for the 1972-73 heavy-duty NOx baseline.

EPA and SCI used the following criteria to identify potential heavy-duty baseline engines:

1) All engines must be 1972-73 model year and should be installed in a vehicle registered as a 1972-73 model year vehicle with a GVWR greater than 8,500 lbs.

2) The test engines must be in good operating condition, must be in their original configuration (i.e., must have original carburetor, distributor, and engine block), must not exhibit evidence of excessive oil consumption, and should not have been subjected to more than 80,000 miles of operation.

3) The engine's original carburetion and ignition system should not have been modified from OEM specifications.

4) The engines shall not have received a major overhaul (i.e., valve grind, valve replacement, or compression ring replacement).

The engine selection process used by ECTD and its contractor, SCI, consisted of three main parts: initial screening, physical inspection, and diagnostic evaluation. Initial screening, usually by telephone, consisted of questioning the vehicle owners as to the vehicle make and GVWR, mileage, engine displacement, past maintenance history, and general operating condition of the engine. If maintenance records were available, the owners were requested to supply copies of these records, or at a minimum, allow inspection of these records.

Vehicles which passed the initial screening process were then inspected by a mechanic to verify the initial screening information and record any pertinent information. The engine was started and observed for proper operation in an attempt to eliminate engines with obvious problems. A compression check was done on many engines at this point. Finally, the distributor and carburetor found on the engine were verified as original and proper by using part numbers. This was accomplished either through direct communication with the manufacturer, or by using service manuals. If, at this point, all of the selection criteria were met, the vehicle was procured by lease, loan, or outright purchase.

The final step in the selection process was a major diagnostic evaluation and tune-up of the engine. During this final phase, the engines were cleaned and given a compression check if this had not been done earlier. Included in the engine diagnosis was an evaluation of the ignition system, spark plug checks, fluid level check, compression check, etc. The engines also received a tune-up in which the ignition wires, spark plugs, PCV valve, belts, and hoses were replaced. The rotor, points, condensor and cap were replaced and the oil, oil filter, gas filter, and air filter were changed. In addition, any other part considered defective was replaced. Manufacturers' service manuals were used to obtain engine tune-up specifications and in some cases the manufacturers provided these tune-up specifications.

EG&G selection criteria for light-duty trucks were the same as for heavy-duty vehicles except that the GVWR reuqirements were 6,001 to 8,500 lbs. rather than 8,500 lbs. and above.

The vehicle selection process EG&G used was basically the same as that used by SCI. The only difference was that after a vehicle was determined to be acceptable, rather than buying the vehicle directly as was the case for SCI, EG&G had a lease agent purchase the vehicle. EG&G then leased the vehicle for a set fee for a period of one year. Upon completion of all testing the vehicles

were returned to the lease agent, Jack King Leasing, 5625 San Pedro Street, San Antonio, TX.

It should be noted that all light-duty truck engines furnished by EG&G for testing in the heavy-duty baseline were given the same pre-test inspection and maintenance at EPA and SwRI as were the regular heavy-duty engines. All maintenance performed on the baseline engines before testing at EPA and SwRI is summarized in Table II-A-3. Maintenance performed at EG&G is included in this table.

4. Procurement Actions

Several procurement actions were instituted to obtain the 26 baseline engines shown in Table II-A-4. These consisted of actions by ECTD and ECTD's authorized contractors, SCI and EG&G. In September, 1977, Systems Control, Inc. was awarded EPA Contract No. 68-03-2715, Procurement of Heavy-Duty Vehicles and Preparation of Engines for Baseline Emissions Testing. The major purpose of this contract was to procure both 1969 and 1972-73 heavy-duty vehicles, tune the engines from these vehicles, remove the engines from these vehicles and finally, to prepare them for testing on an engine dynamometer. As regards the 1972-73 portion of this contract, SCI was contracted to buy 15 1972-73 vehicles.

These vehicles were to be tuned-up and driven to SwRI in San Antonio, Texas for emission testing. Ten heavy-duty vehicles, identified by EPA, were to have the engines removed by SCI and prepared for emission testing at MVEL. Work on this contract was completed as of January 31, 1980. As a result of ECTD's and SCI's efforts the following 15 engines were procured and included in the 1972-73 NOx baseline:

Engine	Baseline Number
IHC 345	BLE-4
IHC 345	BLE-8
IHC 345	SwRI-19
IHC 392	BLE-17
Dodge 413	SwRI-15
Ford 330	BLE-1
Ford 361	BLE-2
Ford 361	SwRI-14
Ford 300	SwRI-20
Chev 350-2	BLE-18
Chev 350-2	BLE-21
Chev 350-4	SwRI-18
Chev 350-2	BLE-3
GMC 427	SwRI-17
Chev 454	SwRI-16

Engines identified with a BLE prefix test number were tested at MVEL, while engines identified with an SwRI prefix were tested at SwRI.

Table II-A-3

Baseline Engine Maintenance Summary

Engine #/Model	Pretesting Restorative Maintenance
EPA-1 Ford 330	Major tune-up.*
EPA-2 Ford 361	Major tune-up.
EPA-3 GM 350-2	Major tune-up, both exhaust manifolds replaced, and distributor, starter solenoid and ignition coil replaced.
EPA-4 IHC 345	Major tune-up.
EPA-5 Ford 360	Major tune-up, timing chain and cam gear replaced, carburetor rebuilt and power valve and vacuum choke diaphram replaced; (Vacuum advance diaphram replaced by EG&G).
EPA-7 Chrysler 318	Major tune-up, timing chain and cam gear replaced, electronic ignition control unit, choke thermostatic spring unit, vacuum advance and carburetor base gasket replaced and a rebuilt distributor installed; carburetor and right exhaust manifold replaced by EG&G).
EPA-8 IHC 345	Major tune-up, governor repaired vacuum advance and manifold gasket replaced and carburetor rebuilt.
EPA-9 GM 292	Major tune-up, rocker cover gasket and intake and exhaust manifold gaskets replaced, (carburetor and distributor replaced by EG&G.
EPA-10 Chrysler 360	Major tune-up and distributor and electronic control module, (ignition ballast resistor replaced by EG&G).
EPA-11 GM 350-4	Major tune-up, (carburetor replaced by EG&G). .
EPA-12 GM 350-4	Major tune-up and water pump replaced.
EPA-13 GM 350-4	Major tune-up, carburetor rebuilt and mechanical advance modified.

Table II-A-3 (cont'd)

EPA-14 Ford 390	Major tune-up, timing chain and cam gear and water pump and fuel pump replaced, (carburetor rebuilt by EG&G).
EPA-16 GM 350-4	Major tune-up, timing chain and cam gear and oil pan replaced.
EPA-17 IHC 392	Major tune-up, water pump, governor and accelerator pump diaphragm replaced and carburetor rebuilt.
EPA-18 GM 350-2	Major tune-up.
EPA-19 Ford 390	Major tune-up, timing chaing, cam gear, oil pump, power valve take-off and #3 valve lifter on liftbank replaced , (starter, distributor, fuel pump and alternator belt replaced and carburetor rebuilt by EG&G).
EPA-21 GM 350-2	Major tune-up.
SwRI-1 Ford 361	Major tune-up.
SwRI-2 Chrysler 413	Major tune-up and fuel pump replaced.
SwRI-3 GM 454-4	Major tune-up and carburetor distributor, intake manifold and intake valve on cylinder #6 replaced.
SwRI-4 GM 350-4	Major tune-up.
SwRI-5 IHC 345	Major tune-up and carburetor replaced.
SwRI-6 Ford 300	Major tune-up and carburetor and distributor replaced.
SwRI-7 GM 427	Major tune-up, distributor, governor and intake and exhaust valve.
SwRI-8 IHC 304	Major tune-up and carburetor rebuilt, (vacuum advance unit replaced by EG&G).

* A major tune-up is defined as replacement and/or adjustment of spark plugs, ignition wires, thermostat, distributor cap, points, rotor, condenser, PCV valve, air filter, fuel filter, oil filter and oil change. Other adjustments included timing, carburetor idle, valve clearances, cylinder power balancing, and mechanical and vaccum advance curves to OEM specifications.

Table II-A-4

	Engine	Model Year	Baseline Number	Mileage	Model Number	Body Type	Source	Procurement Method & Date	Disposition of Test Engine/Veh.
1.	IHC 345	73	BLE-4	91,506	1703H	School bus	Alpena MI Sch. (loan)(MI)	SCI 7-23-79	Storage at EPA
2.	IHC 345	73	BLE-8	82,981	1700	Van	Willett Nat'l Leasing, Chicago (IL)	SCI 9-7-79	Engine purchased by IHC
3.	IHC 345	73	SwRI-19	63,690	1600	Van	FJK Auto Parts (MI)	SCI 1-9-79	Storage at EPA
4.	IHC 392	72	BLE-17	122,406	1700	School bus	Stockbridge Sch. (MI)	SCI 11-15-79	Storage at EPA
5.	IHC 304	73	SwRI-21	37,601	1210	Pick-up	Bruno's Auto Mart (TX)	EG&G #611 4-10-79	Returned to lease agent
6.	Dodge 318	7[illegible]	BLE-7	68,094	D-200	Pick-up	Herb's Used Cars (TX)	EG&G #605 3-8-79	Returned to lease agent
7.	Dodge 360	73	BLE-10	42,696	D-200	Pick-up	A. Smith (TX)	EG&G #486 1-15-79	Returned to lease agent
8.	Dodge 413	73	SwRI-15	56,168	M-300	Concord Motor Home	R. Brown (MI)	SCI 4-30-79	Storage at EPA
9.	Ford 330	72	BLE-1	35,050	F-500	Stake truck	Clarence Landry (lease)(MI)	SCI 4-25-79	Returned to owner
10.	Ford 360	72	BLE-5	71,297	F-250	Pick-up	S. Forster (TX)	EG&G #620 5-3-79	Returned to lease agent
11.	Ford 361	72	BLE-2	93,202	F-750	School bus	Ann Arbor Sch. (loan)(MI)	SCI 7-16-79	Returned to Ann Arbor Sch.
12.	Ford 361	72	SwRI-14	17,278	F-600	Stake truck	E & M Motor Sales (MI)	SCI 5-17-79	Storage at EPA
13.	Ford 300	72	SwRI-20	94,587	F-600	Stake truck	Claude Forget (MI)	SCI 7-10-79	Storage at EPA
14.	Ford 390	72	BLE-14	79,116	F-250	Pick-up	C. Valentine (TX)	EG&G #635 6-18-79	Returned to lease agent
15.	Ford 390	72	BLE-19	92,094	F-250	Pick-up	M. McAdams (TX)	EG&G #640 9-13-79	Returned to lease agent
16.	Chev 292	73	BLE-9	48,484	C-20	Pick-up	S.R. Sigler (TX)	EG&G #628 6-8-79	Returned to lease agent
17.	Chev 350-4	72	BLE-11	91,098	C-20	Pick-up	Bill Crouch Chrysler, Englewood (CO)	EG&G #631 6-7-80	Returned to lease agent
18.	Chev 350-4	72	BLE-12	77,096	C-20	Pick-up	C. Dake (TX)	EG&G #642 10-11-79	Returned to lease agent
19.	Chev 350-4	72	BLE-13	99,861	C-20	Pick-up	Braden Oil Co. (TX)	EG&G #634 6-12-79	Returned to lease agent
20.	Chev 350-4	72	BLE-16	84,080	C-20	Pick-up	E. Trainor (TX)	EG&G #629 6-8-79	Returned to lease agent
21.	Chev 350-2	72	BLE-18	51,681	C-50	School bus	Vasser Sch. (loan)(MI)	SCI 11-26-79	Storage at EPA
22.	Chev 350-2	72	BLE-21	49,511	C-50	School bus	Vasser Sch. (loan)(MI)	SCI 12-12-79	Storage at EPA
23.	Chev 350-4	72	SwRI-18	22,039	P-Ser .	Step van	State of MI (MI)	SCI 4-23-79	Damaged during theft attempt. Storage at EPA.
24.	Chev 350-2	72	BLE-3	98,181	C-40	Van	E & M Motors (MI)	SCI 5-17-79	Storage at EPA
25.	GMC 427	73	SwRI-17	98,739	6500	Van	GMC Detroit Truck Center (MI)	SCI 7-25-79	Engine destroyed while on loan to GM.
26.	Chev 454	73	SwRI-16	35,810	C-30	Van	R. Purdy (MI)	SCI 4-30-79	Storage at EPA

Average Mileage = 69,398

The second procurement action was with EG&G Automotive Research, Inc. of San Antonio, Texas. On July 26, 1978, Contract No. 68-03-2683, Baseline Characterization of Emissions from Medium-Duty Gasoline Vehicles Tested on a Chassis Dynamometer, was awarded to EG&G. The primary purpose of this contract was to procure 1969 and 1972-73 light-duty trucks (LDTs) in the 6,001 to 8,500 pound GVWR range and test them for emissions on a chassis dynamometer. These vehicle emissions tests were used to establish the light-duty truck HC, CO and NOx baselines necessary for setting the revised HC, CO, and NOx emission standards for light-duty trucks. EG&G procured 21 1969 LDTs and 25 1972-73 LDTs to establish these baselines previously mentioned.

EG&G's work for this contract is detailed in the contract final report, (EPA-460/3-80-011) entitled "Procurement and Emissions Testing of 1969 and 1972/73 Model Year Gasoline-Powered Light-Duty Trucks, (6,001-8,500 lbs. GVWR)."2/ EG&G completed all work for this contract in November, 1980.

As part of the control work requirements EG&G was directed to remove the engines from some of the LDTs, and mount them on engine test stands so that they could be tested at MVEL or SwRI. The specific engines to be tested as part of the heavy-duty baseline program were chosen by the ECTD Project Officer. Consideration was given to selecting the engines in the best overall mechanical condition.

In all, 11 engines from these 1972-73 LDTs were tested for inclusion in the 1972-73 heavy-duty NOx baseline program. These engines are listed below:

Engine	Baseline Number	EG&G Vehicle Number
IHC 304	SwRI-21	611
Dodge 318	BLE-7	605
Dodge 360	BLE-10	486
Ford 360	BLE-5	620
Ford 390	BLE-14	635
Ford 390	BLE-19	640
Chev 292	BLE- 9	628
Chev 350-4	BLE-11	631
Chev 350-4	BLE-12	642
Chev 350-4	BLE-13	634
Chev 350-4	BLE-16	629

5. Problems Encountered

ECTD and its contractors made every effort to procure engines which met the selection criteria. However, for some engines all the selection criteria were not met. Due to time, budget, engine availability, and sampling plan constraints, ECTD found it neces-

sary to accept engines which had accumulated more than 80,000 miles or required component replacement, or required more extensive maintenance to bring them back to OEM configuration, (see Table II-A-3). Also, the carburetors or distributors on some engines either were replaced by new original equipment parts supplied by the manufacturers or rebuilt to bring their performance characteristics back to manufacturers specifications.

It should be noted that the first priority was given to obtaining engines from heavy-duty vehicles. However, when procurement of a particular engine was lagging, an engine from a light-duty truck which had been leased by EG&G was chosen for the heavy-duty baseline.

6. Result of Procurement Actions

ECTD's goal for this procurement task was to procure 25 to 30 1972-73 heavy-duty engines, in good mechanical condition, that would be representative of 1973 heavy-duty gasoline production engines. This goal was met satisfactorily. The 26 baseline engines shown in Table II-A-4 are the result of the procurement program. These engines represent 77 percent of the total 1973 gasoline heavy-duty sales and as shown in Table II-A-5 represent a close adherence to the original sampling plan.

These baseline engines are a representative sample. For example, the engines were obtained in four different geographic areas (Michigan, Texas, Illinois, and Colorado) and were taken from actual in-use vehicles. The average mileage accumulation was 69,398 miles and ranged from a low of 17,278 miles to a high of 122,406 miles. Finally, every effort was made to bring these engines to as close to original configuration as possible through pre-test maintenance and engine specification checks.

B. Engine Testing

1. Test Sites

The 1972-73 heavy-duty NOx baseline testing program was undertaken primarily at EPA's Motor Vehicle Emissions Laboratory in Ann Arbor, MI. Twenty-six engines were tested over the course of eighteen months; eighteen were tested on one of ECTD's two transient dynamometers; the remaining eight engines were tested under contract by the Southwest Research Institute (SwRI) in San Antonio, TX.

ECTD testing utilized two test cells, which are adjacent but separated by a twelve-foot-wide motor generator room. Each test cell utilized its own double-ended dynamometer, water coolant system, instrumentation, and ambient air handling-humidity conditioning systems. Both cells were controlled by a single computer, and emissions were measured using the same CFV/CVS unit.

Table II-A-5

Actual Vehicles Tested vs. Sampling Plan

Manufacturer	Engine	% of Market	Sampling Target Range	Actual Engines Tested
Chrysler	440	5.67	1-2	
(11.58%)	413	3.42	1-2	1
(total	361	0.83	0-1	
required = 4)	318	0.71	0-1	1
	400	0.47	0-1	
	360	0.24	0-1	1
	225	0.24	0-1	
Ford	330	7.89	2-3	1
(33.82%)	360	7.56	2-3	1
(total	361	7.51	2-3	2
required = 10)	390	4.23	1-2	2
	391	3.02	0-1	
	300	2.15	0-1	1
	477	0.57	0-1	
	534	0.54	0-1	
	460	0.35	0-1	
GM	350-2	12.02	3-4	3
(37.02%)	350-4	10.67	3-4	5
(total	366	7.56	2-3	
required = 11)	427	3.19	0-1	1
	454	2.64	0-1	1
	292	0.94	0-1	1
IH	345	9.02	2-3	3
(15.34%)	392	4.53	1-2	1
(total	304	0.73	0-1	1
required = 5)	478	0.71	0-1	
	549	0.35	0-1	

Total required = 30 Total tested = 26

% of total heavy-duty sales represented by 26 vehicles tested = 77.45%.

Under contract by ECTD, SwRI developed for the 1969 heavy-duty engine baseline program, engine dynamometer test cells capable of transient operation. This transient capability was utilized for this 1972-73 NOx baseline program.

2. Test Procedure

Testing for the 1972-73 baseline program involved three separate test procedures; the transient test procedure (Reference 40 CFR, Part 86, Subpart N), the 9-mode FTP (Reference 40 CFR, Part 86, Subpart D), and an idle test procedure (Reference 40 CFR, Part 86, Subpart P). At least two valid tests for each test procedure were desired for each engine with the exception of engines tested at SwRI. No idle mode tests were conducted on engines tested at SwRI.

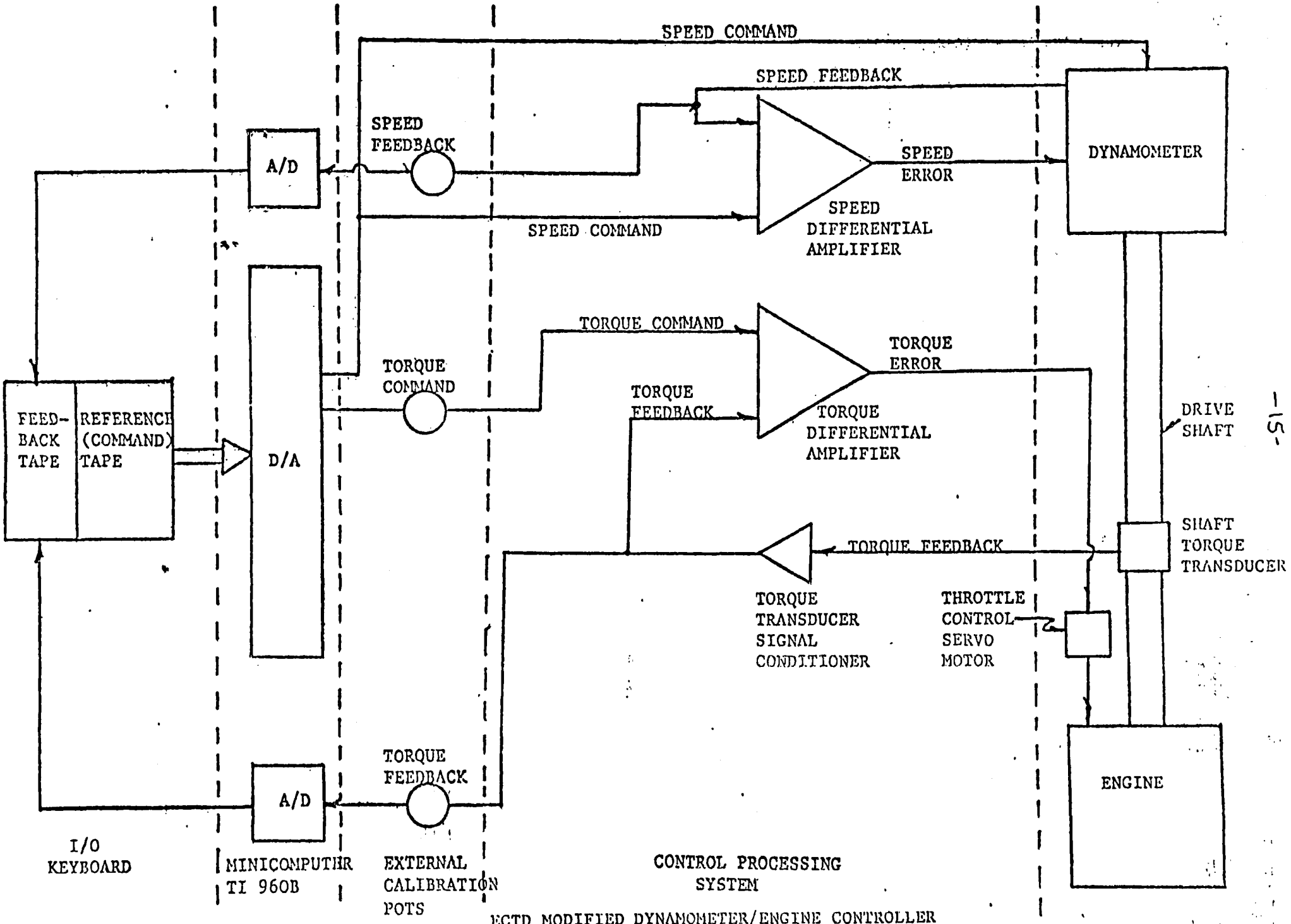
3. Transient Engine Dynamometer Control System

The transient control system used in the baseline program was a digital/analog hybrid, employing closed-loop analog speed control and closed-loop analog torque control, (see Figure 1). A digital cassette recorder served as a source of continual command signals, and also recorded speed/load feedback signals from the engine on a separate cassette tape. The digital command signals from the cassette keyboard were converted to analog control voltages within a Texas Instruments 960B Computer. The TI 960B was programmed for several tasks, the most important of which were transient engine control for emission testing (Task D), and manual steady-state engine control through the keyboard for system calibration (Task A). The analog control circuitry and the digital/analog interfacing were designed by Labeco, Inc. of Mooresville, Indiana.

Test cell hardware included General Electric motoring dynamometers and their associated G.E. control circuitry, which comprised the major portion of the speed loop of the control system. The speed control circuitry, was a simple closed-loop system employing proportional control (i.e., dynamometer speed was a linear function of command voltage), with a proportional feedback loop allowing for the generation of compensatory error voltages.

The torque control circuitry was similar in strategy to the speed control circuitry, i.e., both were error-based systems. Actual engine load was measured by a torque meter (torsional strain gauge type with slip rings) mounted in line in the driveshaft between dynamometer and engine.

Calibration of the system consisted of operating the engine in a task A mode, calibrating the feedback levels and then the throttle input circuits through typed in commands at the computer keyboard. The throttle control circuitry had three calibration controls: 1) "gain adjust" for torque command/feedback resolution, 2) "zero adjust" to set the zero point and, 3) "rate adjust" for



ECTD MODIFIED DYNAMOMETER/ENGINE CONTROLLER

FIGURE 1

overshoot control on large error signals. Specific calibration settings were unique to each engine (reflecting unique throttle/load characteristics and varying impedances between the test cells.) At any given time during production testing, one calibrated engine was present in each test cell, allowing two cold start transient tests per day. (The remaining space in each cell was reserved for engine buildup and preparation). Calibration settings for each engine were recorded to alleviate the need for recalibration when automatic control was switched from one cell to the other.

Following calibration, the engine was mapped under automatic control and a transient cycle command tape was generated. This tape controlled the engine throughout the transient test; feedback data for cycle performance statistical validation were recorded on a separate tape and analyzed after the test.

The transient test began by manually cranking the engine with the starter motor (dynamometer off). Emission sampling began simultaneously with cranking. Upon ignition, the operator was permitted to manipulate the throttle as necessary to preclude stalling. If stalling did occur, or the engine refused to start the contingency procedure was followed. Between ignition and fifteen seconds into the test, the dynamometer, preset to run at engine idle speed, was engaged. Fifteen seconds into the test (referred to as "lag" time), the computer took control of the engine. The first non-idle point in the test occurred at the twenty-four second mark and the transient portion of the cycle began. At the conclusion of the cold cycle the computer automatically returned control to the operator console, at which point the engine was shut down for the soak period. The hot cycle procedure was identical to the cold. (The emissions were sampled according to the schedule presented in Table II-B-1.)

During the analysis of the transient feedback tape, 9-mode and idle testing were performed under completely manual control. Following final validation of all test results, the engine was removed from the test cell.

Throughout the baseline program the engines were run in "speed control" mode, as described above. This was in contrast to "torque control" mode, in which the dynamometer directly controlled engine torque, while the throttle control equipment controlled engine speed. The ECTD system was capable of operating in either mode, and early in the baseline program, controller performance in each mode was analyzed. Based upon the high void rates associated with "torque control" mode due to the lack of cold engine driveability in the early moments of a cold start (resulting in stalled engines and voided tests) the decision was made to operate in "speed control" for the baseline program. The dynamometer controlled engine speed during momentary stumbles at the cold start, precluding stalling of the engine and substantially reducing the likelihood of a void test.

Table II-B-1

Transient Emission
Sampling Schedule (Cold Cycle) 1/

Time After Ignition (seconds)	Event
	- Cranking of engine/begin bag 1 sampling
0	- Ignition (times started)
1 - 14	- Dynamometer engaged
15	- Automatic control engaged
25	- First non-idle cycle command
272	- Bag 1 ends/bag 2 begins
579	- Bag 2 ends/bag 3 begins
895	- Bag 3 ends/bag 4 begins
1167	- Bag 4 ends
1169 ±2	- Computer to manual mode
	- Engine off - 20 minute soak begins

1/ Hot cycle is identical, following twenty-minute soak.

When compared to the SwRI control system the ECTD control system differed in support instrumentation. The basic control system technology technique was similar. SwRI, also ran in the speed control mode.

The error-based throttle control strategy of the ECTD system was implemented during the initial tests conducted for the 1972-73 baseline emission levels. Previously (the 1969 baseline) a preposition throttle control system was used, but due to the calibration difficulty experienced and inability to comply with the regression statistics, the system was modified to an error-based system. The error-based system proved to be a substantial improvement over the old preposition system with the statistical void rate decreasing from 40 percent (1969 baseline) to 15 percent (1972-73 baseline void rates after new system implementation).

4. Engine Preparation and Instrumentation

Engines tested at MVEL arrived from two sources: private contractors and in-house procurements. Engines obtained through in-house procurements were removed from the vehicles and mounted upon test stands; those engines originating from contractors arrived in test-ready configuration. In both cases, the engines were set up for testing according to MSAPC Advisory Circular No. 22A (April 3, 1973).3/

The standard engine test configuration consisted of the engine's flywheel bolted to a torquemeter-equipped rubber-softened 4/ driveshaft (Dana-Spicer) coupled to the dynamometer. The engine was isolated from its mountings by shock-absorbing rubber mounts (usually OEM vehicle mounts). The throttle actuator stands were bolted to the dynamometer bed plate and to the engine itself by means of a rigid cross bar. (Accurate transient control of the throttle was difficult unless the actuator motor and the engine were rigidly fixed to one another.) The throttle servo motors were clutch driven with internal position feedback potentiometers. The actuator arms were connected to the throttle linkages by either ball chain or wire cable such that full travel of the actuator arm (approximately 60°) resulted in wide-open throttle.

The engine coolant water was circulated through a heat-exchanging water cooling system; the system temperature control was set such that coolant water to the engine was a minimum of 20°F below engine thermostat temperature. A portable fan was directed at the front of the engine during the test, but was shut off during the hot soak periods.

Exact duplication of the in-vehicle exhaust system involved practical difficulties arising from the location of the dynamometer. Where necessary, the standard exhaust systems were bent to clear the dyno and other obstructions (e.g., the control instrumentation boom). Bends were kept to a minimum to eliminate back-pressure variations. Marmon flanges were welded to the end of the

exhaust system for attachment of flexible convoluted piping for transport of the raw exhaust to the CVS inlet, to which the piping was rigidly attached. Inlet depression at the CVS was kept within prescribed specifications.

In addition to the tune-ups performed by the procurement contractor, all engines were tuned and adjusted by ECTD personnel to manufacturer's recommended specifications prior to mapping and testing. The tune-up specifications used were those published in the manufacturer's applicable service manuals or obtained directly from the manufacturers. In the interest of accuracy, a number of carburetors and distributors were checked and adjusted by the manufacturers at their own facilities. Every attempt was made to meet the recommended specifications, and this was accomplished in the vast majority of cases. Three engines which were procured but could not be brought to manufacturer specifications were ultimately dropped from the baseline program.

The tune-up procedure involved verification of engine performance. Distributor advance curves and dwell variation were checked on an Allen distributor tester (distributor removed from the engine). With the engine running on the dynamometer, a Sun Model 2001 engine performance tester was used to check mechanical and vacuum advance curves and dwell variations. The same instrument was used in the adjustment of idle HC and CO, along with the carburetor/cylinder balancing adjustment and the carburetor power valve check.

After all mechanical specifications were checked, calibration of the engine/control system was performed, and the engine mapping procedure began.

A summary of the equipment used is presented in Table II-B-2.

5. Emission Sampling System

Emissions were sampled using the CFV-CVS bag technique. Dilution factors for the transient and 9-mode FTP's were determined using an average air/fuel ratio of 13.4, dilution factor for the idle test by using a raw CO_2 analyzer. (The calculations were performed according to the appropriate Federal Register).

Sample bags were analyzed at an analyzer site using the following equipment:

Gas	Instrument	EPA No.
HC	Beckman Model 400 (40% H_2/60% He Fuel)	086985
CO(0-1000 ppm)	Bendix Model 8501-5MB	109724

Table II-B-2

Instrumentation Summary

Instrument	Purpose/Specifications
General Electric Direct Current Dynamometer	Absorbing, 380 HP, 400 ft. lb. Motoring: 360 HP, 375 ft. lb. Base Speed: 5,000 RPM Frame Size: TLF 3644-F
Lebow Torquemeter	Model #1228H (5,000 in-lbs. 0-5,000 RPM) Model #1228 (10,000 in-lbs. 0-5,000 RPM)
Lebow Torque Signal Conditioner and Indicator	Model #7535
CVS Unit (Philco-Ford) (now by Horiba)	CFV Type, 3,000 SCFM Capacity, (Reduced to 1,500)
Labeco Controller	
Texas Instrument 960B Computer with Silent 700 ASR Data Terminal LABECO Control Console Control Equipment	

Gas	Instrument	EPA No.
CO (0-50,000 ppm)	MSA Model 202	109961
CO_2	MSA Model 202	109952
NOx	TECO Serial #CT-M-1063-29	109723 Series 10
CH_4	Bendix Model 8205	038333

Raw CO_2 measurements for the idle test were taken on an MSA Model 202 (EPA #109949) analyzer (0-14%, with ice bath).

Maintenance and calibration checks of the equipment were performed regularly. Both propane injections and an Easttech Vortex shedding flowmeter were used on a weekly basis to check calibration on the CFV-CVS flow.

Emissions collected in the test cells were analyzed at EPA analyzer train A009, located 200 feet down the hall. The maximum delay between sample collection and sample analysis was twenty minutes.

The sampling timetable used during a transient test is presented in Table II-B-1.

6. Void Rates/Repeatability

A summary of the baseline program's void rates and the emission repeatability of valid transient tests is presented below in Tables II-B-3 and II-B-4.

Void rates for the entire program were high (over 50 percent). This high percentage is attributed to the excessive statistical void rate before the implementation of the error-based torque control system and to the higher experimental void rates associated with the use of older engines. Experimental void rates of this magnitude would not occur with new engines.

The baseline emission repeatability was good with the average coefficient of emission variation for the entire baseline program at 6.3 percent. The range of the coefficient of variation was 0.5 percent to 16 percent.

III. NOx Emission Standard Derivation

The 1977 Amendments to the Clean Air Act specified that a 75 percent reduction from the uncontrolled NOx basleine shall represent the new standard. The baseline average value used by EPA in this calculation was a sales-weighted average, so as to reflect the on-road fleet average and not simply the arithmetic mean of the sample.

Calculation of sales weightings for the baseline fleet was complicated by the inclusion of two model years. For the purpose

Table II-B-3

1972/73 Baseline Void Rates at MVEL

	Engine	Total Tests 1/	Void Tests Statistical 2/	Experimental 3/	Total Void Rate
1.	Ford 330	6	3	-	50%
2.	Ford 361	24	18	3	87.5%
3.	GM 350-2	13	1	9	76.9%
4.	IHC 345	7	2	1	42.9%
5.	Ford 360	8 4/	-	5	62.5%
6.	Chrysler 318	3	-	-	0%
7.	IHC 345	5	-	2	40%
8.	GM 292	3	-	1	33.3%
9.	Chrysler 360	4	-	1	25%
10.	GM 350-4	4	1	-	25%
11.	GM 350-4	7	1	2	42.9%
12.	GM 350-4	4	1	-	25%
13.	Ford 390	3	1	-	33.3%
14.	GM 350-4	6	1	1	33.3%
15.	IHC 392	6	-	1	16.7%
16.	GM 350-2	3	-	-	0%
17.	Ford 390	7	2	3	71.4%
18.	GM 350-2	5	2	-	40%
	Total	118	33	29	52.5%

1/ Cold start transient tests intended for baseline data (excluding all correlation and parameter sensitivity tests).

2/ Statistically Void: exceeding the cycle performance regression tolerances given in 40 CFR Part 86, Subpart N.

3/ Experimentally Void: engine or equipment malfunction, operator error, etc.

4/ Starting with engine 5, all subsequent engines were run completely on the new error-based torque control system. Note the decrease in the statistical void rate.

Table II-B-4

1972-73 Baseline Repeatability

	Engine	Valid Tests	Coefficient of Variation (%)1/ NOx
1.	Ford 330	3	2.3
2.	Ford 361	3	10.5
3.	GM 350 -2	3	4.4
4.	IHC 345	4	2.7
5.	Ford 360	3	4.0
6.	Chrysler 318	3	9.2
7.	IHC 345	3	4.0
8.	GM 292	2	11.2
9.	Chrysler 360	3	3.5
10.	GM 350 -4	3	16.0
11.	GM 350 -4	4	10.2
12.	GM 350 -4	3	10.7
13.	Ford 390	2	8.5
14.	GM 350 -4	4	4.3
15.	IHC 392	5	6.8
16.	GM 350 -2	3	3.5
17.	Ford 390	2	4.6
18.	GM 350 -2	3	4.3
19.	Ford 300 2/	2	7.6
20.	Ford 361	3	6.5
21.	GM 350 -4	2	2.0
22.	IHC 345	2	7.0
23.	Chrysler 413	2	5.8
24.	GM 454	2	0.5
25.	IHC 304	2	7.0
26.	GM 427	2	6.5
	Mean baseline coefficient of variation		6.3

1/ Coefficient of variation = 100% (standard deviation/mean).

2/ Engines #19-26 tested at Southwest Research Institute, all others tested at EPA.

of standard derivation, only sales-weighting from the 1973 model year were used. (1973 was the original baseline year; several 1972 model year engines were used, however, so as not to penalize the manufacturers who instituted NOx control in their 1973 engines.) Table III-A-1 lists the sales and sales-weighting data used in the standard derivation.

Based upon the data collected from this program, the baseline sales-weighted average of NOx emissions from 1972-73 heavy-duty gasoline engines is 6.8 g/BHP-hr. The 75 percent reduction from this baseline results in a 1.7 g/BHP-hr standard, or tabulated in Table III-A-2.

The computer print out sheets which follow give a summary of the test results for each engine tested. These results are summarized in the four tables which follow the printouts.

Table III-A-1

1973 Sales Weighting*

Manufacturer	Engine	# of Engines Tested	Percent of Sales	Sales-weighting percent per engine family**	Sales-weighting percent per engine tested
Chrysler	225	0	0.2	0	0
	318	1	0.7	.906	.906
	360	1	0.2	.259	.259
	361	0	0.8	0	0
	400	0	0.5	0	0
	413	1	3.4	4.40	4.40
	440	0	5.7	0	0
Ford	300	1	2.1	2.72	2.72
	330	1	7.9	10.22	10.22
	360	1	7.6	9.83	9.83
	361	2	7.5	9.70	4.85
	390	2	4.2	5.43	2.72
	391	0	3.0	0	0
	460	0	0.4	0	0
	477	0	0.6	0	0
	534	0	0.5	0	0
GM	292	1	0.9	1.16	1.16
	350-2	3	12.0	15.52	5.17
	350-4	5	10.7	13.84	2.77
	366	0	7.6	0	0
	427	1	3.2	4.14	4.14
	454	1	2.6	3.36	3.36
IHC	304	1	0.8	1.03	1.03
	345	3	9.0	11.64	3.88
	392	1	4.5	5.82	5.82
	476	0	0.7	0	0
	549	0	0.4	0	0

* Does not total to 100 percent due to miscellaneous sales from all manufacturers which were too small to consider.

** Corrected to total 100 percent when all engines in the baseline are included.

Table III-A-2

1972-73 Baseline Emissions

	Engine	Sales-Weighting Factor	NOx Emissions	Sales-Weighted NOx
1.	Ford 330	.11034	8.39	.926
2.	Ford 361	.05237	6.98	.366
3.	GM 350-2	.05587	6.45	.360
4.	IHC 345	.04190	5.89	.247
5.	Ford 360	.10615	7.55	.801
6.	Chrysler 318	.00978	10.81	.106
7.	IHC 345	.04190	9.86	.413
8.	GM 292	.01257	7.88	.099
9.	Chrysler 360	.00279	6.38	.018
10.	GM 350-4	.01397	6.87	.096
11.	GM 350-4	.01397	5.51	.077
12.	GM 350-4	.01397	7.84	.110
13.	Ford 390	.02933	6.28	.184
14.	GM 350-4	.01397	5.68	.079
15.	IHC 392	.06285	6.21	.390
16.	GM 350-2	.05587	6.99	.390
17.	Ford 390	.02933	7.97	.234
18.	GM 350-2	.05587	5.85	.327
19.	Ford 300	.02933	8.65	.254
20.	Ford 361	.05237	4.66	.244
21.	GM 350-4	.01397	6.26	.087
22.	IHC 345	.04190	4.86	.204
23.	Chrylser 413	.04749	5.34	.254
24.	GM 427	.04469	8.09	.362
25.	IHC 304	.01117	5.78	.065
26.	GM 454-4	.03631	4.57	.166
	Total:			6.86
75 percent reduction:				1.714

References

1/ EPA Report, "1969 Heavy-Duty Engine Baseline Program and 1983 Emission Standards Development", May, 1979, Timothy P. Cox, Glenn W. Passavant, and Larry D. Ragsdale, is available through NTIS (PB 80120678) and in public docket OMSAPC 78-4.

2/ EPA Report, "Procurement and Emissions Testing of 1969 and 1972/73 Model Year Gasoline-Powered Light-Duty Trucks", (6,001-8,500 lbs. GVWR) is available in public docket A-80-31 and will soon be available through NTIS.

3/ The only exception to A/C 22A procedure was that engines were not equipped with clutch assembles; driveshafts were bolted directly to the flywheel by means of an adapter plate.

4/ Driveshafts used at EPA were rubber-softened to alleviate the possibility of resonant torsional vibrations. SwRI used solid steel shafts with no apparent difficulties.

V. Emission Results

26 Baseline Engines and Summary Tables

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 330 ENG: F330 72HLE-1 0 330 1 COMMENTS: 1972 BLF-1

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	270	159	3946

TEST NO.	CODING	GRAMS / BHP-HR HC	CO	NOx	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOx	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800381	BLT 0101	9.73	90.34	8.36	0.43	9.30				14.90	138.34	12.80	0.66	14.25				5.60	X
800387	BLT	5.66	74.96	9.23	0.32	5.34	3.73	5.50		8.74	115.85	14.27	0.49	8.25	5.77	8.50		6.00	X
800382	BLT	5.38	74.30	9.26						8.58	118.48	14.77						5.80	X
800413	BLT	5.23	73.05	8.53	0.32	4.92	3.61	4.93		8.61	120.16	14.03	0.52	8.09	5.93	8.10		6.00	B
800414	BLT	4.39	75.01	8.18	0.26	4.13	3.27	4.91		7.45	127.41	13.89	0.44	7.01	5.55	8.34		5.90	B
800415	BLT	4.75	75.74	8.48						8.12	129.51	14.49						5.80	B
*** MEAN:		4.79	74.60	8.39	0.29	4.52	3.44	4.92	0.0	8.06	125.69	14.14	0.48	7.55	5.74	8.22	0.0	5.90	N= 3
STD.DEV. :		0.425	1.391	0.192	0.040	0.560	0.240	0.012	0.0	0.582	4.909	0.314	0.057	0.764	0.269	0.170	0.0	0.100	
STD.DEV/MEAN:		0.089	0.019	0.023	0.137	0.124	0.070	0.002	0.0	0.072	0.039	0.022	0.118	0.101	0.047	0.021	0.0	0.017	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST NO.	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOx	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800381	BLT 0101	13.54	125.65	11.62	0.595	12.940				0.719	20.252	-9.35	0	1	X
800387	BLT	8.47	112.21	13.82	0.478	7.993	5.585	8.235		0.668	19.763	-11.54	0	1	X
800382	BLT	8.00	110.56	13.78						0.672	20.348	-8.92	0	1	X
800413	BLT	8.39	117.07	13.67	0.506	7.883	5.779	7.894		0.624	20.945	-6.25	0	1	B
800414	BLT	7.13	121.97	13.29	0.423	6.711	5.312	7.984		0.615	21.668	-3.02	0	1	B
800415	BLT	7.58	121.00	13.54						0.626	21.771	-2.56	0	1	B
*** MEAN:		7.70	120.01	13.50	0.46	7.30	5.55	7.94	0.0	0.622	21.461	-3.94			N= 3
STD.DEV. :		0.636	2.597	0.193	0.059	0.829	0.330	0.063	0.0	0.006	0.451	2.015			
STD.DEV/MEAN:		0.083	0.022	0.014	0.127	0.114	0.060	0.008	0.0	0.010	0.021				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L      III   N   N  EEEEE
G       A A   S      0   0  L       I    NN  N  E
G  GG  A   A   SSS   0   0  L       I    N N N  EEEE
G   G  AAAAA     S  0   0  L       I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL  III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 361 ENG: F361 72HLE-2 0 361 1 COMMENTS: 1972 HLE-2

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	272	157	3743

GRAMS / BHP-HR

IESI CODING	HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800431 PLT 02	13.79	195.17	6.79			3.57	3.22			X
800432 PLT	18.15	192.40	7.75			3.41	4.34			X
800433 PLT	13.24	207.75	6.80			3.46	3.34			X
800437 PLT	21.46	199.23	6.01			2.48	3.53			X
800440 PLT	10.13	206.33	6.15			3.12	3.05			X
800442 PLT	8.98	204.76	6.25			2.42	3.43			X
800443 PLT	11.09	199.12	7.21			3.79	3.42			X
800446 PLT	10.83	197.70	7.67			3.76	3.91			X
800447 PLT	8.16	128.53	6.49			3.18	3.31			X
800450 PLT	10.54	206.88	6.21			2.45	3.76			B
800451 PLT	10.01	210.60	7.11			3.57	3.54			X
800453 PLT	11.08	189.71	7.68			4.05	3.63			B
800456 PLT	12.96	198.33	7.23			3.60	3.64			X
800457 PLT	12.79	205.27	7.05			3.15	3.90			B
800634 PLT	12.90	193.45	4.49	0.79	12.12	2.07	2.42			X
*** MEAN:	11.47	200.62	6.98	0.0	0.0	3.22	3.76	0.0		N= 3
STD.DEV. :	1.175	9.488	0.735	0.0	0.0	0.805	0.137	0.0		
STD.DEV/MEAN:	0.102	0.047	0.105	0.0	0.0	0.250	0.036	0.0		

GRAMS / MILE

IESI CODING	HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800431 PLT 02	21.00	297.28	10.34			5.44	4.91		4.90	X
800432 PLT	18.79	297.58	11.99			5.28	6.71		5.20	X
800433 PLT	20.25	317.74	10.40			5.29	5.11		5.30	X
800437 PLT	36.56	339.37	10.24			4.23	6.01		4.90	X
800440 PLT	17.76	361.60	10.80			5.46	5.34		4.80	X
800442 PLT	15.77	359.68	10.99			4.26	6.73		4.80	X
800443 PLT	17.34	311.51	11.27			5.92	5.35		5.20	X
800446 PLT	16.77	306.08	11.87			5.82	6.05		5.20	X
800447 PLT	15.35	241.85	12.21			5.98	6.23		5.70	X
800450 PLT	16.97	333.03	10.00			3.94	6.06		5.10	B
800451 PLT	16.02	337.03	11.37			5.71	5.67		4.90	X
800453 PLT	16.58	283.82	11.49			6.06	5.42		5.70	B
800456 PLT	18.85	288.58	10.53			5.23	5.29		5.50	X
800457 PLT	18.65	299.30	10.28			4.59	5.69		5.50	B
800634 PLT	20.74	310.88	7.22	1.27	19.47	3.33	3.89		5.30	X
*** MEAN:	17.40	305.38	10.59	0.0	0.0	4.86	5.72	0.0	5.43	N= 3
STD.DEV. :	1.100	25.164	0.792	0.0	0.0	1.086	0.321	0.0	0.306	
STD.DEV/MEAN:	0.063	0.082	0.075	0.0	0.0	0.223	0.056	0.0	0.056	

XXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXX

WEIGHTED GRAMS / # FUEL

IESI CODING	HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC= #/BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800431 PLT 02	16.61	235.14	8.18			4.300	3.881		0.830	18.987	-12.55	0	1	X
800432 PLT	15.74	249.22	10.04			4.422	5.617		0.772	19.784	-8.88	0	1	X
800433 PLT	17.44	273.72	8.96			4.561	4.398		0.759	19.563	-9.90	0	1	X
800437 PLT	29.16	270.69	8.17			3.375	4.795		0.736	22.158	2.05	0	1	X
800440 PLT	13.73	279.59	8.35			4.224	4.129		0.738	22.386	3.10	0	1	X
800442 PLT	12.15	277.08	8.46			3.279	5.185		0.739	22.456	3.42	0	1	X
800443 PLT	14.47	259.95	9.41			4.943	4.466		0.766	20.005	-7.87	0	1	X
800446 PLT	14.07	256.76	9.96			4.883	5.077		0.770	19.764	-8.98	0	1	X
800447 PLT	14.24	224.31	11.32			5.546	5.778		0.573	24.122	11.09	0	1	X
800450 PLT	13.94	273.65	8.22			3.237	4.978		0.756	20.706	-4.64	0	1	B
800451 PLT	12.80	269.31	9.09			4.560	4.527		0.782	20.535	-5.43	0	1	X
800453 PLT	15.41	263.85	10.68			5.636	5.042		0.719	19.197	-11.59	0	1	B
800456 PLT	16.89	258.58	9.43			4.688	4.744		0.767	18.596	-13.89	0	1	X
800457 PLT	16.53	265.20	9.11			4.071	5.037		0.774	18.727	-13.75	0	1	B
800634 PLT	17.65	264.63	6.15	1.07	16.576	2.833	3.311		0.731	20.969	-3.43	0	1	X
*** MEAN:	15.29	267.57	9.33	0.0	0.0	4.31	5.02	0.0	0.750	19.543	-9.99			N= 3
STD.DEV. :	1.295	5.321	1.247	0.0	0.0	1.218	0.036	0.0	0.028	1.034	4.762			
STD.DEV/MEAN:	0.085	0.020	0.134	0.0	0.0	0.282	0.007	0.0	0.037	0.053				

*** FOR DISP CODE: B = VALID & M = VALID ***

GGGG A SSSS 00000 L III N N EEEEE

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: GM350 72BLE-3 0 350 2G

COMMENTS: 1972 BLE-3

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	286	173	3881
2	297	173	3794
3	281	168	3818

TEST SITE	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800458	BLT 03	3.03	137.01	4.90	0.52	2.51	3.27	1.62		4.90	221.22	7.91	0.84	4.06	5.29	2.62		5.30	X
800454	BLT	6.07	94.00	7.86			3.04	4.82		9.70	150.17	12.56			4.86	7.70		6.20	X
800459	BLT	4.32	141.39	6.26	0.52	3.80	2.34	3.92		7.31	239.00	10.58	0.88	6.43	3.95	6.62		5.40	X
800464	BLT	8.89	186.73	4.41	0.71	8.18	2.38	2.04		17.20	361.14	8.54	1.37	15.83	4.60	3.94		4.80	X
800465	BLT	8.38	124.74	6.37	0.57	7.82	3.08	3.29		14.03	208.76	10.66	0.95	13.08	5.15	5.51		5.50	X
800468	BLT	12.89	125.56	6.73			2.51	4.22		21.42	208.59	11.18			4.17	7.02		5.40	X
800471	BLT	7.13	103.26	6.49			2.43	4.07		12.37	179.23	11.27			4.21	7.06		5.50	B
800485	BLT	7.96	111.60	6.71			2.68	4.02		13.64	191.26	11.49			4.60	6.89		5.50	B
800497	BLT	15.74	167.76	6.49	0.84	14.90	3.37	3.11		25.54	272.20	10.53	1.37	24.17	5.47	5.05		4.90	X
800499	BLT	7.13	124.82	6.14	0.56	6.57	2.62	3.52		12.48	218.52	10.76	0.98	11.49	4.59	6.17		5.30	B
*** MEAN:		7.40	113.23	6.45	0.656	6.57	2.58	3.87	0.0	12.83	196.34	11.17	0.98	11.49	4.47	6.71	0.0	5.43	N= 3
STD.DEV. :		0.480	10.872	0.284	0.0	0.0	0.135	0.302	0.0	0.704	20.132	0.375	0.0	0.0	0.222	0.472	0.0	0.116	
STD.DEV/MEAN:		0.065	0.096	0.044	0.0	0.0	0.052	0.078	0.0	0.055	0.103	0.034	0.0	0.0	0.050	0.070	0.0	0.021	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST SITE	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800458	BLT 03	4.18	188.73	6.75	0.719	3.460	4.511	2.237		0.726	20.488	-12.73	0	1	X
800454	BLT	9.68	149.92	12.54			4.852	7.691		0.627	20.376	-15.61	0	2	X
800459	BLT	6.41	209.46	9.27	0.770	5.636	3.467	5.804		0.675	21.110	-10.08	0	1	X
800464	BLT	13.33	279.95	6.62	1.061	12.270	3.562	3.055		0.667	24.519	4.44	0	1	X
800465	BLT	12.48	185.62	9.48	0.847	11.631	4.553	4.899		0.672	21.695	-7.59	0	1	X
800468	BLT	18.66	181.70	9.74			3.631	6.111		0.691	21.287	-6.42	0	3	X
800471	BLT	11.08	160.60	10.10			3.773	6.328		0.643	22.105	-2.83	0	3	B
800485	BLT	12.06	169.10	10.16			4.057	6.095		0.660	21.868	-3.87	0	3	B
800497	BLT	20.34	216.75	8.38	1.090	19.245	4.359	4.023		0.774	20.882	-8.20	0	3	X
800499	BLT	10.62	186.03	9.16	0.836	9.785	3.906	5.252		0.671	22.455	-1.29	0	3	B
*** MEAN:		11.25	171.91	9.81	0.684	9.79	3.92	5.89	0.0	0.658	22.143	-2.66			N= 3
STD.DEV. :		0.733	12.948	0.563	0.0	0.0	0.147	0.566	0.0	0.014	0.296	1.298			
STD.DEV/MEAN:		0.065	0.075	0.057	0.0	0.0	0.038	0.096	0.0	0.022	0.013	-			

*** FOR DISP CODE: B = VALID & M = VALID ***

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 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 270 CID: 345 ENG: IHCV345 72BLE-4 0 345 1 COMMENTS: 1973 BLE-4

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	255	147	3789
2	251	143	3739
3	248	143	3702

IESI	CODING	GRAMS / BHP-HR HC	CO	NOX	METH. NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH. NON-M	NO	NO2	PART	MPG	DISP CODE
800474	BLT 04	4.50	110.83	5.61	0.43	4.07	2.68	2.92	7.40	182.44	9.23	0.71	6.70	4.42	4.81	5.40	X
800466	BLT	4.77	115.61	5.25	0.41	4.36	2.21	3.04	7.17	173.85	7.89	0.62	6.56	3.32	4.58	5.70	X
800501	BLT	6.26	114.32	5.87	0.49	5.78	2.53	3.35	9.19	167.83	8.62	0.71	8.48	3.71	4.91	5.80	B
800502	BLT	4.72	119.15	6.06	0.46	4.25	2.91	3.15	6.88	173.75	8.84	0.68	6.20	4.25	4.59	5.90	B
800503	BLT	4.58	105.89	5.68	0.42	4.16	2.24	3.44	6.86	158.57	8.51	0.63	6.23	3.35	5.16	5.90	B
800506	BLT	4.73	111.83	5.95	0.45	4.28	2.28	3.68	6.99	165.27	8.80	0.67	6.32	3.37	5.43	5.80	B
*** MEAN:		5.07	112.80	5.89	0.46	4.62	2.49	3.40	0.0	7.48	166.35	8.69	0.67	6.81	3.67	5.02	0.0	5.85	N= 4
STD.DEV. :		0.796	5.519	0.160	0.027	0.775	0.310	0.219	0.0	1.141	6.292	0.155	0.033	1.116	0.420	0.358	0.0	0.058	
STD.DEV/MEAN:		0.157	0.049	0.027	0.058	0.168	0.124	0.064	0.0	0.153	0.038	0.018	0.049	0.164	0.115	0.071	0.0	0.010	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH. NON-M	NO	NO2	PART	BSFC# (BHP-HR	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800474	BLT 04	6.45	159.02	8.05	0.617	5.836	3.852	4.197	0.697	20.898	0.92	0	1	X
800466	BLT	6.60	159.90	7.26	0.567	6.030	3.051	4.210	0.723	19.008	-5.54	0	2	X
800501	BLT	8.69	158.56	8.15	0.674	8.011	3.505	4.641	0.721	18.470	-7.30	0	3	B
800502	BLT	6.62	167.11	8.50	0.651	5.968	4.084	4.418	0.713	18.581	-6.75	0	3	B
800503	BLT	6.53	151.06	8.11	0.602	5.930	3.193	4.914	0.701	19.022	-4.53	0	3	B
800506	BLT	6.61	156.19	8.32	0.633	5.978	3.182	5.135	0.716	18.845	-5.42	0	3	B
*** MEAN:		7.11	158.23	8.27	0.64	6.47	3.49	4.78	0.0	0.713	18.729	-6.00			N= 4
STD.DEV. :		1.051	6.700	0.141	0.030	1.027	0.423	0.314	0.0	0.009	0.251	1.257			
STD.DEV/MEAN:		0.148	0.042	0.022	0.049	0.159	0.121	0.066	0.0	0.012	0.013				

*** FOR DISP CODE: B = VALID & M = VALID ***

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 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 360 ENG: F360 72BLE-5 0 360 1 COMMENTS: 1972 BLE-5

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	264	174	4462

IESI CODING	HC	CO	NOX	MEIH.	NON-M	NO	NO2	PART	HC	CO	NOX	MEIH.	NON-M	NO	NO2	PART	MPG	DISP CODE
	GRAMS / BHP-HR								GRAMS / MILE									
800700 BLT 0501	7.04	98.14	6.46	0.43	6.61	2.96	3.50		12.70	177.15	11.66	0.77	11.93	5.34	6.33		6.10	X
800698 BLT	7.89	131.50	7.24	0.58	7.31	2.45	4.80		14.31	238.48	13.14	1.05	13.25	4.44	8.70		4.90	B
800707 BLT	8.07	141.57	7.84	0.00	8.06	3.69	4.15		14.24	249.91	13.84	0.01	14.24	6.51	7.33		4.70	B
800704 BLT	8.09	148.86	6.12	0.58	7.51	2.27	3.85		14.19	261.31	10.74	1.01	13.18	3.98	6.76		4.50	X
800703 BLT	8.71	143.75	7.55	0.62	8.09	2.71	4.84		15.43	254.65	13.38	1.10	14.33	4.80	8.57		4.60	B
*** MEAN:	8.22	138.94	7.55	0.40	7.82	2.95	4.60	0.0	14.66	247.68	13.45	0.72	13.94	5.25	8.20	0.0	4.73	N= 3
STD.DEV. :	0.431	6.540	0.299	0.345	0.444	0.654	0.384	0.0	0.668	8.314	0.356	0.615	0.600	1.106	0.756	0.0	0.153	
STD.DEV/MEAN:	0.052	0.047	0.040	0.859	0.057	0.222	0.084	0.0	0.046	0.034	0.026	0.855	0.043	0.211	0.092	0.0	0.032	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	MEIH.	NON-M	NO	NO2	PART	BSFC / BHP-HR	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800700 BLT 0501	12.48	174.01	11.46	0.757	11.722	5.243	6.215		0.564	23.543	-2.58	0	1	X
800698 BLT	11.25	187.59	10.33	0.827	10.424	3.491	6.843		0.701	23.743	-1.75	0	1	B
800707 BLT	10.79	189.27	10.48	0.005	10.781	4.930	5.553		0.748	23.103	-4.40	0	1	B
800704 BLT	10.42	191.84	7.88	0.744	9.675	2.920	4.961		0.776	22.830	-5.53	0	1	X
800703 BLT	11.43	188.65	9.91	0.815	10.613	3.559	6.352		0.762	23.140	-4.25	0	1	B
*** MEAN:	11.16	188.50	10.24	0.455	10.61	3.99	6.25	0.0	0.737	23.329	-3.46			N= 3
STD.DEV. :	0.332	0.866	0.298	0.471	0.179	0.812	0.651	0.0	0.032	0.360	1.487			
STD.DEV/MEAN:	0.030	0.005	0.029	0.858	0.017	0.203	0.104	0.0	0.043	0.015				

*** FOR DISP CODE: B = VALID & M = VALID ***

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 GGGG    A     SSSS  00000  L      III   N   N  EEEEE
G       A A   S      0   0  L       I    NN  N  E
G  GG  A   A   SSS   0   0  L       I    N N N  EEEE
G   G  AAAAA     S  0   0  L       I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL  III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 20 CID: 318 ENG: 318 72BLF-7 0 318 1 COMMENTS: 1972 BLF-7

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	233	139	3861

IESI CODING	GRAMS / BHP-HR HC	CO	NOX	METH. NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH. NON-M	NO	NO2	PART	MPG	DISP CODE
800604 BLT 0701	5.81	91.40	9.75	0.43	5.38	4.13	5.62	9.20	144.62	15.43	0.69	8.51	6.54	8.89	6.30	B
800608 BLT 0702	5.58	78.67	11.71	0.38	5.20	5.49	6.22	8.53	120.29	17.91	0.58	7.95	8.39	9.52	6.20	B
800615 BLT 0703	5.29	75.59	10.98			4.43	6.55	8.47	121.06	17.58			7.10	10.48	6.30	B
*** MEAN:	5.56	81.89	10.81	0.41	7.93	4.68	6.13	0.0	8.73	128.66	16.97	0.63	12.46	7.34	9.63	0.0	6.27	N= 3
STD.DEV. :	0.262	8.382	0.991	0.037	6.477	0.712	0.471	0.0	0.406	13.832	1.347	0.07810.168		0.949	0.801	0.0	0.058	
STD.DEV/MEAN:	0.047	0.102	0.092	0.090	0.815	0.152	0.077	0.0	0.046	0.108	0.079	0.122	0.816	0.129	0.083	0.0	0.009	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH. NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800604 BLT 0701	9.36	147.19	15.70	0.699	8.662	6.652	9.048	0.621	20.595	4.76	0	1	B
800608 BLT 0702	8.56	120.66	17.96	0.586	7.974	8.416	9.546	0.652	19.995	1.70	0	1	B
800615 BLT 0703	8.71	124.54	18.09			7.30310.784		0.607	20.936	6.49	0	1	B
*** MEAN:	8.88	130.80	17.25	0.64	12.68	7.46	9.79	0.0	0.627	20.509	4.32			N= 3
STD.DEV. :	0.426	14.329	1.343	0.08010.333		0.892	0.894	0.0	0.023	0.477	2.423			
STD.DEV/MEAN:	0.048	0.110	0.078	0.124	0.815	0.120	0.091	0.0	0.037	0.023				

*** FOR DISP CODE: B = VALID & M = VALID ***

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 GGGG    A     SSSS  00000  L      III   N   N  EEEEE
G       A A   S      0   0  L       I    NN  N  E
G  GG  A   A   SSS   0   0  L       I    N N N  EEEE
G   G  AAAAA     S  0   0  L       I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL  III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 270 CID: 345 ENG: V345 72BLE-B 0 345 1 COMMENTS: 1973 BLF-B

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	274	154	3669

TEST	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800606	BLT 0801	5.18	81.53	7.36	0.39	4.79	3.16	4.20		9.01	141.77	12.80	0.68	8.33	5.49	7.31		6.30	X
800613	BLT 0802	7.02	89.90	9.46	0.43	6.58	3.90	5.56		12.27	157.15	16.54	0.76	11.51	6.83	9.71		5.50	B
800616	BLT	6.86	89.49	9.88	0.42	6.43	4.67	5.21		11.80	154.02	17.01	0.73	11.07	8.03	8.97		5.70	B
800623	BLT	6.42	89.31	10.24	0.42	5.99				11.14	155.06	17.78	0.74	10.40				5.50	B
*** MEAN:		6.76	89.57	9.86	0.43	6.34	4.29	5.38	0.0	11.74	155.41	17.11	0.74	10.99	7.43	9.34	0.0	5.57	N= 3
STD.DEV. :		0.312	0.331	0.390	0.005	0.308	0.540	0.243	0.0	0.568	1.611	0.626	0.015	0.559	0.849	0.523	0.0	0.116	
STD.DEV/MEAN:		0.046	0.004	0.040	0.012	0.049	0.126	0.045	0.0	0.048	0.010	0.037	0.021	0.051	0.114	0.056	0.0	0.021	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC#	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800606	BLT 0801	9.24	145.34	13.12	0.699	8.538	5.629	7.494		0.561	22.515	3.51	0	1	X
800613	BLT 0802	10.88	139.37	14.67	0.673	10.209	6.054	8.614		0.645	22.569	3.76	0	1	B
800616	BLT	10.93	142.73	15.76	0.678	10.258	7.445	8.314		0.627	22.245	2.27	0	1	B
800623	BLT	9.92	138.04	15.83	0.657	9.261				0.647	22.389	2.93	0	1	B
*** MEAN:		10.58	140.05	15.42	0.67	9.91	6.75	8.46	0.0	0.640	22.401	2.98			N= 3
STD.DEV. :		0.573	2.434	0.650	0.011	0.562	0.983	0.212	0.0	0.011	0.163	0.746			
STD.DEV/MEAN:		0.054	0.017	0.042	0.016	0.057	0.146	0.025	0.0	0.017	0.007				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS   00000  L        III   N   N  EEEEE
G        A A    S      0   0  L         I    NN  N  E
G  GG   A   A    SSS   0   0  L         I    N N N  EEEE
G   G   AAAAA      S   0   0  L         I    N  NN  E
 GGGG   A   A   SSSS    00000  LLLLL    III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 292 ENG: 292 72BLE-9 0 292 1 COMMENTS: 1972 BLE-9

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	221	130	3725

TEST	CODING	GRAMS / BHP-HR HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	MPG	DISP CODE
800617	BLT 09	4.88	66.31	8.50	0.36	4.52	3.58	4.92		6.42	87.15	11.17	0.47	5.94	4.71	6.46		7.40	B
800620	BLT	4.59	71.83	7.25	0.36	4.23	3.21	4.04		6.00	93.81	9.47	0.47	5.53	4.19	5.28		7.40	B
*** MEAN:		4.74	69.07	7.88	0.36	4.38	3.39	4.48	0.0	6.21	90.48	10.32	0.47	5.73	4.45	5.87	0.0	7.40	N= 2
STD.DEV. :		0.204	3.904	0.882	0.001	0.206	0.264	0.618	0.0	0.297	4.709	1.202	0.000	0.290	0.368	0.834	0.0	0.004	
STD.DEV/MEAN:		0.043	0.057	0.112	0.004	0.047	0.078	0.138	0.0	0.048	0.052	0.116	0.001	0.051	0.083	0.142	0.0	0.001	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800617	PLT 09	7.68	104.27	13.37	0.568	7.112	5.632	7.734		0.636	17.060	-4.00	0	1	B
800620	BLT	7.16	111.89	11.30	0.565	6.592	4.997	5.301		0.642	17.009	-4.29	0	1	B
*** MEAN:		7.42	108.08	12.33	0.57	6.85	5.31	7.02	0.0	0.639	17.034	-4.14			N= 2
STD.DEV. :		0.369	5.392	1.463	0.002	0.367	0.449	1.014	0.0	0.004	0.041	0.203			
STD.DEV/MEAN:		0.050	0.050	0.119	0.003	0.054	0.085	0.144	0.0	0.007	0.002				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 20 CID: 360 ENG: C360 72BLE-10 0 360 1 COMMENTS: 1973 BLE-10

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	271	167	4183

TEST	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800638	BLT 1001	11.60	144.45	6.63						21.92	273.00	12.53						4.60	B
800647	BLT 1002	10.42	152.64	6.21	0.77	9.64	3.00	3.21		19.58	286.91	11.67	1.45	18.12	5.65	6.03		4.70	B
800648	BLT 1003	12.43	138.72	6.29						23.83	265.81	12.05						4.80	B
*** MEAN:		11.48	145.27	6.38	0.77	21.24	3.00	3.21	0.0	21.78	275.24	12.08	1.45	40.04	5.65	6.03	0.0	4.70	N= 3
STD.DEV. :		1.014	7.000	0.224	0.0	0.0	0.0	0.0	0.0	2.129	10.731	0.431	0.0	0.0	0.0	0.0	0.0	0.100	
STD.DEV/MEAN:		0.088	0.048	0.035	0.0	0.0	0.0	0.0	0.0	0.098	0.039	0.036	0.0	0.0	0.0	0.0	0.0	0.021	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800638	BLT 1001	16.45	204.89	9.41						0.705	24.493	2.65	0	1	B
800647	BLT 1002	14.84	217.43	8.85	1.10	13.73	5.28	4.56		0.702	24.305	1.86	0	1	B
800648	BLT 1003	18.42	205.51	9.32						0.675	24.885	4.29	0	1	B
*** MEAN:		16.57	209.28	9.19	1.10	30.19	4.28	4.57	0.0	0.694	24.561	2.93			N= 3
STD.DEV. :		1.794	7.073	0.301	0.0	0.0	0.0	0.0	0.0	0.017	0.296	1.240			
STD.DEV/MEAN:		0.108	0.034	0.033	0.0	0.0	0.0	0.0	0.0	0.024	0.012				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS  00000  L        III   N   N  EEEEE
G        A A    S      0   0  L         I    NN  N  E
G  GG   A   A    SSS   0   0  L         I    N N N  EEEE
G   G   AAAAA      S   0   0  L         I    N  NN  E
 GGGG   A   A  SSSS    00000  LLLLL    III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: G350 72HLE-11 0 350 4 COMMENTS: 1972 HLE-11

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	252	148	3862

TEST SITE	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800650	BLT 11	5.79	98.36	5.73						8.98	152.49	8.88						6.10	B
800646	BLT	4.84	90.72	6.97	0.45	4.39	3.31	3.66		7.40	138.51	10.64	0.69	6.70	5.06	5.58		5.90	B
800649	BLT	5.94	92.01	7.92	0.45	5.49	3.69	4.22		9.17	142.03	12.22	0.70	8.47	5.70	6.52		5.70	B
*** MEAN:		5.53	93.70	6.87	0.45	4.94	3.50	3.94	0.0	8.52	144.34	10.58	0.69	7.58	5.38	6.05	0.0	5.90	N= 3
STD.DEV. :		0.595	4.090	1.098	0.001	0.775	0.268	0.402	0.0	0.972	7.277	1.671	0.007	1.252	0.453	0.665	0.0	0.200	
STD.DEV/MEAN:		0.108	0.044	0.160	0.003	0.157	0.077	0.102	0.0	0.114	0.050	0.158	0.010	0.165	0.084	0.110	0.0	0.034	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST SITE	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC@ (BHP-HR	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800650	BLT 11	8.85	150.39	8.76						0.654	20.073	-1.73	0	1	B
800646	BLT	7.06	132.24	10.16	0.660	6.401	4.829	5.329		0.686	19.781	-3.16	0	1	B
800649	BLT	8.43	130.51	11.23	0.645	7.783	5.237	5.991		0.705	19.973	-2.22	0	1	B
*** MEAN:		8.11	137.72	10.05	0.65	7.09	5.03	5.66	0.0	0.682	19.942	-2.37			N= 3
STD.DEV. :		0.937	11.015	1.240	0.011	0.977	0.288	0.468	0.0	0.026	0.149	0.726			
STD.DEV/MEAN:		0.115	0.080	0.123	0.016	0.138	0.057	0.083	0.0	0.038	0.007				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS   00000  L        III   N    N  EEEEE
G        A A    S       0   0  L         I    NN   N  E
G  GG   A   A    SSS    0   0  L         I    N N  N  EEEE
G   G   AAAAA       S   0   0  L         I    N  NN  E
 GGGG   A   A   SSSS    00000  LLLLL    III   N    N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: G350 72HLE-12 0 350 4 COMMENTS: 1972 HLE-12

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	251	151	4037

IESI	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800653	HLT 12	33.08	168.92	5.71	1.04	32.04	2.74	2.97		49.57	253.13	8.56	1.56	48.01	4.10	4.46		4.90	X
800683	HLT	6.94	152.27	5.23	0.70	6.24	2.42	2.81		11.57	253.88	8.72	1.17	10.40	4.04	4.68		5.10	X
800701	HLT	6.21	108.57	6.07	0.49	5.72	2.95	3.12		9.92	171.71	9.60	0.77	9.05	4.67	4.93		5.70	B
800697	HLT	5.99	114.32	5.59	0.52	5.47	2.33	3.26		9.51	181.66	8.88	0.82	8.69	3.70	5.18		5.50	B
800685	HLT	6.54	146.22	4.73	0.61	5.93	2.29	2.45		10.75	240.26	7.78	1.01	9.75	3.76	4.02		5.10	B
800699	HLT	6.14	114.46	5.64	0.52	5.62	2.53	3.12		9.73	181.37	8.94	0.82	8.91	4.01	4.94		5.40	B
*** MEAN:		6.22	120.89	5.51	0.53	5.69	2.52	2.99	0.0	9.95	193.75	8.80	0.85	9.10	4.03	4.77	0.0	5.42	N= 4
STD.DEV. :		0.235	17.107	0.560	0.054	0.194	0.305	0.365	0.0	0.547	31.351	0.754	0.106	0.458	0.444	0.512	0.0	0.250	
STD.DEV/MEAN:		0.038	0.142	0.102	0.101	0.034	0.121	0.122	0.0	0.055	0.162	0.086	0.124	0.050	0.110	0.107	0.0	0.046	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# (BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800653	HLT 12	39.66	202.55	6.85	1.246	38.416	3.281	3.567		0.834	19.471	-7.64	0	1	X
800683	HLT	9.53	209.16	7.18	0.966	8.566	3.324	3.856		0.728	21.582	2.38	0	1	X
800701	HLT	9.03	157.81	8.82	0.711	8.315	4.291	4.531		0.688	20.430	-3.09	0	1	B
800697	HLT	8.43	161.01	7.87	0.730	7.703	3.279	4.592		0.710	20.610	-2.23	0	1	B
800685	HLT	8.94	199.76	6.47	0.836	8.104	3.123	3.344		0.732	21.276	0.93	0	1	B
800699	HLT	8.49	158.31	7.81	0.714	7.777	3.497	4.311		0.723	20.564	-2.45	0	1	B
*** MEAN:		8.72	169.22	7.74	0.75	7.97	3.55	4.19	0.0	0.713	20.720	-1.71			N= 4
STD.DEV. :		0.304	20.405	0.968	0.060	0.286	0.519	0.579	0.0	0.019	0.379	1.795			
STD.DEV/MEAN:		0.035	0.121	0.125	0.080	0.036	0.146	0.138	0.0	0.027	0.018				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: G350 72HLE-13 0 350 4 COMMENTS: 1972 HLF-13

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	258	170	4147

IESI	CODING	GRAMS / HHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800667	RLT 13	4.59	90.04	6.88	0.42	4.17	3.39	3.48		7.41	145.30	11.09	0.68	6.74	5.47	5.62		5.50	B
800669	RLT	4.58	81.11	8.05	0.38	4.19	3.58	4.48		7.65	135.62	13.47	0.64	7.01	5.98	7.48		5.80	X
800671	RLT	4.48	82.76	8.31	0.39	4.10	4.02	4.29		7.27	134.27	13.49	0.63	6.65	6.53	6.96		5.60	B
800673	RLT	3.93	69.89	8.33	0.32	3.61	4.00	4.33		6.35	112.93	13.46	0.52	5.83	6.46	7.00		5.70	B
*** MEAN:		4.34	80.90	7.84	0.38	3.96	3.80	4.04	0.0	7.01	130.83	12.68	0.61	6.41	6.15	6.53	0.0	5.60	N= 3
STD.DEV. :		0.355	10.205	0.836	0.048	0.307	0.359	0.478	0.0	0.576	16.457	1.377	0.082	0.502	0.593	0.786	0.0	0.101	
STD.DEV/MEAN:		0.082	0.126	0.107	0.129	0.078	0.094	0.118	0.0	0.082	0.126	0.109	0.134	0.078	0.096	0.120	0.0	0.018	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800667	RLT 13	6.55	128.45	9.81	0.598	5.954	4.836	4.971		0.701	20.944	-6.63	0	1	B
800669	RLT	7.21	127.74	12.69	0.606	6.605	5.636	7.049		0.635	21.364	-2.64	0	1	X
800671	RLT	6.63	122.43	12.30	0.574	6.059	5.951	6.349		0.676	21.023	-6.28	0	1	B
800673	RLT	5.91	105.10	12.53	0.487	5.424	6.015	6.513		0.665	20.954	-6.59	0	1	B
*** MEAN:		6.37	118.66	11.55	0.55	5.81	5.60	5.94	0.0	0.681	20.974	-6.50			N= 3
STD.DEV. :		0.395	12.124	1.509	0.058	0.341	0.663	0.847	0.0	0.018	0.049	0.192			
STD.DEV/MEAN:		0.062	0.102	0.131	0.105	0.059	0.118	0.142	0.0	0.027	0.002				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS   00000  L        III    N    N  EEEEE
G        A A    S       0   0  L         I     NN   N  E
G  GG   A   A    SSS    0   0  L         I     N N  N  EEEE
G   G   AAAAA       S   0   0  L         I     N  NN  E
 GGGG   A   A   SSSS    00000  LLLLL    III    N    N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 390 ENG: F390 72HLE-14 0 390 1 COMMENTS: 1972 HLE-14

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	284	170	4253

IESI CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800678 HLT 14	5.48	141.72	6.66	0.44	5.05	2.94	3.72		9.72	251.24	11.81	0.77	8.95	5.21	6.60		4.80	B
800681 HLT	6.88	155.06	5.90	0.50	6.38	2.21	3.69		12.94	291.74	11.11	0.94	12.00	4.16	6.95		4.50	B
800679 HLT	6.08	157.09	6.31	0.48	5.60	3.14	3.18		10.39	268.30	10.78	0.82	9.57	5.36	5.42		4.90	X
*** MEAN:	6.18	148.39	6.28	0.47	5.71	2.57	3.71	0.0	11.33	271.49	11.46	0.85	10.47	4.68	6.77	0.0	4.65	N= 2
STD.DEV. :	0.986	9.434	0.535	0.045	0.940	0.512	0.023	0.0	2.277	28.637	0.495	0.120	2.157	0.742	0.247	0.0	0.212	
STD.DEV/MEAN:	0.159	0.064	0.085	0.096	0.165	0.199	0.006	0.0	0.201	0.105	0.043	0.141	0.206	0.158	0.037	0.0	0.046	

XXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXX

IESI CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800678 HLT 14	7.60	196.56	9.24	0.606	7.000	4.074	5.165		0.721	22.945	-5.25	0	1	B
800681 HLT	9.51	214.46	8.17	0.693	8.819	3.061	5.107		0.723	24.368	0.63	0	1	B
800679 HLT	8.31	214.60	8.62	0.656	7.656	4.286	4.339		0.732	22.096	-8.75	0	1	X
*** MEAN:	8.56	205.51	8.70	0.65	7.91	3.57	5.14	0.0	0.722	23.656	-2.31			N= 2
STD.DEV. :	1.348	12.664	0.757	0.061	1.286	0.716	0.041	0.0	0.002	1.006	4.155			
STD.DEV/MEAN:	0.158	0.062	0.087	0.095	0.163	0.201	0.008	0.0	0.002	0.043				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS  00000  L       III   N   N  EEEEE
G        A A    S      0   0  L        I    NN  N  E
G  GG   A   A    SSS   0   0  L        I    N N N  EEEE
G   G   AAAAA       S  0   0  L        I    N  NN  E
 GGGG   A   A   SSSS    00000  LLLLL   III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: G350 72HLE-16 0 350 4 COMMENTS: 1972 BLE-16

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	268	160	3577

GRAMS / BHP-HR

IESI CODING	HC	CO	NOX	METH.	NON-M	NO	NO2	PART
800751 BLT 1601	9.62	167.29	5.46	0.81	8.81	2.73	2.73	
800760 BLT	8.95	120.96	6.01	0.60	8.35	3.10	2.91	
800772 BLT	5.27	110.60	6.38	0.55	4.72	3.32	3.07	
800792 BLT	7.81	136.88	5.54	0.68	7.12	2.66	2.88	
800799 BLT	8.31	157.37	5.71	0.78	7.53	2.80	2.91	
*** MEAN:	8.67	145.63	5.68	0.72	7.95	2.82	2.86	0.0
STD.DEV. :	0.785	20.754	0.243	0.097	0.764	0.194	0.086	0.0
STD.DEV/MEAN:	0.091	0.143	0.043	0.134	0.096	0.069	0.030	0.0

GRAMS / MILE

IESI CODING	HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800751 BLT 1601	15.06	261.94	8.55	1.27	13.79	4.27	4.28		5.70	B
800760 BLT	13.72	185.41	9.21	0.92	12.80	4.75	4.46		6.30	B
800772 BLT	7.98	167.46	9.67	0.83	7.15	5.02	4.64		6.30	X
800792 BLT	12.25	214.78	8.70	1.07	11.18	4.17	4.53		6.20	B
800799 BLT	13.23	250.43	9.09	1.24	11.99	4.46	4.63		5.80	B
*** MEAN:	13.56	228.14	8.89	1.12	12.44	4.41	4.47	0.0	6.00	N= 4
STD.DEV. :	1.169	34.851	0.313	0.163	1.117	0.255	0.148	0.0	0.294	
STD.DEV/MEAN:	0.086	0.153	0.035	0.145	0.090	0.058	0.033	0.0	0.049	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

WEIGHTED GRAMS / # FUEL

IESI CODING	HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC@ BHP-HR	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800751 BLT 1601	13.94	242.45	7.91	1.177	12.762	3.955	3.958		0.690	20.131	-2.55	0	1	B
800760 BLT	14.05	189.90	9.44	0.940	13.113	4.868	4.567		0.637	19.726	-4.51	0	1	B
800772 BLT	8.19	171.74	9.91	0.852	7.335	5.149	4.764		0.644	19.607	-5.08	0	1	X
800792 BLT	12.26	214.89	8.70	1.072	11.184	4.176	4.527		0.637	20.192	-2.25	0	1	B
800799 BLT	12.35	233.84	8.49	1.158	11.195	4.163	4.325		0.673	20.517	-0.68	0	1	B
*** MEAN:	13.15	220.27	8.64	1.09	12.06	4.29	4.34	0.0	0.659	20.141	-2.50			N= 4
STD.DEV. :	0.978	23.293	0.630	0.108	1.020	0.398	0.278	0.0	0.027	0.324	1.572			
STD.DEV/MEAN:	0.074	0.106	0.073	0.099	0.085	0.093	0.064	0.0	0.040	0.016				

*** FOR DISP CODE: B = VALID & M = VALID ***

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 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA     S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 270 CID: 392 ENG: 1392 72BLE-17 0 392 1 COMMENTS: 1972 BLE-17

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	256	156	3370

IEST CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800715 BLT 1701	7.51	176.39	6.88	0.72	6.79	3.27	3.61		10.99	260.87	10.07	1.06	9.93	4.79	5.28		4.80	B
800747 BLT	6.52	165.21	6.24	0.68	5.84	3.20	3.04		9.70	245.67	9.28	1.01	8.69	4.76	4.52		5.50	B
800748 BLT	6.43	152.42	5.95	0.64	5.79	2.23	3.72		9.73	230.67	9.01	0.97	8.76	3.38	5.63		5.20	B
800750 BLT	6.91	161.05	6.18	0.70	6.22	2.48	3.70		10.41	242.41	9.30	1.05	9.36	3.74	5.57		5.10	B
800749 BLT	6.82	154.94	5.78	0.67	6.16	2.06	3.72		10.18	231.28	8.63	1.00	9.19	3.07	5.55		5.20	B
*** MEAN:	6.84	162.40	6.21	0.68	6.16	2.65	3.56	0.0	10.20	242.18	9.26	1.02	9.19	3.95	5.31	0.0	5.16	N= 5
STD.DEV. :	0.426	10.255	0.420	0.030	0.400	0.558	0.293	0.0	0.534	12.379	0.529	0.037	0.503	0.791	0.462	0.0	0.251	
STD.DEV/MEAN:	0.062	0.063	0.068	0.044	0.065	0.211	0.082	0.0	0.052	0.051	0.057	0.036	0.055	0.200	0.087	0.0	0.049	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IEST CODING	WEIGHTED GRAMS / * FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800715 BLT 1701	8.50	201.80	7.79	0.817	7.683	3.704	4.084		0.884	18.492	-4.90	0	1	B
800747 BLT	8.69	219.99	8.31	0.907	7.782	4.264	4.048		0.751	19.186	-3.42	0	1	B
800748 BLT	8.14	192.94	7.54	0.814	7.329	2.827	4.713		0.790	19.471	-1.99	0	1	B
800750 BLT	8.67	202.07	7.75	0.873	7.801	3.114	4.640		0.797	19.481	-1.94	0	1	B
800749 BLT	8.57	194.65	7.26	0.838	7.734	2.587	4.675		0.796	19.192	-3.39	0	1	B
*** MEAN:	8.51	202.29	7.73	0.85	7.67	3.30	4.43	0.0	0.804	19.244	-3.13			N= 5
STD.DEV. :	0.223	10.716	0.387	0.040	0.194	0.682	0.335	0.0	0.049	0.244	1.227			
STD.DEV/MEAN:	0.026	0.053	0.050	0.047	0.025	0.207	0.076	0.0	0.061	0.013				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L      III   N   N  EEEEE
G       A A   S      0   0  L       I    NN  N  E
G  GG  A   A   SSS   0   0  L       I    N N N  EEEE
G   G  AAAAA      S  0   0  L       I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL  III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: 6350 72HLE-18 0 350 26 COMMENTS: 1972 HLE-18

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	275	168	3614

TEST	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800810	HLT 1801	7.39	119.81	7.24			3.52	3.72		12.24	198.53	12.00			5.84	6.16		6.00	B
800812	HLT	7.31	116.54	6.76			2.80	3.96		12.21	194.67	11.29			4.68	6.61		6.10	B
800778	HLT	7.36	106.70	6.96			3.01	3.95		12.30	178.23	11.62			5.02	6.60		6.30	B
*** MEAN:		7.35	114.35	6.99	0.0	0.0	3.11	3.87	0.0	12.25	190.48	11.64	0.0	0.0	5.18	6.46	0.0	6.13	N= 3
STD.DEV. :		0.040	6.923	0.243	0.0	0.0	0.374	0.137	0.0	0.048	10.780	0.355	0.0	0.0	0.596	0.257	0.0	0.153	
STD.DEV/MEAN:		0.005	0.060	0.035	0.0	0.0	0.120	0.035	0.0	0.004	0.057	0.031	0.0	0.0	0.115	0.040	0.0	0.025	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	HSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800810	HLT 1801	11.86	192.31	11.62			5.658	5.965		0.623	21.474	-1.55	0	1	B
800812	HLT	12.10	192.95	11.19			4.636	6.551		0.604	21.589	-1.03	0	1	B
800778	HLT	12.52	181.47	11.83			5.112	6.719		0.588	21.589	-1.03	0	1	B
*** MEAN:		12.16	188.91	11.55	0.0	0.0	5.14	6.41	0.0	0.605	21.551	-1.20			N= 3
STD.DEV. :		0.336	6.457	0.330	0.0	0.0	0.512	0.396	0.0	0.018	0.064	0.304			
STD.DEV/MEAN:		0.028	0.034	0.029	0.0	0.0	0.100	0.062	0.0	0.029	0.003				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS  00000  L       III   N   N  EEEEE
G        A A    S      0   0  L        I    NN  N  E
G  GG   A   A    SSS   0   0  L        I    N N N  EEEE
G   G   AAAAA      S   0   0  L        I    N  NN  E
 GGGG   A   A  SSSS    00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 390 ENG: F390 72BLE-19 0 390 1 COMMENTS: 1972 BLE-19

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	295	186	4372

TEST	CODING	GRAMS / BHP-HR HC	CO	NOX	MEIH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	MEIH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800819	BLT 19	5.59	100.50	8.23	0.49	5.10	3.02	5.21		11.28	202.87	16.62	0.98	10.30	6.10	10.52		4.90	B
800821	BLT 19	6.02	106.17	7.71	0.52	5.51	3.09	4.62		12.20	215.02	15.62	1.05	11.15	6.26	9.35		4.90	B
800823	BLT 19	6.48	114.81	7.55	0.55	5.93	2.60	4.95		13.16	233.15	15.33	1.12	12.05	5.29	10.04		4.90	X
*** MEAN:		5.80	103.33	7.97	0.50	5.30	3.06	4.91	0.0	11.74	208.94	16.12	1.01	10.72	6.18	9.93	0.0	4.90	N= 2
STD.DEV. :		0.310	4.010	0.371	0.023	0.287	0.049	0.419	0.0	0.651	8.595	0.707	0.050	0.601	0.113	0.827	0.0	0.0	
STD.DEV/MEAN:		0.053	0.039	0.046	0.045	0.054	0.016	0.085	0.0	0.055	0.041	0.044	0.049	0.056	0.018	0.083	0.0	0.0	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	MEIH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800819	BLT 19	8.98	161.57	13.24	0.781	8.201	4.862	8.376		0.622	26.143	-1.31	0	1	B
800821	BLT 19	9.76	172.07	12.50	0.840	8.925	5.013	7.485		0.617	26.185	-1.16	0	1	B
800823	BLT 19	10.42	184.58	12.14	0.883	9.537	4.196	7.952		0.622	26.361	-0.49	0	1	X
*** MEAN:		9.37	166.82	12.87	0.81	8.56	4.94	7.93	0.0	0.619	26.164	-1.23			N= 2
STD.DEV. :		0.554	7.425	0.525	0.041	0.512	0.107	0.630	0.0	0.004	0.041	0.112			
STD.DEV/MEAN:		0.059	0.045	0.041	0.051	0.060	0.022	0.079	0.0	0.006	0.002				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L      III   N   N  EEEEE
G       A A   S      0   0  L       I    NN  N  E
G  GG  A   A   SSS   0   0  L       I    N N N  EEEE
G   G  AAAAA      S  0   0  L       I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL  III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: G350 72BLE-21 0 350 26 COMMENTS: 1972 BLE-21

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	269	163	3506

TEST	CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
800940	BLT 2104	6.12	80.93	6.10	0.49	5.63	2.26	3.84		9.04	119.51	9.01	0.72	8.32	3.34	5.67		6.30	B
800963	BLT 2105	6.20	79.59	5.86			2.81	3.05		9.03	115.92	8.54			4.09	4.44		6.40	B
800970	BLT 2107	7.10	120.56	5.60			2.42	3.17		11.14	189.09	8.78			3.80	4.98		5.90	B
*** MEAN:		6.47	93.69	5.85	0.49	5.63	2.50	3.36	0.0	9.74	141.51	8.78	0.72	8.32	3.74	5.03	0.0	6.20	N= 3
STD.DEV. :		0.545	23.275	0.252	0.0	0.0	0.283	0.427	0.0	1.215	41.248	0.235	0.0	0.0	0.378	0.617	0.0	0.265	
STD.DEV/MEAN:		0.084	0.248	0.043	0.0	0.0	0.113	0.127	0.0	0.125	0.291	0.027	0.0	0.0	0.101	0.123	0.0	0.043	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
800940	BLT 2104	9.25	122.25	9.22	0.740	8.508	3.412	5.805		0.662	19.086	-6.01	0	1	B
800963	BLT 2105	9.38	120.41	8.87			4.253	4.614		0.661	18.859	-7.13	0	1	B
800970	BLT 2107	10.58	179.67	8.34			3.614	4.729		0.671	20.320	0.07	0	1	B
*** MEAN:		9.74	140.78	8.81	0.74	8.51	3.76	5.05	0.0	0.665	19.422	-4.36			N= 3
STD.DEV. :		0.737	33.693	0.441	0.0	0.0	0.439	0.657	0.0	0.006	0.786	3.872			
STD.DEV/MEAN:		0.076	0.239	0.050	0.0	0.0	0.117	0.130	0.0	0.008	0.040				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 361 ENG: F361 SWRI14 0 361 1 COMMENTS: 1972 SwRI14

ENGINE MAP CODE	MAX TORQUE	MAX HP	* RATED RPM
1	0	0	0

TEST CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
801035 BLT 1402	10.70	156.11	5.00						16.72	244.11	7.82						5.60	B
801036 BLT 1404	11.37	158.12	4.53						17.91	249.03	7.14						6.00	B
801037 BLT 1406	10.89	168.62	4.44						17.29	267.89	7.05						5.60	B
*** MEAN:	10.99	160.95	4.66	0.0	0.0	0.0	0.0	0.0	17.31	253.68	7.34	0.0	0.0	0.0	0.0	0.0	5.73	N= 3
STD.DEV. :	0.346	6.720	0.301	0.0	0.0	0.0	0.0	0.0	0.595	12.552	0.421	0.0	0.0	0.0	0.0	0.0	0.231	
STD.DEV/MEAN:	0.031	0.042	0.065	0.0	0.0	0.0	0.0	0.0	0.034	0.049	0.057	0.0	0.0	0.0	0.0	0.0	0.040	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801035 BLT 1402	15.16	221.12	7.08						0.706	20.200	-0.49	21	1	B
801036 BLT 1404	17.33	241.04	6.91						0.656	20.350	0.25	21	1	B
801037 BLT 1406	15.62	241.92	6.37						0.697	20.610	1.53	21	1	B
*** MEAN:	16.04	234.69	6.79	0.0	0.0	0.0	0.0	0.0	0.686	20.387	0.43			N= 3
STD.DEV. :	1.146	11.765	0.371	0.0	0.0	0.0	0.0	0.0	0.027	0.207	1.022			
STD.DEV/MEAN:	0.071	0.050	0.055	0.0	0.0	0.0	0.0	0.0	0.039	0.010				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
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HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 20 CID: 413 ENG: D413 SWRI15 0 413 1 COMMENTS: 1973 SwRI15

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

TEST ID	CODING	GRAMS / BHP-HR HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	MPG	DISP CODE
801038	BLT 1501	8.01	158.28	5.56						14.53	287.36	10.09						4.90	B
801039	BLT 1502	6.20	157.95	5.12						11.21	284.90	9.23						4.90	B
*** MEAN:		7.10	158.11	5.34	0.0	0.0	0.0	0.0	0.0	12.87	286.13	9.66	0.0	0.0	0.0	0.0	0.0	4.90	N= 2
STD.DEV. :		1.240	0.234	0.311	0.0	0.0	0.0	0.0	0.0	2.348	1.750	0.608	0.0	0.0	0.0	0.0	0.0	0.0	
STD.DEV/MEAN:		0.180	0.001	0.058	0.0	0.0	0.0	0.0	0.0	0.182	0.006	0.063	0.0	0.0	0.0	0.0	0.0	0.0	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST ID	CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801038	BLT 1501	11.58	228.73	8.03						0.692	23.530	-1.63	21	1	B
801039	BLT 1502	8.81	224.36	7.27						0.704	23.400	-2.17	21	1	B
*** MEAN:		10.19	226.54	7.65	0.0	0.0	0.0	0.0	0.0	0.698	23.465	-1.90			N= 2
STD.DEV. :		1.958	3.092	0.539	0.0	0.0	0.0	0.0	0.0	0.008	0.091	0.384			
STD.DEV/MEAN:		0.192	0.014	0.070	0.0	0.0	0.0	0.0	0.0	0.012	0.004				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA     S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 454 ENG: GM454 SWRI16 0 454 1 COMMENTS: 1973 SWRI16

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

IEST CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
801040 BLT 1601	3.04	77.39	4.56						5.63	143.48	8.47						4.80	B
801041 BLT 1602	2.79	72.43	4.59						5.14	133.29	8.45						4.90	B
*** MEAN:	2.91	74.91	4.57	0.0	0.0	0.0	0.0	0.0	5.38	138.38	8.46	0.0	0.0	0.0	0.0	0.0	4.85	N= 2
STD.DEV. :	0.177	3.507	0.021	0.0	0.0	0.0	0.0	0.0	0.346	7.209	0.015	0.0	0.0	0.0	0.0	0.0	0.071	
STD.DEV/MEAN:	0.061	0.047	0.005	0.0	0.0	0.0	0.0	0.0	0.064	0.052	0.002	0.0	0.0	0.0	0.0	0.0	0.015	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IEST CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801040 BLT 1601	4.41	112.16	6.61						0.690	23.920	-8.56	21	1	B
801041 BLT 1602	4.06	105.28	6.67						0.688	23.800	-9.02	21	1	B
*** MEAN:	4.23	108.72	6.64	0.0	0.0	0.0	0.0	0.0	0.689	23.860	-8.79			N= 2
STD.DEV. :	0.248	4.867	0.044	0.0	0.0	0.0	0.0	0.0	0.002	0.088	0.325			
STD.DEV/MEAN:	0.059	0.045	0.007	0.0	0.0	0.0	0.0	0.0	0.002	0.004				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS   00000  L       III   N   N  EEEEE
G        A A    S       0   0  L        I    NN  N  E
G  GG   A   A    SSS    0   0  L        I    N N N  EEEE
G   G   AAAAA      S    0   0  L        I    N  NN  E
 GGGG   A   A   SSSS    00000  LLLLL   III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 427 ENG: GM427 SWRI17 0 427 1 COMMENTS: 1973 SWRI17

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

IESI CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
801042 BLT 1702	5.76	50.91	7.72						10.96	96.89	14.71						5.30	B
801043 BLT 1703	6.18	50.64	8.46						11.88	97.31	16.25						5.30	B
*** MEAN:	5.97	50.77	8.09	0.0	0.0	0.0	0.0	0.0	11.42	97.10	15.48	0.0	0.0	0.0	0.0	0.0	5.30	N= 2
STD.DEV. :	0.297	0.188	0.523	0.0	0.0	0.0	0.0	0.0	0.651	0.300	1.049	0.0	0.0	0.0	0.0	0.0	0.004	
STD.DEV/MEAN:	0.050	0.004	0.065	0.0	0.0	0.0	0.0	0.0	0.057	0.003	0.070	0.0	0.0	0.0	0.0	0.0	0.001	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC* /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801042 BLT 1702	9.47	83.73	12.70						0.608	24.570	-6.15	21	1	B
801043 BLT 1703	10.23	83.84	14.01						0.604	24.880	-4.97	21	1	B
*** MEAN:	9.85	83.79	13.35	0.0	0.0	0.0	0.0	0.0	0.606	24.725	-5.56			N= 2
STD.DEV. :	0.536	0.088	0.926	0.0	0.0	0.0	0.0	0.0	0.003	0.219	0.837			
STD.DEV/MEAN:	0.054	0.001	0.069	0.0	0.0	0.0	0.0	0.0	0.005	0.009				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 40 CID: 350 ENG: GM350-4 SWRI18 0 350 4 COMMENTS: 1972 SWRI18

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

IESI CODING	GRAMS / BHP-HR HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	MPG	DISP CODE
801044 BLT 1801	4.00	80.21	6.17						6.70	134.63	10.35						6.60	B
801045 BLT 1803	3.66	80.88	6.35						5.98	132.31	10.39						6.70	B
*** MEAN:	3.83	80.54	6.26	0.0	0.0	0.0	0.0	0.0	6.34	133.47	10.37	0.0	0.0	0.0	0.0	0.0	6.65	N= 2
STD.DEV. :	0.240	0.472	0.127	0.0	0.0	0.0	0.0	0.0	0.509	1.643	0.031	0.0	0.0	0.0	0.0	0.0	0.071	
STD.DEV/MEAN:	0.063	0.006	0.020	0.0	0.0	0.0	0.0	0.0	0.080	0.012	0.003	0.0	0.0	0.0	0.0	0.0	0.011	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801044 BLT 1801	7.14	143.23	11.02						0.560	21.620	0.93	21	1	B
801045 BLT 1803	6.46	142.65	11.20						0.567	21.120	-1.40	21	1	B
*** MEAN:	6.80	142.94	11.11	0.0	0.0	0.0	0.0	0.0	0.563	21.370	-0.23			N= 2
STD.DEV. :	0.486	0.472	0.128	0.0	0.0	0.0	0.0	0.0	0.005	0.353	1.651			
STD.DEV/MEAN:	0.072	0.003	0.012	0.0	0.0	0.0	0.0	0.0	0.009	0.017				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L      III   N   N  EEEEE
G       A A   S      0   0  L       I    NN  N  E
G  GG  A   A   SSS   0   0  L       I    N N N  EEEE
G   G  AAAAA      S  0   0  L       I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL  III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 270 CID: 345 ENG: V345 SWRI19 0 345 1 COMMENTS: 1973 SWRI19

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

IESI CODING	GRAMS / BHP-HR HC	CO	NOx	METH. NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOx	METH. NON-M	NO	NO2	PART	MPG	DISP CODE
801048 PLT 1902	4.75	116.39	5.10					8.54	209.37	9.18					5.90	B
801049 PLT 1903	4.81	108.26	4.62					8.74	196.64	8.38					6.10	B
*** MEAN:	4.78	112.32	4.86	0.0	0.0	0.0	0.0	8.64	203.00	8.78	0.0	0.0	0.0	0.0	6.00	N= 2
STD.DEV. :	0.042	5.748	0.339	0.0	0.0	0.0	0.0	0.141	9.007	0.566	0.0	0.0	0.0	0.0	0.141	
STD.DEV/MEAN:	0.009	0.051	0.070	0.0	0.0	0.0	0.0	0.016	0.044	0.064	0.0	0.0	0.0	0.0	0.024	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

IESI CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOx	METH. NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801048 PLT 1902	8.13	199.30	8.73					0.584	23.240	1.57	21	1	B
801049 PLT 1903	8.62	194.01	8.28					0.558	23.480	2.62	21	1	B
*** MEAN:	8.38	196.66	8.51	0.0	0.0	0.0	0.0	0.571	23.360	2.10			N= 2
STD.DEV. :	0.344	3.733	0.321	0.0	0.0	0.0	0.0	0.018	0.171	0.742			
STD.DEV/MEAN:	0.041	0.019	0.038	0.0	0.0	0.0	0.0	0.032	0.007				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG     A      SSSS  00000  L        III   N   N  EEEEE
G        A A    S      0   0  L         I    NN  N  E
G  GG   A   A    SSS   0   0  L         I    N N N  EEEE
G   G   AAAAA      S   0   0  L         I    N  NN  E
 GGGG   A   A  SSSS    00000  LLLLL    III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1972 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 30 CID: 300 ENG: F300 SWRI20 0 300 1 COMMENTS: 1972 SWRI20

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

TEST SITE CODING	GRAMS / BHP-HR HC	CO	NOX	METH.	NON-M	NO	NO2	PART	GRAMS / MILE HC	CO	NOX	METH.	NON-M	NO	NO2	PART	MPG	DISP CODE
801050 BLT 2003	7.43	70.85	8.19						9.73	92.72	10.71						8.20	B
801051 BLT 2004	7.65	71.26	9.12						9.94	92.65	11.86						8.10	B
*** MEAN:	7.54	71.05	8.65	0.0	0.0	0.0	0.0	0.0	9.83	92.68	11.28	0.0	0.0	0.0	0.0	0.0	8.15	N= 2
STD.DEV. :	0.156	0.286	0.658	0.0	0.0	0.0	0.0	0.0	0.149	0.0	0.813	0.0	0.0	0.0	0.0	0.0	0.072	
STD.DEV/MEAN:	0.021	0.004	0.076	0.0	0.0	0.0	0.0	0.0	0.015	0.0	0.072	0.0	0.0	0.0	0.0	0.0	0.009	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

TEST SITE CODING	WEIGHTED GRAMS / # FUEL HC	CO	NOX	METH.	NON-M	NO	NO2	PART	BSFC# /BHP-HP	TOTAL BHP-HR	PCT ERROR	TEST SITE	MAP CODE	DISP CODE
801050 BLT 2003	12.94	123.43	14.27						0.574	16.970	4.24	21	1	B
801051 BLT 2004	13.14	122.44	15.67						0.582	16.800	3.19	21	1	B
*** MEAN:	13.04	122.94	14.97	0.0	0.0	0.0	0.0	0.0	0.578	16.885	3.72			N= 2
STD.DEV. :	0.141	0.702	0.991	0.0	0.0	0.0	0.0	0.0	0.006	0.122	0.738			
STD.DEV/MEAN:	0.011	0.006	0.066	0.0	0.0	0.0	0.0	0.0	0.010	0.007				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
```

HEAVY DUTY ENGINE TRANSIENT EMISSIONS SUMMARY -- 1973 BASELINE ENGINE(S)

AUG 27, 1980

MFG: 270 CID: 304 ENG: V304 SWRI21 0 304 1 COMMENTS: 1973 SWRI21

ENGINE MAP CODE	MAX TORQUE	MAX HP	@ RATED RPM
1	0	0	0

	GRAMS / BHP-HR								GRAMS / MILE								MPG	DISP
IESI CODING	HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	HC	CO	NOX	MEIH	NON-M	NO	NO2	PART		CODE
801046 BLT 2101	4.01	87.35	5.50						6.18	134.49	8.87						6.80	B
801047 BLT 2102	4.11	83.81	6.07						6.41	130.63	9.46						6.80	B
*** MEAN:	4.06	85.58	5.78	0.0	0.0	0.0	0.0	0.0	6.29	132.56	9.16	0.0	0.0	0.0	0.0	0.0	6.80	N= 2
STD.DEV. :	0.071	2.503	0.403	0.0	0.0	0.0	0.0	0.0	0.163	2.734	0.417	0.0	0.0	0.0	0.0	0.0	0.004	
STD.DEV/MEAN:	0.017	0.029	0.070	0.0	0.0	0.0	0.0	0.0	0.026	0.021	0.046	0.0	0.0	0.0	0.0	0.0	0.001	

XXXXXXXXXXXXXXXXXXX CONTINUATION OF TEST DATA XXXXXXXXXXXXXXXXXXX

	WEIGHTED GRAMS / # FUEL								BSFC#	TOTAL	PCT	TEST	MAP	DISP
IESI CODING	HC	CO	NOX	MEIH	NON-M	NO	NO2	PART	/BHP-HP	BHP-HR	ERROR	SITE	CODE	CODE
801046 BLT 2101	6.79	147.80	9.31						0.591	19.840	2.69	21	1	B
801047 BLT 2102	7.09	144.50	10.47						0.580	20.140	4.24	21	1	B
*** MEAN:	6.94	146.15	9.89	0.0	0.0	0.0	0.0	0.0	0.585	19.990	3.47			N= 2
STD.DEV. :	0.213	2.334	0.820	0.0	0.0	0.0	0.0	0.0	0.008	0.213	1.098			
STD.DEV/MEAN:	0.031	0.016	0.083	0.0	0.0	0.0	0.0	0.0	0.013	0.011				

*** FOR DISP CODE: B = VALID & M = VALID ***

```
 GGGG    A     SSSS  00000  L       III   N   N  EEEEE
G       A A   S      0   0  L        I    NN  N  E
G  GG  A   A   SSS   0   0  L        I    N N N  EEEE
G   G  AAAAA      S  0   0  L        I    N  NN  E
 GGGG  A   A  SSSS   00000  LLLLL   III   N   N  EEEEE
```

TABLE 1: SALES-WEIGHTED TRANSIENT ENGINE EMISSIONS(G/BHP-HR) PAGE NO. 1

1972 / 1973 BASELINE ENGINE(S)

AUG 27, 1980

ENGINE	WTG. FACTOR	SIZE	GRAMS / BHP-HR HC	GRAMS / BHP-HR CO	GRAMS / BHP-HR NOX	GRAMS / BHP-HR PART	WEIGHTED G/BHP-HR HC	WEIGHTED G/BHP-HR CO	WEIGHTED G/BHP-HR NOX	WEIGHTED G/BHP-HR PART	BSFC	MPG	<- WEIGHTED -> BSFC	<- WEIGHTED -> MPG
01 F330 72BLE-1 330 1	0 0.11034	3	4.79	74.60	8.39		0.528	8.231	0.926		0.6217	5.90	0.06859	0.651
02 F361 72BLE-2 361 1	0 0.05237	3	11.47	200.62	6.98		0.601	10.507	0.366		0.7497	5.43	0.03926	0.285
03 GM350 72BLE-3 350 2G	0 0.05587	3	7.40	113.23	6.45		0.414	6.326	0.360		0.6580	5.43	0.03676	0.304
04 IHCV345 72BLE-4 345 1	0 0.04190	4	5.07	112.80	5.89		0.213	4.726	0.247		0.7127	5.85	0.02986	0.245
05 F360 72BLE-5 360 1	0 0.10615	3	8.22	138.94	7.55		0.873	14.748	0.801		0.7370	4.73	0.07823	0.502
07 318 72BLE-7 318 1	0 0.00978	3	5.56	81.89	10.81		0.054	0.801	0.106		0.6267	6.27	0.00613	0.061
08 V345 72BLE-8 345 1	0 0.04190	3	6.76	89.57	9.86		0.283	3.753	0.413		0.6397	5.57	0.02680	0.233
09 292 72BLE-9 292 1	0 0.01257	2	4.74	69.07	7.88		0.060	0.868	0.099		0.6390	7.40	0.00803	0.093
10 C360 72BLE-10 360 1	0 0.00279	3	11.48	145.27	6.38		0.032	0.406	0.018		0.6940	4.70	0.00194	0.013
11 G350 72BLE-11 350 4	0 0.01397	3	5.53	93.70	6.87		0.077	1.309	0.096		0.6817	5.90	0.00952	0.082
12 G350 72BLE-12 350 4	0 0.01397	4	6.22	120.49	5.51		0.087	1.688	0.077		0.7132	5.42	0.00996	0.076
13 G350 72BLE-13 350 4	0 0.01397	3	4.34	80.90	7.84		0.061	1.130	0.110		0.6807	5.60	0.00951	0.078
14 F390 72BLE-14 390 1	0 0.02933	2	6.18	148.39	6.28		0.181	4.352	0.184		0.7220	4.65	0.02118	0.136
16 G350 72BLE-16 350 4	0 0.01397	4	8.67	145.63	5.68		0.121	2.034	0.079		0.6592	6.00	0.00921	0.084
17 I392 72BLE-17 392 1	0 0.06285	5	6.84	162.40	6.21		0.430	10.207	0.390		0.8036	5.16	0.05051	0.324
18 G350 72BLE-18 350 2G	0 0.05587	3	7.35	114.35	6.99		0.411	6.388	0.390		0.6050	6.13	0.03380	0.343
19 F390 72BLE-19 390 1	0 0.02933	2	5.80	103.33	7.97		0.170	3.031	0.234		0.6195	4.90	0.01817	0.144
21 G350 72BLE-21 350 2G	0 0.05587	3	6.47	93.69	5.85		0.362	5.234	0.327		0.6647	6.20	0.03713	0.346
20 F300 SWRI20 300 1	0 0.02933	2	7.54	71.05	8.65		0.221	2.084	0.254		0.5780	8.15	0.01695	0.239
14 F361 SWRI14 361 1	0 0.05237	3	10.99	160.95	4.66		0.575	8.430	0.244		0.6863	5.73	0.03595	0.300
18 GM350-4 SWRI18 350 4	0 0.01397	2	3.83	80.54	6.26		0.053	1.125	0.087		0.5635	6.65	0.00787	0.093
19 V345 SWRI19 345 1	0 0.04190	2	4.78	112.32	4.86		0.200	4.706	0.204		0.5710	6.00	0.02392	0.251
15 D413 SWRI15 413 1	0 0.04749	2	7.10	158.11	5.34		0.337	7.508	0.254		0.6980	4.90	0.03315	0.233
17 GM427 SWRI17 427 1	0 0.04469	2	5.97	50.77	8.09		0.267	2.269	0.362		0.6060	5.30	0.02708	0.237
16 GM454 SWRI16	0 0.03631	2	2.91	74.91	4.57		0.106	2.720	0.166		0.6890	4.85	0.02502	0.176

	454	1															
21	V304	SWRI21	0	0.01117	2	4.06	85.58	5.78		0.045	0.956	0.065		0.5855	6.80	0.00654	0.076
	304	1															
SALES-WEIGHTED GAS BAG TOTALS:										6.76	115.54	6.86	0.0			0.67107	5.606
75% REDUCTION FROM BASELINE:												1.714					

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 GGGG     A      SSSS  00000  L        III   N    N  EEEEE
G        A A    S      0   0  L         I    NN   N  E
G  GG   A   A    SSS   0   0  L         I    N N  N  EEEE
G   G   AAAAA      S   0   0  L         I    N  NN  E
 GGGG   A   A   SSSS    00000  LLLLL    III   N    N  EEEEE
```

ENGINE		<--FOR HC,CO,NOX & PART--> PERCENT TOTAL	CORRECTED PERCENT	WGT. FACTOR	<--METHANE & NON-METHANE-> PERCENT TOTAL	CORRECTED PERCENT	WGT. FACTOR	<----- NO AND NO2 -----> PERCENT TOTAL	CORRECTED PERCENT	WGT. FACTOR
01 F330 72BLE-1 330 1	0	7.900	11.034	0.11034	7.900	17.955	0.17955	7.900	15.266	0.15266
02 F361 72BLE-2 361 1	0	3.750	5.237	0.05237				3.750	7.246	0.07246
03 GM350 72BLE-3 350 2G	0	4.000	5.587	0.05587	4.000	9.091	0.09091	4.000	7.729	0.07729
04 IHCV345 72BLE-4 345 1	0	3.000	4.190	0.04190	3.000	6.818	0.06818	3.000	5.797	0.05797
05 F360 72BLE-5 360 1	0	7.600	10.615	0.10615	7.600	17.273	0.17273	7.600	14.686	0.14686
07 318 72BLE-7 318 1	0	0.700	0.978	0.00978	0.700	1.591	0.01591	0.700	1.353	0.01353
08 V345 72BLE-8 345 1	0	3.000	4.190	0.04190	3.000	6.818	0.06818	3.000	5.797	0.05797
09 292 72BLE-9 292 1	0	0.900	1.257	0.01257	0.900	2.045	0.02045	0.900	1.739	0.01739
10 C360 72BLE-10 360 1	0	0.200	0.279	0.00279	0.200	0.455	0.00455	0.200	0.386	0.00386
11 G350 72BLE-11 350 4	0	1.000	1.397	0.01397	1.000	2.273	0.02273	1.000	1.932	0.01932
12 G350 72BLE-12 350 4	0	1.000	1.397	0.01397	1.000	2.273	0.02273	1.000	1.932	0.01932
13 G350 72BLE-13 350 4	0	1.000	1.397	0.01397	1.000	2.273	0.02273	1.000	1.932	0.01932
14 F390 72BLE-14 390 1	0	2.100	2.933	0.02933	2.100	4.773	0.04773	2.100	4.058	0.04058
16 G350 72BLE-16 350 4	0	1.000	1.397	0.01397	1.000	2.273	0.02273	1.000	1.932	0.01932
17 T392 72BLE-17 392 1	0	4.500	6.285	0.06285	4.500	10.227	0.10227	4.500	8.696	0.08696
18 G350 72BLE-18 350 2G	0	4.000	5.587	0.05587				4.000	7.729	0.07729
19 F390 72BLE-19 390 1	0	2.100	2.933	0.02933	2.100	4.773	0.04773	2.100	4.058	0.04058
21 G350 72BLE-21 350 2G	0	4.000	5.587	0.05587	4.000	9.091	0.09091	4.000	7.729	0.07729
20 F300 SWRI20 300 1	0	2.100	2.933	0.02933						
14 F361 SWRI14 361 1	0	3.750	5.237	0.05237						
18 GM350-4 SWRI18 350 4	0	1.000	1.397	0.01397						
19 V345 SWRI19 345 1	0	3.000	4.190	0.04190						
15 D413 SWRI15 413 1	0	3.400	4.749	0.04749						
17 GM427 SWRI17	0	3.200	4.469	0.04469						

```
   427      1
16 GM454 SWRI16      0    2.600      3.631  0.03631
   454      1
21 V304 SWRI21       0    0.800      1.117  0.01117
   304      1

   SUM TOTALS:          71.600   100.00   1.000       44.000   100.00   1.000       51.750   100.00   1.000
```

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 GGGG     A      SSSS  00000  L        III   N   N  EEEEE
G        A A    S      0   0  L         I    NN  N  E
G  GG   A   A    SSS   0   0  L         I    N N N  EEEE
G   G   AAAAA       S  0   0  L         I    N  NN  E
 GGGG   A   A   SSSS   00000  LLLLL    III   N   N  EEEEE
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TABLE 3: TRANSIENT ENGINE EMISSIONS(G/BHP-HR) PAGE NO. 3

1972 / 1973 BASELINE ENGINE(S)

AUG 27, 1980

ENGINE		SIZE	BSHC	BSCO	BSNOX	PART	SIZE	METHANE	NON-METHANE	SIZE	NO	NO2	<-- COEFF. OF TEST VARIATION --> HC	CO	NOX	PART
01 F330 72BLE-1 330 1	0	3	4.79	74.60	8.39		2	0.29	4.52	2	3.44	4.92	0.0888	0.0186	0.0228	0.0
02 F361 72BLF-2 361 1	0	3	11.47	200.62	6.98					3	3.22	3.76	0.1024	0.0473	0.1055	0.0
03 GM350 72BLE-3 350 2G	0	3	7.40	113.23	6.45		1	0.56	6.57	3	2.58	3.87	0.0648	0.0960	0.0440	0.0
04 IHCV345 72BLE-4 345 1	0	4	5.07	112.80	5.89		4	0.46	4.62	4	2.49	3.40	0.1569	0.0489	0.0271	0.0
05 F360 72BLE-5 360 1	0	3	8.22	138.94	7.55		3	0.40	7.82	3	2.95	4.60	0.0524	0.0471	0.0397	0.0
07 318 72BLE-7 318 1	0	3	5.56	81.89	10.81		2	0.41	7.93	3	4.68	6.13	0.0471	0.1024	0.0917	0.0
08 V345 72BLE-8 345 1	0	3	6.76	89.57	9.86		3	0.43	6.34	2	4.29	5.38	0.0461	0.0037	0.0396	0.0
09 292 72BLE-9 292 1	0	2	4.74	69.07	7.88		2	0.36	4.38	2	3.39	4.48	0.0431	0.0565	0.1120	0.0
10 C360 72BLE-10 360 1	0	3	11.48	145.27	6.38		1	0.77	21.24	1	3.00	3.21	0.0883	0.0482	0.0351	0.0
11 G350 72BLE-11 350 4	0	3	5.53	93.70	6.87		2	0.45	4.94	2	3.50	3.94	0.1077	0.0436	0.1598	0.0
12 G350 72BLE-12 350 4	0	4	6.22	120.89	5.51		4	0.53	5.69	4	2.52	2.99	0.0378	0.1415	0.1016	0.0
13 G350 72BLE-13 350 4	0	3	4.34	80.90	7.84		3	0.38	3.96	3	3.80	4.04	0.0819	0.1261	0.1066	0.0
14 F390 72BLE-14 390 1	0	2	6.18	148.39	6.28		2	0.47	5.71	2	2.57	3.71	0.1595	0.0636	0.0851	0.0
16 G350 72BLE-16 350 4	0	4	8.67	145.63	5.68		4	0.72	7.95	4	2.82	2.86	0.0905	0.1425	0.0428	0.0
17 I392 72BLE-17 392 1	0	5	6.84	162.40	6.21		5	0.68	6.16	5	2.65	3.56	0.0622	0.0631	0.0677	0.0
18 G350 72BLE-18 350 2G	0	3	7.35	114.35	6.99					3	3.11	3.87	0.0055	0.0597	0.0368	0.0
19 F390 72BLE-19 390 1	0	2	5.80	103.33	7.47		2	0.50	5.30	2	3.06	4.91	0.0534	0.0388	0.0465	0.0
21 G350 72BLE-21 350 2G	0	3	6.47	93.69	5.85		1	0.49	5.63	3	2.50	3.36	0.0842	0.2484	0.0431	0.0
20 F300 SWRI20 300 1	0	2	7.54	71.05	8.65								0.0206	0.0040	0.0760	0.0
14 F361 SWRI14 361 1	0	3	10.99	160.95	4.66								0.0314	0.0418	0.0646	0.0
18 GM350-4 SWRI18 350 4	0	2	3.83	80.54	6.26								0.0628	0.0059	0.0203	0.0
19 V345 SWRI19 345 1	0	2	4.78	118.32	4.86								0.0089	0.0512	0.0698	0.0
15 D413 SWRI15 413 1	0	2	7.10	158.11	5.34								0.1801	0.0015	0.0583	0.0
17 GM427 SWRI17 427 1	0	2	5.97	50.77	8.09								0.0497	0.0037	0.0647	0.0
16 GM454 SWRI16	0	2	2.91	74.91	4.57								0.0606	0.0468	0.0047	0.0

454 1										
21 V304 S*R121	0	2	4.06	85.58	5.78			0.0174	0.0292	0.0697	0.0
304 1										
AVERAGES: :								0.0694	0.0608	0.0628	0.0

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 GGGG     A      SSSS  00000  L        III   N   N  EEEEE
G        A A    S      0   0  L         I    NN  N  E
G  GG   A   A    SSS   0   0  L         I    N N N  EEEE
G   G   AAAAA      S   0   0  L         I    N  NN  E
 GGGG   A   A   SSSS   00000  LLLLL    III   N   N  EEEEE
```

TABLE 4: SALES-WEIGHTED TRANSIENT ENGINE EMISSIONS(GRAMS/MI) PAGE NO. 4
1972 / 1973 BASELINE ENGINE(S)

AUG 27, 1980

ENGINE			NTG. FATOR	SIZE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE NOX	GRAMS/MILE PART	WEIGHTED GRAMS/MI HC	WEIGHTED GRAMS/MI CO	WEIGHTED GRAMS/MI NOX	WEIGHTED GRAMS/MI PART	NON-METHANE HC FACTOR	NON-METHANE HC SIZE	NON-METHANE HC G/MILE	NON-METHANE HC WTD.G/MI
01	F330 72BLE-1	0	0.11034	3	8.06	125.69	14.14	0.0	0.889	13.868	1.560	0.0	0.17955	2	7.55	1.356
	330 1															
02	F361 72BLE-2	0	0.05237	3	17.40	305.38	10.59	0.0	0.911	15.994	0.555	0.0				
	361 1															
03	GM350 72BLE-3	0	0.05587	3	12.83	196.34	11.17	0.0	0.717	10.969	0.624	0.0	0.09091	1	11.49	1.045
	350 2G															
04	IHCV345 72BLE-4	0	0.04190	4	7.48	166.35	8.69	0.0	0.313	6.970	0.364	0.0	0.06818	4	6.81	0.464
	345 1															
05	F360 72BLE-5	0	0.10615	3	14.66	247.68	13.45	0.0	1.556	26.290	1.428	0.0	0.17273	3	13.94	2.408
	360 1															
07	318 72BLE-7	0	0.00978	3	8.73	128.66	16.97	0.0	0.085	1.258	0.166	0.0	0.01591	2	12.46	0.198
	318 1															
08	V345 72BLE-8	0	0.04190	3	11.74	155.41	17.11	0.0	0.492	6.512	0.717	0.0	0.06818	3	10.99	0.750
	345 1															
09	292 72BLE-9	0	0.01257	2	6.21	90.48	10.32	0.0	0.078	1.137	0.130	0.0	0.02045	2	5.73	0.117
	292 1															
10	C360 72BLE-10	0	0.00279	3	21.78	275.24	12.08	0.0	0.061	0.769	0.034	0.0	0.00455	1	40.04	0.182
	360 1															
11	G350 72BLE-11	0	0.01397	3	8.52	144.34	10.58	0.0	0.119	2.016	0.148	0.0	0.02273	2	7.58	0.172
	350 4															
12	G350 72BLE-12	0	0.01397	4	9.95	193.75	8.80	0.0	0.139	2.706	0.123	0.0	0.02273	4	9.10	0.207
	350 4															
13	G350 72BLE-13	0	0.01397	3	7.01	130.83	12.68	0.0	0.098	1.827	0.177	0.0	0.02273	3	6.41	0.146
	350 4															
14	F390 72BLE-14	0	0.02933	2	11.33	271.49	11.46	0.0	0.332	7.963	0.336	0.0	0.04773	2	10.47	0.500
	390 1															
16	G350 72BLE-16	0	0.01397	4	13.56	228.14	8.89	0.0	0.189	3.186	0.124	0.0	0.02273	4	12.44	0.283
	350 4															
17	F392 72BLE-17	0	0.06285	5	10.20	242.18	9.26	0.0	0.641	15.221	0.582	0.0	0.10227	5	9.19	0.939
	392 1															
18	G350 72BLE-18	0	0.05587	3	12.25	190.48	11.64	0.0	0.684	10.641	0.650	0.0				
	350 2G															
19	F390 72BLE-19	0	0.02933	2	11.74	208.94	16.12	0.0	0.344	6.128	0.473	0.0	0.04773	2	10.72	0.512
	390 1															
21	G350 72BLE-21	0	0.05587	3	9.74	141.51	8.78	0.0	0.544	7.905	0.490	0.0	0.09091	1	8.32	0.756
	350 2G															
20	F300 SWRI20	0	0.02933	2	7.83	92.68	11.28	0.0	0.288	2.718	0.331	0.0				
	300 1															
14	F361 SWRI14	0	0.05237	3	17.31	253.68	7.34	0.0	0.906	13.286	0.384	0.0				
	361 1															
18	GM350-4 SWRI18	0	0.01397	2	6.34	133.47	10.37	0.0	0.089	1.864	0.145	0.0				
	350 4															
19	V345 SWRI19	0	0.04190	2	8.64	203.00	8.78	0.0	0.362	8.506	0.368	0.0				
	345 1															
15	D413 SWRI15	0	0.04749	2	12.87	286.13	9.66	0.0	0.611	13.587	0.459	0.0				
	413 1															
17	GM427 SWRI17	0	0.04469	2	11.42	97.10	15.48	0.0	0.510	4.340	0.692	0.0				
	427 1															
16	GM454 SWRI16	0	0.03631	2	5.38	138.38	8.46	0.0	0.196	5.025	0.307	0.0				

```
     454      1
21 V304 SWRI21       0  0.01117   2   6.29 132.56   9.16   0.0    0.070   1.481  0.102  0.0
     304      1

SALES-WEIGHTED GAS BAG TOTALS:                                    11.23  192.17  11.47   0.0                    10.034

  75% REDUCTION FROM BASELINE:                                                    2.867
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```
 GGGG     A      SSSS  00000  L        III   N    N  EEEEE
G        A A    S      0   0  L         I    NN   N  E
G  GG   A   A    SSS   0   0  L         I    N N  N  EEEE
G   G   AAAAA      S   0   0  L         I    N  NN  E
 GGGG   A   A  SSSS    00000  LLLLL    III   N    N  EEEEE
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