EPA/AA/CTAB-87-04

Technical Report

Evaluation of a Resistively Heated Conductive Ceramic Fiber Diesel Particulate Filter

by

Robert I. Bruetsch

June 1987

NOTICE

Technical Reports do not necessarily represent final EPA decisions or positions. They are intended to present technical analysis of issues using data which are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments which may form the basis for a final EPA decision, position or regulatory action.

U. S. Environmental Protection Agency
Office of Air and Radiation
Office of Mobile Sources
Emission Control Technology Division
Control Technology and Applications Branch
2565 Plymouth Road
Ann Arbor, Michigan 48105

Table of Contents

Background of Diesel Particulate Control

New vehicle emission standards for diesel particulate exhaust emissions (see Table 1) which necessitate the use of more stringent control strategies for diesel-powered vehicles have generated considerable interest in the development of diesel particulate filtering and regenerating devices. Studies of various systems by a number of diesel vehicle manufacturers and related companies have been reported in the literature and a number of test programs have been performed by EPA and MVEL.

Diesel engines are generally more efficient than similarly sized gasoline-fueled engines. This phenomenon is particularly prevalent when the price of crude oil is high. Currently, gasoline prices in the United States are relatively low and not much more expensive than diesel fuel. This has accounted for much of the sluggish light-duty diesel sales currently seen in the United States market. Gasoline prices are, however, unlikely to stay as low in the future as more small oil companies are forced out of the market and foreign sources cut back on production. Trends in diesel emission standards, ambient air concentrations, and diesel sales are listed in Table 2.

The decrease in sales of diesel vehicles is not as prevalent in Europe, particularly in West Germany, where gasoline prices have remained much higher relative to diesel fuel prices and where diesels have always been a large part of the light-duty passenger car market.

North American delivery trucks and other medium-duty trucks continue to be, as they have been in the past, largely comprised of diesel-powered vehicles and have seemingly been unaffected by changes in fuel prices.

Heavy-duty vehicles have always been dominated by diesel-fueled engines and will probably continue to be in the future due to the better fuel economy, durability and torque characteristics of these larger sized diesel engines compared to similarly sized gasoline-powered truck engines.

Diesel emissions of primary concern are particulates which are emitted in very small (most less than 1.0 micron in diameter) soot particles and are therefore inhalable. These inhalable particulates are widely believed to be human carcinogens. Animal studies have shown them to deteriorate pulmonary functions and cause tumors. Exhaust particulate is comprised of carbonaceous organics, sulfates, and lead. The hydrocarbon compounds in diesel fuel exhaust generally cause the characteristic unpleasant odor experienced by motorists who have had the opportunity to drive behind a diesel-powered vehicle. Also, the inverse relationship between particulate and NOx emissions makes simultaneous control of both pollutants difficult. Noble metal catalysts, which are used to lower the

Table 1

EPA Promulgated Diesel
Particulate Emission Standards

Model Year	Passenger Cars	Light Trucks	Heavy Engines
Pre-1982	NC	NC	NC
1982-86	0.60 g/mile	0.60 g/mile	NC
1987	0.20 g/mile[A]	0.26 g/mile[B]	NC
1988-90	0.20 g/mile	0.26 g/mile	0.60 g/BHP-hr
1991-93	0.20 g/mile	0.26 g/mile	0.25 g/BHP-hr[C]
1994+	0.20 g/mile	0.26 g/mile	0.10 g/BHP-hr[D]

NC = No controls.
A = Emission averaging may be used to meet this standard.
B = Emissions averaging may be used to meet this standard provided that trucks produced for sale in California or designated high-altitude areas may be averaged only within each of those areas.
C = Emissions averaging may be used to meet this standard, but these emissions may not be averaged with HD gasoline emissions. Averaging is restricted to within useful life subclasses. Also, averaging is restricted regionally--the two regions are California and the other 49 states. For urban bus engines, the standard is 0.10 g/BHP-hr--particulate averaging is not allowed with this standard, but emissions from these engines may be used in NOx averaging.
D = Emissions averaging may be used to meet this standard. However, averaging is restricted to within useful life subclasses. Also, averaging is restricted regionally--the two regions are California and the other 49 states. Emissions from engines used in urban buses may not be included in the averaging program.

TABLE 2

DIESEL PARTICULATE EMISSION STANDARDS, EXPOSURE ESTIMATES, AND DIESEL SALES TRENDS

U.S. ENVIRONMENTAL PROTECTION AGENCY

DIESEL PARTICULATE STANDARDS

Light-Duty Vehicles
Standard (gram/mile)

Year	Cars	Trucks
1981 and prior	—	—
1982-1986	0.60	0.60
1987 and later	0.20[a]	0.26[a]

Heavy-Duty Vehicles

Year	Standard (gram/brake – horsepower-hour)	Approximate Fleet Average (gram/mile)
1987 and prior	—	—
1988-1990	0.60	1.42
1991-1993	0.25[a]	
	0.10[b]	0.55
1994 and later	0.10	0.23

[a] Emissions averaging may be used to meet this standard. For trucks and heavy-duty vehicles, some restrictions apply.

[b] For urban bus engines, the standard is 0.10 g/Bhp-hr beginning in 1991. Particulate averaging is not allowed with this standard.

PRELIMINARY DIESEL PARTICULATE EXPOSURE ESTIMATES IN URBAN AREAS

Year	Annual Personal Exposure (ug/m^3)
1986	2.8
1995 Low Sales	1.0
1995 High Sales	1.4

CURRENT AND PROJECTED DIESEL SALES

Light-Duty Vehicles

Year	Percent of Sales
1986	0.9
1995	
Low	0.9
Medium	5.0
High	11.5

Light-Duty Trucks

Year	Percent of Sales
1986	2.6
1995	
Low	2.6
Medium	15.0
High	33.9

Heavy-Duty Vehicles*

Year	Percent of Sales 2B	3-5	6	7-8
1986	19.0	24.7	54.0	86.8
1995	30.0	30.0	71.2	88.3

* 2B = 8,500 to 10,000 lbs.
3-5 = 10,001 to 19,500 lbs.
6 = 19,501 to 26,000 lbs.
7-8 = 26,001 lbs. and up.

soot ignition temperature and oxidize HC and CO emissions in some diesel particulate control devices, have the adverse characteristic of increasing sulfate emissions. Base metal catalysts generally don't create large amounts of sulfates from diesel vehicles, but unfortunately, don't oxidize many HC or CO emissions either. The characteristics of diesel particulate emissions, aside from their concentrations, are similar for all types of diesel vehicles.

Most EPA diesel trap testing done to date has involved evaluation of a variety of non-conductive ceramic wall-flow type diesel particulate filters for light-duty application provided by NGK, Matsushita, Mercedes-Benz (Corning) and Babcock & Wilcox on a bench fixture close-coupled to the exhaust pipe of a 1975 Mercedes 300D. These tests have shown some degree of success with trapping efficiencies ranging from roughly 60 to 90 percent and regeneration times as low as 10 minutes or so. Catalyzed and uncatalyzed filters have been evaluated with face-mounted and/or axial heaters with 800-1000 W power applied to initiate soot combustion. Various problems have been encountered in performing these evaluations, particularly, heater wire short-circuiting and poor flame propagation, which together reduce regeneration efficiency significantly. With most diesel particulate control systems developed to date, soot collection is not a problem. Efficient and complete regeneration with no deterioration of diesel control system durability, however, is a significantly more difficult task. In most wallflow filters, hot spots usually develop at the center of the outlet end of the filter. Other problems develop from nonuniform loading and/or electrical heating of these systems. Design considerations when developing a feasible diesel particulate regeneration system include: filter porosity, filter surface area, system costs, durability, adaptability to regeneration (self-cleaning) techniques, impact on engine (performance, fuel economy, engine durability), and space requirements.

As a result of these test programs, we became interested in fiber and foam-type ceramic filters which have been shown in the literature to be more conductive and ignitable than the wall-flow types. In addition, we became interested in ceramics which offer the ability to be resistively heated uniformly, i.e., potentially eliminating the propagation problem and shortening regeneration time.

Though various types of resistively heated ceramic foam filters are currently being developed, most of EPA's evaluation has involved the Coloroll (formerly Fogarty) filters since they have been developed into an onboard vehicle regenerable particulate filtering device (RPFD) complete with diesel particulate filters, power supply and container. Only machined ceramic materials have been received from other suppliers. The following discussion, therefore, describes EPA evaluation of the Coloroll RPFD.

Test Vehicle and Fuel

The test vehicle being used for diesel trap evaluations is a 1975 Mercedes-Benz 300D Sedan (Vehicle Identification No. 011511412019885). This vehicle is equipped with a mechanically fuel injected, naturally aspirated, 183 cubic inch, in-line 5-cylinder diesel engine. Vehicle inertia weight is 4,000 lbs. The vehicle is fueled with No. 2 diesel fuel from Phillips Oil Co., Bartlesville, OK. Vehicle exhaust flow ranges from about 16-20 cfm at idle to about 50 cfm at 60 mph. Exhaust gas temperatures range from about 275°F at idle to about 725°F at 60 mph at the inlet of the test device. Exhaust gas temperatures are generally 50°F to 100°F higher at the exhaust manifold outlet.

RPFD Description and Bench Evaluation

A diagram of the Coloroll regenerable diesel particulate filtering device is shown in Figure 1. Three hollow cylindrical silicon-carbide filter elements are spring loaded (at 20-25 kg) between two stainless steel electrical leads. This assembly is sandwiched between two solid ceramic insulator rings which are attached to two metal plates inside of a 10-inch diameter cylindrical can. Exhaust flows into the can around the front end plate and radially inward through the filters. Diesel soot accumulates mainly on the outside of the filters and is burned off during regeneration when voltage is applied through the electrical leads. The remainder of the exhaust products flow through the filter walls and escape at the open outlet end of the hollow filters. These filters were uncatalyzed, but were flame-sprayed on the ends with metal alloys to improve ceramic to metal interface electrical contacts and resist oxidation at high temperatures. Some properties of these porous filters are listed below:

Power Density	10-1600 W/cm^3
Normal Range	10-300 W/cm^3
Power Dissipation	0.01-0.75 W/cm^2
Response Time	milliseconds
Heat Up Time	20-30 seconds (@ 800 watts/filter)
Heat Transfer:	
Surface/Volume	400-750 cm^2/cm^3
Operating Temperature	Up to 1000°C
Material Density	0.1-0.5 gm/cm^3

The original test plan for the Coloroll particulate trap initially involved a backpressure determination to define a "clean" trap value (in inches H_2O), prior to loading the trap with soot. It was decided that the trap would be loaded at 40 mph steady state to no greater than three times the initial backpressure at first to condition the filters and determine characteristic load-up time. New filters usually exhibited an

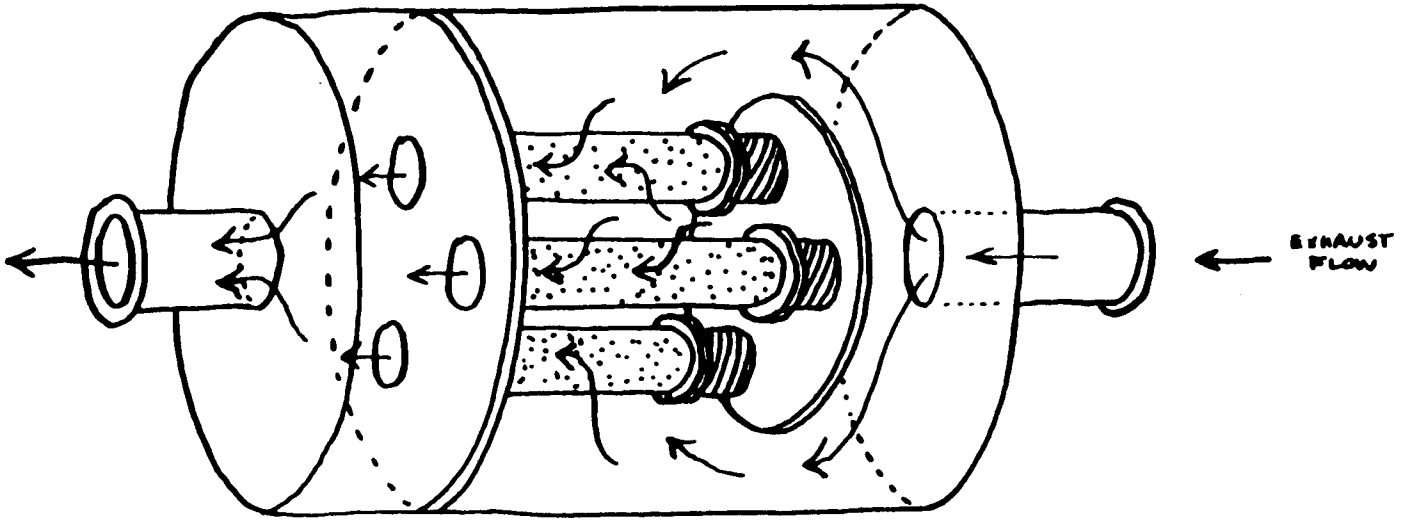


FIGURE1: DIAGRAM OF THREE FILTER METALLIZED RESISTIVELY HEATED Si-C DIESEL TRAP SYSTEM

initial backpressure of about 10-20 in. H_2O and roughly 30-40 in. H_2O after a few regenerations. Filters have been loaded to greater than 200 in. H_2O (5-7 grams soot) in under 20 miles (less than 2 LA-4s) with no reported driveablity problems on the Mercedes 300D test vehicle.

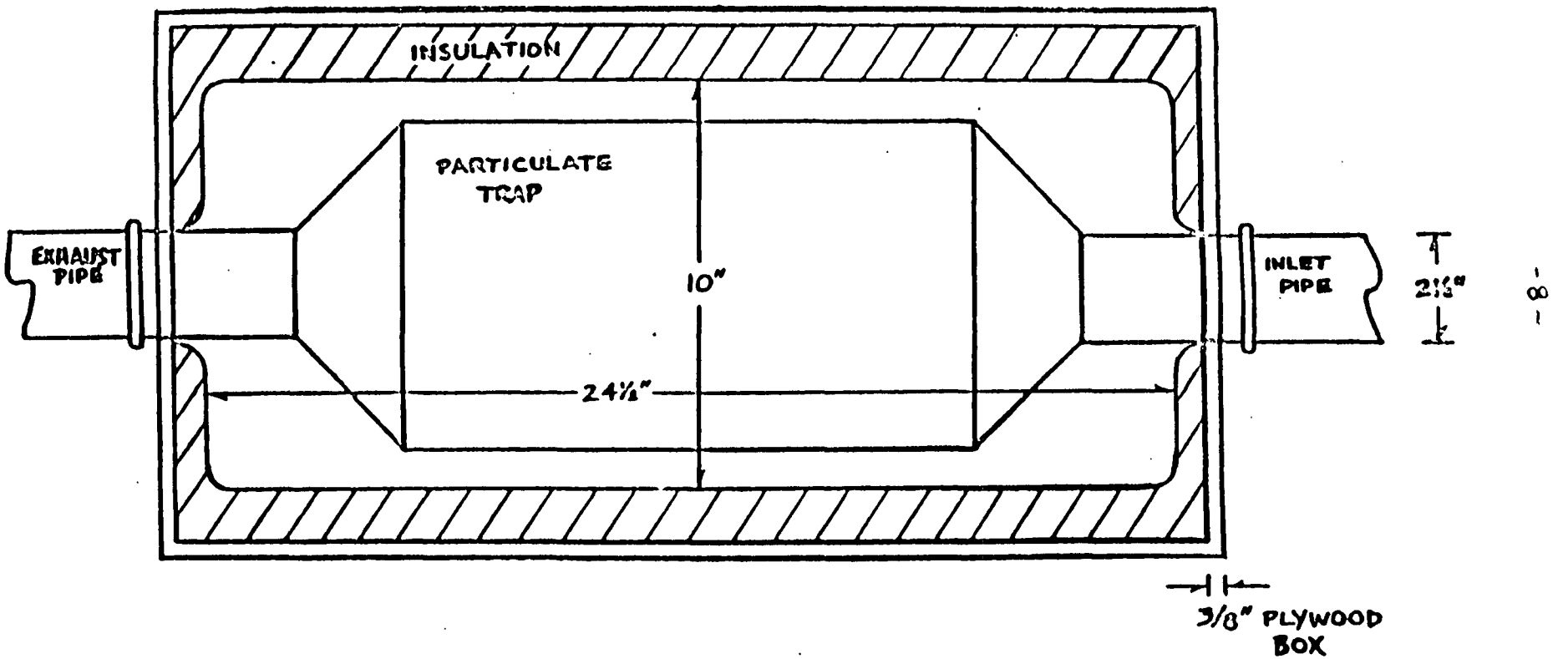
The Coloroll particulate regeneration system was tested both in a bench fixture and onboard the Mercedes test vehicle. The bench fixture consists of an insulated plywood box with a hinged top and a hole at either end for inlet and exhaust pipes. A plan view of the bench fixture is shown in Figure 2. The bench fixture was used to place the trap and measurement instruments in close proximity to the technician and engineer during regenerations. For onboard testing, the vehicle was equipped with a rack along the passenger side on which the particulate trap was placed. The vehicle exhaust system was insulated and rerouted to couple with the side-mounted trap system. With this setup, the trap was located about three feet downstream of the exhaust manifold.

With both bench and onboard configurations, continuous measurements of several parameters were made during regeneration. An MGA-90 Sun Analyzer allowed instantaneous measurement of percent oxygen, percent CO, percent CO_2 and ppm HC emissions. Continuous values were recorded on an Esterline strip chart recorder. The power supplied to the RPFD was monitored by two Fluke 8600A multimeters, one monitoring volts and the other monitoring amps. Since the amount of power supplied to the regeneration system is critical, these meters were monitored throughout each test sequence and were checked frequently for precision with hand-held Fluke meters. Backpressure was measured before and after each regeneration to determine the effectiveness of the regeneration procedure and the completeness of the burn.

The Coloroll power controller consists of a thyristor controller, a three terminal temperature controller with a K-type thermocouple for sensing outlet gas temperature, and a 5 KVA transformer for voltage output of either 25V or 50V, all contained in a 26" x 18" x 18" power supply box.

The power controller is a single-phase unit capable of being operated at 220/240 volts (a.c.), and frequencies of 50 or 60 Hz. The primary voltage is fed to the transformer via a 25 amp thyristor. The thyristor is fitted with a current limiter and this controls the power (or current) applied to the heater. The current limit is controlled by a dial indicator on the front of the power supply box. The temperature controller controls the temperature on the outlet of the Coloroll diesel filter assembly to the set temperature on the dial indicator. Opposite the thyristor inside the power supply box are two 2.5 KVA transformers. Power can be obtained in one of two modes:

FIGURE 2. PLAN VIEW OF DIESEL PARTICULATE TRAP BENCH TEST FIXTURE



OUTSIDE BOX DIMENSIONS = 26.375"L X 13.312"W X 13.062"H

INSIDE BOX DIMENSIONS
(WITH INSULATION) = 24.5"L X 10.0"W X 10.0"H

1. 50 volts @ 100 A = 5 KVA (connected in series); or
2. 25 volts @ 200 A = 5 KVA (connected in parallel).

Through all testing, power was obtained with the transformer in mode 2. The unit is fitted with an external isolation plug as a safety shutoff device.

Prior to operation, the dial indicator and the temperature controller are set to zero and the isolation plug is pulled out. To obtain digital readout of outlet temperature, the thermocouple from the heater outlet is plugged into the rear of the power supply box. The temperature controller is then set to the desired temperature (900°C for maximum power). Plugging in the isolation plug will then light up the temperature readout.

The heater can then be switched on. The dial indicator is turned up to the desired current as indicated on the ammeter. The Coloroll RPFD is designed to take about a maximum of 100A (at 25V, a maximum power input of 2.5KW). At the completion of a test, the dial is turned back to zero. Air supply to the Coloroll RPFD, if any, is then shut off, the isolation plug is unplugged, trap backpressure is checked, and the heater is allowed to cool to room temperature.

Periodic filter resistance checks were made. The electrical resistance across each filter is typically 0.5-0.6 ohms. Filter deterioration and/or failure is usually characterized by a drastic change in electrical resistance. A low reading (e.g., 0.1 ohm) usually indicates filter element failure due to cracking, chipping, or other filter deterioration which contributes to current short circuiting or channeling. A high resistance (e.g., 5 ohms) indicates bad electrical contacts in the form of flame spray deterioration, element pitting, or power supply wire terminal failure. Generally, the thyristor fuse is checked in the event of element failure. Maximum power supplied to the heater was determined by the material supplier to be 2.5 kW (833 watts per filter) though it was found later to operate quite efficiently at much lower power settings.

Originally, the RPFD supplier requested that at least 1 or 2 CFM air or exhaust flow be added throughout regeneration. Eventually, through experimental observation, it was found that no flow during the first minute of regeneration was preferred while the filters were heating up to a stabilized temperature.

Periodic Regeneration Optimization

Initial tests were conducted to determine how efficiently these filters could be regenerated. Though the filters loaded up quickly, it was observed that they could load up to

backpressures in excess of 200 inches of H_2O (7.2 psi) measured at 60 MPH (steady-state loading performed at 40 MPH) without any noticeable deterioration in vehicle driveability. In the interest of preserving the integrity of the filters, low power settings were used initially during regeneration and small amounts of air were injected any time the filters were heated. Since they are not mass produced, filter elements were in short supply, so we decided not to test their regenerative capabilities in a failure mode in the preliminary test phase.

These initial tests showed that the system was extremely efficient at burning soot both uniformly and completely from the silicon-carbide filters. The filters heated up quickly and soot ignition occurred with little or no oxygen injected. As expected, regeneration characteristics improved with higher filter loadings and higher power input.

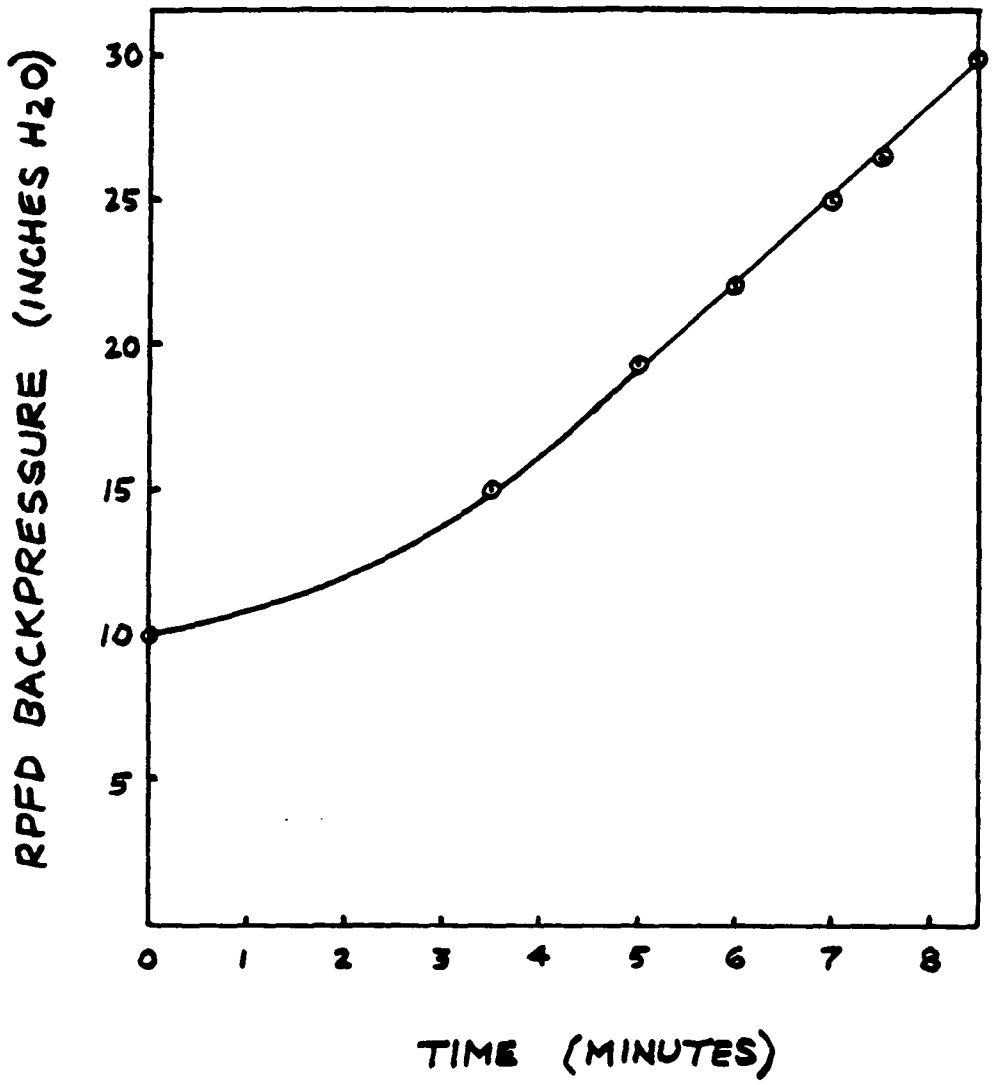
The first set of filters were bench tested with 1360 watts (453 watts per filter) applied @ 85 amps with constant room temperature (74°F) air at a flowrate of 4 cfm through the device. Outlet temperature stabilized in roughly 5 minutes at 480°F$\pm$4°F, which is close to the soot ignition temperature.

The RPFD was then loaded with soot by a warmed-up Mercedes vehicle cruising at 40 MPH from an original backpressure of 10 inches of H_2O measured at 60 MPH to three times the initial backpressure (30 in. H_2O). The filter backpressure increased 2.35 in. H_2O per minute and had increased threefold in 8-1/2 minutes or less than six miles (Figure 3). This is an extremely fast backpressure rise compared to most diesel particulate filters currently being developed. Apparently, though diesel particles are very small in diameter, the pore size of the filter material is also quite small such that particulate tends to load on itself on the outer surface of the filter rather than throughout the filter volume. As a result, though the filter has a void volume of 90 percent, it loads quickly as small pores get clogged with agglomerating soot.

These filters were then regenerated in the bench fixture at the same power setting and flowrate until outlet temperature again stabilized. From the drop in oxygen content in the RPFD we observed that most of the burn occurred several minutes before outlet temperatures stabilized. The RPFD backpressure was then checked @ 60 MPH and had returned to the initial 10 in. H_2O.

Regenerations were continued with higher and higher loadings and power settings. It was found that with 2.5 kW applied (833 watts/filter) complete regeneration could be achieved in less than 3 minutes. Several test runs were performed at this "maximum" power input setting and quick thorough regenerations were obtained. However, it soon became obvious that these were not the most ideal conditions for regenerating the Coloroll RPFD, especially when engine exhaust was flowed through the system instead of shop air.

FIGURE 3. STEADY-STATE (40 MPH) LOADING OF INITIAL RPFD FILTERS



Regeneration under these full power conditions was achieved with some degree of success. However, as was determined experimentally, operation at these high power settings leads to rapid filter deterioration in the form of ceramic filter/stainless steel interface pitting, filter cracking, and overheating due to the high thermal loading on the filter. Often, the current supplied would short circuit across the filter or overload and burn out the power supply wiring.

This situation was apparently exascerbated by exposure of the very hot filters to diesel exhaust during regeneration. The extent of filter deterioration due to exhaust exposure (oxidation) versus that due to thermal shock and short circuiting is unknown. However, filter durability was much better when shop air was used as an oxygen source rather than engine exhaust. Also, only a minimum amount of air flow (1-2 cfm) was found to be desirable since too much flow caused soot to blow off the filter into the can rather than enhance the burn rate and reduce filter temperature at the same time. High temperature flow (near 900°F) did not cool the filter as much. However, the soot flaking problem still occurred even when one filter outlet was fitted with a plate to restrict flow when only this filter was powered during regeneration.

Flowrate Optimization

As more filters became damaged at elevated power settings, airflow optimization was pursued in an attempt to enhance filter durability. Even though it was surmised that the power input was somewhat high for an onboard commercial RPFD in terms of power and fuel economy penalties, quick complete uniform regeneration was seen as a decided improvement over other systems and a capability of the RPFD not to be compromised. Therefore, other parameters were initially investigated to improve RPFD durability.

Both shop air and engine exhaust flow were alternately pumped through the RPFD during regenerations under various loadings and time durations. Filters deteriorated much more rapidly at all flowrates when engine exhaust was used rather than shop air. It was hypothesized that the elevated temperatures of high diesel exhaust flowrates had a more severe oxidizing effect than room temperature shop air, particularly on the ends of the filters where pitting occurred, or where accumulating soot decreased the actual surface where the ceramic and metal come in contact and current is exchanged. Though soot particles are somewhat conductive, they are probably not as conductive as the filter material as judged by the higher surface resistances of sooted filters. High exhaust flowrates also tended to increase backpressure faster than soot could be burned.

Shop air was then used exclusively and a trap bypass system was configured. It was observed that the RPFD worked best when no airflow was added during the first minute or so as the filters were heating up. Then during the next two minutes (when most of the burn occurs) a minimal airflow (1-2 cfm) appeared to provide the oxygen needed to sustain the burn without having a cooling effect on the filters. Finally, as more soot was burned and backpressure decreased (after about 3 minutes) less airflow was needed to complete the regeneration and lower flowrates (0.5-1.0 cfm) were found to be optimum.

Continuous "Clean Trap" Regeneration

Even with soot loading and airflow optimized, problems with filter failures continued as long as maximum power was applied during regeneration. The thermal stress of the high current across the interface of solid metal to porous ceramic was still a significant problem and investigations of various methods of bonding the ceramic to the metal electrical leads were then initiated.

Concurrent with these efforts to improve the ceramic to metal contact, ways were investigated to lower the power demand for regeneration while still maintaining the quick and thorough regeneration characteristics displayed at high power. A variable porosity filter, with maximum filter density at the ends (electrical interfaces) and maximum porosity in the middle of the filter for better soot loading capacity, was suggested as a solution to the ceramic/metal interface problem. The ceramic material suppliers considered this alternate filter design when efforts to improve metal flame-spraying techniques showed little benefit. However, in order to ensure the uniform electrical properties of the filters were maintained when powered, they had spent considerable development effort and company resources to produce uniform density filters. Production of uniform density ceramic filters is a significant contribution to this technology in the RPFD application.

Therefore, a variable cross-section filter was proposed as an alternate solution to the problem. The idea was to have greater cross-sectional area at the ends of the filters than in the middle to increase interface contact area and increase current density in the middle of the filters where the most soot ignition is desired to take place. This type of filter configuration was being developed and tested in the laboratory when a transition in company management caused some discontinuity in the test program.

In the meantime, it was decided to pursue a "continuous" regeneration test sequence in which just enough power was continuously input to the RPFD to maintain a constant backpressure, with variable flow from the changing exhaust flowrates of transient speed/load engine operation. Graphs of

exhaust flow versus power to the RPFD were expected to show that the exhaust flow would actually have a cooling effect on the filters and that higher power was needed at higher exhaust flowrates. Figure 4 shows this expected effect which was later observed in the laboratory, but with little data and at a cost of more ceramic filters. High speed simultaneous loading and burning of the soot destroyed the ceramic filters faster and more severely than before even though lower current was being applied. This is attributed to the combined effects of higher exhaust flow rates and oxidation at elevated exhaust temperatures. A few data points were plotted to show the general trend displayed in Figure 4, but it was decided to determine filter surface temperature vs. power to see if the heat from the exhaust gases was of any benefit at all during regeneration.

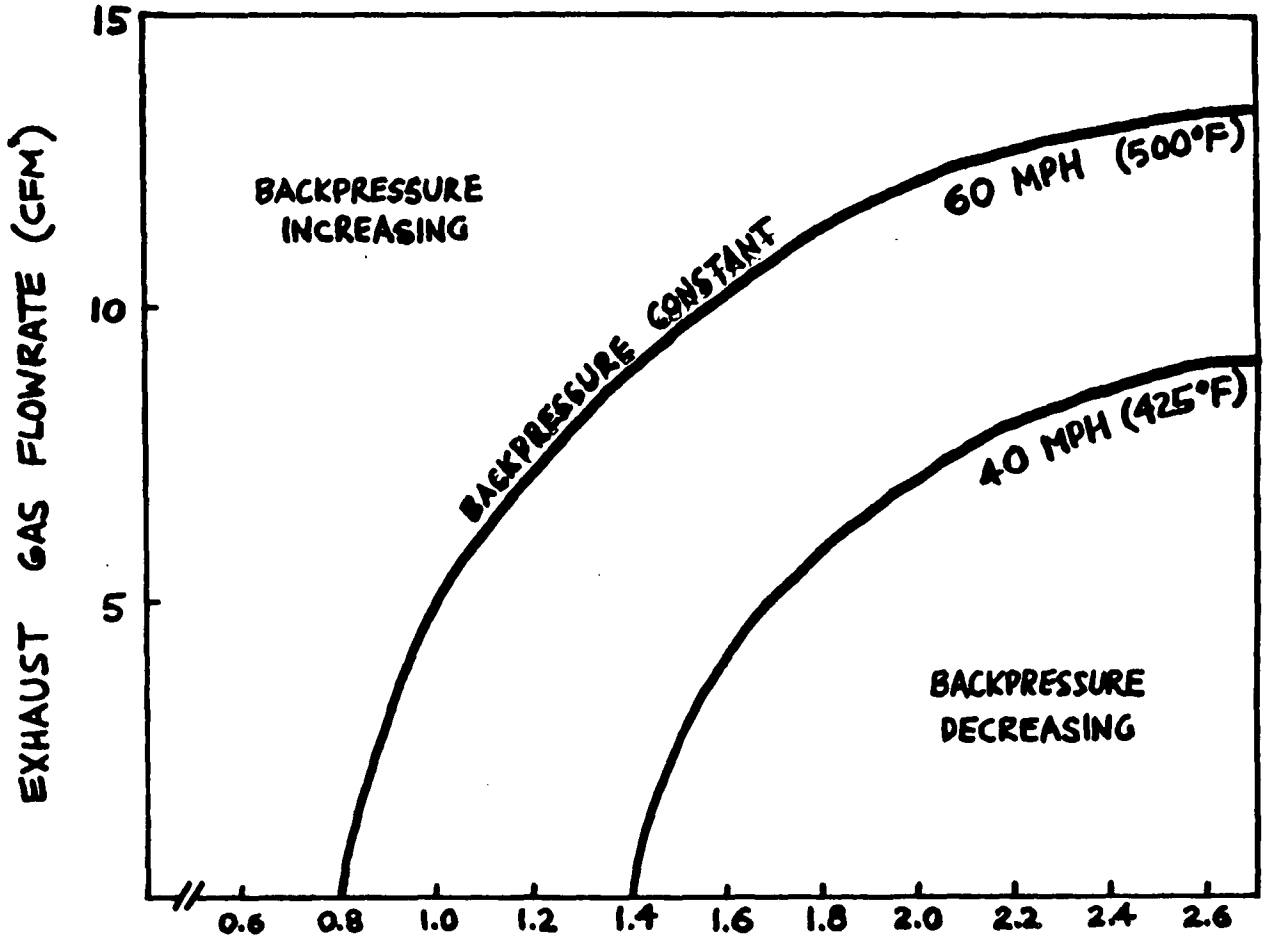
It appeared the bypass system was the best configuration for the RPFD since, if filter surface temperature was as high as believed, the exhaust gases would only be cooling (and oxidizing) the filters even at high speeds (maximum exhaust temperatures) and the RPFD close-coupled to the exhaust manifold.

It was believed that at maximum power, filter temperature was over 1000°F (538°C) perhaps even 1200°F (650°C). Exhaust gas temperature never exceeded 900°F (482°C) at the exhaust manifold outlet even at 60 MPH. Filter surface temperature could not be measured accurately with standard thermocouples and it was desired not to create hot spots on the filter surface attempting to make such measurements. We did not have access to our own optical pyrometer that operated in the same temperature range of the ceramic filters during regeneration even though a quartz window was installed in the side of the RPFD to observe the filters as they burned soot. The ceramic material supplier did have an optical pyrometer, however, and took some measurements of some clean (unsooted) filters at 800 watts and varying (room temperature) air flowrates. The results are shown in Figure 5.

As displayed in Figure 5, with no flow through the filters, the filter surface temperature stabilized in about 1 minute at 600°C, well above the soot ignition temperature. This supported the perception that the filters had the ability to self-ignite, even in the absence of excess oxygen. When nitrogen was flowed through the RPFD prior to a regeneration to purge all oxygen from the RPFD, the filters still ignited when current was applied.

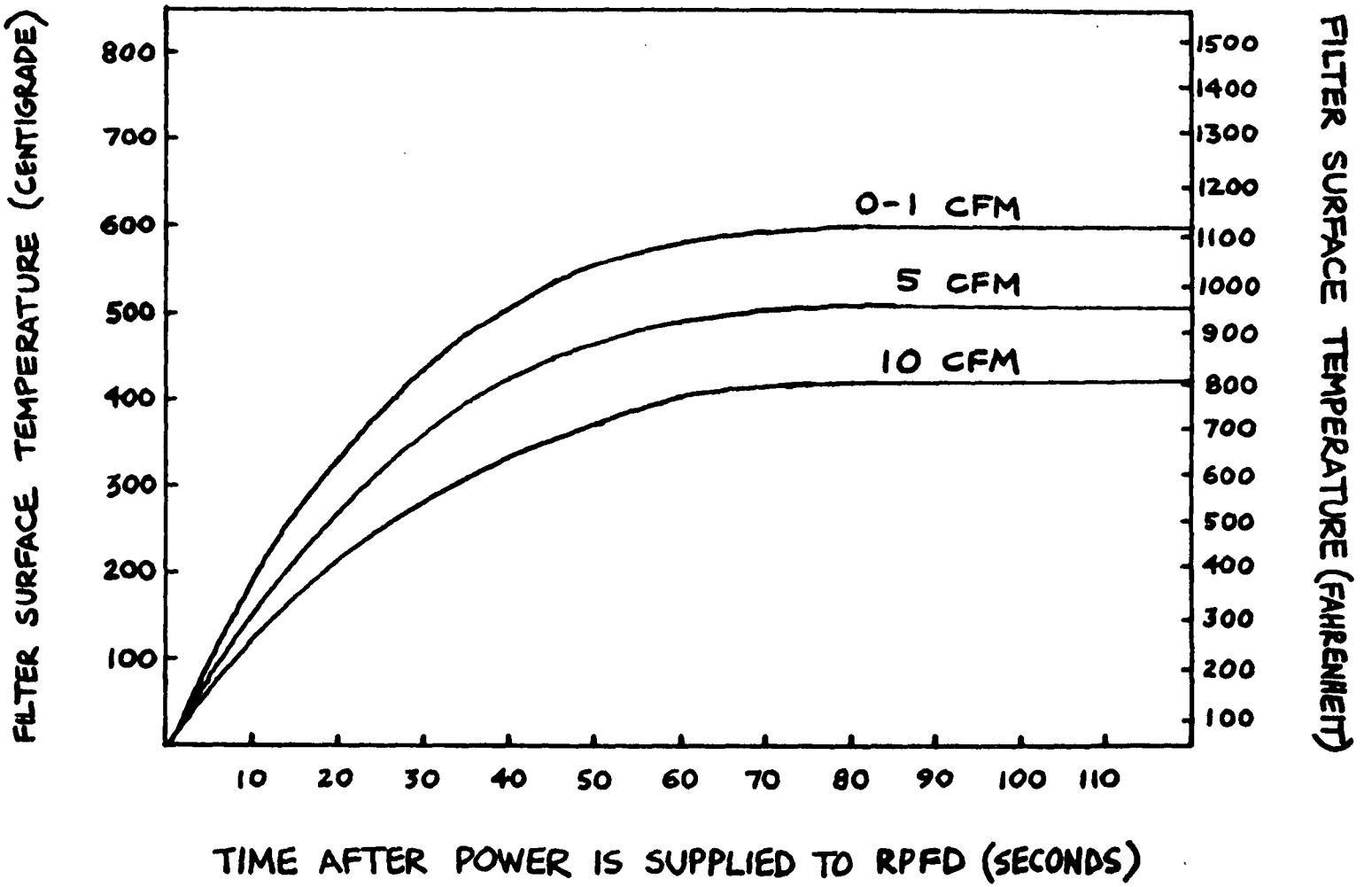
As flow rate was increased, little effect on filter surface temperature was noticed up to 1.0 cfm. Above 1.0 cfm filter surface temperature dropped almost linearly at a rate of approximately 20°C (36°F) per 1.0 cfm in the range of 1-10 cfm. Regeneration with shop air at room temperature did not have a greater cooling effect on the filters than the relatively hot exhaust gases as long as flowrates were kept low, (i.e., below 2 cfm.)

FIGURE 4. STEADY-STATE CONTINUOUS "CLEAN TRAP"* REGENERATION



* CLEAN TRAP = UNLOADED FILTER BACKPRESSURE.

FIGURE 5. EFFECT OF AIR FLOWRATE ON FILTER SURFACE TEMPERATURE AT 800 WATTS PER FILTER



It was surmised that another way to reduce the power requirement to the RPFD for regeneration was to only burn one filter at a time. A "revolver configuration" was envisioned in which a sealed revolving plate rotated at the inlet to the RPFD such that two filters were exposed to diesel soot, while the third was burned. When the burning filter was completely regenerated, the plate would revolve 120° and block or restrict total flow to the next filter to be burned. We did not modify the RPFD to test this configuration nor did we have an adequate system for sealing the filter ends to the revolving plate. However, with the idea of optimizing the RPFD geometry for a feasible diesel automobile or truck production application, and keeping in mind the need to regenerate these filters frequently, the revolver idea was submitted as a means of decreasing power demands on the vehicle by a factor of three at any time during normal urban or highway vehicle operation.

Now that airflow requirements to the RPFD appeared to be more rigorously defined, a test sequence to determine how regeneration efficiency varied with the power applied to the RPFD was performed to further optimize the system for practical vehicle operation.

Regeneration Efficiency Evaluation

In order to compare the results of subsequent regenerations a more standardized procedure was adopted. It was decided that test regenerations would be 5 minutes in duration with the optimized airflow schedule already determined, such that power could be varied to determine the relationship between power, frequency of regeneration, and regeneration efficiency in terms of change in backpressure.

For the purposes of this experiment, regeneration efficiency was defined as:

$$\text{Regeneration efficiency}^{*} = \frac{100\ (BPL - BPF)}{BPL - BPI}\ (\%)$$

Where:

BPL = Backpressure of filters loaded (in. H_2O)

BPF = Final (post-regeneration) backpressure (in H_2O)

BPI = Initial (prior to loading) backpressure (in. H_2O)

The relationship of power supplied to the RPFD and regeneration efficiency was plotted for four different combinations of filter loadings and airflow rates. The four-phase test sequence began by loading the RPFD to a "moderate" loading of 160 in. H_2O (approximately equivalent to one cold start urban FTP drive cycle) on the Mercedes 300D test vehicle. The RPFD was then regenerated onboard the

* All backpressures measured at 60 MPH steady-state vehicle operation.

vehicle with exhaust gas bypassed and the optimized shop air flow schedule used (i.e., no flow for first minute, 1.0 cfm for next 2 minutes, and 0.5 cfm for the final 2 minutes) at the first power setting. Continuous measurement of cfm, O_2, CO, CO_2, RPFD inlet and outlet temperatures were recorded and regeneration (glowing filters in RPFD) was visually observed through the glass port on the side of the RPFD. Backpressures were measured and recorded before and after RPFD loading on the urban driving cycle (FTP), and after regeneration. The change in backpressure for each test and each new power setting was used to determine the regeneration efficiency of each phase of the test program. At least ten power settings were tested for each phase of the test program. This procedure was repeated for Phases II, III, and IV at the following BPLs: 160 in. H_2O, "1/2 airflow schedule;" 200 in. H_2O; and 110 in. H_2O. The results are shown in Figure 6.

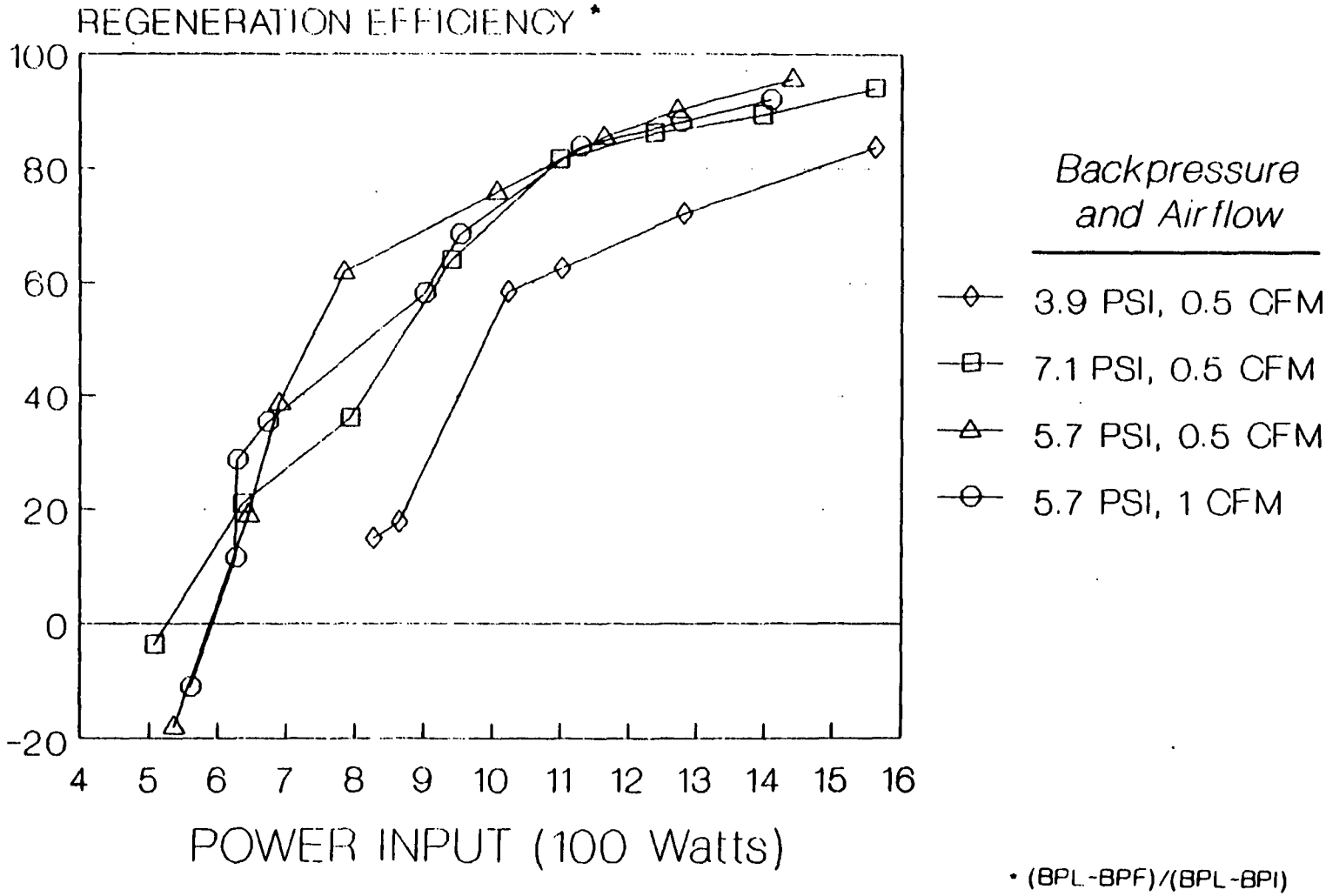
Figure 6 shows that greater than 90 percent regeneration efficiency can be obtained with less than 1275 watts (425 watts/filter) or almost one-half the energy supplied to the RPFD under full power conditions. This figure also shows that under 600 watts (200 watts/filter) almost none of the loaded soot will burn off. Over 40 regenerations were performed on the same three SiC ceramic filter elements during this test program with no deterioration of filter elements. This is probably due to the lower thermal stress of power settings 40 to 80 percent lower than those used to obtain maximum regeneration efficiency (2500 watts). These test results also show that the filters tend to burn better when more heavily loaded and little difference when the already low airflow rate schedule is cut in half. This minimum airflow rate schedule seems to mainly serve as a safety precaution to protect the filters from overheating or cooling too fast after regeneration.

Exhaust Emissions and RPFD Filter Efficiency Testing

In addition to RPFD filter durability problems experienced throughout this test program, several equipment problems, in particular heated flame ionization detector (HFID) problems were encountered. In fact, heated hydrocarbon and particulate analyzer malfunctions paralyzed the test program for eight months between initial baseline exhaust emissions and RPFD filter efficiency determinations during the winter of 1986 and subsequent continued exhaust emissions characterization from November 1986 through May 1987. Accurate quick response exhaust flowmeter measurement was also a continuing problem.

During the spring and summer of 1986, however, the air flowrate optimization, continuous regeneration, and power vs. regeneration efficiency test sequences were performed to fill in the downtime of the exhaust analyzers. As regenerations were optimized, certain trends in RPFD concentrations became quantified as well.

Figure 6
Regeneration Efficiency vs. Power Input
Five-Minute Regenerations



* (BPL-BPF)/(BPL-BPI)

As is shown in Figure 7, when 1500 watts are applied to the RPFD at a loaded backpressure of 200 in. H_2O (7.2 psi) certain trends in the concentrations of products and reactants become apparent. Oxygen concentration starts out close to its normal air concentration, 22-23 percent, and quickly drops as it is consumed in the reaction after power is applied to the RPFD. If regeneration conditions don't vary, O_2 usually bottoms out near 5 percent 2 to 3 minutes after power is applied, and returns to 15 percent after 5 minutes as less soot remains to be burned. CO rises sharply as the burn begins and hydrocarbons have not been completely combusted. As soot ignition occurs, CO drops off momentarily as the reaction kinetics favor CO_2 formation. As regeneration rates reach a maximum (shortly after 2 minutes), peak concentrations of both CO and CO_2 occur. As the burn tapers off, CO goes to zero and CO_2 tapers off to background levels. RPFD outlet temperature stabilizes in the range of 450 to 500°F (205-260°C) at the end of these regenerations, and final backpressure is generally reduced to less than 30 in. H_2O (1 psi) with regeneration efficiency greater than 90 percent.

In spite of exhaust emission analyzer problems, a number of hot and cold start Federal Test Procedures (FTPs) were performed on the Mercedes test vehicle with and without the Coloroll RPFD located in the exhaust system. This testing was performed to determine the unit's efficiency at removing the vehicle's engine-out particulate emissions under simulated cyclic urban conditions and compare RPFD-out emissions to the promulgated U.S. diesel particulate emission standard. The results of this testing are shown in Table 3.

The Mercedes test vehicle was found to have very repeatable particulate exhaust emissions of about 0.45 g/mile over the FTP similar to emission levels of previous test programs on the vehicle. The RPFD-out particulate emissions were below the 0.20 g/mile standard on all 15 tests run and the particulate emissions reduction ranged from 60 to 80 percent.

As mentioned, most equipment problems centered around the heated-FID with chart recorder wiring, pump, regulator and burner components needing frequent maintenance and often temporarily brought within specification but not completely repaired. Cold spots in the heated HC sample line voided the first test run on the RPFD. Other problems were encountered with filter weighing equipment, and when the dry gas meters were changed and affected flow in the particulate sampling system. By far the most variable emissions, however, are the RPFD-out hydrocarbon emissions, which though of low magnitude, vary from .102 to .304 g/mile. HC emissions reported in Table 3 are cold HC-FID numbers.

REGENERATION CHARACTERISTICS

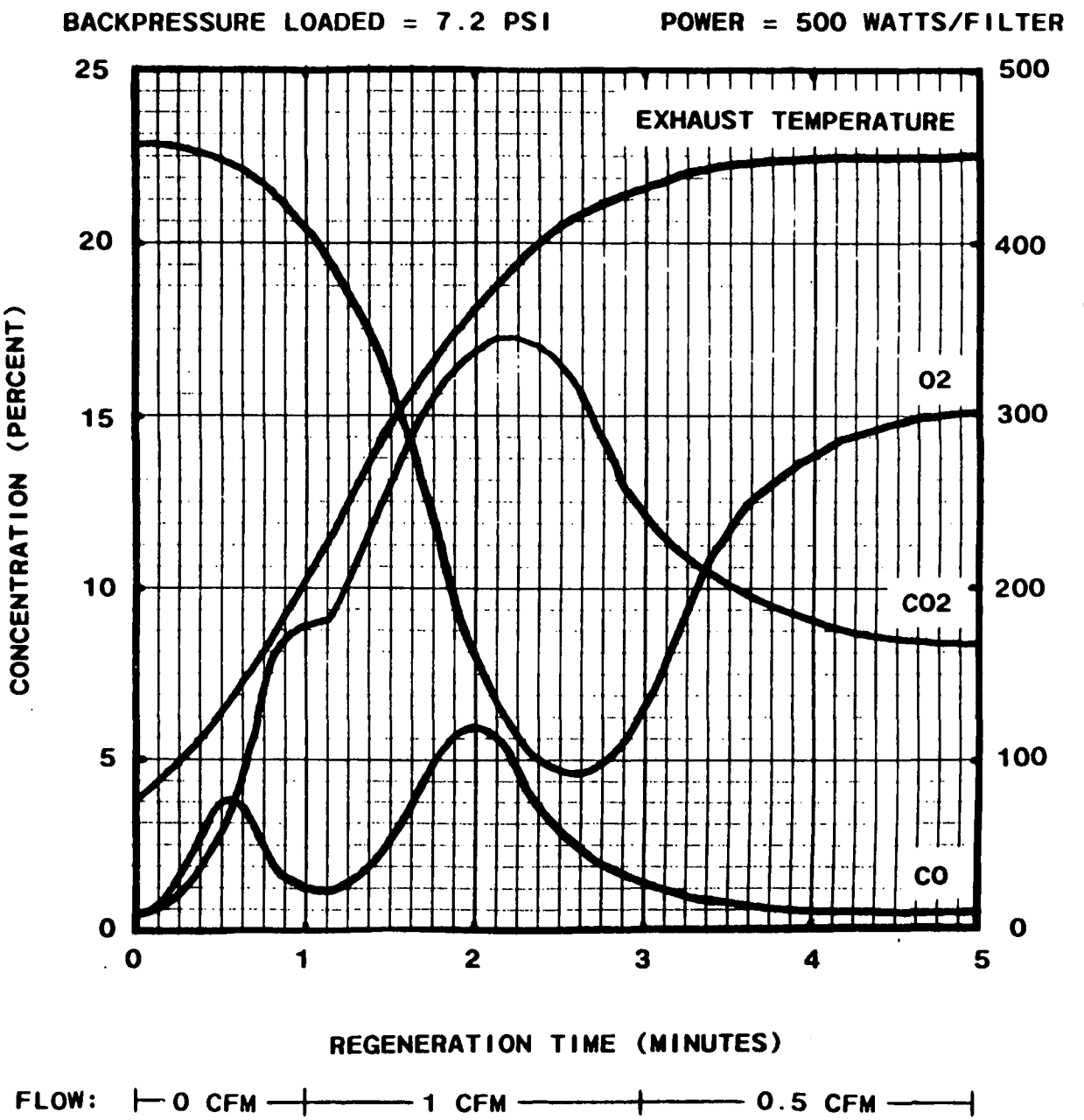


FIGURE 7.

Table 3

Hot LA-4 Coloroll RPFD Emissions Results

Date	Test Number	Trap Config.	HC-FID (g/mi)	CO (g/mi)	CO_2 (g/mi)	NOx (g/mi)	MPG	Part. (g/mi)	Comments
01/16/86	860936	Dummy	.282	0.97	393	1.86	25.7	.461	
01/16/86	860937	w/RPFD	.441	0.97	395	1.79	25.6	.402	Cold spots in HC probe (void test)
02/04/86	861689	Dummy	.299	1.02	406	1.82	25.0	.425	Efficiency
02/04/86	861690	w/RPFD	.297	1.04	420	1.89	24.1	.137	67.8 percent
11/25/86	870817	Dummy	.158	0.94	395	1.81	25.6	.428	Efficiency
11/25/86	870818	w/RPFD	.160	1.00	433	1.91	23.4	.170	60.3 percent
12/09/86	871049	Dummy	.141	0.95	404	1.80	25.0	.441	Efficiency
12/09/86	871050	w/RPFD	.145	1.02	458	1.98	22.1	.158	64.2 percent
12/18/86	871225	w/RPFD	.174	1.07	512	2.15	19.8	.139	Cold start test
01/13/87	871198	w/RPFD	.136	1.06	486	2.06	20.8	.129	Part. void
02/06/87	871662	w/RPFD	.109	1.02	463	2.00	21.9	.104	Humidity high
02/12/87	871927	w/RPFD	.102	0.92	433	1.87	23.4	.086	Efficiency 80.7 percent
03/05/87	872230	Dummy	--	--	--	--	--	.481	Efficiency
03/05/87	872231	w/RPFD	--	--	--	--	--	.114	76.3 Percent
03/12/87	872349	w/RPFD	.143	1.18	516	2.12	19.6	.142	Cold start test
03/19/87	872350	Dummy	.338	1.06	442	1.88	22.9	.487	Cold start test
03/20/87	872468	w/RPFD	.304	1.06	489	2.13	20.6	.080	Cold start test
04/09/87	872731	w/RPFD	.259	0.99	451	1.92	22.4	.080	
04/09/87	872732	w/RPFD	.233	1.04	506	2.15	20.0	.121	
04/17/87	872827	w/RPFD	.111	1.07	513	2.22	19.8	.077	Initial load = 7.0 psi
04/23/87	872888	w/RPFD	.129	1.08	460	1.96	22.0	.094	Initial load = 2.5 psi
05/01/87	873003	w/RPFD	.122	0.96	442	1.90	22.9	.095	HC-FID Void
05/07/87	873004	Dummy	.166	1.17	450	1.89	22.5	.432	2-Bag Test

NOTE: Mercedes 300D engine out particulate (avg. of 17 tests including above [illegible] = .145 standard deviation = .024.

CO and NOx emissions were stable at about 1.0 and 1.8 g/mile, respectively, and changed very little whether the RPFD or a dummy container (baseline) configuration was tested. RPFD-out CO_2 emissions increased slightly over the baseline levels on the vehicle. This increase was in proportion to the decrease in vehicle fuel economy.

Vehicle fuel economy decreased by nearly 10 percent on the FTP when equipped with the RPFD. The hot start FTP fuel economy penalty was 8.1 percent and the cold start FTP fuel economy penalty was 12.7 percent.

The particulate emissions efficiency (percent of baseline engine-out vehicle particulate emissions reduced) was 70.2 percent on hot start tests and 75.4 percent on cold start FTPs.

The vehicle was loaded to backpressures of roughly 200 in. H_2O (7.2 psi) on the test runs described above. A pair of cyclic tests were run on the vehicle equipped with the RPFD with much higher soot loadings to observe the effects on vehicle fuel economy and driveability. At 493 in. H_2O (17.6 psi) the vehicle driveability was characterized by lugging as if pulling a trailer, and vehicle fuel economy fell another 10 to 12 percent below the MPG for normal particulate loading.

All test data from March 5, 1987 to the end of the test program were collected on a second generation RPFD container. This container is similar in operation to the original container with three filter elements electrically powered in parallel, soot loaded on the outside of the filter, and exhaust flow outlet through the open end of the inside of the filters. This alternate RPFD geometry is shown in Figures 8 and 9. This geometry differs from the original can in that the three filters are arranged in a row in a single plane rather than in a cylindrical pattern, and a baffle plate was installed in the RPFD inlet to scatter the particulate for more uniform loading. The outer container itself is much thinner and lighter weight steel and dissipates the heat energy more quickly than the original container. In terms of pressure drop across the filters (10-20 in. H_2O) and vehicle emissions reductions, this RPFD configuration behaved similarly to the original configuration. The new container showed slightly lower particulate emissions, but also lower fuel economy, and slightly higher NOx, CO, CO_2. and HC emissions.

Conclusions

1. Periodic regeneration is preferred over continuous regeneration for filter durability and external power needs, particularly if the RPFD is exposed to exhaust flow or extended high speed vehicle operation.

2. Minimum power for regeneration = 600W (200W per filter). This is the amount of power needed to initiate soot burning and decrease RPFD backpressure. At these power settings, filter temperatures are probably 450-475°C (840-890°F) before soot ignition will occur.

3. Hot cyclic filter efficiency = 70.2 percent. Hot cyclic fuel economy penalty = 8.1 percent (23.2 MPG vs. 25.3 MPG).

4. Cold cyclic filter efficiency = 75.4 percent. Cold cyclic fuel economy penalty = 12.7 percent (20.0 MPG vs. 22.9 MPG).

5. Optimum power supply for regeneration = 1500W (500W per filter). When the RPFD is loaded normally (to 200 in. H_2O) this power supply yields regeneration efficiencies of greater than 95 percent.

6. Optimum exhaust (or shop air) flow during regeneration is 0.5 to 1.0 cfm. Higher flowrates will reduce filter surface temperature and reduce regeneration efficiency. No flow at all is desired while RPFD filters are heating up to a stabilized temperature.

7. Minimum filter loading for "good" regeneration is 6.0 psi; it was found that the more soot loaded on the filter, the better the regeneration characteristics and efficiency. Filters were generally loaded to 7-8 psi (slightly over 200 in. H_2O), where regeneration efficiency and filter durability were both near optimum.

8. Maximum filter loading before significant deterioration of driveability is 400 in. H_2O (14.3 psi.) The filters were loaded to 493 in. H_2O (17.6 psi) and tested yielding a fuel economy penalty. When loaded to 328 in. H_2O (11.7 psi), no noticeable deterioration in driveablility was observed and an 11 percent loss in hot-cyclic fuel economy resulted.

9. Operation costs of the current Coloroll RPFD are high due to the frequency of regeneration required with the present configuration. At an average vehicle speed of 30 mph , 0.008-0.013 kW-hr/mile would be required to power the RPFD for optimum regeneration, and the 8-12 percent loss in fuel economy would contribute to elevated vehicle operational costs.

FIGURE 8.

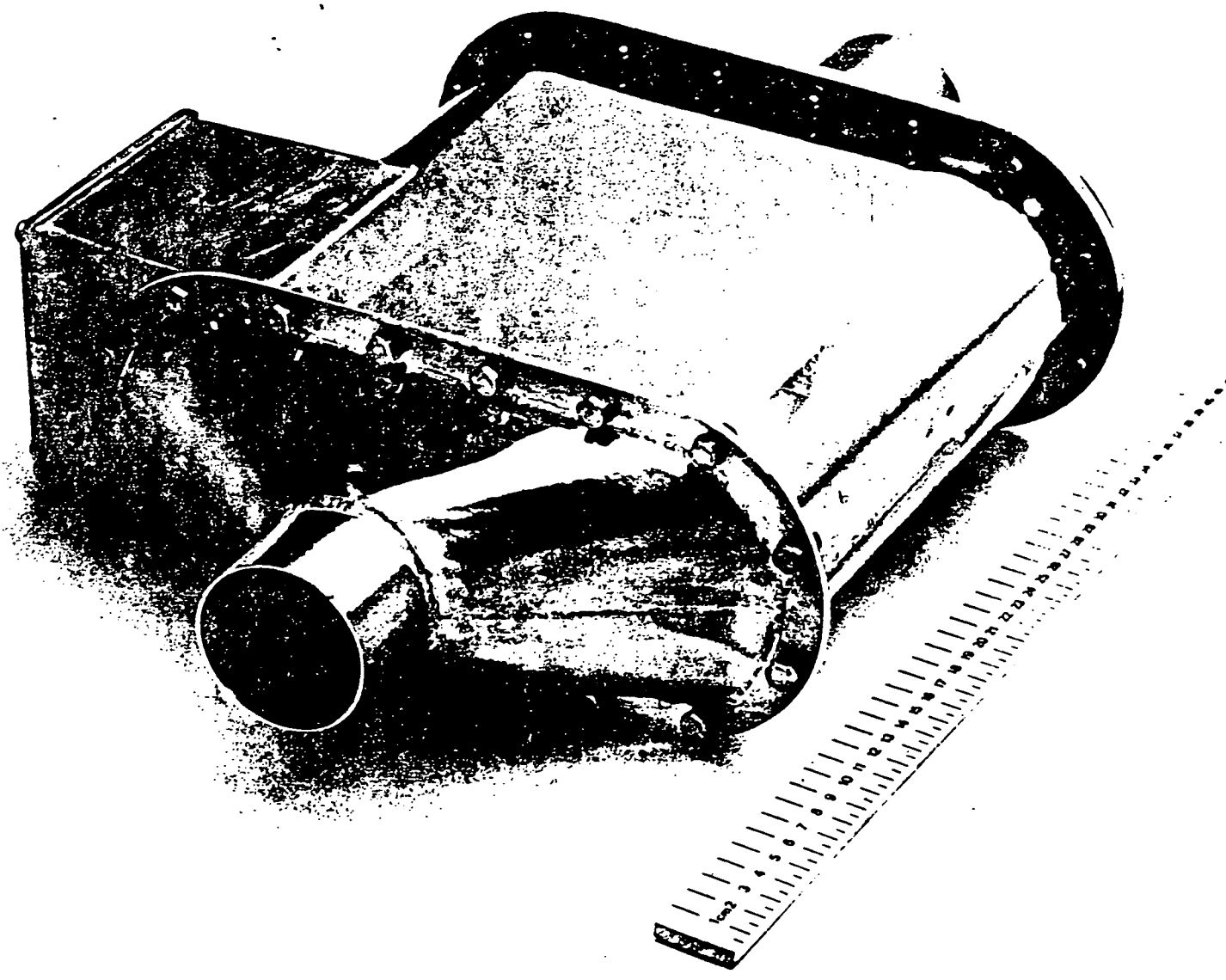
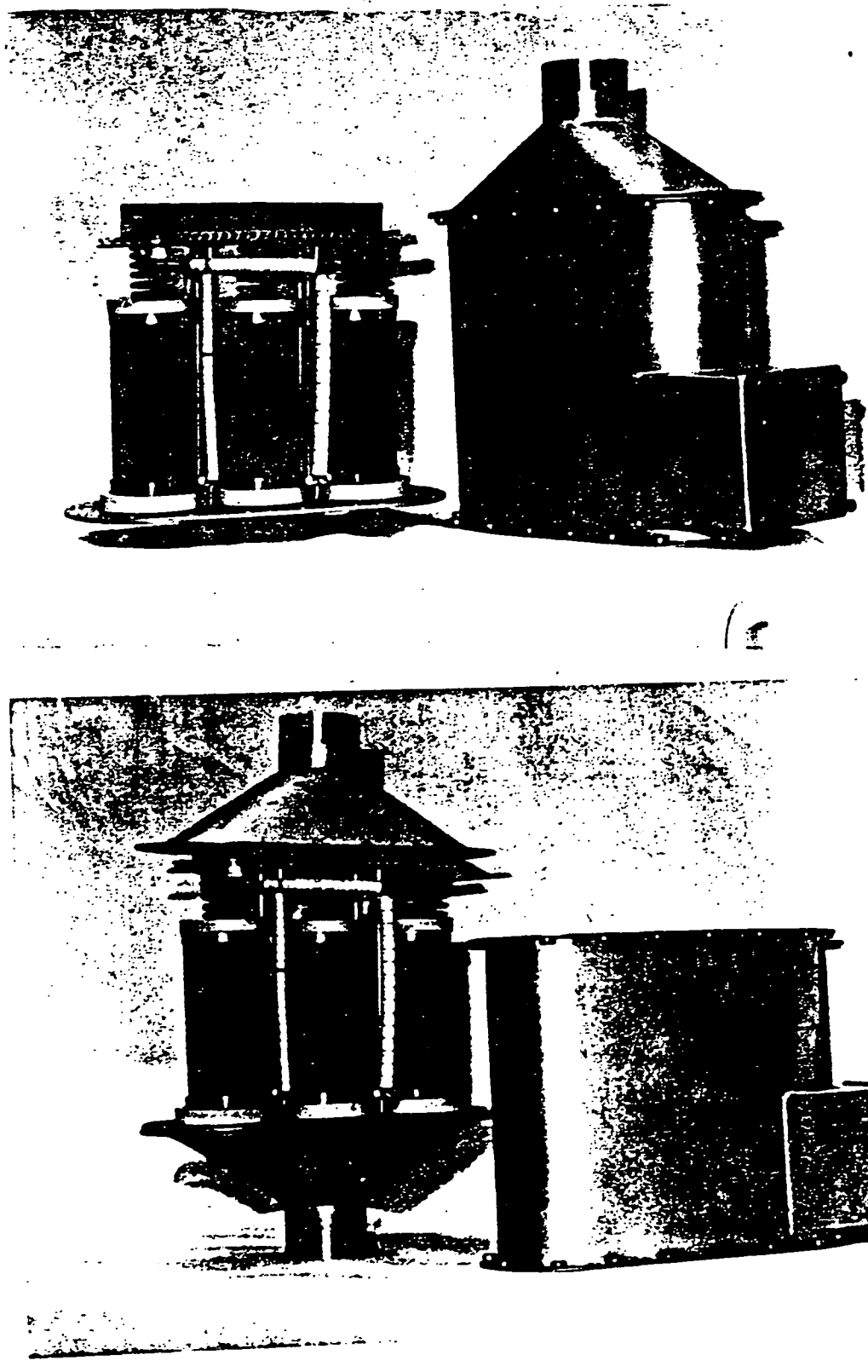


FIGURE 9.



Recommendations

1. Filter pore size should be increased slightly to admit loading of exhaust particulate throughout the entire volume of the ceramic fiber filters instead of loading entirely on the outside of the filters.

2. Filter surface area should also be increased (star shaped and/or bigger filter) with fiber orientation in line with the electrical power terminals. This would greatly reduce frequency of regeneration while maintaining uniform material electrical properties.

3. Electrical contacts between the stainless steel leads and the flame-sprayed ceramic filter surface, need to be improved for increased terminal contact surface area, and isolated from exhaust flow when current is exchanged. Oxidation of these terminals is a major durability problem to be resolved in the development of the Coloroll RPFD. Tests performed near the end of this evaluation program showed improvement in contact surface area by installing coarse stainless steel wool washer-shaped 0.1 inch thick mats between the porous ceramic and solid stainless steel terminals.

4. Variable cross-section filters may also help both contact and filter pressure drop problems since, for electrical uniformity, variable porosity and current density are not desired, and particulate loading at the current pore size is mostly a surface phenomenon.

5. Uniformity of electrically conductive properties of the material need to be improved. This could be accomplished by development of a method for more uniform application of filter dopants, and perhaps noble metals to reduce soot ignition temperature and/or benefit from heat transfer from the exhaust gases.

6. Improved trap geometry is necessary for vehicle (commercial) application. Canning material needs to be optimized and structural shock analysis needs to be performed to demonstrate vibrational and mechanical integrity in a vehicle or truck application.

7. The combination of a foam (or fiber) and a wallflow filter such as the Mazda direct catalyst supply system might improve efficiency while maintaining optimum ignitability (Figure 10). A concentric ring cylindrical tube design incorporating both conductive and nonconductive filter technologies has also been considered for design and testing.

8. Application of a bypass system (possibly the revolver-type configuration) with minimum flow appears to be optimum for the current RPFD geometry (Figure 11). This system configuration reduces instantaneous power requirements to the RPFD while protecting the filters from oxidation and at the same time increasing filter durability.

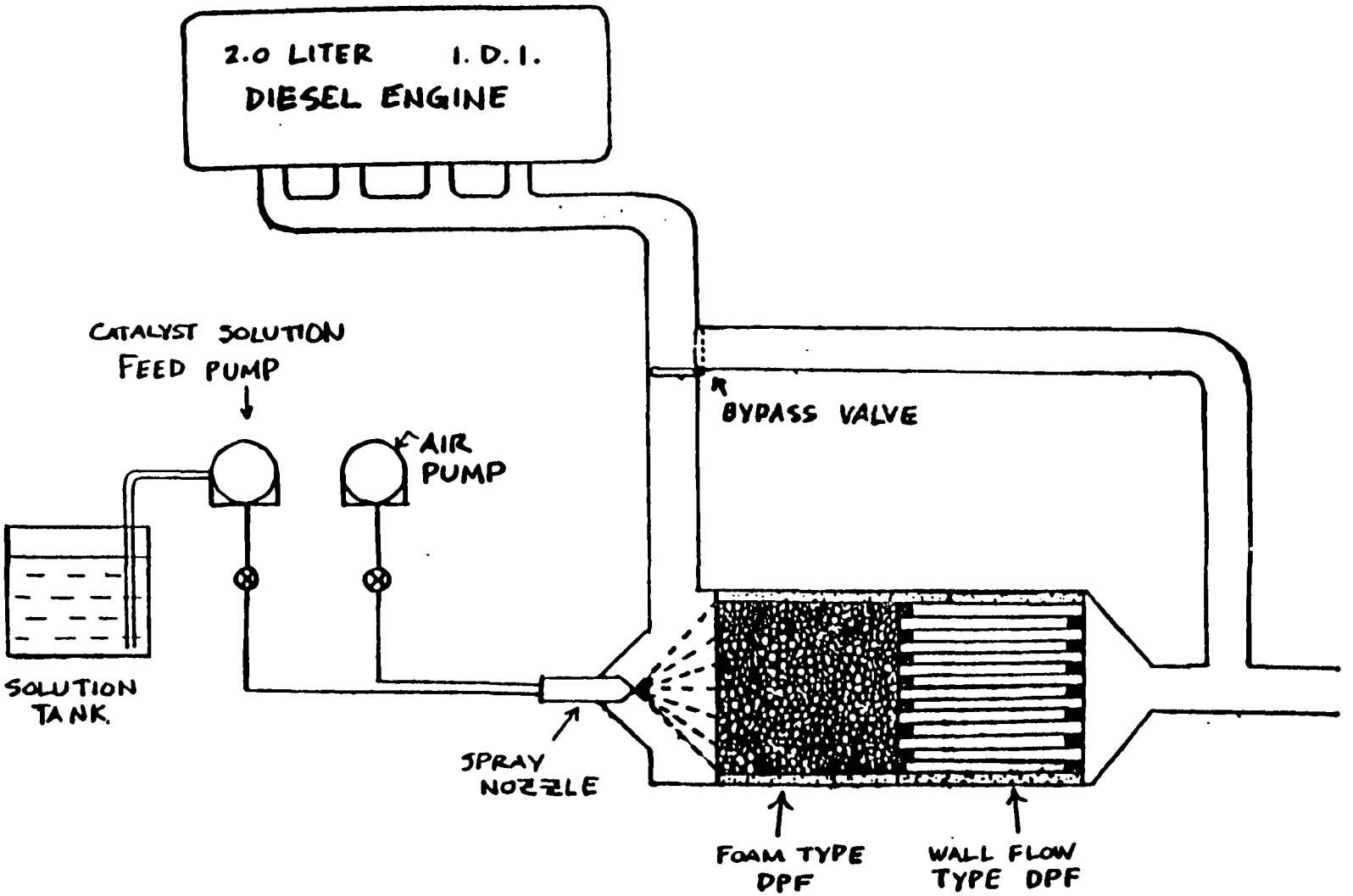


FIG. 16. SCHEMATIC OF DIRECT CATALYST SUPPLY REGENERATION SYSTEM TESTED ON AN ENGINE DYNAMOMETER

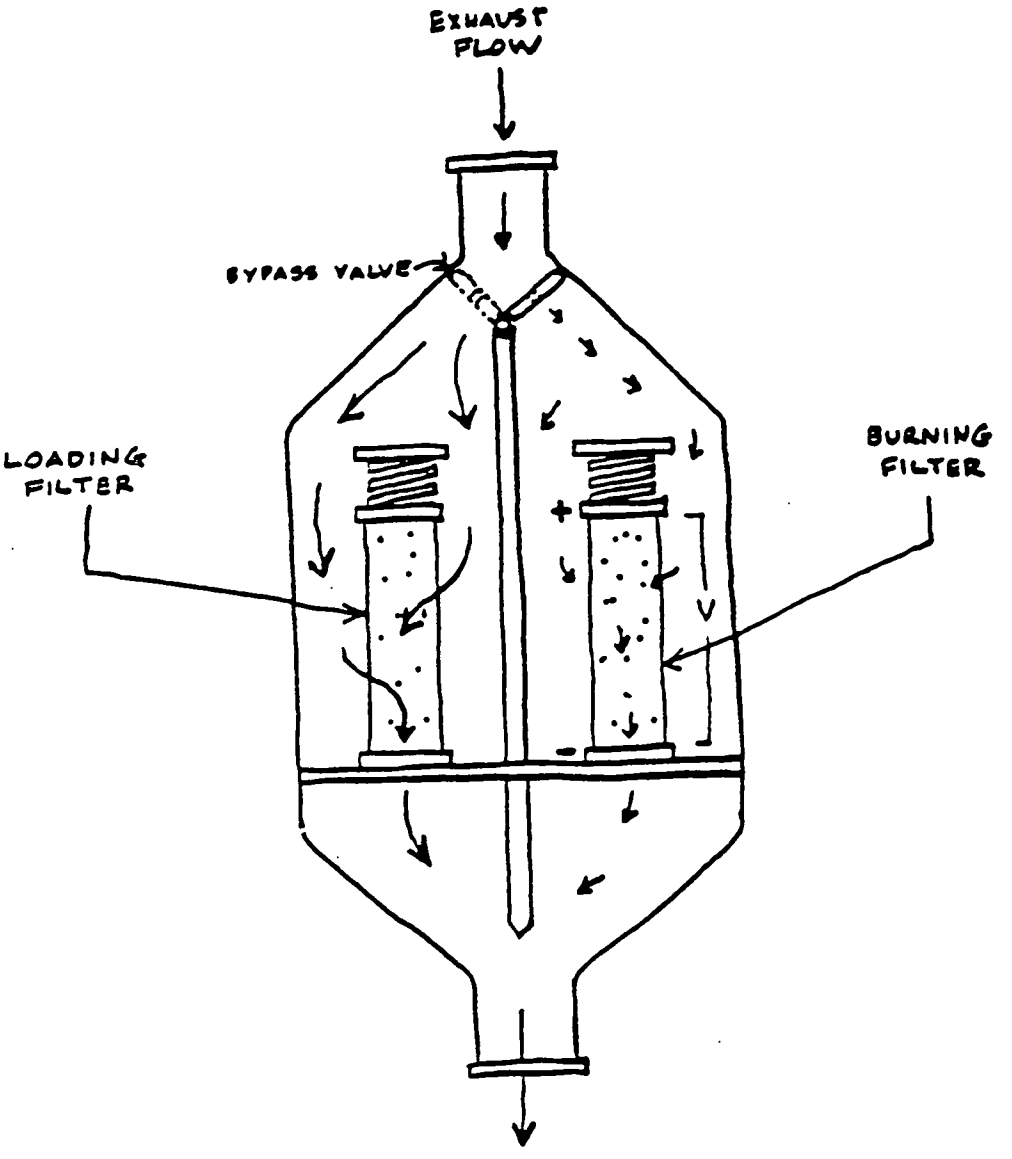


FIG.11 : OPTIMIZED GEOMETRY FOR METALLIZED RESISTIVELY HEATED Si-C DIESEL TRAP REGENGRATION SYSTEM. DIAGRAM SHOWS ONE FILTER BEING LOADED WHILE THE OTHER IS BURNED WITH MINIMUM FLOW APPLIED DURING REGENERATION

References

Chemical Analysis and Biological Testing of Emissions from a Heavy Duty Diesel Truck With and Without Two Different Particulate Traps, Roger Westerholm, Thomas Alsberg, Michael Strandell, Ake Frommelin, Vassillios Grigordis, Anastasia Hantzaridou, and Gautam Maitra, SAE Paper 860014, Arrhenius Laboratory, University of Stockholm, Stockholm, Sweden, Lars Winquist and Ulf Rannug, Wallenberg Laboratory, University of Stockholm, Stockholm, Sweden, Karl-Erik Egebäck and Tommy Bertilsson, Automotive Emission Research Section, The National Swedish Environmental Protection Board, Nyköping, Sweden.

Emissions Performance of Two Catalyzed Trap Oxidizers on a Bus Engine, Terry L. Ullman, SAE Paper 860132, Southwest Research Institute, San Antonio, Texas.

Development of an Emission Control System for Two - Stroke Diesel Powered Transit Coaches, H.C. Vergeer, A. Lawson, W.M. Jones, and W. Robinson, SAE Paper 860133, Ontario, Research Foundation.

The Catalytic Trap Oxidiser on a City Bus: A Dutch Demonstration Program, Rudolf C. Rijkeboer, Joep A.N. Ling, and Jouke van der Weide, SAE Paper 860134, TNO Research Institute for Road Vehicles, Delft, The Netherlands.

The Retrofitting of a Catalytic Trap Oxidiser to a Metropolitan Transit Coach, V. Pelligrin, SAE Paper 860135, Southern California Rapid Transit District.

A Trap Oxidizer System for Urban Buses, K.N. Pattas, P.S. Kikidis, J.K. Aidarinis, N.A. Patsatzis and A.M. Stamatellos, SAE Paper 860136, Dept. of Mechancial Engineering, University of Thessaloniki, Athens, Greece.

Performance and Durability of a Catalyst Trap Oxidiser Installed on a City Bus for 65,000 Miles of Revenue Service, A.J. Hickman, SAE Paper No., 860138, Transport and Road Research, C. Jaffray, Johnson Matthey Chemicals, Ltd.

Revenue Service Evaluation of CTO Performance on an RTS2 Bus in Center City Philadelphia, J.H. McCormick, SAE Paper 860139, Southeastern Pennsylvania Transportation Authority, B.E. Enga and J. Cunningham, Johnson Matthey, Inc.

Practical Application of CTO's to a GM Bus 6V92T Engine, A Real Life Investigation, Joel A. Newman, SAE Paper 860140, SunTran, B.E. Enga, Johnson Matthey, Inc.

Study on Catalytic Regeneration of Ceramic Diesel Particulate Filter, Yoshinori Niura, Kenji Ohkubo, and Kunihiro Yagi, SAE Paper 860290, Technical Research Center, Mazda Motor Corp.

References (cont'd)

Observation of Particle Oxidation in Diesels: Prospect for Combustion Research and Particulate Control, Richard Gibbs, Robert Whitby, and Robert Johnson, SAE Paper 860291, Automotive Emission Laboratory, Bureau of Air Research, NYS Dept. of Environmental Conservation, Albany, NY.

Combustion Modes of Light Duty Particulates in Ceramic Filters with Fuel Additives, Hajime Ise and Kenichiro Saitoh, SAE Paper 860292, Mitsubishi Oil Co., Ltd., Mitsuhiro Kawagoe and Osamu Nakayanta, Mitsubishi Motors Corp.

Forced Regeneration by Exhaust Gas Throttling of the Ceramic Diesel Particulate Trap, K.N. Pattas, A.M. Stamatellos, N.A. Patsatzis, P.S. Kikidis, J.K. Aidarinis, and Z.C. Samaras, SAE Paper 860293, Dept. of Mechanical Engineering, University of Thessaloniki, Athens, Greece.

Development of Diesel Particulate Trap Oxidizer System, Yuhiko Kiyitam, Katsuyuki Tsuji, Satoru Kume, and Osamu Nakayama, SAE Paper 860294.

The Benefits and Costs of Diesel Particulate Control IV - The In-Use Urban Bus, Michael P. Walsh, SAE Paper 860295, Technical Consultant.

Feasibility of Retrofit Technologies for Diesel Emissions Control, Christopher S. Weaver, Robert J. Klausemeier, and Lynn M. Erickson, SAE Paper 860296, Radian Corp., Jerry Gallagher and Ted Hollman, Colorado Department of Health.

Inspection/Maintenance for Light-Duty Diesel Vehicles, Ronald A. Ragazzi, Gerald L. Gallagher, and Richard A. Barrett, SAE Paper 860297, Colorado Department of Health, Denver, Colorado.

Update on the Evaluation of Diesel Particulate Filters for Underground Mining, A. Lawson and H.C. Vergeer, SAE Paper 860298, Ontario Research Foundation, Sheridan Park, Mississauga, Ontario, Canada, A. Stawsky, Engelhard Corp., Specialty Chemicals Division, Edison, NJ, J.H. Danial and E. Thimons, U.S. Department of Interior, Bureau of Mines, Washington, DC.

APPENDICES

Appendix A	Mileage Records
Appendix B	Vehicle Specifications
Appendix C	Regeneration Data
Appendix D	Flowrate Schedules
Appendix E	Regeneration Efficiency Data
Appendix F	Exhaust Emission Data

APPENDIX A: MILEAGE RECORDS

MILEAGE ACCUM. LOG EGGERTY TRAP CONFIG E 700 cfm 42c

EGBP @ MPH

CYCLE	MILEAGE START	STOP	60 MPH	50 MPH	40 MPH	30 MPH	DATE	COMMENTS
EGBP	54935	54936	22.8	17.0	11.2	6.9	9-3-86	½ MILE BEFORE REGEN 1
EGBP ¾ LA4	54942	54943	78.6	61.6	44.7	35.1	9.3.86	¾ OF LA-4 BEFORE R1
LA4	54944	54945	110.09	92.0	70.2	47.4	9.3.86	1ST LA-4 BEFORE R1
¼ LA-4	54935	54949	159.2	123.0	93.8	64.3	9.3.86	BEFORE R1
EGBP	54949	54950	80.0	61.3	49.1	33.2	9.4.86	AFTER R1
340/LA-4	54950	54954	164.3	133.0	105.8	73.0	9.4.86	BEFORE R2 PHASE 1
EGBP	54954	54955	180.0	154.0	113.8	80.0	9.4.86	AFTER R2 PHASE 1
EGBP	54955	54956	72.6	59.1	45.0	29.3	9.4.86	AFTER R3 PHASE 1
LA-4 505	54956	54961	195.0	162.4	124.8	95.0	9.4.86	BEFORE 4
EGBP	54984	54985	36.8	27.0	18.4	12.4	9.5.86	AFTER R4
810/LA4	54985	54992	167.0	132.6	100.09	78.0	9.9.86	BEFORE R5 PHASE 1
EGBP	54992	54993	116.6	96.1	69.4	48.9	9.9.86	AFTER R5
225/LA-4	54993	54995	185.4	150.3	104.8	72.3	9.9.86	BEFORE 6
EGBP	54995	54996	49.3	40.4	32.5	23.0	9.9.86	AFTER R6
730/LA-4	54996	55002	171.5	140.0	105.8	76.0	9.9.86	BEFORE R7
EGBP	55002	55003	129.0	102.7	82.0	58.6	9.10.86	AFTER R7
155/LA-4	55003	55005	196.5	162.8	126.0	91.0	9.10.86	BEFORE R8
EGBP	55005	55006	43.4	32.0	24.8	15.0	9.10.86	AFTER R8
730/LA-4	55006	55012	155.0	130.7	97.5	70.9	9.10.86	BEFORE R9
EGBP	55012	55013	139.8	118.0	87.2	63.4	9.10.86	AFTER R9
EGBP	55013	55014	158.4	132.2	96.0	68.0	9.10.86	BEFORE R10
EGBP	55079 (69)	55080 (81)	~~196.0~~	155.8	120.8	90.3	9.16.86	BEFORE R11 PHASE II
EGBP	55081	55082	64.8	51.1	41.1	25.3	9.16.86	AFTER R11
460/LA-4	55082	55086	153.4	116.0	94.6	65.0	9.16.86	BEFORE R12
EGBP	55124	55125	76.5	61.3	45.3	32.8	9.18.86	AFTER R12
340/LA-4	55125	55128	163.0	135.0	100.4	72.1	9.18.86	BEFORE R13

Rotary mileage M/B D2C8 42C 700 CFM Carb. E

CYCLE	MILEAGE START / STOP	I" H2O B.P.	CC / 5C / 4C / 3C /	Comments
EGBP	55124 55125	76.5	61.3 45.3 32.8	9-18 POST #12
340/LA-4	55125 55128	163.0	135.0 100.4 72.1	PRE #13
EGBP	55128 55129	136.2	110.0 82.2 57.2	9-18 POST #13
135/LA-4	55129 55131	197.2	151.8 106.0 80.1	PRE #14
~~EGBP~~	55131 55132	48.4	33.8 25.6 17.7	POST 14
T80/CA-4	55132 55138	173.0	136.0 105.3 72.5	140"@730@600M SCF
~~EGBP~~	55138	49.6	38.3 29.1 20.4	15 9-22-86
680/LA-4 9-23	55139 55145	183.0	~~142~~ 107.5 73.8	15 POST PRE #16
EGBP 9-23	55145 55146	121.0	96.4 73.3 55.9	POST 16
9-23 135/LA-4	55146 55147	183.3	139.1 105.2 82.7	PRE 17
EGBP 9-23	55147 55148	38.9	31.8 22.5 14.6	POST 17
730/LA-4 9-23 +1035	55148 55153	110.3	79.4 62.3 42.0	PRE 18 ★ MORE NEEDED 1035 ~~1030~~ FROM PRIOR RUN = 1035/L
	55153 55156	173.0	148.9 107.8 72.0	
EGBP 9-24	55156 55157	↑ 200+	145 108.9 75.8	POST 18
~~Post~~ PRE 20 EGBP 9-25-86 POST	55165 55166	44.2	34.3 23.9 17.9	POST 19 9-25
	55167 55172	162.6	126.0 95.3 76.7	PRE-20
9/25 BP 20	55172 55173	37.5	28.8 22.2 14.7	138"-60 MPH V@6905
9/25 765/LA-4	55173 55178	130		PRE 21
765-840/LA-4	55178 55179	155.2	124.4 90.0 73.0	130"@765 PRE 21
9-30-86 EGBP	55179 55180	79.8	60.9 44.3 30.4	9-25 POST 21
9-30 840/LA-4	55180 58185	200.0	158.7 127.0 89.0	PRE 22 PHASE III

THEN 60 MPH 5.5 UNTIL 200." OF EGBP

MILEAGE ACCUM. LOG FOGERTY TRAP M/B CONFIG E5

EGBP @ MPH 1986 700 CFM 4BC

CYCLE	MILEAGE START	STOP	60 MPH	50 MPH	40 MPH	30 MPH	DATE	COMMENTS
EGBP	55185	55186	41.7	34.0	24.6	15.6	9-30-86	POST 22 9-30-86
340/4-60 SS	55186	55194	200.0	165.6	128.5	95.6	9-30	PRE 23. TARGET = 200 @
EGBP	55194	55195	87.0	72.8	54.0	37.6	9-30	POST 23
2-ACCELS 50 SS TO 200"	55291	55295	203.0	168.8	128.0	97.2	10-2-86	PRE 24 PHASE III 100 SS.
EGBP	55295	55296	47.8	36.0	27.1	18.4	10 2 86	POST 24
1 ACCEL 60 SS	55296	55304	200.0	163.6	128.3	89.6	10 2 86	PRE 25
EGBP	55304	55305	163.0	123.2	95.2	65.1	10 2 86	POST 25
60 SS	55305	55306	200.0	158.6	109.7	76.3	10 2 86	PRE 26
EGBP	55306	55307	55.6	43.1	34.7	24.6	10 2 86	POST 26
[redacted]	55307	55314	200.3	167.7	134.6	101.3	10 2 86	PRE 27 2 ACCELS + 50 SS TO 2
EGBP	55314	55316	PEGGED	162.0	~~160.0~~	84.5	10-2-86	POST 27 / PRE 28
EGBP	55316	55317	34.0	26.6	19.8	12.7	10 3 86	POST 28 COLD
2 ACCELS 50 SS	55317	55328	200.0	152.0	120.1	82.8	10 3 86	PRE 29
EGBP	55328	55[illegible]	30 [illegible]	16.5	[illegible]	[illegible]	10 3 86	POST 29
50 MPH SS	55563	55564	200" @ 59 MPH	170.	139.3	96.2	10 17 86	[illegible] PRE 30 10-17-86
EGBP	55564	55565	121.3	97.2	75.0	45.8	10 17 86	POST 30 10-17-86
60 SS	55565	55568	200.0	168.2	135.6	96.4	10 21 86	10 21 86 PRE 31
EGBP	55568	55569	37.9	31.4	24.2	17.8	10 21 86	110 TARGET POST 31
60 SS	55569	55574	110.0	87.2	72.9	54.0	10 21 86	PRE 32
EGBP	55574	55575	59.0	46.3	34.9	26.0	10 21 86	POST 32
50 SS	55575	55579	110.0	94.0	72.8	51.0	10 21 86	PRE 33 PHASE 4
EGBP	55579	55580	47.2	33.4	25.2	18.2	10 21 86	POST 33
50 SS	55581	55586	110.0	91.6	75.3	55.4	10 28 86	PRE 34 110 TARGET
EGBP	55586	55587	97.2	77.8	59.3	39.8	10 28 86	POST 34
50 SS	55587	55590	160.0	130.7	108.2	75.1	10 28 86	TARGET 160 PRE 35
EGBP	55590	55591	119.2				10 28 86	[redacted] POST 35
50 SS	55591	55593	164.5	129.8	103.4	73.0	10 28 86	PRE 36 160
EGBP	55593	55593	107.0	WILL HOLD @ 60 TILL 110"			10 28 86	POST 36
60 SS	55593	55594	113.0	60 SS WENT OVER (DELETE)			10 28 86	PRE 37
EGBP	55594	55595	38.5	31.2	21.2	14.2	10 28 86	POST 37
EGBP	55630	55631	46.7	36.2	27.2	18.1	10 30 86	ENTER + LEFT ROTATION
50 SS	55631	55636	110.0	91.8	74.2	54.4	10 30 86	PRE 38
EGBP	55636	55637	55.7	42.2	32.0	22.7	10 30 86	POST 38
50 SS	55637	55641	110.4	94.3	67.8	48.8	10 30 86	PRE 39
EGBP	55641	55642	95.0	70.0	50.8	39.7	10 30 86	POST 39
50 SS	55642	55643	118.0	95.2	62.8	48.3	11-4-86	PRE 40
50 SS	55643	55647	200.0	158.6	127.9	89.0	11-4-86	PRE 40
EGBP	55647	55648	46.9	37.5	28.3	19.6	11 4 86	POST 40
[illegible]	55[illegible]	[illegible]	[illegible]	130 [illegible]	101.8	79.4	[illegible]	[illegible] 160
EGBP 0 MI.	[illegible]	[illegible]	26.0	[illegible]	[illegible]	[illegible]	[illegible]	LEAKERS

MILEAGE ACCUM. LOG FOGERTY TRAP

CYCLE	MILEAGE START	STOP	EGBP @ MPH 60 MPH	50 MPH	40 MPH	30 MPH	DATE	COMMENTS
50SS	55657	55673	100.0	130.4	105.6	70.3	111886	PRE 41 NEW SILBRS "
EGBP	55673	55674	56.6	43.4	34.3	22.1	111886	Post 41
EGBP	55675	55678	8.0					DUMMY TRAP / EFF TEST
" "	55687	55691	8.0			200" @ 35MPH 2ND GEAR		" " " "
EGBP	55698	55699			—	200.	—	POST LA-4
EGBP	55964	55970	74.3	59.8	47.8	32.1	12486	POST 42
EGBP	55970	55971	77.0	53.0	38.6	27.2	12986	UNLOADED - #43) *PRE HOT
EFFICIENCY TEST			DUMMY / FOGERTY					
EGBP	55971	55980	14.2	8.2	4.0	1.3	12986	PRE DUMMY LA-4
EGBP	~~56190~~	56000	2ND GEAR →			200.0	121086	*FOGERTY / *POST LA4
EGBP	56190	56191	71.0	53.3	42.0	27.8	121186	#44 POST
EGBP	56191	56192	64.6	49.0	36.4	24.6	121186	POST 45
EGBP	56263		200" @ 25.5 MPH			2ND GEAR	122386	AFTER FTP
1987		1987				1987		1987
EGBP	56290	56291	59.3	43.9	32.2	23.8	1-6-87	POST 46 - FTP
EGBP	56291	56291	49.0	32.1	23.0	17.2	1 6 87	2ND REGEN #47
EGBP	56413					200. @ 28.4 MPH	1 13 87	POST FTP
EGBP	56842	56843	55.8	41.2	31.1	21.4	1 23 87	POST 48
50 SS	56843	56845	80.0	64.0	43.0	33.8	1 23 87	PRE 49
EGBP	56845	56846	51.8	35.7	25.2	18.7	1 27 87	POST 49
" "	57623		200" @ 18 MPH				2 11 87	POST LA4
EGBP ~~57623~~	57623	57624	48.9	33.2	24.2	16.0	2-11-87	POST REGEN 50
EGBP	57646	57647	200" @ 38 MPH			2ND GEAR	2 12 87	POST LA-4
★ EGBP	57647	57648	—	200.0	160.2	101.6	2-19-87	NEW OVAL CAN ★
EGBP	57648	57649	39.0	29.8	20.2	12.9	2 19 87	POST 51 REGEN
40 SS		57691		165.9	124.0	90.9	2 19 87 / 2 20 87	40 MPH SS / PRE 52
EGBP	57691	57692	42.6	31.5	21.9	16.0	2 23 87	POST REGEN 52
EGBP	57791	57793	200 @ 57 MPH	162.0	124.3	86.4	3-6-87	After Hot LA-4
	57793		59.3	46.0	35.2	25.6	3 6 87	POST [redacted] 53
LA4	57823	57831	200"/51.6 MPH	⟷	163.0	110.0	3 11 87	LA-4 PRE 54
EGBP	57831	57832	46.7	33.8	26.0	18.3	3 11 87	POST 54
LA-4	57839	57840	200 @ 51.5	193.5	133.1	100.2	3 12 87	1BAG LA-4 POST
EGBP	57840	57841	42.0	31.2	23.8	14.3	3/12/87	~~POST REGEN 55~~ POST REGEN 55
EGBP	57963	57964	42.5	33.0	26.7	17.9	3/26/87	POST LA4 REGEN 56
EGBP	58023	58024	52.0	37.4	28.0	21.9	4-2-87	EGBP
EGBP	58024	58025	41.0	26.2	20.2	13.5	4/2/87	POST REGEN 57

MILEAGE ACCUM. LOG FOGERTY TRAP

★ NEW METER 0-600 PSI

CYCLE	MILEAGE START	STOP	EGBP @ MPH 60 MPH	50 MPH	40 MPH	30 MPH	DATE	COMMENTS
LA-4	58049	58057	8.5	7.5	6.0	5.0	4 3 87	✓ FOR CRACKED FILTERS
EGBP	58057	58058	200/50.6	>200	160"	104.5	4 3 87	OLD METER " H2O REPEAT OF ABOVE
EGBP	58058	58069	48.8	33.6	22.0	14.6	4 3 87	POST REGEN 58
★	— DIFFERENT	EGBP	GAUGE			0-30	PSI	28" H2O = 1 PSI ★
LA-4	58137	58145	8.4	6.4	4.8	3.6	4 8 87	2 LA4 TARGET
LA4	58145	58153	20.7	16.3	12.3	9.1	4 8 87	LA4 PRE R 59
EGBP	58153	58154	2.0	1.4	1.0	0.7	4 8 87	POST 59
EGBP	58154	58155	1.3	0.9	0.7	0.35	4 9 87	POST 60 RE-BURN
A-4	58165	58166	6.6	5.1	3.4	2.6	4 9 87	EMU. LA-4
LA4	58173	58174	17.3	14.4	11.5	8.1	4 9 87	" "
EGBP	58174	58175	2.0	1.4	1.2	0.7	4 9 87	REGEN 60
LA4	58175	58183	10.1	8.0	5.8	4.7	4 9 87	LA4
LA4	58183	58191	25.3	20.2	15.3	12.2	4 9 87	LA4
EGBP	58191	58192	2.3	1.7	1.2	0.7	4 9 87	regen 62
~~50 SS~~ EGBP	58193	58194	3.0	2.45	1.9	0.7	4 17 87	TO 2.0 PSI PRE TEST
50 SS	58194	58199	7.0	5.4	4.8	3.3	4 17 87	~~POST [illegible] TEST~~
HOT LA-4	58206	58207	17.6	13.8	10.6	7.6	4 17 87	
EGBP	58278	58279	2.5	1.8	1.3	0.9	4 23 87	REGEN 63 POST
EGBP	58296	58297	11.7	9.3	7.2	5.35	4 23 87	POST TEST
EGBP	58402	58403	1.7	1.25	0.7	0.45	4 30 87	POST R 64 CAN INSPECTED - OK -
LA-4	58403	58411	7.9	5.9	5.1	3.3	4 30 87	1 LA4 LOAD PRE TEST
	58411			±1.5				DURING LA4 @ 60 ACCEL
EGBP	58422	58423	11.1	8.7	6.8	4.5	5-1-87	POST LA4
EGBP	58423	58424	1.4	1.1	0.6	0.4	5/4/87	POST R 65
EGBP/LA4	58467	58475	7.3	5.5	4.0	3.1	5 6 87	~~[illegible]~~ REGEN 66
EGBP	58483	58484	1.4	0.9	0.7	0.35	5 7 87	POST R66
LA4	58547	58555	9.1	6.9	5.3	3.9	5 21 87	PRE R67
EGBP	58661	58662	1.3 ~~" H2O 23.0~~	0.85	0.7	0.35	6 10 87	POST 67
FTP	58753						6 18 87	FTP Baseline straight pipe REV. FLOW
EGBP " H2O	58835	58837	23.0" H2O	16.0	10.9	5.9	7-1-87	NEW FILTERS Ø MILE B:
LA4 0-600 SEC	58837	58841	50.4" H2O	36.2	29.0	16.3	7 1 87	200" H2O TARGET - LA4
LA4 600-1370	58841	58846	116.8" H2O	86.0	61.9	50.0	7 6 87	↑ SAME TARGET
Start 0-280	58910	58912	144.6	120.9	97.9	77.5	7·9·87	↖ SAME
LA-4 Sec.	58912	58914	—	—	—	-	—	200" H2O while Driving
PRESSURE CHECK	58914	58916	200-+	199-+	161.8	128.5	7-9-87	Just over at 50 MPH
EGBP	58916	58917	32.8	20.0	12.8	6.6" H2O	7 10 87	POST REGEN 1 REV.
LA4	58917	58925	98.4	64.8	46.6	33.2	7 10 87	" H2O

NEW FILTERS A21 B20 C19 REVERSE FLOW

7/28/87

APPENDIX B: VEHICLE SPECIFICATIONS

Table 3

TEST VEHICLE DESCRIPTION

1975 Mercedes Benz 300D

Vehicle Identification Number: 11511412019885

Engine

type	4 Stroke Cycle, IDI Diesel, In-Line 5
bore x stroke	3.58 x 3.64 inches
displacement	3.0 Liter/183 CID
compression ratio	21.0:1
maximum power @ rpm	77 horsepower @ 4000 RPM
fuel metering	Diesel Fuel Injection

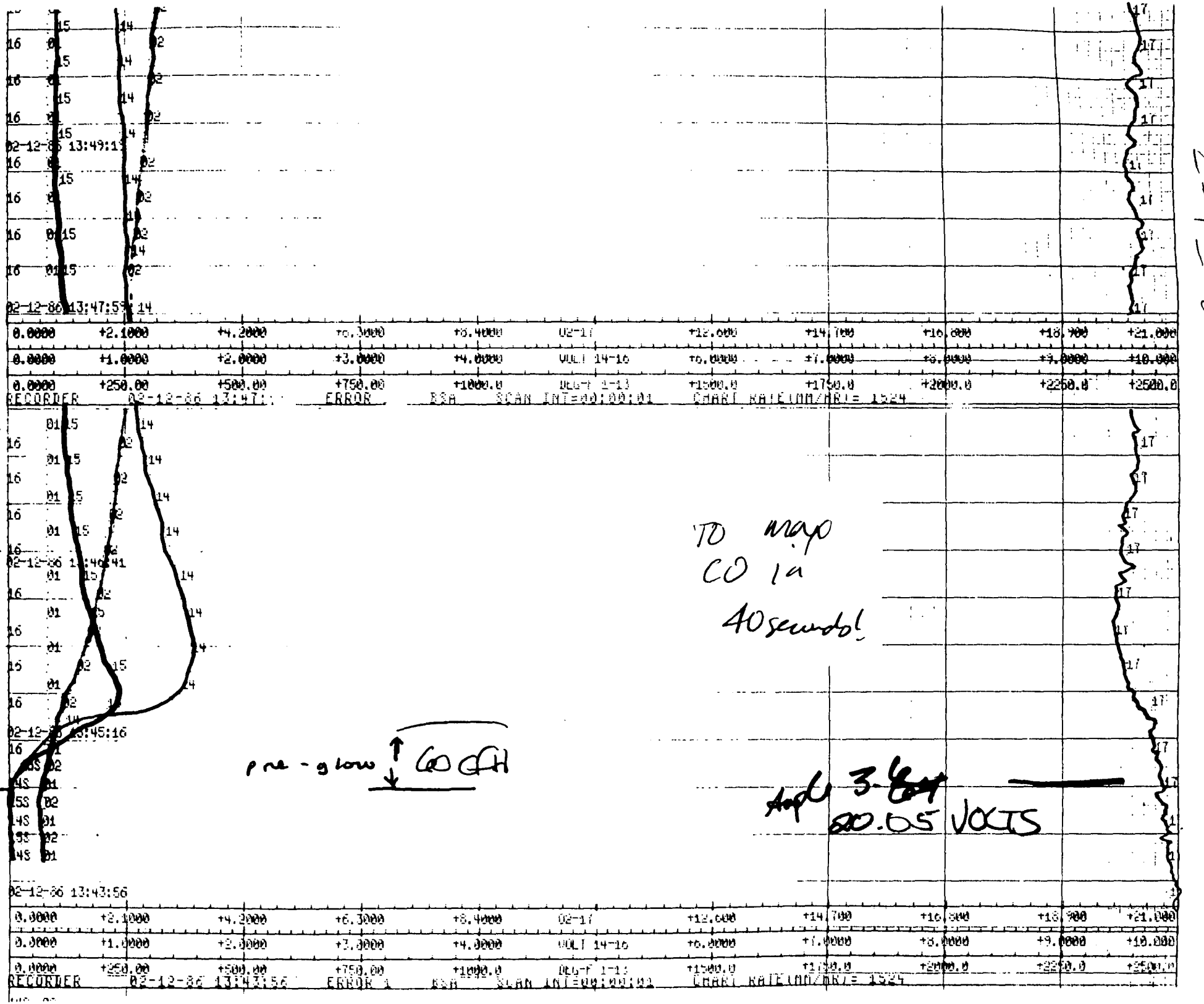
Drive Train

transmission type	3-speed automatic

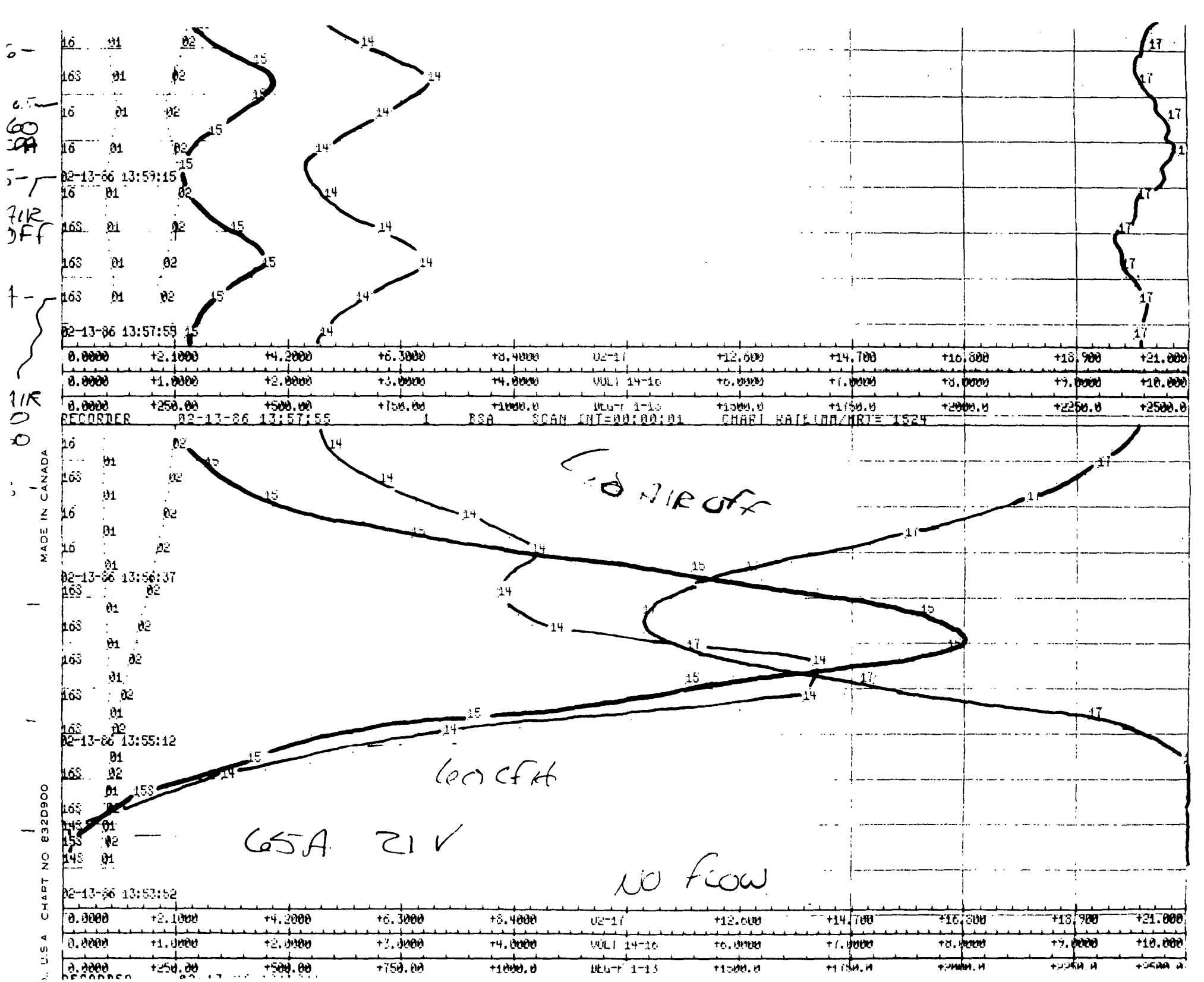
Chassis

type	4 door sedan
tire size	175 SR14
test weight	4000 pounds
dynamometer horsepower	13.2

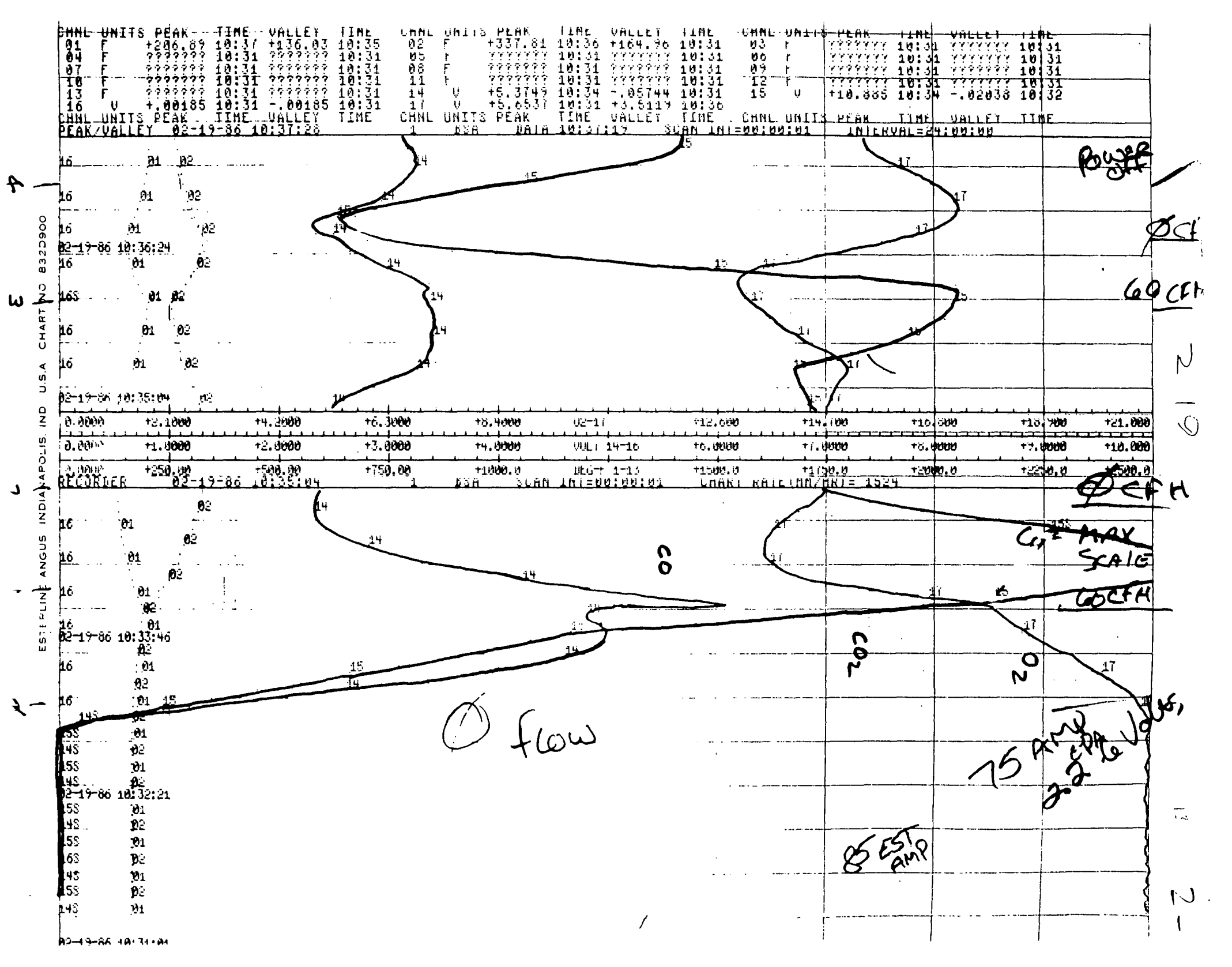
APPENDIX C: REGENERATION DATA

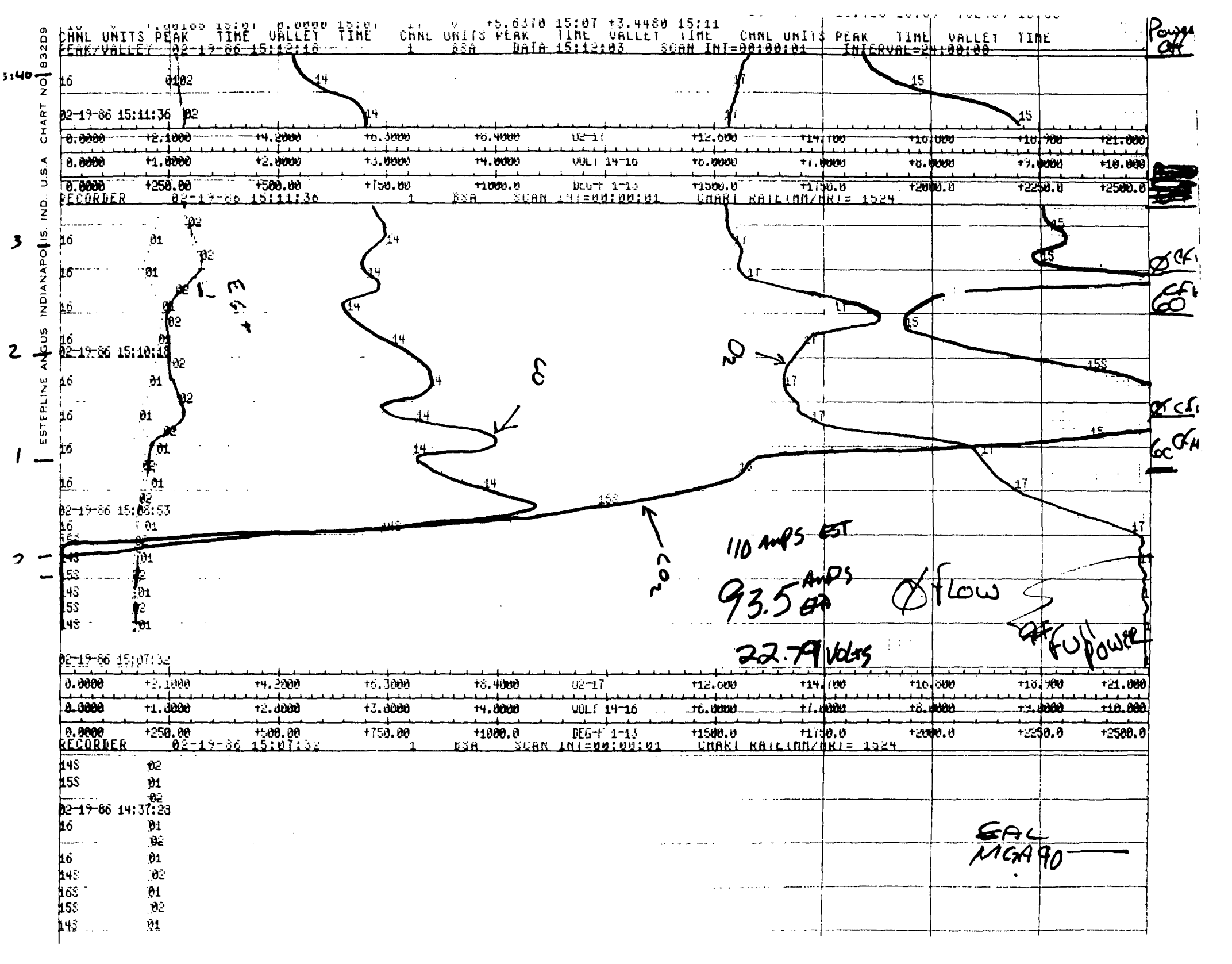

ESTERLINE ANGUS INDIANAPOLIS IND. U.S.A. CHART NO
02-12-86 13:49:13
02-12-86 13:47:5
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 02-12-86 13:47:1 ERROR 0 RSM SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
02-12-86 13:46:41
02-12-86 13:45:16
pre-glow
GO OFF
TO map CO in 40 seconds!
Apply 3.6 ±0.05 VOLTS
02-12-86 13:43:56
RECORDER 02-12-86 13:43:56 ERROR 1 RSM SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

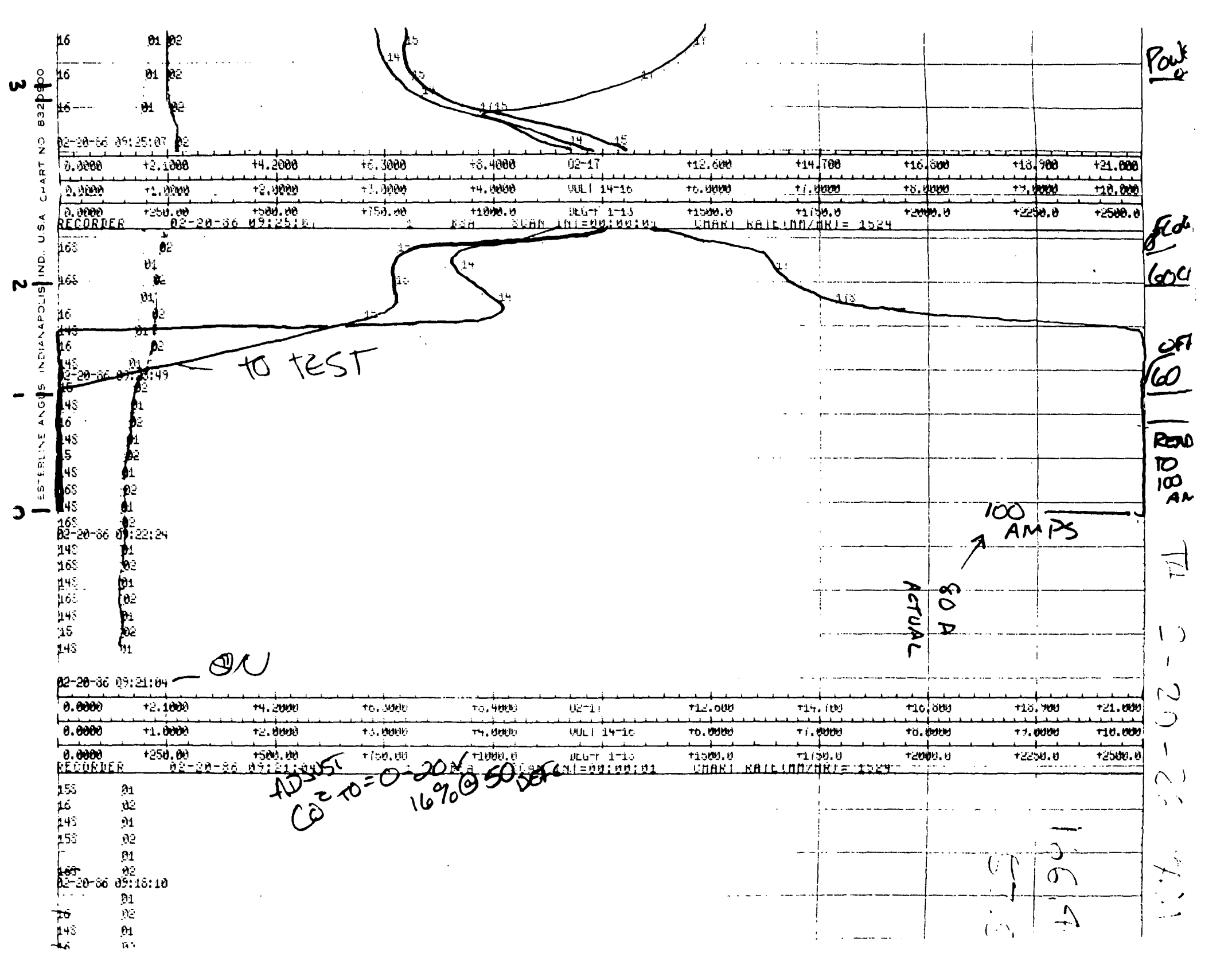
12-12-86

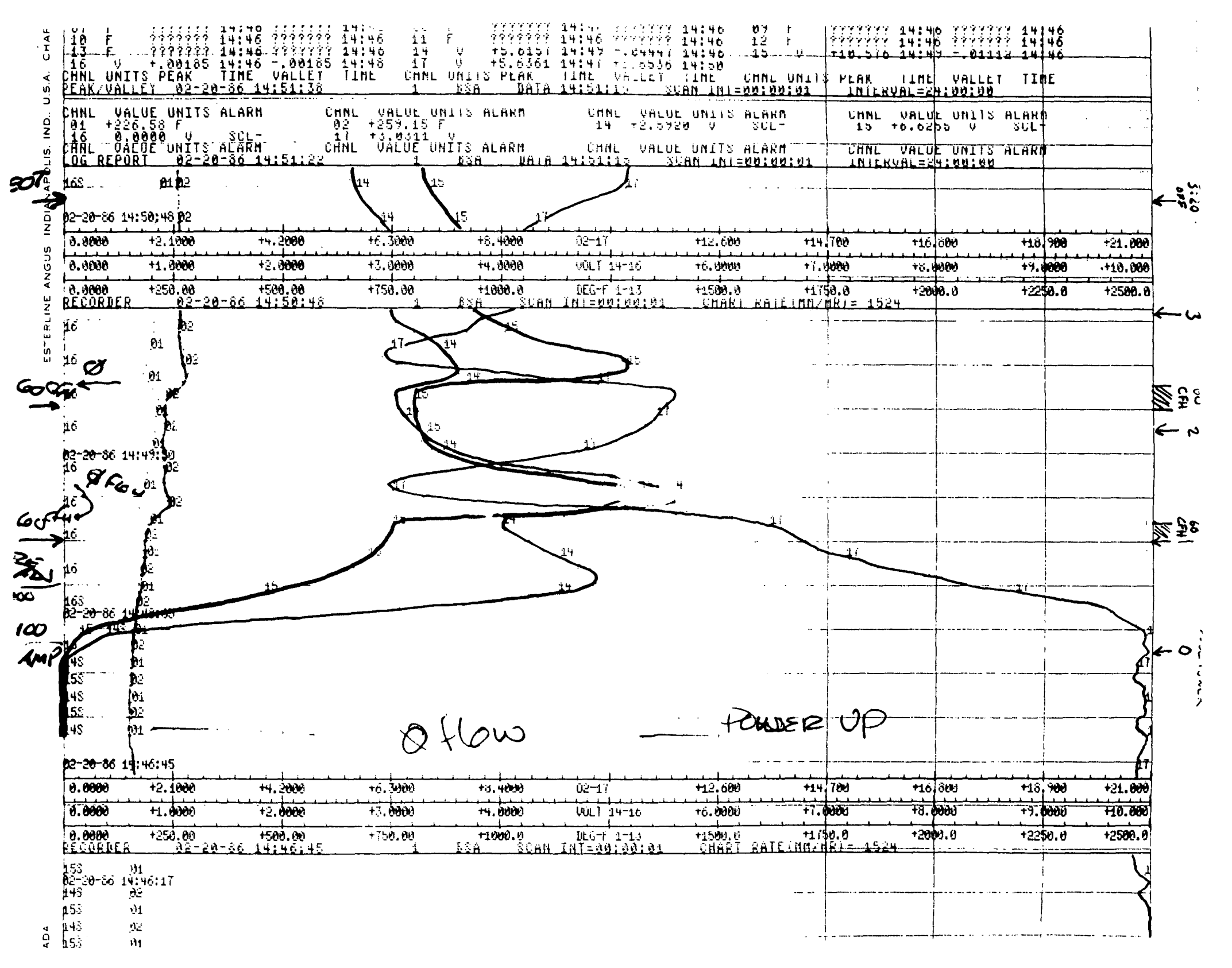

02-13-86 13:59:15
02-13-86 13:57:55
RECORDER 02-13-86 13:57:55 1 RSA SCAN INT=00:00:01 CHART RATE=MM/HR 1524
02-13-86 13:56:37
02-13-86 13:55:12
02-13-86 13:53:52
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 U2-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 VOLT 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
MADE IN CANADA
U.S.A. CHART NO 832D900
10 min off
60 cfh
65A 21V
no flow

2-13-86


CHNL UNITS PEAK TIME VALLEY TIME
01 F +206.89 10:37 +136.03 10:35
04 F ??????? 10:31 ??????? 10:31
07 F ??????? 10:31 ??????? 10:31
10 F ??????? 10:31 ??????? 10:31
13 F ??????? 10:31 ??????? 10:31
16 V +.00185 10:31 -.00185 10:31
CHNL UNITS PEAK TIME VALLEY TIME
02 F +337.81 10:36 +164.96 10:31
05 F ??????? 10:31 ??????? 10:31
08 F ??????? 10:31 ??????? 10:31
11 F ??????? 10:31 ??????? 10:31
14 V +6.3749 10:34 -.05744 10:31
17 V +5.6537 10:31 +3.5119 10:36
CHNL UNITS PEAK TIME VALLEY TIME
03 F ??????? 10:31 ??????? 10:31
06 F ??????? 10:31 ??????? 10:31
09 F ??????? 10:31 ??????? 10:31
12 F ??????? 10:31 ??????? 10:31
15 V +10.885 10:34 -.02038 10:32
PEAK/VALLEY 02-19-86 10:37:26
02-19-86 10:36:24
02-19-86 10:35:04
02-19-86 10:33:46
02-19-86 10:32:21
02-19-86 10:31:01
RECORDER 02-19-86 10:38:04
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DEG F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
1 ASA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
1 ASA MAIN 10:37:17 SCAN INT=00:00:01 INTERVAL=24:00:00
ESTERLINE ANGUS INDIANAPOLIS IND USA CHART NO 832D900
Power off
0 CFH
60 CFH
N 0
0 CFH
CO2 MAX SCALE
60 CFH
CO
CO2
O2
0 flow
75 AMP
2.2 EPA Value
85 EST AMP
N 1


ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHART NO. 832D9
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 02-19-86 15:12:16
RECORDER 02-19-86 15:11:36
02-19-86 15:11:36
02-19-86 15:10:18
02-19-86 15:08:53
02-19-86 15:07:32
02-19-86 14:37:28
SCAN INT=00:00:01
CHART RATE(MM/HR)= 1524
110 AMPS EST
93.5 AMPS
22.79 Volts
Power Off
Flow
Full Power
GAL
MCA90


ESTERLINE ANGUS INDIANAPOLIS IND. USA CHART NO 832P100
02-20-86 09:25:07
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DELTA 1-15 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 02-20-86 09:25:07 CHART RATE(MM/HR)= 1524
TO TEST
02-20-86 09:22:24
02-20-86 09:21:04
ADJUST
CO2 TO 0-20%
16% @ 50 DEG
100 AMPS
60 A
ACTUAL
02-20-86 09:16:10
Pow
Glo
600
OFF
60
REND
TO
100
AM


ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHAF
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 02-20-86 14:51:36
CHNL VALUE UNITS ALARM
LOG REPORT 02-20-86 14:51:22
02-20-86 14:50:48
RECORDER 02-20-86 14:50:48
02-20-86 14:49:30
02-20-86 14:46:45
RECORDER 02-20-86 14:46:45
02-20-86 14:46:17
Q flow
POWDER UP

ESTERLY ANGUS INDIANAPOLIS IND USA CHART NO. 832D

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	F	+194.33	09:38	+118.66	09:33	02	F	+225.51	09:36	+112.39	09:33	03	F	???????	09:29	???????	09:29
04	F	???????	09:29	???????	09:29	05	F	???????	09:29	???????	09:29	06	F	???????	09:29	???????	09:29
07	F	???????	09:29	???????	09:29	08	F	???????	09:29	???????	09:29	09	F	???????	09:29	???????	09:29
10	F	???????	09:29	???????	09:29	11	F	???????	09:29	???????	09:29	12	F	???????	09:29	???????	09:29
13	F	???????	09:29	???????	09:29	14	V	+5.9696	09:35	-.02223	09:29	15	V	+10.139	09:36	-.00741	09:30
16	V	+.00371	09:32	-.00185	09:30	17	V	+6.0104	09:31	+1.6128	09:37						

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

PEAK/VALLEY 02-21-86 09:38:28 1 ASA DATA 07:00:02 SCAN INT=00:00:01 INTERVAL=24:00:00

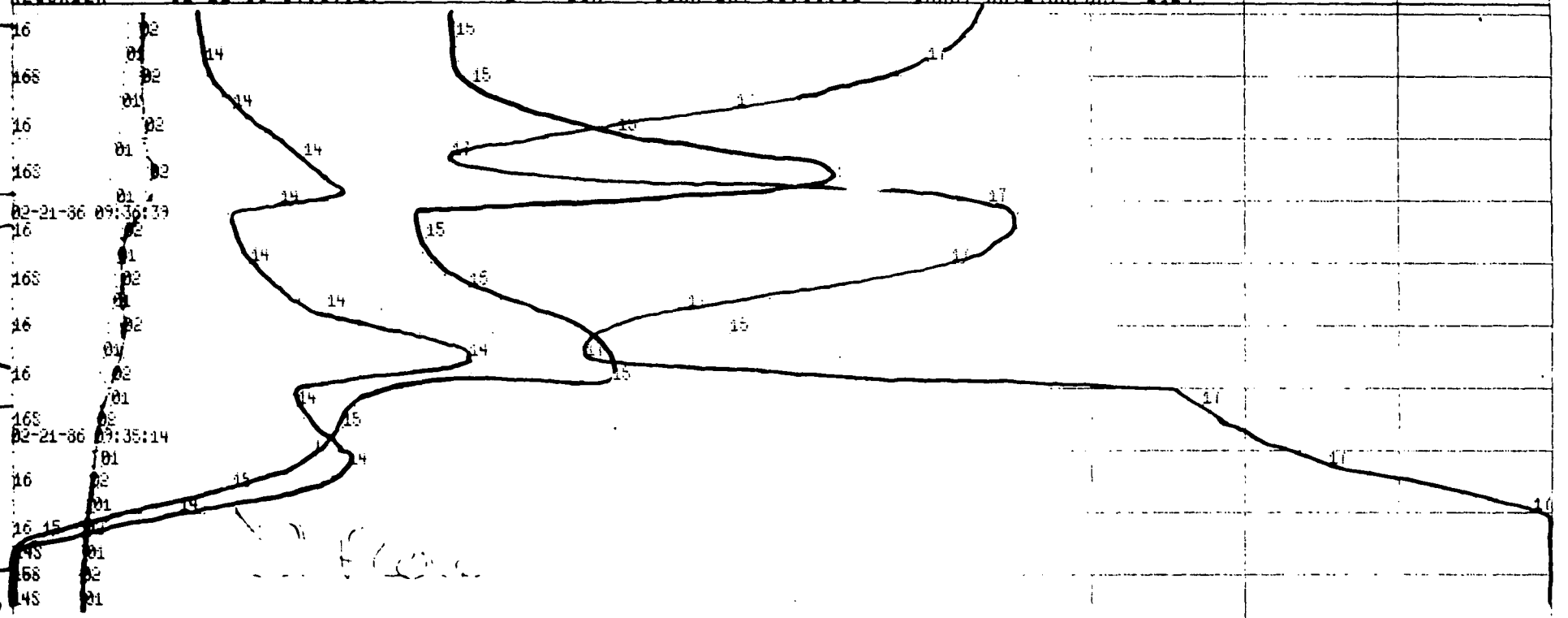
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	+194.33	F		02	+210.51	F		14	+2.4234	V	SCL-	15	+5.1695	V	SCL+
16	+.00185	V	SCL-	17	+3.5641	V	SCL+								

CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM

LOG REPORT 02-21-86 09:38:08 1 ASA DATA 07:00:02 SCAN INT=00:00:01 INTERVAL=24:00:00

0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0

RECORDER 02-21-86 09:37:57 1 ASA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524



02-21-86 09:33:54

0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000

0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000

0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0

RECORDER 02-21-86 09:33:54 1 ASA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

14S 02
15 01
16 02
14S 01
15 02
14S 01
16 02
14S 01

02-21-86 09:33:54

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	F	+148.20	14:26	+135.24	14:28	02	F	+329.51	14:26	+87.829	14:25	03	F	???????	14:24	???????	14:24
04	F	???????	14:24	???????	14:24	05	F	???????	14:24	???????	14:24	06	F	???????	14:24	???????	14:24
07	F	???????	14:24	???????	14:24	08	F	???????	14:24	???????	14:24	09	F	???????	14:24	???????	14:24
10	F	???????	14:24	???????	14:24	11	F	???????	14:24	???????	14:24	12	F	???????	14:24	???????	14:24
13	F	???????	14:24	???????	14:24	14	V	+5.1656	14:26	-.02964	14:24	15	V	+11.466	14:24	+.00041	14:24
16	V	+.00185	14:24	-.00185	14:24	17	V	+3.1112	14:25	+.44076	14:21						

PEAK/VALLEY 02-21-86 14:29:21 1 BSA DATA 14:26:57 SCAN INI=00:00:01 INTERVAL=24:00:00

CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	+136.27	F		02	+329.51	F		14	+3.4750	V	SCL-	15	+4.9751	V	
16	0.0000	V	SCL-	17	+3.4434	V	SCL+								

LOG REPORT 02-21-86 14:29:03 1 BSA DATA 14:26:57 SCAN INI=00:00:01 INTERVAL=24:00:00

0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000

0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0

RECORDER 02-21-86 14:28:43 1 BSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524

0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000

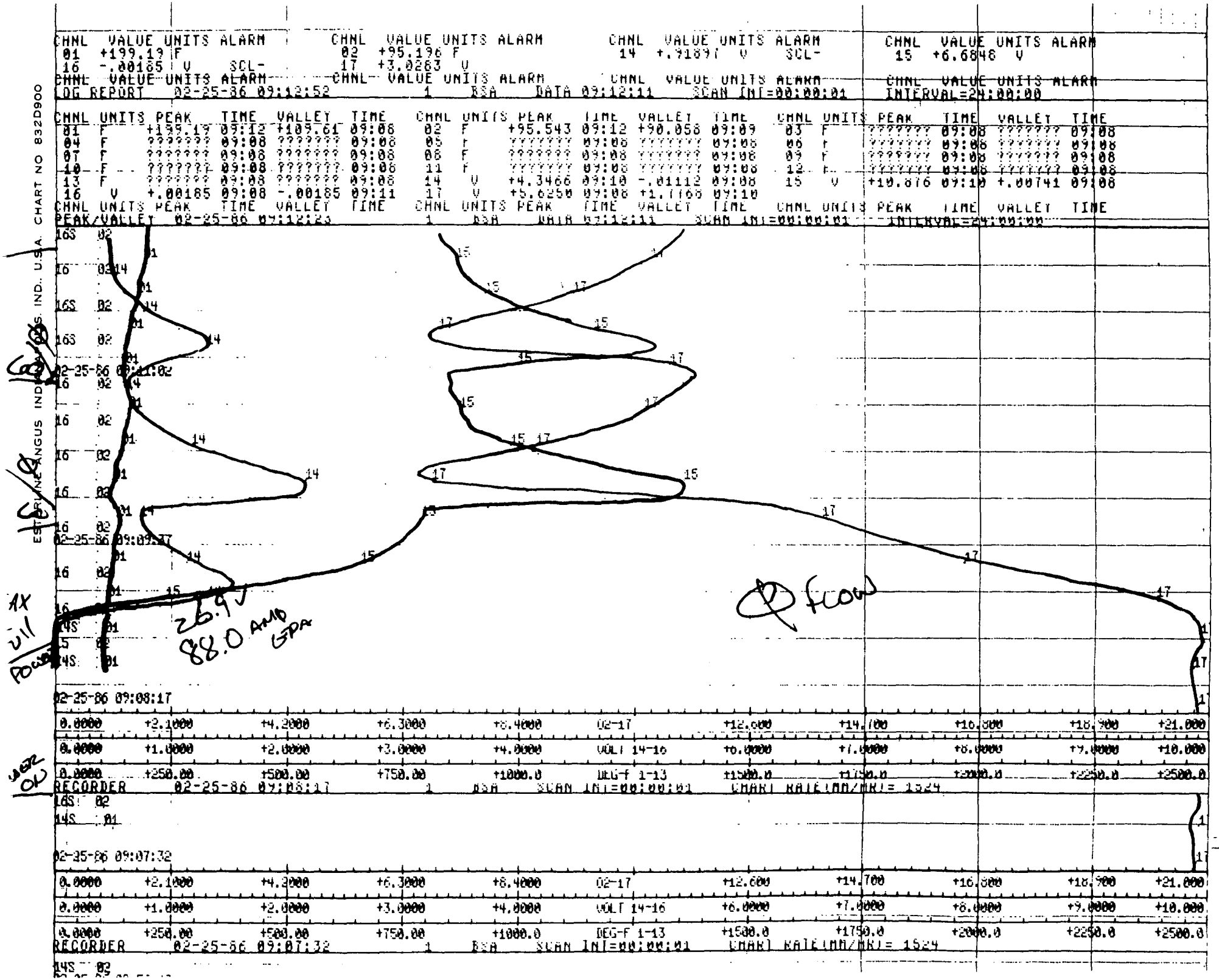
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000

0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0

RECORDER 02-21-86 14:24:40 1 BSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524

02-21-86 14:24:40

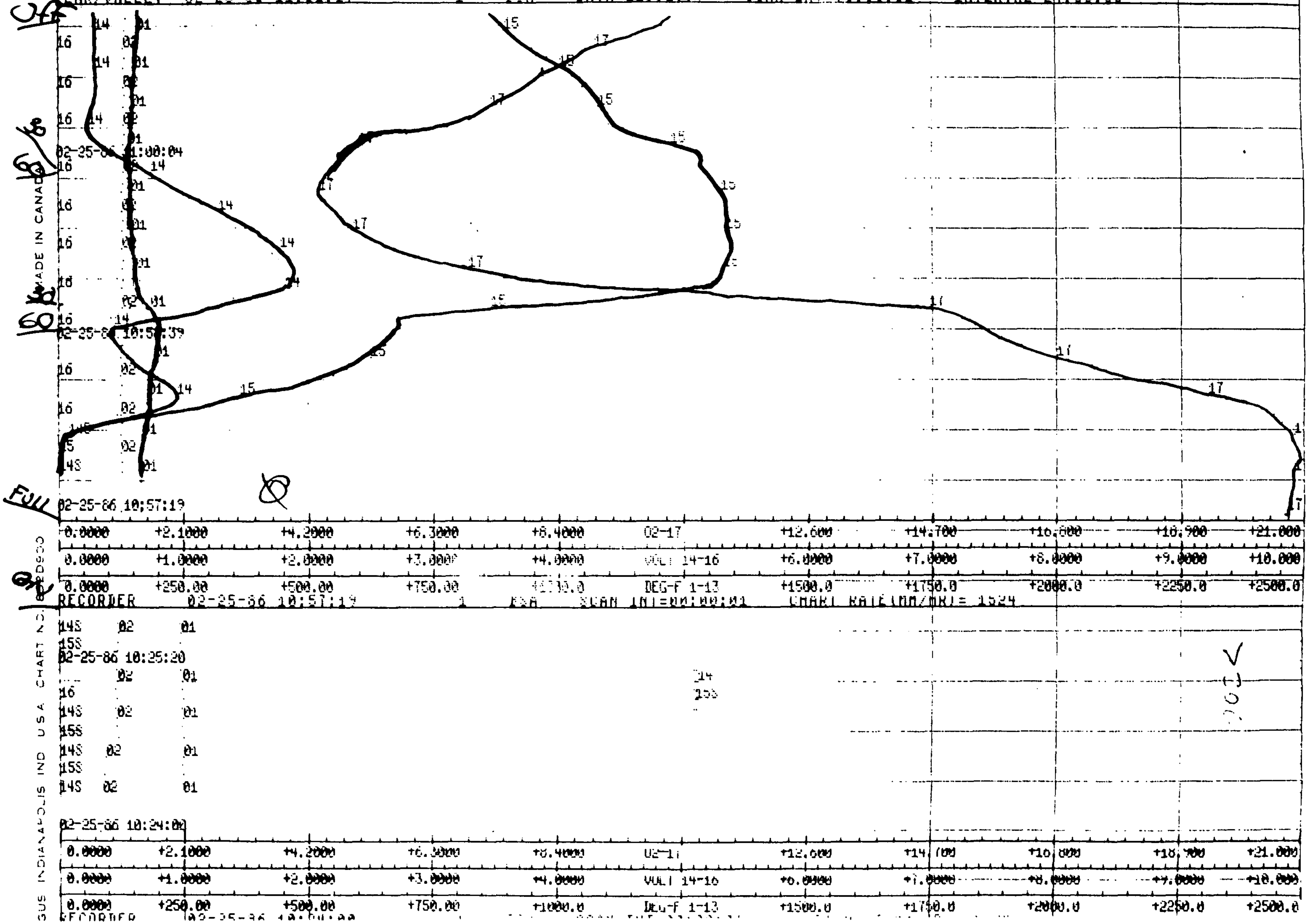
2-21-86 P1


CHNL VALUE UNITS ALARM
01 +199.19 F
16 -.00185 V SCL-
02 +95.196 F
17 +3.0283 V
14 +.71897 V SCL-
15 +6.6848 V
LOG REPORT 02-25-86 09:12:52 1 BSA DATA 09:12:11 SCAN INT=00:00:01 INTERVAL=24:00:00
CHNL UNITS PEAK TIME VALLEY TIME
01 F +199.19 09:12 +105.61 09:06
02 F +95.543 09:12 +90.058 09:09
14 V +4.3466 09:10 -.01112 09:00
15 V +10.076 09:10 +.00741 09:08
16 V +.00185 09:08 -.00185 09:11
17 V +5.6250 09:06 +1.1160 09:10
PEAK/VALLEY 02-25-86 09:12:23 1 BSA DATA 09:12:11 SCAN INT=00:00:01 INTERVAL=24:00:00
02-25-86 09:11:02
02-25-86 09:09:47
02-25-86 09:08:17
02-25-86 09:07:32
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 02-25-86 09:08:17 1 BSA SCAN INT=00:00:01 CHART RATE(MM/MR)= 1524
RECORDER 02-25-86 09:07:32 1 BSA SCAN INT=00:00:01 CHART RATE(MM/MR)= 1524
ESTERLINE ANGUS INDS. U.S.A. CHART NO 832D900
26.9 J
88.0 AMD GPM
Flow

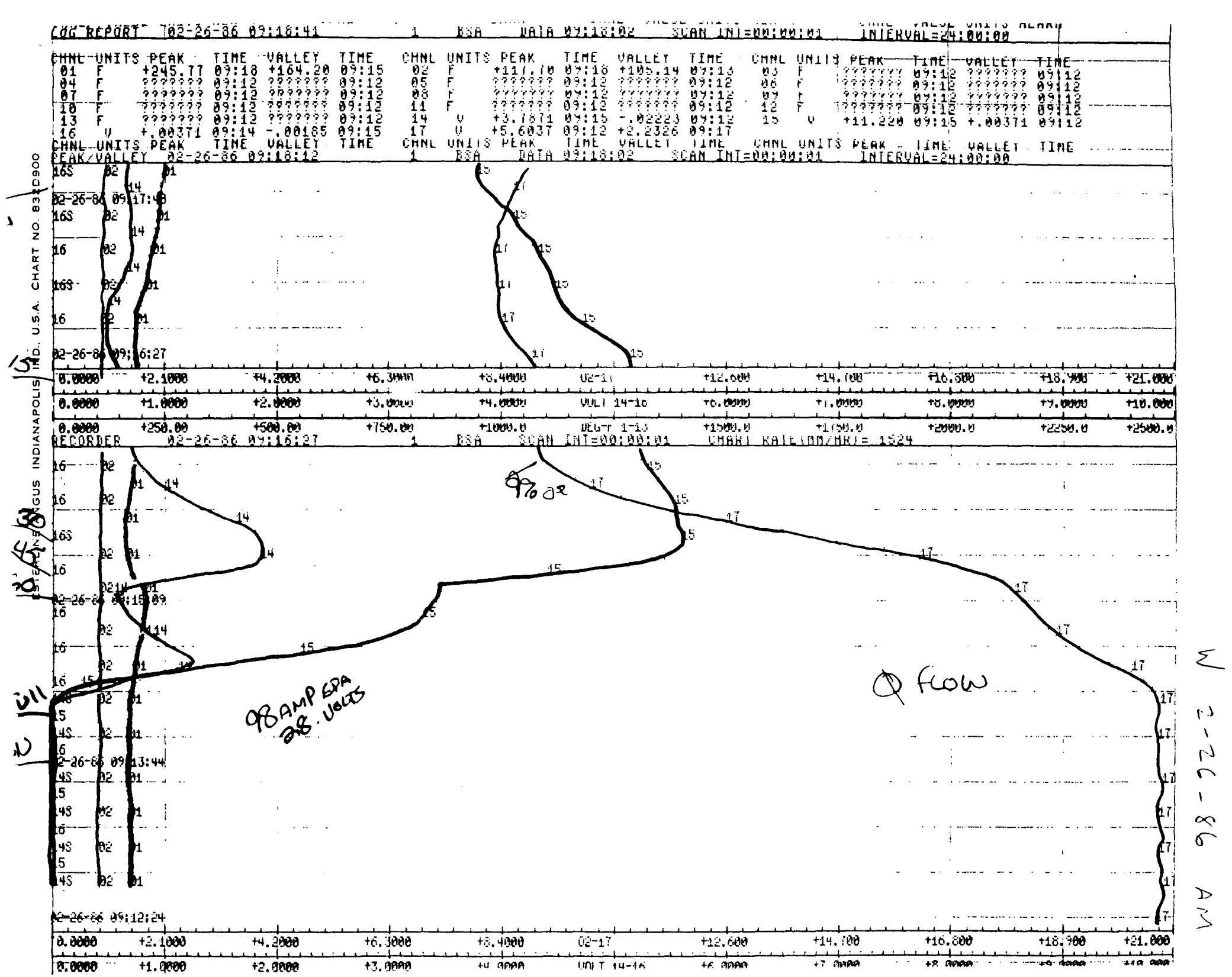
IV 2-25-86 AM

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	F	+205.00	10:58	+144.70	11:00	02	F	+135.90	11:01	+128.12	10:57	03	F	???????	10:57	???????	10:57
04	F	???????	10:57	???????	10:57	05	F	???????	10:57	???????	10:57	06	F	???????	10:57	???????	10:57
07	F	???????	10:57	???????	10:57	08	F	???????	10:57	???????	10:57	09	F	???????	10:57	???????	10:57
10	F	???????	10:57	???????	10:57	11	F	???????	10:57	???????	10:57	12	F	???????	10:57	???????	10:57
13	F	???????	10:57	???????	10:57	14	V	+3.7834	10:59	-.01853	[illegible]	15	V	+10.783	10:59	+.01112	10:57
16	V	+.00185	10:57	0.0000	10:57	17	V	+5.6463	10:57	+1.1867	10:59						
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

PEAK/VALLEY 02-25-86 11:01:17 1 ESA DATA 11:01:09 SCAN INT=00:00:01 INTERVAL=24:00:00

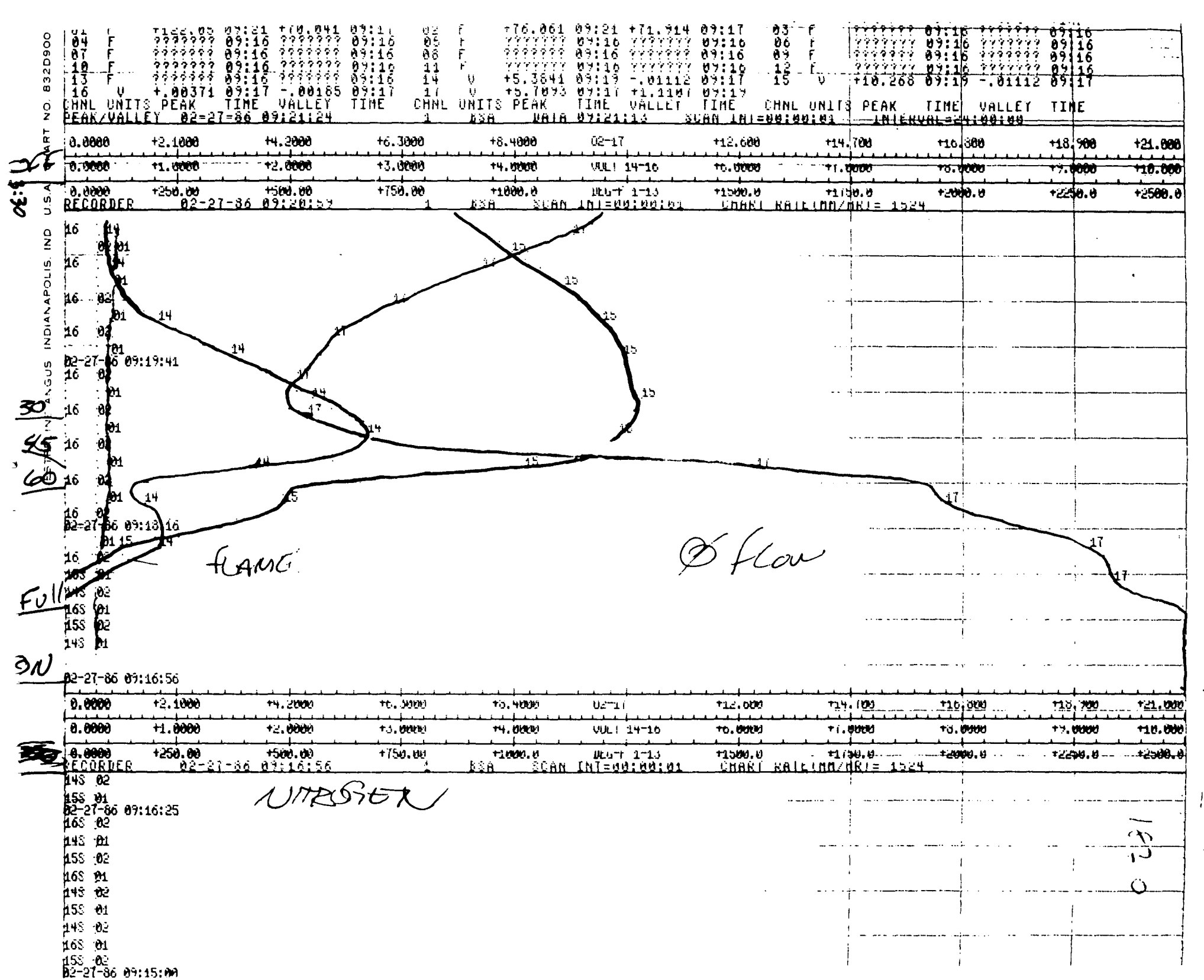


TU 2-25-86 AM2

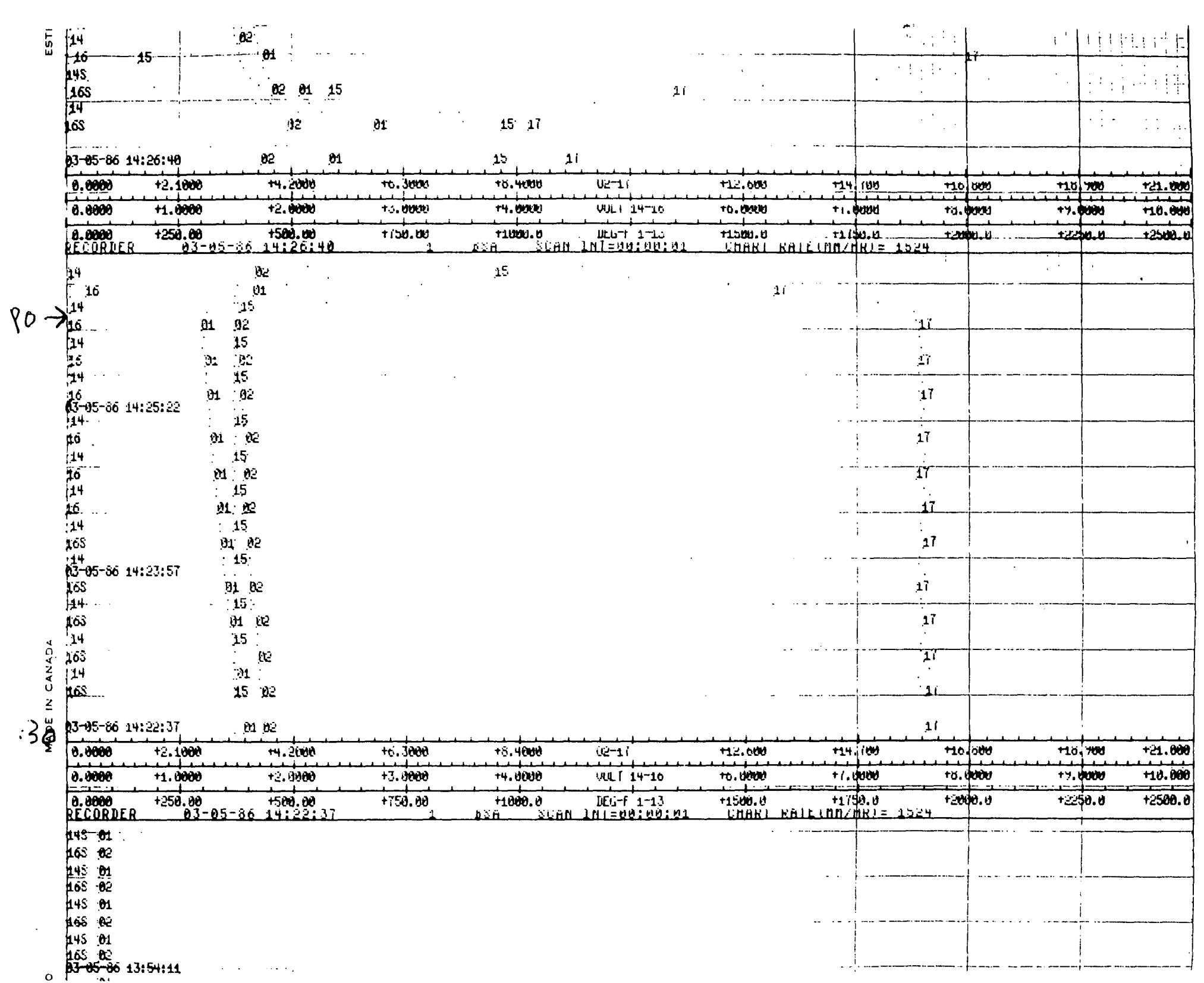


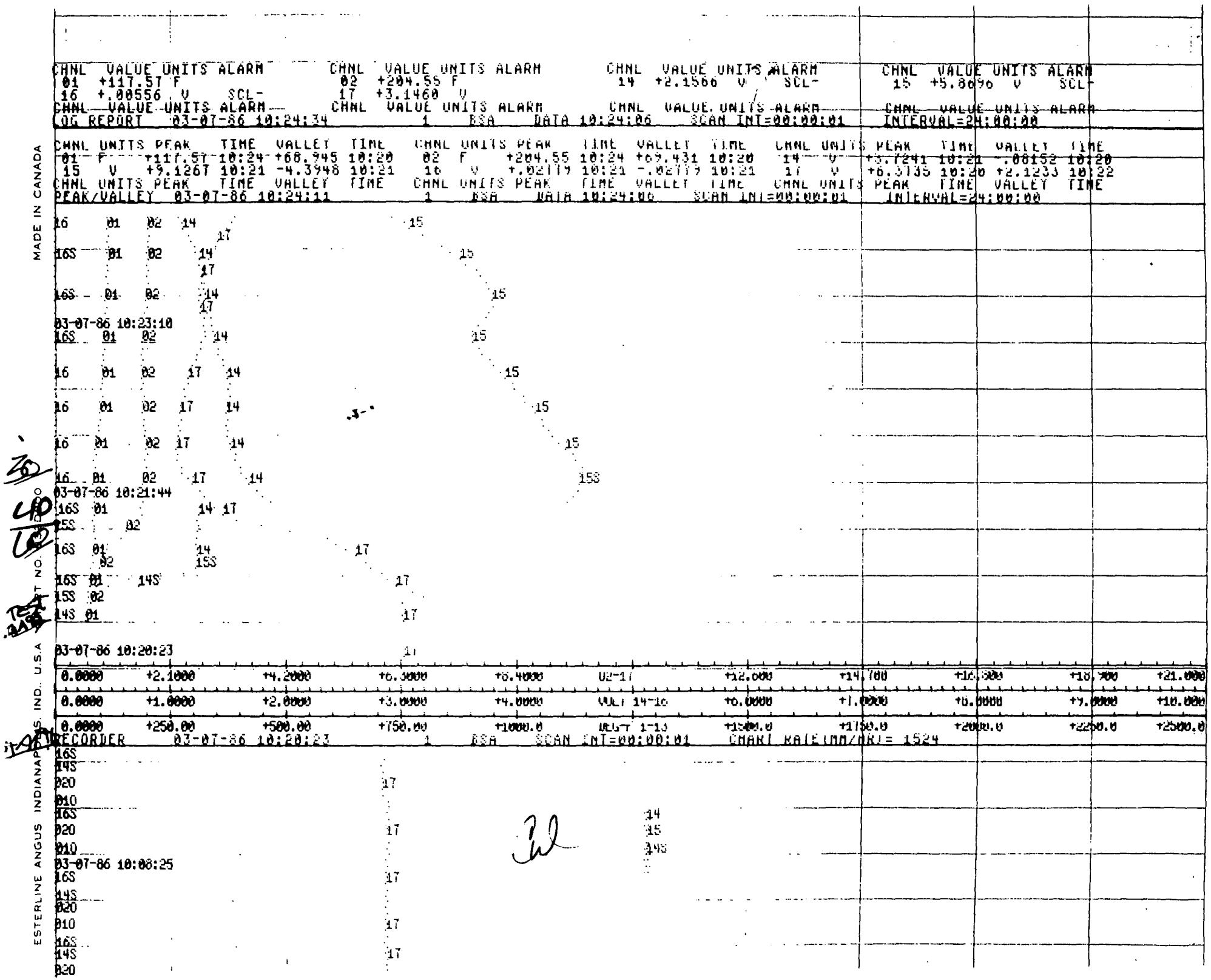
INDIANAPOLIS IND. U.S.A. CHART NO. 831D900

2-26-86 AM



TH 2-27-86 AM N-PURGE


14 02
16 15 01
14S
16S 02 01 15 17
14
16S 02 01 15 17
03-05-86 14:26:40 02 01 15 17
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-05-86 14:26:40 1 DSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
14 02 15
16 01 17
14 15
16 01 02 17
14 15
16 01 02 17
14 15
16 01 02 17
03-05-86 14:25:22
14 15
16 01 02 17
14 15
16 01 02 17
14 15
16 01 02 17
14 15
16S 01 02 17
14 15
03-05-86 14:23:57
16S 01 02 17
14 15
16S 01 02 17
14 15
16S 02 17
14 01
16S 15 02 17
03-05-86 14:22:37 01 02 17
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-05-86 14:22:37 1 DSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
14S 01
16S 02
14S 01
16S 02
14S 01
16S 02
14S 01
16S 02
03-05-86 13:54:11



MADE IN CANADA

ESTERLINE ANGUS INDIANAPOLIS IND. U.S.A. CHART NO.

F 3-7-86 AM NO RIB

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	F	+113.13	11:15	+97.603	11:18	02	F	+174.88	11:19	+97.614	11:15	14	V	+10.242	11:16	-.02964	11:17
15	V	+10.338	11:16	-.01112	11:18	16	V	+.02409	11:18	-.02594	11:16	17	V	+6.0111	11:16	+4.5343	11:19

PEAK/VALLEY 03-07-86 11:19:19 1 BSA DATA 11:19:12 SCAN INT=00:00:01 INTERVAL=24:00:00

16 02 15 17
01 14
16 15 02 17
14S
15S 01 17
16S 02
14S 01 17
03-07-86 11:16:09
15S 02
16S 01 17
14S
15S 02
16S 01 17
14S
15S 02 17
16S 01
14S 02 17
03-07-86 11:16:49
16S 01
14S 02 17
01 15
16S 02 17 14S
15
14S 01 17
16S 02
14S 01 17

03-07-86 11:15:27 17

0.0000	+2.1000	+4.2000	+6.3000	+8.4000	U2-17	+12.600	+14.700	+16.800	+18.900	+21.000
0.0000	+1.0000	+2.0000	+3.0000	+4.0000	VOLT 14-16	+6.0000	+7.0000	+8.0000	+9.0000	+10.000
0.0000	+250.00	+500.00	+750.00	+1000.0	DEG-F 1-13	+1500.0	+1750.0	+2000.0	+2250.0	+2500.0

RECORDER 03-07-86 11:15:27 1 BSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	+117.57	F		02	+204.55	F		14	+2.1566	V		15	+5.5696	V	
16	+.00556	V		17	+3.1460	V									

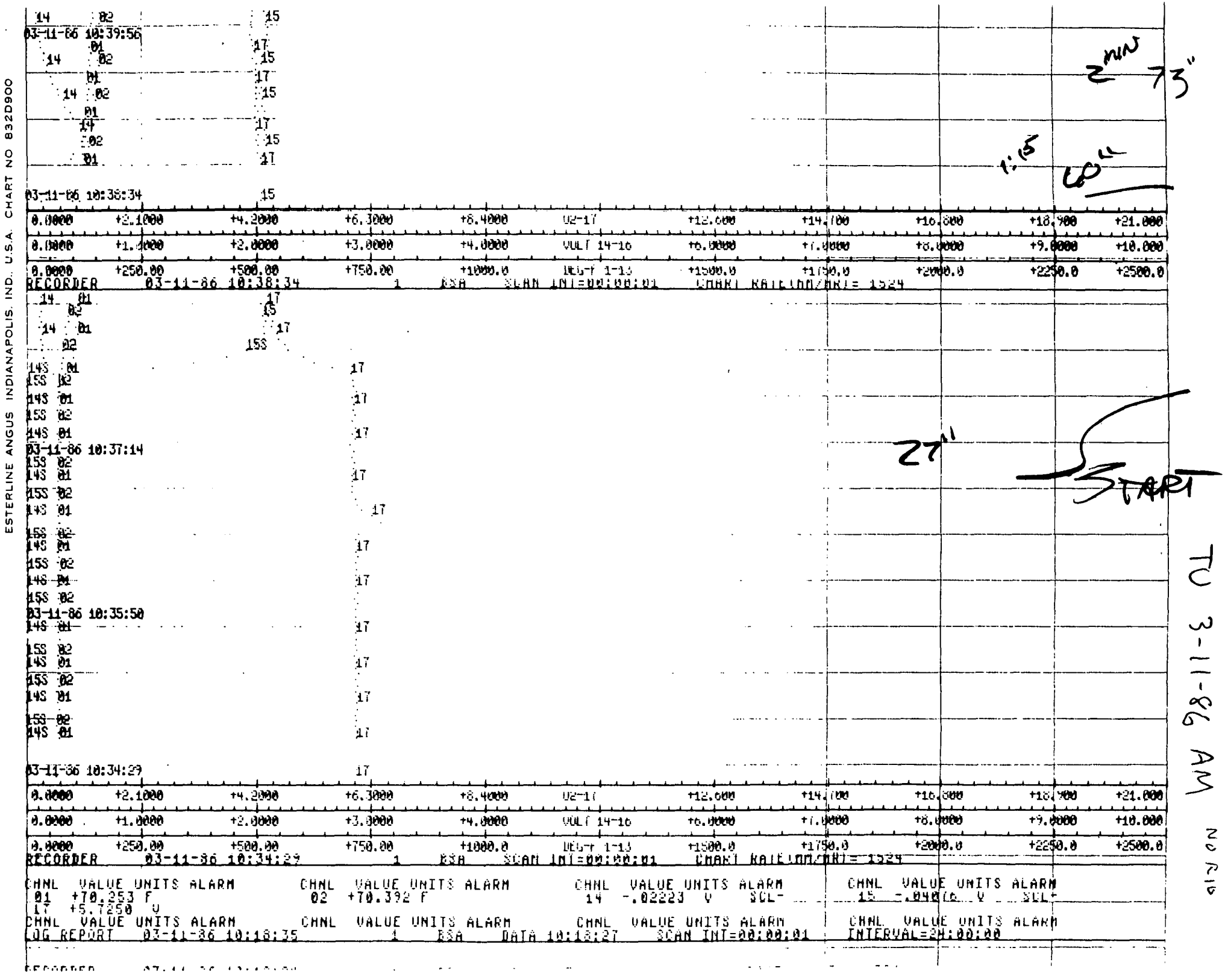
LOG REPORT 03-07-86 11:15:02 1 BSA DATA 10:24:06 SCAN INT=00:00:01 INTERVAL=24:00:00

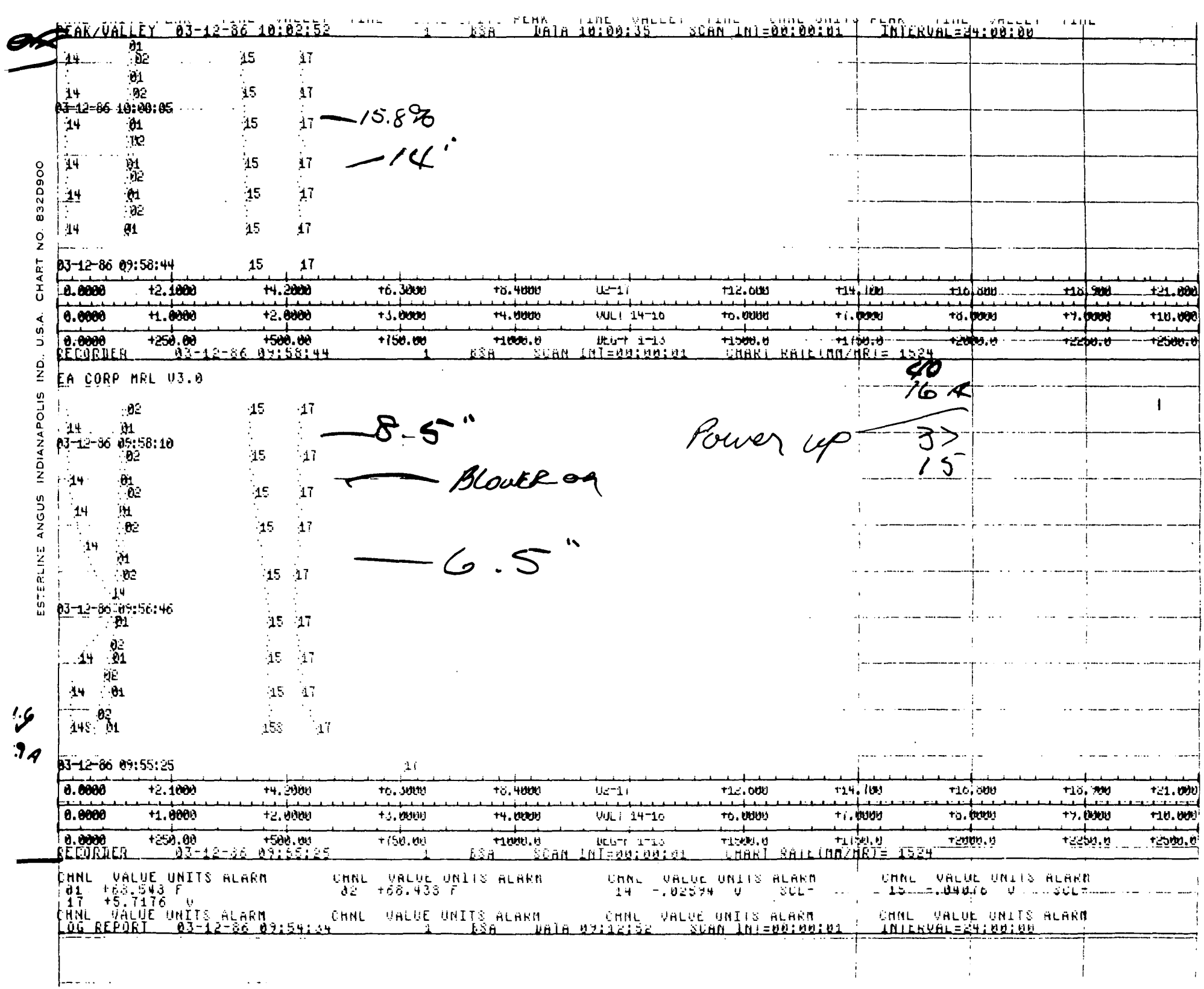
L40" BP @ 60
#16 REBUR

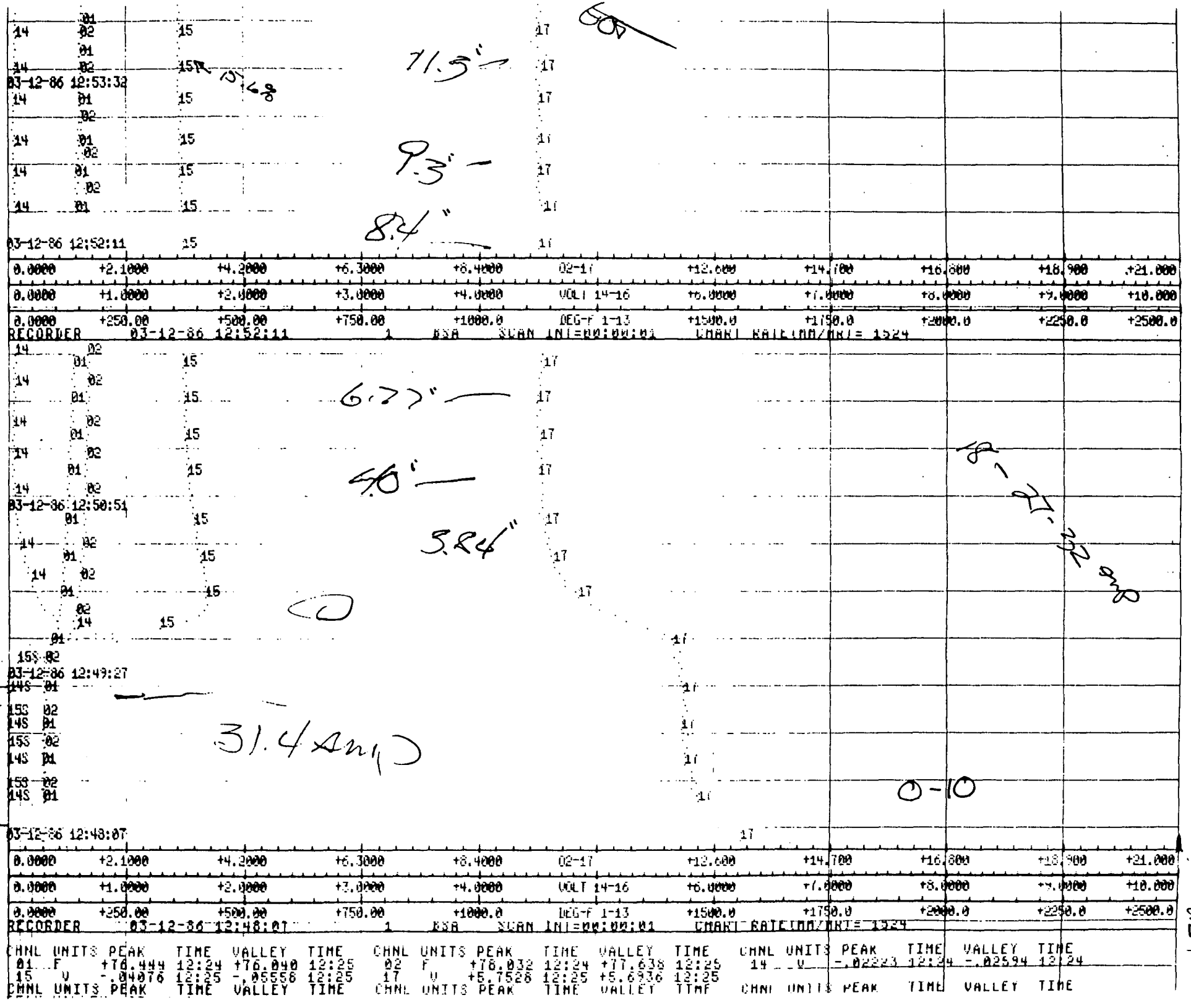
MADE IN CANADA

INDIANAPOLIS, IND. U.S.A CHART NO 832D900

F 3-7-86 AM NO CIB


ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHART NO 832D900
03-11-86 10:39:56
03-11-86 10:38:34
03-11-86 10:37:14
03-11-86 10:35:50
03-11-86 10:34:29
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02-17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 VOLT 14-16 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 DEG-F 1-13 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-11-86 10:38:34 1 BSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
RECORDER 03-11-86 10:34:29 1 BSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
01 +70.253 F 02 +70.392 F 14 -.02223 V SCL- 15 -.04816 V SCL+
17 +5.7250 U
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
LOG REPORT 03-11-86 10:18:35 1 BSA DATA 10:18:27 SCAN INT=00:00:01 INTERVAL=2H:00:00
2 MIN 73°
1:15
60°
27°
START
TU 3-11-86 AM
NO R/D

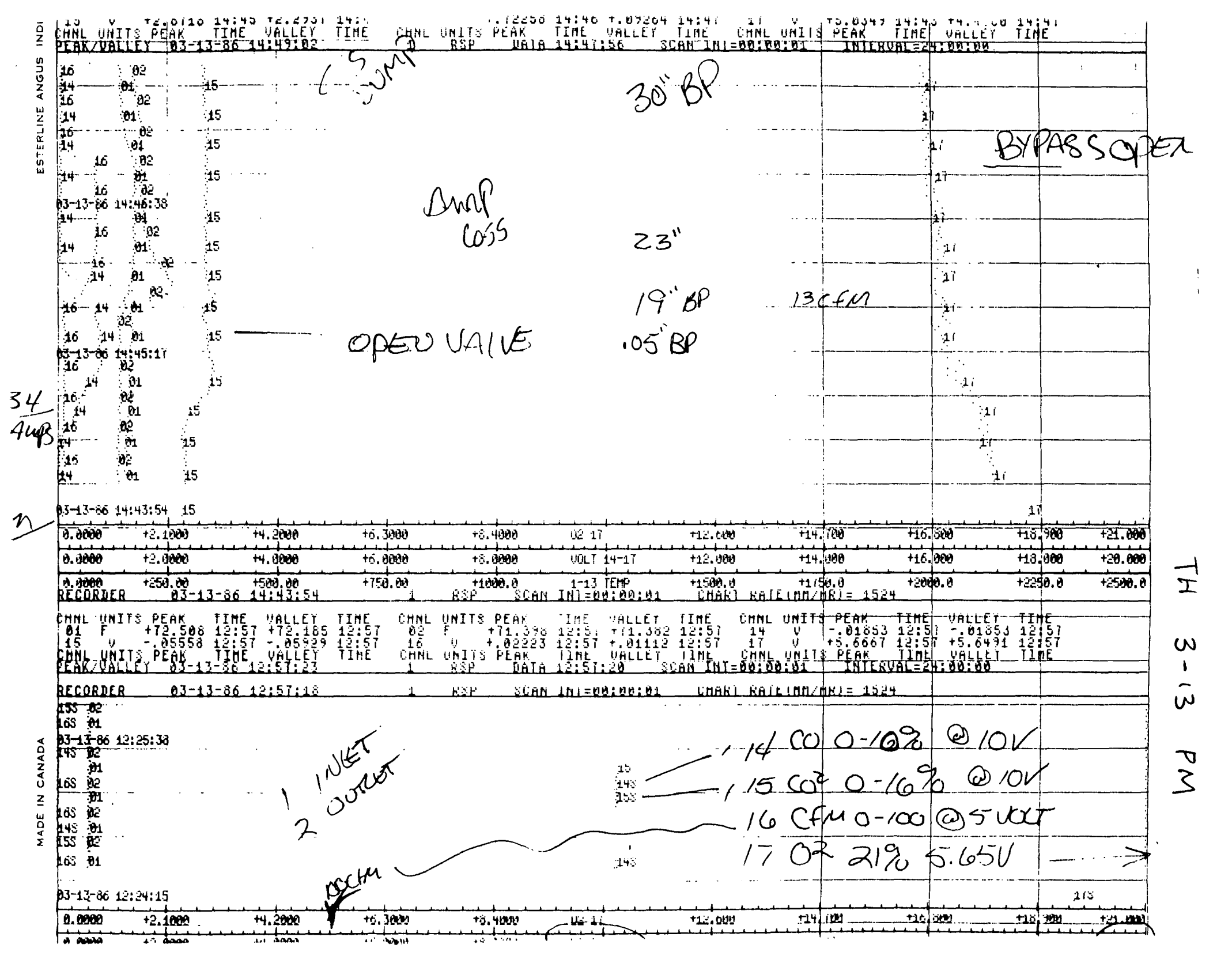

PEAK/VALLEY 03-12-86 10:02:52 1 ESA DATA 10:00:35 SCAN INT=00:00:01 INTERVAL=24:00:00
03-12-86 10:00:05
15.89
14"
03-12-86 09:58:44
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 +5.0000 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-12-86 09:58:44 1 ESA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
EA CORP MRL V3.0
8.5"
Blower on
6.5"
Power up
40
16 A
3>
15
03-12-86 09:58:10
03-12-86 09:56:46
03-12-86 09:55:25
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 +5.0000 +6.0000 +7.0000 +8.0000 +9.0000 +10.000
0.0000 +250.00 +500.00 +750.00 +1000.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-12-86 09:55:25 1 ESA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
01 +68.543 F 02 +68.433 F 14 -.02594 V SCL- 15 -.04076 V SCL-
17 +5.7176 V
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
LOG REPORT 03-12-86 09:54:34 1 ESA DATA 02:12:52 SCAN INT=00:00:01 INTERVAL=24:00:00
W 3-12-86 AM GRAY
ESTERLINE ANGUS INDIANAPOLIS IND. U.S.A. CHART NO. 832D900



W 3-12-86 PM

GRAY WILSON

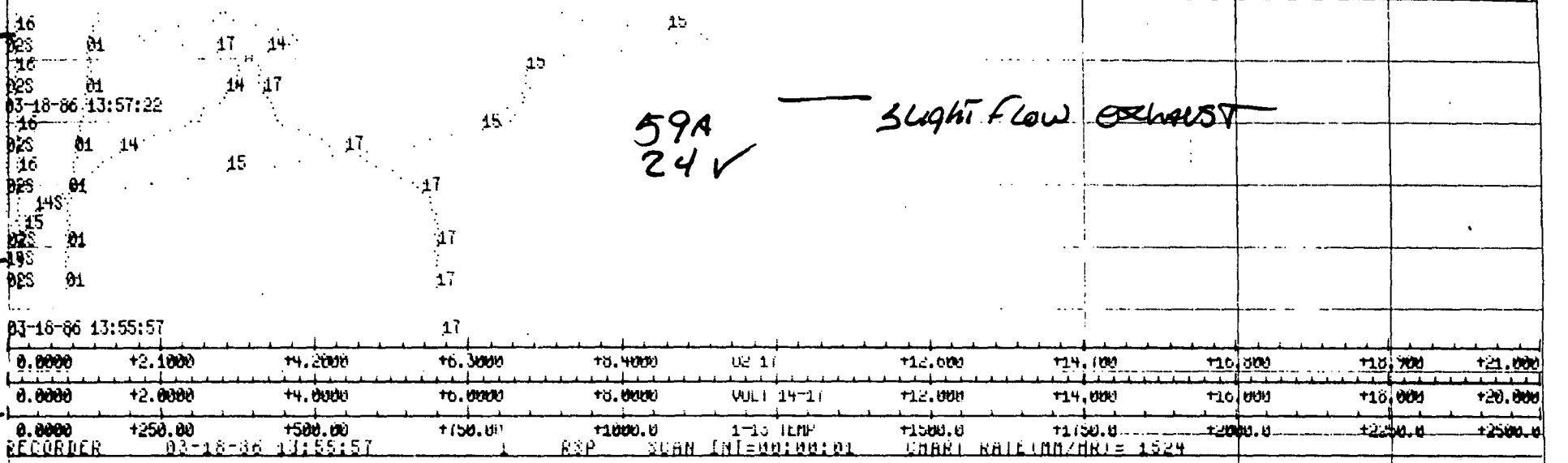
NE 1


ESTERLINE ANGUS INDI
MADE IN CANADA
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 03-13-86 14:49:02
RECORDER 03-13-86 14:43:54
RECORDER 03-13-86 12:57:18
03-13-86 14:46:38
03-13-86 14:45:17
03-13-86 14:43:54
03-13-86 12:25:38
03-13-86 12:24:15
SCAN INT=00:00:01
INTERVAL=24:00:00
CHNL UNITS PEAK TIME VALLEY TIME
01 F +72.508 12:57 +72.185 12:57
02 F +71.396 12:57 +71.362 12:57
14 V -.01853 12:57 -.01853 12:57
15 V -.05558 12:57 -.05929 12:57
16 V +.02223 12:57 +.01112 12:57
17 V +5.6667 12:57 +5.6491 12:57
PEAK/VALLEY 03-13-86 12:57:23
SCAN INT=00:00:01
INTERVAL=24:00:00
0.0000 +2.1000 +4.2000 +6.3000 +8.4000 02 17 +12.600 +14.700 +16.800 +18.900 +21.000
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 VOLT 14-17 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +250.00 +500.00 +750.00 +1000.0 1-13 TEMP +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
30" BP
23"
19" BP
.05" BP
OPEN VALVE
BYPASS OPEN
13 CFM
1 INLET
2 OUTLET
14 CO 0-10% @ 10V
15 CO2 0-16% @ 10V
16 CFM 0-100 @ 5 VOLT
17 O2 21% 5.65V
TH 3-13 PM

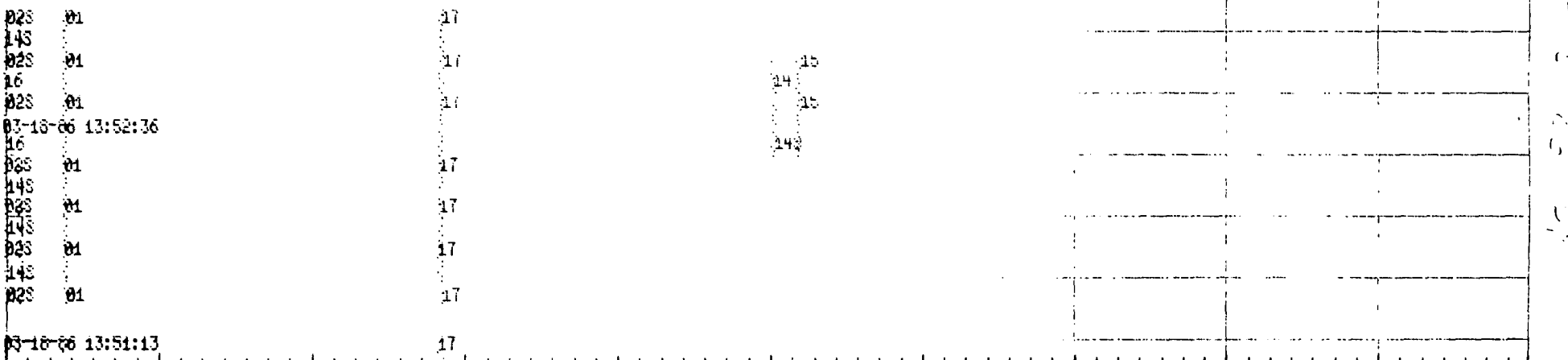
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	F	+151.32	13:58	+97.266	13:56	02	V	+.00141	13:57	-.00141	13:56	14	V	+3.1782	13:58	-.00100	13:56
15	V	+9.1416	13:57	+.16528	13:56	16	V	+.17787	13:58	+.12599	13:57	17	V	+5.0472	13:58	+1.7453	13:57

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME

PEAK/VALLEY 03-18-86 13:58:13 1 RSP DATA 13:58:01 SCAN INT=00:00:01 INTERVAL=24:00:00



RECORDER 03-18-86 13:55:57 1 RSP SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524



RECORDER 03-18-86 13:51:13 1 RSP SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	???????	F	OPEN	02	-.00141	V	SEL-	14	+.00371	V		15	+.00371	V	
16	+.00371	V		17	+.00371	V									

CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM

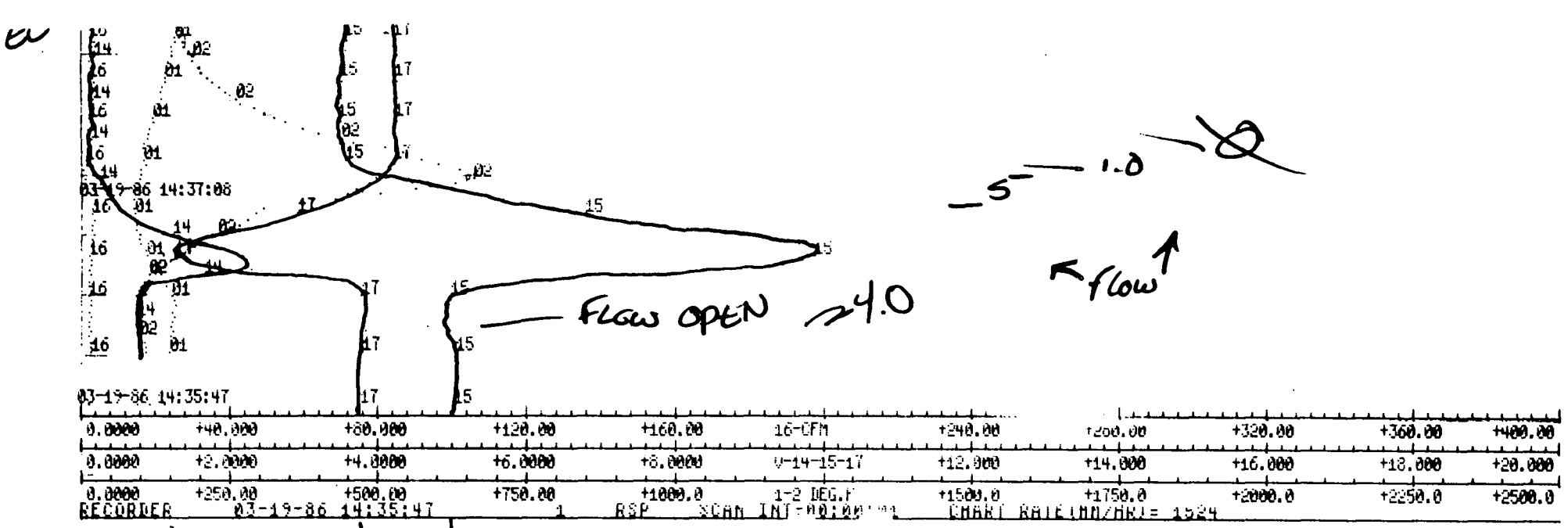
LOG REPORT 03-18-86 13:58:51 1 RSP DATA 13:03:20 SCAN INT=00:00:01 INTERVAL=00:00:01

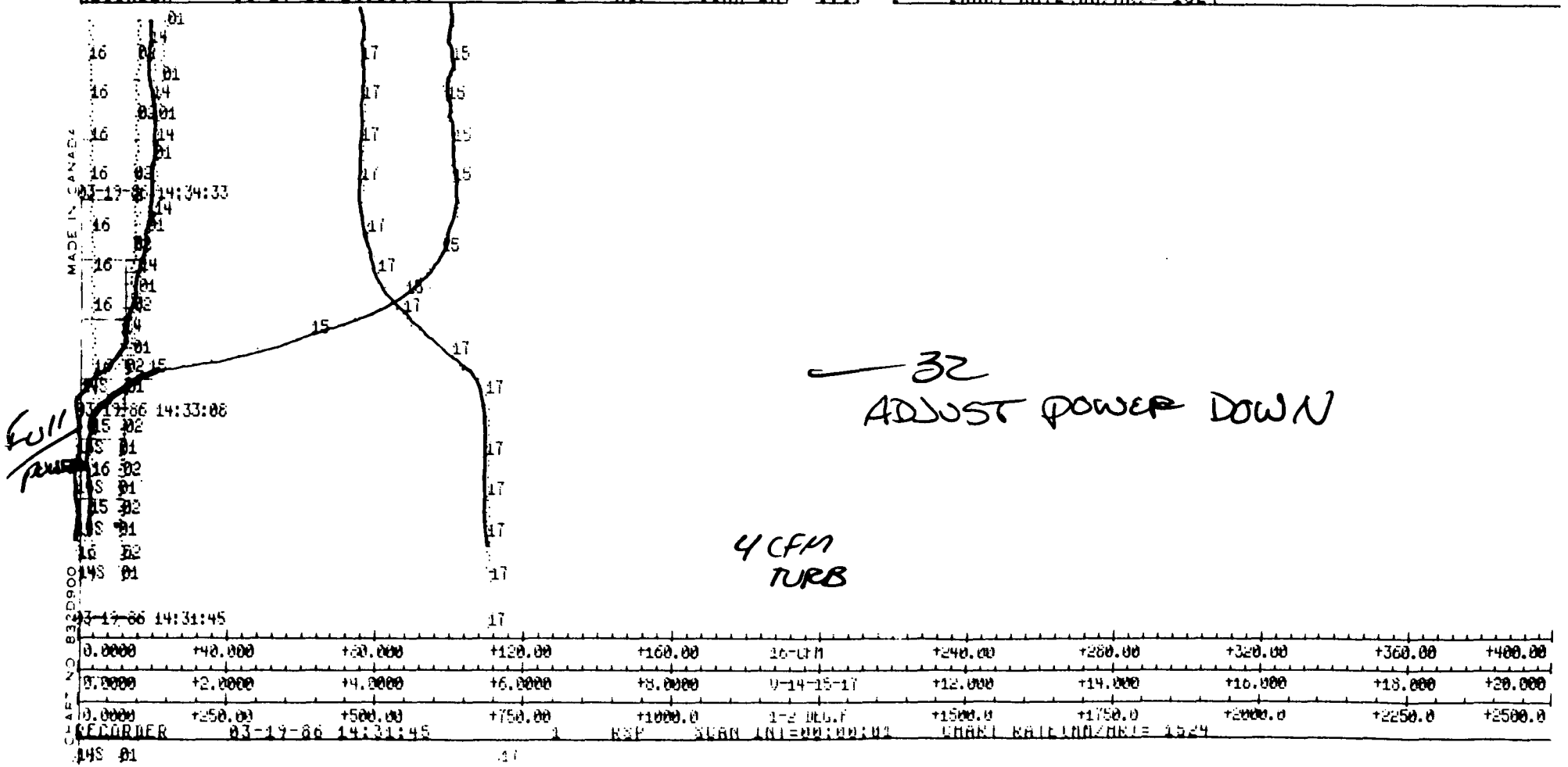
59A
24V
— slight flow exhaust

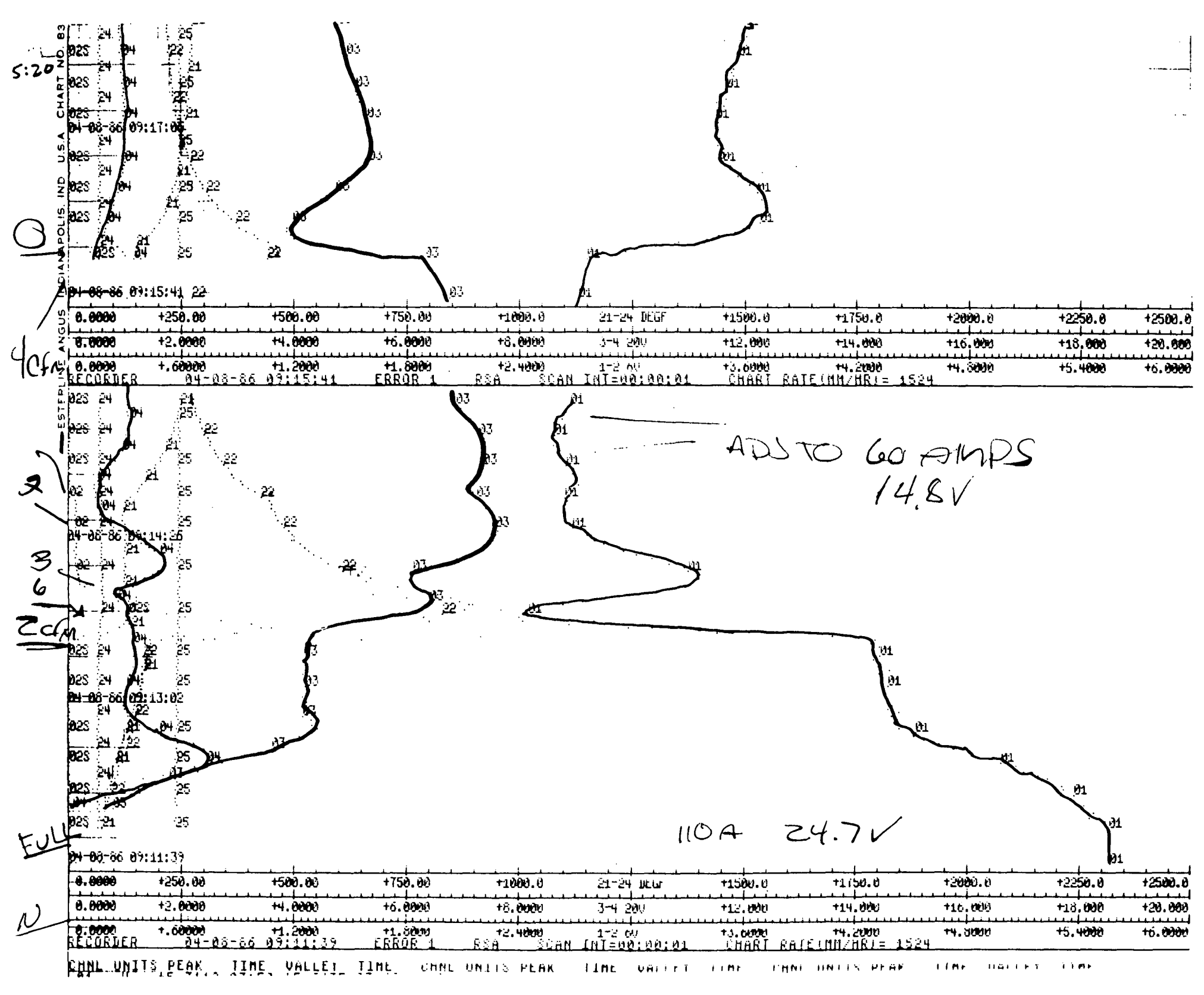
32A

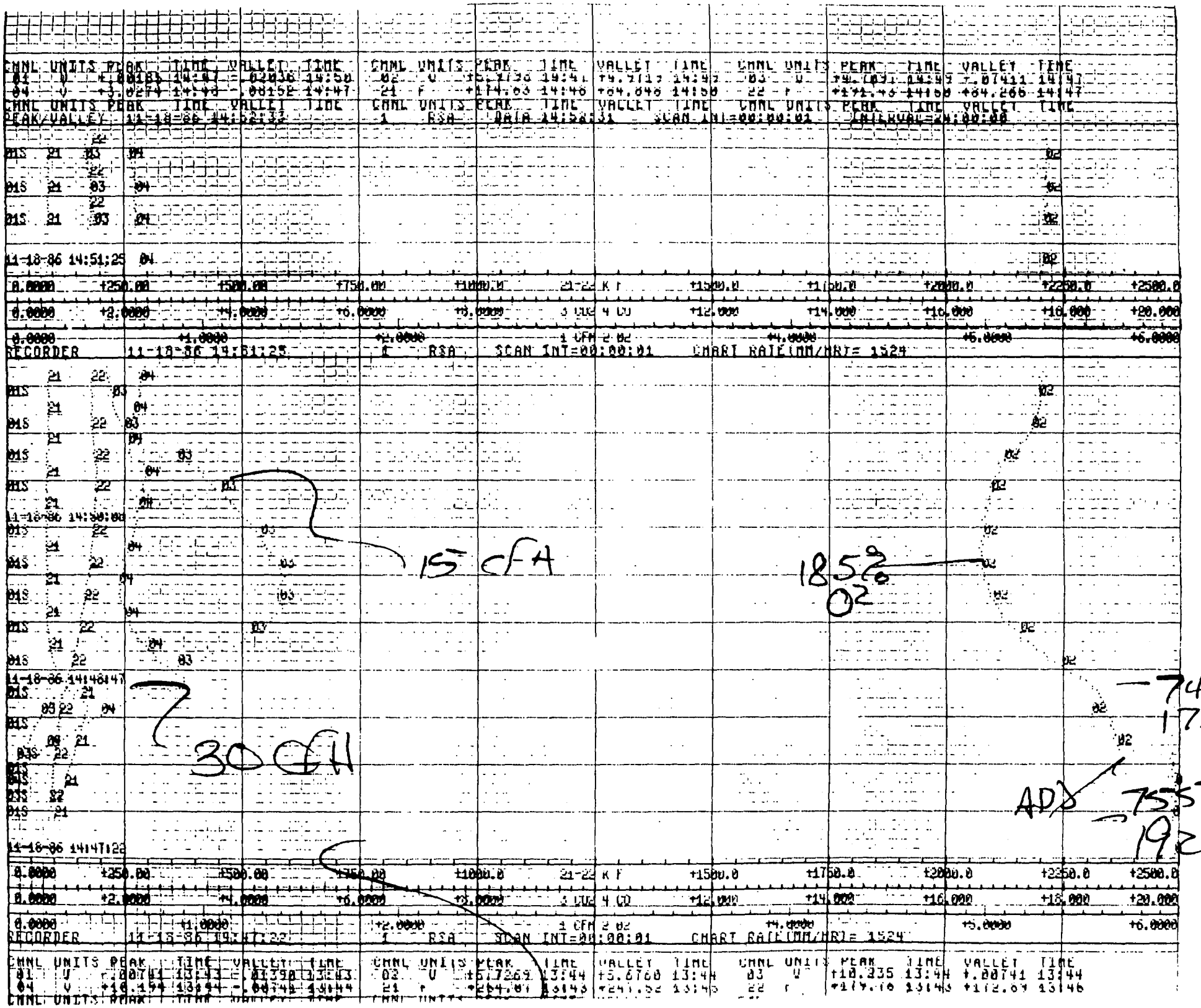
MADE IN CANADA

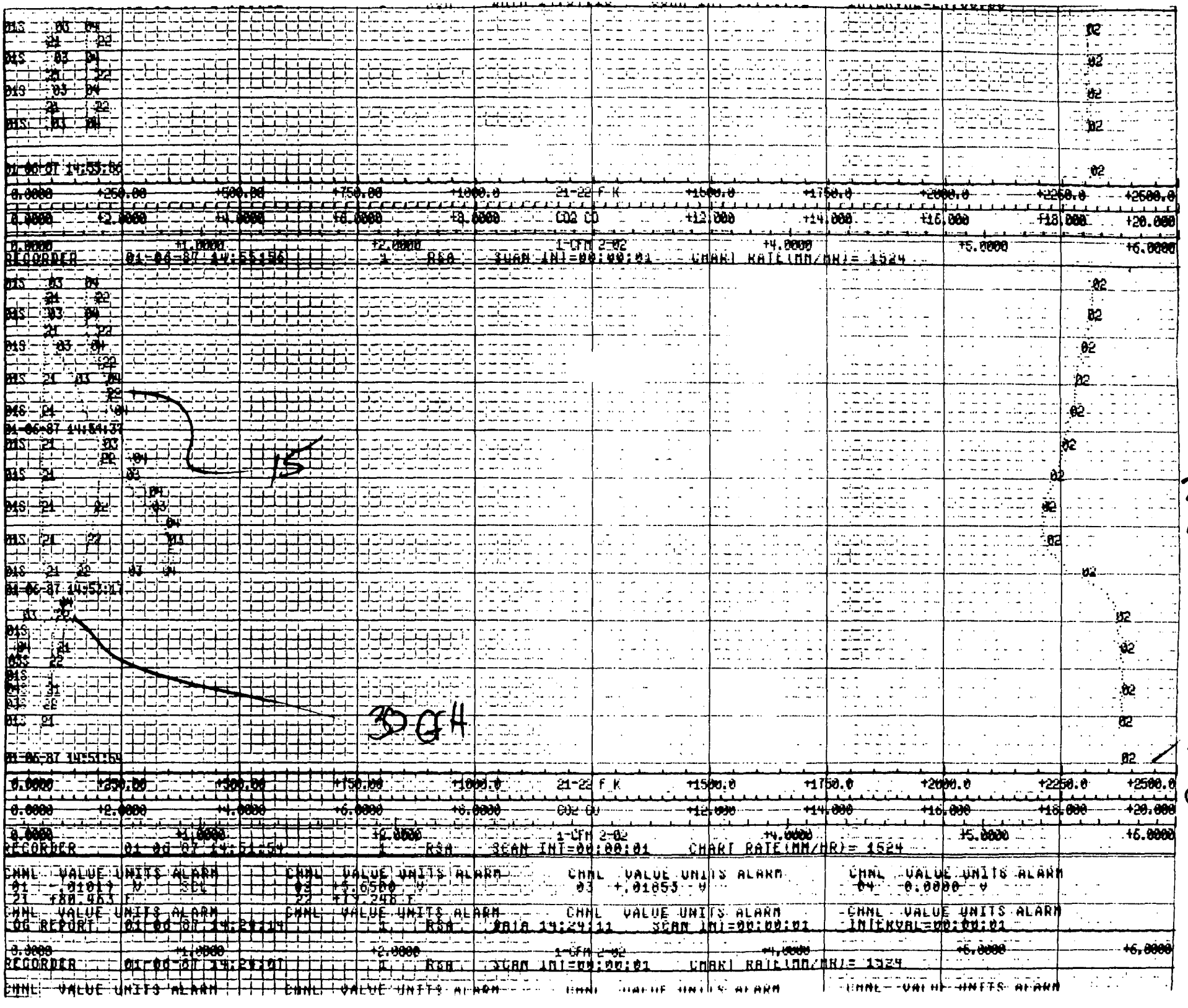
APOLIS IND. U.S.A. CHART NO 832D900


03-19-86 14:37:08
03-19-86 14:35:47
FLOW OPEN ≥4.0
1.0
FLOW
0.0000 +40.000 +80.000 +120.00 +160.00 16-CFM +240.00 +280.00 +320.00 +360.00 +400.00
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 V-14-15-17 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +250.00 +500.00 +750.00 +1000.0 1-2 DEG.F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-19-86 14:35:47 1 RSP SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524


03-19-86 14:34:33
03-19-86 14:33:08
FULL THRUST
32
ADJUST POWER DOWN
4 CFM TURB
03-19-86 14:31:45
0.0000 +40.000 +80.000 +120.00 +160.00 16-CFM +240.00 +280.00 +320.00 +360.00 +400.00
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 V-14-15-17 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +250.00 +500.00 +750.00 +1000.0 1-2 DEG.F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
RECORDER 03-19-86 14:31:45 1 RSP SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

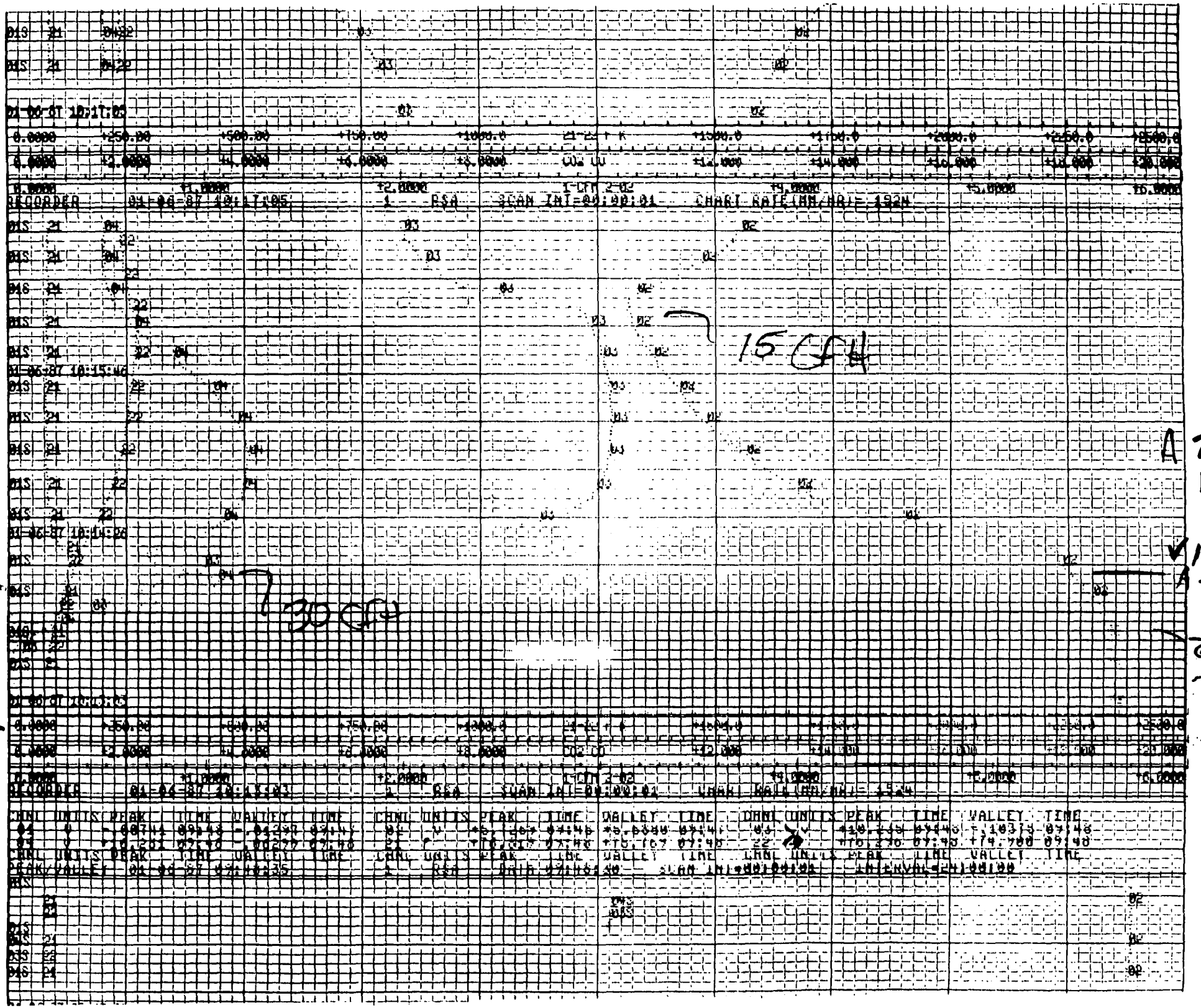

T APR 8 AM
5:20
CHART NO. 83
ESTERLINE ANGUS INDIANAPOLIS IND U.S.A.
04-08-86 09:17:06
04-08-86 09:15:41 22
0
4 Cfm
RECORDER 04-08-86 09:15:41 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
1
2
3
6
2 Cfm
ADJ TO 60 AMPS
14.8V
04-08-86 09:14:26
04-08-86 09:13:02
110A 24.7V
FULL
04-08-86 09:11:39
N
RECORDER 04-08-86 09:11:39 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME

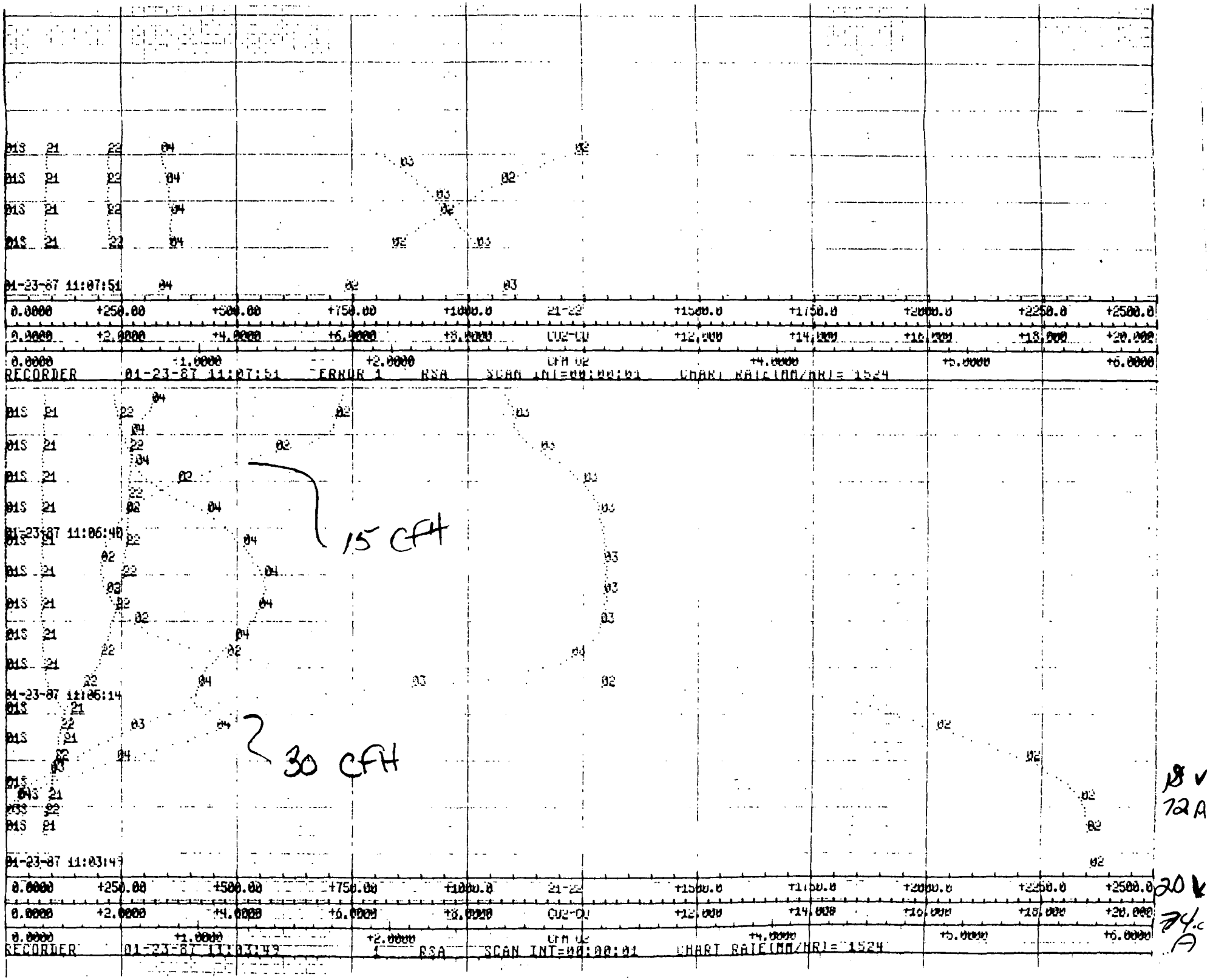

MADE IN CANADA
ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHART NO. 832D900
RECORDER
11-18-86 14:51:25
SCAN INT=00:00:01
CHART RATE(MM/HR)= 1524
15 cfh
30 cfh
185 cfh
02
74.4
17.6
ADS 75 A
1926

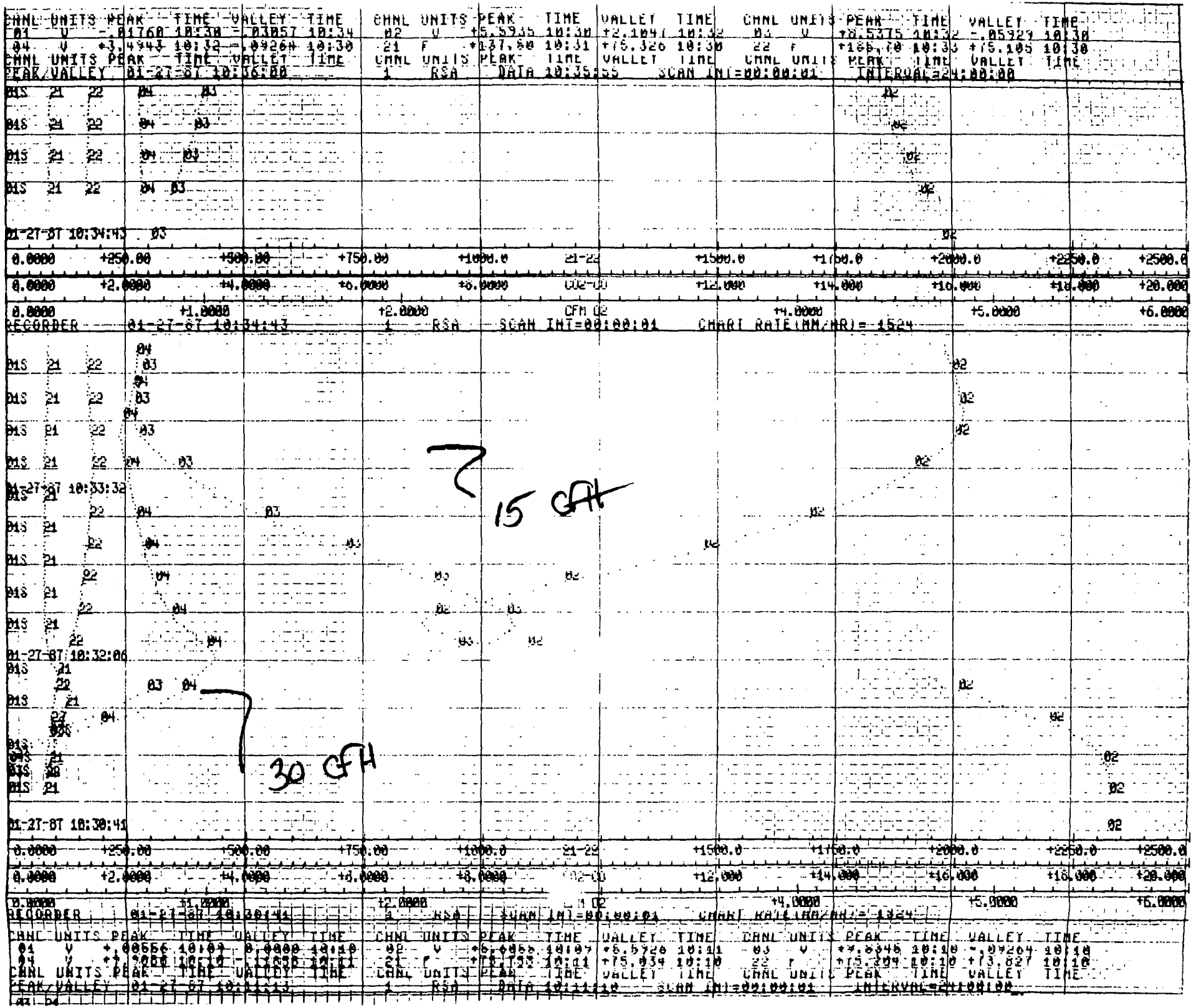


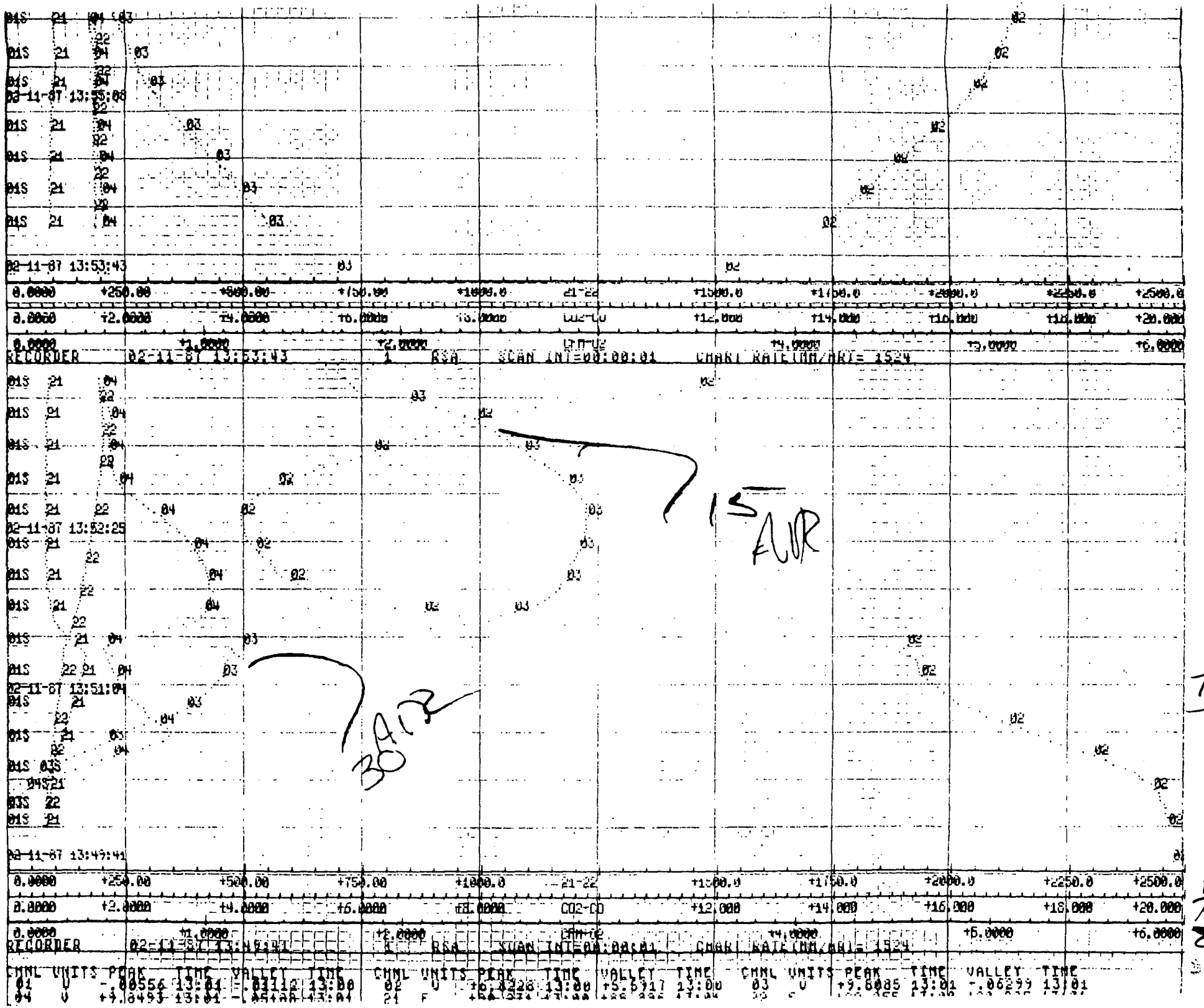
MADE IN CANADA

NO. 832D900

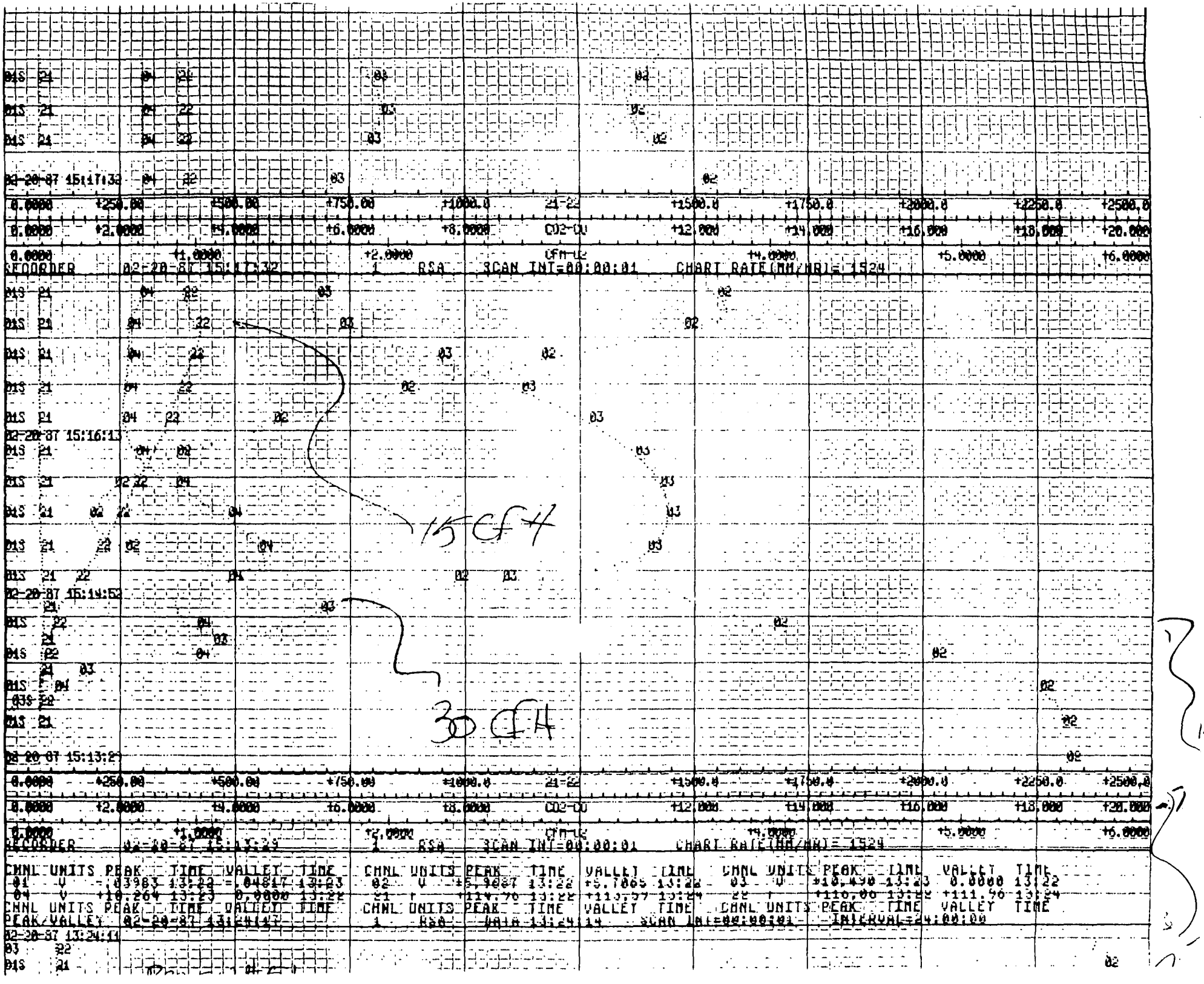

MADE IN CAN
STERLING ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900
RECORDER 01-06-87 10:11:05 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 192M
01-06-87 10:15:46
01-06-87 10:14:26
RECORDER 01-06-87 10:11:05 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 192M
CHNL UNITS PEAK TIME VALLEY TIME
CHNL UNITS PEAK TIME VALLEY TIME
CHNL UNITS PEAK TIME VALLEY TIME
CHNL UNITS PEAK TIME VALLEY TIME
PEAK VALLEY 01-06-87 10:11:05
1-CH 2-CH
1-CH 2-CH
15 CFM
120 CFM
A 75.6
18V
19.3
A 77
77
A

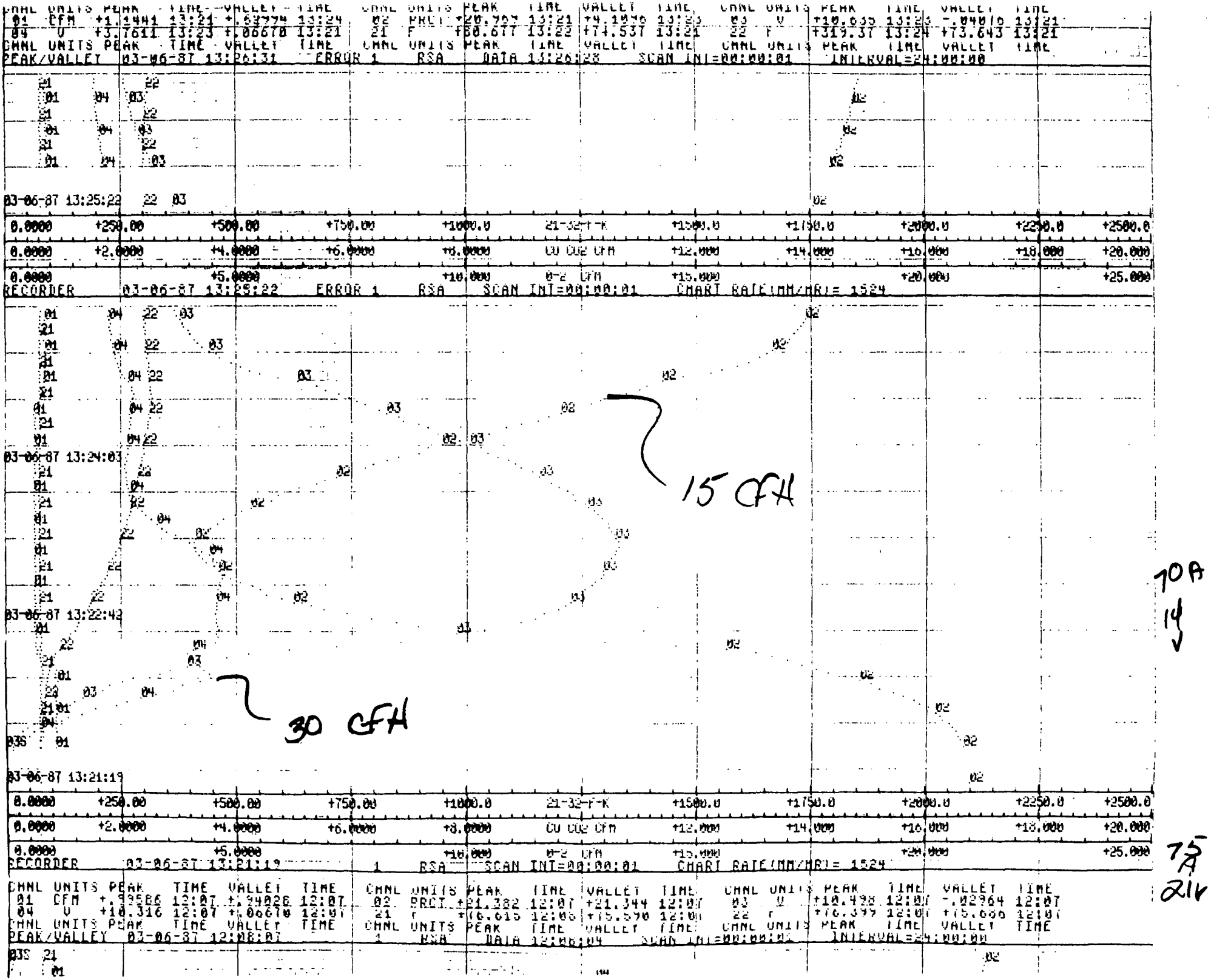

01-23-87 11:07:51
01-23-87 11:06:40
01-23-87 11:06:14
01-23-87 11:03:14
15 CFH
30 CFH
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2-CU +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 CFM O2 +4.0000 +5.0000 +6.0000
RECORDER 01-23-87 11:07:51 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
RECORDER 01-23-87 11:03:43 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
MADE IN CANADA
DIANAPOLIS, IND., U.S.A. CHART NO. 832D900

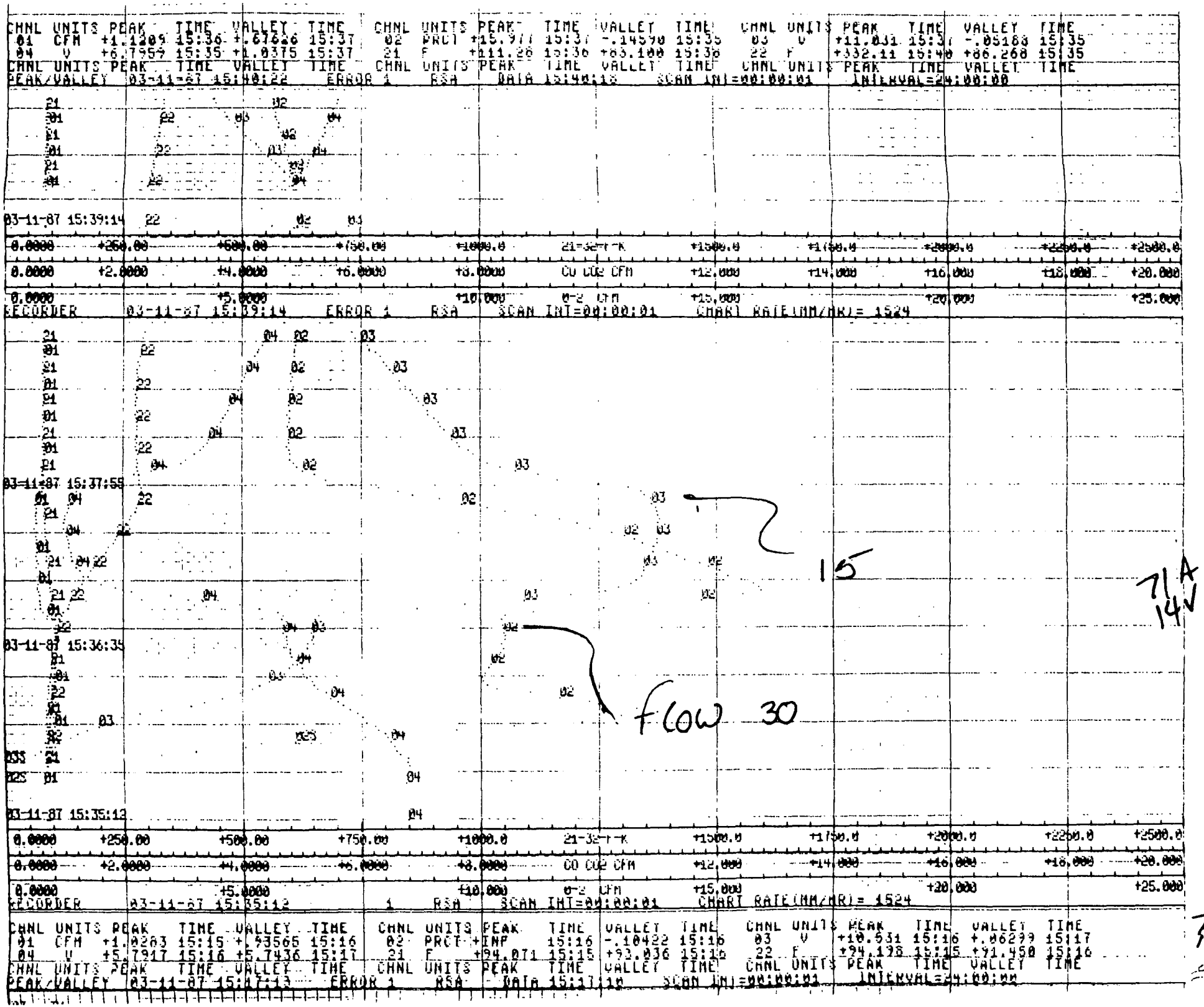

15 CFM
30 CFM
13 A 18 V
75' 22
MADE IN CANADA
832D900

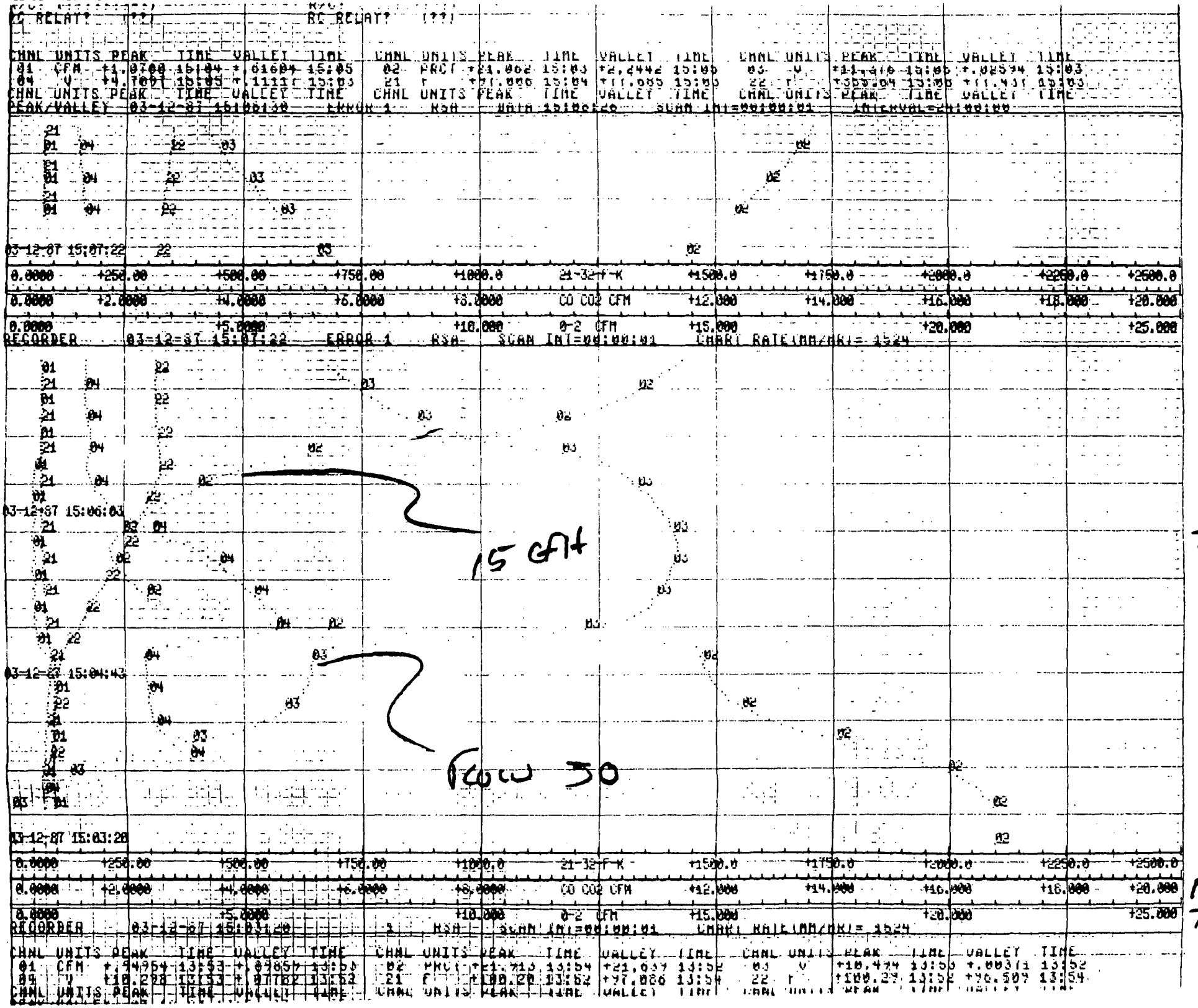


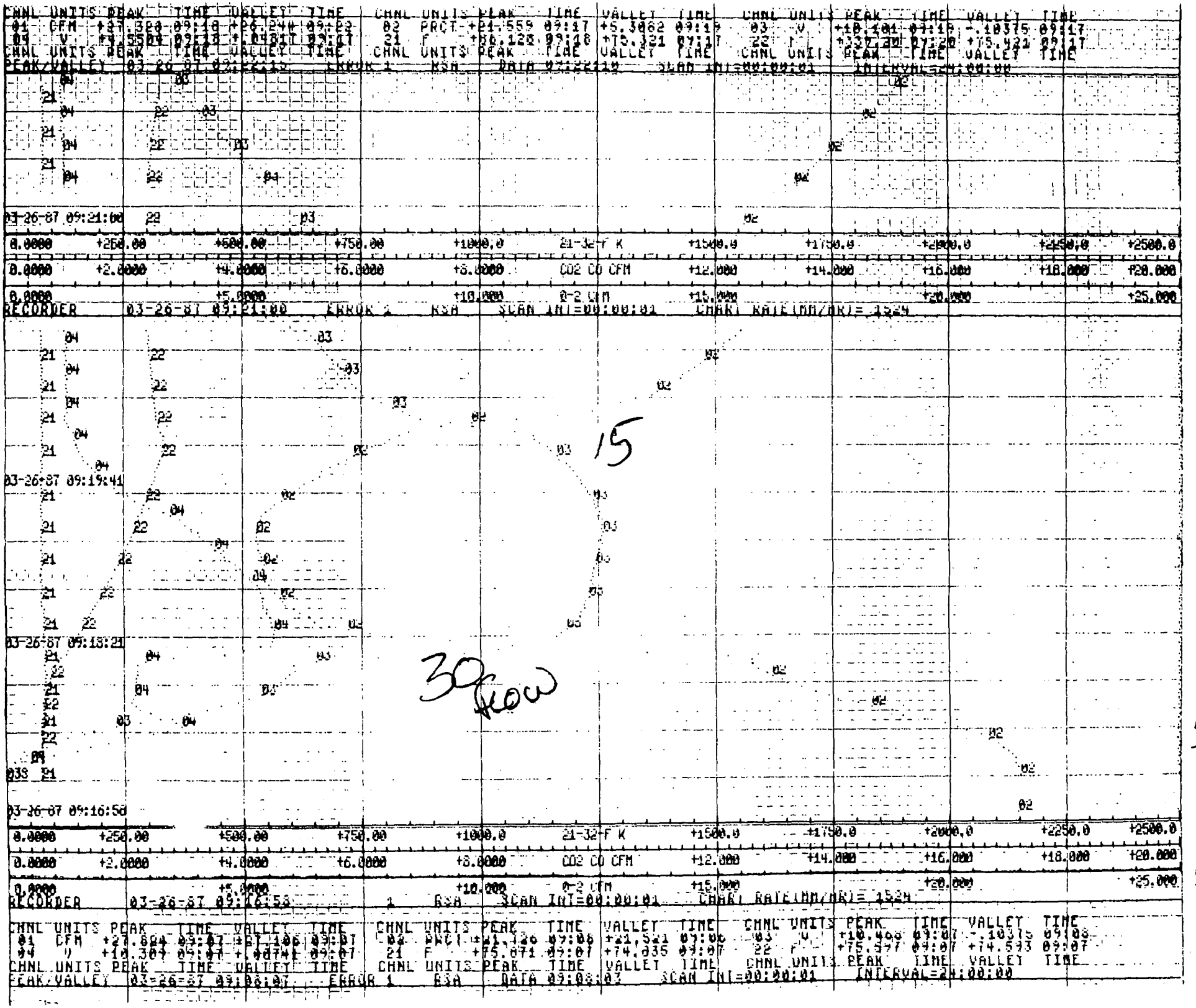
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	U	-.00556	13:04	-.01112	13:00	02	U	+6.8226	13:00	+5.5911	13:00	03	U	+9.6085	13:01	-.06299	13:01
04	U	+4.8493	13:01	-.05488	13:04	21	F										


ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A.
CANADA
15 of 4
30 of 4


ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900
CHNL UNITS PEAK TIME VALLEY TIME
01 CFM +1.1441 13:21 +.69774 13:24
04 V +3.7611 13:23 +1.0667 13:21
02 PRCT +20.707 13:21 +4.1076 13:20
21 F +80.677 13:22 +74.537 13:21
03 V +10.035 13:24 -.04010 13:21
22 F +319.37 13:24 +73.643 13:21
PEAK/VALLEY 03-06-87 13:20:31 ERROR 1 RSA DATA 13:20:28 SCAN INT=00:00:01 INTERVAL=24:00:00
03-06-87 13:25:22 22 03
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32-F-K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 01 02 CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 03-06-87 13:25:22 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
03-06-87 13:24:03
03-06-87 13:22:42
30 CFH
15 CFH
03-06-87 13:21:19
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32-F-K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 01 02 CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 03-06-87 13:21:19 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME
01 CFM +.99586 12:07 +.94028 12:07
04 V +10.316 12:07 +.00670 12:01
02 PRCT +21.382 12:01 +21.344 12:00
21 F +76.615 12:06 +75.590 12:00
03 V +10.498 12:00 -.02964 12:07
22 F +76.399 12:01 +75.000 12:01
PEAK/VALLEY 03-06-87 12:08:01 1 RSA DATA 12:08:04 SCAN INT=00:00:01 INTERVAL=24:00:00


ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHART NO. 832D900
CHNL UNITS PEAK TIME VALLEY TIME
01 CFM +1.1209 15:36 +.67866 15:37
04 V +6.7959 15:35 +1.0375 15:37
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 03-11-87 15:40:22 ERROR 1 RSA
CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +15.977 15:37 -.14570 15:35
21 F +211.26 15:36 +63.100 15:36
CHNL UNITS PEAK TIME VALLEY TIME
03 V +11.031 15:37 -.05183 15:35
22 F +332.11 15:40 +86.268 15:35
DATA 15:40:18 SCAN INT=00:00:01 INTERVAL=24:00:00
03-11-87 15:39:14
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
CO CO2 CFM
0.0000 +5.0000 +10.000 +15.000 +20.000 +25.000
O-2 CFM
RECORDER 03-11-87 15:39:14 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
03-11-87 15:37:58
03-11-87 15:36:39
03-11-87 15:35:12
15
flow 30
7 A
14 V
CHNL UNITS PEAK TIME VALLEY TIME
01 CFM +1.0263 15:15 +.93565 15:16
04 V +5.7917 15:16 +5.7436 15:17
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 03-11-87 15:47:13 ERROR 1 RSA
CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +INF 15:16 -.10422 15:16
21 F +94.071 15:15 +93.036 15:16
CHNL UNITS PEAK TIME VALLEY TIME
03 V +10.531 15:16 +.06299 15:17
22 F +94.138 15:15 +91.450 15:16
DATA 15:17:18 SCAN INT=00:00:01 INTERVAL=24:00:00
75.
18.


RC RELAY? (??)
CHNL UNITS PEAK TIME VALLEY TIME
01 CFM +1.0700 15:04 +.61604 15:05
04 V +4.7091 15:05 +.11111 15:03
02 PRCT +21.062 15:03 +2.4442 15:06
21 F +21.000 15:04 +11.005 15:05
03 V +11.416 15:06 +.02574 15:03
22 F +303.04 15:06 +11.431 15:03
PEAK/VALLEY 03-12-87 15:06:40 ERROR 1 RSH MAIN 15:06:20 SCAN INT=00:00:01 INT=VAL=CH:00:00
03-12-87 15:07:22
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32 F-K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO CO2 CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 03-12-87 15:07:22 ERROR 1 RSH SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
03-12-87 15:06:03
03-12-87 15:04:43
03-12-87 15:03:28
15 cfm
low 50
72 A 14v
185 75f
MADE IN CANADA
VGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900



15

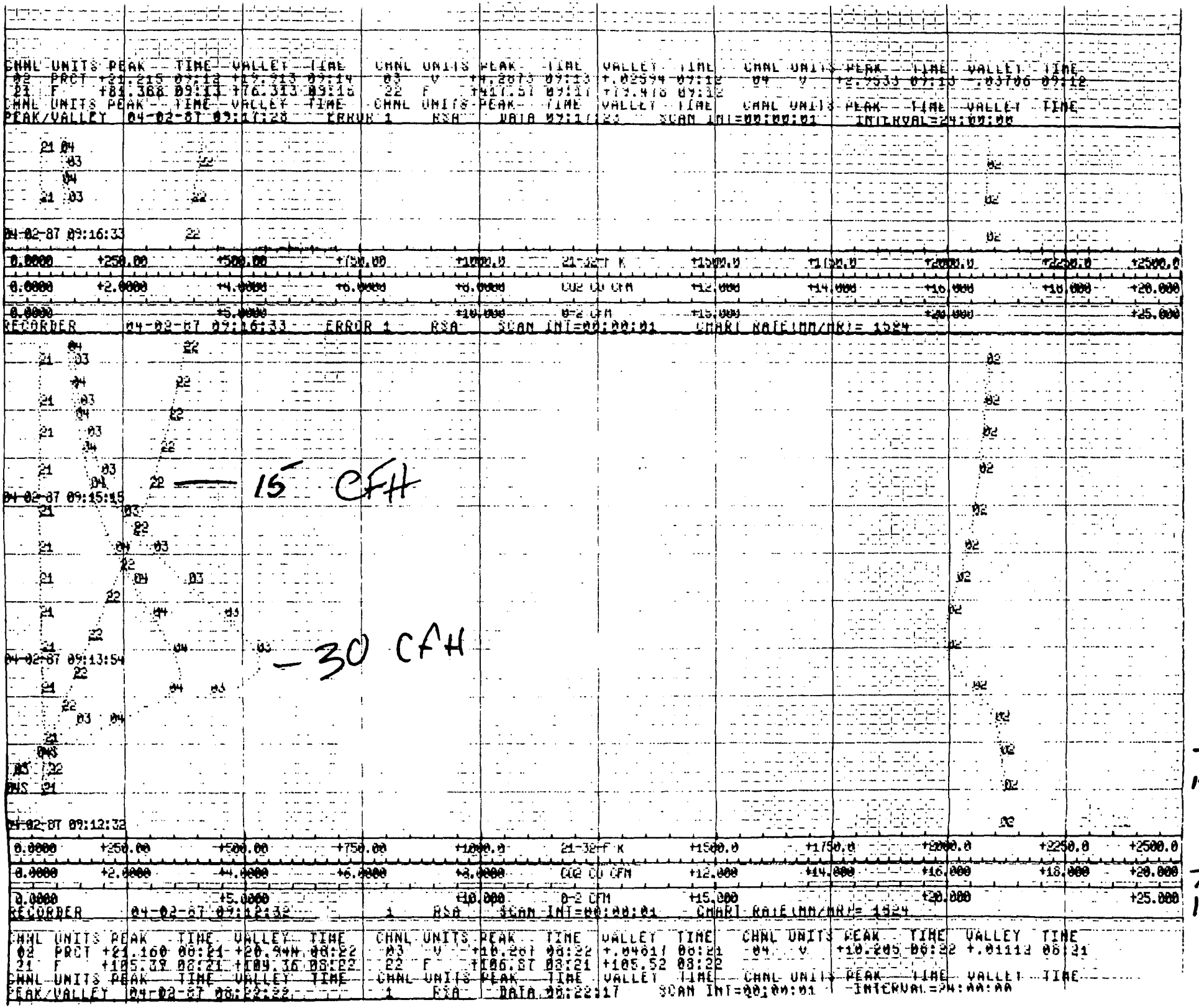
30 flow

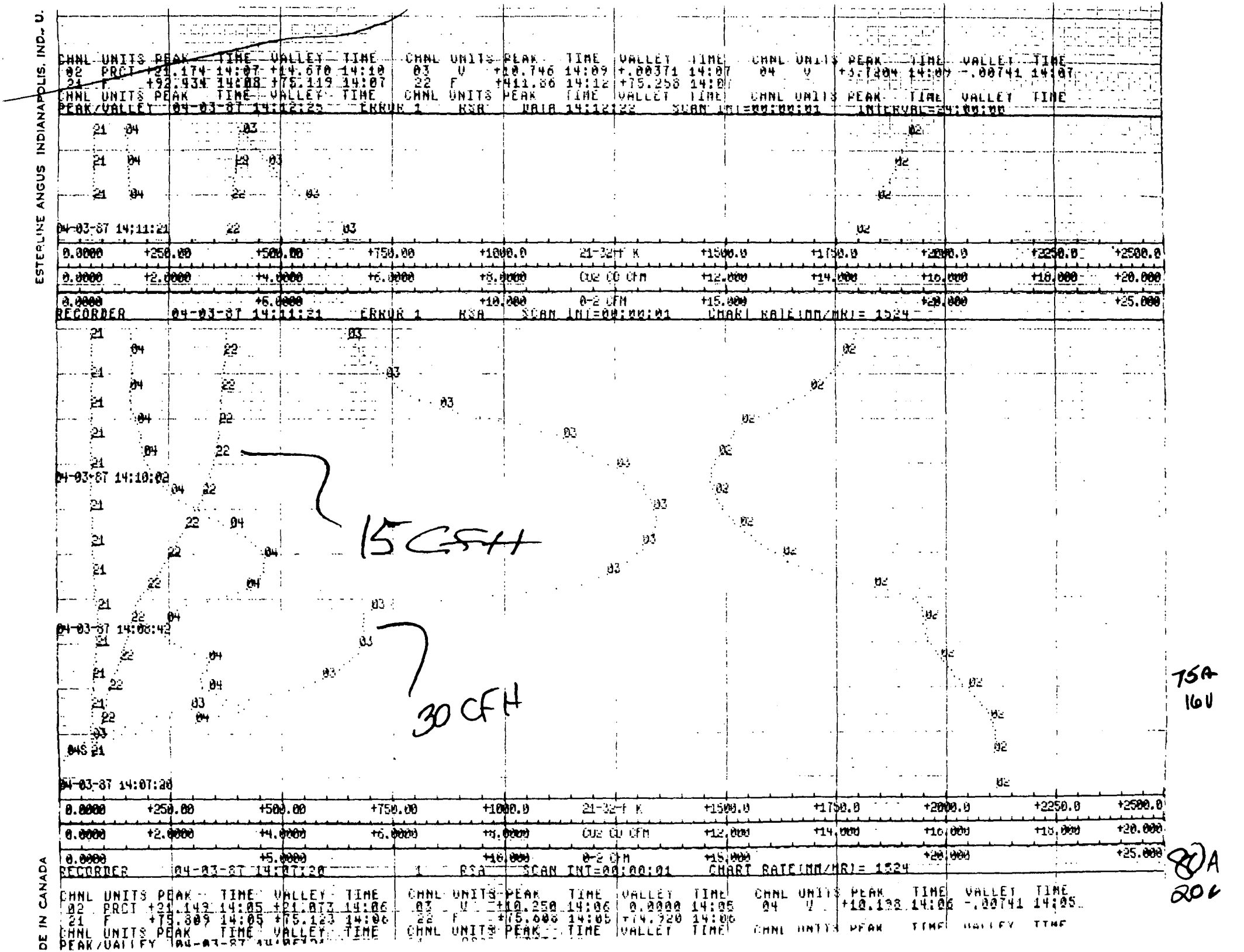
16 V
72 I

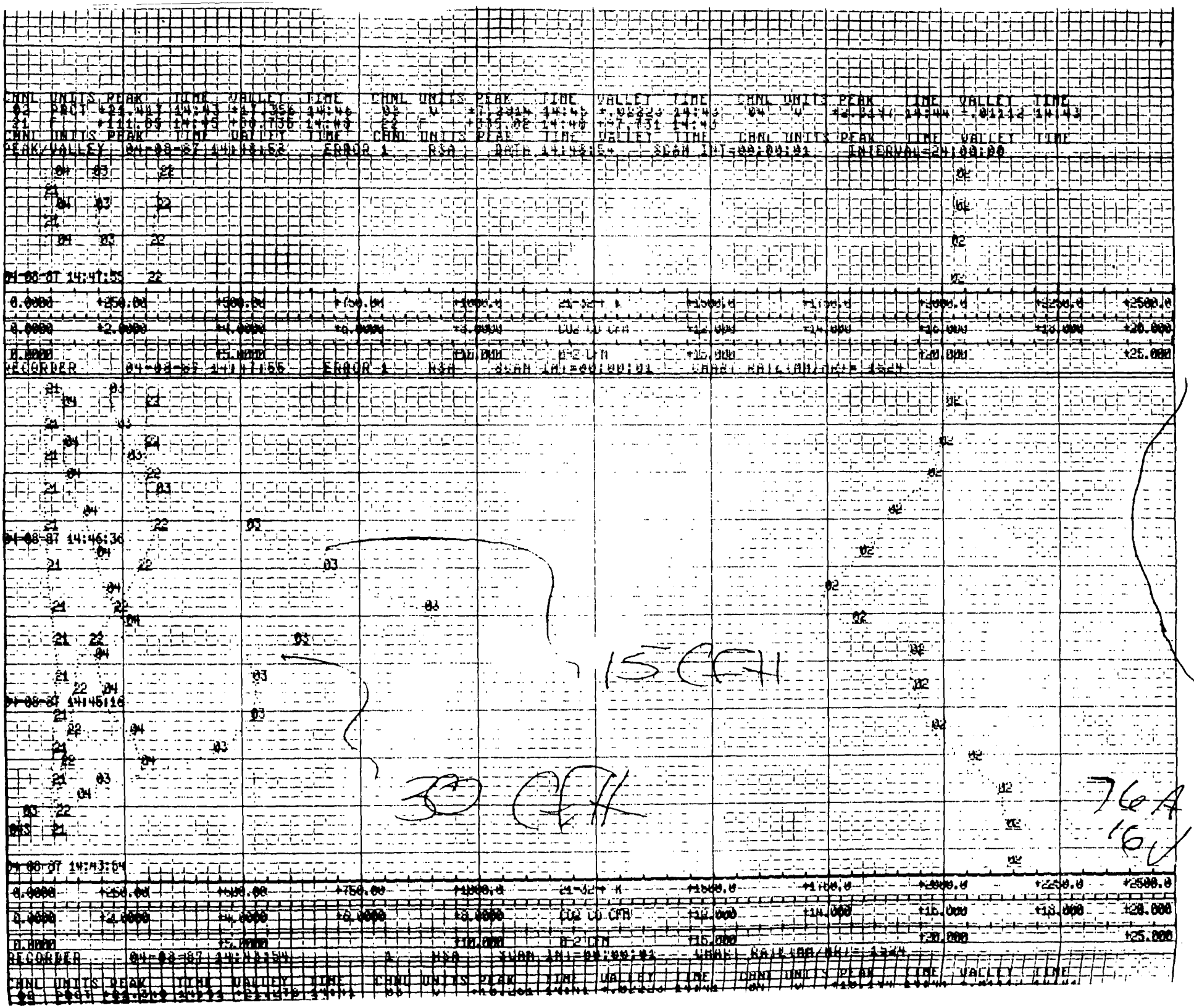
19 V
75 A

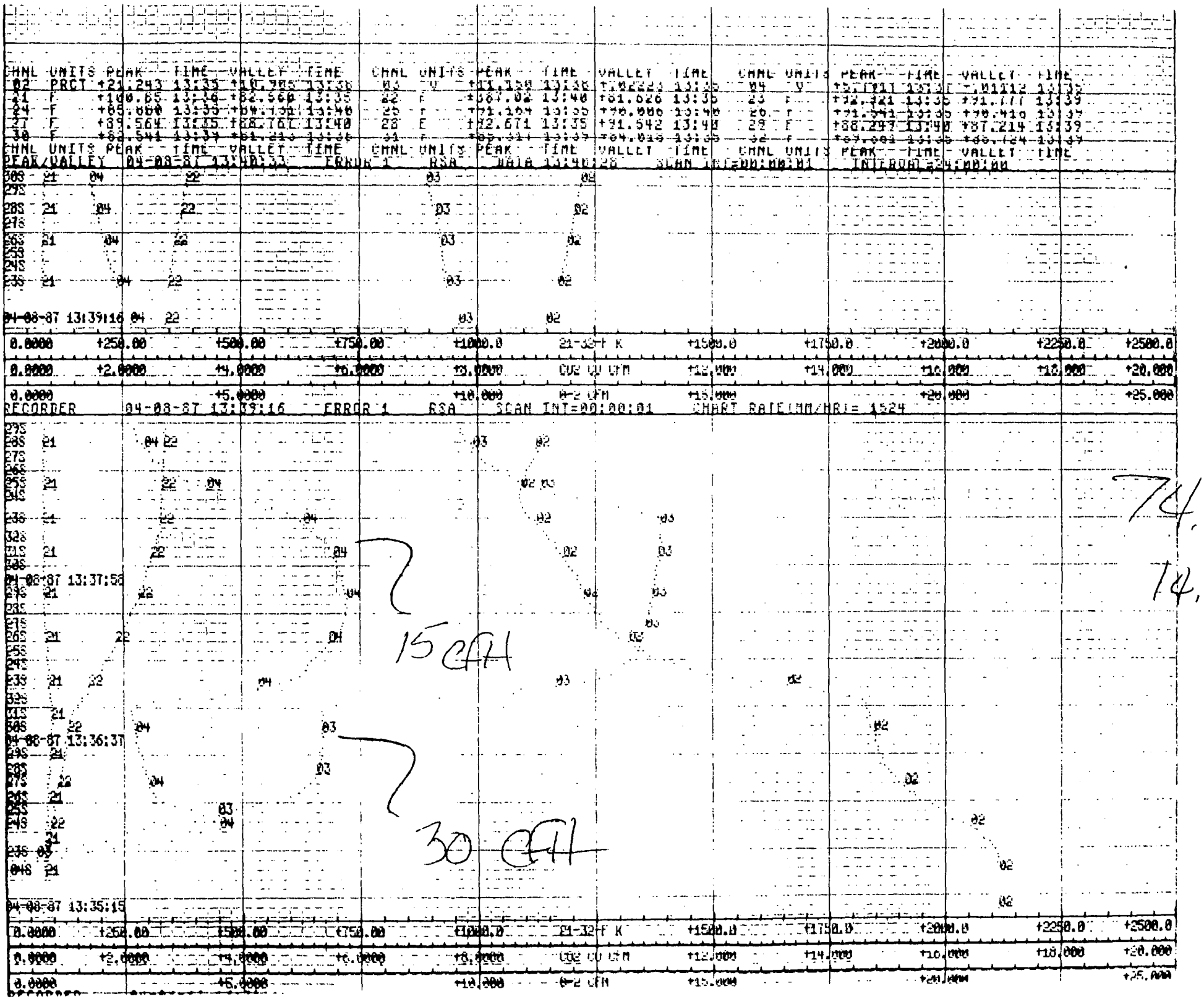
MADE IN CANADA

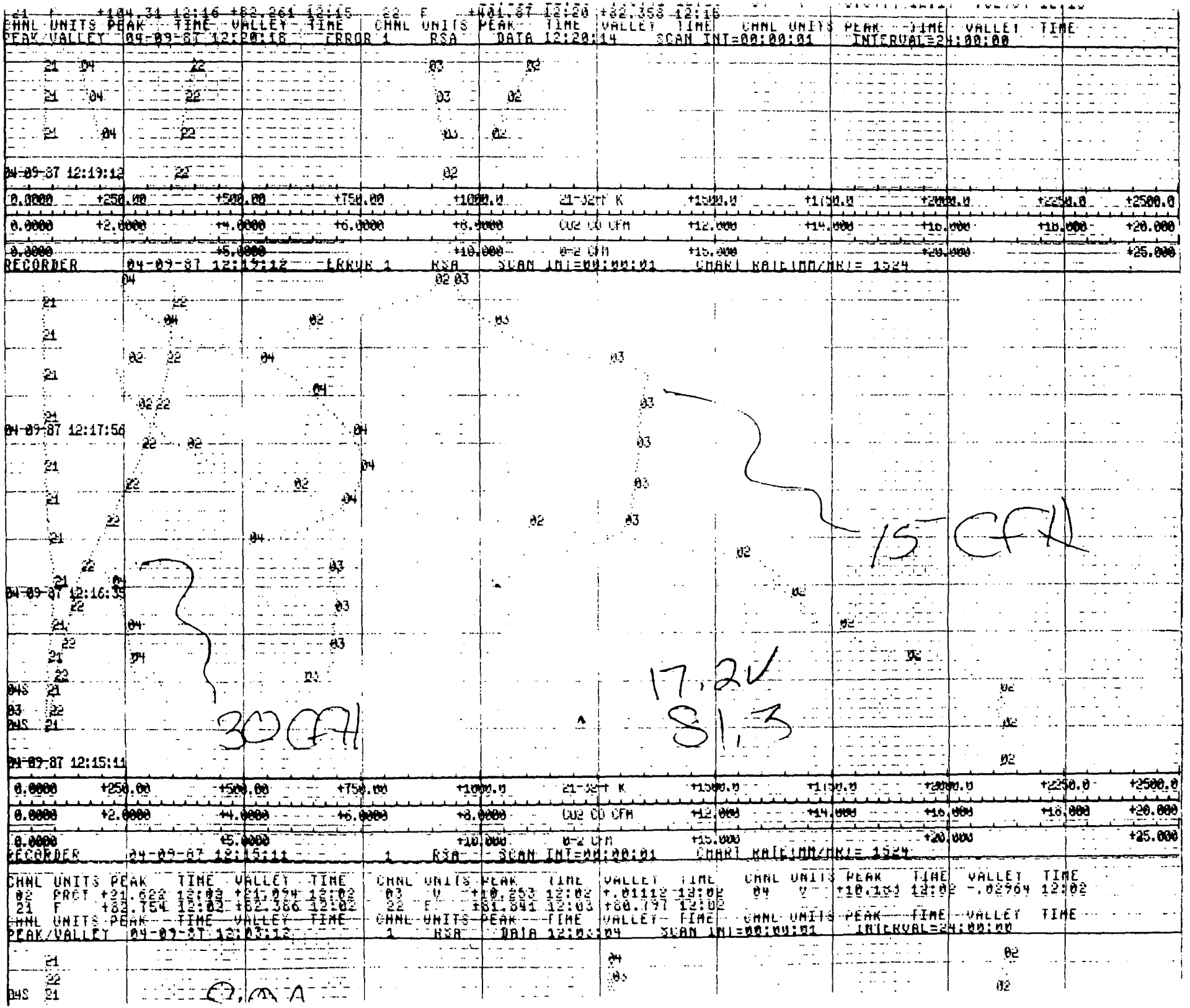
OLIS. IND., U.S.A. CHART NO. 832D900

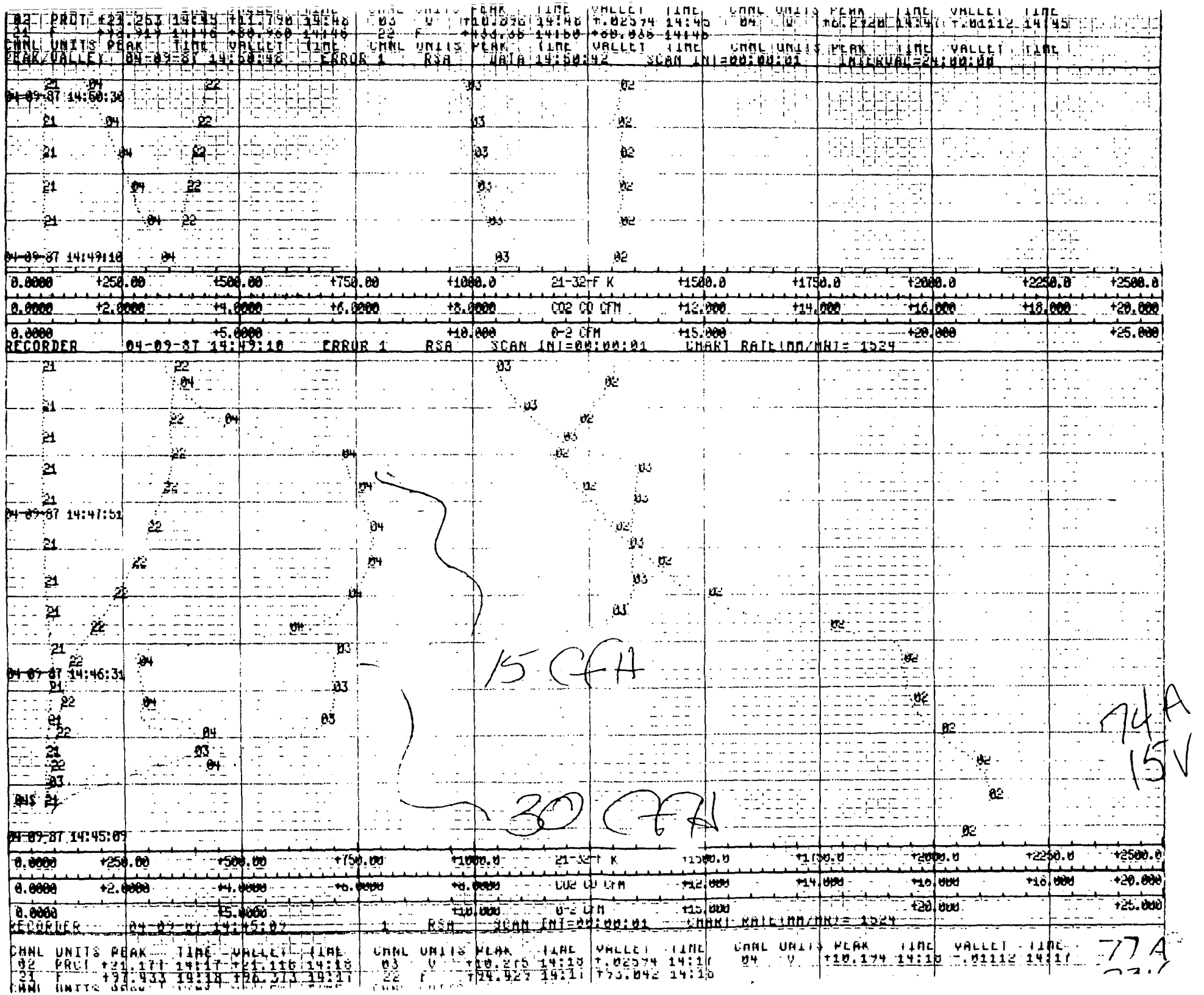

ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900
MADE
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +21.215 09:13 +12.713 09:14 03 V +4.2073 09:13 +.02594 09:12 04 V +2.2533 09:13 +.03706 09:12
21 F +81.368 09:11 +76.313 09:16 22 F +417.51 09:11 +73.410 09:12
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 04-02-87 09:17:28 ERROR 1 RSA DATA 09:11:23 SCAN INT=00:00:01 INTERVAL=24:00:00
04-02-87 09:16:33
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2 CO CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 04-02-87 09:16:33 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
04-02-87 09:15:15
15 CFH
04-02-87 09:13:54
30 CFH
04-02-87 09:12:32
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2 CO CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 04-02-87 09:12:32 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +21.160 00:21 +20.944 00:22 03 V +10.261 00:22 +.04611 00:21 04 V +10.205 00:22 +.01113 00:21
21 F +105.32 00:21 +104.16 00:22 22 F +106.87 00:21 +105.52 00:22
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 04-02-87 00:22:22 1 RSA DATA 00:22:17 SCAN INT=00:00:01 INTERVAL=24:00:00
733
15.81
754
1811


ESTERLINE ANGUS INDIANAPOLIS, IND., U.
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +21.174 14:07 +14.670 14:10 03 V +10.746 14:09 +.00371 14:07 04 V +3.7204 14:09 -.00741 14:07
21 F +92.934 14:08 +75.119 14:07 22 F +411.86 14:12 +75.258 14:07
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 04-03-87 14:12:25 ERROR 1 RSA DATA 14:12:22 SCAN INT=00:00:01 INTERVAL=04:00:00
04-03-87 14:11:21
04-03-87 14:10:02
04-03-87 14:08:42
04-03-87 14:07:20
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 02 CO CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 04-03-87 14:11:21 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
15 CFH
30 CFH
TSA 160
80A 20
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +21.143 14:05 +21.017 14:06 03 V +10.250 14:06 0.0000 14:05 04 V +10.138 14:06 -.00741 14:05
21 F +75.309 14:05 +75.123 14:06 22 F +75.000 14:05 +74.920 14:06
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 04-03-87 14:07:20
DE IN CANADA


ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D90
RECORDER
04-08-87
ERROR 1
CO2 LO CAL
15 CFH
30 CFH
76A
76V

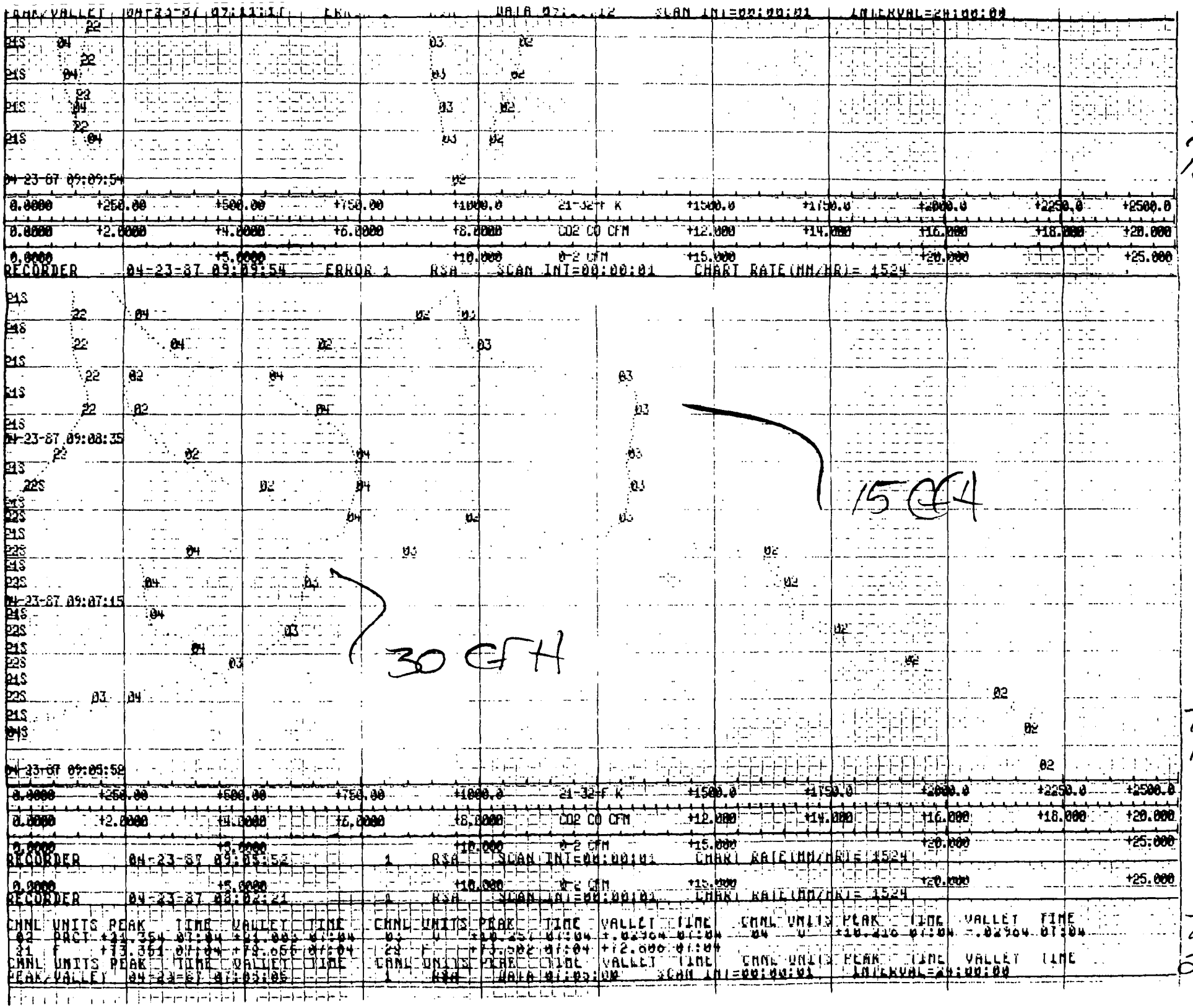

ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900
CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +21.243 13:35 +10.705 13:36
21 F +100.65 13:16 +62.560 13:35
24 F +65.000 13:35 +54.152 13:40
27 F +89.564 13:15 +68.767 13:40
30 F +62.541 13:37 +51.213 13:36
PEAK/VALLEY 04-08-87 13:00:32 ERROR 1 RSA MAIN 13:40:28 SCAN INT=00:00:01 INTERVAL=24:00:00
04-08-87 13:39:16
04-08-87 13:37:56
04-08-87 13:36:37
04-08-87 13:35:15
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32-F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2 00 CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 04-08-87 13:39:16 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
15 CFM
30 CFM
74.5
14.7

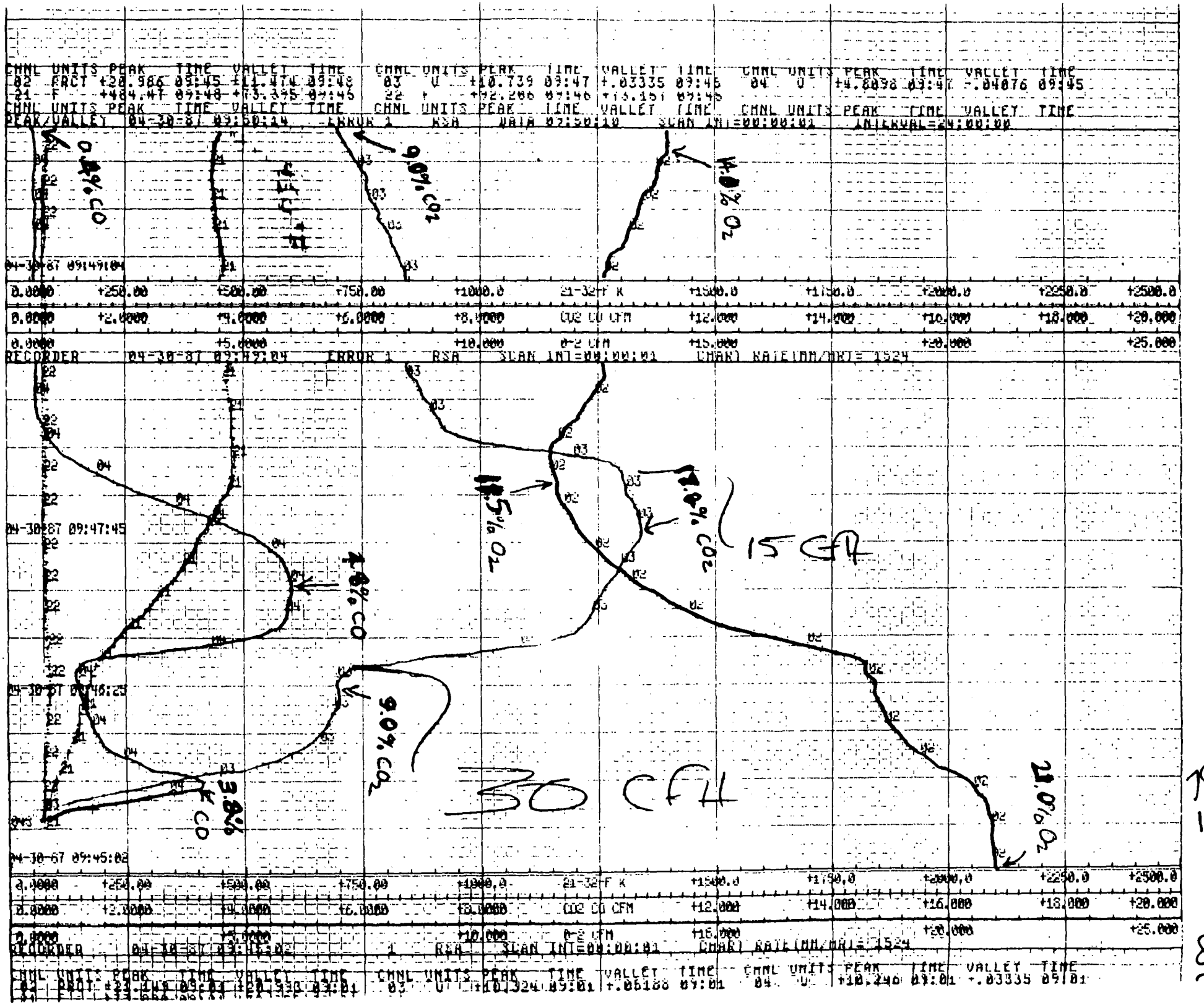

ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900
CHNL UNITS PEAK TIME VALLEY TIME
PEAK VALLEY 04-09-87 12:20:18 ERROR 1 RSA DATA 12:20:14 SCAN INT=00:00:01 INTERVAL=24:00:00
04-09-87 12:19:12
04-09-87 12:17:56
04-09-87 12:16:35
04-09-87 12:15:11
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2 CO CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 04-09-87 12:15:11 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE:MM/HR= 1524
CHNL UNITS PEAK TIME VALLEY TIME
02 PRCT +21.622 12:03 +21.094 12:02
21 F +82.754 12:02 +82.386 12:02
03 V +10.253 12:02 +.01112 12:02
22 F +81.841 12:03 +80.797 12:02
04 V +10.191 12:02 -.02704 12:02
PEAK/VALLEY 04-09-87 12:03:12 1 RSA DATA 12:03:04 SCAN INT=00:00:01 INTERVAL=24:00:00
15 CFM
17.2V
81.3
30 CFM
2.0 A

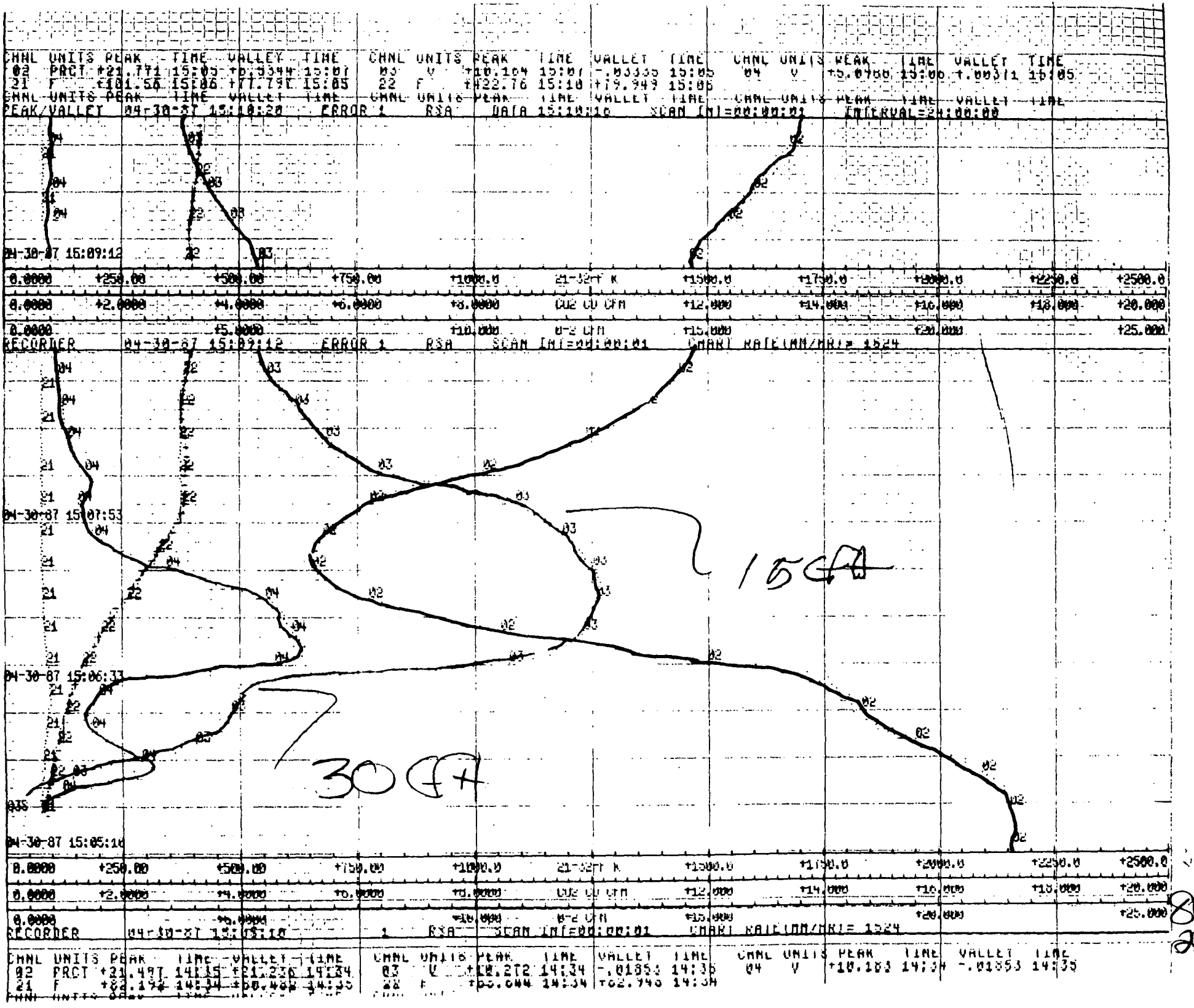


MADE IN CANADA

ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900


PEAK/VALLEY 04-23-87 07:11:16 CHN 1 RSA VALID 02:03:12 SCAN INT=00:00:01 INTERVAL=24:00:00
04-23-87 09:09:54
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32=F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2 CO CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 O-2 CFM +15.000 +20.000 +25.000
RECORDER 04-23-87 09:09:54 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
04-23-87 09:08:35
04-23-87 09:07:15
30 CFH
15 CFH
04-23-87 09:05:52
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32=F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 CO2 CO CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 O-2 CFM +15.000 +20.000 +25.000
RECORDER 04-23-87 09:05:52 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
0.0000 +5.0000 +10.000 O-2 CFM +15.000 +20.000 +25.000
RECORDER 04-23-87 08:02:21 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
02 PACI +21.354 07:04 +21.000 01:04 03 U +10.451 01:04 +.02904 01:04 04 U +10.410 01:04 -.02904 01:04
21 F +73.361 07:04 +70.056 01:04 22 F +73.382 01:04 +2.000 01:04
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 04-23-87 07:05:05 1 RSA VALID 01:03:08 SCAN INT=00:00:01 INTERVAL=24:00:00
MADE IN CANADA
ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 8320900
73A
15V
74A
17V
77A
21V


ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900
0.4% CO
9.0% CO2
14.0% O2
11.5% O2
4.9% CO2
15 CFH
4.8% CO
9.0% CO2
3.8% CO
30 CFH
21.0% O2
18
17
8
C



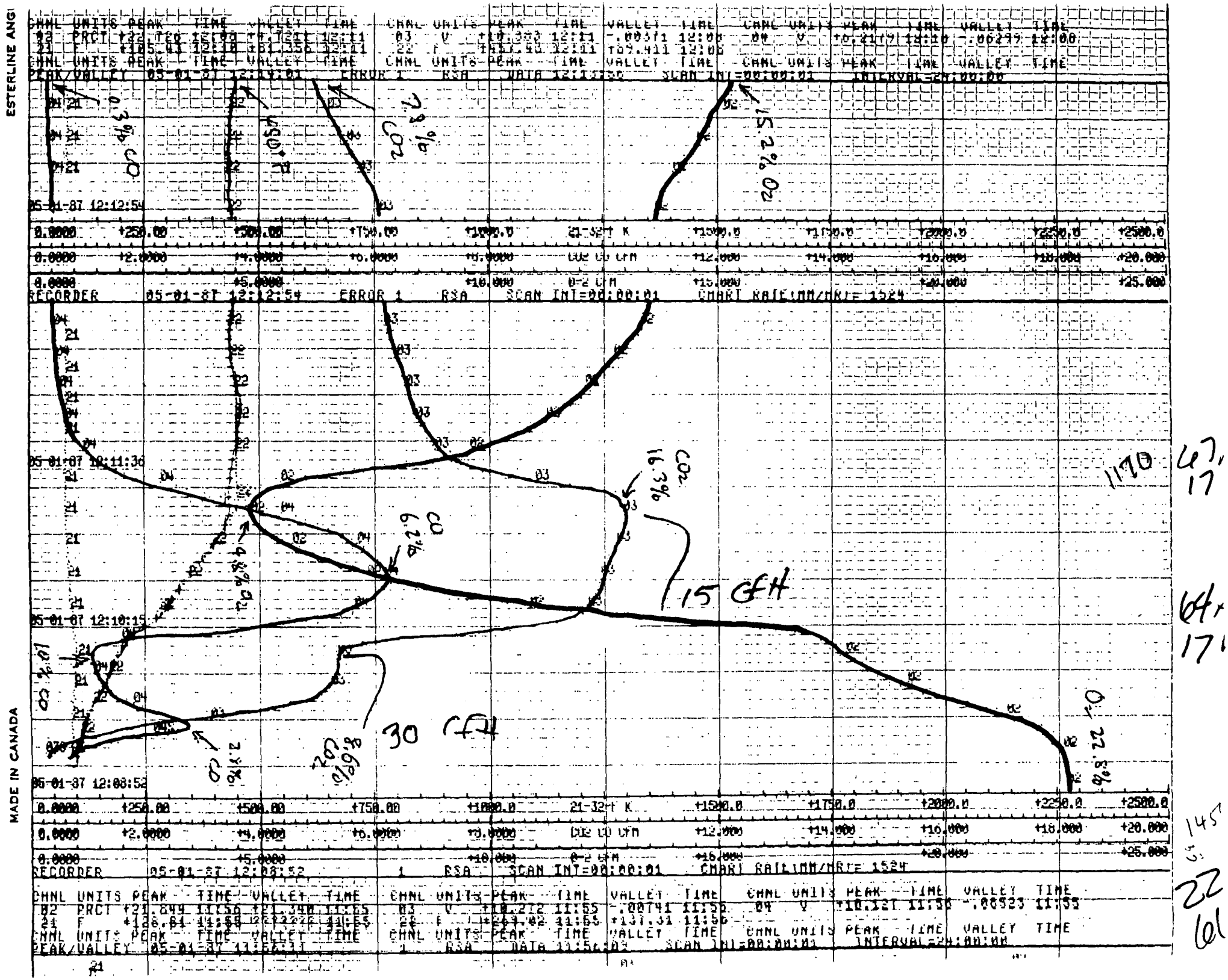
15 ft

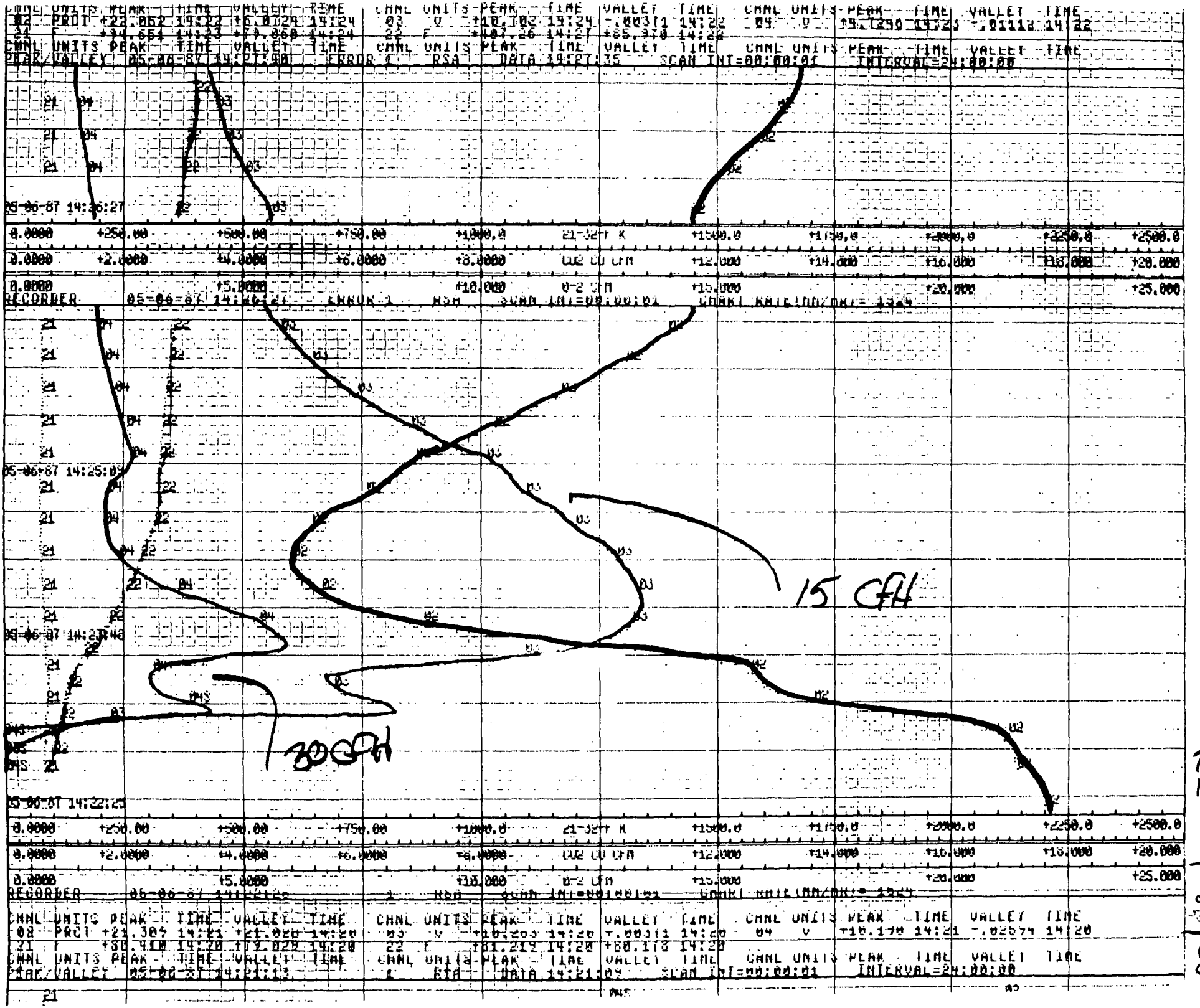
30 ft

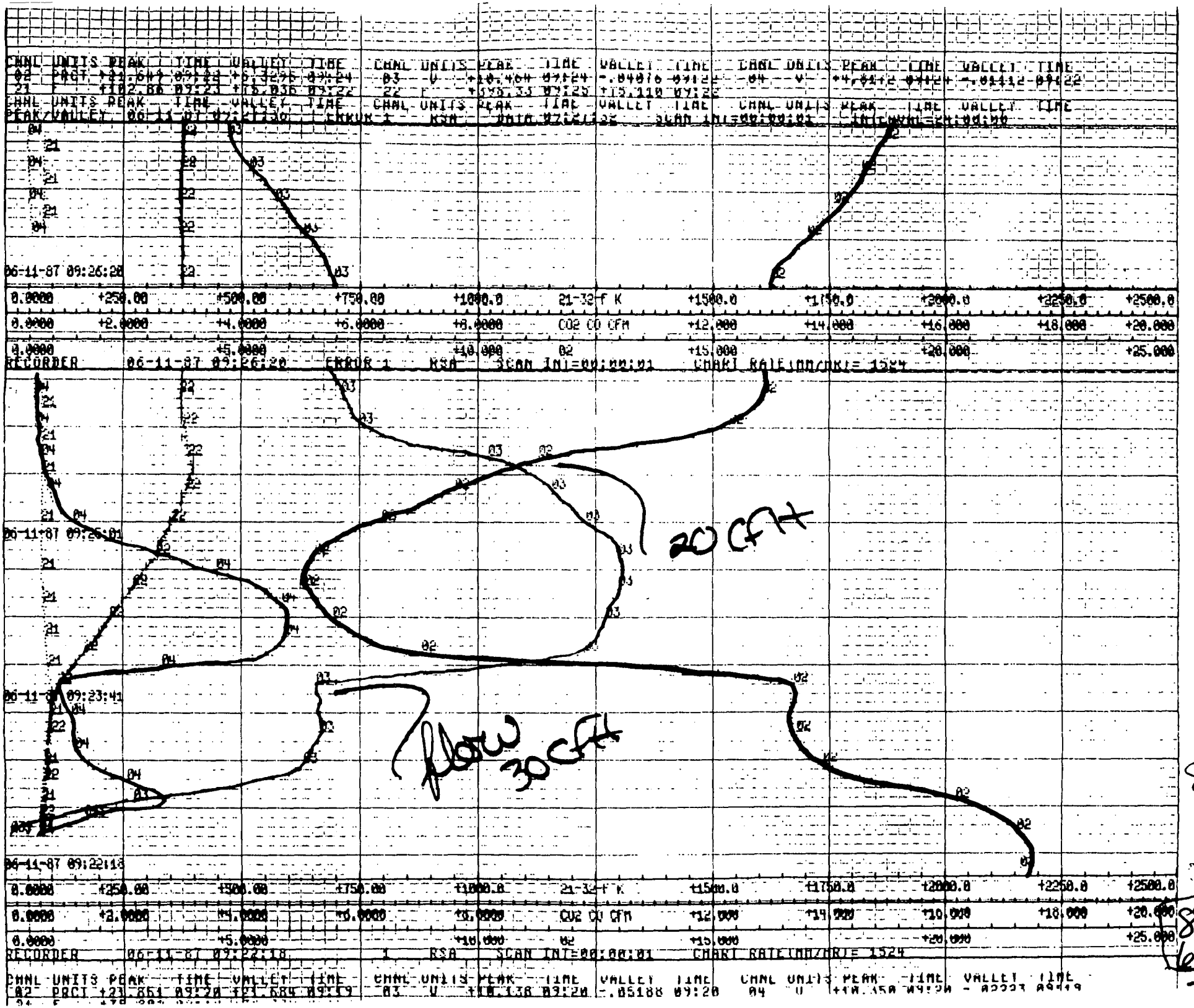
80 ft

MADE IN CANADA

NO. 832D900


ESTERLINE ANGL
MADE IN CANADA
CHNL UNITS PEAK TIME VALLEY TIME
RECORDER 05-01-87 12:12:54 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CO 0.3% 0
CO2 2.8% 1
20 % 2.5
05-01-87 12:12:54
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32 K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 002 00 CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 05-01-87 12:12:54 ERROR 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
05-01-87 12:11:36
CO 6.2%
CO2 9.3%
15 CFH
1170
05-01-87 12:10:15
CO 2.0%
CO2 8.8%
30 CFH
CO2 22.8%
0.0
05-01-87 12:08:52
0.0000 +250.00 +500.00 +750.00 +1000.0 21-32 K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 002 00 CFM +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +5.0000 +10.000 0-2 CFM +15.000 +20.000 +25.000
RECORDER 05-01-87 12:08:52 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 05-01-87 11:56:11 1 RSA DATA 11:56:09 SCAN INT=00:00:01 INTERVAL=24:00:00

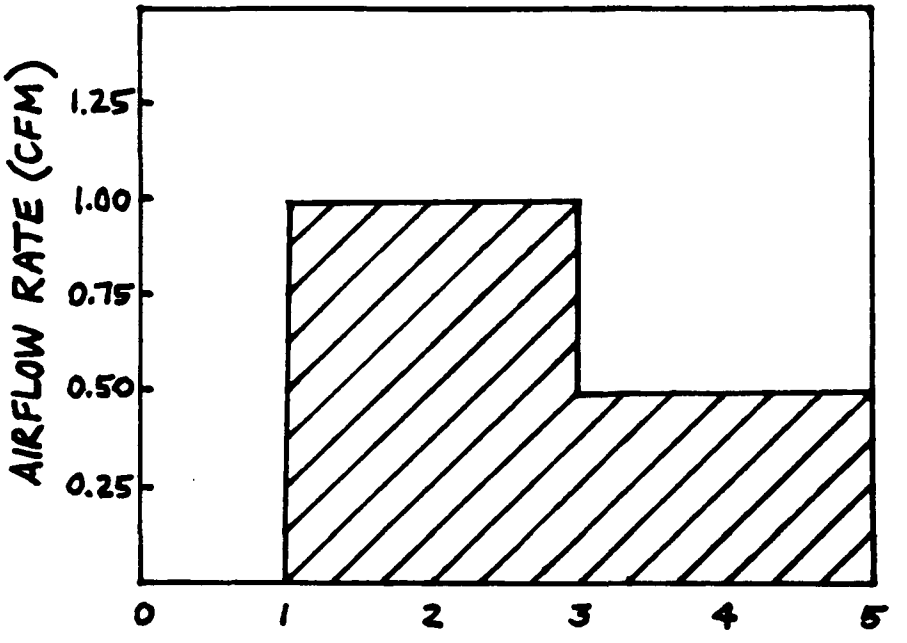

15 CFH
30 CFH



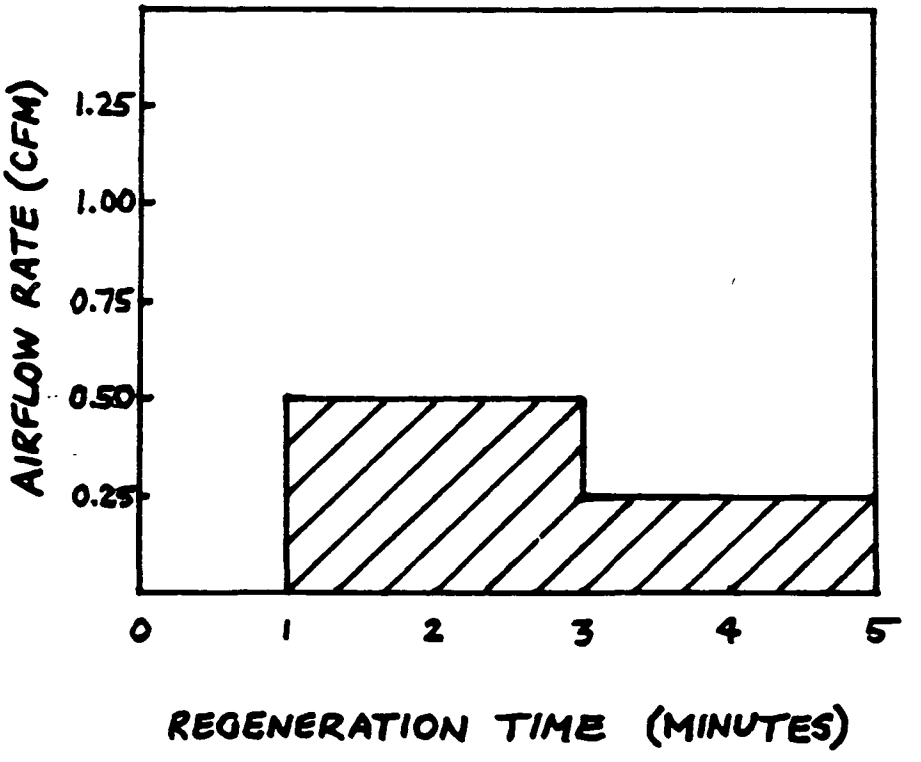
APPENDIX D: FLOWRATE SCHEDULES

REGENERATION AIRFLOW SCHEDULES

SCHEDULE A: 1.0 CFM

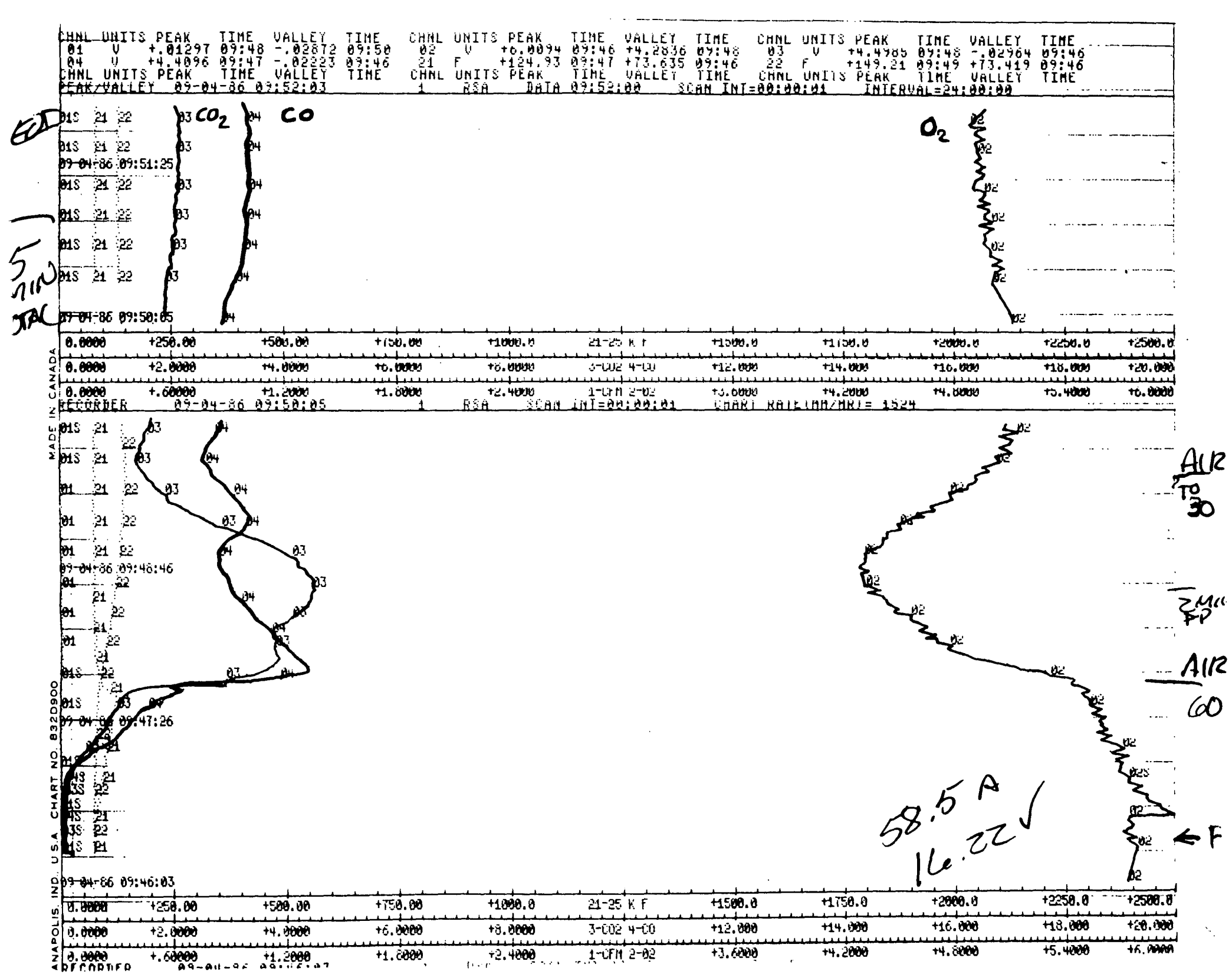


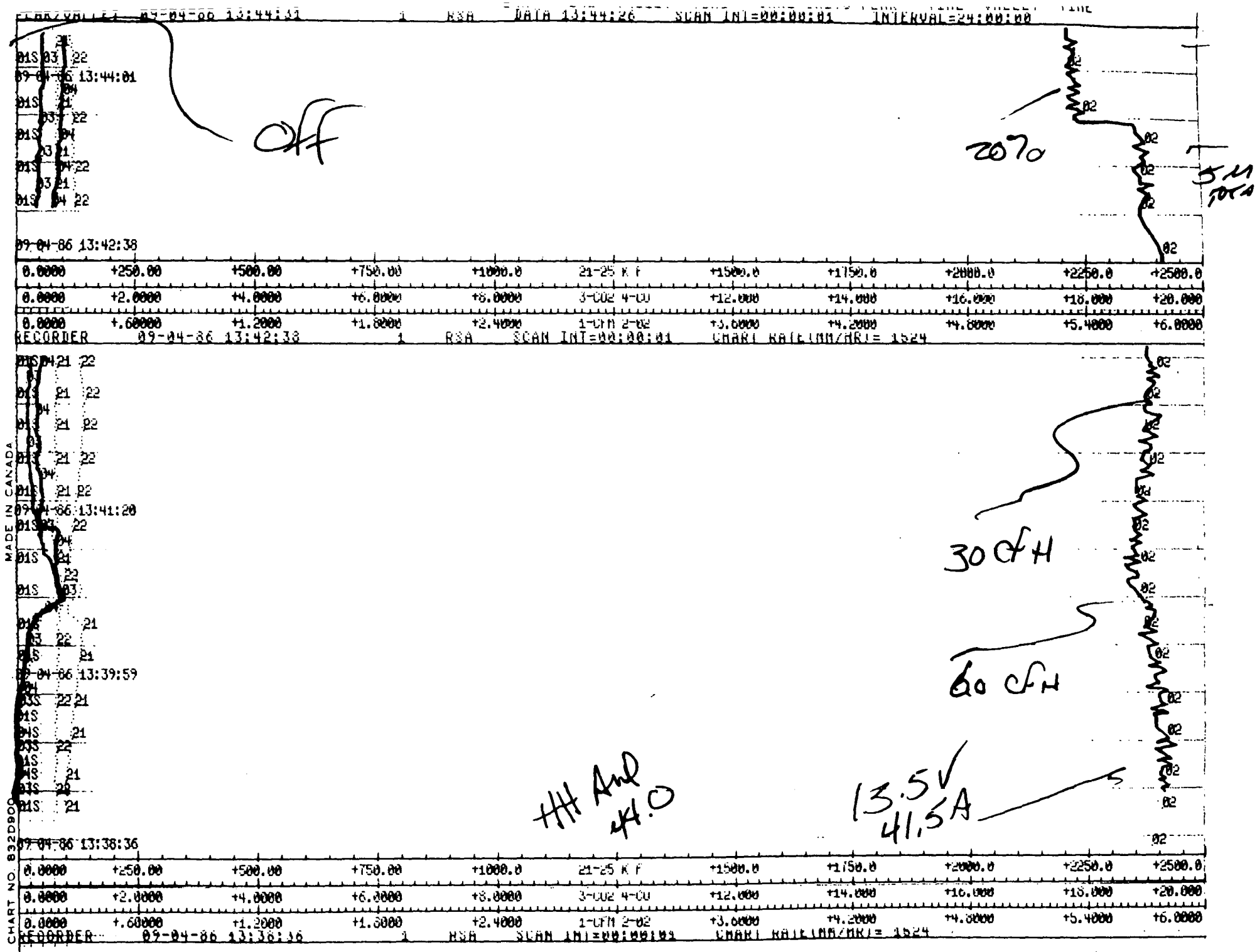
SCHEDULE B: 0.5 CFM



APPENDIX E: REGENERATION EFFICIENCY DATA

PHASE 1: BACKPRESSURE = 5.7 PSI, AIRFLOW 1.0 CFM

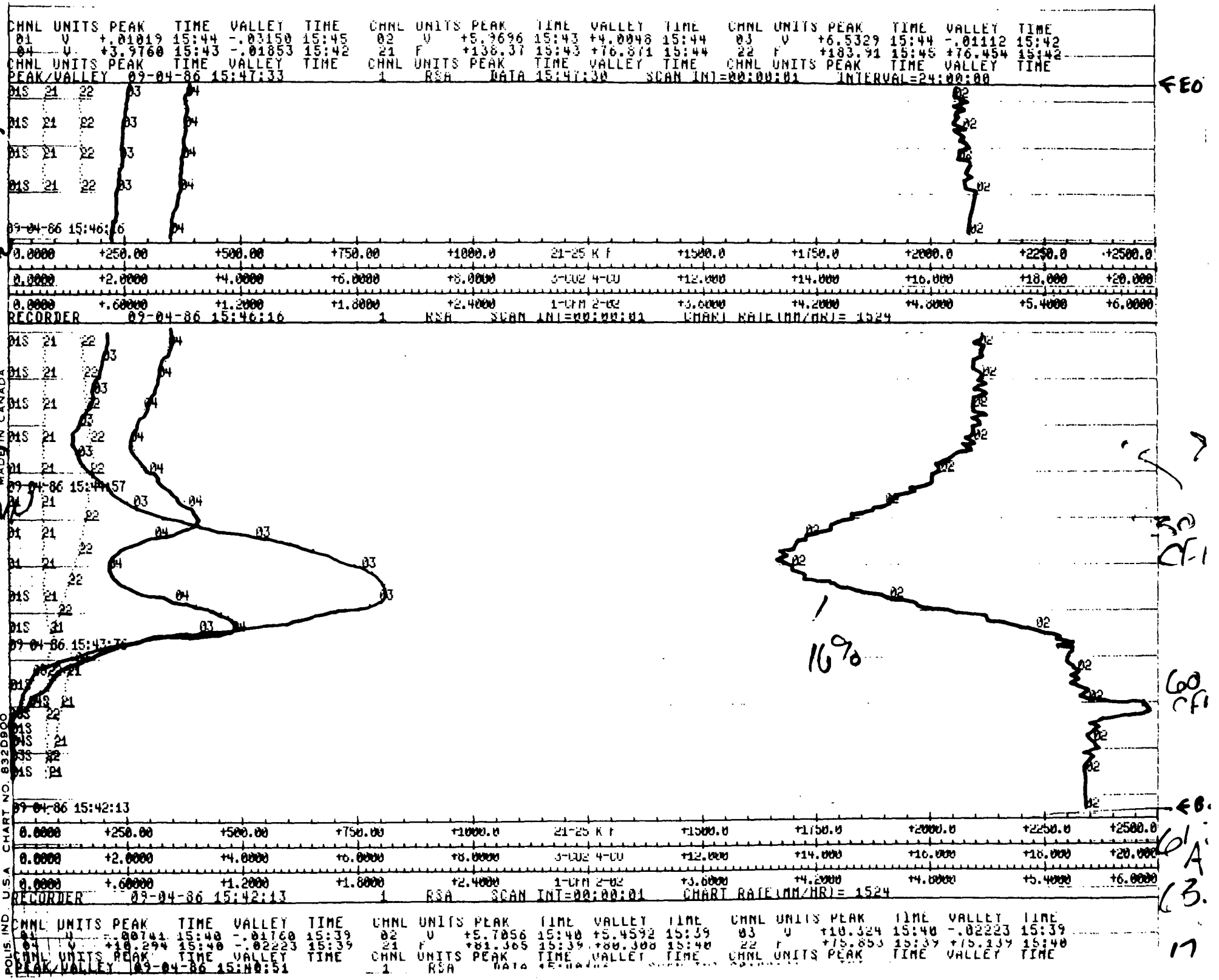

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V +.01297 09:48 -.02872 09:50 02 V +6.0094 09:46 +4.2836 09:48 03 V +4.4985 09:48 -.02964 09:46
04 V +4.4096 09:47 -.02223 09:46 21 F +124.93 09:47 +73.635 09:46 22 F +149.21 09:49 +73.419 09:46
PEAK/VALLEY 09-04-86 09:52:03 1 RSA DATA 09:52:00 SCAN INT=00:00:01 INTERVAL=24:00:00
CO2
CO
O2
09-04-86 09:51:25
09-04-86 09:50:05
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-04-86 09:50:05 1 RSA SCAN INT=00:00:01 CHART RATE(MM/MR)= 1524
09-04-86 09:48:46
09-04-86 09:47:26
09-04-86 09:46:03
MADE IN CANADA
ANAPOLIS, IND. U.S.A. CHART NO. 832D900
AIR TO 30
AIR 60
58.5 A
16.22
F



CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	-.01019	12:12	-.01760	12:11	02	V	+5.6913	12:12	+5.6151	12:11	03	V	+10.301	12:12	-.03335	12:11
04	V	+10.301	12:12	-.01853	12:12	21	F	+161.49	12:11	+157.40	12:12	22	F	+93.989	12:12	+93.257	12:13

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

PEAK/VALLEY 09-04-86 12:13:48 1 RSA DATA


CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V +.01019 15:44 -.03150 15:45 02 V +5.9696 15:43 +4.0048 15:44 03 V +6.5329 15:44 -.01112 15:42
04 V +3.9760 15:43 -.01853 15:42 21 F +138.37 15:43 +76.871 15:44 22 F +183.91 15:45 +76.454 15:42
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-04-86 15:47:33 1 RSA DATA 15:47:30 SCAN INT=00:00:01 INTERVAL=24:00:00
09-04-86 15:46:16
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.80000 +1.2000 +1.8000 +2.4000 1-04 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-04-86 15:46:16 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-04-86 15:44:57
09-04-86 15:43:36
09-04-86 15:42:13
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.80000 +1.2000 +1.8000 +2.4000 1-04 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-04-86 15:42:13 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00741 15:40 -.01760 15:39 02 V +5.7056 15:40 +5.4592 15:39 03 V +10.324 15:40 -.02223 15:39
04 V +10.294 15:40 -.02223 15:39 21 F +81.365 15:39 +80.300 15:40 22 F +75.853 15:39 +75.139 15:40
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-04-86 15:40:51 1 RSA DATA
MADE IN CANADA
CHART NO. 832D900
USA
POLIS IND

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	+.03242	11:58	-.02574	12:00	02	V	+5.7707	11:58	+4.8741	12:01	03	V	+3.7055	12:01	-.02223	11:59
04	V	+1.0116	11:59	-.03335	11:58	21	F	+135.05	11:59	+74.256	11:58	22	F	+166.13	12:01	+75.385	11:58

PEAK/VALLEY 09-05-86 12:03:49 1 RSA DATA 12:03:46 SCAN INT=00:00:01 INTERVAL=24:00:00

03S 21 22
04S
03S 21 22
01
04S
03S 21 22
04S
03S 21 22

09-05-86 12:02:24

19/75 A

0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-CO2 4-CO +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000

RECORDER 09-05-86 12:02:24 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

03S 21 22
04S
03 21 22
04S
04 21 22
01S 03 22
21
01S 04 22 03
09-05-86 12:01:06
01S 21 03
04 22
04S 21 03
04 22
01S 21 03
22
01S 04 03
09-05-86 11:57:45
21
04S 22
01
03S 21
04S 22
01
03S 21
04S 22
03S 21

09-05-86 11:58:22

30 CFH

18/74

19/75A

20V/75A

HiA 79.2

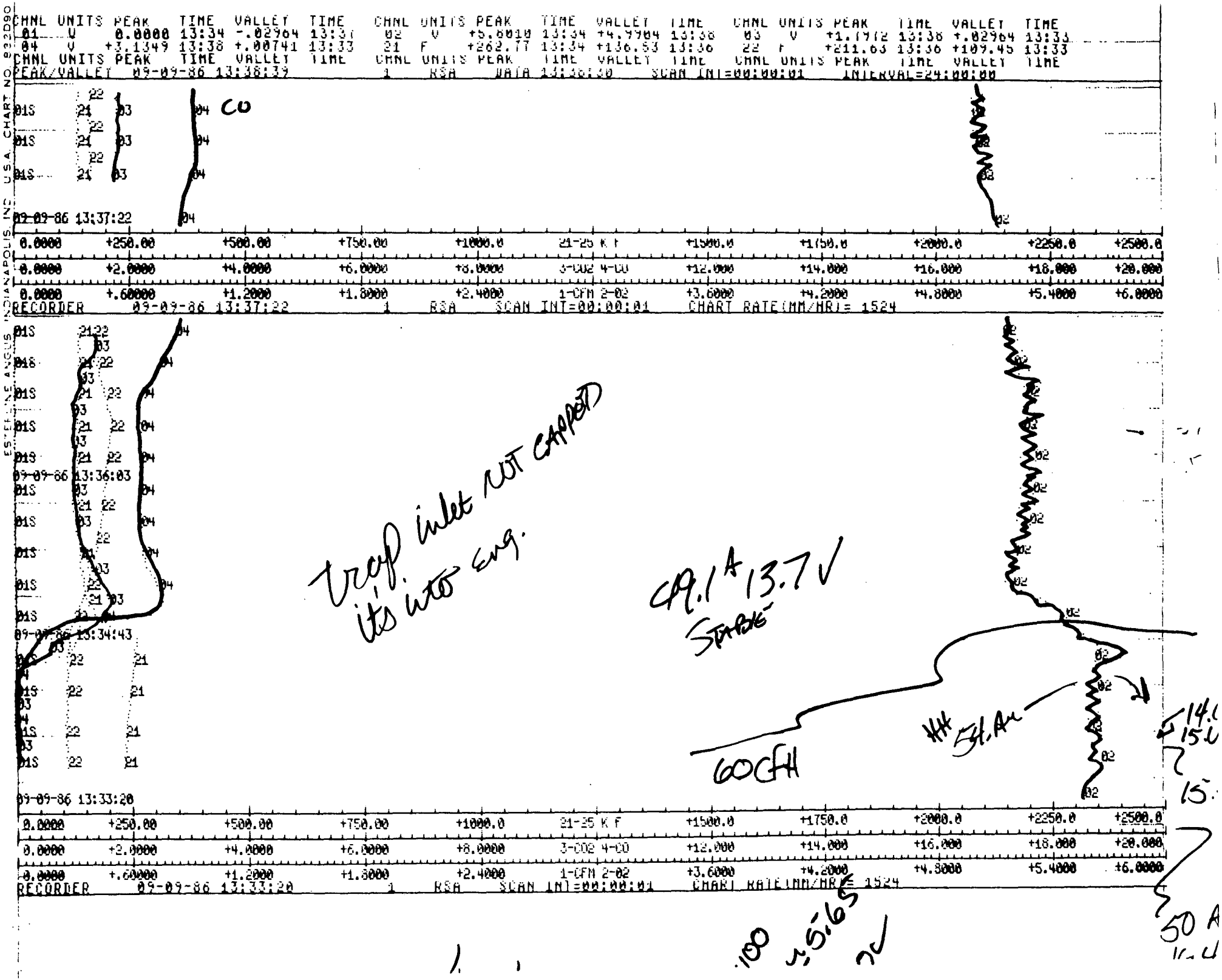
25V 27A

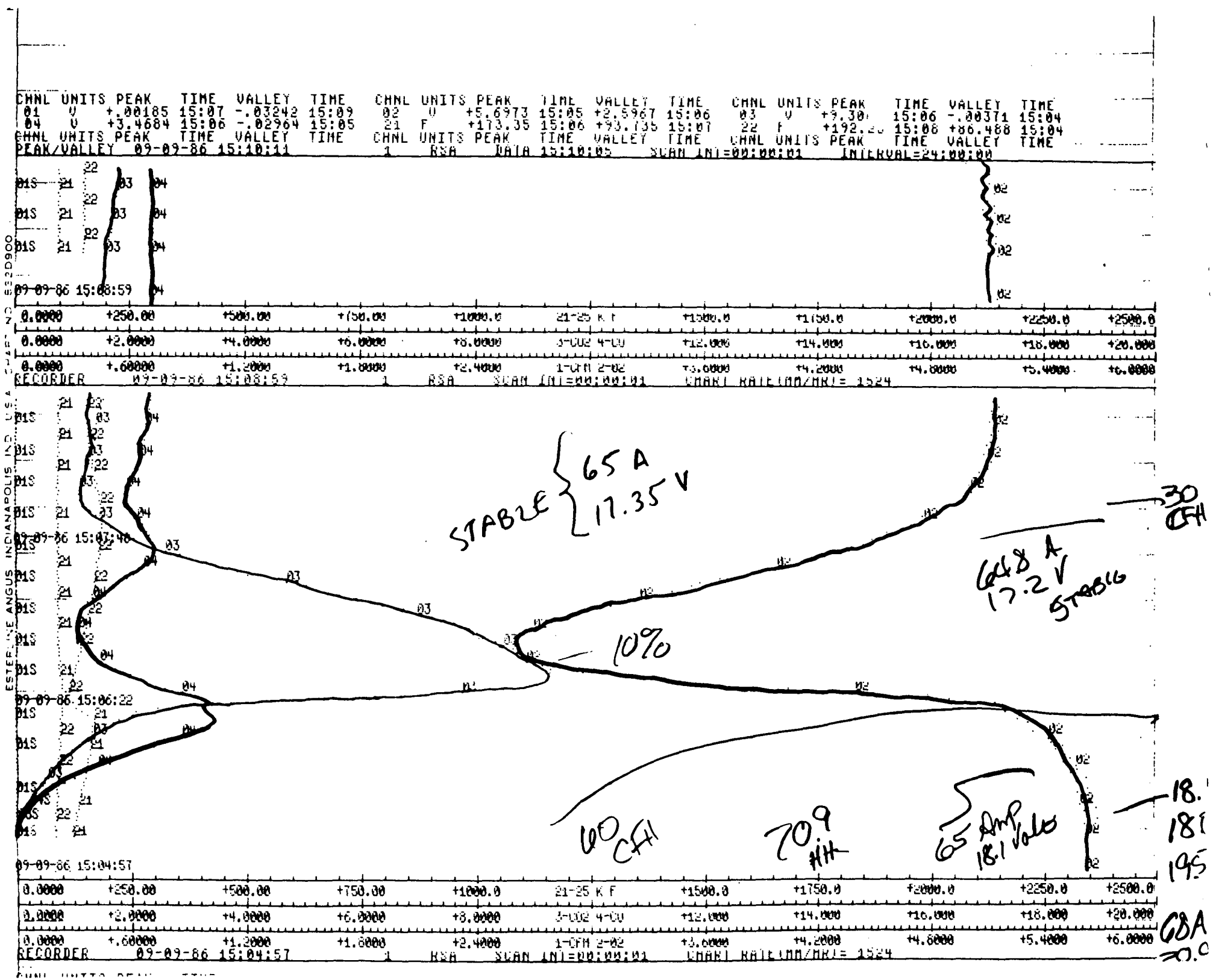
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-CO2 4-CO +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000

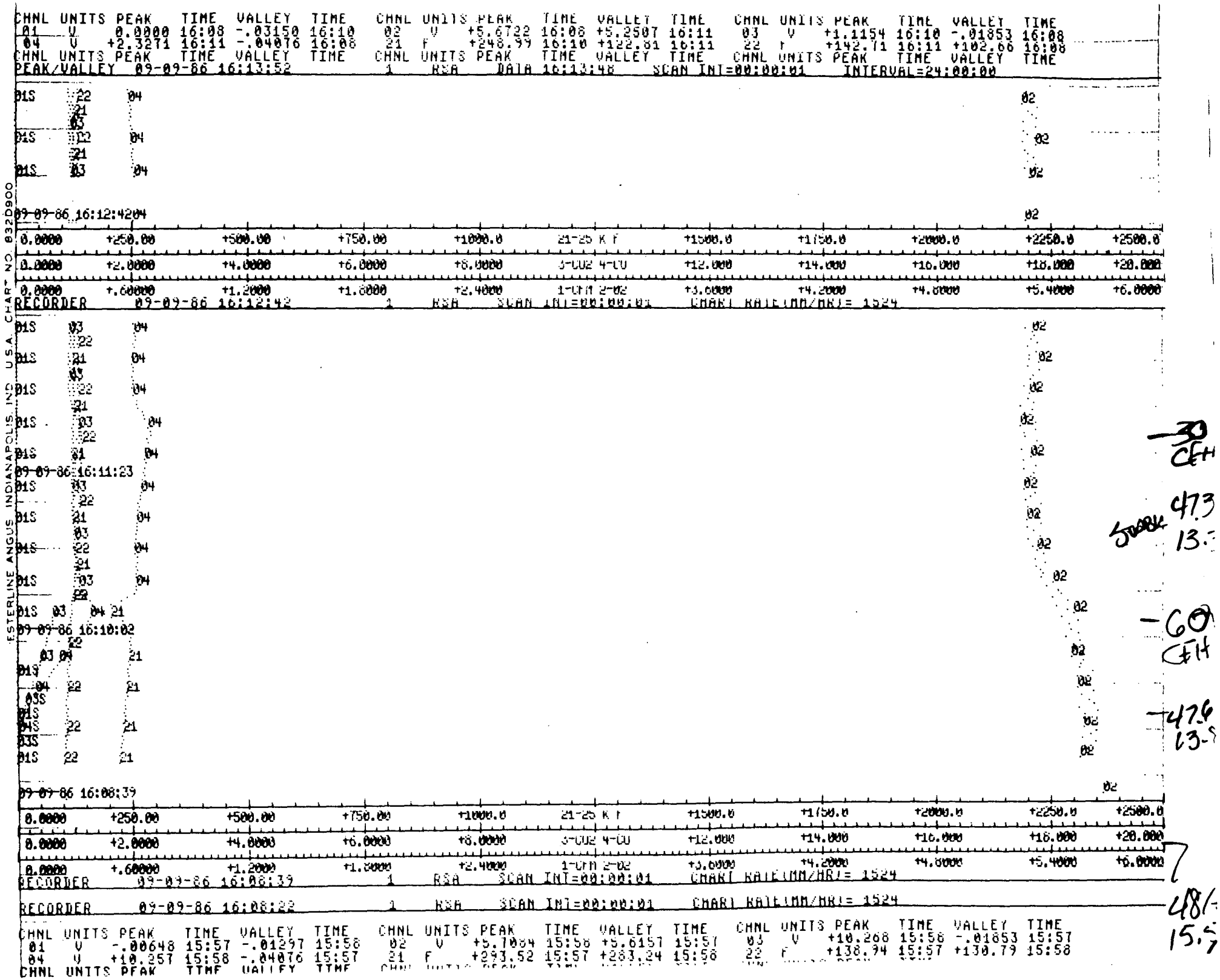
RECORDER 09-05-86 11:58:22 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

MADE IN CANADA

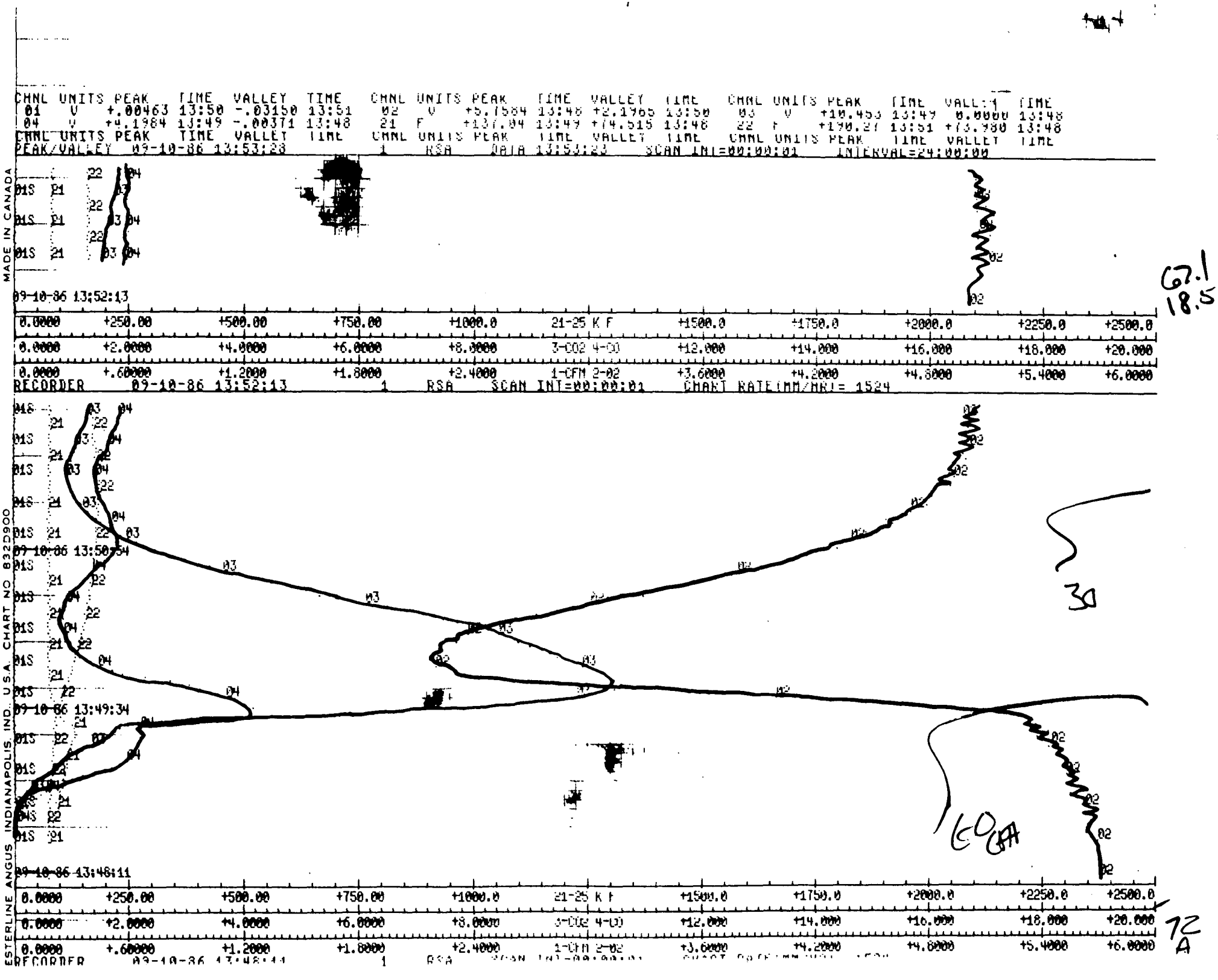
833900

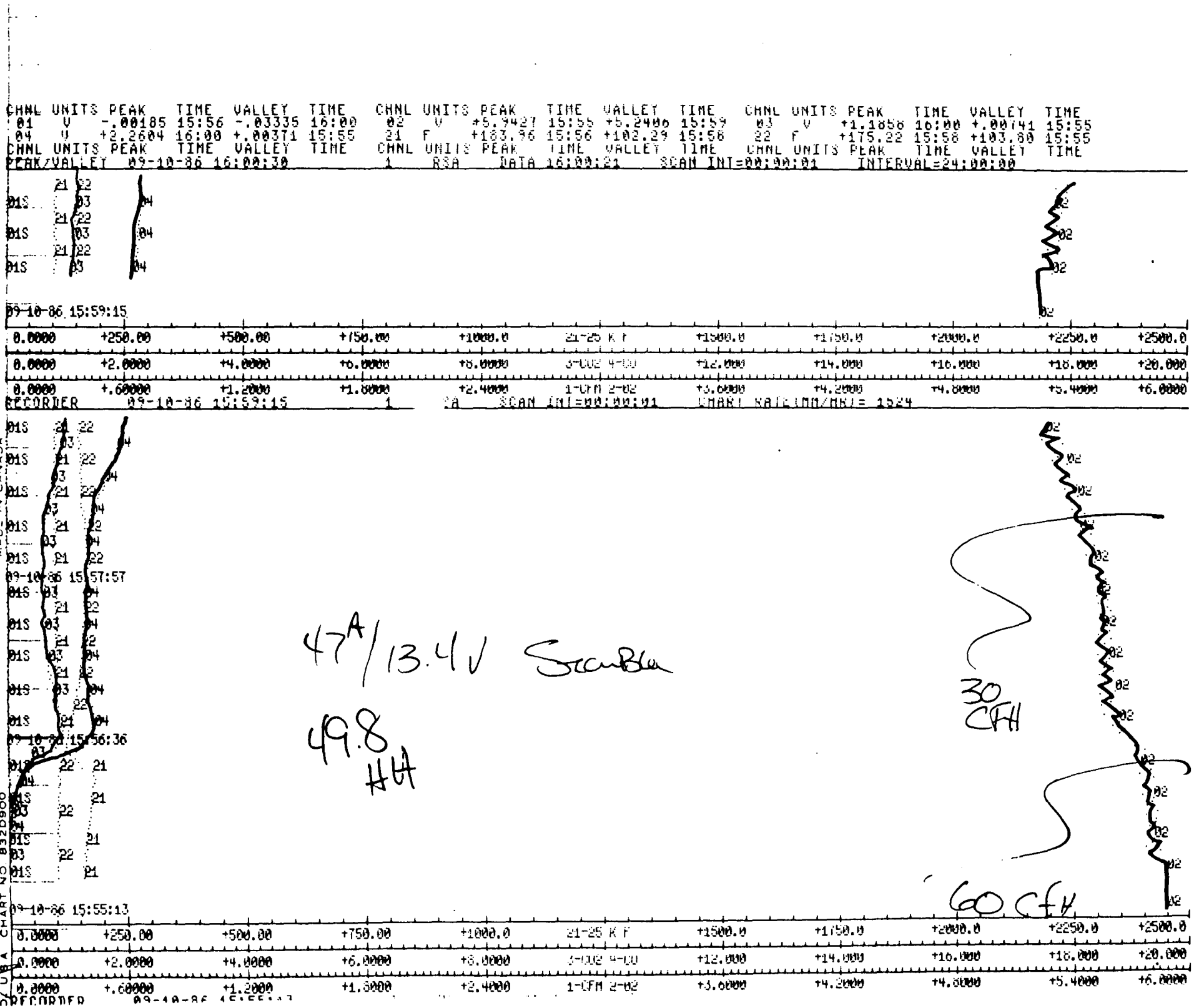

ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHART NO. 832D90
CHNL UNITS PEAK TIME VALLEY TIME
01 V 0.0000 13:34 -.02964 13:31
04 V +3.1349 13:38 +.00741 13:33
02 V +5.6010 13:34 +4.9704 13:38
21 F +262.77 13:34 +136.53 13:36
03 V +1.7172 13:38 +.02964 13:33
22 F +211.63 13:36 +109.45 13:33
PEAK/VALLEY 09-09-86 13:38:39
1 RSA DATA 13:38:30 SCAN INT=00:00:01 INTERVAL=24:00:00
CO
09-09-86 13:37:22
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-09-86 13:37:22 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-09-86 13:36:03
09-09-86 13:34:43
09-09-86 13:33:20
Trap inlet NOT CAPPED
it's into eng.
49.1 A 13.7 V
STABLE
60 CFH
54.A
14.
15.
15.
50 A
100 3.5.165 2V
RECORDER 09-09-86 13:33:20 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

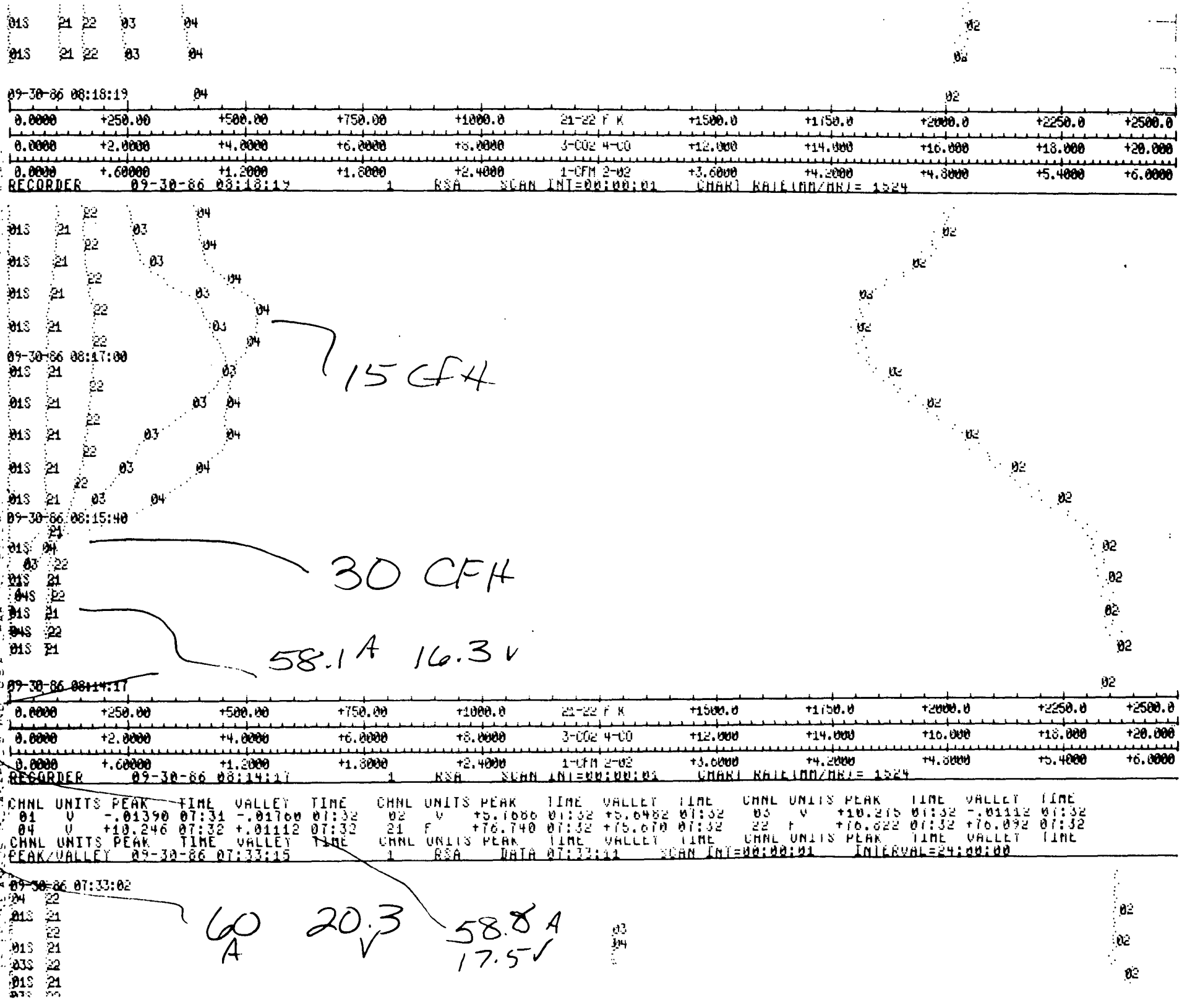

CHNL UNITS PEAK TIME VALLEY TIME
01 V +.00185 15:07 -.03242 15:09
04 V +3.4684 15:06 -.02964 15:05
CHNL UNITS PEAK TIME VALLEY TIME
02 V +5.6973 15:05 +2.5967 15:06
21 F +173.35 15:06 +93.735 15:07
CHNL UNITS PEAK TIME VALLEY TIME
03 V +9.30 15:06 -.00371 15:04
22 F +192.2 15:06 +86.488 15:04
PEAK/VALLEY 09-09-86 15:10:11
1 RSA DATA 15:10:05 SCAN INT=00:00:01 INTERVAL=24:00:00
09-09-86 15:08:59
RECORDER 09-09-86 15:08:59 1 RSA SCAN INT=00:00:01 CHANL RATIO=1524
STABLE { 65 A 17.35 V
30 CFH
66.8 A 17.2 V STABLE
10%
09-09-86 15:06:22
60 CFH
70 #H
65 Amps 18.1 Volts
09-09-86 15:04:57
RECORDER 09-09-86 15:04:57 1 RSA SCAN INT=00:00:01 CHANL RATIO=1524
ESTERLINE ANGUS INDIANAPOLIS IND. USA

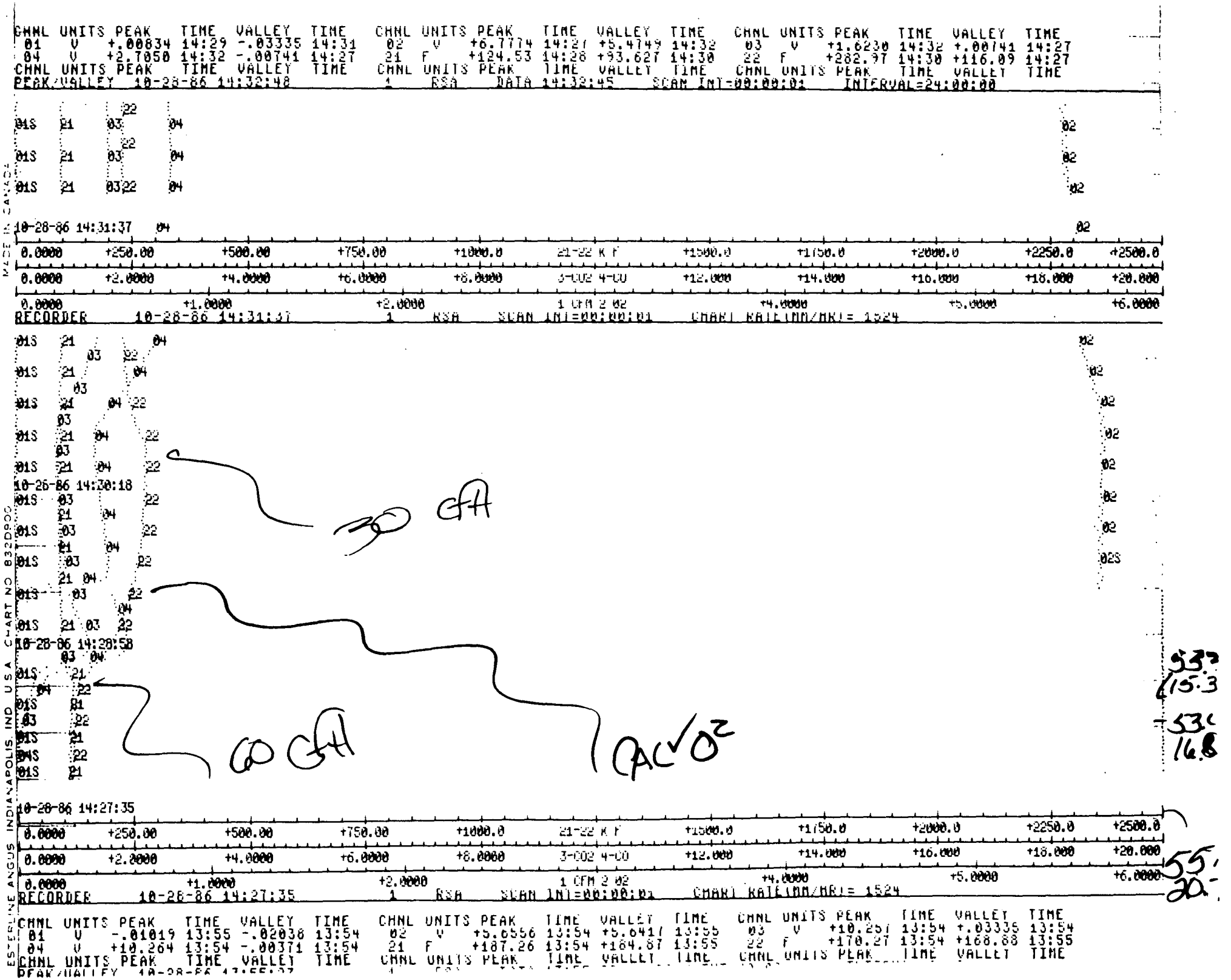


ESTERLINE ANGUS INDIANAPOLIS IND USA CHART NO 832D900

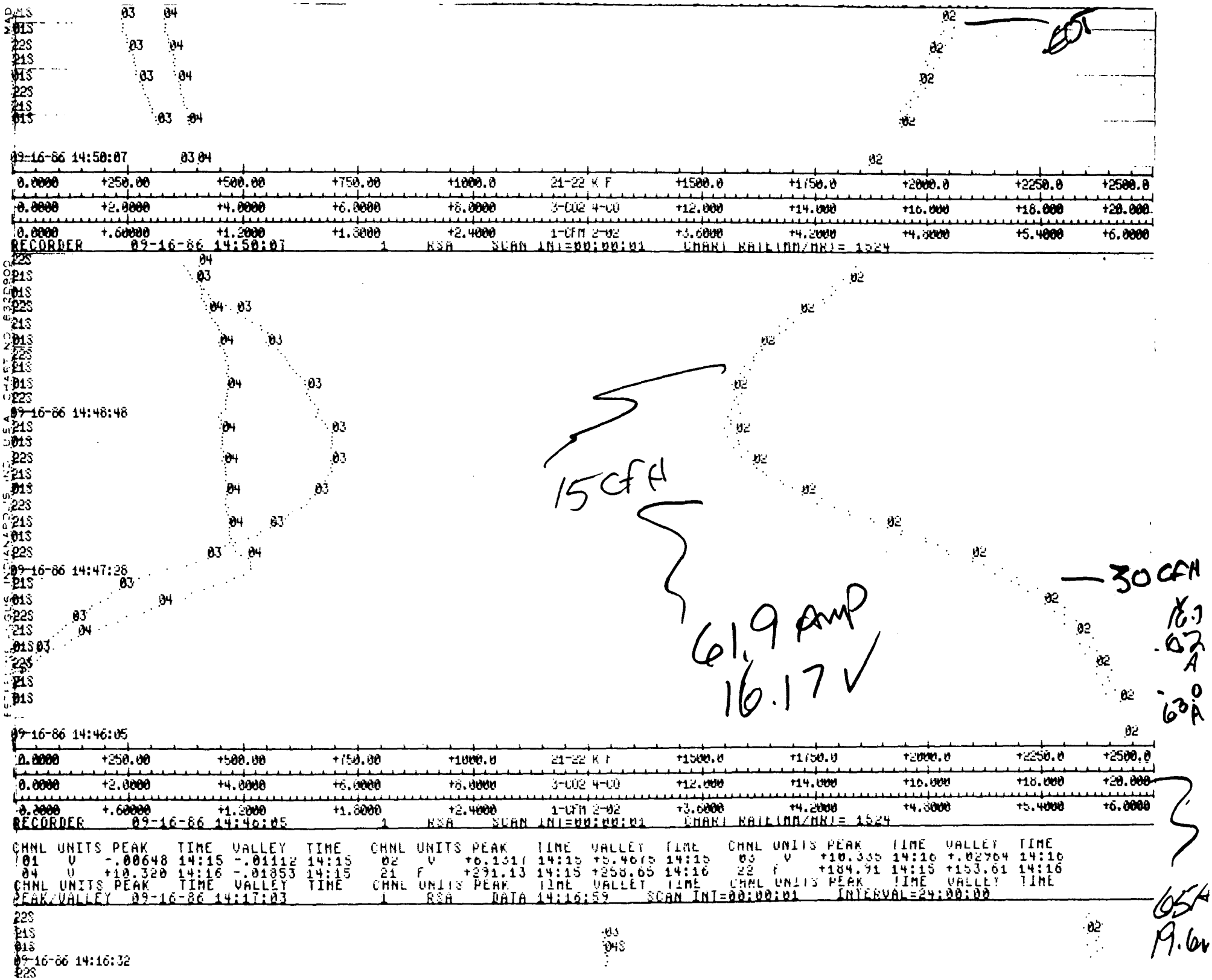

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V +.00463 13:50 -.03150 13:51 02 V +5.1564 13:48 +2.1765 13:50 03 V +10.453 13:47 0.0000 13:48
04 V +4.1984 13:49 -.00371 13:48 21 F +137.04 13:49 +74.515 13:48 22 F +190.27 13:51 +73.980 13:48
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-10-86 13:53:28 1 RSA DATA 13:53:23 SCAN INT=00:00:01 INTERVAL=24:00:00
MADE IN CANADA
09-10-86 13:52:13
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-10-86 13:52:13 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
ESTERLINE ANGUS INDIANAPOLIS, IND. U.S.A. CHART NO 832D900
09-10-86 13:50:54
09-10-86 13:49:34
09-10-86 13:46:11
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-10-86 13:46:11 1 RSA

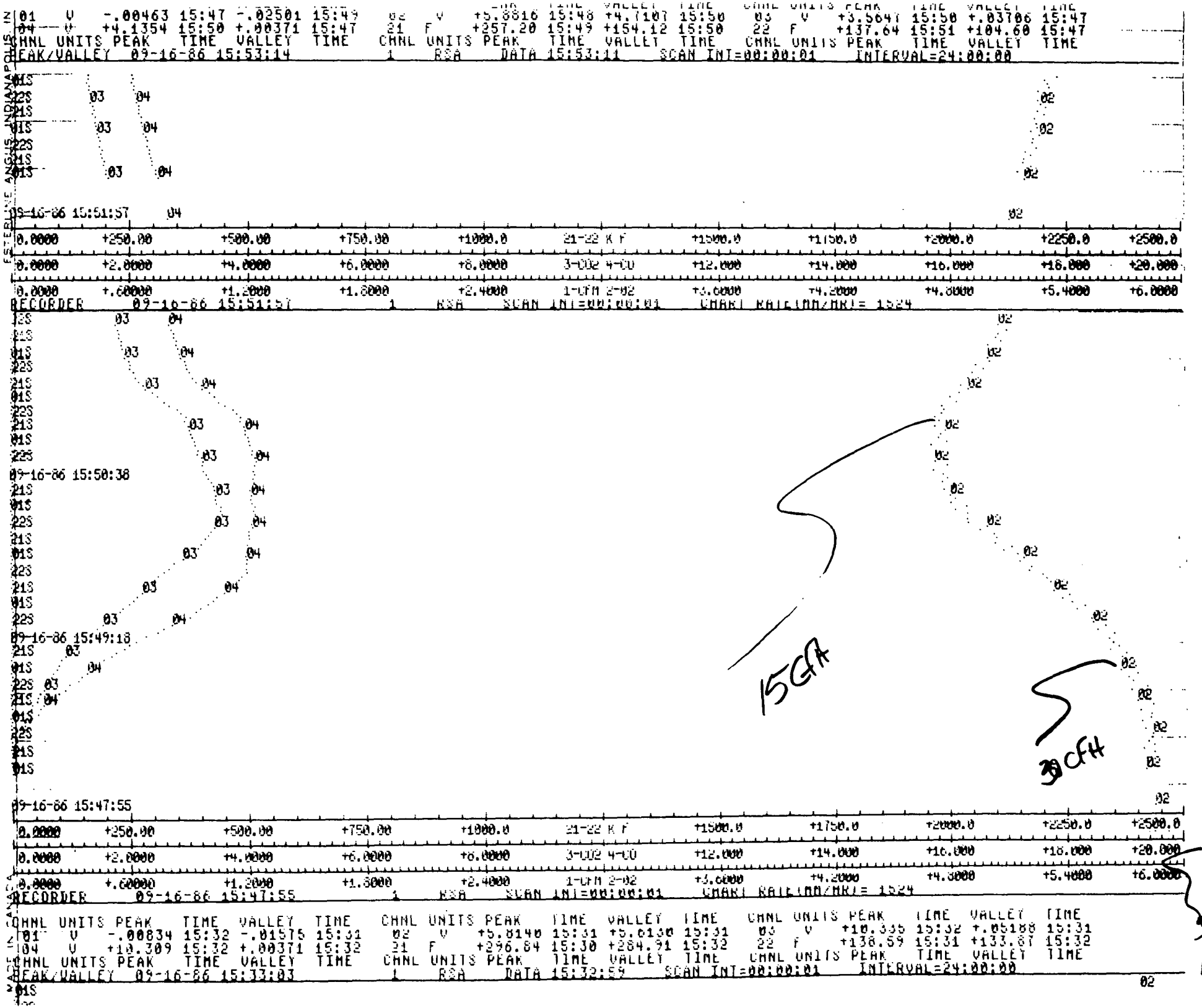

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00185 15:56 -.03335 16:00 02 V +5.9427 15:55 +5.2400 15:59 03 V +1.1856 16:00 +.00741 15:55
04 V +2.2604 16:00 +.00371 15:55 21 F +183.96 15:56 +102.29 15:58 22 F +175.22 15:58 +103.80 15:55
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-10-86 16:00:30 1 RSA DATA 16:09:21 SCAN INT=00:00:01 INTERVAL=24:00:00
09-10-86 15:59:15
0.0000 +250.00 +500.00 +750.00 +1000.0 21-25 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-10-86 15:59:15 1 RSA SCAN INT=00:00:01 CHART SAILING/MK/= 1524
09-10-86 15:57:57
09-10-86 15:56:36
09-10-86 15:55:13
47A/13.4V Scrubber
49.8 HH
30 CFH
60 cfh
MADE IN CANADA
CHART NO 832D900

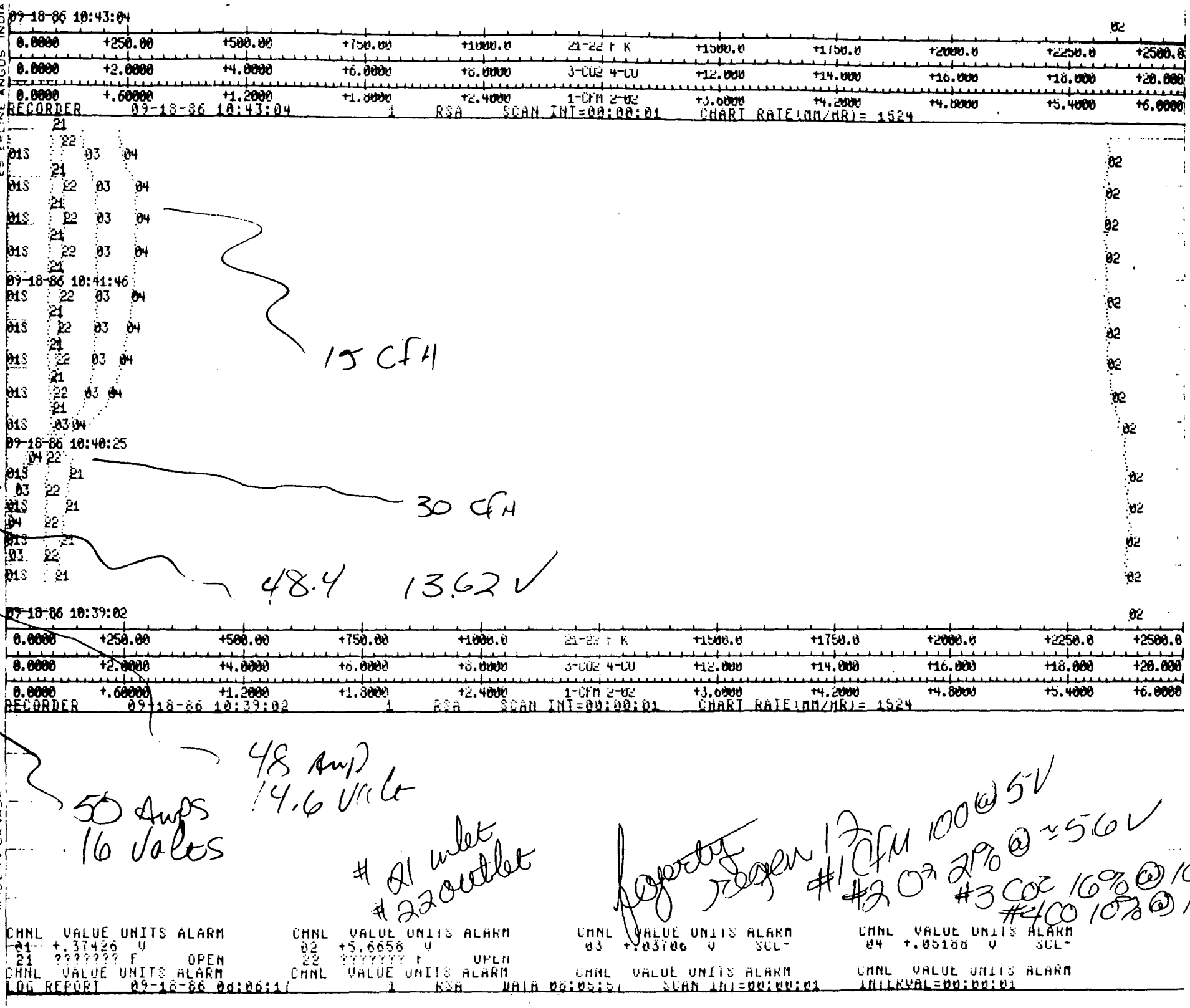

09-30-86 08:18:19
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-C02 4-C0 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-30-86 08:18:17 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-30-86 08:17:00
09-30-86 08:15:40
15 CFH
30 CFH
58.1 A 16.3 V
09-30-86 08:14:17
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-C02 4-C0 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-30-86 08:14:17 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01390 07:31 -.01760 07:32 02 V +5.1666 07:32 +5.0482 07:32 03 V +10.215 07:32 -.01112 07:32
04 V +10.246 07:32 +.01112 07:32 21 F +76.740 07:32 +75.670 07:32 22 F +76.622 07:32 +76.092 07:32
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-30-86 07:33:15 1 RSA DATA 07:33:11 SCAN INT=00:00:01 INTERVAL=24:00:00
09-30-86 07:33:02
60 A
20.3 V
58.8 A
17.5 V

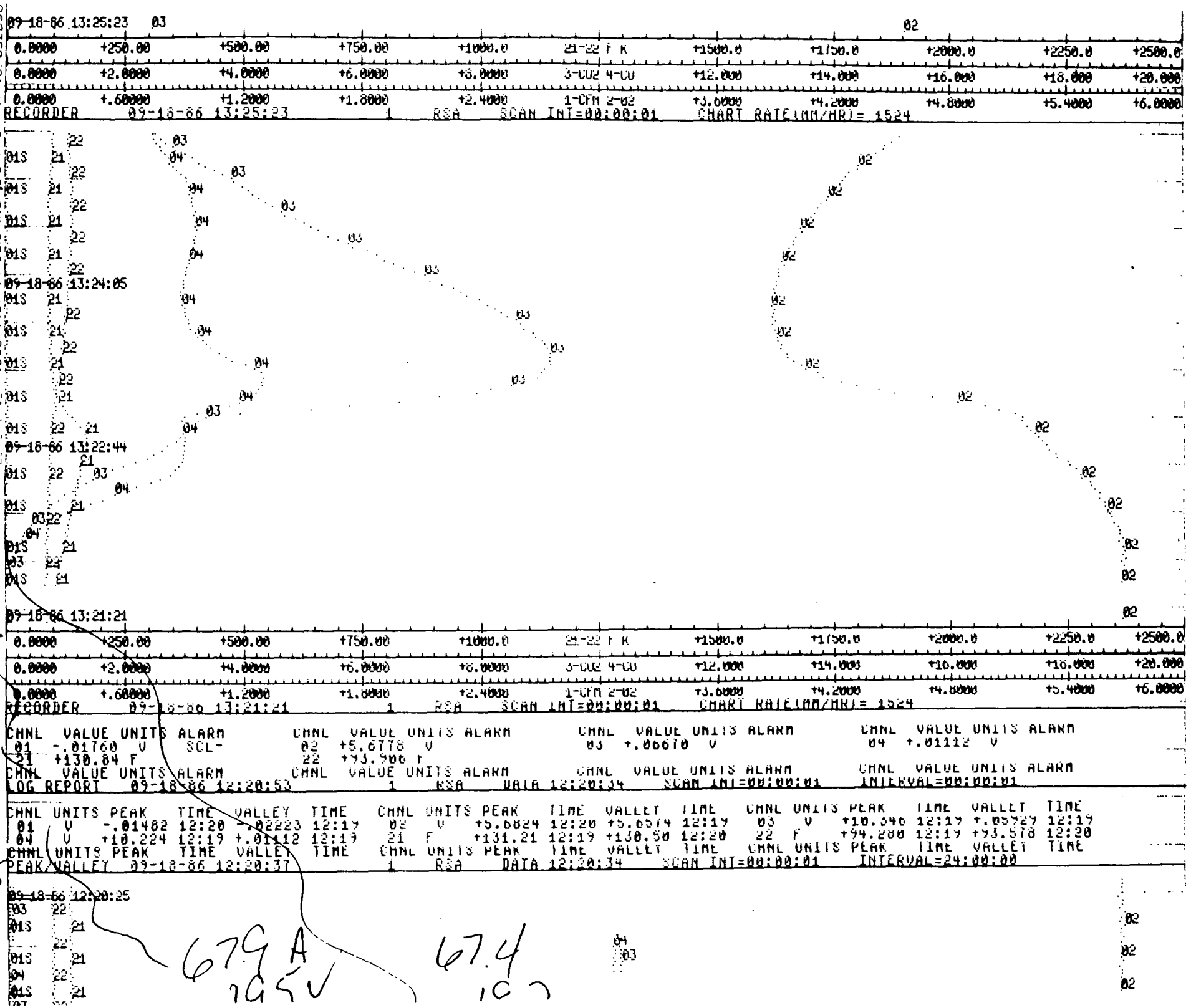

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V +.00834 14:29 -.03335 14:31 02 V +6.7714 14:21 +5.4749 14:32 03 V +1.6230 14:32 +.00741 14:27
04 V +2.7850 14:32 -.00741 14:27 21 F +124.53 14:28 +93.627 14:30 22 F +282.97 14:30 +116.09 14:27
PEAK/VALLEY 10-28-86 14:32:48 1 RSA DATA 14:32:45 SCAN INT=00:00:01 INTERVAL=24:00:00
10-28-86 14:31:37
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 14:31:37 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
10-28-86 14:30:18
10-28-86 14:28:58
10-28-86 14:27:35
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 14:27:35 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01019 13:55 -.02038 13:54 02 V +5.0556 13:54 +5.0417 13:55 03 V +10.257 13:54 +.03335 13:54
04 V +10.264 13:54 -.00371 13:54 21 F +187.26 13:54 +184.87 13:55 22 F +170.27 13:54 +168.88 13:55
PEAK/VALLEY 10-28-86 13:55:37
30 CFH
60 CFH
QAC√O2
ESTERLINE ANGUS INDIANAPOLIS IND USA CHART NO 832D800
MADE IN CANADA

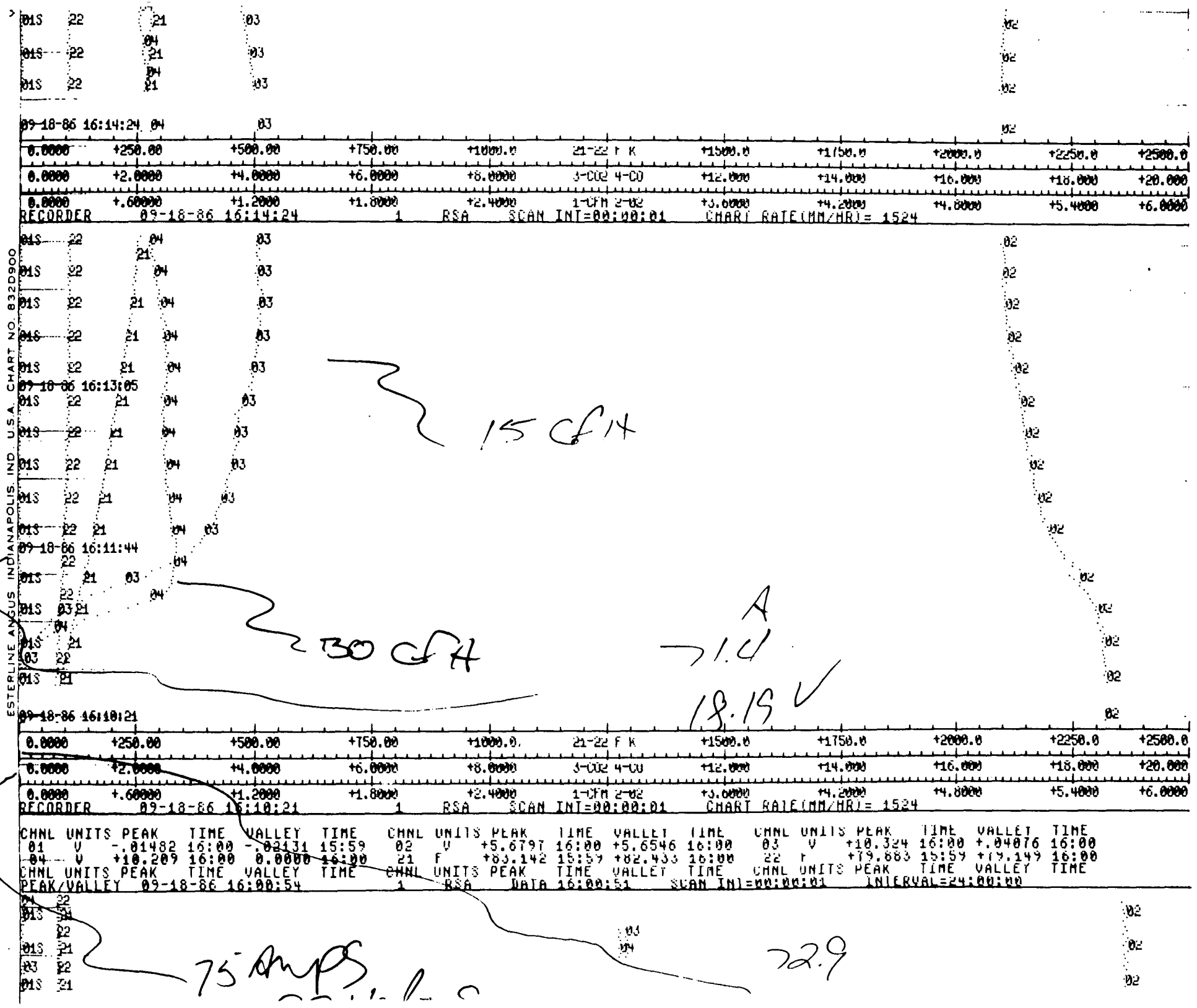
PHASE 2: BACKPRESSURE = 5.7 PSI, AIRFLOW = 0.5 CFM

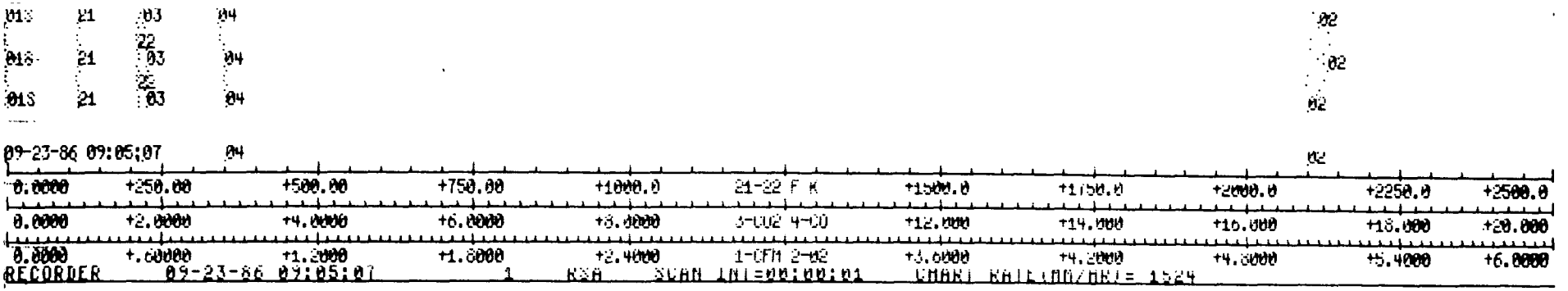

09-16-86 14:50:07
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-CO2 4-CO +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-O2 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-16-86 14:50:07 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-16-86 14:48:48
09-16-86 14:47:28
09-16-86 14:46:05
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-CO2 4-CO +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-O2 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-16-86 14:46:05 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00648 14:15 -.01112 14:15 02 V +6.1311 14:15 +5.4075 14:15 03 V +10.335 14:16 +.02704 14:16
04 V +10.320 14:16 -.01853 14:15 21 F +291.13 14:15 +258.65 14:16 22 F +184.91 14:15 +153.61 14:16
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-16-86 14:17:03 1 RSA DATA 14:16:59 SCAN INT=00:00:01 INTERVAL=24:00:00
09-16-86 14:16:32
15 cfh
61.9 amp
16.17 V
30 cfh
16.1
.07 A
.63 A
.054
19.6

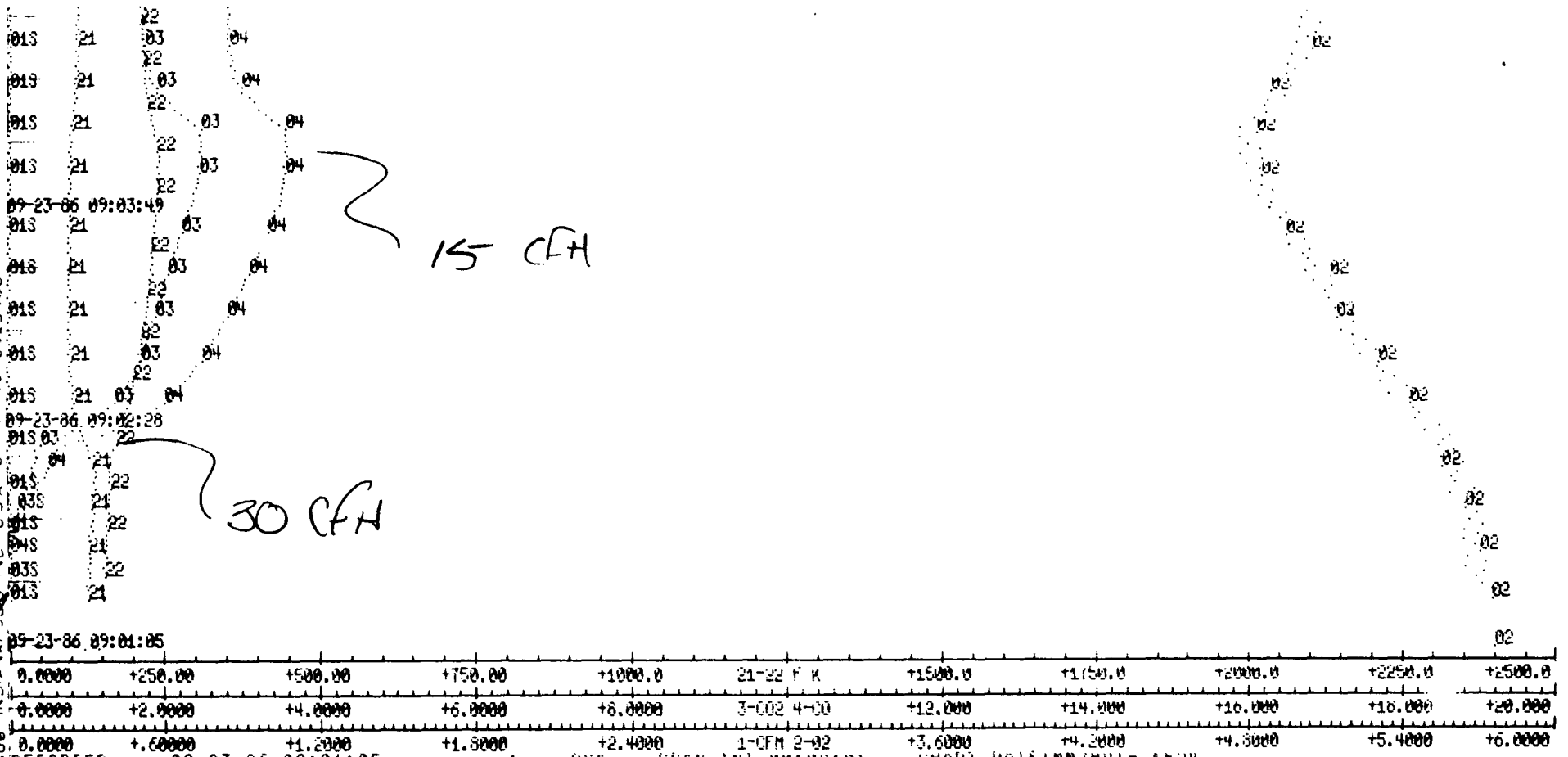

01 V -.00463 15:47 -.02501 15:49 02 V +5.8816 15:48 +4.7107 15:50 03 V +3.5641 15:50 +.03706 15:47
04 V +4.1354 15:50 +.00371 15:47 21 F +257.20 15:49 +154.12 15:50 22 F +137.64 15:51 +104.60 15:47
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-16-86 15:53:14 1 RSA DATA 15:53:11 SCAN INT=00:00:01 INTERVAL=24:00:00
09-16-86 15:51:57
RECORDER 09-16-86 15:51:57 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-16-86 15:50:38
09-16-86 15:49:18
09-16-86 15:47:55
RECORDER 09-16-86 15:47:55 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00834 15:32 -.01575 15:31 02 V +5.8140 15:31 +5.0130 15:31 03 V +10.335 15:32 +.05188 15:31
04 V +10.309 15:32 +.00371 15:32 21 F +296.84 15:30 +284.91 15:32 22 F +138.59 15:31 +133.87 15:32
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-16-86 15:33:03 1 RSA DATA 15:32:59 SCAN INT=00:00:01 INTERVAL=24:00:00
15CFM
30CFM
55-1
16V


09-18-86 10:43:04
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 +3.0000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-18-86 10:43:04 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-18-86 10:41:46
09-18-86 10:40:25
09-18-86 10:39:02
RECORDER 09-18-86 10:39:02 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
15 CFH
30 CFH
48.4 13.62 V
48 Amps
14.6 Volts
50 Amps
16 Volts
#01 inlet
#22 outlet
Regular Regen 17 CFM 100@5V
#1 CFM
#2 0 to 2% @ ~5.6V
#3 COC 16% @ 10V
#4 CO 10% @ 10V
CHNL VALUE UNITS ALARM
01 +.37426 V
21 ??????? F OPEN
02 +5.6656 V
22 ??????? F OPEN
03 +.03706 V SCL-
04 +.05188 V SCL-
LOG REPORT 09-18-86 00:06:17 1 RSA SCAN INT=00:00:01 INTERVAL=00:00:01
ESTERLINE ANGUS INDIA
MADE IN CANADA


ESTERLINE ANGUS INDIANAPOLIS IND USA CHART NO 832D90
09-18-86 13:25:23
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 +3.0000 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-18-86 13:25:23 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-18-86 13:24:05
09-18-86 13:22:44
09-18-86 13:21:21
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 +3.0000 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-18-86 13:21:21 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
01 -.01760 V SCL- 02 +5.6778 V 03 +.00670 V 04 +.01112 V
21 +130.84 F 22 +93.900 F
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
LOG REPORT 09-18-86 12:20:53 1 RSA DATA 12:20:34 SCAN INT=00:00:01 INTERVAL=00:00:01
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01482 12:20 -.02223 12:17 02 V +5.6824 12:20 +5.6574 12:17 03 V +10.346 12:17 +.05729 12:17
04 V +10.224 12:19 +.01112 12:19 21 F +131.21 12:19 +130.50 12:20 22 F +94.280 12:17 +93.578 12:20
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-18-86 12:20:37 1 RSA DATA 12:20:34 SCAN INT=00:00:01 INTERVAL=24:00:00
09-18-86 12:20:25


09-18-86 16:14:24
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-CO2 4-CO +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.0000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-18-86 16:14:24 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-18-86 16:13:05
09-18-86 16:11:44
09-18-86 16:10:21
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-CO2 4-CO +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.0000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-18-86 16:10:21 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01482 16:00 -.02131 15:59 02 V +5.6797 16:00 +5.6546 16:00 03 V +10.324 16:00 +.04076 16:00
04 V +10.209 16:00 0.0000 16:00 21 F +83.142 15:59 +82.433 16:00 22 F +79.683 15:59 +19.149 16:00
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-18-86 16:00:54 1 RSA DATA 16:00:51 SCAN INT=00:00:01 INTERVAL=24:00:00
ESTERLINE ANGUS INDIANAPOLIS IND USA CHART NO. 832D900





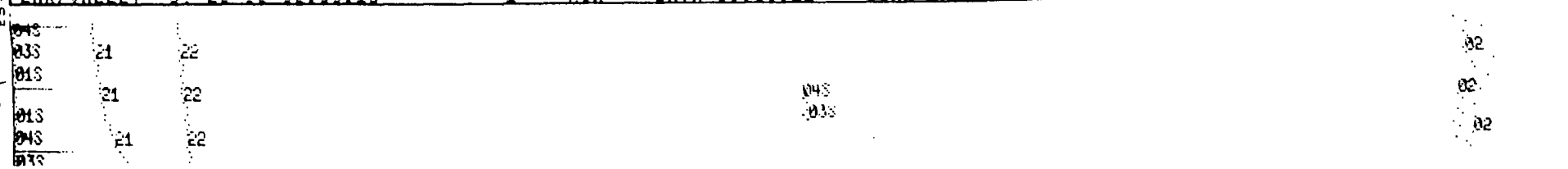
15 CFH

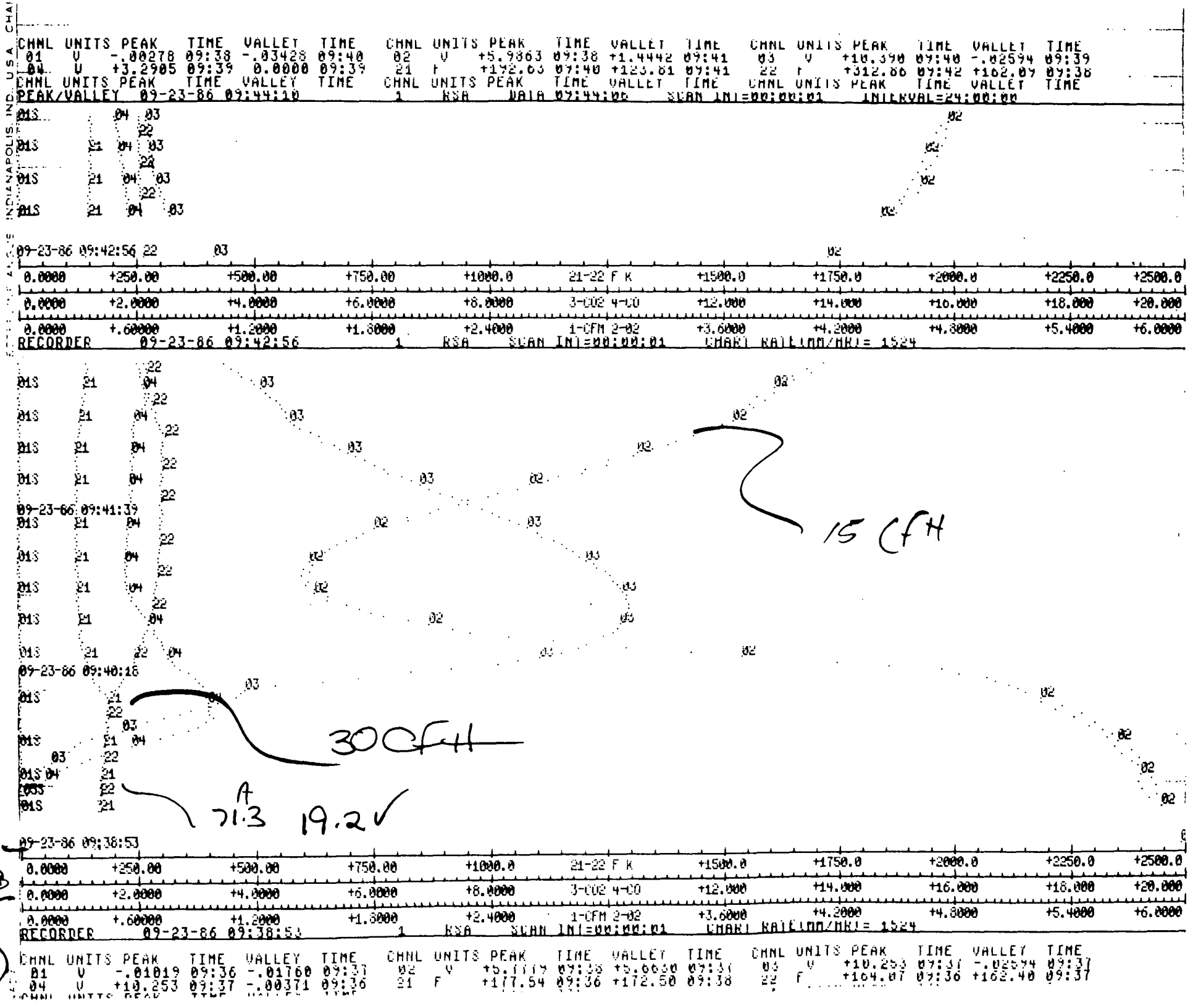
30 CFH

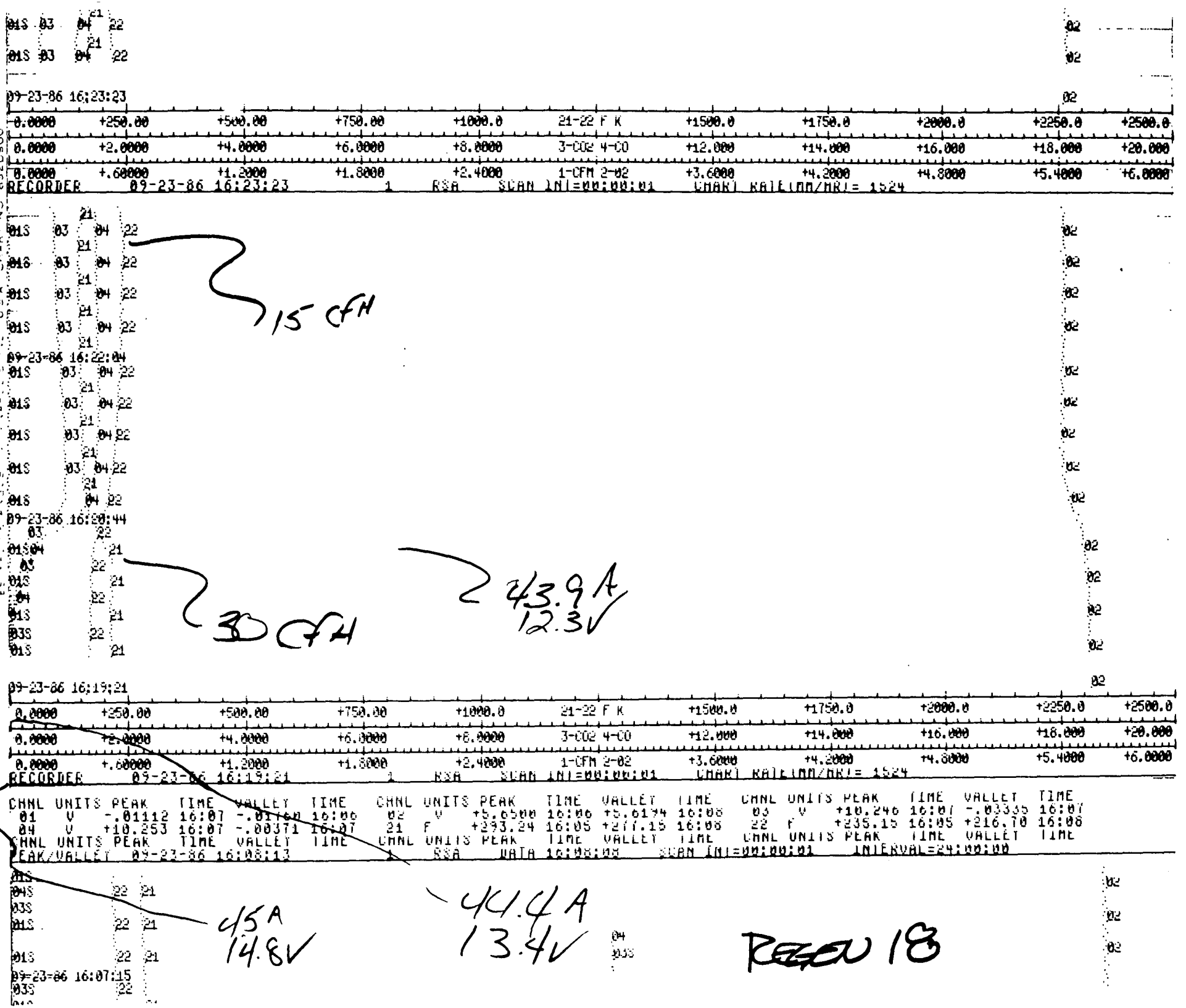
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	-.00165	08:33	-.01019	08:34	02	V	+5.7649	08:34	+5.5819	08:33	03	V	+10.253	08:34	-.02764	08:34
04	V	+10.235	08:34	-.02223	08:34	21	F	+204.74	08:34	+130.14	08:35	22	F	+300.04	08:33	+269.21	08:35

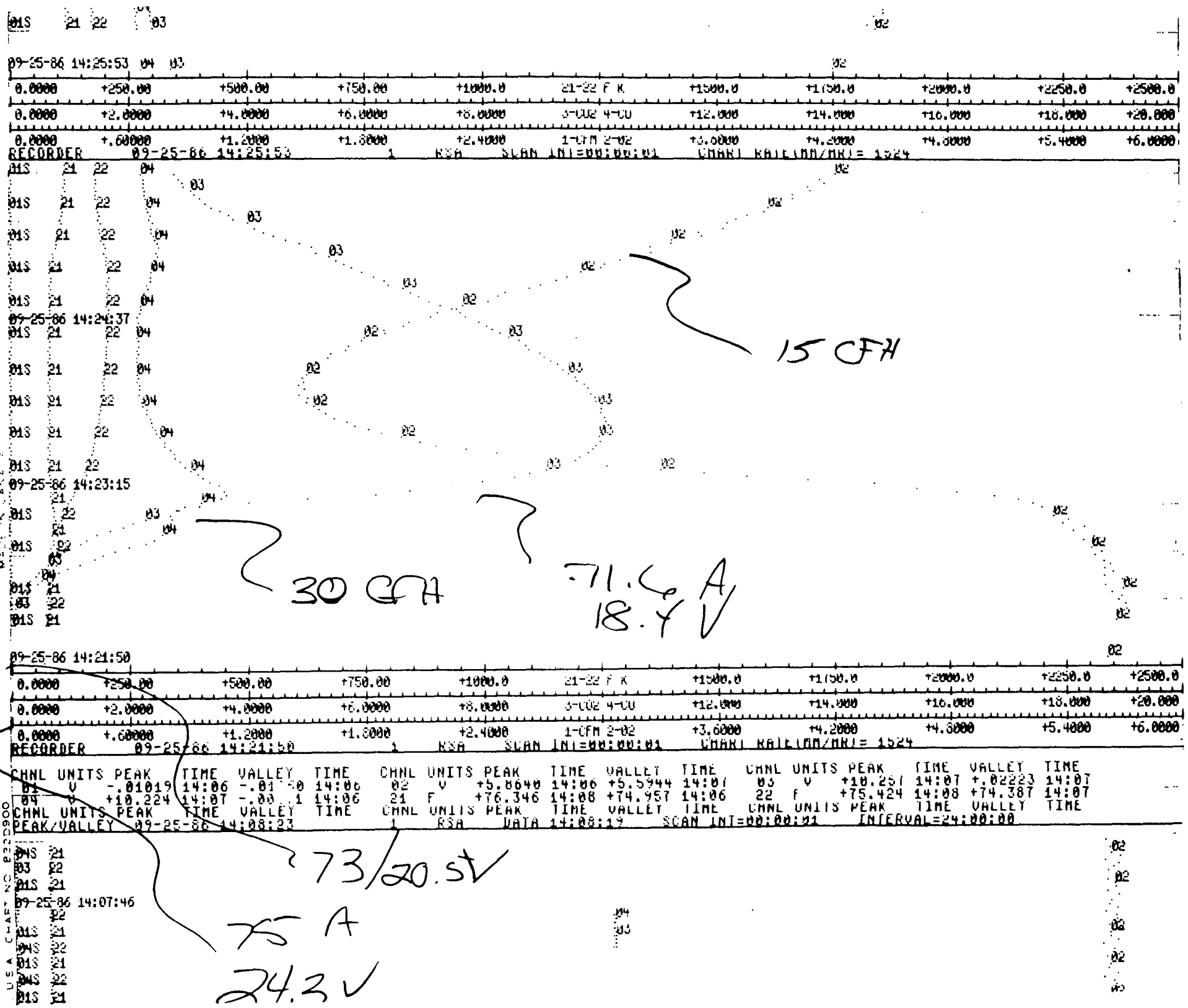
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

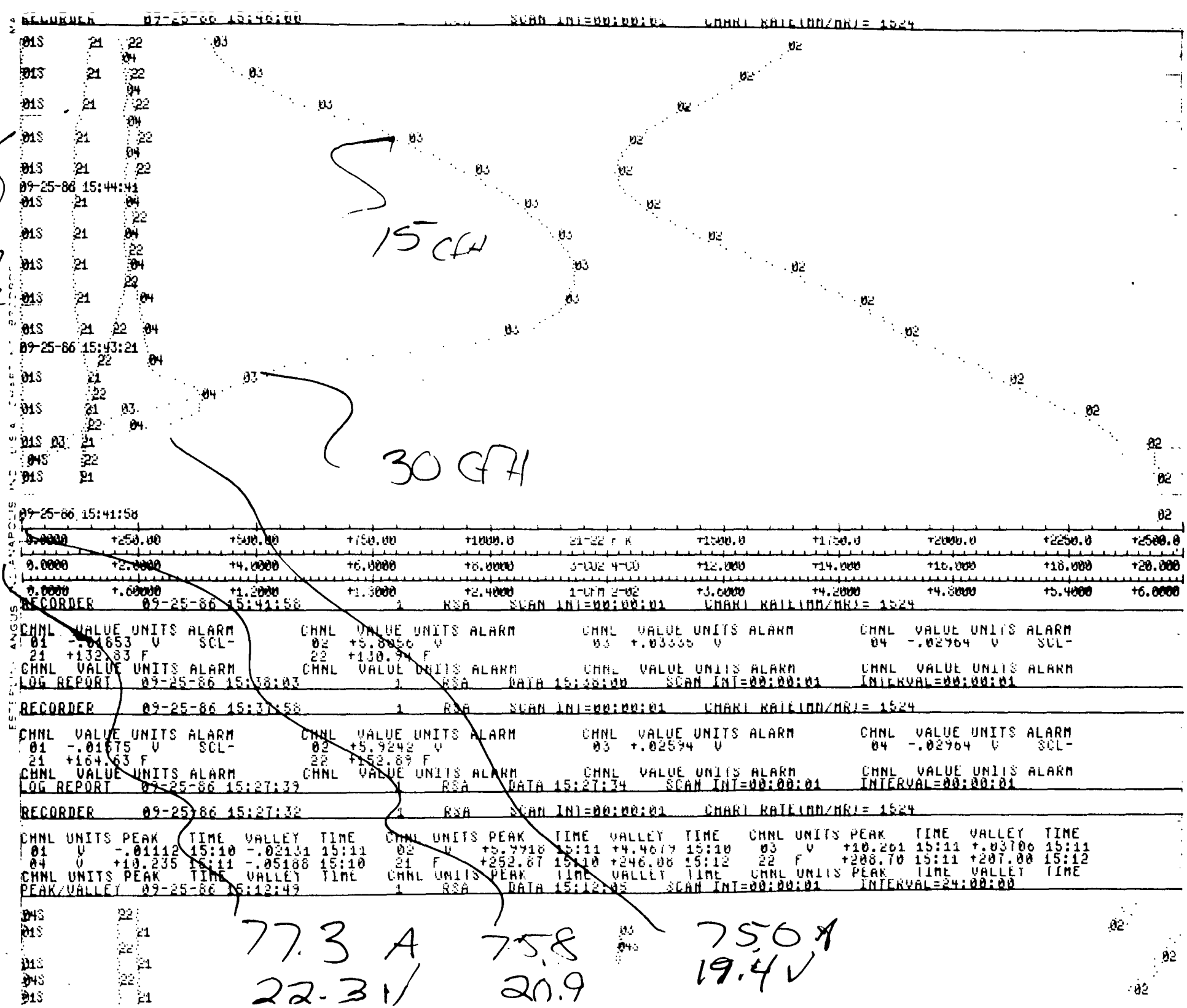
PEAK/VALLEY 09-23-86 08:35:15 1 RSA DATA 08:35:12 SCAN INT=00:00:01 INTERVAL=24:00:00




INDIANAPOLIS IND USA CHA
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00278 09:38 -.03428 09:40 02 V +5.9363 09:38 +1.4442 09:41 03 V +10.390 09:40 -.02594 09:39
04 V +3.2905 09:39 0.0000 09:39 21 F +192.63 09:40 +123.81 09:41 22 F +312.86 09:42 +162.09 09:36
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-23-86 09:44:10 1 RSA DATA 09:44:00 SCAN INT=00:00:01 INTERVAL=24:00:00
09-23-86 09:42:56 22 03 02
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-23-86 09:42:56 1 RSA SCAN INT=00:00:01 CHART RATIO=MM/HR= 1524
09-23-86 09:41:39
09-23-86 09:40:16
15 CFH
30 CFH
21.3
19.2
09-23-86 09:38:53
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-02 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-23-86 09:38:53 1 RSA SCAN INT=00:00:01 CHART RATIO=MM/HR= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01019 09:36 -.01760 09:37 02 V +5.1119 09:36 +5.0630 07:37 03 V +10.253 07:37 -.02594 09:37
04 V +10.253 09:37 -.00371 09:36 21 F +177.54 09:36 +172.50 09:38 22 F +164.07 07:36 +162.40 09:37


09-23-86 16:23:23
-0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-C02 4-C0 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-23-86 16:23:23 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524
15 CFM
09-23-86 16:22:04
09-23-86 16:20:44
30 CFM
43.9 A
12.3V
09-23-86 16:19:21
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-C02 4-C0 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.6000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-23-86 16:19:21 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01112 16:07 -.01160 16:06 02 V +5.6500 16:06 +5.6174 16:08 03 V +10.246 16:07 -.03335 16:07
04 V +10.253 16:07 -.00371 16:07 21 F +293.24 16:05 +277.15 16:06 22 F +235.15 16:05 +216.70 16:08
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-23-86 16:08:13 1 RSA DATA 16:08:08 SCAN INI=00:00:01 INTERVAL=24:00:00
45A
14.8V
44.4A
13.4V
09-23-86 16:07:15
RECEIVED


09-25-86 14:25:53
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.0000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-25-86 14:25:53 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
09-25-86 14:24:37
09-25-86 14:23:15
09-25-86 14:21:50
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 F K +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +.60000 +1.2000 +1.8000 +2.4000 1-CFM 2-02 +3.0000 +4.2000 +4.8000 +5.4000 +6.0000
RECORDER 09-25-86 14:21:50 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01019 14:06 -.01 50 14:06 02 V +5.8640 14:06 +5.5944 14:07 03 V +10.251 14:07 +.02223 14:07
04 V +10.224 14:07 -.00 1 14:06 21 F +76.346 14:08 +74.957 14:06 22 F +75.424 14:08 +74.387 14:07
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 09-25-86 14:08:23 1 RSA DATA 14:08:19 SCAN INT=00:00:01 INTERVAL=24:00:00
09-25-86 14:07:46
15 CFM
30 CFM
71.6 A
18.7 V
73/20.5V
5 A
24.3 V



RECORDER 09-25-86 15:41:58 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524

CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01653	V	SCL-	02	+5.8056	V		03	+.03335	V		04	-.02964	V	SCL-
21	+132.83	F		22	+130.94	F									

LOG REPORT 09-25-86 15:36:03 1 RSA DATA 15:36:00 SCAN INI=00:00:01 INTERVAL=00:00:01

RECORDER 09-25-86 15:37:58 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524

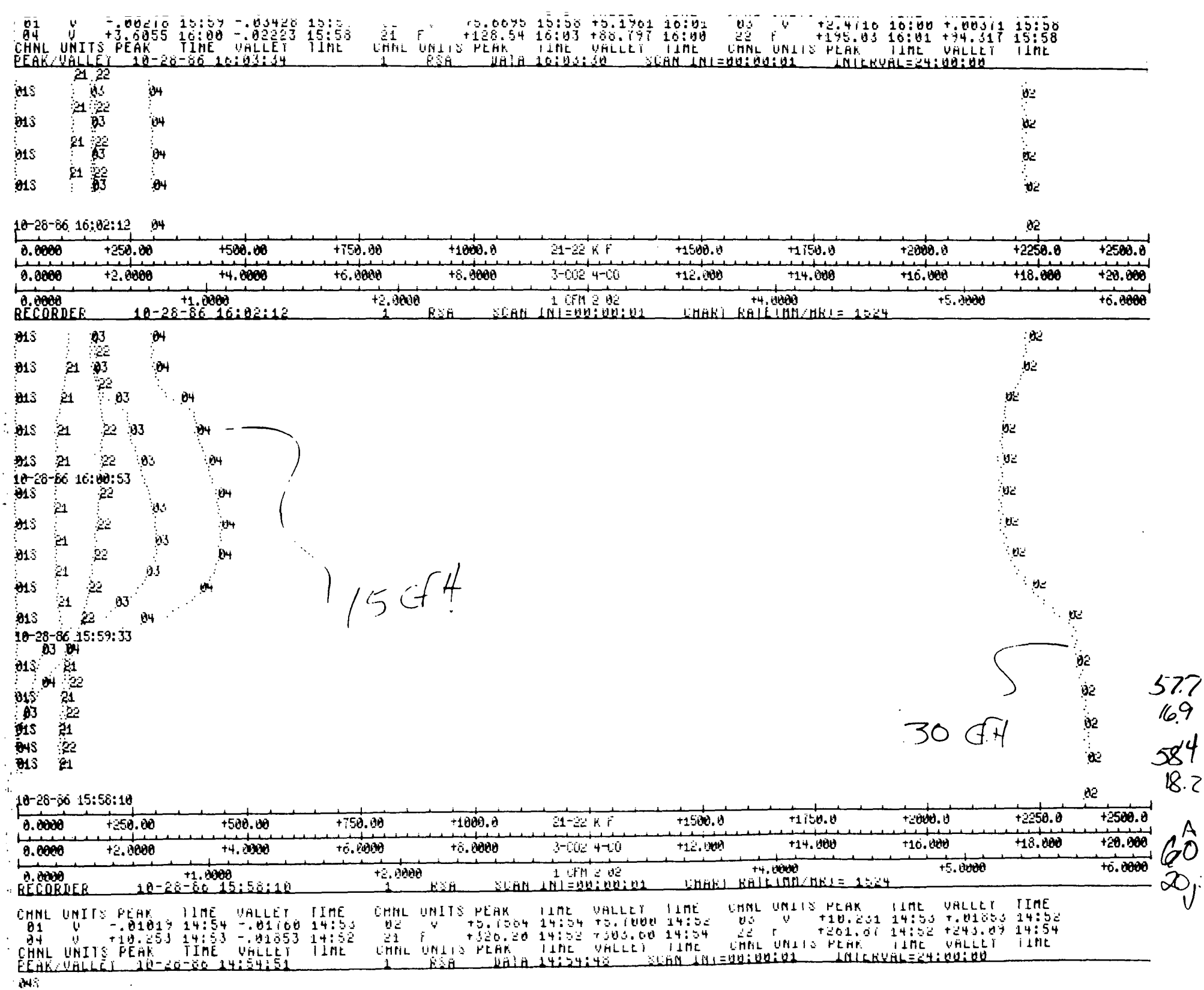
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01675	V	SCL-	02	+5.9242	V		03	+.02594	V		04	-.02964	V	SCL-
21	+164.63	F		22	+152.89	F									

LOG REPORT 09-25-86 15:27:39 1 RSA DATA 15:27:34 SCAN INI=00:00:01 INTERVAL=00:00:01

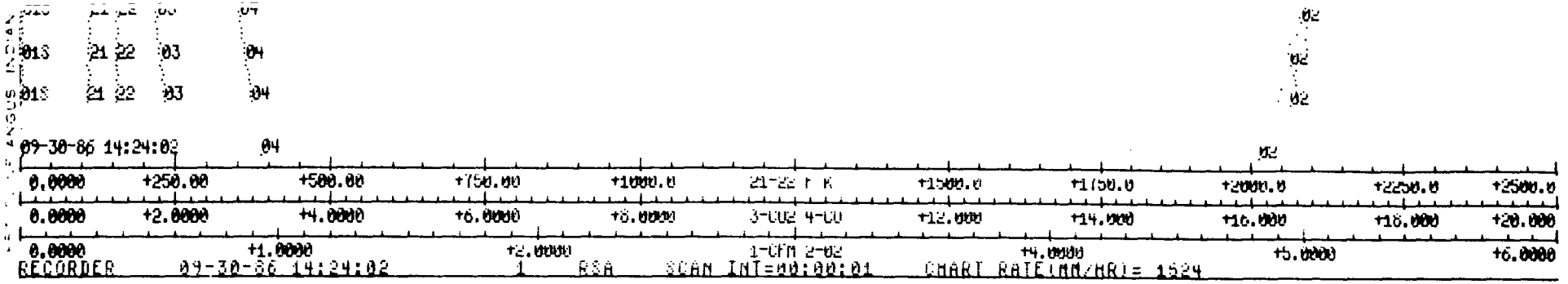
RECORDER 09-25-86 15:27:32 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524

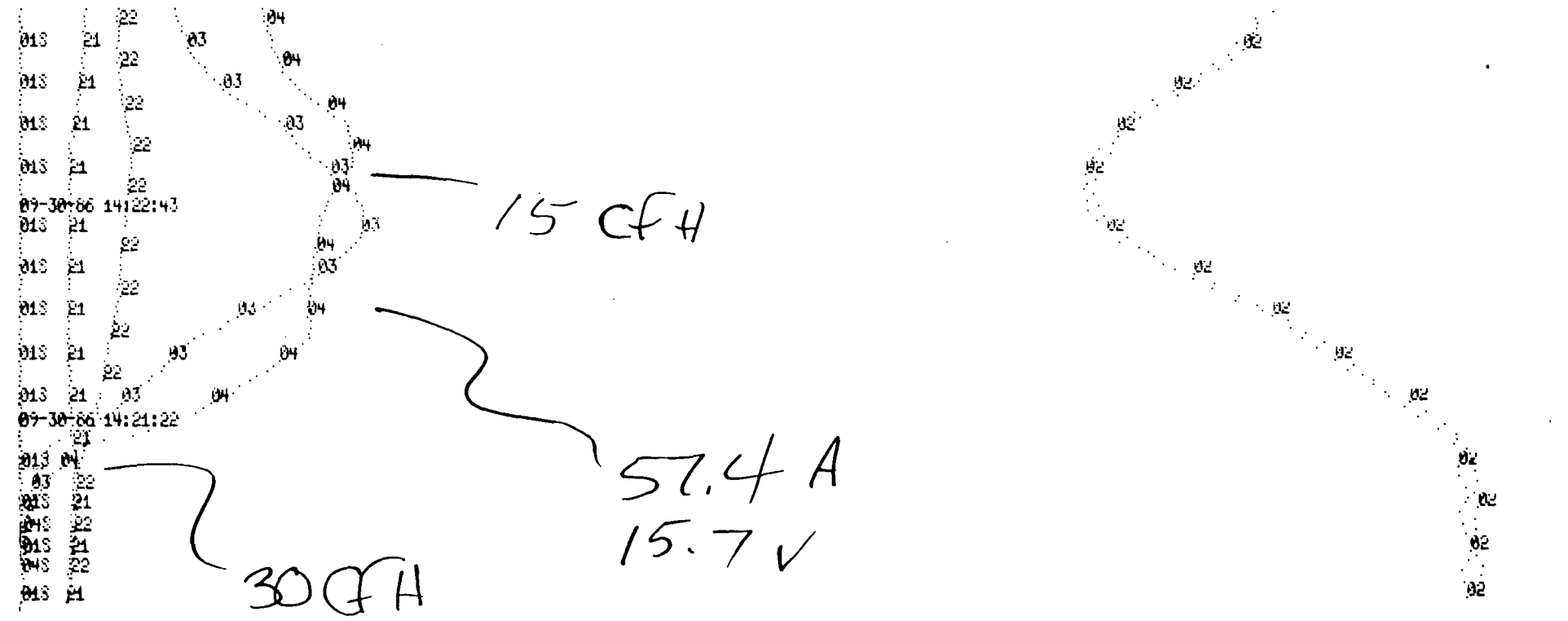
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	-.01112	15:10	-.02131	15:11	02	V	+5.7918	15:11	+4.4679	15:10	03	V	+10.261	15:11	+.03706	15:11
04	V	+10.235	15:11	-.05188	15:10	21	F	+252.87	15:10	+246.06	15:12	22	F	+208.70	15:11	+207.00	15:12

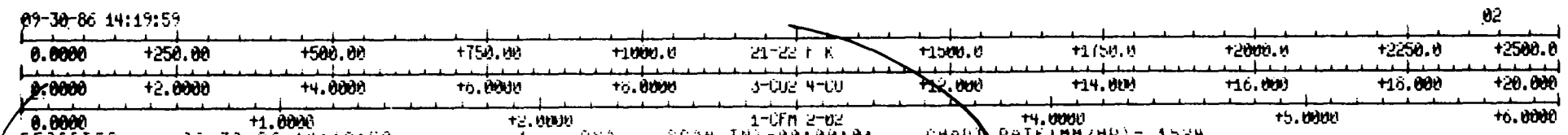
PEAK/VALLEY 09-25-86 15:12:49 1 RSA DATA 15:12:05 SCAN INI=00:00:01 INTERVAL=24:00:00


01 V -.00210 15:59 -.03420 15:5
04 V +3.6055 16:00 -.02223 15:58
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-28-86 16:03:34
+5.0695 15:56 +5.1961 16:01
21 F +128.54 16:03 +88.797 16:00
03 V +2.4716 16:00 +.003711 15:56
22 F +195.03 16:01 +94.317 15:58
1 RSA DATA 16:03:30 SCAN INT=00:00:01 INTERVAL=24:00:00
10-28-86 16:02:12
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 16:02:12 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
10-28-86 16:00:53
10-28-86 15:59:33
10-28-86 15:58:10
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 15:58:10 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01019 14:54 -.01760 14:53
04 V +10.253 14:53 -.01853 14:52
02 V +5.1564 14:54 +5.1000 14:52
21 F +520.20 14:52 +503.00 14:54
03 V +10.201 14:53 +.01853 14:52
22 F +201.67 14:52 +243.09 14:54
PEAK/VALLEY 10-28-86 14:54:51
1 RSA DATA 14:54:48 SCAN INT=00:00:01 INTERVAL=24:00:00
15 cfh
30 cfh
57.7
16.9
584
18.2
60
20

PHASE 3: BACKPRESSURE = 7.1 PSI, AIRFLOW = 0.5 CFM







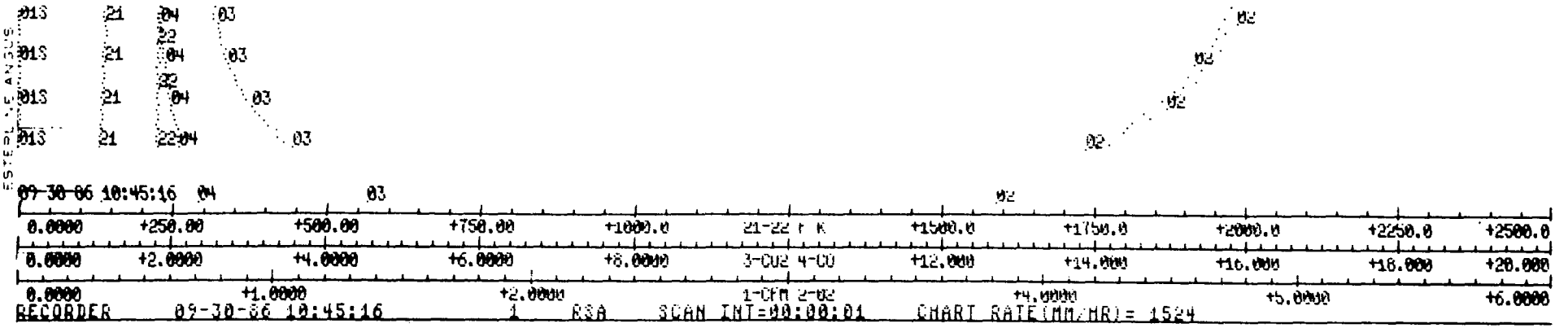
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01112	V	SCL-	02	+5.6324	V		03	0.0000	V		04	-.01053	V	SCL-
21	+74.327	F		22	+74.007	F									

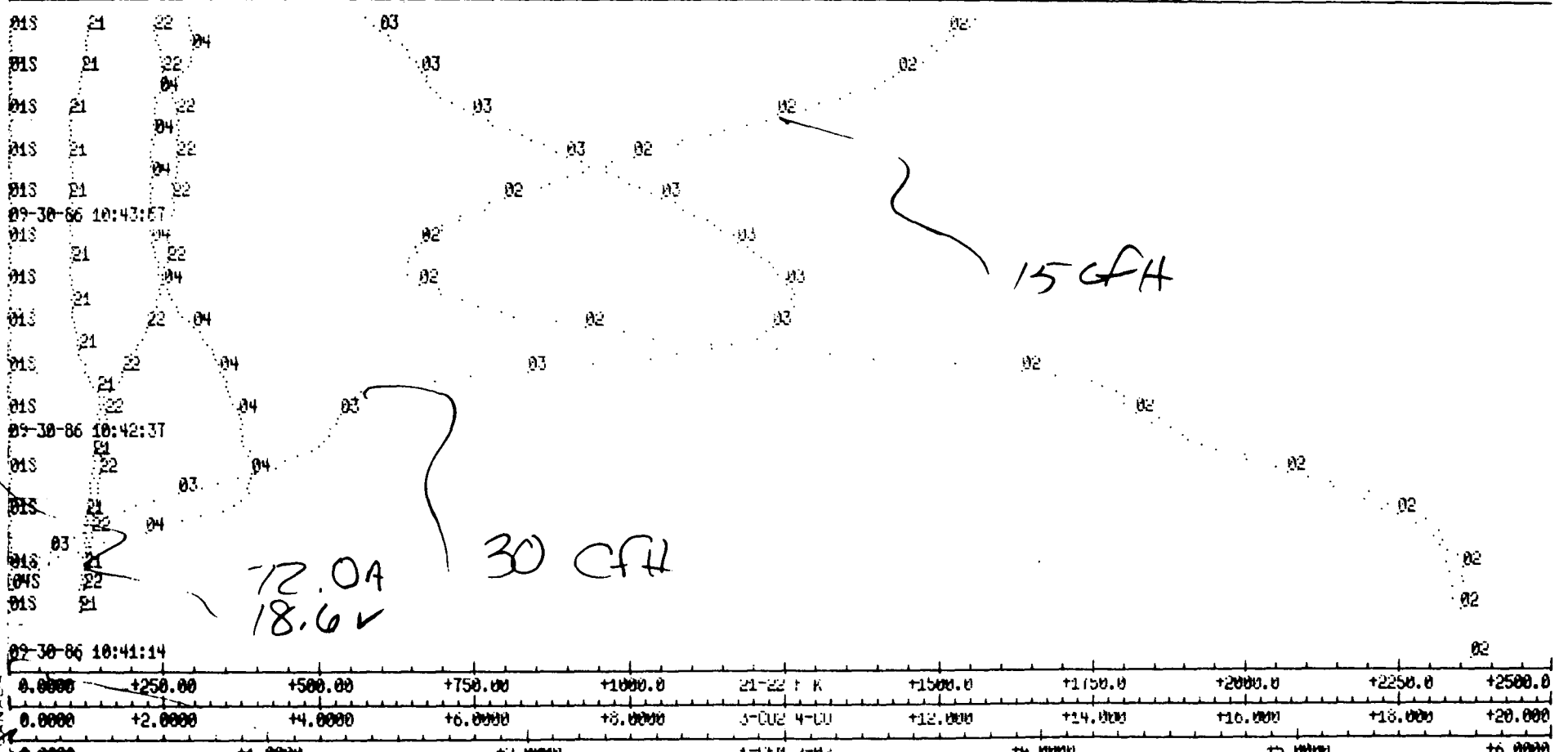
LOG REPORT 09-30-86 13:55:31 1 RSA DATA 12:52:21 SCAN INT=00:00:01 INITVAL=00:00:01

RECORDER 09-30-86 13:55:25 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01271	V	SCL-	02	+5.7167	V		03	+.01112	V		04	-.01053	V	SCL-
21	+197.51	F		22	+197.52	F									

LOG REPORT 09-30-86 13:55:04 1 RSA DATA 11:52:24 SCAN INT=00:00:01 INITVAL=00:00:01





15 cfh

30 cfh

-12.0A

18.6V

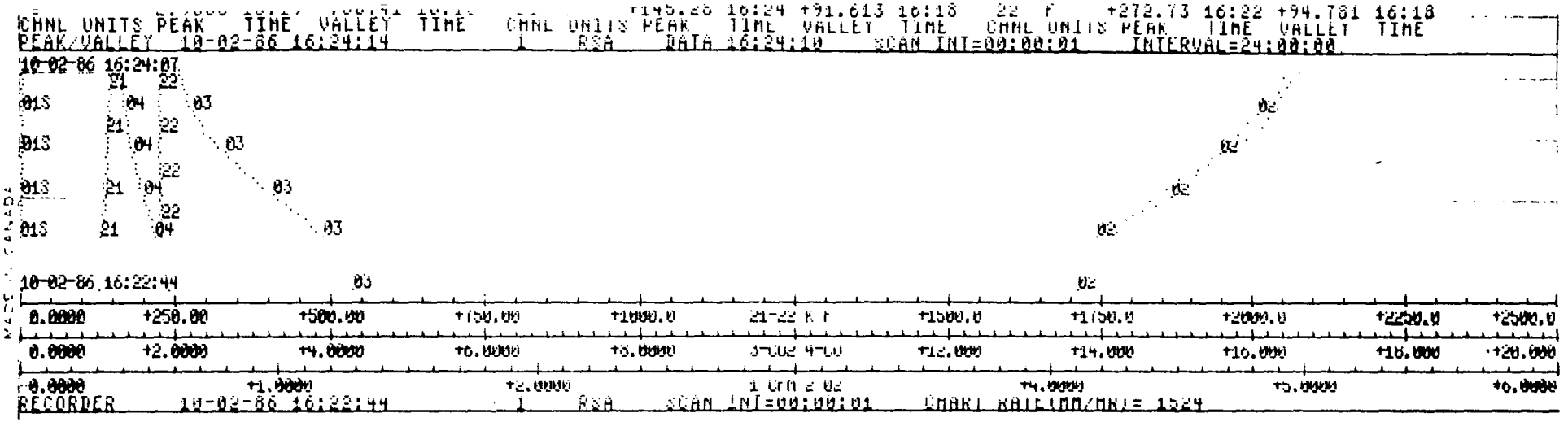
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01482	V	SCL-	02	+5.7019	V		03	+.00141	V		04	-.01653	V	SCL-
21	+145.14	F		22	+136.10	F									

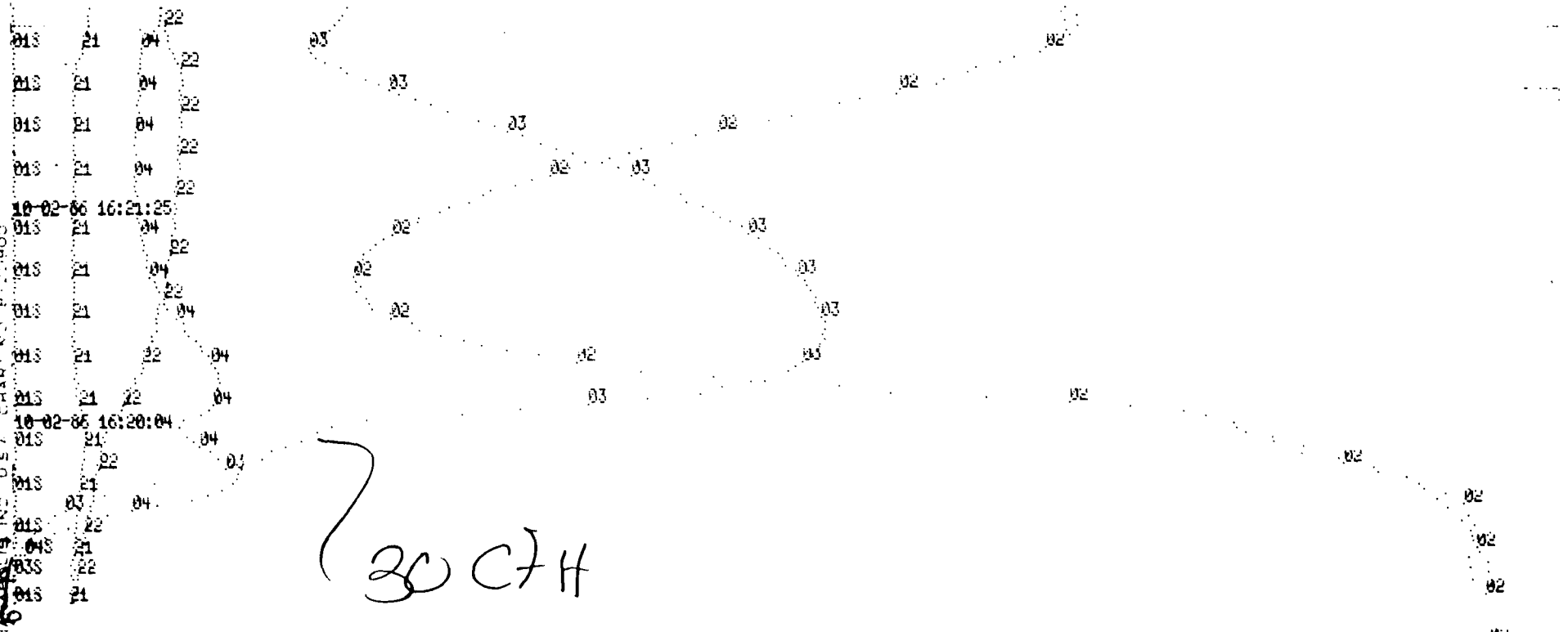
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM

LOG REPORT 09-30-86 10:10:08 1 RSA DATA 10:07:45 SCAN INT=00:00:01 INTERVAL=00:00:01

74.0V

73.4A

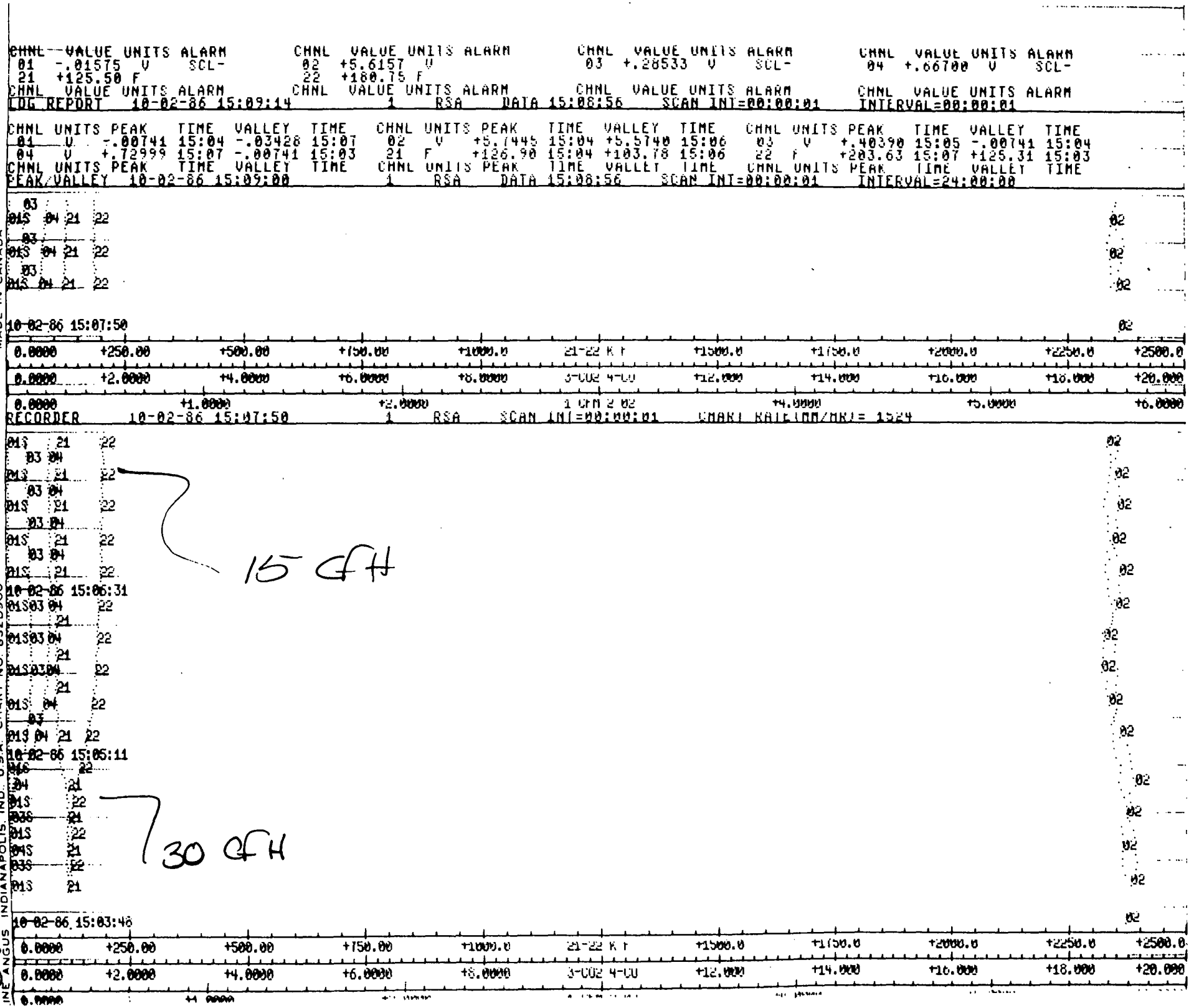


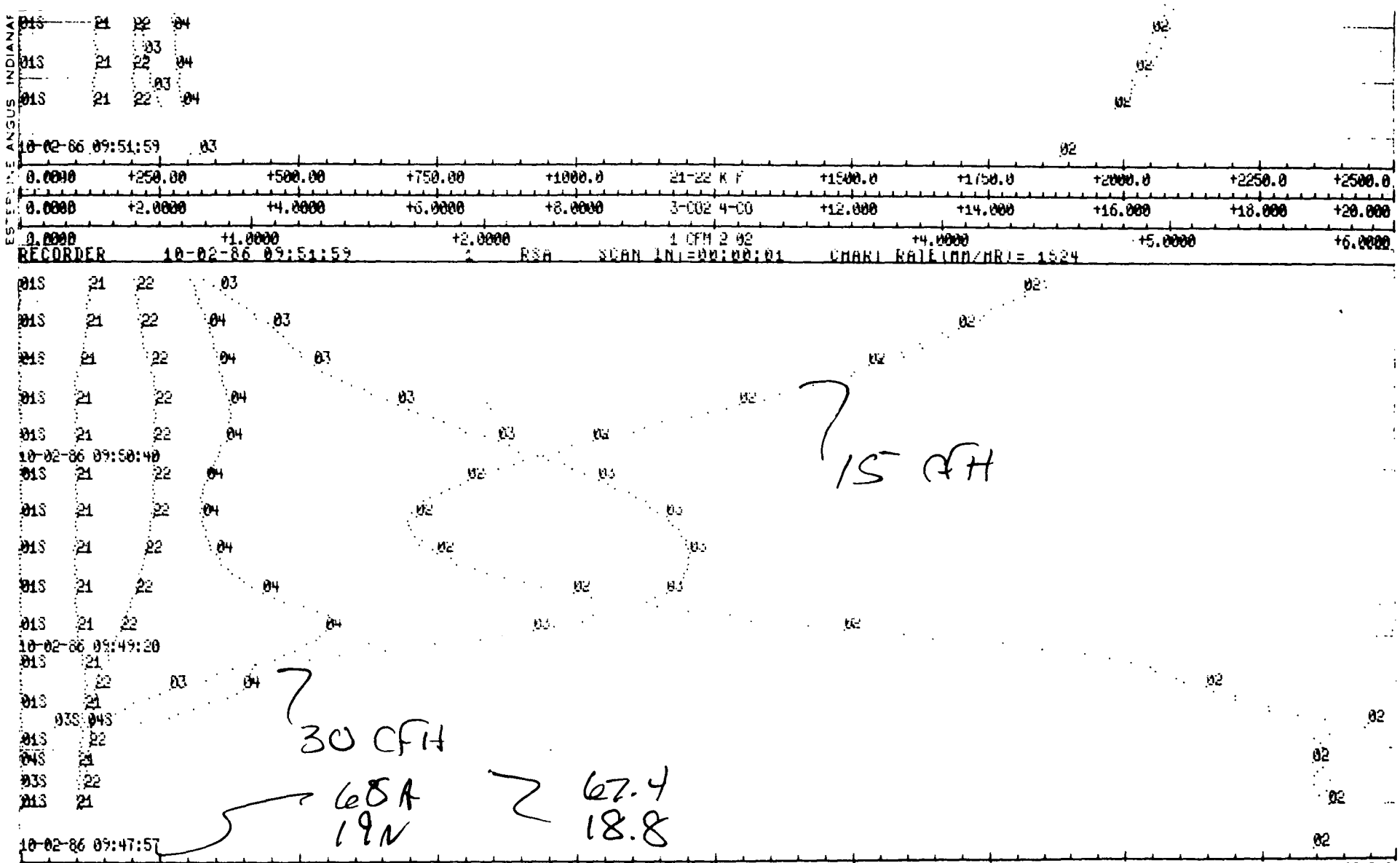


30 C7H

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	-.01112	16:15	-.01760	16:15	02	V	+5.7603	16:15	+5.6722	16:14	03	V	+10.227	16:15	-.01112	16:14
04	V	+10.231	16:15	-.01853	16:15	21	F	+94.405	16:15	+92.999	16:16	22	F	+96.555	16:15	+95.483	16:16

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-02-86 16:16:08 1 RSA DATA 16:16:05 SCAN INT=00:00:01 INTERVAL=24:00:00


CHNL VALUE UNITS ALARM
01 -.01575 V SCL-
21 +125.50 F
02 +5.6157 V
22 +180.75 F
03 +.28533 V SCL-
04 +.66700 V SCL-
LOG REPORT 10-02-86 15:09:14 1 RSA DATA 15:08:56 SCAN INT=00:00:01 INTERVAL=00:00:01
CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00741 15:04 -.03428 15:07
02 V +5.7445 15:04 +5.5740 15:06
03 V +.40390 15:05 -.00741 15:04
04 V +.72999 15:07 -.00741 15:03
21 F +126.90 15:04 +103.78 15:06
22 F +203.63 15:07 +125.31 15:03
PEAK/VALLEY 10-02-86 15:09:00 1 RSA DATA 15:08:56 SCAN INT=00:00:01 INTERVAL=24:00:00
10-02-86 15:07:50
21-22 K F
RECORDER 10-02-86 15:07:50 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
15 GPH
10-02-86 15:06:31
10-02-86 15:05:11
30 GPH
10-02-86 15:03:46
3-02 4-04
1 CPM 2 02
MADE IN CANADA
INDIANAPOLIS IND. U.S.A. CHART NO. 832D900
ANGUS



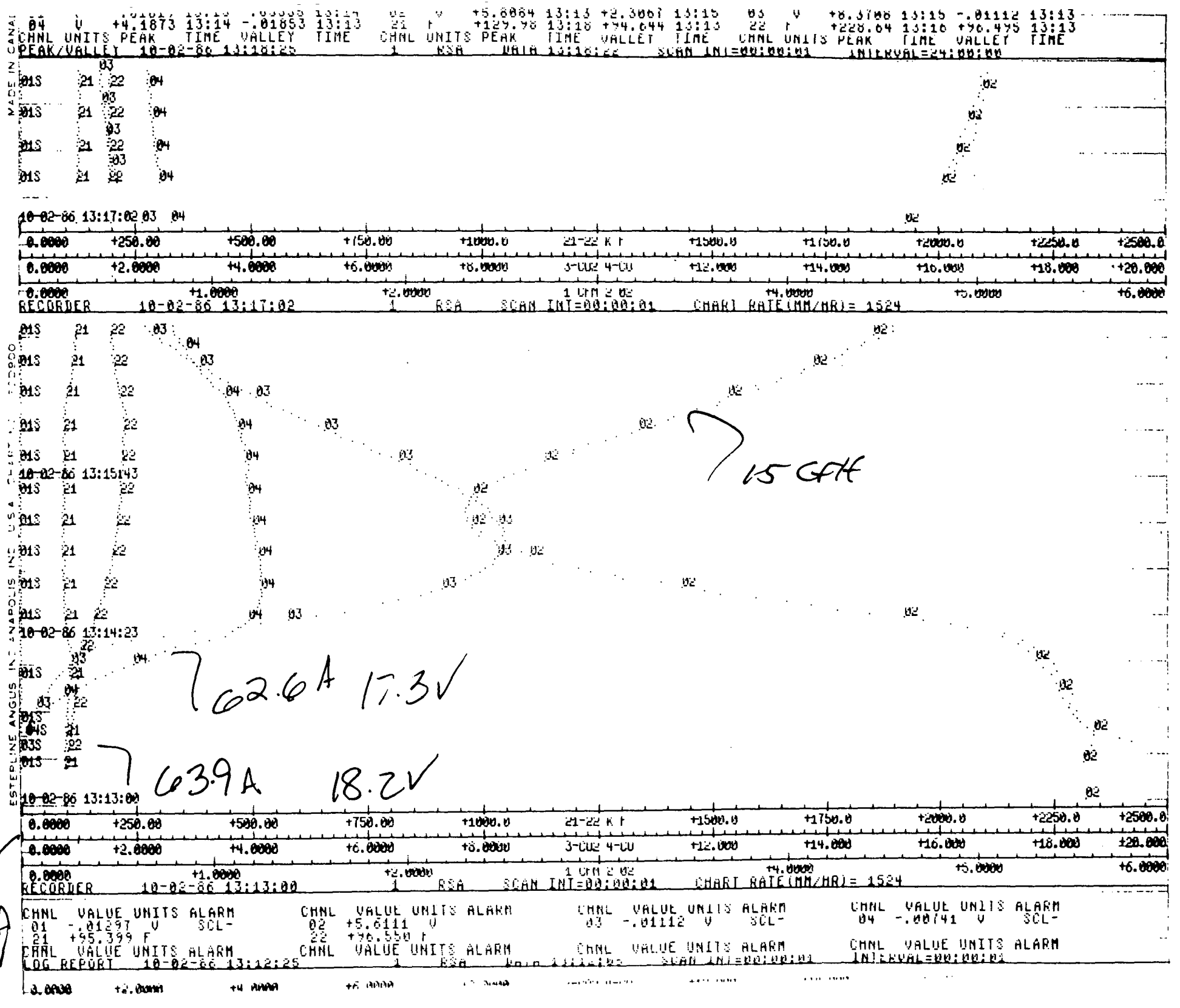
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01112	V	SCL-	02	+5.6652	V		03	0.0000	V	SCL-	04	-.00371	V	SCL-
21	+118.49	F		22	+118.91	F									

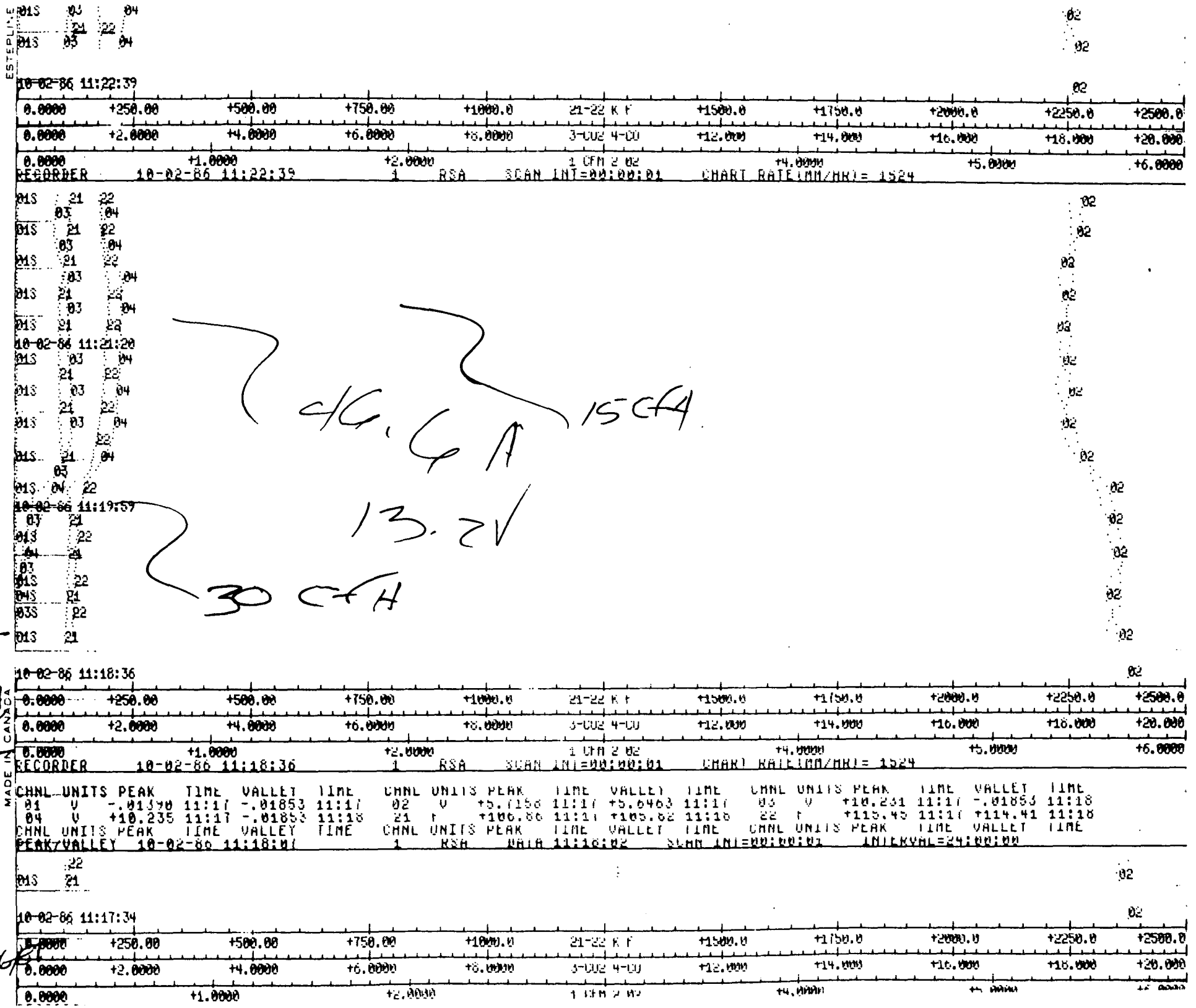
LOG REPORT 10-02-86 09:34:45 1 RSA Data 09:34:42 SCAN INT=00:00:01 INTERVAL=00:00:01

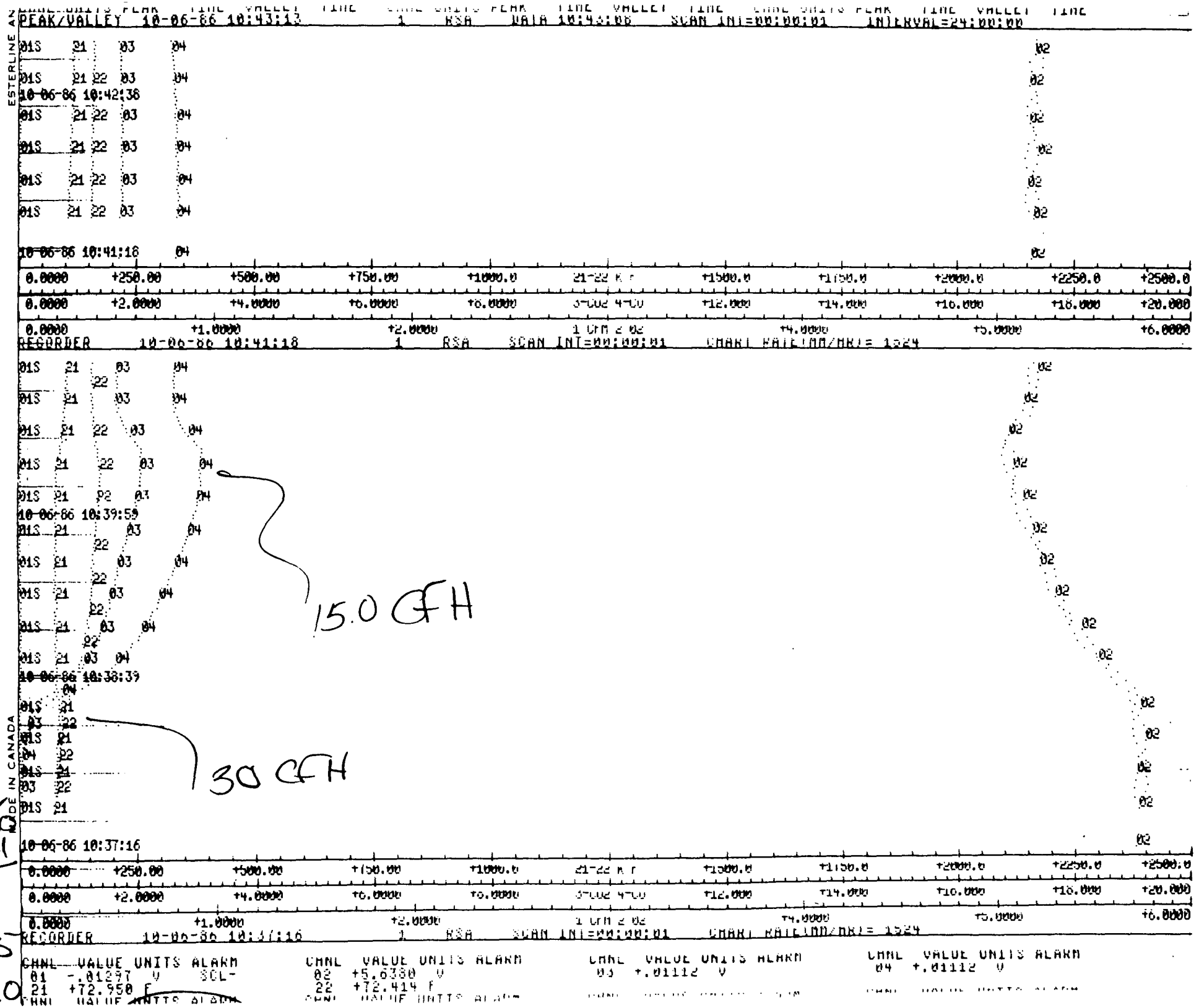
RECORDER 10-02-86 09:34:40 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

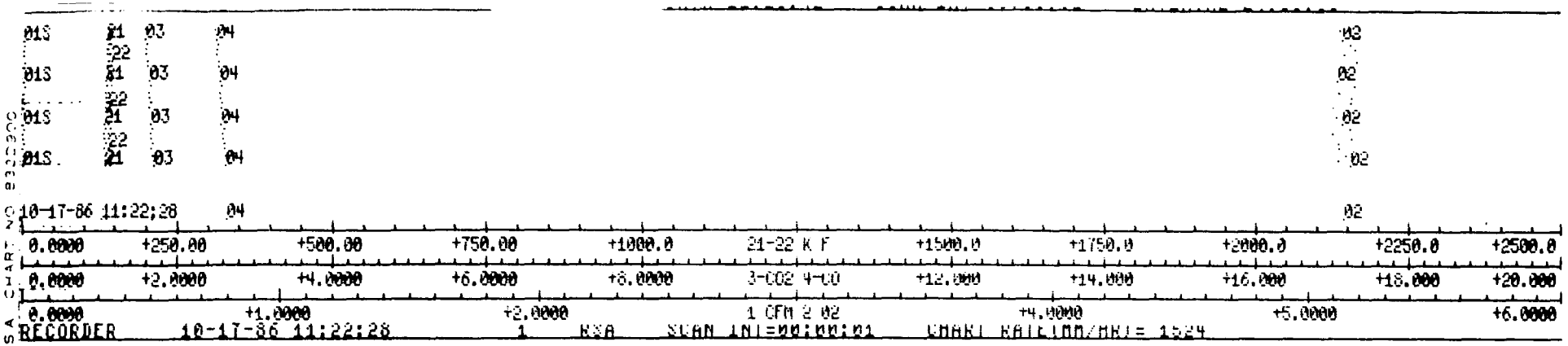
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01112	V	SCL-	02	+5.6615	V		03	0.0000	V	SCL-	04	0.0000	V	SCL-
21	+124.63	F		22	+123.34	F									

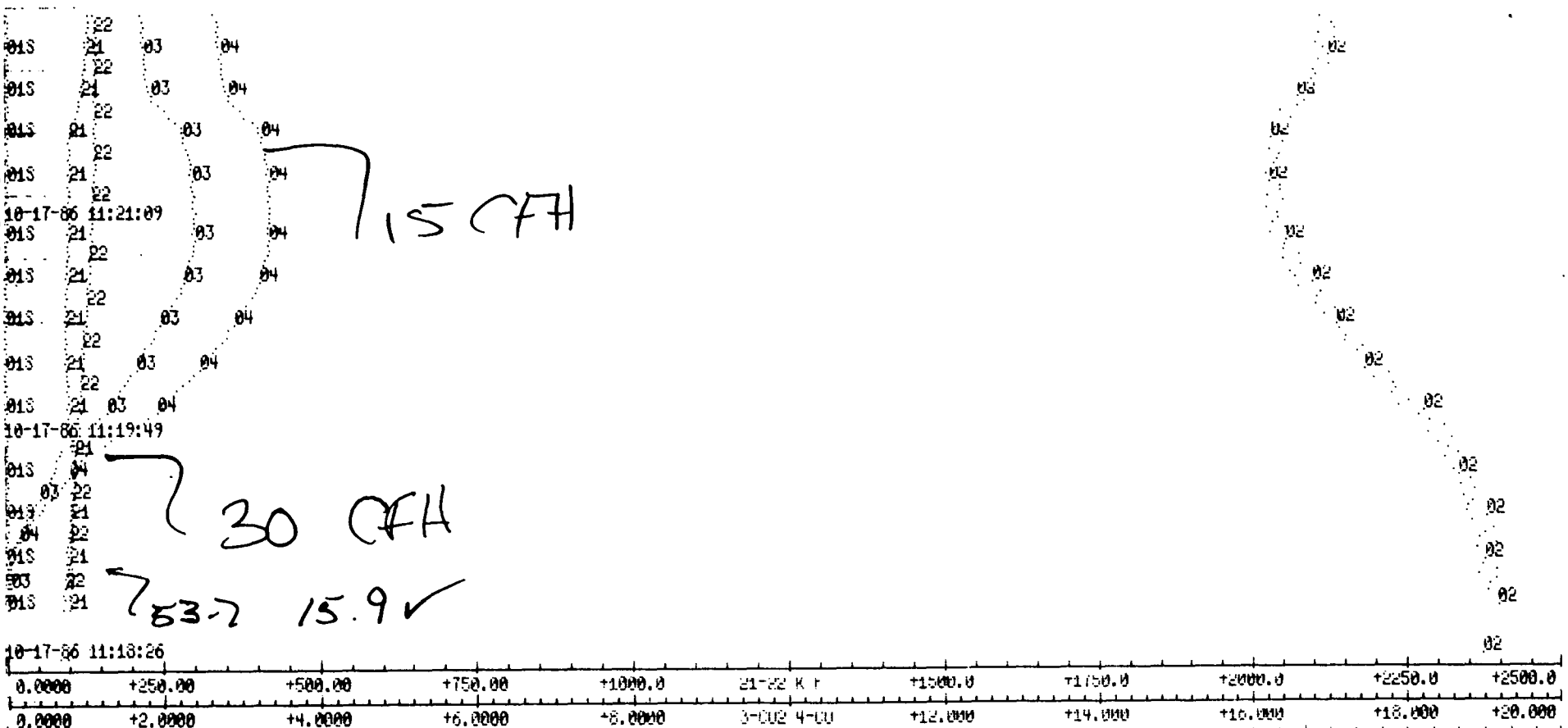
LOG REPORT 10-02-86 09:28:38 1 RSA Data 09:28:34 SCAN INT=00:00:01 INTERVAL=00:00:01


04 V +4.1873 13:14 -.01853 13:13 21 F +129.98 13:16 +94.644 13:13 22 F +228.64 13:16 +96.495 13:13
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-02-86 13:18:25 1 RSA SCAN INI=00:00:01 INTERVAL=24:00:00
10-02-86 13:17:02
RECORDER 10-02-86 13:17:02 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524
10-02-86 13:15:43
10-02-86 13:14:23
10-02-86 13:13:00
15 GPH
62.6A 17.3V
63.9A 18.2V
RECORDER 10-02-86 13:13:00 1 RSA SCAN INI=00:00:01 CHART RATE(MM/HR)= 1524
CHNL VALUE UNITS ALARM
01 -.01297 V SCL-
21 +95.399 F
02 +5.6111 V
22 +96.550 F
03 -.01112 V SCL-
04 -.00741 V SCL-
LOG REPORT 10-02-86 13:12:25 1 RSA SCAN INI=00:00:01 INTERVAL=00:00:01


10-02-86 11:22:39
10-02-86 11:21:20
10-02-86 11:19:59
10-02-86 11:18:36
10-02-86 11:17:34
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-02-86 11:22:39 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01390 11:17 -.01853 11:17 02 V +5.7156 11:17 +5.6463 11:17 03 V +10.231 11:17 -.01853 11:18
04 V +10.235 11:17 -.01853 11:18 21 F +100.86 11:17 +105.82 11:18 22 F +115.45 11:17 +114.41 11:18
PEAK/VALLEY 10-02-86 11:18:01 1 RSA DATA 11:16:02 SCAN INT=00:00:01 INTERVAL=24:00:00
15 CFM
46.6 A
13.2 V
30 CFH
ESTERLINE
MADE IN CANADA


PEAK/VALLEY 10-06-86 10:43:13 1 RSA SCAN INT=00:00:01 INTERVAL=24:00:00
10-06-86 10:42:38
10-06-86 10:41:16
RECORDER 10-06-86 10:41:18 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
10-06-86 10:39:59
10-06-86 10:38:39
10-06-86 10:37:16
RECORDER 10-06-86 10:37:16 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
15.0 GFH
30 GFH
CHNL VALUE UNITS ALARM
01 -.01297 V SCL-
21 +72.950 F
02 +5.6380 V
22 +72.414 F
03 +.01112 V
04 +.01112 V
ESTERLINE ANGLO
MADE IN CANADA





15 CFH

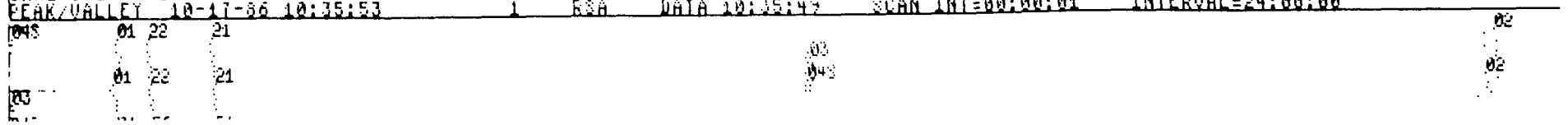
30 CFH

53.7 15.9 V

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	+.42521	10:34	+.39093	10:35	02	V	+5.1612	10:35	+5.0462	10:35	03	V	+10.264	10:35	+.01033	10:35
04	V	+10.201	10:35	-.01112	10:35	21	F	+334.99	10:34	+321.60	10:35	22	F	+232.65	10:34	+220.69	10:35

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

PEAK/VALLEY 10-17-86 10:35:53 1 RSA DATA 10:35:47 SCAN INT=00:00:01 INTERVAL=24:00:00



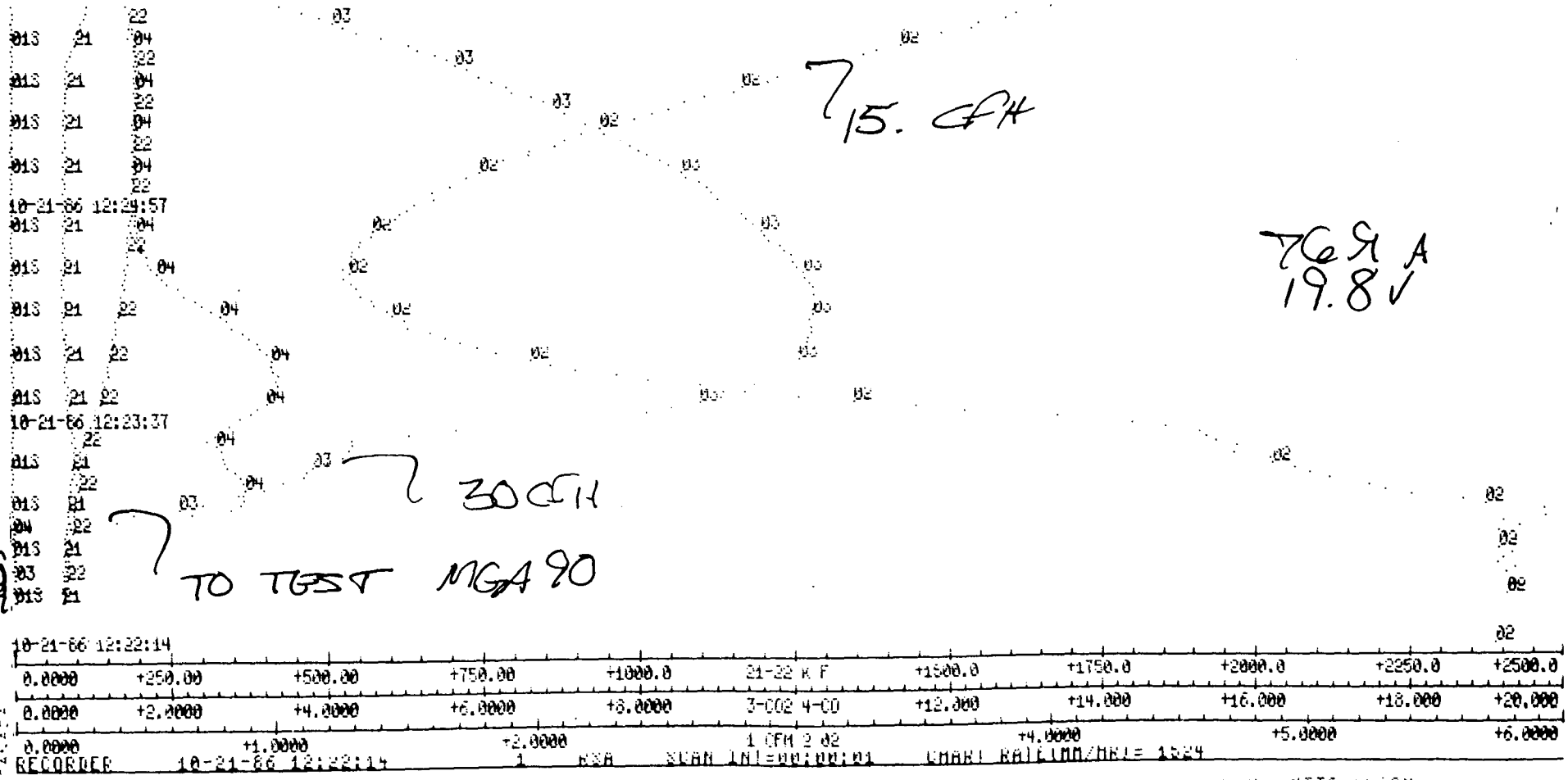
LOG REPORT 10-21-86 12:26:02 1 RSA DATA 12:21:34 SCAN INT=00:00:01 INTERVAL=00:00:01

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	-.00834	12:27	-.03335	12:24	02	V	+5.9570	12:23	+1.2176	12:24	03	V	+10.301	12:24	+.02229	12:22
04	V	+3.4054	12:23	+.01112	12:22	21	F	+155.15	12:27	+76.133	12:22	22	F	+205.30	12:25	+78.547	12:22

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

PEAK/VALLEY 10-21-86 12:27:38 1 RSA DATA 12:27:34 SCAN INT=00:00:01 INTERVAL=24:00:00

RECORDER 10-21-86 12:26:16 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524



RECORDER 10-21-86 12:22:14 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

CHNL	VALUE	UNITS	ALARM
01	-.01667	V	SCL-
21	+30.084	F	

CHNL	VALUE	UNITS	ALARM
02	+5.0621	V	
22	+87.054	F	

CHNL	VALUE	UNITS	ALARM
03	+.02704	V	

CHNL	VALUE	UNITS	ALARM
04	+.00741	V	

715. CFM

TGA A 19.8 V

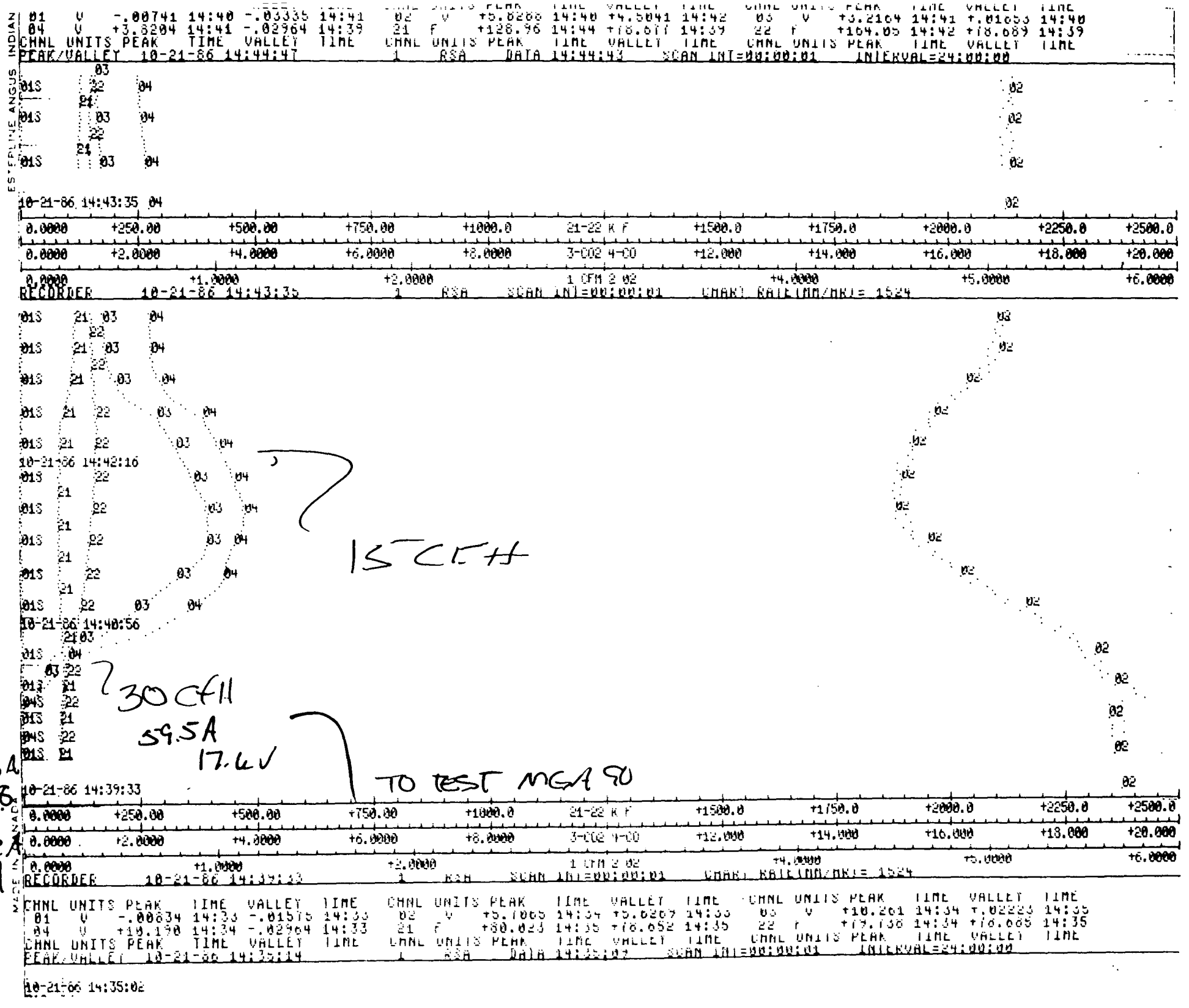
730 CFM

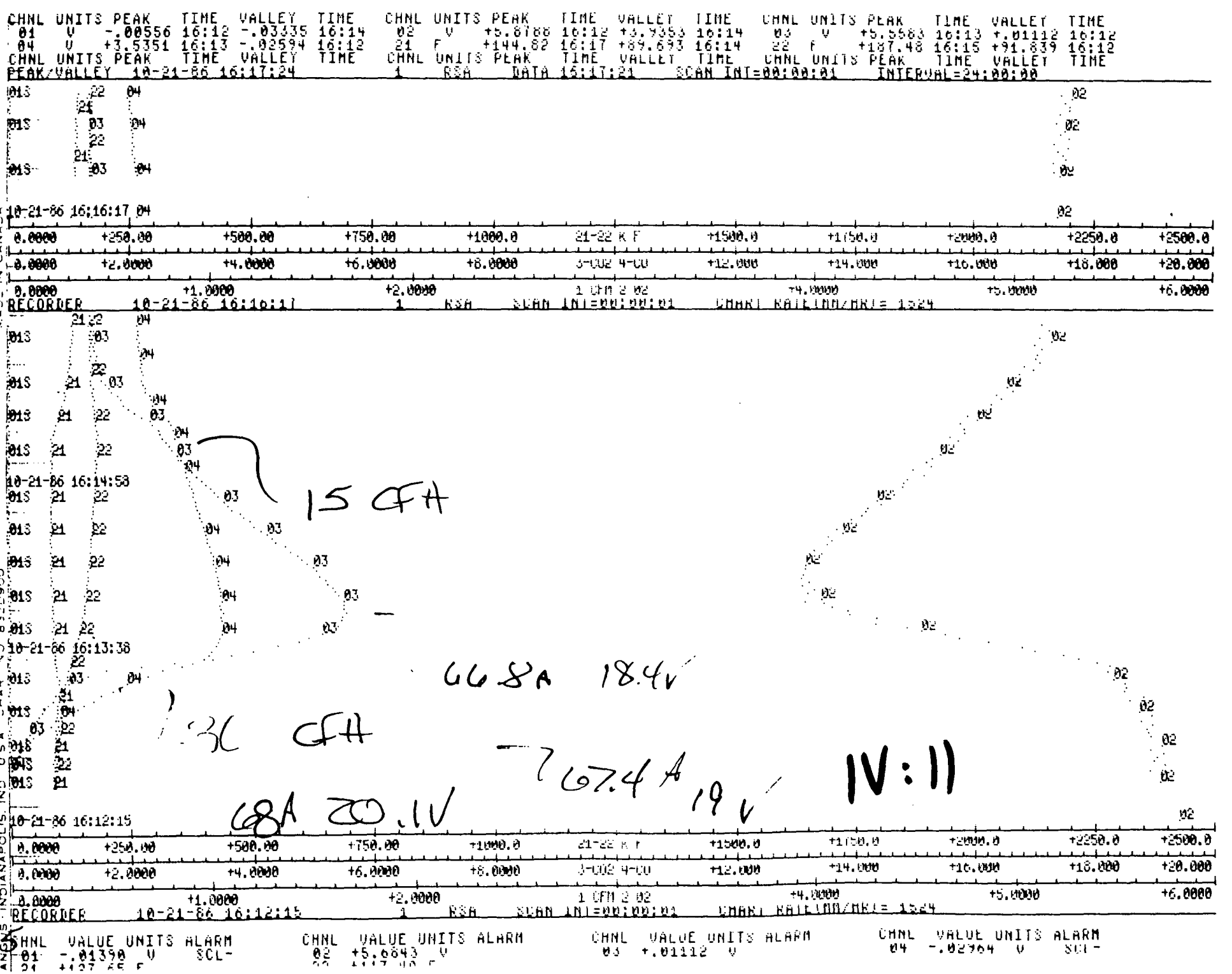
TO TEST MGA 90

A TGA 21.9 V

A 30 5.8 V

PHASE 4: BACKPRESSURE = 3.9 PSI, AIRFLOW = 0.5 CFM


ESTERLINE ANGUS INDIAN
01 V -.00741 14:40 -.03335 14:41 02 V +5.0266 14:40 +4.5041 14:42 03 V +3.2164 14:41 +.01653 14:40
04 V +3.8204 14:41 -.02964 14:39 21 F +128.96 14:44 +16.677 14:39 22 F +104.05 14:42 +18.689 14:39
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-21-86 14:44:47 1 RSA DATA 14:44:43 SCAN INT=00:00:01 INTERVAL=24:00:00
10-21-86 14:43:35
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-21-86 14:43:35 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
10-21-86 14:42:16
10-21-86 14:40:56
10-21-86 14:39:33
15 CFH
30 CFH
59.5A
17.6V
TO TEST MGA 90
60A
88
62A
21
0.0000 +250.00 +500.00 +750.00 +1000.0 21-22 K F +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 3-002 4-00 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 1 CFM 2 02 +4.0000 +5.0000 +6.0000
RECORDER 10-21-86 14:39:33 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00834 14:36 -.01575 14:36 02 V +5.1005 14:34 +5.0207 14:36 03 V +10.201 14:34 +.02223 14:35
04 V +10.190 14:34 -.02964 14:33 21 F +80.823 14:35 +16.052 14:35 22 F +17.136 14:34 +16.005 14:35
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-21-86 14:35:14 1 RSA DATA 14:35:12 SCAN INT=00:00:01 INTERVAL=24:00:00
10-21-86 14:35:02

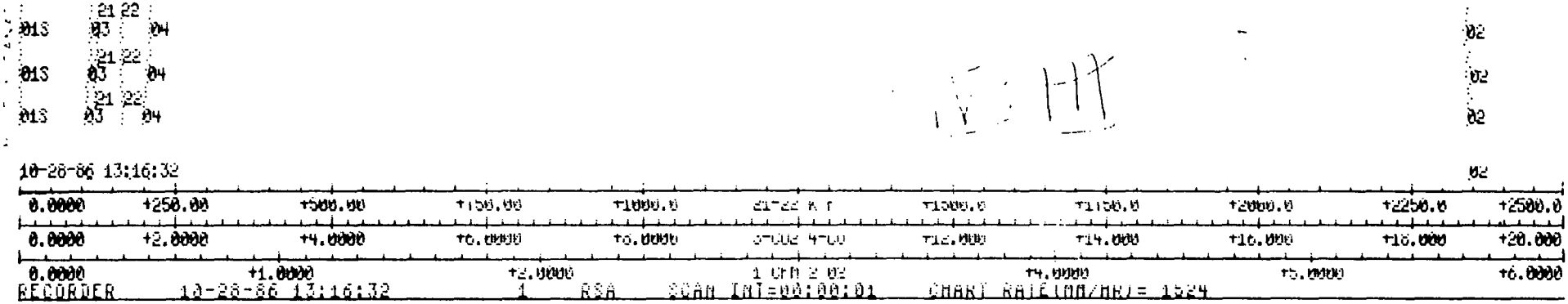

CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00556 16:12 -.03335 16:14 02 V +5.6788 16:12 +3.7353 16:14 03 V +5.5583 16:13 +.01112 16:12
04 V +3.5351 16:13 -.02594 16:12 21 F +144.82 16:17 +89.693 16:14 22 F +187.48 16:15 +91.839 16:12
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-21-86 16:17:24 1 RSA DATA 16:17:21 SCAN INT=00:00:01 INTERVAL=24:00:00
10-21-86 16:16:17
10-21-86 16:14:58
10-21-86 16:13:38
10-21-86 16:12:15
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 +5.0000 +6.0000
RECORDER 10-21-86 16:16:17 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
RECORDER 10-21-86 16:12:15 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
01 -.01390 V SCL- 02 +5.6843 V 03 +.01112 V 04 -.02764 V SCL-
21 +137.65 F
15 CFH
66A 18.4V
13C CFH
68A 20.1V
67.4A 19V
IV:11
MADE IN CANADA
ANSONIA INDIANAPOLIS IND USA CHART NO 832D900

LOG REPORT 10-28-86 13:17:57 1 RSA DATA 13:17:38 SCAN INT=00:00:01 INTERVAL=00:00:01

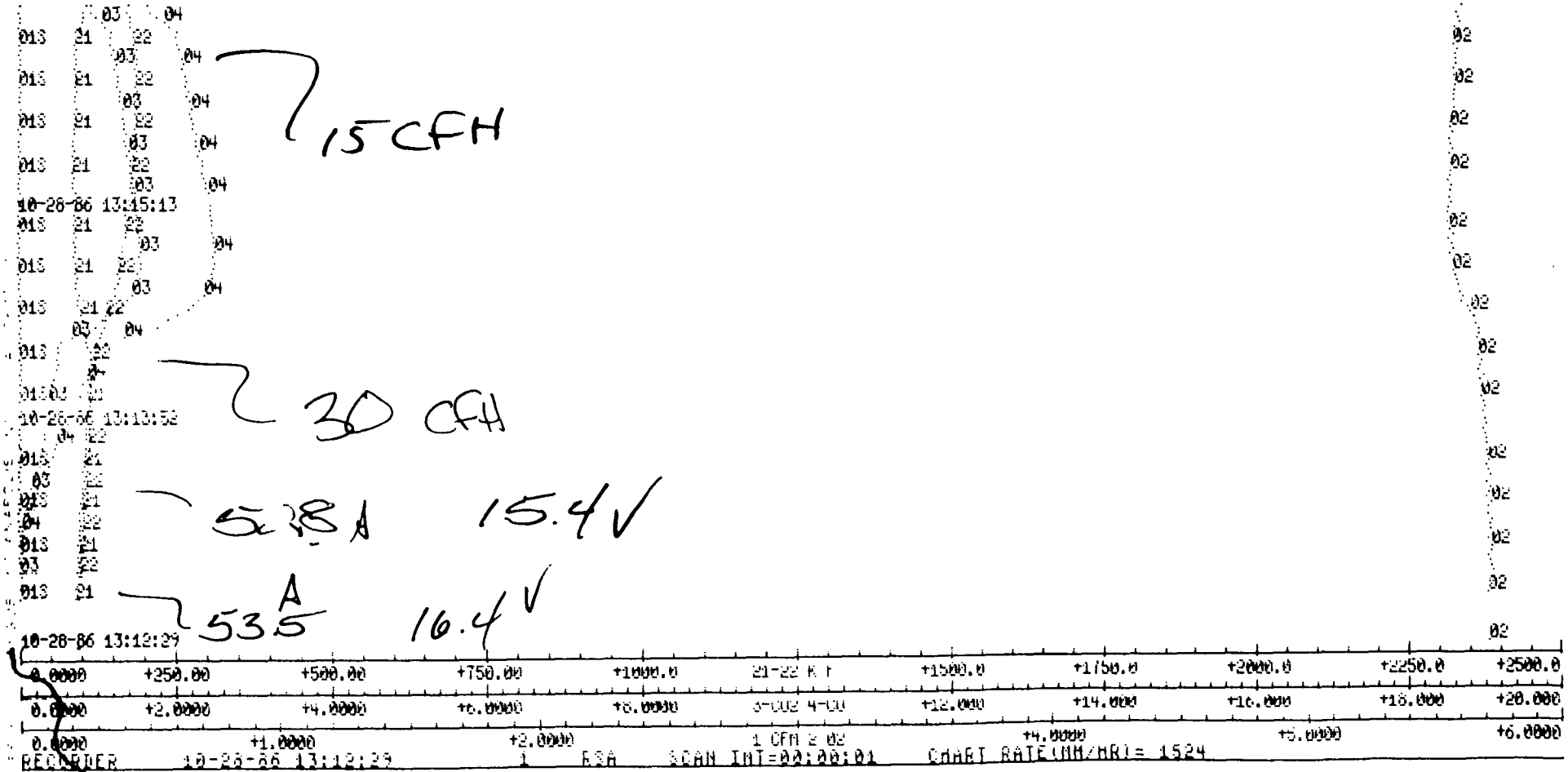
CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME
01	V	-.00185	13:12	-.03613	13:15	02	V	+5.1288	13:12	+5.5602	13:15	03	V	+1.5823	13:14	0.0000	13:12
04	V	+2.5198	13:14	0.0000	13:12	21	F	+127.57	13:17	+69.884	13:15	22	F	+190.00	13:16	+93.069	13:12

CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME	CHNL	UNITS	PEAK	TIME	VALLEY	TIME

PEAK/VALLEY 10-28-86 13:17:41 1 RSA DATA 13:17:38 SCAN INT=00:00:01 INTERVAL=24:00:00



RECORDER 10-28-86 13:16:32 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524



15 CFH

30 CFH

5.28 A 15.4 V

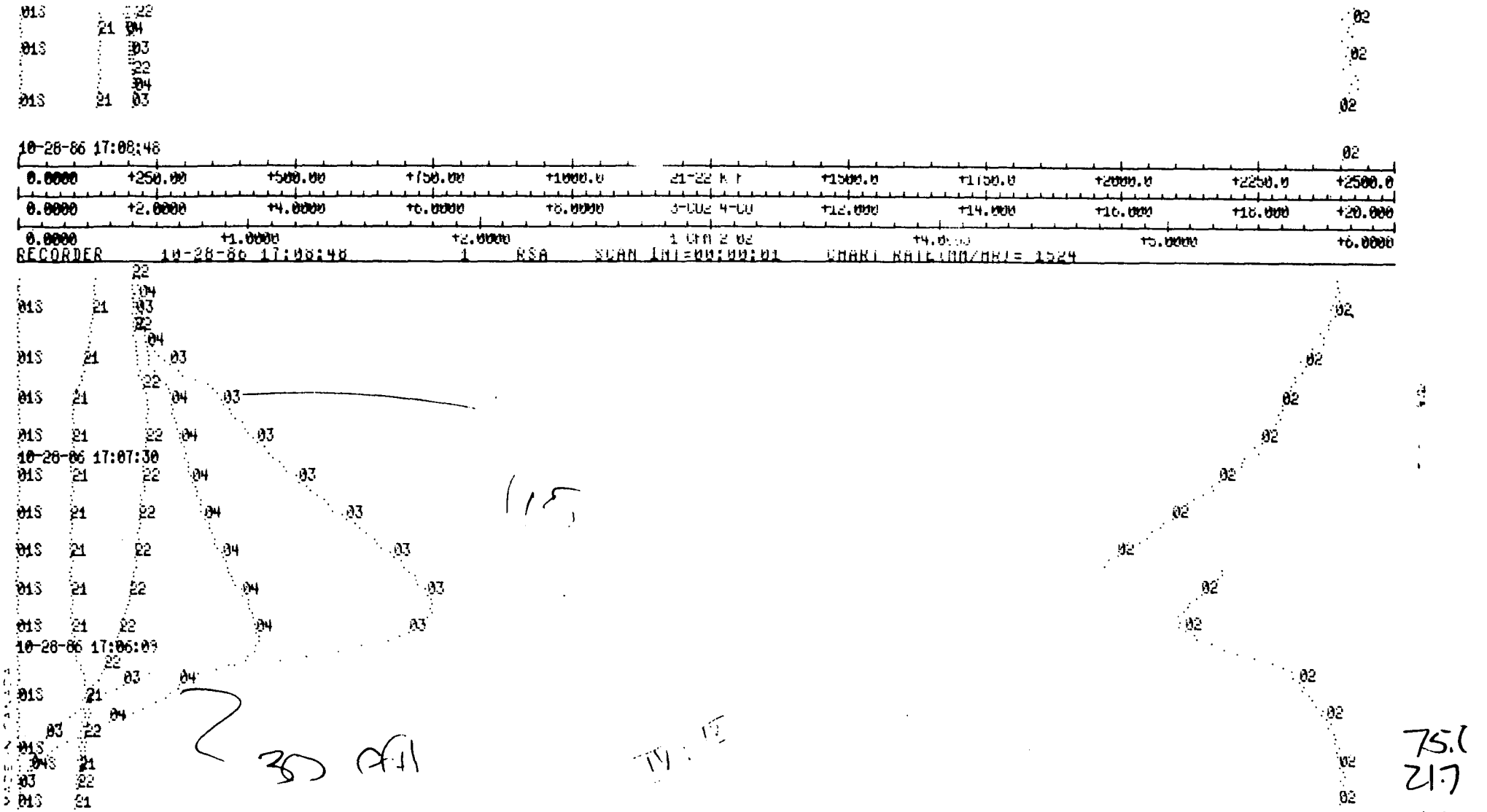
5.35 A 16.4 V

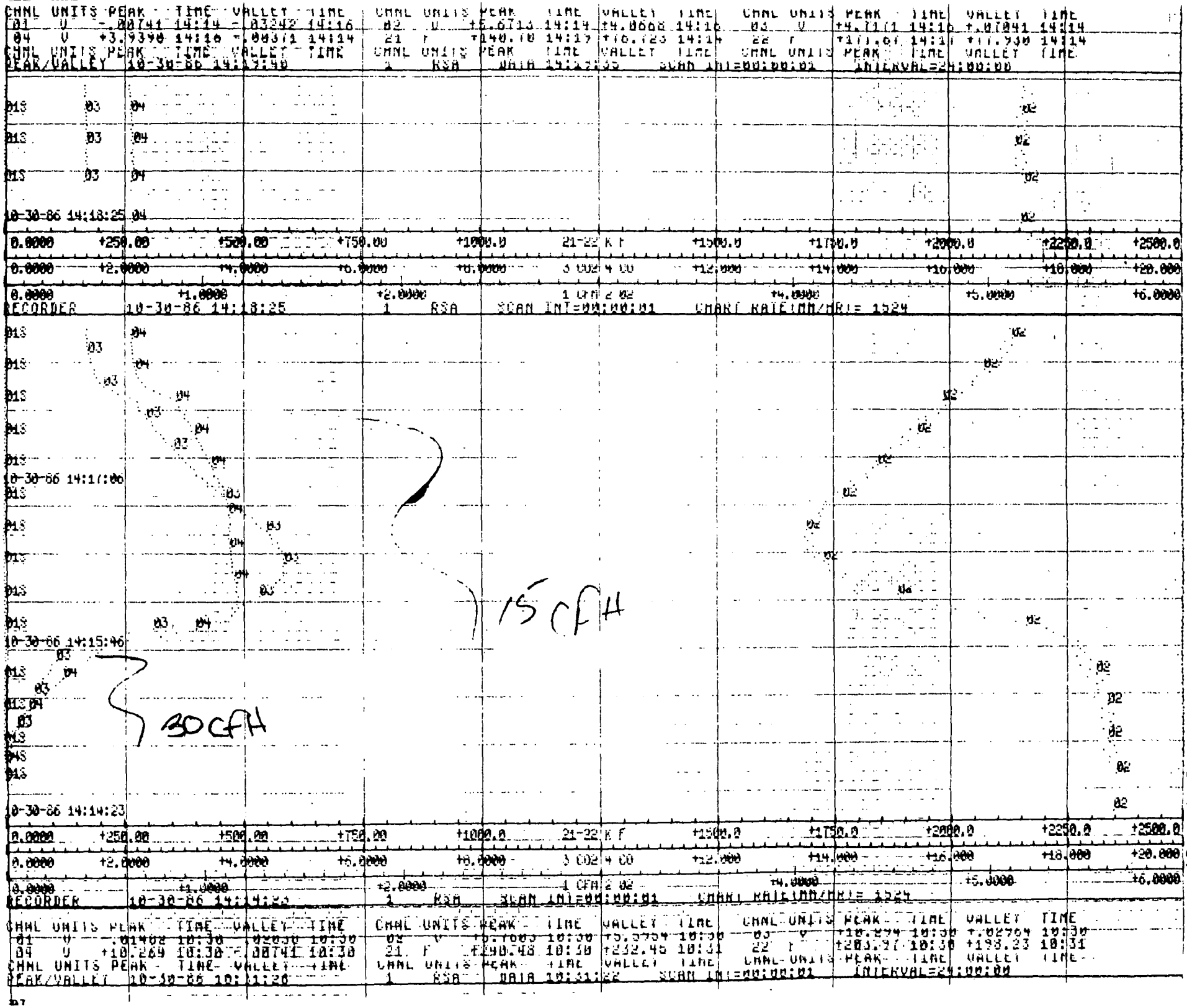
RECORDER 10-28-86 13:12:29 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524

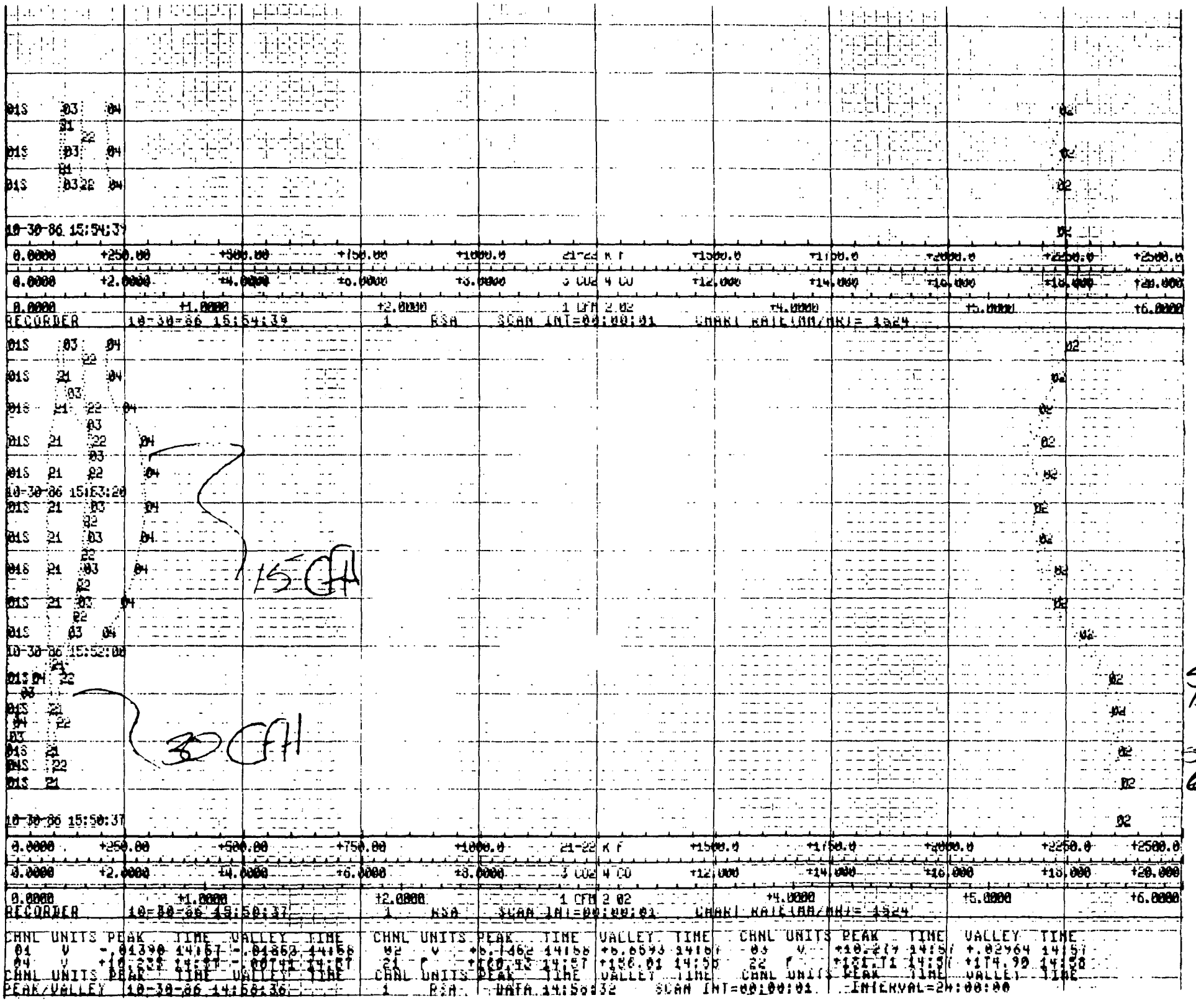
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM
01	-.01482	V	SCL-	02	+5.6991	V		03	+.01653	V		04	+.00371	V	SCL-
21	+192.84	F		22	+159.66	F									

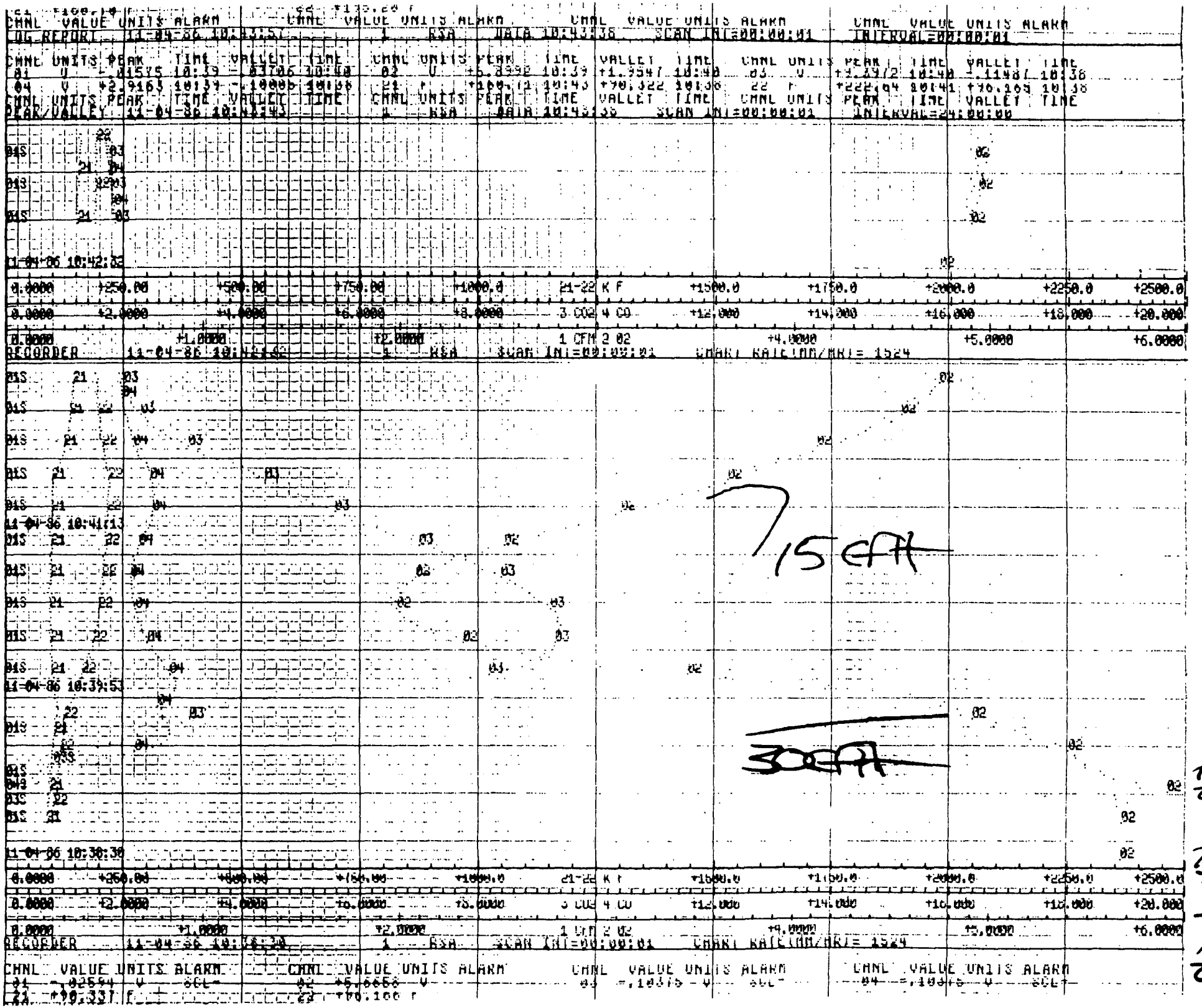
CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM	CHNL	VALUE	UNITS	ALARM

LOG REPORT 10-28-86 12:20:27 1 RSA DATA 12:19:40 SCAN INT=00:00:01 INTERVAL=00:00:01


10-28-86 17:08:46
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 17:08:46 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
10-28-86 17:07:30
10-28-86 17:06:09
10-28-86 17:04:46
0.0000 +250.00 +500.00 +750.00 +1000.0 +1250.0 +1500.0 +1750.0 +2000.0 +2250.0 +2500.0
0.0000 +2.0000 +4.0000 +6.0000 +8.0000 +10.000 +12.000 +14.000 +16.000 +18.000 +20.000
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 17:04:46 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
01 -.01575 V SCL- 02 +5.7593 V 03 +.00741 V 04 -.02223 V SCL-
21 +122.34 F 22 +113.94 F
CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM CHNL VALUE UNITS ALARM
LOG REPORT 10-28-86 16:52:40 1 RSA DATA 16:52:31 SCAN INT=00:00:01 INTERVAL=00:00:01
0.0000 +1.0000 +2.0000 +3.0000 +4.0000 +5.0000 +6.0000
RECORDER 10-28-86 16:52:33 1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00926 16:27 -.01760 16:27 02 V +5.8643 16:26 +5.6621 16:27 03 V +10.220 16:27 -.00741 16:26
04 V +10.242 16:27 -.02964 16:28 21 F +245.96 16:27 +232.63 16:26 22 F +134.63 16:27 +103.58 16:28
CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME CHNL UNITS PEAK TIME VALLEY TIME


CHNL UNITS PEAK TIME VALLEY TIME
01 V -.00741 14:14 -.03242 14:16
04 V +3.9390 14:16 -.00371 14:14
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-30-86 14:13:40
CHNL UNITS PEAK TIME VALLEY TIME
02 V +5.6714 14:14 +4.0008 14:16
21 F +140.10 14:17 +16.123 14:14
CHNL UNITS PEAK TIME VALLEY TIME
1 RSA MAIN 14:17:25
CHNL UNITS PEAK TIME VALLEY TIME
03 V +4.7111 14:16 +.00741 14:14
22 F +111.01 14:16 +11.930 14:14
CHNL UNITS PEAK TIME VALLEY TIME
SCAN INT=00:00:01 INTERVAL=24:00:00
10-30-86 14:13:25
10-30-86 14:17:06
10-30-86 14:15:46
10-30-86 14:14:23
RECORDER 10-30-86 14:13:25
1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
15 cfh
30 cfh
RECORDER 10-30-86 14:14:23
1 RSA SCAN INT=00:00:01 CHART RATE(MM/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01402 10:30 -.02030 10:30
04 V +10.269 10:30 -.00741 10:30
CHNL UNITS PEAK TIME VALLEY TIME
PEAK/VALLEY 10-30-86 10:11:20
CHNL UNITS PEAK TIME VALLEY TIME
02 V +5.7083 10:30 +5.3754 10:30
21 F +290.48 10:30 +232.45 10:31
CHNL UNITS PEAK TIME VALLEY TIME
1 RSA MAIN 10:31:25
CHNL UNITS PEAK TIME VALLEY TIME
03 V +10.274 10:30 +.02704 10:30
22 F +283.27 10:30 +193.23 10:31
CHNL UNITS PEAK TIME VALLEY TIME
SCAN INT=00:00:01 INTERVAL=24:00:00
MADE IN CANADA
T NO. 832D900


10-30-86 15:54:37
10-30-86 15:53:20
10-30-86 15:52:08
10-30-86 15:50:37
RECORDER 10-30-86 15:54:37 1 RSA SCAN INT=00:00:01 CHANL RATE(MB/HR)= 1524
RECORDER 10-30-86 15:50:37 1 RSA SCAN INT=00:00:01 CHANL RATE(MB/HR)= 1524
CHNL UNITS PEAK TIME VALLEY TIME
01 V -.01390 14:57 -.01853 14:56
04 V +10.238 14:57 -.00741 14:57
02 V +6.1462 14:56 +6.0593 14:57
21 F +60.93 14:57 +56.01 14:56
03 V +10.217 14:57 +.02764 14:57
22 F +151.71 14:57 +114.99 14:56
PEAK/VALLEY 10-30-86 14:56:36 1 RSA DATA 14:56:32 SCAN INT=00:00:01 INTERVAL=24:00:00
MADE IN CANADA
ANGUS INDIANAPOLIS, IND., U.S.A. CHART NO. 832D900



MADE IN CANADA

CHART NO. 832D900

APPENDIX F: EXHAUST EMISSIONS DATA

DYNO SITE:0208 TEST # 86-0930 1975 LIGHT DUTY VEHICLE ANALYSIS PROCESSED: 14:41:31 JAN 21, 1986

MFR. CODE	VEHICLE I.D.	VER-SION	EVAP	MFR. REP. INIT.	RUN. CHG.	RETEST CODE	ACTP	ALT. M.P. METH	EQUIVALENT TEST WEIGHT	ACTUAL DYNO H.P.	TRANS. CONFG.	OVER-DRIVE CODE	TEST TYPE: EXPERIMENTAL (ECTD)
200	1151141201986B5	0	N										TEST PROCEDURE: 2 BAG LA-4

PREP DATE	CURB WEIGHT	DRIVE AXLE WEIGHT	GAUGE	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO LEFT	% CO RIGHT	% CO COMB	IDLE RPM	GEAR	SOAK PERIOD	MEASURED COASTDOWN TIME
														0	

AMBIENT TEST CONDITIONS

BARO "HG	WET BULB TEMP	AMB TEMP	UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALTERNATES	EVS MDE
29.30	66.1	75.8	F	60.1	82.06	1.0343		MDE

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL I/A SET	DYNO TEMP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
01-10-86	10	0208	4000	10.9	45.00	53782.0	3/5

BAG 1 3.568 MILES 5.741 KM 8318. ROLL REVS. SECS. VMIX= 6008.0 CU.FT. DILUTION FACTOR = 27.710
SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	10.8	8.05	14	8.3	4.69	3.33 PPM	0.35	0.097	0.060			
NOX-CHEM	15	39.4	19.67	15	8.8	0.41	19.45 PPM	5.58	1.836	1.142	MPG	KPL	L/100KM
CO2	23	22.8	0.451	23	2.2	0.044	0.438 %	1364.28	382.415	237.622	26.5	11.27	8.9
CO	17	8.8	10.45	17	8.7	1.69	14.82 PPM	2.94	0.823	0.511			
HC-MFID	16	4.1	12.22	16	1.0	2.98	9.35 PPM	0.92	0.257	0.160			

BAG 2 3.831 MILES 6.166 KM 8933. ROLL REVS. SECS. VMIX=10252.0 CU.FT. DILUTION FACTOR = 39.587
SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	10.8	8.05	14	8.3	4.69	3.43 PPM	0.58	0.152	0.094			
NOX-CHEM	15	25.2	12.73	15	8.4	0.20	12.54 PPM	7.20	1.879	1.168	MPG	KPL	L/100KM
CO2	23	16.2	0.336	23	2.3	0.048	0.291 %	1546.05	403.529	250.741	25.1	10.67	9.4
CO	17	5.9	14.27	17	8.7	1.69	12.62 PPM	4.27	1.114	0.692			
HC-MFID	16	3.8	11.33	16	1.3	4.47	8.77 PPM	1.17	0.304	0.189			

WEIGHTED VALUES	HC-MFID	CO	CO2	NOX
GRAMS/MILE	0.282	0.973	393.	1.05
BEFORE ROUNDING	.2816	.9734	393.3	1.049
GRAMS/KM	0.175	0.605	244.	1.18
BEFORE ROUNDING	.1750	.6048	244.4	1.155

	MPG	KPL	L/100KM
WEIGHTED VALUES	25.7	11.0	9.1
	25.7445	10.9540	9.1290
72-74 FTP	25.8	10.9	9.1
	25.7541	10.9492	9.1330
UNWEIGHTED FTP	25.8	10.9	9.1
	25.7541	10.9492	9.1330

PARTICULATES GMS./MI. BAG-1 0.445. BAG-2 0.476. BAG-3 . WEIGHTED 0.461

COMMENTS: M/B W/O DEVICE WOT @ 195 SECONDS TOTAL HC LINE HAS COLD SPOT
P195 /5R14 TIRES

VALIDATED
E&D O/C

DYNO SITE: D20A TEST # 86- 936 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 14:39:23 JAN 21, 1986

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	2 BAG LA-4

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
420	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	ECTD BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	TX0A20	47MM	14976	98.08

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1 BAG2	GAS METER PRESS. (" H20) BAG1 BAG2
1-16-86	29.30	2 BAG LA-4, 2 FILTER	2	YES	NO	0%	110	76.0 76.0	3.3 2.2

>>>>> BAG NO. 1 MILES= 3.506 TOTAL VMIX= 6013.8 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/CVSVOL)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
477.928	483.790	5.862	5.805	1035.94	22	0.007014	0.008546	0.001532	1.587	97.56	0.445	0.276	26.4

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED	SECONDARY				W/SEC
0.690	0.750	23	0.007709	0.007749	0.000040	1.629

>>>>> BAG NO. 2 MILES= 3.831 TOTAL VMIX= 10261.6 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/CVSVOL)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
824.249	834.574	10.325	9.830	1065.59	24	0.006129	0.007839	0.001710	1.822	98.08	0.476	0.296	25.0

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED	SECONDARY				W/SEC
0.666	0.750	25	0.006742	0.006777	0.000035	1.659

PARTICULATE WEIGHTED GRAMS/MILE= 0.461 WEIGHTED GRAMS/KM= 0.286 WEIGHTED FUEL ECONOMY= 25.7 MPG

COMMENTS: 1-16-86 M/B W0/TRAP-HC LINE COLD SPOTS-D20B

DYNO SITE:D208 TEST # 872231 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 15:10:38 MAR 9, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE BAG BY BAG
200	11511412019885	0	N								

PREP	DATE	CURB WEIGHT	DRV AXLE WEIGHT	GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
														0		0.0

COMMENTS: M/B 3-5-87 FOGERTY OVAL TRAP HOT START LA-4 PARTICULATES ONLY 1375 SEC
EMMISSION DATA FICTICIOUS

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2231 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 14:49:28 MAR 9, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
3- 5-87	29.44	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	106	78.0	3.0

>>>>> BAG NO. 1 MILES= 7.380 TOTAL VMIX= 16777.9 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
286.442	304.661	18.219	16.920	991.62	143	0.067038	0.067823	0.000785	0.778	92.1%	0.114	0.071	94.7
			== FLOWRATES,CF/MIN ==										
			ACTUAL	TEST/REQUESTED		SECONDARY			W/SEC				
			0.738	0.750	144	0.067747	0.067814	0.000067	0.845				

COMMENTS: 3-5-87 M/B FOGERTY TRAP H/S LA-4

DYNO SITE:D208 TEST # 872349 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 15:01:34 MAR 13, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE --------- EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
03-11-87													0		0.0

/------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.41	45.8	73.8	D	36.8	46.45	0.8817		420

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
03-12-87	12	D208	4000	10.9	45.00	57832.0	N/A

BAG 1 7.432 MILES 11.961 KM 17329. ROLL REVS. SECS. VMIX=16610.0 CU.FT. DILUTION FACTOR = 27.042

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC FID	14	10.1	7.47	14	5.0	3.69	3.91 PPM	1.06	0.143	0.089			
NOX CHEM	15	40.3	20.18	15	0.6	0.30	19.89 PPM	15.78	2.123	1.319	MPG	KPL	L/100KM
CO2	23	23.3	0.493	23	2.4	0.048	0.446 %	3837.34	516.305	320.817	19.6	8.34	12.0
CO	17	6.4	15.94	17	0.0	0.0	15.94 PPM	8.73	1.175	0.730			
HC-HFID	4	18.5	13.90	14	6.4	4.84	9.24 PPM	2.51	0.337	0.209			

COMMENTS: COLD 1 BAG LA4 FOGARTY TRAP MERCEDES WOT AT 190 SEC CHANGE IN PARTIC.SYS
LEGEND SEE INFO. PACKET

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2349 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 16:22:29 MAR 12, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	1	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTER	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
3-12-87	29.41	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	106	82.5	2.7

***** BAG NO. 1 MILES= 7.432 TOTAL VMIX= 16626.7 CU.FT.

====== DRY GAS METER CU.FT. ====== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
344.608	362.265	17.657	16.710	995.04	149	0.067362	0.068356	0.000994	0.989	94.0%	0.142	0.088	19.6

== FLOWRATES,CF/MIN ==

TEST/REQUESTED		SECONDARY			W/SEC
0.750	150	0.068070	0.068133	0.000063	1.052

COMMENTS: 3-12-87 FOGERTY TRAP COLD START 1 BAG LA-4

DYNO SITE:D209 TEST # 872350 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 10:21:53 MAR 24, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE
200	11511412019885	0	N								CVS 75-LATER

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
03-18-87													23		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.15	43.6	75.5 D	32.0	43.06	0.8695		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
03-19-87	14	D209	4000	10.9	45.00	57911.3	N/A

BAG 1 3.568 MILES 5.743 KM 8320. ROLL REVS. SECS. VMIX= 6072.0 CU.FT. DILUTION FACTOR = 22.097

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	12.0	8.87	14	4.8	3.55	5.49 PPM	0.54	0.153	0.095			
NOX-CHEM	15	48.5	24.46	15	1.0	0.51	23.98 PPM	6.86	1.921	1.194	MPG	KPL	L/100KM
CO2	23	28.2	0.603	23	2.2	0.044	0.560 %	1762.87	494.021	306.970	20.5	8.72	11.5
CO	17	7.8	19.41	17	0.0	0.0	19.41 PPM	3.89	1.089	0.677			
HC-HFID	14	23.2	17.39	14	4.6	3.48	14.07 PPM	1.40	0.391	0.243			

BAG 2 3.848 MILES 6.192 KM 8971. ROLL REVS. SECS. VMIX=10427.0 CU.FT. DILUTION FACTOR = 37.553

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.8	6.50	14	4.0	2.95	3.63 PPM	0.62	0.161	0.100			
NOX-CHEM	15	29.5	14.92	15	0.1	0.05	14.87 PPM	7.30	1.898	1.179	MPG	KPL	L/100KM
CO2	23	17.0	0.354	23	2.3	0.046	0.309 %	1670.22	434.093	269.733	23.3	9.91	10.1
CO	17	5.2	12.96	17	0.0	0.0	12.96 PPM	4.46	1.158	0.720			
HC-HFID	14	15.8	11.88	14	4.8	3.63	8.35 PPM	1.42	0.369	0.230			

BAG 3 3.586 MILES 5.771 KM 8361. ROLL REVS. SECS. VMIX= 6099.0 CU.FT. DILUTION FACTOR = 25.666

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.1	6.73	14	4.0	2.95	3.89 PPM	0.39	0.108	0.067			
NOX-CHEM	15	45.0	22.71	15	0.1	0.05	22.66 PPM	6.51	1.815	1.128	MPG	KPL	L/100KM
CO2	23	24.5	0.519	23	2.3	0.046	0.475 %	1500.06	418.312	259.927	24.2	10.30	9.7
CO	17	6.2	15.45	17	0.0	0.0	15.45 PPM	3.11	0.866	0.538			
HC-HFID	14	16.3	12.26	14	5.0	3.78	8.62 PPM	0.86	0.239	0.149			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX
GRAMS/MILE	0.338	1.06	442.	1.88
BEFORE ROUNDING	.3381	1.064	442.1	1.880
GRAMS/KM	0.210	0.661	275.	1.17
BEFORE ROUNDING	.2101	.6609	274.7	1.168

	MPG	KPL	L/100KM
FUEL ECONOMY	22.9	9.7	10.3
	22.8804	9.7149	10.2934

PARTICULATE GMS./MI. BAG-1 0.406, BAG-2 0.468, BAG-3 0.583, WEIGHTED 0.487

COMMENTS: MERCEDES DIESEL COLD START DUMMY TRAP WOT 190 SEC BG 1 WOT 190 SEC BG3

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D209 TEST # 87-2350 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 15:31:06 MAR 23, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	CVS 75-LATER

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1 BAG2 BAG3	GAS METER PRESS. (" H2O) BAG1 BAG2 BAG3
3-19-87	29.15	3 BAG FTP, 3 FILTER	3	YES	NO	0%	111	83.0 85.0 84.0	2.8 2.2 2.8

***** BAG NO. 1 MILES= 3.568 TOTAL VMIX= 6078.0 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
366.800	373.186	6.386	5.986	1015.33	151	0.065052	0.066480	0.001428	1.450	97.3%	0.406	0.252	20.5

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.711	0.750	152	0.067776	0.067815	0.000039	1.489

***** BAG NO. 2 MILES= 3.848 TOTAL VMIX= 10437.1 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
258.696	269.158	10.462	10.094	1033.98	153	0.065808	0.067550	0.001742	1.801	97.9%	0.468	0.291	23.3

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.699	0.750	154	0.067881	0.067918	0.000037	1.839

***** BAG NO. 3 MILES= 3.586 TOTAL VMIX= 6103.1 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
375.186	379.556	4.370	4.089	1492.64	155	0.067368	0.068768	0.001400	2.090	96.5%	0.583	0.362	24.2

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.486	0.750	156	0.068943	0.068994	0.000051	2.166

PARTICULATE WEIGHTED GRAMS/MILE= 0.487 WEIGHTED GRAMS/KM= 0.303 WEIGHTED FUEL ECONOMY= 22.9 MPG

COMMENTS: 3-19-87 M/B DUMMY TRAP

DYNO SITE:D209 TEST # 872468 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 10:21:38 MAR 24, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE
200	11511412019885	0	N								CVS 75-LATER

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	GAUGE	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
03-19-87			EMPTY										18		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	WET BULB TEMP	AMB TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.20	58.8	74.8 F	37.5	49.34	0.8924		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
03-20-87	09	D209	4000	10.9	45.00	57921.7	N/A

BAG 1 3.584 MILES 5.768 KM 8357. ROLL REVS. SECS. VMIX= 6060.0 CU.FT. DILUTION FACTOR = 20.993

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	11.6	8.58	14	4.3	3.18	5.55 PPM	0.55	0.153	0.095			
NOX-CHEM	15	51.5	25.97	15	0.8	0.41	25.58 PPM	7.49	2.090	1.299	MPG	KPL	L/100KM
CO2	23	29.6	0.635	23	2.2	0.044	0.592 %	1859.94	518.917	322.440	19.5	8.30	12.0
CO	17	7.8	19.41	17	0.0	0.0	19.41 PPM	3.88	1.082	0.672			
HC-HFID	14	22.6	16.95	14	4.8	3.63	13.49 PPM	1.34	0.372	0.231			

BAG 2 3.889 MILES 6.259 KM 9068. ROLL REVS. SECS. VMIX=10399.0 CU.FT. DILUTION FACTOR = 34.420

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.8	6.50	14	4.3	3.18	3.42 PPM	0.58	0.149	0.093			
NOX-CHEM	15	33.2	16.78	15	0.5	0.25	16.54 PPM	8.31	2.137	1.328	MPG	KPL	L/100KM
CO2	23	18.5	0.387	23	2.3	0.046	0.342 %	1841.76	473.557	294.254	21.4	9.09	11.0
CO	17	5.2	12.96	17	0.0	0.0	12.96 PPM	4.44	1.143	0.710			
HC-HFID	14	14.8	11.14	14	4.7	3.56	7.68 PPM	1.31	0.335	0.208			

BAG 3 3.620 MILES 5.826 KM 8440. ROLL REVS. SECS. VMIX= 6081.0 CU.FT. DILUTION FACTOR = 21.754

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.8	6.50	14	4.4	3.25	3.40 PPM	0.34	0.093	0.058			
NOX-CHEM	15	53.1	26.77	15	0.5	0.25	26.52 PPM	7.80	2.154	1.338	MPG	KPL	L/100KM
CO2	22	63.5	0.613	22	5.0	0.046	0.570 %	1795.11	495.904	308.140	20.5	8.69	11.5
CO	17	6.4	15.94	17	0.0	0.0	15.94 PPM	3.20	0.883	0.549			
HC-HFID	14	14.2	10.69	14	5.0	3.78	7.08 PPM	0.70	0.194	0.121			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX
GRAMS/MILE	0.304	1.06	489.	2.13
BEFORE ROUNDING	.3043	1.059	489.0	2.132
GRAMS/KM	0.189	0.658	304.	1.32
BEFORE ROUNDING	.1891	.6579	303.9	1.325

	MPG	KPL	L/100KM
FUEL ECONOMY	20.7	8.8	11.4
	20.6981	8.7953	11.3695

PARTICULATE GMS./MI. BAG-1 0.139, BAG-2 0.010, BAG-3 0.168, WEIGHTED 0.080

COMMENTS: MERCEDES DIESEL COLD FTP FOGARTY TRAP WOT 190 SEC BAG 1&3

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D209 TEST # 87-2468 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 15:12:44 MAR 23, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	CVS 75-LATER

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	BAG2	BAG3	GAS METER PRESS. (" H2O) BAG1	BAG2	BAG3
3-20-87	29.20	3 BAG FTP, 3 FILTER	3	YES	NO	0%	113	80.0	83.0	83.0	2.8	2.2	2.8

***** BAG NO. 1 MILES= 3.584 TOTAL VMIX= 6066.3 CU.FT.

DRY GAS METER CU.FT. | PARTICULATE WEIGHT, GRAMS

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
379.577	386.258	6.681	6.308	961.61	157	0.067204	0.067673	0.000469	0.451	90.7%	0.139	0.086	19.5

== FLOWRATES, CF/MIN == ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.750	0.750	158	0.065363	0.065411	0.000048	0.497

***** BAG NO. 2 MILES= 3.889 TOTAL VMIX= 10506.8 CU.FT.

DRY GAS METER CU.FT. | PARTICULATE WEIGHT, GRAMS

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
269.188	380.303	******	******	97.48	159	0.065571	0.065920	0.000349	0.034	88.4%	0.010	0.006	21.1

== FLOWRATES, CF/MIN == ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
7.459	0.750	160	0.065463	0.065509	0.000046	0.039

***** BAG NO. 3 MILES= 3.620 TOTAL VMIX= 6087.3 CU.FT.

DRY GAS METER CU.FT. | PARTICULATE WEIGHT, GRAMS

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
386.258	392.936	6.678	6.271	970.76	161	0.065639	0.066201	0.000562	0.546	89.5%	0.168	0.105	20.4

== FLOWRATES, CF/MIN -- ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.745	0.750	162	0.066382	0.066448	0.000066	0.610

PARTICULATE WEIGHTED GRAMS/MILE= 0.080 WEIGHTED GRAMS/KM= 0.050 WEIGHTED FUEL ECONOMY= 20.6 MPG

COMMENTS: 3-20-87 M/B FOGERTY FTP

DYNO SITE:D208 TEST # 872731 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 13:56:10 APR 13, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE EXPE
200	11511412019885	0	N								2 BAG LA-4

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO IDLE	% CO HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
													0.		0.0

AMBIENT TEST CONDITIONS

BARO "HG	WET BULB TEMP	AMB TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.01	58.2	75.5 F	34.0	46.06	0.8803		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
04-09-87	10	D208	4000	10.9	45.00	58158.0	N/A

BAG 1 3.540 MILES 5.697 KM 8254. ROLL REVS. SECS. VMIX= 6073.0 CU.FT. DILUTION FACTOR = 25.029

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	MASS EMISSIONS GMS/MI	MASS EMISSIONS GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.5	7.02	14	4.4	3.25	3.90 PPM	0.39	0.109	0.068			
NOX-CHEM	15	46.7	23.56	15	2.2	1.12	22.49 PPM	6.51	1.839	1.143	MPG	KPL	L/100KM
CO2	23	25.1	0.533	23	2.1	0.042	0.492 %	1548.33	437.370	271.769	23.2	9.85	10.1
CO	17	6.0	14.95	17	0.0	0.0	14.95 PPM	2.99	0.846	0.525			
HC-HFID	14	15.0	11.28	14	4.7	3.56	7.87 PPM	0.78	0.220	0.137			

BAG 2 3.812 MILES 6.134 KM 8887. ROLL REVS. SECS. VMIX=10395.0 CU.FT. DILUTION FACTOR = 36.045

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	MASS EMISSIONS GMS/MI	MASS EMISSIONS GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.4	6.21	14	4.1	3.03	3.26 PPM	0.55	0.145	0.090			
NOX-CHEM	15	31.3	15.83	15	1.0	0.51	15.33 PPM	7.60	1.994	1.239	MPG	KPL	L/100KM
CO2	23	17.7	0.370	23	2.1	0.042	0.328 %	1768.29	463.925	288.269	21.8	9.28	10.8
CO	17	5.0	12.47	17	0.0	0.0	12.47 PPM	4.27	1.121	0.697			
HC-HFID	14	13.3	10.01	14	4.6	3.48	6.63 PPM	1.13	0.295	0.183			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX		MPG	KPL	L/100KM
GRAMS/MILE	0.259	0.988	451.	1.92	FUEL ECONOMY	22.4	9.6	10.5
BEFORE ROUNDING	.2593	.9883	451.1	1.919		22.4446	9.5502	10.4709
GRAMS/KM	0.161	0.614	280.	1.19				
BEFORE ROUNDING	.1611	.6141	280.3	1.193				

COMMENTS: TRAP FOGARTY UNIT BAG#2 ROLL COUNTS LOW SEE TRACE ALONG ZERO LINE

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2731 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 16:22:28 APR 10, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	2 BAG LA-4

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER TEMP. (F) BAG2	GAS METER PRESS. (" H20) BAG1	GAS METER PRESS. (" H20) BAG2
4- 9-87	29.01	2 BAG LA-4, 2 FILTER	2	YES	NO	0%	104	83.0	86.0	3.0	2.2

>>>>> BAG NO. 1 MILES= 3.540 TOTAL VMIX= 6079.4 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
580.261	587.118	6.857	6.400	949.87	163	0.065089	0.065378	0.000289	0.275	91.8%	0.085	0.053	23.1

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY			W/SEC
0.760	0.750	164	0.067484	0.067510	0.000026	0.299

>>>>> BAG NO. 2 MILES= 3.812 TOTAL VMIX= 10405.9 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
697.788	709.159	11.371	10.899	954.79	165	0.067247	0.067524	0.000277	0.265	90.5%	0.077	0.048	21.8

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY			W/SEC
0.754	0.750	166	0.065439	0.065468	0.000029	0.292

PARTICULATE WEIGHTED GRAMS/MILE= 0.080 WEIGHTED GRAMS/KM= 0.050 WEIGHTED FUEL ECONOMY= 22.4 MPG

COMMENTS: 4-9-87 FOGERTY. HOT LA-4

DYNO SITE:D208 TEST # 872732 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 14:17:32 APR 9, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE
200	11511412019885	0	N								2 BAG LA-4

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
													0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	WET BULB	AMB TEMP	UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.01	57.5	75.0	F	33.0	43.88	0.8724		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
04-09-87	10	D208	4000	10.9	45.00	58166.0	N/A

BAG 1 3.543 MILES 5.702 KM 8261. ROLL REVS. SECS. VMIX= 6073.0 CU.FT. DILUTION FACTOR = 23.364

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.0	5.91	14	4.0	2.95	3.08 PPM	0.31	0.086	0.054			
NOX-CHEM	15	49.2	24.82	15	0.8	0.41	24.43 PPM	7.01	1.978	1.229	MPG	KPL	L/100KM
CO2	23	26.8	0.571	23	2.2	0.044	0.529 %	1662.99	469.361	291.647	21.6	9.19	10.9
CO	17	6.1	15.20	17	0.0	0.0	15.20 PPM	3.04	0.859	0.534			
HC-HFID	14	13.3	10.01	14	4.2	3.18	6.97 PPM	0.69	0.195	0.121			

BAG 2 3.821 MILES 6.150 KM 8910. ROLL REVS. SECS. VMIX=10379.0 CU.FT. DILUTION FACTOR = 31.272

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	7.9	5.84	14	4.0	2.95	2.98 PPM	0.50	0.132	0.082			
NOX-CHEM	15	36.0	18.19	15	0.5	0.25	17.95 PPM	8.80	2.303	1.431	MPG	KPL	L/100KM
CO2	23	20.3	0.426	23	2.2	0.044	0.383 %	2061.14	539.361	335.143	18.8	7.99	12.5
CO	17	5.3	13.21	17	0.0	0.0	13.21 PPM	4.52	1.183	0.735			
HC-HFID	14	12.2	9.19	14	4.3	3.25	6.04 PPM	1.02	0.268	0.166			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX		MPG	KPL	L/100KM
GRAMS/MILE	0.233	1.03	506.	2.15	FUEL ECONOMY	20.0	8.5	11.7
BEFORE ROUNDING	.2329	1.027	505.7	2.147		20.0170	8.5213	11.7352
GRAMS/KM	0.145	0.638	314.	1.33				
BEFORE ROUNDING	.1447	.6382	314.2	1.334				

COMMENTS: TRAP FOGARTY UNIT
WOT @ 190

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2732 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 16:22:31 APR 10, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	2 BAG LA-4

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER TEMP. (F) BAG2	GAS METER PRESS. (" H20) BAG1	GAS METER PRESS. (" H20) BAG2
4- 9-87	29.01	2 BAG LA-4, 2 FILTER	2	YES	NO	0%	113	89.0	83.0	3.0	2.2

>>>>> BAG NO. 1 MILES= 3.543 TOTAL VMIX= 6079.3 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
587.124	593.937	6.813	6.290	966.54	167	0.064457	0.064824	0.000367	0.355	88.6%	0.113	0.070	21.6

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED	SECONDARY	SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.747	0.750	168	0.067100	0.067147	0.000047	0.400

>>>>> BAG NO. 2 MILES= 3.821 TOTAL VMIX= 10389.9 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
709.159	720.481	11.322	10.912	952.17	169	0.067246	0.067712	0.000466	0.444	90.3%	0.129	0.080	18.8

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED	SECONDARY	SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.755	0.750	170	0.066911	0.066961	0.000050	0.491

PARTICULATE WEIGHTED GRAMS/MILE= 0.121 WEIGHTED GRAMS/KM= 0.075 WEIGHTED FUEL ECONOMY= 20.0 MPG

COMMENTS: 4-9-87 FOGERTY. M/B

DYNO SITE:D208 TEST # 872827

1975 LIGHT DUTY VEHICLE ANALYSIS

PROCESSED: 15:27:16 APR 21, 1987

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	GAUGE EMPTY	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	% CO RPM	% CO GEAR	% CO IDLE	% CO HIGH SPEED	IDLE RPM	IDLE GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
													0		0.0

AMBIENT TEST CONDITIONS

BARO "HG	WET BULB TEMP	AMB TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS
28.86	60.0	73.8 F	44.4	57.27	0.9231		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PST	ODOMETER (MI)	SYSTEM MILES
04-17-87	12	D208	4000	10.9	45.00	58199.0	N/A

BAG 1 7.455 MILES 11.998 KM 17383. ROLL REVS. SECS. VMIX=16398.0 CU.FT. DILUTION FACTOR = 27.002

SITE #A203

	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.8	6.50	14	4.8	3.55	3.09 PPM	0.83	0.111	0.069			
NOX-CHEM	15	41.4	20.90	15	1.5	0.76	20.17 PPM	16.54	2.218	1.378	MPG	KPL	L/100KM
CO2	22	51.8	0.494	22	5.1	0.046	0.450 %	3822.18	512.667	318.557	19.8	8.41	11.9
CO	17	5.9	14.70	17	0.0	0.0	14.70 PPM	7.95	1.066	0.662			
HC-HFID	14	13.3	10.01	14	4.2	3.18	6.95 PPM	1.86	0.250	0.155			

COMMENTS: HOT LA-4 7 PSI EGBP AT START ON FOGERTY TRAP WOT 190 SEC

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2827 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 15:34:03 APR 21, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
4-17-87	28.86	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	109	84.0	2.8

>>>>> BAG NO. 1 MILES= 7.455 TOTAL VMIX= 16414.4 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
659.633	677.357	17.724	16.420	999.66	171	0.067201	0.067714	0.000513	0.513	88.8%	0.077	0.048	19.7
		-= FLOWRATES, CF/MIN =-											
		TEST/REQUESTED				SECONDARY			W/SEC				
		0.750			172	0.068804	0.068869	0.000065	0.578				

COMMENTS: 4-17 87 FOGERTY TRAP HOT LA-4 W/7PSI EGBP

DYNO SITE:D208 TEST # 872888 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 11:10:17 APR 27, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--- TEST TYPE --- EXPE	BAG BY BAG
200	11511412019885	0	N									

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
													0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.00	45.8	74.0	D	36.6	47.11	0.8841		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO IWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
04-23-87	10	D208	4000	10.9	45.00	58288.0	N/A

BAG 1 7.443 MILES 11.978 KM 17354. ROLL REVS. SECS. VMIX=16500.0 CU.FT. DILUTION FACTOR = 30.050

SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC FID	14	8.7	6.43	14	4.0	2.95	3.57 PPM	0.96	0.129	0.080			
NOX CHLM	15	37.4	18.90	15	0.8	0.41	18.50 PPM	14.62	1.964	1.220	MPG	KPL	L/100KM
CO2	22	46.8	0.443	22	5.0	0.045	0.400 %	3421.41	459.679	285.631	22.0	9.37	10.7
CO	17	5.9	14.70	17	0.0	0.0	14.70 PPM	8.00	1.075	0.668			
HC-HFID	14	13.7	10.31	14	3.7	2.80	7.61 PPM	2.05	0.275	0.171			

COMMENTS: H/S LA-4 FOGERTY TRAP LOADED TO 2.5 PSI

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2888 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 08:41:59 APR 29, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
4-23-87	29.00	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	98	86.0	1.8

>>>>> BAG NO. 1 MILES= 7.443 TOTAL VMIX= 16515.4 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
616.260	632.771	16.511	15.368	1074.63	173	0.067188	0.067777	0.000589	0.633	90.6%	0.094	0.058	22.0

== FLOWRATES, CF/MIN ==

TEST/REQUESTED	SECONDARY				W/SEC
0.750	174	0.067346	0.067407	0.000061	0.698

COMMENTS: 4-23-87 FOGERTY H/S LA-4 LOADING 2.5 PSI

DYNO SITE:D208 TEST # 873003 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 09:06:44 MAY 7, 1987

a

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE
200	11511412019885	0	N								EXPE CVS 75-LATER

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO IDLE	% CO HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
04-30-87			EMPTY										0		0.0

AMBIENT TEST CONDITIONS

BARO "HG	DEW POINT	AMB TEMP	UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.04	46.4	75.6	D	35.5	48.14	0.8879		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
05-01-87	10	D208	4000	10.9	45.00	58411.0	N/A

BAG 1 3.623 MILES 5.831 KM 8448. ROLL REVS. SECS. VMIX= 5654.0 CU.FT. DILUTION FACTOR = 21.647

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	11.6	8.58	14	4.8	3.55	5.20 PPM	0.48	0.132	0.082			
NOX-CHEM	15	50.0	25.21	15	0.7	0.36	24.88 PPM	6.76	1.867	1.160	MPG	KPL	L/100KM
CO2	22	63.7	0.616	22	5.0	0.045	0.573 %	1678.44	463.234	287.840	21.9	9.30	10.7
CO	17	6.8	16.93	17	0.0	0.0	16.93 PPM	3.16	0.871	0.541			
HC-HFID	14	23.3	17.46	14	3.4	2.57	15.01 PPM	1.39	0.382	0.238			

BAG 2 3.884 MILES 6.250 KM 9055. ROLL REVS. SECS. VMIX= 9709.0 CU.FT. DILUTION FACTOR = 35.437

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.5	6.28	14	4.0	2.95	3.41 PPM	0.54	0.139	0.087			
NOX-CHEM	15	31.5	15.93	15	0.2	0.10	15.83 PPM	7.39	1.903	1.183	MPG	KPL	L/100KM
CO2	22	40.0	0.376	22	4.8	0.043	0.334 %	1680.57	432.730	268.886	23.4	9.95	10.1
CO	17	5.1	12.72	17	0.0	0.0	12.72 PPM	4.07	1.048	0.651			
HC-HFID	14	14.6	10.99	14	3.1	2.35	8.70 PPM	1.38	0.355	0.221			

BAG 3 3.609 MILES 5.808 KM 8414. ROLL REVS. SECS. VMIX= 5721.0 CU.FT. DILUTION FACTOR = 23.021

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.7	6.43	14	4.0	2.95	3.60 PPM	0.34	0.093	0.058			
NOX-CHEM	15	50.2	25.32	15	0.6	0.31	25.02 PPM	6.88	1.908	1.185	MPG	KPL	L/100KM
CO2	22	60.2	0.579	22	4.8	0.043	0.538 %	1596.07	442.281	274.820	22.9	9.75	10.3
CO	17	6.5	16.19	17	0.0	0.0	16.19 PPM	3.05	0.846	0.526			
HC-HFID	14	12.8	9.64	14	3.2	2.42	7.32 PPM	0.68	0.190	0.118			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX
GRAMS/MILE	0.315	0.956	442.	1.90
BEFORE ROUNDING	.3155	.9559	441.7	1.897
GRAMS/KM	0.196	0.594	274.	1.18
BEFORE ROUNDING	.1960	.5940	274.4	1.179

HC-FID 1.22 / 10

FUEL ECONOMY	MPG	KPL	L/100KM
	22.9	9.8	10.3
	22.8926	9.7554	10.2506

PARTICULATE GMS./MI. BAG-1 0.118, BAG-2 0.079, BAG-3 0.109, WEIGHTED 0.095

COMMENTS: FOGERTY TRAP WOT 190 SEC A014 FID RETURN CAL OF SPEC. SPAN & ZERO
OUT
^

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-3003 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 14:06:55 MAY 4, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	CVS 75-LATER

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1 BAG2 BAG3	GAS METER PRESS. (" H2O) BAG1 BAG2 BAG3
5 1 87	29.04	3 BAG FTP, 3 FILTER	3	YES	NO	0%	109	80.0 85.0 84.0	2.8 2.4 2.8

***** BAG NO. 1 MILES= 3.623 TOTAL VMIX= 5660.3 CU.FT.

---------- DRY GAS METER CU.FT. ---------- ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
756.086	762.714	6.628	6.262	903.85	177	0.064953	0.065394	0.000441	0.399	93.4%	0.118	0.073	21.8

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.744	0.750	178	0.064382	0.064413	0.000031	0.427

***** BAG NO. 2 MILES= 3.884 TOTAL VMIX= 9719.6 CU.FT.

---------- DRY GAS METER CU.FT. ---------- ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
647.518	658.598	11.080	10.603	916.68	179	0.065838	0.066131	0.000293	0.269	87.7%	0.079	0.049	23.3

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.734	0.750	180	0.065352	0.065393	0.000041	0.306

***** BAG NO. 3 MILES= 3.609 TOTAL VMIX= 5727.3 CU.FT.

---------- DRY GAS METER CU.FT. ---------- ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
762.714	769.436	6.722	6.304	908.48	183	0.066223	0.066602	0.000379	0.344	87.1%	0.109	0.068	22.9

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED		SECONDARY BEFORE	SECONDARY AFTER	SECONDARY TOTAL	W/SEC
0.749	0.750	184	0.065988	0.066044	0.000056	0.395

PARTICULATE WEIGHTED GRAMS/MILE= 0.095 WEIGHTED GRAMS/KM= 0.059 WEIGHTED FUEL ECONOMY= 22.9 MPG

COMMENTS: 5 1 87 FOGERTY TRAP HEATED FID DATA VOID

DYNO SITE:D208 TEST # 873004 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 16:58:21 MAY 7, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE
200	11511412019885	0	N								2 BAG LA-4

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------- % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
05-06-87													0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.15	45.0	74.5	D	34.9	45.45	0.8780		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
05-07-87	12	D208	4000	10.9	45.00	58475.9	N/A

BAG 1 3.556 MILES 5.722 KM 8290. ROLL REVS. SECS. VMIX= 5892.0 CU.FT. DILUTION FACTOR = 21.960

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	12.9	9.54	14	4.4	3.25	6.44 PPM	0.62	0.174	0.108			
NOX-CHEM	15	49.7	25.07	15	0.8	0.41	24.68 PPM	6.91	1.945	1.208	MPG	KPL	L/100KM
CO2	22	62.8	0.606	22	5.0	0.045	0.564 %	1720.60	483.921	300.695	20.9	8.90	11.2
CO	17	8.3	20.65	17	0.0	0.0	20.65 PPM	4.01	1.128	0.701			
HC-HFID	14	24.5	18.35	14	4.0	3.03	15.47 PPM	1.49	0.419	0.260			

BAG 2 3.854 MILES 6.203 KM 8987. ROLL REVS. SECS. VMIX= 9914.0 CU.FT. DILUTION FACTOR = 37.066

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.0	6.65	14	4.0	2.95	3.78 PPM	0.61	0.159	0.099			
NOX-CHEM	15	30.2	15.27	15	0.6	0.31	14.98 PPM	7.06	1.832	1.138	MPG	KPL	L/100KM
CO2	22	38.3	0.359	22	5.2	0.046	0.314 %	1611.69	418.135	259.817	24.2	10.29	9.7
CO	17	5.7	14.20	17	0.0	0.0	14.20 PPM	4.64	1.205	0.749			
HC-HFID	14	14.5	10.91	14	3.7	2.80	8.19 PPM	1.32	0.344	0.214			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX		MPG	KPL	L/100KM
GRAMS/MILE	0.380	1.17	450.	1.89	FUEL ECONOMY	22.5	9.6	10.4
BEFORE ROUNDING	.3797	1.168	449.7	1.886		22.4609	9.5702	10.4491
GRAMS/KM	0.236	0.726	279.	1.17				
BEFORE ROUNDING	.2359	.7257	279.4	1.172				

COMMENTS: DUMMY TRAP BASELINE WOT 190 SEC BAG 1 #3 FILTER DID NOT LOAD, CHANGE TEST TO 2 BAG LA4

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-3004 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 10:08:14 MAY 13, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	2 BAG LA-4

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER TEMP. (F) BAG2	GAS METER PRESS. (" H2O) BAG1	GAS METER PRESS. (" H2O) BAG2
5- 7-87	29.15	2 BAG LA-4, 2 FILTER	2	YES	NO	0%	109	81.0	82.0	2.8	2.2

***** BAG NO. 1 MILES= 3.556 TOTAL VMIX= 5898.0 CU.FT.

---------- DRY GAS METER CU.FT. ---------- ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
773.601	779.976	6.375	6.035	977.35	185	0.067194	0.068681	0.001487	1.453	97.4%	0.409	0.254	20.9

== FLOWRATES,CF/MIN ==

ACTUAL	TEST/REQUESTED	SECONDARY	SECONDARY	SECONDARY	W/SEC
0.717	0.750	186	0.066784	0.066823	0.000039	1.491

***** BAG NO. 2 MILES= 3.854 TOTAL VMIX= 9923.8 CU.FT.

---------- DRY GAS METER CU.FT. ---------- ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
658.706	668.849	10.143	9.792	1013.44	187	0.065347	0.067073	0.001726	1.749	97.4%	0.454	0.282	24.1

-- FLOWRATES,CF/MIN --

ACTUAL	TEST/REQUESTED	SECONDARY	SECONDARY	SECONDARY	W/SEC
0.678	0.750	188	0.066573	0.066619	0.000046	1.796

PARTICULATE WEIGHTED GRAMS/MILE= 0.432 WEIGHTED GRAMS/KM= 0.269 WEIGHTED FUEL ECONOMY= 22.5 MPG

COMMENTS: 5-7 87 FTP M/B. DUMMY TRAP #3 FILTER DID NOT LOAD

DYNO SITE:0208 TEST # 86-0937 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 08:25:03 JAN 22, 1986

MFR. CODE	VEHICLE I.D.	VEH-ICLE	EVAP	MFR. REP. INIT.	RUN. CHG.	RETEST CODE	ACMP	ALT. H.P. METH	EQUIVALENT TEST WEIGHT	ACTUAL DYNO H.P.	TRANS. CONFIG.	OVER-DRIVE CODE
200	1151141201980S	0	N									

/--------- TEST TYPE --------/
EXPERIMENTAL (ECTD)
/------ TEST PROCEDURE ------/
2 BAG LA-4

PREP DATE	CURB WEIGHT	DRIVE AXLE WEIGHT	GAUGE	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	/------ % CO ------/ RPM	GEAR	LEFT	RIGHT	COMB	IDLE RPM	GEAR	SOAK PERIOD	MEASURED COASTDOWN TIME
														0	

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	WET BULB	AMB TEMP	UNIT	% REL. HUM	S.HUM GR/LB	NOX FACTOR	ALTITUDE	CVS ROOM
29.30	63.6	73.8	F	57.2	72.91	0.9903		420

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IN SET	DYNO TEMP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
01-10-86	13	0208	4000	10.9	45.00	53801.0	N/A

BAG 1 3.593 MILES 5.767 KM 8355. ROLL REVS. SECS. VMIX= 5960.0 CU.FT. DILUTION FACTOR = 27.218
SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.5	8.33	14	4.3	3.20	3.25 PPM	0.32	0.088	0.055			
NOX-CHEM	15	39.8	20.07	15	0.3	0.15	19.92 PPM	6.37	1.777	1.104	MPG	KPL	L/100KM
CO2	23	23.2	0.490	23	2.1	0.042	0.449 %	1367.01	387.063	240.510	25.2	10.14	9.3
CO	17	6.5	13.73	17	0.0	0.0	13.73 PPM	3.09	0.862	0.536			
HC-NDID	14	14.8	11.13	14	4.9	3.68	7.58 PPM	0.74	0.200	0.128			

BAG 2 3.857 MILES 6.207 KM 8993. ROLL REVS. SECS. VMIX=10224.0 CU.FT. DILUTION FACTOR = 40.033
SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.5	8.33	14	4.8	3.42	4.99 PPM	0.50	0.130	0.081			
NOX-CHEM	15	25.3	12.78	15	0.2	0.10	12.69 PPM	6.96	1.804	1.121	MPG	KPL	L/100KM
CO2	23	10.0	0.332	23	2.0	0.040	0.293 %	1550.82	402.075	249.838	25.2	10.71	9.3
CO	17	5.1	12.34	17	0.0	0.0	12.34 PPM	4.16	1.079	0.670			
HC-NDID	14	24.9	16.74	14	4.8	3.80	15.23 PPM	2.35	0.660	0.410			

WEIGHTED VALUES	HC-NDID	CO	CO2	NOX
GRAMS/MILE	0.441	0.974	395.	1.79
BEFORE ROUNDING	.4412	.9745	394.8	1.791
GRAMS/KM	0.274	0.606	245.	1.11
BEFORE ROUNDING	.2741	.6055	245.3	1.113

	MPG	KPL	L/100KM
WEIGHTED VALUES	25.6	10.9	9.2
	25.5824	10.8956	9.1779
72-74 FTP	25.7	10.9	9.2
	25.6601	10.9092	9.1665
UNWEIGHTED FTP	25.7	10.9	9.2
	25.6601	10.9092	9.1665

PARTICULATES GMS./MI. BAG-1 , BAG-2 , BAG-3 , WEIGHTED

COMMENTS: M/B W/FUGANTY DEVICE NOT @ 195 TOTAL HC LINE HAS COLD SPOT
P195 75R14 TIRES SUSPECTED CRACK IN ELEMENT

DYNO SITE: D20A TEST # 86- 937 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 08:44:19 JAN 22, 1980

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	2 BAG LA-4

========== PARTICULATE SAMPLING SYSTEM ==========

EXS DUCT	TUNNEL DIAMETER	TUNNEL
42C	10 INCHES	USED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOCATION	EPA BATCH NO.	FILTER MFR.	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	TEFLON	47MM	1497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	DRUM FILT.	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER TEMP. (F) BAG2	GAS METER PRESS. (" H2O) BAG1	GAS METER PRESS. (" H2O) BAG2
1-16-80	29.30	2 BAG LA-4, 2 FILTER	2	YES	NO	93	100	74.0	74.0	3.4 2.2

>>>>> BAG NO. 1 MILES= 3.983 TOTAL VMIX= 5965.9 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

		TOTAL	CORRECTED	FLOW RATIO	FLTR	..... PRIMARY			CORRECTED	FILTER			FUEL
DEFUNCT	METER	FLOW	TOTAL FLOW	(VMIX/CVSTD)	NO.	DEFUNCT	METER	TOTAL	TOTAL WTS.	EFF.%	GM/MI	GM/KM	ECON. MPG
485.032	491.857	5.225	5.080	1141.60	30	0.007090	0.008332	0.001285	1.303	97.76	0.364	0.226	26.1

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REMOTESITE	..... SECONDARY			WTSEC
0.700	0.750	31	0.007944	0.007974	0.000030	1.333

>>>>> BAG NO. 2 MILES= 3.857 TOTAL VMIX= 10238.8 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

		TOTAL	CORRECTED	FLOW RATIO	FLTR	..... PRIMARY			CORRECTED	FILTER			FUEL
DEFUNCT	METER	FLOW	TOTAL FLOW	(VMIX/CVSTD)	NO.	DEFUNCT	METER	TOTAL	TOTAL WTS.	EFF.%	GM/MI	GM/KM	ECON. MPG
834.575	845.074	10.499	9.829	1041.69	28	0.007305	0.009125	0.001819	1.686	96.28	0.437	0.272	25.1

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REMOTESITE	..... SECONDARY			WTSEC
0.660	0.750	29	0.007298	0.007328	0.000030	1.718

PARTICULATE WEIGHTED GRAMS/MILE= 0.402 WEIGHTED GRAMS/KM= 0.250 WEIGHTED FUEL ECONOMY= 25.0 MPG

COMMENTS: 1-16-80 FOGERTY TRAP NOT-LA-4 TOTAL HC PROBE COLD SPOTS
P175 /5 R14 TIRES

DYNO SITE:D208 TEST # 86-1689 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 09:28:50 FEB 6, 1986

MFR. CODE	VEHICLE I.D.	VER-SION	EVAP	MFR. REP. INIT.	RUN. CHG.	RETEST CODE	ACHP	ALT. H.P. METH	EQUIVALENT TEST WEIGHT	ACTUAL DYNO H.P.	TRANS. CONFG.	OVER-DRIVE CODE	TEST TYPE: EXPERIMENTAL (ECTD) / TEST PROCEDURE: BAG BY BAG
200	11511412019885	0	N										

PREP DATE	CURB WEIGHT	DRIVE AXLE WEIGHT	AXLE GAUGE	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO LEFT	% CO RIGHT	% CO COMB	IDLE RPM	GEAR	SOAK PERIOD	MEASURED COASTDOWN TIME
														0	

AMBIENT TEST CONDITIONS

BARO "HG	WET BULB TEMP	AMB TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
28.92	62.1	73.4 F	53.1	67.52	0.9661		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
02-04-86	11	D208	4000	10.9	45.00	53819.0	N/A

BAG 1 7.490 MILES 12.054 KM 17463. ROLL REVS. SECS. VMIX=16241.0 CU.FT. DILUTION FACTOR = 33.338

SITE #A203

	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	MASS EMISSIONS GMS/MI	MASS EMISSIONS GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.2	7.56	14	4.6	3.80	3.87 PPM	1.03	0.137	0.085			
NOX-CHEM	15	31.9	16.10	15	0.1	0.05	16.05 PPM	13.64	1.822	1.132	MPG	KPL	L/100KM
CO2	22	43.0	0.399	22	4.6	0.039	0.361 %	3038.15	405.639	252.053	25.0	10.62	9.4
CO	17	5.9	14.27	17	0.0	0.0	14.27 PPM	7.64	1.020	0.634			
HC-HFID	16	4.0	11.92	16	1.2	3.58	8.45 PPM	2.24	0.299	0.186			

COMMENTS: DUMMY TRAP HOT LA-4 - P195 75R14 TIRES.

DYNO SITE: D208 TEST # 86-1689 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 09:27:11 FEB 6, 1986

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T4978	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
2- 4-86	28.92	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	104	74.0	2.4

>>>>> BAG NO. 1 MILES= 7.490 TOTAL VMIX= 16255.7 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

					PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
545.177	561.106	15.929	14.682	1107.21	34	0.006223	0.009099	0.002876	3.184	99.1%	0.425	0.264	24.9
		== FLOWRATES, CF/MIN ==											
		TEST/REQUESTED			SECONDARY				W/SEC				
		0.750			35	0.004697	0.004724	0.000027	3.214				

COMMENTS: M-B HOT START 2-4-86 W/DUMMY TRAP (P195 75R14 TIRES)

DYNO SITE:D208 TEST # 86-1690 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 09:28:53 FEB 6, 1986

MFR. CODE	VEHICLE I.D.	VER-SION	EVAP	MFR. REP. INIT.	RUN. CHG.	RETEST CODE	ACHP	ALT. H.P. METH	EQUIVALENT TEST WEIGHT	ACTUAL DYNO H.P.	TRANS. CONFG.	OVER-DRIVE CODE
200	11511412019885	0	N									

/--------- TEST TYPE --------/
EXPERIMENTAL (ECTD)
/------ TEST PROCEDURE ------/
BAG BY BAG

PREP DATE	CURB WEIGHT	DRIVE AXLE WEIGHT	AXLE GAUGE	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	IDLE RPM	IDLE GEAR	% CO LEFT	% CO RIGHT	% CO COMB	SOAK PERIOD	MEASURED COASTDOWN TIME
												0	

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	WET BULB	AMB TEMP	UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
28.83	62.7	73.5	F	55.0	70.50	0.9793		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
02-04-86	13	D208	4000	10.9	45.00	53833.0	N/A

BAG 1 7.486 MILES 12.048 KM 17455. ROLL REVS. SECS. VMIX=16226.0 CU.FT. DILUTION FACTOR = 32.136

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	MASS EMISSIONS GMS/MI	MASS EMISSIONS GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.0	7.40	14	4.4	3.64	3.87 PPM	1.03	0.137	0.085			
NOX-CHEM	15	32.7	16.51	15	0.1	0.05	16.46 PPM	14.16	1.892	1.176	MPG	KPL	L/100KM
CO2	22	44.5	0.414	22	4.9	0.042	0.374 %	3140.64	419.515	260.675	24.1	10.27	9.7
CO	17	6.0	14.52	17	0.0	0.0	14.52 PPM	7.77	1.037	0.644			
HC-HFID	14	15.9	11.95	14	4.9	3.68	8.39 PPM	2.22	0.297	0.185			

COMMENTS: LA-4 ONE BAG W/FOGARTY UNIT WOT @ 195 P195 75R14

DYNO SITE: D208 TEST # 86-1690 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 09:27:18 FEB 6, 1986

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
2- 4-86	28.83	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	100	74.0	3.0

>>>>> BAG NO. 1 MILES= 7.486 TOTAL VMIX= 16241.3 CU.FT.

========== DRY GAS METER CU.FT. ==========

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)
569.068	585.660	16.592	15.268	1.06

== FLOWRATES, CF/MIN ==

TEST/REQUESTED
0.750

====== PARTICULATE WEIGHT, GRAMS ======

	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
PRIMARY	36	0.005259	0.006226	0.000967	1.029	95.6%	0.137	0.085	24.1
SECONDARY	37	0.004953	0.004997	0.000044	1.075				

	W/SEC
	1.075

COMMENTS: 2-4-86 FOGERTY HOT START P195/75R14 TIRES

DYNO SITE:D208 TEST # 870818 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 11:24:11 NOV 26, 1986

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO LEFT	% CO RIGHT	% CO COMB	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
														0		0.0

AMBIENT TEST CONDITIONS

BARO "HG	WET BULB	AMB TEMP	% REL UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.22	59.8	73.2	F	45.2	56.38	0.9195		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
11-25-86	14	D208	4000	10.9	45.00	55691.0	N/A

BAG 1 7.423 MILES 11.947 KM 17308. ROLL REVS. SECS. VMIX=16549.0 CU.FT. DILUTION FACTOR = 32.353

SITE #A203

	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	MASS EMISSIONS GMS/MI	MASS EMISSIONS GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.1	6.73	14	4.5	3.32	3.51 PPM	0.95	0.128	0.079			
NOX-CHEM	15	34.6	17.33	15	0.2	0.10	17.23 PPM	14.20	1.913	1.189	MPG	KPL	L/100KM
CO2	22	43.7	0.412	22	4.3	0.039	0.375 %	3212.44	432.750	268.899	23.4	9.95	10.0
CO	17	5.5	13.58	17	0.0	0.0	13.58 PPM	7.41	0.998	0.620			
HC-HFID	14	9.8	7.39	14	4.1	3.10	4.39 PPM	1.19	0.160	0.099			

COMMENTS: M/B HOT LA-4 W/FOGERTY TRAP SEE ACCEL 1 ON DRIVER TRACE.SEE COMMENTS FROM TEST #870817

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87- 818 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 11:23:37 NOV 26, 1986

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
11-25-86	29.22	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	105	84.0	2.1

>>>>> BAG NO. 1 MILES= 7.423 TOTAL VMIX= 16564.9 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
474.432	491.598	17.166	15.876	1043.42	79	0.007621	0.008726	0.001105	1.153	91.2%	0.170	0.106	23.4
		== FLOWRATES,CF/MIN == TEST/REQUESTED		0.750		SECONDARY			W/SEC				
					80	0.006964	0.007071	0.000107	1.265				

COMMENTS: 11-25-86 FOGERTY TRAP

DYNO SITE:D208 TEST # 870817 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 14:02:29 NOV 26, 1986

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ LEFT	RIGHT	COMB	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
														0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	WET BULB	AMB TEMP	% REL UNIT	HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.22	60.6	73.8	F	46.3	59.00	0.9300		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
11-25-86	13	D208	4000	10.9	45.00	55680.0	N/A

BAG 1 7.470 MILES 12.023 KM 17418. ROLL REVS. SECS. VMIX=16539.0 CU.FT. DILUTION FACTOR = 34.330

SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.8	6.50	14	4.5	3.32	3.28 PPM	0.88	0.118	0.074			
NOX-CHEM	15	32.7	16.38	15	0.3	0.15	16.23 PPM	13.52	1.810	1.125	MPG	KPL	L/100KM
CO2	22	41.3	0.388	22	5.0	0.045	0.345 %	2953.84	395.401	245.691	25.6	10.89	9.2
CO	17	5.2	12.84	17	0.0	0.0	12.84 PPM	7.00	0.937	0.582			
HC-HFID	14	9.3	7.02	14	3.6	2.73	4.37 PPM	1.18	0.158	0.098			

COMMENTS: M/B HOT LA-4 W/DUMMY TRAP PRECEEDING FOGERTY TRAP -NEW CONFIGURATION FOR TOTAL HC LINE + FILTER AND PARTICULATES SYSTEM. HEATED FID REPAIRED. SECONDARY FILTER WEIGHT <THAN PRE TEST VALUE. ADJUSTED TO =PRE-TEST WEIGHT HUMIDITY FLAG BAC.RM

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87- 817 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 14:01:26 NOV 26, 1986

MFR	VEHICLE ID	VEH ID	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885		EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H2O) BAG1
11-25-86	29.22	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	107	84.0	2.0

>>>>> BAG NO. 1 MILES= 7.470 TOTAL VMIX= 16554.9 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
904.701	921.951	17.250	15.949	1037.98	77	0.008554	0.011636	0.003082	3.199	100.%	0.428	0.266	25.6

== FLOWRATES, CF/MIN ==

TEST/REQUESTED		SECONDARY			W/SEC
0.750	78	0.007834	0.006896	0.0	3.199

COMMENTS: 11-25-86 M/B DUMMY TRAP HOT LA-4

DYNO SITE:D208 TEST # 871049 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 15:37:13 DEC 10, 1986

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ LEFT	RIGHT	COMB	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
														0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
28.80	49.0	72.8	D	42.9	53.59	0.9086		42C

/-------- DYNAMOMETER TEST CONDITIONS ----- --/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO IWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
12-09-86	14	D208	4000	10.9	45.00	55985.0	N/A

BAG 1 7.442 MILES 11.976 KM 17351. ROLL REVS. SECS. VMIX-16331.0 CU.FT. DILUTION FACTOR - 33.317

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.2	6.06	14	4.2	3.10	3.05 PPM	0.81	0.109	0.068			
NOX-CHEM	15	33.3	16.68	15	0.1	0.05	16.63 PPM	13.36	1.796	1.116	MPG	KPL	L/100KM
CO2	22	42.5	0.400	22	5.1	0.046	0.356 %	3009.92	404.463	251.322	25.0	10.65	9.4
CO.	17	5.3	13.09	17	0.0	0.0	13.09 PPM	7.05	0.947	0.588			
HC HFID	14	9.2	6.94	14	4.1	3.10	3.93 PPM	1.05	0.141	0.088			

COMMENTS: M/B DUMMY TRAP HOT START LA-4

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-1049 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 09:14:39 DEC 16, 1986

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T4978	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H2O) BAG1
12- 9-86	28.80	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	113	83.0	3.0

>>>>> BAG NO. 1 MILES= 7.442 TOTAL VMIX= 16346.8 CU.FT.

========== DRY GAS METER CU.FT. ==========

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)
955.330	972.625	17.295	15.831	1032.57

== FLOWRATES,CF/MIN ==

TEST/REQUESTED
0.750

====== PARTICULATE WEIGHT, GRAMS ======

	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
PRIMARY	81	0.006911	0.010090	0.003179	3.283	98.7%	0.441	0.274	25.0
SECONDARY	82	0.007740	0.007783	0.000043	W/SEC 3.327				

COMMENTS: 12-9 86 M/B DUMMY TRAP NOT LA-4 PRIOR TO FOGERTY TRAP TEST

DYNO SITE:D208 TEST # 871050 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 12:05:06 DEC 10, 1986

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE
200	115114120198B5	0	N								BAG BY BAG

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ LEFT	RIGHT	COMB	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
														0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
28.82	49.7	73.2	D	43.5	54.99	0.9140		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST	DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
	12-09-86	15	D208	4000	10.9	45.00	55995.0	N/A

BAG 1 7.443 MILES 11.978 KM 17354. ROLL REVS. SECS. VMIX=16397.0 CU.FT. DILUTION FACTOR = 29.973

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.0	6.65	14	4.9	3.62	3.15 PPM	0.84	0.113	0.071			
NOX-CHEM	15	36.4	18.23	15	0.1	0.05	18.18 PPM	14.76	1.983	1.232	MPG	KPL	L/100KM
CO2	22	47.0	0.445	22	5.0	0.045	0.402 %	3410.87	458.263	284.751	22.1	9.40	10.6
CO	17	5.7	14.07	17	0.0	0.0	14.07 PPM	7.61	1.022	0.635			
HC-HFID	14	9.6	7.24	14	4.4	3.33	4.02 PPM	1.08	0.145	0.090			

COMMENTS: M/B FOGARTY TRAP

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-1050 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 12:04:27 DEC 10, 1986

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING ITEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
12 9-86	28.82	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	105	84.0	2.4

>>>>> BAG NO. 1 MILES= 7.443 TOTAL VMIX= 16413.4 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

						PRIMARY							
BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
512.667	530.627	17.960	16.396	1001.06	83	0.008038	0.009110	0.001072	1.073	91.2%	0.158	0.098	22.1
		== FLOWRATES,CF/MIN ==											
		TEST/REQUESTED				SECONDARY			W/SEC				
		0.750			84	0.008641	0.008744	0.000103	1.176				

COMMENTS: 12-9-86 M/B HOT LA-4 FOGERTY TRAP

DYNO SITE:D208 TEST # 871225 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 15:04:44 JAN 6, 1987

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE
200	11511412019885	0	N								EXPE CVS 75-LATER

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO LEFT	% CO RIGHT	% CO COMB	IDLE RPM	IDLE GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
12-17-86														26		0.0

AMBIENT TEST CONDITIONS

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
28.95	48.0	74.2	D	39.5	51.32	0.8999		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	SITE	DYNO ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
12-18-86	14	D208	4000	10.9	45.00	56253.0	N/A

BAG 1 3.578 MILES 5.758 KM 8342. ROLL REVS. SECS. VMIX= 6096.0 CU.FT. DILUTION FACTOR = 20.585

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	11.8	8.73	14	4.2	3.10	5.77 PPM	0.57	0.161	0.100			
NOX-CHEM	15	51.8	25.94	15	0.1	0.05	25.89 PPM	7.69	2.150	1.336	MPG	KPL	L/100KM
CO2	22	66.9	0.648	22	4.7	0.042	0.608 %	1919.67	536.543	333.393	18.9	8.03	12.5
CO	17	8.1	19.99	17	0.0	0.0	19.99 PPM	4.02	1.123	0.698			
HC-HFID	14	13.0	9.79	14	3.3	2.50	7.41 PPM	0.74	0.206	0.128			

BAG 2 3.870 MILES 6.229 KM 9024. ROLL REVS. SECS. VMIX=10440.0 CU.FT. DILUTION FACTOR = 33.651

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.5	6.28	14	4.3	3.18	3.20 PPM	0.55	0.141	0.088			
NOX-CHEM	15	32.2	16.13	15	0.1	0.05	16.08 PPM	8.18	2.114	1.314	MPG	KPL	L/100KM
CO2	22	42.1	0.396	22	4.5	0.040	0.357 %	1931.16	498.964	310.042	20.3	8.63	11.6
CO	17	5.2	12.84	17	0.0	0.0	12.84 PPM	4.42	1.142	0.710			
HC-HFID	14	9.0	6.79	14	3.2	2.42	4.44 PPM	0.76	0.196	0.122			

BAG 3 3.586 MILES 5.772 KM 8362. ROLL REVS. SECS. VMIX= 6106.0 CU.FT. DILUTION FACTOR = 21.290

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.9	6.58	14	4.4	3.25	3.48 PPM	0.35	0.097	0.060			
NOX-CHEM	15	53.7	26.89	15	0.1	0.05	26.84 PPM	7.99	2.227	1.384	MPG	KPL	L/100KM
CO2	22	64.9	0.627	22	4.8	0.043	0.586 %	1854.12	516.985	321.239	19.6	8.34	12.0
CO	17	6.4	15.80	17	0.0	0.0	15.80 PPM	3.18	0.887	0.551			
HC-HFID	14	8.2	6.19	14	3.2	2.42	3.88 PPM	0.39	0.108	0.067			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX		MPG	KPL	L/100KM
GRAMS/MILE	0.174	1.07	512.	2.15	FUEL ECONOMY	19.8	8.4	11.9
BEFORE ROUNDING	.1738	1.068	511.7	2.152		19.7883	8.4166	11.8811
GRAMS/KM	0.108	0.664	318.	1.34				
BEFORE ROUNDING	.1080	.6637	317.9	1.337				

PARTICULATE GMS./MI BAG 1 0.140, BAG 2 0.118, BAG 3 0.173, WEIGHTED 0.139

COMMENTS: MERCEDES FOGARTY UNIT WOT 190 SEC BG1 & BG3

HE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-1225 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 15:03:48 JAN 6, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	CVS 75-LATER

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	9.8%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1 BAG2 BAG3	GAS METER PRESS. (" H20) BAG1 BAG2 BAG3
12-18-86	28.95	3 BAG FTP, 3 FILTER	3	YES	NO	0%	12	78.0 82.0 84.0	3.0 2.0 3.0

***** BAG NO. 1 MILES= 3.578 TOTAL VMIX= 6102.3 CU.FT.

---------- DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
985.826	992.661	6.835	6.256	975.47	85	0.008301	0.008838	0.000537	0.524	100.0%	0.146	0.091	18.9

== FLOWRATES, CF/MIN == ACTUAL	TEST/REQUESTED	SECONDARY	BEFORE	AFTER	TOTAL	W/SEC
0.743	0.750	86	0.008017	0.008017	0.0	0.524

***** BAG NO. 2 MILES= 3.870 TOTAL VMIX= 10451.0 CU.FT.

---------- DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
971.877	983.511	11.634	11.017	948.63	87	0.007923	0.008405	0.000482	0.457	97.6%	0.118	0.073	20.3

== FLOWRATES, CF/MIN == ACTUAL	TEST/REQUESTED	SECONDARY	BEFORE	AFTER	TOTAL	W/SEC
0.762	0.750	88	0.005116	0.005128	0.000012	0.469

*** BAG NO. 3 MILES= 3.586 TOTAL VMIX= 6112.3 CU.FT.

---------- DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
992.661	999.625	6.964	6.304	969.65	89	0.006227	0.006865	0.000638	0.619	100.%	0.173	0.107	19.6

== FLOWRATES, CF/MIN == ACTUAL	TEST/REQUESTED	SECONDARY	BEFORE	AFTER	TOTAL	W/SEC
0.749	0.750	90	0.008158	0.008158	0.0	0.619

PARTICULATE WEIGHTED GRAMS/MILE= 0.139 WEIGHTED GRAMS/KM= 0.086 WEIGHTED FUEL ECONOMY= 19.8 MPG

COMMENTS: M/B FTP FILTERS 86+90 ADJUSTED TO EQUAL PRE TEST VALUE

DYNO SITE:D208 TEST # 871198 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 09:04:10 JAN 14, 1987

a

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE
200	11511412019885	0	N								EXPE CVS 75-LATER

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO IDLE	% CO HIGH SPEED	IDLE RPM	IDLE GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
01-12-87													22		0.0

AMBIENT TEST CONDITIONS

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.08	46.7	74.3	D	37.5	48.62	0.8897		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
01-13-87	13	D208	4000	10.9	45.00	56403.0	N/A

BAG 1 3.613 MILES 5.815 KM 8424. ROLL REVS. SECS. VMIX= 6105.0 CU.FT. DILUTION FACTOR = 21.641

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	12.0	8.87	14	4.4	3.25	5.77 PPM	0.58	0.159	0.099			
NOX-CHEM	15	50.0	25.04	15	0.3	0.15	24.89 PPM	7.32	2.027	1.259	MPG	KPL	L/100KM
CO2	22	63.8	0.616	22	4.7	0.042	0.576 %	1820.40	503.845	313.075	20.1	8.55	11.7
CO	17	8.0	19.74	17	0.0	0.0	19.74 PPM	3.97	1.100	0.684			
HC-HFID	14	19.0	14.27	14	4.3	3.25	11.16 PPM	1.11	0.308	0.191			

BAG 2 3.917 MILES 6.304 KM 9133. ROLL REVS. SECS. VMIX=10426.0 CU.FT. DILUTION FACTOR = 34.305

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.0	6.65	14	4.4	3.25	3.50 PPM	0.60	0.152	0.094			
NOX-CHEM	15	32.2	16.13	15	0.2	0.10	16.03 PPM	8.05	2.056	1.278	MPG	KPL	L/100KM
CO2	22	41.3	0.388	22	4.8	0.043	0.346 %	1871.56	477.792	296.886	21.2	9.01	11.1
CO	17	5.3	13.09	17	0.0	0.0	13.09 PPM	4.50	1.148	0.714			
HC-HFID	14	12.7	9.56	14	4.3	3.25	6.41 PPM	1.09	0.278	0.173			

BAG 3 3.592 MILES 5.781 KM 8375. ROLL REVS. SECS. VMIX= 6121.0 CU.FT. DILUTION FACTOR = 22.429

SITE #A203	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	9.2	6.80	14	4.8	3.55	3.41 PPM	0.34	0.095	0.059			
NOX-CHEM	15	51.0	25.54	15	0.3	0.15	25.39 PPM	7.49	2.085	1.296	MPG	KPL	L/100KM
CO2	22	61.8	0.595	22	4.8	0.043	0.554 %	1756.71	489.063	303.889	20.7	8.82	11.3
CO	17	6.1	15.06	17	0.0	0.0	15.06 PPM	3.04	0.846	0.526			
HC-HFID	14	10.6	7.99	14	4.4	3.33	4.81 PPM	0.48	0.134	0.083			

WEIGHTED VALUES	HC-HFID	CO	CO2	NOX		MPG	KPL	L/100KM
GRAMS/MILE	0.245	1.06	486.	2.06	FUEL ECONOMY	20.8	8.9	11.3
BEFORE ROUNDING	.2451	1.056	486.2	2.058		20.8331	8.8568	11.2907
GRAMS/KM	0.152	0.656	302.	1.28				
BEFORE ROUNDING	.1523	.6562	302.1	1.279				

PARTICULATE GMS./MI. BAG-1 0.127, BAG-2 0.115, BAG-3 0.159, WEIGHTED 0.129

COMMENTS: M/B FTP FOGERTY TRAP WOT @ 195 SECONDS BAG 1&2
DGM OUTLET NO LONGER IN DUMP

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-1198 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 09:03:33 JAN 14, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	CVS 75-LATER

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	9.8%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	BAG2	BAG3	GAS METER PRESS. (" H20) BAG1	BAG2	BAG3
1-13-87	29.08	3 BAG FTP, 3 FILTER	3	YES	NO	0%	110	81.0	78.0	83.0	3.1	2.3	3.1

>>>>> BAG NO. 1 MILES= 3.613 TOTAL VMIX= 6111.3 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)
57.601	64.393	6.792	6.283	972.74

== FLOWRATES,CF/MIN ==

ACTUAL	TEST/REQUESTED
0.746	0.750

PRIMARY

FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
123	0.064595	0.065004	0.000409	0.398	86.7%	0.127	0.079	20.1

SECONDARY

FLTR NO.	BEFORE	AFTER	TOTAL	W/SEC
124	0.065904	0.065967	0.000063	0.459

>>>>> BAG NO. 2 MILES= 3.917 TOTAL VMIX= 10436.7 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)
60.900	72.033	11.133	10.676	977.54

== FLOWRATES,CF/MIN ==

ACTUAL	TEST/REQUESTED
0.739	0.750

PRIMARY

FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
125	0.067193	0.067607	0.000414	0.405	89.8%	0.115	0.071	21.2

SECONDARY

FLTR NO.	BEFORE	AFTER	TOTAL	W/SEC
126	0.068087	0.068134	0.000047	0.451

>>>>> BAG NO. 3 MILES= 3.592 TOTAL VMIX= 6127.3 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)
64.393	71.196	6.803	6.269	977.32

== FLOWRATES,CF/MIN ==

ACTUAL	TEST/REQUESTED
0.745	0.750

PRIMARY

FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
127	0.066602	0.067112	0.000510	0.498	87.5%	0.159	0.099	20.7

SECONDARY

FLTR NO.	BEFORE	AFTER	TOTAL	W/SEC
128	0.067473	0.067546	0.000073	0.570

PARTICULATE WEIGHTED GRAMS/MILE= 0.129 WEIGHTED GRAMS/KM= 0.080 WEIGHTED FUEL ECONOMY= 20.8 MPG

COMMENTS: M/B 1-13-87-FOGERTY- DGM OUTLET NO LONGER IN AIR DUMP. FTP.

DYNO SITE:D208 TEST # 871662 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 15:06:58 FEB 6, 1987

a MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
													0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.30	45.3	72.0	D	38.4	45.74	0.8791		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL Iw SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
02-06-87	08	D208	4000	10.9	45.00	57446.0	N/A

BAG 1 7.492 MILES 12.057 KM 17468. ROLL REVS. SECS. VMIX=16666.0 CU.FT. DILUTION FACTOR = 30.312

SITE #A203	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.3	6.13	14	4.4	3.25	2.99 PPM	0.81	0.109	0.068			
NOX-CHEM	15	38.3	19.18	15	0.6	0.30	18.89 PPM	14.99	2.001	1.243	MPG	KPL	L/100KM
CO2	22	46.8	0.440	22	4.5	0.039	0.402 %	3472.16	463.453	287.977	21.9	9.30	10.8
CO	17	5.6	13.96	17	0.0	0.0	13.96 PPM	7.67	1.024	0.636			
HC-HFID	14	9.2	6.94	14	3.5	2.65	4.38 PPM	1.19	0.159	0.099			

COMMENTS: M/B HOT LA4 FOGARTY TRAP

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-1662 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 15:06:06 FEB 6, 1987

MFR	VEHICLE ID .	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H2O) BAG1
2- 6-87	29.30	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	103	83.0	3.0

>>>>> BAG NO. 1 MILES= 7.492 TOTAL VMIX= 16682.4 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
164.749	182.406	17.657	16.390	1017.82	135	0.067155	0.067875	0.000720	0.733	94.0%	0.104	0.065	21.8

== FLOWRATES, CF/MIN ==

TEST/REQUESTED	SECONDARY			W/SEC
0.750	136	0.067839	0.067885	0.000046	0.780

COMMENTS: M/B FOGERTY 2-6-87 HOT LA-4

DYNO SITE:D208 TEST # 871927 | 1975 LIGHT DUTY VEHICLE ANALYSIS | PROCESSED: 14:06:09 FEB 12, 1987

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	/--------- TEST TYPE -------- EXPE BAG BY BAG
200	11511412019885	0	N								

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	/--- IGNITION TIMING ---/ #1	#2	RPM	GEAR	/------ % CO ------/ IDLE	HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	ADJUSTED
02-12-87													0		0.0

/-------- AMBIENT TEST CONDITIONS ------/

BARO "HG	DEW POINT	AMB TEMP	TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
28.90	45.5	74.2	D	35.9	46.73	0.8827		42C

/-------- DYNAMOMETER TEST CONDITIONS --------/

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
02-12-87	10	D208	4000	10.9	45.00	57639.0	N/A

BAG 1 7.627 MILES 12.274 KM 17782. ROLL REVS. SECS. VMIX=16377.0 CU.FT. DILUTION FACTOR = 31.027

SITE #A203

	EXHAUST SAMPLE RANGE	METER	CONC.	BACKGROUND SAMPLE RANGE	METER	CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	GMS/MI	GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	8.5	6.28	14	4.7	3.47	2.92 PPM	0.78	0.102	0.064			
NOX-CHEM	15	37.1	18.58	15	0.8	0.40	18.19 PPM	14.24	1.868	1.161	MPG	KPL	L/100KM
CO2	22	45.8	0.430	22	4.8	0.042	0.389 %	3304.64	433.304	269.242	23.4	9.94	10.1
CO	17	5.2	12.96	17	0.0	0.0	12.96 PPM	7.00	0.918	0.570			
HC-HFID	14	9.0	6.79	14	3.4	2.57	4.30 PPM	1.15	0.151	0.094			

COMMENTS: M/B FOGERTY HOT START LA-4 ZERO DRIFT ON DRIVERS TRACE 1025 SEC
LAST TEST WITH ROUND TRAP CANISTER

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-1927 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 14:05:28 FEB 12, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H2O) BAG1
2-12-87	28.90	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	100	82.0	3.1

>>>>> BAG NO. 1 MILES= 7.627 TOTAL VMIX= 16393.7 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)	FLTR NO.	PRIMARY BEFORE	PRIMARY AFTER	PRIMARY TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
216.932	235.372	18.440	16.693	982.06	137	0.067254	0.067877	0.000623	0.612	93.1%	0.086	0.054	23.4

== FLOWRATES, CF/MIN ==

TEST/REQUESTED	SECONDARY			W/SEC
0.750	138	0.067762	0.067808	0.000046	0.657

COMMENTS: 2-12-87 FOGERTY TRAP M/B HOT LA-4

DYNO SITE:D208 TEST # 872230

1975 LIGHT DUTY VEHICLE ANALYSIS

PROCESSED: 12:15:00 MAR 6, 1987

MFR.		VER-	MFR. REP.	RUN.	RETEST	ALT. H.P.	EQUIVALENT TEST	ACTUAL DYNO	TRANS.	OVER-DRIVE	TEST TYPE
200	11511412019885	0	N								EXPE BAG BY BAG

PREP DATE	CURB WEIGHT	DRV AXLE WEIGHT	AXLE GAUGE EMPTY	AXLE MEASURE	IGNITION TIMING #1	IGNITION TIMING #2	RPM	GEAR	% CO IDLE	% CO HIGH SPEED	IDLE RPM	GEAR	SOAK PERIOD	COASTDOWN TIME ACTUAL	COASTDOWN TIME ADJUSTED
													0		0.0

AMBIENT TEST CONDITIONS

BARO "HG	DEW POINT	AMB TEMP UNIT	% REL HUM	S.HUM GR/LB	NOX FACTOR	ALDEHYDES	CVS RGE
29.44	46.9	74.3 D	37.7	48.39	0.8888		42C

DYNAMOMETER TEST CONDITIONS

TEST DATE	HR	DYNO SITE	ACTUAL IW SET	DYNO TWHP	TIRE PSI	ODOMETER (MI)	SYSTEM MILES
03-05-87	12	D208	4000	10.9	45.00	57772.0	N/A

BAG 1 7.381 MILES 11.879 KM 17210. ROLL REVS. 1374.0 SECS. VMIX=16712.0 CU.FT. DILUTION FACTOR = 145.402

SITE #A203

	EXHAUST SAMPLE RANGE	EXHAUST SAMPLE METER	EXHAUST SAMPLE CONC.	BACKGROUND SAMPLE RANGE	BACKGROUND SAMPLE METER	BACKGROUND SAMPLE CONC.	CORRECTED CONCENTRATIONS	MASS EMISSIONS GMS.	MASS EMISSIONS GMS/MI	MASS EMISSIONS GMS/KM	AUX. FIELD1	AUX. FIELD2	AUX. CODE
HC-FID	14	10.1	7.47	14	0.1	0.07	7.39 PPM	2.02	0.273	0.170			
NOX-CHEM	15	10.1	5.06	15	0.1	0.05	5.01 PPM	4.03	0.546	0.339	MPG	KPL	L/100KM
CO2	22	10.1	0.089	22	0.1	0.001	0.088 %	762.35	103.281	64.176	95.0	40.41	2.5
CO	17	10.1	25.10	17	0.1	0.25	24.85 PPM	13.69	1.855	1.153			

COMMENTS: M/B HOT START DUMMY TRAP PARTICULATES ONLY 1374 SEC CYCLE

THE FUEL ECONOMY VALUE WAS CALCULATED USING CONSTANT FUEL PROPERTIES FROM PRE-1988 REGULATIONS.

DYNO SITE: D208 TEST # 87-2230 ***** LIGHT DUTY DIESEL PARTICULATE TEST ***** PROCESSED: 14:49:23 MAR 9, 1987

MFR	VEHICLE ID	VERSION	TEST TYPE	TEST PROCEDURE
MERCEDES BENZ	11511412019885	0	EXPERIMENTAL (ECTD)	BAG BY BAG

========== PARTICULATE SAMPLING SYSTEM ==========

CVS UNIT	TUNNEL DIAMETER	TUNNEL
42C	18 INCHES	18ED

========== EXHAUST CONNECTION CONFIGURATION ==========

LENGTH	SURFACE	DIAMETER	INSULATED	NO. ELBOWS	ANGLE
14 FEET	SMOOTH	4 INCHES	YES	1	90 DEGREES

========== PARTICULATE FILTER DESCRIPTION ==========

DIVISION	LOGBOOK	EPA BATCH NO.	FILTER MFR	FILTER TYPE	FILTER SIZE	MFR BATCH NO.	BATCH EFFICIENCY
ECTD	1	17	PALLFLEX	T60A20	47MM	T497B	98.0%

========== PARTICULATE TEST INFORMATION ==========

DATE	BARO. " HG	TEST TYPE	# PRI. FILTERS	SECONDARY FILTERS	BKGD FILTER	PART. CARBON	MAX. TUNNEL TEMP. (F)	GAS METER TEMP. (F) BAG1	GAS METER PRESS. (" H20) BAG1
3- 5-87	29.44	BAG BY BAG, EQUAL SETS	1	YES	NO	0%	102	82.2	3.0

>>>>> BAG NO. 1 MILES= 7.381 TOTAL VMIX= 16727.4 CU.FT.

========== DRY GAS METER CU.FT. ========== ====== PARTICULATE WEIGHT, GRAMS ======

BEFORE	AFTER	TOTAL FLOW	CORRECTED TOTAL FLOW	FLOW RATIO (VMIX/DRYGAS)
269.696	286.442	16.746	15.431	1084.01

== FLOWRATES, CF/MIN ==

ACTUAL	TEST/REQUESTED
0.674	0.750

	FLTR NO.	BEFORE	AFTER	TOTAL	CORRECTED TOTAL WT.	FILTER EFF.	GM/MI	GM/KM	FUEL ECON., MPG
PRIMARY	141	0.067017	0.070294	0.003277	3.552	99.1%	0.481	0.299	95.0
SECONDARY	142	0.066242	0.066272	0.000030	W/SEC 3.585				

COMMENTS: M/B DUMMY TRAP 3-5-87 M/S LA-4