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ASSESSMENT OF CONTROL TECHNIQUES FOR REDUCING EMISSIONS FROM LOCOMOTIVE ENGINES

by
John O. Storment
Karl J. Springer

FINAL REPORT
Contract EHS 70-108
Task VI

Prepared for
Transportation Systems Center
U. S. Department of Transportation
and
Characterization and Control Development Branch
Mobile Source Pollution Control Program
Office of Air and Water Programs
Environmental Protection Agency

April 1973

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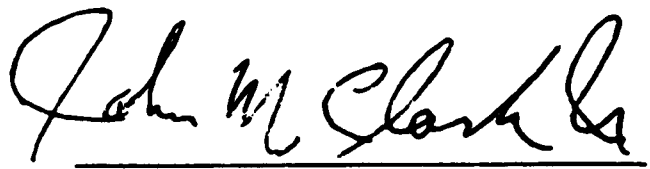

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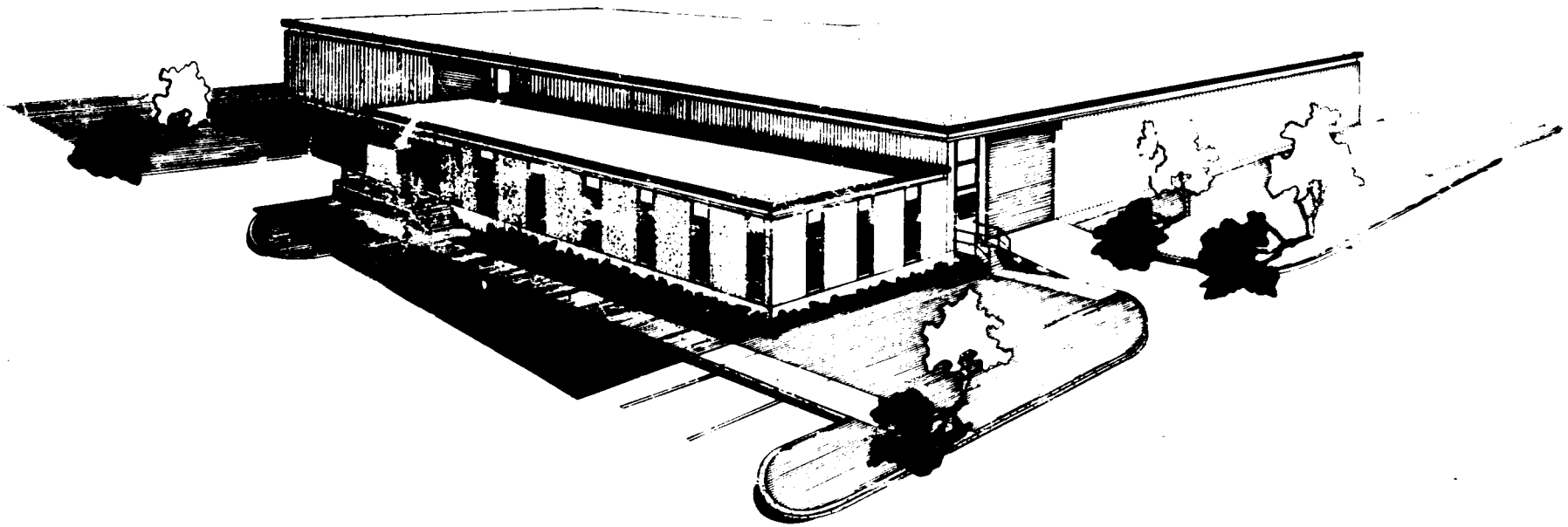

EMISSIONS LABORATORY
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FOREWORD

This project was performed for the U.S. Department of Transportation's Transportation Systems Center by the Emissions Research Laboratory of Southwest Research Institute. The project was an outgrowth of SwRI Proposal No. 11-8750, dated May 16, 1972, entitled "Assessment of Control Techniques for Reducing Emissions from Locomotive Engines". Test work began in November, 1972, and was completed in March, 1973.

The project contract was administered by Mr. William Rogers Oliver of EPA. Project funding was by DOT with funds transferred to EPA for management purposes. The Project Officer responsible for technical direction of the project was Dr. Karl M. Hergenrother of the Transportation Systems Center.

Project Manager for SwRI was Karl J. Springer, Manager of the Emissions Research Laboratory. Supervision of test work, data reduction, and report preparation was by John O. Storment. The lead technician on the project was Raul Martinez, and he was ably assisted by Gene Hoyt and Rodney Bauer. Alan Rittiman, Shop Foreman, furnished valuable assistance in setting up the test engine. Execution of the project was aided by the valuable advice of Mr. Hugh Williams, Jr., of EMD Engineering.

ABSTRACT

The primary objective of this study was to determine the most effective method of reducing emissions of oxides of nitrogen from a two-cylinder version of an EMD series 567C locomotive engine. The control method judged most effective was that which resulted in the greatest reduction in NO_x, had the least adverse effects on other emissions constituents and engine operation, yet was simple to install and maintain.

The NO_x control techniques selected for use in this study included (1) change in fuel injector design, (2) variation in injection timing from the standard setting, (3) inlet air humidification (water induction), (4) reduction of scavenging air volume (air box bleed), and (5) exhaust gas recirculation (EGR). In addition, methods (2) and (3) were used in combination. Continuous measurements of unburned hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_x), and smoke opacity were made as the test engine was operated through a test cycle based on speed and load points characteristic of actual locomotive operation.

Results of these tests indicated that the most effective control method was retarded injection timing (4° from standard). The next most effective method was EGR, with the recirculated exhaust cooled to 125-150° F. It was necessary to derate (or reduce) engine power at certain points in order to maintain smoke opacity at acceptable levels with both of these control techniques. Water induction, whether used with standard or retarded timing, was moderately effective in reducing NO_x, but not as effective as retarded timing alone. Air box bleed was not as effective as cooled EGR, and had the serious drawback of producing excessive smoke and CO. Hot (or uncooled) EGR resulted in substantial reductions in NO_x, but also produced extremely high levels of smoke and CO. It was necessary to drastically derate engine power to reduce smoke to acceptable levels. Finally, it was found that the new low-sac injectors were superior to the older needle-valve in the areas of HC and smoke control, but were inferior in the amount of NO_x produced. These relative differences in the two types of injectors were maintained when the various control methods were used.

I. INTRODUCTION

A. Background

The Emissions Research Laboratory of Southwest Research Institute has been engaged for several years in a series of programs to furnish information to various government agencies on emissions from a variety of sources. One such program, performed under Contract No. EHS 70-108 ("Exhaust Emissions From Vehicles and Related Equipment Using Internal Combustion Engines"), is concerned with a study of emissions from power sources such as used in lawnmowers, motorcycles, outboard motors, farm and construction equipment, and railroad locomotives.

The item of work in EHS 70-108 involving locomotive engines has been completed, and a report issued in October, 1972[1]. Three locomotives were tested; one powered by a four-stroke cycle G. E. engine and two units powered by two-stroke cycle EMD engines, one turbocharged and one naturally aspirated. This study was concerned only with characterization of the emissions from these three locomotives, with no effort expended in the area of control technology. And although EMD and, possibly, G. E. have programs underway to reduce emissions such as smoke and oxides of nitrogen, the two principal emissions of current interest and importance, no work in this area was being conducted by the Federal Government.

The work that is the subject of this report was performed as a sub-phase of Contract EHS 70-108. This arrangement was justified by the fact that the Emissions Research Laboratory had gained valuable experience and information concerning EMD engines in the course of the previous locomotive work. Also, the Department of Automotive Research at SwRI was in possession of a suitable test engine with which to evaluate the various exhaust emission control methods. This test engine was of the same general type as the engine in one of the locomotives (Unit No. 1311) tested previously. There thus existed a data base which could be used as reference for the data from the initial tests of the basic (unmodified) test engine.

B. Objectives

The principal objective of this project was to provide an assessment of various techniques for controlling oxides of nitrogen from a locomotive-type diesel engine operating over typical switch and line-haul duty cycles. The effectiveness of these techniques was to be evaluated and their influence on hydrocarbons, carbon monoxide and, especially, smoke opacity determined. The overall effectiveness of the various control methods could then be established. Attempts were to be made to alleviate, or at least enumerate, any adverse effects of the control techniques on

other emissions or engine operation.

C. Approach

Several control techniques which were known to influence NO_x emission from smaller, automotive-type diesel engines were selected for use in the project. These techniques were evaluated using a two-cylinder version of an Electro-Motive Division (EMD) series 567 locomotive engine. This engine was operated over a test cycle made up of speed and load points typical of a full-size 567 engine. Continuous measurements were made of unburned hydrocarbons, carbon monoxide, oxides of nitrogen, and smoke opacity. A computer program was developed which calculated cycle composite brake specific emissions, as well as brake specific and fuel specific emissions on a modal basis. Two weight factor schedules--one designed around switch or rail yard service and the other around line haul service--were used in performing these calculations. Use of these two sets of time-based weighting factors permitted the effectiveness of a given control technique to be determined for both types of duty cycles.

D. Progress Reports and Project Review

Monthly progress reports were furnished to the Project Officer at DOT and the Contract Administrator at EPA. These reports summarized the items of work accomplished during the reporting period, results of the test work, and brief statements on future project plans and the status of project funds. Many telephone conversations were held with the Project Officer in order to keep him abreast of project status and to solicit technical advice. The Project Officer visited SwRI on December 14, 1972, for an extensive project review. In addition, Mr. Louis Roberts, Director of Technology for DOT's Transportation Research Center, visited the Emissions Research Laboratory on March 14, 1973, and was given a briefing on the project.

II. TEST ENGINE, FUEL, AND INSTRUMENTATION

This section of the report offers a description of the engine used in this study, an analysis of the test fuel, and a description of the instrumentation used to obtain gaseous emissions data.

A. Description of Test Engine

The engine used in this study (Figure 1) was a two-cylinder version of the Electro-Motive Division (EMD) model 567, a blower scavenged, two-stroke cycle engine which, in 8, 12, and 16 cylinder form, is a principal power source for diesel locomotives. The engine has a displacement of 567 cu. in. per cylinder and a maximum governed speed of 845 rpm. The engine is connected to a 1000-hp capacity EMD generator, which is in turn connected to a load bank capable of absorbing 400 hp.

The full-size 567 engine is presently in use in a variety of configurations. Hence, it was necessary to decide which configuration would be representative of most in-service 567 engines. The aid of EMD was formally requested in a letter, dated July 24, 1972, to Mr. Hugh A. Williams, Jr., of EMD Engineering. Mr. Williams responded with a letter which contained information concerning such engine variables as compression ratio, type of cylinder liners and injectors, and injection timing. This letter also contained information and advice about possible engine test cycles. The letter appears as Appendix A of this report.

Based on the information thus obtained, it was decided to equip the test engine with 20-port cylinder liners, 16:1 compression ratio pistons, and fuel injectors calibrated for the medium air flow range of this engine. These components are basic to the 567C model engine, many of which are in use in 8, 12, and 16 cylinder versions.

B. Test Fuel Analysis

The fuel used throughout the project was the No. 2 emissions test fuel specified for use in Federal smoke and emissions certification tests of heavy-duty, automotive-type diesel engines. However, this fuel was used in the project because analysis revealed it to be very much like three typical diesel fuels used by Southern Pacific. An analysis of these three fuels was done in the course of on-site emissions tests performed by Southwest Research on three locomotives at the SP yard[1].

The analysis of the test fuel used in the current project is given in Table 1.

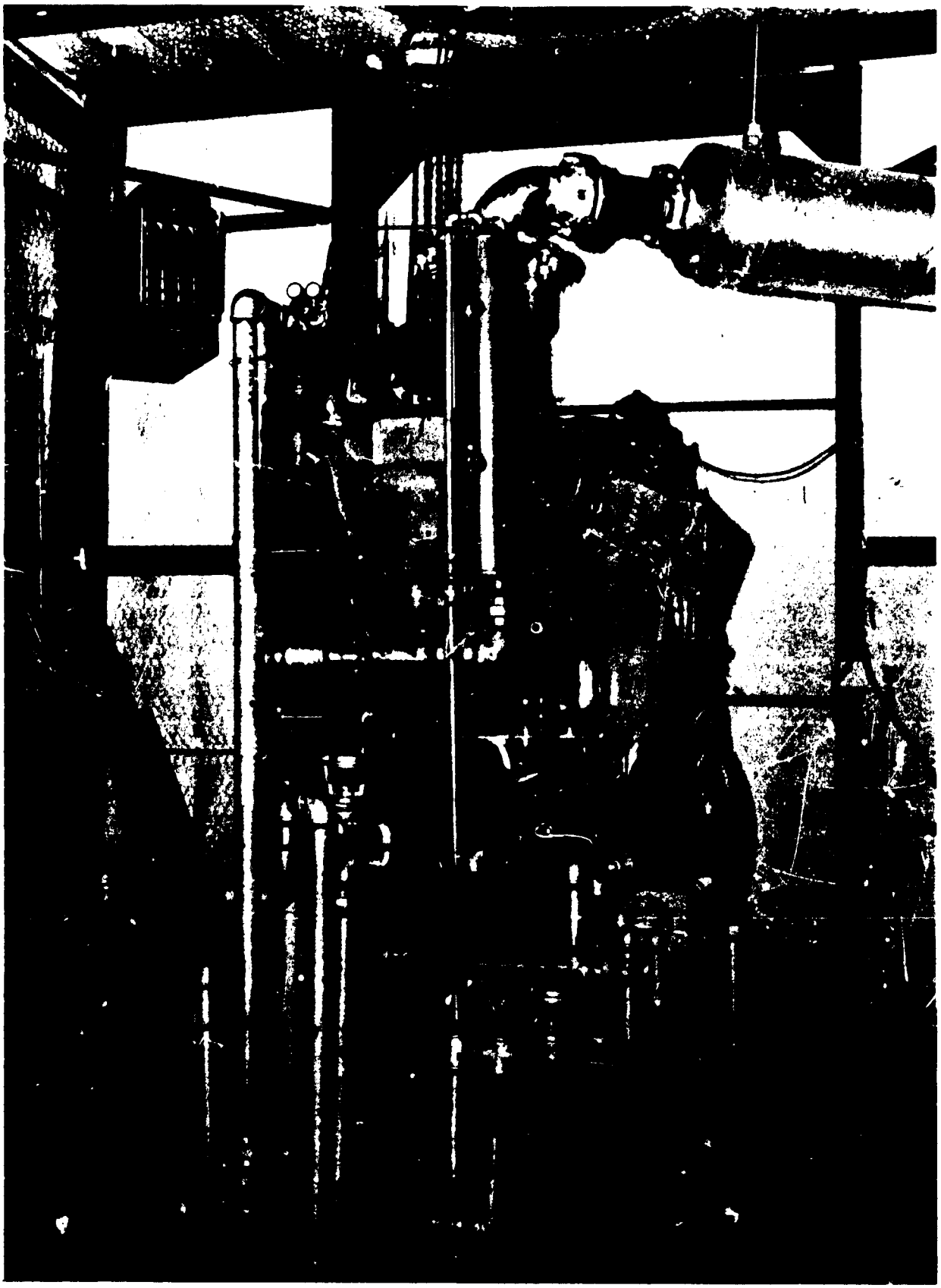


FIGURE 1. EMD 2-567 TEST ENGINE AND INSTALLATION

TABLE 1. LABORATORY ANALYSIS OF TEST FUEL

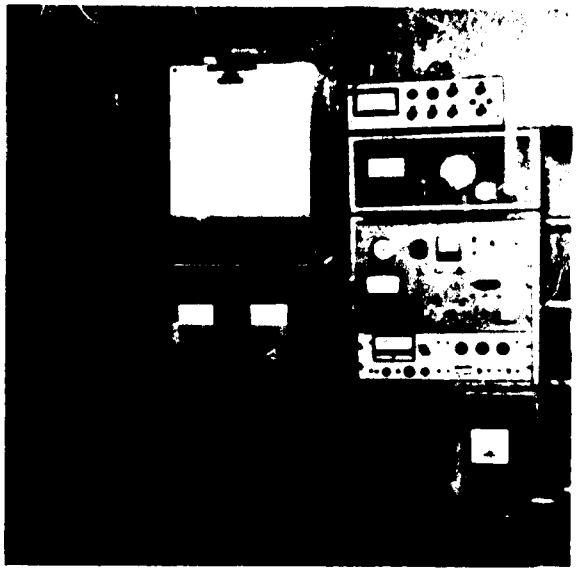
Fuel Type	DF-2
Property	
Gravity, °API	34.5
Sulfur, % by wt.	0.3
Aromatics, %	37.6
Distillation, °F	
Initial Boiling Point	386
End Point	638
10%	436
20%	461
30%	481
40%	498
50%	514
60%	530
70%	546
80%	564
90%	605
95%	648
Recovery, %	99.0
Residue, %	1.0
Calculated Cetane No.	46.7

C. Emission Instrumentation and Measurement Devices

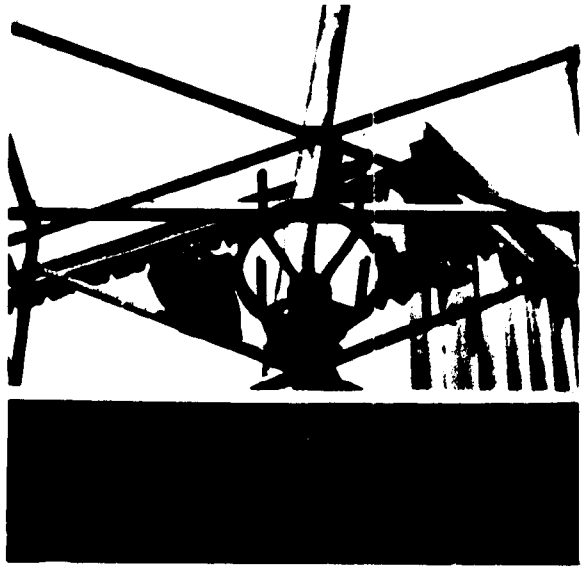
Measurements of unburned hydrocarbons, carbon monoxide, carbon dioxide, oxides of nitrogen (NO_x), and smoke opacity were taken during all tests. Excess oxygen in the exhaust was measured during tests conducted in the later stages of the project. Hydrocarbons (HC) were measured by a heated FID unit built to specifications given in SAE Recommended Practice J215. Carbon monoxide and carbon dioxide were measured by non-dispersive infrared analyzers in a system that conforms to SAE Recommended Practice J177, while oxides of nitrogen were measured by a chemiluminescent analyzer. Oxygen measurements were obtained by a polarographic analyzer. Exhaust smoke opacity was measured by means of an enlarged version of the PHS smokemeter. This enlarged model, built on a 20-in diameter ring instead of the 10-in diameter ring of the normal unit, proved to be a reliable and accurate instrument. The optical head was mounted on a six-in diameter exhaust pipe with the centerline of the light beam four in from the end of the pipe.

Engine fuel consumption was measured by a Flo-Tron linear mass flowmeter with direct readout in pounds per hour. A heat exchanger was

used to keep fuel temperature in the range of 90-100°F. Engine air consumption was measured by means of long-radius nozzles that conform to SAE Recommended Practice J244. Several views of the instrument cart, smokemeter, and fuel and air measurement devices are shown in Figure 2.

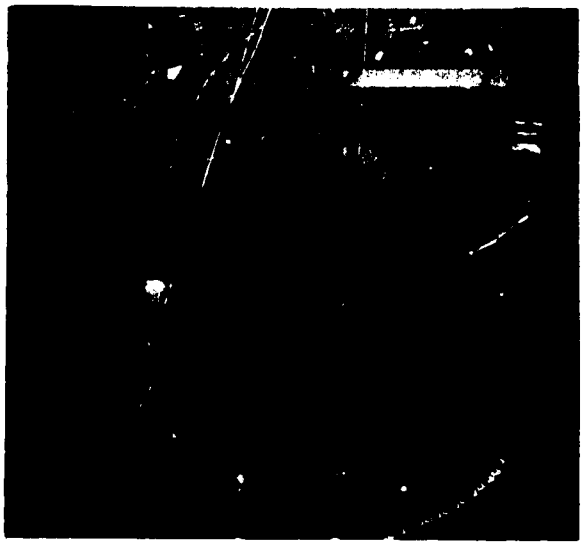


A. Emissions Sampling Cart for Diesel HC, CO,-CO_2, and NO_x



B. Large Size (20-in dia.) PHS Smokemeter

C. Linear Mass Flowmeter and Indicator for Fuel Measurement



D. Long Radius Nozzles for Measurement of Engine Air Flow

FIGURE 2. TEST INSTRUMENTATION FOR MEASUREMENT OF EMISSIONS CONCENTRATIONS, SMOKE, AND FUEL AND AIR FLOW

III. NO_x CONTROL METHODS AND PROJECT TEST PLAN

The objective of this project was to determine the effectiveness of several possible methods for control of locomotive exhaust emissions, particularly emissions of oxides of nitrogen. Several methods which were known to influence NO_x emissions in smaller, automotive-type diesel engines were selected for this study. These methods, and the engine modifications necessary to implement them, are outlined in this section. The test plan which was developed around these control methods is also presented here.

A. NO_x Control Methods

The control methods selected for use with the test engine included (1) fuel injectors of different designs, (2) variation of injection timing, (3) inlet air humidification (water induction), (4) reduction of scavenging air volume (air box bleed), and (5) exhaust gas recirculation (EGR).

Three types of injectors are currently in use in EMD locomotive engines: an older style, known as the spherical-valve injector, which is used in many older engines, but is no longer manufactured; a newer style, called the needle-valve injector, which is used in most later model engines; and the newest type of injector, known as the low-sac, which was introduced by EMD in mid-1972[2]. The principal design difference in these three types of injectors is in the sac volume below the spherical or needle valve that controls fuel flow through the injector. The sac volume has been steadily reduced by these design changes, principally to reduce exhaust smoke opacity and hydrocarbons. It was decided that all three types of injectors should be tested in the project in order to determine their effect on gaseous emissions.

The effect of injection timing on smoke opacity and NO_x from diesel engines is well known (i.e., later injection causes higher smoke but less NO_x), so it was decided that tests should be performed with non-standard timing. The standard timing setting for all EMD engines is 4° BTC. It was recommended by EMD that timing be varied ±4° of the standard setting (letter from Hugh Williams, contained in Appendix A). Injection timing is easily changed on the test engine.

Inlet air humidification (or water induction) was accomplished by mounting two atomization nozzles directly above the blower inlet. Water flow rate (in pounds per hour) was determined for various flowmeter settings. Air was supplied to the atomization nozzles at a constant pressure. Water was inducted at a mass flow rate equal to 25, 50, 75, or 100 percent of the fuel flow mass per mode. The same water rate (as a percent of fuel rate) was used in all modes of a given test.

Reduction of scavenging air (air box bleed) results in incomplete scavenging of exhaust gases from the cylinders and, consequently, a dilution of the incoming air charge. Hence, a kind of internal exhaust gas recirculation is obtained. This method works, of course, only with two-stroke cycle engines. Air box bleed of the test engine was accomplished by means of a three-in diameter gate valve installed in the air box (Figure 3A). A three-in OD pipe containing a plate orifice and a thermocouple was attached to this valve. The pressure drop across the orifice, the static pressure differential, and the temperature of air at the orifice were monitored in order to calculate the mass of the by-pass air (in pounds per minute). Air bleed rates were equal to 10, 20, 35, and 50 percent of the total air flow mass requirement of the engine per mode. The air bleed rate (as a percentage figure) was held constant throughout a given test.

Tests involving exhaust gas recirculation were done using "cooled" and "hot" exhaust gases. In both cases the exhaust gases were taken from a plenum chamber at the top of the engine. A three-in diameter gate valve was installed in this plenum chamber to regulate the flow of exhaust gases (Figure 3B). To obtain cooled EGR the exhaust gases were passed through a large water-cooled heat exchanger before entering the engine air intake system (Figure 3C). The heat exchanger was cooled by water from an external source rather than from the engine cooling system. This allowed the recirculated exhaust gas to be cooled to 125-150°F, a temperature range that might be difficult to obtain in actual locomotive operation unless an efficient air-cooled heat exchanger were used. The EGR flow rates chosen were 10, 20, and 30 percent of intake air mass requirement per mode. However, in the actual test work the rates were approximately 7, 16, and 25 percent of air flow mass. These reduced rates nevertheless indicate the correlation between EGR and engine smoke and gaseous emissions. The EGR rates will be referred to as "nominal" 10, 20, and 30 percent rates.

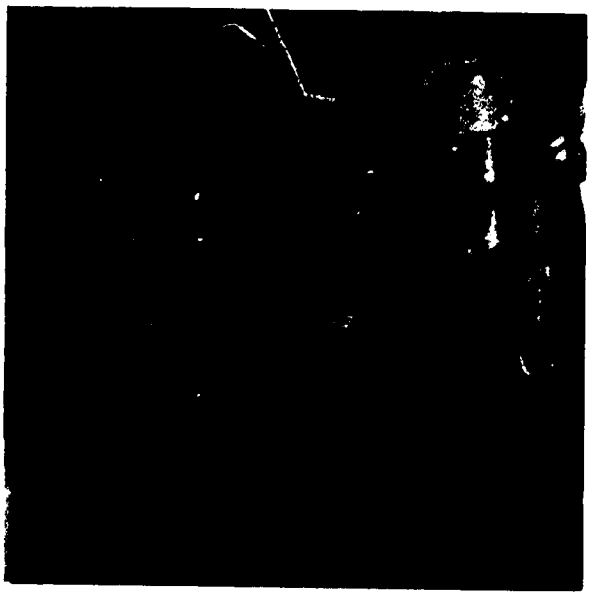
To obtain hot EGR the recirculated exhaust was routed around the heat exchanger. Exhaust temperatures in the EGR line were approximately 200-800°F, depending on engine speed and load. The hot recirculated exhaust was, of course, mixed with cool air in the inlet system before entering the engine. The EGR rates were again somewhat below the nominal 10, 20, and 30 percent rates chosen for this series of tests.

The recirculated exhaust, whether cooled or hot, passed through a straight section of three-in OD pipe containing a plate orifice and thermocouple. The orifice pressure drop, static pressure differential, and temperature of the gas at the orifice were used to compute the mass of the recirculated exhaust. The exhaust then entered the engine air intake system at a point between the air cleaner and the blower.

B. Test Plan

The tests performed in the course of the project are outlined by the

A. Air Box Bleed Valve and Line at Rear of Engine



B. External EGR Line and Vertically-Mounted Heat Exchanger

C. External EGR Line Entering Engine Air Inlet System

FIGURE 3. EXTERNAL ENGINE MODIFICATIONS FOR AIR BOX BLEED AND EXHAUST GAS RECIRCULATION

following matrix.

Injectors	Standard Timing	Nonstd. Timing Adv.	Nonstd. Timing Retd.	Water Induction Std. Timing	Water Induction Retd. Timing	Air Box Bleed	Exh. Gas Recir. Cooled	Exh. Gas Recir. Hot
Spherical	X							
Needle	X	X	X	X	X	X	X	X
Low-Sac	X		X	X	X	X	X	X

The tests at standard timing were used to determine the improvement in emission characteristics that could result from merely changing to a newer-style injector, and also to provide the reference (for needle and low-sac injectors) needed to evaluate the effectiveness of the various control methods. Since all spherical-valve injectors now in use will eventually be replaced by newer types, they were not used in the tests involving the control techniques. On the other hand, the majority of in-service EMD engines are equipped with either needle-valve or low-sac injectors; hence, these injectors were used for the full range of tests. However, some tests with the low-sac models were omitted in order to derive maximum benefit from the time and funds available. In particular, the low-sac injectors were used with only one water rate and retarded timing, rather than with all four water rates, and two of the four air box bleed rates and one of the three EGR rates were not done.

The actual test sequence involved (1) tests with spherical-valve injectors at standard timing, (2) all tests with needle-valve injectors, and (3) all tests involving low-sac injectors. Hence, injectors were not removed until the completion of all tests with a given type.

IV. TEST CYCLE AND DATA REDUCTION

This section describes the test cycle used throughout the project, the rationale behind development of the cycle, and the steps performed to reduce raw data to its final form.

A. Engine Test Cycle

It was deemed desirable to formulate a test cycle which would be representative of locomotive engine operation for this model engine, could be used for all tests regardless of changes in engine configuration from one test series to another, and would be as short as possible and still allow emission levels to stabilize.

Locomotive engines typically operate at certain engine speeds that are obtained by placing the throttle in predetermined positions or "notches". Fuel rate in each throttle position is also predetermined, so that engine power is constant for a given engine speed. Electro-Motive Division engines in line-haul (non-switch) service have eight throttle positions, plus low idle, while engines in switch service are equipped with a continuous-position throttle. The 2-567 test engine was equipped with a continuous-position throttle, but it was decided to operate the engine at speeds which corresponded to the eight throttle positions of a model 16-567C engine with 16:1 compression ratio pistons and medium air flow range injector tips.

The test plan called for several series of tests with different engine configurations produced by changing from one NO_x control method to another. Some, if not all, of these different engine configurations would undoubtedly result in changes in engine power output. It was therefore decided that the test cycle should not involve engine power as a parameter. Thus, engine fuel consumption rate and speed were the quantities which were used to define the test points (modes) of the cycle. A schedule of fuel rates for various EMD engines was obtained from the manufacturer. Fuel rates for the test cycle were obtained by dividing the typical 16-567C fuel rates by a factor of eight.

The test cycle was completed by adding three modes at low idle speed to the eight test points already selected, thus making an 11-mode schedule. The final form of the cycle is given in Table 2.

Initial emission tests with this cycle indicated that four-minute modes were sufficiently long to allow engine speed and load changes and stabilization of emission levels. This 44-minute long cycle formed the basis for all test work in the project. Repeatability of test results was generally good, though not exceptional. Particular problems that occurred during the tests will be mentioned in the section dealing with test results.

TABLE 2. TEST CYCLE FOR EMISSION TESTS OF EMD 2-567C ENGINE

Mode	Notch Position	Engine Speed, rpm	Fuel Rate, lbs/hr
1	Low Idle	285	-
2	1	285	8.0
3	2	344	11.8
4	3	424	21.2
5	4	515	32.5
6	Low Idle	285	-
7	5	584	45.6
8	6	675	60.0
9	7	755	75.6
10	8	835	93.8
11	Low Idle	285	-

B. Recording and Reduction of Data

All data were recorded during the last minute of each mode of the test cycle. Hydrocarbon emissions were measured "wet", that is, without allowing water vapor in the sample to condense. Emissions of CO, CO_2, and NO_x were measured "dry", after water vapor was removed from the sample by means of ice baths and/or a drying agent. Other data recorded at this time included engine speed and load (in terms of generator output), fuel flow, pressure differential across the long-radius nozzles, smoke opacity, and various temperatures and pressures dealing with ambient conditions and engine operation. Ambient wet/dry air temperatures and observed barometric pressure were recorded two or three times during the 44-minute test.

Most of this raw data was entered into a computer program developed for this project. The computer printouts, which appear in Appendix B, provide a detailed summary and analysis of the test data and results. The top half of the printout is concerned with engine performance data and parameters, such as engine speed and power output, mass flow rates for fuel, air and exhaust, fuel-air ratio (later changed to excess oxygen-fuel ratio) and brake specific fuel consumption, and various engine operating temperatures and pressures. The lower half of the printout contains exhaust smoke opacity, emission concentrations, weighting factors (later changed to excess oxygen), and brake specific and fuel specific values for hydrocarbons, carbon monoxide and oxides of nitrogen (as NO_2). All of these data are given on a modal basis. Cycle composite brake specific values of HC, CO, NO_x (as NO_2) and brake specific fuel consumption are also given. Emission concentrations that are measured "dry" appear on the printout as "wet" values after conversion by one of the conversion factors in SAE Recommended Practice J177. Concentration values of NO and NO_x

are further corrected to a standard atmospheric moisture content of 75 grains of water per pound of dry air by the conversion factor approved by the Environmental Protection Agency for diesel engine certification tests[3].

Two weight factor schedules are used in computing the cycle composite brake specific quantities. One schedule represents the duty cycle of a locomotive engaged in switch operation[4], while the other schedule represents the cycle of a line-haul locomotive[5]. The two weighting schedules are given in Table 3.

TABLE 3. LOCOMOTIVE WEIGHT FACTOR SCHEDULES

Mode	Notch Position	Engine Speed, rpm	Percent of Operating Time in Notch	
			ATSF Switch	G. E. Line Haul
1	Low Idle	285	25.7	14.3
2	1	285	10.0	3.0
3	2	344	5.0	3.0
4	3	424	4.0	3.0
5	4	515	2.0	3.0
6	Low Idle	285	25.7	14.3
7	5	584	1.0	3.0
8	6	675	1.0	3.0
9	7	755	0	3.0
10	8	835	0	28.0
11	Low Idle	285	25.7	14.3

The ATSF schedule assumes that a switch engine is at low idle some 77 percent of its operating time. Hence, each of the three idle modes in the test cycle have weight factors of approximately 25.7 percent. The weight factors become progressively smaller as the throttle notch position increases, thus reflecting the small amount of time such an engine spends in the higher horsepower ranges. Indeed, notches 7 and 8 (modes 9 and 10) have weight factors equal to zero.

The G. E. line-haul schedule gives low idle a weight factor of 43 percent, so that each idle mode is weighted by 14.3 percent. Each of the first seven notches consumes three percent of the operating time of the line-haul cycle, while notch 8 (mode 10), the point of maximum power output, is given 28 percent of the operating time. It should be noted that the sum of the weight factors given above is only 92 percent. This is because the G. E. schedule contains a mode for application of the dynamic brake. This condition, which has an eight percent weight factor attached to it, was deleted for purposes of this project. This deletion was necessary, since the test engine did not have the dynamic brake, and justified, since the weighting schedule remains the same for all cycle composite calculations and thus produces brake specific values that can be compared in a relative sense.

It is evident from this discussion that the cycle composite values are highly dependent on the particular set of weight factors used in the calculations, and this dependence should be kept in mind whenever cycle composite values are being discussed. It should also be noted that the weight factors do not have any effect on modal brake specific and fuel specific quantities. However, fuel specific emissions for idle modes are heavily influenced by the fuel rates, since only these fuel rates were uncontrolled. That is, idle fuel rates experienced normal fluctuations, while fuel rates in all other modes were held close to the predetermined values shown in Table 2. These fluctuations also produced relatively large differences in the cycle composite brake specific fuel consumption values, since these values are heavily weighted towards the low idle condition, regardless of the weight factor schedule used. In short, fuel specific emissions at idle (Modes 1, 6, and 11) and cycle composite BSFC values should be interpreted in light of the fact that normal fluctuations in idle fuel consumption play a large part in the differences in these values.

V. SUMMARY OF TEST RESULTS

This section summarizes the results of all tests performed in the project. Principal results presented here include the cycle composite brake specific HC, CO, and NO_x (as computed with both ATSF and G. E. weight factor schedules), the modal smoke opacity, and the (unweighted) modal brake specific and fuel specific emissions. Modal concentrations of HC, CO, and NO_x are summarized in the subsections concerned with air box bleed and cooled and hot EGR. The tables and figures for these modal quantities (except smoke opacity) are contained in Appendix C to avoid cluttering the text, and will be referred to as required. Computer printouts of the calculated test results are contained in Appendix B.

Because this study was a research effort into a relatively unknown area, it was a great advantage to consult with personnel at EMD Engineering about various problems and results encountered in the course of the project. Several telephone conversations were held between the staff of the Emissions Research Laboratory and EMD, and qualitative results of several phases of the test work were discussed. EMD confirmed the general trend of the SwRI results in several areas of testing, including tests with three types of fuel injectors, non-standard injection timing, and water induction. These confirmations served to build confidence in the results and hasten the test schedule along.

Before proceeding to the analysis of the test results, it is necessary to issue a word of caution on one point. The results of this study were obtained from a series of tests in a controlled laboratory environment, using a two-cylinder version of a full-size EMD series 567 locomotive engine. The relationship between this experimental situation and the situation which exists for a typical locomotive in switch or line haul service is not known. Therefore, extreme care should be used in projecting the results of these tests to the railroad industry as a whole, or even to all EMD model 567 in-service engines.

A. Emissions For Three Types of Injectors at Standard Timing

These results characterize the emission levels of the test engine when equipped with three types of injectors set to standard timing (4° BTC). The results also furnish a set of baseline values for needle and low-sac injectors that will be used to evaluate the effectiveness of the various control methods.

Table 4 summarizes the average cycle composite brake specific emissions from Tables B-1 to B-28 of Appendix B. These average values are illustrated in Figures 4 and 5. Comparing the composite values calculated with ATSF weight factors, it was found that brake specific hydrocarbons (BSHC) were reduced by about 49 percent by changing from

TABLE 4. CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR EMD 2-567 ENGINE WITH SPHERICAL-VALVE, NEEDLE-VALVE, AND LOW-SAC INJECTORS AT STANDARD TIMING

Injectors	BSHC	BSCO	$BSNO_x$	BSHC + $BSNO_x$
		ATSF Weight Factor Schedule		
Spherical	8.842	4.081	19.823	28.665
Needle	4.553	4.139	19.562	24.115
Low-Sac	1.837	2.702	22.563	24.400
		G.E. Weight Factor Schedule		
Spherical	2.680	6.251	12.121	14.801
Needle	1.106	10.568	9.823	10.929
Low-Sac	0.655	7.281	13.045	13.700

spherical-valve to needle-valve injectors, while a 60 percent reduction resulted when changing from needle to low-sac injectors. A 79 percent reduction in BSHC was noted between the spherical and low-sac models. Cycle composite brake specific CO (BSCO) was almost the same for the spherical and needle injectors, while the low-sac injectors reduced this value by about 34 percent. Similarly, the brake specific NO_x ($BSNO_x$) was very nearly the same for the spherical and needle injectors, but the low-sac model raised this value approximately 13 percent.

It has been previously mentioned that an earlier phase of Contract EHS 70-108 involved testing of three locomotives, one (No. 1311) of which was powered by an EMD 12-567 engine. This engine was equipped with needle-valve injectors and 16:1 compression ratio pistons, but operated at slightly different speeds than the test engine in some notch positions. Fuel rates per cylinder were very close for the two engines. The cycle composite emissions for this locomotive were calculated with ATSF switch weight factors only. It is interesting to compare these values with those obtained from the 2-567 engine in the baseline tests. The respective BSHC, BSCO, and $BSNO_x$ for the two engines are given below.

Engine	BSHC	BSCO	$BSNO_x$
12-567	8.87	3.89	11.40
2-567	4.55	4.14	19.56

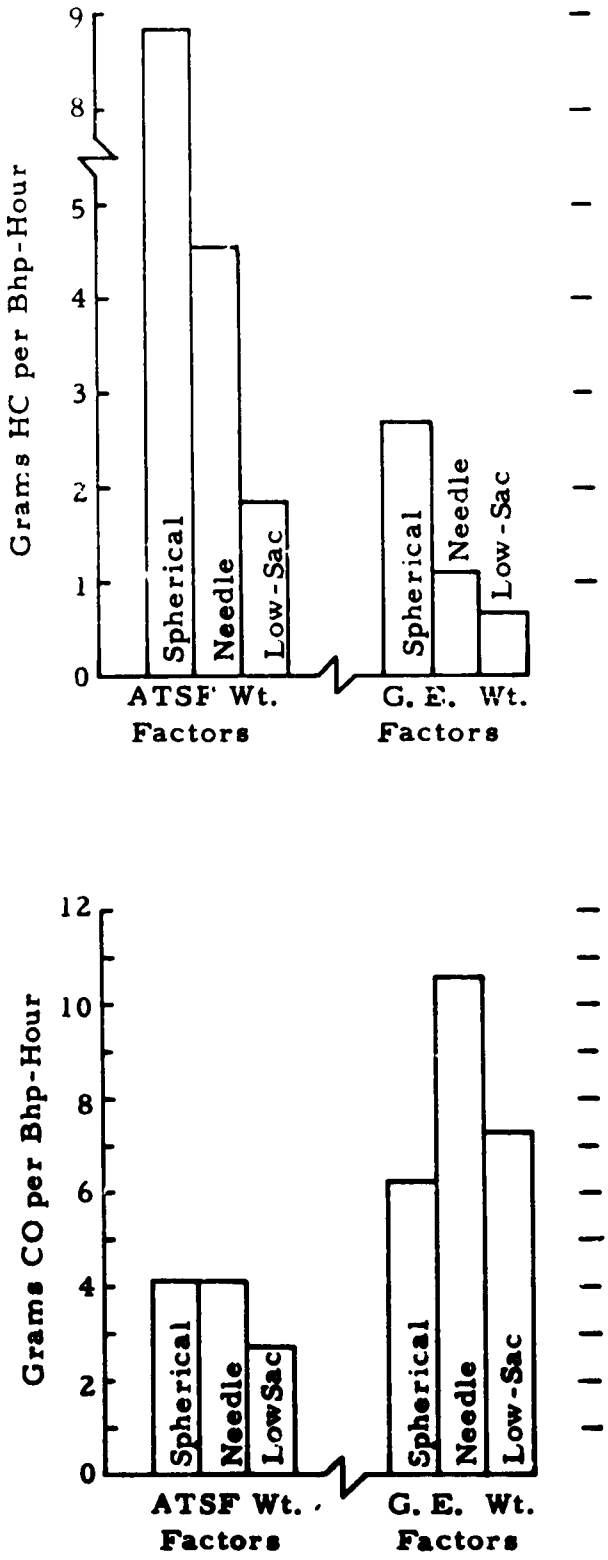


FIGURE 4. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR EMD 2-567 ENGINE EQUIPPED WITH THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

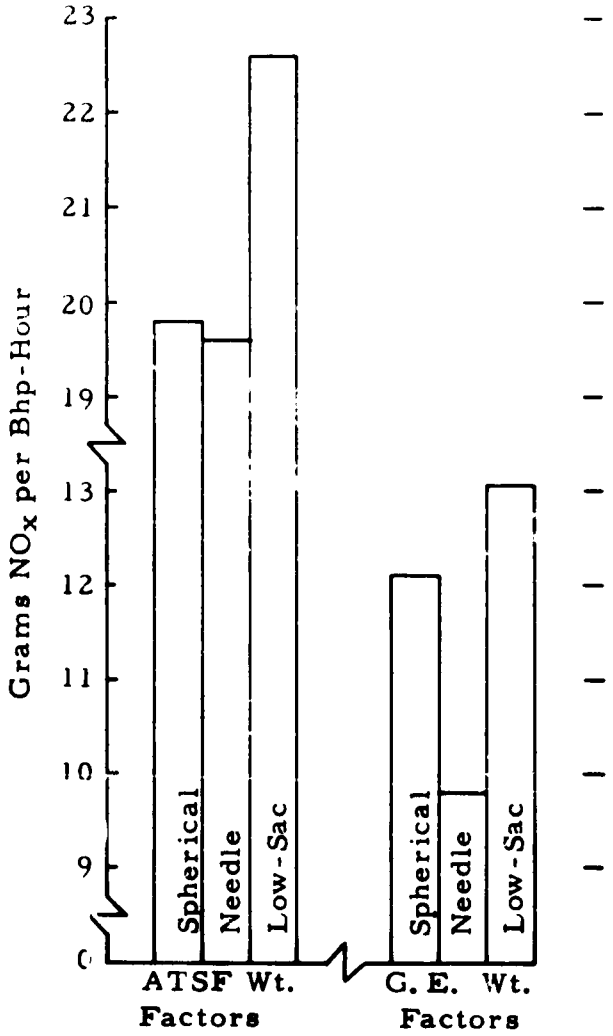


FIGURE 5. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR EMD 2-567 ENGINE EQUIPPED WITH THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

It is evident that only the BSCO values are approximately equal, while BSHC differs by a factor of nearly two, and $BSNO_x$ by slightly less. The cause of these rather large differences lies in the concentrations of HC and NO_x; the 12-cylinder engine simply produced higher concentrations of the former and lower concentrations of the latter than did the 2-567 test engine.

A comparison of the cycle composite brake specific values computed with G. E. weight factors reveals that the needle injectors produced almost 59 percent less BSHC than did the spherical injectors, while a 41 percent reduction occurred between the needle and low-sac models. These latter injectors produced some 75 percent less BSHC than the spherical injectors. The needle and low-sac injectors gave, respectively, 69 and 14 percent more BSCO than the spherical models. The needle injectors produced about 19 percent less $BSNO_x$ than the spherical units, while the low-sac injectors gave seven percent more than the spherical-valves and 25 per-

cent more than the needle-valves.

The average modal smoke opacity for the three types of injectors is given in Table 5 and shown in Figure 6. It is evident that smoke opacity was low in all cases. This is not surprising, since the engine was equipped with new pistons and cylinder liners, and the injectors were either new or recently rebuilt. It is interesting to note that the opacities measured during these tests are very similar to those measured during on-site tests of the 12-567 engine in Unit No. 1311[6].

TABLE 5. MODAL SMOKE OPACITY FOR SPHERICAL-VALVE, NEEDLE-VALVE, AND LOW-SAC INJECTORS AT STANDARD TIMING

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, %		
			Spherical Inj.	Needle Inj.	Low-Sac Inj.
1, 6, 11	Low Idle	285	1.4	0.8	1.0
2	1	285	1.5	1.4	1.2
3	2	344	2.0	1.5	1.2
4	3	424	2.0	1.9	1.3
5	4	515	2.0	1.7	2.3
7	5	584	2.0	1.4	1.8
8	6	675	2.0	1.8	2.3
9	7	755	3.0	2.6	2.5
10	8	835	3.9	4.6	3.8

Average modal brake specific and fuel specific emissions are presented in Table C-1 and Figures C-1 through C-6 in Appendix C. The spherical injectors gave the highest BSHC in every mode or notch position, and the low-sac injectors gave the lowest values (Figure C-1). The spherical and needle injectors produced much more BSHC in notch positions 1-3 (285-424 rpm) than in the remaining test modes. The low-sac models were characterized by fairly constant output of BSHC in all notch positions. The spherical injectors produced the highest BSCO in the lower notch positions, while the low-sac units gave the least (Figure C-2). However, in the upper notch positions the needle injectors produced the most BSCO, and the spherical units gave the lowest values. The behavior of these modal BSCO values, and a brief consideration of the two sets of weight factors involved, illustrate why the rank order of the cycle composite BSCO values discussed previously was changed by the use of the two weighting schedules. The spherical injectors produced the most $BSNO_x$ in the first two notch positions, but the low-sac models resulted in the highest values in all the other positions. The needle injectors gave the lowest values in all but the first notch. Again, the somewhat inconsistent trend of these modal values, when interpreted in light of the two weighting schedules, explains the behavior of the cycle composite values.

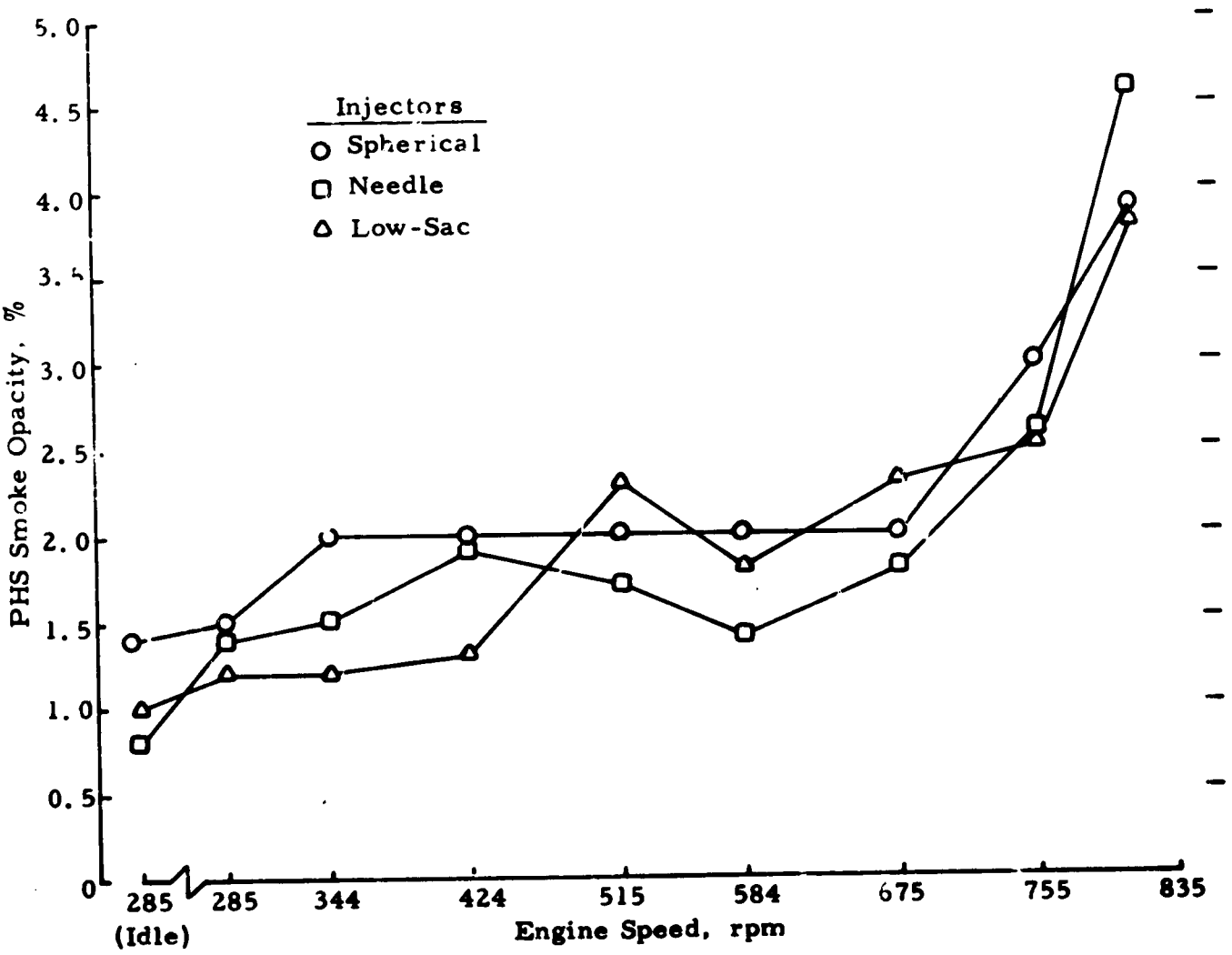


FIGURE 6. MODAL SMOKE OPACITY LEVELS FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

Modal fuel specific data is derived from the mass flow (in grams per hour) of HC, CO, or NO_x, divided by the fuel flow (in pounds per hour). The emission mass flow is basically a function of intake air mass and the concentration of the particular contaminant. Since the mass of intake air and fuel per mode remained fairly constant from one test to another, a given fuel specific value is essentially a function of concentration. The only test points where this analysis is in doubt is at low idle (Modes 1, 6, and 11), where fluctuations in fuel flow produced differences in the associated fuel specific quantities that were not caused by differences in concentrations alone.

Fuel specific HC (Figure C-4) values for the three types of injectors show the same trends as the brake specific HC, with the spherical injectors yielding the highest values and low-sacs the lowest. The fuel specific CO (Figure C-5) values also follow the same trend as their brake specific counterparts, with spherical injectors producing the highest values in the lower notch positions and needle models giving the most FSCO in the higher notches. At low idle condition the low-sac units produced the most CO and the spherical models the least. The $FSNO_x$ of the spherical injectors differs from that of the other two types of injectors not only in magnitude but also in its behavior in the first condition (Figure C-6). This difference is apparently due to a change in the fuel rates at low idle. This change occurred a short time after the baseline tests of the spherical injectors. In any case, the low-sacs produced the most FSCO, and the needle valve units generally produced the least.

Engine power output was fairly constant, regardless of which type of injector was used. The power recorded was observed and not corrected for changes in ambient conditions. Hence, some variation was present, but it is not thought that these differences in power are related to injector design. Engine operation was also unaffected by the different injectors, i.e., there was no roughness or instability of operation present.

In summary, it can be said that the needle and low-sac injectors produced much lower brake specific HC than the spherical-valve models. Unfortunately, the low-sacs produced higher $BSNO_x$ than either of the other two types of injectors. Brake specific CO was not significant in any instance. It should be noted that the observed relative effects of injector type on emissions is very similar to those found in the case of an automotive two-stroke cycle diesel of the same general design as the 2-56[7] engine[7]. The three types of injectors used in the study referenced are known as crown-valve, needle-valve, and LSN (Low Smoke Nozzle), and are very similar to the spherical-valve, needle-valve, and low-sac injectors of the present study.

B. Effect of Injection Timing On Emissions--Needle-Valve and Low-Sac Injectors

A series of tests was performed with the needle and low-sac injectors

set to nonstandard timing. Needle injectors were tested at two such settings, 4° advanced and 4° retarded from the standard 4° BTC. The low-sac units were tested at the retarded setting only.

Table 6 and Figures 7 through 10 summarize the cycle composite brake specific emissions for these tests. The corresponding computer printouts are Tables B-29 through B-48 of Appendix B. As usual, computations were performed with both weight factor schedules.

With needle injectors, standard timing resulted in the highest BSHC (Figure 7) and advanced timing gave the lowest values. These results held true regardless of the weight factor schedule used in the calculations. Likewise, BSCO values computed with ATSF weight factors were highest for standard timing and lowest for the advanced setting (Figure 7). However, when computed with G. E. weight factors, the BSCO was highest with retarded timing and lowest with advanced timing. This difference is due to the fact that retarded timing produced much higher CO concentrations in notches 5 to 8 (584 to 835 rpm), which are weighted more in the G. E. line haul schedule than in the ATSF switch schedule.

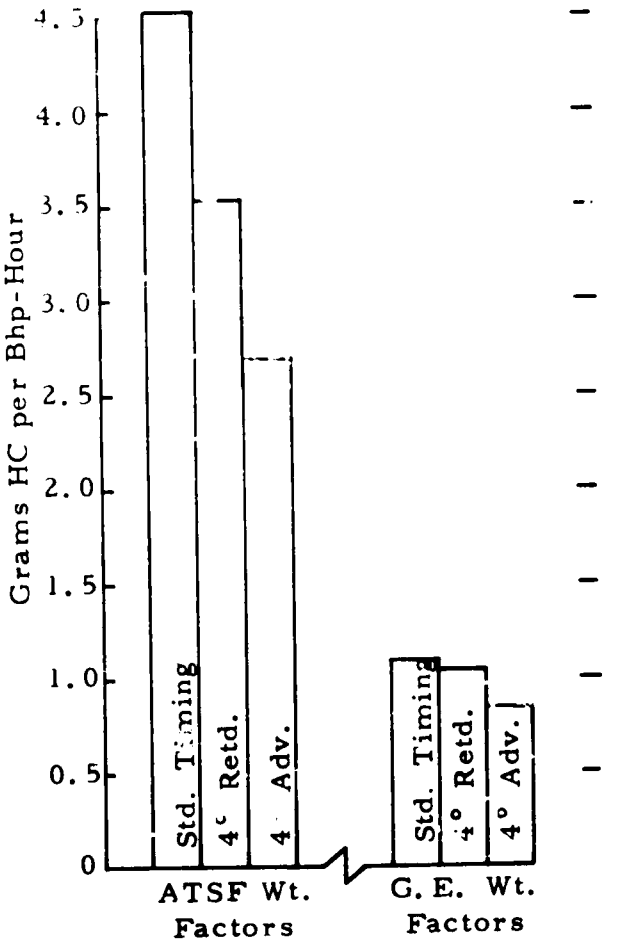
The very important cycle composite values of $BSNO_x$ are shown in Figure 8. As expected, retarded timing produced the lowest values and advanced timing gave the highest. With ATSF weight factors, $BSNO_x$ values with retarded timing were approximately 32 percent lower than with standard timing and about 55 percent less than with advanced timing. Using G. E. weight factors, retarded timing gave about 25 percent less $BSNO_x$ than the standard timing and some 48 percent less than for advanced timing. In all cases, the improvement in the cycle composite $BSNO_x$ was significant and was accomplished with a simple engine modification. The only apparent drawback, in a gaseous emission sense, was the increased CO concentrations in the high-power notch positions.

Retarded timing of the low-sac injectors resulted in slightly lower BSHC and slightly higher BSCO (Figure 9) than was obtained with standard timing. Brake specific NO_x (Figure 10) was reduced by 26 percent for the ATSF cycle and by 28 percent for the G. E. cycle. These brake specific values therefore follow the same trend, relative to the values for the needle injectors, as in the baseline tests; i. e., at retarded timing the low-sac produced less BSHC and BSCO, and more $BSNO_x$ than the needle-valve units.

Table 7 contains the smoke opacity data for both types of injectors at the various timing settings, and Figure 11 illustrates these data. Looking first at the data for the needle injectors, it is evident that retarded timing led to a substantial opacity increase in notches 5 to 8 (584 to 835 rpm). However, the increased opacity was excessive only at the notch 8 position. Another series of tests was performed at retarded timing but with a slight power derating in notch 8. The amount of derating used was

TABLE 6. EFFECT OF INJECTOR TIMING ON CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR NEEDLE-VALVE AND LOW-SAC INJECTORS

Injectors	Injector Timing	BSHC	BSCO	$BSNO_x$	BSHC + $BSNO_x$
		ATSF Weight Factor Schedule			
Needle	Std. (4° BTC)	4.553	4.139	19.562	24.115
	4° Retd.	3.562	3.988	13.226	16.753
	4° Adv.	2.685	3.946	29.586	32.271
Low-Sac	Std. (4° BTC)	1.837	2.702	22.563	24.400
	4° Retd.	1.715	3.194	16.572	18.287
	4° Adv.	-	-	-	-
		G. E. Weight Factor Schedule			
Needle	Std. (4° BTC)	1.106	10.568	9.823	10.929
	4° Retd.	1.041	12.500	7.326	8.366
	4° Adv.	0.839	10.051	14.060	14.899
Low-Sac	Std. (4° BTC)	0.655	7.281	13.045	13.700
	4° Retd.	0.605	9.783	9.378	9.791
	4° Adv.	-	-	-	-



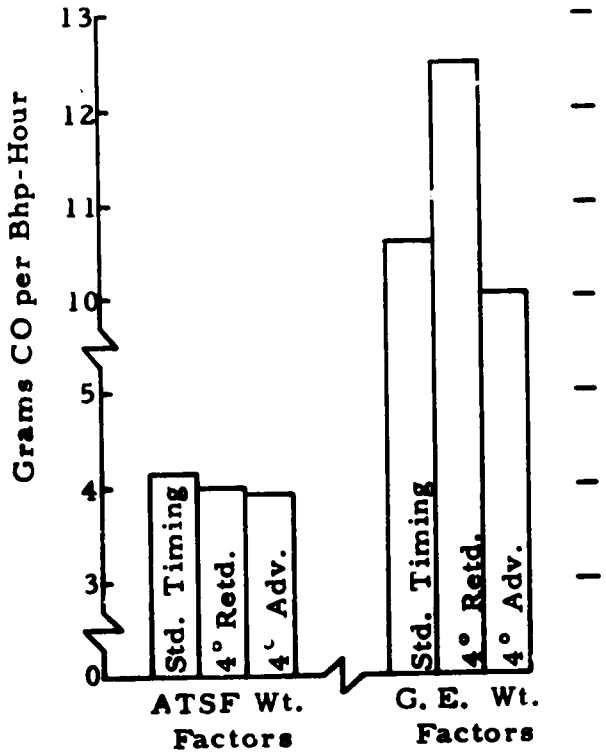


FIGURE 7. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

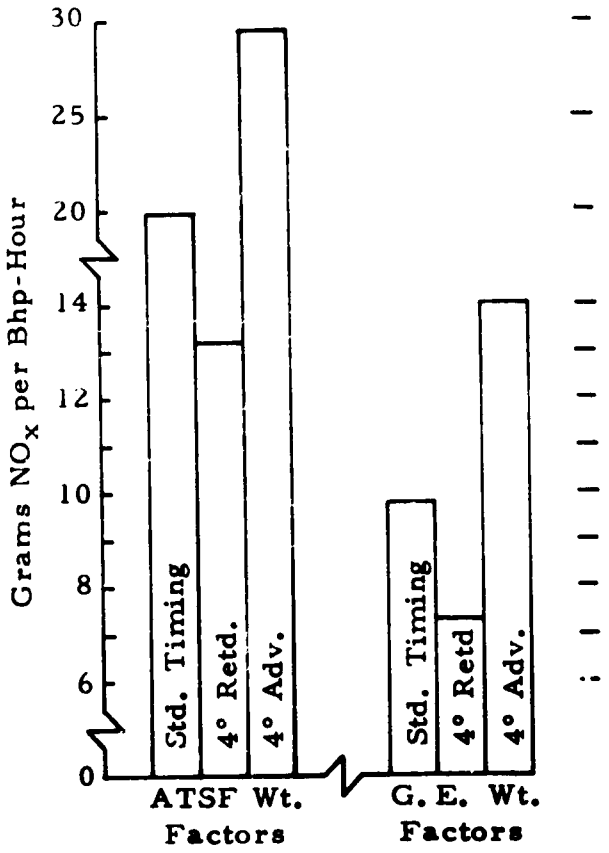


FIGURE 8. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

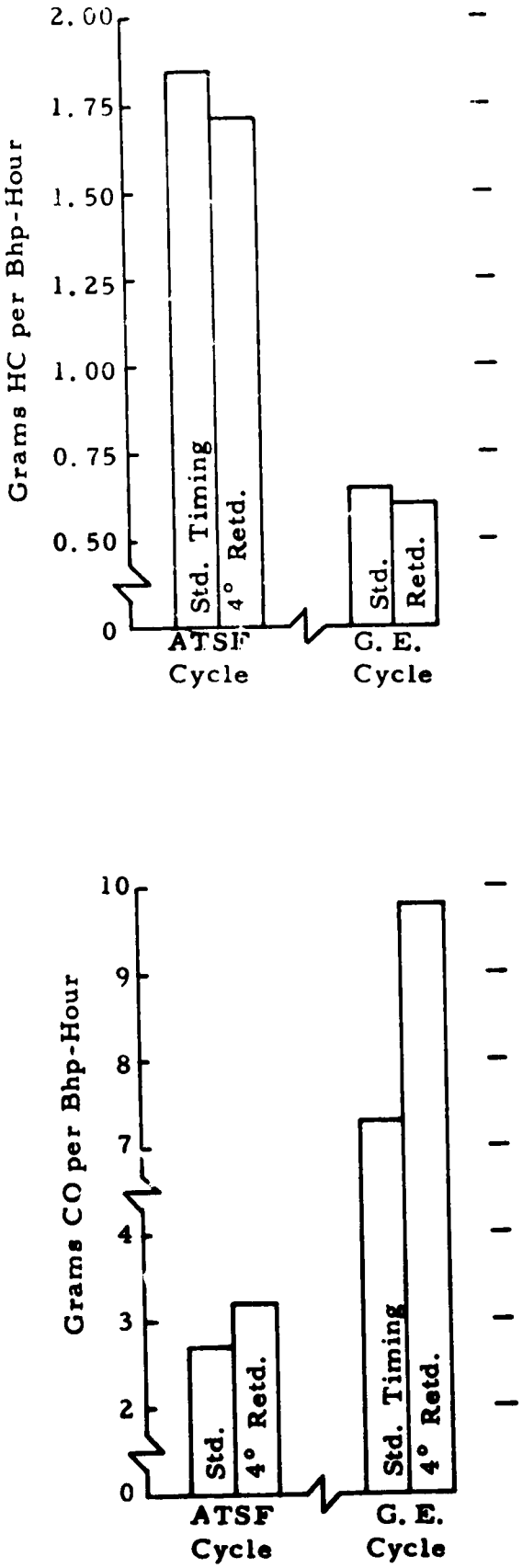


FIGURE 9. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

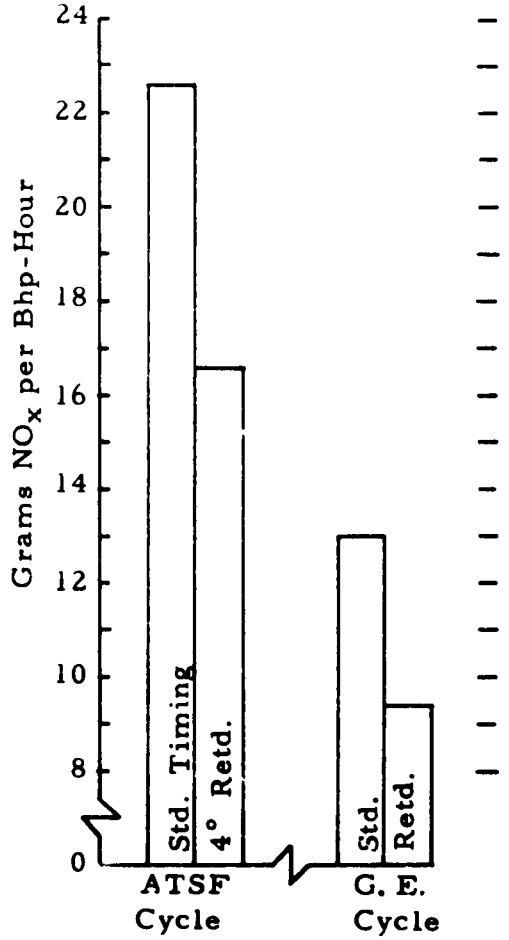


FIGURE 10. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

TABLE 7. EFFECT OF INJECTION TIMING ON SMOKE OPACITY FOR NEEDLE-VALVE AND LOW-SAC INJECTORS

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, %		
			Std. Timing	4° Adv.	4° Retd.
	Needle Injectors				
1, 6, 11	Low Idle	285	0.8	1.1	1.8
2	1	285	1.4	1.2	2.0
3	2	344	1.5	1.2	2.0
4	3	424	1.9	1.2	2.1
5	4	515	1.7	1.2	2.3
7	5	584	1.4	1.4	2.8
8	6	675	1.8	1.3	3.5
9	7	755	2.6	1.7	5.5
10	8	835	4.6	2.7	10.0
	Low-Sac Injectors				
1, 6, 11	Low Idle	285	1.0	-	1.0
2	1	285	1.2	-	1.5
3	2	344	1.2	-	1.8
4	3	424	1.3	-	1.8
5	4	515	2.3	-	2.0
7	5	584	1.8	-	1.8
8	6	675	2.3	-	2.2
9	7	755	2.5	-	3.0
10	8	835	3.8	-	5.7

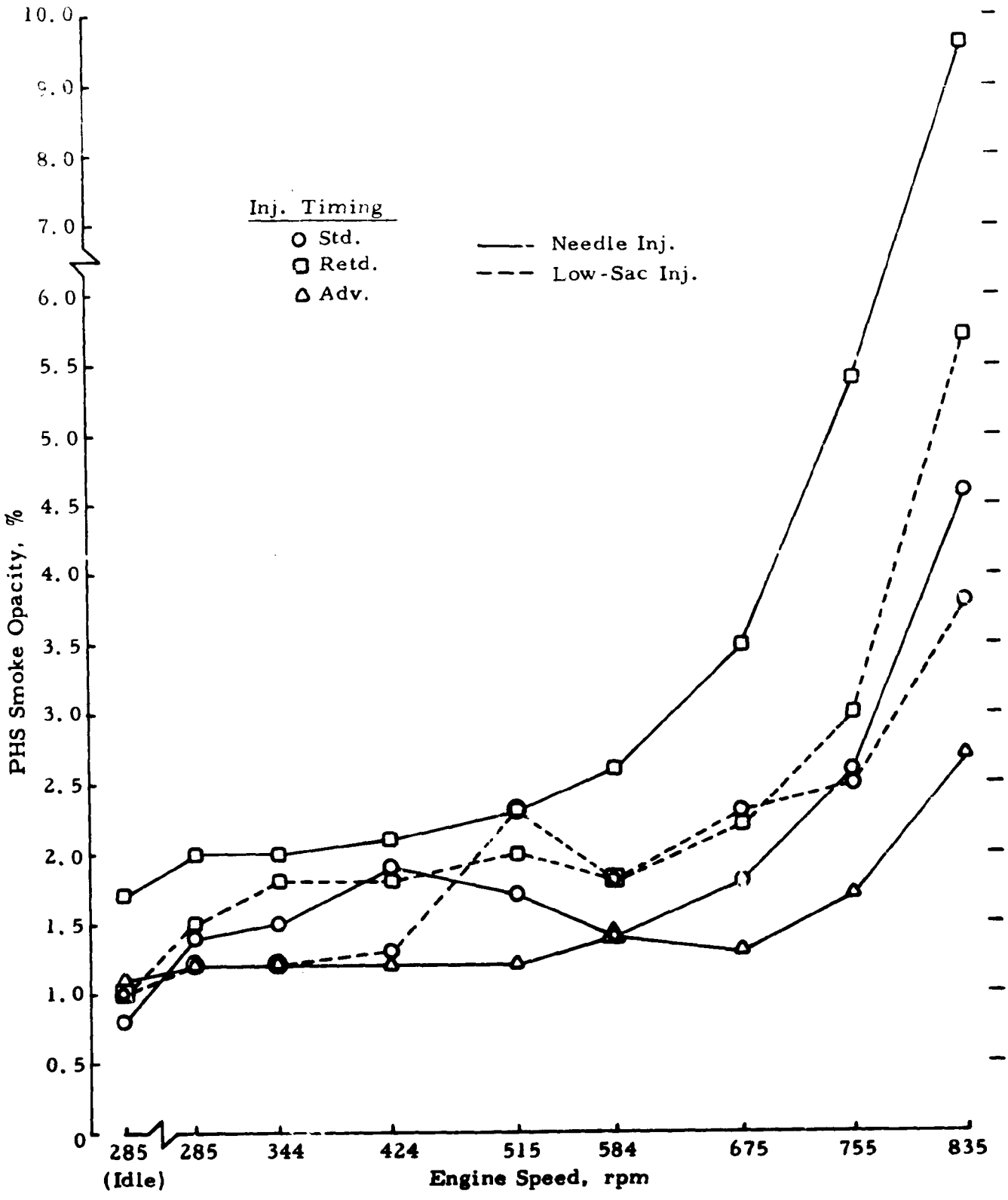


FIGURE 11. MODAL SMOKE OPACITY LEVELS FOR NEEDLE-VALVE AND LOW-SAC INJECTORS AT STANDARD AND NON-STANDARD TIMING

sufficient to reduce smoke opacity to 5 to 6 percent, which is the nominal smoke level for the needle-valve injectors at standard timing. An extra mode, featuring the derated power condition, was performed at the end of two of the tests made with retarded injection timing. The data thus obtained were substituted in place of the original mode 10 data in the computer program and the computations performed again. Only the G. E. line haul weight factors were used in this second set of computations, as the ATSF schedule attaches zero weight to the notch 8 position. The computer printouts for these two tests are also contained in Appendix B, Tables B-47 and B-48. The pertinent data from the printouts are summarized below in Table 8.

TABLE 8. EFFECT OF DERATING ON EMISSIONS, SMOKE AND POWER--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

Cycle Composite Emissions

BSHC		BSCO		$BSNO_x$	
Normal	Derate	Normal	Derate	Normal	Derate
1.041	1.312	12.500	7.939	7.326	7.513

Notch 8 (Mode 10) Smoke, Emissions, and Power

Smoke, %		BSHC		BSCO		$BSNO_x$	
Normal	Derate	Normal	Derate	Normal	Derate	Normal	Derate
10.0	5.5	0.88	1.20	14.52	9.30	6.93	7.12

Power, Bhp		FSHC		FSCO		$FSNO_x$	
Normal	Derate	Normal	Derate	Normal	Derate	Normal	Derate
201	176	1.89	2.52	31.10	19.42	14.84	14.86

It can be seen that, besides the desired reduction in smoke opacity, derating produced slightly higher BSHC and $BSNO_x$ and much lower BSCO both on a cycle composite and modal basis. This same trend holds for the fuel specific quantities. The principal influences on these brake specific and fuel specific quantities are, of course, the 12 percent lower brake horsepower and 10 percent lower fuel rate of the derated condition. In summary, derating in notch 8 is a simple and effective method of obtaining the benefits of retarded timing of the needle injectors without the penalty of increased smoke opacity. Whether this amount of derating is desirable from an operations standpoint is another matter.

Retarded timing also caused smoke opacity associated with the low-sac injectors to increase somewhat over baseline (Table 7 and Figure 11).

However, the baseline (standard timing) opacities were so low that even the increased values were not excessive. Maximum opacity was less than six percent in notch 8; therefore, no tests were conducted with engine power derated in that position.

The average modal brake specific and fuel specific emissions for the needle injectors at standard, advanced, and retarded timing are presented in Table C-2 and illustrated in Figures C-7 through C-12 of Appendix C. Note that the BSHC (Figure C-7) was reduced principally in the first two notch positions by nonstandard timing, with less improvement noted in the later notches. Brake specific CO (Figure C-8) was lowered in the first two notches by retarded timing, but was somewhat increased in the higher-power conditions. The effect of timing on $BSNO_x$ is evident in every notch position (Figure C-9). The modal fuel specific emissions show the same relative trend as the brake specific quantities. It should be mentioned that the idle fuel rate was subject to some fluctuation; hence, there are some slight anomalies between the fuel specific emissions at idle and those for the eight notch positions.

Modal brake specific and fuel specific quantities for the low-sac injectors at standard and retarded timing are given in Table C-3 and shown in Figures C-13 through C-16 in Appendix C. Brake specific HC values (Figure C-13) are very close and show a distinct difference only in the last three notch positions (675 to 835 rpm). Similarly, BSCO (Figure C-13, also) differs significantly only in the last four notch positions. However, $BSNO_x$ (Figure C-14) was lower at every test point for retarded timing. Fuel specific HC and CO (Figure C-15) and NO_x (Figure C-16) again show the same general trends and the same relative differences as the corresponding brake specific quantities.

In summary, it is possible to obtain a substantial reduction in NO_x by retarding injection 4° from the standard setting. The percent reduction in NO_x was greatest for the needle injectors, which produced less NO_x than the low-sac injectors at standard timing. Retarded timing produced slightly less HC, but more smoke and CO in notch positions 5 through 8. Smoke opacity was judged to be a problem only for the needle injectors and the notch 8 condition. A slight power derating in this notch position appears to alleviate the problem. On the whole, engine power at all points of the test cycle was not adversely affected by retarded timing.

C. Effect of Water Induction on Emissions--Needle-Valve and Low-Sac Injectors at Standard Timing

Tests were conducted with needle-valve and low-sac injectors, using various rates of water induction (inlet air humidification). Water rates equal to 25, 50, 75, and 100 percent of the modal fuel flow mass were used. The cycle composite brake specific emissions are summarized in Table 9 for both types of injectors. The corresponding computer printouts appear

TABLE 9. CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND WATER INDUCTION

Injectors	Water Induction, %*	BSHC	BSCO	$BSNO_x$	$BSHC+BSNO_x$
		ATSF Weight Factor Schedule			
Needle	0	4.553	4.139	19.562	24.115
	25	2.784	3.018	17.711	20.495
	50	2.389	3.286	15.862	18.251
	75	1.814	4.881	15.023	16.837
	100	2.312	2.847	16.777	19.090
Low-Sac	0	1.837	2.702	22.563	24.400
	25	1.519	2.164	21.071	22.590
	50	1.655	2.490	20.508	22.164
	75	2.196	2.306	20.210	22.406
	100	2.199	3.426	19.914	22.113
		G.E. Weight Factor Schedule			
Needle	0	1.106	10.568	9.823	10.929
	25	0.897	10.240	9.193	10.090
	50	0.843	10.251	8.410	9.254
	75	0.736	10.210	7.622	8.358
	100	0.854	11.556	8.349	9.203
Low-Sac	0	0.655	7.281	13.045	13.700
	25	0.560	7.744	11.965	12.524
	50	0.562	6.999	11.353	11.914
	75	0.708	6.728	11.026	11.733
	100	0.734	8.164	10.802	11.536

*Percent of fuel flow mass per mode.

as Tables B-49 through B-88 of Appendix B.

Figures 12 and 13 illustrate the test results for the needle injectors. It is readily seen that the induction of more water (as percent of fuel flow mass) caused the BSHC and $BSNO_x$ to steadily decrease from the corresponding baseline (0 percent water) values, until 100 percent water rate was reached. At this point the BSHC and $BSNO_x$ went up, but the resulting values were still below baseline. Hence, the 75 percent water rate was optimum for the reduction of HC and NO_x. These reductions were noted regardless of the weight factor schedule used in the computations, though the magnitude of the reductions was different. Thus, at 75 percent water rate, cycle composite BSHC was 60 percent lower when the ATSF switch schedule was used and about 33 percent lower for the G. E. line haul schedule, while $BSNO_x$ was about 23 percent lower for both schedules.

Cycle composite BSCO was also affected by the rate of water induction, but the changes produced were highly dependent on the weight factors used in the calculations. Thus, in Figure 13, note that when the ATSF schedule was used, BSCO was highest for the 75 percent water rate and lowest for the 100 percent flow rate. But when G. E. weight factors were used, BSCO was highest for the 100 percent rate and lowest (and approximately equal) at the 25, 50, and 75 percent water rates.

Figures 14 and 15 depict the average cycle composite values for the low-sac injectors. Brake specific HC was lowered by the 25 and 50 percent water rates and increased by the other two induction rates. Brake specific CO showed little or no improvement in these tests. However, $BSNO_x$ steadily decreased as the water rate was increased, so that the 100 percent rate produced the least NO_x. The total reduction from the baseline (0 percent water) value was 12 and 17 percent for the ATSF and G.E. weighting schedules, respectively. These are smaller reductions, percentage-wise, than were found to occur with the needle injectors.

Modal smoke opacity for both types of injectors is presented in Table 10 and illustrated in Figure 16 (needle) and Figure 17 (low-sac). It is evident that water induction did not lead to excessive smoke in any instance. In this regard, water induction was superior to retarded injection timing, at least as far as the needle injectors were concerned.

Average modal brake specific and fuel specific emissions for needle injectors are given in Table C-4 and shown in Figures C-17 through C-22 of Appendix C. Water induction resulted in lower BSHC and $BSNO_x$ in almost every mode, and the general efficacy of the 75 percent water rate is evident. The effect on BSCO is not so clearly defined.

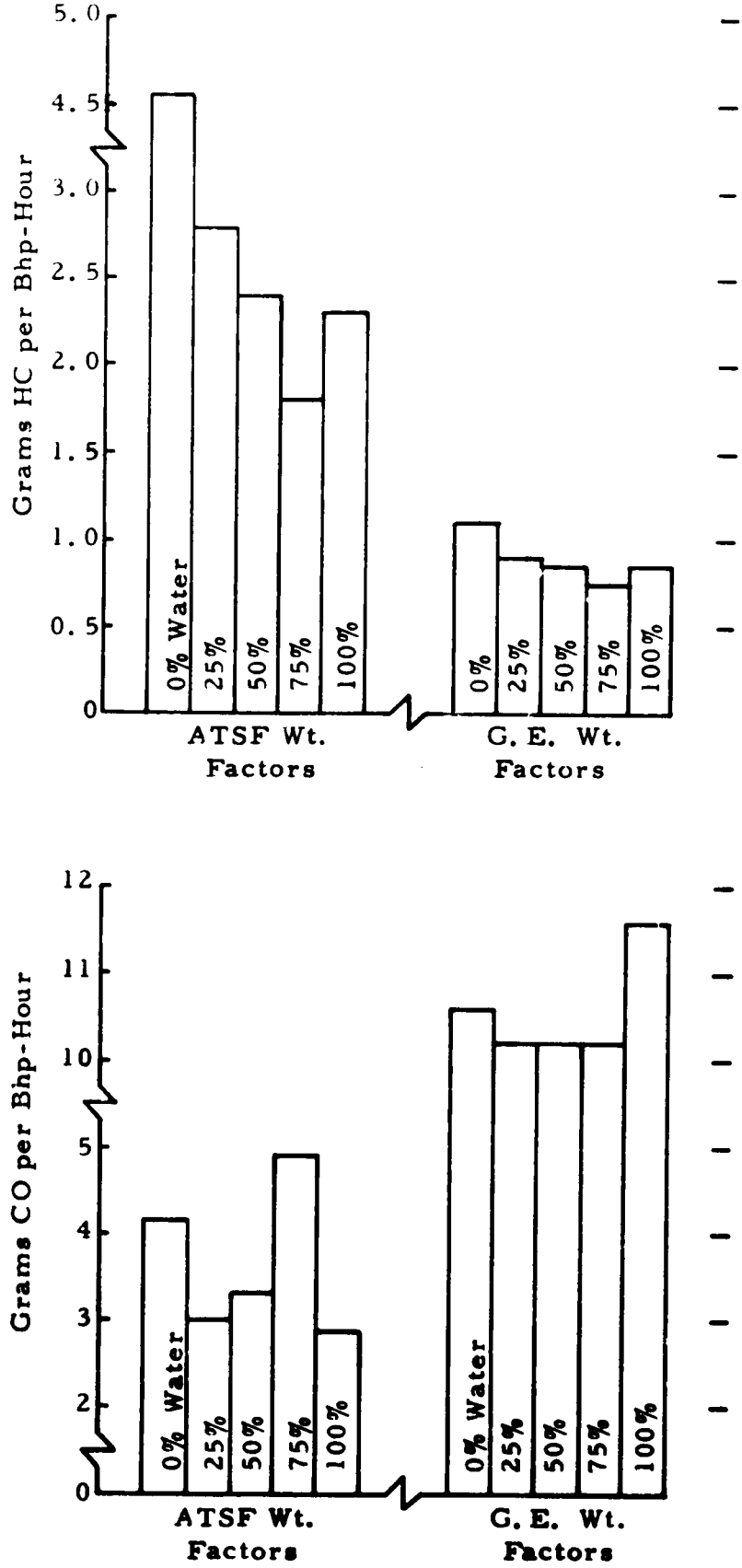


FIGURE 12. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS WATER INDUCTION RATES-- NEEDLE INJECTORS AT STANDARD TIMING

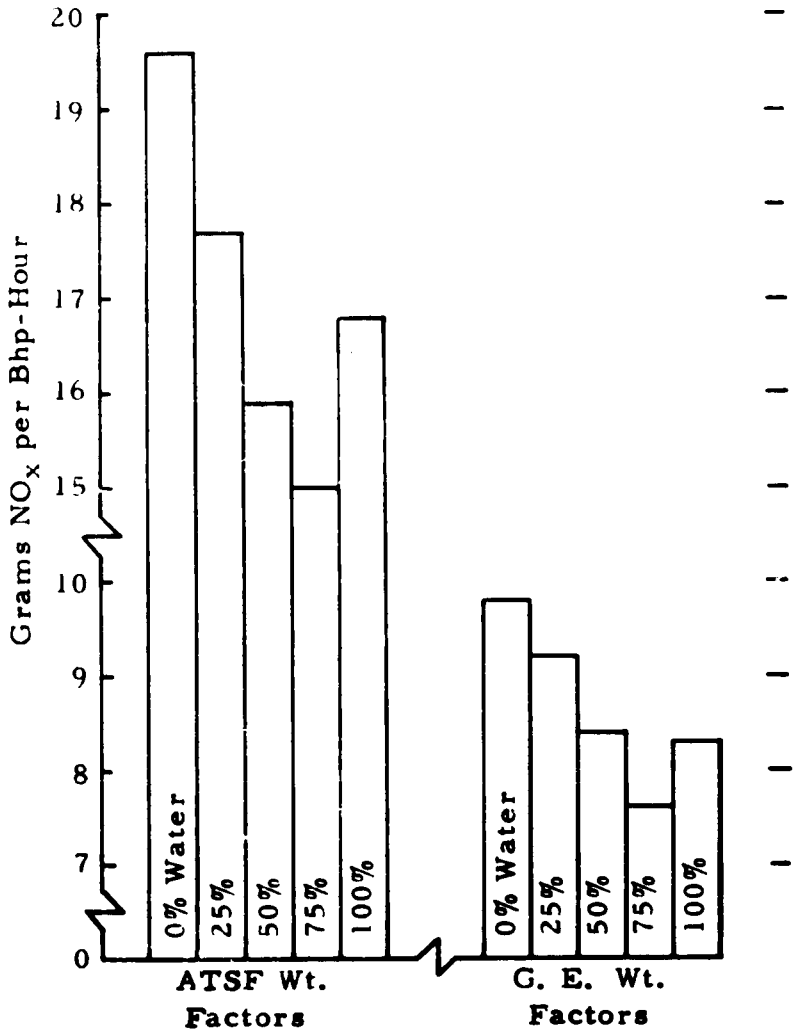


FIGURE 13. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--NEEDLE INJECTORS AT STANDARD TIMING

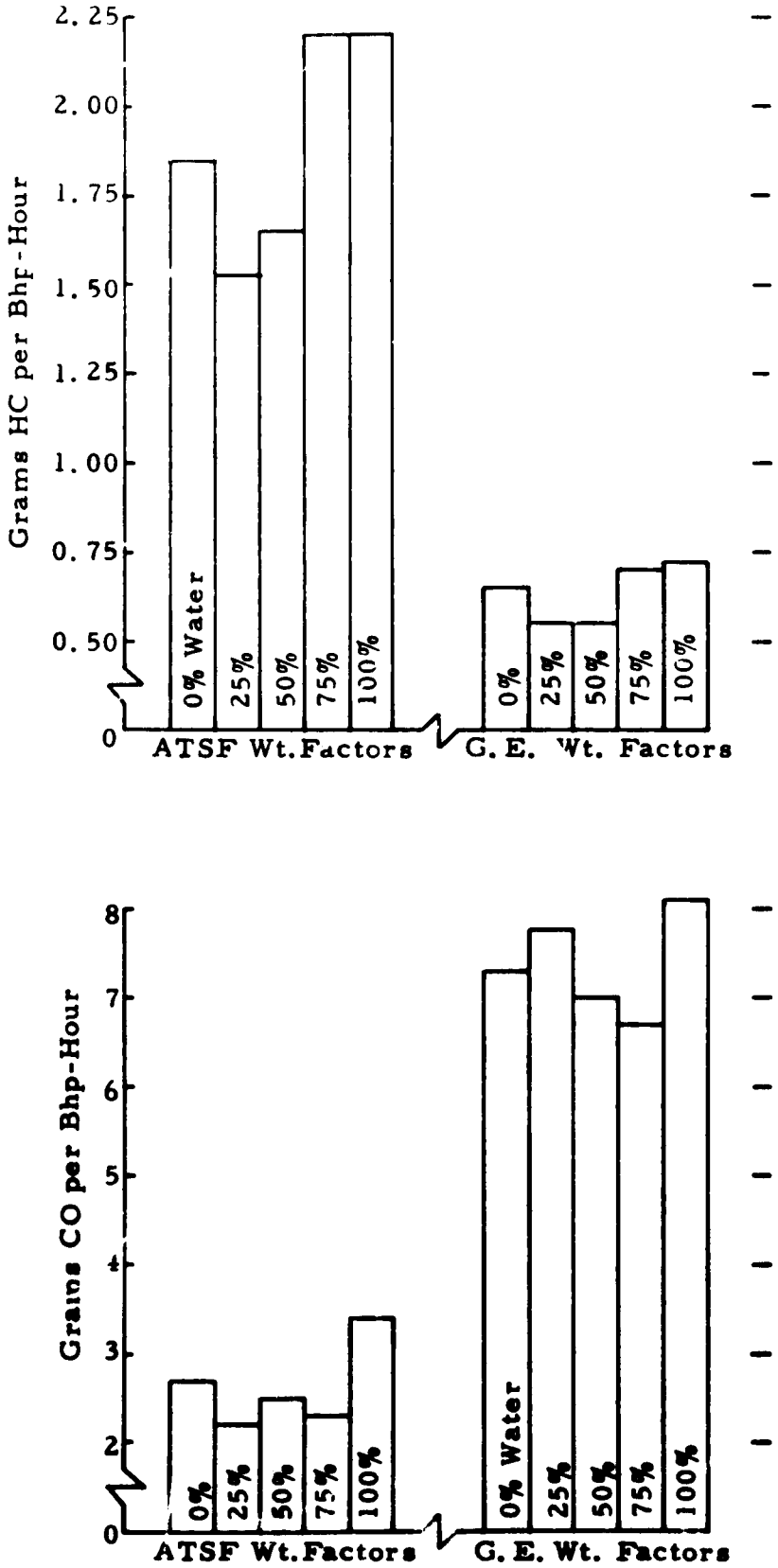


FIGURE 14. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

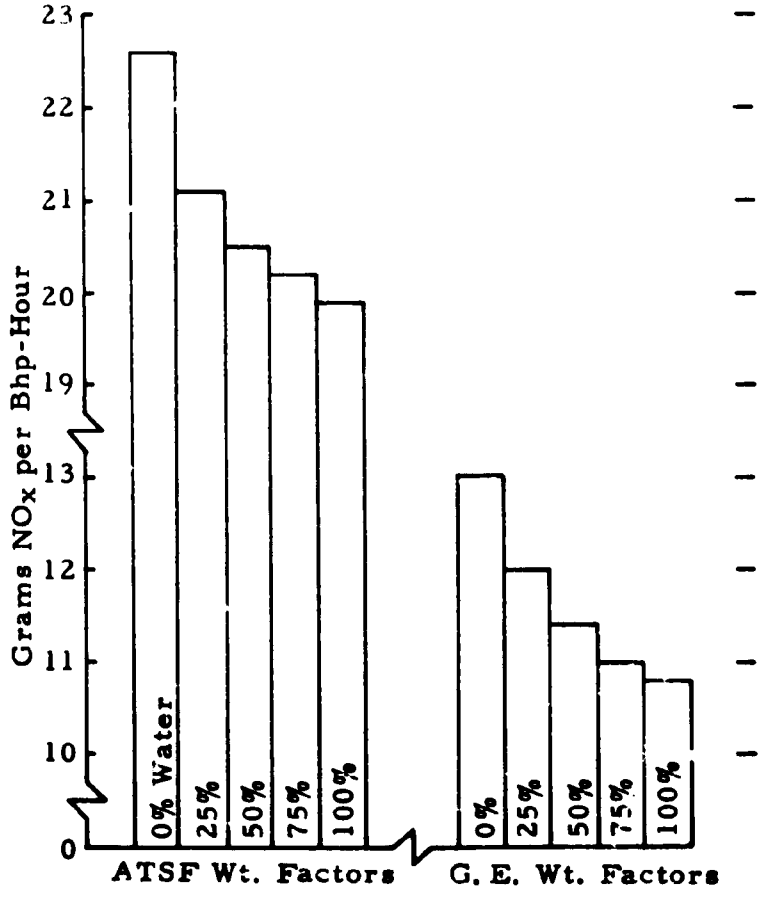


FIGURE 15. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE 10. MODAL SMOKE OPACITY FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND WATER INDUCTION

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, % 0% Water*	25%*	50%*	75%*	100%*
		Needle Injectors					
1, 6, 11	Low Idle	285	0.8	1.0	0.8	0.9	1.4
2	1	285	1.4	1.5	1.2	1.5	1.3
3	2	344	1.5	1.0	1.0	1.2	1.5
4	3	424	1.9	1.0	0.8	1.0	1.5
5	4	515	1.7	1.2	1.0	1.0	1.5
7	5	584	1.4	1.2	1.2	1.2	1.5
8	6	675	1.8	1.3	1.3	1.7	2.0
9	7	755	2.6	2.5	2.5	2.8	3.0
10	8	835	4.6	4.7	5.2	5.8	6.0
		Low Sac Injectors					
1, 6, 11	Low Idle	285	1.0	1.0	1.1	1.1	1.0
2	1	285	1.2	1.0	1.0	1.2	1.2
3	2	344	1.2	1.5	1.0	1.2	1.5
4	3	424	1.3	1.5	1.0	1.2	1.5
5	4	515	2.3	2.0	2.0	2.0	2.8
7	5	584	1.8	1.5	1.8	2.0	2.0
8	6	675	2.3	1.5	1.8	2.2	2.2
9	7	755	2.5	1.8	2.5	2.2	2.2
10	8	835	3.8	3.3	3.5	4.8	4.5

*Percent of fuel flow mass per mode.

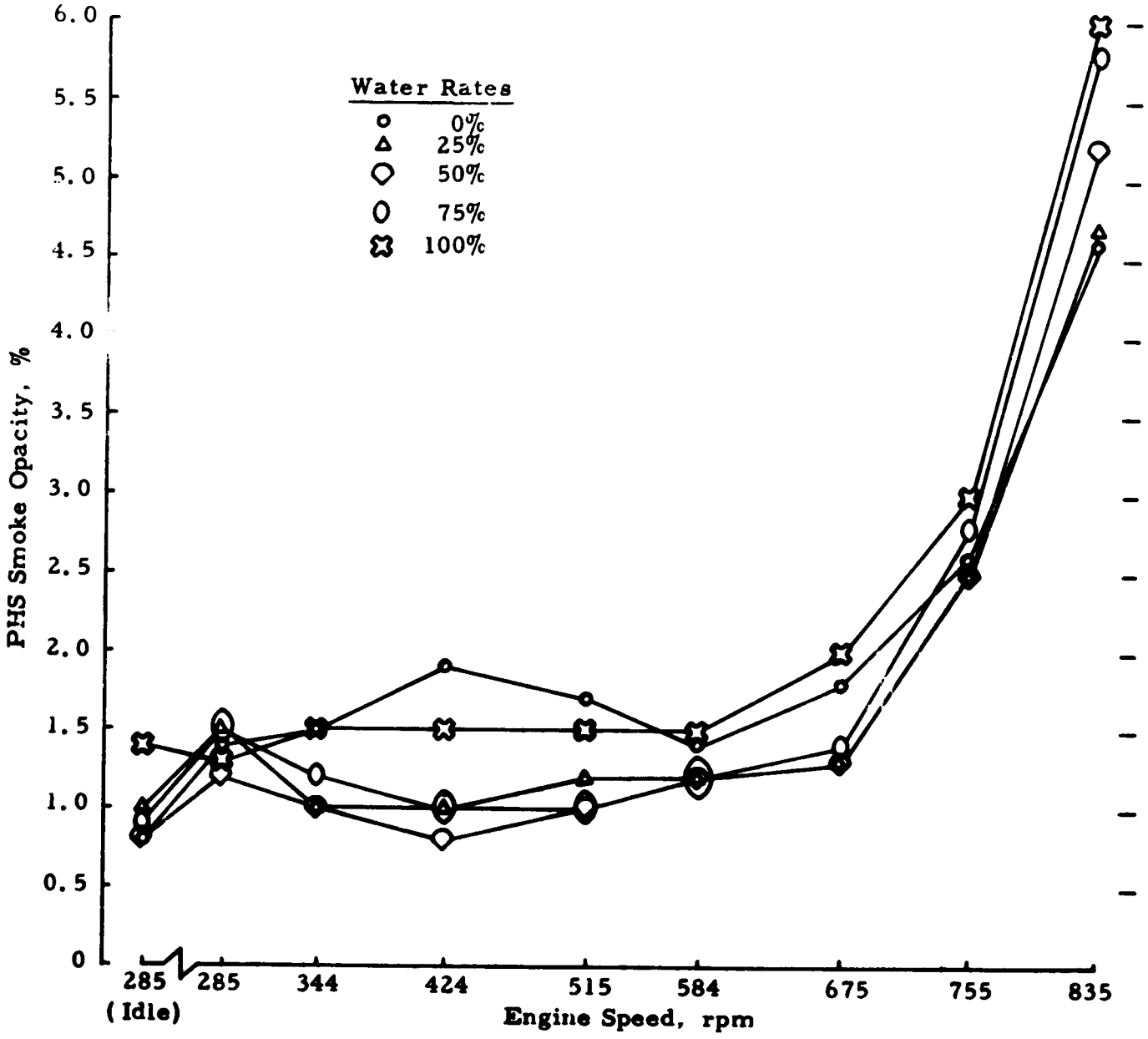


FIGURE 16. MODAL SMOKE OPACITY LEVELS FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

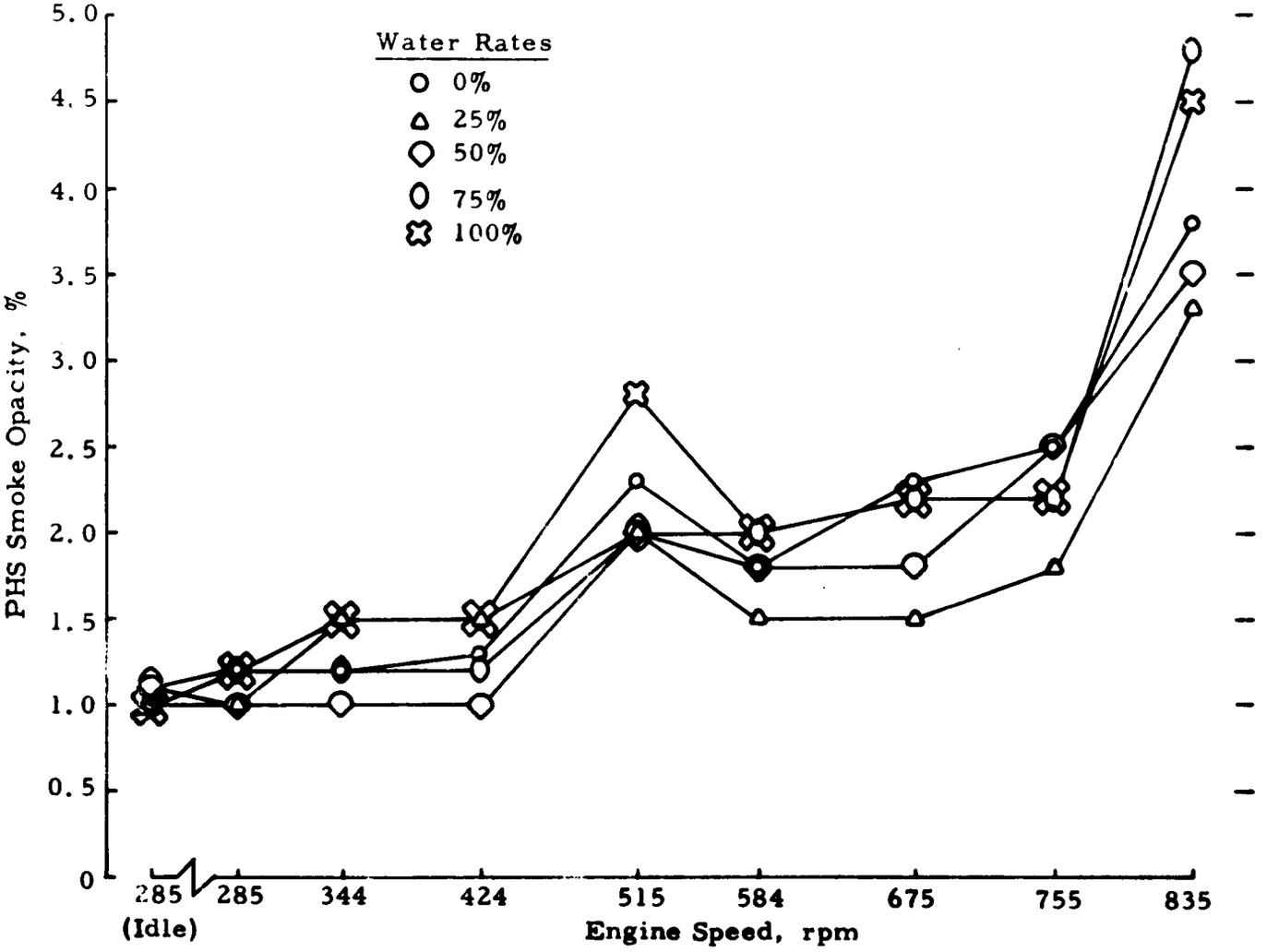


FIGURE 17. MODAL SMOKE OPACITY LEVELS FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

The modal brake specific and fuel specific data for low-sac injectors are given in Table C-5 and illustrated by Figures C-23 through C-27 of Appendix C. The effect of the 100 percent water rate is apparent; HC and CO are higher at nearly every test point, while NO_x is lower in the higher notch positions. However, the 75 percent rate was very nearly as effective as the 100 percent rate in reducing NO_x.

In summary, water induction proved effective in reducing NO_x, but the higher water rates resulted in slight increases in HC and CO. The observed reductions in NO_x were less than that which occurred with retarded injection timing. However, smoke opacity was not increased substantially by water induction and no derating of engine power was necessary. In fact, engine power appeared to experience a slight increase with water induction, possibly due to cooling of the intake air.

Before concluding this discussion of water induction as a control method, it should be mentioned that rather large quantities of water were found at the bottom of the engine air box following a series of tests. This water, usually several gallons worth, evidently passed through the blower without being thoroughly mixed with the intake air. It is not known if this problem could be solved by using a different, possibly more efficient, method of water atomization. It is also not known if a full-size, in-service locomotive engine would generate air box temperatures sufficiently high enough to vaporize this water as it collects.

D. Effect of Water Induction on Emissions--Needle-Valve and Low-Sac Injectors at Retarded Timing

These tests involved a combination of two control methods that, when used separately, generally resulted in substantial reductions of NO_x. For tests with needle injectors, water induction rates of 25, 50, and 75 percent of fuel flow mass were used. The 100 percent water rate was not used since, as mentioned previously, there was no further reduction in NO_x above the 75 percent rate with standard timing. With low-sac injectors, only the 100 percent water rate, which was most effective at standard timing, was used. The computer printouts for these tests appear in Appendix B as Tables B-89 through B-104.

Cycle composite emissions for the needle injectors are summarized in Table 11 and shown in Figures 18 and 19. Several points of interest are immediately obvious. First, water induction did not result in significant reductions in BSHC when injection timing was retarded. This is in contrast to the redcutions observed for water induction in conjunction with standard timing. Second, the combination of water induction and retarded

TABLE 11. CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, STANDARD AND RETARDED TIMING, AND WATER INDUCTION

Water Induction, %*	Injection Timing	BSHC	BSCO	$BSNO_x$	BSHC+$BSNO_x$
		ATSF Weight Factor Schedule			
0	Std.	4.533	4.139	19.562	24.115
	Retd.	3.526	3.988	13.226	16.753
25	Std.	2.784	3.018	17.711	20.495
	Retd.	2.792	2.748	12.030	14.822
50	Std.	2.389	3.286	15.862	18.251
	Retd.	2.668	3.892	11.198	13.866
75	Std.	1.814	4.881	15.023	16.837
	Retd.	2.666	3.673	10.953	13.620
		G.E. Weight Factor Schedule			
0	Std.	1.106	10.568	9.823	10.929
	Retd.	1.041	12.500	7.326	8.366
25	Std.	0.897	10.240	9.193	10.090
	Retd.	1.460	13.954	6.024	7.484
50	Std.	0.843	10.251	8.410	9.254
	Retd.	1.218	15.122	5.630	6.848
75	Std.	0.736	10.210	7.622	8.358
	Retd.	1.182	14.752	5.310	6.492

*Percent of fuel flow mass per mode.

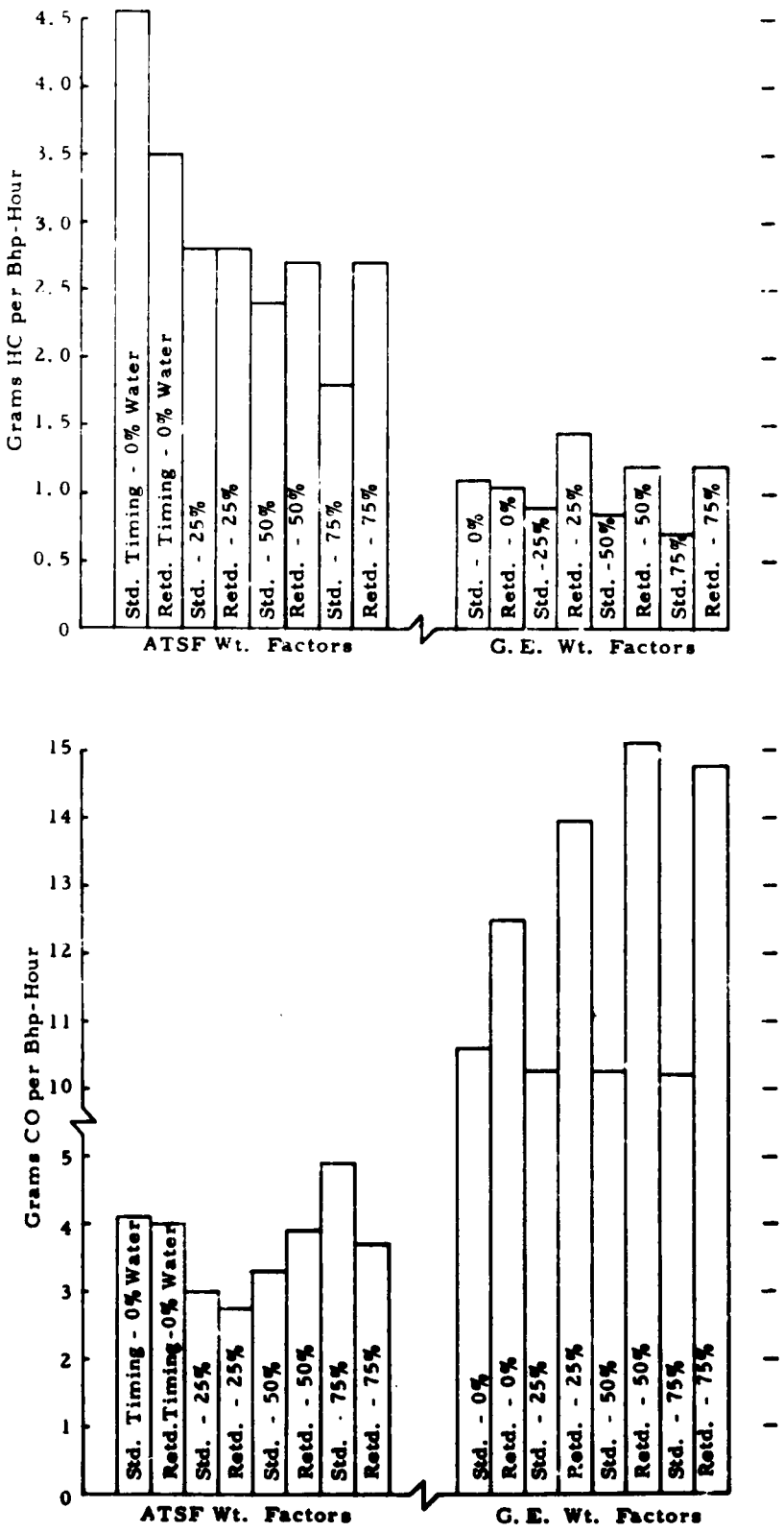


FIGURE 18. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD AND RETARDED TIMING

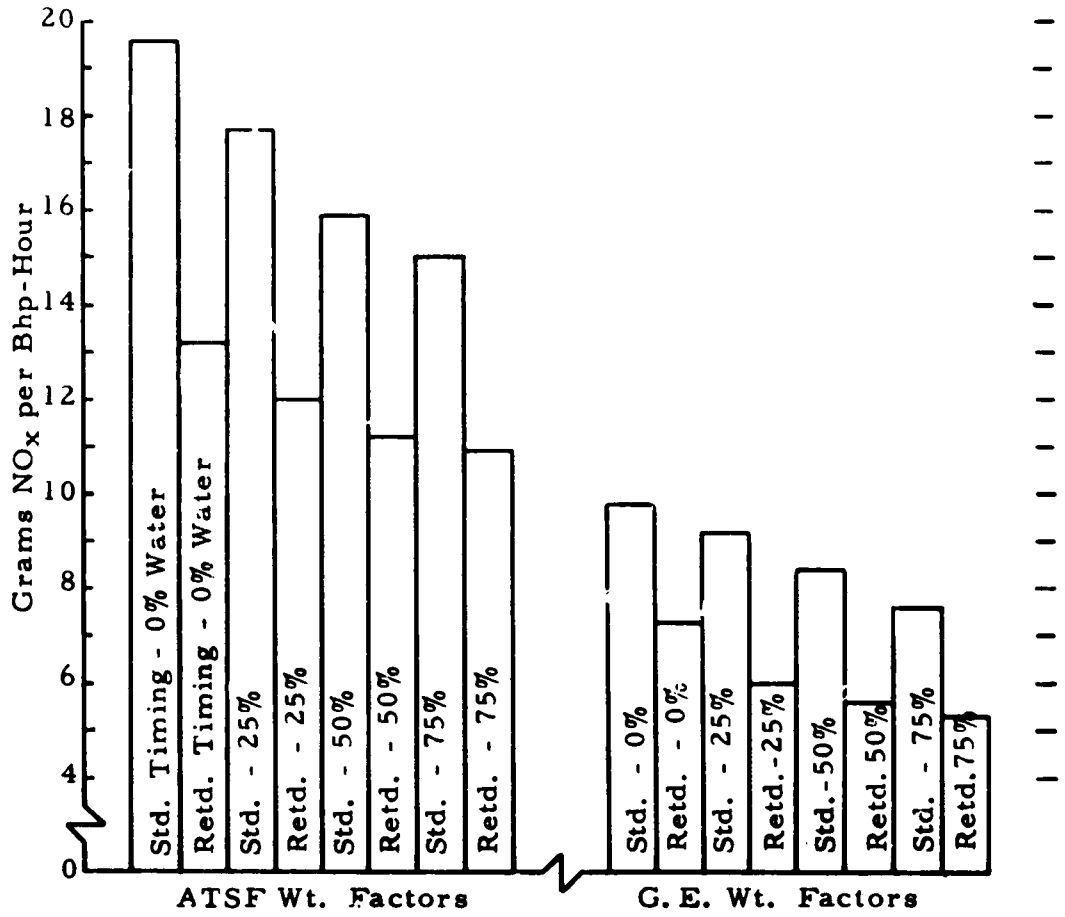


FIGURE 19. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD AND RETARDED TIMING

timing had an adverse effect on BSCO, especially when the cycle composite values were computed with the G. E. weight factor schedule, with its heavy emphasis on the notch 8 position. Note that the addition of water produced almost no change in BSCO when standard timing was used. However, water induction produced much higher BSCO when injection was retarded. Third, water induction produced a reduction in $BSNO_x$ beyond that produced by retarded timing alone. Note the stepwise reductions in $BSNO_x$ as produced by successively higher water rates for both standard and retarded injection timing (Figure 19). However, water induction was not quite as effective with retarded timing as with standard timing. In all, going from standard timing without water to retarded timing with water produced a 44 percent reduction in $BSNO_x$ for the ATSF cycle and a 46 percent reduction for the G. E. cycle. Over one-half of these reductions (32 and 25 percent, respectively) were due to retarded timing, alone.

Figures 20 and 21 illustrate the cycle composite results for low-sac injectors (Table 12, top). Brake specific HC remained almost constant when water induction was used with retarded timing, while BSCO decreased slightly for the ATSF cycle and increased moderately for the G. E. cycle. The $BSNO_x$ values were reduced substantially by using water with retarded timing. Reductions of 40 percent and 47 percent, respectively, were noted in the values for the ATSF and G. E. cycles when standard timing without water was changed to retarded timing and the 100 percent water rate. Of these reductions, over one-half (27 and 28 percent) was again due to retarded timing, alone.

Modal smoke opacity for the tests with needle injectors is given in Table 13 and illustrated in Figure 22. Smoke opacity for low-sac injectors is contained in Table 12 (lower right-hand column) and shown in Figure 23. It can be seen that water induction, particularly at the higher flow rates, caused opacity to increase in the upper notch positions; however, only the smoke in notch 8 was cause for concern. Of course, the needle injectors produced more smoke than the low-sac units. Engine power derating was not tried, since it would probably not yield substantially different results from those discussed previously.

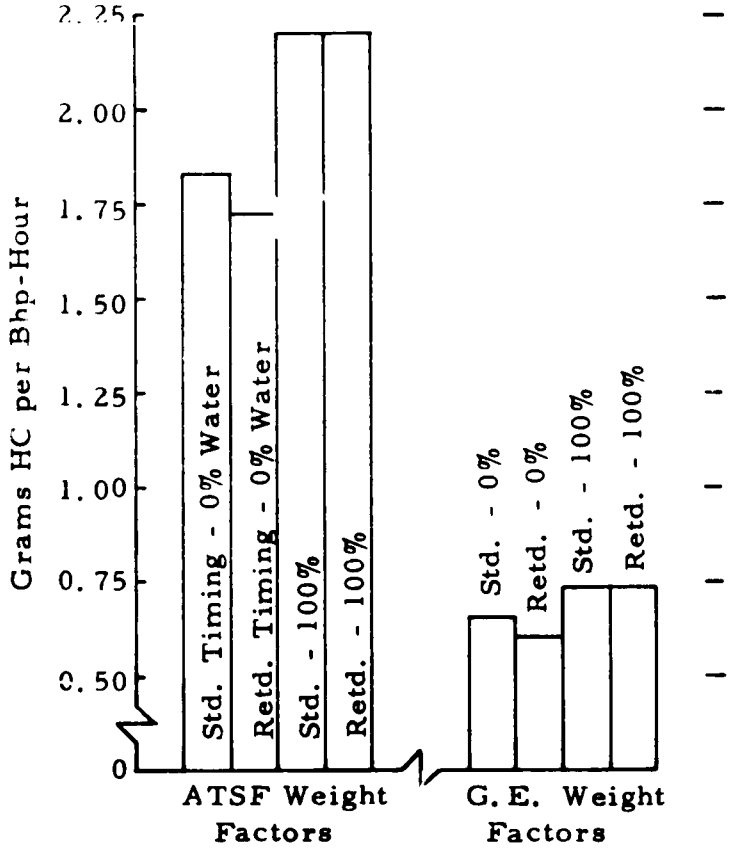
Modal brake specific and fuel specific emissions for the needle-valve injectors are contained in Appendix C, Table C-6 and Figures C-28 through C-33. Brake specific HC experienced a moderate increase in notch position 8, while $BSNO_x$ was reduced at all test points by water induction. Brake specific CO was increased by all three water rates in notches 5 to 8 (584 to 835 rpm), and this well-defined trend was not evident in tests involving water and standard timing. Modal fuel specific emissions follow these same trends in all notch positions.

TABLE 12. SUMMARY OF CYCLE COMPOSITE AND MODAL EMISSIONS DATA FOR LOW-SAC INJECTORS, RETARDED TIMING, AND OPTIMUM WATER INDUCTION RATE (100% of Fuel Flow Mass per Mode)

Water Induction, %*	Injection Timing	Cycle Composite Gaseous Emissions BSHC	BSCO	$BSNO_x$	BSHC + $BSNO_x$
		ATSF Weight Factor Schedule			
0	Std.	1.837	2.702	22.563	24.400
	Retd.	1.715	3.194	16.572	18.287
100	Std.	2.199	3.426	19.914	22.113
	Retd.	2.182	2.979	13.530	15.711
		G.E. Weight Factor Schedule			
0	Std.	0.655	7.281	13.045	13.700
	Retd.	0.605	9.783	9.378	9.791
100	Std.	0.734	8.164	10.802	11.536
	Retd.	0.736	10.846	6.881	7.617

Mode	Engine Speed, rpm	Modal Gaseous Emissions and Smoke Opacity (Retd. Timing) Grams/Bhp-Hour HC	CO	NO_x	Grams/Pound of Fuel HC	CO	NO_x	PHS Smoke Opacity, %
		0% Water Induction*						
1, 6, 11	285	-	-	-	3.86	5.08	29.33	1.0
2	285	0.71	1.81	12.79	1.28	3.24	22.92	1.2
3	344	0.61	1.25	11.23	1.22	2.49	22.39	1.2
4	424	0.46	0.69	11.41	1.03	1.55	25.72	1.3
5	515	0.43	0.44	12.87	0.99	1.03	29.84	2.3
7	584	0.42	0.56	13.82	0.99	1.31	32.30	1.8
8	675	0.49	1.04	13.61	1.14	2.41	31.47	2.3
9	755	0.54	3.28	13.16	1.24	7.56	30.27	2.5
10	835	0.60	8.86	12.19	1.32	19.75	27.20	3.8
		100% Water Induction*						
1, 6, 11	285	-	-	-	6.02	6.38	25.02	1.0
2	285	1.02	1.58	6.96	2.00	3.10	13.70	1.2
3	344	0.86	1.20	6.34	1.72	1.78	12.68	1.2
4	424	0.58	0.80	6.40	1.31	1.28	14.54	1.8
5	515	0.50	0.52	7.63	1.20	1.14	18.36	2.8
7	584	0.46	1.38	7.76	1.12	3.36	18.76	2.5
8	675	0.52	2.41	7.28	1.23	5.75	17.36	2.8
9	755	0.60	5.58	6.96	1.38	12.82	15.99	4.5
10	835	0.66	13.20	6.24	1.47	29.34	13.85	7.5

*Percent of fuel flow mass per mode.



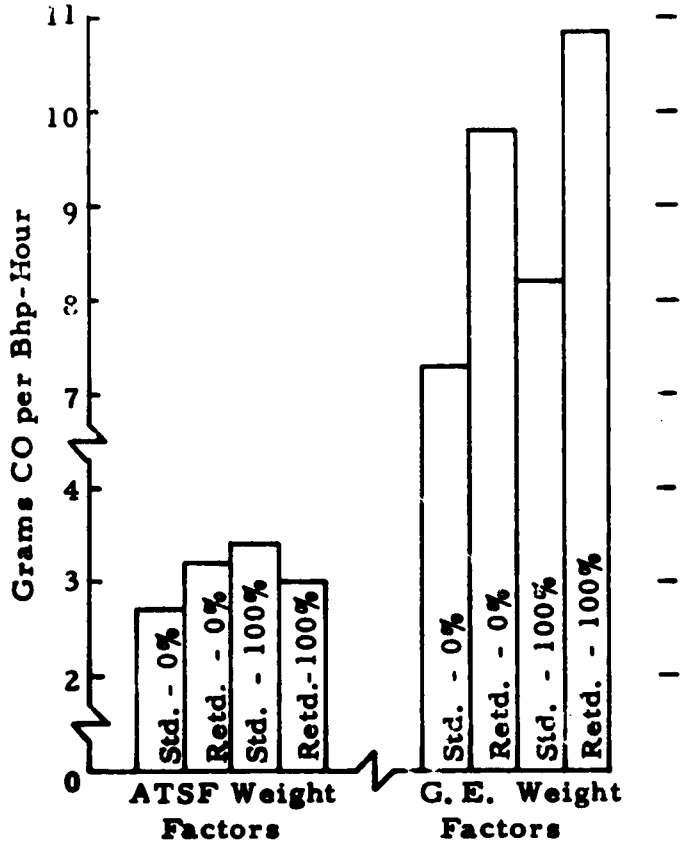


FIGURE 20. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR OPTIMUM WATER INDUCTION RATE--LOW SAC INJECTORS AT STANDARD AND RETARDED TIMING

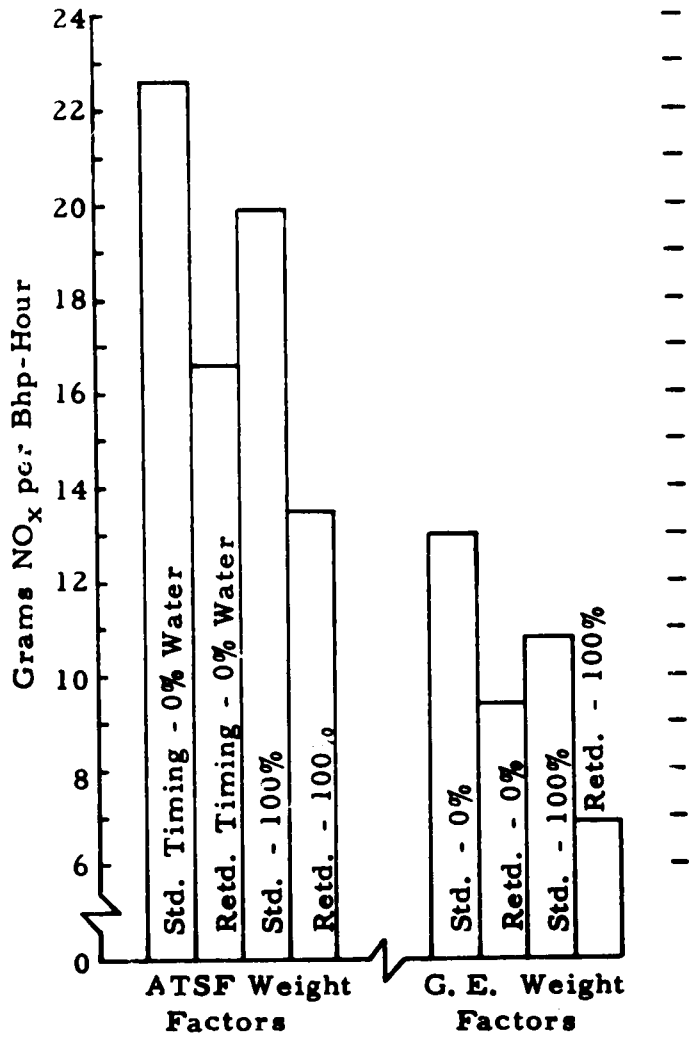


FIGURE 21. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR OPTIMUM WATER INDUCTION RATE--LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

TABLE 13. MODAL SMOKE OPACITY FOR NEEDLE-VALVE INJECTORS, RETARDED TIMING, AND WATER INDUCTION

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, % 0% Water*	25%*	50%*	75%*
1, 6, 11	Low Idle	285	1.8	1.2	1.2	1.2
2	1	285	2.0	2.2	2.0	2.2
3	2	344	2.0	1.8	1.5	1.5
4	3	424	2.1	1.8	2.0	2.0
5	4	515	2.3	2.0	2.2	2.5
7	5	584	2.8	2.5	2.5	2.8
8	6	675	3.5	3.5	3.5	4.0
9	7	755	5.5	5.8	5.8	6.2
10	8	835	10.0	10.8	12.0	12.0

*Percent of fuel flow mass per mode

Similar data from the tests with low-sac injectors are presented in Table 12 (bottom) and Figures C-34 through C-38 of Appendix C. It is evident that the 100 percent water rate caused HC and CO to increase slightly, and NO_x to decrease significantly, in almost every test mode.

E. Effect of Air Box Bleed on Emissions--Needle-Valve and Low-Sac Injectors at Standard Timing

For these tests injectors were set to standard timing, and a set percentage of the scavenging air was vented from the engine air box at each mode of the test cycle. The amount of air vented was equal to 10, 20, 35, or 50 percent of the total air requirement of the engine for tests with needle injectors. Only the 20 and 35 percent bleed rates were tested with low-sac injectors.

Before proceeding to the analysis of the test results, it should be noted that the reduction of scavenging air can effect the brake specific emissions (both modal and cycle composite) in three ways. First, the mass of the exhaust gases is reduced by a percentage very nearly equal to that of the scavenging air reduction. Second, the concentrations of HC, CO, and/or NO_x may be increased or decreased by air box bleed. Either or both of these two factors produce a change in the mass flow (grams/hr) of the contaminants. Third, the power output of the engine is usually lowered by the reduction of scavenging air; hence, brake specific quantities will be increased by the decrease in horsepower. Fuel specific emissions are influenced by the first two factors, but not by the last, assuming that modal fuel flow mass is held constant from one series of tests to another. This was the case here, except that idle fuel rates were uncontrolled, i.e., allowed to experience normal fluctuations.

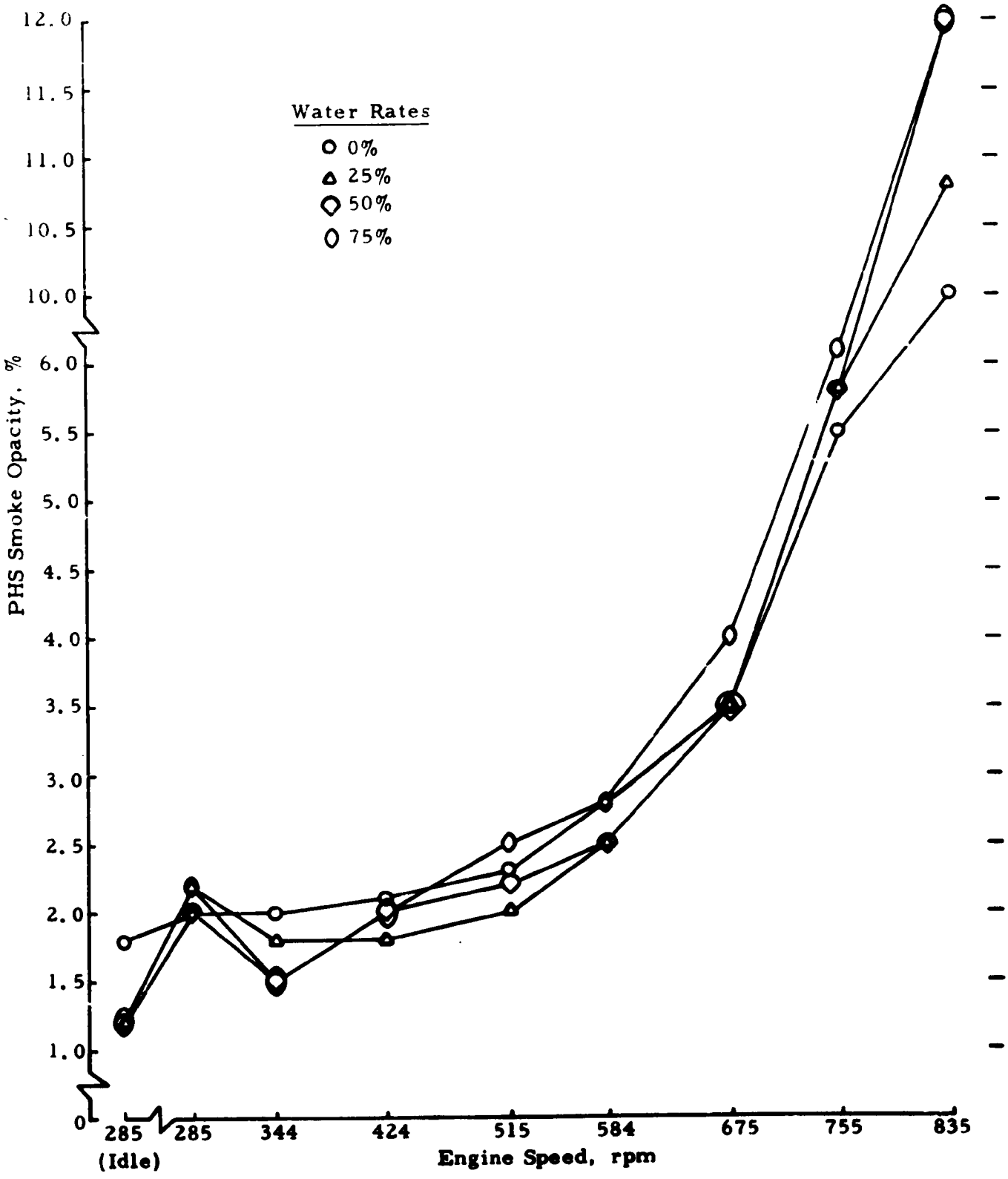


FIGURE 22. MODAL SMOKE OPACITY LEVELS FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

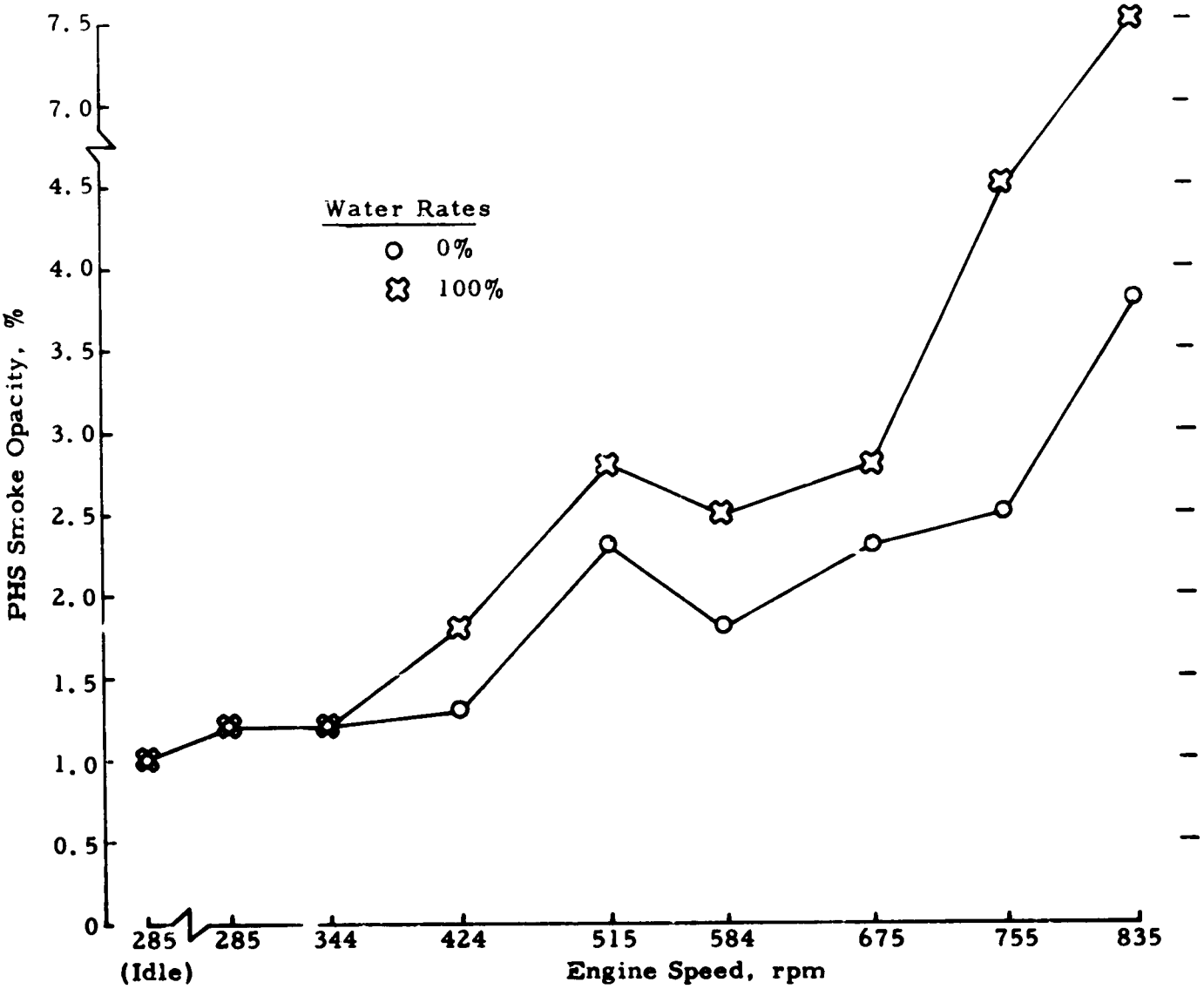


FIGURE 23. MODAL SMOKE OPACITY LEVELS FOR OPTIMUM WATER INDUCTION RATE--LOW-SAC INJECTORS AT RETARDED TIMING

In order to help keep the factor of emission concentrations in mind, a table and three figures are included to show the effect of air box bleed on modal concentrations of HC, CO, and NO_x.

The computer printouts for these tests are in Appendix B, Tables B-105 through B-132. Average cycle composite brake specific emissions are summarized in Table 14 and shown in Figures 24 and 25 (needle injectors) and Figures 26 and 27 (low-sac injectors). It is evident from Figure 24 that air box bleed with the needle injectors tended to reduce BSHC values, especially those computed with the ATSF weighting schedule. Brake specific CO, also computed with ATSF weight factors, was reduced somewhat by the 10, 20, and 35 percent bleed rates. However, all rates of air bleed caused the BSCO based on the G. E. line haul weight factors to increase over the baseline (0 percent bleed) value. Brake specific NO_x (Figure 25) was reduced under all test conditions, but in most cases the reductions were just approximately equal to the mass flow reduction produced by the air bleed.

For low-sac injectors, air box bleed increased BSHC in all but one instance (Figure 26, top), while BSCO increased in every case, even for the ATSF cycle (Figure 26, bottom). Brake specific NO_x was generally lower with air box bleed, but the observed reductions could mostly be attricuted to the reduced mass flow of exhaust, though not to the same extent as for the needle injectors.

At this point in the analysis, it is of interest to look at the effect of air bleed on concentrations, since the behavior of these concentration reflects, to a large extent, the behavior of the cycle composite quantities just discussed, as well as the modal brake specific and fuel specific values that will be discussed shortly.

Table C-7 and Figures C-39, C-40, and C-41 of Appendix C contain the concentrations for the needle injectors. Note that HC concentrations are generally lower at idle and notch 8, which are the most important points of the test cycle; i. e., they receive the greatest amount of weighting in the two weighting schedules used. The generally adverse effect of air box bleed on CO concentration is clearly evident. Idle concentrations were reduced by a small amount, but the overall result was very detrimental. However, the effect on concentrations of NO_x was favorable. There was only slight differences in the various idle concentrations, but beginning at notch 3 (424 rpm) the 50 percent bleed rate began producing appreciable reductions in NO_x. At the notch 8 position, the reduction from baseline (0 percent) concentration was approximately 30 percent. The 35 percent bleed was responsible for a reduction of about 20 percent in notch 8.

TABLE 14. CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND AIR BOX BLEED

Injectors	Air Box Bleed %*	BSHC	BSCO	$BSNO_x$	BSHC + $BSNO_x$
		ATSF Weight Factor Schedule			
Needle	0	4.553	4.139	19.562	24.115
	10	3.164	3.222	16.993	20.157
	20	2.460	2.611	14.903	17.362
	35	1.839	3.281	13.248	15.088
	50	2.133	6.456	10.893	13.026
Low-Sac	0	1.837	2.702	22.563	24.400
	10	-	-	-	-
	20	1.973	3.174	18.084	20.057
	35	1.310	5.184	13.681	14.992
	50	-	-	-	-
		G.E. Weight Factor Schedule			
Needle	0	1.106	10.568	9.823	10.929
	10	1.318	11.492	9.190	10.508
	20	0.846	14.106	8.210	9.056
	35	0.541	15.917	6.734	7.275
	50	0.382	20.052	5.038	5.421
Low-Sac	0	0.655	7.281	13.045	13.700
	10	-	-	-	-
	20	0.611	16.612	9.522	10.134
	35	0.339	17.252	7.151	7.490
	50	-	-	-	-

*Percent of engine air flow mass requirement per mode.

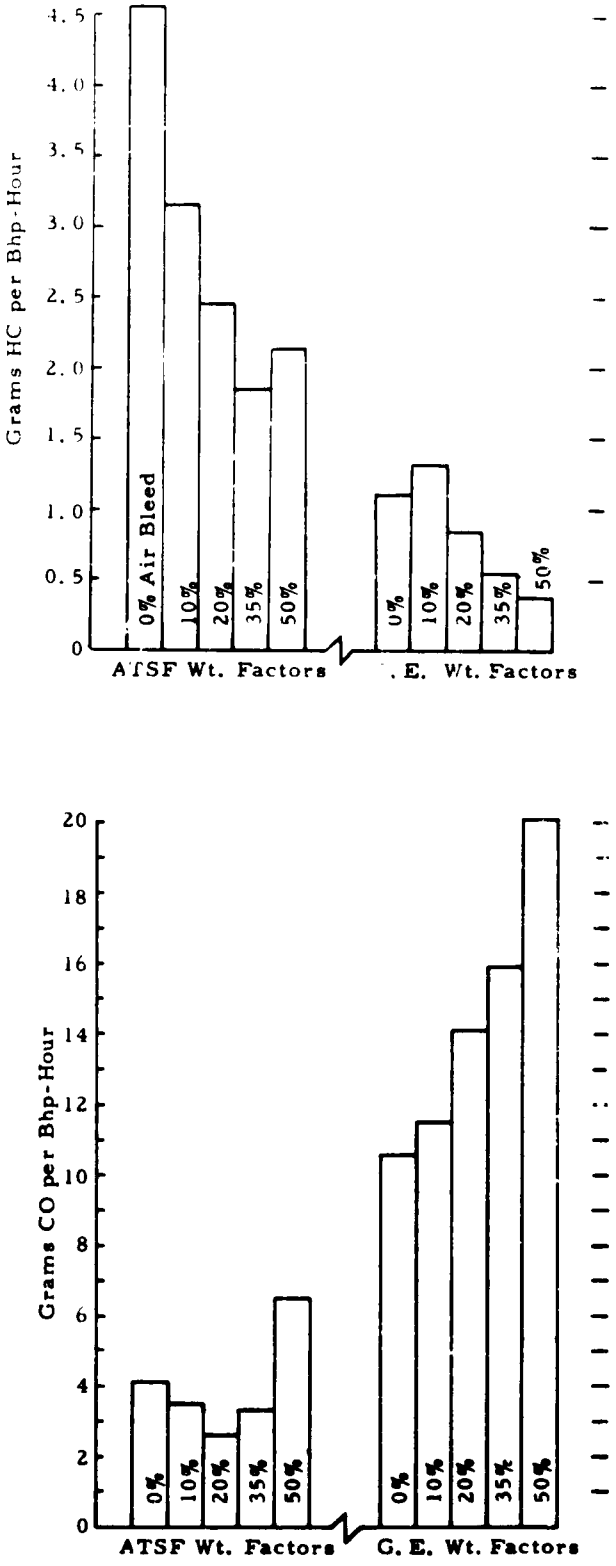


FIGURE 24. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

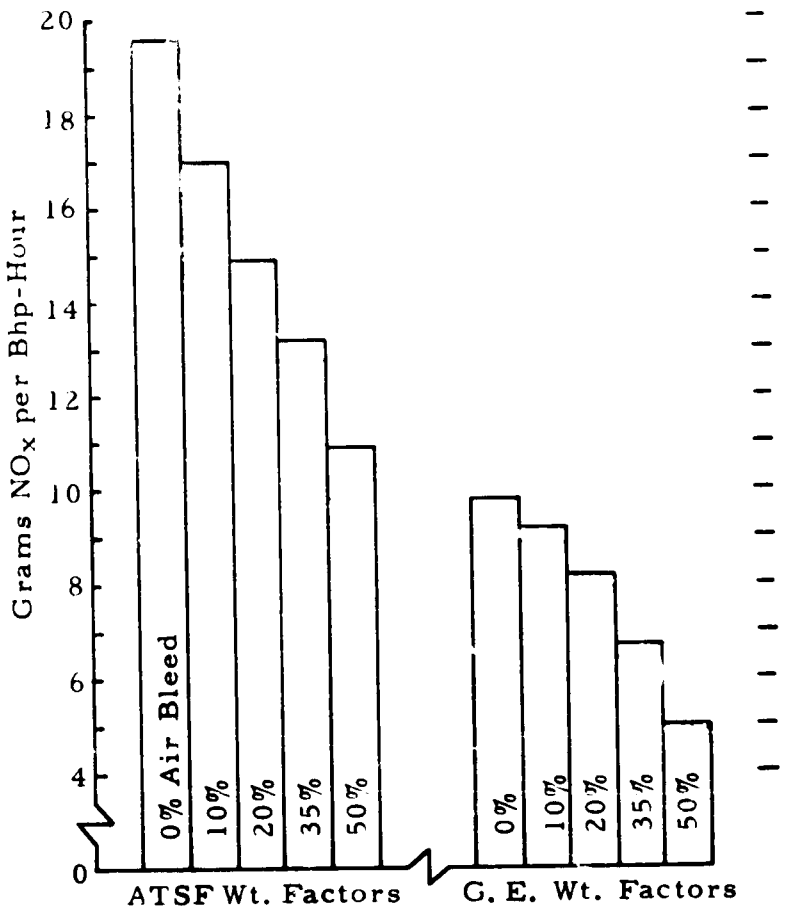


FIGURE 25. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

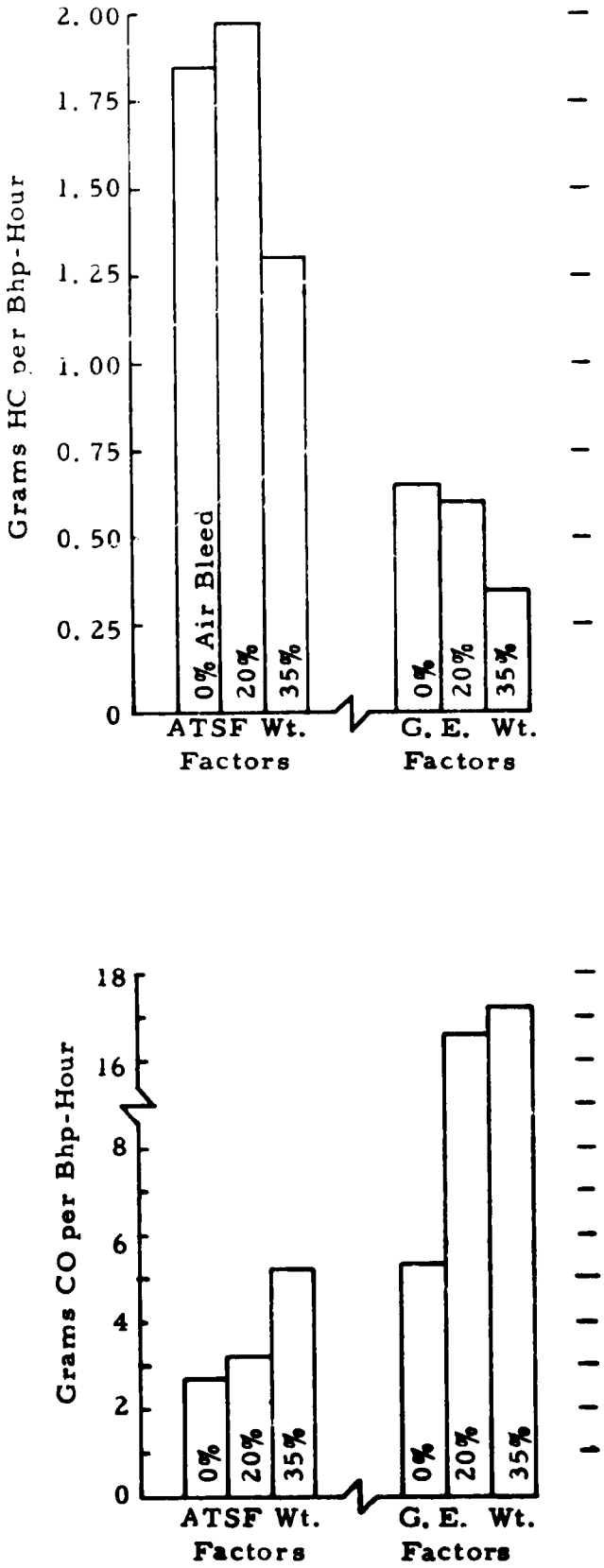


FIGURE 26. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS AIR BOX BLEED RATES-- LOW-SAC INJECTORS AT STANDARD TIMING

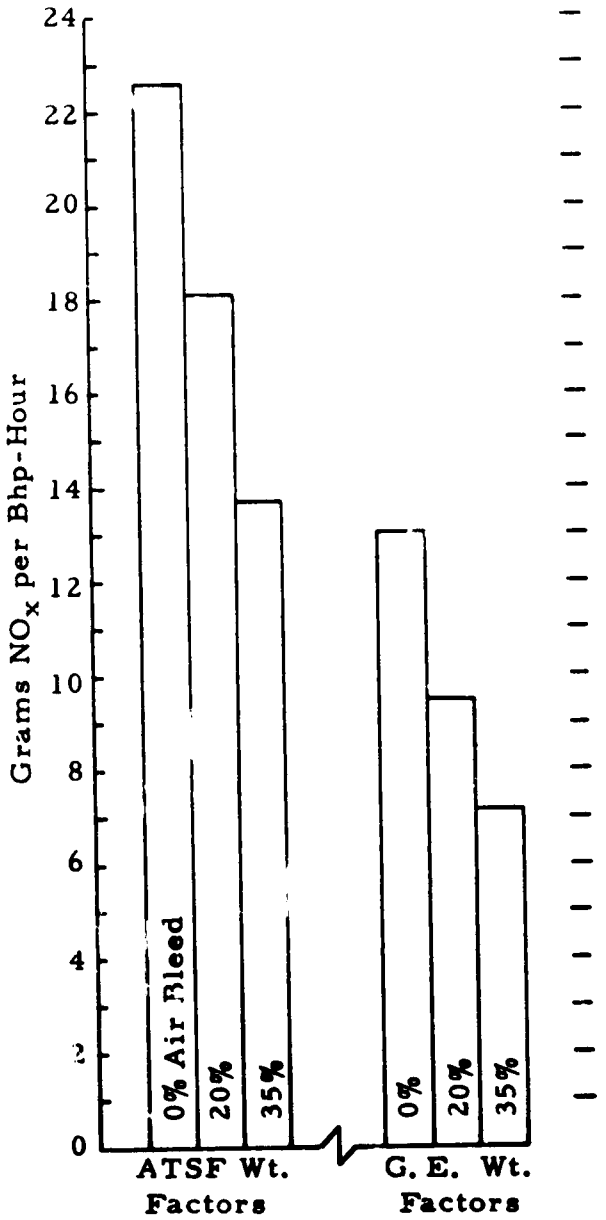


FIGURE 27. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

Concentrations for low-sac injectors and the 20 to 35 percent bleed rates are given in Table C-8 and shown in Figures C-42, C-43, and C-44 of Appendix C. The only substantial reduction in HC concentrations occurred in notches 7 and 8 (755 and 835 rpm) with 35 percent air bleed. In fact, there was an increase in HC over the baseline concentration at most points of the test cycle. Concentrations of CO were greatly increased by use of air box bleed, especially at the higher notch positions. The 35 percent bleed rate reduced NO_x by over 30 percent in notches 5 to 8. Little or no improvement was noted at idle and in the first two notches with either bleed rate.

The modal smoke opacity for these tests is summarized in Table 15 and shown in Figures 28 and 29. With needle injectors the smoke became exessive (i.e., greater than about six or seven percent opacity) in notch positions 5 to 8 with 50 percent air bleed, in notches 6 to 8 for 35 percent bleed, and in notch 8 only with 20 percent air bleed. The range of these "excessive" opacities was from 10 to 37 percent. The low-sac injectors, although generally characterized by lower smoke opacity than the needle units, also produced excessive smoke at certain test points. In particular, smoke opacity in notches 6 to 8 for 35 percent air bleed and notch 8 for 20 percent bleed, was above the specified limit. These opacities ranged from about 9 to 23 percent.

In view of these excessive opacities, it was decided to attempt to limit the smoke opacity by engine power derating. During tests with low-sac injectors, a number of extra modes were performed with engine power cut back by the amount necessary to reduce smoke to the desired opacity range. The computer calculations were then done using the data from both the so-called "normal" modes and from the "derated" modes. Only G. E. weight factors were used when calculating the "derated" quantities, since the ATSF schedule attaches little or no weight to the higher notch positions. The computer printouts for these tests are also included in Appendix B as Tables B-131 through B-132. The pertinent information is summarized in Table 16 of the text.

Cycle composite emissions of HC and NO_x were increased slightly by derating, while CO was decreased greatly. This behavior is, of course, reflected in the modal brake specific emissions. The modal fuel specific emissions exhibit these same trends. Smoke opacity was reduced to four- to six-percent. Power in notch 8 was reduced 12 percent with 20 percent air bleed and 29 percent with 35 percent air bleed. Power in notch positions 6 and 7 was reduced by 12 and 14 percent, respectively, with 35 percent bleed. The large amount of derating required in notch 8, with 35 percent air bleed, suggests

TABLE 15. MODAL SMOKE OPACITY FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND AIR BOX BLEED

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, %				
			0% Air Bleed*	10%*	20%*	35%*	50%*
	Needle Injectors						
1, 6, 11	Low Idle	285	0.8	1.0	1.2	1.7	1.5
2	1	285	1.4	1.8	2.0	2.5	3.5
3	2	344	1.5	1.2	1.5	1.8	2.8
4	3	424	1.9	1.2	1.5	2.8	4.0
5	4	515	1.7	1.5	2.2	3.5	7.2
7	5	584	1.4	1.5	2.5	5.5	14.0
8	6	675	1.8	2.2	3.5	7.0	19.5
9	7	755	2.6	3.5	4.5	10.8	25.0
10	8	835	4.6	6.5	9.8	20.5	37.0
	Low-Sac Injectors						
1, 6, 11	Low Idle	285	1.0	-	1.0	1.0	-
2	1	285	1.2	-	2.0	1.5	-
3	2	344	1.2	-	2.0	1.8	-
4	3	424	1.3	-	1.8	2.0	-
5	4	515	2.3	-	2.8	5.0	-
7	5	584	1.8	-	3.8	6.5	-
8	6	675	2.3	-	3.5	8.8	-
9	7	755	2.5	-	4.5	13.2	-
10	8	835	3.8	-	11.5	23.0	-

*Percent of engine air flow mass requirement per mode.

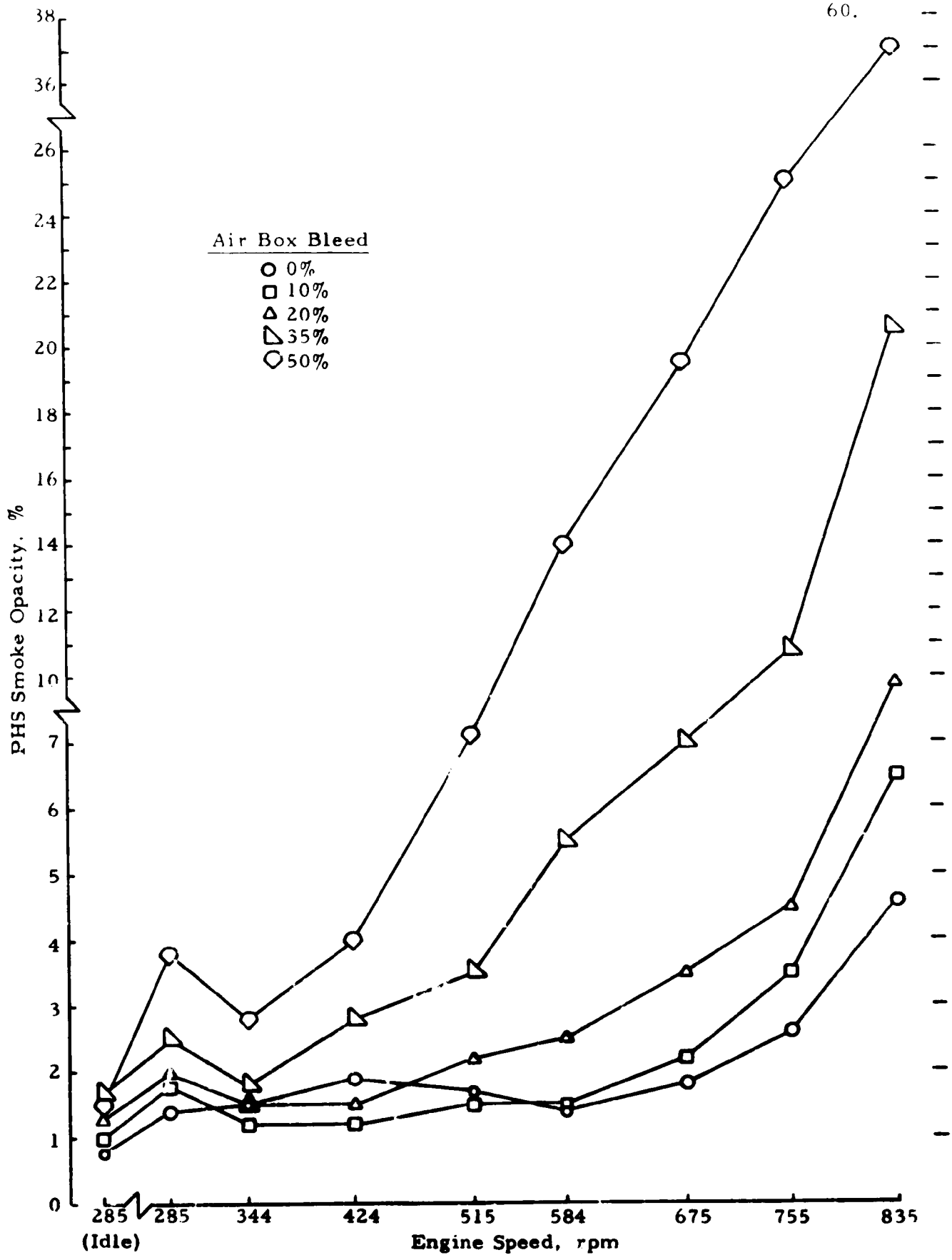


FIGURE 28. MODAL SMOKE OPACITY LEVELS FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

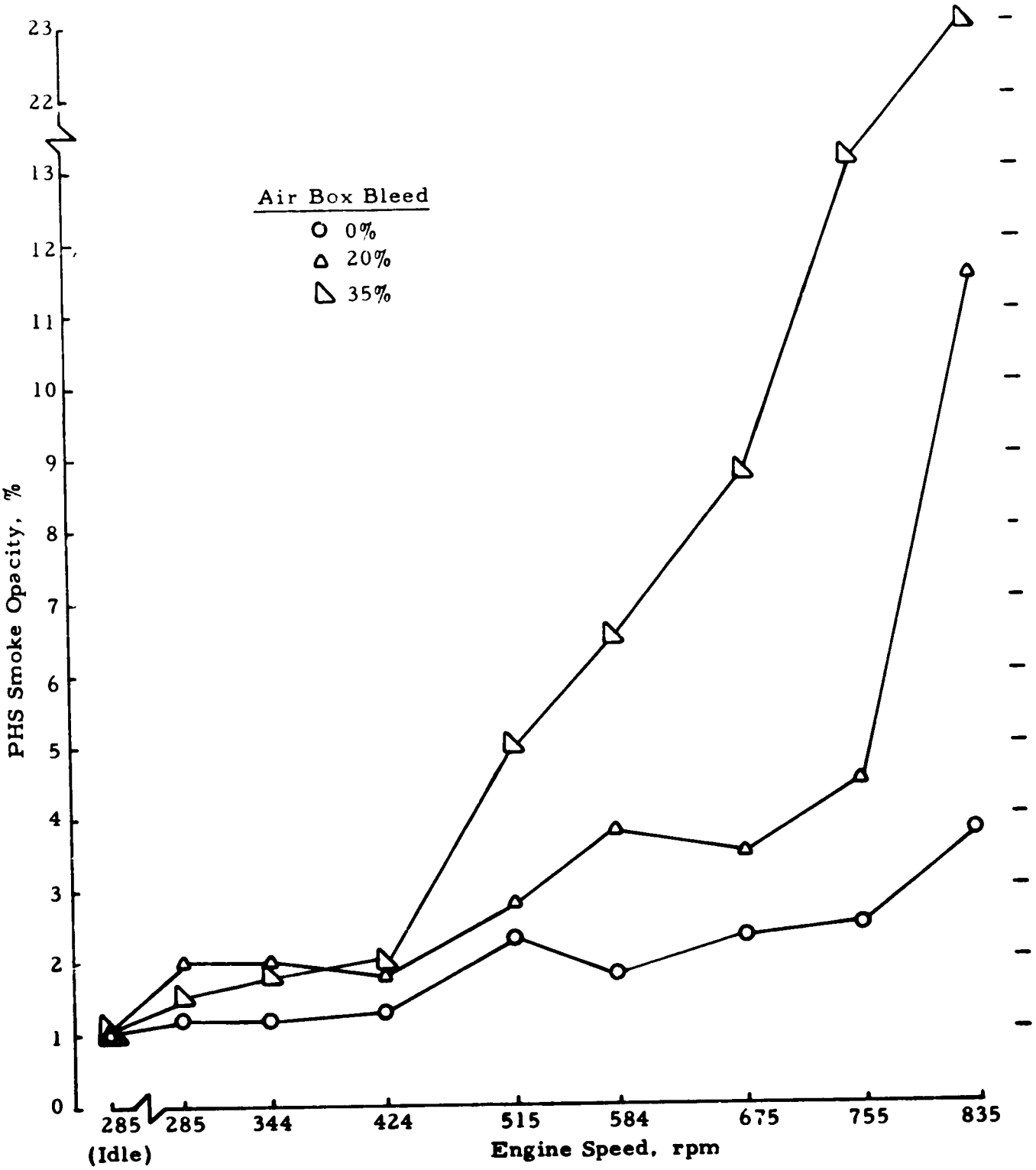


FIGURE 29. MODAL SMOKE OPACITY LEVELS FOR VARIOUS AIR BOX BLEED RATES -LOW-SAC INJECTORS AT STANDARD TIMING

TABLE 16. EFFECT OF DERATING ON EMISSIONS, SMOKE, AND POWER--LOW-SAC INJECTORS, STANDARD TIMING, AND AIR BOX BLEED

Air Box Bleed, %*	Cycle Composite Emissions					
	BSHC		BSCO		$BSNO_x$	
	Normal	Derate	Normal	Derate	Normal	Derate
20	0.611	0.706	16.612	5.718	9.522	11.148
35	0.339	0.520	17.252	7.761	7.151	8.456

Air Box Bleed, %*	Notch Position	Modal Emissions, Smoke, and Power					
		BSHC		BSCO		$BSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	0.51	0.62	20.19	5.89	8.76	10.86
35	6	0.34	0.38	11.29	4.54	6.47	6.82
	7	0.26	0.39	18.19	4.82	6.74	7.26
	8	0.25	0.46	19.66	9.16	6.66	8.21
		FSHC		FSCO		$FSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	1.05	1.34	41.72	12.58	18.10	23.20
35	6	0.74	0.84	24.41	9.99	13.98	15.04
	7	0.53	0.84	37.47	10.39	13.90	15.63
	8	0.48	0.92	37.57	18.58	12.74	16.58
		Smoke, %				Power, Bhp	
		Normal	Derate			Normal	Derate
20	8	11.5	4.0			194	170
35	6	8.8	5.8			130	115
	7	13.2	6.0			156	134
	8	23.0	5.5			180	127

*Percent of engine air flow mass requirement per mode.

that the higher bleed rates may not be suitable in the high-power notch positions. Also, it should be noted that in all likelihood even more derating would be necessary with the needle injectors, since these produce more smoke than the low-sac models.

The modal brake specific and fuel specific emissions for the "normal" (non-derated) tests with needle and low-sac injectors are given in Tables C-9 and C-10, respectively, and illustrated by Figures C-45 through C-50 (needle) and C-51 through C-55 (low-sac). These data illustrate two salient points concerning air box bleed and gaseous emissions; namely, that CO is greatly increased and NO_x is substantially reduced. However, in this instance, the reduction in NO_x was caused principally by the reduced exhaust mass, due to the air bleed itself.

One additional point to be mentioned concerns the effect of air box bleed on engine operation. Considerable engine roughness was present at 50 percent air bleed and a lesser, but still obvious, amount for 35 percent bleed. This roughness occurred in the form of fluctuations in speed, load, and fuel rate, all of which are usually very stable. This problem was not present at the 10 and 20 percent bleed rates. Engine power output was also adversely affected by the higher bleed rates. Observed power losses of 15 to 20 percent were not unusual at 35 and 50 percent air bleed.

F. Effect of Cooled EGR on Emissions--Needle-Valve and Low-Sac Injectors at Standard Timing

Exhaust gas cooled to 125-150° F was recirculated into the engine intake system. The amount recirculated was equal to a nominal 10, 20, or 30 percent of the air flow mass requirement of the engine. The nominal 10 percent rate was omitted for tests conducted with low-sac injectors. The computer printouts for all tests are contained in Appendix B, Tables B-133 through B-162.

The average cycle composite emissions are given in Table 17 and illustrated in Figures 30 and 31 (needle injectors) and 32 and 33 (low-sac). Since the exhaust mass from the engine is reduced by the amount recirculated, the mass flow (g/hr) of HC, CO, and NO_x is influenced by this reduced exhaust mass, as well as by any increase or decrease in the concentrations of these contaminants. Brake specific emissions are also affected by the change in engine horsepower produced by EGR.

When used with needle injectors, cooled EGR resulted in reduced BSHC for the ATSF switch cycle, but showed little or no improvement for

TABLE 17. CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND COOLED EGR

Injectors	Nominal EGR %*	BSHC	BSCO	$BSNO_x$	BSHC + $BSNO_x$
		ATSF Weight Factor Schedule			
Needle	0	4.553	4.139	19.562	24.115
	10	2.580	3.323	14.655	17.235
	20	2.318	2.726	12.071	14.390
	30	2.265	3.616	10.784	13.049
Low-Sac	0	1.837	2.702	22.563	24.400
	10	-	-	-	-
	20	1.108	2.852	15.642	16.750
	30	1.438	3.351	13.710	15.148
		G.E. Weight Factor Schedule			
Needle	0	1.106	10.568	9.823	10.929
	10	0.942	12.164	7.448	8.390
	20	0.959	17.682	4.764	5.722
	30	0.893	21.284	3.574	4.468
Low-Sac	0	0.655	7.281	13.045	13.700
	10	-	-	-	-
	20	0.510	17.949	6.422	6.932
	30	0.532	19.504	4.922	5.456

*Percent of engine air flow mass requirement per mode.

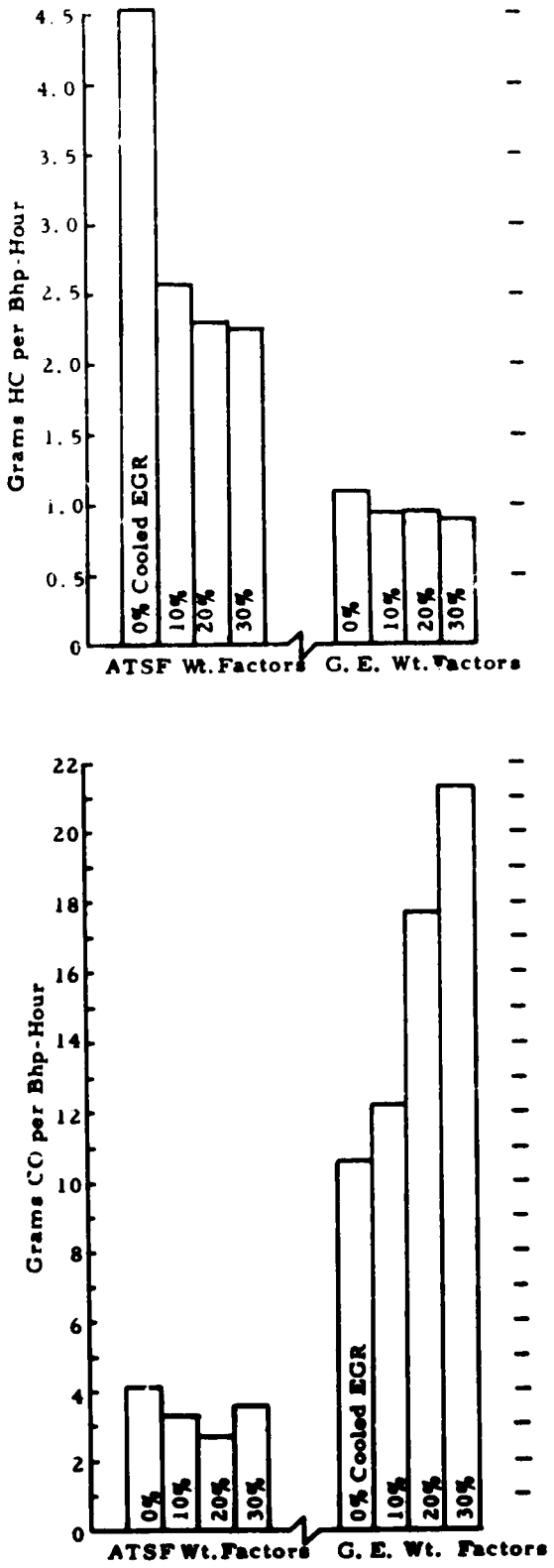


FIGURE 30. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

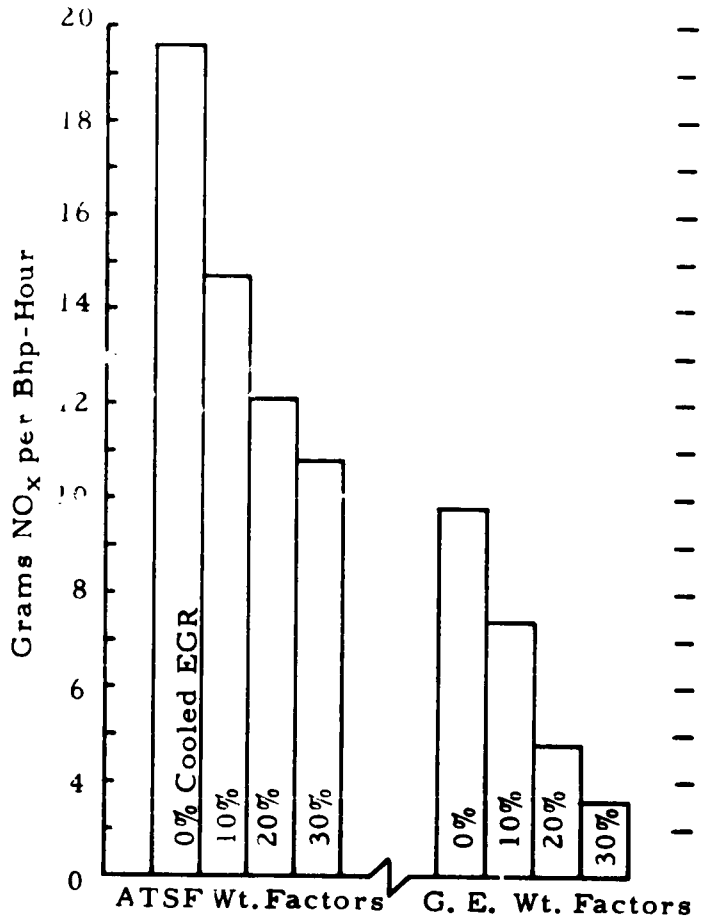


FIGURE 31. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

the G. E. line haul cycle. Brake specific CO was doubled by 30 percent EGR for the line haul cycle, where emphasis is on the higher notch positions. Cycle composite NO_x showed worthwhile reductions with all three EGR rates and both weighting schedules. These reductions ranged from 25 to 45 percent for the switch cycle, to 24 to 63 percent for the line haul.

When used in conjunction with low-sac injectors, cooled EGR reduced BSHC at the 20 percent rate, but increased it at the 30 percent rate. Brake specific CO was almost tripled on the G. E. cycle by 30 percent EGR. Cycle composite NO_x was reduced considerably in all cases. The reductions ranged from 31 to 39 percent for the ATSF cycle, and from 51 to 62 percent for the G. E. cycle. These reductions are commensurate to those observed with needle injectors and the 20 and 30 percent EGR rates.

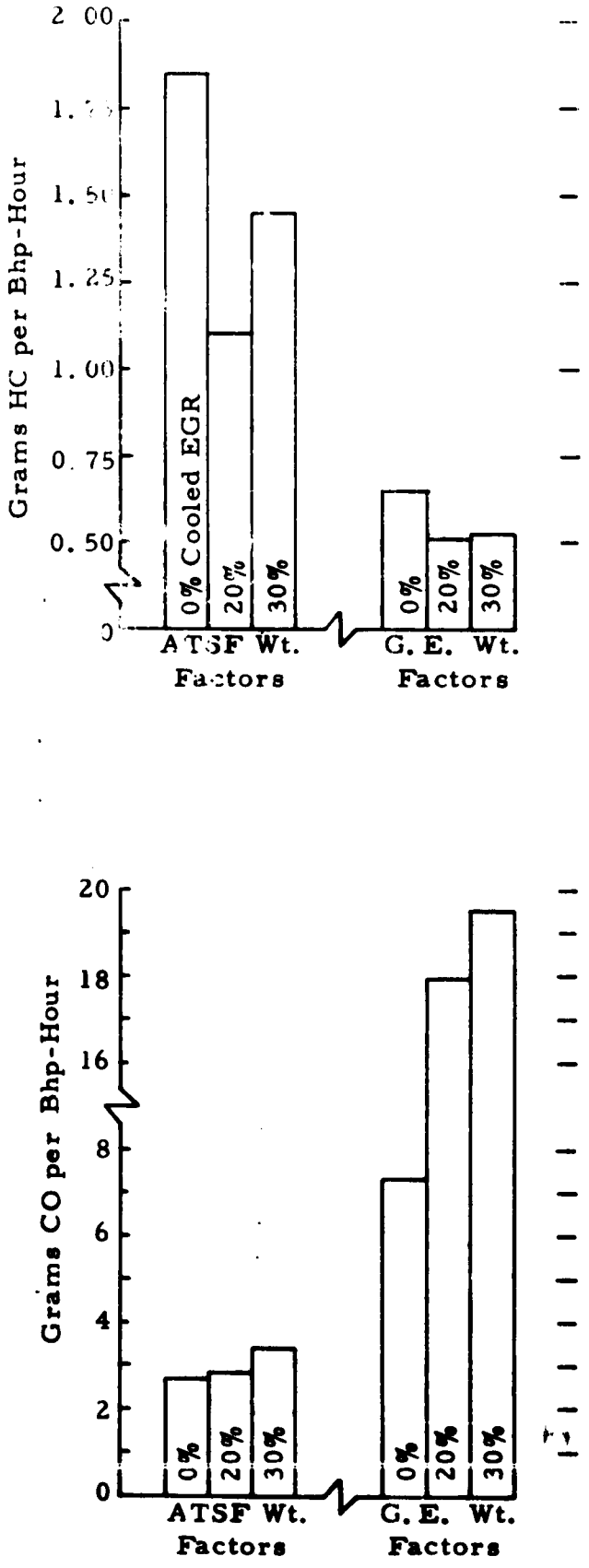


FIGURE 32. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

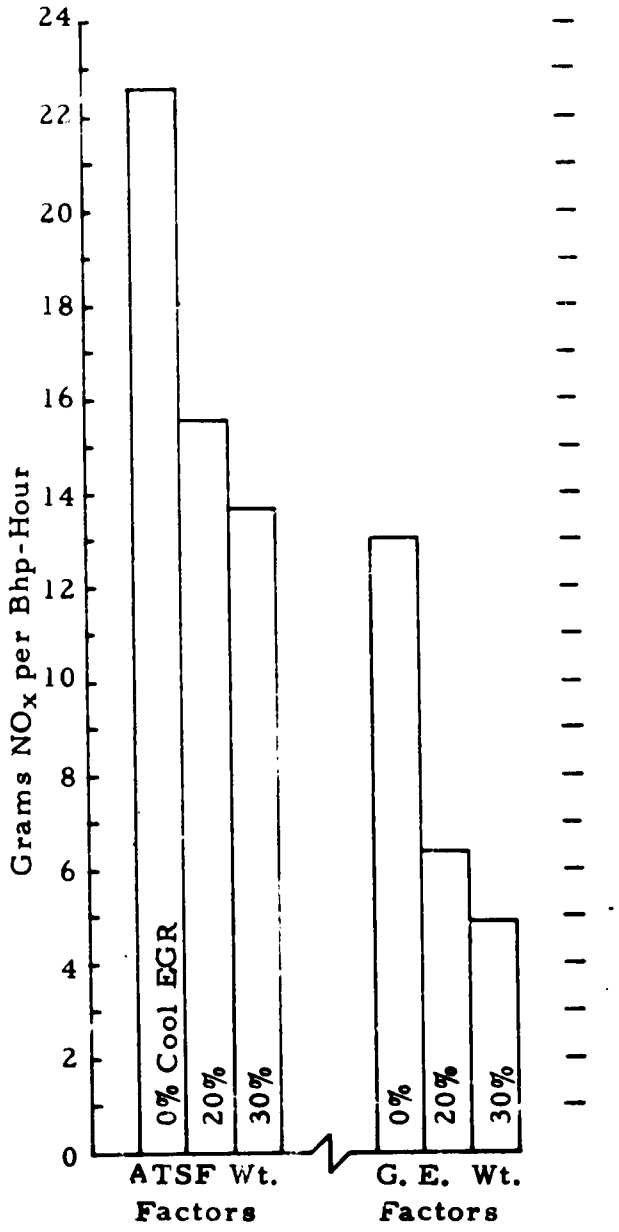


FIGURE 33. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

Table C-11 and Figures C-56 through C-58 of Appendix C are concerned with the modal emissions concentrations for the needle injectors. Similar data for the low-sac injectors is given in Table C-12 and Figures C-59 through C-61. The principal effects of cooled EGR were a drastic increase in CO concentrations, usually beginning in notch position 4 or 5, and a substantial decrease in NO_x concentrations beginning in notches 4 to 8 (515 to 835 rpm). With needle injectors, the 20 percent EGR rate reduced NO_x by 21 to 48 percent of baseline (0 percent EGR) values in these notches, while the nominal 30 percent EGR rate produced reductions of 37 to 58 percent. With low-sac injectors, the corresponding reductions were 22 to 48 percent with 20 percent EGR and 36 to 56 percent with 30 percent EGR.

Smoke opacity data are given in Table 18 and illustrated in Figures 34 and 35. Cooled EGR, in conjunction with needle injectors, produced smoke above the established limit (about six-percent opacity) in notch 7 (30 percent EGR) and notch 8 (all three rates of EGR). The range of these "excessive" opacities was about 9 to 24 percent (Figure 34). Low-sac injectors and cooled EGR produced excessive smoke in these same notch positions, and the opacity range was 9 to 15 percent (Figure 35).

The Project Officer requested that the relation between excessive smoke opacity and the oxygen-fuel ratio be determined for the tests with EGR. In other words, the O_2-fuel ratio at which smoke opacity exceeded the nominal baseline limit should be determined. Toward this end, the excess O_2 content of the exhaust was measured during a series of baseline-type tests (i.e., no EGR, air bleed, and so forth). The mass flow of excess O_2 was calculated in lb/min at standard temperature and pressure, and divided by the observed fuel flow mass to obtain a ratio of excess O_2 to fuel. The excess O_2 in the exhaust was measured during tests with cooled EGR, and the resulting O_2-fuel ratio computed according to the procedure outlined above. The results are presented in the computer printouts in the columns labeled "O_2 Pct" (lower half of table) and "O_2-Fuel Ratio" (upper half of table).

Table 19 summarizes the excess O_2 concentrations and calculated O_2-fuel ratios for tests with both types of injectors. The O_2 fuel ratios are illustrated in Figures 36 (needle) and 37 (low-sac). It can be seen from the smoke opacity data for the needle injectors (Table 18 and Figure 34) that smoke exceeded the nominal baseline limit by a substantial amount at three points--notches 7 and 8 for 30 percent EGR, notch 8 only for 20 percent and notch 7 for 20 percent. The dashed line across Figure 36 closely approximates the point (about 4.0) below which smoke opacity becomes, by definition, excessive.

A similar analysis can be performed using the opacity data for the low-sac injectors (Table 18 and Figure 35). In this case, smoke exceeded the baseline limit by a substantial amount in notches 7 and 8 for 30 percent

TABLE 18. MODAL SMOKE OPACITY FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND COOLED EGR

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, % 0% EGR*	10%*	20%*	30%*
	Needle Injectors					
1, 6, 11	Low Idle	285	0.8	1.1	1.1	1.2
2	1	285	1.4	1.5	1.2	1.7
3	2	344	1.5	1.2	1.1	1.8
4	3	424	1.9	1.8	1.0	2.0
5	4	515	1.7	2.5	1.8	2.5
7	5	584	1.4	1.2	2.0	4.3
8	6	675	1.8	2.5	3.5	6.5
9	7	755	2.6	4.5	6.8	11.2
10	8	835	4.6	9.2	17.2	24.5
	Low-Sac Injectors					
1, 6, 11	Low Idle	285	1.0	-	1.0	1.0
2	1	285	1.2	-	1.0	1.5
3	2	344	1.2	-	1.2	1.8
4	3	424	1.3	-	1.2	2.0
5	4	515	2.3	-	3.0	2.8
7	5	575	1.8	-	2.5	2.5
8	6	675	2.3	-	3.0	4.2
9	7	755	2.5	-	5.2	9.0
10	8	835	3.8	-	11.5	15.5

*Percent of engine air flow mass requirement per mode.

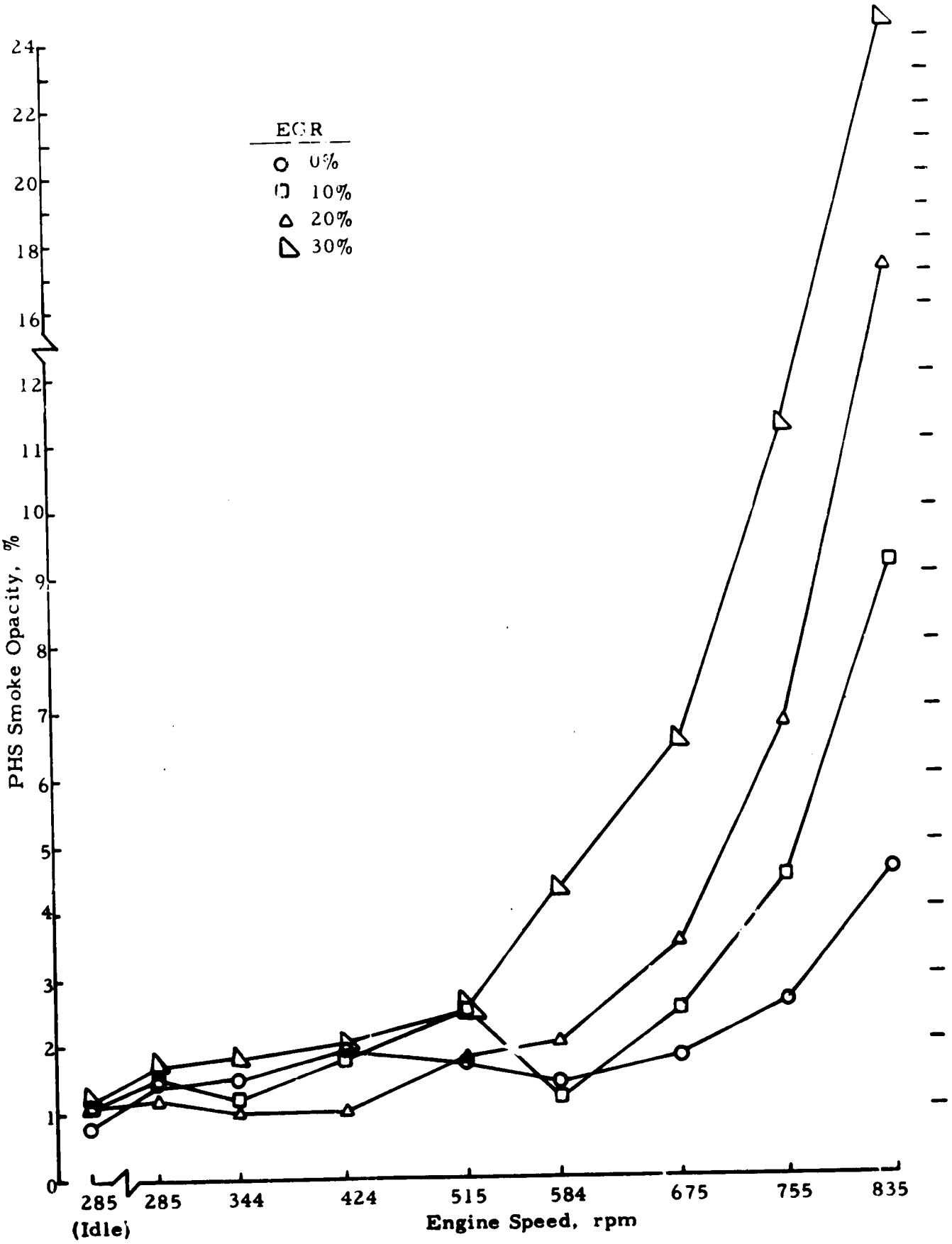


FIGURE 34. MODAL SMOKE OPACITY LEVELS FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

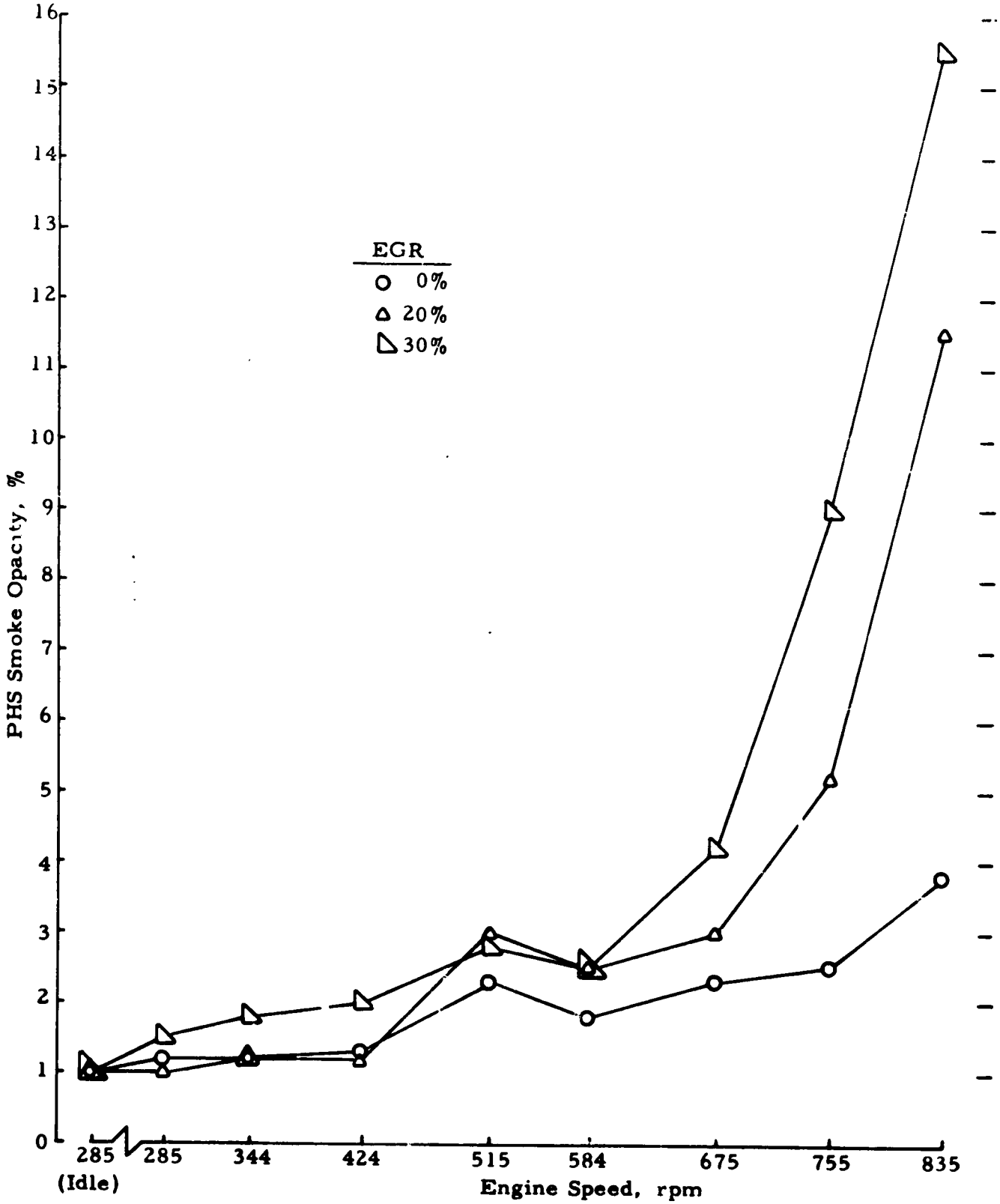


FIGURE 35. MODAL SMOKE OPACITY LEVELS FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE 19. EXCESS O_2 CONCENTRATIONS AND O_2-FUEL RATIOS FOR COOLED EGR--NEEDLE-VALVE AND LOW-SAC INJECTORS AT STANDARD TIMING

Notch Position	0% EGR		10% EGR		20% EGR		30% EGR	
	O_2, %	O_2/Fuel	O_2, %	O_2/Fuel	O_2, %	O_2/Fuel	O_2, %	O_2/Fuel
Needle-Valve Injectors								
Low Idle	20.1	58.85	20.0	57.78	20.2	49.19	20.1	45.26
1	19.0	24.54	19.4	23.63	19.0	19.83	18.8	18.69
2	18.3	17.78	18.5	16.83	18.4	14.72	18.0	13.08
3	17.1	11.59	17.4	10.90	16.9	9.15	16.2	8.18
4	16.2	9.20	16.5	8.79	16.1	7.69	15.2	6.00
5	15.2	7.22	15.8	7.06	14.9	6.04	13.9	4.76
6	14.4	6.09	15.0	5.95	13.9	4.93	12.9	4.04
7	13.8	5.28	14.4	5.11	13.2	4.18	12.4	3.64
8	12.8	4.37	13.6	4.28	12.2	3.51	11.5	2.92
Low-Sac Injectors								
Low Idle	20.2	57.56	-	-	20.4	59.75	19.9	49.64
1	19.4	25.22	-	-	20.0	23.42	18.4	19.50
2	18.8	18.85	-	-	18.8	16.57	17.2	13.51
3	17.7	12.78	-	-	17.4	10.66	15.4	8.38
4	17.1	10.46	-	-	16.4	8.36	14.4	6.60
5	15.9	8.14	-	-	15.0	6.54	13.4	5.20
6	15.2	6.93	-	-	14.3	5.43	12.6	4.38
7	14.6	6.07	-	-	13.8	4.82	12.0	3.77
8	13.8	5.09	-	-	13.4	4.14	11.6	3.23

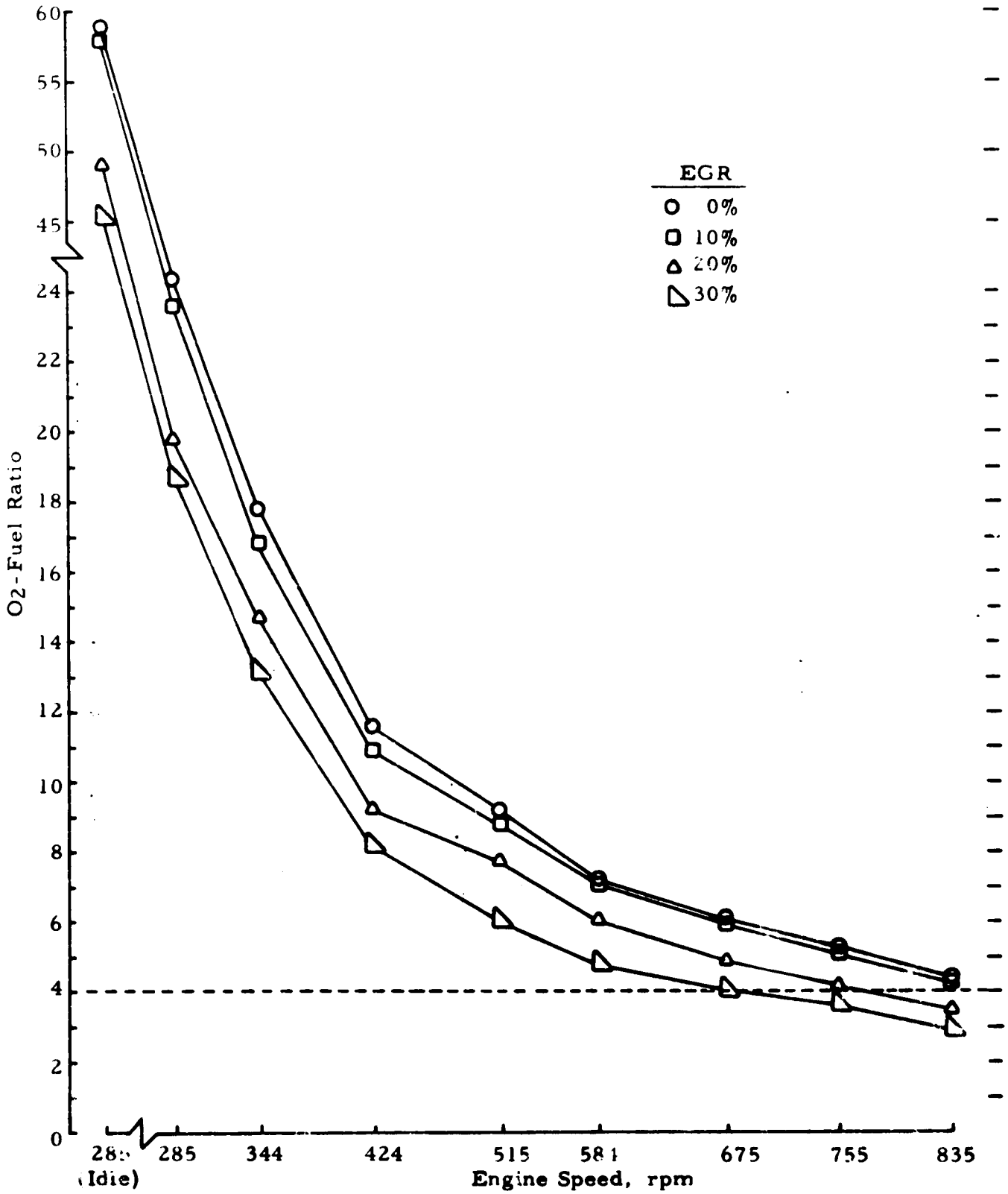


FIGURE 36. MODAL O_2-FUEL RATIOS FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

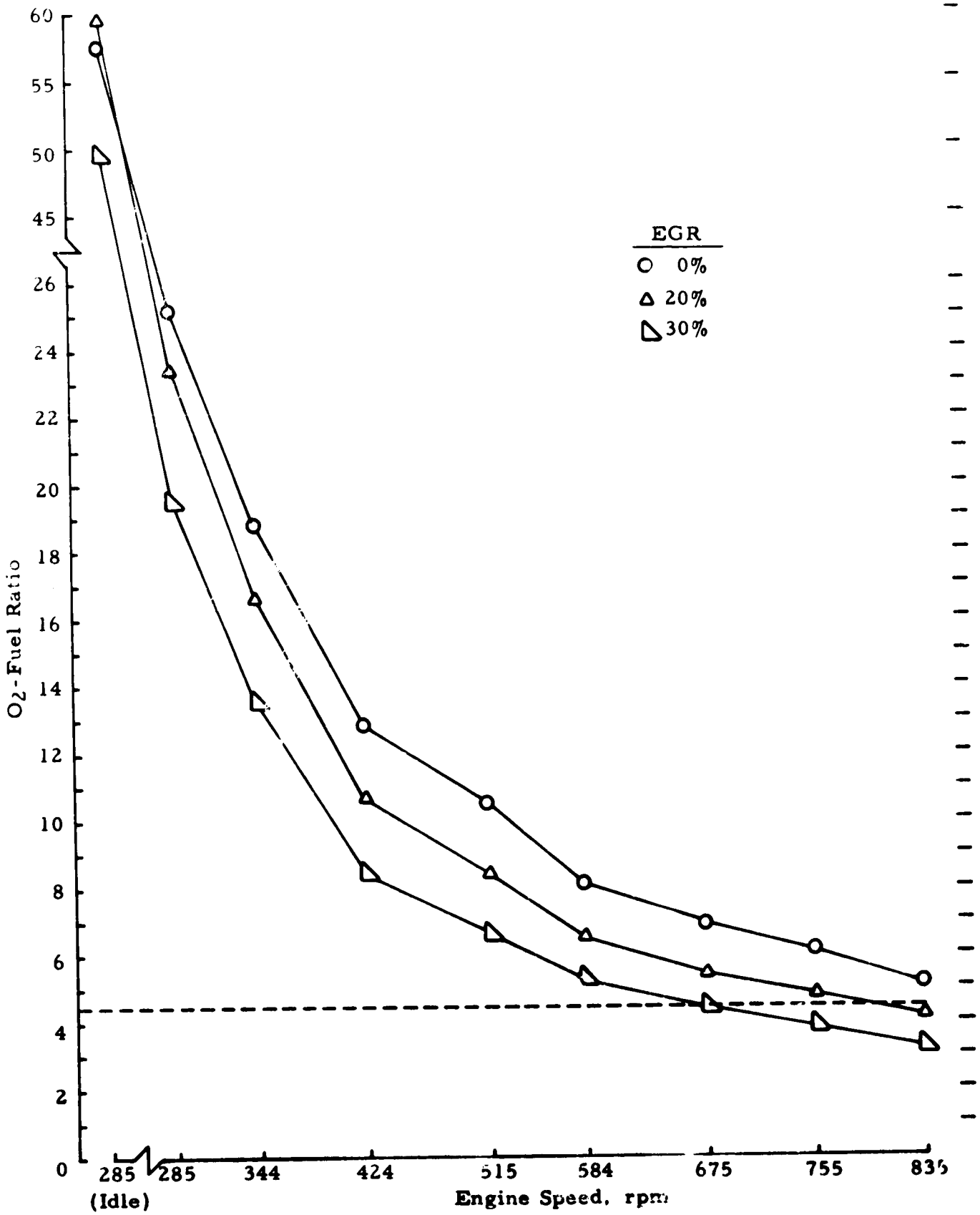


FIGURE 37. MODAL O2-FUEL RATIOS FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

EGR and notch 8 only for 20 percent EGR. The dashed line in Figure 37 approximates the point (about 4.4) where smoke became "excessive".

Engine power was derated in these notch positions in order to determine the amount of derating needed to reduce smoke levels to nominal baseline values. The so-called "normal" and "derated" test results are summarized in Tables 20 and 21 for needle and low-sac injectors, respectively. The pertinent computer printouts are Tables B-155 through B-162 in Appendix B.

With either type of injector, derating generally resulted in increased HC and NO_x and decreased CO, on both a brake specific and fuel specific basis. The ratio of excess O_2 to fuel was, of course, increased, and the ratios produced by derating fell between 4.0 and 5.0 for low-sac injectors and between 4.8 and 5.6 for needle injectors. These ratios are slightly higher than those from the baseline tests; however, the amount of derating was in excess of what was needed to reduce smoke to baseline values, and this extra derating caused the O_2-fuel ratios to increase. Power was reduced in these notch positions by 19 to 41 percent with needle injectors and by a more reasonable 11 to 14 percent with the low-sac units.

Without derating, engine power was affected only slightly by cooled EGR. Even at the nominal 30 percent rate, power was reduced by only five percent. This is a great improvement over the sizable power reductions found to occur with the higher rates of air box bleed.

Modal brake specific and fuel specific emissions for tests without derating are presented in Table C-13 and Figures C-62 through C-67 for needle injectors and in Table C-14 and Figures C-68 to C-72 for low-sacs. These data show that cooled EGR reduced HC in all notch positions, increased CO greatly in the higher notches, and reduced NO_x at all points, especially in the higher notches. In general, the higher the EGR rate, the greater was the reduction in NO_x.

G. Effect of Hot EGR on Emissions--Needle-Valve and Low-Sac Injectors at Standard Timing

These tests were conducted without cooling the recirculated exhaust gas, and the minimum temperature of the EGR was 200° F. In all other respects these tests were identical to those done with cooled EGR. The amount of recirculated exhaust was equal to a nominal 10, 20, or 30 percent of the engine intake air mass required per mode. Only the 20 and 30 percent rates were used with low-sac injectors.

The computer printouts for these tests are Tables B-163 through B-188 of Appendix B. Cycle composite emissions are summarized in Table 22 and shown in Figures 38 through 41. Brake specific HC for the ATSF cycle was significantly lower in most tests; however, little or no

TABLE 20. EFFECT OF DERATING ON EMISSIONS, SMOKE, AND POWER--NEEDLE-VALVE INJECTORS, STANDARD TIMING, AND COOLED EGR

EGR Rate, %*	Cycle Composite Emissions					
	BSHC		BSCO		$BSNO_x$	
	Normal	Derate	Normal	Derate	Normal	Derate
20	0.959	1.008	17.682	3.824	4.764	6.366
30	0.893	1.064	21.284	2.342	3.574	5.420

EGR Rate, %	Notch Position	Modal Emissions, Smoke and Power					
		BSHC		BSCO		$BSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	0.91	0.96	21.87	3.67	4.06	6.09
30	7	0.76	0.78	12.64	2.52	3.37	4.66
	8	0.83	1.06	26.08	2.00	2.96	5.12
		FSHC		FSCO		$FSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	1.91	1.96	46.14	7.52	8.56	12.46
30	7	1.65	1.68	27.40	5.42	7.30	10.02
	8	1.69	1.98	53.14	3.77	6.05	9.60
		Excess O_2, %		Smoke, %		Power, Bhp	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	3.51	5.10	17.2	5.2	198	148
30	7	3.64	4.84	11.2	4.8	165	133
	8	2.92	5.62	24.5	5.0	192	114

*Percent of engine air flow mass requirement per mode.

TABLE 21. EFFECT OF DERATING ON EMISSIONS, SMOKE, AND POWER--LOW-SAC INJECTORS, STANDARD TIMING, AND COOLED EGR

EGR Rate, %*	Cycle Composite Emissions					
	BSHC		BSCO		$BSNO_x$	
	Normal	Derate	Normal	Derate	Normal	Derate
20	0.510	0.537	17.949	7.096	6.422	7.452
30	0.532	0.603	19.504	7.262	4.922	6.056

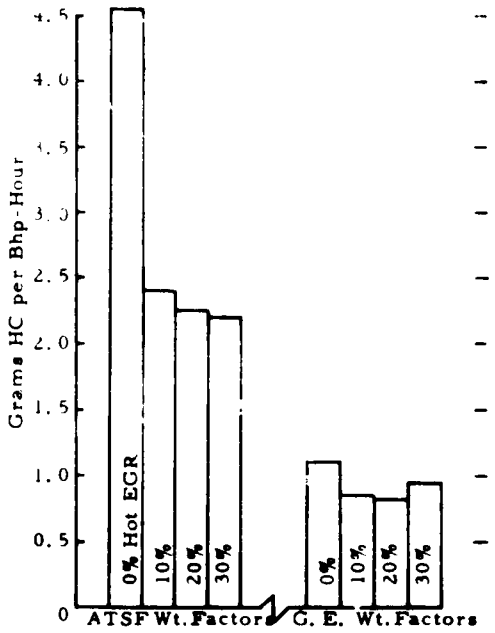
EGR Rate, %*	Notch Position	Modal Emissions, Smoke, and Power					
		BSHC		BSCO		$BSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	0.49	0.52	22.23	8.12	5.40	6.66
30	7	0.50	0.48	13.70	4.04	4.64	5.60
	8	0.49	0.57	23.76	8.76	4.13	5.43
		FSHC		FSCO		$FSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	1.09	1.18	48.89	18.16	11.87	14.90
30	7	1.13	1.10	31.42	9.24	10.64	12.80
	8	1.04	1.24	51.54	19.11	8.95	11.86
		O_2-Fuel Ratio		Smoke, %		Power, Bhp	
		Normal	Derate	Normal	Derate	Normal	Derate
20	8	4.14	4.92	11.5	4.2	206	184
30	7	3.77	4.61	9.0	4.2	174	152
	8	3.24	4.06	15.5	5.2	203	174

*Percent of engine air flow mass requirement per mode.

TABLE 22. CYCLE COMPOSITE BRAKE SPECIFIC EMISSIONS FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND HOT EGR

Injectors	Nominal EGR %*	BSHC	BSCO	$BSNO_x$	BSHC + $BSNO_x$
		ATSF Weight Factor Schedule			
Needle	0	4.553	4.139	19.562	24.115
	10	2.416	3.932	16.720	19.136
	20	2.252	3.345	14.115	16.367
	30	2.202	4.070	11.814	14.017
Low-Sac	0	1.837	2.702	22.563	24.400
	10	-	-	-	-
	20	1.176	3.224	13.360	14.536
	30	1.496	3.372	13.762	15.258
		G.E. Weight Factor Schedule			
Needle	0	1.196	10.568	9.823	10.929
	10	0.859	18.030	7.753	8.612
	20	0.835	27.367	5.345	6.180
	30	0.938	58.926	3.185	4.122
Low-Sac	0	0.655	7.281	13.045	13.700
	10	-	-	-	-
	20	0.473	33.357	5.249	5.722
	30	0.600	64.156	4.128	4.728

*Percent of engine air flow requirement per mode.



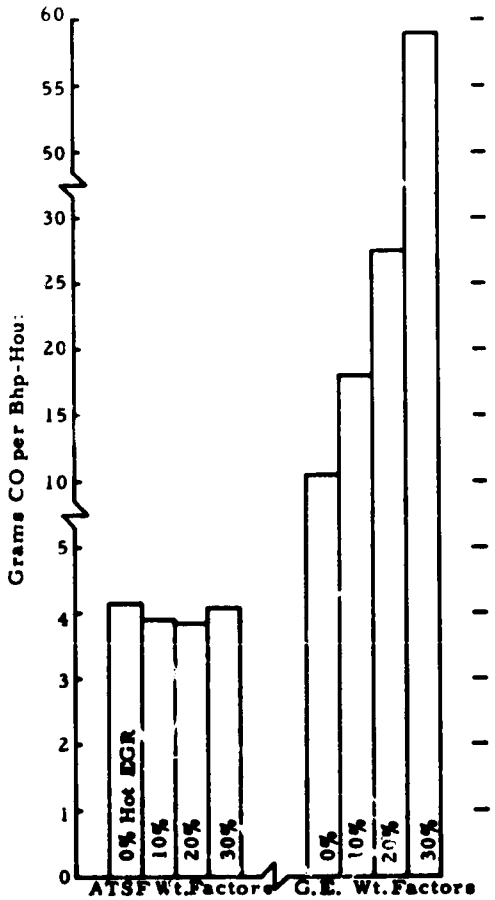


FIGURE 38. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

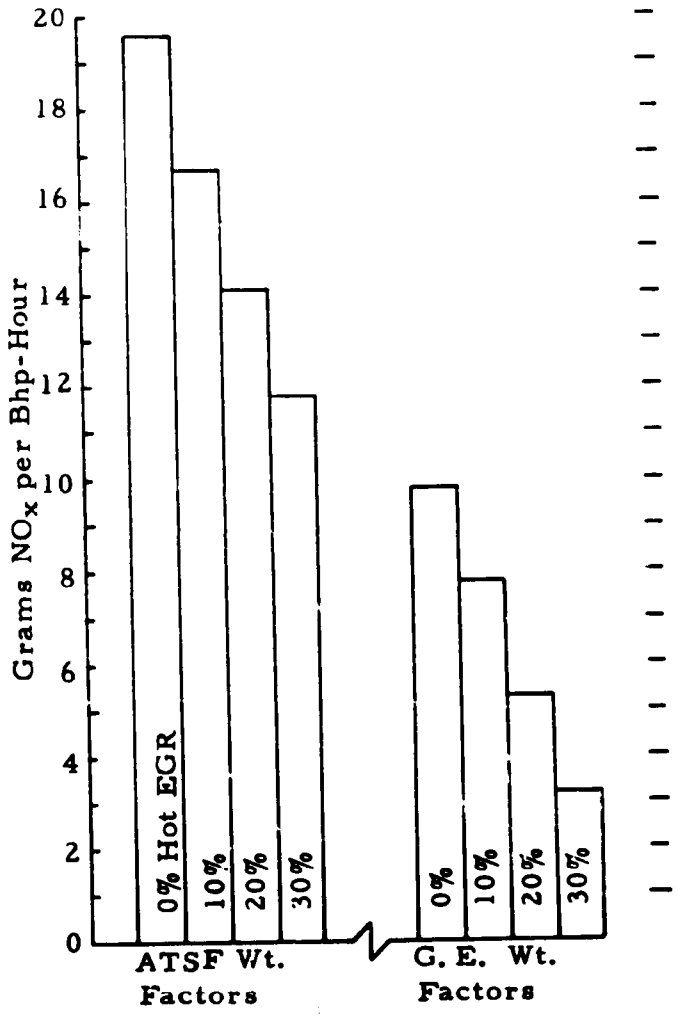
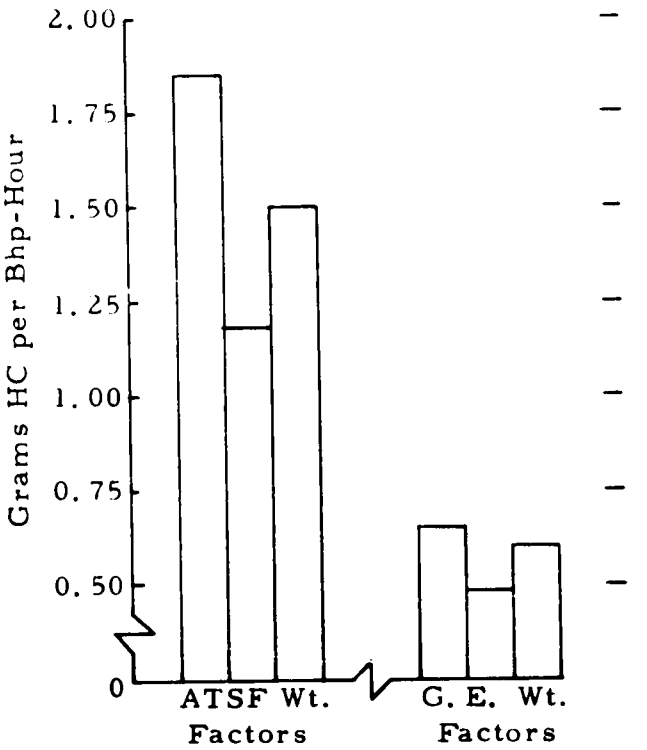


FIGURE 39. CYCLE COMPOSITE BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING



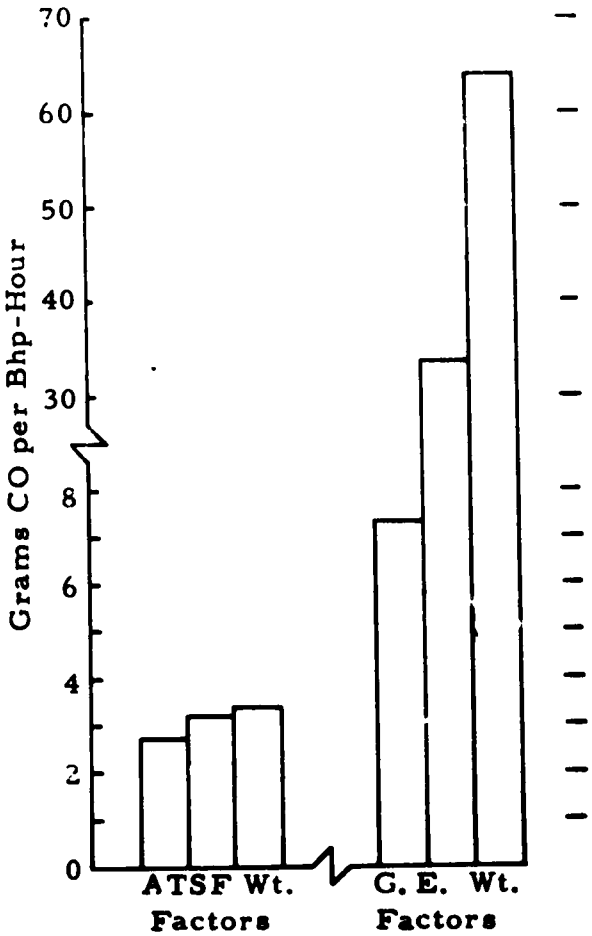


FIGURE 40. CYCLE COMPOSITE BRAKE SPECIFIC HC AND CO FOR VARIOUS RATES OF HOT EGR-- LOW-SAC INJECTORS AT STANDARD TIMING

improvement was present in HC calculated on the G. E. cycle. Brake specific CO was much higher with hot EGR, higher even than with cooled EGR or air box bleed. With nominal 30 percent EGR, and using the line haul weight factors, BSCO was almost six times higher than baseline (0 percent EGR) for needle injectors and almost nine times higher for the low-sac units. Cycle composite NO_x was reduced by hot EGR in all tests, and the reductions were of the same magnitude (percentwise) as with cooled EGR. The ATSF cycle composite values were reduced 15 to 40 percent below baseline for needle injectors and by about 40 percent for low-sac injectors. The G. E. values were reduced 20 to 67 percent for needle injectors and by 60 to 68 percent for low-sacs. The lower percentage reduction for the needle injectors was achieved with the nominal 10 percent EGR rate, which was not used in tests with low-sac injectors.

Table C-15 and Figures C-73 through C-75 give the concentrations produced by needle injectors and hot EGR. Corresponding concentrations for the low-sac injectors are presented in Table C-16 and Figures C-76 through C-78. Hot EGR generally reduced the HC concentrations, especially in the lower notch positions, but this trend was not so evident with the low-sac injectors. Concentrations of CO were slightly increased or decreased at low idle and in the first four notches (285-515 rpm), while in the last four notches the concentrations were increased 1.5 to 7 times (depending on EGR rate) the baseline values for needle injectors and 3 to 12 times the baseline for low-sacs. These increases in CO were generally much higher than those noted with cooled EGR. Concentrations of NO_x were greatly reduced in notch positions 5 through 8 (584-835 rpm). With nominal 30 percent EGR, NO_x from the needle injectors was reduced by 33 to 74 percent in these notches, and by 42 to 73 percent with low-sac injectors.

Smoke opacity data for these tests appear in Table 23 and Figures 42 and 43. Hot EGR tended to increase smoke in most modes, but once again the largest increases were found in the higher notch positions. Opacity was above the baseline limit for needle injectors at six points--notches 6, 7, and 8 for 30 percent EGR notches 7 and 8 for 20 percent, and notch 8 only for 10 percent EGR. The range of these opacities was 7 to 59 percent. The combination of low-sac injectors and hot EGR resulted in excessive smoke in notch positions 6, 7, and 8 for the 30 percent rate, and in notches 7 and 8 for 20 percent EGR. The opacity range in this case was 7 to 54 percent.

The amount of excess O_2 in the exhaust was measured during these tests and the O_2-fuel ratio calculated by the procedure outlined previously. These data are given in Table 24 and illustrated in Figures 44 and 45 for needle and low-sac injectors, respectively. The test points at which smoke opacity exceeded the baseline limit were enumerated in the preceding discussion. If a horizontal line is drawn on the two figures so that these test points lie below it, it is found that the line represents an

TABLE 23. MODAL SMOKE OPACITY FOR NEEDLE-VALVE AND LOW-SAC INJECTORS, STANDARD TIMING, AND HOT EGR

Mode	Notch Position	Engine Speed, rpm	PHS Smoke Opacity, % 0% EGR*	10%*	20%*	30%*
	Needle Injectors					
1, 6, 11	Low Idle	285	0.8	1.2	1.3	1.1
2	1	285	1.4	1.8	1.3	1.8
3	2	344	1.5	1.8	1.2	1.5
4	3	424	1.9	2.0	1.3	1.5
5	4	515	1.7	2.5	2.8	2.5
7	5	584	1.4	2.0	2.3	3.2
8	6	675	1.8	2.8	4.5	7.0
9	7	755	2.6	4.5	9.8	25.0
10	8	835	4.6	12.0	27.5	59.0
	Low-Sac Injectors					
1, 6, 11	Low Idle	285	1.0	-	1.0	1.3
2	1	285	1.2	-	1.0	1.5
3	2	344	1.2	-	2.0	2.2
4	3	424	1.3	-	1.5	2.0
5	4	515	2.3	-	2.0	3.5
7	5	584	1.8	-	2.0	4.2
8	6	675	2.3	-	3.0	8.8
9	7	755	2.5	-	7.0	25.0
10	8	835	3.8	-	22.0	54.5

*Percent of engine air flow mass requirement per mode.

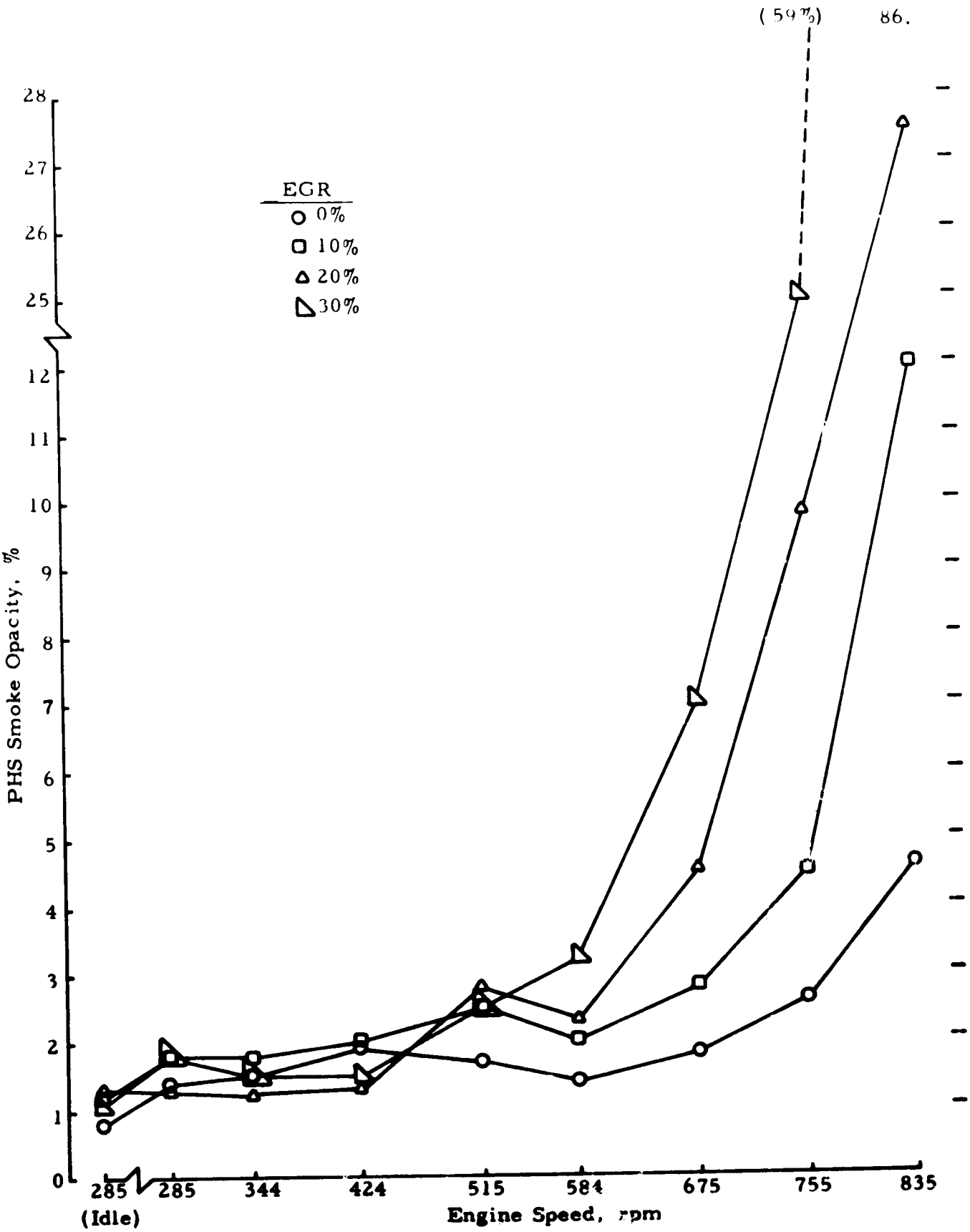


FIGURE 42. MODAL SMOKE OPACITY LEVELS FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

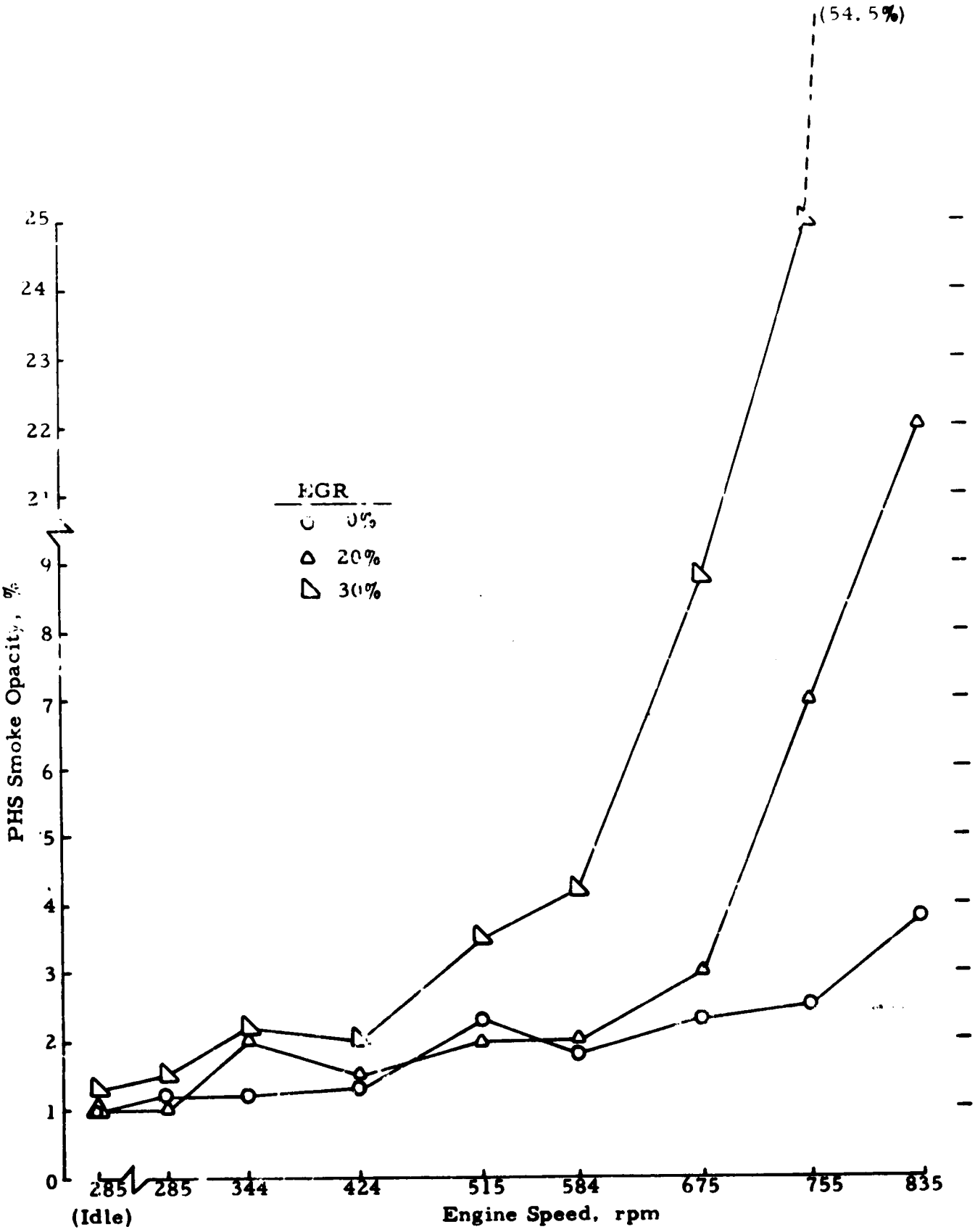


FIGURE 43. MODAL SMOKE OPACITY LEVELS FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE 24. EXCESS O_2 CONCENTRATIONS AND O_2-FUEL RATIOS FOR HOT EGR--NEEDLE-VALVE AND LOW-SAC INJECTORS AT STANDARD TIMING

Notch Position	0% EGR		10% EGR		20% EGR		30% EGR	
	O_2, %	O_2/Fuel	O_2, %	O_2/Fuel	O_2, %	O_2/Fuel	O_2, %	O_2/Fuel
Needle-Valve Injectors								
Low Idle	20.1	58.85	20.0	53.23	19.5	45.09	19.3	40.73
1	19.0	24.54	18.6	22.16	18.3	19.65	18.0	17.48
2	18.3	17.78	17.8	16.10	17.5	14.23	17.4	12.60
3	17.1	11.59	16.4	10.34	15.8	8.47	15.6	7.55
4	16.2	9.20	15.6	8.21	14.8	7.15	14.5	5.70
5	15.2	7.22	14.4	6.47	13.3	5.42	12.8	4.40
6	14.4	6.09	13.4	5.38	12.0	4.25	11.0	3.39
7	13.8	5.28	12.7	4.52	10.6	3.27	9.2	2.73
8	12.8	4.37	11.5	3.59	9.8	2.79	8.4	2.14
Low-Sac Injectors								
Low Idle	20.2	57.56	-	-	19.5	50.59	19.6	47.20
1	19.4	25.22	-	-	18.6	20.56	18.5	17.78
2	18.8	18.85	-	-	18.2	15.41	18.0	13.40
3	17.7	12.78	-	-	16.5	9.79	16.0	8.32
4	17.1	10.46	-	-	15.4	7.51	14.8	6.62
5	15.9	8.14	-	-	14.0	5.89	12.9	4.81
6	15.2	6.93	-	-	12.7	4.68	11.1	3.80
7	14.6	6.07	-	-	11.4	3.77	9.4	2.92
8	13.8	5.09	-	-	10.1	2.95	8.6	2.37

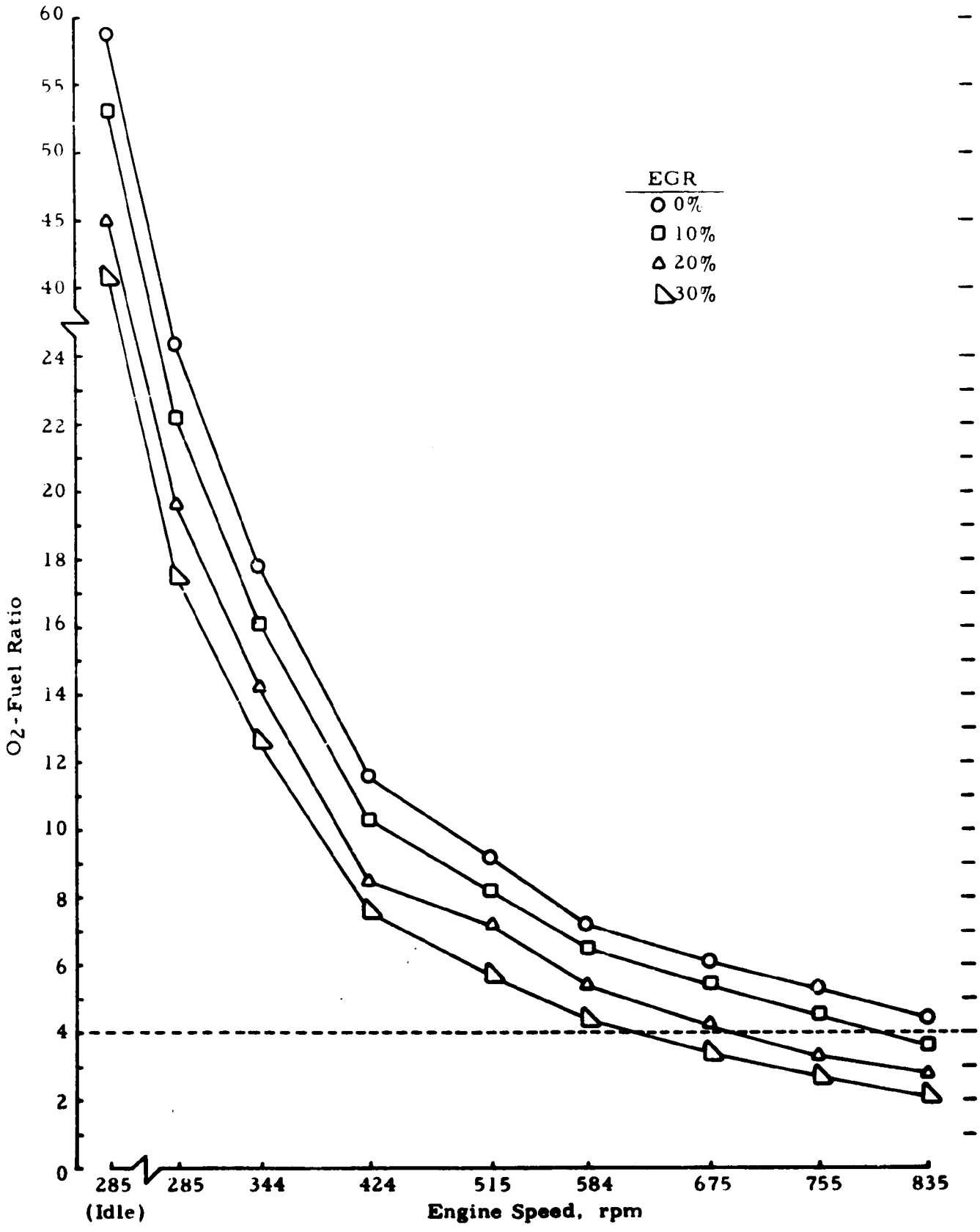


FIGURE 44. MODAL O_2-FUEL RATIOS FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

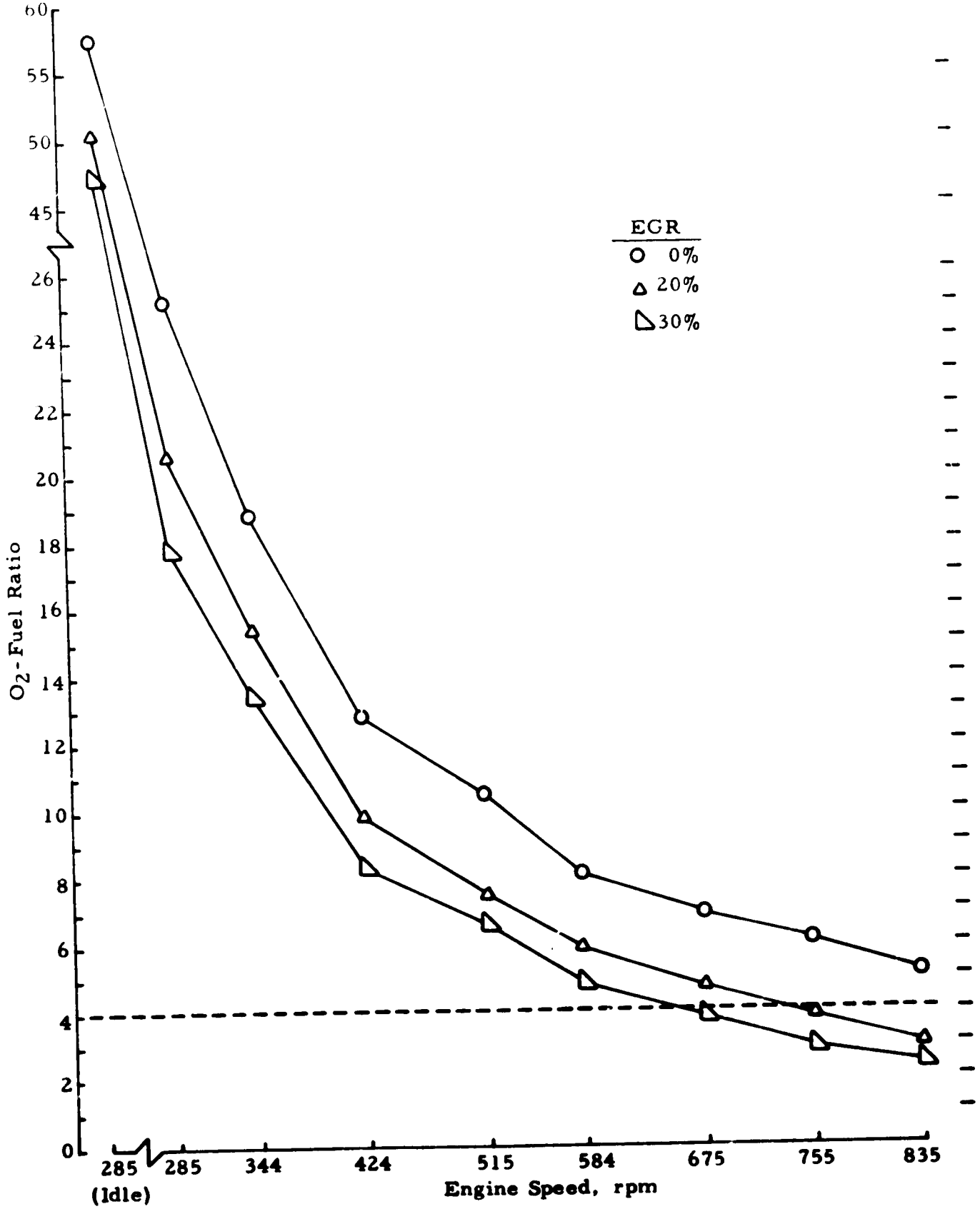


FIGURE 45. MODAL O_2-FUEL RATIOS FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

O_2-fuel ratio of approximately 4.0. This same ratio was found to be of similar significance in tests with cooled EGR. However, the amount of excess O_2 present was considerably less with hot EGR than with cooled EGR. Thus, the O_2-fuel ratios for hot EGR are lower than the corresponding ratios found with cooled EGR, especially at the high-power notch position. Hence, hot EGR produced considerably more smoke at these points than did cooled EGR. Reduced charge density with "hot" EGR is one reason for the deterioration in smoke.

Engine power was derated with the low-sac injectors in an attempt to reduce smoke to the baseline limit. (A similar derating was inadvertently omitted during tests with the needle injectors.) The consequences of this derating are summarized in Table 25. The computer printouts for these tests are Tables B-185 through B-188 of Appendix B.

As in the other tests involving derating, it was found that HC and NO_x increased, while CO was reduced tremendously. The excess O_2-fuel ratio increased into the range of 4.7 to 5.8, which is considerably higher than the range of the corresponding ratios for cooled EGR. As mentioned previously, hot EGR produced smoke of much higher opacity than did cooled EGR, and the amount of power derating needed with hot EGR reflects the difference. With 20 percent EGR the power in notches 7 and 8 was reduced by 7 and 13 percent, respectively. This compares favorably to the derating needed with cooled EGR. However, with 30 percent hot EGR the power in these same notch positions was reduced by 24 and 37 percent, respectively. This is much greater than the corresponding power reductions of 13 and 14 percent required with cooled EGR.

The modal brake specific and fuel specific data for tests sans derating are presented in Table C-17 and Figures C-79 through C-84 for needle injectors and in Table C-18 and Figures C-85 through C-89 for low-sacs. In general, HC was slightly reduced by the use of hot EGR, but CO experienced the expected large increase, especially at the higher-power conditions. However, NO_x was reduced more in the upper notch positions than at the low end of the operating cycle. Even with these large reductions of NO_x, it is not likely that the very high smoke and CO output could be tolerated in actual locomotive operation.

The test engine showed poor operating characteristics with hot EGR. Such problems as unstable speed and load were experienced, especially in the higher notch positions, and these problems became worse as the EGR rate was increased. Output of particulate matter was apparently increased, as the filters used to remove such matter from the exhaust sample required frequent replacement during these tests. Engine power was reduced 15 to 20 percent at most points of the test cycle with nominal 30 percent EGR. These losses in observed power are three to four times greater than noted with cooled EGR.

TABLE 25. EFFECT OF DERATING ON EMISSIONS, SMOKE, AND POWER--LOW-SAC INJECTORS, STANDARD TIMING, AND HOT EGR

EGR Rate, %*	Cycle Composite Emissions					
	BSHC		BSCO		$BSNO_x$	
	Normal	Derate	Normal	Derate	Normal	Derate
20	0.473	0.496	33.357	6.886	5.249	6.713
30	0.600	0.710	64.156	2.242	4.128	7.088

EGR Rate, %*	Notch Position	Modal Emissions, Smoke, and Power					
		BSHC		BSCO		$BSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	7	0.36	0.40	16.21	7.94	5.45	5.90
	8	0.43	0.46	42.73	7.98	4.19	6.03
30	6	0.50	0.45	9.49	2.87	4.81	5.17
	7	0.50	0.60	34.12	2.78	3.45	5.43
	8	0.55	0.68	82.51	2.24	3.03	6.56

		FSHC		FSCO		$FSNO_x$	
		Normal	Derate	Normal	Derate	Normal	Derate
20	7	1.09	0.88	35.20	17.52	11.83	13.01
	8	0.81	0.96	80.91	16.53	7.91	12.50
30	6	1.13	1.02	21.21	6.56	10.79	11.77
	7	1.02	1.26	69.75	5.80	7.05	11.31
	8	1.00	1.28	149.01	2.38	5.46	12.33

		O_2-Fuel Ratio		Smoke, %		Power, Bhp	
		Normal	Derate	Normal	Derate	Normal	Derate
20	7	3.77	4.93	7.0	4.5	165	154
	8	2.95	5.30	22.0	5.0	178	155
30	6	3.80	4.72	8.8	5.0	134	118
	7	2.92	5.03	25.0	5.8	154	117
	8	2.37	5.79	54.5	4.5	169	106

*Percent of engine air flow mass requirement per mode.

H. Recheck of Baseline Emission Levels--Needle-Valve and Low-Sac Injectors at Standard Timing

The baseline emission levels presented in Part A of this section were checked at the end of the test series with needle and low-sac injectors. The results of these tests showed that the baseline for the needle injectors was about ten percent lower for HC and NO_x than at the beginning of the project. Smoke opacity and CO were nearly unchanged. The baseline for the low-sac injectors was almost identical with that which existed originally. This final baseline test series served to validate the experiments conducted with various control strategies and indicates the stability of the laboratory engine employed.

V. SUMMARY AND CONCLUSIONS

This project was conducted for the purpose of evaluating several methods of controlling oxides of nitrogen and smoke output from a two-cylinder version of a popular locomotive engine. The effects of these control methods on hydrocarbon and carbon monoxide emissions were also to be determined. Several well-known methods of NO_x control--such as use of fuel injectors of different designs, variation of injection timing, inlet air humidification, reduction of scavenging air volume, and exhaust gas recirculation--were applied to the test engine. Results of the tests conducted with these control methods were then compared with results of a series of baseline tests, and the comparative effectiveness of the control methods determined.

The following conclusions were drawn from the results of the items of work mentioned above:

(1) Hydrocarbons (HC) were reduced substantially by merely changing from the older-style spherical-valve injectors to the newer needle-valve injectors. Another substantial reduction in HC occurred when the needle-valve injectors were replaced by the new low-sac models. Carbon monoxide (CO) was influenced to some extent by injector design, but the resulting levels were low in any case. Oxides of nitrogen (NO_x) were increased by the low-sac injectors over the levels produced by the other two types of injectors. This increase was most noticeable in the lower notch positions. Smoke opacity was very low in all tests, regardless of the type of injector used. Observed engine power was also approximately equal for each injector.

(2) Retarding the injection timing 4° from the standard setting resulted in slight reductions in HC and a substantial increase in CO in the upper notch positions. Oxides of nitrogen were reduced considerably throughout the test cycle. Smoke opacity was increased, particularly in the higher notch positions, but it was possible to reduce smoke to the baseline level with a slight derating of engine power. Without derating, engine power was not adversely affected by retarded timing. If injection was advanced 4° from the standard setting, HC, CO, and smoke opacity were reduced, but NO_x was increased.

(3) Water induction (inlet air humidification) was responsible for moderate reductions in NO_x, with little or no increases in HC, CO, and smoke opacity. The higher water rates (equal to 75 or 100 percent of fuel flow mass per mode) were most effective in reducing NO_x. Engine power was not adversely affected by the addition of water. One drawback of water induction as a control technique was the discovery that some of the water inducted did not remain in the intake air, but rather collected in the bottom of the engine air box. It is possible, of course, that this problem could be resolved by use of a different method of water atomization.

(4) When retarded injection timing and water induction were combined as a control method, it was found that NO_x was reduced by a greater amount than that observed for each method by itself. However, retarded timing was responsible for well over one-half of the reduction in NO_x. Also, CO and smoke opacity were higher in the upper notch positions than found to occur with retarded timing along. A slight derating of engine power in these notches would no doubt reduce smoke to nominal baseline levels; however, this approach was not actually tried.

(5) Air box bleed (reduction of scavenging air volume) reduced HC with the needle injectors, but not with the low-sac models. Carbon monoxide was greatly increased in the high power conditions for both types of injectors. Brake specific NO_x values were lowered little or not at all, and the reductions which were observed were due, in the main, to the reduced mass flow of exhaust caused by venting the air box. Substantial reductions in the measured concentrations of NO_x did result from air box bleed, but these lower concentrations were in most cases offset by sharp reductions in power. Smoke opacity was greatly increased, and a substantial amount of power derating was needed to lower these opacities back to nominal baseline levels. Engine operation became rough and unstable if over 20 percent of the intake air mass was bled from the air box.

(6) Cooled EGR generally reduced HC or, at worst, produced only a small increase. Carbon monoxide was relatively unchanged at the low-power notch positions, but was substantially increased at the high-power conditions. Oxides of nitrogen showed very worthwhile reductions under all conditions, but especially in the higher notch positions. Smoke opacity was increased, but was deemed excessive only in the last two notches. Smoke opacity (and CO) could be reduced to baseline values by derating engine power. The amount of derating needed was very high for needle injectors, but more reasonable for the low-sac models. Derating caused NO_x to increase slightly and thus negated, to some extent, the beneficial effect of cooled EGR.

(7) Hot EGR resulted in lower HC in most instances, particularly with the needle injectors, but CO was increased tremendously in the upper notch positions. Oxides of nitrogen were reduced substantially, with the greatest decrease noted in the high-power conditions. Smoke opacity was extremely high in notch 8 and excessive in notch 7, as well. To reduce the smoke to baseline values required power to be derated by 24 and 37 percent, respectively, in notches 7 and 8 (30 percent EGR rate). Much less derating was needed with 20 percent EGR, but this lower rate did not produce as great a reduction in NO_x as the 30 percent rate. Hot EGR also resulted in rough engine operation and lower power in all notch positions.

(8) It is apparent that smoke opacity is highly sensitive to the oxygen-fuel ratio. This finding implies that any control technique which lowers this ratio below a definite point (about 4.0, in this instance) will cause "excessive" smoke - - i.e., smoke opacity beyond some agreed-upon level. Since air box bleed and EGR often reduce this ratio below the critical point, their use necessarily entails a reduction in fuel rate and, consequently, in engine power output. A sufficient reduction must be performed to cause the O_2-fuel ratio to return to the critical point previously established.

(9) Based on the above observations, it appears that for this particular case- - i.e., a two-cylinder version of a full-size locomotive engine--the overall most effective control technique consisted of retarded injection timing, with a slight power derating to control smoke opacity. These were very simple steps to take, yet they resulted in a substantial reduction in NO_x, regardless of the type of injector used. The next most effective control method was cooled EGR, plus power derating to keep smoke and CO to acceptable levels. The observed reductions in NO_x were much greater with cooled EGR than with retarded timing, but the hardware required for use of cooled EGR on a full-size engine would be expensive and complicated.

LIST OF REFERENCES

1. Hare, Charles T., and Karl J. Springer, "Exhaust Emissions From Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines," Final Report (Part I) on locomotive diesel engines and marine counterparts, prepared for the Environmental Protection Agency, October 1972.

2. "A Progress Report On Electro-Motive's Emission Reduction Program for Diesel Engines," published by Electro-Motive Division of General Motors Corporation, September 1972.

3. Federal Register, Volume 37, No. 175 (Part II), p. 1870, September 8, 1972.

4. Report on Exhaust Emissions of Selected Railroad Diesel Locomotives, prepared by Southern Pacific Transportation Company, March 1972.

5. Unconfirmed Minutes of a meeting of The Large Engine Diesel Smoke Procedure Task Force, April 18, 1972.

6. Hare, op. cit., p. 20.

7. Springer, Karl J., "An Investigation of Diesel-Powered Vehicle Odor and Smoke--Part V," prepared for the Environmental Protection Agency, to be published Fall, 1973.

APPENDIX A

Letter from Hugh A. Williams, Jr.,
of EMD to Karl J. Springer, Manager
Emissions Research Laboratory

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS CORPORATION

LA GRANGE ILLINOIS

August 8, 1972

Mr. Karl J. Springer, Manager
Emissions Research Laboratory
Southwest Research Institute
8500 Culebra Road
P. O. Drawer 28510
San Antonio, Texas 78284

Dear Karl,

In reply to your letter of July 24, 1972 relative to possible configurations of your 2-567 engine for emissions tests, we would offer the following information:

Model 2-567C Engine

Part No.	Name	Description
8300780	Cyl. Liner	Basic 567 20-port liner
3409499	Piston	Basic 567C with trunnion type connection rod (16:1 compression ratio)
	or	
8061362	Piston	Basic 567B with floating type rod (16:1 compression ratio)
5228230	Injector	567C Basic, Spherical valve, medium output
	or	
5227852	Injector	567B Basic, Spherical valve, low output

The aforementioned part numbers should permit you to identify the parts in your engine. Injectors which were basic to either the 567C or 567B are listed above. The 567C needle valve injectors with 5228713 spray tips which you have in your engine now

are standard needle valve tips in the medium air flow range. The needle valve spray tip for the 567 series engine is available in the low, medium, and high air flow range (*corresponding to orifice area*) and permits the customer who calibrates his own injectors to select the correct spray tip to provide the required injector calibration.

For baseline tests, you could use the 5228230 spherical valve injector, follow it up with the needle valve injector 5228800 (*UTEX 8296454 with calibrating slide or UTEX 8276708 without calibrating slide*), equipped with the 5228713 medium air flow tip.

For a third injector configuration we will provide you with two new injector assemblies 5229290, equipped with 5229243 spray tips. These tips are similar to the 5228713 in that they are medium air flow; however, they have a 53% reduction in the fuel sac volume between the needle valve seat and the orifices.

Basic injector timing for all Roots blown EMD engines is 4° BTC. You may advance timing to approximately 10° BTC before the tappet goes solid against the injector body at the bottom of the stroke and you may retard timing to approximately 4° ATC before the little spherical button retaining spring on the injector adjusting screw is jammed up under the injector rocker arm, causing the spring to break. Thus, you have the latitude of +6 degrees or -8 degrees of adjustment at your disposal. You can probably limit this to ± 4 degrees for practical purposes; i.e., 4 degrees advanced will create excessive rates of pressure rise during combustion and 4 degrees retarded will give you plenty of smoke -- probably more than you can tolerate.

Relative to the type of duty cycle you are planning to use, I have enclosed a chart of the speeds versus throttle position for the 567B and C engines. Also enclosed is a table of Representative EMD Engine Exhaust Flow and Fuel Rates vs. Throttle Position which I had previously sent to you. Also included is a chart of Power piston gap -- fuel output comparison which should be helpful to you in comparing power piston gap versus injector rack length for both the 567B injector 5227852 and 567C injector 5228230.

I will not attempt to provide you with governor power piston gap settings for each throttle position for a 567C engine.

Perhaps your idea of setting fuel rates at each throttle would be equally satisfactory. If you wish us to confirm any engine settings or representative values which you plan to use, please let us know.

Best wishes,

Hugh

H. A. WILLIAMS, JR.
ENGINEERING DEPARTMENT
Engine Design Section

nAW/ar

cc: J. J. Kotlin
W. K. Simpson

File: E-17-A

APPENDIX B

Computer Printouts of Tests Data and Results

Emission Concentration and Rate Summary

TABLE B-1. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-09-72 TEST NO. 2
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN,HG.	EXHAUST PRESS. IN,HG.
1	285	0.0	.10	15.52	15.62	.006	R	-0	80	118	280	280	1.5	.2
2	285	4.8	.14	15.52	15.66	.009	1.704	-0	80	115	230	235	1.5	.2
3	344	13.4	.21	16.87	17.08	.012	.925	-0	80	120	270	280	2.5	.4
4	424	36.1	.35	21.41	21.76	.016	.581	-0	80	120	368	372	3.5	.5
5	515	64.6	.53	27.44	27.97	.019	.446	-0	80	120	483	480	4.0	.7
6	285	0.0	.11	15.49	15.60	.007	R	-0	80	120	307	300	1.5	.2
7	584	96.1	.78	32.36	33.14	.024	.485	-0	80	120	587	590	4.5	.4
8	675	129.9	1.03	38.24	39.26	.027	.474	-0	80	130	690	725	5.4	1.2
9	755	159.6	1.26	42.91	44.17	.029	.472	-0	80	130	775	840	6.7	1.4
10	835	191.2	1.53	47.29	48.82	.032	.481	-0	80	150	855	965	8.1	1.8
11	285	0.0	.09	15.49	15.59	.006	R	-0	80	125	270	280	1.5	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	208	71	82	23	105	1.14	.257	R	R	R	7.15	4.87	11.87
2	1.5	224	44	117	21	138	1.46	.100	9.62	8.07	19.39	5.65	4.79	11.38
3	1.5	246	117	188	30	217	2.21	.050	4.98	3.92	11.96	5.38	4.24	12.94
4	2.0	432	116	418	30	448	3.50	.040	3.43	1.84	11.65	5.91	3.16	20.05
5	2.0	488	104	597	24	626	3.99	.020	2.79	1.18	11.72	5.63	2.39	23.64
6	1.5	192	83	82	23	105	1.19	.257	R	R	R	6.18	5.31	11.10
7	2.0	552	137	838	48	887	4.93	.010	2.51	1.24	13.21	5.18	2.56	27.24
8	2.0	664	205	968	58	1026	5.51	.010	2.65	1.63	13.39	5.59	3.44	28.24
9	2.5	720	466	1044	24	1078	5.05	0.000	2.63	3.39	12.89	5.57	7.18	27.28
10	4.5	672	1193	1085	43	1128	6.61	0.000	2.26	7.67	12.44	4.71	15.95	25.86
11	1.0	288	107	100	6	106	1.09	.257	R	R	R	10.58	7.81	12.70

CYCLE COMPOSITE
BSHC = 9.562 GRAM/BHP HR
BSCO = 6.748 GRAM/BHP HR
BSNO2 = 21.831 GRAM/BHP HR
BSHC + BSNO2 = 31.393 GRAM/BHP HR
BSFC = 1.403 LB/BHP HR

TABLE B-2. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-09-72 TEST NO. 3
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN,HG.	EXHAUST PRESS. IN,HG.
1	285	0.0	.10	15.47	15.57	.006	R	-0	80	120	290	290	1.5	.2
2	285	8.7	.15	15.47	15.61	.009	1.010	-0	80	120	290	250	1.5	.2
3	344	13.4	.20	17.48	17.68	.011	.880	-0	80	120	270	280	2.4	.4
4	424	38.5	.35	21.45	21.80	.016	.546	-0	80	125	300	305	3.5	.5
5	515	67.0	.55	27.44	27.99	.020	.493	-0	80	125	500	495	4.0	.7
6	285	0.0	.09	15.49	15.59	.006	R	-0	80	125	270	270	1.5	.2
7	584	97.4	.77	32.25	33.02	.024	.472	-0	80	135	610	610	4.5	.4
8	675	129.1	1.00	37.95	38.95	.026	.463	-0	80	130	700	720	5.4	1.1
9	755	161.7	1.20	42.91	44.19	.030	.475	-0	80	140	780	860	6.1	1.5
10	835	191.2	1.55	47.14	48.69	.033	.485	-0	80	150	855	900	8.1	1.8
11	285	0.0	.11	15.49	15.60	.007	R	-0	80	125	250	250	1.5	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	224	71	81	17	98	1.09	.257	R	R	R	7.07	4.05	10.90
2	1.5	248	104	144	25	168	1.75	.100	5.67	4.99	13.01	6.52	4.99	10.89
3	1.5	246	126	176	33	210	2.16	.050	6.16	3.66	11.99	5.05	4.16	13.57
4	2.0	436	43	398	29	427	3.30	.040	3.83	1.30	10.99	5.92	2.53	19.13
5	2.0	520	109	606	10	616	4.12	.020	2.91	1.14	11.18	5.91	2.31	22.57
6	1.5	200	71	83	24	107	1.09	.257	R	R	R	10.50	5.21	10.06
7	2.2	576	137	778	33	812	4.93	.010	2.58	1.22	11.09	5.96	2.59	25.17
8	2.2	672	144	912	28	940	5.51	.310	2.60	1.54	12.26	5.78	3.33	26.46
9	2.5	712	424	962	42	1004	6.13	0.000	2.57	3.00	11.06	5.91	6.44	24.46
10	4.5	672	1321	1012	28	1040	6.79	0.000	2.26	8.05	11.94	4.65	10.23	23.57
11	1.8	266	83	87	5	92	1.09	.257	R	R	R	7.44	5.18	9.34

CYCLE COMPOSITE
BSHC = 9.599 GRAM/BHP HR
BSCO = 5.506 GRAM/BHP HR
BSNO2 = 19.306 GRAM/BHP HR
BSHC + BSNO2 = 28.905 GRAM/BHP HR
BSFC = 1.302 LB/BHP HR

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TABLE B-3. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 4
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.71	15.80	.006	R	-0	75	110	205	212	1.6	.2
2	285	4.7	.14	15.71	15.85	.009	.941	-0	75	105	240	260	1.6	.2
3	399	19.0	.20	17.91	17.61	.011	.813	-0	75	108	283	300	2.5	.4
4	494	37.5	.35	21.71	22.06	.016	.559	-0	72	110	375	380	3.5	.5
5	515	63.5	.53	28.23	28.76	.019	.504	-0	72	112	487	485	4.1	.7
6	285	0.0	.09	15.71	15.80	.006	R	-0	83	110	298	300	1.6	.2
7	584	97.5	.77	32.82	33.59	.023	.472	-0	73	118	608	610	4.6	.9
8	675	132.0	1.00	38.45	39.45	.026	.455	-0	72	123	700	730	5.5	1.1
9	755	163.8	1.28	43.43	44.71	.029	.468	-0	75	132	775	850	6.8	1.5
10	835	191.2	1.55	48.23	49.78	.032	.485	-0	73	145	890	960	8.3	1.8
11	285	0.0	.11	15.70	15.80	.007	R	-0	75	125	345	350	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	160	59	78	19	96	1.09	.257	R	R	R	6.92	9.74	12.65
2	1.5	192	47	193	26	168	1.85	.100	4.61	2.26	13.23	4.90	2.90	19.06
3	1.5	272	70	219	29	248	2.31	.050	4.29	2.21	12.55	5.27	2.71	15.93
4	1.5	440	46	381	27	408	3.38	.040	3.41	.72	10.36	6.16	1.30	18.69
5	1.5	488	41	550	32	581	3.87	.020	2.42	.55	11.37	5.79	1.09	22.57
6	1.0	192	24	80	18	97	1.09	.257	R	R	R	7.15	1.76	11.85
7	2.0	576	69	706	13	719	4.79	.010	2.62	.62	11.89	5.55	1.32	25.21
8	2.0	656	137	932	40	972	5.51	.010	2.59	1.07	12.56	5.69	2.36	27.42
9	2.2	688	322	992	40	1031	5.97	0.000	2.98	2.31	12.17	5.24	4.93	25.44
10	3.5	680	916	999	39	1038	6.53	0.000	2.34	6.27	11.68	4.81	12.93	24.07
11	1.5	208	29	80	8	87	1.09	.257	R	R	R	7.78	1.59	9.96

CYCLE COMPOSITE BSHC = 7.788 GRAM/BHP HR
BSCO = 2.815 GRAM/BHP HR
BSNO2 = 19.242 GRAM/BHP HR
BSHC + BSNO2 = 27.030 GRAM/BHP HR
BSFC = 1.259 LB/BHP HR

TABLE B-4. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 5
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.12	15.69	15.81	.008	R	-0	78	105	208	218	1.6	.2
2	285	4.7	.13	15.69	15.82	.009	1.709	-0	78	105	230	250	1.6	.2
3	399	18.9	.19	17.68	17.87	.011	.996	-0	78	109	260	275	2.5	.4
4	494	33.3	.34	22.16	22.50	.015	.619	-0	78	112	360	365	3.5	.5
5	515	63.5	.55	28.35	28.90	.020	.523	-0	78	115	485	485	4.0	.7
6	285	0.0	.11	15.67	15.78	.007	R	-0	75	110	270	273	1.6	.2
7	584	95.9	.76	33.08	33.84	.023	.478	-0	80	120	590	600	4.6	.9
8	675	129.1	1.01	38.93	39.94	.026	.468	-0	78	128	685	730	5.6	1.2
9	755	161.0	1.27	44.00	45.27	.029	.473	-0	78	132	755	832	6.8	1.5
10	835	197.5	1.57	48.30	49.87	.033	.478	-0	80	140	820	905	8.9	1.8
11	285	0.0	.10	15.61	15.72	.007	R	-0	80	130	295	300	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	174	47	83	14	98	1.14	.257	R	R	R	6.18	2.73	9.27
2	1.2	208	47	113	22	135	1.56	.100	4.25	1.10	14.61	5.93	2.95	11.81
3	1.2	272	47	167	30	197	2.16	.050	3.23	1.06	12.91	5.93	1.98	13.11
4	1.5	384	35	339	27	366	3.14	.040	3.93	.62	10.68	6.09	1.01	17.91
5	1.5	464	23	543	22	566	3.93	.020	2.79	.28	11.11	5.83	.83	21.87
6	1.0	192	12	86	14	96	1.09	.257	R	R	R	5.00	.70	9.59
7	1.5	520	49	728	35	763	4.74	.010	2.42	.64	11.63	5.07	1.33	24.36
8	1.5	600	91	884	26	916	5.61	.010	2.45	.79	12.09	4.84	1.58	26.16
9	2.0	672	252	962	52	1014	5.97	0.000	2.99	1.86	12.31	5.07	3.93	26.82
10	3.5	640	1074	1014	52	1070	6.61	0.000	2.13	7.13	11.68	4.96	14.42	24.42
11	1.8	288	29	98	5	99	2.16	.257	R	R	R	6.96	1.68	10.33

CYCLE COMPOSITE BSHC = 8.756 GRAM/BHP HR
BSCO = 2.967 GRAM/BHP HR
BSNO2 = 20.638 GRAM/BHP HR
BSHC + BSNO2 = 29.394 GRAM/BHP HR
BSFC = 1.536 LB/BHP HR

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TABLE B-5. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 6
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.58	15.68	.006	R	-0	78	112	205	215	1.7	.3
2	285	7.0	.13	15.61	15.74	.009	1.136	-0	78	112	230	250	1.7	.3
3	399	16.0	.20	17.61	17.81	.011	.750	-0	78	112	272	290	2.6	.4
4	424	37.6	.35	22.07	22.42	.016	.559	-0	75	115	375	385	3.6	.5
5	515	67.0	.59	28.01	28.55	.019	.484	-0	75	120	490	490	5.0	.7
6	285	0.0	.09	15.59	15.68	.006	R	-0	76	112	270	275	1.6	.3
7	584	98.5	.77	32.84	33.65	.023	.467	-0	79	120	609	615	4.6	.9
8	675	133.9	1.00	38.88	39.88	.026	.450	-0	75	130	695	730	5.5	1.2
9	755	163.8	1.27	93.49	94.75	.029	.464	-0	78	135	770	840	6.8	1.5
10	835	197.5	1.57	98.29	99.86	.033	.478	-0	80	150	860	990	8.3	1.8
11	285	0.0	.10	15.58	15.68	.007	R	-0	80	130	350	380	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	176	59	78	23	100	1.09	.257	R	R	R	6.28	9.21	1.72
2	1.5	232	83	132	23	156	1.66	.100	6.85	9.36	15.03	6.03	9.87	13.23
3	1.5	312	99	209	30	233	2.26	.060	9.59	2.75	11.23	6.11	3.66	19.97
4	1.5	956	93	381	35	917	3.26	.040	3.59	1.96	10.75	6.93	2.61	19.22
5	1.8	552	81	572	22	594	3.99	.020	3.11	.91	10.99	6.92	1.87	22.62
6	1.0	298	59	79	19	98	1.19	.257	R	R	R	9.87	9.71	12.73
7	2.0	656	92	785	22	807	9.79	.010	2.96	.82	11.92	6.33	1.76	25.51
8	2.0	768	137	938	39	977	5.36	.010	3.03	1.07	12.62	6.74	2.39	28.05
9	2.2	829	310	970	39	1009	5.89	0.000	2.97	2.23	11.90	6.90	9.80	25.66
10	3.5	752	1238	1027	39	1065	6.61	0.000	2.61	8.22	11.62	5.29	17.19	24.31
11	1.8	272	36	96	6	102	1.23	.257	R	R	R	9.08	2.36	11.15

CYCLE COMPOSITE BSHC = 9.308 GRAM/BHP HR
BSCO = 9.191 GRAM/BHP HR
BSNO2 = 19.606 GRAM/BHP HR
BSHC + BSNO2 = 28.999 GRAM/BHP HR
BSFC = 1.256 LB/BHP HR

TABLE B-6. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 7
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.61	15.71	.006	N	-0	75	120	235	240	1.7	.3
2	285	9.4	.15	15.58	15.78	.009	.937	-0	75	115	255	270	1.7	.3
3	399	16.5	.19	17.67	17.77	.011	.725	-0	75	115	285	300	2.6	.4
4	424	40.8	.36	21.80	22.15	.016	.529	-0	75	120	395	395	3.6	.5
5	515	66.5	.53	28.23	28.76	.019	.489	-0	75	120	500	500	5.1	.7
6	285	0.0	.09	15.61	15.70	.006	R	-0	75	115	305	305	1.6	.3
7	584	101.9	.77	32.88	33.69	.023	.453	-0	75	122	620	630	4.7	.9
8	675	135.1	1.01	38.76	39.77	.026	.447	-0	77	130	705	725	5.6	1.2
9	755	167.7	1.27	93.77	95.09	.029	.454	-0	78	130	785	860	6.9	1.5
10	835	197.5	1.57	98.19	99.76	.033	.476	-0	80	150	855	975	8.5	1.8
11	285	0.0	.10	15.59	15.69	.007	R	-0	75	130	355	390	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.8	208	59	84	17	101	1.05	.257	R	R	R	7.19	9.88	11.92
2	1.8	298	82	155	21	175	1.75	.100	6.31	3.63	12.69	6.46	3.87	13.89
3	3.0	288	82	208	30	238	2.21	.060	9.22	2.98	11.83	5.82	2.31	15.81
4	3.5	342	58	497	22	519	3.30	.040	5.81	.83	9.82	5.96	1.88	18.79
5	3.5	498	96	591	27	568	3.87	.020	3.60	.83	10.77	5.33	1.09	22.09
6	1.5	229	18	71	21	92	1.09	.257	R	R	R	8.89	.91	11.55
7	2.5	528	69	782	35	817	9.79	.010	2.81	.68	11.71	5.18	1.32	25.82
8	2.5	698	119	891	39	931	5.36	.010	2.99	.88	11.83	5.86	1.97	26.97
9	3.5	688	217	938	26	964	5.97	0.000	2.99	1.53	11.18	5.37	3.37	29.61
10	4.8	672	468	986	52	1038	6.61	0.000	2.23	4.91	10.96	4.69	10.96	23.83
11	2.0	224	29	87	5	93	1.09	.257	R	R	R	7.98	1.88	10.19

CYCLE COMPOSITE BSHC = 8.387 GRAM/BHP HR
BSCO = 8.736 GRAM/BHP HR
BSNO2 = 18.844 GRAM/BHP HR
BSHC + BSNO2 = 26.331 GRAM/BHP HR
BSFC = 1.212 LB/BHP HR

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TABLE [illegible] EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 11-20-72 TEST NO. 1
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	28[illegible]	0.0	.09	15.63	15.72	.006	R	-0	77	105	210	205	1.7	.3
2	285	6.5	.12	15.59	[illegible]	[illegible]	1.103	-	[illegible]	[illegible]	270	218	1.7	[illegible]
3	344	16.1	.20	16.5[illegible]	[illegible]	[illegible]	.746	-	[illegible]	110	320	260	2.6	[illegible]
4	424	39.2	.35	20.96	21.31	.017	.536	-0	81	115	405	385	3.5	.5
5	515	66.4	.54	26.90	27.44	.020	.451	-0	70	120	525	500	4.1	.7
6	285	0.0	.09	14.7[illegible]	14.89	.00[illegible]	R	-0	83	115	315	300	1.6	.3
7	584	97.[illegible]	.75	31.70	32.45	.024	.464	-0	85	112	628	615	4.6	.9
8	675	12[illegible]	1.00	35.91	37.91	.027	.465	-0	85	130	725	730	5.9	1.1
9	755	165.8	1.28	41.84	43.14	.031	.463	-0	85	140	825	860	6.7	1.5
10	835	195.4	1.57	45.77	47.35	.034	.483	-0	85	152	925	1000	8.2	1.8
11	285	0.0	.09	14.83	14.92	.006	R	-0	85	130	325	310	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	128	83	126	5	131	1.19	.257	R	R	R	4.74	6.13	15.90
2	1.5	128	95	142	16	158	1.66	.100	4.05	5.96	16.37	3.68	5.41	19.84
3	1.5	144	105	19[illegible]	15	212	2.47	.050	2.02	2.95	9.75	2.71	3.95	13.07
4	2.0	144	93	356	9	365	3.56	.090	1.03	1.33	8.58	1.93	2.48	16.0[illegible]
5	1.5	160	92	513	9	522	4.19	.020	.6[illegible]	1.00	9.32	1.78	2.09	18.[illegible]7
6	1.0	128	95	105	19	128	1.14	.257	R	R	R	4.83	7.14	15.88
7	1.5	160	114	694	18	711	5.07	.010	.71	1.01	10.28	1.52	2.17	22.15
8	1.5	208	276	811	26	837	5.81	.010	.81	2.13	10.62	1.73	4.59	22.84
9	2.5	272	406	844	13	857	6.29	0.000	.93	6.20	9.63	2.02	13.38	20.79
10	4.5	248	2013	863	13	875	6.78	0.000	.79	12.83	9.16	1.64	26.56	18.97
11	.5	152	59	115	13	128	1.09	.257	R	R	R	5.76	4.47	15.81

CYCLE COMPOSITE
BSHC = 4.501 GRAM/BHP HR
BSCO = 5.709 GRAM/BHP HR
BSNO2 = 20.153 GRAM/BHP HR
BSHC + BSNO2 = 24.654 GRAM/BHP HR
BSFC = 1.206 LB/BHP HR

TABLE B-3. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 11-20-72 TEST NO. 2
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.56	15.64	.005	R	-0	80	120	225	215	1.6	.2
2	285	6.7	.12	15.59	15.71	.007	1.041	-0	78	118	262	236	1.6	.3
3	344	18.0	.20	16.95	17.14	.012	.656	-0	78	120	330	280	2.5	.4
4	424	42.5	.35	20.94	21.29	.017	.495	-0	80	123	425	408	3.6	.5
5	515	70.1	.55	26.85	27.40	.020	.471	-0	80	125	540	520	4.1	.7
6	285	0.0	.08	15.55	15.63	.005	R	-0	80	120	315	300	1.6	.2
7	584	102.1	.76	31.36	32.11	.024	.445	-0	80	130	652	635	4.6	.9
8	675	133.4	1.01	36.95	37.96	.027	.454	-0	88	135	795	752	5.9	1.2
9	755	166.7	1.27	41.38	42.65	.031	.458	-0	85	145	835	875	6.7	1.5
10	835	194.3	1.56	45.34	46.91	.034	.483	-0	90	130	925	1010	8.8	1.8
11	285	0.0	.09	15.50	15.59	.006	R	-0	90	130	300	295	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	120	59	114	15	129	1.09	.257	R	R	R	5.30	5.31	18.99
2	1.0	112	59	141	12	153	1.66	.100	3.95	3.53	15.92	3.38	3.49	19.82
3	1.0	120	62	205	22	226	2.47	.050	1.61	2.06	9.73	2.95	3.19	19.21
4	1.0	144	58	384	9	393	3.60	.090	.95	.76	8.61	1.93	1.55	17.81
5	1.0	160	46	532	13	545	4.25	.020	.83	.47	9.81	1.75	1.01	19.55
6	1.0	120	47	110	18	128	1.09	.257	R	R	R	5.20	3.90	17.80
7	1.0	184	80	717	31	747	5.22	.010	.76	.66	10.18	1.72	1.49	22.09
8	1.5	224	252	812	13	825	5.09	.010	.89	1.09	10.15	1.06	4.16	22.33
9	2.5	256	828	845	39	884	6.45	0.000	.86	5.57	9.77	1.89	12.15	21.33
10	5.5	264	1997	839	26	864	6.70	0.000	.84	18.60	9.01	1.74	26.27	18.67
11	1.0	144	59	104	21	125	1.09	.257	R	R	R	5.94	4.50	15.60

CYCLE COMPOSITE
BSHC = 4.159 GRAM/BHP HR
BSCO = 3.042 GRAM/BHP HR
BSNO2 = 19.394 GRAM/BHP HR
BSHC + BSNO2 = 23.553 GRAM/BHP HR
BSFC = 1.097 LB/BHP HR

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TABLE B-9. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-21-72 TEST NO. 4
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.56	15.64	.005	R	-0	80	110	215	210	1.5	.2
2	285	8.4	.12	15.56	15.68	.008	.884	-0	80	110	270	220	1.6	.3
3	344	14.0	.19	16.90	17.09	.011	.634	-0	80	110	330	270	2.5	.4
4	424	42.7	.35	21.22	21.57	.016	.491	-0	82	115	420	400	3.5	.5
5	515	67.8	.54	27.44	27.98	.020	.475	-0	85	120	530	510	4.0	.7
6	285	0.0	.08	15.60	15.68	.005	R	-0	85	115	275	260	1.5	.3
7	584	102.6	.77	31.59	32.36	.024	.450	-0	80	121	650	635	4.6	.9
8	675	133.4	1.01	37.49	38.51	.027	.456	-0	75	130	735	750	5.5	1.2
9	756	166.6	1.26	42.18	43.44	.030	.452	-0	80	136	820	860	6.7	1.5
10	835	195.4	1.57	46.08	47.64	.034	.481	-0	80	150	900	985	8.2	1.8
11	285	0.0	.09	15.62	15.71	.006	R	-0	80	135	360	360	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.7	144	36	105	23	128	1.09	.257	R	R	R	6.14	3.05	18.00
2	1.5	152	35	144	23	167	1.75	.100	3.76	1.75	13.52	9.25	1.98	15.29
3	1.5	160	47	198	23	220	2.47	.050	2.01	1.17	9.05	3.17	1.05	19.28
4	2.3	192	23	368	19	387	3.68	.040	1.28	.31	8.43	2.60	.63	17.17
5	2.0	208	35	523	23	546	4.19	.020	1.11	.37	9.63	2.35	.77	20.06
6	1.0	168	24	112	17	129	1.09	.257	R	R	R	7.85	2.09	18.18
7	1.5	208	57	749	5	797	5.14	.010	.87	.47	10.14	1.42	1.05	22.61
8	2.3	256	229	862	14	875	5.79	.010	.98	1.79	10.92	2.14	3.81	23.46
9	3.0	288	739	884	14	897	6.13	0.000	.99	5.07	10.10	2.14	11.20	22.33
10	4.3	320	1814	876	13	889	6.61	0.000	1.03	11.63	9.37	2.14	29.18	19.47
11	1.0	152	47	114	14	133	1.79	.257	R	R	R	5.84	3.63	16.76

CYCLE COMPOSITE BSHC = 4.454 GRAM/BHP HR
BSCO = 2.467 GRAM/BHP HR
BSNO2 = 14.508 GRAM/BHP HR
BSHC + BSNO2 = 24.967 GRAM/BHP HR
BSFC = 1.078 LB/BHP HR

TABLE B-10. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-21-72 TEST NO. 5
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.66	15.75	.006	R	-0	75	115	210	210	1.6	.2
2	285	8.2	.13	15.66	15.80	.009	.981	-0	75	115	265	220	1.6	.3
3	344	18.0	.19	17.81	17.20	.011	.695	-0	75	115	325	270	2.5	.4
4	424	39.9	.35	21.08	21.43	.016	.522	-0	75	120	400	380	3.5	.5
5	515	68.9	.54	27.43	27.98	.020	.476	-0	76	120	530	500	4.1	.7
6	285	0.0	.09	15.66	15.75	.006	R	-0	73	112	290	230	1.6	.2
7	584	102.1	.78	31.56	32.34	.025	.456	-0	75	125	650	630	4.6	.9
8	675	132.5	1.00	37.39	38.39	.027	.461	-0	76	130	735	745	5.4	1.2
9	755	165.8	1.26	42.18	43.44	.030	.456	-0	80	140	815	855	6.7	1.5
10	835	194.6	1.58	46.41	48.04	.034	.479	-0	80	150	915	1000	8.2	1.8
11	285	0.0	.09	15.58	15.67	.006	R	-0	85	135	360	360	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.6	128	34	188	18	206	1.09	.257	R	R	R	6.62	4.51	18.90
2	1.5	136	71	196	19	184	1.66	.100	3.98	3.61	13.69	3.84	3.66	13.95
3	2.0	136	82	193	21	218	2.37	.050	1.72	2.07	9.82	2.66	3.82	13.97
4	2.0	152	70	348	18	366	3.58	.040	1.08	.98	8.99	2.07	1.49	16.88
5	2.0	184	58	536	19	599	4.12	.020	.53	.62	9.78	2.08	1.98	20.87
6	1.0	128	47	188	20	128	1.09	.257	R	R	R	5.12	2.78	16.76
7	1.7	200	88	786	9	1.5	5.07	.010	.89	.67	9.78	1.03	1.46	21.93
8	1.5	248	863	819	13	832	5.66	.010	.92	2.81	10.91	2.03	9.95	23.86
9	2.8	288	788	827	13	898	6.13	0.000	.97	9.74	9.81	2.11	18.98	20.87
10	4.0	312	2096	846	13	859	6.78	0.000	.99	18.97	9.48	2.09	27.96	18.87
11	.7	184	71	181	8	184	1.09	.257	R	R	R	6.88	5.03	19.71

CYCLE COMPOSITE BSHC = 4.636 GRAM/BHP HR
BSCO = 4.194 GRAM/BHP HR
BSNO2 = 14.884 GRAM/BHP HR
BSHC + BSNO2 = 23.498 GRAM/BHP HR
BSFC = 1.158 LB/BHP HR

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TABLE B-11. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-21-72 TEST NO. 6
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HMP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.63	15.72	.006	R	-0	80	120	231	225	1.6	.2
2	285	8.3	.13	15.64	15.78	.009	.966	-0	78	120	285	232	1.6	.3
3	344	18.0	.20	16.99	17.19	.012	.669	-0	75	120	330	273	2.5	.4
4	424	40.3	.35	21.03	21.38	.017	.520	-0	75	122	410	390	3.5	.5
5	515	69.4	.55	27.02	27.57	.020	.475	-0	78	125	535	515	4.1	.7
6	285	0.0	.09	15.66	15.75	.006	R	-0	75	120	250	235	1.6	.2
7	584	101.6	.78	31.55	32.33	.025	.459	-0	80	128	455	690	4.5	.9
8	675	132.5	1.01	37.6	38.28	.027	.459	-0	80	132	740	750	5.5	1.2
9	755	165.8	1.28	41.52	42.80	.031	.462	-0	81	140	825	870	6.7	1.5
10	835	199.1	1.57	46.18	47.74	.034	.472	-0	87	158	935	1020	8.2	1.8
11	285	0.0	.09	15.58	15.68	.006	R	-0	85	135	355	395	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	112	71	112	17	129	1.09	.257	R	R	R	9.30	5.95	16.26
2	1.5	112	71	196	20	166	1.66	.100	2.82	3.55	13.67	2.92	3.67	14.15
3	1.5	128	82	196	21	217	2.37	.050	1.62	2.06	8.97	2.42	3.09	13.44
4	2.0	136	70	360	5	365	3.50	.040	.96	.97	8.35	1.83	1.86	16.09
5	2.0	168	58	536	5	540	4.25	.020	.88	.60	9.27	1.85	1.26	19.50
6	1.0	152	97	107	20	126	1.09	.257	R	R	R	5.85	3.69	15.93
7	1.5	168	80	740	5	744	5.14	.010	.71	.67	10.23	1.54	1.46	22.30
8	2.0	232	240	840	0	840	5.81	.010	.88	1.82	10.98	1.93	3.98	22.83
9	3.0	264	840	860	13	879	6.29	0.000	.90	5.70	9.74	1.95	12.39	21.08
10	4.5	296	2126	868	13	881	6.87	0.000	.99	13.91	9.13	1.98	28.90	19.33
11	1.0	176	83	125	6	130	1.09	.257	R	R	R	6.50	4.11	16.[illegible]

CYCLE COMPOSITE BSHC = 9.510 GRAM/BHP HR
BSCO = 9.983 GRAM/BHP HR
BSNO2 = 19.923 GRAM/BHP HR
BSHC + BSNO2 = 23.933 GRAM/BHP HR
BSFC = 1.158 LB/BHP HR

TABLE B-12. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-27-73 TEST NO. 1
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HMP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRE.S. IN.HG.
1	285	0.0	.07	16.98	16.69	59.919	R	-0	78	102	282	200	1.9	.3
2	285	14.8	.19	16.98	16.62	24.635	.580	-0	75	102	258	250	2.0	.3
3	344	23.2	.20	18.91	18.61	18.835	.525	-0	74	104	305	300	3.0	.4
4	424	48.1	.36	22.97	23.39	12.937	.453	-0	70	109	420	390	4.1	.6
5	515	75.4	.55	29.60	30.19	10.750	.435	-0	70	111	525	480	4.7	.8
6	285	0.0	.07	16.37	16.44	55.656	R	-0	70	104	300	275	1.9	.3
7	584	105.2	.76	34.47	35.23	8.155	.433	-0	73	114	620	580	5.3	1.2
8	675	138.2	.99	40.29	41.28	6.993	.431	-0	70	128	690	690	6.4	1.3
9	755	176.0	1.25	46.64	46.90	6.003	.427	-0	78	135	780	812	8.4	1.7
10	835	209.2	1.56	50.09	51.65	5.067	.446	-0	72	148	868	920	9.8	2.1
11	285	0.0	.06	16.96	16.63	58.899	R	-0	72	138	400	380	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	99	98	149	10	159	.92	20.8	R	R	R	2.90	5.18	28.29
2	1.5	99	71	296	19	260	1.90	19.2	.65	2.08	12.58	1.12	3.68	21.69
3	1.5	60	70	304	24	329	2.37	18.6	.63	1.98	11.39	1.21	4.02	21.69
4	1.5	65	58	512	19	531	3.26	17.5	.99	.79	11.12	.96	1.64	29.59
5	3.0	80	96	708	14	722	3.74	16.8	.92	.99	12.98	.97	1.12	28.67
6	1.0	68	68	141	15	156	.92	20.9	R	R	R	3.64	5.15	27.77
7	2.0	109	80	926	41	965	4.52	15.9	.96	.71	13.96	1.06	1.63	32.81
8	2.5	136	137	1081	41	1092	5.00	15.1	.59	1.08	13.95	1.89	2.99	31.18
9	2.5	160	992	1077	55	1131	5.51	14.5	.56	3.95	13.02	1.32	8.00	30.98
10	4.5	192	1302	1096	41	1136	5.89	13.8	.63	8.90	12.12	1.98	50.11	27.19
11	1.0	96	71	152	3	155	.83	20.9	R	R	R	6.51	8.17	29.09

CYCLE COMPOSITE BSHC = 1.885 GRAM/BHP HR
BSCO = 3.266 GRAM/BHP HR
BSNO2 = 22.981 GRAM/BHP HR
BSHC + BSNO2 = 24.866 GRAM/BHP HR
BSFC = .832 LB/BHP HR

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TABLE B-13. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-27-73 TEST NO. 2
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.42	16.48	59.311	R	-0	70	112	209	203	1.9	.3
2	285	15.0	.19	16.42	16.56	25.648	.560	-0	70	110	262	255	2.0	.3
3	344	25.1	.20	18.32	18.52	19.152	.487	-0	70	111	315	310	3.0	.4
4	424	49.7	.36	23.13	23.49	13.093	.431	-0	70	118	424	390	4.1	.6
5	515	76.1	.54	29.54	30.08	10.599	.429	-0	70	118	535	483	4.7	.8
6	285	0.0	.06	16.45	16.51	50.267	R	-0	70	113	340	309	1.9	.3
7	584	107.9	.77	34.50	35.27	7.889	.426	-0	72	120	630	600	5.3	1.1
8	675	139.5	1.01	40.34	41.35	6.681	.433	-0	71	125	700	698	6.5	1.4
9	755	172.6	1.26	45.92	47.18	5.925	.438	-0	73	134	772	800	.8	1.7
10	835	208.1	1.55	50.17	51.72	4.985	.4[illegible]7	-0	75	148	862	915	9.7	2.1
11	285	0.0	.06	16.39	16.45	57.765	R	-0	76	130	410	384	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	48	156	12	160	1.00	20.6	R	R	R	2.75	5.43	31.40
2	1.0	56	59	262	19	282	2.00	19.6	.07	1.71	13.4?	1.46	3.06	23.47
3	1.0	64	59	348	14	362	2.64	19.0	.62	1.19	11.56	1.28	2.34	23.75
4	1.0	72	58	570	19	589	3.56	17.9	.45	.72	12.03	1.04	1.68	27.41
5	2.0	80	35	771	14	785	3.99	17.3	.42	.36	13.41	.97	.84	31.29
6	1.0	60	36	150	12	162	.92	20.2	R	R	R	3.44	4.08	30.35
7	1.5	82	46	991	28	1019	4.86	15.5	.40	.39	14.39	.93	.42	33.76
8	2.0	120	137	1084	28	1112	5.36	14.7	.47	1.07	14.24	1.00	2.46	32.88
9	2.0	140	419	1120	42	1162	5.66	14.3	.51	3.01	13.73	1.15	6.87	31.33
10	3.0	168	1215	1140	42	1181	6.29	13.5	.55	7.44	12.68	1.23	17.77	28.39
11	1.0	46	36	156	5	161	.92	20.1	R	R	R	5.49	4.07	30.06

CYCLE COMPOSITE BSHC = 1.834 GRAM/BHP HR
BSCO = 2.422 GRAM/BHP HR
BSNO2 = 23.351 GRAM/BHP HR
BSHC + BSNO2 = 25.185 GRAM/BHP HR
BSFC = .796 LB/BHP HR

TABLE B-14. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-28-73 TEST NO.3
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.39	16.45	58.067	R	-0	70	115	283	288	1.9	.3
2	285	15.7	.19	16.41	16.55	25.369	.535	-0	70	113	260	260	2.0	.3
3	344	25.1	.21	18.34	18.55	18.571	.495	-0	70	109	322	320	3.0	.4
4	424	48.1	.36	23.16	23.52	12.867	.449	-0	70	112	438	400	4.1	5.2
5	515	75.8	.59	29.52	30.06	10.531	.430	-0	70	113	535	498	4.7	8.8
6	285	0.0	.07	16.41	16.47	54.678	R	-0	70	110	299	272	1.9	.3
7	584	107.9	.76	34.48	35.24	8.378	.429	-0	70	118	622	605	5.4	1.1
8	675	138.6	1.00	40.28	41.28	7.171	.433	-0	71	122	698	693	6.6	1.4
9	755	171.3	1.25	45.89	47.15	6.285	.439	-0	71	130	765	808	8.8	1.7
10	835	207.1	1.56	50.23	51.79	5.217	.452	-0	72	142	878	922	9.8	2.1
11	285	0.0	.06	16.33	16.39	60.951	R	-0	70	115	388	278	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	36	146	14	160	.96	20.2	R	R	R	2.29	4.07	30.02
2	1.0	48	59	257	14	271	2.06	19.4	.67	1.69	12.36	1.25	3.06	23.09
3	1.5	60	59	317	19	336	2.58	18.7	.59	1.14	10.75	1.18	2.31	21.78
4	1.5	76	47	516	9	526	3.50	17.8	.49	.68	11.09	1.09	1.33	24.78
5	2.0	84	46	714	28	742	3.99	17.2	.44	.48	12.71	1.02	1.12	29.55
6	1.0	72	36	138	16	155	.96	20.0	R	R	R	3.41	3.07	27.51
7	2.0	96	69	889	42	930	4.86	16.4	.41	.59	13.12	.90	1.34	30.42
8	2.5	120	125	996	28	1022	5.22	15.7	.47	.98	13.14	1.29	2.27	30.36
9	3.0	152	460	1030	41	1071	5.66	15.1	.55	3.39	12.79	1.26	7.78	29.01
10	4.8	184	1469	1036	55	1090	6.29	14.2	.61	9.66	11.78	1.34	21.37	26.06
11	1.0	88	48	144	6	150	.92	20.0	R	R	R	5.29	5.71	29.58

CYCLE COMPOSITE BSHC = 1.792 GRAM/BHP HR
BSCO = 2.410 GRAM/BHP HR
BSNO2 = 21.856 GRAM/BHP HR
BSHC + BSNO2 = 23.648 GRAM/BHP HR
BSFC = .798 LB/BHP HR

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TABLE B-15. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-09-72 TEST NO. 2
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLO. LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS IN.HG.
1	285	0.0	.10	15.52	15.62	.006	R	-0	80	118	280	280	1.5	.2
2	285	9.8	.19	15.52	15.66	.009	1.709	-0	80	115	230	235	1.5	.2
3	399	13.4	.21	16.87	17.08	.012	.925	-0	80	120	270	280	2.5	.4
4	424	36.1	.35	21.41	21.76	.016	.581	-0	80	120	360	370	3.5	.5
5	515	69.6	.53	27.44	27.97	.019	.456	-0	80	120	483	480	5.0	.7
6	285	0.0	.11	15.49	15.60	.007	R	-0	80	120	287	300	1.5	.2
7	589	96.1	.78	32.36	33.14	.024	.485	-0	80	120	587	590	4.5	.9
8	675	129.9	1.03	38.24	39.26	.027	.474	-0	80	130	690	725	5.9	1.2
9	755	159.6	1.26	92.91	94.17	.029	.472	-0	80	130	775	840	6.7	1.4
10	835	191.2	1.53	97.29	98.82	.032	.481	-0	80	150	855	965	8.1	1.8
11	285	0.0	.09	15.49	15.58	.006	R	-0	80	125	270	280	1.5	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	208	71	82	23	105	1.19	.193	R	R	R	7.15	9.87	11.87
2	1.5	229	99	117	2	138	1.96	.030	9.62	8.07	19.19	5.65	9.79	11.38
3	1.5	296	117	186	30	217	2.21	.030	9.98	3.92	11.96	5.38	9.29	12.99
4	2.0	932	116	918	30	948	3.50	.030	3.93	1.84	11.65	5.91	9.16	20.05
5	2.0	488	109	597	29	626	3.99	.030	2.79	1.18	11.72	5.63	2.39	23.64
6	1.5	192	93	82	23	105	1.19	.193	R	R	R	6.18	5.31	11.10
7	2.0	552	137	838	48	887	4.93	.030	2.51	1.24	13.21	5.18	2.56	27.24
8	2.0	664	205	968	58	1026	5.51	.030	2.65	1.63	13.39	5.59	3.99	28.24
9	2.5	720	966	1049	29	1078	6.05	.030	2.63	3.39	12.89	5.67	7.18	27.28
10	9.5	672	1193	1085	93	1178	6.41	.280	2.26	7.67	12.99	9.71	15.95	25.86
11	1.0	288	107	100	6	106	1.09	.193	R	R	R	10.58	7.81	12.70

CYCLE COMPOSITE BSHC = 2.682 GRAM/BHP HR
BSCO = 6.628 GRAM/BHP HR
BSNO2 = 12.961 GRAM/BHP HR
BSHC + BSNO2 = 15.643 GRAM/BHP HR
BSFC = .525 LB/BHP HR

TABLE B-16. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-09-72 TEST NO. 3
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.47	15.57	.006	R	-0	80	120	290	290	1.5	.2
2	285	8.7	.15	15.47	15.61	.009	1.010	-0	80	120	240	250	1.5	.2
3	399	13.4	.20	17.48	17.68	.011	.880	-0	80	120	270	280	2.9	.4
4	424	38.5	.35	21.45	21.80	.016	.546	-0	80	125	380	385	3.5	.5
5	515	67.0	.55	27.44	27.99	.020	.493	-0	80	125	500	495	5.0	.7
6	285	0.0	.09	15.49	15.59	.006	R	-0	80	125	270	270	1.5	.2
7	589	97.4	.77	32.25	33.02	.024	.472	-0	80	125	610	610	4.5	.9
8	675	129.1	1.00	37.95	38.95	.026	.463	-0	80	130	700	720	5.9	1.1
9	755	161.7	1.28	92.91	94.19	.030	.474	-0	80	140	780	850	6.1	1.5
10	835	191.2	1.55	97.14	98.69	.033	.485	-0	80	150	855	980	8.1	1.8
11	285	0.0	.11	15.49	15.60	.007	R	-0	80	125	250	250	1.5	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	229	71	81	17	98	1.09	.193	R	R	R	7.67	9.85	10.98
2	1.5	260	106	149	25	168	1.75	.030	5.67	9.99	13.81	5.62	9.99	12.89
3	1.5	296	106	176	33	210	2.16	.030	5.15	3.66	11.99	5.85	9.16	13.57
4	2.0	932	93	898	29	927	3.38	.030	3.23	1.30	10.99	5.92	2.59	19.13
5	2.0	528	109	606	10	616	9.12	.030	2.41	1.19	11.19	5.91	2.31	22.57
6	1.5	289	91	83	24	107	1.09	.193	R	R	R	10.58	5.21	12.06
7	2.2	576	187	778	33	812	9.93	.030	2.58	1.82	11.89	5.96	2.59	25.17
8	2.2	672	199	912	30	940	5.61	.030	2.60	1.59	12.26	5.78	3.33	26.96
9	2.5	712	929	962	92	1009	6.13	.030	2.57	5.88	11.85	5.91	6.99	29.96
10	9.5	672	1321	1012	28	1093	6.78	.280	2.26	8.86	11.99	9.65	10.23	28.57
11	1.0	256	83	87	5	92	1.09	.193	R	R	R	7.99	5.15	9.39

CYCLE COMPOSITE BSHC = 2.718 GRAM/BHP HR
BSCO = 7.886 GRAM/BHP HR
BSNO2 = 11.980 GRAM/BHP HR
BSHC + BSNO2 = 14.638 GRAM/BHP HR
BSFC = .526 LB/BHP HR

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TABLE B-17. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 4
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.71	15.80	.006	R	-0	75	110	205	217	1.6	.2
2	285	8.7	.19	15.71	15.85	.009	.991	-0	75	106	240	260	1.6	.2
3	344	19.8	.20	17.41	17.61	.011	.813	-0	75	108	283	300	2.5	.4
4	424	32.5	.35	21.71	22.06	.016	.554	-0	72	110	375	380	3.5	.5
5	515	63.5	.53	28.23	28.76	.019	.504	-0	72	112	487	485	4.1	.7
6	285	0.0	.09	15.71	15.80	.006	R	-0	83	110	298	300	1.6	.2
7	504	97.5	.77	32.82	33.59	.023	.972	-0	73	118	608	616	4.6	.9
8	675	132.0	1.00	38.95	39.95	.026	.955	-0	72	123	700	730	5.5	1.1
9	755	163.6	1.28	43.43	44.71	.029	.969	-0	75	132	775	850	6.6	1.5
10	835	191.2	1.55	48.23	49.78	.032	.985	-0	73	145	890	960	8.3	1.8
11	285	0.0	.11	15.70	15.80	.007	R	-0	75	125	345	350	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	160	59	78	19	96	1.09	.193	R	R	R	6.92	9.79	12.65
2	1.5	192	47	193	26	168	1.85	.030	9.61	2.26	13.23	9.90	2.90	19.06
3	1.5	272	70	214	29	243	2.31	.030	9.29	2.21	12.55	5.27	2.71	15.93
4	1.5	440	96	381	27	408	3.38	.030	3.91	.72	10.36	6.16	1.30	18.69
5	1.5	488	46	550	32	581	3.87	.030	2.42	.55	11.37	5.79	1.09	22.57
6	1.0	192	29	80	18	97	1.09	.193	R	R	R	7.15	1.76	11.85
7	2.0	576	64	786	13	799	9.29	.030	2.62	.62	11.89	5.55	1.32	25.21
8	2.0	656	137	932	40	972	5.61	.030	2.59	1.07	12.56	5.69	2.36	27.62
9	2.2	688	322	992	40	1031	5.97	.030	2.48	2.31	12.17	5.29	4.93	25.99
10	3.5	680	916	999	39	1039	6.53	.200	2.39	6.27	11.68	4.81	12.93	24.07
11	1.5	208	29	80	6	89	1.09	.193	R	R	R	6.78	1.59	9.96

CYCLE COMPOSITE BSHC = 2.670 GRAM/BHP HR
BSCO = 5.256 GRAM/BHP HR
BSNO2 = 12.157 GRAM/BHP HR
BSHC + BSNO2 = 14.826 GRAM/BHP HR
BSFC = .523 LB/BHP HR

TABLE B-18. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 5
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.12	15.69	15.81	.008	R	-0	78	105	200	218	1.6	.2
2	285	9.7	.13	15.69	15.82	.009	1.784	-0	78	105	230	250	1.6	.2
3	344	18.3	.19	17.68	17.87	.011	.996	-0	78	109	260	275	2.5	.4
4	424	33.3	.39	22.16	22.56	.016	.619	-0	78	112	360	365	3.5	.4
5	515	63.5	.55	28.35	28.90	.020	.523	-0	78	115	485	485	4.0	.7
6	285	0.0	.11	15.67	15.78	.007	R	-0	78	110	270	273	1.6	.2
7	504	95.9	.76	33.08	33.84	.023	.978	-0	80	120	590	600	4.6	.9
8	675	129.1	1.01	38.93	39.94	.026	.968	-0	78	128	685	730	5.6	1.2
9	755	161.0	1.27	44.00	45.27	.029	.973	-0	78	132	755	832	6.8	1.5
10	835	197.5	1.57	48.30	49.87	.033	.978	-0	80	148	820	905	8.9	1.8
11	285	0.0	.10	15.61	15.72	.007	R	-0	80	130	345	380	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	176	47	83	19	98	1.19	.193	R	R	R	5.10	2.73	9.27
2	1.2	208	47	113	22	135	1.56	.030	9.05	9.10	11.61	5.93	2.95	11.81
3	1.2	272	47	167	30	197	2.16	.030	5.23	1.80	12.91	6.53	1.90	13.11
4	1.5	384	35	329	37	366	3.19	.030	3.93	.62	10.58	5.89	1.01	17.91
5	1.5	464	23	593	32	566	3.93	.030	2.79	.38	11.11	5.33	.63	21.27
6	1.0	192	12	86	69	95	1.09	.193	R	R	R	6.88	.72	9.86
7	1.5	528	69	728	35	763	9.29	.030	2.92	.69	11.63	5.87	1.33	20.36
8	1.5	600	91	889	26	916	5.81	.030	2.95	.79	12.29	5.89	1.58	24.15
9	2.0	672	252	968	52	1019	5.97	.030	2.99	1.84	12.31	5.87	3.43	26.02
10	3.5	648	1079	1019	52	1070	6.61	.200	2.13	7.13	11.68	4.96	14.98	24.98
11	1.0	208	29	90	6	96	2.16	.193	R	R	R	6.96	1.58	10.33

CYCLE COMPOSITE BSHC = 2.998 GRAM/BHP HR
BSCO = 5.911 GRAM/BHP HR
BSNO2 = 12.138 GRAM/BHP HR
BSHC + BSNO2 = 14.536 GRAM/BHP HR
BSFC = .581 LB/BHP HR

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TABLE B-19. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 6
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.58	15.68	.006	R	-0	78	112	205	215	1.7	.3
2	285	7.0	.13	15.61	15.74	.009	1.136	-0	78	112	230	250	1.7	.3
3	344	16.0	.20	17.61	17.81	.011	.750	-0	78	112	272	290	2.6	.4
4	424	37.5	.35	22.07	22.42	.016	.559	-0	75	115	375	385	3.6	.5
5	515	67.0	.54	28.01	28.55	.019	.484	-0	75	120	440	440	4.0	.7
6	285	0.0	.09	15.59	15.68	.006	R	-0	76	112	270	275	1.6	.3
7	584	98.5	.77	32.88	33.65	.023	.467	-0	79	120	609	615	4.6	.9
8	675	133.4	1.00	38.88	39.88	.026	.450	-0	75	130	645	730	5.5	1.2
9	755	163.8	1.27	43.49	44.75	.029	.464	-0	78	135	770	840	6.8	1.5
10	835	197.5	1.57	48.29	49.86	.033	.478	-0	80	150	860	990	8.3	1.8
11	285	0.0	.10	15.58	15.68	.007	R	-0	80	130	350	380	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	176	59	78	23	100	1.09	.193	R	R	R	6.28	4.21	11.72
2	1.5	232	83	132	23	156	1.66	.030	6.85	4.86	15.03	6.03	4.27	13.23
3	1.5	312	94	204	30	233	2.26	.030	4.59	2.75	11.23	6.11	3.66	14.97
4	1.5	456	93	381	35	417	3.26	.030	3.59	1.46	10.75	6.43	2.61	19.22
5	1.8	552	81	572	22	594	3.99	.030	3.11	.91	10.94	6.42	1.87	22.62
6	1.0	248	59	79	19	98	1.14	.193	R	R	R	4.87	4.71	12.73
7	2.0	656	92	785	22	807	4.79	.030	2.96	.82	11.92	6.33	1.76	25.51
8	2.0	768	137	938	39	977	5.36	.030	3.03	1.07	12.62	6.74	2.39	28.05
9	2.2	824	310	970	39	1009	5.89	.030	2.97	2.23	11.90	6.40	4.80	25.66
10	3.5	752	1238	1027	39	1065	6.61	.280	2.51	8.22	11.62	5.24	17.19	24.31
11	1.8	272	36	96	6	102	1.23	.193	R	R	R	4.08	2.36	1[illegible].15

CYCLE COMPOSITE BSHC = 2.938 GRAM/BHP HR
BSCO = 6.061 GRAM/BHP HR
BSNO2 = 12.093 GRAM/BHP HR
BSHC + BSNO2 = 15.031 GRAM/BHP HR
BSFC = .515 LB/BHP HR

TABLE B-20. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-10-72 TEST NO. 7
INJECTORS' SPHERICAL TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.61	15.71	.006	R	-0	75	120	235	248	1.7	.3
2	285	9.4	.15	15.58	15.72	.009	.937	-0	75	115	255	270	1.7	.3
3	344	16.0	.19	17.57	17.77	.011	.725	-0	75	115	285	300	2.5	.4
4	424	40.0	.36	21.80	22.15	.016	.524	-0	75	120	345	345	3.6	.5
5	515	65.5	.53	28.23	28.76	.019	.489	-0	75	120	500	500	4.1	.7
6	285	0.0	.09	15.61	15.70	.006	R	-0	75	115	305	305	1.6	.3
7	584	101.4	.77	32.88	33.64	.023	.453	-0	75	123	623	630	4.7	.9
8	675	135.1	1.01	38.76	39.77	.026	.447	-0	77	130	705	735	5.6	1.2
9	755	167.7	1.27	43.77	45.04	.029	.454	-0	78	130	785	860	6.9	1.5
10	835	197.5	1.57	48.14	49.70	.033	.476	-0	80	150	855	975	8.9	1.8
11	285	0.0	.10	15.59	15.69	.007	R	-0	75	130	355	390	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.8	200	59	84	17	101	1.05	.193	R	R	R	7.19	4.08	11.92
2	1.8	290	8[illegible]	155	21	175	1.75	.030	5.31	3.63	18.69	5.66	3.07	13.59
3	4.0	288	82	200	30	230	2.21	.030	4.22	2.40	11.07	5.82	3.31	15.21
4	[illegible].5	392	58	397	22	419	3.30	.030	2.81	.83	9.[illegible]4	5.36	1.58	18.79
5	[illegible].1	448	46	541	27	568	3.87	.030	2.68	.53	10.77	5.38	1.09	22.09
6	1.5	224	12	71	21	92	1.09	.193	R	R	R	8.59	.91	11.55
7	2.5	528	69	782	35	817	4.79	.030	2.31	.60	11.71	5.10	1.38	25.82
8	2.5	640	114	891	39	931	5.36	.030	2.49	.88	11.83	5.56	1.97	26.97
9	3.5	688	217	938	26	964	5.97	.030	2.44	1.53	11.18	5.37	3.37	29.61
10	4.0	672	968	956	52	1008	6.61	.200	2.83	6.41	10.96	4.64	13.96	23.03
11	2.0	224	24	87	5	93	1.09	.193	R	R	R	7.48	1.58	10.14

CYCLE COMPOSITE BSHC = 2.583 GRAM/BHP HR
BSCO = 5.284 GRAM/BHP HR
BSNO2 = 11.430 GRAM/BHP HR
BSHC + BSNO2 = 14.013 GRAM/BHP HR
BSFC = .512 LB/BHP HR

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TABLE B-21. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-20-72 TEST NO. 1
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.63	15.72	.006	R	-0	77	105	210	205	1.7	.3
2	285	6.5	.12	15.54	15.66	.008	1.103	-0	80	108	270	218	1.7	.3
3	344	16.1	.20	16.90	17.10	.012	.796	-0	81	110	320	260	2.6	.4
4	424	34.2	.35	20.96	21.31	.017	.536	-0	81	115	405	385	3.5	.5
5	515	66.4	.54	26.90	27.44	.020	.491	-0	70	120	525	500	4.1	.7
6	285	0.0	.09	14.79	14.88	.006	R	-0	83	115	315	300	1.6	.3
7	584	97.0	.75	31.70	32.45	.024	.464	-0	85	112	628	610	4.6	.9
8	674	129.1	1.00	36.91	37.91	.027	.465	-0	85	130	725	730	5.4	1.1
9	755	165.8	1.28	41.86	43.14	.031	.463	-0	85	140	825	860	6.7	1.5
10	835	195.4	1.57	45.77	47.35	.034	.483	-0	85	152	925	1000	8.2	1.8
11	285	0.0	.09	14.83	14.92	.006	R	-0	85	130	325	310	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	128	83	126	5	131	1.14	.193	R	R	R	9.79	6.13	15.90
2	1.5	128	95	142	16	158	1.66	.030	9.05	5.96	16.37	3.68	5.91	19.89
3	1.5	199	105	197	15	212	2.97	.030	2.02	2.95	9.75	2.71	3.95	13.07
4	2.0	199	93	366	9	365	3.55	.030	1.03	1.93	8.58	1.93	2.98	16.01
5	1.5	160	92	513	9	522	4.19	.030	.87	1.00	9.32	1.78	2.09	18.97
6	1.0	128	95	109	19	128	1.14	.193	R	R	R	9.83	7.19	15.88
7	1.5	140	119	699	18	721	5.07	.030	.71	1.04	10.28	1.52	2.17	22.15
8	1.5	208	276	811	26	837	5.81	.030	.81	2.13	12.62	1.73	4.54	28.84
9	2.5	272	906	844	13	857	6.29	.030	.93	6.20	9.63	2.02	13.38	20.74
10	4.5	298	2013	863	13	875	6.78	.280	.79	12.83	9.16	1.64	26.56	18.97
11	.5	152	59	115	13	128	1.09	.193	R	R	R	6.76	9.97	15.81

CYCLE COMPOSITE BSHC = .990 GRAM/BHP HR
BSCO = 10.862 GRAM/BHP HR
BSNO2 = 9.859 GRAM/BHP HR
BSHC + BSNO2 = 10.849 GRAM/BHP HR
BSFC = .517 LB/BHP HR

TABLE B-22. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-20-72 TEST NO. 2
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.56	15.64	.005	R	-0	80	120	225	215	1.6	.2
2	285	6.7	.12	15.59	15.71	.007	1.091	-0	78	118	262	238	1.6	.3
3	344	18.0	.20	16.95	17.14	.012	.656	-0	78	120	330	280	2.5	.4
4	424	42.5	.35	20.99	21.29	.017	.495	-0	80	123	425	400	3.6	.5
5	515	70.1	.55	26.85	27.40	.020	.471	-0	80	125	540	520	4.1	.7
6	285	0.0	.08	15.55	15.63	.005	R	-0	80	120	315	300	1.6	.2
7	584	102.1	.76	31.36	32.11	.024	.445	-0	80	130	652	635	4.6	.9
8	675	133.9	1.01	36.95	37.96	.027	.454	-0	80	135	745	752	5.9	1.2
9	755	166.7	1.27	41.38	42.65	.031	.458	-0	85	145	825	875	6.7	1.5
10	835	199.3	1.56	45.39	46.41	.034	.483	-0	90	150	925	1010	8.2	1.8
11	285	0.0	.09	15.50	15.59	.006	R	-0	90	150	300	295	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	120	57	119	15	129	1.09	.193	R	R	R	5.30	5.81	18.99
2	1.0	112	39	141	12	153	1.66	.030	3.95	3.63	15.92	3.32	3.99	19.82
3	1.0	120	32	205	22	226	2.97	.030	1.61	2.06	9.33	2.95	3.19	19.21
4	1.0	199	58	374	9	393	3.68	.030	.95	.96	8.81	1.93	1.55	17.21
5	1.0	160	96	532	13	595	4.25	.030	.83	.97	9.21	1.75	1.81	19.55
6	1.0	120	97	110	18	128	1.09	.193	R	R	R	5.28	3.98	17.28
7	1.0	184	88	717	31	797	5.22	.030	.76	.66	10.15	1.72	1.99	22.89
8	1.5	224	252	812	13	826	5.89	.030	.89	1.89	10.15	1.85	9.16	22.33
9	2.5	256	828	845	39	884	6.45	.030	.96	5.87	9.77	1.89	12.15	21.33
10	5.5	269	1997	839	26	864	6.78	.280	.89	18.68	9.01	1.79	26.87	18.67
11	1.0	199	59	104	21	125	1.09	.193	R	R	R	5.99	9.58	15.68

CYCLE COMPOSITE BSHC = 1.018 GRAM/BHP HR
BSCO = 10.999 GRAM/BHP HR
BSNO2 = 9.720 GRAM/BHP HR
BSHC + BSNO2 = 10.738 GRAM/BHP HR
BSFC = .511 LB/BHP HR

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TABLE B-23 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-21-72 TEST NO. 4
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.56	15.64	.005	R	-0	80	110	215	210	1.5	.2
2	285	8.4	.12	15.56	15.68	.008	.884	-0	80	110	270	220	1.6	.3
3	344	18.0	.19	16.90	17.09	.011	.634	-0	80	110	330	270	2.5	.4
4	424	42.7	.35	21.22	21.57	.016	.491	-0	82	115	420	400	3.5	.5
5	515	67.8	.54	26.86	27.39	.020	.475	-0	85	120	530	510	4.0	.7
6	285	0.0	.08	15.60	15.68	.005	R	-0	85	115	275	260	1.5	.3
7	584	102.6	.77	31.59	32.36	.024	.450	-0	80	121	650	635	4.6	.9
8	675	133.4	1.01	37.44	38.61	.027	.456	-0	75	130	735	750	5.5	1.2
9	755	166.4	1.26	42.18	43.44	.030	.452	-0	80	136	820	860	6.7	1.5
10	835	195.4	1.57	46.08	47.64	.034	.481	-0	80	150	900	985	8.2	1.8
11	285	0.0	.09	15.62	15.71	.006	R	-0	80	135	360	360	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.7	144	36	105	23	128	1.09	.193	R	R	R	6.14	3.05	18.00
2	1.5	152	35	144	23	167	1.75	.030	3.76	1.75	13.52	4.25	1.98	15.29
3	1.5	140	47	148	23	220	2.47	.030	2.01	1.17	9.05	3.17	1.85	14.28
4	2.3	142	23	368	19	387	3.68	.030	1.28	.31	8.93	2.60	.62	17.17
5	2.0	208	35	523	23	546	4.14	.030	1.11	.37	9.53	2.34	.77	20.06
6	1.0	168	24	112	17	129	1.09	.193	R	R	R	7.25	2.09	18.18
7	1.5	208	57	743	5	747	5.14	.030	.87	.47	10.19	1.42	1.05	22.41
8	2.3	254	229	862	14	875	5.74	.030	.98	1.79	10.42	2.19	3.81	23.96
9	3.0	248	739	884	14	897	6.13	.030	.99	5.07	10.10	2.14	11.20	22.33
10	4.3	320	1814	876	13	889	6.61	.280	1.03	11.63	9.37	2.14	26.18	19.97
11	1.0	152	47	114	14	133	1.09	.193	R	R	R	5.84	3.63	16.74

CYCLE COMPOSITE BSHC = 1.235 GRAM/BHP HR
BSCO = 4.572 GRAM/BHP HR
BSNO2 = 10.076 GRAM/BHP HR
BSHC + BSNO2 = 11.311 GRAM/BHP HR
BSFC = .509 LB/BHP HR

TABLE B-24. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-21-72 TEST NO. 5
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.66	15.75	.006	R	-0	75	115	210	210	1.6	.2
2	285	8.2	.13	15.66	15.80	.009	.981	-0	75	115	265	220	1.6	.3
3	344	18.0	.19	17.01	17.20	.011	.695	-0	75	115	325	270	2.5	.4
4	424	39.9	.35	21.08	21.43	.016	.522	-0	75	120	430	380	3.5	.5
5	515	68.4	.54	27.43	27.98	.020	.476	-0	75	120	530	500	4.1	.7
6	285	0.0	.09	15.66	15.75	.006	R	-0	73	112	240	230	1.6	.2
7	584	102.1	.78	31.56	32.34	.025	.456	-0	75	125	650	630	4.6	.9
8	675	132.5	1.00	37.34	38.34	.027	.451	-0	76	130	735	705	5.4	1.2
9	755	165.8	1.26	42.18	43.44	.030	.456	-0	80	140	815	855	6.7	1.5
10	835	199.6	1.58	46.51	48.09	.034	.474	-0	80	150	915	1000	8.2	1.8
11	285	0.0	.09	15.58	15.67	.006	R	-0	85	135	360	360	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	120	59	108	18	126	1.09	.193	R	R	R	4.62	4.26	15.90
2	1.5	136	71	195	19	169	1.66	.030	3.98	3.61	13.69	3.69	3.60	13.95
3	2.0	136	82	198	25	218	2.27	.030	1.72	2.07	9.02	2.66	3.88	13.97
4	2.0	152	78	348	18	366	3.58	.030	1.68	.98	8.94	2.07	1.89	16.88
5	2.0	184	58	536	19	554	4.12	.030	.94	.62	9.78	2.00	1.38	20.37
6	1.0	128	47	108	20	128	1.09	.193	R	R	R	5.12	3.78	16.76
7	1.7	200	88	706	9	715	5.07	.030	.89	.67	9.98	1.83	1.96	21.93
8	1.5	240	264	819	13	832	6.66	.030	.98	2.01	10.91	2.03	4.95	23.06
9	2.0	280	688	827	13	840	6.13	.030	.97	4.74	9.81	2.12	10.98	20.06
10	4.0	318	2096	896	13	859	6.78	.280	.99	18.97	8.98	2.09	27.86	18.27
11	.7	104	71	121	2	123	1.09	.193	R	R	R	6.00	5.23	19.41

CYCLE COMPOSITE BSHC = 1.173 GRAM/BHP HR
BSCO = 10.799 GRAM/BHP HR
BSNO2 = 9.642 GRAM/BHP HR
BSHC + BSNO2 = 10.815 GRAM/BHP HR
BSFC = .507 LB/BHP HR

TABLE B-25. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 11-21-72 TEST NO. 6
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.09	15.63	15.72	.006	R	~0	80	120	231	225	1.6	.2
2	285	8.3	.13	15.64	15.78	.009	.966	~0	78	120	285	232	1.6	.3
3	395	18.0	.20	16.99	17.19	.012	.667	~0	75	120	330	273	2.5	.4
4	495	30.3	.35	21.03	21.38	.017	.520	~0	75	122	410	390	3.5	.5
5	515	69.4	.55	27.02	27.57	.020	.475	~0	78	125	535	515	4.1	.7
6	285	0.0	.09	15.66	15.75	.006	R	~0	75	120	250	235	1.6	.2
7	585	101.6	.74	31.59	32.33	.025	.459	~0	80	120	655	640	4.6	.9
8	675	132.5	1.01	37.26	38.28	.027	.459	~0	80	132	790	750	5.5	1.2
9	755	165.8	1.28	41.52	42.80	.031	.462	~0	81	140	825	870	6.7	1.5
10	835	199.1	1.57	46.18	47.74	.034	.472	~0	82	150	935	1020	8.2	1.8
11	285	0.0	.09	15.58	15.68	.006	R	~0	85	135	355	345	1.6	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	112	71	112	17	129	1.09	.193	R	R	R	9.30	5.95	16.26
2	1.5	112	71	196	20	166	1.66	.030	2.02	3.55	13.67	2.42	3.67	19.15
3	1.5	128	82	196	21	217	2.37	.030	1.62	2.06	8.97	2.42	3.09	13.99
4	2.0	136	70	360	5	365	3.50	.030	.95	.97	8.35	1.83	1.86	16.04
5	2.0	168	58	536	5	540	4.25	.030	.88	.60	9.27	1.85	1.26	19.50
6	1.0	152	97	107	20	126	1.09	.193	R	R	R	5.85	3.69	15.93
7	1.5	168	80	740	5	749	5.19	.030	.71	.67	10.23	1.59	1.96	22.30
8	2.0	232	240	840	0	840	5.81	.030	.88	1.02	10.98	1.93	3.98	22.83
9	3.0	264	840	860	13	879	6.29	.030	.90	5.70	9.74	1.95	12.39	21.08
10	9.5	296	2126	868	13	881	6.87	.280	.99	13.91	9.13	1.98	28.90	19.33
11	1.0	176	83	125	6	130	1.09	.193	R	R	R	6.50	6.11	16.74

CYCLE COMPOSITE BSHC = 1.119 GRAM/BHP HR
BSCO = 11.161 GRAM/BHP HR
BSNO2 = 9.919 GRAM/BHP HR
BSHC + BSNO2 = 10.933 GRAM/BHP HR
BSFC = .507 LB/BHP HR

TABLE B-26. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-27-73 TEST NO. 1
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2+ FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	16.98	16.69	59.919	R	~0	78	102	282	280	1.9	.3
2	285	19.8	.19	16.98	16.62	29.635	.588	~0	75	102	258	258	2.0	.3
3	395	23.2	.20	18.91	18.61	18.035	.525	~0	79	109	305	300	3.0	.4
4	495	98.1	.36	22.97	23.39	12.937	.453	~0	78	109	428	390	4.1	.6
5	515	75.4	.55	29.60	30.19	10.250	.435	~0	78	111	525	488	4.7	.8
6	285	0.0	.07	16.37	16.44	55.456	R	~0	78	109	300	275	1.9	.3
7	549	105.2	.76	34.47	35.23	8.155	.433	~0	73	119	626	588	5.3	1.7
8	675	138.2	.99	38.29	41.28	6.993	.431	~0	78	128	698	648	6.9	1.9
9	755	174.0	1.25	46.69	46.90	6.003	.427	~0	78	135	788	812	8.9	1.7
10	835	209.2	1.56	50.09	51.65	5.067	.446	~0	72	148	868	920	9.8	2.1
11	285	0.0	.06	16.96	16.53	58.099	R	~0	72	138	488	388	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	98	199	18	158	.92	20.8	R	R	R	8.98	5.18	20.89
2	1.5	96	71	296	19	268	1.90	19.2	.68	2.88	12.58	1.12	3.68	21.69
3	1.5	68	78	386	24	329	2.37	18.6	.63	1.98	11.39	1.21	2.82	21.69
4	1.5	68	58	512	19	531	3.26	17.5	.99	.79	11.12	.96	1.68	29.89
5	3.0	88	96	788	19	782	3.79	16.8	.92	.99	12.98	.97	1.12	28.69
6	1.0	69	98	191	15	156	.92	20.9	R	R	R	3.69	5.15	27.77
7	2.0	199	88	929	91	966	4.52	15.9	.96	.71	13.96	1.06	1.63	32.21
8	2.5	136	137	1881	91	1892	5.00	15.1	.89	1.08	13.98	1.26	2.99	31.18
9	2.5	160	998	1077	55	1131	5.51	14.5	.96	3.98	13.02	1.32	8.88	30.98
10	9.5	192	1388	1096	91	1136	5.89	13.8	.69	8.98	12.12	1.98	28.11	29.19
11	1.0	96	71	152	3	155	.83	20.9	R	R	R	6.81	8.17	24.89

CYCLE COMPOSITE BSHC = .685 GRAM/BHP HR
BSCO = 7.936 GRAM/BHP HR
BSNO2 = 12.998 GRAM/BHP HR
BSHC + BSNO2 = 13.683 GRAM/BHP HR
BSFC = .469 LB/BHP HR

TABLE B-27. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-27-73 TEST NO. 2
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GF LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLE/	TEMPERATURES AIR BOX	DEGREES F LEFT EXHAUST	DEGREES F RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.42	16.48	59.311	R	-0	70	112	209	203	1.4	.3
2	285	15.0	.19	16.42	16.56	25.648	.560	-0	70	110	262	255	2.0	.3
3	399	25.1	.20	18.32	18.52	19.152	.487	-0	70	111	315	310	3.0	.4
4	424	49.7	.36	23.13	23.49	13.093	.431	-0	70	110	424	390	4.1	.6
5	515	76.1	.59	29.59	30.18	10.599	.424	-0	70	110	536	483	4.7	.8
6	285	0.0	.06	16.45	16.51	58.267	R	-0	70	113	370	309	1.4	.3
7	599	107.4	.77	35.50	36.27	7.889	.426	-0	72	120	630	600	5.3	1.1
8	675	139.5	1.01	40.34	41.35	6.66	.433	-0	71	125	700	648	6.5	1.4
9	755	172.6	1.26	45.42	47.10	5.925	.438	-0	73	134	772	800	.8	1.7
10	835	208.1	1.55	50.17	51.72	4.985	.447	-0	75	148	862	915	9.7	2.1
11	285	0.0	.06	16.39	16.45	57.765	R	-0	76	130	410	389	1.4	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	98	156	12	168	1.00	20.6	R	R	R	8.75	8.93	31.90
2	1.0	56	59	262	14	282	2.00	19.6	.82	1.71	13.92	1.96	3.06	23.97
3	1.0	64	59	348	14	362	2.64	19.0	.62	1.14	11.56	1.28	2.39	23.75
4	1.0	72	58	570	14	584	3.56	17.9	.45	.72	12.03	1.04	1.68	27.91
5	2.0	80	35	771	14	785	3.99	17.3	.42	.36	13.91	.47	.84	31.24
6	1.0	60	36	150	12	162	.42	20.2	R	R	R	3.44	4.08	30.35
7	1.5	92	96	991	28	1019	4.86	15.5	.40	.39	14.39	.43	.42	33.76
8	2.0	120	137	1084	28	1112	5.36	14.7	.47	1.07	14.29	1.08	2.46	32.88
9	2.0	140	414	1120	42	1162	5.66	14.3	.51	3.01	13.73	1.15	6.87	31.33
10	3.0	160	1215	1140	42	1181	6.29	13.5	.55	7.99	12.68	1.23	17.77	28.39
11	1.0	96	96	156	5	161	.42	20.1	R	R	R	5.99	9.07	30.06

CYCLE COMPOSITE BSHC = .617 GRAM/BHP HR
BSCO = 6.526 GRAM/BHP HR
BSNO2 = 13.574 GRAM/BHP HR
BSHC + BSNO2 = 14.191 GRAM/BHP HR
BSFC = .966 LB/BHP HR

TABLE B-28. EMISSION CONCENTRATION AND RATE SUMMARY

WEIGHT FACTOR SCHEDULE' GE LINE HAUL
DATE' 2-28-73 TEST NO.3
INJECTORS' LOW-BAC TIMING' STD.

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	TEMPERATURES AIR BOX	DEGREES F LEFT EXHAUST	DEGREES F RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.39	16.45	58.067	R	-0	70	116	203	198	1.4	.3
2	285	15.7	.19	16.41	16.55	25.969	.535	-0	70	113	260	260	2.0	.3
3	399	25.1	.21	18.39	18.55	18.871	.495	-0	70	109	322	320	3.0	.4
4	424	48.1	.36	23.16	23.52	12.867	.444	-0	70	110	430	388	4.1	5.2
5	515	75.8	.59	29.52	30.06	10.591	.430	-0	70	110	535	440	4.7	8.0
6	285	0.0	.07	16.91	16.97	59.678	R	-0	70	110	204	272	1.4	.3
7	599	107.4	.76	35.48	36.24	8.378	.424	-0	70	110	622	605	5.4	1.1
8	675	138.6	1.00	40.28	41.28	7.171	.433	-0	71	122	690	645	6.6	1.4
9	755	171.9	1.25	45.84	47.15	6.285	.439	-0	71	134	765	809	8.0	1.7
10	835	207.1	1.54	50.23	51.79	5.217	.452	-0	72	148	870	922	9.8	2.1
11	285	0.0	.06	16.33	16.39	60.951	R	-0	70	116	200	270	1.4	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	96	196	14	168	.96	20.9	R	R	R	8.84	9.07	30.82
2	1.0	68	69	267	14	271	2.06	19.4	.67	1.64	12.96	1.86	3.06	23.09
3	1.5	60	69	317	14	336	2.58	18.7	.59	1.14	10.75	1.18	2.31	21.72
4	1.5	76	67	516	9	525	3.58	17.8	.45	.60	11.89	1.00	1.33	24.78
5	2.0	84	46	719	20	740	3.99	17.2	.44	.40	12.71	1.00	1.12	24.65
6	1.0	72	36	130	16	155	.44	20.0	R	R	R	3.41	4.07	27.51
7	2.0	96	69	989	42	930	4.84	16.9	.41	.57	13.12	.48	1.49	30.42
8	2.5	120	126	999	80	1082	5.22	15.7	.47	.98	13.15	1.09	2.27	30.34
9	3.0	152	968	1030	91	1071	5.66	15.1	.55	3.34	12.76	1.26	7.72	29.01
10	4.0	184	1969	1036	95	1090	6.29	13.8	.61	9.66	11.78	1.34	21.37	26.06
11	1.0	80	98	199	6	180	.48	20.0	R	R	R	8.84	8.71	29.58

CYCLE COMPOSITE BSHC = .663 GRAM/BHP HR
BSCO = 7.000 GRAM/BHP HR
BSNOX = 12.612 GRAM/BHP HR
BSHC + BSNOX = 13.275 GRAM/BHP HR
BSFC = .971 LB/BHP HR

TABLE B-29 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-06-72 TEST NO. 2
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.84	15.92	.005	R	-0	65	109	220	210	1.7	.3
2	285	13.1	.19	15.84	15.98	.009	.627	-0	64	106	285	239	1.7	.2
3	344	21.6	.20	17.18	17.37	.011	.541	-0	60	107	330	271	2.6	.4
4	424	45.7	.46	21.01	21.37	.017	.468	-0	70	105	474	400	3.7	.5
5	515	73.6	.59	26.84	27.43	.020	.393	-0	74	118	555	523	4.2	.8
6	285	0.0	.08	15.55	15.63	.005	R	-0	74	111	242	270	1.7	.3
7	584	104.9	.76	31.34	32.10	.024	.437	-0	80	121	661	691	4.7	1.0
8	675	137.2	1.01	36.87	37.88	.027	.440	-0	84	130	755	765	5.6	1.2
9	755	167.9	1.26	91.29	92.54	.030	.449	-0	85	140	841	881	6.8	1.5
10	835	201.7	1.56	95.29	96.80	.034	.464	-0	88	152	946	1010	8.3	1.9
11	285	0.0	.08	15.91	15.99	.005	R	-0	90	135	330	320	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	88	48	87	15	102	1.05	.267	R	R	R	9.85	9.15	19.61
2	2.0	88	47	126	13	139	1.85	.100	1.92	1.52	7.33	2.26	2.92	11.68
3	2.0	96	59	158	20	178	2.69	.050	1.01	1.23	6.12	1.87	2.27	11.32
4	2.2	136	46	282	13	295	3.68	.040	.89	.57	5.95	1.79	1.22	12.72
5	2.5	176	81	385	9	393	4.25	.020	.87	.79	6.34	1.95	1.78	14.30
6	1.8	168	59	78	21	99	1.09	.267	R	R	R	7.63	5.31	19.57
7	3.0	229	195	999	9	507	5.07	.010	.91	1.58	6.78	2.08	3.61	15.93
8	3.5	272	931	586	9	595	5.66	.010	.99	3.13	7.09	2.25	7.11	15.99
9	5.5	312	1026	637	9	642	6.13	0.000	1.09	6.83	7.02	2.32	15.22	15.69
10	10.0	320	2553	670	0	670	6.79	0.000	.98	15.58	6.72	2.11	33.67	14.98
11	2.6	204	83	96	0	96	1.0	.267	R	R	R	8.86	7.06	13.20

CYCLE COMPOSITE BSHC = 9.065 GRAM/BHP HR
BSCO = 3.889 GRAM/BHP HR
BSNO2 = 12.898 GRAM/BHP HR
BSHC + BSNO2 = 16.923 GRAM/BHP HR
BSFC = .990 LB/BHP HR

TABLE B-30. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-06-72 TEST NO. 3
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.58	15.66	.005	R	-0	81	105	271	259	1.6	.3
2	295	12.6	.13	15.58	15.71	.009	.636	-0	78	114	289	298	1.7	.3
3	344	23.0	.28	16.87	17.87	.012	.513	-0	79	120	350	299	2.6	.4
4	424	45.7	.35	20.84	21.25	.017	.464	-0	81	125	491	414	3.6	.5
5	515	73.2	.59	26.74	27.33	.020	.495	-0	82	126	569	530	4.2	.8
6	285	0.0	.08	15.59	15.61	.005	R	-0	82	120	265	298	1.6	.3
7	584	105.9	.77	31.28	32.05	.025	.434	-0	82	130	682	662	4.8	1.0
8	675	136.3	.99	36.83	37.83	.027	.437	-0	82	131	758	755	5.6	1.2
9	754	169.2	1.26	91.21	92.47	.031	.447	-0	90	135	855	900	6.8	1.5
10	836	200.7	1.57	95.07	96.64	.035	.468	-0	91	150	955	1020	8.3	1.9
11	285	0.0	.07	15.99	15.88	.004	R	-0	91	141	370	360	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	71	89	16	105	1.05	.267	R	R	R	9.13	6.11	19.89
2	1.6	96	83	136	18	149	1.85	.100	1.58	2.71	7.75	2.99	4.86	18.21
3	2.0	104	82	168	23	188	2.58	.050	1.02	1.60	6.88	1.99	3.18	11.76
4	2.0	128	78	299	13	312	3.79	.040	.78	.86	6.26	1.69	1.83	13.58
5	2.5	169	69	923	9	932	4.85	.020	.71	.68	6.96	1.58	1.58	15.69
6	1.8	168	71	89	16	106	1.05	.267	R	R	R	6.73	6.36	19.66
7	3.0	176	189	748	8	998	5.07	.010	.78	1.96	6.98	1 62	3.86	19.91
8	3.0	208	336	691	9	695	5.59	.010	.76	2.99	7.78	1.74	5.86	17.69
9	5.5	256	1012	679	8	679	6.13	0.000	.85	6.68	7.31	1.98	14.98	16.36
10	9.5	263	2983	686	9	689	6.78	0.000	.84	15.18	6.98	1.83	37.91	16.78
11	2.5	158	83	188	1	189	1.05	.267	R	R	R	7.78	8.99	17.88

CYCLE COMPOSITE BSHC = 3.358 GRAM/BHP HR
BSCO = 9.988 GRAM/BHP HR
BSNOX = 13.418 GRAM/BHP HR
BSHC + BSNOX = 16.776 GRAM/BHP HR
BSFC = .989 LB/BHP HR

TABLE B-31. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-06-72 TEST NO. 4
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.49	15.56	.005	R	-0	82	122	229	220	1.6	.3
2	285	19.0	.19	15.44	15.63	.009	.587	-0	81	120	308	252	1.7	.3
3	344	23.1	.20	16.89	17.09	.012	.510	-0	81	122	350	296	2.6	.4
4	424	47.1	.35	20.85	21.21	.017	.450	-0	85	130	455	426	3.6	.5
5	515	73.2	.54	26.69	27.23	.020	.443	-0	88	130	565	540	4.2	.6
6	285	0.0	.07	15.52	15.59	.005	R	-0	88	125	290	270	1.6	.3
7	584	105.0	.77	31.23	31.99	.025	.438	-0	88	131	681	668	4.7	1.0
8	675	135.6	1.00	36.67	37.67	.027	.441	-0	90	138	762	775	5.6	1.2
9	755	169.5	1.26	41.10	42.36	.031	.447	-0	91	149	860	900	6.7	..5
10	835	200.7	1.56	45.07	46.63	.035	.465	-0	99	160	958	1024	8.2	1.9
11	285	0.0	.07	15.44	15.50	.004	R	-0	97	141	390	370	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	96	59	89	14	103	1.09	.257	R	R	R	4.70	5.79	16.42
2	2.5	112	71	135	19	154	2.06	.100	1.65	2.08	7.44	2.82	3.55	12.67
3	2.0	112	70	182	17	199	2.64	.050	1.09	1.36	6.35	2.13	2.67	12.99
4	2.0	128	58	311	14	324	3.81	.040	.76	.69	6.31	1.69	1.53	14.01
5	2.0	152	58	425	18	443	4.25	.020	.75	.56	7.12	1.69	1.27	16.08
6	2.5	112	48	86	16	102	1.09	.257	R	R	R	5.49	4.64	16.30
7	2.5	176	184	563	4	567	5.14	.010	.71	1.47	7.47	1.62	3.36	17.06
8	4.0	144	419	644	9	652	5.66	.010	.53	3.06	7.83	1.20	6.94	17.75
9	5.5	256	1092	678	9	687	6.29	0.000	.84	7.18	7.42	1.89	16.06	16.58
10	10.5	272	2367	694	4	699	6.70	0.000	.83	14.47	7.02	1.79	31.08	15.07
11	2.0	152	59	99	1	100	1.05	.257	R	R	R	7.78	6.06	16.72

CYCLE COMPOSITE BSHC = 3.196 GRAM/BHP HR
BSCO = 3.587 GRAM/BHP HR
BSNO2 = 13.363 GRAM/BHP HR
BSHC + BSNO2 = 16.559 GRAM/BHP HR
BSFC = .461 LB/BHP HR

TABLE B-32. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-05-72 TEST NO. 1
INJECTORS' NEEDLE TIMING' 4 DEG ADV
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.70	15.79	.006	R	-0	78	185	243	228	1.6	.2
2	285	7.7	.13	15.70	15.83	.008	1.040	-0	75	99	275	245	1.7	.3
3	344	15.6	.20	17.06	17.26	.012	.756	-0	75	108	330	288	2.1	.4
4	424	40.8	.36	21.39	21.75	.017	.529	-0	74	105	415	392	3.2	.6
5	515	73.2	.54	27.11	27.65	.020	.443	-0	73	109	548	495	4.2	.8
6	285	0.0	.10	15.58	15.68	.006	R	-0	78	102	305	290	1.7	.3
7	584	99.6	.75	31.46	32.21	.024	.454	-0	71	110	695	685	4.7	.9
8	675	132.0	1.00	37.30	38.30	.027	.455	-0	71	115	715	718	5.7	1.2
9	755	167.7	1.27	41.92	43.19	.030	.45[illegible]	-0	75	126	828	848	6.8	1.5
10	835	201.1	1.55	45.80	47.35	.034	.464	-0	78	139	925	971	8.3	3.8
11	285	0.0	.09	15.42	15.52	.006	R	-0	78	121	360	350	1.7	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	97	197	18	215	1.28	.257	R	R	R	3.95	3.98	25.28
2	1.0	112	71	265	20	285	1.35	.100	3.09	3.03	25.36	2.93	3.68	29.30
3	1.0	112	78	339	25	364	2.47	.050	1.69	2.05	17.92	2.16	2.71	23.03
4	1.0	112	58	591	15	606	3.60	.040	.79	.81	13.44	1.49	1.54	26.36
5	1.0	143	69	836	30	866	4.28	.020	.69	.69	14.13	1.44	1.56	[illegible]
6	1.0	104	83	193	21	215	1.23	.257	R	R	R	3.71	5.98	25.18
7	1.5	112	57	1064	59	1125	5.07	.010	.98	.99	15.72	1.08	1.07	34.62
8	1.5	152	348	1236	29	1265	5.66	.010	.58	2.29	15.06	1.28	5.04	34.08
9	1.5	200	841	1205	0	1205	6.21	0.000	.71	5.70	14.38	1.56	12.57	31.65
10	2.5	224	1968	1232	29	1261	6.07	0.000	.70	12.19	12.08	1.50	26.29	27.67
11	1.5	64	71	190	8	199	1.09	.257	R	R	R	2.34	5.18	23.77

CYCLE COMPOSITE BSHC = 3.034 GRAM/BHP HR
BSCO = 4.552 GRAM/BHP HR
BSNO2 = 31.961 GRAM/BHP HR
BSHC + BSNO2 = 34.995 GRAM/BHP HR
BSFC = 1.283 LB/BHP HR

TABLE B-33 EMISSION CONCENTNATION AND RATE SUMMARY

DATE' 12-05-72 TEST NO. 2
INJECTORS' NEEDLE TIMING' 9 DEG ADV
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.66	15.74	.005	R	-0	72	111	250	225	1.7	.3
2	285	10.7	.13	15.65	15.78	.009	.798	-0	71	110	265	232	1.7	.3
3	399	1[illegible]	.20	16.98	17.18	.012	.631	-0	73	110	318	270	2.5	.4
4	494	91.[illegible]	.35	21.02	21.37	.017	.503	-0	72	114	407	385	3.6	.5
5	515	72.8	.59	26.98	27.52	.020	.492	-0	72	115	537	500	4.2	.7
6	285	0.0	.08	15.53	15.62	.005	R	-0	71	110	280	240	1.7	.3
7	584	101.3	.79	31.36	32.11	.024	.990	-0	73	109	650	609	4.7	.8
8	675	133.1	1.00	37.11	38.11	.027	.951	-0	75	125	790	731	5.6	1.2
9	755	171.4	1.27	91.89	93.10	.030	.993	-0	76	132	815	855	6.7	1.5
10	835	194.1	1.57	95.71	97.27	.039	.972	-0	79	142	930	984	8.2	1.8
11	285	0.0	.10	15.91	15.51	.006	R	-0	80	125	370	390	1.7	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	64	59	169	20	189	1.09	.257	R	R	R	2.66	9.91	25.72
2	1.5	80	59	269	20	289	1.85	.430	1.56	2.29	18.19	2.08	3.06	24.25
3	1.5	80	70	333	25	358	2.53	.050	.95	1.67	13.99	1.51	2.65	22.16
4	1.5	80	58	580	20	600	3.68	.690	.59	.78	13.26	1.07	1.55	26.36
5	1.5	112	96	819	15	834	4.25	.020	.56	.96	13.61	1.26	1.09	30.76
6	1.0	72	97	172	24	195	1.09	.257	R	R	R	2.97	3.90	26.35
7	1.5	128	98	1049	30	1122	5.07	.010	.59	.38	15.36	1.22	.87	30.91
8	1.5	176	269	1203	59	1261	5.81	.010	.67	1.99	15.60	1.98	9.91	39.61
9	2.0	232	867	1238	44	1282	6.95	0.000	.77	5.73	13.91	1.79	12.93	31.90
10	3.0	296	1827	1256	15	1271	6.87	0.000	.78	11.91	13.09	1.65	29.17	27.61
11	1.5	88	71	107	8	195	1.09	.257	R	R	R	3.00	9.83	21.76

CYCLE COMPOSITE BSHC = 2.347 GRAM/BHP HR
BSCO = 3.713 GRAM/BHP HR
BSNO2 = 28.240 GRAM/BHP HR
BSHC + BSNO2 = 30.577 GRAM/BHP HR
BSFC = 1.079 LB/BHP HR

TABLE B-34. EMISSION CONCENTNATION AND RATE SUMMARY

DATE' 12-05-72 TEST NO. 3
INJECTORS' NEEDLE TIMING' 9 DEG ADV
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.57	15.66	.005	R	-0	79	111	232	206	1.7	.3
2	285	9.6	.13	15.54	15.68	.009	.831	-0	75	111	255	225	1.7	.3
3	399	17.5	.20	16.87	17.07	.012	.685	-0	76	114	290	2[illegible]	2.5	.4
4	494	92.6	.35	21.18	21.53	.017	.993	-0	75	118	415	38[illegible]	3.6	.5
5	515	69.9	.59	26.82	27.37	.020	.978	-0	77	120	530	49[illegible]	4.1	.8
6	285	0.0	.09	15.46	15.55	.006	R	-0	79	115	322	298	1.6	.3
7	584	102.1	.76	31.15	31.92	.025	.999	-0	80	122	671	685	4.7	.8
8	675	132.5	1.00	36.99	37.99	.027	.953	-0	80	129	737	731	5.5	1.2
9	755	166.9	1.26	91.62	92.78	.030	.955	-0	80	140	810	860	6.7	1.5
10	835	197.8	1.56	95.90	96.96	.039	.972	-0	81	150	990	1009	8.1	1.8
11	285	0.0	.09	15.32	15.41	.006	R	-0	81	130	360	390	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	97	167	21	188	1.09	.257	R	R	R	3.31	3.91	25.40
2	1.0	80	71	256	15	271	1.76	.100	1.72	3.03	19.06	2.07	3.65	22.42
3	1.0	96	70	319	30	349	2.37	.050	1.23	1.86	19.68	1.80	2.63	21.42
4	1.0	112	58	592	30	622	3.86	.090	.75	.77	19.57	1.52	1.86	27.53
5	1.0	112	96	888	15	902	9.12	.020	.58	.98	19.88	1.89	1.82	29.83
6	1.0	88	59	160	22	191	1.09	.257	R	R	R	3.39	9.99	23.71
7	1.2	144	68	1042	99	1135	5.07	.010	.59	.86	15.33	1.32	1.85	29.18
8	1.0	192	276	1295	89	1279	5.81	.010	.73	2.88	15.76	1.68	9.89	39.00
9	1.5	224	869	1251	19	1266	6.37	0.000	.76	5.79	14.18	1.68	12.79	31.01
10	2.5	288	1998	1148	29	1226	6.87	0.000	.78	12.98	12.58	1.65	26.98	26.63
11	1.0	80	97	176	12	188	1.09	.257	R	R	R	3.13	3.79	24.82

CYCLE COMPOSITE BSHC = 2.674 GRAM/BHP HR
BSCO = 3.573 GRAM/BHP HR
BSNO2 = 28.576 GRAM/BHP HR
BSHC + BSNO2 = 31.250 GRAM/BHP HR
BSFC = 1.099 LB/BHP HR

TABLE B-35 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-28-73 TEST NO. 1
INJECTORS' LOW-SAC TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.48	16.55	57.817	R	-0	70	108	212	205	1.4	.3
2	285	15.6	.19	16.48	16.63	29.515	.595	-0	70	106	272	270	1.4	.3
3	394	69.1	.20	18.41	18.61	18.740	.505	-0	70	110	330	322	3.0	.3
4	424	98.3	.36	22.48	23.34	12.598	.443	-0	70	113	498	415	4.1	.5
5	515	77.1	.55	29.55	30.09	10.235	.423	-0	72	115	560	515	4.6	.8
6	285	0.0	.07	16.91	16.97	59.956	R	-0	72	111	340	310	1.4	.2
7	584	105.2	.78	34.51	35.28	8.028	.435	-0	72	118	648	620	5.2	1.0
8	675	138.6	1.01	90.15	91.16	6.791	.436	-0	72	125	730	738	6.3	1.4
9	755	171.6	1.26	95.74	97.00	5.985	.441	-0	70	133	795	732	7.4	1.7
10	835	209.9	1.56	50.28	51.84	5.075	.458	-0	72	140	880	943	9.6	2.0
11	285	0.0	.06	16.34	16.45	69.239	R	-0	72	128	340	370	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	44	48	112	14	126	1.00	20.0	R	R	R	2.53	5.44	24.78
2	1.5	52	47	189	19	209	2.06	19.1	.72	1.31	9.28	1.33	2.40	17.02
3	2.0	60	70	222	24	246	2.58	18.5	.61	1.43	3.21	1.21	2.83	16.23
4	2.0	72	58	364	14	378	3.50	17.4	.46	.79	2.89	1.04	1.67	12.81
5	2.0	84	64	533	19	552	4.06	16.7	.43	.71	4.30	1.02	1.60	22.00
6	1.0	68	48	108	16	123	.42	20.1	R	R	R	3.70	5.16	21.46
7	1.5	88	115	651	28	680	4.06	15.7	.39	1.01	.89	.89	2.32	22.61
8	2.0	120	254	732	14	746	5.51	14.4	.47	2.98	4.57	1.08	4.54	21.45
9	3.0	194	666	784	14	798	6.74	13.5	.52	4.80	4.44	1.18	10.84	21.43
10	5.5	176	1615	806	14	820	6.13	13.8	.54	10.78	4.48	1.24	23.53	19.62
11	1.0	84	60	114	11	125	.87	20.0	R	R	R	5.36	7.58	26.03

CYCLE COMPOSITE BSHC = 1.[illegible] GRAM/BHP HR
BSCO = 3.148 GRAM/BHP HR
BSNO2 = 16.823 GRAM/BHP HR
BSHC + BSNO2 = 18.600 GRAM/BHP HR
BSFC = .796 LB/BHP HR

TABLE B-36. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-28-73 TEST NO. 2
INJECTORS' LOW-SAC TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.42	16.49	58.188	R	-0	70	108	205	200	1.4	.2
2	285	15.4	.19	16.11	16.25	29.963	.592	-0	70	106	262	260	1.4	.3
3	394	69.4	.20	18.36	18.56	19.000	.512	-0	70	110	318	315	3.0	.4
4	424	98.8	.36	22.70	23.06	12.149	.447	-0	70	114	490	410	4.0	.6
5	515	76.9	.55	29.50	30.05	10.835	.429	-0	70	115	550	510	4.6	.8
6	285	0.0	.06	16.38	16.44	60.935	R	-0	71	111	310	290	1.4	.2
7	584	106.9	.77	33.77	34.53	7.725	.432	-0	70	120	650	623	5.2	1.0
8	675	138.6	1.00	89.96	90.96	6.592	.434	-0	71	129	720	735	6.3	1.3
9	755	171.3	1.25	95.88	96.34	5.889	.434	-0	72	138	800	842	7.8	1.7
10	835	208.5	1.56	49.67	51.13	4.894	.450	-0	75	151	900	952	9.5	2.0
11	285	0.0	.06	16.33	16.39	69.889	R	-0	75	135	490	410	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	29	111	14	125	.96	20.2	R	R	R	2.69	3.72	23.37
2	1.5	48	47	183	14	197	2.06	19.1	.65	1.27	8.74	1.28	2.34	16.18
3	1.5	56	47	211	20	231	2.58	18.5	.54	.98	7.98	1.19	1.91	16.49
4	1.5	68	35	370	15	385	3.56	17.3	.42	.63	7.84	.95	.97	17.86
5	2.0	76	23	532	10	542	4.06	16.5	.34	.24	9.20	.82	.56	21.95
6	1.0	60	29	110	13	123	.42	20.1	R	R	R	3.62	4.86	20.21
7	2.0	88	115	662	29	691	4.43	15.6	.38	.98	9.69	.87	2.25	22.98
8	2.5	118	254	730	14	744	5.51	14.4	.44	2.99	9.50	1.01	4.59	21.87
9	3.0	136	760	755	14	769	6.21	13.9	.44	5.44	8.98	1.11	12.99	20.66
10	5.5	168	1793	763	28	791	6.89	13.4	.44	11.84	8.98	1.1[illegible]	26.71	18.63
11	1.0	84	60	113	4	117	.87	20.0	R	R	R	5.[illegible]	7.66	24.82

CYCLE COMPOSITE BSHC = 1.658 GRAM/BHP HR
BSCO = 8.387 GRAM/BHP HR
BSNO2 = 16.393 GRAM/BHP HR
BSHC + BSNO2 = 18.051 GRAM/BHP HR
BSFC = .796 LB/BHP HR

TABLE B-37. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-26-73 TEST NO. 3
INJECTORS' LOW-SAC TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2+ FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	16.92	16.98	61,105	R	-0	70	113	228	210	1.8	.2
2	285	15.9	.19	16.39	16.53	25,929	.517	-0	70	112	270	280	1.8	.3
3	399	25.1	.20	18.31	18.51	18,995	.479	-0	70	116	330	3[illegible]	2.8	.4
4	424	48.1	.35	22.61	22.97	12,299	.441	-0	70	120	452	420	4.0	.6
5	515	77.1	.54	29.01	29.55	9,870	.423	-0	70	121	551	510	4.6	.8
6	285	0.0	.06	16.39	16.45	60,385	R	-0	70	127	300	275	1.8	.2
7	584	107.9	.76	33.70	34.47	7,644	.424	-0	70	123	658	628	5.2	1.0
8	675	139.5	1.00	38.63	40.63	6,518	.430	-0	71	131	730	700	6.3	1.3
9	755	173.7	1.25	44.33	45.59	5,634	.433	-0	72	140	810	850	7.7	1.7
10	835	204.2	1.57	49.11	50.68	4,725	.444	-0	72	151	910	970	9.5	2.1
11	285	0.0	.05	16.30	16.36	66,519	R	-0	75	134	900	390	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	60	110	9	119	.42	20.1	R	R	R	2.90	7.17	23.60
2	1.5	56	83	189	10	199	1.45	19.0	.77	2.26	9.94	[illegible]	9.38	17.30
3	2.0	64	87	227	20	247	2.58	18.4	.62	1.60	7.88	1.30	3.33	16.46
4	2.0	72	70	372	15	387	3.50	17.1	.95	.88	7.47	1.03	1.99	18.09
5	2.0	80	69	564	15	578	3.99	16.4	.90	.70	9.58	.96	1.65	22.65
6	1.0	60	91	111	11	122	.42	19.9	R	R	R	3.62	8.59	29.15
7	2.0	96	137	709	14	723	4.43	15.3	.90	1.15	9.48	.95	2.72	23.41
8	2.0	112	265	777	14	791	5.44	14.5	.93	2.03	9.96	1.00	4.72	23.15
9	3.0	136	691	801	29	829	5.74	14.0	.97	9.77	9.90	1.09	11.01	21.7
10	6.0	160	2071	837	14	851	6.29	13.2	.51	13.19	8.91	1.14	29.36	19.82
11	1.0	80	83	117	3	120	.07	19.6	R	R	R	5.90	11.22	26.51

CYCLE COMPOSITE BSHC = 1.210 GRAM/BHP HR
BSCO = 4.127 GRAM/BHP HR
BSNO2 = 16.800 GRAM/BHP HR
BSHC + BSNO2 = 18.210 GRAM/BHP HR
BSFC = .757 LB/BHP HR

TABLE B-38. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-06-72 TEST NO. 2
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.84	15.92	.005	R	-0	65	109	220	210	1.7	.3
2	285	13.1	.19	15.84	15.98	.009	.627	-0	69	106	285	239	1.7	.3
3	399	21.8	.20	17.18	17.37	.011	.541	-0	68	107	330	271	2.6	.4
4	424	46.7	.36	21.01	21.37	.017	.460	-0	70	105	429	400	3.7	.5
5	515	73.6	.59	26.89	27.49	.020	.493	-0	74	110	535	523	4.2	.8
6	285	0.0	.08	15.55	15.63	.005	R	-0	74	111	242	270	1.7	.3
7	584	104.4	.76	31.39	32.18	.024	.437	-0	80	121	661	691	4.7	1.0
8	675	137.2	1.01	36.87	37.88	.027	.498	-0	82	130	755	765	5.6	1.2
9	755	167.9	1.26	41.89	42.89	.030	.499	-0	86	140	841	881	6.8	1.5
10	835	201.7	1.56	46.29	46.88	.034	.464	-0	88	152	905	1010	8.3	1.9
11	285	0.0	.08	15.91	15.99	.005	R	-0	90	135	330	320	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HST FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	88	98	87	15	102	1.05	.193	R	R	R	3.05	9.18	19.61
2	2.0	88	97	126	13	139	1.05	.030	1.98	1.58	7.89	2.26	2.92	11.68
3	2.0	96	89	158	20	178	2.04	.030	1.81	1.83	6.12	1.87	2.87	11.32
4	2.2	136	96	282	13	295	3.60	.030	.84	.57	5.95	1.79	1.82	18.72
5	2.5	176	81	385	9	393	4.25	.030	.87	.79	6.34	1.98	1.78	19.30
6	1.8	168	89	78	21	99	1.09	.193	R	R	R	7.83	5.81	19.57
7	3.0	224	145	949	9	967	5.07	.030	.91	1.58	6.73	2.00	3.61	18.93
8	3.5	272	931	806	9	818	5.66	.030	.96	3.13	7.09	2.05	7.11	18.99
9	5.5	312	1086	637	9	648	6.13	.030	1.09	6.83	7.82	2.32	15.82	18.69
10	16.0	328	2563	670	8	678	6.78	.030	.98	15.58	6.72	2.11	33.57	19.48
11	2.0	200	83	95	8	96	1.05	.193	R	R	R	6.84	9.86	19.80

CYCLE COMPOSITE BSHC = 1.165 GRAM/BHP HR
BSCO = 10.907 GRAM/BHP HR
BSNO2 = 7.120 GRAM/BHP HR
BSHC + BSNO2 = 8.285 GRAM/BHP HR
BSFC = .909 LB/BHP HR

TABLE B-39. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-06-72 TEST NO. 3
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.58	15.66	.005	R	-0	81	125	271	259	1.6	.3
2	285	12.6	.13	15.58	15.71	.009	.535	-0	78	119	284	240	1.7	.3
3	344	22.0	.20	16.87	17.07	.012	.513	-0	79	120	350	299	2.6	.4
4	424	45.7	.35	20.84	21.25	.017	.464	-0	81	125	441	419	3.6	.5
5	515	73.2	.54	26.79	27.33	.020	.445	-0	82	126	560	530	4.2	.8
6	285	0.0	.08	15.54	15.61	.005	R	-0	82	120	265	248	1.6	.3
7	584	105.4	.77	31.28	32.05	.025	.434	-0	82	130	682	652	4.8	1.0
8	675	136.3	.99	36.83	37.83	.027	.437	-0	82	131	750	755	5.6	1.2
9	755	164.2	1.26	41.21	42.47	.031	.447	-0	90	135	955	900	6.8	1.5
10	835	200.7	1.57	45.07	46.64	.035	.468	-0	91	158	955	1020	8.3	1.9
11	285	0.0	.07	15.44	15.50	.004	R	-0	91	141	370	360	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	71	89	16	105	1.05	.193	R	R	R	9.13	6.11	14.84
2	1.5	96	83	126	18	144	1.85	.030	1.58	2.71	7.75	2.44	4.26	12.21
3	2.0	104	82	165	23	188	2.58	.030	1.02	1.60	6.03	1.44	3.12	11.76
4	2.0	128	70	249	13	312	3.74	.030	.78	.85	6.26	1.64	1.83	13.50
5	2.5	144	64	425	9	432	4.25	.030	.71	.68	6.96	1.59	1.52	15.64
6	1.5	128	71	84	16	100	1.05	.193	R	R	R	5.73	4.36	14.65
7	3.0	176	184	490	5	495	5.07	.030	.70	1.96	6.98	1.62	3.36	14.91
8	3.0	208	332	691	4	695	5.59	.030	.76	2.99	7.73	1.74	4.59	17.69
9	5.0	256	1012	674	0	674	6.13	.030	.85	6.68	7.31	1.90	14.95	16.36
10	4.5	280	2983	685	4	689	6.70	.280	.85	15.18	6.92	1.83	32.91	14.78
11	2.5	152	83	102	1	103	1.05	.193	R	R	R	7.78	8.99	17.20

CYCLE COMPOSITE BSHC = .997 GRAM/BHP HR
BSCO = 12.569 GRAM/BHP HR
BSNO2 = 7.366 GRAM/BHP HR
BSHC + BSNO2 = 8.362 GRAM/BHP HR
BSFC = .990 LB/BHP HR

TABLE B-40. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-06-72 TEST NO. 4
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.49	15.56	.005	R	-0	82	122	229	220	1.6	.3
2	285	14.0	.14	15.49	15.63	.009	.587	-0	81	120	308	252	1.7	.3
3	344	23.1	.20	16.89	17.09	.012	.570	-0	81	122	358	296	2.6	.4
4	424	47.1	.35	20.85	21.21	.017	.450	-0	85	130	455	426	3.6	.5
5	515	73.2	.54	26.69	27.23	.020	.493	-0	88	130	565	540	4.2	.8
6	285	0.0	.07	15.52	15.59	.005	R	-0	88	126	240	270	1.6	.3
7	584	105.0	.77	31.23	31.99	.025	.438	-0	88	131	601	668	4.7	1.0
8	675	135.6	1.00	36.67	37.67	.027	.441	-0	90	130	762	775	5.6	1.2
9	755	164.5	1.26	41.10	42.36	.031	.447	-0	91	144	860	900	6.7	1.5
10	835	200.7	1.56	45.07	46.63	.035	.466	-0	99	160	958	1029	8.2	1.9
11	285	0.0	.07	15.49	15.56	.004	R	-0	97	141	348	378	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	96	89	89	14	103	1.09	.193	R	R	R	9.78	8.74	16.42
2	2.5	112	71	135	14	149	2.86	.030	1.65	2.88	7.99	2.62	3.55	12.67
3	2.0	112	70	182	17	199	2.69	.030	1.09	1.36	6.25	2.13	2.47	12.99
4	2.0	128	58	311	14	324	3.81	.030	.76	.69	6.31	1.69	1.63	14.01
5	2.0	152	50	426	10	443	4.25	.030	.75	.56	7.18	1.69	1.27	16.88
6	2.5	112	98	86	16	102	1.09	.193	R	R	R	5.99	4.69	16.30
7	2.5	176	184	563	4	567	5.19	.030	.71	1.97	7.97	1.62	3.36	17.08
8	3.0	144	219	649	4	652	5.66	.030	.83	3.06	7.83	1.80	6.99	17.75
9	5.5	256	1042	678	4	682	6.29	.030	.89	7.18	7.92	1.84	16.86	16.86
10	10.5	272	2867	694	4	699	6.78	.280	.83	19.97	7.82	1.74	31.88	15.87
11	2.0	152	99	99	1	100	1.05	.193	R	R	R	7.78	6.06	16.78

CYCLE COMPOSITE BSHC = .968 GRAM/BHP HR
BSCO = 12.885 GRAM/BHP HR
BSNO2 = 7.998 GRAM/BHP HR
BSHC + BSNO2 = 8.952 GRAM/BHP HR
BSFC = .986 LB/BHP HR

TABLE B-41. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-05-72 TEST NO. 1
INJECTORS' NEEDLE TIMING' 4 DEG ADV
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.10	15.70	15.79	.006	R	-0	78	105	294	220	1.6	.2
2	285	7.7	.13	15.70	15.83	.008	1.040	-0	75	99	275	245	1.7	.3
3	394	15.6	.20	17.06	17.26	.012	.756	-0	75	100	330	280	2.1	.4
4	424	40.8	.36	21.39	21.75	.017	.529	-0	74	105	415	342	3.2	.6
5	515	73.2	.59	27.11	27.65	.020	.493	-0	73	109	540	445	4.2	.8
6	285	0.0	.10	15.58	15.68	.006	R	-0	70	102	305	240	1.7	.3
7	584	99.6	.75	31.46	32.21	.024	.454	-0	71	110	695	605	4.7	.9
8	675	132.0	1.00	37.30	38.30	.027	.455	-0	71	115	715	710	5.7	1.2
9	755	167.7	1.27	41.92	43.19	.030	.453	-0	75	126	820	840	6.8	1.5
10	835	201.1	1.55	45.80	47.35	.034	.464	-0	78	139	925	971	8.3	1.8
11	285	0.0	.09	15.42	15.52	.006	R	-0	78	121	360	350	1.7	.2

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	97	197	18	215	1.28	.193	R	R	R	3.95	3.90	25.28
2	1.0	112	91	265	20	285	1.86	.030	3.09	3.09	25.36	2.93	3.68	29.38
3	1.0	112	70	339	25	364	2.47	.030	1.69	2.05	17.92	2.16	2.71	23.03
4	1.0	112	58	591	15	606	3.68	.030	.29	.01	13.99	1.99	1.59	26.35
5	1.0	128	69	836	30	866	4.25	.030	.69	.69	19.13	1.99	1.55	31.42
6	1.0	109	83	193	21	215	1.23	.193	R	R	R	3.71	5.90	25.10
7	1.5	112	57	1066	59	1125	5.07	.030	.98	.99	15.72	1.05	1.07	29.62
8	1.5	152	300	1236	29	1265	5.66	.030	.58	2.29	15.86	1.28	5.09	34.88
9	1.5	208	891	1285	0	1285	6.21	.030	.71	5.20	19.30	1.56	12.67	31.55
10	1.5	224	1968	1232	29	1261	6.87	.280	.70	12.19	12.82	1.50	26.29	27.67
11	1.5	69	71	140	8	149	1.09	.193	R	R	R	2.34	5.18	23.77

CYCLE COMPOSITE
BSHC = .803 GRAM/BHP HR
BSCO = 10.292 GRAM/BHP HR
BSNO2 = 19.180 GRAM/BHP HR
BSHC + BSNO2 = 19.983 GRAM/BHP HR
BSFC = .500 LB/BHP HR

TABLE B-42. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-05-72 TEST NO. 2
INJECTORS' NEEDLE TIMING' 4 DEG ADV
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.65	15.73	.005	R	-0	78	111	250	225	1.7	.3
2	285	10.7	.13	15.65	15.78	.009	.798	-0	71	110	265	232	1.7	.3
3	394	19.0	.20	16.98	17.18	.012	.631	-0	73	110	310	270	2.5	.4
4	424	41.7	.35	21.82	21.97	.017	.503	-0	72	114	407	385	3.6	.5
5	515	72.8	.59	26.98	27.52	.020	.492	-0	72	116	537	500	4.2	.7
6	285	0.0	.08	15.53	15.62	.005	R	-0	71	110	280	240	1.7	.3
7	584	101.3	.79	31.36	32.11	.024	.498	-0	73	119	650	609	4.7	.8
8	675	133.1	1.00	37.11	38.11	.027	.481	-0	75	125	740	731	5.6	1.2
9	755	171.6	1.27	41.89	43.16	.030	.493	-0	76	132	815	855	6.7	1.5
10	835	199.1	1.57	45.71	47.27	.034	.472	-0	79	142	930	989	8.2	1.8
11	285	0.0	.10	15.41	15.51	.006	R	-0	80	126	370	390	1.7	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	69	59	169	20	189	1.09	.193	R	R	R	2.66	4.41	25.78
2	1.5	88	59	269	20	289	1.66	.030	1.54	2.29	18.19	2.88	3.86	29.25
3	1.5	90	78	333	25	358	2.53	.030	.96	1.67	13.99	1.51	2.65	22.16
4	1.5	80	58	580	20	600	3.68	.030	.69	.78	19.26	1.87	1.55	26.36
5	1.5	118	96	819	15	834	4.26	.030	.84	.96	19.61	1.86	1.89	30.78
6	1.0	72	97	172	24	196	1.09	.193	R	R	R	2.97	5.98	26.35
7	1.5	128	96	1093	30	1122	5.07	.030	.84	.30	15.36	1.92	.87	29.41
8	1.5	176	269	1803	59	1861	8.81	.030	.67	1.99	15.60	1.48	4.91	29.61
9	2.0	232	867	1230	44	1888	6.96	.030	.77	5.73	19.91	1.79	12.48	31.98
10	3.0	298	1827	1256	15	1871	6.87	.280	.78	11.91	19.84	1.65	29.17	27.61
11	1.5	88	71	187	8	196	1.09	.193	R	R	R	3.00	4.89	21.76

CYCLE COMPOSITE
BSHC = .896 GRAM/BHP HR
BSCO = 9.536 GRAM/BHP HR
BSNO2 = 19.164 GRAM/BHP HR
BSHC + BSNO2 = 19.818 GRAM/BHP HR
BSFC = .501 LB/BHP HR

TABLE B-43 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-05-72 TEST NO. 3
INJECTORS' NEEDLE TIMING' 4 DEG ADV
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.57	15.66	.005	R	-0	79	111	232	205	1.7	.3
2	285	9.6	.13	15.54	15.68	.009	.831	-0	75	111	255	225	1.7	.3
3	344	17.5	.20	16.87	17.07	.012	.685	-0	76	114	298	262	2.5	.4
4	424	42.6	.35	21.18	21.53	.017	.493	-0	75	118	415	302	3.6	.5
5	515	69.4	.54	26.82	27.37	.020	.470	-0	77	120	530	495	4.1	.8
6	285	0.0	.09	15.46	15.55	.006	R	-0	79	115	322	290	1.6	.3
7	584	102.1	.76	31.15	31.92	.025	.449	-0	80	122	671	625	4.7	.8
8	675	132.5	1.00	36.94	37.94	.027	.453	-0	80	129	737	731	5.5	1.2
9	755	165.9	1.26	41.52	42.78	.030	.455	-0	80	140	818	868	6.7	1.5
10	835	197.8	1.56	45.40	46.96	.034	.472	-0	81	150	940	1009	8.1	1.8
11	285	0.0	.09	15.32	15.41	.006	R	-0	81	130	360	340	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	47	167	21	188	1.09	.143	R	R	R	3.31	3.91	25.40
2	1.0	80	71	256	15	271	1.75	.030	1.72	3.03	19.06	2.07	3.65	22.92
3	1.0	96	70	319	30	349	2.37	.030	1.23	1.80	14.68	1.80	2.63	21.42
4	1.0	112	58	592	30	622	3.56	.030	.75	.77	13.57	1.52	1.56	27.53
5	1.0	112	46	808	15	822	4.12	.030	.58	.48	14.00	1.24	1.02	29.83
6	1.0	88	59	168	22	191	1.09	.143	R	R	R	3.34	4.49	23.71
7	1.2	144	68	1092	44	1136	5.07	.030	.59	.56	15.33	1.32	1.25	34.18
8	1.0	192	276	1245	29	1274	5.81	.030	.73	2.08	15.76	1.60	4.59	34.80
9	1.5	224	854	1251	14	1265	6.37	.030	.76	5.79	14.10	1.68	12.74	31.01
10	2.5	248	1998	1198	29	1226	6.87	.200	.78	12.48	12.58	1.65	26.92	26.63
11	1.0	80	47	176	12	188	1.09	.143	R	R	R	3.13	3.70	24.02

CYCLE COMPOSITE BSHC = .868 GRAM/BHP HR
BSCO = 10.375 GRAM/BHP HR
BSNO2 = 13.836 GRAM/BHP HR
BSHC + BSNO2 = 14.704 GRAM/BHP HR
BSFC = .503 LB/BHP HR

TABLE B-44. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-28-73 TEST NO. 1
INJECTORS' LOW-SAC TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	OP-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.48	16.55	57.817	R	-0	70	108	212	205	1.9	.3
2	285	15.8	.14	16.48	16.63	29.515	.595	-0	70	106	272	270	1.9	.3
3	344	29.1	.20	18.41	18.61	18.748	.585	-0	70	110	330	322	3.0	.3
4	424	48.3	.36	22.98	23.34	12.598	.443	-0	70	113	448	415	4.1	.5
5	515	77.1	.54	29.55	30.09	10.235	.423	-0	72	115	560	515	4.6	.8
6	285	0.0	.07	16.41	16.47	54.956	R	-0	72	111	348	310	1.9	.2
7	584	105.2	.76	34.51	35.28	8.028	.435	-0	72	118	638	620	5.2	1.0
8	675	138.6	1.01	40.15	41.16	6.741	.436	-0	72	125	738	738	6.3	1.4
9	755	171.6	1.26	45.74	47.00	5.985	.441	-0	70	133	745	732	7.4	1.7
10	835	204.4	1.56	50.28	51.84	5.075	.458	-0	72	148	888	943	9.6	2.8
11	285	0.0	.06	16.39	16.45	64.234	R	-0	72	128	348	378	1.8	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	44	48	112	15	126	1.08	20.8	R	R	R	2.53	5.45	23.78
2	1.5	52	47	184	19	204	2.06	19.1	.72	1.31	9.20	1.33	2.40	17.08
3	2.0	60	70	222	24	246	2.50	18.5	.61	1.43	8.21	1.21	2.03	16.23
4	2.0	72	58	364	14	378	3.50	17.4	.46	.74	7.84	1.04	1.67	17.81
5	2.0	84	69	533	19	552	4.06	16.7	.43	.71	9.33	1.02	1.68	22.08
6	1.0	68	48	108	16	123	.92	20.1	R	R	R	3.78	5.16	21.46
7	1.5	88	115	651	28	680	4.86	15.7	.34	1.01	9.04	.84	2.38	22.61
8	2.0	120	254	732	14	746	5.51	14.9	.47	1.48	[illegible].57	1.00	4.54	21.46
9	3.0	144	664	784	14	798	5.74	14.5	.52	4.08	[illegible].40	1.10	10.04	21.43
10	5.5	176	1615	806	14	828	6.13	11.8	.54	10.78	6.48	1.24	23.53	19.62
11	1.0	84	60	114	11	125	.87	20.8	R	R	R	5.36	7.68	26.03

CYCLE COMPOSITE BSHC = .645 GRAM/BHP HR
BSCO = 8.932 GRAM/BHP HR
BSNO2 = 9.579 GRAM/BHP HR
BSHC + BSNO2 = 10.223 GRAM/BHP HR
BSFC = .476 LB/BHP HR

TABLE B-45. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-28-73 TEST NO. 2
INJECTORS' LOW-SAC TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.92	16.99	58.188	P	-0	70	103	205	200	1.9	.2
2	285	15.9	.19	16.11	16.25	23.963	.542	-0	70	106	262	260	1.9	.3
4	394	23.9	.20	18.36	18.56	19.000	.512	-0	70	110	318	315	3.0	.4
6	424	48.8	.36	22.70	23.06	12.199	.447	-0	70	114	490	490	4.0	.5
8	514	74.9	.55	29.50	30.05	10.035	.429	-0	70	115	550	510	4.6	.8
1	285	0.0	.06	16.38	16.44	60.935	P	-0	71	111	210	200	1.8	.2
3	584	106.9	.77	33.77	34.53	7.725	.432	-0	70	120	650	623	5.2	1.0
5	675	138.6	1.00	39.99	40.99	6.592	.434	-0	71	129	720	735	6.3	1.3
7	755	171.3	1.25	95.08	96.34	5.909	.439	-0	72	138	800	842	7.8	1.7
10	835	208.5	1.56	49.57	51.13	4.849	.450	-0	75	151	900	952	9.5	2.0
11	285	0.0	.06	16.33	16.39	64.009	P	-0	75	135	930	910	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	90	29	111	19	125	.94	20.2	R	R	R	2.29	2.72	23.37
2	1.5	98	47	183	15	197	2.06	19.1	.65	1.27	8.79	1.20	2.39	16.12
3	1.5	56	47	211	20	231	2.58	18.5	.59	.98	7.90	1.19	1.91	15.99
4	1.5	68	35	370	15	389	3.56	17.3	.92	.93	7.84	.95	.97	17.56
5	2.0	76	23	532	10	542	4.06	16.5	.39	.29	9.20	.92	.56	21.95
6	1.0	60	29	110	13	123	.92	20.1	R	R	R	3.62	2.84	29.21
7	2.0	98	115	662	29	691	4.99	15.5	.38	.98	9.69	.87	2.26	22.90
8	2.5	112	259	730	19	795	5.51	14.6	.44	1.97	9.59	1.01	4.59	21.87
9	3.0	196	760	755	14	769	5.81	14.2	.49	5.96	8.98	1.11	12.99	20.96
10	5.5	168	1793	763	28	791	6.29	13.4	.59	11.66	8.38	1.21	25.71	18.63
11	1.0	84	60	113	4	117	.87	20.0	R	R	R	5.35	7.55	29.32

CYCLE COMPOSITE BSHC = .596 GRAM/BHP HR
BSCO = 4.595 GRAM/BHP HR
BSNO2 = 4.036 GRAM/BHP HR
BSHC + BSNO2 = 4.632 GRAM/BHP HR
BSFC = .468 LB/BHP HR

TABLE B-46. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-28-73 TEST NO. 3
INJECTORS' LOW-SAC TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.92	16.98	61.184	R	-0	70	113	220	210	1.8	.2
2	285	15.9	.19	16.39	16.53	25.929	.517	-0	70	112	290	280	1.8	.3
3	394	25.1	.20	18.31	18.51	18.895	.479	-0	70	116	330	324	2.8	.4
4	424	48.1	.35	22.61	22.97	12.299	.441	-0	70	120	452	420	4.0	.6
5	515	77.1	.56	29.01	29.55	9.870	.423	-0	70	121	550	510	4.6	.8
6	285	0.0	.06	16.39	16.45	60.305	P	-0	70	127	300	275	1.8	.2
7	584	107.9	.76	33.70	34.47	7.699	.424	-0	70	123	650	624	5.2	1.0
8	675	139.5	1.00	39.63	40.63	6.618	.430	-0	71	131	730	708	6.3	1.3
9	755	173.7	1.25	94.33	95.59	5.639	.433	-0	72	140	810	850	7.7	1.7
10	835	209.2	1.57	99.11	50.68	4.725	.449	-0	72	151	910	970	9.5	2.1
11	285	0.0	.06	16.30	16.36	66.519	R	-0	75	134	900	340	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	68	110	9	119	.92	20.1	R	R	R	2.98	7.17	23.68
2	1.5	94	83	189	10	199	1.96	19.0	.77	2.26	8.94	1.94	4.38	17.38
3	2.0	64	82	227	20	247	2.58	18.4	.62	1.68	7.88	1.38	3.33	16.96
4	2.0	72	70	372	15	387	3.58	17.1	.96	.88	7.97	1.83	1.99	18.89
5	2.0	88	69	504	15	520	3.99	16.6	.98	.78	9.58	.96	1.65	22.65
6	1.0	60	71	111	11	122	.92	19.9	R	R	R	3.62	8.89	29.15
7	2.0	96	137	709	19	728	4.93	15.3	.95	1.15	9.98	.95	2.72	23.81
8	2.0	112	265	777	19	791	5.99	14.2	.93	2.03	9.96	1.08	4.72	23.15
9	2.0	136	641	881	29	889	6.24	13.8	.97	4.77	9.98	1.09	11.81	21.71
10	4.0	168	2871	837	19	851	6.89	13.2	.81	13.19	8.91	1.19	29.36	19.82
11	1.0	90	93	117	3	120	.89	19.6	R	R	R	5.98	11.82	26.59

CYCLE COMPOSITE BSHC = .575 GRAM/BHP HR
BSCO = 10.872 GRAM/BHP HR
BSNOX = 9.519 GRAM/BHP HR
BSHC + BSNOX = 10.094 GRAM/BHP HR
BSFC = .465 LB/BHP HR

TABLE B 47. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-28-72 TEST NO. 1 W/ NOTCH 8 DERATED
INJECTORS: NEEDLE TIMING: 4 DEG RETD
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	294	0.0	.08	15.58	15.66	.005	R	-0	81	125	271	259	1.6	.3
2	285	14.6	.13	15.58	15.71	.009	.635	-0	78	119	289	290	1.7	.3
3	344	23.0	.20	16.87	17.07	.012	.513	-0	79	120	350	299	2.6	.4
4	429	45.2	.35	20.89	21.25	.017	.464	-0	81	125	491	419	3.6	.5
5	515	73.0	.54	26.79	27.33	.020	.445	-0	82	[illegible]	560	530	4.2	.8
6	285	0.0	.08	15.54	15.61	.005	R	-0	82	[illegible]	265	298	1.6	.3
7	584	105.9	.77	31.28	32.05	.025	.434	-0	82	130	602	662	4.8	1.0
8	675	136.3	.98	36.83	37.83	.027	.437	-0	82	131	750	755	5.6	1.2
9	755	169.2	1.26	41.21	42.47	.031	.447	-0	9[illegible]	135	855	900	6.8	1.5
10	835	177.0	1.41	46.81	48.22	.030	.478	-0	7[illegible]	150	885	955	8.2	1.8
11	295	0.0	.07	15.44	15.50	.004	R	-0	91	141	370	360	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	71	89	16	105	1.05	.193	R	R	R	9.13	6.11	19.89
2	1.5	96	83	126	18	144	1.46	.030	1.58	2.71	7.75	2.49	9.26	12.21
3	2.0	109	82	165	23	188	2.58	.030	1.02	1.60	6.03	1.49	3.12	11.76
4	2.0	124	70	299	13	312	3.79	.030	.78	.85	6.2[illegible]	1.69	1.83	13.60
5	2.5	144	64	423	9	432	4.25	.030	.71	.68	6.96	1.59	1.52	15.69
6	1.0	134	71	89	16	105	1.05	.193	R	R	R	5.73	6.36	19.65
7	3.0	174	189	498	5	495	5.07	.030	.70	1.96	6.48	1.62	3.36	14.91
8	3.0	204	335	641	4	645	5.54	.030	.76	2.64	7.73	1.74	5.59	17.69
9	5.5	256	1012	679	0	679	6.13	.030	.85	6.68	7.31	1.90	19.45	16.36
10	5.5	328	1357	597	5	602	6.45	.280	1.18	9.72	7.08	2.47	20.34	14.81
11	2.5	152	83	102	1	103	1.05	.193	R	R	R	7.78	8.99	17.20

CYCLE COMPOSITE BSHC = 1.249 GRAM/BHP HR
BSCO = 8.241 GRAM/BHP HR
BSNO2 = 7.526 GRAM/BHP HR
BSHC + BSNO2 = 8.775 GRAM/BHP HR
BSFC = .500 LB/BHP HR

TABLE B-48. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-28-72 TEST NO. 2 W/ NOTCH 8 DERATED
INJECTORS: NEEDLE TIMING: 4 DEG RETD
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR		TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.08	15.84	15.92	.005	R	-0	65	109	220	210	1.7	.3
2	285	14.1	.19	15.84	15.98	.009	.[illegible]27	-0	64	106	286	254	1.7	.3
3	344	23.8	.20	17.18	17.37	.011	.[illegible]91	-0	60	10[illegible]	330	271	2.6	.4
4	429	45.[illegible]	.36	21.01	21.37	.017	.[illegible]68	-0	70	10[illegible]	424	408	3.7	.5
5	515	73.6	.54	26.89	27.43	.020	.493	-0	74	116	556	523	4.2	.8
6	285	0.0	.08	15.55	15.63	.005	R	-0	74	111	292	270	1.7	.3
7	584	106.9	.76	31.34	32.10	.024	.437	-0	80	121	66[illegible]	644	4.7	1.0
8	675	137.[illegible]	1.01	36.97	37.98	.027	.440	-0	82	130	755	765	5.6	1.2
9	755	167.9	1.26	41.29	42.54	.030	.449	-0	85	140	891	881	6.8	1.5
10	835	176.0	1.41	46.94	47.85	.030	.481	-0	80	150	885	958	8.1	1.8
11	285	0.0	.08	15.41	15.49	.005	R	-0	90	135	330	320	1.6	.3

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.2	88	98	87	15	102	1.05	.193	R	R	R	8.85	9.15	19.61
2	2.0	89	97	126	13	139	1.45	.030	1.92	1.82	7.33	2.26	2.92	11.68
3	2.6	96	89	158	20	178	2.44	.030	1.01	1.23	6.12	1.37	2.27	11.32
4	2.2	136	96	282	13	295	3.60	.030	.84	.67	5.95	1.79	1.22	12.72
5	2.5	176	81	385	9	393	4.25	.030	.87	.74	6.34	1.94	1.78	15.38
6	1.0	166	89	78	21	98	1.04	.193	R	R	R	7.63	5.31	19.57
7	3.0	229	195	494	9	503	5.07	.030	.91	1.58	6.73	2.00	3.61	15.92
8	3.5	272	431	586	9	595	5.66	.030	.99	3.13	7.09	2.05	7.11	15.99
9	5.5	312	1026	637	9	642	6.13	.030	1.09	6.03	7.08	2.32	15.82	15.69
10	5.5	364	1294	681	9	611	6.37	.280	1.23	8.09	7.17	2.57	18.58	15.98
11	2.0	200	83	95	0	95	1.05	.193	R	R	R	8.06	7.06	15.20

CYCLE COMPOSITE BSHC = 1.374 GRAM/BHP HR
BSCO = 7.637 GRAM/BHP HR
BSNO2 = 7.500 GRAM/BHP HR
BSHC + BSNO2 = 8.874 GRAM/BHP HR
BSFC = .504 LB/BHP HR

TABLE B-49. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-07-72 TEST NO. 1 W/ 25 PERCENT WATER
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.59	15.66	.005	R	25	82	118	292	232	1.6	.3
2	285	19.2	.19	15.69	15.78	.009	.576	25	78	110	295	251	1.7	.3
3	344	23.1	.20	16.97	17.17	.012	.510	25	75	110	339	291	2.6	.4
4	424	47.5	.36	21.05	21.41	.017	.450	25	74	113	431	417	3.7	.6
5	515	74.8	.54	27.40	27.94	.020	.433	25	75	111	532	510	4.3	.8
6	285	0.0	.07	15.63	15.70	.004	R	25	76	105	310	290	1.8	.3
7	564	95.6	.76	31.52	32.28	.024	.475	25	75	111	630	620	5.4	1.0
8	675	140.7	1.00	37.30	38.30	.027	.426	25	78	112	708	721	6.0	1.3
9	755	172.5	1.24	42.21	43.47	.030	.438	25	79	120	805	845	7.2	1.6
10	835	200.6	1.56	47.23	48.79	.033	.466	25	80	131	909	979	8.6	1.9
11	285	0.0	.07	15.56	15.62	.004	R	25	81	118	390	380	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	112	98	114	20	134	1.14	.257	R	R	R	5.26	4.45	20.65
2	1.5	109	47	191	15	206	2.16	.100	1.52	1.37	9.87	2.64	2.39	17.15
3	1.0	112	70	238	14	252	2.80	.050	1.10	1.37	8.08	2.15	2.69	16.83
4	1.0	128	58	347	18	415	3.99	.090	.76	.69	8.08	1.69	1.53	17.99
5	1.0	152	96	527	18	546	4.38	.020	.75	.95	8.80	1.73	1.05	20.33
6	.5	128	98	114	20	134	1.09	.257	R	R	R	6.32	4.68	21.69
7	1.0	168	91	718	5	723	5.22	.010	.75	.81	10.54	1.58	1.71	22.14
8	1.0	208	264	786	27	813	5.81	.010	.75	1.89	9.56	1.75	4.43	22.92
9	2.0	256	719	821	13	835	6.45	0.000	.85	9.73	9.09	1.99	10.79	20.73
10	4.5	264	1472	803	0	803	7.09	0.000	.85	12.61	8.43	1.82	27.09	18.11
11	1.0	128	98	128	6	133	1.09	.257	R	R	R	6.60	4.89	22.62

CYCLE COMPOSITE
BSHC = 3.276 GRAM/BHP HR
BSCO = 2.886 GRAM/BHP HR
BSNO2 = 17.---- GRAM/BHP HR
BSHC + BSNO2 = 20.709 GRAM/BHP HR
BSFC = .869 LB/BHP HR

TABLE B-50. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-07-72 TEST NO. 2 W/ 25 PERCENT WATER
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.62	15.69	.004	R	25	82	118	292	232	1.6	.3
2	285	19.4	.19	15.62	15.76	.009	.564	25	78	110	295	251	1.7	.3
3	344	23.4	.20	16.99	17.19	.012	.512	25	75	110	339	291	2.6	.4
4	424	48.1	.35	21.25	21.60	.017	.491	25	74	113	431	417	3.7	.6
5	515	76.2	.54	27.37	27.91	.020	.428	25	75	111	532	510	4.3	.8
6	285	0.0	.07	15.62	15.69	.004	R	25	76	105	310	290	1.8	.3
7	584	100.6	.77	31.49	32.25	.024	.457	25	75	111	630	620	5.0	1.0
8	675	140.9	1.00	37.12	38.12	.027	.426	25	78	112	708	721	6.0	1.3
9	755	170.1	1.26	41.92	43.18	.030	.443	25	79	120	805	845	7.2	1.6
10	835	207.9	1.65	46.32	47.97	.035	.444	25	80	131	909	979	8.6	1.9
11	285	0.0	.07	15.51	15.58	.004	R	25	81	118	390	380	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	98	123	17	140	1.09	.257	R	R	R	4.14	4.91	23.76
2	1.5	88	71	205	13	218	2.16	.100	1.27	2.03	10.31	2.23	3.50	18.18
3	1.0	96	78	264	20	272	2.80	.050	.97	1.36	8.62	1.81	2.65	16.85
4	1.0	120	58	429	19	437	3.99	.090	.71	.68	8.97	1.61	1.55	19.23
5	1.0	128	96	572	9	582	4.59	.020	.62	.99	9.20	1.45	1.09	21.62
6	1.0	88	98	116	19	134	1.09	.257	R	R	R	4.14	4.91	22.78
7	1.2	152	91	718	18	736	5.36	.010	.64	.77	10.80	1.41	1.68	22.30
8	1.5	176	253	778	14	791	5.89	.010	.63	1.88	9.25	1.48	4.22	21.72
9	3.0	248	868	808	19	819	6.45	0.000	.88	9.79	8.92	1.81	11.07	20.13
10	4.5	248	1434	807	0	807	7.12	0.000	.76	11.77	8.05	1.68	26.14	17.91
11	1.0	120	91	127	5	132	1.09	.257	R	9	R	6.17	7.31	22.13

CYCLE COMPOSITE
BSHC = 2.950 GRAM/BHP HR
BSCO = 3.235 GRAM/BHP HR
BSNO2 = 17.599 GRAM/BHP HR
BSHC + BSNO2 = 20.199 GRAM/BHP HR
BSFC = .833 LB/BHP HR

TABLE B-51. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-07-72 TEST NO. 3 W/ 25 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.58	15.65	.004	R	25	74	110	235	221	1.6	.3
2	285	14.9	.14	15.58	15.72	.009	.550	25	78	109	306	259	1.7	.3
3	344	23.6	.19	16.91	17.10	.011	.483	25	78	111	345	295	2.5	.4
4	424	44.3	.36	20.98	21.33	.017	.439	25	80	118	441	420	3.6	.5
5	515	77.1	.54	27.32	27.86	.020	.420	25	79	115	552	530	4.2	.8
6	285	0.0	.07	15.58	15.65	.004	R	25	79	110	331	310	1.7	.3
7	584	107.9	.77	31.96	32.23	.024	.426	25	78	115	654	641	4.9	1.0
8	675	142.1	1.01	37.16	38.17	.027	.425	25	79	121	730	798	5.8	1.3
9	755	175.5	1.26	41.97	43.23	.030	.430	25	80	125	812	850	7.1	1.6
10	835	209.9	1.58	46.29	47.86	.034	.451	25	82	135	920	995	8.5	1.9
11	285	0.0	.06	15.[illegible]	15.56	.004	R	25	88	125	350	390	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	98	[illegible]37	20	147	1.05	.257	R	R	R	9.55	9.90	29.88
2	1.5	88	71	213	15	228	2.06	.100	1.22	1.96	10.37	2.23	3.57	18.88
3	1.0	96	70	257	25	282	2.69	.050	.92	1.39	8.83	1.90	2.78	18.29
4	1.0	112	58	943	10	953	3.87	.040	.64	.64	8.96	1.97	1.52	19.51
5	1.5	128	58	619	5	624	4.32	.020	.61	.55	9.79	1.96	1.30	23.18
6	1.0	88	98	120	12	132	1.05	.257	R	R	R	9.55	9.90	22.29
7	1.5	152	103	775	5	780	4.93	.010	.60	.81	10.06	1.91	1.84	23.60
8	1.5	184	288	878	29	907	5.66	.010	.65	2.03	10.52	1.93	4.78	24.75
9	2.5	240	829	647	0	887	6.05	0.000	.78	5.37	9.93	1.82	12.50	21.96
10	5.0	248	2157	843	0	843	6.70	0.000	.75	12.94	8.80	1.66	28.71	19.53
11	1.2	112	98	141	6	147	1.00	.257	R	R	R	6.76	5.73	29.13

CYCLE COMPOSITE

BSHC	= 2.525	GRAM/BHP HR
BSCO	= 2.934	GRAM/BHP HR
BSNO2	= 18.112	GRAM/BHP HR
BSHC + BSNO2	= 20.638	GRAM/BHP HR
BSFC	= .743	LB/BHP HR

TABLE B-52. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 1 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.75	15.81	.004	R	50	72	128	251	291	1.6	.3
2	284	15.7	.13	15.63	15.77	.009	.510	50	72	115	305	268	1.6	.3
3	344	23.9	.20	17.00	17.20	.012	.502	50	72	118	351	309	2.7	.5
4	424	44.5	.36	21.12	21.48	.017	.432	50	72	118	448	423	4.0	.6
5	515	77.8	.59	27.03	27.62	.020	.419	50	72	118	550	519	4.6	.9
6	285	0.0	.04	15.62	15.68	.004	R	50	71	109	296	275	1.7	.3
7	584	109.8	.76	31.62	32.38	.024	.419	50	72	106	650	632	5.2	1.1
8	675	144.6	1.00	37.28	38.28	.027	.415	50	73	108	718	731	6.2	1.4
9	755	178.4	1.25	42.67	43.82	.029	.427	50	73	112	799	849	7.3	1.6
10	835	210.5	1.56	46.29	47.85	.034	.444	50	73	121	901	971	8.8	2.0
11	285	0.0	.06	15.63	15.69	.004	R	50	75	109	348	342	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	88	29	125	10	135	1.05	.257	R	R	R	9.64	2.75	25.59
2	1.0	112	91	223	17	241	2.21	.100	1.99	1.07	10.99	2.91	3.67	28.98
3	1.0	104	78	259	19	279	2.80	.050	.99	1.23	8.58	1.97	2.66	18.93
4	.5	112	96	908	15	923	3.79	.040	.69	.53	7.98	1.49	1.22	18.32
5	1.0	128	96	557	9	566	4.25	.020	.68	.43	8.67	1.93	1.02	20.68
6	.5	96	36	120	9	129	1.04	.257	R	R	R	9.23	3.00	22.99
7	1.0	168	103	782	8	782	4.07	.010	.62	.00	8.99	1.51	1.93	21.62
8	1.0	184	253	781	14	795	5.59	.010	.69	1.76	9.10	1.55	4.29	21.98
9	2.0	232	741	819	0	819	6.13	0.000	.79	5.19	8.82	1.85	10.15	20.67
10	9.5	272	2032	811	14	825	6.78	0.000	.82	10.15	8.10	1.84	27.38	18.26
11	1.0	128	89	186	5	191	1.06	.257	R	R	R	7.88	8.84	26.07

CYCLE COMPOSITE

BSHC	= 3.668	GRAM/BHP HR
BSCO	= 2.844	GRAM/BHP HR
BSNO2	= 16.678	GRAM/BHP HR
BSHC + BSNO2	= 19.390	GRAM/BHP HR
BSFC	= .768	LB/BHP HR

TABLE B-53. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 2 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.61	15.67	.004	R	50	70	105	230	215	1.6	.3
2	285	16.5	.14	15.73	15.87	.009	.498	50	70	112	305	255	1.7	.3
3	344	25.1	.19	17.13	17.32	.011	.454	50	70	106	339	291	2.7	.4
4	424	49.9	.36	21.43	21.79	.017	.429	50	70	108	431	409	3.9	.6
5	515	77.8	.54	27.19	27.74	.020	.419	50	70	102	540	510	4.7	.9
6	285	0.0	.07	15.61	15.68	.004	R	50	70	99	292	273	1.8	.3
7	584	110.0	.77	31.64	32.40	.024	.418	50	70	101	635	628	5.2	1.1
8	675	144.6	1.00	37.62	38.62	.027	.415	50	70	105	710	728	6.2	1.4
9	755	178.4	1.26	42.36	43.62	.030	.424	50	70	110	800	838	7.4	1.7
10	835	211.3	1.56	46.14	47.70	.034	.442	50	75	120	890	962	8.8	2.0
11	285	0.0	.06	15.58	15.64	.004	R	50	77	108	408	400	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	80	71	106	17	124	1.09	.257	R	R	R	4.87	8.66	24.63
2	1.0	104	94	187	15	202	2.21	.100	1.32	2.39	8.41	2.66	4.80	16.90
3	1.0	96	94	217	9	227	2.58	.050	.87	1.70	6.76	1.93	3.75	14.88
4	1.0	104	81	364	14	378	3.68	.040	.60	.93	7.14	1.90	2.17	16.64
5	1.0	128	92	[illegible]	9	492	4.12	.020	.60	.86	7.57	1.44	2.06	18.07
6	.5	80	95	105	18	124	1.09	.257	R	R	R	4.14	9.81	20.93
7	1.0	144	148	653	9	662	5.00	.010	.56	1.15	8.42	1.34	2.75	20.14
8	1.0	168	276	741	0	741	5.51	.010	.59	1.94	8.55	1.93	4.68	20.60
9	2.5	224	421	791	0	791	[illegible]	0.009	.72	5.92	8.35	1.71	13.97	19.70
10	5.0	240	2127	784	0	784	6.70	0.000	.72	17.63	7.65	1.62	28.57	17.29
11	1.0	96	95	123	4	127	1.05	.257	R	R	R	5.83	11.53	25.16

CYCLE COMPOSITE BSHC = 2.276 GRAM/BHP HR
BSCO = 4.565 GRAM/BHP HR
BSNO2 = 15.003 GRAM/BHP HR
BSHC + BSNO2 = 17.279 GRAM/BHP HR
BSFC = .748 LB/BHP HR

TABLE B-54. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 3 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.59	15.65	.004	R	50	79	118	236	220	1.6	.3
2	285	15.7	.13	15.59	15.72	.009	.510	50	79	118	318	260	1.6	.3
3	344	26.8	.20	16.91	17.11	.012	.447	50	79	112	349	307	2.7	.4
4	424	50.[illegible]	.35	20.94	21.29	.017	.414	50	79	115	448	425	3.7	.6
5	515	77.8	.54	26.95	27.49	.020	.419	50	79	121	547	520	4.5	.8
6	285	0.0	.06	15.59	15.65	.004	R	50	90	109	290	270	1.8	.3
7	584	109.8	.76	31.47	32.23	.024	.414	50	79	118	646	635	5.1	1.0
8	675	142.8	1.01	37.10	38.11	.027	.423	50	80	111	718	732	6.9	1.3
9	755	177.4	1.27	41.90	43.17	.030	.428	50	82	118	888	849	7.3	1.6
10	835	208.8	1.57	45.74	47.30	.034	.450	50	88	125	902	979	8.7	1.9
11	285	0.0	.05	15.47	15.53	.003	R	50	88	113	385	370	1.6	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	98	120	12	131	1.00	.257	R	R	R	4.35	5.16	23.36
2	1.5	80	71	210	9	219	2.06	.100	1.06	1.86	9.47	2.00	3.66	18.57
3	1.0	80	82	249	14	263	2.69	.050	.79	1.30	7.25	1.66	3.00	16.22
4	1.0	96	78	422	5	426	3.68	.040	.53	.77	7.74	1.28	1.86	18.68
5	1.0	112	69	537	5	541	3.99	.020	.52	.69	8.26	1.26	1.55	19.96
6	1.8	88	68	114	15	128	1.00	.257	R	R	R	5.85	6.01	29.11
7	1.5	152	126	700	9	709	4.93	.010	.59	.97	9.80	1.42	2.35	21.75
8	1.8	184	288	751	28	779	5.36	.010	.65	2.02	8.48	1.53	4.77	21.23
9	3.8	224	816	774	0	774	5.81	0.000	.78	5.22	8.13	1.68	12.10	18.99
10	6.0	248	2109	767	0	767	6.95	0.000	.79	12.57	7.81	1.65	27.91	16.68
11	1.5	96	68	123	0	130	1.00	.257	R	R	R	6.15	7.60	27.35

CYCLE COMPOSITE BSHC = 2.228 GRAM/BHP HR
BSCO = 3.280 GRAM/BHP HR
BSNO2 = 15.905 GRAM/BHP HR
BSHC + BSNO2 = 18.133 GRAM/BHP HR
BSFC = .734 LB/BHP HR

TABLE B-55. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 1 W/ 75 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.65	15.71	.004	R	75	71	100	295	230	1.6	.3
2	285	17.5	.19	15.68	15.82	.004	.480	75	70	100	300	259	1.6	.3
3	344	26.2	.20	17.01	17.21	.012	.459	75	70	101	350	302	2.7	.4
4	424	44.4	.35	21.01	21.36	.017	.425	75	71	105	434	412	3.4	.6
5	515	78.4	.59	27.16	27.70	.020	.416	75	71	100	542	512	4.6	.9
6	285	0.0	.06	15.62	15.68	.004	R	75	71	98	325	290	1.7	.3
7	584	110.0	.76	31.51	32.27	.024	.415	75	70	100	635	625	5.1	1.1
8	675	144.6	1.00	37.52	38.52	.027	.415	75	71	101	709	720	6.2	1.3
9	755	179.7	1.27	91.61	92.88	.030	.423	75	71	106	792	831	7.4	1.7
10	835	209.2	1.55	96.32	97.87	.033	.445	75	76	112	882	960	8.8	1.9
11	285	0.0	.05	15.71	15.76	.003	R	75	77	103	908	900	1.6	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	95	112	13	126	1.09	.257	R	R	R	9.61	10.93	23.69
2	1.5	72	106	191	17	208	2.21	.100	.86	2.52	8.11	1.79	5.25	16.91
3	1.0	80	117	241	14	255	2.75	.050	.69	2.02	7.23	1.51	4.42	15.79
4	1.0	80	93	373	9	383	3.68	.040	.95	1.09	7.00	1.06	2.46	16.66
5	1.0	96	109	515	195	710	4.12	.020	.95	.96	10.82	1.08	2.32	26.05
6	.5	64	95	112	15	127	1.09	.257	R	R	R	3.99	10.39	22.56
7	1.0	112	160	680	14	694	5.00	.010	.93	1.23	8.80	1.05	2.98	21.22
8	1.5	144	324	713	27	741	5.51	.010	.51	2.27	6.51	1.22	5.47	20.55
9	2.5	192	433	708	54	762	6.05	0.000	.60	5.65	7.84	1.43	13.89	18.58
10	5.5	216	2112	476	0	476	6.61	0.000	.65	12.71	6.68	1.97	28.60	15.09
11	1.0	64	107	115	5	120	1.05	.257	R	R	R	9.16	13.90	25.52

CYCLE COMPOSITE BSHC = 1.775 GRAM/BHP HR
BSCO = 5.117 GRAM/BHP HR
BSNO2 = 15.950 GRAM/BHP HR
BSHC + BSNO2 = 17.229 GRAM/BHP HR
BSFC = .733 LB/BHP HR

TABLE B-56. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 2 W/ 75 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.71	15.77	.004	R	75	71	98	271	256	1.6	.3
2	285	16.5	.13	15.62	15.76	.004	.486	75	70	98	311	286	1.7	.3
3	344	29.6	.20	17.02	17.22	.012	.492	75	70	101	315	301	2.6	.4
4	424	50.2	.35	21.13	21.48	.017	.418	75	70	101	430	406	3.4	.6
5	515	78.4	.55	27.01	27.56	.020	.421	75	71	100	534	510	4.6	.9
6	285	0.0	.06	15.74	15.80	.004	R	75	72	98	328	300	1.7	.3
7	584	108.4	.76	31.66	32.42	.024	.421	75	70	101	640	632	5.2	1.1
8	675	144.6	1.00	37.96	38.96	.027	.415	75	71	101	708	725	6.3	1.3
9	755	179.7	1.26	91.66	92.92	.030	.420	75	74	108	802	894	7.4	1.7
10	835	210.4	1.57	96.50	98.07	.033	.446	75	79	102	890	962	8.9	2.0
11	285	0.0	.06	15.59	15.65	.004	R	75	79	105	925	920	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	95	126	12	138	1.09	.257	R	R	R	2.78	10.98	26.88
2	1.5	64	104	200	20	220	2.16	.100	.81	2.67	9.07	1.66	5.58	18.68
3	1.5	64	99	250	11	260	2.88	.050	.68	1.79	7.99	1.21	3.84	16.14
4	1.0	88	93	397	21	418	3.79	.040	.88	1.09	7.84	1.19	2.58	18.84
5	1.0	96	92	584	8	592	4.19	.020	.95	.95	8.91	1.06	2.02	28.88
6	.5	96	88	121	8	129	1.09	.257	R	R	R	2.67	9.62	29.96
7	1.0	136	160	646	21	688	5.07	.010	.84	1.86	8.88	1.87	2.99	21.12
8	1.5	176	329	757	32	789	5.51	.010	.62	2.87	9.07	1.[illegible]	5.06	21.89
9	3.0	216	933	783	8	793	6.13	0.000	.68	5.86	8.88	1.62	13.97	19.85
10	5.5	240	8000	727	C	727	6.61	0.000	.78	11.99	7.66	1.62	26.98	17.17
11	1.0	88	71	128	4	132	1.09	.257	R	R	R	5.35	8.65	26.32

CYCLE COMPOSITE BSHC = 1.664 GRAM/BHP HR
BSCO = 4.892 GRAM/BHP HR
BSNO2 = 16.211 GRAM/BHP HR
BSHC + BSNO2 = 17.876 GRAM/BHP HR
BSFC = .744 LB/BHP HR

TABLE B 57. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 3 W/ 75 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.62	15.68	.004	R	75	72	100	275	260	1.6	.3
2	285	7.8	.13	15.68	15.81	.008	.999	75	70	100	329	279	1.7	.3
3	399	16.8	.20	16.98	17.18	.012	.992	75	70	102	352	312	2.6	.4
4	424	50.2	.36	21.26	21.61	.017	.926	75	70	101	490	412	3.9	.6
5	515	78.9	.55	27.00	27.55	.021	.921	75	73	101	540	512	4.7	.9
6	285	0.0	.06	15.76	15.83	.004	R	75	71	100	320	305	1.7	.3
7	584	110.6	.76	31.71	32.46	.024	.911	75	70	100	632	626	5.2	1.1
8	675	144.6	1.00	37.29	38.29	.027	.915	75	75	102	710	730	6.1	1.5
9	755	178.5	1.25	91.76	93.01	.030	.920	75	70	104	788	835	7.5	1.7
10	835	212.0	1.56	96.68	98.04	.039	.991	75	74	110	880	958	9.0	2.0
11	285	0.0	.06	15.74	15.79	.004	R	75	75	101	340	330	1.8	2.4

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	71	106	13	119	1.09	.257	R	R	R	5.06	8.18	22.99
2	1.5	80	71	184	6	190	2.26	.100	.99	1.65	7.28	2.09	3.68	16.22
3	1.0	96	99	216	23	239	2.80	.050	.81	1.58	6.62	1.81	3.53	14.81
4	1.0	96	93	349	5	348	3.62	.040	.55	1.05	6.98	1.28	2.96	15.20
5	1.0	112	115	475	14	489	4.12	.020	.52	1.06	7.92	1.23	2.53	17.63
6	1.0	80	95	99	7	106	1.09	.257	R	R	R	9.90	10.93	14.05
7	1.5	144	184	581	0	581	4.68	.010	.56	1.92	7.99	1.36	3.96	18.29
8	2.0	140	347	641	14	655	5.36	.010	.56	2.42	7.99	1.35	5.82	18.09
9	3.0	208	790	651	0	651	5.81	0.000	.66	5.00	6.77	1.57	11.91	16.12
10	6.5	229	2001	696	0	696	6.45	0.000	.67	11.93	6.32	1.52	27.01	14.32
11	1.5	64	131	109	6	105	1.05	.257	R	R	R	3.92	16.01	21.89

CYCLE COMPOSITE
BSHC = 1.999 GRAM/BHP HR
BSCO = 9.933 GRAM/BHP HR
BSNO2 = 13.907 GRAM/BHP HR
BSHC + BSNO2 = 15.905 GRAM/BHP HR
BSFC = .729 LB/BHP HR

TABLE B-58. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-11-72 TEST NO. 2 W/ 100 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.59	15.66	.004	R	100	73	97	281	218	1.6	.3
2	285	15.1	.14	15.59	15.73	.009	.599	100	72	98	300	260	1.7	.3
3	399	23.1	.20	18.21	18.41	.011	.510	100	72	100	335	291	2.8	.4
4	424	46.0	.34	22.51	22.86	.014	.465	100	72	92	430	407	4.0	.6
5	515	73.6	.54	29.48	30.22	.018	.493	100	75	91	530	500	4.6	.9
6	285	0.0	.06	16.29	16.35	.004	R	100	75	89	310	290	1.8	.3
7	584	103.8	.76	39.33	35.08	.022	.937	100	76	91	631	621	5.2	1.1
8	675	136.4	1.01	90.37	91.38	.025	.993	100	78	98	710	725	6.2	1.9
9	755	170.6	1.27	95.83	96.30	.028	.995	100	79	99	790	838	7.5	1.7
10	835	205.7	1.57	99.86	50.63	.032	.967	100	82	100	878	955	9.0	2.0
11	285	0.0	.06	15.51	15.56	.004	R	100	84	98	340	300	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	98	116	6	122	1.19	.257	R	R	R	3.98	5.16	21.75
2	1.5	64	71	203	13	216	2.26	.100	.89	1.99	9.79	1.62	3.87	17.98
3	1.0	88	79	230	14	244	2.69	.050	.84	1.97	8.39	1.65	2.89	14.99
4	1.0	96	96	328	9	340	3.68	.040	.63	.61	8.89	1.25	1.31	15.36
5	1.0	120	96	809	5	813	4.19	.020	.65	.58	9.11	1.97	1.13	20.67
6	1.0	88	98	119	15	128	1.09	.257	R	R	R	9.89	5.39	23.81
7	1.5	136	183	682	5	687	5.00	.010	.61	.98	10.83	1.39	2.10	22.99
8	2.0	176	381	767	14	781	5.66	.010	.78	2.98	10.23	1.69	5.93	23.18
9	3.0	216	868	761	14	775	6.13	0.000	.77	6.12	9.89	1.79	13.79	28.98
10	5.5	256	2135	714	0	714	6.78	0.000	.83	13.83	7.59	1.82	30.85	16.62
11	1.5	184	98	122	9	131	1.09	.257	R	R	R	6.88	8.79	25.92

CYCLE COMPOSITE
BSHC = 2.268 GRAM/BHP HR
BSCO = 3.106 GRAM/BHP HR
BSNO2 = 17.387 GRAM/BHP HR
BSHC + BSNO2 = 19.655 GRAM/BHP HR
BSFC = .818 LB/BHP HR

TABLE B-59. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-11-72 TEST NO. 3 W/ 100 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.57	15.64	.004	R	100	79	99	221	210	1.7	.3
2	285	15.0	.19	15.42	16.06	.009	.560	100	79	99	291	250	1.8	.3
3	399	23.2	.20	18.17	18.37	.011	.508	100	78	100	340	299	2.8	.4
4	429	46.4	.35	22.96	23.31	.015	.453	100	79	102	429	402	4.0	.6
5	515	73.4	.59	29.62	30.16	.018	.444	100	79	101	531	502	4.8	.9
6	285	0.0	.07	16.27	16.33	.004	R	100	79	99	328	332	1.8	.3
7	589	102.6	.76	34.41	35.17	.022	.443	100	79	99	620	610	5.1	1.1
8	675	137.7	1.00	39.47	40.47	.025	.436	100	79	99	705	720	6.1	1.3
9	755	169.8	1.26	44.69	45.95	.028	.445	100	80	100	790	831	7.9	1.7
10	835	200.7	1.57	49.14	50.70	.032	.468	100	82	102	830	959	9.0	2.0
11	285	0.0	.06	15.50	15.56	.004	R	100	65	100	411	402	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	72	96	110	18	128	1.04	.257	R	R	R	3.72	3.67	21.60
2	1.5	72	35	186	12	197	2.16	.100	1.02	1.00	9.13	1.82	1.78	16.31
3	1.5	88	47	230	20	249	2.64	.050	.92	.98	8.62	1.81	1.92	16.77
4	1.5	96	47	368	10	378	3.62	.090	.64	.62	8.21	1.91	1.36	18.13
5	1.5	128	46	506	5	511	4.12	.020	.64	.60	9.06	1.56	1.13	20.90
6	1.0	80	36	107	16	123	1.04	.257	R	R	R	9.31	3.83	21.64
7	1.5	144	69	691	5	695	4.93	.010	.65	.62	9.56	1.97	1.90	21.59
8	2.0	176	265	698	14	712	5.59	.010	.64	2.07	9.16	1.59	9.76	21.02
9	3.0	216	793	722	0	722	5.97	0.000	.77	5.69	8.99	1.73	12.67	18.95
10	6.0	248	2103	660	19	679	6.61	0.000	.83	13.97	7.36	1.77	29.83	15.71
11	1.5	104	48	113	3	116	1.04	.257	R	R	R	5.93	5.91	21.68

CYCLE COMPOSITE BSHC = 2.903 GRAM/BHP HR
BSCO = 2.970 GRAM/BHP HR
BSNO2 = 16.586 GRAM/BHP HR
BSHC + BSNO2 = 18.489 GRAM/BHP HR
BSFC = .829 LB/BHP HR

TABLE B-60. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-11-72 TEST NO. 4 W/ 100 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.53	15.60	.004	R	100	81	100	273	250	1.7	.3
2	285	14.9	.13	15.53	15.67	.009	.536	100	78	101	329	268	1.6	.3
3	399	22.4	.19	18.12	18.32	.011	.510	100	79	101	368	300	2.8	.4
4	429	46.4	.35	22.90	22.75	.016	.498	100	79	101	448	415	4.0	.6
5	515	74.8	.59	29.36	29.98	.019	.436	100	80	101	548	518	4.8	.9
6	285	0.0	.07	15.55	15.61	.004	R	100	80	100	271	252	1.8	.3
7	589	104.5	.77	34.16	34.93	.022	.448	100	80	100	625	625	5.1	1.1
8	675	137.7	1.01	39.70	40.71	.025	.440	100	80	100	711	730	6.1	1.3
9	755	169.8	1.26	44.37	45.64	.028	.447	100	81	100	799	836	7.9	1.6
10	835	200.3	1.57	48.52	50.09	.032	.468	100	83	102	901	960	8.9	2.0
11	285	0.0	.06	15.44	15.49	.004	R	100	86	100	420	410	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	88	98	113	10	123	1.04	.257	R	R	R	4.53	4.88	28.65
2	2.0	80	47	189	13	202	2.16	.100	1.11	1.30	9.19	2.07	2.93	17.05
3	1.5	96	70	221	15	236	2.58	.056	1.02	1.49	9.21	2.00	2.93	16.18
4	1.5	96	47	289	10	299	3.68	.090	.61	.59	8.36	1.37	1.32	18.68
5	1.5	104	88	513	0	513	4.12	.020	.58	.61	8.84	1.26	1.34	20.32
6	1.0	64	98	105	18	123	1.04	.257	R	R	R	3.30	4.84	28.67
7	1.5	112	103	602	10	691	5.00	.010	.44	.41	9.98	1.12	2.06	22.67
8	2.0	144	318	799	0	799	5.66	.010	.56	2.43	9.50	1.20	5.52	21.59
9	3.0	176	423	729	0	729	6.13	0.000	.62	6.53	8.59	1.48	14.62	19.83
10	5.5	208	2230	705	0	705	6.61	0.000	.67	14.38	7.97	1.44	31.26	16.23
11	2.0	88	98	117	3	120	1.04	.257	R	R	R	9.81	9.71	29.67

CYCLE COMPOSITE BSHC = 2.176 GRAM/BHP HR
BSCO = 2.965 GRAM/BHP HR
BSNO2 = 16.934 GRAM/BHP HR
BSHC + BSNO2 = 19.615 GRAM/BHP HR
BSFC = .815 LB/BHP HR

TABLE B 61 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-1-73 TEST NO. 1 W/ 25 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.25	16.31	60,772	R	25	80	121	250	230	1.8	.2
2	285	16.1	.19	16.31	16.45	26,109	.509	25	79	120	300	280	1.8	.2
3	399	25.1	.20	17.27	18.47	19,623	.479	25	75	120	335	330	2.8	.4
4	524	49.5	.36	22.89	23.25	13,079	.436	25	74	122	450	415	4.0	5.7
5	515	77.1	.55	29.36	29.90	10,713	.425	25	79	122	540	540	4.8	.4
6	285	0.0	.06	16.39	16.40	62,317	R	25	79	112	265	241	2.0	.3
7	584	109.8	.76	33.30	34.06	8,395	.417	25	79	120	625	600	5.6	1.1
8	675	140.5	1.00	39.57	40.57	7,228	.427	25	75	126	595	700	6.7	1.4
9	765	173.1	1.25	44.28	45.53	6,247	.433	25	77	131	760	798	8.5	1.8
10	835	206.7	1.55	49.05	50.60	5,239	.450	25	75	140	850	910	9.2	2.2
11	285	0.0	.06	17.22	17.28	69,172	R	25	78	115	310	290	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	98	196	7	153	1.00	20.2	R	R	R	2.87	5.68	30.04
2	1.0	98	71	257	21	277	2.06	19.4	.65	1.90	12.22	1.27	3.74	24.03
3	1.5	98	59	317	15	332	2.64	19.2	.97	1.19	10.57	.98	2.38	22.08
4	1.5	56	35	526	15	591	3.62	18.3	.35	.93	10.98	.89	.99	25.17
5	2.0	68	23	726	15	739	3.99	17.7	.35	.29	12.38	.92	.55	29.11
6	1.0	90	29	143	10	153	1.00	20.6	R	R	R	2.91	2.85	30.20
7	2.0	76	57	992	15	957	4.79	16.9	.31	.97	12.82	.75	1.12	30.79
8	2.0	96	137	1011	30	1041	5.29	16.1	.37	1.04	12.99	.86	2.93	30.91
9	2.0	116	159	1035	15	1099	5.59	15.5	.40	1.10	11.93	.93	2.55	27.52
10	3.5	190	1467	1057	15	1071	6.13	14.5	.45	9.99	11.93	1.01	20.99	25.18
11	1.0	69	36	149	3	167	.92	20.5	R	R	R	9.29	9.79	32.35

CYCLE COMPOSITE BSHC = 1.388 GRAM/BHP HR
BSCO = 2.221 GRAM/BHP HR
BSNO2 = 21.389 GRAM/BHP HR
BSHC + BSNO2 = 22.771 GRAM/BHP HR
BSFC = .756 LB/BHP HR

TABLE B-62. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-1-73 TEST NO. 2 W/ 25 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.91	15.97	57,139	R	25	78	110	230	220	1.9	.2
2	285	14.1	.19	15.90	16.09	23,153	.950	25	78	110	270	270	1.9	.3
3	399	29.9	.20	18.12	18.32	18,650	.942	25	80	111	320	312	2.8	.4
4	524	48.8	.36	22.44	22.79	12,305	.938	25	80	119	440	410	4.0	.6
5	515	76.4	.55	29.22	29.77	9,991	.929	25	80	120	540	500	4.6	.8
6	285	0.0	.07	16.29	16.30	55,973	R	25	80	115	350	330	1.9	.3
7	584	106.0	.76	33.41	34.17	7,861	.930	25	80	120	635	610	5.3	1.1
8	675	113.2	1.00	39.35	40.35	6,631	.592	25	80	130	710	711	6.4	1.4
9	765	176.6	1.25	44.33	45.58	5,795	.921	25	82	130	780	820	8.4	1.8
10	835	202.8	1.49	50.32	51.80	5,329	.936	25	85	150	860	910	9.8	2.1
11	285	0.0	.06	16.16	16.23	57,599	R	25	87	115	290	280	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	36	137	12	158	1.05	19.9	R	R	R	2.39	9.17	28.67
2	1.0	98	97	262	20	282	2.26	18.7	.59	1.89	10.22	1.18	2.31	22.78
3	1.5	56	97	381	20	381	2.69	18.9	.56	.93	10.91	1.13	1.88	21.17
4	1.5	68	35	511	15	526	3.56	17.9	.33	.93	10.68	.96	.98	24.82
5	2.0	88	96	711	30	798	4.06	16.6	.41	.97	12.38	.96	1.18	28.85
6	1.0	69	29	139	12	196	1.00	20.5	R	R	R	2.99	2.55	29.79
7	1.0	96	69	896	29	925	4.86	15.8	.41	.88	12.88	.96	1.35	29.98
8	1.0	120	148	969	29	998	5.36	15.9	.56	1.39	15.89	1.06	2.61	28.75
9	1.5	190	930	1016	29	1045	5.66	15.4	.47	2.89	11.53	1.12	6.96	27.96
10	3.0	160	1460	1093	-68	975	6.05	13.7	.57	9.81	18.76	1.38	22.68	29.69
11	1.0	84	98	149	6	158	.96	20.3	R	R	R	9.79	9.35	27.89

CYCLE COMPOSITE BSHC = 1.658 GRAM/BHP HR
BSCO = 2.187 GRAM/BHP HR
BSNO2 = 20.794 GRAM/BHP HR
BSHC + BSNO2 = 22.486 GRAM/BHP HR
BSFC = .748 LB/BHP HR

TABLE B-63. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 3-1-73 TEST NO. 1 W/ 50 PERCENT WATER
INJECTORS: LOW-SAC TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	WATER INDUCT. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.14	16.20	56.764	R	50	80	118	270	210	1.8	.2
2	285	15.7	.19	16.17	16.31	24.924	.523	50	80	115	282	280	1.8	.2
3	344	27.4	.21	18.08	18.29	17.152	.461	50	80	119	342	338	2.8	.4
4	429	50.2	.36	23.71	24.07	12.579	.430	50	81	121	445	412	4.3	.6
5	515	76.4	.54	28.39	27.93	9.497	.426	50	82	121	538	498	4.8	.9
6	285	0.0	.06	16.74	16.80	64.606	R	50	83	119	320	299	2.0	.3
7	584	107.9	.76	34.02	34.78	7.815	.424	50	83	122	630	610	5.6	1.1
8	675	140.8	1.00	39.53	40.53	6.592	.426	50	86	128	692	697	6.8	1.4
9	755	173.6	1.26	44.83	46.09	5.044	.434	50	83	130	750	782	8.7	1.8
10	835	209.2	1.57	50.16	51.73	4.896	.449	50	87	138	850	902	9.3	2.2
11	285	0.0	.06	16.75	16.81	60.154	R	50	87	130	370	350	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	44	48	139	14	153	1.05	19.0	R	R	R	2.61	5.64	29.78
2	1.0	48	59	259	15	274	2.06	18.5	.66	1.61	12.32	1.26	3.08	23.50
3	1.0	56	82	347	20	367	2.80	17.8	.49	1.44	13.60	1.07	3.13	23.01
4	1.0	64	70	502	5	507	3.44	17.0	.41	.88	10.50	.94	2.05	24.91
5	2.0	76	58	704	15	719	3.49	16.4	.39	.60	12.16	.92	1.90	28.50
6	1.0	64	48	133	12	145	1.00	19.7	R	R	R	4.17	6.19	30.99
7	1.5	92	80	902	15	916	4.86	15.5	.39	.68	12.76	.92	1.60	30.06
8	1.5	104	159	933	14	948	5.22	14.7	.40	1.21	12.41	.93	2.03	29.11
9	2.0	128	455	948	29	977	5.51	14.4	.45	3.18	11.71	1.03	7.31	25.81
10	3.5	156	1354	985	14	999	6.13	13.9	.51	8.80	10.68	1.13	19.59	23.76
11	1.0	88	36	145	6	151	1.00	19.4	R	R	R	5.43	9.39	30.51

CYCLE COMPOSITE
BSHC = 1.695 GRAM/BHP HR
BSCO = 2.712 GRAM/BHP HR
BSNO2 = 20.934 GRAM/BHP HR
BSHC + BSNO2 = 22.628 GRAM/BHP HR
BSFC = .759 LB/BHP HR

TABLE B-64. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 3-1-73 TEST NO. 2 W/ 50 PERCENT WATER
INJECTORS: LOW-SAC TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	WATER INDUCT. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	286	0.0	.06	15.81	15.87	58.531	R	50	82	115	215	205	1.8	.2
2	285	16.9	.14	15.82	15.97	23.912	.509	50	82	114	270	270	1.8	.2
3	344	23.2	.20	18.12	18.32	19.157	.517	50	81	118	328	310	2.9	.4
4	429	48.0	.36	22.34	22.69	12.673	.430	50	82	120	440	410	4.0	.6
5	515	77.1	.55	29.82	30.37	10.750	.425	50	82	120	535	490	4.9	.9
6	285	0.0	.06	16.70	16.84	60.319	R	50	82	110	250	230	1.9	.3
7	584	108.4	.76	39.20	39.96	8.397	.421	50	82	122	675	600	5.2	1.1
8	675	139.5	1.00	39.79	40.79	7.108	.432	50	85	125	680	690	6.8	1.4
9	755	172.6	1.26	45.10	46.36	6.108	.438	50	88	132	760	799	8.4	1.8
10	835	206.4	1.56	49.32	50.88	5.106	.454	50	88	136	872	890	9.9	2.2
11	285	0.0	.06	16.11	16.17	61.912	R	50	88	120	352	330	2.8	.3

* EXCESS O2 IN EXHAUST **PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.8	48	48	140	6	146	1.08	20.8	R	R	R	2.37	5.52	27.05
2	1.0	49	71	256	15	271	2.21	19.4	.55	1.76	11.06	1.00	3.45	21.71
3	1.0	52	59	279	15	294	2.58	18.9	.54	1.22	10.02	1.05	2.36	19.48
4	1.0	64	46	510	19	529	3.62	18.0	.39	.57	10.62	.90	[illegible]	24.23
5	2.0	72	35	681	14	695	3.81	17.5	.37	.36	11.03	.80	.84	27.01
6	1.0	60	29	128	18	146	1.00	20.5	R	R	R	3.51	2.70	28.00
7	2.0	80	57	905	29	934	4.06	16.5	.37	.49	13.01	.84	1.16	30.93
8	2.0	108	160	914	57	971	5.28	16.0	.34	1.23	12.27	.84	2.04	28.42
9	3.0	120	442	944	8	999	5.66	15.2	.45	3.47	11.53	1.04	7.43	26.33
10	3.5	152	1260	930	28	958	6.13	14.4	.44	8.22	10.20	1.44	10.04	22.44
11	1.5	88	36	129	2	131	.98	20.6	R	R	R	5.82	4.22	25.48

CYCLE COMPOSITE
BSHC = 1.615 GRAM/BHP HR
BSCO = 2.268 GRAM/BHP HR
BSNO2 = 20.083 GRAM/BHP HR
BSHC + BSNO2 = 21.699 GRAM/BHP HR
BSFC = .777 LB/BHP HR

TABLE B-65. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 1 W/ 75 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.71	15.77	59.566	R	75	70	103	200	195	1.8	.3
2	285	15.7	.19	15.71	15.85	29.121	.523	75	70	100	252	252	1.9	.3
3	399	23.9	.20	17.72	17.93	17.950	.510	75	70	102	308	300	3.3	.5
4	429	99.3	.36	22.22	22.57	12.186	.434	75	70	103	411	378	4.6	.6
5	515	77.1	.59	29.01	29.55	9.990	.423	75	70	99	505	460	5.2	1.0
6	285	0.0	.06	15.71	15.77	59.015	R	75	70	92	282	260	2.1	.3
7	589	110.6	.76	33.16	33.92	7.671	.419	75	70	97	505	560	5.9	1.2
8	675	140.9	1.00	39.63	40.63	6.799	.426	75	70	99	650	655	7.3	1.5
9	755	176.0	1.26	43.59	44.86	5.658	.431	75	70	102	730	762	8.7	1.8
10	835	212.0	1.57	48.69	50.26	4.747	.444	75	71	108	812	880	6.2	2.2
11	285	0.0	.05	16.06	16.12	69.535	R	75	70	99	295	275	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	56	98	199	19	167	1.09	19.8	R	R	R	3.07	5.20	28.22
2	1.0	56	54	237	17	259	2.06	18.8	.75	1.57	11.09	1.93	3.00	21.22
3	1.0	64	47	281	11	292	2.37	18.4	.63	.93	9.96	1.29	1.81	18.59
4	1.0	68	46	445	17	512	3.20	17.9	.91	.56	10.11	.95	1.29	23.32
5	2.0	89	35	675	22	697	3.68	16.6	.92	.35	11.59	1.01	.83	27.29
6	1.0	69	36	137	11	148	.96	19.6	R	R	R	3.51	3.90	26.58
7	2.0	96	69	921	16	938	4.59	15.6	.39	.55	12.92	.99	1.39	30.00
8	2.5	112	198	950	16	966	4.93	15.0	.43	1.12	12.03	1.00	2.69	28.26
9	2.5	152	406	991	16	1007	5.51	14.4	.51	2.72	11.08	1.19	6.32	25.79
10	5.0	168	1309	989	0	989	6.13	13.9	.53	8.16	10.08	1.18	18.37	22.68
11	1.0	88	98	149	7	159	1.00	19.3	R	R	R	5.85	6.32	33.59

CYCLE COMPOSITE BSHC = 1.780 GRAM/BHP HR
BSCO = 2.992 GRAM/BHP HR
BSNO2 = 20.267 GRAM/BHP HR
BSHC + BSNO2 = 22.047 GRAM/BHP HR
BSFC = .770 LB/BHP HR

TABLE B-66. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 2 W/ 75 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.64	15.70	56.879	R	75	75	113	280	280	1.9	.2
2	285	16.9	.19	15.67	15.81	22.705	.509	75	73	100	270	272	1.9	.3
3	399	25.1	.20	17.66	17.86	17.790	.487	75	74	102	315	312	3.1	.4
4	429	99.3	.36	22.91	22.27	12.187	.438	75	73	105	430	402	4.3	.6
5	515	76.7	.59	29.15	29.69	10.038	.425	75	72	102	520	480	4.9	.9
6	285	0.0	.06	15.68	15.75	59.198	R	75	72	98	290	270	2.8	.3
7	589	106.8	.76	33.18	33.87	7.805	.432	75	72	105	600	590	6.3	1.1
8	675	140.6	1.00	39.60	40.60	6.762	.428	75	71	108	665	672	6.9	1.4
9	755	175.1	1.26	43.52	44.78	5.687	.433	75	72	102	745	787	8.3	1.8
10	835	210.9	1.56	48.42	49.99	4.847	.445	75	72	109	822	889	6.8	2.1
11	285	0.0	.06	15.68	15.74	59.939	R	75	72	99	280	260	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	89	98	198	17	169	1.19	19.3	R	R	R	4.89	5.96	30.99
2	1.5	96	59	259	12	268	2.21	18.6	1.19	1.95	10.79	2.33	2.85	21.87
3	1.5	109	78	293	23	317	2.69	18.3	.98	1.32	9.76	2.01	2.71	20.09
4	1.5	116	68	523	12	535	3.58	17.3	.71	.70	10.66	1.61	1.61	24.36
5	2.0	136	46	700	17	717	3.93	16.6	.69	.47	11.99	1.69	1.11	28.21
6	1.0	109	36	139	12	151	1.00	19.7	R	R	R	5.69	3.89	27.69
7	2.0	128	96	877	17	894	4.79	15.9	.69	.98	12.33	1.26	.89	28.55
8	2.0	148	125	958	17	975	5.29	15.1	.86	.95	12.16	1.38	2.22	29.91
9	2.0	189	279	967	17	984	5.79	14.5	.62	3.82	10.08	1.43	7.99	25.18
10	4.5	232	1323	978	17	994	6.29	13.7	.73	8.24	10.18	1.63	18.54	22.89
11	1.5	116	29	186	5	191	1.00	19.6	R	R	R	7.09	2.98	29.19

CYCLE COMPOSITE BSHC = 2.611 GRAM/BHP HR
BSCO = 3.179 GRAM/BHP HR
BSNO2 = 20.153 GRAM/BHP HR
BSHC + BSNO2 = 22.764 GRAM/BHP HR
BSFC = .796 LB/BHP HR

TABLE B-67. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 1 W/ 100 PERCENT WATER
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
----	------	-----	------	------	-------	-----	--------	--------	-----	---	-------	-------	-----	------
1	285	0.0	.06	15.68	15.74	60.549	R	100	72	99	213	200	1.8	.2
2	285	17.3	.19	15.67	15.81	24.992	.973	100	73	99	272	270	1.9	.3
3	399	29.9	.20	17.69	17.90	18.212	.500	100	72	100	320	312	3.0	.5
4	424	49.9	.36	22.68	23.04	12.720	.929	100	72	101	429	395	4.3	.6
5	515	77.1	.59	29.15	29.69	10.341	.923	100	72	99	525	480	5.9	.8
6	285	0.0	.06	15.68	15.74	59.520	R	100	72	93	219	203	2.0	.3
7	569	109.8	.77	32.76	33.53	7.936	.919	100	72	92	609	585	5.5	1.1
8	675	149.3	1.00	39.32	40.32	6.870	.916	100	71	99	675	680	6.7	1.4
9	755	179.2	1.26	43.52	44.78	5.849	.923	100	72	100	750	789	8.1	1.7
10	835	211.7	1.56	48.47	50.03	4.922	.993	100	71	101	832	901	9.8	2.1
11	285	0.0	.05	15.70	15.75	69.703	R	100	71	95	910	900	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
----	--------	----	----	----	----	----	-----	-----	--------	--------	--------	-------	-------	-------
1	1.0	72	71	192	13	156	1.00	19.7	R	R	R	9.90	8.70	31.19
2	1.5	76	71	257	12	269	2.16	19.1	.92	1.70	10.59	1.93	3.59	22.38
3	1.5	94	70	297	24	321	2.69	18.7	.81	1.36	10.15	1.63	2.71	20.33
4	1.5	92	81	506	12	518	3.38	17.8	.56	.99	10.34	1.31	2.30	24.09
5	3.0	109	69	719	23	737	3.95	17.1	.53	.70	12.27	1.25	1.66	24.09
6	1.0	84	71	138	14	152	1.00	20.5	R	R	R	9.85	8.22	28.72
7	2.0	116	92	939	17	956	4.79	16.4	.47	.79	12.62	1.12	1.75	30.11
8	2.0	136	172	987	17	1004	5.36	15.9	.50	1.26	12.12	1.21	3.09	29.19
9	2.0	176	590	996	35	1031	5.74	15.9	.58	3.55	11.13	1.37	8.39	26.31
10	9.5	229	1581	955	17	972	6.29	13.9	.70	9.83	9.93	1.58	22.18	22.91
11	1.0	112	83	138	4	141	1.00	20.0	R	R	R	7.76	11.62	32.05

CYCLE COMPOSITE	BSHC	= 2.221	GRAM/BHP HR
	BSCO	= 3.806	GRAM/BHP HR
	BSNO2	= 19.993	GRAM/BHP HR
	BSHC + BSNO2	= 22.165	GRAM/BHP HR
	BSFC	= .727	LB/BHP HR

TABLE B-68. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 2 W/ 100 PERCENT WATER
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
----	------	-----	------	------	-------	-----	--------	--------	-----	---	-------	-------	-----	------
1	285	0.0	.06	15.68	15.74	59.319	R	100	72	100	213	200	1.6	.2
2	285	17.5	.19	16.01	16.15	23.863	.988	100	74	100	270	265	1.9	.2
3	399	29.6	.21	17.69	17.85	17.681	.509	100	75	102	328	319	2.9	.4
4	424	50.7	.36	22.64	22.99	12.890	.922	100	74	104	430	402	4.1	.5
5	515	77.6	.59	29.31	29.86	10.215	.919	100	73	99	524	485	5.8	.7
6	285	0.0	.05	15.66	15.70	70.550	R	100	74	98	320	275	1.9	.3
7	569	110.8	.76	32.67	33.43	7.803	.913	100	75	95	615	595	5.5	1.1
8	675	149.3	1.00	39.53	40.52	6.838	.919	100	73	98	685	696	6.6	1.4
9	755	179.5	1.27	43.70	44.96	5.695	.923	100	74	100	765	785	7.9	1.7
10	835	211.7	1.56	48.92	49.99	4.812	.993	100	72	101	845	918	9.6	2.1
11	285	0.0	.09	16.02	16.06	87.525	R	100	73	99	382	370	1.7	.8

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
----	--------	----	----	----	----	----	-----	-----	--------	--------	--------	-------	-------	-------
1	1.0	78	60	145	14	159	1.00	19.3	R	R	R	9.98	7.85	31.06
2	1.0	76	83	239	8	249	2.21	18.7	.92	2.00	10.96	1.93	4.17	21.82
3	1.5	84	78	291	18	309	2.75	18.5	.88	1.34	9.67	1.68	2.66	19.20
4	1.5	88	96	529	6	535	3.62	18.0	.59	.55	10.34	1.25	1.31	24.54
5	2.5	100	96	702	23	726	4.06	16.8	.51	.47	12.09	1.21	1.11	25.78
6	1.0	88	98	138	15	153	1.00	20.3	R	R	R	8.88	6.89	30.78
7	2.0	112	92	939	8	939	4.93	16.1	.45	.73	12.84	1.08	1.76	29.61
8	2.5	128	195	958	17	978	5.44	15.2	.47	1.44	11.77	1.14	3.47	28.39
9	2.5	160	869	979	17	996	5.89	14.5	.53	3.72	10.78	1.25	8.78	25.47
10	9.5	208	1611	938	17	955	6.35	13.6	.62	10.08	9.35	1.41	22.58	21.49
11	1.0	104	68	130	8	138	1.00	19.7	R	R	R	9.19	10.51	48.38

CYCLE COMPOSITE	BSHC	= 2.177	GRAM/BHP HR
	BSCO	= 3.896	GRAM/BHP HR
	BSNO2	= 19.884	GRAM/BHP HR
	BSHC + BSNO2	= 22.061	GRAM/BHP HR
	BSFC	= .698	LB/BHP HR

TABLE B-69. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-07-72 TEST NO. 1 W/ 25 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	[illegible]	.07	15.59	15.66	.005	R	25	82	118	292	232	1.6	.3
2	285	19.2	.19	15.69	15.78	.009	.576	25	78	110	295	251	1.7	.3
3	344	34.1	.21	16.97	17.17	.012	.510	25	75	110	339	291	2.6	.4
4	429	67.5	.36	21.05	21.41	.017	.450	25	74	113	431	417	3.7	.6
5	515	94.8	.59	27.40	27.99	.020	.433	25	75	111	532	510	4.3	.8
6	285	0.0	.07	15.63	15.70	.004	R	25	76	105	310	290	1.8	.3
7	534	95.6	.76	31.52	32.28	.024	.475	25	75	111	630	620	4.4	1.0
8	635	140.7	1.00	37.30	38.30	.027	.426	25	78	112	708	721	6.0	1.3
9	755	172.5	1.26	42.21	43.47	.030	.438	25	79	120	805	845	7.2	1.6
10	835	200.6	1.56	47.23	48.79	.033	.466	25	80	131	909	979	8.6	1.9
11	285	0.0	.07	15.56	15.62	.004	R	25	81	118	390	380	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	112	98	114	20	134	1.14	.143	R	R	R	5.26	4.45	20.65
2	1.5	109	67	191	15	206	2.16	.030	1.52	1.37	9.87	2.64	2.34	17.15
3	1.0	112	70	238	14	252	2.80	.030	1.10	1.37	8.08	2.15	2.64	15.83
4	1.0	128	58	387	18	415	3.44	.030	.76	.64	8.08	1.64	1.53	17.44
5	1.0	152	46	527	18	546	4.38	.030	.75	.45	8.80	1.73	1.05	20.33
6	.5	124	48	114	20	134	1.04	.143	R	R	R	6.32	4.68	21.64
7	1.0	168	41	718	5	723	5.22	.030	.75	.81	10.54	1.58	1.71	22.14
8	1.0	208	269	786	27	813	5.81	.030	.75	1.84	9.56	1.75	4.43	22.42
9	2.0	256	714	821	13	835	6.45	.030	.85	4.73	9.09	1.94	10.74	20.73
10	4.5	264	1472	803	0	803	7.04	.280	.85	12.61	8.93	1.82	27.09	18.11
11	1.0	124	98	120	6	133	1.04	.143	R	R	R	6.60	4.84	22.52

CYCLE COMPOSITE BSHC = .988 GRAM/BHP HR
BSCO = 10.314 GRAM/BHP HR
BSNO2 = 9.168 GRAM/BHP HR
BSHC + BSNO2 = 10.156 GRAM/BHP HR
BSFC = .486 LB/BHP HR

TABLE B-70. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-07-72 TEST NO. 2 W/ 25 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.62	15.69	.004	R	25	82	118	292	232	1.6	.3
2	285	19.9	.19	15.62	15.76	.009	.569	25	78	110	295	251	1.7	.3
3	344	33.9	.20	16.99	17.19	.012	.512	25	75	110	339	291	2.6	.4
4	429	66.1	.35	21.25	21.60	.017	.491	25	74	113	431	417	3.7	.6
5	515	94.2	.59	27.37	27.91	.020	.428	25	75	111	532	510	4.3	.8
6	285	0.0	.07	15.62	15.69	.004	R	25	76	105	310	290	1.8	.3
7	534	100.6	.77	31.49	32.25	.024	.457	25	75	111	630	620	4.0	1.0
8	635	140.9	1.00	37.12	38.12	.027	.426	25	78	112	708	721	6.0	1.3
9	755	170.1	1.26	41.92	43.18	.030	.443	25	79	120	805	845	7.2	1.6
10	835	207.9	1.65	46.32	47.97	.039	.444	25	80	131	909	979	8.6	1.9
11	285	0.0	.07	15.51	15.58	.004	[illegible]	25	81	118	390	380	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	98	123	17	140	1.09	.143	R	R	R	4.14	4.91	23.95
2	1.5	88	71	205	13	218	2.16	.030	1.27	2.83	10.31	2.23	3.58	18.12
3	1.0	96	73	264	28	292	2.80	.030	.93	1.36	8.62	1.81	2.66	16.05
4	1.0	120	58	483	14	497	3.44	.030	.71	.68	8.97	1.61	1.55	19.23
5	1.0	128	46	572	9	582	4.54	.030	.62	.44	9.28	1.46	1.04	21.52
6	1.0	80	98	115	19	134	1.09	.143	R	R	R	4.14	4.91	22.78
7	1.2	152	41	718	18	736	5.36	.030	.64	.77	10.20	1.41	1.68	22.30
8	1.5	176	253	778	14	792	5.84	.030	.63	1.80	9.25	1.48	4.22	21.72
9	3.0	240	868	888	14	902	6.96	.030	.68	5.79	8.98	1.81	13.87	20.13
10	4.5	248	1434	887	0	887	7.12	.280	.76	11.77	9.05	1.68	26.14	17.41
11	1.0	120	91	127	5	132	1.09	.143	R	R	R	6.17	7.31	22.13

CYCLE COMPOSITE BSHC = .857 GRAM/BHP HR
BSCO = 9.784 GRAM/BHP HR
BSNO2 = 8.896 GRAM/BHP HR
BSHC + BSNO2 = 9.753 GRAM/BHP HR
BSFC = .471 LB/BHP HR

TABLE B-71. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-07-72 TEST NO. 3 W/ 25 PERCENT WATER
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: GF LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.58	15.65	.004	R	25	79	110	235	221	1.6	.3
2	285	14.9	.14	15.58	15.72	.009	.550	25	78	109	306	259	1.7	.3
3	344	23.6	.19	17.10	17.10	.011	.483	25	78	111	345	295	2.5	.4
4	424	44.3	.36	20.98	21.33	.017	.434	25	80	118	441	420	3.6	.5
5	515	77.1	.54	27.32	27.86	.020	.420	25	79	115	552	530	4.2	.8
6	285	0.0	.07	15.58	15.65	.004	R	25	79	110	331	310	1.7	.3
7	584	107.9	.77	31.46	32.23	.024	.426	25	78	115	659	641	4.9	1.0
8	675	142.1	1.01	37.16	38.17	.027	.425	25	79	121	730	748	5.8	1.3
9	755	175.5	1.26	41.97	43.23	.030	.430	25	80	125	812	850	7.1	1.6
10	835	209.9	1.58	46.29	47.86	.034	.451	25	2	135	920	945	8.5	1.9
11	285	0.0	.06	15.50	15.56	.004	R	25	18	125	350	340	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	48	127	20	147	1.05	.193	R	R	R	9.55	9.90	24.88
2	1.5	88	71	213	15	228	2.06	.030	1.22	1.96	10.37	2.23	3.57	18.88
3	1.0	96	70	257	25	282	2.69	.030	.92	1.39	8.83	1.90	2.78	18.29
4	1.0	112	58	443	10	453	3.87	.030	.69	.66	8.96	1.47	1.52	19.61
5	1.5	128	58	619	5	624	4.32	.030	.61	.55	9.74	1.45	1.30	23.18
6	1.0	88	48	120	12	132	1.05	.193	R	R	R	9.55	9.90	22.29
7	1.5	152	103	775	5	780	4.93	.030	.60	.81	10.06	1.41	1.84	23.60
8	1.5	184	208	870	29	907	5.66	.030	.65	2.03	10.52	1.53	4.78	24.75
9	2.5	240	829	887	0	887	6.05	.030	.78	5.37	9.93	1.82	12.50	21.46
10	5.0	248	2157	843	0	843	6.70	.280	.75	12.94	8.80	1.66	28.71	19.53
11	1.2	112	48	141	6	147	1.00	.193	R	R	R	6.76	5.73	29.13

CYCLE COMPOSITE BSHC = .847 GRAM/BHP HR
BSCO = 10.623 GRAM/BHP HR
BSNO2 = 9.565 GRAM/BHP HR
BSHC + BSNO2 = 10.411 GRAM/BHP HR
BSFC = .448 LB/BHP HR

TABLE B-72. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-08-72 TEST NO. 1 W/ 50 PERCENT WATER
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: GF LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.75	15.81	.004	R	50	72	120	251	241	1.6	.3
2	285	15.7	.13	15.63	15.77	.009	.510	50	70	115	305	268	1.6	.3
3	344	23.9	.20	17.00	17.20	.012	.502	50	72	118	361	309	2.7	.5
4	424	44.5	.36	21.12	21.48	.017	.432	50	72	118	448	423	4.0	.6
5	515	77.8	.54	27.03	27.57	.020	.414	50	72	110	550	519	4.6	.9
6	285	0.0	.06	15.62	15.68	.004	R	50	71	109	295	275	1.7	.3
7	584	109.8	.76	31.62	32.38	.024	.414	50	72	106	650	632	5.2	1.1
8	675	144.5	1.00	37.28	38.28	.027	.415	50	73	108	718	731	6.2	1.4
9	755	178.6	1.25	42.57	43.82	.029	.427	50	73	112	799	840	7.3	1.6
10	835	210.5	1.56	46.29	47.85	.034	.444	50	73	121	901	971	8.8	2.0
11	285	0.0	.06	15.63	15.69	.004	R	50	75	109	348	342	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	80	29	125	10	135	1.05	.193	R	R	R	9.65	2.75	25.59
2	1.0	112	71	223	17	241	2.21	.030	1.99	1.87	10.99	2.94	3.67	20.98
3	1.0	104	70	259	19	279	2.80	.030	.99	1.33	8.50	1.97	2.65	16.93
4	.5	112	46	908	19	923	3.74	.030	.69	.63	7.92	1.98	1.22	18.38
5	1.0	120	46	557	9	566	4.25	.030	.60	.43	8.67	1.93	1.02	20.68
6	.5	96	36	120	9	129	1.09	.193	R	R	R	8.23	3.08	22.99
7	1.0	160	103	702	0	702	5.07	.030	.62	.80	8.99	1.81	1.93	21.62
8	1.0	184	253	781	14	795	5.59	.030	.64	1.76	9.18	1.85	4.24	21.92
9	2.0	240	741	819	0	819	6.13	.030	.79	5.19	8.82	1.85	12.15	20.67
10	4.5	272	2832	811	14	825	6.70	.280	.82	12.15	8.18	1.89	27.38	18.26
11	1.0	128	29	126	5	131	1.05	.193	R	R	R	7.00	2.09	26.07

CYCLE COMPOSITE BSHC = .909 GRAM/BHP HR
BSCO = 9.928 GRAM/BHP HR
BSNO2 = 8.773 GRAM/BHP HR
BSHC + BSNO2 = 9.683 GRAM/BHP HR
BSFC = .960 LB/BHP HR

TABLE B-73. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 2 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.61	15.67	.004	R	50	70	105	230	215	1.4	.3
2	285	16.5	.14	15.73	15.87	.009	.948	50	70	112	305	255	1.7	.3
3	394	25.1	.19	17.13	17.32	.011	.954	50	70	106	334	291	2.7	.4
4	482	44.9	.36	21.43	21.79	.017	.929	50	70	108	431	409	3.4	.6
5	515	77.8	.59	27.19	27.79	.020	.919	50	70	102	590	510	4.7	.9
6	285	0.0	.07	15.61	15.68	.004	R	50	70	99	292	273	1.8	.3
7	584	110.0	.77	31.64	32.40	.024	.918	50	70	101	635	628	5.2	1.1
8	675	144.6	1.00	37.62	38.62	.027	.915	50	70	105	710	728	6.2	1.4
9	755	178.4	1.26	92.36	93.62	.030	.929	50	70	110	800	838	7.4	1.7
10	835	211.3	1.56	96.14	97.70	.034	.992	50	75	120	890	962	8.9	2.0
11	285	0.0	.06	15.58	15.64	.004	R	50	77	108	908	900	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	.5	80	71	106	17	124	1.09	.193	R	R	R	9.87	8.66	29.63
2	1.0	104	94	187	15	202	2.21	.030	1.32	2.39	8.91	2.66	4.80	16.90
3	1.0	96	99	217	9	227	2.58	.030	.87	1.70	6.76	1.93	3.75	14.38
4	1.0	104	81	364	14	378	3.68	.030	.60	.93	7.14	1.90	2.17	16.69
5	1.0	120	92	982	9	992	4.12	.030	.60	.86	7.57	1.99	2.06	18.07
6	.5	80	95	105	18	124	1.09	.193	R	R	R	9.19	9.61	20.93
7	1.0	144	148	653	9	662	5.00	.030	.56	1.15	8.92	1.39	2.75	20.19
8	1.0	168	276	741	0	741	5.51	.030	.59	1.94	8.55	1.93	4.68	20.60
9	2.5	224	921	791	0	791	6.13	.030	.72	5.92	8.35	1.71	14.97	19.70
10	5.0	290	2127	784	0	784	6.70	.280	.72	12.63	7.65	1.62	28.57	17.29
11	1.0	96	95	123	9	127	1.05	.193	R	R	R	9.82	11.53	25.16

CYCLE COMPOSITE
BSHC = .800 GRAM/BHP HR
BSCO = 10.520 GRAM/BHP HR
BSNO2 = 8.231 GRAM/BHP HR
BSHC + BSNO2 = 9.032 GRAM/BHP HR
BSFC = .958 LB/BHP HR

TABLE B-74. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 3 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.59	15.65	.004	R	50	79	118	836	228	1.6	.3
2	285	15.7	.13	15.59	15.72	.009	.810	50	79	118	310	260	1.6	.3
3	394	26.8	.20	16.91	17.11	.012	.997	50	79	112	399	307	2.7	.4
4	484	50.7	.35	20.94	21.29	.017	.914	50	79	115	498	426	3.7	.6
5	515	77.8	.54	26.95	27.49	.020	.914	50	79	121	547	520	4.5	.8
6	285	0.0	.06	15.59	15.65	.004	R	50	80	109	298	270	1.8	.3
7	584	109.8	.76	31.47	32.23	.024	.914	50	79	110	696	635	5.1	1.0
8	675	142.8	1.01	37.10	38.11	.027	.923	50	80	111	718	732	6.9	1.3
9	755	177.9	1.27	91.90	93.17	.030	.928	50	82	118	808	859	7.3	1.6
10	835	208.8	1.57	95.79	97.30	.034	.950	50	80	125	902	979	8.7	1.9
11	285	0.0	.05	15.47	15.53	.003	R	50	80	113	385	370	1.4	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	98	128	12	131	1.08	.193	R	R	R	9.35	8.16	23.96
2	1.5	88	71	210	9	219	2.06	.030	1.06	1.86	9.47	2.88	3.66	18.87
3	1.0	88	82	299	14	263	2.69	.030	.79	1.98	7.25	1.66	3.88	16.82
4	1.0	96	70	982	5	926	3.68	.030	.63	.97	7.79	1.88	1.86	18.68
5	1.0	112	69	527	5	591	3.99	.030	.62	.64	8.26	1.86	1.55	19.96
6	1.0	88	60	114	15	128	1.08	.193	R	R	R	8.85	6.81	20.11
7	1.5	152	126	700	9	709	4.93	.030	.69	.97	9.08	1.92	2.35	21.75
8	1.0	184	208	761	28	779	5.36	.030	.65	2.02	8.98	1.63	4.77	21.23
9	3.0	224	816	779	0	779	5.81	.030	.72	5.02	8.13	1.68	12.18	19.99
10	6.0	248	2184	767	0	767	6.45	.280	.79	12.57	7.51	1.65	27.91	16.68
11	1.5	96	60	129	0	130	1.08	.193	R	R	R	6.16	7.60	27.98

CYCLE COMPOSITE
BSHC = .821 GRAM/BHP HR
BSCO = 10.312 GRAM/BHP HR
BSNO2 = 8.227 GRAM/BHP HR
BSHC + BSNO2 = 9.048 GRAM/BHP HR
BSFC = .964 LB/BHP HR

TABLE B-75. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 1 W/ 75 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.65	15.71	.004	R	75	71	100	245	230	1.6	.3
2	285	17.5	.19	15.68	15.82	.009	.980	75	70	100	300	259	1.6	.3
3	399	26.2	.20	17.01	17.21	.012	.958	75	70	101	350	302	2.7	.4
4	494	44.4	.35	21.01	21.36	.017	.925	75	71	105	434	412	3.4	.6
5	515	78.4	.55	27.16	27.70	.020	.916	75	71	100	542	512	4.6	.9
6	285	0.0	.06	15.62	15.68	.004	R	75	71	98	325	290	1.7	.3
7	584	110.0	.76	31.51	32.27	.024	.915	75	70	100	635	625	5.1	1.1
8	675	144.6	1.00	37.52	38.52	.027	.915	75	71	101	709	720	6.2	1.3
9	755	179.7	1.27	41.61	42.88	.030	.923	75	71	106	792	831	7.4	1.7
10	835	209.2	1.55	46.32	47.87	.033	.995	75	76	112	882	960	8.8	1.9
11	285	0.0	.05	15.71	15.76	.003	R	75	77	103	908	900	1.6	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	95	112	13	126	1.09	.193	R	R	R	9.61	10.93	23.68
2	1.5	72	106	191	17	208	2.21	.030	.86	2.52	8.11	1.79	5.25	16.91
3	1.0	80	117	241	14	255	2.75	.030	.69	2.02	7.23	1.51	4.42	15.79
4	1.0	80	93	373	9	383	3.68	.030	.95	1.04	7.08	1.06	2.46	16.66
5	1.0	96	104	515	195	710	4.12	.030	.95	.96	10.82	1.08	2.32	26.05
6	.5	64	95	112	15	127	1.09	.193	R	R	R	9.99	10.39	22.56
7	1.0	112	160	680	15	694	5.00	.030	.93	1.23	8.80	1.05	2.48	21.22
8	1.5	144	329	713	27	741	5.51	.030	.51	3.27	8.53	1.22	4.97	20.55
9	2.5	192	933	708	54	762	6.05	.030	.60	5.85	7.86	1.93	13.84	18.58
10	5.5	216	2112	676	0	676	6.61	.200	.65	12.71	6.68	1.47	28.60	15.09
11	1.0	64	107	115	5	120	1.05	.193	R	R	R	9.16	13.90	25.52

CYCLE COMPOSITE BSHC = .703 GRAM/BHP HR
BSCO = 10.610 GRAM/BHP HR
BSNO2 = 7.582 GRAM/BHP HR
BSHC + BSNO2 = 8.286 GRAM/BHP HR
BSFC = .959 LB/BHP HR

TABLE B-76. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 2 W/ 75 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.71	15.77	.004	R	75	71	98	271	256	1.6	.3
2	285	16.5	.19	15.62	15.76	.009	.986	75	70	98	311	260	1.7	.3
3	399	29.4	.20	17.02	17.22	.012	.958	75	70	101	315	301	2.6	.4
4	494	50.2	.35	21.13	21.48	.017	.918	75	70	101	430	405	3.4	.6
5	515	78.4	.55	27.01	27.56	.020	.921	75	71	100	534	510	4.6	.9
6	285	0.0	.06	15.74	15.80	.004	R	75	72	98	320	300	1.7	.3
7	584	108.4	.76	31.66	32.42	.024	.921	75	70	101	640	632	5.2	1.1
8	675	144.6	1.00	37.46	38.46	.027	.915	75	71	101	708	725	6.3	1.3
9	765	179.7	1.26	41.66	42.92	.030	.920	75	70	108	802	844	7.4	1.7
10	835	210.4	1.57	46.50	48.07	.033	.996	75	74	102	898	962	8.9	2.0
11	285	0.0	.06	15.59	15.65	.004	R	75	74	105	925	920	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	95	126	12	138	1.09	.193	R	R	R	8.78	10.48	26.80
2	1.5	64	106	200	20	220	2.14	.030	.81	2.67	9.07	1.66	5.50	18.60
3	1.5	64	99	250	11	260	2.80	.030	.68	1.79	7.99	1.21	3.59	16.19
4	1.0	80	93	387	21	408	3.79	.030	.58	1.04	7.69	1.19	2.58	18.89
5	1.0	96	92	559	0	559	4.19	.030	.95	.85	8.91	1.06	2.02	20.83
6	.5	96	83	121	8	129	1.09	.193	R	R	R	8.67	9.62	24.96
7	1.0	136	160	666	21	688	5.07	.030	.85	1.86	8.88	1.28	2.99	21.12
8	1.5	176	329	767	32	799	6.51	.030	.62	2.87	9.87	1.99	5.96	21.89
9	3.0	216	933	783	0	783	6.13	.030	.60	5.86	8.88	1.62	13.97	19.25
10	5.5	240	2088	777	0	777	6.61	.200	.72	11.99	7.65	1.62	26.43	17.17
11	1.0	88	71	128	4	132	1.09	.193	R	R	R	5.35	8.65	25.32

CYCLE COMPOSITE BSHC = .762 GRAM/BHP HR
BSCO = 10.993 GRAM/BHP HR
BSNO2 = 8.. 99 GRAM/BHP HR
BSHC + BSNO2 = 9.111 GRAM/BHP HR
BSFC = .968 LB/BHP HR

TABLE B 77. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-08-72 TEST NO. 3 W/ 75 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.62	15.68	.004	R	75	72	100	275	260	1.6	.3
2	285	17.8	.13	15.64	15.81	.009	.449	75	70	100	329	279	1.7	.3
3	399	26.8	.20	16.48	17.18	.012	.447	75	70	102	372	312	2.6	.4
4	424	50.2	.36	21.26	21.61	.017	.426	75	70	101	440	412	3.9	.6
5	515	78.4	.55	27.00	27.55	.020	.421	75	73	101	540	512	4.7	.9
6	285	0.0	.06	15.76	15.83	.004	R	75	71	100	320	305	1.7	.3
7	584	110.6	.76	31.71	32.46	.024	.411	75	70	100	632	626	5.2	1.1
8	675	144.6	1.00	37.29	38.29	.027	.415	75	75	102	710	730	6.1	1.4
9	755	178.5	1.25	41.76	43.01	.030	.420	75	70	104	788	835	7.5	1.7
10	835	212.0	1.56	46.48	48.04	.034	.441	75	74	110	880	958	9.0	2.0
11	285	0.0	.06	15.74	15.79	.004	R	75	75	101	340	380	1.8	2.4

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	71	106	13	119	1.09	.193	R	R	R	5.06	8.18	22.99
2	1.5	80	71	184	6	190	2.26	.030	.99	1.65	7.28	2.09	3.68	16.22
3	1.0	96	99	216	23	239	2.80	.030	.81	1.68	6.62	1.81	3.63	14.81
4	1.0	96	93	344	5	346	3.62	.030	.55	1.05	6.98	1.20	2.96	15.20
5	1.0	112	115	975	14	989	4.12	.030	.52	1.06	7.92	1.23	2.53	17.63
6	1.0	80	96	99	7	106	1.09	.193	R	R	R	4.90	10.93	14.05
7	1.5	144	184	541	0	541	4.68	.030	.56	1.92	7.99	1.36	3.96	18.29
8	2.0	160	347	641	14	655	5.36	.030	.56	2.42	7.99	1.35	5.82	18.09
9	3.0	208	740	651	0	651	5.81	.030	.66	5.00	6.77	1.57	11.41	16.12
10	6.5	224	2001	696	0	696	6.45	.280	.67	11.93	6.32	1.52	27.01	19.32
11	1.5	64	131	103	6	109	1.05	.193	R	R	R	3.42	16.01	21.89

CYCLE COMPOSITE BSHC = .794 GRAM/BHP HR
BSCO = 4.976 GRAM/BHP HR
BSNO2 = 6.934 GRAM/BHP HR
BSHC + BSNO2 = 7.678 GRAM/BHP HR
BSFC = .456 LB/BHP HR

TABLE B-78. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-11-72 TEST NO. 2 W/ 10% PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.54	15.66	.004	R	100	73	97	281	210	1.6	.3
2	285	15.1	.14	15.59	15.73	.009	.599	100	72	98	300	260	1.7	.3
3	399	53.1	.20	18.21	18.41	.011	.510	100	72	100	335	291	2.8	.4
4	424	96.0	.36	22.51	22.86	.016	.465	100	72	92	430	407	4.0	.6
5	515	73.6	.54	29.68	30.22	.018	.493	100	75	91	530	500	4.6	.9
6	285	0.0	.06	16.29	16.35	.004	R	100	75	89	310	290	1.8	.3
7	594	103.8	.76	34.33	35.08	.022	.437	100	76	91	631	621	5.2	1.1
8	675	136.4	1.01	40.37	41.38	.025	.443	100	78	90	710	725	6.2	1.4
9	755	170.6	1.27	45.03	46.30	.028	.445	100	79	79	790	830	7.5	1.7
10	835	205.7	1.57	49.06	50.63	.032	.457	100	82	100	870	955	9.0	2.0
11	285	0.0	.06	15.51	15.56	.004	R	100	84	90	340	380	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	98	116	6	122	1.14	.193	R	R	R	3.92	5.16	21.75
2	1.5	64	71	203	13	216	2.26	.030	.88	1.94	9.79	1.62	3.57	17.92
3	1.0	80	78	230	19	249	2.64	.030	.84	1.97	8.29	1.65	3.89	16.99
4	1.0	96	96	308	4	312	3.60	.030	.63	.61	8.54	1.35	3.31	18.36
5	1.0	128	96	509	5	513	4.14	.030	.64	.58	9.11	1.47	3.13	20.57
6	1.0	80	48	11-	15	128	1.09	.193	R	R	R	4.54	5.39	23.01
7	1.5	136	183	602	5	607	5.00	.030	.61	.42	10.03	1.39	2.18	22.99
8	2.0	176	381	767	14	781	5.66	.030	.78	2.98	10.23	1.59	5.93	23.18
9	3.0	216	858	761	14	775	6.13	.030	.77	6.12	9.89	1.74	13.74	20.48
10	6.5	256	2135	719	0	719	6.78	.280	.83	13.83	7.69	1.88	30.85	18.62
11	1.5	104	98	122	9	131	1.09	.193	R	R	R	4.28	5.79	25.92

CYCLE COMPOSITE BSHC = .905 GRAM/BHP HR
BSCO = 11.921 GRAM/BHP HR
BSNO2 = 8.526 GRAM/BHP HR
BSHC + BSNO2 = 9.432 GRAM/BHP HR
BSFC = .496 LB/BHP HR

TABLE B-79. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-11-72 TEST NO. 3 W/ 100 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.57	15.64	.004	R	100	79	99	221	210	1.7	.3
2	285	15.0	.19	16.72	16.06	.009	.560	100	79	99	241	250	1.8	.3
3	344	23.2	.20	18.17	18.37	.011	.508	100	78	100	340	299	2.8	.4
4	424	46.4	.35	22.96	23.31	.015	.453	100	79	102	429	402	4.0	.6
5	515	73.4	.54	29.62	30.16	.018	.444	100	79	101	531	502	4.8	.9
6	285	0.0	.07	16.27	16.33	.004	R	100	79	99	328	302	1.8	.3
7	584	102.6	.76	34.91	35.17	.022	.443	100	79	98	620	610	5.1	1.1
8	675	137.7	1.00	39.97	40.97	.025	.436	100	79	99	705	720	6.1	1.3
9	755	169.8	1.26	44.69	45.95	.028	.445	100	80	100	790	831	7.4	1.7
10	835	200.7	1.57	49.14	50.70	.032	.468	100	82	102	830	859	9.0	2.0
11	285	0.0	.06	15.50	15.56	.004	R	100	85	100	911	902	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	72	36	110	18	128	1.09	.193	R	R	R	3.72	3.67	21.60
2	1.5	72	35	186	12	197	2.16	.030	1.02	1.00	9.13	1.82	1.78	16.31
3	1.5	88	47	230	20	249	2.64	.030	.92	.98	8.52	1.81	1.92	16.77
4	1.5	96	47	368	10	378	3.62	.030	.64	.62	8.21	1.41	1.36	18.13
5	1.5	128	46	506	5	511	4.12	.030	.64	.60	9.06	1.56	1.13	20.90
6	1.0	80	36	107	16	123	1.09	.193	R	R	R	4.31	3.83	21.69
7	1.5	144	69	641	5	645	4.93	.030	.65	.62	9.56	1.97	1.90	21.59
8	2.0	176	265	648	19	712	5.59	.030	.69	2.07	9.16	1.59	9.76	21.02
9	3.0	216	793	722	0	722	5.97	.030	.77	5.69	8.99	1.73	12.67	18.95
10	4.0	248	2103	660	19	679	6.61	.280	.83	13.97	7.36	1.77	29.83	15.71
11	1.5	104	98	113	3	116	1.09	.193	R	R	R	5.93	5.91	21.68

CYCLE COMPOSITE BSHC = .907 GRAM/BHP HR
BSCO = 11.347 GRAM/BHP HR
BSNO2 = 8.208 GRAM/BHP HR
BSHC + BSNO2 = 9.115 GRAM/BHP HR
BSFC = .436 LB/BHP HR

TABLE B-80. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-11-72 TEST NO. 9 W/ 100 PERCENT WATER
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	15.53	15.60	.004	R	100	81	100	173	258	1.7	.3
2	285	14.9	.19	16.53	15.67	.009	.536	100	78	101	329	268	1.6	.3
3	344	22.8	.19	18.12	18.22	.011	.510	100	79	101	348	300	2.8	.4
4	424	46.4	.35	22.40	22.75	.016	.448	100	79	101	440	416	4.0	.6
5	515	73.8	.54	29.36	29.90	.019	.436	100	80	101	540	518	4.6	.9
6	285	0.0	.07	16.55	16.61	.004	R	100	80	100	271	252	1.8	.3
7	584	104.5	.77	34.16	34.93	.022	.440	100	80	100	638	625	5.1	1.1
8	675	137.7	1.01	39.70	40.71	.025	.440	100	80	100	711	730	6.1	1.3
9	755	169.8	1.26	44.37	45.64	.028	.443	100	81	100	799	836	7.4	1.6
10	835	200.3	1.57	48.52	50.09	.032	.460	100	83	102	901	960	8.9	2.0
11	285	0.0	.06	15.44	15.44	.004	R	100	86	100	920	918	1.7	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	88	48	113	10	123	1.09	.193	R	R	R	4.53	4.00	20.65
2	2.0	88	47	189	13	202	2.16	.030	1.11	1.30	9.19	2.07	2.43	17.05
3	1.5	96	70	221	15	236	2.58	.030	1.02	1.49	8.21	2.00	2.93	14.18
4	1.5	96	47	289	10	299	3.68	.030	.61	.59	8.06	1.37	1.32	18.68
5	1.5	184	58	513	0	513	4.12	.030	.55	.61	8.06	1.26	1.39	20.32
6	1.0	64	48	105	18	123	1.09	.193	R	R	R	3.30	4.09	20.67
7	1.5	112	103	602	10	641	5.00	.030	.64	.61	9.98	1.12	2.06	22.67
8	2.0	144	312	794	0	794	5.66	.030	.56	2.93	9.50	1.20	5.52	21.59
9	3.0	176	923	794	0	739	6.13	.030	.62	6.53	9.59	1.48	14.62	19.23
10	5.5	208	2230	715	6	705	6.61	.280	.67	14.98	7.97	1.44	31.25	16.23
11	2.0	88	48	117	3	120	1.09	.193	R	R	R	4.91	4.71	23.57

CYCLE COMPOSITE BSHC = .799 GRAM/BHP HR
BSCO = 11.849 GRAM/BHP HR
BSNO2 = 8.312 GRAM/BHP HR
BSHC + BSNO2 = 9.061 GRAM/BHP HR
BSFC = .434 LB/BHP HR

TABLE B-81. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-1-73 TEST NO. 1 W/ 25 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	WATER INDUCT. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.25	16.31	60.772	R	25	80	121	250	230	1.8	.2
2	285	16.1	.19	16.31	16.45	26.109	.569	25	74	120	300	290	1.8	.2
3	399	25.1	.20	18.27	18.47	19.623	.479	25	75	120	335	330	2.8	.4
4	[illegible]	49.5	.30	22.89	23.25	19.074	.446	25	72	122	450	415	4.0	5.7
5	515	77.1	.55	29.36	29.90	10.713	.425	25	74	122	540	548	4.8	.4
6	285	0.0	.06	16.34	16.40	62.317	R	25	74	112	265	241	2.0	.3
7	584	109.8	.76	33.30	34.06	8.345	.417	25	74	120	625	600	5.6	1.1
8	675	140.5	1.00	39.57	40.57	7.220	.427	25	75	126	695	700	6.7	1.4
9	755	173.1	1.25	44.28	45.53	6.247	.433	25	77	131	760	748	8.5	1.8
10	835	206.7	1.55	49.05	50.60	5.348	.450	25	75	140	850	910	9.2	2.2
11	285	0.0	.06	17.22	17.28	69.172	R	25	78	115	310	290	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	48	146	7	153	1.00	20.2	R	R	R	2.87	5.68	30.74
2	1.0	48	71	257	21	277	2.06	19.6	.65	1.90	12.22	1.27	3.74	29.03
3	1.5	48	59	317	15	332	2.69	19.2	.47	1.14	10.57	.48	2.38	22.08
4	1.5	56	35	526	15	541	3.62	18.3	.35	.43	10.98	.80	.49	25.17
5	2.0	68	23	724	15	739	3.99	17.7	.35	.24	12.38	.82	.55	29.11
6	1.0	40	24	143	10	153	1.00	20.6	R	R	R	2.41	2.87	30.20
7	2.0	76	57	942	15	957	4.79	16.9	.31	.47	12.82	.75	1.12	30.74
8	2.0	96	137	1011	30	1041	5.29	16.1	.37	1.04	12.99	.86	2.43	30.41
9	2.0	116	159	1035	15	1049	5.59	15.5	.40	1.10	11.93	.93	2.55	27.52
10	3.5	140	1467	1057	15	1071	6.13	14.5	.45	9.44	11.33	1.01	20.99	25.18
11	1.0	64	36	144	3	147	.92	20.5	R	R	R	4.29	4.78	32.35

CYCLE COMPOSITE	BSHC	=	.498	GRAM/BHP HR
	BSCO	=	7.511	GRAM/BHP HR
	BSNO2	=	12.169	GRAM/BHP HR
	BSHC + BSNO2	=	12.666	GRAM/BHP HR
	BSFC	=	.466	LB/BHP HR

TABLE B-82. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-1-73 TEST NO. 2 W/ 25 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	WATER INDUCT. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.91	15.97	57.134	R	25	78	110	230	220	1.9	.2
2	285	19.1	.19	15.90	16.09	25.153	.450	25	78	110	270	270	1.9	.3
3	399	24.9	.29	18.12	18.32	18.650	.492	25	80	111	320	312	2.8	.4
4	424	40.8	.37	22.44	22.79	12.305	.530	25	80	114	440	410	4.0	.6
5	515	76.9	.55	29.22	29.77	9.941	.429	25	80	120	548	500	4.6	.8
6	285	0.0	.07	16.24	16.30	55.473	R	25	80	115	350	330	1.9	.3
7	584	106.0	.76	33.41	34.17	7.861	.430	25	80	120	675	610	5.3	1.1
8	675	113.2	1.00	39.35	40.35	6.631	.532	25	80	130	710	711	6.4	1.4
9	755	170.5	1.25	44.33	45.58	5.795	.421	25	82	138	780	820	8.4	1.8
10	835	202.8	1.47	50.32	51.80	5.329	.436	25	85	150	860	910	9.8	2.1
11	285	0.0	.06	16.16	16.23	57.549	R	25	87	115	290	280	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	48	36	137	12	150	1.05	19.4	R	R	R	2.34	4.17	28.67
2	1.0	48	47	262	29	282	2.26	18.7	.53	1.09	10.22	1.10	2.31	22.72
3	1.5	56	47	301	20	321	2.69	18.4	.55	.93	10.41	1.13	1.08	21.17
4	1.5	60	35	511	15	526	3.56	17.4	.42	.43	10.62	.96	.48	24.22
5	2.0	80	46	711	30	740	4.06	16.6	.41	.47	12.30	.96	1.10	20.05
6	1.0	64	24	134	12	146	1.00	20.5	R	R	R	3.44	2.55	25.79
7	1.0	96	69	896	29	925	4.86	15.0	.41	.58	12.80	.95	1.35	29.95
8	1.0	120	148	964	29	993	5.36	14.9	.56	1.39	15.29	1.06	2.61	20.75
9	1.5	140	430	1016	29	1045	5.66	14.4	.47	2.09	11.53	1.12	6.06	27.34
10	3.0	168	1466	1043	-68	975	6.05	13.7	.57	4.01	10.76	1.30	22.58	24.69
11	1.0	84	44	143	6	150	.96	20.3	R	F	R	4.78	5.35	27.54

CYCLE COMPOSITE	BSHC	=	.622	GRAM/BHP HR
	BSCO	=	7.976	GRAM/BHP HR
	BSNO2	=	11.761	GRAM/BHP HR
	BSHC + BSNO2	=	12.383	GRAM/BHP HR
	BSFC	=	.462	LB/BHP HR

TABLE B-83. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-1-73 TEST NO. 1 W/ 50 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	14.19	16.20	56.764	R	50	80	118	220	210	1.8	.2
2	285	15.7	.19	14.17	16.31	29.924	.523	50	80	115	282	280	1.8	.2
3	394	27.4	.21	18.08	18.24	17.152	.461	50	80	119	342	338	2.8	.4
4	494	50.2	.34	23.71	24.07	12.329	.430	50	81	121	485	482	4.3	.6
5	515	76.4	.54	29.39	29.93	9.447	.426	50	82	121	538	538	4.8	.9
6	285	0.0	.06	16.79	16.80	64.606	R	50	83	119	320	299	2.0	.3
7	594	107.4	.76	34.02	34.78	7.815	.424	50	83	122	630	610	5.6	1.1
8	675	140.8	1.00	38.53	40.53	6.592	.426	50	86	128	692	687	6.8	1.6
9	755	173.6	1.26	44.83	46.09	5.894	.434	50	83	130	750	782	8.7	1.8
10	835	209.2	1.52	50.14	51.73	5.496	.444	50	82	138	850	902	9.3	2.2
11	285	0.0	.06	16.75	16.81	60.169	R	50	88	130	370	350	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	44	48	139	14	153	1.05	19.0	R	R	R	2.61	5.65	14.28
2	1.0	48	59	259	15	274	2.06	18.5	.46	1.1	12.32	1.26	3.08	23.58
3	1.0	54	82	349	20	367	2.80	17.8	.44	1.44	10.60	1.07	3.13	23.01
4	1.0	64	70	502	5	507	3.44	17.0	.41	.88	10.50	.94	2.05	24.91
5	2.0	76	58	704	15	719	3.94	16.4	.39	.60	12.14	.92	1.40	28.50
6	1.0	64	48	133	12	145	1.00	19.7	R	R	R	9.17	6.19	30.44
7	1.5	92	80	902	15	916	4.86	15.5	.39	.68	12.76	.92	1.60	29.06
8	1.5	104	154	983	14	998	5.22	14.7	.40	1.21	12.41	.93	2.83	29.11
9	2.0	128	455	969	20	977	5.51	13.4	.45	3.18	11.21	1.03	7.31	25.81
10	3.5	164	1359	985	14	999	6.13	13.4	.51	8.80	10.68	1.13	19.55	23.76
11	1.0	48	36	145	6	151	1.00	19.4	R	R	R	5.93	9.39	30.51

CYCLE COMPOSITE BSHC = .570 GRAM/BHP HR
BSCO = 7.236 GRAM/BHP HR
BSNO2 = 11.551 GRAM/BHP HR
BSHC + BSNO2 = 12.120 GRAM/BHP HR
BSFC = .465 LB/BHP HR

TABLE B-84. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-1-73 TEST NO. 2 W/ 50 PERCENT WATER
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.81	15.87	58.691	R	50	82	115	215	205	1.8	.2
2	285	15.9	.19	15.82	15.97	29.912	.509	50	82	119	270	270	1.8	.2
3	394	27.2	.20	18.12	18.32	18.157	.517	50	81	118	320	310	2.4	.4
4	494	48.8	.34	22.34	22.69	12.673	.498	50	82	120	440	410	4.0	.6
5	515	77.1	.55	29.02	30.37	10.758	.425	50	82	120	535	498	4.4	.9
6	285	0.0	.06	16.78	16.84	60.319	R	50	82	110	250	230	1.4	.3
7	594	108.4	.74	34.20	34.96	8.342	.421	50	82	122	625	600	5.2	1.1
8	675	139.5	1.00	39.74	40.79	7.108	.432	50	85	125	688	690	6.8	1.6
9	755	172.	1.26	45.10	46.36	6.187	.439	50	88	132	760	744	8.4	1.8
10	835	208.	1.54	49.32	50.38	5.186	.454	50	88	136	832	890	9.4	2.2
11	285	0.0	.06	16.11	16.17	61.912	R	50	88	120	352	330	2.0	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	40	48	144	6	146	1.00	20.0	R	R	R	2.44	5.69	27.84
2	1.0	44	71	256	15	271	2.21	19.4	.55	1.76	11.86	1.08	3.95	21.71
3	1.0	52	99	279	15	294	2.68	18.9	.54	1.28	10.82	1.05	2.26	19.40
4	1.0	64	96	519	19	538	3.69	18.0	.39	.57	10.68	.90	1.30	24.23
5	2.0	72	95	681	15	696	3.81	17.6	.37	.36	11.83	.88	.84	27.81
6	1.0	60	84	128	18	146	1.00	20.5	R	R	R	3.51	2.78	28.00
7	2.0	88	97	905	24	929	4.06	16.5	.37	.44	13.81	.84	1.14	30.93
8	2.0	100	148	919	57	971	5.22	15.0	.39	1.23	12.27	.84	2.84	28.92
9	3.0	128	492	944	8	994	5.66	14.2	.45	3.47	11.53	1.04	7.43	26.33
10	3.5	152	1268	930	28	958	6.13	13.4	.49	8.22	10.28	1.04	18.04	22.44
11	1.5	88	36	129	2	131	.98	20.6	R	R	R	5.22	9.22	25.98

CYCLE COMPOSITE BSHC = .553 GRAM/BHP HR
BSCO = 6.768 GRAM/BHP HR
BSNO2 = 11.155 GRAM/BHP HR
BSHC + BSNO2 = 11.708 GRAM/BHP HR
BSFC = .471 LB/BHP HR

TABLE B-85. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 1 W/ 75 PERCENT WATER
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.71	15.77	59.566	R	75	70	103	200	195	1.8	.3
2	285	15.9	.19	15.71	15.89	29.121	.523	75	70	100	252	252	1.5	.3
3	399	23.9	.20	17.72	17.93	17.950	.510	75	70	102	308	300	3.3	.5
4	929	99.3	.36	22.22	22.57	12.186	.434	75	70	103	911	376	4.6	.6
5	515	77.1	.59	29.01	29.55	9.990	.423	75	70	99	505	460	5.2	1.0
6	285	0.0	.06	15.71	15.77	59.015	R	75	70	92	282	260	2.1	.3
7	584	113.6	.76	33.16	33.92	7.671	.419	75	70	97	585	560	5.9	1.2
8	675	140.9	1.00	39.63	40.63	6.744	.426	75	70	99	650	655	7.3	1.5
9	755	176.0	1.26	93.59	94.86	5.658	.431	75	70	102	730	762	8.7	1.8
10	835	212.0	1.57	98.69	50.26	4.797	.444	75	71	108	812	880	9.2	2.2
11	285	0.0	.05	16.06	16.12	64.535	R	75	70	99	295	275	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	56	98	199	19	157	1.09	19.8	R	R	R	3.07	5.20	28.22
2	1.0	56	59	237	17	259	2.06	18.8	.75	1.57	11.09	1.93	3.00	21.22
3	1.0	64	47	281	11	292	2.37	18.4	.63	.93	9.96	1.29	1.81	18.59
4	1.0	68	96	995	17	512	3.20	17.4	.41	.56	10.11	.95	1.29	23.32
5	2.0	84	35	675	22	697	3.68	16.6	.42	.35	11.59	1.01	.83	27.29
6	1.0	64	36	137	11	148	.96	19.6	R	R	R	3.51	3.90	26.58
7	2.0	46	69	921	16	938	4.59	15.6	.39	.55	12.42	.94	1.34	30.00
8	2.5	112	198	950	16	966	4.93	15.0	.43	1.12	12.03	1.00	2.64	28.26
9	2.5	152	906	991	16	1007	5.51	14.4	.51	2.72	11.08	1.19	6.32	25.79
10	5.0	168	1309	984	0	984	6.13	13.4	.53	8.16	10.08	1.18	18.37	22.68
11	1.0	88	98	197	7	154	1.00	19.3	R	R	R	5.85	6.32	33.54

CYCLE COMPOSITE BSHC = .592 GRAM/BHP HR
BSCO = 6.690 GRAM/BHP HR
BSNO2 = 10.989 GRAM/BHP HR
BSHC + BSNO2 = 11.575 GRAM/BHP HR
BSFC = .961 LB/BHP HR

TABLE B-86. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 2 W/ 75 PERCENT WATER
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FA. FOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.69	15.70	55.879	R	75	75	113	200	200	1.9	.2
2	285	16.9	.19	15.67	15.81	22.705	.509	75	73	100	270	272	1.9	.3
3	399	25.1	.20	17.66	17.86	17.790	.487	75	74	102	315	312	3.1	.4
4	929	99.3	.36	22.41	22.77	12.107	.430	75	73	105	930	902	4.3	.6
5	515	76.7	.59	29.15	29.69	10.038	.425	75	72	102	528	488	4.9	.9
6	285	0.0	.06	15.68	15.75	59.140	R	75	72	98	298	270	2.8	.3
7	584	106.0	.76	33.10	33.87	7.805	.432	75	72	105	608	590	5.3	1.1
8	675	140.6	1.00	39.60	40.60	6.762	.428	75	71	108	665	672	6.9	1.4
9	755	176.1	1.26	93.52	94.78	5.687	.433	75	72	102	745	787	8.3	1.8
10	835	210.9	1.56	98.92	99.99	4.847	.445	75	72	109	822	889	9.2	2.1
11	285	0.0	.06	15.68	15.74	59.939	R	75	72	99	288	260	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	98	198	17	169	1.19	19.3	R	R	R	4.89	8.96	30.99
2	1.5	96	59	259	12	266	2.81	18.6	1.19	1.95	10.79	2.93	2.85	21.87
3	1.5	109	78	293	23	317	2.59	18.3	.98	1.32	9.76	2.81	2.71	20.89
4	1.5	116	58	523	12	535	3.50	17.3	.71	.78	10.66	1.61	1.61	29.35
5	2.0	136	96	780	17	717	3.93	16.6	.69	.97	11.99	1.69	1.11	28.21
6	1.0	109	36	139	12	151	1.00	19.7	R	R	R	5.69	3.89	27.89
7	2.0	128	96	877	17	894	4.79	15.9	.59	.88	12.33	1.25	.89	28.55
8	2.0	148	185	968	17	975	5.29	15.1	.56	.98	12.16	1.38	2.28	28.91
9	2.0	189	979	967	17	984	5.79	14.5	.48	3.22	10.88	1.93	7.99	28.12
10	9.5	232	1383	978	17	995	6.89	13.7	.73	8.89	10.18	1.63	18.56	22.89
11	1.5	116	89	196	8	191	1.00	19.5	R	R	R	7.89	8.98	28.19

CYCLE COMPOSITE BSHC = .889 GRAM/BHP HR
BSCO = 6.765 GRAM/BHP HR
BSNO2 = 11.067 GRAM/BHP HR
BSHC + BSNO2 = 11.891 GRAM/BHP HR
BSFC = .963 LB/BHP HR

TABLE B-87 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 1 W/ 100 PERCENT WATER
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.68	15.74	60.549	R	100	72	99	213	200	1.8	.2
2	285	17.3	.19	15.67	15.81	24.992	.973	100	73	99	272	270	1.9	.3
3	399	29.9	.20	17.69	17.90	18.212	.500	100	72	100	320	312	3.0	.4
4	484	49.9	.36	22.68	23.04	12.720	.429	100	72	101	424	395	4.3	.6
5	515	77.1	.59	29.15	29.69	10.341	.423	100	72	99	525	486	5.5	.8
6	285	0.0	.06	15.68	15.74	59.520	R	100	72	93	219	203	2.0	.3
7	584	109.8	.77	32.76	33.53	7.936	.419	100	72	92	609	585	5.5	1.1
8	675	149.3	1.00	39.32	40.32	6.870	.416	100	71	99	675	680	6.7	1.4
9	755	179.2	1.26	43.52	44.78	5.899	.423	100	72	100	750	789	8.1	1.7
10	835	211.7	1.56	48.47	50.03	4.922	.443	100	71	101	832	901	9.8	2.1
11	285	0.0	.05	15.70	15.75	69.703	R	100	71	95	410	400	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	71	192	13	156	1.00	19.7	R	R	R	9.90	8.70	31.19
2	1.5	76	71	257	12	269	2.16	19.1	.92	1.70	10.59	1.93	3.59	22.38
3	1.5	84	70	297	24	321	2.69	18.7	.81	1.36	10.15	1.69	2.71	20.33
4	1.5	92	81	506	12	518	3.38	17.8	.56	.99	10.39	1.31	2.30	24.04
5	3.0	109	69	719	23	737	3.93	17.1	.53	.70	12.27	1.25	1.66	29.06
6	1.0	84	71	138	14	152	1.00	20.5	R	R	R	9.85	8.22	28.72
7	2.0	116	92	934	17	956	4.74	16.4	.47	.79	12.62	1.12	1.75	30.11
8	2.0	136	172	987	17	1004	5.36	15.[illegible]	.50	1.26	12.12	1.21	3.04	24.14
9	2.0	176	540	996	34	1031	5.74	14.9	.58	3.55	11.13	1.37	8.39	26.31
10	4.5	229	1581	955	17	972	6.24	13.9	.70	9.83	9.93	1.58	22.18	22.41
11	1.0	112	83	138	9	141	1.00	20.0	R	R	R	7.76	11.52	32.05

CYCLE COMPOSITE BSHC = .768 GRAM/BHP HR
BSCO = 8.119 GRAM/BHP HR
BSNO2 = 10.899 GRAM/BHP HR
BSHC + BSNO2 = 11.666 GRAM/BHP HR
BSFC = .458 LB/BHP HR

TABLE B-88. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-13-73 TEST NO. 2 W/ 100 PERCENT WATER
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.68	15.74	59.319	R	100	72	100	213	200	1.6	.2
2	285	17.5	.19	16.01	16.15	23.863	.980	100	74	100	270	265	1.9	.2
3	399	29.6	.21	17.69	17.85	17.681	.504	100	75	102	320	314	2.9	.4
4	484	50.7	.36	22.69	22.99	12.890	.422	100	79	104	438	402	4.1	.5
5	515	77.8	.54	29.31	29.84	10.215	.419	100	73	99	524	485	4.8	.7
6	285	0.0	.05	15.65	15.70	70.558	R	100	74	98	300	275	1.9	.3
7	584	110.8	.76	32.67	33.43	7.803	.413	100	75	95	615	595	5.5	1.1
8	674	149.3	1.00	39.53	40.52	6.838	.414	100	73	98	685	694	6.6	1.4
9	755	179.5	1.27	43.78	44.96	5.695	.423	100	74	100	765	805	7.9	1.7
10	835	211.7	1.56	48.92	49.99	4.812	.443	100	72	101	845	918	9.6	2.1
11	285	0.0	.09	16.82	16.86	87.525	R	100	73	99	382	378	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	68	195	19	159	1.09	19.3	R	R	R	9.48	7.25	31.86
2	1.0	76	83	239	24	263	2.21	18.7	.98	2.00	10.96	1.93	4.17	21.82
3	1.5	84	78	291	18	309	2.75	18.5	.88	1.39	9.67	1.68	2.66	19.20
4	1.5	88	96	529	6	535	3.62	18.0	.63	.85	10.39	1.25	1.91	24.59
5	2.5	100	96	702	23	725	4.06	16.8	.61	.97	12.09	1.21	1.11	28.72
6	1.0	88	98	138	14	153	1.00	20.3	R	R	R	6.88	6.57	30.78
7	2.0	112	92	934	8	939	4.93	16.1	.49	.73	12.89	1.08	1.76	29.61
8	2.5	128	195	962	17	978	5.44	15.2	.47	1.44	11.77	1.19	3.47	28.39
9	2.5	168	569	979	17	996	5.84	14.5	.53	3.78	10.78	1.25	8.78	25.47
10	4.5	230	1611	938	17	955	6.45	13.4	.62	10.00	9.75	1.41	22.58	21.99
11	1.0	109	68	138	8	146	1.08	19.7	R	R	R	9.19	10.51	32.32

CYCLE COMPOSITE BSHC = .701 GRAM/BHP HR
BSCO = 8.288 GRAM/BHP HR
BSNO2 = 10.709 GRAM/BHP HR
BSHC + BSNO2 = 11.405 GRAM/BHP HR
BSFC = .455 LB/BHP HR

TABLE B-89. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-24-72 TEST NO. 1 W/ 25 PCT. WATER
INJECTORS: NEEDLE TIMING: 0 DEG BTDC
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT*	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIR@BOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.55	15.61	.004	0	25	72	109	228	210	1.6	.3
2	285	15.4	.19	15.45	15.64	.009	.549	25	72	109	314	291	1.7	.3
3	394	23.5	.21	16.92	17.13	.012	.507	25	79	112	358	312	2.6	.4
4	494	45.2	.34	20.99	21.36	.017	.448	25	80	115	451	429	4.2	.5
5	515	69.4	.54	27.62	28.06	.020	.467	25	81	119	568	532	4.3	.8
6	285	0.0	.06	15.53	15.59	.004	0	25	82	119	395	320	1.7	.3
7	584	101.3	.76	32.90	33.17	.023	.452	25	81	119	668	650	5.0	1.0
8	675	132.0	1.00	38.53	39.54	.026	.456	25	82	121	792	752	6.0	1.7
9	755	163.2	1.26	42.45	43.71	.030	.463	25	87	131	838	882	7.1	1.6
10	835	194.3	1.56	46.88	48.44	.033	.481	25	89	140	930	999	8.4	1.9
11	285	0.0	.06	15.58	15.65	.004	0	25	89	123	405	390	1.6	.2

* PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	36	77	15	92	1.54	.257	R	R	R	5.50	4.07	17.32
2	2.5	100	42	127	18	145	2.24	.100	1.35	1.26	6.90	2.95	2.30	11.65
3	2.0	120	48	160	19	179	2.91	.050	1.11	1.08	5.92	2.19	2.13	10.69
4	2.0	138	46	242	9	256	3.93	.040	.85	.58	5.22	1.76	1.19	10.82
5	2.5	156	69	329	13	342	4.38	.020	.83	.74	5.97	1.78	1.58	12.80
6	1.5	120	48	76	16	92	1.14	.257	R	R	R	6.56	5.14	14.37
7	3.0	148	122	409	13	422	5.29	.010	.81	1.48	5.97	1.80	3.28	13.20
8	4.0	224	409	491	9	450	5.74	.010	.90	3.22	5.83	1.98	7.06	12.77
9	6.5	316	924	515	0	515	6.29	0.000	1.12	6.86	5.96	2.41	14.80	12.8
10	11.5	520	2704	529	0	529	6.82	0.000	1.71	17.74	5.69	3.56	36.91	11.
11	2.0	104	40	103	1	104	1.14	.257	R	R	R	7.83	4.30	10.53

CYCLE COMPOSITE BSHC = 3.283 GRAM/BHP HR
BSCO = 2.903 GRAM/BHP HR
BSNO2 = 11.830 GRAM/BHP HR
BSHC + BSNO2 = 15.112 GRAM/BHP HR
BSFC = .835 LB/BHP HR

TABLE B-90. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-24-72 TEST NO. 2 W/ 25 PCT. WATER
INJECTORS: NEEDLE TIMING: 0 DEG BTDC
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT*	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIR@BOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.38	15.44	.004	0	25	75	111	229	219	1.6	.2
2	285	19.8	.19	16.91	16.05	.009	.544	25	73	110	319	267	1.6	.3
3	394	23.1	.20	16.91	16.61	.012	.519	25	71	111	359	303	2.6	.4
4	494	44.9	.35	20.57	20.94	.018	.405	25	71	115	455	429	3.7	.5
5	515	70.9	.55	27.32	27.87	.020	.443	25	73	113	565	531	4.4	.8
6	285	0.0	.06	15.54	15.64	.004	0	25	71	109	290	269	1.6	.2
7	584	101.3	.76	32.64	33.40	.023	.453	25	72	111	470	450	5.0	1.0
8	675	133.1	1.00	38.57	39.57	.026	.451	25	75	119	590	758	6.0	1.3
9	755	165.4	1.25	43.71	44.96	.029	.455	25	75	121	815	860	7.4	1.6
10	835	201.7	1.57	47.60	49.17	.033	.447	25	77	131	912	979	8.4	2.0
11	285	0.0	.06	15.63	15.69	.004	0	25	75	110	362	350	1.4	.3

* PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	HGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	48	98	19	103	1.19	.257	R	R	R	5.86	5.09	10.13
2	2.0	72	44	137	15	152	2.26	.100	.96	1.67	6.67	1.79	2.77	11.79
3	1.5	88	59	169	16	180	2.80	.050	.76	1.11	5.58	1.96	2.13	10.76
4	1.5	96	96	282	18	300	3.99	.040	.64	.57	6.03	1.22	1.17	10.93
5	1.5	112	58	396	19	359	4.38	.020	.58	.60	6.10	1.26	1.29	13.19
6	1.0	72	29	84	19	98	1.14	.257	R	R	R	4.13	2.72	10.37
7	2.0	144	140	427	9	435	5.22	.010	.63	1.39	6.28	1.34	3.09	13.78
8	3.0	176	420	481	4	485	5.81	.010	.64	3.28	6.23	1.53	7.28	13.81
9	5.0	228	969	495	4	499	6.31	0.000	.82	6.79	5.87	1.88	14.93	12.98
10	10.0	392	2549	508	4	512	6.78	0.000	1.26	16.31	6.39	2.78	34.93	11.59
11	1.0	104	29	87	0	87	1.09	.257	R	R	R	5.98	2.73	10.38

CYCLE COMPOSITE BSHC = 2.382 GRAM/BHP HR
BSCO = 2.543 GRAM/BHP HR
BSNO2 = 12.230 GRAM/BHP HR
BSHC + BSNO2 = 14.632 GRAM/BHP HR
BSFC = .836 LB/BHP HR

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TABLE B-91. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-27-72 TEST NO. 1 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.79	15.85	.004	R	50	70	110	285	275	1.7	.3
2	285	15.7	.13	19.71	19.84	.009	.510	50	71	109	333	287	1.8	.3
3	399	23.3	.20	17.00	17.19	.012	.506	50	72	110	363	318	2.6	.4
4	624	46.9	.35	21.56	21.62	.016	.452	50	76	111	458	428	3.9	.6
5	515	73.2	.55	27.44	28.20	.020	.445	50	80	111	548	530	4.6	.8
6	285	0.0	.06	19.92	19.98	.009	R	50	79	109	350	320	1.8	.3
7	584	101.6	.76	32.51	33.27	.023	.451	50	78	110	670	648	5.2	1.5
8	675	132.5	1.00	38.45	39.45	.026	.455	50	80	110	792	758	6.1	1.3
9	755	165.8	1.26	93.07	94.33	.029	.456	50	81	117	818	864	7.4	1.6
10	835	199.7	1.57	96.95	98.52	.033	.479	50	81	129	910	978	8.9	2.0
11	285	0.0	.06	19.35	19.41	.009	R	50	82	112	910	900	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	48	87	6	94	1.09	.257	R	R	R	9.92	5.52	12.87
2	2.0	80	106	132	5	137	2.04	.100	1.00	2.64	5.59	1.96	5.17	10.96
3	1.5	84	106	154	9	163	2.69	.050	.66	2.09	5.19	1.69	4.09	10.22
4	2.0	108	109	242	13	256	3.74	.020	.47	1.88	5.14	1.17	2.84	11.93
5	2.0	128	115	330	13	343	4.25	.020	.65	1.17	5.71	1.96	2.62	12.83
6	1.0	84	71	80	14	94	1.09	.257	R	R	R	9.61	7.82	16.88
7	2.5	152	259	907	9	916	5.07	.010	.66	2.19	5.89	1.96	4.96	13.05
8	3.5	142	518	957	9	966	5.44	.010	.75	4.06	6.00	1.46	8.94	13.20
9	6.0	232	1082	972	9	976	6.04	0.000	.82	7.61	5.50	1.80	16.68	12.06
10	12.0	344	2928	976	0	976	6.61	0.000	1.12	18.99	5.07	2.34	39.66	10.60
11	1.5	104	48	98	3	91	1.09	.257	R	R	R	5.82	5.91	14.69

CYCLE COMPOSITE BSHC = 2.361 GRAM/BHP HR
BSCO = 5.185 GRAM/BHP HR
BSNO2 = 11.112 GRAM/BHP HR
BSHC + BSNO2 = 13.473 GRAM/BHP HR
BSFC = .793 LB/BHP HR

TABLE B-92. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-27-72 TEST NO. 2 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.66	15.72	.004	R	50	73	111	284	282	1.9	.3
2	285	15.3	.13	19.58	19.71	.009	.534	50	71	109	302	257	1.7	.3
3	399	22.7	.20	17.00	17.20	.012	.539	50	71	109	343	300	2.8	.4
4	624	45.7	.36	21.47	21.83	.017	.568	50	75	109	425	421	4.0	.6
5	515	71.4	.55	28.17	28.71	.019	.458	50	79	109	560	538	4.6	.8
6	285	0.0	.06	15.64	15.70	.004	R	50	79	109	288	265	1.7	.3
7	584	101.8	.76	32.80	33.56	.023	.446	50	78	109	661	648	5.1	1.1
8	675	132.2	1.00	38.36	39.35	.026	.452	50	80	110	795	750	6.0	1.3
9	755	167.0	1.26	93.13	94.39	.029	.453	50	80	118	828	870	7.3	1.6
10	835	199.0	1.54	96.88	98.45	.033	.471	50	82	127	915	992	8.8	2.0
11	285	0.0	.06	19.68	19.73	.009	R	50	82	118	355	325	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	48	76	14	89	1.09	.257	R	R	R	9.81	5.18	16.99
2	2.0	104	71	121	13	134	2.21	.100	1.32	1.74	5.67	2.96	3.33	18.98
3	1.5	120	70	138	22	160	2.58	.050	1.20	1.90	5.25	2.27	2.65	9.42
4	2.0	192	70	225	22	247	3.62	.040	.83	.87	5.09	1.78	1.87	10.87
5	2.5	152	92	320	9	333	4.12	.020	.00	.97	5.76	1.76	2.12	10.59
6	1.0	108	48	78	14	92	1.09	.257	R	R	R	6.22	5.46	17.30
7	2.5	174	231	900	8	908	5.00	.010	.77	2.00	5.88	1.72	4.49	13.09
8	3.5	216	420	966	9	975	5.51	.010	.86	3.29	6.11	1.68	7.27	13.51
9	5.5	264	1136	998	0	998	6.07	0.000	.93	7.99	5.71	2.06	17.55	12.62
10	12.0	348	2761	985	4	993	6.61	0.000	1.26	17.68	5.19	2.67	37.58	11.81
11	1.5	124	68	92	3	95	1.09	.257	R	R	R	7.04	6.78	17.77

CYCLE COMPOSITE BSHC = 2.976 GRAM/BHP HR
BSCO = 3.599 GRAM/BHP HR
BSNO2 = 11.283 GRAM/BHP HR
BSHC + BSNO2 = 14.260 GRAM/BHP HR
BSFC = .818 LB/BHP HR

TABLE B-93. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-27-72 TEST NO. 3 W/ 75 PERCENT WATER
INJECTORS: NEEDLE TIMING: 4 DEG RETD
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	19.72	19.78	.009	R	75	70	109	211	205	1.6	.3
2	285	15.2	.19	19.56	19.70	.009	.523	75	72	109	295	258	1.7	.3
3	394	22.8	.20	17.01	17.21	.012	.527	75	79	108	393	302	2.7	.4
4	494	45.6	.35	21.73	22.08	.016	.467	75	78	103	432	410	3.4	.6
5	515	71.4	.55	28.34	28.89	.019	.461	75	79	102	550	521	4.4	.8
6	285	0.0	.06	15.63	15.69	.004	R	75	79	100	310	290	1.8	.3
7	584	101.1	.76	32.94	33.70	.023	.449	75	80	101	695	631	5.1	1.0
8	675	132.2	1.00	38.61	39.61	.026	.454	75	80	102	730	748	6.0	1.3
9	755	163.9	1.25	93.27	94.52	.029	.460	75	81	109	809	860	7.3	1.6
10	835	197.1	1.54	97.31	98.87	.033	.475	75	83	110	892	962	8.9	2.0
11	285	0.0	.06	15.47	15.53	.004	R	75	84	118	285	275	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	98	81	11	92	1.14	.257	R	R	R	3.90	5.19	16.31
2	2.0	84	59	125	13	138	2.26	.100	1.6	1.95	5.60	1.99	2.78	10.71
3	1.5	100	70	138	13	151	2.69	.050	1.00	.90	4.93	1.89	2.65	9.35
4	2.0	118	96	215	13	229	3.54	.040	.79	.59	4.80	1.59	1.27	10.29
5	2.5	136	81	306	9	315	4.12	.020	.72	.86	5.98	1.59	1.86	11.90
6	1.0	109	98	76	11	87	1.09	.257	R	R	R	5.98	5.94	16.30
7	2.5	168	189	382	9	390	4.93	.010	.79	1.61	5.62	1.95	3.59	12.52
8	3.5	209	969	931	0	931	5.59	.010	.81	3.70	5.58	1.78	8.15	17.29
9	4.0	294	1029	991	9	995	5.97	0.000	.89	7.37	5.29	1.99	16.02	11.39
10	11.5	354	2653	933	0	933	6.95	0.000	1.17	17.30	9.69	2.95	36.93	9.77
11	1.5	129	60	89	0	89	1.09	.257	R	R	R	7.72	7.15	16.56

CYCLE COMPOSITE
BSHC = 2.757 GRAM/BHP HR
BSCO = 3.968 GRAM/BHP HR
BSNO2 = 10.695 GRAM/BHP HR
BSHC + BSNO2 = 13.452 GRAM/BHP HR
BSFC = .809 LB/BHP HR

TABLE B-94. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-27-72 TEST NO. 4 W/ 75 PERCENT WATER
INJECTORS: NEEDLE TIMING: 4 DEG RETD
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	19.96	19.51	.009	R	75	79	100	205	200	1.6	.2
2	285	15.0	.13	19.91	19.49	.009	.533	75	78	100	300	251	1.7	.3
3	394	22.7	.19	14.25	14.99	.012	.512	75	78	102	392	296	2.6	.4
4	494	46.2	.36	21.91	21.78	.017	.471	75	79	102	445	420	3.4	.6
5	515	71.6	.55	27.70	28.29	.020	.455	75	79	105	560	530	4.5	.8
6	285	0.0	.06	15.57	15.63	.004	R	75	79	100	295	275	1.7	.3
7	584	100.3	.76	32.65	33.41	.023	.453	75	80	102	650	640	5.0	1.0
8	675	132.2	.99	38.60	39.59	.026	.449	75	81	102	730	740	6.0	1.3
9	755	163.7	1.26	93.18	94.44	.029	.462	75	81	108	811	860	7.4	1.6
10	835	197.1	1.57	97.13	98.70	.033	.477	75	85	112	912	972	8.9	2.0
11	285	0.0	.06	19.76	19.82	.009	R	75	85	108	360	390	1.6	.2

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WET FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	74	60	86	14	100	1.14	.257	R	R	R	4.28	6.68	18.46
2	2.5	84	71	119	7	126	2.21	.100	1.07	1.99	5.38	2.02	3.38	10.48
3	1.5	100	82	196	10	166	2.75	.050	.96	1.66	5.15	1.87	3.06	10.05
4	2.0	116	70	235	4	299	3.68	.040	.78	.81	4.96	1.53	1.83	10.52
5	2.5	136	92	314	9	323	4.14	.020	.71	.96	5.58	1.56	2.10	12.17
6	1.0	96	60	83	11	95	1.09	.257	R	R	R	5.58	6.88	17.74
7	3.0	169	219	910	9	919	5.00	.010	.72	1.92	6.83	1.59	9.29	19.32
8	4.5	192	933	998	9	958	5.51	.010	.76	3.91	5.95	1.69	7.58	19.02
9	6.5	290	1096	962	9	966	5.97	0.000	.86	7.83	5.57	1.86	16.96	11.84
10	12.5	399	2899	955	9	962	6.53	0.000	1.12	18.99	9.99	2.35	38.76	10.35
11	1.5	112	60	92	0	92	1.09	.257	R	R	R	6.99	6.83	17.29

CYCLE COMPOSITE
BSHC = 2.676 GRAM/BHP HR
BSCO = 3.878 GRAM/BHP HR
BSNO2 = 11.211 GRAM/BHP HR
BSHC + BSNO2 = 13.787 GRAM/BHP HR
BSFC = .884 LB/BHP HR

TABLE B-95. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-26-72 TEST NO. 1 W/ 25 PCT. WATER
INJECTORS: NEEDLE TIMING: 4 DEG RETD
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT*	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.55	15.61	.004	R	25	72	109	229	210	1.4	.3
2	285	15.3	.19	15.45	15.59	.009	.544	25	77	109	319	261	1.7	.3
3	344	24.5	.21	16.92	17.13	.012	.507	25	79	112	358	312	2.4	.4
4	424	45.2	.36	20.99	21.34	.017	.482	25	80	115	451	424	3.7	.5
5	515	69.4	.54	27.52	28.06	.020	.467	25	81	119	568	532	4.3	.8
6	285	0.0	.06	15.53	15.59	.004	R	25	82	119	345	320	1.7	.3
7	584	101.3	.76	32.40	33.17	.024	.452	25	81	119	668	650	5.0	1.0
8	675	132.0	1.00	38.53	39.54	.026	.454	25	82	121	792	752	6.0	1.7
9	755	163.2	1.26	42.45	43.71	.030	.463	25	87	131	838	882	7.1	1.6
10	835	199.3	1.57	46.88	48.04	.033	.481	25	89	140	930	999	8.6	1.9
11	285	0.0	.06	15.58	15.65	.004	R	25	89	123	905	390	1.6	.2

* PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	36	77	15	92	1.54	.193	R	R	R	5.50	9.07	17.32
2	2.5	100	47	129	19	145	2.24	.030	1.35	1.26	6.90	2.95	2.30	11.65
3	2.0	120	59	160	19	179	2.91	.030	1.11	1.08	5.92	2.19	2.13	10.69
4	2.0	136	96	247	9	256	3.93	.030	.85	.58	5.22	1.76	1.19	10.82
5	2.5	156	64	329	13	342	4.38	.030	.83	.74	5.97	1.78	1.58	12.80
6	1.5	120	48	76	16	92	1.15	.193	R	R	R	6.50	5.14	16.37
7	3.0	188	172	909	13	922	5.29	.030	.81	1.98	5.97	1.80	3.28	13.20
8	4.0	228	909	991	9	950	5.74	.030	.90	3.22	5.83	1.98	7.06	12.77
9	4.5	316	974	515	0	515	6.29	.030	1.12	6.86	5.96	2.91	19.80	12.87
10	11.5	520	2706	529	0	529	6.87	.280	1.71	17.79	5.69	3.56	36.91	11.84
11	2.0	104	40	103	1	104	1.14	.193	R	R	R	7.83	9.30	18.53

CYCLE COMPOSITE BSHC = 1.685 GRAM/BHP HR
BSCO = 14.478 GRAM/BHP HR
BSNO2 = 6.123 GRAM/BHP HR
BSHC + BSNO2 = 7.808 GRAM/BHP HR
BSFC = .500 LB/BHP HR

TABLE B-96. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 12-26-72 TEST NO. 2 W/ 25 PCT. WATER
INJECTORS: NEEDLE TIMING: 4 DEG RETD
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT*	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.38	15.44	.004	R	25	75	111	224	219	1.6	.2
2	285	14.8	.19	14.91	15.05	.009	.564	25	73	110	314	267	1.6	.3
3	344	23.1	.29	16.91	16.41	.012	.519	25	71	111	354	303	2.6	.4
4	424	44.9	.36	20.57	20.94	.018	.485	25	71	115	455	429	3.7	.5
5	515	70.9	.55	27.38	27.87	.020	.463	25	73	113	565	521	4.4	.8
6	285	0.0	.06	15.59	15.64	.004	R	25	71	109	290	264	1.6	.2
7	584	101.3	.76	32.64	33.40	.023	.450	E.	72	111	670	640	5.0	1.0
8	675	133.1	1.00	38.57	39.57	.026	.451	25	75	119	840	758	6.0	1.3
9	744	164.3	1.25	43.71	44.96	.029	.455	25	76	121	815	869	7.0	1.6
10	835	201.7	1.57	47.60	48.17	.033	.467	25	77	131	912	979	8.4	2.0
11	285	0.0	.06	15.63	15.69	.004	R	25	75	110	362	350	1.4	.3

* PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	48	98	14	103	1.19	.193	R	R	R	3.86	5.09	18.13
2	2.0	72	69	137	15	152	2.26	.030	.96	1.67	6.67	1.70	2.77	11.79
3	1.5	88	59	169	16	185	2.80	.030	.76	1.11	5.58	1.46	2.13	10.76
4	1.5	96	96	282	18	300	3.99	.030	.59	.57	6.03	1.02	1.17	12.93
5	1.5	112	58	346	13	359	4.38	.030	.58	.60	6.10	1.06	1.04	13.19
6	1.0	92	29	84	14	98	1.19	.193	R	R	R	4.13	2.72	18.37
7	2.0	144	168	927	9	935	5.22	.030	.63	1.94	6.88	1.34	3.04	13.78
8	3.0	176	928	981	9	985	5.81	.030	.69	3.28	6.83	1.53	7.28	13.81
9	5.0	228	969	995	9	999	6.31	.030	.82	6.79	6.87	1.88	14.93	12.98
10	10.0	392	2569	508	9	512	6.78	.280	1.26	16.91	5.99	2.78	34.93	11.54
11	1.0	104	29	87	0	87	1.09	.193	R	R	R	6.98	8.73	16.38

CYCLE COMPOSITE BSHC = 1.236 GRAM/BHP HR
BSCO = 13.929 GRAM/BHP HR
BSNO2 = 6.929 GRAM/BHP HR
BSHC + BSNO2 = 7.159 GRAM/BHP HR
BSFC = .487 LB/BHP HR

TABLE B-97. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-27-72 TEST NO. 1 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.79	15.85	.004	R	50	70	110	281	275	1.7	.3
2	285	15.2	.13	14.71	14.84	.009	.510	50	71	109	333	287	1.8	.3
3	394	23.3	.20	17.00	17.19	.012	.506	50	72	110	363	314	2.6	.4
4	494	46.9	.35	21.56	21.92	.016	.452	50	76	111	458	428	3.9	.6
5	515	73.2	.54	27.66	28.20	.020	.445	50	80	111	548	530	4.6	.8
6	285	0.0	.06	19.42	19.48	.004	R	50	74	109	350	320	1.8	.3
7	584	101.1	.76	32.51	33.27	.023	.451	50	78	110	670	648	5.2	1.5
8	675	132.5	1.00	38.45	39.45	.026	.454	50	80	110	742	758	6.1	1.3
9	755	165.8	1.26	94.07	95.33	.029	.456	50	81	117	818	869	7.4	1.6
10	835	194.7	1.57	96.95	98.52	.033	.479	50	81	129	910	978	8.9	2.0
11	285	0.0	.06	19.35	19.41	.004	R	50	82	112	910	900	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	98	87	6	93	1.09	.193	R	R	R	9.42	5.52	17.87
2	2.0	80	106	132	5	137	2.06	.030	1.00	2.64	5.59	1.96	5.17	10.96
3	1.5	88	106	154	9	163	2.64	.030	.86	2.04	5.14	1.64	4.04	10.27
4	2.0	108	104	242	13	256	3.74	.030	.67	1.28	5.16	1.47	2.84	11.43
5	2.0	128	114	330	14	343	4.25	.030	.65	1.17	5.71	1.46	2.62	12.89
6	1.0	84	71	80	14	94	1.09	.193	R	R	R	9.61	7.82	16.88
7	2.5	152	254	907	9	916	5.07	.030	.66	2.14	5.88	1.94	4.86	13.05
8	3.5	192	518	957	9	966	5.64	.030	.75	4.06	6.00	1.66	8.94	13.20
9	6.0	232	1082	972	4	976	6.05	.030	.82	7.61	5.50	1.80	16.68	17.06
10	12.0	344	2928	976	0	976	6.61	.280	1.12	18.99	5.07	2.34	39.64	10.60
11	1.5	104	98	88	3	91	1.09	.193	R	R	R	5.82	5.31	16.69

CYCLE COMPOSITE BSHC = 1.137 GRAM/BHP HR
BSCO = 15.639 GRAM/BHP HR
BSNO2 = 5.577 GRAM/BHP HR
BSHC + BSNO2 = 6.713 GRAM/BHP HR
BSFC = .495 LB/BHP HR

TABLE B-98. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-27-72 TEST NO. 2 W/ 50 PERCENT WATER
INJECTORS' NEEDLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	15.65	15.72	.004	R	50	73	111	209	202	1.9	.3
2	285	15.3	.19	14.58	14.71	.009	.536	50	71	109	302	257	1.7	.3
3	394	22.7	.20	17.00	17.20	.012	.530	50	71	109	343	300	2.2	.4
4	494	46.7	.36	21.43	21.80	.017	.468	50	75	109	425	421	4.0	.6
5	515	71.6	.55	20.17	20.71	.019	.458	50	79	109	560	530	4.6	.8
6	285	0.0	.04	15.66	15.70	.004	R	50	79	103	280	265	1.7	.3
7	584	101.8	.76	32.80	33.56	.023	.446	50	79	109	661	648	5.1	1.1
8	675	132.2	1.00	38.36	39.35	.026	.452	50	80	110	735	750	6.0	1.3
9	755	167.0	1.26	93.13	94.39	.029	.453	50	80	118	820	870	7.3	1.6
10	835	199.0	1.56	96.88	98.45	.033	.471	50	82	127	915	992	8.8	2.0
11	285	0.0	.06	19.68	19.73	.004	R	50	82	118	355	325	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	88	98	76	14	89	1.09	.193	R	R	R	9.81	5.18	16.99
2	2.0	104	71	121	13	134	2.21	.030	1.32	1.79	5.67	2.46	3.63	10.98
3	1.5	120	70	138	22	160	2.58	.030	1.20	1.68	5.85	2.27	2.65	9.92
4	2.0	132	70	225	22	247	3.62	.030	.93	.87	5.89	1.78	1.67	10.87
5	2.5	152	92	320	4	333	4.12	.030	.80	.47	5.76	1.76	2.12	12.59
6	1.0	108	98	78	14	92	1.09	.193	R	R	R	6.22	5.96	17.38
7	2.5	176	231	908	0	908	5.00	.030	.77	2.00	5.82	1.72	4.49	13.09
8	3.5	216	920	966	9	975	5.51	.030	.85	3.29	6.11	1.88	7.27	13.51
9	5.5	264	1136	998	0	998	5.97	.030	.93	7.99	5.71	2.05	17.55	12.62
10	12.0	392	2761	985	9	993	6.61	.280	1.26	17.68	5.14	2.67	37.60	11.01
11	1.5	124	60	92	3	95	1.09	.193	R	R	R	7.09	6.78	17.77

CYCLE COMPOSITE BSHC = 1.288 GRAM/BHP HR
BSCO = 14.618 GRAM/BHP HR
BSNO2 = 5.682 GRAM/BHP HR
BSHC + BSNO2 = 6.982 GRAM/BHP HR
BSFC = .499 LB/BHP HR

TABLE B-99. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-27-72 TEST NO. 3 W/ 75 PERCENT WATER
INJECTORS' NEFOLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	14.72	14.78	.004	R	75	70	104	211	205	1.6	.3
2	285	15.7	.14	14.56	14.70	.009	.523	75	72	104	295	258	1.7	.3
3	344	22.8	.20	17.01	17.21	.012	.527	75	74	108	293	302	2.2	.4
4	424	45.4	.35	21.73	22.08	.016	.467	75	78	103	432	410	3.4	.6
5	515	71.6	.55	28.34	28.89	.019	.461	75	79	102	550	521	4.6	.8
6	285	0.0	.06	15.63	15.69	.004	R	75	74	100	310	290	1.8	.3
7	584	101.1	.76	32.94	33.70	.023	.449	75	80	101	645	631	5.1	1.0
8	675	132.2	1.00	38.61	39.61	.026	.454	75	80	102	730	748	6.0	1.3
9	755	163.4	1.25	43.27	44.52	.029	.460	75	81	104	804	860	7.3	1.6
10	835	197.1	1.54	47.31	48.87	.033	.475	75	83	110	892	962	8.9	2.0
11	285	0.0	.06	15.47	15.53	.004	R	75	86	118	295	275	1.8	.3

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	98	81	11	92	1.14	.193	R	R	R	9.90	5.14	16.31
2	2.0	84	59	125	13	138	2.24	.030	1.04	1.95	5.60	1.99	2.78	10.71
3	1.5	100	70	138	13	151	2.69	.030	1.00	1.90	4.93	1.89	2.65	9.35
4	2.0	116	96	215	13	229	3.54	.030	.79	.59	4.80	1.59	1.27	10.29
5	2.5	134	81	306	9	315	4.12	.030	.72	.86	5.98	1.57	1.84	11.90
6	1.0	104	98	76	11	87	1.09	.193	R	R	R	5.98	5.94	16.30
7	2.5	148	184	382	9	390	4.93	.030	.74	1.61	5.62	1.65	3.59	12.52
8	3.5	204	464	431	0	431	5.59	.030	.81	3.70	5.58	1.78	8.15	12.29
9	6.0	298	1029	441	4	445	6.47	.030	.89	7.37	5.29	1.99	16.02	11.39
10	11.5	356	2653	433	0	433	6.95	.200	1.17	17.30	4.69	2.45	36.43	9.77
11	1.5	128	60	84	0	84	1.09	.193	R	R	R	7.72	7.15	16.56

CYCLE COMPOSITE BSHC = 1.208 GRAM/BHP HR
BSCO = 14.767 GRAM/BHP HR
BSNO2 = 5.158 GRAM/BHP HR
BSHC + BSNO2 = 6.366 GRAM/BHP HR
BSFC = .493 LB/BHP HR

TABLE B-100. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-27-72 TEST NO. 4 W/ 75 PERCENT WATER
INJECTORS' NEFOLE TIMING' 4 DEG RETD
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	WATER INDUCT. PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	14.96	14.51	.004	R	75	79	100	285	288	1.6	.2
2	285	15.0	.13	14.91	14.59	.009	.533	75	78	100	380	251	1.7	.3
3	344	22.7	.19	16.25	16.49	.012	.512	75	78	102	342	296	2.6	.4
4	424	46.2	.36	21.41	21.78	.017	.471	75	79	102	445	420	3.4	.6
5	515	71.6	.59	27.70	28.29	.020	.455	75	79	103	560	530	4.5	.8
6	285	0.0	.06	15.57	15.63	.004	R	75	79	100	295	275	1.7	.3
7	584	100.3	.74	32.66	33.41	.023	.453	75	80	102	650	640	5.0	1.0
8	675	132.2	.94	38.60	39.59	.026	.444	75	81	102	730	748	6.0	1.3
9	755	163.7	1.26	43.18	44.44	.029	.462	75	81	104	811	860	7.4	1.6
10	835	197.1	1.57	47.13	48.70	.033	.477	75	85	112	912	972	8.9	2.0
11	285	0.0	.06	14.96	14.82	.004	R	75	85	108	360	348	1.4	.2

+ PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	60	86	14	100	1.19	.193	R	R	R	9.88	6.68	18.96
2	2.5	84	71	119	9	128	2.21	.030	1.07	1.88	5.38	2.02	3.39	10.88
3	1.5	108	82	196	18	169	2.95	.030	.96	1.66	5.15	1.87	3.06	10.85
4	2.0	116	70	295	9	299	3.68	.030	.72	.86	5.96	1.53	1.83	10.52
5	2.5	134	92	319	9	323	4.19	.030	.71	.96	5.50	1.56	2.10	12.10
6	1.0	96	60	83	11	96	1.09	.193	R	R	R	5.88	6.08	17.79
7	3.0	169	819	910	9	919	5.00	.030	.72	1.92	6.03	1.59	4.89	13.32
8	4.5	192	933	952	9	952	5.61	.030	.76	3.41	5.85	1.69	7.58	13.02
9	6.5	260	1096	962	9	966	6.47	.030	.86	7.03	5.47	1.86	16.96	11.89
10	12.5	344	2894	959	9	962	6.63	.200	1.12	18.99	4.99	2.35	38.76	8.35
11	1.5	112	68	92	0	92	1.09	.193	R	R	R	6.99	6.83	17.29

CYCLE COMPOSITE BSHC = 1.187 GRAM/BHP HR
BSCO = 15.238 GRAM/BHP HR
BSNO2 = 5.961 GRAM/BHP HR
BSHC + BSNO2 = 6.619 GRAM/BHP HR
BSFC = .499 LB/BHP HR

TABLE B-101. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-15-73 TEST NO. 1 W/ 100 PERCENT WATER
INJECTORS' LOW-SAC TIMING' 4 DEG RETD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	16.25	16.31	61.138	R	100	80	110	270	250	1.6	.2
2	285	14.3	.19	16.25	16.39	24.811	.503	100	80	112	290	282	1.7	.2
3	394	23.5	.20	18.17	18.37	18.996	.510	100	80	111	335	328	3.0	.4
4	424	48.3	.36	22.60	23.39	12.459	.693	100	80	112	453	422	4.2	.6
5	515	78.4	.59	29.20	29.79	10.009	.916	100	82	108	555	518	4.9	.9
6	285	0.0	.06	16.25	16.31	62.912	R	100	80	104	332	308	1.9	.2
7	584	110.3	.77	33.50	34.27	7.716	.917	100	80	101	642	630	5.5	1.1
8	675	142.1	1.00	38.53	40.53	6.705	.929	100	80	101	711	729	6.6	1.5
9	755	173.6	1.26	45.18	46.45	5.899	.937	100	80	102	800	842	7.7	1.7
10	835	209.9	1.53	49.74	51.33	5.844	.948	100	82	108	860	955	9.9	2.0
11	285	0.0	.09	16.22	16.26	85.965	R	100	82	104	346	330	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	98	92	13	109	1.00	19.2	R	R	R	4.81	6.01	21.61
2	1.5	80	97	138	14	151	2.06	18.7	1.04	1.25	6.57	2.11	2.98	13.06
3	1.5	86	97	171	16	187	2.58	18.2	.91	.96	6.30	1.78	1.84	12.35
4	2.0	96	97	293	10	303	3.62	17.2	.61	.59	6.33	1.30	1.33	14.29
5	3.5	109	96	464	10	460	4.19	16.5	.52	.96	7.59	1.25	1.11	18.15
6	1.0	80	94	93	12	109	1.00	19.1	R	R	R	5.06	4.51	21.61
7	2.5	120	160	567	5	572	5.07	15.6	.99	1.31	7.68	1.18	3.19	18.51
8	3.0	144	312	554	15	579	5.51	15.0	.59	2.39	7.07	1.28	5.53	16.70
9	4.5	189	833	571	30	601	5.97	14.5	.65	5.86	6.95	1.44	13.92	15.91
10	7.5	216	2119	567	0	567	6.53	13.5	.70	13.69	5.99	1.56	30.36	13.97
11	1.0	104	98	99	2	101	1.00	19.0	R	R	R	4.90	6.61	24.67

CYCLE COMPOSITE BSHC = 2.319 GRAM/BHP HR
BSCO = 2.747 GRAM/BHP HR
BSNO2 = 13.225 GRAM/BHP HR
BSHC + BSNO2 = 15.544 GRAM/BHP HR
BSFC = .720 LB/BHP HR

TABLE B-102. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-15-73 TEST NO. 2 W/ 100 PERCENT WATER
INJECTORS' LOW-SAC TIMING' 4 DEG RETD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	16.29	16.31	52.231	R	100	81	104	238	205	1.6	.2
2	285	14.0	.19	16.29	16.39	24.925	.513	100	81	105	282	280	1.7	.2
3	394	24.5	.20	18.73	18.93	19.164	.484	100	82	108	330	323	2.8	.4
4	424	48.9	.36	22.94	23.31	12.808	.697	100	82	110	455	428	3.9	.6
5	515	78.9	.59	29.30	29.85	10.029	.916	100	80	106	560	525	4.7	.9
6	285	0.0	.05	16.25	16.30	71.938	R	100	80	101	330	302	1.8	.2
7	584	112.2	.77	33.18	33.99	7.643	.910	100	80	100	650	648	5.3	1.1
8	675	144.3	1.00	38.54	39.54	6.728	.916	100	80	100	722	708	6.4	1.4
9	755	176.1	1.26	44.70	45.96	5.837	.933	100	80	100	800	840	7.7	1.7
10	835	207.5	1.46	49.61	51.07	5.068	.952	100	78	101	870	990	9.3	2.0
11	285	0.0	.09	16.62	16.66	84.866	R	100	76	100	484	480	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	66	68	100	13	113	1.09	19.3	R	R	R	3.44	4.38	19.88
2	1.0	72	71	151	15	166	2.21	18.8	.97	1.41	7.35	1.98	2.72	14.34
3	1.0	80	70	175	16	191	2.64	18.3	.88	1.43	6.37	1.67	2.48	13.02
4	1.5	88	81	309	16	328	3.79	17.2	.64	1.08	6.96	1.24	2.05	15.79
5	2.0	96	68	484	10	498	4.25	16.5	.48	.88	7.92	1.14	1.84	18.88
6	1.0	76	60	95	13	108	1.00	19.0	R	R	R	5.48	3.82	25.29
7	2.5	108	189	509	10	600	5.29	15.6	.93	1.96	7.84	1.88	3.87	14.12
8	2.5	132	336	602	15	618	5.64	15.0	.99	2.98	7.99	1.18	5.97	16.82
9	4.5	160	767	619	8	619	5.97	14.5	.55	5.30	6.96	1.20	12.89	16.87
10	7.5	192	1978	594	15	609	6.53	13.8	.62	12.08	6.98	1.36	28.38	14.33
11	1.0	88	79	109	3	107	1.00	19.3	R	R	R	8.84	9.36	38.88

CYCLE COMPOSITE BSHC = 2.049 GRAM/BHP HR
BSCO = 3.811 GRAM/BHP HR
BSNO2 = 13.324 GRAM/BHP HR
BSHC + BSNO2 = 15.373 GRAM/BHP HR
BSFC = .717 LB/BHP HR

TABLE B-103. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-15-73 TEST NO. 1 W/ 100 PERCENT WATER
INJECTORS' LOW-SAC TIMING' 4 DEG RETD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.04	16.25	16.31	61.138	R	100	80	118	270	250	1.6	.2
2	285	16.3	.19	16.25	16.39	29.811	.503	100	80	112	290	282	1.8	.2
3	344	23.5	.20	18.17	18.37	18.496	.510	100	80	111	335	328	3.0	.4
4	424	48.3	.36	22.48	23.34	12.459	.493	100	80	112	453	422	4.2	.6
5	515	78.4	.54	29.24	29.79	10.009	.416	100	82	108	555	518	4.4	.4
6	285	0.0	.04	16.25	16.31	62.412	R	100	80	104	332	308	1.4	.2
7	584	110.3	.77	33.50	34.27	7.716	.417	100	80	101	642	630	5.5	1.1
8	675	142.1	1.00	39.53	40.53	6.705	.424	100	80	101	711	729	6.6	1.4
9	755	173.6	1.26	45.18	46.45	5.899	.437	100	80	102	800	842	7.4	1.7
10	835	209.9	1.57	49.76	51.33	4.899	.448	100	82	108	880	955	8.4	2.0
11	285	0.0	.09	16.22	16.26	85.965	R	100	82	104	345	330	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	48	42	13	109	1.00	19.2	R	R	R	9.81	6.21	21.61
2	1.5	80	47	136	14	151	2.06	18.7	1.04	1.25	6.57	2.11	1.28	13.06
3	1.5	88	47	171	16	187	2.58	18.2	.91	.96	6.30	1.78	1.69	12.35
4	2.0	96	47	293	10	303	3.66	17.2	.61	.59	6.33	1.38	1.33	19.29
5	3.5	104	46	464	10	460	4.19	16.5	.52	.46	7.69	1.25	1.11	18.15
6	1.0	80	34	43	12	109	1.00	19.6	R	R	R	5.06	4.51	21.61
7	2.5	120	169	567	5	572	6.07	15.6	.99	1.31	7.68	1.18	1.19	18.41
8	3.0	144	312	559	15	574	5.51	15.0	.59	2.39	7.07	1.28	5.53	16.70
9	4.5	184	833	571	30	601	5.97	14.5	.65	5.06	6.98	1.49	13.92	15.41
10	7.5	216	2114	567	0	567	6.53	13.5	.70	13.59	5.99	1.56	30.46	13.37
11	1.0	104	48	44	2	101	1.00	19.0	R	R	R	7.30	8.61	24.67

CYCLE COMPOSITE BSHC = .778 GRAM/BHP HR
BSCO = 11.169 GRAM/BHP HR
BSNO2 = 6.653 GRAM/BHP HR
BSHC + BSNO2 = 7.431 GRAM/BHP HR
BSFC = .461 LB/BHP HR

TABLE B-104.EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-15-73 TEST NO. 2 W/ 100 PERCENT WATER
INJECTORS' LOW-SAC TIMING' 4 DEG RETD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	WATER INDUCT. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	16.24	16.31	52.231	R	100	81	106	230	205	1.6	.2
2	285	14.0	.19	16.24	16.38	24.925	.519	100	81	105	282	280	1.7	.2
3	344	24.5	.20	18.23	18.43	19.169	.489	100	82	108	340	323	2.8	.4
4	424	49.4	.36	22.94	23.31	12.208	.437	100	82	110	455	420	3.9	.6
5	515	78.4	.54	29.30	29.85	10.029	.416	100	80	105	560	525	4.7	.4
6	285	0.0	.05	16.25	16.30	71.938	R	100	80	101	330	302	1.8	.2
7	584	112.2	.77	33.18	33.94	7.643	.410	100	80	100	650	640	5.3	1.1
8	675	144.3	1.00	39.54	40.54	6.728	.416	100	80	100	722	740	6.4	1.4
9	755	175.1	1.24	44.70	45.94	5.837	.423	100	80	100	800	840	7.7	1.7
10	835	207.5	1.56	49.51	51.07	5.060	.452	100	78	101	870	940	9.3	2.0
11	285	0.0	.09	16.62	16.66	84.865	R	100	78	100	420	420	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF FUEL FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	64	60	108	13	113	1.09	19.3	R	R	R	8.44	6.38	19.88
2	1.0	72	71	161	15	166	2.21	18.8	.97	1.41	7.35	1.98	1.72	19.39
3	1.0	80	70	175	16	191	2.69	18.3	.82	1.43	6.37	1.67	2.42	13.82
4	1.5	88	81	309	16	320	3.74	17.2	.54	1.00	6.96	1.24	2.24	19.74
5	2.0	96	58	459	10	470	4.25	16.5	.48	.58	7.72	1.16	1.34	18.58
6	1.0	76	60	98	13	108	1.08	19.0	R	R	R	8.98	8.68	25.29
7	2.5	108	109	589	10	600	5.89	15.6	.93	1.96	7.84	1.05	2.67	19.12
8	2.5	132	336	602	15	618	5.66	15.0	.99	2.98	7.99	1.18	5.47	18.82
9	4.5	160	767	619	0	619	5.97	14.5	.55	5.30	6.96	1.20	12.23	16.87
10	7.5	192	1478	594	15	609	6.53	13.8	.62	12.00	6.98	1.30	28.32	14.33
11	1.0	88	29	104	3	107	1.00	19.5	R	R	R	8.06	9.36	32.83

CYCLE COMPOSITE BSHC = .699 GRAM/BHP HR
BSCO = 10.923 GRAM/BHP HR
BSNO2 = 7.189 GRAM/BHP HR
BSHC + BSNO2 = 7.883 GRAM/BHP HR
BSFC = .464 LB/BHP HR

TABLE B 105 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-08-73 TEST NO. 1 W/ 10 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	TEMPERATURES AIR BOX	DEGREES F LEFT EXHAUST	DEGREES F RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	19.84	19.93	.005	R	10	82	121	299	285	1.5	.2
2	285	15.0	.19	19.90	15.09	.010	.573	10	80	119	351	308	1.5	.2
3	394	23.2	.20	16.32	16.52	.012	.508	10	79	120	370	330	2.2	.4
4	494	46.9	.36	20.19	20.55	.018	.470	10	80	122	468	440	3.5	.5
5	515	70.3	.54	25.69	26.23	.021	.458	10	80	125	570	541	4.0	.7
6	285	0.0	.06	19.87	19.94	.004	R	10	80	120	309	291	1.5	.2
7	584	101.8	.76	30.06	30.82	.025	.450	10	80	128	643	673	4.4	.9
8	675	133.5	1.01	35.91	36.92	.028	.453	10	81	133	740	807	5.1	1.1
9	755	169.9	1.25	39.24	40.50	.032	.456	10	82	141	870	920	6.2	1.4
10	835	203.3	1.56	93.01	94.58	.036	.461	10	85	150	990	1068	8.5	1.8
11	285	0.0	.06	19.82	19.88	.004	R	10	85	137	900	340	1.5	1.8

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	112	59	126	5	131	1.19	.257	R	R	R	5.26	5.56	20.19
2	1.5	108	71	226	5	230	2.37	.100	1.93	1.86	9.48	2.99	3.25	17.92
3	1.0	120	47	271	9	281	2.91	.050	1.13	.88	8.63	2.22	1.72	16.98
4	1.0	136	35	426	5	930	9.19	.090	.80	.91	9.31	1.71	.87	17.68
5	1.0	152	34	551	5	556	9.72	.020	.75	.39	8.96	1.63	.79	19.57
6	.5	112	24	120	12	132	1.19	.257	R	R	R	5.81	2.96	22.95
7	1.0	184	114	710	14	724	5.66	.010	.74	.91	9.51	1.64	2.03	21.19
8	2.0	216	358	819	0	819	6.95	.010	.78	2.58	9.91	1.72	5.68	21.21
9	3.0	240	890	876	13	889	6.87	0.000	.78	5.75	9.93	1.71	12.61	20.68
10	5.0	424	2293	894	13	907	6.95	0.000	1.23	12.93	8.59	2.66	28.09	18.63
11	1.0	124	24	137	1	138	1.19	.257	R	R	R	6.91	2.95	23.33

CYCLE COMPOSITE

BSHC	=	3.075	GRAM/BHP HR
BSCO	=	2.996	GRAM/BHP HR
BSNO2	=	17.180	GRAM/BHP HR
BSHC + BSNO2	=	20.255	GRAM/BHP HR
BSFC	=	.859	LB/BHP HR

TABLE B-106, EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-08-73 TEST NO. 2 W/ 10 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	TEMPERATURES AIR BOX	DEGREES F LEFT EXHAUST	DEGREES F RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	19.90	19.97	.005	R	10	79	119	332	225	1.5	.2
2	285	15.0	.19	19.11	19.25	.010	.560	10	78	115	3[illegible]	264	1.5	.2
3	394	23.3	.21	15.99	16.15	.013	.531	10	79	119	355	310	2.4	.3
4	494	46.5	.36	19.66	20.00	.018	.470	10	79	120	446	419	3.[illegible]	.5
5	515	70.3	.54	25.70	26.24	.021	.463	10	80	122	563	541	3.9	.7
6	285	0.0	.07	19.49	19.55	.005	R	10	80	119	298	262	1.5	.2
7	584	101.8	.76	30.01	30.77	.025	.448	10	80	127	601	666	4.3	.9
8	675	132.7	1.01	35.01	36.02	.029	.457	10	81	133	708	800	5.1	1.1
9	755	166.6	1.26	90.62	91.88	.031	.454	10	82	141	878	936	6.2	1.4
10	835	202.2	1.56	93.37	94.93	.036	.462	10	90	160	998	1038	8.4	1.9
11	285	0.0	.06	19.95	19.51	.004	R	10	90	139	385	370	1.5	.2

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	98	119	17	131	1.19	.257	R	R	R	9.58	9.96	28.15
2	2.0	128	71	208	14	222	2.37	.100	1.58	1.76	9.11	2.69	3.15	16.27
3	1.5	136	70	299	28	272	3.03	.050	1.24	1.28	8.19	2.39	2.98	15.32
4	1.5	160	69	495	28	923	9.12	.090	.93	.78	8.83	1.97	1.71	17.06
5	2.0	188	69	531	9	590	9.79	.020	.89	.68	8.78	1.91	1.96	18.78
6	1.5	132	71	117	14	131	1.19	.257	R	R	R	6.39	6.83	28.56
7	2.0	208	148	682	9	691	5.66	.010	.83	1.18	9.02	1.88	2.63	20.19
8	2.5	248	358	777	27	804	6.95	.010	.89	2.86	9.92	1.96	5.60	20.64
9	4.0	284	1029	827	14	841	6.95	0.000	.99	6.77	9.13	2.08	13.92	20.18
10	7.0	452	2528	878	13	886	7.12	0.000	1.33	14.77	8.58	2.87	31.99	18.91
11	2.0	128	96	138	1	139	1.19	.257	R	R	R	7.88	10.79	25.81

CYCLE COMPOSITE

BSHC	=	3.252	GRAM/BHP HR
BSCO	=	3.999	GRAM/BHP HR
BSNO2	=	16.806	GRAM/BHP HR
BSHC + BSNO2	=	20.059	GRAM/BHP HR
BSFC	=	.867	LB/BHP HR

TABLE B-107. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-09-73 TEST NO. 2 W/ 20 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.25	13.31	.005	R	20	78	110	221	217	1.4	.2
2	285	19.9	.19	13.27	13.41	.011	.563	20	75	109	310	262	1.4	.2
3	399	23.7	.20	14.42	14.63	.013	.515	20	78	111	362	330	2.2	.3
4	424	44.4	.36	17.49	17.86	.021	.485	20	79	115	460	431	3.2	.4
5	515	69.9	.55	23.61	24.16	.023	.469	20	80	119	581	560	3.6	.6
6	285	0.0	.06	12.94	13.00	.005	R	20	79	113	340	320	1.3	.2
7	584	99.6	.76	27.46	28.22	.028	.458	20	80	120	710	689	3.9	.8
8	675	129.9	1.01	31.93	32.93	.032	.465	20	81	129	819	831	4.6	1.0
9	755	160.2	1.26	35.56	36.82	.035	.471	20	82	136	920	928	5.5	1.3
10	835	186.1	1.56	39.79	41.35	.039	.503	20	88	143	1028	1148	6.7	1.5
11	285	0.0	.06	13.73	13.79	.004	R	20	82	130	945	955	1.4	.2

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	89	98	119	12	132	1.28	.257	R	R	R	9.10	9.62	21.05
2	2.0	96	97	203	14	217	2.58	.100	1.14	1.11	8.93	2.02	1.97	19.97
3	1.5	112	97	253	14	272	3.26	.050	.91	.76	7.24	1.77	1.47	19.07
4	1.5	132	35	340	14	374	4.52	.040	.69	.36	6.93	1.93	.79	13.29
5	2.0	148	39	460	14	473	5.22	.020	.68	.31	7.07	1.99	.87	15.06
6	1.0	88	19	115	11	126	1.28	.257	R	R	R	9.19	1.13	19.66
7	2.5	176	125	496	0	496	6.05	.010	.66	.43	7.42	1.99	2.03	17.29
8	3.5	200	512	704	14	717	6.75	.010	.66	3.36	7.73	1.92	7.23	16.69
9	5.0	208	1370	793	0	793	7.98	0.000	.63	8.28	7.87	1.39	17.59	16.72
10	10.5	264	3119	786	13	799	8.13	0.000	.77	18.22	7.67	1.59	36.23	15.26
11	1.5	92	12	134	0	135	1.29	.257	R	R	R	9.99	1.27	23.61

CYCLE COMPOSITE BSHC = 2.260 GRAM/BHP HR
BSCO = 1.881 GRAM/BHP HR
BSNO2 = 14.548 GRAM/BHP HR
BSHC + BSNO2 = 16.808 GRAM/BHP HR
BSFC = .029 LB/BHP HR

TABLE B-108. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-09-73 TEST NO. 3 W/ 20 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	13.27	13.34	.005	R	20	70	103	220	210	1.4	.2
2	285	19.9	.13	12.93	13.06	.010	.536	20	70	109	310	262	1.4	.2
3	399	22.7	.20	14.94	15.14	.013	.521	20	70	110	357	307	2.3	.3
4	424	45.1	.36	18.23	18.58	.020	.475	20	71	111	451	421	3.2	.4
5	515	69.8	.55	23.54	24.09	.023	.470	20	71	112	568	548	3.6	.6
6	285	0.0	.06	13.28	13.34	.005	R	20	71	109	340	325	1.3	.2
7	584	99.6	.76	26.95	27.71	.028	.456	20	71	116	698	675	4.0	.8
8	675	131.1	1.00	31.99	32.99	.031	.459	20	73	121	805	820	4.6	1.0
9	755	160.9	1.25	36.18	37.44	.035	.467	20	75	128	896	907	5.4	1.3
10	835	192.7	1.56	38.84	40.40	.040	.485	20	75	135	1000	1110	6.8	1.6
11	285	0.0	.06	13.32	13.37	.004	R	20	77	121	950	945	1.4	.2

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	199	71	119	16	136	1.23	.257	R	R	R	6.34	6.25	14.57
2	2.0	116	99	206	14	221	2.37	.100	1.34	2.17	9.25	2.58	3.89	18.58
3	1.5	120	117	298	14	267	2.86	.050	1.06	2.05	7.72	2.03	3.99	19.02
4	1.5	128	115	386	14	400	4.14	.040	.70	1.25	7.13	1.97	2.63	15.02
5	2.5	190	137	519	5	524	4.79	.020	.69	1.25	7.01	1.96	2.65	15.61
6	1.5	96	98	121	13	134	1.19	.257	R	R	R	9.78	9.69	21.97
7	2.5	160	217	493	5	498	5.59	.010	.64	1.54	7.79	1.29	3.98	17.88
8	3.5	192	488	704	28	732	6.45	.010	.64	3.23	8.39	1.39	7.89	18.27
9	4.0	204	1208	808	41	849	6.95	0.000	.69	7.88	8.53	1.34	16.84	18.26
10	9.0	268	2992	834	14	848	7.40	0.000	.79	16.22	7.72	1.53	33.97	15.93
11	1.5	88	12	137	0	137	1.19	.257	R	R	R	9.67	1.23	23.29

CYCLE COMPOSITE BSHC = 2.659 GRAM/BHP HR
BSCO = 3.391 GRAM/BHP HR
BSNO2 = 15.258 GRAM/BHP HR
BSHC + BSNO2 = 17.917 GRAM/BHP HR
BSFC = .035 LB/BHP HR

TABLE B-109. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-03-73 TEST NO. 1 W/ 35 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	11.65	11.71	.005	R	35	70	110	252	240	1.1	.1
2	285	15.3	.19	11.07	11.21	.013	.599	35	70	110	331	282	1.2	.1
3	394	23.9	.20	11.98	12.18	.016	.512	35	70	111	368	325	2.0	.3
4	929	92.9	.35	14.85	15.20	.029	.490	35	70	112	470	441	2.9	.4
5	515	71.0	.59	18.67	19.21	.029	.459	35	77	115	602	572	3.2	.5
6	285	0.0	.06	11.27	11.33	.005	R	35	71	109	300	277	1.1	.1
7	584	99.0	.76	22.28	23.04	.034	.487	35	73	118	738	720	3.4	.7
8	675	127.7	1.00	26.79	27.79	.037	.468	35	75	121	860	872	3.9	.8
9	755	162.4	1.26	30.93	31.68	.041	.464	35	79	129	978	1052	4.7	1.1
10	835	189.7	1.56	33.19	34.70	.047	.507	35	80	135	1108	1287	5.6	1.4
11	285	0.0	.05	10.80	10.85	.005	R	35	80	126	520	530	1.2	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	36	133	11	144	1.32	.257	R	R	R	2.93	2.89	19.18
2	2.0	89	53	214	14	227	2.00	.100	.81	1.13	7.14	1.98	2.05	13.11
3	1.5	96	58	249	14	263	3.38	.050	.69	.83	6.14	1.39	1.61	12.00
4	2.5	109	57	345	14	358	4.86	.040	.64	.53	5.44	.99	1.09	11.21
5	3.0	120	90	484	5	489	5.66	.020	.43	.44	5.22	.93	1.40	12.45
6	1.5	88	24	1230	409	136	1.37	.257	R	R	R	3.65	1.46	10.44
7	5.5	136	913	617	4	621	6.78	.010	.44	2.66	6.57	.90	5.46	13.44
8	6.5	169	1011	648	13	661	7.48	.010	.47	5.77	6.20	1.00	12.33	13.25
9	10.0	156	2187	734	13	747	8.22	0.000	.40	11.22	6.36	.87	29.17	13.56
10	20.5	176	3755	712	13	725	9.02	0.000	.44	18.55	5.88	.86	36.60	11.60
11	2.0	96	36	135	4	139	1.28	.257	R	R	R	4.58	3.39	21.68

CYCLE COMPOSITE BSHC = 1.773 GRAM/BHP HR
BSCO = 2.688 GRAM/BHP HR
BSNO2 = 12.708 GRAM/BHP HR
BSHC + BSNO2 = 14.481 GRAM/BHP HR
BSFC = .827 LB/BHP HR

TABLE B-110. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-03-73 TEST NO. 3 W/ 35 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.90	12.96	.005	R	35	81	120	285	270	1.1	.1
2	285	15.2	.19	11.66	11.79	.016	.539	35	75	116	350	299	1.2	.1
3	394	23.7	.28	13.98	13.68	.015	.504	35	70	112	378	339	1.9	.2
4	929	94.9	.36	15.66	16.02	.023	.476	35	69	111	478	481	2.9	.4
5	515	68.9	.59	19.58	20.12	.028	.476	35	70	114	605	579	3.2	.5
6	285	0.0	.06	11.52	11.58	.005	R	35	78	118	266	251	1.1	.1
7	584	97.6	.77	22.62	23.39	.033	.471	35	78	118	740	720	3.4	.8
8	675	127.9	1.00	26.99	27.99	.037	.473	35	81	122	866	888	3.9	.9
9	755	159.2	1.27	30.29	31.56	.042	.493	35	82	130	989	1056	4.6	1.1
10	835	178.5	1.54	33.67	35.23	.046	.529	35	80	130	1121	1348	5.4	1.4
11	285	0.0	.06	11.96	11.52	.005	R	35	81	120	918	918	1.1	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	59	135	6	141	1.37	.257	R	R	R	4.06	5.73	22.90
2	3.0	84	82	223	10	232	2.64	.100	.86	1.69	9.78	1.58	3.18	19.99
3	2.0	88	82	275	15	290	3.32	.050	.67	1.24	9.23	1.32	2.99	19.28
4	3.0	116	88	366	101	367	4.86	.040	.65	.75	8.66	1.16	1.58	11.88
5	4.0	144	102	983	0	983	5.66	.020	.59	.79	8.13	1.19	1.66	12.00
6	2.0	88	59	128	16	144	1.37	.257	R	R	R	3.74	5.02	20.09
7	5.5	168	959	637	14	651	6.70	.010	.83	2.23	6.74	1.13	4.74	14.31
8	7.5	184	1038	609	0	609	7.48	.010	.83	6.08	6.54	1.13	12.64	13.44
9	11.5	152	2300	774	0	774	8.22	0.000	.91	12.00	6.89	.82	25.94	13.98
10	20.5	176	3761	772	0	772	9.02	0.000	.96	19.52	6.58	.87	37.23	12.55
11	2.5	88	71	169	3	186	1.32	.257	R	R	R	3.99	6.35	22.89

CYCLE COMPOSITE BSHC = 1.905 GRAM/BHP HR
BSCO = 3.873 GRAM/BHP HR
BSNO2 = 13.789 GRAM/BHP HR
BSHC + BSNO2 = 15.694 GRAM/BHP HR
BSFC = .820 LB/BHP HR

TABLE B-111. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-29-72 TEST NO. 1 W/ 50 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	9.35	9.41	.006	R	50	74	109	206	209	1.0	.2
2	285	15.5	.14	9.34	9.48	.015	.541	50	75	109	323	275	1.0	.1
3	344	23.1	.20	10.43	10.63	.019	.519	50	78	111	380	341	1.6	.2
4	424	41.2	.35	11.90	12.26	.030	.524	50	77	111	509	469	2.5	.2
5	515	66.4	.54	15.46	16.00	.035	.488	50	79	111	651	609	2.8	.4
6	285	0.0	.06	9.45	9.51	.006	R	50	79	110	345	312	.9	.1
7	584	93.5	.76	17.83	18.59	.043	.488	50	78	117	780	771	2.9	.6
8	675	123.2	.99	22.56	23.55	.044	.484	50	75	120	930	950	3.1	.7
9	755	146.1	1.25	23.61	24.86	.053	.513	50	74	122	1090	1220	3.7	.9
10	835	166.3	1.53	26.17	27.71	.059	.553	50	79	131	1260	1450	4.5	1.2
11	285	0.0	.05	9.44	9.54	.005	R	50	77	121	510	500	1.0	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	104	71	127	33	160	1.66	.257	R	R	R	3.59	4.89	18.05
2	4.0	136	116	213	30	243	3.50	.100	1.10	1.87	6.42	2.03	3.45	11.85
3	3.0	160	115	231	30	261	4.12	.050	.97	1.39	5.18	1.87	2.69	9.99
4	4.5	184	158	314	10	324	5.89	.040	.72	1.23	4.16	1.38	2.36	7.99
5	8.0	224	412	447	0	447	6.61	.020	.71	2.61	4.65	1.46	5.35	4.53
6	1.0	140	71	138	19	157	1.56	.257	R	R	R	5.17	5.23	18.95
7	16.0	236	1721	535	19	554	7.84	.010	.62	9.00	4.76	1.27	18.44	4.76
8	20.0	176	3329	571	0	571	8.52	.010	.44	16.73	4.72	.92	34.59	4.75
9	24.0	120	4277	644	0	644	9.66	0.000	.27	19.19	4.74	.53	37.29	4.23
10	37.0	92	4924	650	19	669	4.80	0.000	.20	21.58	4.78	.37	39.00	8.69
11	1.5	84	24	142	4	146	1.56	.257	R	R	R	3.53	1.99	20.01

CYCLE COMPOSITE BSHC = 2.120 GRAM/BHP HR
BSCO = 6.326 GRAM/BHP HR
BSNO2 = 11.201 GRAM/BHP HR
BSHC + BSNO2 = 13.321 GRAM/BHP HR
BSFC = .537 LB/BHP HR

TABLE B-112. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-05-73 TEST NO. 4 W/ 50 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	9.43	9.49	.007	R	50	73	112	270	250	.9	.1
2	285	14.9	.14	9.55	9.68	.014	.550	50	70	111	345	287	.9	.1
3	344	23.8	.21	10.53	10.74	.020	.521	50	70	112	305	350	1.6	.2
4	424	42.7	.36	11.93	12.29	.030	.501	50	70	112	442	452	2.5	.3
5	515	66.4	.55	15.52	16.07	.035	.494	50	71	112	630	580	2.8	.4
6	285	0.0	.06	10.52	10.58	.006	R	50	71	110	305	350	.9	.1
7	584	93.5	.76	17.79	18.55	.043	.490	50	71	111	750	735	2.9	.6
8	675	117.0	1.01	21.41	22.42	.047	.516	50	75	118	920	942	3.1	.7
9	755	152.7	1.26	23.88	25.14	.053	.495	50	70	121	1080	1190	3.7	.9
10	835	164.3	1.56	26.00	27.56	.060	.570	50	80	130	1255	1446	4.4	1.2
11	285	0.0	.05	9.40	9.46	.006	R	50	80	122	530	510	1.0	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	104	83	125	12	137	1.61	.257	R	R	R	3.43	5.44	19.75
2	3.5	136	117	200	15	215	3.32	.100	1.17	1.99	6.02	2.12	3.62	10.96
3	2.5	144	104	241	14	255	4.06	.050	.86	1.23	4.97	1.65	2.36	9.84
4	3.5	180	135	305	0	305	5.01	.040	.60	1.02	3.79	1.36	2.09	7.57
5	6.5	208	295	439	5	443	6.70	.020	.66	1.80	4.69	1.35	3.00	9.30
6	1.5	120	71	122	12	134	1.56	.257	R	R	R	4.97	5.50	17.03
7	12.0	220	1265	544	4	548	7.44	.010	.50	6.61	4.70	1.10	13.40	4.54
8	14.0	104	3012	561	0	561	8.62	.010	.47	14.21	4.64	.40	37.21	8.44
9	26.0	132	4278	607	13	620	9.66	0.000	.24	18.52	4.41	.50	37.41	8.90
10	37.0	96	5309	597	13	610	4.00	0.000	.21	23.77	4.42	.37	41.74	7.76
11	2.5	92	59	143	3	146	1.56	.257	R	R	R	3.89	4.61	18.61

CYCLE COMPOSITE BSHC = 2.146 GRAM/BHP HR
BSCO = 6.586 GRAM/BHP HR
BSNO2 = 10.585 GRAM/BHP HR
BSHC + BSNO2 = 12.731 GRAM/BHP HR
BSFC = .561 LB/BHP HR

TABLE B-113. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-19-73 TEST NO. 1 W/ 20 PCT. AIRBOX BLEED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.38	13.44	99.572	R	20	74	103	214	205	1.3	.2
2	285	14.8	.13	13.37	13.50	21.284	.590	20	75	103	282	275	1.3	.2
3	399	29.5	.20	19.15	19.35	19.771	.481	20	77	110	330	323	2.1	.3
4	424	48.6	.34	18.27	18.62	9.918	.491	20	77	111	487	462	3.0	.4
5	515	73.6	.54	23.63	24.17	7.580	.493	20	75	112	542	555	3.5	.6
6	285	0.0	.06	13.38	13.43	53.777	R	20	74	109	255	230	1.2	.2
7	584	103.7	.76	27.43	28.19	5.450	.490	20	80	116	728	695	3.8	.8
8	675	136.4	1.00	31.61	32.61	4.727	.438	20	78	122	840	840	4.2	1.0
9	755	166.3	1.25	36.58	37.84	3.992	.452	20	88	132	953	1010	5.0	1.2
10	835	193.8	1.56	90.92	91.48	3.120	.484	20	95	146	1098	1260	6.0	1.5
11	285	0.0	.05	13.30	13.36	52.660	R	20	85	118	228	210	1.2	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	36	154	18	172	1.28	19.6	R	R	R	3.79	3.50	27.81
2	2.0	88	59	294	20	314	2.64	19.0	1.06	1.91	10.60	1.96	2.61	19.63
3	2.0	108	70	297	20	317	3.50	18.3	.81	1.08	8.00	1.79	2.29	16.63
4	1.5	128	69	474	20	494	5.00	16.3	.65	.70	8.26	1.47	1.58	10.75
5	2.5	136	103	641	15	655	5.59	15.4	.59	.84	9.30	1.33	2.01	20.99
6	1.0	96	36	154	15	170	1.28	20.5	R	R	R	5.01	3.71	28.44
7	3.5	156	217	808	29	836	6.45	14.5	.56	1.65	9.82	1.27	3.53	22.13
8	3.0	192	660	930	29	958	7.48	13.1	.60	4.19	9.86	1.38	9.44	22.53
9	4.0	184	1648	996	28	1024	8.03	11.8	.55	9.86	10.07	1.22	21.80	22.26
10	10.0	192	3595	953	0	953	8.82	10.5	.55	20.98	8.92	1.13	42.31	18.93
11	1.0	96	98	170	3	173	7.89	14.0	R	R	R	5.29	5.23	31.13

CYCLE COMPOSITE BSHC = 2.197 GRAM/BHP HR
BSCO = 2.829 GRAM/BHP HR
BSNO2 = 18.292 GRAM/BHP HR
BSHC + BSNO2 = 20.389 GRAM/BHP HR
BSFC = .771 LB/BHP HR

TABLE B-114. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-19-73 TEST NO. 2 W/ 20 PCT. AIRBOX BLEED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.27	13.33	97.649	R	20	85	114	228	210	1.2	.2
2	285	15.7	.13	13.27	13.41	21.137	.518	20	85	117	298	287	1.2	.2
3	399	29.5	.20	19.06	19.26	19.522	.481	20	85	120	338	330	2.0	.3
4	424	48.6	.34	18.19	18.53	9.181	.491	20	86	124	482	455	3.0	.4
5	515	73.6	.55	23.42	23.97	7.373	.496	20	88	125	596	555	3.4	.6
6	285	0.0	.06	13.25	13.30	52.736	R	20	86	119	280	250	1.2	.2
7	584	109.9	.76	27.29	28.05	5.466	.437	20	87	125	735	705	3.8	.8
8	675	136.4	1.00	31.39	32.39	4.716	.448	20	87	130	835	840	4.2	1.0
9	755	166.3	1.27	36.36	37.63	3.979	.467	20	90	137	965	1025	5.0	1.2
10	835	193.8	1.56	90.65	92.12	3.108	.484	20	98	139	1093	1222	6.0	1.5
11	285	0.0	.06	13.24	13.30	94.831	R	20	95	135	235	225	1.2	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	59	161	12	173	1.28	19.4	R	R	R	3.93	5.74	27.61
2	2.0	72	99	298	10	308	2.75	19.0	.81	2.11	10.62	1.84	4.15	20.03
3	2.0	84	105	300	15	315	3.38	18.1	.64	1.61	7.92	1.34	3.34	16.44
4	2.0	104	115	477	10	486	4.93	16.0	.52	1.15	8.08	1.19	2.69	18.16
5	3.0	108	137	666	14	681	5.69	15.2	.46	1.18	9.58	1.04	2.64	21.48
6	1.0	72	36	154	15	169	1.23	20.3	R	R	R	3.72	3.67	28.61
7	4.0	148	299	803	14	817	6.37	14.9	.52	2.11	9.94	1.28	4.82	21.62
8	4.0	172	710	918	14	932	7.21	13.2	.54	4.92	9.95	1.22	10.05	21.98
9	5.0	168	1496	933	28	961	8.03	11.8	.50	11.88	9.98	1.10	25.94	20.55
10	13.0	164	3402	916	0	916	8.62	10.9	.47	19.98	8.68	.97	41.12	17.76
11	1.0	100	98	169	3	172	1.19	19.1	R	R	R	9.87	9.62	27.98

CYCLE COMPOSITE BSHC = 1.799 GRAM/BHP HR
BSCO = 3.519 GRAM/BHP HR
BSNO2 = 17.985 GRAM/BHP HR
BSHC + BSNO2 = 19.785 GRAM/BHP HR
BSFC = .775 LB/BHP HR

TABLE B-115 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-20-73 TEST NO. 1 W/ 35 PCT. AIRBOX BLEED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	10.57	10.63	39,898	R	35	77	112	372	315	1.0	.2
2	285	16.6	.19	10.61	10.75	19,996	.995	35	73	110	342	320	1.0	.2
3	344	26.9	.20	11.62	11.82	10,205	.955	35	73	114	364	347	1.6	.3
4	424	45.7	.36	15.01	15.36	6,387	.968	35	73	112	496	460	2.4	.3
5	515	73.4	.55	18.93	19.48	4,899	.997	35	76	115	692	595	2.9	.5
6	285	0.0	.06	10.58	10.64	37,092	R	35	78	115	370	285	1.0	.2
7	584	101.9	.77	22.16	22.92	3,590	.953	35	80	120	892	847	3.5	.8
8	675	129.2	1.00	25.82	26.82	2,899	.968	35	87	125	1060	1160	4.0	1.0
9	755	154.4	1.26	29.89	31.15	2,079	.988	35	95	137	1230	1310	4.7	1.3
10	835	177.0	1.58	32.68	34.26	1,559	.535	35	95	137	1230	1310	4.7	1.3
11	285	0.0	.07	11.02	11.07	42,987	R	35	88	127	960	925	1.0	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	71	168	8	176	1.92	19.2	R	R	R	2.11	5.86	23.78
2	1.5	76	94	289	14	303	3.20	16.6	.65	1.60	8.99	1.31	3.22	17.16
3	1.5	84	93	310	9	319	3.99	15.6	.50	1.09	6.17	1.09	2.90	13.57
4	2.0	92	126	437	9	447	5.81	13.9	.41	1.11	6.98	.77	2.37	13.85
5	4.5	108	333	595	14	608	6.61	12.5	.38	2.31	6.93	1	5.18	15.51
6	1.0	80	97	170	9	179	1.96	18.4	R	R	R	3. 2	3.64	22.83
7	7.0	128	1003	721	0	721	7.98	10.7	.38	5.96	7.04	.89	13.15	15.53
8	9.0	128	2184	728	13	742	8.22	9.6	.35	11.58	6.70	.76	24.74	14.32
9	14.5	96	3680	788	0	788	9.23	7.6	.25	19.91	6.83	.62	39.77	14.00
10	77.0	98	4088	765	52	817	9.33	6.5	.25	20.81	6.83	.67	38.86	12.75
11	1.0	72	95	176	0	176	1.97	18.5	R	R	R	3.29	8.65	26.39

CYCLE COMPOSITE BSHC = 1.389 GRAM/BHP HR
BSCO = 5.370 GRAM/BHP HR
BSNO2 = 19.408 GRAM/BHP HR
BSHC + BSNO2 = 15.798 GRAM/BHP HR
BSFC = .771 LB/BHP HR

TABLE B-116. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-28-73 TEST NO. 2 W/ 35 PCT IRBOX BLEED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	10.59	10.68	98,128	R	35	80	117	488	445	1.0	.2
2	285	16.9	.19	10.83	10.17	13,988	.596	35	77	112	390	362	1.0	.2
3	344	27.2	.20	12.07	12.27	11,321	.933	35	75	115	383	378	1.5	.3
4	424	45.7	.36	14.97	15.33	6,315	.972	35	75	113	498	465	2.6	.4
5	515	73.4	.54	18.96	19.50	4,806	.991	35	76	115	695	588	2.9	.5
6	285	0.0	.06	10.60	10.66	37,591	R	35	76	118	388	338	1.0	.2
7	584	102.2	.77	22.23	23.00	3,651	.958	35	76	115	788	782	3.5	.7
8	675	131.2	1.00	25.82	26.82	2,789	.957	35	76	120	988	918	3.6	.8
9	755	156.3	1.26	29.93	31.19	2,387	.988	35	88	126	1038	1128	4.1	1.0
10	835	183.0	1.56	32.79	34.35	1,789	.510	35	88	130	1158	1335	4.8	1.3
11	285	0.0	.05	10.56	10.61	99,371	R	35	78	117	385	335	1.0	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	97	156	3	159	1.97	19.4	R	R	R	2.97	3.89	21.36
2	1.5	68	93	255	4	260	2.91	17.3	.69	1.62	7.98	1.89	2.97	13.58
3	2.0	72	93	259	53	312	3.56	16.4	.93	1.10	6.87	.99	2.89	14.02
4	2.0	84	119	306	4	340	5.34	13.4	.37	1.01	6.66	.79	2.13	11.97
5	5.5	96	378	560	13	573	6.53	12.1	.33	2.67	6.59	.76	5.21	14.92
6	1.0	69	89	153	8	161	1.97	19.1	R	R	R	2.58	4.62	20.63
7	6.0	116	1089	669	26	669	7.30	11.0	.34	5.99	6.81	.77	13.28	14.94
8	8.5	124	2870	688	25	713	7.94	9.9	.33	11.88	6.23	.78	29.87	14.63
9	12.0	104	3832	760	12	772	8.82	8.9	.27	16.96	6.66	.67	36.16	13.74
10	14.0	104	3751	788	13	801	9.66	7.9	.24	18.61	6.99	.58	38.28	12.72
11	1.0	72	89	156	0	156	1.97	18.9	R	R	R	3.36	8.53	29.05

CYCLE COMPOSITE BSHC = 1.231 GRAM/BHP HR
BSCO = 4.926 GRAM/BHP HR
BSNO2 = 18.984 GRAM/BHP HR
BSHC + BSNO2 = 16.186 GRAM/BHP HR
BSFC = .778 LB/BHP HR

TABLE B-117. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-08-73 TEST NO. 1 W/ 10 PCT. AIRBOX BLEED
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	19.86	19.93	.005	R	10	82	121	299	285	1.5	.2
2	285	15.0	.19	19.80	15.09	.010	.573	10	80	119	351	308	1.5	.2
3	399	23.2	.20	16.32	16.52	.012	.508	10	79	120	370	330	2.3	.4
4	424	45.3	.36	19.19	20.55	.018	.470	10	80	122	468	440	3.5	.5
5	515	70.3	.59	25.69	26.23	.021	.458	10	80	125	570	541	4.0	.7
6	285	0.0	.08	19.87	19.94	.004	R	10	80	120	309	291	1.5	.2
7	589	101.3	.76	30.06	30.82	.025	.450	10	80	128	643	673	4.4	.9
8	675	133.3	1.01	35.41	36.42	.028	.453	10	81	133	790	807	5.1	1.1
9	755	169.9	1.25	39.29	40.50	.032	.454	10	82	141	870	920	6.2	1.4
10	835	203.3	1.56	43.01	44.58	.036	.461	10	85	154	990	1028	8.5	1.8
11	285	0.0	.06	19.82	19.88	.004	R	10	85	147	400	390	1.5	1.8

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	112	59	126	5	131	1.14	.193	R	R	R	5.26	5.56	20.14
2	1.5	108	71	226	5	230	2.37	.030	1.43	1.86	9.98	2.49	3.25	17.42
3	1.0	120	47	271	9	281	2.91	.030	1.13	.88	8.63	2.22	1.72	16.98
4	1.0	136	35	426	5	430	4.14	.030	.80	.41	8.31	1.71	.87	17.60
5	1.0	152	34	551	5	556	4.72	.030	.75	.34	8.96	1.63	.74	19.57
6	.5	112	24	128	.2	132	1.14	.193	R	R	R	5.81	2.46	22.95
7	1.0	184	114	710	14	729	5.66	.030	.74	.41	9.51	1.64	2.03	21.14
8	2.0	216	358	814	0	814	6.95	.030	.78	2.58	9.61	1.72	5.68	21.21
9	3.0	240	890	876	13	889	6.87	.030	.78	5.75	9.93	.71	12.61	20.68
10	6.0	424	2243	894	13	907	6.95	.280	1.23	12.93	8.59	2.66	8.09	18.63
11	1.0	124	24	137	1	138	1.14	.193	R	R	R	6.41	2.95	23.33

CYCLE COMPOSITE BSHC = 1.264 GRAM/BHP HR
BSCO = 10.695 GRAM/BHP HR
BSNO2 = 9.260 GRAM/BHP HR
BSHC + BSNO2 = 10.524 GRAM/BHP HR
BSFC = .484 LB/BHP HR

TABLE B-118. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-04-73 TEST NO. 2 W/ 10 PCT. AIRBOX BLEED
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	19.90	19.97	.005	R	10	79	119	232	225	1.5	.2
2	285	15.0	.19	19.11	19.25	.010	.560	10	78	115	310	269	1.5	.2
3	399	23.3	.21	15.99	16.15	.013	.531	10	79	119	355	310	2.9	.3
4	424	45.5	.36	19.64	20.00	.018	.470	10	78	120	445	419	3.9	.5
5	515	70.3	.54	25.70	26.24	.021	.463	10	80	122	563	541	3.9	.7
6	285	0.0	.07	19.99	19.55	.005	R	10	80	119	240	262	1.5	.2
7	589	101.8	.76	30.01	30.77	.025	.448	10	80	127	601	666	4.3	.9
8	675	132.7	1.01	35.01	36.02	.029	.457	10	81	133	780	800	5.1	1.1
9	755	166.6	1.26	40.62	41.88	.031	.454	10	85	141	870	936	6.2	1.4
10	835	202.2	1.56	43.37	44.93	.036	.462	10	90	148	990	1030	8.4	1.9
11	285	0.0	.06	15.45	15.51	.004	R	10	90	139	385	370	1.5	.2

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	96	98	119	17	131	1.14	.193	R	R	R	9.66	9.96	20.15
2	2.0	120	71	208	14	222	2.37	.030	1.58	1.76	9.11	2.69	3.15	16.27
3	1.5	136	70	249	28	278	3.09	.030	1.29	1.28	8.19	2.34	2.98	15.32
4	1.5	148	49	395	28	423	4.12	.030	.91	.88	8.83	1.97	1.91	17.06
5	2.0	180	49	531	9	540	4.74	.030	.89	.68	8.78	1.91	1.96	18.78
6	1.5	132	71	117	14	131	1.14	.193	R	R	R	6.34	6.83	20.56
7	2.0	208	148	682	9	691	5.66	.030	.83	1.18	9.82	1.85	2.63	20.19
8	2.5	248	358	777	27	804	6.95	.030	.89	2.56	9.92	1.96	5.68	20.64
9	4.0	284	1024	827	14	841	6.95	.030	.99	6.77	9.13	2.08	14.92	20.12
10	7.0	452	2628	892	13	886	7.12	.280	1.33	14.77	8.58	2.87	31.94	18.91
11	2.0	128	96	138	1	139	1.14	.193	R	R	R	7.28	10.79	25.81

CYCLE COMPOSITE BSHC = 1.373 GRAM/BHP HR
BSCO = 12.288 GRAM/BHP HR
BSNO2 = 9.120 GRAM/BHP HR
BSHC + BSNO2 = 10.992 GRAM/BHP HR
BSFC = .484 LB/BHP HR

TABLE B-119. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-04-73 TEST NO. 2 W/ 20 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.25	13.31	.005	R	20	78	110	221	217	1.9	.2
2	285	14.9	.14	13.27	13.41	.011	.563	20	75	109	310	262	1.9	.2
3	344	23.7	.20	14.42	14.63	.014	.515	20	78	111	362	330	2.2	.3
4	424	44.9	.36	17.44	17.86	.021	.485	20	79	115	460	431	3.2	.4
5	515	69.9	.55	23.61	24.16	.023	.469	20	80	119	501	560	3.6	.6
6	285	0.0	.06	12.94	13.00	.005	R	20	79	113	340	320	1.3	.2
7	584	94.6	.74	27.46	28.22	.028	.458	20	80	120	710	684	3.9	.8
8	675	129.9	1.01	31.93	32.93	.032	.465	20	81	129	819	831	4.6	1.0
9	755	160.2	1.26	35.56	36.82	.035	.471	20	82	136	920	978	5.[illegible]	1.3
10	835	194.1	1.56	39.79	41.35	.039	.503	20	88	143	1028	1149	[illegible].7	1.5
11	285	0.0	.06	13.73	13.79	.004	R	20	82	130	995	955	1.9	.2

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	89	48	119	12	132	1.28	.193	R	R	R	9.10	9.62	21.05
2	2.0	96	47	203	14	217	2.58	.030	1.19	1.11	8.93	2.02	1.97	19.97
3	1.5	112	47	253	19	272	3.26	.030	.91	.76	7.24	1.77	1.47	19.07
4	1.5	132	35	360	19	379	4.52	.030	.69	.36	6.93	1.93	.79	13.29
5	2.0	148	39	460	24	473	5.22	.030	.68	.31	7.07	1.99	.67	15.06
6	1.0	88	12	115	11	126	1.28	.193	R	R	R	9.19	1.13	19.66
7	2.5	176	125	696	0	696	6.05	.030	.66	.43	7.92	1.99	2.03	17.29
8	3.5	200	512	704	13	717	6.95	.030	.66	3.56	7.73	1.97	7.23	16.69
9	5.0	208	1920	793	0	793	7.98	.030	.63	8.26	7.87	1.36	17.57	16.72
10	10.5	264	3119	786	13	799	8.13	.200	.77	18.22	7.67	1.59	36.23	15.26
11	1.5	92	12	135	0	135	1.23	.193	R	R	R	9.93	1.27	23.61

CYCLE COMPOSITE BSHC = .899 GRAM/BHP HR
BSCO = 14.781 GRAM/BHP HR
BSNO2 = 0.133 GRAM/BHP HR
BSHC + BSNO2 = 0.992 GRAM/BHP HR
BSFC = .518 LB/BHP HR

TABLE B-120. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-04-73 TEST NO. 3 W/ 20 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	13.27	13.34	.005	R	20	78	103	220	210	1.9	.2
2	285	14.9	.13	12.93	13.06	.010	.536	20	78	109	310	262	1.9	.2
3	344	22.7	.20	14.94	15.14	.013	.521	20	78	110	357	347	2.3	.3
4	424	45.1	.36	18.23	18.58	.020	.476	20	71	111	451	421	3.2	.4
5	515	69.8	.55	23.54	24.09	.023	.470	20	71	112	568	548	3.6	.6
6	285	0.0	.06	13.28	13.34	.005	R	20	71	109	348	325	1.3	.2
7	584	94.6	.76	26.95	27.71	.028	.456	20	71	116	698	675	4.0	.8
8	675	131.1	1.00	31.49	32.49	.031	.459	20	73	121	885	820	4.6	1.0
9	755	160.9	1.25	36.10	37.44	.035	.467	20	76	128	895	997	5.6	1.3
10	835	192.7	1.56	38.84	40.48	.040	.485	20	75	135	1080	1110	6.0	1.6
11	285	0.0	.06	13.32	13.37	.004	R	20	77	121	950	995	1.9	.2

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	144	71	119	16	136	1.23	.193	R	R	R	6.39	6.25	14.57
2	2.0	116	44	206	14	221	2.37	.030	1.34	1.17	8.35	2.58	2.04	15.58
3	1.5	128	117	240	14	267	2.86	.030	1.06	2.05	7.78	2.03	3.99	19.02
4	1.5	128	115	386	14	400	4.19	.030	.78	1.25	7.13	1.97	2.63	15.82
5	2.5	148	137	519	5	524	5.79	.030	.69	1.25	7.01	1.96	2.65	16.61
6	1.5	96	98	121	13	134	1.14	.193	R	R	R	9.78	9.69	21.97
7	2.5	160	217	693	5	698	5.84	.030	.59	1.99	7.79	1.84	3.48	17.88
8	3.5	192	488	744	28	772	6.95	.030	.69	3.23	8.34	1.34	7.84	18.27
9	4.0	204	1786	888	91	979	6.96	.030	.63	7.88	8.53	1.34	16.86	18.25
10	9.0	268	2992	839	19	858	7.98	.200	.79	16.82	7.78	1.58	33.47	16.93
11	1.5	88	12	137	0	137	1.19	.193	R	R	R	9.89	1.23	23.29

CYCLE COMPOSITE BSHC = .898 GRAM/BHP HR
BSCO = 13.938 GRAM/BHP HR
BSNO2 = 0.200 GRAM/BHP HR
BSHC + BSNO2 = 9.130 GRAM/BHP HR
BSFC = .503 LB/BHP HR

TABLE B-121. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-03-73 TEST NO. 1 W/ 35 PCT. AIRBOX BLEED
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	11.65	11.71	.005	R	35	70	110	252	0	1.1	.1
2	285	15.3	.19	11.07	11.21	.013	.594	35	70	110	331	2.2	1.2	.1
3	344	23.4	.20	12.48	12.68	.016	.512	35	70	111	368	325	2.0	.3
4	424	42.4	.36	14.85	15.20	.024	.440	35	70	112	470	440	2.4	.4
5	515	71.0	.54	18.67	19.21	.028	.459	35	72	115	602	572	3.2	.5
6	285	0.0	.06	11.27	11.33	.005	R	35	71	109	305	277	1.1	.1
7	504	94.0	.78	22.29	23.09	.034	.487	35	73	118	738	720	3.4	.7
8	675	127.7	1.00	26.74	27.74	.037	.468	35	75	121	860	872	3.9	.9
9	755	142.4	1.26	30.43	31.68	.041	.474	35	79	129	978	1052	4.7	1.1
10	835	184.2	1.56	33.14	34.70	.047	.507	35	80	135	1108	1287	5.6	1.4
11	285	0.0	.05	10.80	10.85	.005	R	35	80	126	520	530	1.2	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	36	133	11	144	1.32	.193	R	R	R	2.93	2.09	14.18
2	2.0	84	58	214	14	227	2.80	.030	.81	1.13	7.14	1.98	2.05	13.11
3	1.5	96	58	264	14	263	3.38	.030	.69	.83	6.14	1.34	1.61	12.00
4	2.5	104	57	345	14	358	4.86	.030	.49	.53	5.99	.99	1.09	11.21
5	3.0	120	90	484	4	488	5.66	.030	.43	.64	5.72	.93	1.40	12.46
6	1.5	88	29			136	1.37	.193	R	R	R	3.65	1.96	18.99
7	5.5	136	913	617	4	621	6.78	.030	.49	2.66	6.57	.90	5.96	13.99
8	6.5	164	1017	648	13	661	7.48	.030	.47	5.27	6.20	1.00	12.33	13.25
9	10.0	156	2187	734	13	747	8.22	.030	.40	11.22	6.30	.87	29.17	13.56
10	20.5	176	3755	712	13	725	9.02	.280	.44	18.55	5.88	.86	36.60	11.60
11	2.0	96	36	135	4	139	1.28	.193	R	R	R	4.58	3.39	21.68

CYCLE COMPOSITE BSHC = .527 GRAM/BHP HR
BSCO = 15.997 GRAM/BHP HR
BSNO2 = 6.388 GRAM/BHP HR
BSHC + BSNO2 = 6.910 GRAM/BHP HR
BSFC = .521 LB/BHP HR

TABLE B-122. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-03-73 TEST NO. 2 W/ 35 PCT. AIRBOX BLEED
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.90	12.96	.005	R	35	81	120	285	270	1.1	.1
2	285	15.2	.19	11.66	11.79	.012	.539	35	75	115	350	299	1.2	.1
3	344	23.7	.20	13.48	13.68	.015	.506	35	70	112	378	339	1.4	.2
4	424	44.4	.36	15.66	16.02	.023	.476	35	69	111	478	451	2.4	.4
5	515	68.4	.54	19.58	20.12	.028	.476	35	70	114	605	579	3.2	.5
6	285	0.0	.06	11.52	11.58	.005	R	35	70	110	265	251	1.1	.1
7	504	97.6	.77	22.62	23.39	.034	.471	35	70	118	740	720	3.4	.8
8	675	127.4	1.00	26.99	27.99	.037	.473	35	81	122	865	880	3.9	.9
9	755	154.2	1.27	30.29	31.56	.042	.493	35	82	130	989	1055	4.6	1.1
10	835	178.5	1.66	33.67	35.23	.046	.529	35	88	138	1121	1320	5.4	1.4
11	285	0.0	.06	11.46	11.52	.005	R	35	81	120	910	910	1.1	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	54	135	6	141	1.37	.193	R	R	R	4.06	5.73	22.48
2	3.0	84	82	223	10	232	2.64	.030	.86	1.67	7.78	1.64	3.10	19.44
3	2.0	88	82	275	15	290	3.32	.030	.67	1.24	7.23	1.32	2.44	19.28
4	3.0	116	80	266	101	367	4.06	.030	.55	.75	5.66	1.15	1.69	11.88
5	9.0	148	102	483	0	483	5.66	.030	.54	.74	6.13	1.14	1.66	12.88
6	2.0	88	54	120	16	144	1.37	.193	R	R	R	3.74	5.02	20.09
7	5.5	148	354	637	14	651	6.78	.030	.53	2.23	6.74	1.13	4.79	14.31
8	7.5	184	1038	684	0	684	7.48	.030	.53	6.08	6.64	1.13	12.64	13.89
9	11.5	152	2388	774	0	774	8.22	.030	.51	12.88	6.84	.93	25.94	13.48
10	20.5	176	3761	772	0	772	9.02	.280	.46	19.52	6.58	.87	37.23	12.55
11	2.5	88	71	153	3	156	1.32	.193	R	R	R	3.99	6.35	22.84

CYCLE COMPOSITE BSHC = .568 GRAM/BHP HR
BSCO = 16.337 GRAM/BHP HR
BSNO2 = 7.088 GRAM/BHP HR
BSHC + BSNO2 = 7.648 GRAM/BHP HR
BSFC = .537 LB/BHP HR

TABLE B-123. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 12-29-72 TEST NO. 1 W/ 50 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	9.35	9.41	.006	R	50	79	109	206	204	1.0	.2
2	285	15.5	.19	9.34	9.48	.015	.591	50	75	109	323	275	1.0	.1
3	399	23.1	.20	10.43	10.63	.019	.519	50	78	111	380	341	1.6	.2
4	424	1.2	.36	11.90	12.26	.030	.524	50	77	111	509	469	2.5	.2
5	515	66.4	.54	15.46	16.00	.035	.488	50	79	111	651	609	2.8	.4
6	285	0.0	.06	9.45	9.51	.006	R	50	79	110	345	312	.9	.1
7	584	93.5	.76	17.83	18.59	.043	.488	50	78	117	780	771	2.9	.6
8	675	123.2	.99	22.56	23.55	.044	.484	50	75	120	930	950	3.1	.7
9	755	146.1	1.25	23.61	24.86	.053	.513	50	79	122	1090	1220	3.7	.9
10	835	166.3	1.53	26.17	27.71	.059	.553	50	79	131	1260	1450	4.5	1.2
11	285	0.0	.05	9.49	9.54	.005	R	50	77	121	510	500	1.0	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	109	71	127	33	160	1.66	.193	R	R	R	3.59	9.89	18.05
2	4.0	136	116	213	30	243	3.50	.037	1.10	1.87	6.92	2.09	3.95	11.85
3	5.0	160	115	231	30	261	4.12	.030	.97	1.39	5.18	1.81	2.69	9.99
4	4.5	189	158	319	10	329	5.89	.030	.72	1.23	9.16	1.38	2.36	7.99
5	8.0	224	412	997	0	997	6.61	.030	.71	2.61	9.65	1.96	5.35	9.53
6	1.0	140	71	138	19	157	1.56	.193	R	R	R	5.17	5.23	18.95
7	16.0	236	1721	535	19	554	7.84	.030	.62	9.00	9.76	1.27	18.99	9.76
8	20.0	176	3329	571	0	571	8.52	.030	.44	16.73	9.72	.92	34.59	9.75
9	24.0	120	9277	644	0	644	9.66	.030	.27	19.19	9.74	.59	97.29	9.23
10	37.0	92	9424	650	19	669	9.80	.280	.20	21.58	9.78	.37	39.00	8.69
11	1.5	84	24	192	4	196	1.56	.193	R	R	R	3.53	1.99	20.01

CYCLE COMPOSITE BSHC = .379 GRAM/BHP HR
BSCO = 19.299 GRAM/BHP HR
BSNO2 = 5.210 GRAM/BHP HR
BSHC + BSNO2 = 5.589 GRAM/BHP HR
BSFC = .543 LB/BHP HR

TABLE B-124. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-05-73 TEST NO. 4 W/ 50 PCT. AIRBOX BLEED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	FUEL AIR RATIO	BSFC LB/HP HR	AIRBOX BLEED PERCENT+	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	9.43	9.49	.007	R	50	79	112	270	258	.9	.1
2	285	14.9	.19	9.55	9.68	.019	.550	50	78	111	345	287	.9	.1
3	399	23.8	.21	10.63	10.79	.020	.521	50	78	112	385	350	1.6	.2
4	424	42.7	.36	11.93	12.29	.030	.501	50	78	112	492	462	2.5	.3
5	515	66.4	.55	15.52	16.07	.035	.499	50	79	112	630	588	2.8	.4
6	285	0.0	.06	10.52	10.58	.006	R	50	79	110	385	350	.9	.1
7	584	93.5	.76	17.79	18.55	.043	.490	50	79	111	750	735	2.9	.6
8	675	117.0	1.01	21.91	22.92	.047	.516	50	79	118	920	902	3.1	.7
9	755	152.7	1.26	23.88	25.14	.053	.495	50	79	121	1080	1190	3.7	.9
10	835	169.3	1.56	26.00	27.56	.060	.578	50	80	130	1255	1446	4.4	1.2
11	285	0.0	.05	9.90	9.96	.006	R	50	80	122	530	510	1.0	.1

+ PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	WGT FCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	109	83	126	12	137	1.61	.193	R	R	R	3.93	5.95	19.75
2	3.5	136	117	200	14	215	3.32	.030	1.17	1.99	6.82	2.12	3.62	10.96
3	2.5	144	109	241	14	255	4.06	.030	.86	1.23	4.97	1.65	2.34	9.59
4	3.5	180	135	305	0	305	5.81	.030	.68	1.02	3.79	1.36	2.09	7.57
5	6.5	208	295	939	5	[illegible]	6.70	.030	.66	1.88	9.69	1.35	3.80	9.38
6	1.5	128	71	182	12	139	1.66	.193	R	R	R	9.97	5.58	17.03
7	12.0	220	1265	569	[illegible]	598	7.99	.030	.58	6.61	9.78	1.18	13.98	9.69
8	14.0	189	3012	561	0	561	8.62	.030	.47	14.21	9.64	.98	37.21	8.99
9	26.0	152	9278	627	13	640	9.66	.030	.29	18.52	9.91	.58	37.91	8.98
10	37.0	96	[illegible]	597	13	610	9.88	.280	.21	23.79	9.92	.37	41.79	7.76
11	2.0	92	59	193	3	196	1.56	.193	R	R	R	3.59	9.61	18.61

CYCLE COMPOSITE BSHC = .387 GRAM/BHP HR
BSCO = 20.055 GRAM/BHP HR
BSNO2 = 4.869 GRAM/BHP HR
BSHC + BSNO2 = 5.256 GRAM/BHP HR
BSFC = .577 LB/BHP HR

TABLE B-125. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-19-73 TEST NO. 1 W/ 20 PCT. AIRBOX BLEED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.38	13.44	98.572	R	20	74	103	219	205	1.3	.2
2	285	14.8	.13	13.37	13.50	21.289	.590	20	75	103	282	275	1.3	.2
3	399	29.5	.20	14.15	14.35	14.771	.481	20	77	110	330	339	2.1	.3
4	424	48.4	.36	18.27	18.62	9.418	.491	20	77	111	487	452	3.0	.4
5	515	73.6	.59	23.63	24.17	7.580	.493	20	75	112	543	555	3.5	.6
6	285	0.0	.06	13.38	13.43	53.217	R	20	74	104	255	230	1.2	.2
7	584	103.7	.76	27.43	28.14	5.450	.490	20	80	116	728	695	3.8	.8
8	675	136.9	1.00	31.61	32.61	4.727	.438	20	78	122	890	840	4.2	1.0
9	755	166.3	1.25	36.58	37.84	3.992	.452	20	88	132	963	1010	5.0	1.2
10	835	193.8	1.56	40.42	41.98	3.120	.484	20	95	146	1098	1260	6.0	1.5
11	285	0.0	.05	13.30	13.31	52.650	R	20	85	118	228	210	1.2	.2

+ EXCESS O2 IN EXHAUST ++.ERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	36	159	18	172	1.28	19.6	R	R	R	3.79	3.50	27.81
2	2.0	88	59	249	20	269	2.69	19.0	1.06	1.91	10.60	1.96	2.61	19.63
3	2.0	108	70	297	20	317	3.50	18.3	.83	1.48	8.00	1.73	2.29	16.63
4	1.5	128	69	429	20	449	5.00	16.3	.65	.70	8.26	1.47	1.58	18.75
5	2.5	136	103	641	15	655	5.59	15.4	.59	.89	9.30	1.33	2.01	20.93
6	1.0	96	36	159	15	170	1.28	20.5	R	R	R	5.01	3.71	28.99
7	3.5	156	217	808	29	836	6.45	14.5	.56	1.55	9.02	1.27	3.53	22.33
8	3.5	142	660	930	29	958	7.48	13.1	.60	9.19	9.86	1.38	9.44	22.60
9	4.0	189	1698	995	28	1024	8.03	11.8	.55	9.86	10.07	1.22	21.80	22.26
10	10.0	142	3595	953	0	953	8.82	10.5	.55	20.98	8.42	1.13	42.31	18.93
11	1.0	96	98	170	3	173	7.84	14.0	R	R	R	5.29	5.23	31.13

CYCLE COMPOSITE BSHC = .657 GRAM/BHP HR
BSCO = 16.725 GRAM/BHP HR
BSNO2 = 9.640 GRAM/BHP HR
BSHC + BSNO2 = 10.397 GRAM/BHP HR
BSFC = .496 LB/BHP HR

TABLE B-126. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-19-73 TEST NO. 2 W/ 20 PCT. AIRBOX BLEED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.27	13.33	97.647	R	20	85	119	228	210	1.2	.2
2	285	15.7	.13	13.27	13.41	21.137	.510	20	85	117	298	287	1.2	.2
3	399	29.5	.20	14.06	14.26	14.522	.481	20	85	120	338	330	2.0	.3
4	424	48.6	.36	18.14	18.50	9.181	.491	20	86	124	432	465	3.0	.4
5	515	73.6	.55	23.42	23.97	7.373	.494	20	88	125	596	555	3.4	.6
6	285	0.0	.06	13.26	13.30	52.736	R	20	86	119	288	258	1.2	.2
7	584	104.9	.76	27.29	28.05	5.855	.437	20	87	125	735	705	3.8	.8
8	675	136.9	1.00	31.34	32.34	4.716	.438	20	87	130	835	898	4.2	1.0
9	755	166.3	1.27	36.36	37.63	3.879	.457	20	90	137	965	1025	5.0	1.2
10	835	193.8	1.56	40.55	42.12	3.100	.484	20	90	134	1093	1222	6.0	1.5
11	285	0.0	.06	13.29	13.30	46.831	R	20	95	135	235	215	1.2	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	60	59	161	12	173	1.28	19.4	R	R	R	2.93	5.79	27.61
2	2.0	72	94	278	10	288	2.75	19.0	.81	2.11	10.62	1.59	9.15	20.83
3	2.0	84	105	308	15	323	3.38	18.1	.69	1.61	7.92	1.39	3.39	16.99
4	2.0	104	115	477	19	496	4.93	16.8	.62	1.15	8.80	1.19	2.62	19.16
5	3.0	108	137	666	15	681	5.89	15.2	.56	1.18	9.58	1.04	2.64	21.98
6	1.0	72	36	159	15	169	1.23	20.3	R	R	R	3.72	3.67	28.51
7	4.0	148	899	883	19	817	6.37	14.4	.52	2.11	9.44	1.20	9.82	21.62
8	4.0	172	718	917	19	936	7.21	13.2	.54	9.92	9.96	1.22	10.85	21.98
9	5.0	160	1996	983	21	961	8.03	11.8	.50	11.88	9.98	1.18	25.99	20.55
10	13.0	169	3982	916	0	916	8.62	10.4	.47	19.98	8.68	.97	41.12	17.76
11	1.0	108	98	169	3	172	1.19	19.1	R	R	R	4.87	4.62	27.38

CYCLE COMPOSITE BSHC = .665 GRAM/BHP HR
BSCO = 16.998 GRAM/BHP HR
BSNO2 = 9.355 GRAM/BHP HR
BSHC + BSNO2 = 9.988 GRAM/BHP HR
BSFC = .497 LB/BHP HR

TABLE B-127. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-20-73 TEST NO. 1 W/ 35 PCT. AIRBOX BLEED
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	10.57	10.63	35.898	R	35	77	112	352	315	1.0	.2
2	285	14.6	.19	10.61	10.75	19.996	.995	35	73	110	392	320	1.0	.2
3	399	28.9	.20	11.62	11.82	10.205	.455	35	73	119	369	367	1.6	.3
4	424	45.7	.36	15.01	15.46	6.187	.968	35	73	112	496	460	2.6	.3
5	515	73.9	.55	18.93	19.48	4.844	.997	35	76	115	692	585	2.9	.5
6	285	0.0	.06	10.58	10.64	37.042	R	35	76	110	330	285	1.0	.2
7	584	101.9	.77	22.16	22.92	3.590	.953	35	78	115	768	738	3.2	.6
8	675	128.2	1.00	25.62	26.62	2.859	.968	35	80	120	892	847	3.5	.8
9	755	155.9	1.26	29.89	31.15	2.079	.988	35	87	125	1060	1160	4.0	1.0
10	835	177.0	1.48	32.68	34.26	1.559	.535	35	95	137	1230	1410	4.7	1.3
11	285	0.0	.05	11.02	11.07	52.987	R	35	88	127	460	425	1.0	.2

+ EXCESS 02 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	02 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	71	168	8	176	1.92	19.2	R	R	R	2.81	5.86	23.78
2	1.5	76	94	289	14	303	3.20	16.6	.65	1.60	8.99	1.31	3.22	17.16
3	1.5	84	93	310	9	319	3.99	15.6	.50	1.09	6.17	1.09	2.40	13.57
4	2.0	92	126	437	9	447	5.81	13.5	.91	1.11	6.98	.87	2.37	13.85
5	4.5	108	333	595	14	608	6.61	12.5	.48	2.31	6.93	.84	5.18	15.51
6	1.0	80	97	170	7	176	1.96	18.9	R	R	R	3.12	3.69	22.83
7	7.0	128	1003	721	0	721	7.98	10.7	.38	6.96	7.09	.84	13.15	15.53
8	9.0	128	2104	728	13	742	8.22	9.6	.35	11.58	6.70	.76	25.79	14.32
9	19.5	96	3680	788	0	788	9.29	7.6	.25	19.91	6.03	.62	39.77	14.00
10	27.0	98	4088	765	52	817	9.33	6.5	.25	20.81	6.03	.67	38.86	12.75
11	1.0	72	95	176	0	176	1.97	18.5	R	R	R	3.29	8.65	26.79

CYCLE COMPOSITE BSHC = .394 GRAM/BHP HR
BSCO = 18.206 GRAM/BHP HR
BSNO2 = 7.318 GRAM/BHP HR
BSHC + BSNO2 = 7.712 GRAM/BHP HR
BSFC = .591 LB/BHP HR

TABLE B-128. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-20-73 TEST NO. 2 W/ 35 PCT. AIRBOX BLEED
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	10.54	10.60	90.138	R	35	80	117	480	445	1.0	.2
2	285	15.4	.19	10.09	10.17	13.900	.596	35	77	112	340	362	1.0	.2
3	399	27.8	.20	12.07	12.27	11.321	.939	35	75	115	383	378	1.5	.3
4	424	45.7	.36	14.97	15.33	6.315	.972	35	75	113	548	465	2.6	.4
5	515	73.4	.57	18.96	19.52	4.884	.991	35	74	115	695	588	2.9	.6
6	285	0.0	.06	10.60	10.66	37.591	R	35	74	110	388	330	1.0	.2
7	584	102.2	.77	22.23	23.00	3.571	.958	35	74	115	798	752	3.3	.7
8	675	131.2	1.00	25.52	26.52	2.754	.957	35	74	120	988	918	3.6	.8
9	755	156.3	1.26	29.43	31.19	2.307	.982	35	80	126	1090	1120	4.1	1.0
10	835	183.0	1.56	92.79	94.35	1.709	.518	35	90	130	1150	1335	4.8	1.3
11	285	0.0	.05	10.56	10.61	99.371	R	35	78	117	385	335	1.0	.2

+ EXCESS 02 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	02 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	97	156	3	159	1.97	19.4	R	R	R	2.97	3.89	21.96
2	1.5	68	93	255	4	260	2.91	17.3	.59	1.62	7.92	1.04	2.97	19.58
3	2.0	72	93	259	53	312	3.84	16.4	.93	1.18	6.07	.99	2.54	19.02
4	2.5	84	119	306	4	310	5.36	13.4	.39	1.01	5.66	.79	2.13	11.97
5	5.5	96	378	568	13	573	6.53	12.1	.28	2.57	6.54	.76	6.01	14.82
6	1.0	69	89	153	8	161	1.97	19.1	R	R	R	2.58	3.62	20.69
7	6.0	116	1889	699	26	669	7.30	11.0	.24	5.99	6.51	.77	13.28	14.46
8	8.5	129	2470	688	25	719	7.99	9.9	.23	11.00	6.23	.72	24.07	13.63
9	12.0	104	3232	760	12	772	8.82	8.9	.27	16.96	6.66	.67	35.16	13.74
10	19.0	104	3761	788	13	801	9.64	7.8	.24	19.51	6.93	.60	36.88	12.72
11	1.0	72	89	156	0	156	1.97	19.4	R	R	R	3.36	8.59	23.05

CYCLE COMPOSITE BSHC = .339 GRAM/BHP HR
BSCO = 16.298 GRAM/BHP HR
BSNO2 = 6.934 GRAM/BHP HR
BSHC + BSNO2 = 7.268 GRAM/BHP HR
BSFC = .522 LB/BHP HR

TABLE B-129. EMISSION CONCENTRATION AND RATE SUMMARY

DATE 3-19-73 TEST NO.1 W/ 20 PCT. AIRBOX BLEED-NOTCH 8 DERATED
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.38	13.44	98.572	R	20	74	103	219	205	1.3	.2
2	285	14.8	.13	13.37	13.50	21.289	.590	20	75	103	282	276	1.3	.2
3	399	29.5	.20	14.15	14.35	14.771	.481	20	77	110	330	333	2.1	.3
4	424	44.6	.26	18.27	18.62	9.916	.441	20	77	111	487	452	3.0	.4
5	515	73.6	.59	23.63	24.17	7.580	.443	20	75	112	542	555	3.5	.6
6	285	0.0	.06	13.38	13.43	53.777	R	20	74	109	255	230	1.2	.2
7	584	103.7	.76	27.43	28.19	5.450	.440	20	80	116	728	695	3.8	.8
8	675	136.4	1.00	31.61	32.61	4.727	.439	20	78	122	840	840	4.2	1.0
9	755	166.3	1.25	36.58	37.84	3.942	.442	20	87	132	953	1010	5.0	1.2
10	835	170.6	1.34	40.52	41.85	5.370	.470	20	92	144	958	1032	5.8	1.4
11	285	0.0	.05	13.30	13.34	52.660	R	20	46	118	228	210	1.2	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	36	154	18	172	1.28	19.6	R	R	R	3.74	3.50	27.81
2	2.0	88	59	244	20	264	2.69	19.0	1.06	1.91	10.60	1.96	2.61	19.63
3	2.0	108	70	297	20	317	3.50	18.3	.83	1.08	8.00	1.73	2.29	16.63
4	1.5	128	69	374	20	394	5.00	16.3	.65	.70	8.26	1.47	1.58	18.75
5	2.5	136	103	641	15	655	5.59	15.4	.59	.89	9.30	1.33	2.01	20.99
6	1.0	96	46	154	15	170	1.28	20.5	R	R	R	5.01	3.71	28.94
7	3.5	156	217	808	29	836	6.55	14.9	.56	1.55	9.82	1.27	3.53	22.33
8	3.0	192	460	930	29	956	7.48	14.1	.49	4.14	9.86	1.38	9.99	22.50
9	4.0	184	1648	995	26	1049	8.03	11.8	.55	9.86	10.07	1.22	21.80	22.26
10	3.5	200	993	1027	14	1041	7.84	15.5	.65	6.91	11.03	1.38	13.63	23.97
11	1.0	96	98	170	3	173	1.24	19.0	R	R	R	5.29	5.23	31.13

CYCLE COMPOSITE BSHC = .791 GRAM/BHP HR
BSCO = 5.977 GRAM/BHP HR
BSNO2 = 11.325 GRAM/BHP HR
BSHC + BSNO2 = 12.065 GRAM/BHP HR
BSFC = .487 LB/BHP HR

TABLE B-130. EMISSION CONCENTRATION AND RATE SUMMARY

DATE 3-19-73 TEST NO.2 W/ 20 PCT. AIRBOX BLEED-NOTCH 8 DERATED
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.27	13.33	97.644	R	20	85	119	220	210	1.2	.2
2	285	15.7	.13	13.27	13.41	21.193	.510	20	85	117	290	287	1.2	.2
3	399	29.5	.20	14.06	14.26	14.522	.481	20	85	120	330	330	2.0	.3
4	424	44.4	.26	14.14	18.50	9.181	.441	20	85	124	482	455	3.0	.4
5	515	73.6	.65	23.42	23.97	7.373	.446	20	88	125	596	555	3.4	.6
6	285	0.0	.06	13.25	13.30	52.736	R	20	86	119	288	250	1.2	.2
7	584	104.4	.76	27.24	28.05	5.365	.437	20	87	125	735	705	3.8	.8
8	675	136.4	1.00	31.34	32.34	4.716	.440	20	87	130	835	890	4.2	1.0
9	755	166.3	1.27	36.36	37.63	3.879	.457	20	90	137	965	1025	5.0	1.2
10	835	168.7	1.31	40.99	41.75	5.396	.466	20	95	147	960	1037	5.8	1.4
11	285	0.0	.06	13.24	13.30	96.831	R	20	95	135	235	225	1.2	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	59	161	12	173	1.20	19.4	R	R	R	2.93	5.74	27.61
2	2.0	72	94	278	10	288	2.74	19.0	.81	2.11	10.62	1.54	4.15	20.83
3	2.0	84	105	308	15	315	3.30	18.1	.69	1.61	9.42	1.34	3.34	18.44
4	2.0	104	115	477	10	486	4.93	16.0	.52	1.15	8.08	1.19	2.62	18.16
5	3.0	108	137	666	14	681	5.59	15.2	.46	1.10	9.59	1.04	2.64	21.98
6	1.0	72	36	154	15	169	1.23	20.3	R	R	R	3.78	3.67	28.61
7	4.0	148	899	883	14	817	6.37	13.4	.52	8.11	9.44	1.20	9.02	11.62
8	4.0	172	718	918	14	929	7.21	13.2	.45	4.42	9.43	1.22	10.05	21.98
9	5.0	168	1996	933	28	961	8.02	11.0	.54	11.78	9.98	1.18	26.99	20.55
10	4.5	139	825	999	R	999	7.54	15.3	.60	5.37	10.64	1.29	11.52	22.93
11	1.0	100	98	164		172	1.19	19.1	R	R	R	4.87	9.62	27.38

CYCLE COMPOSITE BSHC = .678 GRAM/BHP HR
BSCO = 5.459 GRAM/BHP HR
BSNO2 = 10.972 GRAM/BHP HR
BSHC + BSNO2 = 11.693 GRAM/BHP HR
BSFC = .486 LB/BHP HR

TABLE B-131. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-20-73 TEST NO. 1 W/ 35 PCT. AIRBOX BLEED-NOTCHES 1-8 DERATED
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	10.67	10.63	39.848	R	35	77	112	352	315	1.0	.2
2	285	16.6	.19	10.61	10.75	19.996	.995	35	73	110	342	320	1.0	.2
3	399	26.9	.20	11.62	11.82	10.205	.955	35	73	114	364	367	1.6	.3
4	424	45.7	.36	15.01	15.36	6.387	.968	35	73	112	496	460	2.6	.3
5	515	73.9	.55	18.93	19.48	4.849	.997	35	76	115	642	585	2.9	.5
6	285	0.0	.06	10.58	10.64	37.092	R	35	76	110	330	285	1.0	.2
7	584	101.9	.77	22.16	22.92	4.590	.993	35	78	115	768	738	3.2	.6
8	675	117.5	.90	25.77	26.67	3.975	.960	35	82	124	842	845	3.9	.8
9	755	129.9	1.03	29.82	30.85	3.447	.976	35	89	129	895	930	3.8	.9
10	835	119.1	1.01	32.61	33.61	4.249	.507	35	92	137	850	910	4.1	1.0
11	285	0.0	.05	11.02	11.07	42.987	R	35	88	127	940	925	1.0	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	71	168	9	176	1.92	19.2	R	R	R	2.81	5.86	23.78
2	1.5	76	99	284	19	303	3.20	16.6	.65	1.60	8.99	1.31	3.22	17.16
3	1.5	89	93	310	9	319	3.99	15.4	.50	1.09	6.17	1.09	2.90	13.57
4	2.0	92	126	937	9	947	5.81	13.9	.91	1.11	6.98	.87	2.37	13.85
5	4.5	108	333	595	19	608	6.61	12.5	.38	2.31	6.93	.89	5.18	15.51
6	1.0	80	97	170	9	179	1.96	18.9	R	R	R	3.12	3.69	22.83
7	7.0	128	1003	721	0	721	7.98	10.7	.38	5.96	7.09	.89	13.15	15.53
8	6.5	128	781	681	13	694	7.98	10.6	.38	4.67	6.81	.83	10.15	14.81
9	6.5	128	782	708	13	722	7.66	10.9	.40	4.88	7.40	.89	10.27	15.56
10	5.0	120	1167	727	0	727	6.53	11.5	.48	8.66	8.87	.99	17.08	17.48
11	1.0	72	95	176	0	176	1.37	18.5	R	R	R	3.29	8.65	24.39

CYCLE COMPOSITE BSHC = .596 GRAM/BHP HR
BSCO = 2.385 GRAM/BHP HR
BSNO2 = 9.010 GRAM/BHP HR
BSHC + BSNO2 = 9.556 GRAM/BHP HR
BSFC = .523 LB/BHP HR

TABLE B-132. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-20-73 TEST NO. 2 W/ 35 PCT. AIRBOX BLEED-NOTCHES 6-8 DERATED
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	AIRBOX BLEED PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	10.59	10.60	40.138	R	35	80	117	480	445	1.0	.2
2	285	15.4	.19	10.03	10.17	13.480	.596	35	77	112	340	362	1.0	.2
3	399	27.2	.20	12.07	12.27	11.321	.933	35	75	115	383	370	1.5	.3
4	424	45.7	.36	14.97	15.33	6.315	.972	35	75	113	498	465	2.6	.4
5	515	73.9	.59	18.96	19.58	4.806	.991	35	79	115	645	588	2.9	.5
6	285	0.0	.06	10.60	10.66	37.591	R	35	79	110	380	330	1.0	.2
7	584	102.2	.77	22.23	23.00	3.651	.980	35	79	115	780	752	3.3	.7
8	675	113.1	.89	25.82	26.66	4.422	.998	35	88	126	848	812	3.9	.8
9	755	138.2	1.09	29.93	30.98	3.916	.983	35	88	127	920	958	3.9	.9
10	835	135.1	1.08	32.79	33.87	3.909	.981	35	90	130	872	937	4.9	1.0
11	285	0.0	.05	10.56	10.61	44.371	R	35	78	117	385	335	1.0	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	68	97	156	3	159	1.97	19.4	R	R	R	2.97	3.89	21.36
2	1.5	68	93	255	9	268	2.91	17.3	.59	1.62	7.92	1.09	2.97	13.58
3	2.0	72	93	259	53	312	3.66	16.9	.93	1.10	6.07	.99	2.59	10.82
4	2.3	89	119	386	9	398	5.36	13.9	.37	1.01	5.66	.79	2.13	11.97
5	5.5	96	370	560	13	573	6.53	12.1	.33	2.57	6.59	.76	5.81	15.82
6	1.0	69	89	153	8	161	1.37	19.1	R	R	R	2.58	4.62	20.63
7	6.3	116	1004	644	26	669	7.30	11.8	.39	5.99	6.81	.77	13.28	15.96
8	5.0	124	789	681	90	671	6.78	11.5	.39	4.98	6.83	.86	9.83	15.27
9	5.5	128	807	721	13	734	7.57	10.9	.38	4.76	7.11	.89	10.61	15.78
10	4.0	112	1965	689	13	697	6.95	11.3	.49	9.66	7.85	.91	20.08	15.69
11	1.0	72	89	156	0	156	1.37	18.9	R	R	R	3.36	8.59	23.85

CYCLE COMPOSITE BSHC = .993 GRAM/BHP HR
BSCO = 8.137 GRAM/BHP HR
BSNO2 = 9.881 GRAM/BHP HR
BSHC + BSNO2 = 8.374 GRAM/BHP HR
BSFC = .508 LB/BHP HR

TABLE B-133. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-23-73 TEST NO. 1 W/ 10 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2+ FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	19.88	19.94	52.221	R	10	72	111	200	200	9.9	.2
2	285	15.3	.19	19.92	19.06	23.774	.536	10	73	111	296	255	1.9	.3
3	399	29.5	.20	19.33	19.53	17.012	.489	10	75	118	342	309	3.0	.4
4	494	44.1	.36	20.17	20.53	11.167	.450	10	78	120	445	414	4.0	.6
5	515	73.2	.55	25.64	26.21	8.700	.451	10	80	125	548	518	4.6	.6
6	285	0.0	.06	19.94	19.00	55.489	R	10	80	121	310	291	1.8	.2
7	569	109.5	.78	30.22	30.98	7.230	.438	10	79	125	632	618	5.2	1.0
8	675	138.2	1.01	35.59	36.60	6.115	.437	10	72	131	725	791	6.4	1.3
9	755	170.1	1.26	39.46	40.72	5.221	.444	10	78	142	805	850	7.8	1.6
10	835	202.8	1.57	42.49	44.06	4.343	.464	10	80	158	890	972	9.4	1.9
11	285	0.0	.05	19.91	19.96	66.208	R	10	81	120	374	355	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	98	98	105	14	119	1.19	20.0	R	R	R	3.53	9.92	20.21
2	1.5	90	92	183	18	201	2.26	19.5	1.04	1.22	8.54	1.94	2.28	15.93
3	1.5	100	59	244	22	266	2.86	18.6	.89	1.04	7.75	1.82	2.12	15.83
4	1.5	124	69	381	13	394	3.87	17.7	.70	.78	7.28	1.66	1.74	16.20
5	2.0	144	49	518	4	522	4.32	16.5	.68	.65	8.07	1.51	1.44	17.91
6	1.0	100	98	110	14	124	1.19	20.1	R	R	R	5.50	5.22	22.23
7	1.5	140	80	578	4	582	5.22	16.1	.55	.62	8.73	1.25	1.42	19.93
8	2.0	174	311	733	13	746	5.81	15.2	.62	2.17	8.54	1.41	4.46	17.53
9	4.0	232	864	689	13	702	6.24	14.6	.73	5.44	7.26	1.65	12.24	16.34
10	20.0	284	2608	683	13	695	6.67	13.8	.82	15.07	6.60	1.78	32.52	14.29
11	1.5	120	24	121	0	121	1.09	20.0	R	R	R	7.90	3.13	24.06

CYCLE COMPOSITE BSHC = 2.459 GRAM/BHP HR
BSCO = 2.983 GRAM/BHP HR
BSNO2 = 15.134 GRAM/BHP HR
BSHC + BSNO2 = 17.593 GRAM/BHP HR
BSFC = .729 LB/BHP HR

TABLE B-134. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-23-73 TEST NO. 2 W/ 10 PCT. COOL EGR
INJECTORS' VEHICLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2+ FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	19.23	19.29	52.978	R	10	76	121	235	229	1.8	.2
2	285	15.2	.18	19.61	19.79	23.989	.526	10	72	121	296	260	1.8	.2
3	399	29.4	.20	16.06	16.26	16.690	.509	10	72	121	350	310	2.8	.4
4	494	44.2	.36	19.77	20.13	10.6..	.439	10	72	123	361	340	4.0	.6
5	515	73.4	.56	25.70	26.24	8.871	.441	10	78	129	552	530	4.6	.8
6	285	0.0	.06	19.69	19.65	58.343	R	10	74	122	320	300	1.8	.2
7	569	109.1	.78	29.89	30.65	6.886	.440	10	74	130	645	639	5.1	1.0
8	675	138.2	1.01	34.76	35.78	5.782	.440	10	80	140	735	760	6.2	1.3
9	755	169.9	1.26	38.96	40.21	4.992	.444	10	80	149	810	855	7.6	1.6
10	835	202.8	1.55	42.69	44.24	4.223	.460	10	80	160	892	978	9.3	1.9
11	285	0.0	.05	19.17	19.22	61.398	R	10	81	141	930	910	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	91	109	13	118	1.19	20.1	R	R	R	9.48	7.95	28.16
2	1.5	92	82	178	13	191	2.16	19.2	1.18	2.10	7.99	2.24	4.88	18.21
3	1.0	100	94	224	22	251	2.75	18.5	.98	1.68	7.92	1.79	3.34	19.72
4	2.0	132	81	366	13	379	3.87	17.2	.71	.87	6.71	1.62	1.98	15.87
5	4.0	156	92	477	4	485	4.32	16.6	.73	.86	7.95	1.66	1.96	16.88
6	1.0	112	83	109	16	128	1.09	20.4	R	R	R	6.37	4.95	28.98
7	1.5	144	103	636	13	648	5.22	15.5	.64	1.92	8.26	1.45	3.22	18.74
8	3.0	234	428	716	26	741	5.81	15.0	.70	2.42	8.24	1.58	6.65	18.86
9	5.0	256	903	724	13	737	6.21	14.1	.88	5.65	7.58	1.88	12.64	16.97
10	6.0	312	2554	705	25	730	6.78	13.4	.98	14.65	6.88	1.95	31.88	14.97
11	1.0	134	91	111	4	115	1.04	19.6	R	R	R	8.51	8.91	23.85

CYCLE COMPOSITE BSHC = 2.721 GRAM/BHP HR
BSCO = 4.149 GRAM/BHP HR
BSNO2 = 14.174 GRAM/BHP HR
BSHC + BSNO2 = 16.895 GRAM/BHP HR
BSFC = .769 LB/BHP HR

TABLE B-135. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-22-73 TEST NO. 1 W/ 20 PCT. COOL EGR
INJECTIONS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.91	12.97	93.056	R	20	79	112	205	205	1.8	.2
2	285	15.4	.19	12.90	13.09	19.579	.599	20	79	112	278	278	1.9	.2
3	394	22.8	.20	19.11	19.31	19.819	.518	20	79	119	390	291	2.9	.9
4	424	47.0	.34	16.99	17.35	9.092	.455	20	78	118	438	410	3.9	.5
5	515	73.9	.51	23.02	23.57	7.679	.441	20	79	120	540	510	4.6	.7
6	285	0.0	.06	12.90	12.96	96.911	R	20	79	111	242	235	1.8	.2
7	584	109.5	.76	27.02	27.79	5.961	.438	20	79	125	642	635	5.3	.9
8	675	138.2	1.00	31.15	32.15	4.909	.434	20	79	130	720	735	6.3	1.2
9	755	168.6	1.22	34.87	36.14	4.022	.451	20	86	142	810	860	7.6	1.9
10	835	197.9	1.56	39.02	40.68	3.961	.472	20	88	158	891	953	9.2	1.7
11	285	0.0	.05	12.91	12.96	52.471	R	20	86	140	930	910	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	59	108	11	119	1.28	20.0	R	R	R	3.93	5.07	16.68
2	1.0	92	59	146	17	183	2.92	19.0	1.03	1.31	6.73	1.88	2.90	12.27
3	1.0	112	58	208	13	221	2.91	18.9	.93	.96	6.00	1.79	1.86	11.57
4	1.0	134	46	337	13	350	4.06	16.8	.66	.95	5.58	1.96	.98	12.26
5	2.0	156	69	412	9	416	4.65	16.0	.66	.58	5.73	1.99	1.30	12.99
6	1.0	112	36	106	15	121	1.28	20.5	R	R	R	5.09	3.20	17.80
7	2.0	174	182	492	13	509	5.66	14.8	.62	1.27	5.79	1.91	2.91	13.22
8	3.5	220	585	500	13	513	6.37	13.8	.58	3.58	5.15	1.56	8.24	11.87
9	6.5	280	1423	483	0	483	6.87	12.9	.29	8.02	4.98	1.76	17.80	9.93
10	17.5	335	3644	447	0	447	7.48	12.0	.91	19.94	4.14	1.93	42.26	8.77
11	1.0	124	12	113	0	113	1.19	19.7	R	R	R	6.63	1.27	19.79

CYCLE COMPOSITE BSHC = 2.905 GRAM/BHP HR
BSCO = 2.919 GRAM/BHP HR
BSNO2 = 11.839 GRAM/BHP HR
BSHC + BSNO2 = 14.744 GRAM/BHP HR
BSFC = .807 LB/BHP HR

TABLE B-136. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-22-73 TEST NO. 2 W/ 20 PCT. COOL EGR
INJECTIONS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.88	12.45	95.297	R	20	75	118	200	205	1.8	.2
2	285	15.3	.19	12.92	13.06	20.089	.536	20	78	119	279	258	1.9	.2
3	394	23.8	.20	19.17	19.37	19.629	.509	20	78	120	398	388	2.8	.3
4	424	48.1	.36	17.19	17.54	9.253	.445	20	77	120	434	410	.9	.5
5	515	76.4	.55	22.96	23.51	7.708	.435	20	78	122	550	520	4.6	.7
6	285	0.0	.04	12.88	12.44	99.909	R	20	80	120	285	270	1.8	.2
7	584	109.3	.76	27.10	27.85	6.110	.431	20	82	130	650	640	5.2	.9
8	675	138.2	1.01	31.21	32.22	4.992	.439	20	84	139	740	760	6.2	1.2
9	755	168.6	1.26	35.03	36.28	4.201	.447	20	89	148	819	852	7.5	1.9
10	835	197.5	1.47	39.06	40.43	3.558	.476	20	89	160	900	962	9.1	1.7
11	285	0.0	.05	12.99	13.04	58.020	R	20	90	142	930	920	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	77	98	109	17	126	1.28	20.0	R	R	R	3.24	9.26	18.61
2	1.0	80	70	195	13	198	2.37	19.0	.98	1.60	7.31	1.68	2.95	13.65
3	1.0	92	70	228	10	245	3.14	18.4	.73	1.11	6.39	1.95	2.20	12.68
4	1.0	108	58	255	99	354	4.06	17.0	.52	.55	5.58	1.17	1.29	12.59
5	1.5	136	69	430	9	442	4.72	16.2	.56	.56	5.99	1.29	1.29	13.60
6	1.0	92	98	112	15	128	1.23	20.7	R	R	R	4.37	4.60	19.02
7	2.0	160	171	515	4	519	5.66	15.8	.64	1.19	5.93	1.30	2.76	13.75
8	3.5	216	559	543	0	543	6.35	14.0	.64	3.09	5.97	1.62	7.82	12.48
9	7.0	268	1549	484	0	484	6.87	13.0	.26	8.72	4.65	1.78	19.99	10.17
10	17.0	332	3844	447	0	447	7.34	12.4	.90	23.80	3.98	1.89	50.01	8.35
11	1.5	144	60	117	0	117	1.19	20.1	R	R	R	8.26	6.81	22.00

CYCLE COMPOSITE BSHC = 2.232 GRAM/BHP HR
BSCO = 3.033 GRAM/BHP HR
BSNO2 = 12.303 GRAM/BHP HR
BSHC + BSNO2 = 14.535 GRAM/BHP HR
BSFC = .776 LB/BHP HR

TABLE B-137. EMISSION CONCENTRATION AND RATE SUMMARY

DATE 1-29-79 TEST NO. 3 W/ 30 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FALTON SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.09	12.09	97.230	R	30	75	110	280	280	1.9	.2
2	285	15.0	.13	12.09	12.17	18.786	.533	30	75	110	295	250	2.0	.2
3	344	23.2	.20	12.92	13.12	12.919	.536	30	79	111	340	298	3.0	.4
4	424	49.0	.36	15.62	15.97	7.928	.436	30	78	116	438	412	4.0	.5
5	515	79.5	.55	19.05	19.60	5.916	.443	30	80	120	542	510	4.6	.7
6	285	0.0	.06	11.77	11.82	95.719	R	30	85	R	304	280	1 R	.2
7	584	105.1	.77	22.90	23.66	9.713	.438	30	88	124	648	634	5.2	.8
8	675	136.0	1.01	27.23	28.23	3.972	.444	30	86	135	725	735	6.1	1.1
9	745	164.3	1.26	32.09	33.35	3.574	.455	30	82	142	795	826	7.6	1.4
10	835	191.9	1.57	34.39	35.95	2.869	.482	30	85	159	870	925	9.4	1.7
11	285	0.0	.06	11.69	11.90	96.691	R	30	85	135	360	350	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	71	107	19	127	1.28	20.0	R	R	R	3.57	6.67	19.45
2	2.5	84	82	163	18	181	2.58	18.6	.40	1.75	6.35	1.69	3.29	11.90
3	3.0	112	93	193	18	211	3.14	17.8	.82	1.35	5.09	1.62	2.67	9.96
4	3.0	140	92	309	13	323	4.25	16.0	.60	.78	4.54	1.38	1.80	10.40
5	2.5	176	136	340	13	353	5.00	15.0	.61	.99	4.02	1.38	2.12	9.07
6	1.0	132	83	112	17	128	1.28	19.8	R	R	R	6.06	7.61	19.29
7	6.0	224	355	359	0	359	6.19	13.8	.67	2.10	3.99	1.52	4.80	7.97
8	7.5	268	907	386	0	386	6.61	12.8	.73	4.95	3.96	1.65	11.15	7.74
9	11.0	308	2008	350	4	354	6.78	12.2	.82	10.59	3.07	1.79	23.30	6.76
10	21.0	372	4965	374	0	374	7.12	11.3	.91	21.67	3.02	1.88	49.42	6.26
11	2.0	152	107	120	0	120	1.23	20.1	R	R	R	7.02	9.89	18.16

CYCLE COMPOSITE

BSHC	=	2.916	GRAM/BHP HR
BSCO	=	9.350	GRAM/BHP HR
BSNO2	=	10.399	GRAM/BHP HR
BSHC + BSNO2	=	12.765	GRAM/BHP HR
BSFC	=	.722	LB/BHP HR

TABLE B-138. EMISSION CONCENTRATION AND RATE SUMMARY

DATE 1-29-79 TEST NO. 4 W/ 30 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FALTON SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.22	12.28	91.599	R	30	78	120	290	280	1.7	.2
2	285	15.0	.14	12.29	12.38	19.090	.569	30	75	115	310	280	1.8	.2
3	344	23.4	.20	12.97	13.17	13.266	.512	30	78	117	336	320	2.7	.3
4	424	49.5	.35	15.45	15.79	8.530	.448	30	75	120	435	417	3.9	.5
5	515	79.2	.55	19.10	19.65	6.089	.451	30	80	122	550	522	4.5	.7
6	285	0.0	.04	12.04	12.12	92.398	R	30	76	115	255	240	1.8	.2
7	584	109.1	.76	22.80	23.56	9.781	.440	30	80	126	648	640	5.0	.8
8	675	136.1	1.00	27.35	28.35	4.077	.444	30	80	132	728	742	6.0	1.1
9	756	164.3	1.27	32.59	33.81	3.673	.465	30	82	146	820	844	7.3	1.3
10	835	191.9	1.57	36.48	36.05	2.979	.490	30	90	160	900	955	8.9	1.6
11	285	0.0	.06	12.48	12.53	99.191	R	30	90	140	360	350	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	109	97	120	13	133	1.37	20.9	R	R	R	9.22	8.83	17.78
2	1.0	96	97	189	19	198	2.75	19.0	1.06	1.82	7.07	1.91	1.86	12.93
3	1.0	112	97	229	19	238	3.44	18.2	.83	.69	5.77	1.62	1.36	11.27
4	1.0	192	57	298	9	307	4.59	16.4	.69	.65	4.86	1.36	1.18	10.38
5	2.0	162	79	338	9	347	5.59	15.4	.59	.56	4.02	1.19	1.24	8.48
6	1.0	112	36	117	20	136	1.42	20.0	R	R	R	9.72	2.99	18.78
7	3.0	484	372	383	0	383	6.78	14.0	.55	2.25	3.79	1.25	5.11	8.51
8	5.5	284	881	929	0	929	7.21	13.0	.69	4.86	3.84	1.95	10.95	8.66
9	11.0	280	2627	900	4	904	7.66	12.5	.76	13.60	3.59	1.64	29.92	7.73
10	20.5	324	5821	360	4	364	8.03	11.7	.81	28.78	3.00	1.66	59.71	6.11
11	1.0	128	48	136	0	136	1.37	20.1	R	R	R	6.23	4.61	21.78

CYCLE COMPOSITE

BSHC	=	2.992	GRAM/BHP HR
BSCO	=	8.881	GRAM/BHP HR
BSNO2	=	11.617	GRAM/BHP HR
BSHC + BSNO2	=	14.659	GRAM/BHP HR
BSFC	=	.684	LB/BHP HR

TABLE B-139. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 1-24-73 TEST NO. 5 W/ 30 PCT. COOL EGR
INJECTORS: NEEDLE TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	265	0.0	.06	12.09	12.11	92.302	R	30	80	120	210	210	1.8	.2
2	265	15.9	.19	12.20	12.39	18.245	.596	30	80	120	300	265	1.9	.2
3	344	23.8	.20	12.92	13.12	13.070	.509	30	80	120	350	310	2.8	.3
4	424	46.2	.36	15.79	16.15	8.092	.467	30	78	120	420	410	3.9	.5
5	515	73.2	.55	19.10	19.65	6.010	.451	30	80	122	540	520	4.5	.7
6	265	0.0	.06	11.85	11.91	92.028	R	30	80	120	270	260	1.8	.2
7	564	109.1	.77	23.21	23.98	4.225	.442	30	80	126	645	635	5.1	.8
8	675	149.2	1.01	27.42	28.43	4.062	.450	30	80	135	730	745	6.1	1.1
9	755	169.3	1.27	32.93	34.20	3.665	.464	30	82	143	815	845	7.4	1.3
10	835	189.2	1.57	34.35	35.92	2.911	.498	30	85	158	890	950	9.0	1.6
11	265	0.0	.05	12.00	12.05	50.258	R	30	85	135	320	310	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	59	108	15	123	1.37	20.0	R	R	R	3.03	4.97	16.92
2	1.5	72	70	175	18	193	2.75	18.7	.76	1.48	6.69	1.90	2.72	12.26
3	1.5	92	70	210	23	233	3.38	18.0	.67	1.01	5.59	1.33	2.01	10.99
4	2.0	112	80	296	9	305	4.52	16.3	.52	.79	4.61	1.11	1.58	9.87
5	4.0	136	93	315	9	324	5.29	15.2	.49	.80	3.75	1.07	1.77	8.33
6	1.0	100	59	106	13	119	1.37	20.2	R	R	R	4.14	4.84	16.19
7	3.5	160	355	354	6	360	6.37	13.8	.49	2.15	3.59	1.10	4.86	8.11
8	6.5	208	907	397	0	397	6.78	13.0	.50	6.05	3.63	1.29	11.23	8.07
9	11.5	256	2496	382	0	382	7.21	12.3	.70	13.66	3.99	1.52	29.97	7.91
10	[illegible]	304	5564	342	9	351	7.57	11.6	.76	27.78	2.88	1.63	55.79	5.77
11	[illegible]	108	72	118	0	118	1.19	20.1	R	R	R	5.37	7.07	19.12

CYCLE COMPOSITE BSHC = 1.938 GRAM/BHP HR
BSCO = 3.618 GRAM/BHP HR
BSNO2 = 10.386 GRAM/BHP HR
BSHC + BSNO2 = 12.324 GRAM/BHP HR
BSFC = .807 LB/BHP HR

TABLE B-140. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: [illegible]-24 TEST NO. 3 W/ 20 PCT. COOL EGR
INJECTORS: LOW-SAC TIMING: STD.
WEIGHT FACTOR SCHEDULE: ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	265	0.0	.06	13.62	13.68	54.899	-	20	75	122	240	265	1.7	.3
2	265	15.9	.13	13.85	13.96	23.790	.507	20	73	117	297	290	1.7	.3
3	344	25.8	.20	15.74	15.94	16.663	.465	20	74	120	333	335	2.6	.4
4	424	56.2	.36	19.64	19.98	10.695	.424	20	75	122	452	422	3.8	.5
5	515	78.9	.55	24.63	25.18	8.459	.418	20	75	122	565	515	4.4	.8
6	265	0.0	.06	13.85	13.90	54.834	R	20	73	112	260	295	1.7	.3
7	564	108.3	.74	29.27	30.04	6.531	.423	20	73	120	640	620	5.0	.9
8	674	148.5	1.01	33.45	34.46	5.417	.421	20	77	128	733	735	6.0	1.2
9	755	173.6	1.26	38.49	39.75	4.639	.432	20	80	137	820	851	7.2	1.5
10	835	206.5	1.57	41.88	43.45	4.173	.455	20	79	147	910	967	8.4	1.8
11	265	0.0	.04	13.78	13.82	71.305	R	20	78	138	340	370	1.7	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	46	138	21	159	1.09	21.0	R	R	R	2.69	5.11	20.85
2	1.0	60	71	233	10	243	2.26	20.0	.60	1.69	9.63	1.18	3.33	18.88
3	1.5	60	82	270	10	280	3.03	18.9	.59	1.33	7.96	1.05	2.06	16.05
4	1.5	64	69	424	29	453	4.12	17.9	.32	.72	7.69	.67	1.60	18.83
5	3.0	64	69	582	14	596	4.79	16.6	.28	.58	8.26	.66	1.39	19.77
6	1.0	90	98	136	12	147	1.09	20.2	R	R	R	2.16	5.12	26.02
7	2.0	80	119	718	14	732	5.79	15.0	.29	.83	8.77	.69	1.96	28.79
8	2.5	105	393	726	14	740	6.53	14.3	.33	2.18	7.68	.79	4.99	18.23
9	5.0	150	1434	658	14	672	7.09	13.9	.45	8.64	6.89	1.06	19.78	15.89
10	10.5	196	3778	577	0	577	7.57	13.6	.49	28.98	5.85	.98	95.98	11.58
11	1.0	[illegible]	36	139	9	148	1.09	20.2	R	R	R	5.97	5.88	32.77

CYCLE COMPOSITE BSHC = 1.295 GRAM/BHP HR
BSCO = 2.557 GRAM/BHP HR
BSNO2 = 15.931 GRAM/BHP HR
BSHC + BSNO2 = 17.226 GRAM/BHP HR
BSFC = .713 LB/BHP HR

TABLE B-141. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' [illegible] TEST NO. 2 W/ 20 PCT. COOL EGR
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2+ FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	[illegible]	.06	13.82	13.88	99.722	R	20	75	120	320	295	1.7	.3
2	285	19.9	.13	13.82	13.95	23.092	.520	20	75	115	315	300	1.7	.3
3	399	29.8	.20	15.72	15.92	16.971	.465	20	75	117	338	330	2.6	.4
4	920	50.2	.36	19.54	19.90	10.681	.422	20	75	122	493	415	3.8	.5
5	515	79.9	.55	24.63	25.17	8.259	.416	20	75	122	560	510	4.9	.8
6	285	[illegible]	.06	13.78	13.84	59.039	R	20	78	115	285	255	1.7	.3
7	584	107.5	.76	28.14	28.90	6.545	.418	20	78	126	655	628	5.0	.9
8	675	147.5	1.00	33.42	34.42	5.947	.418	20	78	130	732	730	6.0	1.2
9	755	173.1	1.26	38.89	40.15	4.745	.432	20	85	140	822	850	7.2	1.4
10	835	203.8	1.56	41.49	43.55	4.100	.454	20	90	152	912	965	8.8	1.7
11	285	0.0	.09	13.72	13.76	71.679	R	20	83	135	390	375	1.7	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	31	34	128	9	137	1.09	20.5	R	R	R	1.95	3.93	21.68
2	1.0	45	71	220	15	235	2.26	19.9	.92	1.68	9.20	.81	3.29	17.69
3	1.0	60	82	263	19	282	2.97	18.7	.33	1.33	7.25	.70	2.86	15.60
4	1.0	65	81	913	15	928	3.99	17.3	.23	.89	7.26	.55	1.98	17.18
5	2.0	50	69	558	14	572	4.79	16.1	.21	.58	7.93	.51	1.40	19.08
6	1.0	45	60	137	12	148	1.19	20.0	R	R	R	1.88	4.37	26.09
7	2.0	70	159	709	0	709	5.66	15.1	.25	1.19	8.36	.60	2.73	19.99
8	3.0	115	349	746	14	760	6.37	14.3	.33	2.33	7.87	.80	5.66	18.83
9	5.0	155	1654	672	0	672	6.87	13.6	.97	9.98	6.65	1.09	23.11	15.91
10	12.0	195	4244	554	55	609	7.30	13.3	.59	23.56	5.55	1.20	51.87	12.22
11	1.0	55	83	146	2	148	1.09	20.9	R	R	R	3.89	11.62	33.59

CYCLE COMPOSITE BSHC = .921 GRAM/BHP HR
BSCO = 3.196 GRAM/BHP HR
BSNO2 = 15.353 GRAM/BHP HR
BSHC + BSNO2 = 16.274 GRAM/BHP HR
BSFC = .724 LB/BHP HR

TABLE B-142. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-21-78 TEST NO. 1 W/ 30 PCT. COOL EGR
INJECTORS' LOW-BAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2+ FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.58	12.64	96.855	R	30	72	117	290	225	1.6	.2
2	285	19.2	.13	12.49	12.62	20.082	.649	30	80	115	265	262	1.7	.2
3	399	29.1	.20	13.76	13.96	13.792	.471	30	80	120	320	315	2.6	.3
4	929	50.1	.35	17.02	17.37	8.620	.419	30	80	122	437	405	3.6	.6
5	515	79.9	.55	22.14	22.69	6.755	.416	30	80	129	560	509	4.8	.6
6	285	0.0	.06	12.46	12.52	98.896	R	30	82	117	263	245	1.7	.2
7	584	107.6	.76	26.06	26.82	5.912	.422	30	85	130	662	630	4.8	.8
8	675	147.1	1.00	30.36	31.36	4.611	.422	30	88	139	750	740	5.7	1.1
9	755	173.6	1.26	34.57	35.83	3.993	.439	30	88	148	830	849	6.9	1.3
10	835	203.8	1.56	37.64	39.20	3.357	.460	30	88	155	900	902	8.6	1.6
11	285	0.0	.05	12.05	12.41	53.557	R	30	86	130	305	290	1.6	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	55	71	191	13	155	1.32	20.1	R	R	R	2.55	6.59	23.99
2	1.5	68	110	209	19	210	2.49	19.7	.78	2.79	8.32	1.20	5.08	15.21
3	2.0	65	117	239	18	253	3.32	17.5	.48	1.71	6.08	1.01	3.63	18.41
4	2.0	85	189	363	9	372	4.59	15.7	.39	.99	5.86	.93	2.25	13.28
5	2.5	98	119	958	13	972	5.99	14.0	.39	.84	5.82	.82	2.06	14.81
6	1.0	70	83	143	17	160	1.28	20.0	R	R	R	3.98	8.86	25.99
7	2.5	110	228	496	13	508	6.39	13.8	.36	1.49	6.97	.86	3.59	12.96
8	4.5	150	709	570	0	570	6.96	13.0	.44	4.11	6.93	1.03	9.75	12.07
9	9.0	200	2662	513	13	526	7.38	12.5	.69	19.96	9.69	1.25	33.27	10.06
10	16.5	200	9796	481	13	494	7.57	12.1	.51	29.81	9.11	1.18	52.16	8.42
11	1.0	100	114	168	0	168	1.23	20.0	R	R	R	5.92	12.62	27.95

CYCLE COMPOSITE BSHC = 1.555 GRAM/BHP HR
BSCO = 9.592 GRAM/BHP HR
BSNO2 = 13.688 GRAM/BHP HR
BSHC + BSNO2 = 15.243 GRAM/BHP HR
BSFC = .796 LB/BHP HR

TABLE B 143. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-21-73 TEST NO. 2 W/ 30 PCT. COOL EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATS' SWITCH

MODE	ENGINE SPEED RPM	POWER HP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN. HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.82	12.88	49,548	R	30	88	135	340	320	1.6	.2
2	285	16.6	.19	12.85	12.98	18,922	.995	30	86	126	292	285	1.7	.2
3	344	25.1	.20	13.64	13,69	13,282	.971	30	85	127	337	320	2.6	.4
4	426	49.3	.36	16.90	17,26	8,137	.934	30	87	130	455	420	3.7	.4
5	515	79.4	.54	22.19	22,73	6,936	.910	30	89	130	562	520	4.3	.7
6	285	0.0	.06	12.78	12.83	46,362	R	30	92	128	335	310	1.7	.2
7	584	108.7	.77	25.98	26,74	9,479	.923	30	92	135	663	633	4.8	.8
8	675	140.9	1.00	30.24	31,23	9,230	.926	30	92	139	740	736	5.8	1.0
9	755	173.6	1.22	34.49	35,76	8,592	.938	30	90	145	829	849	6.9	1.3
10	835	202.8	1.56	37.62	39,18	8,112	.962	30	88	155	902	948	8.7	1.6
11	285	0.0	.05	12.80	12,85	52,611	R	30	90	140	365	350	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	29	144	12	156	1.28	19.7	R	R	R	2.50	2.37	25.58
2	1.5	60	59	242	9	251	2.80	18.0	.62	1.21	8.50	1.25	2.45	17.17
3	1.5	65	58	240	18	258	3.32	17.0	.98	.85	6.14	1.01	1.80	13.14
4	2.0	70	96	369	5	373	4.65	15.2	.32	.42	5.64	.75	.97	13.00
5	3.0	75	68	488	0	488	5.51	13.9	.20	.52	6.03	.69	1.26	14.70
6	1.0	55	36	150	11	161	1.28	18.5	R	R	R	2.74	3.54	26.26
7	2.5	95	216	510	0	510	6.95	12.9	.31	1.90	5.42	.73	3.31	12.80
8	4.0	120	535	559	0	559	7.04	12.2	.35	3.13	5.37	.83	7.35	12.62
9	9.0	165	2390	515	0	515	7.48	11.5	.45	12.45	4.58	1.02	29.58	10.47
10	14.5	180	4626	497	0	497	7.66	11.2	.46	23.50	4.15	.99	50.92	8.48
11	1.0	85	36	150	3	153	1.23	18.5	R	R	R	4.81	4.02	20.26

CYCLE COMPOSITE BSHC = 1.320 GRAM/BHP HR
BSCO = 2.110 GRAM/BHP HR
BSNO2 = 13.731 GRAM/BHP HR
BSHC + BSNO2 = 15.050 GRAM/BHP HR
BSFC = .725 LB/BHP HR

TABLE B-144. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-73 TEST NO. 3 W/ 30 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER HP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	14.88	14.94	52,221	R	10	72	111	288	288	4.9	.2
2	285	15.3	.19	14.92	15.06	23,776	.536	10	73	111	296	255	1.9	.3
3	344	24.5	.20	16.33	16.53	17,012	.489	10	76	118	342	309	3.0	.4
4	426	48.1	.36	20.17	20.53	11,167	.450	10	78	120	445	419	4.0	.6
5	515	73.2	.55	25.66	26,21	8,700	.451	10	80	125	548	518	4.6	.8
6	285	0.0	.06	14.94	15.00	55,589	R	10	80	121	317	291	1.8	.2
7	584	109.5	.76	30.22	30,98	9,230	.438	10	74	125	632	618	5.2	1.0
8	675	138.2	1.01	35.59	36,60	8,115	.437	10	72	131	725	741	6.4	1.3
9	755	170.1	1.26	39.94	40,20	8,721	.444	10	78	138	805	850	7.8	1.6
10	835	202.4	1.67	42.99	44,66	8,893	.469	10	80	154	890	972	9.4	1.9
11	285	0.0	.05	14.91	14.96	66,208	R	10	81	120	329	355	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	60	98	105	14	119	1.19	20.0	R	R	R	3.53	4.92	20.21
2	1.5	80	97	183	18	201	2.26	19.5	1.04	1.22	8.64	1.46	2.28	15.93
3	1.5	100	59	244	22	266	2.86	18.6	.89	1.09	7.75	1.82	2.12	15.83
4	1.5	124	69	301	13	314	3.87	17.7	.70	.78	7.20	1.86	1.79	16.20
5	2.0	144	69	518	4	522	4.92	16.5	.68	.65	8.87	1.51	1.44	17.91
6	1.0	100	98	110	14	124	1.19	20.1	R	R	R	5.58	5.22	22.23
7	1.0	140	80	678	4	682	5.22	16.1	.55	.62	8.73	1.25	1.42	14.48
8	2.0	174	311	733	13	746	6.01	15.2	.62	2.17	8.54	1.41	4.46	14.53
9	4.0	232	864	689	13	702	6.29	14.6	.73	5.44	7.26	1.65	12.29	16.39
10	10.5	284	2608	683	13	695	6.87	13.8	.82	15.07	6.60	1.78	32.52	14.29
11	1.5	120	94	121	0	121	1.09	20.0	R	R	R	7.98	3.13	26.86

CYCLE COMPOSITE BSHC = .900 GRAM/BHP HR
BSCO = 12.232 GRAM/BHP HR
BSNOX = 7.388 GRAM/BHP HR
BSHC + BSNO2 = 8.288 GRAM/BHP HR
BSFC = .480 LB/BHP HR

TABLE B-145. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-23-73 TEST NO. 2 W/ 15 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	TEMPERATURES AIR BOX	DEGREES F LEFT EXHAUST	DEGREES F RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	19.23	19.29	52.478	R	10	76	121	235	229	1.8	.2
2	285	15.2	.13	19.61	19.74	23.988	.526	10	72	121	296	260	1.8	.2
3	344	23.8	.20	16.06	16.26	16.690	.509	10	72	121	350	310	2.8	.4
4	424	44.2	.34	19.77	20.13	10.693	.439	10	72	123	351	340	4.0	.6
5	515	73.9	.59	25.70	26.29	8.871	.441	10	78	129	552	530	4.6	.8
6	285	0.0	.04	19.59	19.55	58.363	R	10	79	122	320	300	1.8	.2
7	594	109.1	.76	29.89	30.65	6.986	.440	10	79	130	695	639	5.1	1.0
8	675	134.2	1.01	34.76	35.78	5.782	.440	10	80	140	735	760	6.2	1.3
9	755	168.4	1.26	38.94	40.21	4.992	.446	10	80	149	810	855	7.6	1.6
10	835	202.8	1.55	42.49	44.04	4.223	.460	10	80	160	892	970	9.3	1.9
11	285	0.0	.03	19.17	19.22	61.398	R	10	81	141	930	910	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	71	104	13	118	1.14	20.1	R	R	R	9.90	7.95	20.16
2	1.5	92	82	178	13	191	2.16	19.2	1.18	2.10	7.99	2.24	4.00	15.21
3	1.0	100	99	229	22	251	2.75	18.5	.90	1.68	7.92	1.79	3.34	14.72
4	2.0	132	81	366	13	379	3.87	17.2	.71	.87	6.71	1.62	1.98	15.27
5	3.0	154	92	477	9	485	4.32	16.6	.73	.86	7.45	1.66	1.95	16.88
6	1.0	112	83	104	16	120	1.09	20.4	R	R	R	6.37	4.95	22.90
7	1.5	164	183	635	13	648	5.22	15.5	.64	1.42	8.25	1.95	3.22	14.79
8	3.0	204	429	716	26	741	5.81	14.8	.70	2.42	8.24	1.58	6.65	18.85
9	5.0	254	903	729	13	737	6.21	14.1	.80	5.65	7.58	1.80	12.66	16.47
10	8.0	312	2559	705	25	730	6.78	13.4	.90	14.65	6.88	1.95	31.88	14.97
11	1.0	134	71	111	4	115	1.09	19.5	R	R	R	8.51	8.91	23.55

CYCLE COMPOSITE BSHC = .985 GRAM/BHP HR
BSCO = 12.045 GRAM/BHP HR
BSNO2 = 7.515 GRAM/BHP HR
BSHC + BSNO2 = 8.500 GRAM/BHP HR
BSFC = .976 LB/BHP HR

TABLE B-146. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-22-73 TEST NO. 1 W/ 20 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	TEMPERATURES AIR BOX	DEGREES F LEFT EXHAUST	DEGREES F RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.91	12.97	93.066	R	20	79	112	205	205	1.8	.2
2	285	15.3	.19	18.90	19.09	19.574	.599	20	79	112	278	248	1.9	.4
3	344	22.8	.28	14.11	14.31	14.814	.618	20	79	114	340	291	2.9	.9
4	424	42.0	.36	16.94	17.35	9.092	.455	20	78	118	430	410	3.9	.5
5	514	73.9	.54	23.02	23.57	7.679	.441	20	79	120	540	510	4.6	.7
6	285	0.0	.06	12.90	12.96	46.911	R	20	79	111	242	235	1.8	.2
7	584	109.5	.76	27.02	27.79	5.961	.439	20	79	125	642	635	5.3	.9
8	675	138.2	1.00	31.15	32.15	4.909	.434	20	79	130	720	738	6.3	1.2
9	755	168.6	1.23	34.87	36.14	4.07	.451	20	86	142	810	850	7.6	1.9
10	835	197.4	1.49	39.02	40.58	3.461	.472	20	86	158	891	953	9.2	1.7
11	285	0.0	.03	12.91	12.96	62.974	R	20	86	148	930	910	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	90	59	109	11	119	1.20	20.0	R	R	R	3.93	5.87	16.68
2	1.5	92	99	166	17	183	2.98	19.0	1.03	1.31	6.73	1.88	2.98	12.27
3	1.0	112	58	208	13	221	2.91	18.9	.93	.96	6.88	1.79	1.86	11.57
4	1.0	136	96	337	13	350	4.06	16.8	.66	.95	5.58	1.96	.98	12.86
5	2.0	156	64	412	4	416	4.65	16.0	.66	.58	6.73	1.99	1.30	12.99
6	1.0	112	36	106	15	121	1.28	20.5	R	R	R	5.89	3.20	17.88
7	2.0	176	182	492	13	504	5.66	14.8	.62	1.27	5.79	1.91	2.91	13.22
8	3.5	220	505	500	13	513	6.37	13.8	.68	3.58	5.15	1.56	8.24	11.87
9	6.5	280	1923	383	0	383	6.87	12.9	.79	8.82	4.48	1.76	17.80	8.93
10	17.5	336	4499	467	0	467	7.48	12.0	.91	19.99	4.14	1.93	98.26	8.77
11	1.0	124	12	113	0	113	1.19	19.7	R	R	R	6.63	1.27	19.79

CYCLE COMPOSITE BSHC = .978 GRAM/BHP HR
BSCO = 16.174 GRAM/BHP HR
BSNO2 = 9.792 GRAM/BHP HR
BSHC + BSNO2 = 10.762 GRAM/BHP HR
BSFC = .988 LB/BHP HR

TABLE B-147. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-22-73 TEST NO. 2 W/ 20 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.88	12.95	95.237	R	20	75	118	200	205	1.8	.2
2	285	15.3	.19	12.92	13.06	20.089	.536	20	78	119	279	250	1.9	.2
3	394	23.8	.20	14.17	14.37	14.629	.504	20	78	120	348	308	2.8	.3
4	424	48.1	.36	17.14	17.54	9.253	.495	20	77	120	434	410	.4	.5
5	515	75.5	.55	22.96	23.51	7.708	.435	20	78	122	550	520	4.6	.7
6	285	0.0	.06	12.88	12.94	99.403	R	20	80	120	285	270	1.8	.2
7	584	105.3	.76	27.10	27.85	6.11	.431	20	82	130	650	640	5.2	.9
8	675	138.2	1.01	31.21	32.22	4.992	.434	20	84	134	740	710	6.2	1.2
9	755	168.6	1.26	35.03	36.28	4.281	.447	20	89	148	819	852	7.5	1.4
10	835	197.5	1.57	39.06	40.63	3.558	.476	20	89	160	900	966	9.1	1.7
11	285	0.0	.05	12.99	13.04	58.020	R	20	90	142	930	920	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	48	104	17	126	1.23	20.0	R	R	R	3.29	4.26	10.51
2	1.0	80	20	185	13	198	2.[illegible]	19.0	.90	1.58	7.31	1.68	2.95	13.65
3	1.0	92	20	228	18	246	3.[illegible]	18.4	.73	1.11	6.39	1.45	2.20	12.68
4	1.0	108	58	255	99	354	[illegible]	17.0	.52	.55	5.58	1.17	1.29	12.54
5	1.5	136	64	938	4	942	[illegible]	16.2	.66	.56	5.94	1.29	1.29	13.68
6	1.0	92	48	112	15	128	1.32	20.7	R	?	R	4.37	4.50	14.82
7	2.0	160	171	515	4	519	5.06	15.0	.56	1.19	5.43	1.30	2.76	13.75
8	3.5	216	659	543	0	543	6.05	14.2	.66	4.04	5.47	1.52	4.22	12.48
9	7.0	268	1540	488	0	488	6.87	13.4	.76	8.72	5.55	1.70	19.49	10.17
10	17.0	332	4999	442	0	442	7.49	12.4	.90	23.80	3.98	1.89	50.01	8.35
11	1.5	144	60	117	0	117	1.19	20.1	R	R	R	8.26	6.81	22.00

CYCLE COMPOSITE BSHC = .944 GRAM/BHP HR
BSCO = 19.189 GRAM/BHP HR
BSNO2 = 9.735 GRAM/BHP HR
BSHC + BSNO2 = 5.682 GRAM/BHP HR
BSFC = .484 LB/BHP HR

TABLE B-148 EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-19-73 TEST NO. 3 W/ 30 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.04	12.09	97.230	R	30	75	110	200	200	1.9	.2
2	285	15.0	.13	12.04	12.17	18.786	.533	30	75	110	295	250	2.0	.2
3	394	23.7	.20	12.92	13.12	12.919	.506	30	79	111	340	298	3.0	.4
4	424	49.0	.36	15.62	15.97	7.928	.436	30	78	116	438	412	4.0	.5
5	515	74.5	.55	19.05	19.60	5.916	.443	30	80	120	542	510	4.6	.7
6	285	0.0	.06	11.77	11.82	95.714	R	30	85	118	308	290	1.8	.2
7	584	105.1	.77	22.90	23.66	4.713	.438	30	88	129	648	634	5.2	.8
8	675	136.0	1.01	27.23	28.23	3.472	.444	30	86	135	725	735	6.1	1.1
9	755	166.3	1.26	32.09	33.35	3.574	.455	30	82	142	795	825	7.6	1.4
10	835	199.8	1.57	34.39	35.95	2.869	.482	30	85	154	870	925	9.4	1.7
11	285	0.0	.06	11.84	11.90	96.491	R	30	85	135	360	350	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	71	107	19	127	1.28	20.0	R	R	R	3.57	4.67	14.95
2	2.5	84	82	163	18	181	2.58	19.6	.90	1.75	6.[illegible]	1.64	3.29	11.90
3	3.0	112	93	193	18	211	3.14	17.8	.82	1 35	5.[illegible]	1.62	2.67	9.96
4	3.0	140	92	309	13	323	4.25	16.0	.60	.78	4.54	1.38	1.88	10.90
5	2.5	176	136	340	13	353	5.00	15.0	.61	.99	4.02	1.38	2.12	9.87
6	1.0	132	83	112	17	128	1.28	19.8	R	R	R	6.06	7.61	14.29
7	6.0	224	365	354	0	354	6.13	13.8	.67	2.18	3.99	1.52	4.80	7.47
8	7.5	268	907	386	0	386	6.61	12.8	.73	4.96	3.96	1.65	11.15	7.79
9	12.0	308	2008	350	4	354	6.78	12.2	.82	10.59	3.87	1.79	23.38	6.75
10	21.0	372	4965	374	0	374	7.12	11.3	.91	21.67	3.82	1.88	99.42	6.26
11	1.0	152	107	120	0	120	1.23	20.1	R	R	R	7.82	9.84	18.16

CYCLE COMPOSITE BSHC = .976 GRAM/BHP HR
BSCO = 17.897 GRAM/BHP HR
BSNO2 = 3.557 GRAM/BHP HR
BSHC + BSNO2 = 4.534 GRAM/BHP HR
BSFC = .495 LB/BHP HR

TABLE B 149. MISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-24-73 TEST NO. 4 W/ 30 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.22	12.28	91.594	R	30	78	120	290	280	1.7	.2
2	285	15.0	.19	12.29	12.38	19.040	.597	30	75	115	318	280	1.8	.2
3	399	23.9	.20	12.97	13.17	13.266	.512	30	78	117	356	320	2.7	.3
4	424	44.5	.35	15.95	16.29	8.530	.468	30	75	120	435	417	5.4	.5
5	515	73.2	.55	19.10	19.65	6.089	.451	30	80	122	550	522	9.5	.7
6	285	0.0	.06	12.06	12.1[illegible]	92.398	R	30	76	115	255	240	1.8	.2
7	584	109.1	.76	22.80	23.56	9.781	.440	30	80	126	640	640	5.0	.8
8	675	135.1	1.00	27.35	28.35	9.077	.444	30	80	132	728	792	6.0	1.1
9	755	169.3	1.27	32.54	33.81	9.673	.465	30	82	145	820	849	7.3	1.3
10	835	191.7	1.57	34.48	36.05	2.979	.440	30	90	160	900	955	8.9	1.6
11	285	0.0	.06	12.48	12.53	99.191	R	30	90	190	360	350	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	104	97	120	13	133	1.37	20.4	R	R	R	9.22	3.83	17.70
2	1.0	96	97	184	14	198	2.75	19.0	1.05	1.02	7.07	1.91	1.86	12.93
3	1.0	112	97	224	14	238	3.44	18.2	.83	.69	5.77	1.62	1.34	11.27
4	1.0	132	57	298	9	307	4.59	16.4	.69	.55	4.86	1.36	1.18	10.38
5	2.0	150	75	338	9	347	5.59	15.4	.69	.56	4.82	1.19	1.29	8.92
6	1.0	112	36	117	20	136	1.92	20.0	R	R	R	9.72	2.99	18.78
7	3.5	184	378	383	0	383	6.78	14.0	.55	2.25	3.79	1.25	5.11	8.51
8	5.5	232	881	924	0	924	7.21	13.0	.69	4.86	3.89	1.45	10.95	8.66
9	11.0	280	2527	900	9	909	7.66	12.5	.76	13.68	3.59	1.69	29.92	7.73
10	26.5	328	5821	360	9	369	8.03	11.7	.81	28.78	3.00	1.66	58.71	6.11
11	1.0	128	98	136	0	136	1.37	20.1	R	R	R	6.23	9.61	21.73

CYCLE COMPOSITE
BSHC = .892 GRAM/BHP HR
BSCO = 23.387 GRAM/BHP HR
BSNO2 = 3.678 GRAM/BHP HR
BSHC + BSNO2 = 9.570 GRAM/BHP HR
BSFC = 505 LB/BHP HR

TABLE B-150. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-24-73 TEST NO. 5 W/ 30 PCT. COOL EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.04	12.11	92.302	R	30	80	120	210	210	1.8	.2
2	285	15.9	.19	12.20	12.39	18.245	.596	30	80	120	300	265	1.9	.2
3	399	23.8	.20	12.92	13.12	13.070	.509	30	80	120	350	310	2.8	.3
4	424	44.2	.36	15.79	16.15	8.092	.467	30	78	120	420	410	5.5	.5
5	515	73.2	.55	19.10	19.65	6.010	.451	30	80	122	540	520	9.5	.7
6	285	0.0	.06	11.95	11.91	92.028	R	30	80	120	270	260	1.8	.2
7	584	109.1	.77	23.21	23.98	9.775	.442	30	80	126	645	635	5.1	.8
8	675	135.2	1.01	27.92	28.93	9.062	.450	30	80	135	730	745	6.1	1.1
9	755	169.3	1.27	32.93	34.20	3.665	.469	30	82	143	815	895	7.9	1.3
10	835	189.2	1.57	34.35	35.92	2.911	.448	30	85	158	890	950	9.8	1.6
11	285	0.0	.05	12.00	12.05	50.258	R	30	85	135	320	310	1.8	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	69	108	15	123	1.37	20.8	R	R	R	9.83	4.97	16.92
2	1.5	72	78	178	18	193	2.75	18.7	.76	1.48	6.69	1.98	2.72	12.26
3	1.5	92	78	210	23	233	3.38	18.0	.67	1.81	5.69	1.33	2.81	10.99
4	2.0	112	80	296	9	305	4.52	16.3	.58	.79	4.61	1.11	1.68	9.87
5	3.0	136	113	315	9	324	5.29	15.2	.98	.80	3.75	1.87	1.77	8.33
6	1.0	100	59	106	13	119	1.37	20.2	R	R	R	9.19	9.89	16.19
7	3.5	160	355	356	9	360	6.37	13.8	.99	2.15	3.69	1.13	9.86	8.11
8	6.5	208	907	397	0	397	6.78	13.0	.68	5.05	3.63	1.29	11.23	8.07
9	11.5	256	2946	382	0	382	7.21	12.3	.78	13.66	3.99	1.52	24.97	7.41
10	26.0	304	5569	342	9	351	7.67	11.5	.76	27.78	2.88	1.53	56.79	5.77
11	1.5	108	71	118	0	118	1.19	20.1	R	R	R	5.37	7.89	14.12

CYCLE COMPOSITE
BSHC = .811 GRAM/BHP HR
BSCO = 22.617 GRAM/BHP HR
BSNO2 = 1.488 GRAM/BHP HR
BSHC + BSNO2 = 2.299 GRAM/BHP HR
BSFC = .511 LB/BHP HR

TABLE B-151. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 3-22-73 TEST NO. 1 W/ 20 PCT. COOL EGR
INJECTORS: L-SAC TIMING: STD.
WEIGHT FACTOR SCHEDULE: GF LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	295	0.0	.06	13.92	13.88	56.899	R	20	75	122	290	265	1.7	.3
2	285	15.4	.13	13.85	13.98	23.290	.507	20	73	117	297	290	1.7	.3
3	344	25.5	.20	15.74	15.94	16.663	.465	20	74	120	333	335	2.6	.4
4	424	50.2	.36	19.54	19.90	10.695	.426	20	75	122	456	422	3.8	.5
5	515	78.4	.55	24.64	25.18	8.459	.418	20	75	122	565	515	4.4	.8
6	285	0.0	.06	13.85	13.90	54.834	R	20	73	112	268	245	1.7	.3
7	584	108.3	.76	29.27	30.04	6.531	.423	20	73	120	648	620	5.0	.4
8	675	143.5	1.01	33.45	34.46	5.417	.421	20	77	128	733	735	6.0	1.2
9	755	173.6	1.26	38.44	39.75	4.839	.437	20	80	137	820	851	7.2	1.5
10	835	206.5	1.57	41.48	43.45	4.173	.455	20	79	147	910	967	8.9	1.8
11	285	0.0	.04	13.78	13.82	71.305	R	20	78	130	[illegible]	370	1.7	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	51	48	138	21	159	1.09	21.0	R	R	R	2.69	5.11	28.05
2	1.0	50	71	233	10	243	2.26	20.0	.60	1.69	9.53	1.18	3.33	18.80
3	1.5	60	82	270	10	280	3.03	18.9	.49	1.33	7.46	1.05	2.06	16.05
4	1.5	55	54	424	29	453	4.12	17.4	.29	.72	7.69	.67	1.60	18.03
5	3.0	55	64	582	14	596	4.79	16.6	.28	.50	8.26	.66	1.39	19.77
6	1.0	40	49	136	12	147	1.09	20.2	R	R	R	2.16	5.12	26.02
7	2.0	80	119	718	14	732	5.74	15.0	.29	.83	8.77	.69	1.96	20.79
8	2.5	105	333	726	14	740	6.53	14.3	.33	2.10	7.60	.79	4.99	18.23
9	5.0	150	1934	652	14	666	7.04	13.9	.45	8.69	6.54	1.04	19.70	15.09
10	10.5	160	3778	577	0	577	7.57	13.6	.44	20.90	5.25	.98	45.92	11.52
11	1.0	95	36	139	4	143	1.09	20.2	R	R	R	5.97	5.00	32.77

CYCLE COMPOSITE
BSHC = .486 GRAM/BHP HR
BSCO = 16.863 GRAM/BHP HR
BSNO2 = 6.327 GRAM/BHP HR
BSHC + BSNO2 = 6.813 GRAM/BHP HR
BSFC = .467 LB/BHP HR

TABLE B-152. EMISSION CONCENTRATION AND RATE SUMMARY

DATE: 3-22-73 TEST NO. 2 W/ 20 PCT. COOL EGR
INJECTORS: L-SAC TIMING: STD.
WEIGHT FACTOR SCHEDULE: GF LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.82	13.88	44.722	R	20	75	120	320	295	1.7	.3
2	285	15.4	.13	13.82	13.95	23.092	.520	20	75	115	315	300	1.7	.3
3	344	25.8	.20	15.72	15.92	16.471	.465	20	75	117	338	330	2.6	.4
4	424	50.7	.36	19.54	19.90	10.681	.422	20	75	122	443	415	3.8	.5
5	515	78.4	.54	24.63	25.17	8.254	.416	20	75	122	560	510	4.4	.8
6	285	0.0	.06	13.78	13.84	54.034	R	20	78	115	285	255	1.7	.3
7	584	109.5	.76	29.14	29.90	6.495	.418	20	76	126	655	620	5.0	.4
8	675	143.5	1.00	33.92	34.92	5.447	.418	20	78	130	732	730	6.0	1.2
9	755	175.1	1.26	33.89	40.15	4.795	.432	20	85	140	822	850	7.2	1.4
10	835	206.3	1.56	41.99	43.55	4.100	.454	20	90	152	912	969	8.8	1.7
11	285	0.0	.04	13.72	13.76	71.679	R	20	77	135	390	375	1.7	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	40	36	128	9	137	1.09	20.5	R	R	R	1.45	3.43	21.48
2	1.0	35	71	220	15	235	2.26	19.9	.42	1.60	9.20	.81	3.29	17.69
3	1.0	40	92	253	19	272	2.47	18.7	.33	1.33	7.25	.70	2.06	15.60
4	1.0	[illegible]	81	413	14	428	3.99	17.3	.23	.84	7.26	.55	1.90	17.10
5	3.0	[illegible]	69	558	14	572	4.79	16.1	.21	.50	7.43	.51	1.40	19.00
6	1.0	45	60	137	12	148	1.19	20.0	R	R	R	1.88	6.37	26.04
7	3.0	70	159	709	0	709	5.66	15.1	.25	1.14	8.36	.60	2.73	19.44
8	3.5	105	369	746	14	760	6.37	14.3	.33	2.33	7.07	.80	5.56	18.03
9	5.5	155	1654	672	0	672	6.87	13.6	.47	9.48	6.65	1.09	23.11	15.91
10	12.5	195	4248	554	55	609	7.30	13.3	.54	23.56	5.55	1.20	51.07	12.22
11	1.0	55	83	146	1	147	1.09	20.4	R	R	R	3.84	11.62	33.54

CYCLE COMPOSITE
BSHC = .535 GRAM/BHP HR
BSCO = 19.035 GRAM/BHP HR
BSNO2 = 6.517 GRAM/BHP HR
BSHC + BSNO2 = 7.052 GRAM/BHP HR
BSFC = .466 LB/BHP HR

TABLE B-153. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-21-73 TEST NO. 1 W/ 30 PCT. COOL EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.58	12.64	46.055	R	30	72	117	290	285	1.6	.2
2	285	14.2	.13	12.49	12.62	20.082	.547	30	80	115	265	262	1.7	.2
3	344	25.1	.20	13.76	13.96	13.792	.471	30	80	120	320	315	2.6	.3
4	424	50.4	.35	17.02	17.37	8.620	.419	30	80	122	437	405	3.6	.6
5	515	79.4	.55	22.14	22.69	6.755	.415	30	80	124	560	509	4.7	.6
6	285	0.0	.06	12.46	12.52	48.896	R	30	82	117	263	245	1.7	.2
7	554	107.6	.76	26.06	26.82	5.412	.422	30	89	130	662	630	4.8	.8
8	675	142.1	1.00	30.36	31.36	4.511	.422	30	88	134	750	740	5.7	1.1
9	755	173.6	1.26	34.57	35.83	3.943	.434	30	88	140	833	848	6.9	1.3
10	835	203.8	1.56	37.64	39.20	3.357	.460	30	88	155	900	942	8.6	1.6
11	285	0.0	.05	12.85	12.91	53.557	R	30	86	130	305	290	1.6	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	55	71	141	13	155	1.32	20.1	R	R	R	2.55	6.59	23.44
2	1.5	60	110	204	14	218	2.47	18.7	.70	2.74	8.32	1.28	5.00	15.21
3	2.0	65	117	234	18	253	3.32	17.5	.48	1.71	6.08	1.01	3.63	12.91
4	2.0	85	104	363	9	372	4.59	15.7	.39	.94	5.56	.93	2.25	13.28
5	2.5	90	114	458	13	472	5.44	14.8	.34	.86	5.82	.82	2.06	14.01
6	1.0	70	83	143	17	160	1.28	20.0	R	R	R	3.40	8.06	25.44
7	2.5	110	228	494	13	508	6.37	13.8	.36	1.49	5.47	.86	3.54	12.46
8	4.5	150	709	570	0	570	6.95	13.0	.44	4.11	5.43	1.03	9.75	12.47
9	9.0	200	2662	513	13	526	7.30	12.6	.54	14.45	4.69	1.28	33.27	10.80
10	16.5	200	4746	481	13	494	7.57	12.1	.51	24.01	4.11	1.10	52.16	8.92
11	1.0	100	119	150	0	150	1.23	20.0	R	R	R	5.32	12.42	27.45

CYCLE COMPOSITE BSHC = .565 GRAM/BHP HR
BSCO = 19.065 GRAM/BHP HR
BSNO2 = 4.904 GRAM/BHP HR
BSHC + BSNO2 = 5.469 GRAM/BHP HR
BSFC = .472 LB/BHP HR

TABLE B-154. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-21-73 TEST NO. 2 W/ 30 PCT. COOL EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.82	12.88	44.548	R	30	88	135	340	320	1.6	.2
2	285	16.6	.14	12.85	12.98	18.922	.495	30	86	126	292	285	1.7	.2
3	344	25.1	.20	13.69	13.89	13.282	.471	30	85	127	337	320	2.6	.4
4	424	44.3	.36	16.90	17.26	8.137	.434	30	87	130	455	420	3.7	.4
5	515	79.4	.54	22.19	22.73	6.436	.418	30	89	130	567	520	4.3	.7
6	285	0.0	.06	12.78	12.83	46.362	R	30	92	120	335	310	1.7	.2
7	584	108.7	.77	25.98	26.74	4.474	.423	30	92	135	663	633	4.8	.8
8	675	140.4	1.[illegible]	30.24	31.23	4.230	.426	30	92	134	740	736	5.8	1.0
9	755	173.6	1.[illegible]	34.49	35.76	3.592	.430	30	90	145	824	844	6.9	1.3
10	835	202.8	1.54	37.68	39.10	3.118	.462	30	88	155	902	940	8.7	1.6
11	285	0.0	.03	12.80	12.[illegible]	52.611	R	30	90	140	365	380	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	24	144	12	156	1.20	19.7	R	R	R	2.80	2.37	25.50
2	1.5	60	54	242	9	251	2.08	18.0	.62	1.21	8.50	1.85	2.45	17.17
3	1.5	65	58	240	10	250	3.32	17.0	.48	.85	6.19	1.01	1.88	13.19
4	2.0	70	46	369	5	373	4.65	15.2	.38	.48	5.64	.75	.97	13.08
5	3.0	75	68	488	8	488	5.51	13.9	.28	.52	6.03	.64	1.26	14.78
6	1.0	55	36	150	11	161	1.20	18.5	R	R	R	2.74	3.54	26.26
7	2.5	96	216	510	0	510	6.45	12.9	.31	1.48	5.42	.73	3.31	12.80
8	4.0	120	536	554	0	554	7.04	12.2	.35	3.13	5.37	.83	7.36	12.68
9	9.0	165	2340	515	0	515	7.48	11.5	.45	12.46	4.50	1.02	24.50	10.97
10	19.5	188	4626	497	0	497	7.66	11.2	.46	23.50	4.15	.99	50.48	8.98
11	1.0	85	36	150	3	153	1.23	18.6	R	R	R	4.01	4.02	28.26

CYCLE COMPOSITE BSHC = .500 GRAM/BHP HR
BSCO = 19.191 GRAM/BHP HR
BSNO2 = 4.941 GRAM/BHP HR
BSHC + BSNO2 = 5.442 GRAM/BHP HR
BSFC = .473 LB/BHP HR

TABLE B-155. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-22-73 TEST NO. 1 W/ 20 PCT. COOL EGR--NOTCH 8 DERATED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.41	12.47	93.066	R	20	79	112	205	205	1.4	.2
2	295	15.3	.19	12.80	13.09	19.579	.549	20	79	112	278	244	1.4	.2
3	399	22.8	.20	14.11	14.31	19.819	.518	20	79	114	340	231	2.4	.4
4	424	47.0	.36	16.99	17.35	9.092	.455	20	78	118	434	410	3.0	.5
5	515	73.9	.59	23.02	23.67	7.679	.441	20	79	120	540	510	4.4	.7
6	285	0.0	.04	12.40	12.96	96.911	R	20	79	111	242	235	1.4	.2
7	584	104.5	.74	27.02	27.79	5.961	.438	20	79	125	642	635	5.3	.9
8	675	134.2	1.00	31.15	32.15	9.909	.434	20	79	130	720	738	6.3	1.2
9	755	168.6	1.27	34.87	36.14	9.022	.451	20	86	142	810	850	7.4	1.9
10	835	152.1	1.24	38.31	39.55	9.835	.489	20	80	158	760	810	9.0	1.7
11	285	0.0	.05	12.41	12.46	52.971	R	20	86	140	430	410	1.4	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	54	108	11	119	1.28	20.0	R	R	R	3.93	5.07	14.68
2	1.5	92	59	166	17	183	2.42	19.0	1.03	1.91	6.73	1.88	2.90	12.27
3	1.0	112	58	208	13	221	2.91	18.4	.93	.96	6.00	1.79	1.86	11.57
4	1.0	136	96	337	13	350	4.06	16.8	.64	.65	5.58	1.46	.98	12.26
5	2.0	156	69	412	9	416	4.65	16.0	.66	.68	5.73	1.49	1.30	12.99
6	1.0	112	36	106	15	121	1.28	20.5	R	R	R	5.09	3.20	17.80
7	2.0	176	102	492	13	504	5.66	14.8	.62	1.27	5.79	1.41	2.91	13.22
8	3.5	220	584	500	13	513	6.37	13.8	.68	3.58	5.15	1.54	8.24	11.87
9	6.5	280	1923	483	0	483	6.87	12.9	.79	8.02	4.48	1.76	17.80	9.93
10	5.5	284	572	534	0	534	5.79	13.7	.97	3.91	4.00	1.99	8.00	12.26
11	1.0	124	12	119	0	119	1.19	19.7	R	R	R	4.63	1.27	19.79

CYCLE COMPOSITE BSHC = 1.030 GRAM/BHP HR
BSCO = 3.928 GRAM/BHP HR
BSNO2 = 6.259 GRAM/BHP HR
BSHC + BSNO2 = 7.289 GRAM/BHP HR
BSFC = .539 LB/BHP HR

TABLE B-156. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-22-73 TEST NO. 2 W/ 20 PCT. COOL EGR--NOTCH 8 DERATED
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.88	12.95	95.237	R	20	75	118	200	205	1.9	.2
2	295	15.3	.19	12.92	13.06	20.089	.536	20	78	119	279	250	1.9	.2
3	399	23.8	.20	14.17	14.37	19.624	.504	20	78	120	348	308	2.8	.3
4	424	48.1	.36	17.19	17.54	9.263	.445	20	77	120	434	410	.9	.5
5	515	75.5	.55	22.96	23.51	7.700	.435	20	78	122	540	520	4.4	.7
6	285	0.0	.06	12.88	12.94	99.909	R	20	80	120	205	200	1.8	.2
7	584	105.3	.74	27.10	27.85	6.110	.431	20	82	138	658	640	5.2	.9
8	675	138.2	1.01	31.21	32.22	9.992	.434	20	84	139	790	760	6.2	1.2
9	755	168.6	1.26	35.03	36.28	9.281	.447	20	89	148	819	852	7.6	1.9
10	835	199.3	1.17	38.31	39.49	9.362	.588	20	81	160	798	742	8.9	1.6
11	285	0.0	.05	12.99	13.04	58.028	R	20	90	142	430	420	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	78	48	109	17	126	1.23	20.0	R	R	R	3.84	4.24	18.51
2	1.0	88	70	185	18	198	2.37	19.0	.90	1.46	7.91	1.68	2.96	13.65
3	1.0	98	70	228	18	246	3.19	18.4	.78	1.11	6.84	1.45	2.06	12.68
4	1.0	188	68	256	99	354	4.06	17.0	.52	.55	5.58	1.17	1.09	12.84
5	1.5	136	44	938	9	942	4.72	16.2	.54	.56	5.99	1.29	1.09	13.08
6	1.0	98	48	112	15	128	1.23	20.7	R	R	R	4.37	4.58	19.98
7	2.0	160	171	615	9	624	6.66	15.0	.54	1.19	5.48	1.38	2.76	13.76
8	3.5	216	664	593	0	593	6.96	14.0	.64	4.84	5.07	1.62	9.27	12.98
9	7.0	260	1648	980	0	989	6.87	13.4	.74	8.72	4.86	1.78	19.44	10.17
10	5.0	260	977	523	0	523	5.84	14.4	.99	3.93	4.18	1.92	7.43	12.07
11	1.5	144	60	117	0	117	1.19	20.1	R	R	R	4.86	6.01	22.00

CYCLE COMPOSITE BSHC = .986 GRAM/BHP HR
BSCO = 3.714 GRAM/BHP HR
BSNO2 = 6.474 GRAM/BHP HR
BSHC + BSNO2 = 7.460 GRAM/BHP HR
BSFC = .581 LB/BHP HR

TABLE B-157. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-24-73   TEST NO. 4 W/ 30 PCT. COOL EGR--NOTCH 7,8 DERATED
INJECTORS' NEEDLE   TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.22	12.28	41.599	R	30	78	120	240	280	1.7	.
2	285	15.0	.19	12.29	12.34	19.090	.547	30	75	115	318	280	1.4	.2
3	344	23.4	.20	12.97	13.17	13.266	.512	30	78	117	356	320	2.7	.3
4	424	44.5	.35	15.95	16.29	9.530	.466	30	75	120	435	417	3.4	.5
5	51	73.2	.55	19.10	19.65	6.089	.451	30	80	122	550	522	4.5	.7
6	28	0.0	.06	12.06	12.12	42.348	R	30	76	115	255	248	1.8	.2
7	58[illegible]	104.1	.76	22.80	23.56	4.781	.440	30	80	126	648	640	5.0	.8
8	67[illegible]	135.1	1.00	27.34	28.35	4.077	.444	30	80	132	728	742	6.[illegible]	1.1
9	755	1[illegible].6	1.05	31.80	32.85	4.723	.467	30	80	150	718	750	7.4	1.3
10	835	119.1	1.0[illegible]	33.78	34.84	5.306	.531	30	82	159	620	775	8.7	1.4
11	285	0.0	.06	12.48	12.53	49.191	R	30	90	190	360	350	1.7	.2

* EXCESS O2 IN EXHAUST   **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	104	47	120	13	133	1.37	20.4	R	R	R	4.22	3.83	17.70
2	1.0	96	47	184	19	198	2.75	19.0	1.05	1.02	7.07	1.91	1.86	12.93
3	1.0	112	47	224	19	238	3.44	18.2	.83	.69	5.77	1.62	1.34	11.27
4	1.0	132	57	298	9	307	4.59	16.4	.64	.55	4.86	1.36	1.18	10.38
5	2.0	152	79	338	9	347	5.55	15.4	.54	.56	4.02	1.19	1.24	9.92
6	1.0	112	36	117	20	136	1.42	20.0	R	R	R	4.72	2.49	18.78
7	3.5	184	378	383	0	383	6.78	14.0	.55	2.25	3.74	1.25	5.11	8.51
8	5.5	232	881	424	0	424	7.21	13.0	.64	4.86	3.84	1.45	10.45	8.66
9	5.0	232	414	426	0	426	5.81	13.6	.75	2.66	4.49	1.60	5.69	4.62
10	4.5	252	274	387	4	392	5.14	14.5	.47	2.11	4.95	1.83	3.97	9.32
11	1.0	128	48	136	0	136	1.37	20.1	R	R	R	6.23	4.61	21.73

CYCLE COMPOSITE
BSHC = 1.039 GRAM/BHP HR
BSCO = 2.369 GRAM/BHP HR
BSNO2 = 5.358 GRAM/BHP HR
BSHC + BSNO2 = 6.391 GRAM/BHP HR
BSFC = .590 LB/BHP HR

TABLE B-158. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-19-73   TEST NO. 5 W/ 30 PCT. COOL EGR--NOTCH 7,8 DERATED
INJECTORS' NEEDLE   TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.04	12.11	42.302	R	30	80	120	210	210	1.8	.2
2	285	15.4	.19	12.20	12.39	18.245	.546	30	80	120	300	265	1.4	.2
3	344	23.8	.20	12.92	13.12	13.070	.504	30	80	120	350	310	2.4	.3
4	424	46.2	.36	15.79	16.15	8.092	.467	30	70	120	420	418	3.4	.5
5	515	73.2	.55	19.10	19.65	6.010	.451	30	80	122	540	520	4.5	.7
6	285	0.0	.06	11.85	11.91	42.028	R	30	80	120	270	260	1.8	.2
7	584	104.1	.77	23.21	23.98	4.775	.442	30	86	126	645	635	5.1	.8
8	675	134.2	1.01	27.42	28.43	4.062	.450	30	80	135	730	745	6.1	1.1
9	755	132.0	1.02	31.63	32.65	4.959	.464	30	88	153	715	740	7.3	1.3
10	835	109.5	.97	33.78	34.76	5.927	.533	30	90	165	655	790	8.5	1.4
11	285	0.0	.05	12.00	12.05	50.258	R	30	85	135	320	310	1.8	.2

* EXCESS O2 IN EXHAUST   **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	59	108	15	123	1.37	20.8	R	R	R	3.03	4.97	16.92
2	1.5	78	70	175	18	193	2.75	18.7	.76	1.40	6.69	1.40	2.72	12.86
3	1.5	92	70	210	23	233	3.38	18.0	.67	1.01	5.54	1.33	2.01	10.99
4	2.0	112	80	296	9	305	4.52	16.3	.52	.79	4.61	1.11	1.60	9.07
5	3.0	136	113	315	9	324	5.29	15.2	.48	.80	3.75	1.07	1.77	9.33
6	1.0	100	59	106	13	119	1.37	20.2	R	R	R	4.14	4.09	16.19
7	3.5	160	355	356	4	360	6.37	13.0	.44	2.15	3.54	1.10	4.86	8.11
8	6.5	200	407	397	0	397	6.78	13.0	.50	5.05	3.63	1.09	11.23	8.07
9	4.5	240	367	448	4	453	5.81	14.0	.81	2.39	4.09	1.75	5.15	10.93
10	5.5	272	228	385	0	385	4.93	15.0	1.19	1.90	5.20	2.19	3.57	9.09
11	1.5	100	71	118	0	118	1.19	20.1	R	R	R	5.37	7.07	19.12

CYCLE COMPOSITE
BSHC = 1.095 GRAM/BHP HR
BSCO = 2.314 GRAM/BHP HR
BSNO2 = 5.483 GRAM/BHP HR
BSHC + BSNO2 = 6.578 GRAM/BHP HR
BSFC = .591 LB/BHP HR

TABLE B-159. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-22-73 TEST NO. 1 W/ 20 PCT. COOL EGR--NOTCH 8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.82	13.88	56.899	R	20	75	122	290	265	1.7	.3
2	285	15.9	.13	13.85	13.98	23.790	.507	20	73	117	297	290	1.7	.3
3	344	25.8	.20	15.74	15.94	16.663	.965	20	74	120	333	335	2.6	.4
4	424	50.7	.36	19.54	19.90	10.695	.926	20	75	122	452	422	3.0	.5
5	515	70.4	.55	24.63	25.18	8.459	.918	20	75	122	565	515	4.4	.8
6	285	0.0	.06	13.85	13.90	54.834	R	20	73	112	268	245	1.7	.3
7	584	108.3	.76	29.27	30.04	6.531	.923	20	73	120	648	620	5.0	.9
8	675	143.5	1.01	33.45	34.46	5.417	.921	20	77	128	733	735	6.0	1.2
9	755	173.6	1.26	38.49	39.75	4.839	.937	20	80	137	820	851	7.2	1.5
10	835	184.2	1.41	41.84	43.25	4.797	.446	20	88	150	852	898	8.6	1.[illegible]
11	285	0.0	.04	13.78	13.82	71.305	R	20	78	130	390	370	1.7	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	48	138	21	159	1.09	21.0	R	R	R	2.69	5.11	28.0[illegible]
2	1.0	50	71	233	10	243	2.26	20.0	.60	1.69	9.53	1.18	3.33	18.86
3	1.5	60	82	270	10	280	3.03	18.9	.49	1.33	7.96	1.05	2.86	16.05
4	1.5	55	69	429	24	453	4.12	17.9	.29	.72	7.69	.67	1.68	18.03
5	3.0	65	69	582	14	596	4.79	16.6	.28	.50	8.26	.66	1.39	19.77
6	1.0	40	48	136	12	147	1.09	20.2	R	R	R	2.16	5.12	26.02
7	2.0	80	114	718	14	732	5.79	15.0	.29	.83	8.77	.69	1.96	20.79
8	2.5	105	333	726	14	740	6.53	14.3	.33	2.10	7.68	.79	4.99	18.23
9	5.0	150	1939	652	14	666	7.04	13.9	.45	8.69	6.59	1.09	19.78	15.09
10	4.1	160	1576	623	0	623	7.04	14.1	.48	9.48	6.16	1.08	21.29	13.88
11	1.0	85	36	139	4	143	1.09	20.2	R	R	R	5.97	5.88	32.77

CYCLE COMPOSITE BSHC = .517 GRAM/BHP HR
BSCO = 8.044 GRAM/BHP HR
BSNO2 = 7.083 GRAM/BHP HR
BSHC + BSNO2 = 7.600 GRAM/BHP HR
BSFC = .461 LB/BHP HR

TABLE B-160. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-22-73 TEST NO. 2 W/ 20 PCT. COOL EGR--NOTCH 8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	835	178.0	1.33	41.72	43.05	7.343	.446	20	83	154	826	863	8.6	1.6
2	285	0.0	.06	13.82	13.88	48.267	R	20	75	120	320	295	1.7	.3
3	285	15.4	.13	13.82	13.95	21.653	.520	20	75	115	315	304	1.[illegible]	.3
4	344	25.8	.20	15.72	15.92	15.838	.465	20	75	117	338	338	2.6	.4
5	424	50.7	.36	19.54	19.90	9.448	.922	20	75	122	443	415	3.0	.5
6	515	70.4	.54	24.63	25.17	10.253	.416	20	75	122	548	518	4.4	.8
7	285	0.0	.06	13.78	13.84	40.888	R	20	78	115	285	255	1.7	.3
8	584	104.5	.76	24.14	24.90	6.148	.918	20	78	126	665	628	5.0	.9
9	675	143.5	1.08	33.42	34.48	5.182	.918	20	78	138	732	738	6.0	1.8
10	755	175.1	1.26	38.84	40.15	5.042	.938	20	85	148	822	856	7.2	1.4
11	285	0.0	.04	13.72	13.76	71.679	R	20	83	135	348	375	1.7	.3

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	30	34	181	8	138	1.09	20.5	.10	.21	1.36	.81	.48	3.83
2	1.0	35	71	222	15	237	2.26	14.9	R	R	R	1.64	6.08	37.44
3	1.0	40	82	254	20	274	2.97	18.7	.48	1.46	10.73	.42	3.78	88.64
4	1.0	45	82	418	15	433	3.44	17.3	.37	1.33	11.82	.74	2.06	24.74
5	3.0	50	69	562	14	577	4.79	16.1	.26	.72	9.78	.61	1.78	23.17
6	1.0	35	57	132	11	143	1.14	20.0	.16	.48	1.48	.36	1.16	9.77
7	3.0	70	167	742	8	742	5.66	15.1	R	R	R	3.76	17.03	180.48
8	3.5	105	271	751	14	766	6.37	14.3	.38	2.67	4.03	.48	6.38	21.54
9	5.5	155	1663	675	8	678	6.07	13.6	.49	18.44	7.08	1.17	25.18	16.74
10	4.[illegible]	180	1061	678	14	686	6.45	14.3	.64	6.48	6.74	1.06	14.08	15.73
11	1.[illegible]	55	83	146	1	147	1.09	20.4	R	R	R	3.04	11.68	33.54

CYCLE COMPOSITE BSHC = .306 GRAM/BHP HR
BSCO = 4.096 GRAM/BHP HR
BSNO2 = 5.293 GRAM/BHP HR
BSHC + BSNO2 = 5.679 GRAM/BHP HR
BSFC = .440 LB/BHP HR

TABLE B-161. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-21-73 TEST NO.1 W/ 30 PCT. COOL EGR-NOTCHES 7-8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	[illegible]	.06	12.58	12.64	96.855	R	30	72	117	290	225	1.6	.2
2	285	[illegible]	.13	12.49	12.62	20.082	.547	30	80	115	265	262	1.7	.2
3	399	25.1	.20	13.76	13.96	13.792	.971	30	80	120	320	315	2.6	.3
4	429	[illegible]	.35	17.02	17.37	8.620	.919	30	80	122	437	405	3.6	.6
5	515	[illegible]	.55	22.19	22.69	6.755	.915	30	80	129	560	509	4.2	.6
6	285	0.0	.06	12.46	12.52	48.896	R	30	82	117	263	295	1.7	.2
7	589	107.6	.76	26.06	26.82	5.412	.922	30	89	130	662	630	4.8	.8
8	675	142.1	1.00	30.36	31.36	4.511	.922	30	88	134	750	740	5.7	1.1
9	755	149.8	1.10	34.67	35.76	4.871	.939	30	85	143	760	765	6.8	1.3
10	835	173.1	1.33	37.74	39.07	4.236	.960	30	90	158	825	858	8.4	1.5
11	285	0.0	.05	12.85	12.91	53.557	R	30	86	130	305	290	1.6	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	55	71	191	[illegible]	155	1.32	20.1	R	R	R	2.55	6.59	23.99
2	1.5	60	119	209	[illegible]	218	2.47	18.7	.70	2.79	8.32	1.28	5.00	[illegible]
3	2.0	65	117	239	18	253	3.32	17.5	.48	1.71	6.08	1.01	3.63	[illegible]
4	2.0	85	109	363	[illegible]	372	4.59	15.7	.39	.99	5.56	.93	2.25	13.28
5	2.5	90	119	458	13	472	5.49	14.8	.39	.86	5.02	.82	2.06	14.01
6	1.0	70	83	143	17	160	1.28	20.0	R	R	R	3.40	8.06	25.99
7	2.5	110	228	494	13	508	6.37	13.8	.36	1.49	5.97	.86	3.59	12.96
8	4.5	150	709	570	5	570	6.95	13.0	.49	4.11	5.93	1.03	9.75	12.87
9	4.0	[illegible]	573	558	0	558	6.45	13.5	.52	3.60	5.75	1.18	8.19	13.10
10	5.5	[illegible]	1509	[illegible]	.3	567	7.12	13.0	.63	8.96	5.53	1.36	19.98	12.82
11	1.0	100	119	150	3	158	1.23	20.0	R	R	R	5.32	12.62	27.95

CYCLE COMPOSITE
BSHC = .659 GRAM/BHP HR
BSCO = 7.505 GRAM/BHP HR
BSNO2 = 6.137 GRAM/BHP HR
BSHC + BSNO2 = 6.795 GRAM/BHP HR
BSFC = .975 LB/BHP HR

TABLE B-162. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-21-73 TEST NO.2 W/ 30 PCT. COOL EGR-NOTCHES 7-8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.02	12.08	99.590	R	30	80	135	390	380	1.6	.2
2	285	16.6	.19	12.85	12.90	18.925	.995	30	85	126	292	265	1.7	.2
3	399	25.1	.20	13.69	13.89	13.282	.971	30	85	127	33?	320	2.6	.4
4	429	49.3	.36	16.90	17.26	8.137	.934	30	8?	130	455	420	3.7	.4
5	515	79.4	.59	22.19	22.73	6.936	.918	30	89	130	567	520	4.3	.7
6	285	0.0	.06	12.78	12.83	96.362	R	30	92	120	335	310	1.7	.2
7	589	108.7	.77	25.98	26.74	4.979	.923	30	92	135	663	633	4.8	.8
8	675	140.9	1.08	30.29	31.23	4.330	.926	30	92	139	790	736	5.8	1.0
9	755	159.0	1.12	34.51	35.62	4.392	.935	30	96	145	777	783	6.4	1.3
10	835	179.6	1.33	37.57	38.89	3.893	.956	30	96	160	830	865	8.4	1.5
11	285	0.0	.05	12.80	12.85	52.611	R	30	90	140	365	356	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	29	144	12	156	1.20	19.7	R	R	R	2.50	2.37	28.58
2	1.5	60	59	242	9	251	2.00	18.0	.62	[illegible]	8.50	1.25	2.95	17.17
3	1.5	65	50	240	10	250	3.30	17.0	.90	.65	6.19	1.01	1.00	19.19
4	2.0	70	46	369	5	373	4.65	15.2	.32	.42	5.64	.75	.97	13.00
5	3.0	75	60	400	0	400	5.51	13.9	.20	.52	6.03	.69	1.26	14.70
6	1.0	55	36	150	11	161	1.28	[illegible]	R	R	R	2.79	3.54	26.26
7	2.5	95	216	510	0	510	6.95	12.9	.31	1.90	5.92	.73	3.31	18.00
8	4.0	120	535	559	0	559	7.04	12.2	.35	3.13	5.37	.83	7.36	18.62
9	4.5	145	735	531	13	544	6.07	12.3	.44	4.47	5.44	1.02	10.00	12.49
10	5.0	175	1050	540	13	559	7.04	12.0	.51	8.85	5.33	2.13	18.79	11.69
11	1.0	85	36	150	3	153	1.23	10.5	R	R	R	4.81	4.02	20.26

CYCLE COMPOSITE
BSHC = .947 GRAM/BHP HR
BSCO = 7.018 GRAM/BHP HR
BSNO2 = 5.975 GRAM/BHP HR
BSHC + BSNO2 = 6.588 GRAM/BHP HR
BSFC = .971 LB/BHP HR

TABLE B [illegible]. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-31-73 TE 0. 1 W/ 10 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EX[illegible]T FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	19.99	19.55	98.311	R	10	76	102	275	222	1.8	.2
2	285	13.8	.19	19.85	19.99	21.917	.607	10	77	106	310	265	1.8	.3
3	394	21.8	.[illegible]	16.27	16.47	15.954	.559	10	77	106	350	315	2.8	.4
4	494	99.3	.36	19.99	20.30	10.296	.[illegible]88	10	76	110	440	420	4.0	.5
5	515	69.1	.59	25.24	25.[illegible]8	8.299	.[illegible]40	10	80	115	538	510	4.6	.8
6	285	[illegible].0	.07	19.85	19.92	99.519	R	10	80	107	257	250	1.8	.2
7	584	101.1	.76	30.01	30.[illegible]7	6.996	.951	10	80	120	690	690	5.3	1.0
8	675	132.1	1.00	35.16	36.16	5.361	.959	10	90	132	730	750	6.2	1.2
9	755	163.8	1.26	39.50	40.76	4.510	.961	10	105	150	828	875	7.5	1.5
10	835	192.7	1.56	42.55	44.11	3.598	.986	10	115	170	930	1010	8.9	1.8
11	285	0.0	.06	19.91	19.97	59.217	R	10	105	190	930	920	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	71	117	18	139	1.23	20.0	R	R	R	3.84	6.83	21.12
2	1.5	84	82	183	19	207	2.16	18.5	1.20	2.35	9.71	1.98	3.87	15.98
3	1.5	88	82	204	19	264	2.75	17.8	.88	1.[illegible]	8.64	2.91	1.67	15.37
4	2.0	108	69	903	19	917	3.62	16.5	.65	.[illegible]	9.26	1.34	1.72	16.92
5	2.0	128	42	989	19	999	4.19	15.7	.63	.40	8.03	1.34	1.48	17.19
6	1.5	96	71	122	13	139	1.19	20.0	R	R	R	4.73	7.00	21.65
7	2.0	160	195	672	0	672	5.07	13.9	.69	1.56	8.84	1.93	3.95	19.58
8	3.0	196	528	705	19	723	5.81	13.4	.71	3.80	8.55	1.66	8.37	18.82
9	4.5	<40	1254	795	0	795	6.29	12.6	.79	8.20	8.01	1.71	17.78	17.36
10	12.0	268	3725	697	0	697	6.95	11.5	.81	22.93	6.89	1.67	96.17	19.18
11	1.0	104	95	134	1	140	1.09	19.9	R	R	R	5.63	10.28	29.88

CYCLE COMPOSITE BSHC = 2.595 GRAM/BHP HR
BSCO = 9.783 GRAM/BHP HR
BSNO2 = 17.056 GRAM/BHP HR
BSHC + BSNO2 = 19.681 GRAM/BHP HR
BSFC = .879 LB/BHP HR

TABLE B-164. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-[illegible]-73 TEST NO. 3 W/ 10 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.[illegible]	.06	19.99	19.50	53.993	R	10	80	120	210	215	1.8	.2
2	285	13.6	.19	19.66	19.79	22.397	.593	10	80	120	305	260	1.8	.3
3	394	23.6	.28	16.20	16.48	16.244	.580	10	78	120	355	315	2.7	.4
4	494	96.[illegible]	.35	19.86	20.22	10.283	.[illegible]53	10	80	126	450	430	3.9	.5
5	515	72.9	.59	25.21	25.76	8.138	.[illegible]97	10	80	130	590	530	4.5	.8
6	283	0.0	.06	19.88	19.88	88.375	R	10	80	122	315	300	1.7	.2
7	589	104.1	.76	29.95	30.71	6.930	.[illegible]97	10	82	130	660	650	5.1	.9
8	675	135.1	1.00	35.99	36.99	5.902	.[illegible]94	10	90	140	790	765	6.0	1.2
9	755	168.7	1.27	39.19	40.45	4.583	.[illegible]951	10	100	150	835	885	7.4	1.5
10	835	195.9	1.56	42.91	43.99	3.579	.984	10	110	170	935	1110	8.9	1.8
11	285	0.0	.06	19.76	19.82	58.958	R	10	92	140	350	390	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	72	68	122	13	139	1.04	20.8	R	R	R	3.83	6.38	23.41
2	2.0	88	84	207	10	217	2.16	18.7	1.13	1.66	10.83	1.91	2.74	16.91
3	2.0	88	84	264	19	273	2.75	17.9	.81	1.07	8.20	1.84	2.10	16.13
4	2.0	104	96	917	5	922	3.70	16.4	.[illegible]	.83	7.88	1.31	1.16	17.30
5	2.0	128	69	996	5	991	4.38	15.5	.60	.64	8.25	1.33	1.09	18.96
6	1.0	84	36	120	12	130	1.04	20.2	R	R	R	4.58	3.00	23.48
7	2.0	148	172	678	4	681	5.22	14.4	.68	1.33	8.68	1.32	3.09	19.81
8	2.5	176	467	737	14	751	6.01	13.4	.69	3.31	8.75	1.41	7.96	19.71
9	4.5	224	1238	768	14	778	6.29	12.8	.71	7.81	8.00	1.67	17.39	17.76
10	12.0	248	3720	696	14	709	6.87	11.6	.79	21.98	6.88	1.82	98.91	19.22
11	1.5	104	98	104	0	104	1.04	20.2	R	R	R	5.98	9.96	29.89

CYCLE COMPOSITE BSHC = 2.287 GRAM/BHP HR
BSCO = 3.881 GRAM/BHP HR
BSNOX = 16.384 GRAM/BHP HR
BSHC + BSNOX = 18.672 GRAM/BHP HR
BSFC = .889 LB/BHP HR

TABLE B-165. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-01-73 TEST NO. 1 W/ 20 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.89	12.96	40.145	R	20	75	108	260	255	1.7	.2
2	285	13.7	.14	12.90	13.04	14.315	.618	20	85	105	325	275	1.8	.3
3	344	19.4	.20	14.13	14.33	14.107	.607	20	95	110	355	310	2.6	.4
4	424	42.7	.35	16.94	17.29	8.663	.496	20	90	115	445	420	3.8	.5
5	515	69.1	.54	23.40	23.94	7.265	.471	20	100	120	550	520	4.4	.7
6	285	0.0	.07	12.88	12.94	41.458	R	20	100	120	300	290	1.7	.2
7	584	100.3	.76	27.29	28.05	5.431	.455	20	110	132	660	650	5.0	.4
8	675	128.7	1.00	31.16	32.15	4.319	.465	20	128	145	750	770	5.8	1.1
9	755	154.6	1.27	34.07	35.34	3.326	.477	20	152	170	865	900	6.8	1.3
10	835	189.1	1.56	38.42	39.94	2.802	.496	20	180	192	975	1050	8.2	1.6
11	285	0.0	.06	12.96	13.02	40.291	R	20	118	150	300	300	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	59	126	13	139	1.20	19.6	R	R	R	3.09	4.07	18.53
2	1.0	80	70	195	13	209	2.26	18.3	1.09	1.02	8.85	1.60	2.45	14.33
3	1.0	88	70	229	22	251	2.69	17.5	.86	1.36	8.00	1.41	2.24	13.18
4	1.0	108	80	365	13	378	3.01	16.0	.58	.86	6.61	1.16	1.73	13.32
5	2.5	124	92	445	17	463	4.59	14.9	.57	.83	6.92	1.20	1.77	14.68
6	1.0	92	71	118	18	136	1.20	19.3	R	R	R	3.93	6.06	19.07
7	2.0	136	229	591	17	608	5.66	13.3	.50	1.68	7.34	1.10	3.70	16.16
8	4.5	176	672	611	13	624	6.45	12.1	.58	4.42	6.74	1.25	9.50	14.49
9	8.5	212	2239	579	0	579	7.30	10.8	.62	13.04	5.54	1.30	27.31	11.61
10	23.0	244	6208	475	0	475	7.66	9.9	.68	34.53	4.34	1.37	69.60	8.75
11	1.0	96	59	140	8	148	1.19	19.0	R	R	R	4.85	5.99	24.54

CYCLE COMPOSITE BSHC = 2.193 GRAM/BHP HR
BSCO = 3.955 GRAM/BHP HR
BSNO2 = 15.292 GRAM/BHP HR
BSHC + BSNO2 = 17.485 GRAM/BHP HR
BSFC = .494 LB/BHP HR

TABLE B-166. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-01-73 TEST NO. 2 W/ 20 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.94	13.00	42.305	R	20	83	115	250	240	1.7	.2
2	285	13.3	.13	12.94	13.07	14.051	.603	20	90	115	310	266	1.8	.2
3	344	22.7	.20	14.16	14.36	13.903	.529	20	90	120	355	315	2.6	.3
4	424	46.5	.36	16.94	17.30	8.220	.464	20	95	123	455	435	3.7	.5
5	515	73.3	.59	23.02	23.56	7.101	.495	20	102	130	560	527	4.4	.7
6	285	0.0	.06	12.91	12.90	44.211	R	20	102	125	315	300	1.8	.3
7	584	103.0	.76	27.34	28.11	5.378	.445	20	112	136	665	650	4.9	.4
8	675	132.5	1.00	31.11	32.11	4.227	.453	20	148	155	765	785	5.7	1.1
9	755	159.6	1.20	34.11	35.39	3.251	.480	20	165	170	875	910	6.7	1.3
10	835	191.2	1.50	38.76	40.33	2.831	.495	20	210	190	960	1040	8.7	1.7
11	285	0.0	.06	12.91	12.97	45.937	R	20	115	150	290	285	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	94	71	112	19	130	1.23	19.6	R	R	R	3.60	6.04	10.80
2	1.5	92	71	171	13	184	2.06	18.3	1.80	1.03	7.03	1.90	3.03	12.99
3	1.0	100	68	222	22	243	2.00	17.6	.83	.97	6.66	1.58	1.83	12.59
4	1.5	184	87	366	4	364	4.12	15.6	.61	.86	6.06	1.30	1.80	12.48
5	3.0	144	88	431	13	443	4.74	14.8	.61	.68	6.16	1.37	1.88	13.29
6	1.5	112	54	111	19	124	1.83	14.5	R	R	R	5.05	5.34	14.04
7	2.5	176	207	544	8	558	5.97	13.2	.63	2.06	6.80	1.43	4.63	14.70
8	4.5	216	861	553	8	563	6.70	11.4	.64	5.42	5.78	1.53	11.97	12.77
9	10.5	260	2828	404	8	404	7.40	10.6	.76	16.46	4.64	1.84	34.86	4.67
10	25.0	200	4275	542	8	542	7.30	10.0	.78	23.78	5.34	1.80	47.44	10.48
11	2.0	112	83	122	10	132	1.14	19.2	R	R	R	5.33	7.84	20.57

CYCLE COMPOSITE BSHC = 2.469 GRAM/BHP HR
BSCO = 4.131 GRAM/BHP HR
BSNO2 = 13.304 GRAM/BHP HR
BSHC + BSNO2 = 15.773 GRAM/BHP HR
BSFC = .494 LB/BHP HR

TABLE B-167. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-01-73 TEST NO. 3 W/ 20 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.99	13.00	99.979	R	20	85	115	200	200	1.7	.2
2	285	14.2	.13	12.89	13.02	14.778	.561	20	88	118	250	250	1.8	.2
3	399	23.2	.19	19.47	19.66	14.683	.999	20	95	120	350	305	2.7	.3
4	429	46.8	.36	16.91	17.26	8.516	.958	20	90	125	455	435	3.7	.5
5	515	79.2	.55	23.38	23.93	7.078	.995	20	103	132	575	590	4.9	.7
6	285	0.0	.06	13.10	13.16	97.798	R	20	100	130	330	310	1.7	.2
7	589	109.1	.76	27.29	28.06	5.950	.990	20	113	140	670	655	4.9	.9
8	675	139.8	1.01	31.28	32.29	4.210	.953	20	140	160	770	790	5.7	1.1
9	755	159.6	1.26	34.54	35.80	3.301	.974	20	180	180	900	935	6.6	1.2
10	835	176.5	1.55	38.76	40.31	2.728	.928	20	228	215	1020	1075	7.7	1.5
11	285	0.0	.06	13.25	13.31	50.672	R	20	115	160	310	310	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	59	117	19	135	1.19	19.8	R	R	R	9.26	5.35	20.00
2	1.5	80	71	180	18	198	2.37	18.3	.97	1.64	7.82	1.72	3.02	13.93
3	1.5	88	58	232	22	254	2.80	17.5	.73	.97	6.92	1.97	1.99	13.85
4	1.5	109	46	375	9	383	4.06	15.9	.51	.95	5.11	1.11	.98	13.35
5	3.0	136	69	971	9	980	4.86	14.7	.58	.58	6.68	1.30	1.31	15.03
6	1.5	96	48	115	18	133	1.19	19.7	R	R	R	9.63	4.57	20.45
7	2.5	160	240	581	9	586	5.89	13.9	.57	1.70	6.82	1.29	3.86	15.50
8	4.5	208	812	588	0	587	7.09	11.9	.66	5.15	6.05	1.96	11.38	13.36
9	10.5	248	2992	500	0	500	7.66	10.5	.73	17.65	4.85	1.55	37.26	10.23
10	34.5	272	7229	372	0	372	8.13	9.5	.82	93.92	3.67	1.55	82.23	6.45
11	2.0	108	59	126	5	131	1.19	19.5	R	R	R	5.58	6.12	22.15

CYCLE COMPOSITE BSHC = 2.195 GRAM/BHP HR
BSCO = 3.950 GRAM/BHP HR
BSNO2 = 13.699 GRAM/BHP HR
BSHC + BSNO2 = 15.894 GRAM/BHP HR
BSFC = .810 LB/BHP HR

TABLE B-168. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-02-73 TEST NO. 3 W/ 30 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	11.88	11.94	38.056	R	30	88	118	288	210	1.8	.2
2	285	15.6	.19	11.77	11.91	17.355	.526	30	88	118	270	250	1.9	.2
3	399	23.6	.28	18.96	19.16	18.963	.517	30	89	111	330	300	2.8	.3
4	429	46.2	.36	15.32	15.68	7.566	.967	30	95	119	429	409	3.9	.5
5	515	71.9	.59	18.60	19.19	5.652	.993	30	117	130	590	519	4.6	.7
6	285	0.0	.07	11.79	11.86	38.190	R	30	115	120	330	320	1.7	.2
7	589	102.9	.76	22.88	23.64	4.336	.993	30	144	142	650	642	5.0	.8
8	675	129.9	1.01	26.85	27.86	3.236	.966	30	180	165	770	790	5.7	1.0
9	755	150.5	1.27	32.37	33.63	2.649	.985	30	250	195	880	905	6.5	1.2
10	835	169.6	1.59	33.92	35.96	2.198	.979	30	310	295	960	980	7.6	1.3
11	285	0.0	.06	12.81	12.87	95.235	R	30	210	210	950	995	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	71	116	13	129	1.20	19.6	R	R	R	9.21	5.59	16.78
2	2.0	108	78	178	17	196	2.42	18.0	1.01	1.91	6.96	1.98	3.69	18.80
3	1.5	109	81	227	22	249	2.86	17.4	.77	1.19	6.89	1.98	2.81	18.07
4	1.5	116	69	344	17	361	3.99	15.7	.58	.61	5.88	1.21	1.21	11.38
5	2.5	148	102	911	9	918	4.86	14.5	.99	.71	6.77	1.88	1.57	18.58
6	1.0	128	59	121	13	134	1.20	19.4	R	R	R	9.78	4.63	17.15
7	3.5	176	330	649	8	657	6.01	12.6	.83	2.48	6.84	1.89	9.81	18.29
8	7.5	232	1542	387	0	387	7.48	10.6	.66	8.98	3.84	1.61	14.86	7.69
9	58.0	288	6163	279	0	279	8.42	9.8	.85	36.23	2.79	1.68	71.71	5.34
10	98.0	348	18995	223	0	223	8.42	8.4	1.08	78.68	2.19	1.78	188.88	5.69
11	1.5	104	71	135	0	135	1.19	19.2	R	R	R	9.31	6.66	20.78

CYCLE COMPOSITE BSHC = 2.413 GRAM/BHP HR
BSCO = 4.885 GRAM/BHP HR
BSNO2 = 11.583 GRAM/BHP HR
BSHC + BSNO2 = 13.996 GRAM/BHP HR
BSFC = .836 LB/BHP HR

TABLE B-169. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-02-73 TEST NO. 4 W/ 30 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.23	12.29	39,389	R	30	110	150	252	255	1.9	.2
2	285	15.7	.19	12.29	12.30	17,612	.535	30	110	152	320	292	2.1	.2
3	399	23.2	.23	12.96	13.16	12,793	.517	30	102	190	359	320	3.0	.4
4	429	49.3	.37	15.65	16.02	7,592	.446	30	106	199	352	328	4.3	.5
5	515	71.7	.59	18.81	19.35	5,759	.455	30	120	154	590	510	5.0	.8
6	28'	0.0	.06	12.03	12.10	40,366	R	30	120	150	390	325	1.9	.2
7	584	103.1	.76	22.88	23.64	4,455	.444	30	190	162	658	690	5.5	.8
8	675	129.9	1.00	27.22	28.21	3,590	.460	30	190	189	752	768	6.2	1.1
9	755	153.0	1.26	32.93	33.69	2,811	.499	30	295	215	866	880	7.0	1.2
10	835	166.3	1.56	39.38	35.99	2,191	.563	30	300	250	958	992	8.0	1.3
11	285	0.0	.06	12.03	12.09	42,373	R	30	210	215	915	960	2.0	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	71	121	10	131	1.19	19.3	R	R	R	3.91	5.76	17.39
2	1.5	88	78	205	9	219	2.21	18.0	.92	1.96	7.39	1.71	2.73	13.69
3	1.5	88	70	251	13	265	2.78	17.5	.66	1.09	6.47	1.27	2.01	12.53
4	1.5	100	69	401	9	409	3.93	15.6	.43	.59	5.79	.96	1.31	12.08
5	2.5	116	90	447	4	451	4.52	14.6	.41	.64	5.26	.91	1.91	11.67
6	1.0	96	59	120	13	133	1.19	19.1	R	R	R	4.03	4.97	10.26
7	3.0	152	209	526	0	526	5.81	13.0	.96	1.71	5.21	1.09	3.85	11.73
8	6.5	192	1173	444	0	452	6.95	11.3	.55	6.70	4.29	1.28	19.56	9.21
9	22.0	228	5019	393	0	393	7.09	9.5	.66	29.06	3.26	1.39	58.03	6.59
10	60.0	276	19172	228	0	228	8.03	8.4	.79	88.57	2.13	1.40	193.18	3.78
11	1.7	112	71	135	0	135	1.19	19.0	R	R	R	4.47	6.38	14.59

CYCLE COMPOSITE BSHC = 1.992 GRAM/BHP HR
BSCO = 3.859 GRAM/BHP HR
BSNO2 = 12.186 GRAM/BHP HR
BSHC + BSNO2 = 14.098 GRAM/BHP HR
BSFC = .822 LB/BHP HR

TABLE B-170. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-73 TEST NO. 1 W/ 20 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.39	13.40	51,027	R	20	110	150	262	240	1.7	.2
2	285	15.8	.13	13.39	13.48	28,916	.506	20	105	145	305	295	1.7	.2
3	399	29.5	.20	14.89	15.09	15,620	.401	20	97	190	335	330	2.9	.3
4	429	49.3	.36	18.82	19.18	9,936	.434	20	95	190	450	430	3.7	.4
5	515	76.1	.55	23.48	24.03	7,387	.431	20	100	190	570	529	4.4	.7
6	285	0.0	.05	13.25	13.30	50,915	R	20	101	135	310	285	1.7	.2
7	584	108.7	.76	20.10	20.86	6,009	.419	20	110	145	676	686	4.8	.9
8	675	128.2	1.00	32.39	33.39	4,766	.434	20	120	155	765	768	5.7	1.1
9	755	165.3	1.28	36.96	38.29	3,778	.463	20	175	170	869	895	6.6	1.3
10	835	169.6	1.56	39.65	41.22	2,996	.553	20	263	210	996	1057	7.9	1.6
11	285	0.0	.06	13.22	13.28	49,705	R	20	125	170	300	355	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	98	115	4	119	1.19	19.5	R	R	R	2.60	4.90	20.10
2	1.0	50	71	190	9	198	2.37	18.7	.86	1.58	7.30	1.11	2.13	19.93
3	3.0	56	70	203	9	200	2.86	18.9	.96	1.13	6.05	.93	2.36	18.57
4	2.0	56	50	301	4	305	4.12	16.7	.28	.89	6.46	.65	1.36	14.90
5	2.1	60	57	519	13	527	4.79	15.6	.25	.47	7.19	.58	1.10	14.60
6	1.0	35	90	123	11	134	1.19	19.6	R	R	R	4.01	4.90	22.00
7	2.0	66	183	430	0	630	5.01	19.3	.23	1.07	7.31	.90	3.09	17.99
8	3.4	100	649	600	13	633	6.70	12.9	.38	4.13	6.58	.73	4.88	15.01
9	7.0	180	8780	627	25	852	7.90	11.4	.37	16.59	6.88	.79	35.01	11.94
10	21.0	135	6096	436	0	436	8.03	10.1	.43	44.86	4.36	.70	79.04	8.85
11	1.0	45	40	136	2	136	1.19	19.2	R	R	R	2.30	4.09	23.01

CYCLE COMPOSITE BSHC = 1.019 GRAM/BHP HR
BSCO = 2.983 GRAM/BHP HR
BSNO2 = 13.360 GRAM/BHP HR
BSHC + BSNO2 = 14.379 GRAM/BHP HR
BSFC = .780 LB/BHP HR

TABLE B-171. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-73 TEST NO. 2 W/ 20 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.28	13.34	50.794	R	20	110	152	270	250	1.7	.2
2	285	15.0	.19	13.28	13.42	20.209	.510	20	95	140	295	285	1.7	.2
3	344	29.5	.20	14.81	15.01	15.198	.401	20	90	137	329	322	2.6	.3
4	424	49.3	.36	18.70	19.06	9.636	.434	20	90	134	550	520	3.8	.5
5	515	76.0	.54	23.33	23.88	7.439	.424	20	100	140	544	520	1.7	.7
6	285	0.0	.06	13.16	13.22	48.039	R	20	100	135	305	285	4.4	.2
7	594	100.7	.76	27.92	28.68	5.763	.419	20	110	143	657	634	5.8	.8
8	675	130.2	1.00	32.18	33.18	4.590	.434	20	130	155	760	765	6.8	1.1
9	755	165.3	1.26	36.70	37.96	3.767	.457	20	160	170	860	885	6.7	1.3
10	835	185.1	1.56	39.51	41.07	2.946	.505	20	200	200	1003	1070	7.8	1.6
11	285	0.0	.05	13.12	13.17	53.004	R	20	135	170	360	345	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	59	121	4	126	1.14	19.5	R	R	R	2.59	6.14	21.35
2	1.0	55	82	207	0	207	2.26	18.6	.62	1.84	7.60	1.19	3.54	14.66
3	1.0	60	93	224	4	228	2.69	18.0	.48	1.50	6.03	1.01	3.13	12.53
4	1.0	70	69	394	4	399	3.07	16.3	.36	.70	6.65	.82	1.62	15.33
5	2.0	80	80	541	0	541	4.65	15.3	.33	.65	7.27	.77	1.54	17.12
6	1.0	60	71	121	9	129	1.05	19.7	R	R	R	2.91	6.89	20.59
7	2.0	90	102	613	0	613	5.01	13.8	.31	1.27	6.99	.75	3.02	16.67
8	3.0	120	611	621	13	634	6.61	12.5	.38	3.86	6.57	.88	8.89	15.19
9	7.0	210	2620	529	13	541	7.30	11.3	.64	15.82	5.37	1.39	39.59	11.79
10	23.0	195	7102	398	0	398	8.13	10.1	.92	41.95	3.82	.89	82.12	7.57
11	1.0	70	60	131	1	132	1.19	19.4	R	R	R	3.80	6.94	23.51

CYCLE COMPOSITE BSHC = 1.334 GRAM/BHP HR
BSCO = 3.516 GRAM/BHP HR
BSNO2 = 13.359 GRAM/BHP HR
BSHC + BSNO2 = 14.693 GRAM/BHP HR
BSFC = [illegible] LB/BHP HR

TABLE B-172. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-26-72 TEST NO. 1 30 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	11.64	11.70	38.262	R	30	92	110	205	200	1.0	.2
2	285	19.2	.19	11.64	11.70	16.731	.609	30	95	110	265	265	1.0	.2
3	344	21.3	.20	12.90	13.10	13.288	.559	30	95	114	305	305	2.6	.3
4	424	50.7	.36	16.39	16.75	8.059	.422	30	112	125	455	432	3.0	.5
5	515	76.1	.54	21.12	21.66	6.437	.426	30	157	144	600	540	4.5	.7
6	285	0.0	.04	11.57	11.61	69.002	R	30	180	130	270	255	1.7	.2
7	594	106.8	.76	24.50	25.26	4.634	.427	30	165	155	640	668	4.4	.8
8	675	129.4	.99	29.79	30.78	3.669	.459	30	215	182	795	790	5.5	.9
9	755	154.0	1.26	33.41	34.67	2.001	.491	30	269	215	900	910	6.3	1.1
10	835	168.7	1.56	36.54	38.09	2.302	.554	30	290	255	905	970	7.0	1.3
11	285	0.0	.06	11.93	12.00	39.610	R	30	160	205	357	345	1.4	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	60	97	146	19	160	1.30	19.7	R	R	R	2.30	3.66	20.22
2	1.5	75	70	202	20	229	2.97	18.9	.82	1.53	8.20	1.36	2.51	13.90
3	2.5	85	70	220	5	233	2.86	17.0	.70	1.15	6.27	1.25	2.06	11.83
4	2.0	110	69	387	5	392	4.45	15.5	.40	.60	5.89	1.19	1.40	13.09
5	4.0	115	91	522	13	536	5.29	14.8	.43	.60	6.59	1.02	1.60	15.90
6	1.5	90	60	146	9	155	1.20	19.7	R	R	R	6.27	5.27	35.30
7	4.0	140	332	530	0	530	6.61	12.6	.44	2.07	5.41	1.02	4.04	12.67
8	4.0	140	1577	435	0	435	7.75	12.7	.59	9.03	4.45	1.30	21.43	9.70
9	20.0	170	5055	331	9	339	8.82	9.2	.51	39.60	3.30	1.03	78.63	6.72
10	57.0	165	14859	297	0	297	8.92	8.5	.56	84.69	2.90	1.00	152.95	5.23
11	1.5	80	59	157	0	157	1.19	18.9	R	R	R	3.33	4.93	21.96

CYCLE COMPOSITE BSHC = 1.662 GRAM/BHP HR
BSCO = 4.032 GRAM/BHP HR
BSNO2 = 13.404 GRAM/BHP HR
BSHC + BSNO2 = 15.116 GRAM/BHP HR
BSFC = .703 LB/BHP HR

TABLE B-173. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-26-72 TEST NO. 2 30 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' ATSF SWITCH

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.07	12.13	39.869	R	30	115	167	258	250	2.0	.3
2	285	19.7	.13	12.07	12.20	18.829	.595	30	100	150	282	275	2.0	.3
3	399	22.0	.19	12.99	13.13	13.60[illegible]	.578	30	98	195	318	308	2.9	.4
4	424	50.7	.36	16.67	17.03	8.589	.426	30	105	197	435	412	4.1	.5
5	515	77.8	.53	21.05	21.58	6.805	.511	30	120	152	590	500	4.8	.7
6	285	0.0	.05	11.95	12.01	49.325	R	30	105	140	295	235	1.9	.3
7	594	108.7	.75	24.81	25.56	4.978	.419	30	195	160	655	622	5.2	.8
8	675	138.2	1.00	30.02	31.03	3.935	.436	30	195	180	760	760	5.9	1.0
9	755	159.0	1.25	34.53	35.78	3.091	.487	30	265	230	893	912	6.8	1.2
10	835	168.7	1.56	37.53	39.08	2.445	.554	30	280	252	975	960	8.1	1.4
11	285	0.0	.06	12.32	12.37	47.109	R	30	168	205	372	355	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	24	147	4	151	1.19	19.8	R	R	R	7.00	1.89	19.74
2	1.5	60	23	224	5	228	2.11	18.6	.66	.51	8.20	1.21	.99	15.03
3	2.0	60	35	254	4	258	2.58	18.1	.47	.55	6.91	.90	1.09	13.10
4	2.0	65	34	464	5	469	3.99	16.4	.29	.30	6.81	.68	.71	15.90
5	3.0	75	34	556	14	570	4.79	15.2	.27	.25	6.03	.67	.61	16.59
6	1.5	66	24	143	11	154	1.19	19.8	R	R	R	2.97	2.35	24.94
7	4.5	95	227	591	13	604	6.37	13.2	.29	1.91	6.13	.71	3.90	19.82
8	8.5	190	1548	520	13	533	7.57	11.5	.41	9.19	5.17	.95	20.90	11.87
9	22.0	160	5409	354	4	358	8.92	9.6	.44	33.55	3.59	1.01	69.87	7.37
10	52.0	180	13181	319	0	319	8.32	8.8	.55	80.32	3.15	.99	145.06	5.68
11	1.5	85	36	161	3	164	1.19	19.5	R	R	R	4.08	3.91	25.81

CYCLE COMPOSITE BSHC = 1.330 GRAM/BHP HR
BSCO = 2.713 GRAM/BHP HR
BSNO2 = 14.069 GRAM/BHP HR
BSHC + BSNO2 = 15.399 GRAM/BHP HR
BSFC = .773 LB/BHP HR

TABLE B-174. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-31-73 TEST NO. 1 W/ 10 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	14.49	14.55	48.311	R	10	76	102	225	222	1.0	.2
2	285	13.8	.14	14.85	14.99	21.917	.607	15	77	103	310	265	1.0	.3
3	399	21.8	.20	16.27	16.47	15.959	.559	15	77	106	350	315	2.0	.4
4	424	44.3	.36	19.94	20.30	10.296	.488	10	76	110	448	420	4.0	.5
5	515	64.1	.59	25.24	25.78	8.299	.469	10	80	115	530	510	4.6	.8
6	285	0.0	.07	14.85	14.92	44.514	R	10	80	107	257	250	1.0	.2
7	594	101.1	.76	30.01	30.77	6.646	.451	10	80	120	640	640	5.4	1.0
8	675	132.1	1.00	35.16	36.16	5.361	.439	10	90	132	730	750	6.2	1.2
9	755	163.8	1.26	39.50	40.76	4.518	.467	10	105	150	880	875	7.8	1.5
10	835	192.7	1.56	42.55	44.11	3.590	.486	10	115	170	930	1010	8.9	1.8
11	285	0.0	.06	14.71	14.77	59.217	R	10	105	190	330	320	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	80	71	117	18	134	1.23	20.0	R	R	R	3.84	6.03	21.18
2	1.5	84	82	193	14	207	2.16	18.5	1.20	2.35	9.71	1.90	3.07	15.90
3	1.5	88	82	249	14	264	2.75	17.0	.80	1.63	8.59	1.87	2.41	15.87
4	2.0	100	69	403	14	417	3.68	16.5	.65	.64	8.86	1.30	1.70	16.92
5	2.0	120	98	484	14	499	4.19	15.7	.63	.90	8.03	1.30	1.42	17.19
6	1.5	96	71	122	13	134	1.19	20.0	R	R	R	4.73	7.00	21.65
7	2.0	160	198	678	0	678	5.07	14.5	.64	1.86	8.84	1.43	3.96	19.60
8	3.0	196	580	709	14	723	5.81	13.9	.71	3.00	8.85	1.86	8.37	18.02
9	4.5	290	1259	718	0	718	6.29	12.6	.79	8.80	8.81	1.71	17.70	17.36
10	12.0	268	3725	697	0	697	6.96	11.5	.81	22.93	6.84	1.67	46.17	14.18
11	1.0	184	96	139	[illegible]	140	1.09	19.9	R	R	R	5.63	10.80	24.08

CYCLE COMPOSITE BSHC = .921 GRAM/BHP HR
BSCO = 10.217 GRAM/BHP HR
BSNO2 = 7.767 GRAM/BHP HR
BSHC + BSNO2 = 8.688 GRAM/BHP HR
BSFC = .806 LB/BHP HR

TABLE B-175. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 1-31-73 TEST NO. 3 W/ 10 PCT. HOT EGR
INJECTORS NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXH OUT PRESS. IN.HG.
1	285	0.0	.06	19.44	19.50	53.993	R	10	80	120	210	215	1.8	.2
2	285	13.8	.19	19.66	19.79	22.397	.543	10	80	120	305	260	1.8	.3
3	394	23.6	.20	16.20	16.40	16.299	.508	10	78	120	355	315	2.7	.4
4	494	46.8	.35	19.86	20.22	10.383	.453	10	80	125	450	430	3.4	.5
5	515	72.9	.59	25.21	25.76	8.130	.447	10	80	130	560	530	4.5	.8
6	285	0.0	.06	19.[illegible]	19.86	55.375	R	10	80	129	315	300	1.7	.2
7	584	109.1	.76	29.96	30.71	6.938	.438	10	82	130	660	650	5.1	.9
8	675	135.1	1.00	35.99	36.99	5.402	.444	10	90	140	740	765	6.0	1.2
9	755	168.7	1.27	39.19	40.45	4.523	.451	10	100	150	835	885	7.9	1.5
10	835	195.9	1.58	42.41	43.99	3.579	.484	10	110	170	935	1010	8.9	1.8
11	285	0.0	.06	19.76	19.82	58.958	R	10	92	140	350	340	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.5	72	60	122	13	134	1.09	20.0	R	R	R	3.83	6.30	23.41
2	2.0	80	59	207	10	217	2.14	18.7	1.13	1.66	10.03	1.41	2.79	16.9.
3	2.0	88	59	259	14	273	2.75	17.9	.81	1.[illegible]7	8.20	1.59	2.10	16.13
4	2.0	109	46	317	5	322	3.74	16.9	.59	.[illegible]3	7.88	1.31	1.16	17.38
5	3.0	128	69	536	5	541	4.38	15.5	.60	.[illegible]	8.25	1.33	1.43	18.46
6	1.0	89	36	120	12	132	1.09	20.2	R	R	R	4.58	3.88	23.48
7	2.0	148	172	672	9	681	5.22	14.9	.68	1.33	9.68	1.37	3.04	19.81
8	2.5	176	467	737	14	751	5.81	13.9	.69	3.31	8.75	1.41	7.96	19.7.
9	4.5	229	1238	758	14	772	6.29	12.8	.71	7.8[illegible]	8.60	1.67	17.39	17.76
10	12.0	248	3720	696	14	709	6.87	11.6	.79	21.98	6.88	1.52	45.91	14.22
11	1.5	109	98	129	0	129	1.09	20.2	R	R	R	5.98	5.96	25.29

CYCLE COMPOSITE BSHC = .819 GRAM/BHP HR
BSCO = 17.799 GRAM/BHP HR
BSNOX = 7.739 GRAM/BHP HR
BSHC + BSNOX = 8.558 GRAM/BHP HR
BSFC = .499 LB/BHP HR

TABLE B-176. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-01-73 TEST NO. 1 W/ 20 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.09	12.96	90.195	R	20	75	100	260	255	1.7	.2
2	285	13.3	.19	12.90	13.09	19.315	.618	20	85	105	325	295	1.8	.3
3	394	19.9	.20	19.13	19.33	19.187	.487	20	85	110	355	310	2.6	.4
4	494	92.7	.35	16.99	17.29	8.663	.496	20	90	115	495	420	3.8	.5
5	515	69.1	.59	23.90	23.99	7.265	.471	20	100	120	550	520	4.4	.7
6	285	0.0	.07	12.88	12.94	91.958	R	20	100	120	300	290	1.7	.2
7	584	100.3	.76	27.29	28.05	5.931	.455	20	110	132	660	650	5.0	.9
8	675	120.7	1.00	31.16	32.15	4.319	.466	20	127	145	756	770	5.8	1.1
9	755	159.6	1.27	34.07	35.34	3.326	.477	20	152	170	865	900	6.8	1.3
10	835	189.1	1.56	38.42	39.99	2.882	.496	20	190	198	975	1050	8.2	1.6
11	285	0.0	.06	12.96	13.02	98.291	R	20	110	150	300	300	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	76	59	126	13	139	1.20	19.6	R	R	R	3.89	5.82	18.83
2	1.0	80	78	196	13	209	2.26	18.3	1.09	1.82	F.05	1.68	2.96	19.33
3	1.0	88	78	229	22	251	2.69	17.5	.84	1.56	8.00	1.41	2.24	19.18
4	1.0	109	89	265	13	278	3.81	16.0	.58	.8[illegible]	6.61	1.16	1.73	19.32
5	2.5	124	92	995	17	963	4.54	14.4	.69	.9[illegible]	6.42	1.28	1.77	19.68
6	1.0	92	71	118	18	136	1.28	19.3	R	[illegible]	R	3.93	6.06	19.07
7	2.0	136	289	541	17	600	5.66	13.3	.58	1.68	7.84	1.18	3.70	16.16
8	4.5	176	692	611	13	629	6.45	12.1	.58	3.42	6.74	1.25	9.58	19.99
9	8.5	212	2884	574	6	579	7.30	10.8	.62	13.69	5.84	1.38	27.31	11.61
10	23.0	244	6200	975	0	975	7.66	9.9	.68	29.83	5.84	1.37	69.68	8.75
11	1.0	96	89	148	0	148	1.19	19.8	R	R	R	4.85	5.99	24.84

CYCLE COMPOSITE BSHC = .755 GRAM/BHP HR
BSCO = 27.441 GRAM/BHP HR
BSNOX = 5.358 GRAM/BHP HR
BSHC + BSNOX = 6.113 GRAM/BHP HR
BSFC = .516 LB/BHP HR

TABLE B-177. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-0 -73 TEST NO. 2 W/ 20 PCT. HOT EGR
INJECTORS NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.94	13.00	42.305	R	20	83	115	250	240	1.7	.2
2	285	13.3	.13	12.94	13.07	19.851	.633	20	90	115	310	260	1.8	.2
3	344	22.7	.20	14.16	14.36	13.903	.529	20	90	120	355	315	2.6	.3
4	424	46.5	.36	16.94	17.30	8.220	.469	20	95	123	455	435	3.7	.5
5	515	73.3	.54	23.02	23.56	7.101	.445	20	102	130	560	527	4.4	.7
6	285	0.0	.06	12.91	12.98	44.211	R	20	102	125	315	300	1.8	.3
7	584	103.0	.76	27.34	28.11	5.378	.445	20	112	135	665	650	4.9	.9
8	675	132.5	1.00	31.11	32.11	4.227	.453	20	140	155	765	785	5.7	1.1
9	755	159.6	1.28	34.11	35.39	3.251	.480	20	165	170	875	910	6.7	[illegible]
10	835	191.2	1.58	38.76	40.33	2.831	.495	20	218	190	960	1040	8.7	1.7
11	285	0.0	.06	12.91	12.97	45.937	R	20	115	150	290	285	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	89	71	112	19	130	1.23	19.6	R	R	R	3.60	6.09	18.28
2	1.5	92	71	171	13	184	2.26	18.3	1.20	1.83	7.89	1.90	3.03	12.99
3	1.0	100	58	222	22	243	2.80	17.5	.83	.97	6.65	1.58	1.03	12.59
4	1.5	124	57	355	9	364	4.12	15.6	.61	.56	5.85	1.30	1.20	12.48
5	3.0	144	80	431	13	443	4.79	14.8	.61	.68	6.16	1.37	1.52	13.89
6	1.5	112	59	111	19	129	1.23	19.5	R	R	R	5.05	5.34	19.09
7	2.5	176	287	549	8	558	5.97	13.2	.63	2.06	6.58	1.93	4.63	14.78
8	4.5	216	851	553	0	553	6.78	11.9	.69	5.42	5.78	1.53	11.97	12.77
9	10.5	260	2020	484	0	484	7.48	10.6	.76	16.45	4.69	1.59	34.26	9.67
10	25.0	280	4275	542	0	542	7.30	10.0	.78	23.72	5.39	1.58	47.94	10.90
11	2.0	119	83	122	10	132	1.19	19.2	R	R	R	5.33	7.89	20.57

CYCLE COMPOSITE
BSHC = .869 GRAM/BHP HR
BSCO = 14.898 GRAM/BHP HR
BSNO2 = 5.924 GRAM/BHP HR
BSHC + BSNO2 = 6.793 GRAM/BHP HR
BSFC = .511 LB/BHP HR

TABLE B-178. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-01-73 TEST NO. 3 W/ 20 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	12.94	13.00	44.474	R	20	85	115	280	280	1.7	.2
2	285	14.2	.13	12.89	13.02	19.778	.561	20	88	118	290	250	1.8	.2
3	344	23.2	.19	14.47	14.66	14.683	.499	20	85	120	350	305	2.7	.3
4	424	46.8	.36	16.91	17.26	8.516	.460	20	90	125	455	435	3.7	.5
5	515	74.2	.55	23.38	23.93	7.078	.445	20	103	132	575	590	4.4	.7
6	285	0.0	.06	13.10	13.16	47.798	R	20	100	130	330	310	1.7	.2
7	584	104.1	.76	27.29	28.06	5.450	.440	20	113	140	670	655	4.9	.9
8	675	133.8	1.01	31.28	32.29	4.210	.453	20	140	160	770	790	5.7	1.1
9	755	159.6	1.26	34.54	35.80	3.381	.474	20	180	180	900	935	6.6	1.2
10	835	176.5	1.55	38.76	40.31	2.728	.528	20	220	215	1020	1075	7.7	1.5
11	285	0.0	.06	13.25	13.31	50.672	R	20	115	160	310	310	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	72	59	117	19	135	1.19	19.8	R	R	R	3.75	5.74	20.80
2	1.5	80	71	180	18	198	2.37	18.3	.97	1.69	7.08	1.72	3.02	13.93
3	1.5	80	58	232	22	254	2.80	17.5	.73	.97	6.98	1.97	1.94	13.85
4	1.5	104	46	375	9	383	4.06	15.9	.61	.95	6.11	1.11	.90	13.36
5	3.0	136	69	471	9	480	4.86	14.7	.58	.58	6.60	1.30	1.31	13.03
6	1.5	96	98	115	18	133	1.19	19.7	R	R	R	4.63	4.57	20.95
7	2.5	169	280	501	4	506	5.89	13.4	.57	1.70	6.02	1.29	3.06	15.58
8	4.5	200	812	500	8	508	7.09	11.9	.66	5.15	6.05	1.46	11.30	13.36
9	10.5	248	2442	508	0	509	7.66	10.5	.73	17.65	4.85	1.85	37.26	10.23
10	34.5	272	7224	372	0	372	8.13	9.5	.82	43.42	4.67	1.85	82.23	6.95
11	2.0	108	59	126	5	131	1.19	19.5	R	R	R	5.58	6.12	22.15

CYCLE COMPOSITE
BSHC = .881 GRAM/BHP HR
BSCO = 34.311 GRAM/BHP HR
BSNO2 = 4.759 GRAM/BHP HR
BSHC + BSNO2 = 5.636 GRAM/BHP HR
BSFC = .534 LB/BHP HR

TABLE B-179. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-02-73 TEST NO. 3 W/ 30 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	11.88	11.94	38.85%	R	30	88	110	200	210	1.8	.2
2	285	15.6	.19	11.77	11.91	17.35%	.526	30	88	110	270	250	1.9	.2
3	344	23.6	.20	12.96	13.16	18.96%	.517	30	89	111	330	300	2.8	.3
4	424	44.2	.36	15.32	15.68	7.56%	.467	30	95	114	429	409	3.9	.5
5	515	71.9	.59	18.60	19.19	5.65%	.453	30	117	130	540	519	4.6	.7
6	285	0.0	.07	11.79	11.86	38.19%	R	30	115	128	330	320	1.7	.2
7	584	102.9	.76	22.89	23.64	9.39%	.443	30	144	142	658	642	5.0	.8
8	675	129.9	1.01	26.85	27.86	8.23%	.466	30	180	165	770	780	5.7	1.0
9	755	150.5	1.27	32.37	33.63	2.69%	.505	30	250	195	888	905	6.5	1.2
10	835	159.6	1.59	33.92	35.46	2.19%	.579	30	310	295	962	958	7.6	1.3
11	285	0.0	.06	11.01	12.07	95.23%	R	30	210	210	950	945	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCEN	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	89	71	116	13	129	1.28	19.6	R	R	R	3.31	5.59	16.70
2	2.0	100	70	178	17	196	2.42	18.0	1.01	1.41	6.46	1.92	2.69	12.28
3	1.5	109	81	237	22	259	2.86	17.4	.77	1.19	6.24	1.98	2.31	12.07
4	1.5	116	69	349	17	361	3.99	15.7	.52	.61	5.28	1.11	1.31	11.32
5	2.5	140	102	511	4	515	4.86	14.5	.49	.71	4.72	1.08	1.57	10.53
6	1.0	120	59	121	13	134	1.28	19.4	R	R	R	4.70	9.63	17.15
7	3.5	176	330	499	8	457	6.21	12.6	.63	2.80	4.59	1.20	4.51	10.24
8	7.5	232	1492	387	0	387	7.48	10.6	.66	R.98	3.59	1.41	19.24	7.69
9	28.0	288	6143	274	0	274	8.42	9.0	.85	34.29	2.70	1.68	71.73	5.34
10	50.0	340	12095	223	0	223	8.42	8.4	1.00	70.68	2.14	1.72	122.08	3.69
11	1.5	156	71	135	0	135	1.14	19.2	R	R	R	7.31	6.66	20.70

CYCLE COMPOSITE BSHC = 1.093 GRAM/BHP HR
BSCO = 55.43% GRAM/BHP HR
BSNO2 = 3.123 GRAM/BHP HR
BSHC + BSNO2 = 4.164 GRAM/BHP HR
BSFC = .578 LB/BHP HR

TABLE B-180. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 2-02-73 TEST NO. 4 W/ 30 PCT. HOT EGR
INJECTORS' NEEDLE TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2- FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.23	12.29	39.38%	R	30	118	128	252	255	1.9	.2
2	285	15.7	.19	12.24	12.38	17.61%	.535	30	118	152	320	292	2.1	.2
3	344	23.2	.20	12.96	13.16	18.79%	.517	30	122	149	359	329	3.0	.4
4	424	44.3	.37	15.65	16.02	7.56%	.494	30	136	144	362	329	4.3	.5
5	515	71.7	.59	18.81	19.35	5.75%	.455	30	120	159	498	519	4.8	.8
6	285	0.0	.06	12.03	12.10	98.36%	R	30	120	150	348	325	1.9	.2
7	584	103.1	.76	22.88	23.64	9.45%	.444	30	148	162	658	648	5.5	.8
8	675	129.9	1.00	27.22	28.21	8.59%	.468	30	198	189	752	760	6.2	1.1
9	755	153.0	1.26	32.43	33.69	2.81%	.494	30	295	215	865	880	7.8	1.2
10	835	166.3	1.56	34.38	35.94	2.19%	.563	30	300	250	980	992	8.8	1.3
11	285	0.0	.06	12.07	12.09	92.37%	R	30	210	215	915	960	2.0	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	84	71	121	10	131	1.19	19.8	R	R	R	3.91	5.96	17.89
2	1.5	88	78	206	9	219	2.21	18.0	.48	1.96	7.58	1.71	2.79	13.69
3	1.5	88	78	251	13	265	2.68	17.5	.44	1.89	6.97	1.87	2.81	12.53
4	1.5	100	69	481	9	489	3.93	15.6	.43	.59	5.79	.96	1.31	10.88
5	2.5	116	98	497	9	451	4.82	14.6	.41	.69	5.25	.91	1.41	11.57
6	1.0	96	59	129	13	133	1.19	19.1	R	R	R	4.83	9.97	18.86
7	3.0	152	299	526	8	526	5.81	13.0	.46	1.71	6.21	1.04	3.85	11.78
8	6.5	192	1173	999	8	952	6.96	11.3	.55	6.78	4.89	1.20	14.04	9.21
9	28.0	228	5814	361	8	343	7.84	9.8	.66	29.04	3.84	1.34	38.83	6.59
10	60.0	276	19178	288	8	288	8.83	8.9	.79	88.57	2.11	1.98	193.18	3.78
11	1.0	118	71	136	0	136	1.19	19.0	R	R	R	4.97	6.98	19.94

CYCLE COMPOSITE BSHC = .838 GRAM/BHP HR
BSCO = 62.91% GRAM/BHP HR
BSNOX = 3.847 GRAM/BHP HR
BSHC + BSNOX = 4.684 GRAM/BHP HR
BSFC = .664 LB/BHP HR

TABLE B-181. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-73 TEST NO. 1 W/ 20 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.34	13.40	51.027	R	20	110	150	262	240	1.7	.2
2	285	15.0	.13	13.34	13.48	20.916	.506	20	105	145	305	295	1.7	.2
3	344	24.5	.20	14.89	15.09	15.620	.481	20	97	139	335	330	2.4	.3
4	424	49.3	.36	18.82	19.18	9.935	.434	20	95	140	450	430	3.7	.4
5	515	76.1	.55	23.48	24.03	7.587	.431	20	100	140	570	529	4.4	.7
6	285	0.0	.06	13.25	13.30	50.915	R	20	101	135	310	285	1.7	.2
7	584	108.7	.76	28.10	28.86	6.009	.419	20	110	145	676	650	4.8	.9
8	675	138.2	1.00	32.39	33.39	4.766	.434	20	120	155	765	760	5.7	1.1
9	755	165.3	1.28	36.96	38.24	3.770	.463	20	155	170	869	895	6.6	1.3
10	835	169.6	1.56	39.65	41.22	2.946	.553	20	205	210	995	1057	7.9	1.6
11	285	0.0	.06	13.22	13.28	49.785	R	20	129	170	380	355	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	48	115	4	119	1.19	19.5	R	R	R	2.60	4.93	20.18
2	1.0	50	71	194	4	198	2.37	18.7	.56	1.58	7.30	1.11	3.13	19.43
3	3.0	55	70	223	4	228	2.86	18.4	.45	1.13	6.05	.93	2.36	12.57
4	2.0	55	58	301	4	305	4.12	16.7	.28	.59	6.96	.65	1.36	14.90
5	2.1	60	57	514	13	527	4.79	15.6	.25	.47	7.19	.58	1.10	16.68
6	1.0	35	49	123	11	134	1.19	19.6	R	R	R	1.01	4.90	22.60
7	2.0	65	103	638	0	638	5.81	14.3	.23	1.27	7.31	.54	3.09	17.44
8	3.0	100	649	620	13	633	6.78	12.9	.32	4.13	6.60	.73	9.50	15.21
9	7.0	120	2728	527	25	552	7.48	11.4	.37	16.59	5.52	.79	35.01	11.91
10	21.0	135	6896	435	0	435	8.03	10.1	.43	44.06	4.56	.78	79.69	8.25
11	1.0	45	48	135	2	136	1.19	19.2	R	R	R	2.32	4.89	23.01

CYCLE COMPOSITE
BSHC = .452 GRAM/BHP HR
BSCO = 34.041 GRAM/BHP HR
BSNO2 = 5.570 GRAM/BHP HR
BSHC + BSNO2 = 6.022 GRAM/BHP HR
BSFC = .546 LB/BHP HR

TABLE B-182. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-73 TEST NO. 2 W/ 20 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.28	13.34	50.799	R	20	110	152	270	250	1.7	.2
2	285	15.0	.14	13.28	13.42	20.209	.510	20	95	140	295	285	1.7	.2
3	344	24.5	.20	14.81	15.01	15.198	.481	20	96	137	329	322	2.6	.3
4	424	49.3	.36	18.70	19.06	9.636	.434	20	90	139	550	520	3.8	.5
5	515	76.0	.54	23.33	23.88	7.434	.424	20	100	140	564	528	1.7	.7
6	285	0.0	.06	13.16	13.22	48.839	R	20	100	135	305	285	4.4	.2
7	584	108.7	.76	27.92	28.68	5.763	.419	20	110	143	657	634	5.0	.8
8	675	138.2	1.00	32.18	33.18	4.598	.434	20	130	155	760	765	6.0	1.1
9	755	165.3	1.26	36.70	37.96	3.767	.457	20	160	170	868	885	6.7	1.3
10	835	185.1	1.56	39.51	41.07	2.948	.505	20	208	208	1003	1070	7.8	1.6
11	285	0.0	.05	13.12	13.17	53.009	R	20	135	170	360	345	1.7	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	59	121	4	126	1.19	19.5	R	R	R	2.59	6.19	21.36
2	1.0	55	82	207	0	207	2.26	18.6	.62	1.09	7.60	1.19	3.59	19.66
3	1.0	60	93	224	4	228	2.69	18.0	.48	1.50	6.03	1.01	3.13	12.53
4	1.0	70	69	394	4	399	3.07	16.3	.36	.70	6.65	.82	1.62	15.33
5	2.0	80	88	541	0	541	4.65	15.3	.33	.65	7.27	.77	1.54	17.12
6	1.0	60	71	121	9	129	1.05	19.7	R	R	R	2.41	6.09	20.59
7	2.0	90	102	613	0	613	5.01	13.8	.31	1.27	6.49	.75	3.02	16.67
8	3.0	120	611	621	13	634	6.61	12.5	.30	3.06	6.57	.80	8.09	15.19
9	7.0	210	2620	529	13	541	7.30	11.3	.64	15.02	5.37	1.24	30.59	11.74
10	23.0	145	7102	390	0	390	8.13	10.1	.42	41.45	3.82	.84	82.12	7.57
11	1.0	70	60	131	1	132	1.19	19.4	R	R	R	3.00	6.44	23.51

CYCLE COMPOSITE
BSHC = .494 GRAM/BHP HR
BSCO = 32.673 GRAM/BHP HR
BSNO2 = 4.908 GRAM/BHP HR
BSHC + BSNO2 = 5.402 GRAM/BHP HR
BSFC = .510 LB/BHP HR

TABLE B-183. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-26-72 TEST NO. 1 30 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	11.69	11.70	38.262	R	30	92	110	205	200	1.0	.2
2	285	19.2	.19	11.69	11.78	16.731	.609	30	95	110	265	265	1.0	.2
3	349	21.1	.20	12.98	13.18	13.200	.559	30	95	119	305	305	2.6	.3
4	429	50.7	.36	16.39	16.75	8.059	.422	30	112	125	455	432	3.8	.5
5	515	76.1	.54	21.12	21.66	6.937	.426	30	157	199	580	540	4.5	.7
6	285	0.0	.04	11.57	11.61	69.002	R	30	120	130	270	255	1.7	.2
7	594	106.8	.76	24.50	25.26	4.639	.427	30	165	155	690	660	4.9	.8
8	675	129.9	.99	29.79	30.78	3.669	.459	30	215	182	795	790	5.5	.9
9	755	154.0	1.26	33.41	34.67	2.801	.491	30	259	215	900	910	6.3	1.1
10	835	168.7	1.56	36.54	38.09	2.302	.554	30	290	255	985	970	7.8	1.3
11	285	0.0	.06	11.93	12.00	39.610	R	30	160	205	357	345	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	60	97	146	14	160	1.32	19.7	R	R	R	2.32	3.66	20.22
2	1.5	75	70	202	28	229	2.47	18.4	.82	1.53	8.20	1.36	2.53	13.58
3	2.5	85	70	228	5	233	2.86	17.8	.70	1.15	6.27	1.25	2.05	11.23
4	2.0	110	69	387	5	392	4.45	15.5	.48	.60	5.59	1.19	1.42	13.29
5	4.0	115	91	522	13	536	5.29	14.5	.43	.68	6.59	1.02	1.60	15.48
6	1.5	90	60	146	9	155	1.28	19.7	R	R	R	6.27	8.27	35.38
7	4.0	190	332	530	0	530	6.61	12.6	.44	2.07	5.91	1.02	4.84	12.67
8	9.0	192	1577	435	0	435	7.75	10.7	.59	9.03	4.45	1.30	21.41	9.70
9	28.0	170	5855	331	9	339	8.52	9.2	.51	34.68	3.38	1.03	70.53	6.72
10	57.0	185	14259	297	0	297	8.92	8.5	.55	84.69	2.90	1.08	152.95	5.23
11	1.5	80	59	157	0	157	1.19	18.9	R	R	R	3.33	4.93	21.96

CYCLE COMPOSITE BSHC = .622 GRAM/BHP HR
BSCO = 66.068 GRAM/BHP HR
BSNO2 = 3.952 GRAM/BHP HR
BSHC + BSNO2 = 4.574 GRAM/BHP HR
BSFC = .552 LB/BHP HR

TABLE B-184. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-24-72 TEST NO. 2 30 PCT. HOT EGR
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO*	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT**	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	12.07	12.13	39.069	R	30	115	167	250	250	2.0	.3
2	285	19.7	.13	12.07	12.20	18.029	.595	30	100	150	282	275	2.0	.3
3	349	22.0	.19	12.94	13.13	13.601	.520	30	90	145	310	300	2.9	.4
4	429	50.7	.36	16.67	17.03	8.589	.426	30	105	147	435	412	4.1	.5
5	515	77.0	.53	21.05	21.58	6.005	.411	30	120	152	590	500	4.0	.7
6	285	0.0	.05	11.95	12.01	49.325	R	30	105	140	295	235	1.9	.3
7	594	108.7	.78	24.81	25.56	4.978	.419	30	195	160	685	622	5.2	.8
8	675	130.2	1.00	30.02	31.03	3.935	.436	30	195	180	760	760	5.9	1.0
9	755	154.0	1.25	34.53	35.78	3.091	.487	30	245	230	893	912	6.0	1.2
10	835	168.7	1.56	37.53	39.08	2.445	.554	30	280	252	975	960	8.1	1.4
11	285	0.0	.06	12.32	12.37	47.109	R	30	160	205	372	355	1.9	.2

* EXCESS O2 IN EXHAUST **PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	29	191	9	151	1.19	19.0	R	R	R	2.00	1.09	19.79
2	1.5	60	23	224	5	228	2.11	18.6	.66	.51	8.08	1.81	.99	15.83
3	2.0	60	35	259	9	268	2.80	18.1	.97	.55	6.91	.90	1.09	13.10
4	2.0	65	30	460	4	469	3.99	16.9	.29	.30	6.01	.60	.71	15.90
5	3.0	75	30	556	14	570	4.79	15.2	.87	.85	6.03	.67	.61	16.89
6	1.5	60	29	143	11	150	1.19	19.0	R	R	R	2.97	2.35	29.94
7	4.5	95	227	591	[illegible]	624	6.37	13.2	.29	1.91	6.18	.71	3.90	19.00
8	8.5	140	1548	520	[illegible]	533	7.57	11.5	.91	9.19	5.17	.95	20.90	11.07
9	22.0	160	5909	353	[illegible]	358	8.42	9.6	.99	33.55	3.04	1.05	60.07	7.37
10	52.0	180	13101	319	0	319	8.32	8.8	.95	80.30	3.15	.99	145.06	5.60
11	1.5	85	36	161	3	164	1.19	19.5	R	R	R	4.00	3.91	26.81

CYCLE COMPOSITE BSHC = .578 GRAM/BHP HR
BSCO = 42.844 GRAM/BHP HR
BSNO2 = 4.305 GRAM/BHP HR
BSHC + BSNO2 = 4.883 GRAM/BHP HR
BSFC = .544 LB/BHP HR

TABLE B-185. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-79 TEST NO. 1 W/ 20 PCT. HOT EGR--NOTCHES 7-8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.34	13.40	51.027	R	20	110	150	262	290	1.7	.2
2	285	15.8	.19	13.34	13.48	20.916	.506	20	105	145	305	295	1.7	.2
3	344	29.5	.20	14.89	15.09	15.620	.481	20	97	139	335	330	2.4	.3
4	424	44.3	.34	18.82	19.18	9.935	.434	20	95	140	458	430	3.7	.4
5	515	76.1	.65	23.98	24.63	7.587	.431	20	100	140	570	529	4.4	.7
6	285	0.0	.06	13.25	13.30	50.915	R	20	101	135	310	285	1.7	.2
7	514	108.7	.76	28.10	28.86	6.009	.419	20	110	145	476	450	4.8	.9
8	675	138.2	1.00	32.39	33.39	4.766	.434	20	128	155	765	768	5.7	1.1
9	755	154.0	1.17	36.36	37.53	4.885	.457	20	142	177	842	860	6.6	1.2
10	835	154.9	1.26	39.10	40.36	5.196	.489	20	187	215	860	890	7.4	1.4
11	285	0.0	.06	13.22	13.28	99.785	R	20	129	170	380	355	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	48	115	4	119	1.19	19.5	R	R	R	2.60	4.93	20.18
2	1.0	50	71	194	4	198	2.37	18.7	.56	1.58	7.30	1.11	3.13	14.43
3	3.0	55	70	223	4	228	2.84	18.4	.65	1.13	6.05	.93	2.34	12.67
4	2.0	55	58	381	4	385	4.12	16.7	.28	.59	6.46	.65	1.36	14.90
5	2.1	40	57	514	13	527	4.79	15.6	.25	.47	7.19	.58	1.10	16.68
6	1.0	35	48	123	11	134	1.19	19.6	R	R	R	1.81	4.90	22.60
7	2.0	65	183	438	0	438	5.81	14.3	.23	1.27	7.31	.54	3.04	17.44
8	3.0	100	649	620	13	633	6.78	12.4	.32	4.13	6.60	.73	4.50	15.21
9	4.5	120	1936	555	13	568	7.12	11.8	.34	4.21	5.98	.84	20.13	13.87
10	5.0	140	1337	555	0	555	6.95	12.7	.48	4.16	6.25	.98	18.72	12.76
11	1.0	45	48	135	2	136	1.19	19.2	R	R	R	2.32	4.89	23.01

CYCLE COMPOSITE BSHC = .490 GRAM/BHP HR
BSCO = 7.815 GRAM/BHP HR
BSNO2 = 6.885 GRAM/BHP HR
BSHC + BSNO2 = 7.375 GRAM/BHP HR
BSFC = .500 LB/BHP HR

TABLE B-186. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-23-79 TEST NO. 2 W/ 20 PCT. HOT EGR--NOTCHES 7-8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES AIR INLET	AIR BOX	DEGREES F LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.06	13.28	13.34	50.799	R	20	110	152	270	250	1.7	.2
2	285	15.8	.19	13.28	13.42	20.809	.518	20	95	140	295	285	1.7	.2
3	344	29.5	.20	14.81	15.01	15.190	.481	20	90	137	329	322	2.6	.3
4	424	44.3	.36	18.78	19.06	9.636	.434	20	90	139	550	520	3.8	.5
5	515	76.8	.54	23.93	23.88	7.439	.424	20	100	140	564	520	1.7	.7
6	285	0.0	.06	13.16	13.22	98.839	R	20	100	135	305	285	4.4	.2
7	504	108.7	.76	27.92	28.68	5.763	.419	20	110	143	667	634	5.8	.8
8	675	138.2	1.09	32.18	33.18	4.648	.434	20	130	155	760	765	6.8	1.1
9	755	154.8	1.16	36.10	37.25	4.902	.448	20	165	177	825	848	6.7	1.2
10	835	154.9	1.22	38.96	40.18	5.415	.479	20	195	210	850	877	7.5	1.4
11	285	0.0	.05	13.18	13.17	53.884	R	20	135	170	360	345	1.7	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	50	59	181	4	185	1.19	19.5	R	R	R	2.59	6.19	21.85
2	1.0	55	82	287	0	287	2.86	18.6	.62	1.89	7.60	1.19	3.54	14.66
3	1.0	60	93	229	4	233	2.69	18.8	.58	1.58	6.83	1.01	3.13	12.93
4	1.0	70	69	399	4	399	3.87	16.3	.36	.70	6.55	.82	1.62	15.33
5	2.0	80	80	541	8	591	4.65	15.3	.33	.68	7.87	.77	1.54	17.12
6	1.0	60	71	121	4	129	1.09	19.7	R	R	R	2.41	6.89	20.59
7	2.0	90	102	613	8	619	5.81	13.8	.31	1.87	6.99	.95	3.82	16.67
8	3.0	120	611	621	13	634	6.61	12.8	.38	3.86	6.87	.88	8.89	15.19
9	4.5	130	1858	598	13	556	6.98	12.4	.42	6.68	5.81	.43	14.98	12.98
10	5.0	130	996	585	13	518	6.87	12.4	.45	6.08	5.81	.49	14.39	12.85
11	1.0	70	60	131	1	132	1.19	19.4	R	R	R	3.00	6.99	23.81

CYCLE COMPOSITE BSHC = .581 GRAM/BHP HR
BSCO = 5.960 GRAM/BHP HR
BSNO2 = 6.841 GRAM/BHP HR
BSHC + BSNO2 = 7.842 GRAM/BHP HR
BSFC = .498 LB/BHP HR

TABLE B-187. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-26-73 TEST NO.1 W/ 30 PCT. HOT EGR--NOTCHES 6-8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	285	0.0	.07	11.64	11.70	38.262	R	30	92	110	205	700	1.8	.2
2	285	19.2	.14	11.64	11.78	16.731	.609	30	95	110	265	265	1.0	.2
3	344	21.1	.20	12.98	13.18	13.200	.559	30	95	114	305	305	2.6	.3
4	424	50.7	.36	16.39	16.75	8.054	.422	30	112	125	455	432	3.8	.5
5	515	76.1	.54	21.12	21.66	6.437	.426	30	157	144	580	540	4.5	.7
6	265	0.0	.04	11.57	11.61	69.002	R	30	120	130	270	255	1.7	.2
7	564	105.8	.76	24.50	25.26	4.634	.427	30	165	155	690	660	4.9	.8
8	675	117.9	.87	29.63	30.49	4.906	.441	30	215	195	750	745	5.4	.8
9	755	117.1	.94	33.83	34.77	5.116	.482	30	240	220	[illegible]55	760	6.4	1.0
10	835	106.9	.97	36.10	37.77	5.793	.545	30	235	250	72[illegible]	732	7.9	1.2
11	285	0.0	.06	11.93	12.00	39.610	R	30	160	205	357	345	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.0	60	47	146	14	160	1.32	19.7	R	R	R	2.32	3.65	20.22
2	1.5	75	70	202	28	229	2.47	18.4	.82	1.53	8.20	1.36	2.53	13.58
3	2.5	85	70	228	5	233	2.86	17.8	.70	1.15	6.27	1.25	2.05	11.23
4	2.0	110	69	387	5	392	4.45	15.5	.48	.60	5.59	1.19	1.42	13.29
5	4.0	115	91	522	13	536	5.29	14.5	.43	.68	6.59	1.02	1.60	15.48
6	1.5	90	60	146	9	155	1.28	19.7	R	R	R	6.27	8.27	35.38
7	4.0	140	332	530	0	530	6.61	12.6	.44	2.07	5.41	1.02	4.84	12.67
8	5.0	130	381	442	0	442	6.78	12.6	.44	2.59	5.50	1.01	5.88	12.46
9	5.5	150	334	427	0	427	6.78	12.5	.59	2.61	5.47	1.22	5.42	11.36
10	4.5	145	218	428	0	428	6.13	13.4	.68	2.03	5.56	1.25	3.73	12.04
11	1.5	80	59	157	0	157	1.19	18.9	R	R	R	3.33	4.93	21.46

CYCLE COMPOSITE
BSHC = .732 GRAM/BHP HR
BSCO = 2.155 GRAM/BHP HR
BSNO2 = 7.057 GRAM/BHP HR
BSHC + BSNO2 = 7.789 GRAM/BHP HR
BSFC = .546 LB/BHP HR

TABLE B-188. EMISSION CONCENTRATION AND RATE SUMMARY

DATE' 3-26-73 TEST NO.2 W/ 30 PCT. HOT EGR--NOTCHES 6-8 DERATED
INJECTORS' LOW-SAC TIMING' STD.
WEIGHT FACTOR SCHEDULE' GE LINE HAUL

MODE	ENGINE SPEED RPM	POWER BHP	FUEL FLOW LB/MIN	AIR FLOW LB/MIN	EXHAUST FLOW LB/MIN	O2-FUEL RATIO+	BSFC LB/HP HR	EXH. GAS RECIRC. PERCENT++	TEMPERATURES DEGREES F AIR INLET	AIR BOX	LEFT EXHAUST	RIGHT EXHAUST	AIRBOX PRESS. IN.HG.	EXHAUST PRESS. IN.HG.
1	286	0.0	.07	12.07	12.13	39.069	R	30	115	167	270	250	2.0	.3
2	285	19.7	.13	12.07	12.20	18.829	.595	30	100	158	282	275	2.0	.3
3	344	22.0	.19	12.94	13.13	13.601	.528	30	98	145	310	308	2.9	.4
4	424	50.7	.36	16.67	17.03	8.509	.426	30	105	147	435	412	4.1	.5
5	515	77.8	.53	21.05	21.58	6.005	.411	30	125	152	590	500	4.0	.7
6	285	0.0	.05	11.95	12.01	49.325	R	30	105	140	245	235	1.9	.3
7	584	108.7	.75	24.81	25.56	4.970	.414	30	145	160	655	622	5.2	.8
8	675	119.1	.87	29.55	30.41	4.543	.437	30	200	190	720	717	5.9	.9
9	755	117.1	.93	34.35	35.28	4.936	.478	30	240	230	752	744	6.0	1.0
10	835	106.6	.92	36.67	37.59	5.787	.519	30	245	255	790	750	8.1	1.2
11	285	0.[illegible]	.06	12.32	12.37	47.109	R	30	160	205	372	355	1.9	.2

+ EXCESS O2 IN EXHAUST ++PERCENT OF AIR FLOW MASS

MODE	EXHAUST SMOKE PERCENT	HC PPM	CO PPM	NO PPM	NO2 PPM	NOX PPM	CO2 PCT	O2 PCT	BSHC G/HP HR	BSCO G/HP HR	BSNOX G/HP HR	HC G/LB OF FUEL	CO G/LB OF FUEL	NOX G/LB OF FUEL
1	1.6	58	24	141	9	151	1.19	19.0	R	R	R	2.00	1.89	19.74
2	1.5	60	23	224	5	228	2.11	18.6	.66	.51	8.28	1.2[illegible]	.94	18.03
3	2.3	60	36	259	4	268	2.50	18.1	.47	.55	6.91	.9[illegible]	1.09	13.10
4	2.8	65	34	465	5	469	3.44	16.9	.29	.30	6.01	.68	.71	15.90
5	3.0	75	34	556	14	570	4.79	15.2	.27	.25	6.03	.67	.61	16.59
6	1.5	60	24	143	11	154	1.19	19.0	R	R	R	2.97	2.35	29.94
7	4.5	95	227	591	12	604	6.37	13.2	.29	1.61	6.18	.71	2.40	19.02
8	5.0	135	470	434	0	434	7.12	11.7	.46	3.15	4.84	1.09	7.03	11.08
9	6.0	155	374	414	0	414	6.98	11.0	.62	2.46	6.29	1.29	6.19	11.86
10	4.5	145	265	424	0	424	6.05	12.0	.68	2.46	6.88	1.30	4.75	12.62
11	1.5	85	36	161	3	164	1.19	19.5	R	R	R	4.08	3.41	25.61

CYCLE COMPOSITE
BSHC = .604 GRAM/BHP HR
BSCO = 2.330 GRAM/BHP HR
BSNO2 = 7.119 GRAM/BHP HR
BSHC + BSNO2 = 7.[illegible] GRAM/BHP HR
BSFC = .587 LB/BHP HR

APPENDIX C

Tables and Graphs of Modal Brake Specific Emissions Data

Tables and Graphs of Modal Fuel Specific Emissions Data

Tables and Graphs of Modal Emission Concentrations Data

TABLE C-1. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR SPHERICAL-VALVE, NEEDLE-VALVE, AND LOW-SAC INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
	Spherical Injectors						
1, 6, 11	285	-	-	-	7.61	3.56	11.15
2	285	6.88	4.66	15.58	5.55	3.78	12.77
3	344	4.74	2.79	11.85	5.66	3.33	14.20
4	424	3.32	1.14	10.62	5.90	2.03	18.87
5	515	2.58	0.76	11.17	5.73	1.55	22.45
7	584	2.57	0.86	12.04	5.45	1.81	25.55
8	675	2.65	1.16	12.48	5.77	2.51	27.16
9	755	2.60	2.40	12.05	5.55	5.12	25.74
10	835	2.29	7.42	11.64	4.76	15.45	24.21
	Needle Injectors						
1, 6, 11	285	-	-	-	5.60	4.60	16.52
2	285	3.51	3.70	14.53	3.54	3.65	14.61
3	344	1.80	2.06	9.22	2.68	3.05	13.79
4	424	1.06	0.85	8.47	2.07	1.68	16.54
5	515	0.94	0.61	9.41	1.96	1.28	19.69
7	584	0.81	0.70	10.17	1.71	1.53	22.27
8	675	0.89	1.92	10.52	1.94	4.20	23.00
9	755	0.93	5.46	9.75	2.03	11.89	21.28
10	835	0.92	12.70	9.12	1.92	26.55	19.06
	Low-Sac Injectors						
1, 6, 11	285	-	-	-	3.86	5.08	29.33
2	285	0.71	1.81	12.79	1.28	3.24	22.92
3	344	0.61	1.25	11.23	1.22	2.49	22.39
4	424	0.46	0.69	11.41	1.03	1.55	25.72
5	515	0.43	0.44	12.87	0.99	1.03	29.84
7	584	0.42	0.56	13.82	0.99	1.31	32.30
8	675	0.49	1.04	13.61	1.14	2.41	31.47
9	755	0.54	3.28	13.16	1.24	7.56	30.27
10	835	0.60	8.86	12.19	1.32	19.75	27.20

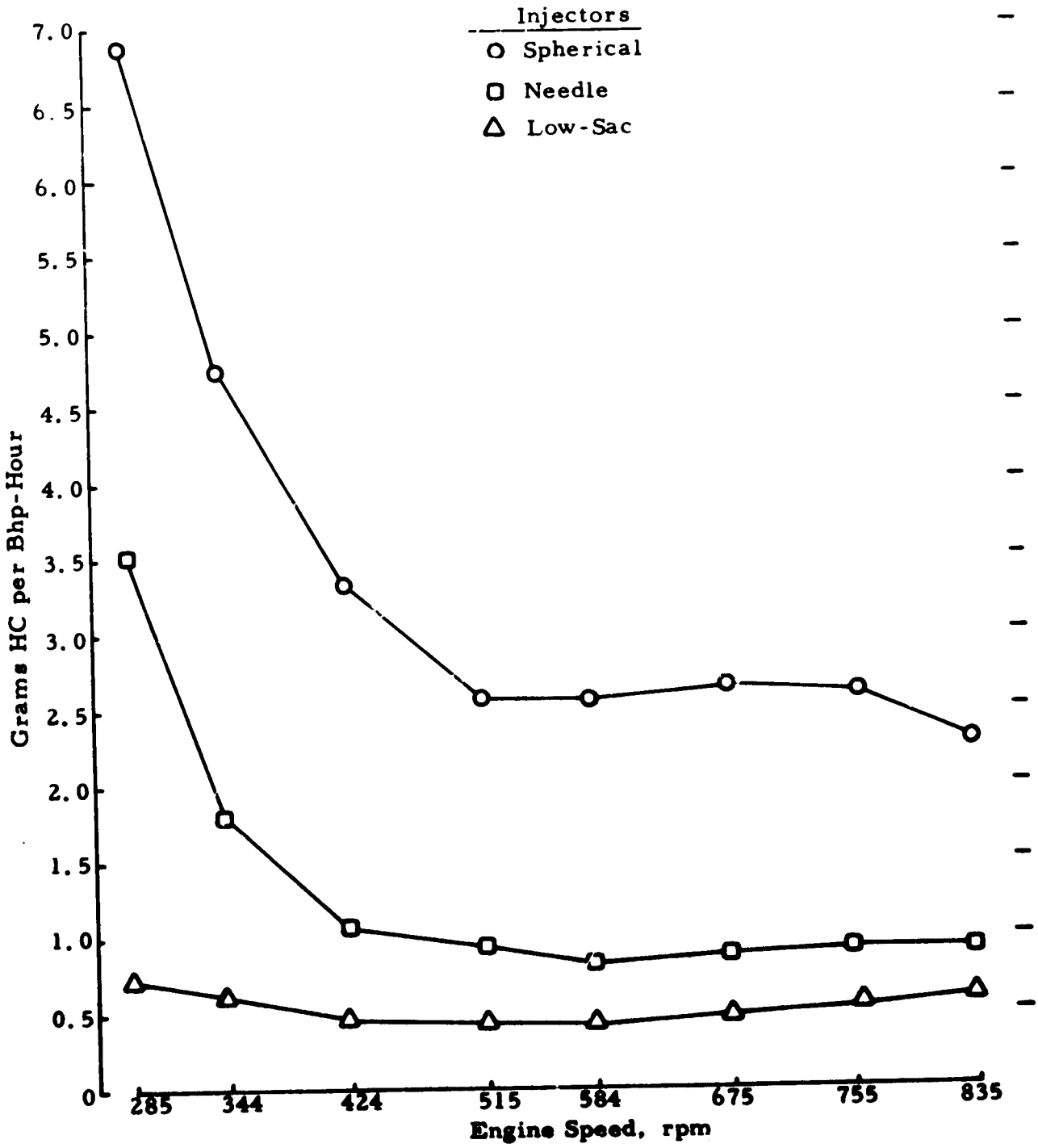

FIGURE C-1. MODAL BRAKE SPECIFIC HC FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

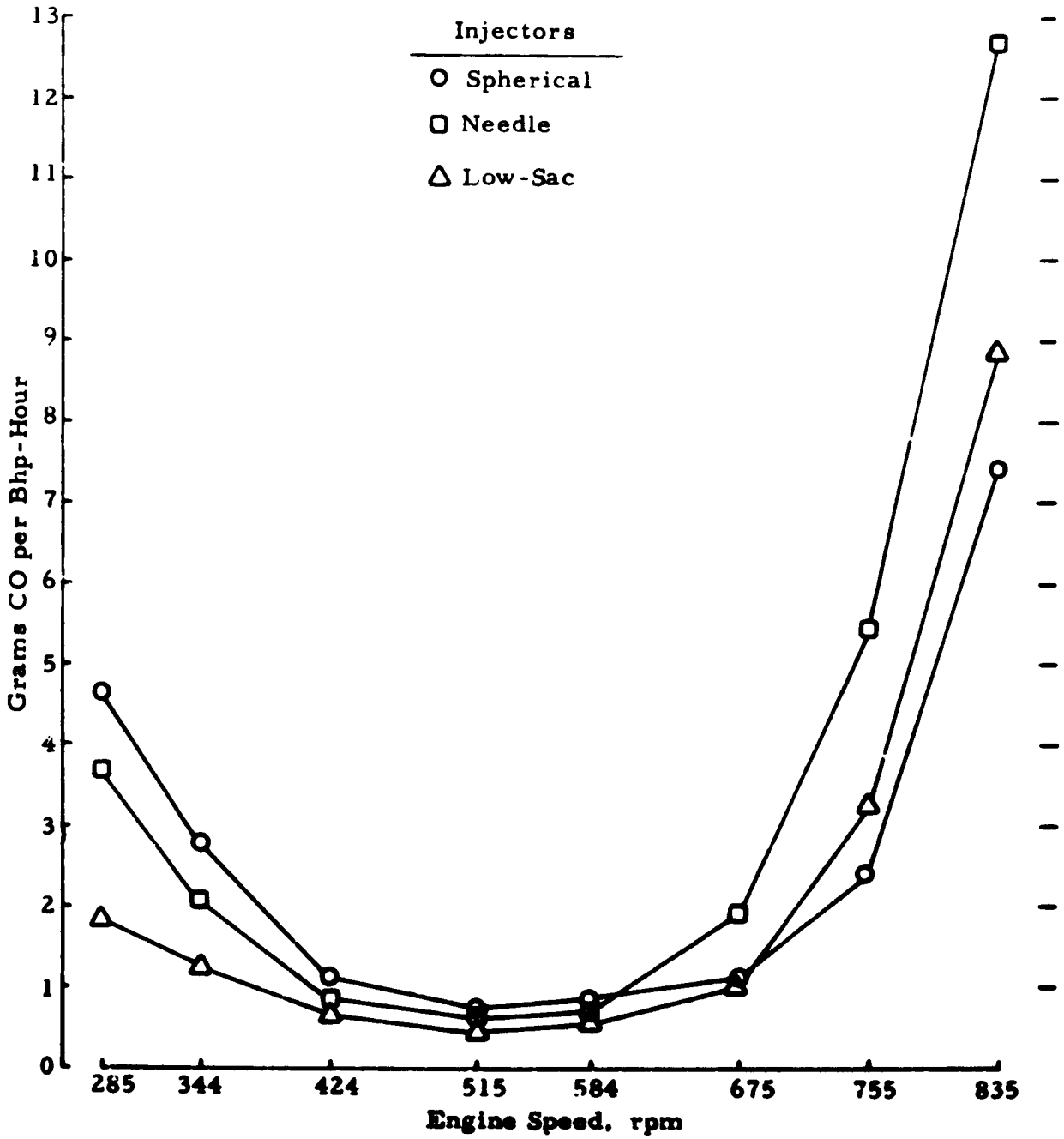

FIGURE C-2. MODAL BRAKE SPECIFIC CO FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

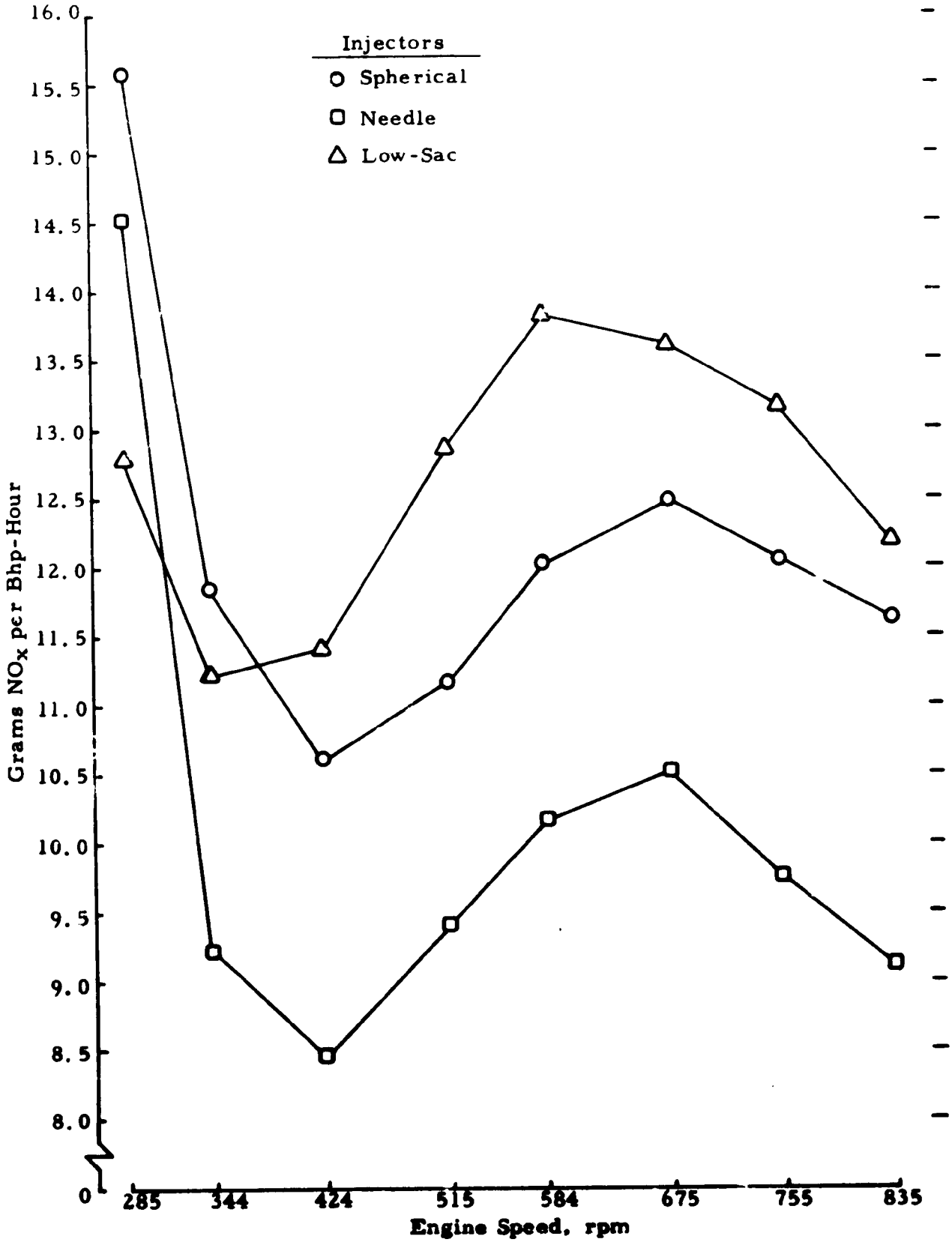

FIGURE C-3. MODAL BRAKE SPECIFIC NO_x FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

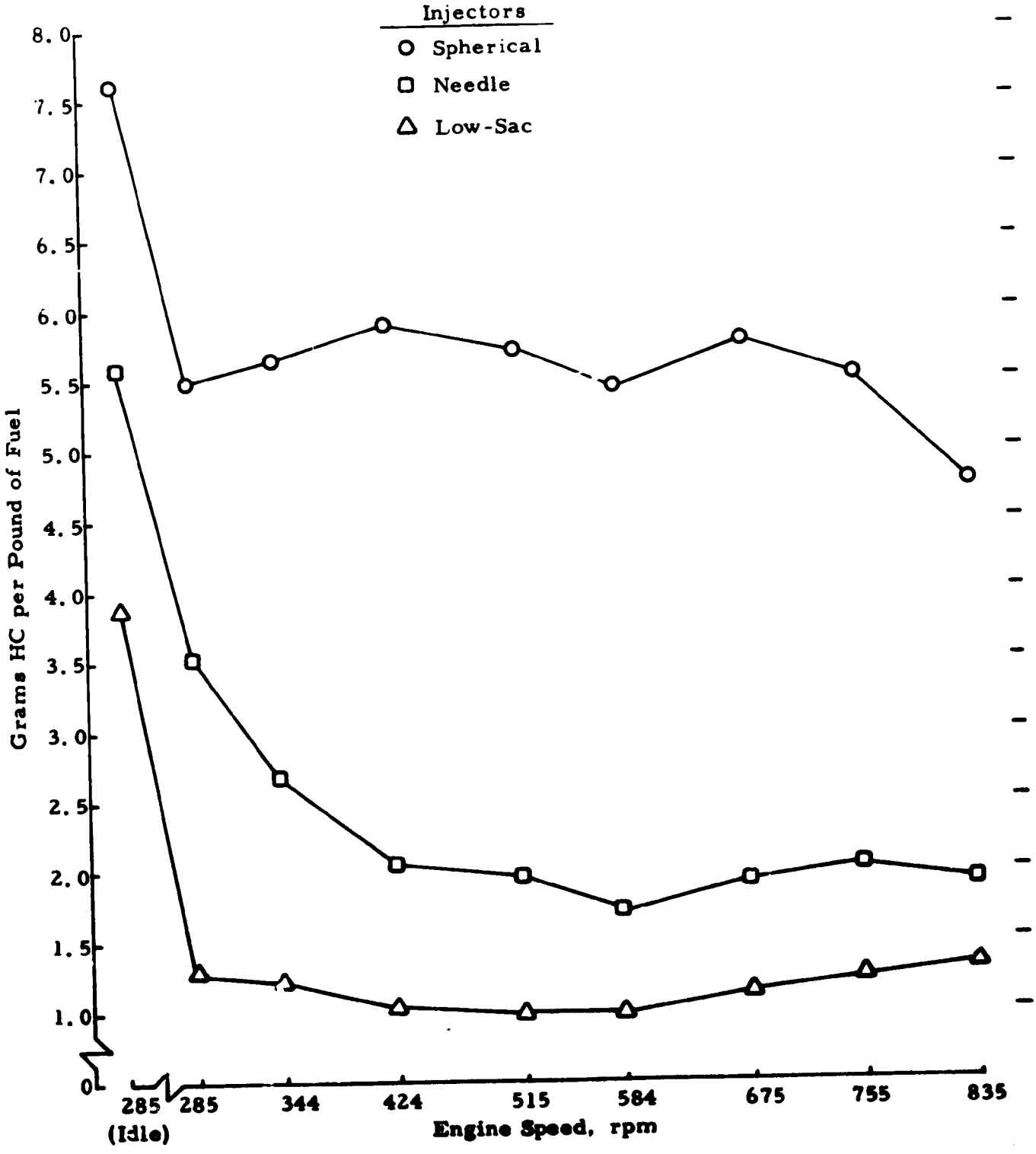

FIGURE C-4. MODAL FUEL SPECIFIC HC FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

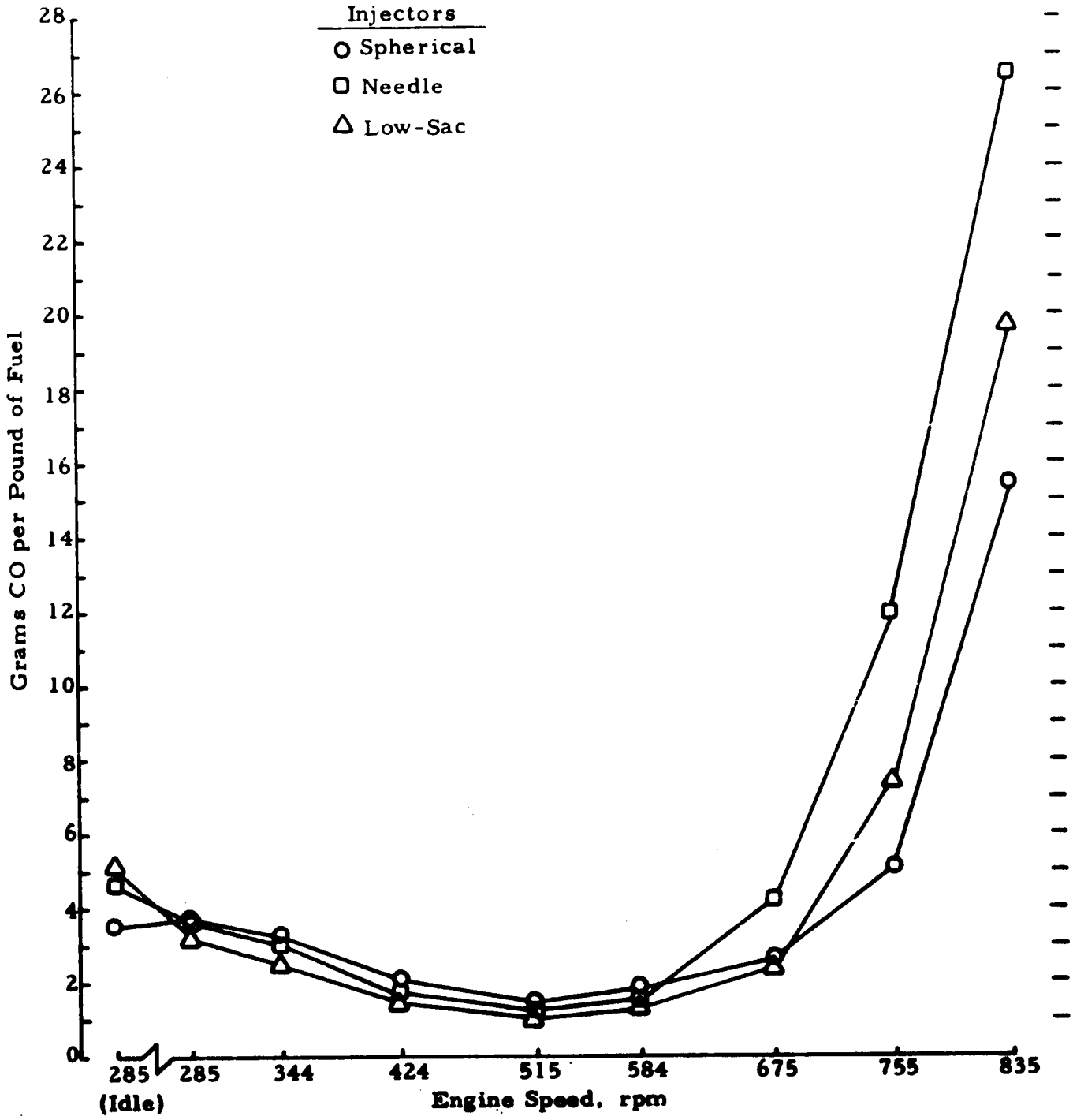

FIGURE C-5. MODAL FUEL SPECIFIC CO FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

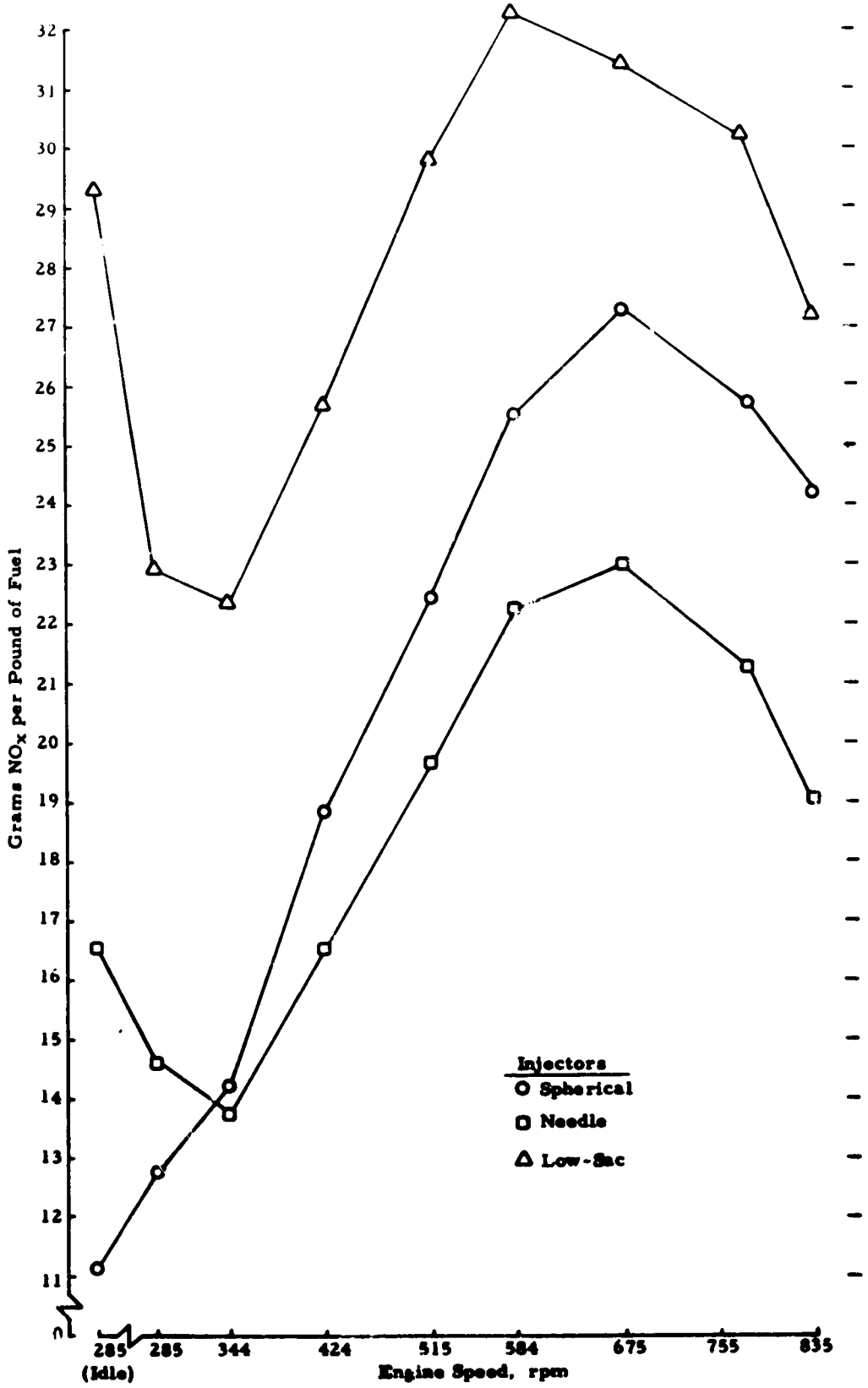

FIGURE C-6. MODAL FUEL SPECIFIC NO_x FOR THREE TYPES OF FUEL INJECTORS AT STANDARD TIMING

TABLE C-2. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS AT ADVANCED AND RETARDED TIMING

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
	Standard Injection Timing (4° BTC)						
1, 6, 11	285	-	-	-	5.60	4.60	16.52
2	285	3.51	3.70	14.53	3.54	3.65	14.61
3	344	1.80	2.06	9.22	2.68	3.05	13.79
4	424	1.06	0.85	8.47	2.07	1.68	16.54
5	515	0.94	0.61	9.41	1.96	1.28	19.69
7	584	0.81	0.70	10.17	1.71	1.53	22.27
8	675	0.89	1.92	10.52	1.94	4.20	23.00
9	755	0.93	5.46	9.75	2.03	11.89	21.28
10	835	0.92	12.70	9.12	1.92	26.55	19.06
	Injection 4° Advanced						
1, 6, 11	285	-	-	-	3.10	4.47	24.57
2	285	2.11	3.05	20.85	2.36	3.46	23.85
3	344	1.27	1.84	15.36	1.82	2.66	22.20
4	424	0.69	0.79	13.59	1.36	1.55	26.74
5	515	0.59	0.54	13.91	1.31	1.20	30.84
7	584	0.54	0.48	15.47	1.20	1.06	34.57
8	675	0.66	2.12	15.74	1.45	4.68	34.76
9	755	0.75	5.74	14.10	1.66	12.75	31.32
10	835	0.75	12.03	12.81	1.60	25.63	27.30
	Injection 4° Retarded						
1, 6, 11	285	-	-	-	6.16	5.33	15.15
2	285	1.96	2.14	7.75	3.00	3.33	12.07
3	344	1.28	1.51	6.33	2.31	2.77	11.66
4	424	0.90	0.76	6.22	1.90	1.60	13.24
5	515	0.85	0.69	6.84	1.88	1.53	15.21
7	584	0.78	1.34	7.01	1.76	3.06	15.91
8	675	0.77	2.65	7.56	1.75	6.01	17.11
9	755	0.90	6.62	7.26	2.03	14.81	16.23
10	835	0.88	14.52	6.93	1.89	31.10	14.84

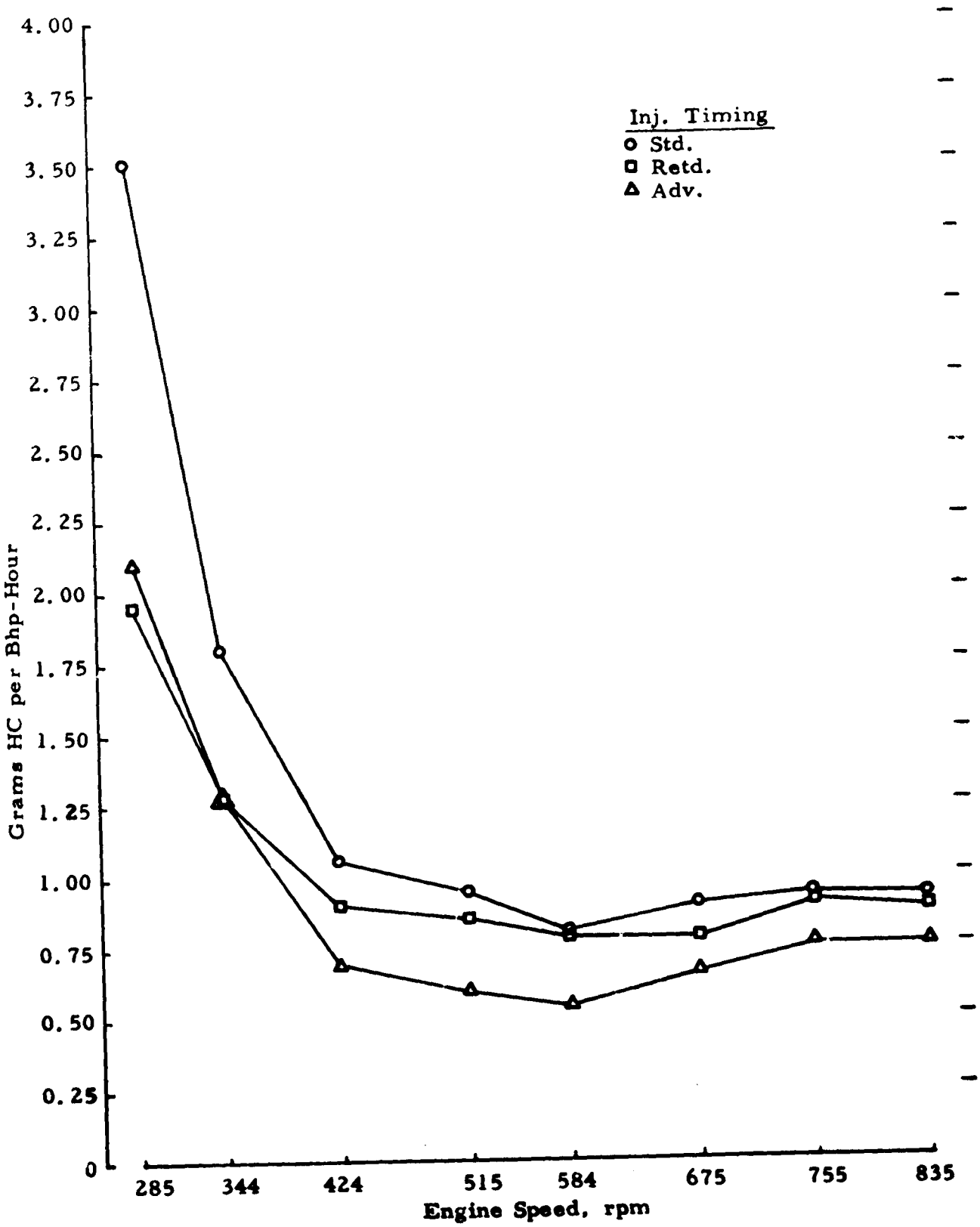

FIGURE C-7. MODAL BRAKE SPECIFIC HC FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

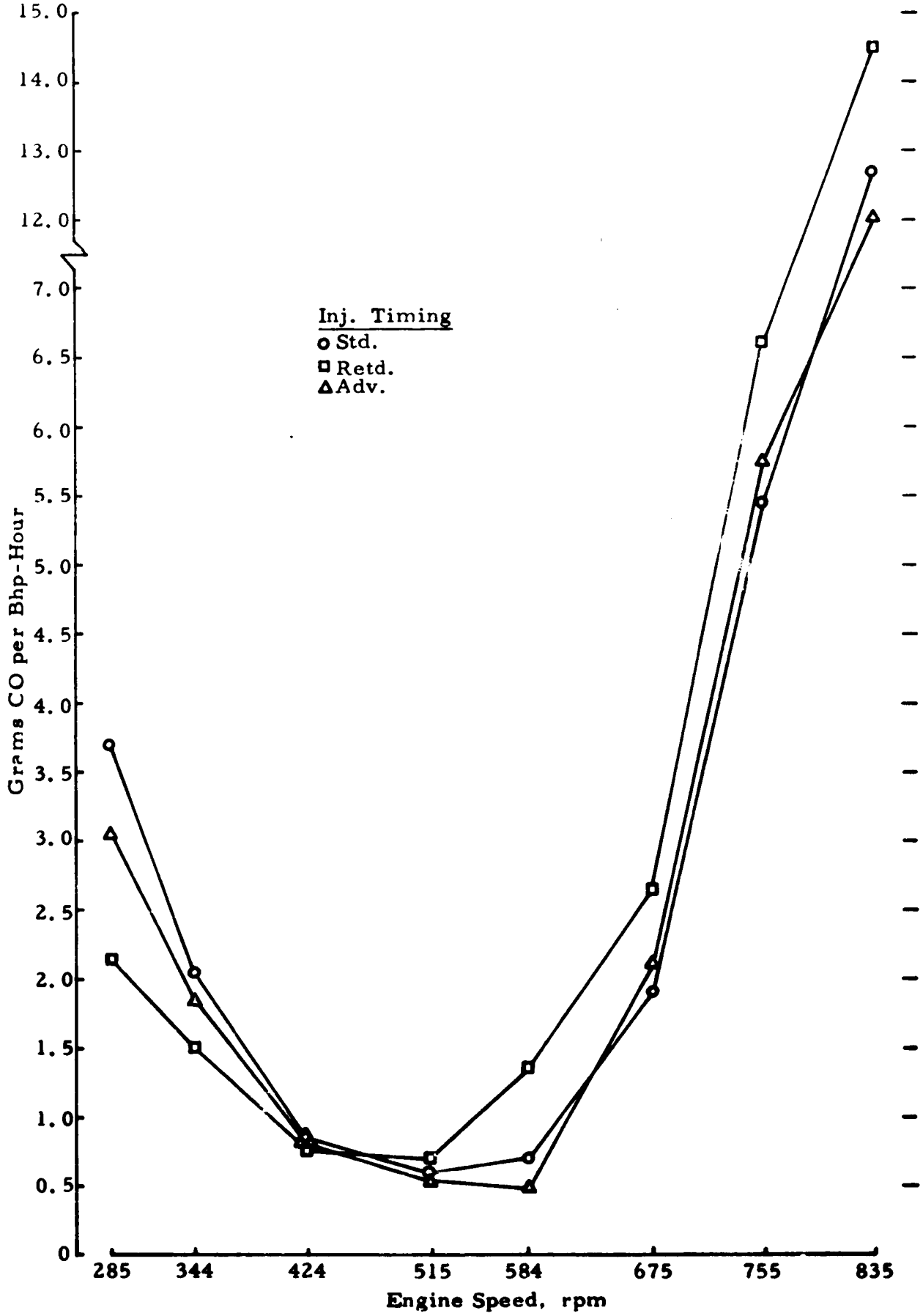

FIGURE C-8. MODAL BRAKE SPECIFIC CO FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

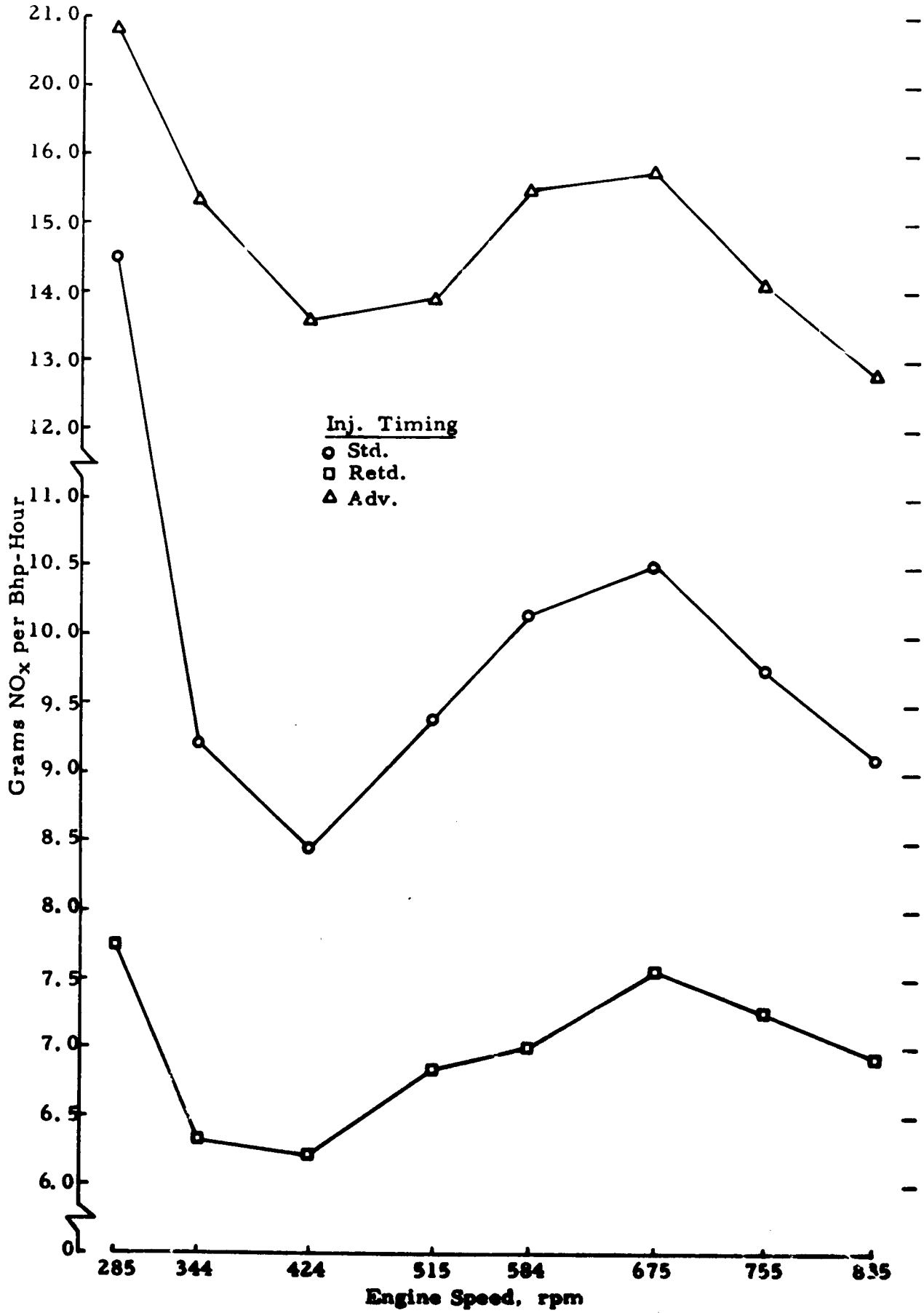

FIGURE C-9. MODAL BRAKE SPECIFIC NO_x FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

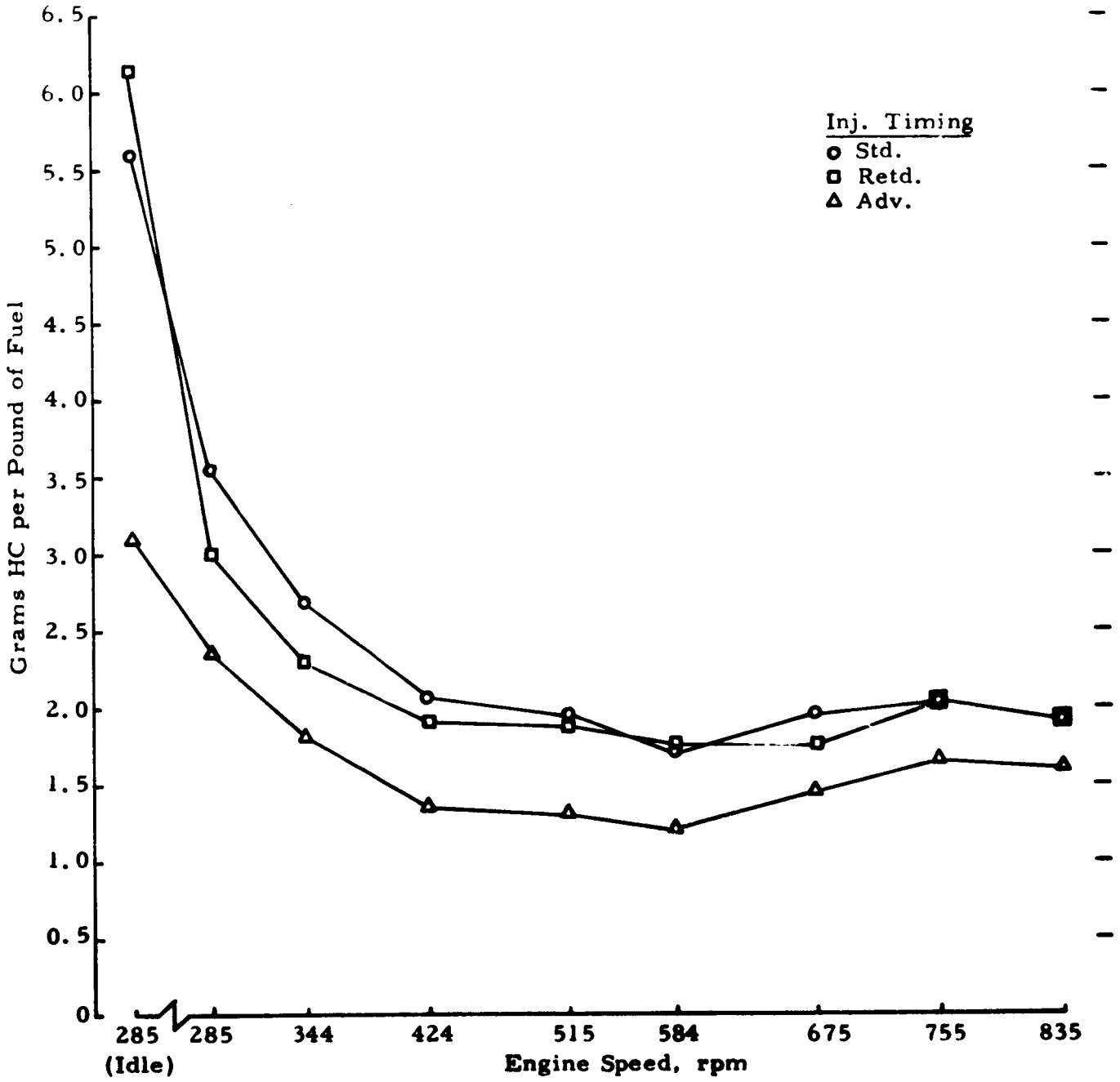

FIGURE C-10. MODAL FUEL SPECIFIC HC FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

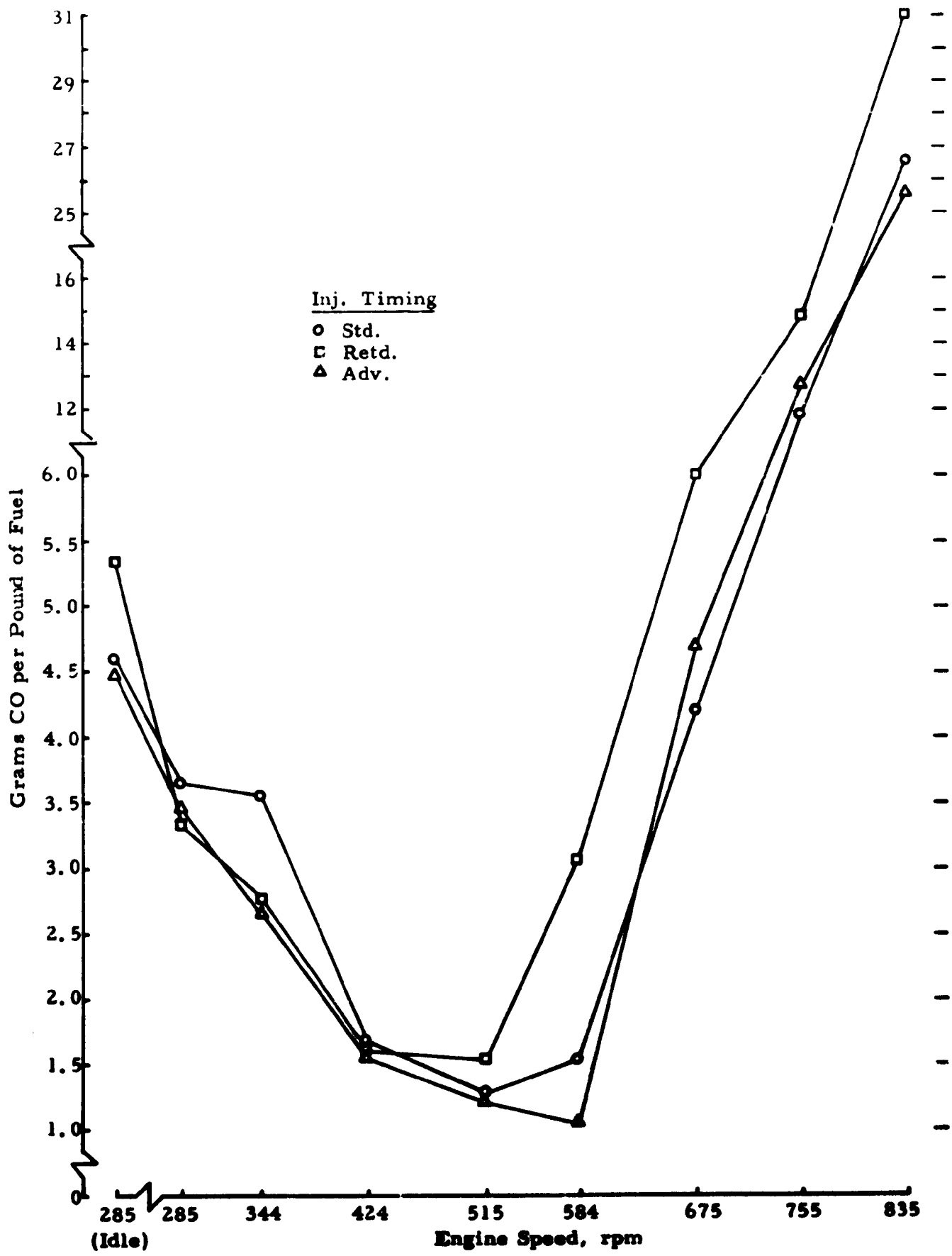

FIGURE C-14. MODAL FUEL SPECIFIC CO FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

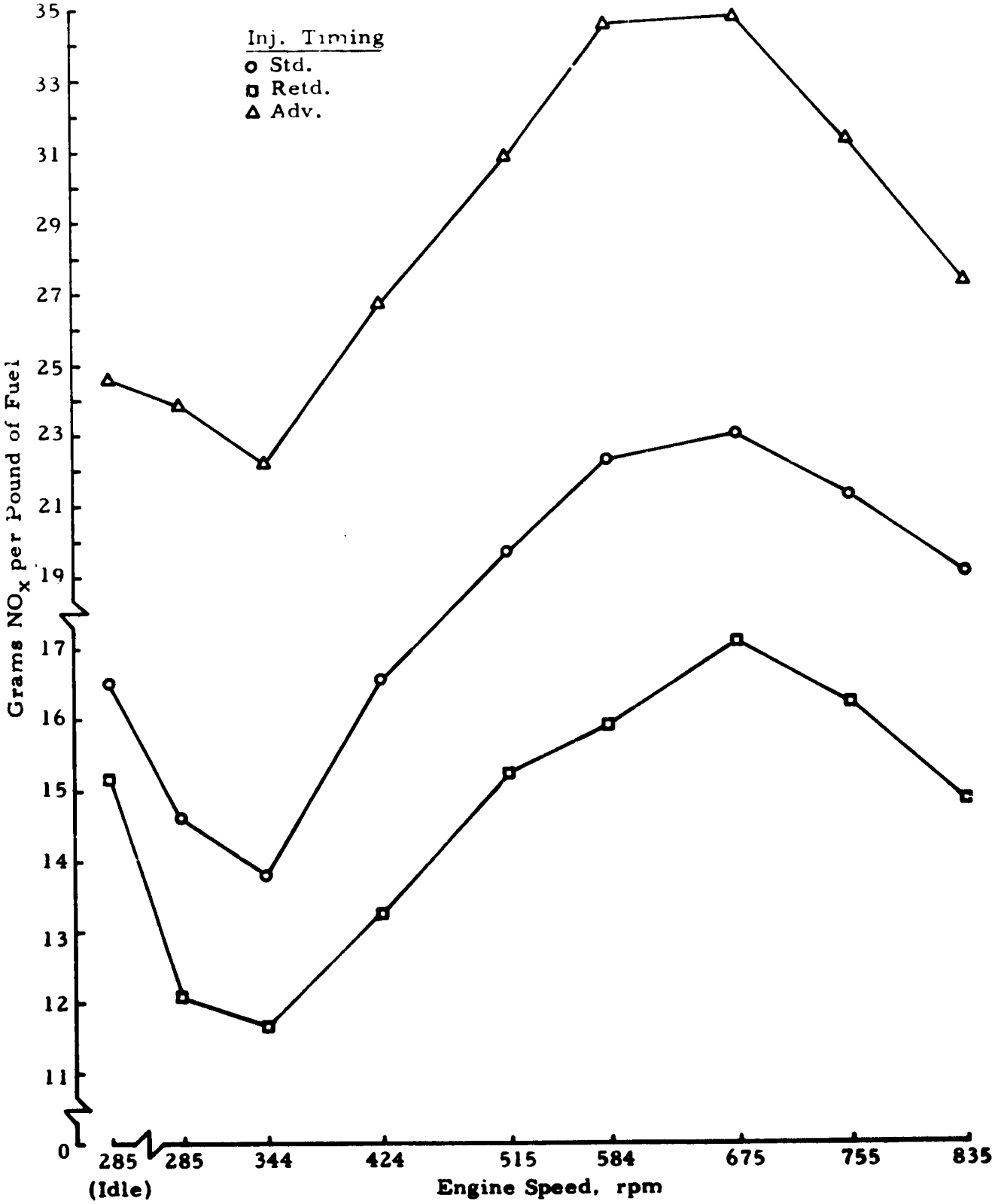

FIGURE C-12. MODAL FUEL SPECIFIC NO_x FOR NEEDLE-VALVE INJECTORS AT THREE TIMING SETTINGS

TABLE C-3. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR LOW-SAC INJECTORS AT RETARDED TIMING

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
		Standard Injection Timing (4° BTC)					
1, 6, 11	285	-	-	-	3.86	5.08	29.33
2	285	0.71	1.81	12.79	1.28	3.24	22.92
3	344	0.61	1.25	11.23	1.22	2.49	22.39
4	424	0.46	0.69	11.41	1.03	1.55	25.72
5	515	0.43	0.44	12.87	0.99	1.03	29.84
7	584	0.42	0.56	13.82	0.99	1.31	32.30
8	675	0.49	1.04	13.61	1.14	2.41	31.47
9	755	0.54	3.28	13.16	1.24	7.56	30.27
10	835	0.60	8.86	12.19	1.32	19.75	27.20
		Injection 4° Retarded					
1, 6, 11	285	-	-	-	3.86	6.48	24.22
2	265	0.71	1.61	8.99	1.34	3.04	16.81
3	344	0.61	1.34	8.00	1.22	2.69	16.04
4	424	0.44	0.68	7.90	1.01	1.54	17.82
5	515	0.41	0.55	9.36	0.97	1.30	22.03
7	584	0.39	1.05	9.84	0.90	2.43	22.84
8	675	0.45	1.99	9.68	1.03	4.60	22.32
9	755	0.49	5.01	9.27	1.13	11.45	21.20
10	835	0.55	11.84	8.76	1.21	26.20	19.36

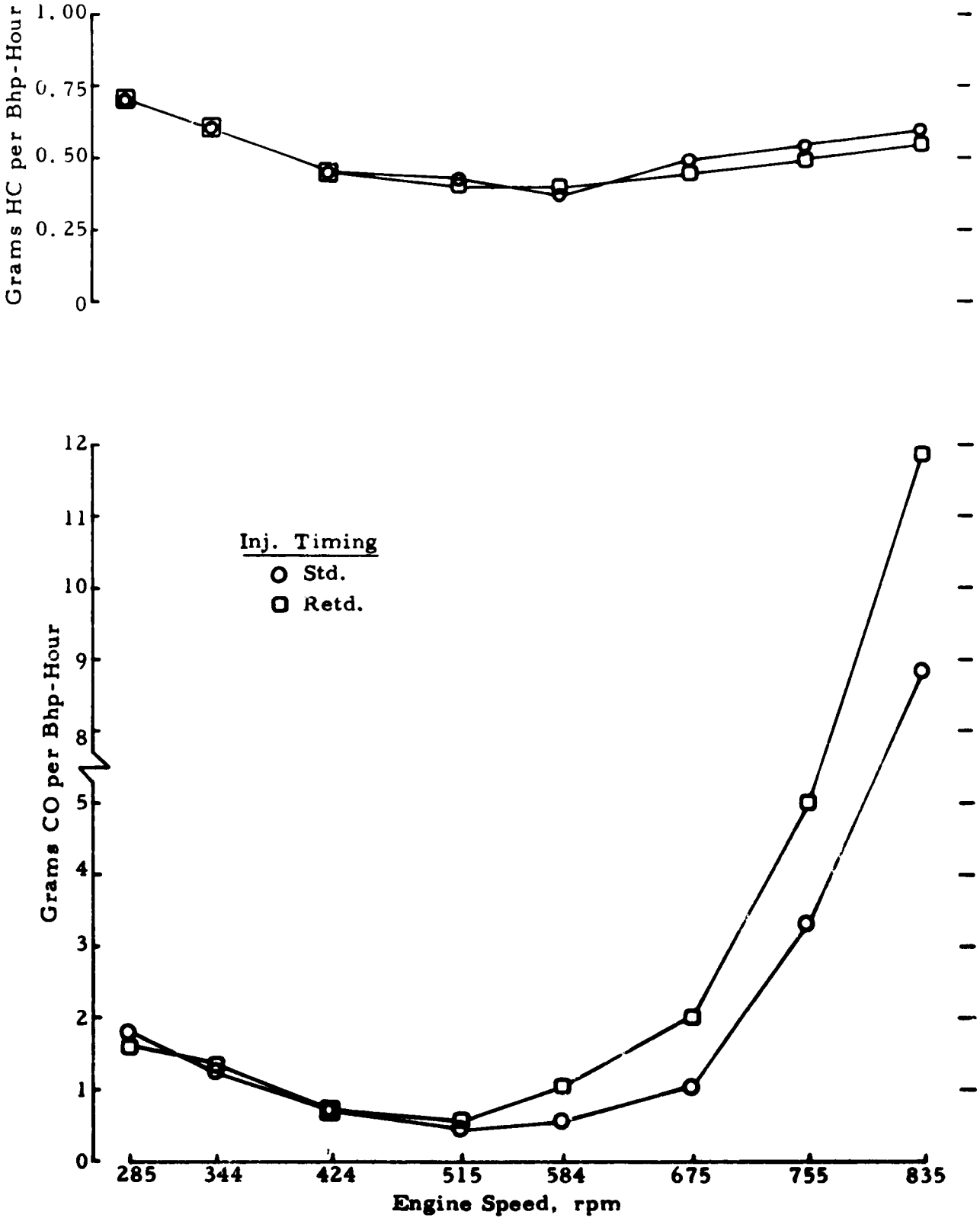

FIGURE C-13. MODAL BRAKE SPECIFIC HC AND CO FOR LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

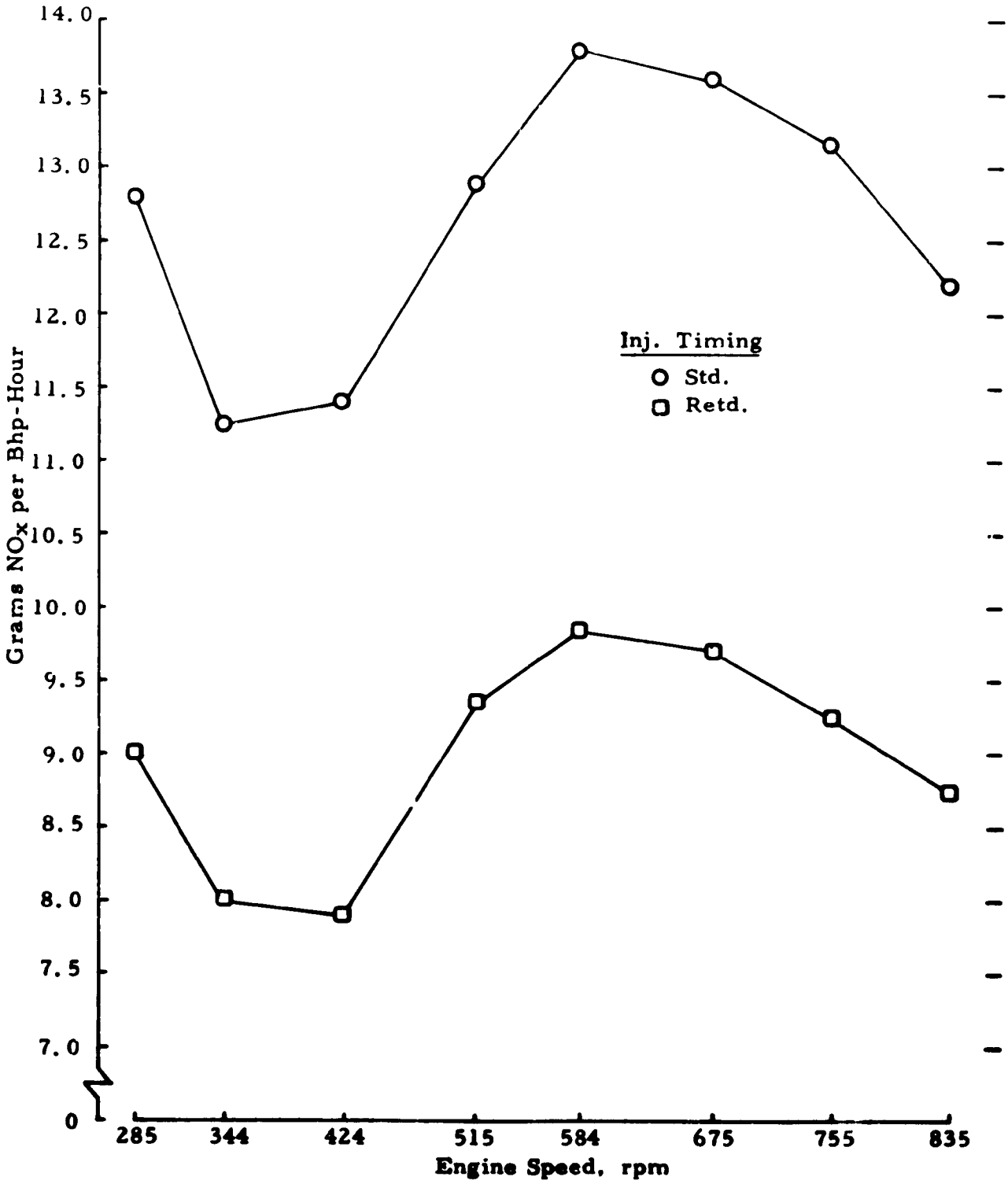

FIGURE C-14. MODAL BRAKE SPECIFIC NO_x FOR LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

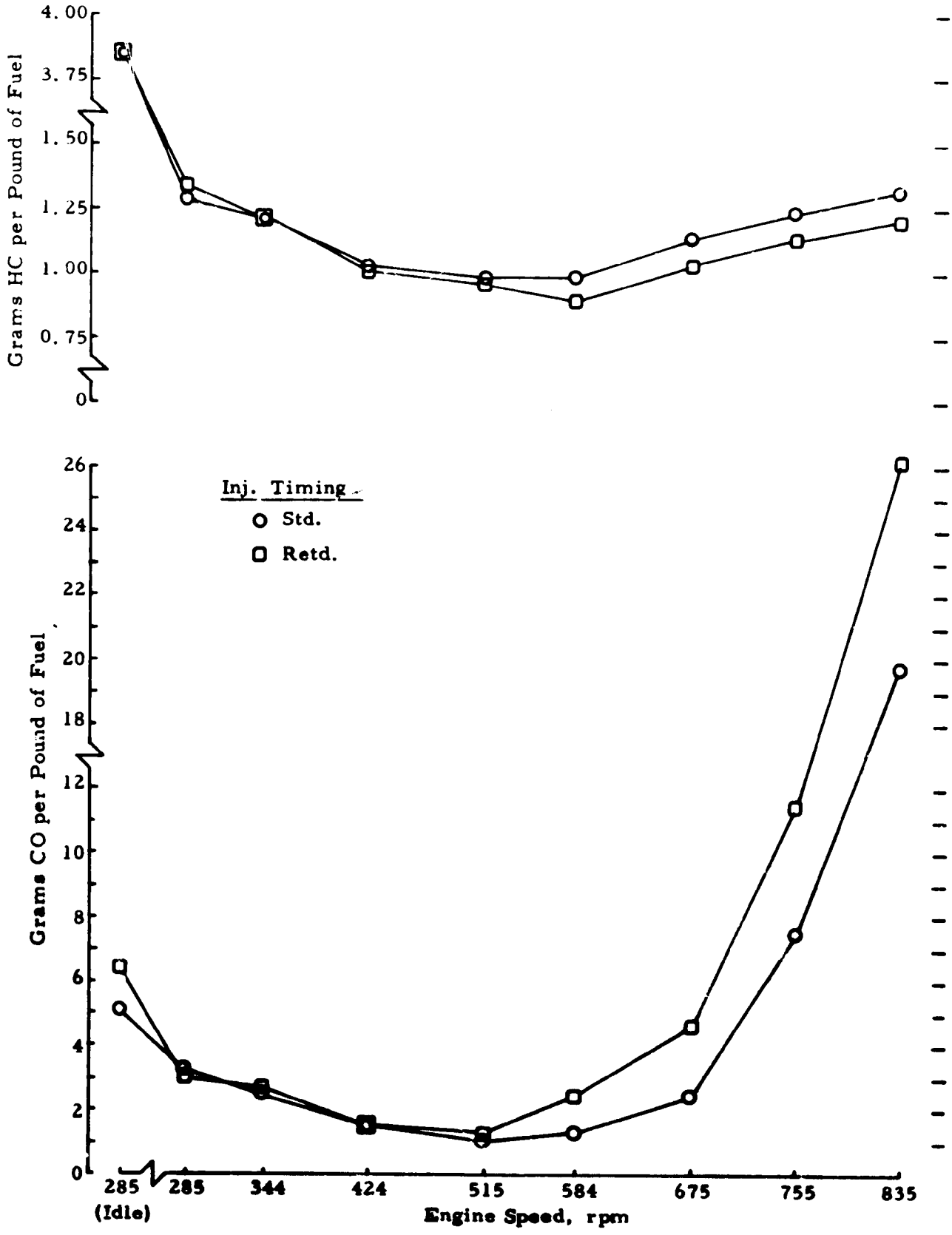

FIGURE C-15. MODAL FUEL SPECIFIC HC AND CO FOR LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

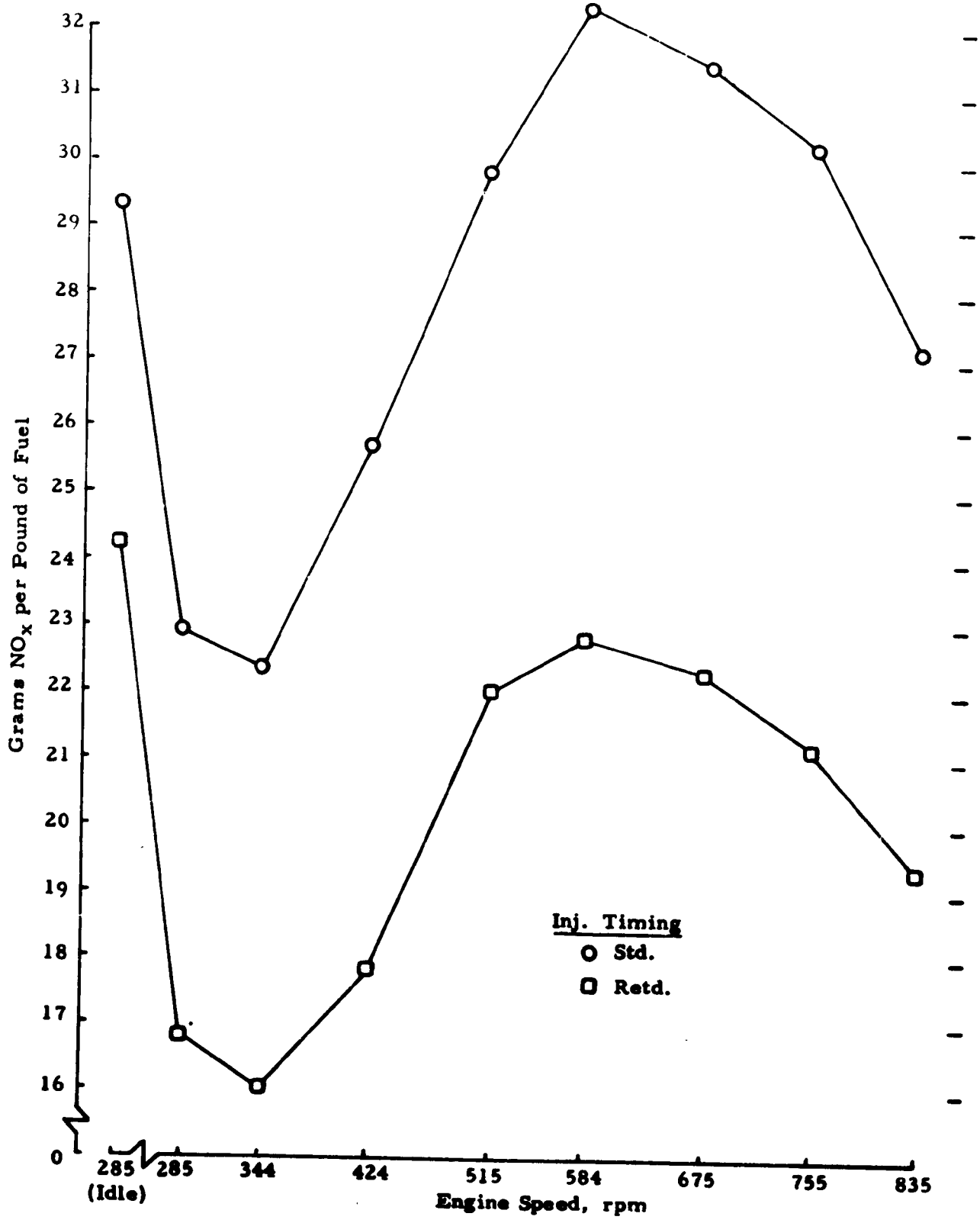

FIGURE C-16. MODAL FUEL SPECIFIC NO_x FOR LOW-SAC INJECTORS AT STANDARD AND RETARDED TIMING

TABLE C-4. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, STANDARD TIMING, AND WATER INDUCTION

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
		0% Water Induction*					
1, 6, 11	285		-	-	5.60	4.60	16.52
2	285	3.51	3.70	14.53	3.54	3.65	14.61
3	344	1.80	2.06	9.22	2.68	3.05	13.79
4	424	1.06	0.85	8.47	2.07	1.68	16.54
5	515	0.94	0.61	9.41	1.96	1.28	19.69
7	584	0.81	0.70	10.17	1.71	1.53	22.27
8	675	0.89	1.92	10.52	1.94	4.20	23.00
9	755	0.93	5.46	9.75	2.03	11.89	21.28
10	835	0.92	12.70	9.12	1.92	26.55	19.06
		25% Water Induction*					
1, 6, 11	285	-	-	-	5.39	5.19	23.31
2	285	1.34	1.79	10.18	2.37	3.18	18.05
3	344	0.98	1.36	8.51	1.95	2.71	16.99
4	424	0.70	0.68	8.34	1.59	1.53	18.89
5	515	0.66	0.48	9.25	1.54	1.13	21.68
7	584	0.66	0.80	10.27	1.47	1.76	22.70
8	675	0.68	1.91	9.78	1.59	4.48	22.96
9	755	0.81	5.30	9.15	1.86	12.12	20.94
10	835	0.79	12.44	8.43	1.72	27.33	18.52
		50% Water Induction*					
1, 6, 11	285	-	-	-	5.34	6.56	24.45
2	285	1.29	2.04	9.44	2.55	4.04	18.65
3	344	0.87	1.47	7.50	1.85	3.16	16.01
4	424	0.59	0.74	7.60	1.39	1.75	17.88
5	515	0.57	0.64	8.17	1.38	1.54	19.57
7	584	0.59	0.97	8.79	1.42	2.34	21.17
8	675	0.63	1.91	8.88	1.50	4.56	21.25
9	755	0.74	5.44	8.43	1.75	12.77	19.79
10	835	0.76	12.45	7.75	1.70	27.95	17.41

*Percent of fuel flow mass per mode.

TABLE C-4. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, STANDARD TIMING, AND WATER INDUCTION (Cont'd)

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
		75% Water Induction*					
1, 6, 11	285	-	-	-	4.05	10.03	23.55
2	285	0.87	2.28	8.15	1.85	4.81	17.27
3	344	0.70	1.78	7.26	1.51	3.83	15.58
4	424	0.50	1.04	7.03	1.18	2.47	16.63
5	515	0.47	0.96	8.88	1.12	2.29	21.23
7	584	0.51	1.30	8.39	1.23	3.14	20.19
8	675	0.56	2.32	8.36	1.35	5.58	20.14
9	755	0.65	5.57	7.57	1.54	13.24	17.98
10	835	0.68	12.21	6.88	1.54	27.50	15.51
		100% Water Induction*					
1, 6, 11	285	-	-	-	5.19	5.29	21.24
2	285	1.22	1.02	9.19	2.13	1.81	16.18
3	344	1.05	0.98	8.11	2.03	2.26	16.02
4	424	0.70	0.51	8.09	1.53	1.11	17.69
5	515	0.69	0.41	8.65	1.55	0.93	19.61
7	584	0.66	0.87	9.60	1.46	1.93	21.43
8	675	0.70	2.34	9.04	1.59	5.31	20.53
9	755	0.77	6.19	8.21	1.73	13.87	18.40
10	835	0.81	13.78	7.07	1.76	29.80	15.28

*Percent of fuel flow mass per mode.

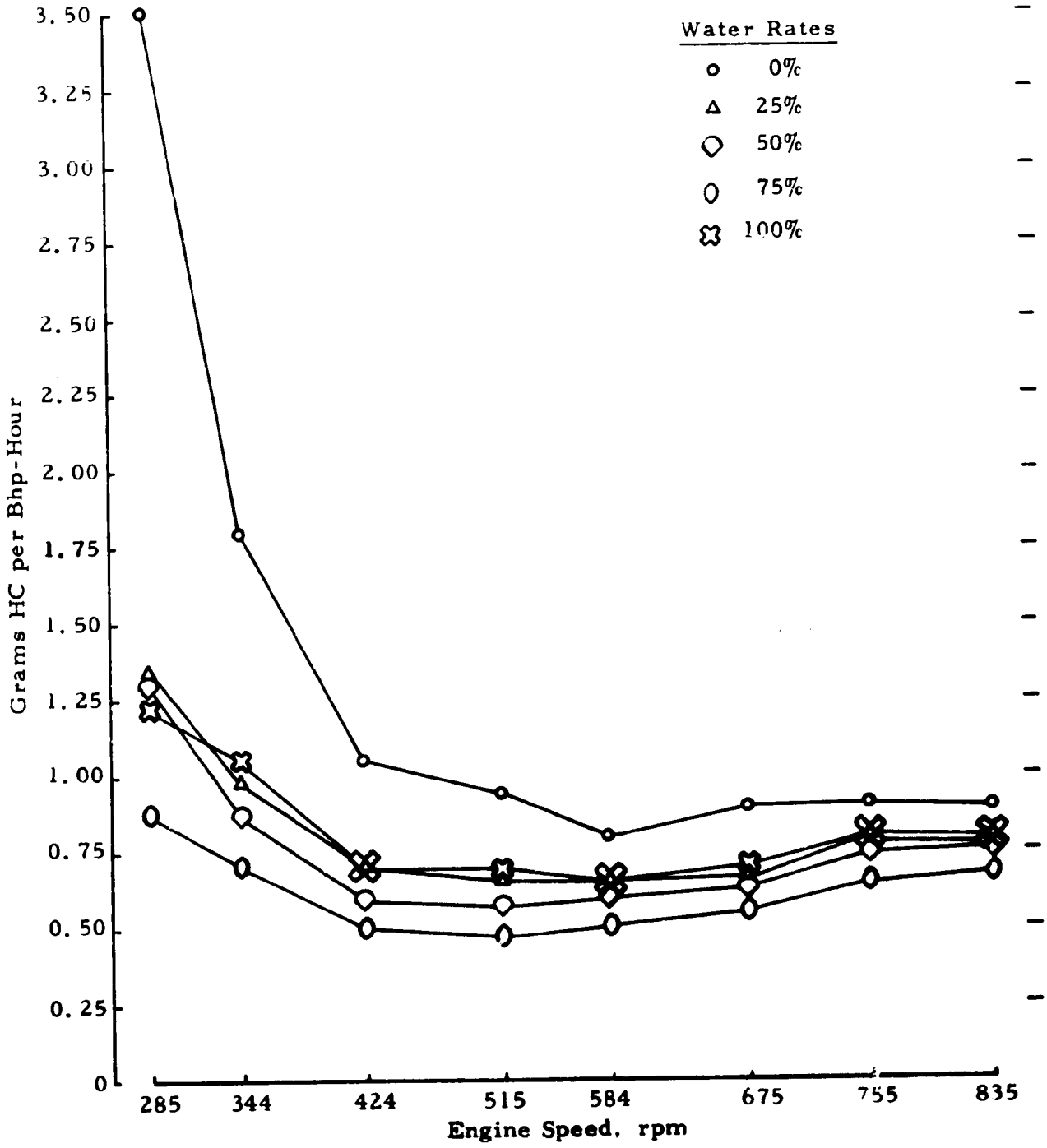

FIGURE C-17. MODAL BRAKE SPECIFIC HC FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

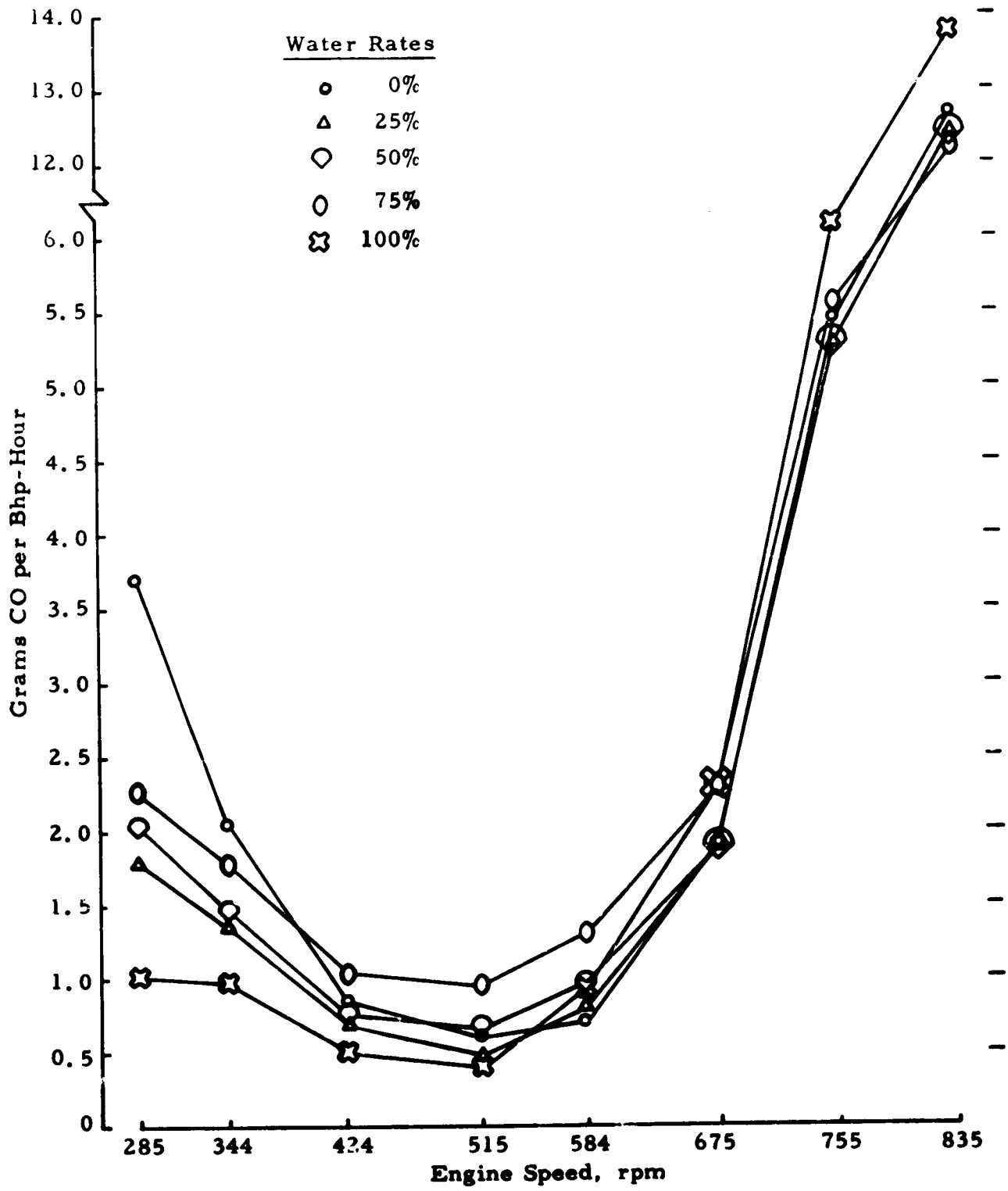

FIGURE C-18. MODAL BRAKE SPECIFIC CO FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

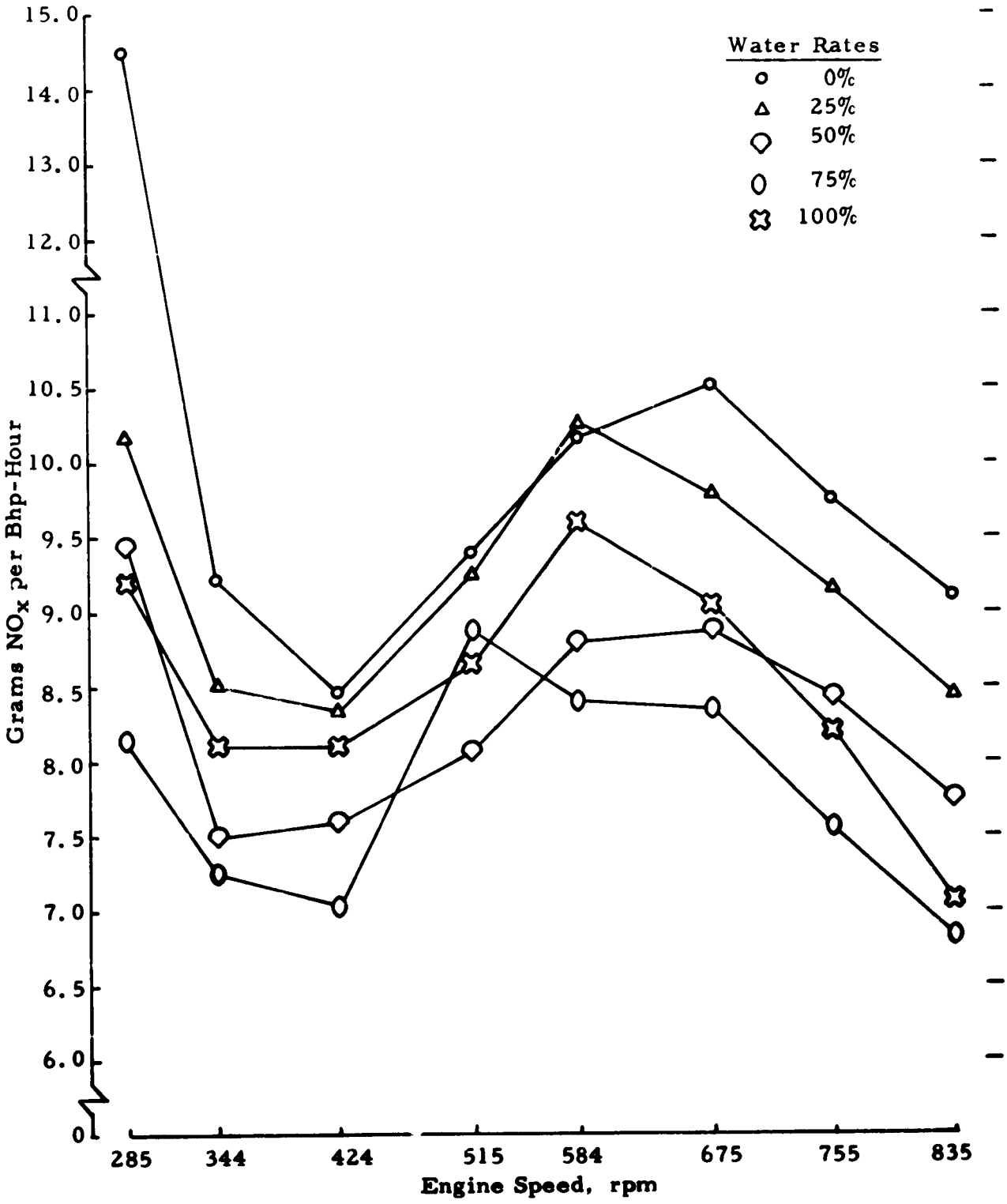

FIGURE C-19. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

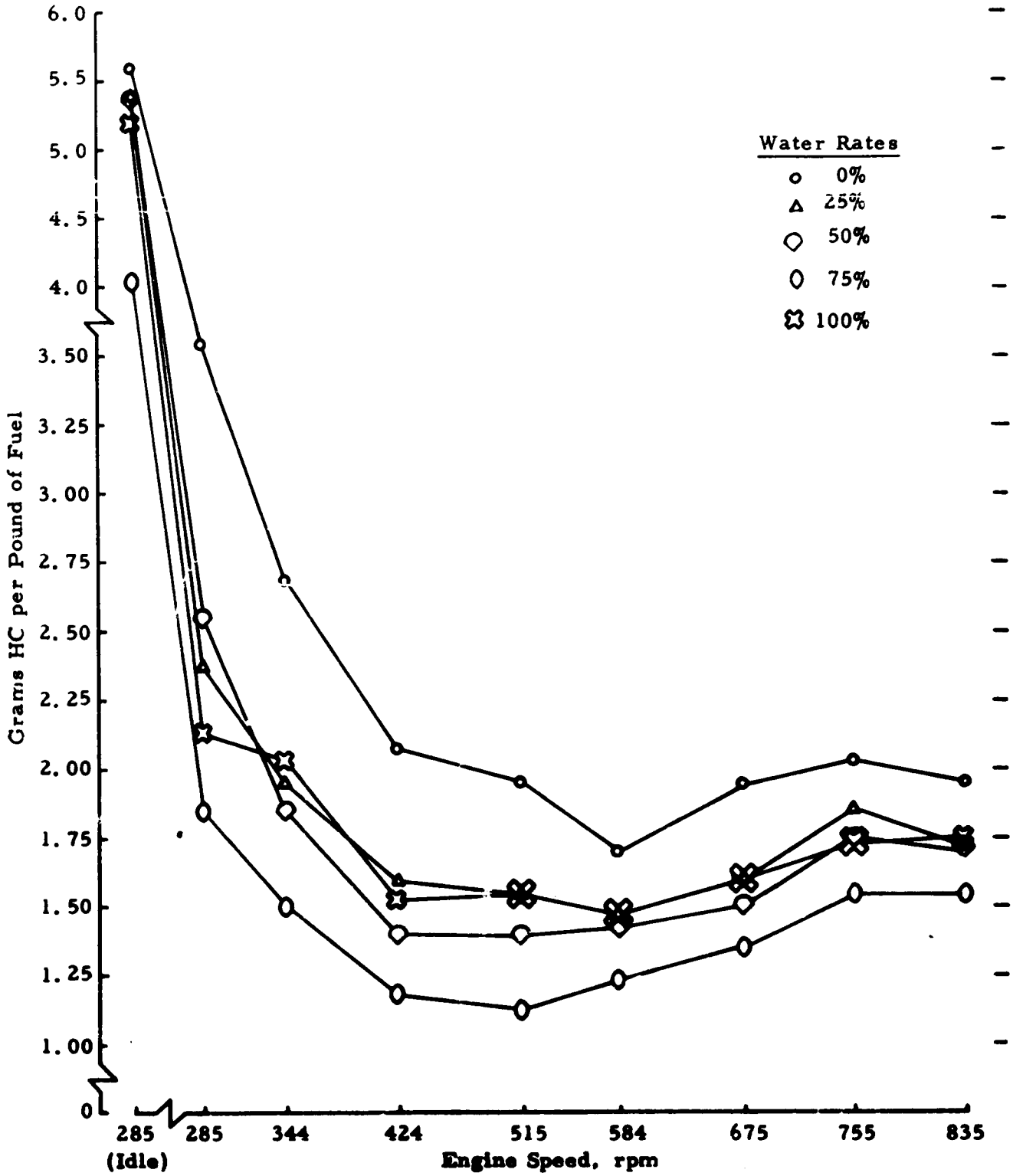

FIGURE C-20. MODAL FUEL SPECIFIC HC FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

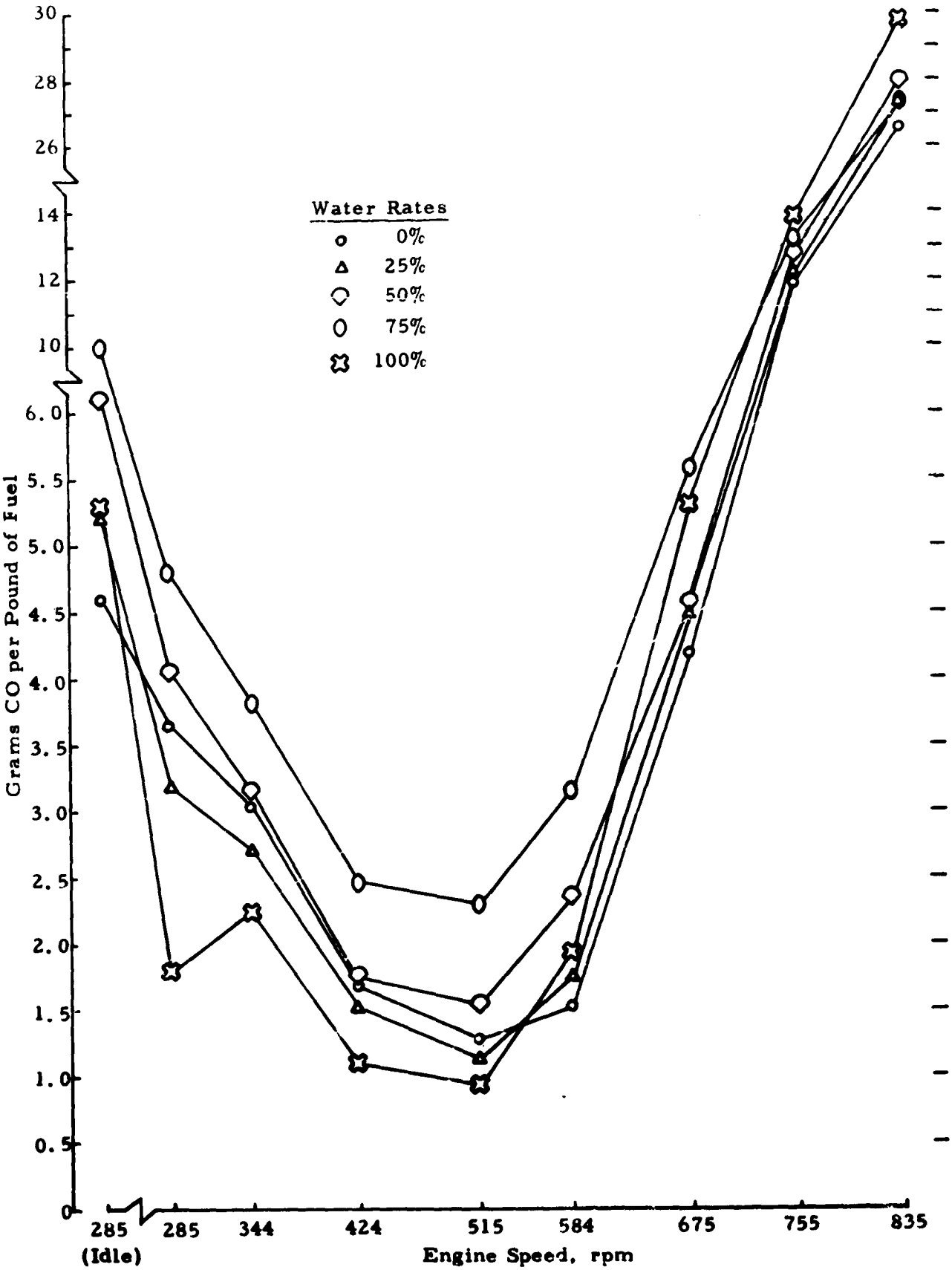

FIGURE C-21. MODAL FUEL SPECIFIC CO FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

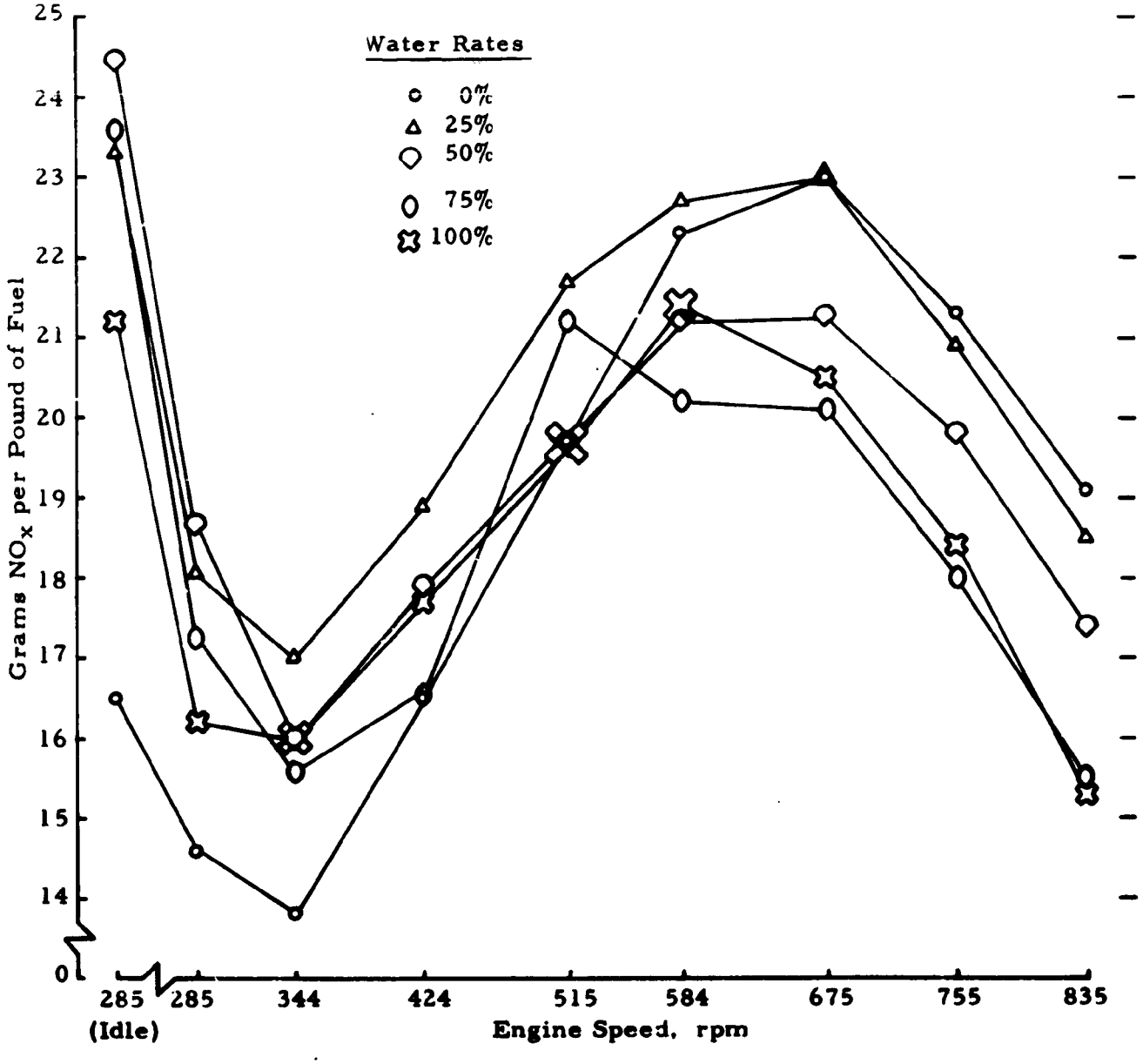

FIGURE C-22. MODAL FUEL SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-5. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR LOW-SAC INJECTORS, STANDARD TIMING, AND WATER INDUCTION

Mode	Notch Position	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
			HC	CO	NO_x	HC	CO	NO_x
	0% Water Induction*							
1, 6, 11	Low Idle	285	-	-	-	3.86	5.08	29.33
2	1	285	0.71	1.81	12.79	1.28	3.24	22.92
3	2	344	0.61	1.25	11.23	1.22	2.49	22.39
4	3	424	0.46	0.69	11.41	1.03	1.55	25.72
5	4	515	0.43	0.44	12.87	0.99	1.03	29.84
7	5	584	0.42	0.56	13.82	0.99	1.31	32.30
8	6	675	0.49	1.04	13.61	1.14	2.41	31.47
9	7	755	0.54	3.28	13.16	1.24	7.56	30.27
10	8	835	0.60	8.86	12.19	1.32	19.75	27.20
	25% Water Induction*							
1, 6, 11	Low Idle	285	-	-	-	3.45	4.23	29.11
2	1	285	0.59	1.47	11.22	1.22	3.02	23.38
3	2	344	0.51	1.03	10.49	1.06	2.13	21.63
4	3	424	0.39	0.43	10.80	0.88	0.99	24.70
5	4	515	0.38	0.36	12.38	0.89	0.83	28.98
7	5	584	0.36	0.53	12.85	0.85	1.24	30.35
8	6	675	0.47	1.22	14.14	0.96	2.52	29.58
9	7	755	0.43	2.00	11.73	1.02	4.71	27.44
10	8	835	0.51	9.63	10.05	1.16	21.75	24.94
	50% Water Induction*							
1, 6, 11	Low Idle	285	-	-	-	3.88	4.79	28.77
2	1	285	0.61	1.68	11.69	1.17	3.27	22.65
3	2	344	0.52	1.33	10.31	1.06	2.75	21.21
4	3	424	0.40	0.73	10.56	0.92	1.67	24.32
5	4	515	0.38	0.48	11.99	0.90	1.12	28.16
7	5	584	0.38	0.59	12.89	0.91	1.38	30.50
8	6	675	0.40	1.22	12.34	0.91	2.84	28.77
9	7	755	0.45	3.33	11.37	1.04	7.62	26.07
10	8	835	0.50	8.51	10.44	1.11	18.84	23.10

*Percent of fuel flow mass per mode.

TABLE C-5. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR LOW-SAC INJECTORS, STANDARD TIMING, AND WATER INDUCTION (Cont'd)

Mode	Notch Position	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
			HC	CO	NO_x	HC	CO	NO_x
	75% Water Induction*							
1, 6, 11	Low Idle	285	-	-	-	5.01	4.61	29.09
2	1	285	0.97	1.51	10.92	1.88	2.93	21.15
3	2	344	0.81	1.13	9.61	1.63	2.26	19.29
4	3	424	0.56	0.63	10.39	1.28	1.45	23.84
5	4	515	0.56	0.41	11.77	1.33	0.97	27.75
7	5	584	0.47	0.47	12.38	1.10	1.12	29.28
8	6	675	0.50	1.04	12.10	1.16	2.43	28.34
9	7	755	0.57	2.97	10.99	1.31	6.88	25.43
10	8	835	0.63	8.20	10.13	1.40	18.46	22.78
	100% Water Induction*							
1, 6, 11	Low Idle	285	-	-	-	6.11	8.80	33.47
2	1	285	0.92	1.85	10.53	1.93	3.88	22.10
3	2	344	0.81	1.35	9.91	1.62	2.69	19.77
4	3	424	0.55	0.77	10.36	1.28	1.81	24.34
5	4	515	0.52	0.59	12.16	1.23	1.39	28.87
7	5	584	0.46	0.74	12.43	1.10	1.76	29.86
8	6	675	0.49	1.35	11.95	1.18	3.26	28.77
9	7	755	0.56	3.64	10.96	1.31	8.59	25.89
10	8	835	0.66	9.92	9.84	1.50	22.38	22.20

*Percent of fuel flow mass per mode.

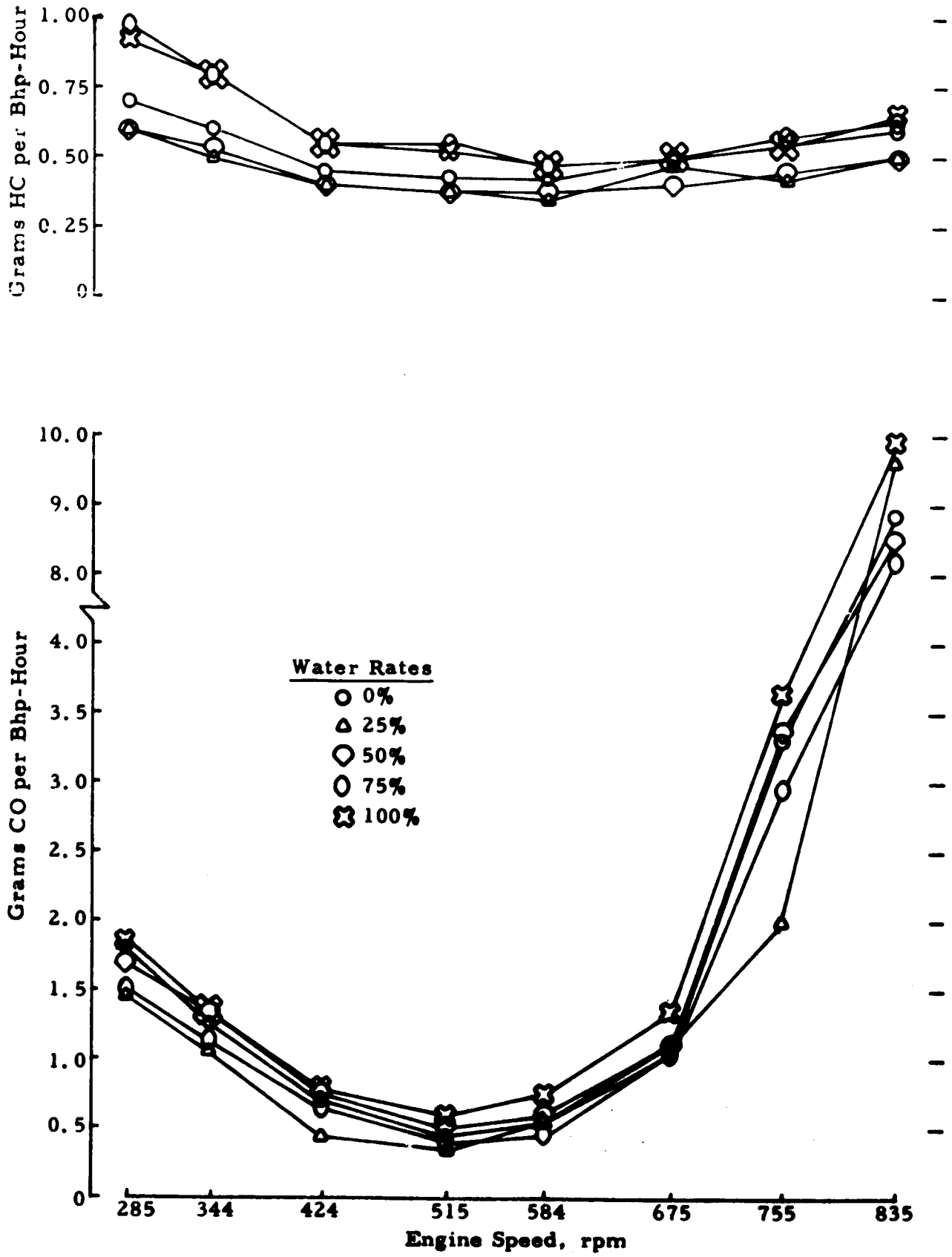

FIGURE C-23. MODAL BRAKE SPECIFIC HC AND CO FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

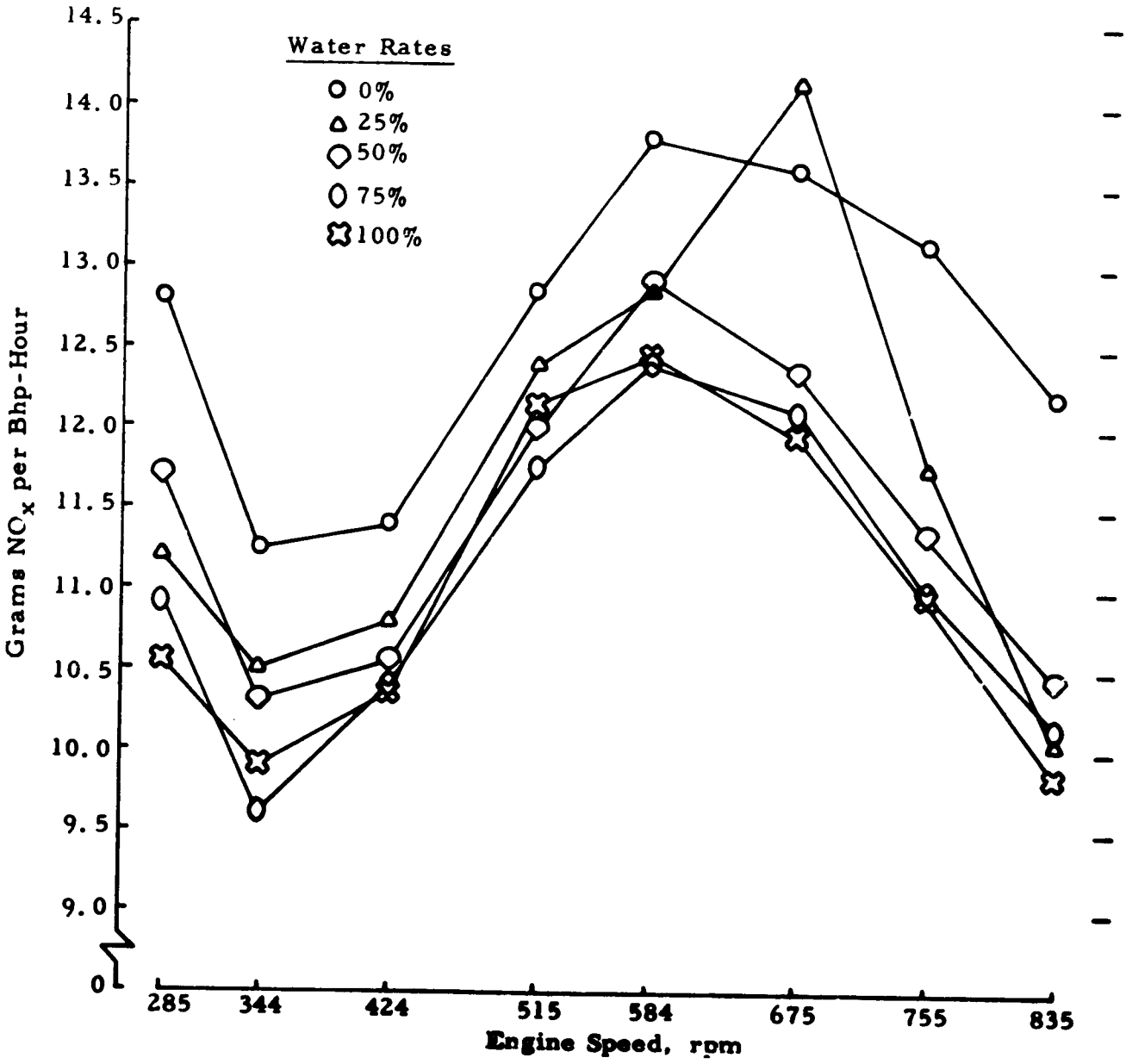

FIGURE C-24. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

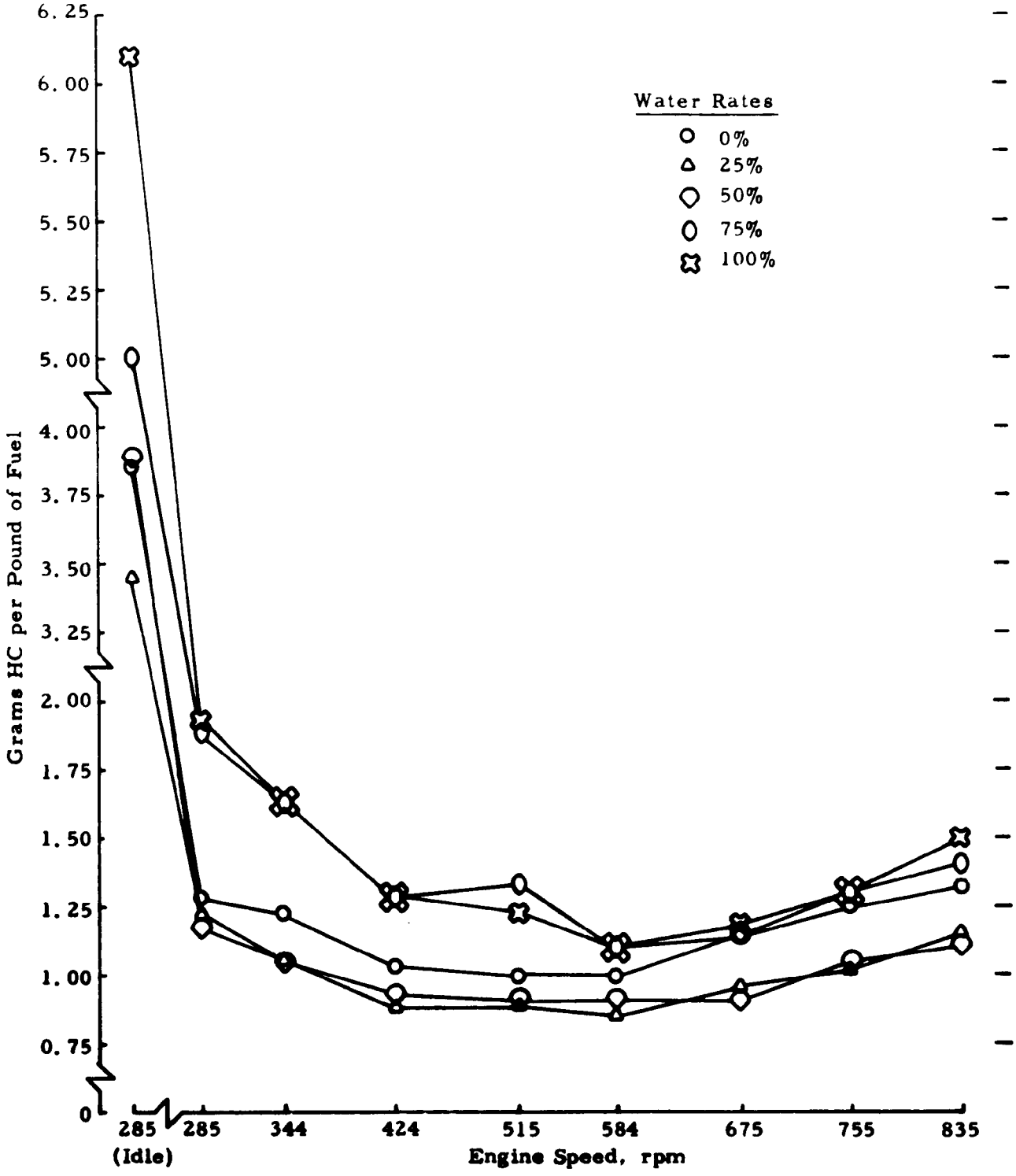

FIGURE C-25. MODAL FUEL SPECIFIC HC FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

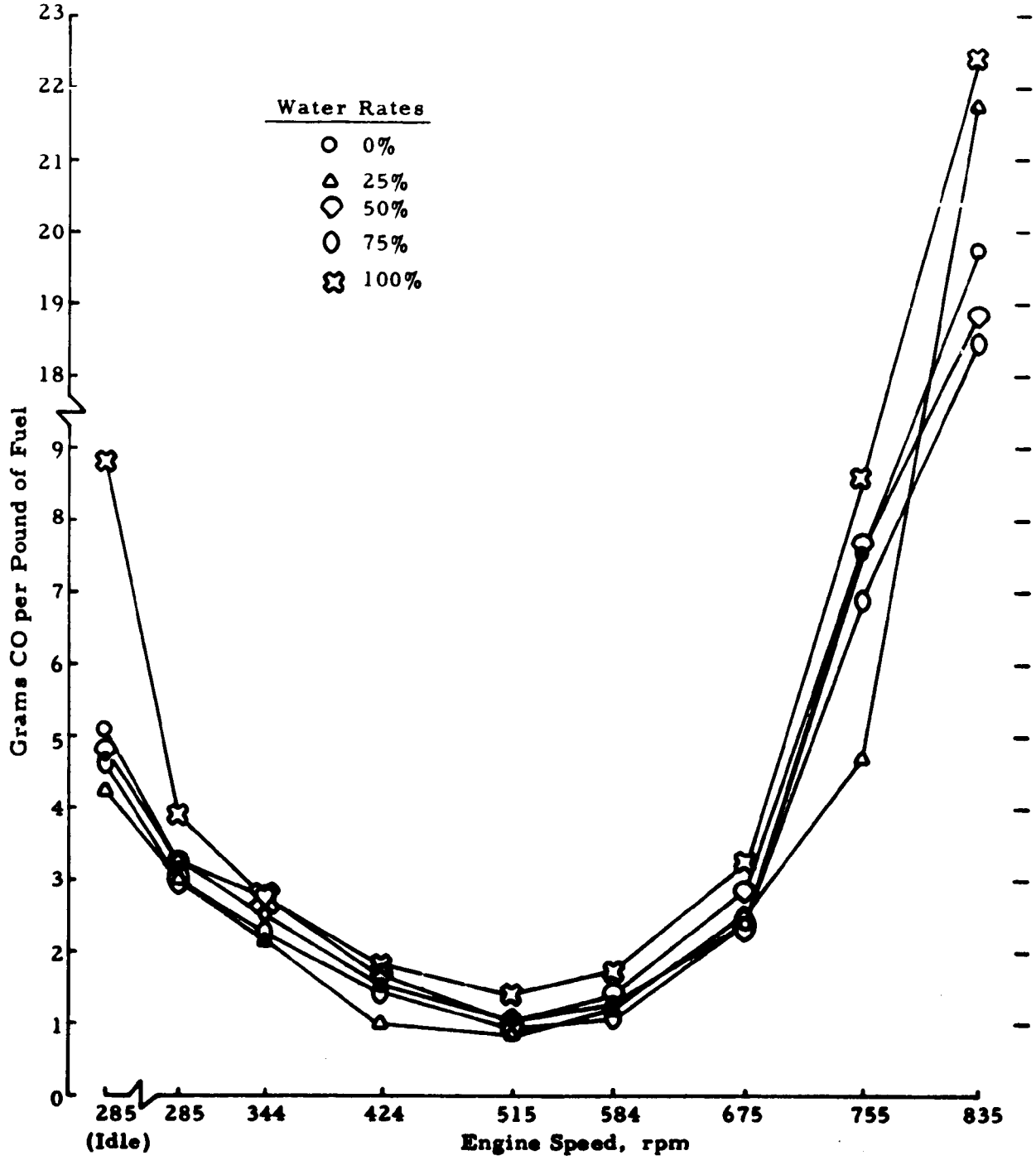

FIGURE C-26. MODAL FUEL SPECIFIC CO FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

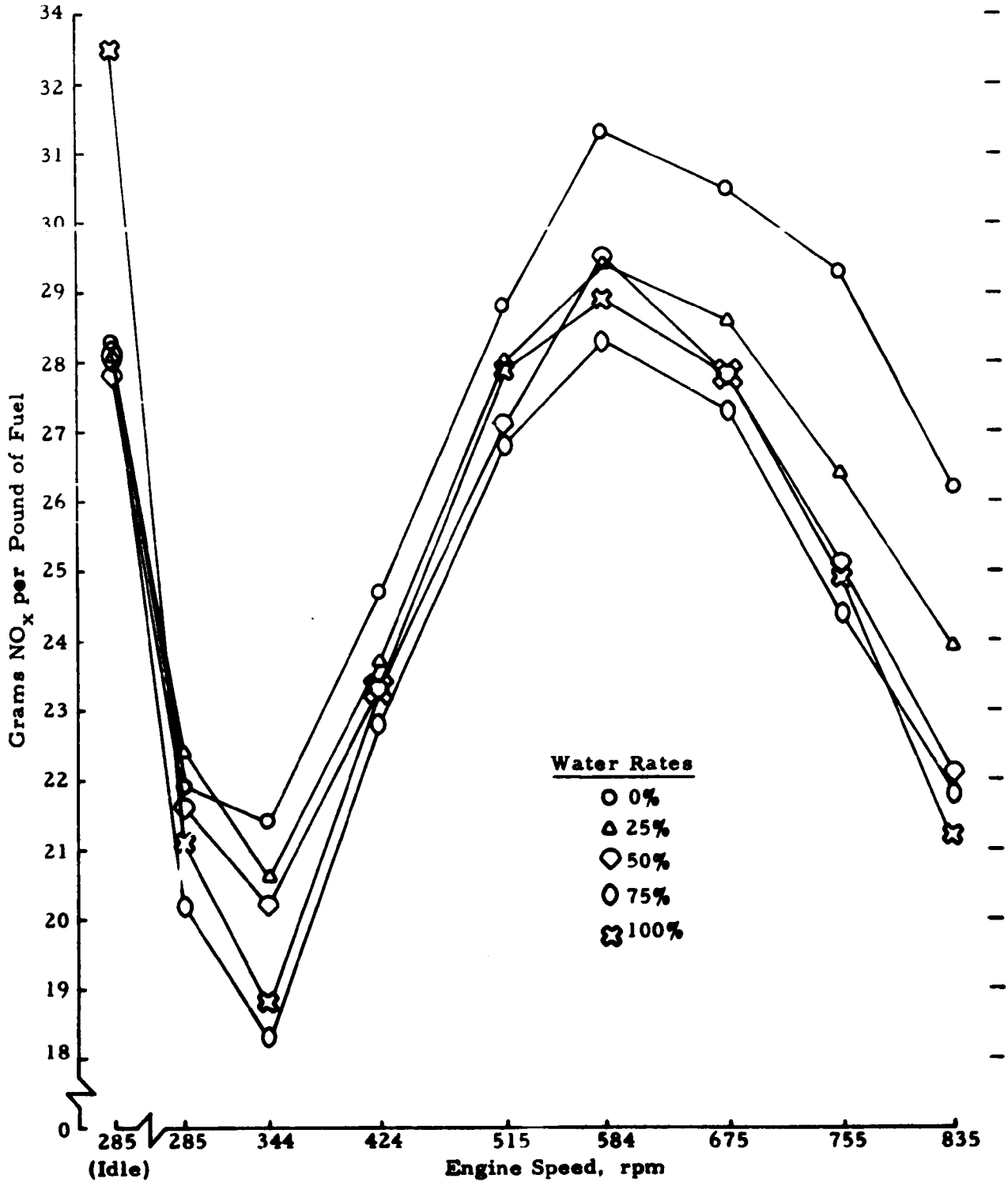

FIGURE C-27. MODAL FUEL SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE C-6. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, RETARDED TIMING, AND WATER INDUCTION

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Water Induction*				
1, 6, 11	285	-	-	-	6.16	5.33	15.15
2	285	1.96	2.14	7.75	3.00	3.33	12.07
3	344	1.28	1.51	6.33	2.31	2.77	11.66
4	424	0.90	0.76	6.22	1.90	1.60	13.24
5	515	0.85	0.69	6.84	1.88	1.53	15.21
7	584	0.78	1.34	7.01	1.76	3.06	15.91
8	675	0.77	2.65	7.56	1.75	6.01	17.11
9	755	0.90	6.62	7.26	2.03	14.81	16.23
10	835	0.88	14.52	6.93	1.89	31.10	14.84
			25% Water Induction*				
1, 6, 11	285	-	-	-	5.63	4.01	17.52
2	285	1.16	1.42	6.54	2.08	2.54	11.72
3	344	0.94	1.10	5.50	1.82	2.13	10.72
4	424	0.72	0.58	5.62	1.49	1.18	11.62
5	515	0.70	0.67	6.04	1.52	1.44	13.00
7	584	0.72	1.44	6.08	1.60	3.18	13.49
8	675	0.80	3.25	6.03	1.76	7.17	13.29
9	755	0.97	6.82	5.92	2.10	14.86	12.88
10	835	1.48	17.02	5.54	3.13	35.92	11.69
			50% Water Induction*				
1, 6, 11	285	-	-	-	5.50	6.01	17.10
2	285	1.16	2.22	5.58	2.21	4.25	10.68
3	344	1.03	1.72	5.22	1.98	3.34	10.10
4	424	0.75	1.08	5.12	1.62	2.36	11.15
5	515	0.72	1.07	5.74	1.61	2.37	12.71
7	584	0.72	2.10	5.85	1.59	4.68	13.04
8	675	0.80	3.68	6.06	1.77	8.10	13.36
9	755	0.84	7.78	5.60	1.92	17.12	12.34
10	835	1.19	18.34	5.13	2.50	38.58	10.80
			75% Water Induction*				
1, 6, 11	285	-	-	-	5.64	6.34	17.11
2	285	1.06	1.62	5.49	2.00	3.08	10.40
3	344	0.98	1.48	5.04	1.88	2.86	9.70
4	424	0.73	0.72	4.88	1.56	1.55	10.40
5	515	0.72	0.91	5.49	1.56	1.98	12.00
7	584	0.73	1.76	5.82	1.62	3.92	12.92
8	675	0.78	3.56	5.72	1.74	7.86	12.66
9	755	0.88	7.60	5.36	1.90	16.48	11.62
10	835	1.14	17.90	4.79	2.40	37.60	10.06

*Percent of fuel flow mass per mode.

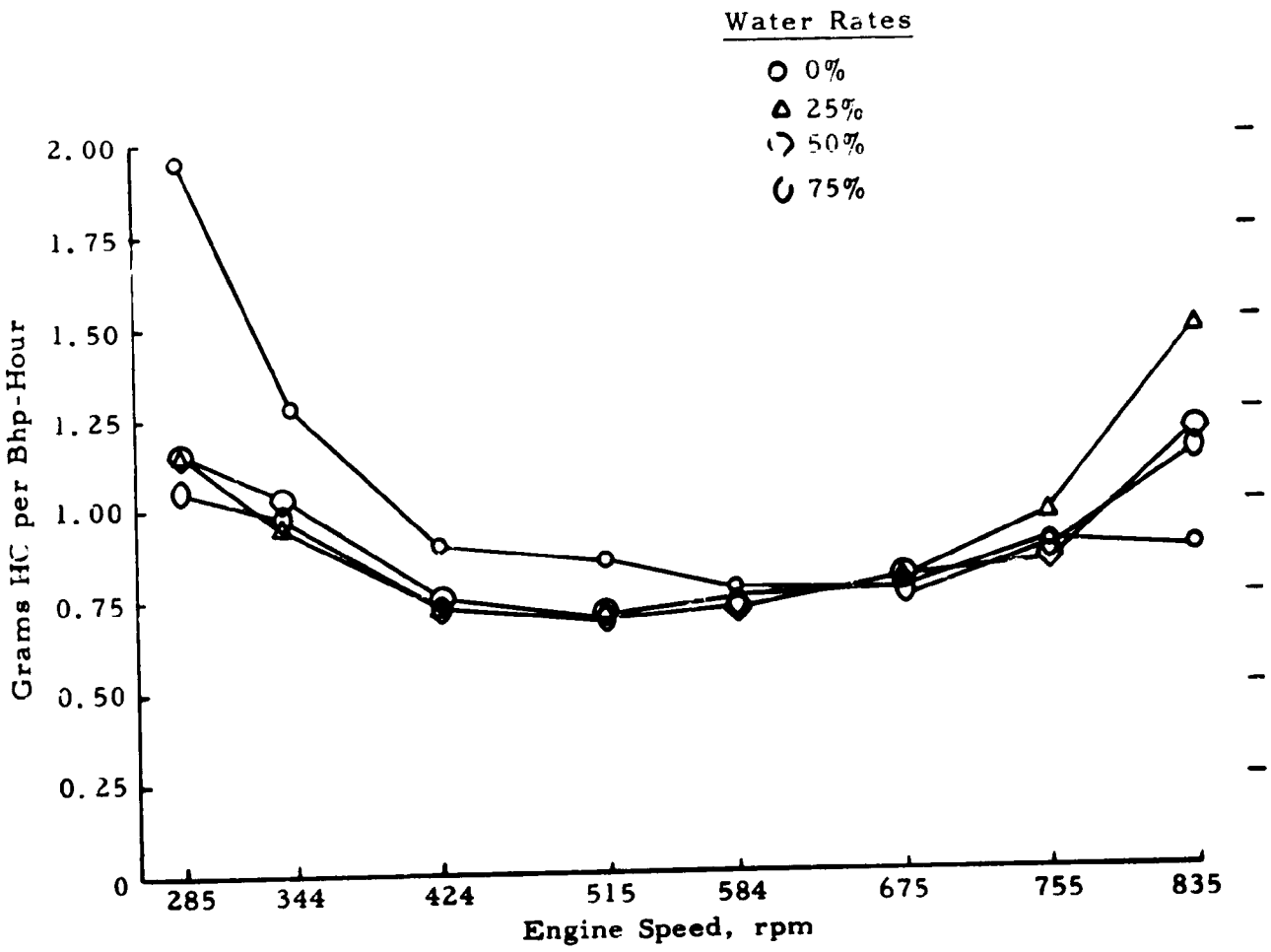

FIGURE C-28.MODAL BRAKE SPECIFIC HC FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

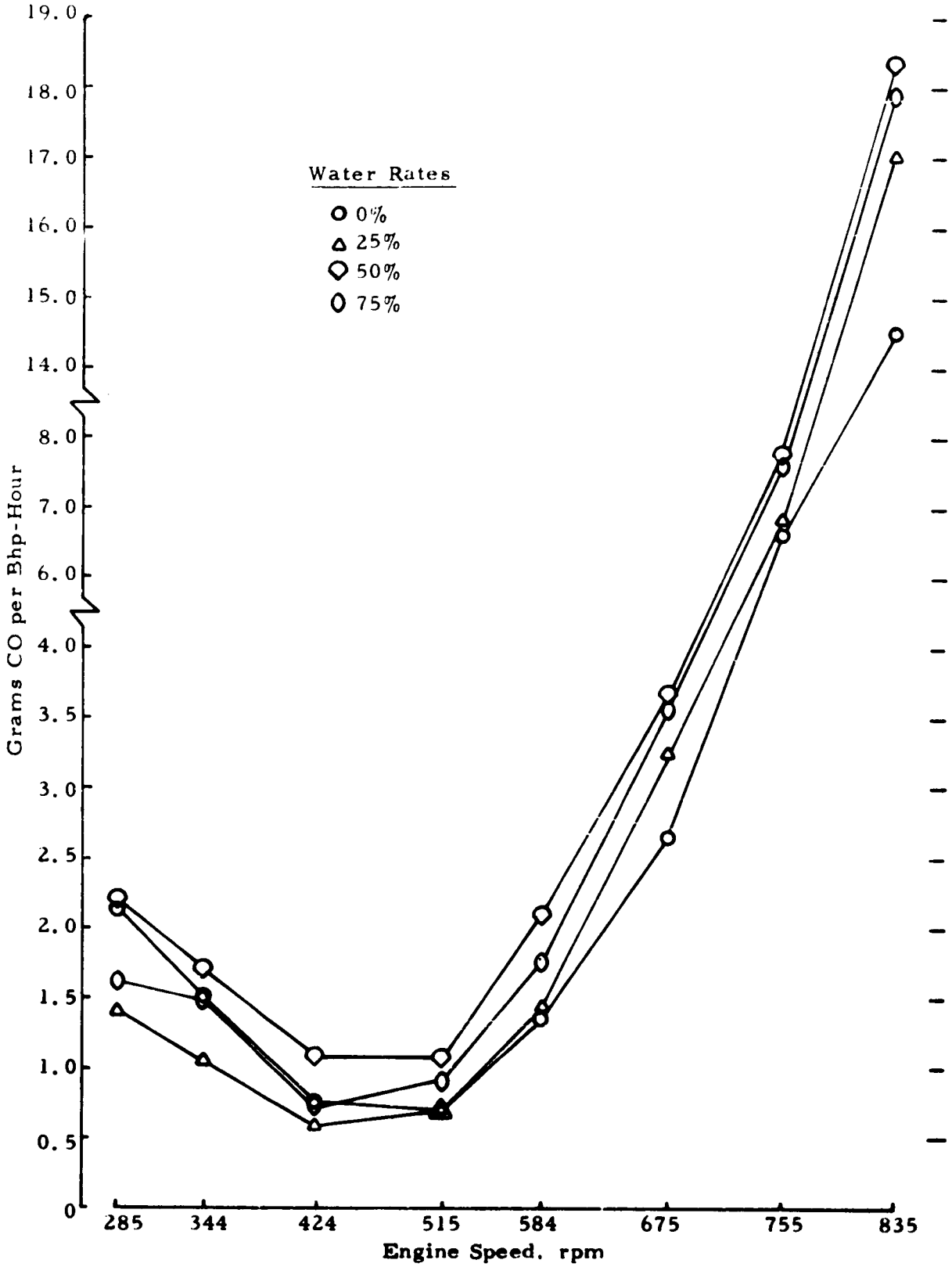

FIGURE C-29.MODAL BRAKE SPECIFIC CO FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

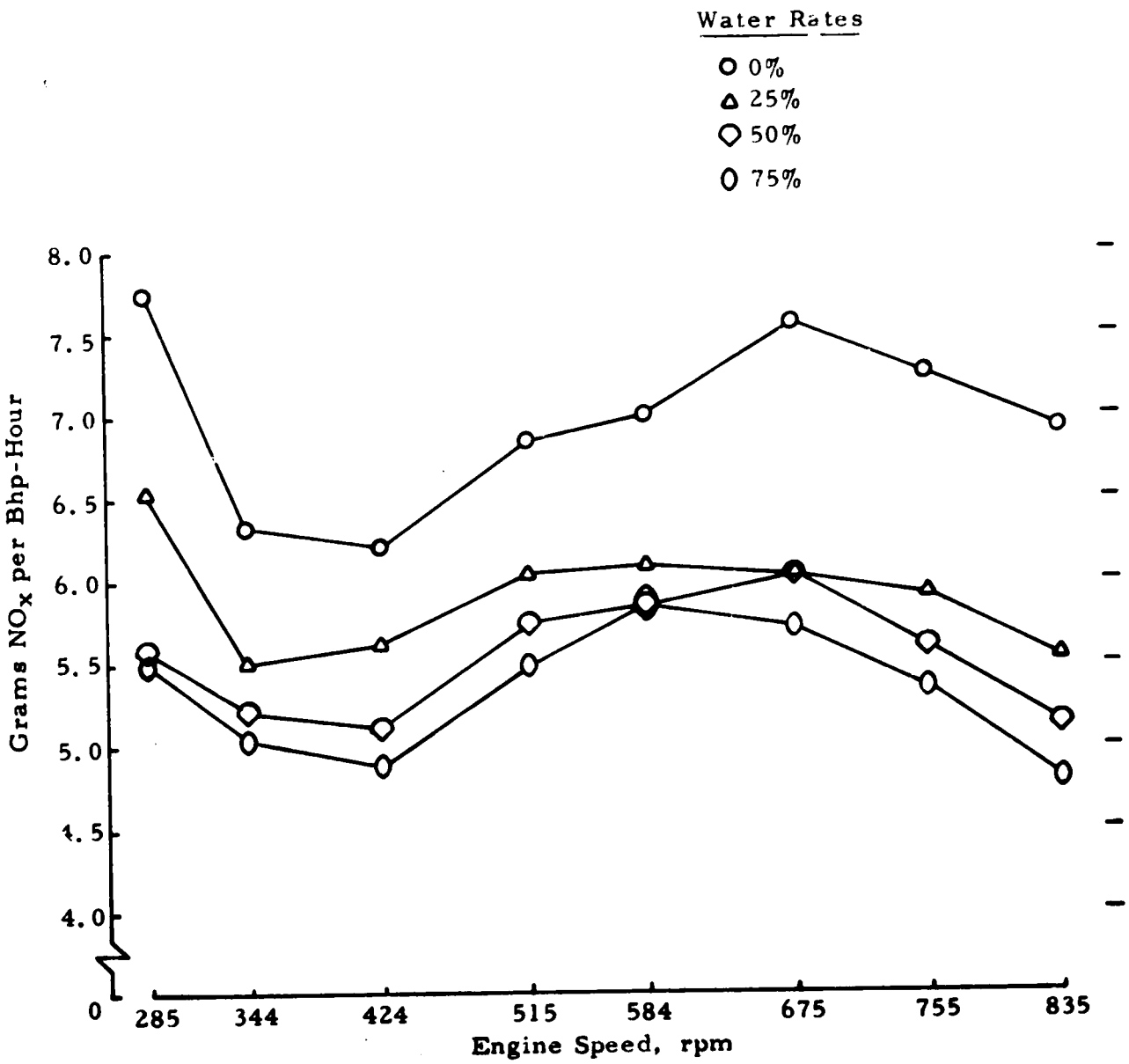

FIGURE C-30. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

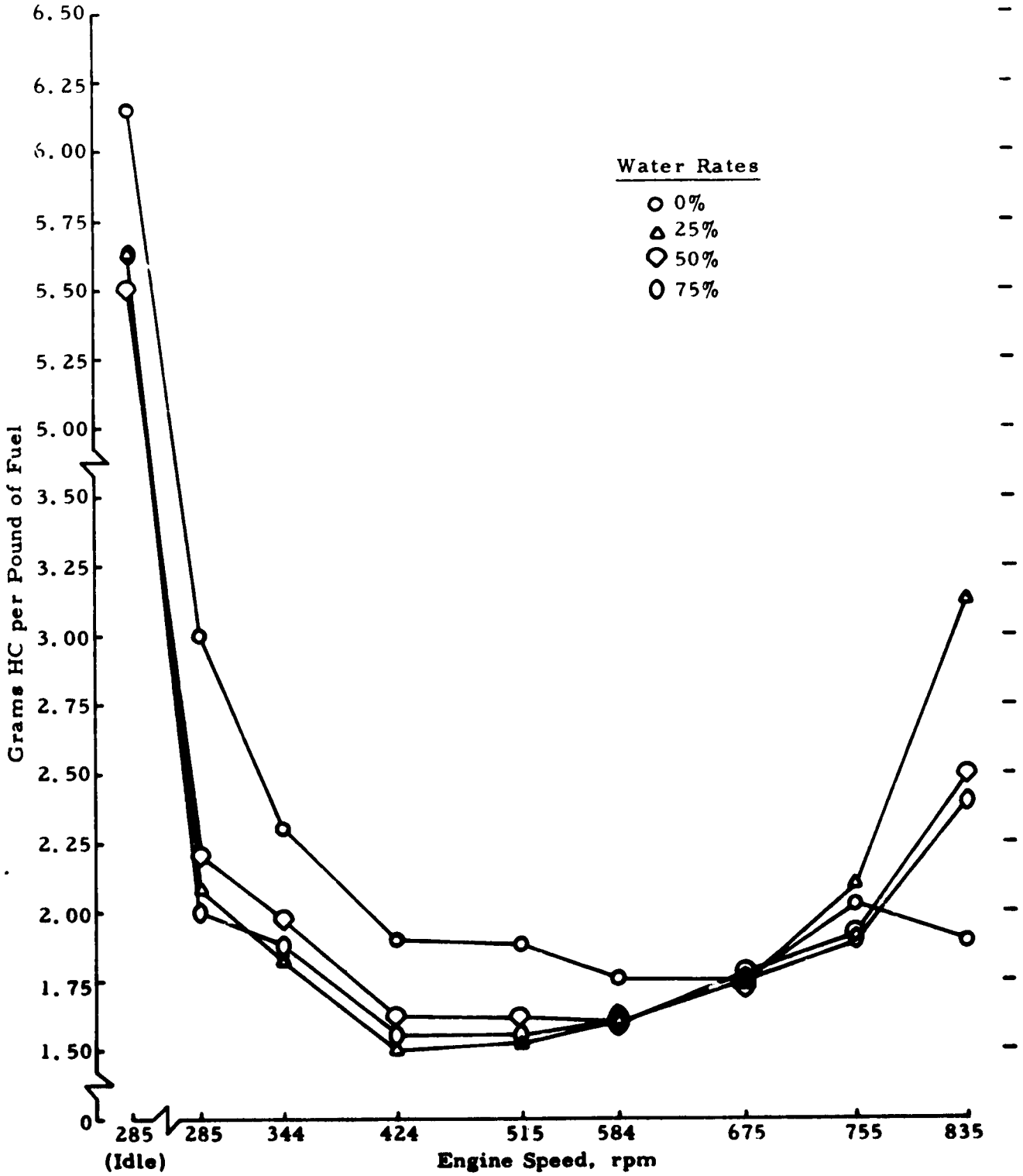

FIGURE C-31. MODAL FUEL SPECIFIC HC FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

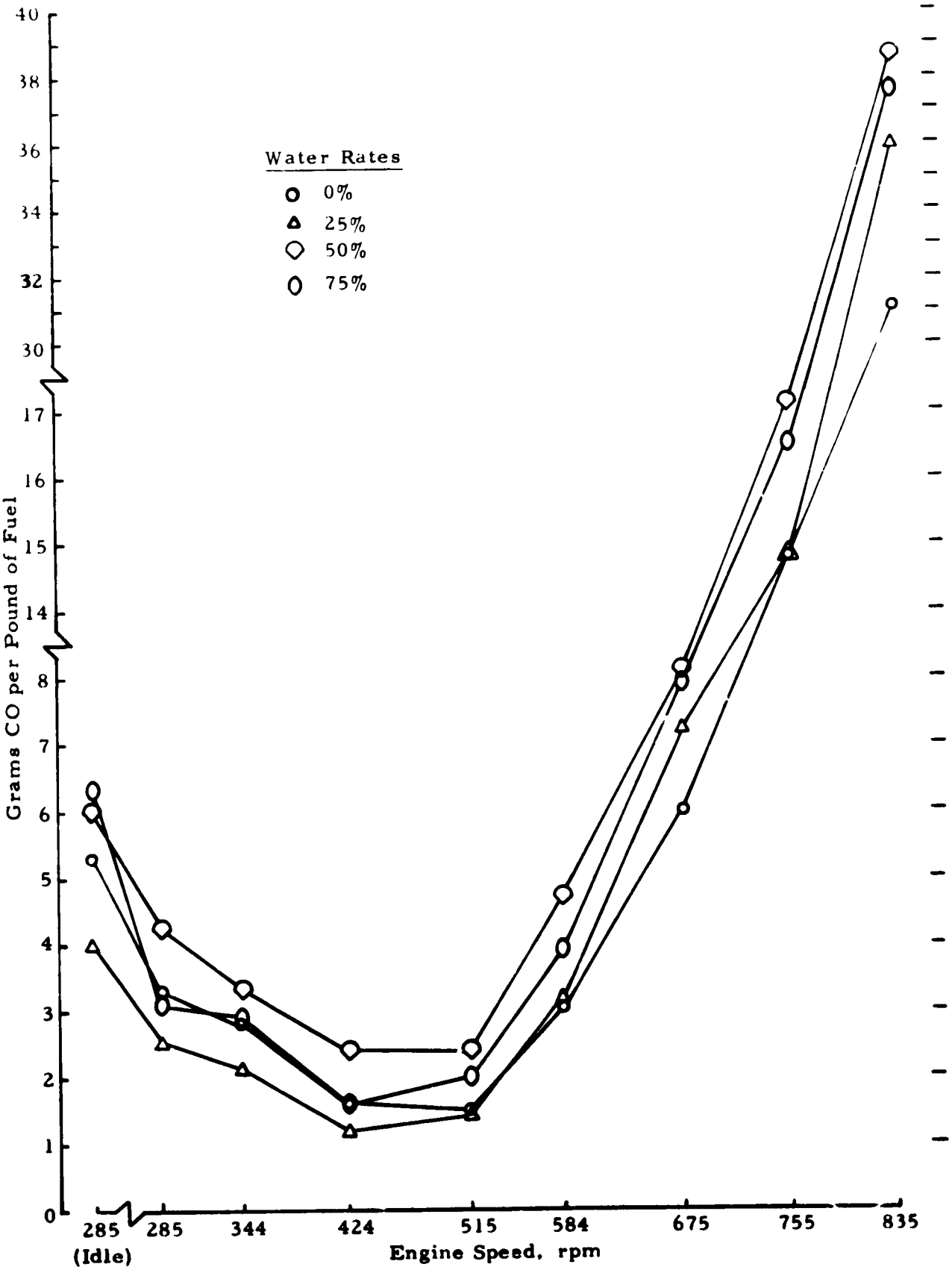

FIGURE C-32.MODAL FUEL SPECIFIC CO FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

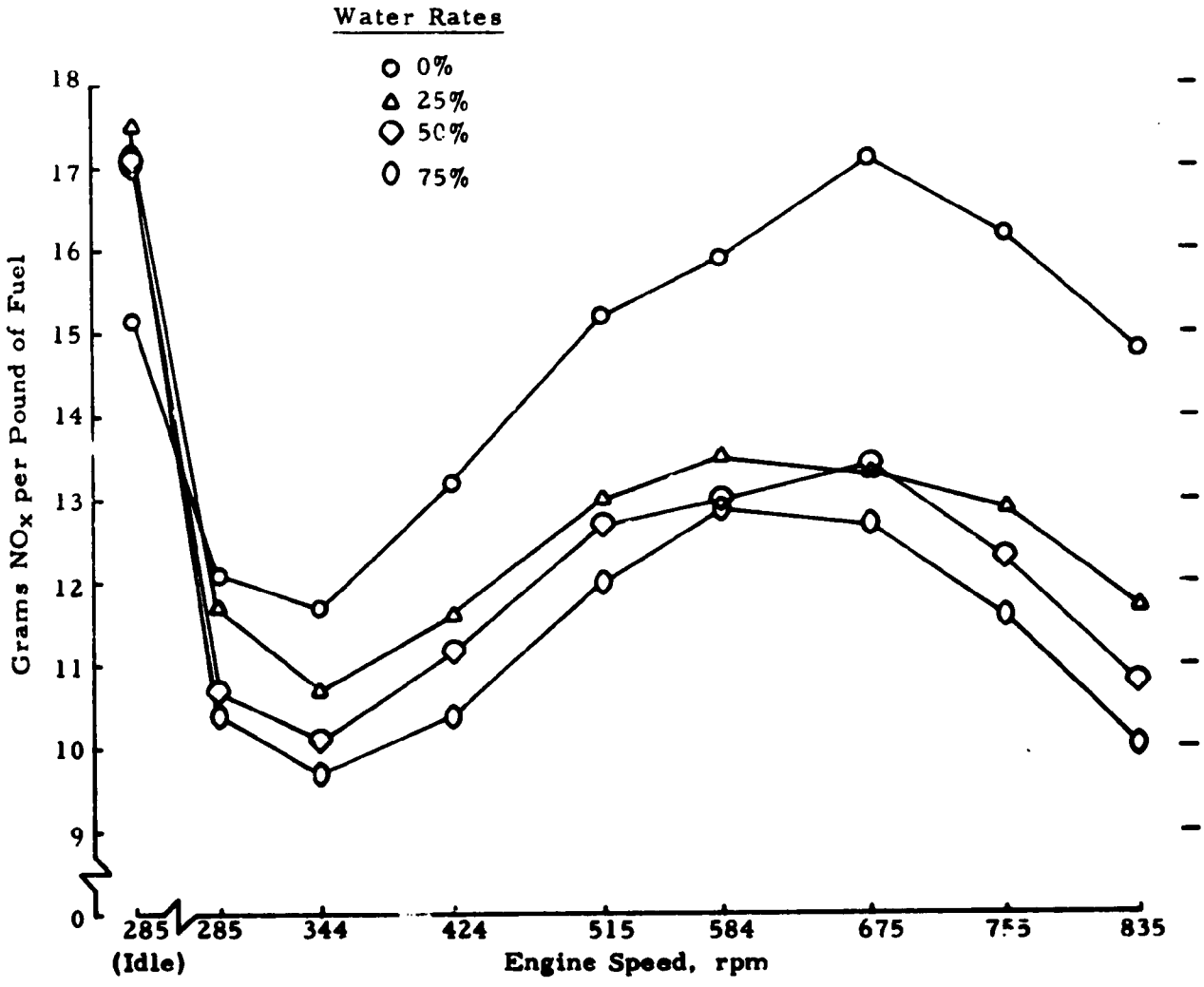

FIGURE C-33. MODAL FUEL SPECIFIC NO_x FOR VARIOUS WATER INDUCTION RATES--NEEDLE-VALVE INJECTORS AT RETARDED TIMING

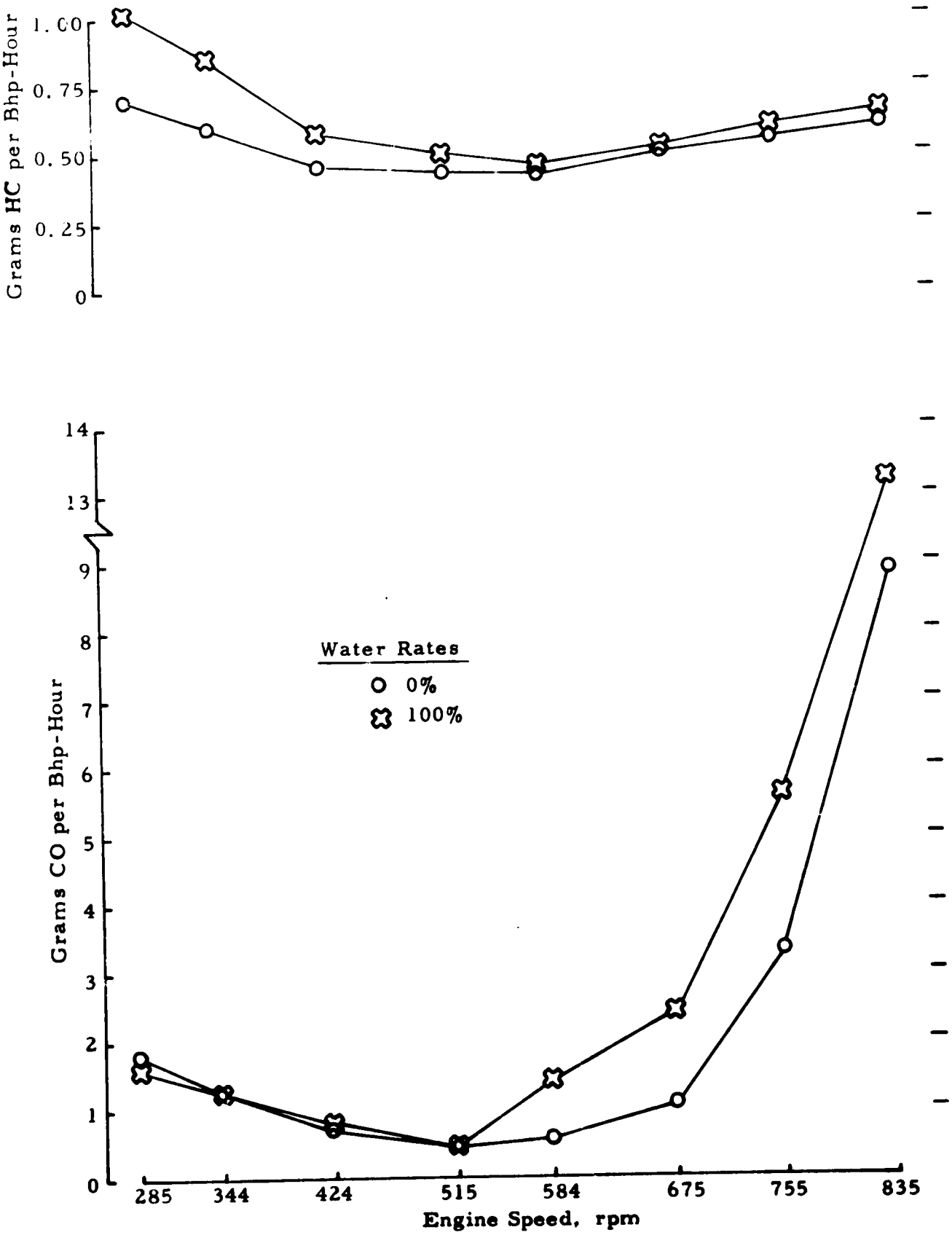

FIGURE C-34. MODAL BRAKE SPECIFIC HC AND CO FOR OPTIMUM WATER INDUCTION RATE--LOW-SAC INJECTORS AT RETARDED TIMING

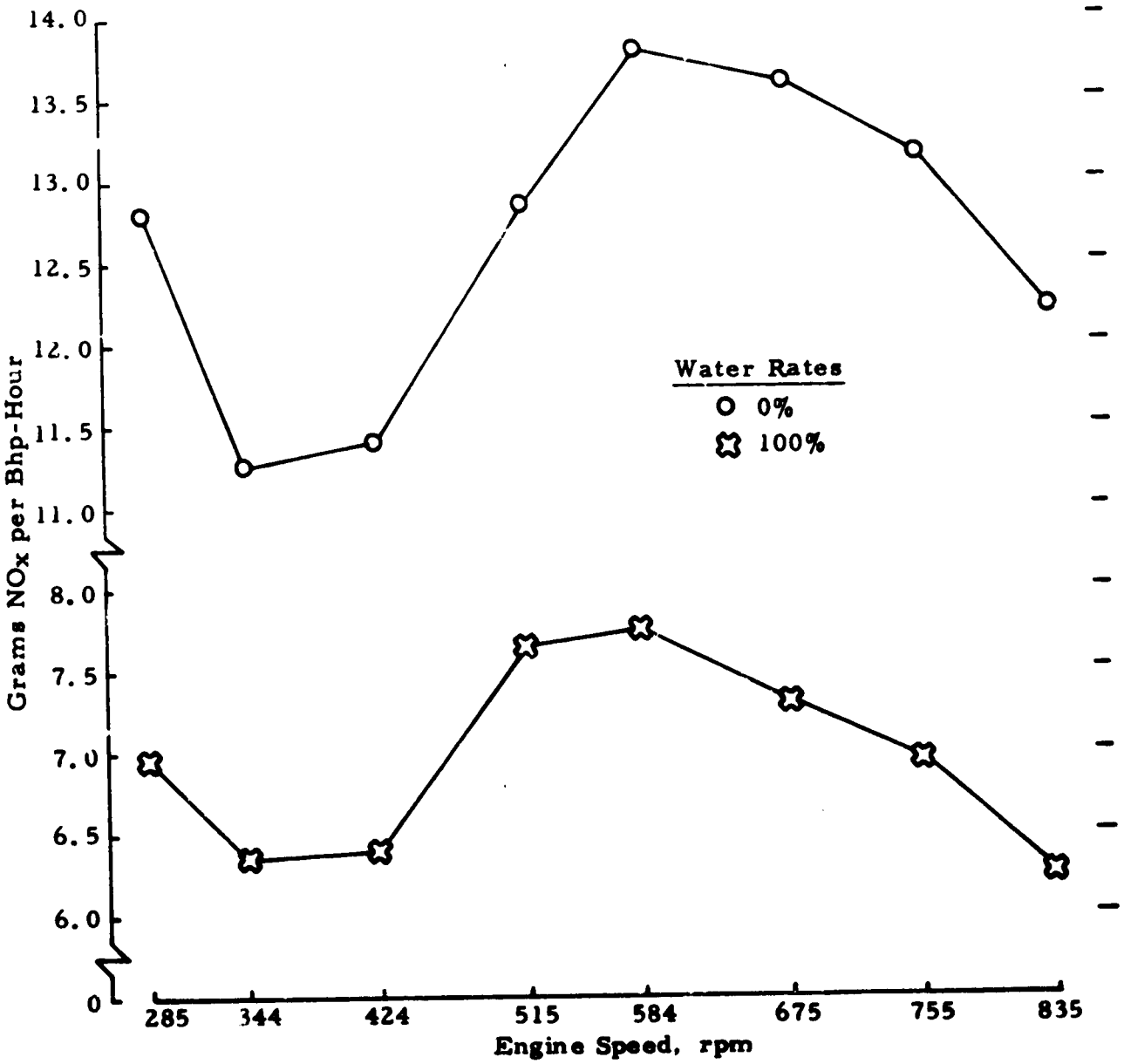

FIGURE C-35 . MODAL BRAKE SPECIFIC NO_x FOR OPTIMUM WATER INDUCTION RATE --LOW-SAC INJECTORS AT RETARDED TIMING

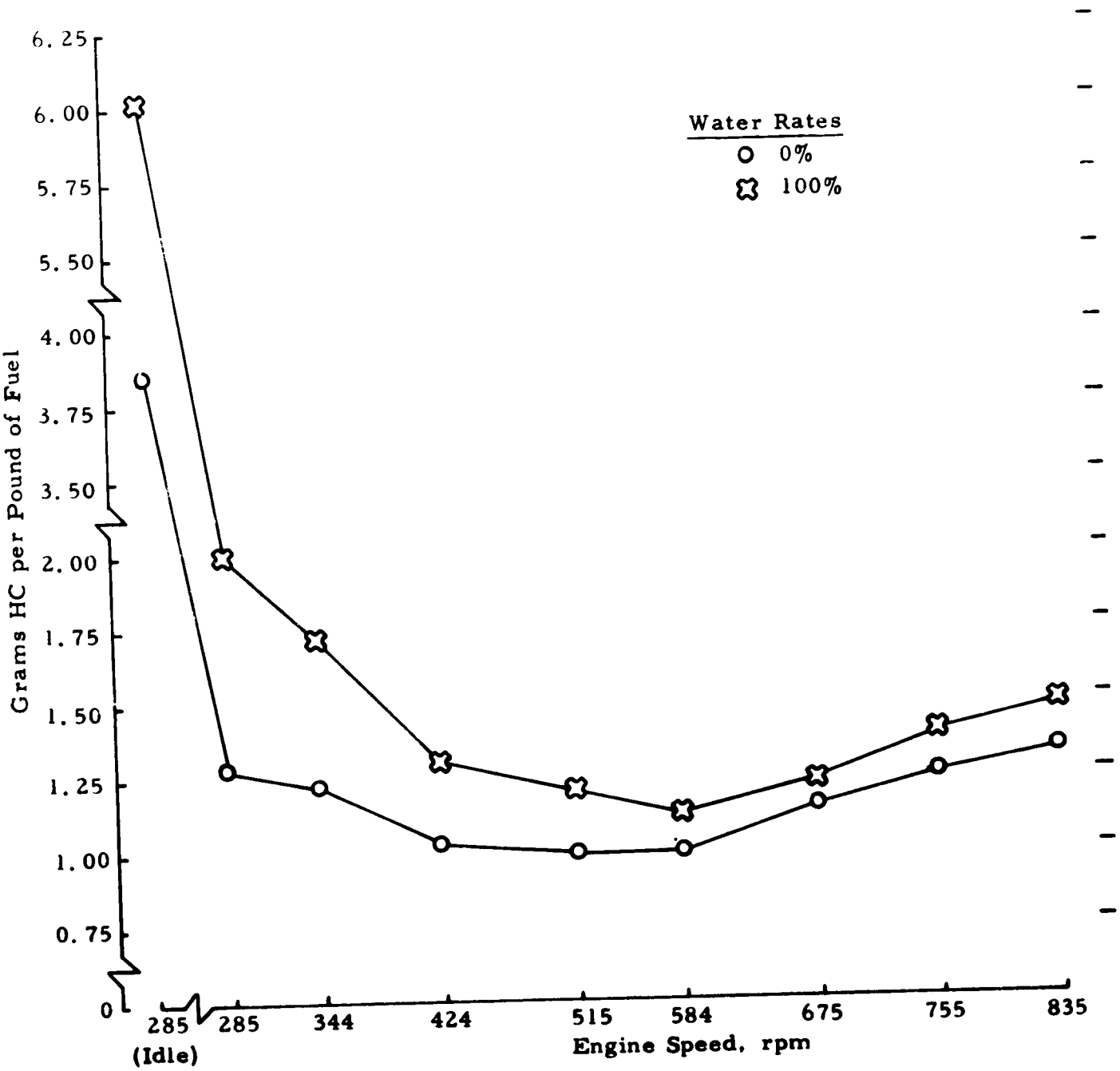

FIGURE C-36. MODAL FUEL SPECIFIC HC FOR OPTIMUM WATER INDUCTION RATE --LOW-SAC INJECTORS AT RETARDED TIMING

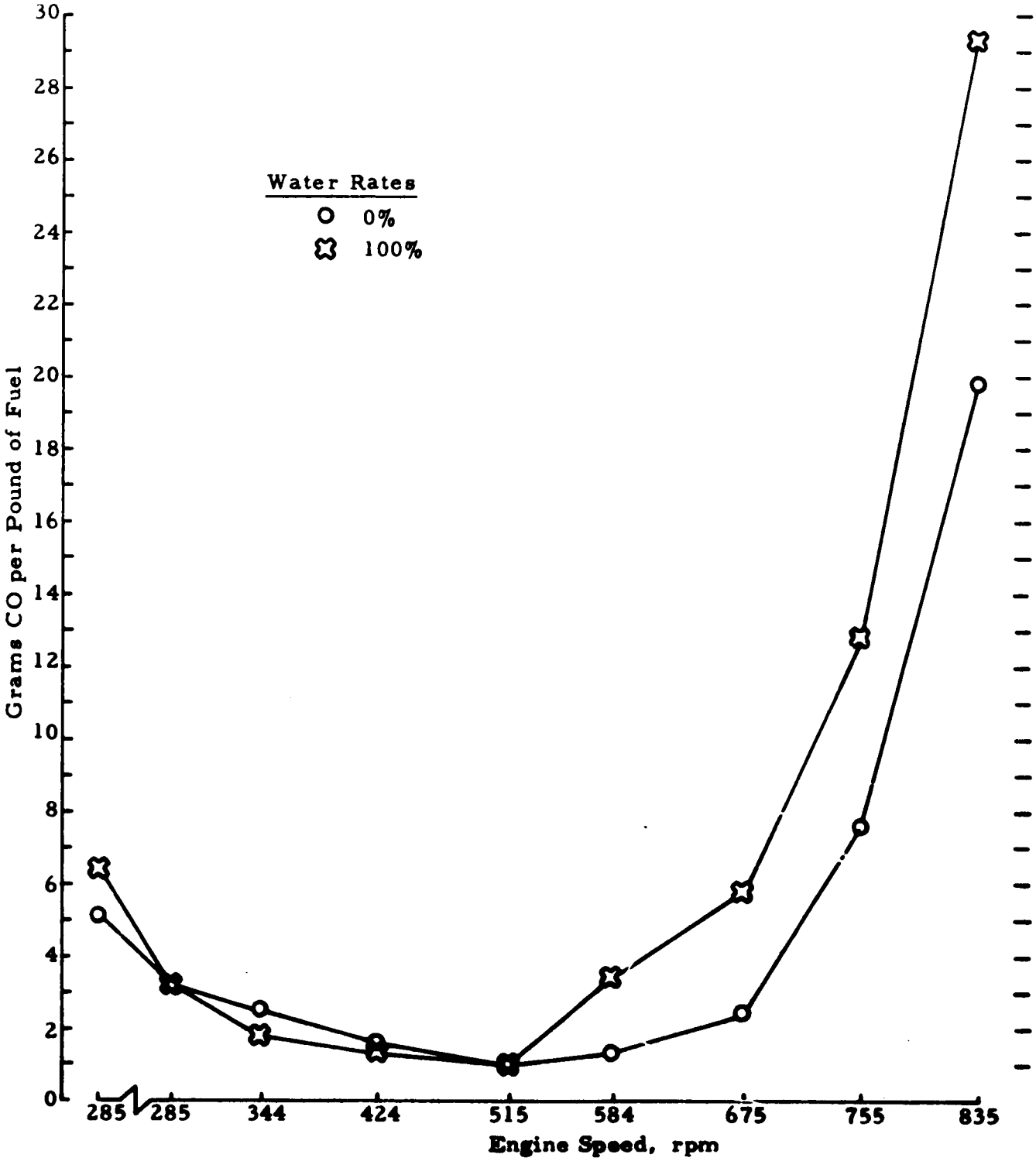

FIGURE C-37. MODAL FUEL SPECIFIC CO FOR OPTIMUM WATER INDUCTION RATE --LOW-SAC INJECTORS AT RETARDED TIMING

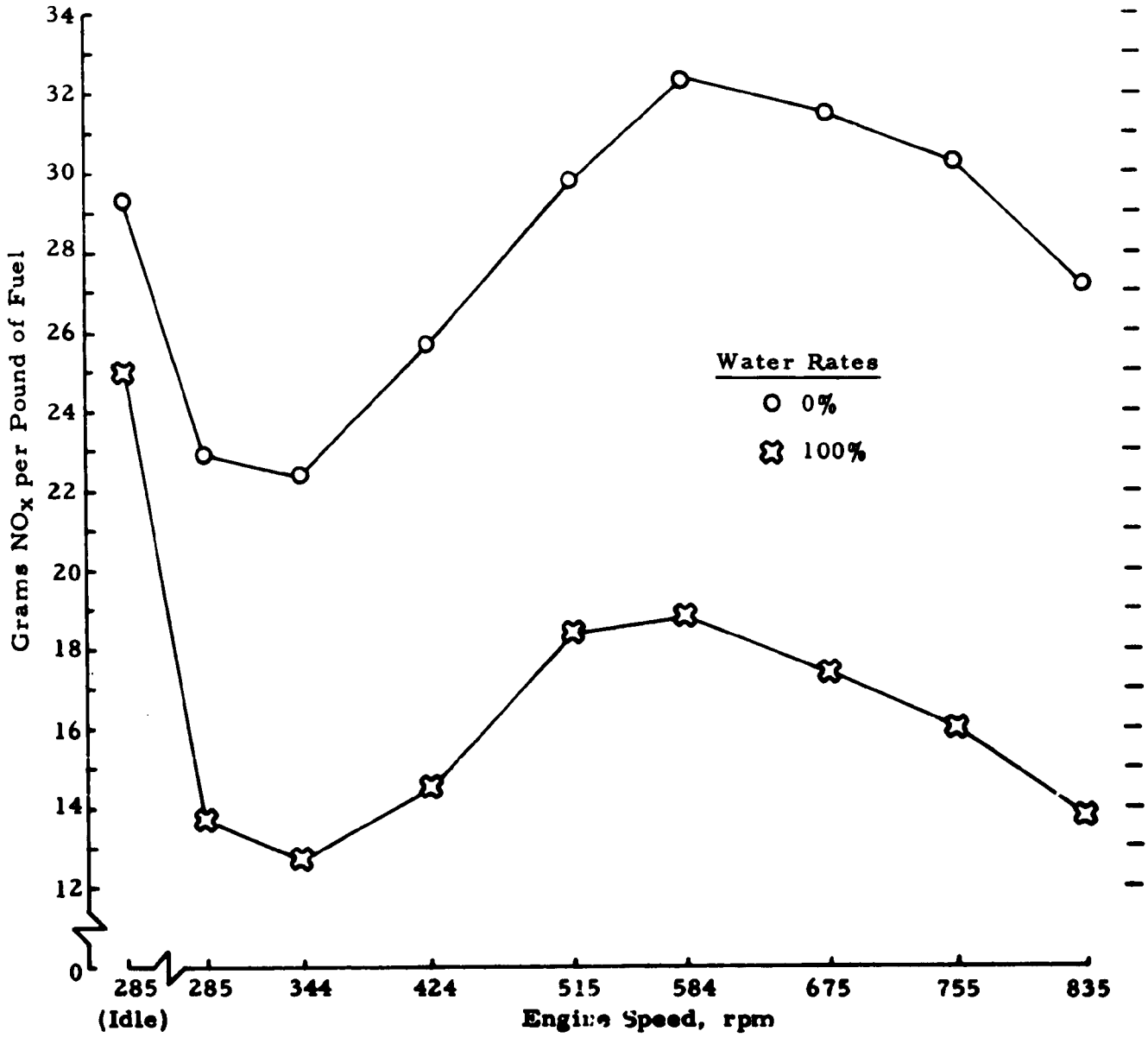

FIGURE C-38. MODAL FUEL SPECIFIC NO_x FOR OPTIMUM WATER INDUCTION RATE --LOW-SAC INJECTORS AT RETARDED TIMING

TABLE C 7. SUMMARY OF EMISSION CONCENTRATIONS FOR VARIOUS RATES OF AIR BOX BLEED-- NEEDLE INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	Air Box Bleed Rates* 0%	10%	20%	35%	50%
		HC Concentrations, ppmC				
1, 6, 11	285	142	117	99	86	109
2	285	128	114	106	84	136
3	344	139	128	116	92	152
4	424	154	148	130	110	182
5	515	176	166	144	130	216
7	584	184	196	168	152	229
8	675	232	232	196	174	180
9	755	272	262	206	154	126
10	835	288	438	266	176	94
		CO Concentrations, ppm				
1, 6, 11	285	59	54	34	48	63
2	285	66	71	71	65	117
3	344	77	56	82	65	110
4	424	63	52	75	69	147
5	515	58	52	86	96	354
7	584	82	131	171	383	1493
8	675	252	358	500	1025	3571
9	755	800	957	1329	2284	4278
10	835	1999	2386	3031	3758	5157
		NO_x Concentrations, ppm				
1, 6, 11	285	128	134	133	143	147
2	285	162	226	219	229	229
3	344	219	277	270	277	258
4	424	375	427	387	363	315
5	515	540	548	499	486	445
7	584	733	708	647	636	551
8	675	842	809	745	675	566
9	755	870	865	821	763	632
10	835	874	897	826	742	637

*Percent of air flow mass requirement per mode.

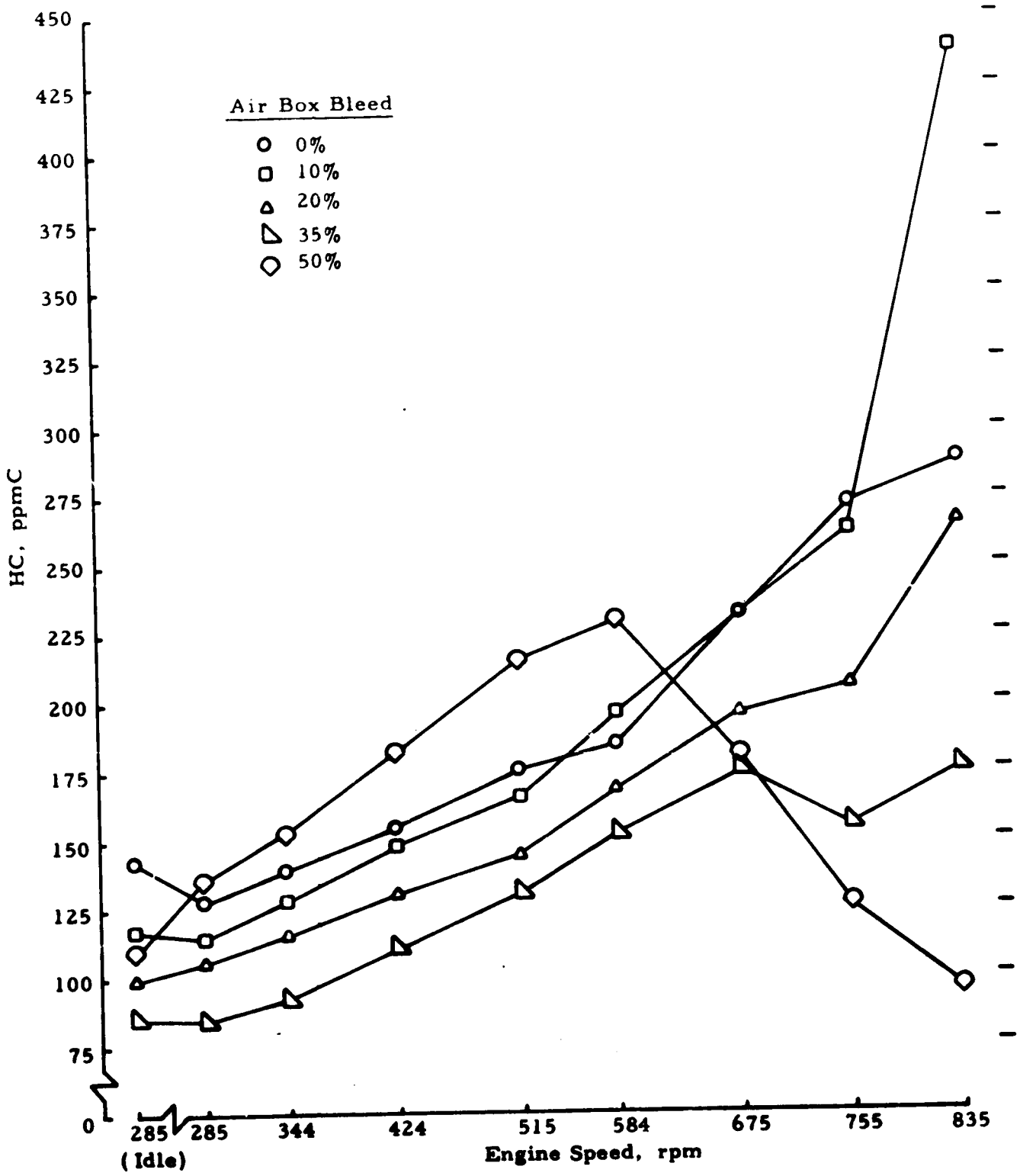

FIGURE C-39. MODAL HC CONCENTRATIONS FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

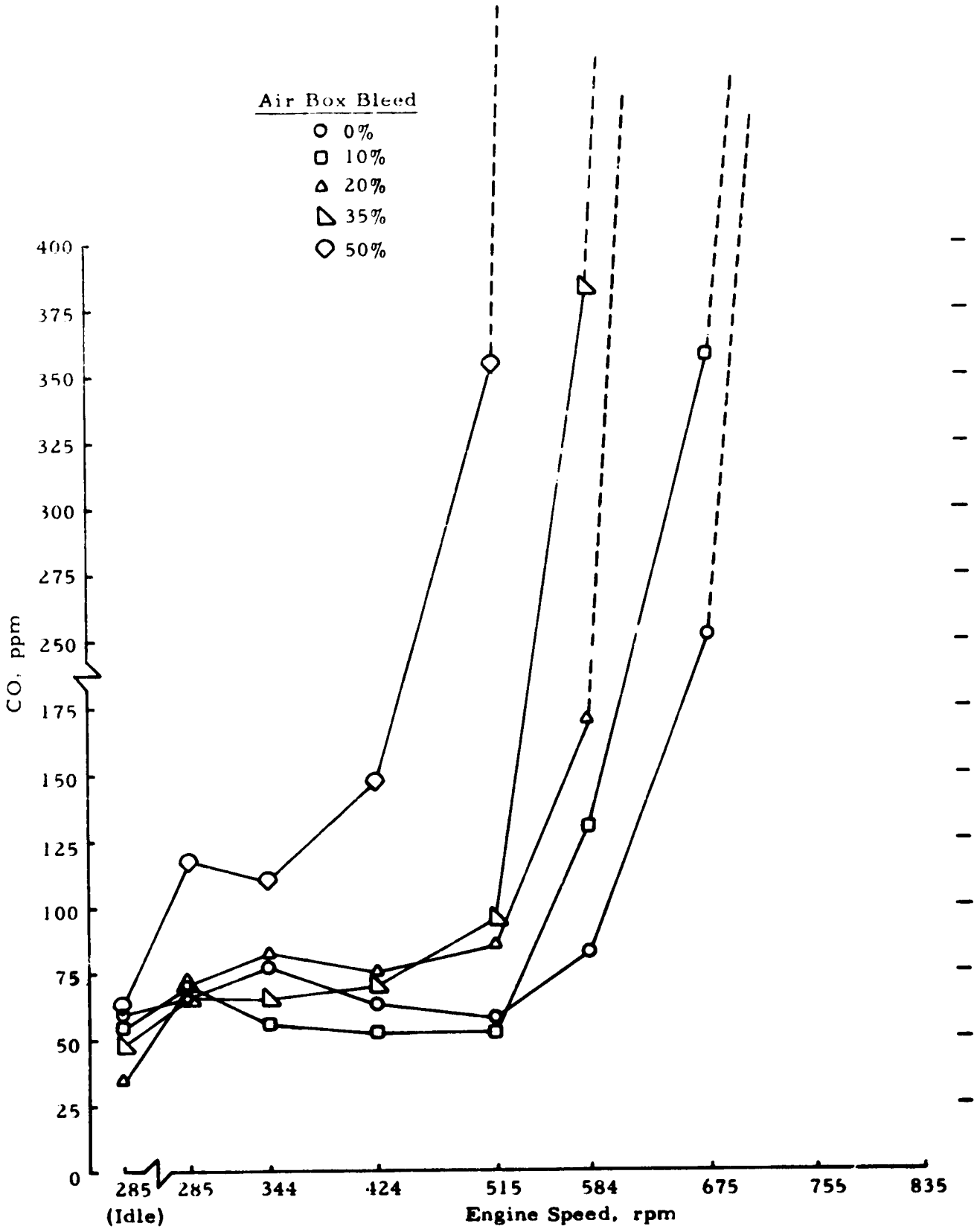

FIGURE C-40. MODAL CO CONCENTRATIONS FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

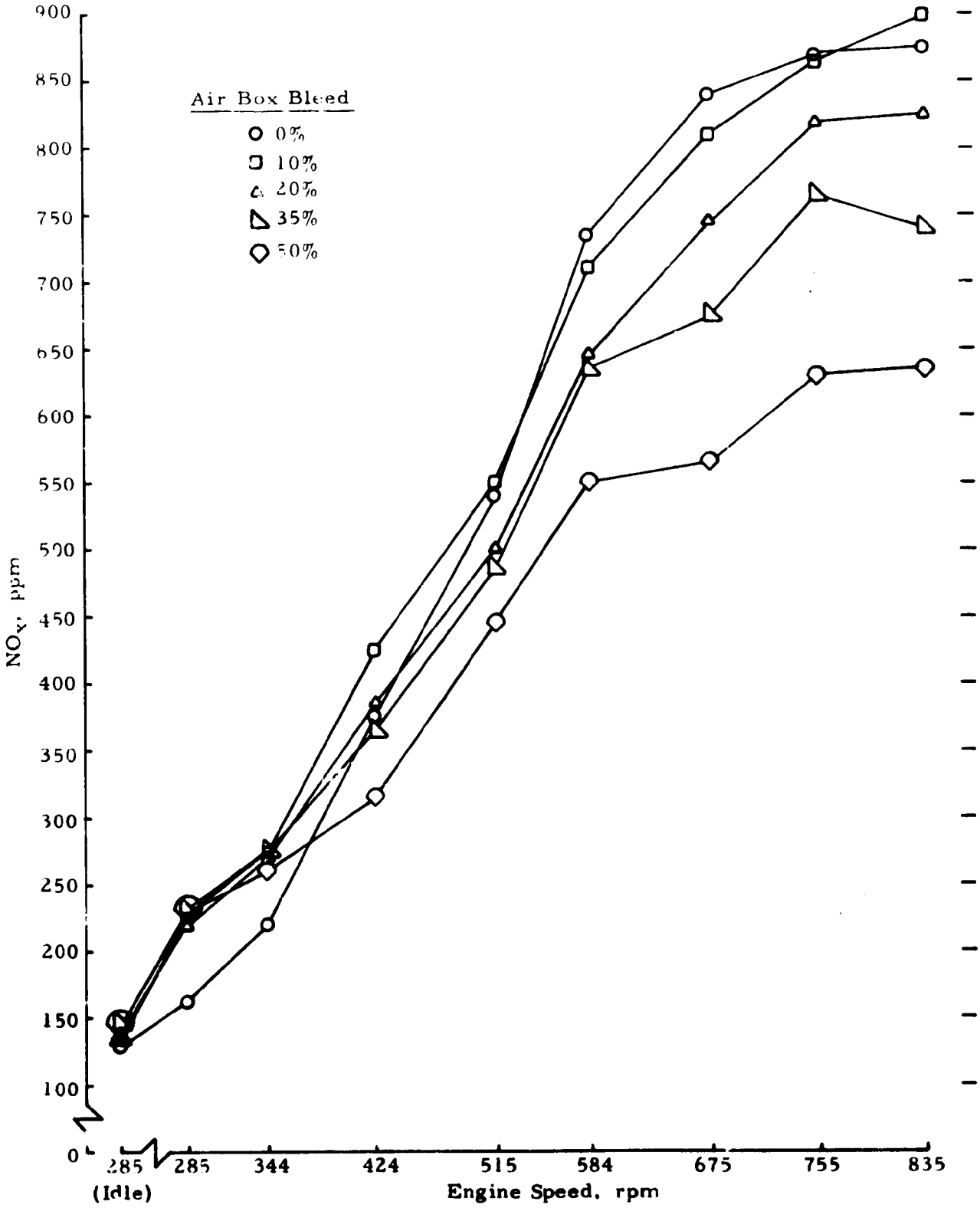

FIGURE C-41. MODAL NO_x CONCENTRATIONS FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-8. SUMMARY OF EMISSION CONCENTRATIONS FOR VARIOUS RATES OF AIR BOX BLEED--LOW-SAC INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	Air Box Bleed Rates* 0%	20%	35%
		HC Concentrations, ppmC		
1, 6, 11	285	68	83	69
2	285	49	80	72
3	344	61	96	78
4	424	72	116	88
5	515	81	122	102
7	584	93	152	122
8	675	125	182	126
9	755	151	176	100
10	835	181	178	101
		CO Concentrations, ppm		
1, 6, 11	285	45	44	63
2	285	63	77	94
3	344	63	88	93
4	424	54	92	120
5	515	42	120	351
7	584	65	258	1004
8	675	133	685	2087
9	755	459	1822	3456
10	835	1355	3539	3919
		NO_x Concentrations, ppm		
1, 6, 11	285	158	172	168
2	285	271	279	282
3	344	342	316	316
4	424	549	492	419
5	515	750	668	591
7	584	971	827	695
8	675	1058	941	728
9	755	1121	992	780
10	835	1136	934	809

*Percent of engine air flow mass requirement per mode.

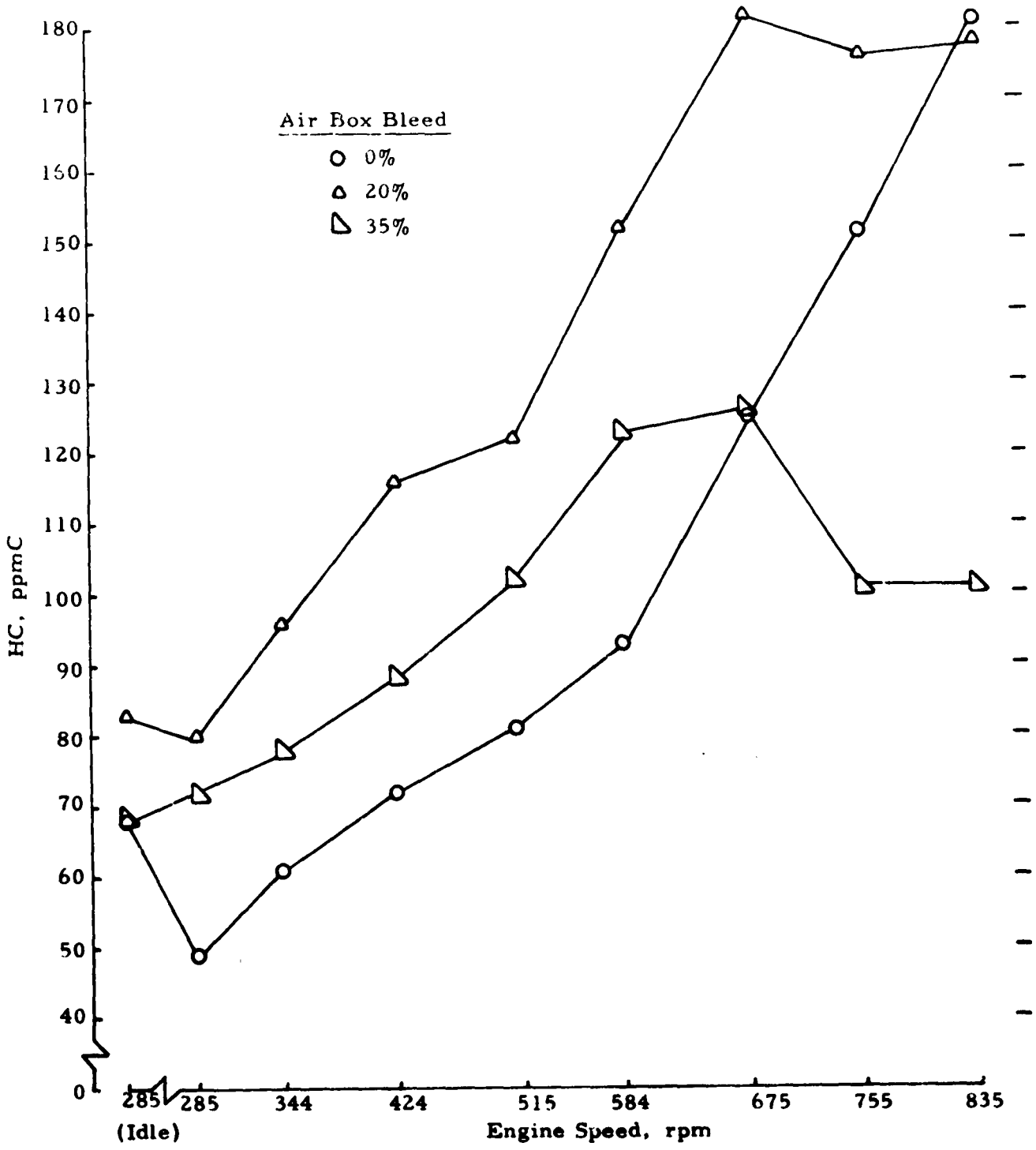

FIGURE C-42. MODAL HC CONCENTRATIONS FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

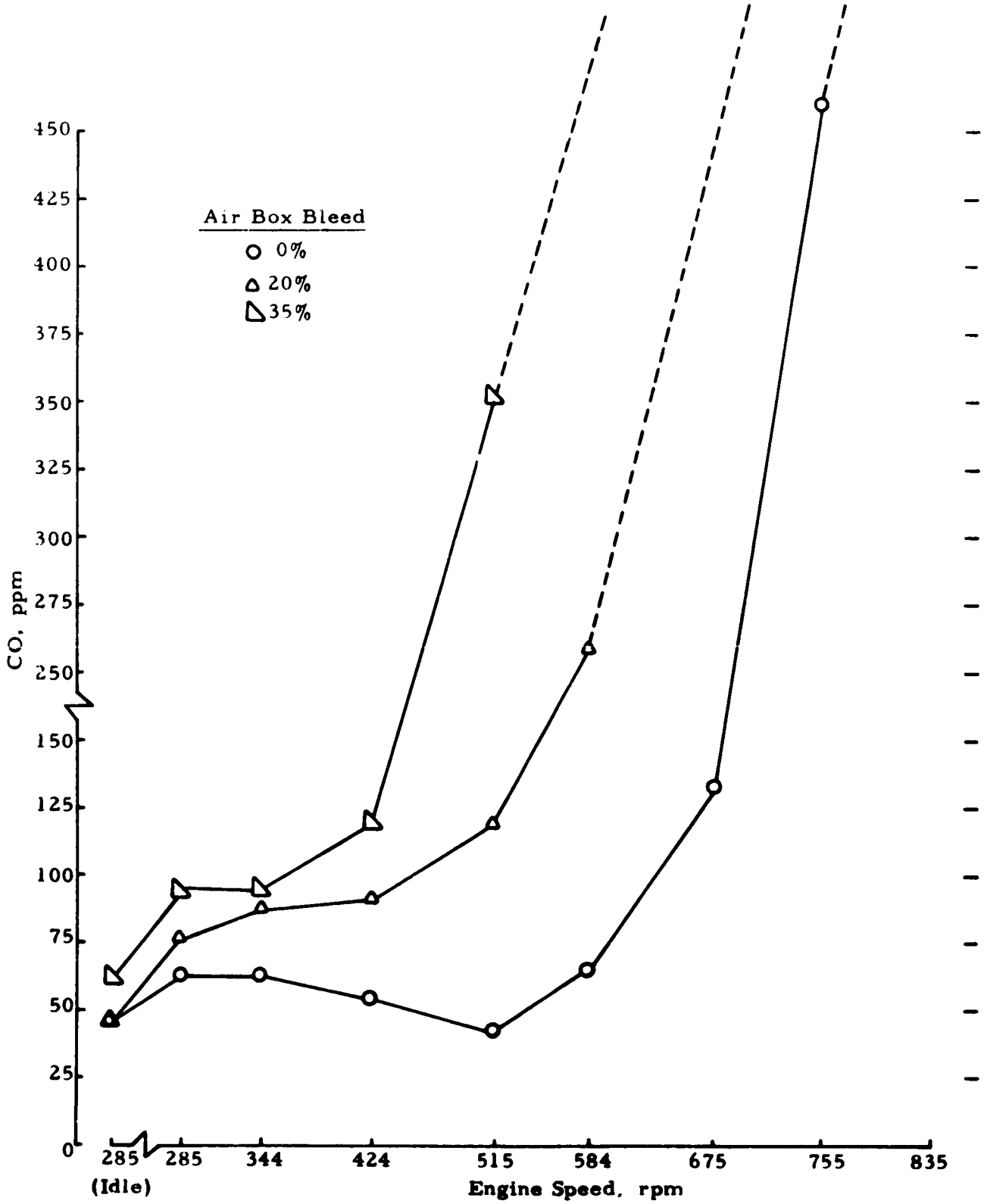

FIGURE C-43. MODAL CO CONCENTRATIONS FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

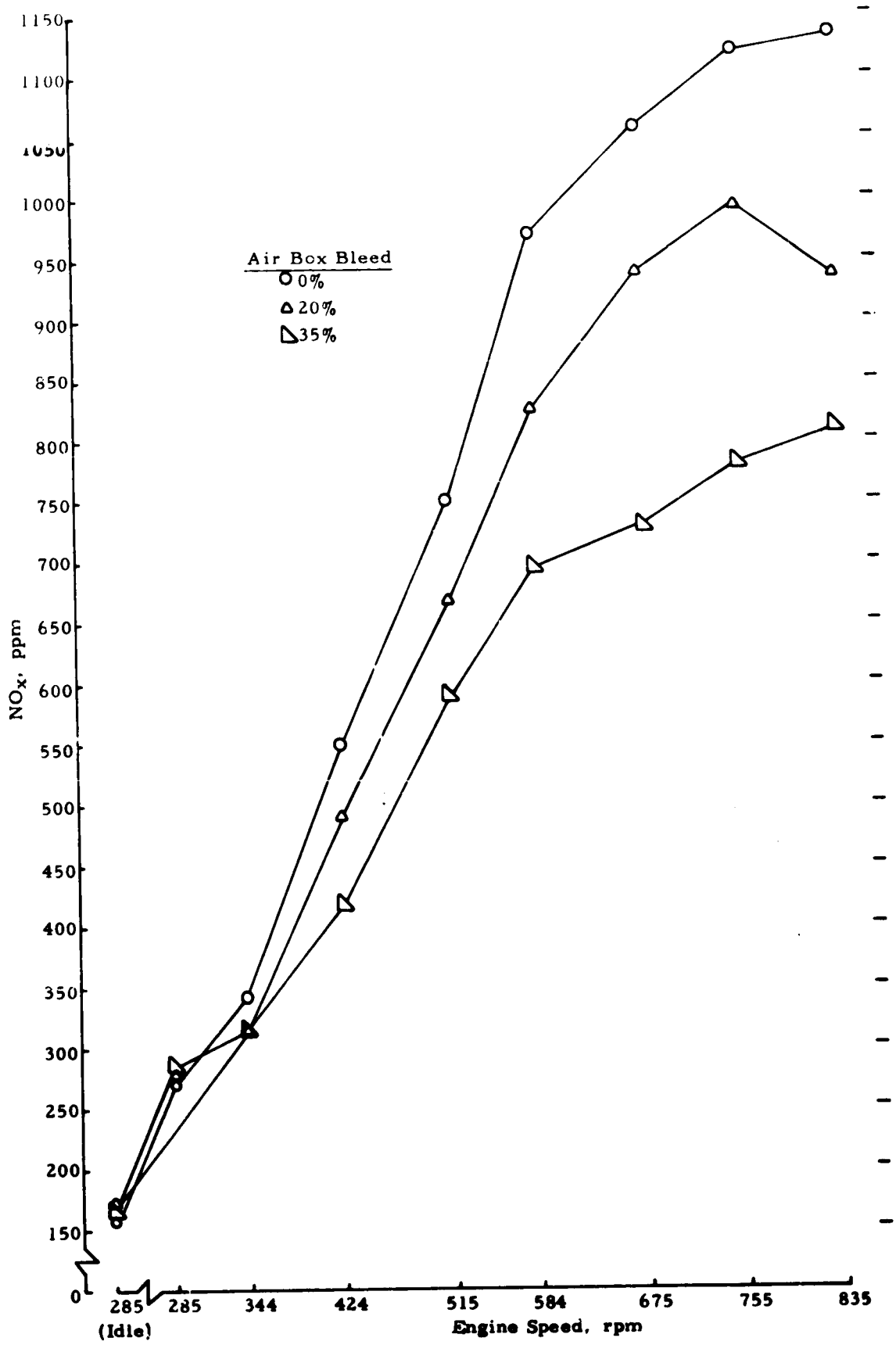

FIGURE C-44. MODAL NO_x CONCENTRATIONS FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE C-9. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, STANDARD TIMING, AND AIR BOX BLEED

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Air Bleed*				
1, 6, 11	285	-	-	-	5.60	4.60	16.52
2	285	3.51	3.70	14.53	3.54	3.65	14.61
3	344	1.80	2.06	9.22	2.68	3.05	13.79
4	424	1.06	0.85	8.47	2.07	1.68	16.54
5	515	0.94	0.61	9.41	1.96	1.28	19.69
7	584	0.81	0.70	10.17	1.71	1.53	22.27
8	675	0.89	1.92	10.52	1.94	4.20	23.00
9	755	0.93	5.46	9.75	2.03	11.89	21.28
10	835	0.92	12.70	9.12	1.92	26.55	19.06
			10% Air Bleed*				
1, 6, 11	285	-	-	-	5.94	5.52	22.07
2	285	1.46	1.81	9.54	2.59	3.20	16.84
3	344	1.18	1.08	8.38	2.28	2.06	16.15
4	424	0.86	0.60	8.17	1.84	1.29	17.37
5	515	0.82	0.51	8.83	1.77	1.10	19.18
7	584	0.78	1.04	9.26	1.74	2.33	21.30
8	675	0.84	2.57	9.52	1.84	5.64	20 92
9	755	0.86	6.26	9.28	1.90	13.76	20.40
10	835	1.28	13.85	8.54	2.76	30.02	18.52
			20% Air Bleed*				
1, 6, 11	285	-	-	-	4.80	3.19	21.44
2	285	1.24	1.64	8.39	2.26	3.00	15.28
3	344	0.98	1.40	7.48	1.90	2.70	14.44
4	424	0.70	0.80	6.78	1.45	1.68	14.13
5	515	0.66	0.78	7.44	1.40	1.66	15.84
7	584	0.62	1.26	7.86	1.36	2.76	17.18
8	675	0.65	3.30	8.06	1.40	7.14	17.46
9	755	0.63	8.08	8.20	1.34	17.22	17.48
10	835	0.76	17.22	7.70	1.54	34.85	15.60
			35% Air Bleed*				
1, 6, 11	285	-	-	-	3.82	4.23	20.77
2	285	0.84	1.40	7.49	1.54	2.58	13.78
3	344	0.68	1.04	6.69	1.33	2.03	13.14
4	424	0.52	0.64	5.58	1.07	1.34	11.55
5	515	0.49	0.72	5.93	1.04	1.53	12.67
7	584	0.49	2.45	6.67	1.02	5.10	13.90
8	675	0.50	5.89	6.37	1.07	12.51	13.55
9	755	0.40	12.01	6.60	0.85	25.08	13.77
10	835	0.45	19.04	6.23	0.87	36.92	12.08
			50% Air Bleed*				
1, 6, 11	285	-	-	-	4.05	4.61	17.90
2	285	1.14	1.93	6.22	2.08	3.54	11.41
3	344	0.92	1.31	5.08	1.76	2.53	9.77
4	424	0.70	1.13	3.98	1.37	2.20	7.76
5	515	0.69	2.25	4.65	1.41	4.58	9.46
7	584	0.60	7.81	4.73	1.23	15.96	9.68
8	675	0.46	17.97	4.68	0.91	35.90	9.37
9	755	0.28	18.83	4.58	0.56	37.35	9.07
10	835	0.21	22.68	4.60	0.37	40.37	8.20

*Percent of air flow mass requirement per mode.

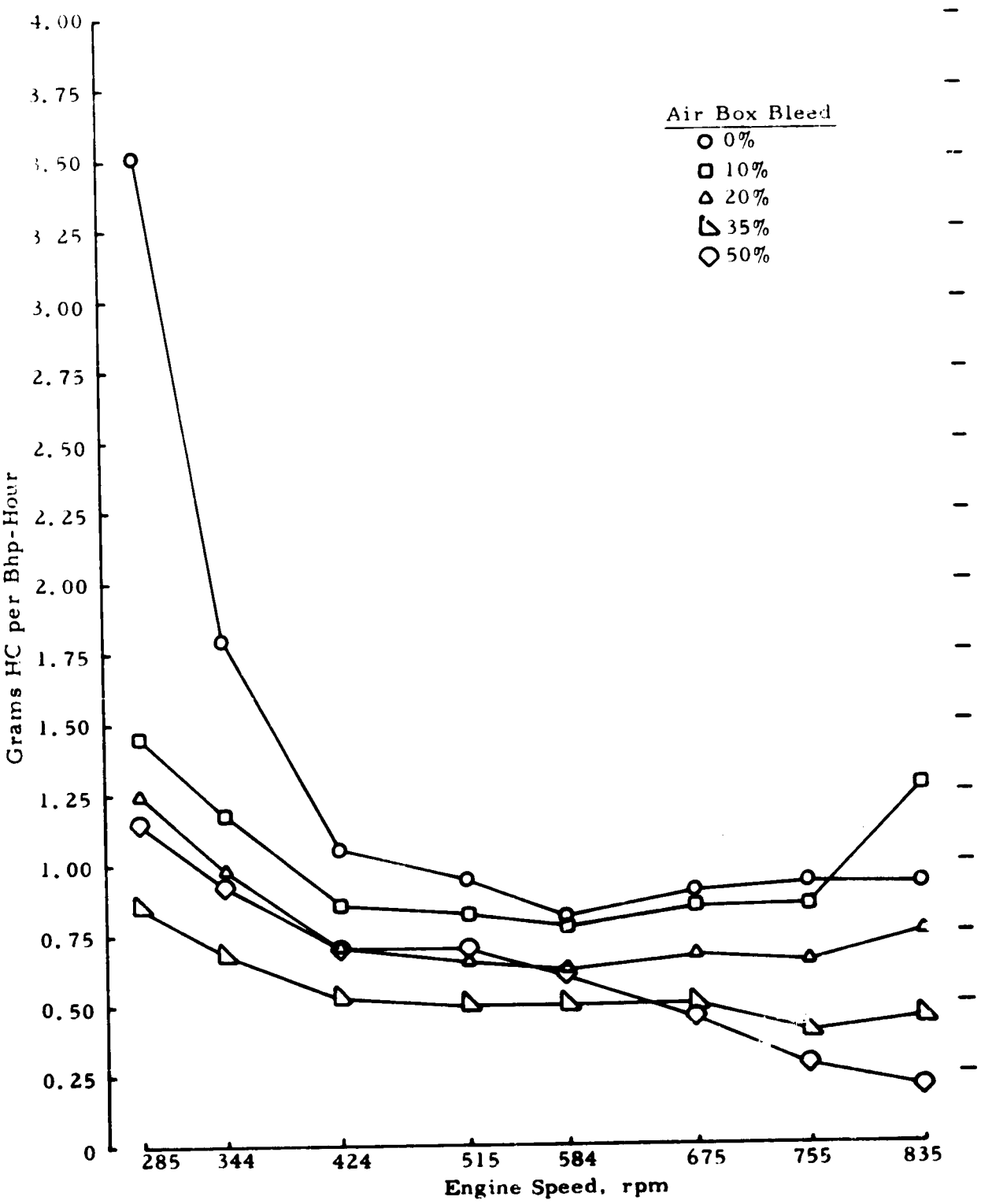

FIGURE C-45. MODAL BRAKE SPECIFIC HC FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

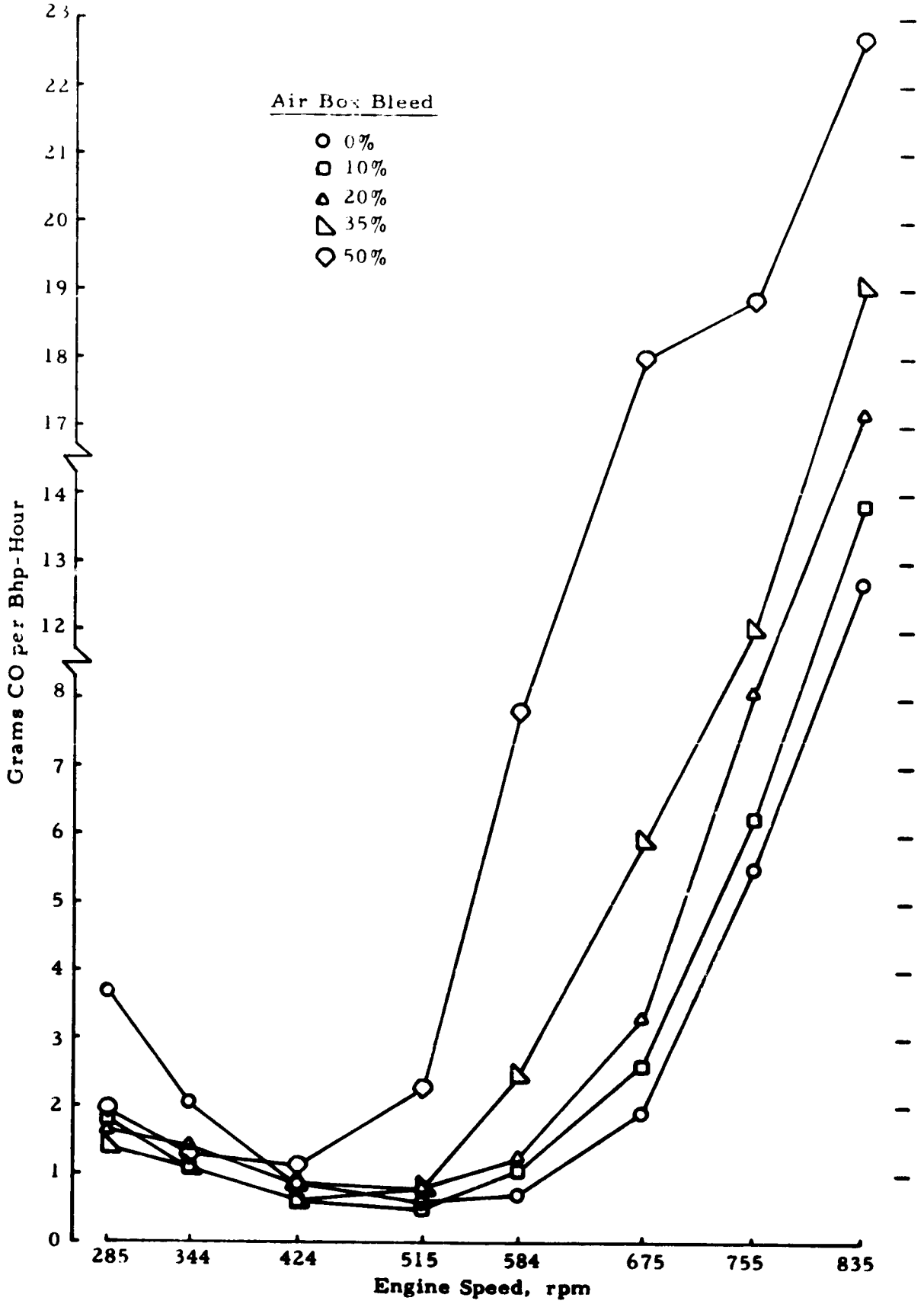

FIGURE C-46. MODAL BRAKE SPECIFIC CO FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

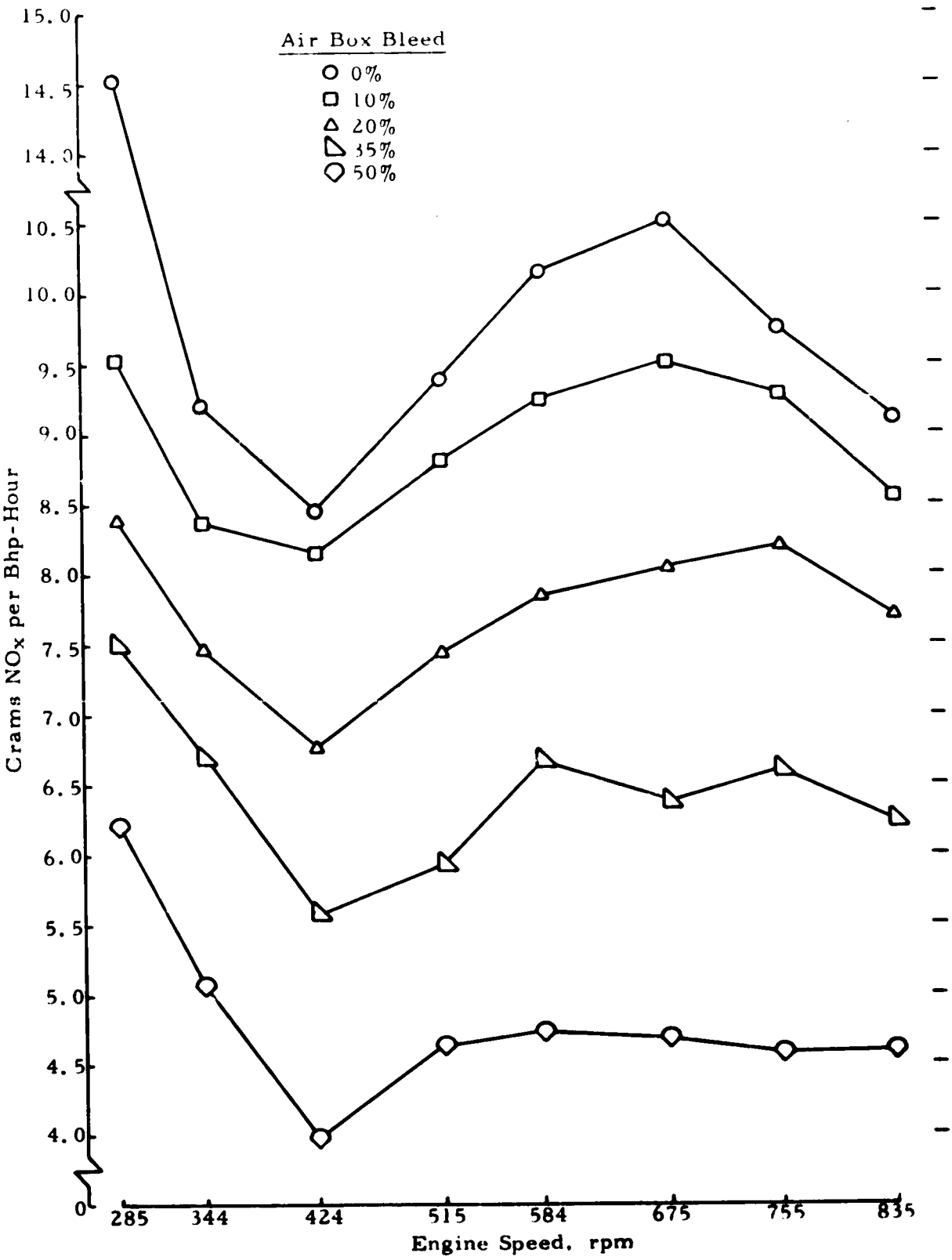

FIGURE C-47. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

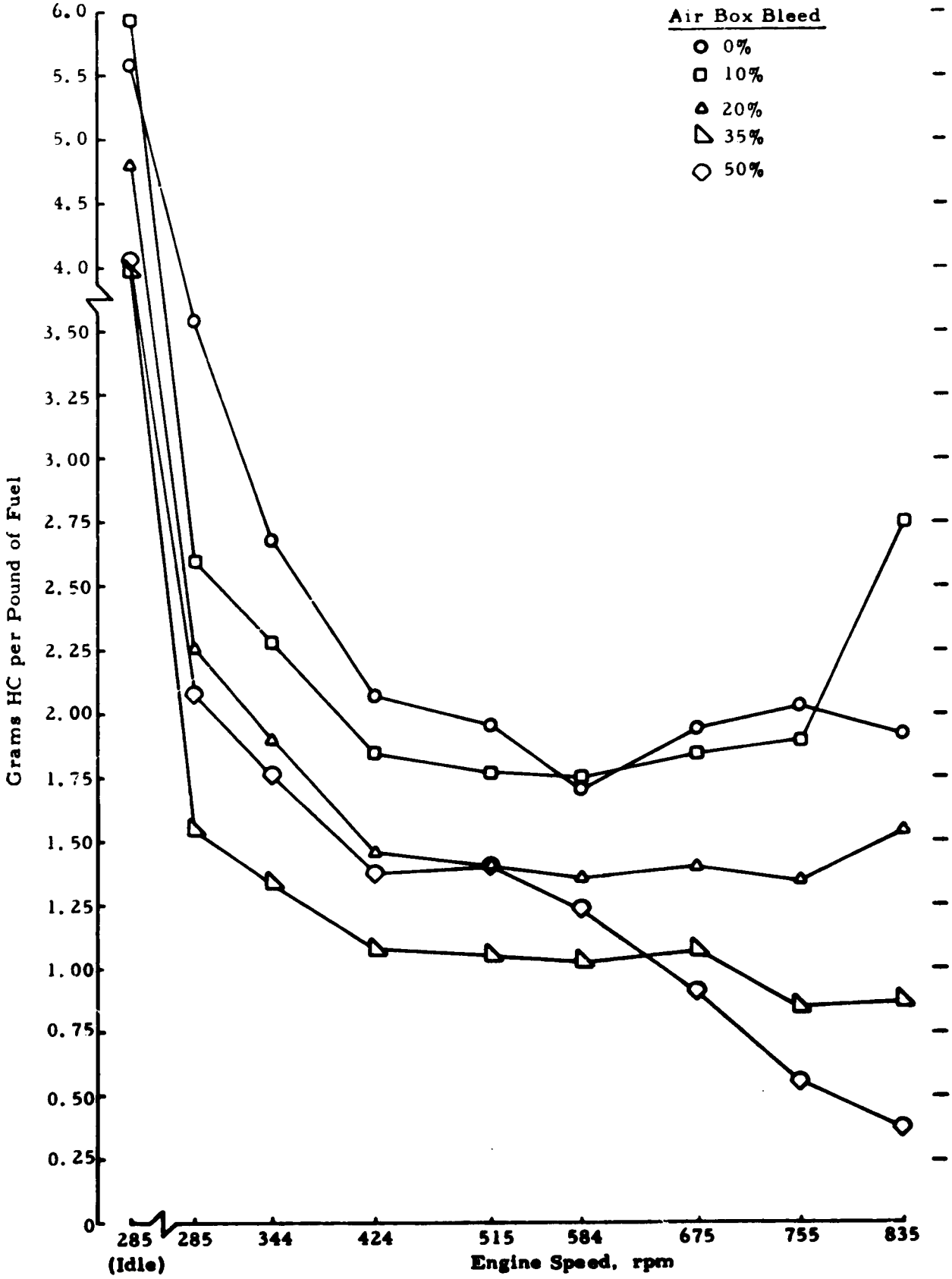

FIGURE C-48. MODAL FUEL SPECIFIC HC FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

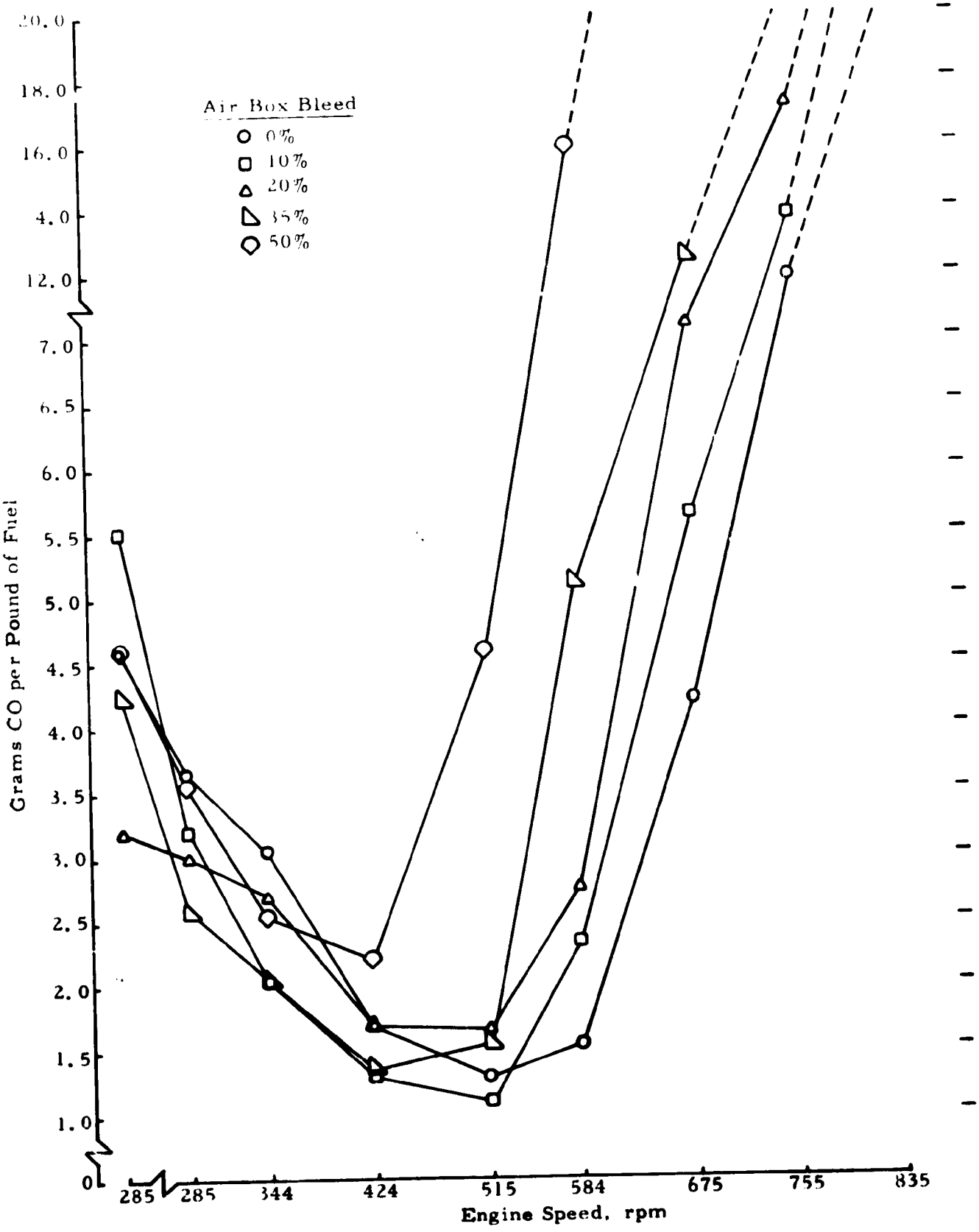

FIGURE C-49. MODAL FUEL SPECIFIC CO FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

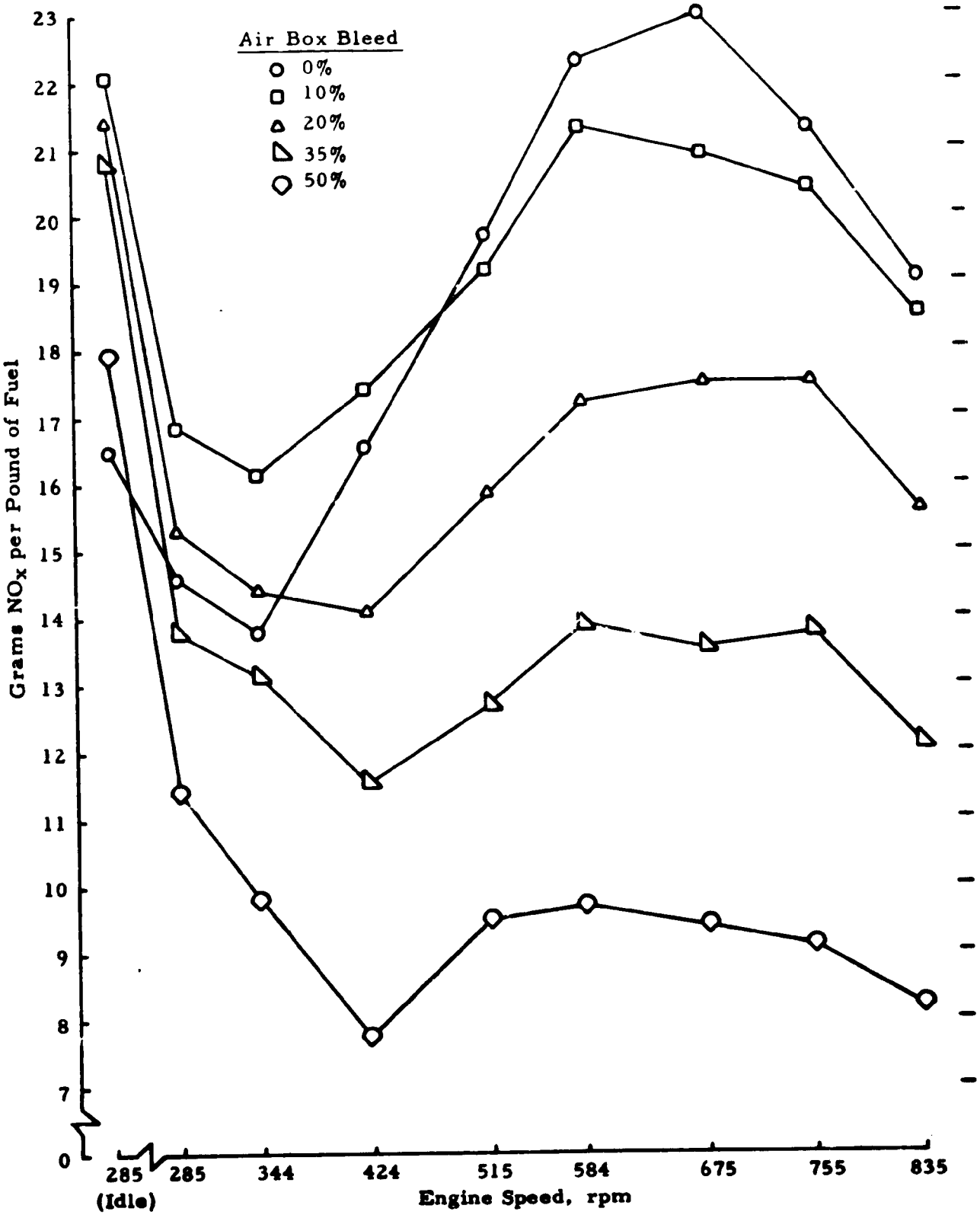

FIGURE C-50. MODAL FUEL SPECIFIC NO_x FOR VARIOUS AIR BOX BLEED RATES--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-10. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR LOW-SAC INJECTORS, STANDARD TIMING, AND AIR BOX BLEED

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Air Bleed*				
1, 6, 11	285	-	-	-	3.86	5.08	29.32
2	285	0.71	1.81	12.79	1.28	3.24	22.92
3	344	0.61	1.25	11.23	1.22	2.49	22.38
4	424	0.46	0.69	11.41	1.03	1.55	25.72
5	515	0.41	0.44	12.87	0.99	1.02	29.84
7	584	0.42	0.56	13.82	0.99	1.31	32.29
8	675	0.49	1.04	13.61	1.14	2.40	31.47
9	755	0.54	3.28	13.16	1.24	7.56	30.27
10	835	0.60	8.86	12.19	1.32	19.75	27.19
			20% Air Bleed*				
1, 6, 11	285	-	-	-	4.26	4.42	28.56
2	285	0.94	1.76	10.61	1.78	3.38	20.23
3	344	0.74	1.35	7.96	1.54	2.79	16.54
4	424	0.59	0.93	8.13	1.33	2.10	18.46
5	515	0.53	1.04	9.44	1.19	2.33	21.24
7	584	0.54	1.83	9.63	1.24	4.18	21.98
8	675	0.57	4.28	9.66	1.30	9.75	21.99
9	755	0.52	10.87	9.74	1.16	23.90	21.41
10	835	0.51	20.19	8.76	1.05	41.72	18.10
			35% Air Bleed*				
1, 6, 11	285	-	-	-	2.93	5.37	23.13
2	285	0.62	1.61	7.96	1.20	3.10	15.37
3	344	0.47	1.09	6.12	1.04	2.52	13.79
4	424	0.39	1.05	6.57	0.83	2.25	12.91
5	515	0.36	2.44	6.74	0.80	5.50	15.16
7	584	0.36	5.95	6.78	0.81	13.18	14.99
8	675	0.34	11.29	6.47	0.74	24.41	13.98
9	755	0.26	18.19	6.74	0.53	37.47	13.90
10	835	0.25	19.66	6.66	0.48	37.57	12.74

*Percent of engine air flow mass requirement per mode.

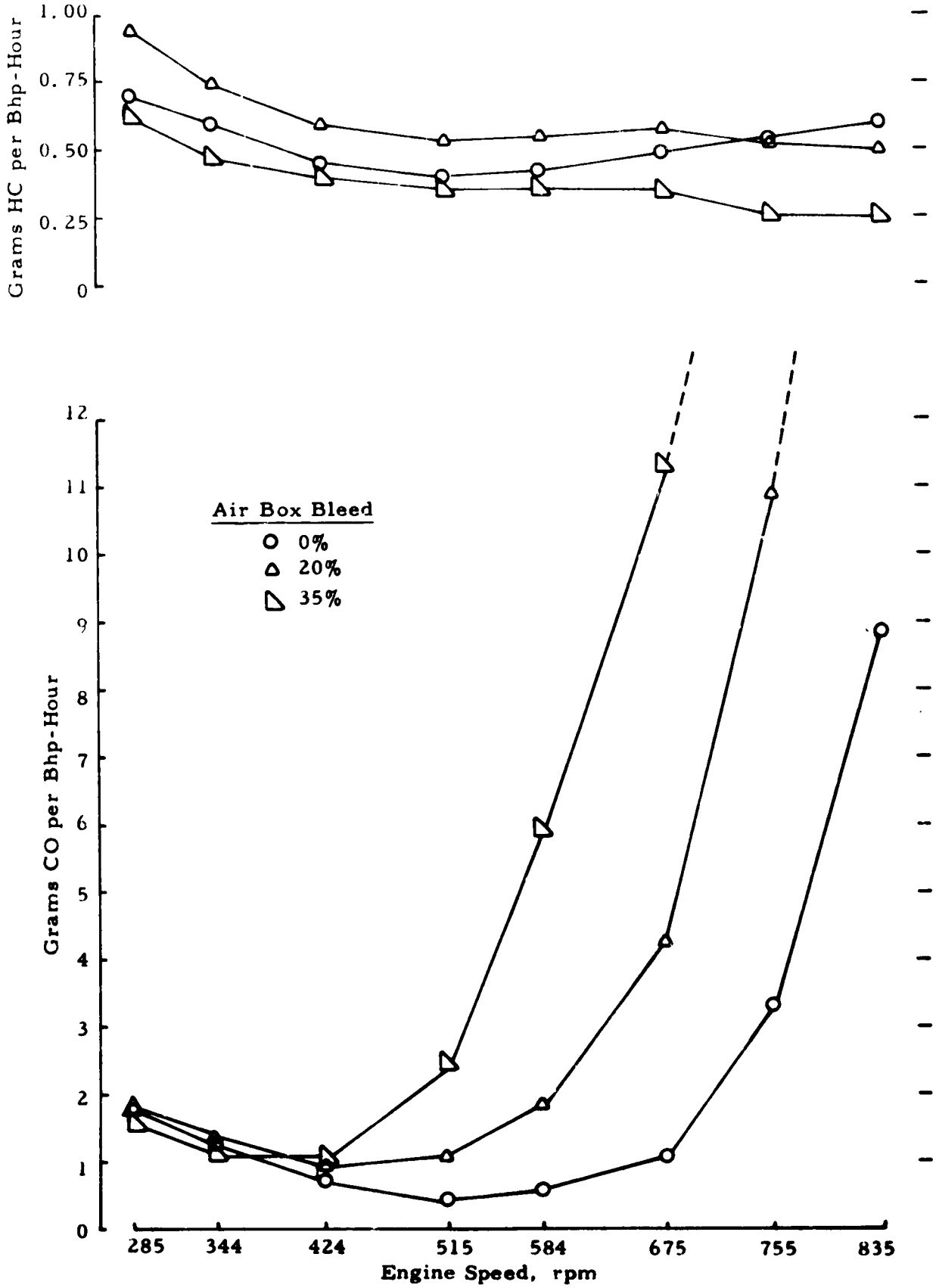

FIGURE C-51. MODAL BRAKE SPECIFIC HC AND CO FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

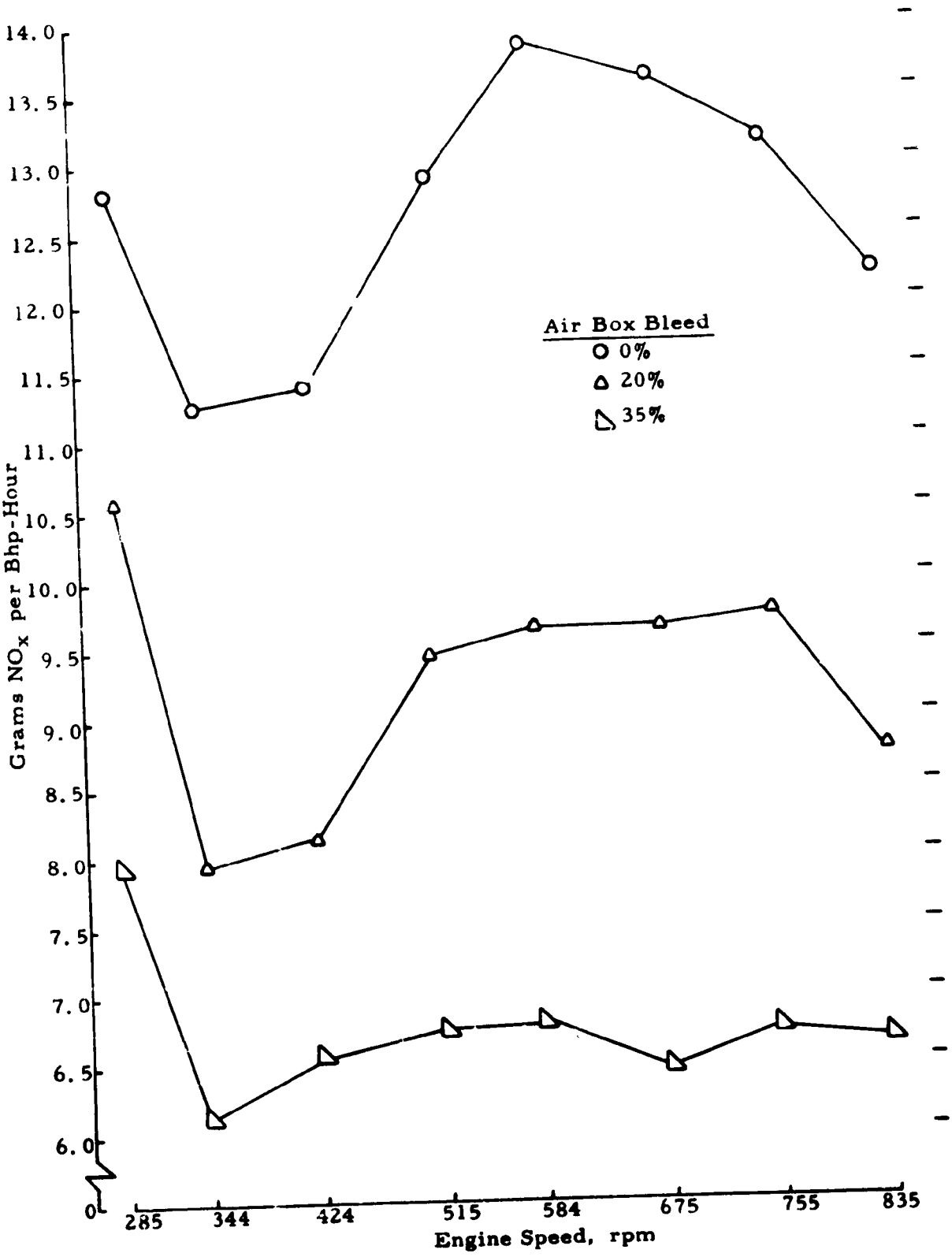

FIGURE C-52. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

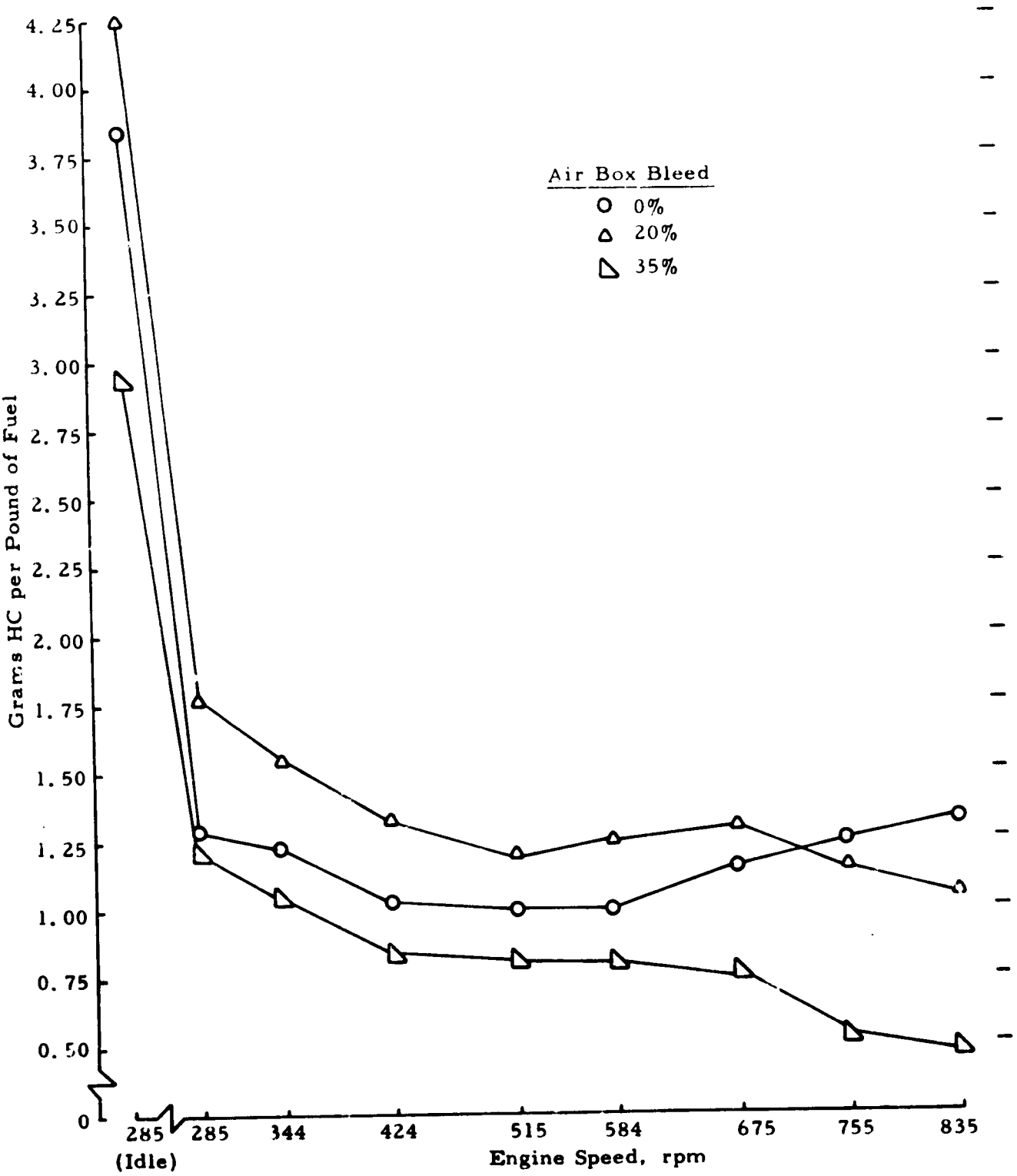

FIGURE C-53. MODAL FUEL SPECIFIC HC FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

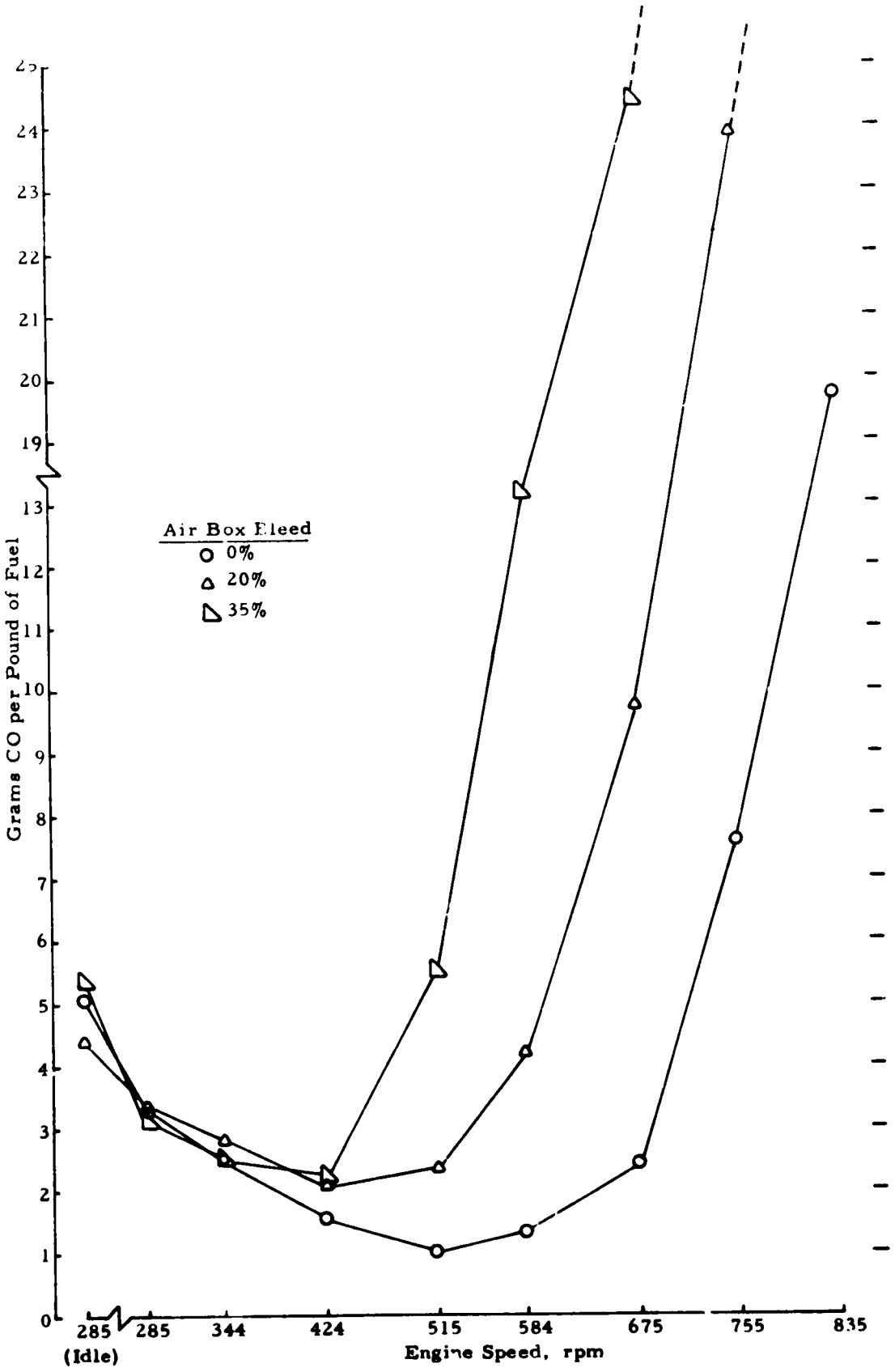

FIGURE C-54. MODAL FUEL SPECIFIC CO FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

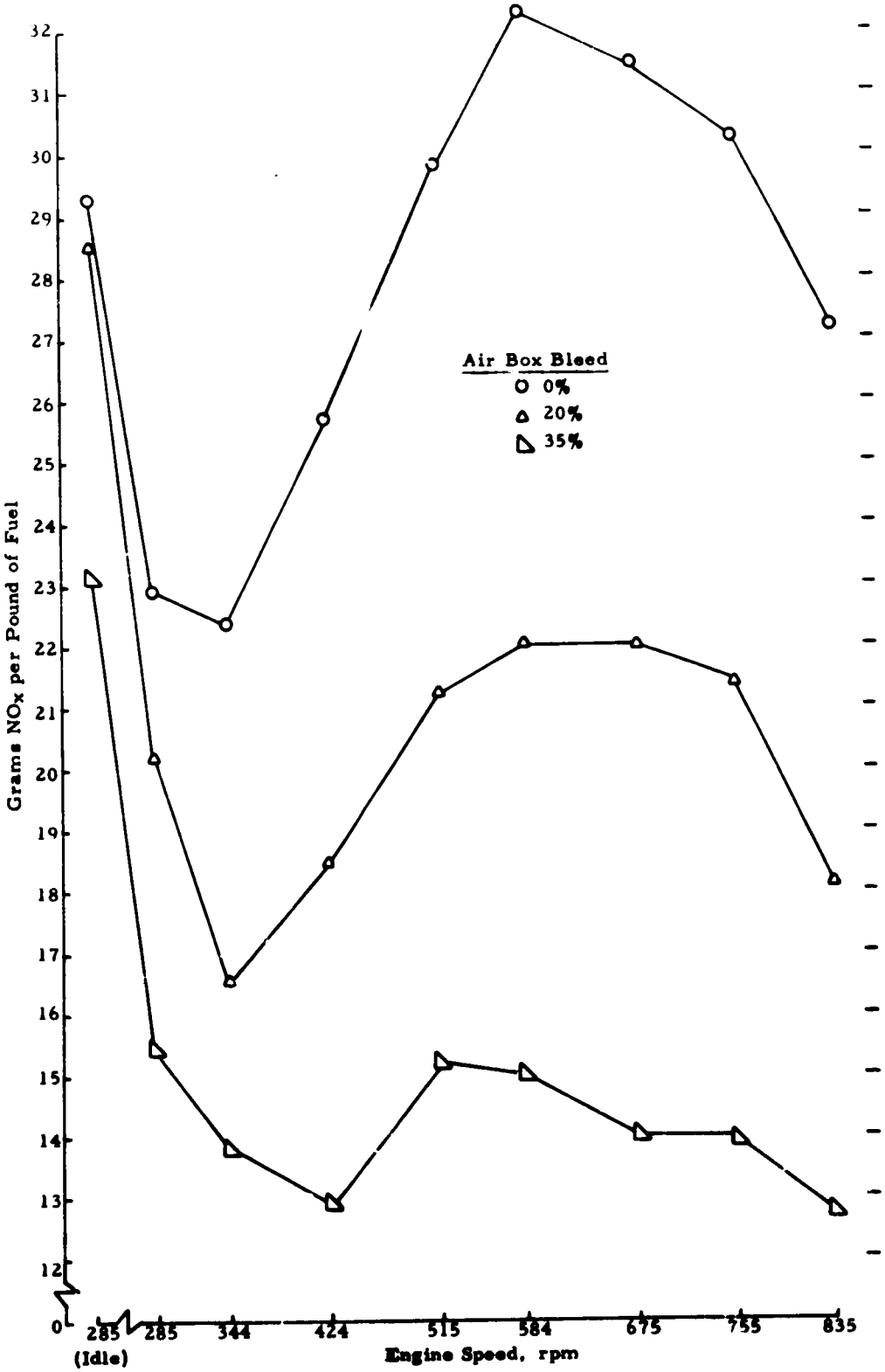

FIGURE C-55. MODAL FUEL SPECIFIC NO_x FOR VARIOUS AIR BOX BLEED RATES--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE C-11. SUMMARY OF EMISSION CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	EGR Rates* 0%	10%	20%	30%
		HC Concentrations, ppmC			
1, 6, 11	285	142	103	104	109
2	285	128	86	86	84
3	344	139	100	102	105
4	424	154	128	122	128
5	515	176	150	146	155
7	584	184	152	168	189
8	675	232	190	218	236
9	755	272	244	274	281
10	835	288	298	334	335
		CO Concentrations, ppm			
1, 6, 11	285	59	58	44	67
2	285	66	65	65	66
3	344	77	77	64	70
4	424	63	75	52	76
5	515	58	81	69	109
7	584	82	132	177	363
8	675	252	370	622	898
9	755	800	884	1482	2344
10	835	1999	2581	4049	5283
		NO_x Concentrations, ppm			
1, 6, 11	285	128	120	121	127
2	285	162	196	191	191
3	344	219	259	233	227
4	424	375	387	352	312
5	515	540	504	429	341
7	584	733	665	512	367
8	675	842	744	528	402
9	755	870	720	486	380
10	835	874	713	457	366

*Percent of engine air flow mass requirement per mode.

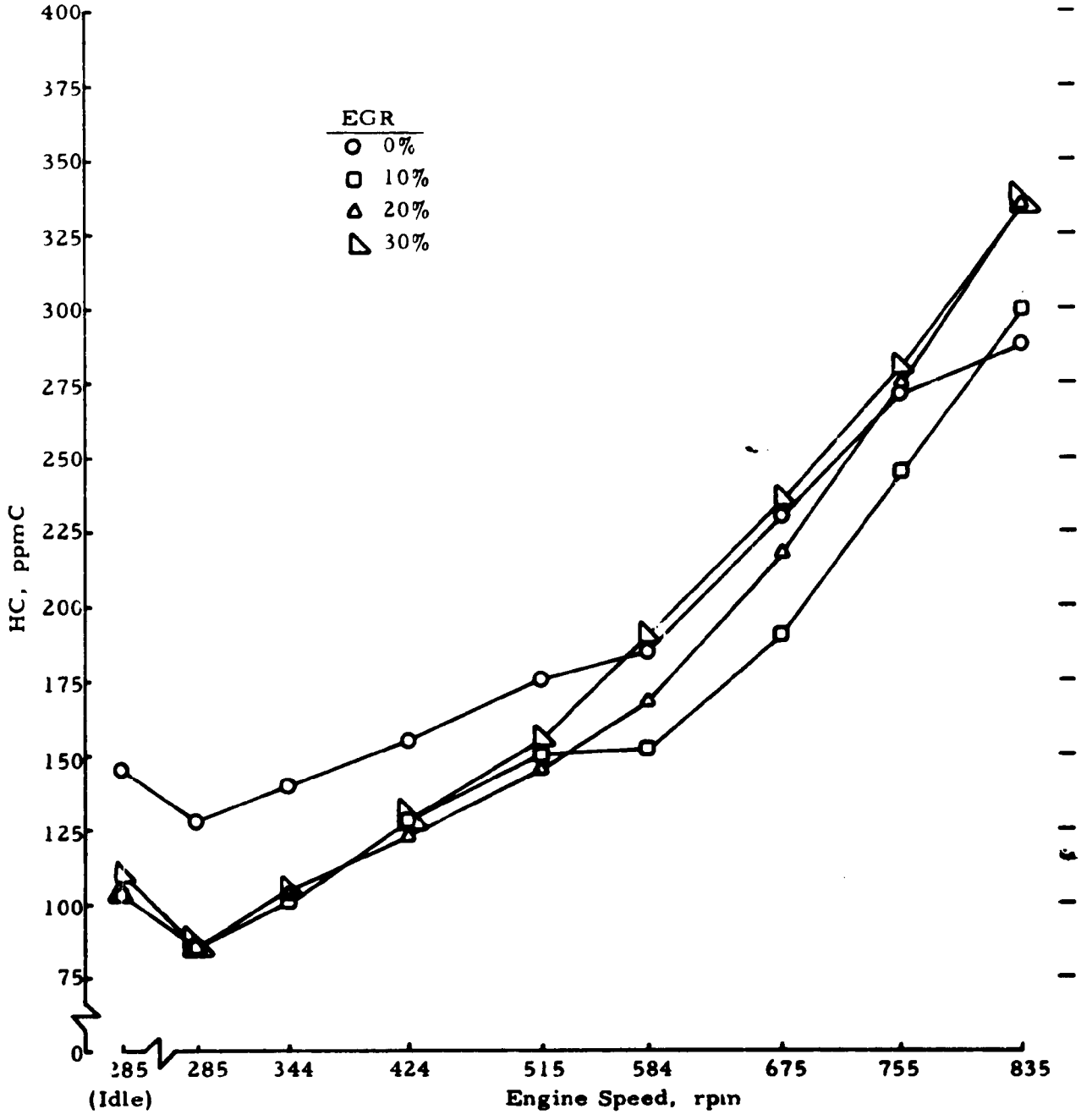

FIGURE C-56. MODAL HC CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

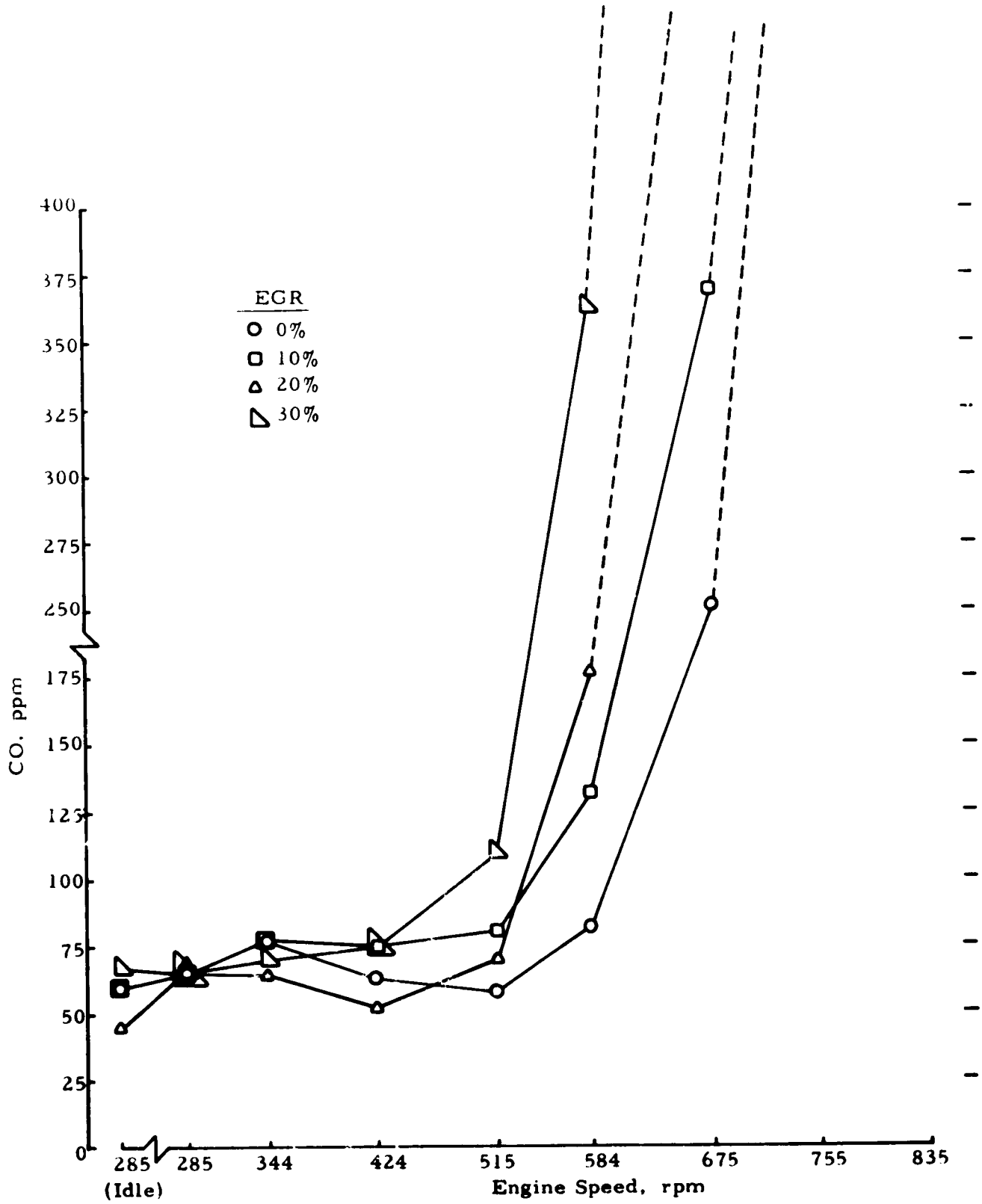

FIGURE C-57. MODAL CO CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

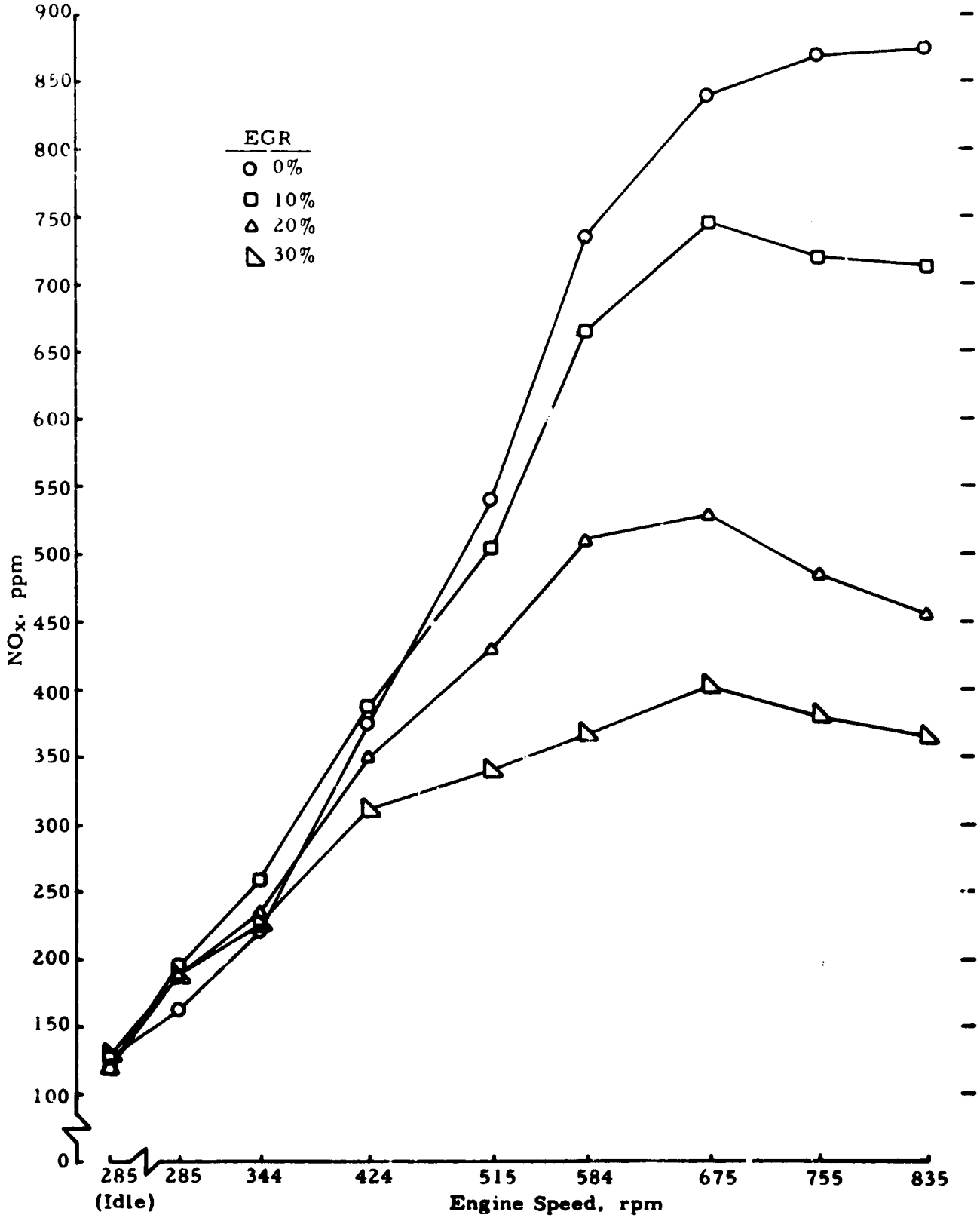

FIGURE C-58. MODAL NO_x CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-12. SUMMARY OF EMISSION CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	Nominal EGR Rates* 0%	20%	30%
		HC Concentrations, ppmC		
1, 6, 11	285	68	49	69
2	285	49	43	60
3	344	61	50	65
4	424	72	59	78
5	515	81	58	83
7	584	93	75	103
8	675	125	105	135
9	755	151	153	178
10	835	181	178	190
		CO Concentrations, ppm		
1, 6, 11	285	45	52	62
2	285	63	71	89
3	344	63	82	88
4	424	54	75	75
5	515	42	69	91
7	584	65	137	222
8	675	133	351	622
9	755	459	1544	2526
10	835	1355	4013	4686
		NO_x Concentrations, ppm		
1, 6, 11	285	158	147	157
2	285	271	239	235
3	344	342	276	256
4	424	549	441	373
5	515	750	584	480
7	584	971	721	509
8	675	1058	750	565
9	755	1121	669	521
10	835	1136	593	495

*Percent of engine air flow mass requirement per mode.

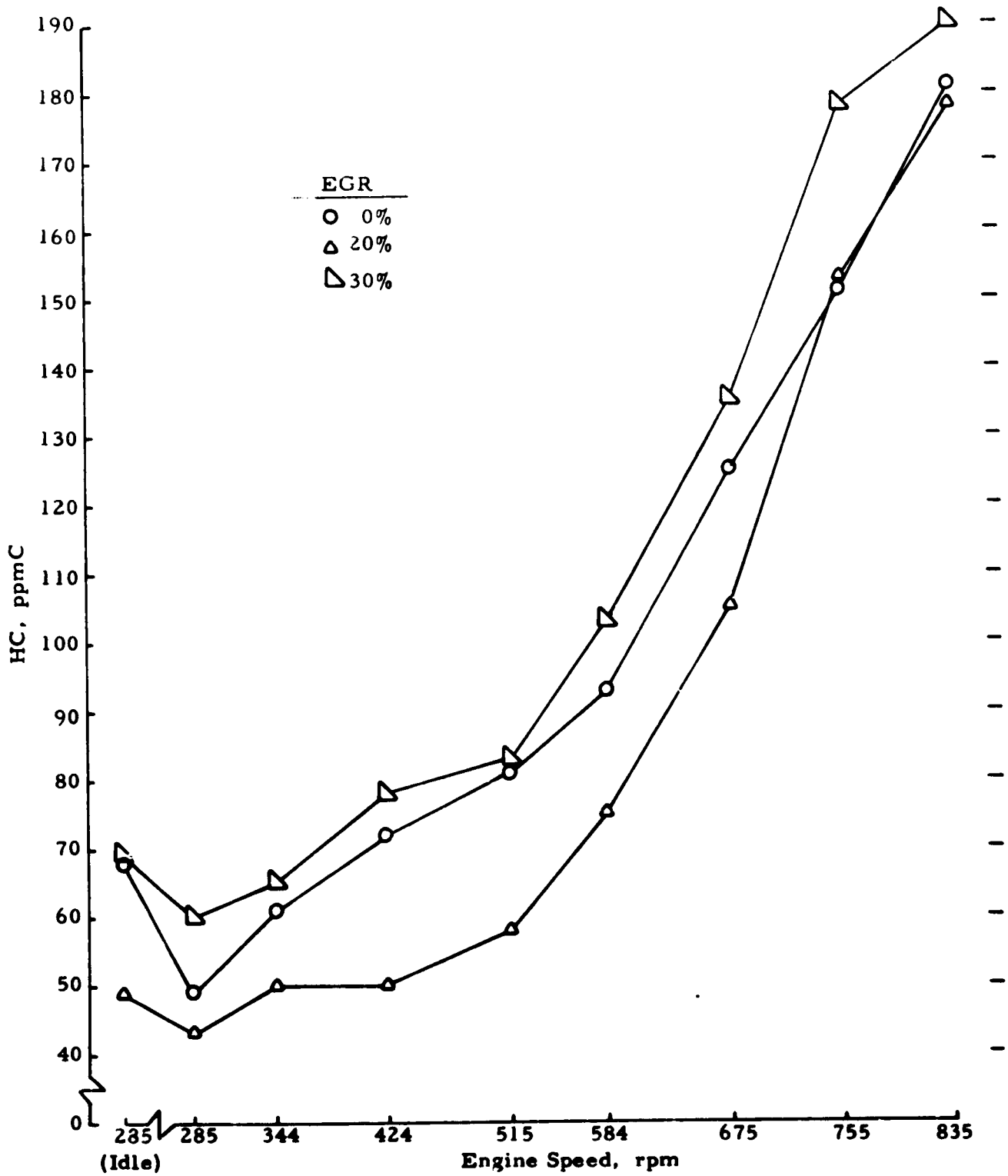

FIGURE C-59. MODAL HC CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

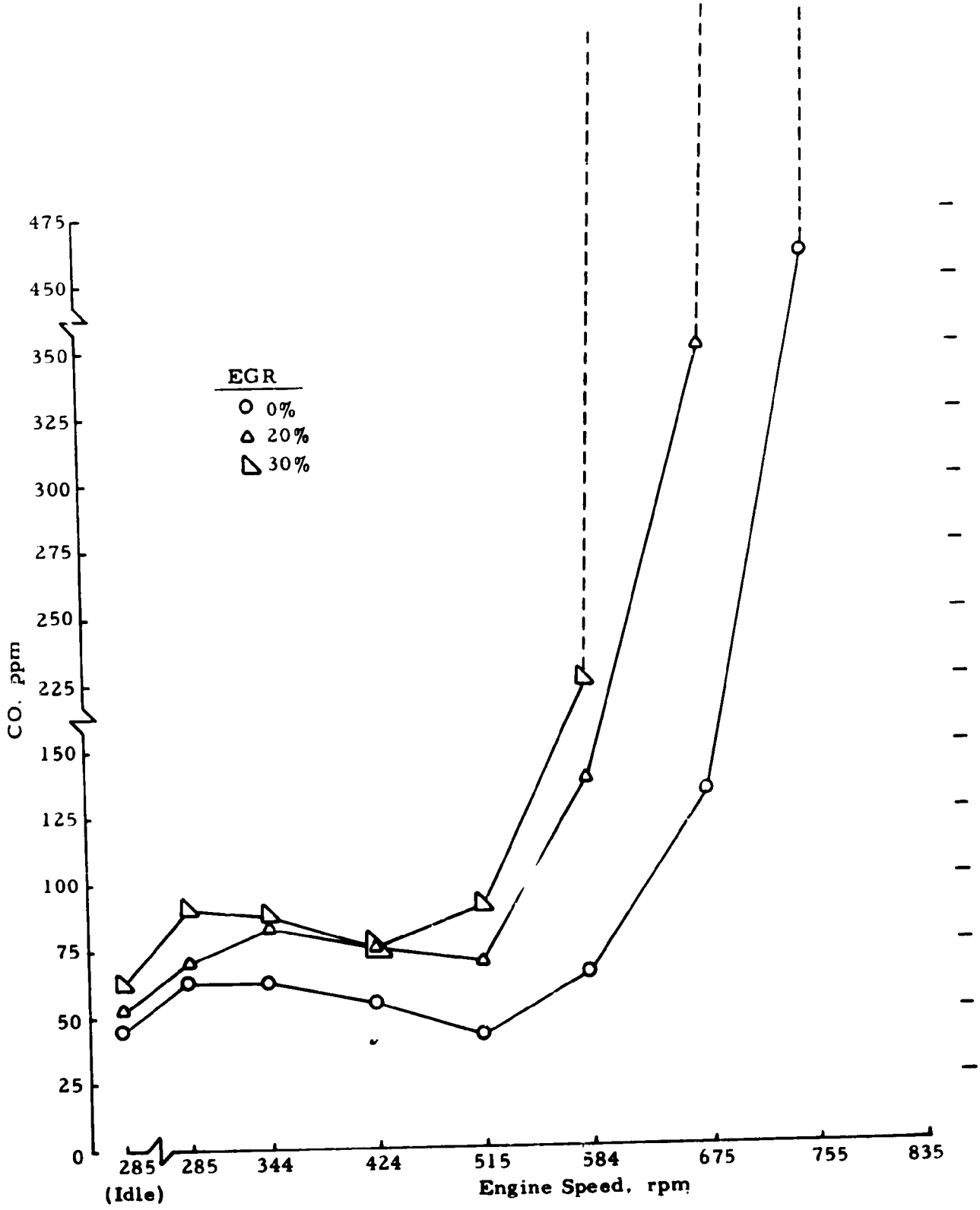

FIGURE C-60. MODAL CO CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

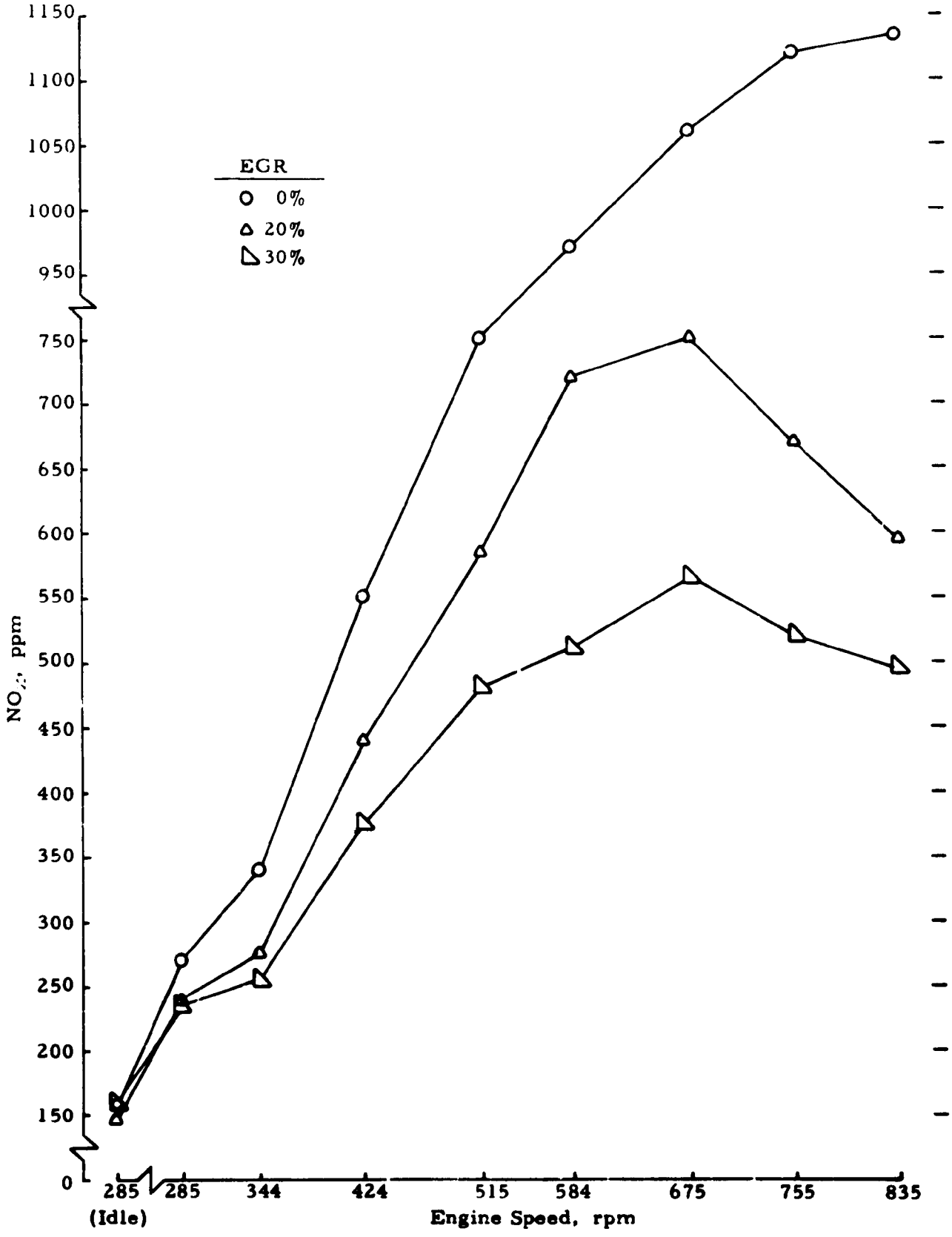

FIGURE C-61. MODAL NO_x CONCENTRATIONS FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE C-13. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, STANDARD TIMING, AND COOLED EGR

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Cool EGR*				
1, 6, 11	285	-	-	-	5.60	4.60	16.52
2	285	3.51	3.70	14.53	3.54	3.65	14.61
3	344	1.80	2.06	9.22	2.68	3.05	13.79
4	424	1.06	0.65	8.47	2.07	1.68	16.54
5	515	0.94	0.61	9.41	1.96	1.28	19.69
7	584	0.81	0.70	10.17	1.71	1.53	22.27
8	675	0.89	1.92	10.52	1.94	4.20	23.00
9	755	0.93	5.46	9.75	2.03	11.89	21.28
10	835	0.92	12.70	9.12	1.92	26.55	19.06
			10% Cool EGR*				
1, 6, 11	285	-	-	-	6.04	6.51	22.44
2	285	1.11	1.66	8.27	2.09	3.14	15.57
3	344	0.90	1.36	7.59	1.81	2.73	15.28
4	424	0.71	0.83	7.00	1.59	1.86	15.74
5	515	0.71	0.76	7.76	1.59	1.70	17.40
7	584	0.60	1.02	8.49	1.35	2.32	19.34
8	675	0.66	2.55	8.42	1.50	5.81	19.19
9	755	0.77	5.55	7.42	1.73	12.45	16.66
10	835	0.86	14.86	6.74	1.87	32.20	14.61
			20% Cool EGR*				
1, 6, 11	285	-	-	-	5.16	4.19	19.10
2	285	0.97	1.45	7.02	1.78	2.63	12.96
3	344	0.83	1.04	6.20	1.62	2.03	12.13
4	424	0.59	0.51	5.58	1.32	1.21	12.40
5	515	0.61	0.57	5.84	1.39	1.30	13.34
7	584	0.59	1.23	5.86	1.36	2.84	13.49
8	675	0.67	3.81	5.31	1.54	8.73	12.18
9	755	0.78	8.37	5.52	1.73	18.65	10.05
10	835	0.91	21.87	4.06	1.91	46.14	8.56
			30% Cool EGR*				
1, 6, 11	285	-	-	-	4.93	5.83	18.59
2	285	0.89	1.42	6.70	1.67	2.62	12.36
3	344	0.77	1.02	5.45	1.52	2.01	10.74
4	424	0.59	0.69	4.67	1.28	1.52	10.22
5	515	0.54	0.77	3.93	1.21	1.71	8.77
7	584	0.57	2.17	3.61	1.29	4.92	8.20
8	675	0.65	4.95	3.64	1.46	11.11	8.17
9	755	0.76	12.64	3.37	1.65	27.40	7.30
10	835	0.83	26.08	2.96	1.69	53.14	6.05

*Percent of air flow mass requirement per mode.

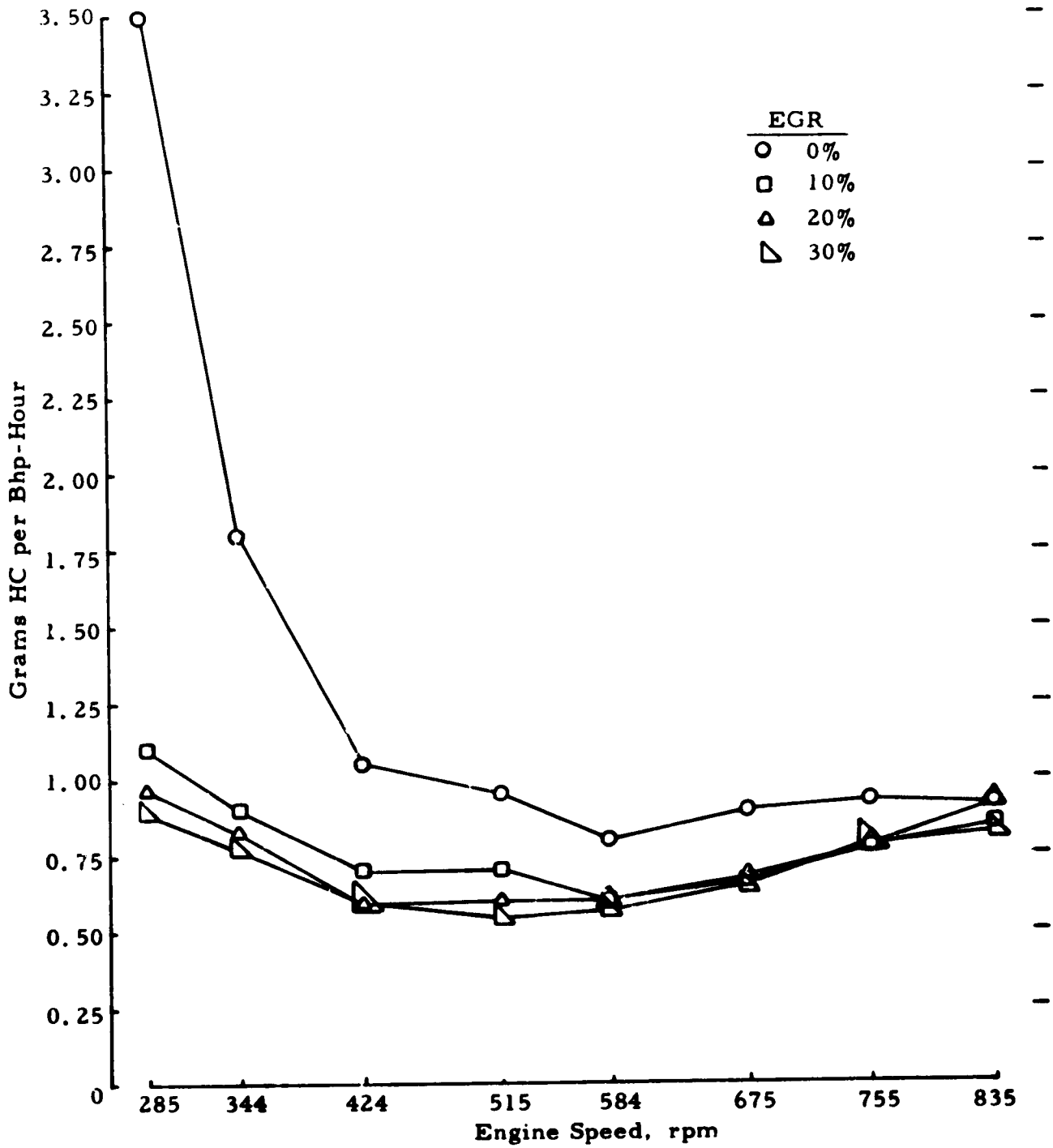

FIGURE C-62. MODAL BRAKE SPECIFIC HC FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

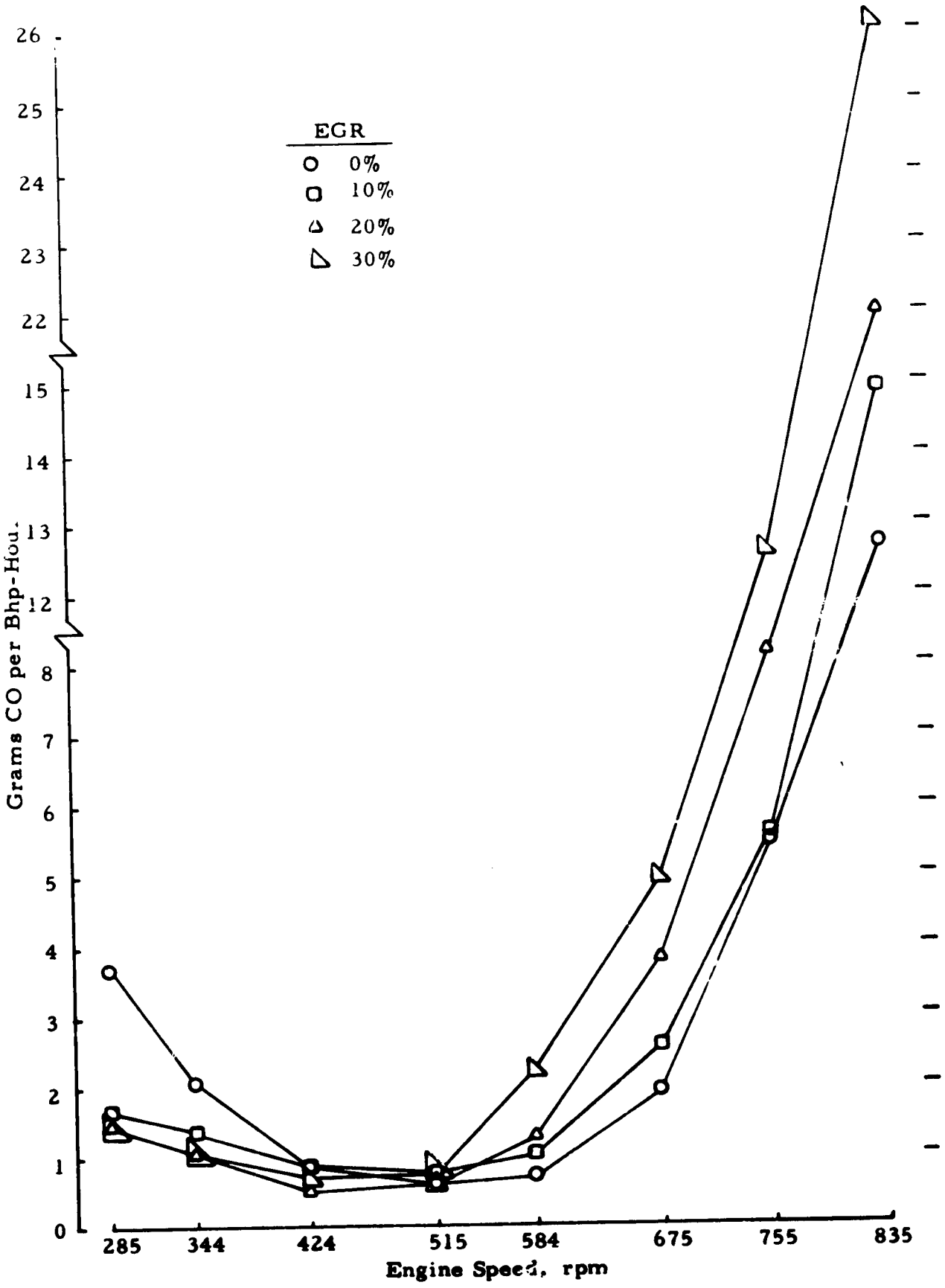

FIGURE C-63. MODAL BRAKE SPECIFIC CO FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

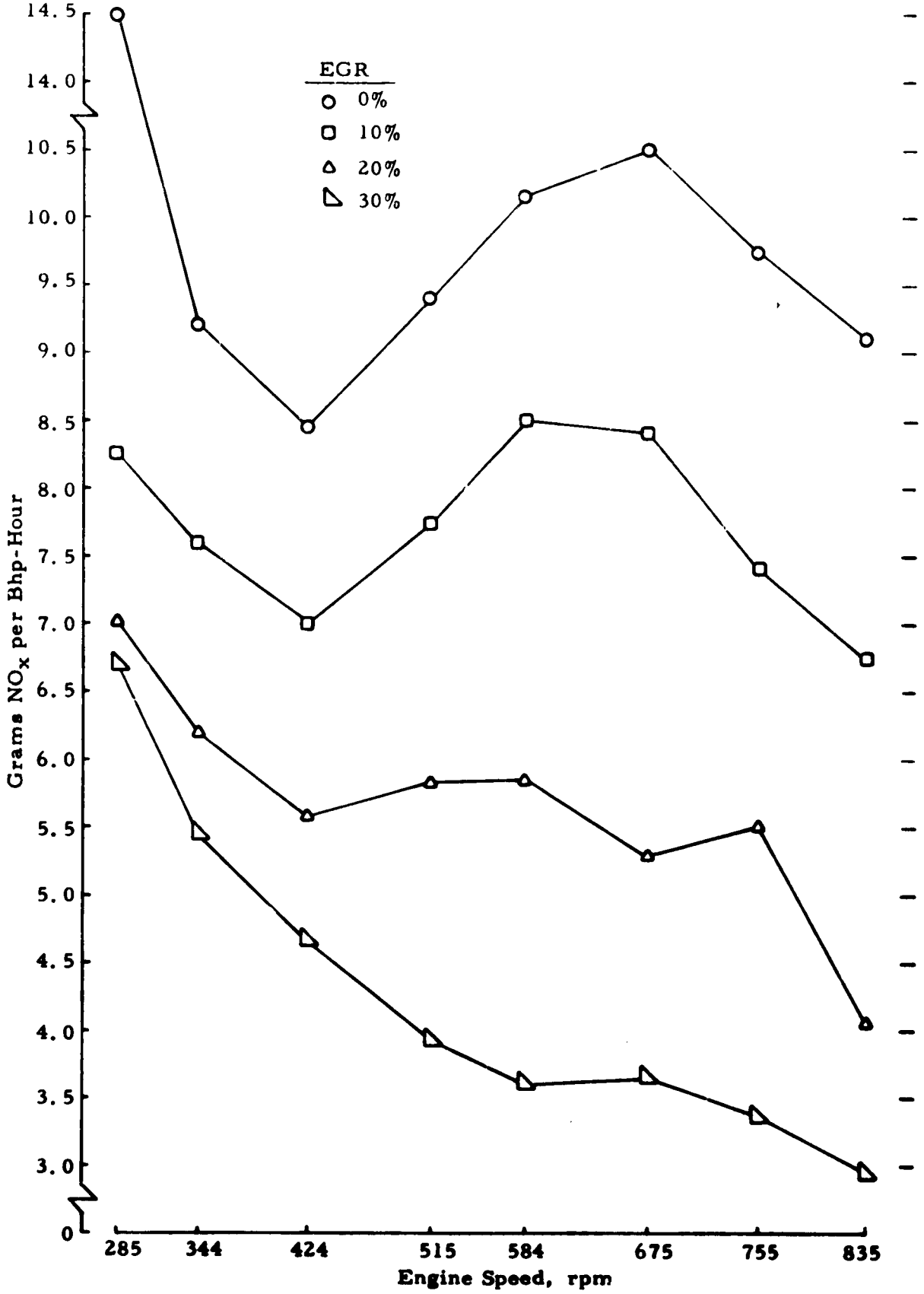

FIGURE C-64. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

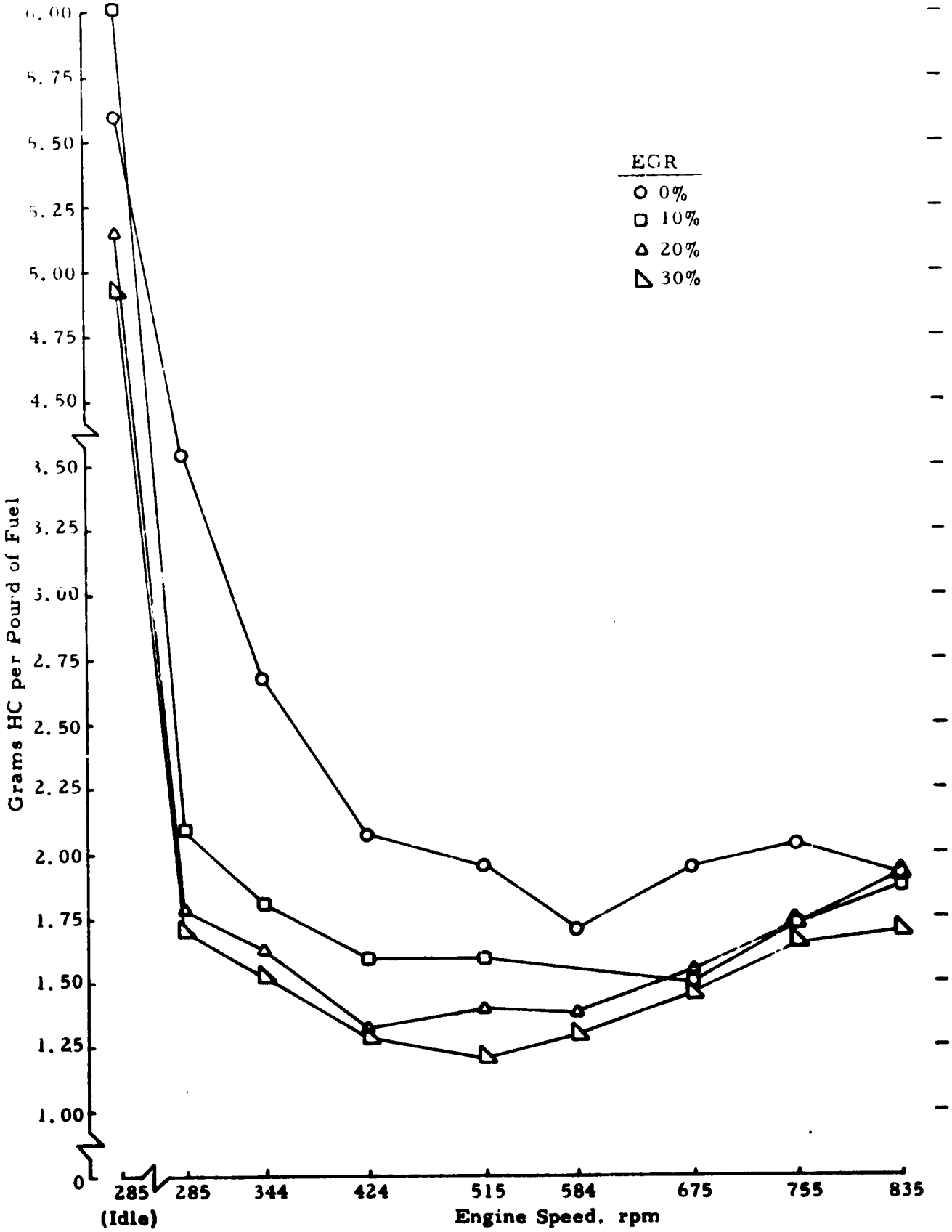

FIGURE C-65. MODAL FUEL SPECIFIC HC FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

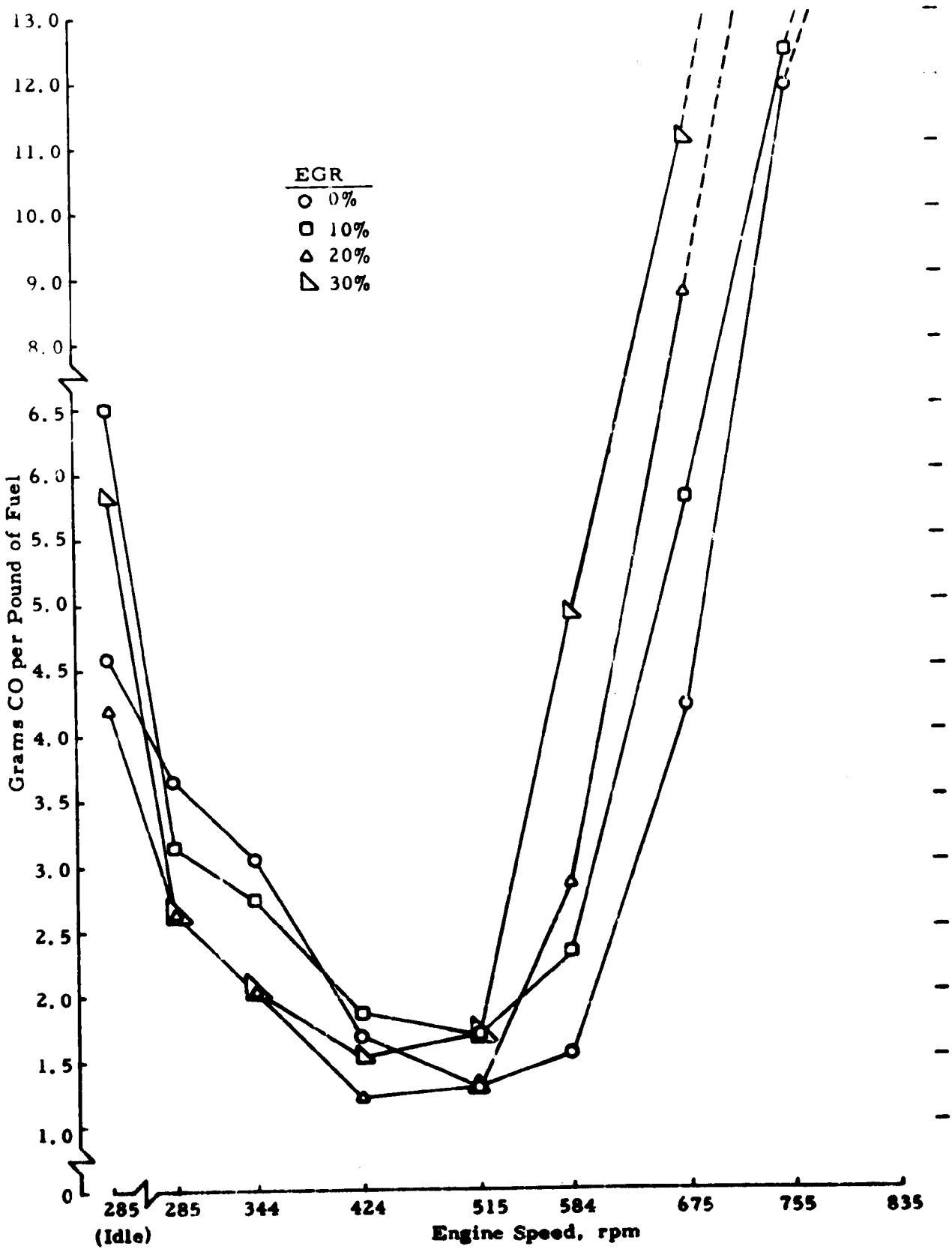

FIGURE C-66. MODAL FUEL SPECIFIC CO FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

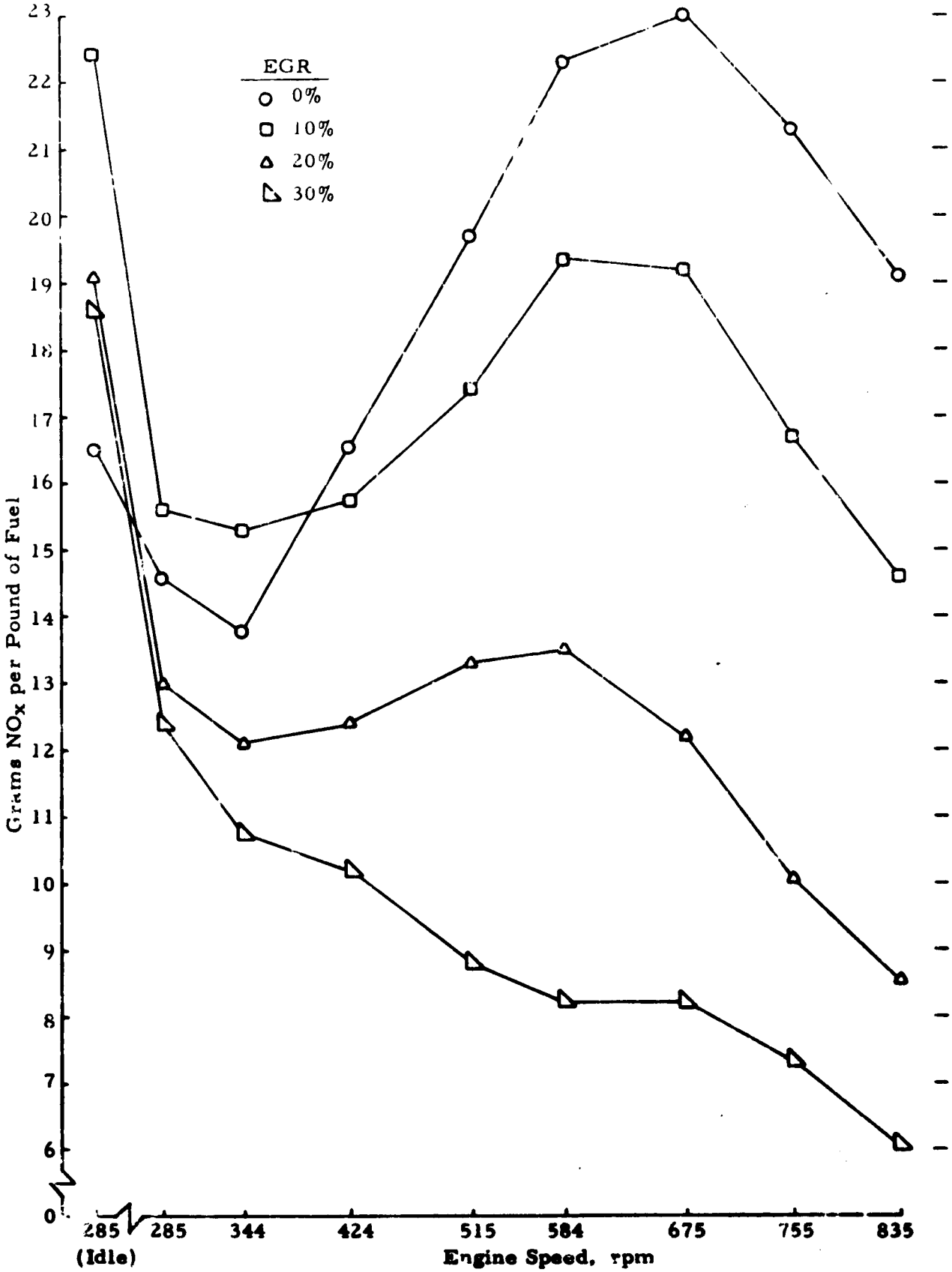

FIGURE C-67. MODAL FUEL SPECIFIC NO_x FOR VARIOUS RATES OF COOLED EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-14. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR LOW-SAC INJECTORS, STANDARD TIMING, AND COOLED EGR

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Cool EGR*				
1, 6, 11	285	-	-	-	3.86	5.08	29.32
2	285	0.71	1.81	12.79	1.28	3.24	22.92
3	344	0.61	1.25	11.23	1.22	2.49	22.38
4	424	0.46	0.69	11.41	1.03	1.55	25.72
5	515	0.41	0.44	12.87	0.99	1.02	29.84
7	584	0.42	0.56	13.82	0.99	1.31	32.29
8	675	0.49	1.04	13.61	1.14	2.40	31.47
9	755	0.54	3.28	13.14	1.24	7.56	30.27
10	835	0.60	8.86	12.19	1.32	19.75	27.19
			20% Cool EGR*				
1, 6, 11	285	-	-	-	2.99	6.10	28.02
2	285	0.51	1.68	9.37	0.99	3.29	18.24
3	344	0.41	1.33	7.36	0.88	2.86	15.83
4	424	0.26	0.78	7.48	0.61	1.83	17.60
5	515	0.25	0.58	8.10	0.59	1.40	19.42
7	584	0.27	0.99	8.57	0.65	2.35	20.36
8	675	0.33	2.22	7.78	0.80	5.28	18.53
9	755	0.46	9.31	6.62	1.06	21.44	15.25
10	835	0.49	22.23	5.40	1.09	48.89	11.87
			30% Cool EGR*				
1, 6, 11	285	-	-	-	3.55	6.20	26.08
2	285	0.66	1.98	8.41	1.26	3.72	16.19
3	344	0.48	1.30	6.14	1.01	2.72	13.02
4	424	0.36	0.68	5.60	0.84	1.61	13.14
5	515	0.31	0.69	5.93	0.76	1.66	14.35
7	584	0.34	1.44	5.44	0.80	3.43	12.88
8	675	0.40	3.62	5.40	0.93	8.55	12.75
9	755	0.50	13.70	4.64	1.13	31.42	10.64
10	835	0.49	23.76	4.13	1.04	51.54	8.95

*Percent of engine air flow mass requirement per mode.

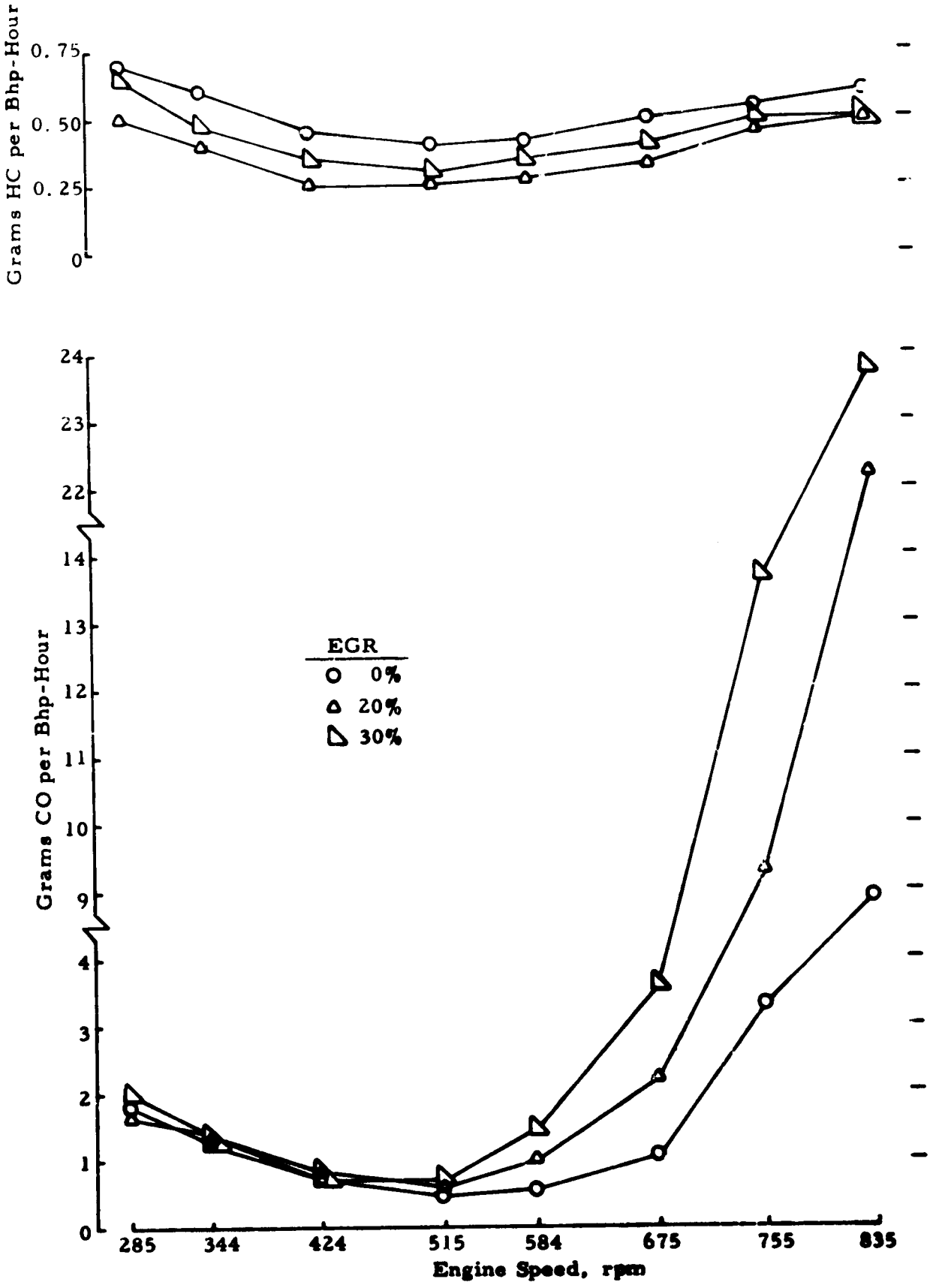

FIGURE C-68. MODAL BRAKE SPECIFIC HC AND CO FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

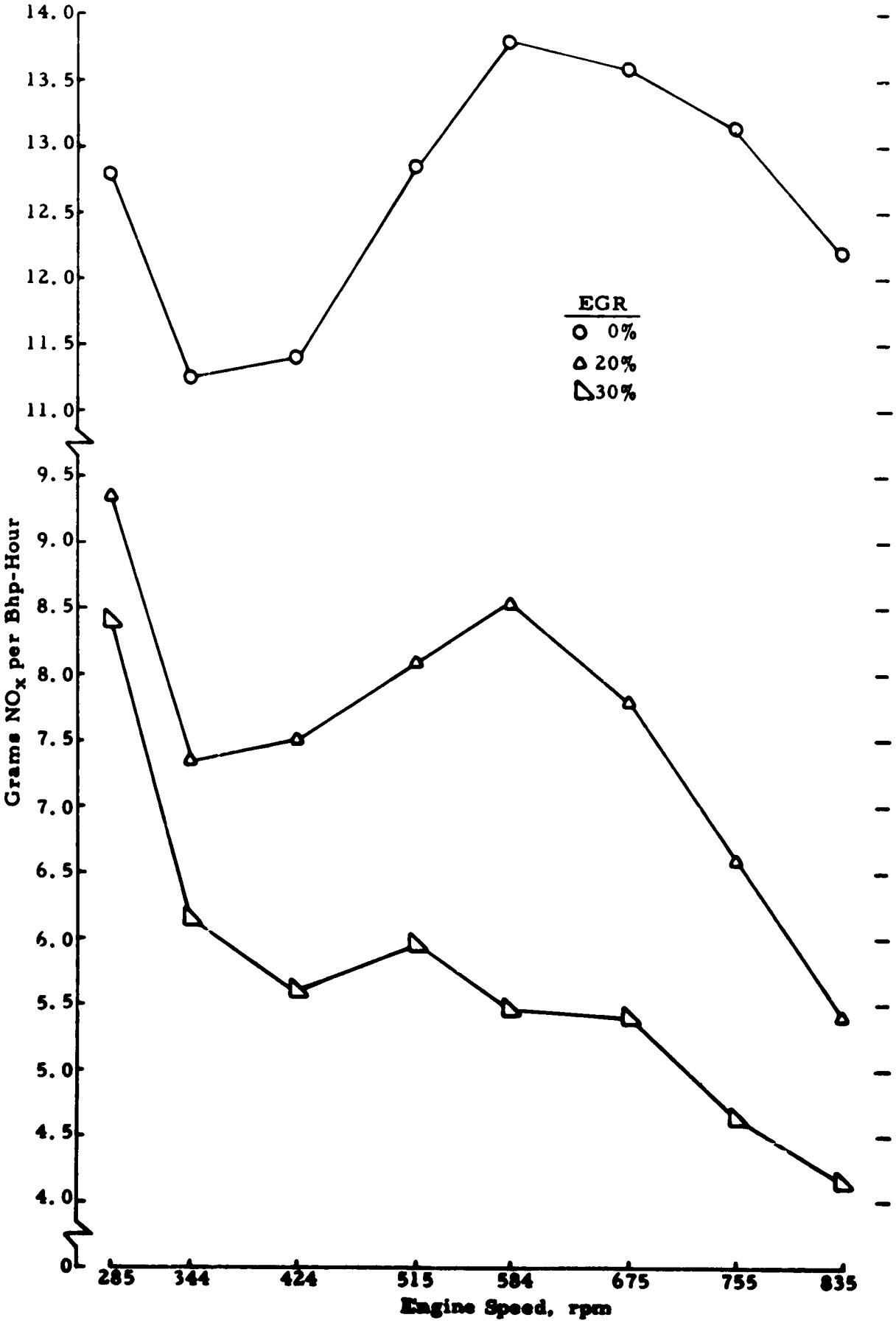

FIGURE C-69. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

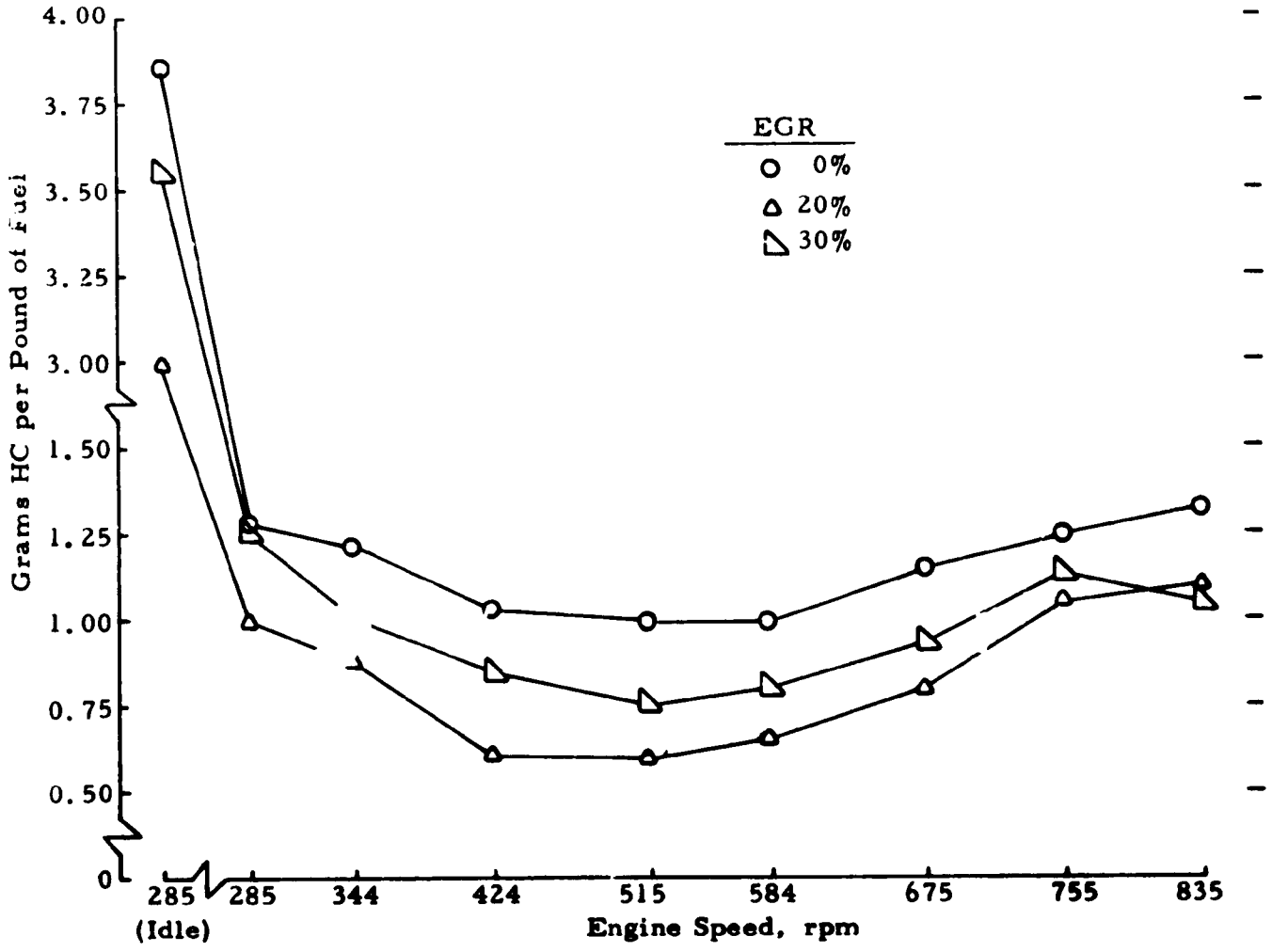

FIGURE C-70. MODAL FUEL SPECIFIC HC FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

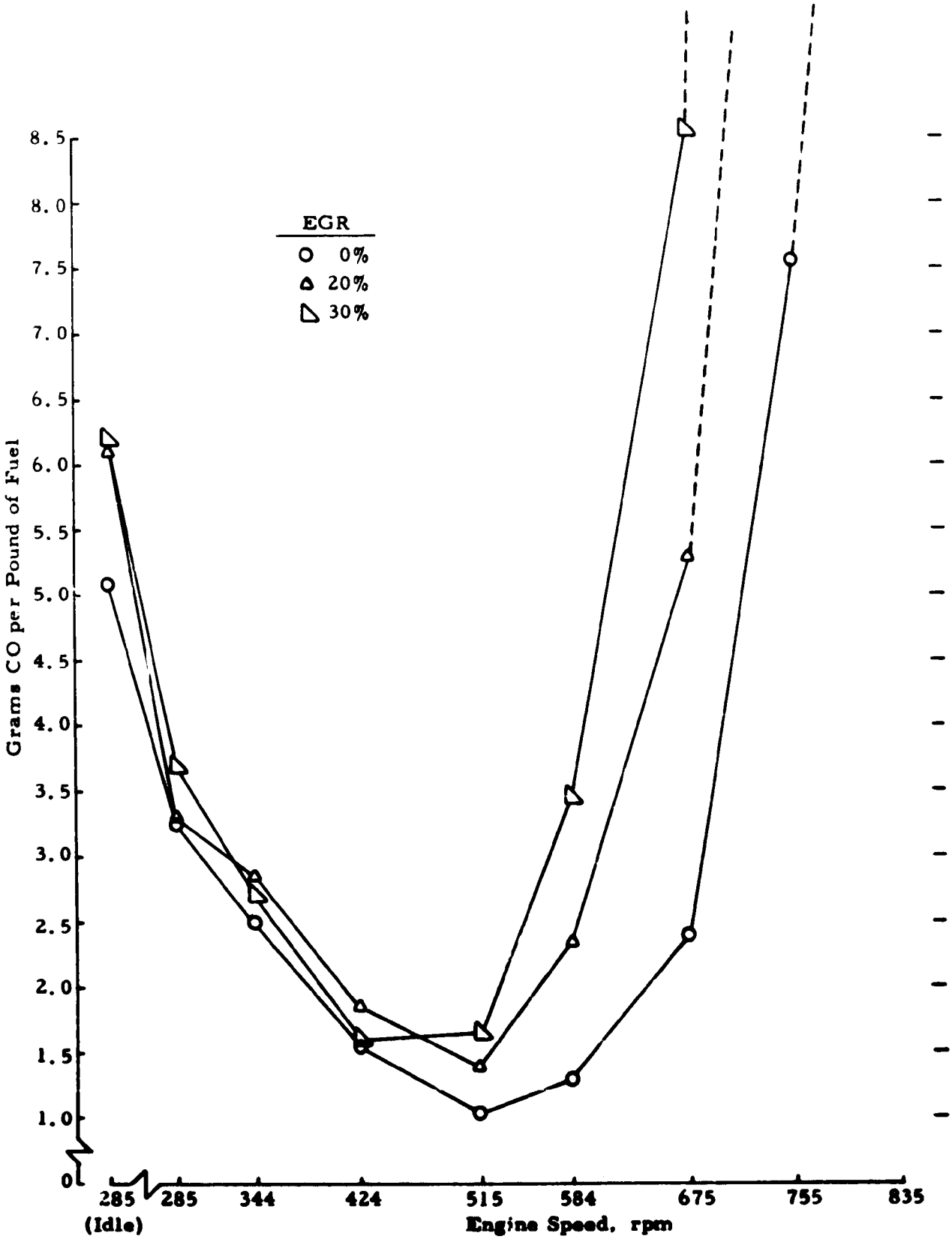

FIGURE C-71. MODAL FUEL SPECIFIC CO FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

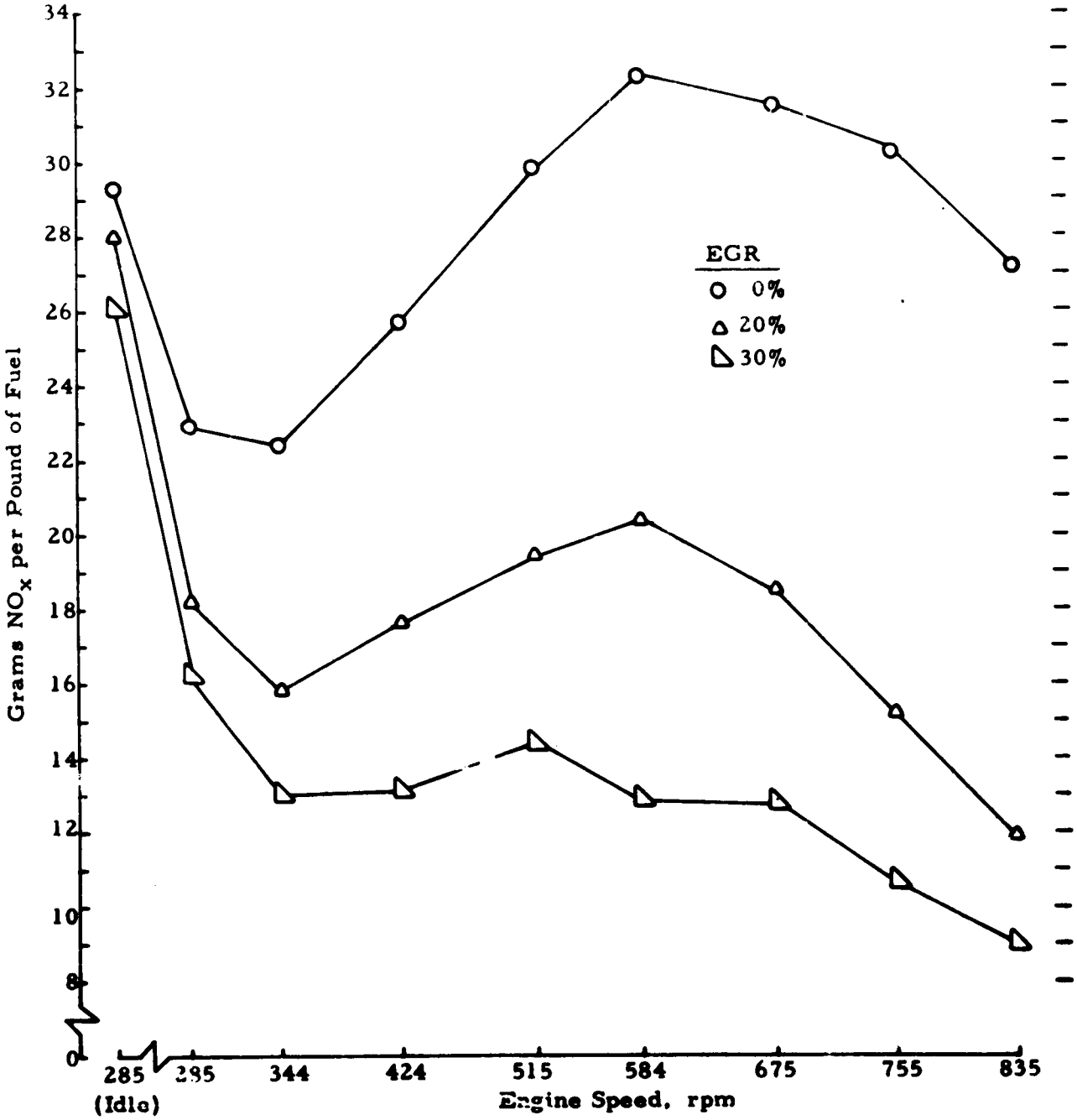

FIGURE C-72. MODAL FUEL SPECIFIC NO_x FOR VARIOUS RATES OF COOLED EGR--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE C-15. SUMMARY OF EMISSION CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	EGR Rates* 0%	10%	20%	30%
		HC Concentrations, ppmC			
1, 6, 11	285	142	90	94	109
2	285	128	82	84	94
3	344	139	88	92	96
4	424	154	106	112	108
5	515	176	128	135	128
7	584	184	154	157	164
8	675	232	186	200	212
9	755	272	232	240	258
10	835	288	258	265	308
		CO Concentrations, ppm			
1, 6, 11	285	59	64	63	67
2	285	66	71	71	70
3	344	77	71	62	76
4	424	63	58	61	69
5	515	58	81	80	96
7	584	82	184	252	307
8	675	252	498	778	1383
9	755	800	1246	2684	5591
10	835	1999	3723	5904	13134
		NO_x Concentrations, ppm			
1, 6, 11	285	128	134	135	133
2	285	162	212	197	205
3	344	219	269	249	262
4	424	375	420	375	385
5	515	540	520	462	433
7	584	733	677	584	492
8	675	842	737	586	420
9	755	870	759	521	311
10	835	874	703	480	226

*Percent of air flow mass requirement per mode.

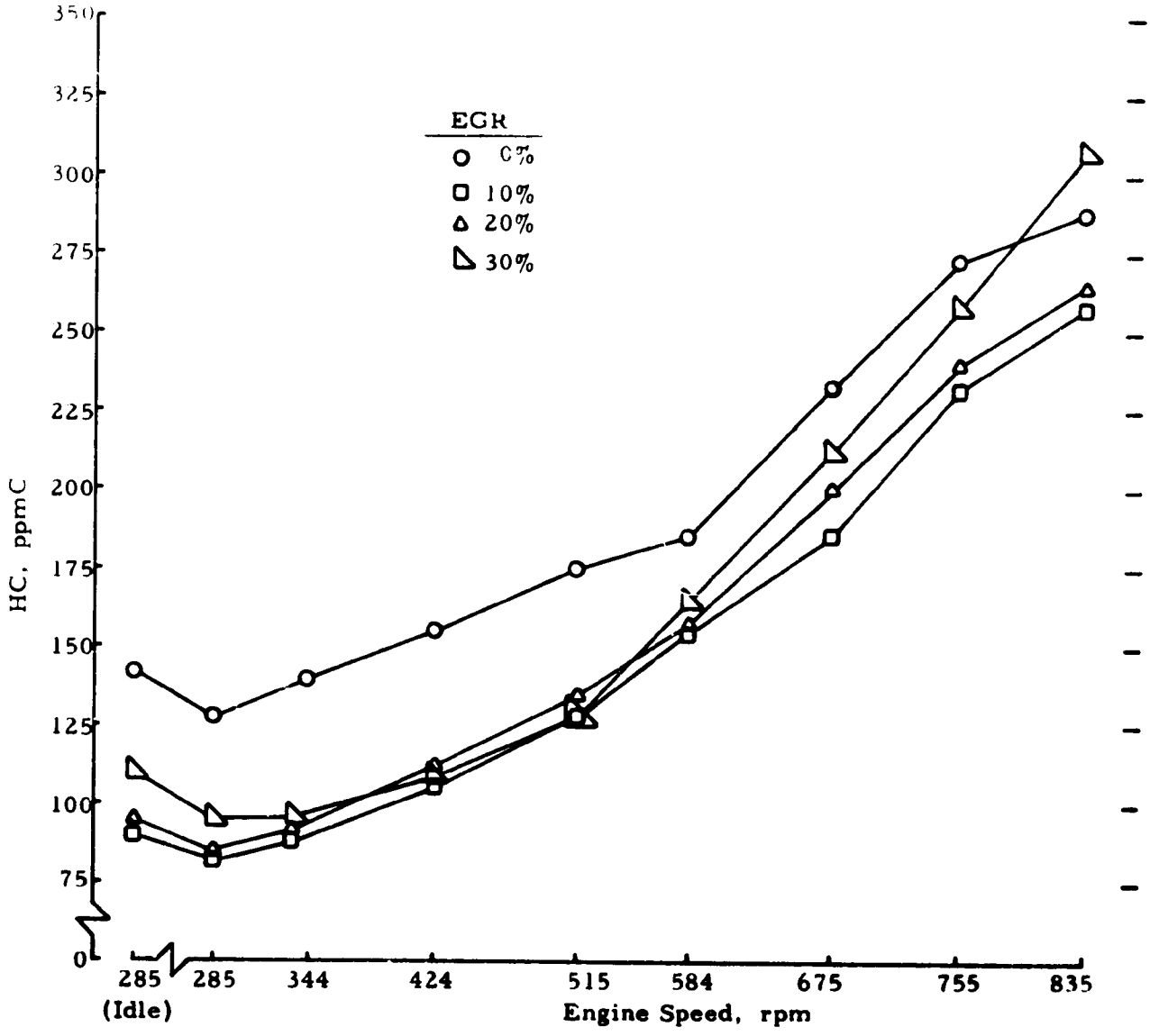

FIGURE C-73. MODAL HC CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

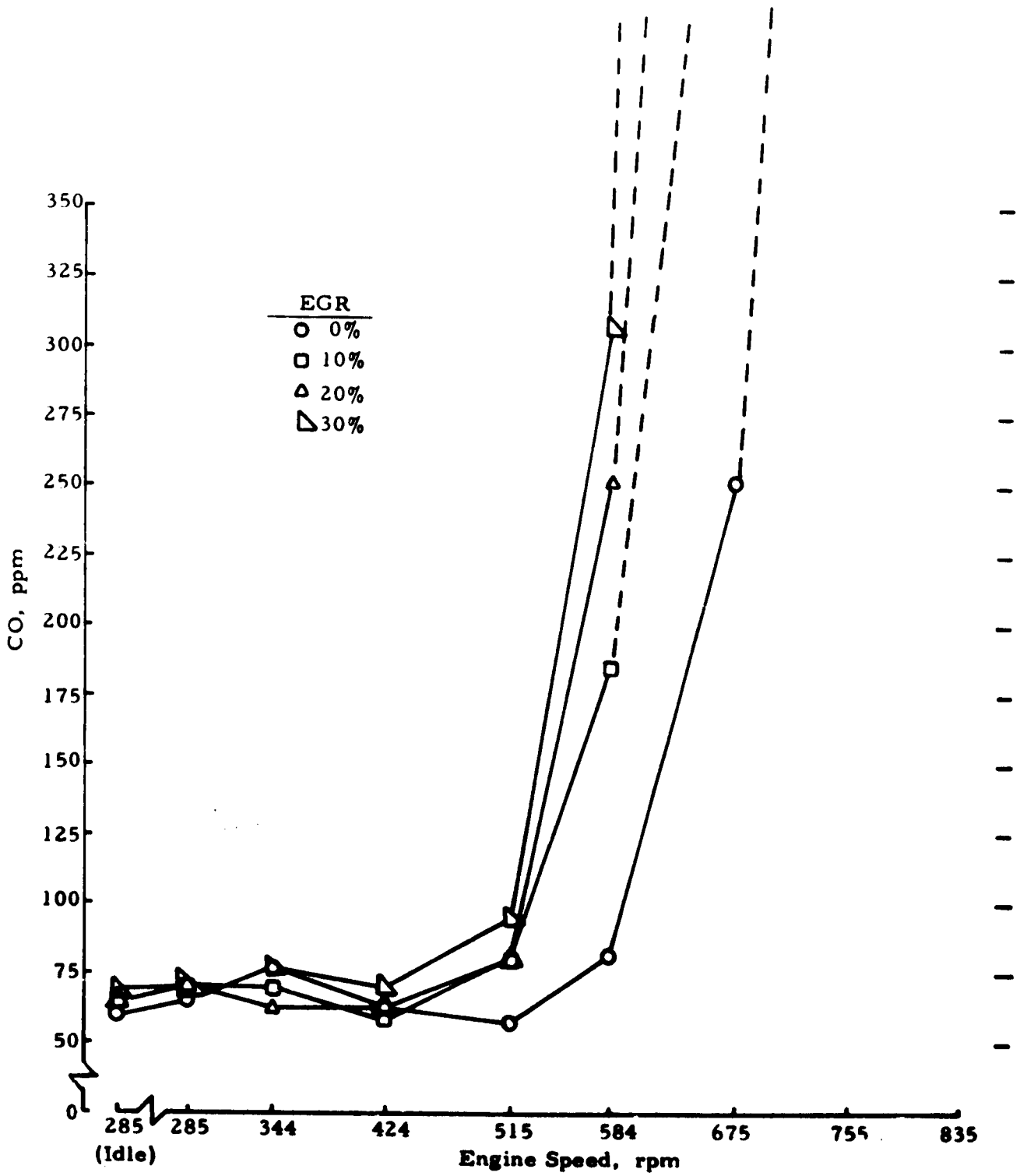

FIGURE C-74. MODAL CO CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

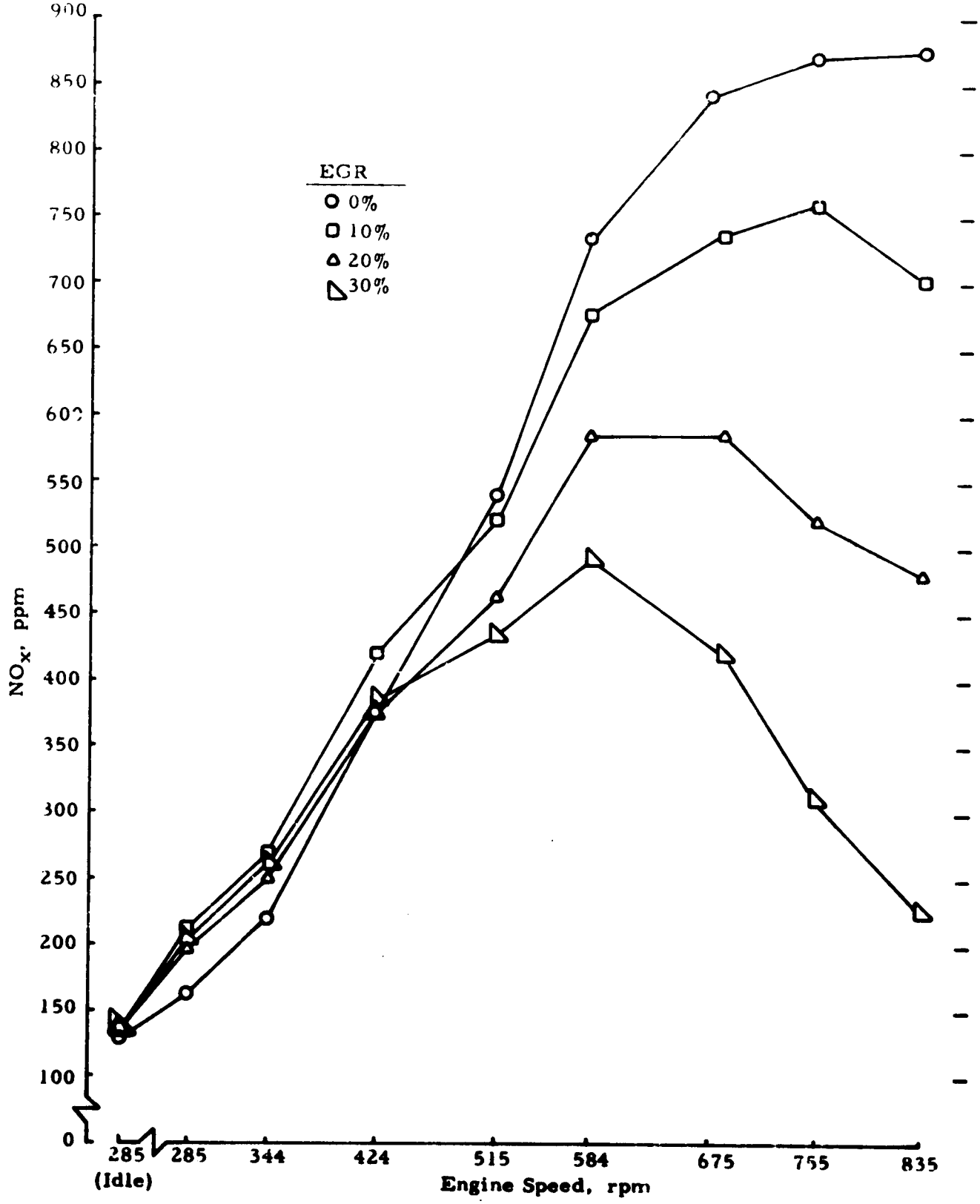

FIGURE C-75. MODAL NO_x CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-16. SUMMARY OF EMISSION CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

Mode	Engine Speed, rpm	Nominal EGR Rates* 0%	20%	30%
		HC Concentrations, ppmC		
1, 6, 11	285	68	52	71
2	285	49	53	68
3	344	61	58	73
4	424	72	63	88
5	515	81	70	95
7	584	93	78	118
8	675	125	110	165
9	755	151	165	165
10	835	181	140	182
		CO Concentrations, ppm		
1, 6, 11	285	45	56	42
2	285	63	77	47
3	344	63	82	53
4	424	54	64	52
5	515	42	69	63
7	584	65	183	280
8	675	133	630	1563
9	755	459	2674	5673
10	835	1355	6999	13720
		NO_x Concentrations, ppm		
1, 6, 11	285	158	129	157
2	285	271	202	228
3	344	342	228	250
4	424	549	392	430
5	515	750	534	553
7	584	971	626	567
8	675	1058	634	484
9	755	1121	546	348
10	835	1136	416	306

*Percent of engine air flow mass requirement per mode.

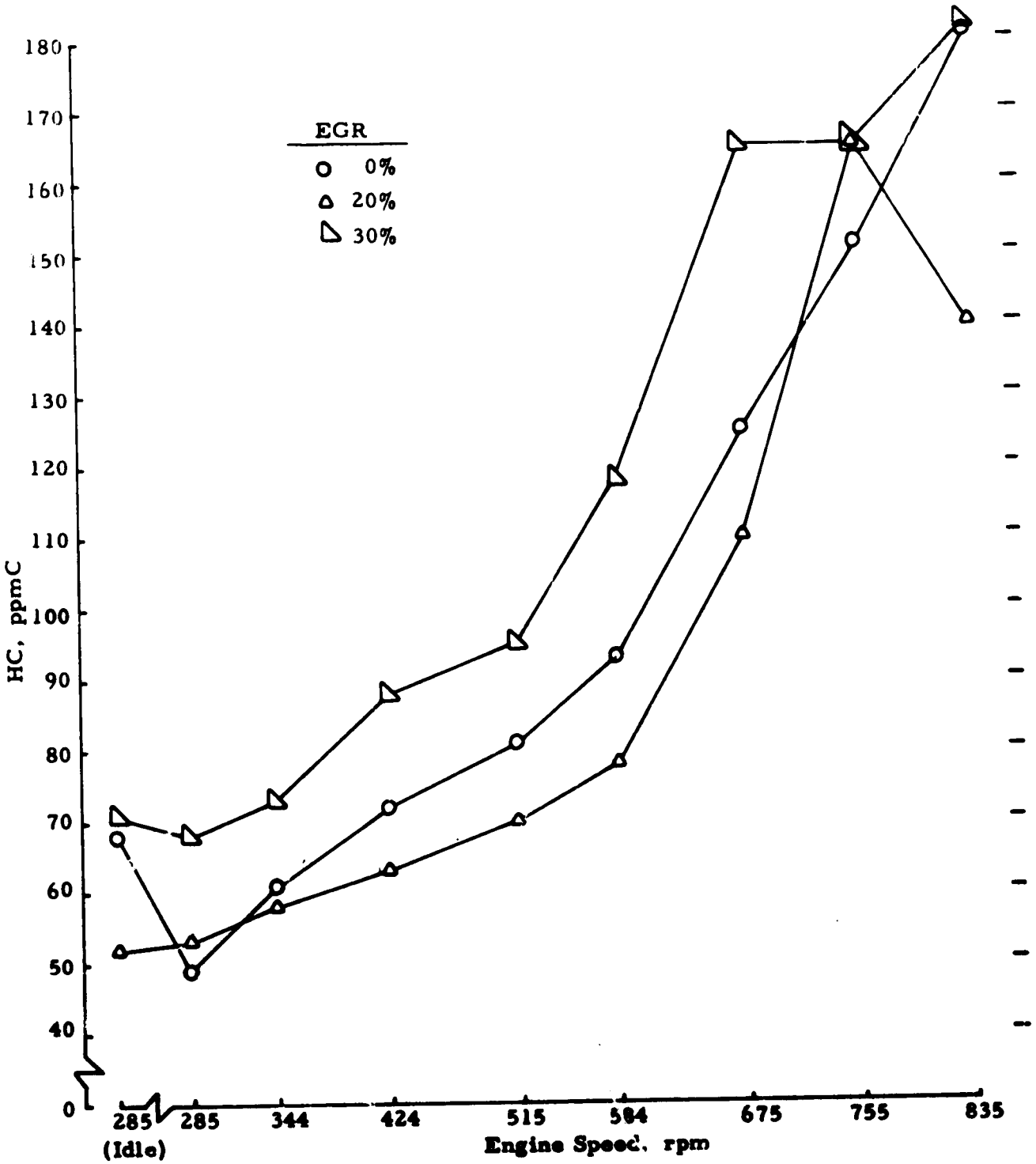

FIGURE C-76. MODAL HC CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

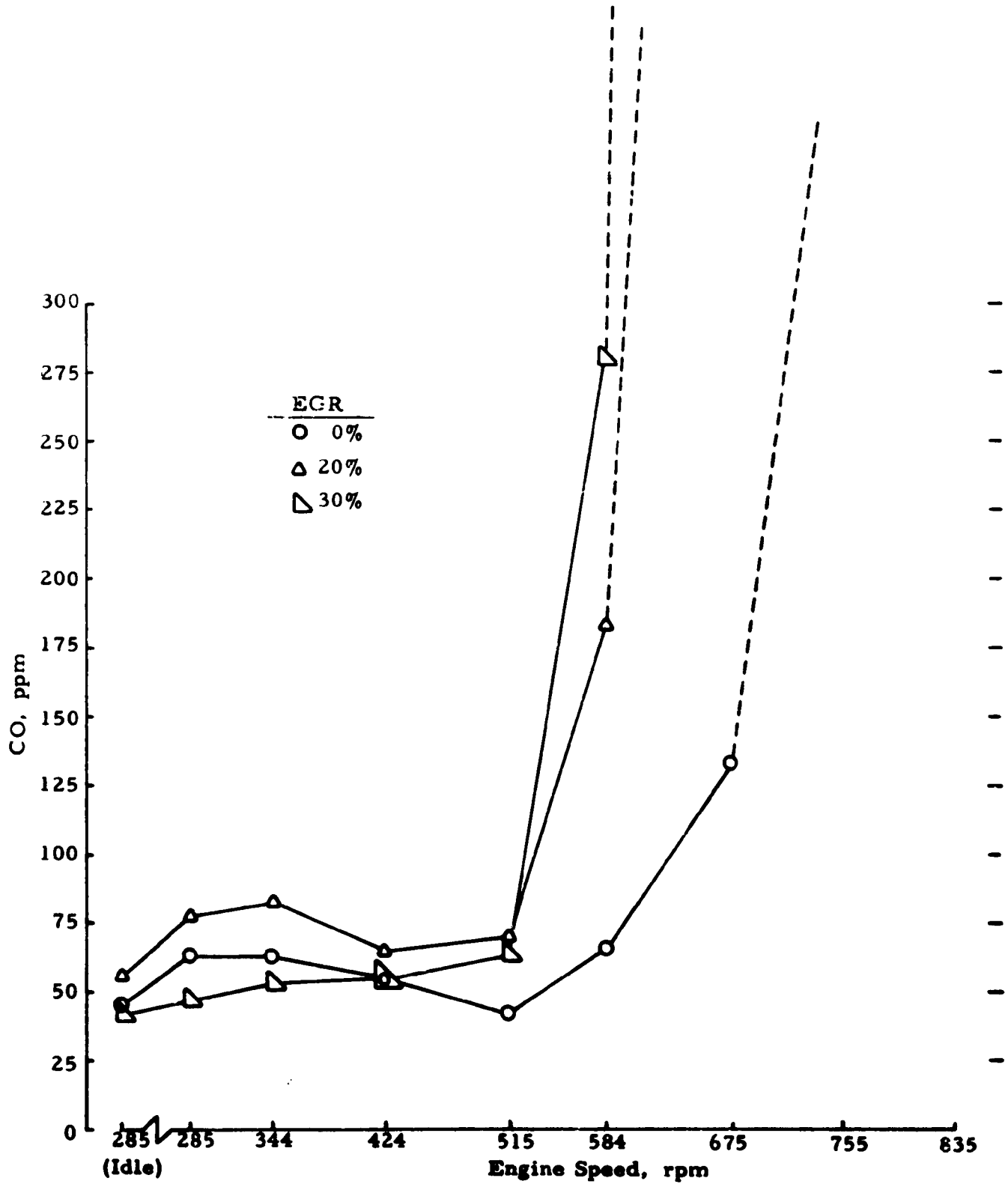

FIGURE C-77. MODAL CO CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

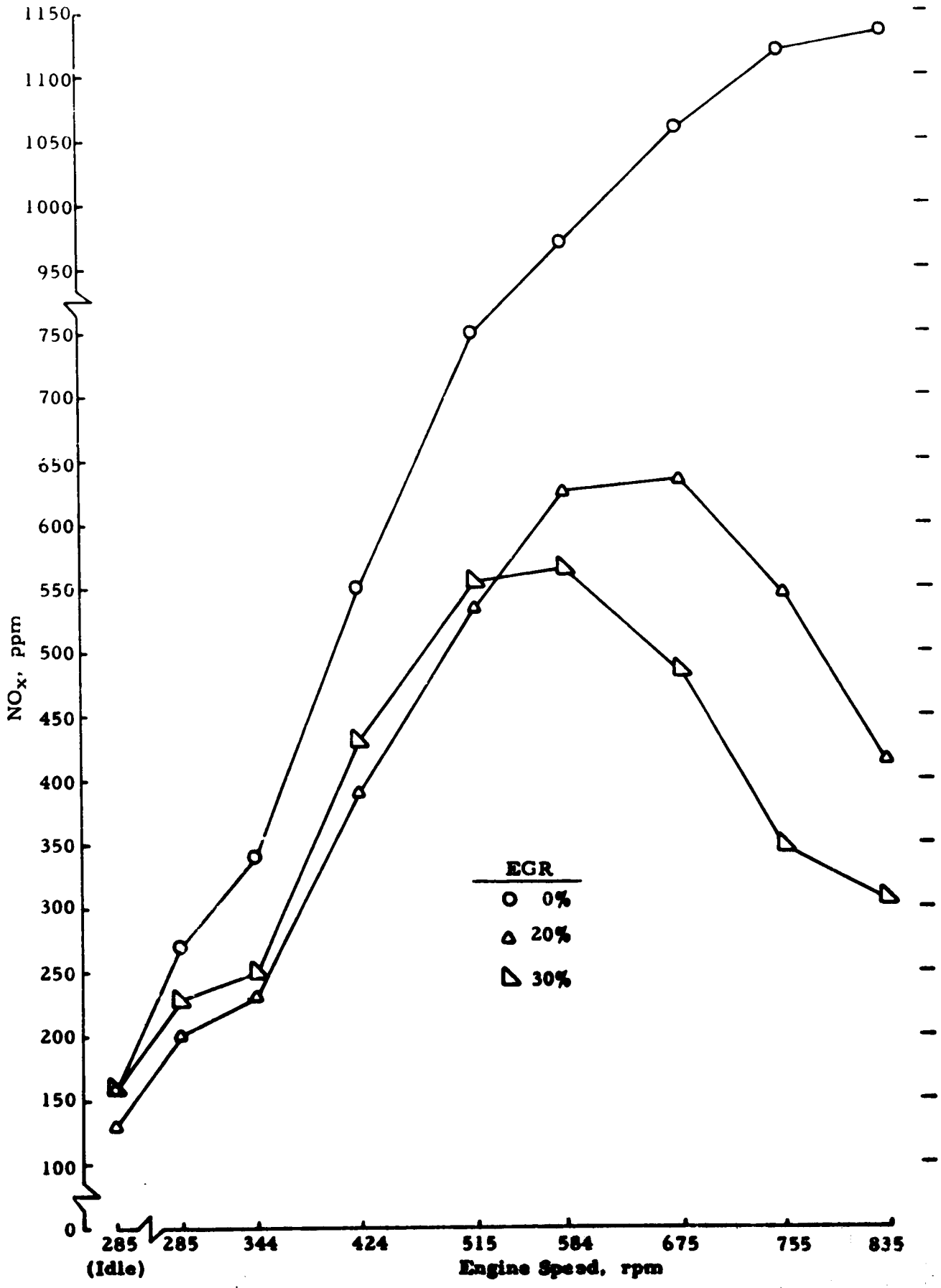

FIGURE C-78. MODAL NO_x CONCENTRATIONS FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

TABLE C-17. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR NEEDLE-VALVE INJECTORS, STANDARD TIMING, AND HOT EGR

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Hot EGR*				
1, 6, 11	285	-	-	-	5.60	4.60	16.52
2	285	3.51	3.70	14.53	3.54	3.65	14.61
3	344	1.80	2.06	9.22	2.68	3.05	13.79
4	424	1.06	0.85	8.47	2.07	1.68	16.54
5	515	0.94	0.61	9.41	1.96	1.28	19.69
7	584	0.81	0.70	10.17	1.71	1.53	22.27
8	675	0.89	1.92	10.52	1.94	4.20	23.00
9	755	0.93	5.46	9.75	2.03	11.89	21.28
10	835	0.92	12.70	9.12	1.92	26.55	19.06
			10% Hot EGR*				
1, 6, 11	285	-	-	-	4.76	6.62	23.13
2	285	1.16	2.00	9.87	1.94	3.33	16.44
3	344	0.84	1.35	8.40	1.58	2.50	15.75
4	424	0.62	0.68	8.07	1.32	1.44	17.15
5	515	0.62	0.77	8.14	1.34	1.68	17.80
7	584	0.61	1.44	8.76	1.38	3.24	19.70
8	675	0.67	3.56	8.65	1.48	7.92	19.26
9	755	0.75	8.00	8.00	1.64	17.56	17.56
10	835	0.78	22.20	6.88	1.60	45.79	14.20
			20% Hot EGR*				
1, 6, 11	285	-	-	-	4.37	5.80	20.35
2	285	1.07	1.78	8.17	1.79	3.00	13.75
3	344	0.81	1.10	7.19	1.49	2.00	13.21
4	424	0.57	0.62	6.19	1.19	1.30	13.05
5	515	0.59	0.70	6.59	1.29	1.53	14.52
7	584	0.57	1.81	6.91	1.27	4.06	15.48
8	675	0.64	5.00	6.19	1.41	10.95	13.54
9	755	0.70	15.71	5.01	1.48	32.94	10.50
10	835	0.76	33.89	4.47	1.50	66.59	8.87
			30% Hot EGR*				
1, 6, 11	285	-	-	-	4.62	5.65	18.29
2	285	0.96	1.44	6.88	1.82	2.71	12.96
3	344	0.72	1.12	6.36	1.38	2.16	12.30
4	424	0.48	0.60	5.51	1.04	1.31	12.10
5	515	0.56	0.68	5.02	1.00	1.49	11.05
7	584	0.50	1.86	4.88	1.12	4.18	10.98
8	675	0.60	7.84	3.92	1.30	16.91	8.45
9	755	0.76	32.64	2.98	1.51	65.28	5.96
10	835	0.90	75.62	2.14	1.56	132.59	3.74

*Percent of air flow mass requirement per mode.

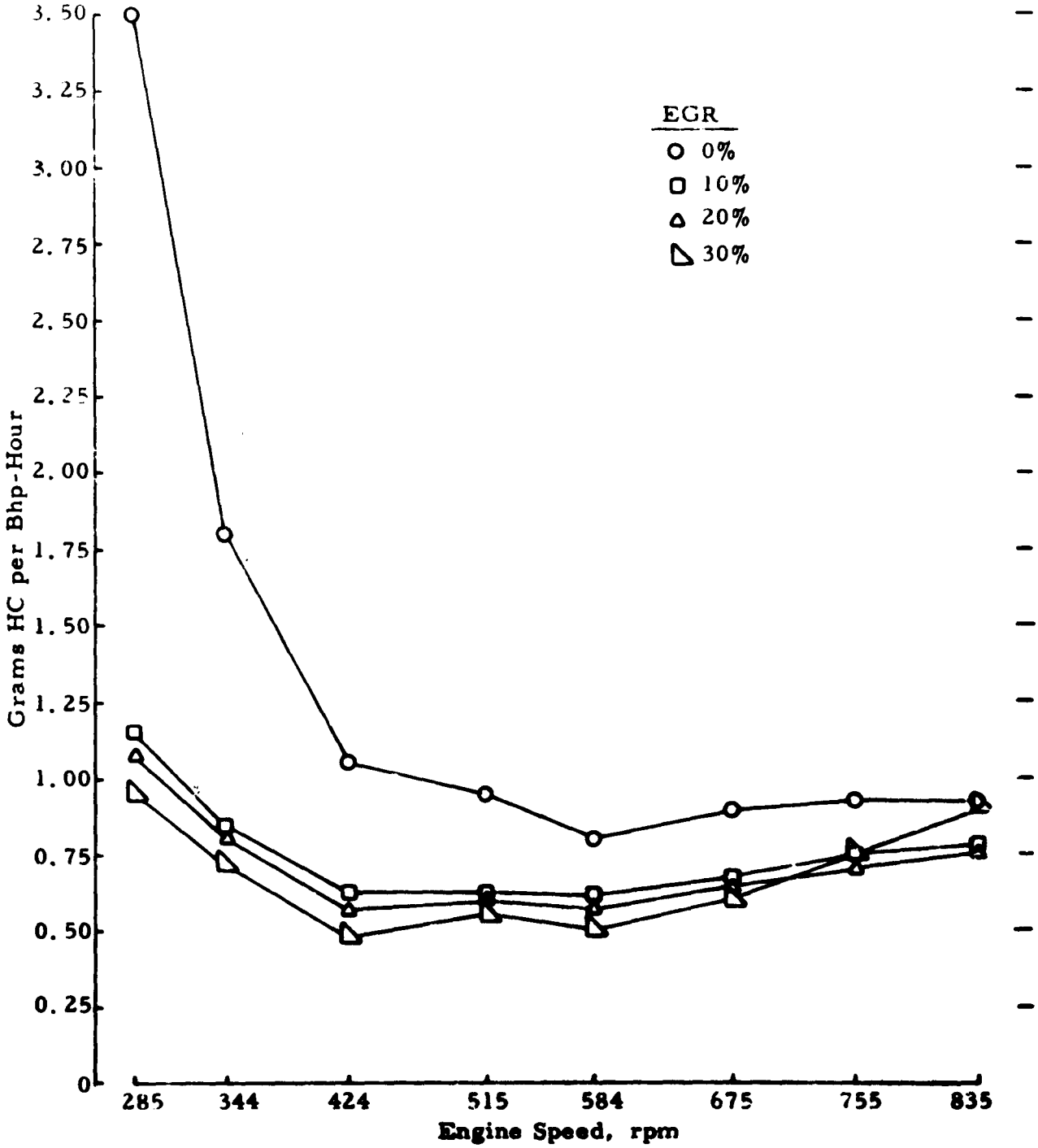

FIGURE C-79. MODAL BRAKE SPECIFIC HC FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

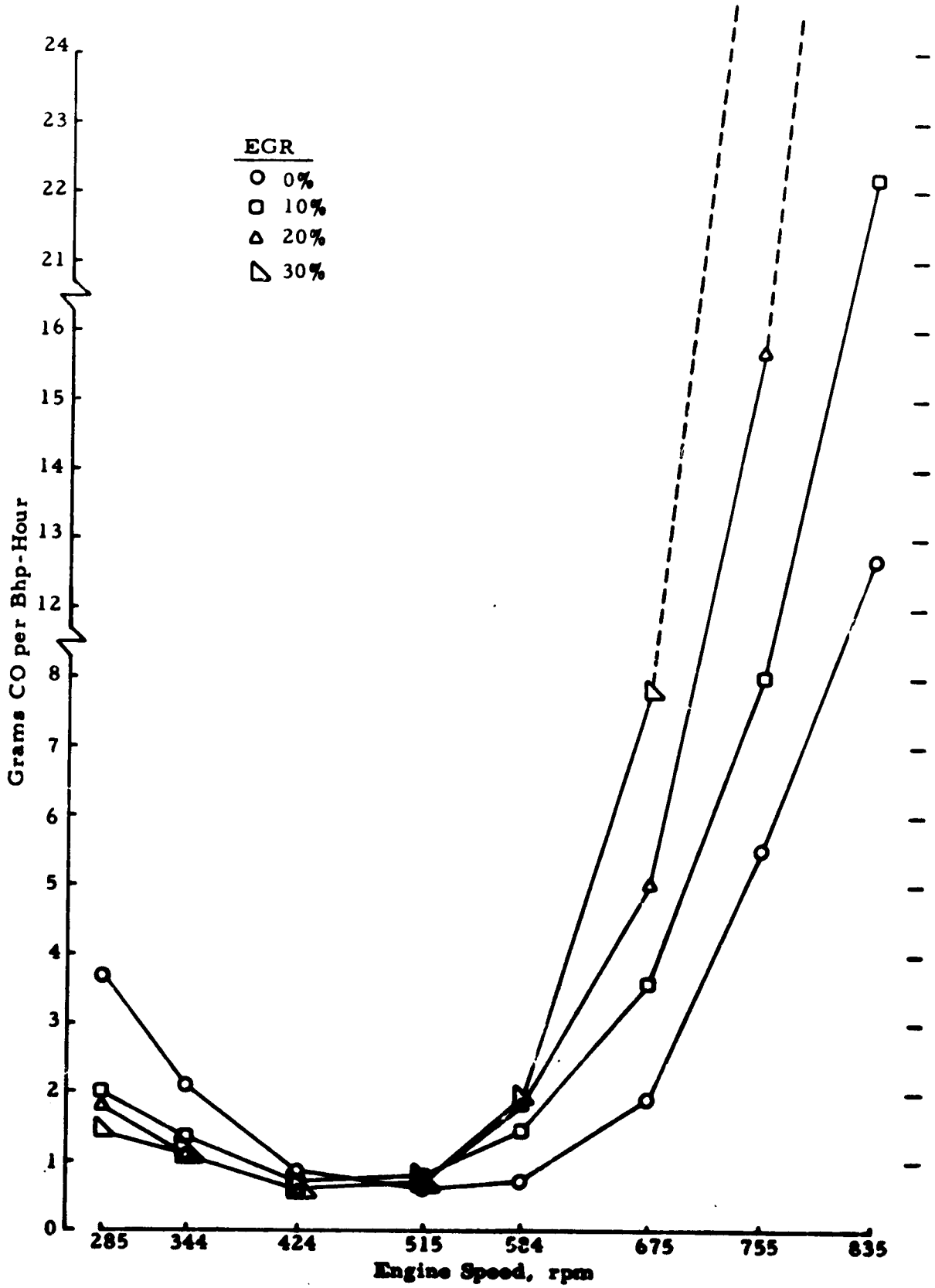

FIGURE C-80. MODAL BRAKE SPECIFIC CO FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

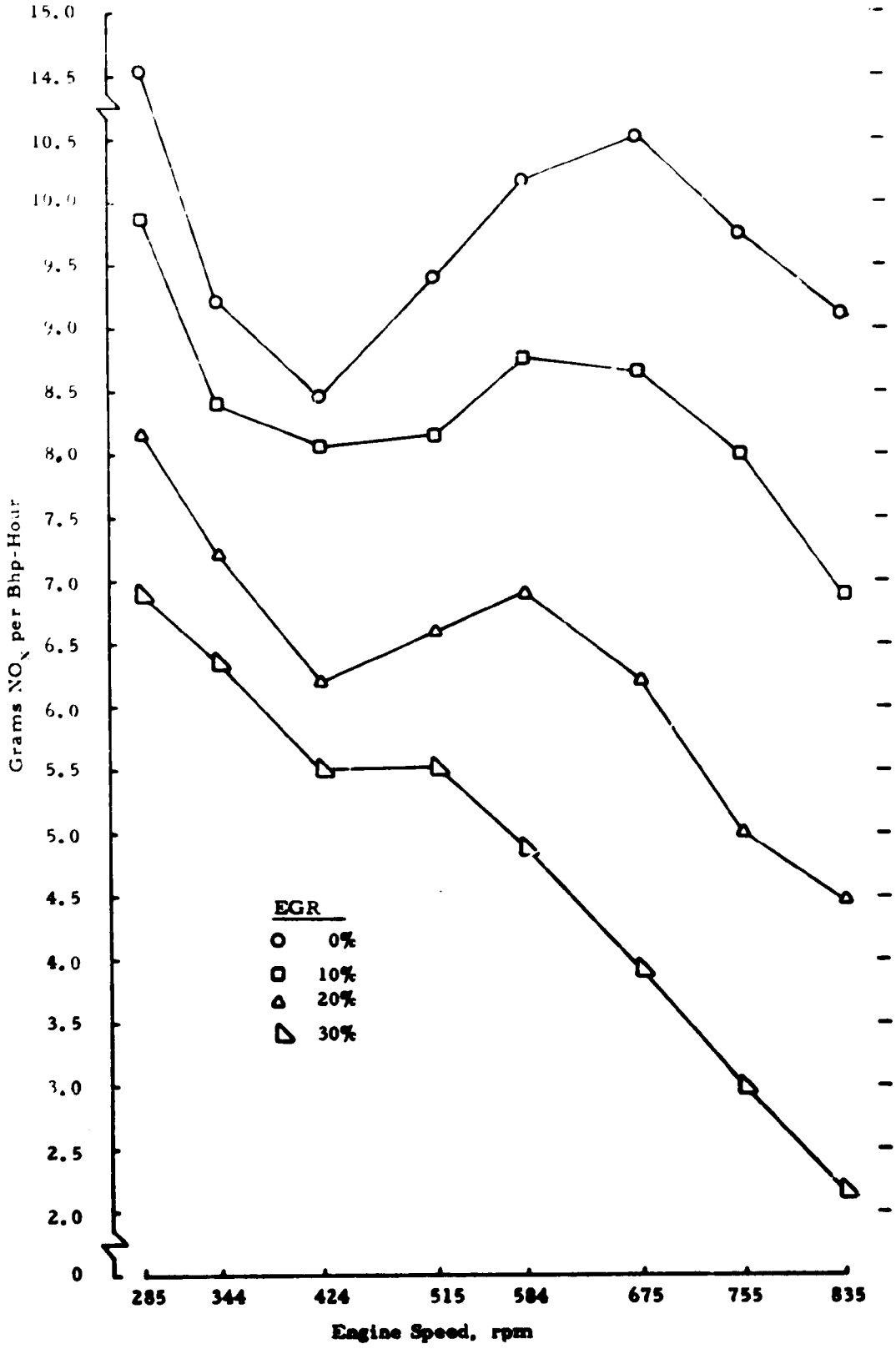

FIGURE C-81. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

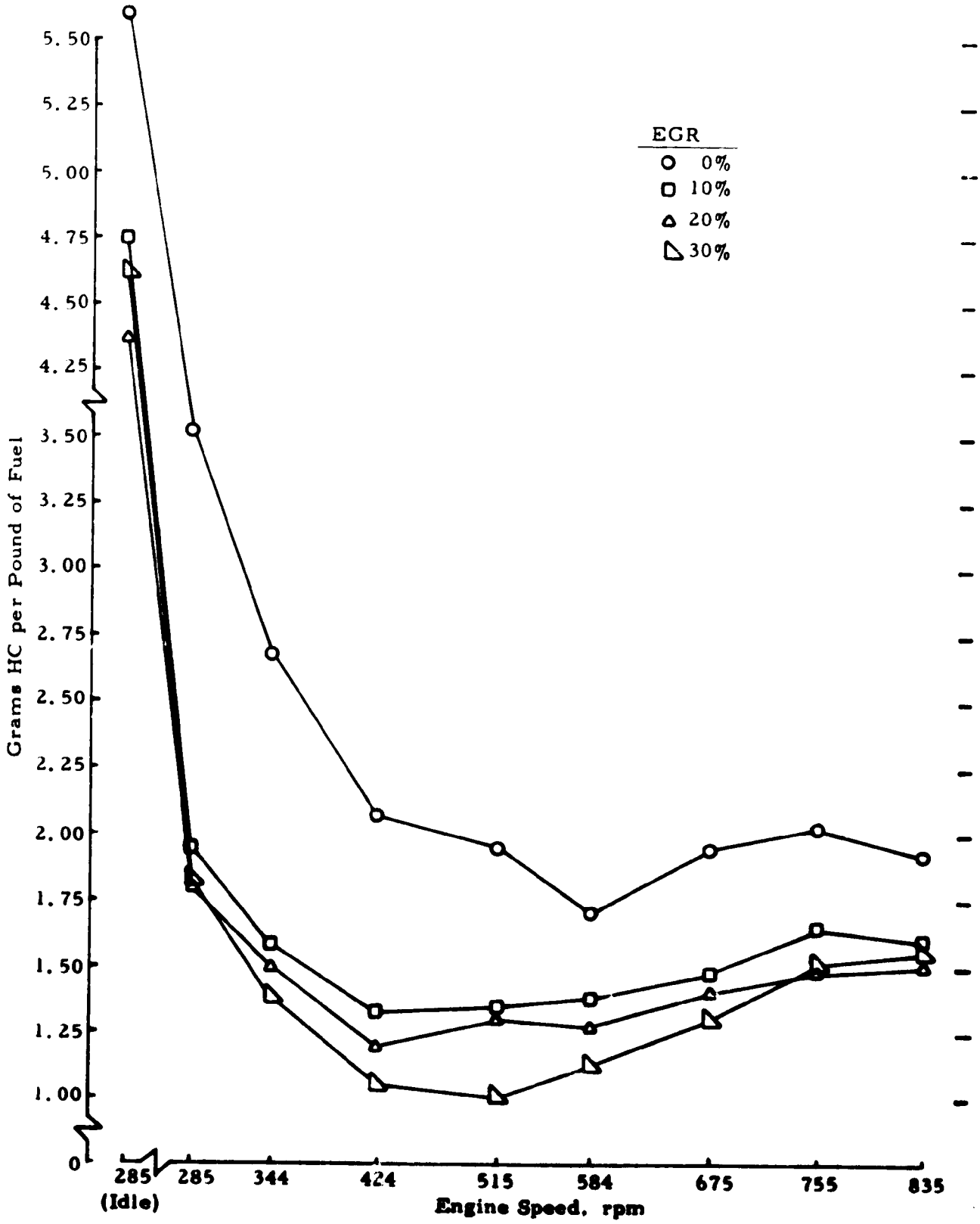

FIGURE C-82. MODAL FUEL SPECIFIC HC FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

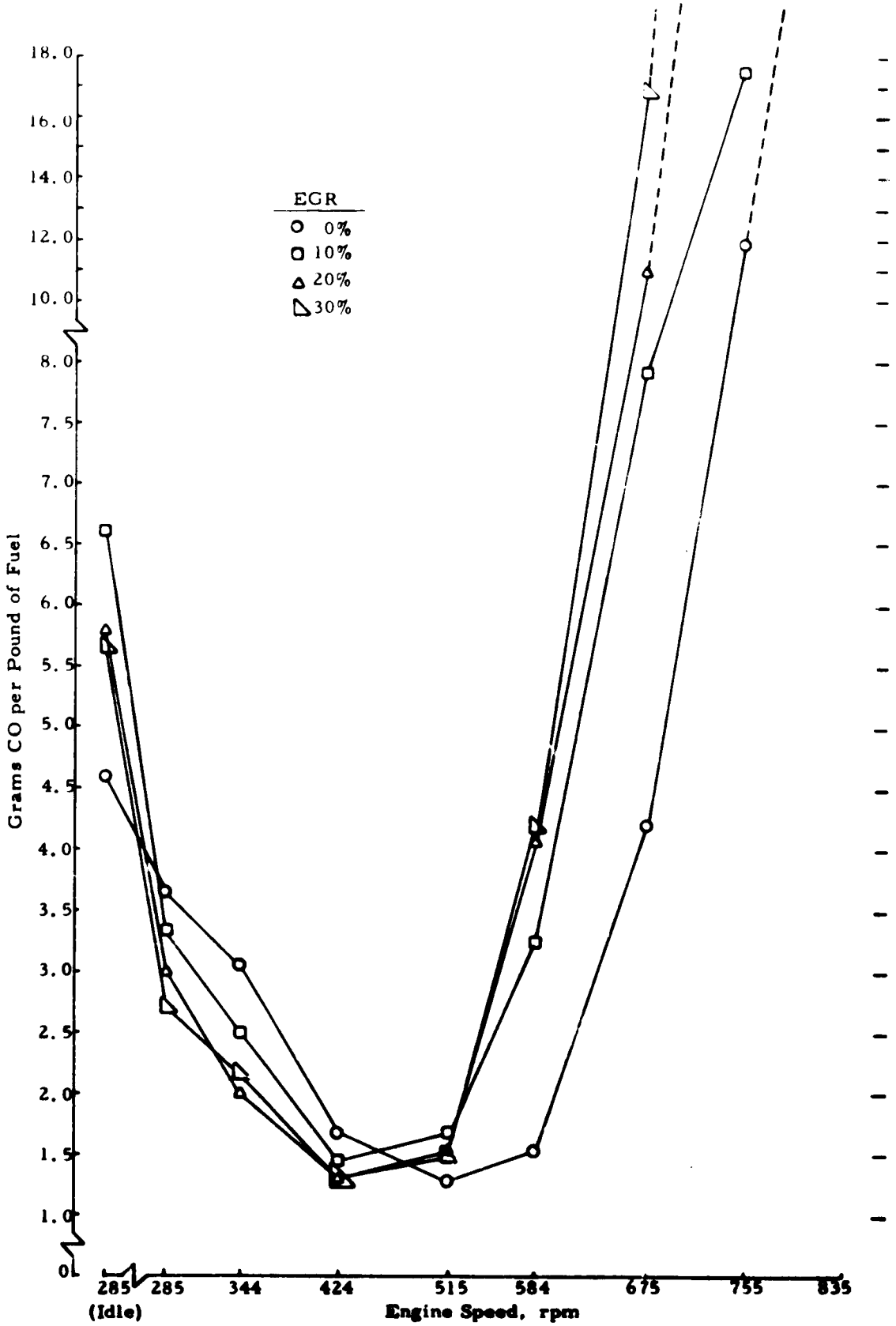

FIGURE C-83. MODAL FUEL SPECIFIC CO FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

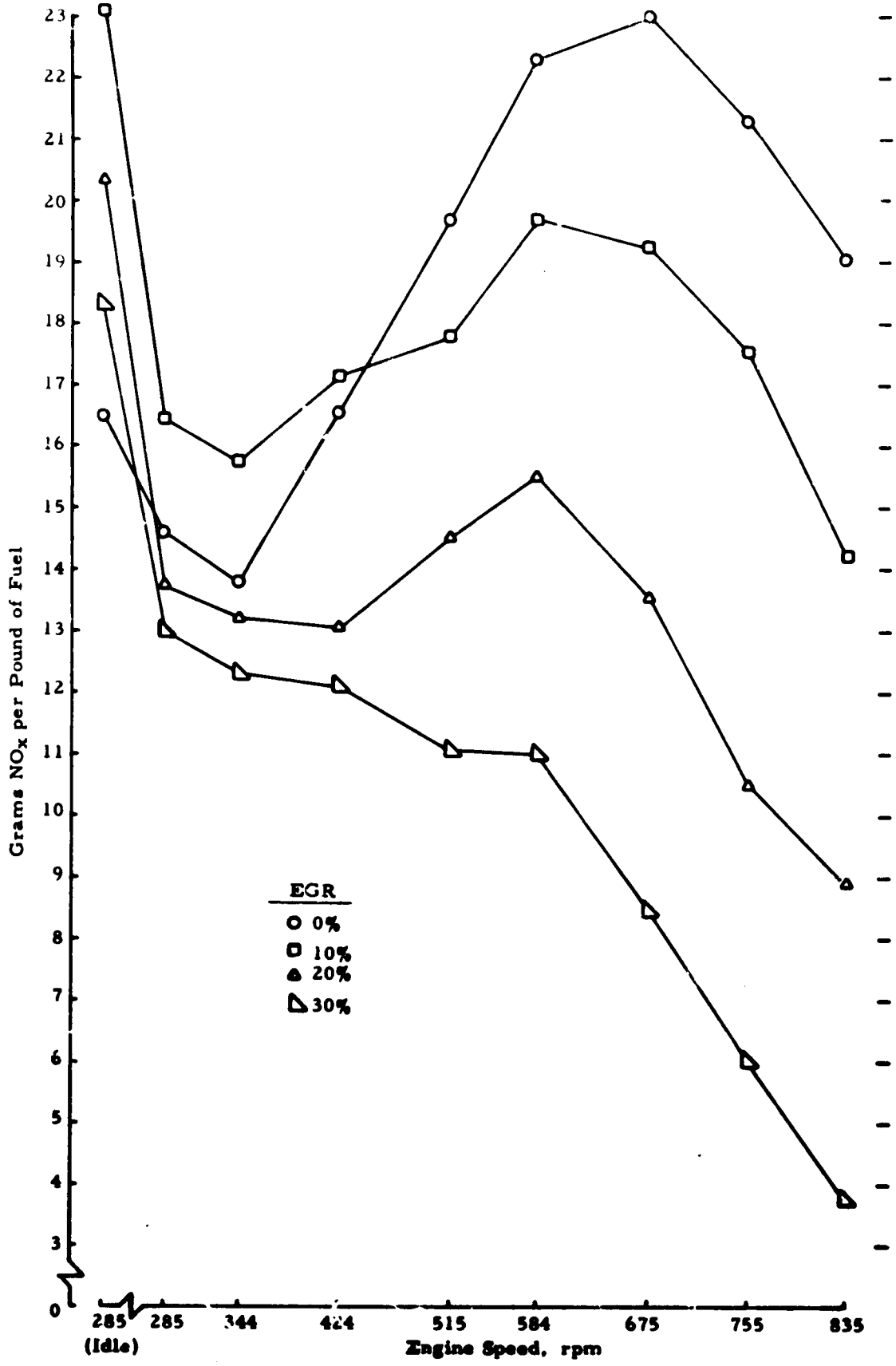

FIGURE C-84. MODAL FUEL SPECIFIC NO_x FOR VARIOUS RATES OF HOT EGR--NEEDLE-VALVE INJECTORS AT STANDARD TIMING

TABLE C-18. MODAL BRAKE SPECIFIC AND FUEL SPECIFIC EMISSIONS FOR LOW-SAC INJECTORS, STANDARD TIMING, AND HOT EGR

Mode	Engine Speed, rpm	Grams/Bhp-Hour			Grams/Pound of Fuel		
		HC	CO	NO_x	HC	CO	NO_x
			0% Hot EGR*				
1, 6, 11	285	-	-	-	3.86	5.08	29.32
2	285	0.71	1.81	12.79	1.28	3.24	22.92
3	344	0.61	1.25	11.23	1.22	2.49	22.38
4	424	0.46	0.69	11.41	1.03	1.55	25.72
5	515	0.41	0.44	12.87	0.99	1.02	29.84
7	584	0.42	0.56	13.82	0.99	1.31	32.29
8	675	0.49	1.04	13.61	1.14	2.40	31.47
9	755	0.54	3.28	13.61	1.24	7.56	30.27
10	835	0.60	8.86	12.19	1.32	19.75	27.19
			20% Hot EGR*				
1, 6, 11	285	-	-	-	2.67	5.70	21.87
2	285	0.59	1.71	7.45	1.15	3.34	14.55
3	344	0.47	1.32	6.04	0.97	2.75	12.56
4	424	0.32	0.65	6.56	0.74	1.49	15.12
5	515	0.29	0.56	7.23	0.68	1.32	16.90
7	584	0.27	1.27	7.15	0.65	3.03	17.06
8	675	0.35	4.00	6.59	0.81	9.20	15.18
9	755	0.36	16.21	5.45	1.09	35.20	11.83
10	835	0.43	42.73	4.19	0.81	80.91	7.91
			30% Hot EGR*				
1, 6, 11	285	-	-	-	3.49	4.08	24.59
2	285	0.74	1.02	8.20	1.29	1.74	14.31
3	344	0.59	0.85	6.59	1.08	1.55	12.17
4	424	0.39	0.45	6.20	0.91	1.07	14.61
5	515	0.35	0.47	6.71	0.85	1.11	16.04
7	584	0.37	1.74	5.77	0.87	4.12	13.75
8	675	0.50	9.49	4.81	1.13	21.21	10.79
9	755	0.50	34.12	3.45	1.02	69.75	7.05
10	835	0.55	82.51	3.03	1.00	149.01	5.46

*Percent of engine air flow mass requirement per mode.

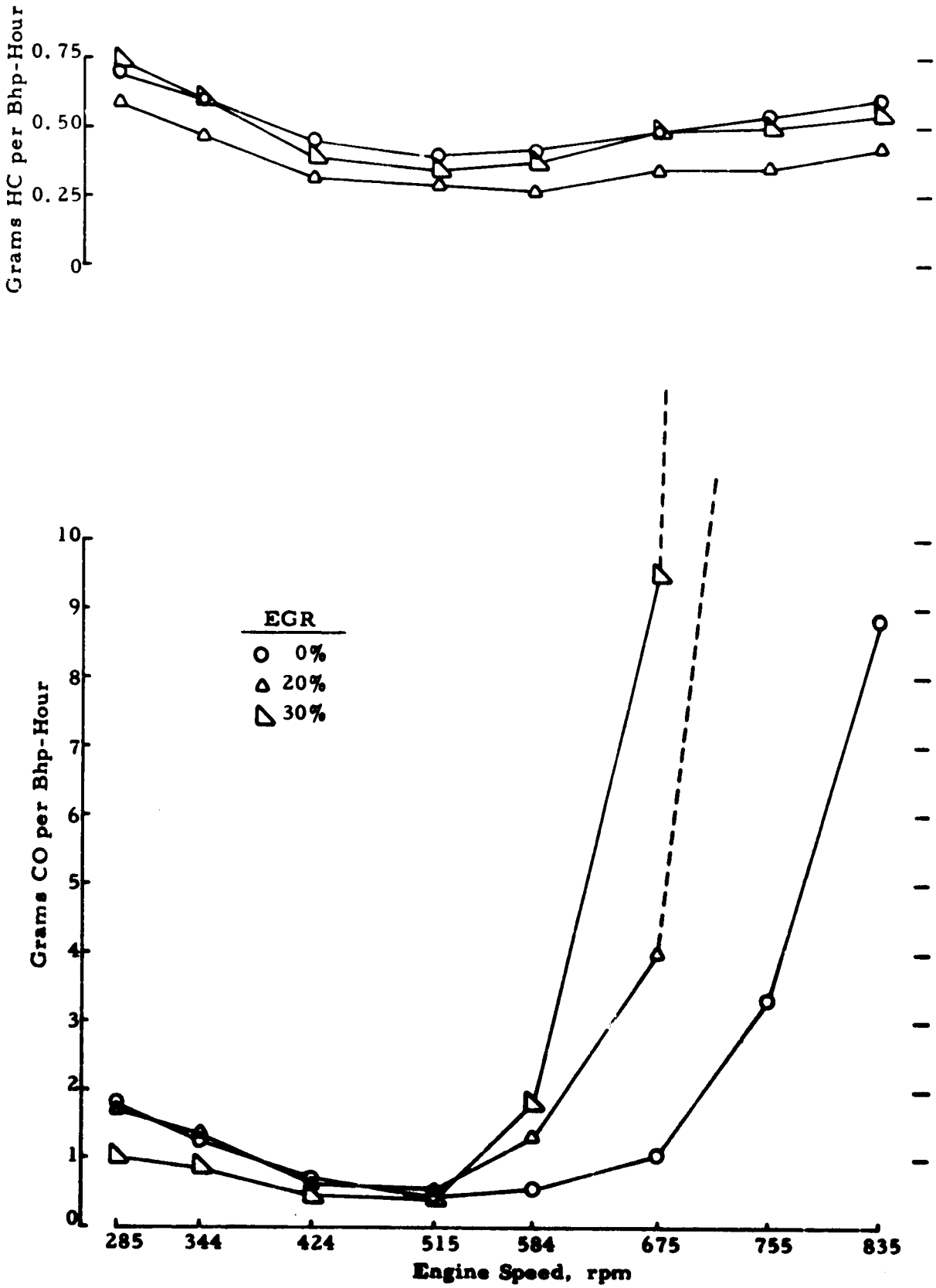

FIGURE C-85. MODAL BRAKE SPECIFIC HC AND CO FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

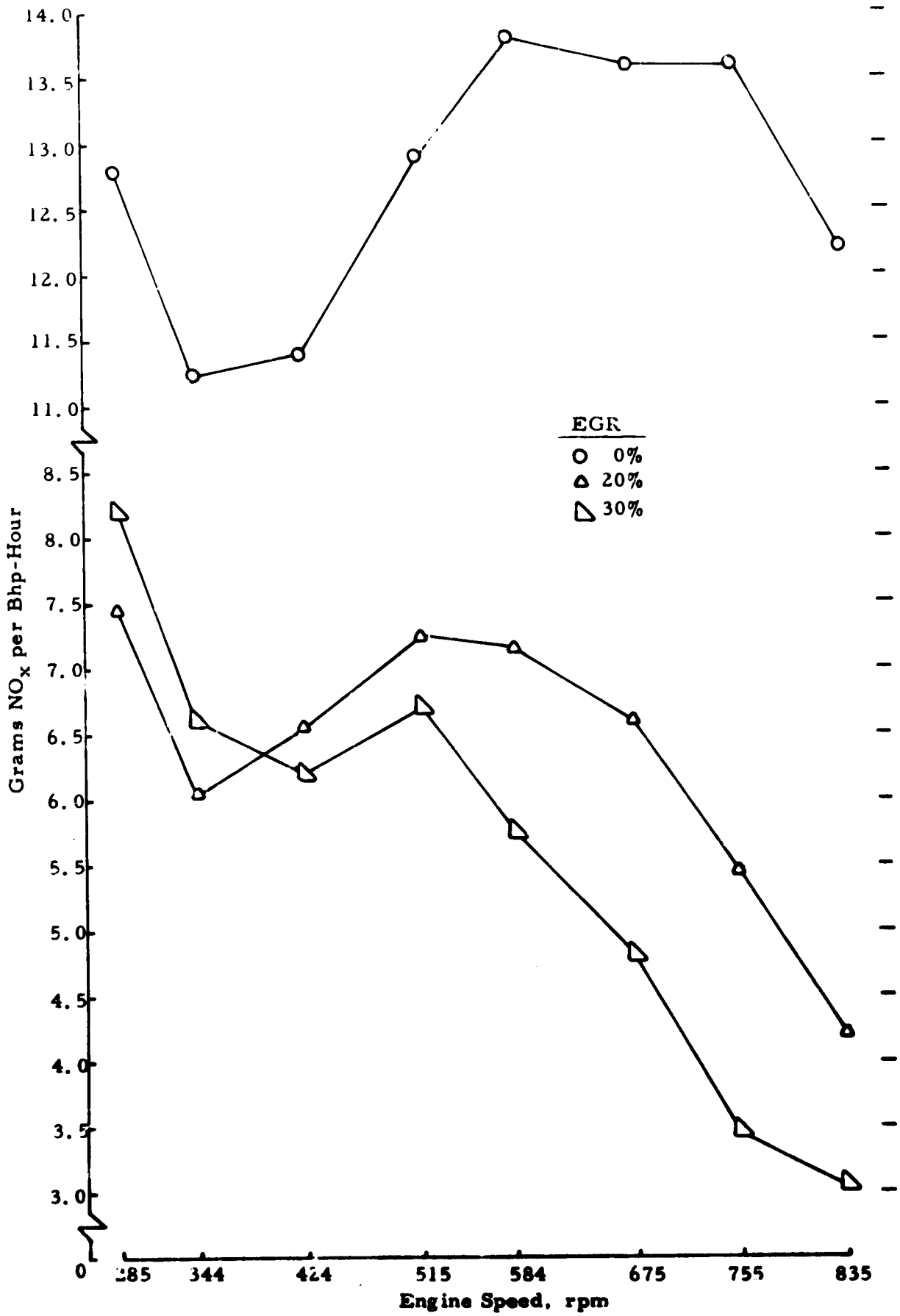

FIGURE C-86. MODAL BRAKE SPECIFIC NO_x FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

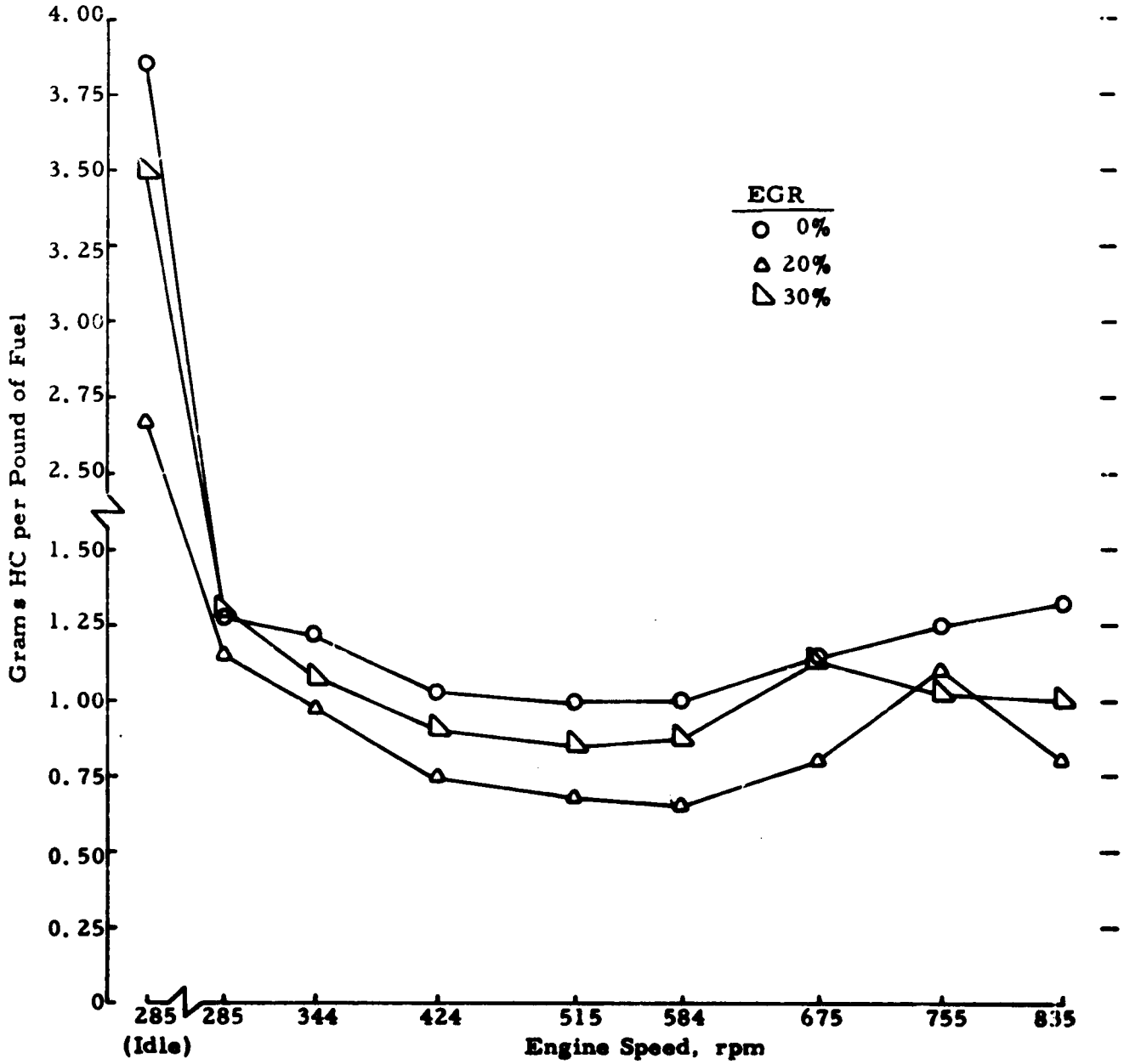

FIGURE C-87. MODAL FUEL SPECIFIC HC FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

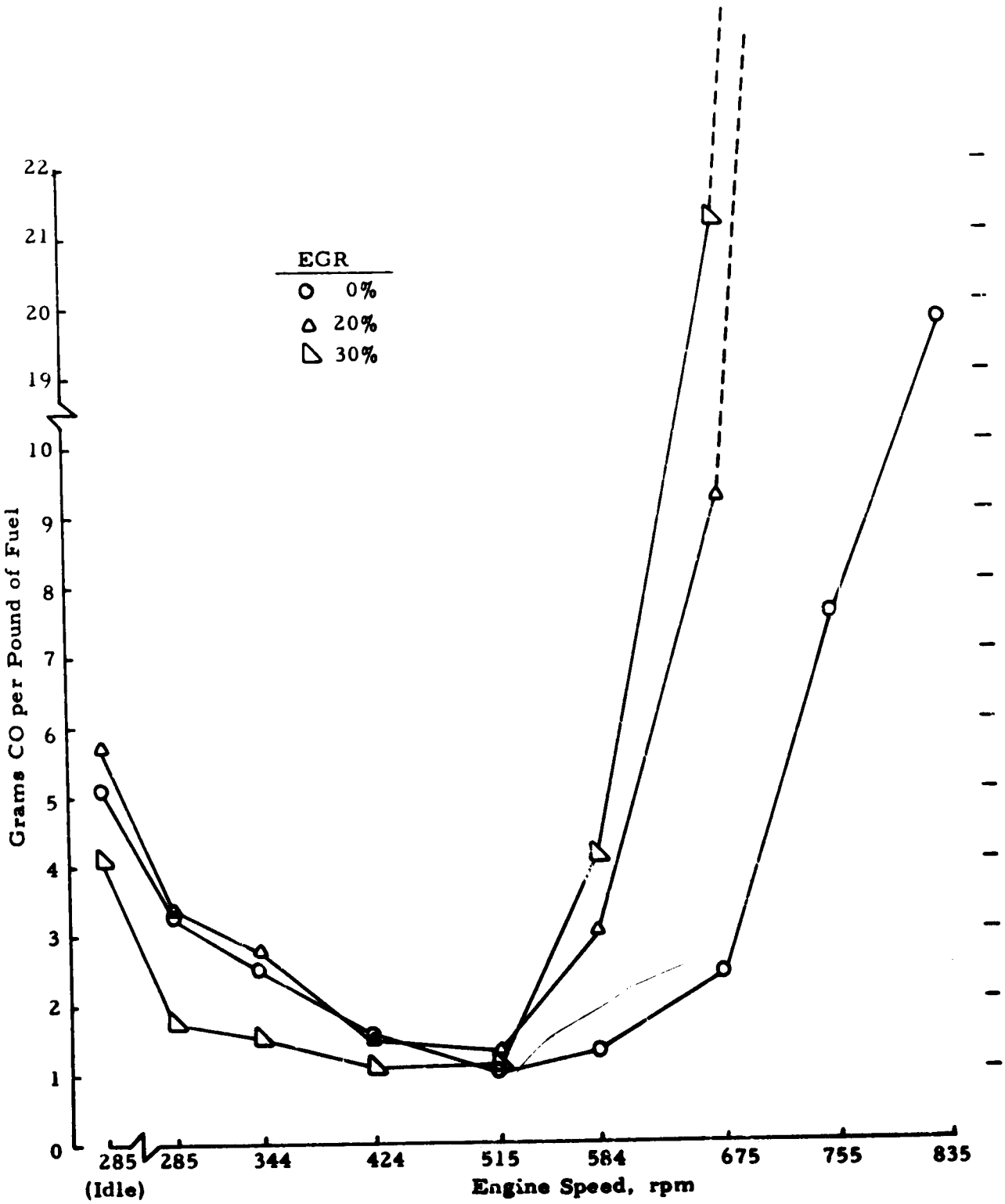

FIGURE C-88. MODAL FUEL SPECIFIC CO FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING

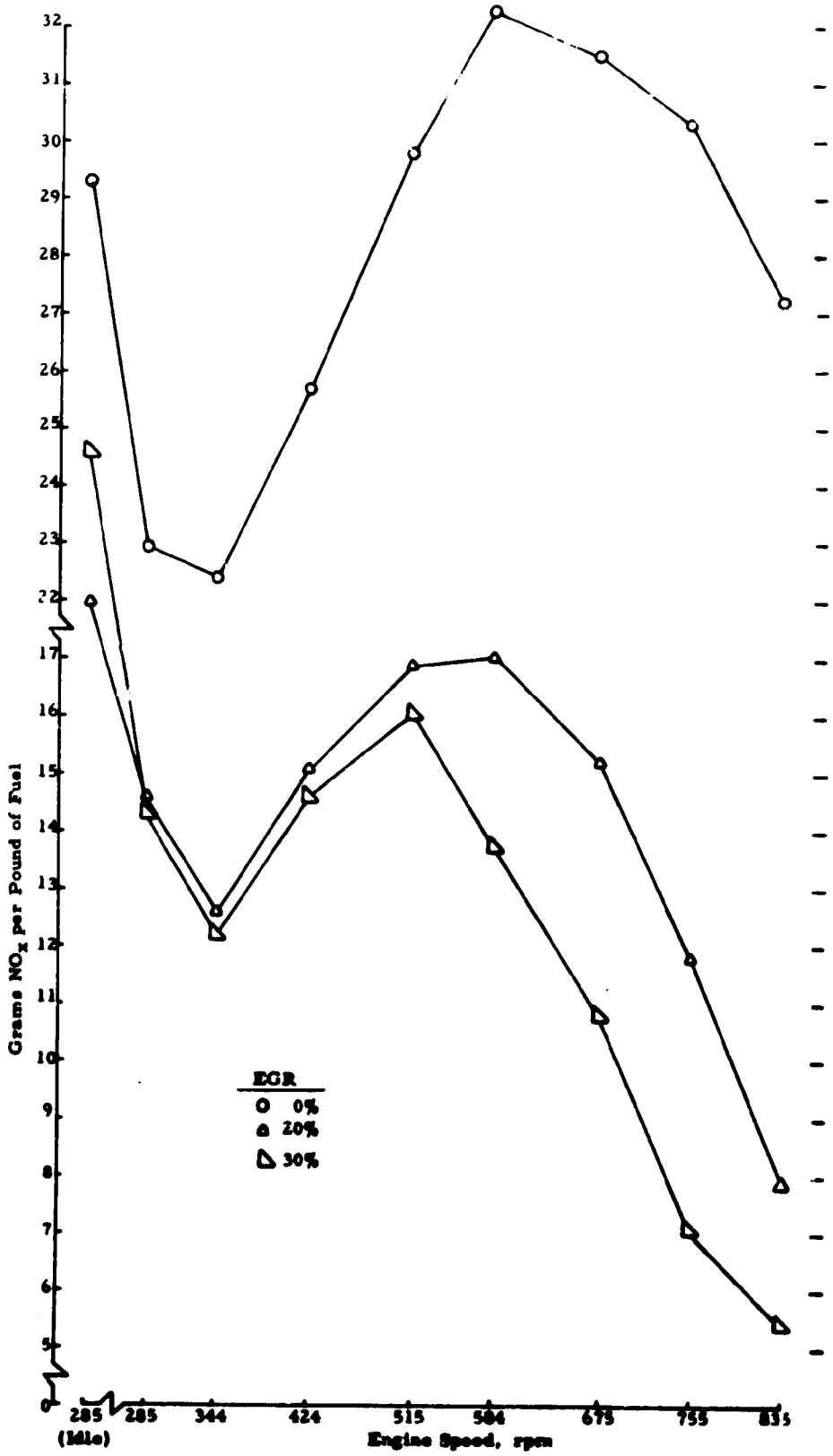

FIGURE C-89. MODAL FUEL SPECIFIC NO_x FOR VARIOUS RATES OF HOT EGR--LOW-SAC INJECTORS AT STANDARD TIMING