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BASELINE
FUEL ECONOMY AND EMISSIONS TESTS
OF A
CHRYSLER 1978, 225CID ENGINE

G. GAGNE, M. BELL, AND R. WALTER

U.S. DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
TRANSPORTATION SYSTEMS CENTER
CAMBRIDGE MA 02142



FINAL REPORT
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16. Abstract This document reports on baseline engine tests of a Chrysler 1978, 225 CID, six-cylinder engine. The tests were conducted in the Automotive Research Laboratory at the Transportation Systems Center. Test results presented herein are also filed on computer-based tapes (9-track ASC II) and are available from the National Technical Information Services (NTIS).			
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PREFACE

This report presents the baseline, steady-state test results of a 1978 Chrysler 225 CID engine. This work was performed in the Automotive Research Laboratory at the Transportation Systems Center of the U.S. Department of Transportation. This work is in support of the Automotive Fuel Economy Research and Analysis Support Program for NHTSA's Technology Assessment Division, Office of Passenger Vehicle Research. The authors gratefully acknowledge the technical support of Ralph Colello, Dr. Thomas Trella, Russell Zub, and Norman Deserres.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol When You Know Multiply by To Find Symbol

LENGTH

in	inches	2.5	cm
ft	feet	30	cm
yd	yards	0.9	m
mi	miles	1.6	km

AREA

in ²	square inches	6.5	cm ²
ft ²	square feet	0.09	m ²
yd ²	square yards	0.8	m ²
mi ²	square miles	2.6	km ²
	acres	0.4	ha

MASS (weight)

oz	ounces	28	grams
lb	pounds	0.45	kg
	short tons (2000 lb)	0.9	t

VOLUME

ts	teaspoon	5	ml
Tsp	tablespoon	15	ml
fl oz	fluid ounces	30	ml
c	cups	0.24	liters
p	pints	0.47	liters
qt	quarts	0.95	liters
gal	gallons	3.8	liters
ft ³	cubic feet	0.03	m ³
yd ³	cubic yards	0.76	m ³

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	°C	Celsius temperature
----	------------------------	----------------------------	----	---------------------

Approximate Conversions from Metric Measures

Symbol When You Know Multiply by To Find Symbol

LENGTH

mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	yards	yd
		0.6	miles	mi

AREA

cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	ac

MASS (weight)

g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	sh

VOLUME

ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
		1.06	quarts	qt
		0.26	gallons	gal
m ³	cubic meters	36	cubic feet	ft ³
		1.3	cubic yards	yd ³

TEMPERATURE (exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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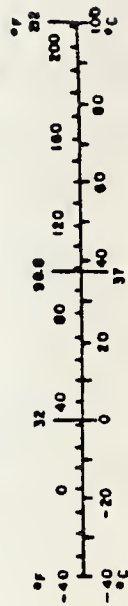


TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1. INTRODUCTION.....	1
2. EXPERIMENTAL DESIGN.....	2
2.1 Engine.....	2
2.2 Test Configuration.....	3
2.2.1 Instrumentation.....	7
2.2.2 Data Acquisition.....	7
2.3 Baseline Test Matrix.....	7
3. TEST PROCEDURES.....	12
4. DATA REDUCTION.....	13
5. TEST RESULTS.....	14
APPENDIX A - DATA REDUCTION EQUATIONS.....	A-1
APPENDIX B - CHRYSLER 225 CID TEST DATA AND REDUCED TEST DATA.....	B-1

LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Page</u>
1. ELECTRONIC FLOW DIAGRAM.....	4
2. CELL NO. 2 TEST ENGINE FLUID CONTROL.....	5
3. TEST CELL NO. 2 LAYOUT.....	6
4. DISTRIBUTOR ADVANCE CHARACTERISTICS.....	9
5. MEASURED VACUUM ACTUATOR.....	10
6. CORRECTED BHP, TORQUE, AND BSFC VS WIDE-OPEN THROTTLE.....	15
7. FUEL CONSUMPTION VS POWER.....	16
8. AIR-FUEL RATIO VS POWER.....	17
9. EGR VS POWER.....	18

LIST OF ILLUSTRATIONS (CONTINUED)

<u>Figure</u>		<u>Page</u>
10.	CO VS POWER.....	19
11.	HC VS POWER.....	20
12.	NOx VS POWER.....	21

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1.	ENGINE CHARACTERISTICS.....	2
2.	CHRYSLER 225 CID ENGINE BREAK-IN SCHEDULE.....	3
3.	FUEL SPECIFICATIONS.....	3
4.	ANALOG INSTRUMENTATION.....	8
5.	STEADY-STATE BASELINE MAPPING SPEED-TORQUE VALUES..	11
B-1.	CHRYSLER 225 CID TEST DATA.....	B-2
B-2.	CHRYSLER 225 CID REDUCED TEST DATA.....	B-13

1. INTRODUCTION

The work reported details the results of baseline, steady-state testing of a 1978 Chrysler, 6-cylinder, 225 CID engine. These tests measured the fuel rate and gaseous emissions while the engine was operated on a dynamometer at 57 speed/load points.

| The objectives of this engine test are as follows:

- o Characterize the fuel economy and emissions of present and prototype automotive engines;
- o Provide an independent data base for vehicle performance modeling and fuel economy assessment.

2. EXPERIMENTAL DESIGN

This section briefly reviews the test design and highlights salient features of the Chrysler 225 CID baseline testing.

2.1 ENGINE

The manufacturers specifications for the Chrysler 225 CID engine are given in Table 1.

TABLE 1. ENGINE CHARACTERISTICS

Model Year	1978
Manufacturer	Chrysler Corp.
No. of cylinders	6
Displacement	225 CID (3.7L)
Bore	3.40 inches (86 mm)
Stroke	4.125 inches (105 mm)
Compression ratio	8.4 to 1
Max. Rated HP	109 @ 3600 rpm
Max. Rated Torque	182 @ 2000 rpm
Calibration	49 State, automatic
Transmission type	automatic
Engine weight*	564 lbs (256 kg)

This mean-tolerance engine was broken-in with the test schedule shown in Table 2. The engine came equipped with an oxidation catalyst and Exhaust Gas Recirculation (EGR) for emission control. The engine was equipped with a manual transmission fly-wheel for mounting to the dynamometer.

*Includes starter, alternator, fan, manual transmission flywheel, bell housing, wire harness, battery cables, vacuum lines, air inlet system. Does not include radiator, water hoses, exhaust pipes, muffler, engine coolant, oil.

TABLE 2. CHRYSLER 225 CID ENGINE BREAK-IN SCHEDULE

<u>Period (hr)</u>	<u>Speed (rpm)</u>	<u>Torque (lb-ft)</u>
1	1200	64.0
1	1600	94.5
1	2000	108.5
2	2400	122.5
2	2800	133.0
2	3200	136.5
2	3600	138.3(1)
2	4000	WOT (1)
1/2	4400	WOT (2)

(1) Cycle 4 min. at load, 1 min. at 1600 rpm no load

(2) Check wide-open throttle (WOT) friction from 4400 rpm down

A single batch of unleaded Indolene test fuel was used for engine break-in and testing. The gasoline specifications are shown in Table 3.

TABLE 3. FUEL SPECIFICATIONS

Amoco Unleaded Indolene

Specific Gravity ... 0.7455@60°F

Percent Carbon... 83.39

Percent Hydrogen... 12.93

H/C Atomic ratio... 1.85

Upper heating value... 19,733 BTU/lb

2.2 TEST CONFIGURATION

The engine was installed in the Automotive Research Laboratory test cell No. 2. This cell has a DC, programmable dynamometer for power absorption and motoring tests. Figures 1 and 2 show the electronic and fluid - flow configurations for the engine mounted in the cell for testing. Figure 3 is an illustration of the engine installed in the cell.

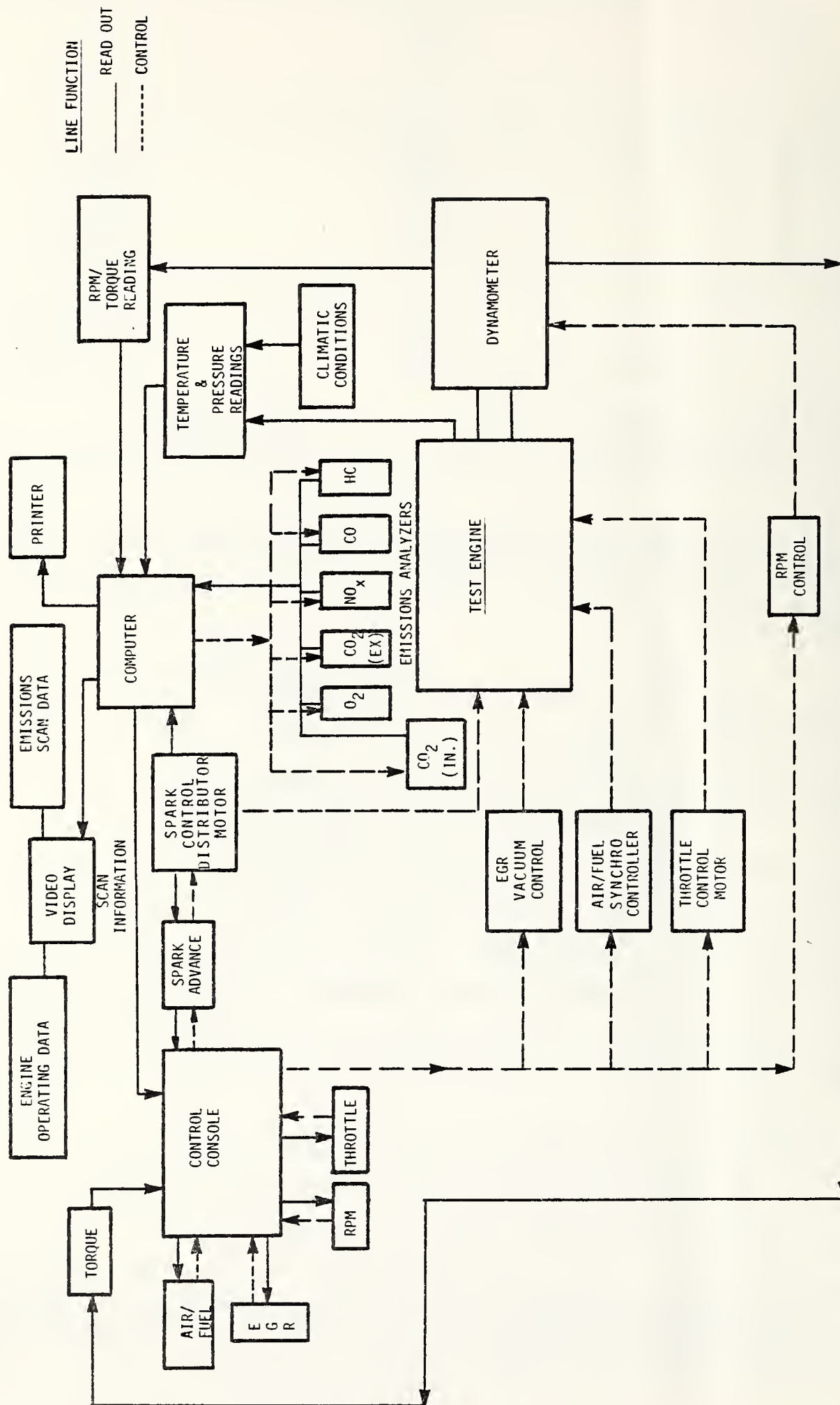


FIGURE 1. ELECTRONIC FLOW DIAGRAM

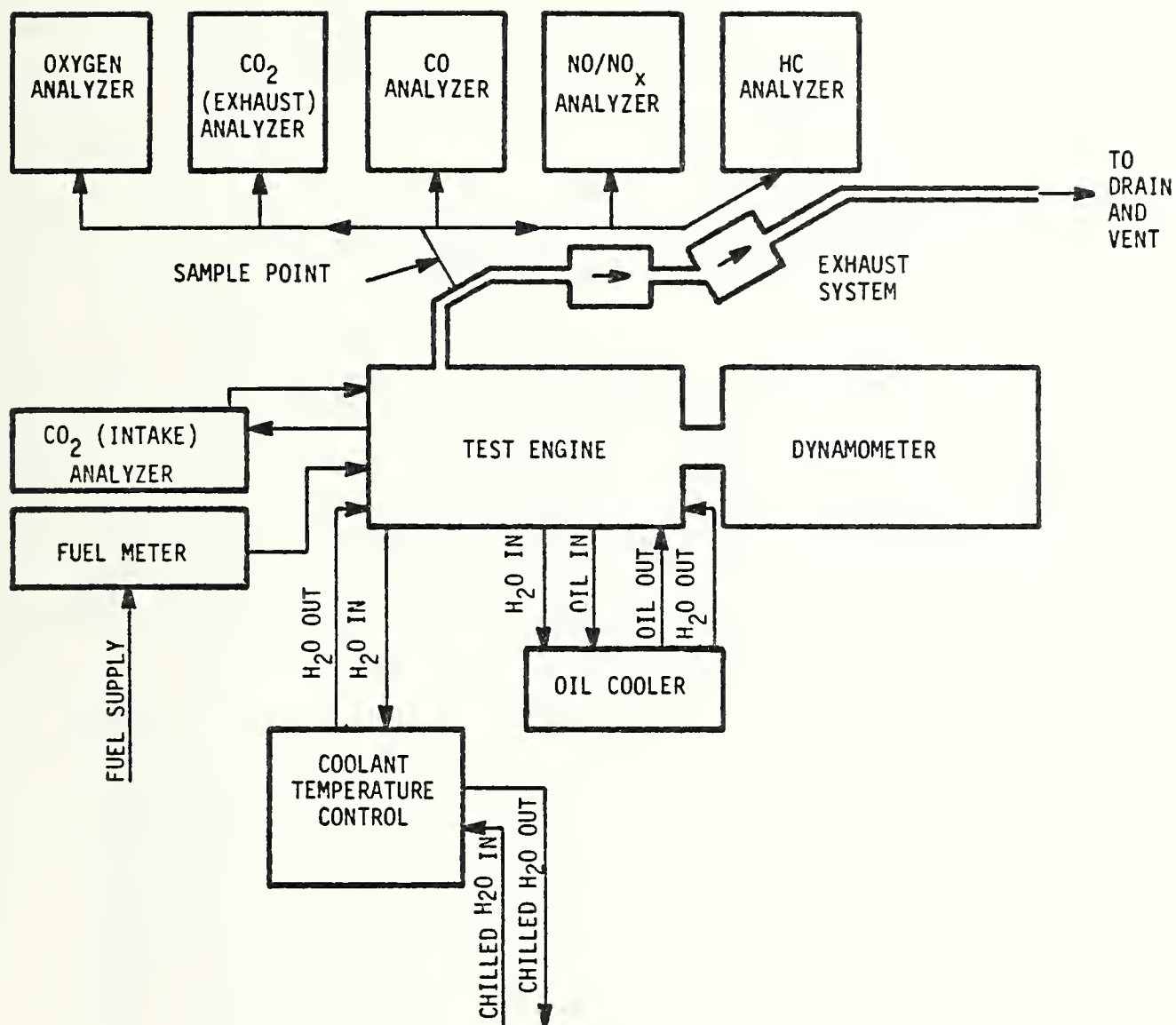


FIGURE 2. CELL NO. 2 TEST ENGINE FLUID FLOW

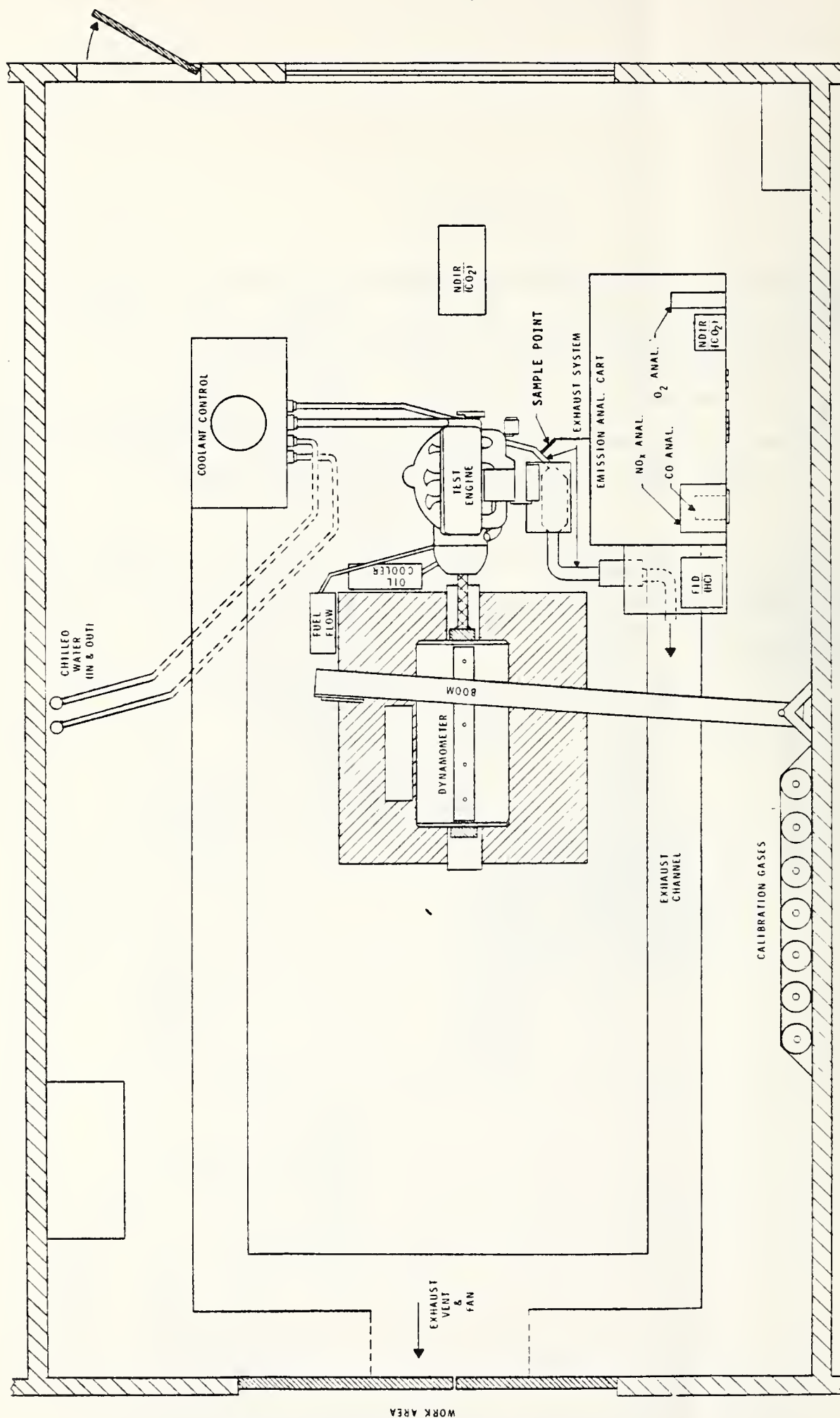


FIGURE 3. TEST CELL NO. 2 LAYOUT

Instead of the standard air cleaner, air induction was directed through a laminar-flow element connected by 4-inch ID plastic tubing to the carburetor. All engine vents (valve cover, carburetor, charcoal canister) were connected to the air-inlet system. Engine coolant and oil temperatures were maintained at $185^{\circ}\text{F} \pm 2^{\circ}\text{F}$ by external heat exchangers. Although all emissions measurements were made before the catalyst, it, as well as a muffler, were installed in the exhaust system in order to duplicate the normal engine back-pressure.

2.2.1 Instrumentation

Real-time measurements of emissions and engine performance were accomplished by the analog instrumentation shown in Table 4.

2.2.2 Data Acquisition

The data acquisition system was Hewlett-Packard 21MX mini-computer with a 45kHz A/D converter and multiplexer. Analog signals from the instrumentation shown in Table 4 were routed, along with digital speed and torque signals, to this computer. The data was continuously updated on a video display and line printer. Data was stored on a disc for subsequent reduction.

2.3 BASELINE TEXT MATRIX

The baseline data for this engine was collected by operating the engine in the steady-state mode with the factory calibrations of air-to-fuel ratio (A-F), spark advance (SA), and exhaust gas recirculation (EGR). The spark timing, distributor advance characteristics are shown in Figure 4. Figure 5 gives the EGR valve displacement versus actuation pressure. During these baseline tests the A-F varied between 13.2 and 19.8, spark advance from 10° to 24° BTDC, and EGR from 0.6% to 16.8%.

The test matrix consisted of 57 speed/load points from 750 rpm to 3600 rpm, as shown in Table 5. In general, these points correspond to 0%, 25%, 50%, 75%, and 100% of maximum positive torque and 25% and 75% of maximum negative torque. (Negative torque is obtained by motoring the powered engine with the dynamometer, thus simulating deceleration.

TABLE 4. ANALOG INSTRUMENTATION

MEASURED VARIABLE	INSTRUMENT TYPE
Oil temp.	OMEGA type K thermocouple; CJ compensator
Ambient temp.	YSI Model 46T6 Tele-thermometer
Inlet air flow	MERRIAM 50MC2-4 Laminar flow element
Inlet air diff. press.	MKS Baratron type 77
Air inlet temp.	OMEGA type K thermocouple; CJ compensator
Fuel inlet temp.	OMEGA type K thermocouple; CJ compensator
Coolant inlet temp.	OMEGA type K thermocouple; CJ compensator
Relative/Humidity	WEATHERMEASURE Model HM111
Exhaust CO	BECKMAN 864 Infrared Analyzer
Exhaust CO ₂	BECKMAN 864 Infrared Analyzer
Exhaust HC	BECKMAN 402 Hydrocarbon Analyzer
Exhaust NO _x	BECKMAN 951 Chemiluminescent Analyzer
Exhaust O ₂	BECKMAN 14330 Paramagnetic Analyzer
Intake CO ₂	BECKMAN 864 Infrared Analyzer
Manifold vacuum	TYCO type AB 15 PSI transducer
Coolant exhaust temp.	OMEGA type K thermocouple; CJ compensator
Spark timing	1.8K precision potentiometer
Peak cylinder press.	KISTLER 538A/601B1 Piezoelectric
Exhaust temp. AC	OMEGA type K thermocouple; CJ compensator
Exhaust temp. BC	OMEGA type K thermocouple; CJ compensator
Exhaust press. AC	TYCO type AB 6 PSI transducer
Exhaust press. BC	TYCO type AB 6 PSI transducer

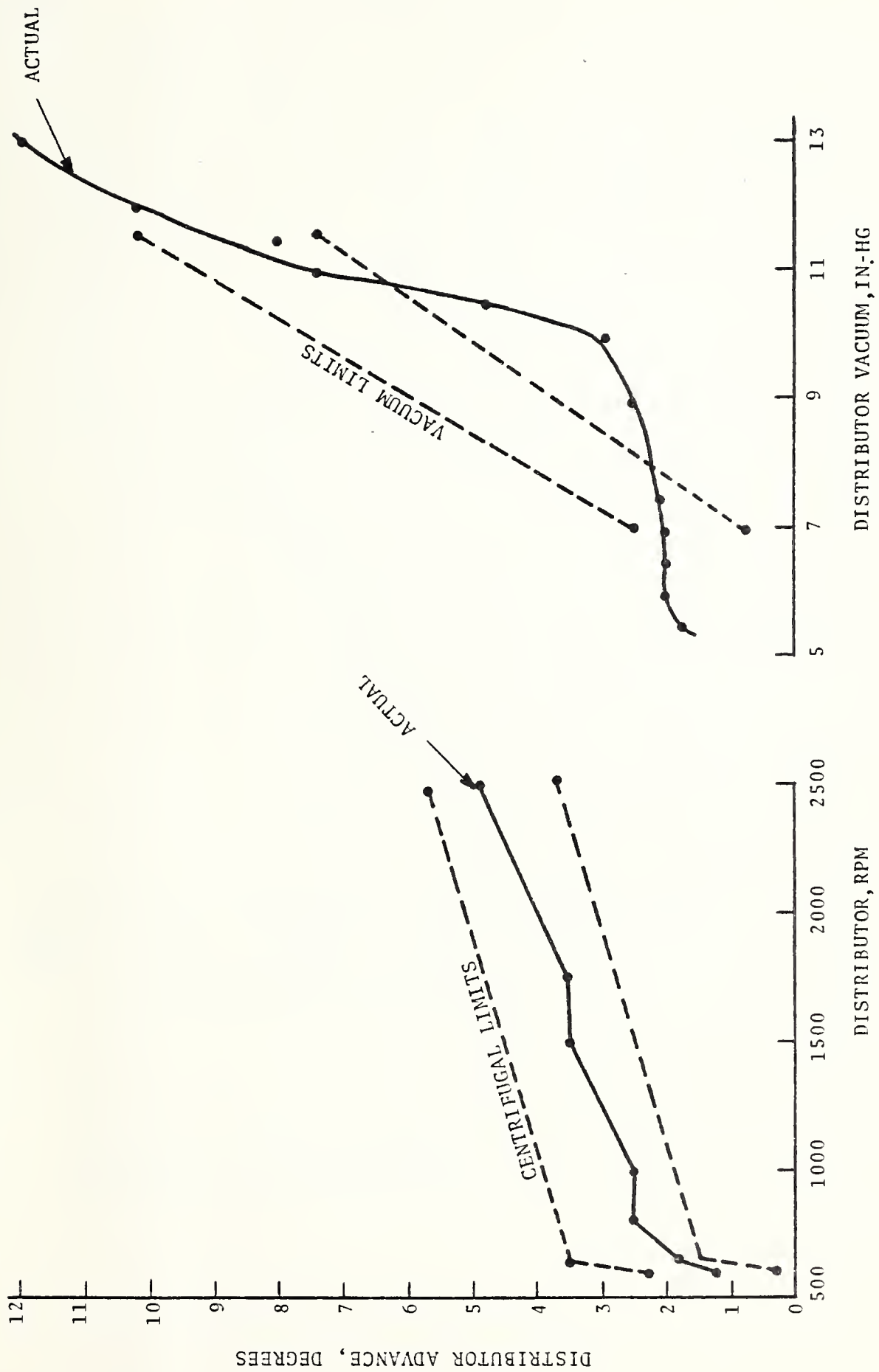


FIGURE 4. DISTRIBUTOR ADVANCE CHARACTERISTICS

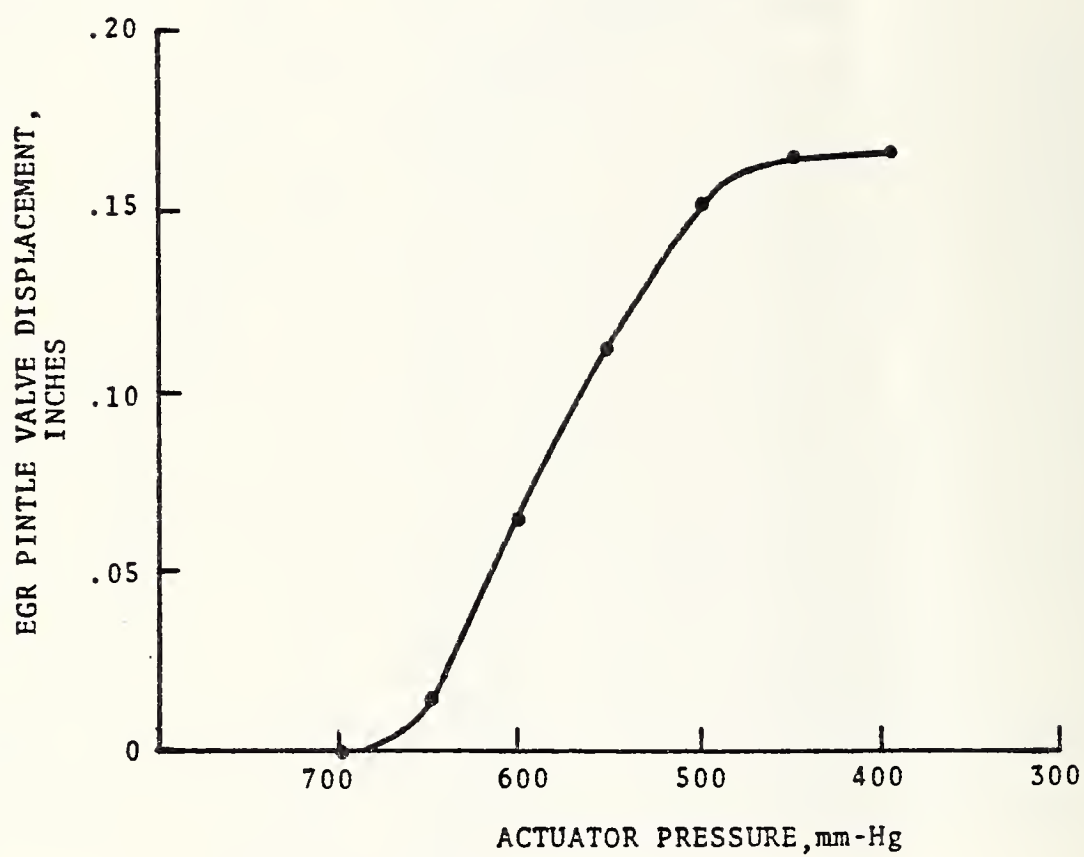


FIGURE 5. MEASURED VACUUM ACTUATOR

TABLE 5. STEADY-STATE BASELINE MAPPING SPEED-TORQUE VALUES

ENGINE SPEED, (RPM)		TORQUE, (LB-FT)								
750	-7,	0,	40							
880	-10,	-2,	0,	40,	80,	120,	160			
1000	-15,	-10,	-5,	0,	40,	80,	120,	160		
1500	-25,	-10,	-5,	0,	40,	80,	120,	160		
2000	-32,	-7,	0,	40,	80,	120,	160			
2500	-30,	-10,	0,	40,	80,	120,	160			
3000	-40,	-30,	-10,	0,	40,	60,	80,	120,	160	
3600	-48,	-36,	-12,	0,	35,	70,	105,	140		

3. TEST PROCEDURES

All instrumentation was periodically checked and calibrated. Emissions instrumentation was calibrated before and after data collection at each power point, or every 30 minutes whichever came first. At each baseline test point, sufficient time was allowed for the operating temperatures and pressures to stabilize (typically 5 to 45 minutes) before data was collected. Each data channel was sampled 30 times in approximately 5 seconds and the data averaged.

4. DATA REDUCTION

The data acquisition system sampled the signals from the analog instrumentation shown in Table 4. All samples in each data set (speed/load point) were averaged and stored on the HP-21MX disc. Test variables were also displayed to the operator by video display and line-printer. The stored disc-data was subsequently transferred to magnetic tape for further reduction on a PDP-10 computer. All corrections to the test data and mass emissions and fuel-flow calculations were performed on the PDP-10 using the equations shown in Appendix A.

All corrected data was printed out in the format of Table B-1. The data includes Engine Speed (RPM), Load (torque) (lb-ft), the % EGR, the Air-Fuel Ratio (A/F) from exhaust and fuel-flow calculations, the exhaust concentrations (ppm or %), various temperatures and pressures, measured air flow to the engine (airflo), the humidity (grains/pound), and fuel flow (grams/second).

5. TEST RESULTS

Figure 6 gives the corrected bhp, torque, and BSFC at wide-open throttle (WOT) for this engine. The maximum horsepower and torque are within manufacturer's specifications. The BSFC is at a minimum at 1500 rpm. Figure 7 shows the fuel rate in lb/hr for all speed-load points. Figures 8 and 9 show the A-F ratio and EGR for all positive horsepower points. Distributor advance is shown in Figure 4, while CO, HC, and NOx mass emission rates as a functions of speed and load are given in Figures 10, 11, and 12.

At low power a lean mixture resulted in relatively low levels of CO and HC. At higher speeds and loads, with richer mixtures, CO and HC increased substantially. As expected, NOx increased at higher power points. In general, the results from this engine are typical of those obtained with a modern production engine. Attached as Appendix B is the test and reduced data for all positive and negative speed/load points.

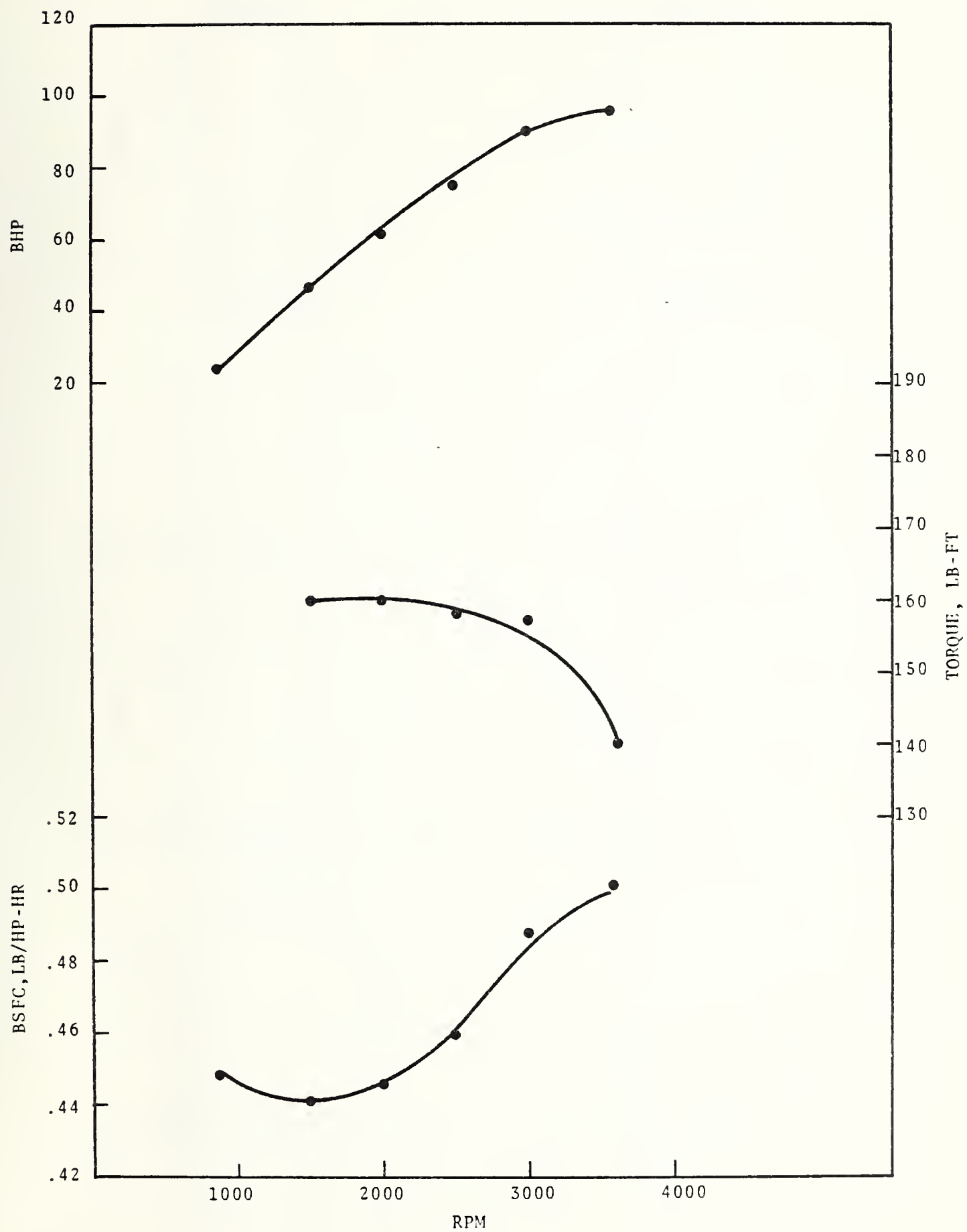


FIGURE 6. CORRECTED BHP, TORQUE, AND BSFC VS WIDE-OPEN THROTTLE

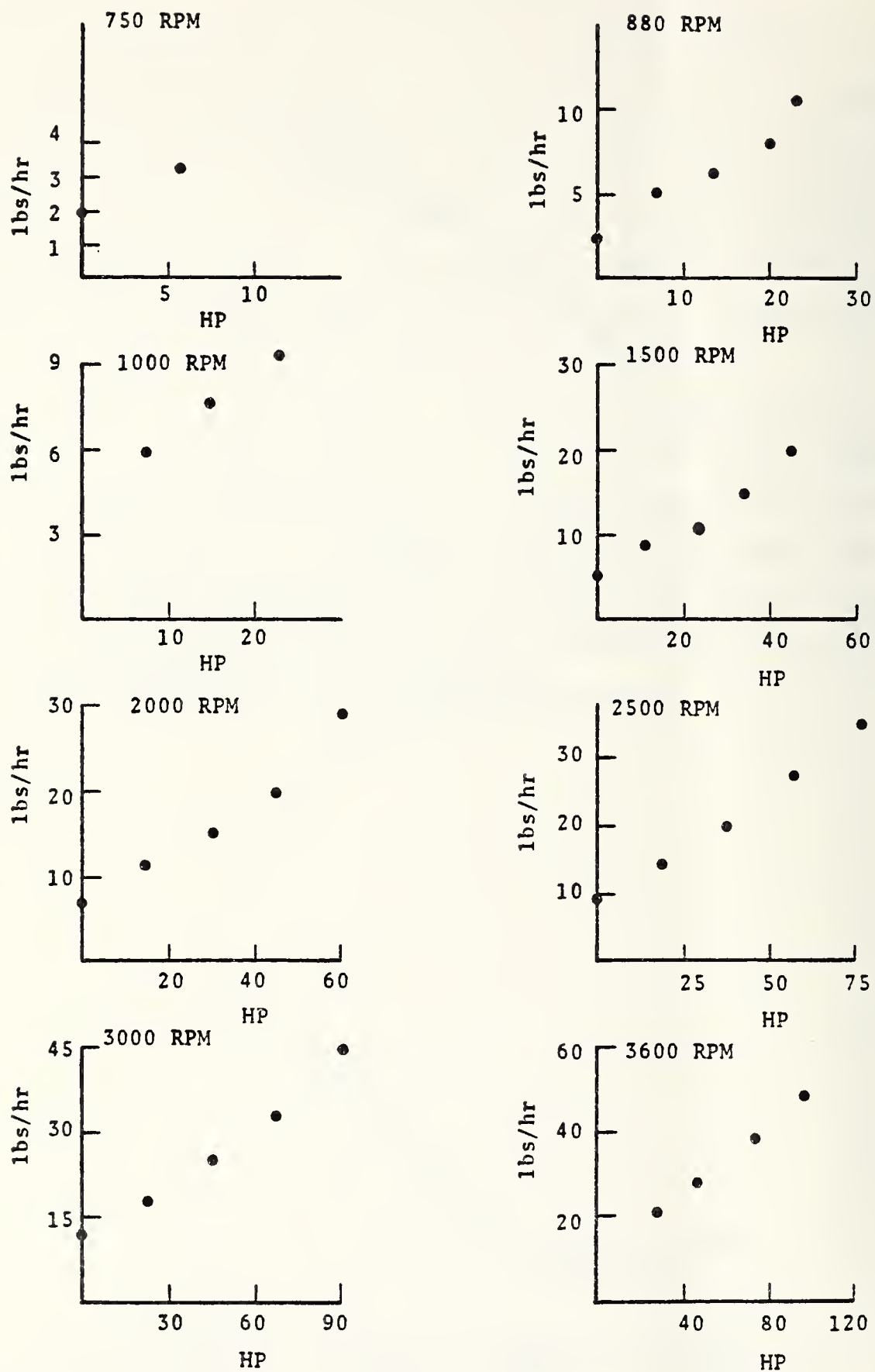


FIGURE 7. FUEL CONSUMPTION VS POWER

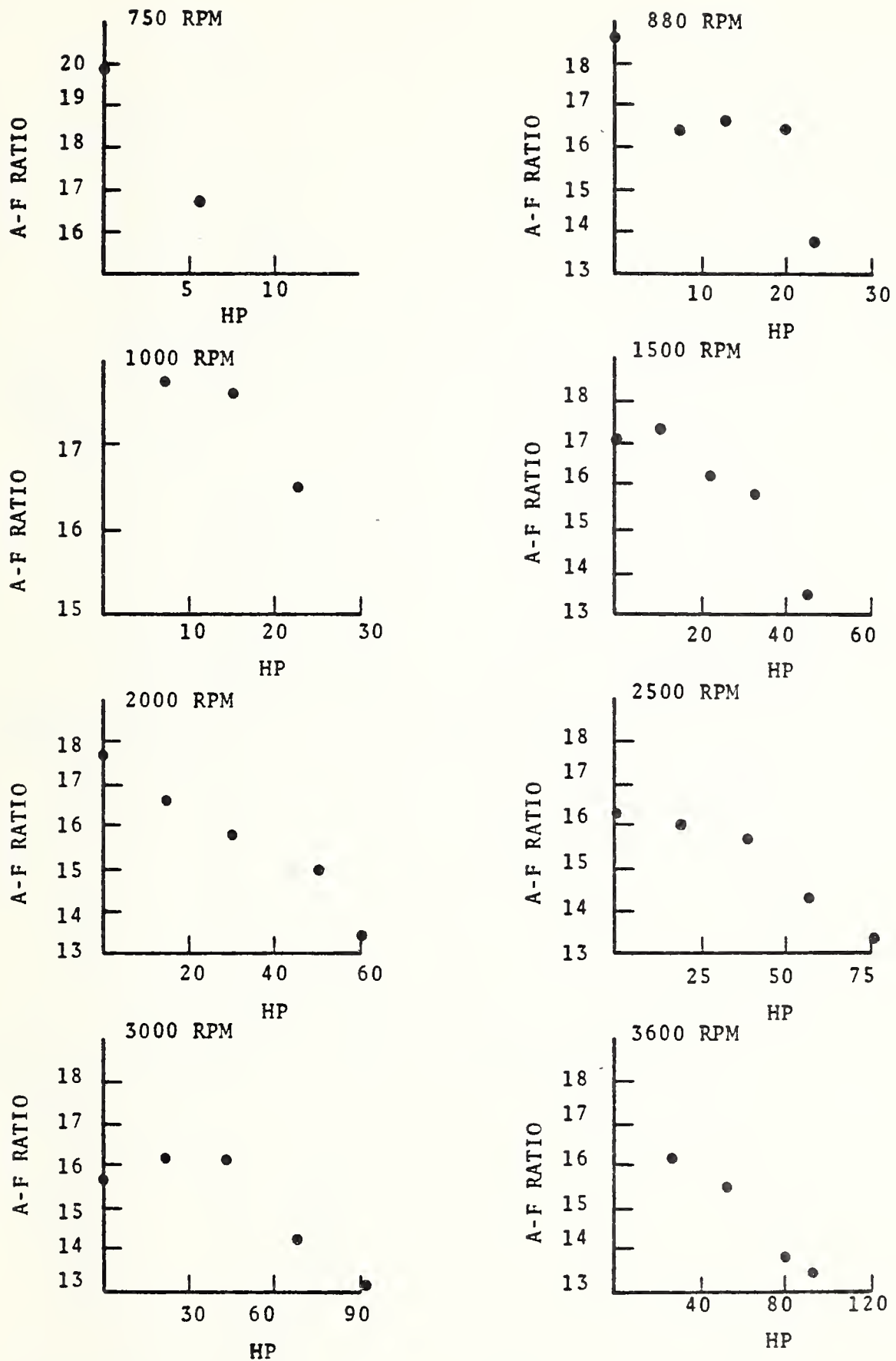


FIGURE 8. AIR-FUEL RATIO VS POWER

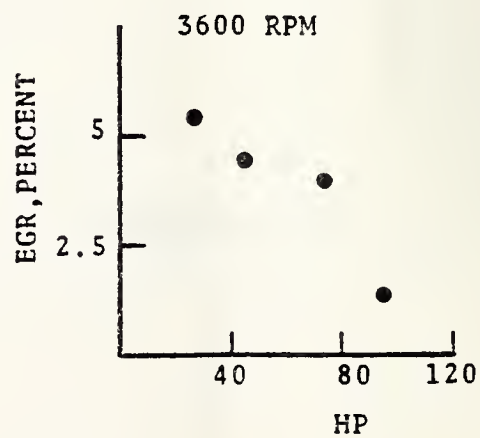
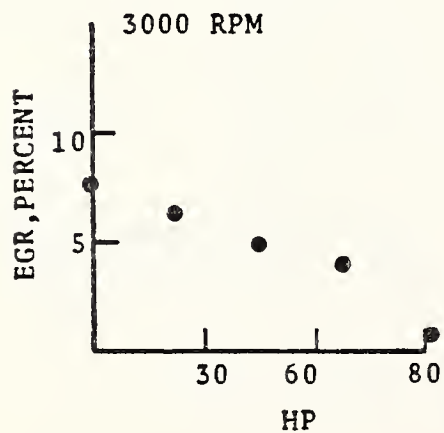
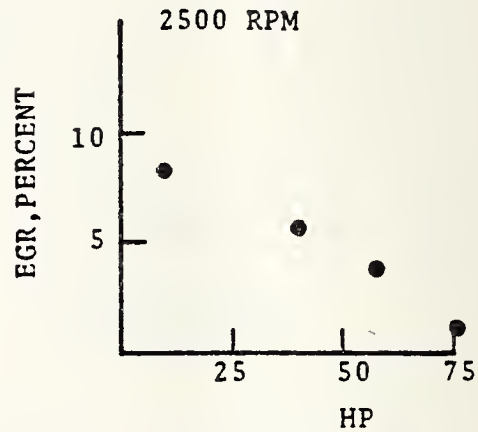
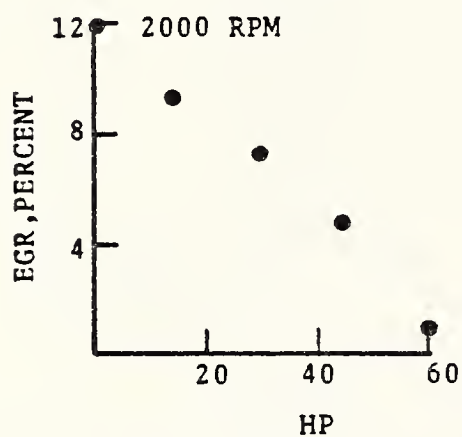
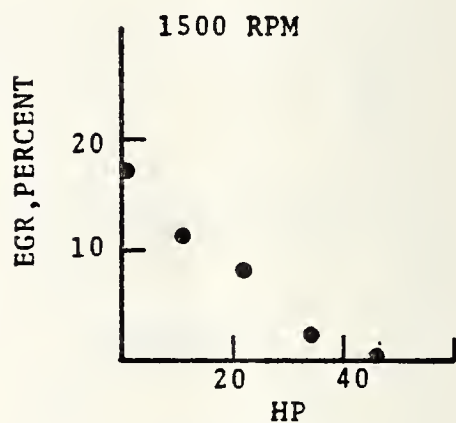
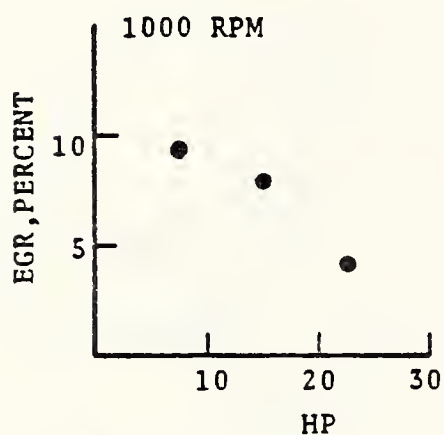
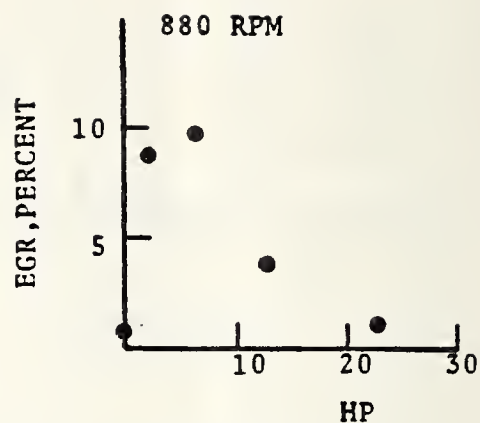
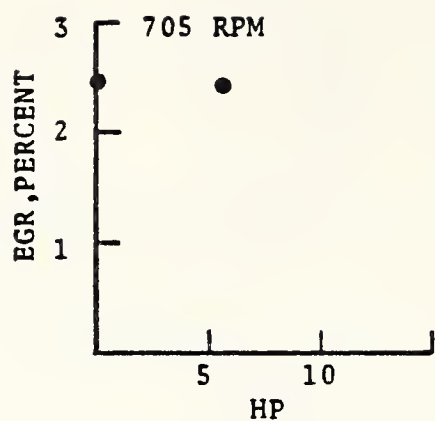


FIGURE 9. EGR VS POWER

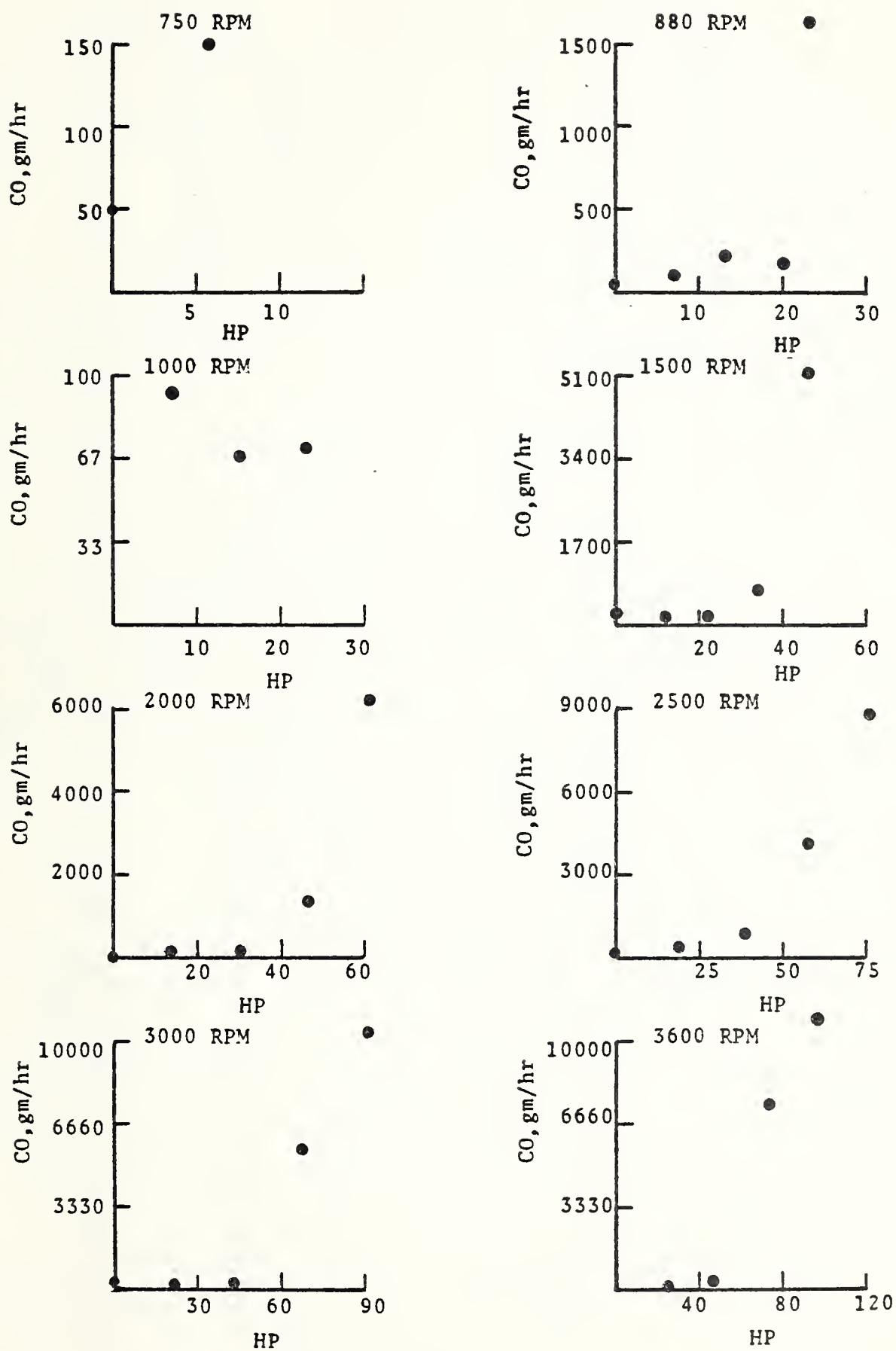


FIGURE 10. CO VS POWER

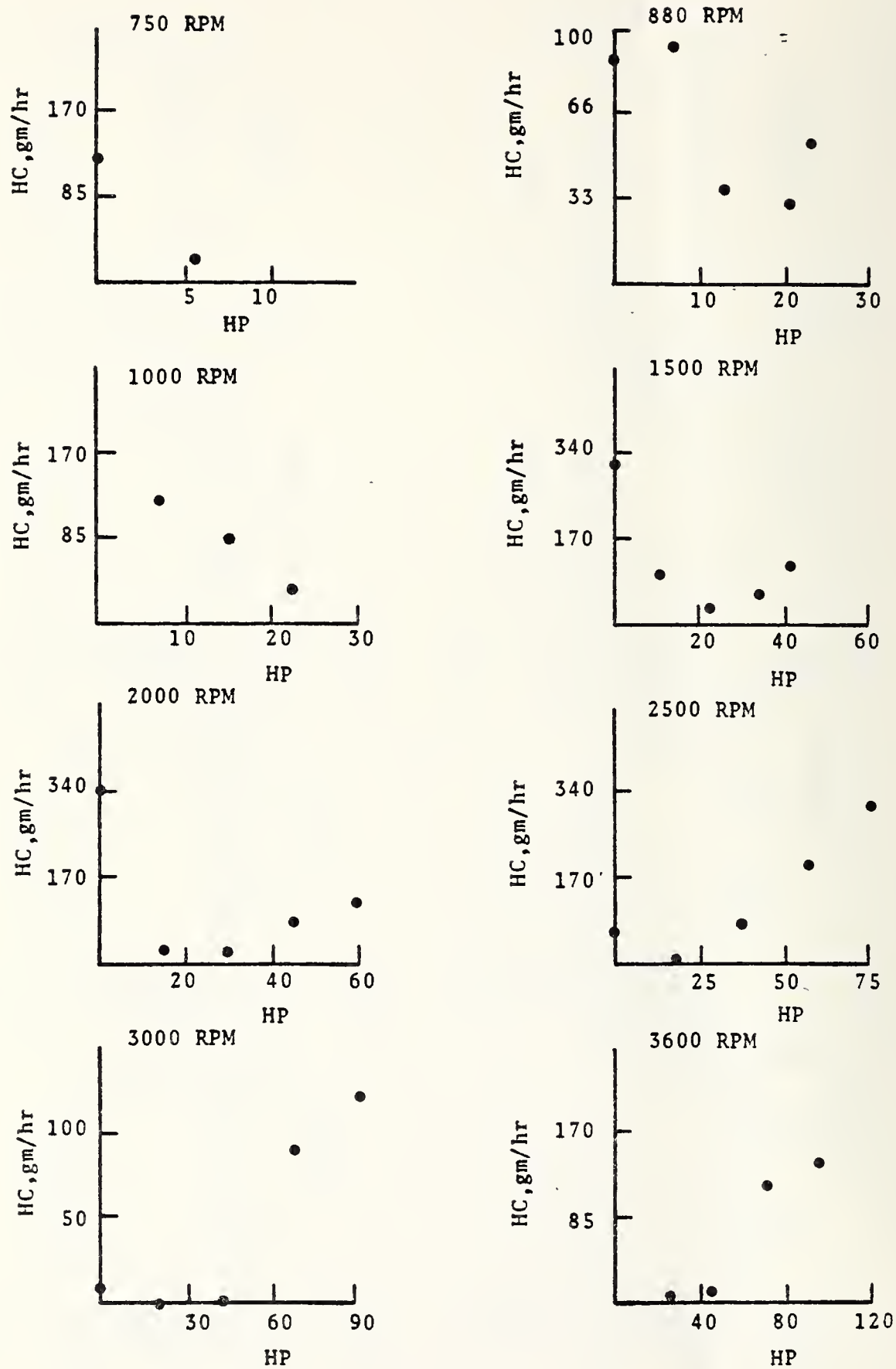


FIGURE 11. HC VS POWER

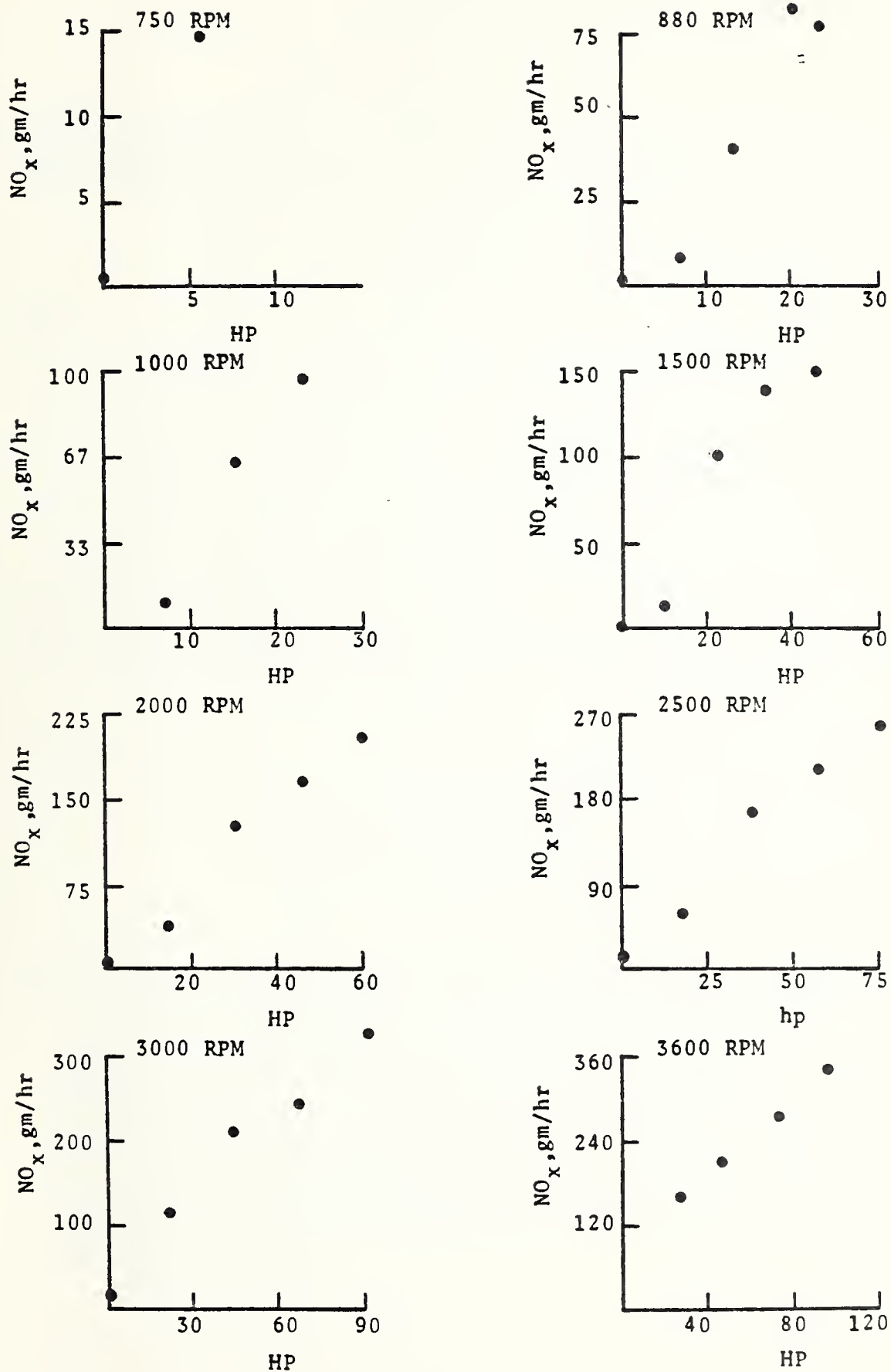


FIGURE 12. NOx VS POWER

APPENDIX A

DATA REDUCTION EQUATIONS

CORRECTED TORQUE, T_c (lb-ft) ⁽¹⁾ From SAE J245, Spark Ignition Engine Rating Code, adjusted to standard SAE ambient conditions:

$$T_c = \frac{B_d^*}{B_{dt}} \left(\frac{t_t + A}{t^* + A} \right)^{1/2} T_t$$

where

B_d^* = Standard Dry Barometric Pressure (29.00 in. Hg, 97.9 kPa)

B_{dt} = Dry Barometric Pressure at Test Conditions

t_t = Ambient Air Temperature at Test Conditions

t^* = Standard Ambient Temperature (85°F, 29.4°C)

A = Absolute Temperature Constant (460°R, 273°K)

T_t = Measured Torque at Test Conditions.

CORRECTED HORSEPOWER, hp_c ⁽¹⁾ From SAE J245, Spark Ignition Engine Rating Code, adjusted to standard SAE ambient conditions:

$$hp_c = \frac{T_c N}{G}$$

where

T_c = Corrected Torque (See above.)

N = Engine Speed (RPM)

G = Power Constant (5252 English, 955 SI).

(1) Engines with manifold preheated air inlet systems are designed to control carburetor air inlet temperature to a specific temperature. Excursions in ambient temperature below this value do not appreciably affect the controlled temperature. The engine performance correction factor as described in SAE J245 Engine Rating Code for Spark Ignition Engines has therefore been updated as follows: If ambient temperature is less than or equal to the manufacturer's stated controlled temperatures, no correction component involving carburetor inlet temperature is made. If ambient temperature exceeds the targeted controlled temperature, the normal J245 correction factor is applied with the targeted controlled temperature used in place of the standard ambient temperature.

MASS FUEL FLOW RATE (lb/hr) From volumetric measurement (corrected to 60°F per ASTM petroleum tables) and fuel specific gravity:

$$\dot{m}_f = \frac{(\text{SpG})_f \left(\frac{1 \text{ lb H}_2\text{O}}{\text{vol}} \right) (\text{vol})_f}{\Delta t_T}$$

where

$$\begin{aligned} \dot{m}_f &= \text{Fuel Flow Rate lb/hr} \\ (\text{SpG})_f &= \text{Specific Gravity of Fuel} \\ (1 \text{ lb H}_2\text{O/vol}) &= \text{Pounds of Water per Unit Volume} \\ (\text{vol})_f &= \text{Volume of Fuel Measured, corrected to} \\ &\quad 60^\circ\text{F per ASTM petroleum tables} \\ \Delta t_T &= \text{Time interval of volume measurement (hrs.)} \end{aligned}$$

CORRECTED BRAKE SPECIFIC FUEL CONSUMPTION (BSFC) (lb/HP-hr)

$$\text{BSFC}_c = \frac{\dot{m}_f}{\text{HP}_c}$$

where

$$\begin{aligned} \text{BSFC}_c &= \text{Corrected Brake Specific Fuel Consumption} \\ \text{HP}_c &= \text{Corrected Horsepower} \\ \dot{m}_f &= \text{Mass Fuel Flow Rate (lb/hr).} \end{aligned}$$

AIR/FUEL RATIO (A/F) Based on emissions measurements from SPINDT, SAE #650507:

$$A/F = F_b \left[11.492 F_c \left(\frac{1+R/2+Q}{1+R} \right) + \left(\frac{120(1-FC)}{3.5+R} \right) \right]$$

where

$$\begin{aligned} R &= \frac{\% \text{CO}}{\% \text{CO}_2} = \frac{\text{Percent CO Concentration}}{\text{Percent CO}_2 \text{ Concentration}} \\ F_c &= \text{Mass Fraction of Carbon in Fuel} \\ F_b &= \frac{\% \text{CO} + \% \text{CO}_2}{\% \text{CO} + \% \text{CO}_2 + \% \text{CH}} \\ Q &= \frac{\% \text{O}_2}{\% \text{CO}_2} = \frac{\text{Percent O}_2 \text{ Concentration}}{\text{Percent CO}_2 \text{ Concentration}} \end{aligned}$$

CARBON MONOXIDE (CO) MASS EMISSION RATE (Grams/Hr).

$$\text{MASS CO} = (4.383) (\dot{m}_f) (A/F+1) (\% \text{CO}) \left[\frac{1}{1 + 0.03148 (\% \text{CO}_2) \frac{\% \text{CO} + \text{CO}_2}{\% \text{CO} + 3\% \text{CO}_2}} \right]$$

where

- $\dot{m}_f$ = Mass Fuel Flow Rate
- A/F = Air-to-Fuel Ratio
- % CO = Percent CO, Concentration
- % CO₂ = Percent CO₂, Concentration.

HYDROCARBON (HC) MASS EMISSION RATE (Grams/Hr)

$$\text{Mass HC} = (0.0002207) (\dot{m}_f) (A/F+1) (\text{ppm HC})$$

where

- $\dot{m}_f$ = Mass Fuel Flow Rate
- A/F = Air-to-Fuel Ratio
- ppm HC = Parts per Million , HC Concentration.

OXIDES OF NITROGEN (NOx) MASS EMISSION RATE (Grams/Hr)

$$\text{Mass NOx} = 0.007201 (\dot{m}_f) (A/F+1) (\text{ppm NOx}) \left[\frac{1}{1 + .03148 (\% \text{CO}_2) \left(\frac{\% \text{CO} + \% \text{CO}_2}{\% \text{CO} + 3\% \text{CO}_2} \right)} \right]$$

where

- $\dot{m}_f$ = Mass Fuel Flow Rate
- A/F = Air-to-Fuel Ratio
- ppm NOx = Parts per Million, NOx Concentration
- % CO = Percent CO, Concentration
- % CO₂ = Percent CO₂, Concentration
- K_H = Humidity Correction Factor.

HUMIDITY CORRECTION FACTOR

$$K_H = \frac{1}{1 - .0047 (\text{Absolute Humidity} - 75)}$$

where absolute humidity is in grains/pound of dry air.

ABSOLUTE HUMIDITY (AH) (Grains/Lb, Dry Air):

$$AH = \frac{(RH) P_{SU}}{1.608 (P_{AMB} - RH \cdot P_{SU})}$$

where

- RH = Measured Relative Humidity
- P_{SU} = Saturated Vapor Pressure (from Keenan and Keyes Steam Tables)
- P_{AMB} = Ambient Barometric Pressure.

APPENDIX B
CHRYSLER 225 CID TEST DATA AND REDUCED TEST DATA

EXPLANATION OF DATA COLUMN HEADINGS

RPM	
CTORQ LB-FT	Torque corrected to standard conditions, SAE, J245
EGR	
A/FEX	Air-to-Fuel ratio Calculated using Spindt method
A/FTC LB/HR	Air-to-Fuel ratio Calculated using total carbon method
CNOX PPM	Oxides of nitrogen corrected for relative humidity
HC PPM	Hydrocarbons, parts per million
CO	Carbon monoxide, percent
CO2	Carbon dioxide, percent
O2	Oxygen, percent
COOLE DEG-F	Exit engine coolant to heat exchanger
EXOIL DEG-F	Exit engine oil to heat exchanger
AIRDP INH2O	Pressure differential across Merriam airflow sensor
AIRFLO LB/MIN	Engine inlet airflow
ABSHUM GR/LB	Grains per pound
FLO G/S	Measured fuel flow, grams per second

Note: Runs 1-85 were taken during warm-up.

TABLE B-1. CHRYSLER 225 CID TEST DATA

MULTIPARAMETER ENGINE MAPPING SHORT FORM TEST SUMMARY OF FILE OPT090

REC NUM	NOMINAL CODE	TIME HHMMSS	RPM LB-FT	ECR %	A7/FEX	A7/FYC L8/HR	CHOX PPM	HC PPM	CU %	CU2 %	O2 %	COOLE DEC-F	EXOTL DEC-F	WINDP L8/HR	WTRFLU G/S	WTRSHUN GR/LB	FLU G/S	DATE JUL.YR		
1	989833	0	98342	1600	40	4.0	14.1	13.3	714	2161	2.08	12.4	5	188	188	-53	2.133	21.760	3.000	183.79
2	989833	0	98441	1600	40	4.1	14.1	13.3	720	2127	2.07	12.4	4	189	189	-53	2.125	21.948	3.000	183.79
3	989833	0	98547	1600	40	4.1	14.1	12.9	713	2261	1.91	12.5	4	189	189	-53	2.138	21.788	3.000	183.79
4	989833	0	98642	1600	40	4.1	14.1	12.9	711	2343	1.86	12.5	4	189	189	-53	2.133	21.688	3.000	183.79
5	989833	0	98743	1600	40	4.1	14.1	13.4	709	2094	1.87	12.5	4	189	188	-53	2.129	21.638	3.000	183.79
6	989833	0	98843	1600	40	4.1	14.2	13.5	712	2047	1.79	12.5	4	189	189	-53	2.129	22.000	3.000	183.79
7	989833	0	98944	1600	40	4.1	14.1	13.4	711	2058	1.88	12.5	4	189	189	-53	2.126	22.218	3.000	183.79
8	989833	0	91041	1600	40	4.1	14.2	13.5	717	2063	1.78	12.5	4	189	189	-53	2.119	22.498	3.000	183.79
9	989833	0	91142	1600	40	4.1	14.2	13.5	709	2103	1.76	12.5	4	188	189	-53	2.127	22.258	3.000	183.79
10	989833	0	91242	1600	40	4.1	14.2	13.5	709	2021	1.76	12.5	4	189	189	-53	2.125	22.318	3.000	183.79
11	989833	0	91341	1600	40	4.1	14.2	13.5	711	2093	1.71	12.5	4	188	189	-53	2.131	22.368	3.000	183.79
12	989833	0	91413	1600	40	4.1	14.2	13.5	707	2860	1.78	12.5	5	189	189	-54	2.139	22.288	3.000	183.79
13	989833	0	92042	1600	49	4.0	14.2	12.0	748	2287	2.16	12.4	7	190	188	-55	2.175	29.398	3.000	186.79
14	989833	0	92145	1600	49	4.1	14.2	12.5	748	2241	2.02	12.4	6	189	188	-55	2.169	29.988	3.000	186.79
15	989833	0	92244	1600	49	4.1	14.2	12.9	746	2231	1.95	12.5	6	189	188	-55	2.171	30.028	3.000	186.79
16	989833	0	92344	1600	49	4.0	14.2	13.4	748	1992	2.02	12.4	6	188	188	-55	2.169	30.268	3.000	186.79
17	989833	0	92444	1600	50	3.9	14.3	13.5	753	1941	1.85	12.5	6	188	188	-55	2.177	30.188	3.000	186.79
18	989833	0	92545	1600	49	4.1	14.3	13.6	749	1882	1.82	12.5	6	188	188	-55	2.168	29.988	3.000	186.79
19	989833	0	92645	1600	49	3.9	14.4	13.6	753	1922	1.73	12.6	6	188	189	-55	2.164	30.088	3.000	186.79
20	989833	0	92745	1600	49	4.1	14.3	13.4	754	2094	1.82	12.6	6	188	188	-55	2.173	29.798	3.000	186.79
21	989833	0	92844	1600	50	4.2	14.3	13.0	756	2127	1.89	12.5	6	189	189	-55	2.152	30.168	3.000	186.79
22	989833	0	92945	1600	50	4.2	14.3	13.5	757	1936	1.73	12.6	6	189	189	-55	2.143	30.088	3.000	186.79
23	989833	0	93044	1600	49	4.2	14.3	13.5	752	1907	1.83	12.5	6	189	189	-55	2.157	30.038	3.000	186.79
24	989833	0	93142	1600	49	4.0	14.3	13.5	751	2013	1.78	12.5	6	189	189	-55	2.178	30.188	3.000	186.79
25	989833	0	93601	1600	51	6	14.1	13.0	767	2273	2.76	12.0	1	189	186	-51	1.988	31.288	3.000	187.79
26	989833	0	93605	1600	51	6	14.1	13.0	765	2288	2.72	12.0	1	189	186	-51	1.983	31.128	3.000	187.79
27	989833	0	93618	1600	51	6	14.1	13.0	765	2206	2.73	12.0	1	189	186	-51	1.994	31.138	3.000	187.79
28	989833	0	93614	1600	51	6	14.1	13.0	764	2288	2.75	11.9	1	189	186	-51	1.998	31.048	3.000	187.79
29	989833	0	93619	1600	51	6	14.1	13.0	765	2258	2.71	12.0	9	192	186	-51	1.995	31.078	3.000	187.79
30	989833	0	93623	1600	51	6	14.1	13.1	765	2231	2.65	12.0	9	193	186	-51	1.995	31.000	3.000	187.79
31	989833	0	90008	1600	51	6	14.1	13.3	750	2064	2.41	12.1	7	189	188	-51	1.995	31.058	3.000	187.79
32	989833	0	90308	1600	51	5.0	14.0	13.2	735	2067	2.51	12.0	7	189	188	-50	1.958	31.000	3.000	187.79
33	989833	0	90312	1600	51	5.0	14.1	13.2	738	2088	2.45	12.1	7	189	188	-50	1.955	31.140	3.000	187.79
34	989833	0	90317	1600	51	5.0	14.0	13.2	732	2073	2.50	12.1	7	189	188	-50	1.955	31.158	3.000	187.79
35	989833	0	90321	1600	51	5.0	14.1	13.3	735	2096	2.42	12.1	7	189	188	-50	1.954	31.188	3.000	187.79
36	989833	0	90827	1600	49	4.6	14.4	12.5	758	2181	2.52	12.0	1.2	188	189	-49	1.900	31.188	3.000	187.79
37	989833	0	90833	1600	49	4.6	14.3	12.5	756	2281	2.53	11.9	1.2	188	189	-49	1.913	31.078	3.000	187.79
38	989833	0	90837	1600	50	4.5	14.4	12.5	756	2296	2.37	12.0	1.2	188	189	-49	1.913	30.798	3.000	187.79
39	989833	0	90842	1600	50	4.5	14.4	13.3	755	2182	2.41	12.0	1.2	189	189	-49	1.908	30.738	3.000	187.79
40	989833	0	90846	1600	49	4.6	14.3	12.8	757	2293	2.49	12.0	1.2	189	189	-49	1.910	30.738	3.000	187.79
41	989833	0	91000	1600	49	4.3	14.3	13.2	756	2145	2.52	12.0	1.1	188	189	-49	1.915	31.128	3.000	187.79
42	989833	0	91004	1600	49	4.4	14.3	12.9	756	2181	2.47	12.0	1.1	188	189	-49	1.915	31.218	3.000	187.79
43	989833	0	91009	1600	49	4.4	14.3	12.9	757	2172	2.51	11.9	1.1	188	189	-49	1.914	31.188	3.000	187.79
44	989833	0	91014	1600	49	4.4	14.3	12.9	754	2183	2.48	11.9	1.1	188	189	-49	1.911	31.198	3.000	187.79
45	989833	0	91133	1600	51	4.4	14.3	13.4	752	2137	2.35	12.0	1.0	189	189	-50	1.958	31.288	3.000	187.79
46	989833	0	91137	1600	51	4.4	14.3	13.4	753	2075	2.44	12.0	1.0	188	189	-50	1.949	31.118	3.000	187.79
47	989833	0	91142	1600	51	4.4	14.3	13.4	753	2057	2.37	12.0	1.0	188	189	-50	1.949	31.118	3.000	187.79
48	989833	0	91146	1600	51	4.4	14.3	13.4	754	2073	2.39	12.0	1.0	189	189	-50	1.954	31.288	3.000	187.79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

REC NUM	NOMINAL CODE	TIME HHMMSS	RPM CTDRO RPM LB-FT	EGR A/FEX %	A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC CHDZ										A/FTC 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162	982716	0 184714	2500	121	3.0	14.3	13.8	719	1046	2.32	12.3	8	190	200	-1.61	6.473	16.438	3.973	123.79
163	982816	0 185213	2500	121	3.0	15.6	13.1	707	538	5.4	13.1	1.5	190	199	-1.32	5.301	16.700	3.081	123.79
164	982816	0 185217	2500	121	3.0	15.6	13.1	707	513	5.0	13.1	1.5	191	199	-1.32	5.289	16.978	3.080	123.79
165	982816	0 185221	2500	121	3.0	15.6	13.1	708	511	5.0	13.1	1.5	192	199	-1.33	5.328	17.000	3.080	123.79
166	982816	0 185225	2500	121	3.0	15.6	13.1	708	530	5.6	13.1	1.5	192	199	-1.32	5.304	17.100	3.081	123.79
167	982816	0 185229	2500	121	3.0	15.6	13.1	708	527	5.6	13.1	1.5	191	199	-1.33	5.323	17.218	3.081	123.79
168	982816	0 185232	2500	121	3.0	15.7	13.1	708	533	5.0	13.1	1.5	190	199	-1.32	5.314	17.140	3.081	123.79
169	982816	0 185236	2500	121	3.0	15.7	13.1	707	528	5.7	13.1	1.5	192	199	-1.33	5.322	17.040	3.024	123.79
170	982816	0 185300	2500	121	3.0	15.7	13.1	707	509	5.9	13.2	1.5	192	199	-1.32	5.278	17.230	2.950	123.79
171	982816	0 185304	2500	121	3.0	15.7	13.1	707	534	6.1	13.1	1.5	192	199	-1.32	5.272	17.040	2.963	123.79
172	982816	0 185308	2500	121	3.0	15.7	13.1	708	547	5.9	13.1	1.5	191	199	-1.32	5.273	16.810	3.142	123.79
173	982916	0 110424	2500	121	3.0	16.2	13.1	374	291	4.0	13.1	2.1	196	196	-90	3.934	17.000	1.990	123.79
174	982916	0 110420	2500	121	3.0	16.2	13.1	370	208	4.1	13.1	2.0	193	196	-99	3.959	16.070	2.087	123.79
175	982916	0 110432	2500	121	3.0	16.2	13.1	353	252	4.1	13.2	2.0	193	197	-98	3.949	16.760	1.994	123.79
176	982916	0 110436	2500	121	3.0	16.2	13.1	346	260	3.7	13.2	2.0	193	197	-98	3.924	16.890	1.996	123.79
177	982916	0 110440	2500	121	3.0	16.2	13.1	331	257	3.8	13.2	2.0	193	197	-98	3.927	17.120	1.992	123.79
178	982916	0 110502	2500	121	3.0	16.2	13.1	353	254	3.7	13.1	2.0	193	197	-97	3.091	17.330	1.953	123.79
179	982916	0 110511	2500	121	3.0	16.2	13.1	339	233	3.8	13.1	2.0	193	197	-97	3.090	17.300	1.940	123.79
180	982916	0 110515	2500	121	3.0	16.2	13.1	327	241	3.0	13.1	2.0	193	197	-97	3.090	17.400	2.036	123.79
181	982916	0 110522	2500	121	3.0	16.2	13.1	329	242	3.7	13.2	2.0	194	197	-97	3.893	17.430	2.130	123.79
182	982916	0 110526	2500	121	3.0	16.2	13.1	332	243	3.7	13.2	2.0	194	197	-97	3.094	17.420	2.099	123.79
183	983016	0 110927	2500	121	3.0	16.3	13.1	101	664	3.5	13.0	2.2	190	196	-65	2.613	17.560	2.645	123.79
184	983016	0 110931	2500	121	3.0	16.3	13.1	102	700	3.5	13.0	2.2	190	196	-65	2.609	17.750	2.520	123.79
185	983016	0 110935	2500	121	3.0	16.3	13.1	102	722	3.4	13.0	2.2	190	196	-65	2.616	17.740	2.524	123.79
186	983016	0 110939	2500	121	3.0	16.3	13.1	102	676	3.1	13.0	2.2	190	196	-66	2.619	17.590	2.073	123.79
187	983016	0 110944	2500	121	3.0	16.3	13.1	102	729	3.3	13.0	2.2	190	196	-65	2.613	17.330	2.264	123.79
188	983016	0 111025	2500	121	3.0	16.4	13.1	97	781	3.0	12.9	2.3	190	196	-65	2.591	17.470	2.620	123.79
189	983016	0 111029	2500	121	3.0	16.4	13.1	98	739	3.2	12.9	2.3	190	196	-65	2.591	17.500	2.553	123.79
190	983016	0 111033	2500	121	3.0	16.4	13.1	100	509	3.3	12.9	2.3	190	196	-65	2.593	17.560	2.01	123.79
191	983016	0 111037	2500	121	3.0	16.3	13.1	100	622	3.3	12.9	2.3	190	196	-65	2.602	17.070	2.972	123.79
192	983016	0 111041	2500	121	3.0	16.3	13.1	101	762	3.4	13.0	2.3	190	196	-65	2.597	17.560	1.602	123.79
193	980715	0 112047	1500	161	5.0	13.6	12.9	723	1631	4.09	11.2	1.0	192	193	-1.13	4.508	18.070	2.246	123.79
194	980715	0 112054	1500	161	5.0	13.6	12.9	724	1631	4.12	11.1	1.0	191	193	-1.13	4.546	18.320	2.205	123.79
195	980715	0 112058	1500	161	5.0	13.6	13.0	723	1632	4.11	11.1	1.0	191	193	-1.14	4.500	18.430	2.301	123.79
196	980715	0 112102	1500	161	5.0	13.6	13.0	722	1620	4.12	11.1	1.0	190	193	-1.14	4.555	18.320	2.261	123.79
197	980715	0 112106	1500	161	5.0	13.6	13.0	721	1630	4.11	11.1	1.0	190	193	-1.14	4.573	18.350	2.157	123.79
198	980715	0 112110	1500	161	5.0	13.6	13.0	722	1615	4.12	11.1	1.0	189	193	-1.15	4.592	18.230	2.215	123.79
199	980715	0 112125	1500	162	5.0	13.6	13.0	720	1625	4.11	11.1	1.0	189	193	-1.14	4.563	17.570	2.175	123.79
200	980715	0 112129	1500	162	5.0	13.6	13.0	719	1610	4.09	11.1	1.0	189	193	-1.14	4.574	17.400	2.304	123.79
201	980715	0 112134	1500	161	5.0	13.6	13.0	721	1624	4.03	11.2	1.0	192	193	-1.14	4.583	17.590	2.100	123.79
202	980715	0 112204	1500	160	5.0	13.6	12.9	719	1630	4.00	11.2	1.0	190	193	-1.13	4.529	17.940	2.005	123.79
203	980814	0 112909	1500	121	5.3	13.7	14.6	720	1072	7.3	13.0	1.0	188	193	-93	3.728	18.030	2.015	123.79
204	980814	0 112913	1500	121	5.3	13.7	14.6	721	1071	7.2	13.0	1.0	180	193	-93	3.725	17.930	2.579	123.79
205	980814	0 112918	1500	121	5.3	13.7	14.6	721	1078	7.6	13.0	1.0	189	193	-93	3.731	17.830	2.490	123.79
206	980814	0 112922	1500	121	5.4	13.7	14.6	720	1060	7.9	13.0	1.0	189	193	-93	3.739	17.930	2.177	123.79
207	980814	0 112926	1500	121	5.3	13.7	14.6	721	1057	7.5	13.0	1.0	190	192	-93	3.713	18.100	2.103	123.79
208	980814	0 112930	1500	121	5.3	13.7	14.6	720	1065	7.6	13.0	1.0	191	192	-93	3.730	17.530	2.005	123.79
209	980814	0 112935	1500	121	5.4	13.7	14.7	720	1064	7.1	13.0	1.0	191	192	-93	3.714	17.800	2.121	123.79
210	980814	0 112939	1500	121	5.4	13.7	14.6	721	1067	7.2	13.1	1.0	190	192	-94	3.758	17.710	2.303	123.79
211	980814	0 113003	1500	121	5.3	13.7	14.6	722	1066	7.6	13.0	1.0	189	192	-94	3.746	17.600	2.347	123.79
212	980814	0 113009	1500	121	5.3	13.7	14.6	720	1081	7.6	13.0	1.0	189	192	-93	3.724	17.560	2.261	123.79
213	980814	0 135007	1401	120	5.2	15.4	15.0	738	1132	5.5	12.9	1.3	189	190	-88	3.500	22.040	1.991	123.79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

REC NUM	NOMINAL CODE	TIME MM:SS	RPM	CTQR RPM	EGR L8-FT	A/FEX %
214	980814 0	135012	1401	120	5	2 15 3
215	980814 0	135016	1401	120	5	2 15 3
216	980814 0	135020	1400	121	5	2 15 3
217	980814 0	135024	1400	121	5	1 15 3
218	980814 0	135000	1400	121	5	4 15 3
219	980814 0	135004	1400	121	5	4 15 2
220	980814 0	135008	1400	122	5	3 15 2
221	980814 0	135412	1401	122	5	3 15 2
222	980814 0	135416	1403	121	5	4 15 2
223	980913 0	140039	1500	82	8	4 16 2
224	980913 0	140044	1500	82	8	4 16 2
225	980913 0	140048	1500	83	8	4 16 2
226	980913 0	140052	1500	83	8	4 16 2
227	980913 0	140056	1500	83	8	3 16 2
228	980913 0	140120	1500	82	8	4 16 2
229	980913 0	140124	1499	82	8	4 16 2
230	980913 0	140128	1500	81	8	4 16 2
231	980913 0	140132	1500	82	8	4 16 2
232	980913 0	140136	1500	82	8	3 16 2
233	981013 0	141515	1500	44	11	2 17 3
234	981013 0	141519	1500	44	11	1 17 3
235	981013 0	141523	1500	44	11	1 17 3
236	981013 0	141527	1500	43	11	0 17 3
237	981013 0	141531	1500	44	11	0 17 6
238	981013 0	141535	1499	43	11	0 17 6
239	981013 0	141614	1500	48	11	1 17 5
240	981013 0	141618	1500	41	11	1 17 4
241	981013 0	141623	1500	43	11	3 17 4
242	981013 0	141629	1500	43	11	4 17 3
243	981013 0	141633	1500	43	11	3 17 4
244	981113 0	142023	1501	4	16	3 17 2
245	981113 0	142027	1500	4	16	3 17 2
246	981113 0	142031	1500	4	16	0 17 2
247	981113 0	142035	1500	5	16	0 17 2
248	981113 0	142039	1500	5	16	7 17 3
249	981113 0	142110	1500	1	16	7 17 2
250	981113 0	142128	1500	2	16	8 17 2
251	981113 0	142132	1500	2	16	9 17 2
252	981113 0	142138	1500	3	16	9 17 1
253	981113 0	142143	1500	2	16	0 17 1
254	981113 0	142147	1500	2	16	0 17 0
255	983417 0	142925	2998	150	7	13 3
256	983417 0	142929	2996	150	7	13 3
257	983417 0	142930	2999	150	7	13 3
258	983417 0	142942	2999	157	7	13 3
259	983417 0	142946	2997	157	7	13 3
260	983417 0	143019	3000	150	6	13 2
261	983417 0	143023	3000	150	7	13 2
262	983417 0	143027	3000	150	7	13 2
263	983417 0	143031	3000	157	7	13 2
264	983417 0	143035	3000	157	7	13 2
265	983517 0	143242	3000	118	3	5 14 0
266	983517 0	143246	3000	118	3	5 14 0
267	983517 0	143250	3000	117	3	5 14 0
268	983517 0	143254	3000	117	3	6 14 0

A/FEX L8/HR	CHON PPM	HC PPM	CO %	CO2 %	O2 %	COOL DEC-F	AIPOP L8/HR	AIRFLO L8/MIN	ABSHUM GR/L8	FLO G/S	DATE JUL-YR
15 0	737	1112	53	12	9	1	3	189	190	-89	3 540 21 960 2 016 123 79
15 0	737	1114	54	12	9	1	3	189	190	-89	3 539 21 840 2 018 123 79
14 9	737	1110	56	12	9	1	3	190	190	-89	3 527 21 710 2 027 123 79
15 0	737	1115	54	12	9	1	3	190	190	-89	3 524 21 670 2 035 123 79
14 7	731	1160	80	12	9	1	2	190	191	-89	3 536 21 200 2 037 123 79
14 6	730	1171	81	12	9	1	2	190	190	-89	3 552 21 250 2 026 123 79
14 6	730	1171	82	12	9	1	2	191	190	-90	3 570 21 470 2 035 123 79
14 6	731	1167	81	12	9	1	1	191	190	-89	3 548 21 680 2 029 123 79
14 6	731	1150	83	12	9	1	1	191	190	-89	3 527 21 030 2 039 123 79
15 9	698	684	18	12	8	2	0	190	191	-81	3 100 22 300 1 730 123 79
15 0	696	663	20	12	8	2	0	190	191	-80	3 173 22 470 1 702 123 79
15 9	696	658	19	12	8	2	0	190	191	-80	3 173 22 360 1 727 123 79
15 9	699	647	17	12	8	2	0	190	191	-80	3 173 22 360 1 727 123 79
15 9	696	653	18	12	8	2	0	190	191	-80	3 102 22 210 1 736 123 79
15 9	697	658	19	12	7	1	9	190	191	-81	3 202 21 370 1 726 123 79
15 9	695	676	18	12	8	1	9	190	191	-81	3 204 21 360 1 693 123 79
15 9	696	674	17	12	7	1	9	190	191	-80	3 179 21 830 1 715 123 79
15 9	697	654	17	12	7	1	9	190	191	-81	3 190 21 700 1 712 123 79
15 9	698	673	17	12	7	2	0	190	191	-81	3 194 21 500 1 602 123 79
16 0	116	2570	21	11	3	3	6	190	190	-69	2 740 22 390 1 300 123 79
15 9	119	2631	21	11	3	3	6	190	190	-70	2 755 22 300 1 353 123 79
15 9	126	2715	21	11	2	3	7	190	190	-70	2 750 22 300 1 363 123 79
15 9	132	2683	21	11	2	3	7	190	190	-70	2 752 22 410 1 393 123 79
16 2	132	2363	21	11	2	3	7	190	190	-70	2 761 22 530 1 367 123 79
16 1	129	2351	21	11	2	3	7	190	190	-70	2 773 22 660 1 283 123 79
15 9	127	2669	22	11	3	3	7	190	190	-67	2 671 22 300 1 297 123 79
15 7	123	2845	22	11	3	3	6	190	190	-68	2 680 22 200 1 204 123 79
15 0	123	2753	22	11	3	3	6	190	190	-60	2 700 22 530 1 362 123 79
16 0	116	2575	21	11	3	3	6	190	190	-69	2 720 22 550 1 368 123 79
15 9	110	2730	21	11	3	3	6	190	190	-69	2 723 22 520 1 412 123 79
1 0	20	13890	43	9	9	5	1	189	188	-41	1 622 21 780 887 123 79
1 0	19	14040	42	9	9	5	1	189	189	-41	1 626 21 740 836 123 79
1 0	19	14040	42	9	9	5	1	189	189	-41	1 628 21 580 836 123 79
1 0	19	13860	43	9	9	5	1	189	189	-41	1 625 21 060 921 123 79
1 0	19	13730	44	9	9	5	2	189	189	-41	1 626 22 030 881 123 79
1 0	20	14670	43	9	8	5	2	189	180	-39	1 557 22 560 813 123 79
1 0	17	14380	47	9	8	5	3	189	188	-40	1 565 22 520 868 123 79
1 0	17	14450	47	9	8	5	2	189	188	-39	1 560 23 020 832 123 79
1 0	17	14420	47	9	8	5	2	189	188	-40	1 561 23 180 833 123 79
1 0	18	14100	51	9	9	5	2	189	188	-39	1 556 23 160 882 123 79
1 0	18	14510	48	9	8	5	1	189	188	-39	1 551 23 160 794 123 79
13 6	729	949	3	81	11	2	3	190	200	-2	34 9 893 25 880 6 275 123 79
13 6	729	940	3	82	11	1	3	190	200	-2	32 9 835 25 050 6 230 123 79
13 6	720	955	3	81	11	1	3	190	201	-2	34 9 804 25 810 6 159 123 79
13 6	729	954	3	83	11	1	2	190	201	-2	33 9 841 26 040 6 278 123 79
13 6	729	954	3	86	11	1	2	190	201	-2	33 9 854 26 090 6 304 123 79
13 6	720	941	3	80	11	1	2	190	201	-2	35 9 935 26 320 6 256 123 79
13 6	727	926	3	82	11	1	2	190	201	-2	33 9 840 25 960 6 349 123 79
13 6	727	920	3	82	11	1	2	190	201	-2	33 9 859 26 030 6 309 123 79
13 6	727	914	3	86	11	1	2	190	201	-2	34 9 879 25 910 6 327 123 79
13 7	725	900	3	84	11	1	2	190	201	-2	33 9 842 25 760 6 304 123 79
14 2	711	815	2	27	12	1	3	190	201	-2	05 7 901 25 150 4 830 123 79
14 3	710	817	2	22	12	1	3	189	201	-2	63 7 936 24 960 4 790 123 79
14 2	710	796	2	23	12	1	3	189	201	-2	05 7 903 24 970 4 796 123 79
14 3	710	793	2	25	12	1	3	189	201	-2	84 7 973 24 900 4 776 123 79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

REC	NOMINAL	TIME	RPM	CTORQ	EGR	A/FEX
NUM	CODE	NHRRSS	RPM LB-FT	%		
269	983517	8 143258	3088	110	3.6	14.1
270	983517	8 143311	3088	117	3.6	14.1
271	983517	8 143315	3088	117	3.6	14.1
272	983517	8 143319	3000	117	3.6	14.1
273	983517	8 143323	3088	117	3.6	14.1
274	983517	8 143327	3000	117	3.6	14.1
275	983617	8 143326	3000	77	4.7	16.2
276	983617	8 143829	3800	77	4.7	16.0
277	983617	8 143833	3000	77	4.7	16.0
278	983617	8 143837	3088	78	4.8	16.0
279	983617	8 143841	3800	77	4.7	16.0
280	983617	8 143845	3008	76	4.7	16.8
281	983617	8 143937	3000	78	4.7	16.2
282	983617	8 143941	3800	77	4.7	16.2
283	983617	8 143945	3008	77	4.7	16.2
284	983617	8 143949	3808	78	4.7	16.2
285	983617	8 143953	3000	78	4.7	16.2
286	983717	8 144328	3800	41	6.1	16.3
287	983722	8 144753	3008	48	6.3	16.0
288	983722	8 144757	3008	48	6.3	16.1
289	983722	8 144801	3000	41	6.3	16.2
290	983722	8 144824	3088	42	6.3	16.2
291	983722	8 144827	3000	41	6.3	16.1
292	983722	8 144832	3808	42	6.3	16.1
293	983822	8 145912	3800	4	7.3	15.7
294	983822	8 145916	3800	4	7.3	15.7
295	983822	8 145920	3008	4	7.3	15.7
296	983822	8 145924	3008	4	7.3	15.7
297	983822	8 145928	3008	4	7.3	15.7
298	983822	8 145944	3008	3	7.6	15.7
299	983822	8 145948	3000	3	7.3	15.7
300	983822	8 145956	3000	4	7.6	15.7
301	983822	8 150002	3008	3	7.6	15.7
302	984223	8 151008	3596	148	1.4	13.4
303	984223	8 151012	3595	148	1.4	13.4
304	984223	8 151016	3594	148	1.4	13.4
305	984223	8 151034	3593	148	1.4	13.4
306	984223	8 151038	3592	148	1.4	13.4
307	984223	8 151049	3597	148	1.4	13.5
308	984223	8 151053	3596	148	1.4	13.5
309	984223	8 151057	3594	148	1.4	13.5
310	984223	8 151101	3596	148	1.4	13.5
311	984223	8 151105	3599	148	1.4	13.5
312	984323	8 151547	3600	106	3.8	13.7
313	984323	8 151583	3600	106	3.9	13.7
314	984323	8 151587	3608	106	3.9	13.7
315	984323	8 151511	3600	106	3.9	13.7
316	984323	8 151515	3600	107	3.9	13.7
317	984323	8 151538	3600	106	3.9	13.8
318	984323	8 151548	3608	106	3.9	13.8
319	984323	8 151552	3600	106	3.9	13.8
320	984323	8 151557	3608	107	3.9	13.8
321	984323	8 151600	3608	107	3.9	13.8
322	984423	8 152046	3600	70	4.4	15.6
323	984423	8 152054	3600	70	4.4	15.6

R/FTC CHOX	HC	C0	CO2	O2	COOL	EXOIL	AIRDP	AIRFLD	ABSNUM	FLO	DATE
LB/HR	FPM	%	%	%	DEG-F	DEG-F	IN/20	LB/MIN	GR/LB	G/S	JUL YR
14.3 789	776	2.20	12.1	3	189	201	-2.63	7.923	24.730	4.826	123.79
14.3 707	778	2.20	12.1	4	198	281	-2.63	7.921	24.548	4.773	123.79
14.3 786	772	2.21	12.1	4	189	201	-2.02	7.893	24.340	4.781	123.79
14.3 705	787	2.22	12.1	4	189	281	-2.03	7.912	24.310	4.771	123.79
14.3 704	810	2.23	12.1	4	189	281	-2.62	7.886	24.430	4.797	123.79
14.3 704	816	2.22	12.1	4	189	201	-2.01	7.869	24.300	4.706	123.79
16.8 693	37	.04	12.6	1.7	190	281	-1.73	6.736	23.308	3.569	123.79
16.5 693	35	.86	12.9	1.5	190	281	-1.70	6.620	23.430	3.509	123.79
16.5 694	36	.86	12.8	1.5	190	281	-1.70	6.619	23.368	3.549	123.79
16.5 693	36	.86	12.8	1.4	190	201	-1.72	6.679	25.270	3.554	123.79
16.5 693	35	.86	12.8	1.5	190	281	-1.72	6.702	23.600	3.586	123.79
16.5 694	33	.86	12.8	1.5	198	281	-1.72	6.673	25.270	3.591	123.79
16.8 694	28	.84	12.6	1.7	189	201	-1.73	6.787	23.740	3.552	123.79
16.8 693	28	.84	12.6	1.7	189	281	-1.73	6.794	25.800	3.555	123.79
16.8 693	28	.84	12.6	1.7	190	281	-1.74	6.763	23.960	3.617	123.79
16.8 693	28	.84	12.6	1.7	190	281	-1.74	6.733	25.930	3.573	123.79
16.8 693	28	.85	12.6	1.7	190	281	-1.73	6.714	23.780	3.593	123.79
16.7 475	25	.04	12.7	1.8	190	281	-1.32	5.892	24.840	2.839	123.79
16.7 620	19	.87	12.6	1.5	190	280	-1.24	4.747	27.090	2.435	123.79
16.8 599	19	.86	12.6	1.6	190	280	-1.24	4.765	26.990	2.504	123.79
16.8 552	19	.87	12.6	1.8	189	280	-1.24	4.783	26.980	2.507	123.79
16.6 553	28	.88	12.8	1.7	189	280	-1.22	4.711	25.920	2.490	123.79
16.6 563	28	.88	12.8	1.7	189	280	-1.22	4.711	23.740	2.537	123.79
16.5 598	19	.88	12.8	1.6	189	280	-1.22	4.722	25.550	2.470	123.79
15.7 138	174	.30	13.1	1.3	190	198	-80	3.039	23.190	1.743	123.79
15.7 141	172	.32	13.1	1.3	190	198	-80	3.056	24.870	1.710	123.79
15.7 142	193	.32	13.1	1.3	190	198	-80	3.036	24.830	1.725	123.79
15.7 141	176	.31	13.1	1.3	190	198	-80	3.058	24.590	1.711	123.79
15.7 138	193	.31	13.1	1.3	190	198	-80	3.058	24.830	1.696	123.79
15.7 138	179	.30	13.1	1.3	190	198	-80	3.065	24.980	1.689	123.79
15.7 137	192	.30	13.1	1.3	190	198	-80	3.065	25.170	1.741	123.79
15.7 137	201	.34	13.1	1.3	190	198	-80	3.065	25.280	1.738	123.79
15.7 136	183	.33	13.1	1.3	190	198	-80	3.061	23.170	1.714	123.79
13.6 690	975	3.70	11.2	4	190	208	-2.84	18.988	27.510	6.069	123.79
13.6 689	969	3.72	11.2	4	190	208	-2.85	18.938	27.790	6.070	123.79
13.6 690	962	3.72	11.2	4	190	208	-2.84	18.918	27.768	6.809	123.79
13.6 689	964	3.72	11.2	4	190	288	-2.87	11.010	27.630	6.061	123.79
13.6 689	959	3.69	11.2	4	190	288	-2.87	10.998	27.690	6.013	123.79
13.7 690	928	3.64	11.3	4	190	288	-2.85	10.980	28.150	6.025	123.79
13.7 691	953	3.62	11.3	4	198	208	-2.85	10.910	28.220	6.815	123.79
13.6 690	930	3.64	11.3	4	190	288	-2.87	11.080	28.050	6.818	123.79
13.7 690	927	3.57	11.3	4	190	288	-2.88	11.040	28.180	6.799	123.79
13.7 690	949	3.57	11.3	4	190	288	-2.86	10.940	27.700	6.801	123.79
13.9 680	966	3.06	11.6	5	189	288	-2.34	8.973	28.110	5.428	123.79
13.9 678	957	3.10	11.5	5	189	288	-2.34	8.978	28.180	5.605	123.79
13.9 678	949	3.10	11.6	5	189	288	-2.36	9.020	28.320	5.499	123.79
13.9 680	938	3.08	11.6	5	189	288	-2.36	9.019	28.410	5.549	123.79
13.9 681	952	3.07	11.6	5	190	288	-2.36	9.824	28.530	5.298	123.79
13.9 679	920	3.00	11.6	5	190	288	-2.34	8.961	27.730	5.258	123.79
14.0 679	912	2.93	11.7	5	189	288	-2.32	8.881	27.830	5.134	123.79
14.0 677	913	2.91	11.6	5	190	288	-2.31	8.865	27.440	5.320	123.79
14.0 677	943	2.90	11.7	5	190	288	-2.36	9.037	27.618	5.296	123.79
13.9 678	942	2.95	11.7	5	190	288	-2.35	9.020	27.720	5.345	123.79
16.1 678	56	17	13.0	1.0	190	207	-1.90	7.264	29.570	4.017	123.79
16.1 678	50	18	13.0	1.0	190	207	-1.91	7.285	29.450	4.040	123.79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

REC NUM	NOMINAL CODE	TIME HHMMSS.	RPM RPM	CTORQ LBS-FT	EGR %	A/FEX
324	90423.0	152050.	3600	69	4.4	15.6
325	90423.0	152102.	3600	68	4.4	15.6
326	90423.0	152106.	3599	69	4.4	15.6
327	90423.0	152124.	3600	68	4.4	15.5
328	90423.0	152128.	3600	69	4.4	15.5
329	90423.0	152132.	3600	69	4.5	15.5
330	90423.0	152136.	3600	69	4.4	15.5
331	90423.0	152140.	3600	68	4.4	15.5
332	90424.0	152723.	3600	37	5.4	16.1
333	90424.0	152729.	3600	38	5.4	16.1
334	90424.0	152741.	3600	35	5.4	16.1
335	90424.0	152745.	3600	35	5.4	16.1
336	90424.0	152749.	3600	35	5.3	16.1
337	90424.0	152753.	3599	36	5.3	16.1
338	90424.0	152810.	3600	36	5.4	16.0
339	90424.0	152814.	3600	36	5.4	16.0
340	90424.0	152818.	3600	36	5.4	16.0
341	90424.0	152822.	3600	37	5.4	16.1
342	90424.0	152826.	3600	37	5.4	16.1
343	905022.0	153542.	3000	120	3.9	14.2
344	905023.0	153546.	3000	120	3.9	14.2
345	905023.0	153550.	3000	120	3.9	14.2
346	905023.0	153554.	3000	120	3.9	14.2
347	905023.0	153558.	3000	120	3.9	14.2
348	905023.0	153611.	3000	120	3.9	14.2
349	905023.0	153615.	3000	121	3.9	14.2
350	905023.0	153619.	3000	121	3.9	14.2
351	905023.0	153626.	3000	121	3.9	14.2
352	905023.0	153630.	3000	121	3.9	14.2
353	905113.0	154400.	1500	125	4.0	15.6
354	905113.0	154404.	1500	126	4.0	15.6
355	905113.0	154409.	1500	126	4.0	15.6
356	905113.0	154429.	1500	125	4.0	15.6
357	905113.0	154433.	1500	125	4.1	15.5
358	905113.0	154437.	1500	125	4.1	15.5
359	905113.0	154441.	1500	125	4.2	15.5
360	905113.0	154455.	1500	125	4.2	15.5
361	905113.0	154503.	1500	124	4.2	15.5
362	905113.0	154507.	1500	125	4.2	15.5
363	905113.0	154511.	1500	125	4.3	15.5
364	905203.0	103344.	870	110	3.7	16.5
365	905203.0	103349.	870	119	3.7	16.5
366	905203.0	103353.	869	119	3.7	16.5
367	905203.0	103357.	870	120	3.7	16.4
368	905203.0	103401.	869	119	3.7	16.4
369	905203.0	103413.	860	119	3.7	16.4
370	905203.0	103417.	860	110	3.7	16.4
371	905203.0	103422.	870	119	3.7	16.4
372	905203.0	103427.	870	119	3.7	16.4
373	905203.0	103431.	870	119	3.6	16.4
374	905303.0	104036.	875	50	11.5	16.7
375	905303.0	104041.	874	50	11.9	16.7
376	905303.0	104045.	874	50	11.9	16.0
377	905303.0	104049.	874	57	11.9	16.0
378	905303.0	104053.	874	56	11.9	16.7

A/FTC LB/HR	CNOX PPM	HC PPM	CO %	CO2 %	COOLE %	EXHIL %	AIRDP %	AIRFLO GPM	ABSHUM G/7LB	FLO G/5	DATE JUL-YR
16.1	676.	50.	.10	13.0	1.0	190.	207.	-1.90	7.264	29.290	3.983 123.79
16.1	677.	46.	.10	13.0	1.0	190.	207.	-1.91	7.307	29.070	3.936 123.79
16.1	677.	54.	.17	13.0	1.0	190.	207.	-1.91	7.282	29.190	3.967 123.79
16.0	673.	54.	.19	13.0	1.0	190.	207.	-1.91	7.293	20.530	3.997 123.79
16.1	673.	45.	.10	13.0	1.0	190.	207.	-1.89	7.252	28.670	4.002 123.79
16.1	674.	48.	.17	13.1	1.0	190.	207.	-1.07	7.176	20.500	3.910 123.79
16.1	675.	53.	.16	13.1	1.0	190.	207.	-1.08	7.204	20.420	3.987 123.79
16.1	673.	52.	.10	13.0	1.0	190.	207.	-1.09	7.245	20.520	3.935 123.79
16.7	620.	20.	.05	12.7	1.6	190.	206.	-1.47	5.616	29.390	2.041 123.79
16.7	610.	19.	.06	12.7	1.6	190.	206.	-1.47	5.614	20.990	3.061 123.79
16.7	646.	19.	.05	12.7	1.6	190.	206.	-1.46	5.504	20.720	2.073 123.79
16.7	653.	19.	.05	12.7	1.6	190.	206.	-1.45	5.502	20.620	3.147 123.79
16.6	650.	19.	.05	12.7	1.6	190.	206.	-1.45	5.504	20.660	2.961 123.79
16.6	634.	19.	.05	12.7	1.6	190.	206.	-1.46	5.602	20.980	3.142 123.79
16.6	636.	19.	.05	12.7	1.5	190.	206.	-1.45	5.555	20.710	2.513 123.79
16.6	641.	19.	.05	12.0	1.5	190.	206.	-1.45	5.551	20.020	2.024 123.79
16.7	639.	19.	.05	12.7	1.5	190.	206.	-1.46	5.582	20.650	3.059 123.79
16.7	635.	19.	.05	12.7	1.5	190.	206.	-1.45	5.568	20.010	2.000 123.79
16.6	632.	19.	.06	12.7	1.6	190.	206.	-1.44	5.542	20.860	2.090 123.79
14.1	606.	974.	2.59	11.0	.9	190.	202.	-2.00	7.660	29.540	4.670 123.79
14.1	685.	1004.	2.50	11.0	.9	190.	202.	-1.99	7.636	29.430	4.707 123.79
14.0	685.	1002.	2.64	11.0	.9	190.	201.	-1.99	7.642	29.320	4.732 123.79
14.0	684.	909.	2.65	11.0	.9	190.	202.	-1.99	7.634	29.140	4.718 123.79
14.0	684.	900.	2.64	11.0	.9	190.	202.	-2.00	7.682	20.020	4.749 123.79
14.0	682.	982.	2.65	11.8	.9	190.	202.	-2.00	7.661	29.050	4.735 123.79
14.0	683.	986.	2.67	11.8	.9	190.	202.	-2.00	7.681	29.410	4.725 123.79
14.0	685.	1008.	2.66	11.8	.9	190.	202.	-2.01	7.696	29.540	4.715 123.79
14.0	685.	1007.	2.66	11.0	.9	109.	202.	-2.01	7.607	29.320	4.726 123.79
14.0	684.	1000.	2.67	11.8	.8	190.	202.	-2.00	7.653	29.350	4.724 123.79
15.2	707.	950.	.61	12.7	1.5	190.	192.	-1.02	3.053	33.770	2.171 123.79
15.3	705.	967.	.54	12.7	1.5	190.	193.	-1.02	3.028	33.450	2.161 123.79
15.2	703.	970.	.57	12.7	1.5	109.	193.	-1.02	3.042	32.990	2.206 123.79
15.1	704.	989.	.62	12.8	1.5	109.	193.	-1.01	3.025	32.600	2.168 123.79
15.1	704.	901.	.63	12.0	1.4	190.	192.	-1.01	3.025	32.330	2.175 123.79
15.1	703.	974.	.64	12.0	1.4	190.	192.	-1.02	3.036	32.460	2.219 123.79
15.0	701.	994.	.60	12.0	1.4	190.	192.	-1.02	3.032	32.320	2.219 123.79
15.1	705.	1009.	.61	12.7	1.4	191.	192.	-1.02	3.062	34.260	2.171 123.79
15.1	706.	997.	.64	12.0	1.4	191.	192.	-1.02	3.061	34.720	2.173 123.79
15.1	706.	999.	.66	12.7	1.4	190.	192.	-1.02	3.056	34.620	2.198 123.79
15.1	706.	1000.	.60	12.7	1.4	190.	192.	-1.02	3.042	34.520	2.226 123.79
15.5	851.	1037.	.10	12.9	2.3	190.	186.	-5.57	2.193	54.560	1.182 124.79
15.5	850.	1037.	.11	12.0	2.3	190.	187.	-5.57	2.109	55.420	1.220 124.79
15.6	852.	1042.	.13	12.8	2.3	190.	186.	-5.57	2.191	55.590	1.223 124.79
15.5	854.	1044.	.13	12.8	2.3	190.	186.	-5.57	2.195	55.020	1.216 124.79
15.6	853.	1024.	.13	12.8	2.3	190.	186.	-5.57	2.195	55.670	1.196 124.79
15.5	851.	1037.	.12	12.9	2.3	190.	187.	-5.57	2.179	55.120	1.207 124.79
15.5	849.	1032.	.13	12.9	2.3	190.	186.	-5.57	2.184	54.810	1.181 124.79
15.5	851.	1025.	.13	12.9	2.2	190.	187.	-5.57	2.185	55.350	1.212 124.79
15.6	852.	1051.	.10	12.0	2.2	190.	186.	-5.57	2.191	55.540	1.241 124.79
15.5	851.	1037.	.11	12.9	2.3	190.	187.	-5.57	2.107	55.490	1.230 124.79
14.2	190.	3571.	.14	12.3	3.0	190.	186.	-4.42	1.622	54.020	.082 124.79
14.2	184.	3497.	.15	12.3	3.0	190.	186.	-4.42	1.624	54.190	.905 124.79
14.4	173.	3323.	.15	12.3	3.0	190.	186.	-4.42	1.625	54.460	.095 124.79
14.4	167.	3182.	.16	12.3	3.0	190.	186.	-4.42	1.619	54.900	.096 124.79
14.4	161.	3154.	.17	12.4	3.0	191.	186.	-4.42	1.619	55.190	.090 124.79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

REC NUM	NOMINAL CODE	TIME HHMMSS	RPM CTORQ		EGR %	A/FEX %
			RPM	CTORQ LB-FT		
379	985383	8 105819	874	76	10.2	16.6
380	985383	8 105024	871	78	9.9	16.6
381	985383	8 105828	873	78	9.8	16.6
382	985383	8 105031	874	78	9.8	16.6
383	985383	8 105035	874	78	9.7	16.6
384	985383	8 105053	872	78	9.8	16.6
385	985383	8 105057	873	77	9.8	16.6
386	985383	8 105101	872	77	9.8	16.6
387	985383	8 105105	875	76	9.8	16.6
388	985383	8 105108	875	77	9.8	16.6
389	986084	8 131449	1500	128	2.8	15.7
390	986084	8 131452	1508	128	2.8	15.7
391	986084	8 131459	1500	128	2.8	15.7
392	986084	8 131503	1500	128	2.8	15.7
393	986084	8 131507	1500	128	2.8	15.7
394	986084	8 131558	1500	129	2.6	15.9
395	986084	8 131619	1500	128	2.4	15.9
396	986084	8 131622	1508	128	2.4	15.9
397	986084	8 131628	1508	127	2.5	15.9
398	986084	8 131632	1508	127	2.5	15.9
399	980385	8 132159	1000	121	3.7	16.4
400	980385	8 132203	1800	121	3.9	16.4
401	980385	8 132227	1000	121	4.1	16.5
402	980385	8 132226	1800	122	4.1	16.5
403	980385	8 132231	1000	122	4.1	16.5
404	980385	8 132254	1800	121	4.1	16.5
405	980385	8 132257	1000	121	4.1	16.5
406	980385	8 132301	1081	121	4.1	16.5
407	980385	8 132305	1001	121	4.1	16.5
408	980385	8 132309	1008	121	4.1	16.5
409	980485	8 133187	1000	79	8.1	17.8
410	980485	8 133111	1080	79	8.0	17.8
411	980485	8 133122	1000	82	8.0	17.8
412	980485	8 133127	999	83	7.9	17.8
413	980485	8 133131	1000	83	7.0	17.9
414	980485	8 133135	1008	82	7.7	17.9
415	980485	8 133138	1008	83	7.6	17.9
416	980485	8 133237	1000	81	7.8	17.6
417	980485	8 133240	1001	81	7.8	17.7
418	980485	8 133244	1001	81	7.7	17.6
419	980485	8 133248	1002	81	7.8	17.7
420	980503	8 143727	999	39	12.6	17.7
421	980503	8 143731	1000	48	12.7	17.8
422	980503	8 143740	1000	39	12.7	17.9
423	980503	8 143744	1000	39	12.6	17.9
424	980503	8 143749	997	39	12.8	17.8
425	980503	8 143802	999	39	12.8	17.8
426	980503	8 143809	1000	39	12.5	17.8
427	980503	8 143813	1001	40	12.6	17.8
428	980503	8 143829	998	39	12.8	17.7
429	980583	8 145734	1008	39	12.7	17.6
430	980583	8 145718	1000	39	9.5	17.5
431	980583	8 145724	1000	39	9.5	17.4
432	980583	8 145728	998	39	9.6	17.4
433	980583	8 145734	998	39	9.6	17.5

D	A/FIC	CHOX	HC	CO	CO2	O2	COOLE	EXOIL	AIRKEP	AIRFLO	ABSHUM	FLO	DATE
LB/HR		PPM		%	%	%	DEG-F	DEG-F	INH2O	LB/MIN	GR/LB	G75	JUL-YR
15.0	430	1651		15.12	8	2.6	191	185	-	46	1.754	53.206	989 124 79
15.1	417	1458		15.12	9	2.6	191	185	-	46	1.755	53.320	960 124 79
15.2	485	1338		15.12	9	2.6	190	186	-	46	1.758	53.408	992 124 79
15.2	522	1423		15.12	9	2.6	190	186	-	46	1.758	53.258	991 124 79
15.1	502	1519		14.12	9	2.6	198	186	-	46	1.757	53.898	1.806 124 79
15.0	530	1667		15.12	9	2.6	198	186	-	46	1.759	54.280	980 124 79
15.3	502	1406		12.12	8	2.6	190	186	-	46	1.758	53.620	952 124 79
15.3	490	1391		12.12	8	2.6	190	186	-	45	1.749	53.378	1.803 124 79
15.2	492	1380		15.12	8	2.6	190	186	-	46	1.753	53.208	981 124 79
15.2	510	1474		15.12	8	2.6	190	186	-	45	1.752	52.820	1.811 124 79
15.2	833	874		39.12	9	1.5	193	191	-1.03	4.074	51.260	2.198 124 79	
15.3	833	880		41.12	9	1.5	193	191	-1.06	4.075	50.990	2.223 124 79	
15.3	833	909		37.12	9	1.5	193	191	-1.03	4.034	51.170	2.219 124 79	
15.2	834	881		38.13	0	1.5	192	191	-1.06	4.065	51.470	2.220 124 79	
15.3	833	884		38.12	9	1.4	191	191	-1.03	4.045	51.430	2.207 124 79	
15.6	827	779		31.12	8	1.7	193	191	-1.07	4.138	49.008	2.234 124 79	
15.5	834	798		30.12	8	1.7	190	191	-1.07	4.120	50.750	2.182 124 79	
15.6	835	790		32.12	8	1.7	189	191	-1.07	4.098	50.970	2.198 124 79	
15.6	835	771		31.12	8	1.6	188	192	-1.06	4.075	51.470	2.226 124 79	
15.6	834	776		30.12	8	1.6	188	192	-1.06	4.065	51.340	2.205 124 79	
15.9	838	906		10.12	6	2.2	192	189	-	67	2.561	51.660	1.290 124 79
15.9	837	969		11.12	6	2.2	191	189	-	67	2.562	51.140	1.297 124 79
16.0	834	934		09.12	3	2.3	190	189	-	67	2.558	51.750	1.585 124 79
16.0	834	950		11.12	6	2.3	190	189	-	67	2.565	51.410	1.396 124 79
16.0	834	960		09.12	6	2.3	190	190	-	67	2.564	51.420	1.331 124 79
15.9	835	972		10.12	6	2.3	189	190	-	67	2.562	52.038	1.403 124 79
15.9	835	964		11.12	6	2.3	190	190	-	66	2.524	51.670	1.346 124 79
16.0	834	936		12.12	5	2.3	190	190	-	66	2.538	51.290	1.364 124 79
16.0	834	949		10.12	5	2.3	190	189	-	67	2.567	51.440	1.368 124 79
16.0	833	957		10.12	5	2.3	190	190	-	67	2.563	51.650	1.373 124 79
16.0	550	2679		10.11	3	3.9	190	188	-	38	2.224	48.990	1.120 124 79
16.2	524	2494		10.11	3	3.9	190	188	-	38	2.226	48.150	1.101 124 79
16.3	559	2405		10.11	2	3.9	190	188	-	39	2.265	47.680	1.095 124 79
16.2	538	2494		10.11	3	3.9	190	188	-	39	2.269	47.510	1.114 124 79
16.5	562	2168		10.11	3	3.9	190	188	-	39	2.268	47.430	1.118 124 79
16.8	592	1827		10.11	3	3.9	190	188	-	39	2.258	47.470	1.107 124 79
16.7	610	1856		10.11	4	3.9	190	187	-	39	2.262	47.570	1.118 124 79
15.9	557	2679		11.11	4	3.8	190	188	-	39	2.253	49.280	1.076 124 79
16.0	597	2575		11.11	3	3.7	190	188	-	39	2.252	48.950	1.118 124 79
15.0	635	2800		11.11	4	3.7	190	187	-	39	2.251	48.650	1.080 124 79
16.0	615	2615		11.11	3	3.8	190	187	-	39	2.268	49.080	1.164 124 79
3.4	87	9832		19.10	6	4.9	189	185	-	46	1.782	48.570	877 124 79
4.7	85	8908		19.10	5	4.9	189	185	-	46	1.786	48.970	941 124 79
4.6	77	8588		20.10	6	5.0	189	185	-	46	1.765	48.700	892 124 79
4.6	82	8487		20.10	7	5.0	189	185	-	46	1.776	48.890	844 124 79
3.8	85	8678		20.10	6	4.9	189	185	-	46	1.775	49.128	879 124 79
4.6	76	8280		19.10	6	4.9	190	185	-	46	1.768	48.820	855 124 79
3.4	81	8792		20.10	6	4.9	189	185	-	46	1.780	49.120	885 124 79
4.2	83	8285		20.10	6	4.9	190	185	-	46	1.767	49.270	914 124 79
4.2	87	8646		19.10	7	4.9	190	185	-	46	1.766	49.050	888 124 79
1.8	83	9571		19.10	7	4.8	189	185	-	46	1.768	48.950	926 124 79
14.2	113	5140		20.11	1	4.8	190	186	-	45	1.715	46.450	849 124 79
13.2	119	5463		21.11	2	4.0	190	186	-	45	1.719	46.708	874 124 79
13.0	113	5893		20.11	1	4.8	190	186	-	44	1.708	46.760	867 124 79
14.1	107	5324		19.11	0	4.1	190	187	-	44	1.705	47.210	850 124 79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

REC NUM	NOMINAL CODE	TIME HMMSS	RPM CTOPO RPM LB-FY	FCR %	A/FEX
434	980583	0 14538	999	39	9.3 17.5
435	980583	0 15015	1000	40	9.3 17.6
436	980583	0 15013	999	39	9.4 17.5
437	980583	0 15023	999	40	9.4 17.5
438	980583	0 15027	1000	40	9.4 17.7
439	980583	0 15031	1000	39	9.4 17.7
440	985482	0 15043	875	39	8.6 16.5
441	985482	0 15047	874	39	8.8 16.6
442	985482	0 15051	873	39	8.8 16.5
443	985482	0 15055	876	38	8.8 16.5
444	985482	0 15059	876	39	8.9 16.4
445	985482	0 15183	876	39	8.8 16.5
446	985482	0 15187	876	48	8.8 16.6
447	985482	0 15311	877	39	8.7 16.6
448	985482	0 15315	876	39	8.8 16.5
449	985482	0 15319	880	39	8.9 16.4
450	985984	0 93930	888	139	1.0 13.8
451	985984	0 93935	888	139	1.0 13.8
452	985984	0 93939	888	139	1.0 13.8
453	985984	0 93943	888	139	1.0 13.8
454	985984	0 93947	888	139	1.0 13.8
455	985984	0 94826	888	139	1.0 13.8
456	985984	0 94035	888	139	1.0 13.8
457	985984	0 94039	888	139	1.0 13.8
458	985984	0 94843	888	139	1.0 13.8
459	985984	0 94047	888	139	1.0 13.8
460	985984	0 94848	888	3	6 18.3
461	985984	0 94858	878	4	6 18.7
462	985984	0 94858	879	3	6 18.9
463	985984	0 94902	888	4	6 18.8
464	985984	0 94924	888	4	6 18.3
465	985984	0 94928	888	4	6 18.3
466	985984	0 94932	879	4	6 18.3
467	985984	0 94936	879	3	6 18.4
468	985984	0 94939	888	4	6 18.8
469	985984	0 95981	758	38	2.4 16.7
470	986284	0 95985	758	38	2.4 16.7
471	986284	0 95989	758	37	2.4 16.7
472	986284	0 188526	749	39	2.4 16.7
473	986284	0 188530	758	39	2.4 16.7
474	986284	0 188534	750	39	2.4 16.6
475	986284	0 188538	749	38	2.4 16.8
476	986284	0 188542	749	37	2.4 16.7
477	986284	0 188546	749	37	2.4 16.7
478	986284	0 188550	749	37	2.4 16.7
479	986284	0 188554	749	37	2.4 16.7
480	986284	0 188558	758	38	2.4 16.7
481	986284	0 188562	758	39	2.4 16.6
482	986284	0 188566	749	39	2.4 16.6
483	986284	0 188570	749	39	2.4 16.6
484	986284	0 188574	749	39	2.4 16.5
485	986284	0 188578	749	39	2.4 16.6
486	986284	0 188582	749	1	2.7 19.4
487	986284	0 188586	748	1	2.7 19.7
488	986284	0 188590	748	1	2.6 19.9

A/FIC	CHOX	HC	CO	CO2	COOLE	EXOIL	AIRDP	AIRFLD	ABSHUM	FLO	DATE
LB/HR	PPM	PPM	%	%	DEC-F	DEC-F	INR20	LB/MTN	GR/LB	G/S	JUL-YR
13.4	107	5838	19.11	1	4.1	190	186	-45	1.714	47.518	883 124.79
13.9	108	5756	21.11	0	4.3	190	186	-46	1.754	48.108	934 124.79
13.0	103	6111	28.11	0	4.2	198	186	-46	1.756	48.238	883 124.79
12.5	106	6304	28.10	9	4.2	190	186	-46	1.753	48.238	861 124.79
13.8	117	5396	28.10	9	4.2	190	186	-45	1.744	48.348	865 124.79
14.4	114	5101	20.10	9	4.3	190	186	-45	1.735	48.578	887 124.79
14.1	167	4406	25.11	7	2.9	189	185	-36	1.403	45.830	687 124.79
14.4	169	3870	27.11	7	2.9	198	185	-37	1.484	46.898	676 124.79
14.0	154	4388	30.11	8	2.9	189	185	-36	1.408	46.378	733 124.79
13.6	146	4483	28.11	7	2.9	198	185	-36	1.398	46.398	775 124.79
13.0	141	4944	29.11	7	2.9	189	185	-36	1.399	46.488	719 124.79
14.2	144	4298	30.11	6	2.9	189	185	-36	1.398	46.568	718 124.79
14.4	142	3916	27.11	7	3.0	189	185	-36	1.396	46.568	742 124.79
14.1	143	4210	27.11	8	3.0	189	185	-36	1.396	46.528	718 124.79
13.9	145	4534	27.11	8	2.9	189	185	-36	1.396	46.508	748 124.79
12.9	140	4898	27.11	8	2.8	189	185	-36	1.398	46.588	822 124.79
13.7	712	1571	2.59	11.8	3	191	185	-59	2.431	15.808	1.513 127.79
13.7	713	1594	2.57	11.8	3	198	185	-59	2.416	15.728	1.518 127.79
13.7	713	1583	2.57	11.8	3	190	185	-59	2.424	15.748	1.507 127.79
13.7	713	1594	2.55	11.8	3	198	185	-59	2.439	15.768	1.528 127.79
13.7	713	1585	2.59	11.8	3	190	185	-59	2.436	15.838	1.513 127.79
13.7	713	1587	2.48	11.9	3	189	185	-59	2.425	16.058	1.515 127.79
13.7	711	1587	2.58	11.8	3	189	185	-59	2.438	15.838	1.513 127.79
13.7	711	1583	2.53	11.8	3	189	185	-59	2.426	15.738	1.583 127.79
13.7	712	1568	2.52	11.9	3	189	185	-59	2.421	15.718	1.516 127.79
13.7	712	1578	2.51	11.8	3	189	185	-59	2.413	15.728	1.528 127.79
5.9	63	9649	25.18	2	5.6	189	183	-18	745	15.868	385 127.79
3.9	58	9431	25.18	1	6.0	189	184	-18	758	15.868	397 127.79
5.1	55	9137	26.18	2	6.0	189	184	-18	758	15.838	410 127.79
8.9	58	7932	24.18	1	5.9	189	183	-18	745	15.698	488 127.79
8.6	57	8162	25.18	2	5.9	189	183	-18	744	15.678	582 127.79
6.8	63	8655	28.18	3	5.5	191	183	-18	746	15.888	483 127.79
4.3	64	9532	27.18	4	5.6	191	183	-18	743	15.948	481 127.79
4.7	62	9631	24.18	2	5.6	192	183	-18	745	15.998	418 127.79
6.2	61	9427	24.18	2	5.7	192	183	-18	746	16.048	438 127.79
9.3	59	7794	26.18	2	5.8	193	183	-18	744	15.978	418 127.79
15.3	364	1868	86.11	5	3.2	194	182	-22	890	15.698	588 127.79
15.6	368	1872	78.11	5	3.1	194	181	-22	889	15.698	499 127.79
13.6	376	1882	79.11	5	3.1	194	181	-22	891	15.768	527 127.79
15.6	319	2002	46.11	7	2.9	198	183	-23	955	15.798	579 127.79
15.3	294	1998	58.11	7	3.0	198	183	-23	952	15.838	550 127.79
15.2	291	2278	64.11	7	3.0	190	183	-23	953	15.708	561 127.79
13.7	262	1857	49.11	7	3.0	189	182	-23	942	15.818	540 127.79
15.8	263	1846	48.11	7	2.9	189	182	-23	944	15.728	536 127.79
13.7	269	1862	49.11	7	3.0	189	183	-23	945	15.808	532 127.79
15.6	267	1885	56.11	7	3.0	189	183	-23	948	15.888	556 127.79
15.6	278	1873	56.11	7	2.9	189	182	-23	946	15.778	547 127.79
15.6	389	1825	54.11	8	2.8	189	182	-23	955	15.988	548 127.79
15.6	310	1882	57.11	7	2.8	189	182	-23	952	15.908	543 127.79
15.6	297	1794	68.11	7	2.8	190	182	-23	953	15.908	551 127.79
15.3	268	2268	56.11	8	2.8	191	182	-23	958	15.918	551 127.79
15.3	269	2114	55.11	7	2.8	191	182	-23	958	16.808	543 127.79
1.0	27	14300	29.9	0	7.3	189	182	-16	666	16.678	363 127.79
1.8	26	14068	24.9	8	7.5	189	182	-16	668	16.648	356 127.79
1.0	25	13600	26.9	0	7.7	188	182	-16	668	16.698	358 127.79

TABLE B-1. CHRYSLER 225 CID TEST DATA (CONTD)

NEGATIVE TORQUES

RPM	CTORQUE LB-FT	A/F	EX	MOCONC PPM	NOCONC PPM	COCONC %	CO2CONC %	O2CONC %	COOL ETEMP DEG F	EXOIL TEMP DEG F	MASSAFLOW LBS/MIN	ABSHUM GR/LB
1588	-25.38	17.47		21.39	1373E+05	4831	6.390	4.641	186.7	198.3	.1633	44.24
1500	-18.52	14.22		21.54	6136E+05	3818	8.530	6.615	186.7	196.6	.3081	44.50
1500	-4.998	17.13		53.25	8908	3354	11.22	4.544	187.3	197.6	3298E-81	44.37
1808.8	-14.59	16.84		30.11	1193E+05	1.968	9.489	5.761	187.7	191.6	.1387	45.26
1000.0	-9.828	14.77		36.98	9693	2.358	11.04	7.026	187.7	188.6	.1430	45.03
999.7	-3.385	18.11		40.98	2531	3722	11.16	4.630	186.3	186.7	.2254	45.18
2000	-32.24	17.96		15.06	1387E+05	5570	5.505	4.809	187.1	212.3	.7381	49.11
2000	-6.904	17.14		26.71	6841	3136	10.55	3.882	186.9	211.3	2.197	50.83
2500	-28.79	19.83		14.60	1269E+05	5781	8.249	7.452	187.0	223.6	1.628	48.85
2500	-10.48	17.87		38.88	4781	3858	11.00	3.538	187.4	226.4	2.615	49.76
3000	-48.01	19.19		11.85	1208E+05	2123	9.059	6.574	181.6	235.4	.5152	31.70
3000	-28.75	18.36		15.89	1161E+05	5196	9.268	5.973	181.8	234.2	1.768	30.62
3000	-8.737	15.78		65.83	599.0	1592	12.41	1.210	181.8	238.7	2.824	32.16
3598	-1599	15.39		137.1	13.52	8587E-01	13.04	.7054	182.8	267.4	4.139	37.45
3688	-47.55	16.98		14.04	1226E+05	2578	7.215	3.813	182.1	257.1	.4427	38.73
3598	-35.70	17.73		17.15	5557E+05	5372	9.551	13.35	182.6	256.1	2.064	37.91
3599	-11.68	14.26		84.49	3112	8761	12.95	1099	183.0	268.9	3.208	49.93
800.8	-10.65	16.74		22.62	1081E+05	1.784	9.222	5.196	183.8	181.3	.4820	60.69
879.3	-1.916	18.18		26.46	9386	3591	9.752	5.353	184.2	179.9	.5596	62.46
758.8	-7.432	18.26		15.74	1057E+05	5782	9.312	5.742	184.8	178.0	.4865	63.19
758.0	-1.487	19.08		21.45	9716	2916	9.190	6.136	182.5	177.7	.5181	62.38

TABLE B-2. CHRYSLER 225 CID REDUCED TEST DATA.

RPM	CORRECTED TORQUE (LB-FT)	EGR (PERCENT)	AIR- FUEL RATIO	FUEL FLOW (LB/HR)	NO _x (GM/HR)	HC (GM/HR)	CO (GM/HR)
1500.0000	51.1100	4.2380	14.5500	8.4289	69.1897	39.2258	686.3305
1500.0000	81.5300	7.1030	15.2400	15.5320	131.9446	16.8107	126.0610
1500.0000	79.8500	7.5470	15.9200	15.1055	124.8359	24.6058	177.1250
1500.0000	79.1200	7.5400	15.9200	14.9585	123.4420	23.9936	186.0913
1500.0000	72.1200	7.5970	15.9500	15.0771	124.6230	23.4302	170.9950
1500.0000	40.2900	9.3570	16.7900	11.3139	37.2201	27.8283	157.3556
2000.0000	3.3460	12.0400	17.5900	7.0232	3.7751	332.4952	193.3445
2000.0000	112.5000	4.8250	15.0000	10.8280	165.7349	71.1749	1465.7210
2000.0000	160.6000	0.9576	13.6000	27.1852	205.5910	118.0539	6239.5000
2500.0000	159.2000	1.0470	13.3900	35.0411	259.9955	132.5016	8933.9440
2500.0000	121.5000	3.8080	14.3400	27.0837	211.5436	92.7661	4152.3250
2500.0000	84.5500	5.6260	15.6700	20.1902	168.6090	35.2924	854.8100
2500.0000	41.5500	8.2210	16.1500	14.4669	58.2993	12.9810	399.8083
2500.0000	3.7170	10.1800	16.3100	9.7536	11.8017	26.0173	244.8221
1500.0000	162.0000	0.8006	13.5600	20.1991	140.9977	102.0168	5204.3940
1500.0000	162.4000	0.8134	13.5500	20.2399	150.1057	101.2744	5187.0840
1500.0000	160.0000	0.8436	13.5600	20.0398	148.4430	102.0220	5134.4290
1500.0000	62.2700	8.3390	15.2200	11.8150	100.5981	29.2460	140.5908
1500.0000	42.2300	11.3100	17.4300	9.3735	13.5025	100.6733	157.8411
1500.0000	2.3350	16.8000	17.0200	5.4645	1.2458	305.1661	205.4742
3000.0000	157.7000	0.6564	13.2300	44.6349	326.1479	122.0923	10519.8000
3000.0000	117.8000	3.5820	14.0700	23.5535	252.0818	88.0748	4827.4880
3000.0000	79.3400	4.6730	15.1000	24.9920	201.9422	2.5246	93.6903
3000.0000	41.4900	6.0650	16.2600	19.7897	109.1072	1.7515	57.7814
3000.0000	42.0400	6.4660	15.1100	17.5866	117.0835	1.2089	102.1009
3000.0000	5.0030	7.5700	15.6900	11.7130	19.3529	7.6154	273.0931
3500.0000	140.2000	1.4180	13.4900	49.6582	344.5222	142.8138	10944.6900
3500.0000	107.2000	3.9090	13.8000	39.2174	278.4396	116.7245	7376.8800
3500.0000	68.9900	4.4230	15.5300	27.9910	220.5550	5.0885	352.3588
3500.0000	27.2400	5.3790	16.0600	20.7049	159.0968	1.2957	83.6615
3000.0000	120.0000	3.9220	14.2400	22.2752	229.7846	102.3202	5434.7440
3000.0000	121.9000	3.9410	14.1700	22.4051	239.1913	104.9149	5665.2310
1500.0000	125.7000	4.2790	15.5000	14.9723	122.6022	52.8015	722.9702
870.0000	119.2000	3.6480	16.4400	7.9818	83.8868	30.9140	68.4523
375.0000	77.2900	9.7560	15.6100	6.3297	40.2641	35.0669	73.4412
1500.0000	127.0000	2.4750	15.8900	15.3493	153.0921	42.9497	338.9929
1000.0000	121.9000	4.1410	16.5000	9.3200	93.2447	32.3095	70.9255
1002.0000	81.2400	7.9010	17.6600	7.5784	62.4144	79.9792	68.3574
1000.0000	39.6300	9.3520	17.7200	5.8747	3.8992	119.7492	93.4668
378.0000	30.3700	8.8500	16.4000	7.1146	8.8019	93.0481	104.5556
880.0000	139.1000	1.0160	13.7900	10.4089	78.2946	52.0390	1693.0920
880.0000	3.8500	0.5953	18.7900	2.4443	2.1818	97.1161	49.9893
379.0000	3.5900	0.6088	18.9500	2.3717	1.8219	79.7524	46.3341
880.0000	4.5930	0.6023	18.7800	2.2764	1.8892	81.8954	51.5970
880.0000	4.8000	0.6076	18.2300	2.4421	2.1268	95.7021	55.0757
880.0000	4.3270	0.6105	18.7700	2.3789	1.9795	78.2471	52.8626
750.0000	38.2500	0.8110	16.7400	3.1878	14.7257	22.5984	189.0836
749.0000	39.6000	2.4470	16.5600	3.4421	11.5316	27.2939	142.2492
749.0000	1.5320	2.4720	15.8500	1.9931	0.6864	116.8305	51.9936

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