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ENGINE PERFORMANCE TEST
OF THE HONDA CVCC

W. F. Marshall



SEPTEMBER 1975
INTERIM REPORT

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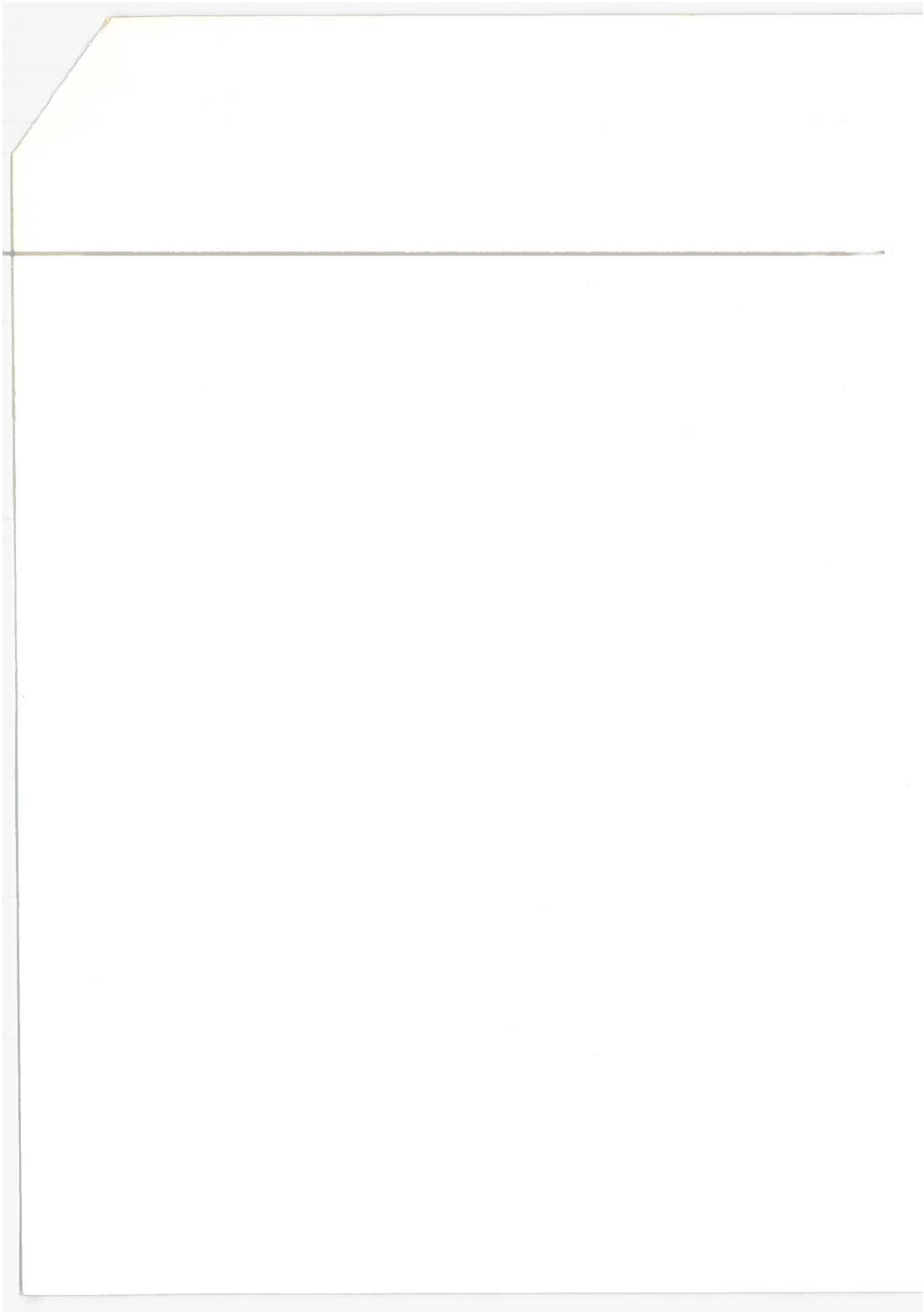
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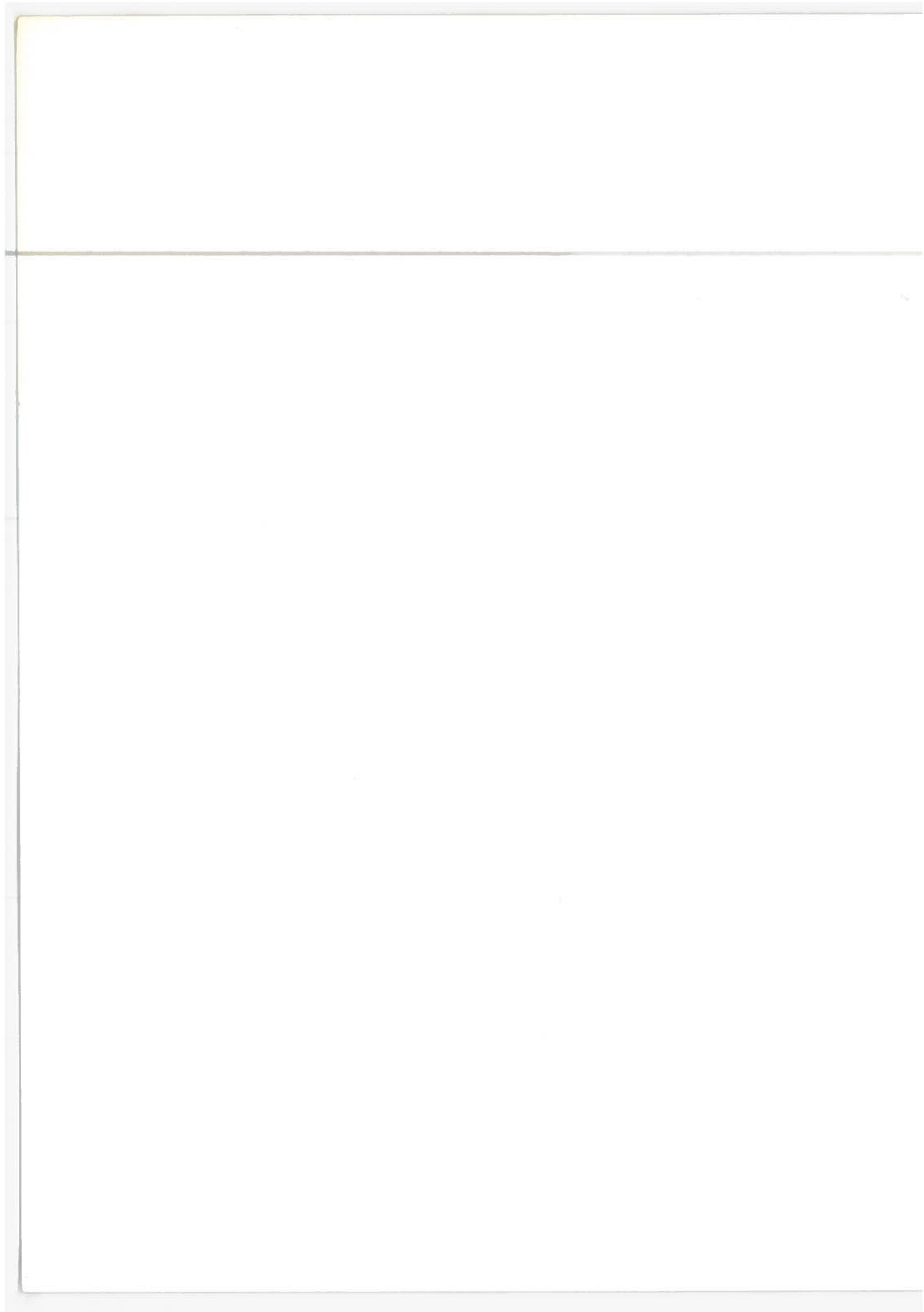
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16. Abstract An engine test of a prototype Honda CVCC, 90.8-cubic-inch displacement, 4-cylinder engine was performed to determine its steady-state fuel consumption and emissions (HC, CO, NO _x) maps, and the data which were obtained are summarized.					
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PREFACE

This report, prepared by the U.S. Energy Research and Development Administration, Bartlesville Energy Research Center for the U.S. Department of Transportation, presents results of an automobile engine test. This represents only one of a series of engines to be tested.



1. INTRODUCTION

This report presents the data which were obtained from a test of a prototype Honda CVCC, 90.8-cubic-inch, 4-cylinder engine. The data included are sufficient to establish the steady-state engine maps for fuel consumption and emissions (HC, CO, NO_x) over the engine's entire operating range. This test represents one of a series of 1975 engines tested or to be tested.

The objective of this program is to obtain automotive engine performance data for use in estimating emissions and fuel economy in varied service and duty. The intent of this work is to provide basic engine characteristic data required as input for engineering calculations involving ground transportation.

2. ENGINE TEST REPORT

The specifications of a prototype Honda CVCC (compound vortex controlled combustion) engine are given in Table 1. The engine is calibrated to achieve emissions standards of 0.41 gm/mi HC, 3.4 gm/mi CO, and 2.0 gm/mi NO_x, which are more rigorous than 1975 Federal or California Standards. Thus, the engine is not representative of 1975 production engines. The fuel used was 7305 and its specifications are given in Table 2. The engine break-in was equivalent to an accumulation of 2000 miles. The break-in details are shown in Table 3. The total engine operating time (break-in and testing) was 160 hours. The period of testing was January 21-28, 1975.

The engine was mounted on a test stand and coupled to an eddy-current dynamometer and an electric motor used for both starting and motoring the engine. The engine was complete except for starter and fan. An alternator was included in the test set-up but was not wired into a charging system. The engine was operated at the following steady-state modes:

Low speeds (1,000; 1,500; 2,000; 2,500 rpm):

Motored, 0, 5, 10, 20, 40, 60, 80, 90, 100 pct of full load

(repeats of 0, 5, 10, 20, 90, 100 pct of full load).

(Measures of "power absorbed by the engine" were not made during motoring tests.)

High speeds (3,500; 4,500; 5,500 rpm):

0, 20, 40, 60, 80, 90, 100 pct of full load

(repeats at 0, 20, 80, 90, 100 pct of full load).

Idle: No load, load equivalent to transmission in "Drive"
(both repeated).

Total number of test modes... 63
Repeats..... 41
Total number of samples... 104.

The following data were recorded:

Test number
Date
Barometric pressure (mmHg)
Dew point (°F) -- Panametrics hygrometer
Inlet air temperature (°F)
Speed (rpm)
Torque (lb-ft) -- BLH strain gauge; Daytronics meter
Fuel rate (lb/hr) -- FLO-TRON linear mass flowmeter
Ignition timing (°BTC)
Manifold vacuum (in. Hg)
Throttle angle (degrees)
% CO -- Beckman NDIR
% CO -- Bechman NDIR
% O₂ -- Beckman polarographic meter

ppmC HC -- Custom build heated FID
 ppm NO_x -- Thermo-Electron chemiluminescent detector
 Oil temperature (°F)
 Oil pressure (psig)
 Coolant temperature (°F)
 Exhaust temperature (°F)
 Exhaust pressure (in. H₂O).

The computed data included absolute humidity (grains/lb dry air), power (BHP), air-fuel ratio, and emission rates of carbon monoxide (CO), unburned hydrocarbons (HC), and oxides of nitrogen (NO_x) in grams/hour. The following equations were applied in the computations:

$$H_2O \text{ (mmHg)} = \exp 1202 \frac{\text{Dew pt (}^\circ\text{F)} - 1.4}{\text{Dew pt} + 212}$$

$$H \text{ (grains } H_2O/\text{lb dry air)} = \frac{4348 H_2O}{\text{Baro.} - H_2O}$$

$$\text{Power (bhp)} = \frac{(\text{Speed})(\text{Torque})}{5252} \left(\frac{736.6}{\text{Baro.} - H_2O} \right) \left(\frac{t_{\text{air}} + 460}{545} \right)^{0.5}$$

$$\text{Air-fuel ratio, A/F} = 4.968 \left\{ \frac{(\text{CO}) + (2\text{CO}_2) + (2\text{O}_2) + \frac{\text{NO}_x}{10^4} + 2.775 \text{CO}_2 \frac{\text{CO} + \text{CO}_2}{\text{CO} + 3\text{CO}_2}}{(\text{CO}) + (\text{CO}_2) + \frac{\text{HC}}{10^4} \left(1 + .02775 \text{CO}_2 \frac{\text{CO} + \text{CO}_2}{\text{CO} + 3\text{CO}_2} \right)} \right\}$$

This equation is based on:

- a. Fuel = CH_{1.85}.
- b. Water-gas-shift equilibrium constant = $\frac{(\text{CO})(\text{H}_2\text{O})}{(\text{CO}_2)(\text{H}_2)} = 3$.
- c. HC determined on a raw exhaust basis, all other species measured on a dry basis.
- d. All NO_x is NO.
- e. Units of HC, NO_x concentrations = ppm (by volume), all others = % (by volume).

$$\text{Mass CO} = (\text{Exhaust flow rate}) \times (\text{concentration CO}) \times \frac{\text{molecular wt CO}}{\text{molecular wt exhaust}} \\ \times (\text{correction for water removal}).$$

$$\text{Mass CO} = 4.383 (\text{fuel rate})(A/F + 1) (\%CO) \frac{1}{1 + .02775 \text{CO}_2 \frac{\text{CO} + \text{CO}_2}{\text{CO} + 3\text{CO}_2}} .$$

$$\text{Mass HC} = 0.0002172 (F)(A/F + 1) (\text{ppm HC})$$

$$\text{Mass NO}_x = 0.0007201 (F)(A/F + 1) (\text{ppm NO}_x) \left(\frac{1}{1 + .02775 \text{CO}_2 \frac{\text{CO} + \text{CO}_2}{\text{CO} + 3\text{CO}_2}} \right)$$

x (humidity correction factor), K_H .

$$K_H = \frac{1}{1 - .0047 (H - 75)} .$$

An estimation of the power absorbed by an engine operated under motored conditions can be done from an analysis of fuel rate and brake power at several speeds.

- a. Assume that, at a given speed, friction power is constant (independent of brake power).
- b. Assume that friction power is a direct function speed.

Then, determine the friction power at each speed by extrapolating to zero fuel rate, on a plot of fuel rate versus power.

Determine the relationship between friction power and speed. The power absorbed by the engine is equal to the difference in friction power at any speed and the friction power at idle speed. This is so because the engine is firing with a closed throttle (idle setting).

Application of this analysis to the Honda CVCC engine yields the following results:

<u>Speed, rpm</u>	<u>Absorbed power, hp</u>
1,000	0.4
1,500	2.6
2,000	4.8
2,500	7.0

TABLE 1. MANUFACTURER'S ENGINE SPECIFICATIONS

Engine Model Type L

Displacement: 90.8 cubic inches

Maximum power: 53 hp at 5,500 rpm

Maximum torque: 73.7 lb-ft at 3,000 rpm

In-line 4 cylinders

Single overhead camshaft, 3 valves

Bore and stroke: 2.9 inches x 3.4 inches

Compression ratio: 7.7

Detail of CVCC system.

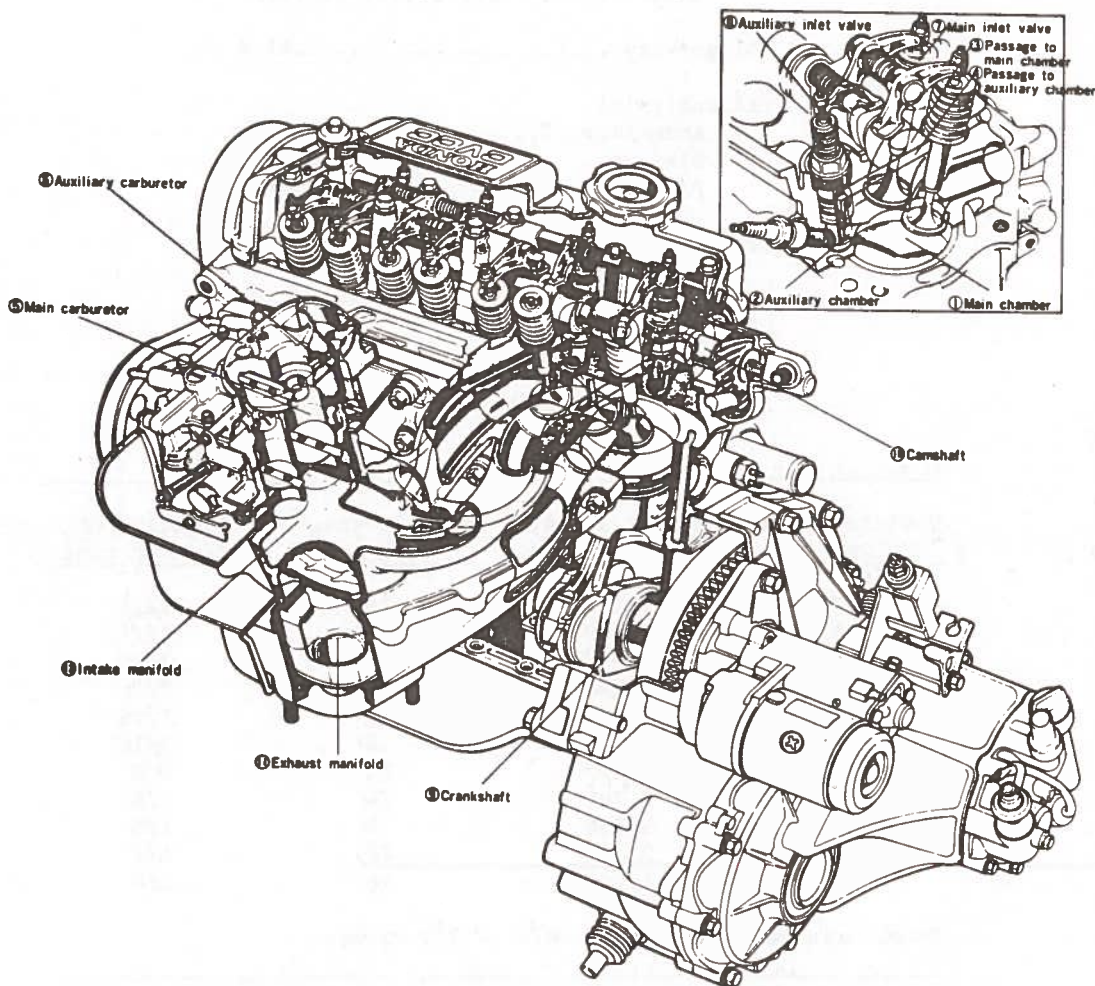


TABLE 2. FUEL SPECIFICATIONS

Fuel No.....	7305
Research Octane Number.....	93
Motor Octane Number.....	85
Reid Vapor Pressure, psig.....	10
Distillation, °F:	
10%.....	123
50%.....	199
95%.....	325
100%.....	383
API gravity.....	61.6
FIA analysis:	
Aromatics, %.....	24.0
Olefins.....	8.3
Paraffins.....	67.7
Sulfur, %.....	0.13
Lead, g/gallon.....	0.00004

TABLE 3. ENGINE BREAK-IN SCHEDULE

Vehicle speed, mph	Engine speed, rpm	Manifold vacuum, "Hg	Fraction of time in mode
20	1,450	16	1/16
40	2,700	14	1/16
60	3,750	9	1/16
30	2,100	14	1/16
50	3,200	12	1/16
70	4,200	8	1/16
50	3,200	12	1/8
40	2,700	14	1/8
60	3,750	9	1/8
30	2,100	14	1/8
20	1,450	16	1/8

Total mileage in an 8-hour shift = 335 miles.

3. DISCUSSION OF TEST RESULTS

The carburetion system was effective in maintaining lean air-fuel ratios over a wide range in speed and load. The air-fuel ratio as a function of power and speed is shown in Figure 1. The maintenance of lean operation (except at wide open throttle) is even better demonstrated by the effect of operating mode of CO emission rate (Figure 2). Hydrocarbon emissions were remarkably low, especially in light of there being no exhaust treatment (e.g., catalyst) included in this system (Figure 3).

Other variables (fuel rate, throttle angle, etc.) as a function of speed and power are given in Figures 4 through 6.

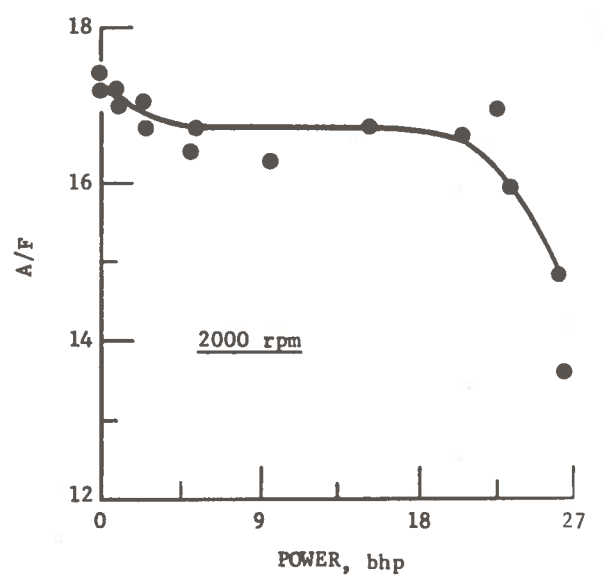
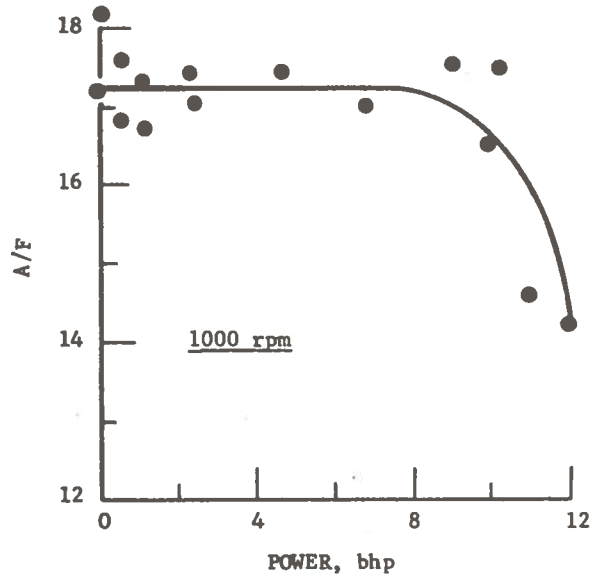
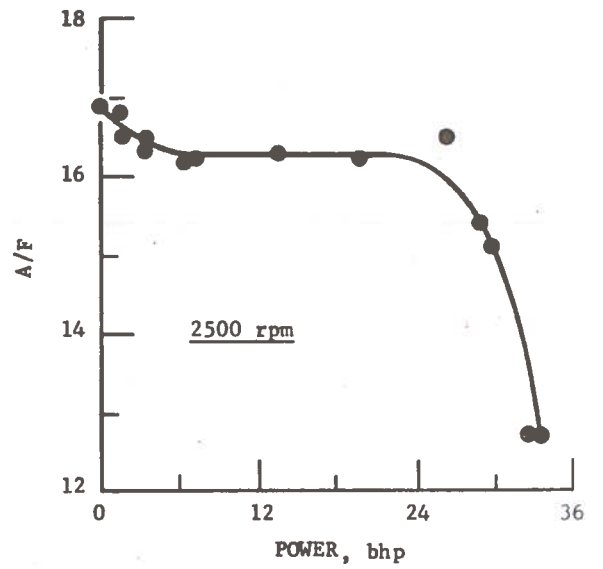
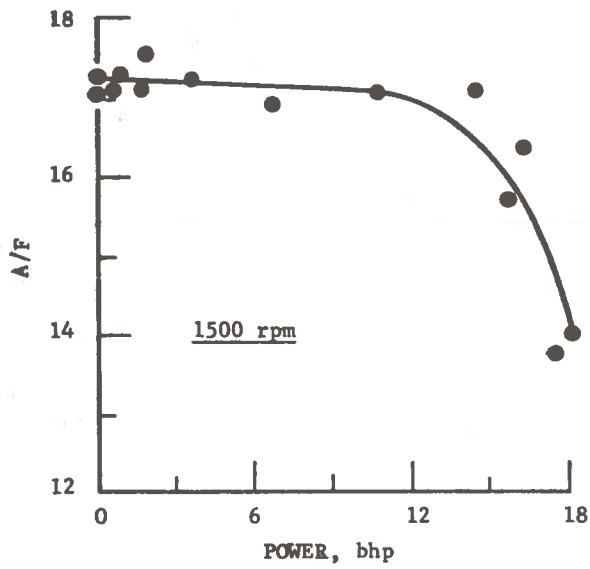


Figure 1. Air-Fuel Ratio at Various Speed and Load Conditions

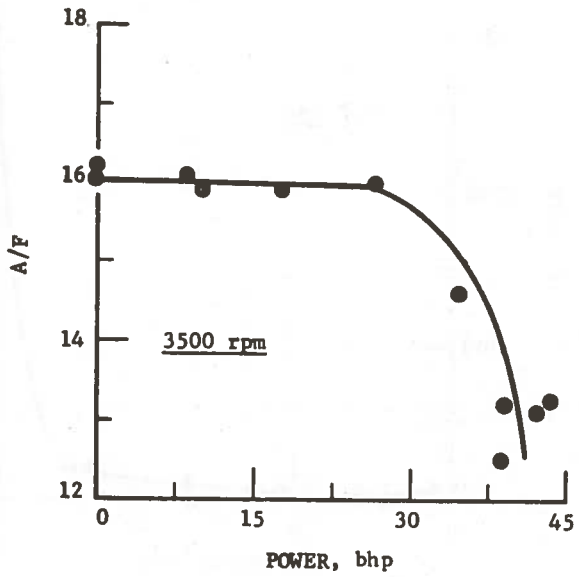
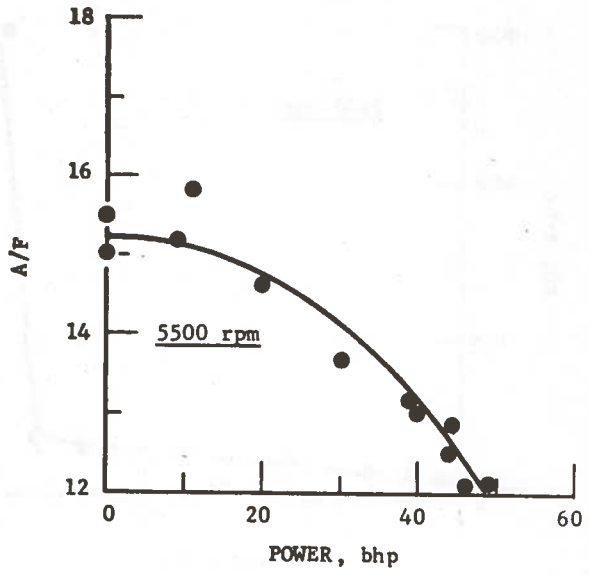
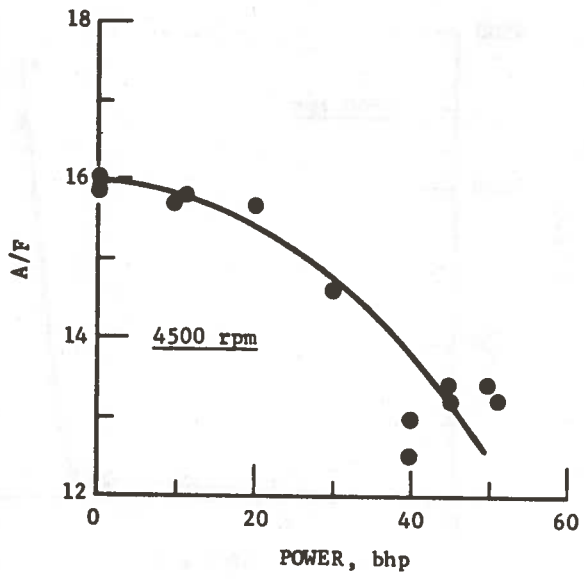


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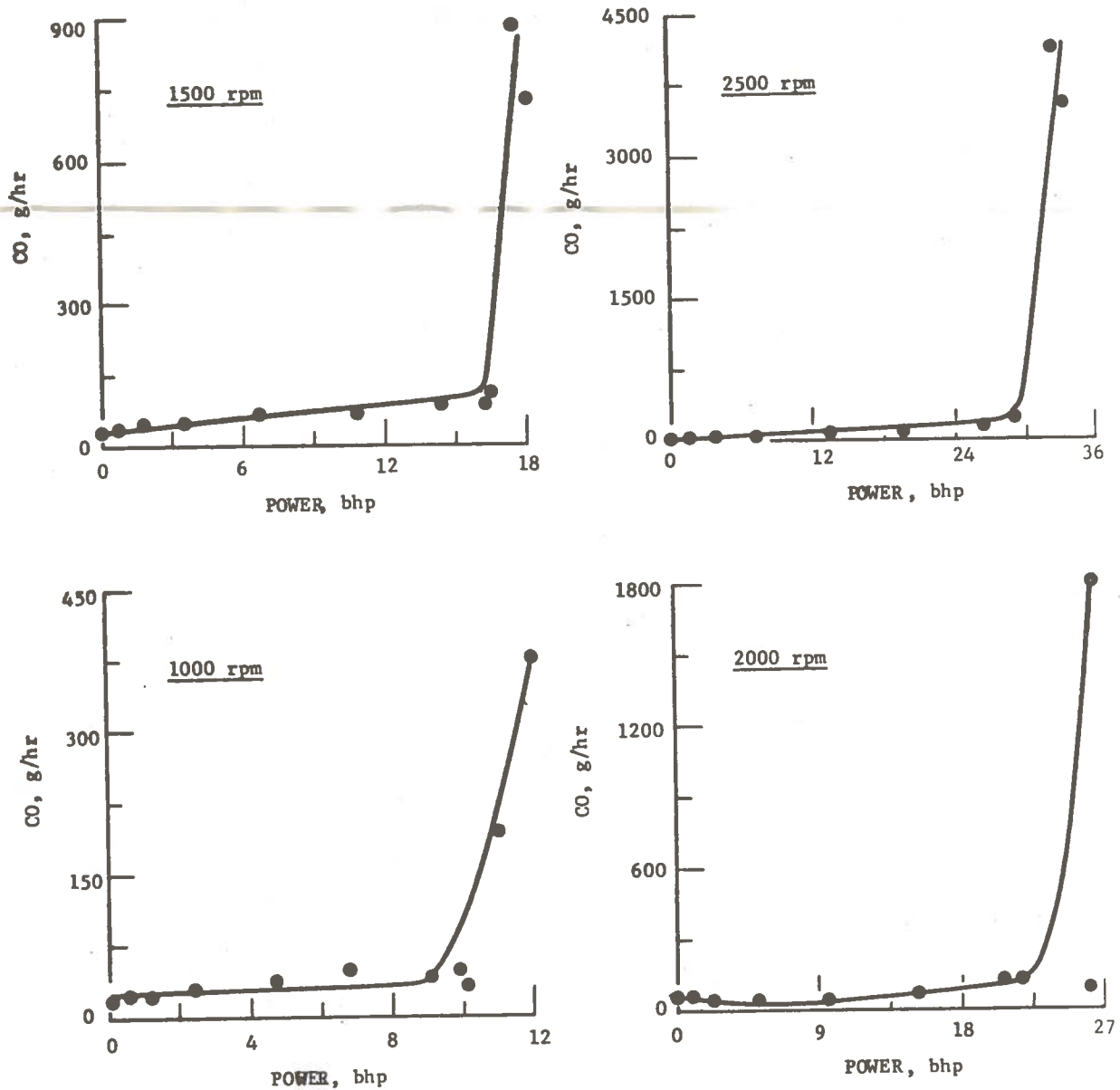


Figure 2. Carbon-Monoxide Emissions at Various Speed and Load Conditions

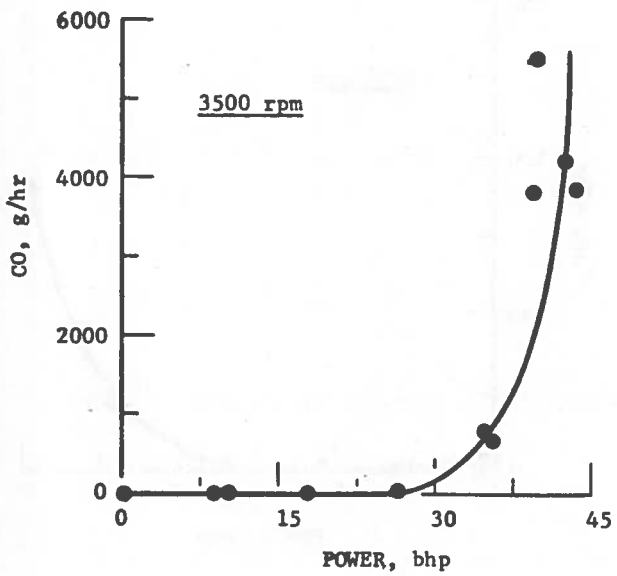
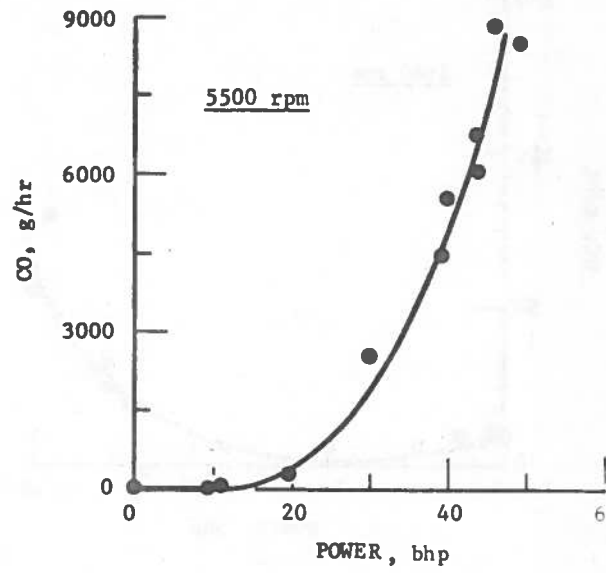
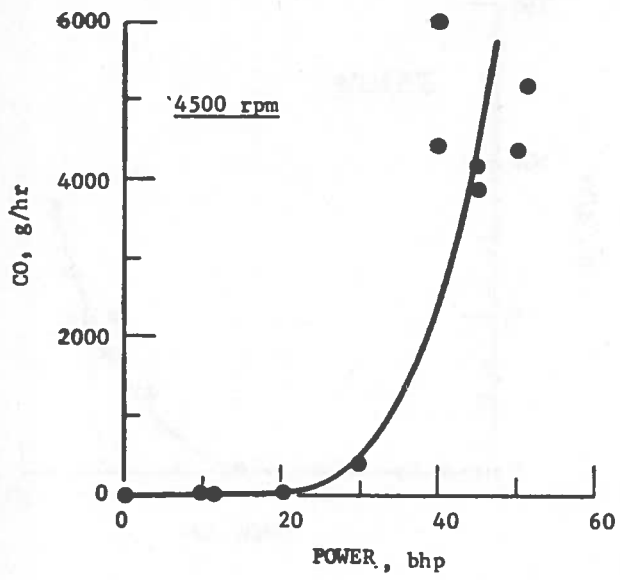


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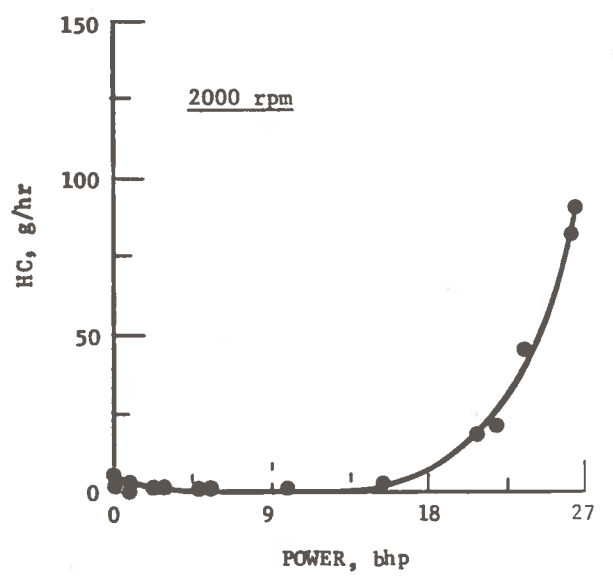
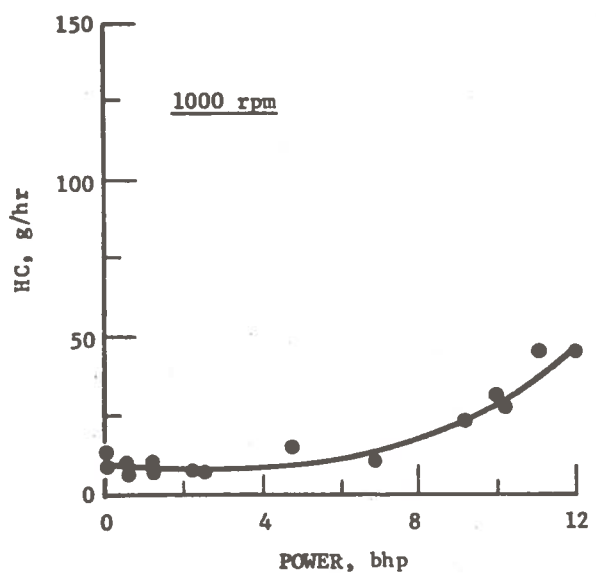
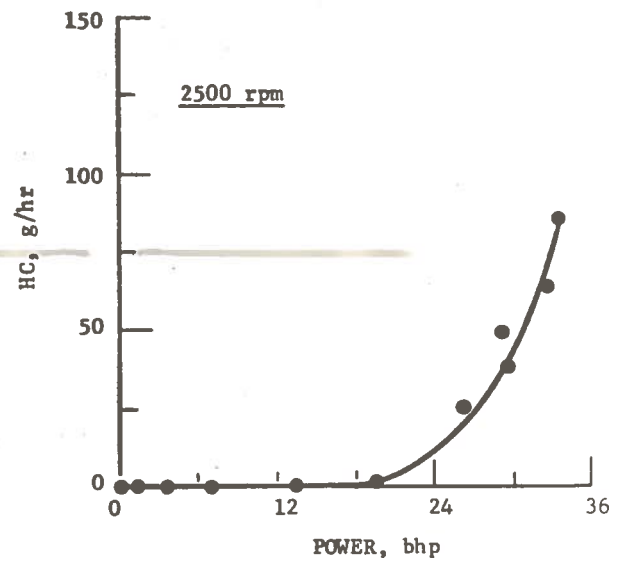
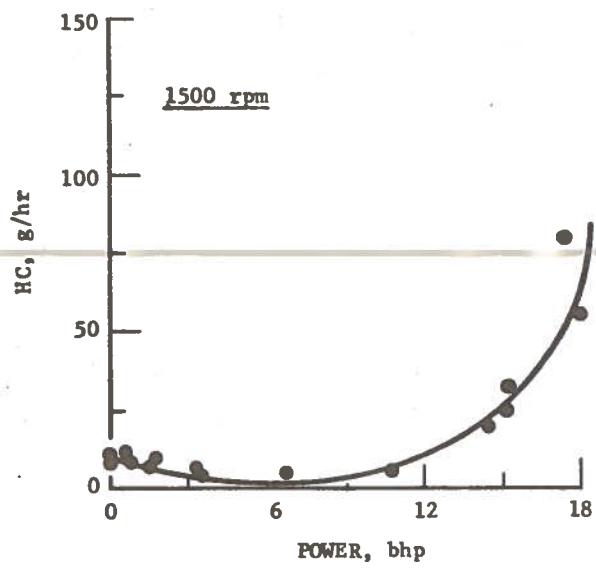


Figure 3. Hydrocarbon Emissions at Various Speed and Load Conditions

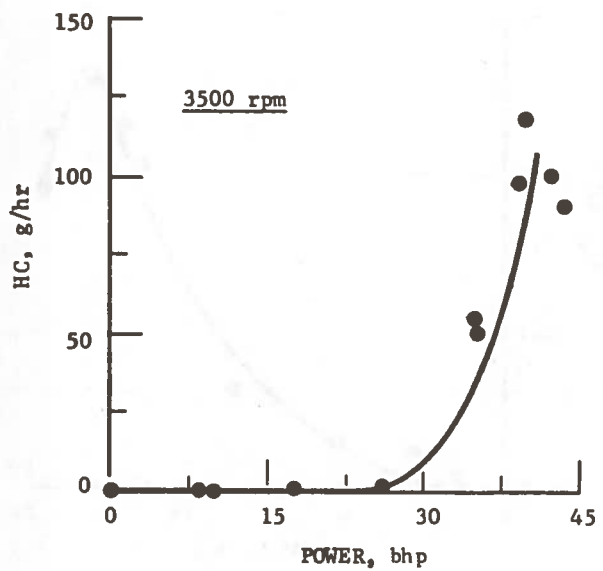
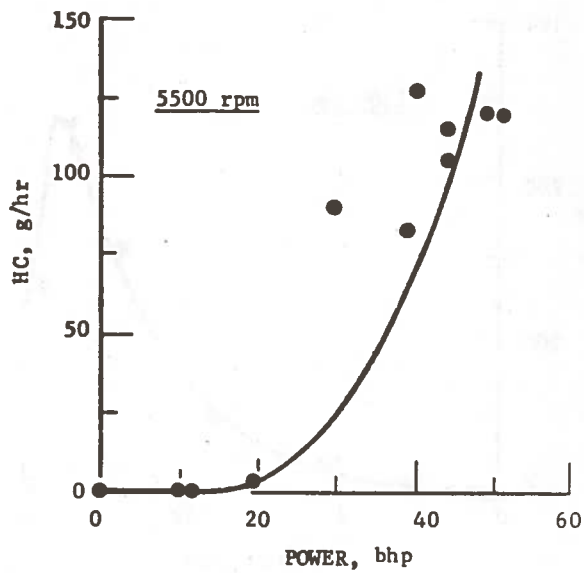
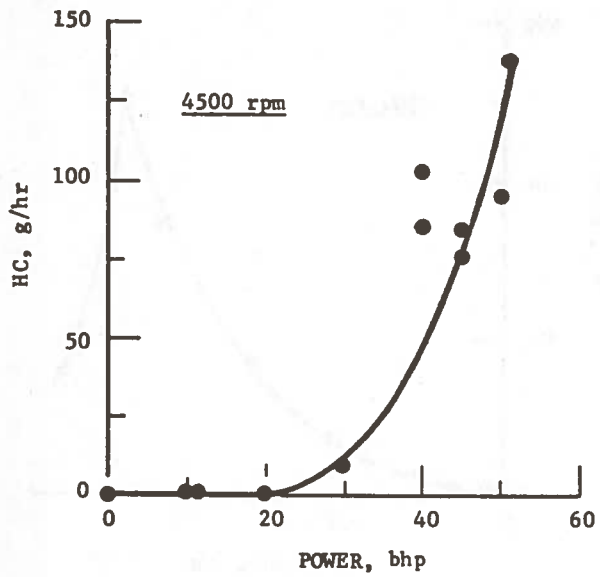
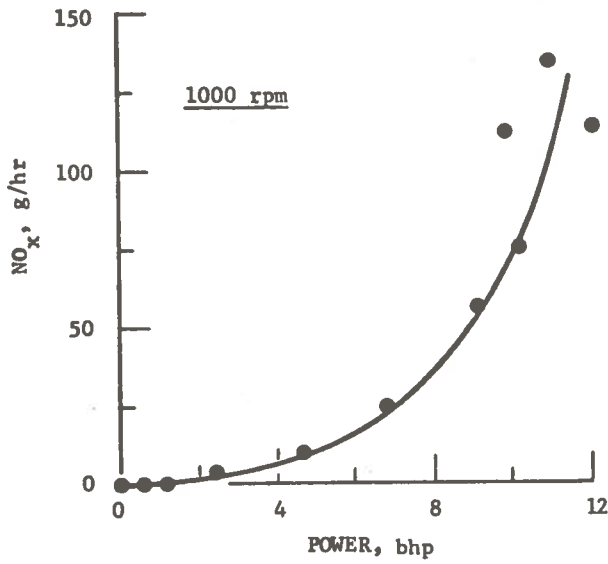
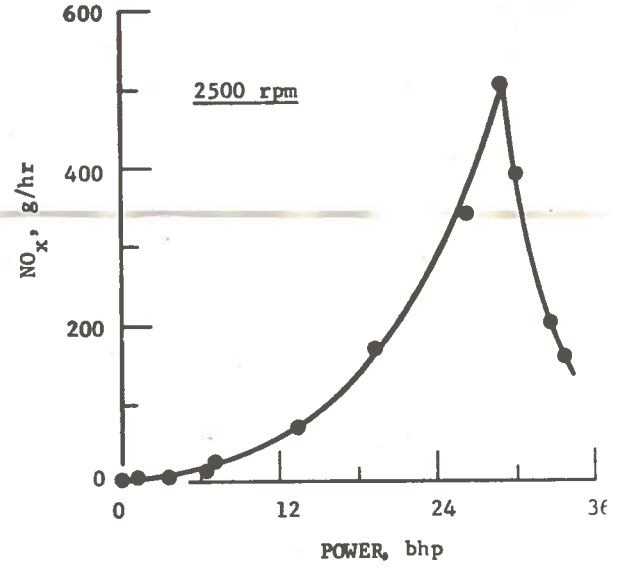
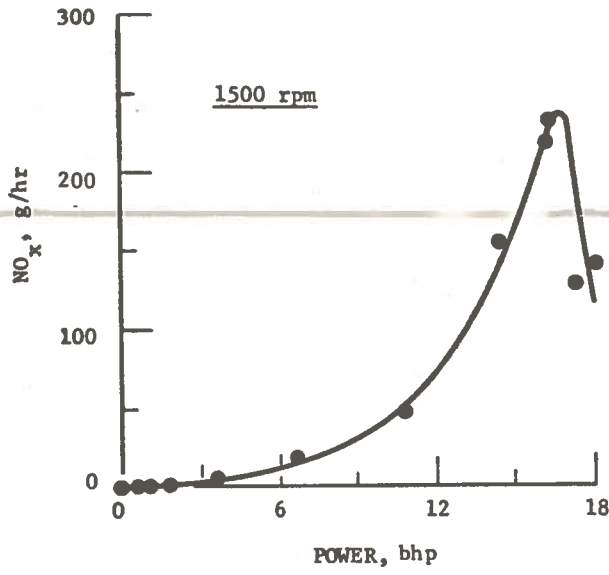


Figure 3. (Continued)



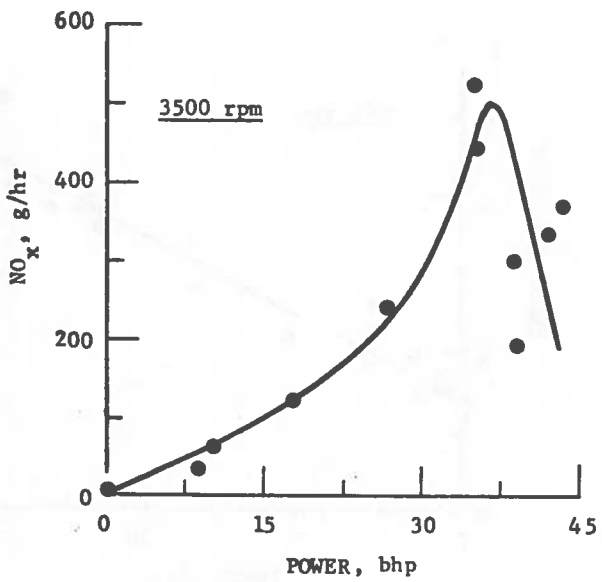
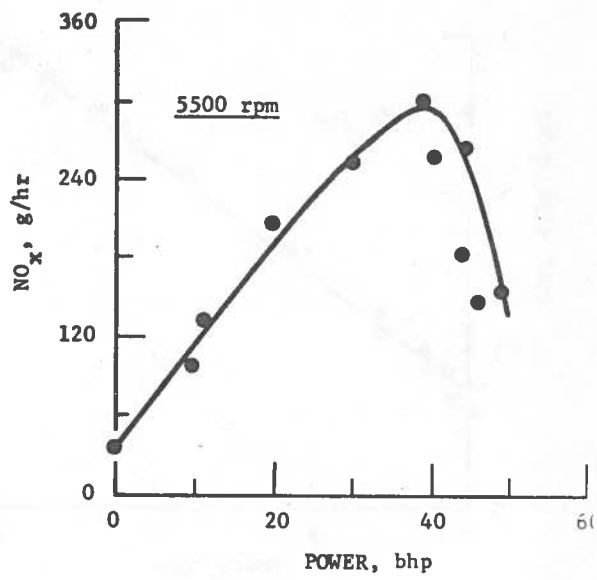
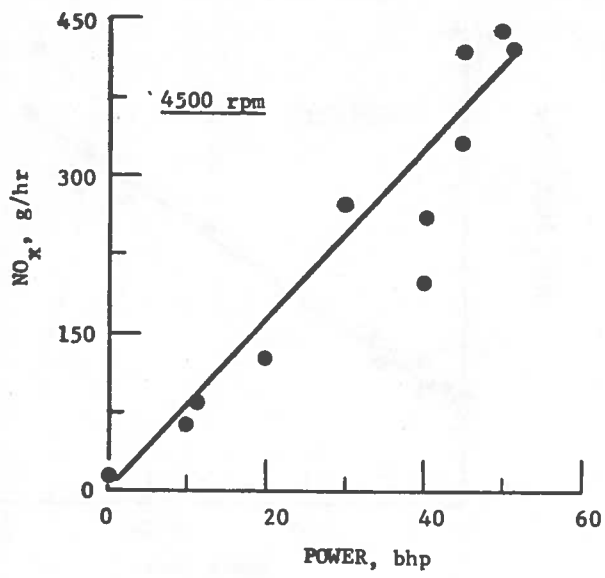


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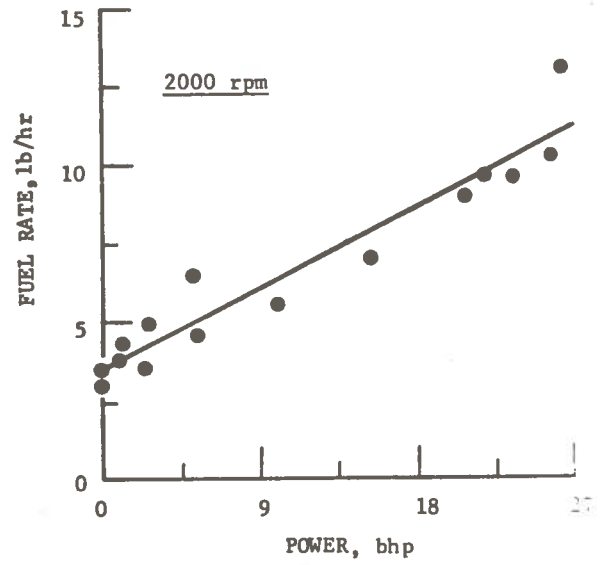
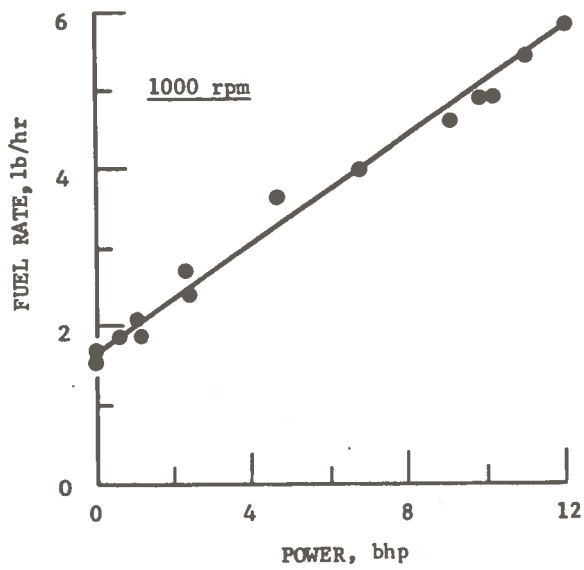
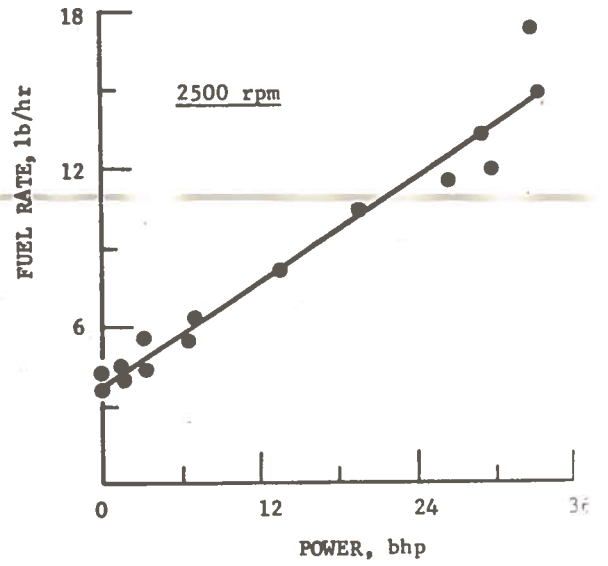
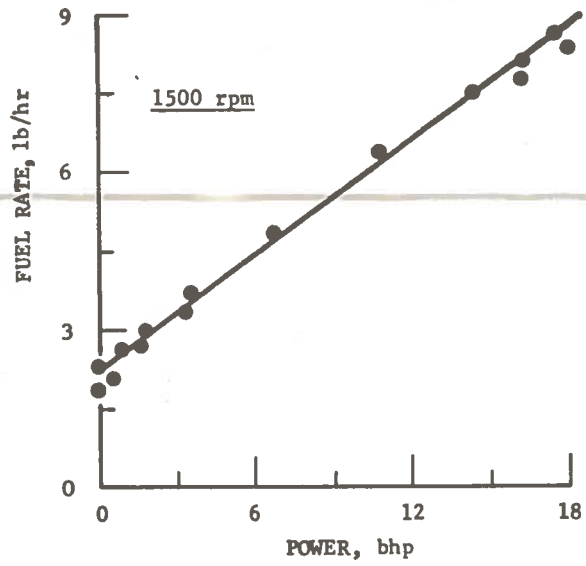


Figure 5. Fuel Rate at Various Speed and Load Conditions

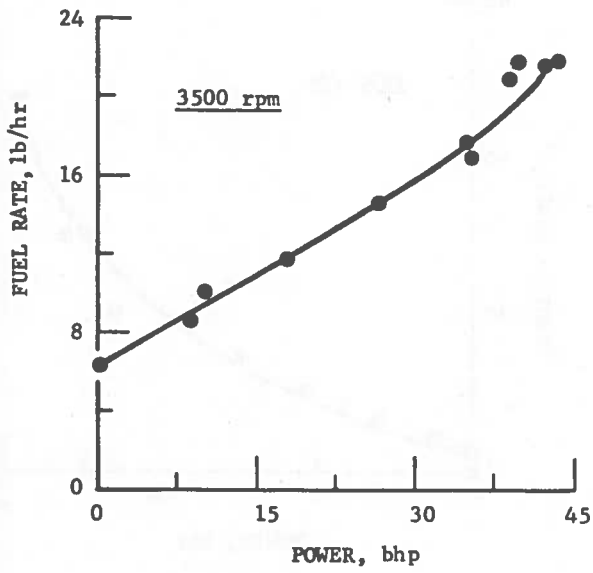
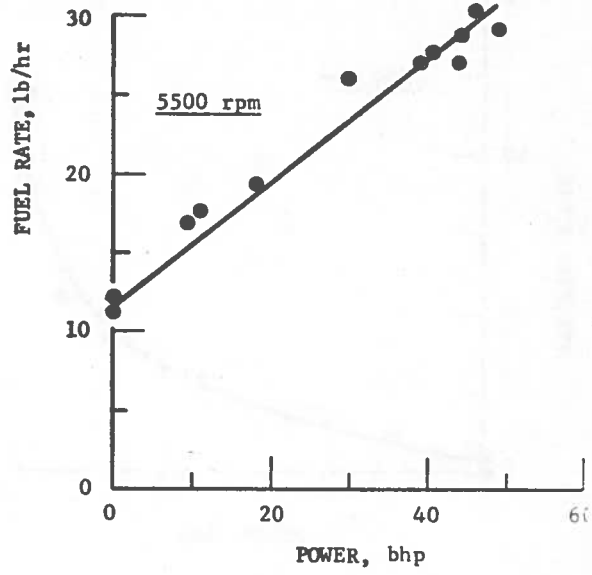
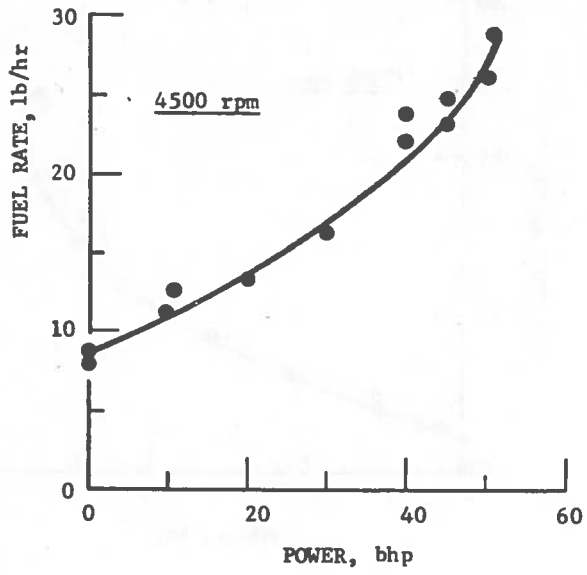


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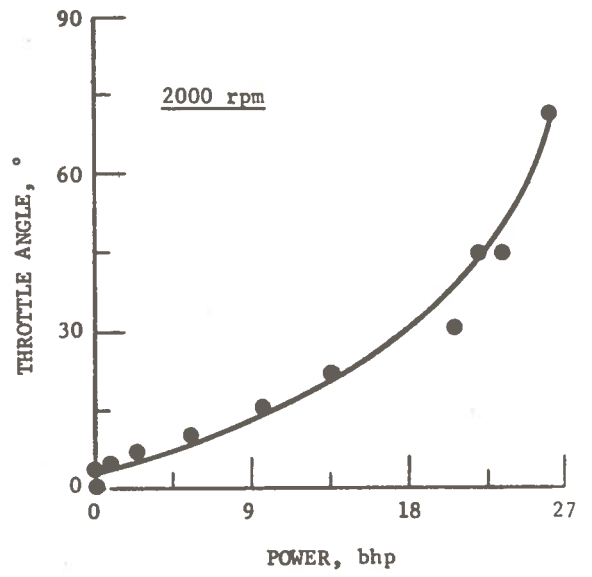
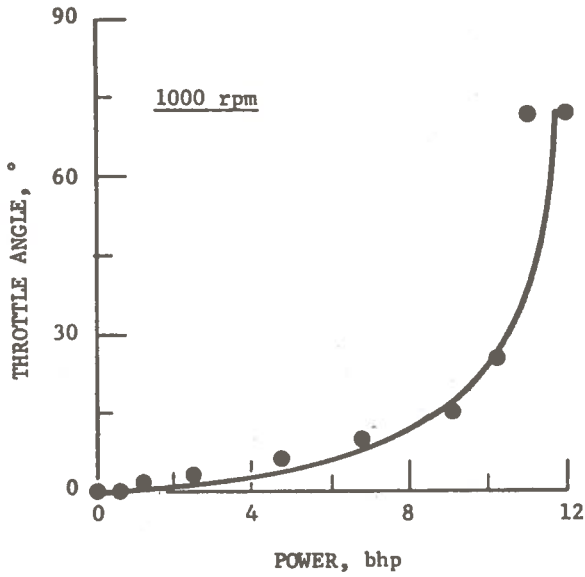
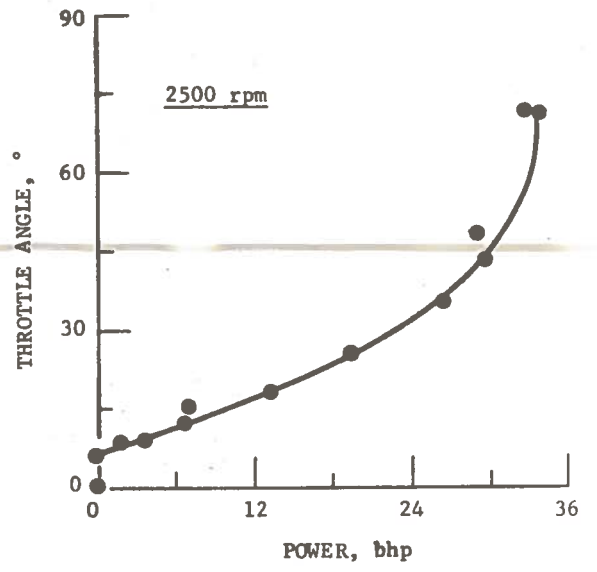
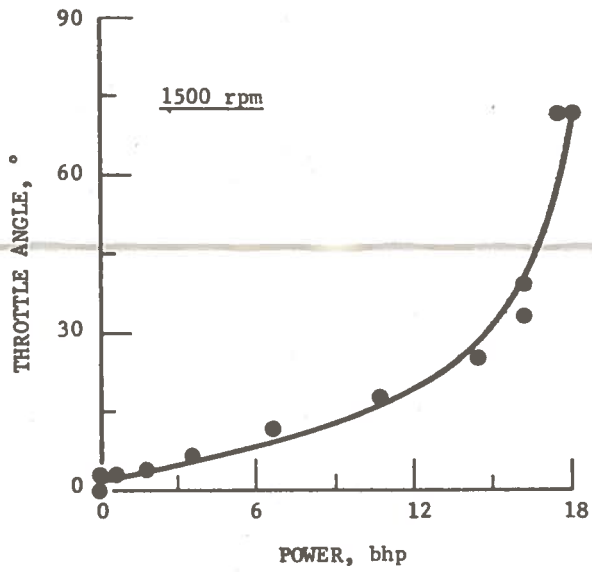


Figure 6. Throttle Angle at Various Speed and Load Conditions

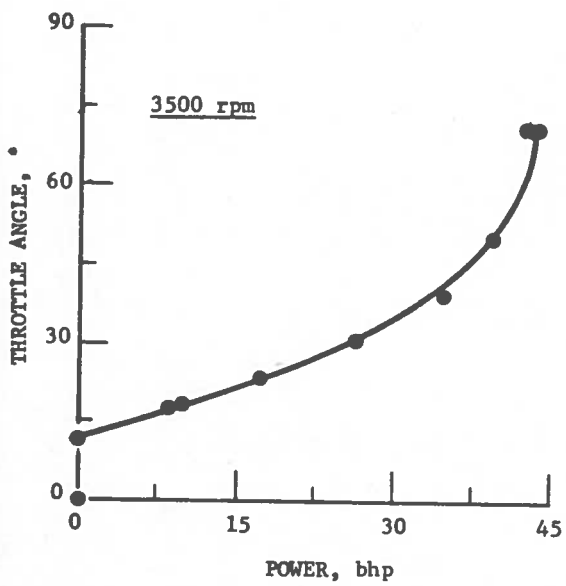
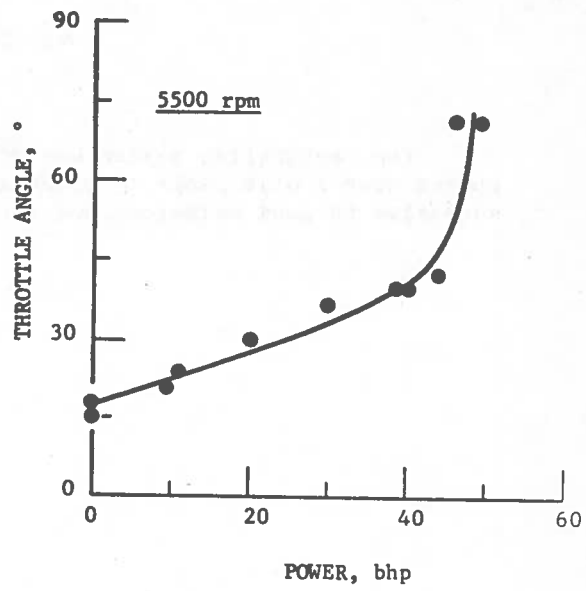
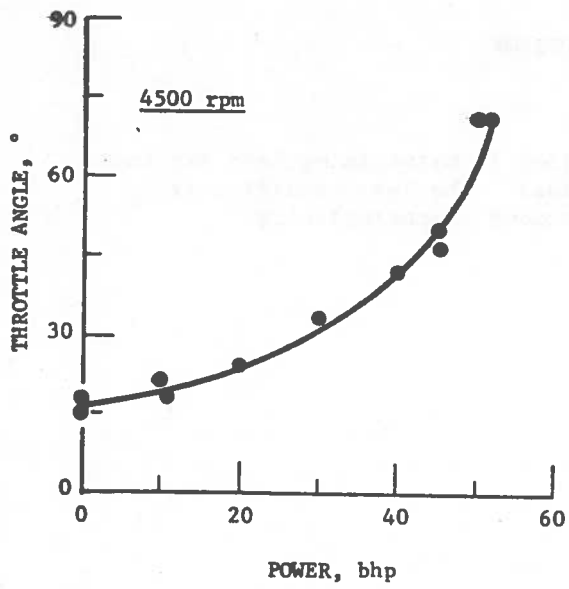


Figure 6. (Continued)

4. CONCLUSION

The carburetion system was effective in maintaining lean air-fuel ratios over a wide range in speed and load. The lean condition is conducive to good emissions and fuel economy characteristics.

APPENDIX
ENGINE TEST DATA

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	101	2	102
Test Date	1/21/75	1/21/75	1/24/75
Barometer (mm Hg)	744.8	744.8	734.8
Humidity (grains/lb)	20	20	31
Temperature (F)	77	77	77
Engine Speed (rpm)	900	800	800
Torque (lb-ft)	0.0	6.0	2.6
Power (bhp)*	0.0	.9	.4
Fuel Rate (lb/hr)	.9	.9	1.5
Ignition Timing (deg BTC)	-3.0	-3.0	-3.0
Manifold Vacuum (in Hg)	19.0	18.5	17.5
Throttle Angle (deg)	0.0	0.0	0.0
Concentrations (dry basis)			
CO (%)	1782	1599	1922
CO2 (%)	12.24	12.24	11.39
O2 (%)	3.85	3.65	4.50
HC (ppmC)	1736	1698	1544
NOx (ppm)	65	87	137
Air-Fuel Ratio	17.30	17.16	18.07
Emission Rates (g/hr)			
CO	11.5	10.3	21.8
HC	5.6	5.4	8.6
NOx**	.5	.7	2.1
Oil Temperature (F)	200	184	206
Oil Pressure (psi)	41	40	33
Coolant Temperature (F)	190	188	138
Exhaust Temperature (F)	754	654	657
Exhaust Pressure (in H2O)	1.0	1.0	1.0

* Corrected-SAE JE16b

** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	12	3	103	4	104
Test Date	1/21/75	1/21/75	1/24/75	1/21/75	1/24/75
Barometer (mm Hg)	744.8	744.8	734.8	744.8	734.8
Humidity (grains/lb)	19	20	31	20	51
Temperature (F)	77	77	76	77	77
Engine Speed (rpm)	1000	1000	1000	1000	1000
Torque (lb-ft)	-2.1	0.0	0.0	3.4	3.0
Power (bhp)*	-0.4	0.0	0.0	.6	.6
Fuel Rate (lb/h)	1.3	1.7	1.6	1.9	1.9
Ignition Timing (deg BTC)	-3.0	-1.5	-3.0	-1.5	-3.0
Manifold Vacuum (in Hg)	19.0	19.5	18.5	19.0	17.5
Throttle Angle (deg)	0.0	0.0	0.0	0.0	0.0
Concentrations (dry basis)					
CO (%)	1782	1759	1644	1736	1667
CO2 (%)	11.39	12.12	11.05	12.62	11.28
O2 (%)	4.50	3.60	4.60	3.25	3.85
HC (ppmC)	2223	1639	2298	1258	1645
NOx (ppm)	59	68	61	84	91
Air-Fuel Ratio	17.97	17.14	18.16	16.82	17.55
Emission Rates (g/hr)					
CO	17.4	21.4	20.0	23.0	23.3
HC	10.7	9.8	13.8	8.3	11.4
NOx **	.9	1.1	1.0	1.5	1.7
Oil Temperature (F)	185	182	198	182	222
Oil Pressure (psi)	43	44	37	52	32
Coolant Temperature (F)	187	188	190	189	177
Exhaust Temperature (F)	656	661	630	684	754
Exhaust Pressure (in H2O)	1.5	1.0	1.0	1.0	1.0

* Corrected-SAE J816b

** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number Test Date	5 1/21/75	105 1/24/75	6 1/21/75	106 1/24/75	7 1/21/75	8 1/21/75
Barometer (mm Hg)	744.8	734.8	744.8	734.8	744.8	744.8
Humidity (grains/lb)	20	31	20	31	20	19
Temperature (F)	78	77	77	77	78	77
Engine Speed (rpm)	1000	1000	1000	1000	1000	1000
Torque (lb-ft)	6.4	6.0	13.2	12.0	24.8	36.6
Power (bhp)*	1.2	1.1	2.5	2.3	4.7	6.8
Fuel Rate (lb/hr)	1.9	2.1	2.4	2.7	3.6	4.0
Ignition Timing (deg BTC)	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
Manifold Vacuum (in Hg)	18.0	16.5	14.5	15.6	10.5	6.0
Throttle Angle (deg)	1.5	1.0	3.0	3.0	5.0	10.0
Concentrations (dry basis)						
CO (%)	1690	1418	1690	1508	1440	1690
CO2 (%)	12.62	11.87	12.37	11.63	12.12	12.24
O2 (%)	3.05	3.65	3.40	3.65	3.80	3.25
HC (ppmC)	1316	1198	1014	866	1156	811
NOx (ppm)	107	113	187	163	310	710
Air-Fuel Ratio	16.66	17.32	17.02	17.42	17.40	16.98
Emission Rates (g/hr)						
CO	22.2	21.5	28.7	29.7	37.6	47.8
HC	8.6	9.0	8.5	8.4	14.9	11.3
NOx**	1.8	2.3	4.2	4.4	10.6	26.1
Oil Temperature (F)	179	198	182	192	188	186
Oil Pressure (psi)	49	39	52	45	42	46
Coolant Temperature (F)	186	186	188	188	190	188
Exhaust Temperature (F)	664	710	765	769	804	888
Exhaust Pressure (in H2O)	1.0	1.5	1.5	2.5	3.5	5.5

* Corrected - SAE J816b
** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number Test Date	9 1/21/75	10 1/21/75	110 1/27/75	11 1/21/75	111 1/27/75
Barometer (mm Hg)	744.8	744.8	738.7	744.8	738.7
Humidity (grains/lb)	19	19	20	19	20
Temperature (F)	77	76	78	77	78
Engine Speed (rpm)	1000	1000	1000	1000	1000
Torque (lb-ft)	49.4	54.2	52.5	65.0	57.8
Power (bhp)*	9.1	10.2	9.9	12.0	11.0
Fuel Rate (lb/hr)	4.6	4.9	4.9	5.8	5.4
Ignition Timing (deg BTC)	6.0	6.5	6.0	6.0	7.5
Manifold Vacuum (in Hg)	2.5	1.0	1.0	0.0	0.0
Throttle Angle (deg)	15.0	25.0	25.0	71.0	71.0
Concentrations (dry basis)					
CO (%)	1108	0.852	1.328	1.1000	0.5900
CO ₂ (%)	11.99	11.75	13.01	13.69	14.26
O ₂ (%)	3.85	3.75	2.65	.45	.75
HC (ppmC)	1386	1575	1943	2669	2822
NOx (ppm)	1300	1625	2600	2550	3150
Air-Fuel Ratio	17.50	17.48	16.34	14.19	14.61
Emission Rates (g/hr)					
CO	37.2	30.5	44.1	374.9	192.0
HC	23.0	27.9	31.9	45.0	45.4
NOx **	56.8	75.6	112.8	113.0	133.9
Oil Temperature (F)	188	192	218	196	207
Oil Pressure (psi)	45	39	34	40	36
Coolant Temperature (F)	192	191	192	178	188
Exhaust Temperature (F)	188	875	951	948	915
Exhaust Pressure (in H ₂ O)	6.5	6.0	6.0	7.5	5.5

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** Corrected for humidity

Engine Honda CVCC 91-CID
 Fuel 7305

Test Number	13	14	113	114
Test Date	1/21/75	1/21/75	1/27/75	1/27/75
Barometer (mm Hg)	744.8	744.8	738.7	738.7
Humidity (grains/lb)	19	19	20	20
Temperature (F)	77	77	79	77
Engine Speed (rpm)	1500	1500	1500	1500
Torque (lb-ft)	0.0	3.2	0.0	2.0
Power (bhp)*	0.0	.9	0.0	.6
Fuel Rate (lb/hr)	2.3	2.6	1.9	2.1
Ignition Timing (deg BTC)	2.0	2.0	0.0	1.5
Manifold Vacuum (in Hg)	19.5	17.5	19.5	19.0
Throttle Angle (deg)	0.0	3.0	2.5	3.0
Concentrations (dry basis)				
CO (%)	.2302	.2110	.2206	.2158
CO2 (%)	12.12	12.12	12.37	12.37
O2 (%)	3.50	3.70	3.85	3.65
HC (ppmC)	1273	964	1699	1757
NOx (ppm)	72	92	78	79
Air-Fuel Ratio	17.07	17.29	17.24	17.08
Emission Rates (g/hr)				
CO	37.7	39.5	30.0	32.2
HC	10.3	8.9	11.4	13.0
NOx**	1.5	2.2	1.4	1.5
Oil Temperature (F)	186	187	239	207
Oil Pressure (psi)	55	55	42	47
Coolant Temperature (F)	189	188	187	187
Exhaust Temperature (F)	745	802	907	851
Exhaust Pressure (in H2O)	1.0	1.5	1.5	1.5

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	15	115	16	116	17	18
Test Date	1/22/75	1/30/75	1/22/75	1/30/75	1/22/75	1/22/75
Barometer (mm Hg)	758.9	746.0	758.9	746.0	758.9	758.9
Humidity (grains/lb)	15	28	15	28	15	15
Temperature (F)	82	79	80	79	77	77

Engine Speed (rpm)	1500	1500	1500	1500	1500	1500
Torque (lb-ft)	6.4	5.5	12.8	12.0	24.8	38.0
Power (bhp)*	1.8	1.6	3.5	3.4	6.8	10.7
Fuel Rate (lb/hr)	3.0	2.7	3.7	3.4	4.8	6.4

Ignition Timing (deg BTC)	4.0	3.0	4.0	3.5	5.0	7.0
Manifold Vacuum (in Hg)	17.5	16.5	15.0	13.5	11.0	5.0
Throttle Angle (deg)	4.0	4.0	7.0	6.0	11.0	17.0

Concentrations (dry basis)

CO (%)	2326	2182	2134	1969	1969	1576
CO2 (%)	12.37	12.12	12.62	11.87	12.88	12.75
O2 (%)	4.10	3.50	3.60	3.45	3.25	3.40
HC (ppmC)	944	862	342	500	302	260
NOx (ppm)	88	115	209	200	470	820

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Air-Fuel Ratio

	17.53	17.14	17.19	17.22	16.90	17.08
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Emission Rates (g/hr)

CO	50.8	42.1	56.3	48.1	66.2	71.4
HC	10.2	8.2	4.5	6.0	5.0	5.8
NOx **	2.5	3.0	7.1	6.6	20.2	47.6

Oil Temperature (F)	177	223	190	199	194	200
Oil Pressure (psi)	54	52	54	54	53	53
Coolant Temperature (F)	190	188	185	188	189	188
Exhaust Temperature (F)	813	881	913	945	999	1074
Exhaust Pressure (in H2O)	1.5	2.0	2.5	2.5	4.0	7.0

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	19	20	120	21
Test Date	1/22/75	1/22/75	1/27/75	1/27/75
Barometer (mm Hg)	758.9	758.9	738.7	738.7
Humidity (grains/lb)	15	15	20	20
Temperature (F)	79	81	78	78
Engine Speed (rpm)	1500	1500	1500	1500
Torque (lb-ft)	52.2	58.5	57.5	64.8
Power (bhp)*	14.4	16.2	16.3	18.0
Fuel Rate (lb/hr)	7.5	7.7	8.1	8.3
Ignition Timing (deg BTC)	17.0	17.0	16.0	13.0
Manifold Vacuum (in Hg)	2.0	1.0	1.0	0.0
Throttle Angle (deg)	25.0	38.0	32.5	71.0
Concentrations (dry basis)				
CO (%)	15.08	15.99	18.75	18.200
CO2 (%)	12.49	13.01	13.55	13.55
O2 (%)	3.35	2.50	1.70	.35
HC (ppmC)	754	949	1262	3300
NOx (ppm)	2250	3250	3400	2000
Air-Fuel Ratio	17.09	16.36	15.67	13.75
Emission Rates (g/hr)				
CO	80.3	83.6	98.5	890.8
HC	19.9	24.5	32.8	79.8
NOx **	153.6	217.6	233.3	127.8
Oil Temperature (F)	200	199	204	206
Oil Pressure (psi)	53	53	53	52
Coolant Temperature (F)	188	187	191	185
Exhaust Temperature (F)	1085	1087	1082	1081
Exhaust Pressure (in H2O)	10.0	10.0	10.0	8.5

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** Corrected for humidity

Engine Honda CVCC 91-C1D
Fuel 7305

Test Number	24	23	123	22	122
Test Date	1/22/75	1/22/75	1/27/75	1/22/75	1/27/75
Barometer (mm Hg)	758.9	758.9	738.7	758.9	738.7
Humidity (grains/lb)	15	15	20	15	20
Temperature (F)	81	80	81	80	79
Engine Speed (rpm)	2000	2000	2000	2000	2000
Torque (lb-ft)	55.7	59.2	61.7	71.6	68.6
Power (bhp)*	20.6	21.9	23.4	26.4	26.0
Fuel Rate (lb/hr)	8.9	9.6	9.5	13.0	10.2
Ignition Timing (deg BTC)	17.0	17.0	17.5	18.5	18.0
Manifold Vacuum (in Hg)	3.0	1.0	1.0	0.0	0.0
Throttle Angle (deg)	31.0	44.0	44.0	71.0	71.0
Concentrations (dry basis)					
CO (%)	1875	1736	1782	2,4500	1152
CO2 (%)	13.01	12.75	13.28	13.55	13.69
O2 (%)	2.77	3.10	2.06	.38	.70
HC (ppmC)	606	665	1476	2462	2644
NOx (ppm)	3150	3200	3800	2450	3300
Air-Fuel Ratio	16.58	16.88	15.95	13.62	14.83
Emission Rates (g/hr)					
CO	114.7	116.7	111.9	1791.1	72.3
HC	18.3	22.1	45.8	89.0	82.1
NOx **	246.8	275.7	311.6	229.5	270.5
Oil Temperature (F)	220	222	224	212	214
Oil Pressure (psi)	54	54	54	54	55
Coolant Temperature (F)	190	190	181	190	193
Exhaust Temperature (F)	1186	1181	1176	1200	1188
Exhaust Pressure (in H2O)	15.5	15.5	15.0	20.0	17.5

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	31	30	130	29	129
Test Date	1/22/75	1/22/75	1/27/75	1/22/75	1/27/75
Barometer (mm Hg)	757.5	757.5	738.7	757.5	738.7
Humidity (grains/lb)	17	17	20	17	20
Temperature (F)	80	79	78	79	78
Engine Speed (rpm)	2000	2000	2000	2000	2000
Torque (lb-ft)	-12.6	0.0	0.0	2.4	3.0
Power (bhp)*	-4.8	0.0	0.0	0.9	1.1
Fuel Rate (lb/hr)	1.3	2.9	3.4	3.7	4.2
Ignition Timing (deg BTC)	6.5	6.5	7.0	6.0	7.0
Manifold Vacuum (in Hg)	23.0	19.0	18.5	19.0	15.5
Throttle Angle (deg)	0.0	0.0	4.0	5.0	6.0
Concentrations (dry basis)					
CO (%)	6300	2254	2498	2158	1736
CO2 (%)	6.95	12.24	12.24	12.24	12.62
O2 (%)	10.55	3.60	3.78	3.50	3.30
HC (ppmC)	36768	301	366	251	113
NOx (ppm)	20	93	70	95	170
Air-Fuel Ratio	18.75	17.26	17.38	17.20	17.01
Emission Rates (g/hr)					
CO	66.4	46.9	61.4	57.2	51.5
HC	191.5	3.1	4.4	3.3	1.7
NOx **	.3	2.5	2.2	3.2	6.6
Oil Temperature (F)	198	204	210	206	244
Oil Pressure (psi)	57	57	56	57	54
Coolant Temperature (F)	181	185	188	188	186
Exhaust Temperature (F)	663	931	997	1000	1061
Exhaust Pressure (in H2O)	2.0	2.0	2.0	2.0	2.5

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number Test Date	128 1/22/75	127 1/27/75	26 1/22/75	25 1/22/75
Barometer (mm Hg)	758.9	738.7	758.9	758.9
Humidity (grains/lb)	15	20	15	15
Temperature (F)	77	78	79	80
Engine Speed (rpm)	2000	2000	2000	2000
Torque (lb-ft)	6.6	13.7	26.4	41.2
Power (bhp)*	2.4	5.2	9.7	15.2
Fuel Rate (lb/hr)	3.5	6.4	5.5	6.9
Ignition Timing (deg BTC)	7.0	7.0	8.5	8.0
Manifold Vacuum (in Hg)	17.5	12.0	11.5	6.5
Throttle Angle (deg)	7.0	10.0	15.0	22.0
Concentrations (dry basis)				
CO (%)	•1875	•1152	•1022	•1306
CO2 (%)	12.75	13.01	13.28	13.01
O2 (%)	3.40	2.95	2.38	2.90
HC (ppmC)	151	66	56	121
NOx (ppm)	150	290	775	1225
Air-Fuel Ratio	17.05	16.73	16.29	16.71
Emission Rates (g/hr)				
CO	46.4	39.1	37.9	62.4
HC	1.8	1.1	1.0	2.9
NOx **	4.8	12.9	36.8	75.0
Oil Temperature (F)	207	243	213	214
Oil Pressure (psi)	56	54	55	54
Coolant Temperature (F)	188	189	189	190
Exhaust Temperature (F)	1042	1109	1182	1186
Exhaust Pressure (in H2O)	3.0	4.5	7.0	10.0

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	41	141	40	140
Test Date	1/24/75	1/28/75	1/24/75	1/28/75
Barometer (mm Hg)	740.4	745.5	740.4	745.5
Humidity (grains/lb)	37	22	37	22
Temperature (F)	77	80	77	78
Engine Speed (rpm)	2500	2500	2500	2500
Torque (lb-ft)	0.0	0.0	3.2	3.6
Power (bhp)*	0.0	0.0	1.5	1.7
Fuel Rate (lb/hr)	4.2	3.5	4.5	4.0
Ignition Timing (deg BTC)	12.0	12.0	10.5	15.0
Manifold Vacuum (in Hg)	18.0	18.5	17.0	17.0
Throttle Angle (deg)	0.0	6.0	8.0	8.0
Concentrations (dry basis)				
CO (%)	.1217	.0343	.1284	.0224
CO2 (%)	12.75	12.37	12.88	12.75
O2 (%)	3.10	3.00	3.00	2.50
HC (ppmC)	54	78	65	25
NOx (ppm)	115	108	145	170
Air-Fuel Ratio	16.88	16.93	16.77	16.48
Emission Rates (g/hr)				
CO	35.8	8.5	40.2	6.1
HC	.8	1.0	1.0	.3
NOx**	4.7	5.5	6.3	6.1
Oil Temperature (F)	211	211	213	217
Oil Pressure (psi)	58	57	58	57
Coolant Temperature (F)	189	188	190	189
Exhaust Temperature (F)	1093	1078	1107	1118
Exhaust Pressure (in H2O)	3.5	3.0	4.0	4.0

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	39	139	38	138	37	36
Test Date	1/24/75	1/27/75	1/24/75	1/27/75	1/24/75	1/24/75
Barometer (mm Hg)	740.4	741.1	740.4	741.1	740.4	740.4
Humidity (grains/lb)	37	30	37	30	37	37
Temperature (F)	79	80	78	78	79	81
Engine Speed (rpm)	2500	2500	2500	2500	2500	2500
Torque (lb-ft)	7.1	7.1	14.8	14.2	28.4	41.2
Power (bhp)*	3.4	3.4	7.0	6.7	13.5	19.6
Fuel Rate (lb/hr)	5.5	4.3	6.3	5.4	8.1	10.4
Ignition Timing (deg BTC)	12.5	12.0	11.5	12.0	12.0	12.0
Manifold Vacuum (in Hg)	16.0	17.0	13.5	14.5	9.5	5.0
Throttle Angle (deg)	9.0	9.0	16.0	13.0	18.0	25.0
Concentrations (dry basis)						
CO (%)	.0936	.1152	.0811	.0894	.0832	.0852
CO2 (%)	13.15	12.88	13.28	13.42	13.15	13.28
O2 (%)	2.60	2.40	2.23	2.25	2.40	2.30
HC (ppmC)	31	52	24	37	31	47
NOx (ppm)	225	143	458	300	925	1563
Air-Fuel Ratio	16.46	16.32	16.18	16.16	16.34	16.27
Emission Rates (g/hr)						
CO	35.1	33.6	34.3	32.3	45.6	59.7
HC	.6	.7	.5	.7	.8	1.6
NOx**	11.8	5.6	26.9	14.7	70.7	152.6
Oil Temperature (F)	214	218	217	220	222	222
Oil Pressure (psi)	58	57	57	58	56	56
Coolant Temperature (F)	188	185	190	189	188	189
Exhaust Temperature (F)	1124	1123	1190	1158	1264	1310
Exhaust Pressure (in H2O)	4.5	4.0	6.5	5.5	12.0	19.0

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number Test Date	35 1/22/75	34 1/22/75	134 1/27/75	33 1/22/75	133 1/27/75
Barometer (mm Hg)	757.5	757.5	738.7	757.5	738.7
Humidity (grains/lb)	17	17	20	17	20
Temperature (F)	77	79	79	78	79
Engine Speed (rpm)	2500	2500	2500	2500	2500
Torque (lb-ft)	57.0	63.0	62.6	71.1	70.4
Power (bhp)*	26.3	29.1	29.7	32.8	33.4
Fuel Rate (lb/hr)	11.3	13.2	11.9	17.2	14.8
Ignition Timing (deg BTC)	21.0	21.0	20.5	22.0	21.0
Manifold Vacuum (in Hg)	2.0	2.0	2.0	0.0	0.0
Throttle Angle (deg)	35.0	48.0	43.0	71.0	71.0
Concentrations (dry basis)					
CO (%)	1.759	2.547	2.800	4.5000	4.5000
CO2 (%)	12.88	13.69	14.26	11.63	11.99
O2 (%)	2.60	1.30	1.00	.22	.25
HC (ppmC)	665	1168	1009	1395	2175
NOx (ppm)	3425	4650	4050	1700	1513
Air-Fuel Ratio	16.48	15.39	15.14	12.71	12.71
Emission Rates (g/hr)					
CO	136.0	214.9	207.9	4108.4	3524.5
HC	25.4	48.5	37.0	63.2	84.2
NOx **	341.8	504.6	392.8	200.4	154.7
Oil Temperature (F)	226	223	232	223	222
Oil Pressure (psi)	57	57	56	57	57
Coolant Temperature (F)	188	192	185	190	194
Exhaust Temperature (F)	1255	1292	1288	1276	1248
Exhaust Pressure (in H2O)	25.0	26.0	25.0	34.0	31.0

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	148	47	147	46	45
Test Date	1/24/75	1/24/75	1/28/75	1/24/75	1/24/75
Barometer (mm Hg)	740.4	740.4	741.1	740.4	740.4
Humidity (Grains/lb)	30	30	30	30	30
Temperature (F)	78	78	80	77	78
Engine Speed (rpm)	3500	3500	3500	3500	3500
Torque (lb-ft)	0.0	13.2	15.0	26.8	40.0
Power (bhp)*	0.0	8.8	10.0	17.8	26.5
Fuel Rate (lb/hr)	6.2	8.5	10.1	11.5	14.4
Ignition Timing (deg BTC)	19.0	19.0	21.0	20.0	20.0
Manifold Vacuum (in Hg)	17.5	13.5	12.0	9.5	5.0
Throttle Angle (deg)	0.0	17.0	18.0	23.0	31.0
Concentrations (dry basis)					
CO (%)	.0417	.0381	.0339	.0454	.0530
CO ₂ (%)	13.15	13.15	13.15	13.28	13.15
O ₂ (%)	2.15	2.05	1.75	1.80	1.90
HC (ppmC)	19	21	10	21	31
NOx (ppm)	195	486	725	1165	1850
Air-Fuel Ratio	16.15	16.09	15.87	15.91	16.02
Emission Rates (g/hr)					
CO	17.3	21.6	22.6	34.5	50.7
HC	.4	.6	.3	.8	1.5
NOx **	11.0	37.4	65.4	119.8	240.0
Oil Temperature (F)	229	237	233	242	243
Oil Pressure (psi)	59	58	58	58	58
Coolant Temperature (F)	187	185	189	192	191
Exhaust Temperature (F)	1260	1331	1336	1392	1437
Exhaust Pressure (in H ₂ O)	6.5	12.0	15.0	24.0	39.0

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** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	55	155	54	154	53	52
Test Date	1/24/75	1/28/75	1/24/75	1/28/75	1/24/75	1/24/75
Barometer (mm Hg)	740.4	741.1	740.4	741.1	740.4	740.4
Humidity (grains/lb)	30	30	30	30	30	30
Temperature (F)	79	77	79	77	78	78
Engine Speed (rpm)	4500	4500	4500	4500	4500	4500
Torque (lb-ft)	0.0	0.0	12.8	11.8	23.5	35.0
Power (bhp)*	0.0	0.0	10.9	10.0	20.0	29.8
Fuel Rate (lb/hr)	8.0	8.5	12.4	12.2	13.2	16.3
Ignition Timing (deg BTC)	20.0	21.0	20.0	20.0	20.0	26.0
Manifold Vacuum (in Hg)	16.0	16.0	11.0	12.5	9.0	5.0
Throttle Angle (deg)	15.0	17.0	18.0	21.0	24.0	33.0
Concentrations (dry basis)						
CO (%)	0.197	0.148	0.283	0.215	0.265	0.4300
CO2 (%)	13.01	13.28	13.15	13.42	13.42	14.12
O2 (%)	1.85	1.80	1.58	1.55	1.50	0.35
HC (ppmC)	26	4	27	6	26	221
NOx (ppm)	235	240	765	645	1075	2050
Air-Fuel Ratio	15.95	15.89	15.75	15.70	15.68	14.64
Emission Rates (g/hr)						
CO	10.5	8.3	23.0	15.7	22.7	423.9
HC	7	1	1.1	0.2	1.1	10.8
NOx**	16.9	18.2	84.1	63.7	125.0	273.9
Oil Temperature (F)	240	244	220	238	237	265
Oil Pressure (psi)	60	61	62	61	61	60
Coolant Temperature (F)	187	187	188	190	190	187
Exhaust Temperature (F)	1403	1422	1439	1441	1436	1512
Exhaust Pressure (in H2O)	13.0	14.5	32.0	25.0	42.0	67.8

* Corrected-SAE J816b
** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	151	149
Test Date	1/24/75	1/28/75
Barometer (mm Hg)	740.4	741.1
Humidity (grains/lb)	30	30
Temperature (F)	77	81
Engine Speed (rpm)	4500	4500
Torque (lb-ft)	47.0	59.2
Power (bhp)*	40.0	51.1
Fuel Rate (lb/hr)	21.9	28.6
Ignition Timing (deg BTC)	30.0	31.0
Manifold Vacuum (in Hg)	2.0	1.5
Throttle Angle (deg)	42.0	47.0
Concentrations (dry basis)		
CO (%)	3.8400	4.8000
CO2 (%)	11.75	11.28
O2 (%)	.25	.12
HC (ppmC)	1471	1661
NO (ppm)	1663	1175
Air-Fuel Ratio	12.96	12.47
Emission Rates (g/hr)		
CO	4449.8	5967.8
HC	84.3	102.1
NOx**	261.2	198.0
Oil Temperature (F)	233	274
Oil Pressure (psi)	61	58
Coolant Temperature (F)	190	187
Exhaust Temperature (F)	1512	1470
Exhaust Pressure (in H2O)	88.6	85.8

* Corrected-SAE J816b

** Corrected for humidity

Engine Honda CVCC 91-CID
 Fuel 7305

Test Number	62	162	61	161	60	59
Test Date	1/27/75	1/28/75	1/27/75	1/28/75	1/27/75	1/27/75
Barometer (mm Hg)	738.7	741.1	738.7	741.1	738.7	738.7
Humidity (grains/lb)	31	30	31	30	31	31
Temperature (F)	80	79	80	80	81	80
Engine Speed (rpm)	5500	5500	5500	5500	5500	5500
Torque (lb-ft)	0.0	0.0	10.3	9.3	18.7	28.0
Power (bhp)*	0.0	0.0	10.8	9.7	19.7	29.5
Fuel Rate (lb/hr)	11.0	12.0	17.5	16.7	19.2	25.8
Ignition Timing (deg BTC)	22.0	22.0	23.0	24.0	21.0	23.0
Manifold Vacuum (in Hg)	14.0	14.0	8.5	10.0	8.0	5.0
Throttle Angle (deg)	17.0	15.0	22.5	20.0	30.0	37.0
Concentrations (dry basis)						
CO (%)	.0107	.0197	.0565	.0125	.2302	1.9600
CO2 (%)	14.26	14.12	13.83	13.97	15.31	13.28
O2 (%)	1.35	.70	1.80	.90	.20	.15
HC (ppmC)	15	5	19	37	57	1239
NOx (ppm)	370	400	834	675	1275	1250
Air-Fuel Ratio	15.49	15.04	15.84	15.20	14.61	13.72
Emission Rates (g/hr)						
CO	7.5	14.7	64.7	13.1	264.6	2876.3
HC	.5	.2	1.1	1.9	3.2	89.9
NOx**	35.4	40.4	130.0	96.1	199.5	249.8
Oil Temperature (F)	280	262	255	257	271	229
Oil Pressure (psi)	60	61	62	61	61	63
Coolant Temperature (F)	188	187	193	190	186	187
Exhaust Temperature (F)	1543	1549	1579	1596	1595	1566
Exhaust Pressure (in H2O)	28.0	27.5	66.4	51.0	74.7	54.1

* Corrected-SAE J816b

** Corrected for humidity

Engine Honda CVCC 91-CID
Fuel 7305

Test Number	156	157	158	156	156
Test Date	1/28/75	1/28/75	1/28/75	1/24/75	1/28/75
Barometer (mm Hg)	738.7	741.1	741.1	734.4	741.1
Humidity (grains/lb)	31	30	30	31	30
Temperature (F)	80	77	77	78	81
Engine Speed (rpm)	5500	5500	5500	5500	5500
Torque (lb-ft)	38.4	37.4	37.4	42.0	44.0
Power (bhp)*	40.4	38.9	38.9	44.1	45.9
Fuel Rate (lb/hr)	27.4	27.0	27.0	27.3	30.5
Ignition Timing (deg BTC)	30.0	31.0	31.0	31.0	31.0
Manifold Vacuum (in Hg)	3.0	2.0	2.0	1.5	0.0
Throttle Angle (deg)	40.0	40.0	40.0	42.0	71.0
Concentrations (dry basis)					
CO (%)	3.7400	2.9800	2.9800	4.7300	5.8000
CO2 (%)	12.62	12.07	12.07	11.16	10.71
O2 (%)	13	11	11	21	20
HC (ppmC)	1752	1132	1132	1616	1559
NOx (ppm)	1280	1550	1550	988	795
Air-Fuel Ratio	12.97	13.23	13.23	12.53	12.12
Emission Rates (g/hr)					
CO	5515.5	4446.7	4446.7	6784.4	8506.0
HC	127.7	83.5	83.5	114.6	120.3
NOx**	257.0	313.4	313.4	193.0	158.0
Oil Temperature (F)	246	240	240	275	252
Oil Pressure (psi)	62	63	63	61	62
Coolant Temperature (F)	193	193	193	186	186
Exhaust Temperature (F)	1543	1556	1556	1530	1523
Exhaust Pressure (in H2O)	110.7	109.3	109.3	113.5	121.8

* Corrected- SAE JG16b

** Corrected for humidity

Engine Honda CVCC 91-CID
 Fuel 7305

Test Number	69	68	67	66	65	64
Test Date	1/30/75	1/30/75	1/30/75	1/30/75	1/30/75	1/30/75
Barometer (mm Hg)	746.0	746.0	746.0	746.0	746.0	746.0
Humidity (grains/lb)	28	28	28	28	28	28
Temperature (F)	79	79	78	78	78	79
Engine Speed (rpm)	3000	3000	3000	3000	3000	3000
Torque (lb-ft)	0.0	12.0	27.4	41.4	52.5	61.5
Power (bhp)*	0.0	6.8	15.5	23.3	29.6	34.7
Fuel Rate (lb/hr)	5.5	7.4	10.4	12.5	13.6	18.8
Ignition Timing (deg BTC)	17.0	16.0	16.0	17.0	25.0	27.0
Manifold Vacuum (in Hg)	18.0	14.0	9.0	5.0	2.0	1.0
Throttle Angle (deg)	16.5	16.0	21.0	28.0	37.0	50.0
Concentrations (dry basis)						
CO (%)	0.0589	0.0454	0.0530	0.0628	0.1736	3.9300
CO2 (%)	12.88	13.28	13.42	13.28	13.69	12.24
O2 (%)	2.35	1.85	1.82	1.95	1.40	0.28
HC (ppmC)	16	16	16	26	67	2002
NOx (ppm)	144	480	1150	1925	4100	1713
Air-Fuel Ratio	16.33	15.92	15.90	16.04	15.61	12.96
Emission Rates (g/hr)						
CO	22.0	22.2	36.3	52.2	152.4	3982.9
HC	3	4	5	1.1	2.9	100.3
NOx **	7.2	31.6	106.0	215.3	484.3	233.5
Oil Temperature (F)	222	228	234	239	241	234
Oil Pressure (psi)	57	57	57	57	57	57
Coolant Temperature (F)	185	185	191	187	190	191
Exhaust Temperature (F)	1183	1274	1349	1374	1374	1347
Exhaust Pressure (in H2O)	5.0	9.0	19.0	30.5	36.0	45.0

* Corrected-SAE J816b
 ** Corrected for humidity

Engine Fuel Honda CVCC 91-CID 7505

Test Number Test Date	72 1/30/75	73 1/30/75	74 1/30/75	75 1/30/75	76 1/30/75	63 1/30/75	72 1/30/75
Barometer (mm Hg)	746.0	746.0	746.0	746.0	746.0	746.0	746.0
Humidity (grains/lb)	28	28	28	28	28	28	28
Temperature (F)	79	79	79	79	79	81	79
Engine Speed (rpm)	4000	4000	4000	4000	4000	3000	4000
Torque (lb-ft)	37.6	37.6	25.0	12.5	0.0	64.0	50.0
Power (bhp)*	28.3	28.3	18.8	9.4	0.0	36.2	37.6
Fuel Rate (lb/hr)	14.9	14.9	13.1	10.0	7.9	19.3	18.7
Ignition Timing (deg BTC)	23.5	23.5	24.5	23.5	24.5	25.5	34.0
Manifold Vacuum (in Hg)	5.0	5.0	9.0	13.5	16.5	0.0	2.5
Throttle Angle (deg)	33.0	33.0	24.0	19.0	12.5	71.0	42.0
Concentrations (dry basis)							
CO (%)	.0409	.0409	.0409	.0306	.0188	3.6600	4.5800
CO2 (%)	13.15	13.15	13.42	13.28	13.28	12.24	11.28
O2 (%)	1.90	1.90	1.55	1.70	1.83	.37	.20
HC (ppmC)	20	20	16	8	4	1888	1850
NOx (ppm)	2550	2550	1500	638	223	2000	1300
Air-Fuel Ratio	16.05	16.05	15.72	15.82	15.91	13.12	12.58
Emission Rates (g/hr)							
CO	40.6	40.6	34.9	20.1	9.8	3856.2	4514.8
HC	1.0	1.0	.7	.3	.1	98.3	90.1
NOx**	340.5	340.5	172.3	56.3	15.6	283.5	172.4
Oil Temperature (F)	256	256	249	244	242	210	261
Oil Pressure (psi)	53	53	58	58	60	58	58
Coolant Temperature (F)	188	188	188	189	187	184	187
Exhaust Temperature (F)	1432	1432	1441	1374	1358	1342	1427
Exhaust Pressure (in H2O)	49.0	49.0	53.5	17.0	10.5	46.0	76.1

* Corrected-SAE J316b
** Corrected for humidity

Engine Honda CVCC 91-CID
 Fuel 7305

Test Number Test Date	71 1/30/75	70 1/30/75	83 1/30/75	82 1/30/75	81 1/30/75	80 1/30/75
Barometer (mm Hg)	746.0	746.0	746.0	746.0	746.0	746.0
Humidity (grains/lb)	28	28	28	28	28	28
Temperature (F)	80	80	80	81	82	83
Engine Speed (rpm)	4000	4000	5000	5000	5000	5000
Torque (lb-ft)	56.3	58.5	0.0	10.6	21.2	31.8
Power (bhp)*	42.4	44.1	0.0	10.0	20.0	30.0
Fuel Rate (lb/hr)	23.3	24.0	10.8	13.2	15.9	22.0
Ignition Timing (deg BTC)	34.0	33.5	23.0	23.0	22.0	23.0
Manifold Vacuum (in Hg)	1.0	0.0	15.0	11.5	8.0	5.5
Throttle Angle (deg)	49.0	71.0	17.0	21.0	28.0	34.0
Concentrations (dry basis)						
CO (%)	3.3400	1.8200	.0179	.0224	.0215	1.0100
CO2 (%)	12.12	12.75	13.83	13.97	13.83	13.83
O2 (%)	.30	.38	.95	.88	1.20	.21
HC (ppmC)	1568	1188	5	9	10	633
NOx (ppm)	2088	2890	340	790	1463	1700
Air-Fuel Ratio	13.21	13.96	15.23	15.19	15.45	14.23
Emission Rates (g/hr)						
CO	4286.0	2537.8	12.2	18.6	21.9	1308.1
HC	99.5	81.9	.2	.4	.5	40.5
NOx**	360.4	542.1	31.2	88.2	200.0	296.2
Oil Temperature (F)	252	225	267	269	277	278
Oil Pressure (psi)	59	60	60	59	58	60
Coolant Temperature (F)	188	191	187	187	190	191
Exhaust Temperature (F)	1446	1458	1504	1543	1581	1629
Exhaust Pressure (in H2O)	80.3	83.0	19.5	33.0	58.1	80.3

* Corrected-SAE J816b

** Corrected for humidity

Engine Honda CVCC 91-C1D
Fuel 7305

Test Number Test Date	79 1/30/75	78 1/30/75	77 1/30/75
Barometer (mm Hg)	746.0	746.0	746.0
Humidity (grains/lb)	28	28	28
Temperature (F)	83	82	81
Engine Speed (rpm)	5000	5000	5000
Torque (lb-ft)	42.4	47.7	50.2
Power (bhp)*	40.0	45.0	47.3
Fuel Rate (lb/hr)	25.1	28.4	29.4
Ignition Timing (deg BTC)	30.5	32.0	32.0
Manifold Vacuum (in Hg)	3.5	1.0	0.0
Throttle Angle (deg)	42.0	45.0	71.0
Concentrations (dry basis)			
CO (%)	4.2900	2.5500	3.9000
CO2 (%)	11.63	12.75	11.99
O2 (%)	.17	.25	.20
HC (ppmC)	1690	979	1407
NOx (ppm)	1125	2150	1600
Air-Fuel Ratio	12.71	13.57	12.94
Emission Rates (g/hr)			
CO	5720.8	4083.3	6185.9
HC	111.4	77.5	110.3
NOx **	201.8	463.2	341.4
Oil Temperature (F)	277	274	260
Oil Pressure (psi)	60	59	61
Coolant Temperature (F)	191	187	188
Exhaust Temperature (F)	1510	1574	1522
Exhaust Pressure (in H2O)	91.3	108.0	110.7

* Corrected -SAE J816b

** Corrected for humidity

