ARB CONTRACT 4-726

EVALUATION OF CVS TEST PROCEDURES

FINAL REPORT

for

State of California
Air Resources Board
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Sacramento, California 95814

March 11, 1976

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ABSTRACT

The effect of dynamometer inertia weight and road load horsepower, vehicle tune parameters, and smoothing the emission test driving schedule on exhaust emissions and fuel economy were studied. Actual vehicle road-load horsepower was measured by coast-down time and engine manifold vacuum. Tests were performed on 50 1968 through 1975 model year vehicles. 1975 and Modified 1972 Federal Test Procedures were used.

Observed differences in exhaust emission and fuel economy test results were tested for statistical significance. Vehicle coast-down times showed actual vehicle road load horsepower was, on the average, 42% greater than the horsepower schedule used in the Federal Test Procedure at a very high level of statistical significance.

This report was submitted in fulfillment of Project Number 2110 and Contract Number ARB4-726 by Automotive Environmental Systems, Inc. under the sponsorship of the California Air Resources Board. Work was completed as of December 22, 1975.

1. INTRODUCTION

The State of California Air Resources Board has identified the need to quantify, by controlled experimentation, the effect of several variables on the results of automotive emission testing. While the state CVS exhaust emission test procedure specifies the driving schedule the sample train and analytical instrumentation, and the test conditions, many variables remain unspecified. These variables may be incorrectly set, or have large tolerances which may greatly affect emission test results.

The effects of dynamometer inertia and road load horsepower settings upon exhaust emission test results were not covered adequately in the literature reviewed by AESi, and yet are known by all familiar with CVS testing procedures to have significant influence. Some work done by AESi for the U. S. Evironmental Protection Agency as part of a large scale testing program was directed towards determining statistically significant differences between testing cars at inertial settings of 250 pounds different from specified test weight. No statistical differences were found at that level with the few cars tested. However, the change in emissions level was detectable.

The variability in exhaust emission results associated with dynamometer road load setting is well known to the automobile manufacturers, although they have not published any substantial data on the subject. Most manufacturers are very concerned about the precision with which horsepower can be set on the accepted chassis dynamometers, and the repeatiability of this setting throughout the test. Because of this problem, manufacturers have installed very expensive all-electric type chassis dynamometers in their quality audit lanes.

Another group of variables needing evaluation is that of engine parameters consisting of idle speed, idle air/fuel ratio in % CO, and basic ignition timing. Data have been developed by numerous firms relating

some of these variables to exhaust emission results. In work for the Coordinating Research Council Air Pollution Research Advisory Committee, TRW Systems, and Scott Research Laboratories jointly performed parametric analyses of the effect of engine parameter changes upon exhaust emissions. These analyses, however, are a few years old and should be augmented to account for effects of newer vehicles/emission control systems.

Another significant variable affecting exhaust emission measurements is the precision with which the driving schedule is driven. In working with numerous companies in the vehicle emissions testing field, AESi engineers had observed different policies relating to the driving the schedule. Some companies do everything possible to follow the trace exactly. Other companies specifically round-off abrupt speed or mode changes, using all of the speed and time tolerance provided by the test procedure.

Because of these needs AESi conducted this program investigating the following variables:

1. Dynamometer inertia weight settings.
2. Dynamometer road load horsepower settings.
3. Engine tune parameter settings (idle CO, idle speed, and basic ignition timing).
4. Test vehicle driving technique

To quantify the effect of these variables, AESi tested 50 1968 through 1975 model year vehicles. The description and results of this project are presented in this report.

2.0 CONCLUSIONS

Conclusions developed from this program are:

1. Actual road load horsepower, as determined by open road coast down procedures, is about 42% higher, on the average, than the current EPA schedule used to set dynamometer road load horsepower.

2. Increasing dynamometer road load horsepower to the coast-down road load horsepower increased oxides of nitrogen emissions (on the average 0.48 grams/mile) and decreased vehicle fuel economy (0.48 miles per gallon or about 4%).

3. Increasing dynamometer inertia to the maximum vehicle load rating (about 870 pounds inertia on the average) increased oxides of nitrogen emissions (0.49 grams/mi) and decreased vehicle fuel economy (about 0.61 miles per gallon or about 5%).

4. Decreasing idle speed 100 rpm increased hydrocarbons (0.22 grams/mi), decreased carbon dioxide (34.1 grams/mi), and increased fuel economy (0.53 miles per gallon or about 4%).

5. Advancing basic timing 5 degrees increased hydrocarbons (0.23 grams/mile), decreased carbon dioxide (30.2 grams/mile), increased oxides of nitrogen (0.46 grams per mile), and increased vehicle fuel economy (0.46 miles per gallon or about 3%).

6. Increasing idle CO 1% increased carbon monoxide (8.57 grams/mile) and decreased vehicle fuel economy (0.23 miles per gallon or about 1.5%).

7. Smoothing the driving schedule to the maximum permitted as measured on ten 1975 model year vehicles, reduced carbon monoxide emissions (1.8 grams per mile) and improved vehicle fuel economy (0.58 miles per gallon or about 5 percent).

Each of the above conclusions is based upon a specific incremental change being made in a tune-up parameter or dynamometer parameter. In order to determine the functional relationships between the parameter changes and emissions, further study will be required. However, this program does indicate the emission changes that can be expected at the given change in the parameter. For example, the results indicate that a 1% increase in idle CO will result in carbon monoxide increasing an average of 8.57 gms/mile. However, the results of this program do not predict the change to be expected when idle CO is increased any other amount such as 0.5%, 1.5% or 2%.

3.0 RECOMMENDATIONS

The following are recommendations derived from this program.

1. In order to determine an expected change in emission level or vehicle economy due to a change in the dynamometer settings:
   - Repetitive testing should be made on each vehicle (e.g., repeat baseline test three times) for each test condition on a fewer number of vehicles.
   - Incremental changes in test conditions should be made on the same vehicle covering a wide range for that test condition (e.g. increase inertia 250, 500, 1000, and 1500 pounds).

2. In order to determine an expected change in emission level or vehicle fuel economy due to a tune parameter:
   - Repetitive testing should be made on a smaller vehicle sample.
   - Incremental changes in tune parameters should be made on each vehicle over a wide range (e.g., increase timing 2, 4, 6, 8, etc. degrees).

3. Additional studies should be made on the open road vehicle coast-down method to determine the effect of variables such as temperature, tire type, and road surface as well as to determine test repeatability.

4. The vehicle coast down method should be subtituted in place of the manifold vacuum method to determine actual vehicle road load horsepower to reflect a true vehicle fuel consumption by the emission test procedure.

4.0 DISCUSSION OF TEST RESULTS

4.1 DISCUSSION OF 1975 FTP EXHAUST EMISSION AND FUEL ECONOMY TEST RESULTS

The 1975 Federal Test Procedure was performed on all test vehicles using three test conditions; a baseline test, increasing inertia to gross vehicle weight, and increasing dynamometer road load horsepower to coast-down road load horsepower value. Tables 4.1-1 and 4.1-2 summarizes the exhaust emission and fuel economy values listing the mean, standard deviation and range for the sample of 50 vehicles and the sample of 10 1975 model year test vehicles respectively. Test results for individual vehicles are listed in Appendix A.

The average inertia increase for the 50 vehicles tested was 870 pounds or about 22 percent increase above the baseline mean inertia value of 3970 pounds. The average dynamometer road load horsepower increase to the coast down value was 4.95 horsepower, or about a 41.7% increase above the baseline mean value of 11.86 horsepower. Road load horsepower and inertia settings for the individual test vehicles are listed in Appendix D.

To determine the statistical significance of the change in emissions and fuel economy resulting from increasing inertia to the gross vehicle weight rating for each vehicle and road load horsepower to the value obtained from coast down data, a paired Student's t test was made. Table 4.1-3 lists the results of the paired t test indicating where statistically significant differences were found. The mean differences for exhaust emissions in grams/mile and fuel consumption in miles/gallon are listed (e.g. $\overline{Y} - \overline{X}$ = inertia weight increase emissions minus baseline emissions in grams/mile). In the case where 50 vehicles make up the sample population, the hypothesis is made that the two population means are identical. We reject this hypothesis when difference between the two sample means is observed and there is no more than a 5% chance that the difference observed is due to some random event. In the case of the 1975 test vehicles (10 were tested) the same null

TABLE 4.1-1

VARIABLE- HC

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	50	3.14	2.11	.54- 9.39
BASELINE	1975	50	2.67	1.87	.38- 8.88
BASELINE	HTST	50	2.30	1.78	.16- 8.74
ID. RPM DEC. 100	HTST	50	2.52	1.98	.08- 9.42
INERTIA INC. TO GVW	1972	50	3.18	2.05	.49- 8.66
INERTIA INC. TO GVW	1975	50	2.73	1.86	.44- 8.44
BASE TIMING INC. 5 DEG	HTST	50	2.53	1.99	.11- 10.97
SMOOTHED DRIVING SCHED.	HTST	10	.29	.16	.08- .55
RLHP INC. TO CD RLHP	1972	50	3.18	2.29	.35- 11.57
RLHP INC. TO CD RLHP	1975	50	2.68	1.87	.31- 8.25
BASELINE REPEAT	HTST	50	2.18	1.78	.20- 8.61
IDLE CO INC. 1.0 PCT.	HTST	50	2.32	1.70	.15- 9.18

TABLE 4.1-1 (Continued)

VARIABLE- CO

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	50	36.67	30.40	5.43- 152.47
BASELINE	1975	50	26.36	21.10	2.46- 91.27
BASELINE	HTST	50	17.93	16.90	.22- 77.16
ID. RPM DEC. 100	HTST	50	19.55	18.00	.31- 82.22
INERTIA INC. TO GVW	1972	50	37.38	29.96	4.77- 178.27
INERTIA INC. TO GVW	1975	50	27.64	22.19	2.34- 101.02
BASE TIMING INC. 5 DEG	HTST	50	17.59	17.58	.27- 80.77
SMOOTHED DRIVING SCHED.	HTST	10	2.00	2.98	.10- 10.15
RLHP INC. TO CD RLHP	1972	50	36.17	32.81	2.73- 189.12
RLHP INC. TO CD RLHP	1975	50	26.30	23.48	1.83- 105.25
BASELINE REPEAT	HTST	50	17.24	16.66	.03- 81.55
IDLE CO INC. 1.0 PCT.	HTST	50	25.81	19.07	.97- 98.01

TABLE 4.1-1 (Continued)

VARIABLE- CO2

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	50	690.89	158.20	322.50-1002.40
BASELINE	1975	50	668.55	151.35	312.50- 972.90
BASELINE	HTST	50	638.86	142.42	290.20- 961.10
ID. RPM DEC. 100	HTST	50	604.81	135.88	306.80- 859.00
INERTIA INC. TO GVW	1972	50	723.61	163.00	326.30-1013.80
INERTIA INC. TO GVW	1975	50	702.97	157.02	315.30- 976.60
BASE TIMING INC. 5 DEG	HTST	50	608.64	125.84	270.50- 867.20
SMOOTHED DRIVING SCHED.	HTST	10	709.88	135.18	432.00- 866.80
RLHP INC. TO CD RLHP	1972	50	709.93	162.71	347.10-1015.90
RLHP INC. TO CD RLHP	1975	50	684.94	161.62	220.20- 971.30
BASELINE REPEAT	HTST	50	635.07	135.93	292.90- 876.60
IDLE CO INC. 1.0 PCT.	HTST	50	632.22	138.83	299.30- 917.10

TABLE 4.1-2

VARIABLE- HC

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	10	.95	.27	.54- 1.45
BASELINE	1975	10	.62	.20	.38- 1.01
BASELINE	HTST	10	.37	.19	.16- .81
ID. RPM DEC. 100	HTST	10	.38	.31	.08- 1.15
INERTIA INC. TO GVW	1972	10	.92	.29	.49- 1.55
INERTIA INC. TO GVW	1975	10	.62	.17	.44- 1.04
BASE TIMING INC. 5 DEG	HTST	10	.37	.19	.11- .66
SMOOTHED DRIVING SCHED.	HTST	10	.29	.16	.08- .55
RLHP INC. TO CD RLHP	1972	10	.83	.40	.35- 1.86
RLHP INC. TO CD RLHP	1975	10	.59	.24	.31- 1.12
BASELINE REPEAT	HTST	10	.31	.09	.20- .43
IDLE CO INC. 1.0 PCT.	HTST	10	.60	.52	.15- 1.67

TABLE 4.1-2 (Continued)

VARIABLE- CO

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	10	10.57	4.40	5.43- 18.17
BASELINE	1975	10	6.60	3.70	2.46- 12.14
BASELINE	HTST	10	3.78	3.90	.22- 11.13
ID. RPM DEC. 100	HTST	10	2.72	1.90	.31- 5.39
INERTIA INC. TO GVW	1972	10	12.20	6.81	4.77- 25.07
INERTIA INC. TO GVW	1975	10	7.95	5.25	2.34- 20.81
BASE TIMING INC. 5 DEG	HTST	10	2.48	3.24	.27- 10.48
SMOOTHED DRIVING SCHED.	HTST	10	2.00	2.98	.10- 10.15
RLHP INC. TO CD RLHP	1972	10	8.72	5.36	2.73- 20.37
RLHP INC. TO CD RLHP	1975	10	5.21	3.40	1.83- 11.53
BASELINE REPEAT	HTST	10	1.88	1.71	.03- 5.25
IDLE CO INC. 1.0 PCT.	HTST	10	8.81	11.54	.97- 32.60

TABLE 4.1-2 (Continued)

VARIABLE- CO2

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	10	799.75	162.57	467.10-1002.40
BASELINE	1975	10	773.95	155.94	459.90- 972.90
BASELINE	HTST	10	741.87	147.42	458.40- 961.10
ID. RPM DEC. 100	HTST	10	694.66	143.45	445.10- 859.00
INERTIA INC. TO GVW	1972	10	842.19	156.20	482.00-1013.80
INERTIA INC. TO GVW	1975	10	826.00	154.43	475.50- 976.60
BASE TIMING INC. 5 DEG	HTST	10	694.82	134.51	430.90- 867.20
SMOOTHED DRIVING SCHED.	HTST	10	709.88	135.18	432.00- 866.80
RLHP INC. TO CD RLHP	1972	10	823.39	159.75	474.60-1015.90
RLHP INC. TO CD RLHP	1975	10	795.84	151.28	468.70- 971.30
BASELINE REPEAT	HTST	10	725.14	135.36	433.60- 876.60
IDLE CO INC. 1.0 PCT.	HTST	10	730.60	152.06	445.90- 917.10

TABLE 4.1-2 (Continued)

VARIABLE- NOXC

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	10	1.69	.37	1.33- 2.57
BASELINE	1975	10	1.59	.37	1.15- 2.41
BASELINE	HTST	10	1.49	.37	.90- 2.07
ID. RPM DEC. 100	HTST	10	1.44	.36	.81- 2.05
INERTIA INC. TO GVW	1972	10	2.00	.36	1.41- 2.59
INERTIA INC. TO GVW	1975	10	1.90	.33	1.42- 2.43
BASE TIMING INC. 5 DEG	HTST	10	1.76	.45	1.22- 2.46
SMOOTHED DRIVING SCHED.	HTST	10	1.52	.48	.78- 2.59
RLHP INC. TO CD RLHP	1972	10	1.80	.36	1.38- 2.63
RLHP INC. TO CD RLHP	1975	10	1.67	.28	1.21- 2.16
BASELINE REPEAT	HTST	10	1.55	.40	.93- 2.34
IDLE CO INC. 1.0 PCT.	HTST	10	1.47	.50	.88- 2.61

TABLE 4.1-2 (Continued)

VARIABLE- MPG

TEST CONDITION	FTP TYPE	SAMPLE SIZE	MEAN	STD.DEV.	RANGE
BASELINE	1972	10	11.35	2.92	8.62- 18.48
BASELINE	1975	10	11.82	2.98	8.97- 19.02
BASELINE	HTST	10	12.38	2.97	9.14- 19.29
ID. RPM DEC. 100	HTST	10	12.79	2.75	10.19- 19.86
INERTIA INC. TO GVW	1972	10	10.73	2.77	8.39- 17.93
INERTIA INC. TO GVW	1975	10	11.04	2.84	8.77- 18.38
BASE TIMING INC. 5 DEG	HTST	10	13.22	3.12	10.16- 20.54
SMOOTHED DRIVING SCHED.	HTST	10	12.96	3.11	10.19- 20.48
RLHP INC. TO CD RLHP	1972	10	11.08	2.92	8.45- 18.48
RLHP INC. TO CD RLHP	1975	10	11.51	2.91	8.96- 18.79
BASELINE REPEAT	HTST	10	12.68	3.09	10.05- 20.37
IDLE CO INC. 1.0 PCT.	HTST	10	12.43	3.08	9.56- 19.80

Table 4.1-3

PAIRED t TEST ON SAMPLE MEANS

Listing of Mean Value Differences When There is Only a 5% Chance That Difference is Due to Some Random Event

Comparison	FTP Type		HC	CO	CO_2	NO_x	Fuel Consumption mi/gal
Baseline inertia vs. inertia weight increased to maximum rated vehicle GVW	Cold-Start 75	$\overline{Y}-\overline{X}$	n.s.d.[a]	n.s.d.	34.4	0.49	-0.61[b]
		σ			32.37	0.48	0.54
Baseline inertia vs. inertia weight increased to maximum GVW	Cold-Start 72	$\overline{Y}-\overline{X}$	n.s.d.	n.s.d.	32.7	0.48	-0.50
		σ			30.10	0.46	0.55
Baseline EPA R1Hp vs. R1Hp increased to open road coast down Hp	Cold-Start 75	$\overline{Y}-\overline{X}$	n.s.d.	n.s.d.	n.s.d	0.48	-0.48
		σ				0.49	0.53
Baseline EPA R1Hp vs. R1Hp increased to open road coast down Hp	Cold-Start 72	$\overline{Y}-\overline{X}$	n.s.d.	n.s.d.	19.04	0.43	-0.40
		σ			51.98	0.47	0.56
Baseline vs. inertia weight increase (1975 vehicles only)	Cold-Start 75	$\overline{Y}-\overline{X}$	n.s.d.	n.s.d.	52.1[c]	0.31	-0.78
		σ			43.70	0.22	0.54
Baseline vs. R1Hp increase (1975 vehicles only)	Cold-Start 75	$\overline{Y}-\overline{X}$	n.s.d.	n.s.d.	21.89	n.s.d.	-0.31
		σ			31.90		0.47

[a] n.s.d = no significant difference.
[b] minus sign indicates decrease in emissions or reduction in fuel economy.
[c] for statistical test performed on 1975 model year vehicle data, statistically significance difference is shown when there is less than a 10% chance that observed difference is due to some random event.

hypothesis test is made. However, we reject this hypothesis when there is no more than a 10% chance that the difference observed is due to some random event.

When increasing inertia weight to gross vehicle weight and increasing dynamometer horsepower to the value obtained by the open road coast down method, we find oxides of nitrogen exhaust emissions are increased and vehicle fuel economy is decreased as is shown in Table 4.1-3. It is worthy at this point in the technical discussion to point out that the observed level of increase in NO_x emissions and decrease in fuel economy is to be expected when inertia and road load horsepower is increased on the average 870 pounds and 4.95 horsepower respectively. What the results of this testing does not predict is the level of change, or the statistical significance of the change, when inertia or road load horsepower is increased at some amount less than or greater than the averages stated above.

In many instances emission and fuel economy mean differences are not found to be statistically significant even though the differences are substantial. In most of these cases, the variance of the differences overshadows the difference in the means. It is possible that a statistically significant difference can be found if the sample size is increased. The variance may also be reduced by selecting a more homogeneous sample. For example, hydrocarbon and carbon monoxide differences are usually difficult to detect on catalyst equipped vehicles.

4.2 DISCUSSION OF 1972 FTP (HOT START) EXHAUST EMISSION AND FUEL ECONOMY TEST RESULTS

The effect of vehicle tune parameter changes and smoothing the driving schedule were measured using a modified 1972 hot start FTP. Table 4.1-1 summarizes the exhaust emission and fuel economy values, listing the mean, standard deviation and range. Test results for the individual vehicles are listed in Appendix A.

The same statistical analyses as discussed in Section 4.1 (testing null hypothesis using paired t test) were applied to this data. Results of these paired t tests are shown in Table 4.2-1. Reducing idle speed 100 rpm increased hydrocarbons and carbon monoxide and reduced oxides of nitrogen emissions, fuel economy was also increased. Advancing basic timing increased hydrocarbon and oxides of nitrogen emissions and increased fuel economy. Carbon monoxide emissions showed no statistical difference as is generally expected. When idle CO was increased 1%, the only resulting statistically significant difference was for carbon monoxide emissions. However, when compared to the baseline repeat test, additional statistically significant differences were observed. This is most likely due to the fact that these two tests were run back-to-back on the same day, whereas the original baseline test was run two days prior to the repeat baseline test. When comparing the baseline repeat test to the baseline test statistically, the two tests do not differ except for hydrocarbon emissions.

As discussed in Section 4.1, results of these tests only infer that changing tune parameters will cause the above observed changes in exhaust emissions and fuel economy. The data is only indicative and not a predictor of an expected change in emission level due to changes in a tune parameter other than the changes performed in this program (e.g., with the data from this program it is not possible to predict the change in hydrocarbon emissions for each one degree change in basic timing). Where no statistically significant differences were observed, this is most likely due to the small differences in sample means and the small sample size.

Table 4.2-1

PAIRED T TEST ON SAMPLE MEANS

Listing of Mean Value Differences When There is Only a 5% Chance that Difference is Due to Some Random Event

Comparison	FTP Type		HC gm/mi	CO gm/mi	CO_2 gm/mi	NO_x gm/mi	Fuel Consumption mi/gal
Baseline vs. idle speed decreased 100 rpm	72 Hot Start	$\bar{Y}-\bar{X}$	0.22	n.s.d.[a]	-34.1[b]	n.s.d.	0.53
		σ	0.62		34.89		0.55
Baseline vs. timing increased +5°	72 Hot Start	$\bar{Y}-\bar{X}$	0.23	n.s.d.	-30.2	0.46	0.54
		σ	0.53		33.84	0.48	0.62
Baseline vs. idle CO increased +1%	72 Hot Start	$\bar{Y}-\bar{X}$	n.s.d.	7.88	n.s.d.	n.s.d.	n.s.d.
		σ		7.38			
Baseline repeat vs. idle CO increased +1%	72 Hot Start	$\bar{Y}-\bar{X}$	n.s.d.	8.57	n.s.d.	n.s.d.	-0.23
		σ		7.36			0.52
Baseline vs. smoothed driving schedule (10 1975 vehicles)	72 Hot Start	$\bar{Y}-\bar{X}$	n.s.d.	-1.78[c]	-32.0	n.s.d.	0.58
		σ		2.16	29.59		0.44
Baseline repeat vs. smoothed driving schedule (10 1975 vehicles)	72 Hot Start	$\bar{Y}-\bar{X}$	n.s.d.	n.s.d.	n.s.d.	n.s.d.	n.s.d.
		σ					
Baseline vs. baseline repeat	72 Hot Start	$\bar{Y}-\bar{X}$	-0.12	n.s.d.	n.s.d.	n.s.d.	n.s.d.
		σ	0.43				

[a] n.s.d. = no significant difference.
[b] minus sign indicates decrease in emissions or reduction in fuel economy.
[c] for statistical test performed on 1975 model year vehicle data, statistically significant difference is shown when there is less than a 10% chance that observed difference is due to some random event.

4.3 COAST-DOWN AND MANIFOLD VACUUM ROAD LOAD HORSEPOWER TEST RESULTS

Figures 4.3-1 and 4.3-2 graphically present the results of the coast-down and engine manifold vacuum methods for determining actual road load horsepower at 50 miles per hour. Coast-down road load horsepower (CD-R1Hp) data was quite consistent, whereas the manifold vacuum road load horsepower (MV-R1Hp) was scattered, as is illustrated by the two figures.

It is evident that the coast-down R1Hp is significantly different than the schedule of road load horsepower settings used for the Federal Test Procedure as shown in Figure 4.3-1. However, it is difficult to determine if the manifold vacuum road load horsepower is different to a significant degree when compared with the coast-down method. To determine if there was any statistical significance for this data, comparisons were made for:

1. CD-R1Hp vs. MV-R1Hp
2. CD-R1Hp vs. Federal Test Procedure (FTP)-R1Hp
3. MV-R1Hp vs. FTP-R1Hp

The sample means were analyzed for significance using a student's t test. Results of these comparisons are presented in the following table.

	FTP R1Hp	MV R1Hp
MV-R1Hp	4.46**	-
CD-R1Hp	16.70**	4.07**

Results of the individual tests are listed in Appendix B including the sample means, standard deviations and ranges. The mean coast-down road load horsepower (16.81 R1Hp) is 41.7% greater than the Federal Test Procedure road load horsepower (11.86 R1Hp) and the mean manifold road load horsepower (14.38) is 21.2% greater than the Federal Test Procedure road load horsepower.

**t scores; a value of 2.58 indicates that there is less than a 1% chance that the observed difference is due to a random event.

Figure 4.3-1

COAST-DOWN ROAD LOAD HORSEPOWER
VS. VEHICLE WEIGHT

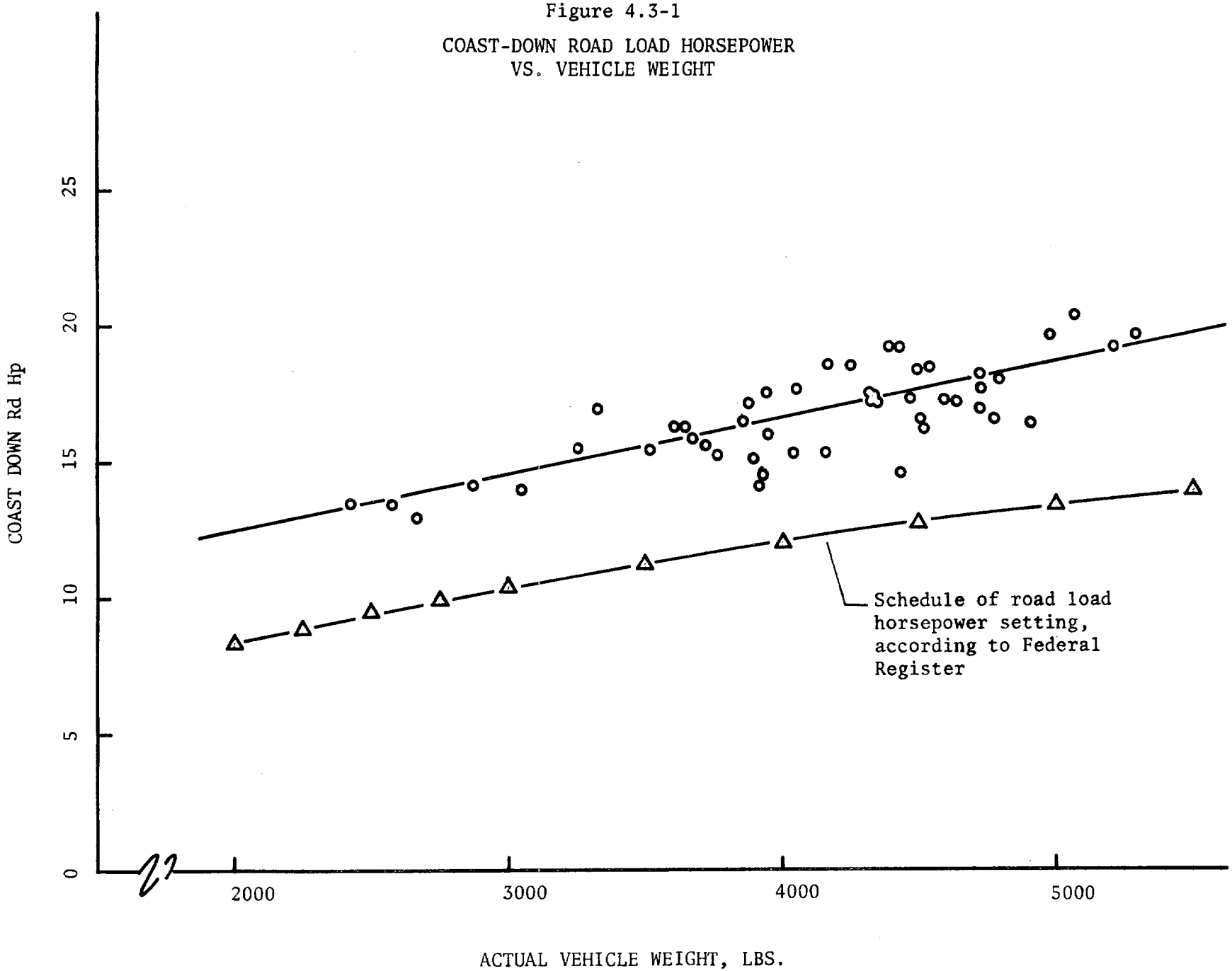
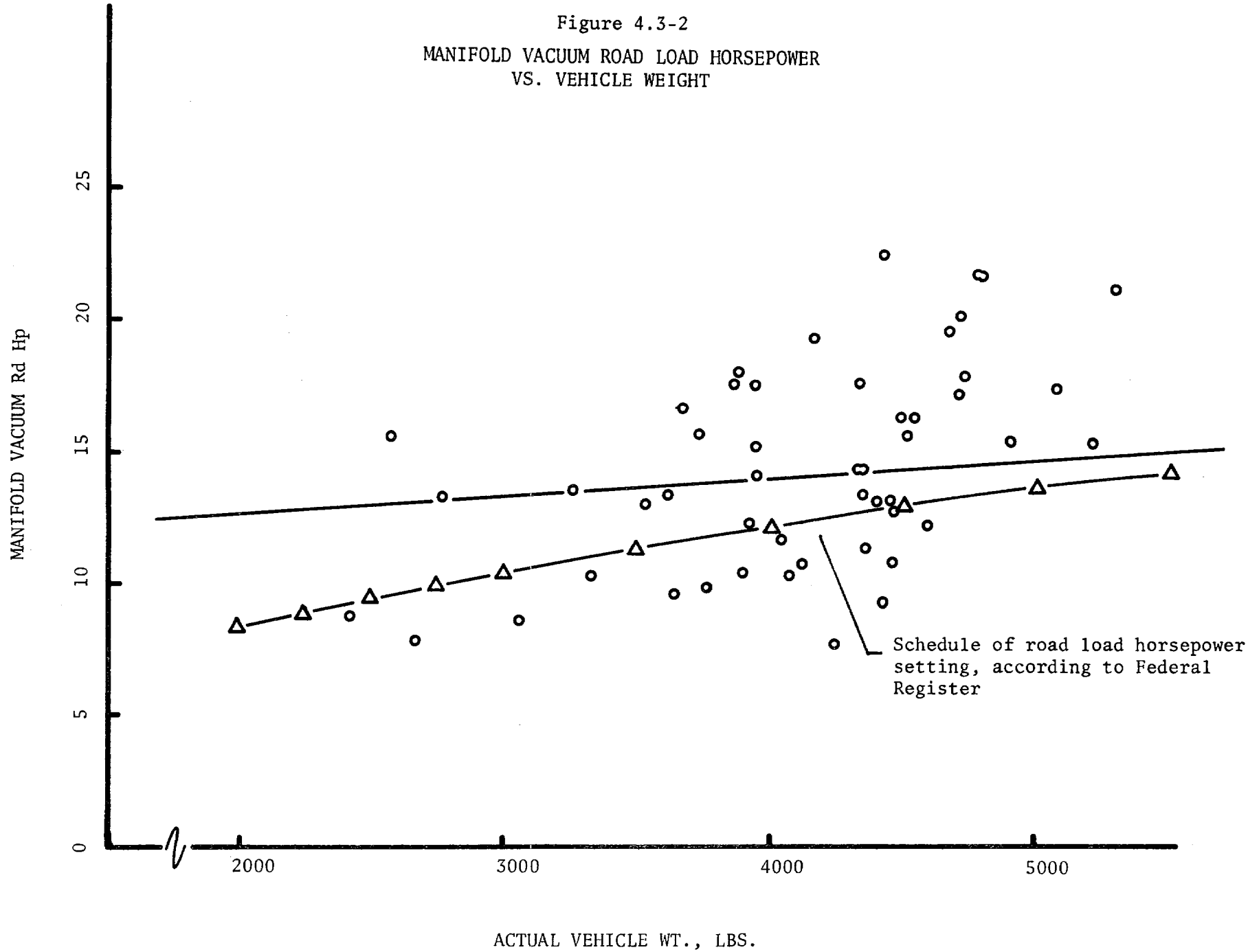


Figure 4.3-2

MANIFOLD VACUUM ROAD LOAD HORSEPOWER
VS. VEHICLE WEIGHT



Two additional statistical tests were made on the coast-down road load horsepower data. Linear regression analyses were performed to predict coast-down road load horsepower from vehicle weight and to predict coast-down road load horsepower from Federal Test Procedure road load horsepower. The regression equations obtained are:

$$CD - RlHp = 8.56283 + 0.002003 \text{ (vehicle weight)}$$

$$CD - RlHp = 4.863008 + 1.006826 \text{ (FTP - RlHp)}$$

The coast-down road load horsepower regression is plotted on Figure 4.3-1. In addition, a hypothesis test was made on the slope of each equation. For both equations, the null hypothesis test is rejected and the observed difference are real with there being less than 5% chance that the difference is due to some random event.

A second order least squares polynominal curve was also fit through the data. However, this equation was not any different than the linear curve, as the coefficient on the squared term was not different from zero. Likewise, a linear regression analysis was performed on the manifold vacuum road load horsepower and is shown on Figure 4.3-2. The equation for this linear curve is

$$MV - RlHp = 11.931566 + 0.000602 \text{ (vehicle weight)}$$

A null hypothesis test was made on the slope of the linear regression equation and is rejected when there is no more than a 5% chance that the observed slope is due to some random error. The Student's t value calculated for the slope indicates the slope of the equation is accurate with less than a 5% chance of error.

As a matter of curosity, one vehicle was selected at random and additional coast-down data was obtained. For this vehicle, back-to-back

coast downs were performed from 55 - 45 mph and 52 - 48 mph in order to determine appreciable difference. At the same time, coast down R1Hp's were also obtained at 60, 50, 35, 30, 20, and 10 mph. Results of the 55 - 45 versus 52 - 48 mph coast downs showed that the 55 - 45 mph method gave about a 1.7% higher R1Hp than the 52 - 48 mph procedure. To ascertain if this difference was real, a R1Hp versus vehicle speed curve was constructed from the additional coast down data. Graphically determining the required R1Hp at 50 mph, using the averages from 55 - 45 and 52 - 48, showed the former to be about 1.6% higher than the latter. Of course this is one point data and additional study is surely required.

5.0 DISCUSSION OF RESULTS

5.1 PROGRAM OBJECTIVE

The "Evaluation of CVS Test Procedures" Program was the measurement of exhaust emissions and actual vehicle road load horsepower requirements from 50 1968 through 1975 model year vehicles. This statistically represents, in-so-far-as possible, the California vehicle population. The overall objectives of this program were:

1. Study the effects of dynamometer road load and inertia settings upon exhaust emissions.
2. Perform an analysis relating engine variables of idle speed, idle mixture and spark timing to changes in exhaust emissions. Obtain data of sufficient confidence to apply to the California vehicle population.
3. Determine the effect on emissions of "close tolerance" versus "wide tolerance" driving of the test schedule.
4. Measure actual road load horsepower requirements of test vehicles using coast-down techniques and compare to manifold vacuum method of determining road load horsepower.
5. Provide fuel economy test data.

5.2 PROGRAM DESIGN

In support of the objectives of this program to quantify the changes in emissions levels due to inertia, road load horsepower (RdHp), vehicle engine tune parameters (idle rpm, idle air/fuel mixture and ignition timing) and the test vehicle driving schedule technique, AESi designed a testing program that would allow the generation of the maximum amount of data within the budget restraints imposed on the program. To accomplish this, a combination of Cold Start 1975 and Hot Start 1972 Federal Test Procedures (FTP) were used in order to minimize the number of days any one test vehicle would be in AESi's possession and maximize the number of possible tests that could be run on each vehicle within that time frame.

The 1975 FTP was chosen to quantify the effect of dynamometer inertia weight settings on exhaust emissions. When considering what inertia weight increase to choose for the 50 vehicle population, it was decided to test the vehicles at their maximum rated gross vehicle weight. Ideally, inertia weight increases of 250, 500, and 1,000 pounds per test vehicle would provide the greatest amount of information. However, this was not possible within the constraints of the program and the use of GVW was chosen to provide information on the maximum level of change expected.

Likewise, the 1975 FTP was chosen to determine the effect of increased dynamometer road load horsepower settings. Here again the choice of determining how much additional road load horsepower to use was subjective. In various discussions with members of the ARB technical staff, there had been a long time interest in testing vehicles at their actual RdHp requirements and determining what changes in emission levels would be experienced. Actual RdHp for each vehicle was determined by measuring the time for the vehicle to coast from 55 mph to 45 mph and the resulting value used for setting dynamometer RdHp.

For measuring the effect of vehicle tune parameter changes on exhaust emissions, the 1972 FTP test procedure was used. The three variables changed were idle speed (100 rpm decrease), basic ignition timing (5 degree advance) and idle air/fuel mixture (increased 1.0% CO absolute). To measure the effect of smoothing the driving schedule, a 1372 second trace was smoothed to the maximum within the ±2 mph and ±1 second or algebraic combination of the two as specified in the Federal Register. The effect on exhaust emissions using the smoothed driving schedule was applied only to the 1975 model year test vehicles.

Another important consideration in support of the overall program objectives was the proper selection of test vehicles, model years 1968 through 1975. In any statistical sampling program there is always concern about the statistical validity of the sample. A careful delineation of the various vehicle makes, engine sizes, transmission and carburetor types was obtained and a 50 vehicle matrix designed.

5.3 TEST VEHICLE PROCUREMENT

5.3.1 Test Vehicle Selection

Test vehicles of the appropriate make, model year, engine displacement, transmission and carburetor venturies were procurred in accordance with matrix (Table 5.3-1). AESi contacted vehicle owners in accordance with the requirements of the test vehicle matrix by telephoning vehicle owners and explaining the use of their vehicle in this program. In addition, a number of the 1975 model year vehicles were procurred from rental car and leasing agencies. At the ARB's direction, AESi was asked to procure 1975 model year vehicles with high mileage in order to see what, if any, catalyst degradation was occurring.

In the course of conducting this program only two vehicle changes to the test vehicle matrix had to be made. The first change made was to vehicle #15. Instead of testing a 122 CID engine, Ford Pinto, a 140 CID engine was substituted. The second substitution was the testing of a 1974 Plymouth Satellite in place of the 1974 Dodge (vehicle #4). The configuration of the Plymouth Satellite was similar to that of a Dodge Coronet/Charger with respect to engine displacement, carburetor, drive line and inertia weight. All other vehicles tested conformed exactly to the test vehicle matrix.

5.3.2 Incentives

To encourage participation, incentives were provided to each vehicle owner whose vehicle was used in the program. Each participant was offered a free fully insured loan car while his car was being tested, a full tank of gas, and a vehicle tune up.

5.3.3 Test Vehicle Handling

Virtually all of the participants delivered their vehicle to AESi's emission testing laboratory. Prior to accepting their vehicle for testing, the vehicle was inspected for soundness of mechanical

Table 5.3-1

VEHICLE MATRIX

Make	Vehicle Information by Model Year								Totals
	1975	1974	1973	1972	1971	1970	1969	1968	
Buick	#001: 455 CID/A4	#011: 455 CID/A4	#021: 350 CID/A4						3
Chevrolet	#002: 400 CID/A4 #003: 350 CID/A4	#012: 400 CID/A4 #013: 350 CID/A4	#022: 140 CID/A2 #023: 350 CID/A2	#030: 350 CID/A2 #031: 400 CID/A2	#037: 307 CID/A2 #038: 350 CID/A2	#042: 307 CID/A2 #043: 350 CID/A2	#046: 350 CID/A4	#049: 307 CID/A2	14
Dodge	#004: 318 CID/A1	#014: 360 CID/A2	#024: 318 CID/A2	#032: 318 CID/A2					4
Ford	#005: 351 CID/A2 #006: 400 CID/A2	#015: 122 CID/A2 #016: 351 CID/A2	#025: 122 CID/M2 #026: 351 CID/A2	#033: 400 CID/A2	#039: 302 CID/A2	#044: 351 CID/A2	#047: 351 CID/A2	#050: 289 CID/A2	11
Oldsmobile	#007: 350 CID/A4	#017: 350 CID/A4	#027: 350 CID/A4	#034: 455 CID/A4					4
Plymouth	#008: 318 CID/A2	#018: 318 CID/A2	#028: 360 CID/A2	#035: 318 CID/A2	#040: 318 CID/A2		#048: 318 CID/A2		6
Pontiac	#009: 350 CID/A2	#019: 400 CID/A2	#029: 350 CID/A2	#036: 455 CID/A4	#041: 350 CID/A2	#045: 350 CID/A2			6
Toyota	#010: 120 CID/M2	#020: 97 CID/M2							2
Totals	10	10	9	7	5	4	3	2	50

operation. If the vehicle had a leaking exhaust system, or was suspected to have a mechanical problem that would affect exhaust emission results, the car was not accepted for testing.

5.4 FACILITIES AND EQUIPMENT

5.4.1 Test Locations

The Emission Testing Laboratory was located at 7300 Bolsa Avenue, Westminster, California. The elevation of the laboratory is approximately 50 feet above sea level.

5.4.2 Constant Volume Sampler

The Constant Volume Sampler was designed and built in accordance with requirements stipulated in pertinent issues of the Federal Register for performing vehicle emission tests in accordance with the 1972 through 1975 Federal Test Procedures. The Constant Volume Sampler featured a gas-to-water heat exchanger and temperature control circuit allowing for control of the sample temperature within ±5 degrees of the set point temperature. Inlet pressure depression was adjusted by a precision butterfly valve enabling inlet pressure adjustments to within plus or minus 0.05 inches of water. Blower speed was maintained at a constant 1,125 revolutions per minute by the use of a constant speed motor. Blower revolutions were counted by the use of a magnetic pickup and an electronic counter.

5.4.3 Exhaust Analysis Console (EAC)

The exhaust analysis consoles used during the performance of this program was designed in accordance with specifications stipulated in various Federal Registers for vehicle emission testing by the 1972 and 1975 Federal Test Procedures. The features specified in the 1975 Federal Test Procedure for drying the sample gas and removing carbon dioxide from the carbon monoxide sample train were included for only

the low range CO instrument (ranges 2 and 3). The instruments used in the exhaust analysis consoles were the Beckman Model 315-B Nondispersive Infrared Analyzers (NDIR's) for the measurement of carbon monoxide and carbon dioxide. The high range carbon monoxide instrument (ranges 4 and 5) featured a stacked sample cell configuration and three-range amplifier. The carbon dioxide analyzers contained the standard 1/8-inch sample cell with a three-range amplifier.

A Beckman Model 400 Flame Ionization Detector (FID) was utilized to measure total hydrocarbons. Each of the Model 400 Flame Ionization Detectors was operated with a 40 percent hydrogen/60 percent nitrogen fuel mixture and special capillary to minimize the oxygen effect.

The Thermo Electron Corporation Model 10A Chemiluminescence Analyzer was used for the measurement of NO and NO_x. This instrument was equipped with four ranges from 0 to 100 through 0 to 2000 ppm NO. A thermal converter was employed to convert NO_2 and other nitrogen oxides to NO. A Thermo Electron Corporation Model 100 NO_x generator was added in performing NO_x converter efficiency determinations in accordance with 38 Federal Register 124, Section 85.074-23.

Honeywell Model 193 Potentiometric Recorders were used in the exhaust analysis console to record all instrument signal outputs. Table 5.4-1 indicates the ranges used for each instrument.

5.4.4 Laboratory Calibration Gases

A complete set of laboratory standard calibration gases were furnished by AESi. The contents of each cylinder were analyzed and concentrations were assigned by the ARB Vehicle Emission Laboratory in El Monte, California. The AESi laboratory used the standard set of gases for defining the complete instrument calibration curves and for subsequent assigning of values to the day-by-day "working" gases. The laboratory standard gases and their nominal concentrations are tabulated in Table 5.4-2.

Table 5.4-1. Instrument Ranges

INSTRUMENT	AESI RANGE NO.	NOMINAL RANGE CONCENTRATIONS
Hydrocarbon	2	0 - 50 ppm
	3	0 - 100 ppm
	4	0 - 300 ppm
	5	0 - 1,000 ppm
	6	0 - 3,000 ppm
	7	0 - 10,000 ppm
Carbon Monoxide	2	0 - 100 ppm
	3	0 - 500 ppm
	4	0 - 3,000 ppm
	5	0 - 30,000 ppm
Carbon Dioxide	2	0 - 4.0 percent
	3	0 - 8.0 percent
NO and NO_x	2	0 - 100 ppm
	3	0 - 250 ppm
	4	0 - 1,000 ppm
	5	0 - 2,000 ppm

Table 5.4-2

LABORATORY STANDARD CALIBRATION GASES

Gas Cylinder	AESi Range	Nominal Concentration	Gas Cylinder	AESi Range	Nominal Concentration
MH462	2	28.2 ppm C_1	A627	4	2080.0 ppm CO
MH1796	2,3	52.5 ppm C_1	LK242367	4,5	2637.0 ppm CO
MH1229	3,4	111.3 ppm C_1	MH1263	5	7790.0 ppm CO
MH1799	4	306.0 ppm C_1	SG303382	5	9950.0 ppm CO
MH1631	5	597.0 ppm C_1	SG216837	5	16720.0 ppm CO
MH1664	5	1041.0 ppm C_1	A3865	5	20770.0 ppm CO
MH1738	6	1479.0 ppm C_1	LK85119	5	30070.0 ppm CO
A7326	6	3087.0 ppm C_1	A3875	2	2975.0 ppm CO_2
MH586	7	4095.0 ppm C_1	A7014	2	9902.0 ppm CO_2
A8759	7	9840.0 ppm C_1	MH1542	2	14691.0 ppm CO_2
LK155925	2	10.5 ppm CO	MH1783	2,3	20304.0 ppm CO_2
K1076832C	2	24.5 ppm CO	A7314	2,3	30251.0 ppm CO_2
LK242364	2	34.0 ppm CO	MH1158	2	39835.0 ppm CO_2
LK60052	2,3	47.1 ppm CO	MH1598	3	5911.0 ppm CO_2
LK242279	2	69.0 ppm CO	MH1148	3	40960.0 ppm CO_2
LK242173	2	91.5 ppm CO	SG16649B	3	61149.0 ppm CO_2
LK156942	3	121.0 ppm CO	LK149923	3	74077.0 ppm CO_2
LK59967	3	176.8 ppm CO	SG17538	2	57.2 ppm NO_x
LK242241	3	249.5 ppm CO	A4975	2,3	117.0 ppm NO_x
LK242257	3,4	337.7 ppm CO	SG285886	3	194.0 ppm NO_x
LK242295	3	472.4 ppm CO	A4914	4	448.0 ppm NO_x
LK242356	4	760.0 ppm CO	SG16704B	4,5	995.0 ppm NO_x
SG13835	4	1010.0 ppm CO	LK150055	5	2065.0 ppm NO_x
HLK-497	4	1672.0 ppm CO			

5.4.5 Chassis Dynamometer

A Clayton Direct Drive Variable Inertia Chassis Dynamometer (CCE-50) equipped with 250-pound increment inertia loading weights was used in the performance of this program.

5.4.6 Miscellaneous Equipment

In addition to the equipment previously described, Varian driver aids were utilized to provide driving schedules for the various driving sequences performed during this program. An Autoscan ignition analyzer, timing lights, tach-dwell meter, other tune-up equipment, and small tools were used as necessary. To measure idle carbon monoxide, a Horiba Mexa 300 dual range NDIR exhaust gas analyzer was used. The nominal concentration ranges for this instrument are 0-10% and 0-2% carbon monoxide, and 0-400 ppm and 0-2000 ppm hexane equivalents.

Weighing of propane recovery test cylinders was accomplished using a Sartorius Balance which can weigh up to 2.2 Kg with a resolution of 10 mg and an accuracy of ±7 mg. The balance contains Class S weights which are traceable to the National Bureau of Standards.

For calibration of the constant volume sampler, AESi used Meriam Model 50 MC2-6SF and Model 50 MC2-4SF laminar flow elements. Both of these instruments have calibration curves traceable to the National Bureau of Standards.

To measure actual road load horsepower, a 5th wheel manufactured by Speedometer Service and Instrument Company was used. The unit consists of a bumper hitch, fork and wheel assembly, DC generator and voltmeter calibrated directly in mph. Speed range is 0-100 mph with 1 division per mph.

5.5 EQUIPMENT CALIBRATION AND CROSS CHECK

This section describes the emission testing system calibration before testing startup and the calibration cross checks that were performed during the course of testing.

5.5.1 Constant Volume Sampler

The CVS was calibrated with the laminar flow elements and accessories (see Section 5.4.6) in accordance withthe basic procedures specified in the Federal Register. Flow was measured at several pressure differentials across the CVS pump at the set point temperature that would be used during testing. Pump flow rate (Vo) in cubic feet per revolution was established at 0.300 ft^3/rev. This calibration was then verified by means of propane recovery tests. Approximately 11 grams of propane was injected into the CVS and sample and background bags collected and analyzed. Results of the propane collected and propane injected had to agree within ±2%.

Following this initial calibration, continuous checks were made on a daily basis. Prior to the start of testing each day, propane recovery tests were performed in the 0-300 ppm carbon range. Throughout the test program the CVS did not require recalibration.

5.5.2 Exhaust Analysis Console (EAC)

The EAC, hydrocarbon (HC), carbon monoxide (CO), carbon dioxide (CO_2), and oxides of nitrogen (NO_x) instruments were calibrated using the laboratory calibration gases (see Section 5.4.4). Each CO and CO_2 instrument was calibrated at seven (7) points spread somewhat evenly across each range. Calibration of the HC Flame Ionization Detector (FID) and the NO_x Chemiluminescence (CL) was at three (3) points across each range using the laboratory calibration gases.

Calibration curves for each instrument and instrument range was determined using a second order least squares fit polynominal. Calibration curves using this method fit each calibration point within 1 percent of fuel scale or 5 percent of measured point. Each week during testing, calibration curves were verified by checking calibration points at full scale and at midpoint. A complete curve check for all analyzers and ranges was completed on a monthly basis. If during a weekly or monthly calibration curve check any one point changed by more than 1 percent of full scale, the calibration curve would be updated. During the course of testing, the CO Range 5 calibration curve needed to be updated once.

EAC daily and weekly checks which were performed are described below:

Daily Check

1. Leak check of HC, CO, CO_2 and NO_x instruments.
2. NO vacuum check
3. HC analyzer - zero and span
4. CO analyzer - zero, gain and tune
5. CO_2 analyzer - zero, gain and tune
6. NO analyzer gain
7. NO_x converter efficiency check

Weekly Check

1. Individual instrument curve check of each range used (3 points).
2. CO response to 100% wet CO_2.

Monthly Check

1. Individual instrument check of each range used (all calibration points).

5.5.3 Chassis Dynamometer

The Clayton ECE-50 DDVIF dynamometer was calibrated by the coast down technique as specified in the Federal Register. Coast downs were performed over the entire range or inertia values (1750 - 5500 lbs). Time for front roll dynamometer speed to coast from 55 to 45 mph was measured with the aid of a strobe light. The time for roll speed to change from 2140 rpm to 1750 rpm was measured and the absorbed dynamometer road load horsepower calculated.

On a monthly basis, coast down calibration checks were performed for each inertia weight. If the actual road load horsepower changed by more than one (1) road load horsepower for any one inertia setting, the entire set of calibration curves were re-run. It was necessary to recalibrate the dynamometer once during the program.

5.5.4 Miscellaneous

The fifth wheel used to measure test vehicle coast-down speeds from 55 to 45 mph was periodically checked on the chassis dynamometer. This was accomplished by placing the fifth wheel on the chassis dynamometer and bringing the roll speed up to a true 50 mph as measured by a strobe light. The speed meter readout on the fifth wheel measured a true 50 mph throughout the entire program.

The calibration of the Mexa 300 HC/CO analyzer used to measure CO and HC emissions, as part of the vehicle inspection and maintenance procedures, was calibrated using the laboratory calibration gases. The instrument was checked on a weekly basis.

5.6 TEST PROCEDURES

All vehicles tested in this program were prepared for and tested in accordance with a set of established program test procedures. Figure 5.6-1 illustrates these procedures by means of a flow schematic. No deviations from this established procedure were allowed unless circumstances prevented a vehicle to follow the normal course of events. The following sections describe these test procedures.

5.6.1 Vehicle Preparation

Upon receipt of the vehicle at the laboratory, verification of the particular make, model year, type of engine, transmission and number of carburetor venturies was performed. In addition, a cursory inspection was performed to verify that the vehicle was in safe operating condition and that the exhaust system was not leaking. Following this initial inspection, the vehicle emission control systems and tune parameters were thoroughly inspected and parts replaced as required to bring the vehicle into a state of tune in accordance with manufacturer's specifications. Figure 5.6-2 depicts the vehicle inspection and maintenance form that was used in conjunction with this portion of vehicle preparation procedures.

No major maintenance was performed on test vehicles under the guidelines of this program. That is, maintenance to cylinder heads, valves, rings, pistons and etc. were not performed. Inspection and maintenance (I&M) was performed on emission control components, motor mechanical components, electrical system and vacuum lines, ignition system, and adjustment of vehicle tune parameters.

Following tune up procedures, the vehicle brakes were checked and adjusted as required. Tires were inspected for safety of operation, tire size recorded and tire pressure adjusted to vehicle manufacturer's recommended inflation pressure.

After I&M procedures were completed, the vehicle fuel tank was drained and refilled to 40% volume with test fuel meeting specifications of 85.073-10 or 85.075-10 of the Federal Register and the vehicle weighed at a public weight station. Additional fuel (about 2-3 gallons) was added to the fuel tank and the vehicle driven to the Los Angeles river

FIGURE 5.6-1
TEST VEHICLE FLOW SCHEMATIC

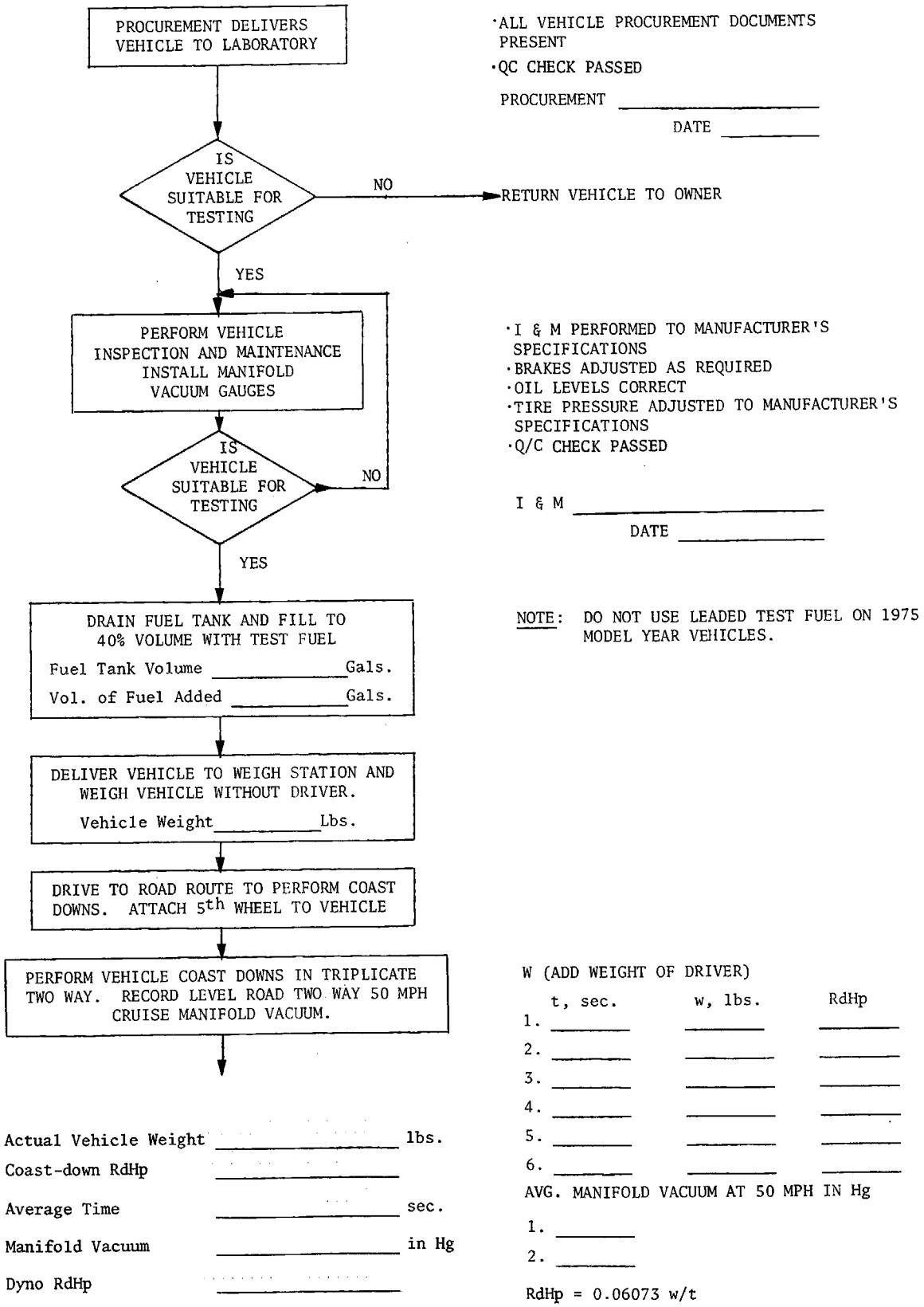


FIGURE 5.6-1 (Continued)

DELIVER VEHICLE TO LABORATORY AND ADJUST DYNAMOMETER ROAD LOAD HORSEPOWER TO SAME MANIFOLD VACUUM AS OBTAINED DURING 50 MPH CRUISE. DISCONNECT VACUUM GAUGE.

DYNAMOMETER:
IdHp = _____
RdHp = _____
TECH: _____
DATE: _____

CHECK IDLE CO SETTING AND TUNE PARAMETERS AND ADJUST AS NECESSARY
Idle CO, % _____
Idle RPM _____
Dwell ° _____
Basic Timing; B, A _____

·Q/C CHECK PASSED
I & M _____
DATE _____

SOAK VEHICLE FOR 12 HRS. MINIMUM OR 20 HRS. MAXIMUM
Soak Period Started _____AM/PM
_____DATE
Soak Period Ends _____AM/PM
_____DATE

CALIBRATE EQUIPMENT. SET ROAD LOAD HORSEPOWER AND INERTIA WITH NON-TEST VEHICLE
RDHp = _____
Inertia = _____ Lbs.

NOTE: CERTIFICATION VALUES USED FOR INERTIA AND RdHp DO NOT INCLUDE 10% ADDITIONAL LOAD FOR AIR CONDITIONING.

RUN COLD START 1975 FTP COLLECT HOT TRANSIENT BAG (4th BAG)

ADJUST IDLE RPM TO VALUE LOWER THAN MANUFACTURER'S SPECIFICATIONS
Idle RPM = _____

Idle HC _____ppm C_6
Idle CO _____%

RUN HOT START FTP EMISSION TEST 2 BAGS 505 + 867

RESET IDLE SPEED TO MANUFACTURER'S SPECIFICATIONS
RPM _____

Idle HC _____ppm C_6
Idle CO _____%

FILL FUEL TANK VOLUME TO 40%

·Q/C CHECK PASSED
TECH _____
DATE _____

FIGURE 5.6-1 (Continued)

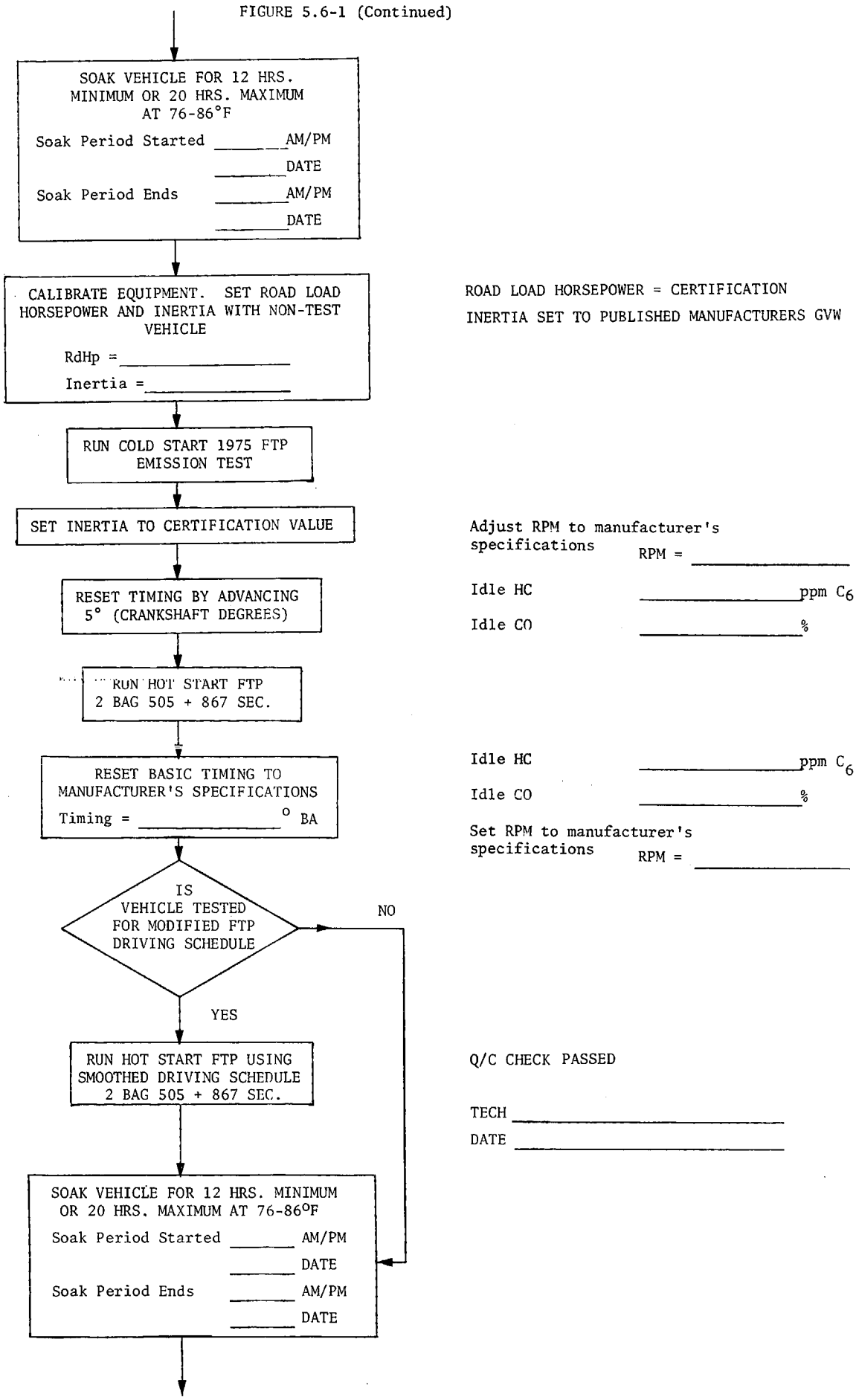


FIGURE 5.6-1 (Continued)

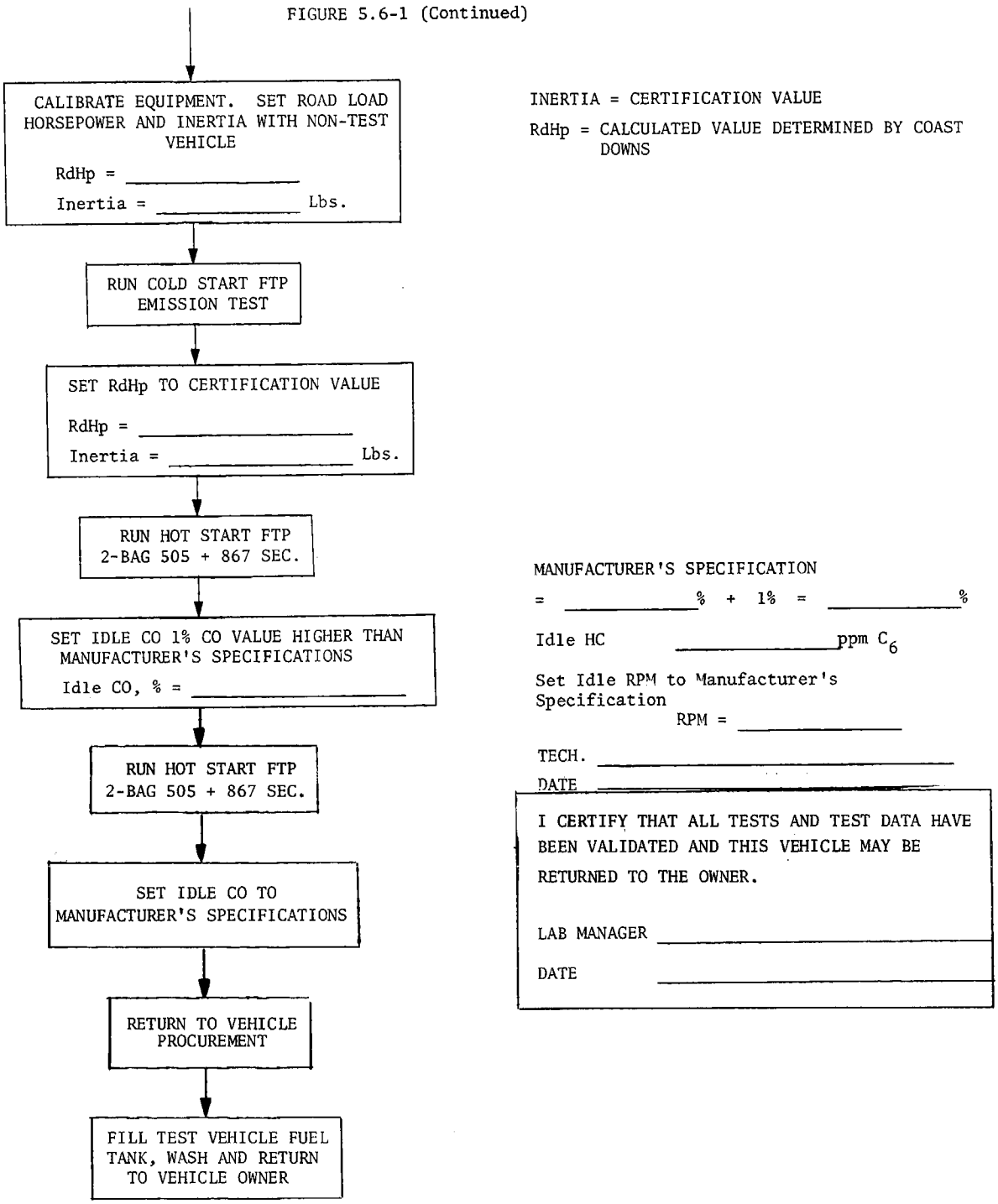


FIGURE 5.6-2
INSPECTION AND MAINTENANCE

Make _____ Model _____ Date _____

CID _____ Carb._____ Trans._____ Car No._____

A. EMISSION CONTROL COMPONENTS

1. VSA System (OSAC, TCS, Time Delay, Spark Delay Valve) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

2. EGR System (Adequate Vacuum, Valve Operation) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

3. AIR System (Pump, Diverter Valve, Check Valve, Hoses Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

4. PCV System (Valve, Filter, Hoses) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

5. ECS System (Cannister, Filter, Hoses) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

6. Catalytic Converters (1975 Model-Year) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

B. MOTOR MECHANICAL COMPONENTS

1. Air/Fuel System (Air Filter, CC Vent Filter, Throttle Linkage, Choke Operation, Fuel Filter, Fuel Leaks, Idle/Stop Solenoid) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

2. Brake System (Linings, Adjustment, Fluid Level) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

3. Electrical and Vacuum Systems (Misc. Wiring, Vacuum Routing) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

4. Cooling and Lubrication Systems (Water Level, Drive Belts, Hoses, Oil Level) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

5. Exhaust System (Leaks) Tech:_____ P ☐ F ☐ C ☐
   Comments:_____

FIGURE 5-6.2 (Continued)

C. PRIMARY AND SECONDARY IGNITION

1. Plugs _____ P ☐ F ☐ C ☐
2. Points _____ P ☐ F ☐ C ☐
3. Condenser _____ P ☐ F ☐ C ☐
4. Wires _____ P ☐ F ☐ C ☐
5. Cap _____ P ☐ F ☐ C ☐
6. Rotor _____ P ☐ F ☐ C ☐

D. SPECIFICATIONS

	As Received	As Tested
1. Dwell		
2. Timing		
3. Cent. Advance	@ RPM	
4. Vacuum Advance	@ "Hg	
5. HC	PPM	
6. CO	%	
7. IRPM		

Tire Pressure: FT _____ RR _____

Cyl. Power Balance | | | | | | | | |

QC Review _____

Adjust Idle RPM to _____

Readjust Idle RPM to _____

Adjust Basic Timing to _____ °

Readjust Basic Timing to _____ °

Idle CO, % set to manufacturer's specifications _____ %

Adjust idle CO to _____ %

Readjust idle CO to _____ %

Check temperature bypass Tech: _____ P ☐ F ☐ C ☐

Comments: _____

_____

bed where vehicle coast-down times were measured as well as steady state 50 mph manifold vacuum.

Upon return of the vehicle to the laboratory, the vehicle was driven on the chassis dynamometer at 50 mph and the dynamometer power adsorption unit adjusted until the two-way average manifold vacuum was reproduced. The indicated dynamometer road load horsepower was recorded and the actual road load horsepower determined from dynamometer calibration data.

Before placing the vehicle into the 12 to 20 hour soak, the vehicle tune parameters were checked and adjusted as necessary.

5.6.2 Equipment Preparation

All test equipment was thoroughly warmed-up, calibrated and inspected for proper operation prior to the performance of testing. The chassis dynamometer was warmed up with a non-test vehicle for a minimum of 15 minutes at 30 miles per hour. During the dynamometer warmup, the dynamometer speed meter was checked for indicating a true 50 mph with a strobe light. In addition, the drivers aid was also checked and adjusted as necessary for indicating a true 50 mph and road load horsepower and inertia set for the following test vehicle.

5.6.3 Vehicle Coast Down Procedures

Vehicle actual road load horsepower requirements at 50 mph were obtained by measuring coast down time from 55 to 45 mph. This testing was performed on the concrete channel of the Los Angeles River bed in the city of South Gate where the river passes beneath the Long Beach Freeway. This section of the river bed is about 1-3/4 miles in length with negligible grade.

Each vehicle was fitted with a manifold vacuum gauge and a 5th wheel to record vehicle speed. The following procedures were performed:

1. Close all windows and place all power accessory equipment in in the off position.
2. Accelerate vehicle to 60 mph and place transmission in neutral.
3. Measure and record time for vehicle to coast down from 55 mph to 45 mph.
4. Accelerate vehicle to 60 mph and repeat step No. 3.

5. Change direction of vehicle travel.
6. Repeat steps No. 2 and 3 above.
7. Change direction of vehicle travel.
8. Repeat steps No. 2 and 3 above.
9. Accelerate vehicle to 50 mph. Allow vehicle to come to a smooth and steady 50 mph, and without throttle movement record manifold vacuum.
10. Change direction of vehicle travel.
11. Repeat steps No. 2, 3 and 9.

Normally the procedure described gave consistent coast-down times. However, there were days when wind conditions were gusty. When this occurred, additional two-way coast downs were performed until six consistent readings were obtained and the high and low coast-down time was thrown out. Data not recorded during these tests were the barometric pressure, temperature, or wind velocity.

5.6.4 Federal Exhaust Emission Procedures

Figure 5.6.3 depicts the detailed procedures that were followed when the 1975 FTP was performed. When vehicles were tested using a 1972 FTP from a hot start, the startup procedure followed was the same as for the hot transient portion of the 1975 FTP. In addition, when measuring 1972 hot start emission levels, the sample was collected in two sample bags - duplicating the hot transient and cold stabilized portions of the 1975 FTP.

5.6.5 Weekly and Daily Test Schedule

During the conduct of emission testing of vehicles under this program, the following test procedures were performed in the order presented in Figure 5.6.4. This schedule was adhered to in order that each vehicle would experience the same testing history. The details of each testing phase follows.

FIGURE 5.6-3

1975 CVS COLD-START PROCEDURES

A. Prepare

All vehicles assigned for "Cold Start" testing must undergo a minimum 12-hour or maximum 20-hour soak in an environment having an ambient temperature of 76° to 86°F for the first hour, 60° to 86°F for 10 to 18 hours, and 76° to 86°F for the last hour. If a vehicle exceeds the 20-hour soak, refer to the section on vehicle preconditioning.

1. Dynamometer

If the dynamometer has not been operated during the previous two hours before the test, the dynamometer must be warmed up for 15 minutes by operating it at 30 mph using a non-test vehicle.

a. Release break on chassis dynamometer.

b. Set inertia and horsepower with non-test vehicle.

c. Set zero and 50 mph on driver's aid and record on strip chart.

2. Vehicle

a. Check Emission Test Request for specified information.

b. Position vehicle on chassis dynamometer rolls without starting engine. All vehicle accessories must be off.

c. Connect required equipment, lift hood and start cooling fan.

d. Record required information on driver's aid trace and test data sheets.

3. Consoles

a. Check Emission Test Request for specified information.

b. Leak check.

c. Record required information on data sheets, analyzer charts, and run log.

4. CVS

a. Turn on blower and Temperature recorder. Blower must be set to 120°F and warmed up to its corresponding normal operating temperature.

b. Start sample pump and adjust sample flowrate to 10 CFH minimum.

c. Leak check bags.

d. If other measurements are to be recorded, refer to special instructions.

FIGURE 5.6-3 (Continued)

B. Test - Cold Transient and Stabilized Dynamometer Run

Ambient air temperature must be between 68° and 86°F. Stalling and cranking will vary accumulated test time.

1. -30 Seconds

   a. Connect flexible exhaust tube to vehicle's tailpipe.

   b. Reset all counters.

2. -10 Seconds

   a. Set choke and ignition in accordance with owner's manual for cold start procedures.

   b. Start console strip charts.

3. -5 Seconds

   Signal console operator in preparation for cranking engine.

4. 0 Seconds - Begin Cold Transient Portion

   a. Signal system operator and crank engine.

   b. Start filling Sample bag #1 and Ambient bag #1.

5. If engine fails to start within 10 seconds of cranking

   a. Vehicle Operator - Disconnect exhaust system and refer to Operating Procedure in Item #5-c below.

   b. Systems Operator - Stop filling bags and CVS blower revolution counter until next start attempt.

   DO NOT EVACUATE BAGS OR RESET COUNTERS

   c. Determine reason for failure to start. If error due to vehicle operator (e.g., not setting choke properly), reschedule test.

   d. If failure to start is caused by vehicle malfunction, corrective action of less than 30 minutes duration may be taken and the test continued.

   e. The sampling system shall be reactivated at the same time cranking is started. When the engine starts, the driving schedule timing shall begin.

   f. If the vehicle fails to start after 10 seconds of cranking, reschedule the test.

6. Engine Start

   a. Vehicle Operator - Release key and start driving aid simultaneously.

   b. System Operator - Record engine cranking time.

FIGURE 5.6-3 (Continued)

IF ENGINE FALSE STARTS OR STALLS

a. Vehicle Operator - If the engine false starts, repeat the recommended starting procedure (e.g., reset choke). If the engine stalls during an idle period, restart the engine immediately. If the engine cannot be started soon enough to make the next acceleration, stop the driver's aid; restart the vehicle; and when the engine starts, restart the driver's aid. If the engine stalls during some operating mode other than an idle mode, stop the driver's aid; restart the vehicle; and accelerate the vehicle to the speed required; and at that point restart the driver's and continue the test.

b. System Operator - Continue Sampling.

If the vehicle cannot be restarted within one (1) minute, void the test.

7. +15 Seconds

a. Automatic Transmission - Brake wheels and place transmission in drive range.

b. Manual Transmission - Place transmission in first gear. If transmission ratio in first gear is greater than 5:1, follow the procedure for three or four speed manual transmission.

8. +20 Seconds - Begin first acceleration.

9. +135 Seconds - System operator record CVS inlet depression.

10. +505 Seconds - End Cold Transient and Begin Stabilized Portion

a. Vehicle Operator - Signal system operator at end of deceleration.

b. System Operator - Simultaneously stop filling Sample bag #1 and Ambient bag #1 and start filling Sample bag #2 and Ambient bag #2.

(1) Initiate analysis of Sample and Ambient bags #1.

(2) Calibrate analyzers. Nominal span points 80% of full scale. Sequence for bag analyzes are:

(a) zero, span, zero
(b) analyze ambient bag
(c) zero, span, zero
(d) analyze sample bag
(e) zero, span, zero

NOTE: Leave strip charts running continuously while analyzing ambient and sample bags. Use lowest ranges possible in order to analyze samples in upper 2/3 of calibration curve. Record instrument deflections and instrument ranges used. Be certain sample and calibration gas flowrates are at the same flowrate. Record integrated wet and dry bulb temperatures for 505 seconds.

FIGURE 5.6-3 (Continued)

c. Record CVS blower counts - Nominal count for 505 seconds is 9469 +18.75 counts for each added one (1) second of engine cranking time and time driver's aid is stopped due to engine stalls.

11. +1369 Seconds

a. Vehicle Operator - Shut off engine two seconds after end of last deceleration.

12. 5 Seconds After Engine Stops Running (Dieseling) - End of Stabilized Portion

a. Vehicle Operator - Signal system operator, stop driver's aid, place transmission in neutral, and release brakes.

b. System Operator - Stop filling ambient and Sample bags #2. Proceed immediately with analyzing ambient and sample bags as in Step B-10-b above. Blower counts will be 16294 +18.75 for each additional second that driver's aid was stopped or engine motored after ignition is shut off.

C. 10 Minute Soak

This soak period cannot be less than 9 minutes nor greater than 11 minutes.

1. Start

a. Vehicle Operator - Turn off cooling fan, close vehicle hood, and disconnect exhaust sample line from vehicle tailpipe.

2. 8 Minutes

a. Vehicle Operator - Connect exhaust system, open vehicle hood, set driving pen to 0 mph and 0 seconds.

D. Test - Hot Transient Dynamometer Run

NOTE: Stalling and cranking time will vary accumulated test times.

The -30 second count-down will begin approximately 9 minutes and 30 seconds after the start of the 10-minute soak but in no case longer than 10 minutes and 30 seconds nor earlier than 8 minutes and 30 seconds.

1. -30 Seconds

a. Vehicle Operator - Turn on cooling fan.

b. System Operator - Reset counters. CVS blower must still be on.

2. -10 Seconds

a. Vehicle Operator - Set ignition and throttle pedal in accordance with owner's manual for hot-start operation.

b. System Operator - Start strip charts.

FIGURE 5.6-3 (Continued)

3. 0 Seconds - Begin Hot Transient Portion

   a. Vehicle Operator - Signal System Operator and crank engine.

   b. System Operator - Start counters and begin filling Ambient and Sample bags #3.

   IF ENGINE FAILS TO START WITHIN 10 SECONDS OF CRANKING

   (1) Vehicle Operator - Determine cause for failure to start engine. If operator error, void test. Repeat starting procedure.

   (2) System Operator - Stop filling bags and CVS blower counter. Stop CVS blower during diagnostic period. Do not evacuate bags or reset counter.

   If vehicle will not start within one (1) minute, void test.

4. Engine Start

   a. Vehicle Operator - Release accelerator pedal and ignition key, and start driving aid simultaneously.

   b. System Operator - Record engine cranking time.

   IF ENGINE FALSE STARTS OR STALLS

   (1) Vehicle Operator - Refer to section B-b-(1) above.

   (2) System Operator - Continue sampling.

5. +5 Seconds

   a. Vehicle Operator - Automatic transmission: Brake wheels and place in drive.

6. +20 Seconds - Begin first acceleration.

7. +505 Seconds

   a. Vehicle Operator - Signal system operator at end of deceleration, stop driving aid. Accelerate vehicle to 50 mph and record 50 mph true roll speed on driver's aid. Speed tolerance must be $\pm$1 mph. If not, void test.

   b. System Operator - Stop filling Ambient and Sample bags #3. Indicate end of test on CVS temperature chart. Initiate analysis of Ambient and Sample bags #3 in accordance with procedure B-10-(2) above.

E. Complete

1. Vehicle

   a. Turn off fan.

   b. Disconnect equipment.

FIGURE 5.6-3 (Continued)

c. Engage brake on dynamometer.

d. Remove vehicle.

2. Driving Aid

a. Record all vehicle problems encountered during test on driver's air chart.

b. Remove driving aid chart, review for validity, technician signature and date, and insert in test vehicle envelope.

3. Consoles

a. Remove analyzer charts and insert in test vehicle envelope.

b. Record test deviations (blower counts) and required information on test data sheets and run log.

c. Back flush.

d. Leak check.

e. Change filters.

4. CVS

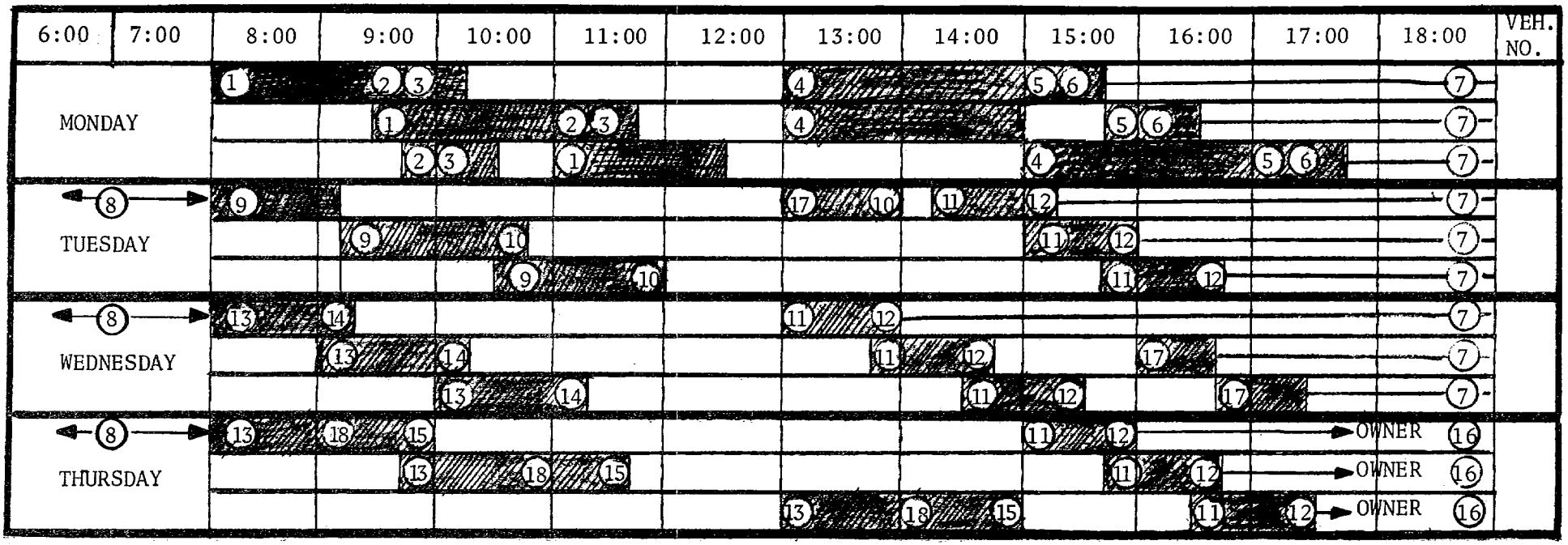
a. Evacuate bags.

b. Leak check bags.

c. Change filters.

FIGURE 5.6-4

TYPICAL WORK WEEK



1. Inspection and Maintenance
2. Drain fuel tank and fill with test fuel to 40%.
3. Weigh vehicle
4. Perform coast-downs
5. Measure RdHp at road manifold vacuum
6. Check idle CO and tune parameters
7. Soak for 12-20 hours
8. Prepare emission testing system
9. Perform 1975 Cold Start FTP (4 bags including hot stabilized portion)
10. Adjust idle RPM
11. Run Hot Start 1972 FTP (2 bags)
12. Reset tune parameters
13. Run Cold Start 1975 FTP
14. Adjust basic timing
15. Adjust idle CO
16. Review all data for completeness; fill fuel tank; wash car; and return to vehicle owner
17. If modified FTP required (1975 model-year vehicles only)
18. Run Hot Start FTP (baseline; 2 bags)

WEEK ENDING _____

NO. TESTED _____

TOTAL _____

Emission Tests - Day 1

1. Initial Baseline Test: This test was a combined 1975 and 1972 FTP. Four sample and background bags were collected. The cold transient, cold stabilized and hot transient bags comprised the 1975 FTP. The hot transient and hot stabilized bags comprised the 1972 hot start FTP test. Dynamometer inertia weight and road load horsepower were set using vehicle certification values when available. If not available, the vehicle shipping weight from the NADA book plus 300 pounds was used. Dynamometer road load horsepower was not increased 10 percent for air conditioning.

2. Idle speed was decreased 100 rpm and idle CO and HC recorded. Idle air/fuel mixture was not adjusted. The vehicle was tested using dynamometer inertia and road load horsepower set to baseline values. At the start of the emission test, the same engine starting and sampling procedures were followed as for the baseline test. Two sample and background bags were collected - the hot transient and hot stabilized bags.

3. Idle speed was reset to manufacturer's specifications and the vehicle placed in soak for 12 hours minimum to 20 hours maximum.

Emission Tests - Day 2

4. A Cold Start 1975 FTP Test was performed with dynamometer inertia set to vehicle GVW and road load horsepower set to baseline value.

5. Basic timing was advanced 5 degrees and idle speed adjusted as required to manufacturer's specification and idle CO and HC recorded. Idle air/fuel mixture was not adjusted. Dynamometer inertia and road load horsepower were set to baseline values. At the start of the emission test, the same engine starting and sampling procedures were followed as for the baseline 1972 hot start test.

6. Basic timing and idle speed reset to vehicle manufacturer's specifications. If vehicle was 1975 model year, step No. 7 following was performed. If vehicle was 1968 through 1974 model year, the vehicle was placed in the 12 to 20 hour soak.

7. Vehicle was placed on dynamometer and inertia and road load horsepower set to baseline conditions. Predrawn smoothed FTP driving schedule (Figure 5.6-5) was loaded into driver's aid. At the start of the emission test, the same engine starting and sampling procedures were followed as for the baseline 1972 hot start test. At the end of the test, the vehicle was placed in the 12-20 hour soak.

Emission Tests - Day 3

8. Dynamometer road load horsepower was set to road load horsepower value derived from vehicle coast-downs in the river basin. Inertia weight was set to baseline conditions and cold start 1975 FTP performed.

9. Immediately following 1975 FTP, dynamometer road load horsepower is set to baseline value and a 1972 hot start FTP test was performed.

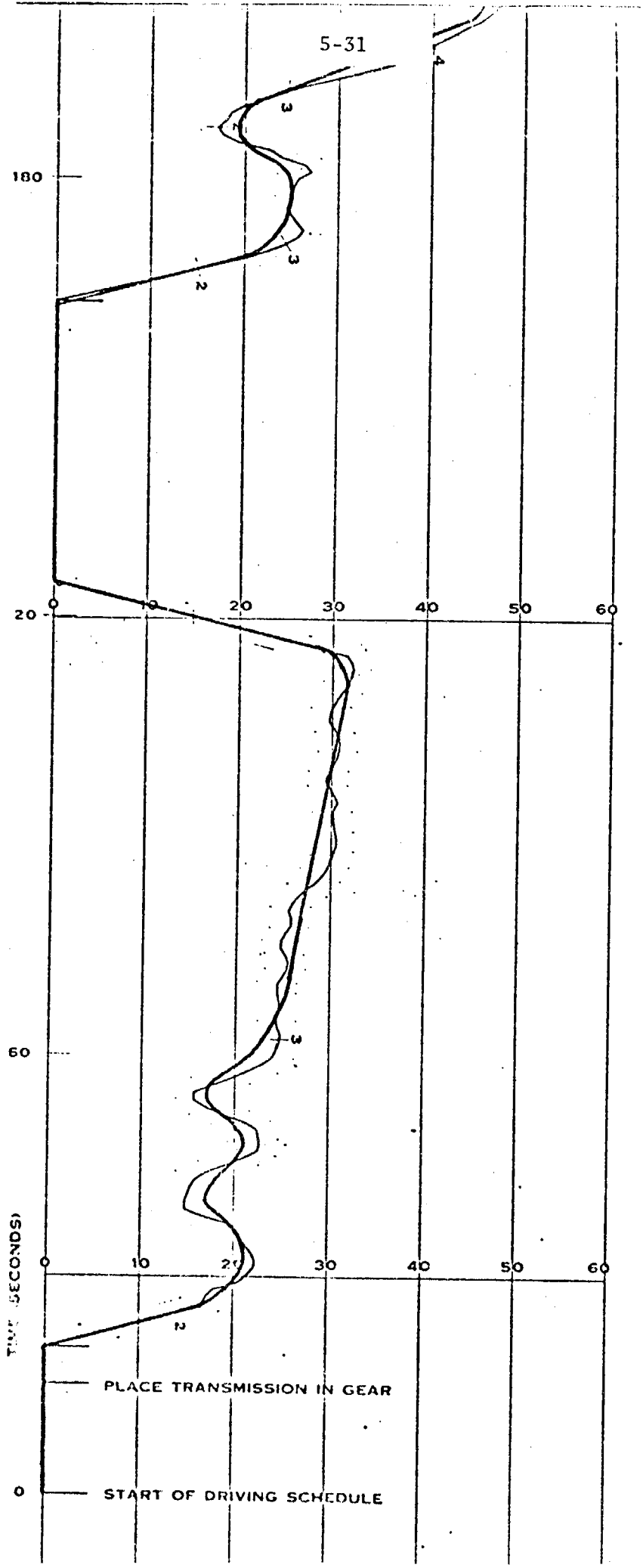


FIGURE 5.6-5

Smoothed Driving Trace

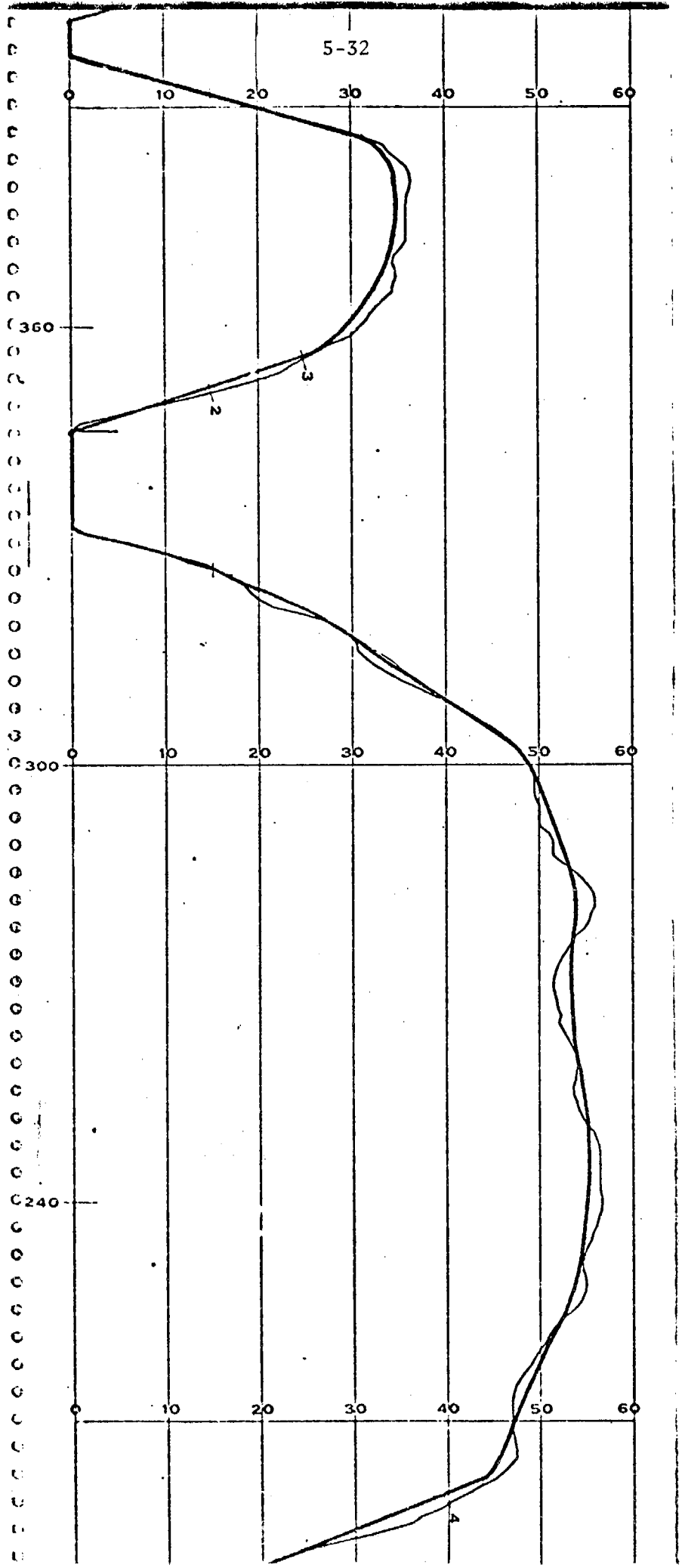


FIGURE 5.6-5
(Continued)

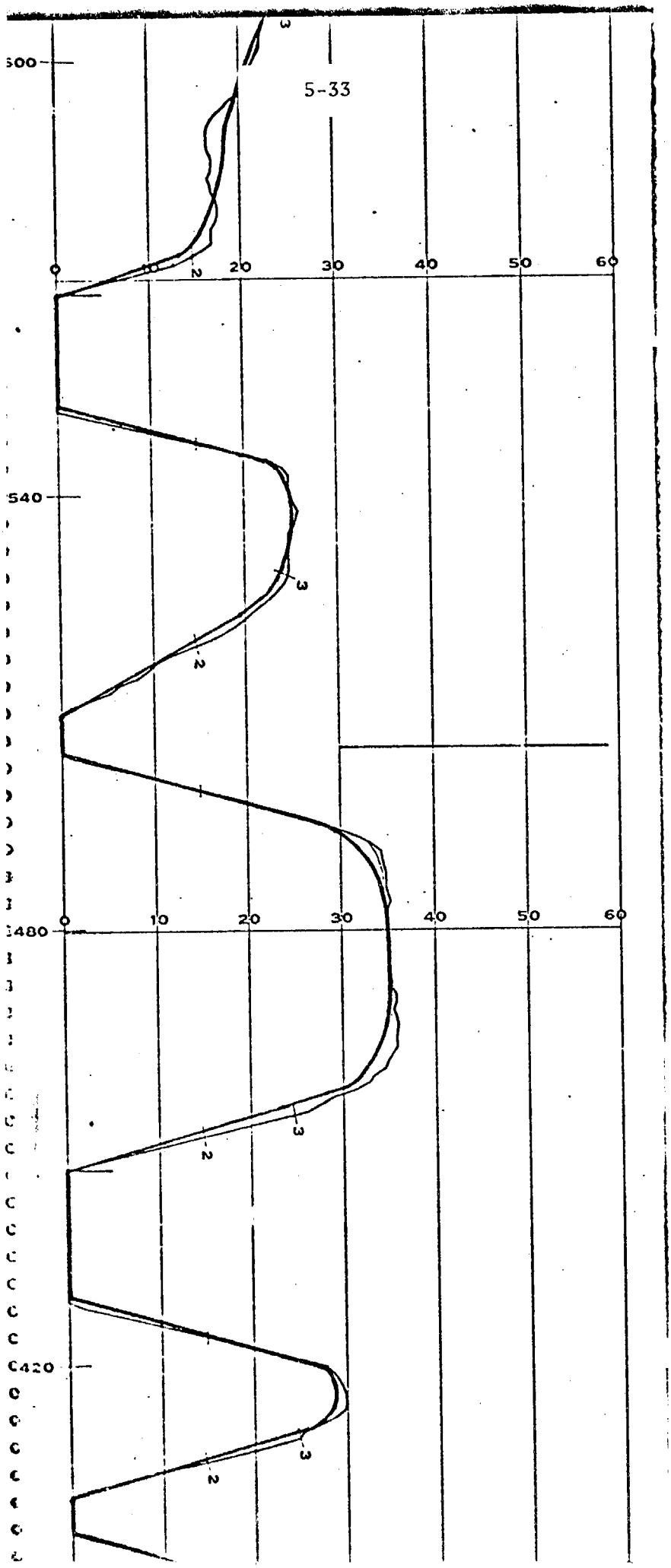


FIGURE 5.6-5
(Continued)

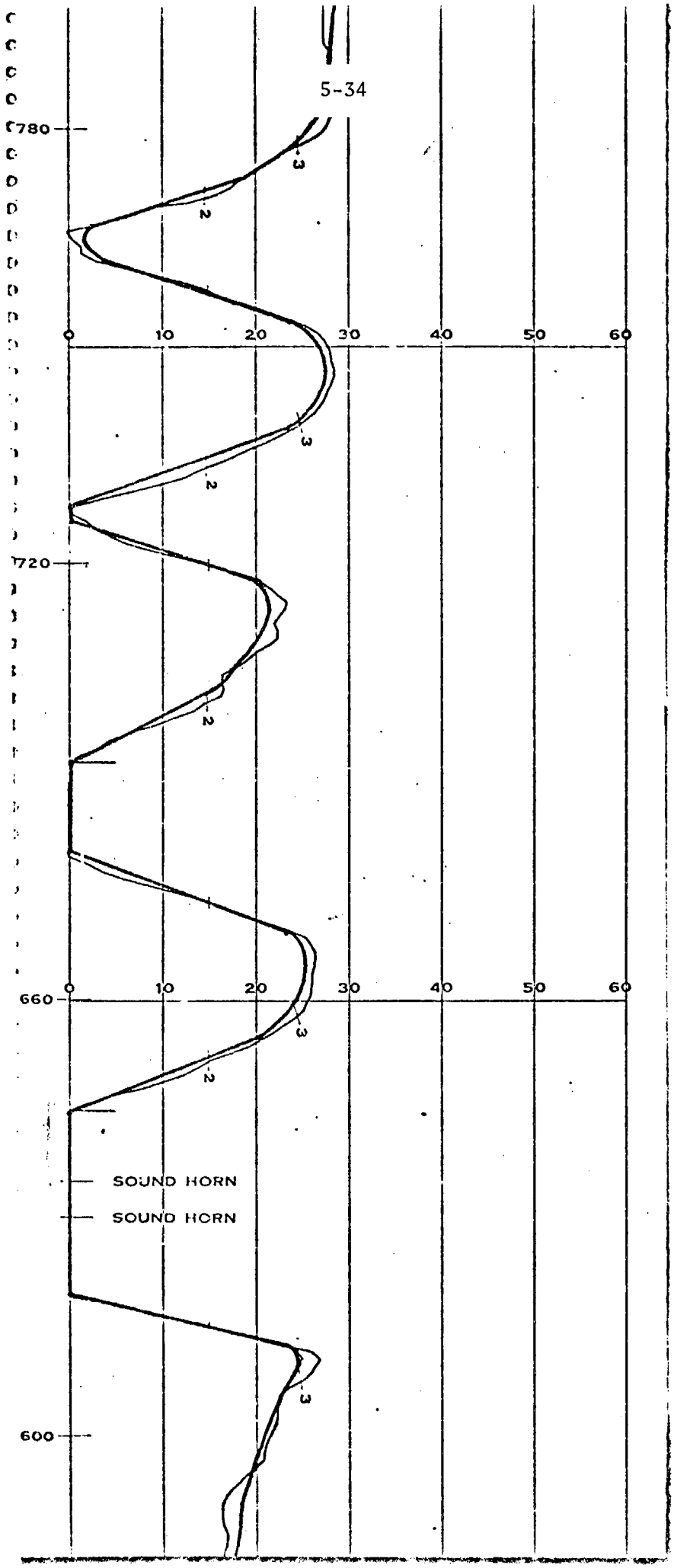


FIGURE 5.6-5
(Continued)

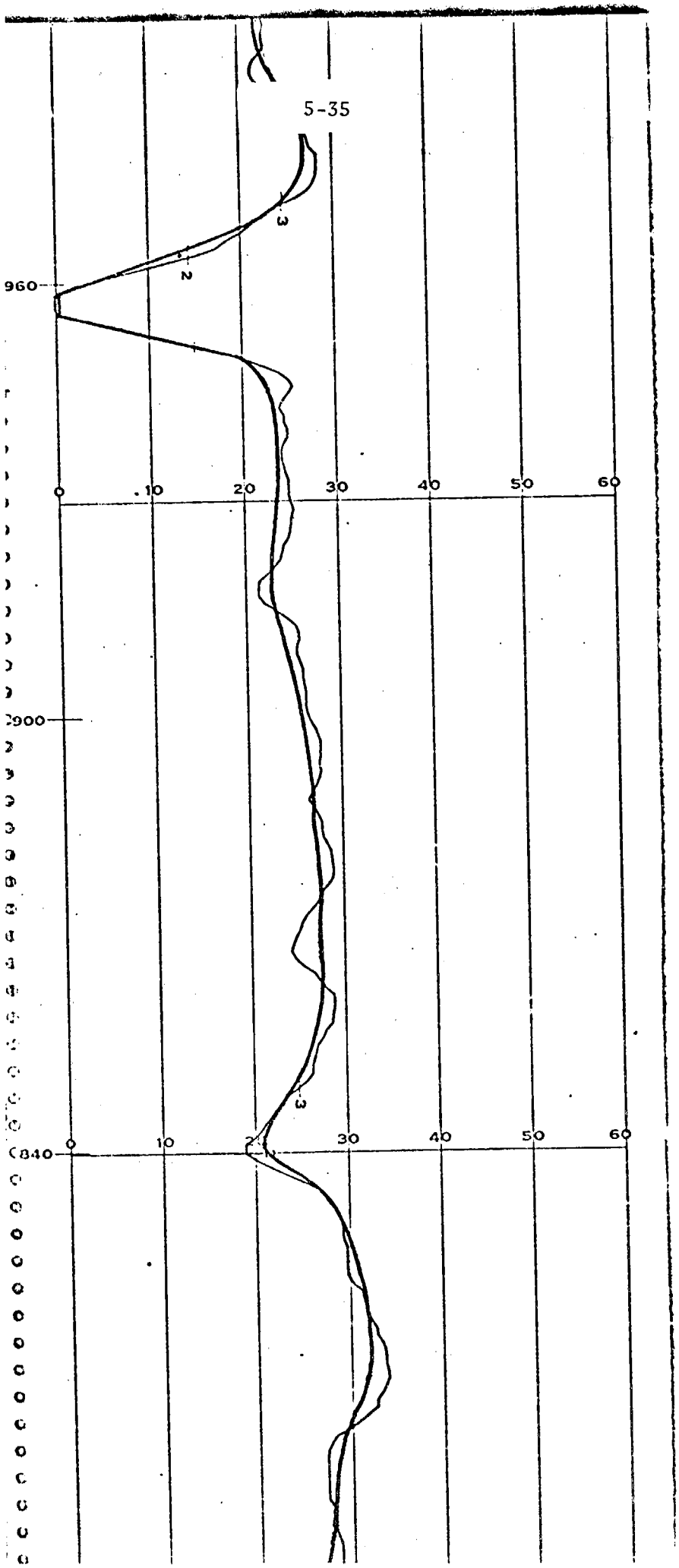


FIGURE 5.6-5
(Continued)

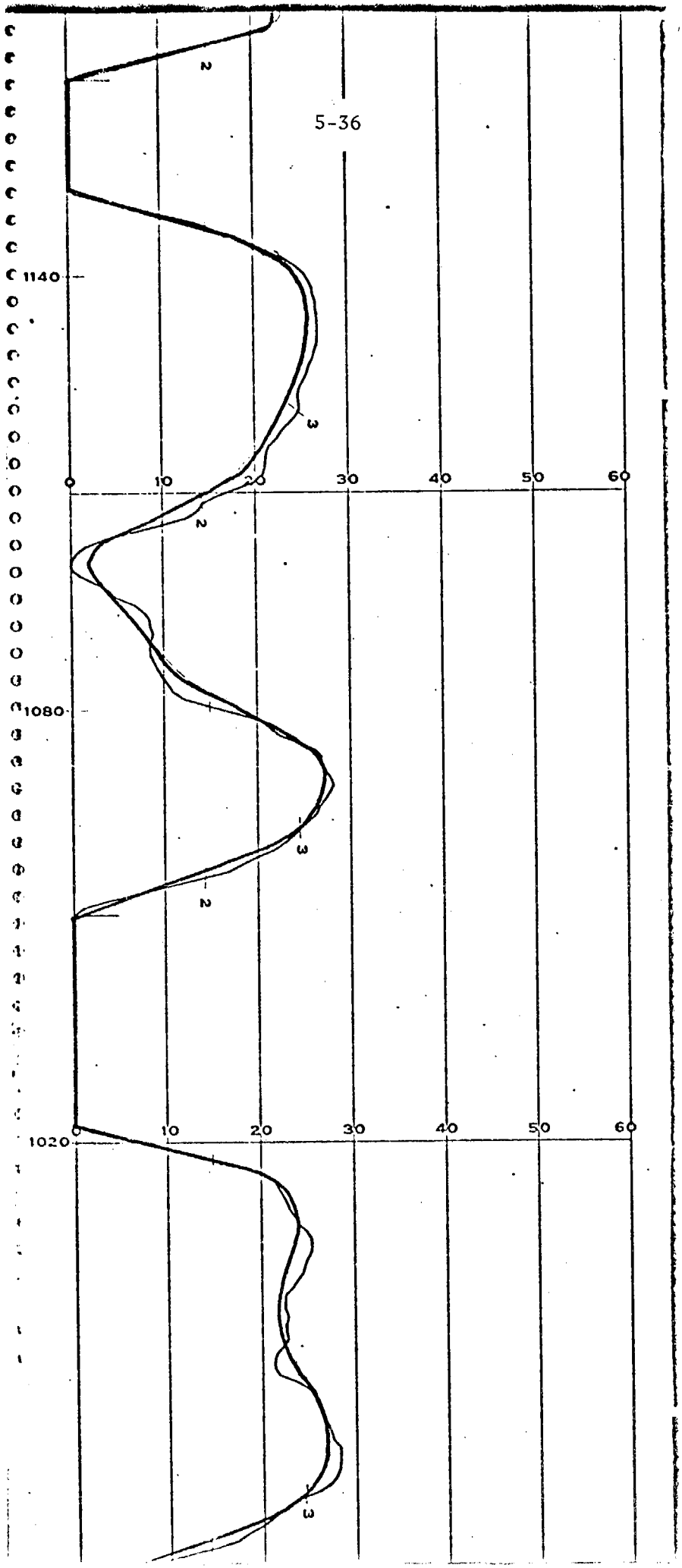


FIGURE 5.6-5
(Continued)

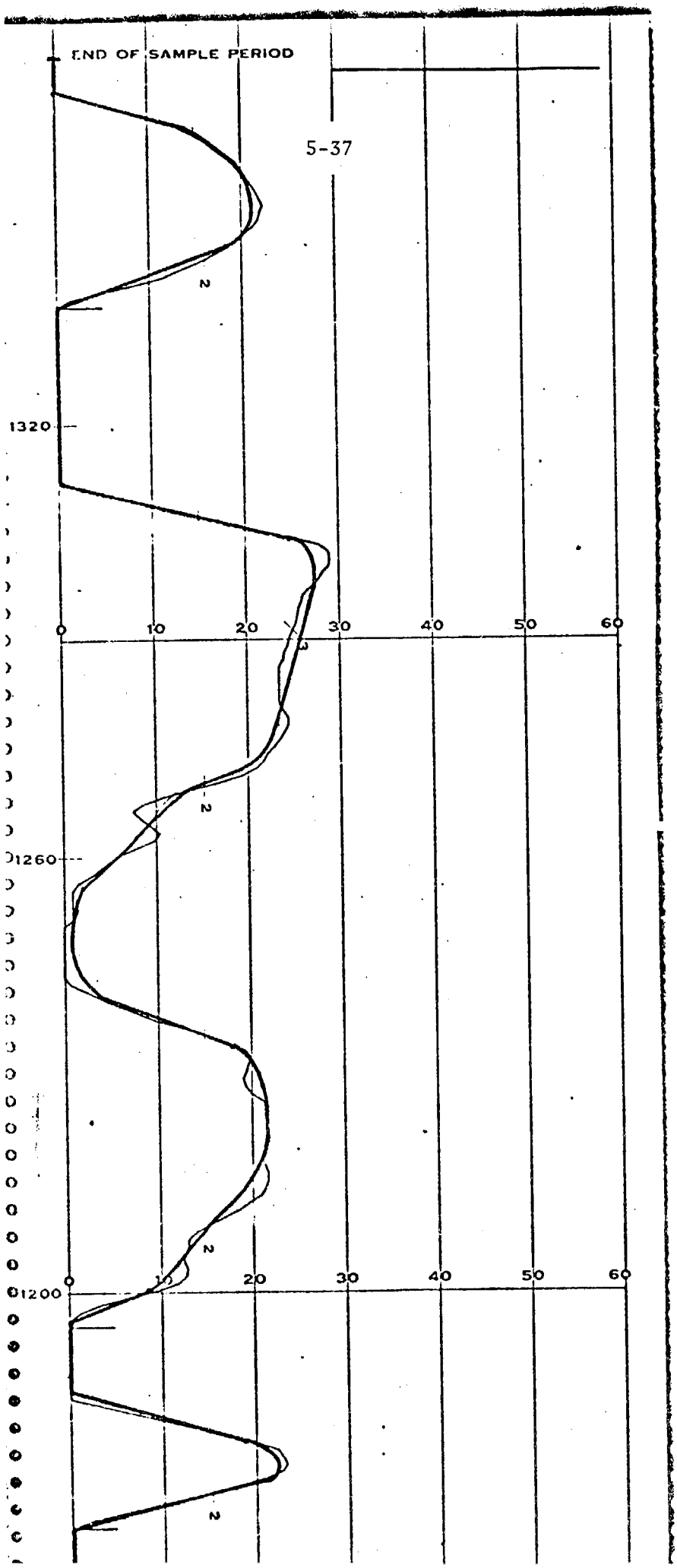


FIGURE 5.6-5
(Continued)

10. Idle air/fuel mixture is adjusted to increase idle CO by 1% (e.g., if idle CO was 3.0% for baseline test air/fuel mixture was adjusted to obtain 4.0% idle, CO value). Idle speed was adjusted to manufacturer's specifications. Dynamometer inertia and road load horsepower was set to baseline values and a 1972 hot start test performed.

5.7 DATA HANDLING

5.7.1 Data Processing

Emission testing information was recorded on a form arranged in keypunch format. This sheet included all required vehicle information, such as the Federal vehicle identification number, test description, cubic inch displacement, number of carburetor venturis, type of transmission and inertia weight. Also included were certain inspection and maintenance data. Exhaust emission data were recorded in the form of instrument range and inertia weight. Also included were certain inspection and maintenance data. Exhaust emission data were recorded in the form of instrument range and deflections for HC, CO, CO_2, NO_x and NO concentrations in the sample and background bags. Conversion of instrument deflection to concentrations and mass emissions was a computerized operation.

5.7.2 Calculation of Results

5.7.2.1 Exhaust Emissions: Results from the various tests performed were calculated in accordance with the following procedures:

1. 1968 through 1975 Model Year Vehicles. The 1976 FTP test was calculated according to 37 Federal Register 221, Section 85.075-26. For the 1972 hot start, FTP test calculations were performed according to 37 Federal Register 221, Section 85.073-26.

2. 1975 Model Year Vehicles. The 1975 and 1972 FTP tests were calculated according to 38 Federal Register 124, Section 85.075-26. One modification to the above calculation procedures was made for the 1972 hot start test in that no weighting was included when summing the two bags to obtain the mass emission data.

5.7.2.2 Fuel Economy: Fuel economy was calculated using the carbon atom mass balance technique. Fuel economy on a miles per gallon basis was calculated using this technique for the 1972 and 1975 FTP's. To calculate fuel economy, the following equations were used:

1972 FTP:

$$\text{mpg} = \left[\frac{2423}{0.866\ \text{HC gm/mi} + 0.4288\ \text{CO gm/mi} + 0.2729\ CO_2\ \text{gm/mi}}\right]$$

where:

$$2423 = 453.6\ \frac{\text{gm}}{\text{lb}} \times 6.17\ \frac{\text{lb}}{\text{gal}} \times 0.866\ \frac{\text{gm } C_1}{\text{gm fuel}}$$

1975 FTP:

$$\text{mpg} = 18178 \div [(0.43)\ (\text{gm } C_1 \text{ in bag 1}) + \text{gm } C_1 \text{ in bag 2} + (0.57)\ (\text{gm } C_1 \text{ in bag 3})]$$

where:

$$18178 = 7.5\ \text{mi} \times 453.6\ \frac{\text{gm}}{\text{lb}} \times 6.17\ \frac{\text{lb}}{\text{gal}} \times 0.866\ \frac{\text{gm } C_1}{\text{gm fuel}}$$

5.7.2.3 Coast Down Road Load Horsepower: Vehicle actual road load horsepower was calculated using the following equation:

$$RdHp = 1/2\left(\frac{W}{32.2}\right)\left(V_1^2 - V_2^2\right) / 550\ t$$

where:

W = vehicle weight as measured + weight of occupants

V_1 = Initial velocity in ft/sec (55 mph = 80.67 ft/sec)

V_2 = final velocity in ft/sec (45 mph = 66 ft/sec)

t = elapsed time to coast from 55 to 45 mph

or:

$$RdHp = 0.06073\ W/t$$

5.8 DATA STATISTICAL ANALYSIS

Statistical analyses were performed for AESi by Dr. Herbert C. Rutemiller, Professor of Quantitative Methods, California State University, Fullerton. Statistical programs were written in FORTRAN IV, and run on the University's Control Data Corporation Model 3150 computer.

Statistical methods used to analyze the data were the student's t test and the paired t test on the sample means. Linear regression analyses were also performed where applicable. The following lists where these statistical tests were performed on sample populations to test if there was no difference between the population means for hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen emissions. These tests were also applied to fuel economy data.

Comparison	Type Test
• Baseline vs. inertia increase	1972 & 1975 FTP
• Baseline vs R1Hp increase	1972 & 1975 FTP
• Baseline vs. idle speed decrease (-100 rpm)	1972 Hot Start
• Baseline vs. basic timing increase ($+5^{o}$)	1972 Hot Start
• Baseline vs. idle CO increase (+1%)	1972 Hot Start
• Baseline vs. smoothed driving schedule	1972 Hot Start
• Baseline repeat vs. baseline	1972 Hot Start
• Baseline repeat vs. idle CO increase (+1%)	1972 Hot Start
• Baseline repeat vs. smoothed driving schedule	1972 Hot Start
• Coast-down R1Hp vs manifold vacuum R1Hp	
• Coast-down R1Hp vs. Federal Test Procedure R1Hp	
• Manifold Vacuum R1Hp vs. Federal Test Procedure R1Hp	

Linear Regression analyses were performed on:

- Δ Emission level vs. Δ inertia weight
- Δ Emission level vs. Δ road load horsepower
- Coast down R1Hp vs. vehicle weight
- Coast down R1Hp vs. federal test procedure R1Hp

The form of the equations used for the student's t test are:

$$\hat{\sigma} = \sqrt{\frac{\Sigma(x-\bar{x})^2 + \Sigma(y-y)^2}{nx + ny - 2}}$$

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{\hat{\sigma}^2}{nx} \quad \frac{\hat{\sigma}^2}{ny}}}$$

where:

$\hat{\sigma}$ = pooled standard deviation
t = student's t score
x = discrete point in x sample
$\bar{x}$ = mean of x sample
y = discrete point in y sample
$\bar{y}$ = mean of y sample
nx = number of data points in x sample
ny = number of data points in y sample

Because of the large vehicle to vehicle variability that existed in this testing program (1968-1975 model year vehicles), another statistical method was used. In this program it happens that the points from the two sample populations are "paired." That is each observation in the first sample, Xi (e.g., baseline test) is related to an observation in the second test, Yi (e.g., dynamometer inertia weight increased to Gross Vehicle Weight). For each paired data points (Xi, Yi) the tests were performed on the

same vehicle. In this case we have a paired experiment and the form of the equations are:

$$
\begin{aligned}
d_1 &= y_1 - x_1 \\
d_2 &= y_2 - x_2 \\
&\vdots \\
d_n &= y_n - x_n
\end{aligned}
$$

and calculate

$$S_d^2 = \frac{\sum_{i=1}^{n} (di - \bar{d})^2}{n-1}$$

and

$$t = \frac{\bar{Y} - \bar{X}}{Sd/\sqrt{n}}$$

In using the paired t test and student's t test, the hypothesis made is that the two populations means are identical. We reject this hypothesis when a difference between the two sample means is observed and there is no more than a 5% chance that the difference observed is due to some random event.

For the linear regression analyses performed, the form of the equation used are:

$$Y = b_0 + b_1 X$$

where

Y = dependent variable

X = independent variable

and b_0 and b_1 are constants.

The constants are estimated by the method of least squares where:

$$b_1 = \frac{\Sigma XY - n\bar{X}\bar{Y}}{\Sigma X^2 - n\bar{X}^2}$$

$$b_0 = \bar{Y} - b_1\bar{X}$$

The hypothesis test is made using b_1 where:

$$t = \frac{b_1 - 0}{S_{b_1}}$$

and

$$S_{b_1} = \frac{Se}{\sqrt{\Sigma X_2 - n\bar{X}^2}}$$

$$Se = \sqrt{\frac{\Sigma(Y - b_0 - b_1X)^2}{n - 2}}$$

The hypothesis being tested is that the true value of b_1 is zero. Rejecting this hypothesis implies that a lienar relationship exists between Y and X.

5.9 PROBLEMS

During the performance of emission testing vehicles, several problems were encountered. While difficulties are normally experienced in conducting programs of this type, the following sections highlight the exceptional difficulties experienced.

5.9.1 Vehicle Problems

The principal cause of problems encountered while testing vehicles in this program was due to carburetor malfunctions during some stage of the testing sequence. Vehicle malfunctions were:

1. Car #46: 1969 Chevrolet 350 CID, automatic transmission and 4 barrel/carburetor. Carburetor developed internal leak following fifth emission test. Vehicle was repaired and completely retested.
2. Car #43: 1970 Chevrolet 350 CID, automatic transmission, 2 barrel Rochester carburetor. Carburetor developed internal fuel leak during baseline emission test. Tests voided and vehicle returned to owner.
3. Car #48: 1969 Plymouth 318 CID, automatic transmission, 2 barrel carburetor. Choke failed to set during baseline cold start emission test. Test voided and repairs were made before rescheduling testing.
4. Car #24: 1973 Dodge 318 CID, automatic transmission, 4 barrel carburetor. Dirt in main jet caused lean operations. Carburetor repaired and tests rerun.
5. Car #19: 1974 Pontiac 400 CID, automatic transmission, 4 barrel carburetor. When engine air/fuel mixture set to manufacturer's specifications, it caused very lean and rough engine operation. Emission data very inconsistent. When idle CO increased 1% on last test, engine roughness eliminated and satisfactory operation occurred.

6. Car #41: 1971 Pontiac 350 CID, automatic transmission, 2 barrel curburetor. After basic timing was advanced 5 degrees, emission levels changed dramatically. Review of data suggests vacuum leak or vacuum advance was inoperative. Vehicle was retested from start of testing sequence.

7. Car #44: Ford 351 CID, automatic transmission, 2 barrel carburetor. Same problem as Car #41. Vehcile was retested completely from start of testing sequence.

5.9.2 Test Procedures

The sequence in which cars were tested was considered an important part of this program. Every effort was made to test vehicles in the same order. However, on several occasions invalid tests were performed and it was necessary to retest the vehicle out of the normal sequence. This occurred to vehicles No. 15, 31 and 44.

5.9.3 Determination of Road Load Horsepower by Engine Manifold Vacuum

The measurement of road load horsepower by manifold vacuum was somewhat subjective. Throttle stretch made it very difficult to obtain a consistent manifold vacuum recording during a 50 mph cruise. Also, it was often very difficult to know whether the vehicle was the edge of accelerating or decelerating when the manifold vacuum was recorded. Likewise, when reproducing the manifold vacuum on the chassis dynamometer, the same difficulties were encountered. Another shortcoming of this test was the difference in ambient temperature between the raod course and laboratory. While the road course temperature was not measured, in general, the temperature at the river basin probably averaged 10 - 15°F higher than the laboratory.

APPENDIX A (Page 1)

VEH	YEAR	MAKE	MODEL	CID
1	75	BUIC	LESA	455

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	.50	CT	6.39	35.35	2991.7	9.57	1972	1.21	12.47	874.5	1.62	9.89
	100	.50	CS	2.65	58.16	3567.0	2.60	1975	1.01	12.14	852.1	1.24	10.16
	100	.50	HT	3.81	30.97	2696.6	4.60	HTST	.81	11.13	814.4	.90	10.64
	100	.50	HS	2.29	52.47	3411.3	2.16						
IDLE RPM DECREASED 100 RPM	10	.10	HT	.99	8.90	2702.9	5.70	HTST	.30	3.21	788.6	1.18	11.17
	10	.10	HS	1.23	15.15	3211.8	3.12						
INERTIA INCREASED TO GVW	90	.50	CT	2.16	25.96	3057.8	11.71	1972	.49	6.86	901.3	2.06	9.72
	90	.50	CS	1.54	25.48	3701.9	3.72	1975	.46	7.29	974.4	1.66	9.00
	90	.50	HT	1.78	31.58	4020.1	6.55						
BASIC TIMING UP 5 DEGREES	30	.10	HT	1.67	19.46	2498.4	6.60	HTST	.46	5.26	767.9	1.33	11.42
	30	.10	HS	1.76	20.01	3260.8	3.38						
SMOOTHED DRIVING SCHEDULE	30	.10	HT	1.01	11.24	2767.0	3.85	HTST	.44	10.15	771.4	.78	11.26
	30	.10	HS	2.31	64.87	3018.5	1.99						
RLHP UP TO COAST DOWN VALUE	30	.10	CT	5.15	32.78	3265.4	11.26	1972	.88	8.95	932.2	1.87	9.36
	30	.10	CS	1.42	34.36	3725.9	2.74	1975	.71	8.49	912.2	1.51	9.57
	30	.10	HT	2.92	26.76	3002.4	6.61						
BASELINE REPEAT	30	.10	HT	1.48	19.43	2721.3	4.81	HTST	.36	5.25	829.6	1.02	10.58
	30	.10	HS	1.23	19.95	3501.0	2.83						
IDLE CO UP 1.0 PERCENT	130	1.50	HT	3.54	78.76	2548.2	4.39	HTST	1.41	32.60	748.0	.91	11.05
	130	1.50	HS	7.05	165.71	3061.7	2.41						

COAST DOWN ROAD LOAD HORSEPOWER = 19.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 15.20
ACTUAL VEHICLE WEIGHT, POUNDS = 5225
BASELINE RLHP = 13.4
BASELINE INERTIA = 5000

APPENDIX A (Page 2)

VEH	YEAR	MAKE	MODEL	CID
2	75	CHEV	MONT	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	.10	CT	9.01	40.19	2832.9	8.05	1972	1.45	5.43	832.2	2.00	10.50
	50	.10	CS	1.85	.53	3408.9	6.93	1975	.83	2.46	812.2	1.99	10.85
	50	.10	HT	.92	1.10	2569.1	7.98	HTST	.29	.22	757.1	1.95	11.71
	50	.10	HS	1.22	.56	3109.3	6.66						
IDLE RPM DECREASED 100 RPM	30	.10	HT	1.49	7.54	2485.4	6.73	HTST	.51	1.09	741.4	1.72	11.92
	30	.10	HS	2.36	.60	3075.2	6.14						
INERTIA INCREASED TO GVW	30	.10	CT	6.82	35.59	2940.1	9.08	1972	1.12	4.77	836.3	2.15	10.48
	30	.10	CS	1.59	.15	3332.1	7.01	1975	.68	2.34	825.5	2.09	10.68
	30	.10	HT	1.08	3.70	2797.9	8.40						
BASIC TIMING UP 5 DEGREES	20	.10	HT	.90	1.52	2674.1	9.50	HTST	.33	.27	784.3	2.39	11.30
	20	.10	HS	1.56	.38	3208.1	8.41						
SMOOTHED DRIVING SCHEDULE	30	.10	HT	1.01	.61	2522.3	6.91	HTST	.55	.10	747.1	1.69	11.85
	30	.10	HS	3.12	.15	3081.3	5.76						
RLHP UP TO COAST DOWN VALUE	65	.10	CT	11.54	43.56	3063.9	8.36	1972	1.86	5.86	865.7	2.00	10.08
	65	.10	CS	2.38	.42	3428.5	6.62	1975	1.12	3.85	846.4	1.97	10.38
	65	.10	HT	1.83	17.02	2810.1	8.04						
BASELINE REPEAT	65	.10	HT	1.18	2.41	2612.1	7.33	HTST	.43	.38	783.6	1.82	11.30
	65	.10	HS	2.07	.43	3264.8	6.33						
IDLE CO UP 1.0 PERCENT	110	1.10	HT	2.14	12.52	2701.0	6.83	HTST	.49	2.21	792.5	1.63	11.13
	110	1.10	HS	1.52	4.06	3242.5	5.39						

COAST DOWN ROAD LOAD HORSEPOWER = 16.50
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 15.60
ACTUAL VEHICLE WEIGHT, POUNDS = 4520
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

APPENDIX A (page 3)

VEH	YEAR	MAKE	MODEL	CID
3	75	CHEV	MONT	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	30	.10	CT	5.93	57.69	2871.4	7.36	1972	.97	7.96	782.7	1.59	11.12
	30	.10	CS	1.37	2.02	2999.0	4.56	1975	.71	5.05	750.1	1.49	11.68
	30	.10	HT	2.47	19.44	2442.6	6.11	HTST	.49	2.64	706.7	1.40	12.46
	30	.10	HS	1.22	.36	2857.6	4.42						
IDLE RPM DECREASED 100 RPM	100	.10	HT	2.56	19.59	2431.2	6.08	HTST	.54	2.96	703.7	1.35	12.50
	100	.10	HS	1.49	2.64	2846.6	4.05						
INERTIA INCREASED TO GVW	40	.10	CT	5.20	68.68	3041.9	8.56	1972	.89	9.51	846.4	1.94	10.27
	40	.10	CS	1.44	2.64	3305.8	5.97	1975	.66	6.81	821.1	1.87	10.65
	40	.10	HT	2.28	33.22	2709.0	7.68						
BASIC TIMING UP 5 DEGREES	80	.10	HT	1.92	15.01	2136.4	8.70	HTST	.52	2.09	606.3	1.96	14.53
	80	.10	HS	1.97	.70	2411.0	6.01						
SMOOTHED DRIVING SCHEDULE	50	.10	HT	1.46	7.38	2456.8	6.45	HTST	.43	1.05	721.6	1.46	12.25
	50	.10	HS	1.73	.47	2955.4	4.46						
RLHP UP TO COAST DOWN VALUE	40	.10	CT	5.04	44.33	3024.4	8.89	1972	.89	6.26	830.2	1.85	10.53
	40	.10	CS	1.66	2.59	3201.7	4.95	1975	.68	3.64	797.2	1.72	11.03
	40	.10	HT	2.29	9.94	2591.2	7.20						
BASELINE REPEAT	40	.10	HT	1.52	9.04	2463.6	7.38	HTST	.42	1.58	713.6	1.63	12.38
	40	.10	HS	1.59	2.81	2888.5	4.85						
IDLE CO UP 1.0 PERCENT	160	1.10	HT	1.27	3.53	2468.4	7.02	HTST	.39	.97	724.9	1.55	12.20
	160	1.10	HS	1.66	3.77	2968.3	4.62						

COAST DOWN ROAD LOAD HORSEPOWER = 16.30
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 10.70
ACTUAL VEHICLE WEIGHT, POUNDS = 4545
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

APPENDIX A (Page 4)

VEH	YEAR	MAKE	MODEL	CID
4	75	DODG	CORO	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	40	.10	CT	3.73	47.95	3413.9	5.36	1972	.54	6.60	886.8	1.35	9.88
	40	.10	CS	.33	1.56	3236.9	4.77	1975	.38	3.29	844.0	1.33	10.44
	40	.10	HT	1.64	4.41	2850.9	5.05	HTST	.27	.66	834.9	1.29	10.61
	40	.10	HS	.41	.52	3411.0	4.61						
IDLE RPM DECREASED 100 RPM	20	.10	HT	.39	2.65	2331.0	4.62	HTST	.08	.47	724.1	1.18	12.25
	20	.10	HS	.23	.89	3099.6	4.22						
INERTIA INCREASED TO GVW	50	.10	CT	7.04	82.99	3615.7	5.53	1972	1.02	11.24	967.6	1.41	8.98
	50	.10	CS	.57	1.34	3641.2	5.06	1975	.64	5.80	926.8	1.42	9.47
	50	.10	HT	2.14	11.42	3078.5	5.62						
BASIC TIMING UP 5 DEGREES	100	.10	HT	1.34	3.57	2774.1	5.16	HTST	.40	.58	797.2	1.22	11.11
	100	.10	HS	1.68	.80	3204.8	4.00						
SMOOTHED DRIVING SCHEDULE	40	.10	HT	.72	2.11	2924.8	5.28	HTST	.16	.38	807.9	1.33	10.97
	40	.10	HS	.51	.76	3134.5	4.72						
RLHP UP TO COAST DOWN VALUE	50	.10	CT	2.11	28.79	3528.8	6.25	1972	.35	3.90	912.6	1.43	9.65
	50	.10	CS	.55	.44	3315.8	4.49	1975	.31	1.90	868.5	1.37	10.18
	50	.10	HT	1.51	2.47	2948.0	5.38						
BASELINE REPEAT	40	.10	HT	1.20	5.74	2938.0	5.17	HTST	.22	.87	776.5	1.27	11.40
	40	.10	HS	.45	.76	2885.8	4.35						
IDLE CO UP 1.0 PERCENT	50	1.10	HT	1.31	10.14	2936.9	5.08	HTST	.32	1.81	841.7	1.20	10.50
	50	1.10	HS	1.07	3.44	3375.5	3.92						

COAST DOWN ROAD LOAD HORSEPOWER = 18.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 10.70
ACTUAL VEHICLE WEIGHT, POUNDS = 4175
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
5	75	FORD	TORI	351

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	10	.10	CT	5.58	109.07	3561.5	8.62	1972	.94	15.66	1002.4	1.78	8.62
	10	.10	CS	1.45	8.38	3956.2	4.76	1975	.57	9.74	972.9	1.67	8.97
	10	.10	HT	.73	31.14	3174.1	7.19	HTST	.37	8.16	891.2	1.60	9.81
	10	.10	HS	2.03	30.03	3509.9	4.78						
IDLE RPM DECREASED 100 RPM	40	.10	HT	6.71	35.12	3131.4	7.30	HTST	1.15	5.39	859.0	1.55	10.19
	40	.10	HS	1.91	5.29	3311.2	4.36						
INERTIA INCREASED TO GVW	20	.10	CT	10.06	125.51	3489.1	10.65	1972	1.55	25.07	1013.8	2.20	8.39
	20	.10	CS	1.55	62.54	4114.4	5.87	1975	1.04	20.81	976.6	2.10	8.77
	20	.10	HT	3.41	69.45	3000.2	9.37						
BASIC TIMING UP 5 DEGREES	20	.10	HT	1.98	25.13	2705.5	5.90	HTST	.66	10.48	809.0	1.40	10.73
	20	.10	HS	2.98	53.45	3362.0	4.57						
SMOOTHED DRIVING SCHEDULE	20	.10	HT	1.63	15.37	2818.0	6.29	HTST	.37	2.51	861.1	1.47	10.25
	20	.10	HS	1.13	3.42	3640.1	4.75						
RLHP UP TO COAST DOWN VALUE	10	.10	CT	4.15	101.92	3599.1	8.63	1972	.71	14.56	955.8	1.83	9.05
	10	.10	CS	1.14	7.29	3569.0	5.09	1975	.56	9.41	927.3	1.77	9.41
	10	.10	HT	2.28	34.10	3225.3	7.78						
BASELINE REPEAT	10	.10	HT	1.66	22.77	2724.0	6.67	HTST	.37	3.67	876.6	1.55	10.05
	10	.10	HS	1.08	4.74	3850.7	5.04						
IDLE CO UP 1.0 PERCENT	65	1.10	HT	2.21	38.42	3077.7	4.96	HTST	.45	6.82	916.4	1.21	9.56
	65	1.10	HS	1.13	12.72	3795.3	4.10						

COAST DOWN ROAD LOAD HORSEPOWER = 17.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 17.80
ACTUAL VEHICLE WEIGHT, POUNDS = 4740
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
6	75	FORD	LTD	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	20	.10	CT	5.64	130.79	3549.8	6.32	1972	.82	18.17	993.8	1.43	8.66
	20	.10	CS	.54	5.46	3903.4	4.39	1975	.60	10.92	963.3	1.45	9.04
	20	.10	HT	2.64	35.41	3148.9	6.64	HTST	.44	5.46	961.1	1.56	9.14
	20	.10	HS	.66	5.53	4059.3	5.04						
IDLE RPM DECREASED 100 RPM	50	.10	HT	1.92	22.62	2952.2	5.66	HTST	.44	3.65	841.2	1.30	10.47
	50	.10	HS	1.38	4.78	3356.9	4.06						
INERTIA INCREASED TO GVW	20	.10	CT	6.88	171.02	3514.3	6.32	1972	1.01	23.30	986.5	1.48	8.65
	20	.10	CS	.68	3.71	3884.8	4.79	1975	.67	12.07	950.9	1.51	9.14
	20	.10	HT	2.42	23.23	3045.3	6.63						
BASIC TIMING UP 5 DEGREES	20	.10	HT	2.31	18.25	2924.8	7.23	HTST	.58	3.24	867.2	1.66	10.16
	20	.10	HS	2.08	6.06	3578.9	5.26						
SMOOTHED DRIVING SCHEDULE	20	.10	HT	1.81	12.06	2960.6	7.50	HTST	.38	1.90	866.8	1.68	10.19
	20	.10	HS	1.04	2.22	3540.1	5.13						
RLHP UP TO COAST DOWN VALUE	20	.10	CT	5.63	144.36	3651.7	6.61	1972	.94	20.37	1015.9	1.51	8.45
	20	.10	CS	1.41	8.39	3967.5	4.73	1975	.72	11.53	971.3	1.48	8.96
	20	.10	HT	2.79	28.03	3065.2	6.21						
BASELINE REPEAT	20	.10	HT	1.62	9.38	2858.3	7.28	HTST	.38	1.62	847.3	1.66	10.43
	20	.10	HS	1.23	2.78	3496.6	5.16						
IDLE CO UP 1.0 PERCENT	40	1.10	HT	1.41	23.54	2971.7	5.77	HTST	.36	4.31	917.1	1.40	9.60
	40	1.10	HS	1.28	8.80	3906.5	4.72						

COAST DOWN ROAD LOAD HORSEPOWER = 18.00
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 21.60
ACTUAL VEHICLE WEIGHT, POUNDS = 4805
BASELINE RLHP = 13.9
BASELINE INERTIA = 5500

VEH	YEAR	MAKE	MODEL	CID
7	75	OLDS	CUTL	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	30	.10	CT	6.24	73.94	2601.5	7.69	1972	.98	14.10	717.7	1.69	11.95
	30	.10	CS	1.11	31.81	2781.5	5.01	1975	.65	10.14	694.9	1.66	12.46
	30	.10	HT	1.90	21.82	2301.4	7.28	HTST	.41	7.05	667.7	1.67	13.06
	30	.10	HS	1.15	31.05	2706.4	5.25						
IDLE RPM DECREASED 100 RPM	10	.10	HT	.88	17.38	2285.9	7.42	HTST	.26	4.91	671.9	1.80	13.05
	10	.10	HS	1.04	19.45	2753.2	6.08						
INERTIA INCREASED TO GVW	90	.10	CT	4.93	77.15	2853.0	10.48	1972	.77	12.32	792.5	2.33	10.90
	90	.10	CS	.81	15.24	3091.1	6.98	1975	.57	9.04	768.9	2.27	11.32
	90	.10	HT	2.32	34.00	2541.4	9.70						
BASIC TIMING UP 5 DEGREES	100	.10	HT	.70	8.99	2099.0	8.53	HTST	.18	1.53	608.1	2.01	14.53
	100	.10	HS	.65	2.51	2461.9	6.56						
SMOOTHED DRIVING SCHEDULE	30	.10	HT	.67	1.80	2230.4	7.08	HTST	.19	2.04	637.8	1.56	13.84
	30	.10	HS	.76	13.51	2553.2	4.60						
RLHP UP TO COAST DOWN VALUE	30	.10	CT	4.10	43.22	2562.5	8.55	1972	.64	5.81	708.0	1.86	12.35
	30	.10	CS	.71	.32	2747.3	5.38	1975	.47	2.54	686.9	1.82	12.83
	30	.10	HT	1.89	.30	2285.0	8.09						
BASELINE REPEAT	30	.10	HT	1.09	.17	2205.4	7.27	HTST	.28	.03	640.7	1.60	13.84
	30	.10	HS	1.03	.06	2599.6	4.69						
IDLE CO UP 1.0 PERCENT	100	1.10	HT	1.92	22.21	2280.2	6.66	HTST	.58	9.90	645.2	1.48	13.40
	100	1.10	HS	2.47	52.07	2559.1	4.45						

COAST DOWN ROAD LOAD HORSEPOWER = 14.50
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.20
ACTUAL VEHICLE WEIGHT, POUNDS = 4455
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
8	75	PLYM	FURY	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	.50	CT	7.52	82.46	2988.4	6.53	1972	1.10	11.17	805.5	1.56	10.74
	100	.50	CS	.75	1.29	3052.9	5.17	1975	.62	5.15	775.8	1.50	11.30
	100	.50	HT	1.18	3.35	2597.3	5.69	HTST	.24	.53	740.2	1.50	11.97
	100	.50	HS	.61	.60	2953.8	5.55						
IDLE RPM DECREASED 100 RPM	110	1.50	HT	.48	1.95	2584.6	6.17	HTST	.14	.31	724.1	1.48	12.25
	110	1.50	HS	.56	.35	2846.5	4.94						
INERTIA INCREASED TO GVW	100	.50	CT	5.96	93.32	3321.1	8.47	1972	.87	12.70	881.1	1.99	9.82
	100	.50	CS	.57	1.94	3287.4	6.45	1975	.52	6.00	847.0	1.97	10.35
	100	.50	HT	1.35	5.14	2871.9	8.20						
BASIC TIMING UP 5 DEGREES	100	.50	HT	1.67	2.55	2417.3	7.27	HTST	.31	.40	688.3	1.85	12.87
	100	.50	HS	.66	.48	2745.1	6.60						
SMOOTHED DRIVING SCHEDULE	90	.60	HT	.70	3.86	2352.2	6.26	HTST	.19	.65	680.2	1.66	13.02
	90	.60	HS	.70	.99	2749.0	6.17						
RLHP UP TO COAST DOWN VALUE	100	.50	CT	4.93	81.72	3220.1	6.87	1972	.76	11.07	849.0	1.65	10.22
	100	.50	CS	.78	1.28	3147.3	5.53	1975	.50	5.10	815.4	1.67	10.77
	100	.50	HT	1.46	3.15	2778.0	7.16						
BASELINE REPEAT	90	.60	HT	1.44	5.19	2660.5	6.50	HTST	.26	.75	754.9	1.66	11.73
	90	.60	HS	.51	.46	3001.1	5.92						
IDLE CO UP 1.0 PERCENT	120	1.50	HT	.57	5.20	2500.8	6.80	HTST	.15	1.09	727.9	1.82	12.16
	120	1.50	HS	.57	2.99	2958.1	6.87						

COAST DOWN ROAD LOAD HORSEPOWER = 17.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 17.60
ACTUAL VEHICLE WEIGHT, POUNDS = 4345
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
9	75	PONT	VENT	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	10	.10	CT	4.38	53.95	2262.8	6.85	1972	.66	7.25	634.8	1.33	13.70
	10	.10	CS	.56	.39	2498.4	3.11	1975	.40	3.52	614.3	1.15	14.30
	10	.10	HT	.93	4.97	1993.0	4.45	HTST	.19	1.07	587.0	.98	15.07
	10	.10	HS	.50	3.07	2409.2	2.91						
IDLE RPM DECREASED 100 RPM	70	.10	HT	.45	3.33	1888.0	4.14	HTST	.21	4.33	447.5	.81	14.21
	70	.10	HS	1.14	29.17	1468.2	1.95						
INERTIA INCREASED TO GVW	20	.10	CT	5.28	69.02	2507.2	8.94	1972	.77	9.32	714.4	1.85	12.14
	20	.10	CS	.48	.87	2850.4	4.92	1975	.48	5.46	693.3	1.68	12.63
	20	.10	HT	1.51	18.20	2229.6	6.69						
BASIC TIMING UP 5 DEGREES	90	.10	HT	.37	1.12	1959.5	5.92	HTST	.11	.27	589.0	1.32	15.05
	90	.10	HS	.48	.87	2457.9	3.97						
SMOOTHED DRIVING SCHEDULE	20	.10	HT	.28	.14	1971.3	4.10	HTST	.08	.39	572.9	.99	15.47
	20	.10	HS	.36	2.76	2325.8	3.29						
RLHP UP TO COAST DOWN VALUE	20	.10	CT	5.51	55.42	2490.2	7.84	1972	.81	7.68	689.9	1.38	12.60
	20	.10	CS	.57	2.15	2684.2	2.50	1975	.45	3.82	664.5	1.21	13.22
	20	.10	HT	.82	4.68	2156.0	5.62						
BASELINE REPEAT	20	.10	HT	.62	5.40	2000.4	4.69	HTST	.21	3.62	595.0	.93	14.76
	20	.10	HS	.94	21.74	2462.1	2.26						
IDLE CO UP 1.0 PERCENT	100	1.10	HT	3.25	37.25	1923.3	3.89	HTST	1.67	27.14	546.4	.88	14.94
	100	1.10	HS	9.29	166.30	2174.8	2.71						

COAST DOWN ROAD LOAD HORSEPOWER = 15.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 10.40
ACTUAL VEHICLE WEIGHT, POUNDS = 3905
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
10	75	TOYO	CORO	97

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	20	.20	CT	5.41	47.48	1626.8	12.90	1972	.78	6.86	467.1	2.57	18.48
	20	.20	CS	.47	4.00	1876.5	6.37	1975	.44	3.56	459.9	2.41	19.02
	20	.20	HT	.89	3.97	1531.8	10.74	HTST	.16	.83	458.4	2.07	19.29
	20	.20	HS	.28	2.23	1906.3	4.81						
IDLE RPM DECREASED 100 RPM	30	.20	HT	.73	4.17	1419.7	10.07	HTST	.15	.91	445.1	2.05	19.86
	30	.20	HS	.39	2.67	1918.6	5.33						
INERTIA INCREASED TO GVW	20	.20	CT	4.67	47.79	1640.8	12.95	1972	.70	6.90	482.0	2.59	17.93
	20	.20	CS	.55	3.93	1974.4	6.45	1975	.44	3.90	475.5	2.43	18.38
	20	.20	HT	1.36	8.37	1555.4	10.93						
BASIC TIMING UP 5 DEGREES	30	.10	HT	.56	4.02	1423.3	12.42	HTST	.11	.67	430.9	2.46	20.54
	30	.10	HS	.27	.99	1808.1	6.00						
SMOOTHED DRIVING SCHEDULE	40	.10	HT	.40	3.80	1435.7	13.78	HTST	.09	.80	432.0	2.59	20.48
	40	.10	HS	.27	2.19	1804.4	5.63						
RLHP UP TO COAST DOWN VALUE	40	.10	CT	3.05	17.06	1608.3	12.92	1972	.51	2.73	474.6	2.63	18.48
	40	.10	CS	.79	3.43	1951.4	6.81	1975	.33	1.83	468.7	2.16	18.79
	40	.10	HT	.70	5.20	1530.7	6.68						
BASELINE REPEAT	40	.10	HT	1.09	5.56	1417.7	11.73	HTST	.20	1.07	433.6	2.34	20.37
	40	.10	HS	.41	2.44	1834.1	5.80						
IDLE CO UP 1.0 PERCENT	30	.20	HT	.76	6.17	1495.3	13.95	HTST	.18	1.24	445.9	2.61	19.80
	30	.20	HS	.55	3.12	1848.9	5.61						

COAST DOWN ROAD LOAD HORSEPOWER = 14.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.20
ACTUAL VEHICLE WEIGHT, POUNDS = 2785
BASELINE RLHP = 9.4
BASELINE INERTIA = 2500

VEH	YEAR	MAKE	MODEL	CID
11	74	BUIC	RIVI	455

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	40	.10	CT	12.91	110.90	3164.8	11.34	1972	2.54	18.98	921.7	2.67	9.25
	40	.10	CS	6.15	31.45	3748.3	8.66	1975	2.38	12.71	881.9	2.70	9.77
	40	.10	HT	10.82	28.44	2639.8	11.72	HTST	2.37	7.37	817.0	2.70	10.62
	40	.10	HS	6.94	26.81	3487.8	8.53						
IDLE RPM DECREASED 100 RPM	60	.10	HT	10.15	23.95	2684.0	13.18	HTST	2.52	6.76	807.8	2.78	10.74
	60	.10	HS	8.77	26.76	3374.8	7.64						
INERTIA INCREASED TO GVW	40	.10	CT	12.90	116.79	3314.6	12.67	1972	2.45	19.64	957.9	2.84	8.91
	40	.10	CS	5.51	30.50	3870.0	8.65	1975	2.04	12.66	912.2	2.31	9.46
	40	.10	HT	7.41	24.92	2712.6	5.70						
BASIC TIMING UP 5 DEGREES	40	.10	HT	9.78	28.23	2776.9	13.58	HTST	2.34	4.39	831.6	2.80	10.50
	40	.10	HS	7.80	4.72	3460.0	7.38						
RLHP UP TO COAST DOWN VALUE	20	.10	CT	10.89	86.89	3413.5	13.93	1972	2.58	14.93	958.1	2.99	8.97
	20	.10	CS	8.44	25.09	3772.6	8.50	1975	2.47	10.30	912.0	3.01	9.49
	20	.10	HT	9.44	25.98	2806.0	14.20						
BASELINE REPEAT	20	.10	HT	6.87	27.08	2717.1	12.65	HTST	1.72	6.82	832.1	2.85	10.47
	20	.10	HS	6.06	24.07	3523.5	8.76						
IDLE CO UP 1.0 PERCENT	80	.60	HT	7.24	27.03	2704.0	14.83	HTST	1.96	7.66	823.9	3.16	10.54
	80	.60	HS	7.42	30.43	3475.3	8.89						

COAST DOWN ROAD LOAD HORSEPOWER = 19.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 21.00
ACTUAL VEHICLE WEIGHT, POUNDS = 5305
BASELINE RLHP = 13.4
BASELINE INERTIA = 5000

VEH	YEAR	MAKE	MODEL	CID
12	74	CHEV	CAPR	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	.30	CT	12.24	325.55	3418.1	6.79	1972	2.27	48.99	976.6	1.71	8.37
	50	.30	CS	4.79	41.86	3906.1	6.06	1975	2.09	27.89	945.9	1.74	8.91
	50	.30	HT	9.93	47.93	3014.1	7.21	HTST	2.05	12.16	906.9	1.71	9.52
	50	.30	HS	5.45	43.25	3787.5	5.63						
IDLE RPM DECREASED 100 RPM	500	.10	HT	6.97	43.50	2818.1	5.96	HTST	1.62	14.17	831.4	1.39	10.34
	500	.10	HS	5.16	62.78	3417.3	4.43						
INERTIA INCREASED TO GVW	90	.25	CT	14.33	350.97	3485.3	6.51	1972	2.41	54.53	977.4	1.63	8.29
	90	.25	CS	3.75	57.97	3845.1	5.72	1975	1.93	33.91	935.7	1.63	8.93
	90	.25	HT	7.99	79.73	2936.6	6.56						
BASIC TIMING UP 5 DEGREES	90	.10	HT	8.17	41.94	2753.9	6.87	HTST	2.11	11.76	804.8	1.56	10.70
	90	.10	HS	7.68	46.28	3282.3	4.84						
RLHP UP TO COAST DOWN VALUE	50	.10	CT	12.19	338.85	3606.2	6.86	1972	2.08	52.14	986.3	1.65	8.26
	50	.10	CS	3.40	52.21	3790.8	5.53	1975	1.79	30.09	947.5	1.67	8.88
	50	.10	HT	8.37	48.70	3096.3	7.13						
BASELINE REPEAT	50	.10	HT	7.28	57.74	2909.6	6.30	HTST	1.55	18.65	865.9	1.46	9.86
	50	.10	HS	4.34	82.13	3584.9	4.64						
IDLE CO UP 1.0 PERCENT	110	1.30	HT	4.69	53.13	3217.5	7.50	HTST	1.16	20.37	916.7	1.66	9.32
	110	1.30	HS	3.97	99.63	3657.6	4.93						

COAST DOWN ROAD LOAD HORSEPOWER = 17.00
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 20.00
ACTUAL VEHICLE WEIGHT, POUNDS = 4730
BASELINE RLHP = 13.4
BASELINE INERTIA = 5000

VEH	YEAR	MAKE	MODEL	CID
13	74	CHEV	MONT	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	.50	CT	18.36	341.22	2946.6	7.60	1972	4.13	50.46	848.6	1.68	9.44
	100	.50	CS	12.61	37.21	3417.8	4.98	1975	3.66	27.18	829.5	1.72	10.05
	100	.50	HT	12.14	34.97	2696.0	8.10	HTST	3.62	8.73	732.0	1.67	11.73
	100	.50	HS	14.99	30.47	2794.2	4.44						
IDLE RPM DECREASED 100 RPM	999	.20	HT	20.05	35.37	2342.7	7.45	HTST	6.26	9.92	681.5	1.55	12.38
	999	.20	HS	26.88	39.02	2768.7	4.20						
INERTIA INCREASED TO GVW	100	.50	CT	22.42	246.75	3006.4	8.81	1972	5.64	38.36	841.0	1.99	9.66
	100	.50	CS	19.86	40.92	3301.4	6.09	1975	5.52	23.77	808.0	2.01	10.29
	100	.50	HT	20.88	54.84	2571.4	9.15						
BASIC TIMING UP 5 DEGREES	600	.15	HT	10.27	27.45	2344.6	9.43	HTST	3.16	7.50	689.4	1.95	12.48
	600	.15	HS	13.40	28.77	2826.0	5.20						
RLHP UP TO COAST DOWN VALUE	200	.30	CT	12.08	197.07	3190.3	8.20	1972	2.56	31.87	869.8	1.79	9.57
	200	.30	CS	7.09	41.97	3333.5	5.23	1975	2.45	21.21	830.6	1.87	10.19
	200	.30	HT	10.73	56.77	2673.5	9.23						
BASELINE REPEAT	100	.50	HT	7.75	44.79	2450.0	7.79	HTST	2.24	11.92	721.4	1.64	11.88
	100	.50	HS	9.09	44.59	2960.6	4.53						
IDLE CO UP 1.0 PERCENT	200	1.30	HT	6.44	71.56	2418.8	7.10	HTST	1.73	23.41	712.1	1.45	11.77
	200	1.30	HS	6.50	104.00	2922.3	3.79						

COAST DOWN ROAD LOAD HORSEPOWER = 18.40
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 16.20
ACTUAL VEHICLE WEIGHT, POUNDS = 4500
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
14	74	PLY	SAT	360

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	60	.50	CT	8.29	122.29	2415.3	14.31	1972	2.00	22.43	677.5	3.45	12.35
	60	.50	CS	6.73	45.94	2665.8	11.54	1975	1.95	15.96	658.7	3.48	12.87
	60	.50	HT	7.53	37.12	2168.8	14.77	HTST	1.92	11.58	642.2	3.53	13.32
	60	.50	HS	6.84	49.72	2647.5	11.73						
IDLE RPM DECREASED 100 RPM	200	.20	HT	8.48	41.23	2006.6	13.37	HTST	2.36	13.07	609.8	3.00	13.92
	200	.20	HS	9.25	56.78	2566.8	9.14						
INERTIA INCREASED TO GVW	200	.20	CT	9.51	146.47	2634.2	17.38	1972	2.26	26.37	752.5	4.80	11.08
	200	.20	CS	7.46	51.29	3009.5	18.65	1975	2.20	18.33	729.9	4.99	11.60
	200	.20	HT	8.62	40.68	2336.5	19.76						
BASIC TIMING UP 5 DEGREES	220	.20	HT	6.04	28.61	2096.1	16.21	HTST	1.77	7.33	614.4	3.95	14.06
	220	.20	HS	7.24	26.39	2511.9	13.43						
RLHP UP TO COAST DOWN VALUE	50	.20	CT	10.74	140.13	2743.5	16.63	1972	2.23	25.65	745.3	3.89	11.20
	50	.20	CS	5.96	52.25	2846.5	12.51	1975	1.89	18.03	718.8	4.09	11.79
	50	.20	HT	6.26	39.86	2394.6	19.30						
BASELINE REPEAT	50	.20	HT	5.77	34.61	2236.7	15.36	HTST	1.62	8.77	660.7	3.65	13.06
	50	.20	HS	6.41	31.14	2718.5	11.98						
IDLE CO UP 1.0 PERCENT	70	1.50	HT	6.02	68.60	2101.8	14.10	HTST	1.81	24.56	618.4	3.35	13.40
	70	1.50	HS	7.54	115.61	2536.2	11.02						

COAST DOWN ROAD LOAD HORSEPOWER = 19.30
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.10
ACTUAL VEHICLE WEIGHT, POUNDS = 4405
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
15	74	FORD	PINT	140

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	40	.10	CT	7.85	112.65	1853.9	10.81	1972	1.48	22.75	514.1	1.93	16.01
	40	.10	CS	3.22	58.00	2002.1	3.69	1975	1.15	17.33	495.3	1.73	16.88
	40	.10	HT	3.55	41.34	1605.6	8.16	HTST	.90	13.09	468.8	1.55	18.04
	40	.10	HS	3.17	56.83	1910.1	3.49						
IDLE RPM DECREASED 100 RPM	90	1.10	HT	4.90	64.71	1615.1	7.45	HTST	1.09	18.18	471.3	1.44	17.64
	90	1.10	HS	3.25	71.61	1920.0	3.34						
INERTIA INCREASED TO GVW	40	.10	CT	8.80	131.22	1913.8	10.82	1972	1.62	26.53	537.7	2.04	15.19
	40	.10	CS	3.32	67.74	2118.7	4.47	1975	1.25	20.93	519.0	1.84	15.98
	40	.10	HT	3.98	57.59	1668.6	8.17						
BASIC TIMING UP 5 DEGREES	50	.10	HT	8.03	73.67	1517.0	8.64	HTST	1.91	21.12	438.5	1.64	18.59
	50	.10	HS	6.30	84.76	1771.6	3.69						
RLHP UP TO COAST DOWN VALUE	70	.10	CT	8.52	140.26	2024.8	11.28	1972	1.62	27.06	553.7	2.06	14.76
	70	.10	CS	3.64	62.66	2128.3	4.17	1975	1.28	20.59	535.0	1.91	15.54
	70	.10	HT	4.01	55.22	1778.5	9.28						
BASELINE REPEAT	70	.10	HT	6.03	66.98	1647.9	7.77	HTST	1.28	17.72	488.4	1.58	17.06
	70	.10	HS	3.57	65.94	2015.1	4.05						
IDLE CO UP 1.0 PERCENT	40	1.10	HT	6.76	82.73	1834.0	8.43	HTST	1.40	22.73	510.4	1.59	16.13
	40	1.10	HS	3.76	87.72	1994.0	3.48						

COAST DOWN ROAD LOAD HORSEPOWER = 15.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.60
ACTUAL VEHICLE WEIGHT, POUNDS = 3260
BASELINE RLHP = 10.3
BASELINE INERTIA = 3000

VEH	YEAR	MAKE	MODEL	CID
16	74	FORD	TORT	351

	THC	TCO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	.10	CT	11.38	220.22	2844.0	9.25	1972	2.19	33.52	793.2	1.97	10.41
	100	.10	CS	5.06	31.17	3105.3	5.54	1975	1.70	19.01	754.8	1.99	11.24
	100	.10	HT	4.91	29.36	2338.6	9.49	HTST	1.35	7.60	717.1	2.01	12.11
	100	.10	HS	5.18	27.66	3039.6	5.61						
IDLE RPM DECREASED 100 RPM	40	.80	HT	6.50	40.46	2425.0	9.70	HTST	1.71	11.36	701.0	2.02	12.26
	40	.80	HS	6.29	44.71	2832.1	5.44						
INERTIA INCREASED TO GVW	100	.10	CT	9.82	201.25	2987.9	11.69	1972	2.01	31.27	841.9	2.50	9.89
	100	.10	CS	5.23	33.31	3326.3	7.07	1975	1.64	18.50	816.8	2.53	10.44
	100	.10	HT	4.95	33.22	2657.4	12.04						
BASIC TIMING UP 5 DEGREES	150	.10	HT	6.02	34.90	2349.1	10.92	HTST	1.72	9.19	692.1	2.28	12.47
	150	.10	HS	6.84	34.03	2841.7	6.19						
RLHP UP TO COAST DOWN VALUE	90	.10	CT	9.66	192.56	2995.0	12.42	1972	2.02	30.08	833.1	2.51	10.01
	90	.10	CS	5.48	33.03	3253.3	6.42	1975	1.67	18.10	807.6	2.52	10.56
	90	.10	HT	5.08	34.94	2659.5	12.47						
BASELINE REPEAT	90	.10	HT	4.54	31.47	2498.6	9.46	HTST	1.27	7.80	749.6	2.02	11.59
	90	.10	HS	4.99	27.03	3123.6	5.72						
IDLE CO UP 1.0 PERCENT	125	1.10	HT	4.81	52.49	2403.8	8.84	HTST	1.42	16.98	714.2	1.88	11.91
	125	1.10	HS	5.87	74.88	2952.5	5.22						

COAST DOWN ROAD LOAD HORSEPOWER = 20.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 19.60
ACTUAL VEHICLE WEIGHT, POUNDS = 4680
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
17	74	OLDS	OMEG	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	40	.10	CT	12.08	56.05	2607.1	10.28	1972	2.86	11.99	721.2	2.21	11.85
	40	.10	CS	9.37	23.87	2802.2	6.32	1975	2.70	8.48	693.0	2.19	12.42
	40	.10	HT	10.02	19.93	2235.0	9.99	HTST	2.62	5.80	661.6	2.19	13.08
	40	.10	HS	9.60	23.55	2727.3	6.45						
IDLE RPM DECREASED 100 RPM	95	.50	HT	11.09	24.36	2098.6	10.21	HTST	3.13	6.81	626.4	2.23	13.72
	95	.50	HS	12.35	26.72	2599.3	6.49						
INERTIA INCREASED TO GVW	40	.10	CT	13.90	126.15	2774.6	13.10	1972	3.25	20.80	784.4	2.99	10.73
	40	.10	CS	10.50	29.87	3108.2	9.33	1975	2.97	15.33	754.4	3.01	11.27
	40	.10	HT	10.19	54.15	2380.7	13.39						
BASIC TIMING UP 5 DEGREES	60	.15	HT	10.01	32.93	2199.7	11.55	HTST	3.28	7.25	652.8	2.50	13.16
	60	.15	HS	14.57	21.43	2696.0	7.18						
RLHP UP TO COAST DOWN VALUE	45	.10	CT	11.90	56.39	2671.6	12.51	1972	2.91	10.70	739.9	2.61	11.59
	45	.10	CS	9.89	23.87	2877.6	7.07	1975	2.70	8.37	715.0	2.61	12.05
	45	.10	HT	9.21	25.70	2344.3	12.46						
BASELINE REPEAT	45	.10	HT	8.26	23.05	2195.6	9.70	HTST	2.37	6.04	663.9	2.15	13.04
	45	.10	HS	9.53	22.27	2783.6	6.42						
IDLE CO UP 1.0 PERCENT	100	1.10	HT	8.92	63.21	2241.2	10.74	HTST	2.62	21.60	656.9	2.32	12.70
	100	1.10	HS	10.73	98.78	2685.8	6.67						

COAST DOWN ROAD LOAD HORSEPOWER = 17.80
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 10.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4065
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
18	74	PLY	DUST	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	40	.50	CT	20.58	186.84	2479.7	5.90	1972	4.02	36.60	672.8	1.62	11.95
	40	.50	CS	9.58	87.67	2566.2	6.25	1975	3.16	25.89	636.8	1.77	12.92
	40	.50	HT	9.22	45.89	2005.6	7.88	HTST	2.36	15.54	544.6	2.23	15.40
	40	.50	HS	8.46	70.68	2078.9	8.88						
IDLE RPM DECREASED 100 RPM	75	.25	HT	7.31	39.43	1965.1	8.16	HTST	1.32	11.28	587.9	2.17	14.56
	75	.25	HS	2.60	45.16	2444.5	8.13						
INERTIA INCREASED TO GVW	40	.35	CT	13.70	146.42	2306.6	7.69	1972	2.84	29.00	656.0	1.89	12.49
	40	.35	CS	7.63	71.09	2613.6	6.45	1975	2.34	20.71	646.4	1.90	12.94
	40	.35	HT	7.12	37.31	2180.2	7.94						
BASIC TIMING UP 5 DEGREES	40	.40	HT	8.18	34.62	1987.3	9.31	HTST	3.70	12.18	578.8	2.61	14.56
	40	.40	HS	19.58	56.75	2354.1	10.26						
RLHP UP TO COAST DOWN VALUE	40	.50	CT	11.93	115.01	2437.8	8.39	1972	3.08	27.39	709.3	2.02	11.65
	40	.50	CS	11.21	90.39	2882.0	6.78	1975	2.73	21.02	691.3	2.06	12.12
	40	.50	HT	7.23	31.27	2201.0	8.89						
BASELINE REPEAT	40	.50	HT	6.58	32.84	2024.9	8.08	HTST	1.86	10.69	596.4	2.07	14.34
	40	.50	HS	7.34	47.36	2448.4	7.44						
IDLE CO UP 1.0 PERCENT	70	1.50	HT	19.13	79.12	2100.0	9.27	HTST	3.80	30.91	597.9	2.33	13.48
	70	1.50	HS	9.36	152.69	2384.0	8.23						

COAST DOWN ROAD LOAD HORSEPOWER = 15.90
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 16.70
ACTUAL VEHICLE WEIGHT, POUNDS = 3675
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
19	74	PONT	FIRE	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	55	.25	CT	13.60	130.39	3240.9	5.53	1972	2.77	23.75	868.3	1.20	9.71
	55	.25	CS	7.18	47.73	3271.3	3.43	1975	2.46	17.30	824.1	1.13	10.34
	55	.25	HT	9.50	45.56	2659.1	4.63	HTST	2.26	12.33	770.5	1.01	11.14
	55	.25	HS	7.42	46.93	3119.7	2.95						
IDLE RPM DECREASED 100 RPM	10	.10	HT	5.59	16.88	2602.5	5.00	HTST	1.70	6.11	766.5	1.13	11.36
	10	.10	HS	7.13	28.98	3146.1	3.49						
INERTIA INCREASED TO GVW	40	.10	CT	10.13	109.45	3361.1	6.83	1972	2.10	18.74	905.5	1.50	9.43
	40	.10	CS	5.64	31.08	3430.0	4.41	1975	1.98	13.64	861.6	1.48	9.99
	40	.10	HT	8.54	42.38	2783.6	6.55						
BASIC TIMING UP 5 DEGREES	100	.10	HT	9.02	15.01	2341.4	5.11	HTST	2.32	6.10	697.5	1.17	12.43
	100	.10	HS	8.34	30.75	2889.9	3.67						
RLHP UP TO COAST DOWN VALUE	40	.10	CT	10.69	60.82	3233.7	5.55	1972	2.15	10.53	885.2	1.22	9.77
	40	.10	CS	5.40	18.14	3405.4	3.56	1975	1.77	7.76	844.5	1.21	10.30
	40	.10	HT	5.77	24.34	2697.8	5.53						
BASELINE REPEAT	40	.10	HT	4.61	14.25	2557.2	4.72	HTST	1.35	4.24	772.5	1.14	11.33
	40	.10	HS	5.49	17.53	3236.4	3.81						
IDLE CO UP 1.0 PERCENT	100	1.20	HT	5.99	40.05	2500.2	5.86	HTST	1.74	10.29	741.4	1.32	11.63
	100	1.20	HS	7.06	37.12	3060.5	4.00						

COAST DOWN ROAD LOAD HORSEPOWER = 15.30
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 19.20
ACTUAL VEHICLE WEIGHT, POUNDS = 4165
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
20	74	TOYO	CORO	96

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	60	.90	CT	8.09	76.91	1444.7	13.43	1972	1.64	15.79	418.6	2.47	19.79
	60	.90	CS	4.19	41.52	1694.8	5.13	1975	1.36	12.60	406.1	2.25	20.64
	60	.90	HT	4.49	34.90	1279.8	10.45	HTST	1.11	9.72	395.8	2.06	21.42
	60	.90	HS	3.83	37.99	1688.5	5.02						
IDLE RPM DECREASED 100 RPM	40	.80	HT	5.06	45.70	1251.3	11.07	HTST	1.20	11.01	383.1	2.14	21.97
	40	.80	HS	3.91	36.85	1622.1	4.94						
INERTIA INCREASED TO GVW	60	.90	CT	9.62	90.99	1495.3	14.99	1972	1.94	18.25	434.9	2.92	18.90
	60	.90	CS	4.91	45.86	1766.2	6.90	1975	1.65	14.93	423.5	2.72	19.64
	60	.90	HT	5.78	47.35	1345.9	12.33						
BASIC TIMING UP 5 DEGREES	100	.60	HT	6.57	62.40	1308.6	14.76	HTST	1.61	15.22	395.2	3.13	20.93
	100	.60	HS	5.49	51.76	1655.7	8.73						
RLHP UP TO COAST DOWN VALUE	100	.60	CT	8.00	75.56	1499.6	15.02	1972	1.60	15.57	431.1	2.73	19.28
	100	.60	CS	4.02	41.22	1733.3	5.47	1975	1.34	13.00	425.0	2.55	19.75
	100	.60	HT	4.54	41.73	1419.5	12.56						
BASELINE REPEAT	100	.60	HT	5.03	41.95	1294.4	10.04	HTST	1.16	10.51	391.7	1.96	21.55
	100	.60	HS	3.69	36.88	1643.4	4.65						
IDLE CO UP 1.0 PERCENT	32	1.90	HT	4.06	41.12	1298.2	9.58	HTST	1.04	10.59	399.1	1.89	21.19
	32	1.90	HS	3.70	38.31	1695.4	4.57						

COAST DOWN ROAD LOAD HORSEPOWER = 13.70
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 8.80
ACTUAL VEHICLE WEIGHT, POUNDS = 2435
BASELINE RLHP = 8.8
BASELINE INERTIA = 2250

VEH	YEAR	MAKE	MODEL	CID
21	73	BUIC	CENT	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	70	.40	CT	9.02	101.60	2766.2	12.14	1972	2.28	20.95	751.3	2.56	11.22
	70	.40	CS	8.11	55.49	2868.7	7.04	1975	2.14	15.94	714.9	2.56	11.89
	70	.40	HT	7.15	35.79	2287.1	12.15	HTST	2.05	11.12	676.4	2.53	12.68
	70	.40	HS	8.20	47.58	2786.0	6.82						
IDLE RPM DECREASED 100 RPM	70	.40	HT	7.86	54.56	2208.9	11.74	HTST	2.22	16.04	634.9	2.45	13.31
	70	.40	HS	8.82	65.76	2552.8	6.60						
INERTIA INCREASED TO GVW	70	.40	CT	10.63	117.99	2889.0	13.23	1972	2.76	21.16	852.2	3.13	9.93
	70	.40	CS	10.04	40.70	3502.7	10.24	1975	2.49	14.55	818.7	3.15	10.45
	70	.40	HT	7.15	30.97	2448.5	13.51						
BASIC TIMING UP 5 DEGREES	75	.30	HT	5.65	26.18	2346.7	10.20	HTST	1.75	6.91	690.0	2.16	12.57
	75	.30	HS	7.46	25.64	2828.2	6.03						
RLHP UP TO COAST DOWN VALUE	70	.40	CT	10.99	141.84	2860.8	11.64	1972	2.51	24.40	785.5	2.56	10.67
	70	.40	CS	7.85	41.15	3030.5	7.54	1975	2.19	16.00	755.4	2.67	11.28
	70	.40	HT	6.81	31.31	2464.7	13.17						
BASELINE REPEAT	70	.40	HT	6.49	32.16	2289.2	11.26	HTST	1.98	10.21	683.6	2.36	12.58
	70	.40	HS	8.35	44.42	2838.1	6.41						
IDLE CO UP 1.0 PERCENT	80	1.40	HT	5.91	56.58	2383.0	10.56	HTST	1.84	21.14	688.6	2.24	12.20
	80	1.40	HS	7.89	101.99	2781.8	6.22						

COAST DOWN ROAD LOAD HORSEPOWER = 18.70
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 7.70
ACTUAL VEHICLE WEIGHT, POUNDS = 4255
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
22	73	CHEV	VEGA	140

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	.20	CT	16.32	182.20	1542.1	9.44	1972	3.36	42.81	421.0	2.06	17.79
	50	.20	CS	8.25	138.91	1615.7	5.99	1975	2.80	35.60	402.4	1.96	19.01
	50	.20	HT	9.56	87.26	1297.3	8.18	HTST	2.38	31.95	373.5	1.78	20.59
	50	.20	HS	8.32	152.39	1503.9	5.18						
IDLE RPM DECREASED 100 RPM	210	7.00	HT	9.38	99.26	1297.9	8.03	HTST	3.13	38.69	358.0	1.73	20.71
	210	7.00	HS	14.12	190.91	1387.1	4.93						
INERTIA INCREASED TO GVW	150	.20	CT	12.58	155.43	1698.6	8.57	1972	2.65	33.81	460.2	1.90	17.02
	150	.20	CS	7.27	98.13	1752.9	5.65	1975	2.37	26.74	446.4	1.83	17.91
	150	.20	HT	8.99	62.49	1517.2	7.74						
BASIC TIMING UP 5 DEGREES	130	.70	HT	6.98	51.16	1374.6	7.74	HTST	2.00	24.58	384.0	1.65	20.70
	130	.70	HS	8.00	133.16	1505.7	4.63						
RLHP UP TO COAST DOWN VALUE	130	.20	CT	10.72	163.54	1804.9	9.42	1972	2.33	38.36	484.4	1.97	16.08
	130	.20	CS	6.77	124.17	1827.9	5.33	1975	2.19	31.71	469.6	1.89	16.87
	130	.20	HT	8.86	76.08	1610.5	8.41						
BASELINE REPEAT	130	.20	HT	5.71	94.45	1429.4	6.14	HTST	1.84	38.42	400.7	1.35	19.02
	130	.20	HS	8.08	193.70	1575.5	3.95						
IDLE CO UP 1.0 PERCENT	120	1.20	HT	5.09	82.65	1515.0	6.54	HTST	1.77	37.85	422.3	1.43	18.22
	120	1.20	HS	8.16	201.26	1652.0	4.19						

COAST DOWN ROAD LOAD HORSEPOWER = 13.00
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 7.80
ACTUAL VEHICLE WEIGHT, POUNDS = 2670
BASELINE RLHP = 9.4
BASELINE INERTIA = 2500

VEH	YEAR	MAKE	MODEL	CID
23	73	CHEV	NOVA	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	85	.50	CT	18.98	146.59	2394.2	9.51	1972	3.77	28.27	673.0	2.14	12.17
	85	.50	CS	9.29	65.40	2653.2	6.52	1975	3.00	21.18	651.7	2.18	12.79
	85	.50	HT	8.87	53.42	2114.5	10.04	HTST	2.48	16.01	624.5	2.20	13.50
	85	.50	HS	9.70	66.68	2568.9	6.49						
IDLE RPM DECREASED 100 RPM	80	.30	HT	8.50	67.06	2053.9	9.43	HTST	2.47	18.59	610.7	2.05	13.71
	80	.30	HS	10.06	72.39	2526.5	5.96						
INERTIA INCREASED TO GVW	80	.50	CT	20.91	203.37	2482.1	10.45	1972	4.21	41.86	731.7	2.49	10.95
	80	.50	CS	10.68	110.60	3006.0	8.20	1975	3.38	34.00	718.8	2.63	11.34
	80	.50	HT	9.90	99.86	2311.8	12.32						
BASIC TIMING UP 5 DEGREES	125	.70	HT	9.56	62.67	2100.4	11.89	HTST	2.81	17.47	624.4	2.62	13.44
	125	.70	HS	11.51	68.38	2582.6	7.75						
RLHP UP TO COAST DOWN VALUE	50	.30	CT	23.41	173.40	2400.0	10.24	1972	4.52	36.74	374.1	2.15	11.78
	50	.30	CS	10.46	102.12	406.1	5.85	1975	3.41	29.22	220.2	2.20	12.39
	50	.30	HT	8.89	74.47	374.7	10.92						
BASELINE REPEAT	50	.30	HT	9.67	83.77	2085.9	9.37	HTST	2.86	21.84	606.0	2.02	13.67
	50	.30	HS	11.80	80.06	2458.9	5.80						
IDLE CO UP 1.0 PERCENT	140	1.50	HT	8.78	92.05	2065.0	8.59	HTST	2.61	25.84	608.0	1.85	13.52
	140	1.50	HS	10.80	101.73	2495.2	5.31						

COAST DOWN ROAD LOAD HORSEPOWER = 14.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 12.30
ACTUAL VEHICLE WEIGHT, POUNDS = 3925
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
24	73	DODG	CHAL	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	60	.50	CT	15.12	227.15	2157.0	9.09	1972	3.58	56.62	582.0	2.13	13.01
	60	.50	CS	11.70	197.47	2207.8	6.89	1975	3.27	53.68	553.8	2.11	13.69
	60	.50	HT	11.15	188.49	1785.9	8.79	HTST	2.87	48.29	529.8	2.09	14.44
	60	.50	HS	10.36	173.65	2187.8	6.89						
IDLE RPM DECREASED 100 RPM	100	2.60	HT	10.70	181.00	1801.7	9.31	HTST	2.89	48.48	518.9	2.12	14.69
	100	2.60	HS	10.96	182.62	2090.0	6.57						
INERTIA INCREASED TO GVW	100	.50	CT	16.48	205.11	2272.2	10.30	1972	3.83	52.67	626.3	2.43	12.31
	100	.50	CS	12.22	189.95	2425.2	7.93	1975	3.42	52.08	595.9	2.39	12.90
	100	.50	HT	11.17	197.33	1871.4	9.75						
BASIC TIMING UP 5 DEGREES	80	.60	HT	9.53	148.30	1746.8	10.95	HTST	2.52	36.32	517.0	2.56	15.25
	80	.60	HS	9.40	124.08	2130.6	8.28						
RLHP UP TO COAST DOWN VALUE	130	.50	CT	14.60	194.41	2284.8	10.78	1972	3.29	45.93	623.3	2.44	12.58
	130	.50	CS	10.09	150.08	2390.3	7.54	1975	2.95	44.63	600.6	2.42	13.06
	130	.50	HT	10.11	177.31	1985.7	10.44						
BASELINE REPEAT	130	.50	HT	9.10	150.56	1832.9	8.49	HTST	2.32	36.18	547.6	2.07	14.51
	130	.50	HS	8.31	120.76	2274.3	7.00						
IDLE CO UP 1.0 PERCENT	70	1.50	HT	10.23	199.05	1900.5	9.30	HTST	2.79	55.41	549.7	2.12	13.75
	70	1.50	HS	10.68	216.54	2222.1	6.63						

COAST DOWN ROAD LOAD HORSEPOWER = 16.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 17.50
ACTUAL VEHICLE WEIGHT, POUNDS = 3860
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
25	73	FORD	PINT	122

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	1.50	CT	25.33	187.58	1184.6	12.82	1972	9.06	68.16	322.5	2.51	19.37
	50	1.50	CS	42.65	323.64	1233.8	6.00	1975	8.88	63.92	312.5	2.50	20.14
	50	1.50	HT	22.85	131.69	1053.5	12.75	HTST	8.74	60.73	290.2	2.48	21.48
	50	1.50	HS	42.73	323.82	1123.1	5.82						
IDLE RPM DECREASED 100 RPM	50	2.00	HT	23.71	111.32	1118.1	13.11	HTST	9.42	52.32	306.8	2.64	21.20
	50	2.00	HS	46.93	281.09	1182.8	6.66						
INERTIA INCREASED TO GVW	110	1.50	CT	23.92	182.79	1229.4	14.59	1972	8.59	63.88	326.3	2.94	19.56
	110	1.50	CS	40.51	296.28	1217.5	7.45	1975	8.44	59.65	315.3	2.94	20.38
	110	1.50	HT	21.92	127.14	1084.6	14.61						
BASIC TIMING UP 5 DEGREES	200	4.70	HT	28.68	145.29	981.9	15.11	HTST	10.97	64.98	270.5	2.91	21.80
	200	4.70	HS	53.57	342.04	1046.5	6.70						
RLHP UP TO COAST DOWN VALUE	110	1.50	CT	22.79	206.87	1297.6	15.51	1972	8.09	67.48	347.1	3.04	18.55
	110	1.50	CS	37.88	299.26	1305.3	7.25	1975	7.95	61.34	338.9	3.16	19.29
	110	1.50	HT	21.00	126.01	1189.9	17.20						
BASELINE REPEAT	110	1.50	HT	22.83	146.20	1030.2	12.87	HTST	8.61	61.20	292.9	2.53	21.32
	110	1.50	HS	41.76	312.77	1166.9	6.12						
IDLE CO UP 1.0 PERCENT	90	2.50	HT	21.26	172.21	1050.3	12.43	HTST	9.18	73.74	299.3	2.44	19.99
	90	2.50	HS	47.59	380.87	1194.1	5.89						

COAST DOWN ROAD LOAD HORSEPOWER = 13.50
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 15.50
ACTUAL VEHICLE WEIGHT, POUNDS = 2575
BASELINE RLHP = 9.9
BASELINE INERTIA = 2750

VEH	YEAR	MAKE	MODEL	CID
26	73	FORD	TORI	351

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	190	.40	CT	13.46	127.51	2481.1	18.25	1972	3.05	26.33	718.4	3.71	11.54
	190	.40	CS	9.42	69.97	2907.2	9.61	1975	2.79	21.00	695.3	3.84	12.05
	190	.40	HT	10.04	57.38	2177.1	19.91	HTST	2.64	14.99	660.7	3.98	12.82
	190	.40	HS	9.78	55.06	2778.0	9.91						
IDLE RPM DECREASED 100 RPM	190	.40	HT	11.35	71.82	2114.4	18.22	HTST	2.94	17.37	643.5	3.68	13.05
	190	.40	HS	10.67	58.47	2711.9	9.34						
INERTIA INCREASED TO GVW	190	.40	CT	12.08	139.73	2645.5	19.92	1972	2.93	29.25	763.4	4.34	10.85
	190	.40	CS	9.88	79.65	3079.7	12.64	1975	2.76	24.75	738.0	4.46	11.30
	190	.40	HT	9.82	80.55	2312.5	21.53						
BASIC TIMING UP 5 DEGREES	265	.20	HT	9.90	53.40	2094.7	23.41	HTST	2.71	14.72	623.8	4.69	13.54
	265	.20	HS	10.43	57.03	2583.8	11.75						
RLHP UP TO COAST DOWN VALUE	190	.40	CT	12.16	103.00	2504.3	26.04	1972	2.98	25.91	714.8	5.06	11.61
	190	.40	CS	10.22	91.29	2856.4	11.94	1975	2.80	22.45	699.9	5.14	11.94
	190	.40	HT	9.75	57.54	2308.6	27.05						
BASELINE REPEAT	190	.40	HT	8.75	57.21	2179.2	21.69	HTST	2.48	16.21	663.6	4.39	12.74
	190	.40	HS	9.82	64.39	2797.8	11.24						
IDLE CO UP 1.0 PERCENT	300	1.40	HT	10.16	92.47	2147.1	21.26	HTST	2.91	28.23	631.5	4.28	12.96
	300	1.40	HS	11.68	119.29	2589.2	10.81						

COAST DOWN ROAD LOAD HORSEPOWER = 19.30
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 22.40
ACTUAL VEHICLE WEIGHT, POUNDS = 4440
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
27	73	OLDS	CUTL	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	65	.50	CT	11.82	112.30	2728.8	18.95	1972	2.70	23.04	774.8	3.81	10.83
	65	.50	CS	8.41	60.53	3081.9	9.65	1975	2.38	17.68	750.8	3.32	11.30
	65	.50	HT	7.60	41.71	2414.1	12.46	HTST	2.08	12.53	721.9	2.89	11.87
	65	.50	HS	7.97	52.23	3000.5	9.23						
IDLE RPM DECREASED 100 RPM	110	1.00	HT	8.71	54.73	2309.5	10.54	HTST	2.27	18.73	697.0	2.57	12.10
	110	1.00	HS	8.33	85.78	2918.2	8.76						
INERTIA INCREASED TO GVW	85	.50	CT	11.99	95.77	2758.9	21.50	1972	2.89	22.98	783.8	4.69	10.71
	85	.50	CS	9.67	76.55	3119.3	13.64	1975	2.58	19.68	760.8	4.12	11.10
	85	.50	HT	7.93	52.41	2456.9	14.06						
BASIC TIMING UP 5 DEGREES	90	.30	HT	8.36	40.80	2250.1	14.39	HTST	2.51	14.96	675.2	3.52	12.56
	90	.30	HS	10.44	71.41	2813.8	11.98						
RLHP UP TO COAST DOWN VALUE	80	.50	CT	12.60	118.39	2890.8	15.94	1972	2.99	25.76	796.8	3.64	10.49
	80	.50	CS	9.84	74.79	3085.2	11.37	1975	2.72	20.39	761.7	4.41	11.07
	80	.50	HT	9.08	47.74	2428.6	26.04						
BASELINE REPEAT	80	.50	HT	7.88	52.45	2496.4	13.77	HTST	2.19	14.74	739.9	3.18	11.53
	80	.50	HS	8.51	58.08	3053.1	10.10						
IDLE CO UP 1.0 PERCENT	100	1.50	HT	8.12	60.02	2422.3	21.67	HTST	2.38	24.06	719.0	4.56	11.62
	100	1.50	HS	9.74	120.45	2969.8	12.53						

COAST DOWN ROAD LOAD HORSEPOWER = 17.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 14.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4330
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
28	73	PLYM	FURY	360

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	20	.50	CT	13.45	185.89	2645.1	18.00	1972	2.37	27.94	771.0	4.08	10.80
	20	.50	CS	4.32	23.69	3137.5	12.60	1975	1.71	16.02	752.4	4.30	11.34
	20	.50	HT	4.83	28.95	2399.8	20.91	HTST	1.20	7.53	733.6	4.45	11.85
	20	.50	HS	4.17	27.49	3101.9	12.49						
IDLE RPM DECREASED 100 RPM	15	.10	HT	3.34	24.19	2515.1	17.03	HTST	.90	6.84	760.6	4.00	11.47
	15	.10	HS	3.38	27.09	3189.7	12.97						
INERTIA INCREASED TO GVW	15	.10	CT	11.54	188.22	2839.4	20.75	1972	2.16	28.57	829.3	5.08	10.08
	15	.10	CS	4.69	26.05	3380.1	17.32	1975	1.66	17.94	805.8	5.26	10.58
	15	.10	HT	4.95	48.32	2530.8	23.14						
BASIC TIMING UP 5 DEGREES	10	.25	HT	5.97	51.37	2371.8	24.85	HTST	1.50	13.91	702.7	5.20	12.17
	10	.25	HS	5.25	52.99	2898.2	14.16						
RLHP UP TO COAST DOWN VALUE	10	.10	CT	48.86	457.88	2695.6	21.19	1972	7.17	65.63	790.0	4.86	9.69
	10	.10	CS	4.88	34.32	3229.5	15.28	1975	3.80	34.29	779.3	5.06	10.51
	10	.10	HT	4.57	45.55	2555.0	23.75						
BASELINE REPEAT	80	.20	HT	7.24	24.37	2286.4	18.50	HTST	1.54	6.12	728.0	4.26	11.96
	80	.20	HS	4.29	21.54	3173.9	13.46						
IDLE CO UP 1.0 PERCENT	90	1.50	HT	6.65	55.01	2406.6	19.41	HTST	1.22	20.66	723.6	4.19	11.68
	90	1.50	HS	2.48	99.94	3020.5	12.02						

COAST DOWN ROAD LOAD HORSEPOWER = 17.40
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 11.80
ACTUAL VEHICLE WEIGHT, POUNDS = 4485
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
29	73	PONT	CATA	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GPAMS/MILE HC	GPAMS/MILE CO	GPAMS/MILE CO2	GPAMS/MILE NOXC	MPG
BASELINE	80	.80	CT	10.23	164.45	2886.8	13.56	1972	2.67	35.83	764.3	4.85	10.71
	80	.80	CS	9.81	104.25	2845.4	22.81	1975	2.49	28.08	723.3	5.49	11.46
	80	.80	HT	7.83	62.57	2346.9	21.97	HTST	1.92	20.61	696.6	4.36	12.08
	80	.80	HS	6.55	91.99	2877.5	10.70						
IDLE RPM DECREASED 100 RPM	60	.50	HT	13.82	67.76	2149.0	28.04	HTST	3.37	21.86	616.1	4.94	13.43
	60	.50	HS	11.47	96.16	2471.5	8.99						
INERTIA INCREASED TO GVW	80	1.00	CT	14.42	209.10	2860.9	15.76	1972	3.30	42.42	760.3	4.79	10.60
	80	1.00	CS	10.32	109.05	2841.4	20.20	1975	2.38	30.47	722.3	5.21	11.42
	80	1.00	HT	2.35	51.88	2361.4	21.27						
BASIC TIMING UP 5 DEGREES	80	.80	HT	13.00	64.60	2249.7	25.21	HTST	3.62	19.66	659.6	4.81	12.65
	80	.80	HS	14.17	82.82	2697.2	10.86						
RLHP UP TO COAST DOWN VALUE	60	.60	CT	10.09	193.50	2845.0	17.80	1972	2.81	38.56	749.0	5.24	10.85
	60	.60	CS	11.01	95.69	2772.1	21.52	1975	2.72	27.79	711.1	5.73	11.63
	60	.60	HT	8.87	51.80	2346.7	24.27						
BASELINE REPEAT	60	.60	HT	9.82	85.11	2311.8	30.38	HTST	2.85	25.55	665.9	6.79	12.42
	60	.60	HS	11.56	106.53	2682.4	20.58						
IDLE CO UP 1.0 PERCENT	120	1.80	HT	8.72	72.10	2214.7	25.43	HTST	2.51	26.67	658.9	4.97	12.53
	120	1.80	HS	10.07	127.91	2726.9	11.81						

COAST DOWN ROAD LOAD HORSEPOWER = 16.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 15.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4910
BASELINE RLHP = 13.4
BASELINE INERTIA = 5000

VEH	YEAR	MAKE	MODEL	CID
30	72	CHEV	CONC	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	.10	CT	11.78	124.40	2719.4	13.59	1972	2.23	21.74	763.0	2.73	11.04
	50	.10	CS	4.95	38.68	3003.1	6.91	1975	1.72	14.87	729.8	2.68	11.71
	50	.10	HT	5.02	33.94	2282.1	12.87	HTST	1.28	9.52	682.9	2.64	12.65
	50	.10	HS	4.58	37.43	2839.3	6.94						
IDLE RPM DECREASED 100 RPM	105	.10	HT	8.25	35.59	2083.2	12.53	HTST	2.10	9.94	626.1	2.52	13.69
	105	.10	HS	7.49	38.98	2612.4	6.35						
INERTIA INCREASED TO GVW	50	.10	CT	13.04	131.48	2748.4	17.78	1972	2.45	24.00	788.8	3.46	10.64
	50	.10	CS	5.37	48.49	3167.5	8.20	1975	1.91	16.95	759.1	3.48	11.22
	50	.10	HT	5.90	38.81	2357.5	17.99						
BASIC TIMING UP 5 DEGREES	80	.10	HT	5.70	28.32	2074.6	18.62	HTST	1.62	7.92	622.2	3.52	13.88
	80	.10	HS	6.44	31.07	2592.1	7.75						
RLHP UP TO COAST DOWN VALUE	50	.10	CT	11.66	100.80	2792.6	15.70	1972	2.22	18.92	769.5	2.98	11.01
	50	.10	CS	5.02	41.08	2978.8	6.68	1975	1.75	13.68	739.9	2.98	11.58
	50	.10	HT	5.39	31.92	2403.4	15.63						
BASELINE REPEAT	50	.10	HT	6.58	38.44	2159.5	11.92	HTST	1.48	10.08	654.7	2.47	13.15
	50	.10	HS	4.49	37.16	2750.4	6.61						
IDLE CO UP 1.0 PERCENT	100	1.10	HT	4.77	46.67	2116.1	12.43	HTST	1.26	14.61	644.9	2.53	13.22
	100	1.10	HS	4.65	62.91	2720.5	6.54						

COAST DOWN ROAD LOAD HORSEPOWER = 17.40
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4350
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
31	72	CHEV	CAPR	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	40	.10	CT	8.61	97.79	2897.9	19.14	1972	1.62	17.02	848.1	3.81	10.09
	40	.10	CS	3.57	29.89	3462.8	9.42	1975	1.39	13.58	824.5	3.73	10.45
	40	.10	HT	5.59	52.49	2587.6	18.17	HTST	1.22	11.26	777.9	3.68	11.11
	40	.10	HS	3.57	31.97	3246.5	9.41						
IDLE RPM DECREASED 100 RPM	90	.10	HT	7.56	62.47	2427.7	17.46	HTST	1.71	13.27	733.3	3.47	11.69
	90	.10	HS	5.23	37.04	3072.3	8.56						
INERTIA INCREASED TO GVW	70	.10	CT	9.76	129.54	2989.3	22.29	1972	1.95	23.93	861.8	4.70	9.80
	70	.10	CS	4.87	49.90	3474.0	12.97	1975	1.73	20.32	830.5	4.62	10.23
	70	.10	HT	6.81	82.06	2577.5	21.19						
BASIC TIMING UP 5 DEGREES	70	.10	HT	6.74	53.28	2347.2	19.48	HTST	1.10	12.14	701.6	3.88	12.26
	70	.10	HS	1.51	37.79	2914.7	9.58						
RLHP UP TO COAST DOWN VALUE	70	.10	CT	9.27	127.28	3030.4	24.01	1972	1.81	21.50	853.4	4.63	9.94
	70	.10	CS	4.30	33.95	3370.1	10.74	1975	1.60	17.19	827.6	4.60	10.33
	70	.10	HT	6.54	70.57	2691.2	23.60						
BASELINE REPEAT	50	.10	HT	5.90	57.63	2508.5	19.82	HTST	1.35	13.02	757.3	3.99	11.35
	50	.10	HS	4.25	40.03	3171.1	10.12						
IDLE CO UP 1.0 PERCENT	90	1.10	HT	4.95	63.49	2416.5	18.45	HTST	1.25	14.58	741.4	3.67	11.56
	90	1.10	HS	4.41	45.87	3144.1	9.10						

COAST DOWN ROAD LOAD HORSEPOWER = 18.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 17.10
ACTUAL VEHICLE WEIGHT, POUNDS = 4720
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
32	72	DODG	CORO	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	.50	CT	11.39	228.44	2248.4	19.61	1972	2.35	42.67	648.7	4.11	12.28
	50	.50	CS	6.27	91.58	2616.6	11.22	1975	1.98	30.39	632.1	4.26	12.94
	50	.50	HT	6.47	66.83	2030.0	21.59	HTST	1.65	21.02	611.4	4.32	13.67
	50	.50	HS	5.91	90.80	2555.2	10.82						
IDLE RPM DECREASED 100 RPM	60	.40	HT	7.99	82.60	1959.6	20.95	HTST	2.08	29.87	582.2	4.18	13.97
	60	.40	HS	7.64	141.40	2406.9	10.42						
INERTIA INCREASED TO GVW	20	.50	CT	16.51	264.49	2547.4	22.04	1972	3.46	55.19	708.5	5.09	11.01
	20	.50	CS	9.45	149.42	2766.7	16.13	1975	2.92	43.26	661.1	5.06	12.03
	20	.50	HT	9.33	107.60	1922.9	21.65						
BASIC TIMING UP 5 DEGREES	140	.80	HT	8.33	73.46	2035.0	28.47	HTST	2.30	23.90	581.0	5.69	14.19
	140	.80	HS	8.92	105.78	2322.2	14.17						
RLHP UP TO COAST DOWN VALUE	20	.50	CT	13.42	244.47	2483.3	24.77	1972	2.84	47.42	692.9	5.04	11.44
	20	.50	CS	7.89	111.17	2713.6	13.02	1975	2.42	35.09	675.3	5.22	12.03
	20	.50	HT	7.88	82.31	2251.3	27.21						
BASELINE REPEAT	20	.50	HT	7.54	76.60	2006.3	20.53	HTST	1.98	24.48	599.5	4.24	13.78
	20	.50	HS	7.32	107.02	2490.2	11.24						
IDLE CO UP 1.0 PERCENT	50	1.50	HT	7.52	96.12	2020.1	21.11	HTST	2.04	33.33	609.1	4.30	13.29
	50	1.50	HS	7.79	153.86	2548.0	11.11						

COAST DOWN ROAD LOAD HORSEPOWER = 17.40
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 14.40
ACTUAL VEHICLE WEIGHT, POUNDS = 4330
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
33	72	FORD	LTD	400

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	.40	CT	37.38	94.62	2517.5	17.13	1972	5.74	24.37	755.4	3.55	10.94
	100	.40	CS	5.64	88.13	3148.1	9.52	1975	3.69	22.80	740.5	3.86	11.27
	100	.40	HT	10.44	73.96	2321.3	21.14	HTST	2.18	21.27	713.9	4.11	11.77
	100	.40	HS	5.89	85.59	3033.3	9.66						
IDLE RPM DECREASED 100 RPM	100	1.80	HT	6.93	81.99	2172.6	20.78	HTST	1.84	31.56	659.7	4.04	12.42
	100	1.80	HS	6.89	154.70	2775.3	9.49						
INERTIA INCREASED TO GVW	100	.40	CT	41.09	287.46	2563.1	19.27	1972	6.33	54.27	762.8	4.03	10.23
	100	.40	CS	6.40	119.58	3157.6	10.93	1975	3.79	37.75	745.4	4.18	10.87
	100	.40	HT	7.59	70.07	2335.0	21.33						
BASIC TIMING UP 5 DEGREES	110	2.80	HT	7.72	77.08	2122.4	18.97	HTST	2.08	29.93	645.1	3.94	12.71
	110	2.80	HS	7.92	147.36	2716.0	10.59						
RLHP UP TO COAST DOWN VALUE	50	.50	CT	32.40	295.87	2688.6	18.31	1972	4.97	50.70	818.8	3.94	9.71
	50	.50	CS	4.90	84.36	3452.1	11.25	1975	3.17	32.89	808.9	4.28	10.20
	50	.50	HT	8.63	61.59	2559.1	22.72						
BASELINE REPEAT	50	.50	HT	5.70	49.41	2310.8	20.82	HTST	1.30	13.62	738.4	4.28	11.62
	50	.50	HS	4.08	52.71	3226.8	11.28						
IDLE CO UP 1.0 PERCENT	80	1.40	HT	7.84	103.19	2395.2	19.80	HTST	2.04	35.42	750.3	4.12	10.93
	80	1.40	HS	7.47	162.46	3232.1	11.07						

COAST DOWN ROAD LOAD HORSEPOWER = 17.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 12.20
ACTUAL VEHICLE WEIGHT, POUNDS = 4600
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
34	72	OLDS	98	455

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	25	.10	CT	7.98	72.53	2997.3	18.66	1972	1.73	13.13	852.7	4.05	10.10
	25	.10	CS	4.97	25.92	3397.8	11.68	1975	1.65	9.08	811.6	4.27	10.69
	25	.10	HT	7.01	19.25	2456.5	21.58	HTST	1.62	5.00	779.8	4.61	11.20
	25	.10	HS	5.12	18.28	3392.1	13.01						
IDLE RPM DECREASED 100 RPM	25	.10	HT	5.94	16.53	2423.7	20.25	HTST	1.55	5.75	753.5	4.43	11.57
	25	.10	HS	5.71	26.61	3227.4	12.99						
INERTIA INCREASED TO GVW	25	.10	CT	7.74	74.50	3002.3	19.50	1972	1.63	12.65	860.8	4.28	10.02
	25	.10	CS	4.45	20.38	3453.6	12.64	1975	1.60	8.47	824.3	4.51	10.54
	25	.10	HT	7.46	19.51	2522.3	22.48						
BASIC TIMING UP 5 DEGREES	70	.15	HT	5.78	15.76	2204.9	24.25	HTST	1.60	4.31	681.0	5.14	12.81
	70	.15	HS	6.21	16.59	2902.8	14.28						
RLHP UP TO COAST DOWN VALUE	70	.20	CT	7.44	81.97	3124.9	23.56	1972	1.59	13.97	883.7	5.04	9.75
	70	.20	CS	4.48	22.78	3502.6	14.27	1975	1.56	9.22	847.0	5.30	10.25
	70	.20	HT	7.10	19.49	2642.5	26.95						
BASELINE REPEAT	70	.15	HT	6.10	19.37	2495.3	20.32	HTST	1.48	5.34	756.0	4.56	11.54
	70	.15	HS	4.99	20.65	3175.0	13.91						
IDLE CO UP 1.0 PERCENT	80	1.10	HT	4.95	42.85	2424.8	22.29	HTST	1.52	15.78	755.2	4.96	11.31
	80	1.10	HS	6.45	75.50	3239.3	14.87						

COAST DOWN ROAD LOAD HORSEPOWER = 20.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 17.30
ACTUAL VEHICLE WEIGHT, POUNDS = 5090
BASELINE RLHP = 13.4
BASELINE INERTIA = 5000

VEH	YEAR	MAKE	MODEL	CID
35	72	PLYM	SATE	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	90	.50	CT	12.77	202.57	2153.2	20.52	1972	2.92	53.96	610.7	4.31	12.63
	90	.50	CS	9.16	202.14	2427.1	11.83	1975	2.55	46.47	597.8	4.41	13.08
	90	.50	HT	7.85	103.94	1982.7	21.78	HTST	2.26	40.36	581.5	4.33	13.62
	90	.50	HS	9.06	198.76	2378.2	10.67						
IDLE RPM DECREASED 100 RPM	600	2.50	HT	9.73	118.52	1824.6	21.25	HTST	2.46	40.00	544.2	4.20	14.44
	600	2.50	HS	8.75	181.47	2257.0	10.21						
INERTIA INCREASED TO GVW	50	.50	CT	13.34	209.22	2403.7	24.12	1972	2.83	40.91	687.9	5.34	11.66
	50	.50	CS	7.86	97.63	2755.7	15.94	1975	2.50	32.11	672.1	5.43	12.16
	50	.50	HT	9.02	93.41	2195.6	25.27						
BASIC TIMING UP 5 DEGREES	30	.30	HT	8.91	70.11	2013.9	26.02	HTST	2.21	20.76	583.1	5.08	14.26
	30	.30	HS	7.66	85.58	2359.3	12.09						
RLHP UP TO COAST DOWN VALUE	20	.20	CT	10.70	154.85	2409.0	28.78	1972	2.39	32.15	669.7	5.70	12.20
	20	.20	CS	7.20	86.29	2613.7	13.93	1975	2.17	25.16	652.9	5.77	12.70
	20	.20	HT	7.78	62.89	2188.2	29.77						
BASELINE REPEAT	20	.20	HT	5.21	64.07	2028.4	23.06	HTST	1.58	21.60	599.6	4.52	13.91
	20	.20	HS	6.60	97.96	2468.3	10.81						
IDLE CO UP 1.0 PERCENT	60	1.50	HT	8.05	89.28	2017.0	23.84	HTST	2.16	33.07	595.4	4.77	13.57
	60	1.50	HS	8.18	158.77	2448.6	11.92						

COAST DOWN ROAD LOAD HORSEPOWER = 17.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 11.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4365
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
36	72	PONT	CATA	455

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	50	1.10	CT	12.59	289.43	2955.4	18.15	1972	3.10	73.15	831.9	3.70	9.28
	50	1.10	CS	10.63	259.22	3284.2	9.61	1975	2.84	61.65	807.7	3.91	9.72
	50	1.10	HT	9.17	138.08	2636.3	20.92	HTST	2.72	53.88	781.4	3.98	10.15
	50	1.10	HS	11.27	266.02	3224.0	8.90						
IDLE RPM DECREASED 100 RPM	60	1.00	HT	8.07	96.87	2232.6	13.19	HTST	2.35	43.15	731.8	2.90	11.00
	60	1.00	HS	9.59	226.72	3255.8	8.58						
INERTIA INCREASED TO GVW	40	.90	CT	11.80	247.89	3291.7	18.89	1972	3.05	72.10	919.1	3.95	8.52
	40	.90	CS	11.05	292.86	3601.8	10.75	1975	2.83	62.73	886.5	4.15	8.93
	40	.90	HT	9.02	124.55	2862.0	21.55						
BASIC TIMING UP 5 DEGREES	80	1.30	HT	9.34	122.94	2527.2	21.12	HTST	2.90	48.95	739.3	3.91	10.76
	80	1.30	HS	12.44	244.16	3017.4	8.21						
RLHP UP TO COAST DOWN VALUE	40	.80	CT	11.58	257.65	3119.8	19.12	1972	3.29	84.43	857.8	3.58	8.87
	40	.80	CS	13.06	375.58	3313.7	7.73	1975	3.08	75.38	832.9	3.98	9.24
	40	.80	HT	8.89	138.54	2792.3	24.34						
BASELINE REPEAT	40	.80	HT	7.82	99.08	2680.7	19.79	HTST	2.29	38.38	795.0	3.76	10.29
	40	.80	HS	9.34	188.79	3281.9	8.37						
IDLE CO UP 1.0 PERCENT	100	2.10	HT	7.86	128.62	2643.7	18.29	HTST	2.65	64.19	769.2	3.43	10.11
	100	2.10	HS	12.04	352.79	3125.6	7.43						

COAST DOWN ROAD LOAD HORSEPOWER = 16.50
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 21.60
ACTUAL VEHICLE WEIGHT, POUNDS = 4790
BASELINE RLHP = 12.7
BASELINE INERTIA = 4500

VEH	YEAR	MAKE	MODEL	CID
37	71	CHEV	CAME	307

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	210	.10	CT	15.70	28.60	2145.5	20.33	1972	3.62	7.76	580.2	4.26	14.70
	210	.10	CS	11.48	29.62	2206.0	11.62	1975	3.20	7.70	555.8	4.10	15.36
	210	.10	HT	10.10	27.84	1824.6	18.20	HTST	2.83	6.26	559.1	3.89	15.36
	210	.10	HS	11.15	19.12	2368.5	10.96						
IDLE RPM DECREASED 100 RPM	260	.90	HT	10.54	5.88	1791.3	16.34	HTST	2.90	5.39	534.9	3.52	16.07
	260	.90	HS	11.24	34.52	2220.4	10.03						
INERTIA INCREASED TO GVW	210	.10	CT	19.90	145.27	1927.8	16.50	1972	4.30	23.71	589.1	3.83	13.87
	210	.10	CS	12.37	32.54	2490.8	12.22	1975	3.66	15.52	596.3	4.13	14.05
	210	.10	HT	11.49	37.48	2021.5	20.48						
BASIC TIMING UP 5 DEGREES	300	.30	HT	11.90	19.43	1849.7	23.11	HTST	3.43	6.50	539.1	5.04	15.85
	300	.30	HS	13.80	29.34	2193.8	14.69						
RLHP UP TO COAST DOWN VALUE	300	.30	CT	17.27	100.11	2288.1	21.71	1972	3.81	15.61	629.5	4.56	13.33
	300	.30	CS	11.33	16.95	2433.0	12.52	1975	3.18	9.81	602.7	4.29	14.14
	300	.30	HT	8.93	23.85	1935.6	18.11						
BASELINE REPEAT	300	.30	HT	9.12	28.01	1805.0	16.07	HTST	2.71	7.31	546.5	3.61	15.67
	300	.30	HS	11.21	26.83	2294.0	11.02						
IDLE CO UP 1.0 PERCENT	300	1.40	HT	9.46	33.49	1725.9	16.73	HTST	3.16	16.66	534.3	3.68	15.56
	300	1.40	HS	14.24	91.44	2281.6	10.83						

COAST DOWN ROAD LOAD HORSEPOWER = 15.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 9.90
ACTUAL VEHICLE WEIGHT, POUNDS = 3770
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
38	71	CHEV	NOVA	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	110	.50	CT	9.54	131.84	2164.1	15.02	1972	2.32	26.16	640.1	3.43	12.89
	110	.50	CS	7.85	64.39	2636.5	10.72	1975	2.09	20.28	628.4	3.49	13.32
	110	.50	HT	6.49	54.44	2010.5	15.85	HTST	1.86	14.34	618.1	3.66	13.73
	110	.50	HS	7.49	53.10	2625.5	11.58						
IDLE RPM DECREASED 100 RPM	140	.25	HT	6.28	48.98	1936.1	15.61	HTST	1.81	13.12	588.4	3.49	14.44
	140	.25	HS	7.29	49.45	2476.7	10.56						
INERTIA INCREASED TO GVW	90	.40	CT	10.55	138.97	2228.2	13.97	1972	2.47	26.15	667.7	3.39	12.39
	90	.40	CS	7.95	57.16	2779.2	11.46	1975	2.12	18.76	659.0	3.60	12.78
	90	.40	HT	5.97	41.75	2114.0	16.77						
BASIC TIMING UP 5 DEGREES	160	.40	HT	6.55	41.26	1948.5	18.77	HTST	1.97	10.93	594.5	4.20	14.37
	160	.40	HS	8.20	40.68	2510.5	12.71						
RLHP UP TO COAST DOWN VALUE	90	.40	CT	11.23	148.81	2369.6	17.57	1972	2.44	28.91	682.3	3.93	12.07
	90	.40	CS	7.10	67.98	2747.6	11.91	1975	2.13	22.13	669.6	4.12	12.49
	90	.40	HT	7.03	59.68	2202.0	20.07						
BASELINE REPEAT	90	.40	HT	6.73	47.22	2046.1	16.21	HTST	1.88	12.30	624.5	3.60	13.66
	90	.40	HS	7.39	45.00	2637.6	10.82						
IDLE CO UP 1.0 PERCENT	145	1.50	HT	7.50	90.36	1981.2	14.62	HTST	2.18	24.32	613.6	3.44	13.48
	145	1.50	HS	8.82	92.05	2620.9	11.16						

COAST DOWN ROAD LOAD HORSEPOWER = 15.70
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 15.70
ACTUAL VEHICLE WEIGHT, POUNDS = 3730
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
39	71	FORD	MAVF	302

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	70	.40	CT	13.40	221.43	1842.1	21.52	1972	2.93	39.12	527.5	4.49	14.84
	70	.40	CS	8.54	71.97	2114.0	12.12	1975	2.53	25.16	516.5	4.84	15.75
	70	.40	HT	8.14	37.71	1697.4	26.24	HTST	2.31	14.01	523.0	5.27	16.07
	70	.40	HS	9.20	67.37	2225.1	13.26						
IDLE RPM DECREASED 100 RPM	110	1.10	HT	7.61	55.24	1546.0	24.27	HTST	2.02	18.73	470.5	4.76	17.53
	110	1.10	HS	7.53	85.27	1983.0	11.41						
INERTIA INCREASED TO GVW	85	.40	CT	14.79	249.72	1802.1	20.83	1972	3.07	42.03	512.5	4.63	15.09
	85	.40	CS	8.23	65.54	2041.3	13.89	1975	2.55	25.53	501.6	5.22	16.15
	85	.40	HT	7.96	32.51	1659.4	28.61						
BASIC TIMING UP 5 DEGREES	90	.20	HT	8.41	46.38	1599.3	27.42	HTST	2.16	14.09	471.5	5.42	17.74
	90	.20	HS	7.81	59.28	1936.7	13.26						
RLHP UP TO COAST DOWN VALUE	85	.10	CT	13.71	217.69	1892.0	24.18	1972	2.91	36.13	537.5	5.03	14.71
	85	.10	CS	8.11	53.30	2139.4	13.53	1975	2.48	21.90	525.5	5.42	15.64
	85	.10	HT	8.11	30.41	1734.3	29.34						
BASELINE REPEAT	85	.10	HT	8.04	45.84	1628.1	23.97	HTST	1.98	11.45	493.8	4.95	17.14
	85	.10	HS	6.84	40.02	2075.6	13.17						
IDLE CO UP 1.0 PERCENT	90	1.40	HT	8.38	50.78	1683.2	27.40	HTST	2.10	14.68	498.7	5.50	16.80
	90	1.40	HS	7.36	59.34	2056.7	13.83						

COAST DOWN ROAD LOAD HORSEPOWER = 14.00
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 8.60
ACTUAL VEHICLE WEIGHT, POUNDS = 3055
BASELINE RLHP = 10.3
BASELINE INERTIA = 3000

VEH	YEAR	MAKE	MODEL	CID
40	71	PLYM	SATE	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	110	1.20	CT	10.52	108.34	2277.7	16.15	1972	2.26	29.44	645.5	3.18	12.70
	110	1.20	CS	6.45	112.45	2563.2	7.73	1975	2.19	26.95	615.1	3.19	13.37
	110	1.20	HT	9.60	75.53	1878.5	16.26	HTST	2.38	30.88	570.7	3.14	14.17
	110	1.20	HS	8.22	156.09	2401.8	7.29						
IDLE RPM DECREASED 100 RPM	90	1.85	HT	7.54	66.27	1831.8	15.09	HTST	2.01	29.43	552.9	2.97	14.66
	90	1.85	HS	7.50	154.47	2315.0	7.18						
INERTIA INCREASED TO GVW	110	1.80	CT	11.19	127.22	2416.5	16.56	1972	2.43	33.35	681.6	3.54	11.97
	110	1.80	CS	7.90	122.92	2695.8	9.99	1975	2.35	30.64	649.6	3.53	12.59
	110	1.80	HT	10.20	91.54	1995.3	16.38						
BASIC TIMING UP 5 DEGREES	110	1.90	HT	7.59	61.96	1779.1	17.56	HTST	2.06	24.35	530.2	3.35	15.44
	110	1.90	HS	7.87	120.64	2197.8	7.56						
RLHP UP TO COAST DOWN VALUE	50	1.60	CT	11.89	125.18	2303.8	18.62	1972	2.61	33.40	647.0	3.55	12.54
	50	1.60	CS	7.72	125.34	2548.9	8.02	1975	2.48	29.48	626.1	3.60	13.06
	50	1.60	HT	10.12	73.61	2027.9	19.28						
BASELINE REPEAT	50	1.60	HT	7.60	75.37	1818.0	15.84	HTST	2.05	29.93	557.0	3.04	14.54
	50	1.60	HS	7.79	149.08	2359.8	6.96						
IDLE CO UP 1.0 PERCENT	90	2.20	HT	7.67	81.00	1823.5	15.44	HTST	2.15	27.54	653.8	2.97	12.61
	90	2.20	HS	8.47	125.52	3079.7	6.84						

COAST DOWN ROAD LOAD HORSEPOWER = 15.50
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.10
ACTUAL VEHICLE WEIGHT, POUNDS = 3530
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
41	71	PONT	FIRE	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	130	1.00	CT	17.35	309.25	2395.9	12.00	1972	3.78	53.22	679.5	2.77	11.45
	130	1.00	CS	10.98	89.93	2700.3	8.80	1975	3.13	33.43	662.7	2.93	12.25
	130	1.00	HT	8.89	48.86	2175.4	14.08	HTST	2.64	16.67	635.7	3.04	13.25
	130	1.00	HS	10.87	76.15	2592.6	8.71						
IDLE RPM DECREASED 100 RPM	300	1.50	HT	8.78	54.96	2057.4	14.39	HTST	2.79	17.38	603.5	3.05	13.88
	300	1.50	HS	12.14	75.37	2469.1	8.47						
INERTIA INCREASED TO GVW	120	.60	CT	15.63	264.09	2568.4	16.18	1972	3.56	46.26	726.0	3.76	10.96
	120	.60	CS	11.06	82.87	2876.7	11.98	1975	3.07	30.22	708.5	3.96	11.60
	120	.60	HT	9.22	53.05	2337.4	18.92						
BASIC TIMING UP 5 DEGREES	120	.50	HT	8.95	55.53	2042.0	17.81	HTST	2.82	17.70	600.7	3.80	13.93
	120	.50	HS	12.23	77.20	2463.3	10.68						
RLHP UP TO COAST DOWN VALUE	100	.60	CT	12.87	230.14	2294.1	14.09	1972	3.26	45.96	649.8	3.09	12.12
	100	.60	CS	11.55	114.58	2579.6	9.07	1975	2.94	32.75	632.8	3.55	12.81
	100	.60	HT	8.69	56.30	2069.9	20.12						
BASELINE REPEAT	100	.60	HT	7.51	46.09	2069.5	15.39	HTST	2.42	19.34	622.9	3.18	13.43
	100	.60	HS	10.66	98.99	2602.1	8.47						
IDLE CO UP 1.0 PERCENT	130	2.00	HT	7.97	63.08	2019.4	14.90	HTST	2.58	30.23	583.0	3.04	13.90
	130	2.00	HS	11.38	163.63	2353.4	7.87						

COAST DOWN ROAD LOAD HORSEPOWER = 16.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 15.20
ACTUAL VEHICLE WEIGHT, POUNDS = 3950
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
42	70	CHEV	MALI	307

	IHC	TCO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	600	.70	CT	20.18	146.18	1952.6	16.44	1972	6.61	31.42	552.7	3.52	14.25
	600	.70	CS	29.40	89.47	2193.0	9.93	1975	6.42	27.04	541.0	3.07	14.71
	600	.70	HT	17.72	88.53	1798.6	10.62	HTST	6.30	21.81	525.6	2.56	15.31
	600	.70	HS	29.52	75.06	2143.6	8.57						
IDLE RPM DECREASED 100 RPM	999	.60	HT	17.10	102.42	1698.5	9.35	HTST	6.05	24.53	487.0	2.24	16.30
	999	.60	HS	28.25	81.53	1953.7	7.44						
INERTIA INCREASED TO GVW	600	.90	CT	18.11	171.85	2024.4	18.70	1972	5.98	39.28	576.3	3.86	13.51
	600	.90	CS	26.72	122.73	2298.2	10.29	1975	5.81	34.46	562.3	3.40	13.99
	600	.90	HT	15.90	108.40	1838.9	12.51						
BASIC TIMING UP 5 DEGREES	800	.40	HT	18.06	84.56	1710.5	13.63	HTST	6.54	19.30	507.8	3.44	15.89
	800	.40	HS	30.97	60.21	2098.1	12.19						
RLHP UP TO COAST DOWN VALUE	600	.90	CT	21.09	167.87	2038.7	19.73	1972	6.68	36.47	568.7	4.18	13.72
	600	.90	CS	29.00	105.64	2226.2	11.65	1975	6.40	31.08	553.6	3.79	14.26
	600	.90	HT	17.45	96.91	1840.4	14.48						
BASELINE REPEAT	600	.90	HT	17.24	117.33	1806.4	11.56	HTST	6.09	26.69	518.3	2.71	15.32
	600	.90	HS	28.46	82.86	2081.2	8.75						
IDLE CO UP 1.0 PERCENT	500	1.70	HT	14.77	112.79	1760.8	10.51	HTST	5.25	31.54	514.3	2.46	15.29
	500	1.70	HS	24.59	123.74	2096.8	7.98						

COAST DOWN ROAD LOAD HORSEPOWER = 16.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 17.50
ACTUAL VEHICLE WEIGHT, POUNDS = 3950
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
43	70	CHEV	MALI	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	.80	CT	18.29	386.24	2013.5	18.84	1972	4.49	85.64	543.0	3.60	12.83
	100	.80	CS	15.37	256.08	2059.3	8.18	1975	4.09	73.80	520.1	2.92	13.68
	100	.80	HT	13.08	230.45	1711.8	9.87	HTST	4.00	77.16	493.3	1.91	14.15
	100	.80	HS	16.91	348.26	1988.3	4.45						
IDLE RPM DECREASED 100 RPM	120	.60	HT	13.73	258.88	1671.4	10.62	HTST	3.83	82.22	478.4	2.10	14.33
	120	.60	HS	14.98	357.74	1916.6	5.14						
INERTIA INCREASED TO GVW	40	.80	CT	21.00	452.80	2088.0	18.66	1972	5.31	110.27	572.7	3.62	11.64
	40	.80	CS	18.81	374.25	2207.6	8.51	1975	4.84	101.02	553.1	3.16	12.21
	40	.80	HT	14.88	331.06	1829.3	12.51						
BASIC TIMING UP 5 DEGREES	130	.50	HT	13.26	250.78	1683.9	12.46	HTST	3.94	80.77	487.2	2.47	14.17
	130	.50	HS	16.28	355.03	1969.9	6.06						
RLHP UP TO COAST DOWN VALUE	100	.80	CT	20.35	442.11	2218.8	22.35	1972	5.12	106.31	582.8	4.12	11.59
	100	.80	CS	18.06	355.24	2152.6	8.55	1975	4.70	92.69	557.3	3.57	12.37
	100	.80	HT	14.84	262.88	1883.1	15.06						
BASELINE REPEAT	100	.80	HT	14.09	262.44	1730.5	11.69	HTST	3.82	81.55	500.1	2.32	13.87
	100	.80	HS	14.56	349.17	2020.3	5.69						
IDLE CO UP 1.0 PERCENT	150	1.80	HT	14.55	328.77	1784.0	13.07	HTST	4.15	98.01	505.6	2.58	13.20
	150	1.80	HS	16.55	406.30	2008.1	6.31						

COAST DOWN ROAD LOAD HORSEPOWER = 17.60
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 14.10
ACTUAL VEHICLE WEIGHT, POUNDS = 3950
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
44	70	FORD	GALA	351

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	80	1.50	CT	61.08	1025.86	1894.8	6.28	1972	9.39	152.47	611.1	2.54	10.08
	80	1.50	CS	9.37	117.64	2688.6	12.79	1975	5.40	78.87	621.9	3.51	11.64
	80	1.50	HT	8.47	57.54	2036.5	19.02	HTST	2.17	18.19	613.6	4.42	13.68
	80	1.50	HS	7.83	78.88	2565.1	14.10						
IDLE RPM DECREASED 100 RPM	140	4.60	HT	11.33	131.93	1842.1	26.31	HTST	3.28	52.11	503.5	6.03	14.90
	140	4.60	HS	13.24	258.93	1934.2	18.88						
INERTIA INCREASED TO GVW	120	1.50	CT	51.12	1126.16	1987.6	11.46	1972	8.66	178.27	608.7	4.60	9.69
	120	1.50	CS	13.84	210.83	2577.6	23.03	1975	5.54	100.00	612.4	5.90	11.28
	120	1.50	HT	10.08	96.41	2036.7	28.60						
BASIC TIMING UP 5 DEGREES	130	4.40	HT	11.81	163.05	1913.4	30.56	HTST	3.49	53.97	542.0	7.04	13.92
	130	4.40	HS	14.37	241.72	2151.5	22.25						
RLHP UP TO COAST DOWN VALUE	140	2.00	CT	72.86	1200.22	1952.7	11.10	1972	11.57	189.12	588.5	4.24	9.63
	140	2.00	CS	13.93	218.21	2461.3	20.73	1975	6.86	105.25	602.8	5.87	11.24
	140	2.00	HT	10.88	96.57	2140.1	32.46						
BASELINE REPEAT	140	2.00	HT	10.75	110.99	2023.6	26.56	HTST	3.05	36.46	593.9	6.08	13.43
	140	2.00	HS	12.14	162.49	2430.8	19.08						
IDLE CO UP 1.0 PERCENT	130	2.50	HT	9.77	123.00	1857.3	24.85	HTST	2.92	42.88	559.0	5.34	13.97
	130	2.50	HS	12.16	198.58	2335.6	15.18						

COAST DOWN ROAD LOAD HORSEPOWER = 19.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 9.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4420
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
45	70	PONT	TEMP	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	75	.10	CT	22.71	432.32	2062.8	18.14	1972	4.50	62.64	615.9	4.96	12.19
	75	.10	CS	11.02	37.48	2556.1	19.06	1975	3.63	34.98	612.7	5.55	13.08
	75	.10	HT	11.27	68.32	2020.7	25.93	HTST	3.04	15.90	592.4	5.85	14.16
	75	.10	HS	11.55	50.91	2422.4	17.93						
IDLE RPM DECREASED 100 RPM	275	.10	HT	15.28	60.05	1850.1	24.03	HTST	4.74	13.86	542.2	5.64	15.34
	275	.10	HS	20.28	43.90	2216.0	18.24						
INERTIA INCREASED TO GVW	75	.10	CT	17.29	233.45	2270.6	27.90	1972	3.69	36.61	651.5	6.32	12.32
	75	.10	CS	10.37	41.09	2615.7	19.54	1975	3.16	22.23	635.5	6.60	13.05
	75	.10	HT	10.40	44.26	2060.4	31.49						
BASIC TIMING UP 5 DEGREES	115	.10	HT	12.64	32.49	2005.0	28.96	HTST	3.71	8.04	586.0	7.00	14.54
	115	.10	HS	15.21	27.84	2390.2	23.56						
RLHP UP TO COAST DOWN VALUE	75	.10	CT	20.86	267.08	2249.6	27.20	1972	4.51	40.32	640.4	6.60	12.36
	75	.10	CS	12.93	35.33	2553.7	22.31	1975	3.80	22.65	631.1	7.01	13.09
	75	.10	HT	11.52	34.57	2126.3	32.60						
BASELINE REPEAT	180	1.10	HT	12.05	44.52	1987.4	27.32	HTST	3.60	11.47	596.0	6.17	14.20
	180	1.10	HS	14.93	41.52	2482.9	18.93						
IDLE CO UP 1.0 PERCENT	180	1.10	HT	12.70	64.82	1858.3	26.73	HTST	4.00	18.68	540.2	6.09	15.25
	180	1.10	HS	17.29	75.25	2193.0	18.92						

COAST DOWN ROAD LOAD HORSEPOWER = 15.40
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 11.80
ACTUAL VEHICLE WEIGHT, POUNDS = 4050
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
46	69	CHEV	CAPR	350

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	140	.10	CT	29.58	418.28	1873.6	20.90	1972	8.76	71.51	543.0	5.23	13.00
	140	.10	CS	36.10	118.02	2198.9	18.30	1975	8.23	44.07	540.7	5.73	13.96
	140	.10	HT	22.70	57.22	1842.7	27.50	HTST	7.94	17.82	525.1	6.13	15.35
	140	.10	HS	36.85	76.45	2095.3	18.46						
IDLE RPM DECREASED 100 RPM	135	.10	HT	22.34	47.48	1743.7	27.18	HTST	7.71	13.82	495.9	6.17	16.38
	135	.10	HS	35.49	56.16	1975.2	19.09						
INERTIA INCREASED TO GVW	100	.20	CT	27.24	359.33	2059.7	25.61	1972	8.54	61.03	591.8	6.47	12.42
	100	.20	CS	36.81	98.42	2378.4	22.92	1975	8.17	37.74	587.0	6.77	13.21
	100	.20	HT	22.35	52.87	1997.7	29.53						
BASIC TIMING UP 5 DEGREES	120	.50	HT	20.84	64.56	1876.9	30.51	HTST	7.78	19.76	535.5	7.02	15.02
	120	.50	HS	37.51	83.67	2139.2	22.16						
RLHP UP TO COAST DOWN VALUE	70	.10	CT	26.72	377.66	2090.0	27.71	1972	8.61	61.96	581.7	6.61	12.57
	70	.10	CS	37.87	87.04	2272.8	21.90	1975	8.25	36.66	575.9	6.94	13.46
	70	.10	HT	22.01	44.82	2013.4	31.99						
BASELINE REPEAT	70	.10	HT	22.42	54.10	1790.9	25.02	HTST	8.16	15.97	532.1	5.91	15.23
	70	.10	HS	38.77	65.70	2199.7	19.30						
IDLE CO UP 1.0 PERCENT	130	1.10	HT	18.96	88.47	1822.6	24.78	HTST	6.83	32.24	532.3	5.72	14.69
	130	1.10	HS	32.26	153.32	2169.4	18.12						

COAST DOWN ROAD LOAD HORSEPOWER = 18.50
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 16.30
ACTUAL VEHICLE WEIGHT, POUNDS = 4555
BASELINE RLHP = 12.0
BASELINE INERTIA = 4000

VEH	YEAR	MAKE	MODEL	CID
47	69	MERC	COUG	351

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	260	1.10	CT	26.73	767.14	1925.3	21.87	1972	6.10	119.68	533.8	5.51	11.98
	260	1.10	CS	19.01	130.49	2078.4	19.43	1975	5.31	66.99	524.9	5.93	13.73
	260	1.10	HT	16.42	73.85	1807.7	27.41	HTST	4.57	25.52	516.7	6.21	15.54
	260	1.10	HS	17.85	117.56	2067.6	19.16						
IDLE RPM DECREASED 100 RPM	225	1.40	HT	17.90	93.78	1687.4	25.67	HTST	4.99	26.30	478.3	5.92	16.58
	225	1.40	HS	19.50	103.49	1899.8	18.71						
INERTIA INCREASED TO GVW	210	1.40	CT	25.67	336.28	1931.1	22.83	1972	5.82	59.69	542.5	5.92	13.56
	210	1.40	CS	17.99	111.40	2137.8	21.55	1975	5.04	39.45	532.9	6.29	14.54
	210	1.40	HT	15.42	69.96	1804.9	27.68						
BASIC TIMING UP 5 DEGREES	250	.90	HT	16.99	80.55	1821.9	29.49	HTST	4.55	24.44	520.1	6.86	15.50
	250	.90	HS	17.15	102.77	2079.2	21.96						
RLHP UP TO COAST DOWN VALUE	230	.80	CT	22.55	214.61	2106.6	27.29	1972	5.26	41.97	574.4	6.52	13.51
	230	.80	CS	16.89	100.16	2201.4	21.64	1975	4.66	30.36	557.6	6.73	14.32
	230	.80	HT	14.70	61.92	1885.7	29.95						
BASELINE REPEAT	230	.80	HT	17.73	86.64	1743.9	24.21	HTST	4.43	24.97	507.4	5.64	15.84
	230	.80	HS	15.46	100.62	2061.7	18.10						
IDLE CO UP 1.0 PERCENT	240	2.10	HT	15.90	100.65	1735.7	24.17	HTST	4.38	29.73	500.4	5.62	15.83
	240	2.10	HS	16.95	122.34	2017.5	17.95						

COAST DOWN ROAD LOAD HORSEPOWER = 17.20
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 18.00
ACTUAL VEHICLE WEIGHT, POUNDS = 3890
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
48	68	PLYM	VALL	318

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	200	1.30	CT	23.03	371.70	1779.9	14.66	1972	6.34	107.21	481.7	3.35	13.25
	200	1.30	CS	24.55	432.35	1832.5	10.45	1975	5.76	91.27	467.1	3.99	14.13
	200	1.30	HT	15.31	161.99	1587.7	23.05	HTST	4.52	59.53	442.2	4.82	16.14
	200	1.30	HS	18.58	284.45	1728.7	13.11						
IDLE RPM DECREASED 100 RPM	200	2.80	HT	21.26	194.71	1494.3	23.22	HTST	5.68	60.97	413.6	5.25	16.84
	200	2.80	HS	21.34	262.58	1607.4	16.17						
INERTIA INCREASED TO GVW	160	1.80	CT	23.12	361.53	1935.8	16.64	1972	6.23	101.13	528.5	4.24	12.56
	160	1.80	CS	23.59	396.91	2027.8	15.14	1975	5.76	86.73	508.7	4.90	13.39
	160	1.80	HT	16.94	172.10	1676.2	25.29						
BASIC TIMING UP 5 DEGREES	160	1.60	HT	16.52	164.51	1550.9	24.05	HTST	4.93	59.48	436.1	5.07	16.28
	160	1.60	HS	20.47	281.58	1719.9	14.01						
RLHP UP TO COAST DOWN VALUE	150	1.20	CT	24.11	425.63	1998.5	14.52	1972	6.44	116.97	523.9	3.25	12.19
	150	1.20	CS	24.22	451.67	1930.6	9.83	1975	5.77	96.81	507.3	4.16	13.10
	150	1.20	HT	15.28	160.37	1780.3	26.48						
BASELINE REPEAT	150	1.20	HT	15.04	159.18	1572.6	23.14	HTST	4.50	57.35	443.1	4.82	16.22
	150	1.20	HS	18.70	270.93	1750.9	12.98						
IDLE CO UP 1.0 PERCENT	200	2.30	HT	15.80	191.41	1572.3	21.89	HTST	4.59	62.93	436.7	4.65	16.14
	200	2.30	HS	18.63	280.56	1703.0	12.96						

COAST DOWN ROAD LOAD HORSEPOWER = 16.30
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 13.30
ACTUAL VEHICLE WEIGHT, POUNDS = 3620
BASELINE RLHP = 10.3
BASELINE INERTIA = 3000

VEH	YEAR	MAKE	MODEL	CID
49	68	CHEV	CHEV	307

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	350	1.50	CT	19.30	214.65	1983.7	19.55	1972	4.61	35.81	539.9	4.71	14.54
	350	1.50	CS	15.28	53.93	2065.5	15.74	1975	4.21	25.26	517.2	4.76	15.57
	350	1.50	HT	14.07	75.89	1685.6	20.24	HTST	3.81	15.79	494.4	4.80	16.71
	350	1.50	HS	14.48	42.52	2022.2	15.74						
IDLE RPM DECREASED 100 RPM	400	1.30	HT	16.67	99.19	1545.0	18.78	HTST	4.62	21.26	438.5	4.40	18.25
	400	1.30	HS	17.96	60.26	1743.6	14.20						
INERTIA INCREASED TO GVW	350	1.50	CT	19.49	221.03	2001.4	20.21	1972	4.70	36.47	549.0	5.55	14.29
	350	1.50	CS	15.77	52.52	2115.9	21.39	1975	4.38	26.48	528.7	5.68	15.20
	350	1.50	HT	15.31	89.55	1734.2	21.93						
BASIC TIMING UP 5 DEGREES	260	.50	HT	15.74	86.46	1663.6	23.48	HTST	4.23	17.89	481.7	5.44	16.97
	260	.50	HS	15.99	47.71	1948.9	17.31						
RLHP UP TO COAST DOWN VALUE	250	.40	CT	21.66	266.63	2009.1	19.62	1972	4.92	43.46	550.5	5.06	14.00
	250	.40	CS	15.26	59.32	2119.5	18.33	1975	4.37	30.34	535.6	5.27	14.87
	250	.40	HT	14.41	94.03	1813.1	22.42						
BASELINE REPEAT	250	.40	HT	14.45	94.95	1646.5	18.46	HTST	3.86	18.43	485.1	4.32	16.87
	250	.40	HS	14.54	43.31	1991.8	13.91						
IDLE CO UP 1.0 PERCENT	180	1.30	HT	14.24	104.63	1652.1	18.68	HTST	3.92	23.64	482.6	4.34	16.68
	180	1.30	HS	15.12	72.68	1967.3	13.87						

COAST DOWN ROAD LOAD HORSEPOWER = 16.40
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 9.70
ACTUAL VEHICLE WEIGHT, POUNDS = 3640
BASELINE RLHP = 11.2
BASELINE INERTIA = 3500

VEH	YEAR	MAKE	MODEL	CID
50	68	FORD	MUST	289

	IHC	ICO	TEST	GRAMS HC	GRAMS CO	GRAMS CO2	GRAMS NOXC	FTP TYPE	GRAMS/MILE HC	GRAMS/MILE CO	GRAMS/MILE CO2	GRAMS/MILE NOXC	MPG
BASELINE	100	1.60	CT	14.95	169.21	1987.9	21.48	1972	3.62	44.67	551.8	4.59	14.02
	100	1.60	CS	12.18	165.80	2150.3	12.95	1975	3.32	40.12	536.9	4.61	14.55
	100	1.60	HT	11.01	109.40	1792.2	21.78	HTST	3.03	34.95	522.1	4.80	15.13
	100	1.60	HS	11.72	152.69	2123.9	14.20						
IDLE RPM DECREASED 100 RPM	160	4.60	HT	11.39	151.97	1577.8	18.26	HTST	3.18	50.02	462.2	4.04	16.12
	160	4.60	HS	12.43	223.15	1888.8	12.00						
INERTIA INCREASED TO GVW	90	.90	CT	15.58	234.04	1852.6	16.72	1972	3.69	49.58	548.1	4.56	13.92
	90	.90	CS	12.09	137.78	2258.3	17.48	1975	3.34	39.45	544.4	4.90	14.40
	90	.90	HT	11.02	100.83	1803.1	21.16						
BASIC TIMING UP 5 DEGREES	120	2.60	HT	11.18	91.16	2163.4	22.82	HTST	3.08	34.13	555.7	5.11	14.34
	120	2.60	HS	11.92	164.84	2004.5	15.48						
RLHP UP TO COAST DOWN VALUE	70	.70	CT	16.89	162.77	2150.2	24.59	1972	3.82	40.86	583.2	5.25	13.46
	70	.70	CS	11.73	143.70	2224.2	14.76	1975	3.51	36.04	562.4	5.37	14.09
	70	.70	HT	12.86	99.31	1876.4	26.24						
BASELINE REPEAT	100	1.60	HT	10.36	92.01	1784.5	18.92	HTST	2.78	29.69	510.0	4.22	15.70
	100	1.60	HS	10.48	130.64	2040.1	12.72						
IDLE CO UP 1.0 PERCENT	125	2.60	HT	10.88	103.38	1664.9	20.01	HTST	2.93	35.58	493.0	4.40	15.90
	125	2.60	HS	11.12	163.49	2032.8	12.99						

COAST DOWN ROAD LOAD HORSEPOWER = 17.10
MANIFOLD VACUUM ROAD LOAD HORSEPOWER = 10.30
ACTUAL VEHICLE WEIGHT, POUNDS = 3330
BASELINE RLHP = 10.3
BASELINE INERTIA = 3000

APPENDIX B

LISTING OF COAST DOWN ROAD HORSEPOWER, MANIFOLD VACUUM ROAD HORSE POWER, FTP ROAD HORSEPOWER AND VEHICLE WEIGHT

Vehicle No.	Calc. RdHp	Man. Vac. @ 50 mph	Equiv. Dyno RdHp	EPA RdHp	Vehicle Weight	Vehicle Weight + Drivers
001	19.1	14.0	15.2	13.4	4890	5225
002	16.5	14.3	15.6	12.7	4250	4520
003	16.3	15.0	10.7	12.7	4180	4545
004	18.6	10.5	10.7	12.7	4040	4175
005	17.6	12.8	17.8	12.7	4470	4740
006	18.0	12.4	21.6	13.9	4670	4805
007	14.5	13.0	13.2	12.7	4090	4455
008	17.2	5.5	17.6	12.7	4070	4345
009	15.1	15.0	10.4	11.2	3540	3905
010	14.1	10.5	13.2	9.4	2420	2785
011	19.6	15.6	21.0	13.4	4970	5305
012	17.0	12.1	20.0	13.4	4390	4730
013	18.4	12.7	16.2	12.7	4060	4500
014	19.3	15.3	13.1	12.0	4060	4405
015	15.6	8.1	13.6	10.3	2890	3260
016	20.2	14.5	19.6	12.7	4240	4680
017	17.8	14.6	10.3	11.2	3720	4065
018	15.9	14.5	16.7	12.0	3330	3675
019	15.3	12.5	19.2	12.0	3890	4165
020	13.7	15.1	8.8	8.8	2140	2435
021	18.7	15.5	7.7	12.7	4120	4255
022	13.0	11.2	7.8	9.4	2370	2670
023	14.6	14.5	12.3	12.0	3580	3925
024	16.6	15.4	17.5	11.2	3510	3860
025	13.5	11.9	15.5	9.9	2280	2575
026	19.3	14.5	22.4	12.7	4160	4440
027	17.2	10.5	14.3	12.7	3960	4330
028	17.4	15.8	11.8	12.7	4140	4485

APPENDIX B

LISTING OF COAST DOWN ROAD HORSEPOWER, MANIFOLD VACUUM ROAD HORSEPOWER, FTP ROAD HORSEPOWER AND VEHICLE WEIGHT

Vehicle No.	Calc. RdHp	Man. Vac. @ 50 mph	Equiv. Dyno RdHp	EPA RdHp	Vehicle Weight	Vehicle Weight + Drivers
029	16.2	16.5	15.3	13.4	4550	4910
030	17.4	16.4	13.3	12.0	4050	4350
031	18.1	16.0	17.1	12.7	4360	4720
032	17.4	16.1	14.4	12.0	3970	4330
033	17.2	17.0	12.2	12.7	4300	4600
034	20.2	16.7	17.3	13.4	4810	5090
035	17.1	16.3	11.3	12.0	4060	4365
036	16.5	18.6	21.6	12.7	4450	4790
037	15.2	15.8	9.9	11.2	3480	3770
038	15.7	17.1	15.7	11.2	3400	3730
039	14.0	18.0	8.6	10.3	2920	3055
040	15.5	16.0	13.1	11.2	3365	3530
041	16.2	15.8	15.2	11.2	3650	3950
042	16.1	14.3	17.5	11.2	3580	3950
043	17.6	18.5	14.1	11.2	3730	3950
044	19.1	17.2	9.3	12.0	4120	4420
045	15.4	18.4	11.8	12.0	3750	4050
046	18.5	13.0	16.3	12.0	4260	4555
047	17.2	17.3	18.0	11.2	3590	3890
048	16.3	16.8	13.3	10.3	3280	3620
049	16.4	18.8	9.7	11.2	3340	3640
050	17.1	16.9	10.3	10.3	3060	3330
Mean	16.81	14.70	14.41	11.86	3810	4117
Standard Deviation	1.75	2.71	3.84	1.15	656	662
Range	13.0-20.2	5.5-18.8	7.7-22.4	8.8-13.9	2280-4890	2575-5305

APPENDIX C

LISTING OF TIRE SIZE & TIRE PRESSURE
ON INDIVIDUAL VEHICLES

Vehicle Number	Make	Model	Tire Size		Tire Pressure	
			Front	Rear	Front	Rear
01	Buick	Le Sabre	J78x15	J78x15	24	24
02	Chevrolet	Monte Carlo	GR70x14	GR70x14	28	28
03	Chevrolet	Monte Carlo	GR70x14	GR70x14	28	28
04	Dodge	Coronet	G78x14	G78x14	28	28
05	Ford	Torino	HR78x14	HR78x14	24	24
06	Ford	LTD	HR78x15	HR78x15	26	26
07	Oldsmobile	Cutlass Sup.	GR78x15	GR78x15	28	28
08	Plymouth	Fury	GR78x15	GR78x15	28	28
09	Pontiac	Ventura	E78x14	ER78x14	28	30
10	Toyota	Corolla	165SR13	165SR13	24	24
11	Buick	Riviera	JR78x15	JR78x15	26	28
12	Chevrolet	Caprice	G78x15	G78x15	26	26
13	Chevrolet	Monte Carlo	GR70x14	GR70x14	28	28
14	Plymouth	Satellite	HR78x14	HR78x14	26	28
15	Ford	Pinto	175x13	175x13	24	28
16	Ford	Torino	G78x14	G78x14	28	26
17	Oldsmobile	Omega	E78x14	E78x14	23	27
18	Plymouth	Duster	D78x14	D78x14	30	30
19	Pontiac	Firebird	GR70x15	GR70x15	25	24
20	Toyota	Corolla	165R13	165R13	22	22
21	Buick	Regal	G78x14	G78x14	28	28
22	Chevrolet	Vega	165SRx13	165SRx13	24	30
23	Chevrolet	Nova	F70x14	F70x14	26	30
24	Dodge	Challenger	G70x14	G70x14	26	26
25	Ford	Pinto	A70x13	A70x13	24	24

APPENDIX C

LISTING OF TIRE SIZE & TIRE PRESSURE
ON INDIVIDUAL VEHICLES

Vehicle Number	Make	Model	Tire Size		Tire Pressure	
			Front	Rear	Front	Rear
26	Ford	Torino	G78x14	G78x14	28	26
27	Oldsmobile	Cutlass	G78x14	G78x14	28	28
28	Plymouth	Fury	F78x15	F78x15	30	30
29	Pontiac	Catalina	HR70x15	HR70x15	24	24
30	Chevrolet	Concours	G78x14	G78x14	26	26
31	Chevrolet	Caprice	G78x15	G78x15	26	26
32	Dodge	Coronet	H78x14	H78x14	22	32
33	Ford	LTD	G75x15	G75x15	26	28
34	Oldsmobile	98	225x15	225x15	26	30
35	Plymouth	Satellite	H78x14	H78x14	22	32
36	Pontiac	Catalina	215x15	215x15	24	24
37	Chevrolet	Camero	670x14	670x14	24	24
38	Chevrolet	Nova	ER70x14	ER70x14	24	28
39	Ford	Mavrick	D70x14	D70x14	24	26
40	Plymouth	Satellite	GR70x14	GR70x14	28	28
41	Pontiac	Firebird	F78x14	F78x14	26	24
42	Chevrolet	Malibu	8.25x14	G78x14	28	28
43	Chevrolet	Malibu	FR70x14	FR70x14	22	26
44	Ford	LTD	G70x15	G70x15	26	27
45	Pontiac	Tempest	G78x14	G78x14	24	28
46	Chevrolet	Caprice	G78x14	G78x14	24	30
47	Mercury	Cougar	F70x14	F70x14	28	28
48	Plymouth	Valiant	F70x14	F70x14	24	26
49	Chevrolet	Chevelle	7.75x14	7.75x14	26	26
50	Ford	Mustang	E78x14	E78x14	24	24

APPENDIX D

Listing of Inertia and Road Load Horsepower Used for Emission Tests

Dynamometer Loading / Vehicle No.	Baseline Tests		Increased Inertia		Actual RdHp		All Other Tests	
	Inertia	RdHp	Inertia	RdHp	Inertia	RdHp	Inertia	RdHp
01	5000	13.4	5500	13.4	5000	19.1	5000	13.4
02	4500	12.7	5500	12.7	4500	16.5	4500	12.7
03	4500	12.7	5500	12.7	4500	16.3	4500	12.7
04	4500	12.7	5500	12.7	4500	18.6	4500	12.7
05	4500	12.7	5500	12.7	4500	17.6	4500	12.7
06	5500	13.9	5500	13.9	5500	18.0	5500	13.9
07	4500	12.7	5500	12.7	4500	14.5	4500	12.7
08	4500	12.7	5500	12.7	4500	17.2	4500	12.7
09	3500	11.2	5000	11.2	3500	15.1	3500	11.2
10	2500	9.4	3000	9.4	2500	14.1	2500	9.4
11	5000	13.4	5500	13.4	5000	19.6	5000	13.4
12	5000	13.4	5500	13.4	5000	17.0	5000	13.4
13	4500	12.7	5500	12.7	4500	18.4	4500	12.7
14	4000	12.0	5500	12.0	4000	19.3	4000	12.0
15	3000	10.3	4000	10.3	3000	15.6	3000	10.3
16	4500	12.7	5500	12.7	4500	20.2	4500	12.7
17	3500	11.2	5000	11.2	3500	17.8	3500	11.2
18	4000	12.0	5000	12.0	4000	15.9	4000	12.0
19	4000	12.0	5000	12.0	4000	15.3	4000	12.0
20	2250	8.8	3000	8.8	2250	13.7	2250	8.8
21	4500	12.7	5500	12.7	4500	18.7	4500	12.7
22	2500	9.4	3000	9.4	2500	13.0	2500	9.4
23	4000	12.0	5000	12.0	4000	14.6	4000	12.0
24	3500	11.2	4500	11.2	3500	16.6	3500	11.2
25	2750	9.9	3000	9.9	2750	13.5	2750	9.9
26	4500	12.7	5500	12.7	4500	19.3	4500	12.7
27	4500	12.7	5000	12.7	4500	17.2	4500	12.7
28	4500	12.7	5500	12.7	4500	17.4	4500	12.7

APPENDIX D (Continued)

Listing of Inertia and Road Load Horsepower Used for Emission Tests

Dynamometer Loading / Vehicle No.	Baseline Tests		Increased Inertia		Actual RdHp		All Other Tests	
	Inertia	RdHp	Inertia	RdHp	Inertia	RdHp	Inertia	RdHp
29	5000	13.4	5500	13.4	5000	16.2	5000	13.4
30	4000	12.0	5000	12.0	4000	17.4	4000	12.0
31	4500	12.7	5500	12.7	4500	18.1	4500	12.7
32	4000	12.0	5500	12.0	4000	17.4	4000	12.0
33	4500	12.7	5500	12.7	4500	17.2	4500	12.7
34	5000	13.4	5500	13.4	5000	20.2	5000	13.4
35	4000	12.0	5500	12.0	4000	17.1	4000	12.0
36	4500	12.7	5500	12.7	4500	16.5	4500	12.7
37	3500	11.2	4000	11.2	3500	15.2	3500	11.2
38	3500	11.2	4000	11.2	3500	15.7	3500	11.2
39	3000	10.3	3500	10.3	3000	14.0	3000	10.3
40	3500	11.2	4500	11.2	3500	15.5	3500	11.2
41	3500	11.2	4500	11.2	3500	16.2	3500	11.2
42	3500	11.2	4500	11.2	3500	16.1	3500	11.2
43	3500	11.2	4500	11.2	3500	17.6	3500	11.2
44	4000	12.0	5000	12.0	4000	19.1	4000	12.0
45	4000	12.0	4500	12.0	4000	15.4	4000	12.0
46	4000	12.0	5000	12.0	4000	18.5	4000	12.0
47	3500	11.2	4000	11.2	3500	17.2	3500	11.2
48	3000	10.3	4000	10.3	3000	16.3	3000	10.3
49	3500	11.2	4000	11.2	3500	16.4	3500	11.2
50	3000	10.3	4000	10.3	3000	17.1	3000	10.3
Avg	3970	11.86	4840	11.86	3970	16.81	3970	11.86
σ	740	1.15	798	1.15	740	1.75	740	1.15
R	2250-5500	8.80-13.40	3000-5500	8.80-13.40	2250-5500	13.00-20.20	2250-5500	8.80-13.40