

**Effectiveness of Idle Adjustment on Light-Duty  
Trucks at Commercial Repair Facilities**

by  
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Abstract

This paper describes the results of a project on Light Duty Trucks to evaluate the effectiveness of idle adjustment at commercial repair facilities. This effort involved a total of 96 trucks and vans tested by Automotive Testing Laboratories (ATL) during 1979. These vehicles were a subset of 370 vehicles tested in St. Louis as a part of the FY 78 Light Duty Truck Emission Factor Program. Vehicles which arrived for testing without limiter caps were chosen to participate in the survey. After the complete laboratory test, a contractor employee took each vehicle to a service station or independent garage and asked simply that the idle mixture and speed be adjusted to manufacturer's specifications. Upon return to the laboratory, the work performed by the Facility was evaluated using a tachometer and garage-type emission analyzer. The sequence was completed when the contractor's mechanic performed the idle adjustments to the best of his ability. The data obtained illustrates the inability of the majority of independent repair facilities to properly set idle mixtures. The results of this project point to the need for mechanic training in reducing vehicle emissions through correct maintenance procedures.

### Background

According to the Clean Air Act and its Amendments, the Environmental Protection Agency (EPA) is required to encourage and implement programs which will assure that properly maintained vehicles will meet their emission standards throughout their useful life. Inspection/Maintenance programs are the primary force behind this effort to control emissions from in-use vehicles with the work to be performed by the commercial repair industry. It is well known that a substantial number of in-use vehicles will not meet their emission standards when tested in an as-received condition. (Reference 1) One of the major reasons is that the idle mixture and speed has been maladjusted. In order for these vehicles to meet their emission standards, these adjustments must be made correctly. The typical places for these adjustments to be made include dealerships, service stations, and independent garages.

### Purpose

This study was designed to evaluate the ability of the commercial repair industry to set idle adjustments to manufacturer's specifications.

### Selection and Test Procedures

Vehicles selected for this project were recruited primarily for the FY78 Light-Duty Truck Emission Factor Program. Trucks which arrived at Automotive Testing Laboratories' (ATL) St. Louis facility missing idle mixture limiter caps were chosen for this study. Ninety-six out of a total of 370 trucks tested which had their limiter caps missing were taken to commercial facilities by various persons in the ATL organization (secretaries, lab personnel, engineers, technicians, etc.). The following procedures were employed:

Before Leaving ATL - Vehicle identification information was recorded on worksheets provided by EPA. Idle readings (CO, HC, RPM) were also measured and recorded. Any evidence that the vehicle was in a testing program (e.g., data packets or exhaust connectors) was removed from the vehicle. A repair facility was contacted to set up an appointment to have idle mixture and speed adjusted. If possible, all adjustments were to be performed while the driver waited. No reference was made to any affiliation with an emission testing lab or that this was to be part of an EPA study.

At Repair Facility - The person requested that the idle mixture and speed be adjusted to manufacturer's specifications. If questioned why, it was stated that they had been informed in some way (by a friend, magazine article, etc.) that this is a very important adjustment from a number of standpoints, such as fuel economy and engine performance. If the mechanic insisted that other maintenance be performed, it was stated that the person wanted only the idle adjusted at this time to see what difference it made. If the mechanic said that he did not know how to set it to specifications, he was asked to set it as best he could. Notes were made (although not in his presence) of any comments and actions taken by the mechanic. Observations regarding instruments, tools, and cost data were also recorded on the worksheets.

After Returning to ATL - ICO, IHC, and IRPM were measured and recorded, as were the number of  $\frac{1}{4}$  turns necessary to lightly seat the idle mixture screws. The mixture screw settings were not measured prior to sending the vehicle to the commercial repair facility. Idle parameters were then adjusted to manufacturer's specifications by ATL mechanics and the location of the idle mixture screws relative to the lightly seated position was recorded. ICO, IHC and IRPM were again measured and recorded. New limiter caps were installed in the center position. The vehicle was then returned to its owner.

Follow-Up - ATL personnel performed a follow-up inspection approximately 30 days later. The presence and position of the limiter caps were checked at that time. The owner was also asked several questions relating to the performance of his vehicle.

#### Results

Idle tests - Nine 1979 model year trucks were taken to commercial repair facilities. The results of these adjustments are summarized in Figure 1. After adjustment at commercial repair facilities, idle HC concentration increased by 80% and idle CO increased by 50%. The engine RPM values, representing the average absolute difference from manufacturer's specifications, were essentially unchanged. The average cost for these adjustments was \$2.17.

Eighty-seven trucks from the 1975-1978 model years were also taken to commercial repair facilities. Their results are summarized in Figure 2. After adjustments at commercial repair facilities, idle HC concentration decreased by 25% and idle CO decreased by 9%. Again, the engine RPM values, representing the average absolute difference from manufacturer's specification were virtually unchanged. The average cost was \$4.23. Almost one-quarter of these visits resulted in no charge.

A follow-up limiter cap inspection was accomplished approximately 30 days later on a total of 82 trucks. The new limiter caps on 55 trucks were found to be unaltered. Limiter caps had been removed on 22 trucks and 5 trucks had their settings altered with the limiter caps still installed. The results of the follow-up are summarized in Figure 3.

The results of each of the 96 trucks involved in this project are listed in the Appendix.

Results of the Federal Test Procedure - Although the Federal Test Procedure (FTP) was not performed on these vehicles after they returned from the repair facility, the FTP emissions for the fleet were collected and averaged based on the presence of limiter caps upon arrival at the laboratory. These averages are listed in Table 1. The values here indicate that vehicles without limiter caps have average HC and CO emission levels which exceed those where the limiter caps are intact.

Conclusions

1. Only minor adjustments would be required to allow most vehicles to pass a basic I/M test.
2. The commercial repair industry does not currently adjust idle mixture and speed properly.
3. A lack of training and proper equipment (tachometers and exhaust analyzers) is apparent in the performance of this type of maintenance.
4. In order to conduct successful Inspection/Maintenance programs, some form of incentive or a major effort in mechanic training will be required to ensure that idle adjustments are made properly.

References

1. J.T. White, "An Evaluation of Restorative Maintenance on Exhaust Emissions from In-use Automobiles", SAE Paper 780082, March, 1978.

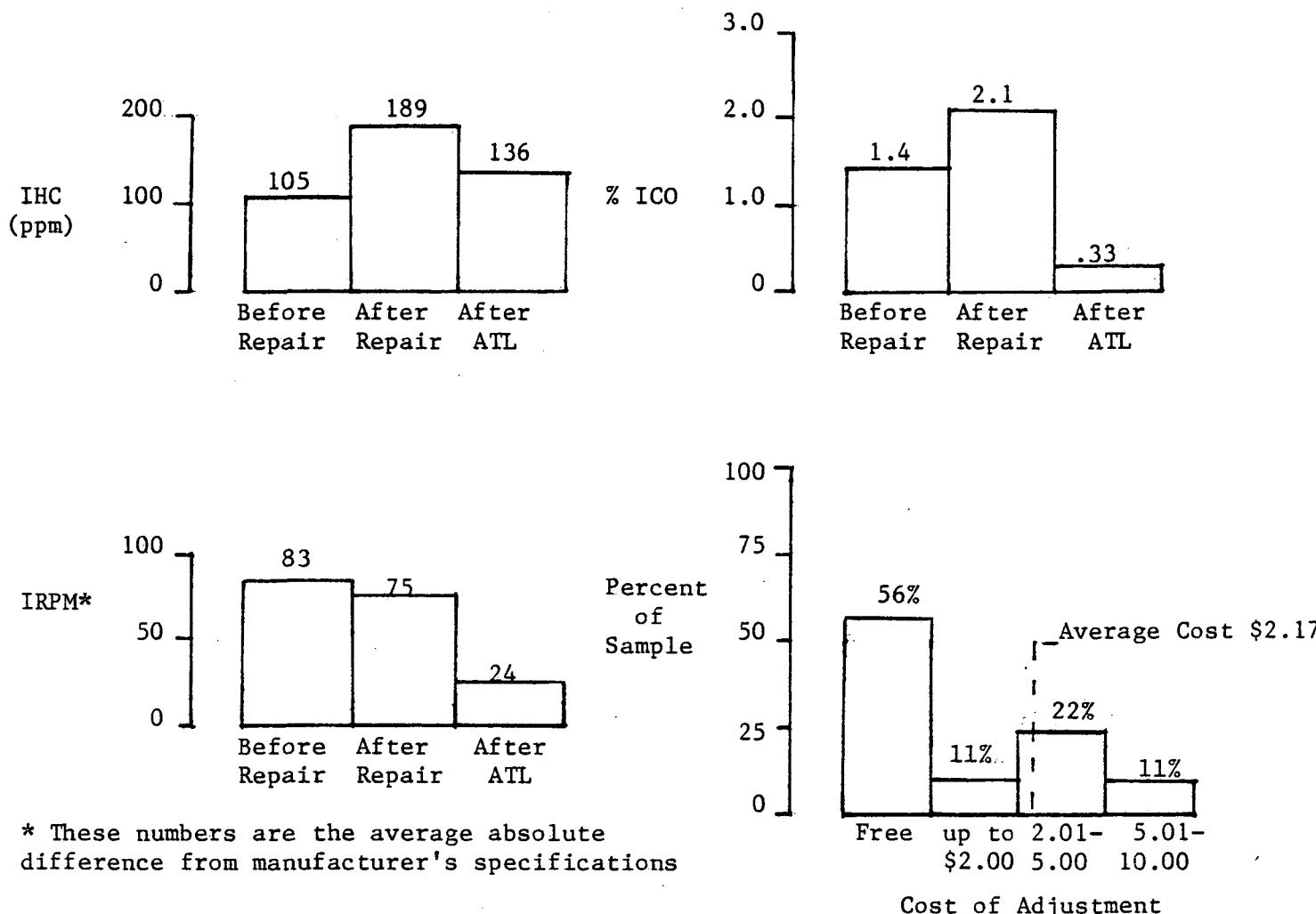
Table 1

Emission levels and Fuel Economy versus Presence of Limiter Caps

<u>Model Year(s)</u>	<u>Limiter Caps on?</u>	<u>N</u>	FTP		<u>HC</u>	<u>CO</u>	<u>NOx</u>	<u>MPG</u>	<u>HFET</u>	<u>IHC</u>	<u>ICO</u>
1975-1978	Yes	159	3.73	39.3	3.87	12.7	16.5	240	1.4		
1975-1978	No	100	5.74	58.9	3.88	12.1	16.0	380	3.5		
75-78 Totals		259	4.50	46.9	3.87	12.5	16.3	290	2.2		
1979	Yes	95	.97	13.2	1.89	12.9	16.5	76	.16		
1979	No	15	1.17	14.2	2.02	12.2	16.5	103	1.15		
79 Totals		110	.99	13.3	1.91	12.8	16.5	80	.30		

Figure 1

Effectiveness of Idle Adjustments  
at Commercial Repair Facilities  
Nine 1979 Light Duty Trucks



\* These numbers are the average absolute difference from manufacturer's specifications

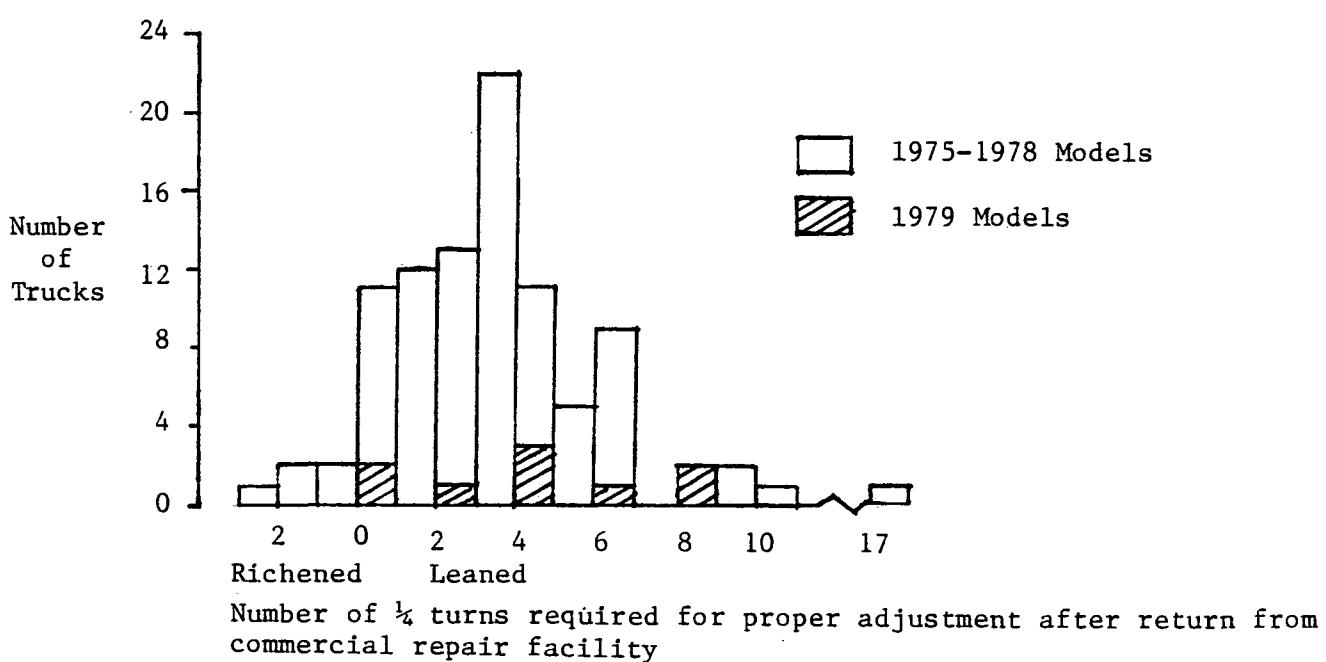
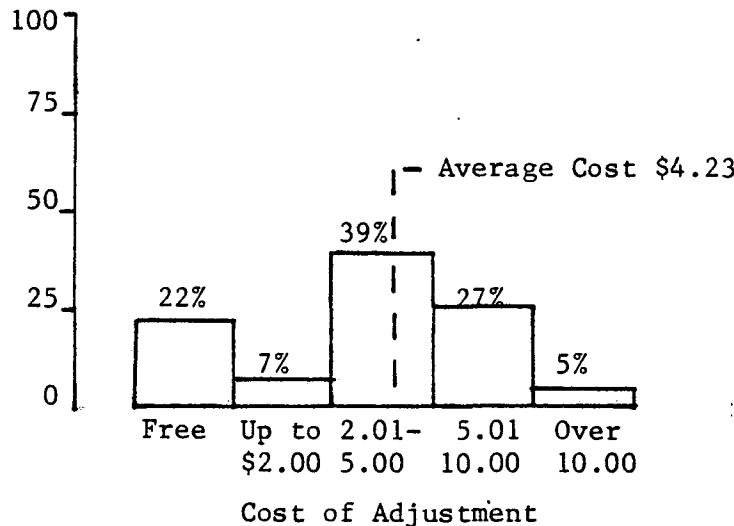
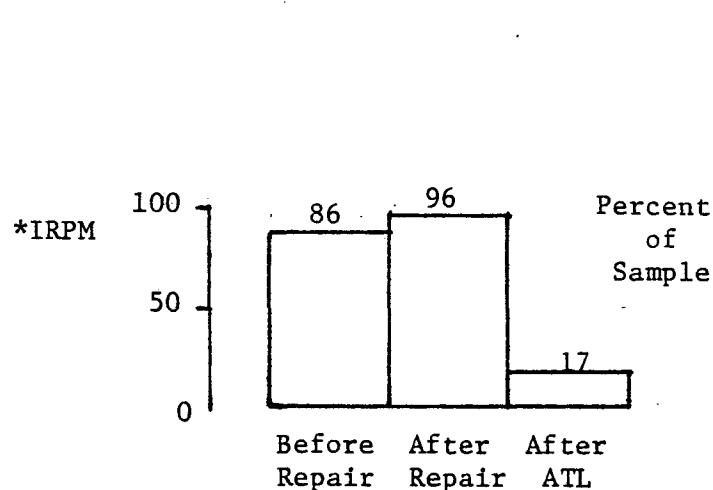
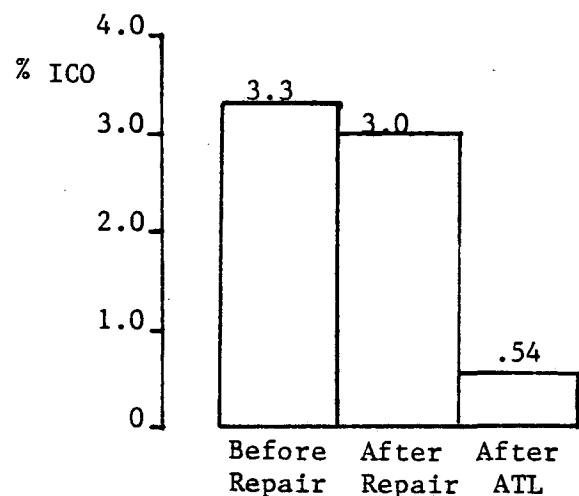
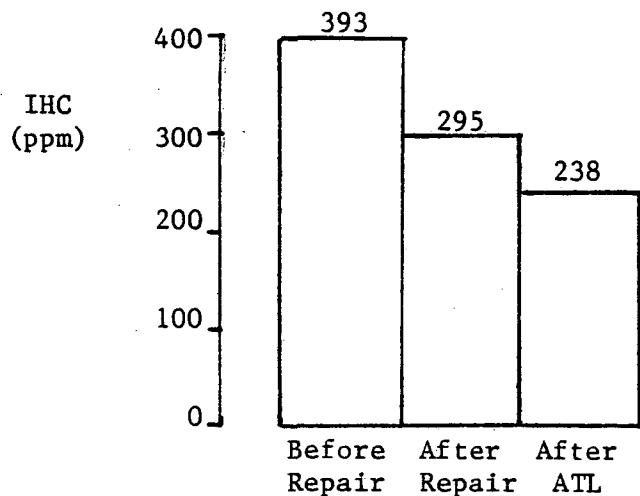


Figure 2  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities  
Eighty-Seven 1975-1978 Light Duty Trucks

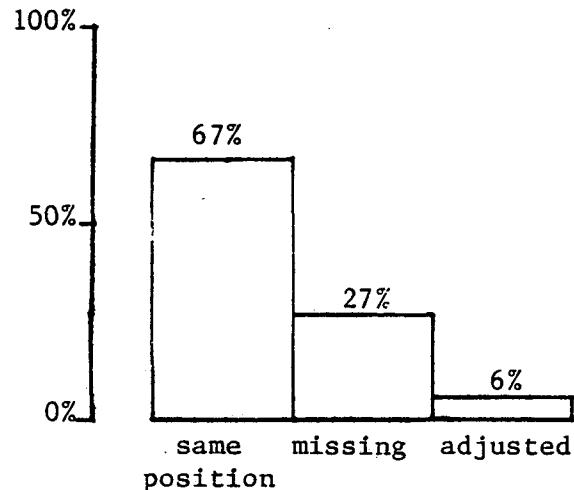


\* These numbers are the average absolute difference from manufacturer's specifications

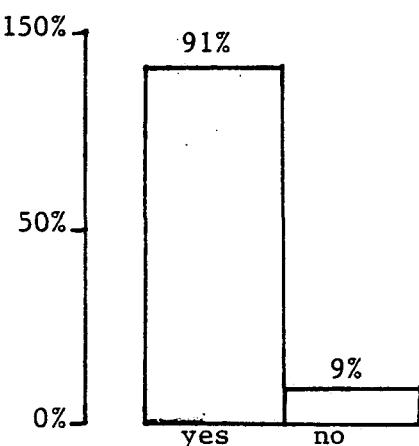
Figure 3

Results of 30 Day Follow-Up Inspection and Questionnaire  
Eighty Two 1975-1979 Light Duty Trucks

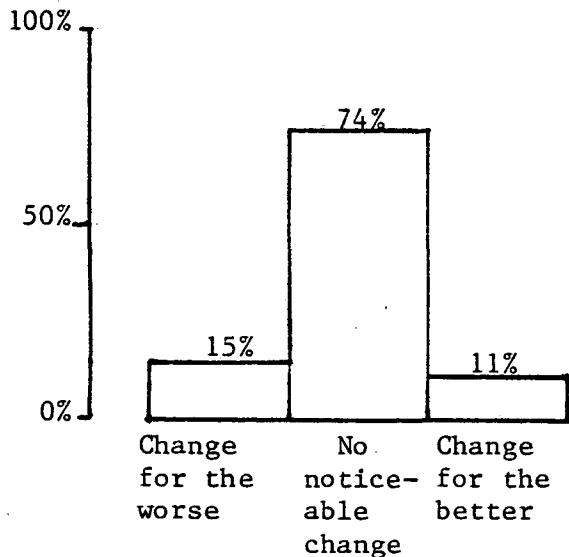
Limiter cap status at 30 day follow up inspection



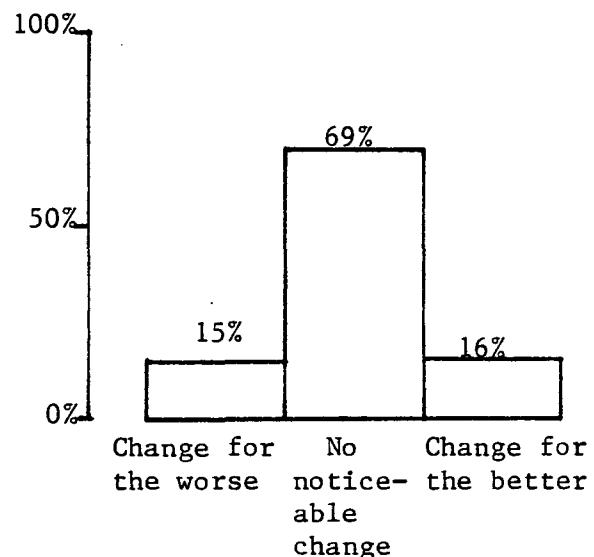
Satisfied with present performance?



Is performance different than before test?



Has there been a change in fuel economy



**Appendix**

**Effectiveness of Idle Adjustments  
at Commercial Repair Facilities**

**FY-78 ST LOUIS TRUCKS**

Date & Vehicle Number	Make & Model	Before Repair Facility	Type of Facility	Service Person's Comments	After				Differences in 1/4 Turns of Mixture Screws**				Additional Comments	
					Cost	IHC	ZICO	IRPM*	Lab Set	IHC	ZICO	IRPM	Left	Right
7/13/79	CHEV-K10	199 - 3.53 - 890	Amoco Station	MECHANIC SAID VACUUM HOSES WERE NOT PROPERLY ROUTED. ADJUSTED WITH A SCREWDRIVER.	0	135	1.10	780	125	.25	730	16 12	14 12	Slight improvement in drivability after lab setting.
10/15/79	Dodge-D-100	78 - .06 - 820	Phillips 66 Station	Mechanic looked under the hood of vehicle. Claimed vehicle was running satisfactorily. Said didn't need any adjustments. No reference or tools were used.	0	130 - .70 - 820	250 - .10 - 675		10 6	10 6		No difference all evaluations good		
8/3/79	Ford-F100	62 - .01 - 820	Texaco Station	Mechanic said there wasn't much to adjust on "79" models but the idle was fast. Hooked up an analyzer and adjusted carb with a small screwdriver.	4.50	430 - 7.5 - 600	50 - .10 - 700		16 10	12		Driveability better after Laboratory adjustments. Fair good		
3/9/79	Ford-F150	266 - 7.29 - 600	Independent Garage	Mechanic claimed vehicle was not far out of adjustment but that he could make it run better. Adjusted carb using a tachometer and screwdriver.	84.50	450 - 2.6 - 750	150 - .15 - 650		17 9	18 10		Slight improvement in normal acceleration from stop after lab adjustments. Fair good		
9/24/79	Ford-F150	69 - .04 - 580	Shell/ station	Mechanic claimed carburetor seemed maladjusted but wouldn't make any adjustments because it would void the vehicle's warranty.	0	100 - .30 - 570	200 - .30 - 570		11 12	14 12		Slight improvement only in normal acceleration from stop after lab adjustments. Fair Good otherwise		
7/30/79	Ford-F150	62 - .01 - 600	Mobil station	Mechanic refused to make any adjustments for fear of voiding warranty. Said vehicle should be taken to dealer for adjustment.	0	130 - 1.40 - 580	200 - 1.10 - 620		18 14	19 14		No difference all evaluations good		
9/15/79	Ford-F250	69 - .01 - 580	Independent Garage	Mechanic made no comments. Just took tools and began adjustments. No analyzer was used. only spray cleaner and screwdriver.	2.00	260 - 5.0 - 600	160 - .10 - 600		23 13	16 13		Vehicle drivability after garage adjustment was poor. Driveability was better before adjustment. Slight improvement after lab adjustment.		
8/31/79	Toyota-AJ5-1P3	72 - .50 - 800	Toyota Dealer	Mechanic said vehicle didn't require any adjustments. unable to observe proceedings so cannot comment on equipment used for diagnosis.	0	60 - .40 - 820	60 - .10 - 800		24 16	24 16		Driveability slightly worse after lab adjustments. (good to poor)		

IHC ZICO IRPM\*

AVERAGES

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+greater than, -less than).

IHC ZICO IRPM\*

Cost

Left Right

\*\* "+" = number of 1/4 turns  
in the "rich" direction  
"-" = number of 1/4 turns  
in the "lean" direction

Effectiveness of Idle Adjustments  
at Commercial Repair Facilities

**FY-78-ST LOUIS TRUCKS**

Date	Vehicle Number	Make & Model	Before Repair Facility	Type of Facility	Service Person's Comments	Repair Facility Cost	After			Differences in % Turns of Mixture Screws**			Additional Comments
							IHC	ZICO	IRPM*	IHC	ZICO	IRPM	Left
6/6/79	9099	Chev-LUV	72 - 1.44 - 850	Standard station	mechanic claimed to have adjusted carb to emission sticker specs. used an analyzer and carb adjusting tool.	88.50	20 - .25 - 980	26 - .25 - 800		7 (+130)	6 (-50)	-	No Difference All evaluations good.
3/7/79	8106	Chev-C10	333 - 1.4 - 600	Standard station	mechanic at first said vehicle needed new spark plugs. Later said carb needed adjustment. Adjusted carb using only screwdriver and carb cleaner. No analyzer.	83.95	500 - 1.0 - 1100	400 - .20 - 600		12 (+500)	15 -	10 -	Slight improvement in driveability after Lab. adjustments (good to excellent)
6/6/79	8119	GMC-C2500	219 - 2.56 - 480	Mobil station	mechanic said idle mixture screws were chipped. Adjusted carb using screwdriver and wrench but no analyzer.	6.25	115 - 2.2 - 540	40 - .15 - 700		13 (-60)	13 -	8 -	No Difference All evaluations good
5/14/79	8120	Chev-C20	151 - 3.08 - 700	Mobil Station	No comment from mechanic. No references nor analyzer used on carb. Adjustment used a carb adjust tool and screwdriver.	3.00	125 - 4.0 - 700	75 - .04 - 700		14 -	13 -	10 -	No Difference All evaluations good
7/6/79	8124	Chev-K10	244 - 7.23 - 600	Independent Garage	mechanic said there was no need for any adjustments. No analyzer only screwdriver used.	92.50	360 - 7.6 - 660	110 - .35 - 740		16 (-40)	13 (+40)	8 -	Slight improvement only in normal acceleration from stop. from fair to good
7/13/79	8126	GMC-Jimmy	203 - 2.76 - 720	Phillips 66 Station	mechanic looked in manual but claims he couldn't find any specs. All he did was turn idle down a bit using a wrench & screwdriver. No analyzer.	0	820 - .20 - 500	1300 - .25 - 800		16 (-200)	9 (+100)	9 -	Slight improvement in normal acceleration from stop from fair to good. Idle & oil life remain same (good)
7/20/79	8134	Dodge-D150	199 - 5.11 - 700	Standard station	mechanic used dwell-tach-point analyzer timing light and screw- drivers for adjustments. Also used carb spray cleaner.	84.00	360 - 7.0 - 660	100 - .50 - 750		7 (-90)	16 -	9 -	Slight improvement in driveability after garage adjustment plus additional improvement after Lab. adjustments (good to great)
7/25/79	8135	Dodge-D150	527 - 2.46 - 700	Independent Garage	Mechanic took vehicle for test drive, looked under hood and said vehicle didn't need any adjust- ments. No analyzer.		660 - 1.6 - 640	740 - 1.0 - 750		8 (-110)	8 -	6 -	Slight improvement after lab adjustments (good to excellent)

AVERAGES

IHC ZICO IRPM\*

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+greater than, -less than)

Cost IHC ZICO IRPM\* IHC ZICO

Left Right

\*\*"+" = number of  $\frac{1}{4}$  turn  
in the "rich" direction  
"--" = number of  $\frac{1}{4}$  turn  
in the "lean" direction

-11-

Effectiveness of Idle Adjustments  
at Commercial Repair Facilities

**FY-78 - ST. LOUIS TRUCKS**

Date & Vehicle Number	Make & Model	Before Repair Facility	Type of Facility	Service Person's Comments	After			Differences in 1/4 Turns of Mixture Screws**			Additional Comments	
					Repair Facility Cost	IHC ZICO IRPM*	Lab Set IHC ZICO IRPM	Left	Right	Left	Right	
8141 10/19/79	Dodge-B200	50 - 1.01 - 600	Gas Station	Mechanic said vehicle probably needed a new air filter, and gasoline filter. Said that the choke was probably sticking. No tools nor analyzer was used only carb cleaner.	\$3.00	150 - 1.7 - 620 (-130)	100 - .70 - 750	12	14 12	Slight improvement in driveability only in normal acceleration. Idle quality remained good.		
8142 11/26/79	Dodge-D200	131 - .90 - 810	Sunoco Station	Mechanic said one side of the carb was maladjusted didn't say which, used only a carb adjustment tool - no analyzer	\$4.00	340 - 8.2 - 840 (+140)	160 - .5 - 750 (+50)	7 3	8 3	Slight improvement in driveability after Lab. adjustments (fair to good)		
8143												
8149 9/6/79	Ford-F100	242 - 4.96 - 700	Texaco Station	Mechanic said vehicle needed a tune-up or new air cleaner. Used carb spray cleaner and carb adjustment tool to adjust carb. No analyzer	\$5.50	375 - 5.5 - 690 (-10)	250 - .20 - 700 -	16 10	14 13	No improvement after garage adjustment (fair) only slight improvement from normal operation from adjustments (fair to good)		
8150 5/25/79	Ford-F100	1165 - 10.0 - 550	Texaco Station	Mechanic said timing out of specs. not carb settings. Said vehicle also needed new air cleaner. Couldn't observe what was done to vehicle.	\$7.50	375 - 3.5 - 750 (+50)	225 - 1.02 - 700 -	16 12	13 12	No Difference All evaluations good		
8152 9/19/79	Ford-F150	418 - 3.89 - 560	Standard Station	Mechanic took test drove - opened hood and claimed carb. Didn't seem to be off much. Used small screwdriver and mirror for adjustment. No analyzer	0	500 - 4.5 - 560 (-90)	225 - .4 - 650 -	12 11	12 11	Slight improvement in driveability after Lab. adjustments. (good to excellent)		
8154 11/12/79	Ford-F150	1597 - .59 - 620	Phillips 66 Station	No comment from mechanic. used tachometer and screwdriver for adjustments - No analyzer	\$4.00	550 - 6.0 - 850 (+100)	550 - 3.0 - 750	20 11	11 14	Idle quality after Lab. adjustment dropped from good to fair after garage adjustment. Driveability etc. was good.		
8156 3/1/79	Ford-F150	424 - 7.29 - 650	Shell Station	Mechanic said idle adjustment was low. Couldn't observe proceedings - not allowed in mechanic's area.	\$6.00	200 - 1.3 - 650	125 - .04 - 650 -	12 12	12 11	No Difference All evaluations good		

AVERAGES

\*Number shown in parenthesis is the difference in RPM from the manufacturers specifications.  
(+=greater than, -=less than).

Cost IHC ZICO IRPM\* IHC ZICO Left Right  
\*\*"4" = number of 1/4 turn in the "rich" direction  
"-" = number of 1/4 turn in the "lean" direction

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Effectiveness of Idle Adjustments  
at Commercial Repair Facilities

**FY-78-ST.LOUIS TRUCKS**

Date & Vehicle Number	Before Repair Facility	Type of IRP ZICO IRPM* Facility	Service Person's Comments	After		Differences in 1/4 Turns of Mixture Screws**				Additional Comments
				Cost	Repair Facility	Lab Set	IRP ZICO IRPM	IRP ZICO IRPM	Left	
8/16/79 3/26/79	Ford-F150 244-2.76-650	Standard Station	mechanic said there was really no way to adjust carb. He set up the idle speed with screwdriver no analyzer	\$3.00	600 - 8.0 - 750 (+100)	800 - 5.0 - 650 -	14 10	12 10	No difference All evaluations good	
8/16/79 5/8/79	Ford-F150 342-.93-600	Standard Station	mechanic said vehicle needs new spark plugs. Used an Al/Pn Scope, for adjustment and also replaced one spark plug. Couldnt observe other tools used. Used K-900y	\$15.25	125 - .04 - 650 -	120 - .04 - 650 -	10 10	11 10	Slight improvement from fair to good idle quality with #7Co. otherwise f/l evaluations ste good.	
8/16/79 6/14/79	Ford-F250 219-4.41-560	Sunoco Station	mechanic said left side of carb was set rich. Used a carb adjusting tool and screwdriver couldn't see any other tools.	\$5.00	240 - 5.0 - 580 (-70)	200 - 1.2 - 650 -	12 11	17 11	Slight improvement in driveability from fair to good.	
8/16/79 4/18/79	Ford-F250 160-5.71-650	Mobil Station	mechanic said idle rpm was high used some carb cleaner and screwdriver for adjustment. No analyzer	\$3.50	170 - 5.47 - 700 (+50)	220 - 2.3 - 650 -	16 12	15 12	Quality of normal fuel from stop and idle quality improved from fair to good after idle adjustment. Remained same after lab. adjustment.	
8/16/79 5/4/79	Ford-F150 571-5.26-700	Standard Station	no comment from mechanic used carb adjust tool and screwdriver for carb adjustments No analyzer	\$4.00	1200 - 6.0 - 600 -	900 - .54 - 600 -	10 6	- -	No difference All evaluations fair	
8/17/79 7/23/79	Ford-F150 239-6.36-540	Shell Station	mechanic said he adjusted carb to specs. using a Sun Scope carb adjust tool and used some reference books.	\$5.00	230-3.8-640 (-10)	150 - .3 - 680 (+30)	17 17	20 13	No difference All evaluations good	
8/18/79 5/29/79	Chev.-C10 62-.01-620	Shell Station	mechanic said air cleaner dirty causing poor mileage. Used screwdriver for carb adjustments no analyzer	\$3.50	125 - 3.01 - 700 (+200)	75 - .02 - 500 -	16 10	17 10	No difference All evaluations good	
8/19/79 4/9/79	Datsun-620 74-1.06-860	Independent Garage	mechanic blamed pollution control equipment for poor performance. He used a tachometer, dwell meter for carb adjustment. No analyzer	\$4.00	90 - .52 - 700 (+100)	65 - .50 - 600 -	8 10	- -	Driveability was worse after lab. adjustment from good to fair. Remained same (good) after garage adjustment.	

IRP ZICO IRPM\*

AVERAGES

Cost IRP ZICO IRPM\* IRP ZICO IRPM\*

Left

Right

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+=greater than, -=less than)

"+" = number of 1/4 turn  
in the "rich" direction

"-" = number of 1/4 turn  
in the "lean" direction

<sup>-15-</sup>  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities  
**FY-78-ST. LOUIS TRUCKS**

Date & Vehicle Number	Before Repair Facility	Type of IHC ZICO IRPM* Facility	Service Person's Comments	Cost	After		Differences in 1/4 Turns of Mixture Screw**		Additional Comments		
					IHC	ZICO	IRPM*	IHC	ZICO	IRPM	
8195 6/28/79	Toyota	33 - .50 - 760	IND. GARAGE	Mechanic said carb was set too rich. Used a Scope and screwdriver to adjust carb.	812.50	120 - .89 - 830	100 - .15 - 820	12 (+30)	9 (+10)	-	Idle quality improved slightly from fair to good after lab. adjustments.
8196 3/14/79	Toyota	212 - .79 - 900	DEALER- SHIP	MECHANIC SHID SETTINGS WERE OFF VERY LITTLE USED TACH.	11.25	150 1.30 1000	50 .03 900	16 (+150)	12 (+50)	-	No Difference
8199 10/24/79	Chev.-LUV	22 - .59 - 960	MOBIL GAS STATION	USED TACHOMETER CLAMPED CARB. USED LURENCH	4.50	50 .60 1020	50 .50 900	15 (+120)	15 (0)	15 15	NO DIFFERENCE
7202 5/11/79	Chev.-C10	105 .01 - 640	STANDARD GAS STATION	MECHANIC SAID BAD GAS MILEAGE CALSED BY DIRTY AIR FILTER USED SUN SCOPE, SCREWDRIVER	10.00	150 .03 600	100 .02 500	10 (+100)	10 10	11	NO DIFFERENCE
7207 4/11/79	Chev.-C10	114 - .32 - 650	IND GARAGE	MECHANIC SHID 25 POINTS OFF. NO NEED IN GOING ANY FURTHER. USED SMALL MACHINE	0.00	130 .60 560	110 .01 700	9 (-140)	5 5	9	SLIGHT IMPROVEMENT AFTER LAB SET
7208 9/13/79	Chev.-C10	72 - .03 - 540	STANDARD GAS STATION	MECHANIC ASK WHY I UNWITTED IT PRO., SHID RIGHT SCREW WAS ALL WAY IN. USED ADJ. TOOL AND TACHOMETER	4.00	620 6.20 590	320 .30 510	16 (+90)	9 (+10)	14 8	NO DIFFERENCE
7209 10/12/79	Chev.-C20	+2000 - .18 - 480	Phillip 66 GAS STATION	MECHANIC SAID TRUCK MISSING, changed 1/4 SPARK PLUG. SAID IT NEEDED PLUG WIRES USED NO INSTRUMENTS TO SET	5.41	150 1.70 800	450 .50 700	22 (+200)	14 (+100)	24 14	NO DIFFERENCE TRUCK ENGINE STILL MISFIRIS
7210 4/10/79	Chev.-C20	330 - 7.6 - 500	IND. GARAGE	MECHANIC SAID 3 NEEDED AIR FILTER	6.50	410 5.20 600	460 .90 700	15 (-100)	12 13	21 (0)	IMPROVEMENT AFTER FACTORY SET

IHC ZICO IRPM\*

AVERAGES

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+greater than, -less than)

IHC ZICO IRPM\*

IHC

ZICO

IRPM

-16-

## Effectiveness of Idle Adjustments at Commercial Repair Facilities

FY-78 ST. LOUIS TRUCKS

REFERENCES

THE KICO TRUST

\*Number shown in parenthesis is the difference in RPM from the manufacturers' specifications.  
(+greater than, -less than)

Cost HIC XICO TRPM<sup>5</sup> HIC XICO

Let

Ring

**East**"+ = number of  $\frac{1}{2}$  turn  
in the "rich" direction  
" - " = number of  $\frac{1}{2}$  turn  
in the "lean" direction

-17-  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities  
**FY-78 ST. LOUIS TRUCKS**

Date & Vehicle Number	Make & Model	Before Repair Facility	Type of IHC ZICO TREP* Facility	Service Person's Comments	Cost	Repair Facility			Lab Set		Differences in 1/4 Turns of Mixture Screws**		Additional Comments
						IHC	ZICO	TREP*	IHC	ZICO	TREP*	Left	Right
7218 7/11/79	Dodge-B100	249-4.54-1060	Mobil station	Mechanic at first said it would be 2 b.s. job and wouldn't have time to do it, but went ahead and took the carb air cleaner off and made the carb only screwdriver adjustments. \$8.00		700 - .3 - 860 (+110)	800 - .15 - 650 (-100)		15 5	9 6	No improvement; engine has occasional misfire. All evaluations - fair		
7220 7/25/79	Dodge-D100	232-7.23-600	Teraco station	Mechanic asked if vehicle was running rich. It was told it was but to check and adjust if needed. Mechanic checked scope and after removing carb air cleaner, he cleaned carb, read carb meter and adjusted idle speed with scope. \$7.00		250 - 6.4 - 690 (-70)	125 - 4 - 780 (+30)		8 5	- -	Ran same after garage adjustment with slight improvement (from fair to good) on 90% of test. Very few stops.		
7222 3/6/79	Dodge-B200	152-3.03-900	Standard station	Mechanic stated after the adjust- ments he slowed the idle rpm. Used a screwdriver (no analyzer) and didn't consult any references. \$3.00		150 - 1.5 - 600 (-150)	150 - .1 - 750 -		20 9	4 10	No difference All evaluations good.		
7226 5/25/79	Ford-F100	468 - 45 - 650	Standard station	Mechanic said he set idle speed a bit lower using a screwdriver. NO Analyzer	0	800 - 9.01 - 560 (-90)	800 - .01 - 650 -		24 12	12 13	idle quality dropped from good to fair after garage adjustment but went back to good after ATL adjustments.		
7227 7/25/79	Ford-F100	681-6.7 - 650	Mobil station	Mechanic used a screwdriver to adjust carb. No analyzer	0	180 - 3.3 - 700 (+50)	75 - .03 - 650 -		16 10	13 12	No difference All evaluations good.		
7228 3/20/79	Ford-F150	139-2.97-650	Standard station	Mechanic said his equipment wouldn't work on electronic ign. so he just listened to engine idle in neutral + drove and said it was OK. NO Analyzer	\$2.00	75 - .04 - 730 (+80)	50 - .04 - 650 -		16 16	17 16	No difference All evaluations good except idle quality fair with A/C on.		
7229 7/5/79	Ford-F250	121-5.56-580	Independent Garage	Mechanic said carb was set too rich. Used only a screw- driver to adjust. NO Analyzer	\$3.00	190 - .3 - 550 (-100)	145 - -2 - 680 (+30)		11 11	16 11	No difference All evaluations good.		
7230 4/27/79	Ford-F100	725-5.26-460	Standard station	Mechanic after cleaning tailpipe said veh. was running rich. Used scope and screwdriver for adjustments. NO analyzer	\$8.50	460 - 1.25 - 720 (+70)	500 - .5 - 650 -		14 11	14 10	Slightly worse (from good to fair) after garage adjustment. Back to good after ATL adjustments.		

IHC ZICO TREP\*

AVERAGES

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+ = richer than, - = leaner than)

Cost IHC ZICO TREP\* IHC ZICO

Left Right

\*\* "+" = number of 1/4 turn  
in the "rich" direction  
"-" = number of 1/4 turn  
in the "lean" direction

**-18-**  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities  
**FY-78-ST. LOUIS-TRUCKS**

Date & Vehicle Number	Make & Model	Before Repair Facility	Type of Facility	Service Person's Comments	Cost	IHC ZICO IRPM*	After Repair Facility	Lab Set	IHC ZICO IRPM*	Left	Right	Differences in 1/4 Turns of Mixture Screws**		Additional Comments	
												IHC	ZICO	IRPM*	
7/23/79	Ford-F150	275-4.41-540	Shell Station	mechanic adjusted carb and timing claiming both were out of specs. Used carb adjusting tool and screwdriver no analyzer.	\$7.00	250-6.0-580	200-.9-650	9	12	Idle quality with air on-fair - same as before station adjustment. No evaluation from ATL?		7	10	Idle quality with air on-fair - same as before station adjustment. No evaluation from ATL?	
7/23/79	Ford-F150	313-6.87-750	Phillips 66 Station	mechanic took vehicle for test run and said vehicle didn't need any adjustments No Analyzer	0	400-5.5-800	800-.25-750	19	17			15	9		
7/23/79	Ford-F250	446-83-700	Independent garage	mechanic adjusted carb. using an Allen Testing Analyzer	\$3.00	180-1.6-650	240-.4-650	17	14	No difference (fair) after garage adjustments. After ATL adjustments evaluation went from fair to good.		15	13		
7/24/0	Chev.-C10	401-6.53-620	Texaco station	mechanic took test drive said only thing wrong was idle speed a bit high. Adjusted carb with screwdriver. Also changed gas filter - Said old one was clogged which supposedly caused any of the problems. No Analyzer	\$5.25	470-6.2-620	250-.5-600	13	18			6	6		
8/15/79	Chev.- C10	302-5.47-550	Standard station	mechanic said he leaned the carb. Used Tachometer, screw- driver and a motor manual No Analyzer	\$6.50	600-7.0-700	350-.5-510	12	6	No difference All evaluations were fair.		6	7		
8/25/79	Chev.-C10	325-6.53-600	Standard station	mechanic used infra-red analyzer and carb adjusting tool for adjustments.	\$8.00	70-.01-580	75-.01-550	10	-			11	-		
8/23/79	GMC-C1500	354-5.26-600	Standard station	only observed that the mechanic used a sun analyzer.	\$2.50	175-6.23-540	300-1.4-600	16	13	No difference (good) after garage adjustment. Idle quality went from good to fair after ATL adjustments.		11	12		
6/6/79	Chev.-C-10	331-7.97-440	Standard station	mechanic made some carb adjustments with screwdriver said engine sounds better. No Analyzer	\$1.00	300-4.0-560	175-.04-600	12	10			7	8		

IHC ZICO IRPM\*

AVERAGES

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+greater than, --less than)

Cost IHC ZICO IRPM\*

Left Right

"+" = number of 1/4 turn  
in the "rich" direction  
"-" = number of 1/4 turn  
in the "lean" direction

Effectiveness of Idle Adjustments<sup>19</sup>  
at Commercial Repair Facilities  
**FY-78-ST. LOUIS TRUCKS**

FY- 78- ST. LOUIS TRUCKS

INC ZICO IRPM

**Cost**    **IHC**    **ZICO**    **IRPIT**    **IHC**    **ZICO**

Left Right

## AVERAGES

\*Number shown in parenthesis is the difference in RPM from the manufacturers specifications.  
(+ greater than, - less than)

"+" = number of  $\frac{1}{4}$  turn  
in the "rich" direction  
"-" = number of  $\frac{1}{4}$  turn  
in the "lean" direction

-20-  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities

**FY-78 ST. LOUIS TRUCKS**

Date & Vehicle Number	Repair Facility	Type of IHC ZICO IRPM* Facility	Service Person's Comments	After						Differences in 1/4 Turns of Mixture Screws**		DRIVEABILITY Additional Comments		
				Cost	IHC	ZICO	IRPM*	Lab Set	IHC	ZICO	IRPM			
6267 4/6/79	Chev.-C20	206 - .3 - 600	DEPART- MENT STORE	USED TACH., SCREWDRIVERS NO COMMENTS	4.50	125	1.02	600	200	.04	600	16 12	16 12	NO CHANGE
6270 6/26/79	Ply. PB200	139 - 3.19 - 750	STANDARD GAS STATION	MECHANIC RECOMMENDS CARB. CLEANED, NEW PLUGS USED SCREWDRIVER	6.50	140	5.40	890	50	.80	750	7 4	8 4	IDLE QUALITY LUOKSE
6273 7/5/79	Dodge-B100	1451 - 2.28 - 750	STANDARD GAS STATION	NO COMMENTS USED SCREWDRIVER	2.50	900	.30	800	1000	.25	800	11 10	14 10	ACCEL. SLIGHTLY BETTER AFTER LHS SET
6275 7/9/79	Ford-F100	1582 - 9.17 - 580	IND. GARAGE	MECHANIC SAID IT NEEDS AIR FILTER & TUNEUP USED SCREWDRIVER	2.00	600	6.50	780	750	.25	760	11 8	-	NO CHANGE
6278 4/17/79	Ford-F150	769 - 3.9 - 600	MOBIL GAS STATION	MECHANIC SAID A TUNEUP SHOULD DO IT USED SCREWDRIVER	3.00	600	1.30	650	680	.25	550	14 12	15 12	NO CHANGE
6280 6/25/79	Ford-F100	967 - .06 - 680	SHELL GAS STATION	SHD IT WHS H "DEAD MISSOUT" AND NEEDED H PHOT REPIPED NONE	0.00	1200	.10	520	260	.90	640	12 11	12 11	SLIGHT DRIVEABILITY IMPROVEMENT AFTER LHS ADJUST
6284 7/18/79	Ford-F250	170 - .85 - 550	BELLEVILLE GAS STATION	SHD TRUCK NEEDED TUNEUP, PLUGS WERE REALLY BAD USED SMALL SCREWDRIVER	0.00	200	.30	530	150	.90	550	12 11	8 11	MAJOR IMPROVEMENT IN DRIVEABILITY AFTER LAB SET
6290 6/20/79	GMC-C1500	131 - 0.0 - 650	STANDARD GAS STATION	NO MECHANIC COMMENTS USED SCREWDRIVER	5.00	600	1.50	580	130	.05	680	14 12	16 12	NO CHANGE

AVERAGES

IHC ZICO IRPM\*

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+ = greater than, - = less than)

Cost IHC ZICO IRPM\* IHC ZICO

Left

Right

\*\* = number of  $\frac{1}{4}$  turn  
in the "rich" direction  
- = number of  $\frac{1}{4}$  turn  
in the "lean" direction

**Effectiveness of Idle Adjustments  
at Commercial Repair Facilities**

**FY-78 ST. LOUIS TRUCKS**

Date & Vehicle Number	Make & Model	Before Repair Facility	Type of Facility	Service Person's Comments	After						Differences in 1/2 Turns of Mixture Screws **		PRIORITY Additional Comments	
					Cost	IHC %ICO	IRPM*	IHC %ICO	IRPM*	Lab Set	IHC %ICO	IRPM	Left	Right
6291 4/26/79	Chei. - C10	325-7.05-620	STANDARD GAS STATION	USED SUN MACHINE SAID GAS PEDAL WAS STICKING	5.00	155	205	600	150	200	600	13 12	14 -2	NO CHANGE
6294 7-6-79	Jeep - CJ7	173-2.76-560	TEXICO GAS STATION	SAID CARB WAS NOT OUT THAT MUCH USED CARB ADJ. TOOL AND SMALL SCREWDRIVER	3.00	400	14	500	65	13	660	7 6	-	MAJOR DRIVABILITY IMPROVEMENT AFTER CNB SET
6296 9-26-79	Datsun	206-4.54-790	OTHER MICHEN'S STAN	MECHANIC SAID HE SET IDLE DOWN USED CARB ADJ. TOOL AND SMALL SCREWDRIVER	1.00	280	200	530	350	300	750	4 0	-	NO CHANGE
6297 10/26/79	Toyota	72-67-840	SHELL GAS STATION	ADJUSTED IDLE MIXTURE BY EAR - SAID HE THOUGHT IT WAS ADJUSTED RIGHT NOW USED SCREWDRIVER	2.00	30	.80	840	50	.30	850	9 4	9 4	NO CHANGE
5305 4/23/79	Chei. - C10	72-0.0-700	STANDARD GAS STATION	MECHANIC DID NOT ACT LIKE HE KNEW WHAT I WANTED DONE USED SMALL SCREWDRIVER	2.00	50	1.30	650	62	.01	600	14 12	14 12	NO CHANGE
6300 6/26/79	Chei. - LUV	242-15-980	Shell Gas Station	mechanic said veh. didn't need adjustment. Probably valves gapped up suggested using strong fuel additive to clean up valves. used an analyzer to adjust carb. advanced timing about \$6.00 used a wrench and screwdriver	160	-18	-880	115	-1	-900	15 10	-	-	No change after Garage adjustments idle quality abit worse (from good to fair) after ATL adjustment

AVERAGES

IHC %ICO IRPM\*

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+greater than, -less than)

Cost IHC %ICO IRPM\* IHC %ICO

Left Right

\*\*+ = number of 1/2 turn  
in the "rich" direction  
-- = number of 1/2 turn  
in the "lean" direction

-22-  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities

**FY-78 57 CARS TRUCKS**

Date & Vehicle Number	Make & Model	Before Repair Facility	Type of Facility	Service Person's Comments	After			Differences in 1/4 Turns of Mixture Screws**			Additional Comments	
					INC ZICO	IRPM*	Cost	INC ZICO	IRPM*	INC ZICO	IRPM*	
5309 7/23/79	Chev.-C20	85 - .88 - 950	SHELL GAS STATION	MECHANIC SAID NO ADJUSTMENT WAS NECESSARY	0.00	40 .20 920	120 .18 690	8 - 6 -	(+320)	(+90)		MAJOR IMPROVEMENT IN DRIVENABILITY AFTER LNB SET
5310 5/4/79	Chev.-C20	290 - .83 - 600	ZEPHYR GAS STATION	MECHANIC SAID THAT HE SET IT A LITTLE LEAN NO ANALYZER	7.00	100 1.01 700	300 .70 600	14 13 12 12	(+100)	(0)		MAJOR IMPROVEMENT IN DRIVENABILITY AFTER LNB SET
5311 5/14/79	Chev.-C20	1502 - .47 - 650	SPARKEED GAS STATION	MECHANIC SAID IT NEEDS A TUNE-UP. USED CHRB, ADJUSTING TOOL, REPLACED SPARK PLUG	3.50	60 1.01 680	50 .54 700	10 11 10 10	(-20)	(0)		TRUCK RUNS BETTER
5313 6/23/79	Chev.-K10	92 - 0.0 - 590	TEXACO GAS STATION	MECHANIC THOUGHT IT RAN FINE but MIGHT BE A LITTLE KICK USED SCREWDRIVER	0.00	60 .09 550	65 .05 610	7 10 10 10	(-50)	(+10)		SLIGHTLY WORSE AFTER LNB ADJUST.
5314 7/14/79	Chev.-C10	121 - 6.58 - 575	FINN GAS STATION	MECHANIC SAID HE SET TIMING SAID IT WAS OFF	9.00	340 5.60 600	160 .14 630	11 14 8 8	(10)	(+30)		NO CHANGE
5320 6/22/79	Dodge-B200	1780 - 4.54 - 950	SHELL GAS STATION	MECHANIC SAID HE SET CHRB. USED SMALL SCREWDRIVER	0.00	150 5.20 980	100 .90 750	10 6 5 5	(+230)	(0)		SLIGHT IMPROVEMENT IN IDLE QUALITY AFTER LNB SET
5322 6/21/79	Dodge-B200	209 - 4.02 - 710	STANDARD GAS STATION	MECHANIC SAID DIRTY AIR FILTER PREVENTED TRUE ADJUSTMENT USED TAPE/DWELL METER AND SCREWDRIVER	8.50	120 2.50 680	40 .30 750	8 12 9 9	(-70)	(0)		NO CHANGE
5323 3/2/79	Dodge-B300	106 - .11 - 700	SHELL GAS STATION	MECHANIC USED SCREWDRIVER, NO ANALYZER	8.50	85 .09 680	75 .08 750	16 17 16 16	(-70)	(0)		NO CHANGE

INC ZICO IRPM\*

AVERAGES

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+ = greater than, - = less than)

Cost INC ZICO IRPM\* INC ZICO

Left Right

"+" = number of 1/4 turn  
in the "rich" direction  
"-" = number of 1/4 turn  
in the "lean" direction

**-73-**  
Effectiveness of Idle Adjustments  
at Commercial Repair Facilities

**FY-78 ST. LOUIS TRUCKS**

Date & Vehicle Number	Before Repair Facility	Type of Facility	Service Person's Comments	After			Differences in 1/4 Turns of Mixture Screws**			Additional Comments			
				Cost	IHC %ICO	IRPM*	Lab Set	IHC %ICO	IRPM				
5324 10/30/79	Ford-F150	341-6.05-800 SUNOCO GAS. STATION	MECHANIC SAID TRUCK WAS RUNNING FINE AND NEEDED NO ADJUSTMENT. DID NOT WANT TO TAKE MY MONEY FOR NOTHING. MADE NO ADJUSTMENTS.	0.00	300	6.00	850	250	4.00	600	8 2	8 2	NO CHANGE
5326 3/23/79	Ford-F150	216-2.76-550 SHELL GAS STATION	MECHANIC LOOKED UP SPECS IN MOTOR MANUAL USED TACH/DWELL METER AND SCREWDRIVER	2.00	425	6.20	550	280	1.80	550	14 10	14 11	SLIGHT IMPROVEMENT IN IDLE QUALITY
5327 4/25/79	Ford-F100	92-.37-600 TEXACO GAS. STATION	MECHANIC SAID HE ADJUSTED CARB. ON SCOPE	7.50	125	1.00	600	125	.03	650	12 12	13 11	NO CHANGE
5332 3/7/79	Ford-F250	139-2.07-550 STANDARD GAS. STATION	MECHANIC SAID HE COULD ONLY GET IT DOWN TO 1.3% CO, SPECS ARE 1.0% TRUCK HAD EXHAUST HUMBERS USED SUN HC, CO, TACH, SCOPE, SCREWDRIVER	15.50	900	2.00	600	155	.03	550	11 6	9 7	SLIGHT IMPROVEMENT, AFTER FACILITY, MIGHT MEET
5334 10/16/79	Ford-F150	1385-+10%-300 PHILLIPS GAS. STATION	MECHANIC SAID IT WAS RUNNING RICH ADJUSTED IT CLEANER USED A SCREWDRIVER	3.00	360	7.20	460	300	1.80	550	8 6	11 8	IMPROVEMENT AFTER FACILITY AND ALSO AFTER LAB.
5338 4/26/79	Chev.-C10	160-2.46-625 SHELL GAS. STATION	MECHANIC SAID IT WAS RUNNING A LITTLE RICH USED CARBURETOR ADJ. TOOL	0.00	125	1.00	650	130	1.00	600	12 12	12 12	NO CHANGE
5339 5/10/79	Chev.-C20	213-1.84-650 SHELL GAS. STATION	MECHANIC SAID HE SET BACK TO FACTORY SPECS. USED TACH & DWELL METER	6.00	1100	1.02	450	220	.59	650	6 10	46 12	SLIGHTLY BETTER AFTER LAB SET
5340 pink pm 16, 19													

AVERAGES

\*Number shown in parenthesis is  
the difference in RPM from the  
manufacturers specifications.  
(+ = greater than, - = less than)

Cost IHC %ICO IRPM\* IHC %ICO Left Right

"+" = number of 1/4 turn  
in the "rich" direction  
"-" = number of 1/4 turn  
in the "lean" direction

**-24-**  
**Effectiveness of Idle Adjustments  
at Commercial Repair Facilities**

**FY-78 ST. LOUIS TRUCKS**

FY-78 ST. LOUIS TRUCKS

## AVGAGES

## THE ZICO TRPM<sup>3</sup>

\*Number shown in parenthesis is the difference in RPM from the manufacturers specifications.  
(+greater than, -less than)

Cost JHC ZICO TRPM<sup>2</sup> JHC ZICO

Left 1

"4" = number of  $\frac{1}{4}$  turn  
in the "rich" direction  
"—" = number of  $\frac{1}{4}$  turn  
in the "lean" direction