ANALYSIS OF
EFFECTIVENESS
AND COSTS

of
RETROFIT EMISSION
CONTROL SYSTEMS
for
USED MOTOR
VEHICLES

volume V appendices

Environmental Protection Agency

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volume V appendices

prepared under EPA Contract 68-04-0038

Olson Laboratories, Inc. 500 East Orangethorpe Avenue Anaheim, California 92801

In Association With Northrop Corporation

Report 71Y233

MAY 1972

for

ENVIRONMENTAL PROTECTION AGENCY
Office of Air Programs
Division of Emission Control Technology
2565 Plymouth Road
Ann Arbor, Michigan 48105

Approved by:

D. D. Foulds
Vice President
Olson Laboratories, Inc.

FOREWORD

The Environmental Protection Agency, as Administrator of the Clean Air Amendments Act of 1970, is required to assist States and air pollution control agencies in meeting national ambient air quality standards and mobile or stationary source emission standards, by issuing information on control techniques. Contract 68-04-0038 was performed with the Office of Air Programs, Division of Emission Control Technology, to determine what emission control techniques are feasible for retrofit to used cars, considering emission reduction effectiveness, costs, effect on vehicle performance, and the facilities and labor skills required for retrofit device installation and eventual maintenance and inspection. This report documents the results obtained, the pertinent data upon which the results are based, the techniques of test and analysis, and the recommendations for future programs to implement the results. The report consists of the following six volumes:

- I. <u>Program Summary</u>: Highlights the principal program results and conclusions as to the overall feasibility of retrofit methods for vehicle emission control. Provides guidelines for the evaluation of retrofit approaches and the implementation of control programs.
- II. System Descriptions: Documents the physical, functional, and performance characteristics of the candidate retrofit methods and their installation requirements and costs.
- III. <u>Performance Analysis</u>: Documents the relative effectiveness and costs of retrofit methods, the techniques of analysis and testing, and the assumptions and rationale upon which the analysis was based.
- IV. <u>Test and Analytical Procedures</u>: Documents the approach to the overall program objectives and the tasks and procedures implemented to meet the objectives.
- V. <u>Appendices</u>: Documents the raw data obtained from retrofit development sources and data of overall applicability to the report.
- VI. Addendum for Durability Tests: Documents the results of 25,000-mile durability tests on four representative retrofit devices.

ACKNOWLEDGMENTS

This program was conducted under the direction and with the assistance of Dr. Jose L. Bascunana, Project Officer of the Environmental Protection Agency. Emission Control Technology, Inc., provided the methodology for performance analysis under a subcontract agreement with Olson Laboratories, Inc.

The accomplishment of this program was made possible by the cooperation and assistance of the many developers and manufacturers of retrofit devices. Their contribution of coordination time, data, and retrofit device hardware is very much appreciated.

GLOSSARY

AMA Automobile Manufacturers Association

CEI Cost Effectiveness Index

CI Cost Index

CID Cubic inch displacement

CNG Compressed natural gas

CO Carbon monoxide

CVS Constant volume sampling

DI Driveability Index

EGR Exhaust gas recirculation

EI Emission Index

EPA Environmental Protection Agency

gm/mi Grams per mile
HC Hydrocarbons

LNG Liquefied natural gas

LPG Liquefied petroleum gas

MMBM Mean-miles-before-maintenance

MMBPF Mean-miles-before-partial-failure

MMBTF Mean-miles-before-total-failure

mph Miles per hour

mpg Miles per gallon

MTTM Mean-time-to-maintain MTTR Mean-time-to-repair

NDIR Nondispersive infrared

NOx Oxides of nitrogen
OEM Original equipment

PCV Positive crankcase ventilation

PI Performance Index ppm Parts per million

SAE Society of Automotive Engineers

WOT Wide open throttle

VOLUME V

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APPENDIX V-1 DATA SURVEY RESULTS

APPENDIX V-1

DATA SURVEY RESULTS

This appendix identifies all retrofit device development and information sources contacted during the retrofit study. Each source was assigned a file number for control purposes. The nature of the response from each source was categorized so that an overall profile of the retrofit development field could be established (refer to Volume II, Section 1, for discussion of results).

The device classification number is listed only for those devices for which sufficient information was obtained to evaluate them as part of the retrofit study. An "x" in the 3h field of the listing means that the device was also tested in the study.

APPENDIX V-1 DATA SURVEY RESULTS

1	2 DEVELOPMENT SOURCE					3	DICL	PNED	RESPONSE	4	HARDWARE TYP	PE 5 COMMENTS
DEVICE AND/OR FILE NO.			/,			/	7	7		//cr	ASS NO. DEVICE NA	
1	Adaks Products, Inc. 285 Mount Read Blvd. Rochester, N.Y. 14611	a b	С		-	1	k x	Ť	1.2.1		Bleed to Intake	
2	AEC Corporation	x										3a Letter not returned
3	Air Pollution Control Association 4400 Fifth Ave. Pittsburgh, Pa. 15213 Tel (412) 621-1100	х	c					x				3i File Nos. 10, 227, 285
4	Air Pollution Control, Inc.											Refer to Device 10
5	Air Pollution Control Institute	x					ŀ				•	3a Letter not returned
6	Algas, Inc.	x									: :	3a Letter not returned
7	All American Racers Inc. Daniel Gurney, Pres.	x										3a Letter not returned
8	All-O-Matic Industries 2099 Jericho Turnpike New Hyde Park, N.Y. 11040 Tel (516) 437-2200	X	ς .									
9	American Machine & Foundry 5929 Rodeo Rd. Los Angeles, Calif.	x				٠						3a Letter returned un- opened. Address unknown
10	American Pollution Controlled, Incorporated 19900 E. Colfax Ave. Aurora, Colo. 80010			x	х	x x	×		1.2.2	Exh tio	ottle-Controlled aust Gas Recircula- n with Vacuum ance Disconnect	3e Reports and performance data received in lieu of questionnaire.
11	American Oil Company	x		$\left \ \right $								3a Letter not returned
12	Anpol Chemical Corp. Lakewood, Calif.	x								Anp G3	ol Formula	3a Letter returned un- opened (insufficient address). Correct address is P.O. Box 20259, Long Beach, Calif. 90801.
13	Atlantic Richfield Co. 445 S. Figueroa St. Los Angeles, Calif. 90054 Tel (213) 629-4111	x										3b New car installation
14	Atmospheric Pollution Control Research Lab.	x							:			3a Letter not returned
15	Automotive Consulting Engineering	x										3a Letter not returned

1	2 DEVELOPMENT SOURCE					3	اعوا	meo.	RESPONSE	4	HARDWARE TY	PE [5]	COMMENTS
DEVICE AND/OR FILE NO.		/\$								CLASS NO.	DEVICE NA	ME	
		a	<u>آ</u>	c d	e	£	g h	1	a	<u></u>	b		
16	Automotive Environmental Systems, Inc. 3272 North E. St. San Bernardino, Calif. 92404	x										3a Letter not	returned
17	Automotive News Box 5001 Anaheim, Calif.	х										3a Letter ret opened - Orde	
18	Automotive Performance 7138 Envoy Ct. Dallas, Tex. 75247	x										3a Letter not	returned
19	Automotive Research Associates T. D. Cook	x										3a Letter not	returned
20	Bathco Industries, Inc. P.O. Box 2871 Fullerton, Calif. 92633 Tel (714) 879-5805			×		х				Catalytic Co	onverter	3b No data	
21	Battelle Memorial Institute Columbus Laboratories 505 King Ave. Columbus, Ohio 43201 Tel (614) 299-3151		x					x				31 File Nos. 392, 393.	390, 391,
22	Bendix Corporation Motor Component Div. 1931 Oakwood Ave. Elmira, N.Y. 14903	x				x			1.2.6	Electronic H Injection	Puel	3a Evaluation EPA Test Repo	
23	Biap Enterprises	x				x			1.3.2	Electronic Unit	gnition	3a Evaluation HEW/NAPCA Rep	
24	Brisko's Mileage-Saver, Inc. P.O. Box 38 Ojibwa, Wis. Tel Winter 2691			××		x			2.1	Heavy Duty I Crankcase Co Valve with A	ontrol	3d Evaluation miscellaneous EPA Test Repo	data and
25	Bystrons Oljeprodukter Sagrenksagatan 7 Kahstad, Sweden	x										3a Letter not	returned
26	California Air Resources Board Hill St. Los Angeles, Calif.	x										3a Letter not	returned
27	University of Calif. 1301 S. 46th St. Richmond, Calif.	x										3å Letter not	returned
28	Mr. John S. Caruso 14-38 Broadway Astoria Long Island, N.Y. 11106	x								Centrifugal	Fan	3a Insufficie	nt data

DEVICE AND/OR FILE NO.	DEVELOPMENT SOURCE									RESFONSE	HARDWARE TYP	COMMENTS
1 1				,	//	/	1				CLASS NO. DEVICE NA	
		all	b c	d	e	£	g	h	1	. а	b	
29	Celanese Corporation of America E. Kleppinger, Environ Control	x				1						3a Letter not returned
30	Chevron Research Co. 576 Standard Ave. Richmond, Calif.	:	×									Telecon - Negative response
31	Chromalloy American Corp. 2100 W. 139th St. Gardena, Calif. 90249 Tel (213) 770-1860					х				1.1.2	Thermal Reaction by Turbine Blower Air Injection	3f Did not return questionnaire (mixed feelings for program). Sufficient data sent.
32	Clean Air Research Co. 800 Moraga Dr. Mountain View, Calif.	x										3a Letter not returned
33	Colspan, Inc. P.O. Box 3467 Boulder, Colo. 80303			x	x	х	x	x		1.2.4	Carburetor Modifica- tion, Main Jet Differ- ential Pressure	
34	Colt Industries Holly Carburetor Div. 11955 E. Nine Mile Rd. Warren, Mich. 48090 Tel (313) 536-1900		x						x		: :	3i See Device 10
35	Coordinating Research Council, Inc. 30 Rockefeller Plaza New York, N.Y.	x										3a Letter not returned
36	Consolidated Engineering Technology Corp. Subsidiary of Technology, Inc. 71 Forest Brockton, Mass.	x								1.4.3	Fuel Conditioning by Exposure to Electro- magnetic Field	3a Letter returned: incorrect address. Evaluation based on HEW/NAPCA Test Report dated 6-70.
37	Consumer Power	x										3a Letter not returned
38 ⁽¹⁾	Mr. George Cornelius 279 West 7th St. San Pedro, Calif. 90731 Tel (213) 833-1348	,	x								Exhaust Gas Recirculation	3f Patent 3,306,033
39	Custom Engineering (Ref. 158)	x						١				3a No data
40	Digitek	x										3a Letter not returned
41	Fansteel, Inc. 1 Tantalum Pl. Chicago, Ill. 60064	x									·	3a Letter not returned

⁽¹⁾Withdrew from program.

1	DEVELOPMENT SOURCE					3	ر ا	Linearo	RESPONSE		4 HARDWARE TY	PE 5 COMMENTS
DEVICE AND/OR FILE NO.				,	//		//	7		//	CLASS NO. DEVICE NA	
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42	Ferry Cap & Set Screw 2151 Scranton Rd. Cleveland, Ohio 44113			x	x	x	x x		1.2.1		r Bleed to Intake nifold	
43	Fuel Injection Parts Co., Inc. Robert M. Whelan, Pres	x										3a Letter not returned
44	Fuel Injection Sales & Service James E. Biewitt, Sr.	x										3a Letter not returned
45	Fuji Heavy Industries, Limited 1439 Osawa Mitaka-Shi Tokyo, Japan	x		:								3a Letter not returned
46	Pollution Control Div. FWI, Inc. P.O. Box 3402 Tulsa, Okla. 74101 Tel (918) 587-6731		ĸ								•	3b Involved in waste water pollution control
47	Good Air Limited 25 St. Marys St. Toronto 12, Canada			х								3d Interested, but no further information
48	Gulf Oil Corporation Gulf Building P.O. Box 1166 Pittsburgh, Pa. 15230		×			x		x				3i File Nos. 396, 397, 398, 399, 400, 401, 402. 3c/f Patent 3,423,928.
49	H. R. & A. Distributors 4159 Buena Vista Suite 7 Dallas, Tex. 75205	x	5									3a Letter not returned. No device description. Refer to No. 178.
50	Humble 0il & Refining P.O. Box 2180 Houston, Tex. 77001	,	ĸ									
51	Hurst Perform, Inc. J. McLean, Pres.	,	ĸ									
52	IMPCO Carburetion Division of A.J. Industries 16916 Gridley P1. Cerritos, Calif. 90701 Tel (213) 860-6666			x					1.4.1	LP	G Conversion	3d Interested; submitted general data package. Evaluation included HEW/NAPCA Report 71-10 and report dated 2-70.
53	Illinois Institute of Technology Chicago, Ill.	x										3a Letter not returned

1	DEVELOPMENT SOURCE						3	orci	PHED	RESPO	NSE	4 HARDWARE TY	PE 5 COMMENTS
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54	Johns-Manville Environmental Control Systems Division P.O. Box 159 Manville, N.J. 08835 Tel (201) 722-9000		x						}				3b Not in a position to participate
55	J. W. Automotive Engineering Co. J. L. Weyer, Test Eng	x						:					3a Letter not returned
56	Porter Landrum 7225 Second Ave., South Birmingham, Ala. Tel (205) 595-0251			2	x :	x :	x			1.2	.4	Crankcase Blowby and Idle Air Bleed Modification	3h Baseline data not available
57	Litvak & Attorney's at Law Box 1953 Denver, Colo. 80201 Tel (303) 266-0381			2	c :	x	x 2	ĸ		1.2	.1	Air Bleed with Exhaust Gas Recirculation and Vacuum Advance Dis- connect	3h Generation of emission data late
58	Lubrizol Corporation P.O. Box 3057 Cleveland, Ohio 44117	x											3a Letter not returned
59	Manfredi Enterprises 2947 Loran Ave. Cleveland, Ohio Tel 651-8484			,	ĸ :	x	х			4.0		Three-Stage Exhaust Gas Control System	3f Redesigning the device
60	Marvel Schebler	x											3a Letter not returned. Refer to Device 459.
61	University of Michigan Automotive Engineering North Campus Ann Arbor, Mich.	x		,								·	3a Letter not returned
62	Mitsui 8-7-1 Shimorenjaku, Mitaka-City Tokyo, Japan	x		١.			8 8 8 8			1.1	.1	Catalytic Converter	3a Letter not returned. No device description. Evaluation based on EPA Test Report 71-22.
63	Mobil Oil Corporation	x											3a Letter not returned
64	Nelson Muffler Corp. P.O. Box 308 Stoughton, Wis. 53589 Tel (608) 873-6641		x						x				3i File No. 102
65	New Jersey State Bureau of Air Pollution Control John Fitch Plaza P.O. Box 1390 Trenton, N.J. 08625		x						x				31 File Nos. 12, 75, 96, 244, 292, 384, 387, 400, 417, 418, 420, 421, 422, 423, 425, 426, 427, 428, 424.

1	DEVELOPMENT SOURCE					3]	DECL	MED	RESPONSE	1	4 HARDWARE	YPE 5 COMMENTS
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66	New York State Department of Environmental Conservation Albany, N.Y. 12001	x						x				31 File Nos. 75, 387, 389
67	North American Gas	x										3a Letter not returned
68	Novo Industrial Corp. 2199 Pacific Ave., Rm 202 San Francisco, Calif. 94115	x										3a Letter returned un- opened - Moved, left n address.
69	Optimizer Control Corp. 5309 Edina Industrial Blvd. Minneapolis, Minn. 55435 Tel (612) 941-6161		2	K X	×	x	ж		1.3.1	Vac	ectronic Controlled cuum Advance Discor ct and Carburetor an Idle Modificatio	-
70	Oxy-Catalyst Inc. East Biddle St. West Chester, Pa. Tel (215) 692-3500		34	c	x						nolithic Catalyst nverter	3d Not interested in participating at this time. 3f Patent 3,203,168.
71	Pennsylvania Refining Company 2686 Lisbon Rd. Cleveland, Ohio 44104	x										3a Letter not returned
72	Petrolane 5037 E. Telegraph Rd. Los Angeles, Calif. 90022 Tel (213) 261-0264		3	(Pro	opane Carburetion	3d Did not return questionnaire
73	Phillips Petroleum Co. P.O. Box 792 Pasadena, Tex. 77501 Tel 472-4351	x										
74	Pott Industries 111 S. Bemiston St. Louis, Mo. 63105	x										3a Letter not returned
75	Turner & Associates 6219 Joyce Way Dallas, Tex. 75225		×	¢ 2	×	x					nition Spark dification	3g Emission data not received. 3f Patent 3,019,276.
76	Mr. Charles Roberts (See Device 172)	x										3a Letter not returned
77	Roberts Induction Modification (See Device 172)	x										3a Letter not returned
78	San Diego Gas & Electric P.O. Box 1831 San Diego, Calif. 92112	x										3a Letter not returned

1	DEVELOPMENT SOURCE		3 DECLINATO RESPONSE	4 HARDWARE TYPE	5 COMMENTS
DEVICE AND/OR FILE NO.				CLASS NO. DEVICE NAME	
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79	Scott Research Laboratories, Inc. P.O. Box 2416 San Bernardino, Calif. 92406 Tel (714) 887-2571	x			
80	Shell Oil Company One Shell Plaza P.O. Box 2463 Houston, Tex. 77001	x		Refe	r to Device 81
81	Shell Oil Company One Shell Plaza Houston, Tex. 77002	x			
82	Signal Oil & Gas Co.	x		3a I	etter not returned
83	Society of Automotive Engineers, Inc. Two Pennsylvania Plaza New York, N.Y. 10001 Tel (212) 594-5700	x	x	31 F	ile Nos. 286, 287
84	Southwest Research Inst. 8500 Culebra Rd. San Antonio, Tex.	x		3a I	etter not returned
85	Specialty Equipment Manufacturers Association	x		За І	etter not returned
86	Standard Oil Company	x		3a I	etter not returned
87	Standard Oil of California	x		3a I	Letter not returned
88	Standard Oil of Ohio	x		I i	Questionnaire not urned
89	Stanford Research Inst. Client Relations & Development Menlo Pk, Calif.	x		3a 1	etter not returned
90	Sun Electric Corp.	x		3a 1	Letter not returned
91	Sullivan Carburetor Develop- ment Co. "ADCO" 1500 Fieldcrest Dr. Pleasant Hill, Calif. 94523	x			Old not return stionnaire
92	Sun Oil Company	x		3a 1	etter not returned

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		/5		\\display \\ \display \\ \din \display \\ \display \\ \display \\ \display \\ \dinplay \\ \display \\ \display \\							/
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ļ .		a b) c	d	e	£ E	3 h	1	a	l)
93	Texaco, Inc. P.O. Box 509		x		ı				1.1.1	Catalytic Converter with Exhaust Gas Re-	3c Patents 3,406,515 and 3,402,550. Evalu-
	Beacon, N.Y. 12508									circulation, Spark	ation based on EPA
							·			Modification, and Lean Idle Mixture	Test Report 71-26.
0,	m)										2. 7.44
94	Thermasan Corporation 161 Enterprise Dr.	x				-					3a Letter not returned
	Ann Arbor, Mich. 48106		Ш		1	1					
95	REI Industries, Inc.	H		x	,	ĸ			1.3.2	Paser Magnum	3d Did not return ques-
	2344 Farrington Dallas, Tex. 75207										tionnaire. Evaluated on basis of EPA test
	Tel (214) 638-8270										reports (see Appendix
										٠	V-2, 7d and 7e, page V-2-70).
96	Universal Oil Products			×	, ,	٠,	ξ x		1.1.1	Catalytic Converter	3f Patent 3,237,399
, ,	30 Algonquin Rd.				^ ′	` `	` ^		1.1.1	with Distributor Vac-	
	Des Plaines, Ill. 60016									uum Advance Disconnect	
97	Union Oil of Calif.	×									3a Letter not returned.
	Los Angeles, Calif.										Patent 3,257,798
98	Universal Oil Products Air Correction Div	x			-						3a Letter not returned
99	VAW of America, Inc.	x									3a Letter not returned
100	Wallace-Murray Corp. Schwitzer Division	x							1.2.5	Turbocharger	3a Letter not returned. Evaluation based on
	299 Park Ave.										EPA Test Report dated
	New York, N.Y. 10017 Tel (212) 758-4000				1						5-71.
101	Wisconsin Mining Co., Limited	x									3a Letter not returned
101	Suite 302										Ja Beccel Mot letained
	95 King St. East Toronto, Ontario, Canada										
102	W. R. Grace & Co.	11.									3b Negative verbal
102	w. A. Grace & CO.	'						^			reply.
											3i File No. 227.
103	Zedec Enterprises	x									3a Letter not returned
104	Union Carbide Co.	2	ĸ								
	P.O. Box 8004 South Charleston, W.Va. 25303										
105											
105	University of Wisconsin College of Engineering	*									
	1513 University Ave. Madison, Wis. 53706										
	Tel 262-3543										
		<u>11</u>	Ш					L	<u> </u>		

1	2 DEVELOPMENT SOURCE	* 14		 -	3	OEC!	H-MED	RESPONSE		4	HARDWARE T	YPE	COMMENTS
DEVICE AND/OR				/	//	7	7/	////	77	LASS NO.	DEVICE	NAME /	7
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		/							/	/			
		æb ab		%			3 /2	<i>≩</i> / }.					
			c a	e	1 18	s h	1	a	_			В	
106	State of North Carolina Department of Water & Air Resources P.O. Box 27048 Raleigh, N.C. 27611	x											
107	North Dakota Environmental Health & Engineering	x										3a Letter	not returned
108	Oklahoma State Dept. of Health 3400 North Eastern Oklahoma City, Okla. 73105	x											
109	Oregon Air Quality Control District	x						ļ	ļ			3a Letter	not returned
110	Pennsylvania Bureau of Air Pollution Control	x										3a Letter	not returned
111	State of Rhode Island Department of Health 204 Health Bldg Davis St. Providence, R.I. 02908	x					х					31 File No	o. 383
112	South Carolina Pollution Control Authority 1321 Lady St. P.O. Box 11628 Columbia, S.C. 29211 Tel (803) 758-2915	x											
113	State of Tennessee Department of Public Health Nashville, Tenn. 37219	x											
114	Texas State Agency Division of Air Pollution Control	x										3a Letter	not returned
115	Utah State Agency Utah State Division of Health	x										3a Letter	not returned
116	Vermont State Agency Industrial Hygiene Div.	x										3a Letter	not returned
117	Washington State Agency Washington State Department of Ecology	x										3a Letter	not returned
118	West Virginia State Agency Air Pollution Control	x										3a Letter	not returned

1	DEVELOPMENT SOURCE				3	DECL	NED.	RESPONSE	4	HARDWARE TYPE	COMMENTS
DEVICE AND/OR FILE NO.		 					\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\		CLASS NO.	DEVICE NAME	
ļ	[аЬ	c d	e	f g	h	1	a		b{	
119	Wisconsin State Agency Air Pollution Control									3a Lo	etter not returned
120	State of Wyoming Dept. of Health & Social Services State Office Building Cheyenne, Wyo.	x									
121	Arizona State Dept. of Health Div. of Air Pollution Control 4019 N. 33rd Ave. Phoenix, Ariz.	x					x				ile Nos. 18, 75, 314, 394, 395
122	Bay Area Air Pollution Control District 939 Ellis St. San Francisco, Calif. 94109	x									·
123	County of Los Angeles Air Pollution Control Dist. 434 S. San Pedro St. Los Angeles, Calif. 90013 Tel (213) 629-4711	x									
124	County of San Diego Department of Health 1600 Pacific Highway San Diego, Calif. Tel (213) 239-7711	x									
125	Colorado Department of Health Air Pollution Control Div. 4210 E. 11th Ave. Denver, Colo. 80220 Tel (303) 343-2911						х			31 F	ile Nos. 10 and 33
126	State of Connecticut State Department of Health Environmental Health Services 79 Elm St. Hartford, Conn. 06115						х			31 S	ee additional list
127	State of Delaware Department of Natural Resources & Environmental Control Dover, Del. 19901						х			31 F	ile Nos. 96, 403
128	Washington D.C. Air Pollution Control Div.	×								3a L	etter not returned

1	DEVELOPMENT SOURCE					3	ORCL	Pul D	RESPONSE	4	HARDWARE TYPE	5 COMMENTS
DEVICE AND/OR FILE NO.										CLASS NO.	DEVICE NAME	
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129	Environmental Protection Agency Region I Office J.F. Kennedy Federal Building Boston, Mass. 02203							x			31	File No. 1
130	Environmental Protection Agency Region II Office 26 Federal Plaza New York, N.Y. 10007	×										
131	Environmental Protection Agency Region III Office Air Pollution Control Charleston, W.Va.	×									3a	Letter not returned
132	Environmental Protection Agency Region IV Office Air Pollution Control	x									3a	Letter not returned
133	Environmental Protection Agency Region V Office Air Pollution Control	x									3a	Letter not returned
134	Environmental Protection Agency Region VI Office Air Pollution Control							x				File Nos. 75, 28, 2, 283, 284
135	Environmental Protection Agency Region VII Office Air Pollution Control			x								Questionnaire not turned
136	Environmental Protection Agency Region VIII Office Air Pollution Control	x									3a	Letter not returned
137	Environmental Protection Agency Region IX Office Air Pollution Control	x									3a	Letter not returned
138	Environmental Protection Agency Region X Office Air Pollution Control 1200 Sixth Ave. Seattle, Wash. 98101							×				File Nos. 70, 244, 3, 434, 435
139	Georgia Department of Public Health 47 Trinity Ave., S.W. Atlanta, Ga. 30334 Tel (404) 656-2000	3										
140	State of Illinois Air Pollution Control Office	x								·	3a	Letter not returned

1	DEVELOPMENT SOURCE		3	ecrimen	RESPONSE	4	HARDWARE TYPE	COMMENTS
DEVICE AND/OR		/	///	77	/////	CLASS NO.	DEVICE NAME	7
FILE NO.		//	///		////﴿			
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		\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$			\		/	
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		a b c d e	f B	h 1	1 4	<u></u>	ь	
141	State of Indiana State Board of Health 1330 W. Michigan St. Indianapolis, Ind. 46206	x		x			31 F1	le No. 274
142	State of Iowa Department of Health Lucas State Office Bldg. Des Moines, Iowa 50319	x						
143	Kansas State Dept. of Health Topeka, Kans.	x						
144	State of Kentucky Air Pollution Control Office	x					3a Le	tter not returned
145	State of Louisiana Air Pollution Control Office	x					3a Le	tter not returned
146	State of Maine Air Pollution Control Office	x					3a Le	tter not returned
147	State of Maryland Environmental Health 2305 N. Charles St. Baltimore, Md. 21218 Tel (301) 383-2779	x						
148	State of Michigan Air Pollution Control Office	x					3a Le	tter not returned
149	State of Minnesota Pollution Control Agency 717 Delaware St., S.E. Minneapolis, Minn. 55440 Tel (612) 378-1320	x						
150	State of Mississippi Air & Water Pollution Control Commission P.O. Box 827 Jackson, Miss. 39205 Tel 354-6783	x						
151	State of Missouri Air Pollution Control Office	x					3a Le	tter not returned
152	State of Montana State Department of Health Helena, Mont. 59601	x						
153	State of Nevada Clark County Air Pollution Control Office	x					3a Le	tter not returned

1	2 DEVELOPMENT SOURCE				3	DECLIF	 ueo	RESPONSE	4	HARDWARE TYP	COMMENTS
DEVICE AND/OR FILE NO.		 \$ \$			7	7	7/		CLASS NO.	DEVICE NA	 /
		a b c	d	/0/ e	£ 8	ky z 3 h		/ 2		b	/
154	State of New Jersey Air Pollution Control Office P.O. Box 1390 Trenton, N.J. 08625	x									See File No. 65
155	State of New Mexico Environmental Improvement Agency P.O. Box 2348 Santa Fe, N.M.						х				3i File Nos. 275, 276, 277
156	State of New York Air Pollution Control 50 Wolf Rd. Albany, N.Y. 12205	x								·	3a Letter not returned
157	Hooker Industries, Inc. 1009 W. Brooks St. Ontario, Calif. 91762 Tel (714) 983-5870		x		x				Headers		3f Unsure of effective- ness of device
158	Darwin A. Tyler 30160 Wisconsin St. Apple Valley, Calif. 92307		x						Air Fuel C	ontrol	3d Questionnaire not received
159	Clayton Manufacturing P.O. Box 550 El Monte, Calif. 91734 Tel (213) 283-4131	x						٠			
160	Oildex Corporation P.O. Box 3755 Long Beach, Calif. 90803		x	x	x z	ĸ		2.2	Closed or Control Sy Filter	Open Blowby stem with	3g Photographed device
161	General Motors Environmental Activities Staff General Motors Technical Center Warren, Mich. 48090				x						3f Device sold only in Calif.
162	Ethyl Corporation Research & Development 1600 W. Eight Mile Rd. Ferndale, Mich. 48220	×					х				3i File Nos. 164, 387, 388, 3c Patent 3,577,727; 3,495,401.
163	California Hwy Patrol P.O. Box 898 Sacramento, Calif. 95804	x									
164	Mr. Otis Jackson 6325 Lagrande Detroit, Mich. Tel (313) 892-6689		x	x	х			1.1.4	Exhaust Ga	s Filter	3d Emission data not received

1	DEVELOPMENT SOURCE				3		Levelo	RESPONSE	4 HARDWARE TY	PE 5 COMMENTS
DEVICE AND/OR FILE NO.									CLASS NO. DEVICE NA	
	[ь	c d	e	Ī	8 h	1	a	t	<u></u>
165	Mr. Charles Penkova 147 E. 18th St. Costa Mesa, Calif. Tel (714) 646-0016			x				4.0	Exhaust Gas After- burner/Recirculation with Blowby and Fuel Evaporation Recirculation	
166	Allied Equipment Co. 1509 San Pablo Berkeley, Calif. Tel 526-7047		×							3d Did not return questionnaire
167	Alfa Romeo, Inc. Western Division 215 Douglas St., S. El Segundo, Calif. 90245 Tel (213) 772-4414	x								
168	Consumers Union of U.S. Auto Test Division 367 Boston Post Rd. Orange, Conn. 06477	x								
169	Rochester Products Div. of General Motors 1000 Lexington Ave. Rochester, N.Y. 14603 Tel (716) 254-5050						x			31 File No. 223
170	Automotive Association International Inc. 75 Narcissa Dr. Portuguese Bend, Calif. Tel (213) 377-8507		×	x	ж			2.1	Closed Blowby Control System	3 1 1 1
171	American Motors Corp. 14250 Plymouth Rd. Detroit, Mich. 48232	ж								
172	Pollution Abatement System 9001 Rosehill Rd. Jenexa, Kans. 66215 Tel (913) 888-1221		2		x			1.2.3	Intake Manifold Modification	3d Questionnaire not returned. /Reference File Nos. 76 and 77 and EPA Report 71-14.
173	Detonaire Inc. 32 E. Bridge St. Beres, Ohio 44017 Tel (216) 234-6261		ж э		x				Catalytic-Muffler	3d Questionnaire not returned
174	Stevens Institute of Technology Castle Point Station Hoboken, N.J. Tel (201) 792-2700	x					x			31 File Nos. 279, 315, 384, 385, 386

1	DEVELOPMENT SOURCE				<u> </u>	Ī	IJ.	SCÝM	eo l	RESPONSE	4	HARDWARE TY	PE 5 COMMENTS
DEVICE AND/OR FILE NO.	<u> </u>			/		//	1	T			CLASS NO.	DEVICE NA	
		(S)	»/з /2/ b о		*/ */* */ e		8					b	
175	Emission Control Technology Inc. 950 N. Main St. Orange, Calif. 92667		- 1	x		1 1				1.3.1	Ignition Tim Modification Idle Adjustm	with Lean	
176	Same as File No. 172	11											,
177	Engine Manufacturers Assn. 111 E. Wacker Dr. Chicago, I11. 60601 Tel (312) 644-6610		x									,	
178	Research Technology 2820 Ladybird Ln. Dallas, Tex. 75220			x					×	·			3d Questionnaire not returned. 31 File No. 49.
179	Same as File No. 34	$\ \ $											
180	Xonics 6837 Hayvenhurst Ave. Van Nuys, Calif. 91406 Tel (213) 787-7380			ж									3d Questionnaire not returned
181	Drysdale Exhaust System 22240 Prospect St. Hayward, Calif. 94541			x		ж					Crankcase Ve	entilator	3d Questionnaire not returned
182	Combustion Chemicals 15720 Ventura Blvd. Encino, Calif. 91316 Tel (213) 986-0181			x						1.4.2	Fuel and Oil	l Additives	3d Questionnaire not returned. Evaluation based on miscellaneous data.
183	State Agency Chief Environmental Engr	x										,	3a Letter not returned
184	State of Alaska Department of Environmental Conservation Ponch O Juneau, Alaska 99801		x										
185	State of Florida Dept. of Air & Water Pollution Control 315 S. Calhoun St. Tallahassee, Fla. 32301		ж					,			·		
186	State of Hawaii Chief of Air Sanitation Board	x											3a Letter not returned
187	State of Massachusetts Director, Bureau of Air Use Management	x											3a Letter not returned

	2 DEVELOPMENT SOURCE					<u> </u>	CT MED	RESPONSE		4	HARD	WARE TY	PE .	COMMENTS	
DEVICE AND/OR						7/	7	////	$//^{c}$	LASS NO.		EVICE NA	ME /	7	1
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188	State of Montana	x	$\ \cdot \ $	Ì									3a Letter	not returne	d
	Director, Air Pollution Control Division							:							
189		x													İ
	Department of Health Air Pollution Unit					١									Ì
	450 E. Town St. Columbus, Ohio 43216														
190	Commonwealth of Virginia	,	k												ł
	State Air Pollution Control Board			1	П		ı		l				}		
	State Office Bldg. Richmond, Va. 23219						ı								
	Tel (703) 770-2378						l								
191	Esso Research & Engineering Co. Linden, N.J.	2													
192	V.P., Broadway Ignition Co.	x											3a Letter	not returne	.d
193	Auto Research Laboratories Donald L. Powell	ж											3a Letter	not returne	:d
194	Olson-Horiba Charles H. Oliver	x											3a Letter	not returne	.d
195	EPSCO	x											3a Letter	not returne	.d
196	Vlad Filko F&B Manufacturing Company	x											3a Letter	not returne	:d
197	United Delco	x											3a Letter	not returne	bŧ
198	Toyota Motor Sales U.S.A., Inc.	;	ĸ												
	2055 W. 190th St. P.O. Box 2991										•				
	Torrance, Calif. 90509 Tel (213) 770-1730														
199	Purad, Inc.	x											3a Letter	not returne	≱d.
200	Mr. Fred E. Morgan	х											3a Letter	not returne	ed
201	Los Angeles Trade-Technical College, Auto Mechanics	;	×				×							os. 26, 90, 171, 197, 2	203
	Los Angeles, Calif.												213, 216,	217, 219, 2 232, 235, 2	222
202	IGO	x												not returne	
		1	Ш					<u> </u>							

1	2 DEVELOPMENT SOURCE					3	DOC!	MED	RESPONSE	4		HARDWARE TY	PE,	COMMENTS
DEVICE AND/OR FILE NO.	,									//cu	ASS NO.	DEVICE N	AME	7
<u></u>		at	٩	d	e	£ 8	h	+	a				b	
203	Autoscan 3641 Holdrege Ave. Los Angeles, Calif. 90016	x							:				3a Letter	not returned
204	Autolab 8190 Auto Dr. Riverside, Calif. 92504	x							<i>:</i>				3a Letter	not returned
205	Joe's Tune-Up Center 500 E. Wardlow Long Beach, Calif.	x				ļ							3a Letter	not returned
206	Application Research Corp. 9010 Ballanca Los Angeles, Calif. 90045	x											I	returned un- Moved, not le.
207	Automobile Club of Southern California 2601 S. Figueroa St. Los Angeles, Calif. 90007	,	c					x			·			os. 125, 216, 406, 407, 408,
208	American Honda Company 100 W. Alondra Blvd. Gardena, Calif. 90247	x											3a Letter	not returned
209	Champion Spark Plug Co. 900 Upton Ave. Toledo, Ohio	x											3a Letter	not returned
210	Scoville Manufacturing Company 99 Mill St. Waterbury, Conn.	x											3a Letter	not returned
211	T.R.W. Inc., Engineering Div. 1455 E. 185th St. Cleveland, Ohio 44117 Tel (216) 383-4770	x											3a Letter	not returned
212	M.E.P.S., Inc. 2232 S. Industrial Hwy. Ann Arbor, Mich. 48104	x											3a Letter	not returned
213	AC Spark Plug Division General Motors Corp. 1300 N. Port Hwy. Flint, Mich. 48556 Tel (313) 766-5000	х											3a Letter	not returned
214	ACF Industries, Inc. Carter Carburetor Div. 2840 N. Spring Ave. St. Louis, Mo. 63107 Tel (314) 531-2960			x						Car	buretor	r	· ·	ipating through Control Corp. 69

	2 DEVELOPMENT SOURCE					3		CL ME	ا ہ	RESPONSE		4	HARDWARE TY	PE 5 COMMENTS
DEVICE AND/OR FILE NO.			/									CLASS NO.	DEVICE NA	ME
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215	American Car and Foundry Industry, Inc. 2840 N. Spring Ave. St. Louis, Mo. 63107	x							-					3a Letter not returned
216	Walker-Manufacturing Co. Michigan Division 633 Hupp Ave. Jackson, Mich.	x	x			×				,				3a Letter not returned, 3c Patents 3,457,723 and 3,295,313
217	Volkswagen Pacific Inc. 11300 Playa St. Culver City, Calif. 90232	ж												3a Letter returned un- opened; not at this address.
218	Ford Motor Company The American Rd. Dearborn, Mich. 48121								x					3i File Nos. 10, 175, 429
219	Chrysler Corporation P.O. Box 1118 Detroit, Mich. 48231	ж												3a Letter not returned
220	Rolls-Royce, Ltd. Motor Car Div. Creive, England	x												3a Letter not returned
221	British Leyland Motor Corp. Ltd. Atmosphere's Pollution Control Research Lab. Browns Ln. Coventry CV5 9DR England Tel Allesley 2121	x												
222	International Harvester Co. 2911 Meyer Rd, PO Box 1109 Fort Wayne, Indiana 46801	x												
223	General Motors Corporation 3044 West Grand Blvd. Detroit, Michigan 48202	x												
224	Jaguar Cars, Ltd. CV5 9 DR Coventry, England	x												
225	Fiat S.P.A. Strada del Drosso 145 10135 Torino (Italia)	x												
226	Renault Inc. 100 Sylvan Ave. Englewood Cliffs, N.J. 07632 Tel (201) 461-6000			x		x					2.	26/32 DI with Man Air Filt without Intake M	D Carburetor wal Choke er with or Preheating	3d Questionnaire not returned
227	Norris Industries, Vernon Br. P.O. Box 56507 5215 S. Boyle Ave. Los Angeles, Calif. 90056					ж						ermal and terburner	Catalytic s	3f Questionnaire not returned. Patent 3,287,899

1	DEVELOPMENT SOURCE						3	OBCL!	MED	RE	SPO	VSE		4		н	ARDV	VARE	TYF	¥			5 _C	OMMEN	ITS
DEVICE AND/OR FILE NO.		<u> </u>	/ 5/2										[CLAS	S NO.	/	D	EVICE	NA	ME	/	/			
		$\neg \Box$	Ь	c	4	f	8	h	1	┝		2	_			···			b	_					
228	Daimler-Benz Artiengesellschaft Stuttgart-Unterlurkhein, Germany	x																		Pat	ents	3,5	41,7	785, 440,8	
229	Standard Motor Company Coventry, England	x																		3 a	Lette	er n	ot 1	eturr	ned
230	Audi NSU Auto Union Artiengesellschaft 8070 Ingolstadt, Germany		ж																						
231	Chicago Screw Company Bellwood, Ill.	x																		3a :	Lette	er n	ot r	eturn	ned
232	Nissan Motor Company Ltd. Takero-Cho Kanagawa-Ku Yokohama, Japan	ж																		3а	Lette	er n	ot I	eturn	ned
233	White Motor Company 3201 Lomita Blvd. Torrance, Calif. 90305	x		į																					
234	Humber, Ltd. Stake Coventry, England	x																•		3а	Lette	er n	ot 1	eturr	ned
235	Spelin, Inc. 918 Industrial Ave. Palo Alto, Calif.																			ope	Lette ned; warda	mov	ed;	ned u	ın-
236	DePaolo Products Co. 721 Filbert St. San Francisco, Calif. 94133	×										•												ned u unkr	
237	K&B Manufacturing Co. 12152 S. Woodruff Ave. Downey, Calif. 90241	×																		3а	Lette	er n	ot 1	eturr	ned
238	Hercules Div. Canton, Ohio 44702	ж																		3а	Lette	er n	ot 1	eturr	ned
239	Hupp Corporation Canton, Ohio 44702	x													•					3a	Lette	er n	ot 1	eturr	ned
240	Co-Rectifire Systems, Inc. J. Owen Drake 4671 E. 11th Ave. Hialeah, Fla. 33013	x																		3a	Lette	er n	ot r	eturr	ned
241	Tungstew Contract Mfg. Wm. Hollepeter 7311 Cottage Ave. N. Bergen, N.J.	x																		3a	Lette	er n	ot 1	eturr	ned
242	Automotive Controls Corp. Wm. H. Fergeson, Mkting Mgr 2001 Lunt Ave. Elk Grove Village, Ill.	x																		3а	Lette	er n	ot 1	eturr	ned

1	DEVELOPMENT SOURCE					3	J	CLM	49	RESPONSE	4 HARDWARE TYPE	COMMENTS
DEVICE AND/OR FILE NO.		•		/		<i>[</i>]	//				CLASS NO. DEVICE NAME	7
<u> </u>		1	٥	1	٩	Ē	8	h	1	a	b (
243	Echlin Mfg. Co. Echlin Rd. & U.S. 1 Branford, Conn. 06405 Tel (203) 488-7241		×								3c Intere at this t	sted but not ime
244	E.I. du Pont de Nemours & Co. Petroleum Chemicals Div 612 S. Flower St. Los Angeles, Calif. 90017 Tel (213) 624-1354	x				x				1.1.2	3f Evalua Patents 3	,302,394 and Reference
245	Varicam 10457 Roselle St. San Diego, Calif. 92121			ж	×	x	x :	x		1.2.2	Variable Camshaft Timing	· :
246	Dana, Perfect Circle Div. 552 S. Washington St. Hagerstown, Ind. 47346			x	х	x	x	x		1.2.2	Speed-Controlled Exhaust Gas Recircula- tion with Vacuum Advance Disconnect	
247	C.B. Uhmar (7839 S. Wellsford Whittier, Calif. 90606	x							· /	,	3a Letter	not returned
248	D. Rossman 2 Third Pl. Long Beach, Calif.	x				<u>.</u>					3a Letter	not returned
249	Mr. Gene Sposto 10707 Norlain Ave. Downey, Calif.			ж		x					Afterburner device 3d Questi returned	onnaire not
250	Tri-Sciences Corporation 406 Rutger St. Utica, N.Y.	×									3a Letter opened	returned un-
251	Pur Air Research, Inc. 470 S. San Vicente Blvd. Los Angeles, Calif.	x										returned un- loved; left no
252	R.G. Edgar 4871 Geneva Ave. Concord, Calif. 94521			x							Fuel Additive 3d Questi returned	onnaire not
253	J. Derugeris 695 Kenneth Ave. Campbell, Calif.	x									3a Letter	not returned
254	W. Godstrey 2746 W. 9th St. Los Angeles, Calif.	x									3a Letter	not returned
<u></u>		Ш	1									

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1	DEVELOPMENT SOURCE		3 ORCLINED RESPONSE	4 HARDWARE TYPE	5 COMMENTS
DEVICE AND/OR FILE NO.				CLASS NO. DEVICE NAME	
		a b c d e	f 8 h 1 a	b	
255	C.F. Bahrmar 2313 N. Sparks Burbank, Calif.	x		За	Letter not returned
256	G. Carlyle 8331 Bailey Rd. Yuba City, Calif. 95991	x		3a	Letter not returned
257	Azure Blue Corp. P.O. Box 496 El Dorado, Calif. 95623	x		3a	Letter not returned
258	Dynatesk Industries Inc. North Brunswicks, N.J.	x		За	Letter not returned
259	Corona Engineering 2856 Show Dr. Richmond, Calif. 94806		11 1 1 1 1	Photocell-Controlled 3f	Received photographs
260	Instrumatics Corp. 55812-29 Palms Highway Yucca Valley, Calif. 92284	x		. 3 <i>a</i>	Letter not returned
261	O.R. Cedarholm 4 Cedar Ln. Eureka, Calif. 95501	×			Interested but letter ot returned
262	J. Fernandez 1620 S. Myrtle Ave. Monrovia, Calif. 91016	x		3a	Letter not returned
263	Monocar HC Vacuum Control Valves 311 Nakoma St. San Antonio, Tex.	x		op	Letter returned un- pened; not at this ldress.
264	"Less Smog" W. Murray 10531 Acacia St. Garden Grove, Calif.	x		3a	Letter not returned
265	A.C. Hewitt 1469 Rose Villa St. Pasadena, Calif.	x		36	Letter not returned
266	Exhaust Aid Corp. 2603 N. Downer Ave. Milwaukee, Wis. 53211	x		3a	Letter not returned
267	Triade Development Corp. 3664 Coliege Ave. San Diego, Calif.	x	x	re	Ouestionnaire not eturned. Fratent 3,088,447

1	2 DEVELOPMENT SOURCE					3] 	LIMED	RESPONSE		4 HARDWARE TY	PE 5 COMMENTS
DEVICE AND/OR					,	//	1	7	////	77	CLASS NO. DEVICE NA	AME /
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268	Delta Products, Inc. 630 S. 7th St. Grand Junction, Colo. 81501 Tel (303) 242-9000			x	x	×	×		1.3.2		pacitive Discharge gnition	·
269	U.N. Schultz 12429 Huntington Dr. Pasadena, Calif.	x										3a Letter not returned
270	Phillips Applied Research 1640 21st St. Santa Monica, Calif. 90404	x										3a Letter not returned
271	Econo Smog Control Inc. Odessa, Tex.	x										3a Letter returned un- opened; left no address
272	Research Fuels Inc. 1495 Kingston St. Aurora, Colo.	x										3a Letter returned un- opened; left no address
273	Sciap Association 1532 Piaza Bldg. Wichita, Kans.	x								Ca	talytic Afterburner	3a Letter not returned. Patent 3,220,179
274	C. Eugene Miller Professor of Environmental & Biomedical Engineering University of Louisville Louisville, Ky. 40208	ж										3a Letter not returned
275	Pneumetrics Inc. 19338 Hondelires St. North Ridge, Calif.	x		ì	 - -							3a Letter not returned
276	Exhaust Controls Inc. 429 Delaney St. Newark, N.J. 07105 Tel (201) 344-6484		3									3c Refer to File No. 292
277	Universal Products Inc. 1427 Slocum St. Dallas, Tex. 75207	x										3a Letter not returned
278	Pedersen Enterprises P.O. Box 528 Farmington, Ma. 04938 Tel 778-3850			×		ж		-			dersen Exhaust Gas eatment System	3c Unable to participate at this time. Patent 3,545,201
279	Saranga Research Center, Inc. South Delsea Drive, R. D. #2 Millville, New Jersey 08332 Tel (609) 825-8556			×	ĸ	x	x		1.4.3	Fu	el Conditioner	

Aerospace Corp. Aerospace Corp. Director of Pollution and Resources 2350 S. El Segundo Blvd. Los Angeles, Calif. 281 Harry Raid Prgs. Auto Lube Company 4159 Bunne Visa. Soite 7 Dillas, Tex. 75207 282 J85 Carb. Co. P.O. Box 10391 Dallas, Tex. 75207 283 R.I. McKinlavy 2010 Penton Rd. Longreen, Tex. 284 Filteron International 222 Irving Blvd. Dallas, Tex. 75207 285 Swannon Engineering 6 Meanufacturing Company 1132 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. MgMs Building 300 W. Seth St. New York, N.Y. 10019 287 Automotive Service Industry Association Power William St. Redondo Blvd. Inglewood, Calif. Soid St. New York, N.Y. 10019 288 Conrad A. Bodai, PhD Environmental Scientific Assn. Area Chicago, 111. 60601 289 Maremont Marketing Inc. 166 N. Michigan Ave. Chicago, 111. 60601 280 Marketing Inc. 166 N. Michigan Ave. Chicago, 111. 60601 290 John De Paolo 71 Filbert St.	1	2 DEVELOPMENT SOURCE		·			Ţ	3],	acri.	MED	RESPONSE	4 HARDWARE TYPE 5 COMMENTS
Director of Follution and Resources 2350 S. El Sagundo Blvd. Los Angeles, Calif. 281 Harry Reid Prgs. Auto Lube Company 4159 Buene Vista Suite 7 Dallas, Tex. 75204 282 J&S Carb. Co. P.O. Box 10391 Dallas, Tex. 75207 283 R.L. McKinley 201 Fenton Rd. Longreen, Tex. 284 Filteron International 2322 Irving Blvd. Dallas, Tex. 75207 285 Swenson Engineering & Manufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. MEMA Building 304 W. Soth St. New York, N.T. 10019 287 Acknowitve Service Industry Association 230 N. Michigan Ave. Chicago, 111. 60601 288 Conrad A. Bodai, PhD Redondo Blvd. Inglewood, Calif. 91006 Tel (213) 445-1263 289 Maremont Marketing Inc. 168 N. Michigan Ave. Chicago, 111. 60601 289 Maremont Marketing Inc. 168 N. Michigan Ave. Chicago, 111. 60601 290 John De Paolo 721 Filbert St. San Francisco, Calif.	AND/OR FILE											
Director of Follution and Resources Resources 2350 S. El Segundo Blvd. Los Angeles, Calif. 281 Marry Reid Prgs. Auto Lube Company 4159 Buene Vista, Suite 7 Dallas, Tex. 75204 282 J&S Carb. Co. P.O. Box 10391 Dallas, Tex. 75207 283 R.L. McKinley 201 Fenton Rd. Longreen, Tex. 224 Filteron International 2322 Irving Blvd. Dallas, Tex. 75207 285 Swanson Engineering & x Manufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. McMcManufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 287 Accomptive Service Industry Association 230 N. Michigan Ave. Chicago, III. 60601 288 Conrad A. Bodaf, PhD Chicago, III. 60601 289 Maremont Marketing Inc. 168 N. Mchigan Ave. Chicago, III. 60601 289 Maremont Marketing Inc. 168 N. Mchigan Ave. Chicago, III. 60601 280 Maremont Marketing Inc. 168 N. Mchigan Ave. Chicago, III. 60601 280 John De Paolo 721 Filbert St. San Francisco, Calif. 3a Addressee unker Letter returned un P.O. Dos 2039, You 2030, You 2039, You 2030, You 2039, You 2039, You 2030, You 2030, You 2039, You 2039, You 2030, You 2030, You 2039, You 2039, You 2030, You 2039, You 2030, You 2039, You 20			a b	c	d	e	£	g	h	1	a	ь ь
Auto Lube Company 4159 Buena Vista, Suite 7 Dallas, Tex. 75204 282 J&S Carb. Co. P.O. Box 10391 Dallas, Tex. 75207 283 R.L. McKinley 201 Fenton Rd. Longreen, Tex. 284 Filteron International 2322 Irving Blvd. Dallas, Tex. 75207 285 Swanson Engineering & Manufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. MMPM Building 304 W. 58th St. New York, N.Y. 10019 287 Automotive Service Industry Association 230 N. Mchigan Ave. Chicago, Ill. 60601 288 Conrad A. Bodai, PhD Environmental Scientific Assn. 319 San Miguel Dr. Arcadia, Calif. 91006 Tel (213) 445-1263 289 Maremont Marketing Inc. 168 N. Mchigan Ave. Chicago, Ill. 60601 Tel (312) 263-7676 290 John De Paolo 721 Filbert St. San Francisco, Calif. 28 Addressee unknown Letter returned up P.O. Box 2039, You	280	Director of Pollution and Resources 2350 S. El Segundo Blvd.	x									3a Letter not returned
P.O. Box 10391 Dallas, Tex. 75207 283 R.L. McKinley 201 Fenton Rd. Longreen, Tex. 284 Filteron International 2322 Irving Blvd. Dallas, Tex. 75207 285 Swanson Engineering & x Manufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. MEMA Building 304 W. 58th St. New York, N.Y. 10019 287 Automotive Service Industry Association 230 N. Michigan Ave. Chicago, 111. 60601 288 Conrad A. Bodai, PhD Environmental Scientific Assn. 319 San Miguel Dr. Arcadia, Calif. 91006 Tel (213) 445-1263 289 Maremont Marketing Inc. 168 N. Michigan Ave. Chicago, 111. 60601 Tel (312) 263-7676 290 John De Paolo 721 Filbert St. San Francisco, Calif. X X X X X X X X X X X X X X X X X X	281	Auto Lube Company 4159 Buena Vista, Suite 7	x									3a Letter not returned
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2322 Irving Blvd. Dallas, Tex. 75207 285 Swanson Engineering & x Manufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. x MMMA Building 304 W. 58th St. New York, N.Y. 10019 287 Automotive Service Industry Association 230 N. Michigan Ave. Chicago, Ill. 60601 288 Conrad A. Bodai, PhD Environmental Scientific Assn. 339 San Miguel Dr. Arcadia, Calif. 91006 Tel (213) 445-1263 289 Maremont Marketing Inc. 168 N. Michigan Ave. Chicago, Ill. 60601 Tel (312) 263-7676 290 John De Paolo 721 Filbert St. San Francisco, Calif. 3a Letter not retu A x x x x x 1.2.4 Carburetor Main Discharge Nozzle Modification 3d Unable to partiat this time 3d Unable to partiat this time 3d Unable to partiat this time	283	201 Fenton Rd.		x	۱							Steam Power Unit 3a Not a retrofit device
Manufacturing Company 1133 E. Redondo Blvd. Inglewood, Calif. 286 Motor Equipment Mfg. Assn. MEMA Building 304 W. 58th St. New York, N.Y. 10019 287 Automotive Service Industry Association 230 N. Michigan Ave. Chicago, 111. 60601 288 Conrad A. Bodai, PhD Environmental Scientific Assn. 319 San Miguel Dr. Arcadia, Calif. 91006 Tel (213) 445-1263 289 Maremont Marketing Inc. 168 N. Michigan Ave. Chicago, 111. 60601 Tel (312) 263-7676 290 John De Paolo 721 Filbert St. San Francisco, Calif.	284	2322 Irving Blvd.	x					3				3a Letter not returned
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168 N. Michigan Ave. Chicago, Ill. 60601 Tel (312) 263-7676 290 John De Paolo 721 Filbert St. San Francisco, Calif. 290 John De Paolo 701 Filbert St. San Francisco, Calif.	288	Environmental Scientific Assn. 319 San Miguel Dr. Arcadia, Calif. 91006			x	x	ж	х	ж		1.2.4	Discharge Nozzle
721 Filbert St. San Francisco, Calif. Letter returned un	289	168 N. Michigan Ave. Chicago, Ill. 60601			×							3d Unable to participate at this time
	290	721 Filbert St.	x									3a Addressee unknown, Letter returned unopened P.O. Box 2039, Yount- ville, Calif.

1	2 DEVELOPMENT SOURCE					3] 	~	RESPONSE	4	HARDWARE TY	COMMENTS
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291	Eaton, Yale, and Towne Inc. Research Development Lab. 1000 Rust St. Saginaw, Mich. 48601	x										3a Letter not returned
292	Engelhard Minerals & Chemical Corporation Englehard Industries Division 429 Delaney St. Newark, N.J. 07105			ж		x			1.1.1	Catalyti	c Converter	3d Questionnaire not returned. 3f Patent 3,197,955. Evaluation based on EPA Test Report 71-13.
293	Key Research Company P.O. Box 226 Nottingham, Pa. 19362	ж				x				Power Je	ctor	3a Letter not returned
294	Energy Transmission Corp. Subsidiary of Doughboy Ind, Inc 2360 Cabrera San Bernardino, Calif.	х							1.2.2		Gas Recircula- h Carburetor tion	3a Letter not returned
295	Pollution Controls Industries, Incorporated 2207 Border Ave. Torrance, Calif. 90501			x	×	x :	×		1.2.4	Carburet Variable	or with Venturi	
296	A.S. Manceri Controlled Ignition Electronics 9446 Borson St. Downey, Calif.			х	x	х			1.3.2		Timing and dification	3f Photograph received
297	Dr. S.J. Carter 14902 Purdy Ave. Midway City, Calif. 92655 Tel 894-3456	ж										3a Letter not returned
298	D.D. Sanford P.O. Box 802 Oakland, Calif. 94604	ж		!								3a Letter not returned
299	Mr. C.T. Carnes U.S. Carburetor & Mfg. Co. 939 - 4th St. Hollister, Calif. 95023	x										3a Letter not returned
300	Lois King Engineering 2901 E. Pierson Phoenix, Ariz.	x				x				Decelera Exchange	tion Valve Brake	3a Letter not returned
301	Mr. J.O. Hartsell Randsburg, Calif.	x							·	Exchange	Condenser	3a Letter not returned
302	Mr. J. Hull 44954 - 3rd St., E. Lancaster, Calif. 93534		x						,			3c Letter returned un- opened. Not prepared to participate - Telecon.

1	DEVELOPMENT SOURCE						3,	DEC!	NED	RESPONSE		4 HARDWARE TYP	COMMENTS
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303	Preventive Maintenance Co. 864 Burlway Rd. Burlingame, Calif. 94010	x									F	uel Additive	3a Letter not returned
304	Metal Units, Inc. 4130 Mennes St. Riverside, Calif. 92509			х							D	ual Fuel	3a Questionnaire not returned
305	Mr. E. B. McWhirter 2619 E. Victor Hugo Ave. Phoenix, Ariz. 85032 Tel (620) 947-8371			×		x					A	ir Injection Pump	3d No further informa- tion received. 3e Patent 3,401,518
306	Power Replacements, Inc. 1306 Logan Ave. Costa Mesa, Calif.	x									A	dditive	3a Letter not returned
307	Mr. F. M. Johnson 821 Centinela Ave. Inglewood, Calif. 90302	x									E	xchange Absorb	3a Letter not returned
308	Mr. Ernest A. Eastman Box 73, Smith St. Sedona, Ariz. 86336 Tel (602) 282-3540			x	×	×				1.1.3	E	xhaust Gas Afterburner	3f Photographs taken. Patent 3,304,711
309	Mr. John H. White 6494 Leonard Dr. Redding, Calif. 96001	x				x	l						3a Letter not returned. 3f Patent 3,383,854
310	Mr. Jess Birdwell 5476 Linden Ave. #7 Long Beach, Calif. 90805	ж			-	×							3a Letter not returned. 3f Patent 3,372,540
311	Mr. Paul Ketzer 191 Rue De La Courcelles #17 Paris, France	ж				x							3a Letter not returned. 3f Patent 3,370,419
312	Mr. Brooks Walker 1280 Columbus Ave. San Francisco, Calif. 94133			x		x					E	xhaust Treatment	3d Unable to complete questionnaire at this time. 3f Patents 3,368,345, 3,282,046, 3,162,184, 3,265,373, 3,338,111, 3,346,243, 3,563,886, 3,456,633, 3,507,260.
313	H. D. Bowman Company P.O. Box 735 Raleigh, N.C. 27602 Tel (919) 834-1878					×					F	xhaust Filters	3d Questionnaire not returned. 3f Patents 3,224,171 and 3,350,877

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314	Albano Enterprises Inc. DBA Air-Jet Manufacturing 1570 E. Edinger, Suite G Santa Ana, Calif. 92705 Tel (714) 835-9177			×	3	ĸ				Crankcase Ventilation System 3d Questionnai returned	re not
315	Nycal Co., Inc. 700 Washington Ave. Carlstadt, N.J. 07072		:	x 2	, ,	ĸ x			2.1	Closed Blowby Control System 3g Photographs 3f Patent 3,49	
316	Gerlach Emprise Product 723 E. Proyidencia Ave. Burbank, C lif. Tel 842-5317		:	x	1	x				Auto Exhaust Homogenizer 3d Questionnai returned. 3f Patent 3,27	
317	Automotive Exhaust Control Corporation 2824 - 51st St., South St. Petersburg, Fla. 33707 Tel (813) 341-6462			x >	,	x			1.2.4	Carburetor Modification 3f Photograph with Vacuum Advance Disconnect	taken
318	Mr. A. S. Chan 16227 Soriano Dr. Hacienda Heights, Calif. 91745	х								3a Letter not	returned
319	Wilko Machine, Inc. 2313 N. San Fernando Blvd. Burbank, Calif. 91504	x								PRD Carburetor and Muffler System	returned
320	Devcom Associates 1885 Kashlan Rd. La Habra, Calif. 90631	х								H ₂ O Exchange Filter 3a Letter not	returned
321	Mr. H. P. Rock 5034 Del Rio Salt Lake City, Utah 84117	x								3a Letter not	returned
322	Mr. E. O. Wilford 300 Linden Ave. Merion Station, Pa. 19066	x			>	ζ .			1.1.5	Exhaust Gas Back- pressure Valve By Aletter not Evaluation bas HEW/NAPCA Repo	ed on
323	Mr. D. Casul 2459 Cardinal Way Salt Lake City, Utah 84121	x								Daul Carburetor Small 3a Verbal negareply	tive
324	B-Z Disposal Service 5230 N. Clark Ave. Lakewood, Calif. 90712	x			3	ς			;	Muffler 3a Letter not	returned
325	Servi-Tech, Inc. A Division of Silvex Industries 122 Navajo St. Salt Lake City, Utah 84104		1	x	2	x x			1.2.1	Air-Vapor Bleed to 3g Photographs Intake Manifold	taken
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1	2 DEVELOPMENT SOURCE		3 DECLINED RESPONSE	4 HARDWARE TY	PE 5 COMMENTS
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326	Mr. George A. Bomba 100 Adelaide St. Concord, Calif. 94520	x		Thermal Reactor	3d Questionnaire not returned
327	International Air Pollution Control Ltd. 14th Ave., S.W. Calgary 3, Alberto, Canada	x		Muffler Catalyst	3a Letter returned un- opened (address incom- plete)
328	T.R.E.C. Development 2576 Highland Blvd. Nanaimo, British Columbia, Canada	x		Thermal Reactor	3a Letter returned un- opened (address unknown)
329	J&S Automotive Service 736 "F" St. Chula Vista, Calif. 92010	x		Air Injector Exchange	3a Letter not returned
330	Grant Industries, Inc. 3680 Beverly Blvd. Los Angeles, Calif. 90004	x			3a Letter not returned
331	Same as File No. 330				
332	Mutual Industries, Inc. Worcester, Mass.	x		Anti-Smog Device	3a Letter not returned. Patents 3,354,635 and 3,415,055
333	Eunice F. Lambert 65 W. Encanto Blvd. Phoenix, Ariz. 85003	x		CO ₂ Burner Muffler	3a Letter not returned. Patent 3,350,878
334	Hanskarl Leistritz 49 Reichenhaller Str. 8228 Freilassing, Germany	x		Afterburner	3a Letter not returned. Patent 3,347,040
335	Mr. Joel B. Guin 148 E. 48th St. New York, N.Y. 10017	x		Exhaust Purifier	3a Letter not returned. Patent 3,331,201
336	Mr. Albert Vanderpoel 14509 Van Ness Ave. Gardena, Calif. 90249	×		Exhaust Manifold Afterburner	3a Letter not returned. Patent 3,314,230
337	Mr. Clarence Boyd 5325 Belt Rd., N.W. Washingtin, D.C. 20015	x		Exhaust Purification Method and Apparatus	3a Letter not returned. Patent 3,306,034
338	Mr. Jack C. Morrell 8 Oxford St. Chevy Chase, Md. 20015	x		Emission Control	3a Letter not returned. Patent 3,306,035
339	Mr. Edward R. Knopp 7884 Wyandot St. Denver, Colo. 80221	x		Anti-Smog Device	3a Letter not returned. Patent 3,300,964

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DEVICE AND/OR FILE NO.				/CLASS NO./ DEVICE NA	ME
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340	Mr. Josef Ernst Hardenbergstrasse 14 Hagen, Germany	x		Exhaust Decontamina- tion	3a Letter not returned. Patent 3,290,876
341	Mr. Charles W. Morris 11769 Chenault St. Los Angeles, Calif. 90049	x		Exhaust Control System	3a Letter not returned. Patents 3,287,899, 3,581,490, 3,209,531, 3,209,532
342	Joseph Lucas, Ltd. Great King St. Birmingham, B19 3XF, England	x	K	 Patrol Injection System Ignition System Pumps Recirculation Valves 	3a Questionnaire not returned. Patent 3,287,900
343	Mr. Gary W. Wright 2317 Kimridge Rd. Beverly Hills, Calif.	x		Antismog Afterburner	3a Letter not returned. Patent 3,276,202
344	Mr. Carter Wells 1962 N. Prospect Ave. Milwaukee, Wis.	x		Exhaust Aid	3a Letter not returned. Patent 3,253,041
345	Socony Mobile Oil Co., Inc. New York, N.Y.	x		Afterburner	3a Letter not returned. Patent 3,228,185
346	Mr. Walter D. Maring Shelby, Ind.	x			3a Letter not returned. Patent 3,214,902.
347	Mr. Horace V. Littell 1429 Wedgewood Drive Anaheim, Calif.	x		Anti-Pollutant Device	3a Letter not returned. Patent 3,213,608
348	Donaldson Company, Inc. Minneapolis, Minn.	x		Afterburner	3a Letter not returned. Patent 3,201,933
349	Mr. John Dolza 810 State St. Fenton, Mich.	x			3a Letter not returned. Patents 3,201,933 and 3,192,706
350	Mr. James J. Dolfi, Sr. 2750 Arlington Ave. #F Torrance, Calif.		K	1. Vac-Tronic Spoiler 2. Gas Purifier	3d Questionnaire not returned. 3f Patent 3,186,164
351	Mr. Robert B. Heller 1111 Loxford Terrace Silver Spring, Md.	x		Exhaust Emission	3a Letter not returned. Patent 3,180,083
352	Firma J. Eberspacher Esslingen (Neckar) Germany		K	Exhaust Detoxicator	3c New car installation. 3f Patent 3,174,277

l	DEVELOPMENT SOURCE		3 DECLINED RESPO	NSE 4 HARDWARE	TYPE 5 COMMENTS
DEVICE AND/OR FILE NO.	·			CLASS NO. DEVICE	NAME
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353	Minnesota Mining & Manu- facturing Company St. Paul, Minn.	x		Afterburner	3a Letter not returned. Patent 3,172,251
354	Honda Giken Kogyo Kabushiki Kaisha Toyko, Japan	x			3a Letter not returned. Patent 3,590,578
355	Suzuki Jidosha Kogyo Kabushiki Kaminura Hamana-Gun, Japan	x			3a Letter not returned. Patent 3,590,579
356	Herman P. Roth General Scientific Lab. Manhatton Beach, Calif.	x			3a Letter not returned
357	Dow Chemical Company Midland, Mich.	x		·	3a Letter not returned. Patent 3,563,029
358	Tenneco, Inc. Houston, Tex.	x			3a Letter not returned. Patent 3,563,030
359	Southwick W. Briggs 6240 Western Ave. Chevy Chase, Md. 20015	x			3a Letter not returned. Patents 3,568,437 and 3,520,131
360	Standard-Triumph Motor Co., Ltd Canley, Coventry, England	x			3a Letter not returned. Patent 3,537,257
361	Mr. John Kaufmann, Jr. 3716 Woodrow Ave. Pittsburgh, Pa. 15227	x			3a Letter not returned. Patent 3,543,510
362	Sanitized A. G. Burgdorf Berne, Switzerland	x			3a Letter not returned. Patent 3,534,547
363	Mr. Joseph W. McKee Route 1, Box 292 Broomfield, Colo. 80020	x			3a Letter not returned. Patent 3,524,316
364	Godfrey Precision Pro., Ltd. Godfrey House Hampton Road West West Hanworth Middlesex, England	x			3b Patent 3,498,054
365	Genaro G. Celayan 3171/2 N. Beaudry Ave. Los Angeles, Calif. 90012	×			3a Letter not returned. Patent 3,499,282
366	Porsche K. G. Stuttpart-Zuffenhausen Germany	x			3a Letter not returned. Patent 3,491,533

1	DEVELOPMENT SOURCE	<u> </u>	3 DECLINED RESPONSE	4 HARDWARE TYP	COMMENTS
DEVICE AND/OR FILE NO.				CLASS NO. DEVICE NA	ME
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367	Robert A. Rando and James J. Rando 107 N. Chelsea Ave. Atlantic City, N.J. 08401	x			3a Letter not returned. 3f Patent 3,482,395
368	Bruno Bettega 179 Franklin St. Northvale, N.J. 07647	x			3a Letter not returned. 3f Patent 3,477,227
369	Mr. George R. Stevens 291 River Rd. Bogota, N.J. 07603	×			3a Letter not returned. 3f Patent 3,477,227
370	Borg-Warner Corporation 200 S. Michigan Ave. Chicago, Ill. 60604	x	x		3e Will participate through their Marvel Schebler Division File No. 60 3f Patent 3,479,816
371	Gerald L. Schnurmacher 319 Bonita Ve. Piedmont, Calif. 94611	x		Exhaust System	3d Questionnaire not received. Patent 3,462,946
372	Mykola Hraboweckyj 12312 Beech Daly Rd. Taylor, Mich. 48180	x		Exhaust System	3d Questionnaire not received. Patent 3,468,124
373	Mr. Frank Gurr Salt Lake City, Utah	x			3a Letter not returned. Patent 3,470,689
374	letatsu Okno 1667-2-406 Mure, Mitaka Tokyo, Japan	x		(3a Letter not returned. Patent 3,446,011
375	Nippon Denso Kabushike Kaisha Kariyashi, Aichiki-Ken Japan	x			3a Letter not returned. Patent 3,455,105
376	Mr. Louis Anderson Gotgatan 73 Stockholm, Sweden	x			3a Letter not returned. Patent 3,444,687
377	Katashi Aoi 480 Juniso, Kamakura-Shi Kanagawa-Ken, Japan	x			3a Letter not returned. Patent 3,421,315
378	Kockums Mekaniska Verkstads Artiebolag Malmo, Sweden	x			3a Letter not returned. Patent 3,426,526

1	DEVELOPMENT SOURCE		3 DECTIMED	RESPONSE	4 HARDWARE TYP	E COMMENTS
DEVICE AND/OR FILE NO.					CLASS NO. DEVICE NA	
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379	Bernhard Max Schongs Stapelfelderstrasse 34A Hamburg, Germany	x				3s Letter returned un- opened - Insufficient address. Patent 3,413,804
380	Hans Waldemar Lau Laurenburgerstrasse 9 Hamburg, Germany	x				3a Letter not returned. Patent 3,413,804
381	Jurgen Behrans Schulstrasse 23 Breitenfelde, Germany	х				3a Letter not returned. Patent 3,413,804
382	Mr. John Farrell 5320 Beverly Hills Ln. Houston, Tex. 77027	x				3a Letter not returned. Patent 3,415,056
383	Fran Corporation 105 Pawtucket Ave. East Providence, R.I. 02916	x		·		3a Letter not returned
384	Hydro-Catalyst Corp. 60 E. 42nd St. New York, N.Y. 10017 Tel (201) 946-4195	xx	xx		Air-Fuel Mixture Diffuser	3d Insufficient time to evaluate
385	Oil Technology Corp. 99 E. Hawthorne Ave. Valley Stream, N.Y. 11580	x				3a Letter not returned
386	Mr. Martin B. Pearlman 78-05 - 141st St. Flushing, N.Y. 11367	x	x	N .	Nophume Muffler Device	3d Questionnaire not returned. Patent 3,142,150
387	Dopp Systems, Inc. 157-12 Willets Point Blvd. Whitestone, N.Y. 11357	x		ļ	Dopp Smog Reducer ,	3a Letter not returned
388	Associated Consultants, Inc. P.O. Box 64612 Baton Rouge, La. 70806	×				3a Letter not returned
389	Automotive Emission Control Suite 104 Atkinson Square Louisville, Ky. 40218	x			•	3a Letter not returned
390	Morgan Firestone Iroquois Shore Rd. Oakville, Ontario, Canada	x				3a Letter not returned
391	Dart Industries 8480 Beverly Blvd. Los Angeles, Calif. 90054	x				3a Letter not returned

1	2 DEVELOPMENT SOURCE	*****	3 DECLINED RESPONSE	4 HARDWARE TYP	COMMENTS
DEVICE AND/OR FILE NO.	·			CLASS NO. DEVICE NA	ME
392	Mr. Jack F. Dámaree	a b c d e	f 8 h 1 a	D	3a Letter not returned
3,2	P.O. Box 201 Georgetown, Tex. 78626				
393	Environmental Control Systems Corporation 1335 King Ave. Columbus, Ohio 43212	x			3d Questionnaire not returned
394	H. M. Laboratories Inc. Sta-Power Division 56 Harbor St. San Rafael, Calif. 94901	x			3a Letter not returned
395	Otis Elevator Company 8000 Baker Ave. Cleveland, Ohio 44102	x		Exhaust System	3a Letter not returned
396	Aquanautics, Inc. Acquair Division 225 Mt. Hamilton Ave. Los Altos, Callf. 94022	x			3a Letter not returned
397	American Lecithin Company P.O. Box 4056 Atlanta, Ga. 30302	x			3a Letter not returned
398	Exhaust Control Mfg. Corp. 2905 - 47th Ave. North St. Petersburg, Fla. 33714	x			3a Letter not returned
399	Southern Pollution Controls, Incorporated 2607 Leeman Ferry Rd. Huntsville, Ala. 35801	x			3a Letter not returned
400	Sierra Scientific Corp. 625 S. Wells Ave. Reno, Nev. 89502	x			3a Chose not to advertise device
401	Turbo Injector Sales Suite 203, Executive Bldg. 115 S. 17th St. Paducah, Ky. 42001	x	1.2.1	Air-Vapor Bleed to Intake Manifold	3d Interested - Ques- tionnaire not returned. Evaluation based on miscellaneous data.
402	University Resources Inc. 115 Suffolk Rd. Wellesley Hills, Mass. 02181	x			3a Letter not returned
403	Victor Equipment Company P.O. Drawer 1007 Denton, Tex. 76201	x			3a Letter not returned

1	DEVELOPMENT SOURCE				3	DECLIP	₩.D	RESPONSE	4	HARDWARE TY	PE 5 COMMENTS
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404	Micro Mist Corporation 33 Milford Dr. Hudson, Ohio 44236 Tel (216) 653-8831		x	3	3						3c Unable to participate at this time. 3f Patent 3,326,538
405	Refer to File No. 36		1								
406	Grayiano Gas Saving Device, Inc. 422 W. Alosta Blvd. Glendora, Calif. 91740 Tel 963-6371		x	×					Cylindrical Element	Diffusion	3d Questionnaire not returned. 3f Patent 3,583,377
407	Bob R. Wittington 1002 N. Canal St. P.O. Drawer 370 Carlsbad, N.M. 88220	x									3a Letter not returned
408	Riverside Auto Repair 4170 Soto St. Riverside, Calif.		x	K X	×			4.0	Exhaust Gas Recirculati Intake Vacu and Turbule	um Control	3g Photographs taken
409	Clyde Randolph Jones 37-B Calle Aragon Laguna Hills, Calif. 92653 Tel (714) 837-1816		x						,		3c Unable to participate at this time
410	W. A. Dennis 514 W. Bay Ave. Balboa, Calif.	х									3a Letter returned un- opened - Moved, left no address,
411	U.S. Department of Commerce Advisor on Environmental Quality Room 5611 Washington, D.C. 20236	x									3a Letter not returned
412	American Society of Mechanical Engineering 1916 Race St. Philadelphia, Pa.	x									3a Letter not returned
413	Arthur D. Little Cambridge, Mass.	x									3a Letter not returned
414	Environmental Science and Technology 1155 Sixteenth St., N.W. Washington, D.C. 20036 Tel (202) 737-3337	x									
415	Louis W. Milos 152 Mahar Ave. Clifton, N.J. 07011	х							Engine Exha	ust System	3a Letter not returned. Patent 3,396,535

<u>I</u>	DEVELOPMENT SOURCE					3	DECL	PNED	RESPONSE	4 HARDWARE TY	COMMENTS
DEVICE AND/OR FILE NO.		//								CLASS NO. DEVICE NA	
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416	Edward Haas 93 Darnacherstrasse Basel, Switzerland	x								Exhaust Gas Treating Device	3a Letter not returned. Patent 3,392,522
417	Mr. Yuma K. Kretschmer Farrar, Ga.	x							,	Exhaust Gas Treatment	3a Letter returned un- opened; address unknown. Patent 3,595,015
418	Energy Sciences, Inc. 343 Coral Circle El Segundo, Calif. 90245 Tel (213) 322-6368	x							1.2.1	Air Bleed to Intake Manifold	3a Letter not returned. Evaluation based on EPA Test Report 71-25.
419	Allied Management Consultants 2383 Pruneridge Ave. Santa Clara, Calif. 95050 Tel (408) 243-8310			x							3d Questionnaire not returned
420	Vapor Injector, Inc. Bargerville, Ind. 46106 Tel (717) 761-4271	x								Vapor Injector	3f Letter not returned
421	Cyril J. Telank-Combustion Air Pollution Con. 149 Amberston Dr. Williamswille, N.Y. 14221	x							. :	Combustion Device	3a Letter not returned
422	Sierra Distributors P.O. Box 266 Bloomingburg, N.Y. 12721	x								Crankcase Emission Control Unit	3a Letter not returned
423	Denecon Corporation P.O. Box 114 Middletown, N.J. 07748			x		x				Automotive Antipollution Device	3c Unable to participate at this time
424	Mr. Thomas J. Hoy 839 S. 13th St. Newark, N.J. 07108]	ĸ								
425	Clean Environment, Inc. 3445 38th St., N.W. Washington, D.C. 20016			x	x	×			1.1.3	Exhaust Gas Afterburner	3e Unable to participate at this time. 3f Patent 3,601,982
426	Dr. Cornell Grossman 46 Old Short Hills Rd. Short Hills, N.J. 07078	x									3a Letter nor received
427	Kar Products, Inc. 461 N. 3rd Ave. Des Plaines, Ill. 60016			x	x	x	ĸ		2.1	Closed or Open Blowby Control System with Filter	3g Photographs taken
428	Natural Gas Vehicles, Inc. Washington, D.C.	ж								CNG Conversion	3a Letter returned un- opened (insufficient address).
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429	Trans-World Marketing, Inc. P.O. Box 165 Bountiful, Utah 84010 Tel (801) 292-1437		3	:	×				Econo-Needles	3d Questionnaire not returned. 3f Emission test data not received.
430	Richard Kolb 540 Princeton St. New Milford, N.J.		,	×	x			1.2.3	Induction Modification	3e Photographs received
431	Dawnard Corporation 70 Glenn Way Belmont, Calif.	x								3e Letter not returned
432	Billvined Mufflers, Inc. John M. Running, Attorney 920 Kinderkamack Rd. River Edge, N.J. 07661		,	\$	x				Muffler Modification	3d Questionnaire not returned. 3f Patent 3,066,755
433	Auto Pollution Control Corp. P.O. Box 392 Gresham, Ore. 97030		3	x	×	x		1.2.1	Air-Vapor Bleed to Intake Manifold	3g Photographs taken, 3e Data received in lieu of questionnaire.
434	Cleman Enterprises 13256 Northrop Way Belleview, Wash. 98004	x						.:		3a Letter returned un- opened (incomplete address).
435	Innova Inc. Nanaimo System 44 Ravenna Blvd. Seattle, Wash. 98115		,	S					Flame Afterburner	3d Unable to participate at this time
436	National Inventors Council Washington, D.C. 20231	x								3a Letter not réceived
437	American Society of Inventors P.O. Box 122 Marion Station Philadelphia, Pa. 19066	x							,	3a Letter not received
438	International Inventors Registrar 1157 S. Beverly Dr. Los Angeles, Calif. 90035	x								
439	Mr. Joel Hill 371 W. O'Connor St. E. Palo Alto, Calif. 94303		1	ς .	×				Electronic Ignition System	3d Questionnaire not returned
440	Mr. F. O. Wiseman Route 8, Box 431 Chambersburg, Pa. 17201			c x	x			1.2.3	Air-Fuel Mixture Deflection Plate	3d Participating. 3f Insufficient emissions data to evaluate device for test. Patent 3,393,984
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1	2 DEVELOPMENT SOURCE					3]	eci.w	ED \$	RESPONSE	4	Н	ARDWARE T	YPE 5 COMMENTS
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441	Automatic Systems 1007 E. 10th St. Fairmont, Minn.		x										3c Unable to participate at this time
442	Laser Nucleonics, Inc. 123 Moody St. Waltham, Mass. 02154 Tel (617) 891-7880		1	ĸ	x					Spark :	Plug		3d Questionnaire not returned
443	Mr. John de Rageris 695 Kenneth Ave. Campbell, Calif. 95808	x										·	3a Letter not returned
444	Mr. Cyril J. Telack 149 Amherston Dr. Williamsville, N.Y. 14221 Tel (716) 634-2623	i i	2	ĸ						:			3a Questionnaire not returned
445	Systron Donner 4101 Wayside Ln. Carmichael, Calif. 95608	×							,				3a Letter not returned
446	M. E. Grey and Associates 914 Roses Rd. San Gabriel, Calif. 91775	x								•			3a Letter not returned
447	Mr. John Marois 4317 Orange Ave. San Diego, Calif. 92801	x											3a Questionnaire not returned
448	Mr. J. T. Webster 2436 Green Leaf Anaheim, Calif. 92801	x		-									3a Questionnaire not returned
449	Refer to File No. 259												,
450	Owens-Corning Fiberglass Corporation Newark, N.J.	x								Cataly Treatm	tic Exh ent	aust	3a Letter returned un- opened (Addressee unknown). Patent 3,166,895
451	Mr. Sidney B. Wertheimer 7403 Woodmar Ave. Hammond, Ind.	x								Exhaus	t Purif	ier	3a Letter returned un- opened (no forwarding address). Patent 3,282,047
452	Mr. Willard R. Calvert 306 Glenlock Rd. Ridley Park, Pa.									Exhaus	t Gas C	Converter	3a Letter returned un- opened (moved, not for- wardable). Patent 3,176,461

1	DEVELOPMENT SOURCE					3	DECL	NED	RESPONSE	4 HARDWARE TY	PE COMMENTS
DEVICE AND/OR FILE NO.										CLASS NO. DEVICE NA	 / ' ' ' '
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453	Mr. Joseph S. Barlow 1957 Maiden Ln. Altadena, Calif.	x								Combustion Control	3a Letter returned un- opened (moved, not forwardable). Patent 3,224,188
454	Mr. Eugene W. Hines 4292 Esta Dr. Flint, Mich.	x								Afterburner	3a Letter returned un- opened (moved, not forwardable). Patent 3,285,002
455	Envirotech Corporation Salt Lake City, Utah	x									3a Letter returned un- opened (insufficient address). Patent 3,466,868
456	Mr. Joe W. Von Brimer General Scientific Labs Inc. Sherman Oaks, Calif.	x									3a Letter returned un- opened (insufficient address). Patent 3,577,728
457	Engine Accessories Manufactur- ing Company 5809 E. Beverly Blvd. Los Angeles, Calif. Tel (213) 723-4978	x	x			x			1.4.2	Water Injection	3a Evaluation based on APCA Project B-1-7-2 Report dated 1966.
458	Sky Corporation Stockton, Calif.	x	×			×			1.2.1	Air Bleed to Intake Manifold	3a Evaluation based on EPA Test Report 72-5
459	Marvel-Schebler Division Borg-Warner Corp. 2195 S. Elwen Rd. Decatur, Ill. 62525	x	×			x			1.4.1	LPG Conversion with Deceleration Unit	3a Evaluation based on HEW/NAPCA Test Report 71-8.
460	Pacific Lighting Service Co. 720 S. Flower St. Los Angeles, Calif. 90054	x	×			x			1.4.1	Compressed Natural Gas Dual-Fuel Conversion	3a Evaluation based on EPA Test Report 71-17
461	Refer to EPA Test Report 71-21	x	x			x			1.4.1	LPG Conversion with Exhaust Reactor Pulse Air Injection and Exhaust Gas Recircu- lation	3a Evaluation based on EPA Test Report 71-21
462	Automotive Emissions Control Corp. (AEC) Louisville, Ky.	х	x			x			1.2.1	Air Bleed to Intake and Exhaust Manifolds	3a Evaluation based on EPA Test Report 72-1
463	Esso Research and Eng. Co. P.O. Box 111 Linden, N.J. 07036	х	x			x			1.1.2	Rich Thermal Reactor with Exhaust Gas Re- circulation and Spark Retard	3a Evaluation based on EPA Test Report 72-3 and SAE Paper 710608
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1	DEVELOPMENT SOURCE					3	DICLINA	, F	RESPONSE	4 HARDWARE TYPE 5 COMMENTS
DEVICE AND/OR FILE NO.		•		<i>.</i>		1	77		7///	CLASS NO. DEVICE NAME
		at	c	d	e	f E	h	1		b
464	Refer to EPA Test Report 72-4	x	x		,	к			1.4.1	Methanol Fuel Conversion with Catalytic Converter 3a Evaluation based on EPA Test Report 72-4
465	Refer to EPA Test Report 71-24	x	×		;	к			1.4.2	Fuel Additive 3a Evaluation based on EPA Test Report 71-24
466	Algas Industries 2657 Andjou Ave. Dallas, Tex. 75220	x	x		;	ĸ			1.4.1	LPG-Gasoline Dual-Fuel 3a Evaluation based on Conversion HEW/NAPCA Test Report 71-1
467	Production System ⁽¹⁾	x							3.0	Fuel Evaporation Control System 3a Review of production system only
468	Ethyl Corporation 100 Park Ave. New York, N.Y. 10017	x	x		;	ĸ			1.1.2	Lean Thermal Reactor with Exhaust Gas Recirculation 3a Evaluation based on Aerospace Report TOR-0172(2787)-2
469	E.I. du Pont de Nemours & Co. (Refer to Device 244)		x			ĸ			4.0	Rich Thermal Reactor with Exhaust Gas Recirculation and Particulate Control 3a Evaluation based on du Pont Paper A-72692, HEW/NAPCA Test Report 71-3 and report dated 5-70.
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⁽¹⁾ This device represents a fuel evaporation control system used on new model vehicles. The device was evaluated for retrofit cost feasibility.

APPENDIX V-2 RETROFIT DATA INVENTORY

APPENDIX V-2

INVENTORY OF RETROFIT SOURCE DATA FOR DEVICES EVALUATED IN RETROFIT PROGRAM

This appendix lists the principal items of data obtained from retrofit development sources for each of the devices evaluated in the retrofit program. A data inventory sheet is provided for each of these devices, as follows:

Device No	•		- · · · · · · · · · · · · · · · · · · ·	
1	62	244	315	457
10	69	245	317	458
22	93	246	322	459
23	95	259	325	460
24	96	268	384	461
31	100	279	401	462
33	160	282	408	463
36	164	288	418	464
42	165	292	425	465
52	170	294	427	466
56	172	295	430	467
57	175	296	433	468
59	182	308	440	469

NOTE: All data items listed on the following retrofit device data inventory sheets were provided by the retrofit source except those designated by asterisk; the latter were obtained from the data files of Olson Laboratories, Inc., or from the Environmental Protection Agency. Test reports provided by the Environmental Protection Agency are listed by author at the end of this appendix.

Device No. 1 - Air Bleed to Intake Manifold

- *1. Olson Laboratories Test Report No. 231-1, "Emissions Test of an Adaks Vacuum Breaker System," 20 May 1971.
- 2. Adaks Products Incorporated Brochure, "Adaks Vacuum Breaker."
- 3. Installation Procedure, "Installation of the Adaks Vacuum Breaker," 25 May 1971.
- 4. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *5. Gompf, Henry L., "Exhaust Emissions from Two Passenger Vehicles Equipped with the ADAKS Device," Report 72-6, EPA Office of Air Programs, September 1971.
- *6. Photograph No. BB041.

<u>Device No. 10 - Throttle-Controlled Exhaust Gas Recirculation with Vacuum Advance Disconnect</u>

- 1. Letters dated 17 July 1971 and 3 August 1971, addressed to the Air Resources Board, Subject "Northrop Report for the Test and Evaluation of the American Pollution Controlled, Inc. Exhaust Emission Control Device."
- 2. "Functional Description of American Pollution Controlled Pollution Control System for Used Cars."
- 3. System Description, "APC Exhaust Emission Control System."
- 4. "Application for State of California Accreditation of Exhaust Control System for Used Cars," 9 February 1971.
- 5. Progress Report, "Summary of Test Results," American Pollution Controlled, Inc.
- *6. Northrop Report No. 71Y139, "Testing and Evaluation of the American Pollution Controlled, Inc. Exhaust Emission Control Device Final Report," 2 July 1971.
- *7. Photograph No. BB046.

Device No. 22 - Electronic Fuel Injection

*1. Thomson, John C., "Exhaust Emissions from a Passenger Automobile Equipped with Electronic Fuel Injection," Report 71-12, EPA Division of Motor Vehicle Research and Development, December 1970.

Device No. 23 - Electronic Ignition Unit

*1. Gompf, Henry L., "Exhaust Emissions from a Passenger Car Equipped with the Biap Electronic Ignition Unit," Report 71-7, HEW/NAPCA Division of Motor Vehicle Research and Development, September 1970.

Device No. 24 - Heavy Duty Positive Crankcase Control Valve with Air Bleed

- *1. Gompf, Henry L., "Exhaust Emissions from a Passenger Car Equipped with Brisko's Heavy Duty PCV Valve," Report 71-20, EPA Division of Emission Control Technology, Air Pollution Control Office, February 1971.
- 2. Brochure, "Brisko's Power Booster PCV System."
- 3. Reprint from Super Service Station, "Anti-Pollutant System Brings Profits," November 1970.
- 4. Automotive Emissions test results comparing standard PCV system to Brisko's PC Valve, 26 August 1970.
- 5. Letter, F. Brisko to Olson Laboratories, Inc., 23 July 1971.
- 6. Letter, Technical Editor of Super Service Station Magazine to F. Brisko, 21 June 1971.
- 7. Letter, C. W. Schneider to Brisko Mileage Saver, Inc., 14 June 1971.
- 8. Letter, Pacific Lighting Service and Supply Company to F. Brisko, 15 June 1966.

Device No. 31 - Thermal Reaction by Turbine Blower Air Injection

- 1. Ulyate, J. R., "A New Air Supply System for Automotive Exhaust Emission Control," Chromalloy American Corporation, Advanced Products Division, performance and test results booklet.
- 2. Brochure, "The AMF Smog Burner TM."
- 3. Letter, Chromizing Company to Olson Laboratories, Inc., "Tests of Emission Control Devices for Retrofit on Used Cars," 6 August 1971.

Device No. 33 - Carburetor Modification, Main Jet Differential Pressure

- 1. Colspan Memorandum, "Colspan Automatic Mixture Control; Report of Preliminary Tests," 15 June 1971.
- 2. Automotive Testing Laboratories, Inc., "Hot Cycle Data, Test No. A-386," 12 July 1971.
- 3. Marvel-Schebler Division, Borg Warner Corp., "Exhaust Calculations, Test No. 53," 15 July 1971.
- 4. Marvel-Schebler Division, Borg Warner Corp., "Exhaust Calculations, Test No. 54," 15 July 1971.
- 5. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *6. Photograph No. BB034.

Device No. 36 - Fuel Conditioning by Exposure to Electromagnetic Field

*1. Caggiano, Michael A., "The Effect on Exhaust Emissions of the CETEC Atom-X Device," HEW/NAPCA Division of Motor Vehicle Pollution Control, Unnumbered Report, June 1970.

Device No. 42 - Air Bleed to Intake Manifold

- *1. Olson Laboratories, Inc., Test Report, "Vehicle Exhaust Emission Test Report for Ferry Cap & Set Screw Co.," 17 January 1970.
- 2. Test Report No. 90704-58, 18 June 1970 and 22 July 1970.
- *3. Olson Laboratories, Inc., Test Report, "Final Report for Wisconsin Mining Co., Ltd," 5 March 1970.
- 4. Installation Procedure, "PED Antipollution Device."
- 5. System Description, "PED Automobile Antipollution Device."
- 6. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *7. Photograph No. BB037.

Device No. 52 - LPG Conversion

- 1. Letter, 30 July 1971, from Herbert V. Hills, Executive Vice President, Impco, A Division of A. J. Industries, Inc., Cerritos, California 90701.
- 2. Miscellaneous sales brochures:
 - a. Impco the Complete Design.
 - b. Reprint of 'Why a Top Builder of Race Cars Favors Propane," from Butane-Propane News, May 1971.
 - c. "Impco First in Clean Air."
 - d. Reprint of "Sewage Plant's Engines Operate Economically on Digester Gas," from Diesel and Gas Turbine Progress, October 1970.
 - e. Reprint of "Your Car Will Run on LPG!" from Road Test, December 1969.
 - f. Reprint of "Propane to Power a Police Fleet," from Butane-Propane News (Impco Form No. BAJ 2-70).
 - g. Reprint of "LPG Passes Horsepower Test," from Road Test, April 1970 (Impco Form No. RT 4-70).
 - h. Butane-Propane News, BPN 4-705M-Rev. 4 4-715M, December 1970.
 - i. Special reprint of "Dual-Fuel Systems: How to Make the Conversion," from SP-GAS, May 1970 (Impco Form No. LP-G 5-70).
 - j. Reprint of "Propane Fuel Passes Racing Test with Flying Colors," from Autoproducts, April 1971.
 - k. "Diamond Reo Selects Impco for Heavy-Duty LPG Engines."
 - 1. "Impco Conquering Off-Road Racing."
 - m. Reprint of 'Water Pollution Makes a Market for LP-GAS," from Butane-Propane News, June 1970 (Impco Form No. BPN 770).
 - n. Reprint of "Propane Powered Civil Defense Sirens are Dependable," from Public Works, November 1970 (Impco Form No. PW 2 11-70).
 - o. "Impco Carburetion," Impco Form No. CA 70.
 - p. Reprint of "Clean Up Your Act," from Stock Car Racing, July 1971 (No. SSR 771(5M)).
- *3. Gompf, Henry L., "Exhaust Emissions from 10 GSA Rebels and 10 GSA Falcons Equipped with LPG Conversion Kits," Report 71-10, HEW/NAPCA Division of Motor Vehicle Research and Development, October 1970.

- 4. California Air Resources Board, "Emission Test on Three LP-GAS Vehicles," Project M 205, February 1970.
- 5. Impco Catalog of Emission Test Data on Material Handling Vehicle (Catalog File A).
- 6. Impco Catalog of Emission Test Data and California Air Resources Board Resolution accepting Impco LPG carburetors for Pre-1966 Vehicles (Catalog File B).
- 7. Impco Catalog of Component Descriptions and Prices (Catalog File C).
- 8. Impco Catalog of Emission Test Data and California Air Resources Board Resolutions accepting Impco LPG and CNG carburetors for 1966 and subsequent vehicles.
- 9. "Performance and Economy," LP-GAS Motor Fuel Manual (provided by Manchester Tank Company, Lynwood, California).
- 10. "Gas Power," the Fleet Owner's Gaseous Fuel Manual, a Publication of the Clean Air Car Project, California Institute of Technology, Environmental Quality Laboratory, 1 November 1971.
- 11. Miscellaneous data provided by the Manchester Tank Company, Lynwood, California:
 - a. "Performance and Economy LP Gas Motor Fuel," prepared by Manchester Tank Company.
 - b. "Care and Handling of LP Gas as a Motor Fuel," published by the Western Liquid Gas Association, San Francisco, California, 1966.
 - c. "The Experts in Pressure Vessels," Manchester Tank Company 25th Year.
 - d. "Evaluation of LPG as a Motor Fuel," letter from Rodney L. Inman, Industrial Engineer, State of California, Business and Transportation Agency, to Mr. E. L. Tinney, Equipment Engineer, 22 February 1971.
 - e. "Propane as an Engine Fuel for Cleaner Air," National LP-Gas Association, Chicago, Illinois.
 - f. McDonagh, Allan M., Harry J. Palola, and Lynn M. Treadway, "Alternate Fuel Systems," a report to The Ford Motor Company, published by California State College, Long Beach, School of Engineering, Mechanical Engineering Department.
- 12. State of California Air Resources Board Resolution 69-8, 15 January 1969.
- 13. State of California Air Resources Board Resolutions 70-9/A/B/C/D/E/F, 28 January through 21 July 1971.
- 14. Caltech Clean Air Car Project, "Gaseous Fuels Manual," California Institute of Technology Environmental Quality Laboratory, Pasadena, California, 1 November 1971.
- 15. "California Exhaust Emission Standards and Test Procedures for Motor Vehicles Modified to Use Liquified Petroleum Gas or Natural Gas Fuel," State of California Air Resources Board, 28 November 1969.

Device No. 56 - Crankcase Blowby and Idle Air Bleed Modification

- 1. Three glossy photos, Schematic No. 333000-1, titled "Fuel Preparation System Modification for 2V Carburetor."
- 2. Memorandum, titled "Landrum Experimental Spark Plug Evaluation, Department of Health, Education, and Welfare," 15 April 1969.
- 3. Letter, Ethyl Corporation, Research and Development Department, "Exhaust Emission Test Report," 5 June 1970.
- 4. Landrum Research memo, 3 June 1970, "Exhaust Emission Test Report."
- 5. Memo, Scott Research Laboratories, Inc., titled "MV PCB Test Cycle Calculations," 27 March 1967.
- 6. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *7. Photograph No. BB042.

Device No. 57 - Air Bleed with Exhaust Gas Recirculation and Vacuum Advance Disconnect

- 1. Litvak letter, "Analysis of Effectiveness and Costs of Retrofit Emission Control Systems for Used Vehicles," 29 July 1971.
- 2. System Description, "The Litvak System."
- 3. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *4. Photograph Nos. BB059 and BB062.

Device No. 59 - Three-Stage Exhaust Gas Control System

- 1. Atlantic Richfield Diagnostic Report, Carburetor Modification System, 19 August 1971.
- 2. Newspaper clipping, "Turn of a Screw Cuts Pollution from Her Car," 19 August 1971.
- *3. Olson Laboratories Test Report Nos. 570 and 571, "Before and After Installation of Anti-Pollution Device," 12 April 1971.
- *4. Olson Laboratories Test Reports, 13 January 1970 and 4 March 1970, "Vehicle Exhaust Emission Test Report for Manfredi Enterprises."
- 5. Manfredi Enterprises Test No. 1-1150-2, "Exhaust Emission Test Summary," 23 January 1970.
- 6. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).

Device No. 62 - Catalytic Converter

*1. Thomson, John C., "Exhaust Emissions from an Army M-151 Equipped with a Mitsui Catalyst," Report 71-22, EPA Motor Source Pollution Control Program, Air Pollution Control Office, March 1971.

<u>Device No. 69 - Electronic-Controlled Vacuum Advance Disconnect and Carburetor Lean</u> Idle Modification

- 1. Baseline Test, "Cold Start and Driveaway Evaluation," 16 October 1968.
- 2. Device Test, "Cold Start and Driveaway Evaluation," 16 October 1968.
- 3. Brochure, July 1971, "The Polimiter, Automotive Exhaust Emissions Control."
- 4. Blueprint No. EX100-475, "Carter Emission Control Kit," 21 September 1971.
- *5. Olson Laboratories Test Report, 13 February 1969, "Vehicle Exhaust Emission Test 1967 Ford XL for Optimizer Control Corporation."
- *6. Olson Laboratories TWX, 5 October 1971, subject "Retrofit Carburetor Numbers and Model."
- 7. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *8. Photograph No. BB058.

Device No. 93 - Catalytic Converter with Exhaust Gas Recirculation, Spark Modification, and Lean Idle Mixture

*1. Thomson, John C., "Emission Results from a Texaco Catalyst Concept Applied to a Previously Uncontrolled Engine," Report 71-26, EPA Mobile Source Pollution Control Program, Air Pollution Office, April 1971.

Device No. 95 - Ignition Spark Modification

- *1. Thomson, John C., "Exhaust Emissions from a Passenger Car Equipped with the Paser Magnum Electronic Anti-Pollution Engine Economizer," HEW/NAPCA Division of Motor Vehicle Research and Development, September 1970.
- *2. Thomson, John C., "Exhaust Emissions from a 1971 Passenger Car Equipped with the Paser Magnum Electronic Anti-Pollution Engine Economizer," Report 71-31, EPA Bureau of Source Pollution Control, Office of Air Programs, June 1971.

Device No. 96 - Catalytic Converter with Distributor Vacuum Advance Disconnect

- *1. Retrofit Study Program Emission and Driveability Test Data.
- 2. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *3. Photograph Nos. BB066 and BB067.
- *4. Thomson, John C., "Exhaust Emissions from a Passenger Car Equipped with a Universal Oil Products Catalytic Converter," EPA Division of Motor Vehicle Research and Development, Air Pollution Control Office, Report 71-16, December 1970.
- 5. Universal Oil Products Company, Des Plaines, Illinois, "Purzaust Retrofit System," Description and Installation Instructions, 1965 Chevrolet 327 CID, Kit Type C (no report number), undated report.
- 6. Universal Oil Products Company, Des Plaines, Illinois, "Purzaust Retrofit System," Description and Installation Instructions, 1961 Chevrolet 283 CID, Kit Type C (no report number), undated report.
- 7. Universal Oil Products Company, Des Plaines, Illinois, "Purzaust Retrofit System," Description and Installation Instructions, 1965 Chevrolet, Nova 194 CID, Kit Type A (no report number), undated report.

Device No. 100 - Turbocharger

*1. Thomson, John C., "A Report on the Exhaust Emissions from a Turbocharged Volks-wagen," Draft Report, EPA Division of Emission Control Technology, Bureau of Mobile Source Pollution Control, Office of Air Programs, May 1971.

Device No. 160 - Closed or Open Blowby Control System with Filter

- 1. Oildex Brochure.
- United States Testing Company, Inc., Test Report, "On Gas Analysis on Automobile Exhaust Gas," Laboratory No. 8473, W.O. 3133.
- 3. Oildex Installation Instruction, 18 June 1965.
- 4. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *5. Photograph No. BB035.

Device No. 164 - Exhaust Gas Filter

- 1. Ethyl Corporation Test Report, 21 April 1971; 17 August 1971; 31 August 1971; "Emission Test of an Exhaust Filtering System."
- 2. Summary of Gaseous Emission Tests, 17 August 1971.
- 3. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- 4. Letter, 3 June 1971, from Ethyl Corporation Research and Development Department (Research Laboratories, 1600 West Eight Mile Road, Ferndale, Michigan 48220) to Device 164 Developer, with Exhaust Emission Test Report attached.
- 5. Polaroid photograph.

Device No. 165 - Exhaust Gas Afterburner/Recirculation with Blowby and Fuel Evaporation Recirculation

- 1. Air Resources Board Test Report, "Project 196, Emission Test of Penkova Exhaust Control System," June 1970.
- 2. Air Resources Board Test Report, "Project 196, Emission Test of Modified Penkova Exhaust Control System," December 1970.
- 3. Air Resources Board Test Report, "Project 196, Tests 2 and 3, Emission Test of Modified Penkova Exhaust Control System," 29 June 1971.
- 4. Scott Research Laboratories, Inc., Final Report, "Federal Cold Start Exhaust Emissions Test, 1965 Ford, for Mr. Charles C. Penkova," 4 May 1970.
- *5. Olson Laboratories Incorporated Testing Agreement, 2 February 1971.
- 6. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *7. Photograph No. BB045.

Device No. 170 - Closed Blowby Control System

- 1. Letter by Donald D. Binder, President, Automotives Associates International, Inc., 75 Narcissa Drive, Portuguese Bend, California (Tel 377-8507 or 377-8517), subject: Participation in "Analysis of Effectiveness and Costs of Retrofit Emission Control Systems for Used Vehicles," 22 July 1971.
- 2. McJones, R. W., and J. W. Huron, "Control of Crankcase Emissions Through the Use of Negative Crankcase Pressure," Society of Automotive Engineers, Inc., 485 Lexington Avenue, New York 17, N.Y., West Coast Meeting Los Angeles, California, Report No. 660547, 8-11 August 1966.
- 3. Letter from Donel R. Olson, Director, San Bernardino Laboratory, Scott Research Laboratories, Inc., to K&B Manufacturing Corporation, 12152 South Woodruff Avenue, Downey, California, 12 August 1964, subject: Effect of Device 170 on Reduction of Exhaust Nitrogen Oxides.
- 4. Letter from Donel R. Olson, Director, San Bernardino Laboratory, Scott Research Laboratories, Inc., to K&B Manufacturing Corporation, 12152 South Woodruff Avenue, Downey, California, 10 November 1964, subject: Mode by Mode Calculations for the Exhaust Emission Tests conducted on 28 October 1964.
- 5. Webb, Milton J., Scott Research Laboratories, Inc., 2600 Cajon Boulevard, San Bernardino, California, for K&B Manufacturing Corporation, 12152 South Woodruff Avenue, Downey, California, "Blowby Measurement and Exhaust Emission Testing 1956 Chevrolet," 28 October 1964.
- 6. Functional Schematic, K&B Closed Crankcase Control, Normal Engine Operation, published by K&B Manufacturing Corporation.
- 7. Functional Schematic, K&B Closed Crankcase Control, Fast Acceleration or Hill Climbing, published by K&B Manufacturing Corporation.
- 8. VAC-U-TRON (a controlled vacuum system for smog reduction), K&B Manufacturing Corporation, 12152 Woodruff Avenue, Downey, California, A Subsidiary of Aurora Plastics Corp.
- 9. Patent No. 3,139,080, McMahon, R. E., "Internal Combustion Engine," 30 June 1964, filed 16 July 1962.
- 10. Patent No. 3,362,386, McMahon, R. E., "Internal Combustion Engine," 9 January 1968, filed 17 May 1965.
- 11. Suggested Dealer Price Schedule, Form PS-1-D, 15 April 1968, published by K&B Manufacturing Corporation.
- 12. Wholesaler Price Schedule, Form PS-1-W, 15 April 1968, published by K&B Manufacturing Corporation.
- 13. Suggested Retail Price Schedule, Form PS-1-R, 15 April 1968, published by K&B Manufacturing Corporation.

- 14. VAC-U-TRON Installers Kit (Stock No. 5233) Contents and Suggested List Price, published by K&V Manufacturing Corporation.
- 15. Letter by John A. Maga, Executive Officer, State of California Air Resources Board, 14 December 1970, subject: Adoption of Resolution 70-88.
- 16. Installers Manual on High Efficiency Vacuum Operated Crankcase Emission Control System, Weatherly Index 660, published by K&B Manufacturing Corporation.
- 17. Service Manual on Crankcase Emission Control System, Weatherly Index 660, published by K&B Manufacturing Corporation.
- 18. VAC-U-TRON Engine Guard, approved crankcase emission control system, published by K&B Manufacturing Corporation.
- 19. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).

Device No. 172 - Intake Manifold Modification

- *1. Thomson, John C., "Exhaust Emissions from a Vehicle Equipped with the Roberts Induction Device Modification Supplied under Contract CPA 70-51," Report 71-14, EPA Division of Motor Research and Development, December 1970.
- 2. "A General Report on the Design, Performance and Cost of the Emissions Control System," PAS Corporation, 9001 Rosehill Road, Lenexa, Kansas 66215, 6 August 1971. (Revised as per letter dated 17 August 1971 from Paul E. Berger, PAS Corporation.)
- 3. Functional schematic view of one intake "RAM" using gasket configuration, Charles G. Roberts and Son, Designers, 1015 N. Michigan, Howell, Michigan 48843, Tel (517) 546-2672.

Device No. 175 - Ignition Timing Modification with Lean Idle Adjustment

- 1. California Air Resources Board Resolution 71-72, September 1971, Amendment 71-72A, December 1971.
- 2. Letter from Emission Control Technology, Inc., 1240 West Collins Ave., Orange, California 92667, 4 August 1971, subject: Participation in retrofit emission control system program sponsored by the Environmental Protection Agency (EPA), Contract No. 68-04-0038, with enclosure on "System Description/Installation Procedure."
- 3. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *4. Photograph No. BB195.

Device No. 182 - Fuel and Oil Additives

- 1. Letter from Combustion Chemicals Corporation, 15720 Ventura Boulevard, Encino, California 91316, by Morton W. Marcus, 5 August 1971, subject: Participation in program of "Analysis of Effectiveness and Costs of Retrofit Emission Control Systems for Used Vehicles" (No. 68-04-0038) with enclosure of emission tests from City of Los Angeles.
- 2. Letters to Combustion Chemicals Corporation from R. D. Allen, Manager, Transportation, Douglas Aircraft Division, 3855 Lakewood Boulevard, Long Beach, California 90680, 6 February 1970 (No. C1-39-RDA-062), subject: Test Data on FE-plus additive in Douglas' gasoline and diesel driven vehicles.
- *3. Test report on two 1968 Fords and two 1969 Fords with FE-plus gasoline additive. Tests run on 10 July 1970 through 13 August 1970 for Combustion Chemicals Corporation by Olson Laboratories.
- 4. American Honda Corporation Test Report for FE-plus (E300A), by The Bob Bondurant School of High Performance Driving, 1983 South Ritchey, Santa Ana, California 92705.
- 5. "Baja 500 Questionnaire Results" on evaluation of FE-plus gasoline and oil additives during off road race in Baja California, Mexico, 22 September 1970, by Combustion Chemicals Corporation (SCO/MAR).
- 6. Glyco cam bearings from Volkswagen racing engines using same brand of racing oil, same number of competition hours (Baja 500 and Ascot). Engines prepared by, and tests conducted by John Miguel, 5793 Las Indios Circle, Buena Park, California (714) 826-6005.
- 7. Test report no. 7129 to Combustion Chemicals Corporation (SCO/MAR) Purchase Order No. 5505, by Admerco, Inc., Materials Research and Environmental Testing Laboratory, 14721 Lull Street, Van Nuys, California, subject: To determine corrosion properties of FE-plus additive in various fuels and lubricants in connection with a variety of materials, 26 February 1970.
- 8. Riney, Tom, "Another Point for Ecology," Evening Outlook, 26 January 1971.
- 9. Test report on FE-plus engine lubricant from petrolane, Carburetion Service Center, 5037 East Telegraph Road, Los Angeles, California, to Combustion Chemicals Corporation (SCO/MAR), 23 June 1971.
- *10. Telecon 2 March 1972 between B. L. Ryle, Combustion Chemicals Corporation, P.O. Box 444, Calahasas, California 91302, Tel (213) 884-0383, and D. J. Dewey, Olson Laboratories, subject: Additive Cost and Quantity per Gallon Information.

Device No. 244 - Rich Thermal Reactor

- 1. Scott Laboratories, Inc., Final Report No. 2883, "Federal Cold Start Exhaust Emission Test on a 1970 Chevrolet," 18 March 1970.
- 2. Brochure, "Exhaust Manifold Reactor."
- *3. Thomson, John C., "Exhaust Emissions from a Passenger Car Equipped with a DuPont Exhaust Emission Control System," HEW/NAPCA Division of Motor Vehicle Pollution Control, May 1970.(1)
- *4. Thomson, John C., "Exhaust Emissions from a Passenger Car Equipped with a DuPont Exhaust Emission Control System Using 1975 Test Procedure," Report 71-3, HEW/NAPCA Division of Motor Vehicle Research and Development, August 1970.(1)
- 5. Cantwell, E. N., I. T. Rosenlund, W. J. Barth, F. L. Kinnear, and S. W. Ross, "A Progress Report on the Development of Exhaust Manifold Reactors," SAE Paper 690139, January 1969.
- 6. Cantwell, E. N., "A Total Exhaust Emission System," Document A-72692, Petroleum Laboratory, E. I. duPont de Nemours & Co., Inc., Wilmington, Delaware.
- 7. "Today: The Elimination of Automobile Air Pollution," Document A-70135, du Pont Petroleum Chemicals.

⁽¹⁾ The Device 244 reactor was used in combination with EGR and particulate control in these tests (refer to Device 469).

Device No. 245 - Variable Camshaft Timing

- *1. Thomson, John C., "Exhaust Emissions on an Uncontrolled Passenger Car Using Variable Cam Timing," HEW/NAPCA Report 71-4, August 1970.(1)
- *2. Thomson, John C., "An Evaluation of a Variable Cam Timing Technique as a Control Method for Oxides of Nitrogen," HEW/NAPCA Report 71-11, October 1970.(1)
- 3. Brochures, "Installation Instructions," "Distributor Price List," "Varicam Application Sheet," "Varicam Brochure."
- 4. Magazine Reprints, "Quicker & Quicker & Quicker," August 1968.
- 5. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *6. Freeman, Max A., and Roy C. Nicholson, "Valve-Timing for Control of Oxides of Nitrogen (NOx)," SAE Paper 720121, January 1972.
- *7. "Variable Cam Timing as an Emission Control Tool," SAE 700673.
- *8. Photograph Nos. BB030 and BB031.

⁽¹⁾ The variable cam timing device tested by EPA is not the same as Device 245, but was used for comparison purposes in the study of Device 245.

<u>Device No. 246 - Speed-Controlled Exhaust Gas Recirculation with Vacuum Advance Disconnect</u>

- 1. Environmental Protection Agency Test, "Emission Test of a Perfect Circle Speed Controlled Exhaust Recirculation (RETRONOX) System, 27 July 1971 to 30 July 1971.
- 2. Test Report Nos. 829-F-001, 946-F-002, 946-F-003, and 946-F-005, "Reduction by External Means of Pollutants in Exhaust Emissions from Automotive Engines," 21 September 1970, 10 August 1971, 30 August 1971, and 23 September 1971.
- 3. Brochure, "Dana-Perfect Circle, Speed-Controlled Exhaust Recirculation System," 16 June 1971.
- 4. System Description, "Dana RETRONOX System."
- 5. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *6. Gompf, Henry L., "Evaluation of the Emission Reduction with the Perfect Circle Retronox Speed Controlled EGR System," EPA Office Mobile Source Pollution Control Program, Office of Air Programs, Report 72-8, October 1971.
- *7. Photograph Nos. BB049 and BB057.

Device No. 259 - Photocell-Controlled Ignition System

- 1. Corona Engineering Summary Test Report, "Emission Test of a Corona Ignition System."
- 2. Corona Engineering Supplementary Information, "Corona Ignition System."
- 3. Letter, 2 November 1971, "Reduced Air Pollution," from Corona Engineering.
- 4. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *5. Photograph Nos. BB123, BB124, BB125, BB126, BB129 and BB130.

Device No. 268 - Capacitive Discharge Ignition

- 1. Brochure, "Delta Mark Ten Installation Instructions," 1 June 1967.
- 2. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *3. Photograph No. BB194.

Device No. 279 - Fuel Conditioner

- 1. Brochure, "Saranga Industries Fuel Activators, More Power, No Smog."
- 2. Patent Specification No. 814,269, 3 June 1959.
- 3. Letter "Fuel Activator," from Watkins's Trucks, Inc., 16 June 1971.
- 4. Disclosure Document No. 006381, "Method & Device for Increasing the Combustion Efficiency of Liquid Fuels," 16 August 1971.
- 5. Stevens Institute of Technology Test Report No. 3797/637, "Exhaust Emission Test on a 1969 Chevrolet," 31 March 1971.
- 6. Stevens Institute of Technology Test Report, "Test on a GMC Diesel Truck Equipped with a Saranga Fuel Activator."
- 7. Lehigh Testing Laboratories Test Report No. 214,832, "Emission Testing of Saranga Fuel Activator."
- 8. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *9. Photograph No. BB040.

Device No. 282 - LP Gas Injection

- 1. J&S Carburetor Company Test Report, "Carburetor Test," 16 January 1971.
- 2. Brochure No. 1031, "Get the Lead Out of Your Gas."
- 3. Brochure No. PS-1032, "Propane Anti-Knock Injector Kit and Tanks," November 1970.
- 4. Brochure No. 1040, "The J&S Phoenix #40."
- 5. Brochure No. 1246, "How to Install the Model 700 or 750 Regulator and Jet-Flow Adapter."
- 6. Brochure No. 1250, "The New Jet-Flow LP Kit."
- 7. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *8. Photograph Nos. BB104 and BB105.

Device No. 288 - Carburetor Main Discharge Nozzle Modification

- 1. Bodai, Conrad A., PhD, "Summary of Reported Measurements by Independent Laboratories."
- 2. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *3. Photograph Nos. BB032 and BB033.

Device No. 292 - Catalytic Converter

- *1. Thomson, John C., "A Report on the Exhaust Emissions of an Army M-151 1/4-Ton Truck Using an Exhaust Catalyst," Report 71-13, EPA Division of Motor Vehicle Research and Development, December 1970.
- 2. Engelhard Industries Sales Brochures, Forms EM-8958, EM-6366, and "Engelhard Accepts the Challenge with the PTX Catalytic Exhaust Purifier," Engelhard Industries, A Division of Engelhard Minerals and Chemicals Corporation, New Jersey.
- 3. Bilhuber, Val, "The Key That Unlocked the Docks," reprinted from NLPGA Times, August 1968, for Engelhard Minerals & Chemicals Corporation.
- *4. Telecons between M. L. Webb, Olson Laboratories, Project Engineer, Contract 68-04-0038, and Herbert Morreall, Engelhard Industries, on 14 and 15 October 1971.

Device No. 294 - Exhaust Gas Recirculation with Carburetor Modification

*1. Thomson, John C., "Exhaust Emission from Passenger Vehicles Equipped with Doughboy Carburetors," Report 71-15, EPA Division of Motor Vehicles Research and Development, Air Pollution Control Office, December 1970.

Device No. 295 - Carburetor with Variable Venturi

- 1. Letter, Pollution Controls Industries, Inc., "System Description, Variable Venturi Carburetor (VCC)," 27 August 1971.
- 2. Scott Research Laboratories, Inc., Test Report, "Emission Tests, 1966 Ford Mustang," 4 February 1971.
- 3. System Description, "Description of the PCI Variable Venturi Carburetors."
- 4. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *5. Photograph Nos. BB047 and BB048.

Device No. 296 - Ignition Timing and Spark Modification

- 1. Cont-Ignitron Co. Brochure, "The Equalizer."
- 2. California Air Resources Board, "Evaluation Tests of Exhaust Emission Control Device," Project 205, July 1971.
- 3. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *4. Photograph Nos. BB052, BB060, and BB061.

Device No. 308 - Exhaust Gas Afterburner

- Arizona State Department of Health Test Report, "Vehicle Emission Test,"
 July 1971.
- 2. Vehicle Emission Test, 1967 Chevrolet, With and Without Device 308 Installed, Arizona State Department of Health, Division of Air Pollution Control Test Report, 11 November 1971.
- 3. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *4. Photographs BB054 and BB055.

Device No. 315 - Closed Blowby Control System

- *1. Olson Laboratories, Inc., Test Report, "Final Report for the Nycal Company, Inc.," 7 October 1969.
- 2. Stevens Institute of Technology Test Report, 23 June 1971.
- 3. Copy of Patent: No. 3,495,578, 17 February 1970.
- 4. Miscellaneous Test Reports.
- 5. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *6. Photograph Nos. BB064 and BB065.

Device No. 317 - Carburetor Modification with Vacuum Advance Disconnect

- 1. HEW, Motor Vehicle Compliance Section Test Report, 8 March 1967.
- 2. Scott Research Laboratories, Inc., Test Report, "Final Report, Federal Cold Start Exhaust Emission Test, 1963 Cadillac for Mr. R. Loudenslager," 16 February 1970.
- 3. Scott Research Laboratories, Inc., Test Report, "Final Report Federal Cold Start Exhaust Emission Tests, 1967 Cadillac, for Mr. R. Loudenslager," 22 May 1970.
- 4. Air Resources Board Test Report, "Project 189 Emission Test of A.E.C. Exhaust Emission Control Device," 4 November 1970.
- 5. Speed Specialists, Inc., Test Report, "Automotive Emission Control Device (A.E.C.)," 23 March 1971.
- 6. System Description, "The Theory of the A.E.C. Retrofit Emission Control Device," George P. Fetting, Coordinating Designer, 27 September 1971.
- 7. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *8. Photograph No. BB063.

Device No. 322 - Exhaust Gas Backpressure Valve

*1. Verelli, Leonard D., "Exhaust Emissions from a Passenger Car Equipped with the 'Wilford Smog Suppressor'," HEW/NAPCA Report 71-9, October 1970.

Device No. 325 - Air-Vapor Bleed to Intake Manifold

- Automotive Testing Laboratories, Inc., Test Report "On Servi-Tech Vapor Injection for Servi-Tech, Inc."
- 2. Scott Research Laboratories, Inc., Test Report SRL 2956 01 0371, "Final Report, California 7-Mode Hot Cycle Emission Test for Servi-Tech, Inc., 2 March 1971.
- 3. California Air Resources Board Test Report, "Tests No. 201-1 and 201-2, California 7-Mode Hot Cycle Emission Test for Servi-Tech, Inc.," 16 March 1971.
- 4. Servi-Tech, Inc., Brochure, 'Why Auto Emission Control."
- 5. Servi-Tech, Inc., Brochure, "Auto Emission Control System."
- 6. Automotive Testing Laboratories, Inc., Test Report.
- 7. Servi-Tech, Inc., Brochure, "Auto Emission Control System Installation Instructions."
- 8. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).

Device No. 384 - Air-Fuel Mixture Diffuser

- 1. Memo, Hydro-Catalyst Corporation, "Installation Instructions for Carburetor Catalyst," 20 October 1971.
- 2. Schematic No. 419, "Hydro-Catalyst Device for Buick Rev. Pt. No. 1237019,"
 Triple P, Inc., Division of F. D. Farnam Company.
- 3. Test No. 89, Stevens Institute of Technology, Exhaust Emission Test, 20 May 1971.
- 4. Patent Disclosure, Figure 1, Improved Design.
- 5. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *6. Photograph Nos. BB036 and BB038.

Device No. 401 - Air-Vapor Bleed to Intake Manifold

- 1. Brochure on "Turbo Vapor Injector," distributed by St. Clair Sales & Distribution, Inc., 2792 Goodells Rd., Goodells, Michigan 48027.
- 2. Test Report, "Turbo Vapor Injector," No. 002104A by Detroit Testing Laboratory, 12800 Northend Avenue, Detroit, Michigan for St. Clair Sales & Distribution, Inc., 24 March 1970.
- 3. Final Report, "Cold Start and Hot Start Exhaust Emission Tests," Project No. 51023, for St. Clair Sales & Distribution, Inc., 20 May 1970.

Device No. 408 - Exhaust Gas and Blowby Recirculation with Intake Vacuum Control and Turbulent Mixing

- 1. System Description, "Principle of Operation."
- 2. Copy of Patent No. 3,273,550, 20 September 1966.
- 3. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *4. Photograph No. BB134.

Device No. 418 - Air Bleed to Intake Manifold

- *1. Gompf, Henry L., "Exhaust Emissions from Two-Passenger Vehicles Equipped with "Fumcell," Report 71-25, EPA Mobile Source Pollution Control Program Air Pollution Control Office, 26 November 1971.
- *2. 7-Cycle, 7-Mode Emission Test Results With and Without Device 418, Project 51018, 27 March and 1/7 April 1970, Olson Laboratories, Inc.

Device No. 425 - Exhaust Gas Afterburner

- 1. U.S. Patent No. 3601982.
- 2. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- 3. Letter from James W. McCrocklin, President, Clean Environment, Inc., McLean Gardens Apartments, Benning Hall, Room 143-2, 3445 38th St., N.W., Washington, D.C. 20016, in reply to OLI's letter of 14 September 1971, 23 September 1971, subject: Participation in "Analysis of Effectiveness and Costs of Retrofit Emission Control Systems for Used Vehicles" program.
- 4. Letter from James W. McCrocklin, President, Clean Environment, in response to OLI's letter of 14 October 1971, 20 October 1971, subject: Emission Test Results.
- 5. McCrocklin, James W., "Development of Low-Emission Vehicles" (Technical Characteristics of Device 425), Clean Environment, Inc., Washington, D.C., 19 June 1971.
- 6. McCrocklin, James W., "A Comparative Analysis of Exhaust Emission Control Systems" (Effectiveness of the Inter-Industry Emission Control Concept Versus Device 425 System), Clean Environment, Inc., Washington, D.C., 17 April 1971.
- 7. Letter from Harold J. Gibson, Manager, Detroit Laboratories, Ethyl Corp., 1600 West Eight Mile Road, Ferndale, Michigan 48229, to APPCA, Inc., 7147 Woodland Drive, Springfield, Virginia 22151, attn: Capt. James McCrocklin, with Exhaust Emission Test Report attached, 20 August 1970.

Device No. 427 - Closed or Open Blowby Control System with Filter

- 1. Parts Catalog 1971/1972, "Engine Vent System."
- 2. Installation & Service Instructions, "Lift Truck Applications."
- 3. Engine Vent General Installation Instructions.
- 4. Scott Laboratories Test Report No. 2422, "Crankcase Blowby Measurement for Fleet Vehicle Selection," 28 February 1967.
- 5. Scott Laboratories Test Report No. 2601, "California Bench Flow Characteristics of Engine Vent Systems," 5 February 1969.
- *6. Summary of Vehicle Exhaust Emission Test Report Performed by Olson Laboratories, Inc., 24 March 1970.
 - 7. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- *8. Photograph No. BB050.

Device No. 430 - Induction Modification

- 1. System Description, "The Vaporizer."
- 2. Installation Instructions.
- 3. Stevens Institute of Technology Test Report, 7 August 1966.
- 4. Scott Research Laboratories, Inc., Test Reports, Project 1249, -01, -02.
- 5. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).

Device No. 433 - Air-Vapor Bleed to Intake Manifold

- 1. Auto Pollution Control Corporation Brochure, "Vapor Injection System Installation Instructions."
- 2. Auto Pollution Control Corporation Brochure, "Vapor Injection System."
- 3. Auto Pollution Control Corporation Brochure, "Vapor Injection Needle Product Information, Application Chart, Test Results."
- 4. Automotive Testing Laboratories, Inc., Test Report, "Supplement to Test Report on Servi-Tech Vapor Injection for Servi-Tech, Inc."
- 5. Scott Research Laboratories, Inc., Test Report, SRL 2956 01 0371, "Final Report, California 7-Mode Hot Cycle Emission Test," 2 March 1971.
- 6. Auto Pollution Control Corporation Test Report, "Tests Performed by Gonzaga University, Spokane, Washington."
- *7. Photograph Nos. BB039 and BB051.

Device No. 440 - Air-Fuel Mixture Deflection Plate

- 1. System Description.
- 2. Copy of Patent No. 3,393,984, 23 July 1968.
- 3. "Test Experience Summary," 12 June 1967.
- 4. Retrofit Data Survey Questionnaire Response (refer to Appendix V-3).
- 5. Device configuration photograph.

Device No. 457 - Water Injection

*1. Hollabaugh, D. M., "The Effects of Water Injection on Nitrogen Oxides in Automotive Exhaust Gas," Project B-1-7-2, 1966, Air Pollution Control Association.

Device No. 458 - Air Bleed to Intake Manifold

*1. Thomson, John C., "Emissions Results from an Automobile Using the Frantz Vapor Injector," EPA Report 72-5, EPA Office of Air Programs, September 1971.

Device No. 459 - LPG Conversion with Deceleration Unit

- *1. Hopkins, Howe H., "Feasibility of Utilizing Gaseous Fuels for Reducing Emissions from Motor Vehicles," Unpublished Report, EPA Division of Motor Vehicle Research and Development, 24 November 1971.
- *2. Telecon between T. R. Godburn, Applications Engineer, Marvel-Schebler Division of Borg-Warner, Decatur, Illinois, and W. R. Hougland, EPA Project 68-04-0038, Documentation Task Leader, 14 February 1972.
- *3. Gompf, Henry L., "Exhaust Emissions from a Passenger Car Powered by Marvel-Schebler LPG Conversion," HEW/NAPCA Report 71-8, September 1970.
- 4. Form No. 9653, Century Gas Equipment, "LPA Motor Fuel and You," Marvel-Schebler Division, Borg-Warner, Decatur, Illinois.

Device No. 460 - Compressed Natural Gas Dual-Fuel Conversion

- *1. "Emission Reduction Using Gaseous Fuels for Vehicular Propulsion," Final Report on Contract No. 70-69 for Environmental Protection Agency, Air Pollution Control Office, by the Institute of Gas Technology, Chicago, Illinois, June 1971.
- 2. State of California Air Resources Board Resolutions 70-9/A/B/C/D/E/F, 28 January through 21 July 1971.
- *3. Thomson, John C., "An Evaluation of the Exhaust Emissions from Two Vehicles Equipped with Compressed Natural Gas Conversion Kits," Report 71-17, EPA Division of Motor Vehicle Research and Development, Air Pollution Control Office, December 1970.
- 4. "Interest in Compressed Natural Gas Carburetion Grows as Pacific Lighting's Dual-Fuel System Gains Approval," A Gas Industries Publication by Paul Lady, Associate Publisher.
- 5. "Exhaust Emission Tests of Pacific Lighting Model 1.25 Natural Gas Dual-Fuel (Modified IMPCO 300A)," Pacific Lighting Service Company, Los Angeles, California, September 1969.
- 6. "Reduction of Air Pollution by the Use of Natural Gas or Liquified Petroleum Gas Fuels for Motor Vehicles," State of California Air Resources Board, 18 March 1970.
- *7. Hopkins, Howe H., "Feasibility of Utilizing Gaseous Fuels for Reducing Emissions from Motor Vehicles," Unpublished Report, EPA Division of Motor Vehicle Research and Development, 24 November 1971.
- 8. McDonagh, Allan M., Harry J. Palola, and Lynn M. Treadway, "Alternate Fuel Systems," a report to the Ford Motor Company, California State College, School of Engineering, Mechanical Engineering Department, 4 June 1971.

Device No. 461 - LPG Conversion with Exhaust Reactor Pulse Air Injection and Exhaust Gas Recirculation

*1. Thomson, John C., "Exhaust Emissions from a Reactor Equipped, Full-Size Automobile Using LPG Fuel," Report 71-21, EPA Division of Emission Control Technology, Mobile Source Pollution Control Program, Air Pollution Control Office, March 1971.

Device No. 462 - Air Bleed to Intake and Exhaust Manifolds

*1. Thomson, John C., "Exhaust Emissions from Controlled and Uncontrolled Vehicles Using the "Pollution Master" Emission Control Device," Report 72-1, EPA Office of Air Programs, August 1971.

Device No. 463 - Rich Thermal Reactor with Exhaust Gas Recirculation and Spark Retard

- *1. Lang, Robert J., "A Well-Mixed Thermal Reactor System for Automotive Emission Control," SAE Paper 710608, June 1971.
- *2. Thomson, John C., "An Evaluation of the Emissions Characteristics of the Esso Well-Mixed Thermal Reactor," Report 72-3, EPA Office of Air Programs, August 1971.

Device No. 464 - Methanol Fuel Conversion with Catalytic Converter

- *1. Ashby, Anthony H., "Emissions from the Methanol Fueled Stanford University Gremlin, Report 72-4, EPA Office of Air Programs, August 1971.
- *2. Telecon between Ernest Lovelin, Chemist, Amsco Division of Union Oil Co., La Mirada, California, and W. R. Hougland, EPA Project 68-04-0038, Documentation Task Leader, 3 February 1972.

Device No. 465 - Fuel Additive

*1. Verrelli, Leonard D., "Exhaust Emissions from a Passenger Car with Gasoline Treated with Bycosin Fuel Additive," Report 71-24, EPA Division of Emission Control Technology, Mobile Source Pollution Control Program, Air Pollution Control Office, April 1971.

Device No. 466 - LPG-Gasoline Dual-Fuel Conversion

- *1. Caggiano, Michael A., "Emissions from Two LPG Powered Vehicles," HEW/NAPCA Division of Motor Vehicle Pollution Control, February 1970, (Unnumbered Report).
- *2. Ashby, H. Anthony, "Exhaust Emissions from Seven LP Gas Powered Vehicles," Report 71-1, HEW/NAPCA Division of Motor Vehicle Research and Development, July 1970.
- *3. Telecon between Ralph Abbot, Chief Engineer, Algas Industries, Dallas, Texas, and W. R. Hougland, EPA Project 68-04-0038, Documentation Task Leader, 14 February 1972.
- 4. California Air Resources Board Resolution 71-29/A/B, Acceptance of Device 466 Carburetor Model PCAMX500A for 300-CID and Over Engines of Light-Duty Vehicles, 21 July 1971.

Device No. 467 - Fuel Evaporation Control System

- *1. Deeter, W. F., H. D. Daigh, and O. W. Wallin, Jr., "An Approach for Controlling Vehicle Emissions," Society of Automotive Engineers (SAE) Report No. 680400, Two Pennsylvania Plaza, New York, N.Y. 10001, Mid-Year Meeting, 20 24 May 1968.
- *2. Telecon between Parts Manager, McCoy-Mills, Ford Dealer, Fullerton, California, and Charles Mertz, Northrop Systems Engineer on 10 January 1971, subject: To obtain parts breakdown and costs for installation of evaporative system.

Device No. 468 - Lean Thermal Reactor with Exhaust Gas Recirculation

*1. The Aerospace Corporation, "An Assessment of the Effects of Lead Additives in Gasoline on Emissions Control Systems Which Might be Used to Meet the 1975-1976 Motor Vehicle Emission Standards," Aerospace Report No. TOR-0172 (2787)-2, 15 November 1971."

<u>Device No. 469 - Rich Thermal Reactor with Exhaust Gas Recirculation and Particulate Control</u>

- 1. Cantwell, E. N., "A Total Exhaust Emission System," Document A-72692, Petroleum Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.
- *2. Thomson, John C., "Exhaust Emissions from a Passenger Car Equipped with a DuPont Exhaust Emission Control System, HEW/NAPCA Division of Motor Vehicle Pollution Control, May 1970, (Unnumbered Report).
- *3. Thomson, John C., "Exhaust Emissions from a Passenger Car Equipped with a DuPont Exhaust Emission Control System Using 1975 Test Procedure," Report 71-3, HEW/NAPCA Division of Motor Vehicle Research and Development, August 1970.

TEST REPORTS PROVIDED BY ENVIRONMENTAL PROTECTION AGENCY (EPA)

		Author/Title/Date	Device No.	Volume II <u>Reference</u>
1.	Ash	aby, Anthony H.,		
	a.	"Exhaust Emissions from Seven LP Gas Powered Vehicles," HEW/NAPCA Report 71-1, July 1970.	466	57
	b.	"Emissions from the Methanol Fueled Stanford Uni- versity Gremlin," EPA Report 72-4, August 1971.	464	62
2.	Cag	giano, Michael A.,		
	a.	"Emissions from Two LPG Powered Vehicles," HEW/NAPCA Unnumbered Report, February 1970.	52, 466	38
	b •	"The Effect on Exhaust Emissions of the CETEC Atom-X Device," HEW/NAPCA Unnumbered Report, June 1970.	36	107
3.	Gom	npf, Henry L.,		
	а.	"Retrofit Emission Control Devices for Pre-1968 Vehicles," HEW/NAPCA Report 71-2, July 1970.	(1)	
	b.	"Exhaust Emissions from a Passenger Car Powered by Marvel-Schebler LPG Conversion," HEW/NAPCA Report 71-8, September 1970.	459	60
	c.	"Exhaust Emissions from a Passenger Car Equipped with Biap Electronic Ignition Unit'," HEW/NAPCA Report 71-7, September 1970.	23	81
	d.	"Exhaust Emissions from 10 GSA Rebels and 10 GSA Falcons Equipped with LPG Conversion Kits," HEW/NAPCA Report 71-10, October 1970.	52	39
	e.	"Exhaust Emissions from a Passenger Car Equipped with Brisko's Heavy Duty PCV Valve'," EPA Report 71-20, February 1971.	24	95
	f.	"Exhaust Emissions from Two Passenger Vehicles Equipped with the ADAKS Device," EPA Report 72-6, September 1971.	1	76
	g.	"Evaluation of the Emission Reductions with the Perfect Circle Retronox Speed Controlled EGR System," EPA Report 72-8, October 1971.	246	94

⁽¹⁾ The General Motors, Ford, and Chrysler retrofit devices covered by this report were excluded from study under EPA Contract 68-04-0038 (refer to Contract Exhibit A-III-B)

TEST REPORTS PROVIDED BY ENVIRONMENTAL PROTECTION AGENCY (EPA) (Continued)

٠		Author/Title/Date	Device No.	Volume II <u>Reference</u>
	h.	Draft of "Exhaust Emissions from Two Passenger Vehicles Equipped with Fumcell," EPA Report 71-25, 26 November 1971.	418	88
4.	Nit	lobaugh, S. M., "The Effects of Water Injection on rogen Oxides in Automotive Exhaust Gas," 1966, A Project B-1-7-2.	457	106
5.	for	kins, Howe H., "Feasibility of Utilizing Gaseous Fuels Reducing Emissions from Motor Vehicles," Unpublished Report, 24 November 1971.	Various	47
6.	No.	titute of Gas Technology, Final Report on EPA Contract 70-69, "Emission Reduction Using Gaseous Fuels for icular Propulsion," June 1971.	Various	30
7.	Tho	mson, John C.,		
	a.	"Exhaust Emissions from a Passenger Car Equipped with a DuPont Exhaust Emission Control System," HEW/NAPCA Unnumbered Report, May 1970.	244, 469	. 74
	b.	"Exhaust Emissions from a Passenger Car Equipped with a DuPont Exhaust Emission Control System Using 1975 Test Procedure," HEW/NAPCA Report 71-3, August 1970.	244, 469	75
	c.	"Exhaust Emissions on an Uncontrolled Passenger Car Using Variable Cam Timing," HEW/NAPCA Report 71-4, August 1970.	245	91
. •	d.	"Exhaust Emissions from a Passenger Car Equipped with the 'Paser Magnum Electronic Anti-Pollution Engine Economizer'," Unnumbered HEW/NAPC Report, September 1970.	95	. 82
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	f.	"An Evaluation of a Variable Cam Timing Technique as a Control Method for Oxides of Nitrogen," HEW/NAPCA Report 71-11, October 1970.	245	92
	g.	"Exhaust Emissions from a Vehicle Equipped with the Roberts Induction Modification Supplied Under Contract CPA 70-51," EPA Report 71-14, December 1970.	77, 172	97

TEST REPORTS PROVIDED BY ENVIRONMENTAL PROTECTION AGENCY (EPA) (Continued)

	Author/Title/Date	Device No.	Volume II <u>Reference</u>
h.	"Exhaust Emissions from a Passenger Automobile Equipped with Electronic Fuel Injection," EPA Report 71-12, December 1970.	22	100
i,	"Exhaust Emission from Passenger Automobiles Equipped with Doughboy Carburetors," EPA Report 71-15, December 1970.	294	96
j.	"A Report on the Exhaust Emissions of an Army M-151 1/4-Ton Truck Using an Exhaust Catalyst," EPA Report 71-13, December 1970.	292	10
k.	"Exhaust Emissions from a Passenger Car Equipped with a Universal Oil Products Catalytic Converter, EPA Report 71-16, December 1970.	96	. 5
1.	"An Evaluation of the Exhaust Emissions from Two Vehicles Equipped with Compressed Natural Gas Conversion Kits," EPA Report 71-17, December 1970.	460	67
m.	"Exhaust Emissions from a Reactor Equipped, Full-Size Automobile Using LPG Fuel, EPA Report 71-21, March 1971	461	61
n.	"Exhaust Emissions from an Army M-151 Equipped with a Mitsui Catalyst," EPA Report 71-22, March 1971.	62	8
0.	"Emission Results from a Texaco Catalyst Concept Applied to a Previously Uncontrolled Engine," EPA Report 71-26, April 1971.	. 93	9
p.	"A Report on the Exhaust Emissions from a Turbocharged Volkswagen," EPA Unnumbered Report, May 1971.	100	99
q.	"Exhaust Emissions from Controlled and Uncontrolled Vehicles Using the 'Pollution Master' Emission Con- trol Device," EPA Report 72-1, August 1971.	462	90
r.	"An Evaluation of the Emission Characteristics of the Esso Well Mixed Thermal Reactor," EPA Report 72-3, August 1971.	463	102
s.	"Emissions Results from an Automobile Using the Frantz Vapor Injector," EPA Report 72-5, September 1971.	458	89

TEST REPORTS PROVIDED BY ENVIRONMENTAL PROTECTION AGENCY (EPA) (Continued)

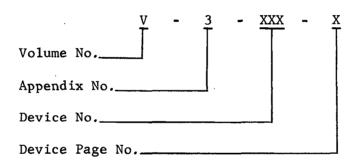
	Author/Title/Date	Device No.	Volume II <u>Reference</u>
8.	Verrelli, Leonard,		
	a. "Exhaust Emissions from a Passenger Car Equipped with the 'Wilford Smog Suppressor'," HEW/NAPCA Report 71-9, October 1970.	322	22
	b. "Exhaust Emissions from a Passenger Car with Gasoline Treated with Bycosin Fuel Additive," EPA Report 71-24, April 1971.	465	105

APPENDIX V-3 QUESTIONNAIRE RESPONSES

APPENDIX V-3

DATA SURVEY: QUESTIONNAIRE RESPONSES

This appendix contains the questionnaire responses received from retrofit device development and production sources. The pages of this appendix are numbered as follows:



Questionnaire responses were received for the following devices:

Device			
1	160	279	384
33	164	282	408
42	165	2 88	425
56	170	295	427
57	175	296	430
59	245	308	440
69	246	315	
75 (1)	259	317	
96	268	325	

⁽¹⁾ Evaluation of this device for vehicle emission effectiveness was not possible from the data supplied by the developer.

RETROFIT INFORMATION OUTLINE

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog)

. Principles of Operation See attached sales brochure

. Installation Reqm'ts

None special -- See attached Installation_Procedure

. Adjustments

See attached Installation Procedure

. MFG Techniques

Die casting, stamping, molding, turning. Also see hardware of which two units have been delivered to Olson Laboratories in Anaheim, California.

1.2 Development Status

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Number to Date

Not known-extended over 8 to 12 years.

Don't know

8000 Total -- - 500 U.S.A.

Adaks has not used dealers up to this time.

3000 Total---150 in U.S.A.

10,000,000 estimated

1.3 Emission Control Category (check applicable box)

Mec	Mechanical Modification										
	Exhaust C	Control		Crank-	Fuel		Crank-				
Induction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case				
(x)											
\mathcal{X}											
·- Х											

Hydrocarbon

Carbon Monoxide

Oxides of Nitrogen

Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles, Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range) up to
Number of Retrofit

AMC	Chrysler	Chrysler CM Ford		Foreign (Specify)
Yes	Yes	Yes	Yes	Yes
800 cu.in.	800 cu.in.	800 cu.in.	800 cu.in.	800 cu.in.
Not known	Not known	Not known	Not known	over 2000

Model Types to Satisfy

Application

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaust Emission Measurements, Fill In Applicable Blanks										
Please attach additional test data if		Hot-Start Cold-Star		Fe 1970	deral Tes 1972	ts X	Other Te	Particu- lates				
available	нс, РРМ	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	НС,	co,	NO _x ,			
Baseline, as received				2.8	48	6.3		-				
Baseline, after tune-up	224.4	1.738	1307.8	No tune	up performed.							
Retrofit device test	194.8	0.496	1144.6	1.73	11.1	6.4						
Number of cars	5	5	5	1	1	1	·					
Test source	Olson Laboratories Dearborn, Michigan			EPA Federal Government Willow Run, Michigan								
Additional test data		,	·									
Durability Fleet				•			· .	·				

Test Data (Attach Data If Available) Test data attached for Olson Laboratory tests. Test data given for EPA Federal tests at Willow Run are based on results obtained over the phone and only cover one vehicle, a Valient 1970. Other tests were run on a 1963 Chevrolet. All test data have been relayed to Mr. Jose 2.2 Special Regm'ts., if any (Fuel, Safety) Bascumana.

NONE For Items 2.3 and 2.4 no formal tests have been run, but no failures of the AVB have Miles Confidence Test Source MMBF ever been reported over the 4 years of sales by Mr. Lökka, Norway. 2.3 Reliability (mean mileage Excess of 100,000 miles estimated. between failure, MMBF) MTTR, Hours Parts Required for Repair 2.4 Maintainability (mean time to repair, MTTR)

2.5 Periodic Maintenance/ Inspection Requirements Inspect air filter and replace if necessary at the normal time of engine air filter inspection. The AVB filter will last as long as the normal engine air filter /2,000 www.

MITM PARTY = 05 LM

Make Chrysler Year 1969 Engine CID 383 Transmission X Ambient Temperature 60 C 10:30 a.m. M A Car Preparation Data Overnight low Ly or Sasic Ignition Timing 1/2 Degrees Proint Dwell 26 Degrees BTDC Idle Mode Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 2.5 sec	2.5		Drivability Evaluatio Check Applicable Boxe	n-Retrofi s. See E	t Devi	ce	Install 2 For D	led Ori	l: P vab	lease ility	Con	duct l cedure	Eva e,	luatio Page	on and	ď	
Ambient Temperature 60 ° 10:30 a.m. Car Preparation Data Overnight low h5°F Basic Ignition Timing 72 Degrees BTDC Idle Mode Other Special Adjustments: Attach Data Sheet Data Sheet Soak 12 hours minimum Start to run time 2.5 sec 2 150 0 X 1500			Make Chrysler Year	1969 E	ngine	CID	383	7	ran	smissi	on		Х				
Car Preparation Data Overnight low 45°F Basic Ignition Timing 72 Degrees PIDC Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 2.5 sec No. of attempts 1 Choke Hi-cam (N) 20 sec 1600 X Maccel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 50-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 0-30 (1/2 Throttle) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 30-55 (MOT at Detent) Decel 55-15 (Mod Brake) Stop Engine, Soak 15 Min, Restart: Start Time 1.5 Sec, Attempts Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 30-55 (MOT at Detent) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Accel 15-5			•			- 1						м					
Basic Ignition Timing Ps Degrees Point Dwell 26 Degrees BTDC Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 2.5 sec Wickdown (N) 20 sec In drive, 10 sec In drive, 10 sec In drive, 10 sec In drive, 10 sec Stop Engine, Soak 15 Min, Restart: Start Time 1.5 sec, Attempts Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Idle, 15 Seconds Stop Engine, Soak 15 Min, Restart: Start Time 1.5 sec, Attempts Idle, 15 Seconds Cruise 15 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Decel 55-15 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 15 (0.1 Mile) Accel 30-55 (WoT at Detent) Decel 55-15 (Mod Brake) Idle, 15 Seconds Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Idle, 15 Seconds Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Idle, 15 Seconds Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Idle, 15 Seconds Accel 15-50 (Mod Brake) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Acce			•				ŗ										
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27 7 24 2		Pe		Trial 1	Tria	1 2	Trial	3	1				<u>. </u>				
Decel 60-30, Sec 37.5 36.1 32.9 to low ambient and dampness		W	OT Accel 0-60, Sec	12.2	12.	7	11.8			** Po	or c	hoke	kic	kdown	prob	abl;	y due
	٠		Decel 60-30. Sec	37.5	36.	1	32.9] _	to	low	ambi	ent	and	dampn	ess	

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

3.2	Profit	Margins
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- . Manufacturer
- · Distributor
- . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs
 - . Fuel Economy . miles/gallon

City

Highway

Composite

. Parts Replacement Cost

Cost	Quantity	
\$40.00	10,000 excl	uding tooling
Purchased from	Inventor N/A	
\$8.00	100,000	
\$5.00	100,000	
750	7.00,000	

·	15%	100,000	
.5	(33%)?	Independent	makeup
	(40%) ?	Independent	makeup
	11035 5	Independent	makeup

Baseline	Retrofit
Higher than	composit.
Lower than	composit.
14.75	15.75

\$48*

*Most cars require kits and parts which cost \$40 but special adaptor plates are needed on som cars and prices may be a high as \$48 for those kits which include adaptor plates for some

4. Marketing Information/Plan

In the past we have sold the AVB to major fleet owners only.

A trainer/installer goes with the first 3-4 units and teaches the fleetowner's mechanics in the installation of the AVB.

We are now setting up a nationwide sales organization including manufacturers reps., warehouse distributors, jobbers, and dealer/installers. Each dealer/installe will be trained in the installation of the AVB. This is part of our sales program. We can not sell the AVB in Californis, but we are presently attempting to obtain permission to do so.

RETROFIT INFORMATION OUTLINE

1.	System	Information	١
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1.1 Retrofit System Description (use extra pages or attach catalog)
. Principles of Operation See Enclosure 1 - Memorandum dated June 15, 1971

. Installation Reqm'ts

See Note 1. Enclosure 2

Adjustments

See Note 2, Enclosure 2

. MFG Techniques

No special required uses - Off-the-shelf parts.

1.2 Development Status

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Nu	mber	to	Date
		8	
		3	
	No	ne	
	No	ne	

11 90.000

1.3 Emission Control Category (check applicable box)

Mec	hanical Mo	ndificatio	n			Fuel Modi	fication
	Exhaust (Crank-	Euo1		Crank-
Induction	Ignition	Combus- tion	Exhaust		Fuel Evap. Control	Exhaust	case
X	·						
X							
X					,		

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

0ther

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

	AMC	Chrysler	СМ	Ford	Foreign (Specify)
Year (Range)	SEE NOTE	3			
Engine CID (Range)					
Number of Retrofit					

Model Types to Satisfy

Application

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

	Exhaust Emission Measurements, Fill In Applicable Blanks									
		Hot-Start Cold-Star		Fe 1970	deral Tes <u>X</u> 1972		Other Te and te	ify units	Particu lates	
available	нс, РРМ	CO, %	NO _X , PPM	нс, дрм	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received					,,,,,,					
Baseline, after tune-up	1154	3.203	1157.	12.01	62.54	3.85				·
Retrofit device test	729	1.529	823.95	7.59	29.85	275%				
Number of cars	Test Dat	a is for	1965 Ran	bler test	car, and	d is typic	al. Auto	mation T	esting La	abs.,
Test source	Aurora	Colo.; Ma	anul Sche	bler Div	, Berg-	Warner,	Deactor,	Ill Se	e Enclosu	re 3
Additional test data		·				<u> </u>				
Durability Fleet	None =	No spec	fic dura	ility flee	t testing	done to d	ate.			
Test Data (Attach Data)	[f Availab	le) See	Encles	ıre 3						
2.2 Special Reqm'ts., i	f any (Fue	el,Safety)	No sp	ecial req	uirement	s except	initial se	t up - Se	e Note 2.	
	.	MMBF M	liles	Confidence	e Test	t Source	1			
2 3 Reliability (mean m	ni leage	See N		0011110011	7,55					
between failure, M		<u> </u>								
		MTTR, H	lours				Parts	Required	for Repa	ir
2.4 Maintainability (me	ean time	See Not	te 4		<u>. l</u>					
to repair, MTTR) 2.5 Periodic Maintenand Inspection Requirem		See No	te 4							

2.6)	Check Applicable Boxe																
		Make Rambler Year	- 65	Engine	CI	D 2	32	Tran	smi	ssi	on	[]	x	7				
		Ambient Temperature	48 °F					_				_	M	— A				
		Car Preparation Data																
_	_		_				1						\neg			_	<u> </u>	٦
		ic Ignition Timing 8	vegrees	Idle	e M	ode		A	cce	1. 1	Mode	е		Cr	uise		Dece	1
		nt Dwell <u>36 Degrees</u>						\vdash	Τ	Т	_		\dashv	-	П	\dashv		\exists
(er Special Adjustments -a Sheet None	: Attach	RPM	orv		1		٩	ess		4	1	orv				
		ca Sheet None Soak 12 hours minimum	n		Satisfactory			Satisfactory	Detonation	Stretchiness	a)	Hesitation		Satisfactory		Detonation		밁
	dle	Start to run time 3		Engine	isf	뒴	=	isf	ong	걸	Stumble	įţa		isf	Surging	ona		五
	Start/Idl	No. of attempts 1		Ę	Sat	Rough	Stall	Sat	Bet	Str	Stu	Hes	Sag	Sat	Sur	Det	Stall	Backfire
	tar	Choke Hi-cam (N) 20 s	— sec	200		x		لــــا						L				ل
		Kickdown (N) 10 sec		350	x													
	Cold	In drive, 10 sec			X													
,						4												
		Accel 0-30 (1/2 throt	tle)					\mathbf{x}										
	`	Cruise 30 (0.1 Mile)												X				
	Orive-Away	Accel 30-55 (WOT at [Detent)					x									None	<u>.</u>
	Ve-	Decel 55-15 (Mod Brak	(e)													 1		
		Cruise 15 (0.1 Mile)											_	X				
	Start	Accel 15-50 (1/2 Thro	ttle)							x		丄		<u></u>				
	Sta	Cruise 50 (0.1 Mile)												Lx			None	, —
	Cold	Decel 50-0 (Mod Brake	·)			· · · ·	_											لـ
	ర	Idle, 15 Seconds		400	X													
ſ	Sto	p Engine, Soak 15 Min	, Restar	t: Star	·t ·	Time		_Sec	, A	tte	mpt:	s _		·				
		Idle, 15 Seconds		400	X					-	_	_	7					
	_	Accel 0-30 (1/2 Thro						X							_	_		
	Evaluation	Cruise 30 (0.1 Mile)						\mathbf{x}	\neg		Т		\neg	X			D. T.	
	luat	Accel 30-55 (WOT at	- 1														None	٦
	Eva	Decel 55-15 (Mod Bra	,												Т	\neg		لـ
-		Cruise 15 (0.1 Mile)						ГТ	T	13	<u>ς</u> [7	X				
ļ	Start	Accel 15-50 (1/2 Thr Cruise 50 (0.1 Mile)	-					ш			<u>, </u>		_1	x	$\neg \tau$	\neg	Non	_
	Hot	Decel 50-0 (Mod Brak																٦
	≖∣	Idle, 15 Seconds	e,	400	x			r	omme	on+e			Sli	ght h	esit	atio	n off	١
ł	اـــــ 20	rformance	Trial 1	Trial		Tri	al 3	7				- mb						-
t		T Accel 0-60, Sec	30	28			27	1 -										_
		ecel 60-30. Sec	20	25			24] ~										_

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

3.	2	P۲	of	fί	t	Ma	ra	ins

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs

. Fuel Economy , miles/gallon

City

Highway

Composite

. Parts Replacement Cost

LOST	Quantity
\$12,000	Experimental Units
8,000	4 Prototypes & Testing & Evaluation

	E 4 M	30 000 40 000
	56%	20,000 - 40,000
ı	30%	20,000 - 40,000
	30%	20,000 - 40,000

None

None

\$8.65	20,000 - 40,000
1.0	

Periodic adjustment check (6 Mo.)

Baseline	Retrofit	
See Enclos	ure l Memo.	1965 Rambler 1964 Valiant
		1968 Checker
None		

4. Marketing Information/Plan

with large organization with existing distribution, sales, and field service organization. Under such arrangement would build all or part of the product which would be distribution and serviced by partner organization. Such conversations were held with and resulted in an informal joint venture wherein provides prototype retrofit devices and makes available

laboratory test facilities and consulting services, such as those at

No final business arrangements have been made
or discussed in detail. Part of test data (Enclosure 3) was done at the

ENCLOSURE 2

RETROFIT INFORMATION OUTLINE

- NOTE 1 Installation is accomplished by drilling and tapping two holes: one in the top of the carburetor fuel bowl; the second in the intake manifold. In some models of carburetors already present holes can be used.
- NOTE 2 Once the system is installed on the carburetor of an automobile an initial adjustment is required to set the system operating at the desired fuel/air ratio. The system is best adjusted initially on a chassis dynammeter. Adjustment is made by opening value until operation at the desired fuel/air ratio is achieved. In the absence of a chassis dynammeter the system may be adjusted by a single road test wherein, at a steady state cruise condition value is opened until a slight drop is noted in RPM on mechanics tachometer. From this point value is slightly closed and locked in position. Specific procedures vary with carburetor model and automobile make and year.
- NOTE 3 As far as we can determine the system is applicable to all automobiles or other vehicles utilizing internal combustion gasoline engines having a float/bowl type carburetor. Installations have been made on AMC, Chrysler, GM. Ford, and foreign cars with SU carburetors (TR, MG, Jaguar) and, in one instance a Toyota Land Couiser (jeep type). The system functioned well in all instances. Effect varies with carburetor make and model, and with automobile make and model. Best effects have been noted on older automobiles, pre-1967.
- NOTE 4 No durability/reliability testing has been done. Over 90,000 miles of driving has been accumulated on experimental test cars in a fifteen (15) month period. No system failures have occurred. During this period minor maintenance was done on each system primarily changes is setting to gather data in different full/air ratios. Accordingly it is not practical to sort out that fraction applicable to straight maintenance of the system. Opinion is that negligable maintenance is required.

RETROFIT INFORMATION OUTLINE

1. System Information

1.1	Retrofit	System	Description	(use	extra	pages	or	attach	catalog
-----	----------	--------	-------------	------	-------	-------	----	--------	---------

Principles of OperationInstallation Reqm'ts

Drilling of air intake manifold

. Adjustments

Idle screw for R.P.M.

. MFG Techniques

1.2 Development Status

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Nu	mber	to	Date
	Х		
	Y	00	
		27	
	550	nα	10

1.3 Emission Control Category (check applicable box)

	Mecl	nanical Mo	Fuel Modification					
		Exhaust (Control		Crank-	Fuel		Crank-
1	nduction	Ignition	Combus- tion	Exhaust	case Control	Evap. Control	Exhaust	case
	(\mathbf{x})							
	(6)							
,								
1								

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

E	TT.	<u> </u>	ع)ر	9 j	Pop
-			w ~		
Year	(R	ange)		

Engine CID (Range)

Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)	
1964	1968	1965 & 1967	7 1965 & 1	967 See b	elow
1956	383	230 389	200 35	2	
1 only	1 only	1 only	4 only		

Model Types to Satisfy

Application

4 only - Foreign - Renault 12
1 only - " - Renault 16
1 only - " - Renault 8
1 only - " - Peugot 304
1 only - " - Volkswagon
4 only - " - Fiat 600

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

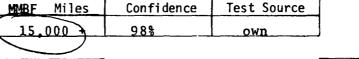
Exhaust Emission Measurements, Fill In Applicable Blanks Please attach 7-Mode Hot-Start x Federal Tests Other Tests (specify units Particuadditional test 1970 and test conditions) 1972 lates 7-Mode Cold-Start data if available NOx, PPM HC, GPM CO, GPM NOx, GPM HC, CO, NOx, HC, PPM CO, % 738 9.42 1,100 6.27 Baseline, as received No tune up No tune up Baseline, after tune-up Retrofit device test 454 402 2.68 1.50 1 only 1 only Number of cars Test source Olson Lab. #1-1166,3 Ethyl Corp. Pontiac 1967/389 with Additional test data Tune up. (Olson Lab.) 174 1.00 PED 226 2.29 Durability Fleet None Baseline

Test Data (Attach Data If Available)

2.2 Special	Reqm'ts.,	if	any	(Fuel	,Safety	1	 	 	 	 	 	

2.3 Reliability (mean mileage between failure, MMBF) Note: Failure of plugs or points not PED Device.

- 2.4 Maintainability (mean time to repair, MTTR)
- 2.5 Periodic Maintenance/ Inspection Requirements



MIAR, Hours	Parts Required for Repair
(0,5 HR MW.)	

Check every tune up for CO & HC emissions. Check to see that unit is secure and that there is a vacuum draw from inside air filter.

12000 MI

		Check Applicable Boxe	:S. JCC	Enclosu	re	١ ــــ	UI .	יוט	· Vub	111	Ly	Fru	cec	iure	٠, ٢	age	4.			
		Make <u>Chrysler</u> Year	1968	Engine	CID	3	83	_]	Γran	smi	ssi	on	[x					
		Ambient Temperature	68 ⁰ F										_	M	A					
		Car Preparation Data																		
	Dac:		Dograce				\neg	1						\neg	Γ			٦	Γ	
		ic Ignition Timing <u>50</u> nt Dwell 28 Degrees	pegrees	Idle	Мо	de			A	ссе	1.	Mod	e	Ė		Cru	ise		De	cel
		er Special Adjustments	· Attach		7		\dashv		J	Т	,			7		J	Τ	7		
•		ta Sheet	. Accuen	RPM	tor				tor	Я	Jess		Я			g		Я		
	l a	Soak 12 hours minimum	n		Satisfactory				Satisfactory	Detonation	Stretchiness	a	Hesitation			Satisfactory	뮭	Detonation		빌
		Start to run time 3		Engine	tis	Rough	Stall		tis	ton	ret	Stumple	Sit			Li S	Surging	Ę	(16+2	Backfire
	Start/Idl	No. of attempts 1		ш	Sa	8	St		Sa	De	St	3	He	Sag		Sa	3	a	Ĵ	
	Sta	Choke Hi-cam (N) 20 s	ec		χ										_					
	Cold	Kickdown (N) 10 sec			x		_													
	පි	In drive, 10 sec			\perp	х														
		year		1				1						_						
		Accel 0-30 (1/2 throt	ttle)					ı	<u>x </u>						г			_		
	a a	Cruise 30 (0.1 Mile)					1			-		- 1	\neg	Ĺ	X					
	ve-Away	Accel 30-55 (WOT at D	=					1	X [$\overline{}$
	ive	Decel 55-15 (Mod Brak	(e)												Γ		- 1	٦		Ш
	: Dri	Cruise 15 (0.1 Mile)						1	-т	\neg			_	\neg	L	χ		J		
	Start	Accel 15-50 (1/2 Thro	ittle)					l	_X		1		1		Γ	V T		7		
	1	Cruise 50 (0.1 Mile)	. 1	!											L	<u>x </u>		لـ		\Box
	Cold	Decel 50-0 (Mod Brake Idle, 15 Seconds	:)	750	x	T	\neg												<u> </u>	
	Sto	op Engine, Soak 15 Min	Restar	<u> </u>		ime	一.	1	_Sec	Δ	† † <u>^</u>	mnt	c	2						
		Idle, 15 Seconds	is nestur	1	x	11110	\neg	<u> </u>	عاد د	, ^	CUE	mp c	-			-				
		Accel 0-30 (1/2 Thro	ttle)						x											
	u	Cruise 30 (0.1 Mile)						•								x				
	ati	Accel 30-55 (WOT at	Detent)	88 ⁰ F	,				х						_	~		_		
	Evaluation	Decel 55-15 (Mod Bra	ke)	Ambie	nt										_			_		
	Ē	Cruise 15 (0.1 Mile)		Temp.				r						_,		\mathbf{x}				
	Start	Accel 15-50 (1/2 Thr	ottle)					Į	х		\perp				Г			_		
ļ		Cruise 50 (0.1 Mile)													Ĺ	<u>x </u>		╛		
	Hot	Decel 50-0 (Mod Brak	e)														•			
		Idle, 15 Seconds			X			7		ommo							one			
		rformance	Trial l	Trial	2			Ч	_1	mil	<u>es</u>	<u> 1</u> a	ıst	tı	<u>ine</u>	up	28	.00	10 п	niles
		OT Accel 0-60, Sec	11 5	10 5	+	9 5		\dashv	_							 -				

3. Estimated Cost Information, Dollars			
3.1 Retrofit System Cost	Cost	Quantity	
. Initial Cost	under \$10.00		
. Developmental/Prototype	Х		
. Manufacturing			
. Distribution			
3.2 Profit Margins			
. Manufacturer			
· Distributor			
. Dealer/Installer (Retail)			
3.3 Installation on Vehicle . Kit/Parts			
. Labor, Hours	1/2 hour	·	
3.4 Recurring Retrofit Costs			
. Fuel Economy , miles/gallon	Baseline	Retrofit	
City		Slight improvement	
Highway		5 - 7%	
Composite			
. Parts Replacement Cost			
	·		
	•		
4. Marketing Information/Plan			
	•		

RETROFIT INFORMATION OUTLINE

1.	System	Information	'n
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1.1 Retrofit System Description (use extra pages or attach catalog)

•	Principles of operation	See Abstract "A"
	Installation Reqm'ts	See Atachment "R"
•	Adjustments	See Atachment "C"
	MFG Techniques	Standard Materials and Techniques

1.2 Development Status

Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Number to Date

to	Date
200	
40	
12	
0.	
12	
120	м.
	200 40 12 0 12

1.3 Emission Control Category (check applicable box)

	Mecl	Mechanical Modification											
į		Exhaust 0	Control		Crank-	Fuel		Crank-					
1	nduction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case					
	x	· v											
	х	x											
ì	х	х											
•													

Hydrocarbon

Carbon Monoxide

Oxides of Nitrogen

Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)

Engine CID (Range)
Number of Retrofit

AMC	Chrysler	CM	Ford	Foreign (Specify)
A11	A11	A11	A11	
Any	Any	Any	Any	

Model Types to Satisfy

Application: One for each combination of Venturi size and idle mixture screw orifice size.

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

	Exhaust Emission Measurements, Fill In Applicable Blanks											
Please attach additional test data if		Hot-Star Cold-Sta	·t			ederal		ts	Other T		ecify units itions)	Particu lates
available	нс, РРМ	CO, %	NO _X ,	PPM HO	, GPM	co,	GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received												
Baseline, after tune-up					·	<u> </u>						
Retrofit device test		<u> </u>				<u> </u>			<u> </u>	<u> </u>		
Number of cars						<u> </u>						
Test source												
Additional test data												
Durability Fleet						<u> </u>						
Test Data (Attach Data If Available) See attachment "D" dated 9/22/71 - Ref. "ETHYL CORP."												
2.2 Special Reqm'ts., i	f any (Fu	el,Safet	y) <u>Non</u>	е								
				·								
		MIABE	Miles	Cor	fiden	ce	Test	t Source]		•	
2.3 Reliability (mean m		No fail		100			See 1.2 (12 vehicles - 420,000 miles					.es)
•		MTTR,	Hours						Part	s Requir	ed for Repa	ir
2.4 Maintainability (me to repair, MTTR)	ean time	None re	quired						None	required		
2.5 Periodic Maintenand Inspection Requirem		_										

Make FORD Year 1967 Engine CID 289 Transmission x Ambient Temperature 72.5 °F Dry bulb NOTE: See attachment MonA. Car Preparation Data Basic Ignition Timing Degrees Point Dwell Degrees Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time sec Choke Hi-cam (N) 20 sec Kickdown (N) 10 sec In drive, 10 sec Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (MOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 13-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Life Accel 15-50 (Mod Brake) Cruise 50 (Mod Brake) Cruise 50 (Mod Brake) Cruise 50 (Mod Brake) Cruise 50 (Mod Bra	2.6	Drivability Evaluation-Retrof Check Applicable Boxes. See I													and	
Ambient Temperature 72.5 OF Dry bulb NOTE: See attachment MonA. Car Preparation Data Basic Ignition Timing Degrees Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time sec Choke Hi-cam (N) 20 sec Choke Hi-cam (N) 20 sec Choke Hi-cam (N) 10 sec Consess 30 (0.1 Mile) Cruise 30 (0.1 Mile) Cruise 15 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Cruise 30 (0.1 Mile) Cruis		Make FORD Year 1967 (Engine	CII	D 28	39	1	rans	mis	sio	n		T _x	7		
Point Dwell Degrees Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time sec With the seconds accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Gruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Accel 0-30 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-5 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-6 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 55-7 (Mod Brake) Cruise 50 (0.1 Mile) Decel 55-8 (Mod Brake)		Ambient Temperature 72.5 OF					_					nt M		•		
Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time sec No. of attempts Choke Hi-cam (N) 20 sec Kickdown (N) 10 sec In drive, 10 sec Cruise 30 (0.1 Mile) Cruise 15 (0.1 Mile) Cruise 50 (0.1 Mile) Cruise			Idle	e Mo	ođe			Ac	ce1	. M	ode	:		Cruise		Dece1.
Choke Hi-cam (N) 20 sec Chickdown (N) 10 sec Color In drive, 10 sec Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 30 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 30 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake)	0th	er Special Adjustments: Attach	RPM	tory				tory	a	ssa		u a		tory	g g	
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Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Laccel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Comments See mass vehicle Performance Trial 1 Trial 2 Trial 3 emission data sheet - ATTACHMENT '	ය	In drive, 10 sec														
Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Comments See mass vehicle Performance Trial 1 Trial 2 Trial 3 emission data sheet - ATTACHMENT '	Start Drive-Away	Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)					[I					
Idle, 15 Seconds Comments See mass vehicle Performance Trial 1 Trial 2 Trial 3 emission data sheet - ATTACHMENT '	Start Evaluation	Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)	t: Star	rt]	Time]	Sec,	At	tem	pts]			
Decel 60-30. Sec	P	Idle, 15 Seconds erformance Trial 1 OT Accel 0-60, Sec	Irial	Ż	 Iri	al 3					n d					

2.	б	Check Applicable Boxes. See	it Dev Enclos	ice Insta ure 2 For	lle Dr	d: Please Conduct Evivability Procedure	waluation and , Page q	
		Make FORD Year 1967	Engine	CID 28	9	Transmission (A	
		Ambient Temperature 57°F		•		M	 А	
		Car Preparation Data		-				,
		ic Ignition Timing ODegrees it Dwell 017 Degrees	Idl	e Mode		Accel. Mode	Cruise	Cace 1
		er Special Adjustments: Attach	_	>		7 19		
	Dat	a Sheet	Engine RPM	Satisfactory Rough Stall		Satisfactory Detonation Stretchiness Stunble	Satisfactory Surging	
	Je	Soak 12 hours minimum	ine	sfa 1		Satisfacto Detonation Stretchine Stumble	Satisfacto Surging Detenation	
	rt/1d1	Start to run time 4 sec	Eng	Satis Rough Stall		Satisfa Detonat Stretch Stunble Hesitat	ati urg cio	Stall
	art	No. of attempts / Choke Hi-cam (N) 20 sec	0.1	┡╼┋═┼═┤		0, 0, 0, 0	. N . O	تيت
			1475					
	Cold	Kickdown (N) 10 sec In drive, 10 sec	715	2				
	L	111 61146, 10 366	//2			. ,		
		Accel 0-30 (1/2 throttle)				WIIII		
	>	Cruise 30 (0.1 Mile)					X	
	-Aviay	Accel 30-55 (WOT at Detent)				X	— 	
	18	Decel 55-15 (Mod Brake)	·				 	
	Dri	Cruise 15 (0.1 Mile)					X	,
	art	Accel 15-50 (1/2 Throttle)		.* •				
	Sta	Cruise 50 (0.1 Nile)					KIL	
	Cold	Decal 50-0 (Mod Brake) Idle, 15 Seconds	580	W T			•	نــــــن
	Sto	op Engine, Soak 15 Min, Restar		rt Time ~	3	Sec Attemnts /		
		Idle, 15 Seconds	580	1 1.11			,	
•		Accel 0-30 (1/2 Throttle)				X		,
	no	Cruise 30 (0.1 Mile)						
	Evaluation	Accel 30-55 (WOT at Detent)						
	val	Dacel 55-15 (Mod Brake)						. لــــــا
		Cruise 15 (0.1 Mila)						•
	Start	Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)					M	
	Hot	Decel 50-0 (Mod Brake)					· المستناسات	
		Idle, 15 Seconds	580	L.		Comments		
	PE	rformance Trial 1		1 2 Trial	3			*
	3/10	T Accel 0-50, Sec 12.5	13.					
		ecel 60-30, Sec 34	35	34		J		

2.6	Orivability Evaluation-Retrof Check Applicable Boxes. See	it Device Instal Enclosure 2 For	led: Please Conduct E Drivability Procedure	valuation and	4
	Make FORD Year 1967	Engine CID 280	Transmission	$\overline{\mathbf{X}}$	
	Ambient Temperature 56 °F		M.	Α	
	Car Preparation Data				
	ic Ignition Timing 6 Degrees	Idle Mode	Accel. Mode	Cruise	Cecel
Da	er Special Adjustments: Attach ta Sheet Soak 12 hours minimum Start to run time # sec	Engine RPM Satisfactory Rough Stall	Satisfactory Detonation Stretchiness Stumble	Salisfactory Surging Detenation	Stall.
Cold Start	Start to run time # sec No. of attempts / Choke Hi-cam (N) 20 sec Kickdown (N) 10 sec In drive, 10 sec	1500 V 1100 V 800 V		S 5 0	
Cold Start Drive-Away	Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)	560 V		XIII	
-, Hot Start Evaluation	Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds enformance Trial 1	560 V Trial 2 Irial	X Conments		
ļ	0T Accel 0-60, Sec /2.3 Decel 60-30, Sec 32	12.9 13 34 34			

	3.1 Retrofit System Cost	COST	quantity	<u>_1</u>
	. Initial Cost	\$50:000.00		
	. Developmental/Prototype			
	. Manufacturing	\$8.00 each	/ 50,000	1
	. Distribution	unknown		
	3.2 Profit Margins before taxes			ר
	. Manufacturer	20%	50,000	_
	· Distributor		 	variable based on
	. Dealer/Installer (Retail)	L	<u> </u>	retail price.
	3.3 Installation on Vehicle			٦
	. Kit/Parts	See 3.2	<u> </u>	
	. Labor, Hours	.7 hours	1	_ aproximate average
	3.4 Recurring Retrofit Costs			based of skill.
	 Fuel Economy , miles/gallon 	Baseline	Retrofit	1
	City	14.0	16.8	
	Highway	16.0	17.8	
	Composite	15.0	17.0	
	. Parts Replacement Cost		NONE	
4.	Marketing Information/Plan No	definite plans	at this time.	
			·	
				•
	·			

3. Estimated Cost Information, Dollars

RETROFIT INFORMATION OUTLINE

INCT	allation	-			i.			TACHED
		keqm'ts						
_	stments	_		<u> </u>	 	 	 	
. Mru	Technique	S			 			
1.2 Develo	pment Sta	tuc	Mumb o	er to Date				
	nceptual/l			r to Date				
	ototype	besign sta	.ge	3				
	nufacture	4						
	stributed							
	stalldd or			·				
	tal Accumu			,000				
(Estimated,	, Thousand	ls)					
			,					
1.3 Emissi	on Contro	Category	y (check a	арритсави	e DOX)		Γ	
	Mec	hanical M		on		·····	Fuel Modi	fication
		Exhaust (Crank-	Fuel		Crank- case
	Induction	Ignition	Combus- tion	Exhaust	case Control	Evap. Control	Exhaust	Case
ydrocarbon -	Х	Х						
rbon Monoxide	Х							
	Х	Х						
ides of Nitrogen	I .	1 1			i i			ļ .
kides of Nitrogen articulates								

Model Types to Satisfy

Application

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaust Emission Measurements, Fill In Applicable Blanks										
Please attach additional test data if	7-Mode 7-Mode			_	Fe 1970	deral Tes 1972		0		sts (spec st condit		Particu lates
available	HC, PPM	CO, %	NO _X ,	PPM	HC, GPM	CO, GPM	NO _X , GF	PM H	IC,	co,	NO _x ,	
Baseline, as received			<u> </u>									
Baseline, after tune-up							<u> </u>					<u> </u>
Retrofit device test					SEE A	TTACHED	DATA F	RON (OLSON LA	BORATORIE	S INC. A	d
Number of cars						PROCEDUR						
Test source												
Additional test data												
Durability Fleet												
Test Data (Attach Data	Tf Availah	101										
2.2 Special Reqm'ts., i	T any (Fue	91,5ate1	:y	one								
	1	MMBF_	Miles	С	Confidence	e Tes	t Source	e]				
2.3 Reliability (mean	mileage											
between failure, M	MBF)	Unknow	n					_				
		MTTR,	Hours]					Parts	Required	for Repa	ir
2.4 Maintainability (mo	ean time		SEE PAG	E #4	4 OF ATTA	ACHMENT						
to repair, MTTR)												
2.5 Periodic Maintenand Inspection Required suggested when												

.0		Check Applicable Boxe											a
		Make <u>Chev.</u> Year	r <u>1957</u>	Engine (CID_	283	_Tran	smiss	ion	Image: square in the last square in	хх		
		Ambient Temperature	54 ⁰ F							М	A		
		Car Preparation Data											
_										$\overline{}$			
		ic Ignition Timing 8	_Degrees	Idle	Mode		l A	ccel.	Mode		Cru	ise	Dece1
		nt Dwell <u>30 Degrees</u>			<u> </u>	T^{T}	\vdash			\top			
		er Special Adjustments	: Attach	RPM	ory		旨	n ess			l A		
Γ		<u>ca Sheet</u> Soak 12 hours minimur	<u> </u>	ē R	<u>Satisfactory</u> Rough		Satisfactory Detonation Stretchiness Stumble	Sag	Satisfactory	Surging Detonation	e		
	e G	Start to run time 6		Engine	isf		Satisfactory	<u>Detonation</u> Stretchine	Stumble		İŝf	Surging Detonat	Stall Backfire
	Start/Idl	No. of attempts 2		ᇤ	Satis	Sta	Sat	Det Str	Str		Sat	Sur	Stall Backf
	tar	Choke Hi-cam (N) 20 s	_	830	X	+-	٠				<u> </u>		
			SEC		$\hat{\mathbf{x}}$	\Box							
	3	Kickdown (N) 10 sec In drive, 10 sec		650	^ x	H							
_		111 01146, 10 366		0301	^	<u></u>							
		Accel 0-30 (1/2 thro	ttle)				x						
		Cruise 30 (0.1 Mile)					<u> </u>				X		
	Url ve-Away	Accel 30-55 (WOT at I	Detent)				X				<u> </u>		
	ve-/	Decel 55-15 (Mod Brak	-										No No
	2	Cruise 15 (0.1 Mile)									х		
-	נו	Accel 15-50 (1/2 Thro	ttle)					X			,		
1	Start	Cruise 50 (0.1 Mile)									X		
	_	Decel 50-0 (Mod Brake	e)										No No
Ġ	3	Idle, 15 Seconds		590 X							ě		
_5	to	p Engine, Soak 15 Mir	, Restar	t: Start	: Tim	e2	Sec	, Atte	empts	<u>'l</u>			
		Idle, 15 Seconds		600 X				- 1					
		Accel 0-30 (1/2 Thro	=				LX			Ш			
	5	Cruise 30 (0.1 Mile)					[]				X		
1	מפר	Accel 30-55 (WOT at	•				X			لــــــــــــــــــــــــــــــــــــــ	•		
	Evaluation	Decel 55-15 (Mod Bra											No No
		Cruise 15 (0.1 Mile)					Г ., Т					لــــــــــــــــــــــــــــــــــــــ	
642	נמו	Accel 15-50 (1/2 Thr					X				[V]	$\neg \neg$	
+65		Cruise 50 (0.1 Mile)		X						[^]	نــــــــــــــــــــــــــــــــــــــ	No. No.	
3	Ĕ	Decel 50-0 (Mod Brak	.e)	595 X									No No
+	 D-	Idle, 15 Seconds	Tuisl 1	Trial		<u> </u>	7	omment	S				
		rformance T Accel 0-60, Sec	Trial]	15	cur	1 <u>11 3</u> 17	┪ -						
\vdash		ecel 60-30. Sec	18	20	1	17	1 -						

3. Estimated Cost Information, Dolla	Estimated ars active ins	cost installed tallation and a	to be \$55.00 based on adjustment time of 1.8
3.1 Retrofit System Cost	Cost	Quantity	hours and normal industry parts and labor profit.
. Initial Cost			paras and taser profits.
. Developmental/Prototype			,
. Manufacturing			
. Distribution			
3.2 Profit Margins			7
. Manufacturer			_
. Distributor			<u>.</u>
. Dealer/Installer (Retail)			
3.3 Installation on Vehicle . Kit/Parts]
. Labor, Hours			
3.4 Recurring Retrofit Costs	Unknown		
. Fuel Economy , miles/gallo	n Baseline	Retrofit	
City		-	
Highway			
Composite			
. Parts Replacement Cost	-]

4. Marketing Information/Plan

Installation will have to be through controlled facilities where equipment

and personnel can be relied upon to properly adjust and service the unit.

This is not recommended for over the counter sales with no guarantee how

it will be installed or adjusted.

1. System Information

1.1 <u>Description</u> - System is composed of a one piece plate to be mounted between carburetor and intake maniford.

In addition to the plate, distributor advance vacuum is disconnected through a standard temperature sensative vacuum switch.

The plate contains:

A - Exhaust gas circuit

B - Filtered air circuit

Both circuits are controlled by identical valves having no moving parts.

The flow through both valves, is regulated by a single sensor having one moving part.

The sensor responds to <u>air flow</u> through the engine. (Not RPM, vacuum, road speed, etc.)

Attached externally to one side of the plate is a dash pot to dampen the "hunting" action of the sensor.

Principles of Operation

EGR Circuit:

Exhaust gases are recirculated into the intake manifold in varying amounts in proportion to the cubic feet of air being consumed by the engine.

The total volume of recirculation can be pre-set for a given engine model before installation.

Since the exhaust gases do not contact any of the metering mechanism, corrosion or scale buildup does not occur to alter metering action with mileage accumulation.

Filtered Air Circuit:

Identical in operation to the E.G.R. Circuit, but with the inclusion of an adjustable needle to regulate, or block, filtered air flow.

This circuit is used to lean out the carburetor above idle without having to make internal changes inside the carburetor.

Installation Requirements:

- 1 Remove carburetor and mounting studs.
- 2 Clean manifold surfaces and install longer studs.
- 3 Using new gaskets, slip device plate over studs and reinstall carburetor. (Large majority of engines have existing exhaust holes which will automatically feed exhaust gases into device plate. Those that do not, slip drill template over studs and drill with 3/8" electric drill.)
- 4 Inspect and readjust if needed, linkages, shift rods, kick down switches, etc.
- 5 If cross-over type choke is used, a choke rod extension is furnished to be snapped onto existing choke rod.
- 6 Install vacuum disconnect switch kit and route vacuum hoses to carburetor and distributor. (Note cooling system is not disturbed using this type switch.)

Adjustments:

Factory carburetor and ignition specifications apply with these exceptions:

Carburetor:

Idle speed, auto transmission - In drive factory specs + 50 RPM

Idle speed, standard & overdrive - factory specs + 75 RPM

Idle mixture, using infrared analyzer - .9 to 1.2% CO

Idle mixture, using combustion analyzer - 86%
Idle mixture, using no analyzer - best lean idle (emergency method only.)

Device Plate:

Air adjustment, using dynomometer and analyzer - Follow Clayton Key Mode procedure for "high cruise" while adjusting screw to read CO .8 to 1.0%.

Air adjustment, using only analyzer - 2200 RPM in neutral, adjust to 1.2% + .1% CO or 87% + 1% if using combustion analyzer.

Air adjustment, emergency method only - 2200 RPM in neutral, slowly turn air screw out from its seat until lean roughness is detected, turn screw in one full turn.

(Note: Device plate air screw does <u>not</u> operate at curb idle.)

Manufacturing Techniques:

No critical tolerances are necessary with the exception of the sensor which is adjusted to its plate during assembly.

Teflon type coating of exhaust passages and single moving part in sensor. Temperature sensitive vacuum switch designated to fit one of the open spaces between radiator tubes. It is secured by nylon "T" straps. This leaves the cooling system undisturbed.

1.4 Year range - 1955 - 1970 with engine sizes Classes B through F.14 basic device plates will cover these engine applications.Governing factor being the carburetor mounting base configuration.

2.4 Maintainability - One hour to R & R and service.

Parts required, minimum: 2 mounting gaskets

maximum: 2 mounting gaskets

1 dash pot

1 filter element

1 air adjusting needle

1 sensor shaft

	-	•						
	illation F	Reqm'ts		***				
•	tments							· · · · · · · · · · · · · · · · · · ·
. MFG T	[echniques	5		<u></u>	· <u>- : · · · · · · · · · · · · · · · · · · </u>		, , , , , , , , , , , , , , , , , , , 	
1.2 Develop	oment Stat	tus	Numi	ber to Date	e			
Con	ceptual/[Design Sta	ige []			
⊮ Pro	totype	٠.		one.	· .			
Man	ufactured	ı						
Dis	tributed	to Dealer						
Ins	talled on	Veh1cles		one	<u> </u>			
↓ Tot	al Accumu	lated Mil	es L					
(E	stimated,	Thousand	ls) ¹	.500 hours				
	•			• • • •				
1.3 Emissic	on Contro	Category	(check	applicabl	e box)			
	Mecl	nanical Mo		Fuel Mod	ficatio			
		Exhaust (Control		Crank-	Fue1		Crank-
1	nduction	Ignition	Combus tion	- Exhaust	case Control	Evap. Control	Exhaust	case
ydrocarbon				1%				
arbon Monoxide				x	ļ			
xides of Nitrogen		·		x				
articulates				х				
ther								
1.4 Automotiv Light Du		bility (A es Less T			ıvaflable)			
		A	мс	Chrysler	СМ	Fo		oreign pecify)
Year (Range)).		19	969 DOOGE				-
• 5-1	Engine CID (Range)							
•	(Range)	·	6	(sportsman	υ			

2.	Performance Data	Enclosure 1 cont

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhau	st Emissi	on Measur	ements, F	ill In App	licable	Blanks	<u> </u>	<u></u>
Please attach additional test data if		Hot-Star Cold-Star	t		ederal Te	sts		Particu lates		
available	HC, PPM	CO, %	NO _X , PP	M HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,	
Baseline, as received	400	6%								
Baseline, after tune-up										
Retrofit device test	0	0	73.46 1	ess						
Number of cars			-	<u> </u>	<u> </u>			<u> </u>		
Test source	One car	and one	test ema	ne						
Additional test data						<u> </u>				
Durability Fleet										
Test Data (Attach Data 1	f Availat	ole)								
2.2 Special Reqm'ts., in	f any (Fu	el,Safety	None							
		MMBF	Miles	Confiden	ce Tes	t Source	}			
2.3 Reliability (mean m	i leage	No figu		com ruen	103	C Jource				
between failure, MM	_	L NO LIQU	res		 _		J			
	,	MTTR,	Hours				Part	s Requir	ed for Repa	ir
2.4 Maintainability (me	an time	None								
to repair, MTTR)										
2.5 Periodic Maintenance Inspection Requirem		One yea	r - and c	_						

. 6	Drivability Evaluation Check Applicable Boxes	n-Retrof s. See	it Dev Enclos	i ce ure	Ins 2 F	tall For D	ed: riva	Plea bili	ty P	roc	uct edur	Evalu e, Pa	ation ge 4.	and	
	Make Dodge-SportsYear	1969	Engine	CII) s	ix	_Tra	nsmi	ssio	n		х			
	man Ambient Temperature	68 0 F	- Engi	ne '	Temr	perat	ure	1809	'ਜ'		M	A			
	Car Preparation Data	<u></u> ·		, -		,			••						
		.				\neg				-				7	
	sic Ignition Timing <u>o</u>	_vegrees	Idle	e Mo	ode		Accel. Mode Cr						ruise		Dece1
	int Dwell42to47Degrees					\dashv	-				Т		1 1	\dashv	
	ner Special Adjustments:	: Attach	RPM	מו			2	ا	255		ا		<u> </u>	_	
Di	ata Sheet			act			act	13	pin			'	ן לֱ	ij	ہو ا
٩	Soak 12 hours minimum		Engine	Satisfactory	동	뒴	Satisfactory	Detonation	Stretchiness	Stumble	Hesitation Saα		Satisfactory Surging	Detonation	Stall Backfire
Start/Idl	Start to run time 2	_	En	Sat	Rough	Stall	Sat	et	Ħ	Ħ.	Sag			Ħ H	Stall Backf
i i	No. of attempts 1			Н	-	\dashv	L.			<u> </u>	7	l L'	1 1		الم الم
		ec	900	Х				٠,							
Cold	Kickdown (N) 10 sec		900	×_	-	-									
	In drive, 10 sec	•	600 .												
	T		1					ГТ	- т-	$\overline{}$					
	Accel 0-30 (1/2 throti	tle)					X				<u> </u>	×	ТТ	_	
<u>}</u>	Cruise 30 (0.1 Mile)													ل	
ve-Away	Accel 30-55 (WOT at De						х								
, v	Decel 55-15 (Mod Brake	∍)										_	т т	7	لسلسا
Pri	I I						<u>k</u>								
Start	Accel 15-50 (1/2 Throt	ttle)					X				لــلـ			_	
	1											×.	1_1	٦	
P[O]	Decel 50-0 (Mod Brake)				<u> </u>										
_			600	Х											
St	op Engine, Soak 15 Min,	Restar	t: Star	rt 1	ime	-	Se	c, A	ttem	ıpts					
ļ	Idle, 15 Seconds		600					Т							
	Accel 0-30 (1/2 Throt	tle)					Х			Щ.	Ш	-	T T	_	
Evaluation	Cruise 30 (0.1 Mile)		1							_	 1	- Lx		ل	
uat	Accel 30-55 (WOT at D	-					Х	Ш			لبل				
Val	Decel 55-15 (Mod Brak	(e)										_		_	
												х			
Start	Accel 15-50 (1/2 Thro	ttle)					Х				L			_	
												х			
훈	ľ	:)		T	r										
-	Idle, 15 Seconds					Comments With the unit					ins	stalled.			
P	erformance	Trial l	Irial	_2	Iri	al 3	┨.								
N	OT Accel 0-60. Sec	27 .	23	_	2	0	┨ .	2	6	1	3	31	29)	
1	Dece 1 60-30 Sec	22	25		2	7	1	2	6	- 1	_	1	27	,	

3.1 Ref	trofit System Cost	Cost	Quantity		
•	Initial Cost	None Availa	ble		
	Developmental/Prototype	Not Known	One		
•	Manufacturing	Not Known	Not Known		
•	Distribution	None	None		
3.2 Pro	ofit Margins				
•	Manufacturer	None Availa	ble		
•	Distributor	None			
•	Dealer/Installer (Retail)	None			
3.3 Ins	tallation on Vehicle		·		
	Kit/Parts	Not Known	Not Known		
•	Labor, Hours	Not Known	Not Known		
3.4 Re	curring Retrofit Costs				
	Fuel Economy , miles/gallon	Baseline	Retrofit		
according to test conducted	City Without Unit	10.2 mpg 7 sto	os 17.8 mpg 8 sto	ops With	Unit
	Highway Without Unit	17.1 mpg	15.6 mpg	With	Unit
	Composite				
, •	Parts Replacement Cost		Not Known		
	me le				
4. Market	ing Information/Plan TO be	sold to new ca	ar manufacturers,	as well as	
_	used cars now on the road.		·		

2. Performance Data on 1964 Plymouth, 318 C.I.D., Auto. Trans., 3500 1b

Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

:		Exhaus	t Emissio	n Measure	ments, Fi	11 In App	licable	Blanks		
Please attach — additional test data if					old Start deral Tes TP 1972	ts	Other To	Particu- lates		
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	HC,	co,	NO _X ,	
Baseline, as received	323.2	0.85	1930	3.96	30.63	6.09				
Baseline, after tune-up	315.8	1.41	1305	3.90	40.54	4.51			<u> </u>	
Retrofit device test	95.1	.75	472	1.46	26.46	1.64		<u> </u>	<u> </u>	
Number of cars						<u> </u>	<u> </u>	<u> </u>		
Test source	Carter	Carburet	or Divisi	on, ACF I	ndustries	, Inc. Em	ission La	boratory		
Additional test data	`									
Durability Fleet			<u> </u>		l	<u> </u>	<u> </u>	<u> </u>	<u> </u>]

Test Data (Attach Data If Available)

2.2 Spec	ial	Reqm'ts.	, if	any	(Fuel,Sa	afety)_	None	<u> </u>		 	

2.3 Reliability (mean mileage between failure, MMBF)

MMBF	Miles .	Confidence	Test Source

2.4	Maintainability (mean	time
	to repair, MTTR)	

2.5	Periodic	Maintenance/
		n Requirement:

MTTR, Hours	 	Parts	Required	for	Repair

٠,

2.	6	Drivability Evaluation Check Applicable Boxe																nd	
		Make Plymouth Year	r <u>1964</u>	Engine	CII	D3	18	_Tı	ran	smi:	ssic	on	Γ	\prod	x]				
		Ambient Temperature	75 °F											M	A				
		Car Preparation Data																	
1	Bas ⁻	ic Ignition Timing 10	Degrees					Γ						7	Г				
		nt Dwell Degrees		Idle Mode				L	Accel. Mode Cruise							se		Decel	
(Othe	er Special Adjustments	: Attach	<u>-</u>	2				5		S ²					k			
	Dat	ta Sheet		RPM	Satisfactory			"	cto	ion	Stretchiness		ion		.	Satistactory	igi		
	e	Soak 12 hours minimum	n	Engine	sfa	도			sfa	nat	45	भी	Hesitation		1.	र्घ	Detonation		Stall Backfire
	Start/Idl	Start to run time 2	ati	Rough	Stall		Satisfactory Detonation		tre	Stumble	esi	ge		בו	Detonat		Stall Backf		
	art	No. of attempts 1		:				L			7	7	<u> </u>	2	Ľ	7 '	1 9		ا م ه
		Choke Hi-cam (N) 20		1100	X		_												
	Cold	Kickdown (N) 10 sec	,	-	X														
	0	In drive, 10 sec			Х														
		Accol 0 20 /1/2 thus	447a\					Γ	х	丁	Т	Т	Ţ	\neg					
		Accel 0-30 (1/2 thro Cruise 30 (0.1 Mile)	ttie)					L	<u>^ </u>						Гх	1			
	-Away	Accel 30-55 (WOT at I	Dotont \	,			•	Γ	х	Т	Т	Т	Т	\neg		<u> </u>	ئــــــــــــــــــــــــــــــــــــــ	ļ	
	e-A	Decel 55-15 (Mod Brai	-					L	<u></u> _										
	Orive	Cruise 15 (0.1 Mile)	KE)												x	П	Т		لـــــــا
		Accel 15-50 (1/2 Thre	1+101					·ſ	х]			,	
	Start	Cruise 50 (0.1 Mile)	Julie			-		L							X	T			
		Decel 50-0 (Mod Brake	<u>a</u>)	·											_			,	
	Cold	Idle, 15 Seconds		550	Х														اا
	Sto	op Engine, Soak 15 Mir	ı, Restar	t: Star	t 1	Time	2		Sec	, A1	tter	npt	s _	1		,			
		Idle, 15 Seconds		500	Х			_						_	•				
		Accel 0-30 (1/2 Thro	ottle)					L	Х		\perp		\perp		-			,	
	<u>e</u>	Cruise 30 (0.1 Mile))					_						_	Х				
	uat	Accel 30-55 (WOT at	Detent)					L	x										
	val	Decel 55-15 (Mod Bra)	
	t E	Cruise 15 (0.,1 Mile)						_	 .T		1	- 1		_	X	L			
	Start Evaluation	Accel 15-50 (1/2 Thr	·					L	X			<u> </u>			Γ.,			}	
	Hot S	Cruise 50 (0.1 Mile)													Х	1	1!		
	Ĭ	Decel 50-0 (Mod Brak	(e)	550	х		\neg		_										لسلسا
	<u> </u>	Idle, 15 Seconds	Trial	- 1	T			C	omme sie			_				ty w bv			
		OT Accel 0-60, Sec	لهلتنا		لتد	<u>ar .</u>	significantly affected by the emission control kit.												
		Decel 60-30. Sec	None None					7							0.T.				

1965 CHEVROLET 283 C.I.D. AUTO. TRANS. 4000 1b

2. Performance Data on 1965 Chevrolet, 283 C.I.D., Auto. Trans., 4000 1b Weight

Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

Please attach additional test data if available

Baseline, as received
Baseline, after tune-up
Retrofit device test
Number of cars
Test source
Additional test data

Durability Fleet

Exhaus	t Emissio				licable	Blanks		
		Fe	deral Tes	ts		Particu- lates		
CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
2.75	820			. •				
2.90	836	5.67	82.13	3.04				
1.18	800	2,58	39.40	2.98				
Carbureto	or Divisio	n, ACF In	dustries,	Inc.				<u> </u>
	Hot-Start Cold-Star CO, % 2.75 2.90 1.18	Hot-Start <u>X</u> Cold-Start CO, % NO _X , PPM 2.75 820 2.90 836 1.18 800	Hot-Start <u>X</u> Fe 1970 <u>F</u> CO, % NO _X , PPM HC, GPM 2.75 820 2.90 836 5.67 1.18 800 2.58	Cold Start X Federal Test Tes	Cold Start X Federal Tests 1970 FTP 1972	Cold Start	Hot-Start x	Cold Start X

Test Data (Attach Data If Available)

2.2 Special Reqm'ts., if any (Fuel, Safety)

2.3 Reliability (mean mileage between failure, MMBF)

2.4	Maintainability (mean	time
	to repair, MTTR)	

MMBF	Miles .	Confidence	Test Source

MTTR, Hours		Parts	Required	for	Repair	

1966 FORD 289 C.I.D. AUTO. TRANS. 3500 1b

2. Performance Data on 1966 Ford, 289 C.I.D., Auto. Trans., 3500 1b

Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaust Emission Measurements, Fill In Applicable Blanks													
Please attach additional test data if		Hot-Start Cold-Star		Fe	old Start deral Tes TP 1972	ts	Other Te and te	Particu- lates							
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,						
Baseline, as received	361.0	2.44	1430	4.64	51.91	4.83									
Baseline, after tune-up	294.7	2.12	1095	3.71	46.00	3.52									
Retrofit device test	163.1	1.15	538	2.13	27.18	1.81									
Number of cars															
Test source	Carter	Carbureto	r Divisio	n, ACF In	dustries,	Inc.									
Additional test data															
Durability Fleet							<u> </u>]	<u> </u>						

Test Data (Attach Data If Available)

2.2 Special	Reqm'ts.,	if any	(Fuel,Safety)	 - 	 			
				 	 			

2.3 Reliability (mean mileage between failure, MMBF)

MMBF	Miles .	Confidence	Test Source

2.4	Maintainability (mean time
•	to repair, MTTR)	

2.5	Periodic Maintenance/	
	Inspection Requirements	

MTTR, Hours	<u> </u>	Parts Required for Repair

2.	6	Drivability Evaluation Check Applicable Boxe														d ·					
		Make Chevrolet Year	1965	Engine	CI	D2	283	_1	[ransm	issi	on		Х								
		Ambient Temperature	75 ⁰ F									M	, A								
		Car Preparation Data					•														
1	0 2 5	ic Ignition Timing /	Dogracis					ſ		•											
	Basic Ignition Timing 4 Degrees Point Dwell Degrees Other Special Adjustments: Attach				Idle Mod				Accel. M					Cru	ise	De	cel				
												7			$\neg \neg$		T				
,		ta Sheet	. Actach	RPM	Satisfactory				Satisfactory Detonation	Stretchiness	İ	g		Satisfactory	اوا						
		Soak 12 hours minimum	n	l .	fact			Ì	Satisfacto Detonation	hic	اه	Hesitation Sao		act	Surging Detonation		밀				
	die	Start to run time 2		Engine	ist.	뒴	4		ist	etc.	Stumble			isf	Surging Detonat	=	Backfire				
	‡	No. of attempts 1		Ę	Sat	Rough	Stall		Sat Det	Str	Stu	Kes Sao		Sat	a a	1 5	Backf				
	Start/Idl	Choke Hi-cam (N) 20		1300	х			•						<u> </u>			ر				
		, .		-	х																
	PL03	In drive, 10 sec			х																
		1																			
	Γ	Accel 0-30 (1/2 thro	ttle)						х												
		Cruica 20 (0 1 Mila)	·											х							
	Away	Accel 30-55 (WOT at [Detent))					Х				Ì								
	Ye.	Decel 55-15 (Mod Brak	ce)									-									
	F	Cruise 15 (0.1 Mile)												X	x						
	7	Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)		Accel 15-50 (1/2 Throttle)								١,									
	Sta			Cruise 50 (0.1 Mile)				Cruise 50 (0.1 Mile)												X	
	p[03	Decel 50-0 (Mod Brake	e)													L					
	ပိ	Idle, 15 Seconds		600	Х		╝.									•					
	St	op Engine, Soak 15 Min	, Restar	t: Sta	rt '	Time	2	:	Sec,	Atte	mpts			_							
		Idle, 15 Seconds		550	X			1		-			ı								
		Accel 0-30 (1/2 Thro			•			l	Х			لــــــــــــــــــــــــــــــــــــــ	١,								
	io i	Cruise 30 (0.1 Mile)						ſ	- 			1 1	, 1	X							
	uat	Accel 30-55 (WOT at						Į	X							_					
	Evaluation	Decel 55-15 (Mod Bra											1	-	- -	L	Ш				
		Cruise 15 (0.1 Mile)						ſ	х			1		X							
	Start	Accel 15-50 (1/2 Thr						l	^					x							
	Hot S	Cruise 50 (0.1 Mile)							٠		•	l		للل	_						
	Ĭ	Decel 50-0 (Mod Brak	600 X					٠													
	<u>ا</u>	Idle, 15 Seconds	╶╶┦╶┈┈┸┈┞┈┞┈┈ ┪						nent:	-				ty was							
	Performance Trial WOT Accel 0-60, Sec None			ırla	- 4	uri	<u>aı 3</u>	Ч				ontro			by Er	.c					
		Decel 60-30. Sec	None		-		·	\dashv	*********			at W.									

0		Check Applicable Box															ana		
		Make Ford Year	r <u>1966</u> i	Engine	CII	D_2	89	_	Tra	nsmi	ssic	on		Х]				
		Ambient Temperature	75 ⁰ F										M	A					
		Car Preparation Data																	
В	asi	ic Ignition Timing 6	Degrees]			7		٦
		nt Dwell Degrees	_	Idle Mode				Accel. Mode						Cru	ise		Dece	1	
0	the	er Special Adjustments	s: Attach	5-	5		Ì		ج		22								
	Dat	ta Sheet		RPM	Satisfactory		ł		Satisfactory	ig	Stretchiness		g		Satisfactory	ļ	g		
1	٥	Soak 12 hours minimum	W	Engine	sfa	ے			s fac	Detonation	걸	न	Hesitation Sag		fa	į	Detonation		Backfire
	/Id	Start to run time $\frac{2}{1}$ No. of attempts $\frac{1}{1}$ Choke Hi-cam (N) 20	sec	Eng	ati	Rough	Stal		at:	eto	tre	Stumble	esi	2	ati	Surging	ata	Stall	귷
١	art/	No. of attempts 1			S	~	S	į	\ \sigma	٥	8	9	Ĭ '	3	N	2	9	N N	Ä
١	Sti	Choke Hi-cam (N) 20	sec	1150	Х		_												
١	o Jd	Kickdown (N) 10 sec	•	-	Х		_												
L	ပ	Kickdown (N) 10 sec In drive, 10 sec		-	Х										•				
٢	_			ì				1				$\overline{}$	—	7					
		Accel 0-30 (1/2 thro	ttle)					į			x			J	x	Т	\neg		
	lay.	Cruise 30 (0.1 Mile)						ļ	٦		Т	\top	Т	7					
	Drive-Away	Accel 30-55 (WOT at)	-					ļ	X			!		ل					٦
	۲	Decel 55-15 (Mod Bra	ke)		-										x		_1		ز
		Cruise 15 (0.1 Mile)	-441-1					•	Γ-		x	\top	Т	7					
	Start	Accel 15-50 (1/2 Three	ottiej						<u> </u>	1 l	1.	٠٠,		<u>ل</u>	x	Т	\neg		
		Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake	٠,١		•								•						٦
	CoJd	Idle, 15 Seconds	=)	560	х	П	\neg												
-		op Engine, Soak 15 Mir	n. Restari	t: Sta		Time		2	Se	c. A	tter	nots		1					
ſ		Idle, 15 Seconds		500	х	1	$\overline{}$. ,					-				
		Accel 0-30 (1/2 Thro	ottle)					1			Х								
	5	Cruise 30 (0.1 Mile)												_	X				
ľ	ati	Accel 30-55 (WOT at	Detent)	·					X			$oldsymbol{ol}}}}}}}}}}}}}}}}}}$]					_
ŀ	Evaluation	Decel 55-15 (Mod Bra	ake)														_		
	E	Cruise 15 (0.1 Mile))		•			1		•				7	X				
	Start	Accel 15-50 (1/2 The	rottle)					l	L		Х	<u>Ŀ</u>		1	\Box		_		
		Cruise 50 (0.1 Mile)													X		لــا		7
ŀ	Hot	Decel 50-0 (Mod Brak	ce)	560	Ţ	1	_												ل
F	_	Idle, 15 Seconds	Trial 1	560	X				1	Comm								ed on	
H		rformance	Iria	1_2	Iri	al :	<u>.</u>			-							0 mph;	_	
ł		T Accel 0-60, Sec	None None										kit					WIEROU	_

 System Information 	tion	nforma	I	System	1.
--	------	--------	---	--------	----

1.1	Retrofit	System	Description	(use	extra	pages	or	attach	catalog
-----	----------	--------	-------------	------	-------	-------	----	--------	---------

Principles of Operation see attached "Operation and Installation" booklet

. Installation Regm'ts Can be custo

Can be customer installed in about 5 minutes

. Adjustments

see p. 20 of "Operation and Installation" booklet

. MFG Techniques

1.2 Development Status

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Number to Date

130 000

150, pvo 15,000,000

1.3 Emission Control Category (check applicable box)

	Mec	hanical M		on			Fuel Modi	fication
1	nduction	Exhaust (Exhaust	Crank- case Control	Fuel Evap. Control	Exhaust	Crank- case
		7	0 11	rodule	calions	- rege	ured	
				1		0		
				<u> </u>				

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

	AMC	Chrysler	GM	Ford	Foreign (Specify)
L	our one n	odel fits al	l these		
		odel fits al			
	our one m	odel fits al	l these		

Model Types to Satisfy

Application Instructions apply to 4 or less cylinders, 6 cylinders and 8 cylinder engines . Pages 19,20 in booklet.

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exha	ust Emi	ssic	n Me	asure	ment	s, Fi	i11 I	n App	licable	Blanks		
Please attach additional test data if		Hot-Start Federal Tests Cold-Start 1970 1972					Other Tests (specify units and test conditions)			Particu- lates				
available	HC, PPM	CO, %	NO _X ,	PPM	нс,	GPM	co,	GPM	NО _χ ,	GPM	нс,	co,	NO _x ,	
Baseline, as received														
Baseline, after tune-up					<u> </u>		<u> </u>		<u> </u>					
Retrofit device test		<u> </u>					Ì		<u> </u>					
Number of cars					<u> </u>				<u> </u>		<u> </u>			<u> </u>
Test source														•
Additional test data														
Durability Fleet														
		MMBF	Miles		Conf	i den c	:e	Test	t Sou	rce				
2.3 Reliability (mean mi	leage]			
between failure, MMB	F)			_										
	j	MTTR,	Hours	1_	_						Par	ts Requi	red for Repa	ir
2.4 Maintainability (mea	n time		0									nor	re	
to repair, MTTR)													_	
2.5 Periodic Maintenance Inspection Requireme			ron k i				all	. ca,	pica	tor	blocks	ere z	firmly att	tacked 4
		lgmb	an all	rea	ever	y à	25-00	m	lex	,			•	

2.6	Drivability Evaluation-Retrof Check Applicable Boxes. See					1
	Make <u>FORD</u> Year 70	Engine Cl	D 390	_Transmission	×	
	Ambient Temperature 75°F			M	A	
	Car Preparation Data					
Ba	sic Ignition Timing 9° B10° Degrees					
	int Dwell 26 Degrees	Idle M	lode	Accel. Mode	Cruise	Decel
0t	her Special Adjustments: Attach	- I				
D	ata Sheet	Engine RPM	3	Satisfactory Detonation Stretchiness Stumble Hesitation Sag	Satisfactory Surging Detonation	
	Soak 12 hours minimum	Engine		Satisfacto Detonation Stretchine Stumble Hesitation Sag	Satisfacto Surging Detonation	Stall Backfire
5	Start to run time <u></u> sec	Eng	Rough Stall	Satisfa Detonat Stretch Stumble Hesitat Sag	Satisfa Surging Detonat	Stall Backf
17 / 17 - 13	No. of attempts /	U	2 2 0	N Q N N H N	श्रु ये व	्र ब
3	Choke Hi-cam (N) 20 sec	1120 X				
7,00	Kickdown (N) 10 sec	900 X				
5	In drive, 10 sec	860 X				
Г	Accol 0 20 (1/2 thmottle)			X		
	Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile)				X	
	Accel 30-55 (WOT at Detent)			X		
5	Decel 55-15 (Mod Brake)					
New August	Cruise 15 (0.1 Mile)				×	سب
				×	<u> </u>	
C+3 x+	Cruise 50 (0.1 Mile)				×	
700	Idle, 15 Seconds	650 X			٠	L
S	top Engine, Soak 15 Min, Restari	t: Start	Time 5	Sec, Attempts /		
	Idle, 15 Seconds	710 X				
	Accel 0-30 (1/2 Throttle)			×		
2	Cruise 30 (0.1 Mile)				x	
1,40	Accel 30-55 (WOT at Detent)			X		,
Fvaluation	Decel 55-15 (Mod Brake)					
	I CIUISE IS (O.I PILLE)				×	
Start	Accel 15-50 (1/2 Throttle)			×		
					X	
Hot	Decel 50-0 (Mod Brake)		, , , , , , , , , , , , , , , , , , , 			
<u> </u>	Idle, 15 Seconds	650 X	<u> </u>	Comments		
	Performance Trial 1		Trial 3			
1	OT Accel 0-60, Sec 9.2	9_	9			
- 1	Decel 60-30, Sec			1		

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

Cost	Quantity
\$10.00	l retail
2.50	
5.00	

1.00

3.50

4.00

- 3.2 Profit Margins
 - . Manufacturer
 - . Distributor
 - . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours

_					
	-0-				
ľ	customer insta	1.1 ed	in	5	minutes

- 3.4 Recurring Retrofit Costs
 - . Fuel Economy , miles/gallon

City

Highway

Composite

. Parts Replacement Cost

Baseline	Retrofit
10	11
12	1 ¼
11	12 1
	-0-

4. Marketing Information/Plan

distributors who service the retail outlets within a specified area.

Also, we well direct to national interstate accounts. This is a relatively inexpensive marketing system. At the present time, our low retail is \$19.95 and the high is \$29.95. It's a matter of supply and demand. As indicated above, it could be sold for much less.

 Retrofit System Description Principles of Operation 	(use extra pages or attach catalog)
. Installation Reqm'ts) See attachment.
. Adjustments)
. MFG Techniques	
. Mrd Techniques	
1.2 Development Status	Number to Date

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mec	Mechanical Modification								
	Exhaust C	Control		Crank-	Fuel		Crank-		
Induction	Ignition	Combus-	Exhaust	case Control	Evap. Control	Exhaust	case		
			Х						
			Х						
			. X						
1							,		

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)
Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)
All				
-	6	12	7	5

Model Types to Satisfy Application

Fiat VW Volvo Loyota Datsur

2.	Performance Data		Enclosure 1 cont
		•	

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

	Exhaust Emission Measurements, Fill In Applicable Blanks										
Please attach additional test data if	7-Mode Hot-Start <u>x</u> 7-Mode Cold-Start			Fe 1970	deral Tes 1972		Other Tests (specify units and test conditions)			Particu- lates	
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,		
Baseline, as received	-	-	-			·					
Baseline, after tune-up	740	2.8	1360	7.5	95	-	ļ	<u></u>			
Retrofit device test	345	.8	520	5.8	38			1			
Number of cars	2	2	2	1		<u>-</u>					
Test source	LABORA	TORY TEST	AT UOP								
Additional test data	none	_				•	·				
Durability Fleet	see 2.	B									

Test Data (Attach Data If Available)

2.2 Special Reqm'ts., if any (Fuel,Safety)_	Fuel must not contain Phosphorus additives.	
Safety - see attachment.		

2.3 Reliability (mean mileage between failure, MMBF)

MMBF Miles	Confidence	Test Source
12500	95%	UOP data

2.4 Maintainability (mean time to repair, MTTR)

	MTTR, Hours	MNBN		Parts Required for Repair
I	12500	95%	UOP data	Replace catalyst.
N	TTR-0.25 W			

2.5	Inspection Requirements	Above. 25,000 miles can be projected in 2.3 and 2.4 to a 75% confidence level
	This is an extrapolat	ion based on performance level in 12,000 mile tests at UOP.

2.6		Drivability Evaluation-Re Check Applicable Boxes.															and		
		Make Chevrolet Year 19	161 E	ngine	CII	2	83		Tran	smi	ssi	on		Τx]				
		Ambient Temperature	^o F										1	M A	١				
		Car Preparation Data																	. •
R	ac.	ic Ignition Timing 4° De	nrees			_				-				7			7		<u> </u>
		nt Dwell 29 Degrees	9.003	Idle	Mo	ode			A	cce	1. 1	Mode	9		Cru	ise		De	:e 1
		er Special Adjustments: A	ttach		_				X	\Box	7	T	\top	7			1		
		ta Sheet		RPM	Satisfactory	İ			Satisfactory	a	Stretchiness		a		Satisfactory				
ſ	e	Soak 12 hours minimum		e l	fac		- 1		fac	Detonation	Ħ	4	<u>Hesitation</u>		3	9	מברחוומר נחו		17
		Start to run timese	c	Engine	tis	Rough	Stall		tis	ij	린	Stumble	Ħ	9	1 #	Surging		Stall	Backfi
	Start/Idl	No. of attempts			S	~	2		S	٩	স	7	<u> 判</u>	3	N	3 8	Ë	7	Ba
	Sta	Choke Hi-cam (N) 20 sec		1100	x.	_	_												
į	Cold	Kickdown (N) 10 sec	.	700	X		_							:					
Ĺ	ပ	In drive, 10 sec		_600_	لع														
,-														_					
		Accel 0-30 (1/2 throttle)	٠					ليا			\perp		ل			٦ .		
	ay	Cruise 30 (0.1 Mile)												<u> </u>	X		_		
-	-Aw	Accel 30-55 (WOT at Dete	nt)						Lx L				丄	ل					
-	Drive-Away	Decel 55-15 (Mod Brake)													r		7	نـــا	
1	1	Cruise 15 (0.1 Mile)										Т		_	X		J		
	art	Accel 15-50 (1/2 Throttle	e)						X					ك	ГVТ		٦		
		Cruise 50 (0.1 Mile)	Ì												X	i_	J		
	Cold	Decel 50-0 (Mod Brake) Idle, 15 Seconds	+				_						*					Ш	
۲.				565	نبد	<u></u>	<u>ا</u> ـــ		,										
٦	Sto	op Engine, Soak 15 Min, Re	estart	:: Star	t .	1 me	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		ecے۔	, A	tter	mpt:	s	1					
		Idle, 15 Seconds	.			1		i	х	Т	\neg	Т	7	7					
.	<u>_</u>	Accel 0-30 (1/2 Throttle Cruise 30 (0.1 Mile)	·												T _x		7		
- 1	tion	Accel 30-55 (WOT at Dete	ant)						х	Т	Т	Т	T	٦	لنا		ز		
	Evaluat	Decel 55-15 (Mod Brake)	,,,,											_					
- ∤.	Eva	Cruise 15 (0.1 Mile)													X		7		
	Start	Accel 15-50 (1/2 Thrott)	le)					1	V		T	Т	T	7	سبا		ل		
		Cruise 50 (0.1 Mile)	,					,						_	T	Т	7		
	Hot	Decel 50-0 (Mod Brake)													LAL		_		
	_	Idle, 15 Seconds		475	Х				C	omm	ents	S	ı	Perf	orman	nce a	cce	otah	le
	Pe		ial 1	Trial	2	Iri	al	3	l I										
	WC	OT Accel 0-60, Sec 16	5.7	17.	0	1	7,0												
	0	ecel 60-30. Sec	5.0	23.	0	2	5.0												

Enclosure 1 cont.

•	6 Cylinder 1-44 in ³ C	Cars onverter	8 Cylinder Cars 2-30 in ³ Converter		
3. Estimated Cost Information, Dollars			_		
3.1 Retrofit System Cost	Cost	Quantity			
. Initial Cost					
. Developmental/Prototype			•		
. Manufacturing					
. Distribution	~ \$30 ea [*]	100;000 units	\$\$50/2-units* 100,000unit		
3.2 Profit Margins			1		
. Manufacturer					
· Distributor					
. Dealer/Installer (Retail)		<u> </u>			
3.3 Installation on Vehicle					
. Kit/Parts) \$10/vehicle	\$15/vehicle*		
. Labor, Hours	·	5)		
3.4 Recurring Retrofit Costs					
. Fuel Economy , miles/qallon	Baseline	Retrofit			
City) .		
Highway					
Composite					
. Parts Replacement Cost		\$15 refill*	\$20 refili*		

4. Marketing Information/Plan *Prices assume quantity sale ________to State or Municipal Programs. Installation costs are those quoted by established muffler shops for complete installation of converter and piping. State and Municipal Governments should be able to negotiate equivalent or lower prices from certified or contract installers. Price does not include cost of lean-tuning and vehicle inspection. This is a prerequisite to a successful catalytic retrofit program. However, it is also an essential and separate first step in any automotive emission control program whether catalysts are specified or not.

1. System Information	ion (uso outma nagos on attach catalog)
Principles of Operation	ion (use extra pages or attach catalog) n <u>Crankcase Vent·lation -See Attached Brochure</u>
. Installation Reqm'ts	Installation Instructions weede Kit
. Adjustments	Carbidle if necessary
. MFG Techniques	

1.2 Development Status Number to Date completed 1933 Conceptual/Design Stage Prototype 500,000 ESTIMATED SALES TO DATE Manufactured TO DATE ON Cars : Distributed to Dealer 200,000 ESTIMATED SALES Trucks Installed on Vehicles UNKNOWN Total Accumulated Miles (Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

	Mec	hanical Mo		onn		•	Fuel Modi	fication
	Induction	Exhaust C Ignition	Combus- tion	Exhaust	Crank- case Control	Fuel Evap. Control	Exhaust	Crank- case
Hydrocarbon					90000			
Carbon Monoxide					V			
Oxides of Nitrogen Particulates					~			
Other	l						L1	

1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW

Foreign **AMC** Chrysler CM Ford (Specify) Year (Range) 1455 -1971 1955-1971 1955-1971 1955-1971 Engine CID (Range) 140 UP 140 UP 140 OP 140 UP Number of Retrofit 21 61 47 103

ALL Model Types to Satisfy Application ALL

Other

_	D C D.A.		F1
2.	Performance Data	•	Enclosure 1 cont

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaust	t Emissio	on Measurements, Fill In Applicable Blanks							
Please attach additional test data if available		Hot-Start Cold-Start		Fe 1970	deral Tes 1972		Other Tests (specify units Par and test conditions)				
	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,		
Baseline, as received						<u> </u>			ļ		
Baseline, after tune-up						ļ <u>.</u>		ļ	ļ	ļ	
Retrofit device test					 	<u> </u>			 	 	
Number of cars				l	<u> </u>		<u> </u>	<u> </u>	ļ	<u> </u>	
Test source						 					
Additional test data									ļ	ļ	
Durability Fleet				L	L	<u> </u>	<u> </u>	<u> </u>		<u></u>	
Test Data (Attach Data)	If Availab	ile) Sæe	ettec	ned							
2.2 Special Reqm'ts., i	f any (Fue	.l,Safety)	N	ONE							
											
		·									
	1	MMBF Mi	les	Confidence	e Test	t Source]				
2.3 Reliability (mean m	mileage	NO FAILU		00.11.1.00.110			1				
between failure, M		<u></u>					,				
·		MTTR, Ho	ours				Parts	Require	d for Repa	iir	
2.4 Maintainability (me	ean time	5 M.	n .				VAPOR	FILTER	ELEMEN	7	
to repair, MTTR)											
2.5 Periodic Maintenance/ See attached Service bulletin Inspection Requirements											

Make CADILIAC Year 1972 Engine CID472 Transmission X Ambient Temperature 40 OF Car Preparation Data Basic Ignition Timing 8 Degrees Point Dwell 30 Degrees Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 6 sec Day 17 Degrees Who. of attempts 2 Decell Provided Base 1 Decell Provide	2.6	Drivability Evaluation Check Applicable Boxe	on-Retrof es. See	it Devi Enclosu	ce	insta 2 For	lle Dr	d: Please (rivability l	Conduct Ev Procedure,	valuation and Page 4.	i
Car Preparation Cata Basic Ignition Timing 8 Degrees Point Dwell 30 Degrees Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 6 sec Soak 12 hours minimum Start to run time 6 sec Soak 12 hours minimum Start to run time 6 sec Soak 12 hours minimum Start to run time 6 sec Soak 12 hours minimum Start to run time 6 sec Soak 12 hours minimum Soak 12 hours m		Make CADILLAC Yea	r <u>1972</u>	Engine	CID	472		Transmissi	on T	x	
Basic Ignition Timing 8 Degrees Point Dwell 30 Degrees Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 6 sec The No. of attempts 2 Choke Hi-cam (N) 20 sec Nickdown (N) 10 sec In drive, 10 sec In drive, 10 sec It Rocel 15-50 (1/2 throttle) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 50-15 (NOT at Detent) Cruise 50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 50-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 50-15 (Mod Brake) Cruise 50 (0.1 Mile) Decel 50-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 50-15 (Mod Brake) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mi		Ambient Temperature	40_ ⁰ F						М	A	
Point Dwell 30 Degrees 1dle Mode Accel Mode Decel		Car Preparation Data									
Point Dwell 30 Degrees 1dle Mode Accel Mode Decel	В	asic Ignition Timing	s Degrees								
Other Special Adjustments: Attach Data Sheet Soak 12 hours minimum Start to run time 6 sec 55 to 1000 x			<u> </u>		Мо	de		Accel. 1	1ode	Cruise	Dece1
Choke Hi-cam (N) 20 sec 1000 X		 _	s: Attach	_	7			7 0		3.	
Choke Hi-cam (N) 20 sec 1000 X	ا	Data Sheet			to			tor	uo	tor	
Choke Hi-cam (N) 20 sec 1000 X		Soak 12 hours minimum	m	ine	sfac	ے اے		sfac nati	olo Eati	fac	ire
Choke Hi-cam (N) 20 sec 1000 X		Start to run time 6	_sec	Eng	ati	ougl tal		atis etor tre	tunk esit	atis urgi	La l
Choke Hi-cam (N) 20 sec 1200 X 1000 X		No. of attempts 2			Š	S		N Q N	2 = 2	न न न	\ <u>\</u> \alpha
Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) X X X X X X X X X X X X X	.	Choke Hi-cam (N) 20	sec	1200	_	X					•
Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) X X X X X X X X X X X X X	Ì	P Kickdown (II) 10 sec			_+	X					
Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Hod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Expect Seconds Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Trial 1 Trial 2 Irial 3 WOI Accel 0-50, Sec 10 10 10 10	L	In drive, 10 sec	·.	760	X						
Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Hod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Expect Seconds Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Trial 1 Trial 2 Irial 3 WOI Accel 0-50, Sec 10 10 10 10	۲			1				F			· ·
Accel 30-55 (NOT at Detent) Decel 55-15 (Nod Brake) Cruise 15 (0.1 Mile) Decel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Stop Engine, Soak 15 Min, Restart: Start Time 2 Sec, Attempts 1 Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Cruise 15 (0.1 Mile) Cruise 50 (0.1 Mile) Decel 55-15 (Mod Brake) Cruise 50 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Idle, 15 Seconds Performance Itial 1 Trial 2 Irial 3 NOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.		į	ttle)					X			
Decel 55-15 (Nod Brake)	- 1	Cruise 30 (0.1 Mile)	.						7	X	
Cruise 15 (0.1 Mile) X		Accei 30-55 (WOI at 1						X			$\Gamma T \gamma$
Accel 15-50 (1/2 Throttle) X	Ī	S Decei 55-15 (Flod Brai	ke)					:		x	لـــــــا
Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Stop Engine, Soak 15 Min, Restart: Start Time 2 Sec, Attempts 1 Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (9.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Accel 15-50 (Mod Brake) Idle, 15 Seconds Performance Trial 1 Trial 2 Trial 3 NOT Accel 0-50, Sec 10 10 10 10		•	-++1-1						1		
Decel 50-0 (Mod Brake) 3 Idle, 15 Seconds Stop Engine, Soak 15 Min, Restart: Start Time 2 Sec, Attempts 1 Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Cruise 50 (0.1 Mile) Accel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.		Chaise 20 (1/2 11/4)	-			• •				X	
Stop Engine, Soak 15 Min, Restart: Start Time 2 Sec, Attempts 1 Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (9.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Ferformance Trial 1 Trial 2 Trial 3 WOT Accel 0-60, Sec 10 10 10 10	- 1				•	:	:		<i>:</i>	اللبلتا	
Stop Engine, Soak 15 Min, Restart: Start Time2 Sec, Attempts 1 Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.			= /	640	x						المسلسا
Idle, 15 Seconds Accel 0-30 (1/2 Throttle) X		Stop Engine, Soak 15 Mir	ı. Restar	·		ime	2	Sec. Atte	nnts 1		٠
Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Trial 1 Trial 2 Trial 3 NOT Accel 0-60, Sec 10 10 10 10 and no further adjustments were made.	ſ		.,		x				p 03		
Cruise 30 (9.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Performance Trial Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.			ottle)					x			
Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 and no further adjustments were made.	l	E Chuico 20 (0 1 Mile)	· ·							X	
Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Performance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.		Accel 30-55 (WOT at						x			
Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Performance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.		Decel 55-15 (Mod Bra	ake)								
Decel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.)							X	
Decel 50-0 (Mod Brake) Idle, 15 Seconds Ferformance Trial 1 Trial 2 Trial 3 WOT Accel 0-50, Sec 10 10 10 10 and no further adjustments were made.		Accel 15-50 (1/2 Thi	-					X			
Idle, 15 Seconds Ferformance Valve as received from the factory. Regine tuned to factory specifications and no further adjustments were made.)		•			,		X	لنب
Performance Trial Trial 2 Trial 3 Valve as received from the factory. Wot Accel 0-50, Sec 10 10 10 and no further adjustments were made.	:		ke)							•	
WOT Accel 0-50, Sec 10 10 10 Engine tuned to factory specifications and no further adjustments were made.	-										
	}-				2		3_	Engine t	uned to f i	ctory specif	ications
Dece 1 60-30 Sec 33 32 35	ŀ		33	32	\dashv	35		and no r	arther ad	Justments Mei	

.6	Orivability Evaluation Check Applicable Boxe	on-Retrof ⊵s. See	it Devi Enclosu	ce Inst re 2 Fc	alle r Dr	d: Please ivability	e Conduct E y Procedure	valuation and , Page 4	i
	Hake CADILLAC Year	r <u>1972</u>	Engine	CID <u>472</u>		Transmis	sion	x	
	Ambient Temperature	38 ⁰ F					М	A	
	Car Preparation Data								
	ic Ignition Timing <u> </u>	<u>Degrees</u>		Mode		Accel	. Mode	Cruise	Dece1
	er Special Adjustments ta Sheet	: Attach	RPM	tory		tory	st g	tory	
_ e	Soak 12 hours minimum		Engine	Satisfactory Rough		Satisfactory Detonation	strendines Stumble Hesitation Sag	Satisfactory Surging Detonation	fire fire
Start/Idl	Start to run time 4 No. of attempts 1	sec	Eng	Satis	Stall	Sati	Stumble Hesitat Sag	Satisfa Surging Detonat	Stall Backfire
Sta	Choke Hi-cam (N) 20	 sec	1300	X					Anna projection d
Sold	Kickdown (II) 10 sec		1100	X	-				
<u></u>	In drive, 10 sec	•	900	X L	_]				
Orfve-Away	Accel 0-30 (1/2 thro Cruise 30 (0.1 Mile) Accel 30-55 (NOT at 1 Decel 55-15 (Nod Brai	Detent)				x		x	
Cold Start D	Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thro Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake Idle, 15 Seconds	·	650	x T]			x	
Sto	op Engine, Soak 15 Mir	, Restar	t: Star	t Time_	2	_Sec, Att	tempts 1		
Evaluation	Idle, 15 Seconds Accel 0-30 (1/2 Thro Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Decel 55-15 (Mod Bra	Detent)	720	<u>* </u>		x x		X	
Not Start Eva	Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thr Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brak	ottle)			-	x		X X	
<u> </u>	Idle. 15 Seconds		650	X		Comer		ne was set to	
	rformance	Trial 1		2 Iria			mde, after	nd ne further installation	
	T Accel 0-60. Sec	34	10 35	35			System,		
	Erc Dr 71 750					J			

Cost 3s fo 50	Quantity	
I		
I		
	1	
		•
etail)		
30 650		
30 Minto /hr		
ts		
/gallon Baseline	Retrofit	
st	\$ 1,50	
	Jubbers & Distr	ibutors
	ts /gallon Baseline st	ts /gallon Baseline Retrofit st Thru Dealers, Jobbers & Distr

 System Inform 	ation	
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1.1	Retrofit	System	Description	(use	extra	pages	or	attach	catalogy	١
-----	----------	--------	-------------	------	-------	-------	----	--------	----------	---

. Principles of Operation Exhaust Filtering System

. Installation Requits Peplaces Standard exhaust system.

. Adjustments

. MFG Techniques

1.2 Development Status

Conceptual/Design Stage
Prototype
Manufactured
Distributed to Dealer
Installed on Vehicles
Total Accumulated Miles

lų	mber	to	Date
	1	3	
		3	
		0	
		0	
		3	
	ವ ೩	00	0

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Med	hanical Mo	ndificatio	n			Fuel Modi	fication
	Exhaust (Crank-	Fue1		Crank-
Induction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case
			X				
			X				
			Χ				

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)
Number of Retrofit

	AMC	Chrysler	СМ	Ford	Foreign (Specify)
	MOST	most	most	most	
Ì					
ı	1'	1.7	• (٠,	

Model Types to Satisfy Application

_	_	_		_	
2	Per	∙f∩rr	nance	a Da	ıta

Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

e»	Please attach additional test data if		Hot-Star Cold-Sta			deral Tes	ts	Other T		cify units	Suspexied Particu- lates
-	available	HC, PPM	co, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,	3m/m1
Base	line, as received	206	0,690	935	A.8	15.4	3.9				0.034
Base	line, after tune-up				· · ·	·				<u> </u>	0.090
	rofit device test	168	1.03	1047	2.58	47.78	5.82			- 	0.038
	er of cars		<u> </u>	1	 	l	<u> </u>	L		<u> </u>	<u> </u>
	source	1970 0	Ldsmo	bile, te	sted	at E	thyl c	PRP		1	
Addı	tional test data	<u> </u>	ļ	 	 	 	ļ				 -
			1		1						
Test	ability Fleet Data (Attach Data)			•		g Proc	e dure,	FOUR	Hot-Sti	9rts 7-1	node Cy
Test	ability Fleet Data (Attach Data) Special Reqm'ts., i			•		g Proc	e dure,	FOUR	Hot-541	9rts 7-1	node Cy
[est	t Data (Attach Data)			•		g Proc	e dure,	Four	Hot-541	9rts 7-1	node Cy
Test	t Data (Attach Data)		el ,Safety	•			se dure,	Four	Hot-541	9r75 7-1	node Cy
Test	t Data (Attach Data)	f any (Fu	el ,Safety	' <u>)</u>				Four	Hot-541	9r75 7-1	node Cy
Tes1	Special Reqm'ts., i	f any (Fu	el ,Safety	Miles						ed for Repa	
Test 2.2 2.3	Special Reqm'ts., i	f any (Fu	el,Safety	Miles							

Enclosure 1 Cont.

2.	6	Drivability Evaluati Check Applicable Box	on-Retrof es. See	it Dev Enclos	i ce ure	Ins 2 F	talle or D	ed: P rivab	lea ili	se ty	Con Pro	duct	Ev.	alda Page	10n 4.	an	d.		
		Make <u>QLDS</u> Yea	r <i>j970</i>	Engine	CII	1	5-5-	Tran	smi	ssi	on .		X						
		Ambient Temperature	o _F										M A	4					
		Car Preparation Data																	
						-							7			\neg	Г		\neg
		ic Ignition Timing _S	Degrees	Idle	a Mo	ahr			lcce	1	Mod	۵.		ראון	ise		. -	ece)	,
	Poi	nt Dwell <u>30</u> Degrees		1416	- 110	T	_	-	T	··	1104	<u> </u>	-	1010	136	\dashv	-	1	4
1	Oth	er Special Adjustment	s: Attach	Σ	2	٠		2		SS				4		ļ			
	Da	ta Sheet		RPM	Satisfactory			Satisfactory	Detonation	Stretchiness		ig		Satisfactory	ļ	į			
	ه	Soak 12 hours minimu	m	Engine	sfa	ے		Sfa	nat	育	Stumble	Hesitation		धै	ig	Detonation			Backfire
	Start/Idl	Start to run time 3	2 sec	Eng	ati	Rough	Stall	ati	eto	벍	Ę	esi	Sag	1	Surging	to	Ì	Stall	ğ
	irt/	No. of attempts 1			S	~	S	S		S	9	三	S	S	7	ğ	L	Ŋ	ä
	Sta	Choke Hi-cam (N) 20	sec	500			_										٠.		
	pl 03	Kickdown (N) 10 sec		500															
	క	In drive, 10 sec			V											•			
		Accel 0-30 (1/2 thro	ttle)						9K (24	1	or o	K						
	>	Cruise 30 (0.1 Mile)												OK	DK	אכ			
	Orive-Away	Accel 30-55 (WOT at	Detent)					OK	ON	7K	OK	O NC	K						
	ve-	Decel 55-15 (Mod Bra	ke)														þ	KP	지
	Dri	Cruise 15 (0.1 Mile)												OK	215	2K			
		Accel 15-50 (1/2 Thr	ottle)					DK K	OK	7K 4	>K 0	16 6	19			_			
	Start	Cruise 50 (0.1 Mile)	,			•		-						OK	>K 6	*			
		Decel 50-0 (Mod Brake	a)											بالبيسيا			0	KO	R
	Cold	Idle, 15 Seconds			on												_	I	_
,	Sta	op Engine, Soak 15 Min	ı. Restari	t: Star	ct T	ime	- //	Sec	. Δ	tte	mnt	. A.	110						
!		Idle, 15 Seconds	,,			2/5			,	-	mp c.	. 01	۷ <u>۰</u>						
		Accel 0-30 (1/2 Three	1+1-1		-/\	<u> </u>	27()	OK	ok o	K	to	KO	च						•
	uo	Cruise 30 (0.1 Mile												OK	KC	K			
		Accel 30-55 (WOT at						OK	OKO	K	2K C	ok o	73						
	Evaluati	Decel 55-15 (Mod Bra						5.4					_]				0	ro.	K
	Eva	Cruise 15 (0.1 Mile)											•	OK	W/	<i>A</i>	ب		ان
		1						OX	ماء		مايد	K O	7						
	Start	Accel 15-50 (1/2 Thi	_	,					771	<u> </u>	·······································	<u>``\</u>	ľ,	OK C	N/e	×			
	Hot	Cruise 50 (0.1 Mile)												27.1	· F		6	(6)	7
	Ĭ	Decel 50-0 (Mod Brai	(e)		44	200	200	_									٢,	\ P	۲
		Idle, 15 Seconds				016		7 ^C	omme	ent:	5								_
		erformance	Trial 1	Irial	4			┪ -				11	/4						-
ļ		OT Accel 0-60, Sec	OK.	OK	\dashv	0 /		┨ -				<u>U/</u>	<i>A</i>						_
	[Decel 60-30. Sec	DK	OK	1	01	<u> </u>	J _											

. Estimated Cost Information, Dollars	5		
3.1 Retrofit System Cost	Cost	Quantity	
. Initial Cost	\$85.00	1	
. Developmental/Prototype	\$1,000	,	
. Manufacturing	NO INFORM	Atux	
. Distribution	.,		
3.2 Profit Margins			
. Manufacturer			
. Distributor			
. Dealer/Installer (Retail)			
3.3 Installation on Vehicle			
. Kit/Parts	NO INFORM	nation	
. Labor, Hours	11: 1:		
3.4 Recurring Retrofit Costs	· · · ·		•
. Fuel Economy , miles/gallon	Baseline	Retrofit	
City	standard (rust	
Highway	, ,		
Composite			
. Parts Replacement Cost 170	INFORMATOR		
Marketing Information/Plan De	veloping		
	•		
	•		

•	Cucken	Information
1.	SVETAM	Intormation

1.1 Retrofit System Description (use extra pages or attach catalog	1.1	Retrofit	System Description	(use extra	pages or	attach	catalog
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. Principles of Operation Ace

Installation Reqm'ts Do Notes 1-2

Adjustments

MFG Techniques

1.2 Development Status

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles (Estimated, Thousands)

Number	to	Date

,	5
	. /
	NONE
	NONE

1.3 Emission Control Category (check applicable box)

Mec	Fuel Modification							
Exhaust Control				Crank-	Fue1		Crank-	
nduction	Ignition	Combus - Exhau			Evap. Control	Exhaust	case	
~			7	~	~	1	•	
V	-	V	V	レ	V	v _s	レ	
-	V	V	V	٧	_		V	
سا	レ	~	V	v	١		V	

Hydrocarbon Carbon Monoxide Oxides of Nitrogen **Particulates**

Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

AMC	Chrysler	CM	Ford	Foreign (Specify)
1955.671	1955-671	1955/571	1955 1671	
199 to 901	97 383	972 405	190-429	
6	6	5	6	

Model Types to Satisfy

Application

2	Performance Data	Enclasure 1 cont

ele aracon en	lata i	in Les	ter er	٠٠٠ و المعادد	ic to	0416	da TELL,	2-26	-7/	
						11 In App	**			
Please attach additional test data if	7-Mode Hot-Start /			Federal Tests 1970 1972			Other Tests (specify units and test conditions)			Particu- lates
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NOX.	
eline, as received		<u> </u>	., .							
eline, after tune-up							_			
rofit device test	188	1059	704	556	2.3	716			13	
ber of cars			/	/	1	1	•			
t source	Scott ?	Resh. 8	Rob, -	Calif.	air x	resoure	estel	,-0,	L.1. Kabo	rotor
itional test data				V						
ability Fleet										
Leavy dill	y w	et i	gnat	of is	des.	to in	sprove	The	Combus	unan
		1		<u> </u>					_	
',	· .			Can At dam a]		in Bull	1
Poliability (maan m	ilozgo	MMBF M	liles	Confidenc	e Test	Source	non	e ar	railable	at
•		MMBF N	liles	Confidenc	e Test	Source	non	e ar	tin	at
Reliability (mean m between failure, MM				Confidenc	e Test	Source	fr	esent	tiny	
between failure, MM	BF)	MTTR, H	lours	Confidenc	e Test	Source	Parts	s Requir	ed for Repa	ir
-	BF) an time	MTTR, H	lours hv.				Part:	s Requir	tiny	ir

2.6	Drivability Evaluation-Retrof Check Applicable Boxes. See	Enclosu	ıre	2 For	Dr	rivability Procedure		l
	Make FALCON Year 1965	Engine	CID	200	<u> </u>		4	
	Ambient Temperature <u>70</u> °F					M	Α	
	Car Preparation Data							
Bas	ic Ignition Timing <u>12</u> Degrees					·		
	nt Dwell 36 Degrees	Idle	Mo	de		Accel. Mode	Cruise	Dece1
	er Special Adjustments: Attach		J					
	ta Sheet	RPM	tor			on de l	g g	
٩	Soak 12 hours minimum	ae l	fac			facilitation	fac at i	<u> 8</u>
		Engine	Satisfactory	Rough Stall		Satisfactory Detonation Stretchiness Stumble Hesitation Sag	Satisfactory Surging Detonation	Stall Backfire
Start/Id1	No. of attempts /		S	a x		Sat Det Str Stu Hes Sag	न्न न	S S
Sta	Choke Hi-cam (N) 20 sec	7.00	1					
Cold	Kickdown (N) 10 sec	600	4					
క	In drive, 10 sec	55a	V					
	Accel 0-30 (1/2 throttle)						[]	
_	Cruise 30 (0.1 Mile)							
Drive-Away	Accel 30-55 (WOT at Detent)			•		V		
ķ	Decel 55-15 (Mod Brake)							
						GH THE		
Start	Accel 15-50 (1/2 Throttle)							
	Cruise 50 (0.1 Mile)						\checkmark	
Ploo	Decel 50-0 (Mod Brake)	ا سد	71					
	Idle, 15 Seconds	550	<u> </u>		_			
St	op Engine, Soak 15 Min, Restar		$\overline{}$	ime	5	_Sec, Attempts/_		
	Idle, 15 Seconds	550	1					
_	Accel 0-30 (1/2 Throttle)							
ion	Cruise 30 (0.1 Mile)							
Start Evaluat	Accel 30-55 (WOT at Detent)					y	· .	
. va	Decel 55-15 (Mod Brake)					,		Ш
£	Cruise 15 (0.1 Mile)							
Sta	Accel 15-50 (1/2 Throttle)							
Hot.	Cruise 50 (0.1 Mile)							
F	Decel 50-0 (Mod Brake) Idle, 15 Seconds	550	1	7		Commonte		لسلسا
	erformance Trial 1		7	<u> </u>	— থ	Comments		
	OT Accel 0-60, Sec	Lilai	1		<u>.</u>			
	Dece 1 60-30 Sec		\top					······································

Enclosure 1 cont.

3. Estimated Cost Information, Dollars			
3.1 Retrofit System Cost	Cost	Quantity	
. Initial Cost	125 00	/	
. Developmental/Prototype	40.000	1	
. Manufacturing	NONE		
. Distribution	NONE		
3.2 Profit Margins		,	•
. Manufacturer	NONE		
· Distributor	NONE		
. Dealer/Installer (Retail)	175,00		17 5
3.3 Installation on Vehicle . Kit/Parts (onle assy. units	15.00	/	. 125
. Labor, Hours	25.00	1.	165
3.4 Recurring Retrofit Costs			
. Fuel Economy , miles/gallon	Baseline	Retrofit	
City	16MI.PE. GAI	2 DAIL PER GAL	DLEADED OR NONLEHDE
Highway		25 MI. PER GAL	FUEL
Composite		·	
. Parts Replacement Cost	,	,	ब
		7	·
	f		
4. Marketing Information/Plan	IONE AT	PRESEN	TIME
			, ,
	<u> </u>		

. Inst	allation	Reqm'ts	Ve	intilcho:	Systa	2m	mon	stat any	dos ra ble	Locatio.
. Adju	stments		5	- "Vacuun	dur	mg.	idle (wa	rm) Neu	tral	
. MFG	Techniques	5								
1.2 Develo	pment Stat	ha	Ma	mber to D						
	nceptual/[1	,						
	ototype	ocongii oco	19 C		7 27	Thes	•			
	nufactured	i		10	7	1/2-1/2	-)			
Dis	stributed	to Dealer	•	7500			Ź			
Ins	talled on	Vehicles	,	7000						
Tot	al Accumu	lated Mil	es .	5,000,0	ال					
(1	Estimated,	, Thousand	is)	•	•					
1.3 Emissi	on Contro	1 Category	y (chec	k applica	ble box)				
	Mec	hanical M	ndifica	tion				Fuel Mod	ification	
		Exhaust (Crai	nk-	Fuel		Crank-	
	nduction	Ignition	Combu tion	ıs- Exhau		e	Evap.	Exhaust	case	
ydrocarbon	-		,	-	5		20110101		-	
arbon Monoxide										
xides of Nitrogen			V							
articulates										
)ther	l	Closed	CR	PANKCAS	e Ve	NTV.	<u> </u>		ELEVERA B	LE
	Control of	f Grankeas	e Emas	IRUN -	012 th 48.	Uso	0) No.	enfice)	whene pro	-1 UYP
1.4 Automoti							7		, ,	
	ty Vehicl				availa	bie)		•		
J				25 4111			Ī			
		A	MC	Chrysler	· 9	М	Fo		oreign pecify)	
Year (Range)	196	6	959-66	1959	-68	1961-1		1-68	
Engine CID	(Range)	A	L ·	ALL	A	26	AL	4	10%	
	Retrofit		/ [2	- 1	K .	1 (0	ン	

2.	Performance Data	•	•	Enclosure	1	cont

_		Exhaus	t Emissio	n Measure	ments, Fi	ill In App	licable E	Blanks		
Please attach additional test data if		Hot-Start Cold-Star		Fe 1970	deral Tes 1972			sts (spec st condit	cify units	Particu- lates
available	HC, PPM	CO,%	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received										
Baseline, after tune-up	525/m	367%	1352/pm	-			<u> </u>			
Retrofit device test	457 km	439%	'''	·						
Number of cars	2 /	hides 7	EDT DAT	⊘						
Test source	Se	ott Res	exach.	Laborato	rio-	In Bar	nardiù,	Cal. J.		
Additional test data										
Durability Fleet	8 Jeh	de A	Leet							
Test Data (Attach Data I	f Availab	1e)	•							
2.2 Special Reqm'ts., it	fany (Fue	:1,Safety)		Non	e K	EQU 112E	o 04	fer the	- ag	justman
	ĺ	MMBF M	ilos	Confidenc	a Tost	Source]			
2.3 Reliability (mean m	ileage		POOU	95%		57 -	1'S FAIL	11263 RE	peaten	
between failure, MM		700	1	10/0			J			
	, 	MTTR, H	ours				Parts	Require	d for Repa	ir
2.4 Maintainability (me	an time	7 1/4 11			<u> </u>		RV	dean	ing (flo	136
to repair, MTTR)							 		-6-1-	
•		,	/	12		a.`	150	nine tes		
2.5 Periodic Maintenanc Inspection Requirem	e/ ents		yeur -	12,0				,,,		

2.6	Drivability Evaluatio Check Applicable Boxe											đ
	MakeYear	E	ngine	CID		•	Transmi	ssior		\neg		
	Ambient Temperature	o _F							М	A		
	ic Ignition Timing nt Dwell Degrees	_Degrees	Idle	e Mo	de		Acce	1. Mc	ode	Cr	ruise	Dece1
	er Special Adjustments	: Attach		k				7	\Box	一		
	ta Sheet	7.0000	RPM	tor			P to	nes	a	1		
Start/Idle	Soak 12 hours minimum	_sec	Engine	Satisfactory	Rough Stall	,	Satisfactory Detonation	Stretchiness	Hesitation Sag	Caticfactory	Surging Detonation	Stall Backfire
Cold	In drive, 10 sec											
Cold Sta	Accel 0-30 (1/2 throt Cruise 30 (0.1 Mile) Accel 30-55 (WOT at D Decel 55-15 (Mod Brake Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thro Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake Idle, 15 Seconds	etent) e) ttle)	· Star	·+ T:	ime		Sec, A	ttemn	its.			
	Idle, 15 Seconds					,						
uation	Accel 0-30 (1/2 Thro Cruise 30 (0.1 Mile) Accel 30-55 (WOT at I					 						
Evalua	Decel 55-15 (Mod Bra	(e)										
Hot Start E	Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thro Cruise 50 (0.1 Mile)											
=	Decel 50-0 (Mod Brake Idle, 15 Seconds	7	. [T			Commo	ents	_5	hsh	actory	ر السلام
Pe	erformance	Trial 1	Trial	2]	rial	3		fom.		2///	8) Veh	idos
WC	OT Accel 0-60, Sec			1					00 m	ile a	Tura be la	Ly Teso
	Decel 60-30. Sec				•			May	1965			·

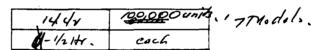
3.	Estimated	Cost	Information,	Dollars

- 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

Cost	Quantity	
446	100,000 un t	•
1.21		
4.85	,	
8:36		

3.2 Profit Margins

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours



3.4 Recurring Retrofit Costs

- . Fuel Economy , miles/gallon City Highway
 - Composite
- . Parts Replacement Cost

Retrofit

NoDATA.

4.	Marketing	Information/Plan	Marketing		Standard
	-	A form	while trade-	_	
	,,,,,				
•					

RETROFIT INFORMATION OUTLINE

 System Information Retrofit System Description Principles of Operation 	on (use extra pages or attach catalog) SEE ENCLESURE I	
. Installation Reqm'ts		
. Adjustments		
. MFG Techniques		-
1.2 Development Status	Number to Date	
Conceptual/Design Stag		•
Conceptual/Design Stag	ge	

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

	Mec	hanical Mo	ndificatio	on			Fuel Modi	fication
		Exhaust (Control		Crank-	Fuel	l	Crank-
]	nduction	Ignition	Combus- tion	Exhaust	case Control	Evap. Control	Exhaust	case
	/							
	/							-
1		/						
							L	

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)
Number of Retrofit

AMC	Chrysler	G M	Ford	Foreign (Specify)
55-65	55-65	55-65	55-65	
OVER 140	OVER 140	I		
	(1 TOTA	12)		

Model Types to Satisfy
Application

2. Performance Data Enclosure 1 cont.

		Exhaus	t Emissi	on Measure	ments, Fi	ill In App	licable	Blanks		
Please attach additional test data if		Hot-Start Cold-Star		Fe 1970	deral Tes 1972			ests (spe	cify units	Particu lates
available	нс, РРМ	CO,%	NO _X , PP	M HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,	
Baseline, as received	696	3.25	1170							
Baseline, after tune-up			,,	ļ						
Retrofit device test ¥⊀	224	1.54	533			ļ			<u> </u>	
Number of cars				ļ -	<u></u>	<u> </u>	<u> </u>			<u>.</u>
Test_source	OLSO	y LAB	S			<u> </u>		<u>. </u>		
Additional test data					<u> </u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>
Durability Fleet **	235	1.50	538				1		CAR A	
		Mar M	li les	Confidenc	Tost	t Source]			
2.3 Reliability (mean m	ni leage	75,00		100 %	E		1			
between failure, M		75,0		100 /0		<i></i>	J			
		MTTR, H	lours						d for Repa	ir
2.4 Maintainability (me	ean time	30.75	•75				NEW	UNIT	4	
				RS De	~! 405	T 14/		J AJO 7		
to repair, MTTR)		•							REPA	
to repair, MTTR) 2.5 Periodic Maintenand Inspection Requirer SISULO INTERPORTED INTERPOR	ce/ ments /	No p	EKIOO HRD I	DERIOR	OIC N	VANCE 2011	ON AN	DEVICE 7	o ma	VEHIC XIMI

3.1 Retrofit System Cost	Cost	Quantity
. Initial Cost (TOTAL)	# 40	100,000
. Developmental/Prototype		
. Manufacturing		
. Distribution		
3.2 Profit Margins		
. Manufacturer		
. Distributor		
. Dealer/Installer (Retail)	#20	
3.3 Installation on Vehicle		<u></u>
Kit/Parts	#20	
. Labor, Hours		
3.4 Recurring Retrofit Costs	1 HR.	
. Fuel Economy , miles/gallon	Baseline	Retrofit
City	1 ==	12
Highway	15	7.5
Composite	No CHA	NGE
. Parts Replacement Cost	NO CAR	
. rarus nepracement cost		

3. Estimated Cost Information, Dollars

RETROFIT INFORMATION OUTLINE

1. S	yste	m Information	- see attached	
1.		etrofit System Principles of	Description (use extra pages or attach catalog) Operation	
	•	Installation	Reqm'ts	
		Adjustments		

1.2	Development Status	Number to Date
	Conceptual/Design Stage	
	Prototype	
	Manufactured	5/65
	Distributed to Dealer	5015
	Installed on Vehicles	5000(?)
	Total Accumulated Miles	5000 K

(Estimated, Thousands)

. MFG Techniques

1.3 Emission Control Category (check applicable box)

Mec	hanical Mo	ndificatio	on			Fuel Modi	fication
	Exhaust (Crank-	Fuel		Crank-
nduction	Ignition	n Combus- Exhaust			Evap. Control	Exhaust	case
		V					
		V					
		~					

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

AMC	Chrysler	GM	Ford	Foreign (Specify)
67 - 72	59-72	55-72	54-72	
290-390	273-440	283-455	221-428	
/	4	6	5	-

Engine CID (Range) Number of Retrofit

Model Types to Satisfy

Application |

Year (Range)

1. System Information

1.1 Retrofit System Description. The VARICAM replaces the stock sprocket on the nose of the crankshaft and provides automatic variable valve timing.

Principles of Operation. The valve train of any standard internal combustion engine is a compromise: being fixed, it has only one RPM range where peak overall efficiency is realized. Above and below this RPM range (at approximately freeway speeds for most passenger cars), the engine overall efficiency falls off. The VARICAM, by advancing the valve timing at low speeds and retarding it at high speeds, affords a higher overall efficiency throughout the engine's operating range. A spring of the highest quality is used to advance the valve timing. As engine speed increases, more and more torque is required to rotate the camshaft. As this torque build-up occurs, the spring is deflected and the valve timing moves toward the retard position in a near linear relation. This variation in valve timing results in increased performance, better specific fuel consumption traits, and reduced exhaust emissions.

Installation Requirements. Remove the front valve chain cover and the stock camshaft sprocket, replace the sprocket with the VARICAM per the furnished instructions and replace the front cover.

- Adjustments. Other than minor ignition re-setting on installation, no adjustments should be required for the life of the engine.
- Manufacturing Techniques. In most cases, stock sprockets are modified by machining methods, faceplates are machined from bar stock (or die cast if quantities are sufficient to make this method economically feasible), and the units assembled and adjusted at the point of origin.

_		
2.	Performance Data	Enclosure 1 cont

		Exhaus	t Emissic	n Measure	ements, Fi	ill In App	licable B	lanks		
Please attach additional test data if		Hot-Start Cold-Star	t	Federal Tests 1970 1972			Other Tests (specify units and test conditions)			Partic late
available	нс, РРМ	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received				12:9	123	3.2				
Baseline, after tune-up										
Retrofit device test				5.5	61	1.7				
Number of cars				/	/	/				
Test source	NAPCA	1 test	reque	sted by	0.5.1	Army 7	ank - A4	tomotive	e Comm	and
Additional test data										
Durability Fleet										
Test Data (Attach Data	If Availab	le)								
2.2 Special Reqm'ts., i	f any (Fue	el,Safety)	hone						P	
		MMBF M	iles	Confidenc	e Test	Source				
2.3 Reliability (mean motion between failure, MN		Unlimited	d	95%	Usei	-5				
·		MTTR, H	ours				Parts	Required	for Repa	ir
2.4 Maintainability (me to repair, MTTR)	ean time	~								
2.5 Periodic Maintenand Inspection Require		None								

2.6	Drivability Evaluation Check Applicable Boxe	on-Retrof es. See	it Devi Enclosu	ce :	Instal 2 For	led: Driv	Plea abili	ase ity	Cond Proc	uct E edure	valo , Pa	uatio age /	on and	d		
	Make Olds Year Toronado Ambient Temperature Car Preparation Data			سمج	425 eng IARIC	in e	mile	, e a g c	, -	M 73,7	A 769					
Poi	ic Ignition Timing/ <u>A</u> nt Dwell <u>30</u> Degrees		Idle		1				Mode	3 <i>a</i> , /		Cruis	se		Dec	e1
		n _sec	Engine RPM	Satisfactory	Rough Stall		Satisfactory Detonation	Stretchiness	Stumble	Sag		Satisfactory	Detonation		Stall	Backfire
1 1	Choke Hi-cam (N) 20 s Kickdown (N) 10 sec In drive, 10 sec	_	N/A N/A N/A	V V V V				_ -						-		
PL	Accel 0-30 (1/2 throt Cruise 30 (0.1 Mile) Accel 30-55 (WOT at D Decel 55-15 (Mod Brak Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thro Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake Idle, 15 Seconds	Detent) e) ettle)	N/A	V		V	1] 1] 1]									
Hot Start Evaluation	Idle, 15 Seconds Accel 0-30 (1/2 Thro Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Decel 55-15 (Mod Bra Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thr Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brak	ttle) Detent) ke) ottle)	Star	t Ti	ime/	'S(
	Idle, 15 Seconds erformance OT Accel 0-60, Sec	Trial 1 8,6			rial: 8.6			me	dia-			s ta A 11	200	PG 7	lio.	_ _ _

Enclosure 1 cont.

2	Ectimated	Cact	Information	Do 11 am

2 1	l Date	nfit	Syster	n Cac+
	ו רעפיו.ו	VI I L	382 FE	11 (11)

- . Initial Cost
- . Developmental/Prototype
- . Manufacturing
- . Distribution

3.2 Profit Margins

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)

3.3 Installation on Vehicle

- . Kit/Parts
- . Labor, Hours

3.4 Recurring Retrofit Costs

. Fuel Economy , miles/gallon

City

Highway

Composite

. Parts Replacement Cost

Cost	Quantity
40-50	10,000
Existing	
12-18	10,000
Normal	

20% of gross	
30% " "	. —
50% " "	_

40-50	10,000
1-2	

Baseline	Retrofit
10,12	11.76
	4042

4.	Marketing Information/Plan Through warehouse distributors and retail outlets (standard channels)	_

RETROFIT INFORMATION OUTLINE

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog) See Encl. #1

. Principles of Operation Speed controlled exhaust gas recirculation & spark retard

. Installation Reqm'ts

Mechanic plus normal shop tools

. Adjustments

Lean best carburetor idle setting

. MFG Techniques

Purchase & assemble components into kits

Apr. 10, 1972

1.2 Development Status

Number to Date

9 90 by

None

9

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

52,000

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mec	Mechanical Modification									
	Exhaust (Control		Crank-	Fuel		Crank-			
nduction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case			
Х	X	Х					•			
x	X	Х								
х	X	Х								

Hydrocarbon

Carbon Monoxide

Oxides of Nitrogen

Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available) See Encl. #2 Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)
Number of Retrofit

			· · · · · · ·			1
L	AMC	Chrysler	СМ	Ford	Foreign (Specify)	<u> </u>
L	155-171	155-171	155-171	155-171	VW Sedan	
	All	All	Alí	All	1200-1500 C.	ļς,
	10	12	65	18	1	

Model Types to Satisfy

Application

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaust Emission Measurements, Fill In Applicable Blanks										
Please attach additional test data if available	7-Mode Hot-Start 7-Mode Cold-Start			Federal Tests 1970 1972 _X			Other Te and te	Particu- lates				
	нс, РРМ	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	HC, GPM	CO, GPM	NO _X , GPM			
Baseline, as received												
Baseline, after tune-up				5.09	12.51	9.85	8.3	113.8	1.4			
Retrofit device test				3.30	11.37	3.06	16.66	59.73	0.485			
Number of cars				1	1	1						
Test source	Scott Research Labs. E.P.A Ypsilanti, Michigan											
Additional test data							172 Cold	Starts				
Durability Fleet				169 For	d Wagon		163 Chev	rolet Sec	an			

Test Data (Attach Data If Available)

See Enclosure #3 for additional data

- 2.2 Special Reqm'ts., if any (Fuel, Safety) None other than normal precautions observed by mechanics concerning hot engine parts.
- 2.3 Reliability (mean mileage between failure, MMBF)

MMBF Miles Confidence Test Source
Insufficient data available

2.4 Maintainability (mean time to repair, MTTR) MTTR, Hours Parts Required for Repair

Insufficient data available Component replacement

2.5 Periodic Maintenance/ Inspection Requirements Functional inspection at installation. Clean orifice in valve each 6 months.

2.	6	Drivability Evaluati Check Applicable Box	on-Retrof es. See	it Devi Enclosi	i ce ure	Ins 2 I	tall For D	ed: riva	Ple bil	ase ity	Co Pr	ndu oce	ct dur	Eva e,	luat Page	ion 4.	an	d		
		Make Plymouth Yea	r <u>1964</u>	Engine	CI	D_3	18	_Tra	ınsır	iss	ion			X						
		Ambient Temperature	59 ⁰ F										M	A						
		Car Preparation Data						•												
		ic Ignition Timing nt DwellDegrees	Degrees	Idle	e Mi	ode			Acc	el.	Мо	de			Cru	ise			Dec	:e1
1	Oth	er Special Adjustment	s: Attach	Σ	2			1	}	SS					2				Ì	
	Da	ta Sheet	·	RPM	Satisfactory			Satisfactor	3 5	Stretchiness		jon			Satisfactory	.	į			a
	ه ا	Soak 12 hours minimu	m	Engine	sfa	اء ا	4	f.	Detonation	t E	C+umble	Hesitation			fa	į	Detonation			Fire
	Start/Idl	Start to run time 5	sec	Eng	ati	Rough	Stall	1	4	t	1	esi	Sag	ŀ	ij	Surging	at o		Stall	Backfi
	rt,	No. of attempts 2				~	7	Ľ	1	S		Ī	S		N	7	ð		Ġ	<u>~~</u>
	St	Choke Hi-cam (N) 20	sec	700	X											•				
	Cold	Kickdown (N) 10 sec		550	X				•								•			
	ပ	In drive, 10 sec		500.	X								•				•	•		
	Cold	Accel 0-30 (1/2 thro Cruise 30 (0.1 Mile) Accel 30-55 (WOT at 1 Decel 55-15 (Mod Brak Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thro Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake Idle, 15 Seconds	Detent) ke) ottle)	550	X			X X							x x	I].		
	Sto	op Engine, Soak 15 Mir	i, kestar	550 550	υτ Χ	1 me		Se	С,	Att	emp	ts								
		Idle, 15 Seconds Accel 0-30 (1/2 Thro	n++1e)	770 1	Α.			x	Ė					Ī						
	5	Cruise 30 (0.1 Mile)	-						1	L	L		•	١.	х	T	\neg			
	·-		Accel 30-55 (WOT at Detent)				•	X	T					1	٠٠٠					
	ı] na	Decel 55-15 (Mod Bra					L					•					ſ			
	Eva	Cruise 15 (0.1 Mile)												x	T		_		_	
	Start Evaluat	Accel 15-50 (1/2 Thr					X	Π	П				Ì	L. <u></u> 1						
		Cruise 50 (0.1 Mile)						1					•	X	T					
	Hot	Decel 50-0 (Mod Brak												<u></u>		_	ſ			
	_	Idle, 15 Seconds	550	X			Comments								_					
	Pe	erformance	Trial 1	Trial	2	Iri	al 3	- 1			_									
		T Accel 0-60, Sec	13	12			12													
i	i	ecel 60-30. Sec	18	25			23													

Enclosure 1 cont.

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

Cost	Quantity	
\$62,600	9	
30,000	90]
25.00	Each - based o	n high
60.00	11 11	27 17

Gross

n high volume mfg. product

- 3.2 Profit Margins
 - . Manufacturer
 - . Distributor
 - . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours

\$85.00	1
20.00	2

- 3.4 Recurring Retrofit Costs
 - . Fuel Economy , miles/gallon
 City
 Highway
 Composite
 - . Parts Replacement Cost
 - ** Maximum single component replacement cost.

Base	eline	Retrofit						
9.18	*14.71	8.20	*13.47					
15.56	*18.12	15.00	*19.60					
15.89	*17.78	14.20	*19.00					
		** \$17.50						

lst Figure - '69 Ford Wagon 2nd Figure (*) - '64 Plymouth Sedan

See Encl. #4

4. Marketing Information/Plan Tentative plans to market through present parts distribution channels; independent Wholesale Parts jobbers, NAPA Warehouse distributors,

O.E. vehicle manufacturers service parts franchised dealer distribution channels.

Training provided through present field representatives (approx. 175)

by "in location" clinics and also by training facilities, and manpower of the O.E. vehicle manufacturers.

25%

35% 40%

RETROFIT INFORMATION OUTLINE

Exhaust Control Crank- Fuel		
1.2 Development Status Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- tion Crank- Fuel Exhaust Control C		·····
Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- Exhaust case Evap. Induction Ignition Combus- Exhaust case Evap. Control Control Arbon Monoxide Arides of Nitrogen Control	board	ds
Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus-Exhaust case Evap. Induction Ignition Combus-Lion Control C	•	
Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- tion Arbon Monoxide Arichaed Arichaed Fest of unbury gases is required — Please refer attached Less Than 6000 Lb GVW		
Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank-Fuel Induction Ignition Combus-Exhaust case Evap. tion Control Control drocarbon rbon Monoxide ides of Nitrogen rticulates ther A substantiating fest of unbury, gases is required - Please refer a Hached fest report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW		
Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank- Fuel Induction Ignition Combus- Exhaust case Evap. Induction Monoxide ides of Nitrogen Inticulates There R substantiating fest of unburn, gases is required - Please refer attached fest report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW		
Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank- Fuel Induction Ignition Combus- Exhaust case Evap. Control	•	
Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank Fuel Induction Ignition Combus Exhaust case Evap. Induction Ignition Combus Exhaust case Evap. Control Control Control Control Induction Ignition Combus Exhaust case Evap. Control Control Control Control Induction Ignition Combus Exhaust case Evap. Control Control Control Crank Fuel Evap Control Control Crank Fuel Evap Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control		
(Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank- Induction Ignition Combus- tion Control C		
1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank - Fuel Induction Ignition Combus - Exhaust case Evap. Control Control Control Control Induction Ignition Combus - Exhaust case Evap. Control Control Control Control Control Control Control Control		•
Mechanical Modification Exhaust Control Induction Ignition Combus- Exhaust case Evap. Control Contro	•	
Exhaust Control Induction Ignition Combustation Crank-Fuel Exhaust case Evap. Control C		
Induction Ignition Combus- Exhaust case Evap. Control Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Induction Ignition Combus- Exhaust case Evap. Control Induction Ignition Combus- Exhaust case Evap. Induction Ignition Combus- Exhaust case Induction Ignition Ign	Fuel Mod	dification
Induction Ignition Combustion Control Control drocarbon arbon Monoxide ides of Nitrogen articulates ther A substantiating test of unbury gases is required - Please refer attached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW		Crank-
ides of Nitrogen articulates ther A substantiating test of unbury gases is required - Please refer attached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	Exhaust	case
ides of Nitrogen rticulates ther R substantiating test of unburn gases is required - Please refer attached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	<u> </u>	
ther R substantiating test of unburnagases is required - Please referatached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW		ļ
ther R substantiating test of unburnagases is required - Please referatached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	· · · · · · · · · · · · · · · · · · ·	<u> </u>
gases is required - Please refer attached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	 	ļ
gases is required - Please refer attached test report 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	l,	1
1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	rned	exhau
Light Duty Vehicles Less Than 6000 Lb GVW		THE
AMC Chrysler CM Ford		<u>i </u> _
		Foreign
Year (Range)	 G	Specify)
Engine CID (Range)		
Number of Retrofit		

2.	Performance Data		Enclosure	1 cont
. .	i Crioimance Data		CITC 10341C	1

ſ		Cuban	-A F-::				• • • •			
Please attach additional test data if		Hot-Star Cold-Sta			ederal Tes 1972	its	Other T and t	Partice lates		
available	HC, PPM	CO, %	NO _X , PP	HC, GPM	CO, GPM	NO _X , GPM	нс,	co, _	NO _x ,	
Baseline, as received										
Baseline, after tune-up		· · · · · · · · · · · · · · · · · · ·						1		
Retrofit device test				<u> </u>						
Number of cars			<u> </u>			<u> </u>				<u> </u>
Test source				· · · · · · · · · · · · · · · · · · ·	Į					
Additional test data						<u> </u>				<u> </u>
Durability Fleet		·			<u> </u>			<u> </u>		l
2.2 Special Reqm'ts., if	Fany (Fue	el,Safety	/)							
		MMBF	Miles	Confidenc	e Test	t Source]			
2.3 Reliability (mean m between failure, MM]			
		MTTR,	Hours				Part	s Requir	ed for Repa	ir
2.4 Maintainability (me to repair, MTTR)	·									
2.5 Periodic Maintenanc Inspection Requirem	e/ ents	No ma	untena	uce re	9d, e	except	spar	rk pi	lug cha	uge
		appro	x. ei	very	250	100 1	un ics			

2.6	Check Applicable Bo												IG
	MakeYe	ar	Engine	CII)		_Tran	smiss	ion				
	Ambient Temperature	°F								M	A		
	Car Preparation Dat	<u>a</u>									_		
Otl Di albi/trety	sic Ignition Timing	s ts: Attach num sec	Idl	Satisfactory 🗷	Rough	Stall	Satisfactory	Stretchinese .		. Hesitation Sag	<u> </u>	Satisfactory a Surging se Detonation	Stall
Cold Start Drive-Away	Accel 15-50 (1/2 Th Cruise 50 (0.1 Mile) Detent) ake)) rottle)											
Hot Start Evaluation	Accel 15-50 (1/2 T	rottle) e) t Detent) rake) e) hrottle)						ommen					
	Decel 60-30. Sec			\neg		,	1 -						

3. Estimated Cost Information, Dollars			
3.1 Retrofit Syste m Cost	Cost	Quantity	
. Initial Cost			
. Developmental/Prototype			·
. Manufacturing	\$ 50	100,000	approx
. Distribution			
3.2 Profit Margins		<u>,</u>	7
. Manufacturer			1
· Distributor			1
. Dealer/Installer (Retail)			
3.3 Installation on Vehicle			-
. Kit/Parts			1
. Labor, Hours]
3.4 Recurring Retrofit Costs			-
. Fuel Economy , miles/gallon	Baseline	Retrofit	_
City			
Highway			
Composite			
. Parts Replacement Cost]
4. Marketing Information/Plan			
			
			

RETROFIT INFORMATION CUTLINE

١.	System Information	MARK TEN "B"
	1.1 Retrofit System Description Principles of Operation	on (use extra pages or attach catalog) Fast Rise - High energy ignition - (Capacitive Discharge)
	. Installation Reqm'ts	Connect 4 wires - Install 3 screws.
	. Adjustments	Increase plug gap for maximum effectiveness.
	. MFG Techniques	Printed circuit board assembly.

1.2 Development Status

Conceptual/Design Stage
Prototype

Manufactured
Distributed to Dealer
Installed on Vehicles
Total Accumulated Miles

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

	Mec	hanical Mo	Fuel Modification						
		Exhaust (Crank-	Fuel		Crank-	
٠	nduction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case	
		X							
l		х							

Hydrocarbon
Carbon Monoxide
Cxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)
 Light Duty Vehicles Less Than 6000 Lb GVW

	AMC	Chrysler	СМ	Ford	Foreign (Specify)
Year (Range)		Applicabl	e to all veh	icles	
Engine CID (Range)	whic	h are 12 V.	negative gro	und powered.	
Number of Retrofit					

Model Types to Satisfy Application

2.	Performance Data	Enclosure] cont
	i Ci i Oi illanice Data	Elicioadie Coll

	Exhaust Emission Measurements, Fill In Applicable Blanks									
udareronar cese;		Hot-Start Cold-Star		Fe 1970	deral Te:		Other Tests (specify units and test conditions)			Particu lates
available H	C, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,_	NO _x ,	
Baseline, as received										
Baseline, after tune-up				,						
Retrofit device test		1								
Number of cars		1		<u> </u>			:			
Test source										
Additional test data										
Durability Fleet										
2.2 Special Reqm'ts., if a	any (Fu	el,Safety) <u>No</u>	one						
		MMBF N	1i les	Confidence	ce Tes	t Source]			
2.3 Reliability (mean mil between failure, MMBF		250,000 1		90% +		ld Data]			
		MTTR, I	lours						ed for Repa	
2.4 Maintainability (mean	time	0.5					Std. Elec	- Most a tronic Su	vailable at pply Outlet	
to repair, MTTR)							•			
2.5 Periodic Maintenance/ Inspection Requirement		None	<u> </u>			······································				
·										

2.6	Drivability Check Applic	Evaluation-Retro able Boxes. Sec	ofit Dev e Enclos	ice Insta ure 2 For	11e	ed: Please Cond rivability Proc	uct Ev	aluation and Page 4.	l
	Make	Year	_ Engine	CID		_Transmission	. 🔲		
	Ambient Temp Car Preparat	eratureO ion Data	F	·			M A	.	•
	ic Ignition T	imingDegree _Degrees		e Mode		Accel. Mode		Cruise	Decel
Da e	ta Sheet Soak 12 hour	timesec pts (N) 20 sec 10 sec	Engine RPM	Satisfactory Rough		Satisfactory Detonation Stretchiness Stumble	Sag	Satisfactory Surging Detonation	Stall Backfire
i ro	Cruise 30 (0 Accel 30-55 Decel 55-15 Cruise 15 (0	(WOT at Detent) (Mod Brake) .1 Mile) (1/2 Throttle) .1 Mile) Mod Brake)							
Hot Start Evaluation	Idle, 15 Sec Accel 0-30 (Cruise 30 (C Accel 30-55 Decel 55-15 Cruise 15 (C	(1/2 Throttle) (1/2 Throttle) (1/2 Mile) (MOT at Detent) (Mod Brake) (1/2 Mile) (1/2 Throttle) (Mod Brake)		rt Time		Sec, Attempts Comments			
	OT Accel 0-60, Decel 60-30, S								

	3.1 Retrofit System Cost	Cost	Quantity	
	. Initial Cost	None		
	 Developmental/Prototype 	None		
	. Manufacturing	\$20.00 each	25,000 Min.	
	. Distribution			
	3.2 Profit Margins			
	. Manufacturer			
	· Distributor			
	<pre>. Dealer/Installer (Retail)</pre>			
	3.3 Installation on Vehicle . Kit/Parts			
	. Labor, Hours	0.5		
	3.4 Recurring Retrofit Costs			•
	 Fuel Economy , miles/gallon 	Baseline	Retrofit	•
	City			
	Highway			
	Composite			
	. Parts Replacement Cost		in the state of th	
4.	Marketing Information/Plan Pre	sently marketed Retail cost -	through Dealers	3.
		Retail Cost -	939.93	
				فيستميز ويوفيه فيهم ومتماع والمستحرب والمستحرب والمستحرب والمستحرب والمستحرب والمستحرب والمستحرب والمستحرب
		·		

3. Estimated Cost Information, Dollars

RETROFIT INFORMATION OUTLINE

1. System	Information
-----------	-------------

1.1 Retrofit System Description (use extra pages or attach catalog)

. Principles of Operation Retard spark at low RPM.

. Installation Reqm'ts

Use with Mark Ten, connect 4 wires.

. Adjustments

Readjust timing at distributor.

. MFG Techniques

Standard printed circuit board assembly.

1.2 Development Status

Conceptual/Design Stage Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Nu	mber	to	Date
		3	
		_	

12

None

3 25

1.3 Emission Control Category (check applicable box)

	Mec	Fuel Modification							
		Exhaust (Crank-	Fuel		Crank-	
]	nduction	Ignition	Combus- tion	Exhaust	case Control	Evap. Control	Exhaust	case	
		x							
.		Х							
								· · · · · · · · · · · · · · · · · · ·	
					!			•	

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)
All apr	licable with	variable ef	fectiveness.	
	,			

Model Types to Satisfy

Application

2. Performance Data Enclosure 1 cont.

		Exhaus	st Emissic	on Measure	ements	, Fi	11 In App	licable E	31anks	······	
Please attach additional test data if		lot-Start Cold-Star		Fe 1970 _	deral	Tes 1972		Other Tests (specify units Part and test conditions) la			Partic late
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO,	GPM	NO _X , GPM	нс,	co,	NO _x ,	
Baseline, as received		=		<u> </u>							
Baseline, after tune-up		Insuffic	ient data	availab]	e at	this	time.		<u> </u>		<u> </u>
Retrofit device test									<u> </u>	<u> </u>	<u> </u>
Number of cars		·	<u> </u>	<u> </u>	<u>L</u>		<u> </u>	<u> </u>	<u> </u>		
Test source			,				·	,	·		·
Additional test data				ļ	 			<u> </u>	ļ	<u> </u>	<u> </u>
Durability Fleet			<u> </u>	<u> </u>	<u> </u>				<u> </u>	<u> </u>	
Test Data (Attach Data	If Availab	1e)									
2.2 Special Reqm'ts., i	f any (Fue	el,Safety) Non	e							
	. 1	MMBF	Miles	Confiden	ce	Test	t Source	1			
2.3 Reliability (mean	mileage	10 6				Est	Imate]			
between failure, M	_							-			
		MTTR,	Hours							ed for Repa	1
2.4 Maintainability (m	ean time	1.0				Est:	imate	Std	Available Supply St	e at Electr core.	onic
to repair, MTTR)								• .			
2.5 Periodic Maintenan		No main	tenance r	equired,	perio	dic	check wit	h timing			
Inspection Require	ments	device	desirable	to assur	e eff	ecti	veness (a	nnually).			

not

2.6) •	<pre>brivability Evaluation-Retrof Check Applicable Boxes. See 1</pre>	it Dev Enclos	icel ure	Install 2 For I	led: iriv	: Please /ability	Conduct En	valuation a , Page ą	nd	
		Make Dodge Year 72	Engine	CII	1440	î'r	ansmiss	ion [হ		
		Ambient Temperature 22°F					,	М	A		
		Car Preparation Data	,								
:	200	ic Ignition Timing /2 Degrees				Γ			{	·	-1
		nt Dwell 32 Degrees	Idle	e Mo	ode		Accel.	Node	Cruise	Dece'	1
		er Special Adjustments: Attach				-	JT				7
•		ta Sheet	RPM	tor			Tal H		Satisfactory Surging Dotonation		
		Soak 12 hours minimum		Satisfactor			Satisfactory Detonation Stretchines	Stumble Hesitation Sag	Satisfacto Succiona		립
	Idle	Start to run time sec	Engine	tis	Rough Stall		tong	Stunblo Mesitat Sag	Satisfa Surging Surging		uackiire
	art/1	No. of attempts 1	ωï	Sa	Ro		t De Sa	Stun Hes Sag	Sal	Stall	2
	Stai	Choke Hi-cam (N) 20 sec	800	Ÿ			ates at administração de la final de la fi				_
	•	Kickdown (!1) 10 sec	800	1						•	
	Cold	In drive, 10 sec	700	15							
									P		
		Accel 0-30 (1/2 throttle)					<u>/ </u>			•	
	5	Cruise 30 (0.1 Mile)						 -	[X]]	
	Orive-Away	Accel 30-55 (WOT at Detent)					<u> </u>				_
•	, Ke	Decel 55-15 (Mod Brake)								, L.L.	ل
	i	Cruise 15 (0.1 Mile)				_			MLL] .	
	। ਨਹ	Accel 15-50 (1/2 Throttle)			<i>:</i> ·	L	九一一			1	
	St.	Cruise 50 (0.1 Mile)		٠	_				LY.L	J	٦
		Decel 50-0 (Mod Brake) Idle, 15 Seconds	1 40	V		<i>:</i>					
	! ——		600							*	
	Sto	op Engine, Soak 15 Min, Restar	t: Star		Time_/Q		Sec, Att	empts /			
		Idla, 15 Seconds Accel 0-30 (1/2 Throttle)	12.5	4	نــــــــــــــــــــــــــــــــــــــ	<u></u>	VI I				
	r.	Cruise 30 (0.1 Mile)				L.	<u> </u>	اد حلحجات	IXIT]	
	Evaluation	Accel 30-55 (WOT at Detent)				٢	<u> </u>		<u> </u>	J	
,	Jua	Decel 55-15 (Mod Brake)				1	<u> </u>				7
		Cruise 15 (0.1 Mile)						•	A	1	يـ
	Start	Accel 15-50 (1/2 Throttle)					XI I		<u> </u>		
		Cruise 50 (0.1 Mile)				7		·			
	HOT	Decel 50-0 (Mod Brake)								\mathbf{y}	j
	٠.	Idle, 15 Seconds	600	X			Johnen	ts	go ya akumiyak diyo waki waki ku 1,111-1-1-1-1-1-1-1-1-1-1	T	
	Pe	rformance Trial 1	<u>Iria</u>	2			.,		-		
	MC	OT Accel 0-50, Sec 32	24	/	13.5					. sie a. sandilleinsplane - in dalle i	
		Decel 60-30, Sec 24	24	.5	24.5						

2.	b	Check Applicable Boxe	on-Retrof es. See l	it Devi Enclosi	ce re	Install 2 For D	ed: Oriv	: Pleas vabilit	e Con y Pro	iduct Ev ocedure	raluation , Page 4.	and	
		Make Dodge Year	1972	Engine	CID	440	Tı	ransmis	sion		7		
		Ambient Temperature	10 °F							М	A		
		Car Preparation Data											
	Basi	ic Ignition Timing /2	2 Degrees		·····		ſ				<u> </u>		
		nt Dwell 32 Degrees	-	Idle	Мо	de .		Accel	. Mod	le	Cruise		Dece1
	Othe	er Special Adjustments	: Attach	Σ	2			à	2		5		
	Da	ta Sheet ·		RPM	Satisfactory	.		Satisfactory Detonation	Stretchines Stumble	ion	Satisfactory Surging	ion	
	e)	Soak 12 hours minimum	_	Engine	sfa	됩니		Satisfacto Detonation	Stretch Stumble	Hesitation Sag	Satisfa Surging	Detonation	Stall Backfire
	/1d3	Start to run time_3		Enç	Sati	Rough Stall		sati etc	tre tu	les i	ati	e to	Stall
	12.00	No. of attempts 2		40.			L		1 3				Laa
		Choke Hi-cam (N) 20	sec	1000	-+						•		
	100	Kickdown (ii) 10 sec		750	\dashv					. •			
	<u> </u>	In drive, 10 sec		600		<u>.</u>						٠,	• .
		//.cce1 0-30 (1/2 thro	Ltle)				5	XTT	1.1			•	· .
		Cruise 30 (0.1 Mile)	,				<u>ت</u>	 			×		
	Drive-Away	Accel 30-55 (NOT at)	Detent)					X					ف مساور ما
	ke-	Decel 55-15 (Mod Brai	(e)								*****		
	F	Cruise 15 (0.1 Mile)					_	·			X		*
	Start	Accel 15-50 (1/2 Thre	ottle)			٠.	L	X L	لــــــــــــــــــــــــــــــــــــــ		(
	•	Cruise 50 (0.1 Mile)	٠.	٠.							LXI.		
	Cold	Decel 50-0 (Mod Brake	e)	(•						لسلسا
	·	Idle, 15 Seconds		600	χŢ								
	Sto	op Engine, Soak 15 Mir	i, Restari	700	t T	ime		Sec, At	tempt	:s /			
	İ	Idle, 15 Seconds Accel 0-30 (1/2 Thro	httlal	700			Γ	TT	1				
	١	Cruise 30 (0.1 Mile)	•				_						
	Evaluation	Accel 30-55 (WOT at						$\Pi\Pi$					
	alu	Decel 55-15 (Mod Bra											
		Cruise 15 (0.1 Mile)) .			•	,			· 			
	Start	Accel 15-50 (1/2 Thi	ottle)				L		44		السائسال		
	1	Cruise 50 (0.1 Mile)						•					
	Hột Hột	Decel 50-0 (Mod Brak	(e)	4.55				÷				۷.	
. · ·	-	Idle, 15 Seconds	Tuda 3 3	650			7	Comme			+1+ude		
	Γ	erformance OT Accel 0-50, Sec	101/2	10 10	4	Irial3		, i	-		c Con		
		Decel 60-30, Sec	24	23	+	27					Carbu		
	<u></u>	<u> </u>		L				35.6.5		- V			

3. Estimated Cost Information, Dollars			
3.1 Retrofit System Cost	Cost	Quantity	7
. Initial Cost	Major Deve	Lopement	
. Developmental/Prototype		See Below)	
. Manufacturing	\$15.00 Each	25,000 Min.	Includes Profit
. Distribution			
3.2 Profit Margins			٦
. Manufacturer	See A	bove	<u> </u>
· Distributor	Not Kn	own	4
 Dealer/Installer (Retail) 			_
3.3 Installation on Vehicle			٦
. Kit/Parts	Not Known (S	ee Above)	4
. Labor, Hours	1.0 Max.		1
3.4 Recurring Retrofit Costs	D32	D 1 . C*1	. ·
Fuel Economy , miles/gallon City	Baseline	Retrofit	4,
City			-
Highway Composite	No Data		1
. Parts Replacement Cost			4
. rates Repracement cost	. !		١
Note: This add-on could be incorpora	plan for marke	k Ten "B" ("Sys	stem #1" as
submitted) and could be marked numbers.	ted for under \$0	60.00 complete	in reasonable

1. Sv	/stem	Info	rma t	i.	on
-------	-------	------	-------	----	----

1.1	Retrofit System Descript Principles of Operation	ion (use ex	tra pages or at BROSHU	tach catalogy	= # /
	. Installation Reqm'ts	//	11	11	" PARA
	. Adjustments	11	11	11	11 11
	. MFG Techniques	SEE	PATEINT	ENCLOSURE #	£2\$3

1.2	Development Status	Number to Date
	Conceptual/Design Stage	
	Prototype	
	Manufactured	2000 ±
	Distributed to Dealer	NONE
	Installed on Vehicles	2000 ±
	Total Accumulated Miles	N.A.
	(Estimated, Thousands)	

1.3 Emission Control Category (check applicable box)

Fuel Modification Mechanical Modification Exhaust Control Crank-Crank-Fue1 case Exhaust nduction [Ignition] Combus-Exhaust case Evap. tion Control Control

Hydrocarbon Carbon Monoxide Oxides of Nitrogen **Particulates** Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

·	AMC	Chrysler	СМ	Ford	Foreign (Specify)
Year (Range)	ALL	Acc	Acc	ALC	ALL
Engine CID (Range)	Acc	ALL	ALL	ALL	ALL
Number of Retrofit	/	/	1	/	1

Model Types to Satisfy AUTONOFICE CHIT FITS ALL GRES
Application TRUK CHIT FITS AL TRUK

GALLOWE, DIESEL (#2 FJEL) & INCUSTRIAL (#6 FJEL)

		Exhaus	t Emiss	on Meas	uremen	ts, Fi	ill In App	olicable	Blanks		
Please attach additional test data if		Hot-Start Cold-Star	1970	Federal Tests • 1970 1972				Other Tests (specify units Pand test conditions)			
available	HC, PPM	CO, %	NO _X , PF	M HC, G	PM CO	GPM	NO _X , GPM	HC,	CO,	NO _X ,	
Baseline, as received				<u> </u>		···					
Baseline, after tune-up											
Retrofit device test				<u> </u>				<u> </u>			
Number of cars				<u> </u>		•	<u> </u>	<u> </u>			
Test source	SEL	EN	X050	IRES	#4	1	5				
Additional test data											
Durability Fleet			<u> </u>	1				L			<u> </u>
Test Data (Attach Data)	lf Ava ilab	le)									
2.2 Special Reqm'ts., i	f any (Fue	1,Safety	Non	<u> </u>							
									 		
	1	NARE N	liles	Confid	ence	Test	t Source]			
2.3 Reliability (mean m	ni leage	NON							-		
between failure, MP	IBF)										
		MTTR, H	lours					Par	rts Requir	ed for Repa	ir
2.4 Maintainability (me	an time	Non	E		1			M	ONE		
to repair, MTTR)		•									
2.5 Periodic Maintenand		Non	<u></u>							<u> </u>	
Inspection Requirem	nents										

Enclosure 1 Cont.

SEE ENCLOSURES #4,5\$6 2.6 Drivability Evaluation-Retrofit Device Installed: Please Conduct Evaluation and Check Applicable Boxes. See Enclosure 2 For Drivability Procedure, Page 4 Make _____ Year _ Engine CID Transmission Ambient Temperature Car Preparation Data Basic Ignition Timing . Degrees Idle Mode Accel. Mode Cruise Dece1 Point Dwell Degrees Other Special Adjustments: Attach Satisfactory RPM Satisfactory Data Sheet Nows **Jesitation** Engine Soak 12 hours minimum Rough Start to run time sec No. of attempts Choke Hi-cam (N) 20 sec Kickdown (N) 10 sec In drive, 10 sec Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) S Idle, 15 Seconds Stop Engine, Soak 15 Min, Restart: Start Time Sec, Attempts Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent). Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Comments

Trial 2 Trial 3

Trial 1

Performance WOT Accel 0-60. Sec Decel 60-30, Sec

ESTIM	47ED	FOR
ARS(C)	TPIK	15/1

3.	${\tt Estimated}$	Cost	Information,	Dollars
----	-------------------	------	--------------	---------

- 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

3.2	Profit	Margins
.	110116	1101 41113

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)

3.3 Installation on Vehicle

- . Kit/Parts
- . Labor, Hours

3.4 Recurring Retrofit Costs

Fuel Economy , miles/gallon City Highway

Composite

. Parts Replacement Cost

Cost	Quantity			
75.C 200,T				
N.A.	NA.			
N.A.	NA-			

N.A.	N.A.
N.A	MA.
N.A.	N.A.

\$5,00	ANY
5 HRS	ANY

Baseline	Retrofit
SEE END	#I PRC
"	• •
•	"
	NONE

4.	Marketing Information/Plan		
		See Enclosed	LETTER
	paintenance and the second second second second second second second second second second second second second		

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog)

. Principles of Operation Use of propane gas (LP-gas) as motor fuel.

. Installation Reqm'ts

Can be installed with or without modification of motor such as increasing compression, changing timing, etc.

. Adjustments

. MFG Techniques

Zinc & aluminum die castings, machined, stamped, etc.

1.2 Development Status

Ror the #40 Carburetor: Number to Date Note: The #725 Regulator and other components have

been on the market for years.

Conceptual/Design Stage
Prototype
Manufactured
Distributed to Dealer
Installed on Vehicles
Total Accumulated Miles

xx xx xx xx 400 6000 5,600 12 on motor vehicles 5,300 240 on stationary engines

20,000 miles

millions of

miles

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mec	Mechanical Modification								
	Exhaust C	Control		Crank-	Fuel		Crank-		
Induction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case		
ļ							<u> </u>		
						Ţ,			

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range)

Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)
250-430*	250-430*	250-430*	25-430*	?

Model Types to Satisfy Application

*We have no detailed application catalog worked out yet on the #40 Carburetor. We can fit most all pickups having motors from 250 to 430 C.I.D. On cars, however, we don't have the $7\frac{1}{2}$ to 8" needed on some models between manifold flange and car hood.

2.	Performance Data	 Enclosure	1 cont.
	i ci i di mance bava	4114103450	

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

For the #40LP Gas Carburetor & 725 Regulator on 1965 Ford V8 car, 289c.i.d.

	Exhaust Emission Measurements, Fill In Applicable Blanks														
Please attach additional test data if	7-Mode Hot-Start 7-Mode Cold-Start					19	Federal Tests 1970 1972				Other Te	Other Tests (specify units and test conditions)			
available	HC,	PPM	CO,	%	NO _X ,	PPM	HC,	GPM	СО,	GPM	NO _X , GPM	HC, ppm	CO,%	NO _x ,	
Baseline, as received															
Baseline, after tune-up								•					4.5	?	
Retrofit device test									<u> </u>			500 to	0.15	no data	no data
Number of cars												1	1	no data	no data
Test source					_										_
Additional test data				,,											
Durability Fleet									<u> </u>			1			

Test Data (Attach Data If Available)

2.2 Special	Reqm'ts.,	if any	(Fuel,Safety))	 	 	
						 	<u>.</u>

2.3 Reliability (mean mileage between failure, MMBF)

MMBF	Miles	Confidence	Test Source

2.4 Maintainability (mean time
 to repair, MTTR)

MTTR, Hours	 	Parts	Required	for Repair

2.5 Periodic Maintenance/ Inspection Requirements Very trouble-free. Little or no maintenance required, unless LP-gas is unitsually dirty, in which case the regulator might need cleaning. Say once a year.

2.	6	For the Drivability Check Applic	Evaluati		it Dev	i ce	Ins	tall	led	l: P1	lea:	se (Con	duct	: Ev	/alua	tion	and	l ta	ank.
		Make	Engine CID				T													
Ambient TemperatureOF															M A	A				
Car Preparation Data																				
Basic Ignition TimingDegrees					Idle Mode			ĺ	Accel Made											
Point DwellDegrees				Accel. Mode					Cruise			Ľ	Dece1							
()the	er Special Ad	justment	s: Attach	Σ	2		ł	1	ב		SS		ĺ		2				
	Da:	ta Sheet	RPM	cto			1	cto	ä	ine		jon		t		ion				
	Je.	Soak 12 hour			Engine	sfa	Satisfactory Rough	Stall		Satisfactory	nat	Stretchiness Stumble		tat	Hesitation Sag	Sfa	ing	nat		Stall Backfire
	PI/	Start to run			Eng	ati				ati	Detonation	tre tum esi	esi	Satisfactory Surging Detonation		eto	Stall Backf	म् श्र		
	Cold Start/Idl	No. of attem				<u>ري</u>			L	<u> </u>		<u>~1</u>	7		2	\ \	4		L	<u>م</u> ه
		Choke Hi-cam		sec		-	\vdash	_												
		Kickdown (N)				-	\vdash	\dashv												
	٥	In drive, 10	sec		<u></u>	<u> </u>	Ш													
		Accel 0-30 (1/2 thro	ttle)				-					\prod					,		
	Start Drive-Away	Cruise 30 (0	.1 Mile)						_	γ-	_									
		Accel 30-55	(WOT at	Detent)					Ĺ			\bot							_	
		Decel 55-15	(Mod Bra	ke)										 -	للنا					
		Cruise 15 (0	.l Mile)						٠, ۲					_						
		Accel 15-50	•							1										
i		Cruise 50 (0.1 Mile)																	_	 1
	Cold	Decel 50-0 (Idle, 15 Sec													L					
ı	لسيسا			<u> </u>	L															
	Sto	top Engine, Soak 15 Min, Restart				t: Start Time				Sec, Attempts										
		1	Idle, 15 Seconds Accel 0-30 (1/2 Throttle)																	
	_	i												J						
	tior		Cruise 30 (0.1 Mile)											٦	للللا					
	Evaluation	Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)							L				┙			Г				
	Eva																L			
								٢	٦											
	Start								L				_							
	HQt HQt	Decel 50-0 (Mod Brake)															Γ			
	-	Idle, 15 Seconds								_ Comments			Î _n Ta	a he	anne h	ve had no te		_ +20	ina	
1	—— Pe	Performance Trial 1			Trial	2	Tri	al 3	٦	done according to									_	
	-	T Accel 0-60													*	تيلل				
		lecel 60 30 S							╛											

For the #40LP carburetor, #725 Regulator & #8 Accessory Kit with motor fuel tank.

3.	Estimated Cost Information, Dollars			•								
	3.1 Retrofit System Cost	UserCost	Quantity									
	. Initial Cost	\$330.00	each set	<u>:</u>								
	. Developmental/Prototype											
	. Manufacturing											
	. Distribution											
	3.2 Profit Margins			7								
	. Manufacturer			We have								
	Distributor			no answers								
	. Dealer/Installer (Retail)			here.								
	3.3 Installation on Vehicle Fuel tem	k \$125.00		·								
	. Kit/Parts	165.00		<u>.</u>								
	. Labor, Hours 5 hrs.\$8.00/hour	\$40.00										
	3.4 Recurring Retrofit Costs	nil										
	 Fuel Economy , miles/gallon 	Baseline	Retrofit	Note: LP-gas in many								
	City			areas is 10 to 25% cheaper per gallon than gasoline.								
	Highway On many US autos	, 1D to 12	10 to 11	This can mean that fuel								
	Composite			costs will be the same in some cases, 10 to 20%								
	. Parts Replacement Cost		\$30 to \$40	less in other cases.								
4.	Marketing Information/Plan We n manufacturers, and LP-gas deal	_	•	ruck dealers and air carburation								
		sales program we probably should market thru auto garages.										
	•											

4

Foreign

(Specify)

Ford

1. Sv	stem	Info	rmation	١
-------	------	------	---------	---

1.1 Retrofit System Description (use extra pages or attach catalog)

	Principles of Operation	see extra paper	
	Installation Reqm'ts	about ½ hour work	
_	Adjustments	idle for old cars	,

screw machining . MFG Techniques

1.2 Development Status

Conceptual/Design Stage Prototype

Manufactured Distributed to Dealer

Installed on Vehicles Total Accumulated Miles

(Estimated, Thousands)

Number to Date

		~ ~ ~	•	
90%	for	a]	1	cars
<i>L</i>	50			
]	-5			
20.	000			

1.3 Emission Control Category (check applicable box)

Mec	nanical Mo	Fuel Modification					
	Exhaust Control			Crank-	Fue1		Crank-
nduction	Ignition	Combus- tion	Exhaust	l i	Evap. Control	Exhaust	case
X					yes -		
\angle					yes		
X					yes	MIS 120.	KET?
	,				yes *	/	

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates Other

> 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW

> > AMC

Year (Range) Engine CID (Range) Number of Retrofit

Model Types to Satisfy Application

Chrysler

see attached data see attached data

CM

2.	Performance Data	Enclosure 7	cont.
			,

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaus	t Emissic	on Measure	ements, Fi	ill In App	olicable (Blanks	1	
Please attach additional test data if		Hot-Start Cold-Star		Fe 1970	Federal Tests 1970 1972			Other Tests (specify units and test conditions)		
available HC, PPN		CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received		·								
Baseline, after tune-up										
Retrofit device test									1	
Number of cars										
Test source						-				
Additional test data										
Durability Fleet										
2.2 Special Reqm'ts., i	f any (Fue	el,Safety) no	ne						
		MMBF M	liles	Confidence	ce Test	Source]			
2.3 Reliability (mean mean between failure, MM				100%			J 			
		MTTR, H	lours.				Parts	Require	d for Repa	ir -
2.4 Maintainability (me to repair, MTTR)	ean time	no main	itenance	is nece	ssary				-	
2.5 Periodic Maintenand Inspection Requirem		none								

^{*} see attached data

Make	Year	Engine C	ID	_Transmission]	
	perature	°F			M A		
Point Dwell	TimingDegralDegrees djustments: Att	Idle	J	Accel. Mode		Cruise	Dece
Data Sheet Soak 12 hou Start to ru No. of atte Choke Hi-ca Kickdown (N In drive, 1	mpts mm (N) 20 sec l) 10 sec		+ + + Satisfactory Rough Stall	Satisfactory Detonation Stretchiness Stumble	Hesitation Sag	Satisfactory Surging Detonation	Stall
Cruise 30 (Accel 30-55 Decel 55-15 Cruise 15 ((WOT at Detent (Mod Brake) O.1 Mile) (1/2 Throttle) O.1 Mile) (Mod Brake))		+ + + + + + + + + + + + + + + + + + + +		+ + + + + + + + + + + + + + + + + + + +	
Idle, 15 S Accel 0-30 Cruise 30 Accel 30-5 Decel 55-1 Cruise 15 Accel 15-5 Cruise 50	(1/2 Throttle) (0.1 Mile) 5 (WOT at Detend 5 (Mod Brake) (0.1 Mile) 0 (1/2 Throttle) (0.1 Mile)	±)	Time	Sec, Attempts +		+ + + + + + + + + + + + + + + + + + + +	
Hece 50-0 Idle, 15 S Performance WOT Accel 0-60	Tria	+	2 Trial 3	Comments			

3. Estimated Cost Information, Dollars				
3.1 Retrofit System Cost	Cost	Quantity	7	
. Initial Cost	\$ 18 to \$ 25	1		
. Developmental/Prototype				D
. Manufacturing	appr. 7500	1000	\$7.50	such.
. Distribution	·			
3.2 Profit Margins				
. Manufacturer	normal			
· Distributor	normal			•
. Dealer/Installer (Retail)	normal			
3.3 Installation on Vehicle			∵1	
. Kit/Parts			4	
. Labor, Hours	½ hour	1		
3.4 Recurring Retrofit Costs			-1	
. Fuel Economy , miles/gallon	Baseline	Retrofit	4	
City		15% - 20%	measured	reduction
Highway			-	
Composite		2020	4	
. Parts Replacement Cost	l	none	ا	
4. Marketing Information/Plan ———		•	niantis til, gain allistore om til trainmin a við 12 stor	
				<u>.</u>
	· · · · · · · · · · · · · · · · · · ·			
de la company de				
				•

(High performance model ready for

mass production October '71)

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog)

. Principles of Operation Fuel metering calibrated relative to air mass flow

Installation Reqm'ts Fits Ford & G.M. V-8 engines. Simple adaptors required

for some others--throttle linkage adaptors generally required.

Adjustments

Throttle linkage and auto trans. Dashpot.

. MFG Techniques Aluminum die casting and production machined parts.

. Ind recimiques

1.2 Development Status

Conceptual/Design Stage

Prototypes

Manufactured

Distributed to Dealer Installed on Vehicles

Total Accumulated Miles

Number to Date

5 10,000

(Extinated: Xhausanda):

1.3 Emission Control Category (check applicable box)

Mec	hanical M	Fuel Modification						
	Exhaust (Crank-	Fuel		Crank-	
Induction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case	
X						·		
X								
X								

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)*
Number of Retrofit

Less man c				
AMC	Chrysler	GM	Ford	Foreign (Specify)
All ·	All	All	All	All
All	A11	All	, A11	All
4	4	4	4	4.

Model Types to Satisfy

Application**

-27-

*Existing prototypes for 100-200 C.I.D. and 300-500 C.I.D.

**Linkage kits in greater numbers.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

More detailed data will be available in a few weeks.

		Exhaust Emission Measurements, Fill In Applicable Blanks								
Please attach additional test data if	7-Mode Hot-Start <u>X</u> 7-Mode Cold-Start		3000 Inertia Weight Federal Tests 1970 1972			Other Tests (specify units and test conditions)			Particu- lates	
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received										
Baseline, after tune-up:		•		1.84	9.3	(0.87)E	timated	<u> </u>		
Retrofit device test**				1.28	8.5	2.07			<u> </u>	
Number of cars				1	1	1				
Test source	Sco	tt Resear	rch Labs,	Wilming	ton, Cali	ifornia Fa	acility (R	eport Att	ached)	
Additional test data					٠.			•		
Durability Fleet										

Test Data	(Attach Data If Available)	
	ed Exhaust Recycle System	
##With	out Exhauet Recycle System	

**Without Exhaust Recycle System
2.2 Special Reqm'ts., if any (Fuel, Safety)

None

2.3	Reliability	(mean	mileage
	between fail	ure. h	MBF)

MMBF Miles Confidence Test Source

Engineering judgement indicates that the VVC will be much better than other existing carburetors.

2.4	Mai	intainab	ility	(mean	time
	to	repair,	MITTR)		

MTTR, Hours			Parts Required for Repair
			simple spring adjustment done
twice during	ifetime of the v	ehicle.	

2.5	Periodic	Maintenance/
		n Requirement

(Same as 2.4)

Enclosure 1 Cont.

(These data will be available to this detail in about two weeks.) 2.6 Drivability Evaluation-Retrofit Device Installed: Please Conduct Evaluation and Check Applicable Boxes. See Enclosure 2 For Drivability Procedure, Page 4 Make _____Year Engine CID Transmission Ambient Temperature Car Preparation Data Basic Ignition Timing Degrees Idle Mode Accel. Mode Cruise Dece1 Point Dwell Degrees Other Special Adjustments: Attach Satisfactory Satisfactory RPM Satisfactory Stretchiness Detonation Data Sheet :ngine Soak 12 hours minimum Stumble Start to run time sec No. of attempts Choke Hi-cam (N) 20 sec 으 Kickdown (N) 10 sec In drive, 10 sec Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Cruise 30 (0.1 Mile)
Accel 30-55 (WOT at Detent)
Decel 55-15 (Mod Brake)
Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Stop Engine, Soak 15 Min, Restart: Start Time_ Sec, Attempts Idle, 15 Seconds Accel 0-30 (1/2 Throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent) Decel 55-15 (Mod Brake) Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake) Idle, 15 Seconds Comments Performance Trial 1 Irial 2 Irial 3 WOT Accel 0-60. Sec Decel 60-30, Sec

3. Estim	ated Cost Information, Dollars			
3.1 R	etrofit System Cost	Cost	Suantity	This dam not ready for
•	Initial Cost			presentation at this time
•	Developmental/Prototype			however, detailed data is becoming available
•	Manufacturing			on low production runs
•	Distribution			of a high performance version of the carbureton
3.2 Pi	rofit Margins			version or the carbaretor
•	Manufacturer		**************************************	
•	Distributor			
•	Dealer/Installer (Retail)	<u> </u>		
3.3 Ir	nstallation on Vehicle Kit/Parts			
	Labor, Hours		1/2 hour	
3.4 R	ecurring Retrofit Costs			•
ŕ	Fuel Economy , miles/gallon	Baseline	Retrofit	
	City			
	Highway			
	Composite			
•	Parts Replacement Cost			
	•			
. Marke	ting intolliaction/rian		manufacturing a	nd marketing gh Performance
	configuration.			<u></u>
			<u> </u>	ا <u>مسئلات المائية المائية المائية المائية المائية المائية المائية المائية المائية المائية المائية المائية المائية</u> المائية
•		——————————————————————————————————————		- A desired and the second sec

RETROFIT INFORMATION OUTLINE

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog)

intensity.

Principles of Operation Electronically control ignition timing & increase spark

. Installation Reqm'ts

Attaches to ignition coil & points

. Adjustments

Normal engine manufacturer specification

. MFG Techniques

Printed circuit board with state of the art

silicon l C chips, switching power transistors.

1.2 Development Status

Number to Date

Conceptual/Design Stage

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

30,000

100

. 20

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mec	hanical Mo	dificatio	n	_		Fuel Mod	fication
	Exhaust C			Crank-	Fuel	٠.	Crank-
nduction	Ignition	Combus- tion	Exhaust		Evap. Control	Exhaust	case
	x			·	,		
	x						·
		,					

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)

AMC	Chrysler	СМ	Ford	Foreign (Specify)	
ALL	ALL	ALL	ALL	*ALL Neg Grou	ınd
. tf	n	11	· #	"	
II	††	. 11	11	. 11	

Number of Retrofit Model Types to Satisfy

Application * Positive Ground Systems available on request.

** Wankle Eng. Systems available on request.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

•												
		Exhaus	t Emis	sion	Measure	ement	s, F	ill In App	olicable B	lanks		
Please attach additional test data if		Hot-Start Cold-Star		_	Fe 1970	edera	1 Tes 1972			sts (spec st condit		Particu lates
available	HC, PPM	CO, %	NO _X ,	PPM ł	IC, GPM	co,	GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received												
Baseline, after tune-up												
Retrofit device test												
Number of cars	÷											
Test source						_						
Additional test data				•								
Durability Fleet												
Test Data (Attach Data I 2.2 Special Reqm'ts., if					ARB Tes				of all g	rade gaso	line	
fuels, such as	_	_										········
side effects	to engine	such as	knocki	ng or	pingin	g.						
	1							·····	1			
		MMBF N	<u>liles</u>	C	on fiden o	ce	Test	t Source				
2.3 Reliability (mean m	ileage			10,	000]			
between failure, MM	BF)											
		MTTR, H	lours					·	Parts	Required	for Repa	ir
2.4 Maintainability (me	an time	10 min.							warranty	provides	full rep	lacement
to repair, MTTR)									•			
2.5 Periodic Maintenanc Inspection Requirem		Ev	ery 50	,000	miles							

2.6	5	Drivability Evaluation Check Applicable Box	on-Retrof es. See	it Dev Enclos	ice ure	Ins 2 F	talle or Di	ed: F rivat	Plea Dili	se (Cond Proc	uct edur	Evai e, F	luati Page	ion an 4.	d	
		Make <u>1965</u> Year	rCAD	Engine	CI	D	<u>429</u>	_Trar	ısmi	ssi	on		х				
		Ambient Temperature	o _F									М	A				
		Car Preparation Data					_										
		ic Ignition Timing	Degrees	Idle	e Mi	ode		<i>F</i>	\cce	1. 1	1ode			Crui	ise	Decel	
- 1		er Special Adjustments ta Sheet ^{None}	s: Attach	RP	torv			tory	В	ness		a		tory	目		
	ld Start/Idle	Soak 12 hours minimum Start to run time 2 No. of attempts 1 Choke Hi-cam (N) 20 Kickdown (N) 10 sec	_sec _	Engine	⊠ Satisfactory	Rough	Stall	Satisfactory	Detonation	Stretchiness	Stumble	Hesitation Sag		Satisfactory	Surging Detonation	Stall Backfire	
:	င္ပ	In drive, 10 sec	 		X												
	Cold Start Drive-Away	Accel 0-30 (1/2 thro Cruise 30 (0.1 Mile) Accel 30-55 (WOT at I Decel 55-15 (Mod Brai Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thro Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brake Idle, 15 Seconds	Detent) ke) ottle)		x			x]	x		x	
	Hot Start Evaluation	p Engine, Soak 15 Mir Idle, 15 Seconds Accel 0-30 (1/2 Thro Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Decel 55-15 (Mod Bra Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thr Cruise 50 (0.1 Mile) Decel 50-0 (Mod Brak Idle, 15 Seconds	Detent) ke) cottle)	t: Sta	x	Time	2	x x	Comme		I]	x	III	x x	l
·	Pe	rformance	Trial l	Trial	2	Iri	al 3] _				able	in	crea	se in	performan	ıc
		T Accel 0-60, Sec						-									
		1 (0 20 (

3. Estimated Cost Information, D	LOS	t Information	. Dollars
----------------------------------	-----	---------------	-----------

3.1 Retrofit System	Cost
---------------------	------

- . Initial Cost
- . Developmental/Prototype
- . Manufacturing
- . Distribution

Cost	Quantity
100,000	10,000
123,000	
30,000	

3.2 Profit Margins

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)

70,000	10,000
100,000	10,000
200,000	10,000

3.3 Installation on Vehicle

- . Kit/Parts
- . Labor, Hours
- 3.4 Recurring Retrofit Costs
 - . Fuel Economy , miles/gallon
 City
 Highway

Composite

. Parts Replacement Cost

3.00	10 min
	
Baseline	Retrofit
9	10.5

4 connections

None

Baseline	Retrofit
9	10.5
' 10	12.0
9,5	11.75
	None

4.	4. Marketing Information/Plan See	Enclosure.							
	· · · · · · · · · · · · · · · · · · ·	that future distribution will be supplemented							
	through a series of company organized franchised tune-up shops.								

 System Inf 	formation
--------------------------------	-----------

- 1.1 Retrofit System Description (use extra pages or attach catalog)
 - . Principles of Operation
 - . Installation Regm'ts
 - . Adjustments
 - . MFG Techniques

1.2 Development S	tatus	ŝ
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Conceptual/Design Stage
Prototype
Manufactured
Distributed to Dealer
Installed on Vehicles
Total Accumulated Miles
(Estimated, Thousands)

٧u	mber	to Da	ate	
				•
	86	000	-J _M	iles

1.3 Emission Control Category (check applicable box)

Mecl	Fuel Modification							
	Exhaust (Control		Crank-	Fuel		Crank-	
Induction Ignitio		Combus- Exhaust		case Control	Evap. Control	Exhaust	1	
NINE	NONE	NONE	NONE		NONE	NONE	NONE	
			-	· · · · · · · · · · · · · · · · · · ·				
						-		

Hydrocarbon
Carbon Monoxide
Oxides of Nitrogen
Particulates
Other

1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

AMC	C Chrysler (Ford	Foreign (Specify)		
	·			-		

Model Types to Satisfy Application

2.	Performance Data	Enclosure 1 cont

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

53		Exhaus	st Emissio	n Measure	ments, F	ill In App	licable	B1anks		
Please attach additional test data if		-Mode Hot-Start			deral Tes 1972		Other Tests (specify units and test conditions)			Particu lates
available	нс, РРМ	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _x ,	
Baseline, as received										
Baseline, after tune-up										
Retrofit device test								<u> </u>		
Number of cars								<u> </u>		
Test source										· · ·
Additional test data								<u> </u>		
Durability Fleet	<u> </u>									
2.2 Special Reqm'ts., i	f any (Fue	Safety	Not	FFFe	CF M				ver k	
		MMBF_N	Miles	Confidence	e Test	t Source]			
2.3 Reliability (mean m	_									
•	·	MTTR, H	lours				Part	s Requir	ed for Repa	ir
2.4 Maintainability (me	ean time						SP	Ark P	1/19	
to repair, MTTR)				/		L	IP P	AL AL P	BL	
to repair, MTTR) 2.5 Periodic Maintenance/ Inspection Requirements Regulat Maintenance/ Inspection Requirements										

2.6)	Check Applicable Boxes	n-Retrof S. See I	it Devi Enclosu	ce Instal re 2 For	led Dri	1: Please Con ivability Pro	duct E cedure	Evaluation and e, Page 4.	
		Make Chell Year	1967	Engine	CID_327	<u>7</u> 1	[ransmission		X	
		Ambient Temperature	o _F					М	A	
		Car Preparation Data	sec.	,						
E	Bas:	ic Ignition Timing	Degrees							
P	oir	nt Dwell MF9 Degrees	Poec	Idle	Mode	l	Accel. Mod	e	Cruise	Decel
C)the	er Special Adjustments:	Attach				7 4			
		ta Sheet		RPM	tor		tor on nes	a	to t	
-	a)	Soak 12 hours minimum			Satisfactory Rough Stall		Satisfactory Detonation Stretchiness Stumble	Hesitation Sag	Satisfactory Surging Detonation] <u>2</u>
	Idl	Start to run time	sec	Engine	Satis Rough Stall		Satisfa Detonat Stretch Stumble	Sit	Satisfac Surging Detonati	Stall Backfi
	Start/Idl	No. of attempts		3	S 8 2		St St	Hes:	s 2 a	St
	Sta	Choke Hi-cam (N) 20 se	ec	550			1		7	
ĺ	Cold	Kickdown (N) 10 sec			1					
Į	ဒ	In drive, 10 sec								
r)		r				
		Accel 0-30 (1/2 throti	tle)			l		لـلــ		
	ay	Cruise 30 (0.1 Mile)				Г	 			
	Orive-Away	Accel 30-55 (WOT at De	-			Į				
	'nve	Decel 55-15 (Mod Brake	e)							
		Cruise 15 (0.1 Mile)	_ ,			Г				
	ď	Accel 15-50 (1/2 Throt	tle)			į				
		Cruise 50 (0.1 Mile)								
		Decel 50-0 (Mod Brake) Idle, 15 Seconds								
L			Pootoni	- C+			Caa	_		
١	311	op Engine, Soak 15 Min, Idle, 15 Seconds	Restar	: Star	t time		Sec, Attempt	s		
		Accel 0-30 (1/2 Throt	.tle)	L		ſ				
	L L	Cruise 30 (0.1 Mile)	,610)			L				
İ	Evaluation	Accel 30-55 (WOT at D	etent)			ſ				
ĺ	alu	Decel 55-15 (Mod Brak	·				······································			
		Cruise 15 (0.1 Mile)								
1	Start	Accel 15-50 (1/2 Thro	ttle)							
		Cruise 50 (0.1 Mile)								
	돺	Decel 50-0 (Mod Brake)							
		Idle, 15 Seconds					Comments			
	Рe	rformance	Trial]	Trial	2 Irial 3	<u>.</u>				
	WO	T Accel 0-60, Sec							······	
	D	ecel 60-30. Sec								

without Device

٤.	O	Check Applicable Boxes. See	Enclosur	e 2 For Di	rivability	Conduct Ev Procedure,	/aluation and , Page 4.	
		Hake ChoV. Year 1967	ر Engine C	54697L 10 <u>D</u>	192409 _Transmissi	on ,	म	
		Ambient TemperatureOF				М	A	
		Car Preparation Data					٠.	
	Pasi	ic Ignition Timing <u>2%</u> Degrees					[-	
	Poir	nt Dwe!1 <u>30</u> Degrees	Idle	Mode	Accel.	Mode	Cruise	Decel
		er Special Adjustments: Attach	КРМ	2	SSS C		ا لا	
	Dat	ta Sheet	e B	act	acto tion hine	ior	acto	e
	d1e	Soak 12 hours minimum Start to run time 20 sec	Engine	Satisfactory Rough Stall	Satisfactory Detonation Stretchiness	Stumblo Hesitation Sag	Satisfactory Surging Detenation	Stall Beckfire
	·t/1	Start to run time <u>20</u> sec No. of attempts <u>1</u> Choke Hi-cam (N) 20 sec	Li j	Satis Rough Stall	Sar Det	Stu lies Sag	Sat	Stall Beckf
	Sta	Choke lii-cam (N) 20 sec	700	1			·	المسيد بالمستحدث
		Kickdown (N) 10 sec	600	1				
	ဒ	In drive, 10 sec	550			;	•,	
	<u></u>		1	•				
		Accel 0-30 (1/2 throttle)						
	way	Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent)			X		1/11_1_1	
		Decel 55-15 (Mod Brake)			<u> </u>			
	Dri	Cruise 15 (0.1 Mile)					X	
	Start	Accel 15-50 (1/2 Throttle)			X			
	1	Cruise 50 (0.1 Mile)					للللا	
	Cold	Decel 50-0 (Mod Brake) Idle, 15 Seconds	600 X			,		
		<u> </u>	<u> </u>	Time 20	C-a 144a			
		op Engine, Soak 15 Min, Restar Idle, 15 Seconds	600	Time_AL	sec, Atte	mpts /	 :	
		Accel 0-30 (1/2 Throttle)			$X \square$			
	e l	Cruise 30 (0.1 Mile)				· · · · · · · · · · · · · · · · · · ·	X	
	uati	Accel 30-55 (WOT at Detent)			X		•	
	Evaluation	Decel 55-15 (Mod Brake)					TI I	
		Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle)			THE T		[XI]	
	Start	Cruise 50 (0.1 Mile)	·		بالسنسار		X	
	Hot	Decel 50-0 (Mod Brake)					<u>V </u>	
,		ldle, 15 Seconds	600 7	Y	Comment	s		
•	J	erformance Trial 1	1	2 Irial 3	-			
		OT Accel 0-50, Sec 510 d Oecel 60-30, Sec 800 d	200d	Good	7			
	<u></u>	Decel 60-30, Sec 200d	1/4 - 0	12/90	J			

		INITH	Devi	<u>C</u> e	<u>)</u>					
?.6	;	Drivability Evaluation-Retrof	it Devi	ce	Installe	ed	: Please	Conduct Ev	valuation and	
		Check Applicable Boxes. See	Enclose	ire 114	2 For Di 697114	ri 29	vability <i>Ya 4</i>	Procedure,	, Page 4.	
		Make (hol/ Year 1967	Engine	CID	5	Ţ	ransmissi	on D	7	
		Ambient Temperature OF		•				М	A	
		Car Preparation Data								
	١	ic Ignition Timing 2% Degrees		····		٢	- 			<u></u>
			Idle	Mo	de .		Accel.	Mode	Cruise	Dece1
		nt Dwell <u>30</u> Degrees		J		ŀ		- 1 - 1 - 1		
·		er Special Adjustments: Attach ta Sheet	RPM	Š			ory Bess	اا	D ork	
ĺ		Soak 12 hours minimum	<u>و</u>	Satisfactory			Satisfactory <u>Petonation</u> Stretchiness	Stuable Hesitation Sag	Satisfactory Surging Detonation	9
	Idle	Start to run time 20 sec	Engine	131	텀크	1	isfond	Stuable Mesitat Sag	Satisfa Surging Detonat	Stall Backfir
	1/1	No of allowante	苗	Set	Rough Stall		Sat Protestr	Stu- Hes Sag	Sat	Stall Backf
	tai	No. of attempts / Choke Hi-cam (N) 20 sec	700	X		Ļ	<u></u>			
		Kickdown (II) 10 sec	600	X						
	Cold	In drive, 10 sec	550	$\frac{n}{x}$						
1		111 dr 196, 10 Sec		<i>/</i> ; 1						
		Accel 0-30 (1/2 throttle)				Γ	X			÷
		Cruise 30 (0.1 Mile)	,			۲,	<u> </u>	لحظمط	[X]	•
	way	Accel 30-55 (WOT at Detent)				Γ	XIII		[/``	•
	re-A	Dacel 55-15 (Mod Brake)				L	//	لصاحنايس		
	Drive-Away	Cruise 15 (0.1 Hile)					:		X	ليسلنسا
		Accel 15-50 (1/2 Throttle)	,		:·		X		lyfinless-board	
	~ ₹	Cruise 50 (0.1 Mile)				_	<u> </u>		X	
		Decel 50-0 (Mod Brake)	İ			:			المحسانية المسكما	
	PLOO	Idle, 15 Seconds	600	X				•		L
•	Sto	op Engine, Soak 15 Min, Restar	t: Star	t T	ime 20		Sec. Atte	mpts /	* *	•
1		Idle, 15 Seconds	600							
j		Accel 0-30 (1/2 Throttle)			+		X		i	
	ou	Cruise 30 (0.1 Mile)				_			X	
	Evaluation	Accel 30-55 (WOT at Detent)	,				X			
	a]u	Decel 55-15 (Mod Brake)				Ī	,			
	ω C	Cruise 15 (0.1 Mile)			ŧ				X	
	Start	Accel 15-50 (1/2 Throttle)					X			
		Cruise 50 (0.1 Mile)		•			,		X	
	Hot	Decel 50-0 (Mod Brake)						<i>,</i>	:	
		Idle, 15 Seconds	600	X		_	Comment	s		h-Million con 1 0,000 di
.	Pe	rformance Trial 1	Trial		Irial 3	_			v	
	110	T Accel 0-50, Sec 800d	8000		800 d					
Į	0	ecel 60-39. Sec Bood	8000		Good	ال				

ity
it

VEHICLE EMISSION TEST

/ /	A 1311.T	OHE LAIDSTON IL			•
Date ///// 7/	Car Make	Oker.		Model Y	ear <u>67</u>
PCV Valve: Yes	No	Good >	Poor _	Inop	erative
Other Emission Control					
Mest Results	50 mph	30 mph		Idle	Average ##
Carbon Monoxide (CO) %		1, &	<u>.</u>	<u> </u>	
Hydrocarbons (HC) ppm	120	160		1100	
Nitric Cxide (NOx) ppm	4500	\$ 150		1150	
Arizona Emission Standards **	Large	Engines (> 140	CID)	Small Engin	es (< 1-0 000
Model Year	CO	- % HC - po	m	CO - 5	mag - 0H
1968 and Later		.0* 300*		4.0	400
1963 Through 1967	. 4	.5* 500*	_	5.0	600
1962 and Older .	75	.0 600		6.0	800
**Based on Average.	*Approvéd	. Others Pendi	ng. NO	x - Not Yet	Defined.
Describle Possens For Process	vo Zminaion	•			

Possible Peasons For Excessive Emissions

High CO - Carburetor set too rich or choke sticking, air cleaner dirty, carburetor nalfunctioning (float level, etc.), plugged PCV valve.

High HC - Fouled spark plugs, broken ignition wires, defective distributor, abnormal loss of cylinder compression.

The data included herein is informational only, for the sole use of the owner of the vehicle tested and the State Division of Air Pollution Control. It shall in no way be construed as a certification or approval of any device or fuel or oil additive, nor shall it be considered a repair order or diagnostic data sheet.

ARIZONA STATE DEPARTMENT OF HEALTH
Division of Air Pollution Control
VEC: AAA-0164 (cnk/9-15-71)

WITH DEVICE

	VEHIC	LE EMISSION T	EST		
Date //// // PCV Valve: Yes Other Emission Control	Car Make _ No	Chur V	Poor _	_ Model Y	ear <u>67</u>
Test Pesults	50 mph	30 mg	h	Idle.	Average **
Carbon Monoxide (CO) %			<u>.5</u>	2.5	
Hydrocarbons (HC) ppm	150	1.5	<u>19</u> , .	200	
Mitric Oxide (NO _N) ppm	450	2.5	(3)	150	
Arizona Emission Standards**	Large	Engines (> 14	O CID)	Small Engin	es (< 140 CID)
Model Year	CO	- % HC - p	. מכי	CO - %	HC - ppm
1968 and Later	3.	0* <u>300</u> *		4.0	400
1963 Through 1967	4.	5* 500*	•	5.0	600
1962 and Older	5.	0 600		6.0	800
**Based on Average.	*Approved.	Others Pend	ing. N	O _x - Not Yet	Defined.
Possible Feasons For Excessi	ve Emissions	<u>i</u>	•	-	

Eigh CO - Carburetor set too rich or choke sticking, air cleaner dirty, carburetor malfunctioning (float level, etc.), plugged PCV valve.

High HC - Fouled spark plugs, broken ignition wires, defective distributor, abnormal loss of cylinder compression.

The data included herein is informational only, for the sole use of the owner of the vehicle tested and the State Division of Air Pollution Control. It shall in no way be construed as a certification or approval of any device or fuel or oil additive, nor shall it be considered a repair order or diagnostic data sheet.

. SIZONA STATE DEPARTMENT OF HEALTH ivision of Air Pollution Control (cak/9-15-71)

Date 7/25/1/ PCV Valve: Yes X Other Emission Control	Car Make	C COOD S		odel Year
Test Results	50 mph	30 mph	Idle	Average **
Carbon Honoxide (CO) %		<u> </u>	, ,	/
Hydrocarbons (HC) ppm	50	10	60	66.6
Nitric Oxide (NOx) ppm	250	400		
Arizona Emission Standards**		Engines (> 140		Engines (< 140 CID)
Model Year	CO -		m CO	- % HC = ppm
1968 and Later	3.0	O* 3CO*	-	•0 400
1963 Through 1967	4.5	5* 500*	5	•0 600
1962 and Older	5.0	600		• 0 800
**Based on Average.	*Approved.	Others Pendi	ng. NO $_{\rm x}$ - No	t Yet Defined.
Possible Reasons For Excessi	ve Emissions		· 	

High CO - Carburetor set too rich or choke sticking, air cleaner dirty, carburetor malfunctioning (float level, etc.), plugged PCV valve.

High HC - Fouled spark plugs, broken ignition wires, defective distributor, abnormal loss of cylinder compression.

The data included herein is informational only, for the sole use of the owner of the vehicle tested and the State Division of Air Pollution Control. It shall in no way be construed as a certification or approval of any device or fuel or oil additive, nor shall it be considered a repair order or diagnostic data sheet.

ARIZONA STATE DEPARTMENT OF HEALTH Division of Air Pollution Control VEC: AAA-0164 (cak/9-15-71)

1. System Information

Retrofit System Description (use extra pages or attach catalog)
Principles of Operation Positive Sealed Crankcase Ventilating Device

Principles of Operation

Installation Regm'ts

approx. 90 minutes

at installation only **Adjustments**

machinery & extrusion . MFG Techniques

1.2 Development Status

Conceptual/Design Stage **Prototype** Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles

umber to Da	<u>te</u>
16	
16	-
440,000	

(Estimated, Thousands).

1.3 Emission Control Category (check applicable box)

	Mec	hanical Mo	dificatio	n			Fuel Modi	fication
		Exhaust C			Crank-			Crank-
	nduction	Ignition	Combus- tion	Exhaust		Fuel Evap. Control	Exhaust	case
	X				X ·			
	Х				Х			
n	х		· · · · · · · · · · · · · · · · · · ·		x			
	·							
	1	1 1		·				

Hydrocarbon. Carbon Monoxide Oxides of Nitrogen **Particulates**

Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)
	1968	1960-1969	1967-1971	
			235-350	
	1	2	13	
	1	1	1	

Model Types to Satisfy

Application

			E.
2.	Performence	Ď.	

Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

	<u> </u>	Exha	ust Emis	sion Meas	ureme	nts, F	ill In App	licable	Blanks		
Please attach additional test data if		Mode Hot-Start X			Federal Tests 1970 X 1972			Other Tests (specify units and test conditions)			Particu lates
available	HC, PPM	co, x	NO _X ,	PPM HC, G	PM C	O, GPM	NO _X , GPM	нс,	co,	NO _x ,	
Baseline, as received									•		
Baseline, after tune-up				X		X					
Retrofit device test				х		x	<u> </u>				
Number of cars											
Test source											
Additional test data											
Durability Fleet											
2.2 Special Reqm'ts., i	f any (Fu	el,Safe	ty)		no	n e					
		MMBF	Miles	Confid	ence	Tes	t Source]			
2.3 Reliability (mean m	ni leage]			
between failure, MM							,	-			
•		MTTR,	, Hours		· 			Par	ts Requir	ed for Repa	ir
2.4 Maintainability (me to repair, MTTR)	ean time										
2.5 Periodic Maintenanc Inspection Requirem					<u> </u>					-	

3. Estimated Cost Information, Dollars		<u> </u>	1
3.1 Retrofit System Cost	Cost	Quantity	
. Initial Cost			
. Developmental/Prototype		A. 115	
. Manufacturing			
. Distribution	<u>.</u>		
3.2 Profit Margins			ı
. Manufacturer			
• Distributor			
. Dealer/Installer (Retail)		<u> </u>	•
3.3 Installation on Vehicle		,	1
. Kit/Parts	under \$20.0		
. Labor, Hours	approx. 90	pinutes	·
3.4 Recurring Retrofit Costs			·
. Fuel Economy , miles/gallon	Baseline	Retrofit	
City			
Highway			
Composite		<u> </u>	
. Parts Replacement Cost	•		
4. Marketing Information/Plan			The state of the s
			:
		i	
	v	• •	•
		•	

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog)

. Principles of Operation See Exhibits # 1 & # 2 Attached Hereto.

. Installation Regmits

See Exhibit # 3 Attached hereto

. Adjustments

Idle Jet & Ignition Retarding

. MFG Techniques

Mass Production thru Automatic Screw Machined Parts.

1.2 Development Status

Conceptual/Design Stage

Prototype

-

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

Number to Date

25

25

See Exhibits 4 & 5 Attached.

(See Exhibit # 6 (Photo) Attached.

None Offered

15 (All activated)

120,000 Plus.

1.3 Emission Control Category (check applicable box)

	Mec	hanical M	odificatio	n			Fuel Mod	fication
		Exhaust			Crank-	F		Crank-
	nduction	Ignition	Combus- tion	Exhaust		Fuel Evap. Control	Exhaust	case
	All Tes	ts to dat	e indicat	е Х	NOTE:	We previ	ously for	warded al
	emissio	n reducti	ons	X	Test R	ports to	1	
	below C	alifornia	Air	Х	Duplica	te Copie	are ava	llable in
•	Resourc	es Board		Х	the eve	ent you w	sh them.	
	Standar	ds.		X				

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

AMC Chrysler CM Ford Foreign (Specify)

One Device, with several variable Jet Sizes,

will adapt to any make or model automobile,

or any internal comb. engine, using a carburetor.

Year (Range) Engine CID (Range)

Number of Retrofit

Model Types to Satisfy

Application

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaust Emission Measurements, Fill In Applicable Blanks									
Please attach additional test data if	7-Mode Hot-Start 7-Mode Cold-Start			Federal Tests 1970 1972			Other Tests (specify units and test conditions)			Particu- lates	
available	HC, PPM	ÇO,%	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,		
Baseline, as received	ALL TES	DATA CO	NCERNING	THIS DEVI	CE HAS BE	EN FORWAR	DED TO YO	JR ATTENT	ION:		
Baseline, after tune-up	WE WILL	GLADLY S	END DUPLI	CATE COPI	ES IF REQ	UIRED.					
Retrofit device test											
Number of cars	·										
Test source	SCOTT LA	BORATORIE	S: CALIF	: A.R.B.	SPEED SP	ECIALISTS	:				
Additional test data											
Durability Fleet								<u> </u>]		

Test Data (Attach Data If Available)

2.2 Special Regmits., if any (Fuel,Safe	NONE KNOWN.	LOW GRADE F	UEL SATISFACTORY	• NO SAFETY HAZARD COU	ILD
	·		RETROFIT DEVICE	IF PROPERLY INSTALLED) .

2.3 Reliability (mean mileage between failure, MMBF)

MMBF Miles	Confidence	Test Source
100%	100%	1967 Cad.

In excess of 30,000 miles on 1967 Cad Test Car has been attained without any adjustment requirements, or any noticable change in performance.

	MTTR, Hours	Parts Required for Repair
2.4 Maintainability (mean time	None	None (No moving parts)

2.5 Periodic Maintenance/ Inspection Requirements

to repair, MTTR)

No Maintenance required normally; A rough running engine at idle would indicate a plugged fuel source. Our Unit with suitable built-in filters would eliminate any chance of a plugged passage.

2.6	i	Drivability Evaluation-Retrof Check Applicable Boxes. See	it Dev Enclos	ice ure	Ins	tall or [le Or	d: Please C ivability P	onduct Ev rocedure,	valuation and Page 4.
		Make Cadillac Year 1967	Engine	CII)_4	29		Transmissio	n x	$\overline{\mathbf{x}}$
		Ambient TemperatureOF							M	A
		Car Preparation Data								
В	as	ic Ignition Timing $\frac{31}{2}$ Degrees	,							
		nt DwellDegrees	Idl	e Mo	oge .			Accel. M	ode	Cruise Decel
0	the	er Special Adjustments: Attach	>	5				2 8		
r	Da	ta Sheet	R P M	Satisfactory				Satisfactory Detonation Stretchiness	l ei	Satisfactory Surging Detonation Stall Backfire
	<u> </u>	Soak 12 hours minimum	Engine	sfa	٩	4		Satisfacto Detonation Stretchine	Stumble Hesitation Sag	Satisfacto Surging Detonation Stall Backfire
ĺ	Start/Idl	Start to run time 2 sec	Eng	ati	Rough	Stall		eto tre	Stum Hesi Sag	Satis Surgi Deton Stall
	art	No. of attempts 1		X		-		N 0 N	7 7 7	तियव तिच
	•	Choke Hi-cam (N) 20 sec	<u> </u>	X	\dashv	\dashv				
	Co 1d	Kickdown (N) 10 sec	-	Х		\dashv		,		
L		In drive, 10 sec	L	[]						
	ve-Away	Accel 0-30 (1/2 throttle) Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent)	ALL PREV	IOUS ED 1	SLY 30 }	FOR -		x		x
	i ve-	Decel 55-15 (Mod Brake)	COPI	ES A	LAV	LABI	E	IF DESIRED	•	
		Cruise 15 (0.1 Mile)						x		X
	Start	Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)						<u> </u>		x
		Decel 50-0 (Mod Brake)								
	Cold	Idle, 15 Seconds		Х						
	Sto	op Engine, Soak 15 Min, Restar	t: Sta	rt 1	ime	2		_Sec, Attem	pts 1	
		Idle, 15 Seconds		Х			1	·	· · · · · · · · · · · · · · · · · · ·	-
ŀ		Accel 0-30 (1/2 Throttle)						X		
	ion	Cruise 30 (0.1 Mile)					i		, , , , , , , , , , , , , , , , , , , 	Х
	uat	Accel 30-55 (WOT at Detent)						X		
	Start Evaluation	Decel 55-15 (Mod Brake)								\mathbf{x}
	だ	Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Throttle)					1	IX T	T	<u> </u>
	Sta	Cruise 50 (0.1 Mile)						<u> </u>	<u>.i. </u>	x
	Hot	Decel 50-0 (Mod Brake)								
		Idle, 15 Seconds		Х				Comments		vice works in Ratio
	Pe	rformance Trial 1	Iria	<u> </u>	Iri	al 3	Ц		fore all	Carburetor and there- performance is as
-	WC	T Accel 0-60, Sec		_					normal a	as the stock carburetor
- 1	r	Acel 60-30 Sec						J		

Enclosure 1 cont.

Retrofit System Cost Initial Cost Developmental/Prototype Manufacturing Distribution Profit Margins (A.E.C. MARK-UP Manufacturer	Cost 2.00 25,000 1.00	Quantity 1 1	COSTS WOULD DECREASE IN PERCENTAGE TO VOLUME PRODUCTION
. Developmental/Prototype . Manufacturing . Distribution Profit Margins (A.E.C. MARK-UP	25,000	1	
. Manufacturing . Distribution Profit Margins (A.E.C. MARK-UP	1.00		
. Distribution Profit Margins (A.E.C. MARK-UP			. •
ا Profit Margins (A.E.C. MARK-UP ر	1.00	1	
	1.00	1	
	1.00	1	
!	2.00	1	•
. Dealer/Installer (Retail)	2.95	1	
Installation on Vehicle			SUGGESTED RETAIL PRICE
Kit/Parts	9•95	1	INSTALLED: \$19.95
Labor, Hours (1/2 Hr.Approx.)	10.00	1	
Recurring Retrofit Costs			
Fuel Economy , miles/gallon	Baseline	Retrofit	
City		10% - 15% Plus	
Highway		10% - 15% Plus	•
Composite		10% - 15% Plus	
Parts Replacement Cost		NONE	
	Distributor Dealer/Installer (Retail) Installation on Vehicle Kit/Parts Labor, Hours (1/2 Hr.Approx.) Recurring Retrofit Costs Fuel Economy , miles/gallon City Highway Composite	Distributor Dealer/Installer (Retail) Installation on Vehicle Kit/Parts Labor, Hours (1/2 Hr.Approx.) Recurring Retrofit Costs Fuel Economy , miles/gallon City Highway Composite	Distributor Dealer/Installer (Retail) Installation on Vehicle Kit/Parts Labor, Hours (1/2 Hr.Approx.) Recurring Retrofit Costs Fuel Economy, miles/gallon City Highway Composite Dealer/Installer (Retail) 2.00 1 2.95 1 10.00 1 Baseline Retrofit 10% - 15% Plus 10% - 15% Plus

4.	Marketing Information/Plan (1) To Sell Direct to Service Centers; To Farm All
	Production & Sales thru such Companies as , etc.; (3) To Offer
	License Rights to all Automobile Manufacturers interested in their older product
	and nation wide Service Centers;

RETROFIT INFORMATION OUTLINE

1. System Informati	tion	rma 1	1fo	In	tem	Svs	1.
---------------------	------	-------	-----	----	-----	-----	----

1.1 Retrofit System Description Principles of Operation	extra pages Previously		h catalogy	
. Installation Reqmits	n	n		
. Adjustments	 п	n		
. MFG Techniques	Ħ	11		

400

45 Million total

1.2 Development Status

Number to Date Conceptual/Design Stage Prototype Manufactured -18,000 Distributed to Dealer 13,000 Installed on Vehicles 10,000

Total Accumulated Miles (Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mec	Mechanical Modification								
	Exhaust Control			Crank-	E1		Crank-		
nduction	Ignition	Combus- tion	Exhaust		Fuel Evap. Control	Exhaust	case		
X		x							
X		X							
X		X							

Hydrocarbon Carbon Monoxide Oxides of Nitrogen **Particulates** Other

1.4 Automotive Adaptability (Attach catalog if available)

NOTES:

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

AMC	Chrysler	GM	Ford	Foreign (Specify)
ALL	ALL	ALL	ALL	See Note 1
140 CID Ar	d Larger -			
1 & 4 See	Note 2 Below			· ·

Model Types to Satisfy **Application**

Air Needles not applicable to metric threads at present time.

One model of fits all automobiles. Four models of air needles to fit various thread and needle configurations of carburetors.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

		Exhaus	t Emissic	n Measure	ements, Fi	11 In App	licable B	lanks		
Please attach additional test data if available	All Baselines Hot Start 7-Mode Hot-Start 2 7-Mode Cold-Start 5			Fe 1970	deral Tes 1972		Officer lests (specify units and test conditions)			Particu- lates
	нс, РРМ	CO, %	NO _X , PPM	нс, дрм	CO, GPM	NO _X , GPM	HC, ppm	co, %	NO _X , ppm	
Baseline, as received	494	3.14	876	_			526	2.88	1155	
Baseline, after tune-up	Not Ave	ilable		-			Not	Availabl		
Retrofit device test	347	2.03	791	NOT	VAILABLE		313	0.25	1292	
Number of cars	7	7	7				. 1	1	1	
Test source	American	Automoti	ve Testin	g Lab.			Californ	ia Air Re	sources Bo	ard
Additional test data	N. A.					٠				·
Durability Fleet	N. A.									

Test Data (Attach Data If Available) All Baseline tests "Hot Start" Retrofit Tests 5 - "Cold Start", 2 - "Hot Start"

2.2 Special Reqm'ts., if any (Fuel, Safety) Chemical should be kept out of the reach of children - Not fit for human consumption.

2.3 Reliability (mean mileage between failure, MMBF)

MMBF	Miles	Confidence	Test Source
Not	Availal	ole - No failur	reported

	MTTR, Hours	Parts Required for Repair
me	Not Available	

2.4 Maintainability (mean time to repair, MTTR)

2.5 Periodic Maintenance/
Inspection Requirements

per refill. At time of refill a visual inspection of the system is recommended to see that the unit

is aerating and that all connections are secure.

	Make Ford Wagon Year 1969	Engine	CI	D	429		ransmissi	ion 📗 🛽	X	
	Ambient Temperature 68 0F							M	A	
	Car Preparation Data									
3as	ic Ignition Timing 6 BTDegrees				\Box					
oi	nt Dwell <u>36</u> Degrees	Idl	e M	ode			Accel.	Mode	Cruise	Dec
)th	er Special Adjustments: Attach	- -	ځ		- 1		2 2			
Da	ta Sheet None	RPM	Satisfactory				Satisfactory Detonation Stretchiness	ig	Satisfactory Surging Detonation	.
<u>e</u>	Soak 12 hours minimum	ine	sfa	ء	4		sfa nat tch	tat	sfa ing	
rt/Id	Start to run time <u>4.5</u> sec	Engine	ati	Rough	Stall		Satisfacto Detonation Stretchine	Stumble Hesitation Sag	Satisfacto Surging Detonation	Stall
art,	No. of attempts 1		S		$\stackrel{\sim}{-}$	l	2 9 2	4 = 4	2 2 9	N
Sta	Choke Hi-cam (N) 20 sec	750	х							
Cold	Kickdown (N) 10 sec	700	X		\dashv					•
3	In drive, 10 sec	575	Х	Ш	لــــا	•		•	•	
	[A1 0 20 /1/0 4b447.)	1			,	İΓ	_			
	Accel 0-30 (1/2 throttle)					L	X			
Away	Cruise 30 (0.1 Mile) Accel 30-55 (WOT at Detent)					ſ	₽	T		
Ve-A	Decel 55-15 (Mod Brake)		-			L	All	<u> </u>		
Driv	Cruise 15 (0.1 Mile)								VX	щ
エ	Accel 15-50 (1/2 Throttle)					_	ox		<u> </u>	
Sta	Cruise 50 (0.1 Mile)								XX	
P	Decel 50-0 (Mod Brake)									
င္ပ	Idle, 15 Seconds	600	x				,			
Sto	op Engine, Soak 15 Min, Restar	t: Sta	rt	Time	0.5		Sec, Atte	empts <u>1</u>		
	Idle, 15 Seconds	600	X]	г				
	Accel 0-30 (1/2 Throttle)					L	x			
ion	Cruise 30 (0.1 Mile)			<u>.</u>		٢			X	
Eyaluation	Accel 30-55 (WOT at Detent)		· . ·			L	X			
Eva	Decel 55-15 (Mod Brake)					,				
	Cruise 15 (0.1 Mile)					٠, ۲		1. 11	XX	
Start	Accel 15-50 (1/2 Throttle) Cruise 50 (0.1 Mile)					£	<u> </u>		xx	
Hot	Decel 50-0 (Mod Brake)								لللم	
	Idle, 15 Seconds	600	X				Comment	ts Car	was not prepa	red n
Pe	erformance Trial 1	Tria			al:	3			n with an as	
	OT Accel 0-60, Sec 12.5 se	1	О в			- 1	ec Transa	niggion ge	emed to be sh	18+12

3	Fetimated	Cost	Information.	Dolland
J.	EStimated	COST	intormation.	DOLLARS

- 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

3.2 Profit M	argins
--------------	--------

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs
 - Fuel Economy , miles/gallon City Highway Composite
 - . Parts Replacement Cost

Cost	Quantity
\$ 25,000	5
\$ 65,000	400
\$ 95,000	18,000
\$ 19,000	13,000

8% of retail	
20% of retail	
50% of retail	

\$ 42.95	a plus	tax 8	insta	Lation
1 hour (s	Vg. cl	arge \$	6.00	

Baseline	Retrofit
12.0	14.1
16.3	18.5
13.5	15-5
	\$ 1.95/2.500 mil

4.	Marketing Information/Plan	The product is co	urrently b	eing marketed on	a direct
	sales program with a dis	stributor selling	to direct	dealer-salesmen.	These
	dealer-salesmen then sell	l direct to the co	nsumer.	ومالعائب بمعشب قسائه نسيم وتسائين فيشم مسيم	raide <u>i in ann ann de ain</u>

1. System Information

1.1 Retrofit System Description (use extra pages or attach catalog)
Principles of Operation Treatment of gasoline and air mixture.

Installation Regm'ts :

Removal of carburetor and gasket.

Adjustments

Lean idle adjustment screws.

. MFG Techniques

Catalyst contained/positioned by gasket.

1.2 Development Status

Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mec	hanical Mo	dificatio	on			Fuel Modi	fication	
	Exhaust Control				Fuel		Crank-	
nduction	Ignition	Combus- tion	Exhaust	Crank- case Control	Evap. Control	Exhaust	case	
x		·	•					
х						:		
х						, , , ,		
х			·					

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

0ther

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range) Engine CID (Range) Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)
60-72	55-72	53-72	55-72	No info.
All	All	All	All	11 11
10	12	15	12	11 11

Model Types to Satisfy

Application

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

-	Exhaust Emission Measurements, Fill In Applicable Blanks									
Please attach additional test data if	7 H 1 H 2 C 1 X			Federal Tests 1970 <u>Hot</u> 1972			7-mode	Particu- lates		
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	HC, PDM	co,%	NO _x ,	
Baseline, as received										
Baseline, after tune-up	676	3. 90		220	1.1%		136	.74%		·
Retrofit device test	322	1.95		116	.16		132	.12%		
Number of cars	3	3		1	1			1		•
Test source	Scott L	aboratory	and David	son Labor	atory of S	evens Inst	itute			
Additional test data										
Durability Fleet	Not ava	ilable - H	ppefully ir	six montl	នេ					

Test Data (Attach Data If Available)

2.2 Special	Reqm'ts.,	if any	(Fuel,Safety)	None	 		
			•			•	
-				•			

2.3 Reliability (mean mileage between failure, MMBF)

MARE	Miles	Confidence	Test Source
Note			

Estimate life to be in excess of 50,000 miles (2 have been run over 40,000 miles, 2 over 30,000 miles all without failure.)

2.4 Maintainability (mean time to repair, MTTR)

MTTR, Hours		 Parts	Required for	Repair
0	·	None		

2.5 Periodic Maintenance/ Inspection Requirements

Νo	maintenance	required.	

2.6	Drivability Evaluation Check Applicable Boxe														and		
	Make Olds Year	69	Engine	CI	455	<u> </u>	Tran	smi	ssic	n		х					
	Ambient Temperature	60 ^O F									M	A					
	Car Preparation Data	· · · · ·															
Bas	ic Ignition Timing 9	Degrees															
Poi	nt Dwell 29 Degrees	,	Idle	e Mo	ode		A	cce	1. 1	1ode			Cru	ise	_	D	ece 1
Oth	er Special Adjustments	: Attach	<u> </u>	ح ا			8	1	ä								
Da	ta Sheet *Special Not	:e	RP	Satisfactory			Satisfactory	뎔	Stretchiness	╽.	9		Satisfactory		g		
ه ا		m ."	Engine	sfa	ے		Sfa	Detonation	5	4	Hesitation Sag		fa	Surging	Detonation	١.	Backfire
Start/Idl	Start to run time 11	<u>∕</u> ⁄3sec	Eng	ati	Rough	Stal	ati	ᄗ	Ħ	Stumble	Sag	,	ij	BIT	to		Stall Backf
art,	No. of attempts $\frac{1}{2}$	_		-	~	S	S		Ŋ	9 :			S	4	À		7 8
	•	sec	2200	X		_											
Cold	Kickdown (N) 10 sec		1800	X	\vdash	_					٠.						
ن	In drive, 10 sec		1100	Х	Ш				•								
			· }						· 	_	$\overline{}$						
	Accel 0-30 (1/2 thro					X	<u> i</u>		<u>. l</u>	لــــــــــــــــــــــــــــــــــــــ		T		\neg			
-Awa	Cruise 30 (0.1 Mile)						₩.	1	1	Т			X				
	Accel 30-55 (WOT at I	-					X				لــــــــــــــــــــــــــــــــــــــ						
٦	Decel 55-15 (Mod Brai	ke)											X		\neg		
		-441-1									A	i_					
Start	Accel 15-50 (1/2 Thro	ottiej					Ш				نــــــــــــــــــــــــــــــــــــــ		X	Т	\neg		
		- 1															T
Cold	Decel 50-0 (Mod Brake Idle, 15 Seconds	=) .	850	х		<u> </u>										<u></u>	
 +2	op Engine, Soak 15 Mir	Rostan	t - Cta	rt '	Time	 , 1	Sac	. Д	ttar	npts	1						
	Idle, 15 Seconds	i, Nestar	600	х		7		., ^	LLEI	iip cs	. —						
	Accel 0-30 (1/2 Thro	nttle)		·			\mathbf{x}	Ţ	\top	T							
ڃ	ł						<u> </u>					,	х	T	\neg		
Evaluation	Accel 30-55 (WOT at	•					x										
n n	Decel 55-15 (Mod Bra	•														Г	
1	Cruise 15 (0.1 Mile)	•											х				···
Start	Accel 15-50 (1/2 Thr						х		T				<u></u>				
	Cruise 50 (0.1 Mile)				•						•		x				
왕	Decel 50-0 (Mod Brak	(e)															
	Idle, 15 Seconds		650	х			_ 0	omm	ents	5							
Р	erformance	Trial 1		1_2	Iri	al 3	┨.										
<u> W</u>	OT Accel 0-60. Sec	11	11	-		11	┧.						,				
	Decel 60-30. Sec	30	31			31	_ [

^{*}Note: For lowest pollution idle mixture screws leaned by 7/8 turn from factory settings.

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

Cost	Quantity
15-\$20.00	Lots of 25M
\$50	Lots of 1
\$2.72-\$4.04	Lots of 25M
\$12.23-\$15.81	Lots of 25M

Lots of 25M

Lots of 25M

Lots of 25M

- 3.2 Profit Margins
 - . Manufacturer
 - . Distributor
 - . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs
 - . Fuel Economy , miles/gallon City Highway

Composite

. Parts Replacement Cost

\$5	1
.25	1

Baseline	Retrofit
10	11.5
14	15
13	14
	O

4.	Marketing Information/Plan	plans to market	through ne	w car dea	lerships
* ;	•	ed with pollution instrumentation.	4		L-1
		·			
					L. co.

50%

25%

40%

	Principles of Operation_Installation Regm'ts			In Cormetion Submitt			0 6-000		
	. Adjustments _			1969 figures					
-	Techniques			* 0					
, · · · · · · · · · · · · · · · · · · ·		, -		٠.					
1.2 Develor	oment Status		Numbe	er to Date	1				
•	nceptual/Desi	gn Stag		;					
Pro		1			٠.				
Mar					•				
Dis	stributed to	Dealer							
Ins		: 1							
Tot	al Accumulat	ed Miles	s [25,600					
(É	stimated, Th	ousands)						
					,				
1.3 Emissi	on Control C	ategory	(check	applicable	e box)		•		
		lificati	on	1		Fuel Mod	fication		
Ex		xhaust Control			Crank-	Fue1		Crank-	
	nduction Igr			Exhaust	case	Evap.	Exhaust	case	
	<u>-</u> -		tion		Control	Control			
ydrocarbon	X -				×			-	
arbon Monoxide	<u> </u>		<u> </u>	Y.	X				
xides of Nitrogen	×			×	X				
articulates	4								
ther	<u> </u>	<u> </u>		<u> </u>				L	
1 4 Automoti	ve Adaptabil	ity (At	tach cat	alog if a	vailable\				
	ity Vehicles				vallable)				
2.30 24	·	2033 1111	111 0000	LD GVA					
	•	AM	c c	hrysler	CM	Fo		oreign pecify)	
Year (Range)						- 	— \ <u>\</u>	pecity	
Engine CID (Range)							<u> </u>	· · · · · · · · · · · · · · · · · · ·	
Number of Retrofit			ĺ					· · · · · · · · · · · · · · · · · · ·	
	s to Satisfy		. 1	+ 0.0		10	20	0	
Application			Hae	prave		fil	al	(
		¢.	Eng	ines ?	è Ca	hure	loss.		
			lur	rent	prototy	م ر د	inst	the c	
•			a	Stock	(1961)	Chew	rolet.		

2. F	Performance Data		Seebm	The	~	/\ /.t	to the	للإما	rent tes	to a	vailat	dclosure 1	cont.
2.1	Exhaust Emission	Performan	ce (Avg	Value	if Mo				Please	Attach S	upportin	g Data)!	or test.
			Exhaus	st Emis	sion	Measur	ements	, Fi	ill In App	licable	Blanks	·	
	Please attach additional test data if		Hot-Stari Cold-Stai	;			ederal		its	Other T		ecify units litions)	Particu- lates
	available	HC, PPM	CO, %	NO _x ,	РРМ Н	C, GPM	co,	GPM	NO _X , GPM	нс,	co,	NO _x ,	
Base'	line, as received												
Base ¹	line, after tune-up												
Retro	ofit device test												
Numbe	er of cars												
Test	source												
Addi	tional test data					ï							
Dura	bility Fleet												
Test	Data (Attach Data I	f Availab	1e)										•
	•												•
2.2	Special Reqm'ts., if	f any (Fue	1,Safety	<u>}</u>	No								
	·												
			-										
		1	 			·			 ·	1			
	•		MMBF !	<u> 1i les</u>	Co	nfiden	ce	Test	t Source	4			
2.3	Reliability (mean m				<u> </u>					†			
	between failure, MM	BF)			ŀ								
			MTTR, I	lours	<u> </u>					Part	s Requir	red for Repa	ir
2.4	Maintainability (me to repair, MTTR)	an time			•					<u> </u>	,		
2.5	Periodic Maintenanc Inspection Requirem		Mini	nal		-							

.6)	Check Applicable Boxe	n-Retrofi s. See E	it Device Inclosure	2 For [ed: Plea Orivabili	se Conduct ty Procedure	Evaluation and e, Page 4.	
		Make Cherrolt Year	P61 1	Engine CI	0 283	_Transmi	ssion	X	
		Ambient Temperature	75 °F				М	Α	
		Car Preparation Data							
		ic Ignition Timing 51*** nt Dwell South Degrees	Idle M	ode	Acce	1. Mode	Cruise	Dece1	
		er Special Adjustments	: Attach	,			6		
		ta Sheet		RPM To		E E	Ses Luc	ror g	1:
ſ	<u>в</u>	Soak 12 hours minimum				Satisfactory Detonation	Stretchiness Stumble Hesitation Sao	Satisfactory Surging Detonation	e
		Start to run time 60	4	Engine	Rough Stall	tis	Stretch Stumble Hesitat Saq	Satisfa Surging Detonat	Stall Backfire
	Start/Idl	No. of attempts \		Sa.	Rou	Sar	Stur Stur Hes	Sur Sat	Stall Backf
	tar	Choke Hi-cam (N) 20 s	ec	700					1
١		•		750 }				•	
١	Cold	In drive, 10 sec		500					
ı		111 011103 10 300	•	<u> </u>	 				•
ſ		Accel 0-30 (1/2 throt	tle)			+			
		Cruise 30 (0.1 Mile)	,010)					' X	
١	Drive-Away	Accel 30-55 (WOT at D	otent)			λ			
		Decel 55-15 (Mod Brak				<u> </u>			
		Cruise 15 (0.1 Mile)	-,					\times	4
		Accel 15-50 (1/2 Thro	t+1e) ⁻						
	Start	Cruise 50 (0.1 Mile)				<u> </u>			
-	1d S	Decel 50-0 (Mod Brake	١						X
1	င္ပ	Idle, 15 Seconds	,	4 6001			•		
٠	Sto	op Engine, Soak 15 Min	Rostari		Time 5	Sec A	ttempts \	:	
ſ	300	Idle, 15 Seconds	, nescur	600 X		م راعالـــــ	recempes	·	
1		Accel 0-30 (1/2 Thro	ttle)	, , , ,		\times			
	Ę	Cruise 30 (0.1 Mile)	33.0,					×	
	Evaluation	Accel 30-55 (WOT at	Detent)			XII		المالية المالية	•
┨	ָ בַּ	Decel 55-15 (Mod Bra	_				· · · · · · · · · · · · · · · · · · ·	٠,	V
	Ē	Cruise 15 (0.1 Mile)	-					Q	سيما
	Start	Accel 15-50 (1/2 Thr			••			بميا	
١		Cruise 50 (0.1 Mile)	,			<u> </u>			
ĺ	Hot	Decel 50-0 (Mod Brak	e)	:					8
İ		Idle, 15 Seconds		600 ×		Comm	ents		<u>حب</u>
İ	Pe	erformance	Trial l		Trial 3	1			
Ī		OT Accel 0-60, Sec	19.3	19.00					
	WOT Accel 0-60, Sec 19.0 Decel 60-30, Sec 9.0			9.9	9.6				

3.1 Retrofit System Cost	Cost	Quantity	
. Initial Cost			1
. Developmental/Prototype			
. Manufacturing			
. Distribution]
3.2 Profit Margins			1
. Manufacturer			1
• Distributor			1
. Dealer/Installer (Retail)]
3.3 Installation on Vehicle . Kit/Parts			
. Labor, Hours			
3.4 Recurring Retrofit Costs			_
. Fuel Economy , miles/gallon	Baseline	Retrofit	
City			
Highway			
Composite			
. Parts Replacement Cost			
. Marketing Information/Plan	Enden the of	·	

ATTACHED ATTACHED

	1.	System	Informa	atio
--	----	--------	---------	------

1.1 Retrofit System Description (use extra pages or attach catalog)

•	rrinciples of operation	See Attached Document	
	Installation Reqm'ts	Same	
	Adjustments	Same	
	MFG Techniques	Same	

1.2 Development Status

Conceptual/Design Stage
Prototype
Manufactured
Distributed to Dealer
Installed on Vehicles
Total Accumulated Miles

Number to Date
5
5
NOME
NOME
5
20,000

(Estimated, Thousands)

1.3 Emission Control Category (check applicable box)

Mecl	nanical Mo	dification	on			Fuel Modification				
	Exhaust (١	Crank-	Fuel	,	Crank-			
nduction	Ignition	Combus- Exhaust		case Control	Evap. Control	Exhaust	case			
NONE	none	NOME	HOME YES		NONE	HONE	HOME			
NONE	HOME	HOME	YES	NONE	HOME	NONE	HORE			
NONE	HOME	NONE	YES	MONE	HONE	NONE	NONE			
HONE	HOME	NORE		HOME	HONE	none	HOME			
	CONTROL		SEE HOTES	HOTES		NOTES :	NOTES			

ATTACHED ATTACHED

Hydrocarbon

Carbon Monoxide

Oxides of Nitrogen

Particulates

Other

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

	•
Year (Range))
Engine CID ((Range)
Number of R	etrofit

AMÇ	Chrysler	СМ	Ford	Foreign (Specify)
ATT	ALL	ALL	ALL	ALL .
ALL	AIJ	ALL	ALL	ALL
			T	

Model Types to Satisfy

SEE "SUMMARY" IN ATTACHED OUTLINE.

Application

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

	Exhaust Emission Measurements, Fill In Applicable Blanks													
Please attach additional test data if		Hot-Start Cold-Star		# Fe 1970	deral Tes 1972		Other Te and te	cify units	Particu- lates					
available	нс, РРМ	CO, %	NO _X , PPM	HC, ĠPM	CO, GPM	NO _X , GPM	HC, PPM	co *	NO _X , PPM					
Baseline, as received	500 9-3 -		72	72 200		500	9.3							
Baseline, after tune-up	500	9.3	•	72	200		500 9.3	<u> </u>						
Retrofit device test			131	0.24	5.52	1.97	17.2	0.26						
Number of cars			1	1	1	1	1	1						
Test source Montgomery Ward & Company, with Horiba Nexa - Bthyl Corporation														
Additional test data					• .			Y						
Durability Fleet	Unlimite	<u>a</u>			<u></u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>				

Test Data (Attach Data If Available) Dynamometer Tests using Procedures prescribed by H.E.W Sec. 85,87, of Title 45, Part 85, dated July 1, 1969

2.2 Special	κeqm'ts.,	if any	(Fuel, Safety)_	P10880	see attaone	1 SUMMARI	 	

2.3 Reliability (mean mileage between failure, MMBF)

MMBF Miles	Confidence	Test Source
Unlimited	100%	Сомралу

Parts Required for Repair MTTR, Hours 2.4 Maintainability (mean time Spark Plug Unlimited 100% Company

to repair, MTTR)

2.5 Periodic Maintenance/ Inspection Requirements NONE - Unless the Spark Plug or electronic air-control burn out. This would

be indicated by a Red Warning Light on the dash not going out when the intermed

temperature fails to reach burning levels.

2.	5	Drivability Evaluati Check Applicable Box	on-Retrof es. See	it Devi Enclosi	ce ire	Ins 2	stal For	le Dr	d: ival	Plea bili	se ty	Conc Proc	luct edui	Eva re,	luat Page	ion 4.	and			
		Make Chevrolet Yea	r 1969	Engine	CI):	250		Trai	nsmi	ssi	on	X]					
		Ambient Temperature	° _F										M	A						
		Car Preparation Data																		
		ic Ignition Timing <u>sto</u> nt Dwell std. Degrees	1. Degrees	Idle Mode					Accel. Mode						Cru	ise		De	cel	
(th	er Special Adjustment	s: Attach	5-	5				۲		Ş				K					
	Da	ta Sheet		RPM	Satisfactory				Satisfactory	lon	Stretchiness		Ö		Satisfactory		a			
	e e	Soak 12 hours minimu	m .	Engine	sfa	ب			s fac	Detonation	당	न	Hesitation Sag	1	fa	g	Detonation		ire	
	lb1/	Start to run time 20	<u>sec</u>	Eng	ati	Rough	Stal	•	ati	eto	tre	Stumble	es i	<u> </u>	at is	Surging	ato.	Stall	Backfi	
	art/	No. of attempts	<u>. </u>	<u>`</u>	S	-R	S		S		S	7	当 ′]	S	3	Ž	Š	B	
	St	Choke Hi-cam (N) 20	sec	1500	X															
	Cold	Kickdown (N) 10 sec		700	I				•						,	*				
	3	In drive, 10 sec	•	2500	X															
		· · ·)							- 1			ר ר			•			
		Accel 0-30 (1/2 thro				,		I		_L			J	<u> </u>	- 	¬ ·		,		
	Away	Cruise 30 (0.1 Mile)							·	$\neg \tau$	1		_	٦.	X					
		Accel 30-55 (WOT, at	-						X					J						
	'n.	Decel 55-15 (Mod Bra	· /·											x		7	L			
	t Dri	Cruise 15 (0.1 Mile)							$\neg \tau$	Ŧ	_	Т	٦			_)				
	tart	Accel 15-50 (1/2 Thr	ittie)	ttle)						X			!_		٠. ل			٦		
	d St	Cruise 50 (0.1 Mile)	- \												X				<u> </u>	
	Col	Decel 50-0 (Mod Brak Idle, 15 Seconds	e) ;	700														L	L	
			n Dagtar	لسنسا		l			C.	. ^	• • • ·									
	311	op Engine, Soak 15 Mi Idle, 15 Seconds	n, kestar	700		THE	Ť	<u>u_</u>	<u> </u> ာeေ	:, A	rtei	mpts		<u>. </u>		;				
		Accel 0-30 (1/2 Thr	0+10)						X	Т	- [\neg	1] .						
:	Ĕ	Cruise 30 (0.1 Mile		,					ت.			_		J	x	T	٦			
	tio	Accel 30-55 (WOT at							x	T	T	\top	T	7	L		۔			
.	Evaluation	Decel 55-15 (Mod Br							ليتتيا				1	1.				<u> </u>		
		Cruise 15 (0.1 Mile	-			•									X		٦.			
	Start	Accel 15-50 (1/2 Th	- 4			,			x	\neg	T	T	T	1	<u></u>		لب			
		Cruise 50 (0.1 Mile	*						L	,					x					
	Hot	<u>'</u>	Decel 50-0 (Mod Brake)									•			,			\bigcap		
		Idle, 15 Seconds	700 X				Comments No trouble experienced in													
	Performance Trial 1				2	Iri	al	3	· · · · · · · · · · · · · · · · · · ·											
	WC	OT Accel 0-60, Sec		ISPAOT					ı	ODE			`							
	r	Decel 60-30 Sec	SA.	ISFACT	OR	7														

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

3.	2	Pr	ofi	t	Ma	rgi	ns
----	---	----	-----	---	----	-----	----

- . Manufacturer
- . Distributor
- . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs
 - Fuel Economy , miles/gallon City

Highway

Composite

. Parts Replacement Cost

Cost	Quantity
\$1,500	5
Same	5
\$80,00	1
Unknown	

	the state of the s
See 4	
See 4	
See 4	

	\$20.00	1
į	2	

Baseline	Retrofit
17	15
18-20	15
	\$1.85

4. Marketing Information/Plan

The Company plans to negotiate the manufacturing and marketing of the Device and related System and obtain a franchise royalty as mutually agreed upon. Profit margins will be established by the manufacturer.

It might be well to point out that the overall net cost of the System can be reduced by the normal cost of the muffler which it will replace. It can be a far better noise abater than the normal muffler.

RETROFIT INFORMATION OUTLINE

1. SYSTEM THIOTMETIC	١.	System	Informatio	n
----------------------	----	--------	------------	---

1.1 Retrofit System Description (use extra pages or attach catalog)

. Principles of Operation See catalog, pages 1-3, 45, 4

. Installation Regmits

See catalog, page 45, see attachment 2 & 3

. Adjustments

See catalog, page 45:

. MFG Techniques

Manufactured by subcontractors; inspected, assembled, and packed at our plant.

1.2 Development Status

Conceptual/Design Stage.

Prototype

Manufactured

Distributed to Dealer

Installed on Vehicles

Total Accumulated Miles

(Estimated, Thousands)

٧ų	mber to	o Date	
	,		
	··	,-	
		-	
	30,0	uoo esi	t.

600,000 M

1.3 Emission Control Category (check applicable box)

Mec	Fuel Modification						
	Exhaust C			Crank-	Fuel .	_	Crank- case
nduction	Ignition	Combus- tion	Exhaust	case Control	Evap. Control	Exhaust	
X	,			Х			
X		,		Х		:	
. Х		·		Х			•
,			·				

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

Other

1,4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

Year (Range)
Engine CID (Range)
Number of Retrofit

AMC	Chrysler	СМ	Ford	Foreign (Specify)
A11	All	All	All	All
All	All	All	All	All
1*	1*	1*	1*	1*

Model Types to Satisfy

Application

*Valve size depends upon CID of engine. All other modifications are kit adaptations, i.e., brass fittings, hose adaptors - see catalog.

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

	Exhaust Emission Measurements, Fill In Applicable Blanks									
Please attach additional test data if	7-Mode Hot-Start X 7-Mode Cold-Start		Federal Tests 1970 1972			Other Tests (specify units and test conditions)			Particu- lates	
available	HC, PPM	CO, %	NO _X , PPM	нс, дрм	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received	191	0.75%	1859							
Baseline, after tune-up							I			
Retrofit device test	7 - 1	0.23%	1785				<u> </u>			
Number of cars	1	1	1							
Test source	est source Olson Laboratories, Inc., Dearborn, Michigan									
Additional test data										
Durability Fleet										

Test Data (Attach Data If Available) See attachments 4, 5, 6

2.2 Special	Reqm'ts.,	if any	(Fuel, Safety)_	None		

2.3 Reliability (mean mileage between failure, MMBF)

MMBF Miles	Confidence	Test Source	
15,000*		Scott Labor	atories

*Average service requirements; no record of failure

intainability (mean time .8 hours Parts Required for Repair

- 2.4 Maintainability (mean time to repair, MITR)
- 2.5 Periodic Maintenance/ Visual inspection of residue in condensate jar (5,000 miles): Inspection Requirements change filter elements (15,000 miles); check condition of hose and valve (annually).

2.6	Drivability Evaluation Check Applicable Boxe	on-Retrofi es. See E	it Dev [.] Enclos	ice ure	Ins 2 F	talle or Dr	d: iva	Plea bili	ise (Cond Proc	luct edur	Eva e,	luat Page	ion an 4.	d	
	Make : Ford Year	. 1968 E	Engine	CII	D 3	02	Tra	nsmi	issic	on		T _v]			
								М	M A .:							
	Ambient Temperature	<u>60</u>										•				
	Car Preparation Data	î ·		·		-3	_					٦			_	
	sic Ignition Timing 6_B	<u>_r</u> Begrees	Idle	s Mr	ahr			Acce	el. N	Mode	v.		Cru	ico		Dece1.
	int Dwell 28 Degrees	a	·		T	\dashv	\vdash	T	1	1000	·	-		136	-	Dece
	ner Special Adjustments	: Attach	RPM	Ž			}		255	ľ			≱		- {	
Da	ita Sheet			Satisfactory			Satisfactory	Detonation	Stretchiness		Hesitation Sag		Satisfactory			يو ا
ام ا	Soak 12 hours minimum		Engine	isf	딞	4	C	nat	tct	Stumble	<u>ta</u>		Sfa	Surging Detonation		Stall Backfire
17	Start to run time 3		Enç	Sat	Rough	Stall	1 +	et.	tre	tm	les	3	Ħ	urg eto		Stall Backf
Start/Id]	No. of attempts			Н	\dashv	–			-71	7	10]	L'1	4 -	L	പ്പ
	· ·	sec	700		-	\dashv				•						
010	Kickdown (N) 10 sec		600	1		-			,				,			
	' In drive, 10 sec		550	X					•							
	A1 0 20 /1/2 4bi-		<u>;</u>	,			<u></u>	1. 1		\top		٦	•			
	Accel 0-30 (1/2 throt	•					X	1_1			Д	١				
\a	Cruise 30 (0.1 Mile)			• •			Γ			- Т	Т	٦	(X.)			
A-a	Accel 30-55 (WOT at D						LX	<u>i</u>				ل			Γ	
Orive-Away	Decel 55-15 (Mod Brak		•										7.	$\neg \neg$	L	لـــــــا
										\neg	-	7	X			
Start	Cruise 50 (0.1 Mile)	icie)					LX					ز				
		, ·											LX_L		٢	
[3	Decel 50-0 (Mod Brake Idle, 15 Seconds	;)		v		7									Ĺ	لـــلـــ
	op Engine, Soak 15 Min	, Restari	550 t: Sta	rt 1	Time	 l	_Se	c, A	\tter	npts	: 1					
	Idle, 15 Seconds		550	x												
	Accel 0-30 (1/2 Thro	ttle)					\Box X]				
- lo		1										_	\mathbf{x}			
Evaluation	Accel 30-55 (WOT at	Detent)					Lx			\bot					_	
a]u	Decel 55-15 (Mod Bra	ıke)										•			L	
		ı										_	\mathbf{x}			
Hot Start	Accel 15-50 (1/2 Thr	ottle)					Lx]				
15	Cruise 50 (0.1 Mile)												\mathbf{x}			
문	Decel 50-0 (Mod Brak	e)		,	, , , , , , , , , , , , , , , , , , ,											
	Idle, 15 Seconds		550	Х			7	Com	ents	5	T	est	_per	form	ed_	on
Į.P	erformance	Trial l	Tria	1_2	Iri	a] 3	1	مد_	<u> </u>	71.	T	ne_	engi	ne h	ad.	
W	OT Accel 0-60, Sec	14 sec.	13 s	ec	11	sec	∤ .	95	,361	0_m	ile	s a	nd w	as e	1111	pped
L	Decel 60-30, Sec	21 sec.	23 s	ec	23	sec	₫.	fr	om o	del	<u>ive</u>	rу	with	Eng.	ine	<u>Ven</u> t
								Sу	ster	m.						

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - Developmental/Prototype
 - Manufacturing
 - Distribution

3.2	Pro	fit	Man	rgins
-----	-----	-----	-----	-------

- . Manufacturer
- Distributor
- . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs

. Fuel Economy , miles/gallon City

Highway

Composite

Parts Replacement Cost

Cost	Quantity
\$59.70	1.
فعيم بيانان بيم سيفي بالمسيطور والسائل التاريخ	
\$34.82	<u> </u>

No Dist.	
\$23.88	1

Included in	initial cost
\$10.00 reco	mmended

Baseline	Retrofit						
	2-4 MPG						
	3-5 MPG						
	2-1/2 - 4-1/						

PG \$3.95 filter cost

Presently establishing dealer network 4. Marketing Information/Plan in materials handling field with exceptional results. unit is now OEM on some Clark, Hyster, Yale, and Pettibone Mercury models. We are also conducting full scale advertising in trade journals, such as Modern Materials Handling and Materials Handling and Engineering Magazines. This is now being negotiated to expand to other media avenues.

SEE ATTACHED

Adjustments MFG Techniques 1.2 Development Status Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- Exhaust case Evap. Induction Ignition Combus- Exhaust case Evap. Exhaust Control Contr	attached report	See	leqm'ts 2	llation F	. Insta
1.2 Development Status Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- Exhaust case Evap. Induction Ignition Combus- Exhaust case Evap. Control C	<u>, , , , , , , , , , , , , , , , , , , </u>		· . }	tments	. Adjus
1.2 Development Status Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- Exhaust case Ivap. Control	Hamping		i	echniques	. MFG T
Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Control Induction Ignition Combus—Exhaust case Evap. Control	0		•		
Conceptual/Design Stage Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Combus-Exhaust case Evap. Control Con		· .	•		1 0 Days 1
Prototype Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank- Fuel Induction Ignition Combus- Exhaust case Evap. Control Con					•
Manufactured Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Induction Ignition Combus- Exhaust case Evap. Exhaust Control C	^	je	esign Sta		
Distributed to Dealer Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank-Fuel Induction Ignition Combus-Exhaust case Evap. Control Cont		-		• •	
Installed on Vehicles Total Accumulated Miles (Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank- Fuel Induction Ignition Combus- Exhaust case Evap. Control					
(Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Fuel Modi Exhaust Control Crank Fuel Induction Ignition Combus Exhaust case Evap Control Control Control Induction Ignition Combus Exhaust case Evap Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control		-			
(Estimated, Thousands) 1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank Fuel Modification Exhaust Control Contro	6 453	. 2			•
1.3 Emission Control Category (check applicable box) Mechanical Modification Exhaust Control Crank- Fuel Exhaust Control Combus- Exhaust case Evap. Exhaust Control Con	9,.00_1				
Mechanical Modification Exhaust Control Crank- Fuel Induction Ignition Combus- Exhaust case Evap. Control Cont))	inousanu	.s c ilila ceu ,	()
Exhaust Control Induction Ignition Combus- Exhaust case Evap. Control Grocarbon rbon Monoxide ides of Nitrogen rticulates her 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	pplicable box)	(check a	Category	on Contro	1.3 Emissio
Exhaust Control Induction Ignition Combus- Exhaust case Evap. Control	Fuel Modification	dificatio	nanical_Mo	Mecl	•
Induction Ignition Combus- Exhaust case Evap. Control	Crank- Fuel Crank-	ontrol	Exhaust C		
tion Control Control drocarbon rbon Monoxide ides of Nitrogen rticulates her 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	rue i	Combus-	Ignition	Induction Ignition	
1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW		tion			
des of Nitrogen rticulates ner 1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW	· · · · · · · · · · · · · · · · · · ·				rocarbon
1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW					oon Monoxide
1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW		·			des of Nitrogen
1.4 Automotive Adaptability (Attach catalog if available) Light Duty Vehicles Less Than 6000 Lb GVW					ticulates
Light Duty Vehicles Less Than 6000 Lb GVW		l	<u> </u>) 	er
Light Duty Vehicles Less Than 6000 Lb GVW		•			
Light Duty Vehicles Less Than 6000 Lb GVW	alog if available	tach cat:	hility (A	ve Adanta	1 4 Automoti
i Fe					•
t and to a tour to the				-J,	2.322
	hrysler CM Ford Foreign (Specify)	IC CI	Al		÷
Year (Range)	\(\sigma\))	Year (Range
Engine CID (Range)					•
Number of Retrofit enknown at This time	known at This time	ein		Retrofit	Number of F

2. Performance Data	l		Enclosure 1 conf

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

•		*								
		Exhaus	t Emissic	n Measure	ments, Fi	11 In App	licable B	Blanks		
Please attach additional test data if		Hot-Start Cold-Star		Fe 1970	deral Tes 1972			sts (spec	ify units	Particu lates
available	HC, PPM	CO, %	NO _X , PPM	HC, GPM	CO, GPM	NO _X , GPM	нс,	co,	NO _X ,	
aseline, as received								:		
aseline, after tune-up	728 (1)	2.18(1)	754(1)	3,96 (1)	73.73 (1)	5.06(1)				
etrofit device test				3.52 (2)	63.89(2)	3.39(2)	(stande	ed meta	ring both	cars)
umber of cars ()				047/2901)	3:43	1.67(2)	7.			
est source	STEVENS	INSTITU	TE OF TE	CH NOLOG	y \$ 5	COTT RE	SEARCH L	LABORA	TORIES 11	ve.
Additional test data										
Ourability Fleet				3.55(1)	36.304	2.69(1)	(lean	main .	etering	D
2.2 Special Reqm'ts., i	any (rui	er,sarety		none						
		MMBF N	li les	Confidenc	e Test	Source	(To-da	te - 23,	ooo miles	accum
2.3 Reliability (mean π	ni leage	not le	tallished	- satimal	tedat car.	life	reinst	alled)	no faile	ue, an
between failure, MM	MBF)		<u></u> :							
		METR, I	lours				Parts	Required	for Repa	ir
2.4 Maintainability (me	ean time		iours atablish	d			Parts	Required	i for Repa	ir
2.4 Maintainability (me to repair, MTTR)	ean time			<u>l</u>			Parts	Required	i for Repa	ir

(stop witch and fifth whol not available to non reliable tests)

Enclosure 1 Cont.

2.6	Drivability Evaluation Check Applicable Box													d .	
	MakeYea	r I	Engine	CID	·	T:	rans	miss	ion		I				
	Ambient Temperature Car Preparation Data						:			-	M A				
Po	sic Ignition Timing int DwellDegrees			e Mod	le		Ac	cel.	Mod	e		Crui	se	D	ecel
	her Special Adjustment ata Sheet	s: Attach	RPM	tory			tory	DO SO		В	. }	tory	a		
	Soak 12 hours minimu Start to run time No. of attempts	sec	Engine	Satisfactory	Rough Stall		Satisfactory	Stretchinese	Stumble	Hesitation	Sag	Satisfactory	Surging Detonation		Stall Backfire
7100							,		•						
Cold Start Drive-Away	Decel 55-15 (Mod Bra Cruise 15 (0.1 Mile) Accel 15-50 (1/2 Thr Cruise 50 (0.1 Mile)	Detent) ke) ottle)													
S	top Engine, Soak 15 Mi	n, Restar	t: Sta	rt Ti	me		Sec	, Att	empt	s					
Evaluation	Idle, 15 Seconds Accel 0-30 (1/2 Throgodoruse 30 (0.1 Mile Accel 30-55 (WOT at) Detent)	·	1 1										_	
Hot Start Eva	Accel 15-50 (1/2 Th) rottle))	٠.				Ι	I							
	Idle, 15 Seconds	nc)					Co	ommen	ts						
	Performance	Trial 1	Iria	1 2	rial	4	_								
	WOT Accel 0-60, Sec			_+		\dashv		 							
ı	Decel 60-30 Sec	ì	I	i i		ı									

3.	Estimated	Cost	Information.	Dollars
J.	LJUINACEU	6036	ATTENDED IN COURT	בום ווטע

3.	1	Retr	ofit	System	Cost
•	•			-,	

- . Initial Cost
- . Developmental/Prototype
- . Manufacturing
- . Distribution

Cost	Quantity

3.2 Profit Margins

- . Manufacturer
- · Distributor
- . Dealer/Installer (Retail)

3.3 Installation on Vehicle

- . Kit/Parts
- . Labor, Hours

5-1000	
\$10-15 0	1 hour

each

\$5-10.00

3.4 Recurring Retrofit Costs

Fuel Economy , miles/gallon City Highway

Composite (1 while)

. Parts Replacement Cost

Baseline	Retrofit
	يرسن مشيرين برياسي والمساورة والمساو
13.50 M.P.G.	15.93 M.P.G.
	# 0.00

4.	Marketing Information/Plan -	mot	esta	blished.	_	and the second second	
	Contemplating lice	m Alma	For	man	la fa	- and	ande-
	of the device		-	7			

RETROFIT INFORMATION OUTLINE

Please collate with patent copy and performance summary submitted to Dearborn office 9/13/71.

- 1. System Information
 - 1.1 Retrofit System Description (use extra pages or attach catalog)
 - . Principles of Operation Wet film flow into manifold is intercepted and dispersed by non-wettable coated blades.
 - Installation Reqm'ts

- Lift carburctor.

Adjustments -

Readjust idle in normal manner, usually turn

. MFG Techniques

leaner. Sheet metal stamping, proprietary

1.2 Development Status Number to Date Conceptual/Design Stage Prototype 20 Manufactured Distributed to Dealer 20

Installed on Vehicles

Total Accumulated Miles Est. 600,000

(Estimated, Thousands).

1.3 Emission Control Category (check applicable box)

Mec	Fuel Modi	fication					
·	Exhaust C			Crank-	Euol		Crank-
Induction	Ignition	Combus- tion	Exhaust	case Evap. Control Control		Exhaust	case
X							
X			i				
2							
Х						,	

Hydrocarbon Carbon Monoxide Oxides of Nitrogen Particulates

0ther

1.4 Automotive Adaptability (Attach catalog if available)

Light Duty Vehicles Less Than 6000 Lb GVW

	AMC	Chrysler	СМ	Ford	Foreign (Specify)
Year (Range)				,	
Engine CID (Range)					
Number of Retrofit					

Application

Model Types to Satisfy Models will need match diversity of carburetor flange designs. Approximately 10 models should cover 90% or more of existing cars. Estimated tooling cost is about \$3000 each.

2. Performance Data Enclosure 1 cont.

2.1 Exhaust Emission Performance (Avg Value if More than One Test Please Attach Supporting Data).

None available.

		Exhaust Emission Measurements, Fill In Applicable Blanks											
Please attach additional test data if	7-Mode Hot-Start 7-Mode Cold-Start			Federal Tests 1970 1972					Other Tests (specify units and test conditions)			Particu- lates	
available	нс, РРМ	CO, 9	NO _X ,	PPM	HC,	GPM	CO,	GPM	NO _X , GPM	нс,	co,	NO _X ,	
Baseline, as received													
Baseline, after tune-up		<u> </u>											,
Retrofit device test		<u> </u>					L			<u> </u>			
Number of cars		<u> </u>								ŀ			
Test source													
Additional test data													
Durability Fleet													

Test Data (Attach Data If Available)

2.2 Special Reqm'ts.,	if any (Fuel	Safety)	Discarded	device	should	not	be	incinerated	as	fluorinated
coating will		-								

2.3	Reliabil	lity (mear	n mileage
	between	failure,	MMBF)

MMBF	Miles	Confidence	Test Source

Only failure was fatigue fracture of soft aluminum blade after 2 years and 40,000 miles. Coating was still effective

	MTTR, Hours	Parts Required for Repair
2.4 Maintainability (mean time	2	Replace plate.
to repair, MTTR)		

2.5 Periodic Maintenance/ Inspection Requirements

none	required.		 	

- 3. Estimated Cost Information, Dollars
 - 3.1 Retrofit System Cost
 - . Initial Cost
 - . Developmental/Prototype
 - . Manufacturing
 - . Distribution

Cost	Quantity
\$3.00	100,000
Nominal	sample
.75	100,000
2.25	W

- 3.2 Profit Margins .
 - . Manufacturer
 - Distributor
 - . Dealer/Installer (Retail)
- 3.3 Installation on Vehicle
 - . Kit/Parts
 - . Labor, Hours
- 3.4 Recurring Retrofit Costs
 - . Fuel Economy , miles/gallon

City

Highway

Composite

. Parts Replacement Cost

35% Gross	100,000
50% "	
50% "	

\$3.00	
\$	

Retrofit
12-16
15-21 Typ
driving mix
None

cal result for medium size 8 cyl. cars.

10

4. Marketing Information/Plan Device is protected by U. S. patent

3,393,984. Entire patent right is owned by Franklin O. Wisman who stands ready to discuss non-exclusive licensing with

qualified applicants. Best retrofit exploitation of device is believed to be as part of a super carburetor overhaul kit which would include leaner main jets tailored to the capability of each model engine.

APPENDIX V-4

DEVELOPER INDEX OF EVALUATED RETROFIT DEVICES (ALPHABETICALLY ARRANGED)

This appendix provides an alphabetical listing of developers whose devices were evaluated for retrofit use in controlling used car emissions.

NOTE: Appendix V-1 contains a list of all developers and sources of information contacted regarding retrofit devices.

DEVELOPMENT SOURCE	DEVICE AND/OR FILE NO.		VOL II	
		CLASS NO.	DEVICE NAME	REF PAR.
Adaks Products, Inc. 285 Mount Read Blvd. Rochester, N. Y. 14611	1	1.2.1	Air Bleed to Intake Manifold	4.1.1
Algas Industries 2657 Andjou Ave. Dallas, Tex. 75220	466	1.4.1	LPG-Gasoline Dual-Fuel Conversion	6.1.2
American Pollution Controlled, Incorporated 19900 E. Colfax Ave. Aurora, Colo. 80010	10	1.2.2	Throttle-Controlled Exhaust Gas Recircu- lation with Vacuum Advance Disconnect	4.2.1
Auto Pollution Control Corp. P.O. Box 392 Gresham, Ore. 97030	433	1.2.1	Air-Vapor Bleed to Intake Manifold	4.1.4
Automotive Association International Inc. 75 Narcissa Dr. Portuguese Bend, Calif. Tel (213) 377-8507	170	2.1	Closed Blowby Control System	7.1.2
Automotive Emissions Control Corp. (AEC) Louisville, Ky.	462	1.2.1	Air Bleed to Intake and Exhaust Manifolds	4.1.8
Automotive Exhaust Control Corp. 2824 51st Street South St. Petersburg, Fla. 33707 Tel (813) 341-6462	317	1.2.4	Carburetor Modifica- tion with Vacuum Advance Disconnect	4.4.5
Bendix Corporation Motor Component Div. 1931 Oakwood Ave. Elmira, N. Y. 14903	22	1.2.6	Electronic Fuel Injection	4.6.1
Biap Enterprises (Address unknown)	· 23	1.3.2	Electronic Ignition Unit	5.2.1
Bodai, Conrad A., PhD Environmental Scientific Assn. 319 San Miguel Dr. Arcadia, Calif. 91006 Tel (213) 445-1263	288	1.2.4	Carburetor Main Dis- charge Nozzle Modification	4.4.3

DEVELOPMENT SOURCE	DEVICE AND/OR		VOL II	
DETECTIVE TO THE	FILE NO.	CLASS NO.	DEVICE NAME	REF PAR.
Brisko's Mileage-Saver, Inc. P.O. Box 38 Ojibwa, Wis. Tel Winter 2691	24	2.1	Heavy Duty Positive Crankcase Control Valve with Air Bleed	7.1.1
Chromalloy American Corp. 2100 W. 139th St. Gardena, Calif. 90249 Tel (213) 770-1860	31	1.1.2	Thermal Reaction by Turbine Blower Air Injection	3.2.4
Clean Environment, Inc. 3445 38th St., N. W. Washington, D.C. 20016	425	1.1.3	Exhaust Gas After- burner	3.3.2
Colspan, Inc. P.O. Box 3467 Boulder, Colo. 80303	33	1.2.4	Carburetor Modifica- tion, Main Jet Differ- ential Pressure	4.4.1
Combustion Chemicals 15720 Ventura Blvd. Encino, Calif. 91316 Tel (213) 986-0181	182	1.4.2	Fuel and Oil Additives	6.2.1
Consolidated Engineering Technology Corporation Subsidiary of Technology, Inc. 71 Forest Brockton, Mass.	36	1.4.3	Fuel Conditioning by Exposure to Electro- magnetic Field	6.3.1
Corona Engineering 2856 Show Dr. Richmond, Calif. 94806	259	1.3.2	Photocell-Controlled Ignition System	5.2.3
Dana Perfect Circle Division 552 S. Washington St. Hagerstown, Ind. 47346	246	1.2.2	Speed-Controlled Exhaust Gas Recircu- lation with Vacuum Advance Disconnect	4.2.3
Delta Products, Inc. 630 S. 7th St. Grand Junction, Colo. 81501 Tel (303) 242-9000	, 268	1.3.2	Capacitive Discharge Ignition	5.2.4
E.I. du Pont de Nemours & Co. Petroleum Chemicals Division 612 S. Flower St. Los Angeles, Calif. 90017 Tel (213) 624-1354	244	1.1.2	Rich Thermal Reactor	3.2.1

DEVELOPMENT SOURCE	DEVICE AND/OR		VOL II	
DEVELOTMENT SOUNCE	FILE NO.	CLASS NO.	DEVICE NAME	REF PAR.
E.I. du Pont de Nemours & Co. (refer to Device 244)	469	4.0	Rich Thermal Reactor with Exhaust Gas Re- circulation and Par- ticulate Control	9.4
Eastman, Ernest A. Box 73, Smith St. Sedona, Ariz. 86336 Tel (602) 282-3540	308	1.1.3	Exhaust Gas After- burner	3.3.1
Emission Control Technology Inc. 950 N. Main St. Orange, Calif. 92667	175	1.3.1	Ignition Timing Modification with Lean Idle Adjustment	5.1.2
Energy Sciences, Inc. 343 Coral Circle El Segundo, Calif. 90245 Tel (213) 322-6368	418	1.2.1	Air Bleed to Intake Manifold	4.1.6
Energy Transmission Corp. Subsidiary of Doughboy Industries, Inc. 2360 Cabrera San Bernardino, Calif.	294	1.2.2	Exhaust Gas Recircu- lation with Carburetor Modification	4.2.4
Engelhard Minerals & Chemical Corporation Engelhard Industries Division 429 Delaney St. Newark, N. J. 07105	292	1.1.1	Catalytic Converter	3.1.2
Engine Accessories Manufacturing Company 5809 E. Beverly Blvd. Los Angeles, Calif. Tel (213) 723-4978	457	1.4.2	Water Injection	6.2.4
Esso Research and Engineering Company P.O. Box 111 Linden, N. J. 07036	463	1.1.2	Rich Thermal Reactor with Exhaust Gas Re- circulation and Spark Retard	3.2.2
Ethyl Corporation 100 Park Ave. New York, N. Y. 10017	468	1.1.2	Lean Thermal Reactor with Exhaust Gas Recirculation	3.2.3
Ferry Cap & Set Screw 2151 Scranton Rd. Cleveland, Ohio 44113	42	1.2.1	Air Bleed to Intake Manifold	4.1.2

DEVELOPMENT SOURCE	DEVICE		VOL II	
DETECTION TO THE TOTAL PROPERTY OF THE PROPERT	AND/OR FILE NO.	CLASS NO.	DEVICE NAME	REF PAR.
Hydro-Catalyst Corp. 60 E. 42nd St. New York, N. Y. 10017 Tel (201) 946-4195	384	1.2.3	Air-Fuel Mixture Diffuser	4.3.4
IMPCO, Division of A.J. Industries 16916 Gridley P1. Cerritos, Calif. 90701 Tel (213) 860-6666	52	1.4.1	LPG Conversion	6.1.1
Jackson, Otis 6325 Lagrande Detroit, Mich. Tel (313) 892-6689	164	1.1.4	Exhaust Gas Filter	3.4.1
J. & S. Carb. Company P.O. Box 10391 Dallas, Tex. 75207	282	1.4.2	LP Gas Injection	6.2.3
Kar Products, Înc. 461 N. 3rd Ave. Des Plaines, Ill. 60016	427	2.1/2.2	Closed or Open Blowby Control System with Filter	7.2.2
Kolb, Richard G. 540 Princeton St. New Milford, N. J.	430	1.2.3	Induction Modification	4.3.2
Landrum, Porter 7225 Second Ave., South Birmingham, Ala. Tel (205) 595-0251	56	1.2.4	Crankcase Blowby and Idle Air Bleed Modification	4.4.2
Litvak & Attorney's at Law Box 1953 Denver, Colo. 80201 Tel (303) 266-0381	57	1.2.1	Air Bleed with Exhaust Gas Recirculation and Vacuum Advance Disconnect	4.1.3
Manceri, A. S. Controlled Ignition Electronics 9446 Borson St. Downey, Calif.	, 296	1.3.2	Ignition Timing and Spark Modification	5.2.5
Manfredi Enterprises 2947 Loran Ave. Cleveland, Ohio Tel 651-8484	59	4.0	Three-Stage Exhaust Gas Control System	9.1

DEVELOPMENT SOURCE	DEVICE AND/OR FILE NO.		VOL II	
		CLASS NO.	DEVICE NAME	REF PAR.
Marvel-Schebler Division Borg-Warner Corporation 2195 South Elwin Rd. Decatur, Ill. 62525	459	1.4.1	LPG Conversion with Deceleration Unit	6.1.3
Mitsui 8-7-1 Shimorenjaku Mitaka - City Tokyo, Japan	62	1.1.1	Catalytic Converter	3.1.3
Nycal Co., Inc. 700 Washington Ave. Carlstadt, N. J. 07072	315	2.1	Closed Blowby Control System	7.1.3
Oildex Corporation P.O. Box 3755 Long Beach, Calif. 90803	160	2.2	Closed or Open Blowby Control System with Filter	7.2.1
Optimizer Control Corp. 5309 Edina Industrial Blvd. Minneapolis, Minn. 55435 Tel (612) 941-6161	69	1.3.1	Electronic-Controlled Vacuum Advance Discon- nect and Carburetor Lean Idle Modification	5.1.1
Pacific Lighting Service Co. 720 S. Flower St. Los Angeles, Calif. 90054	460	1.4.1	Compressed Natural Gas Dual-Fuel Conversion	6.1.6
Penkova, Charles 147 E. 18th St. Costa Mesa, Calif. Tel (714) 646-0016	165	4.0	Exhaust Gas After- burner/Recirculation with Blowby and Fuel Evaporation Recircu- lation	9.2
Pollution Abatement System 9001 Rosehill Rd. Jenexa, Kansas 66215 Tel (913) 888-1221	172	1.2.3	Intake Manifold Modification	4.3.1
Pollution Controls Industries, Incorporated 2207 Border Ave. Torrance, Calif. 90501	, 295	1.2.4	Carburetor with Var- iable Venturi	4.4.4
Production System (1)	467	.3.0	Fuel Evaporation Con- trol System	8.1
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⁽¹⁾ This device represents a fuel evaporation control system used on new model vehicles. The device was evaluated for retrofit cost feasibility.

DEVICE	Ţ	HARDWARE TYPE	VOL II
FILE NO.	CLASS NO.	DEVICE NAME	REF PAR.
95	1.3.2	Ignition Spark Modification	5.2.2
408	4.0	Exhaust Gas and Blowby Recirculation with Intake Vacuum Control and Turbulent Mixing	9.3
279	1.4.3	Fuel Conditioner	6.3.2
325	1.2.1	Air-Vapor Bleed to Intake Manifold	4.1.4
458	1.2.1	Air Bleed to Intake Manifold	4.1.7
93	1.1.1	Catalytic Converter with Exhaust Gas Re- circulation, Spark Modification, and Lean Idle Mixture	3.1.4
401	1.2.1	Air-Vapor Bleed to Intake Manifold	4.1.5
96	1.1.1	Catalytic Converter with Distributor Vacuum Advance Disconnect	3.1.1
, 245	1.2.2	Variable Camshaft Timing	4.2.2
100	1.2.5	Turbocharger	4.5.1
	AND/OR FILE NO. 95 408 279 325 458 93 401 96	AND/OR FILE NO. CLASS NO. 95 1.3.2 408 4.0 279 1.4.3 325 1.2.1 458 1.2.1 93 1.1.1 401 1.2.1 96 1.1.1	AND/OR FILE NO. CLASS NO. DEVICE NAME 95 1.3.2 Ignition Spark Modification 408 4.0 Exhaust Gas and Blowby Recirculation with Intake Vacuum Control and Turbulent Mixing 279 1.4.3 Fuel Conditioner 325 1.2.1 Air-Vapor Bleed to Intake Manifold 458 1.2.1 Air Bleed to Intake Manifold 93 1.1.1 Catalytic Converter with Exhaust Gas Recirculation, Spark Modification, and Lean Idle Mixture 401 1.2.1 Air-Vapor Bleed to Intake Manifold 96 1.1.1 Catalytic Converter with Distributor Vacuum Advance Disconnect 245 1.2.2 Variable Camshaft Timing

DEVELOPMENT SOURCE	DEVICE AND/OR		VOL II	
DEVELOPMENT SOURCE	FILE NO.	CLASS NO.	DEVICE NAME	REF PAR.
Wilford, E. O. 300 Linden Ave. Merion Sta., Penn. 19066	322	1.1.5	Exhaust Gas Back- pressure Valve	3.5.1
Wiseman, F. O. Route 8, Box 431 Chambersburg, Penn. 17201	440	1.2.3	Air-Fuel Mixture Deflection Plate	4.3.3
Refer to EPA Test Report 71-21	461	1.4.1	LPG Conversion with Exhaust Reactor Pulse Air Injection and Exhaust Gas Recir- culation	6.1.4
Refer to EPA Test Report 72-4	464	1.4.1	Methanol Fuel Conver- sion with Catalytic Converter	6.1.5
Refer to EPA Test Report 71-24	465	1.4.2	Fuel Additive	6.2.2