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EVALUATION OF ECCONO-NEEDLES

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Henry L. Gompf
Test and Evaluation Branch
Environmental Protection Agency

Background

Canco Incorporated of San Rafael, California, requested that the Test and Evaluation Branch conduct a program to determine the emission control potential of Eccono-Needles. The company representative presented test data which they had obtained from a reputable laboratory showing significant reductions in hydrocarbon and carbon monoxide emissions. This data was generated using a group of vehicles operated and tested at 5000 feet above sea level where baseline CO levels are much higher than at sea level.

Device

Eccono-Needles replace the stock idle mixture screws from a vehicle's carburetor. The replacement screws are available in six sizes covering a significant proportion of vehicles currently being operated in the United States.

Eccono-Needles are hollow allowing air to bleed through them with the intended effect of leaning air/fuel ratio. Installation instructions supplied with the device call for screwing the Eccono-Needles in until they are seated and then backing off one-half a turn. The use of a garage-type combustion analyzer, while not specified in the instructions, enables more precise settings of lean idle mixture.

Test Program

Three vehicles from the EPA test fleet were selected for installation of Eccono-Needles:

1962 Chevrolet Biscayne	283 CID
1963 Ford Galaxie	289 CID
1970 Plymouth Valiant	225 CID

All three vehicles were equipped with automatic transmissions.

The Valiant and the Galaxie were subjected to three test configurations. After baseline testing at "best idle" setting, Eccono-Needles were installed according to the installation instructions and the cars were again tested. Subsequently, the idle CO was set at a minimum level with Eccono-Needles and the two vehicles were retested. The Biscayne was tested in only the baseline and lean-set Eccono-Needles configurations.

All testing was performed in accordance with the November 10, 1970, Federal Register. This document details the standard Federal Emission Test Procedure for 1972 model year vehicles. Fuel consumption was quantitatively evaluated during the testing.

Test Results

The test results for the three vehicles are presented in the Appendix of this report. These results are summarized below:

Summary of Emission Results
% Reduction from Baseline

	1962 Chevrolet		1963 Ford		1970 Plymouth	
	Normal set	Lean idle	Normal set	Lean idle	Normal set	Lean idle
HC	---	7%	7%	2%*	5%*	0%
CO	---	30%	10%	5%	19%*	33%
CO_2	---	9%*	2%*	0%	3%	1%*
NOx	---	14%*	18%*	5%*	4%	2%*

*Increase

Fuel consumption calculations for the three vehicles indicated the following results:

Fuel Consumption/Change from Baseline

1962 Chevrolet		1963 Ford		1970 Plymouth	
Normal set	Lean idle	Normal set	Lean idle	Normal set	Lean idle
---	4%**	1%***	1%***	0%	4%***

**Penalty
***Benefit

Conclusions

With careful combustion analyzer setting of Eccono-Needles hydrocarbon and carbon monoxide levels can be reduced in the vehicles tested. Oxides of nitrogen tend to increase. Similar reductions of HC and CO might be achieved by resetting the standard idle mixture screws.

Fuel consumption results were mixed and therefore no conclusions as to the effectiveness of Eccono-Needles on fuel economy can be made.

1972 Federal Test Procedure
All Results in Grams Per Mile

1962 Chevrolet-283 CID

Date	HC	CO	CO_2	NOx
Baseline				
3-17-72	5.30	54.5	515.8	3.8
3-16-72	6.3	67.9	532.7	3.9
3-15-72	6.1	47.2	525.9	4.1
Average	5.9	42.4	524.8	3.9
Eccono-Needles	(low idle CO)			
4-6-72	5.4	19.8	540.9	4.5
4-10-72	5.4	36.2	585.5	4.8
4-8-72	5.6	28.4	541.6	*
4-7-72	*	34.26	609.9	4.1
Average	5.5	29.6	569.5	4.5
% Reduction from Baseline	7%	30%	9% increase	14% increase

Baseline fuel consumption 14.7
Eccono-Needles fuel consumption 14.1 mpg

*Error in sampling

1972 Federal Test Procedure
All Results in Grams Per Mile

1963 Ford-289 CID

Date	HC	CO	CO_2	NOx
Baseline				
2-2-72	8.9	116.1	508.1	4.1
2-3-72	7.3	124.2	522.5	4.0
2-4-72	8.0	119.7	529.1	3.9
2-5-72	7.4	105.9	523.4	4.2
2-28-72	9.2	130.5	519.6	4.0
Average	8.2	119.3	520.5	4.0
Eccono-Needles (followed recommended installation)				
2-29-72	7.1	104.6	537.7	4.4
3-1-72	8.0	111.8	528.3	4.3
3-2-72	7.5	103.7	523.8	5.0
3-3-72	7.8	102.3	535.3	5.0
Average	7.6	106.9	531.3	4.7
% Reduction from Baseline	7%	10%	2% increase	18% increase
Eccono-Needles (lean idle CO)				
3-17-72	8.3	112.7	498.5	3.7
3-22-72	8.5	113.0	546.5	4.6
Average	8.4	112.9	522.5	4.2
% Reduction from Baseline	2% increase	5%	0%	5% increase

Baseline fuel consumption	12.3 mpg
Eccono (normal set) fuel consumption	12.4 mpg
Eccono (lean idle) fuel consumption	12.4 mpg

1972 Federal Test Procedure
All Results in Grams Per Mile

1970 Valiant-225 CID

Date	HC	CO	CO_2	NOx
Baseline				
2-2-72	2.3	44.7	407.9	4.8
2-4-72	1.9	37.0	418.7	3.7
2-5-72	2.0	33.1	425.7	5.3
2-23-72	2.4	41.0	392.3	4.9
2-25-72	1.9	36.5	407.9	5.3
2-26-72	2.1	36.1	397.9	5.1
2-28-72	2.3	48.6	403.8	5.4
Average	2.1	39.6	407.7	4.9
Eccono Needles (followed recommended installation)				
2-29-72	2.5	62.9	384.8	4.4
3-1-72	1.9	31.8	404.1	4.7
3-3-72	2.2	47.2	398.3	4.9
Average	2.2	47.3	395.7	4.7
% Reduction from Baseline	5%increase	19% increase	3%	4%
Eccono Needles (lean idle CO)				
3-17-72	2.3	28.7	394.5	4.8
3-21-72	2.3	29.7	422.2	4.7
3-22-72	1.9	24.2	419.3	4.9
3-23-72	1.8	23.3	407.8	5.4
Average	2.1	26.5	411.0	5.0
% Reduction from Baseline	0%	33%	1% increase	2% increase

Baseline fuel consumption	18.5 mpg
Eccono (normal set) fuel consumption	18.5 mpg
Eccono (lean idle) fuel consumption	19.2 mpg