

Evaluation of the Turbo Vapor Injector

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Test and Evaluation Branch
Emission Control Technology Division
Environmental Protection Agency

Background

TVI Marketing Inc. of Lexington, Michigan, requested that EPA test their Turbo Vapor Injector device. Results of testing at Olsen Laboratories showed substantial reductions in carbon monoxide (CO) and hydrocarbon (HC) emissions. The Test and Evaluation Branch scheduled testing of the device.

Device

The Turbo Vapor Injector is a vacuum vapor induction system which is attached to the PCV line. Air is drawn through an alcohol-and-water based solution into the base of the carburetor. The device comes with instructions so that it can be retrofitted to any car including older vehicles without PCV lines.

Test Program

A 1970 Plymouth Valiant, 225 CID, from the EPA fleet was used for the program. Seven tests were conducted, two without the device (baseline), three with the device properly attached, and then two more with the fluid bottle empty so that only air was drawn into the PCV line. These last two tests were conducted at the request of the sales representative who delivered the device to the EPA laboratory.

Prior to the testing, the Valiant's carburetor was set at 2% CO and 650 rpm at idle, and was not adjusted again throughout the testing. All testing was performed in accordance with the 1975 Federal Test Procedure (FTP). Full details of this procedure are found in the November 15, 1972 Federal Register, Volume 37, Number 221, Part II.

All tests were conducted using the standard dynamometer inertia loading for the Valiant which is 3,000 pounds. Test fuel was Indolene Clear (lead-free standard test fuel).

Test Results

The test results are presented in the Appendix of this report. In addition to emission results, fuel economy was determined using a carbon balance method. Emission and fuel consumption results are summarized as follows:

Summary of Results
% Change from Baseline

	TVI Device	TVI (bottle empty)
HC	4.5 decrease	7.6 decrease
CO	17.1 decrease	13.0 decrease
CO ₂	9.7 increase	6.9 increase
NOx	26.4 increase	20.7 increase
Fuel Consumption	5.7 increase	3.5 increase

The Turbo Vapor Injector decreased hydrocarbon and carbon monoxide emissions with an accompanying increase in oxides of nitrogen. Fuel consumption rose slightly with the device. Without any fluid, the changes from baseline demonstrated the effect of air/fuel ratio enleanment with the addition of air through the PCV system.

Conclusion

On the EPA test vehicle, the Turbo Vapor Injector reduced carbon monoxide emissions with an accompanying equivalent increase in oxides of nitrogen. No reduction in fuel consumption was observed.

APPENDIX

TVI Test Program - 1975 Federal Test Procedure

Baseline

Test No.	HC gpm	CO gpm	CO ₂ gpm	NOx gpm	Fuel Consumption mpg
16-330	2.27	33.55	352.7	4.36	20.95
16-333	2.19	31.19	406.2	5.78	18.9
AVERAGE	2.23	32.37	379.4	5.07	19.9

TVI Device

Test No.	HC gpm	CO gpm	CO ₂ gpm	NOx gpm	Fuel Consumption mpg
16-338	2.23	28.01	417.5	6.30	18.6
16-341	1.99	25.82	420.2	6.44	18.81
16-344	2.17	26.59	411.1	6.50	18.93
AVERAGE	2.13	26.81	416.2	6.41	18.82

TVI Device (Bottle Empty)

Test No.	HC gpm	CO gpm	CO ₂ gpm	NOx gpm	Fuel Consumption mpg
16-347	2.15	29.48	397.5	5.79	19.4
16-350	1.97	26.86	413.3	6.45	19.0
AVERAGE	2.06	28.17	405.4	6.12	19.2