

Evaluation of a Chevrolet Fitted with a Vortex Reactor

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Office of Air and Water Programs  
Environmental Protection Agency

## Background

The Emission Control Technology Division was contacted by Vortex Inc. of Tucson, Arizona, concerning the possible testing of their test vehicle fitted with a thermal reactor. The vehicle had been recently tested at the General Motors Proving Ground in Mesa, Arizona, and approached the 1975 Federal interim emission levels, being slightly high only in carbon monoxide. The Test and Evaluation Branch agreed to test the vehicle, but because of the heavy work load could only schedule one test. Additional and more complete tests on this system and on a system designed for OEM application are planned in the near future.

## System Description

The thermal reactor was a large cylinder, approximately eight inches in diameter and seven feet long. It was fitted into the exhaust system, about three feet downstream of the exhaust manifold. A spark plug near the upstream end of the reactor was fired by means of a separate coil connected to the regular coil. Air from an air pump could be controlled by the driver to enter either the exhaust manifold or the entrance (before the spark plug) of the reactor.

## Test Program

The vehicle supplied by Vortex was a 1972 Chevrolet Impala. The original engine was replaced with a 1965 Chevrolet 327 CID engine. The test performed was a 1975 FTP as outlined in the November 15, 1972, Federal Register for light duty vehicles. Because of the Vortex representative's concern for back pressure from the standard CVS exhaust hook-up, the dilution box was not used and the exhaust pipe from the vehicle was simply stuck inside the larger inlet pipe to the CVS.

For the first 300 seconds of the test air from the air pump was ported to the exhaust manifold. For the rest of the test it was ported to the reactor.

## Test Results

The test results are presented below along with calculated fuel economy. Emissions are in grams/mile.

<u>Test No.</u>	<u>HC</u>	<u>CO</u>	<u>CO<sub>2</sub></u>	<u>NOx</u>	<u>MPG</u>
16-674	.81	22.68	803.5	1.43	10.8
1975 Interim Standards	1.50	15.0	---	3.1	---

Conclusions

The Vortex system produced much lower emissions than are typical for a 1965 uncontrolled vehicle. However, the vehicle failed to meet 1975 interim levels, HC and NOx emissions were about half the limits, but CO emissions were 50% higher.