State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-175-13
Relating to Exemptions Under Section 27156
of the Vehicle Code

HYPERMAX ENGINEERING, INC.
FUEL INJECTION NOZZLE

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39515 and Section 39516 of the Health and Safety Code and Executive Order G-45-9;

IT IS ORDERED AND RESOLVED: That the installation of the Fuel Injection Nozzle marketed by Hypermax Engineering, Inc., 255 E Route 72, Gilberts, Illinois 60136 has been found not to reduce the effectiveness of the applicable vehicle pollution control system and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1993-97 trucks equipped with a turbocharged Navistar 7.3L diesel engine.

The Fuel Injection Nozzle is a complete set of new fuel injectors that have been designed to increase fuel flow at WOT.

This Executive Order is valid provided that the installation instructions for the Fuel Injection Nozzle will not recommend tuning the vehicle to specifications different from those of the vehicle manufacturer.

Changes made to the design or operating conditions of the Fuel Injection Nozzle, as exempt by the Air Resources Board, which adversely affect the performance of the vehicle's pollution control system shall invalidate this Executive Order.

Marketing of the Fuel Injection Nozzle using any identification other than that shown in this Executive Order or marketing of the system for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of the system shall not be construed as exemption to sell, offer for sale, or advertise any component of the kit as an individual device.

This Executive Order does not constitute any opinion as to the effect the use of the Fuel Injection Nozzle may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF HYPERMAX ENGINEERING, INC.'S FUEL INJECTION NOZZLE.

No claim of any kind, such as "Approved by the Air Resources Board", may be made with respect to the action taken herein in any advertising or other oral or written communication.

Violation of any of the above conditions shall be grounds for revocation of this order. The order may be revoked only after a ten-day written notice of intention to revoke the order, in which period the holder of the order may request in writing a hearing to contest the proposed revocation. If a hearing is requested, it shall be held within ten days of receipt of the request and the order may not be revoked until a determination after hearing that grounds for revocation exist.

Executed at El Monte, California, this 29th day of May 1997.

R. B. Summerfield, Chief
Mobile Source Operations Division

State of California
AIR RESOURCES BOARD

EVALUATION OF HYPERMAX ENGINEERING, INC.'S FUEL INJECTION NOZZLE FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

May 1997

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AIR RESOURCES BOARD

EVALUATION OF HYPERMAX ENGINEERING, INC.'S FUEL INJECTION NOZZLE FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

by

Mobile Source Operations Division
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El Monte, CA 91731

(This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.)

SUMMARY

Hypermax Engineering, Inc. of 255 E Route 72, Gilberts, Illinois 60136 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for their Fuel Injection Nozzle designed for 1993-97 trucks equipped with a turbocharged Navistar 7.3L diesel engine.

Based on submitted emissions test data, the staff concludes that the Fuel Injection Nozzle will not adversely affect exhaust emissions from vehicles for which the exemption is requested.

The staff recommends that Hypermax Engineering, Inc. be granted an exemption as requested and that Executive Order D-175-13 be issued.

TABLE OF CONTENTS

	Page Number
SUMMARY	i
CONTENTS	ii
I. INTRODUCTION	1
II. CONCLUSION	1
III. RECOMMENDATION	1
IV. FUEL INJECTION NOZZLE DESCRIPTION	1
V. DISCUSSION OF THE FUEL INJECTION NOZZLE	2

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FUEL INJECTION NOZZLE FOR AN EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Hypermax Engineering, Inc. of 255 E Route 72, Gilberts, Illinois 60136 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for their Fuel Injection Nozzle for 1993-97 trucks equipped with a turbocharged Navistar 7.3L diesel engine.

II. CONCLUSIONS

Based on submitted emissions test data, the staff concludes that Hypermax Engineering, Inc.'s Fuel Injection Nozzle will not adversely affect exhaust emissions from the vehicles for which the exemption is requested.

III. RECOMMENDATION

The staff recommends that Hypermax Engineering, Inc. be granted an exemption for their Fuel Injection Nozzle for installation on 1993-97 trucks equipped with a turbocharged Navistar 7.3L diesel engine. The staff also recommends that Executive Order D-175-13 be issued.

IV. FUEL INJECTION NOZZLE DESCRIPTION

The Fuel Injection Nozzle manufactured by Hypermax Engineering has been specifically designed for installation on 1993-97 trucks equipped with a turbocharged Navistar 7.3L diesel engine.

The purpose of using Hypermax's Fuel Injection Nozzle is to enhance the performance of the 7.3L diesel engine during high torque and wide open throttle conditions (WOT). The kit includes a new set of injectors.

The new set of injectors, described as a Hydraulically Actuated Electronic Controlled Unit Injector (HEUI), have a higher maximum fuel flow rate at WOT than the factory stock injectors. Hypermax claims that these injectors maintain stock flow characteristics during normal driving conditions, those conditions similar to the CVS-75 Federal Test Procedure. The HEUI has four major components: Solenoid, poppet valve, intensifier piston & plunger, and the nozzle assembly. The poppet valve is held on its lower seat by a spring. In this closed position, high pressure inlet oil is blocked and the intensifier cavity is open to drain. When the solenoid is energized, the poppet is quickly lifted off of the lower seat to the upper seat. The path to the drain is now closed and the inlet for high pressure oil

is opened. The high pressure oil enters the injector and acts on top of the intensifier piston. Pressure builds on the intensifier, pushing it and the plunger down. The intensifier is 7 times larger in surface area than the plunger, providing an equal multiplication of force creating the injection pressure. The downward movement of the plunger pressurizes the fuel in the plunger cavity, causing the nozzle to open.

V. DISCUSSION OF THE FUEL INJECTION NOZZLE

A 1995 Ford F-350 equipped with a 7.3L turbocharged diesel engine was used for the evaluation of the Fuel Injection Nozzle. Testing consisted of one Cold 505 in the baseline configuration and one Cold 505 in the modified configuration. The dynamometer inertia weight and horsepower settings were 8000-lbs. and 19.3-hp., respectively. The emissions testing was conducted by Roush Laboratories for Hypermax, data was evaluated against the vehicles's baseline emission levels. Table 1 lists those results.

Table 1.

(gm/mile)

	HC	CO	NOx	Particulates
Baseline	0.89	4.68	7.8	0.15
Modified	0.60	4.60	8.0	0.11

The ARB did not perform testing to confirm the emission test results submitted by the applicant. Emission test results submitted were below the vehicle's baseline emission levels or within the allowable increases of 0.1 grams/mile or 10 percent on HC or NOx, 1.0 grams/mile or 15 percent on CO, and 0.03 grams/mile or 15 percent on Particulates.

In addition to their emissions evaluation Roush also performed a key on engine off (KOEO) test and a key on engine running (KOER) test with the vehicle in the baseline and modified configuration. Hypermax used a new 1997 Ford F-350 truck with the 7.3L diesel engine to evaluate the affect of the device on the vehicle's limited on-board diagnostic (OBD) II system. The OBD II system was introduced only on medium-duty diesels trucks in 1997. No codes were detected and the vehicle's monitors completed their check. An incomplete monitor would mean that the vehicle's computer had not been able to complete its evaluation of the sensors associated with that monitor. Therefore, based

on the test results and the OBD II checks, the staff concludes that the installation of the Fuel Injection Nozzle will not have an adverse effect on exhaust emissions on those applicable vehicles.

Hypermax Engineering has submitted all the required information and fulfilled the requirements for an exemption.