

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-231-3
Relating to Exemptions Under Section 27156
of the Vehicle Code

WHIPPLE INDUSTRIES, INC.
SUPERCHARGER KITS

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 Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the Whipple supercharger kits, manufactured by Whipple Industries, Inc. of 3292 North Weber Avenue, Fresno, CA 93722, 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 the following vehicle applications:

<u>Whipple Part Number</u>	<u>Vehicle Application</u>
WI-TEC S3116-93-4A	1988-93 GM 4.3 liter S-10 model trucks
WI-TEC C3116-93-4A	1988-93 GM 4.3 liter C/K model trucks
WI-TEC 3133-89-5A	1989 GM 5.0/5.7 liter trucks
WI-TEC 3133-91-5A	1990-91 GM 5.0/5.7 liter trucks
WI-TEC 3133-93-5A	1992-93 GM 5.0/5.7 liter trucks
WI-TEC 3150-89-7A	1988-89 GM 7.4 liter trucks
WI-TEC 3150-90-7A	1990 GM 7.4 liter trucks
WI-TEC 3150-93-7A	1991-93 7.4 liter trucks

The following modifications to the original equipment emission control systems are allowed.

1. The original heated air intake system is removed and cold-start emission problems are avoided by heated coolant water flowing through the throttle-body adapter.
2. The original air cleaner is replaced by the air cleaner assembly supplied with the supercharger kit.

This Executive Order is valid provided that installation instructions for this supercharger will not recommend tuning the vehicle to specifications different from those submitted by Whipple Industries, Inc.

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

Marketing of this supercharger using any identification other than that shown in this Executive Order or marketing of this supercharger 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 supercharger shall not be construed as exemption to sell, offer for sale, or advertise any component of the kit as an individual device.

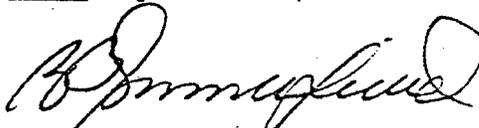
This Executive Order does not constitute any opinion as to the effect the use of this supercharger may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF WHIPPLE INDUSTRIES, INC.'S SUPERCHARGER KITS.

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 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 March, 1993.



R. B. Summerfield
Assistant Division Chief
Mobile Source Division

Original

State of California
AIR RESOURCES BOARD

EVALUATION OF WHIPPLE INDUSTRIES, INC.'S SUPERCHARGER KITS
FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE
CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE
CALIFORNIA CODE OF REGULATIONS

March 1993

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AIR RESOURCES BOARD

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CALIFORNIA CODE OF REGULATIONS

by

Mobile Source Division
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731-2990

(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

Whipple Industries, Inc., of 3292 North Weber Avenue, Fresno, California 92722 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for the Whipple Industries, Inc.'s supercharger kits. The supercharger kits are designed for installation on the following vehicle applications:

<u>Whipple Part Number</u>	<u>Vehicle Application</u>
WI-TEC S3116-93-4A	1988-93 GM 4.3 liter S-10 model trucks
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WI-TEC 3150-93-7A	1991-93 7.4 liter trucks

Based on the results from emission tests performed at an independent laboratory on a 1991 Chevrolet Suburban, the staff concludes that Whipple Industries, Inc.'s supercharger kits will not adversely affect exhaust emission from vehicles for which an exemption is requested.

The staff recommends that Whipple Industries, Inc. be granted an exemption as requested and that Executive Order D-231-3 be issued.

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I. INTRODUCTION

Whipple Industries, Inc. of 3292 North Weber Avenue, Fresno, California 92722 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code for the Whipple Industries, Inc.'s supercharger kits. The supercharger kits are designed for installation on the following vehicle applications:

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Whipple Industries, Inc. has submitted data from testing on a 1991 Chevrolet Suburban at Automotive Testing & Development Services, Ontario, California.

II. CONCLUSIONS

Based on the results from emission tests performed at Automotive Testing & Development Services on a Chevrolet Suburban, the staff concludes that Whipple Industries, Inc.'s supercharger kits will not adversely affect exhaust emissions from vehicles for which an exemption is requested.

III. RECOMMENDATION

The staff recommends that Whipple Industries, Inc. be granted an exemption for their supercharger kits for installation on the following vehicle applications:

<u>Whipple Part Number</u>	<u>Vehicle Application</u>
WI-TEC S3116-93-4A	1988-93 GM 4.3 liter S-10 model trucks
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WI-TEC 3150-90-7A	1990 GM 7.4 liter trucks
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The staff also recommends that Executive Order D-231-3 be issued.

IV. DEVICE DESCRIPTION

The Whipple Industries, Inc.'s supercharger kits are designed for installation on the following vehicle applications:

<u>Whipple Part Number</u>	<u>Vehicle Application</u>
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WI-TEC 3150-90-7A	1990 GM 7.4 liter trucks
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The supercharger kit consists of a WI-TEC supercharger, an air cleaner system, auxiliary fuel pressure regulator, powertrain auxiliary controller and other plumbing components necessary to install the kit. The supercharger kit operates in conjunction with the original equipment

manufacturer (OEM) computer controlled fuel injection and the emission control system already certified with the stock engine.

The purpose of supercharging an engine is to increase its volumetric efficiency and power output at particular engine loads and throttle openings. At light engine loads and small throttle openings, the engine manifold pressure and power output is the same as a normally aspirated engine. At heavy engine loads and increased throttle openings, the manifold pressure is increased by the supercharger allowing more air and fuel to enter the engine, resulting in higher power output.

The WI-TEC supercharger is a positive displacement twin screw rotor, compressor powered by a crankshaft driven serpentine belt. The maximum volume of air is determined by selecting the proper ratio between the supercharger pulley and the crankshaft pulley. The supercharger is driven utilizing the engine's standard serpentine belt loop system. The air needed to operate the supercharger enters the engine compartment through the stock fender location and into the supplied air cleaner. Air then enters the stock throttle body injection, mounted at the rear of the supercharger. The fuel injected is controlled by the OEM electronic control module (ECM). The total engine air flow amount is controlled in the same manner as the OEM, by the throttle plate in the throttle body injection. The air/fuel mixture is compressed within the supercharger inlet and outlet ports by the design of the twin screw rotors. When the inlet throttle plates are opened to allow for more flow, the mixture exits the outlet port at higher pressure into the stock intake manifold. Maximum positive manifold pressure is limited to 8.0 psi by the built-in pressure ratio and driven ratio.

The original ECM calculates the correct fuel delivery necessary during all normal engine operating conditions. Additional fuel required at rapid throttle openings, and during boost conditions, is supplied by temporarily increasing the fuel pressure to the injectors on the throttle body injection through an externally mounted auxiliary fuel pressure regulator. The main fuel delivery is calculated by the stock ECM and is determined from inputs from the manifold pressure, engine RPM, throttle position and coolant temperature. Power enrichment fuel is determined by the ECM and supplemented by the increased fuel pressure determined by the auxiliary fuel pressure regulator.

The OEM ECM is retained. A powertrain auxiliary controller box is installed under the hood which measures the manifold pressure at the throttle body and intake manifold. The powertrain auxiliary controller box uses the speed density calculation to determine the correct fuel necessary for proper engine functioning with the supercharger installed.

When the supercharger kit is installed, the heated-air intake system is removed. Instead, engine coolant is routed through the throttle body mounting adaptor on the supercharger which increases fuel atomization during cold engine operation. Installation of Whipple Industries, Inc.'s supercharger kits do not alter the OEM location of the oxygen sensor and the catalyst. The tune-up specifications also remain the same.

V. SUPERCHARGER KIT SYSTEM EVALUATION AND DISCUSSION

A 1991 Chevrolet Suburban equipped with a 7.4 liter (454 CID) fuel injected gasoline engine was used for the evaluation of the supercharger kits. The dynamometer inertia weight and loading were 8000-lbs and 16.3-hp respectively.

Emission tests conducted by Automotive Testing & Development Services for Whipple Industries, Inc. consisted of one Cold-Start CVS-75 emission test in the unmodified (baseline) configuration and on Cold-Start CVS-75 emission test in the modified (supercharger kit system installed) configuration. Confirmatory tests were not conducted. A summary of the test results is shown below:

Exhaust Emissions Test Results
On A 1991 Chevrolet Suburban
(Automotive Testing & Development Services)

Test Mode	Exhaust Emissions (gm/mi)		
	NMHC	CO	NOx
Baseline	.506	13.512	2.613
Device	.538	10.444	2.313
Difference	+.032	-3.068	-.300
% Difference	+6.3%	-22.7%	-11.5%

Results from the emission tests conducted at Automotive Testing & Development Services show the vehicle emissions with the Whipple Industries, Inc.'s supercharger kit installed to be within allowable test limits specified under "Procedures for Exemption of Add-on and Modified Parts." Based on the test results, the staff concludes that the installation of Whipple Industries, Inc.'s supercharger kits did not have an adverse effect on exhaust emissions of the affected vehicles. Whipple Industries, Inc. submitted all the required information and fulfilled the requirements for exemption.