

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-171-7
Relating to Exemptions Under Section 27156
of the Vehicle Code

ADVANCED TURBO SYSTEMS, INC.
6.9/7.3 L FORD DIESEL TURBOCHARGER SYSTEM

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 RECOMMENDED: That the installation of the 6.9/7.3L Ford Diesel Turbocharger System, manufactured by Advanced Turbo Systems, Inc. 5919 South 350 West, Murray, Utah 84107 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 and older model-year Ford vehicles powered with a Navistar 6.9/7.3L diesel engine.

The following modifications to the original equipment manufacturer is allowed:

1. The stock air cleaner assembly is replaced with Advanced Turbo Systems, Inc.'s air cleaner assembly compatible with the turbocharger.
2. The exhaust system terminates into a single three inch outside diameter connection under the vehicle.
3. The crankcase positive ventilation system breather connection is relocated due to the installation of the turbocharger kit.

This Executive Order is valid provided that installation instructions for this turbocharger system will not recommend tuning the vehicle to specifications different from those submitted by Advanced Turbo Systems, Inc.

Changes made to the design or operating conditions of the turbocharger system, 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 turbocharger system using any identification other than that shown in this Executive Order or marketing of the turbocharger 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.

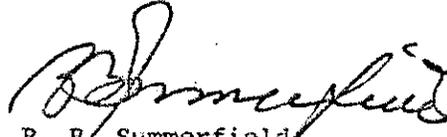
This Executive Order does not constitute any opinion as to the effect the use of the turbocharger system may have on any warranty either expressed or implied by the vehicle manufacturer.

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 ADVANCED TURBO SYSTEMS, INC.'S 6.9/7.3L FORD DIESEL TURBOCHARGER SYSTEM.

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 8th day of June, 1993.



R. B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF ADVANCED TURBO SYSTEMS INC.'S 6.9/7.3L FORD DIESEL
TURBOCHARGER SYSTEM FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA
CODE OF REGULATIONS

June 1993

State of California
AIR RESOURCES BOARD

EVALUATION OF ADVANCED TURBO SYSTEMS INC.'S 6.9/7.3L FORD DIESEL
TURBOCHARGER SYSTEM 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 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

Advanced Turbo Systems, Inc. (ATS) of 5919 South 350 West, Murray, Utah 84106, has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for the ATS 6.9/7.3L Ford Diesel Turbocharger System. The ATS 6.9/7.3L Ford Diesel Turbocharger System is designed for installation on 1993 and older model year Ford trucks powered by Navistar 6.9L and 7.3L diesel engines.

ATS submitted a completed application and other required information, as well as results from snap-idle tests performed at the Air Resources Board Haagen Smit Laboratory, El Monte, California on a 1993 Ford F-350 powered by a Navistar 7.3 liter engine, in accordance with Section 2182, Title 13, California Code of Regulations.

Based on the submitted information and an engineering evaluation based on similarity to previously exempted ATS turbo kits, the staff concludes that the ATS 6.9/7.3L Ford Diesel Turbocharger System will not adversely affect exhaust emissions from vehicles for which an exemption is requested.

The staff recommends that Advanced Turbo Systems Inc.'s 6.9/7.3L Ford Diesel Turbocharger System be granted an exemption as requested and that Executive Order D-171-7 be issued.

TABLE OF CONTENTS

	Page Number
SUMMARY	i
CONTENTS	ii
I. INTRODUCTION	1
II. CONCLUSION	1
III. RECOMMENDATION	1
IV. ATS TURBOCHARGER SYSTEM DESCRIPTION	2
V. DISCUSSION	3

EVALUATION OF ADVANCED TURBO SYSTEMS INC.'S 6.9/7.3L FORD DIESEL TURBOCHARGER SYSTEM EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Advanced Turbo Systems Inc. (ATS) of 5919 South 350 West, Murray, Utah 84106, has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for their 6.9/7.3L Ford Diesel Turbocharger System. The ATS 6.9/7.3L Ford Diesel Turbocharger System is designed for installation on 1993 and older model year Ford trucks powered by a Navistar 6.9 liter or 7.3 liter heavy-duty diesel engine.

ATS submitted a completed application and other required information, as well as results from snap-idle tests performed at the Air Resources Board's Haagen Smit Laboratory in El Monte, California, in accordance with Section 2182, Title 13, California Code of Regulations.

II. CONCLUSIONS

Based on the submitted information and an engineering evaluation, the staff concludes that the ATS 6.9/7.3L Ford Diesel Turbocharger System will not adversely effect exhaust emissions from vehicles for which an exemption is requested.

III. RECOMMENDATION

The staff recommends that Advanced Turbo Systems, Inc., be granted an exemption for their 6.9/7.3L Ford Diesel Turbocharger System for installation on 1993 and older model-year Ford trucks powered by Navistar 6.9 or 7.3 liter heavy duty diesel engines. The staff also recommends that Executive Order D-171-7 be issued.

IV. 6.8/7.3L FORD DIESEL TURBOCHARGER SYSTEM DESCRIPTION

The purpose of the ATS turbocharger kit is to increase the power output of the engine by increasing its volumetric efficiency. This is accomplished by compressing the intake charge to pressures above that of the atmosphere. The increase in pressure allows a greater charge density to enter the combustion chamber, providing more oxygen for combustion. The maximum fuel delivery is slightly increased in order to maintain proper air-fuel ratios with the increased air flow from the turbocharger when it is providing positive manifold pressure (boost).

The major components of the kit include a .82 A/R ratio Garrett Airesearch Model No. TC4303, a modified air filter, a turbo wastegate valve, and the hardware and exhaust piping required to install the kit on the vehicle. The wastegate valve operates by diverting some exhaust gas from the turbine when the maximum desirable boost is obtained. The original equipment crankcase positive ventilation system breather connection is relocated due to the turbocharger installation. A complete air cleaner assembly is supplied with the system to replace the stock air cleaner assembly. The exhaust system supplied with the kit terminates in a single three inch outside diameter connection under the vehicle. No other emission-related components are removed or disconnected when the turbocharger is installed.

Maximum boost is limited by the size of the turbine and compressor. The maximum engine speed is regulated by the OEM fuel injection governor which is not modified by the installation of the kit. Therefore, by controlling maximum engine speed, maximum turbine speed and the corresponding boost are also controlled.

V. DISCUSSION

Advanced Turbo Systems, Inc. has requested that the 6.9/7.3 L Ford Diesel Turbocharger System be exempted for 1993 model year Ford trucks powered by 6.9 or 7.3 liter heavy-duty diesel engines. The 6.9/7.3 L Ford Diesel Turbocharger System is similar to the ATS turbo kit, which is currently exempted under Executive Order Number D-171-6. The only difference between the two turbocharger kits is that the 6.9/7.3L Ford Diesel Turbocharger System is equipped with a wastegate. The wastegated version is identical to the non-wastegated version except that a smaller turbine inlet is used, increasing the velocity of the exhaust gases entering the turbine. This improves the response of the turbocharger and reduces the time between the opening of the throttle and the turbocharger reaching operating speed. The reduction of turbo lag time could decrease hydrocarbon and particulate emissions by reducing the duration of the oxygen shortage. The difference in turbo lag time between the standard turbo kit and the wastegated turbo kit is not sufficient to increase the combustion temperature. For this reason, the staff has determined that the oxides of nitrogen emissions will not be increased. In addition, the 6.9/7.3L Ford Diesel Turbocharger System is the same turbocharger system certified on the Navistar turbocharged 7.3L engine. Based on the information provided to us by the ATS, the wastegate will not significantly change the emissions characteristics of the turbocharger kit.

Snap-Idle tests were conducted at the Air Resources Board's Haagen Smit Laboratory in El Monte, California on a 1993 Ford F-350 pick-up truck equipped with a Navistar 7.3 liter engine and the turbocharger system installed. The results of the snap-idle test performed are shown in Table 1 on the next page.

Table 1

SNAP-IDLE TEST RESULTS

(Advanced Turbo Systems, Inc.)

Snap-Idle Smoke Opacity Test Results

2%, 2%, 2%, 4%

These results show that the modified vehicle emissions do not exceed the 40% opacity standard. This further demonstrates that the addition of the ATS 6.9/7.3L Ford Diesel Turbocharger kit will not have an adverse effect on emissions for 1993 and older model year Ford trucks equipped with Navistar 6.9 and 7.3 liter heavy duty diesel engines. ATS submitted all of the required information and fulfilled the requirements for an exemption.