

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-161-1
Relating to Exemptions under Section 27156
of the Vehicle Code

GALE BANKS ENGINEERING
TURBOCHARGER KIT MODEL NO. 6.2G FOR CHEVROLET/GMC HEAVY-DUTY VEHICLES
POWERED BY A 6.2 LITER GENERAL MOTORS
HEAVY-DUTY DIESEL ENGINE

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 add-on turbocharger kit Model No. 6.2G manufactured by Gale Banks Engineering, 546 Duggan Avenue, Azusa, California 91702, using a Rotomaster turbocharger Model No. T04B with an A/R ratio of 1.0 has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1982 through 1986 model-year Chevrolet/GMC heavy-duty vehicles powered by a 6.2 liter General Motors heavy-duty diesel engine.

Modifications to the OEM emission-related parts due to the installation of the turbocharger kit include an air cleaner assembly, a new 3" low-restriction muffler and 3" diameter exhaust pipe.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

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

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

This Executive Order does not constitute any opinion as to the effect that the use of this device 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 THE GALE BANKS ENGINEERING TURBOCHARGER KIT MODEL NO. 6.2G FOR INSTALLATION ON CHEVROLET/GMC VEHICLES POWERED BY A 6.2 LITER GENERAL MOTORS HEAVY-DUTY DIESEL ENGINE.

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

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this 14th day of May, 1986.



K. D. Drachand, Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF GALE BANKS ENGINEERING'S ADD-ON TURBOCHARGER KIT
MODEL NO. 6.2G FOR INSTALLATION IN CHEVROLET/GMC
HEAVY-DUTY VEHICLES POWERED BY A 6.2 LITER
GENERAL MOTORS HEAVY-DUTY DIESEL ENGINE

May, 1986

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MODEL NO. 6.2G FOR INSTALLATION IN CHEVROLET/GMC
HEAVY-DUTY VEHICLES POWERED BY A 6.2 LITER
GENERAL MOTORS HEAVY-DUTY DIESEL ENGINE

by

Mobile Source Division

State of California
AIR RESOURCES BOARD
9528 Telstar Avenue
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

Gale Banks Engineering (Banks) has applied for exemption from the prohibitions in Vehicle Code Section 27156 for their add-on turbocharger kit Model No. 6.2G designed for 1982-1986 Chevrolet/GMC heavy-duty vehicles which are powered by the General Motors 6.2 liter heavy-duty diesel engine.

Banks has submitted a completed application and all the required information as well as comparative exhaust emissions data which shows that their kit does not have an adverse effect on the emissions from the vehicles described in the application. Confirmatory testing performed at the Haagen-Smit Laboratory verified the applicant's test results.

The staff recommends that Banks be granted an exemption for their add-on turbocharger kit and that Executive Order D-161-1 be issued.

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EVALUATION OF GALE BANKS ENGINEERING'S ADD-ON TURBOCHARGER KIT
MODEL NO. 6.2G FOR INSTALLATION IN CHEVROLET/GMC
HEAVY-DUTY VEHICLES POWERED BY A 6.2 LITER
GENERAL MOTORS HEAVY-DUTY DIESEL ENGINE

I. INTRODUCTION

Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, California 91702, has applied for exemption from the prohibitions of Vehicle Code Section 27156 for their add-on turbocharger kit Model No. 6.2G for 1982-1986 Chevrolet/GMC heavy-duty vehicles powered by the 6.2 liter General Motors heavy-duty diesel engine.

Banks has submitted a completed application, all the necessary information and comparative exhaust emissions data.

II. CONCLUSION

Based on the submitted information and the comparative exhaust emissions tests performed on a 1986 Chevrolet Suburban heavy-duty diesel truck, the staff concludes that the installation of the Banks turbocharger kit Model No. 6.2G will not adversely affect exhaust emissions from the vehicles for which the exemption has been requested.

III. RECOMMENDATIONS

The staff recommends that Banks be granted an exemption for this turbocharger kit for use on 1982-1986 Chevrolet/GMC heavy-duty vehicles powered by the 6.2 liter General Motors heavy-duty diesel engine and that Executive Order D-161-1 be issued.

IV. TURBOCHARGER KIT DESCRIPTION

The purpose of the Banks turbocharger system is to increase the power output of the engine by increasing the volumetric efficiency of it by compressing the intake charge to pressures above that of the atmosphere. This

increased 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).

Maximum positive manifold pressure is limited to 10 psig by the size of the turbine and the 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 corresponding boost pressures are also controlled.

No OEM emission controls are removed or disconnected when the turbocharger kit is installed.

The major components of the system include a 1.0 A/R ratio Rotomaster Model No. T04B turbocharger, custom intake and exhaust tubing, air cleaner assembly, brackets, hoses and the hardware necessary to complete the installation.

Detailed installation instructions are included in every kit to insure that the turbocharger installation is done properly (see Appendix 1). A facsimile of the system identification label is shown in Appendix 2.

V. TURBOCHARGER KIT EVALUATION

Evaluation of the Banks turbocharger kit included analysis of all submitted information to confirm that it meets the requirements for the exemption, a comparison of the submitted exhaust emissions data and a comparison of the confirmatory emissions data generated at the Haagen-Smit Laboratory. The test vehicle was a 1986 Chevrolet Suburban heavy-duty diesel truck with an automatic transmission.

Banks performed comparative exhaust emissions tests at FCI International Testing, Inc., in Santa Ana, CA, on the 1986 Chevrolet Suburban described earlier. The test program used was the "Test Program for Add-On Turbocharger Kits for Heavy-Duty Engines" (see Appendix 3). The results of these tests are shown in Table 1.

Table 1
FCI Steady-State Test Results

Mode	Exhaust Emissions (ppm)		
	HC	CO	NOx
Baseline Idle	17.1	23.3	64.0
Turbo Idle	13.2	18.0	52.0
Percent Change	-23	-30	-19
Baseline 20 mph	18.3	46.0	63.0
Turbo 20 mph	20.7	58.0	51.5
Percent Change	+13	+26	-18
Baseline 30 mph	18.3	58.0	111.5
Turbo 30 mph	19.2	63.0	109.0
Percent Change	+5	+9	-2
Baseline 40 mph	20.7	91.0	169.5
Turbo 40 mph	20.7	80.0	146.0
Percent Change	0	-12	-14
Baseline 50mph	19.2	85.0	257.0
Turbo 50 mph	20.7	63.0	247.0
Percent Change	+8	-26	-4
Baseline 55 mph	25.2	100.0	300.0
Turbo 55 mph	25.2	63.0	300.0
Percent Change	0	-37	0

Confirmatory testing was performed at the Haagen-Smit Laboratory and these results are shown in Table 2.

Table 2
Confirmatory Steady-State Test Results
Exhaust Emissions (ppm)*

<u>Mode</u>	<u>HC</u>	<u>CO</u>	<u>NOx</u>
Baseline Idle	37	126	299
Turbo Idle	36	136	303
Percent Change	-3	+8	+2
Baseline 20 mph	44	120	289
Turbo 20 mph	42	106	302
Percent Change	-5	-12	+5
Baseline 30 mph	43	121	352
Turbo 30 mph	42	104	347
Percent Change	-2	-14	-1
Baseline 40 mph	41	116	315
Turbo 40 mph	39	101	320
Percent Change	-5	-13	+2
Baseline 50mph	47	99	363
Turbo 50 mph	38	75	382
Percent Change	-19	-23	+5
Baseline 55 mph	56	93	391
Turbo 55 mph	41	66	431
Percent Change	-26	-29	+10

*Average of two tests in each condition.

VI. DISCUSSION

The steady-state test results indicate that emissions at some test points were slightly increased, however, the increases are only a few ppm which are well within the sensitivity limits of the instruments. This demonstrates that the addition of the Gale Banks Model 6.2G Turbocharger kit will not have an adverse effect on emissions from the 1982-1986 Chevrolet/GMC heavy-duty diesel vehicles for which the exemption was requested.

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



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 21 1986

OFFICE OF
AIR AND RADIATION

Mr. Jack Schwendener
Project Engineer
Gale Banks Engineering
546 Duggan Avenue
Azusa, CA 91702

Dear Mr. Schwendener:

Thank you for your letter of June 3, 1986 concerning installation of your model 6.2G turbocharger kit on 1982-1986 Chevrolet/GMC heavy-duty diesel vehicles with a 6.2 liter General Motors heavy-duty diesel engine. You enclosed a copy of CARB Executive Order D-161-1 which applies to these particular Chevrolet/GMC vehicles. The EPA had accepted CARB's approval for installation of Gale Banks Engineering turbocharger kit No. 6.9F on 1983-1986 Ford heavy-duty vehicles in our letter of May 6, 1986.

Upon review of your request, the EPA accepts CARB Executive Order D-161-1 as satisfying the reasonable basis criteria of Mobile Source Enforcement Memorandum 1A, as applied to the installation of Gale Banks Engineering turbocharger kit No. 6.2G on 1982-1986 model year Chevrolet/GMC heavy-duty trucks powered by a 6.2 liter GM heavy-duty diesel engine. This determination is subject to all other limitations set out in California Executive Order D-161-1, as well as our correspondence of May 6, 1986.

I hope this sufficiently answers your questions. If not, please contact Mr. Robert Greco of my staff at (202) 475-8838.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Richard G. Kozlowski".
for Richard G. Kozlowski
Director

Field Operations and Support Division

GALE BANKS
JUL 21 1986
ENGINEERING