State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-176-3
Relating to Exemptions Under Section 27156
of the Vehicle Code

DINAN ENGINEERING, INC.
"TURBOCHARGER KIT PART NOS. D800-7500, D800-8500 AND D800-8502"

Pursuant to the authority vested in the Air Resources Board ("ARB") 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 Turbocharger Kit part numbers D800-7500, D800-8500, and D800-8502 manufactured by Dinan Engineering, Inc. (Dinan) has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions in Section 27156 of the Vehicle Code for those applications listed hereunder:

Part Number	Model-year	Vehicle Model	Transmission Type
D800-7500	1988-1992	750i/750iL	Automatic
D800-8500	1991-1992	850i	Automatic
D800-8502	1991-1992	850i	Manual

The following modifications are incorporated into the kit in order to allow its installation on the vehicles:

1. Stock air cleaner is replaced with a smaller air cleaner.
2. New intake plumbing is installed.
3. PCV is re-located.
4. New evaporative canister is installed in a different location for BMW model 750iL only.
5. New exhaust manifolds installed.
6. New head pipes installed.

This Executive Order is valid provided that installation instructions for this turbocharger kit 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 ARB, 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 the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

This Executive Order is granted based on results from emissions tests conducted in accordance with Cold-Start CVS-75 Federal Test Procedure. However, the ARB finds that reasonable grounds exist for believing that use of some components of the kit may adversely affect emissions of motor vehicles when operating under conditions outside the parameters of the previously prescribed test procedures. Accordingly, the ARB reserves the right to conduct additional emission tests, in the future, as such tests are developed, that will more adequately measure emissions from all cycle phases. If such test results demonstrate that the Turbocharger Kit adversely affects emissions during off-cycle conditions (defined as those conditions which are beyond the parameters of the Cold-Start CVS-75 Federal Test Procedure), this Executive Order shall be effectively rescinded as of the date the test results are validated. Further, if such test results or other evidence provides the ARB with reason to suspect that the Turbocharger Kit will affect the durability of the emission control system, Dinan Engineering, Inc. shall be required to submit durability data to show that the durability of the vehicle emission control system is not, in fact, affected and/or that the add-on or modified part demonstrates adequate durability.

In addition to the foregoing, the ARB reserves the right in the future to review this Executive Order and the exemption provided herein to assure that the exempted add-on or modified part continues to meet the standards and procedures of Title 13, California Code of Regulations section 2222 et seq. and any future amendments thereto.

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 DINAN ENGINEERING, INC.'S TURBOCHARGER KIT PART NUMBERS D800-7500, D800-8500, AND D800-8502.

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.

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 may result in its rescission or submission to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this 9th day of January, 1992.

R. B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF DINAN ENGINEERING, INC.'S TURBOCHARGER KIT PART NUMBERS D800-7500, D800-8500, AND D800-8502 FOR EXEMPTION FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 AND TITLE 13, SECTION 2222, CALIFORNIA CODE OF REGULATIONS

January, 1992

EVALUATION OF DINAN ENGINEERING, INC.'S TURBOCHARGER KIT PART NUMBERS D800-7500, D800-8500, AND D800-8502 FOR EXEMPTION FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 AND TITLE 13, SECTION 2222, CALIFORNIA CODE OF REGULATIONS

by

Mobile Source Division

State of California
AIR RESOURCES BOARD
9528 Telstar Avenue
El Monte, CA 91731-2990

SUMMARY

Dinan Engineering, Inc. (Dinan) of 81 Pioneer Way, Mountain View, California 94041 has applied for an exemption from the prohibitions in Vehicle Code Sections 27156 and 38391 for their Turbocharger Kit part numbers D800-7500, D800-8500, and D800-8502 for installation on the following model-year BMW 5.0L vehicles:

Part Number	Model-year	Vehicle Model	Transmission Type
D800-7500	1988-1992	750i/750iL	Automatic
D800-8500	1991-1992	850i	Automatic
D800-8502	1991-1992	850i	Manual

The Turbocharger kit consists of Warner/Ishi turbocharger model RHB52/5T-503, new larger capacity fuel injectors, Turbotronics III ECU Prom, Turbotronics V Fuel Enrichment, new air cleaner, new intake plumbing, air-to-air intercooler, new PCV tubing, new evaporative canister for BMW model 750iL, electronic ignition control computer, Turbotronics III ignition timing prom, new exhaust manifold, and new head pipes.

Test results from an independent laboratory, using available cycles under the Federal Test Procedure (FTP), showed that emissions from the test vehicle did not exceed California new vehicle certification standard with the Dinan's Turbocharger Kit installed. Based on the data submitted by the applicant, staff recommends that the exemption be granted as requested and that Executive Order D-176-3 be issued.

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I. INTRODUCTION

Dinan Engineering, Inc. (Dinan) of 81 Pioneer Way, Mountain View, California 94041 has applied for an exemption from the prohibitions in Vehicle Code Sections 27156 and 38391 for their Turbocharger Kit part numbers D800-7500, D800-8500, and D800-8502 for installation on the following model-year BMW 5.0L vehicles:

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D800-8502	1991-1992	850i	Manual

The Dinan Turbocharger Kit consists of Warner/Ishi turbocharger model RHB52/5T-503, new larger capacity Bosch Motronic electronic fuel injection, Turbotronics III Prom, Turbotronics V electronic fuel enrichment computer, new smaller air cleaner, new intake plumbing, air-to-air intercooler, new PCV tubing, new evaporative canister for BMW 750iL only, an electronic ignition control computer, Turbotronics III ECU ignition prom, new exhaust manifold, and new head pipes.

II. CONCLUSION

Results from tests conducted at Milton Roy Company in Orange, California, showed that emissions from the test vehicle did not exceed California's new vehicle certification standards with the Dinan's Turbocharger Kit installed. Due to time constraints, the Air Resources Board (ARB) could not perform confirmatory testing on the test vehicle. Based on the low emission levels from the independent laboratory testing, staff concludes that the installation of the Dinan's Turbocharger Kit will not reduce the effectiveness of the emission control systems of the applicable vehicles.

This conclusion is also based on the available test cycles under the Federal Test Procedure.

III. RECOMMENDATION

The staff recommends that the exemption be granted as requested and that Executive Order No. D-176-3 be issued, permitting the advertisement, sale and installation of the Turbocharger Kit on vehicles shown above.

IV. DEVICE DESCRIPTION

The purpose of the Dinan turbocharger kit is to increase the power output of the 5.0L BMW engine by compressing the intake air charge to a pressure above that of the atmosphere, and thereby increasing the volumetric efficiency of the engine. This is accomplished by using exhaust gas to spin a turbine which in turn spins a compressor. Compression of the intake air increases its charge density providing more oxygen for combustion. The increased air flow requires more fuel in order to maintain the proper air/fuel ratio for optimum combustion. In order to better manage the demand for extra fuel, Dinan uses larger capacity fuel injectors; Turbotronics III, a modified electronic control unit (ECU) prom program to re-curve the fuel injection and ignition systems; and Turbotronics V, an electronic fuel enrichment computer to provide proper fuel delivery under boost conditions.

The Warner/Ishi turbocharger used by Dinan in their kit is of the radial flow type with area ratio (A/R) of 0.59; area of throat of 2.46 square inches; and distance from centroid area to center of vortex of 2.75 inches. The turbocharger achieves a maximum boost pressure of 10 psi with the stock engine's 9:1 compression ratio.

Other modifications to the vehicle's emission control system are: (1) Replacement of stock air cleaner with smaller air cleaner due to space limitation, (2) Installation of new intake plumbing to accommodate the intercooler, (3) Installation of an air-to-air intercooler between the turbocharger and intake manifold to reduce the intake charge temperature, (4) Re-routing the PCV to a new location to prevent exposure to boost pressure, (5) Replacing the evaporative canister in 750iL BMW with another canister of the same storage capacity and relocating it using new hoses with the appropriate length, (6) An electronic ignition control computer and a new detonation sensor are used to prevent detonation, (7) A modified ECU prom program (Turbotronics III) is used to re-curve the ignition system to match the requirements of the turbocharged engine, (8) Installation of new exhaust manifolds, and (9) Installation of new head pipes.

V. DEVICE EVALUATION

The applicant has submitted test results conducted at Milton Roy Company, an independent test laboratory, in Orange, California. One CVS-75 test was conducted on a 1990 BMW 750iL powered by a 5.0L engine. All BMW models included in the application have the same emission standards and are equipped with the same emission control system as the test vehicle.

According to the literature submitted by Dinan, the turbocharger boost begins at engine speed of 1600 RPM. In order to determine if the turbocharger would cause any adverse effect on the emissions control system during boost, the test vehicle was driven for twenty miles to bring it to full operating temperature. Following the mileage accumulation, a steady-state test similar to the Smog Check was conducted at 2500 RPM.

Emissions from both tests were compared with new vehicle certification standard and the Smog Check standard for the test vehicle model-year.

CVS-75 Test Results
(Milton Roy Company Laboratory)

	THC	CO	NOx
Standard	0.41	0.7	0.7
Turbocharger kit	0.334	2.833	0.142
Deterioration Factor	1.021	1.077	1.339
D.F. adjusted	0.341	3.051	0.190

Steady-state Test Results at 2500 RPM
(Milton Roy Company Laboratory)

	HC	CO
Standard	220 ppm	1.2%
Turbocharger Kit	5 ppm	0.04%

Due to time constraints, the ARB could not perform confirmatory testing with the Dinan Turbocharger Kit. The exemption of the Turbocharger Kit is therefore based on the test results from Milton Roy Company which showed that the device did not produce any adverse effect on the test vehicle.