State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-176-9
Relating to Exemptions Under Section 27156
of the Vehicle Code

DINAN ENGINEERING
DINAN SUPERCHARGER 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 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 Dinan Supercharger System, **designed to a maximum boost pressure of 5.5 psi., with a supercharger pulley diameter of 3.12" and a crankshaft pulley diameter of 5.10",** manufactured by Dinan Engineering, 150 S. Whisman, Building "E", Mountain View, California 94041 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 BMW 8 cylinder vehicle applications: 1994/95 530T, 530i & 540i, 1993-95 740i & 840i.

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

Installation of the superchargers requires the replacement of the factory Lucas fuel injectors with Lucas model # 5207009 (28.8 lb./Hr.) injectors, a replacement ECU-PROM, K & N air filter, a resistor placed in the airflow meter bridge circuit, the removal of a stock pop-off valve located on the intake manifold, new fuel pump, and the relocation of the PCV tube from the intake manifold to the supercharger inlet.

Changes made to the design or operating conditions of the Dinan Supercharger 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 the Dinan Supercharger System using any identification other than that shown in this Executive Order or marketing of the Dinan Supercharger 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 Dinan Supercharger System shall not be construed as an 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 that the use of the Dinan Supercharger System may have on any warranty either expressed or implied by the vehicle manufacturer.

This Executive Order is granted based on an evaluation of emissions impact if emissions tests were conducted in accordance with Cold-Start CVS-75 Federal Test Procedure. However, the ARB finds that reasonable grounds exist to believe that use of the Dinan Supercharger System series 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 Dinan Supercharger System series adversely affect 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 Dinan Supercharger System series will affect the durability of the emission control system, Dinan 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.

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'S DINAN SUPERCHARGER 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 14th day of May 1996.

R. B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF DINAN ENGINEERING'S DINAN SUPERCHARGER SYSTEM FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

May 1996

State of California
AIR RESOURCES BOARD

EVALUATION OF DINAN ENGINEERING'S DINAN SUPERCHARGER 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
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(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

Dinan Engineering of 150 S. Whisman, Building "E", Mountain View, California 94041 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for the Dinan Supercharger System designed for 1994/95 BMW 530T, 530i & 540i, 1993-95 BMW 740i & 840i.

Based on emissions testing of the Dinan Supercharger System on a 1995 BMW 540i, the staff concludes that the Dinan Supercharger System will not adversely affect exhaust emission from vehicles for which the exemption is requested.

The staff recommends that Dinan Engineering be granted an exemption as requested and that Executive Order D-176-9 be issued.

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I. INTRODUCTION

Dinan Engineering of 150 S. Whisman, Building "E", Mountain View, California 94041 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for the Dinan Supercharger System designed for 1994/95 BMW 530T, 530i & 540i, 1993-95 BMW 740i & 840i.

II. CONCLUSIONS

Based on emissions testing of the Dinan Supercharger System on a 1995 BMW 540i, the staff concludes that the Dinan Supercharger System will not adversely affect exhaust emission from vehicles for which the exemption is requested.

III. RECOMMENDATION

The staff recommends that Dinan Engineering be granted an exemption for their Dinan Supercharger System for installation on 1994/95 BMW 530T, 530i & 540i, 1993-95 BMW 740i & 840i. The staff also recommends that Executive Order D-176-9 be issued.

IV. SUPERCHARGER DESCRIPTION

The Dinan Supercharger System is specifically designed for installation on 1994/95 BMW 530T, 530i & 540i, 1993-95 BMW 740i & 840i. The supercharger is designed to increase the volumetric efficiency of the BMW engine by forcing more air into the engine than it would normally consume in a non-supercharged condition. Air is delivered to the supercharger from a replacement K & N filter which is supplied by Dinan with their supercharger kit. The installation of the supercharger is designed to be self contained, using no oil feed lines to lubricate the bearings of the supercharger. The boost is

limited to 5.5 psi., no wastegate is utilized to limit boost. Installation of the supercharger requires modifications to be made to the factory fuel injection system and emission control system certified with the stock engine.

The Dinan supercharger is a centrifugal air compressor mounted and powered similar to an automotive air conditioning compressor. The air compression operation is achieved by rotating the impeller wheel within the compressor housing. Rotational energy is transferred from the engine's crankshaft to the supercharger's input shaft by a belt and pulley system. The rotational speed of the supercharger's input shaft is increased with respect to the crankshaft. The supercharger's internal belt drive system increases the impeller's rotational speed relative to the rotational speed of the input shaft. Air is supplied from an aftermarket air filtration system to the supercharger, the supercharger then discharges the pressurized air into a replacement ducting that is connected to the OEM throttle body.

Modifications to the emissions control system that are involved with the installation of the supercharger are as listed: The relocation of the crankcase breather hose, new fuel injectors, new PROM chip, relocation of the pop-off valve, and a modification to the air flow meter bridge circuit. In the OEM configuration, the crankcase breather hose is plumbed into the air intake system between the air filtration assembly and the intake manifold - usually on or near the throttle body. The addition of the supercharger would pressurize the intake tract, eliminating the necessary vacuum at the OEM location. Therefore, according to the manufacturer, the crankcase breather outlet is relocated upstream of the supercharger where the vacuum condition exists to ensure the breather continues to perform its original function. The recalibrated replacement PROM is designed to take advantage of the

supercharger's boost condition, fuel and timing tables in the modified replacement PROM are altered to handle the change from a naturally aspirated condition to a supercharged condition. No changes are made to the timing and fuel tables that are active during close loop operations. The factory fuel injectors, Lucas, model # 5207002, with a maximum flow rate of 18.13 lb./Hr. are replaced with a Lucas, model # 5207009, with a maximum flow rate of 28.8 lb./Hr. This change provides for the greater flow of fuel needed during high boost. The pop-off valve is designed to close the PCV circuit at high intake manifold vacuum, with the installation of the supercharger and the relocation of the PCV, the pop-off valve is not needed. The addition of the resistor circuit is designed to rescale the air flow meter to meet the demands of higher air flow passed by the supercharger.

Dinan supplies all the necessary brackets, hoses, ducting, hardware, and installation instructions.

V. DISCUSSION OF THE SUPERCHARGER

A 1995 BMW 540i with a 4.0L V8 engine was used for the evaluation of the Dinan Supercharger System. The dynamometer inertia weight and horsepower settings were 4000-lbs and 7.2-hp respectively. The emission tests conducted by Clean Air Vehicle Technology Center of Hayward, California, for Dinan Engineering, consisted of one Cold Start CVS-75 emission test in the modified configuration (Dinan Supercharger System installed). The ARB did not perform emissions testing to confirm the test results submitted by the applicant. A summary of the test results is shown below:

Exhaust Emission Test Results

Test	Exhaust Emissions (gm/mi)		
Mode	NMHC	CO	NOx
Device w/dfs	0.21	2.84	0.12
Standards	0.25	3.4	0.4

The CVS-75 emission test results at Clean Air Vehicle Technology Center indicates the vehicle is below the applicable emissions standards set for that engine family. Therefore, based on the test results, the staff concludes that the installation of the Dinan Supercharger System will not have an adverse effect on exhaust emissions of the affected vehicles.

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