

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-140  
Relating to Exemptions under Section 27156  
of the Vehicle Code

SPEARCO PERFORMANCE PRODUCTS, INC.  
"TURBOCHARGER KIT FOR 2.4 LITER TOYOTA VEHICLES"

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 (using a 0.70 A/R ratio Ishikawajima-Harima Heavy Industries turbocharger) for 2.4 liter Toyota vehicles manufactured by Spearco Performance Products, Inc., of 7541 Woodman Place, Van Nuys, California 91405, 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 1984 and older model-year Toyota Celicas and pick-up trucks with a 2.4 liter (144 CID) fuel injected four-cylinder engine.

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 SPEARCO ADD-ON TURBOCHARGER KIT FOR 2.4 LITER TOYOTA VEHICLES.

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.

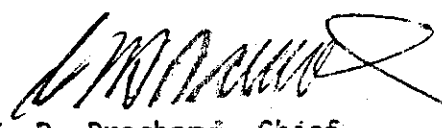
Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

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 18<sup>th</sup> day of October, 1983.

  
K. D. Drachani, Chief  
Mobile Source Division

Date of Issue: October 11, 1983

EVALUATION OF SPEARCO PERFORMANCE PRODUCTS, INC.'S ADD-ON TURBOCHARGER KIT FOR 2.4 LITER TOYOTA VEHICLES FOR EXEMPTION FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA ADMINISTRATIVE CODE.

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.)

STATE OF CALIFORNIA

AIR RESOURCES BOARD

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OCTOBER 11, 1983

### SUMMARY

Spearco Performance Products, Inc. has requested an exemption from the prohibitions in Vehicle Code Section 27156 for their add-on turbocharger kit for installation on 1984 and older model-year Toyota Celicas and pick-up trucks with a 2.4 liter (144 CID) four-cylinder fuel injected engine.

Based on the results from comparative exhaust emission tests performed by Spearco at an independent laboratory on a 1983 Toyota Celica, and from confirmatory tests performed by the ARB on the same vehicle, the staff concludes that Spearco's turbocharger kit evaluated will not adversely affect exhaust emission from vehicles for which exemption is requested.

The staff recommends that Spearco Performance Products, Inc. be granted an exemption as requested and that Executive Order D-140 be issued.

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EVALUATION OF SPEARCO PERFORMANCE PRODUCTS, INC.'S ADD-ON TURBOCHARGER KIT FOR 2.4 LITER TOYOTA VEHICLES FOR EXEMPTION FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA ADMINISTRATIVE CODE.

I. INTRODUCTION

Spearco Performance Products, Inc., of 7541 Woodman Place, Van Nuys, California 91405, has requested an exemption from the prohibitions in Vehicle Code Section 27156 for their add-on turbocharger kit. The turbocharger kit is intended for installation on 1984 and older model-year Toyota Celicas and pick-up trucks with a 2.4 liter (144 CID) fuel injected four-cylinder engine.

Spearco has submitted data from comparative (stock baseline versus turbocharged) emission tests conducted on a 1983 Toyota Celica at Olson Engineering, Inc. in Huntington Beach, California. Confirmatory tests were conducted on the same vehicle at the Air Resources Board (ARB) Laboratory in El Monte, California.

II. CONCLUSION

Based on the results from comparative exhaust emission tests performed by Spearco at an independent laboratory on a 1983 Toyota Celica, and from confirmatory tests performed by the ARB on the same vehicle, the staff concludes that Spearco's turbocharger kit evaluated will not adversely affect exhaust emission from vehicles for which exemption is requested.

III. RECOMMENDATIONS

The staff recommends that Spearco be granted an exemption for their add-on turbocharger kit for installation on 1984 and older model-year

Toyota Celicas and pick-up trucks powered by a 2.4 liter (144 CID) fuel injected four-cylinder engine. The staff also recommends that Executive Order D-140 be issued.

#### IV. TURBOCHARGER KIT DESCRIPTION AND OPERATION

The original equipment manufacturer (OEM) exhaust manifold is replaced by a Spearco manifold. The turbine inlet mounts directly to the replacement exhaust manifold. The turbine, driven by exhaust gases, is linked to the compressor by a solid shaft. Intake air is routed from the air flow meter to the compressor by the compressor inlet pipe. It is then compressed and routed into the intake plenum through the discharge pipe. Exhaust gases from the turbine is routed to the catalytic converter via the exhaust pipe.

Lubrication and cooling of the turbocharger is provided by a steel braided line from a tap into the main oil galley. Oil from the turbocharger is returned to the oil pan.

Maximum positive pressure (boost) is limited to 5 psig by a wastegate mounted on the exhaust manifold. The wastegate is preset to dump excess exhaust gases when intake manifold pressure reaches 5 psig, thus bypassing the turbine.

The kit also includes a fuel enrichment device. The device connects to the intake manifold and coolant temperature sensor. When boost pressure reaches 4 psig, the device increases the electrical resistance of the temperature sensor. This increase in electrical resistance dictates the vehicle's computer to increase the fuel flow through the injector nozzles, thus enriching the fuel charge during boost conditions above 4 psig.



An electronic spark retard module is employed to suppress detonation during boost conditions or heavy load operations. The module utilizes a sensor, mounted on the intake manifold or cylinder head, to detect detonation. When detonation is detected, the module electronically retards the spark until detonation is eliminated.

No modifications to the OEM tune-up specifications are required when the turbocharger kit is installed. All OEM emission controls are left intact.

#### V. TURBOCHARGER KIT EVALUATION

A 1983 Toyota Celica vehicle with a 2.4 liter four-cylinder fuel injected engine was used for the evaluation of the Spearco kit. The dynamometer inertia weight and loading used was 3125 lbs. and 11.0 hp, respectively.

Testing, conducted by Spearco and confirmed by the ARB, consisted of cold start CVS-75 and hot start Highway Fuel Economy tests to determine exhaust emission in the unmodified (baseline) and turbocharged (device) configurations for comparison. A summary of the test results is tabulated in the following table:

Table  
Exhaust Emission Test Data  
Evaluation of Spearco Turbocharger Kit  
1983 Toyota Celica

| <u>Test Facility</u> | <u>Test Mode</u> | Exhaust Emission (g/mi) |           |            | Fuel Economy (mpg) |            |
|----------------------|------------------|-------------------------|-----------|------------|--------------------|------------|
|                      |                  | <u>HC</u>               | <u>CO</u> | <u>NOx</u> | <u>City</u>        | <u>Hwy</u> |
| OEI                  | Baseline         | 0.26(1)                 | 2.3       | 0.34       | 21.46              | 31.44      |
|                      | Device           | 0.24(1)                 | 1.4       | 0.34       | 23.89              | 34.22      |

Table (Contd)  
Exhaust Emission Test Data  
Evaluation of Spearco Turbocharger Kit  
1983 Toyota Celica

| <u>Test Facility</u> | <u>Test Mode</u> | <u>Exhaust Emission (g/mi)</u> |            |             | <u>Fuel Economy (mpg)</u> |             |
|----------------------|------------------|--------------------------------|------------|-------------|---------------------------|-------------|
|                      |                  | <u>HC</u>                      | <u>CO</u>  | <u>NOx</u>  | <u>City</u>               | <u>Hwy</u>  |
| ARB                  | Baseline         | 0.24(2)                        | 2.7        | 0.31        | 21.1                      | 29.2        |
|                      |                  | 0.22(2)                        | 2.4        | 0.33        | 21.3                      | 29.1        |
|                      |                  | <u>0.23(2)</u>                 | <u>2.5</u> | <u>0.32</u> | <u>21.2</u>               | <u>29.2</u> |
|                      | Device           | 0.24(2)                        | 2.3        | 0.34        | 21.1                      | 29.7        |
|                      |                  | 0.26(2)                        | 2.5        | 0.37        | 21.5                      | 28.8        |
|                      |                  | 0.23(2)                        | 1.8        | 0.39        | 22.8                      | -           |
|                      |                  | <u>0.24(2)</u>                 | <u>2.2</u> | <u>0.37</u> | <u>21.8</u>               | <u>29.3</u> |
|                      |                  | Emission Standard              | 0.39(2)    | 3.4         | 0.7                       | -           |
|                      |                  | (1): Total hydrocarbon.        |            |             |                           |             |
|                      |                  | (2): Non-methane hydrocarbon.  |            |             |                           |             |

#### VI. DISCUSSION

Both sets (Spearco's and ARB's) of comparative (stock and turbocharged) exhaust emission tests show that when the turbocharger kit was installed according to Spearco's instructions, the kit did not have an adverse effect on exhaust emissions on the test vehicle.

The original application requested an exemption for 1983 and older model-year vehicles only. Upon completion of the evaluation tests, the 1984 models were being introduced to California consumers. Spearco has requested, in writing, that their application be updated to include the 1984 models as well, since the engines used in the 1984 models are identically designed as the ones in the 1983 models.

In response to Spearco's request, the staff utilized the certification documents to compare the engine design of both 1983 and 1984 model-year Toyota 2.4 liter fuel injected engines. Since the engines in the 1984 models are identically designed as the 1983 engines,

the staff is of the opinion that the 1984 vehicles will have the same degree of performance/emissions impact as in the 1983 models. Because the test data on a 1983 test vehicle showed no adverse effect on the vehicles exhaust emission with the turbocharger kit installed, the kit will have no adverse effect on the 1984 models either. No additional testing was required or performed to incorporate Spearco's request to include the 1984 models in their application for exemption.