

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-97-2
Relating to Exemptions under Section 27156
of the Vehicle Code

BAE
TURBOCHARGER KIT MODEL NO. T04B M2

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 turbocharger kit model No. T04B M2 manufactured by BAE of 3032 Kashiwa Street, Torrance, California 90503, 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 1981 model year Airstream 28 foot motorhomes having an Isuzu QD 145 six-cylinder diesel engine and automatic transmission.

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 BAE TURBOCHARGER KIT, KIT MODEL NO. T04B M2.

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 23rd day of June, 1981.


K. D. Drachand, Chief
Mobile Source Control Division

State of California
AIR RESOURCES BOARD

Staff Report

June 5, 1981

Evaluation of the BAE Turbocharger Kit Model No. T04B M2 for Compliance With the Requirements of Section 27156 of the Vehicle Code.

I. INTRODUCTION

BAE of 3032 Kashiwa Street, Torrance, California 90505, has applied for exemption of a turbocharger kit from the prohibitions of Section 27156 of the Vehicle Code (V.C.). The kit, turbocharger kit model No. T04B M2, is intended for 1981 model year Airstream 28 foot motorhomes having an Isuzu QD 145 six-cylinder diesel engine and automatic transmission.

BAE has submitted comparative emission data from back-to-back steady state exhaust emissions tests conducted on an Airstream motorhome at the company's own emission laboratory. Confirmatory tests were conducted on the same motorhome at the Air Resources Board's (ARB) Haagen-Smit Laboratory in El Monte, California.

II. TURBOCHARGER KIT DESCRIPTION

The BAE turbocharger kit consists of an AiResearch turbocharger, an exhaust manifold to turbocharger adaptor, and an intake pipe. The components are packaged with installation hardware to complete the kit.

The exhaust manifold to turbo adaptor is installed on the OEM exhaust manifold located on the driver's side of the engine. The turbine inlet of the turbocharger mounts directly to the adaptor. The turbine, driven by exhaust gases, is linked to the compressor by a solid shaft. Compressed incoming air is routed to the intake manifold through the BAE intake pipe mounted transversely over the engine.

Maximum positive manifold pressure is limited to 13 psig by the size of (and exhaust flow through) the turbine housing. No wastegate or other active boost limiting device is used.

The cooling of the turbocharger is achieved by direct fan air from engine and lubricating oil passing through the unit. The oil is piped from the filtered main oil galley to the turbocharger bearing housing. Oil from the turbocharger is returned to the oil pan.

No modifications to the OEM tune-up specifications are required when the turbocharger kit is installed.

III. TEST PROGRAM

A 1981 Airstream 28 foot motorhome with an Isuzu QD 145 six-cylinder diesel engine and automatic transmission was used for testing. The test weight for the motorhome is 14,500 lbs. The frontal area road load horsepower (RLHP) used in the testing was 36 horsepower at 50 mph.

Back-to-back steady state tests were conducted on the test motorhome at the following points:

- 1) idle
- 2) 60, 50, 40, 20 mph at 2 times RLHP
- 3) idle
- 4) 60, 50, 40, 20 mph at 1 times RLHP

IV. APPLICANT TEST DATA

The applicant's exhaust emissions test data in Table 1 was generated at the company's own emission laboratory.

Table 1
Applicant Exhaust Emissions Test Data

Mode	Load	HC ⁽¹⁾ (ppm)	Exhaust Emissions		
			CO (ppm)	CO ₂ (%)	NOx (ppm)
Baseline idle	-	338	127	2.2	160
Device idle	-	158	130	1.7	192
Baseline 60 mph	2XRL	260	1755	10.6	830
Device 60 mph	2XRL	230	130	8.3	880
Baseline 50 mph	2XRL	691	292	8.9	820
Device 50 mph	2XRL	211	130	8.0	810
Baseline 40 mph	2XRL	378	185	6.6	605
Device 40 mph	2XRL	194	130	6.5	575
Baseline 20 mph	2XRL	404	180	4.2	395
Device 20 mph	2XRL	195	150	4.5	420
Baseline idle	-	150	120	2.1	374
Device idle	-	155	93	1.7	130
Baseline 60 mph	1XRL	629	290	7.5	660
Device 60 mph	1XRL	144	120	7.2	600
Baseline 50 mph	1XRL	459	172	6.7	510
Device 50 mph	1XRL	141	130	6.0	400
Baseline 40 mph	1XRL	448	165	5.3	405
Device 40 mph	1XRL	139	153	5.2	380
Baseline 20 mph	1XRL	453	165	3.8	370
Device 20 mph	1XRL	151	165	3.9	310

(1) Determined by a flame ionization detector (FID) but reported as carbon by applying an experimental factor of 3.5 to convert to heated flame ionization detector (HFID) values.

V. ARB TEST DATA

The ARB's exhaust emissions test data is shown in Table 2.

Table 2

ARB Exhaust Emissions Test Data

Mode	Load	HC ⁽²⁾ (ppm)	Exhaust Emissions		
			CO (ppm)	CO ₂ (%)	NOx (ppm)
Baseline idle	-	62	127	1.70	149
Device idle	-	63	139	1.68	151
Baseline 60 mph	2XRL	-	-	-	-
Device 60 mph	2XRL	-	-	-	-
Baseline 50 mph	2XRL	50	1977	11.49	591
Device 50 mph	2XRL	76	130	7.16	597
Baseline 40 mph	2XRL	91	205	7.71	582
Device 40 mph	2XRL	73	142	6.42	538
Baseline 20 mph	2XRL	73	182	3.36	345
Device 20 mph	2XRL	73	184	3.77	373
Baseline idle	-	60	139	1.70	168
Device idle	-	63	139	1.68	151
Baseline 60 mph	1XRL	111	413	9.16	612
Device 60 mph	1XRL	66	133	5.83	516
Baseline 50 mph	1XRL	85	196	7.02	524
Device 50 mph	1XRL	64	146	5.36	403
Baseline 40 mph	1XRL	81	192	5.32	427
Device 40 mph	1XRL	66	169	4.71	357
Baseline 20 mph	1XRL	78	173	3.00	279
Device 20 mph	1XRL	67	184	3.34	336

(2) HC as carbon measured by an HFID.

VI. DISCUSSION

The applicant's reported exhaust HC emission data in Table 1 were calculated from measured HC values. The applicant's laboratory used a general (not heated) Flame Ionization Detector (FID) for exhaust hydrocarbon determination. An experimental factor of 3.5 was used by the applicant to convert the measured FID values to Heated-FID values. HC data reported by the ARB laboratory were obtained using a HFID.

The two (2) sets of laboratory data (Tables 1 and 2) show that there are some changes in emissions due to the installation of the turbocharger kit. The changes, however, are within test variability and are considered to be insignificant.

VII. CONCLUSION AND RECOMMENDATIONS

Comparative chassis dynamometer tests indicate the the BAE turbocharger kit model No. T04B M2 will not significantly affect exhaust emissions when installed in accordance with the manufacturer's instructions. The staff recommends that BAE be granted an exemption from the prohibitions of V. C. Section 27156 for this kit for 1981 model year Airstream 28 foot motorhomes having an Isuzu QD 145 six-cylinder diesel engine and automatic transmission. The staff recommends that Executive Order No. D-97-2 be adopted.