

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-161-20
Relating to Exemptions Under Section 27156
of the Vehicle Code

GALE BANKS ENGINEERING
SMOKE REDUCTION SYSTEM

Pursuant to the authority vested in the Air Resources by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 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 Smoke Reduction System manufactured by Gale Banks Engineering of 546 Duggan Avenue, Azusa, California 91702, 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 to 1991 vehicles powered with an 8.2 liter Detroit Diesel heavy-duty diesel engine.

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 the product 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'S SMOKE REDUCTION 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 communications.

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 9 day of July, 1991.

R. Summerfield
for R.B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF GALE BANKS ENGINEERING'S SMOKE REDUCTION SYSTEM
MODEL NO. V3LM-403 FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE
CALIFORNIA CODE OF REGULATIONS

July 1991

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by

Mobile Source Division
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731-2990

(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 the 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 Smoke Reduction System (SRS) Model No. V3LM-403 designed for 1982 to 1991 vehicles powered with an 8.2 liter Detroit Diesel heavy-duty diesel engine.

Banks has submitted a completed application with all the required information. Results of the comparative smoke opacity tests conducted jointly by Banks and the Air Resources Board (ARB) show that the Smoke Reduction System does not have an adverse effect on the emissions from vehicles powered with an 8.2 liter Detroit Diesel heavy-duty diesel engine. The staff recommends that Banks be granted an exemption for their add-on Smoke Reduction System and that Executive Order D-161-20 be issued.

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I. INTRODUCTION

Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, California 91702, has applied for exemption from the prohibitions in Vehicle Code Section 27156 for their add-on Smoke Reduction System (SRS) Model No. V3LM-403 designed for 1982 to 1991 vehicles equipped with a Detroit Diesel 8.2 liter heavy-duty diesel engine.

II. CONCLUSION

Based on the submitted information and a comparative snap-idle test performed jointly by Banks and the Air Resources Board (ARB) on a 1985 Ford truck equipped with an 8.2 liter Detroit Diesel heavy-duty diesel engine, the staff concludes that the installation of the Banks Smoke Reduction System Model No. V3LM-403 will not adversely affect emissions from 1982 to 1991 vehicles powered with a Detroit Diesel 8.2 liter heavy-duty diesel engine.

III. RECOMMENDATIONS

The staff recommends that Banks be granted an exemption for this SRS kit for use on 1982 to 1991 vehicles powered with a Detroit Diesel 8.2 liter heavy-duty diesel engine and that Executive Order D-161-20 be issued.

IV. DEVICE DESCRIPTION

The Banks Smoke Reduction System (SRS) is a turbocharger system designed for installation on 1982 to 1991 vehicles powered with an 8.2 liter Detroit Diesel engine. The major components of the system include a Schwitzer Model No. V3LM-403 turbocharger, custom intake and exhaust tubing, brackets, hoses and the hardware necessary to complete the installation.

The SRS kit provides additional air to the combustion process to promote more complete combustion of the available fuel and thus reduce smoke output. Unlike a typical turbocharger system which is intended to produce additional power, the Banks SRS kit is designed for the sole purpose of reducing smoke. The appendix shows a comparison of a typical turbo system and the SRS kit. Installation of the SRS kit requires minimal modifications to the stock configuration. The Detroit Diesel 8.2 liter heavy-duty diesel engine has a fixed fuel delivery rate which can only be increased by an increase in engine speed or by a substitution of internal engine components. Thus, no unnecessary adjustments on fuel delivery system can be made by the end user. Banks SRS kit limits boost pressure to 6 psi and power level is increased to less than 5 percent. No OEM emission controls are removed or disconnected when the SRS kit is installed.

V. DISCUSSION OF THE SRS KIT EVALUATION

Evaluation of the Banks SRS kit included an analysis of all submitted information on hardware modifications, potential changes in engine parameters, and smoke opacity at wide-open throttle (steady state). Based on the review of submitted information, it was determined that a potential increase in emissions could occur during transient conditions. Thus, ARB requested that a snap idle test be conducted in the baseline and modified configuration. A 10 percent increase in smoke opacity was set as the passing criteria for the SRS kit, and the overall smoke opacity could not exceed 55 percent.

Testing was conducted at the Gale Banks Engineering facility using a 1985 Ford F700 truck powered by an 8.2 liter Detroit Diesel heavy-duty

diesel engine. The ARB and Banks both had their own set of smoke opacity meters to monitor smoke opacity levels during the snap idle test. Testing was done using both ARB and Gale Banks Smoke opacity meters to determine if the vehicle with the turbocharger installed exhibits smoke opacity levels within 10 percent of baseline. Bank's and ARB's opacity readings showed identical results (see Table 1).

Table 1
Snap-Idle Smoke Opacity Test Results*

Baseline snap-idle	31%, 40%, 34%
Modified snap-idle	27%, 24%, 23%

* Testing was conducted as stated in the California Code of Regulations (CCR) section 2182. Heavy-Duty Diesel Vehicle Smoke Opacity Test Procedure.

The snap-idle test results indicate that smoke opacity of the modified vehicle was lowered by more than 10 percent. This demonstrates that the addition of the Gale Banks Smoke Reduction System (SRS) Model No. V3LM-403 will not have an adverse effect on emissions for 1982-1991 Detroit Diesel 8.2 liter heavy-duty diesel engine for which the exemption was requested.

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

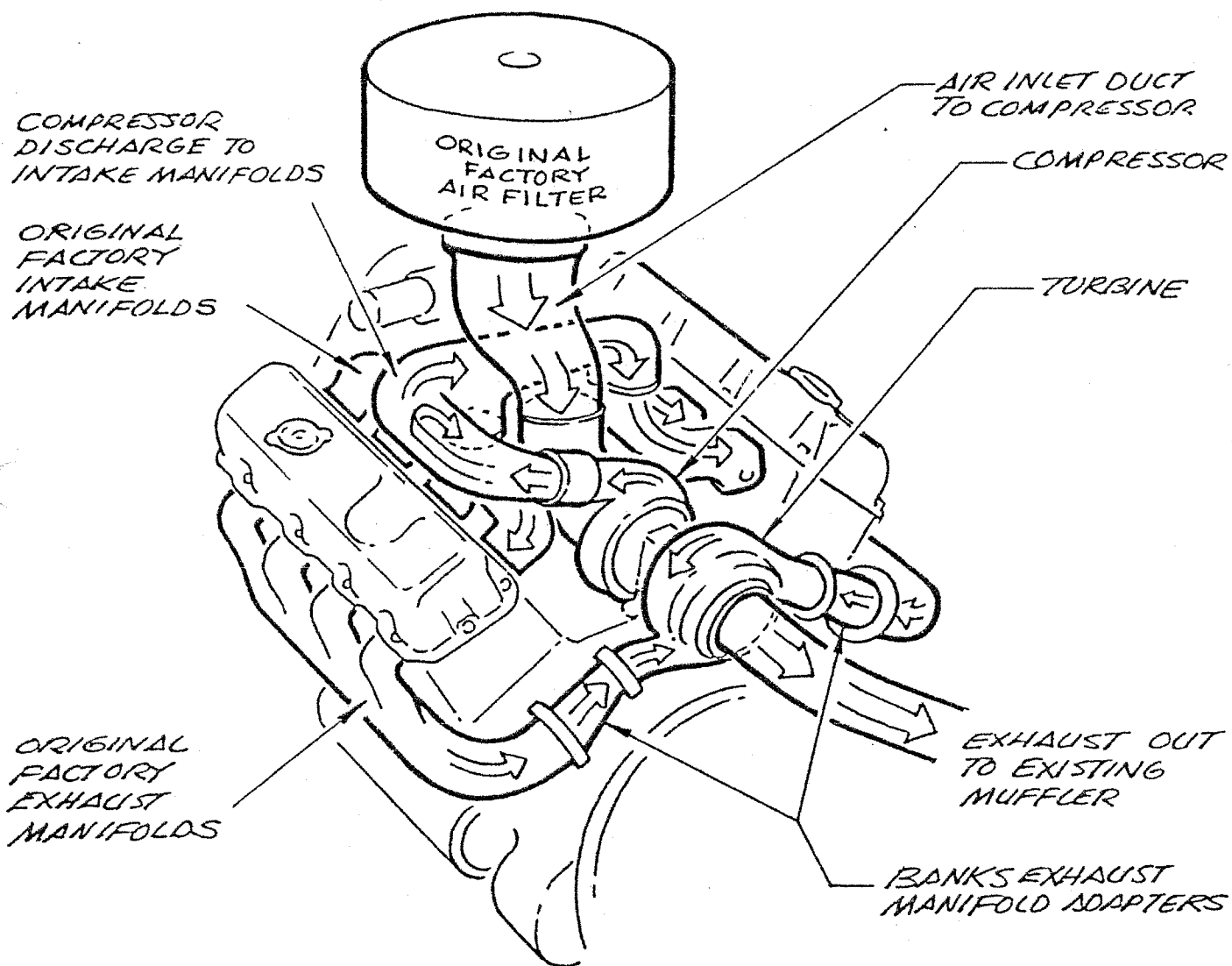
APPENDIX

8.2L SMOKE REDUCTION SYSTEM (SRS)

INSTALLATION INSTRUCTIONS

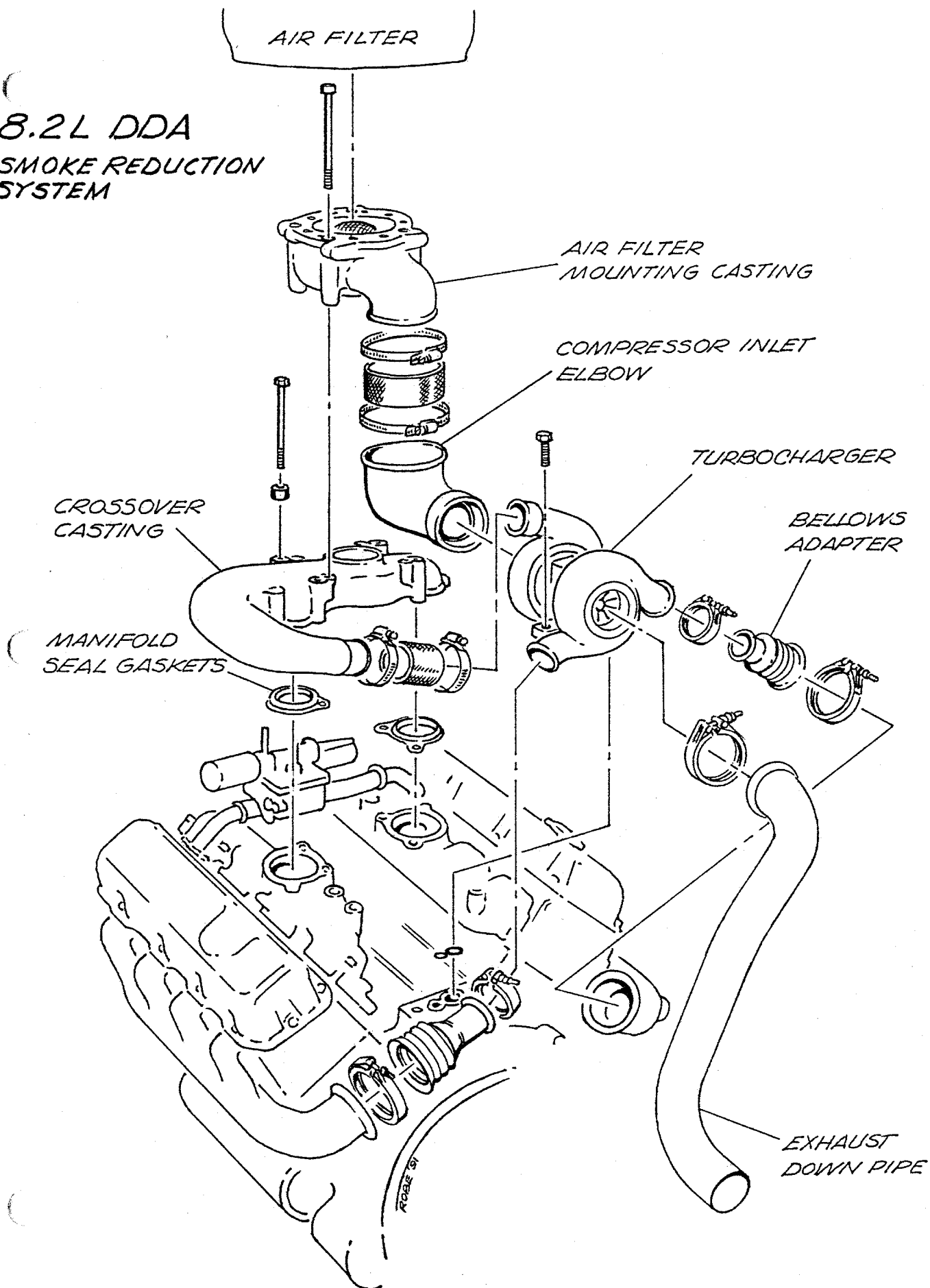
1. Remove air filter. Remove air filter housing from engine.
2. Remove "Y" adapter from intake manifolds.
3. Disconnect exhaust piping from exhaust manifolds. Remove piping and muffler from vehicle. On engines with rear outlet exhaust manifolds, cover manifold outlets to prevent any foreign object entry.
4. Clean area around turbocharger mounting flange on rear of engine. Remove block-off plate.
5. Install turbocharger on flange at rear of engine. Use new gasket supplied with turbocharger. Re-use existing bolts.
6. Install exhaust feed piping into turbocharger. On engines with rear outlet exhaust manifolds, install two bellows adapters. NOTE: there is a right and left hand adapter. On engines with bottom outlet exhaust manifolds, install a right and left hand head pipe, provided. Connect exhaust to turbocharger with new V-band clamps, provided. Re-use existing V-band clamps at exhaust manifold connections.
7. Install rubber elbow and clamps on turbocharger compressor inlet nipple. Leave clamps loose at this time. Install silicone hose and clamps on turbocharger compressor outlet nipple.
8. Install crossover casting onto intake manifolds. Make sure manifold seal gaskets are in good condition. Replace if necessary. Tighten turbo outlet hose clamps.
9. Install air filter mounting casting on crossover casting and air inlet elbow. Tighten inlet elbow clamps.
10. Install new exhaust downpipe onto turbocharger exhaust outlet connection. Use the 3 1/2" V-band clamp provided. Re-install the muffler and exhaust hangers.
11. Re-install air cleaner / filter assembly on air inlet adapter.

12-'90

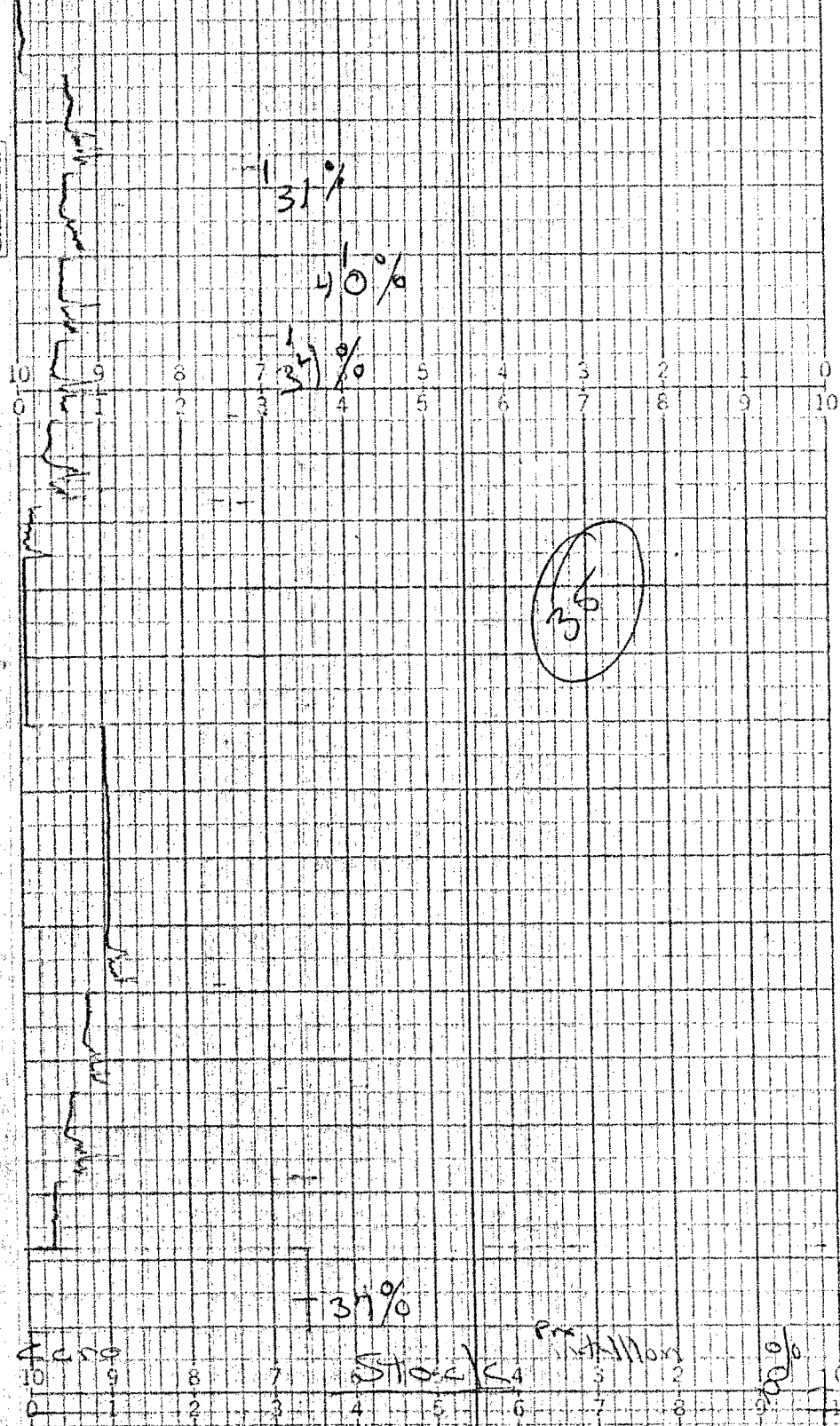


REAR VIEW OF ENGINE
8.2L D.D.A.

8.2L DDA
SMOKE REDUCTION
SYSTEM



Charts-Inc

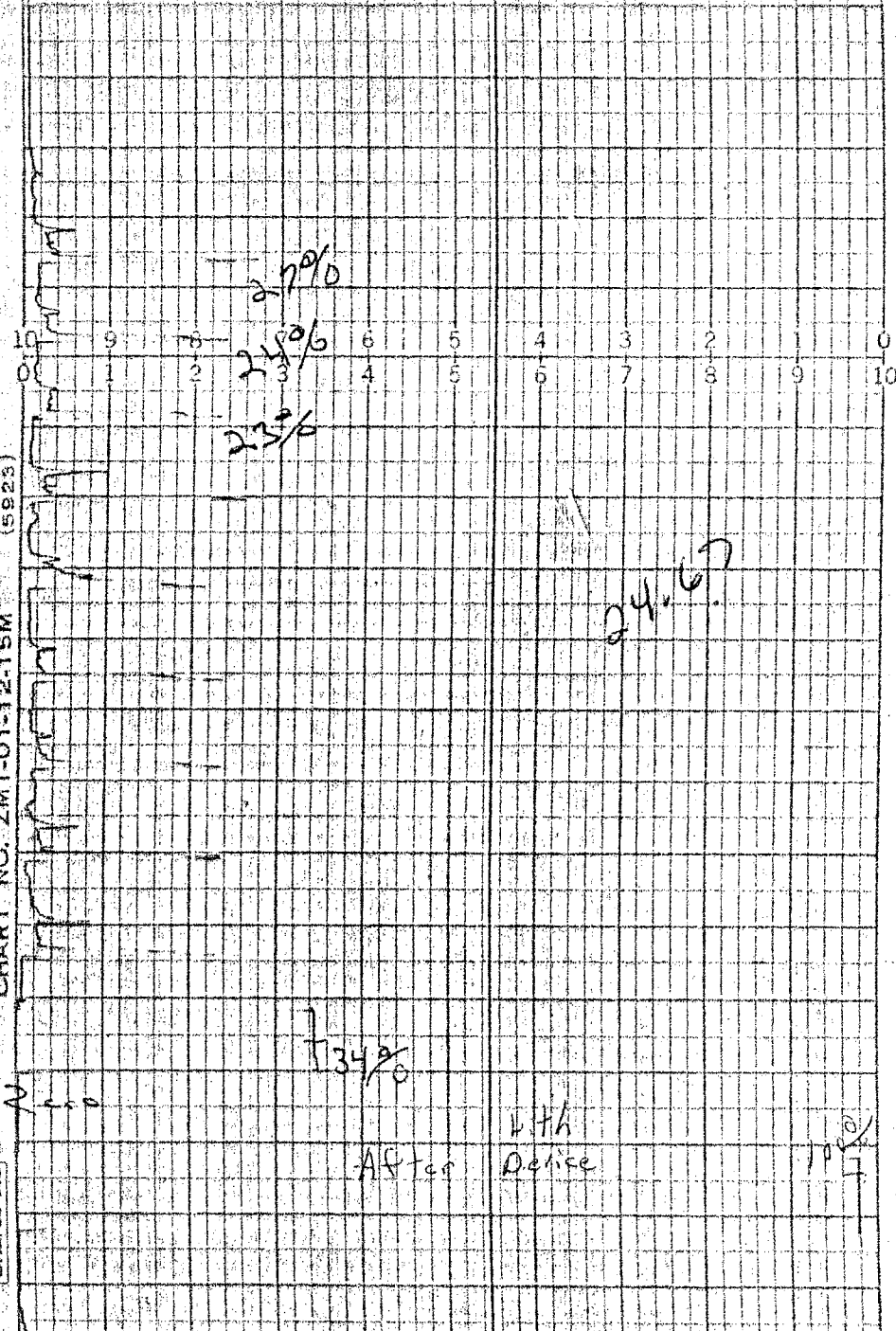


DATE 3/21/91 CHART SPEED 8cm/min
TIME 0849 LIC. PLATE CA2R24513
CITATION # _____
DRIVERS SIGNATURE QSP

Stock Configuration
Average 33

CHART NO. ZM1-01-12-15M (5923)

Chart-Log



DATE 3/21/91 CHART SPEED 8 cm/min

TIME 1029 LIC. PLATE 2R24513

CITATION # _____

DRIVERS SIGNATURE OSR

modified configuration

Average 24.7

Compare and Contrast
Of The
SRS System vs Conventional Turbocharging

Conventional Turbocharging SRS System

	Conventional Turbocharging	SRS System	
Altitude Compensation	Yes	Yes	Similarities
Fuel Mileage Improvement	Yes	Yes	
Turbocharger	Yes	Yes	
Minor Adapters And Connectors	Yes	Yes	
Change Fuel Settings	Yes	No	Differences
Change Exhaust Manifold	Yes	No	
Change Exhaust Pipe	Yes	No	
Change Exhaust Muffler	Yes	No	
Change Air Filter	Yes	No	
Change Air Cleaner Housing	Yes	No	
Change Intake Manifold	Yes	No	
Change Air Inlet To Cleaner Housing	Yes	No	
Boost Pressure	10-20 psi	5-6 psi only	
Power Level	40-50% increase	less than 5%	