

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-161-27  
Relating to Exemptions Under Section 27156  
of the Vehicle Code

GALE BANKS ENGINEERING  
POWER PACK SYSTEM FOR 7.5 LITER FORD OR OSHKOSH CHASSIS MOTORHOMES

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 Power Pack System comprised of #14 gage steel exhaust manifolds, pre-cat piping, single-inlet muffler, and air inductor manufactured by Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, CA 91702, 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 1989 thru 1992 model-year motorhomes with gross vehicle weight (GVW) of 14,000 lbs. or greater powered by a Ford 7.5 liter (460 CID) EFI gasoline engine and utilizing the Ford or Oshkosh chassis.

This Executive Order is valid provided that installation instructions for this Power Pack System will not recommend tuning the vehicle to specifications different from those submitted by Banks.

Changes made to the design or operating conditions of the Power Pack 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 this Power Pack System using any identification other than that shown in this Executive Order or marketing of this Power Pack 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 Power Pack System shall not be construed as 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 the use of this Power Pack System 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 CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF GALE BANKS ENGINEERING'S POWER PACK SYSTEM.

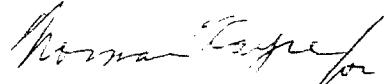
GALE BANKS ENGINEERING  
POWER PACK SYSTEM

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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 a 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 28<sup>th</sup> day of April, 1992.



R. B. Summerfield  
Assistant Division Chief  
Mobile Source Division

State of California  
AIR RESOURCES BOARD

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

April 1992

State of California  
AIR RESOURCES BOARD

EVALUATION OF GALE BANKS ENGINEERING'S POWER PACK 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  
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 mention of trade names or commercial products constitute endorsement or recommendation for use.)

## SUMMARY

Gale Banks Engineering (Banks) has applied for an exemption from the prohibitions in Vehicle Code Section 27156 for their add-on Power Pack System designed for 1989-92 model-year motorhomes with a gross vehicle weight (GVW) of 14,000 lbs. or greater powered by a 7.5 liter Ford EFI gasoline engine on either a Ford or Oshkosh chassis.

Banks has submitted a completed application and all the required information as well as temperature test data which shows that the Power Pack System will not adversely affect the emissions of the applicable 1989-92 motorhomes.

The staff recommends that Banks be granted an exemption for their add-on Power Pack System and that Executive Order D-161-27 be issued.

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EVALUATION OF GALE BANKS ENGINEERING'S POWER PACK SYSTEM FOR EXEMPTION  
FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE  
WITH SECTION 2323, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, California 91702, has applied for exemption from the prohibitions of Vehicle Code Section 27156 for their add-on Power Pack System designed for 1989-92 model-year motorhomes with a gross vehicle weight (GVW) of 14,000 lbs. or greater powered by a 7.5 liter Ford EFI gasoline engine on either a Ford or Oshkosh chassis.

Banks has submitted a completed application and all the required information as well as comparative temperature test data.

II. CONCLUSION

Based on the submitted information and the temperature test data performed on a 1990 7.5 liter gasoline-powered motorhome (GVW greater than 14,000), the staff concludes that the installation of the Banks' Power Pack System will not adversely affect the emissions on the applicable 1989-92 motorhomes.

III. RECOMMENDATIONS

The staff recommends that Banks be granted Executive Order D-161-27 for use of the Power Pack System on 1989-92 model-year motorhomes with a gross vehicle weight (GVW) of 14,000 lbs. or greater powered by a 7.5 liter Ford EFI gasoline engine on either a Ford or Oshkosh chassis.

IV. DESCRIPTION

The purpose of the Banks Power Pack System is to enhance the engine's power and fuel efficiency through the reduction of restrictions in the intake and exhaust system. The Power Pack System consists of exhaust

manifolds, pre-catalyst piping, and ram air inductor.

The exhaust system consists of tubular exhaust manifolds "headers" constructed out of #14 gage steel, Y-pipe assembly, low restriction muffler, and a low restriction tail pipe. As with the original equipment manufacturer's (OEM) exhaust system, the main function of the Banks Power Pack System is to route exhaust gases from the two exhaust manifolds of the engine into the catalytic converter prior to the muffler. Each cylinder has a 1.5" diameter tube that combines with the adjacent tubes into a 2.5" diameter connector. On each side of the engine, these two 2.5" connectors feed directly into the Y-pipe where they output as one pipe into the catalytic converter. The Banks' Y-pipe houses the oxygen sensor similar to the OEM. The Power Pack System also includes an air inductor, which uses a flex hose and a boot type funnel located at the grill to naturally induce lower temperature intake air. Installation of the Banks Power Pack System does not alter the OEM location of the catalyst, oxygen sensor, or air injection.

#### V. POWER PACK SYSTEM EVALUATION AND DISCUSSION

New vehicle certification of Ford powered motorhomes that Banks has requested exemption on required the use of an engine dynamometer due to their weight classification. Since Banks sells only a small volume of Power Pack systems applicable to this application and the cost of testing on an engine dynamometer is prohibitive, Banks requested that an exemption be granted based on data from temperature testing instead of engine emission testing which was accepted by the ARB for their exemption of heavy-duty motorhomes powered by General Motors engines.

A 1990 Starcraft Motorhome powered by a Ford 7.5 liter EFI engine was



used as the test vehicle. Testing consisted of sampling the catalyst inlet exhaust temperature at various engine RPMs in the baseline and modified configuration. ARB staff reviewed the setup, checked the calibration, and observed the testing during baseline and modified temperature data acquisition. Results are listed in Table 1.

Table 1

Exhaust Temperature at Catalyst Inlet

Engine RPM	Temperature Factory Exh.	Temperature Power Pack	Temperature Change	Percent Change
4000	1475	1452	-23	-1.6%
3500	1463	1383	-80	-5.5%
3000	1450	1401	-49	-3.4%
2700	1411	1383	-28	-2.0%

The Power Pack temperature test data and the stock temperature test data submitted by the applicant varied no greater than 5.5 percent in exhaust temperature. Furthermore, a decrease in temperature of this percentage will not have any additional impact on catalyst deterioration. Based on these results, the staff concludes that the installation of the Banks Power Pack System will not have an adverse effect on the exhaust emissions of the affected vehicles. The Gale Banks Engineering submitted all the required information and fulfilled the requirements for exemption.

Appendix



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**BANKS POWERPACK  
INSTALLATION INSTRUCTIONS  
FOR 460 FORD EFI  
IN OSHKOSH/JOHN DEERE AND FORD  
MOTORHOME CHASSIS PLATFORM**

1. Raise vehicle on suitable hoist, jacks, or ramps. Disconnect battery.
2. Remove tailpipe assembly from the muffler rearward.
3. Remove muffler from catalytic converter.
4. Disconnect catalytic converter air injection piping from converter and at rubber hose connections on feed piping on engine. Remove piping assemblies. Save all clamps and hardware.
5. Disconnect oxygen sensor wire at oxygen sensor.
6. Unbolt catalytic converter at converter inlet flange. Remove converter.
7. Remove headpipe assembly from exhaust manifolds.
8. Disconnect sparkplug wires at sparkplugs. Label wires to assist in re-installation.
9. Remove sparkplug heat shields.
10. Disconnect EGR valve feed tube from fitting at rear of left hand exhaust manifold.
11. Remove exhaust manifolds from engine. Unbolt ignition coil bracket and dipstick tube bracket as required.
12. Clean cylinder head exhaust flange surfaces of any rust or carbon. Install the Banks PowerPack exhaust manifolds. RE-install ignition coil bracket. Use 3/8 - 16 x 1 inch 12 point bolts supplied.
13. Re-install spark plug heat shields and dipstick tube. Use spacers supplied to relocate these components.

14. Re-install air injection tube assemblies. It will be necessary to cut one air injection tube to provide clearance to the exhaust manifold. Cut the tube 6 inches from the most forward bend. Join the tube halves with the 1 inch I.D. silicone hose and two NO. 16 hose clamps, provided.
15. Install the PowerPack "Y"-pipe assembly to the exhaust manifolds. Use two donut gaskets, provided, between the manifold outlets and "Y"-pipe flanges.
16. Carefully remove the oxygen sensor from the original head pipe assembly and re-install in the PowerPack "Y" pipe. Reconnect the wiring.
17. Re-connect the EGR valve exhaust feed tube to the bung on the left hand PowerPack exhaust manifold.
18. Re-install the catalytic converter on "Y"-pipe flange. Use new gasket provided. Re-connect the air injection tubes to the catalytic converter.
19. Install the Powerpack muffler to the catalytic converter. The stainless steel adapter and extension pipe, supplied, mount between the converter and muffler. Note the alignment notch on the adapter. Use one 2 1/2 inch and 3 inch U-clamp to complete the assembly.
20. Attach the existing front muffler hanger bracket to the 3-inch U-clamp to support the front of the muffler.
21. Install the PowerPack tailpipe assembly. Use existing hangers in vehicle to support tailpipe.
22. Install heat shield, provided, on left frame rail, adjacent to engine, to provide heat protection to hydraulic lines in the vicinity.
23. Remove vehicle from ramps or hoist. Remove plastic air intake silencer from air inlet hoses between air filter assembly and engine.
24. Using a hacksaw, cut the tapered sections off the silencer as shown in the illustration. Re-install the silencer in the air intake hoses using the original clamps.
25. Remove the air cleaner housing cover. Replace the factory paper element with the low restriction K&N filter element provided.
26. Reconnect spark plug wires and battery cables. Replace spark plug wires and distributor cap if condition looks marginal.

27. Start vehicle and allow engine to warm up. Listen for any exhaust leaks. Test drive vehicle to locate possible leaks or rattles. Re-tighten clamps or reposition tubing slightly if necessary to eliminate leaks and rattles.

NOTE: The exhaust system will smoke upon initial start up. This is because grease used in the tube bending process will burn off the inside of the tubing as it warms up.

#### TUNE UP SPECIFICATIONS

Use all factory tune up specifications. No tune up changes are required with the Banks PowerPack.

# BANKS POWERPACK

460 FORD EFI MOTORHOMES

