

R-291

MICHIGAN  
STATE HIGHWAY DEPARTMENT  
JOHN C. MACKIE, COMMISSIONER

Power-Glo Additive for Automobile Use

A. J. Permoda  
M. H. Janson

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Highway Research Project 58 G-88

Research Laboratory  
Office of Testing and Research  
Report No. 291  
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POWER-GLO  
ADDITIVE FOR AUTOMOBILE USE

The Research Laboratory recently received for evaluation a sample of "Power-Glo," advertised as an additive agent for automotive gasoline and lubricating oil.

According to the manufacturer's literature, reproduced in Figures 1A and 1B, "Power-Glo is a chemically compounded pure petroleum base fuel additive for both new and old cars! It contains only the ingredients necessary to revitalize lost engine power, vitality and efficiency... Power-Glo through years of home and laboratory experiments and tests has proven itself to be the one known fuel additive that will remove carbon, acid and lead deposits --- prevent the formation of sludge and other foreign content --- reduce oil consumption to a minimum --- promote longer engine life as well as better all-around engine performance... It is the one known fuel additive that will absorb condensation (water) throughout the fuel system, giving engines the capacity to perform a more satisfactory and carefree service."

Evaluatory Procedures

A review of Departmental files revealed that the Testing Laboratory in 1941 and 1942 had conducted a field service evaluation on a fuel additive called "Lubri-Gas." The tests were run in four different vehicles using gasoline with and without the fuel additive. The tests disclosed no significant advantage for the fuel additive in regard to improvement in gasoline economy, cylinder compression, or ability to decarburize the cylinder-head assembly. Information obtained in the present investigation indicates that the tested Lubri-Gas was essentially a motor oil.

Since no official authorization was received to test Power-Glo in field use, it was believed that the initial evaluations should consist of identifying the chemical nature of the fuel additive, and ascertaining the difference in chemical constitution between the previously tested Lubri-Gas and Power-Glo.

It was also believed advisable to canvass University agencies and automobile manufacturers as to their experience with additives in general and perchance with Power-Glo specifically. None of the canvassed agencies had any experience with Power-Glo, but one automobile manufacturer offered to test this additive and the Laboratory subsequently forwarded a sample.

#### Test Results

Power-Glo additive looked very much like motor oil. A closer examination revealed that it was a two-phase mixture, with scattered small droplets of minor phase dispersed in the major oil phase. An odor was evident of aromatic solvents, such as benzene and xylene.

An infra-red spectrum of Power-Glo was obtained as shown in Figure 2A, while Figure 2B is the infra-red spectrum obtained on the residue after the minor phase had been distilled from Power-Glo, employing vacuum distillation. The minor phase was present in small amount and was not collected for identification purposes.

A comparison of the spectrum in Figure 2A with that in Figure 2B of the distillation residue shows a diminution in depth of absorption bands in the residue spectrum at wavelengths of 2.95, 3.25, 5.1, 5.5, 5.8, 6.55, 9.6, 12.7 and 14.8 microns, indicating that the volatile minor phase consisted of materials having absorption bands at the indicated wavelengths.

The absorption band at 2.95 microns is very likely due to an alcoholic (OH) vibration, while the bands at 3.25, 5.1, 5.5, 6.55, 9.6 and 14.8 can be ascribed to aromatic-type solvents, while the band at 5.8 microns is generally ascribed to a carbonyl structure such as found in a ketone or ester. Therefore chemical blending agents containing these structures are indicated for the minor phase in Power-Glo.

The spectrum of Power-Glo distillation residue (Figure 2B) is similar to Shell Oil Company's SAE 20 motor oil (Figure 2C). All of the above spectra were obtained on a Perkin-Elmer Model 21 Spectrophotometer.

#### Automobile Company's Test Results

The automobile manufacturer who tested Power-Glo for mutual information reported:

"According to our rather cursory examinations, Power-Glo consists mainly of mineral oil having a viscosity approximately equivalent to SAE 20 motor oil. In addition, minor amounts of the following substances were identified:

- a) benzene
- b) methanol
- c) xylenes, principally p-xylene
- d) acetone
- e) fatty ester
- f) chlorine containing compound
- g) sulfur containing compound

The sample was essentially ashless (0.01 percent). The results of a semi-quantitative spectrometric analysis made on only one milligram of ash seems to indicate that the metals present are contaminants."

Results of the submitted ash analysis are on file. The company reported lead as being present to the extent of 2 to 20 percent of the ash with smaller amounts indicated for metals like iron, aluminum, sodium, etc.

The following excerpt from this company's correspondence expresses the opinions regarding additives obtained from another automobile manufacturer and from University automotive laboratory.

"Generally speaking, it has been our company policy to build automobiles that will operate satisfactorily on the regularly available commercial fuels and lubricants furnished by the petroleum industry at filling station outlets without supplementary additions thereto. When it has been necessary to make exception to this policy, we generally furnish a special product through our dealers as a company part having an official part number.

"Because of the practical impossibility of making adequate service tests on many proprietary mixtures which are constantly being offered, we have found it necessary to take the position that responsibility for proof of the benefits claimed for such mixtures must rest with the supplier of the proprietary mixture. As engine manufacturers we cannot accept responsibility for recommending any mixtures until there has been a long and trustworthy record of use in field service. Neither can we accept responsibility for difficulties that may arise from their use.

"We have not had any experience which would permit of departure on our part from this policy in the case of Power-Glo."

### Conclusions

Test data indicate that the tested sample of Power-Glo consisted of approximately SAE 20 motor oil saturated to excess with alcohol. Small amounts of aromatic and carbonyl bearing solvents also were found; these may serve to increase the amount of alcohol (the agent included to absorb condensation water from a car's fuel system) which can be maintained in solution in the oil phase of this additive.

### Recommendations

Available information does not warrant recommending the use of Power-Glo fuel additive in Departmental vehicles since this product is indicated to be similar in constitution to one previously field service-tested as a fuel additive, under the trade name of Lubri-Gas, which did not provide distinctly improved motor performance.

# NOW IT CAN BE SOLD!!



## After Eight Long Years of

- RESEARCH
- EXPERIMENTS
- and DEVELOPMENT

## WHAT IS AMAZING "Power-Glo" ?

'POWER-GLO' is a chemically compounded pure petroleum base 'fuel additive' for both new and old cars! It contains only the ingredients necessary to revitalize lost engine power, vitality and efficiency. It is guaranteed to be absolutely safe for all combustion engines.

'POWER-GLO' THROUGH YEARS OF HOME AND LABORATORY EXPERIMENTS and tests has proven itself to be the one known 'fuel additive' that will remove carbon, acid and lead deposits - - prevent the formation of sludge and other

foreign content - - reduce oil consumption to a minimum - - promote longer engine life as well as better all-around engine performance.

'POWER-GLO' reacts equally well at low and high temperatures - - assuring all combustion engines of positive lubrication under the most severe conditions. It is the one known 'fuel additive' that will absorb condensation (water) throughout the fuel system giving engines the capacity to perform a more satisfactory and carefree service.

## "Power-Glo" MAKES CARS RUN "FREE of FRICTION"

Yea! 'POWER-GLO' the amazing 'fuel additive' in the modern trend... with its SUPER ENGINE LUBRICATING qualities protects all combustion engines by coating all moving parts with a 'tough' chemically treated lubricating compound that actually protects rings, valves, pistons, rods, etc. from carbon, acid and lead deposits - - giving all combustion engines the capacity to perform with such endless ease - - that they are actually able to perform - - in the absence of water, cooling system or a fan - - - - PROOF POSITIVE THAT 'POWER-GLO' POSITIVELY REDUCES ENGINE HEAT, FRICTION AND WEAR.

The Manufacturers are NOT suggesting that you remove the Radiator from your car . . . Not even the Fan Belt . . . But, doesn't it make sense that any product that can make a motor perform "Free of Friction" and with such endless ease and fuel economy is worth trying in your car?

### MONEY BACK GUARANTEE

'POWER-GLO'... is warranted to make the users actually 'FEEL THE IMPROVEMENT'... in the performance of their car engine - - regardless of its age and condition - - or the purchase price will be cheerfully refunded.

### PREPARING FOR STORAGE?

Be sure to treat your tractors, combines, boat motors or other combustion engines with 'POWER-GLO' before storing them for the off-season. Then relax and be assured of easy starting and continued engine performance when the time comes to use them again.

### HOW TO PROPERLY USE "Power-Glo" FOR BEST ALL AROUND RESULTS

1. Add 1 - 8 oz. Bottle to your Gas... this revives engine power and efficiency, saves gas and assures 'trigger-quick' startings.
2. Add 1 - 8 oz. Bottle to your Crankcase... this gives positive engine lubrication, frees sticking sluggish valves, quiets hydraulic valve lifter noises and reduces heat, friction and wear.
3. Add 1 - 8 oz. Bottle to your Crankcase every Oil Change and 1 - 8 oz. Bottle to your Gas every 500 miles... this will insure continued removal of carbon, acid and lead deposits and will prove a savings to you in engine repairs and gas and oil usage.

FOR EXTREME CASES use instructions as indicated in Directions on bottle.

## WHAT Power-Glo DOES for AUTO'S, TRUCKS, etc.

### ☞ Increases Gasoline Mileage

Power-Glo is guaranteed to raise the compression of your engine thereby assuring a more relaxed and efficient performance - - automatically increasing gasoline mileage from 1 to 4 1/2 miles per gallon.

### ☞ Positive Engine Lubrication

Power-Glo 'WILL NOT BURN' thereby assuring positive lubrication of all moving engine parts with a tough 'super engine lubricant' that actually clings to the engine under extreme pressures and high motor temperatures that positively guarantees the reduction of costly engine repairs.

### ☞ Increases Engine Performance

Power-Glo guarantees to make the users actually feel the improvement in the performance of their car engine - regardless of its age and condition - or the purchase price will be cheerfully refunded.

### ☞ Assures "Trigger-Quick" Starting

Power-Glo assures all combustion engines with positive engine lubrication under any weather conditions - - and being the one known 'fuel additive' that will absorb oil dilution and condensation (water) throughout the fuel system giving all engines the capacity to perform entirely free of friction guaranteeing rapid trigger-quick starting.

### ☞ Frees Sticking Sluggish Valves

Power-Glo removes and prevents the formations of carbon, gum, lacquer, acid, lead deposits and other foreign content that causes piston ring and valve sticking - guaranteeing the engine greater power and efficiency.

### ☞ Reduces Oil Consumption

Power-Glo will go to work seconds after it is placed in your crankcase oil and is guaranteed to remove the sludge and carbon from piston rings - - in many cases eliminating oil consumption almost instantly.

### ☞ Keeps Engines Running Cooler

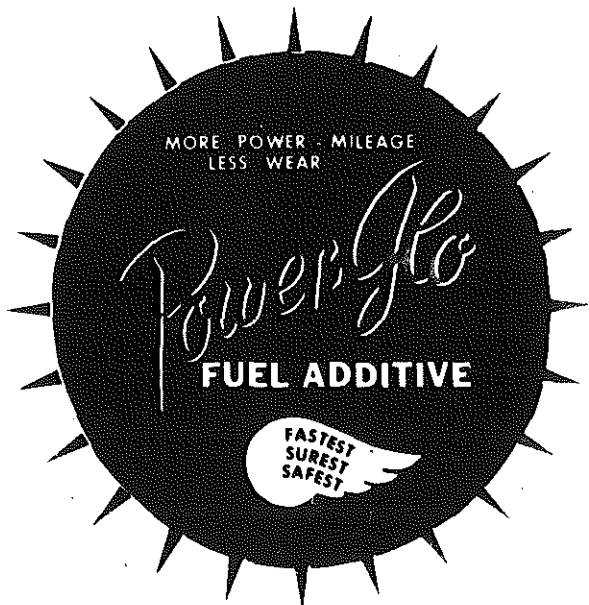
Power-Glo is such a tough super engine lubricant that it will actually allow an engine to perform and operate with NO FAN, NO WATER, NO COOLING SYSTEM whatsoever - - and still not injure the car engine in the least. (Positive proof of this test can be obtained upon request.)

### ☞ Reduces Heat, Friction and Wear

Power-Glo with its super engine lubricating qualities allows all combustion engines to function with such operating ease - - reducing costly engine repairs to a bare minimum.

Endorsed & Sold by VANGUARD BUSINESS ENTERPRISES - 12 Straight Ave., S.W. - Grand Rapids, Michigan - Phone GL 4-4574

Figure 1A. Company Literature Distributed with Power-Glo.



**THE AMAZING**

**IN THE MODERN TREND**

**CUTS ENGINE REPAIRS !!  
SAVES GAS AND OIL !!**

**BEST !! BY ACTUALITY TEST !!**

**FOR CARS - TRUCKS - TRACTORS - DIESELS  
AND ALL OTHER COMBUSTION ENGINES**

**\* MONEY BACK GUARANTEE \***

POWER-GLO is warranted to make the users actually  
FEEL THE IMPROVEMENT . . . in the performance of their  
car engine - regardless of its age and condition - or the  
purchase price will be cheerfully refunded.

**POWER-GLO MANUFACTURING CO.**

Howard City, Michigan



**AVAILABLE IN  
8 OZ. AND 32 OZ. BOTTLES  
1 AND 5 GALLON CANS  
30 AND 54 GALLON DRUMS**

**REMOVES CARBON,  
ACID AND LEAD DEPOSITS !!**

- Gives Positive Engine Lubrication
- Revives Engine Power and Efficiency
- Assures "Trigger-Quick" Startings
- Frees Sticking - Sluggish Valves
- Quiets Hydraulic Valve Lifter Noises
- Reduces Heat, Friction and Wear

ENDORSED AND SOLD BY

**VANGUARD BUSINESS ENTERPRISES -- 12 Straight Ave. S.W. -- Grand Rapids, Mich.**

Figure 1B. Company Literature Distributed with Power-Glo.



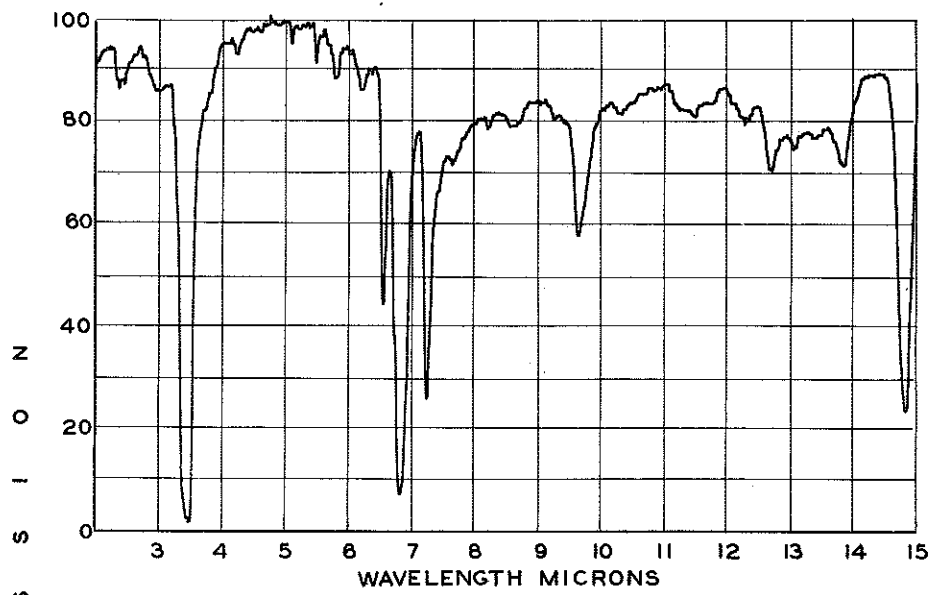


Figure 2A - Spectrum of Power-Glo in 0.03 mm, demountable rock salt cell.

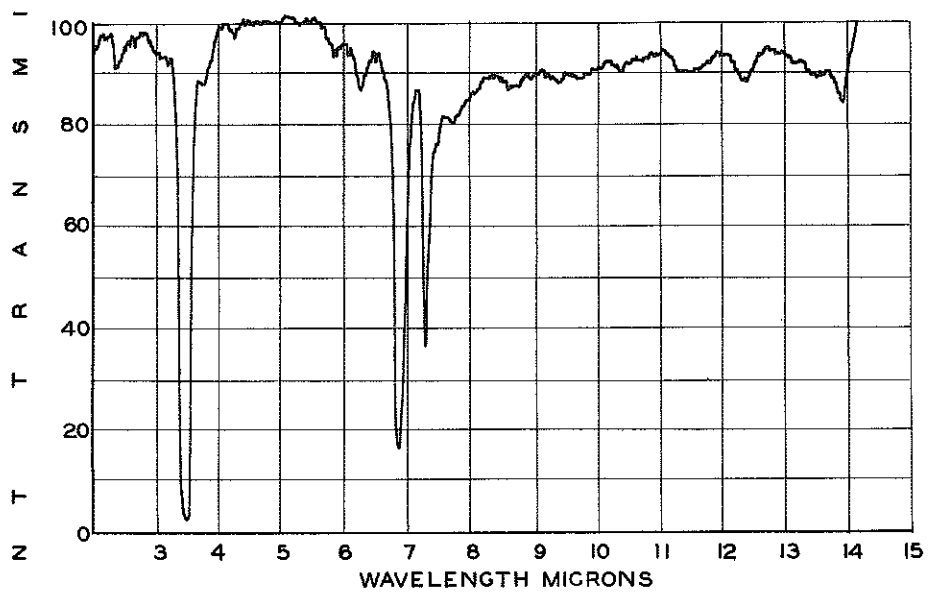


Figure 2B - Spectrum of Power-Glo Distillation Residue in 0.02 mm, demountable rock salt cell.

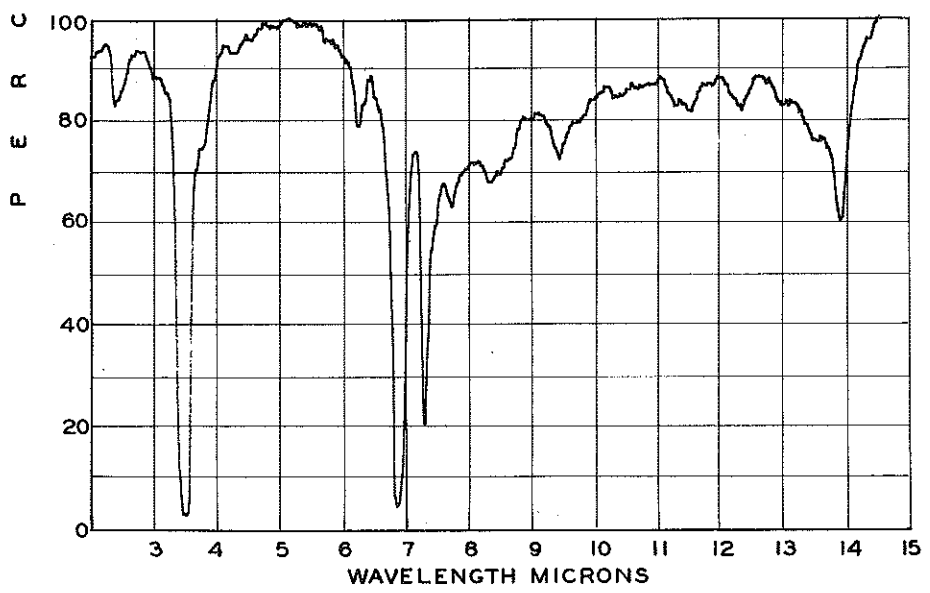


Figure 2C - Spectrum of Shell Oil Company SAE 20 Motor Oil in 0.02 mm, demountable rock salt cell.