

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-214
Relating to Exemptions Under Section 27156
of the Vehicle Code

UNIVERSAL DIESEL PRODUCTS, INC.
UNIVERSAL DIESEL LIQUEFIER
FOR INSTALLATION ON 1990 AND OLDER MODEL-YEAR
HEAVY-DUTY DIESEL-POWERED MOTOR 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 Section 39515 and Section 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the universal diesel liquefier, models U-8, U-15 and U-30, manufactured by Universal Diesel Products, Inc. have 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 1990 and older model-year heavy-duty diesel-powered motor vehicles with engine rating up to 600 H.P.

This exemption shall not apply to any device, apparatus, or mechanism advertised, offered for sale or sold with, or installed on, a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

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 system 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 system using an identification other than that shown in this Executive Order or marketing of this 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 a kit shall not be construed as 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 UNIVERSAL DIESEL LIQUEFIER.

No claims 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.

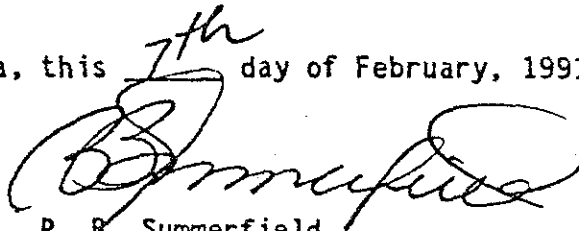
Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

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 violations 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 ^{7th} day of February, 1991.



R. B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF UNIVERSAL DIESEL PRODUCTS, INC.
UNIVERSAL DIESEL LIQUEFIER FOR EXEMPTION FROM THE PROHIBITIONS
OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222,
TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

February 1991

State of California
AIR RESOURCES BOARD

EVALUATION OF UNIVERSAL DIESEL PRODUCTS, INC.
UNIVERSAL DIESEL LIQUEFIER 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

Universal Diesel Products, Inc. (Universal) has applied for exemption of the Universal Diesel Liquefier, Models U-8, U-15 and U-30, for installation on 1990 and older model-year heavy-duty diesel-powered vehicles from the prohibitions in California Vehicle Code Section 27156.

Universal Diesel Liquefier is a heat exchanger which uses the engine coolant to heat up the fuel supply to the engine. This is to achieve easy engine start-up in cold weather. After an engineering evaluation of the device, the staff has concluded that the device will not adversely affect exhaust emissions from the vehicles for which the exemption is requested.

The staff recommends that Universal be granted an exemption for their Universal Diesel Liquefier for installation on 1990 and older model-year heavy-duty diesel-powered vehicles with engine rating up to 600 H.P., and that Executive Order D-214 be issued.

TABLE OF CONTENTS

	Page Number
SUMMARY	i
CONTENTS	ii
I. INTRODUCTION	1
II. CONCLUSION	1
III. RECOMMENDATIONS	1
IV. DEVICE DESCRIPTION AND OPERATION	2
V. DISCUSSION	2
VI. APPENDIX : INSTALLATION INSTRUCTIONS	6

EVALUATION OF UNIVERSAL DIESEL PRODUCTS, INC.
UNIVERSAL DIESEL LIQUEFIER FOR EXEMPTION FROM THE PROHIBITIONS
OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222,
TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Universal Diesel Products, Inc. (Universal) of 897 Stremel Road, Kelowna, B.C., Canada V1X 5E6, has requested for an exemption of the Universal Diesel Liquefier from the prohibitions in California Vehicle Code (VC) Section 27156. The exemption is requested for installation of the device on 1990 and older model-year heavy-duty diesel-powered vehicles under the following applications:

Up to 175 H.P.	Model U-8
Up to 425 H.P.	Model U-15
Up to 600 H.P.	Model U-30

II. CONCLUSIONS

Based on an engineering evaluation of the device, the staff concludes that the device will not adversely affect exhaust emissions from 1990 and older model-year heavy-duty diesel-powered vehicles.

III. RECOMMENDATIONS

The staff recommends that Universal be granted an exemption for their Universal Diesel Liquefier for installation on 1990 and older model-year heavy-duty diesel-powered vehicles. The staff also recommends that Executive Order D-214 be issued.

IV. DEVICE DESCRIPTION AND OPERATION

The Universal Diesel Liquefier is an annular type heat exchanger of about 18-inches long with a 5-inch outside diameter. A coil shaped tube, with fuel inlet and outlet positions at the opposite ends, is attached to the inner periphery of the cylinder (See Figure 1). The device is mounted on the engine frame, as close to the fuel pump as possible, using two mounting L-shaped brackets. Figure 2 shows typical flow diagram. In use, a steel-braided hose carries the engine coolant as the heating medium from the engine block to one end of the cylinder. A second hose carries fuel from the tank through the coiled fuel tube. Fuel is passed through the coil in counter flow to hot engine coolant passing through the annular chamber between the inner and outer walls. This allows the fuel to be heated up to 150 °F before it flows into the fuel atomizing device of the engine.

V. DISCUSSION

Cold ambient temperatures frequently cause problems in the operation of the internal combustion engines, especially diesel engines. Pre-heating the fuel for such an engine, either before carburation or injection, could help improve the engine operation. As with other fuel pre-heaters available in the market, the Universal Diesel Liquefier uses hot coolant to preheat the fuel. The manufacturer claims the device is distinct from other pre-heaters because diesel fuel is heated to its optimum temperature before it is injected into the combustion chamber. This results in reduced fuel consumption, exhaust emissions and jelling problems, longer crankcase oil life and smoother and quieter engine operation.

Staff did not conduct any test to confirm manufacturer's claims. The applicant submitted testimonials from Universal Diesel Liquefier customers stating improvements in engine performance and fuel economy. Test results were also submitted from American Services Associates, 18154 SE 41st Place, Issaquah, WA 98027, showing reductions in hydrocarbons, oxides of nitrogen, carbon monoxide and particulate emissions due to the use of the device on a Caterpillar 3208 diesel engine. The testimonials are very subjective and the test results were not conducted in accordance with the Federal Test Procedures. Thus, they were not used in the ARB's evaluation of the device.

The staff has evaluated the design and operation of the Universal Diesel Liquefier. Based on engineering principles, the staff has determined that the device when installed in series with the diesel engine fuel system will not adversely affect the performance of factory equipped emission control systems on 1990 and older model-year heavy-duty diesel-powered vehicles with engine rating up to 600 H.P.

UNIVERSAL DIESEL LIQUEFIER

READ CAREFULLY

INSTALLATION INSTRUCTIONS

- =====
1. CHECK engine operating temperature and make sure the thermostat is a minimum 190°.
 2. FIND a suitable location to mount the Liquefier unit. The unit should be mounted on the frame(Drivers Side) as close as possible to the Final Fuel Filter. This will assure the least amount of heat loss. A piece of angle iron may be used as a mounting bracket for the Liquefier. Many times there are holes in the frame or existing bolts that can be used to secure the angle iron. Another alternative is to fabricate two T brackets. The Liquefier may now be permanently mounted.
 3. LOCATE the HOT WATER SUPPLY HOSE that runs from the engine to the Cab Heater. Cut the hose and install a "Y". From the "Y" run a hose to the Hot Water Inlet on the Liquefier. Hot Water must enter the Liquefier on the end that is nearest the Final Fuel Filter.
 4. LOCATE the Cab Heater HOT WATER RETURN HOSE. Cut the hose and install a "Y". From the "Y" run a hose to the Water Outlet on the Liquefier.
 5. BLOW OUT the fuel line running through the Liquefier with compressed air.
 6. CONNECT the fuel line from the fuel tank to the fuel inlet on the Liquefier by using the Nut, Compression Sleeve and an Aeroquip Adapter.
 7. FABRICATE a fuel line to run from the Fuel Outlet on the Liquefier to the Final Fuel Filter. This line should run the shortest route possible. Connect the fuel line to the Liquefier by using the Nut, Compression Sleeve and an Aeroquip Adapter.
 8. SUPPORT fuel lines just before and after the Liquefier so as to reduce vibration.
 9. START the engine. Check all fuel and water connections for leakage.
- =====

PARTS LIST

In addition to the two(2) Water Elbows, Nuts and Compression Sleeves supplied with each Liquefier, you will require the following:

1. Heater Hose and Clamps
2. Two(2) "Y"'s
3. Angle Iron or Flat Iron for mounting bracket and bolts
4. Fuel Line Adapters by Aeroquip:

CATERPILLAR Part Numbers-#2027 8-6 or #2027 8-8 or #2027 10-8

CUMMINS Part Number-#2027 10-8

FUEL LINE ROUTING AND CONNECTIONS

CATERPILLAR ENGINES

DIAGRAM #1

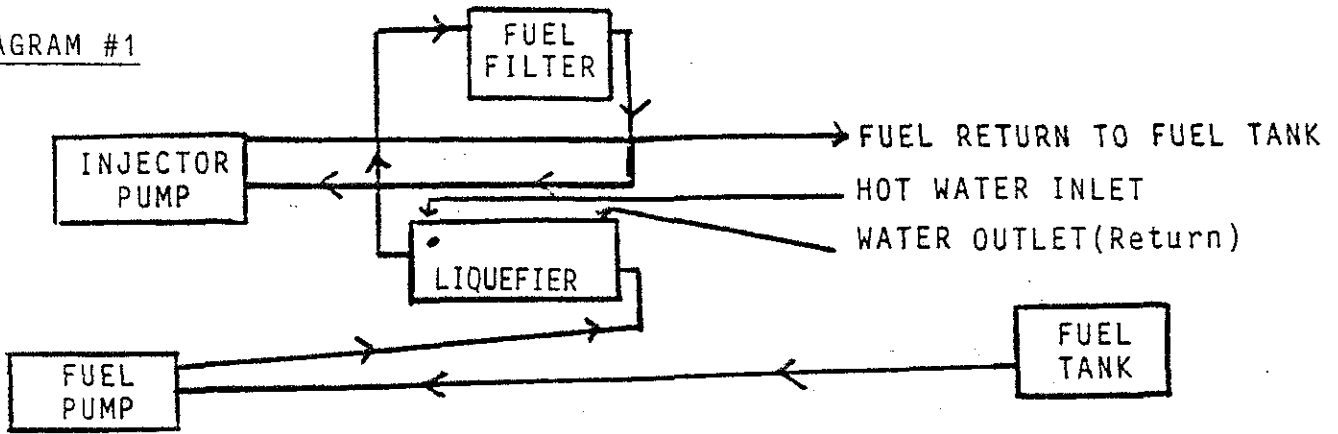
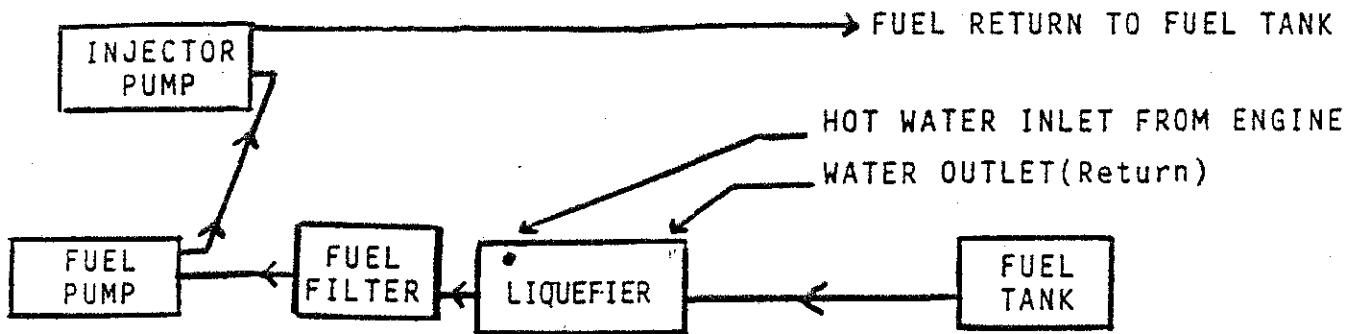
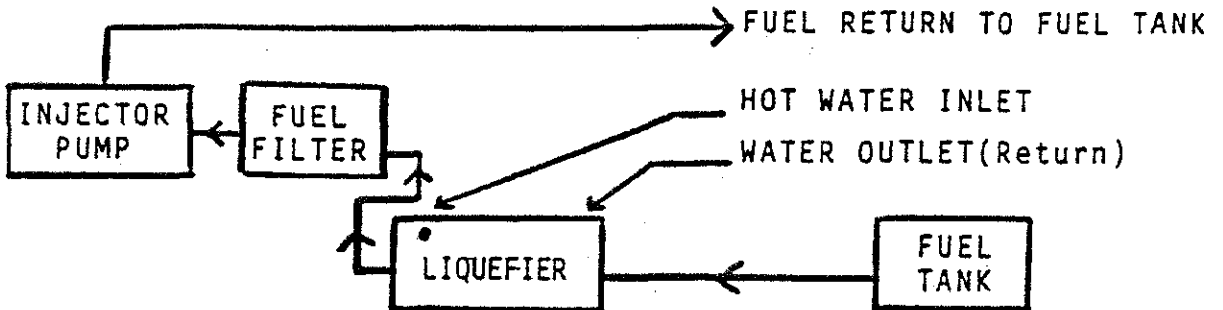


DIAGRAM #2

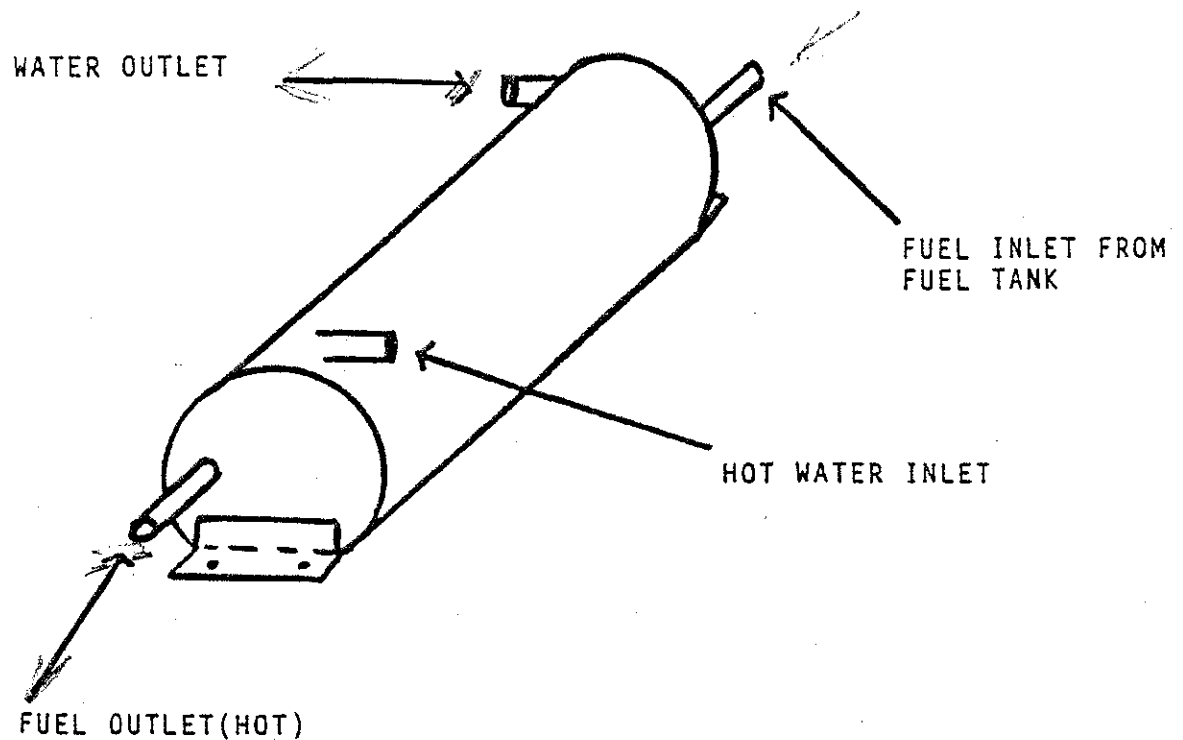


CUMMINS ENGINES



← = FUEL FLOW DIRECTION

UNIVERSAL DIESEL LIQUEFIER

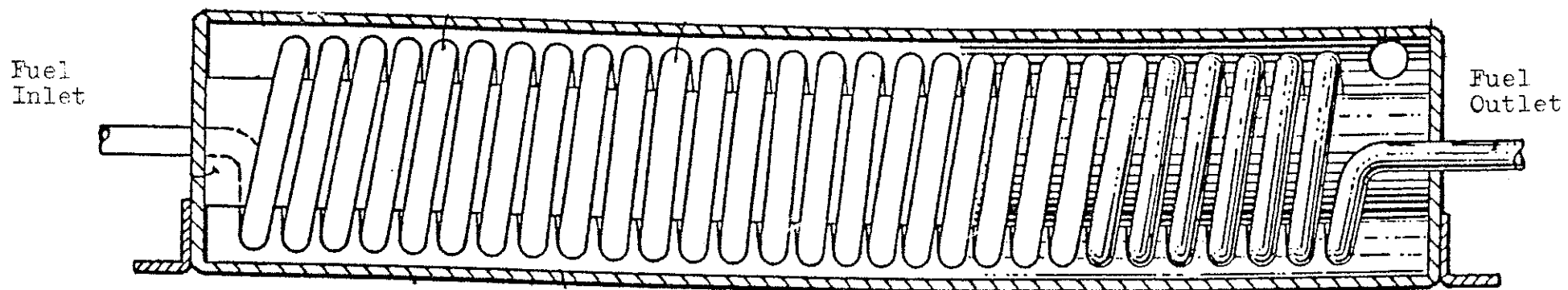


GENERAL INFORMATION

1. THE USE OF 90° ELBOWS IN FUEL LINES CAN CAUSE AN ENGINE TO LOSE POWER.
2. THERMOSTATS ONLY CONTROL THE MINIMUM OPERATING TEMPERATURE, NOT THE MAXIMUM.
3. ZERO LEAK (NON-VENTED) THERMOSTATS WILL MAINTAIN A MORE CONSTANT OPERATING TEMPERATURE. A WEIRSTAT ZERO LEAK THERMOSTAT HAS PROVEN TO BE VERY RELIABLE.
4. WHEN USING WINTER(#1) FUEL, CONSUMPTION CAN BE UP TO 10% MORE AND A POWER LOSS OF UP TO 10% CAN BE EXPERIENCED WITHOUT THE LIQUEFIER INSTALLED.
5. WHEN COMPARING MILEAGE(RECORDS) IN ORDER TO DETERMINE FUEL REDUCTIONS, BE SURE TO COMPARE THIS WINTER OR SUMMER TO LAST WINTER OR SUMMER.
6. A DIESEL ENGINE LEFT IDLING WILL CONSUME .5 TO .75 GALLONS PER HOUR.
7. THE UNIVERSAL DIESEL LIQUEFIER IS DESIGNED FOR YEAR-ROUND USE. DO NOT DISCONNECT THE UNIT DURING SUMMER MONTHS. SUMMER FUEL IS HEAVIER AND HARDER TO BURN.

Figure 1

Universal Diesel Liquefier

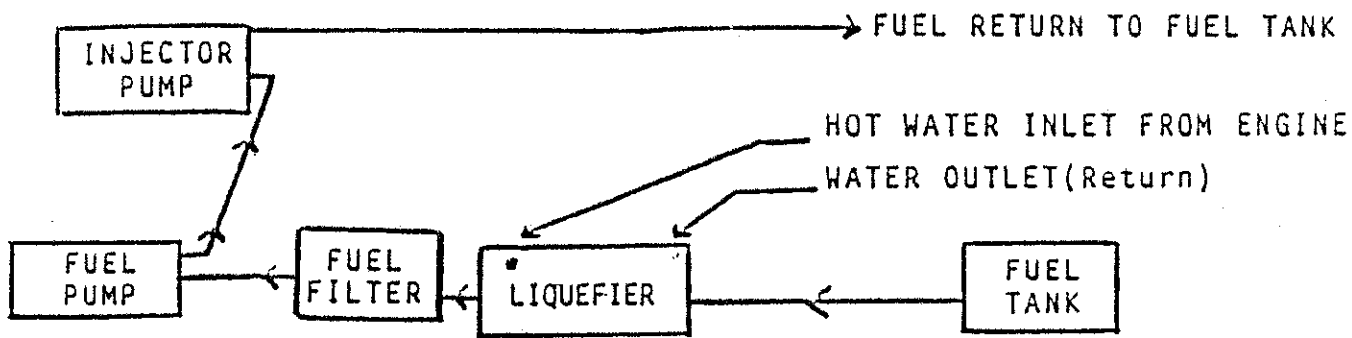
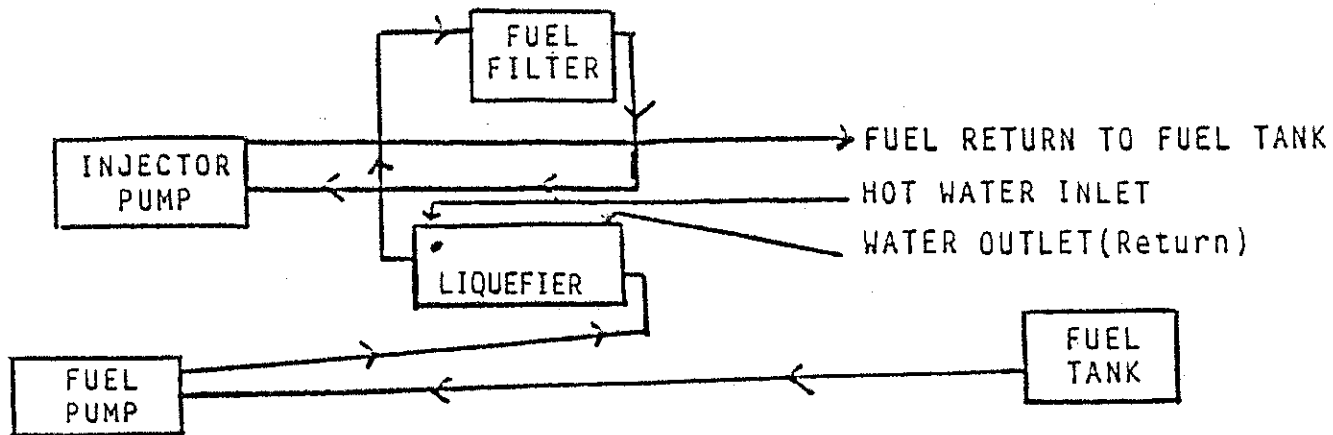


VI. APPENDIX : INSTALLATION INSTRUCTIONS

Figure 2

Fuel Line Routing and Connections

CATERPILLAR ENGINES



CUMMINS ENGINES

