



Dear Customer,

Thank you for selecting Hydra-Master Corporation as your equipment manufacturer. Only quality materials have been incorporated to ensure reliable performance and long life.

Another benefit you receive as a Hydra-Master owner will be to receive Product Support Bulletins and supplements to this manual. Our manual program is to keep you abreast of changes and/or modifications to your equipment.

Again, thank you and we shall continue to do all possible to ensure you remain a proud Hydra-Master owner.

A handwritten signature in cursive script that reads "Mike Palmer".

Mike Palmer  
President  
Hydra-Master Corp.

BOB CAT - HYDRA CAT - DUAL CAT MANUAL  
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# HYDRA-CAT OPERATION PROCEDURE

## START-UP

1. PERFORM DAILY/PERIODIC MAINTENANCE AS SPECIFIED BY THE SERVICE MANUAL.
  2. CONNECT ALL REQUIRED HOSES.  
**NOTE: IMPORTANT - PURGE ALL AIR FROM INCOMING GARDEN HOSE PRIOR TO HOOKING UP TO MACHINE.**
  3. CONNECT CLEANING TOOL TO LENGTH OF HOSE REQUIRED TO PERFORM CLEANING.
  4. START ENGINE AT LOW THROTTLE AND ALLOW INITIAL WARM-UP PERIOD OF TWO-FIVE MINUTES. (CHOKE AS REQUIRED).  
**NOTE: STEPS 5 THROUGH 9 SHOULD BE PERFORMED WITH CLEANING TOOL ON.**
  5. ENGAGE ELECTRIC CLUTCH ON HIGH PRESSURE PUMP.
  6. INCREASE ENGINE SPEED TO MAXIMUM FACTORY SETTING (2400-2500 RPM).
  7. OPEN CHEMICAL FLOW METER APPROXIMATELY 4 TO 5 TURNS COUNTER CLOCKWISE FROM THE CLOSED POSITION. WITH CLEANING TOOL TURNED ON, ADJUST INCOMING WATER REGULATOR AS REQUIRED TO ACHIEVE 9 GALLONS OF CHEMICAL FLOW PER HOUR. REDUCE CHEMICAL FLOW TO DESIRED SETTING (USUALLY 5 GALLONS/HOUR) BY CLOSING (CLOCKWISE) CHEMICAL FLOW METER VALVE.  
**NOTE: RECOMMENDED PRESSURE FOR CARPET CLEANING IS 300-400 P. S.I.**
- DUAL CAT CHEMICAL ADJUSTMENT — SEE INSTRUCTIONS BELOW.**
8. LIGHT PILOT LIGHT ON HEATER.  
**NOTE: IF YOU SUSPECT UNIT HAS FROZEN, DO NOT LIGHT HEATER AND REFER TO SERVICE BULLETIN NO. 112, OR CONTACT YOUR NEAREST HYDRA-MASTER REPRESENTATIVE.**
  9. TURN ON HEATER BURNER ASSEMBLY AND ADJUST TEMPERATURE TO DESIRED SETTING (130-200 F.).  
**NOTE: THE HEATER IS DEMAND OPERATED AND REQUIRES THE CLEANING TOOL TO BE TURNED ON TO STABILIZE TEMPERATURE SETTINGS.**
10. COMMENCE CLEANING OPERATION.

## SHUT-DOWN

1. RETURN TOOL AND HOSES TO TRUCK.
  2. DISCONNECT VACUUM HOSE FROM TOOL.
  3. LOCK HYDRA-HOE "ON".
  4. TURN OFF CHEMICAL FLOW.
  5. TURN HEATER TO OFF POSITION.  
**NOTE: WAIT UNTIL ALL CHEMICAL IS FLUSHED FROM UNIT.**
- FREEZE GUARDING - IF NECESSARY, DO IT PRIOR TO STEP 6.**
6. REDUCE ENGINE SPEED TO SLOW SETTING
  7. DISENGAGE ELECTRIC CLUTCH
  8. INJECT LPS LUBRICANT INTO BLOWER LUBE PORT FOR 7-8 SECONDS.
  9. TURN UNIT OFF
  10. STORE HOSES PROPERLY

## Water Damage — Vacuum Only

### START-UP

1. PERFORM ONLY STEPS 1, 2, 3, 4, 6, AND 10 AS DESCRIBED ABOVE

### SHUT-DOWN

1. PERFORM ONLY STEPS 3 AND 7 AS DESCRIBED ABOVE



## MANUFACTURER'S LIMITED WARRANTY

Hydra-Master Corporation extends to the original purchaser of goods for use, the following Warranty covering goods manufactured or supplied by Hydra-Master, subject to the qualifications indicated.

**THERE IS NO OTHER EXPRESSED WARRANTY  
IN NO EVENT IS HYDRA-MASTER LIABLE  
FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

- Hydra-Master Corporation warrants to original purchaser for the periods set forth herein that goods manufactured or supplied by it will be free from defects in workmanship and material, provided such goods are installed, operated and maintained in accordance with Hydra-Master's written instructions and that such installations are performed or inspected by Hydra-Master's Authorized Representatives.

### PRODUCT OR SYSTEM

#### CLEANING UNIT

Engine  
Vacuum/Blower  
High Pressure Pump  
Heater System  
Frame  
Instruments & Instrument Panel  
Hoses (Internal)  
Cleaning Tools  
Hose Reel(s)  
Tanks  
Fuel  
Vacuum

Internal Controls & Valves  
All Fittings (Internal)  
Main Power Coupler (Eng. to Vacuum)  
  
One Year or/1000  
hours from date  
of purchase.  
  
Warranty expires  
upon attaining  
either of the above

#### HOSES AND FITTINGS (EXTERNAL)

High Pressure Hose  
Vacuum Hose  
Quick Connectors or  
Solution Couplers  
Pulley Belts  
Garden Hose  
  
Three Months (90 Days)  
from date of purchase.

**NOTE:** The Ninety day limitation on Warranty regarding hoses and quick connect fittings equals or exceeds warranties extended by respective manufacturers/suppliers.

- Hydra-Master's sole liability and purchaser's sole remedy for a failure of goods under this Warranty and for any and all other claims arising out of the purchase and use of the goods, including negligence on the part of the manufacturer, shall be limited to the repair of the product by the repair or replacement, at Hydra-Master's option, of parts that do not conform to this Warranty. Product or part(s) must be returned to Hydra-Master Corporation, 20309 - 64th Ave. W., Lynnwood, Washington 98036, transportation charges prepaid.
- WARRANTY DOES NOT INCLUDE:** reimbursement for labor, travel time, mileage or work loss incurred in the removal, reinstallation or replacement of parts and/or equipment approved under the provisions of this Warranty.
- THIS WARRANTY SHALL NOT APPLY TO:**
  - Cost of maintenance, adjustments, installation and start-up.
  - Failures due to normal wear, accident, misuse, abuse, negligence or improper installation.
  - Products which are altered or modified in manner not authorized by Hydra-Master Corporation in writing.
  - Failure of goods caused by defects in the system or application in which the product is installed, i.e. truck, van, building, etc.
  - Telephone, telegraph, teletype or other communications expense.
  - Living and travel expenses of persons performing service excepting those authorized by Hydra-Master under prior contract.
  - Rental equipment used while Warranty repairs are being performed.
  - Overtime labor requested by purchaser.
    - Parts, sub-assemblies, assemblies or major components affected directly or indirectly by freezing.

**IMPORTANT:** Freeze Guard Systems incorporated within units either as standard equipment or as options are convenience items only. Hydra-Master assumes no responsibility for their failure, power failures affecting their performance or any resulting damage.

Items susceptible to damage by freezing are as follows:

- |  |  |
|--|--|
| a. Pressure & Solution Gauges          | g. Solution quick connect fittings (couplers)          |
| b. Flow Meters                         | h. Relief valves or high pressure by-pass valves       |
| c. High Pressure Pumps                 | i. Cleaning tools and their respective controls/valves |
| d. Heater or heat exchanger components | j. Regulators and solenoids                            |
| e. Hoses                               | k. Solution & pressure switches                        |
| f. Fittings (steel, brass and plastic) | l. Pump clutches damaged by frozen pumps               |

- No person is authorized to extend any other warranties or to assume any other liability on Hydra-Master's behalf unless made or assumed in writing by an officer of Hydra-Master Corporation and no person is authorized to give any warranties or assume any other liabilities on behalf of seller unless made or assumed in writing by seller.

Claim No. \_\_\_\_\_

WARRANTY CLAIM

DATE CLAIM FILED \_\_\_\_\_

Customer Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Equipment Model \_\_\_\_\_ Serial No. \_\_\_\_\_

Purchased From \_\_\_\_\_ Date Purchased \_\_\_\_\_

No. of Hours Used \_\_\_\_\_ Defective Part \_\_\_\_\_

Briefly Describe Defect \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Signature \_\_\_\_\_

\*\*\*\*\*

Factory Use Only

Date Part Received \_\_\_\_\_ Inspected By \_\_\_\_\_

Describe Findings: \_\_\_\_\_

\_\_\_\_\_

Action Taken: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Amount of Claim \$ \_\_\_\_\_

## GENERAL INFORMATION

This manual contains installation and operation instructions as well as information required for proper maintenance, adjustment and repair of this unit. Since the first and most important part of repair work is the correct diagnosis of the trouble, a general troubleshooting section and component manual troubleshooting charts have been included for your convenience.

Unlike the garden tractor, lawnmower and cement mixer all having one and maybe two functions to perform, the Hydra-Master truck mounted carpet cleaning plant has many functions to perform simultaneously.

1. Engine has to run consistant RPM.
2. Vacuum has to pull air and dirty water back from cleaning site.
3. Water pump provides stable pressure at proper water flow for cleaning.
4. Chemical has to be injected into the water stream at the right consistency.
5. Heater must fire on demand and maintain proper heat. (Except for Aqua Cat).
6. Vacuum tank must store dirty water until drained.

As you can see, it is not just a turn key operation with only one thing to worry about, DOES IT START?!

As there is no guesswork in the manufacture of these highly advanced cleaning plants, there must be none in preparing it to get the job done in the field. It is the purpose of this manual to help you properly understand, maintain and service your Hydra-Master cleaning plant. Follow the directions carefully and you will be rewarded with years of profitable trouble-free operation.

It is imperative that no section be overlooked when preparing for operation of this equipment.

**WARNING**

Hydra-Master uses this symbol throughout the manual to warn of possible injury or death.

**CAUTION**

This symbol is used to warn of possible equipment damage.

MAINTAIN GOOD PROFIT - WITH GOOD MAINTENANCE

In the past 3 years, we at Hydra-Master have become alarmed at the increasing number of calls pertaining to service problems.

Our findings are that 85% of all down time is a direct result of poor maintenance habits. If maintenance is a difficult function to schedule into your busy operation, here is one important parallel that may influence your thinking toward maintenance procedure:

Each hour of machine operation is equal to 75 miles of driving.

A 5½ hour average day equals 310 miles.

An average 5 day week or 27½ hours = 2062.5 miles.

Each month an average of 8660 miles is put on the machine.

One year of average machine operation is equal to 103,920 miles.

Compare this to your car and the maintenance you would give it for this many miles of trouble-free driving!

Enclosed is a maintenance log sheet that should be attached to the machine and kept in force by a responsible operator.

GOOD PROFITS AND GOOD MAINTENANCE GO HAND IN HAND

HYDRA-MASTER WANTS YOU TO BE A TROUBLE-FREE DRIVER!



HYDRA-MASTER CORPORATION

MAINTENANCE LOG		DATE	DATE	DATE	DATE	DATE	DATE	DATE
SERVICE ITEMS	MAX HRS.	HOURS	HOURS	HOURS	HOURS	HOURS	HOURS	HOURS
Lubricate Blower - AFTER EACH JOB								
Inspect Machine Generally	8							
Check Engine Oil	8							
Check Pump Oil	8							
Clean Vac Holding Tank, Nylon Filter Bag & S/S Filter W/Brush	8							
* Change Eng. Oil (Summer SAE 30)								
** Winter SAE 20) 3 Qts. W/O Oil Filter, 3½ Qts. W/O Filter	30							
* Disassemble H/P Bypass Valve & Lube Stem Assy. (Ref. Drawing)	100							
Remove Machine from Truck for Complete Inspection of:								
Battery Electrolytes	100							
Belts and Pulleys	100							
Fuel Lines	100							
Nuts and Bolts	100							
Heater Cover (Except Aqua-Cat)	100							
Heater Burner Assy. (Ex. Aqua-Cat)	100							
Service Air Cleaner	100							
Clean Vacuum Tank (free float hinge of lint & lube)	100							
Spray Quick Connectors (all) With WD 40	100							
Lightly Oil Direct Drive Shafts	100							
Check for Chafing Wires	100							
Tighten Exhaust Manifold Clamps	100							
Tighten Dodge Coupler (direct drive) (DO NOT OVER-TORQUE)	100							
Replace Engine Oil Filter	200							
Replace Spark Plugs (LP gas gap .018/gas agp .025)	200							
* Change Blower Oil (40 wt. non-detergent)	200							
Replace Points & Condenser (gap .020)	300							
* Grease Blower Fittings	300							
* Change Pump Oil (Cat oil)	300							
Lube Throttle Lever	300							
Heater Slide & Button Assembly	300							
Check Engine Valve Clearance & Decarbon Heads	400							
Replace Pump Short Cup Kit	1000							
Inspect Valves (grind if nec.)	1000							

- \* Engine Oil - Summer 30 SAE
- \* Blower Oil - 40 SAE Non-Detergent
- \* Pump Oil - Special Cat Oil

Recommended Fuel - Unleaded Gasoline

\*\* Engine Crankcase Breather Cleaning ! - Refer to Onan Service Manual.

TRUCK PREPARATION

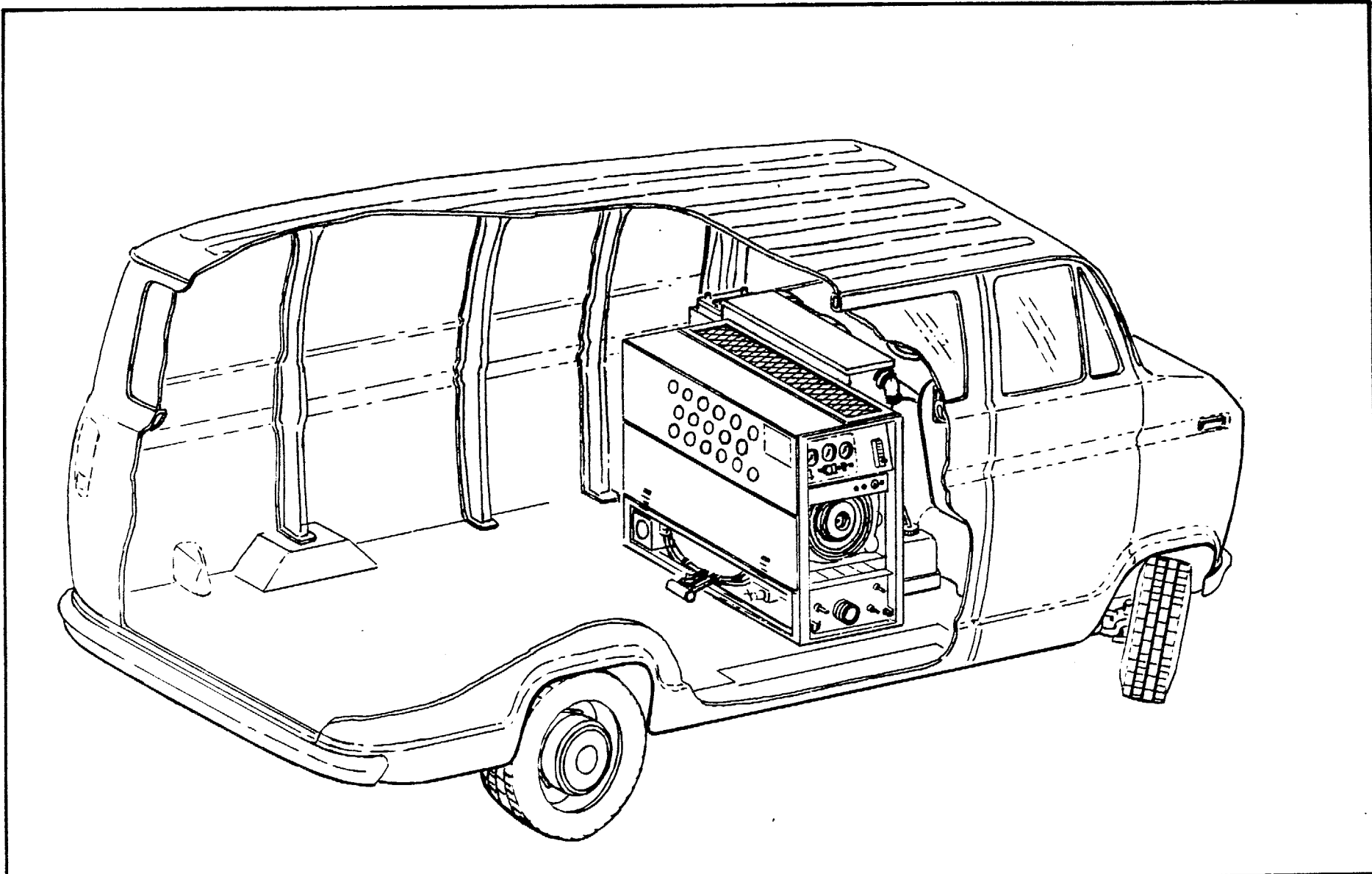
- Truck Prep.: Materials needed:
1. 6' x 12' Ozite indoor/outdoor carpet
  2. 4x8x5/8" Plywood (1 side good)
  3. 6 - 1½" sheet metal screws
  4. 1 - 1"x1"x18" angle iron
  5. 3 - 2"x5/16" bolts
  6. 3 - 5/16" flat washers
  7. 3 - 5/16" lock washers
  8. 3 - 5/16" nuts
  9. 1 can marine adhesive
  10. 1 staple hammer or glue gun
  11. 1 gas hook-up (thru floor mount)

Decide location of machine in Van.

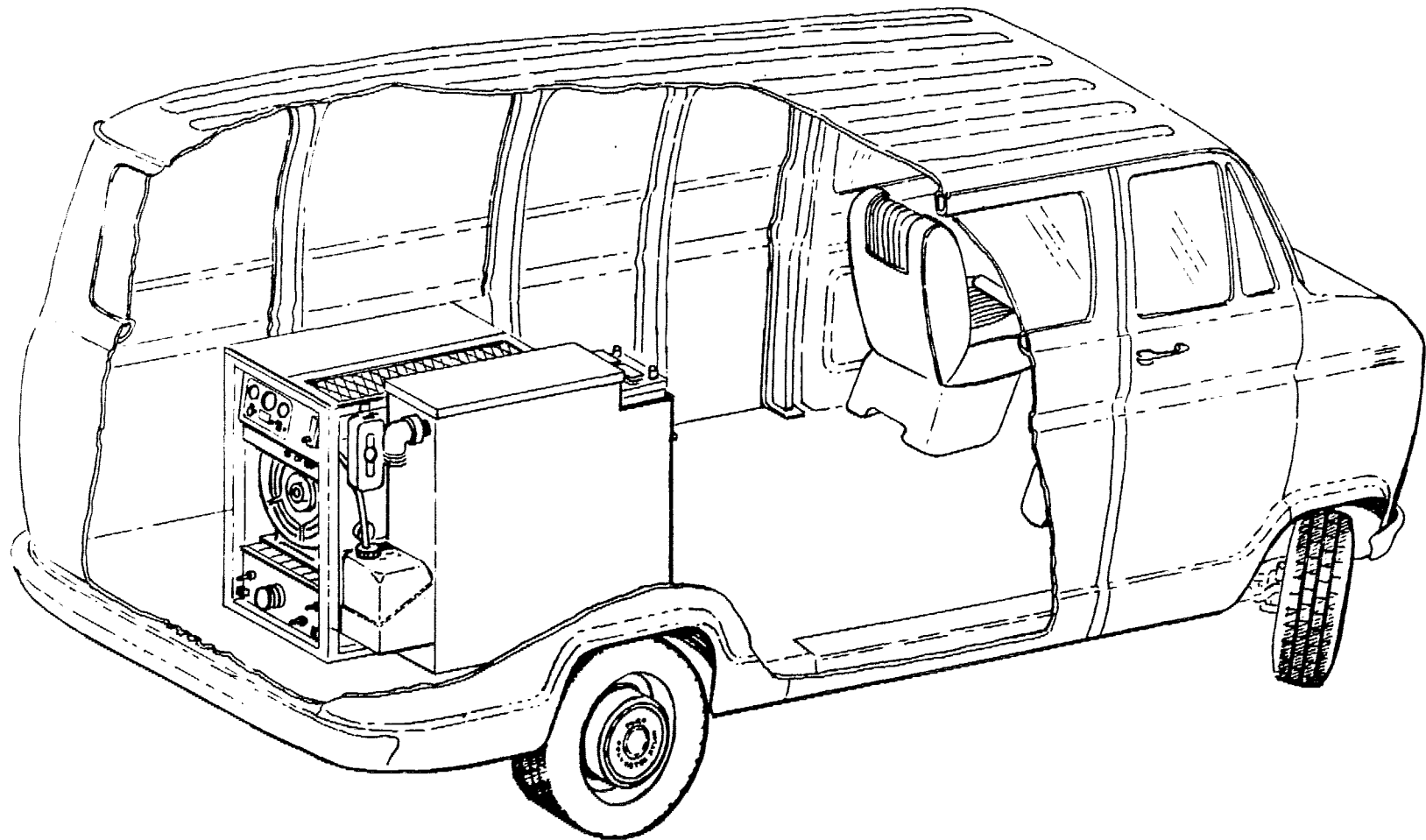
- A. Side door: Most installations are side door. This provides rear access for accessories and hoses as well as unobstructed access to component/working side of machine, thus making it a bit easier to perform maintenance and/or repair without removing unit from the truck.
- B. Rear door: Although this location partly limits working access, it does direct the noise away from the cleaning site. Some cleaners in the colder areas prefer this location because it puts the weight mass over the rear wheels for better traction in ice and snow. Rear mounting requires the unit to be slid to the right side as far as possible. This not only provides adequate working space on the component side of the unit but also makes better weight distribution inside the Van (engine and component wt. line up over drive shaft). Also, it is physically easier to load unit into rear door due to height of Van bed. When carrying water, tank will then be located over center of Van.

**WARNING**

Ensure that machine is well secured to the floor of Van with hardware supplied. Sudden or crash stop will cause machine to rocket forward, all 550 lbs. worth! Protect your driver and machine. SECURE IT!



<b>UNIT LOCATION I</b>				
DRWG NO	SCALE	DRWN BY	APPRVD	DATE
HM-124	0	O.GRANT, JR		4-4-79
© 1978 HYDRA MASTER CORPORATION				



## UNIT LOCATION II

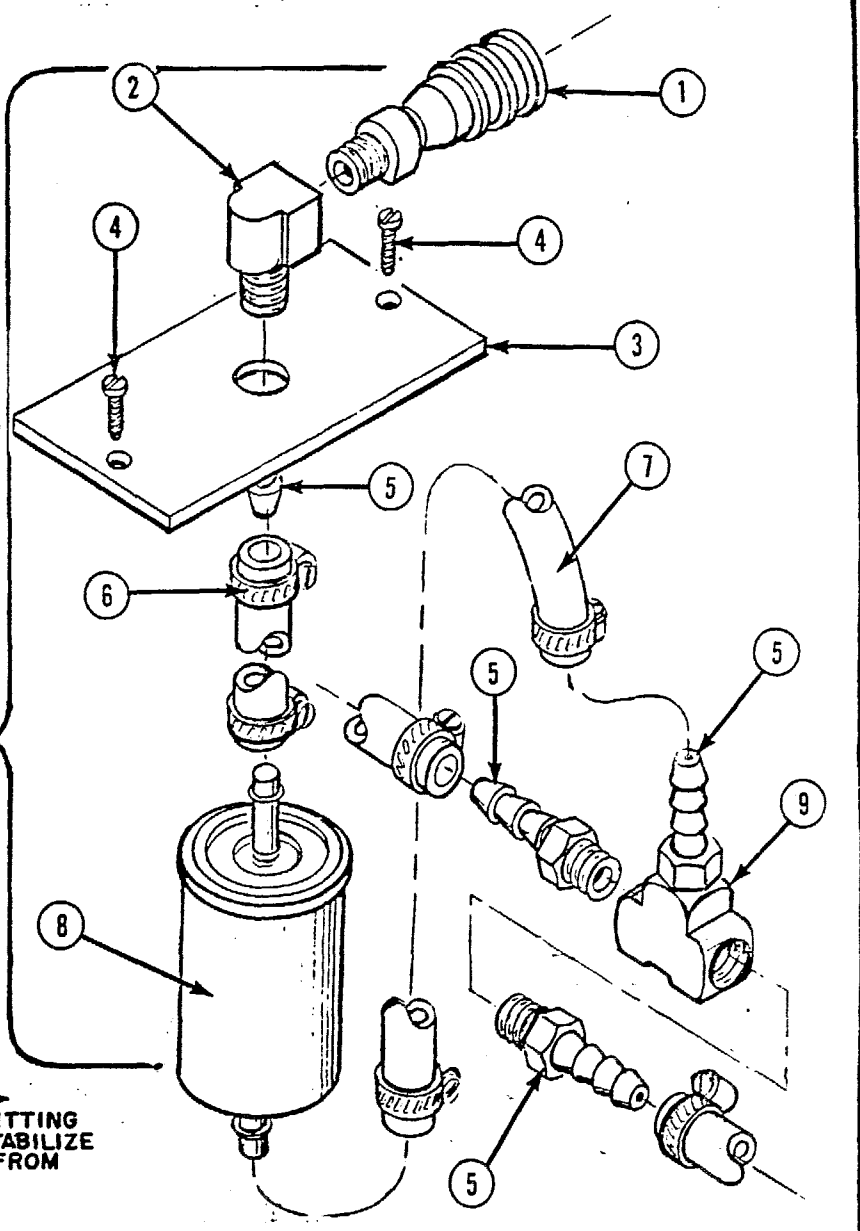
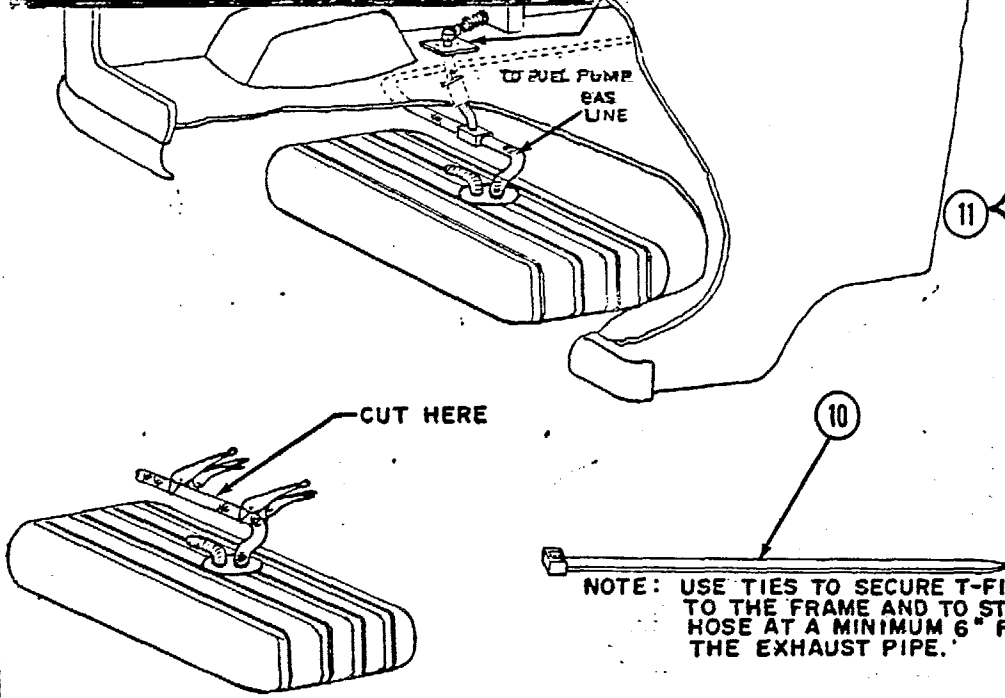
DRWG NO	SCALE	DRWN BY	APPRVD	DATE
HM-125	0	O.GRANT,JR.		4-3-79

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PART NO.	PART DESCRIPTION	QTY USED
1 611001	QUICK CONNECT SOCKET	1
2 612090	FITTING (1/8 BRS.STR. ELBOW)	1
3 625701	PLATE	1
4 619121	SCREW	2
5 613025	HOSE BARB	4
6 620104	HOSE CLAMP	6
7 637105	HOSE (CUT TO LENGTH)	4
8 625300	FUEL FILTER	1
9 612120	FITTING	1
10 620305	TIE WRAP	6
11 625700	THRU-FLR GAS HOOK-UP (1-10)	1

NOTE: DRILL <sup>9</sup> 16" HOLE THROUGH THE TRUCK FLOOR TO RECEIVE FITTING AT THE LOCATION SHOWN.

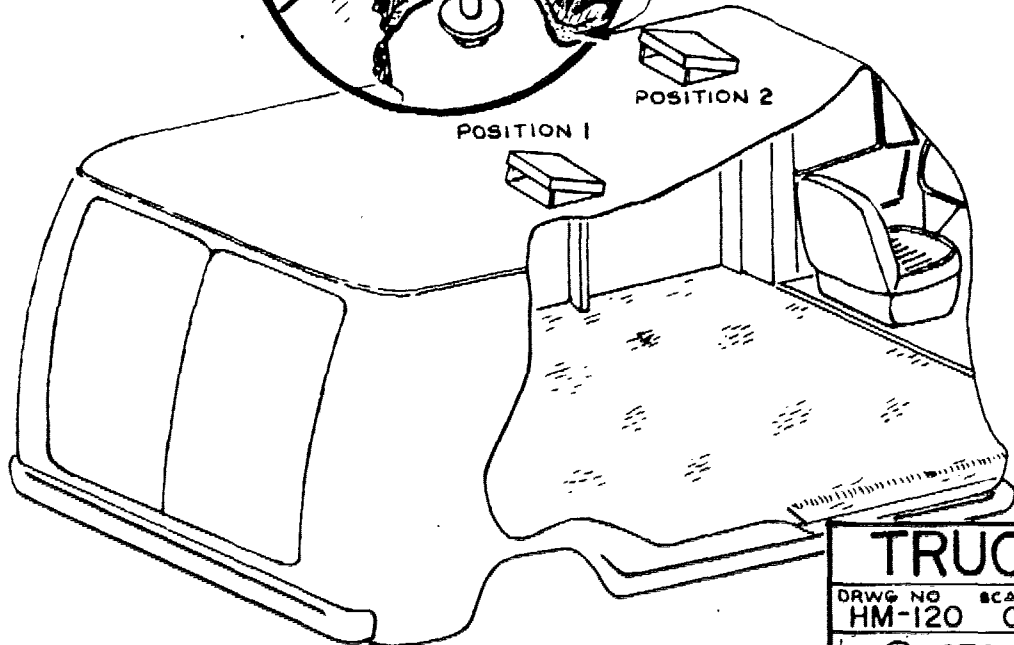
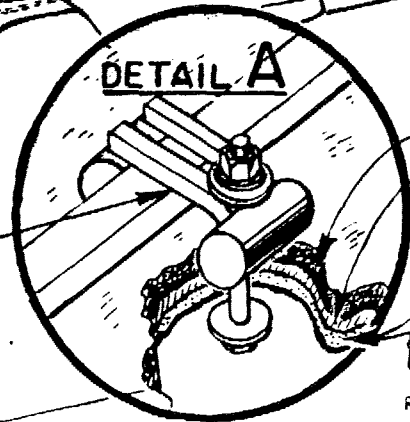
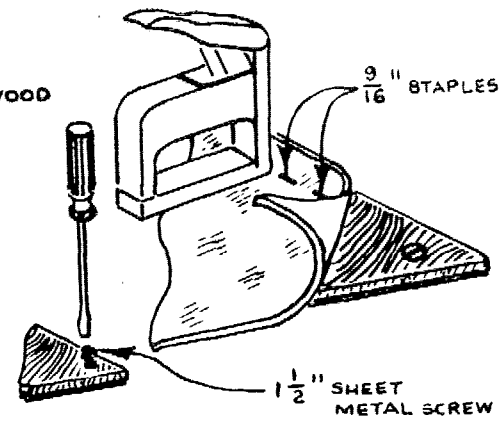
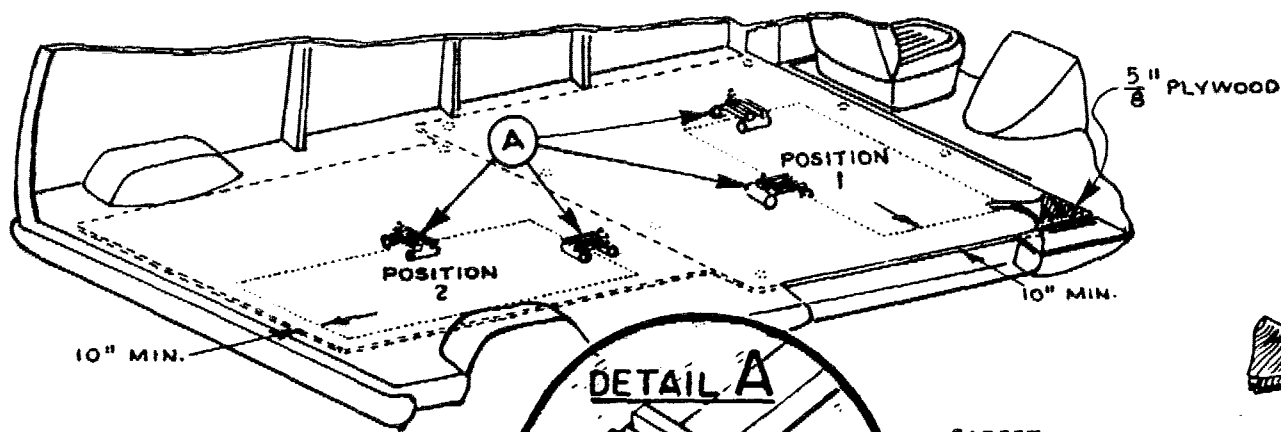
NOTE: USE TIES TO SECURE T-FITTING TO THE FRAME AND TO STABILIZE HOSE AT A MINIMUM 6" FROM THE EXHAUST PIPE.



**THRU-FLOOR GAS HOOK-UP**

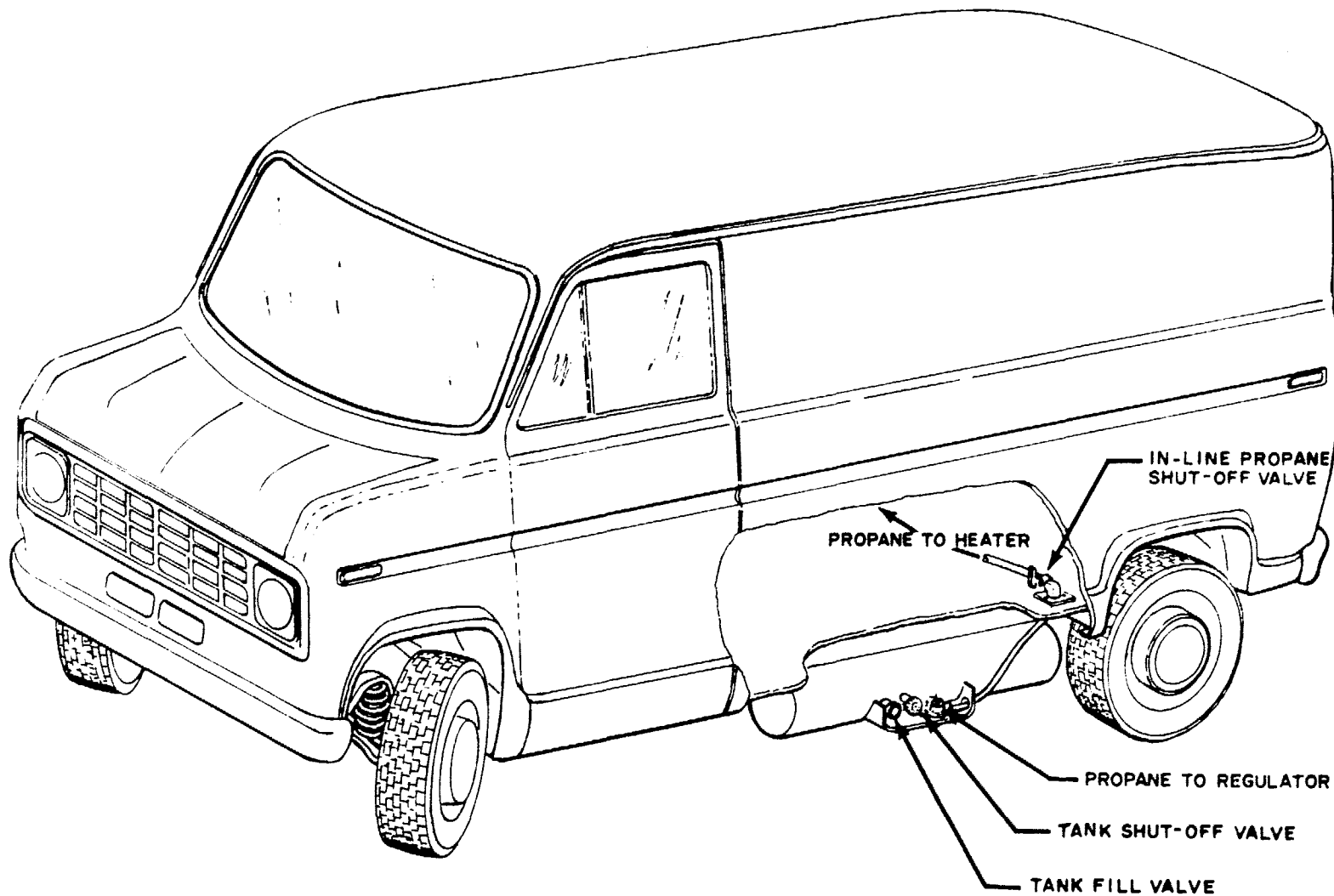
DRAWING NO HM-121  
 DRAWN BY O. GRANT, JR.  
 DATE /REV. 1-6-8

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- Note:
1. A non-rubber backed indoor-outdoor type carpet is stapled in place after the plywood has been attached to the bed of the van.
  2. To prevent the machine from sliding TieDown Cleats must be positioned over the frame. (Shown in DETAIL A)
  3. A vent placed in the van roof directly over the heater is recommended.

<b>TRUCK PREPARATION</b>				
DRWG NO	SCALE	DRWN BY	APPRVD	DATE
HM-120	0	OGRANT,JR		4-4-79
© 1978 HYDRA MASTER CORPORATION				



**HYDRA  
MASTER**



## PROPANE TANK LOCATION

DRAWING NO HM - 117

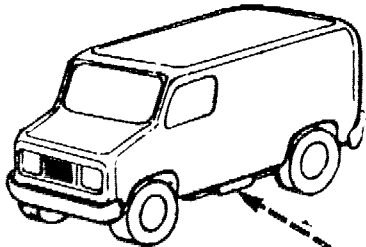
DRAWN BY O. GRANT, JR.

DATE 6 - 5 - 79

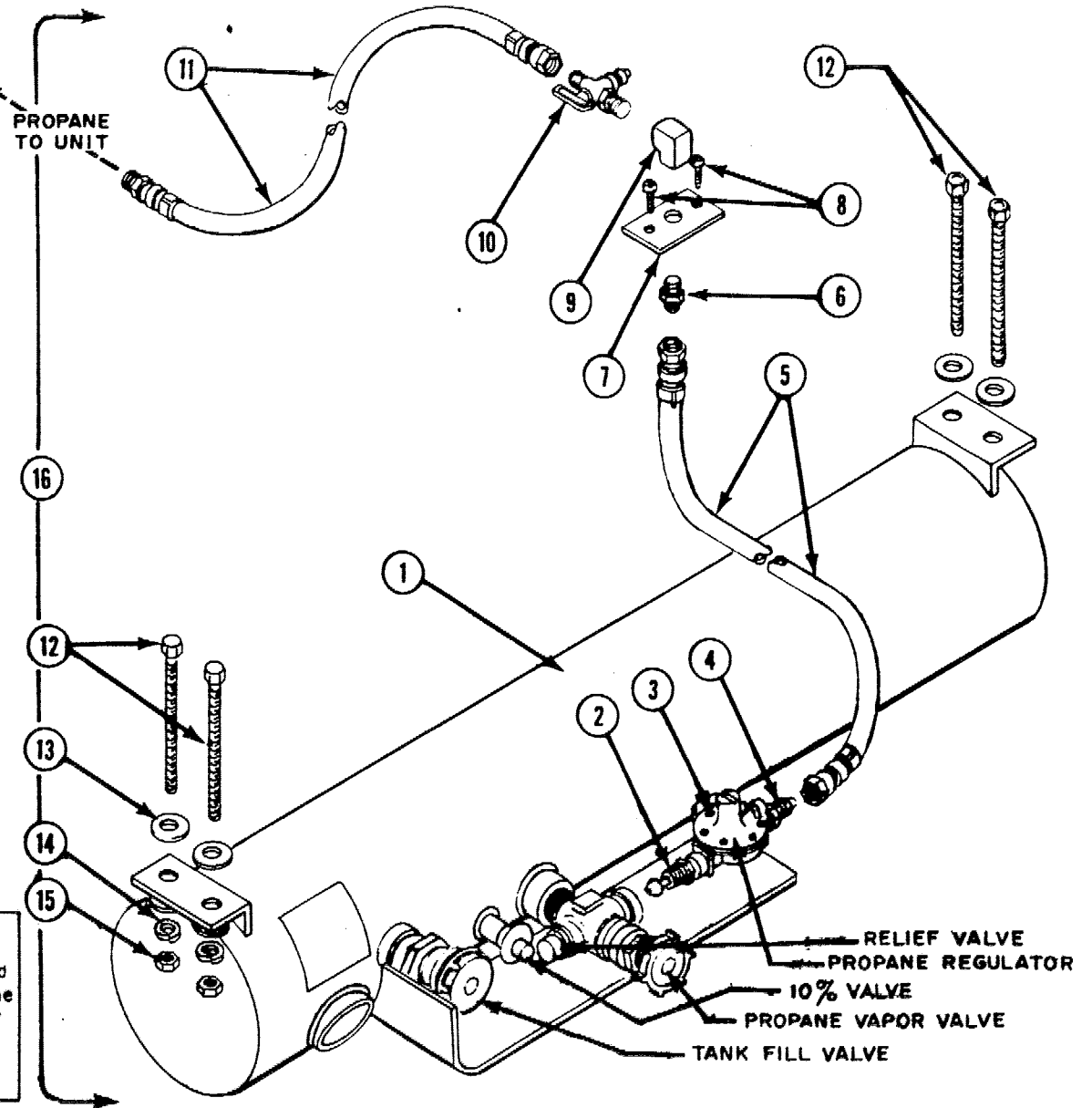
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REF NO	PART NO	PART DESCRIPTION	QTY USED
1		PROPANE TANK	1
	A627021	A. 10 Gal.	
	B627022	B. 16.5 Gal.	
	C627023	C. 23 Gal.	
2.	614002	SPUDNUT	1
3.	627000	PROPANE REGULATOR	1
4.	614006	PROPANE FITTING	1
5.	637300	PROPANE HOSE	1
6.	614006	PROPANE FITTING	1
7.	627005	PLATE (THRU FLOOR)	1
8.	619121	SCREW	2
9.	610211	PROPANE FITTING	1
10.	614009	PROPANE SHUT-OFF VALVE	1
11.	637301	PROPANE HOSE	1
12.	618620	CARRIAGE BOLT	4
13.	616030	FLAT WASHER	8
14.	616231	LOCK WASHER	4
15.	617600	NUT	4
16.	627004	PROPANE THRU-FLOOR HOOK-UP (Incl. parts 2-11)	1



PROPANE TANK should be mounted on the side of the truck to ALLOW ACCESS to ALL the VALVES.



# PROPANE TANK PLUMBING

DRAWING NO	HM-116	PAGE
DRAWN BY	O. GRANT, JR.	31
DATE	6-13-79	
APPD		



## HYDRA/DUAL CAT SPECIFICATIONS

### GENERAL

Warranty	* One Year or 1000 Hours
Dimensions	* 48" L X 32" W X 34" H
Weight	* 550 Lbs.

### COMPONENTS

A. Engine	* 20 Horsepower Onan Industrial Air-cooled
RPM	* 2600 Factory Recommended
Fuel	* Unleaded
Oil Capacity	* 3½ Quarts W/Filter
B. Vacuum/Blower	* Positive Displacement (Lobe Type)
RPM	* 2600 Factory Recommended
Water Lift & Air Flow	* 195-210 inches Pre-set 275 CFM
Oil	* 40 S.A.E.
Grease	* High Temperature Bearing
C. Water Pump	* Positive Displacement Piston W/Stainless Cylinders
Oil	* Special Cat Oil Lubricant
Pressure	* Hydra Cat - 300 PSI Factory Pre-set adjustment Dual Cat - 300 PSI Factory Pre-set adjustment
Pulley Belt	* 5L380
R.P.M.	* 900
D. Propane Heater	* 120,000 BTU Temperature Fired
Heat Setting	* 140 - 250 Max.

E. Frame Construction

Legs

Recovery Tank

\* Steel

\* Retractable W/Castered Wheels

\* Anodized Aluminum

F. Hoses

Internal

\* Teflon W/Steel Reinforced Sheath

External Solution

\* High Pressure - Non-Marking  
2500 P.S.I. Rated

External Vacuum

\* Heavy Duty Flexible and Non-Marking

G. Tools

Hydra Hoe Carpet Wand

\* Stainless Steel W/Adjustable Handle and High Pressure Valve  
Jet Size 8008E - Hydra Cat  
8006E - Dual Cat

\* Replaceable Lips

Stair Sprayer

\* Hand Held W/Single Jet  
( Same as Carpet Tool )

Stair Vacuum

\* Cast Aluminum  
\* 12 VDC - VW Type

H. Battery

\* Enclosed Frame

I. Safety Features

\* Automatic Vacuum Tank Limit Switch

\* Incoming Water Pressure Switch  
W/Auto Shut Down Capability -  
Electric Clutch

J. Instrumentation

Pressure Gauge

\* 1-1000 PSI Glycerine Filled

Temperature Gauge

\* 100-280 Degrees

Vacuum Gauge

\* 0-30 HG

Hour Meter

\* Total Lapse Time in Hours  
and Tenths

Chemical Flow Meter

\* 0-10 Gallons/Hour

Choke

\* Mechanical

Service Computer

\* Electronic

K. Options and Auxiliary Systems

\* Pump-in System W/Aux. Pump  
and Holding Tank For Trans-  
porting Water Supply

SPECIFICATIONS HYDRA/DUAL CAT

DASH PANEL - STAINLESS STEEL

HIGH PRESSURE GAUGE	0-1000 PSI GLYCERINE FILLED
TEMPERATURE GAUGE	100-280 DEGREES
VACUUM GAUGE	0-30 HG
HOUR METER	HOURS AND TENTHS OF HOURS
CHEMICAL FLOW METER	0-10 GPH
MASTER POWER FUSE	30 AMP
CHARGING FUSE	15 AMP
FREEZE GUARD FUSE	15 AMP
VISUAL ON INDICATOR	AUTO TYPE BULB
AUX. PUMP INDICATOR	AUTO TYPE BULB
SERVICE REQUIRED LIGHT	AUTO TYPE BULB
CHOKE	PULL TYPE
AUX. PUMP	ELECTRICAL SWITCH



## X-81 OR HYDRA STRETCH

### OPERATIONAL PROCEDURES

#### START-UP

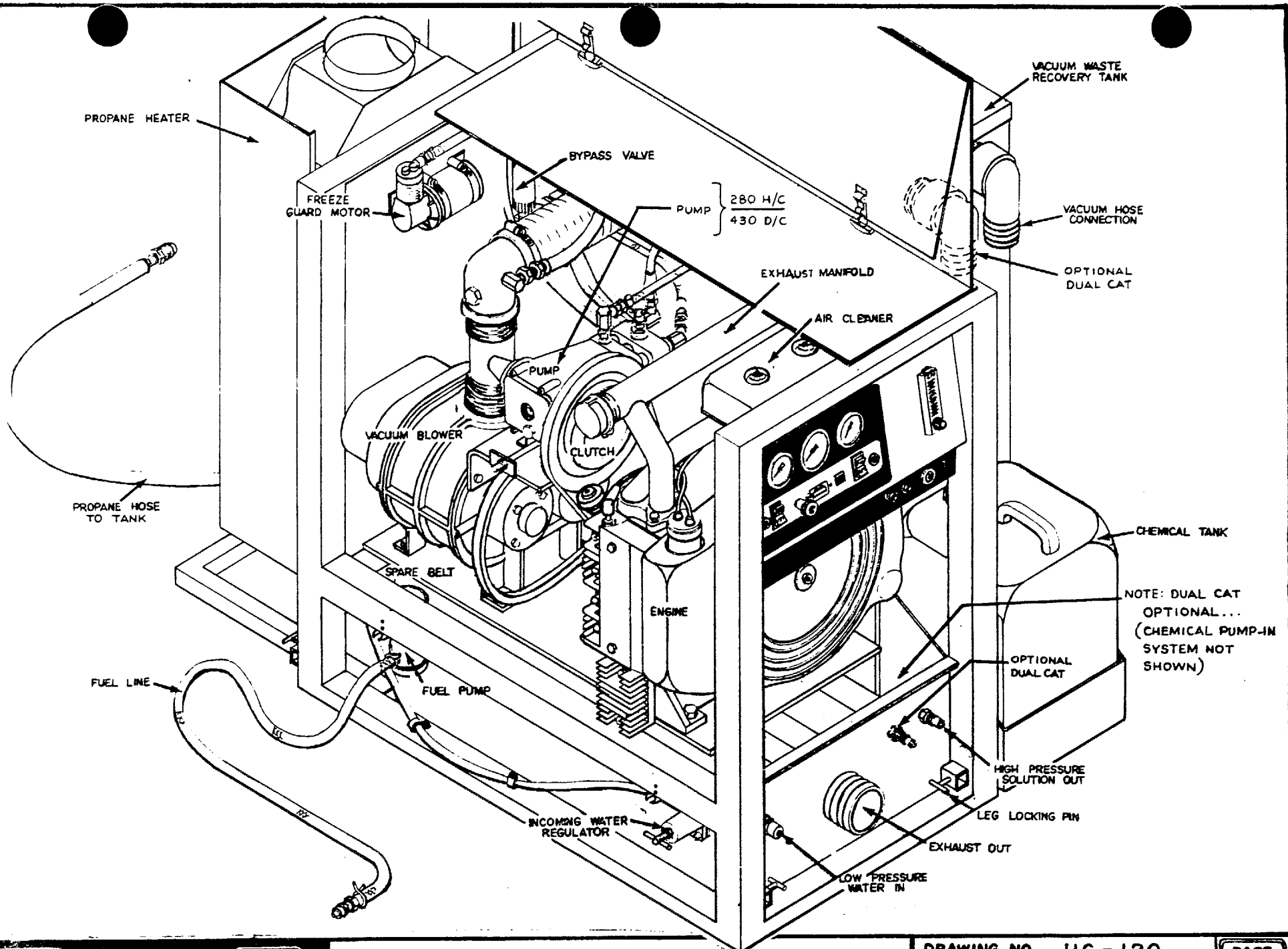
1. Perform daily/periodic maintenance as specified by the Service Manual.
2. Connect all required hoses.
3. Connect cleaning tool to length of hose required to perform cleaning.
4. Start engine at low throttle and allow initial warm-up period of 2-5 minutes. (Choke as required).
5. Turn electric clutch switch to the 'on' position, if high pressure solution is required.
6. Advance engine idle (2500 RPM's).
7. Spray wand or wands to void all air from unit. As the mix tank is in a fill cycle, the chemical flow meter may be adjusted to your desired setting. NOTE: Recommended carpet cleaning pressure is 300 PSI.
8. Once all air is voided from system, heater may be ignited. (NOTE: If not familiar with operation of this heater, refer to heater section of this manual).
  - A. Open propane valve on the tank.
  - B. Ignite pilot on the heater.
  - C. To ignite burner, turn dial to 'on' position.NOTE: If you suspect that the unit has frozen, DO NOT light the heater. Refer to Service Bulletin #112 or contact your nearest Hydra-Master Representative.
9. Turn on burner assembly and adjust temperature to the desired setting from 130 to 200 degrees F.
10. Commence cleaning operation.



## X-81 OR HYDRA STRETCH

### SHUT DOWN

1. Turn heater to 'off' position, spraying wand for at least 3 minutes to allow the heater coils to cool.
2. Close valve on propane tank.
3. Remove vacuum hose.
4. Reduce engine speed to idle (1600 RPM).
5. Flush clear water through chemical system for 10 seconds. (Vinegar should be rinsed through system weekly). Turn 'off' chemical flow meter.
6. Turn on cleaning tool to flush chemical from unit, hoses and cleaning tool. NOTE: If freeze guard is necessary, perform steps 1 and 2 of freeze guard procedure at this time.
7. Disengage electric clutch on high pressure pump by turning off the control switch.
8. At this time, the blower should be lubricated.
9. Turn ignition switch 'off'.
10. Drain vacuum tank. Vacuum filters should be cleaned prior to mobilization of Van. NOTE: If freeze guard is necessary, perform steps 3-9 of freeze guard procedure at this time.



# DUAL/HYDRA CAT COMPONENTS

DRAWING NO	HC-120	PAGE
DRAWN BY (REV)	O. GRANT, JR.	8A
DATE	6-20-79	

## HYDRA STRETCH FREEZE GUARD PROCEDURE

Freeze guarding should be performed prior to shut-down with the heater off.

1. Remove clear chemical feed hose from chemical jug and insert into container of 50/50 anti-freeze and water mixture.
2. Run unit, siphoning anti-freeze mixture for 10 seconds at 10 GPH on the flow meter.
3. Turn unit off. Disconnect inc. water supply to machine. Loosen knob on bypass valve to allow air to flow through system.
4. Open drain on mix tank.
5. Insert freeze guard hose onto low pressure in quick connect. Turn on freeze guard pump until only air is entering the mix tank.
6. Disconnect freeze guard hose from low pressure in quick connect.
7. Connect the alternate freeze guard hose to the high pressure out quick connect. Turn on freeze guard pump until air appears in the mix tank.
8. Plug in all hoses and tools which will require freeze guarding to the freeze guard quick connect. Turn on freeze guard pump until water is voided from tools.
9. Close drain valve on mix tank.

OPERATION PRECAUTIONS

MACHINE ADJUSTMENTS:

ALTHOUGH THIS UNIT HAS BEEN FACTORY ADJUSTED IT MAY REQUIRE ADDITIONAL ADJUSTMENTS TO ACHIEVE OPTIMUM PERFORMANCE; I.E. ALTITUDE MAY REQUIRE CARB ADJUSTMENT AND AMBIENT TEMPERATURES MAY REQUIRE HEAT CONTROL ADJUSTMENT. WHEN REQUIRED, RE-ADJUSTMENT MUST BE ACCOMPLISHED BY AN AUTHORIZED HYDRA-MASTER REPRESENTATIVE OR WARRANTY MAY BE INVALIDATED.

ENGINE COOLING:



UNITS EMPLOYING AIR COOLED ENGINES MUST NOT BE INCAPACITATED WITHIN A VAN WITH DOORS AND WINDOWS CLOSED. EXCESSIVE TEMPERATURES WITHIN THE ENGINE WILL RESULT IN PREMATURE ENGINE FAILURE AND A COMPROMISE OF APPLICABLE WARRANTY

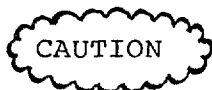
- A. WHEN RUNNING THE AQUA CAT THE COLD WATER SOURCE MUST BE CONNECTED TO KEEP ENGINE PROPERLY COOLED.

LEVEL:



DURING OPERATION, VAN OR TRAILER MUST BE PARKED ON LEVEL GROUND NOT TO EXCEED + OR - 10 DEG.. FAILURE TO INSURE PROPER LEVELING MAY PREVENT PROPER INTERNAL LUBRICATION OF ENGINE, VACUUM AND/OR HIGH PRESSURE PUMP COMPONENTS.

FREEZE PROTECTION:



ALL UNITS ARE EQUIPPED WITH FREEZE PROTECTION DEVICES AND/OR INSTRUCTIONS PROVIDED ON OPERATING LABELS FOR THE PREVENTION OF FREEZE DAMAGE.

FAILURE TO PERFORM RECOMMENDED STEPS OR USE SYSTEMS DESIGNED FOR THIS PURPOSE CAN RESULT IN EXPENSIVE COST, DOWNTIME AND COMPROMISE TO APPLICABLE WARRANTY.



## ONAN ENGINE

An Onan instruction brochure is included with this manual (see index) which may assist you in resolving an engine related problem.

### PROBLEMS:

### CAUSE AND/OR SOLUTION

ENGINE FAILS TO START	1. Loss of fuel	A. Empty gas tank.
ENGINE RUNS ROUGH		B. Plugged fuel line or filter.
ENGINE BACKFIRES		C. Defective fuel pump.
ENGINE FAILS TO ACCELERATE		D. Gas line kinked or crushed.
ENGINE REDUCES SPEED TO LOW RPM UNDER LOAD		
	2. Blown master fuse	A. Electrical short.
		B. Defective fuse.
	3. Oil on points	A. Consult with Onan for possible modification or replacement of seals within point box.
		B. Drill a 1/8" hose through point box cover and gasket to alleviate vacuum.
	4. Worn or maladjusted points	A. Remove and replace points and condenser.
		B. Clean and adjust points.
	5. Defective spark plugs	A. Remove and replace.
		B. Clean and regap.
	6. Defective spark plug wires	A. Spark plug wires along with many others may, at certain points, come in contact with heated parts (exhaust manifold) or abrasive parts (sharp metal, teflon hose). This may be taken into consideration for electrical shorts.
		B. Remove and replace.
	7. Low compression	A. Defective valve.
		B. Stuck valve.
		C. Worn compression rings.
		D. Defective piston.

8. Float switch in recovery tank (NOTE: temporary repair permits disconnection of float switch wire from point box terminal. Continued operation with this condition will compromise Vac. Blower).
- A. Switch stuck in upright position.
  - B. Defective float switch.
  - C. Float switch may be obscured with lint or debris.
9. Engine will not turn over
- A. Dead battery.
  - B. Loose terminal connection on battery or ignition switch.
  - C. Defective starter.
  - D. Seized engine or Blower, pump, recirculating pump, could cause engine to not turn over. use process of elimination to aid in further diagnosis.
  - E. Often anodizing will prevent electrical system from grounding properly.
10. Defective carburetor
- A. Clean Carb.
  - B. Replace Carb.
  - C. Choke locked in closed position.
  - D. Often Carb float level comes out of adjustment. This should be set by holding carb upside down and the float should be at 3/16.
11. Improperly adjusted carb (NOTE: a comprehensive manual is available and defines necessary adjustments.)
- A. Incorrect air mixture ratio adjustment.
  - B. Incorrect float level adjustment.

12. Carbon build-up in cylinders  
(NOTE: carbon build-up can be minimized by using unleaded reg. gas. Should carbon removal be necessary, reinstall heads with new gaskets).
13. Incorrect timing
14. Dirty air cleaner
15. Clogged fuel filter
16. Low oil level or malfunctioning oil pump
- A. Carbon build-up may be excessive if carb or valves are improperly adjusted, engine RPM too low, improper spark plug gap.
- B. Remove cylinder heads and eliminate carbon build-up with wire brush.
- A. Timing may become offset if point box is not secure or if points are out of adjustment.
- B. Refer to Onan Maintenance instructions for details.
- A. If exhaust gaskets do not seat properly or heat exchanger gasket is bad, exhaust may heat and melt the air cleaner requiring much clean up repair.
- B. PCV valve may be cleaned by rinsing thoroughly with solvent.
- C. Remove and replace or clean as required.
- A. Remove and replace.
- A. Oil pressure sensors can be installed on the engines. This will eliminate many problems which may occur.

## VACUUM BLOWER

### POSITIVE DISPLACEMENT

A Blower Instruction brochure is included with this manual (see index) which may assist you in resolving a blower related problem.

#### PROBLEMS:

#### CAUSE AND/OR SOLUTION

<u>PROBLEMS:</u>	<u>CAUSE AND/OR SOLUTION</u>	
NOISE IN VACUUM BLOWER	1. Loose direct drive coupler	A. Examine coupler boot for defects and re-tighten lock bolts. (Refer to coupler drawing). B. Replace coupler boot if it is either torn or punctured.
	2. Worn gears	A. Remove and replace gears. (NOTE: replacement of gears must be accomplished by qualified technician). B. Timing of vacuum blower has been changed due to worn components. Replacement of components must be accomplished by a qualified technician.
	3. Lack of lubrication (NOTE: Permanent damage may have resulted from lack of lubrication).	A. Lubricate as specified by applicable vacuum blower manual. See index.
	4. Worn bearings	A. Remove and replace bearings as required. Must be accomplished by a qualified technician.
	5. Debris and/or foreign material build-up (NOTE: A stainless steel filter is provided in vac. inlet located in vac tank to protect vacuum blower components).	A. Disassemble vacuum blower and remove foreign material. (NOTE: Disassembly should be accomplished by qualified technician only. Replacement of worn parts is recommended if this procedure is necessary.)
	6. Loose or missing mounting bolts	A. Tighten or reinstall mounting bolts.

VACUUM BLOWER  
(CONT.)

PROBLEM:

CAUSE AND/OR SOLUTION:

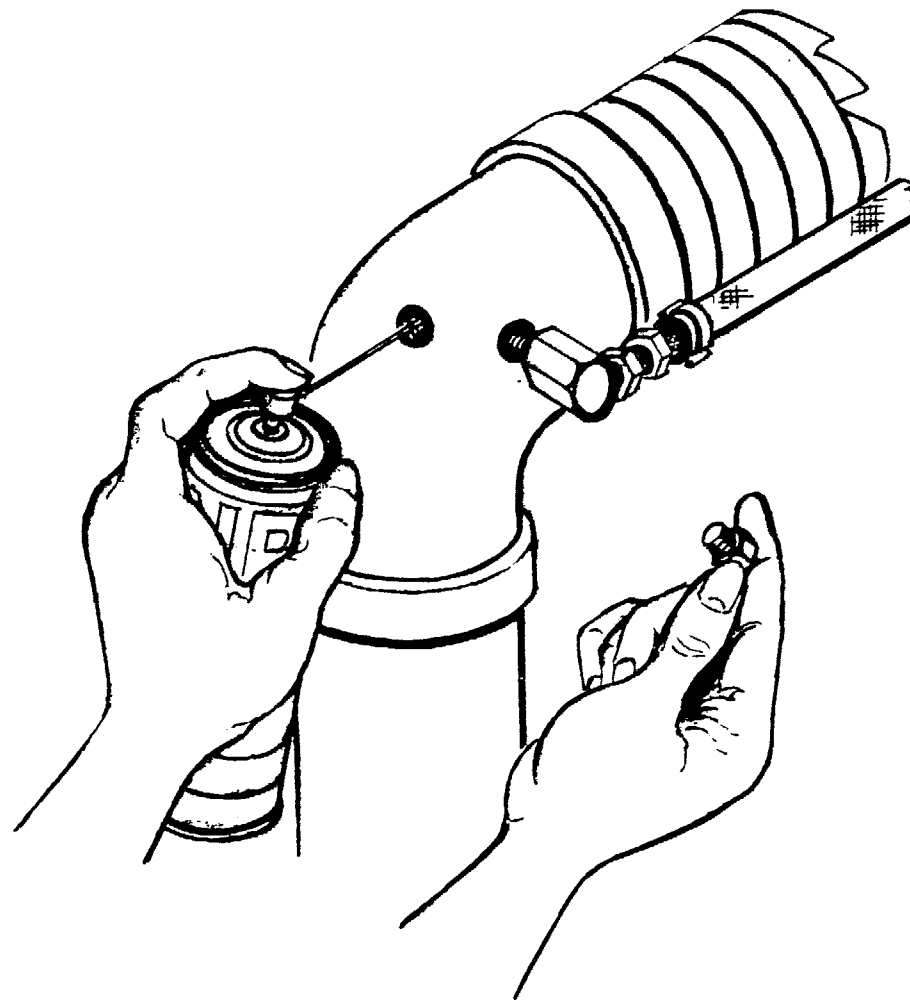
LOSS OF VACUUM

1. Defective or mal-adjusted vac. relief valve  
A. Examine, replace if necessary and/or adjust vac relief valve.
2. Collapsed vac hose between blower and vac tank  
A. Remove and replace hose (NOTE: a special reinforced hose is required for replacement.)
3. Clogged stainless steel filter  
A. Remove and clean or replace S/S filter.
4. Defective vac tank seal  
A. Remove and replace vac tank seal.
5. Defective or "open" vac tank dump valve  
A. Close valve  
B. Replace valve.
6. Fractured weld on vac tank  
A. Re-weld as required or replace tank.
7. Collapsed or kinked vac hose  
A. Reshape hose if possible and/or eliminate kinks.
8. Plugged vac hose  
A. Remove obstruction.
9. Restriction in cleaning tool  
A. Remove obstruction.
10. Worn end plates or lobes in vac blower  
A. Replace worn components. (NOTE: must be accomplished by a qualified technician.)
11. Loose coupling system between engine and blower  
A. The set screws may come loose causing blower to stand still while engine may be turning properly. (NOTE: unless the blower is seized or making a knocking noise, your vacuum loss is not caused by a bad blower.)

BLOWER IS SEIZED:

1. Rust  
A. Spray rust dissolving lubricant onto lobes to emulsify rust and attempt to rotate vacuum lobes.
2. Foreign matter  
A. Disassemble and remove foreign matter and repair as required. (NOTE: disassembly must be accomplished by qualified technician.)
3. Seized  
A. If you suspect that your blower has seized, remove coupling element then run engine for a few seconds. This way you wont confuse similar problems.

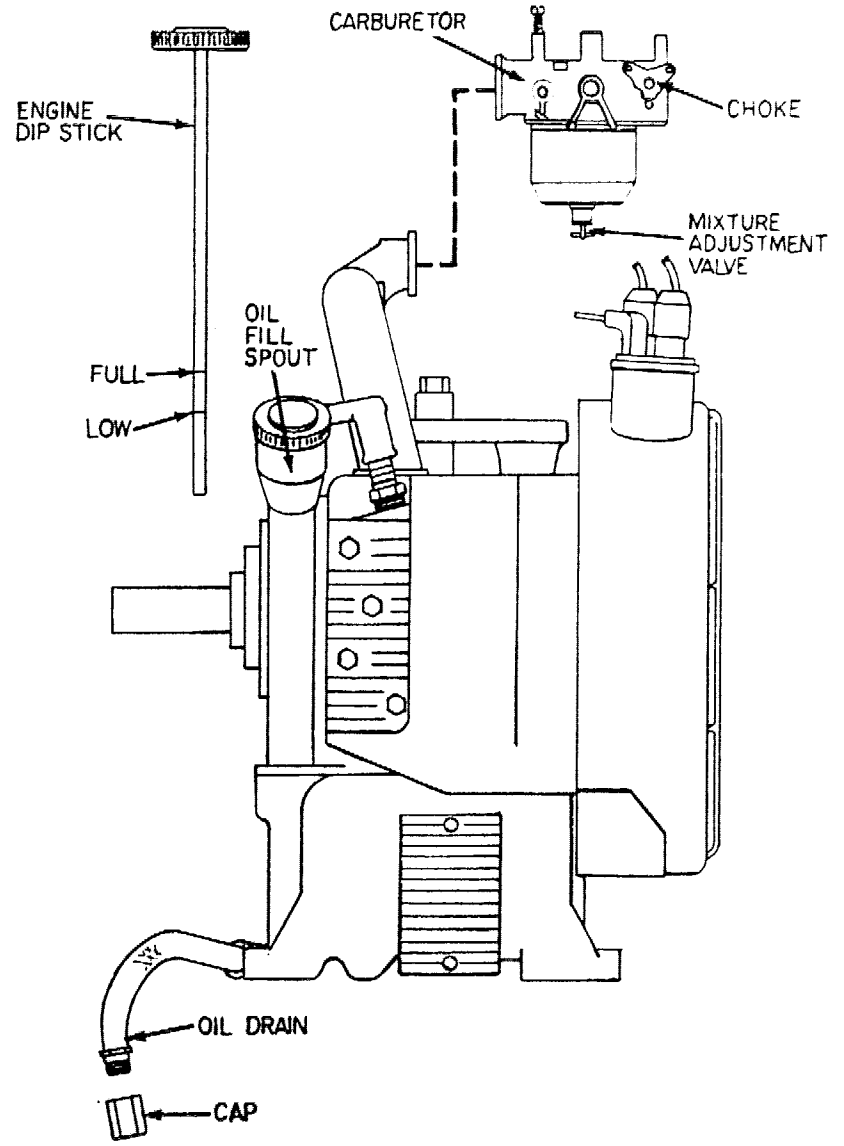
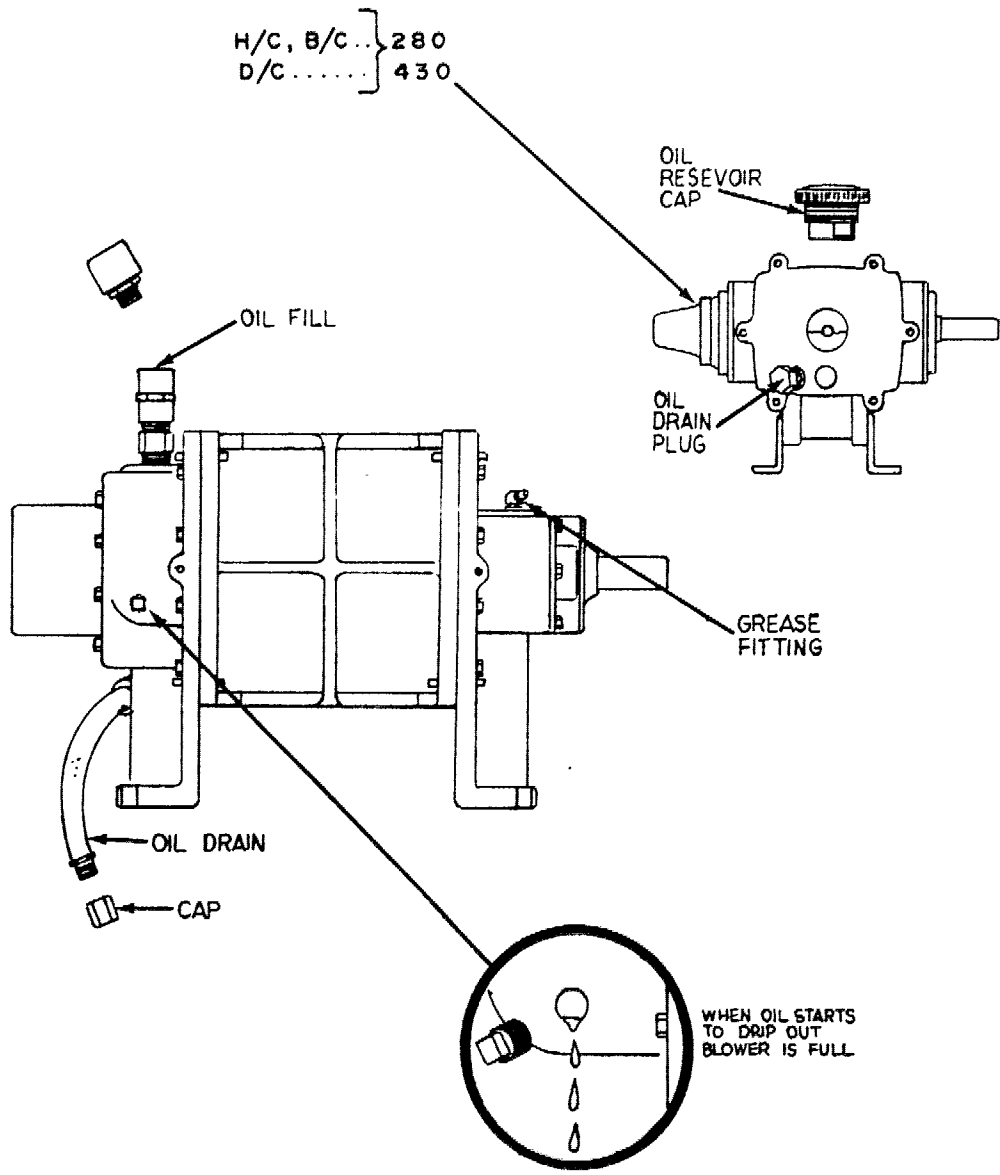
*To assure correct maintenance of the blower, a lubrication, used periodically, is required. Suggested is LUBRICANT LPS/25 or equivalent.*



## BLOWER LUBRICANT DETAIL

DRWG NO	SCALE	DRWN BY	APPRVD	DATE
HM-100	0	O. GRANT, JR.		4-3-79

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# DUAL/HYDRA CAT MAINTENANCE

DRAWING NO	HC-117	PAGE
DRAWN BY		6C
DATE	6-19-79	

## Cat Pump

As you remove your discharge manifold, there is a set of 3 check valves (which usually fall out during dis-assembly). If the surfaces of these check valves are dirty, or show signs of chemical build-up, it is probable that they would remain open causing pressure loss or pulsation. Upon inspecting the valves, make sure that the teflon buttons in the valve spring retainers are still intact. Also examine the discharge manifold. Look for problems such as cracks, chemical build-up or warpage due to freezing. If this discharge manifold is warped, it will cause the check valves to stick and will result in loss of pressure.

The Cat pump cups are often the source of pressure loss. Upon inspection they may appear melted or torn, but often they will look good. Replace them anyway. There is no sure method of visually inspecting the cups. Hydra-Master recommends changing cups whether they look good or not.

Anytime your pump is being dismantled, Hydra-Master recommends replacement of all 'o' rings and seals. This is merely a convenience to the customer to make sure that the Cat pump is in top operating condition.

The prrrm-a-lube seals located within the intake manifold will allow air to enter the pump if they are worn. Again, it is difficult to visually pinpoint a defective prrrm-a-lube seal. Replace them all.

Within the piston sleeve cylinders there are 6 'o' rings that are about 1/4 the size of a penny. If these 'o' rings are bad, water will be pumped back into the oil. If this has occurred the oil will raise in level and will appear milky. If you are unable to repair seals right away, change oil frequently. Repair the pump as soon as possible so as to not damage bearing or connecting rods.

Repairing of Cat pumps is not a difficult task, however, before dis-assembling make sure you have the proper parts required.

- 1 - short (or hot) cup kit
- 6 - piston sleeve 'o' rings
- 3 - Prrrm-a-lube seals
- 1 - bottle Cat oil

Read instructions thoroughly, supplied in the Cat pump manual, prior to disassembly and follow directions as stated. Oil all seals thoroughly prior to installation. (Remember, a newly scarred seal is no better than the one you just took out.)



## HIGH PRESSURE PUMP

A pump instruction brochure is included with this manual. (See index) which may assist you in resolving a pump related problem.

### PROBLEMS:

### CAUSE AND/OR SOLUTION:

#### LOSS OF PRESSURE

- |  |   |
|--|---|
| 1. Clogged filter screen in garden hose quick connect coupler.                         | A. Remove and clean or replace filter.  |
| 2. Low water pressure at source  | A. Determine rate of flow and select an alternate source of supply if water pressure is inadequate.   |
| 3. Defective or blocked check valves in high pressure pump cylinder head               | A. Disassemble cylinder head and replace or clean applicable check valve.   |
| 4. Delaminated, kinked or clogged hose between the mix tank and the high pressure pump | A. Remove and replace defective hose.   |
| 5. Defective pressure relief valve or debris in pressure relief valve                  | A. Disassemble and clean pressure relief valve as illustrated in drawing.<br><br>B. Replace defective or worn out bypass cup.<br><br>C. Replace bypass valve. |
| 6. Defective or worn piston cups   | A. Remove and replace piston cups as defined by pump manual.  |

7. Obstructions in internal hoses which feed water to the pump
  - A. Remove obstruction or replace affected hose.
8. Pump and/or hoses leak water
  - A. Repair and/or replace item causing leak.  
(NOTE: Worn seals within the pump will cause leaking while cleaning tool is not in use but will suck air as cleaning tool is turned on thus resulting in a pressure loss.)
9. Defective clutch  
(NOTE: If electric clutch fails to engage, power cannot be transferred to high pressure pump.)
  - A. Examine electrical wiring and switch to ensure power is supplied to clutch.
  - B. Examine low water level float sensor at the bottom of mix tank for possible restriction.
  - C. Remove and replace electric clutch.
10. Loose drive belt for high pressure pump
  - A. Readjust belt as required or replace if defective.

WATER IN OIL

- |                            |  |
|----------------------------|--|
| 1. Damaged piston rod seal | A. Rebuild piston rod assy. and replace applicable 'o' rings and seals. (NOTE: Failure to comply may compromise the high pressure pump and cause its total destruction.) |
|----------------------------|--|

LOSS OF/OR ERRATIC CHEMICAL FLOW

- |   |  |
|---|--|
| 1. Clogged chemical tank filter                                 | A. Clean or replace chemical tank filter.  |
| 2. Defective control valve on chemical flow meter               | A. Remove and replace valve assembly.  |
| 3. Cracked or split chemical feed hose                          | A. Remove and replace hose.  |
| 4. Cracked chemical flow meter                                  | A. Remove and replace flow meter.  |
| 5. Air leak or water leak from chemical flow meter to mix tank. | A. Inspect hose and fittings for possible fracture. (NOTE: Even the most minute fracture may cause severe variance in chemical flow readings). |
| 6. Clogged or defective metering valve in the mix tank          | A. Inspect and repair.   |

DIRECT DRIVE COUPLER

VIBRATION:

Tighten bolts and allen screws.  
(Also allen screws that secure  
pulley to shafts of electric  
motor and blower).

MISALIGNMENT:

Due to loose bolts on electric  
motor or blower mounts.

OVER-FILLING PROPANE  
TANK (NOTE: Propane  
heater is designed  
to operate on vapor  
propane only - NOT  
LIQUID PROPANE.

Over-filling propane  
tanks forces liquid  
propane into the heat-  
er causing an over-  
rich condition which  
creates carbon or soot  
build-up within the  
heater core. Restric-  
tions due to this prob-  
lem compromise the heat-  
ing ability of the heat-  
er and render an unsafe  
condition. Over-filling  
the propane tank can be  
prevented if filling  
procedure is stopped  
when white vapor is first  
emitted from the propane  
tank. Only authorized and  
trained personnel should  
fill propane tanks.)

RESTRICTION OF AIR FLOW  
AT BASE OF HEATER.

- A. Remove any article such  
as chemical containers,  
hose, boxes, etc., within  
18 inches of base of heat-  
er. (NOTE: This situa-  
tion also creates an  
over rich condition which  
results in carbon build-  
up as described above.  
Carbon removal is accom-  
plished in the same  
manner.)

LOSS OF TEMPERATURE DUE TO COLD WEATHER (NOTE: Climactic changes alter the output capability of the heater. Example: The propane heater is designed to elevate the temperature of a given amount of water in a given period of time. Water emitted from a faucet at 50 deg. on a warm day may increase in temperature as much as 20 deg. before entering the heater thus resulting in a 20 deg. boost in temperature once heated. An additional benefit is experienced since warm air is also drawn into the heater and provides an additional boost in temperature. Conversely, winter time operation alters the performance of the heater capability since water leaving a faucet at 50 deg. may lose 10 - 13 deg. in temperature before entering the heater. Likewise, the air drawn into the heater is also colder, thus reducing the overall performance. This condition is natural and cannot safely be altered by any mechanical means. It may therefore be assumed that efficiency levels will vary in relationship to the climate.

9. WORN OUT SPRAY JET

(NOTE: Cleaning tools designed to spray a constant flow of 1½ GPM will average 1 gallon of flow per minute on actual working situations since flow is not continuous. An average flow of 1 GPM results in 6000 gallons of flow for every 100 hours of unit operation. Spray tips are capable of consistent flow rates for approximately 20,000 gallons. They should be replaced, therefore, approximately every 350 hours. Worn spray jets allow a greater average rate of flow thus reducing desired temperature levels.)

A. Remove and replace spray jet.

10. REDUCTION OF FLOW due to increased length of solution hose. (NOTE: For every 50 feet of hose, beyond 200 feet in total length, a measurable loss of flow is experienced. This condition is a result of the increased friction experienced by the water as it passes through the hose. As has been indicated above, reduction in flow automatically reduces propane metering thereby reducing temperature. The proper balance of flow can be reinstated by simply changing the cleaning tool spray jet to the next larger size. Example: if your cleaning tool contains an 8006E spray jet, you would change it to an 8008E to compensate for any losses in flow due to the addition of solution hoses.

11. FOREIGN MATERIAL IN HIGH PRESSURE BYPASS VALVE. (NOTE: The high pressure bypass valve is designed to fully close when the cleaning tool is turned on. Any foreign matter collecting on the piston will prevent full closure of the valve and allow a portion of the water to continue to circulate instead of being routed to the cleaning tool. To correct this situation, the bypass valve must be disassembled and cleaned (refer to drawing provided in this manual for bypass disassembly).

12. FROZEN OR DAMAGED QUICK CONNECT FITTINGS. (NOTE: Couplers which have been frozen often impede the flow of cleaning solutions and adversely affect the heater as defined by previous comments pertaining to the reduction of propane metering to the heater.)

A. Remove and replace damaged fittings.



#18 Yellow Flame

- A. Liquid propane entering into system due to (1) over-filled propane tank, (2) truck driven with propane tank valve opened, (3) truck parked on an incline. Hoses with liquid propane can be flushed with alcohol.
- B. Propane regulator malfunction due to (1) liquid propane obstructing vapor flow, (2) dirt or dust entering through vent port on the propane regulator (this may be remedied by using Tupperware cover supplied by Hydra-Master for propane regulator), (3) over pressurization of propane regulator, caused from filling propane tank with valve opened, will cause warpage of the regulator. Replace immediately.
- C. Dirty heater core will prevent flame from being vented. A blue flame is required to achieve maximum heat. Oxygen must be vented with the propane to achieve maximum heat.
- D. Dirty or malfunctioning burner assembly will cause insufficient propane and oxygen mixture.

16. CLOGGED FILTER SCREEN IN GARDEN HOSE QUICK CONNECT FITTING. (NOTE: Refer to step #14).

IMPORTANT: Permanent removal of the filter screen may compromise the total integrity of water flow throughout the unit. The incoming regulator, heater water flow valve, high pressure pump and high pressure bypass valve may be adversely affected if foreign material is permitted to pass through them. Alterations of this type void Hydra-Master's warranty on all water related components.

A. Clean screen or replace.

17. FLAMES PROTRUDING OUTSIDE OF HEATER COVER.

- A. Overfilled propane tank causing liquid instead of vapor to enter heater.
- B. Heater core clogged with carbon or soot and requiring cleaning.
- C. Incorrect adjustment propane regulator.
- D. Defective or malfunctioning burner valve assembly.

EXCESSIVE HEAT

1. Maladjustment of propane regulator. (NOTE: propane regulators are factory pre-set and may be readjusted by authorized Hydra-Master personnel.)
  - A. Contact Hydra-Master Corp. to determine correct procedure.
2. Overfilled propane tank (NOTE: Hydra-Master's propane heater is designed to operate on vapor propane only. Over-filling a propane tank allows liquid propane to enter all heater related components and permits an over-rich burning condition to occur. This condition usually requires the heater core to be cleaned of soot and carbon deposits. Cleaning may be accomplished by removal of heater core and application of a household oven cleaner. Following application of oven cleaner, rinse residue with clean water.)

4. Propane residue/deposits collecting in burner assembly. (NOTE: Burner assemblies are factory sealed and must be cleaned by trained technicians only. Failure to comply may compromise operator and equipment safety.)
  - A. Remove and replace burner assembly.
5. Flame remains partial or complete when wand is not spraying.
  - A. Debris in heater water regulator.
  - B. Heater water regulator has frozen.
  - C. Replace poppit valve.
  - D. Check pump protection system for leakage.

PILOT LIGHT

1. Pilot light will not ignite. (NOTE: do not use a needle or pin to clean pilot orifice - use compressed air or solvent only.)
  - A. Verify propane reaching ignitor. (NOTE: a kinked or crushed hose may impede propane flow.)
  - B. Remove and clean orifice
  - C. Verify ignitor spark is operating correctly.

See IMPORTANT Note, Next Page.

IMPORTANT: If a new propane tank has been installed or hoses have been disconnected, air may enter propane hoses and must be purged prior to attempting to light the pilot burner. Should this condition exist, operator must depress the pilot button for 3-5 minutes and attempt to ignite the pilot light at 30 second intervals. A very slight hissing noise should be evident while performing this operation.

#### MAIN BURNER INOPERATIVE

IMPORTANT: Hydra-Master's propane heater will only ignite under normal conditions with the cleaning tool turned on. Any partial or full burn condition without cleaning tool turned on is abnormal and must be corrected immediately to prevent personal injury or equipment damage.

- |  |  |
|--|--|
| 1. Clogged spray jet<br>(NOTE: any reduction in solution flow automatically limits the amount of propane metered to the burner assembly. Full or partial blockage will render the heater inoperative.) | A. Remove jet and clean as required          |
| 2. Kinked hose   | A. Unkink or replace hose.                   |
| 3. Damaged water flow valve at base of heater. (NOTE: refer to preceding instructions.)  | A. Remove and repair or replace water valve. |
| 4. Water valve diaphragm ruptured or distorted through normal use.   | A. Remove and replace water valve diaphragm. |

See IMPORTANT Note, Next Page

IMPORTANT: The function of the incoming water regulator is to balance the demand for water to a position whereas chemical will be siphoned from the chemical tank. Rotating the regulator counter-clockwise too far results in loss of pressure, loss of temperature and total loss of chemical flow and compromises internal components of the high pressure pump.

6. Clogged garden hose strainer                      A. Remove and clean or replace strainer.
7. Low water pressure from source                      A. Locate alternate source.
8. Kinked garden hose or water supply hose                      A. Remove kinks and verify flow has been re-established.
9. Defective propane regulator                      A. Remove and replace regulator.
10. Loss or reduction of high pressure  
(NOTE: Any reduction or loss of high pressure adversely affects flow rates and may cause heater to shut down automatically.)                      A. Determine cause of pressure loss and repair as required.
11. Foreign material in high pressure bypass valve (NOTE: Excessive amounts of foreign material may alter flow causing automatic shut-down of the burner assembly.)                      A. Disassemble and clean bypass valve as required. (See drawing).

## ELECTRICAL SYSTEM

The entire electrical system operates on 12 volts DC which is provided by a battery located at the rear of the vacuum holding tank. Battery levels are sustained by a 15 amp alternator designed within the engine. A comprehensive schematic is provided which details the entire electrical system and it's components.

### PROBLEM

### CAUSE AND/OR SOLUTION

#### LOW BATTERY VOLTAGE

- |  |  |
|--|--|
| 1. Defective battery                     | A. Remove and replace  |
| 2. Corroded battery terminals            | A. Clean terminals and battery posts.  |
| 3. Low battery fluid                     | A. Add water to appropriate level.   |
| 4. Defective voltage regulator           | A. Remove and replace voltage regulator.   |
| 5. Loose wiring within electrical system | A. Examine all terminal connections and verify that they are secure. (NOTE: give special attention to ignition switch terminals and voltage regulator terminals.   |
| 6. Blown charging fuse                   | A. Remove and replace fuse.<br>B. Check battery charge<br>C. Check battery cells with hydrometer.  |
| 7. Electrical short in wiring system     | A. Examine electrical systems for bare wires.  |
| 8. Poor ground connection                | A. Examine terminal and remove corrosion if necessary.<br>B. Follow ground wire from (-) of battery to where it grounds at the frame. If it is grounded to anodized aluminum then scratch some of the anodizing off to allow for circuit to be completed through the aluminum. |

9. Defective alternator
- A. Remove fly wheel housing and fly wheel to expose alternator and remove and replace alternator. (NOTE: a qualified technician may be necessary to perform this function.)

#### INOPERATIVE TEMPERATURE GAUGE

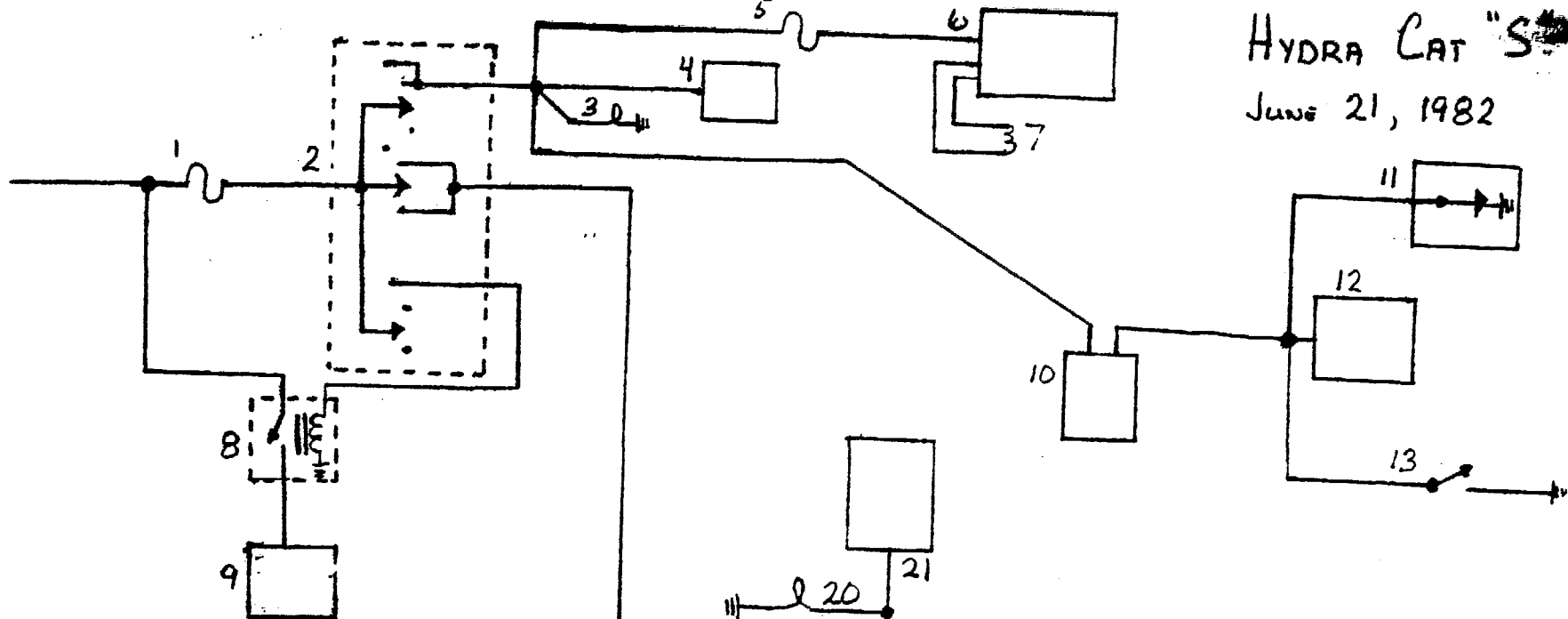
- 1. Temperature doesn't register or gives a false reading. (NOTE: the integrity of the temperature gauge can be determined by simply turning on the ignition switch and shorting the temperature sending unit wire to ground. If the needle on the temperature gauge deflects to maximum temperature, it may be assumed that the temperature gauge is good. It would then be necessary to replace the sending unit only.)
  - A. Examine all wires leading to and from the gauge including the temperature sending unit wire.
  - B. Remove and replace sending unit.
  - C. Remove and replace temperature gauge.
- 2. Temperature gauge reads maximum upon turning key to ignition/
  - A. Battery terminals may be interchanged.

#### INOPERATIVE HOUR METER

- 1. Time is not advancing correctly
  - A. Verify 12 volts DC is available at the hour meter with the ignition switch turned on. This can be accomplished with a volt meter or a test lamp.
  - B. Remove and replace hour meter if 12 volts is available.
  - C. A nylon gear within the clock may have been jammed due to a sudden jolt of the machine or truck. You may try simply tapping on the meter to try to free the nylon gear.

# HYDRA CAT "S"

June 21, 1982



- 1 MAIN 25 AMP FUSE
- 2 STARTER SWITCH
- 3 LAMP
- 4 FUEL PUMP
- 5 CHARGING 15 AMP FUSE
- 6 VOLTAGE REGULATOR RECTIFIER
- 7 STATOR
- 8 STARTER SOLENOID
- 9 STARTER MOTOR
- 10 ~~COT~~
- 11 OIL SAFETY SWITCH
- 12 POINTS BOX
- 13 VAC KILL SWITCH

- 14 LAMP
- 15 CLUTCH PUMP SWITCH
- 16 PUMP LAMP
- 17 MIX TANK SWITCH
- 18 ELECTRIC CLUTCH
- 19 FREEZE GUARD SW
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- 21 FREEZE GUARD PUMP
- 22 HOUR METER
- 23 LAMP
- 24 TEMP GAUGE
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## INOPERATIVE ELECTRIC CLUTCH -

### HIGH PRESSURE PUMP

The High Pressure Pump clutch is designed to operate when pressurized water is connected to the units incoming water fitting. A pressure switch has been incorporated to protect the clutch from accidental activation. It will also disengage the electric clutch if water pressure drops below 5 PSI.

1. Clutch will not engage

- A. With the use of a jumper wire, bridge pressure switch terminals to determine integrity of pressure switch and clutch. If clutch engages with pressure switch shunted, replace pressure switch. If clutch does not engage, verify 12 volts DC is available at the electric clutch. (NOTE: Verification can be accomplished by using a volt meter or test lamp.)
- B. Verify battery is fully charged and capable of supplying necessary voltage and current to engage electric clutch. (NOTE: The integrity of the battery and charging systems must be determined by a qualified technician with proper test equipment.)
- C. Remove and replace clutch if A and B reflected above indicate sufficient voltage and power is available.

BOB CAT - HYDRA CAT - DUAL CAT  
MARK IV - MARK V  
TROUBLESHOOTING

Many of the malfunctions which can occur are minor in nature and can be rectified with minimal effort. Unfortunately, we frequently have a tendency to examine the unit as a whole and not direct our attention to the actual problem, which is a system within the entire unit. Realizing that downtime is our worst enemy, and that troubleshooting a problem can be extremely easy if we understand the functional systems, components, and the method with which they interplay with one another, we must determine to become involved. Example: Do not address a chemical feed problem with the electrical system.

In the following pages we shall endeavor to identify both a problem and its probable cause and solution. Only those problems which are determined to have a more frequent cyclic occurrence will be reflected within this section of the manual. Isolated situations will not be included. After exhausting the possibilities contained herein, you are encouraged to contact either an authorized Hydra-Master Service Center or Hydra-Master's Service Department for additional solutions. A minimum of information is recommended prior to contacting either of the above. A list is provided for your needs.

1. Engine R.P.M. without vacuum or solution hoses attached.
2. Pressure - high pressure readings with both cleaning tool turned off and turned on.  
(NOTE: Any pulsations should be indicated).
3. Vacuum levels with intake port on vacuum recovery tank completely blocked.  
(NOTE: With the use of a tachometer, determine engine R.P.M. under a maximum load condition).
4. Rate of flow emitted from cleaning tool for a 60 second period.  
(NOTE: Approximately  $1\frac{1}{2}$  gallons per minute is desired with 100' solution hose attached to the cleaning tool).
5. Maximum temperature as reflected by the temperature gauge.  
This reading should be taken with 100' of solution hose attached to the cleaning tool. The thermostat dial for this reading should be on Very Hot with the tool spraying for 3 minutes constantly.

## CHEMICAL TANK TROUBLESHOOTING

- No or Low Chemical Flow -
1. Check that hoses in the tank are secured. Check that the hose from the top of the flow meter to the side of the mix tank is secured with no kinks. Check the hose from the bottom of the flow meter to the chem. jug for kinks or cracks.
  2. Check the anti-siphon screen on the end of the hose which goes into the mix tank. To check this screen for proper function, remove it from the plastic hose. You should be able to suck through the hose barb end, but you should not be able to blow through the hose barb end. (If you can not suck through it then rinse it out with vinegar.

NOTE: If you are in a low water pressure area and find that the volume of water entering the mix tank is not enough to allow your venturi to siphon chemical, unscrew the spring from the anti-siphon screen and cut off 2 coils. Screw the spring back into position.

3. Check flow meter for float obstruction.
4. Turn incoming water regulator clockwise to increase water flow volume.

Inability to adjust chemical with the flow meter

1. Debris lodged behind teflon seat in flow meter knob.
2. Teflon seat dismounting from flow meter knob.

Solution reversing from mix tank to chemical jug

1. Anti-siphon screen removed from chemical jug hose.
2. Debris in anti-siphon screen.

Mix Tank overflows

1. Float ball in mix tank hanging up (not moving freely).
2. Extension bracket pinching the float lever, restricting full action of the lever.

Mix Tank overflows  
(Cont.)

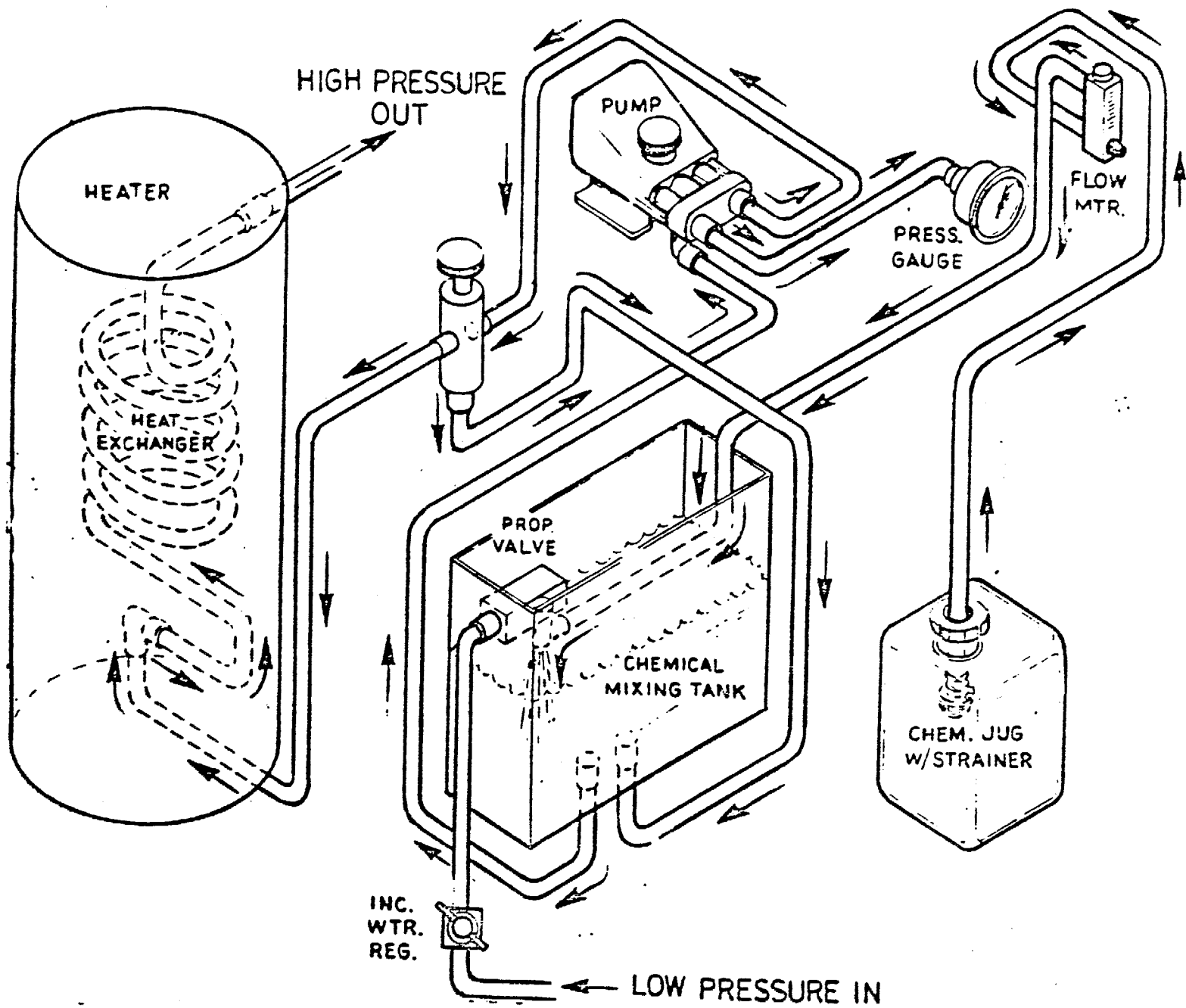
3. Plunger not seating properly on the valve. (Remove the 2 screws which hold the extension assembly to the valve. Do not lose or drop the screws. Remove the extension assembly. Turn it upside down. Inspect the plunger for proper seating. If there is no debris obstructing the valve or plunger, the plunger may be out of adjustment. To adjust, loosen the set screw on the retainer ball and move the ball toward the end of the rod 1/16". Retighten set screw. Place extension assembly back into position. Tighten the two screws.

Mix Tank doesn't keep  
up with water output

1. Check garden hose quick connect assembly screen.
2. Check garden hose and/or feed hose to the mix tank for clog, kinks or blockage.
3. Turn incoming water regulator handle clockwise to increase water inlet flow.
4. Float ball in mix tank hanging up. (Not moving freely).
5. Extension bracket pinching float lever, restricting full action of the lever.
6. Valve plunger not opening fully. To adjust, remove the 2 screws which hold the extension assembly to the valve. (Do not lose or drop the screws). Remove the extension assembly, turn it upside down. To adjust, loosen the set screw on the retainer ball. Place your thumb on the plunger and press it in 1/16" and slide the set screw retainer ball toward the plunger end 1/16". Tighten the set screw. Place the extension assembly back into position. If the tank starts to overflow, the retainer ball is too close to the plunger.

Pump pulsates when the  
tank is in a fill mode

1. Check that the hose which goes from the gray plastic venturi to the bottom of the tank is not directed toward the Cat pump pick up port. If it is, aim it in another direction.



## HYDRA STRETCH PLUMBING

Your Hydra Stretch plumbing system is unique to all other Hydra-Master plumbing systems and is uncomparable throughout the carpet cleaning industry. This system has been designed to be the most simple and trouble-free ever.

The incoming water flows through the incoming water regulator which should be set at about 20 PSI at the mix tank. Water will now flow through a proportioning valve which will simultaneously mix the chemical to achieve your desired solution. The mix tank is equipped with 2 different float valves, one of which responds to the water level of the tank and will maintain the proper volume of solution to be reserved for the Cat pump. The secondary float valve is a safety valve that is designed to protect your system from sudden or unexpected loss of water supply. If, for example, the water source at the house was turned 'off', the water level of the mix tank would drop activating the secondary valve which automatically disengages the electric clutch on the Cat pump.

In conjunction with the incoming water flow, the chemical ratio may be obtained by an adjustment of the chemical flow meter during the fill cycle of the mix tank. The chemical will flow from the chemical jug to the chemical flow meter, then to the proportioner where it is distributed into the mix tank at your desired proportion. This line should be flushed with vinegar weekly to prevent abnormal chemical build-up. This may be done by removing the clear plastic hose from the chemical jug and inserting it into a one quart container of vinegar. This should be done with the chemical flow meter setting on 10 GPH with both heaters off. Simply spray the wand for the duration of the vinegar in the one quart container, then repeat the process with one quart of clear water to void all lines of vinegar.

NOTE: With this unique chemical system, your chemical flow is proportioned to the filling cycles of the mix tank, not the direct spraying of the wand. Therefore, it is possible that as your wand is spraying, you may have no chemical flow. Also the converse is true in that you may not be spraying your wand but, if the mix tank is in a filling cycle, your chemical flow meter may read your desired flow.

The water will now be siphoned from the bottom of the mix tank to the Cat pump. If neither of the wands are spraying, the water will bypass from the bottom of the brass pressure relief valve to the mix tank.

If the wand or wands are spraying, the water will then flow to the desired heater. This heater has a capacity of up to 5 gallons, therefore, it is extremely important that all air is bled out of the heater prior to initial start-up. This may be achieved by running the system, without the heater on, for approximately 60 seconds.

This heater is thermostatically controlled, therefore, upon initial ignition of the heater, the burner will fire for about 1 minute. Once desired temperature is achieved, the thermostat within the heater will turn off the burner. With the design of this heater it is possible that the flame may be on when the wand is off. Likewise, it is possible that the flame may be off when the wand is on.

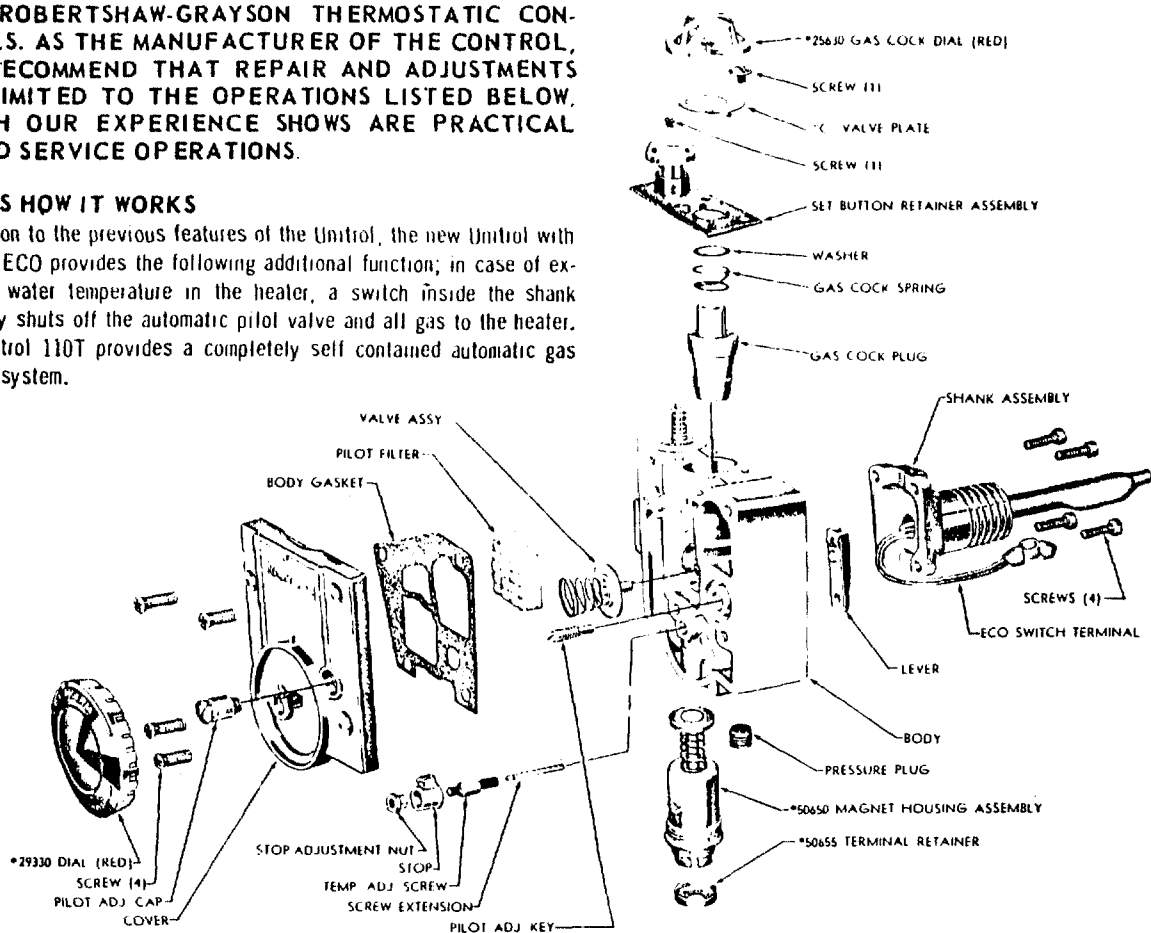
The thermostat dial on this heater should be set so that once the heater has achieved a temperature of 170-190 then spray the wand for a constant 60 seconds, then turn the wand off. Now the burner on the heater should remain on for 30-40 seconds. If the flame goes out prior to 30 seconds, turn the thermostat dial to a higher setting. If the flame on the burner continues to burn after 40 seconds, turn the thermostat dial to a lower setting.

This Hydra Stretch water flow technique is designed for simplicity in your achievement of proper PSI, heat and chemical mixture.

THIS BULLETIN IS INTENDED AS A GUIDE TO QUALIFIED FIELD SERVICEMEN INSTALLING OR REPAIRING ROBERTSHAW-GRAYSON THERMOSTATIC CONTROLS. AS THE MANUFACTURER OF THE CONTROL, WE RECOMMEND THAT REPAIR AND ADJUSTMENTS BE LIMITED TO THE OPERATIONS LISTED BELOW, WHICH OUR EXPERIENCE SHOWS ARE PRACTICAL FIELD SERVICE OPERATIONS.

### HERE'S HOW IT WORKS

In addition to the previous features of the Unitrol, the new Unitrol with built in ECO provides the following additional function; in case of excessive water temperature in the heater, a switch inside the shank assembly shuts off the automatic pilot valve and all gas to the heater. The Unitrol 110T provides a completely self contained automatic gas shut off system.

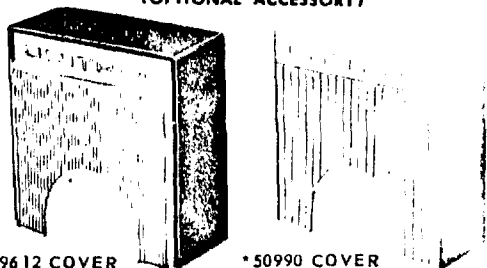


### NOTES:

To remove GAS COCK and TEMPERATURE DIAL, pull off (friction fit).

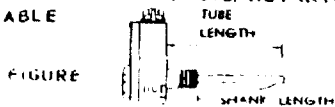
\*These items available for Field Service Replacement. Order by part number shown above.

### DECORATIVE PLASTIC SLIP-ON COVER (OPTIONAL ACCESSORY)



### WHEN ORDERING CONTROL SPECIFY:

1. MODEL - UNITROL 110T OR 110HCT.  
(SEE SMOOTH SIDE OF CASTING FOR STAMP.)
2. OUTLET SIZE 1/2 I.F., 3/8 PIPE OR 1/2 PIPE (110HCT ONLY).
3. SHANK LENGTH - (SEE FIG. 1).
4. TUBE LENGTH - (SEE FIG. 1).
5. TEMPERATURE DIAL - HOT 160° (110T) OR VERY HOT - 180° (110T8) NOT INTERCHANGEABLE



### GENERAL DESCRIPTION

The Unitrols 110T and 110HCT are combination Water Heater thermostats with automatic pilot, built-in automatic over temperature "ENERGY CUT-OFF" device, adjustable control of main and pilot gas, pilot filter with main and pilot gas cock, all in one compact unit.

The Unitrols 110T and 110HCT can be easily identified one from the other by the die cast front covers (front page) and by the model numbers on the smooth side of the body.

NOTE: These controls may be found with decorative plastic slip-on covers bearing the names, "UNITROL" or "UNITROL 400."

The Unitrol 110HCT is a high capacity version of the Unitrol 110T designed for application on appliances having higher than average Btu input.

The internal porting of the 110HCT is larger than on the standard 110T. This results in the outlet tapping being 1/16" closer to the rear of the body casting and the shank protruding 3/16" further behind the body. The net difference then is 1/8".



If control replacement is necessary, a Unitrol 110HCT can be substituted for a standard 110T; however, the Unitrol 110HCT must be replaced with another Unitrol 110HCT because of gas capacity requirements.

**A Unitrol 110T8 (180°) must not be substituted for a Unitrol 110T (160°) if control replacement is necessary.**

Service procedures and lighting instructions are identical for both controls.

The Unitrols 110T and 110HCT provide:

1. Accurate and dependable water temperature control.
2. Convenient built-in main gas pressure tap.
3. "Energy Cut-Off" Device - Complete high limit shut-off of all gas (pilot and main burner).
4. Complete shut-off of all gas (pilot and main burner) in the event of pilot outage.
5. High capacity pilot gas filter ahead of pilot adjustment.
6. Easy accessibility of all adjustments.
7. Robertshaw-Grayson "yoke" construction which permanently divorces the water from the gas passages.

## INSTALLATION INSTRUCTIONS

### PIPING

Make sure that the piping is clean and free from scale and burrs. Apply a small amount of good quality pipe thread compound which is suitable for the type gas being used. Thread compound should be used sparingly and on male threads only, leaving the first two threads clean. Pipe dope or thread compound should never be used on female threads as it may be pushed into the valve body.

### THERMOCOUPLE

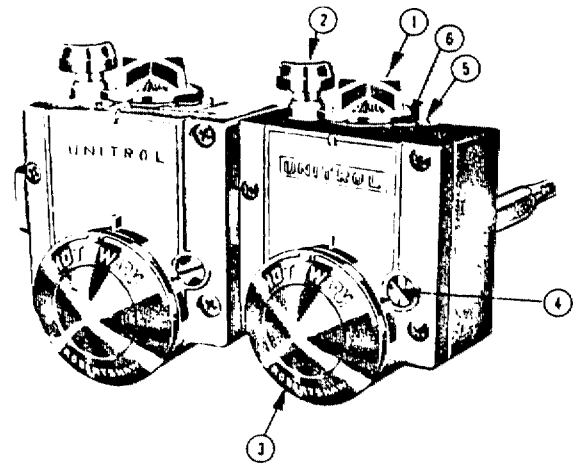
The thermocouple nut should be started and turned all the way in by hand. An additional quarter turn with a small (4") wrench will then be sufficient to seat the lock washer. **Caution:** Overtightening may cause damage to the thermocouple or magnet and is unnecessary.

### AUTOMATIC PILOT MAGNET AND VALVE ASSEMBLY REPLACEMENT

1. Shut off gas at line valve or meter.
2. Remove Thermocouple.
3. With small screwdriver, remove red plastic TERMINAL RETAINER.
4. With narrow blade screwdriver, pry blue SWITCH TERMINAL from magnet base slot, working from both sides to avoid damage.
5. Remove MAGNET ASSEMBLY by unscrewing 3/4" hexagon magnet assembly.
6. When replacing MAGNET ASSEMBLY, apply thread lube sparingly and tighten sufficiently to prevent gas leakage.
7. Reinstall TERMINAL in magnet base slot (it may be necessary to reposition TERMINAL wires.)
8. Reinstall TERMINAL RETAINER (snaps on).
9. Reinstall thermocouple (see "Installation Instructions" for proper thermocouple installation).
10. Re-establish gas supply and leak test with soap solution.

**CAUTION:** Never leave water heater with switch terminal disconnected from magnet in conclusion of service call.

## PROCEDURE FOR LIGHTING OR RELIGHTING



1. Turn GAS COCK DIAL (1) to "OFF" position.
2. Wait sufficient length of time to allow gas which may have accumulated in burner compartment to escape. (At least 5 minutes.)
3. Turn GAS COCK DIAL (1) to "PILOT" position.
4. Depress and hold RESET BUTTON (2) while lighting pilot burner. Allow pilot to burn approximately one-half minute before releasing RESET BUTTON. If pilot does not remain lighted, repeat operation allowing longer period before releasing RESET BUTTON. Adjust pilot, if necessary, as noted under "Pilot Burner Adjustment."
5. Turn GAS COCK DIAL (1) to "ON" position and turn TEMPERATURE DIAL (3) to desired position.

### MAIN BURNER ADJUSTMENT

(Gas Input):

1. To adjust main burner flame, loosen "C" valve screw, (5) turn "C" valve plate (6) clockwise to decrease the flow of gas to the main burner, or counter-clockwise to increase. Tighten "C" valve screw.

### PILOT BURNER ADJUSTMENT

1. Remove Pilot Adjustment Cap (4).
2. Adjust pilot key to provide properly sized flame.
3. Replace Pilot Adjustment Cap (4).

### TO CLEAN THERMOSTAT VALVE

1. Turn GAS COCK DIAL to "OFF" position.
2. Remove TEMPERATURE DIAL and PILOT ADJUSTMENT CAP.
3. Turn temperature stop to match opening in cover.
4. Remove four screws to remove COVER and COVER GASKET.
5. Remove SPRING and VALVE ASSEMBLY.
6. Clean VALVE and SEAT with lint-free cloth or chamois and replace SPRING and VALVE ASSEMBLY.
7. Replace COVER GASKET, COVER and PILOT ADJUSTMENT CAP. Tighten screws.  
NOTE: Place gasket on cover and slip screws into cover before replacing cover on body.
8. Relight PILOT and leak test around gasket with main burner "ON".
9. Replace TEMPERATURE DIAL.

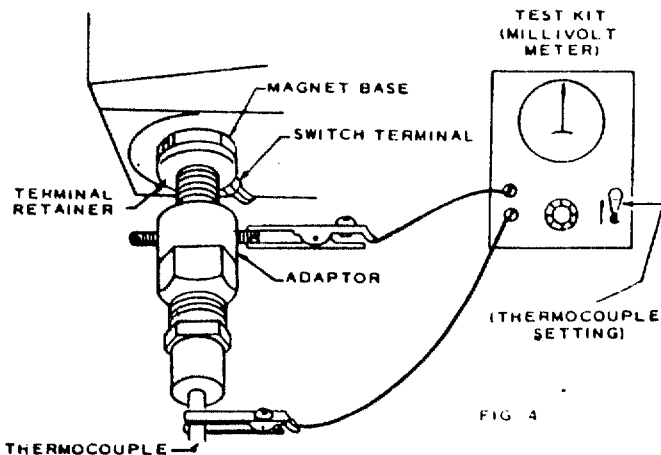


FIG. 4

- IV With adaptor connected as in Figure 4, check as follows:
- (A) Follow standard Lighting Procedure
  - (B) With closed circuit output in excess of eight millivolts, blow out pilot
  - (C) A good magnet should remain locked up for a drop of five millivolts or more from original stabilized output
  - (D) If magnet does not operate properly, replace magnet
  - (E) Repeat standard Lighting Procedure

If Section IV does not result in start-up, proceed to Section V

- V Check E.C.O. switch for closure:
- (A) Be sure water at thermostat level is below 120°F. To insure this, draw water from hot water faucet until thermometer registers 120°F or less
  - (B) With Test Kit on Magnet setting and dial set for maximum amperage, check for switch closure and continuity through the switch by touching clips to opposite switch terminal contacts as shown in Figure 5

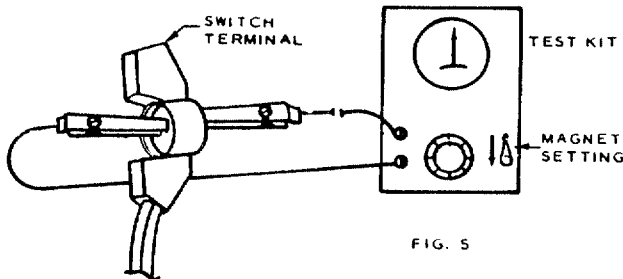


FIG. 5

- (1) If switch is closed, essentially full amperage reading will be obtained (approaching maximum needle deflection to the right)
- (2) If switch is open, no current will be shown (no meter needle deflection)
- (C) If switch contacts are open, replace control
- (D) If switch contacts are closed, follow standard Lighting Procedure. If these checks do not result in start-up, replace control

**Without Test Kit**

- VI To Check Thermocouple:
- (A) Remove thermocouple nut from Magnet Base and connect "Known Good Magnet" to thermocouple
  - (B) Follow standard Lighting Procedure, holding reset button down at least 30 seconds after lighting pilot
  - (C) Lock-up "Known Good Magnet" by depressing magnet valve face. If thermocouple is good, magnet should remain locked up for at least 30 seconds after pilot is extinguished
  - (D) If thermocouple does not lock-up, "Known Good Magnet" replace thermocouple

If thermocouple is good, proceed to Section VII

**VII To Check Magnet**

- (A) With small screwdriver, remove E.C.O. terminal retainer
- (B) With narrow blade screwdriver, pry E.C.O. terminal from magnet base slot, working from both sides to avoid terminal damage
- (C) Follow thermocouple installation instructions, leaving switch terminal out of magnet base
- (D) Follow standard Lighting Procedure
- (E) After thermocouple temperature is stabilized, (pilot burning at least 2 minutes) blow out pilot, if magnet is good, it should remain locked-up for at least 30 seconds after pilot is extinguished
- (F) If magnet will not lock-up or will not remain locked-up for at least 30 seconds after pilot is extinguished, replace magnet following Magnet Replacement Instructions (Page 3). If magnet is good, proceed to Section VIII

**CAUTION:** Never leave water heater with switch terminal disconnected from magnet at conclusion of service call

**VIII To Check E.C.O. Switch**

- (A) Be sure water at thermostat level is below 120°F. To insure this, draw water from hot water outlet until thermometer registers 120°F or less
- (B) Light pilot. If pilot does not remain lit when reset button is released, proceed as follows:
- (C) Remove thermocouple from magnet base
- (D) Remove E.C.O. terminal retainer
- (E) Remove E.C.O. switch terminal
- (F) Install thermocouple in magnet base
- (G) Light pilot. If pilot remains lit when reset button is released and if tests in Section VI and VII prove thermocouple and magnet are good, E.C.O. switch is not closing. Replace entire control

**CAUTION:** Never leave water heater with switch terminal disconnected from magnet at conclusion of service call

**COMPLAINT**

**WATER HEATER SERVICE ANALYSIS**

No hot water (pilot will not stay on)	Not enough hot water	Water too hot	POSSIBLE CAUSE	
			WATER HEATER SERVICE ANALYSIS	POSSIBLE CAUSE
X				Lint in pilot air opening
X				Loose or inoperative thermocouple
X				Inoperative electro magnet
X				Clogged pilot orifice
X				Improper pilot flame adjustment
X				Heater subjected to strong drafts
X				ECO switch contacts open (see test procedure for ECO)
	X			Thermostat setting too low
	X			Regulator pressure too low
	X			Main burner orifice too small (or clogged)
	X			Heater too small
	X			Thermostat out of calibration
		X		Thermostat setting too high
		X		Dirt on thermostat seat
		X		Thermostat out of calibration

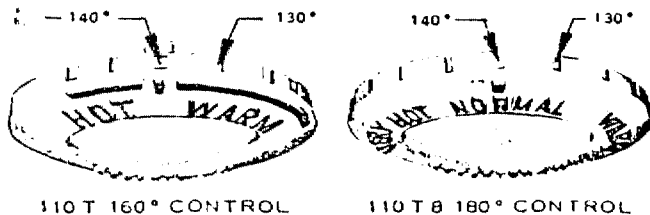
## TO LUBRICATE GAS COCK PLUG

1. Close gas supply at meter or line valve.
2. Remove GAS COCK DIAL by pulling straight up (rock dial slightly while pulling up).
3. Remove "C" VALVE PLATE and RESET BUTTON RETAINER PLATE (two screws).  
NOTE: Hold down retainer plate while removing screws.
4. Remove WASHER and SPRING and pull GAS COCK PLUG straight out of cavity. Rotate plug slightly if necessary.
5. Remove old grease from plug only. Do not attempt to clean cavity as old grease or foreign matter may be pushed into cavity.
6. Relubricate plug only with good quality gas cock grease suitable for aluminum gas cocks. Do not overlubricate.
7. Replace GAS COCK PLUG, SPRING WASHER, RESET BUTTON, RETAINER PLATE, "C" VALVE PLATE. Make sure "GAS COCK DIAL" is in "PILOT" position before tightening retainer plate screws.
8. Re-establish gas supply and relight pilot.
9. Test for leaks with soap solution with GAS COCK in both "ON" and "OFF" positions.

## TO RECALIBRATE THERMOSTAT

The Unitrol thermostat is built to the most exacting standards, and is a precision instrument which should never need recalibration. If, however, through misuse, tampering, or other conditions beyond our control, the thermostat is found to be more than 20° F out of calibration, a qualified serviceman may recalibrate as follows:

1. Manually turn the TEMPERATURE DIAL to the 130° mark (See Fig.)  
NOTE: If the temperature of the water is so high that the burner will not come on, run enough hot water from a faucet to cause the thermostat to turn the burner on. Then allow the burner to operate until the thermostat shuts it off.
2. Using a suitable thermometer (220°F), determine water temperature at the heater drain cock as follows:
  - a. Close off the cold water supply to the heater (this insures that burner remains off while testing.)
  - b. Open the nearest hot water faucet to break air lock.
  - c. Slowly open the drain cock until a flow of water just sufficient to cover the thermometer bulb is obtained.
  - d. When the temperature rise of the thermometer has stabilized, note the temperature and close the drain cock.
  - e. Close hot water faucet opened in step "b" and OPEN COLD WATER SUPPLY
3. Turn TEMPERATURE DIAL to correspond to the actual water temperature as determined by thermometer.

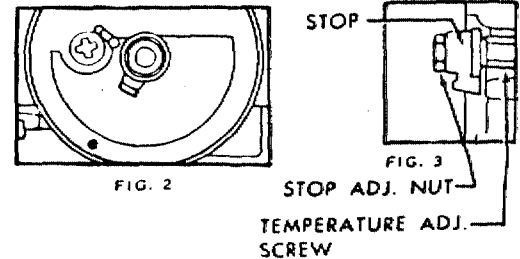


NOTE: Mark as shown = 140°. Each notch on rim of dial = 10° either direction.

4. Remove TEMPERATURE DIAL, mark location of stop for reference and replace (See Fig. 2)

5. Turn DIAL "clockwise" until the control snaps on.
6. Turn DIAL "counterclockwise" slowly until the control just snaps OFF.
7. Remove TEMPERATURE DIAL and holding STOP to pre-rotation, carefully loosen STOP ADJUSTMENT NUT (See Fig. 3)
8. Taking care not to move TEMPERATURE ADJUSTING SCREW, turn STOP until it corresponds with reference mark previously made.
9. Hold STOP and tighten STOP ADJUSTMENT NUT.
10. Replace TEMPERATURE DIAL, set to desired temp and recheck "OFF" temp as follows:

- Cycle heater by drawing hot water until burner comes on. Turn off hot water faucet and allow heater to heat water until the heater automatically shuts off. Check water temperature again at drain cock, comparing with temp. dial setting.



TEMPERATURE DIAL TYPES MUST NOT BE INTER-CHANGED SINCE ECO TEMPERATURES ARE MATCHED TO DIAL TYPE.

## BUILT-IN-ECO TEST PROCEDURE UNITROL 110T SERIES

Follow standard procedure for lighting or relighting. Adjust burner if necessary.

- I. If heater does not start up immediately under standard procedure for lighting, check the following:
  - (A) Check Thermostatic Valve Action.  
Thermostat valve leaks can result in overheating of tank water and result in shutdown due to E.C.O. action. If valve is found to leak, clean valve; if valve still leaks, replace thermostat.
  - (B) Check Thermostat Calibration at Highest Setting.  
160° Thermostats — (Hot - Warm Dial)  
If top temperature exceeds 160°F at shut off, shutdown was likely due to E.C.O. action. Recalibrate so top setting is in 155°F range.  
180° Thermostats — (Very Hot Dial)  
If top temperature exceeds 180°F at shut off, recalibrate so top setting is in 175°F range.
  - (C) If none of the above conditions exist, shutdown was most likely due to other causes.
- II. If standard procedure for lighting does not result in start-up, proceed to Sections III., IV., and V., if Test Kit is available; or Sections VI., VII., and VIII., if Test Kit is not available. A proven "good" magnet is required for tests outlined in sections VI., VII. and VIII.

### If Test Kit is Available

- III. Make closed circuit millivolt check as follows:
  - (A) Use Grayson Test Kit No. C165-34 or equivalent millivolt meter.
  - (B) Connect Adaptor No. 75036 and Test Kit as shown in Figure 4, being sure connections are tight.
  - (C) Follow standard Lighting Procedure.
  - (D) Check closed circuit output. If less than eight millivolts, replace the thermocouple.
  - (E) Repeat standard Lighting Procedure after thermocouple replacement.

If closed circuit millivolt check is greater than eight millivolts, or standard procedure does not secure start-up, proceed to Section IV.

## CONVERSION FROM CHEMICAL PUMP SYSTEM TO MIX TANK SYSTEM

NOTE: This set up may not be applicable to those systems with Junkers heaters.

1. The current incoming water line is routed from the incoming water regulator to the intake of the Cat pump. This hose may now run from the incoming water regulator to the side of the mix tank which is adjacent to the proportioner.
2. The bypass return line which currently goes to the low PSI side of the Cat pump will now be routed to the bottom of the mix tank.
3. A 1/2" hose may now be run from the bottom of the mix tank to the low pressure inlet of the Cat pump. The current fittings into the Cat pump must be replaced with the 8MA 8UFS fitting.
4. The chemical pump and it's 3 hoses can now be eliminated from the system.

The new clear plastic hose with the anti-siphon device will run from the chemical jug to the bottom of the chemical flow meter. The hose from the top of the chemical flow meter will now run to the inlet side of the proportioning valve.

5. The high level float should be factory set. The low water level kill switch will have 2 wires. The low water pressure switch by the incoming water regulator will no longer be used, so disconnect one wire from the low pressure switch and connect it to one of the wires from the low water level kill switch in the mix tank. Then connect the remaining wire on the low water pressure switch to the remaining wire on the low water level kill switch.
6. Disconnect and remove all wires leading to and from relay switch and flow sensor.
7. Remove flow sensor.  
  
Your chemical will now be dispensed into the mix tank in proportion to the water entering the mix tank.
8. Remove pump protection hose and insert plug.

NEW STYLE HEATER  
OPERATING INSTRUCTIONS

CAUTION: Heater must be fully purged with water prior to igniting.

A. TO START PILOT:

1. Adjust thermostat control knob on Unitrol to "warm".
2. Adjust upper dial to "pilot" position.
3. Depress pilot button.
4. Depress sparking button to light pilot.

IF NO: Is propane tank full?  
Is propane tank valve open?  
Has air been properly bled from propane line?

IF YES: Wait ten seconds, depressing button manually, then let off button.

B. TO LIGHT MAIN BURNER:

1. Turn upper knob to "ON" position. Flame will come on.

IF NO: PILOT HAS EXPIRED.

Turn upper dial to "OFF" position.  
Do not attempt to relight pilot for 60 seconds.  
Then repeat instructions (A - #1-4).

Water may already be at controlled temperature.

IF YES: Flame will turn off when thermostat senses maximum temperature.

C. TO ACHIEVE PROPER CARPET CLEANING TEMPERATURE:

1. Complete procedures A & B.
2. With 100' of hose, turn cleaning wand on for 5 minutes. The temperature should stabilize at 180-190 degrees. (If not, propane regulator may require slight adjustment).
3. Once a constant 180-190 degree reading is established, turn cleaning wand "off". The flame on the heater burner should remain on for 10-14 seconds.
  - a. If the flame expires prior to 5-14 seconds, turn the thermostat dial to a higher reading (then repeat C 1-3).
  - b. If the flame remains lit after 14 seconds, turn the thermostat dial to a lower reading. (Then repeat C 1-3).

c. If a 180 degree reading cannot be achieved:

1. Measure your water output. This heater will heat 1.5 gallons per minute constantly at 190 degrees. If your output is more than 1.5 GPM then your temperature will read low. If your output is less than 1.5 GPM then your temperature will read high.
2. If your wand is spraying constantly at 1.5 GPM and your temperature is still below 180 degrees then your burner jet may require cleaning.

TO REMOVE BURNER:

- Remove pilot tube nut and thermo-couple nut from the bottom of the Unitrol valve.
- Remove sparking wire from the plug at the burner.
- Loosen pipe union which connects the burner pipe to the gas valve pipe.
- Remove burner assembly.

Slide a #17 torch tip cleaner in and out of each jet. (Torch tip cleaner may be found at welding supply store.)

D. TO SHUT DOWN HEATER:

1. Turn upper dial to "OFF" position. Spray wand for 3 minutes to cool the coils in the heater.
2. Close propane tank valve.

H - M 1-79

OVER - WETTING

Over-wetting is annoying to all concerned and sometimes leaves a bad impression of the cleaning process used.

There are several areas that will cause over-wetting:

1. Too few vacuum strokes or improper vacuum strokes.
2. Obstructed, kinked or cut hoses.
3. Vacuum tank drain valve left partially open.
4. Clogged vacuum blower filter.
5. Cleaning a heavily foam-saturated carpet without defoamer. ( We recommend crystal type ).
6. Vacuum relief valve not operating properly, due to wear and misalignment, or adjustment may be required to increase vacuum to original factory setting. ( 14-15 HG ).

NOTE: 1979 model has vacuum relief valve built in to tank lid and has been preset at the factory.

## FREEZING

### DAMAGE BY FREEZING

Although reference has been made in the preceding pages regarding the damage resulting from freezing the unit, we shall condense and define the overall compromise of individual components:

1. Quick connect couplers	Replace
2. Incoming Water Regulator	Rebuild or replace
3. Heater water flow valve	Rebuild or replace
4. Warped or damaged High Pressure Pump manifolds	Rebuild pump and replace damaged parts
5. High Pressure relief valve	Rebuild or replace
6. Chemical flow meter	Repair or replace
7. Chemical check valve	Replace
8. Internal hoses and fittings	Replace
9. Propane heater core	Repair or replace
10. Cleaning tool valves and fittings	Repair or replace
11. Solution hoses and fittings	Repair or replace
12. High pressure gauge	Replace
13. Temperature sending unit	Replace
14. Pump safety solenoid	Replace
15. Chemical Pump (Dual Cats)	Repair or replace

A freeze guard system has been incorporated which minimizes and virtually eliminates possible damage resulting from freezing. Failure to operate it properly definitely compromises the unit and will result in costly repairs, not to mention the compromise to equipment and operator safety. The following procedure defines the steps necessary to accomplish this task.

1. Draw a 50/50 mixture of antifreeze and water or alcohol into the chemical feed line for a period of 30 seconds in the same manner as would be used to draw chemical.
2. Turn off propane heater and close propane tank valve.
3. Reduce engine speed to idle.
4. Turn off chemical flow meter.



5. Disengage electric clutch on high pressure pump.
6. Turn off engine.
7. Disconnect high pressure solution hoses and attach drain hose.
8. Rotate ignition switch counter-clockwise to accessory position and depress freeze guard button until water is no longer ejected from the drain hose.
9. Turn key switch "on" and pump clutch switch "on", short out the pump protection sensor with a screwdriver, turn on freeze guard pump to blow water out of the pump protection system.
10. Disconnect drain hose and continue to depress freeze guard button for 15 seconds.
11. Reconnect drain hose to remove residual moisture remaining within the machine.
12. Turn ignition switch off.  
(NOTE: Prior to turning ignition switch off, it may be desirable to reconnect high pressure solution hoses and cleaning tool and repeat steps 8, 9 and 10 above. Failure to purge hoses and cleaning tools may damage valves and fittings.)

CAUTION:

13. If extremely cold, disconnect hose to pressure gauge, leave loose until next start-up.

## PARTS ORDERS

Dear Customer,

To expedite your parts needs, please call your Regional Sales Representative. In most instances, he either stocks or has access to parts through a Regional Service Center.

In the event parts are unavailable locally, your Sales/Service Representative will contact Hydra-Master and coordinate your needs. If this becomes necessary, always indicate the method of shipment you desire, i.e. UPS, UPS Blue Label, Air Freight, Air Express, Etc..

Thank you for your compliance with the above request and we shall do our best to fulfill your needs.

## WARRANTY NEEDS

Hydra-Master Warranty is second to none and provides you the assurance of continued reliability. We realize the importance of minimum down time which can only be achieved through manufacturers support. The following procedure defines the steps necessary to provide you this service. Compliance with it is essential if parts are required.

1. Call Hydra-Master Corporation  
(206) 775-7275) and provide the following:
  - A. Name of Company and address
  - B. Model of equipment
  - C. Date of purchase
  - D. Hours on the unit
  - E. Serial number of unit
  - F. Name of person authorized to order parts
  - G. Salesman unit purchased from
  - H. Description of the problem
  - I. Pressure readings on high pressure gauge with wand turned on and turned off
  
2. Method of shipment - UPS, Air Freight, Air Mail, Air Express, Auto Freight, Etc..

3. DO NOT give malfunctioning part(s) to a sales/service representative. ALL parts must be returned, freight prepaid, to Hydra-Master Corporation for evaluation.

Hydra-Master's warranty policy provides parts without charge for thirty days to customer maintaining good credit rating. Malfunctioning parts must be returned directly to Hydra-Master Corporation for final disposition. Un-approved warranty evaluations and/or failure to return part(s) for warranty consideration will result in appropriate charges. Detailed instructions always accompany each shipment to outline both your obligations and options to the warranty procedure.

Any questions you have regarding the warranty program should be directed to service personnel at Hydra-Master Corporation. We shall endeavor to be fair in our evaluation of your warranty claim and always provide you a complete analysis of our findings.



No. PSB - HM - 100

Date: JANUARY 1979

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** HYDRA-CAT, BOB-CAT  
& AQUA CAT

**Section Insert#:**

**Subject:** CARBON REMOVAL - ENGINE

Units operating on regular gasoline require carbon removal from combustion chambers approximately every 400 hours as defined by the Onan Service Manual. Failure to comply will void the engine manufacturers warranty and could result in unnecessary expense and costly down time. The cost to perform carbon removal is relatively inexpensive but does vary throughout the country. Normally this service must be scheduled with the Onan Service Center in the same manner as tune-ups, etc.



No. PSB-HM-101

Date: January 1977

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

**Section Insert #:**

**Subject:** ONAN ENGINE VALVE ADJUSTMENTS

To ensure continued reliability from the ONAN engines incorporated in our units, it is NECESSARY to adjust both intake and exhaust valves after 300 hours of use. Failure to comply with this suggestion may necessitate a valve repair after 500 hours of use and can compromise engine warranty during the warranty period.

The condition which will often occur if valves are not adjusted is power loss and damage to valves and valve seats.

Instructions for preventive maintenance procedures, i.e. tune-up, oil changes, carburetor breather filter, fuel adjustment, valve adjustments, etc. are outlined in the ONAN Service Manual contained in the Hydra-Master Manual. Your local small engine service shops as well as ONAN Service Centers are qualified to perform necessary adjustments.



No. PSB-HM-102

Date: JANUARY 1979

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

**Section Insert #:**

**Subject:** CLEANING STROKE PROCEDURE

PURPOSE:

To eliminate excess moisture remaining in the carpet fiber and the sawtooth appearance which results from diagonal movement of the cleaning tool.

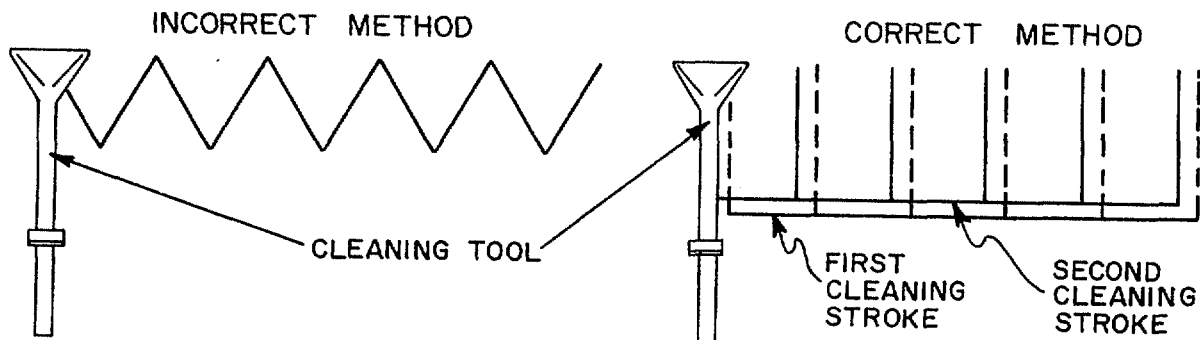
SCOPE:

All types of carpet.

PROCEDURE:

Always move the cleaning tool in smooth forward and backward strokes. Apply slight pressure on the forward stroke while the solution is injected into the carpet. When extracting (drying), apply firm pressure on the forward stroke to ensure a positive "lock" for the vacuum and minimize the "hopping" effect resulting on unsmooth carpet. During the forward and reverse strokes, movement to the right or left should only be accomplished at the extreme rear of the stroke. A drawing is provided below to illustrate this technique. Overlapping is also important to ensure even application of solution to prevent saturation.

Failure to adopt the above procedure can result in increased fiber shrinkage, brown out, and longer drying periods.



FORM # \_\_\_\_\_



No. PSB-HM-103

Date: JANUARY 1979

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

**Section Insert #:**

**Subject:** WATER SOFTENER

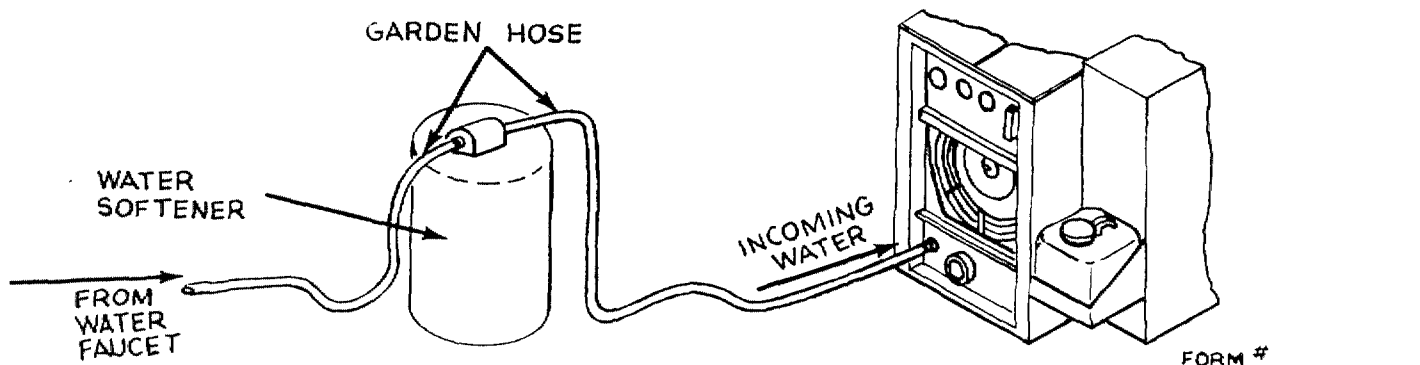
Many areas of the country have an excess of minerals in the water which results in what is commonly called "hard water". These minerals tend to adhere to the insides of heater coils and other parts of the machines causing damage and a loss of cleaning effectiveness.

Reports from several of our machine users commending the results of the use of water softeners in conjunction with their machines prompts us to recommend the procedure to everyone in a "hard water" area.

The relatively low cost of a water softener service is more than made up for in the increased life of machine parts and continued cleaning efficiency.

Contact a water softener distributor in your area for information on the rental of a simple water treatment unit to carry in your truck.

See installation diagram below.





No. PSB-HM-105

Date: JANUARY 1979

## PRODUCT SUPPORT BULLETIN

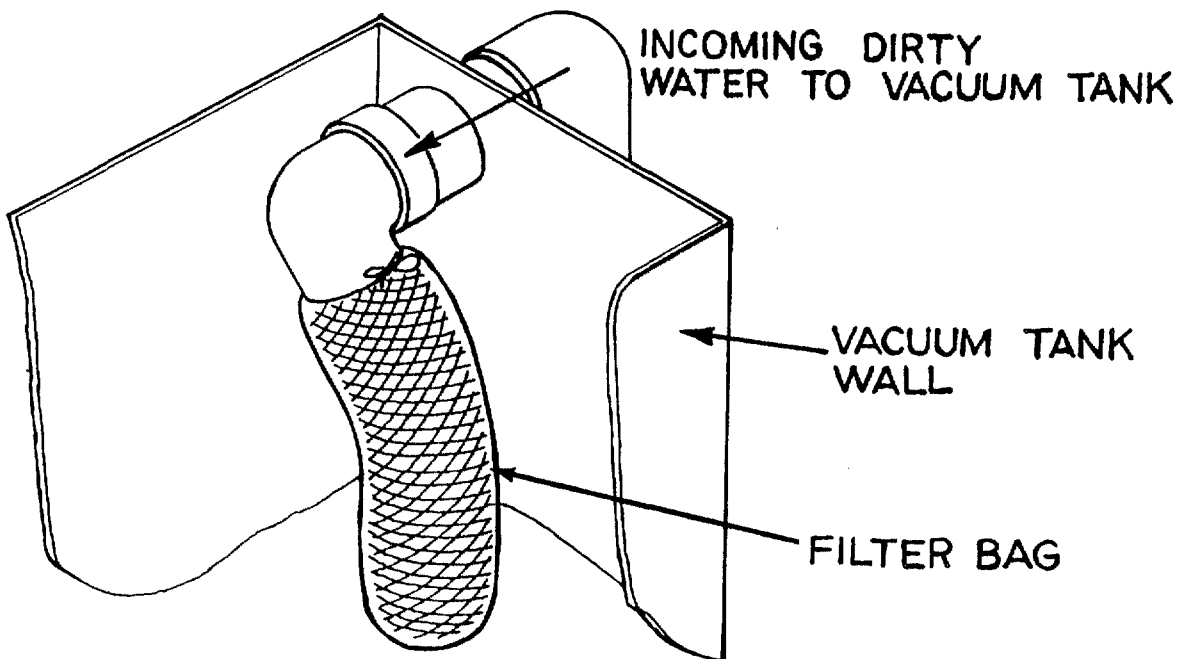
### Service/Parts/Publications

**Model(s):** ALL

**Section Insert#:**

**Subject:** VACUUM TANK FILTER BAGS

We have available, for your purchase, filter bags that are designed to trap all of the lint, sand and dirt that would normally collect at the bottom of your vacuum tank. The use of these bags, if emptied at the end of each job or at the end of the day, will eliminate the buildup of much of the debris in the tank. The drawstring top of these bags is designed to be tied to the incoming water inlet in the vacuum tank.



FORM # \_\_\_\_\_





No. PSB-HM-104

Date: JANUARY 1979

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

**Section Insert#:**

**Subject:** CHEMICAL BUILD-UP

TO SAVE TIME AND MONEY, REMEMBER PROTECTIVE MAINTENANCE IS THE KEY TO MANY SUCCESSFUL OPERATIONS. SOME OF OUR CUSTOMERS ARE NEGLECTING TO FLUSH THEIR MACHINES AFTER 40 HOURS OF USE. REMEMBER, BECAUSE OF THE DIFFERENT TYPES OF CHEMICALS, WATER CONDITIONS, AND HEAT, CHEMICAL BUILD-UP MAY OCCUR. TO FIGHT THIS PROBLEM, FLUSH THE MACHINE ONCE A WEEK OR EVERY 35 - 40 HOURS WITH VINEGAR. FOLLOW THESE INSTRUCTIONS: WHILE MACHINE IS RUNNING, PLACE CHEMICAL FEED HOSE IN A BOTTLE OF WHITE VINEGAR AND TURN ON TOOL SO THE VINEGAR WILL BE PULLED THROUGH THE SYSTEM. DO NOT LEAVE IN SYSTEM ANY LONGER THAN 45 MINUTES OR DAMAGE MAY OCCUR TO INTERNAL COMPONENTS. FLUSH WITH CLEAR WARM WATER IN THE SAME MANNER AS THE VINEGAR WAS INJECTED. THIS WILL BREAKDOWN BUILD-UP AND PREVENT COSTLY DOWN TIME, AND LONGER LIFE FOR YOUR MACHINE.

WHITE VINEGAR IS A MILD ACID AND WILL CONTRIBUTE TO THE REMOVAL/BREAKDOWN OF EXCESSIVE CHEMICAL BUILD-UP IN COMPONENTS SUCH AS HOSES, FITTINGS AND HEATERS.



No. PSB 121  
Date: MAY 1980

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

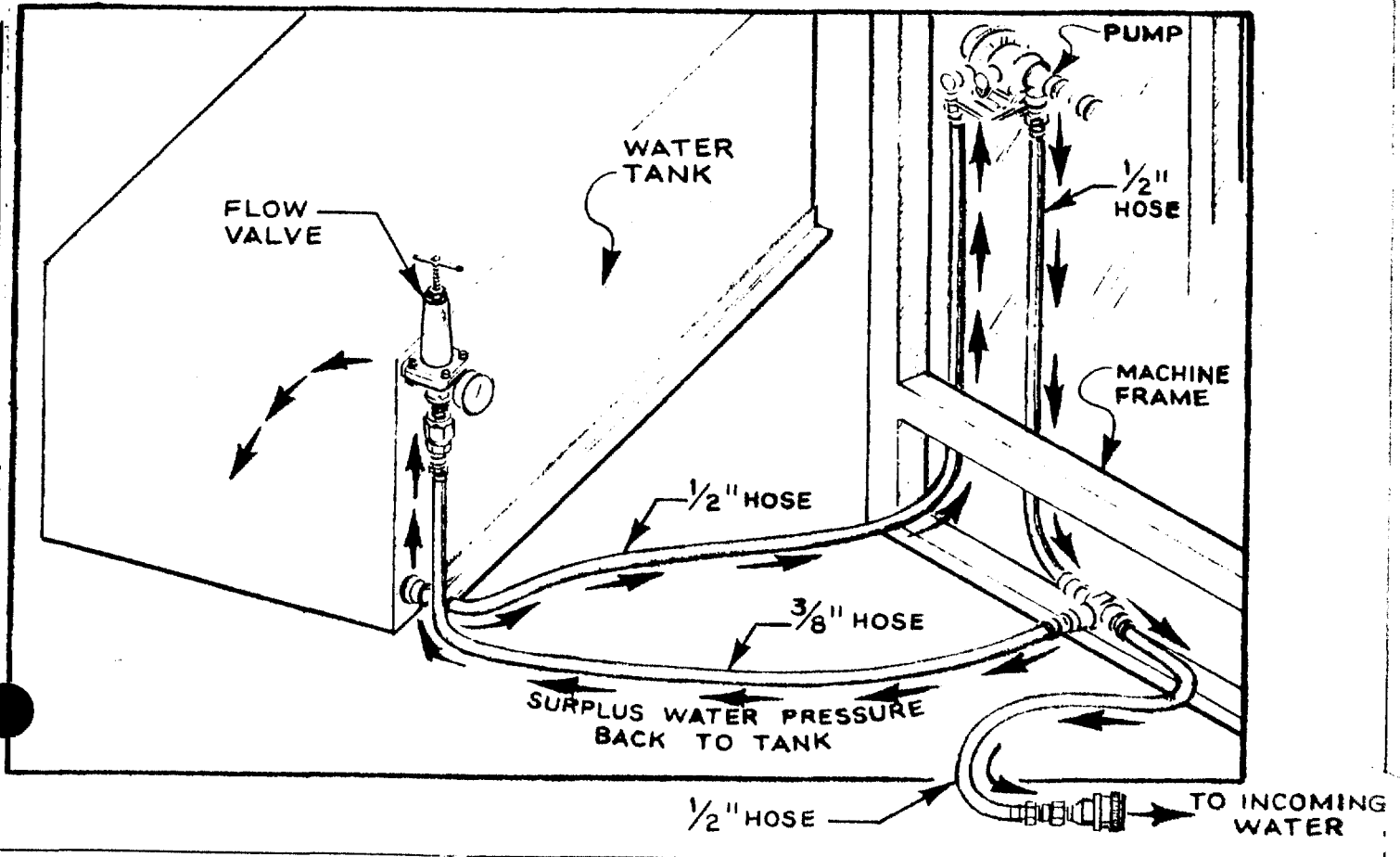
**Model(s):** DUAL-CAT & HYDRA-CAT

**Section Insert #:**

**Subject:** PUMP-IN SYSTEM

HYDRA-MASTER FIELD REPORTS HAVE INCREASINGLY INDICATED A DEFICIENCY IN THE DUAL-CAT & HYDRA-CAT PUMP-IN SYSTEM. A VALVE AND GAUGE HAS BEEN ADDED TO MAINTAIN A CONSTANT FLOW AND PRESSURE AGAINST THE SYSTEM-PUMP. THE GAUGE PROVIDES A READING TO ASSURE THIS CONSTANCY. IT SHOULD READ 45 P.S.I.

TURN THE TEE-HANDLE ON THE VALVE CLOCKWISE FOR PRESSURE INCREASE OR COUNTER-CLOCKWISE TO DECREASE THE PRESSURE.





No. PSB - HM - 113

Date: August, 1979

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

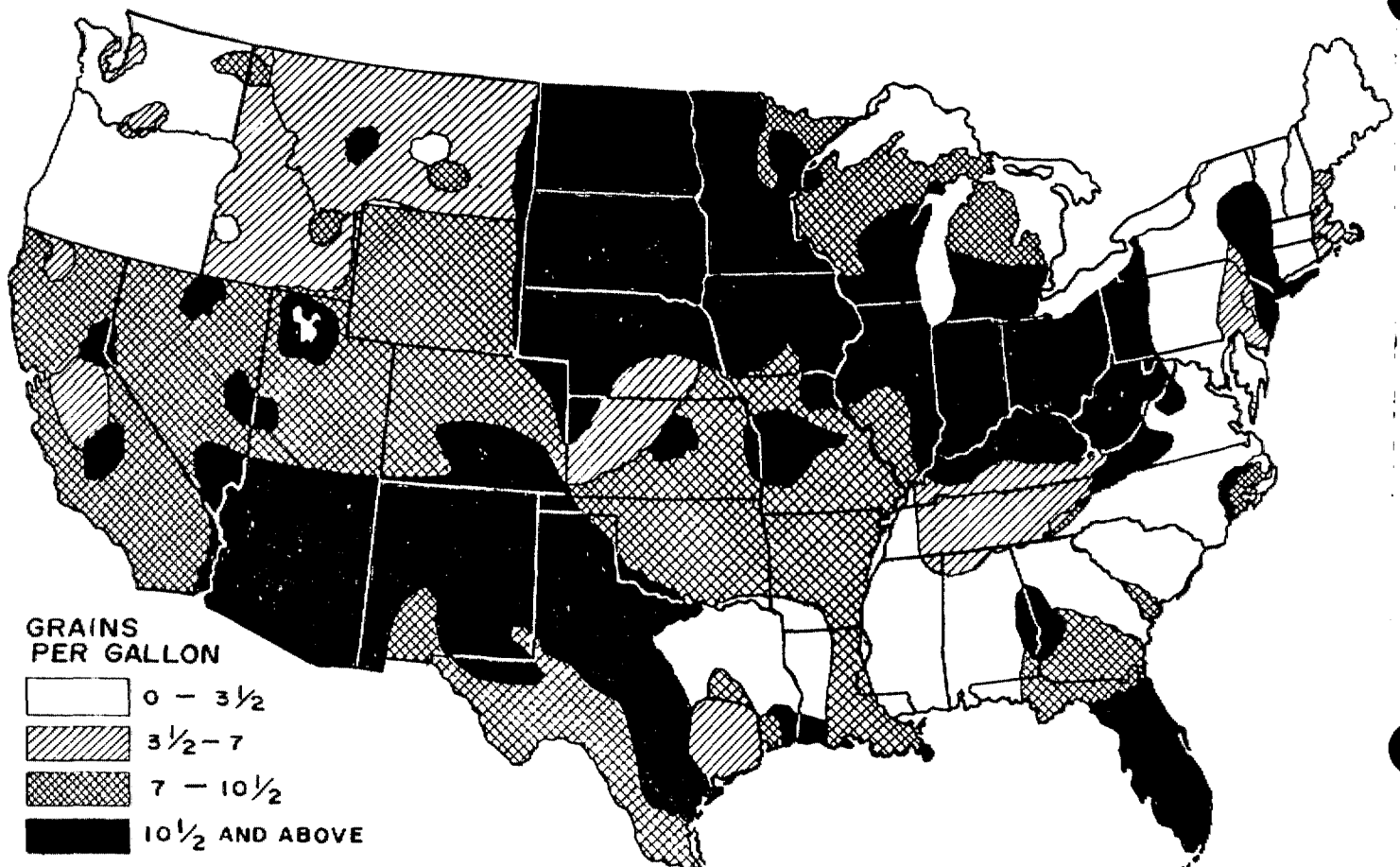
**Section Insert#:**

**Subject:** USE OF A WATER SOFTENER

#### IMPORTANT NOTICE

The quality of water varies greatly throughout the United States and influences the reliability and efficiency of equipment in direct proportion to its level of hardness. The map below defines areas which compromise fluid related components such as hoses, fittings, heaters, pumps, valves and water cooled engines.

Cleaning efficiency and equipment life is increased, chemical use decreased and the appearance of cleaned carpets enhanced when water softeners are incorporated in hard water areas. Hydra-Master strongly urges the use of water softener units in areas exceeding  $3\frac{1}{2}$  grains per gallon. Using the legend as a reference, determine the quality of water in your area and take action immediately should it be necessary.





No. PSB - HM - 111

Date: August, 1979

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

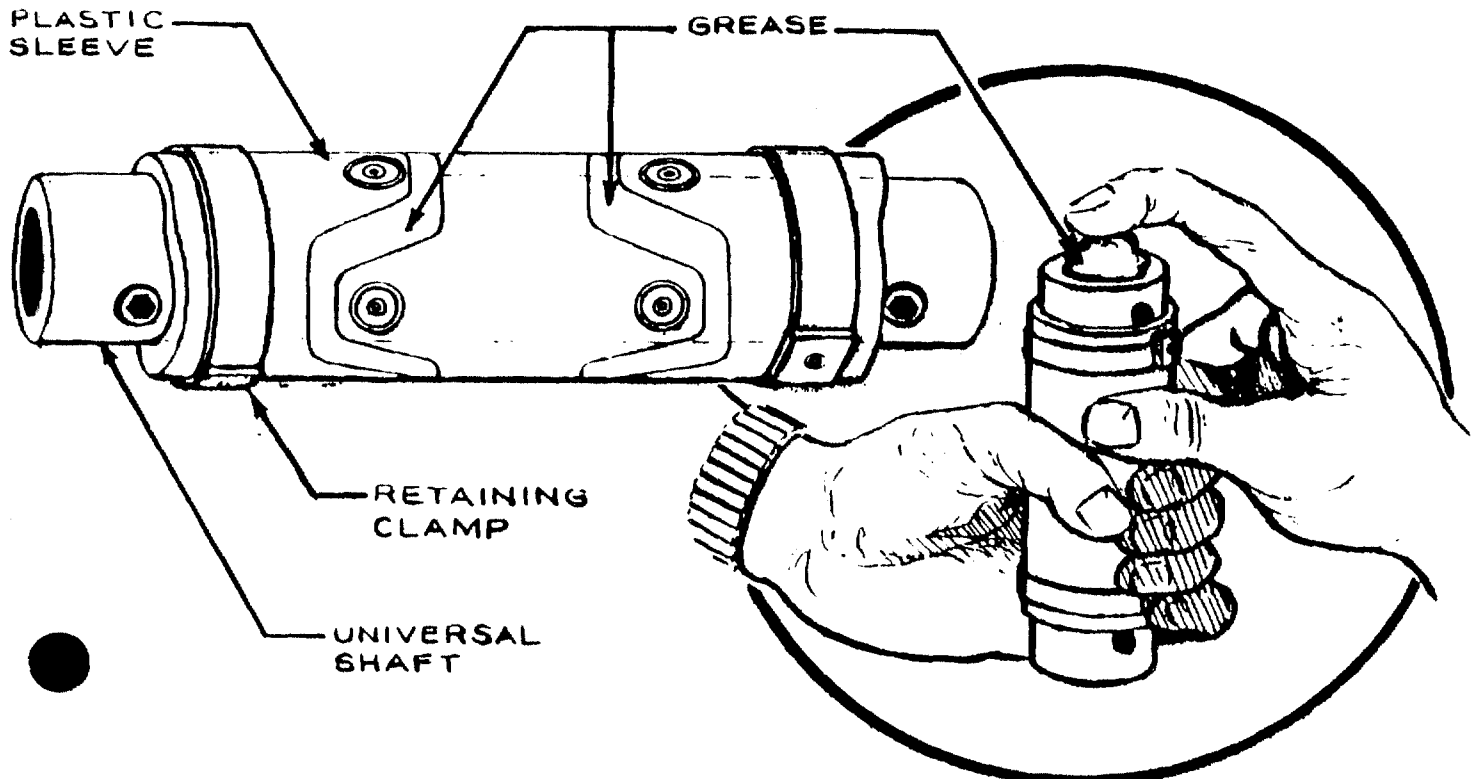
**Model(s):** ALL Aqua Cats and Units **Section Insert #:**  
employing a self contained  
**Subject:** pump-in system.  
Positive lubrication of  
Universal coupler bearings.

**IMPORTANT:** On all subject models, lubrication of the universal coupler is necessary to ensure continued reliability and long life. Installation of a plastic sleeve as illustrated will serve to contain grease as the coupler rotates during normal use. Prior to re-installation of the coupler, grease should be forced through each end until it appears at swivel joints.

**NOTE:** During reinstallation of the coupler, careful consideration should be given to avoid misalignment as this will result in reduced coupler life.

**ATTENTION:** Upon request, sleeves will be provided without charge to customers purchasing models not equipped with this modification.

**NOTE:** Plastic sleeve should be clamped as illustrated.





No. 114

Date: JANUARY, 1980

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** HYDRA CAT, DUAL CAT  
BOB CAT, H-VAN

**Section Insert #:**

**Subject:** FREEZE GUARD PUMP MAINTENANCE UP-DATE

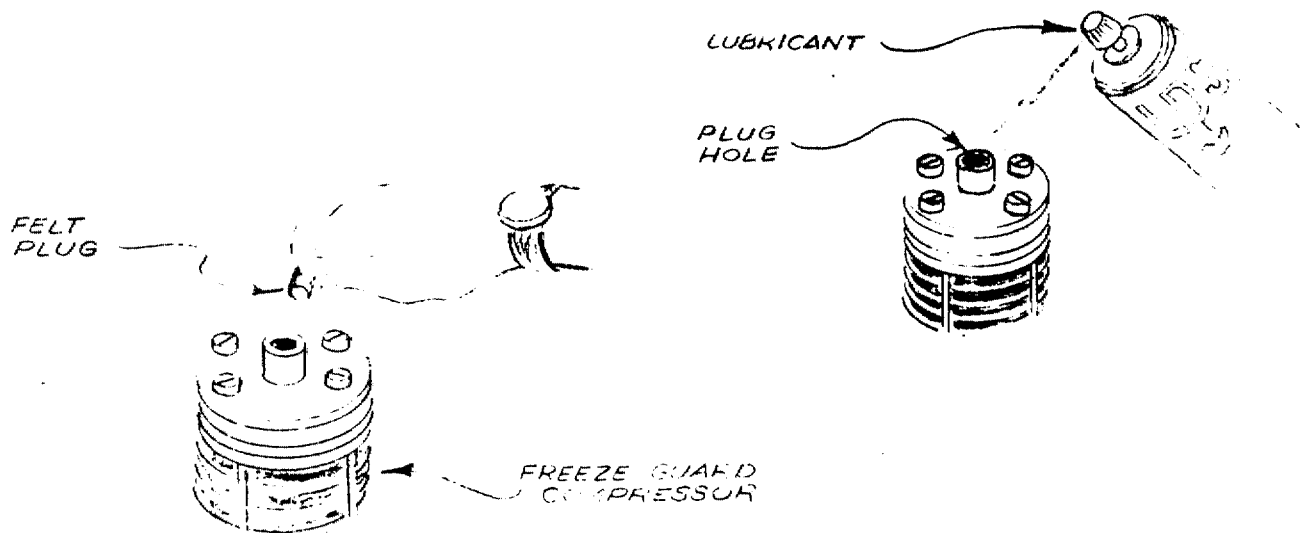
DUE TO PROBLEMS ARISING WITH FREEZE GUARD COMPRESSORS, I FEEL IT WOULD BE TO OUR (AND OUR CUSTOMERS) ADVANTAGE TO LUBRICATE THESE PUMPS.

THIS CAN BE DONE EFFICIENTLY BY REMOVING THE FELT FILTER ON THE TOP OF THE PUMP HEAD AND SPRAYING A SMALL AMOUNT OF LPS 1. THIS OPERATION SHOULD BE REPEATED WEEKLY.

AFTER LUBRICATION, THIS PUMP SHOULD BE OPERATED TO ALLOW FOR MAXIMUM LUBRICATION OF PISTON AND CYLINDER.

THIS PROCEDURE SHOULD BE PERFORMED IN THE SUMMER MONTHS ALSO AS EXTENSIVE PERIODS OF NON-USE MAY CAUSE PISTON TO SEIZE TO THE CYLINDER.

THANK YOU,  
BOB CRAM  
WARRANTY/SERVICE





No. 116

Date: MAY, 1980

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL EXCEPT HYDRA STATION AND HYDRA VANS **Section Insert#:**

**Subject:** USE OF GASAHOL AND GASOLINE DE-ICER IN ONAN BUILT ENGINES

EFFECTIVE: IMMEDIATELY

The use of gasahol and gasoline de-icers could possibly distort the internal parts of carburetors and fuel pumps and deteriorates the binders of the gaskets used on Onan built engines.

Because of the unknown effects of gasahol and gasoline de-icers, ONAN does not recommend their use in ONAN built engines.

Onan intends to do future testing on gasahol fuel and its effects when used in Onan engines in 1980. These test results will be published in a future Product Support Bulletin when available.



No. PSB - #124

Date: MARCH, 1981

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

**Section Insert #:**

**Subject:** BYPASS VALVE

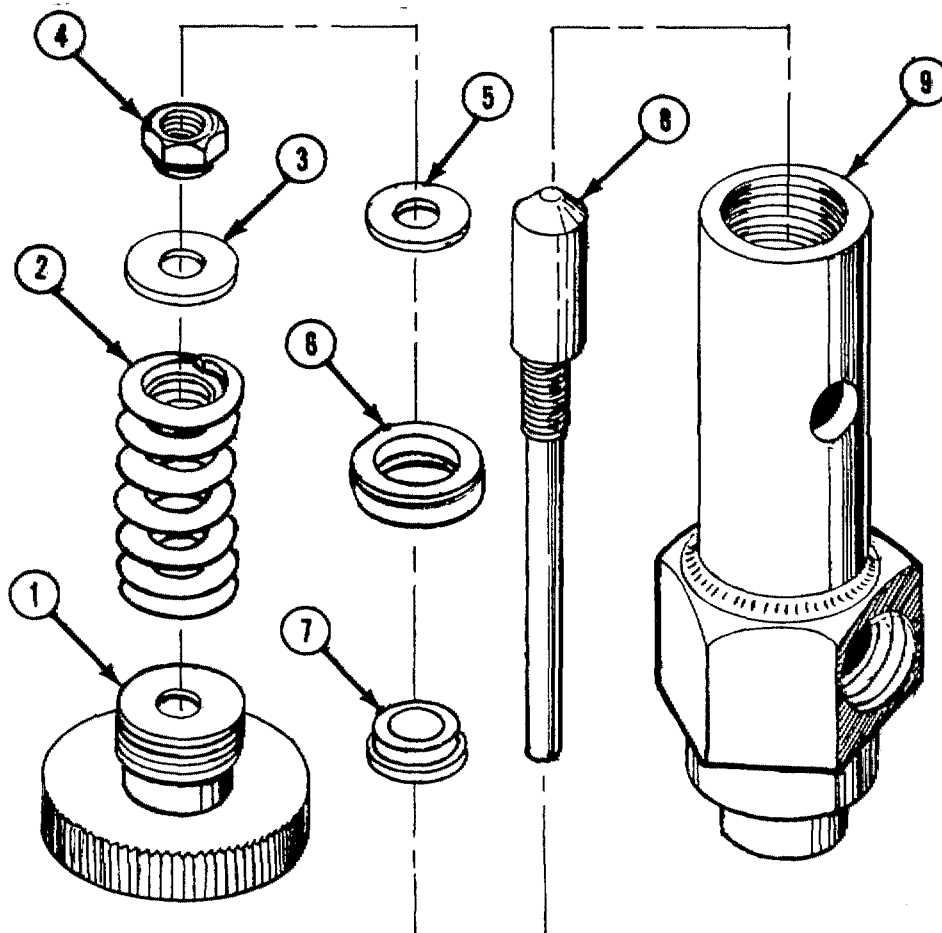
READ BEFORE REPAIR

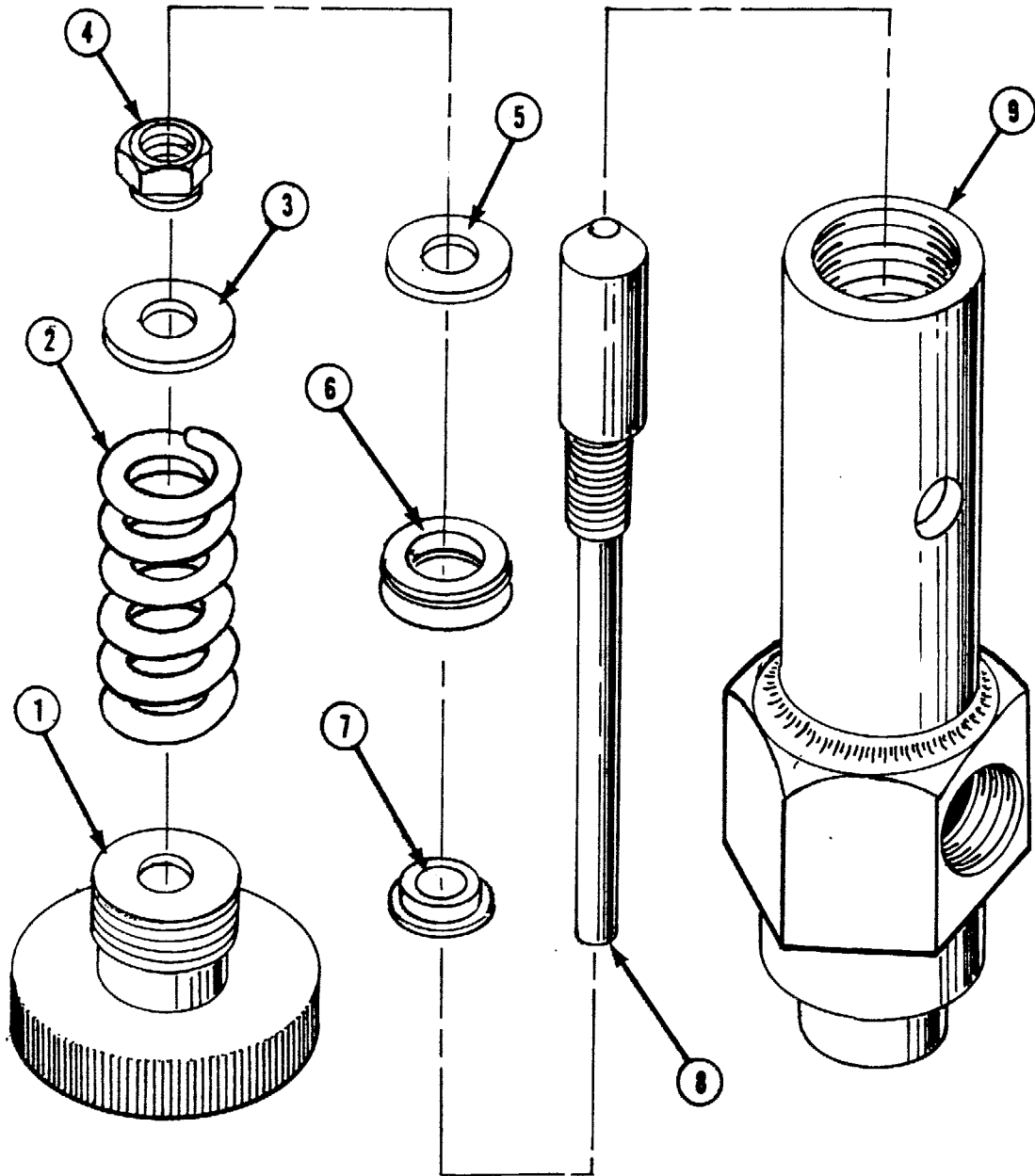
TO SERVICE BYPASS

1. Unscrew knurled knob and remove.
2. Wiggle protruding shaft with fingers or pliers, pull up and remove from main body.

#### SPECIAL INSTRUCTIONS - BYPASS

- #4 - 5/16" fine thread
- #6 - Cup seal (if leather, replace or lube with leather oil).
- #7 - Brass bushing
- #8 - Shaft - if cup needs replacement, place thin end of shaft only in vise and remove 5/16" nut. Fat end is "seating" surface and must be free of abrasion to properly seat. NOTE: IMPORTANT - when replacing cup seals, only wrench nut #4 to where cup will not turn on shaft. If cup is too loose, Bypass will leak. Too tight, cup will flange and Bypass will leak.





REF. NO.	PART NO.	PART DESCRIPTION	QTY. USED
1.	-----	BYPASS VALVE KNOB	1
2.	000-155-109	SPRING, STOCK	1
	000-155-108	" , HEAVY DUTY	1
3.	-----	WASHER	1
4.	-----	NUT	1
5.	-----	WASHER	1
6.	000-044-002	CUP, LEATHER	1
	000-044-003	" , BLACK RUBBER	1
7.	-----	WASHER	1
8.	000-150-005	REPLACEMENT SHAFT	1
9.	-----	BYPASS BODY	1





No. HM - 125

Date: OCTOBER 198

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** BOBCAT

**Section Insert #:**

**Subject:** ENGINE EXHAUST MANIFOLD

THE HYDRA-MASTER MAINTENANCE LOG IN YOUR MANUAL STATES TO TIGHTEN EXHAUST MANIFOLD CLAMPS EVERY 100 HOURS.

HYDRA-MASTER ASKS THAT YOU PROCEED ONE STEP FURTHER AND ALSO TIGHTEN THE EXHAUST MANIFOLD STAND OFF TUBE. "LOCK TIGHT" MAY BE REQUIRED ON SOME MODELS.

TO PREVENT THREAD DAMAGE IN THE ENGINE HEAD, IT IS IMPORTANT THAT THIS BECOMES A PART OF YOUR MAINTENANCE ROUTINE.



No. PSB-HM-126

Date: NOVEMBER 1980

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL H/CATS, AQUA-CATS  
DUAL-CATS, D/AQUA-CATS  
**Subject:** MANUFACTURED PRIOR TO  
AUGUST 1980

**Section Insert #:**

TO HELP REDUCE PROBLEMS WITH ENGINE SEIZURES DUE TO MALFUNCTIONING OIL PUMPS, HYDRA-MASTER WILL NOW SUPPLY IT'S CUSTOMERS WITH OIL PRESSURE SWITCHES.

THIS SWITCH IS LOCATED DIRECTLY ABOVE THE OIL FILTER. A SINGLE WIRE WILL RUN FROM THIS SWITCH TO THE STUD ON THE POINT BOX. IF YOUR MACHINE DOES NOT HAVE THIS ENGINE SAFETY DEVICE AND YOU WISH TO INSTALL ONE, PLEASE CALL HYDRA-MASTER PARTS DEPARTMENT, (206) 775-7276.



No. PSB-HM-127

Date: JANUARY, 1981

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** HYDRA-CAT, DUAL-CAT,  
BOBCAT

**Section Insert#:**

**Subject:** PROPANE GASES

PROPANE GASOLINE IS EASILY ACCESSIBLE ACROSS THE COUNTRY. HOWEVER, IT IS IMPORTANT TO REALIZE THAT THESE GASES DO VARY. IN THE 5 MAJOR WINTER MONTHS, PROPANE REFINERIES WILL ADD METHOL ALCOHOL. THIS IS DONE TO RESTRICT MOISTURE OR CONDENSATION FROM ENTERING THE SYSTEM. IF IT DOES, THE METHOL ALCOHOL WILL ELIMINATE POSSIBLE FREEZING OF THAT CONDENSATION.

THIS ADDITIVE WILL HAVE NO EFFECT ON THE PERFORMANCE OF THE BURNER UNIT, HOWEVER, IF YOUR PROPANE IS PURCHASED IN SEPTEMBER, BUT NOT USED UNTIL DECEMBER, IT IS POSSIBLE THAT THE CONDENSATION MAY FREEZE. SYMPTOMS OF THIS OCCURRING IN YOUR UNIT WOULD BE LOW OR NO PROPANE FLOW, OR AS IF THE TANK WAS ALMOST EMPTY.

APPROXIMATELY -40 DEG. F. IS THE FREEZING POINT OF PROPANE FUEL. HOWEVER, BUTANE WILL FREEZE AT 32 DEG. F.. THEREFORE, IT MAY BE TO YOUR ADVANTAGE TO SEE TO IT THAT METHOL ALCOHOL IS ADDED AT YOUR BUTANE SUPPLIES REFINERY.



No. HM-PSB-128

Date: JANUARY, 1981

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

**Model(s):** ALL

**Section Insert#:**

**Subject:** INSTRUMENTS & GAUGES

YOUR HYDRA-MASTER UNIT IS EQUIPPED WITH AN INSTRUMENT PANEL WHICH CONTAINS THE APPROPRIATE GAUGES FOR YOUR UNIT. THESE INSTRUMENTS ARE IMPORTANT TOOLS TO YOUR CARPET CLEANING SUCCESS. WITHOUT THEM YOU WOULD NOT HAVE COMPLETE OVERSIGHT OF YOUR UNITS OUTPUT SINCE THE TEMPERATURE OF THE WATER CANNOT BE ACCURATELY MEASURED BY THE AMOUNT OF STEAM YOU SEE EXPELLED FROM THE WAND, NOR CAN THE PRESSURE BE MEASURED BY THE FEEL OF THE WATER HITTING THE CARPET. THEREFORE, IF YOUR GAUGE HAS MALFUNCTIONED, DON'T GUESS AS TO WHAT YOU THINK IT MIGHT READ. YOU MAY DAMAGE YOUR EQUIPMENT OR POSSIBLY A CARPET (AND YOUR REPUTATION).



No. HM-PSB-129

Date: JANUARY, 1981

## PRODUCT SUPPORT BULLETIN

### Service/Parts/Publications

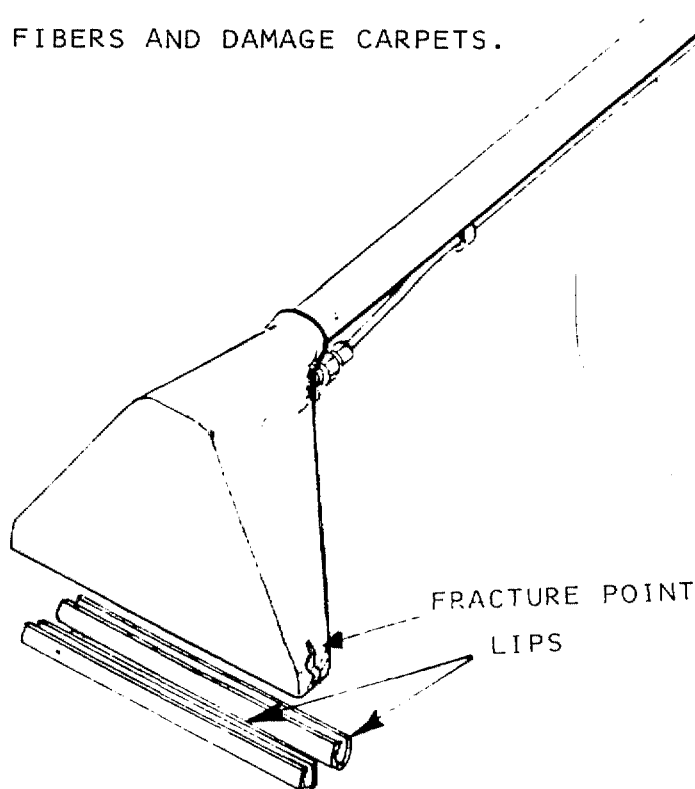
**Model(s):** ALL

**Section Insert#:**

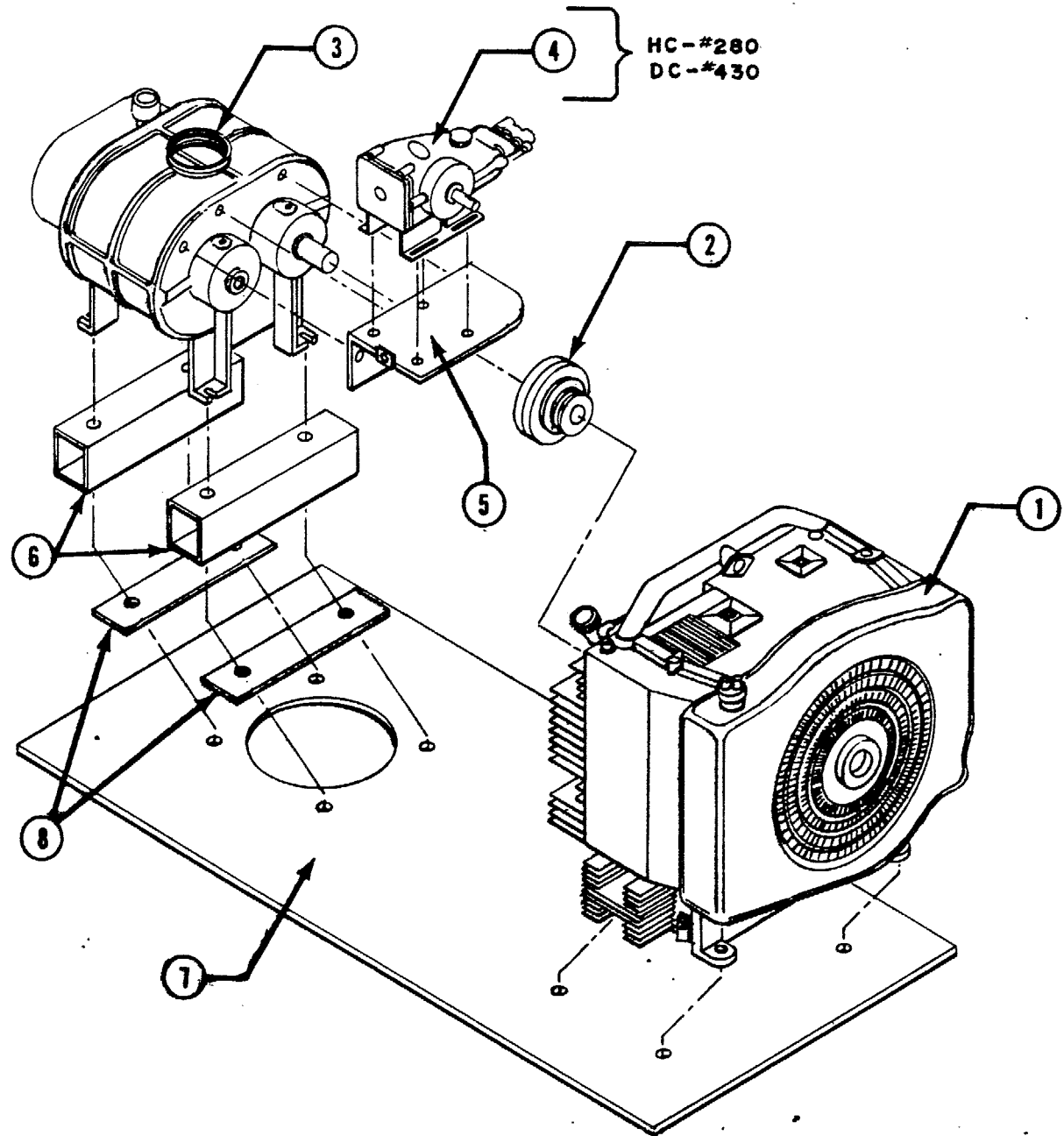
**Subject:** HYDRA HOE CLEANING TOOL  
CRACKED VACUUM HEAD

AFTER PERIODS OF USE AND STORAGE IN THE REAR OF YOUR TRUCK, IT MAY BE POSSIBLE THAT THE VACUUM HEAD OF YOUR WAND MAY SHOW SIGNS OF SEVERE WEAR OR FATIGUE. INSPECTION OF YOUR WAND MAY SHOW A CRACK ON EACH END ABOVE THE LIPS OF YOUR TOOL. THIS MAY BE REPAIRED BY A HELI ARC WELD. PRIOR TO THE WELD THE STAINLESS STEEL SURROUNDING THIS FRACTURE MUST BE EXTREMELY CLEAN. AFTER REPAIR THE WELD MUST BE GROUND SMOOTH.

IT IS IMPORTANT THAT THESE FRACTURES ARE REPAIRED OR IT MAY SNAG CARPET FIBERS AND DAMAGE CARPETS.

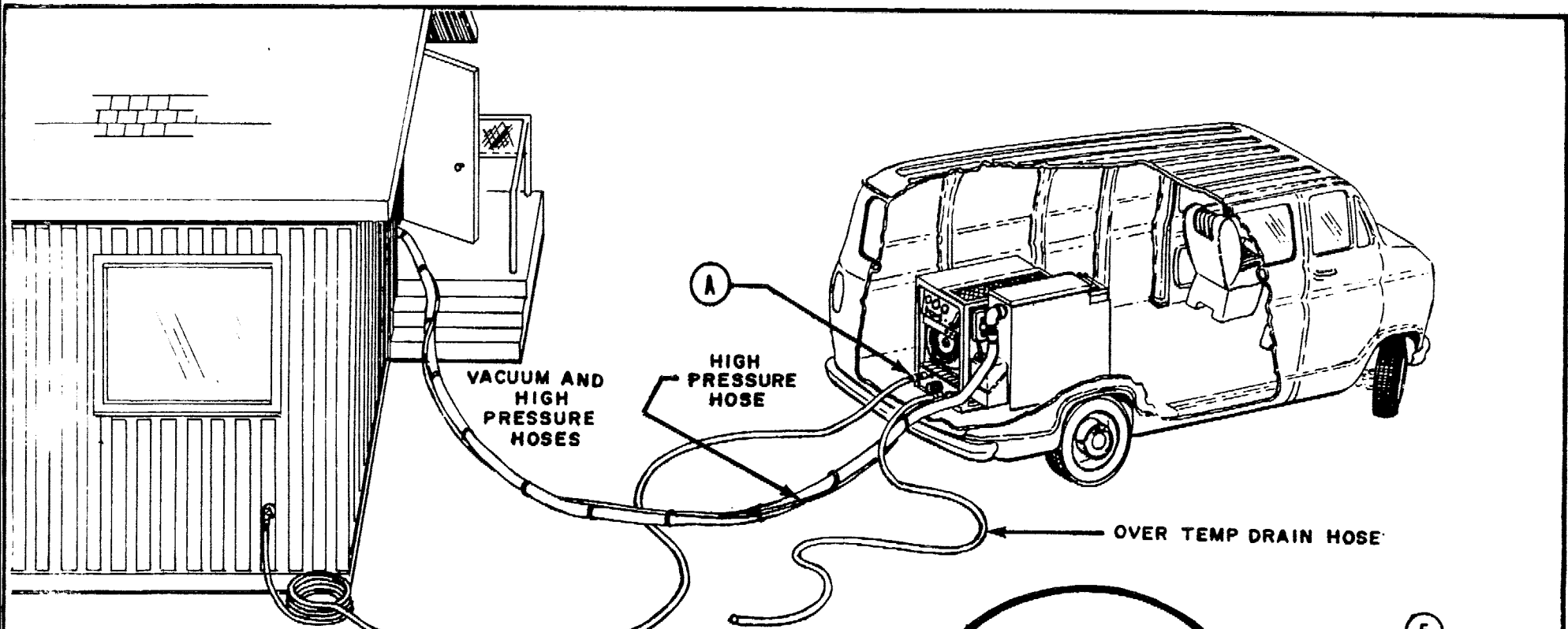


REF NO	PART NO	PART DESCRIPTION	QTY USED
1.	625900	ENGINE	1
2.	635002	COUPLER	1
3.	626000	BLOWER	1
4.	628000	D/C HIGH PRESS. PUMP	1
	728000	H/C HIGH PRESS. PUMP	1
5.	628011	PUMP MOUNT. BRACKET	1
6.	639007	BLOWER SPACER BLOCKS (Chrome plated)	2
7.	639006	POWER PACK PLATE (Chrome plated)	1
8.	639009	SHIM (Blower Spacer Block)	2

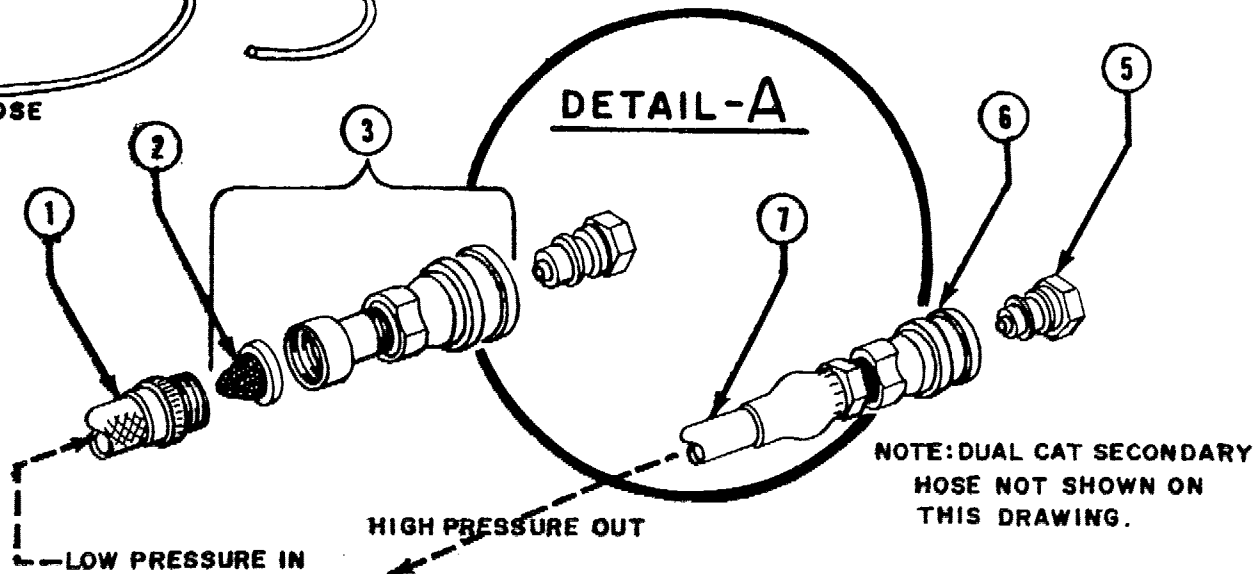


# HYDRA CAT / DUAL CAT POWER PACK

DRAWING NO. HC-117  
 DRAWN BY O. GRANT, JR.  
 DATE 5-4-79



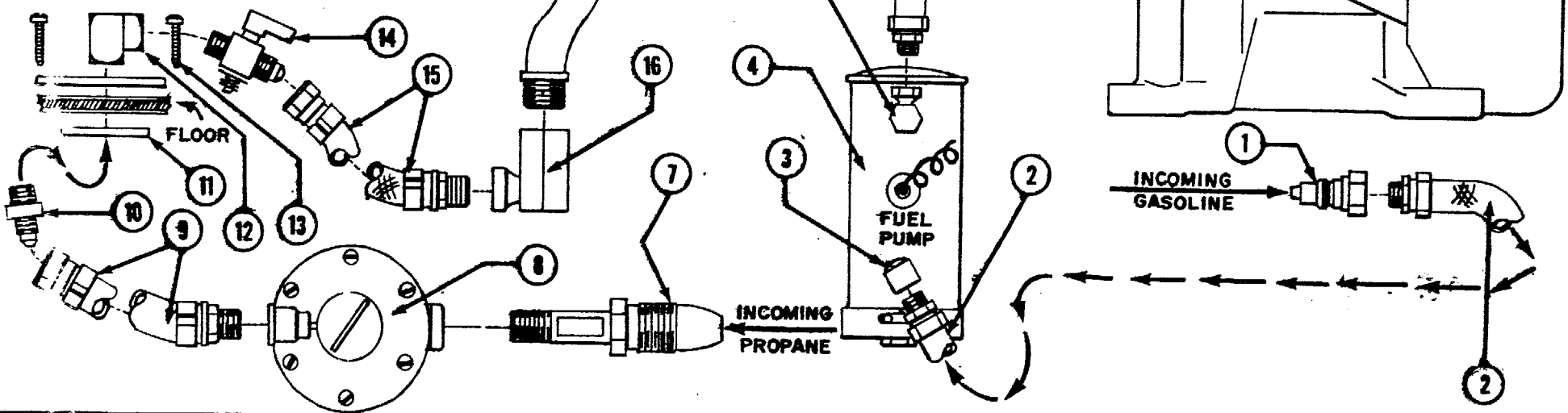
REF NO	PART NO	PART DESCRIPTION	QTY USED
1	636020	GARDEN HOSE	1
2	636024	SCREEN REPLACEMENT	1
3	636022	INLET GDN. HOSE CONN. (incl. screen)	1
4	611201	QUICK CONN. PLUG	1
5	611101	QUICK CONN. PLUG	1
6	611102	QUICK CONN. SOCKET	1
7	636001	HIGH PRESSURE HOSE	1



# BOB/HYDRA/DUAL CAT HOSE DIAGRAM

DRAWING NO HC-116  
 DRAWN BY O. GRANT, JR.  
 DATE 6-5-79

REF NO	PART NO	PART DESCRIPTION	QTY USED
1.	611001	QUICK CONNECT PLUG	1
2.	637110	RUBBER HOSE	1
3.	612090	FITTING	1
4.	625313	FUEL PUMP	1
5.	610001	FITTING	1
6.	637006	TEFLON HOSE	1
	614002	PROPANE SPUDNUT	1
8.	627000	PROPANE REGULATOR	1
9.	637300	PROPANE HOSE	1
10.	614006	PROPANE FITTING	1
11.	616060	FLAT WASHER	1
12.	610211	PROPANE FITTING	1
13.	619121	SCREWS	2
14.	614009	PROPANE SHUT-OFF VALVE	1
15.	637301	PROPANE HOSE	1
16.	610303	FITTING	1

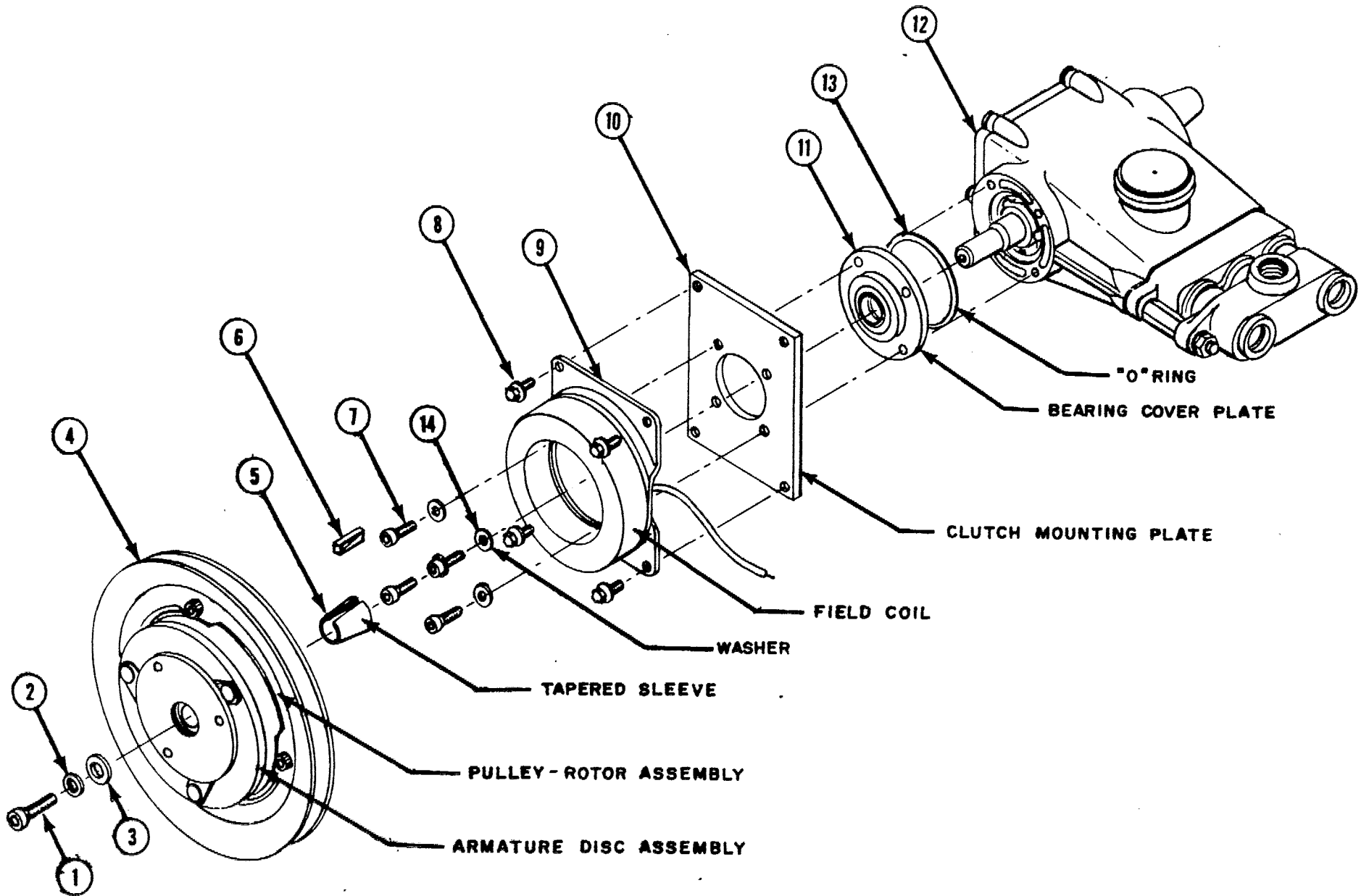


# FUEL DIAGRAM

DRAWING NO	BC-113	PAGE
DRAWN BY	O. GRANT, JR.	37
DATE	6 - 6 - 79	

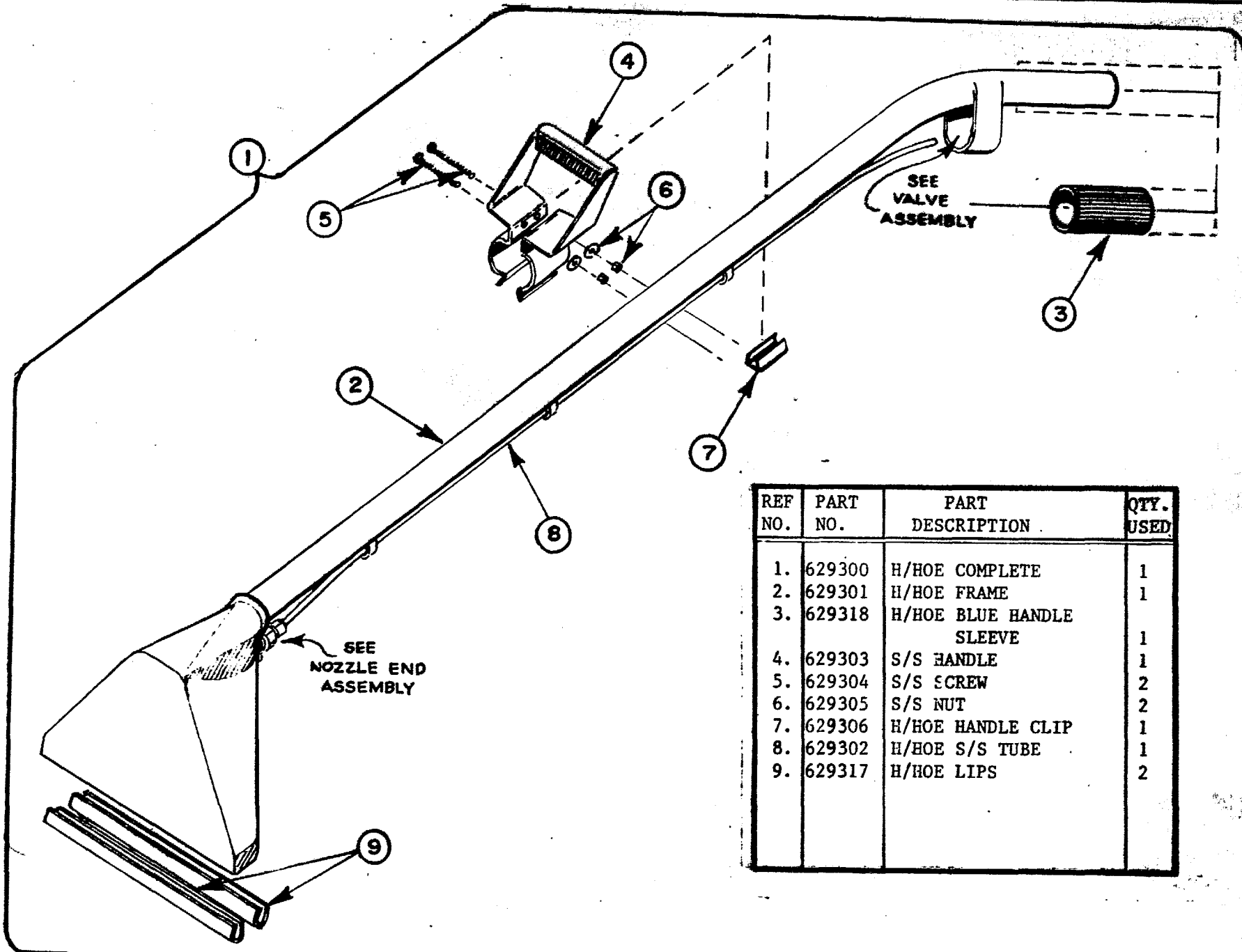






**BOB/DUAL/HYDRA CAT  
ELECTRIC PUMP CLUTCH ASSY**

DRAWING NO	HM-127
DRAWN BY	O. GRANT, JR.
DATE	6-5-79



REF NO.	PART NO.	PART DESCRIPTION	QTY. USED
1.	629300	H/HOE COMPLETE	1
2.	629301	H/HOE FRAME	1
3.	629318	H/HOE BLUE HANDLE SLEEVE	1
4.	629303	S/S HANDLE	1
5.	629304	S/S SCREW	2
6.	629305	S/S NUT	2
7.	629306	H/HOE HANDLE CLIP	1
8.	629302	H/HOE S/S TUBE	1
9.	629317	H/HOE LIPS	2



# HYDRA-HOE ASSEMBLY

DRAWING NO HM-126

DRAWN BY O. GRANT, JR.

DATE 4 3 79

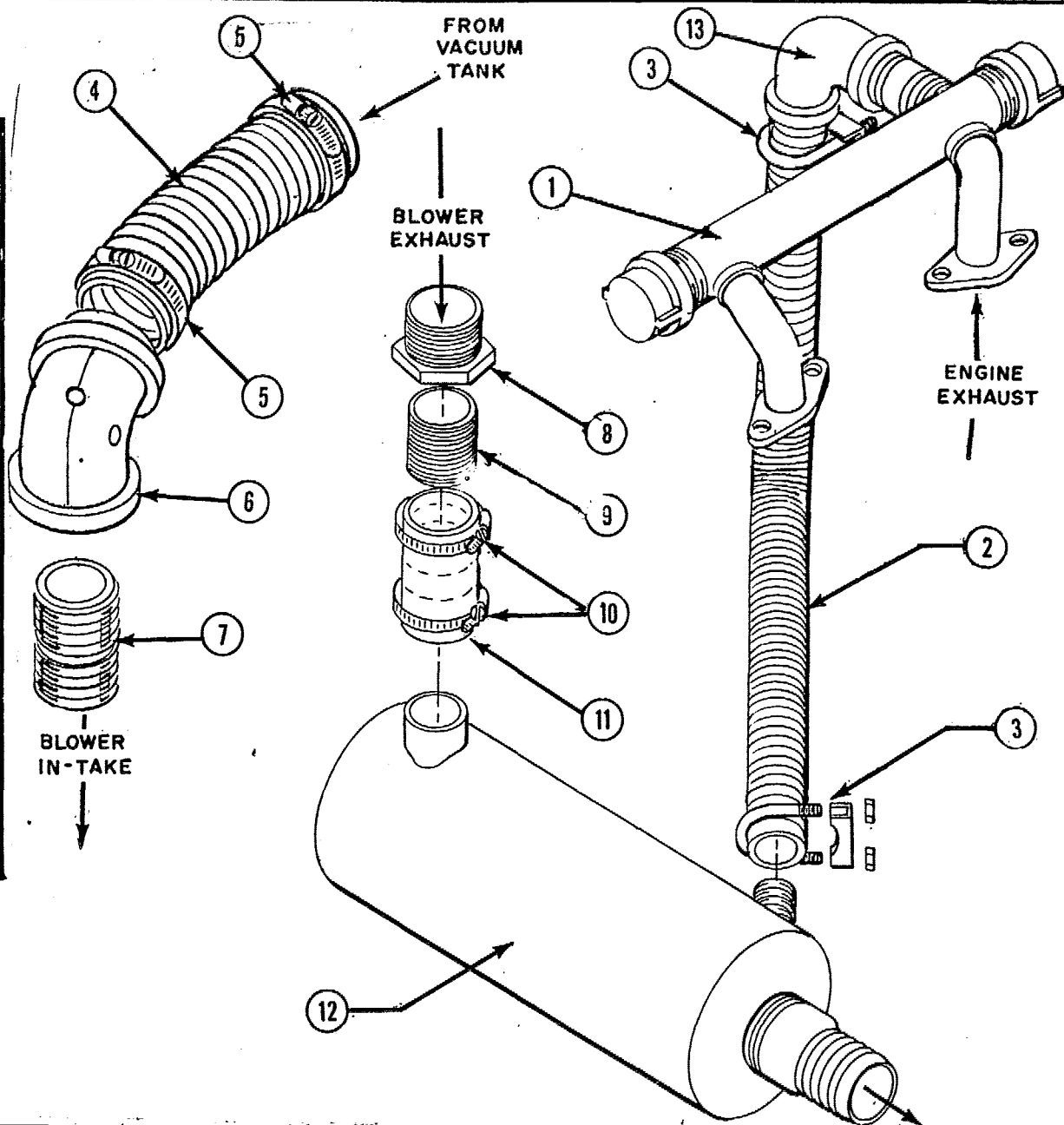
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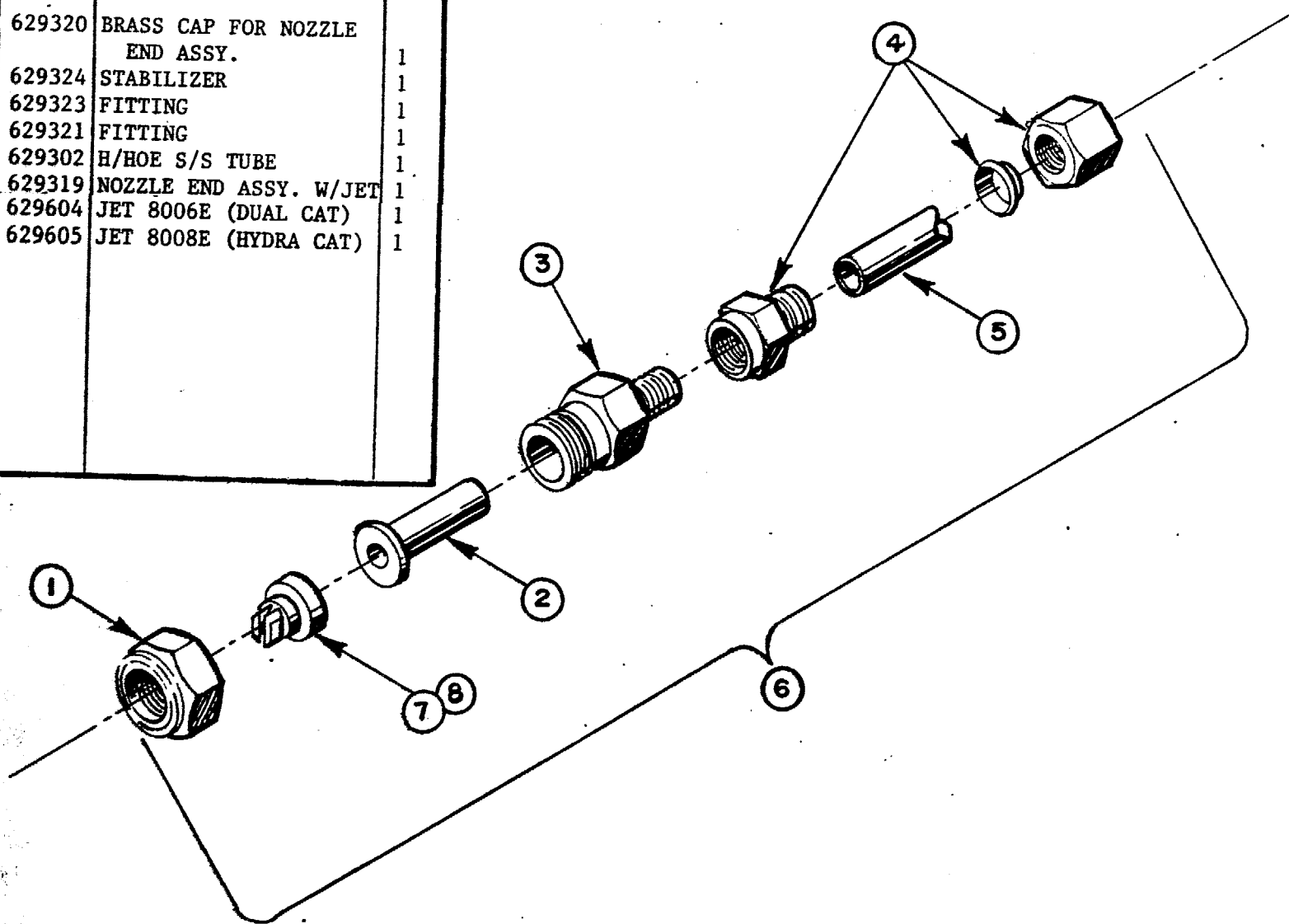
REF NO	PART NO	PART DESCRIPTION	QTY USED
1	625318	EXHAUST MANIFOLD	1
2	637506	FLEX HOSE	1
3	625721	MUFFLER CLAMP	2
4	637505	MARINE HOSE	1
5	620148	HOSE CLAMP	2
6	638570	PIPE ELBOW	1
7	638072	PIPE NIPPLE	1
8	638780	BUSHING	1
9	638060	PIPE NIPPLE	1
10	620144	HOSE CLAMP	1
11	637501	DISCHARGE HOSE	2
12	626301	MODIFIED SILENCER	1
13	638530	PIPE, ELBOW	1



# DUAL / HYDRA CAT EXHAUST

DRAWING NO HC-112  
 DRAWN BY O. GRANT, JR.  
 DATE 6-4-79  
 REV. 1-8-8.

REF NO.	PART NO.	PART DESCRIPTION	QTY USED
1.	629320	BRASS CAP FOR NOZZLE END ASSY.	1
2.	629324	STABILIZER	1
3.	629323	FITTING	1
4.	629321	FITTING	1
5.	629302	H/HOE S/S TUBE	1
6.	629319	NOZZLE END ASSY. W/JET	1
7.	629604	JET 8006E (DUAL CAT)	1
8.	629605	JET 8008E (HYDRA CAT)	1



# HYDRA-HOE NOZZLE END ASSEMBLY

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DRAWING NO HM-128

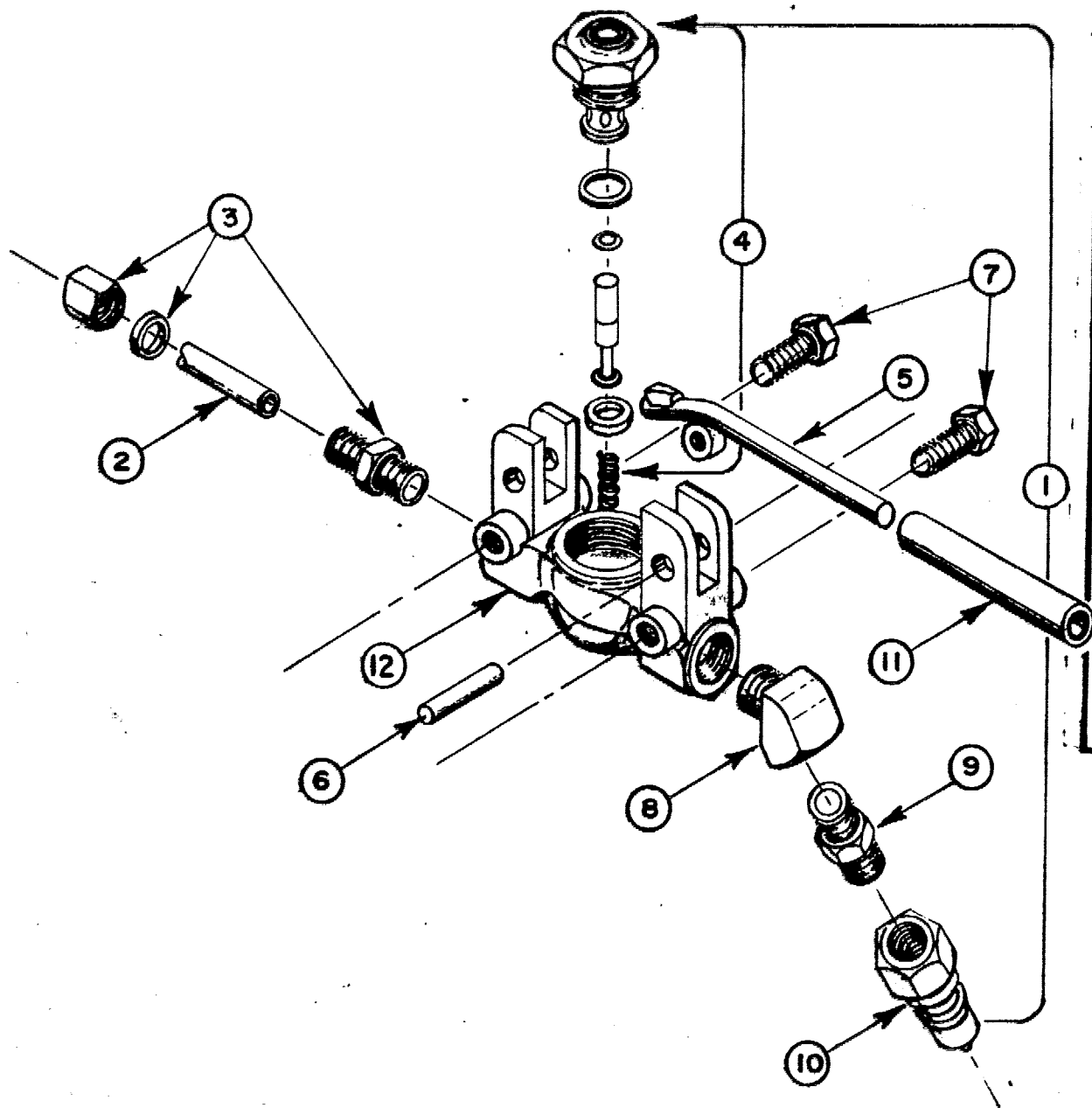
DRAWN BY Oscar Granj.

DATE 4-3-79 SCALE

APPD

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REF NO.	PART NO.	PART DESCRIPTION	QTY. USED
1.	629309	H/HOE VALVE COMPLETE	1
2.	629302	H/HOE S/S TUBE	1
3.	629322	FITTING	1
4.	629313	H/HOE PLUNGER KIT	1
5.	629310	H/HOE TRIGGER	1
6.	629312	H/HOE TRIGGER PIN	1
7.	618502	BOLT	2
8.	612080	FITTING	1
9.	612042	FITTING	1
10.	611101	QUICK CONNECT PLUG	1
11.	629311	H/HOE TRIGGER SLEEVE	1
12.	629307	HOUSING (H/HOE VALVE)	1



# HYDRA-HOE VALVE ASSEMBLY

DRAWING NO HM-127

DRAWN BY - OSCAR GRANT, JR.

ASSY: ALL

DATE: 3-30-78

SCALE: NTS

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