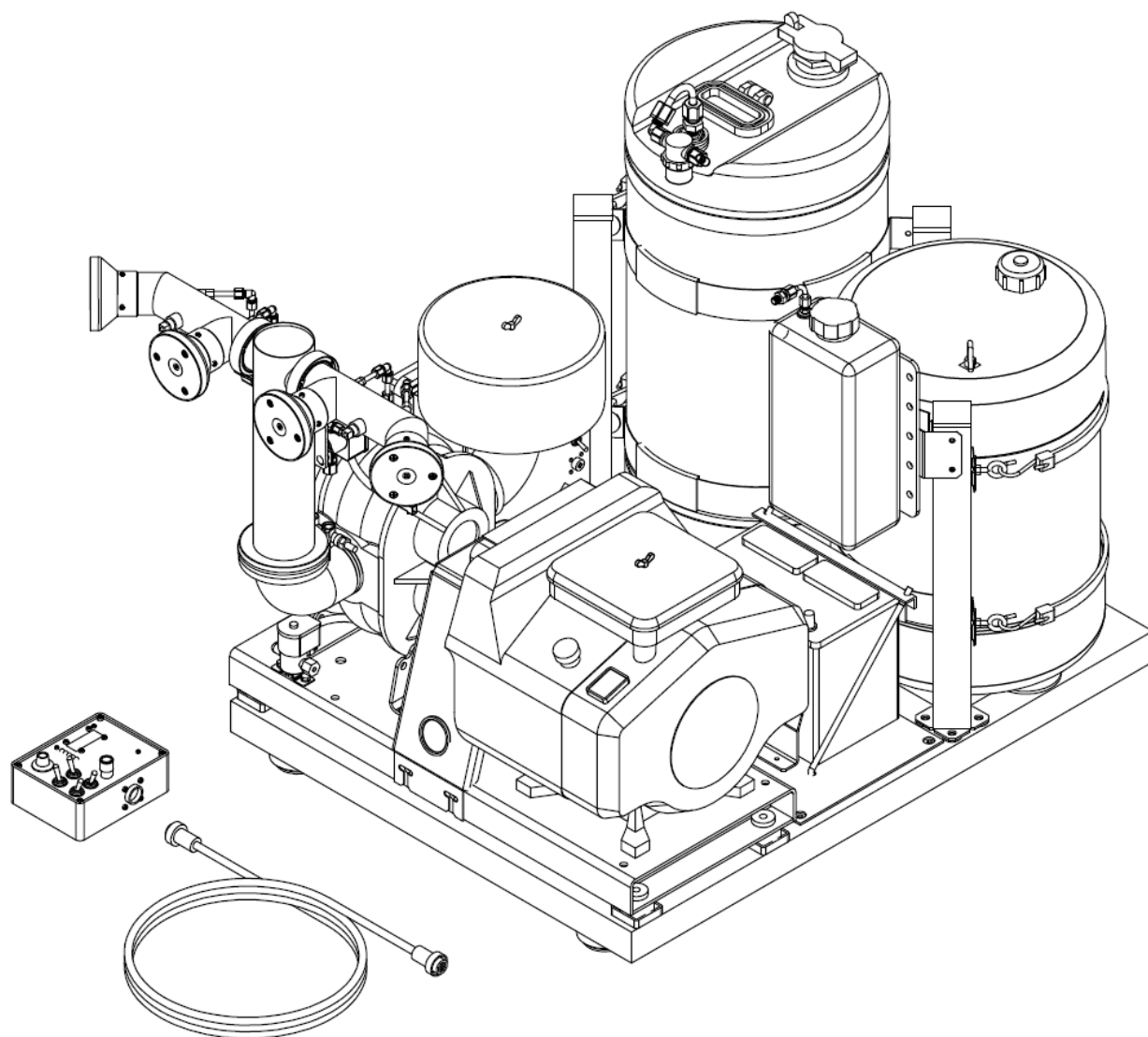


DYNA-FOG®
MAXI-PRO™ 4

**MODEL 2742 SERIES 5 ULV AEROSOL
APPLICATOR**



Manufactured by:

Curtis Dyna-Fog, Ltd.
17335 U.S. Highway 31 North
PO. Box 297
Westfield, Indiana 46074 USA
www.dynafog.com

INNOVATORS OF SPRAYING AND FOGGING DEVICES
OPERATION, MAINTENANCE AND SPARE PARTS MANUAL

Operation, Maintenance and Spare Parts Manual For:

**Dyna-Fog® Maxi-Pro 4™
Model 2742, Series 5**

**ULV Aerosol Applicator
(Cold Fogger)**

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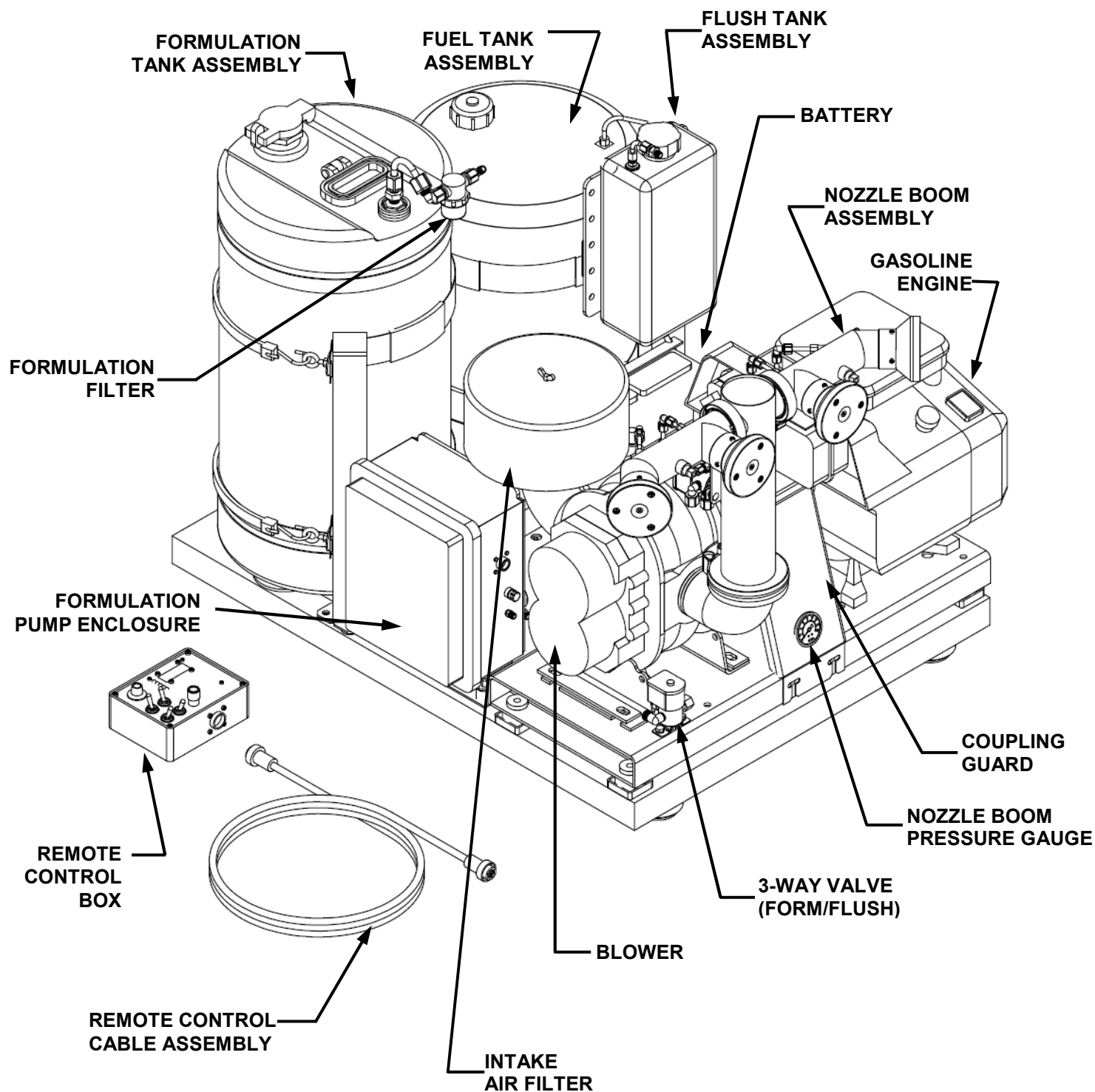
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BLOWER SERVICE & REPAIR	See Attached Manual

**MACHINE SPECIFICATIONS
FOR MAXI PRO™ 4, MODEL 2742 SERIES 5**

TYPE:	Aerosol Generator, Non-Thermal, Insecticide, Ultra-Low-Volume, (ULV)
ENGINE:	Briggs & Stratton, 4-cycle, 2 cylinders, gasoline engine, 18 HP, equipped with electric starter and alternator. Gasoline consumption: 1.6 U.S. gal./hr. (6.05 Lt./hr.) Operating Speed: 2,500 RPM
BLOWER:	Positive displacement. Straight lobe, rotary type, direct drive. Output Air Pressure: Rated at 0-10 PSI (.68 Bar) Output Air Flow: Rated at 0-400 CFM (11.2 m³/min.)
FORMULATION PUMP:	3-Types Available: 1) High volume, corrosion resistant diaphragm pump. 2) Stainless steel gear pump with optional radar syncroflow control. 3) Fmi ceramic piston pump with carbon cylinder with optional syncroflow control.
NOZZLE SYSTEM:	Boom mounted, cluster type with 180° horizontal adjustment (azimuth) and 180° vertical adjustment (elevation), 4 nozzles.
TANKS:	Corrosion resistant, high-density Polyethylene. Formulation: 15 U.S. Gallons (56.7 liters). Flush: 1 U.S. Gallon (3.78 liters), Optional 1.25 gallons (4.73 liters) Gasoline: 12.2 U.S. gallons (46 Lt), cap with level gage.
PARTICLE SIZE:	5-30 Microns Volume-Median-Diameter (VMD) depending on flow rate and viscosity.
WEIGHT EMPTY:	450 lbs. (204 Kg.)
LENGTH:	44 in. (112 cm.)
WIDTH:	33 in. (84 cm.)
HEIGHT:	32 in. (81 cm.)
MOUNTING BASE FRAME:	39" L x 30" W (97 cm x 76 cm)
SHIPPING INFORMATION (CRATED)	
DIMENSIONS:	46" L x 36" W x 36" H (117 cm. x 99 cm. x 99 cm.)
VOLUME:	37 cu.ft. (1.1 cu. Meter)
SHIPPING WEIGHT:	495 lbs (225 Kg.)



Maxi-Pro™ 4 Major Components Diagram

FOREWORD

The application of insecticides is the predominant method by which man attempts to control the size of insect populations. Due to environmental and economical reasons, it is desirable to treat a given area with the least amount of insecticide that can be made to be effective. The most efficient method is to break up the liquids into aerosols and distribute these fine droplets over the target area. The small droplets stay suspended for longer periods of time due to their size and are distributed more evenly, remaining effective longer.

The term ULV is an abbreviation for Ultra-Low-Volume, the technology used to treat areas with small amounts of chemical in an aerosol form. These chemicals are usually in a more concentrated state than chemicals used in other methods of application.

For best results, the Dyna-Fog ULV aerosol generator model 2742 should be operated and maintained in compliance with this manual. Insecticides must be applied in compliance with their label instructions.

WARNING

Read and thoroughly understand all information, cautions and warnings on the formulation label which may affect personal safety. Know any dangers of the solution used and know what to do in case of an accident involving the solution.

Always use the appropriate safety equipment and dress accordingly to the chemical formulation which is being used.

DESCRIPTION

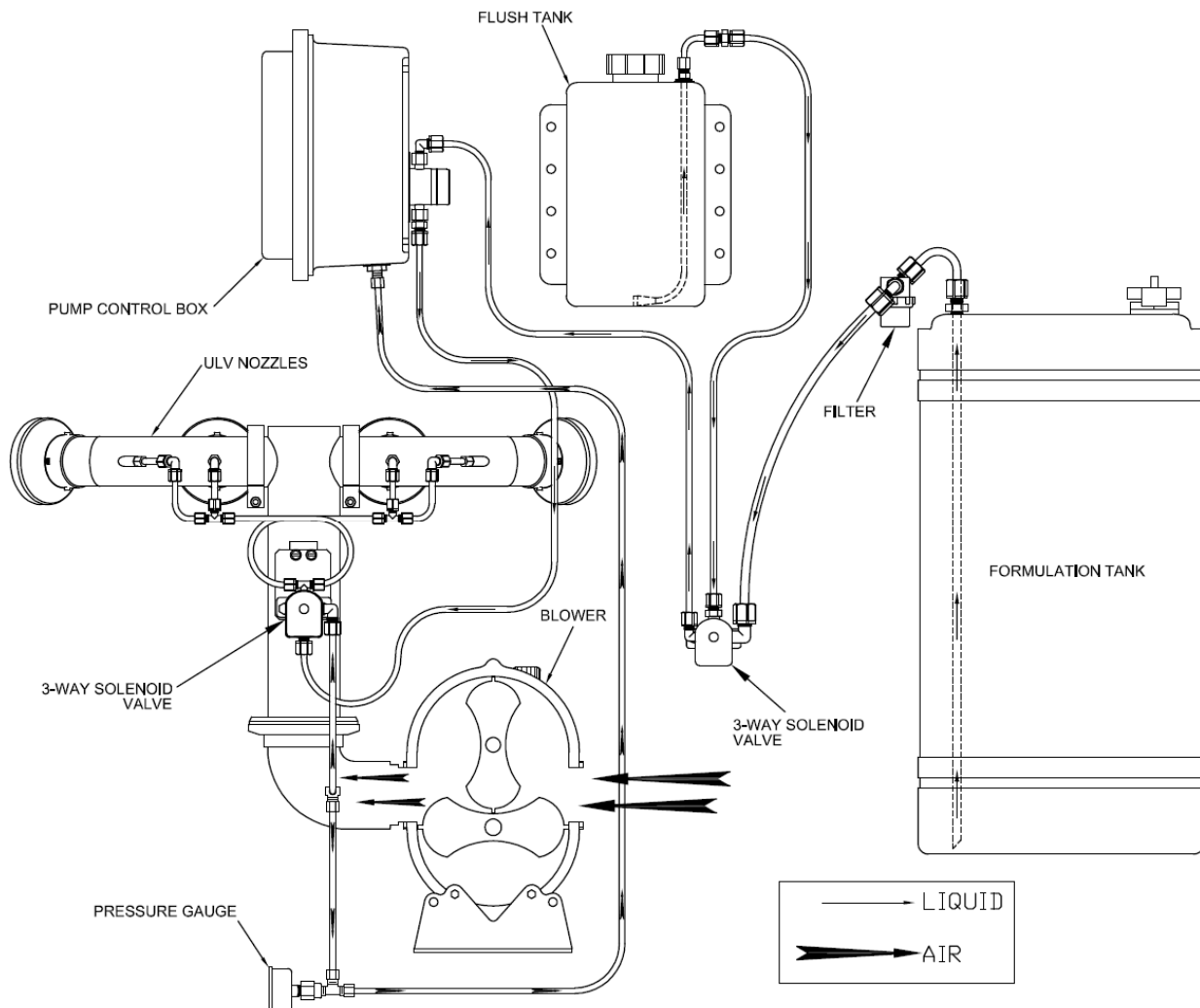
The Dyna-Fog model 2742 ULV Aerosol Generator is designed to disperse concentrated formulations at flow rates in the range of 0 to 18 oz./min. (0-540 ml/min) with droplet sizes less than 20 microns VMD (Volume-Median-Diameter).

This machine is to be vehicle or trailer mounted and is designed to be operated by the driver of the vehicle using the remote control box.

WORKING PRINCIPLES

An 18 Horsepower, electric start, four-cycle gasoline engine with a flexible coupling on its output shaft is used to drive a positive displacement rotary-blower. The air entering the blower is first filtered through a large stainless steel filtering element. The blower supplies air pressure to (4) nozzles. The air pressure is adjustable between 2-8 **PSI** (0.14 - 0.54 Bar) By varying the engine speed. The formulation is delivered to each nozzle by means of a variable speed positive displacement, rotary gear pump that draws the formulation from the tank, through a filter and **3-way** valve, and into each nozzle. Each of the (4) nozzles has six stationary fins that create a swirling effect of the air mass as it leaves each nozzle. In the center of this swirling **air** mass is a liquid supply spray tube. The spray tube directs the formulation into the air mass where it is sheared into billions of tiny droplets and dispersed into the atmosphere.

This unit is equipped with a flushing system that is controlled from the remote control unit. The flushing liquid is conveyed to the nozzles in the same manner as the formulation. **The system must be flushed after each use.**



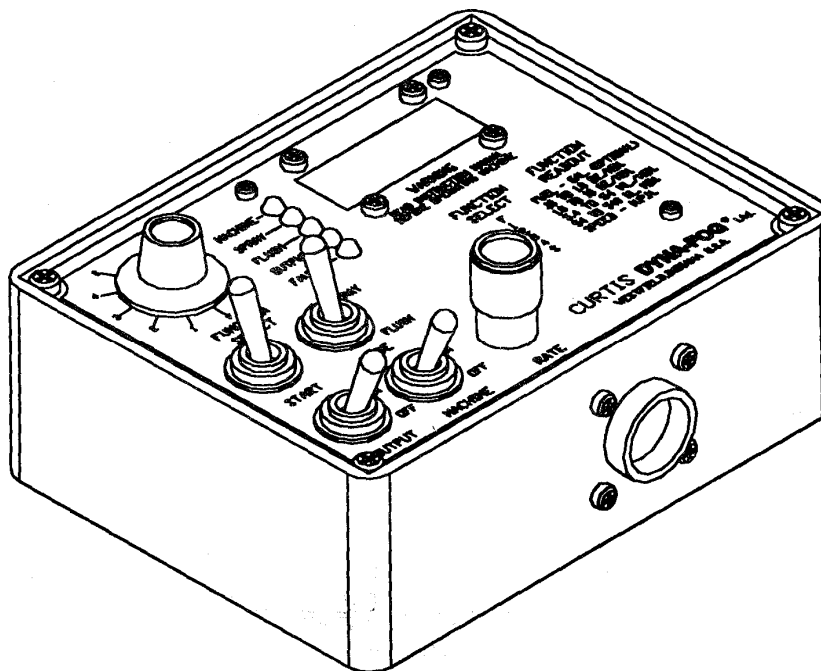
FLUID SYSTEMS DIAGRAM

WORKING PRINCIPLES (Continued)

All liquid conveying components such as tubing, fittings, pump, filters, and valves are made of corrosion resistant materials.

The machine is equipped with a remote control unit that contains the following ;

- Machine ON/OFF switch
- Engine remote start switch
- Formulation/Flush selector switch
- Five function rotary switch that selects:
 1. Low formulation flow rates (English units)
 2. High formulation flow rates (English units)
 3. Low formulation flow rates (Metric units)
 4. High formulation flow rates (Metric units)
 5. Fuel level, Optional (Gallons)
- Digital readout of any of the five functions selected
- Spray output ON/OFF switch
- Pump flow rate control knob
- Colored L.E.D.'s to designate selected function



REMOTE CONTROL BOX

ASSEMBLY INSTRUCTIONS

- 1) Uncrate the unit and remove all packing materials.
NOTE: It is a good idea to retain the original machine shipping carton for storage.
- 2) Place the remote control unit where it will not be damaged while the machine is being installed.
- 3) Remove the machine from the shipping skid by removing the three lag screws that retain the shipping brackets. Keep the brackets for mounting the machine to your vehicle or trailer bed.
- 4) Check the lubricating oil level in both the engine and blower. Refer the engine and blower sections of this manual and to the engine and blower manuals for the correct filling procedure and add oil if necessary.
- 5) Activate the dry charge storage battery according to the following instructions:

CHARGING THE BATTERY

DANGER POISON

Batteries produce explosive gases. Keep sparks, flame and cigarettes away ! Ventilate when charging or using in an enclosed space.

The battery contains Sulfuric Acid, which causes severe burns. If acid contacts eyes, skin or clothing, flush well with water. For contact with eyes, get immediate medical attention.

Keep battery and acid away from children and other persons who may not be aware of dangers involved.

- A. Remove battery from its mounting and place on a stable workbench.
- B. Remove vent caps from battery. Remove or destroy any sealing device which may have been used to close or restrict the vent openings in the vent caps.
- C. Fill each cell of the battery to the top of the separators with approved battery Electrolyte of 1.265 specific gravity.
NOTE: The temperature of the battery and electrolyte at time of filling should be Be above 60°F (15 °).

CAUTION

NEVER FILL BATTERY IN MACHINE AS SPILLS WILL DAMAGE FINISH AND CAUSE PREMATURE CORROSION AND/OR DAMAGE TO COMPONENTS.

- D. Charge 12 volt battery at 3 - 4 amps until the acid temperature is above 80°F (26 °C), and the hydrometer reading is 1.250 or higher. Acid temperature must never exceed 125 °F while charging.

NOTE: Both temperature and hydrometer readings must be met.

- E. After charging the battery, check acid levels in all cells and fill each cell with acid to the proper level.
- F. Re-install vented caps.
- G. Re-install the battery onto the machine in same position as it was before being
- H. Connect the RED positive (+) cable to the positive terminal of the battery and fasten it securely with the hardware provided.
- I. Connect the BLACK negative (-) cable to the negative terminal of the battery and fasten it securely with the hardware provided.

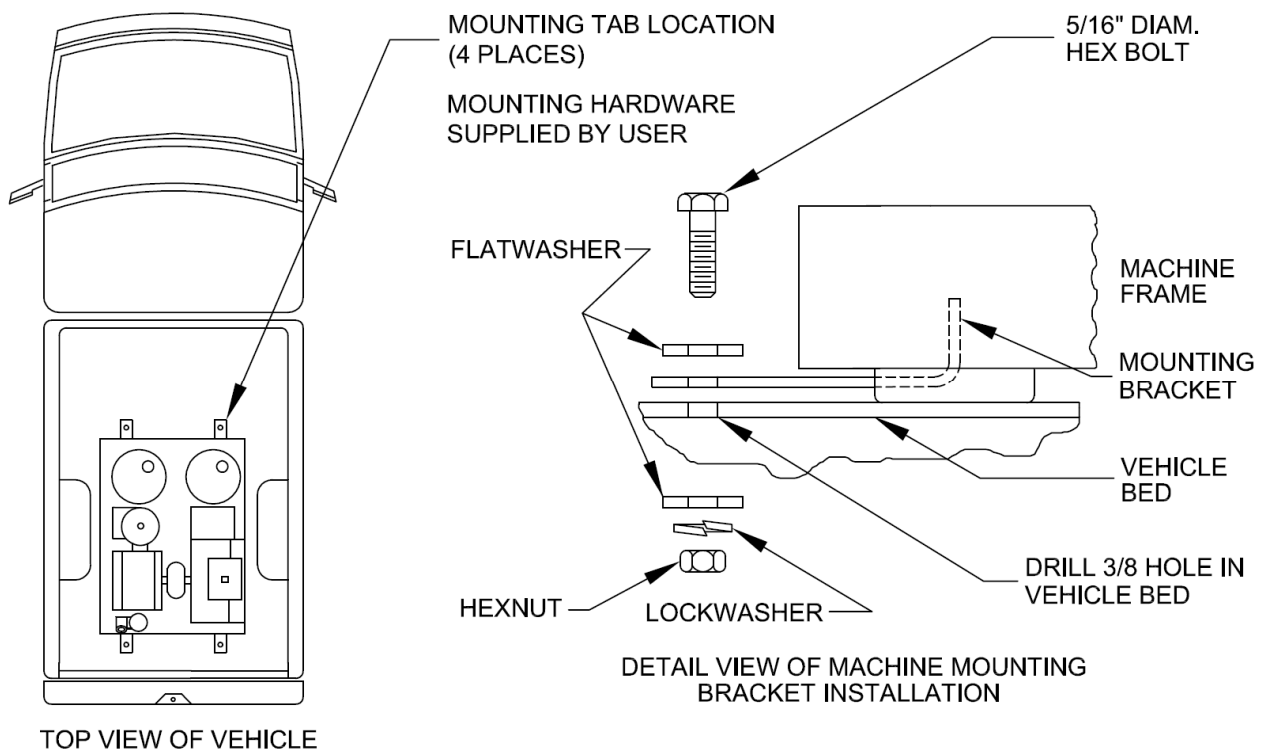
CAUTION

- *When installing the battery, connect the negative (-) cable last to prevent sparking and shorting.*
- *When disconnecting is required, remove the negative (-) cable first.*
- *Reverse polarity can cause damage to the starting and charging system.*

After battery has been initially service, only water should be added to restore the liquid level in each cell. Further addition of acid will cause battery failure.

MACHINE INSTALLATION

1. Remove the machine from the skid and lift the machine onto the vehicle with the discharge end of the machine toward the rear of the vehicle.
2. Pass the remote control unit through an open window and locate it within reach of the person operating the machine. If permanent vehicle installation is desired, the remote control cable can be fed through a clearance hole in the vehicle chassis and then reconnected. When drilling clearance holes, ensure that all sharp edges are removed and covered to prevent premature wearing of the remote cable. When routing the cable to the vehicle cab, do not allow the cable to be exposed to any sharp edges. Avoid sharp bends when routing the cable. Once the cable has been routed to the cab, reseal all drilled openings to prevent moisture and/or exhaust gases from entering the cab.
3. Using the (3) hold-down brackets used for mounting the machine to the shipping skid, securely mount the machine to the bed of the vehicle (see diagram below). Depending on the type of bed surface, it may be necessary to use additional mounting hardware to secure the machine.



WARNING

NEVER ATTEMPT TO OPERATE THE MACHINE WITHOUT FIRST VERIFYING THAT IT IS SECURELY MOUNTED. FAILURE TO DO SO COULD RESULT IN SEVERE INJURY.

SAFETY PRECAUTIONS

WARNING

READ AND UNDERSTAND THESE SAFETY PRECAUTIONS BEFORE OPERATING MACHINE

1. **ENGINE AND FUEL;** This machine uses gasoline as the fuel for the internal combustion engine and all precautions commonly applying to this volatile fuel should be observed. Exercise extreme caution to avoid spilling of gasoline. If spillage occurs, wipe it off and allow evaporation time before starting the engine. DO NOT attempt to put fuel in tank while the machine is still running. Avoid smoking or open flames in area when handling gasoline. Never run the unit indoors unless exhaust is vented to outside. These fumes contain carbon monoxide which is colorless and odorless and can be fatal.

CAUTION

DO NOT OPERATE ENGINE WITHOUT MUFFLER.

NOTE: The engine is equipped with a muffler that has a U.S. Forestry Service approved spark arrester which is required by law in some states.

DO NOT TOUCH HOT MUFFLER, CYLINDERS OR FINS AS CONTACT MAY CAUSE BURNS.

EXCEPT FOR ADJUSTMENT, DO NOT OPERATE THE ENGINE IF AIR CLEANER OR COVER DIRECTLY OVER THE CARBURETOR AIR INTAKE IS REMOVED.

DO NOT RUN THE UNIT IF THE COUPLING GUARD IS REMOVED.

DO NOT TAMPER WITH GOVERNOR SPRINGS, GOVERNOR LINKS OR OTHER PARTS WHICH MAY INCREASE OR DECREASE THE GOVERNED ENGINE SPEED.

2. **MACHINE DAMAGE:** Never operate a machine after it has been damaged. A damaged machine can be very hazardous.
3. **WIND:** Spraying during windy conditions is not usually practical because the formulation will drift out of the intended area. However, under **NO** circumstances should spraying into the wind be attempted. This may cause hazardous accumulations on the machine or carrying vehicle.

SAFETY PRECAUTIONS (Continued)

4. **SAFETY EQUIPMENT:** In addition to any safety equipment that may be required by the type of formulation which is being used, the following items should be mandatory for each vehicle which carries this machine during fogging operations.
 - a. Fire Extinguisher, chemical-type rated for fuel fires.
 - b. First Aid Kit.
 - c. Eye Wash Solution.
 - d. Safety Glasses.
 - e. Container of Oil Dry Compound.
 - f. Gloves Rated for High Temperature.
 - g. Respirator Adequate for Formulation being used.
5. **CHILDREN:** Many spraying operations are performed in residential areas, commonly at dusk. This presents the operator with the problem of children who are attracted to the noise and/or mist being created. Children have been observed running into and riding bicycles through the mist. The possible hazard lies in the toxic effect of some formulations, the severity of which depends upon the chemical used, mist density and the length of time of direct exposure.

IT IS THE OPERATOR'S RESPONSIBILITY TO DISCOURAGE ANYONE FROM PLAYING IN THE MIST OR BEING NEAR THE MOVING VEHICLE.

6. **FORMULATIONS:** Ensure that formulations are applied only in strict compliance with the formulation label as well as local, state and federal regulations and that these formulations are dispersed only by trained personnel of public health organizations, mosquito abatement districts, pest control operators or other qualified personnel.
 - a. Always comply with any requirements for protective clothing, goggles, gloves, facial masks or respirators required on the formulation label.
 - b. Do not exceed the dosage set forth on the registration label of the insecticide to be used.
 - c. Always store formulation in its original labeled container.
7. **BLOWER PRESSURE:** Do not allow to operate with blower pressure above 8 psi, and never under any circumstance exceed 10 psi. For most applications, a blower pressure (nozzle pressure) of 6-7 psi is satisfactory (see table 2).

MACHINE OPERATION

CAUTION

READ THIS COMPLETE OPERATION SECTION AND THE SECTION ON SAFETY PRECAUTIONS BEFORE STARTING THE MACHINE FOR THE FIRST TIME.

For first time operation, the sections on MACHINE INSTALLATION and MACHINE OPERATION must be performed before proceeding with this section.

When operating this machine for the first time, move to an uncongested and well-vented work area away from flammable materials.

WARNING

READ THE SECTION ON SAFETY PRECAUTIONS BEFORE PREPARING TO DISPENSE FORMULATION.

READ AND THOROUGHLY UNDERSTAND ALL INFORMATION, CAUTIONS AND WARNINGS ON THE FORMULATION LABEL WHICH MAY AFFECT PERSONAL SAFETY. KNOW ANY DANGERS OF THE SOLUTION USED AND KNOW WHAT TO DO IN CASE OF AN ACCIDENT INVOLVING THE SOLUTION.

ALWAYS USE THE APPROPRIATE SAFETY EQUIPMENT AND DRESS ACCORDING TO THE CHEMICAL FORMULATION WHICH IS BEING USED.

WARNING

- *DO NOT USE ANY SUBSTANCES FROM UNMARKED CONTAINERS OR FROM CONTAINERS WITH OBVIOUSLY ALTERED LABELS.*
- *READ AND FOLLOW THE INSTRUCTIONS ON THE CHEMICAL SOLUTION LABEL FOR ULV SPRAYING OF THE SOLUTION .*
- *DO NOT SPRAY NEAR AN OPEN FLAME OR HOT MATERIALS.*
- *DO NOT LEAVE THE MACHINE UNATTENDED.*

PRE-SPRAY CHECK LIST

1. Verify that the remote control box is within easy reach of the operator.
2. Verify that the adjustable nozzle boom is in the correct position as required for the spraying operation to be accomplished, and that the ring damp which allows this positioning is tight.
3. Verify that the engine has sufficient fuel and is properly lubricated.
4. Verify that the blower has been serviced.
5. Inspect all hoses for abnormal conditions.
6. Verify that no foreign objects or tools have been left in or about the machine.
7. Verify that the sufficient amount of formulation is in the tank and that the tank filling cap is tight and it's air vent hole is not restricted.
8. Verify that the battery is mounted security and cable connections are proper and tight.
9. Verify that all safety equipment is in place and is in proper working order.
10. Verify that the flow rate control has been calibrated and is dispensing formulation in accordance with the manufacturers label requirements.

CAUTION

BEFORE PROCEEDING WITH ANY SPRAYING OPERATION, THE OPERATOR SHOULD BE THOROUGHLY FAMILIAR WITH STARTING AND STOPPING THE MACHINE AND WITH ALL THE OPERATING^ CONTROLS. IF YOU ARE OPERATING THE MACHINE FOR THE FIRST TIME, EXERCISE THE MACHINE THROUGH ITS FULL OPERATIONAL SEQUENCES FROM A POSITION OF FULL VISIBILITY OF THE MACHINE BEFORE OPERATING THE MACHINE FULLY REMOTE. THIS IS ALSO A GOOD IDEA FOR EXPERIENCED OPERATORS WHO MAY BE OPERATING A NEW MACHINE OR WHO MAY BE REACTIVATING A MACHINE AFTER REPAIRS OR A PERIOD OF INACTIVITY. REFER TO THE ENGINE MANUAL FOR STARTING AND STOPPING INSTRUCTIONS.

ENGINE PREPARATION

Oil Recommendations

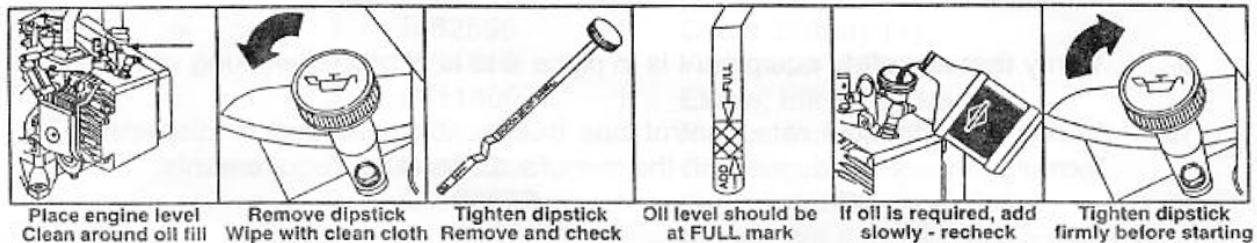
Change and add oil according to chart below. Do not overfill. Use high quality detergent oil classified "For service SC, SD, SE, SF, SG" as B&S "warranty certified" SAE 30 oil, part no. 100005. Use no especial additives with recommended oils.

SAE VISCOSITY GRADES											
				**							
°F	-20	0	20	32	40	60	80	100			
°C	-30	-20	-10	0	10	20	30	40			
TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE											

(*) Air cooled engines run hotter than automotive engines. Use of multi-viscosity oils (10W-30, etc.) Above 40 °F (4°C) will result in high oil consumption and possible engine damage. Check oil level more frequently if using these types of oil.

(**) SAE 30 oil, if used below 40 °F (4 °C), will result in hard starting and possible engine

bore damage due to inadequate lubrication. Check oil level before starting engine. Add oil (If required) as shown below.



Start and run the engine at idle for 30 seconds. Shut engine off. Wait 30 seconds and check oil level. Add oil to bring level to Full mark on dipstick, if required.

Oil capacity is about 1.5 quarts (1.4 liters) if engine is not equipped with oil filter. Oil capacity is about 1.75 quarts (1.7 liters) if engine is equipped with oil filter.

Note :Engine is shipped from factory without oil. Before starting the engine, check oil level.

Fuel Recommendations

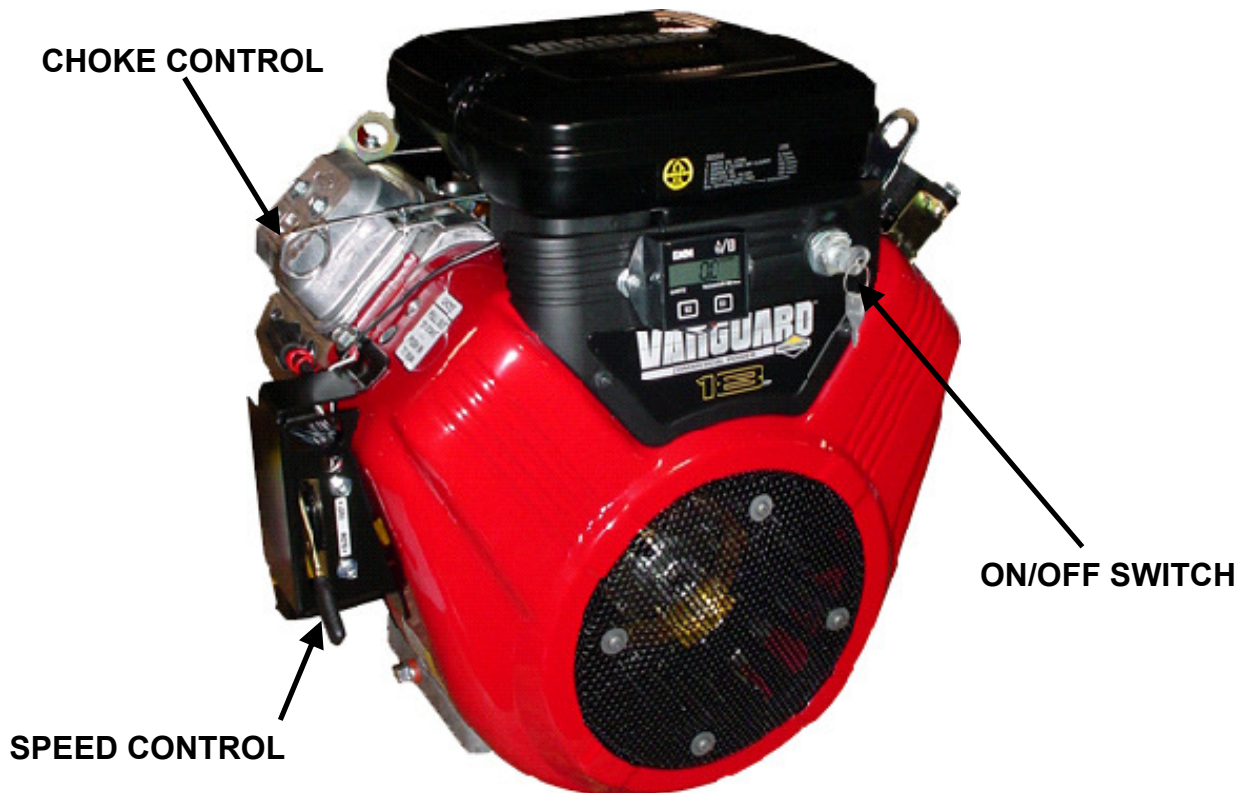
The engine will operate satisfactorily using any automobile gasoline. Use clean, fresh, lead-free gasoline with a minimum of 77 octane. (Leaded gasoline may be used if it is commercially available, and if lead-free is not available). Purchase fuel in quantity that can be used within 30 days. DO NOT MIX OIL WITH GASOLINE. B&S do not recommend using gasoline which contains alcohol, such a gasohol. If gasoline with alcohol is used, it must contain less than 10% Ethanol and must be removed from engine during storage. Do not use gasoline which contains Methanol. Fuel Level : Do not overfill. Allow space in fuel tank for fuel expansion.

STARTING THE ENGINE

1. **CHOKE ENGINE:** Move engine choke control to position lever in "choke" position (pulling the control rod). NOTE: This should fully dose choke on carburetor.

Note: The manual choke is provided for cold starting of the engine. Once the engine has been allowed to warm-up, choking the engine should not be needed for restarting.

2. **TURN "ON" THE MACHINE "ON/OFF" SWITCH:** Position Machine "ON/OFF" switch on the remote control box to "ON" position. Also verify that the "OUTPUT" switch on the remote control box is in the "OFF" position.
3. **TURN "ON" (RUN) THE "RUN/STOP" SWITCH:** Position kill switch on engine to "ON". This switch is located next to the starter button.
4. **START ENGINE:** Activate the spring-loaded starter switch on the engine or activate the toggle switch on the remote control box to the start position. NOTE: To prevent overheating the engine starter motor, do not activate the motor longer than 15 seconds at a time.
5. **SET ENGINE SPEED:** Allow the engine to warm-up and gradually move the choke lever to the "unchoked" position (pushing the control rod). Adjust the engine Speed control to achieve the desired Boom Pressure. Pulling the control rod increase the engine speed (increase the boom pressure). The engine speed control is located dose to the cap of the oil level indicator (dipstick).



MEASURING LIQUID FLOWABILITY (VISCOSITY)

In order to achieve consistent results in generating aerosols with a volume-median-diameter (VMD) in the sub 20 micron range, several variables must be kept under control at the same time. The ability of an aerosol generator to consistently break up a liquid into appropriate sized droplets depends on (3) key elements:

1. The available energy flow (air flow) through the nozzle is governed by the blower speed. As the air mass and its velocity through the nozzle decreases, the droplet size (VMD) will increase assuming that the liquids viscosity and flow rate remains constant.
2. The flow rate of the liquid governed by the speed of the liquid pump.
3. The viscosity of the liquid.

Various liquids have different viscosities. Viscosity is defined as a fluids resistance to flow commonly measured in units of a centipoise (CP). Generally, the thicker the liquid, the greater the viscosity and the higher the CP number. Examples of some liquid viscosities are:

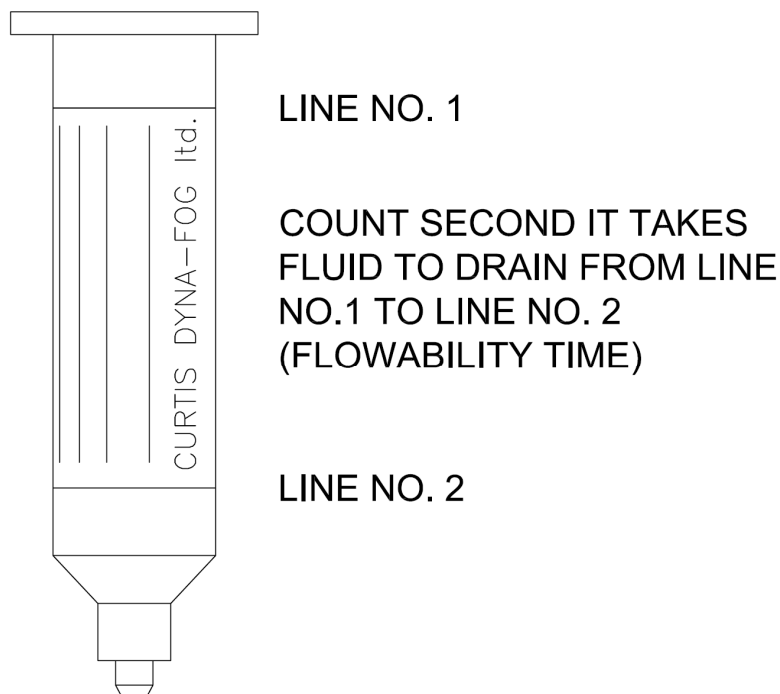
<u>LIQUID</u>	<u>VISCOSITY (CP)</u>
WATER	1
DIBROM	3-4
DOW MFC	3-4
PYRETHRIN, RESMETHRIN	6-7
DURSBAN 1.5 ULV	12-14
TECHNICAL MALATHION	28

By measuring the flowability of a liquid, adjusting the engine speed to produce the desired nozzle boom pressure, and by setting the flow rate on the digital readout remote control box, accurate particle size can be achieved.

To measure the flowability (viscosity) of your formulation:

1. Place a sample of the formulation liquid to be dispensed in the relative flowability meter provided with the machine such that the liquid level is above the top line.
2. Hold the meter vertical and allow the liquid to flow through the brass orifice at the outlet end of the meter into an appropriate container.
3. Using a stopwatch or a watch with a sweep second hand, determine the flowability time in seconds that it takes for the liquid level to fall from the top line to the bottom line.

Once the flowability of the liquid has been measured, tables 1 and 2 can be used as an approximate guide for setting the pump flow rate and nozzle boom pressure for your spray application.



NOTE: Periodically calibrate the flowability meter using plain water. Water should flow through the orifice such that the time between the top line and the bottom line is 32 + 2 seconds.

CAUTION

Follow all warnings and cautions on your formulation label. Do not attempt to apply any formulation at a rate greater than what is specified on the formulation label. This includes driving your vehicle at a rate slower than what is specified.

TYPICAL FLOW RATES FOR INSECTICIDES

TABLE 1

FLOW RATE					
VEHICLE SPEED MPH	DURSBAN (CHLORPYRIFOS) OZ/MIN	DOW MFC OZ/MIN	PYRETHRIN OZ/MIN	D1BROM OZ/MIN	TECHNICAL MALATHION OZ/MIN
5	1.4-2.7	.33 - .66	2.0-2.5	3.0-6.0	1.0-2.1
10	2.7-5.3	.66-1.33	4.0 - 5.0	6.0-12.0	2.0-4.3
15	—	1.0-2.0	6.0-7.5	9.0-18.0	3.0-6.5
20	—	—	8.0-10.0	—	4.0-8.6
FLOW RATE					
VEHICLE SPEED KM/HR	DURSBAN (CHLORPYRIFOS) ML/MIN	DOW MFC ML/MIN	PYRETHRIN ML/MIN	DIBROM ML/MIN	TECHNICAL MALATHION ML/MIN
8	42-81	10-20	60-75	90-180	30-63
16	81 -159	20-40	120-150	180-360	60-129
24	—	30-60	180-225	270 - 540	90-195
32	—	—	240 - 300	—	120-258

CAUTION

The above rates are examples of typical application rates found on their respective formulation labels. Refer to the label of your formulation to determine the actual application rate before calibrating your machine to any of the above flow rates.

Once the flowability of the formulation to be sprayed has been determined, and the formulation pump has been calibrated, select one of the three tables (next page) that is closest to the flowability of the formulation to be sprayed (34, 40 or 88 seconds). Then match the closest flow rate in the left hand column with the flow rate specified on the formulation label. A boom pressure can then be selected that will produce a particle size in accordance with the formulation label. Remember, with a constant flow rate supplied to the nozzle system, increasing nozzle boom pressure will decrease particle size.

***PARTICLE SIZE (VMD) IN MICRONS RESPECT TO
FLOW RATE AND BOOM PRESSURE***

TABLE 2

DIBRON (NALED) (TIME THROUGH FLOW METER APPROX. 34 SECONDS)						
LIQUID FLOW RATE OZ/MIN	LIQUID FLOW RATE ML/MIN	BOOM PRESSURE				
		8PSI	6PSI	4PSI	3PSI	2PSI
1	30	4.7 VMD	5.7 VMD	8.4 VMD	10 VMD	14 VMD
5	150	5.2 VMD	6.7 VMD	9.5 VMD	16.5 VMD	17 VMD
12	360	6.3 VMD	7.5 VMD	12.3 VMD	20 VMD	22 VMD
18	540	7.1VMD	8.2 VMD	16.1 VMD	24 VMD	26 VMD

TABLE 3

PYRETHRIN (TIME THROUGH FLOW METER APPROX. 40 SECONDS)						
LIQUID FLOW RATE OZ/MIN	LIQUID FLOW RATE ML/MIN	BOOM PRESSURE				
		8PSI	6PSI	4PSI	3PSI	2PSI
1	30	5 VMD	6.1 VMD	13.8 VMD	11 VMD	15.2 VMD
5	150	6.2 VMD	8.5 VMD	15.5 VMD	18.9 VMD	20.3 VMD
12	360	7.9 VMD	11.8 VMD	17.4 VMD	23 VMD	25.7 VMD

TABLE 4

MALATHION (TIME THROUGH FLOW METER APPROX. 88 SECONDS)						
LIQUID FLOW RATE OZ/MIN	LIQUID FLOW RATE ML/MIN	BOOM PRESSURE				
		8PSI	6PSI	4PSI	3PSI	2PSI
1	30	7.2 VMD	9.7 VMD	15.1 VMD	14 VMD	18 VMD
5	150	10.3 VMD	12.6 VMD	17.8 VMD	21.1 VMD	25.6 VMD
12	360	14.7 VMD	18.2 VMD	22.1 VMD	27.8 VMD	30 VMD

Note : Boom plugs must be removed when obtaining pressure of 2 and 3 psi.

SYNCROFLOW SYSTEM

When equipped, the Curtis Syncroflow System allows you to dispense formulation at either a constant flow ("manual") regardless of vehicle speed, or a variable flow ("syncroflow") which is correlated to vary proportionately with vehicle speeds from 0 - 20 mph (0-32 km/h). Either mode can be actuated by a toggle switch located on the side of the pump control box.

When the syncroflow mode is actuated, electronic pulses are fed from the ground speed sensor (either a GPS or Radar Sensor depending on model) to the formulation pump. As the vehicle moves faster or slower these pulses increase or decrease in frequency which in turn cause the formulation output pump to increase or decrease the fluid flow.

SPRAYING - SYNCROFLOW

1. Place the formulation to be used in the formulation container.

CAUTION

Carefully read the formulation label for safety precautions and application rate.

2. Ensure that all switches on the remote control box are in the OFF position.
3. Place the MANUAL - SYNCROFLOW toggle switch which is located on the formulation pump control box into the Syncroflow position.
4. If the required Output rate is 0.3 to 1.8 ounces per minute (9 ml/min to 54 ml/min), contact the factory to set the rate range connections in the chassis interface box to the LOW position, then place the Function Select switch remote control box in either position 1 or 3 as appropriate. If the required Output rate is 1.8 to 18 ounces per minute (standard factory setting in the pump control box), place the Rate Range switch in the HIGH position and the Function Select switch in position 2 or 4 as appropriate.
5. Place the MACHINE switch on the remote control box in the ON position.
6. Place the RUN-STOP (ON-OFF) switch located on the engine in the RUN (ON) position and start the engine (see STARTING ENGINE section).

7. Place the MODE switch on the remote control box in the SPRAY position.
8. Observe that, the MACHINE light and the SPRAY light are ON and the FLUSH, OUTPUT and FAULT Sights are not ON.
9. The digital rate readout should reads zero.
10. Start the vehicle in motion and place the OUTPUT switch in the ON position.
11. Adjust the knob for the rate of flow specified by the formulation label that pertains to your vehicle speed.

Example: If a formulation label calls for an output of 3 oz at 5 MPH (89 ml at 8 Km/h), 6 oz at 10 MPH (177 ml at 16 Km/h), 9 oz at 15 MPH (266 ml at 24 Km/h), and 12 oz at 20 MPH (335 ml at 32 Km/h), you may set the flow rate at any of these speeds. If the vehicle is moving at 10 MPH (16 Km/h), set the rate knob to dispense 6 oz (177 ml), which will appear on the digital readout window. Once the rate of 6 oz (177 ml) is established at 10 MPH, leave the rate knob into that position. From that point on, as the vehicle speed increases the output will automatically vary proportionately.

12. At this point the OUTPUT light should also be ON. If the range is adjusted beyond the limits of the measuring system, the FAULT light will come ON.
13. The Spray output can now be started and stopped by placing the OUTPUT switch in the ON or OFF position as required.

NOTE

If the vehicle is driven over 22 MPH (35 Km/h), the fault light will come ON. If the vehicle is driven below 5 MPH (8Km/h), the spray will automatically shut off.

FINISHED OPERATION

When the spraying operation is complete, the unit must be flushed in accordance with FLUSHING SYSTEM section of this manual.

PREVENTIVE MAINTENANCE

NOTE: A successful maintenance program begins after the first use of the machine and not after the machine has ceased to function.

PREVENTIVE MAINTENANCE:

1. Occasionally inspect mounting hardware to ensure that fasteners are tight. Loose hardware can cause excessive vibration leading to major failure of components.
2. Acquaint yourself with the operating sounds of your machine. Strange sounds suddenly appearing can be a forewarning of difficulties which may be preventable with immediate action.
3. Keep the machine clean externally as well as internally. Some insecticides contain chemicals which are corrosive.

BATTERY

WARNING

Batteries produce explosive gases. Keep sparks and flames away. Ventilate when charging or using in enclosed space. Always shield eyes when working near batteries. The battery contains sulfuric acid and can cause severe burns. Avoid contact with skin, eyes and clothing.

1. Check battery fluid level each week. If the level is low, add distilled water. After initial activation of battery, never add additional electrolytic fluid. Distilled water is preferred.
2. Check vent holes in battery and remove any obstructions such as dirt, corrosion etc.
3. Inspect posts and remove any corrosion build-up using water and baking soda.
4. Apply an anti-corrosion compound or a light coating of petroleum jelly to battery terminals to minimize corrosion.

MAINTENANCE SCHEDULE

TABLE 5

FREQUENCY MAINTENANCE OPERATION	8 HRS OR DAILY	25 HRS OR NEW SEASON	50 HRS OR NEW SEASON	100 HRS OR NEW SEASON	100-300 HRS
ENGINE					
CHANGE OIL LEVEL					
CHANGE OIL LEVEL(W/O FILTER)					
CHANGE OIL LEVEL(W/FILTER)					
CHANGE OIL FILTER					
SERVICE PRE-AIR FILTER					
SERVICE AIR FILTER					
DEBRIS GUARD (OPTIONAL)					
CLEAN COOLING SYSTEM (FINS)					
INSPECT SPARK ARRESTER					
REPLACE OR CLEAN SPARK PLUG					
REPLACE IN-LINE FUEL FILTER					
CLEAN COMBUSTION CHAMBER					
ROTARY BLOWER					
CHECK OIL LEVEL					
CLEAN AIR FILTER					
GREASE BLOWER					
SOLENOID VALVES					
INSPECT INTERNAL PARTS/CLEAN (USE REBUILDING KIT IF REQUIRED)					
OTHERS					
FLUSH FORMULATION SYSTEM					
INSPECT BATTERY FLUID LEVEL					
CLEAN FORMULATION FILTER					
INSPECT FLEXIBLE DRIVE COUPLING					

NOTE: Change oil more often when operating in high ambient temperatures. Clean air filters more often under dusty conditions or when airborne debris is present. See engine and blower manuals.

FLUSHING SYSTEM

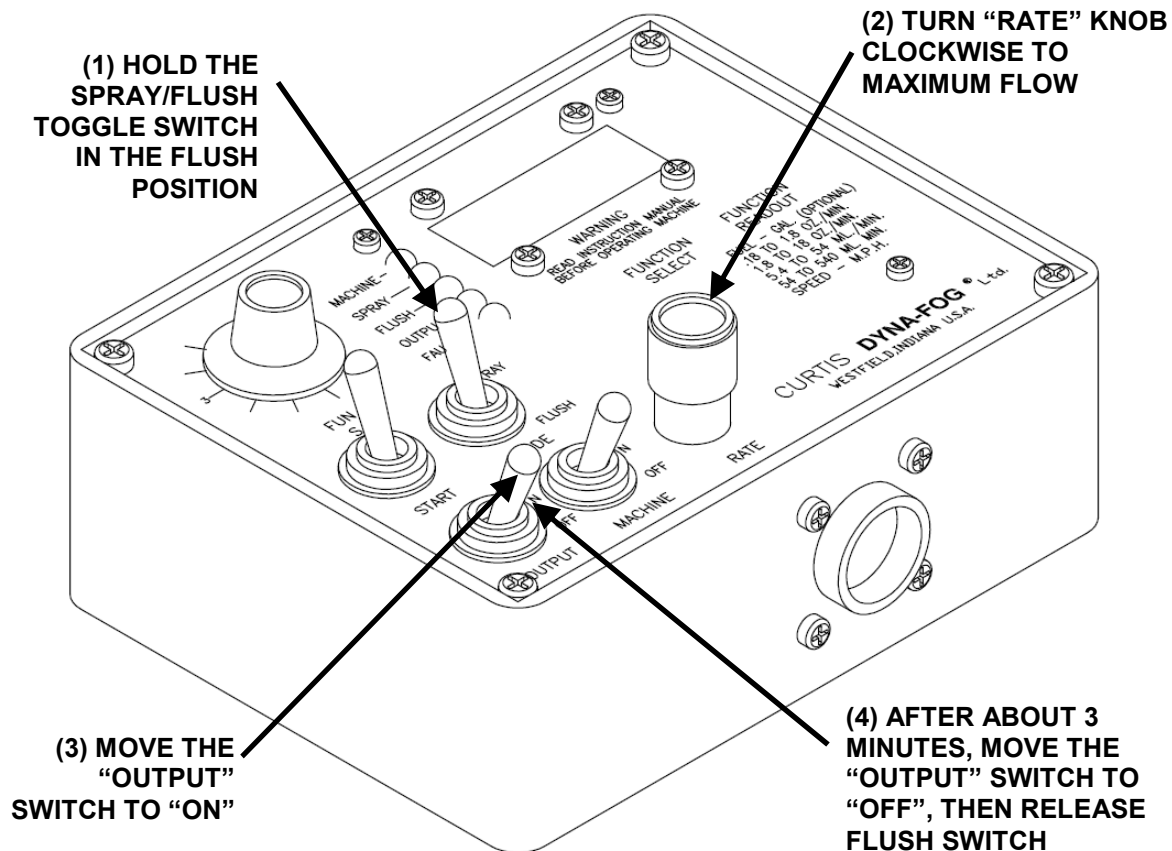
The system must be flushed after each use to protect the equipment from the corrosive material in the formulation.

CAUTION

Never handle any parts on the that come in contact with formulation until the unit has been thoroughly flushed with isopropyl alcohol or other recommended flushing agent.

TO FLUSH SYSTEM:

1. If the unit is equipped with the Curtis Syncroflow system, verify that the "Manual-Syncroflow" switch located on the pump control box is in the "Manual" position.
2. With the engine and blower operating, place the "MODE" momentary toggle switch on the remote control box in to the "Flush" position (hold it in to the flush position).
3. Verify that the "Function Select" dial on the remote control box is in the position number 2 (or 4).
4. Turn clockwise the "Rate" knob on remote control knob to maximum flow.
5. Place "OUTPUT" toggle switch on remote control box into the "ON" position.
6. Flush for 3 to 5 minutes.
7. Place "OUTPUT" toggle switch on remote control box into the "OFF" position.
8. Release the "MODE" momentary toggle switch from the "Flush" position.



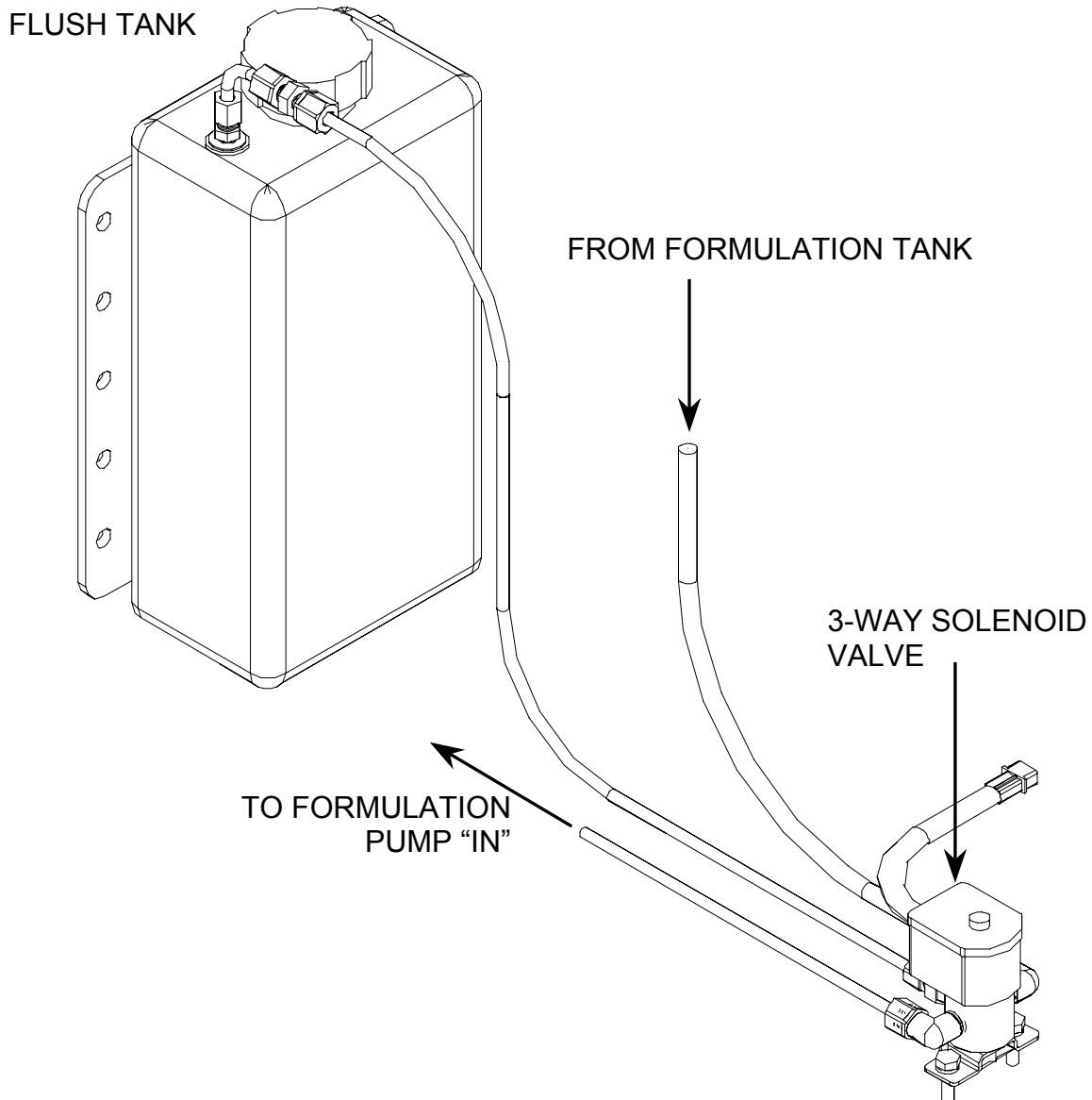
FLUSH OPERATION. SEQUENCE WITH REMOTE CONTROL BOX

3-WAY SOLENOID VALVE (FORMULATION/FLUSH)

The corrosion resistant 3-way solenoid valve is located under the Nozzle Boom assembly (close to blower brackets) and is used as a selector to route either formulation (spray) or flushing solution (flush) from the respective tanks to the nozzles.

This is accomplished by placing the “**MODE**” switch located on the remote control box into either “*Spray*” or “*Flush*” position.

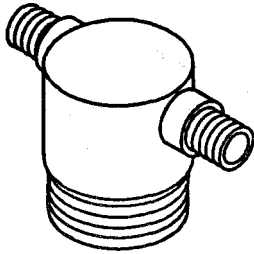
After each application of formulation it is necessary to flush the system.



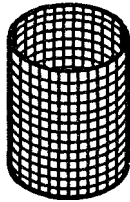
3-WAY SOLENOID VALVE (FORMULATION/FLUSH) CONNECTIONS

FORMULATION FILTER

The system is equipped with an in line low profile filter located at the formulation tank standpipe. This filter is to prevent any foreign matter from entering the 3-way solenoid valve and the nozzle system. Located inside the filter housing is a fine mesh stainless steel screen and an Atlas gasket seal.



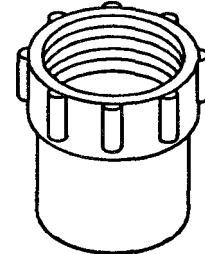
62558-4



62558-1



10200-124



62558-3

IN-LINE FILTER (P/N 62558-5)

TO REMOVE AND CLEAN THE SCREEN

1. Loosen and remove the bottom portion (bowl) from the housing body, being careful not to loose the Atlas gasket seal ring.
2. Remove and clean the fine wire mesh stainless steel screen.
3. Check the Atlas gasket seal ring and replace if necessary.

CAUTION

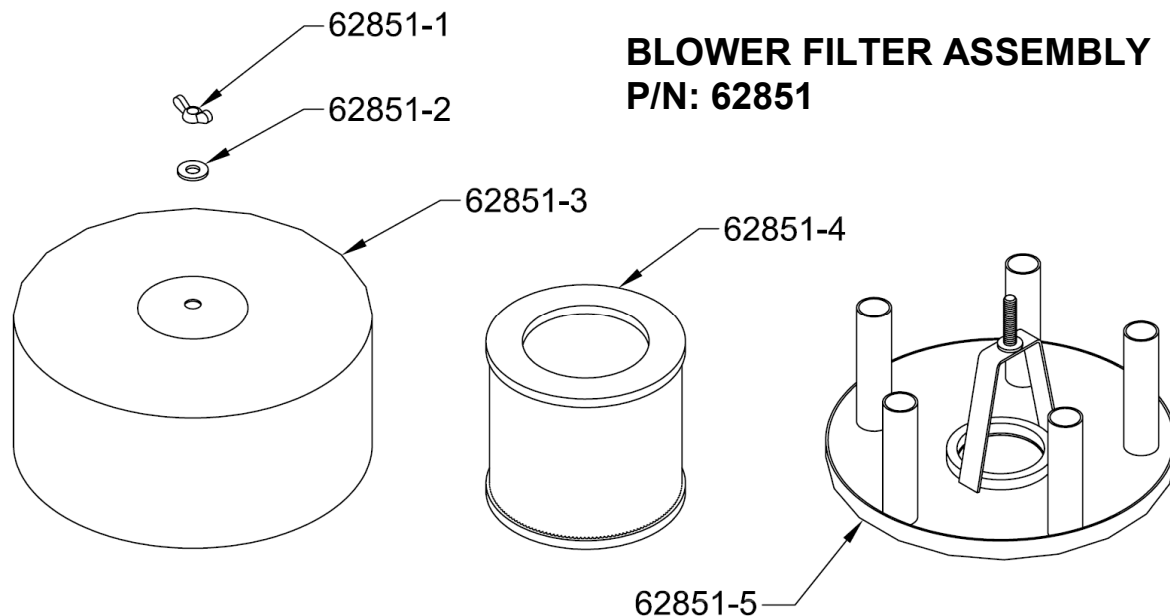
Do Not over tighten as damage to the Atlas gasket seal ring may occur. Over tightening will not improve the seal.

Note : If leakage occurs, open the unit and clean and inspect the Atlas gasket sea! ring. A suitable lubricant applied to the ring will help the seal.

FILTER - SILENCER (Rotary Blower)

A) General: The air blower filter - silencer is mounted on the air blower. Dirt and other foreign particles are filtered from the incoming air by means of the reusable stainless element. The design is such that it partially silences the air also.

Note: Do Not run the machine without this filter silencer assembly; as this
Would cause serious damage to the blower unit.



B) Removal and disassembly:

1. Remove the filter-silencer from the air blower by turning it counter-clockwise.
2. Remove wing nut and washer.
3. Remove outer shell cover.
4. Remove stainless element.

C) Inspection and Cleaning :

1. Clean the stainless screen in an approved solvent, dry with compressed air, or shake to remove excess solvent and allow to dry naturally. Inspect the screen for defects that may permit dirt or other foreign particles to enter the air blower.
2. Inspect the outer shell cover for cracks, breaks or dents and replace if required.
3. Remove any foreign matter or obstruction from any of the tubes of the main base assembly. Be careful not to loose the clips from the base which isolate the shell from the base to prevent excessive vibration.

ULV NOZZLE ASSEMBLY

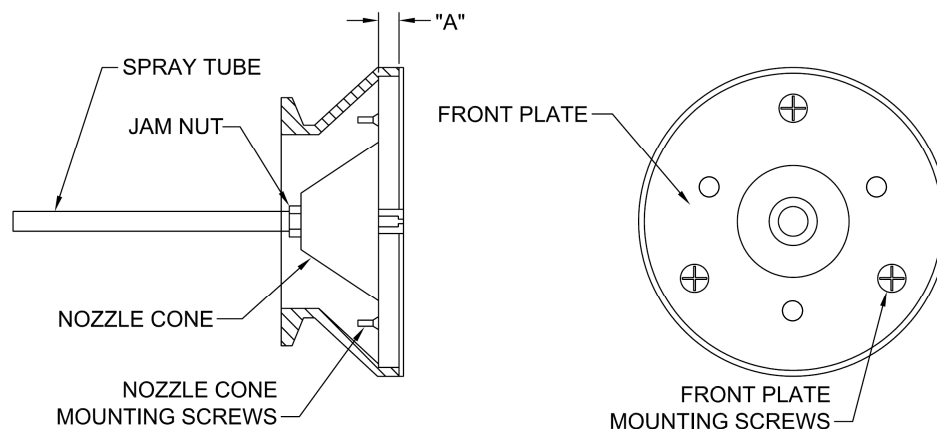
The design of ULV Nozzles is such that it should require little maintenance if the machine is properly flushed after each use. However, if it becomes necessary to clean the entire Nozzle Assembly, refer to steps 1-7. To inspect the inside of the Nozzle it is not necessary to remove the entire Nozzle Assembly from the machine. Refer to steps 4-7.

TO REMOVE THE ENTIRE NOZZLE:

- 1.) Loosen the plastic nut on the rear of the nozzle to enable removing the plastic elbow from the spray tube.
- 2.) Loosen the steel nut on the rear of the nozzle that secures the nozzle to the nozzle boom. There are two O-rings within the nut used for sealing against the spray tube.
- 3.) Remove nut used to tighten the stainless clamp for retaining the nozzle to the boom assembly. Remove the stainless steel clamp. The nozzle should now be free from the boom assembly.
- 4.) Remove the (3) front plate mounting screws and remove the front plate.
- 5.) If necessary, the large O-ring installed beneath the front plate can be removed. NOTE: DO NOT loosen the jam nut that locks the spray tube to the nozzle cone. See "IMPORTANT" below.
- 6.) Soak the nozzle parts in a degreasing solution to remove all residue.
- 7.) Thoroughly rinse the parts and reassemble.

IMPORTANT

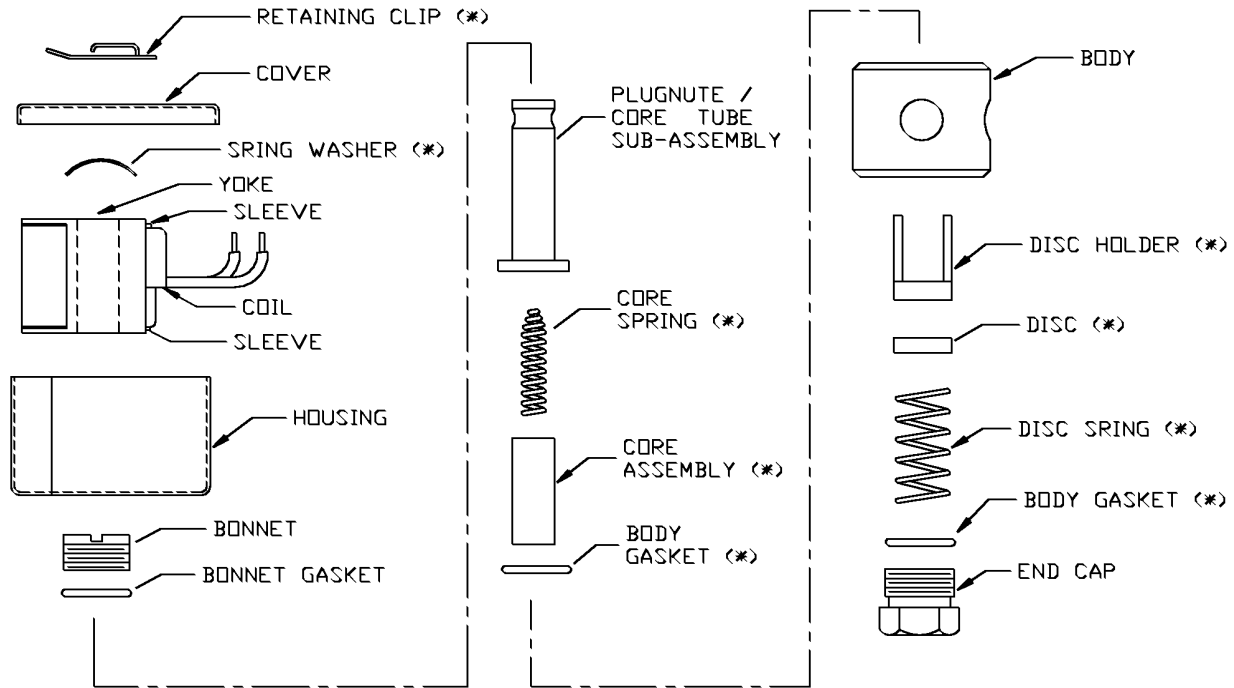
If for any reason it becomes necessary to have to remove the spray tube from the nozzle cone, care must be taken to hold dimension "A" when reassembling. Dimension "A" is the distance from the end of the spray tube to the front face of the nozzle cone. Be careful not to damage the output end of the spray tube when disassembling. Note what dimension "A" measures before disassembling nozzle.



3- WAY SOLENOID VALVE ASSEMBLY

(INSTRUCTIONS FOR REBUILDING AND CLEANING)

1. Using a screwdriver, snap off the retaining clip which secures the coil assembly.



EXPLODED VIEW, 3-WAY SOLENOID VALVE

2. Remove the retaining clip, the nameplate spacer and the coil housing.
3. Slide the coil off the valve body, and using a spanner nut (P/N 62650-15), remove the core housing for cleaning or rebuilding.
4. Clean all parts thoroughly, using a cleaning solvent.
5. When reassembling the valve, be sure that the body seal ("O" ring) is in place.
6. Tighten gently.
7. Re-assemble coil assembly, nameplate spacer, and retainer clip.

* Indicates parts supplied in rebuild kit (P/N 62650-14).

NOTE: A spanner nut P/N 62650-15 will be needed for disassembling core housing from body.

PUMP - FLOW CALIBRATION

The formulation pump is a magnetically coupled, rotary gear pump that maintains a consistent flow of fluid thru the nozzle system regardless of fluid temperature or viscosity.

To check the output of the pump with respect to the digital readout on the remote control box:

1. Disconnect the 3/8" formulation tube from the formulation tank and submerge the tube into a graduated beaker that contains a known amount of formulation (preferably enough formulation to spray for at least 3 minutes). The formulation should be the same formulation which is to be used for your spray application.
2. Select position 1 or 2 (oz./min. Display) or position 3 or 4 (ml/min. Display) on the remote control box.
3. Start the engine and adjust the engine speed to achieve the desired pressure (from table 1) and insure that mode switch on the remote box is in the spray position and the output switch is in the off position.

Note: If you select position 2 or 4, you have selected the "high" output range of your pump. 1.8-18 oz/min (54 - 540 ml/min). Your pump control box has been setting at the factory to work in this range. If you select position 1 or 3, you have selected the "low" output range of your pump, 0.18 -1.8 oz/min (5.4 - 54 ml/min). Please contact the Dyna-Fog Distributor or directly to our factory to receive the information about how change the setting at the pump control box.

4. Following all safety precautions in this manual and on your formulation label: activate the output switch on the remote box to the on position and time the amount of liquid that is sprayed in 2 minutes.

Divide the measured amount of liquid sprayed by 2 to get output per minute.

If the output measured is higher than specified on the formulation label, rotate the rate switch on the remote box counterclockwise to decrease flow (clockwise to increase flow).

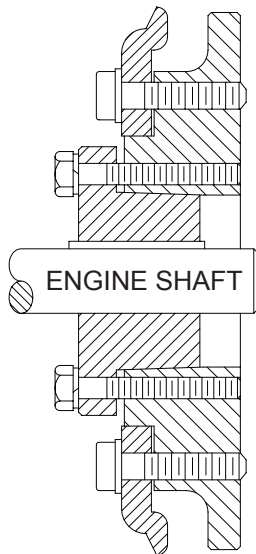
5. After calibrating your pumping system, reconnect the 3/8" formulation tube to the formulation tank.
6. Pour an adequate amount of formulation into the formulation tank being careful not to spill any of the liquid.

HI-FLEX COUPLING INSTALLATION INSTRUCTIONS

FLANGE AND BUSHING INSTALLATION

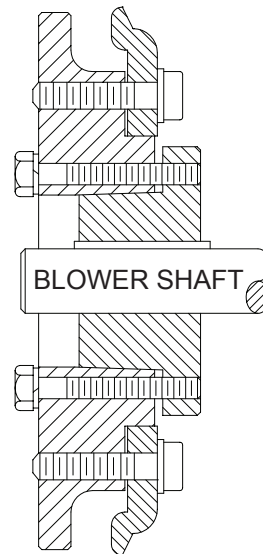
Make sure the bore and tapered cone surface of the bushing and flanges are free of all foreign substances such as paint or dirt.

1. Place *QD bushing on the shaft over the key with flange end first. The end of the bushing should be flush with the end of the shaft for best results. NOTE : If shaft end project beyond the bushing, be sure to allow for end float and misalignment.
2. Either loosen flange assembly screws as much as possible or disassemble. Slip flange over *QD bushing and assemble in the following manner:



OUTSIDE MOUNT

A. OUTSIDE MOUNT. Align the clearance holes in the *QD bushing with the tapped holes of the flange assembly. Assemble pull-up bolts and lock washers as shown in above figure. Tighten pull-up bolts progressively and evenly to the *QD bushing bolt torque (108 in-lb).



INSIDE MOUNT

B. INSIDE MOUNT. Align clearance holes in the flange assembly with the tapped holes in the *QD bushing. Assemble pull-up bolts and lock washers as shown in above figure. Tighten pull-up bolts progressively and evenly to the *QD bushing bolt torque (108 in-lb).

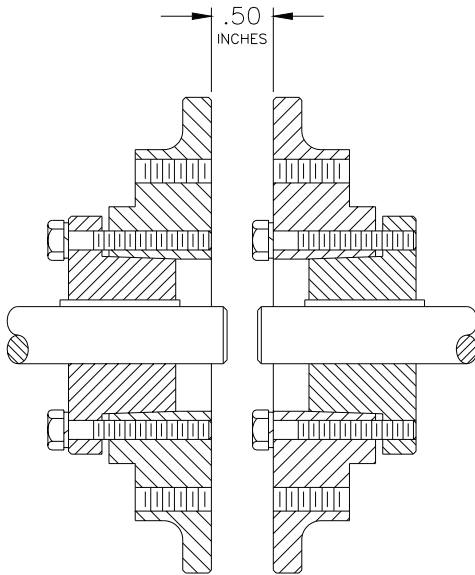
HI-FLEX COUPLING INSTALLATION INSTRUCTIONS (Continued)

CAUTION : NEVER ALLOW THE FLANGE ASSEMBLY TO BE DRAWN IN CONTACT WITH THE FLANGE OF THE *QD BUSHING. THERE SHOULD BE A GAP FROM 1/8" TO 1/4" BETWEEN THEM. IF THE GAP IS CLOSED, THE SHAFT IS SERIOUSLY UNDERSIZED.

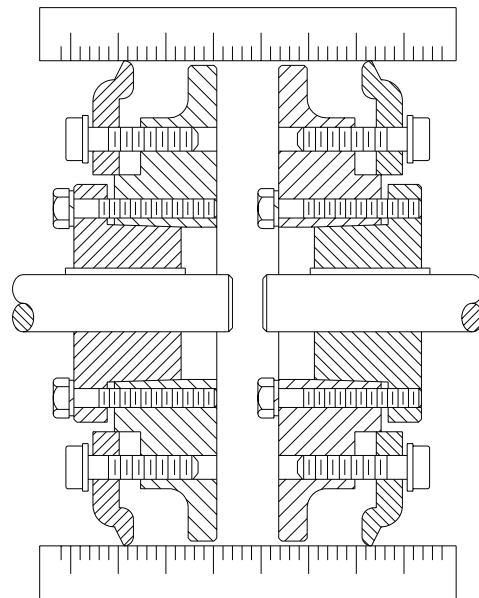
Bolts of *QD Bushing: 1/4-20 x 1-1/4 , grade 5.

Bolts of Flange Assembly: 5/16-18 Socket Head Cap, equivalent to grade 8.

- The second *QD bushing is placed on the other shaft as described on step 1 and the second flange assembly is slipped over the bushing and assembled to the distance of 1 -1/8" (as indicated in below/left drawing) apart following the



**FLANGE ASSEMBLY MOUNTED DISTANCE
PRIOR TO INSTALLING FLEXIBLE ELEMENT**



CHECKING THE FLANGE SPACING

**FLANGE ASSEMBLY MOUNTED
DISTANCE PRIOR TO INSTALLING
FLEXIBLE ELEMENT**

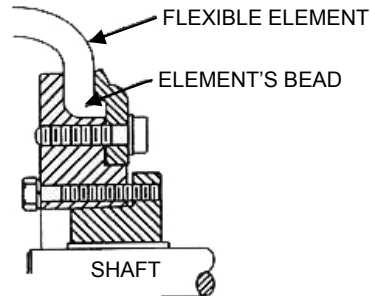
**CHECKING THE FLANGE
SPACING**

- FOR PARALLEL SHAFTS :** Using a scale or straight edge, check the flange spacing and angular misalignment at four places 90° apart around the coupling without rotating the flanges. The flanges should be aligned so that the dimensions at all four places do not vary more than 1/32" for best results. Check parallel misalignment by laying the straight edge across the flange O.D. several places around the circumference of the coupling. Parallel misalignment not to exceed 1/32" for best results.

FOR PARALLEL AND NON PARALLEL SHAFTS : For the longest coupling life is always best to align couplings as accurately as possible upon the initial installation.

INSTALLATION OF FLEXIBLE ELEMENT/INSERT

5. You may loosen the flange assembly screws as much as possible without disassembly of cover or you may remove the screws completely thus disassembling the cover. In either case wrap the flexible element around the flange assembling. Make sure the beads of the element are fully worked down upon the seats of covers as shown in the detail on the right drawing. To insure proper seating, rap on the tire O.D. with a small mallet until the split is closed.



FLEXIBLE ELEMENT INSTALLATION

IMPORTANT: Split must be closed after assembly is completed.

6. Hold with your hand the split of the flexible element. Tighten (finger tight) one or two screws directly opposite the split. Using both hands knead the tire pulling it toward the split. Repeat the procedure on all remaining screws. Retighten each screw, in succession, with a torque wrench to 300 in-lb.

NOTE : The metal pieces of the coupling that clamp the rubber element will operate properly only if tightly clamped by the screws. Over tightening cannot damage the rubber element, but being too loose may damage the coupling.

TO REPLACE FLEXIBLE ELEMENT/INSERT

Loosen all flange assembly screws completely to disengage the covers of the flange assemblies. Grasp one end of the flexible element at the split and peel it off the flange assemblies. Remove any foreign substances, such dirt, off both sides of the flange assemblies and install the new flexible element according to step 5 and 6. If necessary to replace flange assembly screws, use only grade 8 or equivalent.

IMPORTANT NOTICE: Because of the possible danger to person(s) or property from accidents which may result in the use of this products, it is important that the Hi-Flex coupling be used in accordance with the engineering information specified in the catalog and in these instructions. Proper installation, maintenance and operating procedures must be observed. Proper guards and other safety devices that may be needed or specified in safety codes should be provided and used, but are neither provided by, nor the responsibility of the manufacturer.

STORAGE & SHIPMENT

PREPARING THE BLOWER FOR STORAGE

In preparing the blower for storage, the inner workings of the blower must be coated with a rust inhibiting oil. This is done by removing the air filter/silencer by turning it counterclockwise (CCW). After the filter/silencer is removed, access to the inner workings is possible. A rust inhibitor can then be sprayed into the blower while rotating the blower shaft to insure all parts are oiled. A compatible rust inhibitor should also be added to existing oil, and all bearings should be greased. Re-install filter onto blower and cover the filter assembly with a plastic bag to prevent debris from accumulating in the inlet tubes.

PREPARING THE ENGINE FOR STORAGE

An engine to be stored over 30 days should be completely drained of fuel to prevent gum deposits forming on essential parts, fuel filter, and tank.

NOTE:

The use of a fuel additive, such as Dyna-Fog STA-BIL will minimize the formation of fuel gum deposits during storage. Such an additive may be added to the gasoline in the fuel tank of the engine, or to the gasoline in a storage container.

- A. All fuel should be removed from the tank. Run the engine until it stops from lack of fuel. The small amount of fuel that remains in the sump of tank should be removed by absorbing it with a clean, dry cloth.
- B. While the engine is still warm, drain the oil from the crankcase. Refill with fresh oil.
- C. Remove the spark plug and pour approximately half ounce (15 cc.) of engine oil into each cylinder and crank slowly to distribute the oil. Replace the spark plugs.
- D. Clean dirt and chaff from cylinders, cylinder head fins, blower housing, rotating screen and muffler areas.
- E. Store in a clean dry area.

PREPARING THE BATTERY FOR STORAGE

Disconnect positive (+) and negative (-) battery cables and wrap cable ends with electrical tape. Remove battery and store in a cool dry area.

CAUTION

WHEN DISCONNECTING OF THE BATTERY IS REQUIRED, REMOVE NEGATIVE (-) CABLE FIRST.

PREPARING THE FRAME ASSEMBLY FOR STORAGE

The frame should be wiped down with Isopropyl Alcohol and dried. If original shipping carton is not available the unit should be covered with a tarpaulin or plastic sheet.

WARNING

It is against Federal Law to ship insecticides and flammable liquids in an unmarked, non-D.O.T. approved container without proper labeling and U. N. number.

If for any reason it becomes necessary to return your machine to our Factory, make certain that the Formulation and Fuel Tanks have been and flushed as described above. If a machine is received that has not been drained and flushed, a service fee will be charged for doing so.

ELECTRICAL CONTROL

NOTE: The electrical controls do not require periodic maintenance but should be checked when the machine does not function properly. The electric controls consist of the switches, solenoid, read-out system, optical tachometer, valve and gear pump. Normal operation of the basic components is described below:

1. **FORMULATION ON/OFF VALVE:** The electronically operated ON/OFF valve is controlled by the switch on the remote control panel labeled OUTPUT-ON and an interlock circuit located on the RATE CONTROL printed circuit board. The solenoid valve should be open any time the OUTPUT-ON switch is in the ON position unless the pump is in a loss of control, over speed, or open loop condition. In the latter condition, the indicator light on the control panel marked FAULT will be illuminated.
2. **ROTARY GEAR PUMP:** The rate of flow of formulation is dictated by the rate of rotation of the gear pump. For each revolution of the gear pump a fixed amount of fluid is metered into the nozzle system. The fluid variation at a given speed is essentially independent of the viscosity or temperature of the fluid. Gear pump is magnetically coupled to the drive motor such that there is no rotary seal within the pump. The Formulation Control System consist of an electrically operated spray-flush valve, and electrically operated ON/OFF valve, a positive displacement rotary gear pump, and an electrical rate control and read-out system.

FMI PUMPING SYSTEM: Pumping the liquid is accomplished by the piston rotating and moving in and out of the piston cylinder, all at the same time. The pump is driven by a 12 VDC electric motor. For each revolution of the pump a fixed amount of liquid is accurately metered into the nozzle system. The pump is virtually unaffected by liquid viscosity and temperature. The piston is made of ceramic and the cylinder is stainless steel with a chemically inert carbon liner. Clearance between the cylinder and piston are in the millionths of an inch range. Viton wiper seals prevent any liquid from leaving the cylinder. The FMI pumping system can be supplied with the optional Synchroflow automatic-flow-control system.

DIAPHRAGM PUMPING SYSTEM: Pumping the liquid is accomplished by an electric motor driving an eccentric cam. The cam actuates a diaphragm that moves liquid as the motor rotates. The motor operates at a fixed speed. Liquid flow is varied by using a needle type metering valve on the pump discharge side. Liquid that is not fed to the nozzle system is by-passed back to the inlet side of the pump.

3. **SPRAY-FLUSH VALVE:** The Spray-Flush is a 3-way solenoid valve capable of connecting the input to the pump from the formulation tank or alternately from the flush solution tank.
4. **RATE CONTROL SYSTEM:** The electrical rate control system consist of a command potentiometer, a pulse width modulated motor driver, the motor portion of the motor gear-pump, an optical tachometer generator, and an optical tachometer decode circuit.
5. **OPTICAL TACHOMETER:** The optical tachometer is used on the Gear and FMI Pumping systems. It operates on the principle of interruption of the transmission of infrared light from a light emitting diode to a photo transistor. A 40 tooth narrow faced spur tooth gear is used as the interrupting device. As the gear turns through the sensor the transmission is interrupted 40 times per complete revolution of the rate 40 pulses per second. At 25 revolutions per second the pulse rate is 1000 pulses per seconds. These pulses are fed into a frequency to voltage converter which generates a DC voltage analogous to flow rate. This voltage is attenuated and scaled to give a read-out in ounces/minute or milliliters/minute.

GEAR PUMPING SYSTEM

TOGGLE SWITCH FUNCTIONS

- 1) **Machine** switch off: Removes +12 V DC system power and grounds engine ignition to kill engine.
Machine switch on: Applies +12 V DC system power and removes ground from engine ignition. This position also applies power to machine L.E.D. light indicating power is on.
- 2) **Start**: Applies system power to starter solenoid to start engine.
- 3) **Mode** Spray: In spray position, applied + 12 V DC system sends power to 3-way valve mounted on the blower/engine base plate to connect Formulation Tank, and power to Spray Light.
Mode Flush : In flush position, removes power from 3-way valve, opens port to Flush Tank, and applies power to Flush Light.
- 4) **Output** on: Applies +10 V DC power to pump motor-control module, output L.E.D. light and opens the 3-way valve mounted on the nozzle boom.
Output off: Removes power to pump motor-control module turning output L.E.D. light off and closes 3-way valve on nozzle boom.

SELECTOR SWITCH FUNCTIONS

<u>SWITCH POSITION</u>	<u>FUNCTION</u>
F	Connects fuel level readout (Optional) to digital meter and locates decimal point one place from right. Voltage of 7.5 millivolts correspond to 7.5 gallons.
1	Connects low rate readout in ounces/minute to digital meter and located decimal point 2 places from right. Voltage of 18.0 millivolts corresponds to 1.80 oz/min.
2	Connects high rate readout in ounces/minute to digital meter and located decimal point 2 places from right. Voltage of 180.0 millivolts corresponds to 18.00 oz/min.

SELECTOR SWITCH FUNCTIONS (Continued)

- 3 Connects low rate readout in milliliters/minute to digital meter and located decimal point one place from right. Voltage of 54.0 millivolts corresponds to 54.0 ml/min.
- 4 Connects high rate readout in milliliters/minute to digital meter and leaves decimal point blank. Voltage of 54.0 millivolts corresponds to 54.0 ml/min.
- 5 Syncroflow mode. (Optional feature, a syncroflow cable must be purchased for this feature to operate.) In syncroflow mode of operation, connects speed indicator readout in miles per hour to digital meter and locates decimal point one place from right. Voltage of 20.0 millivolts corresponds to 20 mph. In manual mode of operation, connects potentiometer supply to digital meter. When engine is running and output switch is not on, readout should read 30.2 +/-1.0. This number indicates that the system should be calibrated. When the output switch is on, this number should read 25.2 +/-1.5. This number indicates that the potentiometer is connected and the instrument ground is firmly connected.

RATE POTENTIOMETER

Output rates are commanded by a rate potentiometer which in the manual mode is supplied from the + 10.00 volt power supply through a 1000 ohm resistor and in the syncroflow mode directly from the output of speed decode module. The range of output is determined by the High/Low connections inside the Pump/Control assembly (consult Factory). In the High rate (Standard setting of the machine), the command is 0 to 18 oz/min (0 to 540 ml/min) and in the Low rate, the command is 0 to 1.8 oz/min (0 to 54.0 ml/min). In Syncroflow each of the rates is varied as a function of the vehicle speed. As the vehicle speed is reduced the output is reduced proportionally.

INDICATOR LIGHTS

<u>LIGHT</u>	<u>FUNCTION</u>
Machine	Indicates that machine switch is ON. Supplied by +12VDC power.
Spray	Shows that spray mode has been selected by toggle switch on panel.
Flush	Shows that spray mode has been selected by toggle switch on panel.
Output	Shows that output is ON. Will light only when blower pressure switch is activated by pressure developed in nozzle boom.
Fault	Comes on when speed exceeds 22 mph or when output rate exceeds selected instrumentation or control range.

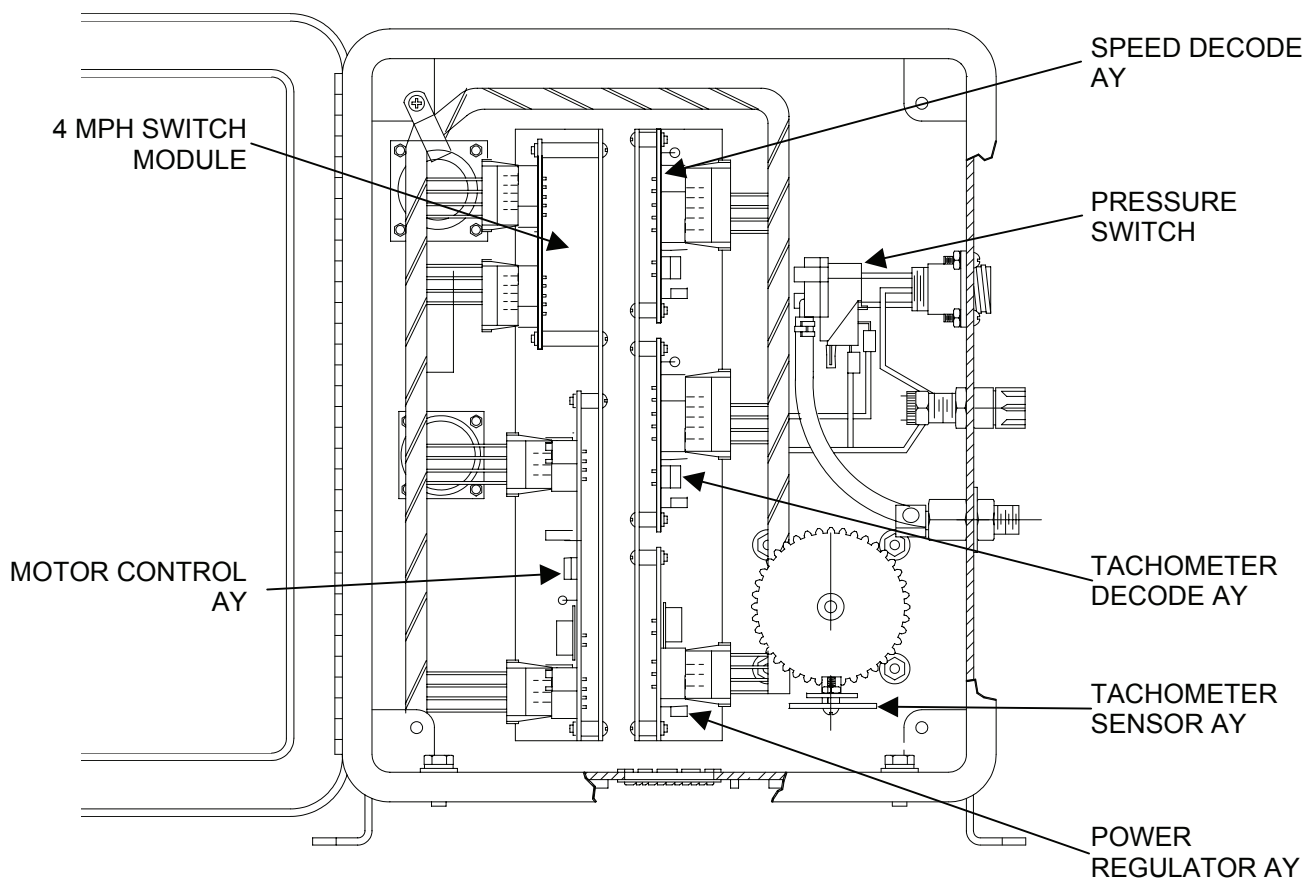
PUMP CONTROL ASSEMBLY

The pump control assembly contains the formulation pump, the control electronics, the manual/syncroflow switch, and the power fuse.

FORMULATION PUMP: The formulation pump is a magnetically coupled stainless steel, gear pump driven by a DC motor. The DC motor is driven by the variable pulse width output of the motor control module.

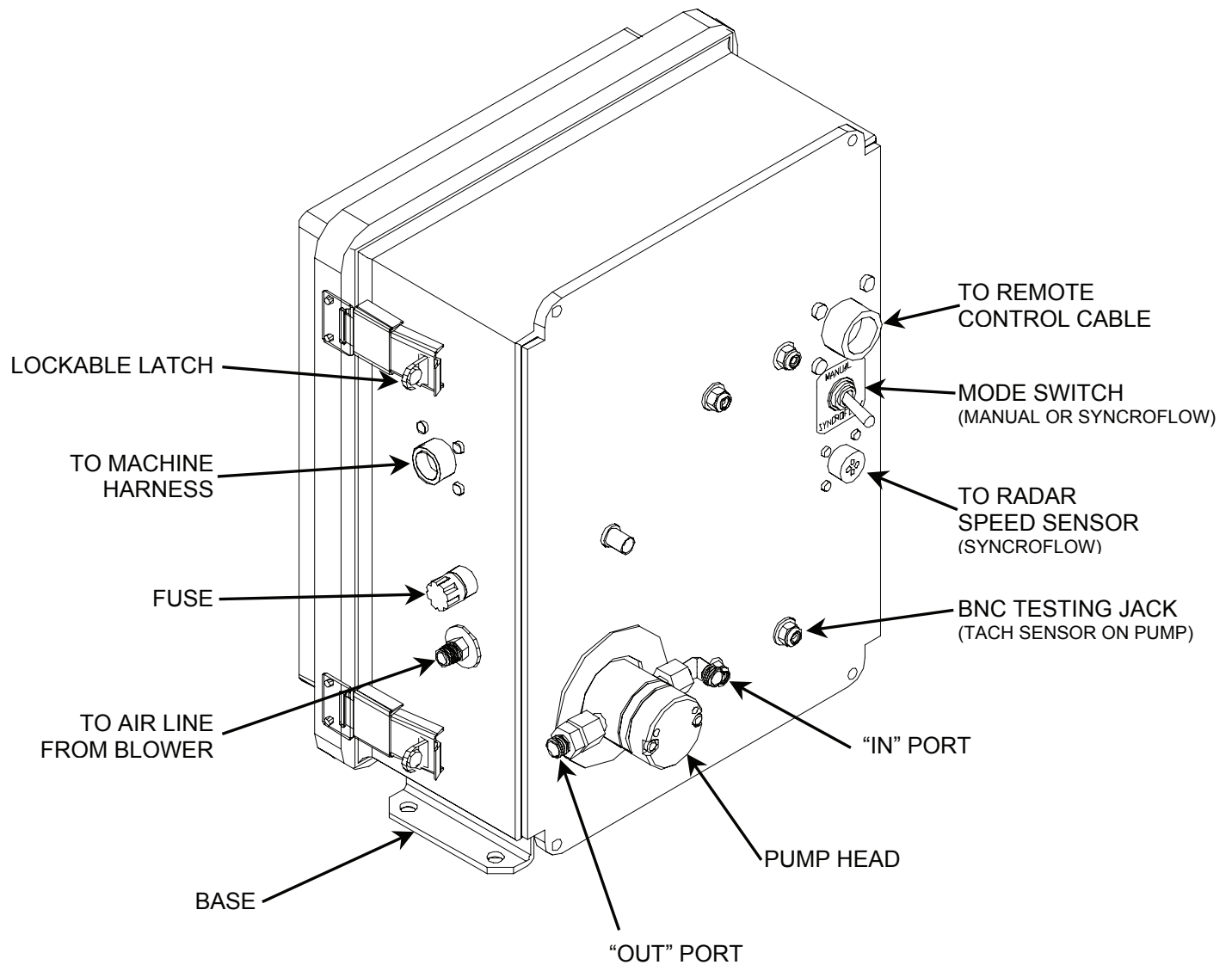
MANUAL/SYNCROFLOW SWITCH: In the manual mode the + 10.00 V DC is connected to the rate potentiometer through a 1000 ohm resistor and in the syncroflow mode, the output of the speed decode module is connected directly to the rate potentiometer. No voltage is supplied by either unless the pressure switch is closed.

TEST JACK: Test point where output frequency generated by optical tachometer can be monitored. As reference, the frequency is 888 cycles per second for 540 ml/min of flow rate.



Gear Pumping System shown.

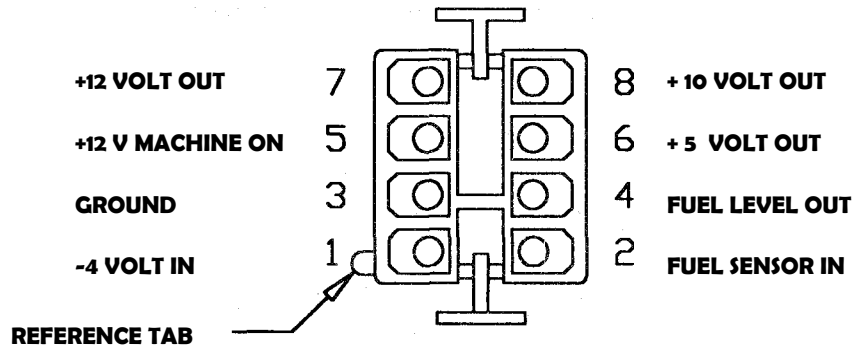
OUTSIDE CONTROLS/COMPONENTS (Gear Pumping System)



Gear Pump Enclosure Assembly

POWER SUPPLY MODULE

The power regulator module takes the 12V DC battery power and converts it to 10.00 +/- .05 V DC and 5.00 +/- .12 V DC for use as references in the system. The metering accuracy is dependent on the accuracy of the + 10 V DC supply. This module also contains the reference amplifier which is analogous to the gallons of gasoline remaining. An attenuator of 121:1 in the remote control box reduces the 0.9 volts to 7.5 millivolts for readout on the digital voltmeter. Pin-outs for the power supply module are as follows:

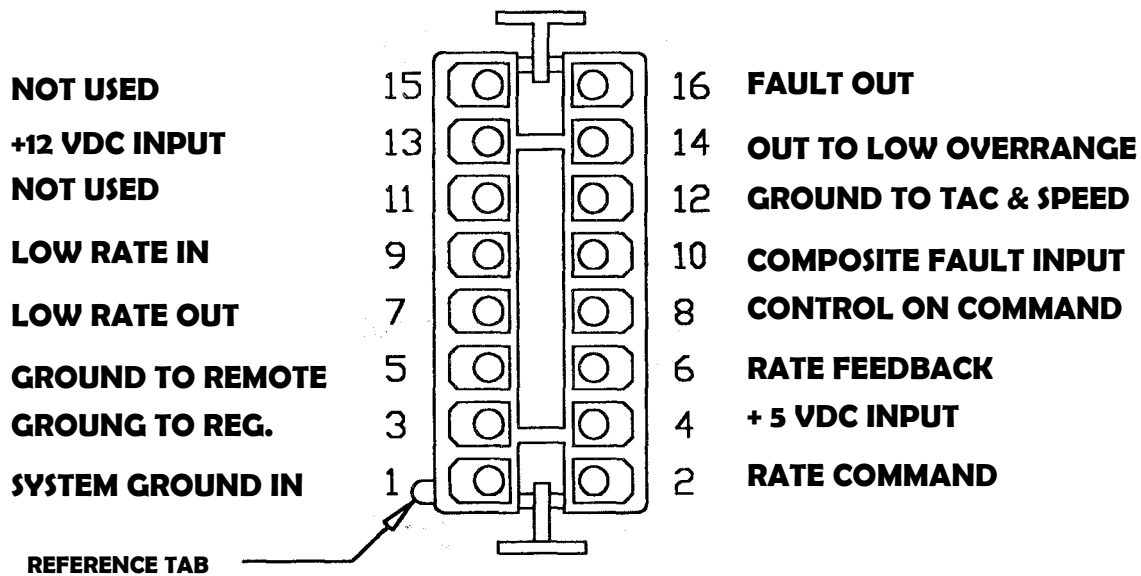


PIN	FUNCTION	DESCRIPTION
1	-4V DC	-4 V DC in from tach decode module, usually -4.00 +/- .15VDC.
2	Fuel sensor in	Connects through J3 to fuel sensor (optional) located in fuel tank, low resistance (20 ohms) corresponds to full tank: high resistance (220 ohms) corresponds to empty tank.
3	Ground	Module ground input.
4	Fuel out	Analog voltage to remote box; 0 corresponds to empty 0.9 V DC corresponds to 7.5 gallons (optional).
5	+12VDC	Power out interlock.
6	+5VDC	Regulated +5 V to rest of system +5.00 +/- .12 volts DC.
7	+12VDC	Battery power input from machine on switch.
8	+10VDC	Regulated +10 V power to rest of system +10.00 +/- .05 volts DC.

MOTOR CONTROL MODULE

The motor control module receives a command from the rate potentiometer located on the remote control box and generates a variable pulse width command to the formulation motor. The command signal is added to the feed back signal generated by the tachometer decode circuit and a difference amplified drives the variable pulse width generator.

This module also contains the circuits needed to operate the fault indicator in the remote control box and to provide the voltage to open the 3-way solenoid valve. Pin outs for the motor control module are as follows:



PIN	FUNCTION	DESCRIPTION
1	System ground in	Provides ground to module from system
2	Rate command	Command voltage from potentiometer in remote control box.
3	Ground	Ground to voltage regulator.
4	+5 V DC	+5.00+/- .12VDC.
5	Ground	Ground to remote control box.

MOTOR CONTROL MODULE (Continued)

6	Rate feedback	Voltage from tach decode module which represents pumping rate: 3 to 6.2 V DC. See tachometer module pin 6.
7	Low rate OUT	Pins 7 & 9 are used as junction only.
8	Control on command	+10.00 volts dc when output on switch is on. Pressure switch must also be energized.
9	Low rate OUT	Pins 7 & 9 are used as junction only.
10	Composite fault in	Any voltage representing meter or speed overrange at this pin will cause fault light to come on.
11	Not used	
12	Ground	Ground to TAC & speed decode.
13	+12 vdc input	+12 V DC system power input.
14	Out to low Overage	Diode isolated low range.
15	Not used	
16	Fault out	+11 +/-2 V DC out to fault light in remote control.

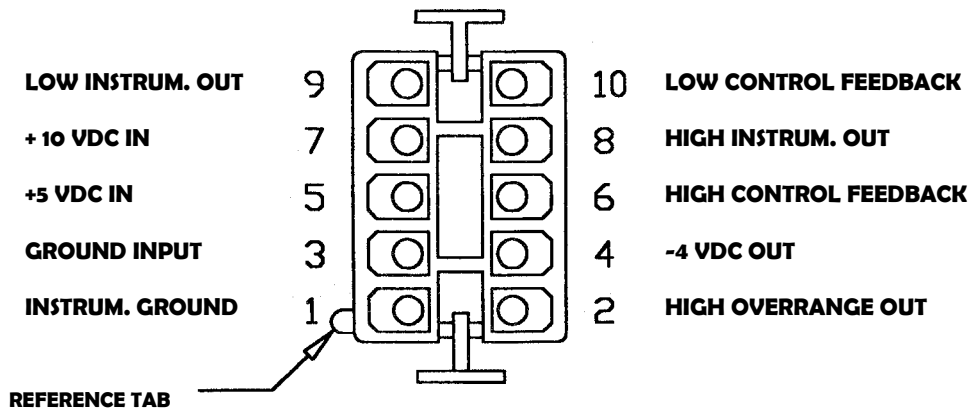
TACHOMETER DECODE MODULE

The tachometer decode module senses the interruptions of the infrared sensor located on the motor which drives the formulation pump.

The sensor is interrupted 40 times (the number of teeth on the sensing gear) with each revolution of the pump. These pulses are amplified and fed into two frequencies to voltage converters, one for low range and one for high range.

The low range converter generates 7.00 +/- .05 volts for each 88 interruptions per second, and high range converter generates 6.50 +/- .05 volts for each 888 interruptions per second. On low range 7.0 volts is analogous to 1.8 ounces per minute (54 ml/min) and on high range 6.5 volts is analogous to 18 ounces per minute (540 ml/min).

The scale factors differ for high and low ranges in order that the characteristics of the pump can be more closely approximated.



PIN	FUNCTION	DESCRIPTION
1	Instrument ground	Provides reference to voltmeter in remote box which is free of heavy current flows that can cause errors in readings.
2	High overrange	Causes fault light circuit in motor control to be activated in motor overspeeds due to excess command or break lock condition 0 to 8.5 V DC.
3	Ground	Ground input for module.

TACHOMETER DECODE MODULE (Continued)

- | | | |
|----|--------------------|---|
| 4 | -4VDC | Power out to fuel reference amplifier in power regulator module. Generated by inverter circuit in tach module. Usually measures -4.00 +/- .15 volts. |
| 5 | +5 V DC | Power in from voltage regulator module measures 5.00 +/- .12 volts. |
| 6 | High rate feedback | Feedback to motor control module to stabilize motor speed in high range. Will vary from 3 volts to 6.2 volts depending on motor speed. 3 volts at 0; and 6.2 volts at 18 oz/min (540 ml/min). |
| 7 | +10 V DC | Regulated +10 V from power supply module +10.00 +/- .05VDC. |
| 8 | High instrument | Buffered and filtered analog voltage for high rate readout. 0 volts corresponds to 0 output +6.50 volts corresponds to 18 oz/min (540 ml/min). |
| 9 | Low instrument | Buffered and filtered analog voltage for low rate read out. 0 volts corresponds to output +7.00 volts corresponds to 1.8 oz/min (54 ml/min). |
| 10 | Low rate feedback | Feedback to motor control module to stabilize motor speed in low range. Will vary from 3 volts to 6.2 volts depending on motor speed. 3 volts at 0 oz/min; and 6.2 volts at 1.8 oz/min (54 ml/min). |

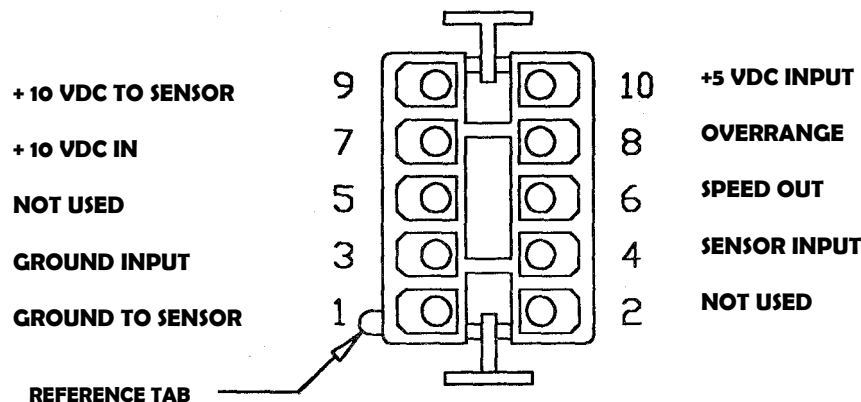
SPEED DECODE MODULE

The speed decode module is included in all machines equipped with the SYNCROFLOW option.

This module is similar to the tachometer decode module in that it uses a frequency to voltage converter and an external sensor to generate a pulse rate. The speed decode module is driven by a Hall effect sensor which is mechanically coupled to the transmission of the vehicle. The sensor contains a 20 pole monolithic magnetic device which rotates at the rate of 1000 revolutions per mile, thus generating a pulse rate of 20,000 pulses per mile. At 20 miles per hour, this corresponds to 400,000 pulses per hour or 111 pulses per second.

The frequency to voltage converter is calibrated for 6.6 volts output for 111 pulses per second input (6.60 volts at 20 mph). An attenuator of 331:1 in the remote control box causes the meter to read 20.0 mV at 20 mph. In the syncroflow mode this voltage is used as the command voltage in lieu of the fixed voltage in the manual mode.

The connections to the module are as follows:



PIN	FUNCTION	DESCRIPTION
1	Ground to sensor	Provides a ground reference to the Hall effect speed sensor.
2	Not used	
3	Ground input	Input ground from system.

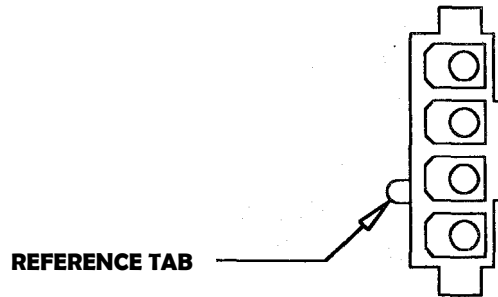
SPEED DECODE MODULE (Continued)

4	Sensor input	Provide "sink" (solid state switch to ground) each time one of the magnetic poles on the monolithic magnet passes the Hall effect sensor, causing a voltage drop across the pull up resistor R 10 located on the speed decode module.
5	Not used	
6	Speed out	Scale factor equals .336 volts per mph or .0594 volts per pulse Analog voltage 0 to 8.5 volts representing 0 to 25.7 mph. per second.
7	+10 V DC Power in	+10.00 +/- .05 volts DC input power.
8	Overrange	Voltage output which causes fault light to come on if speed of 25 mph is exceeded while unit is operating.
9	+10 VDC to sensor	Provides power to sensor only when speed decode module is included.
10	+5 V DC power in	+5.0 +/- .12 volts DC input power.

OPTICAL SENSOR INTERFACE

The interface with the optical sensor is through the small 4 pin connector on the tachometer decode module.

The signal references are as follows:



PIN	FUNCTION	DESCRIPTION
1	Test	Buffered tachometer rate 0 to approximately 1200 pulses per second.
2	Sensor PWR	+5 V DC limited by 180 ohms to drive the emission diode in the optical sensor.
3	Sensor rate	Output of optical sensor. Same frequency as buffered tach rate.
4	Ground	Ground to optical sensor.

4 MPH SWITCH MODULE

The 4 mph switch module stops the output of formulation in the syncroflow mode when the vehicle speed slows to 4 miles per hour or below. This module measures the analog voltage output of the speed decode module and compares it to a reference voltage to determine if the speed is above, or below the preset level. If the speed is above the preset level a relay on the module is energized, which in turn allows the output solenoid valve to open, and the formulation pump motor to operate. Below the preset level the module closes the solenoid valve and stops the formulation pump. In manual mode the relay on the module is energized at all times regardless of vehicle speed. The connections to the module are as follows:

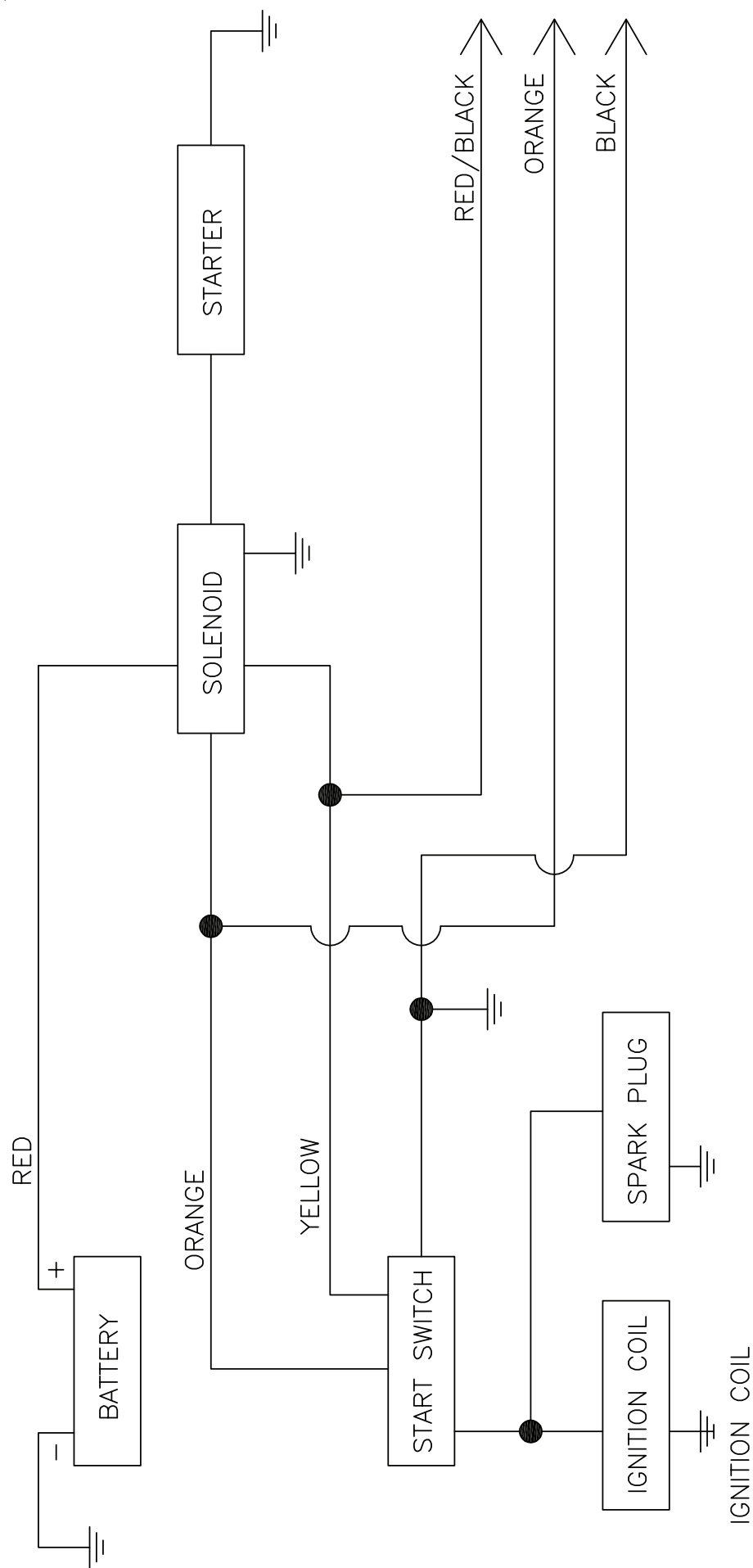


CONNECTOR "A"

PIN	FUNCTION	DESCRIPTION
1	Command analog out	From relay contact to pin 2 on motor control.
2	Command analog in	Command voltage from rate adjust in remote control box to relay contact.
3	Command +10VDC	From relay contact to pin 8 on out motor control.
4	Command +10VDC	+10 volts dc when output switch is ON. Pressure must also be activated.

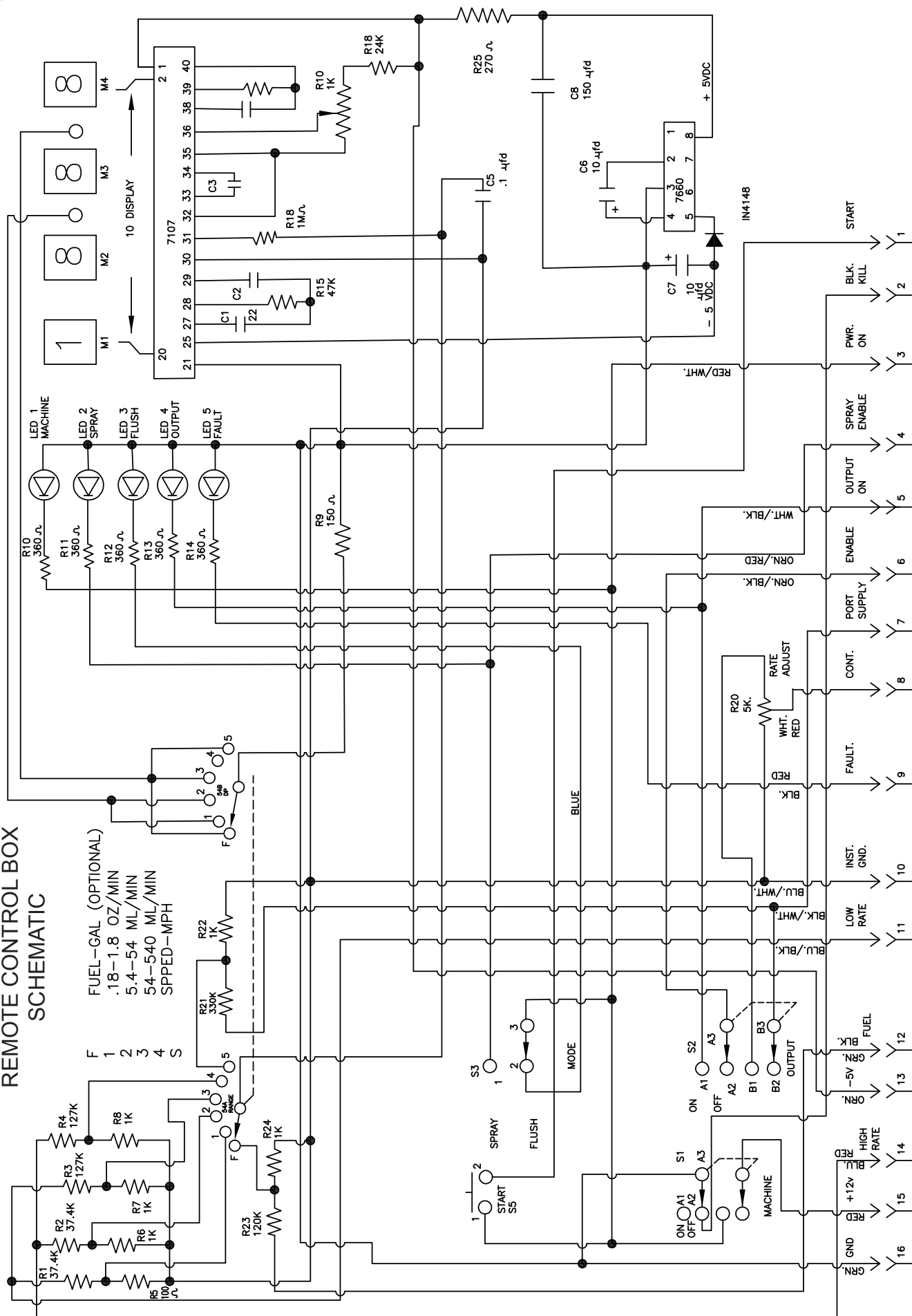
CONNECTOR "B"

PIN	FUNCTION	DESCRIPTION
1	+10VDC	+10.00+.05 volts input power
2	-5 V DC	From inverter on speed decode module.
3	Gnd	Ground input for module
4	Signal	Analog voltage 0-8.5 volts representing 0-25.7 mph from speed decode module in syncroflow mode. In manual mode+ 10 V DC fixed.

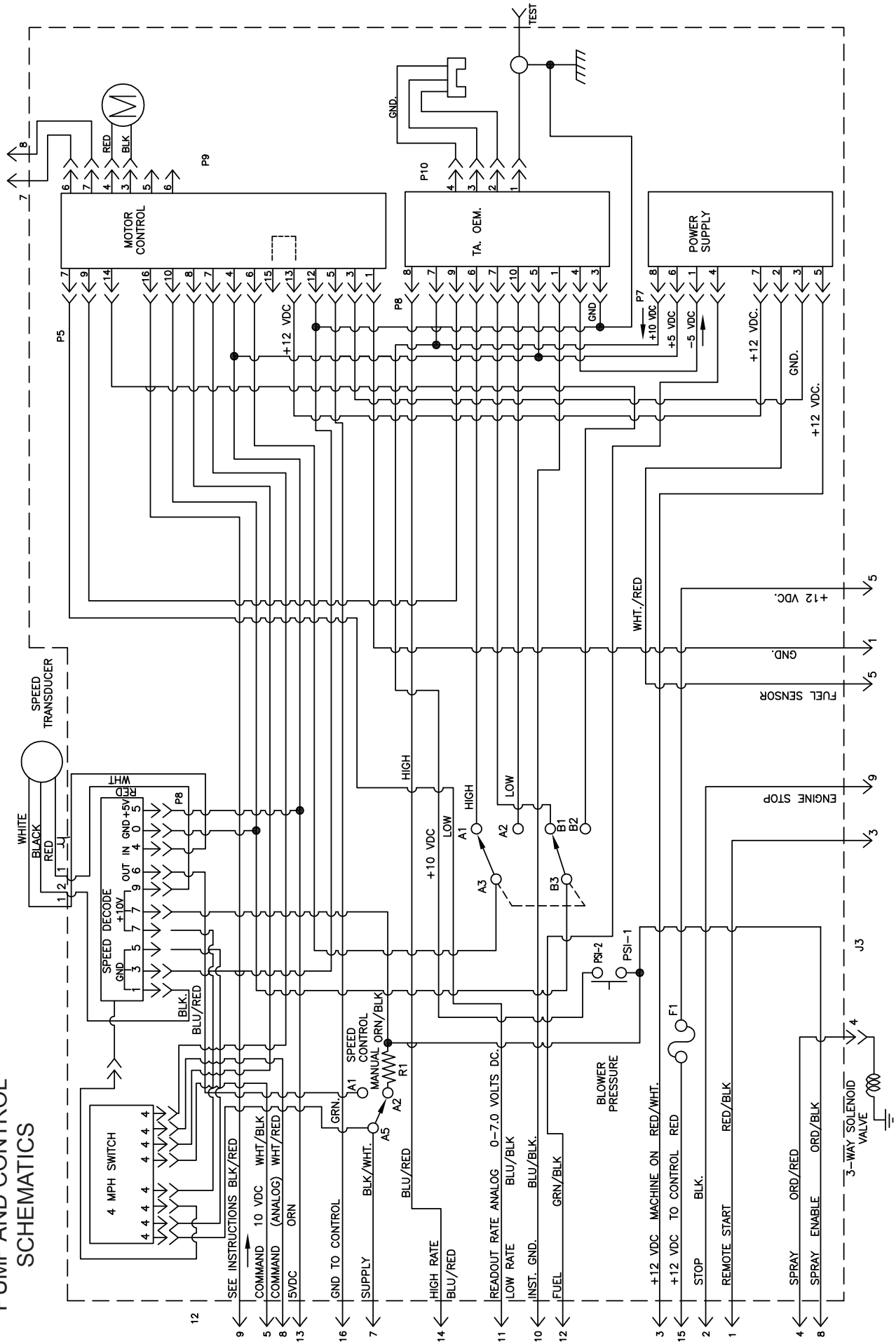


ENGINE WIRING DIAGRAM

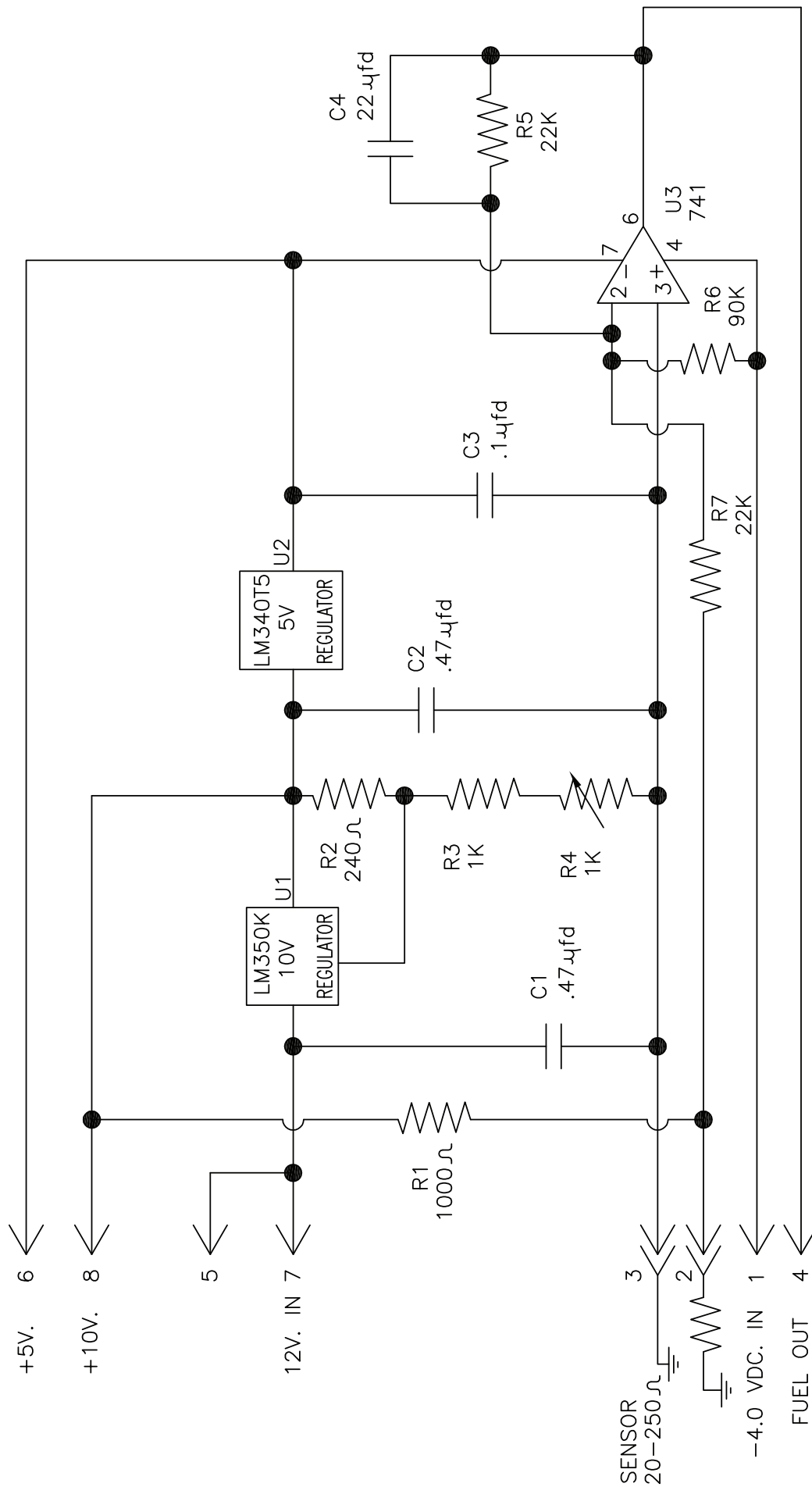
REMOTE CONTROL BOX SCHEMATIC

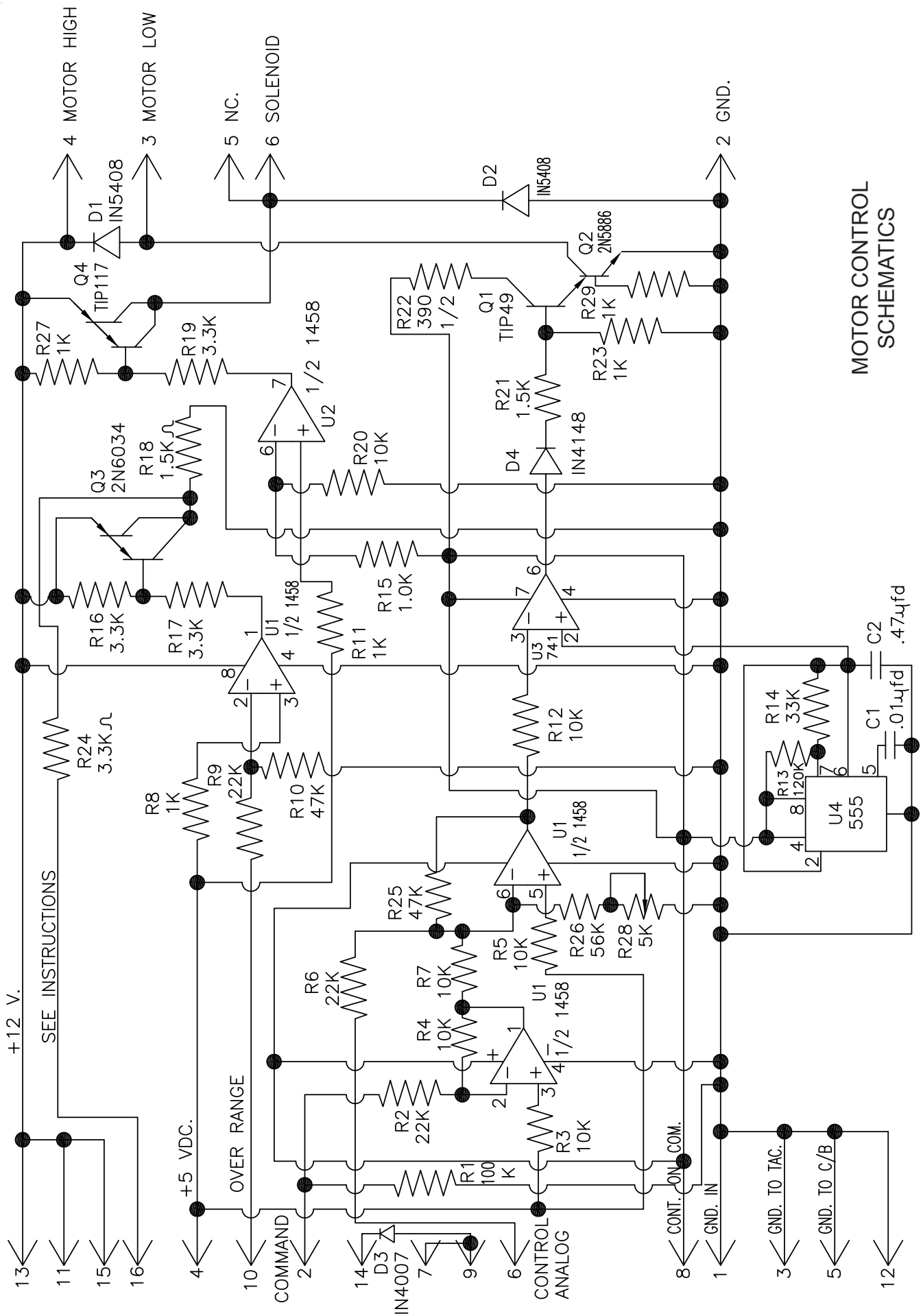


PUMP AND CONTROL SCHEMATICS

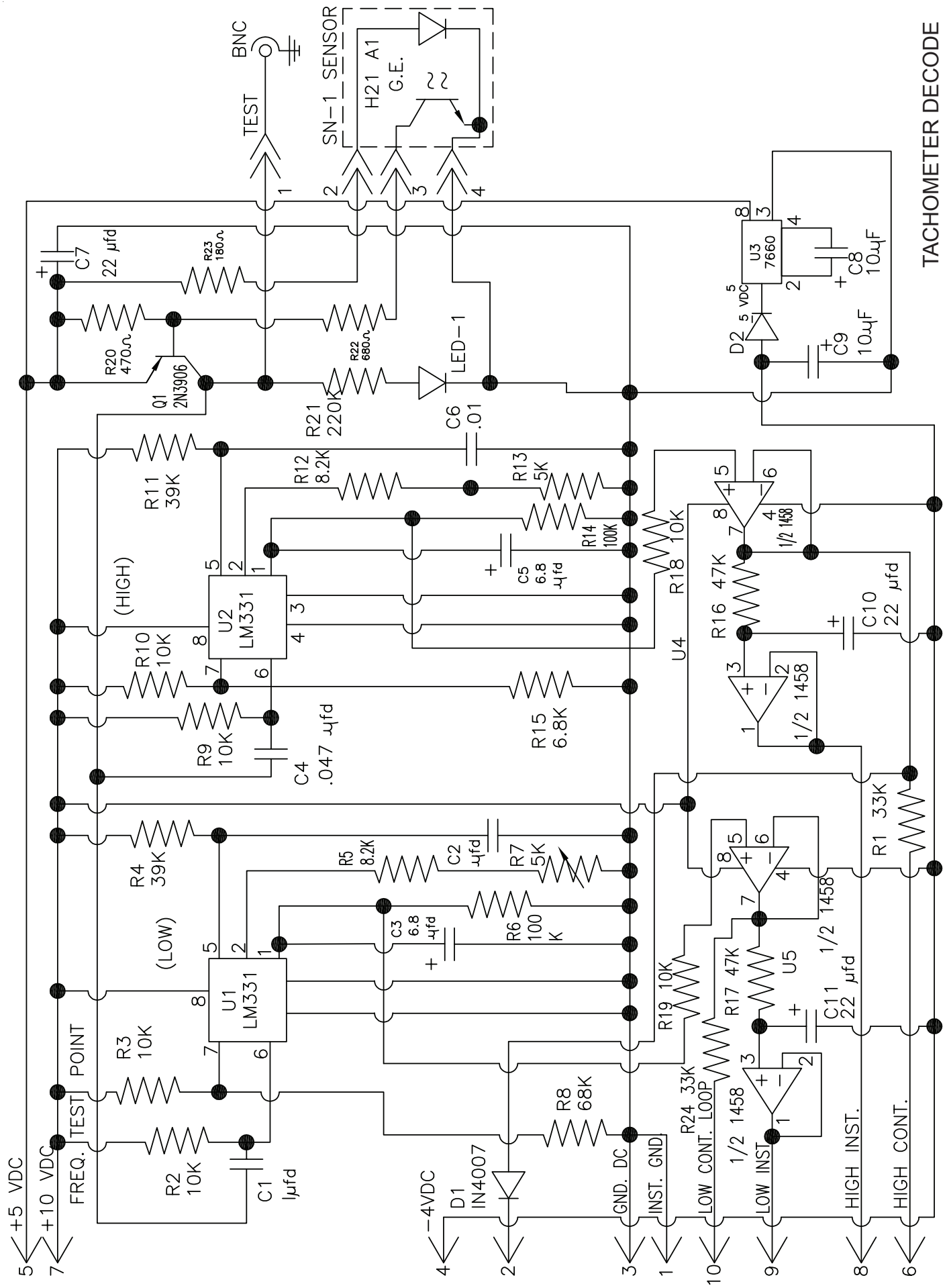


POWER REGULATOR SCHEMATICS

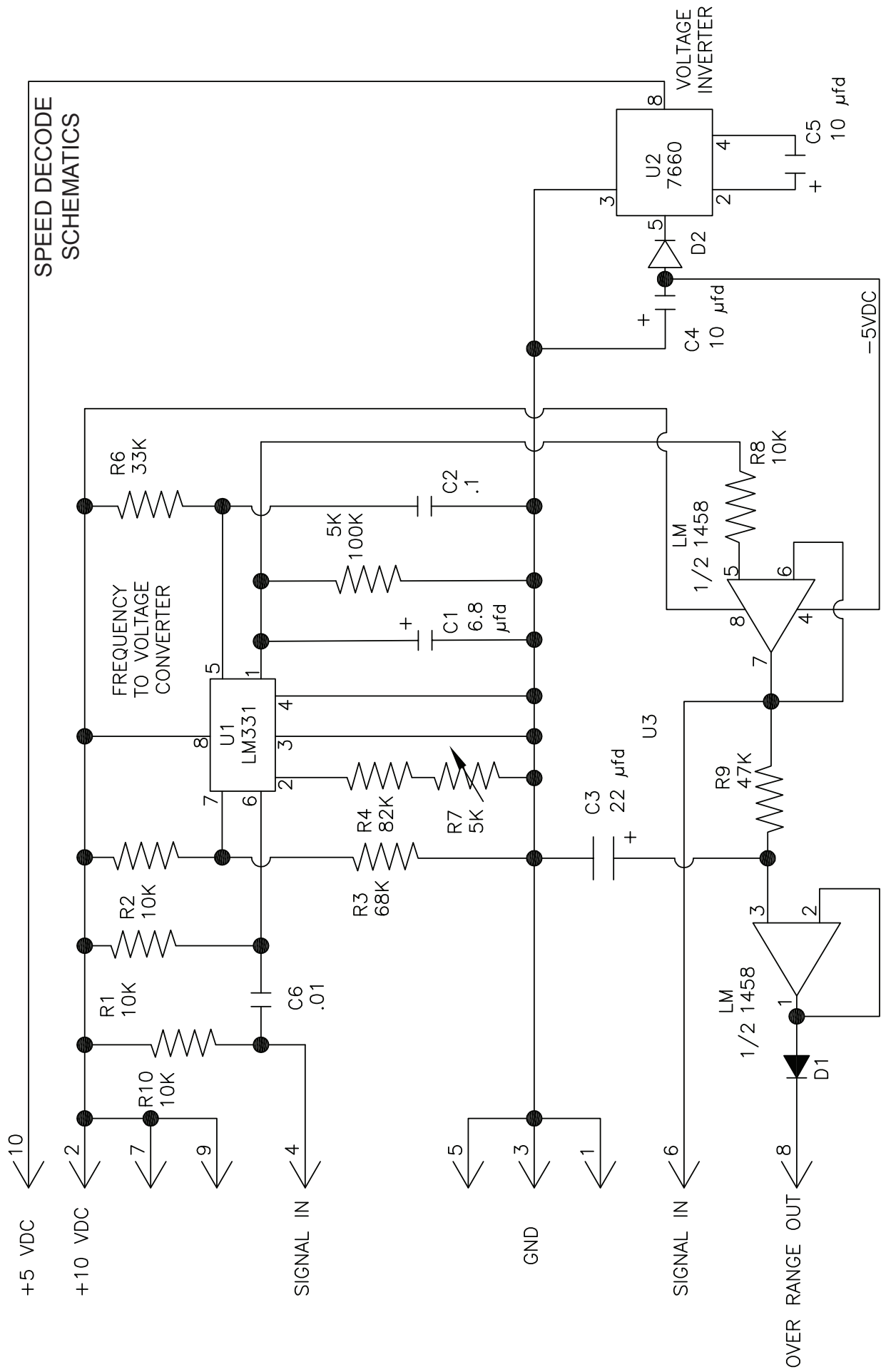




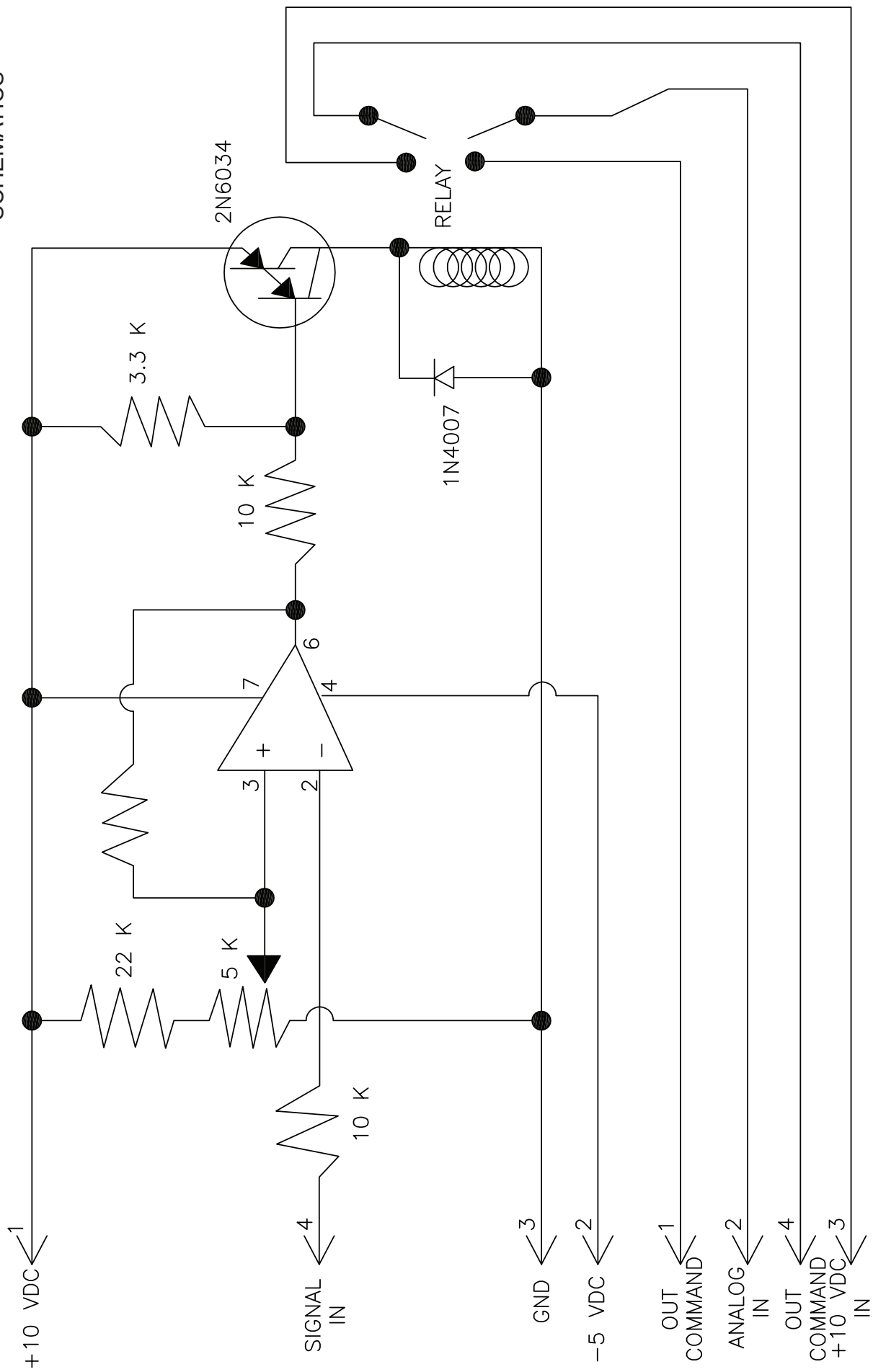
MOTOR CONTROL SCHEMATICS



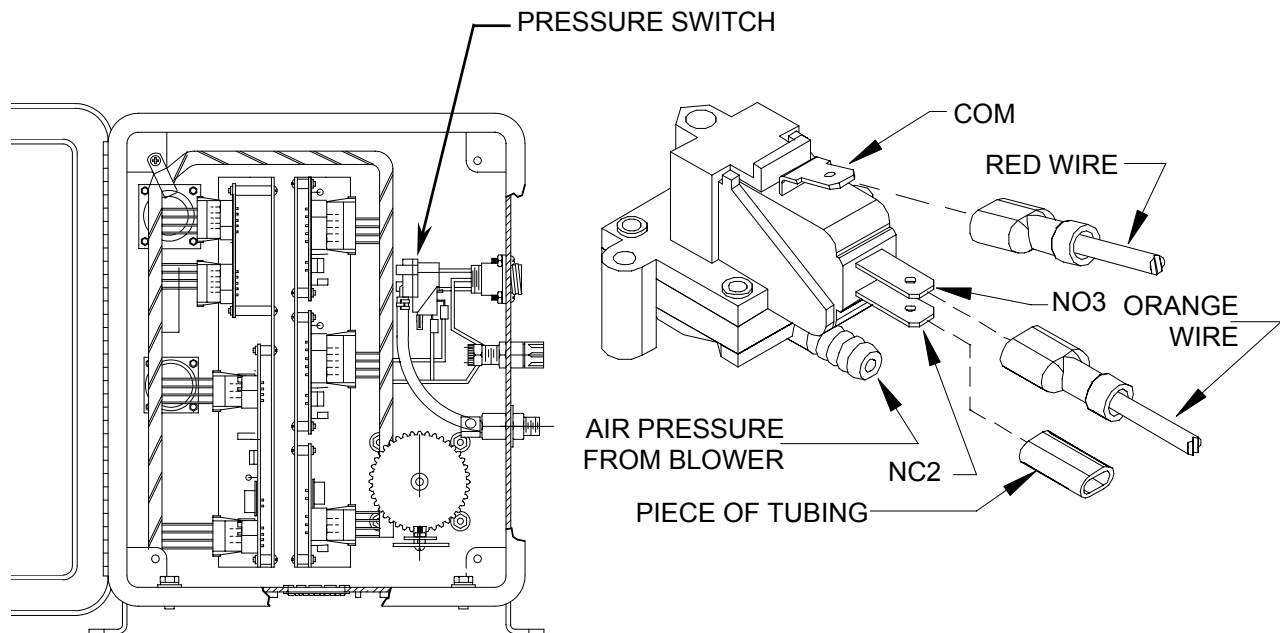
TACHOMETER DECODE
SCHEMATICS



4 MPH. SWITCH SCHEMATICS



BY PASSING THE AIR PRESSURE SWITCH



PUMP AND CONTROL ASSEMBLY, P/N 64617-R (RELATIVE LOCATION OF PRESSURE SWITCH)

The air pressure switch is part of the logic of the circuit, allowing the operation of the formulation pump only if the air nozzle boom pressure is present. With this feature the machine is not able to pump (spill) the formulation with the engine/blower off (stopped).

Bypassing the pressure switch will enable you (without the machine's engine running) to determine if the switch is functioning properly.

To bypass the pressure switch located inside the formulation pump enclosure perform the following:

1. Remove the orange wire from the terminal "NO3" (normally opened), and remove the piece of tubing from terminal "NC2" (normally closed). Place the orange wire onto terminal "NC2". Doing this will enable the formulation pump to be operated without the machine's engine running.
2. Replace orange wire and tubing back into their original positions when finished.

TROUBLESHOOTING

<u>SYMPTOMS</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
1. Starter fails to crank engine.	a. Battery cable connections. b. Dead battery. c. Defective starter switch d. Starter defective. e. Blower locked up.	a. Clean & tighten cable; loose, dirty or damaged connections. Replace a damaged cable. b. Replace or charge battery. c. Check starter button on engine. d. Replace starter. e. Inspect blower for rotation.
2. Engine hard to start or stops	a. START-STOP switch on engine in stop position or faulty. b. machine ON-OFF switch located on remote box in OFF position or faulty. c. No fuel or contaminated fuel. d. Clogged fuel filter. e. Spark plugs faulty. f. Fuel pump on carburetor defective. g. Terminals loose or wiring defective. h. Spark plug wire disconnected. i. Loosen gasoline hose Clamps or perforated gasoline hose.	a. Place switch in start or run position. b. Place switch in ON position or replace faulty switch. c. Add fuel o clean tank and refuel. d. Replace fuel filter. e. Clean or replace plugs. f. Consult nearest Briggs service center. g. Tighten loose terminals , replace defective wiring. h. Connect spark plug wire. i. Tighten loose clamps or change the gasoline hose.
3. Engine misses or runs erratically.	a. Spark plug faulty. b. Spark plug wire disconnected. c. Contaminated fuel. d. Clogged fuel filter. e. Carburetor mounting gasket leaks. f. Cylinder head gasket leaks. g. Carbon build-up beneath cylinder head. h. Loosen gasoline hose Clamps or perforated gasoline hose.	a. Clean or replace plugs. b. Connect spark plug wire. c. Replace fuel. d. Replace fuel filter. e. Tighten bolts , replace gasket if necessary. f. Tighten cylinder head bolts. g. See engine manual. i. Tighten loose clamps or change the gasoline hose.
4. Engine knocks or develops noise.	a. Crankcase oil low. b. Spark arrestors clogged. c. Flywheel loose.	a. Fill oil to proper level, after oil fill, if noise continues consult nearest Briggs service center. b. Clean or replace. c. Consult nearest Briggs service center.

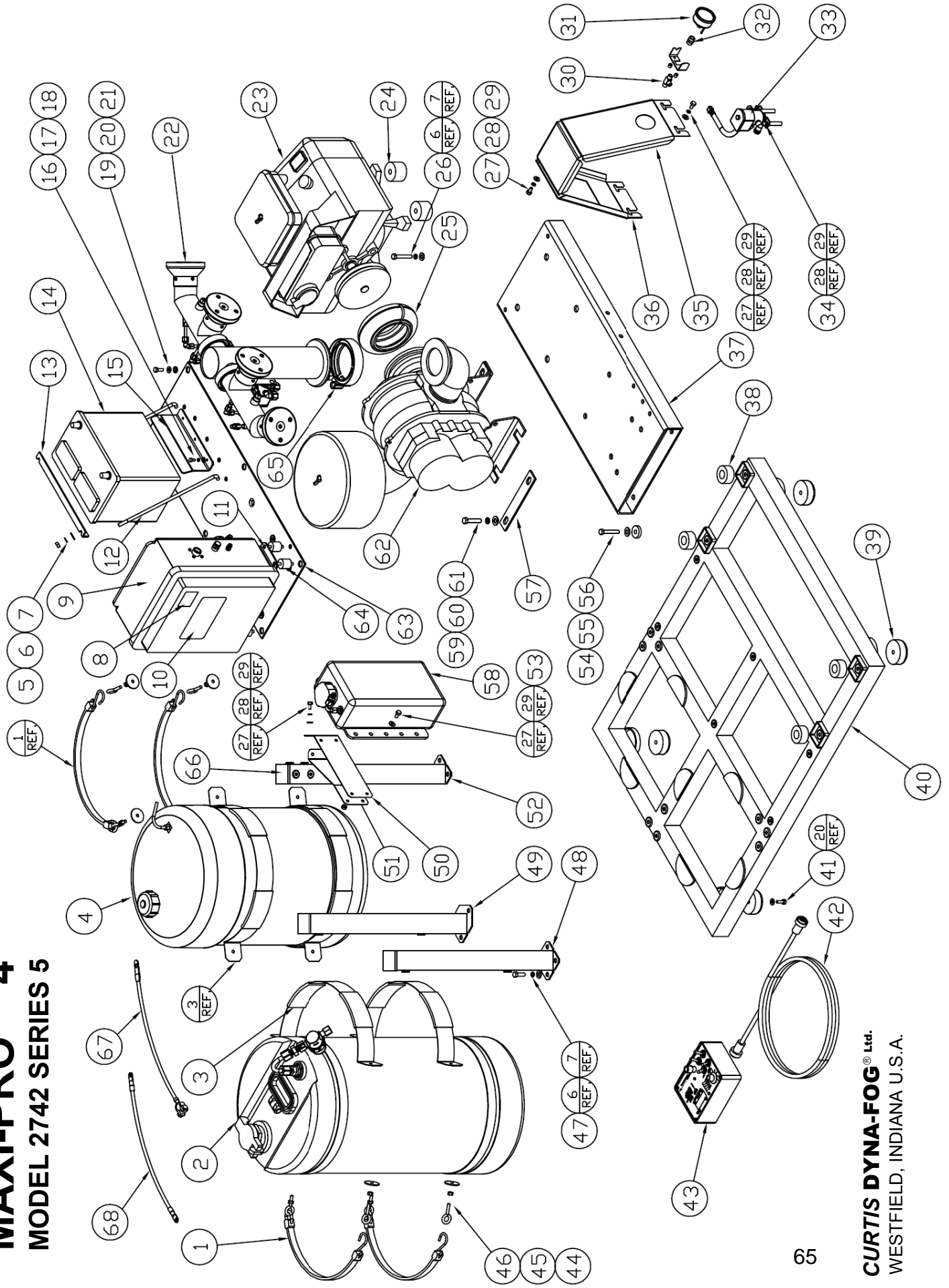
SYMPTOMSPOSSIBLE CAUSECORRECTIVE ACTION

- | | | |
|--|---|--|
| 5. Engine will not idle smoothly. | a. Carburetor dirty or out of adjustment.
b. Springs on speed control lever fell off. | a. Clean or adjust carburetor.
b. Replace springs. |
| 6. Engine overheats. | a. Crankcase oil low.
b. Air shroud clogged
c. Exhaust restricted.
d. Spark arrester clogged. | a. Add oil to proper levels.
b. Clean or replace air shroud.
c. Replace muffler.
d. Clean or replace. |
| 7. Engine backfires. | a. Gasoline mixture too lean.
b. Defective spark plugs.
c. Inlet valve sticking. | a. Adjust carburetor.
b. Clean, adjust, or replace.
c. Free, clean and adjust valve. |
| 8. Engine Compression low. | a. Valve clearance improper.
b. Defective cylinder head.
c. Defect valves or piston rings.
d. Cylinder head gasket leaks. | a. Adjust valve
b. Consult nearest Briggs service center.
c. Consult nearest Briggs service center.
d. Tighten head bolts or replace bolts. |
| 9. Engine does not deliver full power. | a. Carburetor choke valve partly closed.
b. Air cleaner dirty.
c. Carburetor defective.
d. Exhaust restricted.
e. Spark arrester clogged.
f. Rotary blower air inlet filter restricting air inlet. | a. Adjust choke.
b. Service air cleaner
c. Clean, adjust or replace.
d. Replace muffler.
e. Clean or replace.
f. Inspect filter. |
| 10. Engine stops suddenly. | a. Ignition switch faulty.
b. Fuel system has dirt, water or gum.
c. Defective choke on linkage.
d. Carburetor defective.
e. Rotary blower locked up.
f. Fuel pump defective.
g. Faulty wiring. | a. Replace ignition switch.
b. Clean fuel tank, link & check fuel filter.
c. Inspect choke linkage wire & choke.
d. Clean or replace.
e. Inspect rotary blower for rotation.
f. Clean or replace.
g. Tighten loose terminal, replace defective wiring. |
| 11. Blower will not operate while engine is running. | a. Defective coupling.
b. Gears in blower damaged. | a. Check coupling, tighten flange screws as specified.
b. Consult factory. |
| 12. Blower makes excessive noise. | a. Rotors, gears, or bearings defective. | a. Consult factory. |

<u>SYMPTOMS</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
13. Machine light not on.	a. Blown fuse. b. Battery not connected. c. Control ground disconnected d. Defective LED	a. Eliminate Short and replace fuse. b. Connect battery. c. Check ground for physical and electrical connection to chassis. Outside of test connector should read 0 ohms to chassis. d. Replace LED.
14. Output light not ON when	a. Engine not running. b. Defective pressure switch. c. Leak in pressure line.	a. Start engine. b. Replace switch. Pressure switch can be temporarily shorted across terminal for test. c. Check and correct.
15. Output reading erratic or inaccurate.	a. Defective pressure switch. b. Loose ground. c. Optical tachometer not engaged.	a. With blower running measure voltage to Ground or both sides of pressure switch. Voltage should be not more than +/- .01 Volts difference between sides. b. Check ground points on module to chassis ground. c. With engine running and the rate potentiometer set maximum CCW, slowly rotate the gear connected to the motor through the optical device. The LED light on the tachometer decode module should go light and dark. If not, adjust bracket slightly until light will operate. If light does not operate, check all power supply voltages first. See module charts and schematic diagrams.
16. Pump runs but no output.	a. Leak in suction line. b. Output solenoid not opening.	a. Check lines and tighten fittings if necessary. Check that both formulation and flush tank have solution in them. Check sediment bowls for tightness. b. Check voltage at connector which goes To solenoid. Should be 10.5 volts min. If not check for voltage at the motor control module. If voltage is not there replace motor control module.

MAXI-PRO™ 4

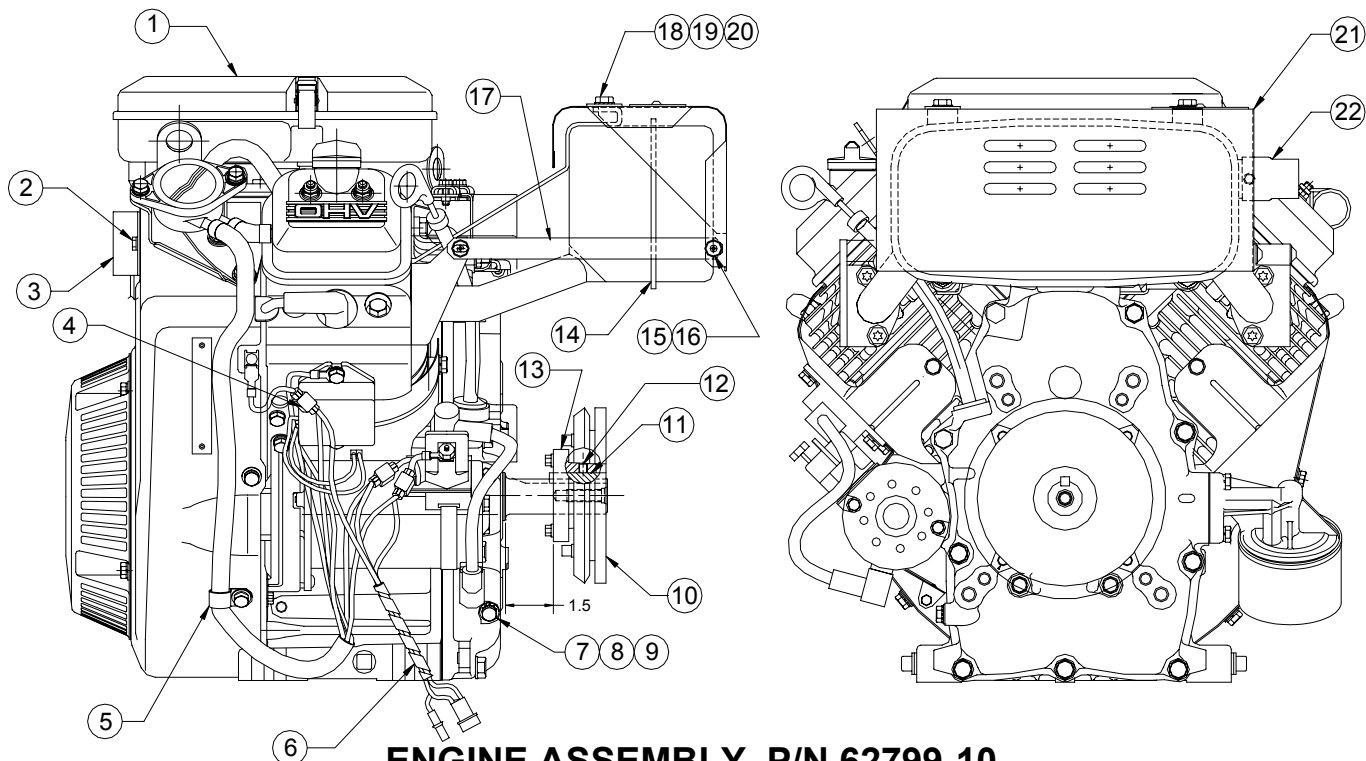
MODEL 2742 SERIES 5



EXPLODED MACHINE DIAGRAM

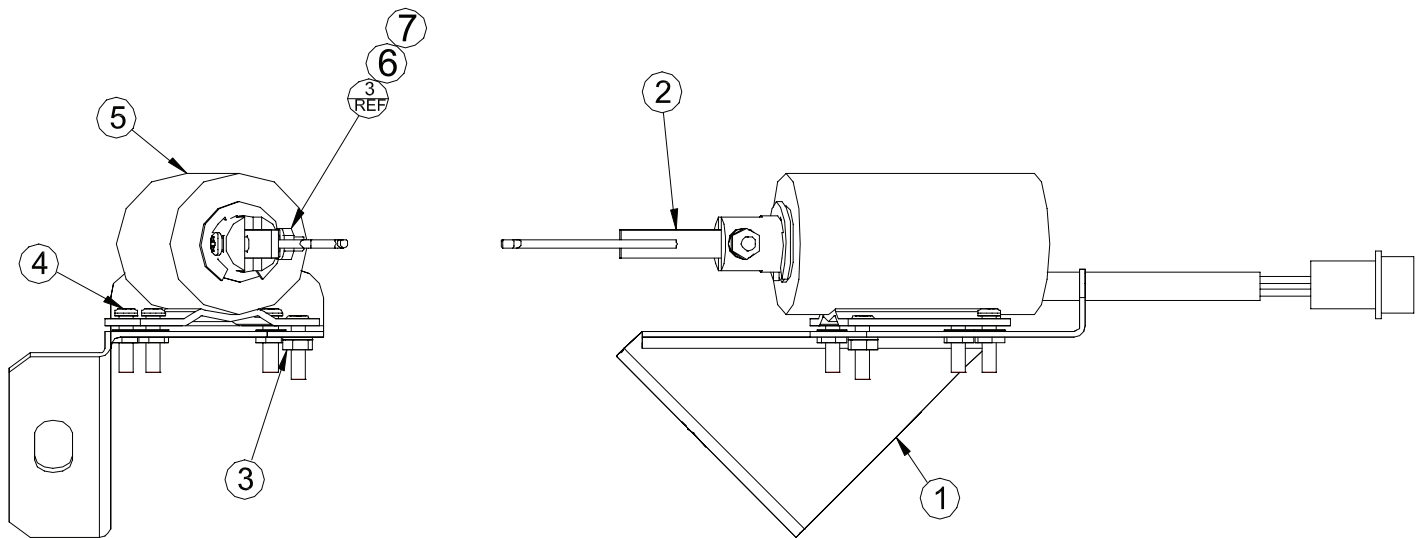
ITEM	PART #	QTY	DESCRIPTION	ITEM	PART #	QTY	DESCRIPTION
1	63268	4	TIE DOWN AY	36	63468	1	GUARD, COUPLING REAR
*2	64004-1	1	FORMULATION TANK AY	37	62855	1	ENGINE/BLOWER MNTG AY
3	62875-2	4	STRAP AY, TANK	38	63327	4	FOOT, EPDM RUBBER
*4	63860	1	TANK AY, FUEL 12.2 G	39	49053	4	BUMPER, RUBBER 2.5"
5	120376	2	NUT, 5/16-18 HEX	40	62826	1	FRAME AY, WELDED
6	120393	15	WASHER, FLAT 5/16 REG	41	121900	4	BOLT, 1/4-20 x 1
7	120214	15	WASHER LOCK, 5/16 SPLIT	42	62628	1	REMOTE CONTROL CABLE AY
8	79110-1	1	LABEL	43	64690-1	1	REMOTE CONTROL BOX AY (BILINGUAL)
*9	64617-R	1	PUMP ENCLOSURE GEAR PUMP	44	63621	8	WASHER, FENDER
10	62613	1	LABEL, CAUTION	45	134551	4	NUT, 1/4-20 x 2
11	63450	1	PLATE AY, PUMP MNTG	46	63151	4	BOLT, EYE, 1/4-20 x 2
12	62845	2	ROD, BATTERY CONTAINER	47	122017	9	BOLT, 5/16-18 x 1, HEX
13	62843	1	RETAINER, BATTERY	48	62836	1	SIDE POST AY
14	62595	1	BATTERY	49	64818	1	POST AY, CENTER
15	62844	1	BATTERY STOP	50	64820	1	BRACKET, FLUSH LARGE
16	9415361	3	SCREW, 10-24 x 5/8 TRCR	51	64821	1	BRACKET, FLUSH
17	139749	3	WASHER, LOCK #10, EXT	52	64816	1	POST AY (FUEL/FLUSH)
18	120391	3	WASHER, FLAT #10, REG	53	9419454	4	NUT, LOCK 1/4-20 HEX
19	63382	6	BOLT, 1/4-20 x 3/4 LOCK	54	63432	4	BOLT, 5/16 x 1.5
20	9416904	10	WASHER, FLAT 1/4	55	63477	4	WASHER, FENDER
21	63323	6	GROMMET, 3/8 ID, NEOPR.	56	62899	4	ISOLATOR
*22	62881	1	NOZZLE/BOOM AY	57	62873	2	HOLD DOWN, BLOWER
*23	62799-11	1	ENGINE AY, 18 HP (w/ELECT CHOKE)	*58	63337-1	1	TANK AY, FLUSH, 1 GAL
24	63178	4	ENGINE SPACER	59	122168	4	BOLT, 3/8-16 x 1.75
25	67087-3	1	INSERT, FLEX COUPLING, PX70	60	120382	4	WASHER, LOCK 3/8, SPLIT
26	63432	4	BOLT, 5/16-18 x 1.5 HEX	61	120394	4	WASHER, FLAT, 3/8 REG
27	121887	14	BOLT, 1/4-20 x 3/4	*62	63461	1	BLOWER, AY
28	120392	16	WASHER, FLAT 1/4 REG	63	62874-3	1	PLATE AY, MOUNTING
29	120380	14	WASHER, LOCK 1/4 SPLIT	64	63148	4	SHOCK MOUNT
30	22184	1	MALE RUN TEE	65	45927	1	CLAMP, V-INSERT
31	63245-4	1	GAUGE, LIQUID FILLED	66	63150	3	PLUG, 2" SQUARE CAP
32	444094	1	COUPLING	67	62596-1	1	CABLE, BATTERY, (POSITIVE)
*33	62946	1	VALVE AY, FORM/FLUSH	68	62597	1	CABLE AY., BATTERY (NEGATIVE)
34	121966	2	BOLT, 1/4-20 X 2.5 HEX				
35	63466	1	GUARD, COUPLING FRONT				

*Parts List in Separate Page



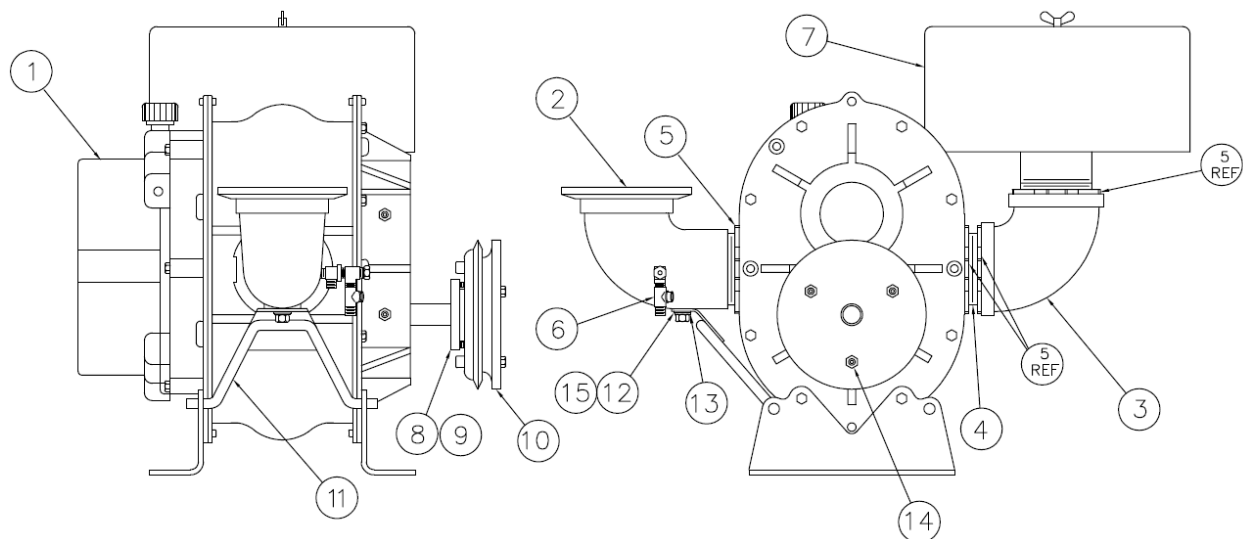
ENGINE ASSEMBLY, P/N 62799-10

<u>ITEM</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>	<u>ITEM DESCRIPTION</u>
1	1	62799	ENGINE, 18 HP, VANGUARD
2	2	190254	NUT, 10-24 LOCK HEX
3	1	64016	HOURLMETER / TACHOMETER
4	3	85685	CONNECTOR 3M
5	1	63285-1	CLAMP, CABLE 5/8
6	1	49078	HARNESS, ADAPTER (B&S)
7	1	63186	BOLT, M8-1.25 x 16, HEX
8	1	138485	WASHER, LOCK, 5/16, EXT
9	1	120393	WASHER, FLAT, 5/16, REG
10	1	63458-1	FLANGE AY
11	1	62549	KEY, 1/4 x 1 3/4
12	1	139009	SCREW, SET, 1/4-28 x 1/4
13	1	63460-7	BUSHING, 1"
14	1	62800	MUFFLER (18 HP VANG)
15	2	159920	SCREW, 10-24 x 1/2 PH
16	2	120391	WASHER, FLAT #10, REG
17	2	63189	STRUT, HEAT SHIELD
18	2	63191	SCREW, 1/4 x 1/2, TAP AB, ZINC
19	2	9416904	WASHER, 1/4 FLAT
20	2	121753	WASHER, 1/4 LOCK, EXT
21	1	63877	SHIELD AY (MUFFLER 18 HP VANG)
22	1	62781	SPARK ARRESTER (18 HP VANG)



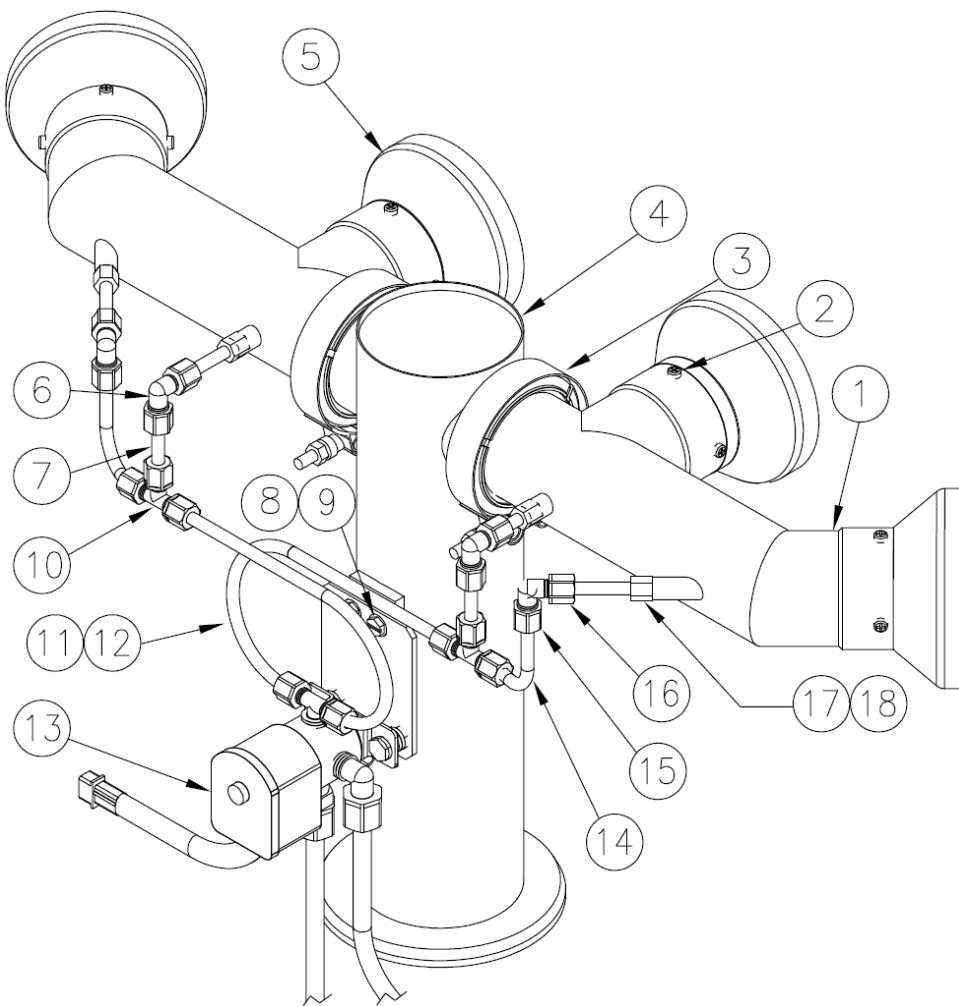
SOLENOID/BRACKET AY 65085 (OPTIONAL ELECTRIC CHOKE)

<u>ITEM</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	63182	1	BRACKET, SOLENOID CHOKE
2	53284	1	LINKAGE AY, CARBURETOR
3	134524	5	NUT, 4-40 HEX
4	159053	4	SCREW, 4-40 x 3/8 PHCRZ
5	65087	1	SOLENOID AY
6	85075	1	SCREW, 4-40 x 3/4
7	138522	1	WASHER, LOCK #4 INTO



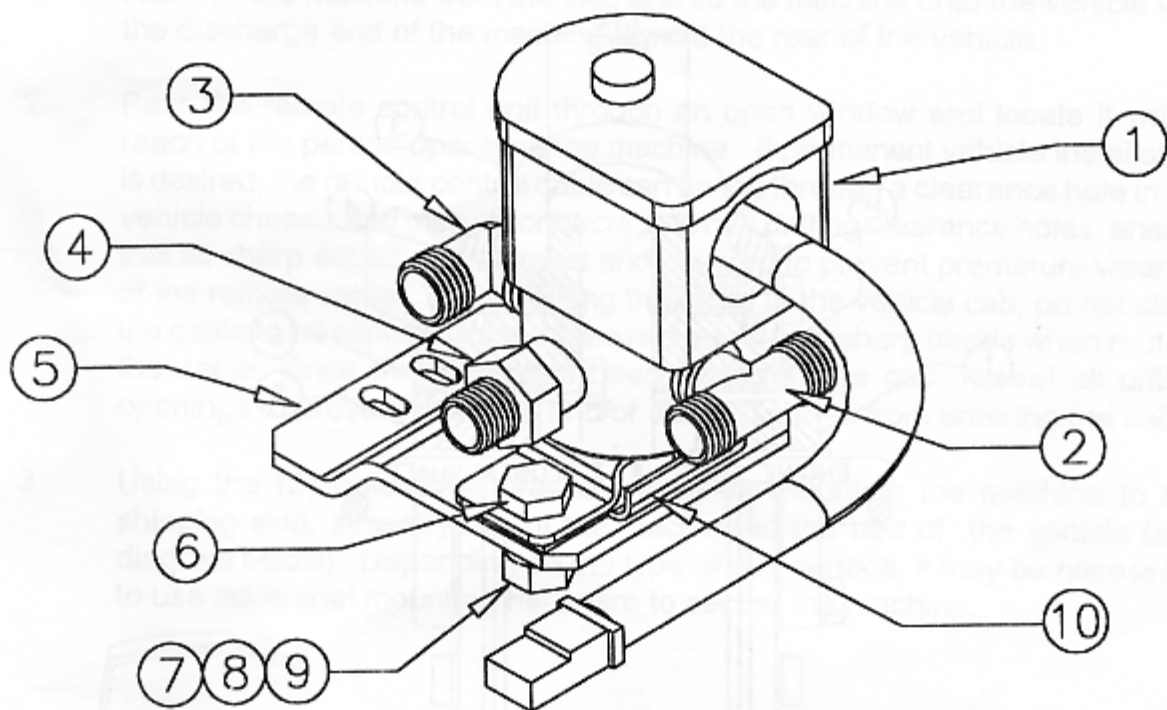
BLOWER ASSEMBLY P/N: 63461

<u>ITEM</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>	<u>ITEM DESCRIPTION</u>
1	1	62809	BLOWER, ROOT 5.45
2	1	62871	CUTPUT FLANGE AY
3	1	62826	ELBOW, INPUT
4	1	62824	NIPPLE, 2.5 NPT. X 3.5
5	4	62805	LOCKING RING
6	1	22183-8	RESTRICTING TEE
7	1	62851	FILTER SILENCER
8	1	139009	SCREW, SET, 1/4-28 X .25
9	1	63460-6	BUSHING, 7/8" BONRE, 5H
10	1	67087	FLANGE AY., UNIVERSAL, SH70
11	1	62877	ANTI-TURN WELD ASSEMBLY
12	1	120388	WASHER, FLAT, 3/8 REG
13	1	138542	WASHER, LOCK, 3/8, INTO
14	3	63438	BOLT, .25-20 X 1.5 GRADE 8
15	1	122119	BOLT, 3/8-16 X 3/4



NOZZLE/BOOM ASSEMBLY, P/N 62881

<u>ITEM</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	62866	2	NOZZLE ARM WELDED AY
2	62163	16	SCREW, 8-32 x 3/8
3	63019	2	CLAMP, V-INSERT
4	62861-2	1	TEE TUBE AY
5	67094-1	4	NOZZLE AY
6	62555-1	4	UNION ELBOW, 1/4 T
7	62584-23	2	TUBING, 1/4
8	189772	2	SCREW, 10-32 x 3/8 HEX
9	138479	2	WASHER, #10 EXT
10	62556-1	2	UNION TEE 1/4 T
11	62584-17	2	TUBING, 1/4
12	74312-3	4	ANTI-CRIMP SPRING
13	62890-5	1	VALVE AY, 3-WAY
14	62584-22	2	TUBING, 1/4
15	62582-1	13	NUT, 1/4 T, PLASTIC GRIP
16	62550-1	4	NUT, 1/4 T, STEEL GRIP
17	145463	4	NUT, 1/4 TUBE
18	10100-10	8	O-RING

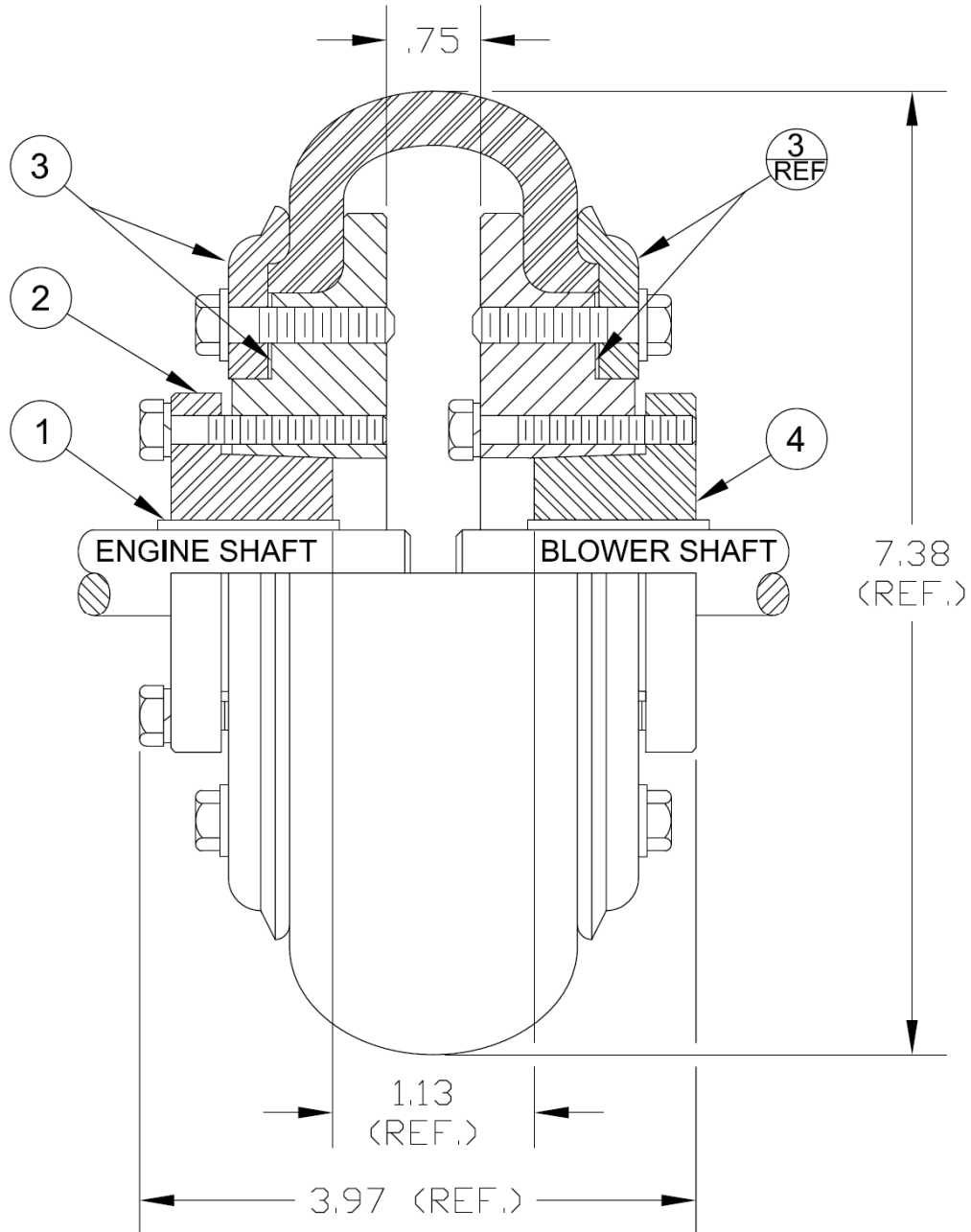


3-WAY VALVE ASSEMBLY (BOOM), P/N B62890

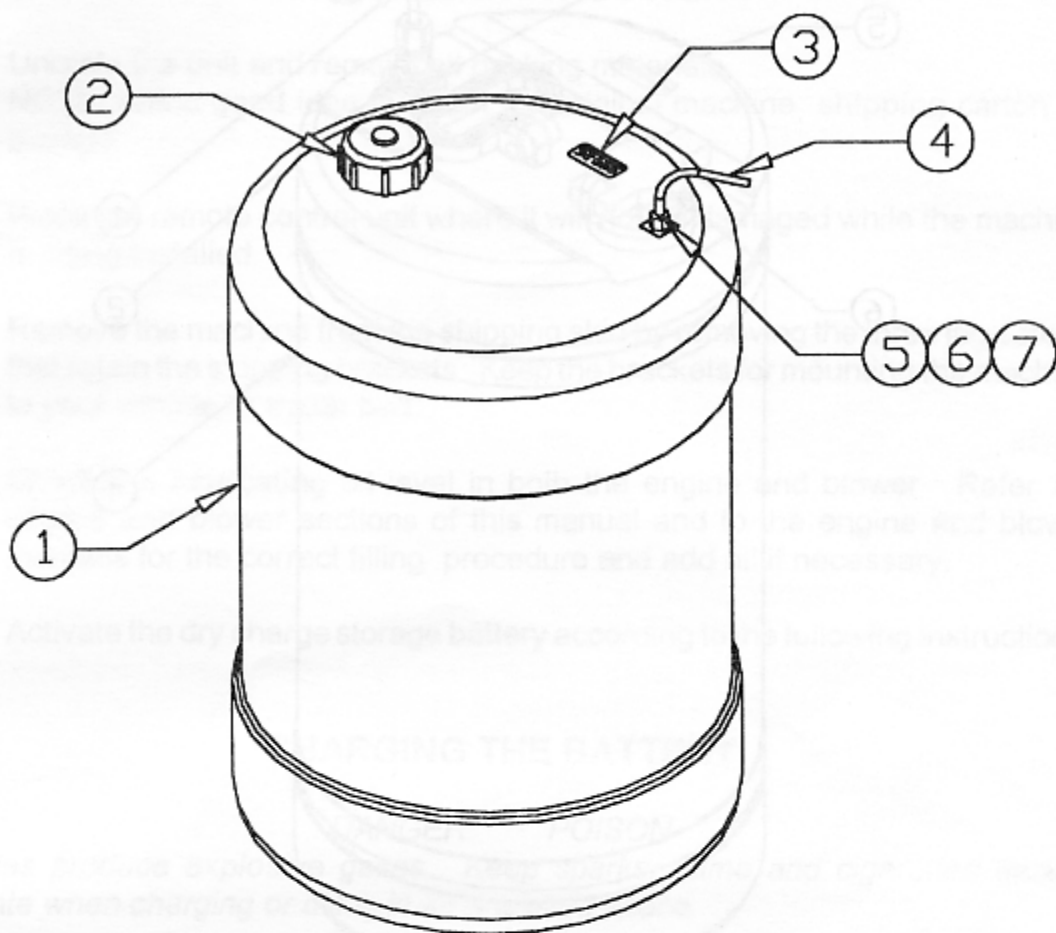
ITEM	PART NO.	QTY	DESCRIPTION
1	B62650-2	1	Valve Assy., 3 way
	B62650-1	1	Valve, 3 way solenoid
	A54081	1	Housing, socket (2 ckt)
	A74281	2	Sidefeed con. Socket
	A48066-4	1	Tubing, flex 3/8 Dia, 18" L
2	A63410	1	Tee 1/4 T x 1/4 T x 1/4 MP
3	B62641-2	1	Elbow, 1/4 MP - 1/4 T
4	B62552-1	1	Connector, 1/4 MP - 1/4 T
5	B-63142	1	Bracket, valve
6	G121887	2	Bolt, hex, 1/4 - 20 x 3/4
7	G120380	2	Washer, lock, 1/4 split
8	G120392	2	Washer, flat, 1/4 reg.
9	G120375	2	Nut, hex, 1/4 - 20
10	B62732	1	Bracket, valve ret.

FLEXIBLE COUPLING ASSEMBLY

P/N 67087-3

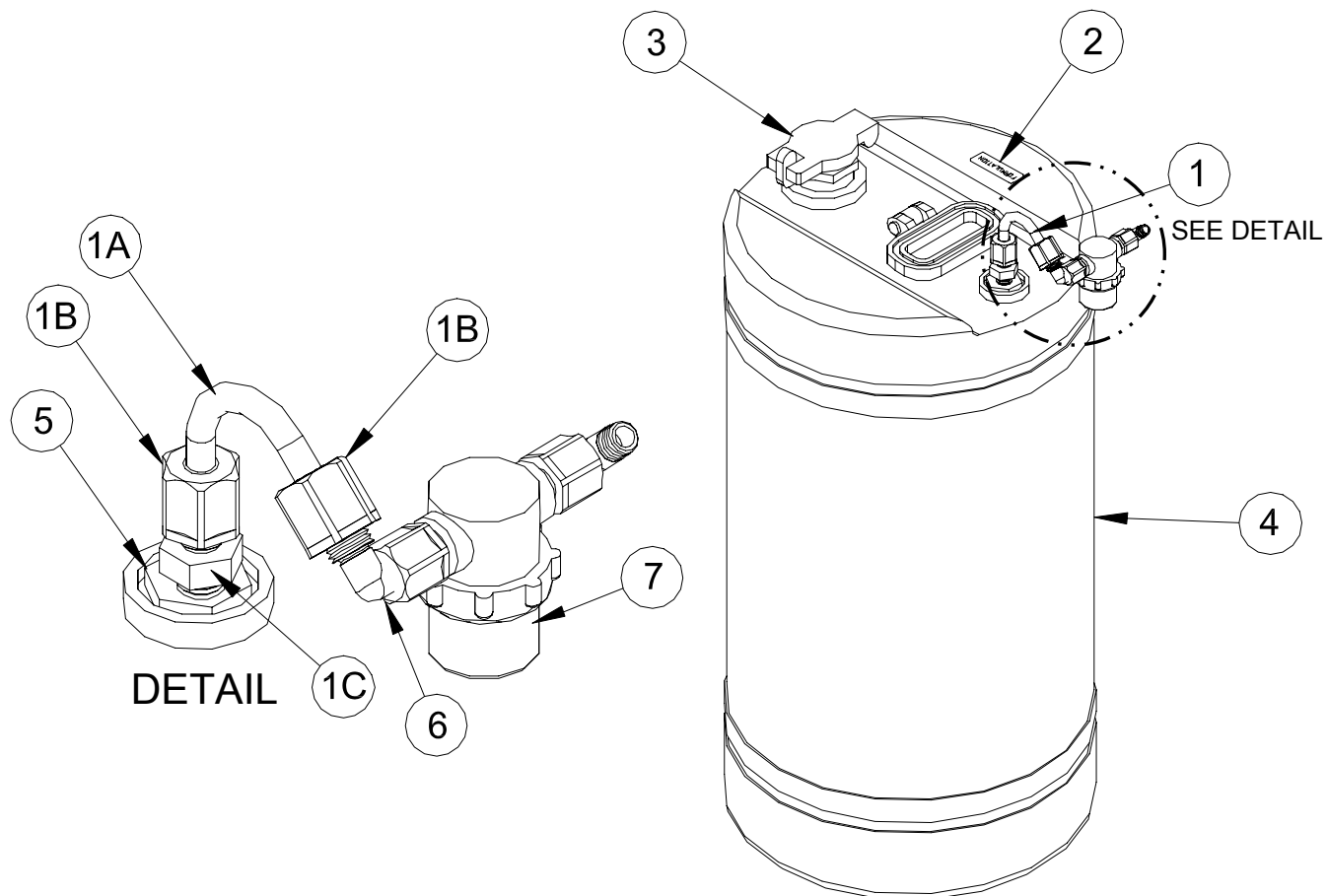


ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	62549	KEY, 1/4 X 1.75
2	1	63460-7	BUSHING, TYPE SH, 1"
3	2	67087	FLANGE AY., SH70
4	1	63460-6	BUSHING, TYPE SH., .875"



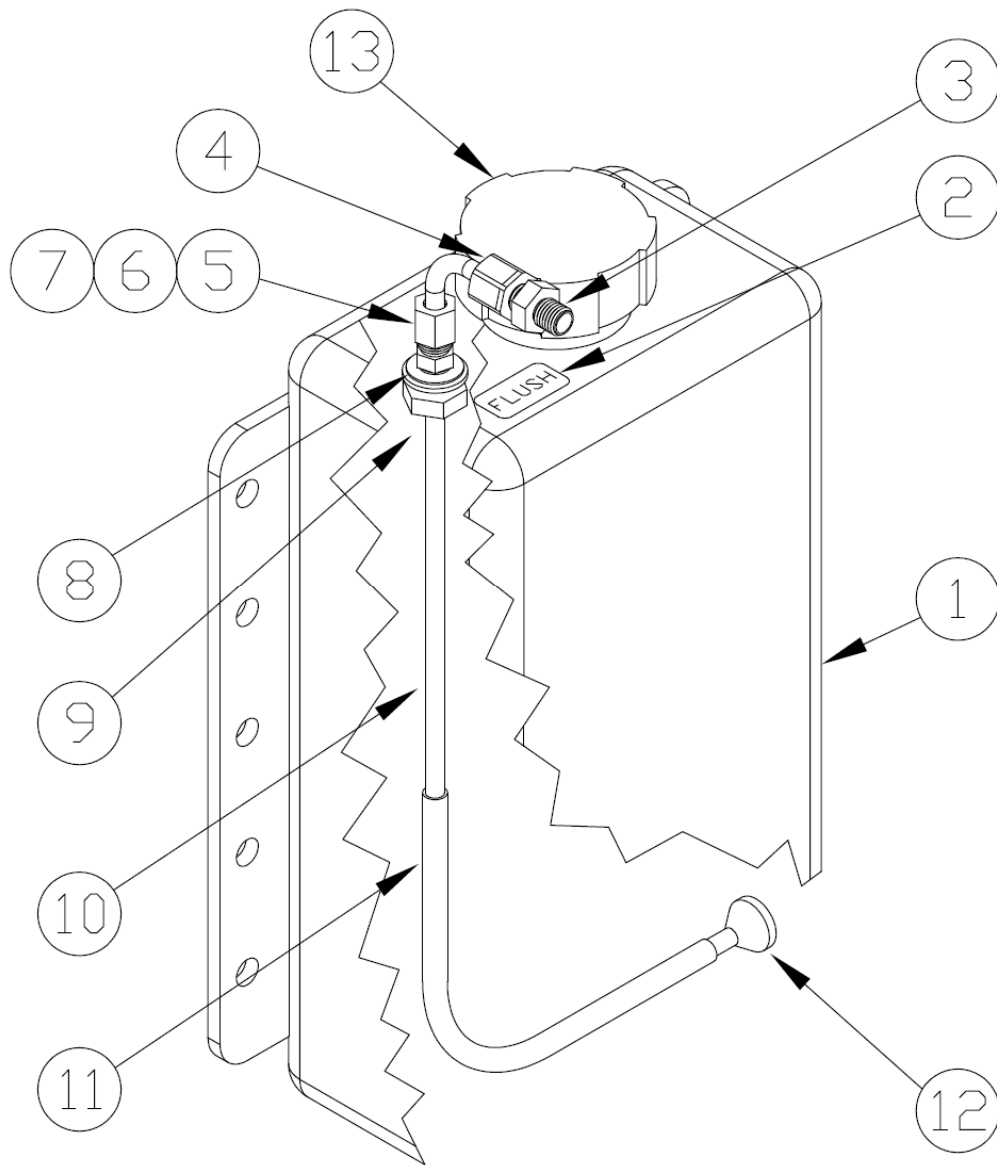
**TANK ASSEMBLY, GASOLINE, 12.2 GALLONS
P/N C63860**

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	D64088-1	1	Tank, 12.2 Gal., Mach.
2	B62578-4	1	Cap with gauge
3	A85520	1	Label, gasoline
4	B62563-5	1	Standpipe, SSTU, 0.25
5	A10105	1	Connector, standpipe
6	G114628	1	Sleeve, 1/4 T
7	G145463	1	Nut, 1/4 T



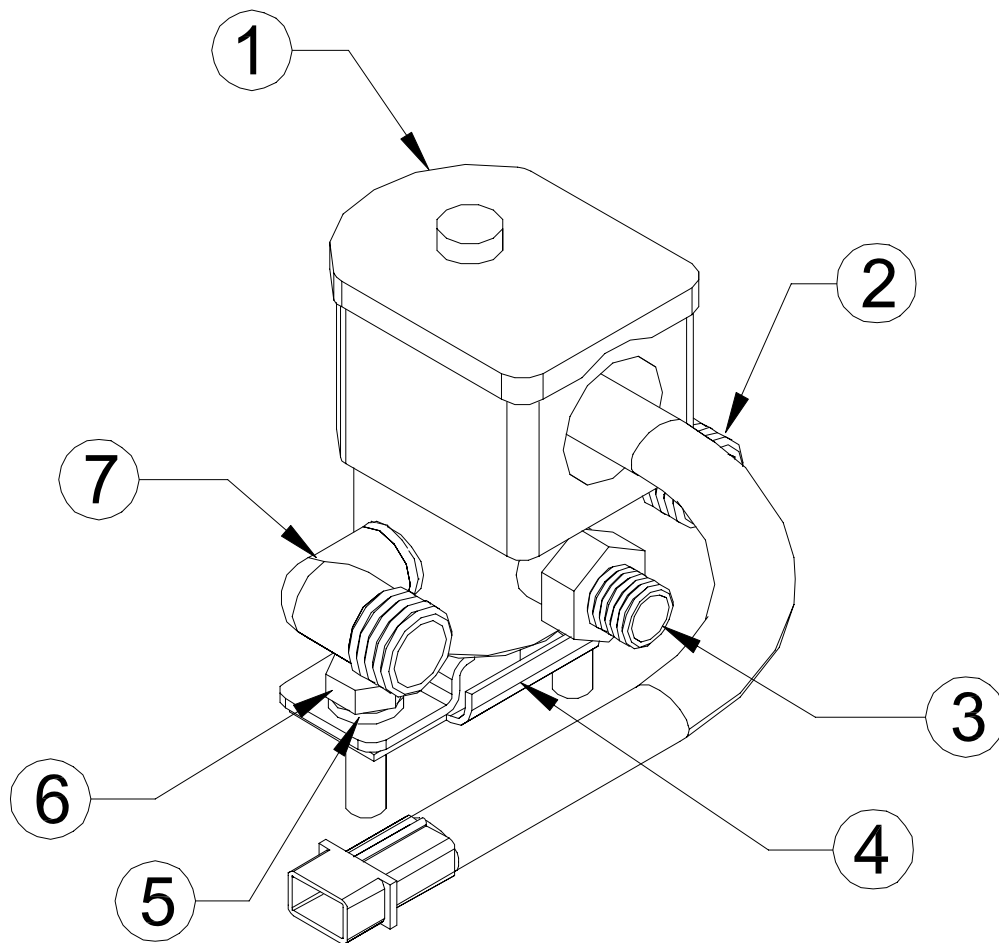
FORMULATION TANK ASSEMBLY W/ FILTER P/N 64004-1

<u>ITEM</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	62574	1	FORMULATION STANDPIPE AY
1A	62545	1	FORMULATION STANDPIPE
1B	62550-3	2	NUT, .375 STL GRIP
1C	62573-2	1	CONNECTOR, MALE MOD.
2	63094	1	LABEL, FORMULATION
3	64077	1	CAP AY, MALE FILL 2"
4	64002	1	TANK, 15G NAT POLY
5	64772	1	BUSHING, ¾ MPT x 3/8 FPT, NYL
6	62554-4	2	FEMALE ELBOW
7	62558-5	1	FILTER/O-RING AY



FLUSH TANK ASSEMBLY (1 GALLON), P/N: 63337-1

<u>ITEM</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	63302-6	1	TANK, 1 GAL. (MACHINED)
2	62592	1	LABEL, FLUSH
3	62553-1	1	CONNECTOR, UNION, 1/4 T
4	62550-1	1	NUT, .25, STEEL GRIP
5	114628	1	SLEEVE, 1/4 T
6	145463	1	NUT, 1/4 T
7	10105	1	CONNECTOR, STANDPIPE
8	53131	1	WASHER, FLAT
9	74288	1	NUT, LOCK, 1/8 NPSL
10	63336	1	STANDPIPE, FLUSH TANK
11	62227-8	1	TUBE, PVC
12	62346	1	FILTER, PLASTIC, PICK-UP
13	63302-2	1	CAP AY., 2 QT. VENTED
NS		1	RUBBER GASKET



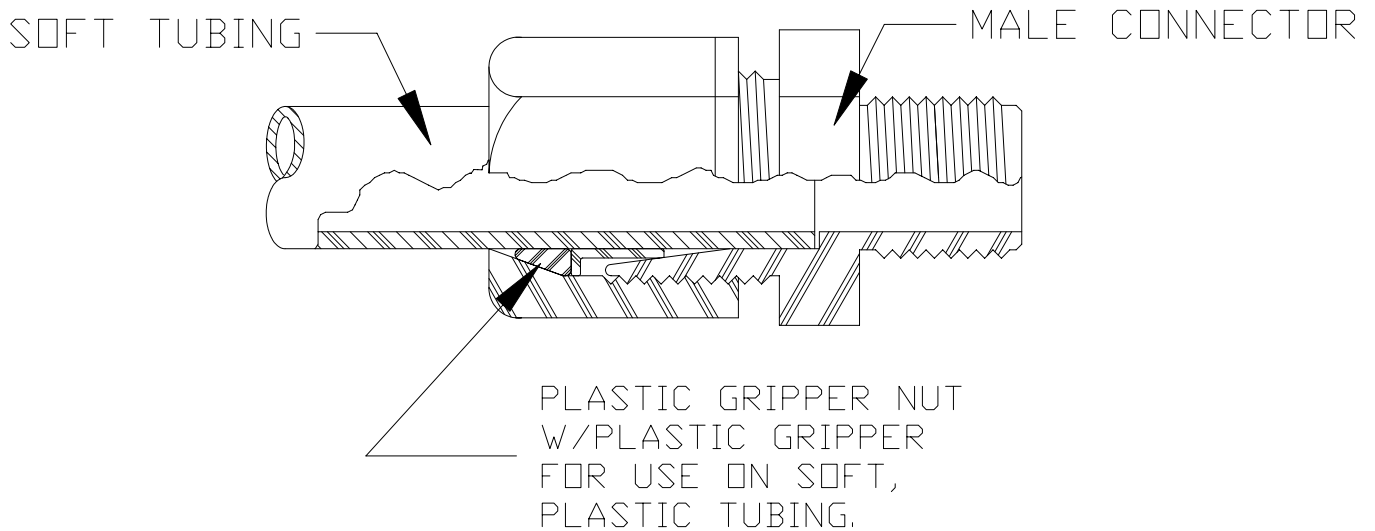
3-WAY VALVE ASSEMBLY (FORM/FLUSH) P/N 62946

<u>ITEM</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	62650	1	VALVE AY, 3-WAY
	62650-1	1	VALVE, 3 WAY SOLENOID
	34065	1	HOUSING, PIN (2 CKT)
	74282	2	PIN, SIDE FEED (REEL)
	48066-4	1	TUBING, FLEX 3/8 DIA, 18" L
2	62641-2	1	ELBOW, 1/4 MP – 1/4 T
3	62552-1	1	CONNECTOR, 1/4 MP – 1/4 T
4	62732	1	BRACKET, VALVE RETAINER
5	120380	2	WASHER, LOCK, 1/4 SPLIT
6	121966	2	BOLT, HEX, 1/4-20 x .75
7	62641-3	1	ELBOW 1/4 MP x 3/8 T

SAMPLE CONNECTIONS USING STEEL & PLASTIC GRIPPER NUT

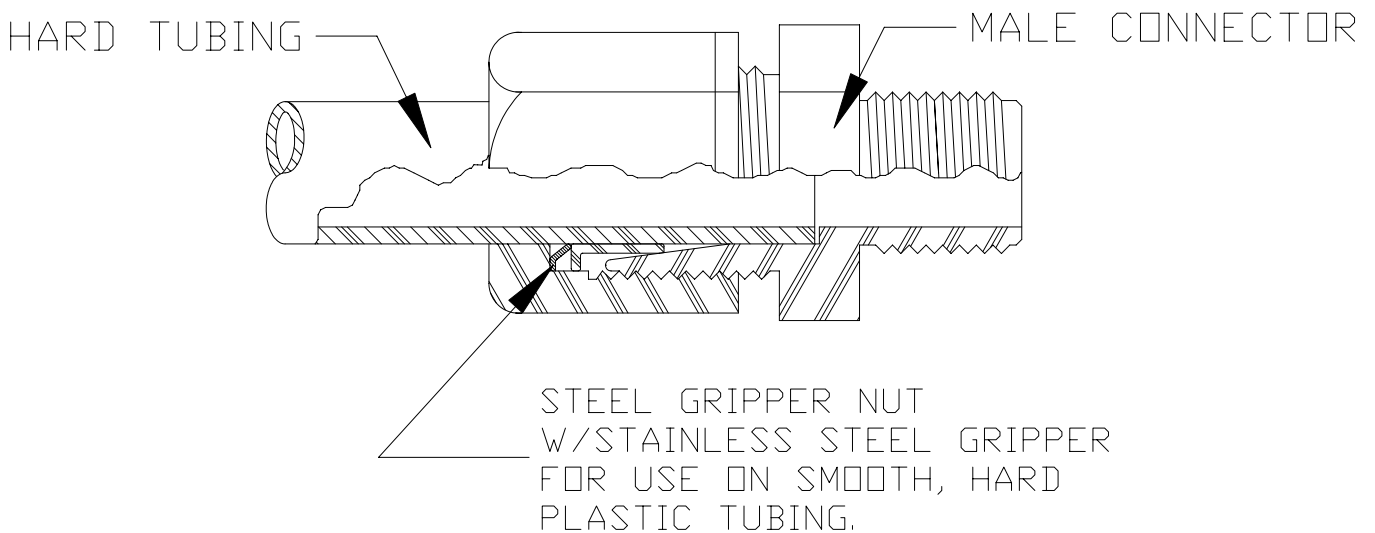
P/N 62582-1 FOR 1/4" TUBING

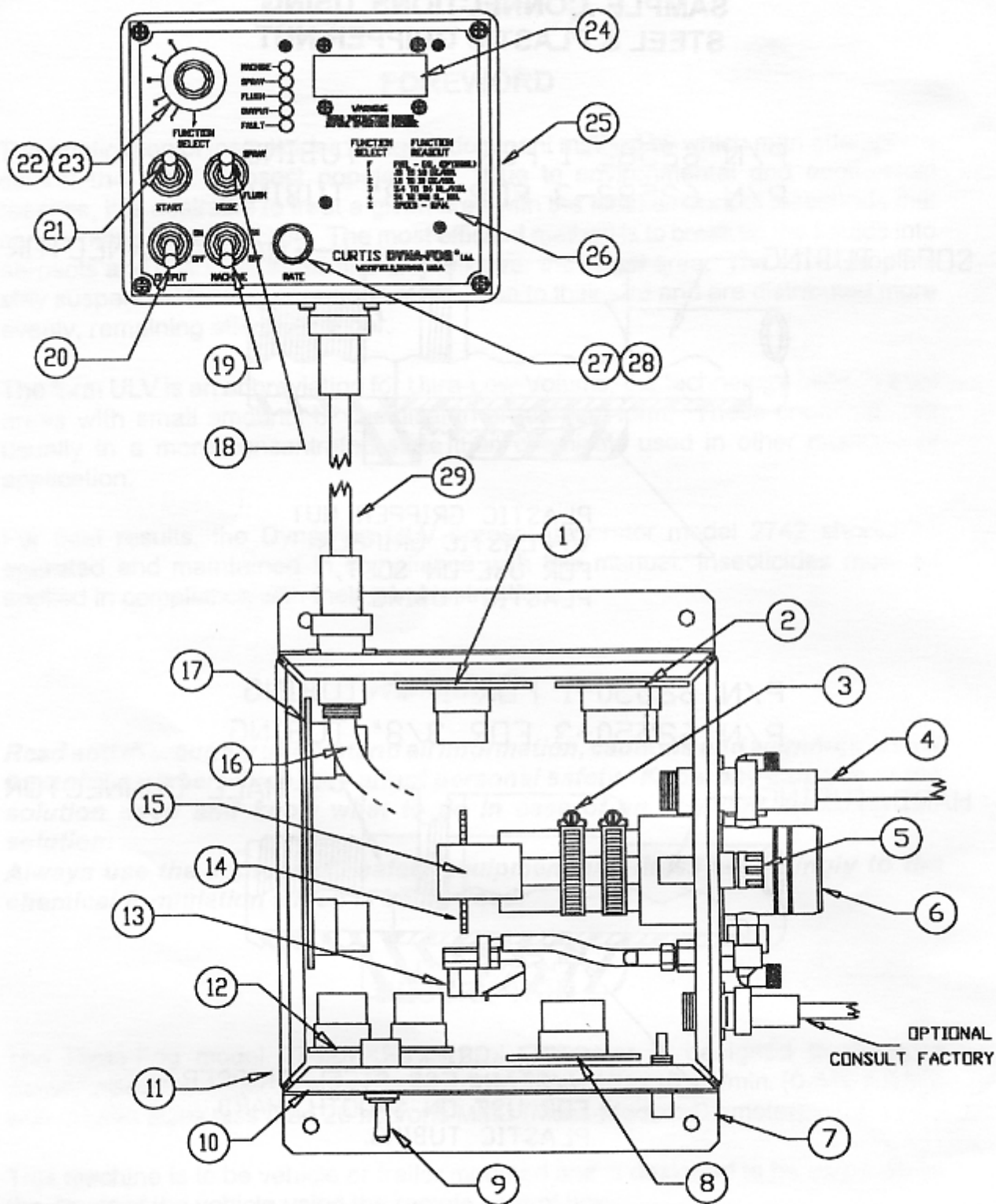
P/N 62582-3 FOR 3/8" TUBING



P/N 62550-1 FOR 1/4" TUBING

P/N 62550-3 FOR 3/8" TUBING

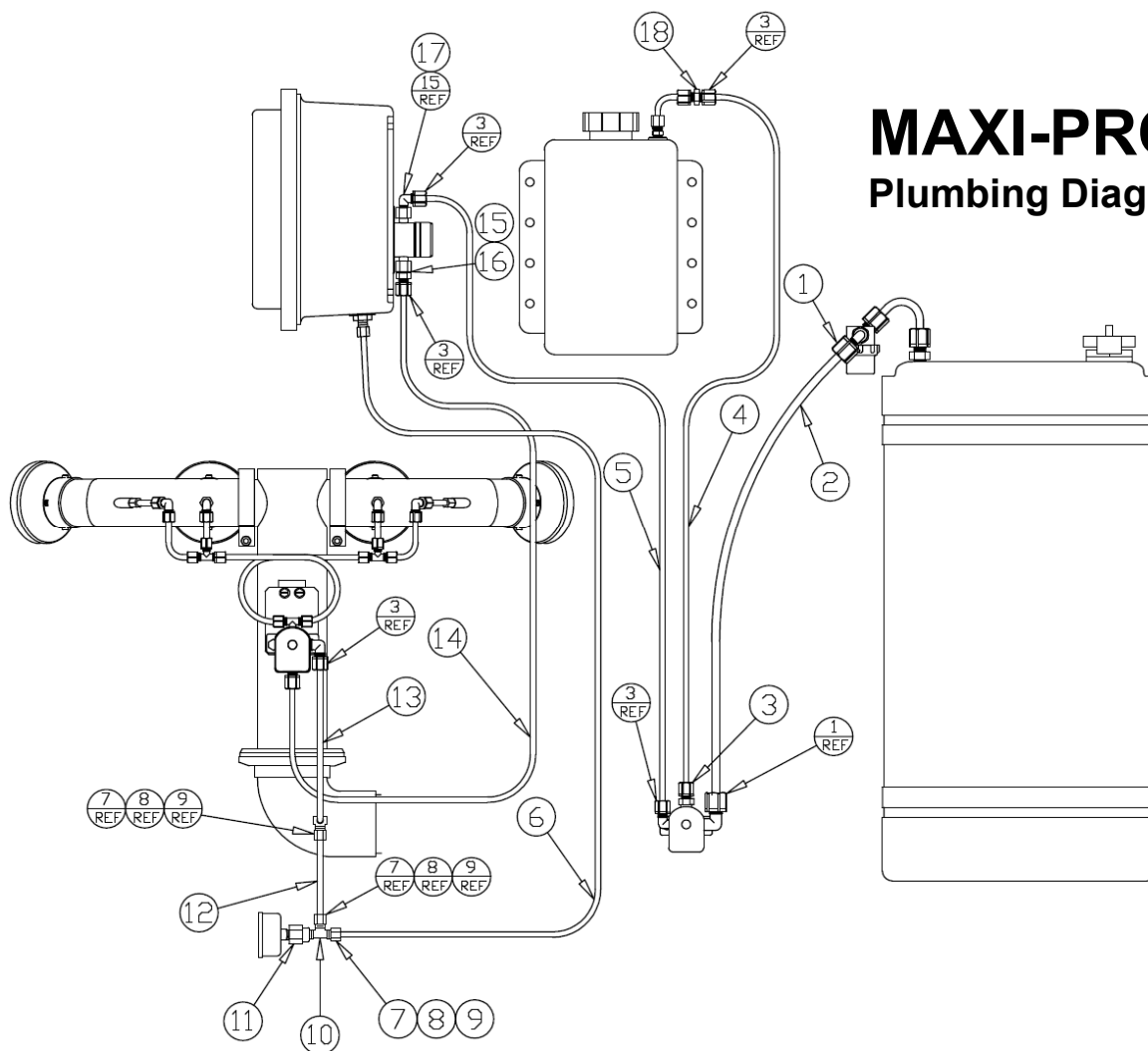




FORMULATION CONTROL SYSTEM

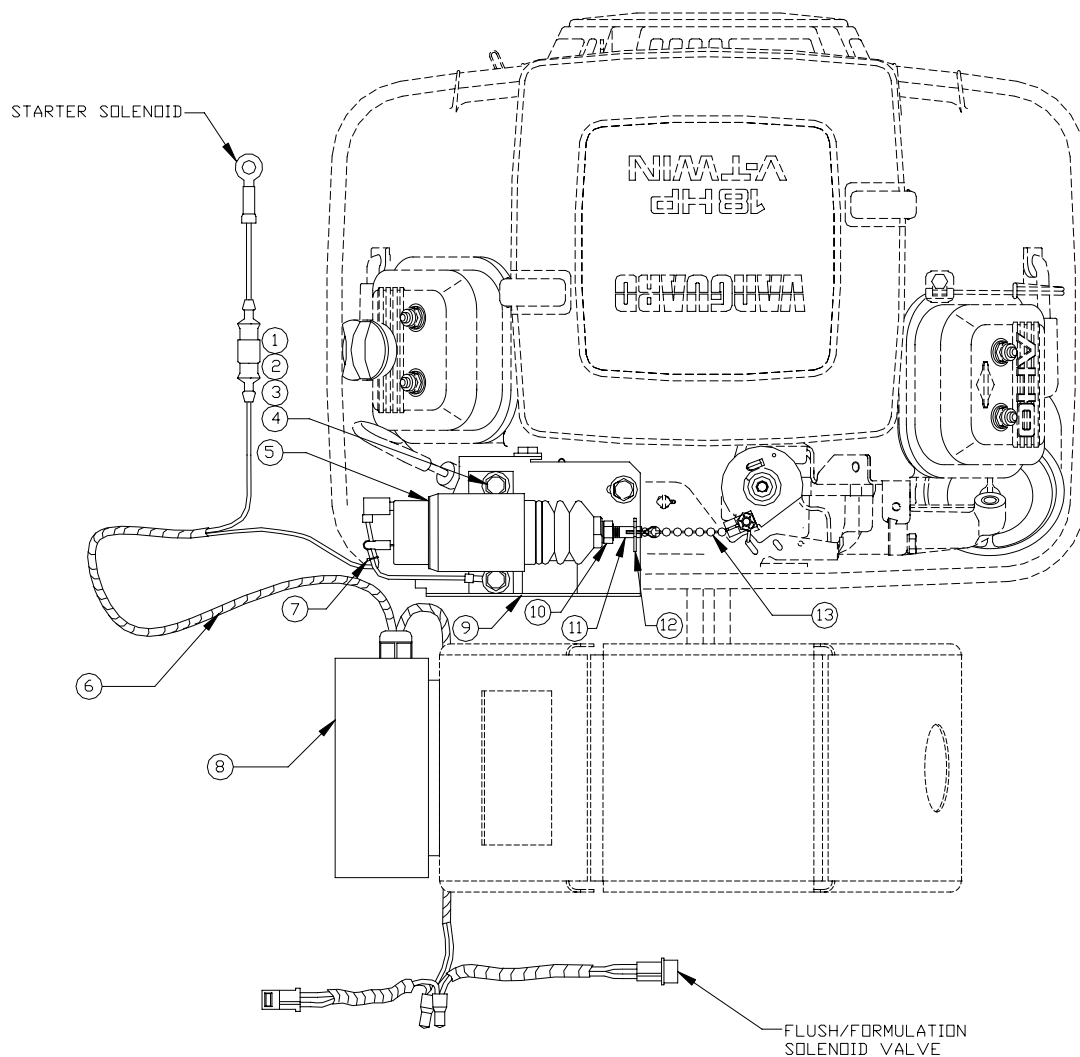
FORMULATION CONTROL SYSTEM

<u>ITEM</u>	<u>PART NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	62625	1	Power regulator Ay.
2	62621	1	Tachometer decode Ay.
3	20054-2	1	Clamp
4	62692	1	Chassis harness Ay.
5	54049	1	Fuse holder
N.S.	54026-1	1	Fuse, 15 A.
6	62651-1	1	Formulation Pump Ay.
7	62841	1	Chassis box base
8	62667	1	Speed decode Ay.
9	45945	1	Switch, SPDT
10	62648	1	Chassis box
11	62679-1	1	Pump Box Ay.
12	64669	1	4 MPH switch module
13	62703	1	Pressure switch Ay.
14	62684	1	Spur gear
15	62624	1	Tachometer sensor Ay.
16	62676	1	Internal harness Ay.
17	62618	1	Motor control Ay.
18	62897	1	Switch, SPDT
19	62630	1	Switch, DPDT
20	62630	1	Switch, DPDT
21	62674	1	Switch, SPDT momentary
22	62632-1	1	Switch, rotary
23	62634	1	Knob, rotary switch
24	62633	1	Digital meter Ay.
25	62672	1	Remote control box Ay.
26	62639	1	Front panel, screened
27	62635	1	Knob, rate control
28	62636	1	Shaft lock, rate control knob
29	62628	1	Remote control cable Ay.
N.S.	62609	1	Chassis box cover



MAXI-PRO™ 4 Plumbing Diagram

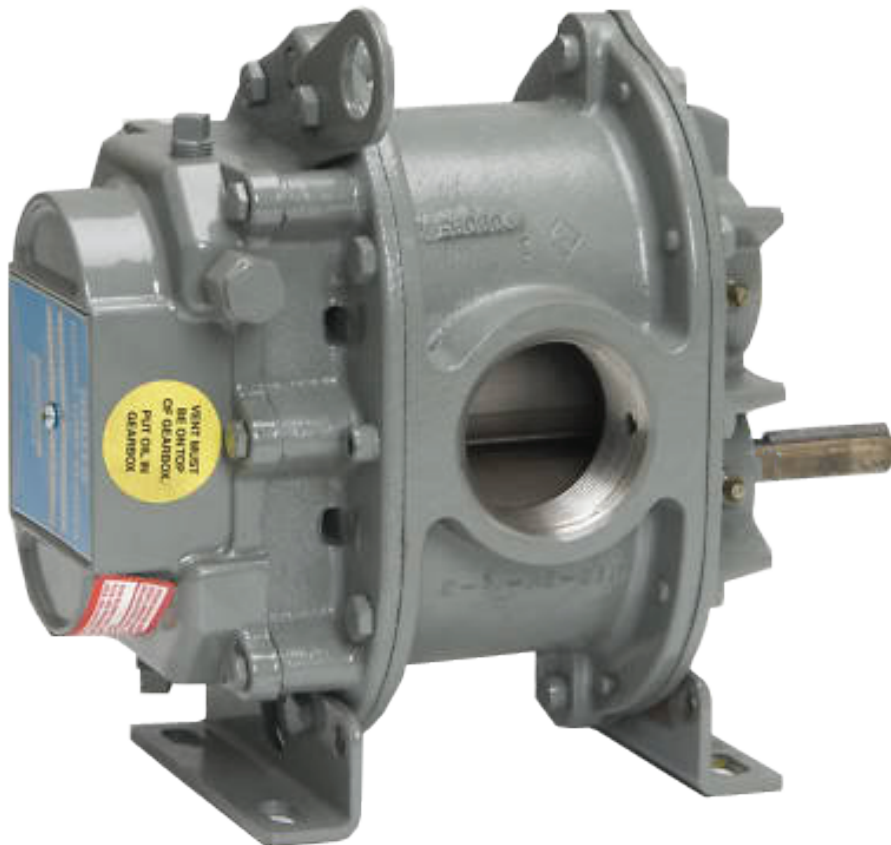
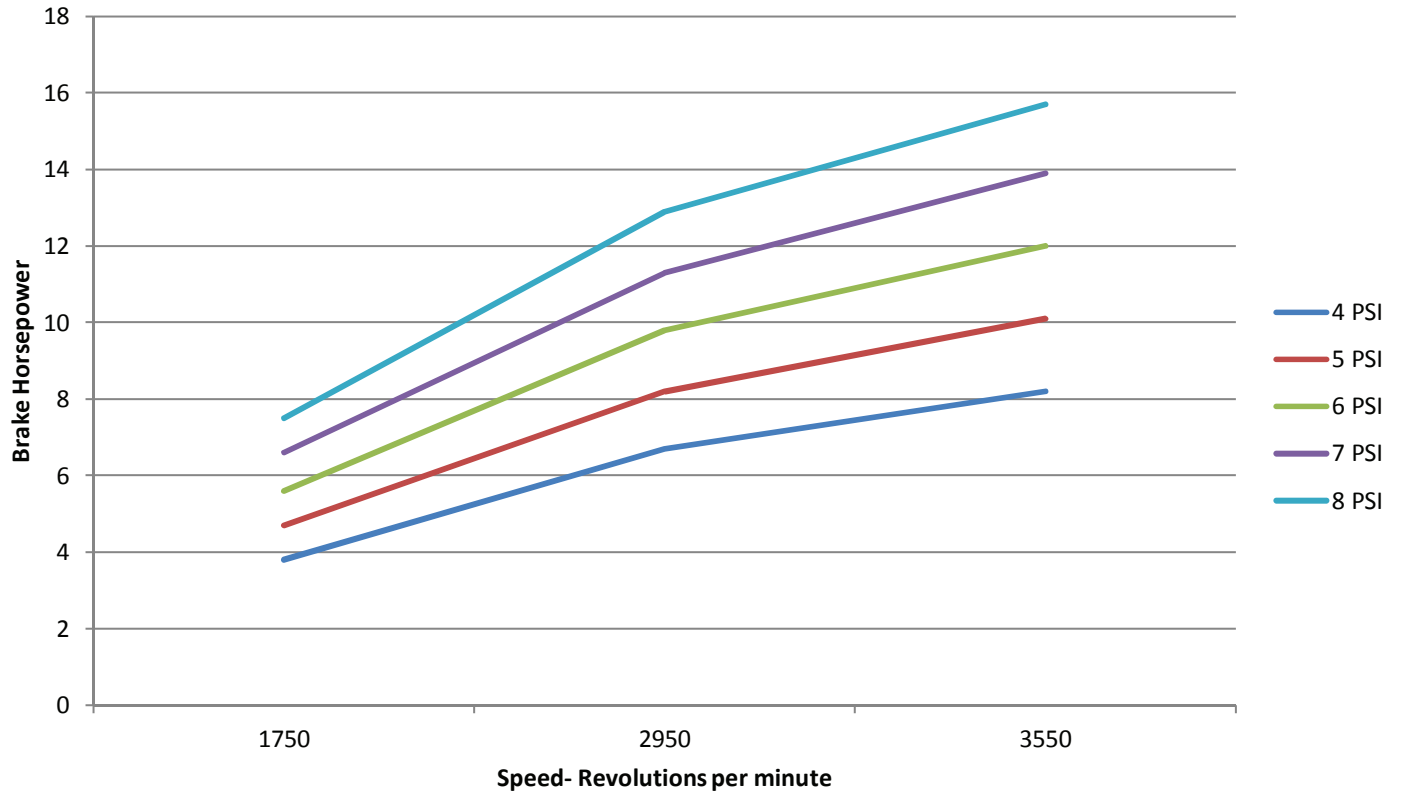
<u>ITEM</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	62582-3	2	NUT, 3/8 PLTC GRIP
2	62586-11	1	TUBE, 3/8 OD x 54"
3	62582-1	6	NUT, 1/4 PLST GRIP
4	62584-9	1	TUBE, 1/4 OD x 53"
5	62584-20	1	TUBE, 1/4 OD x 21"
6	62584-18	1	TUBE, 1/4 OD x 17.5"
7	145463	5	NUT, 1/4 T, TUBE
8	114628	5	SLEEVE, 1/4 TUBE
9	58239	5	BRASS INSERT
10	22184	1	MALE TEE
11	444104	1	REDUCER COUPLING 1/8 x 1/4
12	62584-12	1	TUBING, 1/4 x 11"
13	62584-21	1	TUBING, 1/4 x 14"
14	62584-14	1	TUBING, 1/4 x 36"
15	63254	2	ADAPTOR, 1/8 MP-1/8 FP
16	62552-3	1	CONNECTOR 1/8 MP-1/4 T
17	62641-1	1	ELBOW, 1/8 MP-1/4 T
18	62553-1	1	CONNECTOR, UNION, 1/4T
NS	62650-14	1	REBUILD KIT, 3-WAY VALVE



IDLEBACK KIT P/N 63875

<u>ITEM</u>	<u>QUANTITY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	2	120854	BOLT HEX ¼-20 x 5/8"
2	2	120392	WASHER, FLAT ¼ REG
3	2	121753	WASHER, LOCK ¼ EXTO
4	2	134551	NUT, HEX ¼-20
5	1	63850	SOLENOID, 12V DC
6	1	62693-140	WIRE ASSEMBLY, BLACK
7	1	20247	TIE, CABLE
8	1	63849	ENCLOSURE, RELAY
9	1	63874	BRACKET, SOLENOID
10	1	120367	NUT, HEX ¼-28
11	1	63856	ROD, SOLENOID (ZINC PLATED)
12	1	20414	INTERNAL HAIR PIN
13	1	63855	CHAIN, SOLENOID CONNECTOR

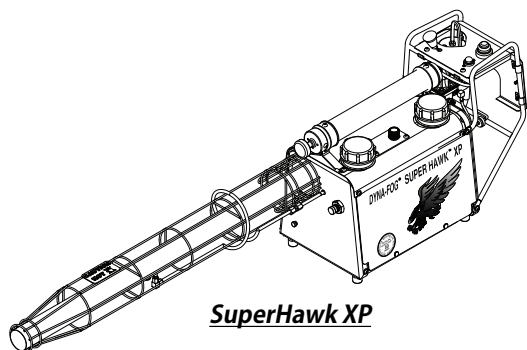
ROOTS Blower (URAI 45) Performance Curve



Notes:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Dyna-Fog Offers a Complete Assortment of Sprayers and Foggers



SuperHawk XP

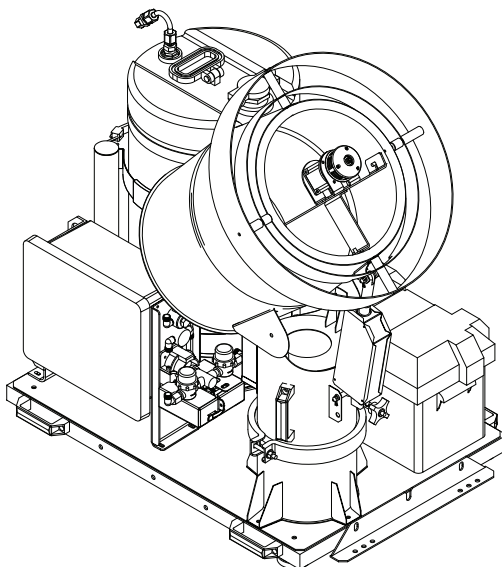
PULSE-JET POWERED THERMAL FOGGERS:

From 0-120 GPH (0-453 LPH) output. Our complete line include different models like the Superhawk, Golden Eagle, Trailblazer, Falcon, Patriot, Blackhawk, Mister III, SilverCloud and Model 1200. Portable or Truck mounted machines. Different models are available for Oil base or Water base formulations.

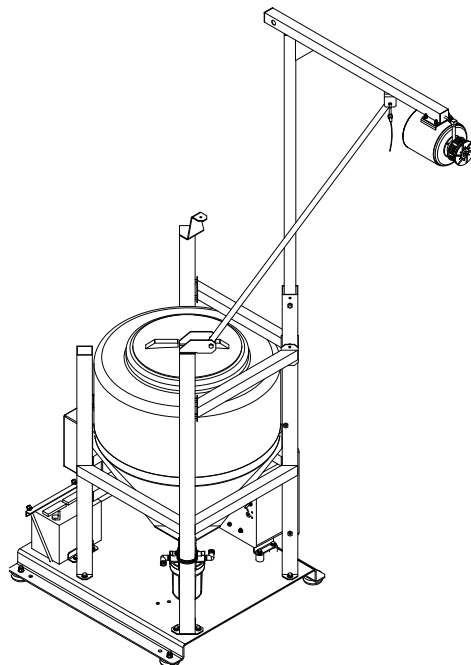
ELECTRIC ROTARY ATOMIZERS:

DYNA-JET L30: State-of-the-Art, Electric Rotary Atomizer ULV Aerosol Generator. 12 VDC, Light Weight, Truck mounted Machine with FMI pump. Optional Syncroflow Available.

DYNA-JET L15: Drift Sprayer for migratory pest control like Locust. Flow Rate from 0 to 2 L/min. Optional Radar Syncroflow.



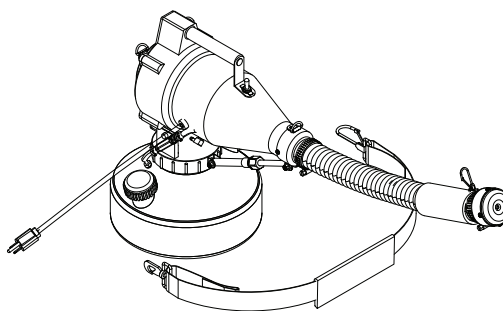
Dyna-Jet L-30



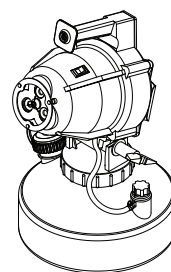
Dyna-Jet L-15

ELECTRIC HAND-HELD ULV/MIST GENERATORS:

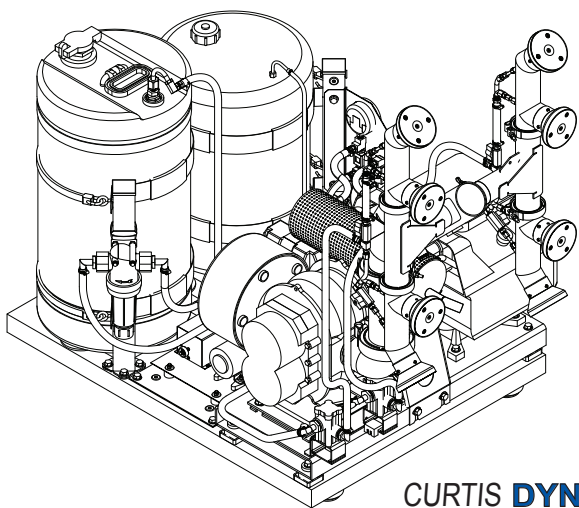
A Full line of electric cold fog applicators with 1-3 gallon tanks, available in 115 and 230 VAC.



Cyclone Ultra-Flex



Hurricane ES



LV-8

COMBUSTION ENGINE DRIVEN ULV AEROSOL GENERATORS:

Truck mounted Units powered by 8, 9, 11, 18 and 20 HP four cycle, OHV Gasoline Engines. Diesel versions also available. One, two, four and eight nozzle configurations. Patented full remote control of boom functions (rotation of turntable and angle of nozzles) available on certain models. Your choice of Gear, Piston or Diaphragm pumping system. Pressurized system versions available for specific international markets. Optional Automatic flow control "Syncroflow" also available with Radar or GPS speed sensing. 25 cc and 40 cc two cycle portable models are also available.