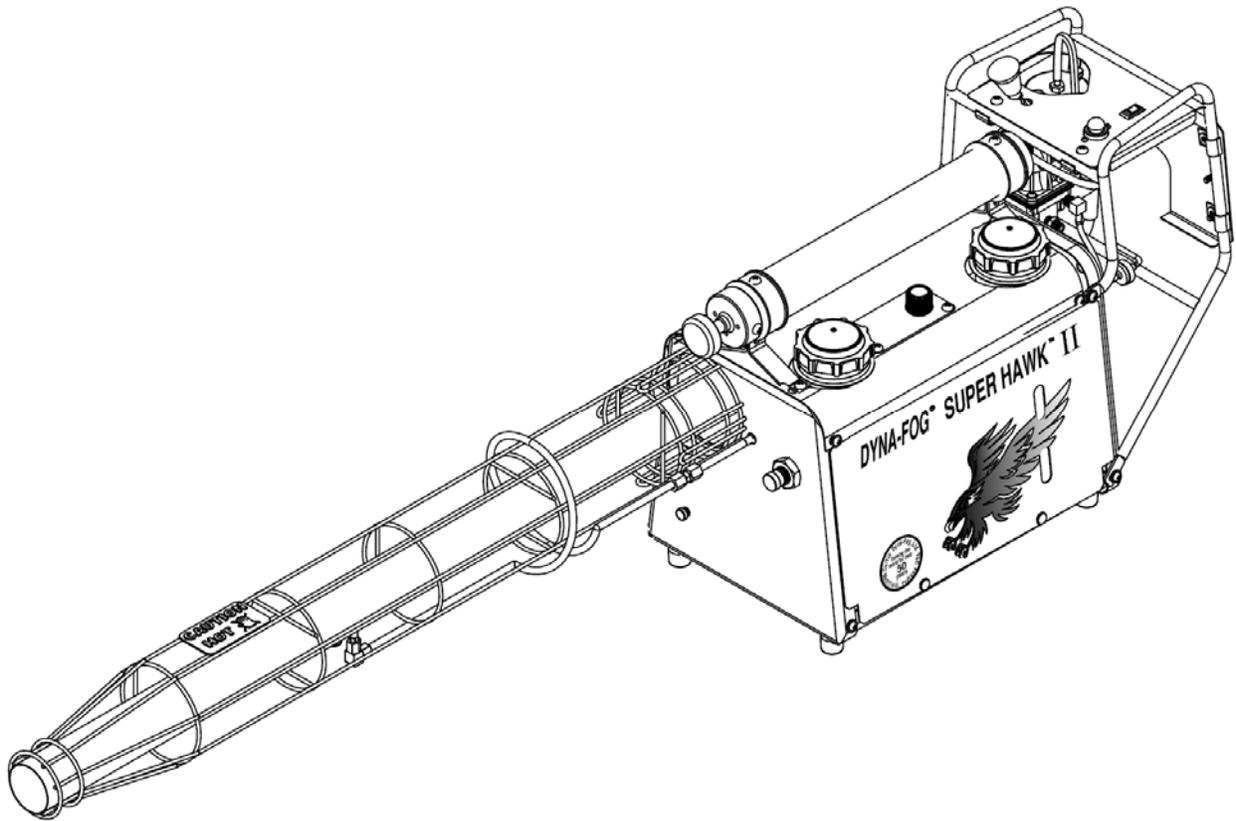


# SUPERHAWK™ II



## INSTRUCTION MANUAL FOR OPERATION, SERVICE AND MAINTENANCE

# SUPERHAWK™ II

SERIES 1

HAND-HELD THERMAL FOG APPLICATOR

Superhawk is a trademark of Curtis Dyna-Fog, Ltd.

DYNA-FOG is a Registered trademark of Curtis Dyna-Fog, Ltd.

The Falcon design is protected by one or more of the following patents:

**U.S. Patents:** 2,715,390; 2,738,334; 2,857,332; 2,950,592; 2,970,430; 3,052,094;  
4,030,695; 3,151,454; 4,811,901; 7,798,474; 8,006,959; 8,123,198

**Canadian Patent:** 762,939

**German Patent:** 31-48-522

**Japanese Patent:** 1587278

Other U.S. and International Patents Pending

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## SPECIFICATIONS FOR SUPERHAWK II

Type.....	Thermal Aerosol Fog, Resonant Pulse Principle
Formulation Output .....	0-42 Ltrs./Hr.....0-11 U.S. Gal/Hr.
Engine Performance.....	30 HP.....22 KW.....18,900 Kcal/Hr.
Gasoline Consumption.....	1.9 Ltrs./Hr.....0.5 Gal/Hr.
Weight (Empty).....	7.5 Kg.....16.5 Lbs.
Weight (Full).....	12.8 Kg.....28.3 Lbs.
Gasoline Tank.....	1.1 Ltrs.....0.3 Gal.
Gasoline Tank Material.....	Corrosion Resistant Aluminum
Formulation (Solution) Tank.....	4.5 Ltrs .....
Ignition Source.....	"Buzzer" type Electronic Coil
Starting Gasoline Method.....	Patented "Primer Bulb"
Starting Power Source.....	(8) 1.5 Volt "D" size alkaline batteries or standard 12 Volt cigarette lighter outlet
Length.....	132 cm.....52 in.
Width.....	24.1 cm .....
Height.....	36.8 cm.....14.5 in.
Fog Particle Size.....	0.5-50 Microns
Shipping Data:	
LxWxH.....	140 x 28 x 41 cm.....55 x 11 x 16in
Weight.....	14.5 Kg.....32 Lbs.
Volume (cube).....	0.16 Cu. M.....5.6 Cu. Ft.

## TO THE NEW OWNER

Congratulations on your purchase of one of the world's finest insecticide fog generators in the world. With reasonable care and maintenance, this efficient mechanism will provide many hours of service. For best results, this fog generator must be operated and maintained in compliance with these instructions.

## CORRESPONDENCE

In all correspondence concerning the customer's machine and in ordering parts, the customer must refer to the model and serial numbers of his machine. This information is found on the nameplate attached to the machine.

## DESCRIPTION

This fog generator employs the resonant pulse principle to generate hot gases flowing at high velocity. The high velocity gases atomize the formulation instantly so that it is vaporized and condensed rapidly causing negligible formulation breakdown. The fog particle size is readily controllable from approximately 0.5 to 50 microns and greater. The smaller particle sizes correspond to the lower formulation flow rates and the larger particle sizes correspond to the higher formulation flow rates. This machine is intended for outdoor use and for enclosed spaces with volumes of more than 500 cubic feet (14 cubic meters). Use in more confined spaces may create a fire or explosion hazard.

## WORKING PRINCIPLE

The engine is essentially a tube with a combustion chamber, an intake valve, and a supply of a combustible mixture of fuel and air. To begin, a negative pressure is created in the fuel tank by depressing a flexible priming bulb. This draws fuel into the priming bulb, which is then forced into the antechamber and combustion chamber, where it is ignited by the sparkplug. An explosion occurs in the combustion chamber driving the gases out the engine tube. The negative pressure created by the gas flow out the engine tube causes the intake valves to open allowing more air to pass through the venturi of the carburetor. The air passing through the carburetor aspirates fuel from the carburetor in a combustible mixture. This mixture is ignited again and the cycle is repeated. The frequency of repeated explosions is many times per second.

The initial source of ignition is a spark plug powered by an electronic ignition system. After original ignition the repeated cycles are sustained by a glow coil which is an integral and inseparable part of the engine tube assembly. A sample of the pressure pulses from the combustion chamber is routed to the carburetor where it operates a diaphragm fuel pump within the carburetor to pump additional fuel from the fuel tank to the carburetor. When the fuel pump operation has stabilized, further operation of the priming pump is not required.

## **Working Principle (Cont'd)**

The exhaust emission of a pulse jet engine is low in pollutant components due to the following basic design features: The combustion chamber and a length of the discharge (exhaust) tube attached to it operate at a bright red temperature approximating 1800°F., (982°C.) In addition, an amount of air (oxygen) in excess of that required for normal burning of fuel vapor is fed to the engine. Thus, combustion is quite complete and pollutants formed in other types of engines are actually burned to their non-pollutant end products in the pulse jet engine.

The formulation remains in the formulation tank under pressure until the formulation valve is opened. Then, the formulation is forced from the tank and delivered to the engine tube where it is injected into the high velocity pulsating flow of hot gases. The formulation is broken into small particles by the pulsating gases, then discharged into the atmosphere.

### **WARNING**

**READ AND UNDERSTAND THESE SAFETY PRECAUTIONS BEFORE OPERATING MACHINE.**

I. FUEL. This machine uses GASOLINE as the fuel and all precautions commonly applying to this volatile fuel should be observed. Be careful not to spill gasoline over the machine. If this occurs wipe it off and allow adequate evaporation time before starting the machine. GASOLINE ON THE MACHINE OR SPILLED IN THE IMMEDIATE AREA IS HAZARDOUS. DO NOT ATTEMPT TO PUT FUEL IN A HOT MACHINE.

## **Working Principle (Cont'd)**

2. FOGGING FORMULATIONS. All thermal fogging formulations are combustible, that is, they all can be caused to burn. This is true even of high flash point or "no" flash point formulations. A combustible liquid vapor can be ignited because it readily forms a uniform mixture with the air which contains the oxygen needed for combustion. However, fine particles of combustible liquids or solids suspended in the air very closely spaced are capable of propagating flame from one to another once ignition starts. A good analogy is the grain mill explosion. Although the fine particle dust in a grain mill has "no" flash point, the phenomena of the grain mill explosion is an all too common occurrence. While a high flashpoint or a "no"flash point liquid formulation will ignite far less readily than a low flash point liquid, and for this reason is strongly advocated, the high or "no" flash point formulation can ignite if the proper conditions exist. These conditions are basically two: 1) a sufficient volume of liquid in the form of fine particles suspended in the air; and 2) a sufficiently high energy source of ignition.

3. FOG CONCENTRATION. It has been fully established that an acceptable level of liquid in the atmosphere is one gallon (3.8 liters) for each 50,000 cubic feet (1400 cubic meters). There is a margin of safety of at least 5 to 1 in this figure. But long before this concentration is reached, with the fine white particle fog that this machine generates, visibility within the fog is reduced to less than 15 inches (38 CM.) Thus, an operator fogging within a closed area will not be able to see his way long before a combustible atmosphere can be approached. However, if the operator is outside of the closed area, it is quite possible to over fog, particularly if the area is small, i.e., crawl spaces under buildings or between ceiling and roof.

It is important to always employ a dry fog setting in a closed area to avoid depositing oil particles on combustible surfaces, thus creating a fire hazard. If a combustible atmosphere is established or a combustible deposit is laid down, a source of ignition may cause a fire. Even in open areas, care should be taken to avoid unnecessary accumulations of oil particles on objects within the fogging area. To avoid danger of fire or explosion in a closed space, the enclosed volume, fogging time and required formulation volume must be carefully calculated.

## Working Principle (Cont'd)

4. FOG IGNITION. The greatest hazard of fog ignition is from an external source. This can be gas or oil pilot lights or sparks from electrical controls such as switches, relays, etc. Therefore, it is strongly recommended that all such sources be eliminated by extinguishing all pilot lights and turning off all electrical power before fogging.

The design of the machine is such that it is quite difficult to ignite the fog from an external source since the ignition must be positioned just at the proper distance from the discharge end to cause fog ignition and this distance is on the order of only 6-8 inches (15-20 cm). If an external source ignites the fog being discharged, it will produce a torching effect. Should this occur, quickly release the FORMULATION ON-OFF LEVER to stop the fog discharge. Never artificially wedge, or block open the formulation ON-OFF VALVE.

On a DRY FOG setting, which must always be employed indoors and in confined areas, the ignition source must be continuous since the fog will not continue torching except briefly if the ignition source is removed. On a WET FOG setting, it is possible for the fog to continue to torch after removal from the ignition source. Never use a wet fog setting indoors and in confined spaces. Extreme caution must be exercised when using a wet fog setting under all circumstances. A wet fog setting can leave a deposit of liquid on combustible surfaces creating a fire hazard should torching take place.

A second source of fog ignition can be the machine itself. If the machine stops running for any reason including running out of gasoline, the operator must quickly release the FORMULATION ON-OFF LEVER to stop the fog discharge. If the engine stops, it is possible for some formulation to flow into the still hot engine tube where it will vaporize. Part of this vapor may then be drawn by natural thermal convection back through the annular cooling air space between the cooling duct and the engine tube, to the red hot engine combustion chamber. If the proportion of vapor to air is just right when this occurs, the vapor will ignite

## Working Principle (Cont'd)

and flash back through the discharge end of the engine tube, igniting the small amount of formulation which may continue to flow very briefly. Burning formulation can then drip briefly from the discharge end of the cooling air duct. If this burning formulation comes into contact with an easily combustible material or a surface which has accumulated a substantial deposit of liquid formulation, a fire could result.

5. **SAFETY EQUIPMENT.** Many of the formulations which can be dispensed with this machine are highly toxic and require special safety equipment. The formulation label should specify all safety precautions with respect to the formulation. Read and observe the procedures, **CAUTIONS** and **WARNINGS** on the formulation label. Proper ear protection should also be worn when operating this machine.

6. **IMPROPER OPERATION.** There is no substitute for good maintenance practices. An engine with excessive carbon deposits will run weakly and is likely to stop at any time. A weak running engine will also emit an extremely wet fog at lower rates of formulation flow and this can result in surfaces rapidly becoming coated with the formulation and help to feed a fire if ignition takes place as described above. Refer to the **MAINTENANCE** section for cleaning instructions .

7. **IMPROPER USE.** Never place the discharge end of the machine too close to a wall or other obstruction. The engine is maintained at the proper operating temperature by cooling air aspirated (pumped) by hot gases flowing out of the discharge (exhaust) end of the engine. If this cooling air flow is prevented, the machine will overheat and it will cause permanent damage which could result in an explosion or fire. Maintain at least 24 inches (61 CM) clearance between the engine discharge (exhaust) and external objects.

## **Working Principle (Cont'd)**

8. **MACHINE DAMAGE.** Never operate a machine after it has been damaged. A damaged machine can be a fire hazard.

9. **WIND.** Fogging during windy conditions is not usually practical because the formulation will drift out of the intended area. However, under no circumstances should fogging INTO the wind be attempted. Should the machine stop running for any reason, and a wind gust force vaporized formulation back against the hot combustion chamber, it could ignite and flash back causing momentary flaming from the discharge (exhaust) end of the machine.

10. **CHILDREN.** Many fogging operations are performed in residential areas commonly at dusk. This presents the operator with the problem of children who are attracted to the fog. Children have been observed running into and riding bicycles through the fog. Once in the fog, they cannot see or be seen. In some reported instances, a child has been injured by running into an object obscured by the fog. Also there is a possibility of fire should the machine briefly flame or become ignited from an external source. Still another possible hazard lies in the toxic effect of the formulation, the severity of which depends upon the chemical used, fog density, and the length of time of direct exposure.

**IT IS THE OPERATOR'S RESPONSIBILITY TO DISCOURAGE ANYONE  
FROM PLAYING IN THE FOG.**

## OPERATION

**CAUTION:** Read this complete OPERATION section and the section on SAFETY PRECAUTIONS before starting the machine for the first time.

### PREPARING THE ENGINE FOR OPERATION

1. When operating this machine for the first time, place the machine in an uncongested and well ventilated work area away from flammable materials. Place the machine on a concrete pad or a stable workbench.
2. Remove Fuel Tank Cap and fill the Fuel Tank with either regular or unleaded gasoline.

### IMPORTANT

Gasoline with a minimum of 87 octane should be used. Use clean gasoline. Dirty gasoline can promptly overload the fuel filter and “varnish” the moving parts of the carburetor causing them to stick. Water in the gasoline can cause unexplained stops. Very old or stale gasoline has a detrimental effect on the rubber seals in the fuel system and causes hard starting because it vaporizes poorly.

3. Place the Fuel Tank Cap on the Fuel Tank and turn the cap firmly in the clockwise (CW) direction until the stop is reached.
4. Wipe any spilled gasoline from the machine and allow time for any unseen spills to evaporate.

### CAUTION

Do not put any formulation in the machine until you have become familiar with starting and stopping the pulse jet engine.

## CAUTION

Read the complete OPERATION section and the section on SAFETY PRECAUTIONS before operating the engine.

### NOTE

*Abbreviated starting and cleaning procedures are shown on the instruction label attached to the machine; however, these should be used as reference only after you are thoroughly familiar with the procedures, CAUTIONS and WARNINGS contained in this manual.*

## ENGINE STARTING CONDITIONS

### NOTE

*The method used for starting the engine will vary slightly depending on previous conditions of the machine. Regardless of which of the following conditions exist, the ignition switch must be depressed to:*

**DRY START:** (Applies when the machine is first placed in service; when the machine has been completely out of fuel; or, when the machine has not been in recent use). When starting from the dry condition (drained, consumed or evaporated from the carburetor), additional actuation of the priming pump bulb will be required to move fuel from the tank to the primer bulb.

**COLD START:** (Applies after the engine has been started initially; has been stopped before running out of gasoline and has been allowed to cool). Under these conditions, very little actuation of the priming pump is required as some gasoline will usually remain in the carburetor. One actuation of the priming pump is usually sufficient under these conditions.

**HOT START:** (Applies after the engine has been started initially; has been stopped before running out of gasoline and has not been allowed to cool before restarting). Under these conditions, actuating the priming bulb is usually not required as some gasoline will usually remain in the antechamber.

## Engine Starting Condition (Continued)

FLOODED START: (Applies after too much fuel has reached the antechamber by excessive operation of the priming pump). See section on STARTING A FLOODED ENGINE.

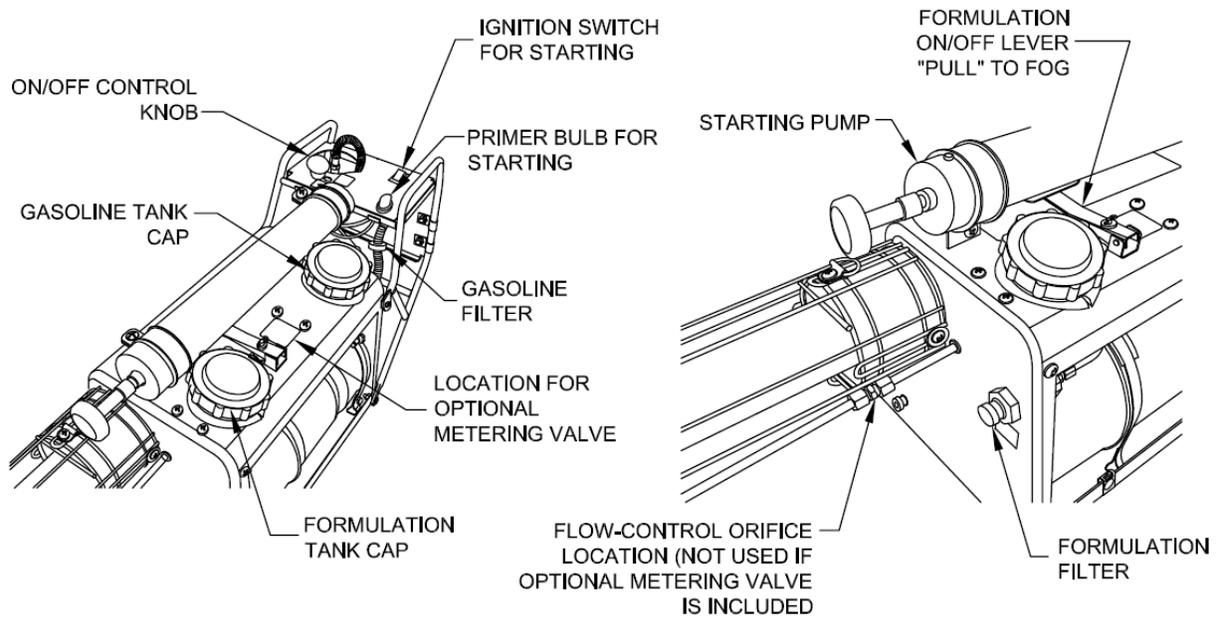


Figure 1

## STARTING THE ENGINE

1. Verify that the FORMULATION ON/OFF lever is released. If your unit is equipped with a formulation metering valve, ensure that it has been rotated fully clockwise (CW) until the stop is reached.
2. Position the 3-WAY SWITCH on the rear panel of the machine to the proper position for the intended battery source to be used.
3. Lift the ON/OFF Control Knob and place it in the "ON" position.

### WARNING

**DO NOT LEAVE THE MACHINE UNATTENDED WITH THE ON/OFF CONTROL IN THE ON POSITION, ESPECIALLY IF THE MACHINE HAS BEEN RUNNING. IF THE ENGINE IS HOT AND THE ON-OFF CONTROL IS IN THE ON POSITION, THE MACHINE MAY SELF START.**

4. Depress and release the "Primer Bulb" repeatedly until the fuel is visible in the Bulb. Once fuel reaches the Bulb, pump Bulb (1-2) times only. (A HOT engine requires little or no priming to start.) A COLD engine requires (1-2) primes once fuel reaches the primer bulb.

### WARNING

**DO NOT ACTUATE GASOLINE PRIMER BULB WITH ON/OFF CONTROL KNOB IN OFF POSITION. DO NOT ATTEMPT TO START MACHINE WITH THE CARBURETOR COVER REMOVED.**

## Starting the Engine (Cont'd)

5. Simultaneously press and hold down the Ignition Switch and stroke the starting air pump at a steady speed until the engine begins to run. Continue holding down the switch until the engine is warm and running strong.

### IMPORTANT

Excessively depressing the primer bulb will “flood” the engine. Flooding means that an excessive amount of gasoline has reached the spark plug. A flooded engine may require several steady pumps to start. If the engine has not started within (20) pumps, repeat steps 4 and 5.

### WARNING

**If flame emits from the discharge (exhaust) end of the engine tube, the engine is flooded. FLOODING MAY RESULT IN A LOUD EXPLOSIVE SOUND AND CAUSE SOME SMALL AMOUNT OF FLAME TO BE EMITTED FROM THE DISCHARGE (EXHAUST) END OF THE ENGINE.**

### NOTE:

*If the Engine does not start, and the buzzing sound emitted by the Electronic Ignition is not heard, release the IGNITION SWITCH and proceed to the TROUBLE SHOOTING section of this manual.*

## STARTING A FLOODED ENGINE

1. Verify that the FORMULATION ON/OFF LEVER is released, and if your machine is equipped with a FORMULATION VALVE, ensure that the valve has been rotated fully clockwise (CW) until the stop is reached.
2. Lift the ON-OFF Control and place it in the ON position.
3. Simultaneously depress the "ignition" switch and begin steadily stroking the air pump.
4. Continue depressing the IGNITION SWITCH and stroking the pump. If the engine has not started within approximately 20 pumps, repeat steps 4 and 5 of the STARTING THE ENGINE section.

### **IMPORTANT**

*It is important that the batteries in the machine are strong enough to produce a HOT spark at the spark plug. If the spark appears weak, try starting your machine from the Auxiliary Position. To do this, move the Power Selector Switch to the Auxiliary Position and connect the Auxiliary Cable from the rear of the machine to a 12Volt "Cigarette Lighter" receptacle.*

## STOPPING THE ENGINE

1. To stop the engine, lift the ON-OFF control and place it in the OFF position.

### **WARNING:**

**TO PREVENT ACCIDENTAL STARTING OF THE MACHINE WHEN TRANSPORTING OR STORING THE MACHINE, PLACE THE POWER SELECTOR SWITCH INTO THE CENTER OFF POSITION.**

## SELECTING A FORMULATION

Thermal fogging is an efficient and economical non-residual method of controlling insects. But the fog machine can not do the job alone. The proper insecticide, properly formulated is absolutely necessary. The machine will accept ineffective, poorly compounded solutions and the fog will appear no different from an efficient and well formulated compound, but the killing power will be lacking. It requires insecticide to kill insects.

Improperly compounded formulations can promptly drop out of solution in the formulation system and give poor results. Your distributor is usually qualified to make recommendations and to furnish properly formulated insecticides; but if you have any specific questions or doubts, feel free to contact the factory.

### CAUTION

Use only formulations prepared for thermal fogging and for the specific job to be accomplished. This information should be found on the formulation label.

### WARNING

**THIS DEVICE IS DESIGNED TO DISPENSE CHEMICAL SOLUTIONS IN A FOG. MOST OF THE CHEMICAL SOLUTIONS WHICH MAY BE DISPENSED WITH THIS MACHINE REQUIRE REGISTRATION WITH OR APPROVAL BY VARIOUS GOVERNMENT AGENCIES. USE OF SOME OF THESE SOLUTIONS MAY BE RESTRICTED, REGULATED OR PROHIBITED IN CERTAIN AREAS.**

## **FOGGING FOR INSECT CONTROL**

### **CAUTION**

Before placing any formulation in the Formulation Tank, the operator should be thoroughly familiar with starting and stopping the pulse jet engine. If you are operating the machine for the first time, start and stop the engine a few times. This is also a good idea for experienced operators who may be operating a new machine or who may be reactivating an old machine after repairs or after a period of inactivity. Refer to the appropriate sections for starting and stopping instructions.

### **WARNING**

**READ THE SECTION ON SAFETY PRECAUTIONS BEFORE PREPARING TO DISPENSE FOG.**

**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.**

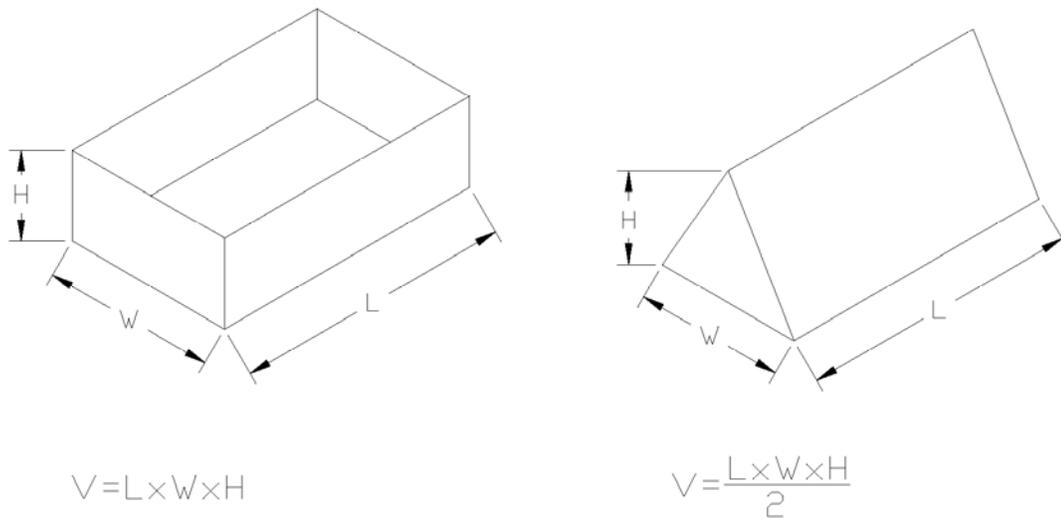
**ALWAYS USE THE APPROPRIATE SAFETY EQUIPMENT AND DRESS ACCORDING TO THE CHEMICAL FORMULATION WHICH IS BEING USED.**

## PREPARING TO DISPENSE FOG

### FOGGING WITHIN ENCLOSED SPACES:

When intending to fog within enclosed spaces such as buildings, crawl spaces, and spaces between ceiling and roof, a "dry" fog must be used. The enclosed space volume, formulation volume, and fogging time must be carefully calculated to avoid overfogging.

Volume formulas for simple shapes usually found in structures are shown below:



**Figure 2**

### BEFORE FOGGING:

1. Determine the volume of the enclosed space to be fogged in cubic feet or cubic meters as applicable. Read the formulation label and determine the normal usage rate of the formulation. This usually varies from 1 fluid ounce (oz.) per 1000 cubic feet, (approximately 100 milliliters per 100 cubic meters) to 1 ounce per 3000 cubic feet (approximately 100 milliliters per 300 cubic meters).
2. Determine the Formulation Volume.

## BEFORE FOGGING (Cont'd)

3. Determine the fogging time.

### NOTE

*Tables 1 and 2 are provided as a quick reference for determining fogging time.*

*As a "rule of thumb." when fogging indoors, your metering valve setting should never exceed 4. If your machine is equipped with fixed orifices instead of a metering valve, use the #36 orifice fitting as a maximum indoor rate. ALSO, the operator must maintain at least 2.4 meters (8 feet) of clearance between the discharge end of the machine and the target being fogged.*

### **Example: (Using English System Units)**

STEP 1: Let's assume that the attic space shown on the previous page has a base (W) of 26 feet, and a height (H) of 7 feet and a length (L) of 43 feet. The volume (V) may be determined as follows.

The volume (V) may be determined as follows:

$$V = \frac{26 \times 7 \times 43}{2} = 3913 = 3900 \text{ cubic feet}$$

Let's also assume that the formulation label specifies a normal usage rate of 1 ounce per 3000 cubic feet (Table 2). Knowing the usage rate from the formulation label and the volume of space to be fogged, the formulation volume and fogging time can be calculated as shown below.

## BEFORE FOGGING (Cont'd)

**STEP 2:** The normal required formulation Volume is:

$$\frac{(3900\text{cu.ft.}) \times (1 \text{ oz.})}{3000 \text{ cu. ft.}} = \mathbf{1.3 \text{ ounces}}$$

**STEP 3:** The normal time to fog 1.3 ounces is:

$$\frac{(1.3 \text{ oz.})}{(t \text{ seconds})} \times \frac{(5 \text{ oz.})}{(60 \text{ seconds})}$$

$$t \text{ seconds} = \frac{(60 \text{ seconds}) (1.3 \text{ oz.})}{5 \text{ oz.}} = \mathbf{15 \text{ seconds}}$$

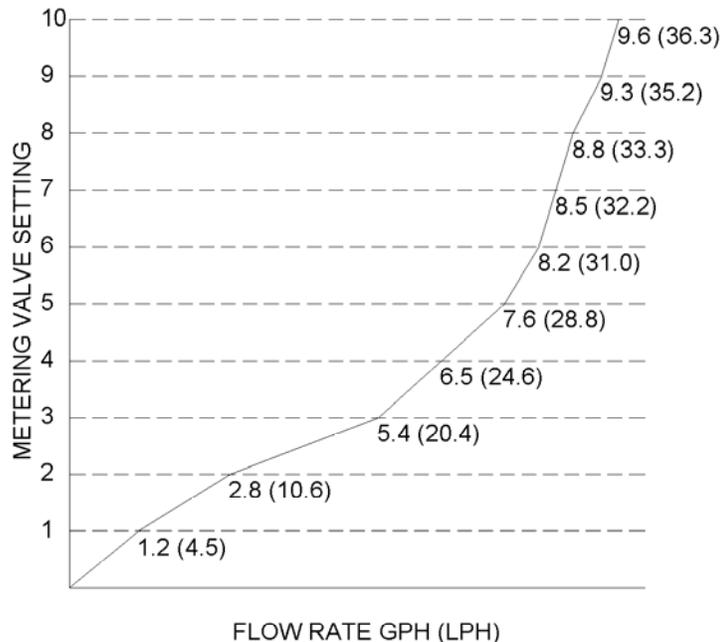
where t = normal time to fog, and 5 oz. is the average machine flow rate to achieve a "dry fog."

### FOGGING OUTDOORS:

Read and follow all cautions and warnings for "Dispensing Fog". Read and follow the instructions for thermal fogging on the chemical solution label.

### (OPTIONAL METERING VALVE) VALVE SETTING VS. FLOW RATE:

This graph represents an approximate cross reference between the metering valve setting (0-10) and the formulation flow rate. This graph was derived using 467 Base oil (approximately 1 centipoise viscosity) as the formulation being fogged.



## ENCLOSED SPACE VOLUME vs FORMULATION VOLUME AND FOGGING TIME

Based on formulation label application rate of:

1 fluid ounce (oz) per 1000 cubic feet (cu. ft.)

100 milliliters (ml) per 100 cubic meters (cu. m.)

Volume of Enclosed Space Cu. Ft. (Cu. Meters)		Average Flow Rate* To achieve "DRY" Fog Oz/Min (MI/Min)		Fogging Time (Seconds)
1000	( 30)	5	(150)	12
2000	( 60)	5	(150)	24
3000	( 90)	5	(150)	36
5000	( 140)	5	(150)	60
10000	( 280)	5	(150)	120
20000	( 560)	5	(150)	240
30000	( 840)	5	(150)	360
40000	(1120)	5	(150)	480
50000	(1400)	5	(150)	600

**TABLE 1**

## ENCLOSED SPACE VOLUME vs FORMULATION VOLUME AND FOGGING TIME

Based on formulation label application rate of:

1 fluid ounce (oz) per 3000 cubic feet (cu. ft.)

100 milliliters (ml) per 300 cubic meters (cu. m.)

Volume of Enclosed Space Cu. Ft. (Cu. Meters)		Average Flow Rate* To achieve "DRY" Fog Oz/Min (MI/Min)		Fogging Time (Seconds)
1000	( 30)	5	(150)	4
2000	( 60)	5	(150)	8
3000	( 90)	5	(150)	12
5000	( 140)	5	(150)	20
10000	( 280)	5	(150)	40
20000	( 560)	5	(150)	80
30000	( 840)	5	(150)	120
40000	(1120)	5	(150)	160
50000	(1400)	5	(150)	200

**TABLE 2**

\* This flow rate is an average. Your actual flow rate required to produce a "dry" fog may vary depending on the viscosity of the formulation to be fogged, the formulation tank pressure, and the operating characteristic "dry" fog must be used when fogging in an enclosed area. See "Dispensing FOG WARNING". on page24-27. To test the fog to verify that it is "dry," see "Caution" on page 27.

## **WARNING**

**IF YOUR FLOW RATE REQUIRED TO ACHIEVE A "DRY" FOG IS GREATER OR THE AVERAGE FLOW RATE GIVEN IN TABLES 1 AND 2, FOGGING TIME FOR THE ENCLOSED SPACE WILL BE DIFFERENT THAN THE TIME SHOWN. (SEE SECTION ON PREVIOUS PAGE TO DETERMINE FOGGING TIME.)**

**IT SHOULD ALSO BE NOTED THAT TABLES 1 AND 2 ARE BASED ON A FLOW RATE OF 2.3 GPH (8.9 LT./HR.) OR 5 OZ./MIN, (150 ML./MIN.) "DRY-FOG" AS SHOWN.**

1. If the engine is running, stop the engine and wait 15 seconds for pressure in the Formulation Tank to escape.

## **CAUTION**

**Remove tank cap slowly**

2. Rotate the Formulation Tank Cap fully counterclockwise (CCW) and remove it from the formulation tank neck.

3. Place an appropriate amount of formulation in the formulation tank.

## **NOTE**

*It is a good idea to put only as much formulation in the tank as is necessary to do a particular job. This helps to ensure that the formulation tank will be empty when the fogging job is finished.*

## **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 THERMAL FOGGING OF THE SOLUTION.**

4. Place the Formulation Tank Cap on the Formulation Tank and rotate it clockwise (CW) until the stop is reached.

## **NOTE**

*The Formulation Tank must be sealed air tight for the machine to operate properly.*

## **CAUTION**

Read the entire OPERATION SECTION and the section on SAFETY PRECAUTIONS before starting the machine for the purpose of dispensing fog.

## **WARNING**

**DO NOT UNDER ANY CIRCUMSTANCES USE A WET FOG IN A CLOSED AREA.**

**DO NOT FOG ANY ENCLOSED SPACE OF LESS THAN 500 CUBIC FEET (14 CUBIC METERS) WITH THIS MACHINE.**

**DO NOT FOG AN ENCLOSED SPACE FOR MORE THAN 7.5 SECONDS FOR EACH 1000 CUBIC FEET (28 CUBIC METERS) OF ENCLOSED SPACE. (THIS INFORMATION IS BASED ON A MACHINE FLOW RATE OF 9 U.S. GPH (34 LT./HR.) OR 19 OZ./MIN. (568 ML/MIN.) (EQUIVALENT OF 1 GALLON/50,000 CU. FT.) YOUR MACHINE IS CAPABLE OF PRODUCING HIGHER FLOW RATES THAN 9 GPH (34 LT./HR.).**

**NEVER FOG INDOORS USING A FLOW RATE THAT PRODUCES A WET FOG (SEE SECTION “PREPARING TO DISPENSE FOG”). EXTINGUISH ALL OIL AND GAS PILOT LIGHTS AND TURN OFF ALL ELECTRICAL POWER IN A CLOSED AREA BEFORE FOGGING.**

**DO NOT FOG NEAR AN OPEN FLAME OR HOT MATERIALS. THIS INCLUDES LIGHTED MATCHES, CIGARETTES, ETC.**

**DO NOT WEDGE OR BLOCK OPEN THE FORMULATION ON-OFF LEVER OR LEAVE THE MACHINE UNATTENDED.**

**IF THE ENGINE STOPS FOR ANY REASON, RELEASE THE FORMULATION ON/OFF LEVER IMMEDIATELY.**

**IF AN EXTERNAL SOURCE IGNITES OR TORCHES THE FOG, RELEASE THE FORMULATION ON/OFF LEVER IMMEDIATELY.**

**DO NOT AT ANY TIME PLACE THE MACHINE ON ITS SIDE.**

**DO NOT PLACE THE DISCHARGE (EXHAUST) END OF AN OPERATING MACHINE CLOSER THAN 24 INCHES (61 CM) TO A WALL OR OTHER OBSTRUCTION. THIS CAN CAUSE THE ENGINE TO OVERHEAT AND CAUSE THE MACHINE TO SUFFER PERMANENT DAMAGE LEADING TO A FIRE OR EXPLOSION.**

**DO NOT TOUCH THE HOT ENGINE TUBE. ALLOW SUFFICIENT COOLING TIME AFTER OPERATION BEFORE ATTEMPTING ADJUSTMENT, REPAIR OR MAINTENANCE.**

**DO NOT LOOK INTO THE ENGINE DISCHARGE (EXHAUST) TUBE.**

**DO NOT FOG INTO THE WIND.**

**DO NOT LEAVE THE FOG CONTINUOUSLY DIRECTED AT THE SAME AREA OR OBJECT. THIS MAY CAUSE A BUILD-UP OF A FLAMMABLE SUBSTANCE OR LEAVE UNDESIRABLE DEPOSITS ON WALLS, FURNITURE, ETC.**

### **NOTE**

*The formulation flow to the INJECTION ORIFICE is controlled by both a fixed flow restrictor orifice (or optional formulation metering valve) which controls the formulation flow rate and an ON/OFF Valve. The fixed orifices supplied with your machine are:*

<b>ORIFICE</b>	<b>GPH</b>	<b>LPH</b>
#24	1.5	5.7
#28	2.6	10.0
#36	4.6	17.5
#60	8	30.0
#72*	11	42.0

***\*The #72 orifice is installed in your machine and is tested at the factory for proper flow.***

### **WARNING**

**THE LARGER NUMBERED ORIFICES PRODUCE HIGHER FLOW RATES. THEREFORE, THE FOG OUTPUT OF THE LOWER NUMBERED ORIFICES (#24, #28 and #36) WILL ALL TEND TO PRODUCE A “DRY” FOG. FOG QUALITY CHANGES FROM “DRY” TO “WET” AS FLOW RATE INCREASE. THE POINT OF CHANGE OVER FROM DRY TO WET DEPENDS ON VARIABLES SUCH AS THE FORMULATION TANK PRESSURE, FORMULATION VISCOSITY, THE STATE OF CLEANLINESS OF THE FORMULATION SYSTEM AND THE OPERATING CHARACTERISTICS OF THE ENGINE.**

## **CAUTION**

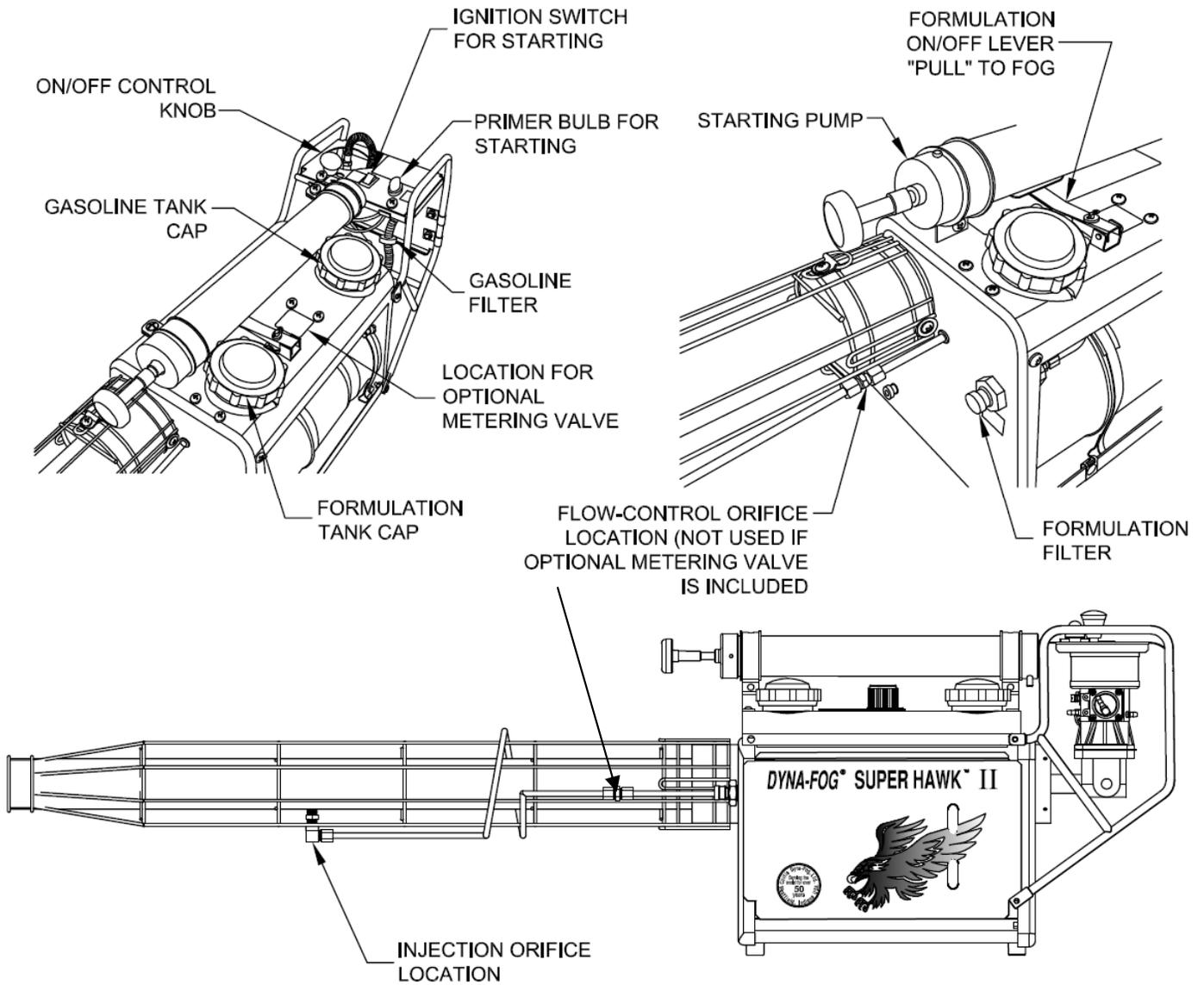
When it is intended to fog in a closed area, the operator should first test the fog to verify that it is **DRY** before entering the closed area. To test the fog quality pass a dark piece of paper or a shiny object through the fog at a distance of approximately 24 inches (61 CM) from the discharge (exhaust) end of the machine. If there is any visual accumulation on the paper or object, the fog must be considered **WET** and the flow control orifice must be reduced to a smaller number (or the metering valve closed clockwise to a lower number) to produce a dryer fog. To ensure a **DRY** fog, always give yourself a margin of safety in selecting a formulation flow rate.

## **START FOGGING**

### **WARNING:**

**ENSURE THAT THE PERSON OPERATING THE MACHINE IS WEARING OSHA APPROVED SAFETY EQUIPMENT (IE. GLOVES, RESPIRATORS, GOGGLES, ETC...) BEFORE ATTEMPTING TO FOG! FOLLOWING ALL OTHER APPLICABLE NOTES, CAUTIONS AND WARNINGS LISTED IN THIS MANUAL AND ON THE FORMULATION LABEL.**

1. Start the engine as specified in the section **STARTING THE ENGINE**.
2. Verify that the Formulation Tank Cap is tight.
3. When the engine is running smooth, move the machine to a clear open area and pull the **FORMULATION CONTROL LEVER**. Release the lever to stop fogging.
4. Observe the fog being produced and if necessary after allowing the machine to cool, select a different flow control orifice that will give the fog quality you desire.



**Figure 4**

## **STOP FOGGING**

1. When fogging is complete, release the FORMULATION ON-OFF LEVER (and if applicable, rotate the FORMULATION METERING VALVE clockwise (CW) until the stop is reached.)
2. Stop the engine by lifting the ON-OFF CONTROL and placing it in the OFF position.

## **CLEAN UP**

1. Drain any unused Formulation from the tank into its original container for proper storage.

## **CAUTION**

Store all formulations where they are not accessible to children or other persons who may not be aware of potential dangers involved.

Do not store formulations in unmarked or otherwise improper containers.

Do not store formulations in empty food or beverage containers or in any container marked for another substance.

Do not re-use empty formulation containers for other purposes.

Dispose of empty formulation containers in accordance with the formulation label instructions.

2. After properly storing the formulation, perform the "AFTER EACH USE" maintenance operations under the MAINTENANCE section of this manual.

## **NOTE**

*Many formulations will release residue that can settle in the formulation tank. If this residue is left to collect in the Formulation Tank, it will eventually be carried through the formulation system forming sludge in the system. This sludge can completely block the formulation system making fogging impossible.*

## **CAUTION**

Because the machine may still have gasoline in its tank, the machine should be stored between uses under conditions applicable to gasoline containers generally, i.e., store in a cool dry and well ventilated place away from sources of ignition.

3. If preparing the machine for long-term storage or shipment, refer to the section marked STORAGE AND SHIPMENT.

## **PREVENTATIVE MAINTENANCE**

### **NOTE**

*A successful maintenance program begins after the first use of the machine and not after the machine has ceased to function. Numbers in parentheses refer to the identification numbers in the Parts identification Section.*

## **AFTER EACH USE**

If the machine will be left idle for more than one (1) hour, flush the system as follows to avoid frozen valves and plugged lines resulting from formulation residues.

## FLUSH THE FORMULATION SYSTEM

1. Drain the Formulation Tank.

### CAUTION:

Store the formulation properly. See the cautions under clean up.

2. Pour one pint of kerosene, No. 2 Fuel Oil or Diesel Fuel into the Formulation Tank and thoroughly mix it inside the tank.
3. Start the engine in accordance with the OPERATION section and fog out all of the liquid in the tank.

### WARNING

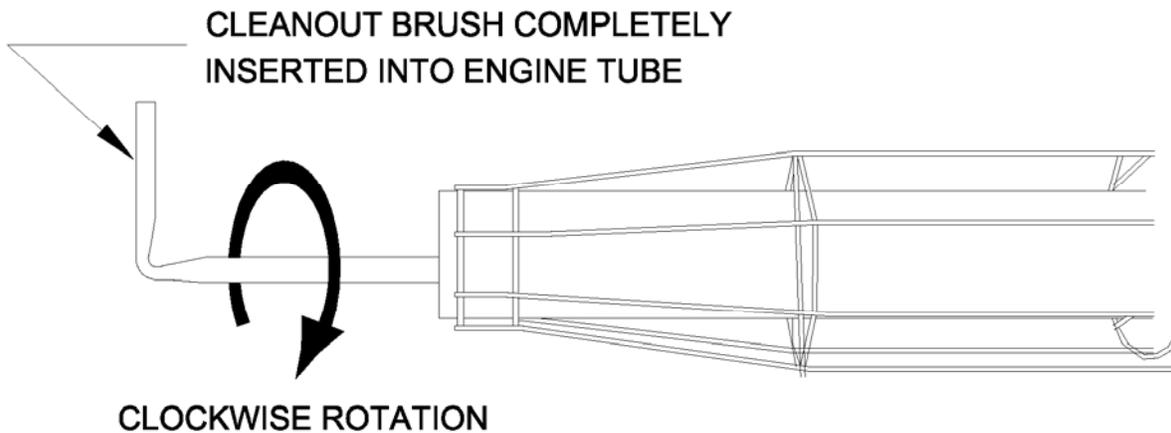
**ALL CAUTIONS AND WARNINGS APPLICABLE TO OPERATION AND FOGGING ARE APPLICABLE TO THIS FLUSHING PROCEDURE.**

## INSPECT FOR FORMULATION RESIDUES

Examine the Formulation Tank and system for residues. If deposits are building up, increase the amount of flushing liquid that is fogged after each use.

## CLEAN THE ENGINE DISCHARGE (EXHAUST) TUBE

- 1 . Using the Clean out Tool provided, (Fig. 5 ) insert the brush into the engine discharge (exhaust) tube and rotate it clockwise (CW) as you push the tool into the tube as far as the handle permits.



**Figure 5**

2. Continue rotating the tool in the same direction and pull back and remove the brush from the tube.

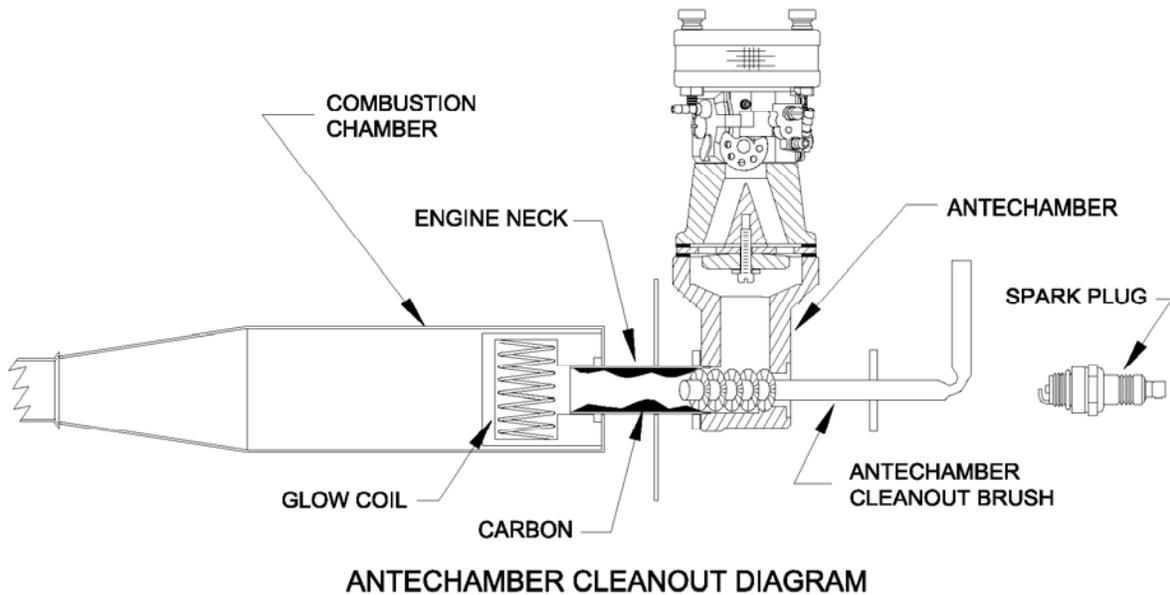
### **NOTE**

*It is not normally necessary to push and pull hard on the brush handle; however, if the engine tube is not cleaned regularly, it becomes increasingly difficult to clean. Push and pull gently and continue rotating. Loose carbon will be removed from the tube when the engine is next started.*

## **AFTER EVERY EIGHT (8) HOURS OPERATION**

### **Clean the Formulation Filters**

1. Remove the FORMULATION FILTERS. One is located on the machine front panel and the other is in the tank neck. Clean them with detergent and water.



**Figure 6**

2. If the filters have deposits that soap and water will not remove, clean them using an automotive carburetor cleaner.
3. Thoroughly dry the filters and re-install them.

### **CAUTION**

Do not operate the system without the formulation filters installed. Extensive damage to the system may occur due to clogging of lines and orifices.

### **CLEAN THE ENGINE NECK**

#### **NOTE**

*A screw driver or similar tool may be used to remove the carbon.*

### **CAUTION**

Extreme care must be taken to prevent damaging the glow coil in the combustion chamber. Any tool used should be short enough to prevent the tip of the tool from reaching and damaging the glow coil.

## **WARNING**

**A DAMAGED OR OUT OF POSITION GLOW COIL WILL CAUSE POOR ENGINE STARTING AND OPERATION.**

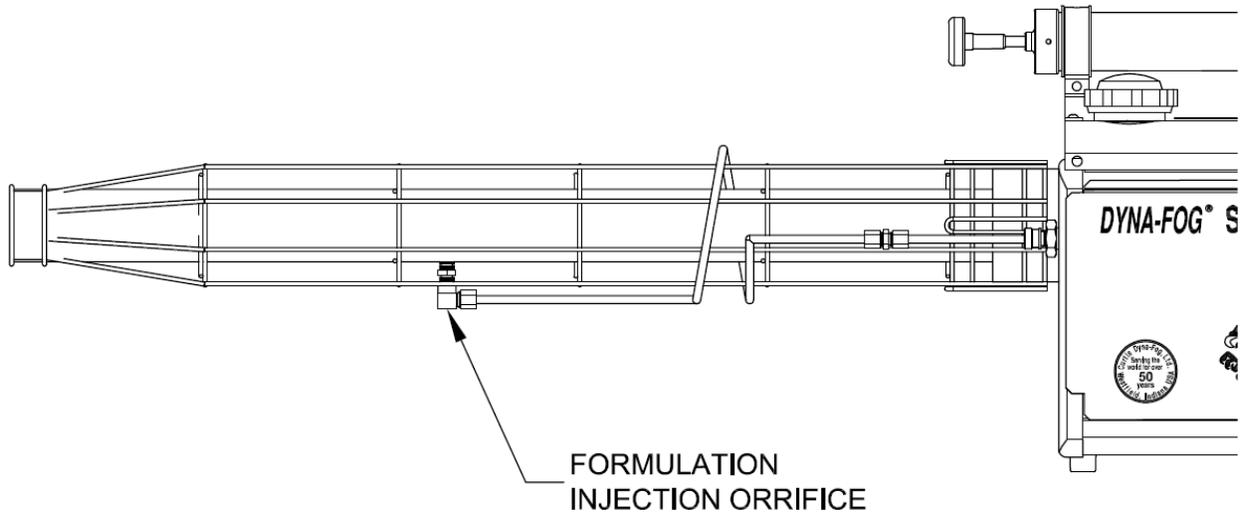
**ACCUMULATION OF CARBON IN THE ENGINE NECK WILL ULTIMATELY RESULT IN HARD STARTING AND POOR PERFORMANCE.**

## **EXAMINE THE SPARKPLUG**

In general, the only time the spark plug goes bad is if the white porcelain becomes cracked or broken. Occasionally carbon will form on the electrodes. When this happens, rub the carbon off with a piece of steel wool. The spark plug is gapped at 0.060" (1.5 MM). A wide spark plug gap is required to ensure fast, efficient starting of the engine. DO NOT close the spark plug gap smaller than this dimension. Always install the spark plug with your fingers. NEVER USE A WRENCH TO TIGHTEN THE SPARK PLUG.

## **CHECK ON-OFF CONTROL ADJUSTMENT**

1. If the On-Off Control linkage does not rotate the linkage stop from full open to full closed (see picture) than the linkage should be adjusted.
2. To adjust the linkage, loosen the Jam Nut and twist the Control Wire into the Control Linkage in the direction needed. When properly functioning, the On-Off Control should rotate the Linkage Plate (see figure 8 for linkage hole location) as far as it will go in either direction.



**Figure7**

## **AFTER EVERY 25 HOURS OF OPERATION CLEAN THE FORMULATION INJECTION ORIFICE**

1. Disconnect the Formulation Injection Line at the injection end and then remove the elbow assembly (Fig. 7).
2. Insert a wire through the Coupling into the engine tube to remove carbon deposits.
3. Reassemble the Elbow and the Formulation Injection Line. Apply a pipe sealant to the pipe threads of the nipple prior to the assembly.

## **CHECK THE FUEL FILTER**

Inspect the Fuel Filter (Fig. 4) in the fuel line. If it is dirty, replace the filter for a new one (P/N58316). Inspect the filter located within the carburetor (see Figure 13 for location).

## **CHECK THE BATTERIES**

No set period of time can be established for the replacement of the "D" size batteries, but the spark intensity should be checked whenever the machine does not start easily. See TROUBLESHOOTING SECTION concerning the testing of the electronic ignition.

If your machine is equipped with a 12 VOLT battery pack (8 "D" cell batteries), the nominal voltage of fully charged batteries should be at least 12 Volts D.C. This voltage will vary battery age and with the ambient temperature conditions. Under some circumstances, it may vary as much as +/- 2 volts. Replace your batteries when the battery pack voltage is below 9 volts DC.

## **WARNING**

**IMPROPER USE OF BATTERIES MAY CAUSE LEAKAGE AND EXPLOSION. THEREFORE, STRICTLY OBSERVE THE FOLLOWING PRECAUTIONS.**

**(1) INSTALL THE BATTERIES WITH THE POSITIVE (+) AND NEGATIVE (-) POLARITIES IN THE PROPER DIRECTION.**

**(2) DO NOT USE NEW AND OLD BATTERIES TOGETHER.**

**(3) DO NOT USE CYLINDRICAL ALKALINE BATTERIES WITH OTHER TYPES OF BATTERIES.**

**(4) NEVER ATTEMPT TO SHORT-CIRCUIT, DISASSEMBLE, OR HEAT BATTERIES. DO NOT THROW BATTERIES IN FIRE.**

**CYLINDRICAL ALKALINE BATTERIES ARE NOT RECHARGEABLE. IF RECHARGED, THEY MAY LEAK AND EXPLODE.**

## **CARBURETOR**

The Carburetor on this machine does not need frequent adjustment or servicing. Careful attention to putting only clean gasoline in the machine will significantly reduce trouble with the Carburetor. The Carburetor idle-needle is pre-set at the factory for the correct fuel at an altitude of approximately 1000 feet (305 meters.)

Minor adjustment of the needle may be required for high altitude. When the Carburetor is set at the nominal setting as explained below, performance difficulties will usually be found to be caused by sources other than the carburetor. For example, if the engine dies or runs rough, carbon build up in the engine neck will often be found to be the cause. Scheduled cleaning as detailed in MAINTENANCE will eliminate this cause.

## IDLE NEEDLE ADJUSTMENT

### NOTE

Read the entire CARBURETOR section before performing the idle needle adjustment.

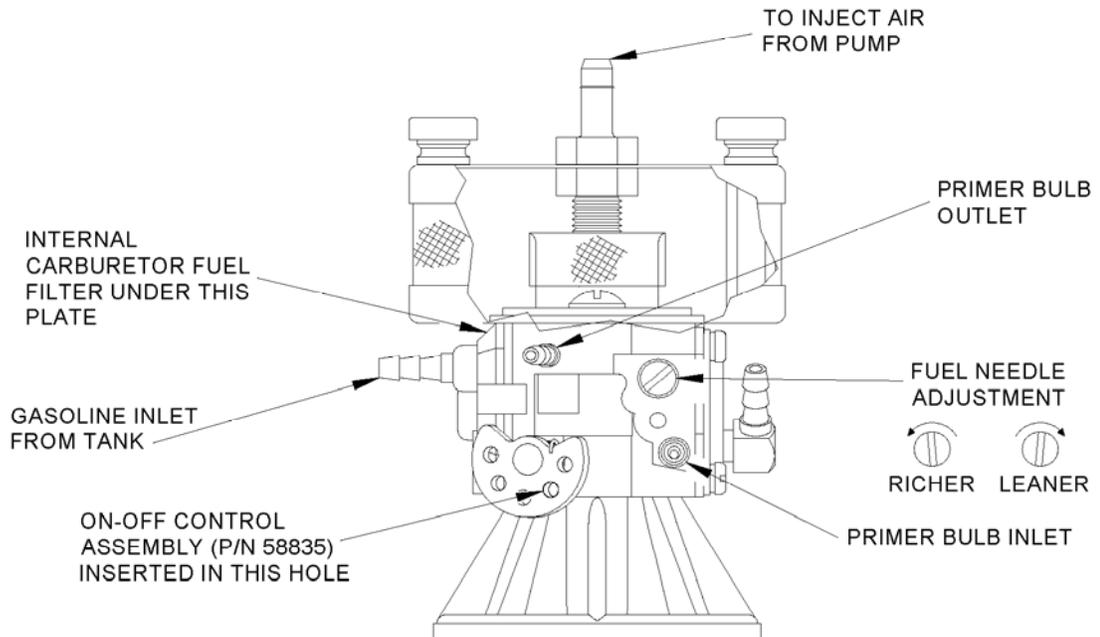


Figure 8

1. Drain any formulation remaining in the Formulation Tank.
2. Add approximately 1 quart (1 liter) of flushing solution, fuel oil or kerosene to the Formulation Tank.
3. Make sure the Fuel Tank has gasoline in it and if equipped with a FORMULATION METERING VALVE, the valve is closed.
4. With the engine stopped, turn the idle-needle screw gently clockwise (CW) until the needle seats.

## CAUTION

Do not over tighten the idle-needle. Over tightening can damage the needle seat in the carburetor.

5. After the needle seats, turn the idle-needle screw counterclockwise (CCW) one-half (1/2) of one revolution open.

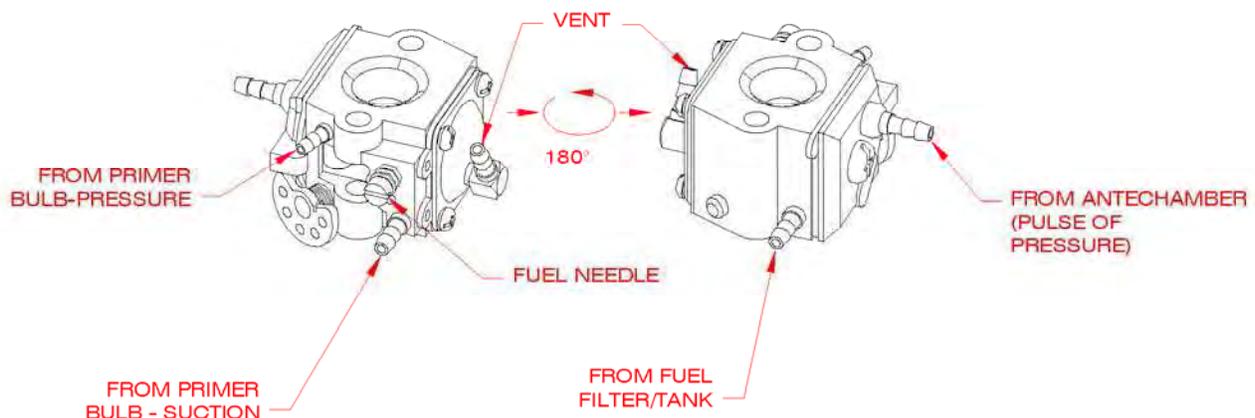
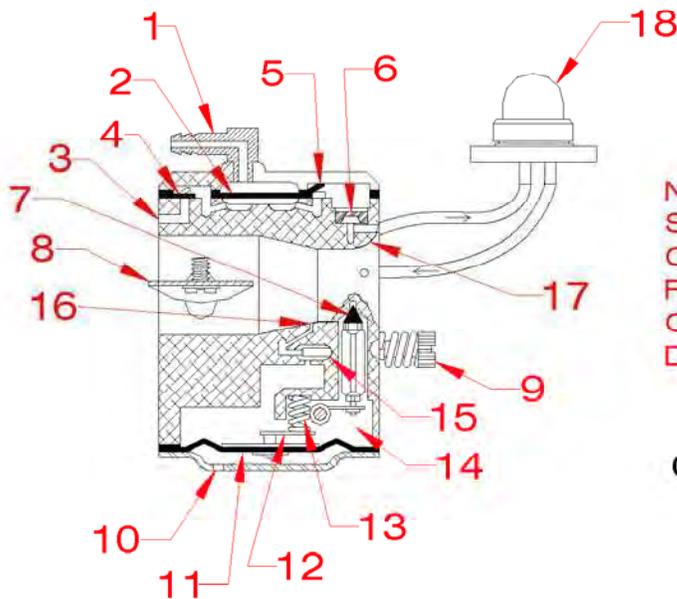


Figure 9



NOTE: TO SHOW THE OPERATING SYSTEMS IN THE CARBURETOR IN ONE VIEW THE FUEL NEEDLE WAS ROTATED IN THE CROSS SECTION OF THE CARBURETOR SYSTEMS DIAGRAMS.

**CARBURETOR SYSTEMS DIAGRAM  
OPERATING FUNCTIONS**

**Figure 10**

1. Engine Impulse: Actuates Fuel Pump Diaphragm alternating pressure-vacuum pulses.
2. Fuel Pump Diaphragm: Fluctuates in response to engine impulse. Transfers fuel through Fuel Pump Valves.
3. Fuel Inlet: Fuel drawn from tank.
4. Inlet Valve: Responds to Fuel Pump Diaphragm. Opens during vacuum pulse. Closes during pressure pulse.
5. Outlet Valve: Closes during vacuum pulse. Opens during pressure pulse.
6. Filter Screen: Filter fuel on route to Metering Chamber.
7. Inlet Needle Valve: Lifts off seat to allow fuel entry into Metering Chamber.
8. Butterfly Valve: Shuts off air flow stopping engine.
9. Fuel Needle: Adjusts fuel richness.
10. Atmospheric Vent: Allows air Metering Diaphragm.
11. Metering Diaphragm: Drawn up engine is running to activate Metering Lever.
12. Metering Lever: Lifts Inlet Needle
13. Metering Lever Spring: Transmits force to lever. Closes Inlet Valve as Metering Chamber fills.
14. Metering Chamber: Fuel reservoir.
15. Nozzle Well: Fuel is drawn in from Chamber at high speed.
16. Nozzle: Increases fuel discharge at high speed.
17. Venturi: Increases air velocity at Nozzle creating a suction to draw fuel into Throttle Bore.
18. Priming Pump: Used to supply fuel to antechamber for starting.

## WARNING

**IF THE MIXTURE IS TOO LEAN THE ENGINE MAY DIE AT THIS POINT. UPON RESTARTING, FLAME MAY MOMENTARILY SHOOT OUT THE DISCHARGE TUBE.**

## NOTE

*This section outlines the operating systems in the Carburetor. Refer to "The Starting System Diagram" and the "Carburetor System Diagram" for a pictorial representation of all systems and names. The end of this section contains procedures for all possible Carburetor adjustments.*

The purpose of the Carburetor is to supply a combustible mixture of fuel and air to the Pulse Jet Engines. The carburetor uses four systems to create this mixture. These systems are:

1. A Venturi
2. A Metering Chamber
3. A Fuel Pump
4. A Fuel Needle

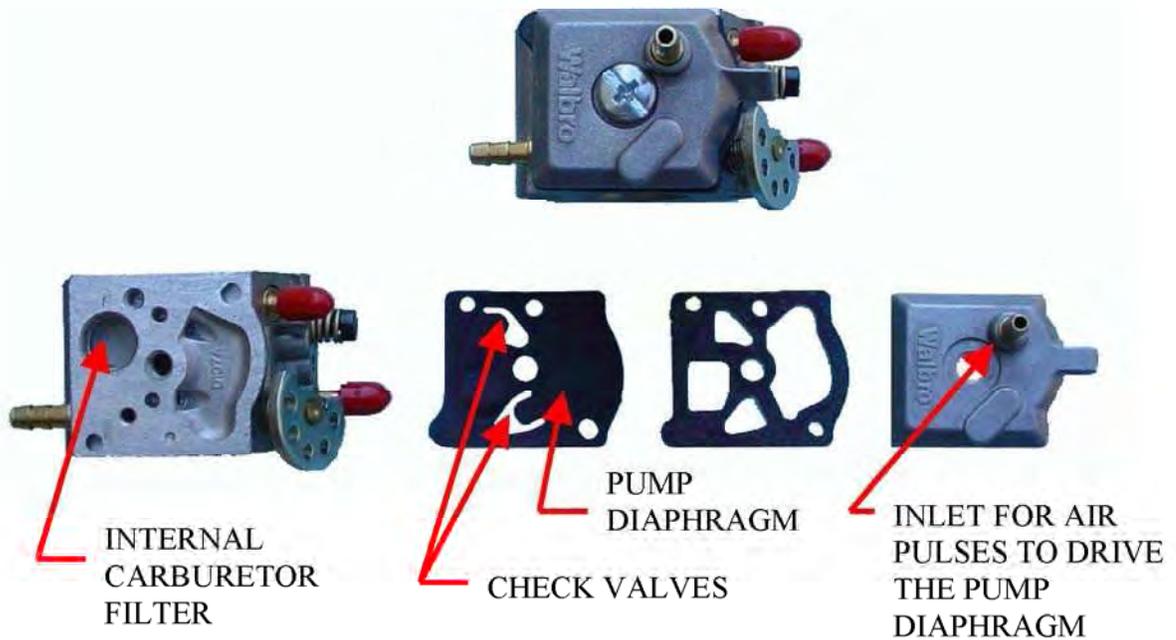
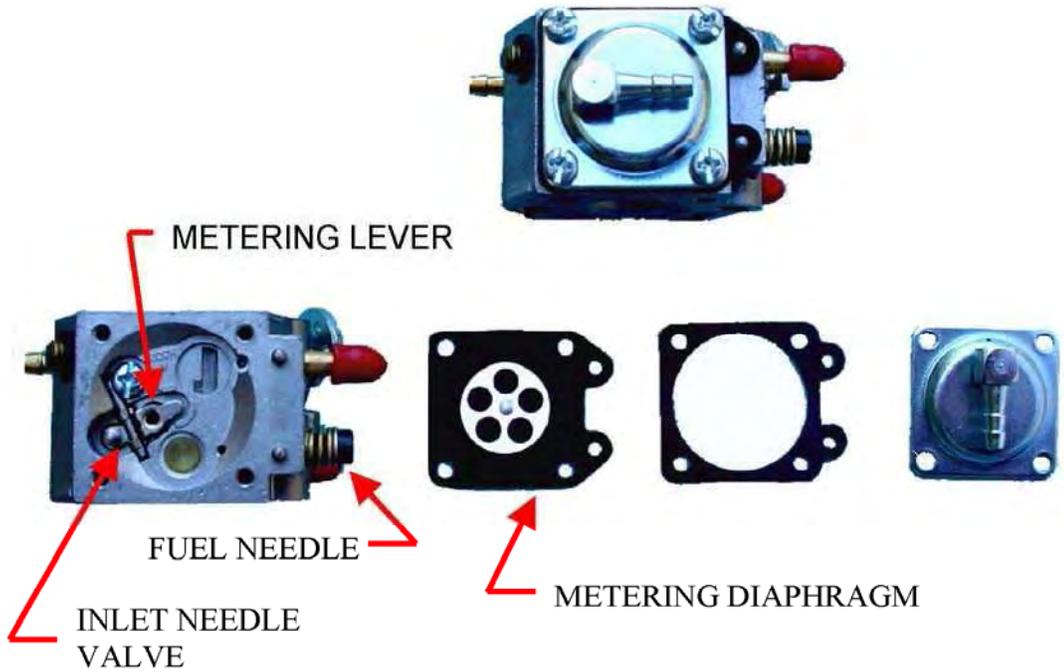
The Venturi is the air passage through the Carburetor. When air moves through a Venturi a partial vacuum is created. The strength of the vacuum varies proportionately to the amount of air flowing through the Venturi. When a constant volume of gasoline is connected to the Venturi, the vacuum created by the Venturi will draw an amount of gasoline proportional to the air flow past the Venturi and disperse the gasoline in the airflow. This arrangement allows the carburetor to always supply the correct ration of fuel and air to the engine.

The Metering Chamber maintains a constant volume of gasoline for the Venturi and prevents gasoline from leaking out through the Carburetor should the machine be overturned. As gasoline enters and begins to fill the Metering Chamber it presses out on the Metering Diaphragm allowing the spring under the Metering Lever to push out on the lever closing the Inlet Needle Valve. When the air flowing through the Venturi draws gasoline from the Metering Chamber, the Metering Diaphragm moves in pressing in the Metering Lever and opening the Inlet Needle Valve, thereby allowing the metering Chamber to fill with gasoline again. When the engine is not running, vacuum is not created in the Venturi to move the Metering Diaphragm so the Metering Diaphragm does not move in and out. In this condition the spring behind the Metering Lever holds the Inlet Needle Valve closed preventing gasoline from leaking through the Carburetor if the machine is overturned.

The purpose of the Internal Fuel Pump is to deliver the gasoline to the Carburetor and be capable of delivering the maximum amount of gasoline the Pulse Jet Engine would ever require. The Fuel Pump Diaphragm is driven by the alternating positive and negative air pressure from the engine's intake-explosion-discharge cycle. Movements Pump Diaphragm draw gasoline through a series of check-valves and push the gasoline toward the Metering Chamber.

The Fuel Needle fine tunes the fuel-air mixture allowing for small differences in engines and performance.

**CARBURETOR – METERING CHAMBER SIDE**



**CARBURETOR – PUMP CHAMBER SIDE**

**FIGURE 11**

## CARBURETOR ADJUSTMENT

### NOTE

*If clean fresh gasoline combined with a Fuel Stabilizer Additive is used, the Carburetor will almost never require servicing. Usually most operational problems involve carbon build-up, weak spark, or excessive priming causing the engine to flood. All of these possibilities should be checked before working on Carburetor.*

An out of adjustment Carburetor will cause the following symptoms.

### NOTE

*All of these can also be caused by a weak battery and/or carbon build-up.*

**Symptom: #1 Machine is hard to start (too much gasoline).**

**Possible Cause:**

1. Bad gasoline
2. Inlet Needle Valve wedged open.
3. Fuel Needle set too far open.
4. Weak Batteries
5. Metering Lever inside carburetor set too far out.

**Symptom: #2 Machine is hard to start (not enough gasoline).**

**Possible Cause:**

1. Carburetor is clogged.
2. Fuel needle in carburetor stuck to its seat.
3. Metering lever set too far in.

**Symptom: #3 Machine runs but dies when beginning to fog.**

**Possible Cause:**

1. Fuel-air mixture is too lean or too rich.
2. Throttle linkage not traveling to full OPEN position.

## ADJUSTING THE FUEL NEEDLE

The engine must be running in order to adjust the Fuel Needle. If the engine will not run and the fuel needle is set between 1/2 and 3/4 turn out (open), the Fuel Needle setting is not likely to be the problem.

If the engine will not run and the Fuel Needle is not set between 1/2 -3/4 turn out, set the Needle to this setting. The machine should start in this range.

1. Once the machine is running proceed as follows:  
With Fuel Oil or Flushing solution in the Formulation Tank, move the machine where it can safely be used to fog for a brief period.
2. Install the #72 flow control orifice (or if equipped, set the Formulation Metering Valve to "10") and start the machine.

### CAUTION

If the machine is running too lean or too rich, the next step may cause the engine to stop and a small amount of flame may exit the engine discharge.

### NOTE

*A pulse-jet-engine that has a LEAN fuel:air mixture will not carry fog and the engine will want to stop running. A pulse-jet-engine that is set RICH will run rough or sputter frequently.*

## **WARNING**

**WHEN ADJUSTING THE FUEL NEEDLE DO NOT TOUCH THE ENGINE HOUSING. THE HOUSING HEATS UP QUICKLY TO A TEMPERATURE WHICH CAN CAUSE SERIOUS BURNS IF TOUCHED.**

3. Using a small regular tip screwdriver, slowly rotate the Fuel Needle clockwise then counterclockwise. Listen to the sound of the engine and adjust the Carburetor Fuel Needle to the setting smoothest and strongest. This setting should be the correct Fuel Needle setting.

4. Pull up on the Formulation Lever.

5. If the engine stops or hesitates, immediately release the Formulation Lever and rotate counterclockwise 1/16th turn or less. Repeat steps 3 and 4 until the engine no longer hesitates or stops when beginning to fog.

## **ADJUSTING THE METERING LEVER**

The Metering Lever setting affects how easy the machine is to start. When the Metering lever is properly set, it allows the proper amount of gasoline to flow through the Carburetor for starting. However, if the Metering Lever is not set properly, the Metering Diaphragm may push too far or too little on the Metering Lever allowing too much or too little of gasoline into the engine.

If the Metering Lever is set too far in, the movement of the Metering Diaphragm will not be sufficient to open the Inlet Needle Valve the required amount. This will make the engine hard to start because it will not be getting enough gasoline.

If the Metering Lever is set too far out, the movement of the Metering Diaphragm will open the Inlet Needle Valve too far. This will make the engine hard to start because it will be getting too much gasoline.

A Metering Lever set too low will decrease the volume of gasoline held in the Metering Chamber. This will force the Fuel Needle to be set more than 3/4 turn from STOP to compensate for less gasoline in the Metering Chamber.

A Metering Lever set too far out will increase the volume of gasoline held in the Metering chamber. This will force the Fuel Needle to be set at less than 3/4 turn from STOP.

If the internal Carburetor parts are replaced or removed it is a good idea to check the Metering Lever adjustment. The metering lever is adjusted in relationship to the circuit plate as shown in the Metering Lever Adjustment Diagram (Fig. 12 ).

Be careful that the Metering Lever tip is not set farther out than 0.031 inches (0.787 mm), since this passageway through the Carburetor to remain open all the time. A setting of more than 0.031 inches (0.787 mm) will cause the machine to flood and be extremely difficult to clear from the flooded condition. After adjusting the Metering Lever be sure to readjust the Fuel Needle.

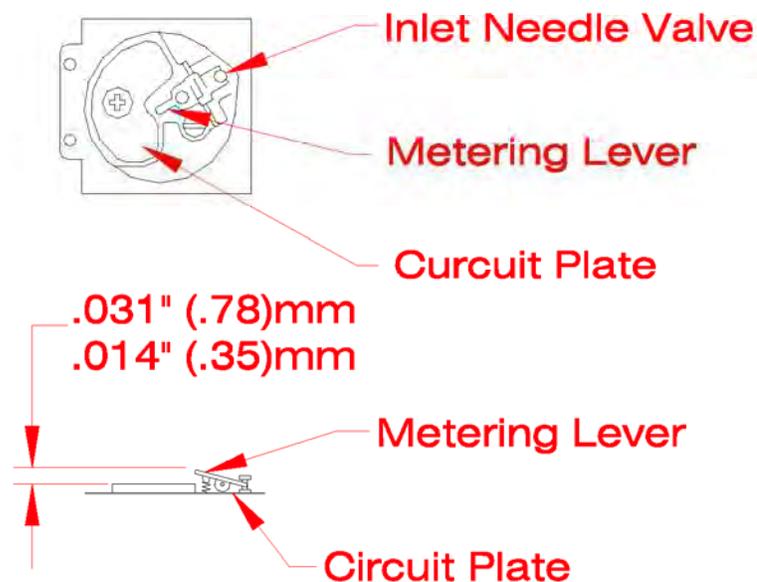
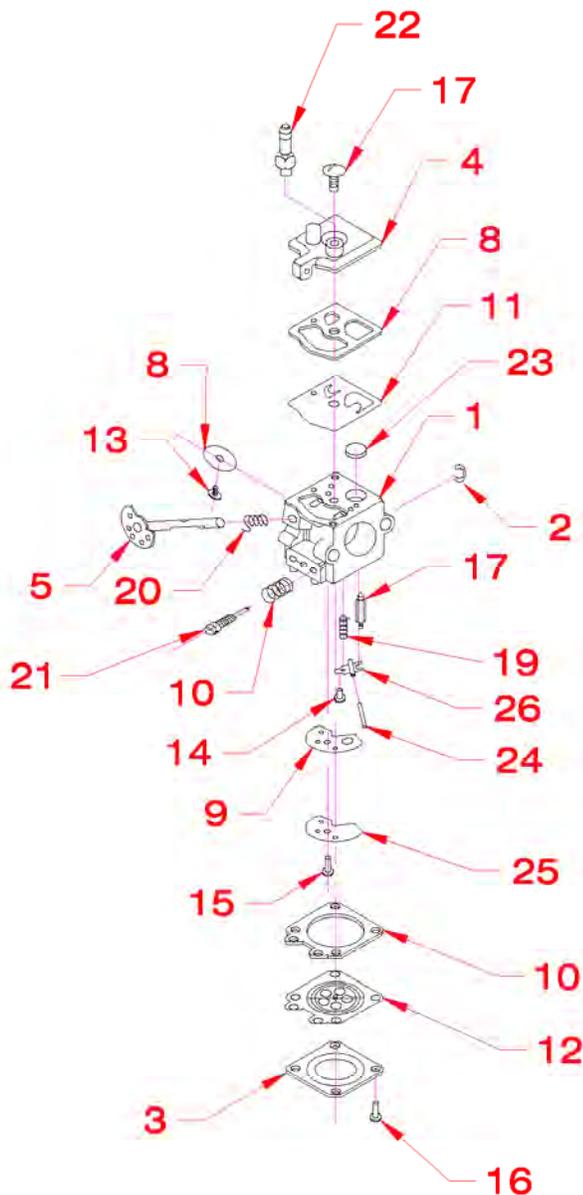


Figure 12

To clean the CARBURETOR filter, proceed as follows:

1. Remove the plate, pump diaphragm and gaskets from the Carburetor. See diagram and illustrations.
2. Gently remove the filter screen taking care not to deform or spread the wire mesh.
3. Clean the screen in fresh gasoline.
4. Re-assemble the parts as illustrated in the Carburetor breakdown.



REF. NO.	PART NAME
1	Body Assembly – Carburetor
2	Ring – Throttle Retainer
3	Cover – Metering Diaphragm
4	Cover – Fuel Pump
5	Shaft Assembly – Throttle
6	Valve – Throttle
7*	Valve – Inlet Needle
8**	Gasket – Fuel Pump
9**	Gasket – Circuit Plate
10**	Gasket – Metering Diaphragm
11**	Diaphragm –Fuel Pump
12**	Diaphragm Assembly – Metering
13*	Screw – Throttle Valve
14	Screw – Metering Lever pin
15*	Screw – Circuit Plate
16	Screw Assembly – Metering Cover & Throttle Clip
17	Screw – Pump Cover
18	Spring – High Speed Needle
19*	Spring – Metering Lever
20	Spring – Throttle Return
21	Needle – Fuel
22	Fitting – Inlet
23*	Screen – Inlet
24*	Pin – Metering Lever
25	Plate – Circuit
26*	Lever – Metering
*	Contents in Repair Kit – PN (58237)
**	Contents in Gasket/Diaphragm Kit – PN (58238)

**Figure 13**  
Carburetor Assembly Diagram

## TROUBLE SHOOTING

### ***Remember:***

Reduction of trouble begins with the performance of the prescribed maintenance actions in the MAINTENANCE section of this manual. All maintenance actions should be performed before using this procedure. See the Systems Diagram (Page 52) for a schematic representation of the machines operation.

**Symptom:** The engine will not start.

### **Check:**

1. The On-Off Control setting could be out of adjustment preventing starting air from reaching the engine. See the section on ADJUSTING THE ON-OFF CONTROL.
2. The machine could be out of gasoline or have very old and/or stale gasoline in the Fuel Tank. Use only fresh gasoline with a minimum octane rating of 87.
3. The Fuel Filter could be clogged.
4. Examine the starting air line to see if it is securely connected to the top of the air filter cover and at the air pump.
5. The spark plug may be weak or intermittent. If the spark plug is soaked with gas then the machine is "flooded". Is the electrode gap correct? Refer to the MAINTENANCE section of this manual.
6. Remove the spark plug to see if gasoline reaches the spark plug. If the spark plug is not wet, then gasoline is not reaching the spark plug.

## **WARNING:**

**DO NOT push the ignition switch with the spark plug removed.**

Symptom: There is no spark when the Ignition Switch is pressed.

Check:

1. The batteries may be too weak. Remember, batteries will go dead over a period of time whether they are used or not.
2. Examine the wiring for loose connections. Is the spark plug boot firmly attached? Make sure the connected properly.
3. If the Ignition Switch begins to go bad, it may work in some positions but not in others.
4. After 1, 2 and 3 are tried, then the only possible remaining source of problems is the Ignition Coil. Re-check the above before replacing the Ignition Coil.

Symptom: Gasoline does not reach the Antechamber.

Check:

1. The Primer Bulb lines for leaks. By removing the air filter top cover, fuel should be visible when the bulb is depressed.
2. The Fuel Filter may be clogged.
3. The Fuel Needle may be closed.
4. The machine may be out of gasoline.
5. The On-Off Control may not be properly located for starting the machine.

6. The Inlet Needle Valve may be stuck in its seat. This can occur when stale gasoline is used or when the machine is left setting for long periods of time. To solve this problem the Metering Diaphragm Cover and the Diaphragm may have to be removed and the Inlet Needle Valve manually broken loose. See the section on the CARBURETOR. Use Dyna-Fog® Fuel Stabilizer or equivalent, to reduce these types of problems.

**Symptom: Machine floods easily.**

**Check:**

1. Is the Fuel Needle properly set?
2. The spark plug gap must be properly set. If gap is too close the gasoline will fill the gap and prevent spark from occurring.
3. The Metering Lever could be set too far out.
4. Primer pump being depressed excessively.
5. Batteries may be weak.

**Symptom: The engine runs weak.**

**Check:**

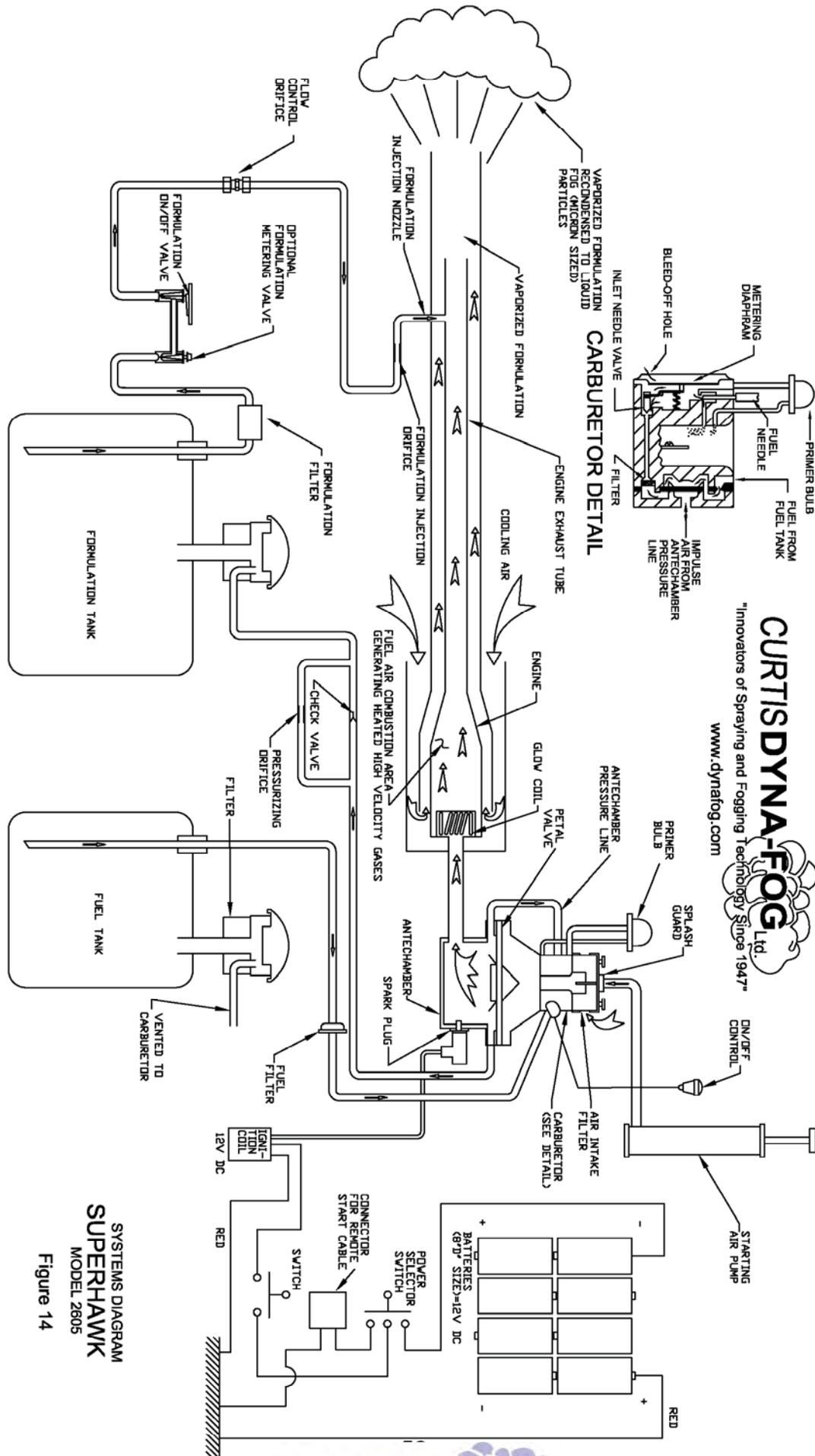
1. Make sure the On-Off Control linkage is properly set. Linkage wheel should rotate fully counterclockwise to STOP. If not, adjust linkage. See page 37.
2. Is there a carbon build-up? Check by looking into the engine with a flashlight. Refer to the MAINTENANCE section.

3. Is there an air leak at the bottom on the Carburetor Assembly? Tighten the two carburetor mounting screws.
4. Is the Fuel Needle out of adjustment causing the machine to run weak? See the CARBURETOR section.
5. Is the gasoline bad or dirty?
6. Is there large amounts of air in the gasoline line? Air bubbles make the machine run weak. Check the fuel line connections, including the two lines from the primer bulb to the Carburetor.

**Symptom: The machine will not fog.**

**Check:**

1. Is the Formulation Tank pressurized when the machine is running? If not, the pressurizing valve is bad or installed backwards.
2. Check the formulation delivery lines from the tank to the injection point on the engine to see if they are clogged. Trace the fluid path from the tank to the injection orifice at the engine.
3. Is the pressurizing valve in backwards? See the section on WORKING PRINCIPLES.
4. Check for carbon at the injection point. See MAINTENANCE section.
5. Does the Formulation Tank Cap leak?



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SYSTEMS DIAGRAM  
**SUPERHAWK**  
 MODEL 2605  
 Figure 14

## STORAGE AND SHIPMENT

### NOTE

*It is a good idea to retain the original machine shipping carton as well as its inner packing and blocking materials for any storage and shipment which may be required.*

1. If the machine is functional, flush the formulation system in accordance with the instructions under MAINTENANCE. Drain the Formulation Tank by removing the Formulation Tank Cap from the tank neck. Then remove the Drain Plug from the bottom of the Formulation Tank. Using a rotary motion to drain all of the formulation. Rinse the inside of the Formulation Tank using one of the liquids specified for FLUSHING under MAINTENANCE. When all of the liquid has been removed from the Formulation Tank, re-install the Drain Plug and the Formulation Tank Cap.

2. Drain the Fuel Tank by removing the Fuel Tank Cap. Remove the Fuel Tank Plug and drain the tank in the same manner as done in the previous step for the formulation.

Re-install the Fuel Tank Plug and the Fuel Tank Cap. Then PUMP repeatedly with the IGNITION SWITCH held until no further firing occurs and no further fuel is observed in the Antechamber of the engine. This will clear out any fuel left in the lines or in the carburetor.

3. Remove the Batteries from the battery holder and store the Battery in a cool dry place.

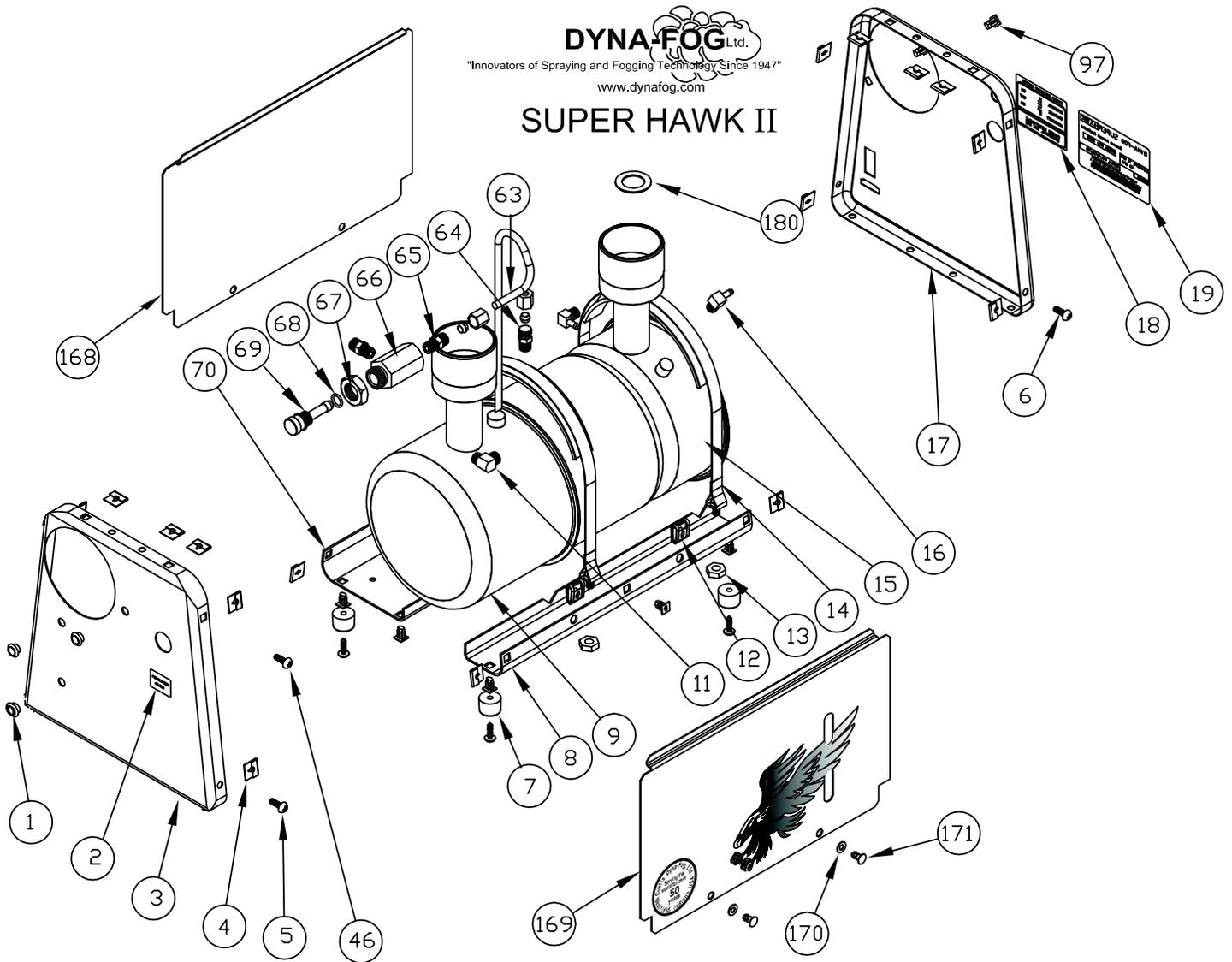
4. Position the Power Selector switch on the rear of the machine into the OFF position.

5. Store the machine in a cool dry place. If the original carton is not available, cover the machine to avoid accumulation of dust or dirt.
  
6. When the original carton and its inner packing and blocking materials are not available and the machine is to be shipped long distances or by commercial carrier, considerable care must be taken in packaging to avoid damage in transit. The machine must be held in place to prevent rocking, shifting or bouncing in the carton.

### **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 DRAINED AND FLUSHED AS DESCRIBED ABOVE. IF A MACHINE IS RECEIVED THAT HAS NOT BEEN DRAINED AND FLUSHED, A SERVICE FEE WILL BE CHARGED FOR DRAINING AND PROPERLY DISPOSING OF THE CONTENTS.**

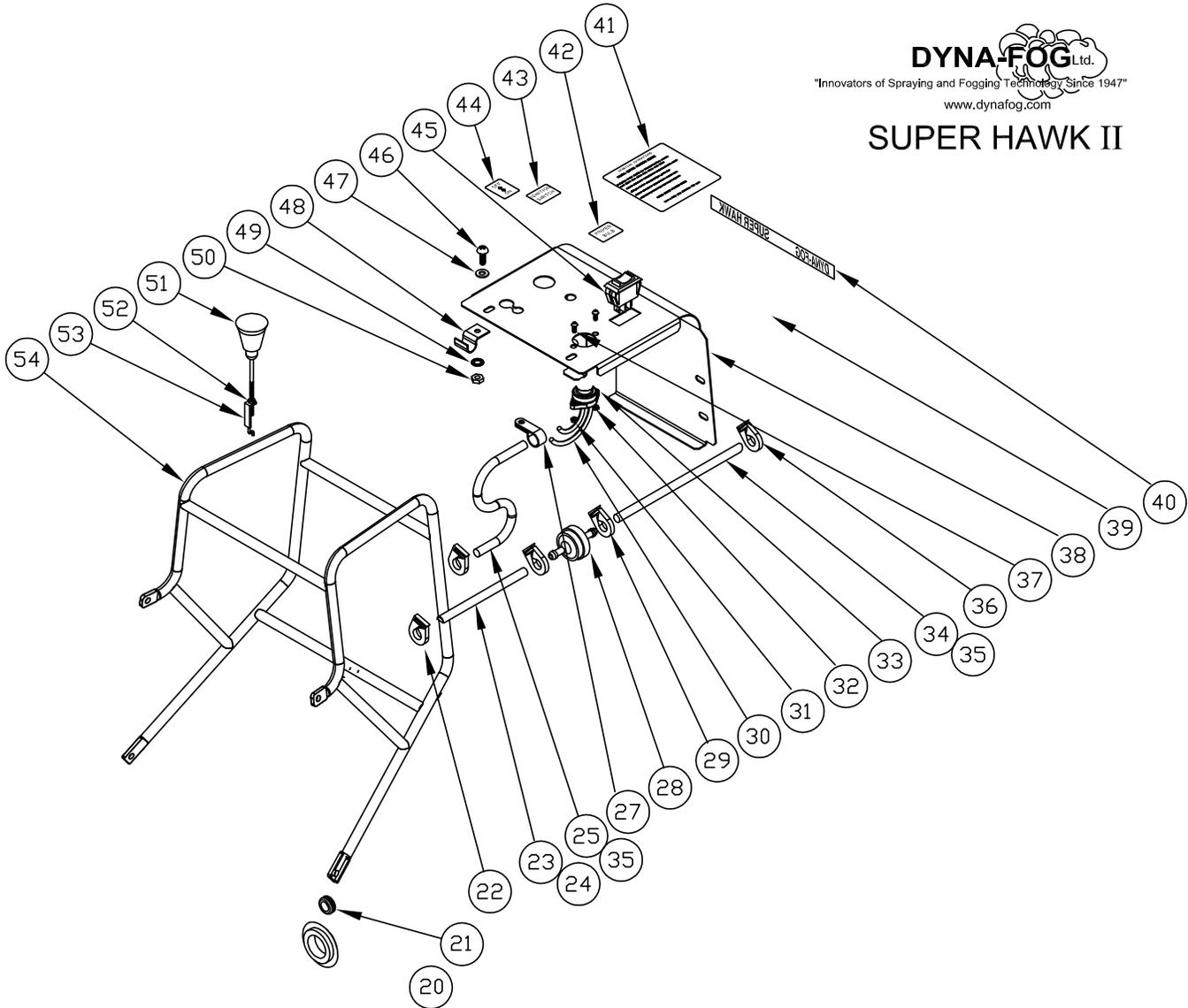
## SUPER HAWK II



ITEM #	QTY.	DESCRIPTION	PART #
1	3	EYELET	A10040
2	1	LABEL, FORM. FILTER	C58813-7
3	1	HOUSING, DISCH. SUHAWK	C58506-12
4	10	NUT, 10-24 J-TYPE	A58707
5	6	SCREW, 10-16X1/2, AB	9414722
6	4	SCREW, 10-16X3/4, ABP	9414724
7	4	FOOT, RUBBER	A58284
8	1	PANEL, BOT, L.H. FL BLK	C32517-4
9	1	FORM. & STANDPIPE AY.	C85577
11	3	ELBOW, 90, 1/8 MPT	A85748
12	4	RECEPTACLE, 1/4 TURN	A58520-3
13	4	NUT, HEX, 1/4-20	134551
14	2	MTG. STRAP AY.	A32501
15	1	FUEL TANK & BARB AY.	C58254
16	3	ELBOW, HOSE, BARB	A85916
17	1	HOUSING, ANT., BLACK	C58806-2
18	1	LABEL, PWR SEL SWT	A58659-1

ITEM #	QTY.	DESCRIPTION	PART #
19	1	LABEL, SUPERHAWK II I.D.	A58827
46	8	SCREW, 10-24X1/2, TRCR	157684
63	1	LINE AY (STANDPIPE)	C32816-1
64	1	CONNECTOR, STANDPIPE	A10105
65	2	CONNECTOR, 1/8 P-1/4	441685
66	1	FILTER BODY AY.	B58265
67	1	NUT	A85522
68	1	O'RING	B10100-12
69	1	FORMULATION FILTER AY.	A85551
70	1	PANEL, BOT, R.H., BLACK PWDRCT	D32518-5
97	18	EXPANSION NUT	A85363
168	1	PANEL AY., SIDE	C58575-4
169	1	PANEL AY., LFT. SIDE	C58590-4
170	4	RETAINER, 1/4 TURN	A58520-2
171	4	STUD, 1/4 TURN, 475L	A58520-1
180	2	FUEL/FORMUL. TANK FILTER	A58596

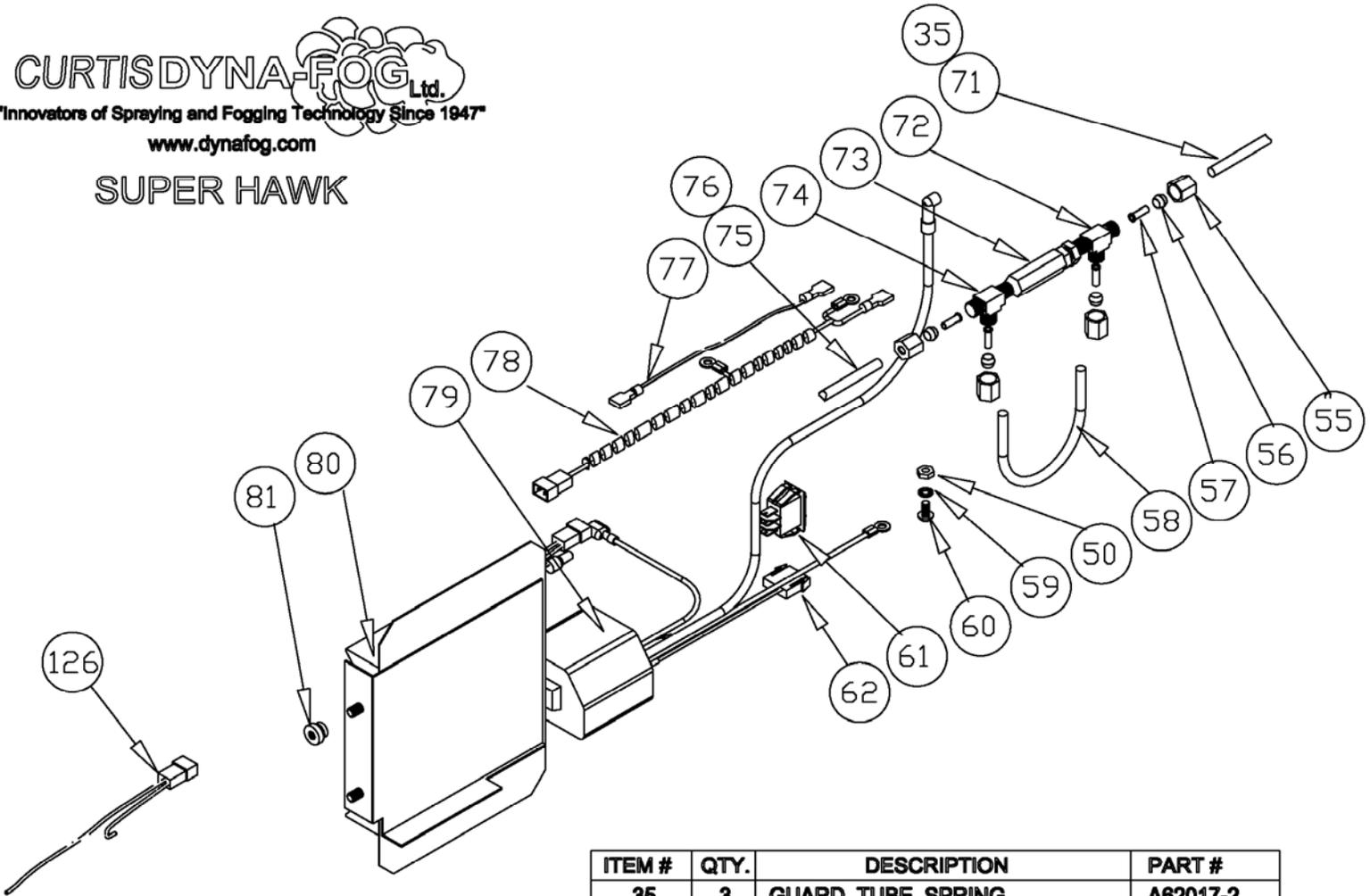
## SUPER HAWK II



ITEM #	QTY.	DESCRIPTION	PART #
20	1	GROMMET, 1"CAPLUG	A63238-3
21	1	GROMMET, PLAIN BORE	A20021-1
22	1	CLAMP, PLASTIC	B21158-1
23	1	TUBE, TYGON (YELLOW)	A58713-2
24	1	GUARD, TUDE, SPRING	A62017-1
25	1	TUBE, TYGON (YELLOW)	A58713-5
26	1	GUARD, TUBE, SPRING	A62017-6
27	1	CLAMP, 1/2 TUBE	A86690-2
28	1	FILTER, 3/16X75 MICRO	A58316
29	3	CLAMP, HOSE, GRAY	A80296-3
30	1	TUBE, VINYL, 6.5"	A58601-1
31	1	TUBE, VINYL, 6"	A58601-2
32	2	NUT, MACH. SCREW	134530
33	1	PRIMER, BULB	A63428
34	1	TUBE, TYGON (YELLOW)	A58713-3
35	3	GUARD, TUBE, SPRING	A62017-2
36	5	CLAMP, PLASTIC	B21158-3

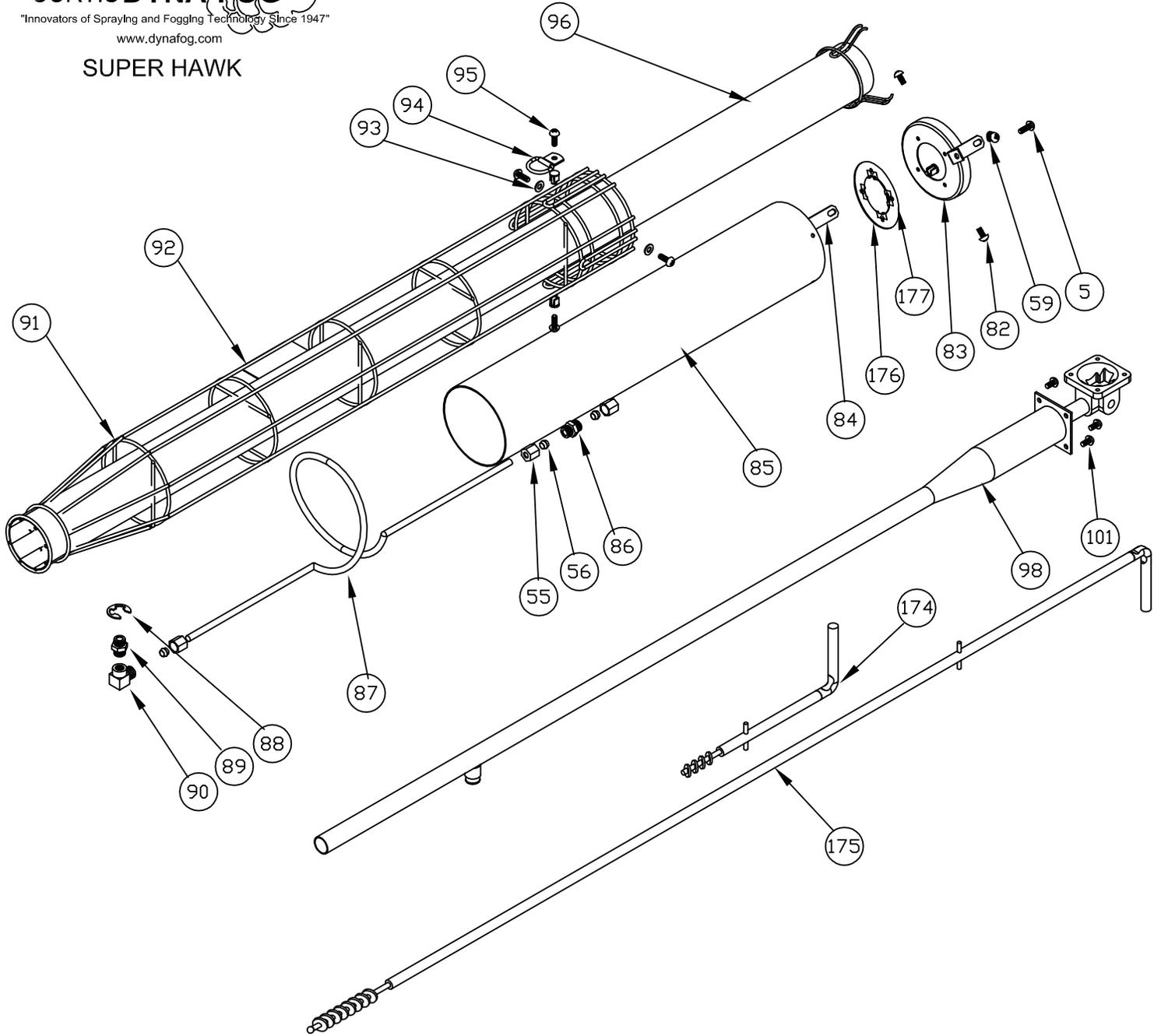
ITEM #	QTY.	DESCRIPTION	PART #
37	2	SCREW, 6-32X1/2 CRPH	N58615
38	1	COVER, CARB. (SILVER)	D58810-4
39	1	LABEL, SPARK GAP	A86714
40	1	LABEL, SUPERHAWK II LOGO	A58828-1
41	1	LABEL, STARTING INST.	C58813-1
42	1	LABEL, PRIMER BULB/IGNITION	A58903
43	1	LABEL, ON	A58906
44	1	LABEL, OFF	A58905
45	1	SWITCH, N.O. ROCKER	A58609
46	8	SCREW, 10-24X1/2, TRCR	157684
47	28	WASHER, FLAT, #10, REG.	120391
48	6	CLIP, RETAINER	A58811
49	18	WASHER, LOCK, 10, EXT.	138479
50	12	NUT, 10-24, HEX	120361
51	1	CONTROL KNOB AY.(INCL.#52)	B58272-7
52	1	NUT, 4-40, HEX	134524
53	1	LINKAGE AY., CARB.	A21193
54	1	FRAME AY. POWDER COAT BLACK	D58801-2

**SUPER HAWK**



ITEM #	QTY.	DESCRIPTION	PART #
35	3	GUARD, TUBE, SPRING	A62017-2
50	12	NUT, 10-24, HEX	120361
55	16	NUT, 1/4 TUBE	145463
56	16	SLEVE, 1/4 TUBE	114628
57	10	INSERT, BRASS, 1/4 TUBE	A58239
58	1	TUBE, 1/4	B58212-8
59	17	WASHER, LOCK, #10, INT.	121801
60	1	SCREW, 10-24X3/8, PN	159908
61	1	SWITCH, 3-POS., ROCKER	A58655
62	1	POWER JACK AY.	A58830
71	1	TUBE, 1/4	B58212-1
72	1	RESTRICTING TEE AY.	A22183-2
73	1	VALVE AY., PRESS., AFLAS	B58683-1
74	1	MALE RUN TEE	A22184
75	1	TUBE, 1/4	B58212-3
76	1/2	SPRING, ANTICRIMP, 7"	A74312-3
77	2	WIRE AY. BLK/WHIT	A58808
78	1	HARNESS AY. BATTERY	B58809
79	1	COIL AY., IGNITION	B58826
80	1	BATTERY HOLDER AY.	C58650
81	2	NUT, 1/4-20 NYL. THMB.	A58645
126	1	UNIV. BATTERY HARNESS	N58843

**SUPER HAWK**



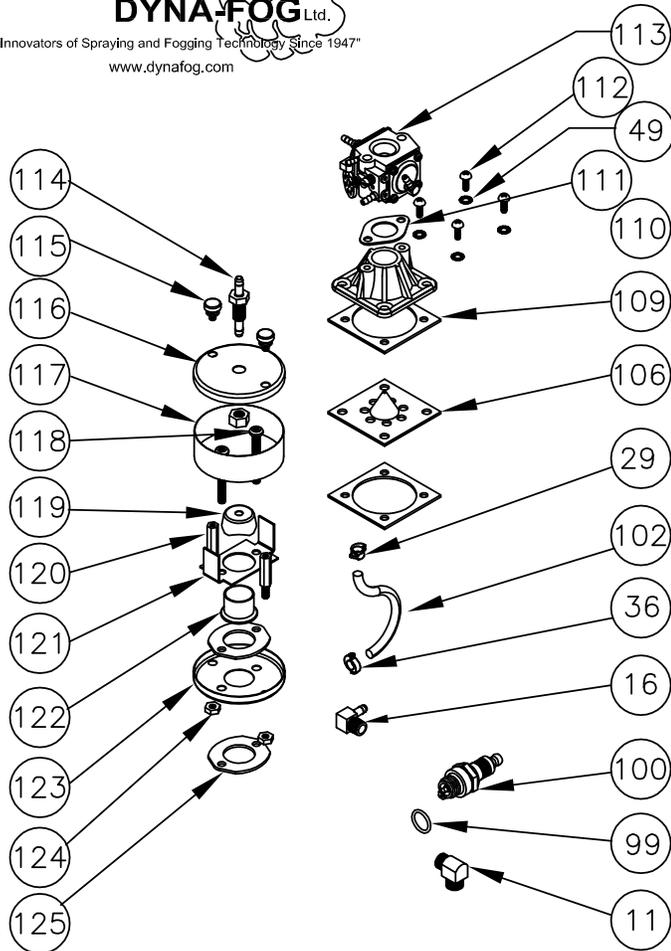
ITEM #	QTY.	DESCRIPTION	PART #
5	6	SCREW, 10-16X1/2, AB	9414722
55	16	NUT, 1/4 TUBE	145463
56	16	SLEEVE, 1/4 TUBE	114628
59	4	WASHER, LOCK, #10, EXTO	138479
82	8	SCREW, 10-16X3/8	A85362
83	1	ENGINE RING, FL BLK	A32626-4
84	2	BRACKET, SHORT DUCT	A58524
85	1	SHORT AIR DUCT, SUPHK	C32621-5
86	1	UNION/ORIFICE AY.	B64490-72
87	1	INJECTION LINE	B58574-1
88	1	E'RING	A58291
89	1	NIPPLE, HEX	A85742

ITEM #	QTY.	DESCRIPTION	PART #
90	1	ELBOW AY., INJ. ORIF.	A58625
91	1	WIRE GUARD	D58530
92	1	PLATE, CAUTION HOT	B58706
93	5	WASHER FLAT 1/4 RE	120392
94	3	CLAMP, CARRY STRAP	A11719
95	4	SCREW, 10-16X3/4 TA	9428082
96	1	AIR DUCT. LONG	B58283-5
98	1	ENGINE AY.	C58269-1
101	4	SCREW, 10-16x3/8	A85362
174	1	ANTCHMR C/O BRUSH	B58250
175	1	CLEAN OUT BRUSH	C32145
176	1	RING	A32627
177	4	J TYPE NUT	A58707

# SUPERHAWK II

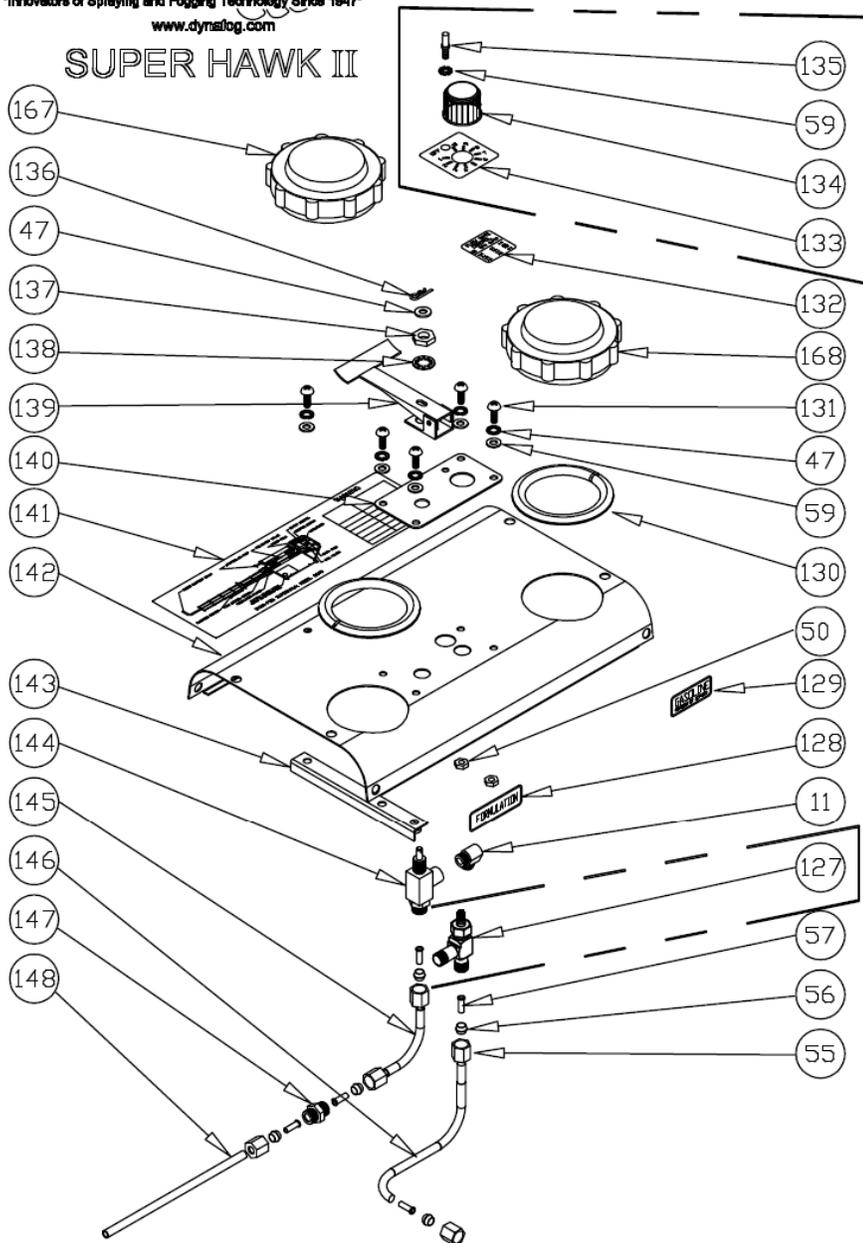


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ITEM #	QTY.	DESCRIPTION	PART #
11	3	ELBOW, 90, 1/8 MPT	A85748
16	3	ELBOW, HOSE, BARB	A85916
29	3	CLAMP, HOSE, GRAY	A80296-3
36	5	CLAMP, PLASTIC	B21158-3
49	18	WASHER, LOCK, 10, EXT.	138479
99	1	O'RING	B10010-14
100	1	SPARK PLUG	A80082-1
102	1	TUBING, RIENPVC .125	A58636-1
106	1	PETAL VALVE AY.	A32636
109	2	GASKET, VENTURI	A32109
110	1	CARBURETOR ADAPTOR	D43011
111	1	GASKET, TOP CARBURETOR	A43016
112	4	SCREW, 10-24X5/8 PN	159929
113	1	CARBURETOR	C58389-1
114	1	UNION, 1/4 T BULKHEAD	A62472
115	2	SCREW, 8-32NYL. THUMB	A58593
116	1	START AIR, HSG. BLK	B53035-2
117	1	SCREEN, AIR FILTER	B58531
118	2	SCREW, 10-24X1-1/2	132862
119	1	SCREEN, 30-MESH (MOD)	A58627-1
120	2	STANDOFF, 8-32 M-F	A58594
121	1	PLATE, SPLASHGUARD	A58676
122	1	EYELET, FLAT FLANGE	A58674
123	1	START AIR, HSG, BLK	B53035-1
124	2	NUT, 8-32 NYL. HEX	A58592
125	2	GASKET, CARBURETOR	A58675

## SUPER HAWK II

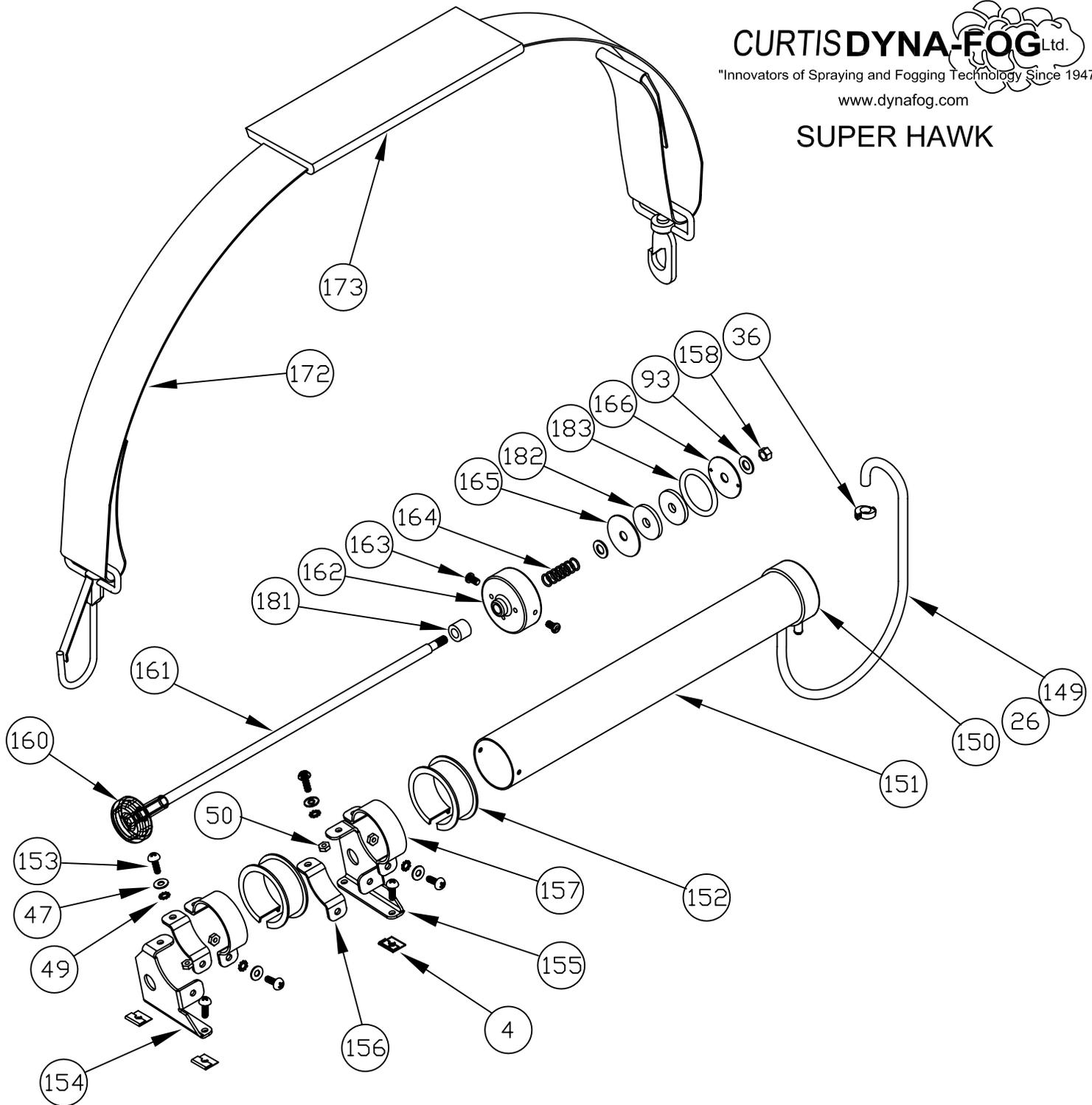


ITEM #	QTY.	DESCRIPTION	PART #
11	3	ELBOW, 90, 1/8 MPT	A85748
47	28	WASHER, FLAT, #10, REG.	120391
50	12	NUT, 10-24, HEX	120361
55	16	NUT, 1/4 TUBE	145483
56	16	SLEVE, 1/4 TUBE	114628
57	10	INSERT, BRASS, 1/4 TUBE	A58239
58	1	TUBE, 1/4	B58212-8
59	17	WASHER, LOCK, #10, INT.	121801
127	1	VALVE AY., METERING	A58841
128	1	LABEL, FORMULATION	A85521
129	1	LABEL, GASOLINE	A85520
130	2	RUBBER GROMMET	A32524-1
131	5	SCREW, 10-24X3/8	157678
132	1	LABEL, FLOW RATE	C58813-8
133	1	LABEL, FLOW RATE	A58610
134	1	KNOB AY., CONTROL	B58559

ITEM #	QTY.	DESCRIPTION	PART #
135	1	PIN INDICATOR	A58554
136	1	INTERNAL HAIR PIN	A20414
137	1	NUT, 3/8-24, ALUM.	A32670
138	1	WASHER, LOCK, 3/8, INT.	138542
139	1	LEVER & STOP AY.	A58829
140	1	PLATE, VALVE, BLACK	B58815-2
141	1	LABEL, MACH. DIAGRAM	C58813-8
142	1	COVER, SUPERHAWK TOP	D58814-2
143	1	BRACE AY., TOP COVER	A58818
144	1	SHUT-OFF VALVE AY.	B32538
145	1	TUBING, 1/4	B58212-27
146	1	TUBING, 1/4	B58212-4
147	1	UNION, 1/4T-1/4T	441703
148	1	INJ. LINE EXT. (CLEAR)	A58643-1
167	1	CAP, FORMULATION (NON-VENTED)	B58717
168	1	CAP, GASOLINE (NON-VENTED)	B58718

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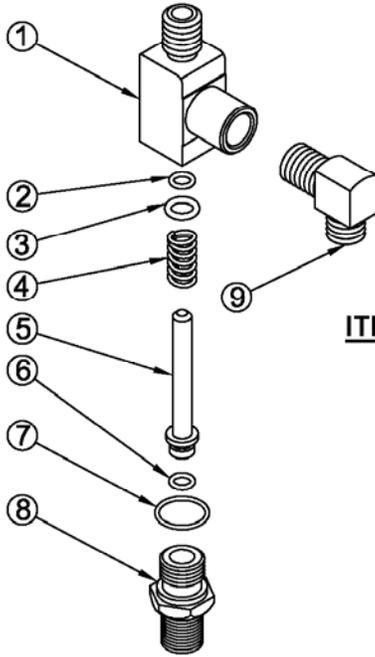
**SUPER HAWK**



ITEM #	QTY.	DESCRIPTION	PART #
4	10	NUT, 10-24 J-TYPE	A58707
26	1	GUARD, TUBE, SPRING	A62017-6
36	5	CLAMP, PLASTIC	B21158-3
47	28	WASHER, FLAT, #10, REG.	120391
49	18	WASHER, LOCK, 10, EXT.	138479
50	12	NUT, 10-24, HEX	120361
149	1	TUBING, 1/4	B80447-4
150	1	AIR PUMP BASE-1 HOLE	C58278-1
151	1	BARREL, AIR PUMP	B58293-1
152	4	INSULATOR, BUNA	A32809-1
153	10	SCREW, 10-24X5/8, TRCR	9415361
154	1	BRACKET, FRONT, AIR PUMP	58862
155	1	BRACKET, REAR, AIR PUMP	58862-1
156	2	CLAMP, ONE QUARTER	58863
157	2	CLAMP, TREE QUARTER	58864

ITEM #	QTY.	DESCRIPTION	PART #
158	1	NUT, NYLOCK 1/4-20	9419454
159	2	SCREW, 1/4-20X1/2 FL	132255
160	1	KNOB	A80133
161	1	ROD	B80026-4
162	1	CAP, AIR PUMP, PVC	B58277
163	2	SCREW, 6-20X5/16, TAP	190075
164	1	SPRING	A80046
165	1	WASHER, ORING RETAINER (1 HOLE)	A58868
166	1	WASHER, W/RELIEF, ORING RETAINER	A58868-1
172	1	STRAP, CARRYING	A85574
173	1	PAD, STRAP 10" LONG	A86226
181	1	TUBE, RUBBER BUMPER	A59989
182	2	WASHER, PLASTIC	A58869
183	1	ORING, VITON, 1.707 O.D.	B10100-323

# OPTIONAL METERING VALVE



<u>ITEM</u>	<u>PART No</u>
1	32537
2	10100-8
3	32044
4	32048
5	35034p7
6	10100-7
7	10100-12
8	58556
9	85748

**P/N 58822**

<u>DESCRIPTION</u>
BODY
O-RING
WASHER
SPRING
STEM
O-RING
O-RING
CONNECTOR
ELBOW 90°, 1/8MPT – 1/4T

## CURTIS DYNA-FOG<sup>®</sup> Ltd.

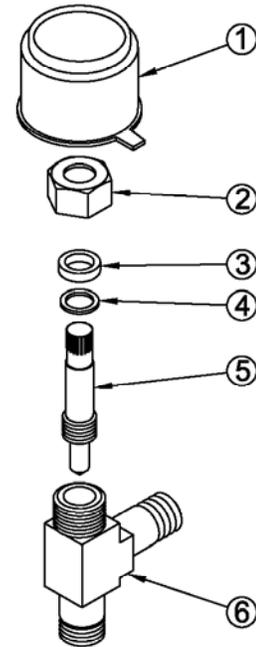
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## SUPERHAWK

<u>ITEM</u>	<u>PART No</u>	<u>DESCRIPTION</u>
1	58559	KNOB
2	32692	NUT
3	32690	WASHER, GASKET
4	32691	WASHER, METAL
5	32689	STEM, REGULATOR
6	32693	BODY

**P/N 58841**

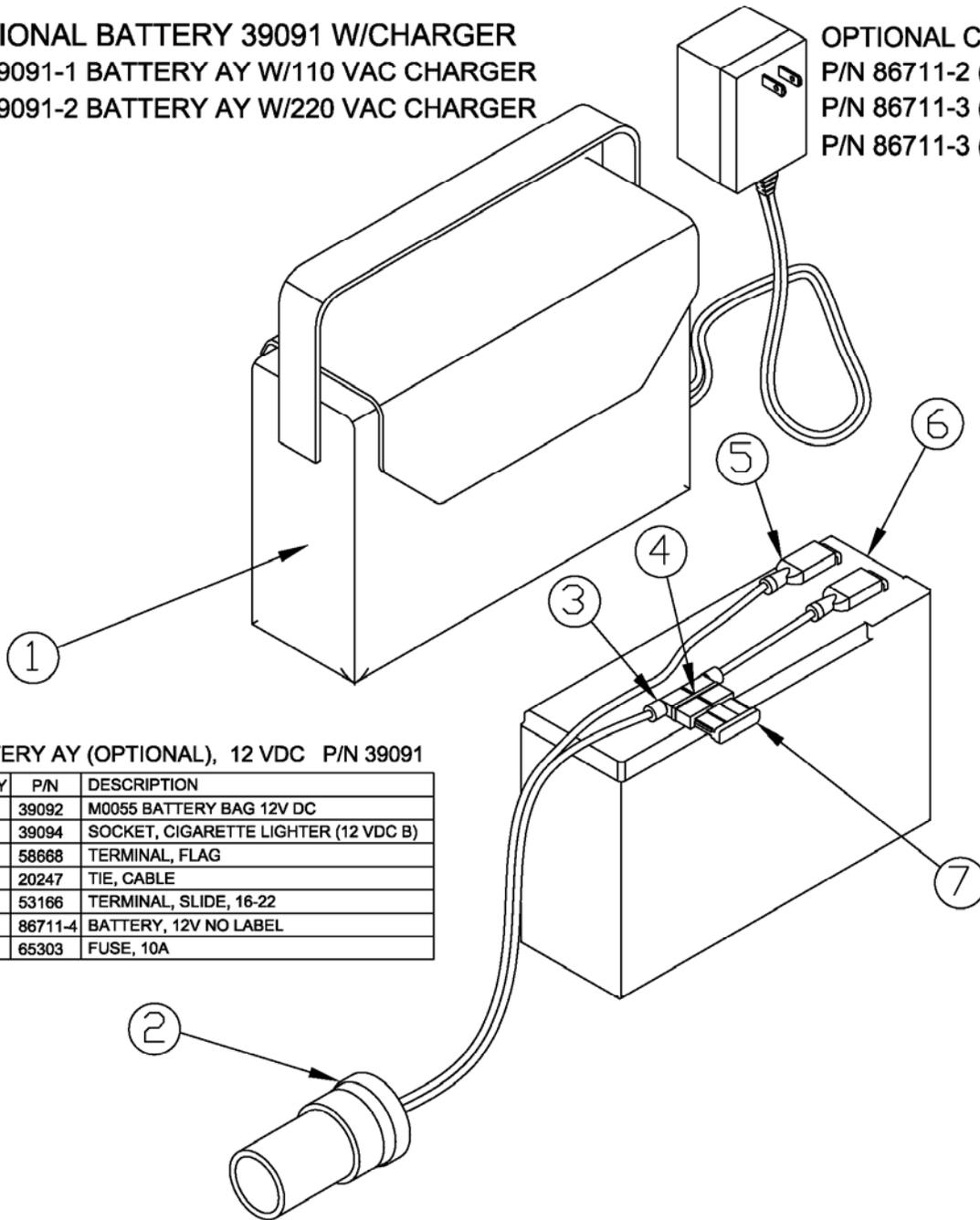


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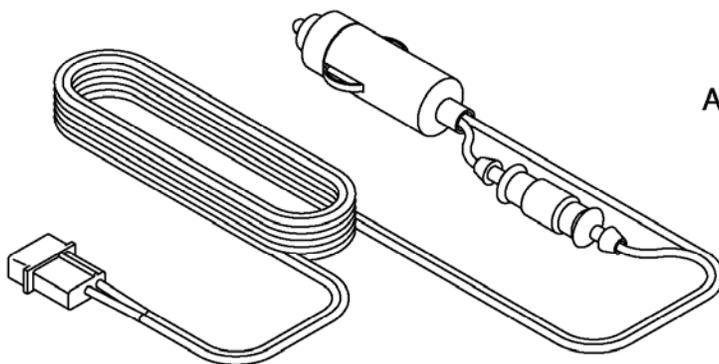
OPTIONAL BATTERY 39091 W/CHARGER  
 P/N 39091-1 BATTERY AY W/110 VAC CHARGER  
 P/N 39091-2 BATTERY AY W/220 VAC CHARGER

OPTIONAL CHARGER  
 P/N 86711-2 (110 VAC)  
 P/N 86711-3 (220 VAC)  
 P/N 86711-3 (220 VAC)



BATTERY AY (OPTIONAL), 12 VDC P/N 39091

ITEM	QTY	P/N	DESCRIPTION
1	1	39092	M0055 BATTERY BAG 12V DC
2	1	39094	SOCKET, CIGARETTE LIGHTER (12 VDC B)
3	2	58668	TERMINAL, FLAG
4	1	20247	TIE, CABLE
5	2	53166	TERMINAL, SLIDE, 16-22
6	1	86711-4	BATTERY, 12V NO LABEL
7	1	65303	FUSE, 10A



ADAPTOR, CIG. LIGHTER  
 P/N 58672

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**SUPERHAWK**™

**CURTIS DYNA-FOG** Ltd.

"Innovators of Spraying and Fogging Technology Since 1947"

## NOISE LEVEL MEASUREMENTS OF CURTIS DYNA-FOG AEROSOL APPLICATORS

MODEL	LINEAR SOUND PRESSURE LEVEL							OVERALL WEIGHTED db (A)	OVERALL LINEAR SOUND PRESSURE	C <sub>E</sub> (FRENCH) MEASURE- MENT METHOD
	63HZ	125HZ	500HZ	1KHZ	2KHZ	4KHZ	8KHZ			
HURRICANE	45	51	59	54	61	64	67	76	77	85
CYCLONE	45	53	53	54	67	62	68	76	76	90
TRAILBLAZER	74	82	86	79	82	78	70	90	97	103
GOLDEN EAGLE	75	87	91	83	78	81	71	92	97	
BLACKHAWK	90	88	84	77	68	68	60	92	100	
MISTER III	85	83	86	78	70	75	76	90	95	
MISTERMAX	89	89	89	85	82	83	81	96	102	
NIGHTHAWK	45	51	53	50	45	45	50	61	64	
TYPHOON 1								99		
**TYPHOON 2	73	73	73	76	76	73	79	90	93	
**MAXI-PRO	68	77	74	74	74	74	83	96	99	
TORNADO	45	53	53	54	67	62	68	76	76	90

TEST DATE: FEBRUARY 3, 1993

**TEST CONDITIONS AND PROCEDURES USED:** To simulate an operator's position during normal use, all noise measurements were taken at a distance of 2.5 feet (.76 meters) from the machines.

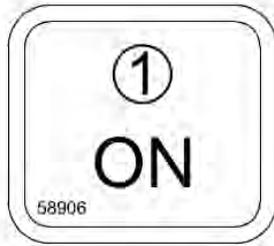
Indoor tests were performed in a laboratory of 48 x 33 x 10 feet (14.6 x 10.1 x 3.0 meters) at an ambient air temperature of 70° F (21 °C).

\*\*These tests were taken outdoors and performed with an ambient air temperature of 40° F (4° C).

**EQUIPMENT USED:** 1.) CERTIFIED GOLDLINE DIGITAL REAL-TIME ANALYZER, MODEL 30.

2.) CERTIFIED GENERAL RADIO SOUND-LEVEL-METER, MODEL 1565-B.

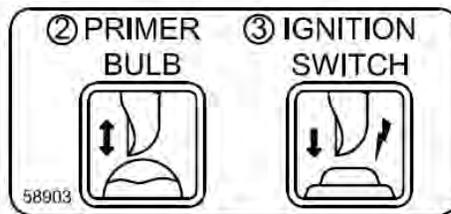
## Superhawk II New Labels



P/N: 58906  
Label, ON, Superhawk II



P/N: 58905  
Label, OFF, Superhawk II



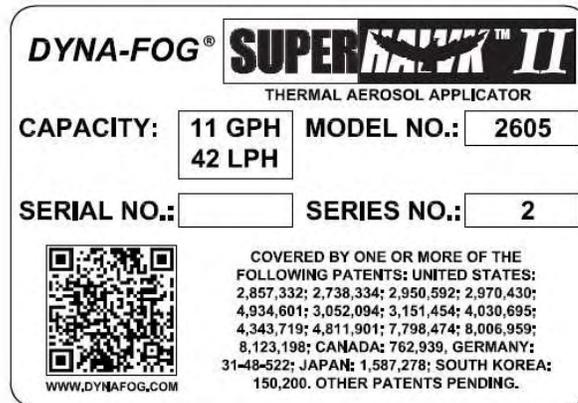
P/N: 58903 Label, Primer Bulb/Ignition,  
Superhawk II



P/N: 58828-1 Label, Superhawk II Logo

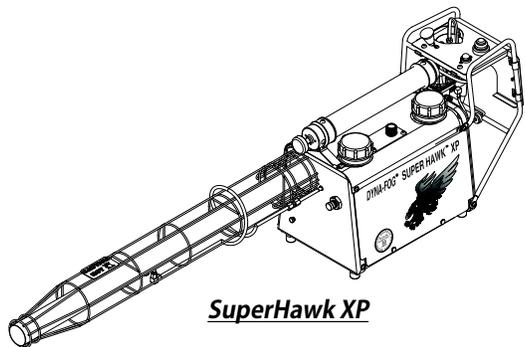


P/N: 58909-1 Label, Side Panel, Superhawk II Logo



P/N: 58827 ID Label,  
Superhawk II

# Dyna-Fog Offers a Complete Assortment of Sprayers and Foggers



**SuperHawk XP**

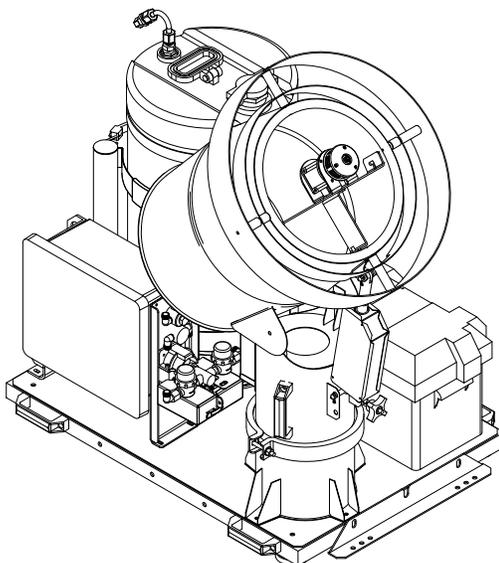
## PULSE-JET POWERED THERMAL FOGGERS:

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.

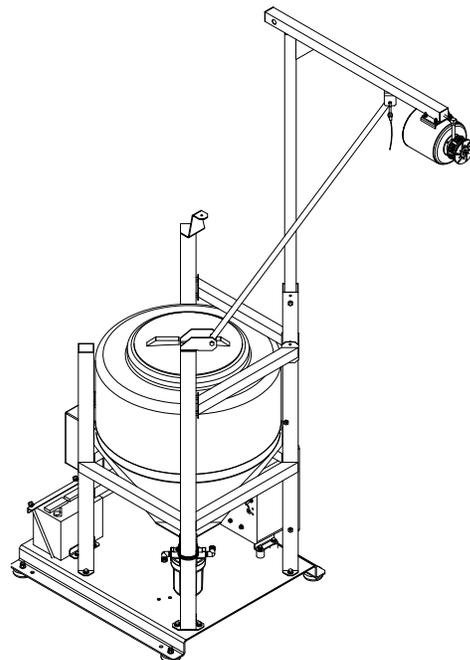
## ELECTRIC ROTARY ATOMIZERS:

**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.



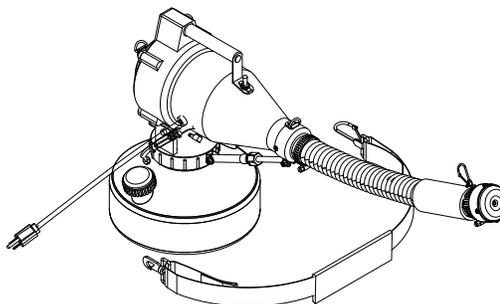
**Dyna-Jet L-30**



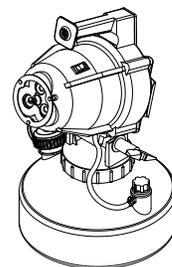
**Dyna-Jet L-15**

## ELECTRIC HAND-HELD ULV/MIST GENERATORS:

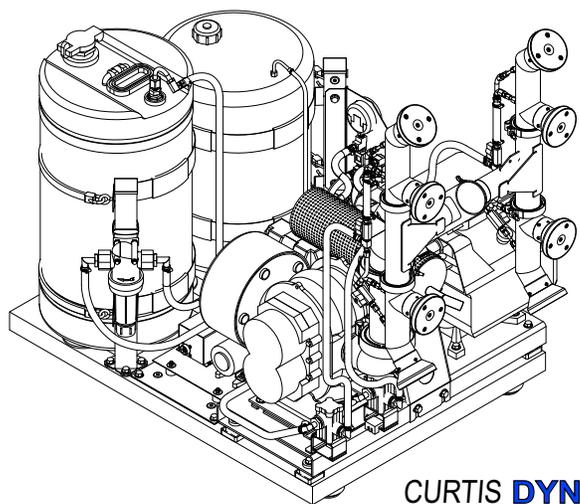
A Full line of electric cold fog applicators with 1-3 gallon tanks, available in 115 and 230 VAC.



**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.