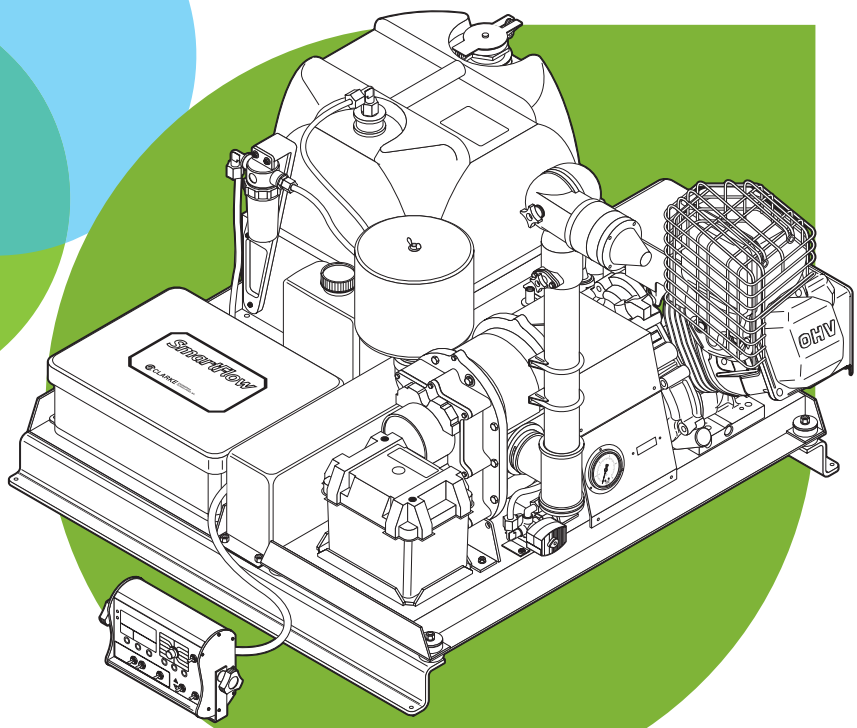
INSTRUCTION MANUAL AND PARTS LIST

COUGAR®
ULV SPRAYER



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COUGAR® ULV SPRAYER

Warranty Information

Clarke Mosquito Control Products, Inc. (CMCP) warrants that during the first year following the purchase of CMCP manufactured products or equipment, such products or equipment will perform in accordance with the instruction manuals when properly installed, operated and maintained. During the warranty period, CMCP's sole obligation and liability shall be at CMCP's option to:

A. Replace or repair defective parts (including, at CMCP's option, replacement of the entire unit) so that the unit will perform in accordance with the instruction manual.

OR

B. Refund the applicable payment upon return of the product.

Products requiring examination or repair under warranty must be returned postage/freight prepaid to CMCP in Roselle, IL. Examination and /or repair at locations other than the factory shall only be done upon authorization of CMCP and by persons approved by CMCP.

Components and accessories with electronic circuitry will carry the same warranty as the CMCP machines provided they are installed at the factory or by an authorized factory representative. Field installations, modifications and /or the addition of other devices to CMCP circuitry void this warranty. Aftermarket electronic items and parts such as "chips", "processors", etc. are not eligible for return, credit or warranty once the shipping package has been opened.

This limited warranty does not cover components or parts covered by warranties of other manufactures.

This limited warranty specifically excludes the cost of labor to customers or to other parties connected with the examination and /or repair of warranted products.

EXCEPT AS NOTED ABOVE, NO OTHER WARRANTY IS EXPRESSED, AND NONE SHALL BE IMPLIED, INCLUDING SPECIFICALLY ANY WARRANTY OF MERCHANTABILITY OF WARRANTY OF FITNESS FOR USE OR FOR A PARTICULAR PURPOSE. EXCEPT FOR THE FOREGOING, CMCP SHALL HAVE NO LIABILITY TO CUSTOMER OR OTHER PARTY OR ANY GENERAL, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FAILURE OF THE PRODUCT(S) TO PERFORM AS WARRANTED, OF FOR ANY REASON.

THIS IS THE TOTAL EXTENT OF THE WARRANTY.

SPECIFICATIONS

COUGAR® ULV SPRAYER

Clarke Cougar Specifications

Engine	10 hp Briggs & Stratton OHV IC Engine
Blower	Roots (105 CFM @ 3600 RPM)
Dispersal Head	Clarke IHPLAT
Fuel	Gasoline Min Octane
Fuel Tank Capacity	2.84 gallons (10.7 liters)
Flush Tank Capacity	2 quarts (1.9 liters)
Insecticide Tank Capacity	15 gallons (56.7 liters)
Droplet Size	90% less than 20 Microns
Flow Rate	Up to 18 ozlmin (532.26 ml/min)*
Dimensions	42"H (107cm) x 38"W (97 cm) x 43"H (102cm)
Net Weight (Empty)	250 pounds (112 kilos)
Shipping Weight	350 pounds (159 kilos)
Shipping Cube	39.8 feet (12.13 meters)

* With standard 1/4" Piston. Larger pump heads available with flow rates up to 77 oz/min (2277 ml/min).

THIS MANUAL IS FOR MY Clarke COLD AEROSOL FOG GENERATOR - COUGAR

SERIAL NUMBER _____

THE ABOVE INFORMATION, WHICH CAN BE FOUND ON THE CHASSIS, SHOULD BE FILLED IN. YOUR PROMPT ATTENTION TO THIS MATTER WILL MAKE IT CONVENIENT FOR YOU IN THE FUTURE, AS THIS INFORMATION MUST BE GIVEN WHEN ORDERING PARTS.

Every effort has been made to make this manual as complete as possible so that it will provide maximum assistance in operating and maintaining your Clarke Grizzly Cold Aerosol Fog Generator.

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Every effort has been made to make this manual as complete as possible so that it will provide maximum assistance in operating and maintaining your Clarke Cougar Cold Aerosol Fog Generator.

This manual is divided generally into two sections – Operating and Maintenance Section and Illustrated Parts Section.

The Operating and Maintenance Section contains complete instructions for assembling, installing, operating and maintaining your Clarke Cougar Cold Aerosol Fog Generator. No difficulty should be encountered in following them.

Before attempting to start your unit the first time, study the complete Operation Instructions carefully and identify all parts referred to. You will find that the operation of your Clarke Cougar Cold Aerosol Fog Generator is a simple matter. However, like all mechanical equipment, your unit requires a certain amount of maintenance.

The Maintenance Instructions will enable your Clarke Cougar Cold Aerosol Fog Generator to give you continuous and trouble-free service. It is highly recommended that some system be established to assure the performance of this maintenance as its importance cannot be overemphasized.

Although, with proper maintenance, your unit should operate indefinitely without any trouble, there might come a time when trouble does develop. For such an occasion, a complete Trouble Shooting Section has been prepared and included in this manual.

The Parts Book Section of the manual is made up of exploded views and parts list. Every part of the unit is illustrated and identified with a part number. Always order parts by part number, description and the serial number of your unit.

⚠ WARNING

THIS CLARKE COUGAR COLD AEROSOL FOG GENERATOR IS MANUFACTURED AND SOLD FOR USE ONLY WITH INSECTICIDES WHICH HAVE BEEN DULY REGISTERED AND APPROVED. DO NOT EXCEED THE DOSAGE SET FORTH ON THE REGISTRATION LABEL OF THE INSECTICIDE TO BE USED.

USE OF UNAPPROVED INSECTICIDES AND OR DOSAGE MAY BE HAZARDOUS

⚠ IMPORTANT

ONLY QUALIFIED PERSONNEL SHOULD OPERATE THE CLARKE COUGAR FOG GENERATOR.

⚠ WARNING

ALL SPRAY SWITCHES MUST BE IN THE "OFF" POSITION BEFORE THE IGNITION SWITCH IS TURNED ON.

SAFETY SUMMARY

1. WARNING: Observe all safety precautions set forth on the registration lable of the insecticide to be used.

2. WARNING: Never operate the fog generator in an enclosed area unless the exhaust gases are piped to the outside. Exhaust gases contain carbon monoxide, which is colorless, odorless and poisonous gas.

3. WARNING: Do not fill the fuel tank while the engine is in operation. Gasoline spilled on a hot engine may explode and cause serious injury to personnel.

4. WARNING: Do not attempt repairs in the insecticide system without protection until the system has been thoroughly flushed with a flushing solution for the insecticide used.

COUGAR® ULV SPRAYER

This manual provides the description, theory of operation, assembling instructions, mounting instructions, operation instructions, calibration instructions, maintenance instructions and illustrated parts breakdown for the Clarke Cougar Cold Aerosol Fog Generator for Ultra Low Volume (ULV) application of insecticide.

Description

The Clarke Cougar Cold Aerosol Fog Generator consist of an engine, fuel tank, a rotary blower capable of developing 8 P.S.I. maximum pressure, an adjustable discharge nozzle head assembly, a flow control, an insecticide tank, a flush tank, a remote console a filter-silencer with a stainless steel element and insecticide filter.

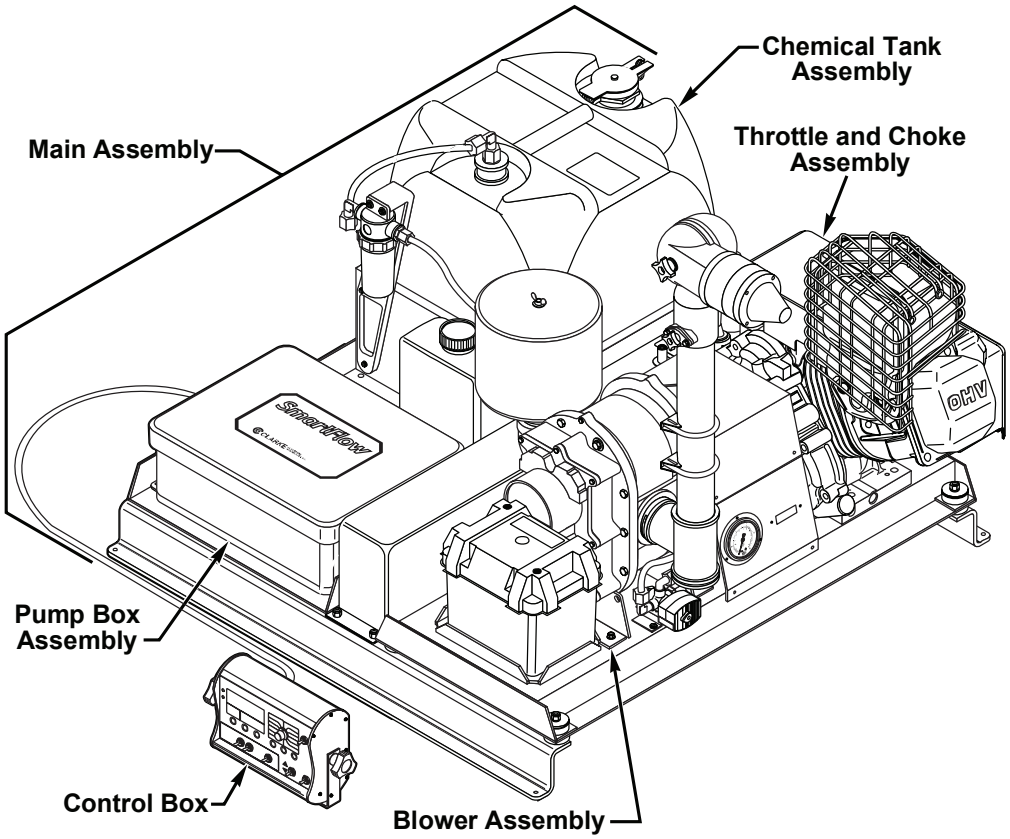

Figure 1- Cougar Cold Aerosol Fog Generator

Theory of Operations

The Clarke Cougar Cold Aerosol Fog Generator is designed for precision metering of concentrated insecticide through the discharge nozzle head. Any desired flow rate, within limits, can be easily set at a target rate. When fogging, the concentrated insecticide is drawn from the insecticide tank and pumped at the preset rate with constant, even flow to the discharge nozzle head where it is sheared into optimum size droplets by the air blast from the blower and dispersed into the atmosphere. After dispersal, the droplets stay suspended in the air and drift with prevailing winds to insect infested areas. The optimum size of a particular insecticide is defined on the registration label for that insecticide and can be controlled by varying either the nozzle air pressure, the insecticide flow rate or both. Changing the speed of the engine will vary the nozzle air pressure. Slowing down the engine decreases the pressure which increases the droplet size because of less shearing action and conversely, speeding the engine up increases the pressure which decreases the droplet size for a particular flow rate. The correct flow rate will be defined on the registration label for that insecticide. As stated above, the flow rate also affects the droplet size. The droplet size tends to increase as the flow rate increases. Optimum size droplets must be maintained and should be checked periodically by an authorized person.

Particle Size

The air pressure at the nozzle and the volume of the chemical flow changes particle size. Particle size is specified on the label of the insecticide for that insecticide. This is a part of the label and a part of the legal use of that insecticide.

It is the responsibility of the user of the equipment and the insecticide to determine that the particle size developed by the ULV Cold Aerosol Fog Generator they are is using is proper for the chemical that is being used. That is the law.

Insecticide labels discuss the determination of particle size and the suppliers of the insecticide should be equipped to measure, or help you measure, the particle size produced by your ULV Cold Aerosol Fog Generator. The ULV Cold Aerosol Fog Generator should not be operated unless the required particle size is known and measured.

Clarke Engineering Technologies, Inc. can not tell you what air pressure to use with a particular insecticide to get the particle size required by the label. There are too many variables involved, such as chemical mixture, flow rate and the temperature of the insecticide.

Your Clarke representative or distributor can work with you to be sure you are producing the correct particle size for the insecticide used.

Assembly Instructions

The Clarke Grizzly Cold Aerosol Fog Generator is shipped completely assembled except that the Remote Control Box needs to be plugged into the socket located on the fog generator, see Figure 1, and the other end of the cable plug into the end of the pump box, see Figure 2 (see page 8). The plugs are polarized and can only be inserted in one position. Be sure to hand tighten the knurled locking cap onto the socket.

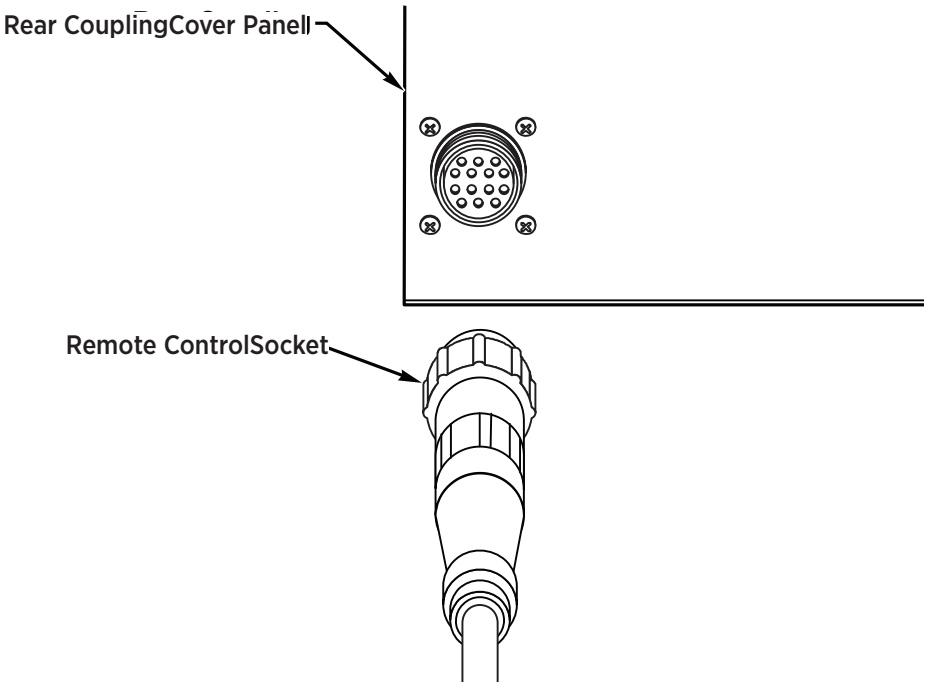

Figure 2- Harness Connection

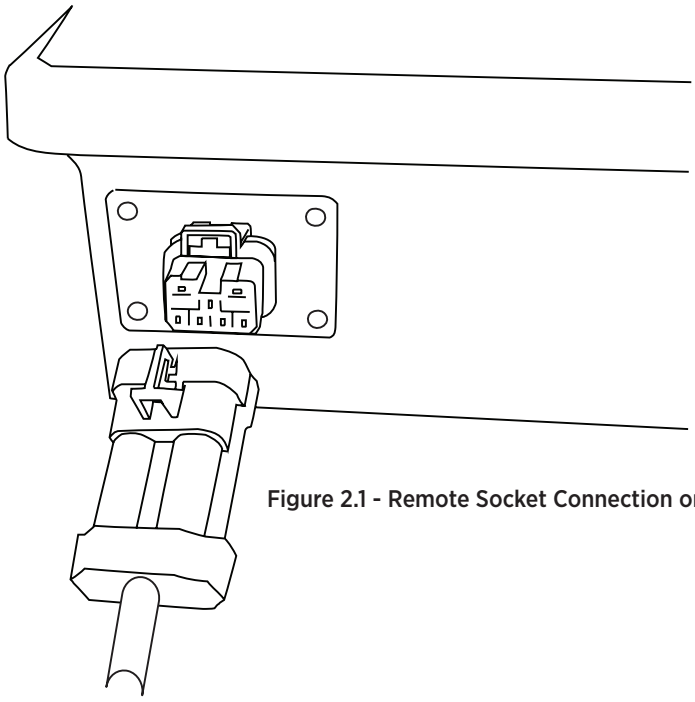

Figure 2.1 - Remote Socket Connection on Plug Box

In order to eliminate vibration and excessive cab noise, the Clarke Cougar Cold Aerosol Fog Generator should be bolted to the bed of the vehicle. Position the fog generator so that the nozzle is located towards the rear of the vehicle and all switches are easily accessible. Make sure that the fog generator is located where the insecticide tank can be easily filled. With the fog generator in the correct location, drill holes through the holes in the Z-base rails and fasten the unit to the bed with plated bolts. Mount the Console in the cab of the vehicle in a convenient location. Route the cable back to the fog generator in a way that affords protection against cutting and snagging. Align the plug pins with the holes in the socket on the unit and lock the plug in place by hand tightening the knurled locking cap onto the socket.

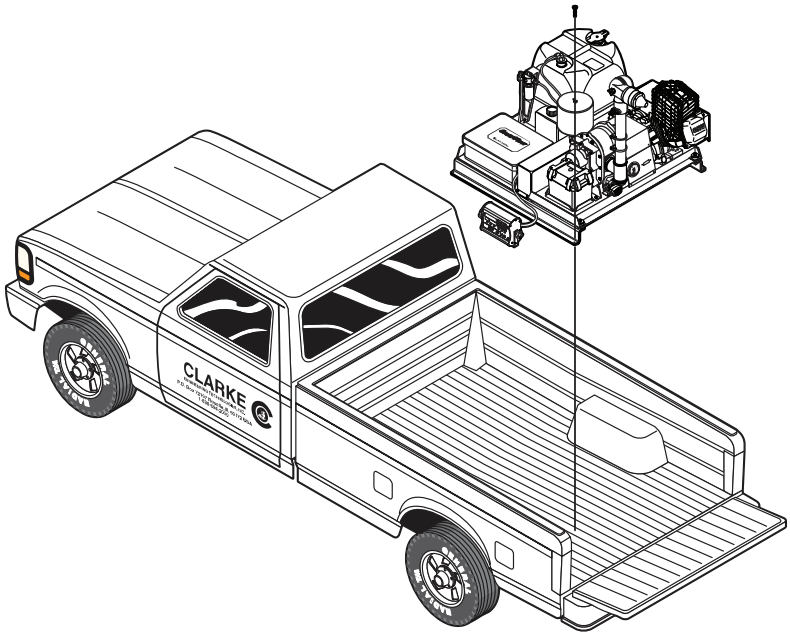

Figure 4- Truck Mounting

Note: Hearing protection must be worn when outside the vehicle in close proximity with the Clarke Cougar Cold Aerosol Fog Generator Cold Aerosol Fog Generator when it is running.

CAUTION

HEARING PROTECTION REQUIRED

Read this complete Operation Instructions (page 9) section before starting the Clarke Cougar Cold Aerosol Fog Generator.

Operation Instructions

When operating the Clarke Cougar Cold Aerosol Fog Generator for the first time, move to an uncongested and well-ventilated work area in an open area away from flammable materials.

Pre-Start

1. Verify that the battery cable connections are correct and tight. This is a negative ground system.
2. Verify that no foreign objects or tools have been left in or about the fog generator.
3. Check the oil in the engine. If necessary, add oil until the level reaches the mark on the dipstick. The engine manual supplied with the fog generator will advise the correct oil to use. Reference Figure 5.
4. Check the oil and lubrication levels on the blower. See the Blower (page 45) section.
5. Fill the gasoline tank. Reference Figure 5.

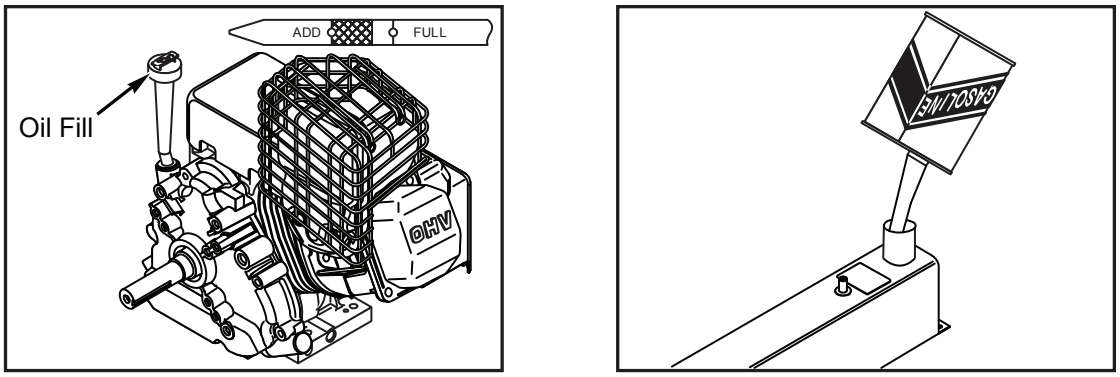

Figure 5- Fill engine Oil and Gasoline Tank

6. Service the insecticide tank with the appropriate insecticide. Always use a funnel with a strainer screen when adding insecticide to the tank. Reference Figure 6.

7. 7. Place flushing solution in the flush tank. Reference Figure 6.

Figure 6- Filling Insecticide Tank and Flush Tank

8. Verify that the Console is within easy reach of the operator.

9. Verify that the nozzle is in the correct position for spraying. The nozzle is adjustable both horizontally and vertically. To rotate the nozzle, loosen the appropriate knob on the side of the mast or side of the nozzle head and rotate the nozzle. Retighten the knobs after adjustment. Reference Figure 7.

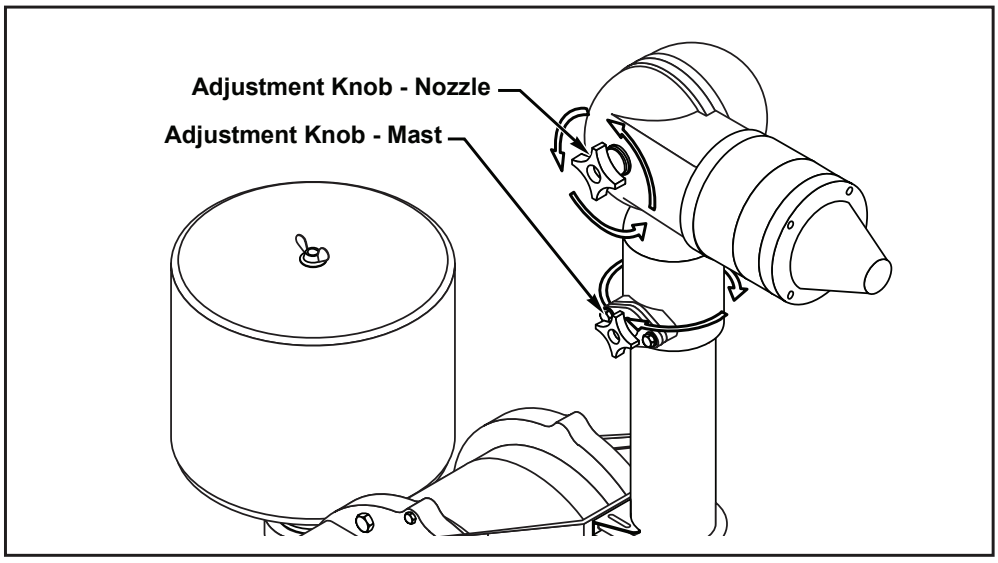

Figure 7- Nozzle Position

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Start-Up

1. On the Console, turn the Main Power switch to the ON position. Reference Figure 8.
2. On the Console, set the Spray switch to the OFF position. Reference Figure 8.
3. For a cold engine, on the Console, toggle the choke switch and starter switch at the same time, until the engine fires. Reference Figure 8.
4. For a hot engine, on the Console, toggle the starter switch until the engine fires. Reference Figure 8.
5. When the engine fi res release both the choke and starter switch.

Note: Pressing the start button on the engine will also start the engine. The Main Power switch on the Console must be in the ON position for the engine to be started.

Note: Using short cranking cycles of several seconds provides the best starter life. Prolonged cranking can damage the starter motor if cranked more than 15 seconds per minutes.

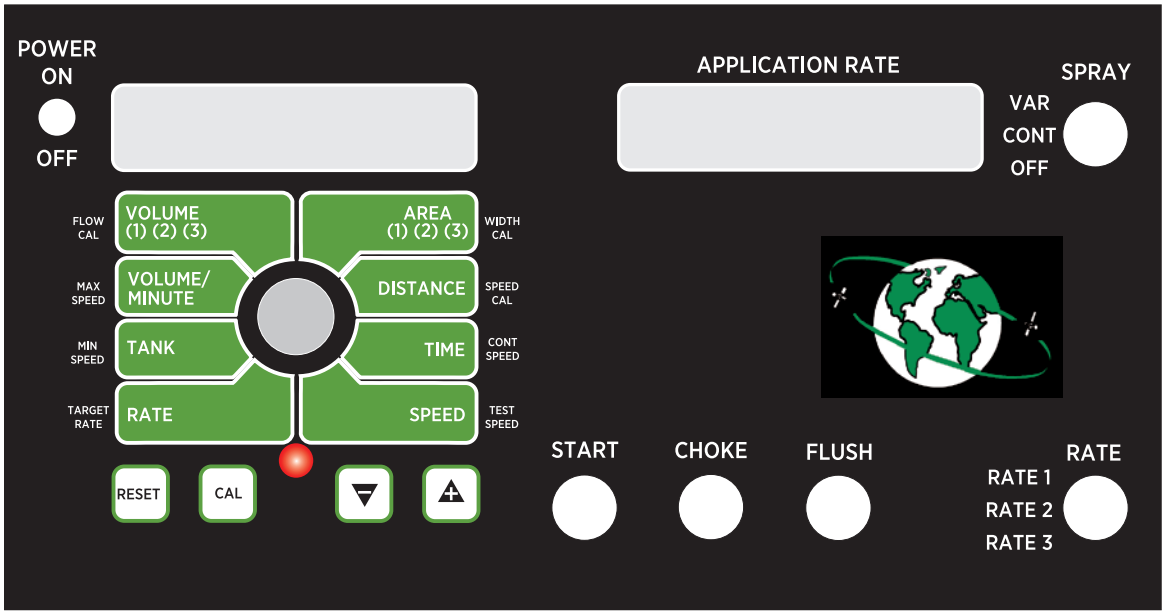


Figure 8- SmartFlow Console

Pressure Gauge

The unit is equipped with a glycerin filled pressure gauge to read the nozzle air pressure and is mounted on the fog generator coupling guard between the engine and blower.

Adjusting the Nozzle Air Pressure

Nozzle air pressure is one of the main criteria for good particle size. Changing the speed of the engine adjusts this pressure. The nozzle air pressure can be adjusted by checking the pressure gauge as the engine speed is increased or decreased. The engine RPM can be adjusted by using a screwdriver. Reference Figure 9.

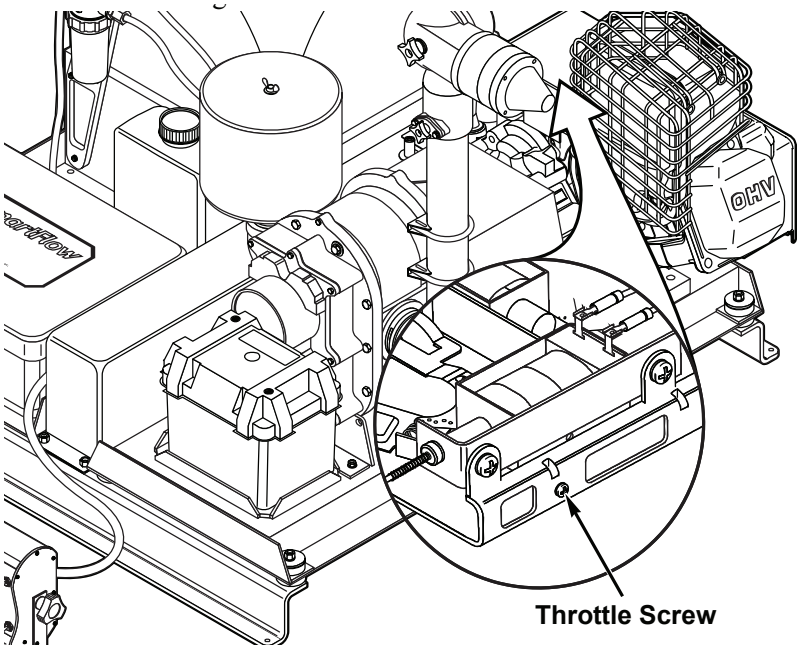


Figure 9- Throttle Screw

Low-Pressure Cut-off

The Clarke Cougar Cold Aerosol Fog Generator is equipped with an air low-pressure cut-off switch. If, for some reason, the nozzle air pressure drops below 1 P.S.I., the Flow Control will cut off. This prevents the blower from being filled with insecticide because of insufficient air blast. Because of this, the engine on the fog generator must be running when setting the flow rate.

The air low-pressure cut-off switch is located inside the coupling guard and is mounted on the rear of the pressure gauge. If necessary, this switch can be adjusted in the field by removing the rubber plug from the tip of the switch and then using a 7/32" Allen wrench, turn the adjustment screw in about 1/2 turn increments. Turning clockwise increases the air pressure cut-off point. Turning counter-clockwise decreases the air pressure cut-off point.

Notes

TOTAL COUNTERS

Total Counters

The Smart Flow control accumulates the following totals to document spraying applications:

Counter	Description	Units
Total Flow	The amount of liquid applied since the counter was last reset.	Tenths of a gallon or tenths of a liter
Area*	The total application area since the counter was last reset.	Acres or hectares
Distance*	The distance the vehicle has traveled while spraying since the counter was last reset.	Miles or kilometers
Time	The spray time since the counter was last	Hours
Hours	The cumulative spray time. This counter cannot be reset.	Hours

SmartFlow Control

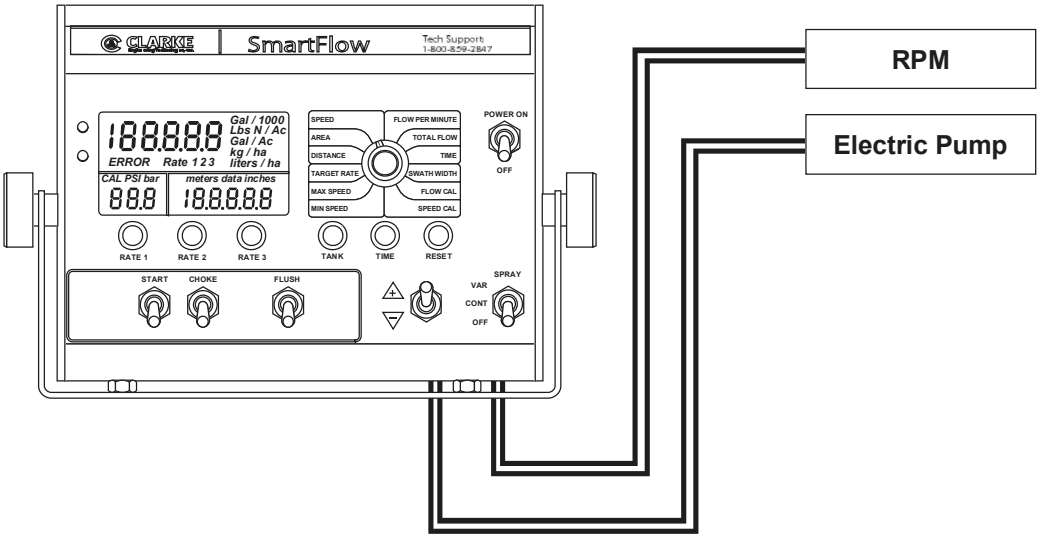
Installation, Operation and Maintenance Manual

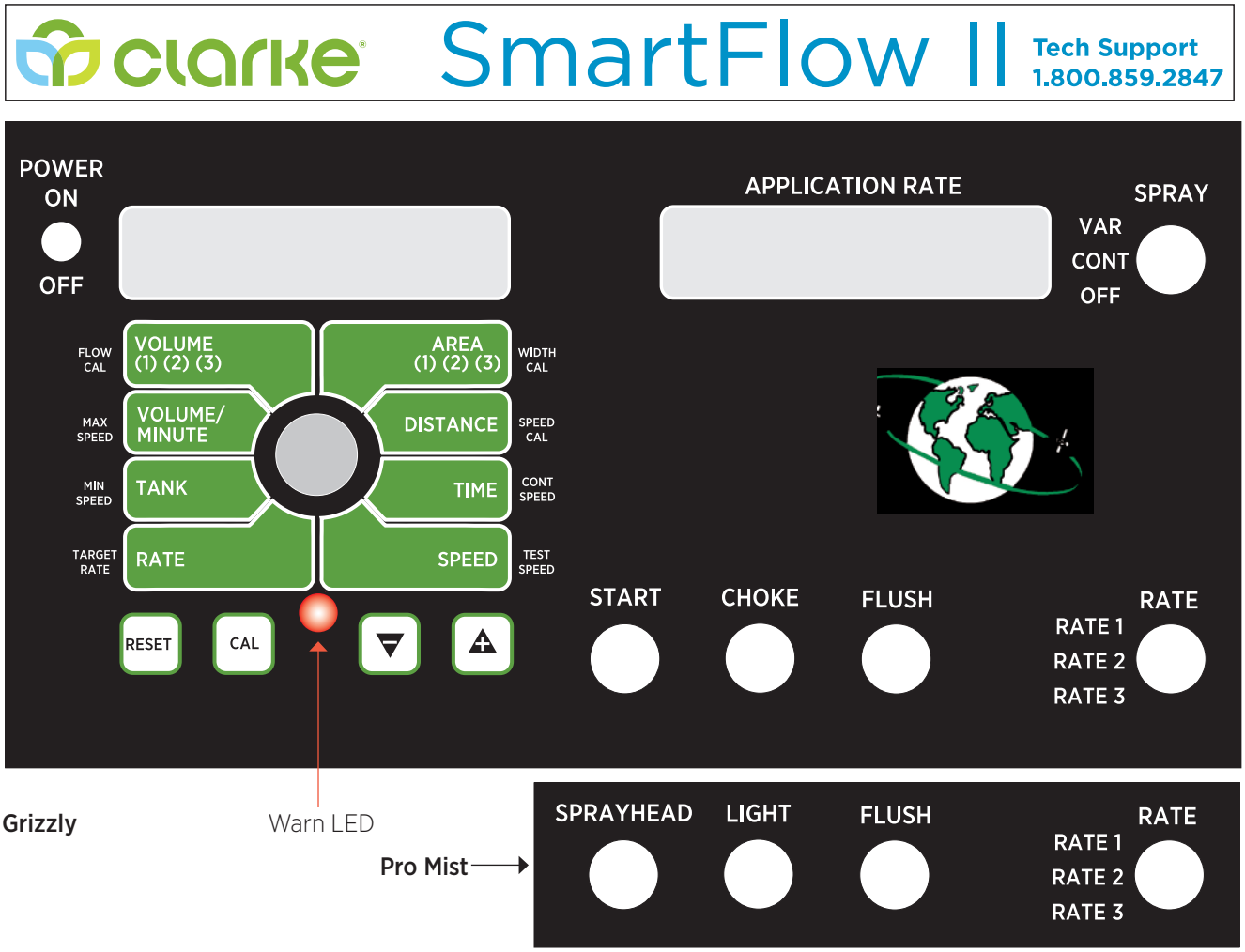
Description

The SmartFlow control provides programmable microcomputer control for Clarke spraying systems. The SmartFlow control offers the following features:

- The SmartFlow control uses data from speed and flow sensor to vary the speed of the electric pump on the spraying system. This automatically maintains the target application rate.
- The SmartFlow control can operate alone, or for GPS-controlled Variable Rate Applications (VRA), it can use an RS232 Serial Link to send data to and receive commands from an external computer.
- Three different application rates can be preprogrammed into the SmartFlow control, allowing quick operator selection by the touch of a switch.
- The SmartFlow control is available for both gas and electric spraying systems.
- For gas spraying systems, an optional pressure sensor can be installed so the user can monitor
- the application pressure.

Console





The Clarke control box is used with the following two Clarke Mosquito Control spraying systems. The Pro Mist uses a slightly different overlay (shown above) and slightly different internal wiring. The same software is used in both.

Volume Counters

Three Volume counters are provided. When in the **VOLUME** position the selected counter is indicated by the Number icon (**1, 2, 3**) in the Data display and a different counter can be selected by using **INC** key. (Note the **DEC** key is not used since that is used to clear the counter in some models). Cycling power or Brown outs will not change the selection. The user can not change the Counter selection while in CALIBRATE or SPECIAL CALIBRATE but it can be changed while in Test Speed mode.

If a flow signal is present then Volume continues to accumulate while in the **VARIABLE**, **CONTINUOUS** or **OFF** mode. All three Volume counters are always active and will accumulate volume (not just the selected or displayed counter).

Area and Volume counters are coupled together (as pairs) so selecting Volume counter 1 also selects Area Counter 1. This was done so user can easily see how much Volume was applied to a particular area (Volume 1 is always applied to Area 1, and Volume 2 to Area 2 etc.).

Area Counters

Three Area counters are provided. When in the **AREA** position the selected counter is indicated by the Number icon (**1, 2, 3**) shown in the Data display and a different counter can be selected by using the **INC** key. (Note the **DEC** key is not used since that is used to clear the counter in some models: 'Lite' and 'D'). Cycling power or Brown outs will not change the selection. The user can not change the Counter selection while in CALIBRATE or SPECIAL CALIBRATE but it can be changed while in Test Speed mode.

Area is only accumulated while in the **VARIABLE** mode (and not "Lo Speed" or "Hi Speed") and all three counters are active and will accumulate area (not just the selected or displayed counter). When in the **CONTINUOUS** or **OFF** mode all three Area counters stop accumulating area.

Area and Volume counters are coupled together (as pairs) so selecting Area counter I also selects Volume Counter 1. This was done so the user can easily see how much Volume was applied to a particular area (Volume 1 is always applied to Area 1, and Volume 2 to Area 2 etc.).

The Speed Cal factor can be changed at any time (before or after a field is completed) and the correct area will be re-computed.

Distance

The **DISTANCE** position shows the distance traveled in 0.1 increments from 0 to 9,999.9 miles or km Distance is accumulated in Feet (or Meters).

The Distance counter will only accumulate when in the **VARIABLE** mode (and not "Lo Speed,, or.,Hi Speed"). If in the **CONTINUOUS** or **OFF** mode it will display the last accumulated distance.

Distance is saved to EEPROM during brown outs or when power is turned off.

Time

The **TIME** position displays the "spray time" since the counter was last reset. It displays from 0.1 to 9999.9 hours.

The "Time" counter accumulates spray time when in **VARIABLE** (and not "Lo Speed" or "Hi Speed") or **CONTINUOUS** mode.

Control Panel Functions

This section describes the functions of the control panel for the SmartFlow control. The control panel is the same for gas and electric spraying systems, except for the three controls on the lower left.

This section covers these control panel features:

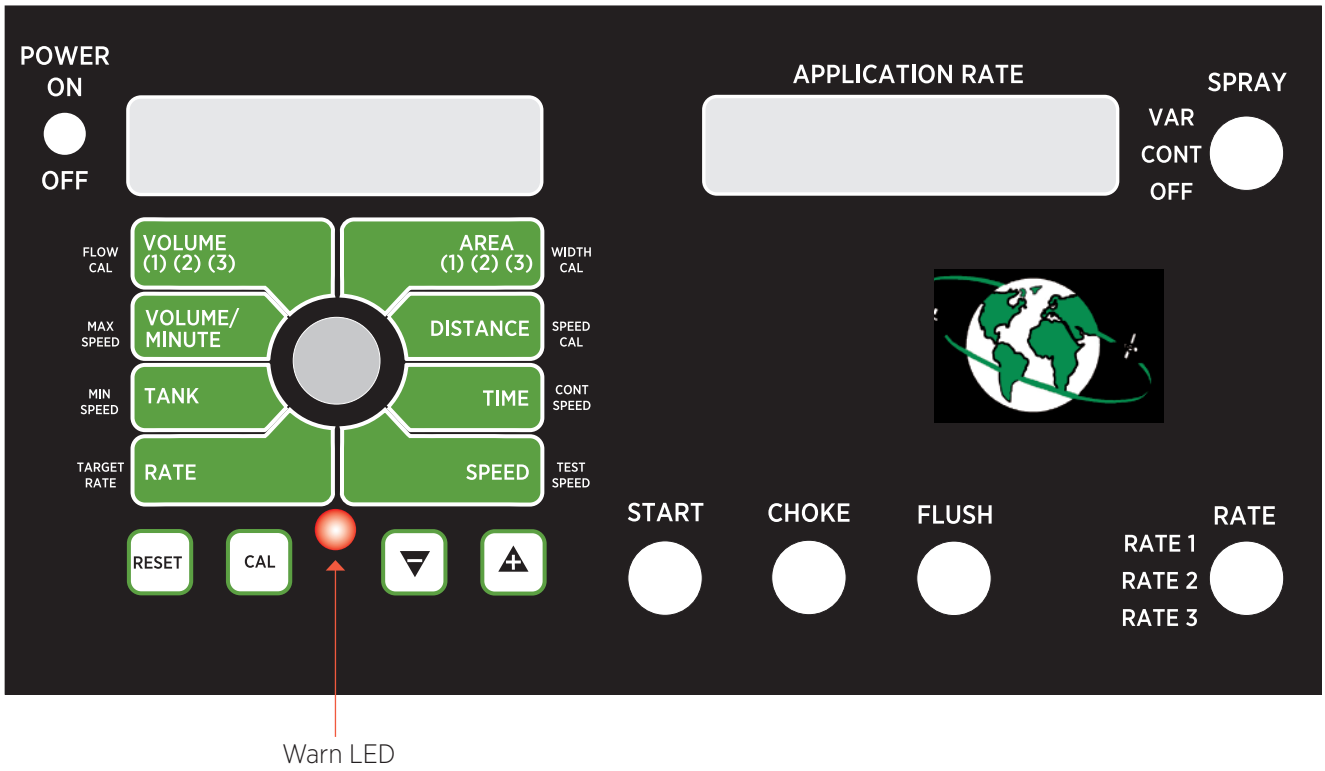
COUGAR® ULV SPRAYER

Alarm On/Off Toggle Switch

This rear mounted toggle switch is used to turn off (disable) the audible alarm.

Warning LED & Alarm

While in **VARIABLE** or **CONTINUOUS** mode, the Warning LED, and the Audible Alarm will turn on (steady) whenever there is more than 10% error in the application rate. However the audible alarm (only) can be delayed if the "Alarm Setting" is used.

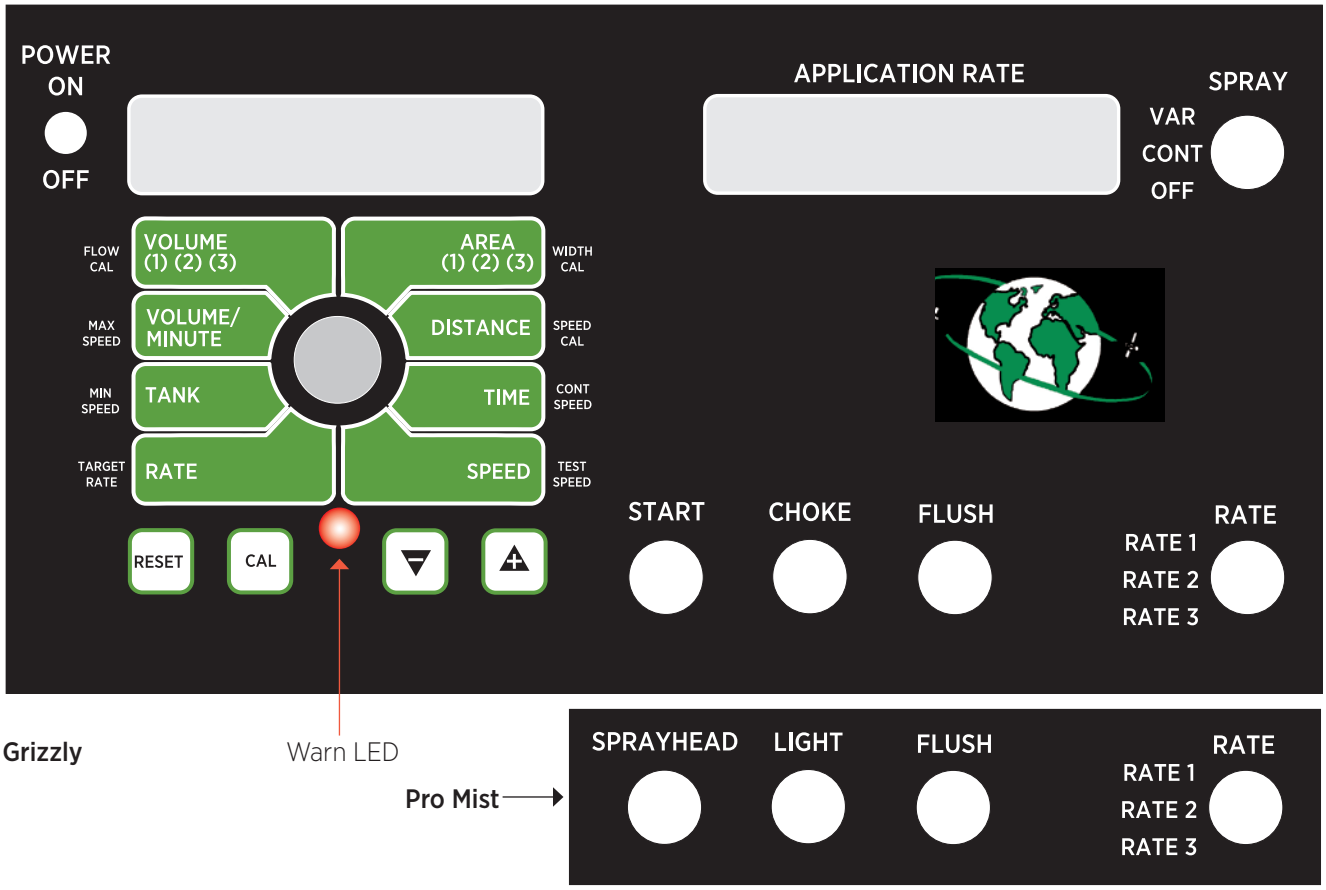


POWER Switch

The POWER switch turns the SmartFlow control on and off. In the OFF position, this switch also grounds the magneto on a gas spraying system or trips the main breaker on an electric spraying system.

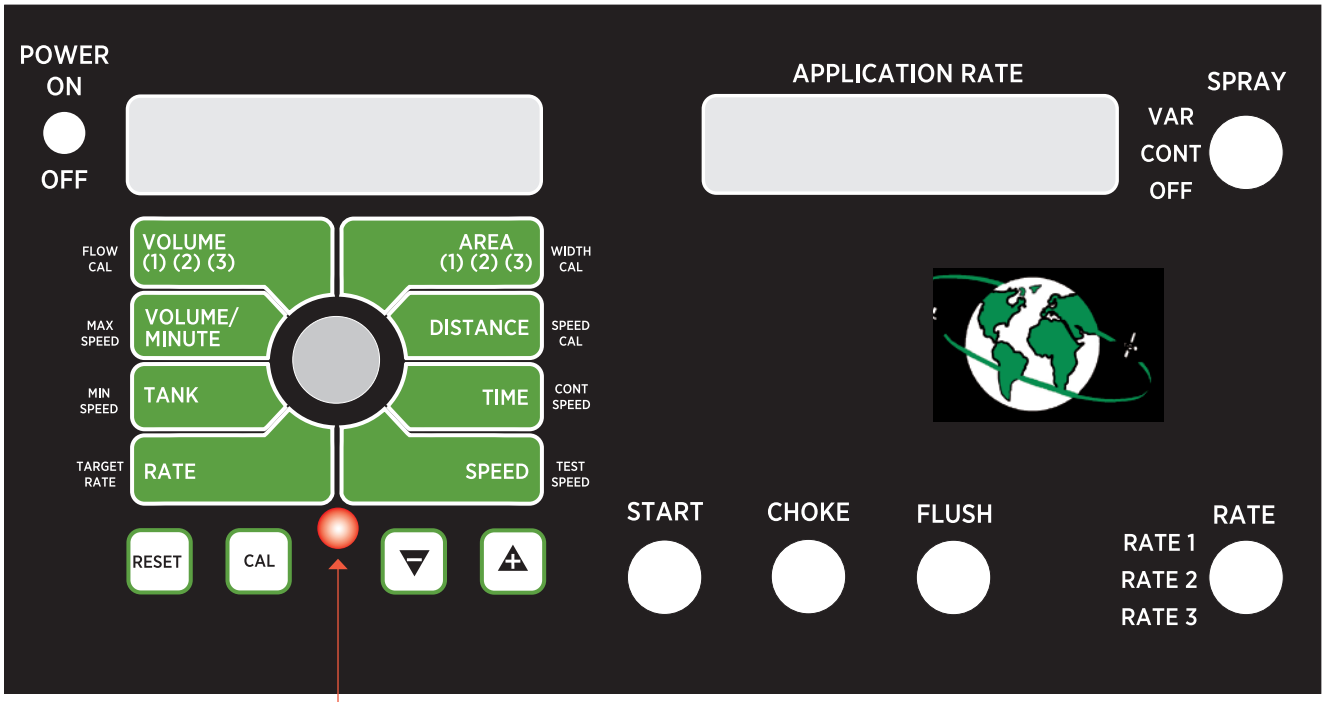
IMPORTANT

On an electrical spraying system, the power switch must be turned ON before the main breaker can be turned on.



LCD Display Driver

The Clarke control box has two LCD displays, each of which is capable of displaying any combination of digits, decimal points, and icons as shown in the illustration below.



Grizzly Warn LED

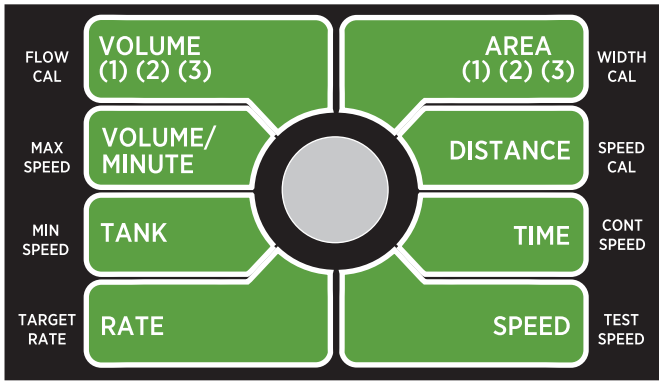
Rotary Switch

All SPECIAL CALIBRATE factors will be stored in EPROM when exiting SPECIAL CALIBRATE mode (press **CAL** key for 1 sec). They will not be saved when power is turned off so if a user accidentally makes a change he can turn the power off to abort any SPECIAL CALIBRATE changes.

The following positions have a SPECIAL CALIBRATE factor. The Data display will show dashes and the Application Rate display will go blank when in an unused position.

Tank Fill Size

Tank Set Point



Units

Vehicle ID

Width

Control Speed

Units

Selecting **Area** position displays in the Application Rate display and allows the user to change the Units. Pressing the **INC** or **DEC** key will toggle between English and Metric.

It is recommended that Units be changed by loading English or Metric defaults because changing the Units cal factor does not automatically convert other Cal factors. Therefore if the Units are changed the user must review and change all other cal factors (like Width) to the correct value for those units.

Vehicle ID

Selecting **Distance** position displays in the Application Rate display and allows the user to change the Vehicle ID.

Width

Selecting **Time** position displays in the Application Rate display and allows user to change the Width from 0.1 to 6,553.5 feet or 0.01 to 655.35 meters if Metric.

Control Speed

Selecting **Speed** position displays in the Application Rate display and allows the user to change the Control Speed for the control algorithm. Pressing the **INC** or **DEC** key will adjust the Control Speed from -4 to 3. It is normally set in the middle (-1) but if needed, it allows the user to decrease or increase the Control Speed for his particular system.

Tank Alarm Set Point

Selecting the **Volume/Minute** position displays in the application Rate display and allows the user to change the TANK ALARM SETPOINT which can be toggled to OFF or set from 0.1 to 6,553.5 Gallons or Liters.

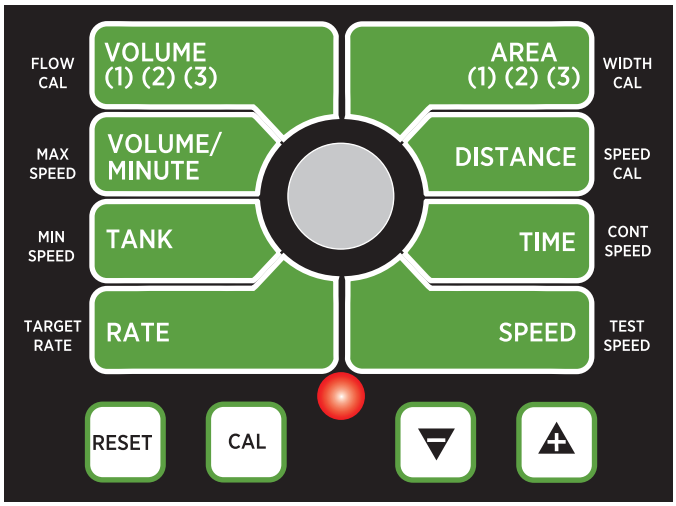
When OFF no alarm will be given as the Tank is emptied otherwise a visual and audible alarm is given. See Tank function for details.

7.1 Fill Tank Size

Selecting **Volume** position displays in the Application Rate display allows the user to enter a FILL TANK SIZE which can be toggled to OFF for 0.1 to 6,553.5 Gallons or Liters.

+/– Button

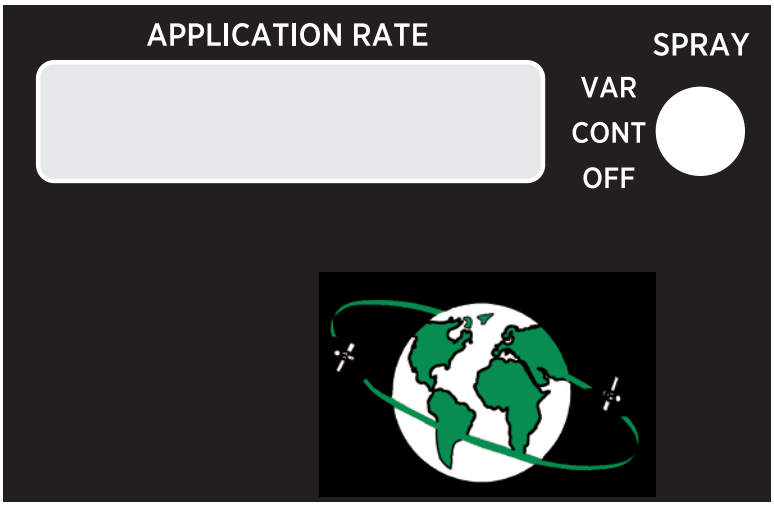
The +/– (increase/decrease) button is used to enter or adjust values in the display.



MODE	CONTROL	DESCRIPTION
VAR, CON or OFF spray mode	Turn knob to tank	This button adjusts the tank volume.
Calibrate mode	Place rotary switch in a calibration position	This button adjusts the selected calibration factor.

SPRAY Switch

The SPRAY switch controls the spray mode.



CONTROL	DESCRIPTION
VAR position	Variable Mode The SmartFlow control varies the pump speed to automatically maintain the selected application rate based on *flow* and *speed*. Total Flow, Distance, Time, Hours, and Area counters accumulate in this mode.
CONT position	Continuous Mode The SmartFlow control varies the pump speed to automatically maintain the selected application rate based on *flow only*. This mode can be used to spray while the vehicle is stopped. Total Flow, Time, and Hours counters accumulate in this mode.
OFF position	Off Mode The sprayer is stopped, and the Application Rate, Flow Per Minute, and Active Swath values go to zero. Total Flow and Tank counters accumulate in this mode in case flow does not stop immediately.

Calibration

This section covers these calibration topics:

Calibration Factors

The SmartFlow control has eight calibration factors:

CALIBRATION FACTOR	ROTARY SWITCH POSITION	DESCRIPTION
Continuous Speed	DISTANCE	The speed that is used in Continuous mode.
Units	VOLUME PER MINUTE	The control can be set to use English or Metric units.
Target Rate	TARGET RATE	Sets the three preset Target Application Rates.
Maximum Speed	MAX SPEED	The maximum speed allowed in Variable mode. If the vehicle exceeds this speed, the control goes into Off mode until the speed goes below this number again.
Minimum Speed	MIN SPEED	The minimum speed allowed in Variable mode. If the vehicle goes below this speed, the control goes into Off mode until the speed exceeds this number again.
Width	SWATH WIDTH	The width of the application area; typically 300 feet for mosquito control applications.
Flow Cal	FLOW CAL	Specifies the number of flow sensor pulses per gallon applied. This enables the SmartFlow control to accurately measure total flow, flow per minute, and application rate.
Speed Cal	SPEED CAL	Specifies the distance the vehicle travels between speed sensor pulses. This enables the SmartFlow control to accurately measure speed, distance, area, and application rate.

Setting Target Application Rate

To set one of the three preset Target Application Rates for Variable and Continuous mode:

1. Place the control in Calibration mode.

TARGET RATE displays the Target Application rate for **VARIABLE** and **CONTINUOUS** mode (automatic control). Up to three different Target Rates can be programmed in oz/acre or from mLiter/Hectare. Since a typical rate is 1.00 oz/acre (73.1 mL/Hectare) this provides excellent resolution and range.

The **Rate** toggle switch (Rate 1, 2 or 3) will determine which target Rate is selected and the number icon.

Setting the Maximum Speed

MAX SPEED displays the “Maximum Speed” which can be adjusted from “off” to 0.1 to 45.0 mph or kph. If used, the user must ensure that Max Speed is greater than Min Speed (if used) or else the sprayer will never turn on.

MAX SPEED is used to stop the sprayer (and Distance, Area and Time counting) when the ground speed exceeds this limit (in the VARIABLE mode only).

Setting the Minimum Speed

MIN SPEED displays the “Minimum Speed” which can be adjusted from “off” to 0.1 to 45.0 mph or kph. If used, the user must ensure that Min Speed is less than Max Speed (if used) or else the sprayer will never turn on.

MIN SPEED is used to stop the sprayer (and Distance, Area and Time counting) when the ground speed drops below this limit (in the VARIABLE mode only).

Setting the Flow Calibration Factor

To set the Flow Cal factor:

1. Place the control in Calibration mode.

2. Move the rotary switch to the FLOW CAL position.

FLOW CAL, the Flowmeter calibrate factor is in (English or Metric) and can be adjusted from 0.1 to 6553.5 Edges/Oz.

Press the **CAL** key to toggle the display to show the Volume counter. The Volume will be displayed in Ounces (one decimal point) or in Liters (three decimal places). Press the **RESET** key to clear the Volume counter, and make sure to empty the calibrated container.

Select **CONTINUOUS** mode again and begin collecting. The Volume counter will begin to increment and display from 0.0 to 1000.0 Ounces or from 0.000 to 30.000 Liters.

When the calibrated container reaches the desired mark or is full, select **OFF** to shut the pump off.

Verify the **VOLUME** counter is currently displayed.

Use the **INC** and **DEC** keys (press and hold) to adjust the **VOLUME** counter until it matches the actual total volume in the calibrated container. This will automatically fine-tune the Flow Cal value. Press the **CAL** key again to toggle the display to show the Flow Cal value and write it down for future reference.

Repeat the test to confirm the accuracy.

Press the **CAL** key for one second with the rotary switch in any position. The Spray switch can be in **VARIABLE**, **CONTINUOUS**, or **OFF**. If a Cal change was made, the CMC will store the Cal Factors in EEPROM.

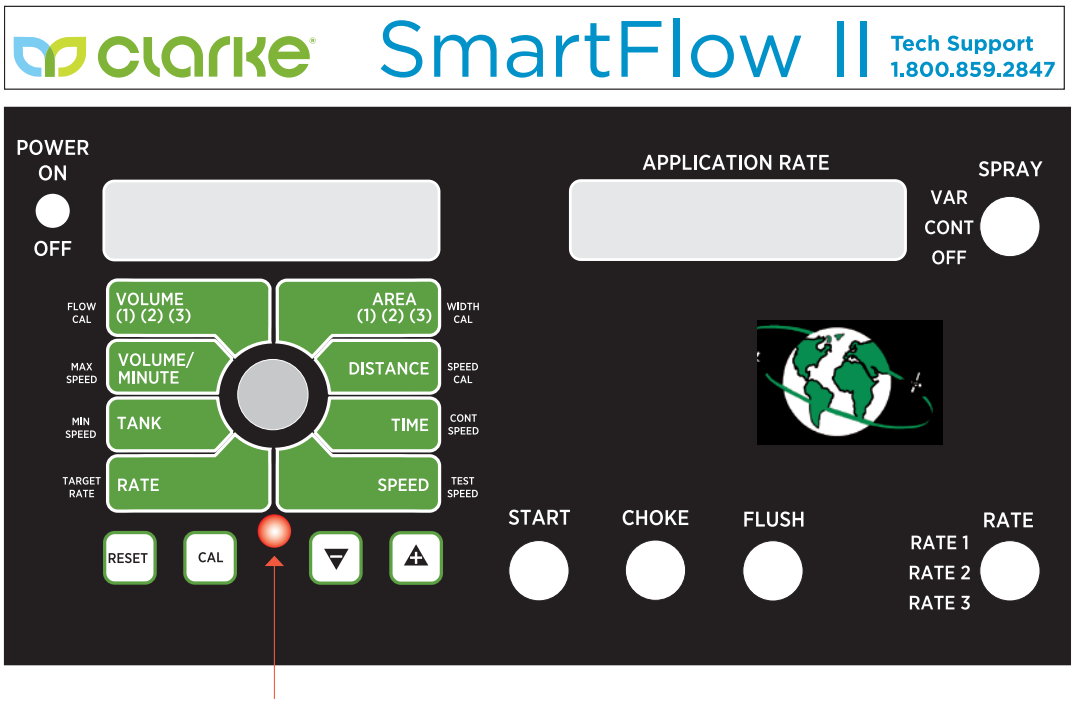
Reloading Calibration Defaults

Default Calibrate factors are loaded, and all Counters are cleared, if the CAL and DEC keys are held while turning the Console on. If the rotary switch is in the Area position, it will select the Metric Units and load Metric defaults. Any other rotary position will select English units and load English defaults.

CAL FACTOR	ENGLISH	METRIC
Distance	0	0
Area 1	0	0
Area 2	0	0
Area 3	0	0
Gallons 1	0	0
Gallons 2	0	0
Gallons 3	0	0
Tank	15.0	56.8
Time	0	0
Audible Alarm Delay “Alarm Setting”	3 sec	3 sec
Speed Cal	.189 (inch/edge)	0.48 (cm/edge)
Flow Cal (Edges/Oz)	2660.0	2660.0
Target Rate 1	1.00 Oz/A	73.0 mLPH
Target Rate 2	1.00 Oz/A	73.0 mLPH
Target Rate 3	1.00 Oz/A	73.0 mLPH
Continuous Speed	10.0 mph	16.0 kph
Min Speed	2.0 mph	3.2 kph
Max Speed	22.0 mph	35.4 kph
Units	0 (Eng)	1 (Metric)
Vehicle ID	1	1
Width	300.0 feet	91.44 m

Operation

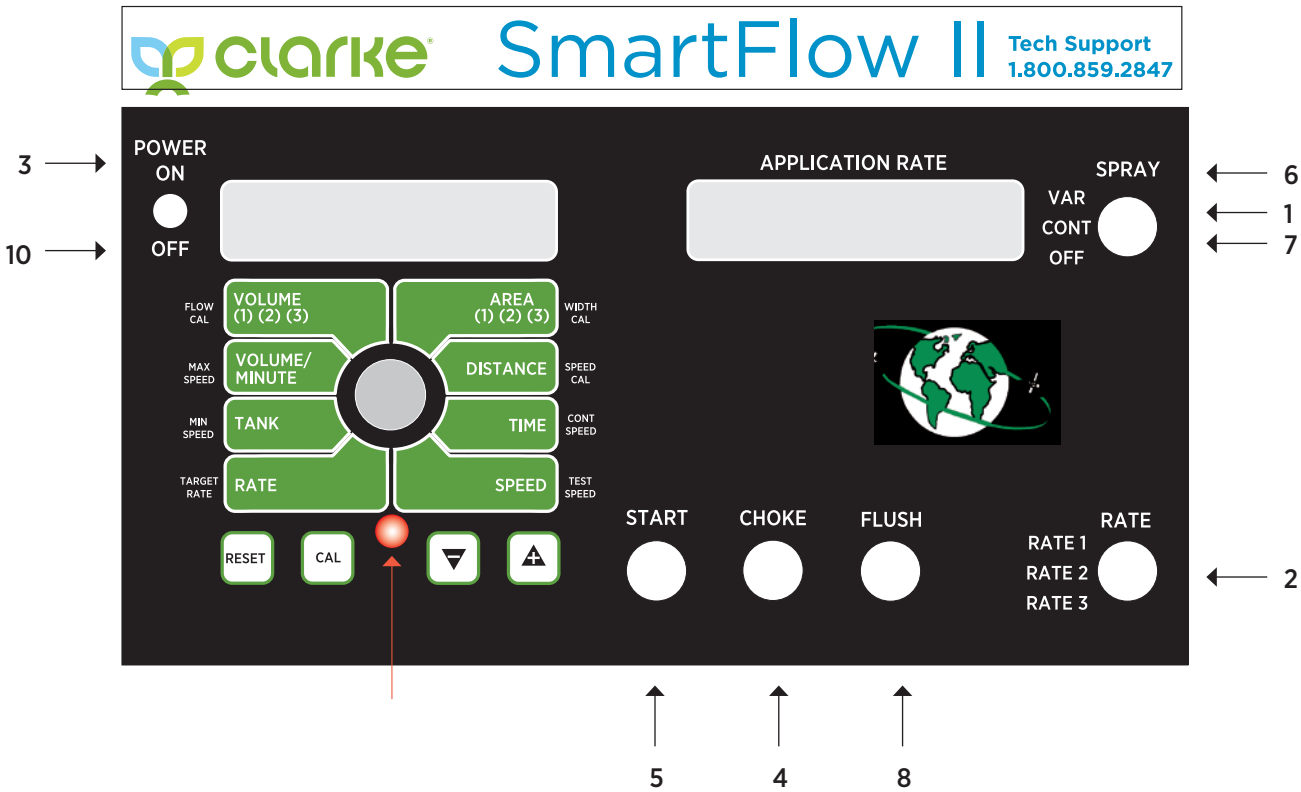
This section covers these operating procedures:



Startup / Shutdown

Step by Step SmartFlow Operation

1. Make sure SPRAY is OFF.
2. Check RATE switch position.
3. Switch POWER switch to ON.
4. Hold CHOKE switch up.
5. Hold START switch up until engine starts.
6. When ready to start spraying move SPRAY switch to VAR. or CON.
7. When done spraying move SPRAY switch to OFF.
8. Hold FLUSH switch for 2 seconds.
9. After 1 minute flush cycle engine will throttle down.
10. Move POWER switch to OFF position.



Selecting the Application Rate

To select a preset application rate, switch to the desired rate (RATE 1, RATE 2, or RATE 3) in the display window.

If the SPRAY switch is in the VAR or CON position, the selected rate is displayed. If the SPRAY switch is in the OFF position, the upper window will still display OFF, but the new application rate will be selected.

Clearing Counters

When Area and Volume 1 (only) are selected then **RESE**T key will clear four counters (Area 1, Volume 1, Distance and Time) at the same time. When in the **OFF** mode, and in the Distance, Area, volume or Time rotary position then pressing the **RESET** key for 1 second will clear Time, Distance, Area 1 and Volume 1 (four counters). While in the Distance or time mode it will not display or clear any counters unless the counter pair 1 is selected in Area or Volume. The Area-Volume pairs 2 or 3 are cleared independently. While in Area or Volume mode, select the desired pair to clear (2 or 3) and with the Spray toggle in **OFF** mode press the **RESET** key for 1 second. Since the Area and Volume counters are paired, clearing a selected Area counter will also clear the corresponding Volume counter (and vice versa). When the **RESET** key is pressed it will immediately display in the Data display as a warning that it is about to clear counters. If the **RESET** key is released while displaying then the counters remain unchanged. If the **RESET** key is pressed for 1 second or more then the message disappears and is replaced with “0” to indicate the counters were cleared.

Adjusting Tank Volume

You should adjust the tank volume to match the actual volume of liquid in your tank each time you fill the tank. To adjust the tank volume:

1. Make sure that the SmartFlow control is not in Calibration mode.

The tank volume can be adjusted by setting the Spray switch **OFF** and then using the **INC** or **DEC** keys to adjust it from 0.0 to 6553.5 Gal or Liter. For safety this can only be done while the spray switch is in **OFF**.

Maintenance

IMPORTANT

It is highly recommended that some system be established to assure the performance of the following maintenance instructions.

General

- Replace worn or damaged parts on the Clarke Cougar Cold Aerosol Fog Generator.
- Service the engine according to the Engine Maintenance Manual.
- Service the blower according to the Blower Maintenance Manual and the Blower (page 45) section.

Daily

- Visually check the fog generator each day before use and make any necessary adjustments and /or repairs.
- Crank the engine and check the nozzle air pressure as indicated on the pressure gauge on the fog generator. If the pressure varies more than + or - 1/2 P.S.I. from the preset pressure range, readjust the nozzle air pressure. See Adjusting the Nozzle Air Pressure (page 12)
- After use of the fog generator, flush the insecticide system with a suitable flushing solution.

Every 50 Hours

- Check the flow rate calibration. See Setting the Flow Calibration Factor (page 29) and Calibration Factors (page 26).
- Check all bolts and fasteners and tighten if necessary.
- Check all gasoline hoses, insecticide lines and fittings for cracks, leaks or wear. Replace if needed.
- Check all nozzle parts for wear or physical damage. Replace damaged parts.
- Remove and clean the element in the filter-silencer as follows. Reference Figure 9.
    a. Remove the wing nut and washer.
    b. Remove the cover and element.
    c. Clean the inside of the housing and the element as required. If the element is damaged or bent, replace with a new one.
    d. Replace the element, cover, washer and wing nut.

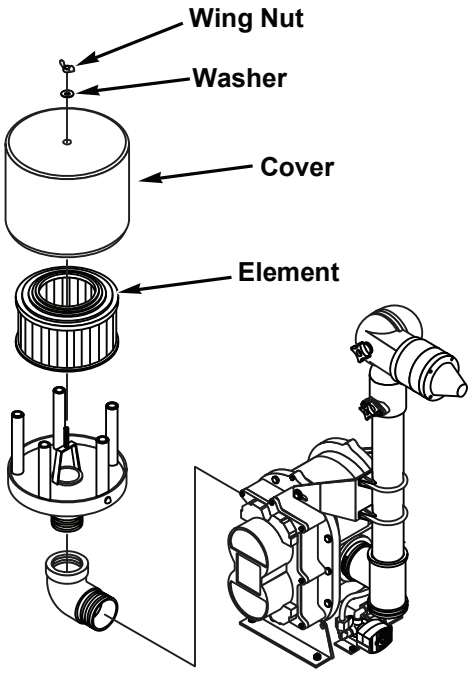


Figure 9- Element Replacement

Every 100 Hours

Clean the insecticide filter. If this filter becomes stopped up, the insecticide flow will be restricted or stopped. There is a fine mesh screen located in the cylindrical housing. This screen can be removed for inspection and/or cleaned by manually unscrewing the housing bowl.Reference Figure 10.

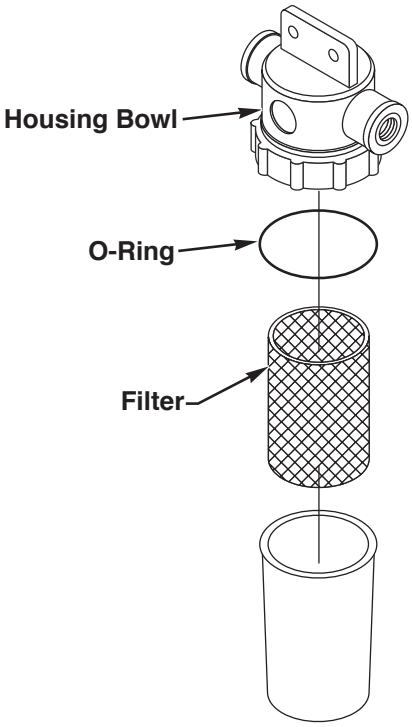


Figure 10- Insecticide Filter

- Check the battery voltage. Test the battery with a volt-ohmmeter. Connect the positive (+) meter lead to the positive (+) battery terminal. Connect the negative (-) meter lead to the negative battery terminal. Set the meter on volts. If the meter reads 11.5 to 12 or more volts, the battery is OK. If the meter reads less than 11.5 volts, check the specific gravity of the electrolyte. See below for instructions on checking specific gravity of the electrolyte.
- Check the battery electrolyte. Remove the battery vent caps and check the electrolyte level. Add clean distilled water if necessary to cover the battery plates. Check the specific gravity of the electrolyte with a hydrometer. If the specific gravity is between 1.250 and 1.280, the battery cell being tested is OK. If the specific gravity is between 1.225 and 1.250, the battery cell being tested is still in fair condition. If the specific gravity is below 1.150 in any one cell, replace the battery. If the specific gravity in one cell is 0.050 more or less than the other cells, and charging does not bring the charge to a 50% charge, replace the battery.

Replace the in-line gasoline filter. Using pliers, loosen the tension on the two hose clamps and slide them off of the filter barbs. Remove the old filter from the gasoline hose. Install a new filter and replace the hose clamps. New filters can be installed with the direction of flow going either way. Never reverse an old filter. Reference Figure 11.

- Check the pulsation dampers. The metering pump used on the fog generator tends to deliver a slightly pulsating flow of insecticide. For best aerosol particle size, a more even (non-pulsation) ow is desirable. A small air chamber pulsation damper is located in the metering pump outlet line between the pump and the discharge nozzle. It is a nylon assembly with an air dome that can be unscrewed by hand for inspection. There is a gasket that seals the joint between the air dome and the lower housing. The air dome should be checked periodically to make sure that it has not become filled with insecticide. If the dome has no air in it, it will not function as a pulsation damper. When reassembling, be sure that the sealing gasket is properly positioned so as to avoid damage caused by pinching. Applying a light coat of oil or grease will prevent pinching the gasket. Tighten the housing only hand tight when reinstalling. Do not use tools. Reference Figure 11.

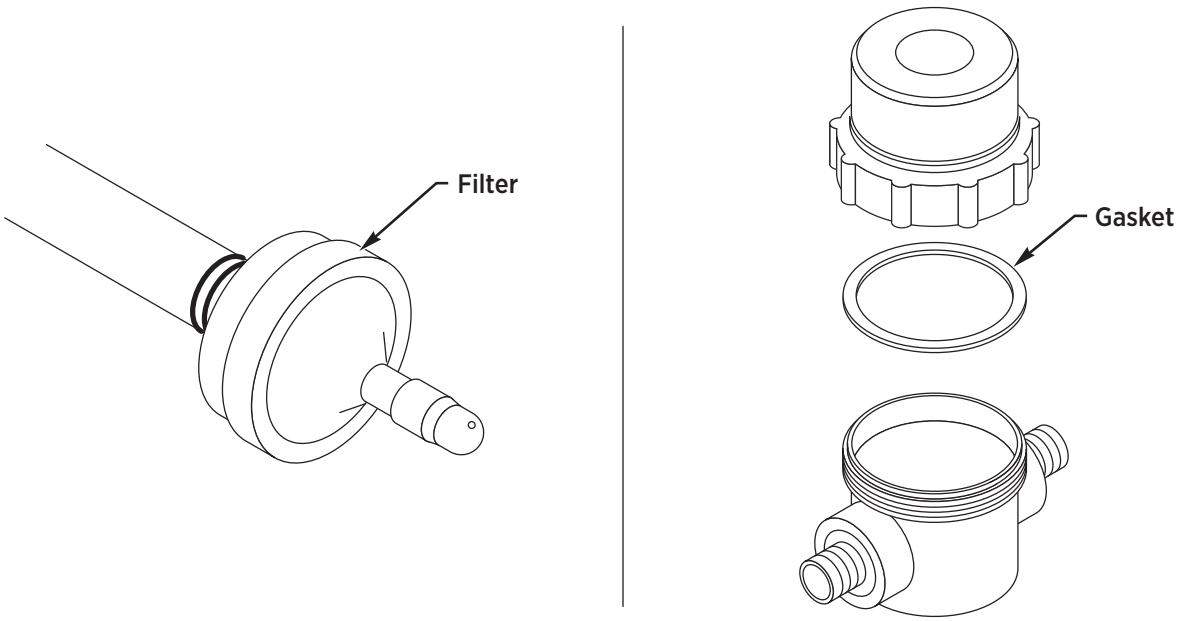


Figure 11- In-Line Gasoline Filter/Pulsation Dampner

Engine

Lubricate and service the engine according to the engine manual. We recommend the use of a high quality, SAE 30W detergent oil classified “for service SF, SG, SH” (such as Briggs & Stratton(r) 100005 or 100028) when operating at temperatures above 40 F. Below 40, SAE 10W30 or 5W30 oil is acceptable. Reference Figure 12.

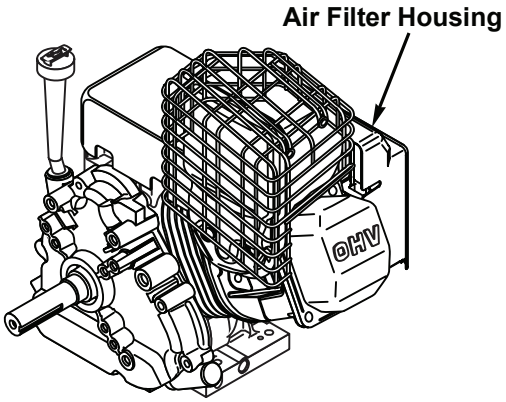


Figure 12- Engine Filters

Blower

A simple but very effective lubrication system is employed on the blower. At the drive shaft end the bearings are grease lubricated using hydraulic pressure relief fittings. These relief fittings vent any excess grease, preventing pressure build-up on the seals. A restriction plug and metering orifice prevent loss of lubricant from initial surges in lubricant pressure but permit venting excess lubricant under steadily rising pressures.

The blind end bearings and timing gears are enclosed by a gearhouse located opposite the drive end of the blower. The lower timing gear functions as an oil slinger, carrying lubricant to the upper timing gear and providing splash lubrication for the bearings. Pressure within the gearbox is vented through the breather plug.

To fill the gearbox, remove the breather plug and the oil overflow plug. Fill the reservoir up to the overflow hole. Place the breather and the overflow plug into their respective holes.

Under normal conditions the oil level on the non-drive end of the blower should be checked every 25 hours of operation. Change the oil every 100 hours or 30 days, whichever comes first. Under extremely hot or dusty operation conditions, the oil level should be checked more often and may require more frequent changes. Every six months the oil breather plug should be removed cleaned in solvent and blown out with clean compressed air to provide unobstructed venting.

Shaft bearings at the drive end of the blower are grease lubricated and each bearing housing is equipped with pressure type grease fittings and pressure type relief fittings. When servicing drive end bearing, use a premium grade, petroleum base grease with high temperature and moisture resistance and good mechanical stability. Using a pressure gun, force new lubricant into each drive end bearing housing until traces of clean grease comes out of the relief fittings. Grease should be added using hand operated grease gun to the drive end bearings at varying time intervals depending on duty cycle. Reference Figure 13.

Recommended greasing intervals:

1. With the blower operating 8 hours per day, grease should be added every two weeks.
2. With the blower operating 16 hours per day, grease should be added every week.

More frequent intervals may be necessary depending on the grease operating temperature and under unusual circumstances.

The oil used must be of the proper viscosity and certified to meet M-S type specifications of heavy-duty type. Do not use multiple viscosity oils.

Recommended oil viscosity:

- 30° F and under SAE 30
- From 30° F to 90° F SAE 40
- From 90° F SAE 50

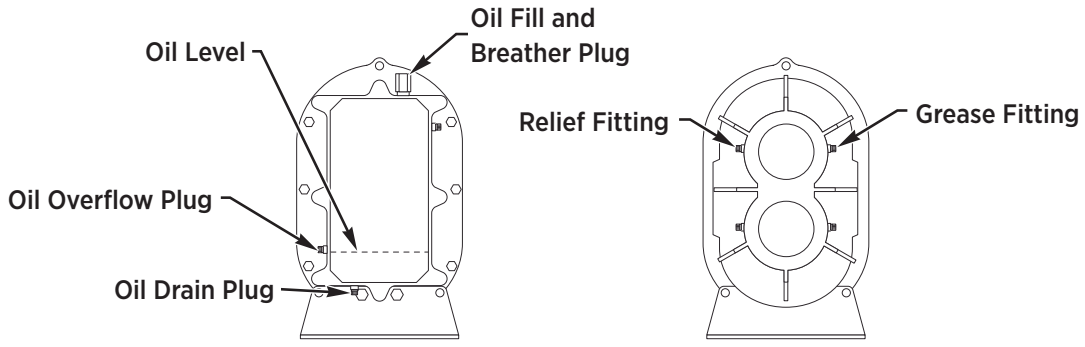


Figure 13- Blower

Couplings

To replace the engine or blower coupling or the coupling sleeve:

1. Disconnect the negative battery cable on the battery.
2. Remove the coupling guard cover.
3. Remove the blower from the chassis.
4. Remove the setscrews in the engine and blower couplings and slide the couplings off of the shafts. If these couplings are difficult to move, the couplings are either rusted to the shafts or there is a burr on the keys under the setscrews. If this is the case, use penetration oil such as Marvel Mystery Oil(r) to loosen the rust and use a drill slightly smaller than the setscrew holes to deburr the keys. This drill must have a fl at point in order not to drill into the keys.
5. Carefully fi le and remove existing burrs or high spots caused by the setscrews on the engine and blower shafts and the keys.
6. Slide the engine coupling and 1/4" key onto the engine drive shaft. Position the engine coupling 1-5/16" from the engine. Reference Figure 14.
7. Install the engine coupling setscrews and tighten them, which locates the engine coupling in its final position.
8. Slide the blower coupling and 3/16" key onto the blower drive shaft. Position the blower coupling 1-5/16" from the blower. Reference Figure 14.
9. Install the blower coupling setscrews and tighten them, which locates the blower coupling in its final position.

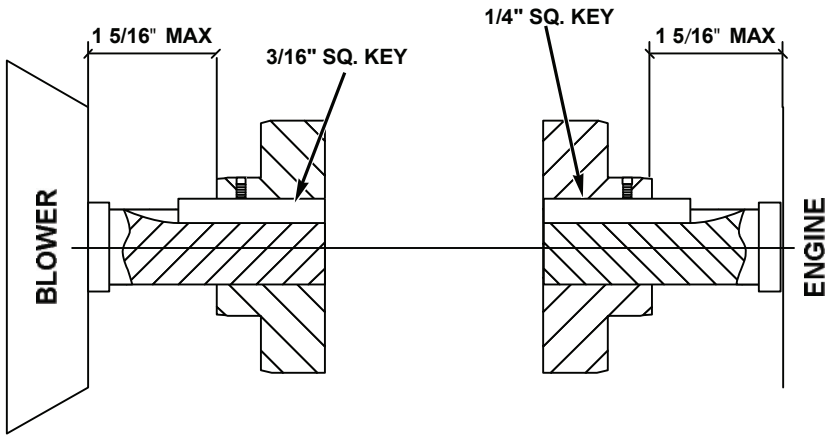


Figure 14- Coupling Assembly

10. Install the rubber coupling sleeve, mount the blower on the chassis, leaving the blower mounting bolts loose and slide the blower towards the engine to engage the sleeve. The blower shaft may have to be rotated to engage the sleeve.

11. Using the shims that were under the blower, shim the blower to align the engine and blower shafts. Tighten the blower mounting bolts.

Steps 12 and 13 MUST be preformed to assure correct shaft alignment.

12. Check parallel alignment by placing a straightedge across the two coupling anges and measuring the maximum offset at various points around the edge of the coupling anges WITHOUT ROTATING THE COUPLING FLANGES. If the maximum offset exceeds .015 inches, realign the shafts. Reference Figure 15.

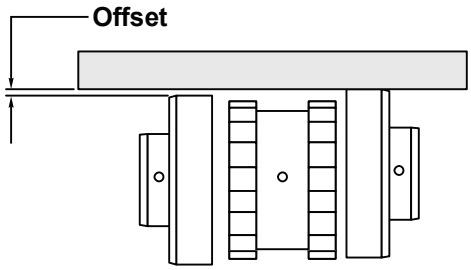


Figure 15- Measuring Offset

13. Check angular alignment with a micrometer, vernier, or caliper. Measure from the outside of one flange to the outside of the other at intervals around the edge of the coupling flanges. Determine the maximum and minimum dimensions WITHOUT ROTATING THE FLANGE COUPLINGS. These measurements must be within .070 inches. If correction is necessary, be sure to recheck the parallel alignment. Reference Figure 16.

14. Install the coupling guard cover.

15. Connect the negative battery cable.

Note: The coupling, coupling sleeve and connected equipment will normally operate longer and more economically when the couplings are carefully aligned.

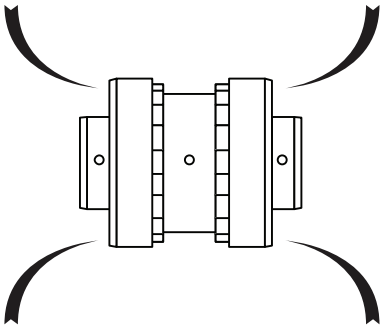


Figure 16- Parallel Alignment

Maintenance

CAUTION

Coupling sleeve may be thrown from the coupling assembly with substantial force when the couplings are subjected to a severe shock load or abuse.

To replace the engine or blower coupling or the coupling sleeve:

1. Flush the fog generator for at least 10 minutes
2. Drain the insecticide tank and thoroughly clean it.
3. Drain the flush tank and thoroughly clean it.
4. Pour 1 quart of light weight oil into the flush tank. Engine oil can be used.
5. Pour enough light weight oil into the insecticide tank to cover the bottom of the drop pipe.
6. Spray and flush the fog generator until the oil in the insecticide and flush tanks is completely through the system and sprays out of the nozzle.
7. Engine:
    a. All fuel should be removed from the tank. Run the engine until it stops from lack of fuel.
    b. While the engine is still warm, drain the oil from the crankcase. Refill with fresh oil.
    c. Remove the spark plugs and add a tablespoon of engine oil into the spark plug holes. Install the spark plugs, but do not connect the plug leads. Crank the engine slowly 2 to 3 revolutions to distribute the oil. Replace the plug leads.
    d. Clean dirt and chaff from the cylinders, cylinder head fins, engine blower housing, rotating screen and muffler areas.
    e. Clean all other exterior surfaces of the engine.
    f. Spread a light film of oil over any exposed metal surfaces of the engine to prevent rust.
8. Remove and clean the filter-silencer element and housing as explained in Maintenance (page 41) section. Reference Figure 9.
9. Blower:
    a. Remove the oil breather plug, clean in solvent and blow out with clean compressed air.
    b. Drain the oil from the oil reservoir and refill with fresh oil. Grease the bearings on the drive end.
    c. Remove the filter-silencer. If the filter-silencer is hard to unscrew from the blower inlet port, use penetrating oil such as Marvel Mystery Oil(r) to loosen the rusted threads.
    d. Pour 1 pint of lubrication oil (SAE 40) in the blower intake.
    e. With the engine ignition switch off, use the starter to turn the blower slowly so that the entire inner surface of the blower is coated with oil. This will prevent a coat of rust from forming in the blower and in all probability will save the cost of a new blower or an expensive repair bill.
    f. Reinstall the filter-silencer.

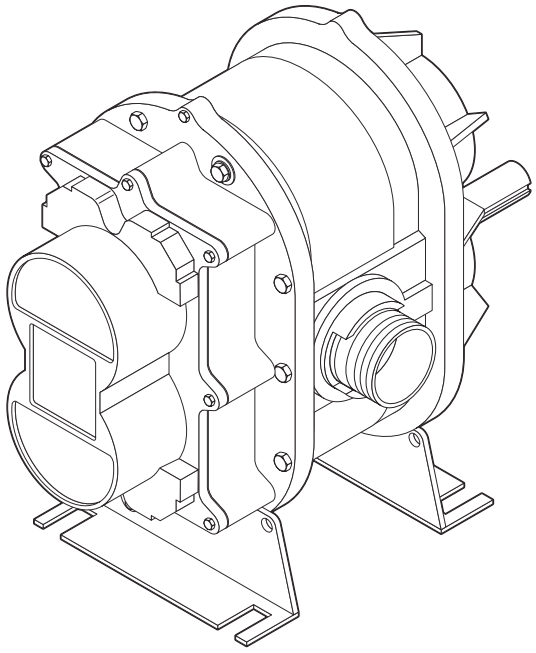
10. Charge the battery and store as recommended by the manufacturer.

11. Clean all insecticide residue and oil off the Clarke Cougar Cold Aerosol Fog Generator and repaint if necessary.

12. Store the Clarke Cougar Cold Aerosol Fog Generator in a clean dry area under suitable cover protected from the elements.

A major problem can be the blower rusting up over the winter. If moisture gets into air chamber, the rotary lobes will rust together preventing the blower from turning. When this happens, either the engine or blower shaft may be sheared when the engine is started. Following the storage recommendations of this manual can prevent this.

Removing the port elbows and pouring penetration oil such as Marvel Mystery Oil into the lobe chamber will usually loosen a rusted blower. The blower may need to sit for a day or two with the penetration oil in it before the engine is started. When trying to free the blower, don't turn the ignition switch on. Just bump the starter button until the blower turns. In extreme cases, the blower shaft may have to be turned by hand with the pipe wrench to loosen the lobes. Care must be taken not to damage the blower shaft with the pipe wrench. Once the blower turns, the engine can be started and the lobes should hone themselves free of rust.



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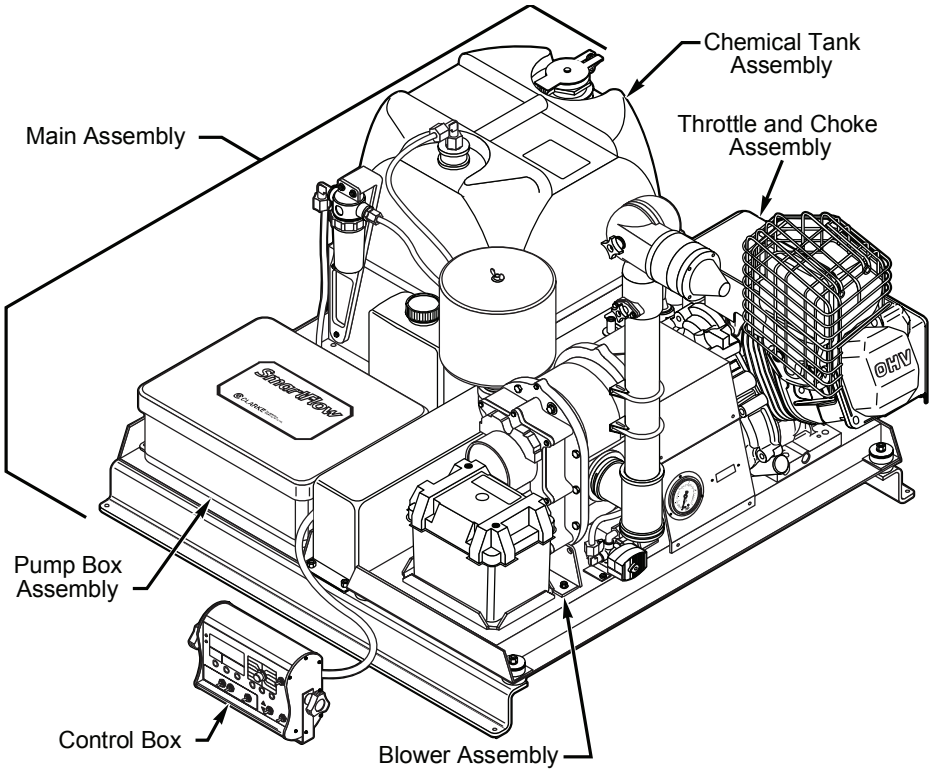
COUGAR® ULV SPRAYER



Procedure for determining correct part number and description of individual parts:

1. If the individual part is shown on the illustration, the part number and the description can be obtained from the parts list.
2. If the part is a component of an assembly, the location of the assembly breakdown can be obtained from the parts list. This assembly breakdown will identify the individual part.

NOTE: If there is a reference to serial numbers please take this into consideration.

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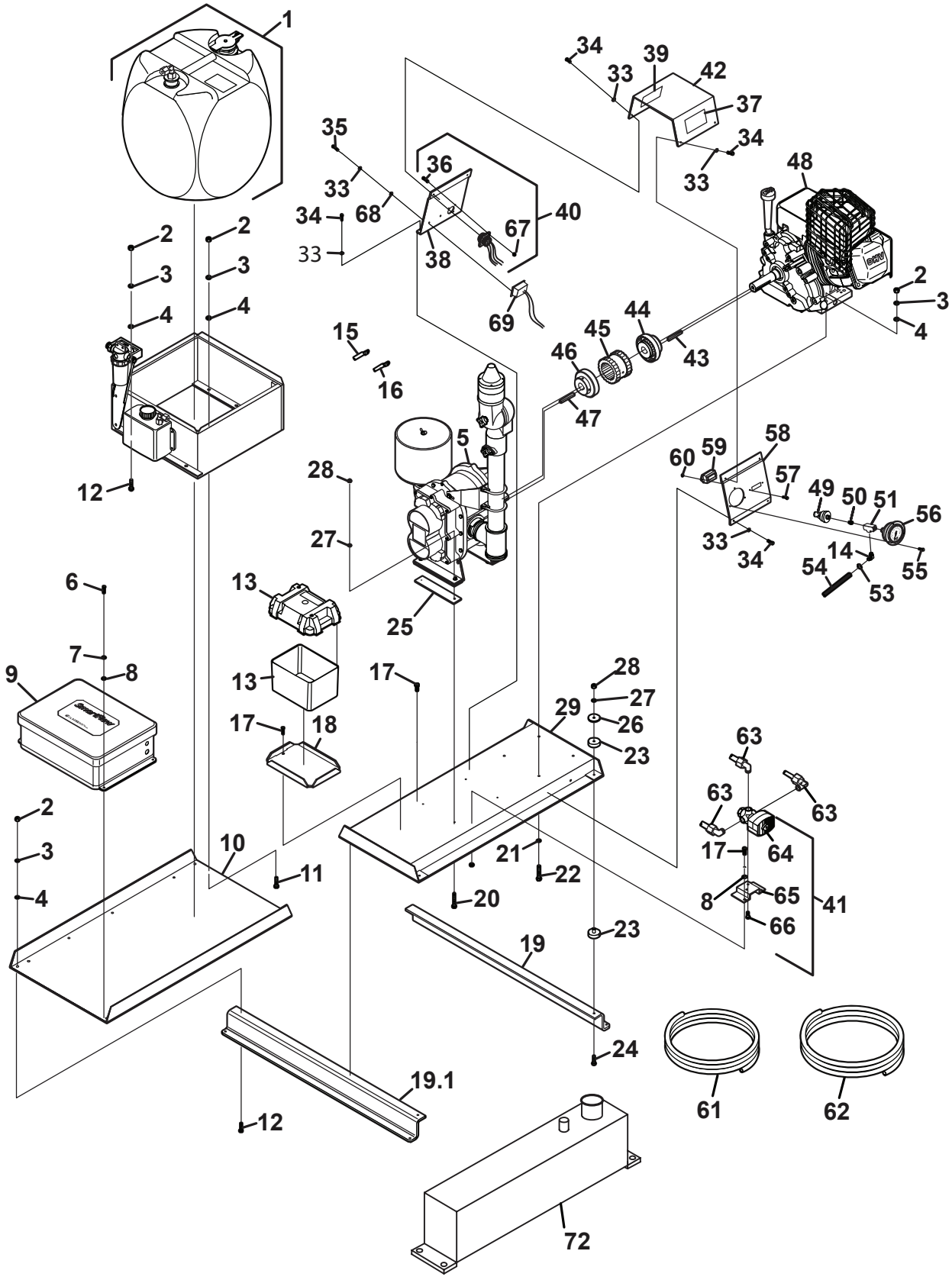
COUGAR® ULV SPRAYER

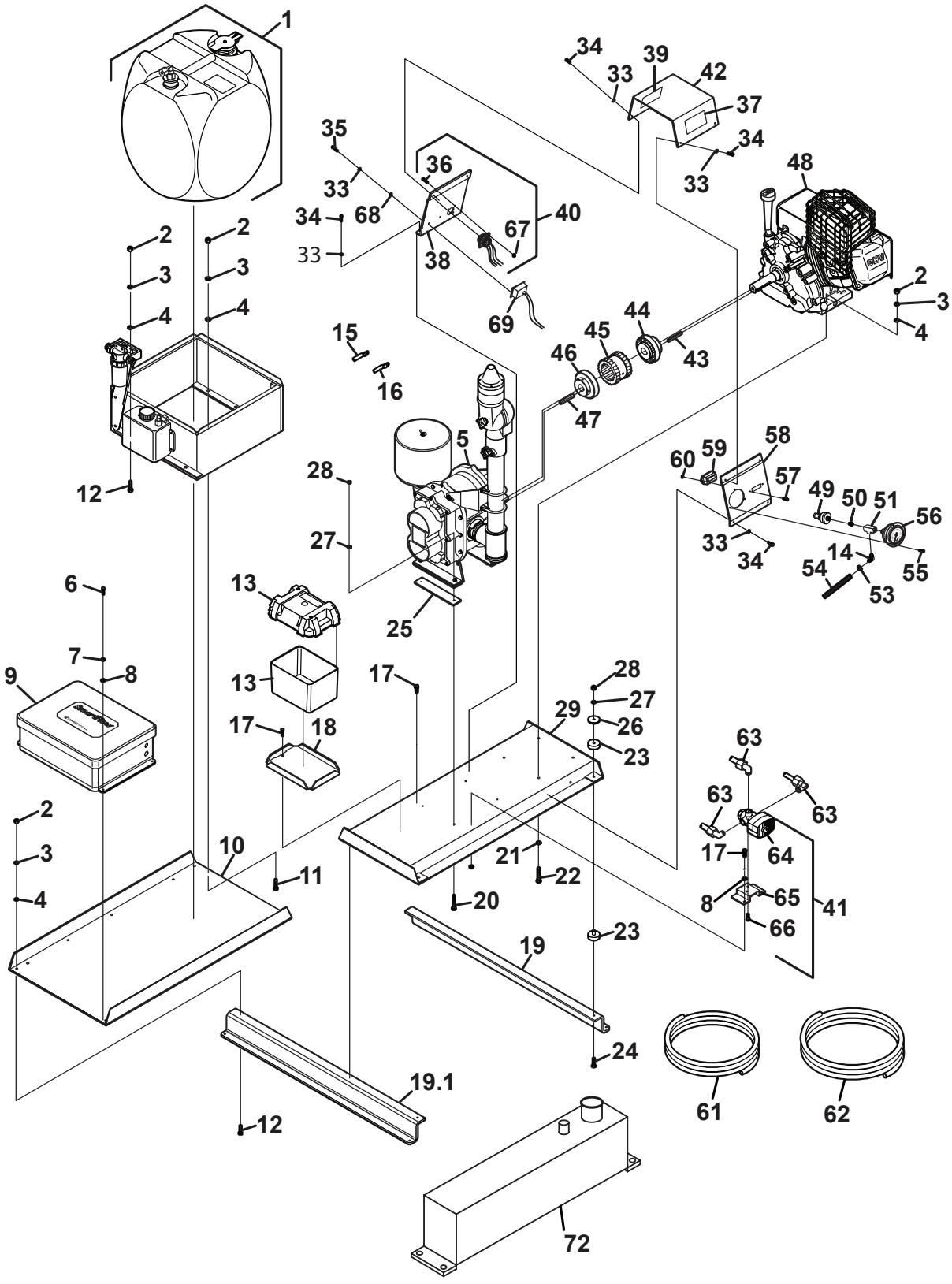


COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
1	1	FORMULATION TANK ASSEMBLY	10296
2	10	HEX NUT 5/16" - 24	11260
3	10	LOCK WASHER 5/16"	11241
4	10	FLAT WASHER 5/16"	11240
5	1	BLOWER ASSEMBLY W/ MAST	10994
6	4	1/4" - 20 X 5/8 PHILLIPS PAN HEAD SCREW	11187
9	1	FLOW CONTROL ASSEMBLY	10976
10	1	TANK TRAY	10916
11	2	BOLT 5/16" - 24 X 1"	11264
12	4	BOLT 5/16" - 24 X 3/4"	11263
13	1	BATTERY BOX	10007
14	1	BRASS ELBOW	10031.1
18	1	TRAY BATTERY	10017
19	1	BASE RAIL, ENGINE	12823
19.1	1	BASE RAIL, ENGINE	12824
20	4	BOLT, 3/8" - 24 X 1 1/4"	11321
21	1	BASERAIL - BLOWER	12824
22	4	BOLT 5/16" - 24 X 2 1/2"	11277
23	4	RUBBER MOUNT	10222
24	4	BOLT 3/8" - 24 X 2"	11323
25	1	.010" SHIM (IF NECESSARY)	10962
26	4	WASHER RUBBER MOUNT	10223
27	8	LOCK WASHER 3/8"	11291
28	8	HEX NUT 3/8" - 24	11320Z
29	1	MAIN FRAME	12624
33	8	#10 INTERNAL LOCK WASHER	11102Z
34	8	PHILLIPS PAN HEAD 10 - 32 X 3/8"	11145Z
35	2	PHILLIPS PAN HEAD 10 - 32 X 1/2"	11147
36	4	6 - 32 X 3/8" PHILLIPS PAN HEAD SCREW	11056
37	1	WARNING LABEL - CONNECTION	10351
38	1	CONNECTION PANEL, COUGAR 8 H.P.	13247
39	1	WARNING LABEL - HEARING	10350
40	1	CONNECTION PANEL ASSEMBLY	13287
41	1	SOLENOID ASSEMBLY, INCLUDES 64,65,66,63	13246
42	1	COUPLING COVER, COUGAR 8 H.P.	12626
43	1	KEY 1/4" X 1/4" X 1 3/4"	10953
44	1	COUPLING HALF, ENG 6S - 1"	10947
45	1	ELEMENT	10949
46	1	COUPLING HALF 6 - S 5/8"	10948
47	1	3/16" x 3/16" x 2" KEY	10954
48	1	ENGINE ASSEMBLY 8 H.P. COUGAR	12846

MAIN ASSEMBLY

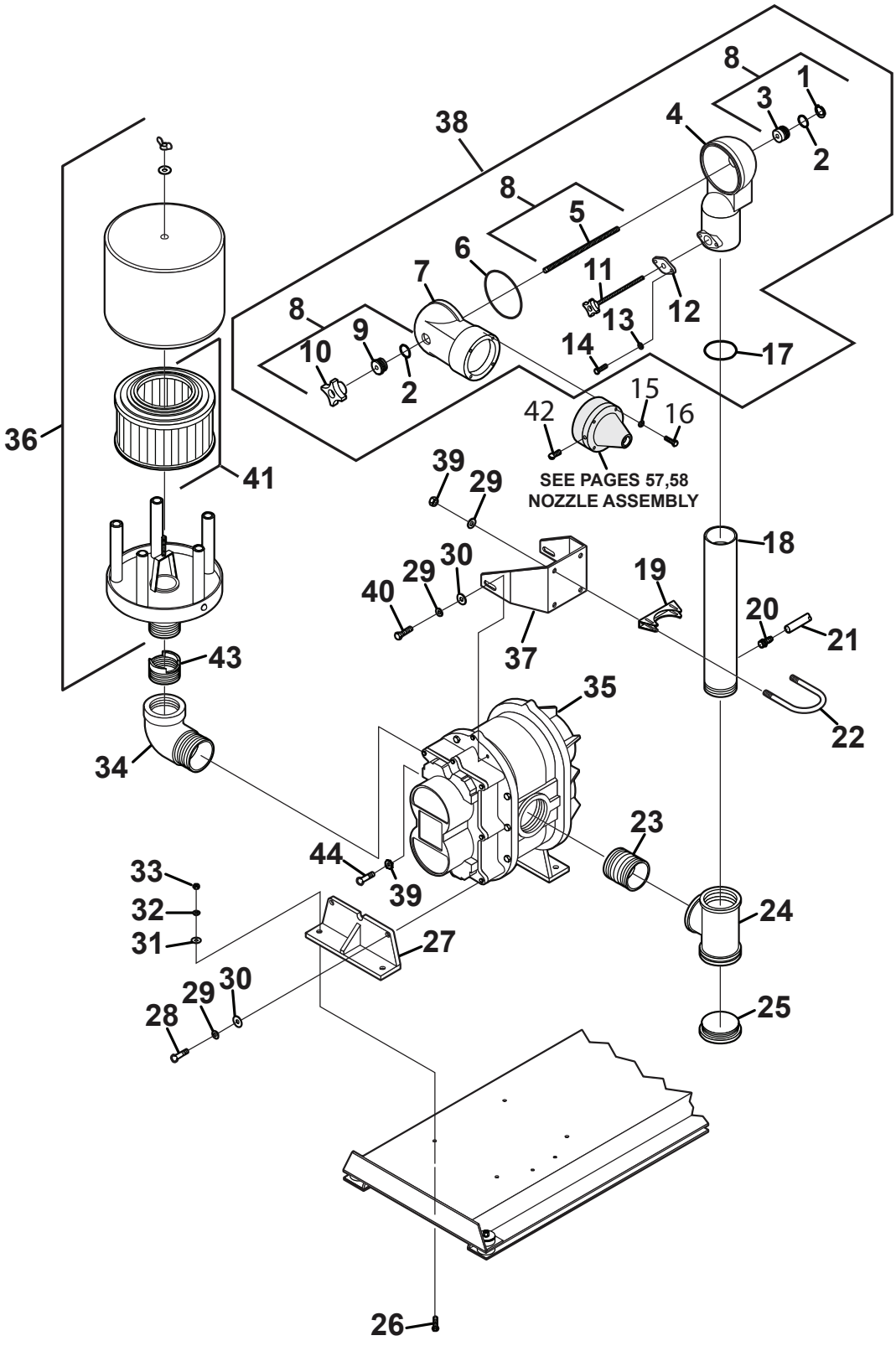
COUGAR® ULV SPRAYER



COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
49	1	PRESSURE SWITCH 1 PSI	12328
50	1	1/4" X 1/8" BRASS BUSHING	10330
51	1	BRASS "TEE" 1/4"	10329
53	2	HOSE CLAMP	10033
54	13.5"	AIRLINE 1/4"	10042
55	3	PHILLIPS PAN HEAD 6 - 32 X 1/4"	11055
56	1	PRESSURE GAUGE	10550
57	2	PHILLIPS PAN HEAD 8 - 32 X 1 1/4"	11088
58	1	GAUGE PANEL, COUGAR 8 H.P.	12623
59	1	TINY TACH	12248
60	2	PLASTIC LOCK NUT 8 - 32	11077
61	AR	1/4" POLY TUBE - ORDER BY THE INCH	10040
62	AR	3/8" POLY TUBE - ORDER BY THE INCH	10041
63	3	MALE JACO 3/8" X 1/4" X 90, INCLUDES 3/8" NUT #10539	10181
64	1	SOLENOID VALVE 3/WAY	10709
65	1	BRACKET	10580
66	2	PHILLIPS PAN HEAD THREAD FORMING 8 - 32 X 1/4"	11090
67	4	LOCK NUT 6-32	11052
68	2	10-32 GREER JAM NYLOCK	11160
69	1	MAGNETO RELAY	13317
	5"	RED WIRE	30512
	11.5"	BLACK WIRE	30504
	13"	VIOLET WIRE	13316
			12863
71	1	GAUGE POINT SUB ASSEMBLY, INCLUDES 14,49,50,51,53,54,55,56,57,58,59,60	12847
70	1	HARNESS ASSEMBLY	13199
72	1	GAS TANK ASSEMBLY	12817

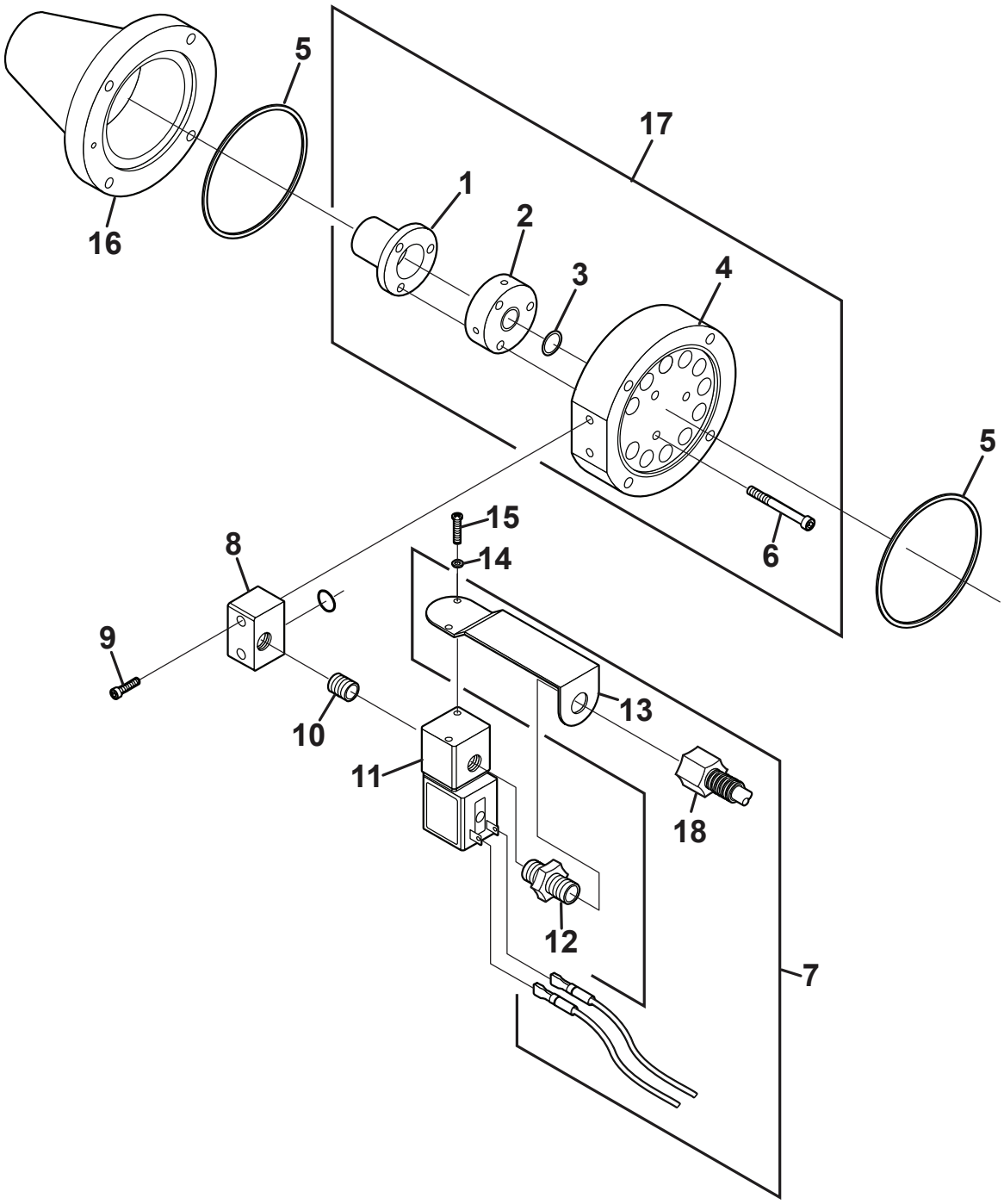
BLOWER ASSEMBLY



COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
1	1	SNAP RING	10293
2	2	O-RING	10167
3	1	PLUG (3/8" - 24)	10183.1
4	1	SWIVEL HALF, INLET	10173
5	1	ROD 3/8" - 24 S.S WITH SPRING PIN 1/8" X 1/2" #11001	10268.1
6	1	O-RING	10184
7	1	SWIVEL HALF, OUTLET	10269
8	1	STUD KNOB ASSEMBLY	10402.1
9	1	PLUG FLANGE	10182
10	1	KNOB	12056
11	1	KNOB, STUD ASSEMBLY	10267
12	1	RETAINER PLATE	10292
13	2	INTERNAL LOCK WASHER 1/4"	10267
14	2	PHILLIPS PAN HEAD SCREW 1/4" - 20 X 3/4"	11189
15	4	HI COLLAR LOCK WASHER #10	11103
16	4	SOCKET CAP SCREW SS 10 - 24 X 1 1/2	11125
17	1	O-RING	10185
18	1	MAST	10194.1
19	2	CLAMP, MAST BRACE	10284A
20	1	1/4" X 1/4" MALE HOSE BARB W/ ORIFICE	11103Z
21	13.5"	AIRLINE 1/4"	10042
22	2	U-BOLT	10284
23	1	NIPPLE, 2" X CLOSE	10289
24	1	TEE, 2"	10288
25	1	PIPE, PLUG, 2"	12013
26	4	BOLT 3/8" -24 X 1-1/4"	11321
27	2	FOOT	10961
28	4	BOLT 5/16" - 18 X 1 1/4"	11257
29	10	LOCK WASHER 5/16"	11241
30	6	FLAT WASHER 5/16"	11240
31	4	FLAT WASHER 3/8"	11290
32	4	LOCK WASHER 3/8"	11291
33	4	NUT, 3/8" - 24	11320Z
34	1	ELBOW	10291
35	1	24 BLOWER	10960
36	1	AIR FILTER ASSEMBLY, INCLUDES 41	10956
37	1	MAST BRACE	10963
38	1	SWIVEL ASSEMBLY	10312
39	5	HEX NUT 5/16" - 18	11250
40	2	BOLT 5/16" - 18 X 1"	11249
41	1	FILTER (REPLACEMENT)	12462
42	1	PHILLIPS PAN HEAD 10-32 X 3/8"	11145Z
42	1	BUSHING	10955
44	1	5/16"-18 X 1-1/2" SQ HD SET SCREW	11278

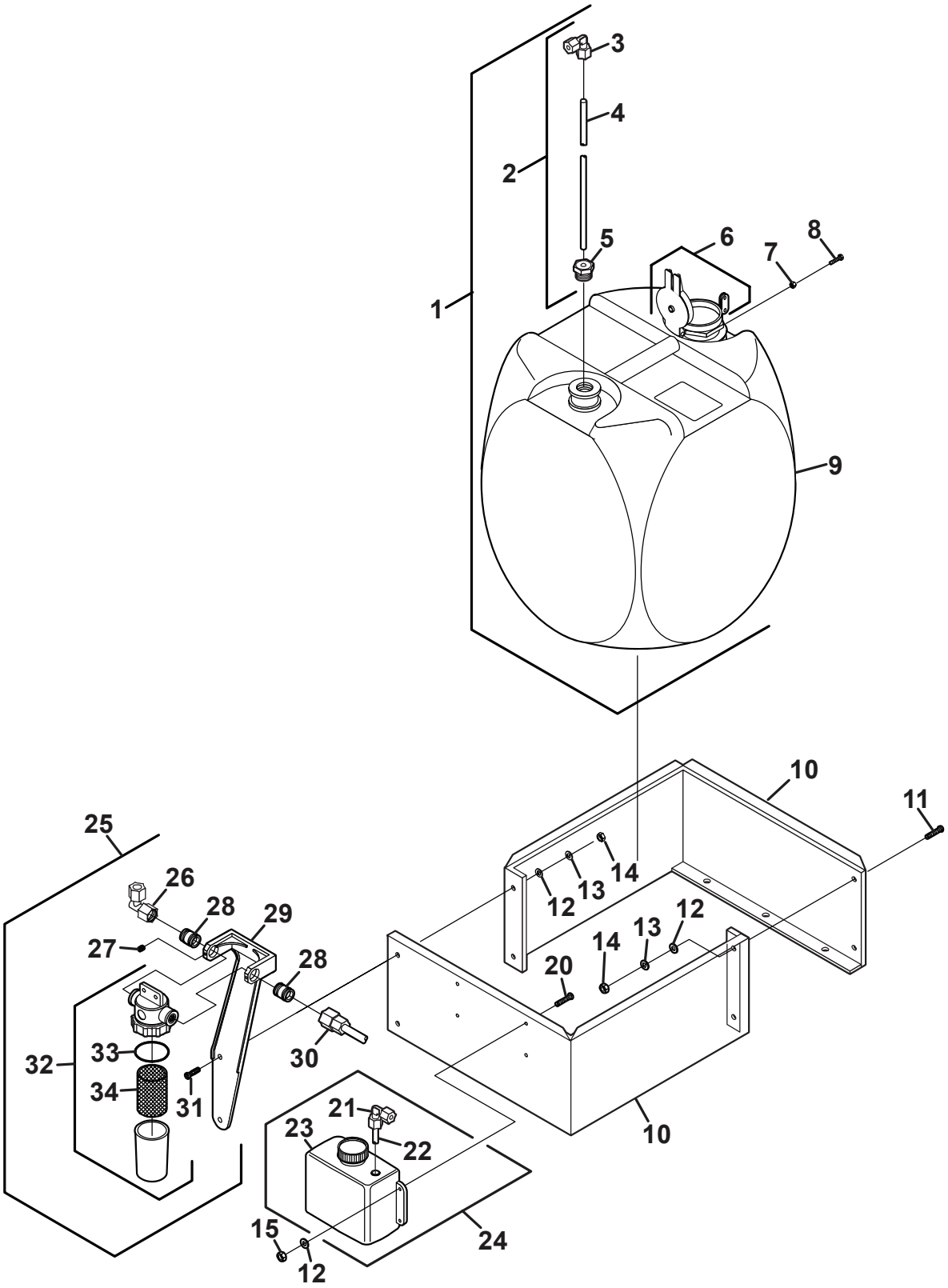
NOZZLE ASSEMBLY



COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
1	1	DIFFUSER CONE, COUGAR 8 H.P.	10972
2	1	MIXING CHAMBER	10974
3	1	O-RING	10166
4	1	FLUID ELEMENT	12516
5	2	O-RING	10185
6	3	SOCKET CAP SCREW S.S. 10 - 32 1 1/4"	11155
7	1	HARNESS ASSEMBLY	12876
8	1	SOLENOID BLOCK	12517
9	2	SOCKET CAP SCREW S.S. 10 - 24 X 1 1/4"	11124Z
10	1	1/8" CLOSE NIPPLE S.S.	10100
11	1	SOLENOID VALVE	10101
12	1	JACO 1/4" X 1/8" MALE	10037
13	1	SOLENOID BRACKET	10021
14	2	LOCK WASHER #4	H1210
15	2	3mm - .5 X 7mm PHILLIPS PAN HEAD	13571
16	1	AIR CAP	10737
17	1	NOZZLE ASSEMBLY	12010
18	1	LOOM	10046
19	1	O-RING	10166

CHEMICAL TANK ASSEMBLY

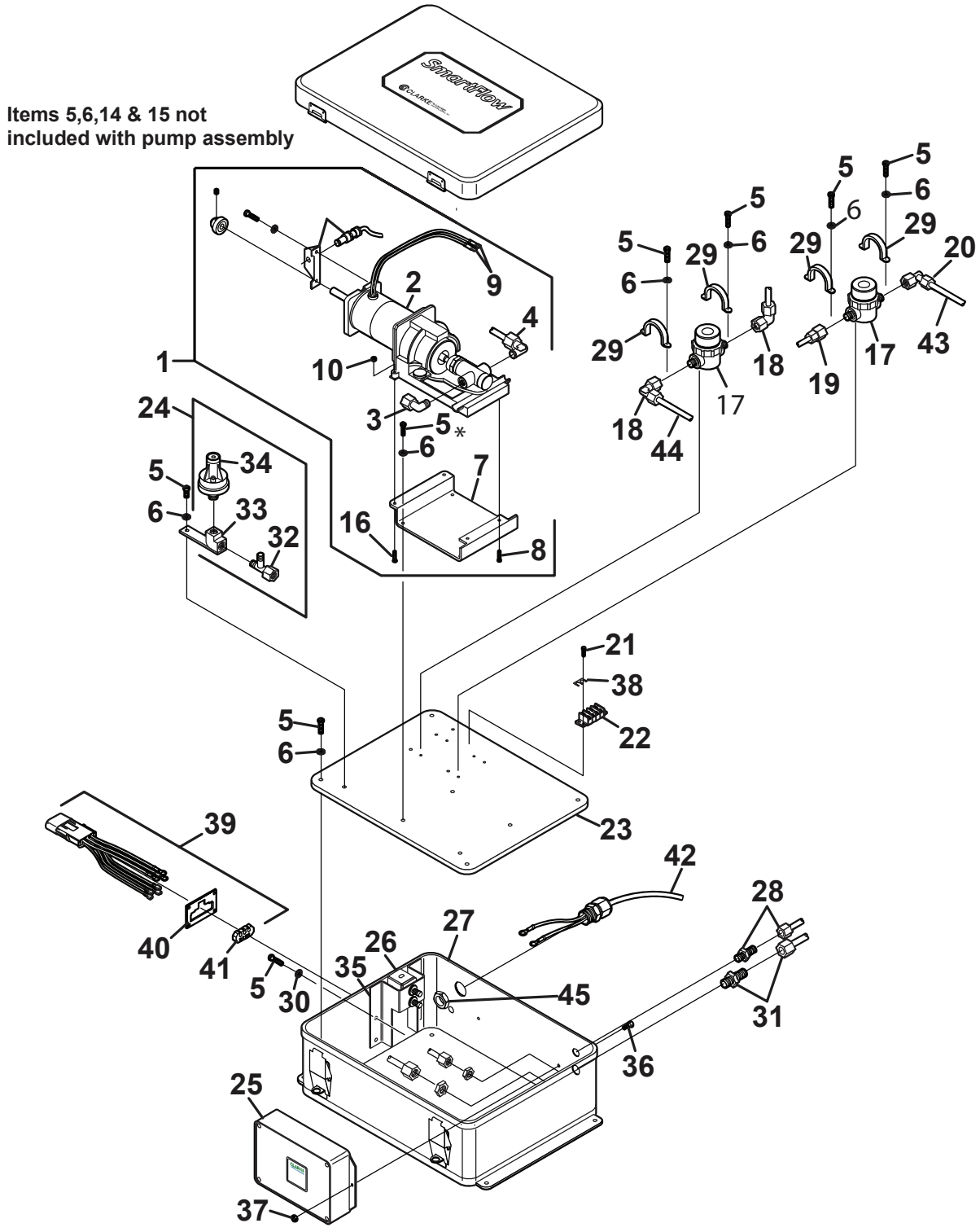


CHEMICAL TANK ASSEMBLY

COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
1	1	CHEMICAL TANK ASSEMBLY	10296
2	1	PICK UP TUBE ASSEMBLY	10298
3	1	3/8" X 1/4" 90° FEMALE ELBOW INCLUDES 3/8" NUT #10539	10204
4	1	PICK UP TUBE WELDMENT	12050
5	1	3/4" X 1/4" NYLON BUSHING DRILLED	10039.1
6	1	TANK CAP ASSEMBLY	10118
7	1	6 - 32 NYLON INSERT LOCK NUT, S.S	11063
8	1	6 - 32 X 5/8" PHILLIPS PAN HEAD SCREW, S.S.	11058Z
9	1	CHEMICAL TANK	10011
10	2	TANK WRAP	10020
11	2	1/4" - 20 X 5/8" PHILLIPS PAN HEAD SCREW	11187
12	8	1/4" SAE FLAT WASHER	11170Z
13	4	1/4" SPLIT LOCK WASHER	11171
14	4	1/4"-20 HEX NUT	11180
15	4	1/4" - 20 NYLON LOCK NUT	11183Z
16	1	O-RING	10170
17	1	BLANK CAP	10052
18	1	PLUG	10067
19	1	PHILLIPS PAN SHEET METAL SCREW #8 - 5/8" S.S.	11083
20	4	1/4" - 20 x 3/4" SOCKET FLAT HEAD	11191
21	1	3/8" X 1/4" X 90 JACO FEMALE ELBOW	10204
22	1	PICKUP TUBE	10429
23	1	FLUSH TANK	10416
24	1	FLUSH TANK ASSEMBLY	12891
25	1	FILTER ASSEMBLY INCLUDES ITEMS 26-34	12829
26	1	3/8 X 3/8 X 90 FEMALE JACO ELBOW	10838
27	2	SET SCREW 10-24 X 1/4	11133Z
28	2	NIPPLE, 3/8 X 1 1/2 STAINLESS STEEL	12843
29	1	CASTING, FILTER SUPPORT	12758
30	1	FEMALE JACO 3/8 X 3/8	10836
31	2	1/4" - 20 X 1 1/4" PHILLIPS PAN HEAD SCREW	11197
32	1	STRAINER	10155
33	1	GASKET	10388
34	1	STRAINER	10390

PUMP BOX ASSEMBLY

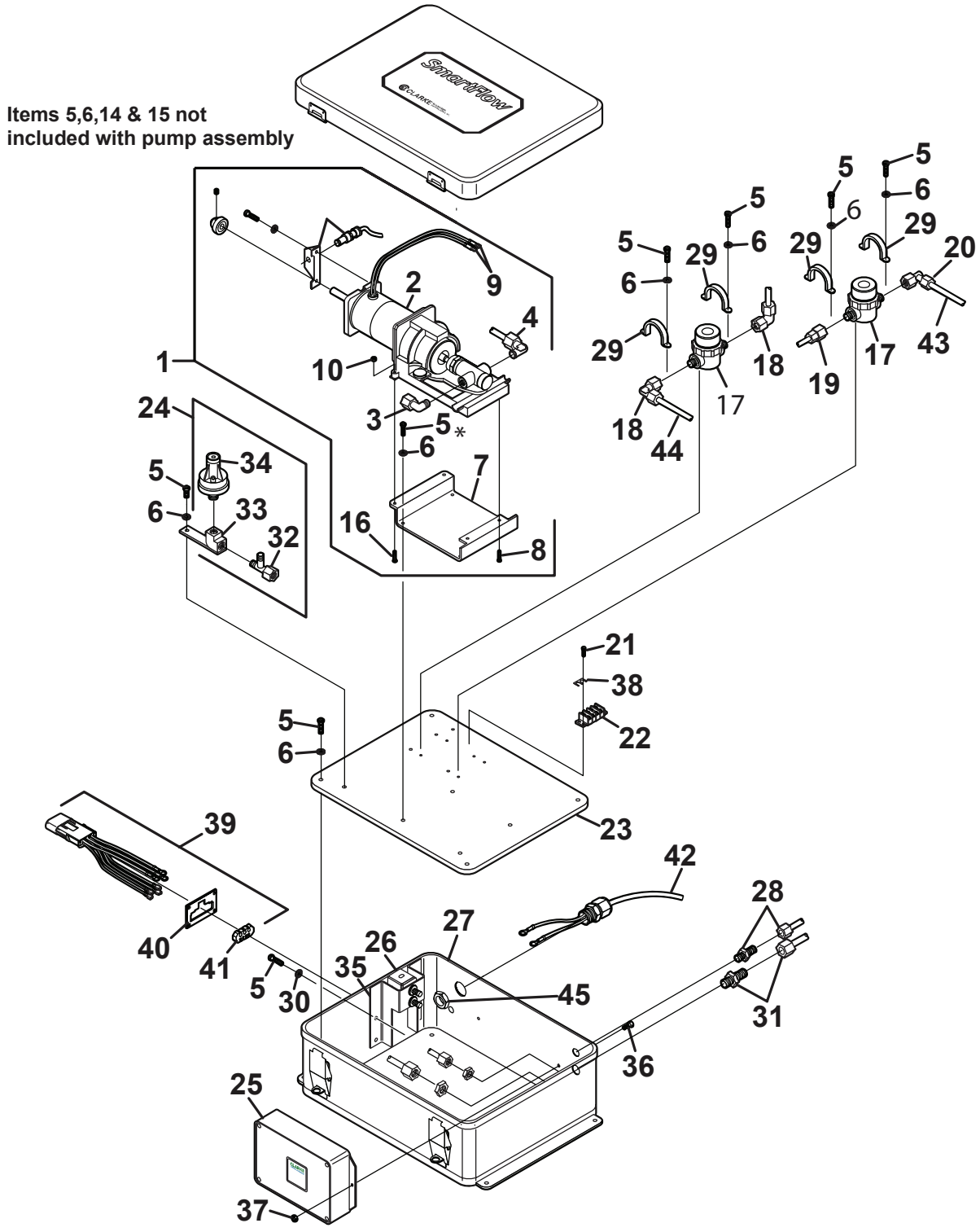


PUMP BOX ASSEMBLY

COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
1	1	PUMP ASSEMBLY	10344
2	1	PUMP	10177
3	1	1/4" X 1/4" X 90° MALE ELBOW INCLUDES 1/4" NUT #10538	10038
4	1	3/8" X 1/4" X 90° MALE ELBOW INCLUDES 3/8" NUT #10539	10181
5	21	10 - 32 X 3/8" PHILLIPS PAN HEAD SCREW	11145Z
6	17	#10 SPLIT LOCK WASHER	11101Z
7	1	PUMP PEDESTAL	10248
8	2	8 X 3/8" PHILLIPS PAN HEAD TAPPING SCREW	11075Z
9	2	#6 SPADE TERMINALS	30553
10	2	8 - 32 NYLON INSERT LOCK	11077
11	1	SET SCREW 8-32 X 1/4"	11072
12	1	HUB MAGNET RING	12946
13	1	MAGNET RING	12947
14	1	MAGNET HUB ASSEMBLY INCLUDES ITEMS 11-13	12948
15	1	BRACKET AND SENSOR ASSEMBLY	12970
16	2	8 - 32 X 7/8" PHILLIPS PAN HEAD SCREW	11081Z
17	2	PULSATION DAMPER	10148
	2	GASKET, PULSATION DAMPER INCLUDED WITH ITEM #17	10387
18	2	3/8" X 1/4" X 90° FEMALE ELBOW INCLUDES 3/8" NUT #10539	10204
19	1	1/4" X 1/4" FEMALE FITTING INCLUDES 1/4" NUT #10538	10128
20	1	1/4" X 1/4" FEMALE ELBOW INCLUDES 1/4" NUT #10538	10127
21	2	6 - 32 X 3/8" PHILLIPS PAN HEAD SCREW	11056
22	1	TERMINAL STRIP	10158
23	1	PANEL	12957
24	1	PRESSURE SWITCH ASSEMBLE	10439
25	1	EPD	12988
26	1	CIRCUIT BREAKER	12930
27	1	PUMP BOX DRILLED	12980
28	1	1/4" BULKHEAD UNION FITTING INCLUDES 1/4" NUT #10538	10179
29	4	CLAMP PULSATION DAMPNER MOUNT	12965
30	4	WASHER INTERNAL #10	11102Z
31	1	3/8" BULKHEAD UNION FITTING INCLUDES 3/8" NUT #10539	10180
32	1	JACO "TEE", INCLUDES 1/4" NUT #10538	10435
33	1	BRASS ELBOW W/ MOUNTING PLATE	10420
34	1	PRESSURE SWITCH - 50 psi	10417
35	1	BRACKET FOR CIRCUIT BREAKER	12967
36	2	SCREW 10-32 X 1/2" PHILLIPS PAN HEAD	11147
37	2	NUT 10-32 GEER JAM NYLOCK	11160
38	1	JUMPER	37211
39	1	HARNESS ASSEMBLY	12991

PUMP BOX ASSEMBLY



COUGAR® ULV SPRAYER

POS	QTY.	DESCRIPTION	PART NO.
40	1	PANEL CONNECTION	12954
41	1	RETAINER, 7 PIN	12904
42	1	CABLE ASSEMBLY (PUMP BOX)	12976
43	AR	1/4" POLY TUBE - ORDER BY THE INCH	10040
44	AR	3/8" POLY TUBE - ORDER BY THE INCH	10041
45	1	NUT	12505
46	2	SCREW 8- 32 X 3/8" PHILLIPS PAN HEAD	11084Z
47	2	#8 INTERNAL LOCK WASHER	11085

TROUBLE SHOOTING

COUGAR® ULV SPRAYER

TROUBLE	POSSIBLE CAUSE	REMEDY
Chemical pump not running when Spray switch turned on.	Defective Spray switch or loose connectors.	Replace.
	Defective Low-Pressure Cut-Off switch.	Replace. For field repair, this switch can be "jumped" by connecting a wire between the terminals on the switch.
	Low-Pressure Cut-Off switch out of adjustment	Adjust as shown on page 12.
Chemical pump runs but no chemical flow.	Leak in suction line.	Check lines, tighten.
	Out of chemical	Check that both chemical tank and flush tank have solution in them.
	Three-way solenoid valve not opening.	Check voltage at connector which goes to the solenoid valve. The voltage should be 12 volts. If not, check for voltage at the control panel.
	Three-way solenoid valve clogged up.	Disassemble and clean.
	Nozzle solenoid valve not opening.	Check voltage at connector which goes to the solenoid valve. The voltage should be 12 volts. If not, check for voltage at the control panel.
	Nozzle solenoid valve clogged up.	Disassemble and clean.
	Line strainer gasket pinched.	Replace gasket.
	Line strainer plugged.	Clean or replace.
	Pump is dry.	Prime with motor oil.
	Pump is defective.	Visually check pump for rotation and piston movement. Repair or replace.
Coupling sleeve damaged or thrown.	Misalignment between engine and blower shafts.	Carefully align engine and blower shafts.

COUGAR® ULV SPRAYER

TROUBLE	POSSIBLE CAUSE	REMEDY
Cannot calibrate to correct particle size.	Air pressure too low, which will produce large particles.	Increase engine speed.
	Air pressure too high, which will produce small particles.	Decrease engine speed.
	Flow rate too high.	Calibrate to correct flow rate.
	Flow rate too low.	Calibrate to correct flow rate.
	Nozzle damaged.	Replace damaged parts.
	Temperature too low.	Calibrate above 70° F.
Chemical drips from nozzle when not running.	Insecticide tank filled completely to top.	Leave a 2" air space at the top of the tank when filling.
	Pump system running.	Defective low-pressure cut-off switch.
Chemical drips from the nozzle while running.	Engine RPM too low.	Set throttle for correct air pressure at nozzle.
	Excessive flow rate.	Set for correct flow rate.
	Insecticide tank filled completely to top.	Leave a 2" air space at the top of the tank.
	If the spray is ON, defective nozzle.	Replace.
	If the spray is OFF, insecticide in blower.	Run to clear blower and flush blower to remove the insecticide.
Chemical flow out of nozzle is noticeably pulsating.	No air dome in pulsation damper.	Check the air dome to make sure it has not become filled with chemical.
Chemical leaks at fittings.	Fittings crossthreaded or defective.	Retighten or replace.

TROUBLE SHOOTING

COUGAR® ULV SPRAYER

TROUBLE	POSSIBLE CAUSE	REMEDY
Chemical pump not running when Spray switch is turned on.	Defective Spray switch or loose connectors.	Replace.
	Defective Low-Pressure Cut-Off switch.	Replace. For field repair, this switch can be "jumped" by connecting a wire between the terminals on the switch.
	Low-Pressure Cut-Off switch out of adjustment.	Adjust as shown on page 14.
Chemical pump runs but no chemical flow.	Leak in suction line.	Check lines, tighten.
	Out of chemical.	Check that both chemical tank and flush tank have solution in them.
	Three-way solenoid valve not opening.	Check voltage at connector which goes to the solenoid valve. The voltage should be 12 volts. If not, check for voltage at the control panel.
	Three-way solenoid valve clogged up.	
	Nozzle solenoid valve not opening.	Disassemble and clean.
	Nozzle solenoid valve clogged up.	Check voltage at connector which goes to the solenoid valve. The voltage should be 12 volts. If not, check for voltage at the control panel.
	Line strainer gasket pinched.	
	Line strainer plugged.	Disassemble and clean.
	Pump is dry.	Replace gasket.
	Pump defective.	Clean or replace.
		Prime with motor oil.
		Visually check pump for rotation and piston movement. Repair or replace.
Coupling sleeve damaged or thrown.	Misalignment between engine and blower shafts.	Carefully align engine and blower shafts.

COUGAR® ULV SPRAYER

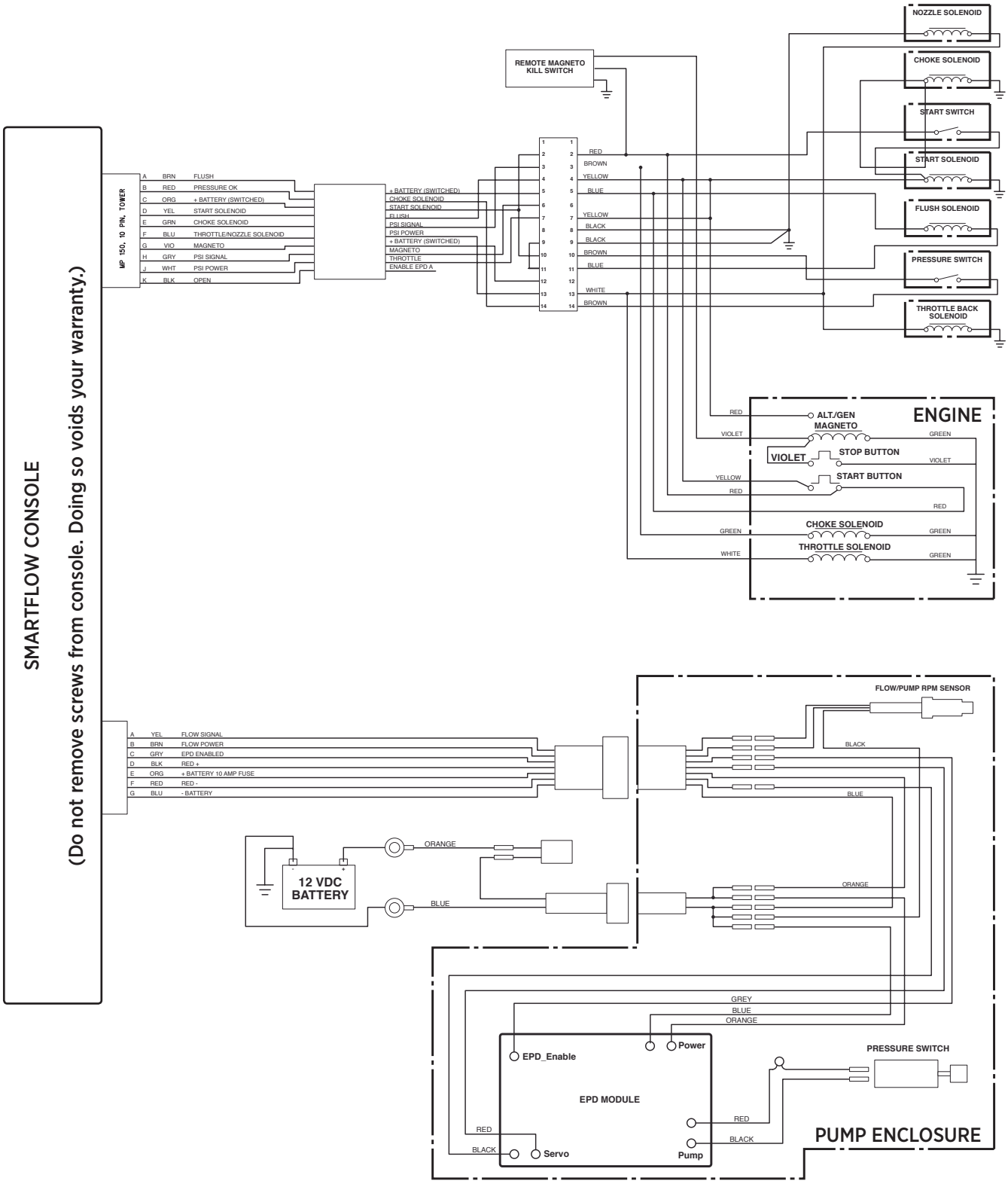
TROUBLE	POSSIBLE CAUSE	REMEDY
Engine backfires.	Gasoline mixture too lean.	Check carburetor.
	Defective spark plugs.	Clean, adjust and/or replace.
	Inlet valves sticking.	Free, clean and adjust valve.
Engine compression low.	Valve clearance improper.	Adjust valve.
	Defective cylinder head.	Consult nearest engine service center.
	Defective valves or piston rings.	Consult nearest engine service center.
	Cylinder head gasket leaks..	Tighten head bolts or replace gasket.
Engine cuts off when the Spray switch is turned on.	Cold engine.	Allow the engine to warm up. Momentarily choke the engine when the Spray switch is turned on.
Engine does not deliver full power.	Carburetor choke valve partly closed.	Adjust choke.
	Air cleaner dirty.	Service air cleaner.
	Carburetor defective.	Clean, adjust or replace.
	Exhaust restricted.	Replace muffler.

TROUBLE SHOOTING

COUGAR® ULV SPRAYER

TROUBLE	POSSIBLE CAUSE	REMEDY
Engine hard to start, will not start or fails.	Main Power switch located on remote control box in OFF position or faulty switch and/or wires.	Place switch in ON position or replace faulty switch and/or wires.
	Ignition switch located on engine defective.	Replace.
	Out of fuel or contaminated fuel. Clogged fuel filter.	Add fuel or clean tank and refuel.
	Spark plugs faulty.	Clean or replace fuel filter.
	Fuel pump or carburetor defective.	Consult nearest engine service
	Defective fuel pump.	
	Terminals loose or wiring defective.	Repair of replace.
	Spark plug wire disconnected.	Tighten loose terminals, replace defective wiring.
	See engine instruction manual.	Connect spark plug wire.
	Pinched or shorted wiring in the control box.	See engine instruction manual.
		Re-route wires and tape them.

COUGAR® ULV SPRAYER



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