

## MODEL 435S - COMET PUMP

### SPECIFICATIONS - P/N 435S-000000

#### PERFORMANCE

DISCHARGE VOLUME.....4.0 GPM / 15.1 LPM  
PUMP HEAD PRESSURE.....3000 PSI / 207 BAR

#### GENERAL

MINIMUM INLET WATER PRESSURE.....40 PSI / 0.68 BAR  
WEIGHT (DRY) .....345 LBS / 156 KG  
HOSE, PUMP TO UNLOADER..... P/N K02-03216A2  
SPRAY TIP.....(#5.0-0DEG) P/N J00-00050-2  
HOSE, DISCHARGE.....3/8" X 50' P/N K02-03150E1  
WAND & TRIGGER GUN..... P/N J06-00158-B  
BELT - ENGINE TO PUMP..... P/N R02-00237

#### PUMP & UNLOADER

PUMP..... P/N N16-00002  
PUMP PULLEY..... P/N R03-00784  
PUMP PULLEY BUSHING..... P/N R04-00001  
WATER FILETR..... P/N C04-00144  
UNLOADER.....P/N C07-03700

#### PUMP ENGINE

ENGINE HORSEPOWER..... 11 HP / 8.2 KW  
ENGINE MAKE..... VANGUARD  
ENGINE STARTING.....RECOIL  
ENGINE PART NUMBER..... P/N F05-00455  
ENGINE PULLEY..... R03-00749  
ENGINE PULLEY BUSHING ..... R04-00006  
ENGINE AIR FILTER.....P/N F05-00454-02  
ENGINE AIR PRE-CLEANER.....P/N F05-00454-01

## MACHINE RECORD

## MAINTENANCE RECORD

**PLACE OF PURCHASE**

**NOTES:**

## SAFETY AND OPERATION

### ENGINE DRIVEN COLD WATER CLEANERS

#### MACHINE UNPACKING

ALL CLEANERS ARE CAREFULLY INSPECTED AND CARTONED TO PROTECT AGAINST SHIPPING DAMAGE. IF THERE IS DAMAGE OR MISSING PARTS, THE TRANSPORTATION COMPANY AGENT SHOULD MAKE A NOTATION TO THAT EFFECT ON THE BILL. REFER TO THE PARTS LIST IN THIS MANUAL AND ADVISE WHAT PARTS ARE MISSING OR DAMAGED. IF AVAILABLE, GIVE THE INVOICE NUMBER ON ALL ORDER BILLS. THIS PROCEDURE WILL ENABLE NEEDED PARTS TO BE SHIPPED QUICKLY.

**READ ALL** Installation, Operation, and Maintenance instructions before operating the machine

**NOTE:** Refer to **CLEANER MODEL** for **SERIAL NUMBER** location

**NOTE:** Dimensions are in inches unless otherwise noted

#### IMPORTANT SAFETY INSTRUCTIONS

1. Before operating this machine, read and observe all safety, unpacking, and operating instructions. Failure to comply with these instructions could create a hazardous situation.
2. The operator of this equipment should be thoroughly familiar with its operation and trained in the job to be accomplished.
3. The operator of this equipment should wear protective face shields and other protective clothing as required for safe operation.
4. The operator of this equipment should not operate this machine when fatigued or under the influence of alcohol or drugs.
5. Do not leave this machine unattended when it is operating.
6. All installations must conform to all applicable local codes. Contact your electrician, plumber, utility company or seller for details.
7. If a water leak is found, **DO NOT OPERATE THE MACHINE**. Shut down the engine and repair.
8. Always point the gun assembly in a safe direction and do not direct spray on the cleaner.
9. Do not operate the machine if any mechanical failure is noted or suspected.
10. **⚠ WARNING:** Never put hands or fingers in wash spray. **DO NOT** point the gun assembly toward your body or at anyone else. Failure to do this could result in serious injury.

11. Do not start the machine unless the gun assembly is firmly gripped by the machine operator. Failure to do this could result in injury from a flying hose and gun assembly.
12. When starting a job, survey the area for possible hazards and correct before proceeding.
13. If chemicals are used in conjunction with this equipment, read and follow the product label directions.
14. All guards, shields, and covers must be replaced after adjustments are made to prevent accidental contact with hazardous parts.
15. Drive belts must be inspected and tightened periodically to operate at optimum levels.
16. Inspect machine for damaged or worn components and repair or replace to avoid potential hazards. Do not operate the machine if any mechanical failure is noted or suspected.
17. Always use the correct size spray tip specified in the GENERAL section of in the **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
18. Do not start the engine until you have observed all safety and operating instructions found in the engine owners manual.
19. Do not refuel the machine while it is running or hot. Allow it to cool sufficiently to prevent ignition of any spilled fuel.

**⚠ WARNING: CARBON MONOXIDE HAZARD**



20. **⚠ WARNING:** DO NOT run engine in an enclosed area. Exhaust gases contain carbon monoxide, an odorless and deadly poison.
21. **⚠ WARNING:** Avoid the exhaust areas as they are dangerously hot during and a short time after operation.

**SAVE THESE INSTRUCTIONS**

<b>PRE START-UP</b>	
<ol style="list-style-type: none"> <li>The first time the machine is operated, after repairs have been made, or if the machine has set for a period of time (30 days or more) follow the following procedures. <ol style="list-style-type: none"> <li>Check the tension of the belt (if so equipped) per instructions in <b>MACHINE MAINTENANCE</b> section.</li> <li>Flush the machine per instructions in <b>MACHINE MAINTENANCE</b> section.</li> </ol> </li> <li><b>CAUTION:</b> Always use the factory supplied pressure wash hose with your machine. Do not substitute other hoses as a potential safety problem may develop.</li> <li><b>CAUTION:</b> If machine has been exposed to sub-freezing temperatures, it must be thoroughly warmed to above freezing before operating. Failure to warm machine can cause damage to the pump packings and other components.</li> </ol>	<ol style="list-style-type: none"> <li>Turn on the water supply.</li> <li>With the gun assembly in hand (on trigger gun models hold the trigger gun valve in open position) and with a good flow of water start the engine per engine owners manual. <p><b>CAUTION:</b> A good flow of water must be flowing from the end of a gun within 30 seconds, before proceeding. Lack of water can cause water pump damage.</p> <p><b>CAUTION:</b> On a machine equipped with a trigger gun valve, if the trigger gun valve remains in the closed position for more than 5 minutes, water pump damage may occur.</p> </li> <li>To <b>APPLY CHEMICAL:</b> (If equipped with chemical valve or injector) <ol style="list-style-type: none"> <li>Mix chemicals per label instructions. Use necessary safety precautions.</li> <li>Insert chemical screen into chemical container</li> <li>Adjust metering valve (if so equipped) per instructions outlined on chemical metering valve insert.</li> <li>If the gun assembly is equipped with variable or multiple nozzle assembly, adjust as desired.</li> </ol> </li> </ol>
<b>START-UP</b>	
<ol style="list-style-type: none"> <li>Refer to the <b>MACHINE MAINTENANCE SCHEDULE</b> for any maintenance to be performed before operation.</li> <li><b>ENGINE:</b> Refer to engine manual for scheduled maintenance to be performed.</li> <li><b>OIL LEVEL:</b> Check the oil level in the water pump, the gear case (if so equipped), and the engine.</li> <li><b>WATER SUPPLY:</b> This machine must have a pressurized water supply meeting or exceeding the maximum discharge volume specified in the PERFORMANCE section, and a minimum water inlet pressure specified in the GENERAL section of the <b>MACHINE SPECIFICATIONS</b>.</li> <li><b>WATER CONDITION:</b> Water containing large amounts of lime, calcium or other similar materials can produce a coating on the inside of the impact nozzle or spray tip and coil pipe.</li> <li><b>FUEL:</b> Fill the fuel tank as specified in the engine owners manual.</li> <li><b>BELT:</b> (if so equipped): Make sure belt tension and condition is as specified in <b>MACHINE MAINTENANCE</b> Section.</li> <li><b>METERING VALVE</b> (if so equipped): Make sure metering valve is closed before operation. If air enters the system through this valve, poor performance and machine damage will occur. Refer to the metering valve insert for proper operation.</li> </ol>	<ol style="list-style-type: none"> <li>To <b>RINSE:</b> <ol style="list-style-type: none"> <li>Close chemical metering valve (if so equipped). NOTE: It is advisable to dip the chemical screen in a container of clean water and open the valve 1 minute to clean the valve of any remaining residue.</li> <li>If the gun assembly is equipped with variable or multiple nozzle assembly, open and close to clean the nozzle of any remaining residue.</li> <li>Start from the top, working downward using long, overlapping strokes.</li> </ol> </li> </ol>
	<b>SHUT-DOWN</b>
	<ol style="list-style-type: none"> <li>Shut down the engine per engine owners manual.</li> <li>Turn off the water supply.</li> <li>If freezing conditions may exist, refer to STORAGE section in the <b>MACHINE MAINTENANCE</b> section.</li> <li>Refer to the engine owners manual for proper engine storage.</li> </ol>

## MACHINE MAINTENANCE

### GAS ENGINE DRIVEN COLD WATER CLEANERS

#### FLUSHING

1. Connect machine to a pressurized water supply meeting the requirements specified in the GENERAL section of the **MODEL SPECIFICATIONS**.
2. Turn on the water supply.
3. Remove spray tip from gun assembly.
4. With gun assembly in hand, start engine. On trigger gun models hold the trigger gun valve in open position.

**CAUTION:** DO NOT RUN PUMP WITHOUT WATER, AS THIS WILL CAUSE DAMAGE TO THE PUMP AND VOID WARRANTY.

5. When clean water flows from gun, turn off the switch.
6. Reinstall spray tip.
7. With gun assembly in hand, turn on the switch. On trigger gun models hold the trigger gun valve in open position.
8. When clean water flows from gun, turn off the engine.
9. If freezing conditions may exist, refer to "STORAGE" section.
10. Turn off and disconnect the water supply.

#### STORAGE

1. Rinse the Soap Line by inserting the screen into a container of clear water and open the metering valve 1 minute to clean it of any remaining residue. Be sure the chemical metering valve is closed when finished.
2. Disconnect the water supply.
3. Remove the spray tip nozzle from gun assembly and wire to machine.
4. Attach an air chuck to the air valve stem on the pump assembly. With the trigger gun in the open position, apply air until a mixture of air and very little water is coming from the gun wand
5. Fill a 1-gallon container with Ethylene Glycol type antifreeze. Minimum should be a mixture of  $\frac{1}{2}$  antifreeze and  $\frac{1}{2}$  water strength before each use, as the antifreeze will dilute with each use.
6. Install a 2-ft. Garden hose to the water inlet. Insert the other end into a container of antifreeze solution.
7. With the discharge gun assembly in hand, turn on the switch. On trigger gun models

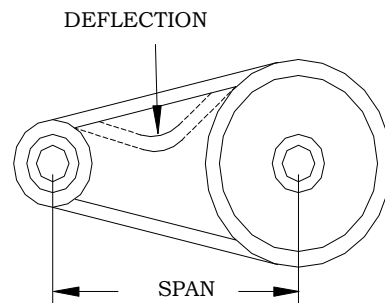
hold the trigger gun valve in open position.

8. Shut off the engine just prior to running out of antifreeze mixture.
9. Disconnect the battery and follow storage procedures for the engine per engine owners manual.
10. Disconnect gun and hose.
11. Place machine and battery in a dry place protected from weather conditions.

#### SPRAY TIP MAINTENANCE

1. Remove the spray tip from the gun assembly.
2. Blow out debris with compressed air from the outside in. Any debris remaining in the inlet side of the nozzle should be cleaned out. If lime or chemical scale is present in the inlet side, the nozzle may be soaked in descaling solution, white vinegar, or replaced. If the tip is too worn, replace with one specified in the GENERAL section of the **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
3. Before replacing spray tip flush the machine per "FLUSHING".
4. Reinstall Spray tip to gun assembly.

#### BELT TENSION



1. Correct belt tension will allow a  $\frac{1}{64}$ -inch deflection for each inch of span between pulley centers with a 6-pound force applied in the middle of the span.  
EXAMPLE: A 6-pound force applied at the middle of an 8 inch span should produce a deflection of  $\frac{8}{64}$  inch or  $\frac{1}{8}$  inch.
2. Belts can be tightened or loosened by loosening the nuts holding the pump assembly to the motor mount. Then tighten or loosen the j-bolt on the motor mount. Retighten the pump assembly after the desired tension is reached.

## MACHINE MAINTENANCE SCHEDULE

COLD WATER CLEANERS	DAILY	EACH HR FIRST 8 HRS	AFTER FIRST 50 HRS	EVERY 50 HRS	EVERY 500 HRS	YEARLY
<b>1. OIL BATH WATER PUMP:</b>  Oil Level – check and add as needed per <b>PUMP SERVICE</b> insert.  Oil Change – drain and refill per <b>PUMP SERVICE</b> insert. <b>CAUTION:</b> Used oil must be disposed into an environment safe container and brought to an oil recycling center.  Oil Contamination – Milky color indicates water	●		●		●	
<b>2. HOSES:</b>  Blistering, Loose Covering.  Abrasion of cover exposing reinforcement.  Cuts exposing reinforcement.	●					
<b>3. BELTS:</b>  Cracks or fraying  For correct belt tension, see <b>MACHINE MAINTENANCE</b> insert.	●	●		●		
<b>4. FILTER – WATER:</b>  Check water inlet hose screen for debris  Check float tank (If so equipped) screen for debris  Check water filter (if so equipped) screen for debris	●					
<b>5. SPRAY TIP:</b>  Check Tip for debris.	●					●
<b>8. GUARDS AND SHIELDS:</b>  Check that all guards and shields are in place and secure.	●					
<b>9. FREEZING TEMPERATURES:</b>  Freezing temperatures break water pumps and like components. See STORAGE in the <b>MACHINE MAINTENANCE</b> section for cold weather instructions.	●					

## **CLEANER TROUBLESHOOTING**

### **ENGINE DRIVEN COLD WATER CLEANERS**

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>
1. Poor Cleaning Action.	A. Hard water. B. Low Pressure. C. Little or no chemical being drawn. D. Improper chemical. E. Improper chemical mixture  F. Low discharge pressure.	A. Connect machine to water softener. B. See "Low operating pressure" C. See "Machine will not draw chemical".  D. Obtain proper chemical. E. Mix chemicals per the label. Follow all mixing , handling, application, and disposal instructions. F. See "Low operating pressure"
2. Machine will not draw chemical.	A. No chemical solution. B. Metering valve not open. C. Chemical line strainer clogged. D. Air leak in chemical line.  E. Metering valve clogged.	A. Replenish supply. B. Turn metering valve knob to open. C. Remove screen and clean.  D. Tighten all fittings and hoses for the chemical line. E. Disassemble and clean.
3. Low operating pressure	A. Insufficient water supply.   B. Incoming water hose too small. C. Water supply hose too long. D. Belt slippage. E. Worn Belt. F. Spray tip worn or wrong size.  G. Dirty or worn check valves in water pump. H. Water supply hose kinked. I. Inlet filter screen clogged.  J. Engine runs slow.  K. Air leak in inlet plumbing. L. Defective water pump. M. Leaking discharge hose.   N. Chemical metering valve open and sucking air. O. Defective unloader valve (if so equipped).	A. The water supply must meet or exceed the maximum discharge volume specified in the PERFORMANCE section, and the minimum water inlet pressure specified in the GENERAL section of <b>MODEL SPECIFICATIONS</b> . B. Use larger water supply hose. C. Use shorter water supply hose.  D. Tighten belt per instructions on <b>MACHINE MAINTENANCE</b> . E. Replace belt per <b>CLEANER EXPLODED VIEW</b> . F. Replace with proper size spray tip specified in the GENERAL section of the <b>MODEL SPECIFICATION</b> or <b>MODEL EXPLODED VIEW</b> for proper size. G. See <b>PUMP TROUBLESHOOTING</b> .  H. Straighten hose. I. Clean water filter screen or hose inlet screen. J. See "Engine starts slow or overheats and stops". K. Tighten all fittings. L. See <b>PUMP TROUBLESHOOTING</b> . M. If a water leak is found, <b>DO NOT OPERATE THE MACHINE</b> . Disconnect the power and replace hose. N. Resupply chemical, place soap screen in water, or shut off metering valve. O. Repair or replace unloader valve.

<b>CLEANER TROUBLESHOOTING (CONT.)</b>		
<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>
4. Excessive,unusual noise.	A. Pump B. Defective engine.  C. Pulleys rubbing. D. Misalignment of pump and engine.	A. See <b>PUMP TROUBLESHOOTING</b> . B. Call service technician or take engine to Repair/Warranty station. C. Adjust shields or pulley(s). D. Realign pump and engine.
5. Belts slipping.	A. Belts too loose.  B. Excessive Back Pressure C. Defective Water Pump.	A. Tighten belt per instructions in <b>MACHINE MAINTENANCE</b> . B. See "Excessive Back Pressure" C. See <b>GENERAL PUMP SERVICE</b> .
6. Excessive Back Pressure	A. Spray tip built up with lime.    B. Water pump turning too fast.	A. Remove and clean, or replace spray tip with tip specified in the GENERAL section of <b>MODEL SPECIFICATIONS</b> or <b>MODEL EXPLODED VIEW</b> . Flush machine per <b>FLUSHING</b> in <b>MACHINE MAINTENANCE</b> . B. See <b>MODEL SPECIFICATIONS</b> .
7. Excessive vibration.	A. Defective Belt.    B. Defective Pump.	A. Remove and replace using belt specified in <b>CLEANER EXPLODED VIEW</b> or the GENERAL section of <b>MODEL SPECIFICATIONS</b> . Tighten belt per instructions on <b>MACHINE MAINTENANCE</b> schedule. B. See <b>PUMP TROUBLESHOOTING</b> .
8. Spray pattern is broken or irregular.	A. Clogged spray tip   B. Worn or incorrect spray tip	A. Remove and clean spray tip per SPRAY TIP MAINTENANCE in <b>MACHINE MAINTENANCE</b> B. Remove and replace with tip specified in the GENERAL section of <b>MODEL SPECIFICATIONS</b> or <b>MODEL EXPLODED VIEW</b>
9. Engine will not start.	A. No fuel.  B. Plugged fuel filter. C. Water in fuel. D. Defective or corroded battery cable. E. Defective engine.	A. Replenish fuel as specified in engine owners manual. B. Change engine fuel filter. C. Drain and replenish fuel. D. Clean cables and cable ends. E. Call service technician.
10. Engine starts slow or overheats and stops.	A. Improper fuel.  B. Excessive back pressure. C. Defective engine.  D. Dirt in fuel line or filters. E. Incorrect oil level.  F. Engine overloaded. G. Dirty air cleaner.  H. Faulty spark plug.	A. Replenish fuel as specified in engine owners manual. B. See "Excessive Back Pressure" C. Call service technician, or take engine to Repair/Warranty station. D. Clean line or replace filter. E. Check oil level per engine owners manual. F. See "Excessive Back Pressure" G. Change air cleaner filters per engine owners manual. H. Change plug and set gap per engine owners manual.



## ***PUMP TROUBLESHOOTING***

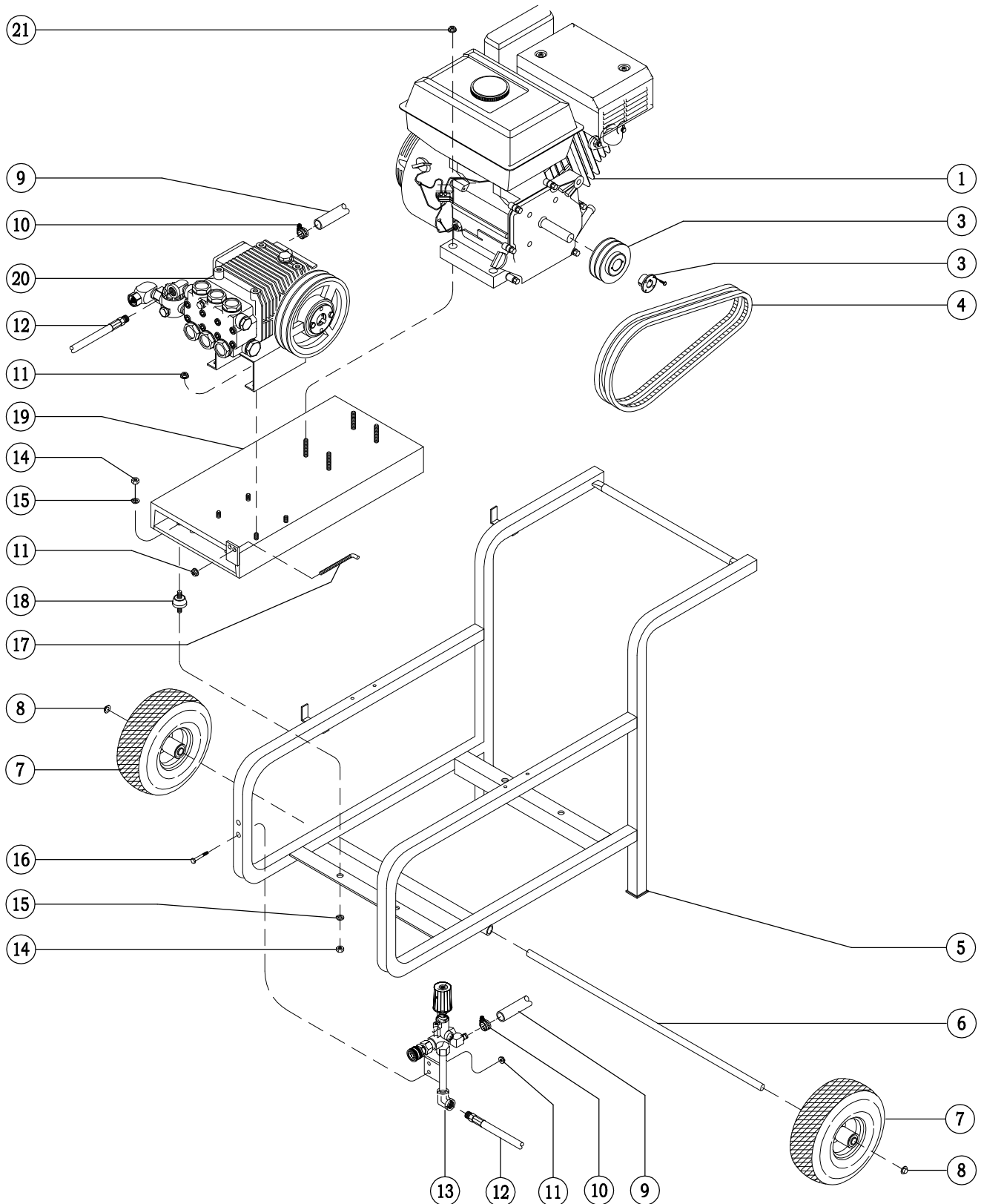
<b><i>TROUBLE</i></b>	<b><i>POSSIBLE CAUSE</i></b>	<b><i>REMEDY</i></b>
1. Oil leaking in the area of water pump crankshaft.	A. Worn crankshaft seal. B. Bad bearing. C. Grooved shaft. D. Failure of retainer o-ring	A. Remove and replace. B. Remove and replace. C. Remove and replace. D. Remove and replace.
2. Excessive play on crankshaft.	A. Defective bearings. B. Excess shims.	A. See "Worn bearing". B. Set up crankshaft.
3. Loud knocking in pump.	A. Loose connecting rod screws. B. Worn connecting rod. C. Worn bearings. D. Loose plunger bushing screw.	A. Tighten connecting rod screws per <b>PUMP SPECIFICATIONS</b> . B. Replace connecting rod per <b>PUMP MAINTENANCE</b> . C. Replace bearings per <b>PUMP MAINTENANCE</b> . D. Tighten plunger screw per <b>PUMP SPECIFICATOINS</b> .
4. Oil leaking at the rear portion of the pump.	A. Damaged or improperly installed oil gauge window gasket. B. Damaged or improperly installed rear cover. C. Oil gauge loosed. D. Rear cover screws loose. E. Pump overfilled with oil, displaced through crankcase breather hole in oil cap/dipstick.	A. Replace gasket or o-ring. B. Replace gasket or o-ring. C. Tighten oil gauge. D. Tighten rear screws. to torque values in <b>PUMP SPECIFCATIONS. S</b> E. Drain oil: refill to recommended oil level as stated in <b>OIL LEVEL</b> in <b>PUMP MAINTENANCE</b> .
5. Water in crankcase	A. May be caused by humid air condensing into water inside the crankcase. B. Worn or damaged plunger screw o-ring.	A. Maintain or step up lubrication schedule. B. Remove and replace. See <b>PLUNGER SERVICE</b> in <b>PUMP MAINTENANCE</b> .
6. Worn bearing	A. Excessive belt tension. B. Oil contamination.	A. See <b>BELT TENSION</b> in <b>MACHINE MAINTENANCE</b> . B. Check oil type and change intervals per <b>PUMP SPECIFICATIONS</b> .
7. Short bearing life	A. Excessive belt tension. B. Misalignment between pump and motor. C. Oil has not been changed on regular basis.	A. See <b>BELT TENSION</b> in <b>MACHINE MAINTENANCE</b> . B. Re-align pump and motor. C. Check oil type and change intervals per <b>PUMP SPECIFICATIONS</b> .
8. Short seal life	A. Damaged plunger bushing. B. Worn connecting rod. C. Excess pressure beyond the pump's maximum rating. D. High water temperature.	A. Replace punger bushing. B. Peplace connecting rod. C. Match pressure stated in <b>PUMP SPECIFICATIONS</b> . D. Lower water tempersture stated in <b>PUMP SPECIFCATIONS</b> .

## **PUMP TROUBLESHOOTING**

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>
9. Dirty or worn check valves.	A. Normal wear. B. Debris	A. Remove and replace. B. Check for lack of water inlet screens.
10. Presence of metal particles during oil change.	A. Failure of internal component. B. New pump.	A. Remove and disassemble to find probable cause. B. New pumps have machine fillings and debris and should be drained and refilled per <b>PUMP SPECIFICATIONS</b> .
11. Water leakage from under head.	A. Worn packing. B. Cracked/scored plunger. C. Failure of plunger retainer o-ring.	A. Install new packing. B. Remove and replace plunger. C. Remove and replace plunger retainer o-ring.
12. Loud knocking noise in pump	A. Pulley loose on crankshaft. B. Defective bearing. C. Worn connecting rod. D. Worn crankshaft. E. Worn crosshead.	A. Check key and tighten set screw. B. Remove and replace bearing. C. Remove and replace connecting rod. D. Remove and replace crankshaft. E. Remove and replace crosshead.
13. Frequent or premature failure of the packing	A. Scored, damaged, or worn plunger. B. Overpressure to inlet manifold. C. Abrasive material in the fluid being pumped. D. Excessive pressure and or temperature of fluid being pumped. E. Over pressure of pumps. F. Running pump dry.	A. Remove and replace plungers. B. Reduce inlet pressure. C. Install proper filtration on pump inlet pumping. D. Check pressures and fluid inlet temperature; be sure they are within specified range. E. Reduce pressure. F. Do not run pump without water.
14. Low Pressure	A. Dirty or worn check valves. B. Worn packing. C. Belt slipping.  D. Improperly sized spray tip or nozzle. E. Inlet filter screen is clogged. F. Pitted valves.	A. Clean/Replace check valves. B. Remove and replace packing. C. See BELT TENSION in <b>MACHINE MAINTENANCE</b> . D. See <b>MACHINE SPECIFICATIONS</b> for specified spray tip or nozzle. E. Clean inlet filter screen. F. See VALVE SERVICE in <b>PUMP MAINTENANCE</b> .
15. Erratic pressure: pump runs rough	A. Dirty or worn check valves. B. Foreign particles in valve assemblies. C. High inlet water temperature	A. Clean/Replace check valves. A. Clean/Replace check valves. C. See temperature in <b>PUMP SPECIFICATIONS</b> .
16. Excessive vibration	A. Dirty or worn check valves	A. See "Dirty or worn check valves"
17. Scored plungers	A. Abrasive material in fluid being pumped.	A. Install proper filtration on pump inlet plumbing
18. Pitted plungers	A. Cavitation	A. Decrease inlet water temperature and/or increase inlet water pressure.
19. Cavitation	A. High inlet fluid temperature Low inlet pressure.	A. Lower inlet fluid temperature. Raise inlet fluid pressure.

# ASSEMBLY, CLEANER

## EXPLODED VIEW



## ASSEMBLY, CLEANER - 435S TRIGGER GUN

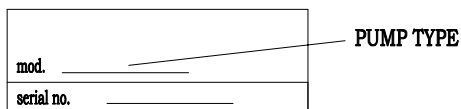
### PARTS LIST - P/N 435S-00603

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	F05-00455	ENGINE, GAS - 11HP VANGUARD	12	K02-03216A2	ASSEMBLY, HOSE
2	R03-00749	PULLEY, DOUBLE V	* 13	435S-00515	ASSEMBLY, UNLOADER
3	R04-00006	BUSHING, PULLEY	14	H06-50001	NUT, HEX
4	R02-00237	BELT, V	15	H05-50001	WASHER, LOCK
5	425S-00130	FRAME, BALCK	16	H04-31326	SCREW, CAP
6	AR58-02703	ROD, AXLE	17	H03-31311	BOLT, J
7	G02-10016B	ASSEMBLY, TIRE & RIM	18	H10-50000	MOUNT, RUBBER
8	H06-62500	NUT, PAL	19	435S-00134	MOUNT, ENGINE & PUMP
9	K33-01400	HOSE, WATER	* 20	435S-00501	ASSEMBLY, PUMP
10	W02-00032	CLAMP, HOSE	21	H06-37500	NUT, HEX
11	H06-31300	NUT, HEX	*For Breakdown See Z08-02791 (13), Z08-02806 (20)		

## COMET PUMP SERVICE

### PUMP IDENTIFICATION

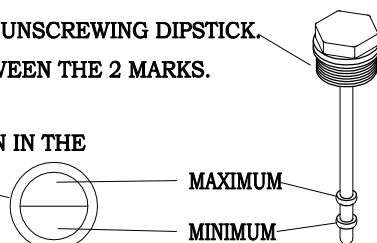
PUMP I.D. PLATE FOUND BEHIND PUMP HEAD.  
NOTE LOCATION OF INFORMATION ON THE PLATE BELOW



### OIL LEVEL

CHECK THE OIL LEVEL BY UNSCREWING DIPSTICK.  
THE LEVEL SHOULD BE BETWEEN THE 2 MARKS.

OIL LEVEL IS ALSO SHOWN IN THE  
ROUND INDICATOR.

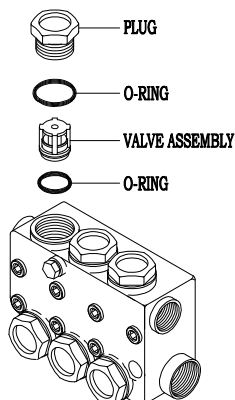


### VALVE SERVICE

1. REMOVE THE PLUGS HOLDING THE VALVE ASSEMBLIES.
2. REMOVE AND DISCARD O-RINGS FROM PLUGS. CLEAN PLUGS WITH SOLVENT OR SOAP AND WATER AND ALLOW TO DRY.
3. USING FINGERS, NEEDLE NOSE PLIERS, OR HOOK SHAPED TOOL, REMOVE VALVE ASSEMBLIES FROM HEAD. REMOVE AND DISCARD THE O-RINGS FROM THE VALVE ASSEMBLIES AND/OR HEAD. EXAMINE EACH VALVE ASSEMBLY AND DISCARD DAMAGED ASSEMBLIES USING INSERT SHEET FOR PART NUMBERS OF REPLACEMENT.
4. CLEAN ANY ACCUMULATED DEBRIS FROM THE VALVE CAVITIES AND FLUSH WITH CLEAN WATER.
5. WASH THE VALVE ASSEMBLIES IN CLEAN WATER AND RINSE. WHILE STILL WET, TEST EACH VALVE ASSEMBLY BY HOLDING THE GUIDE AND SUCKING ON THE VALVE SEAT. A PROPERLY SEATING VALVE WILL ALLOW GOOD VACUUM TO BE DEVELOPED AND MAINTAINED, WHILE A MALFUNCTIONING VALVE WILL NOT. GOOD VALVES SHOULD BE SET ASIDE FOR INSTALLATION IN STEP 6.
6. TO REINSTALL VALVE:

LUBRICATE A NEW O-RING WITH PUMP CRANKCASE OIL AND INSTALL INTO THE VALVE CAVITY IN THE HEAD. INSTALL A GOOD VALVE ASSEMBLY INTO THE CAVITY AS ILLUSTRATED.

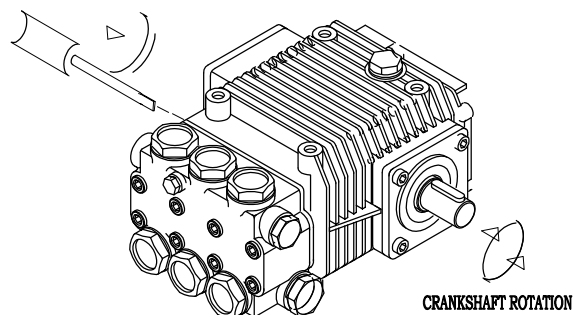
7. LUBRICATE A NEW O-RING AND PLACE ON CLEANED PLUG REMOVED IN STEP 2. INSTALL THE PLUG INTO THE HEAD TIGHTENING BY HAND THEN TORQUE TO VALUE INDICATED ON THE PUMP INSERT.



### HEAD REMOVAL

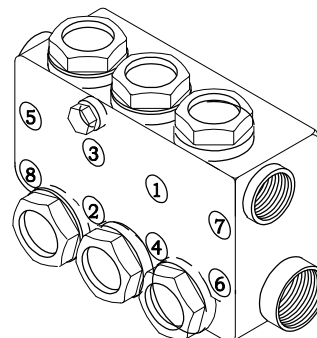
#### PUMP HEAD REMOVAL

1. REMOVE THE CAPSCREWS HOLDING THE PUMP HEAD TO THE CRANKCASE. A METRIC TOOL IS REQUIRED FOR THIS STEP.
2. REMOVE THE HEAD BY ROTATING THE CRANKSHAFT AND LEVERING BETWEEN HEAD AND CRANKCASE. KEEP HEAD PARALLEL TO THE FRONT SURFACE OF CRANKCASE TO PREVENT BINDING ON PLUNGERS. ONCE HEAD IS REMOVED PROTECT EXPOSED PLUNGERS FROM DAMAGE.
3. FOR PLUNGER, SEALS, AND PACKING MAINTENANCE SEE SEPARATE SECTIONS LATER IN THIS INSERT.



#### PUMP HEAD REINSTALLATION

1. ROTATE CRANKSHAFT SO TWO OUTER PLUNGERS ARE PROJECTING THE SAME DISTANCE FROM CRANKCASE.
2. LUBRICATE EXPOSED PLUNGERS WITH CRANKCASE OIL.
3. START HEAD ONTO PLUNGERS AND USING SOFT Mallet, TAP HEAD EVENLY UNTIL IT CONTACTS THE CRANKCASE.
4. START THE CAPSCREWS THROUGH THE HEAD AND INTO THE CRANKCASE.
5. TIGHTEN ALL SCREWS BY HAND, THEN TIGHTEN CAPSCREWS TO THE VALUE LISTED IN THE "TORQUE SPECIFICATIONS" FOUND ON THE PUMP INSERT. TORQUE CAPSCREWS IN THE ORDER LISTED BELOW.

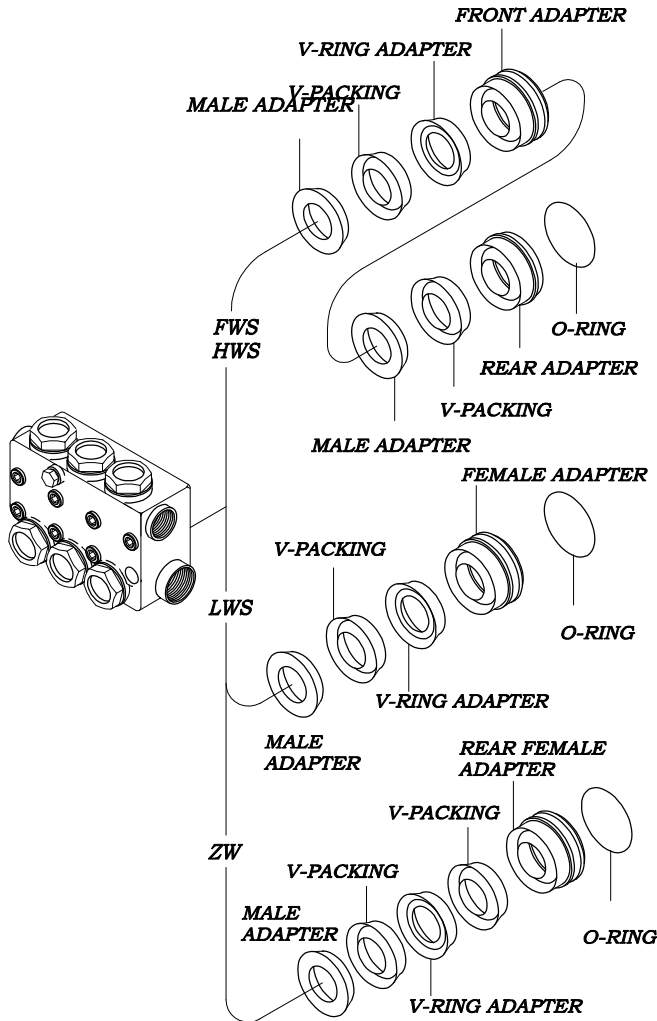


## COMET PUMP SERVICE

### PACKING SERVICING

#### PACKING REMOVAL

1. REMOVE PUMP HEAD AS INSTRUCTED ON Z08-02761.
  2. USING THE SEAL EXTRACTOR TOOL REMOVE THE ADAPTERS, V-RINGS, AND V-PACKINGS AS BELOW.
- NOTE: REFER TO SERIES LISTED ON PUMP PLATE.



#### PACKING & HEAD INSPECTION

1. CLEAN PACKING CAVITIES IN HEAD AND RINSE WITH CLEAN WATER. CLEAN EXPOSED PLUNGERS.
2. CLEAN MALE AND FEMALE ADAPTERS WITH SOAP AND WATER AND ALLOW TO DRY.
3. INSPECT MALE AND FEMALE ADAPTERS AND DISCARD WORN ITEMS.

#### PACKING INSTALLATION

1. LUBRICATE PACKING CAVITIES IN HEAD AND ALL PACKINGS AND ADAPTERS WITH PUMP CRANKCASE OIL.
2. LAY HEAD ON BENCH WITH PACKING CAVITIES UP.
3. INSTALL PACKINGS AS ILLUSTRATED ABOVE.
4. RE-INSTALL HEAD AS INSTRUCTED ON Z08-02761.

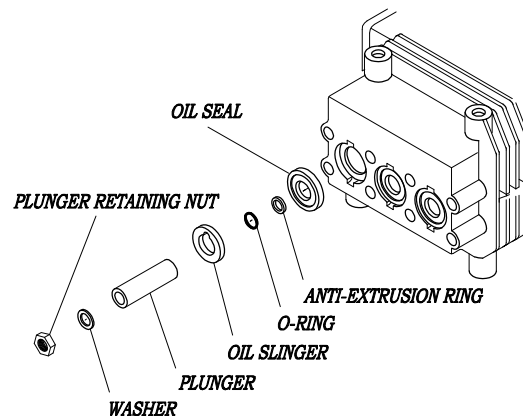
### PLUNGER SERVICING

#### PLUNGER INSPECTION

1. REMOVE PUMP HEAD AS INSTRUCTED ON Z08-02761.
2. EXAMINE EACH PLUNGER, LOOKING FOR A SMOOTH SURFACE FREE FROM CRACKS, SCORING, OR PITTING. ANY DEFECTIVE PLUNGERS SHOULD BE REMOVED PER INSTRUCTIONS BELOW.
3. DISCARD ANY DEFECTIVE PLUNGERS. REFER TO PUMP INSERT SHEET FOR REPLACEMENT PART NUMBERS.
4. RE-INSTALL PLUNGER AS INSTRUCTED BELOW.
5. RE-INSTALL HEAD AS INSTRUCTED ON Z08-02761.

#### PLUNGER REMOVAL

1. REMOVE THE PLUNGER RETAINING NUT BY TURNING COUNTER CLOCKWISE. REMOVE PLUNGER WASHER AND SLIDE PLUNGER OFF CROSSHEAD. INSPECT PLUNGERS AS INSTRUCTED IN "PLUNGER INSPECTION".



#### PLUNGER INSTALLATION

1. INSTALL O-RING ONTO CROSSHEAD FOLLOWED BY THE BRASS WASHER.
2. SLIDE PLUNGER ONTO CROSSHEAD.
3. INSTALL FLAT WASHER ONTO CROSSHEAD.
4. THREAD NUT ONTO CROSSHEAD AND TORQUE PER PUMP INSERT.

### OIL SEAL SERVICING

1. REMOVE PUMP HEAD AS INSTRUCTED ON Z08-02761.
2. REMOVE PLUNGER AS INSTRUCTED ABOVE.
3. SET PUMP ON COVER END CAREFUL NOT TO DAMAGE OIL LEVEL GAUGE. REMOVE OIL SEAL.
4. RE-INSTALL SEAL WITH LIPS TOWARD CRANKSHAFT.
5. RE-INSTALL PLUNGER AS INSTRUCTED ABOVE.
6. RE-INSTALL HEAD AS INSTRUCTED ON Z08-02761.

*PUMP MAINTENANCE RECORD*

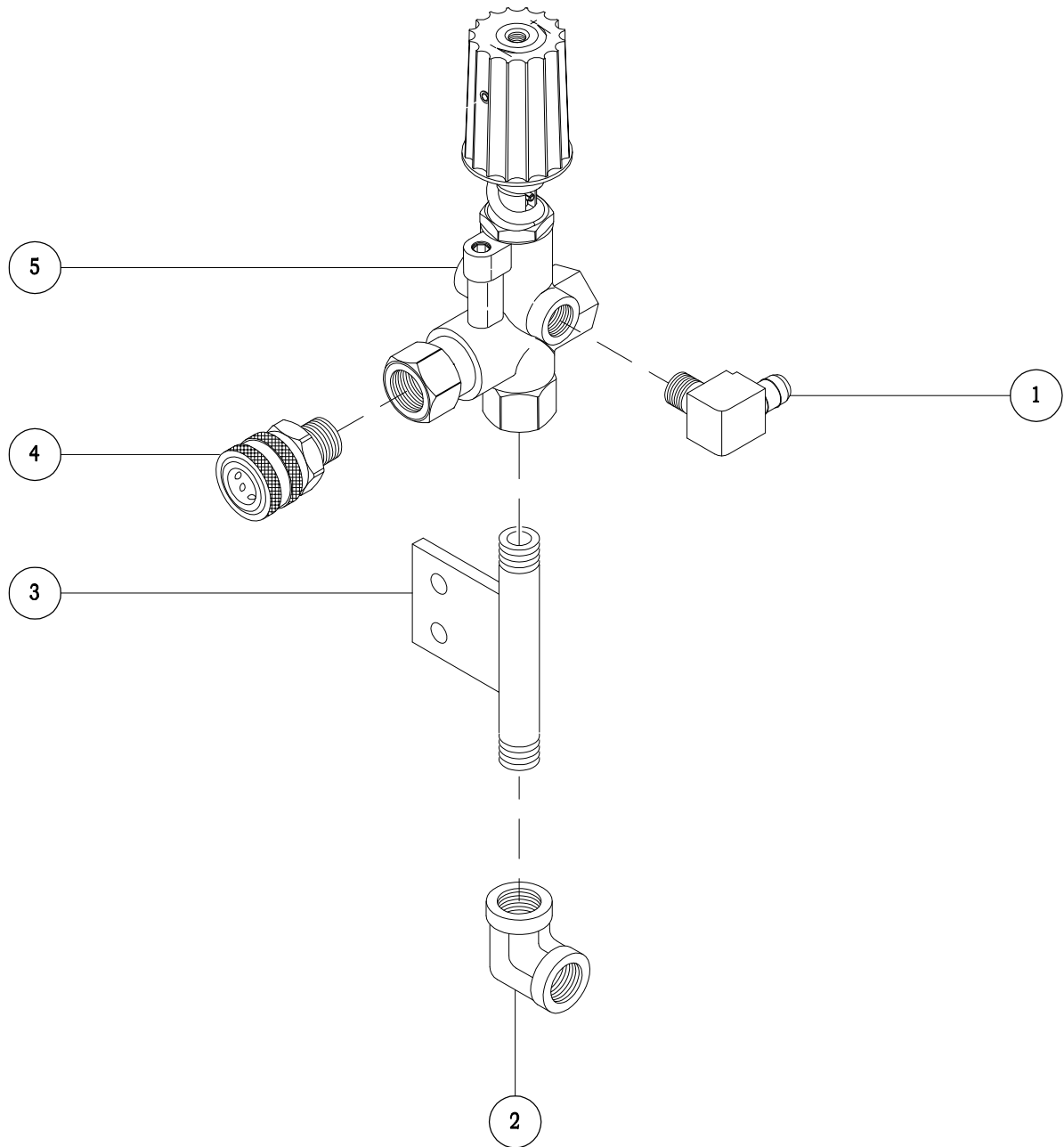
*OIL CHANGE*

MONTH / DAY / YEAR	OPERATING HOURS	OIL BRAND & TYPE

*PUMP SERVICE*

MONTH / DAY / YEAR	OPERATING HOURS	TYPE OF MAINTENANCE

**ASSEMBLY, UNLOADER**  
**EXPLODED VIEW - P/N 435S-00515**



**PARTS LIST**

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	W02-10040-8	BARB, HOSE	4	W04-34135-A	COUPLER, QUICK DISCONNECT
2	E08-00010-5	ELBOW, PIPE	5	C07-03700	VALVE, UNLOADER
3	835S-00514	BRACKET, UNLOADER			



# VALVE, UNLOADER - C07-03700

## SPECIFICATIONS

MAX FLOW.....7.8 GPM / 30 LPM  
 MAXIMUM UNLOADING PRESSURE.....3650 PSI / 251 BAR  
 MAXIMUM TEMPERATURE.....190°F / 88°C  
 WEIGHT.....2.1 LBS / 0.91 KG  
 BYPASS.....1/4 NPT  
 INLET & DISCHARGE.....3/8 NPT

## REPAIR PARTS PACKAGE

\* P/N C07-03700KA - INCLUDES 1 EACH OF ITEMS:  
 6, 13, 21, 24, TWO OF 9 & THREE OF ITEM 5

## ACCESSORIES

Y02-00009.....0 TO 1500 PSI / 103 BAR GAUGE  
 Y02-00002.....0 TO 2000 PSI / 138 BAR GAUGE  
 Y02-00010.....0 TO 5000 PSI / 345 BAR GAUGE

## PARTS LIST

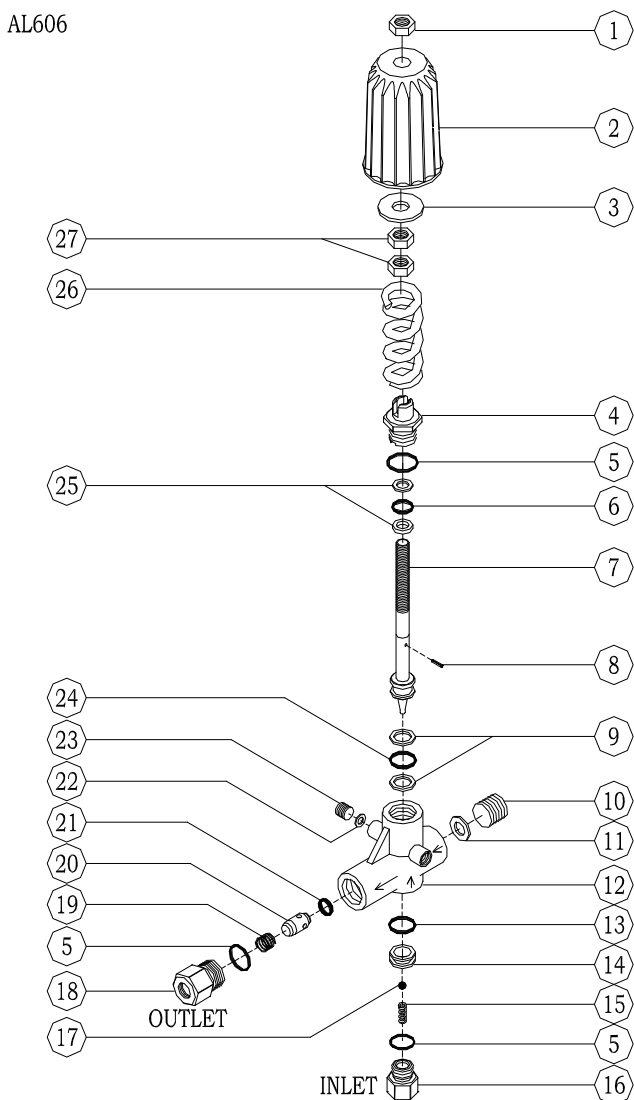
ITEM	PART NO.	DESCRIPTION
1	C07-03700-7	NUT, LOCK - M8
2	C07-03700-8	KNOB, ADJUSTMENT
3	C07-03700-9	FOLLOWER, SPRING
4	C07-03700-11	GUIDE, PISTON
* 5	C07-02300-08	O-RING
* 6	8RS6-000SV01	O-RING
7	C07-03700-26	PISTON
8	C07-03700-15	PIN, SPRING
* 9	C07-03700-28	RING, ANTI-EXTRUSION
10	C07-0370019A	PLUG - 3/8
11	C07-0370019B	GASKET, WASHER
12	C07-0370018B	HOUSING - 3/8
* 13	N07-20028	O-RING
14	C07-03700-21	SEAT
15	C07-03700-23	SPRING, COMPRESSION
16	C07-03700-24	GUIDE, BALL
17	C07-02000-18	BALL
18	C07-03700-1	GUIDE, ORIFICE
19	C07-03700-3	SPRING, COMPRESSION
20	C07-03700-4	ORIFICE, SHUTTER
* 21	C07-02000-20	O-RING
22	C07-03700-6B	GASKET, WASHER
23	C07-03700-6A	PLUG - 1/4
* 24	C07-03700-29	O-RING
25	C07-03700-12	RING, ANTI-EXTRUSION
26	C07-0370010C	SPRING, COMPRESSION - BLUE
27	C07-03700-25	NUT, HEX - M8

## UNLOADING ADJUSTMENT

1. INSTALL APPROPRIATE PRESSURE GAUGE IN PUMP HEAD OUTLET. THE GAUGE SHOULD HAVE A PRESSURE RANGE OF TWICE THE OPERATING PRESSURE.
2. LOOSEN NUT (1) AND TURN KNOB COUNTER CLOCKWISE UNTIL MINIMUM SPRING TENSION.
3. OPEN TRIGGER GUN, START PUMP, AND OBSERVE PRESSURE GAUGE READING. SLOWLY TIGHTEN KNOB COUNTER CLOCKWISE UNTIL DESIRED OPERATING PRESSURE.
4. CLOSE AND OPEN TRIGGER GUN TO CHECK UNLOADING PRESSURE AND BYPASS FUNCTION OF UNLOADER VALVE. UNLOADING PRESSURE SHOULD NOT EXCEED OPERATING PRESSURE BY MORE THAN 400 PSI.
5. LOCK SETTING BY TIGHTENING LOCK NUT (1).

NOTE: ONCE OPERATING PRESSURE IS REACHED, TURNING CLOCKWISE INCREASES UNLOADING PRESSURE ONLY.

## EXPLODED VIEW



***FILTER, WATER - P/N C04-00144, C04-00145, C04-00146, C04-00147******SPECIFICATIONS***

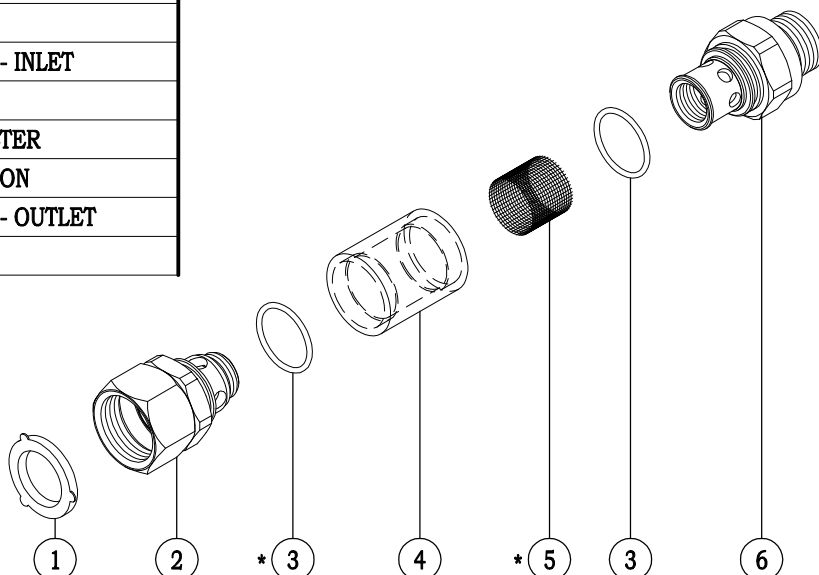
MAXIMUM FLOW .....8.0 GPM / 30.3 LPM  
MINIMUM INLET PRESSURE.....15 PSI / 1.02 BAR  
MAXIMUM INELT PRESSURE....150 PSI / 10.3 BAR  
MAXIMUM TEMPERATURE .....180° / 82°C  
WEIGHT.....0.5 LBS. / 0.23 KG  
BYPASS.....1/4 FNPT (C04-00146, C04-00147)  
INLET/OUTLET....3/8 NPT (C04-00145, C04-00147)  
INLET/OUTLET....1/2 NPT (C04-00144, C04-00146)  
DIMENSIONS.....1.125" X 3.75"

***MAINTENANCE***

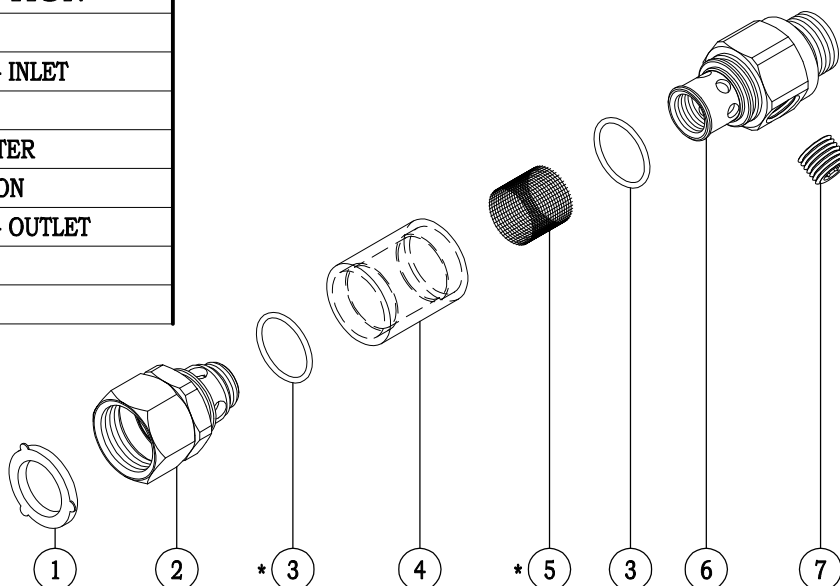
1. With wrench on hex behind garden hose nut and opposite end of glass, unscrew the filter. Be cautious of the glass tube as it don't fall onto a sharp object.
2. Clean the screen and glass tube.
3. Check o-rings for cuts, cracking or abrasion.
4. Reinstall screen and glass tube onto the machine, and reinstall the garden hose swivel.

***P/N C04-00144, C04-00145******PARTS LIST***

<b><i>ITEM</i></b>	<b><i>PART NO.</i></b>	<b><i>DESCRIPTION</i></b>
1	C05-00271	WASHER, HOSE
2	-----	HOUSING, FILTER - INLET
* 3	C07-02700-08	O-RING
4	C04-00144-01	TUBE, GLASS - FILTER
* 5	C04-00144-03	SCREEN, FILTRATION
6	-----	HOUSING, FILTER - OUTLET
*	C04-00148	KIT, REPAIR

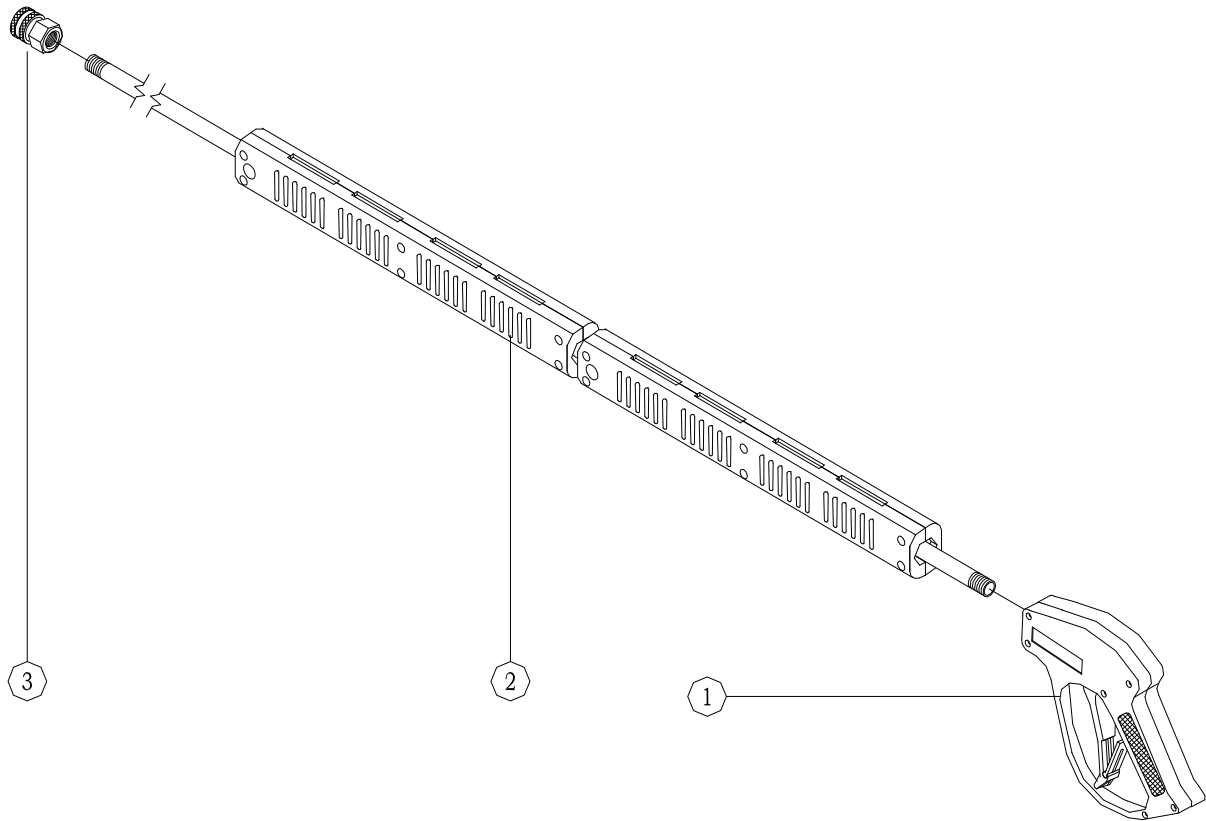
***EXPLODED VIEW******P/N C04-00146, C04-00147******PARTS LIST***

<b><i>ITEM</i></b>	<b><i>PART NO.</i></b>	<b><i>DESCRIPTION</i></b>
1	C05-00271	WASHER, HOSE
2	-----	HOUSING, FILTER - INLET
* 3	C07-02700-08	O-RING
4	C04-00144-01	TUBE, GLASS - FILTER
* 5	C04-00144-03	SCREEN, FILTRATION
6	-----	HOUSING, FILTER - OUTLET
7	C07-02000-26	PLUG, PIPE
*	C04-00148	KIT, REPAIR

***EXPLODED VIEW***

# *ASS'Y, TRIGGER GUN & WAND*

*EV - P/N J06-00158-B*



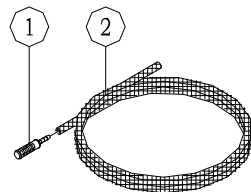
## *PARTS LIST*

<i>ITEM</i>	<i>PART NO.</i>	<i>DESCRIPTION</i>
1	J06-00158	VALVE, TRIGGER GUN
2	J06-00104E	ASSEMBLY, WAND - 42"

## *PARTS LIST*

<i>ITEM</i>	<i>PART NO.</i>	<i>DESCRIPTION</i>
3	W04-24225-A	COUPLING, FEMALE

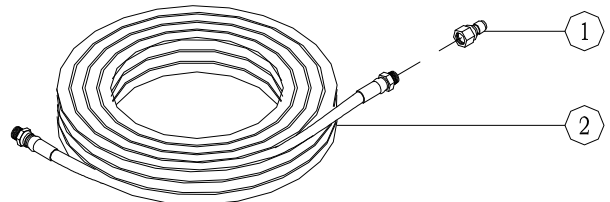
## *ASSEMBLY, CHEMICAL LINE* *EV - P/N 4120-00902P*



## *PARTS LIST*

<i>ITEM</i>	<i>PART NO.</i>	<i>DESCRIPTION</i>
1	C04-00131	SCREEN, CHEMICAL
2	Z01-08413-2	HOSE, POLY BRAID - 84"

## *ASSEMBLY, HOSE & COUPLER* *EV - P/N 2102-00710*



## *PARTS LIST*

<i>ITEM</i>	<i>PART NO.</i>	<i>DESCRIPTION</i>
1	W04-31231-B	NIPPLE, COUPLER
2	K02-03150-1	ASSEMBLY, HOSE

## BREAKDOWN, TRIGGER GUN - P/N J06-00158


### SPECIFICATIONS

MAXIMUM VOLUME.....10.0 GPM / 37.9 LPM  
 MAXIMUM PRESSURE.....5000 PSI / 344.7 BAR  
 TEMPERATURE RISE.....300°F / 150°C  
 WEIGHT.....1.8 LBS / 0.8 KG  
 INLET.....3/8" NPT FEMALE  
 OUTLET.....1/4" NPT FEMALE  
 DISCHARGE FITTING.....S.S.

### REPAIR INSTRUCTIONS

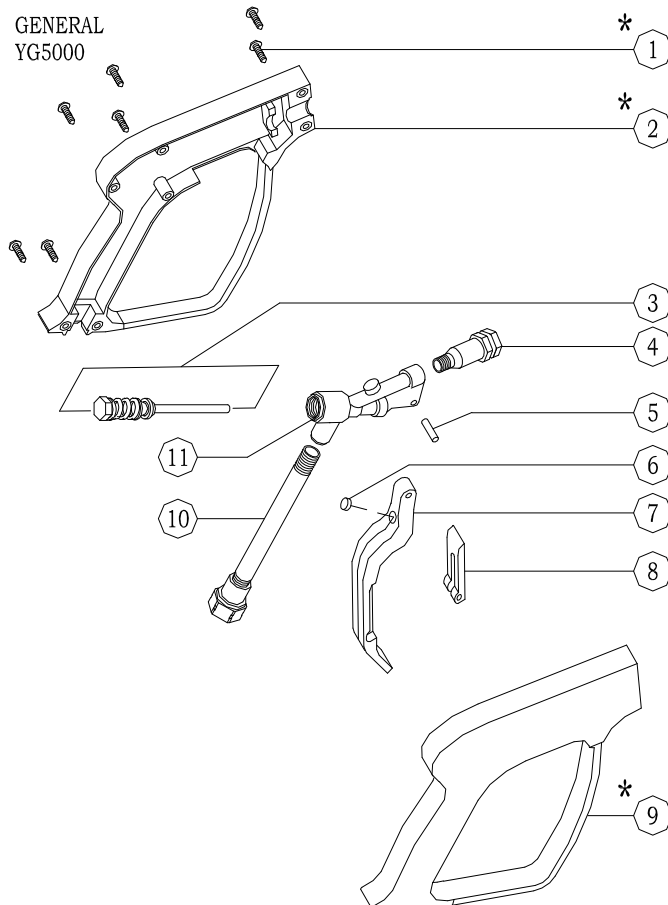
1. Remove screws (Item 1).
2. Remove handle housings.
3. Drive out pin (Item 5).
4. With a small dowel, remove the cam (Item 6) through the backside of the trigger. Replace with new cam.
5. Remove valve retainer (Item 11), springs (Items 13), and ball (Item 14).
6. With a dowel drive out pin (Item 17) and ball seat (Item 15).
7. Assemble in reverse order.

**WARNING:** DO NOT USE ACID CONCENTRATES THROUGH GUN


**WARNING:** NEVER SECURE TRIGGER GUN IN AN OPEN POSITION (TRIGGER PULLED BACK) BY MEANS OTHER THAN THE OPERATOR'S HAND, ETC. BODILY HARM MAY OCCUR IF THE OPERATOR LOSES CONTROL OF THE TRIGGER GUN.

**CAUTION:** ALWAYS ENGAGE TRIGGER SAFETY LATCH (ITEM 8) WHEN NOT IN USE.

### EXPLODED VIEW



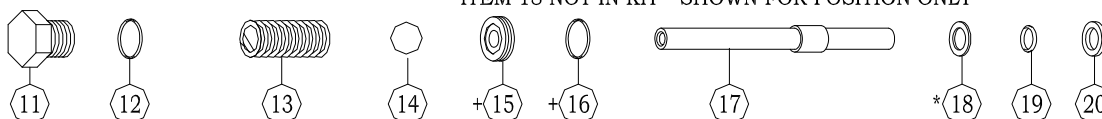
### PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
*1	J06-00132-19	SCREW, SELF TAP	7	J06-00158-04	TRIGGER
*2	-----	HOUSING, HANDLE - LEFT	8	J06-00158-05	LATCH, SAFETY
3	J06-99158	KIT, REPAIR	*9	-----	HOUSING, HANDLE - RIGHT
4	J06-00158-01	FITTING, DISCHARGE	10	J06-00158-06	FITTING, INTAKE - 3/8 FNPT
5	J06-00158-02	PIN - 5 X 27.5MM	11	J06-00158-11	HOUSING, VALVE - BRASS
6	J06-00158-03	CAM	*J06-99158A		KIT, HANDLES - HOUSING

### KIT, BREAKDOWN - P/N J06-99158

NOTE: POSITION PIN WITH CUPPED END TOWARDS BALL.

\* ITEM 18 NOT IN KIT - SHOWN FOR POSITION ONLY



### PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
11	-----	RETAINER, VALVE	17	-----	PIN, VALVE
12	J06-00158-07	O-RING	18	*J06-00158-09	WASHER, FLAT - 3.2 X 7 X 0.5MM
13	-----	SPRING, COMPRESSION	19	J06-00121-07	O-RING - VITON
14	J06-00121-11	BALL, SS - 5/16"	20	J06-00158-10	WASHER, FLAT - 3.2 X 7.5 X 1.2MM
15	J06-00158-08	SEAT, VALVE			
16	C07-01300-08	O-RING - VITON		+J06-99158B	KIT, O-RING AND SEAT