OPERATING INSTRUCTIONS
AND
MAINTENANCE MANUAL

HAMMONDS MODEL AC600

FUEL ADDITIVE INJECTOR CART

Manufactured by:

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November 2010

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ATTACHMENTS:

SPECIAL NOTICE TO USERS

PLEASE READ CAREFULLY BEFORE OPERATING EQUIPMENT

This fluid powered additive injector system is designed to give consistent, dependable performance when operated and maintained according to manufacturer's recommendations. However, being a mechanical device, it is subject to failure from improper installation, wear, human error and operating environments beyond the control of the system. Because of this fact, it is the responsibility of the operator to make certain that:

A. The system is installed properly.

B. The system is being operated properly.

C. The system is actually running during product transfer.

D. The system is checked after the transfer operation to make certain the proper amount of additive was injected during the operation.

The performing of these checks by the operator eliminates the possibility of product not having the proper customer required additive ratio. Therefore, since the manufacturer cannot be present during each transfer operation, the responsibility for checking the performance of the system is that of the operator. Should there be any questions whatsoever, the operator should consult the distributor from whom the unit was purchased.

DO NOT TAKE CHANCES.....DO NOT GUESS.....BE ABSOLUTELY CERTAIN THAT THE SYSTEM IS INSTALLED AND WORKING AS IT SHOULD.

The user/ operator carries the final responsibility to make certain the system is operating properly.

INSTALLATION AND PREPARATION FOR STARTUP

In most cases, the Hammonds fluid powered injector is shipped complete and ready to operate. The system should include appropriate fittings to suit your specific application. Flow direction is marked on the fluid motor housing, additive pumps and check valves. Any and all flow restricting devices such as ON/OFF ball valves, remote panels, sight flow indicators or suction strainers must be installed on the suction side of additive pumps.

CAUTION

Do Not Attempt To Use This Device Without Understanding And Following Proper Safety Precautions Regarding System Grounding, Fire Safety And Special Handling For Potentially Dangerous Additives.

Consult your Engineering Department for their specific instructions. Make certain all personnel involved with this system are thoroughly familiar with safe operating practices.

If your system has been purchased "bare," consult your equipment distributor for help in selecting hoses, fittings and other related accessories. Selection of materials compatibility, location of unit within the system, effect of the unit on the system and injection point of the additive are also factors that should be discussed by factory authorized personnel.

If no factory-authorized distributor is available, consult the factory directly for assistance.

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INSTALLATION CONSIDERATIONS OF BARE UNITS

Hammonds additive injector systems may be installed in a wide variety of applications, systems, and operating conditions. **This Manual Makes The Assumption That The Purchaser Has Consulted With A Factory Authorized Distributor Or The Factory And Has Approval For The Application And Installation**. If this is not the case, listed below are a few considerations that should be reviewed before installing a unit in an existing system.

FLOW CONSIDERATIONS

The Hammonds Model 600 requires a minimum of 20 and up to 200 GPM to deliver consistent ratios. This does not mean that the system cannot be used in cases where startup and shutdown fall under the 20 GPM minimum. However, these installations require calibration to compensate for the lower flow rates during these periods of operation. Check with the factory if you have any questions in the area of performance.

MATERIALS OF CONSTRUCTION

The standard material in a Hammonds Model 600 fluid driver is anodized cast aluminum housing. Optional material is carbon steel.

INJECTION POINT OF ADDITIVE

Some additives may adversely affect other components in the product handling systems, for example seals in meters, valve seals, aluminum and filter elements to name a few. The Hammonds injector systems do an excellent job of mixing the additive in the fuel systems, while injecting at an almost continuous rate. Because of this superior mixing and very small concentration of additive in any one point, many customers feel that this is not a problem. **SOME DO**, and therefore, should use their own judgment as to the effect of these additives. **Hammonds Technical Services, Inc. Can Only Advise You Of The Possible Hazards**. It is up to the owner of the equipment to decide his preference as to location of the additive injection point. It can be placed at any point in the system. The 600 comes with the injection point directly ahead of the fluid motor for good blending. It can be located elsewhere very easily. If the injection point is moved from the body of the injector, the 1/4" tapped hole must be plugged, the inlet check valve moved to the new location, and the injection tubing rerouted to the new location. An injection check valve must always be used regardless of location.

WHERE TO PHYSICALLY MOUNT THE INJECTOR ON A REFUELER

If the unit is to be installed upstream of the filter separator (monitor), it can be placed at any place that is convenient between the system pump and the filter separator. If installation is to be downstream of the filter separator, the most ideal location is just after the filter separator, ahead of the de-fueling valve or pressure control valve. The unit can be installed between the de-fueling valve and the hose reels. However, this will cause some loss of efficiency in the de-fueling capability, since the system pump will be pulling through the injector motor. It does not harm the unit to run backwards. If the system is installed after the pressure control valve, overall flow may be effected since the control valve monitors system pressure and compensates accordingly. The nominal backpressure produced by the injector could have an effect on the operation of the pressure control valve and its reaction to changing system conditions, you may effect flow volumes. If you are in doubt about this particular subject, and feel that your chosen mounting location will effect the valve, consult the factory. Most systems can be adjusted to compensate for this minor loss.

Model 600 can be mounted in most any convenient location. The standard product connection is 3" 150# flange. The performance of the 600 is not effected by changes in pipe direction or other components such as valves, strainers or meters directly before or after the injector. However, care should be taken in placing the unit too close to other items such as turbine meters that may be sensitive. Consult other manufacturers for advice in placing the fluid motor adjacent to their specific equipment.

MOUNTING ATTITUDE

The Model 600 can be mounted in a horizontal, vertical, or even a slanted pipe with one condition. The main motor shaft that powers the injector **MUST** always be horizontal. If this is not done, premature wear will occur in the unit, causing close design tolerances in the unit to become excessive. This will lead to a loss in the system's ability to operate correctly at low flow rates. **Study The Installation Drawing At The End Of The Manual Carefully. Consult Your Local Distributor Or The Factory If You Have Any Questions Whatsoever.**

LOCATION RELATIVE TO METERS

Hammonds injectors can be installed at any point in the system. If the unit is placed upstream of the meter, it will precisely inject additive to the system, whether a single hose or dual hoses are used.

SPACE REQUIREMENTS

The system is designed with easy service in mind. The entire rotor and pump assembly can be removed, where possible, from the housing without disturbing the system piping. Ample room should be reserved in the installation for this removal. The injector pump is removed from the side on which it is mounted. Approximately 2" should be allowed for complete removal of the pump. Should the fluid motor need service, it is typically done from the backside. A clearance of 12" is required on the backside to remove the rotor and rear side plate. An equal amount is necessary to remove the rotor and shaft from the front, or injector side. Also, allow room for the operator to have visual

access to the pump controls for calibration adjustment purposes.

ON/OFF OPERATION

There are two methods for providing ON/OFF operation to the system. The first uses a remote panel that includes a special rotary valve connecting the additive tank and injector appropriately, and the other is a simple ball valve placed in the additive supply line that connects the additive storage tank and the injector. Although the valve can be located at any point, it works best located as close to the injector suction as possible. The valve should be a simple two-way, ¼" stainless steel ball valve. Make certain that the "trim" or seal in the valve is Teflon®, or an elastomer that is compatible with the additive to be used.

Since the injector is a diaphragm type pump, it can be operated "DRY" without damage. When the additive supply valve is turned OFF, the injector simply maintains a suction on the additive line until the valve is opened for operation. The injector immediately begins pumping when the valve is returned to the ON position. An injector can operate indefinitely in the OFF position, but if this is going to be normal practice, simply mark the stroke setting on the dial and stroke the pump to zero and lock it down. This will extend the life of all the moving parts. When injection is needed, set the dial to the marked position.

When a Hammonds remote operating panel is used, the OFF position allows the injector pump to recirculate the additive back to the additive storage tank.

CAUTION

NEVER, NEVER turn the injector off by placing an ON/OFF control valve on the discharge side of the pump. This blocks the discharge of the pump, causing damage to the diaphragms and pump parts. If the system is equipped with a relief valve, the diaphragm could rupture after repeatedly blocking the discharge. This would result in an uncontrolled leak of additive, as well as preventing the system from operating.

LOCATION OF THE ADDITIVE

The additive tank should always be placed as close to the injector as possible. Ideally, the tank should be at the same level, or slightly higher than the unit. If this is not possible, the injector will have to pull a suction lift. Special care should be taken to assure there are absolutely no leaks in the suction line of the injector. A pinhole will prevent the system from priming and/or operating efficiently. Tape all threaded connections carefully with Teflon® sealant. The injector should not be required to lift additive more than four (4) feet.

ADDITIVE PAILS AND SIPHON TUBES

The popular use of an additive pail equipped with a siphon tube is a convenient way to store additive without the expense of a custom made tank. But, when the pail is used out-of-doors, in the weather, certain precautions must be considered. The top of the pail must be sheltered from the rain and snow. If rain and/or snow is allowed to accumulate on the top of the pail, some of the water will make its way into the pail, thereby contaminating the additive.

The water that leaks in will go to the bottom of the pail as it is heavier than most fuel additives. The inlet of the siphon tube is close to the bottom of the pail and will pick up this water injecting it causing problems.

Caution must be used when changing a pail of additive. Before removing the siphon tube, dry the area of the pail around the adapter which threads the siphon tube into the pail. Disconnect the supply line to the pump. Be careful to keep the ends of the line clean and dry. Now unthread the siphon tube assembly from the pail. Examine the tube for any contaminants and the threads for any dirt or water. Make certain that the top of the new additive pail is clean and dry. Install the siphon tube assembly and reconnect the supply line. Examine the condition of the desiccant dryer tube attached. Replace the desiccant dryer with a new one when it is ¾ pink. This will insure your additive supply is clean and dry. Reinstall the pail in its sheltered, dry location.

TUBING AND CONNECTIONS

High-density Synflex® tubing is provided with every system for refueler installation. Although stainless steel tubing would be more desirable, the poly tubing is easier to install and less expensive. Make sure all tubing is carefully secured and grouped together, whenever possible. USE CAUTION TO NOT CRUSH OR KINK TUBING WHEN INSTALLING. Tubing runs should be as straight and level as possible with a minimum of low spots or "traps" that can trap air during startup. Tubing should not be allowed to "thump" or vibrate during operation, as this will cause premature fatigue and failure.

INSTALLING THE REMOTE PANEL

The remote operating panel, RP1-1, uses a rotary valve that connects injector suction, discharge, additive tank and injection point at the proper time for the system functions of "INJECT", "OFF", "BLEED", and "CALIBRATE". When installing a remote panel, make certain connecting lines are level, well secured and as short as possible. If installing on a refueler with flow rates over 180 GPM, use the 1/2" line for the suction supply from the additive tank to the panel sight flow indicator continuing to the pump suction. The 3/8" line is for the discharge runs. Improperly connected lines will generate very confusing operating conditions that are difficult to diagnose. FOLLOW THE INSTRUCTIONS WITH THE UNIT CAREFULLY.

PREPARATION FOR CALIBRATION AND STARTUP

Before Attempting To Start The System Or Make Calibrations, Please Read The Following Information Carefully.

During startup and calibration, you will be bleeding the system of air, collecting samples of additive during the calibration and checking for possible leaks throughout the system. Provisions should be made for collection or clean up of spilled fluid. Attempts should be made to minimize losses during these procedures. If the additive being handled is flammable, fire safety precautions should be taken. (Since the installation may also be tested at this time, extreme caution should be used in checking for leaks of the main line.) If you wish to set

the system up for leak-free testing and calibration with zero spillage, please consult your local distributor or the factory for help in doing so. Hammonds is glad to suggest any necessary parts and procedure for "zero spill" startup and calibration.

A WORD ABOUT ADDITIVES

Most additives being used in fuels today have at least some degree of toxicity. Many are very dangerous. Extreme caution should be taken in handling additives. Remember, the additive is placed under pressure when being injected into the line, and when collecting samples during calibration, some spillage may occur. Be careful, wear protective clothing including eye protection. Be sure you have facilities to wash off any additive that may come in contact with your skin. Read all additive manufacturers safety precautions and Material Safety Data Sheets, following them to the letter.

HERE IS WHAT IS NEEDED:

- Appropriate safety protection equipment.
- Eye protection in the form of safety goggles.
- An assortment of wrenches that fit the various fittings on the system. Note: two (2) 10" crescent wrenches will normally take care of any adjustments to fittings you may have to make. One to hold the fitting, and one to hold the adjacent fitting.
- A marked graduated glass bottle that is marked in either cc's or ounces. (At least 16 oz.)
- A stop watch.
- A means of determining the flow rate of the main system.
- A small pocket calculator is helpful.
- A clipboard is helpful with pad of paper.
- AT LEAST ONE, AND PREFERABLY TWO HELPERS
- A large container or catch basin to collect the output of the pump while you are not actually calibrating the system.

REMEMBER: Any plumbing system varies with temperature and fluid being pumped. The system also changes as parts of the pump wear.

CALIBRATION AND STARTUP

IF YOUR INJECTOR SYSTEM IS EQUIPED WITH CALIBRATION GAUGES, FOLLOW THE INSTRUCTIONS FOR THEIR USE IN THE BACK OF THIS MANUAL.

Please Follow These Steps In Their Given Order. Read Them Over Carefully Before Starting, Then Follow Them To The Letter. If There is Any Part Of The Procedure That Is Not Clear, Consult Your Local Distributor Or The Factory Directly.

1. Make certain the additive tank is full of the proper additive.

2. Open the suction valve between the tank and the pump. This valve should be located at any point between the additive tank and the injector.

3. All systems are calibrated at the factory to customer specified requirements. So if adjustments are

required, they should only be minor. If this is the case, go directly to step 7.

4. If you are starting from scratch in the calibration and adjustment, loosen the stroke adjustment locking screws located on the bottom of the pump body. This will allow the stroke adjustment to be moved.

5. Adjust the stroke adjustment knob located on the pump body to approximately 50%. **CAUTION:** Do not turn this adjustment knob with excessive force. If this is difficult to adjust, simply rotate the main rotor shaft, by producing flow in main product line.

6. Lock the stroke adjustment locking screw down firmly.

THE FOLLOWING STEP (#7) IS FOR A SYSTEM NOT EQUIPPED WITH A REMOTE PANEL

7. Set the calibration valve (3-way valve) in the "calibrate position." This is done by making certain that the handle on the valve is positioned so that additive will exit through the short tube. A check valve sized for the application should be installed on the end of this tube. If no check valve is there, contact your distributor or the factory.

8. Make certain all product connections going to and from the system are in their proper, locked position to ensure safe, leakproof flow of product through the fluid motor. Double check the flow direction arrows located on the fluid motor housing, and check valves above and below the pump head to ensure that the system is installed properly.

9. At this point, consider the information you will have to gather during the next few steps of the calibration process.

A. What will the product flow rate through the unit be?

B. What is the length of time that the calibration will cover?

C. What is the amount of additive in ounces or cc's that you will need to collect based on the duration of the calibration?

You Should Have the Answer To All Of These Questions Before Your First Trial Run.

10. Before starting the main product flow through the system, make certain everyone understands that you will run the system for, let's say, one (1) minute or one hundred (100) gallons. Even shorter runs are fine, especially if you are running at high flow rates.

11. Place the measured graduate under the calibration tube. (The short tube with the check valve on the end.) Put on your eye protection.

12. At the command of the timekeeper, or the person watching the flow meter, start the main product pump.

13. Give the system a few seconds to gather momentum and flow through the fluid motor.

Confirmation that the fluid motor is running may be obtained by removing the stroke adjustment knob(s) and locking screw(s) so that the graduated power frame cover may be removed. This will expose the pump drive bearing mounted on the end of the main motor shaft. If the fluid motor is operating properly, this bearing will be turning around in an eccentric motion.

14. If the pump is being started up for the first time, it will take a few seconds to prime itself and begin discharging fluid from the calibration tube. Is your eye protection on? If not, PUT IT ON NOW!

15. As soon as the pump begins discharging a clear, air free stream of fluid from the calibration tube, you are ready to begin your calibration. At this point, the system is primed.

16. You will now prepare to make your first actual calibration run. Empty your collected additive back into the tank, putting the bottle back under the calibration tube. IF YOUR SYSTEM IS EQUIPPED WITH A REMOTE PANEL, SCREW THE CALIBRATION BOTTLE INTO THE RECEPTACLE ON THE PANEL. Notice the setting on the main product meter, set your stop watch at zero.

17. When ready, start the system again. Stop it at the decided time interval or meter reading. Calculate the amount of product that traveled through the system. Measure the amount of additive gathered, and record the amount of elapsed time.

18. It will be at this time that you will have to calculate how much additive you should have collected for the amount of fuel that the system pumped. This, of course, depends upon the ratio that is required. The following example is the easiest way of explaining the procedure without getting too complicated. It is not the only way...use it if you like.

Example condition:
Amount of product pumped: 500 gallons
Ratio of additive desired: 250 PPM (Parts per million)

It is assumed that the operator will know how much product is being pumped through the system in a given length of time. If, for example, you have a meter that registers the flow in gallons, you simply record the gallons at the beginning of the timed run, and then again at the end of the run. If you run for one (1) minute, you simply subtract the beginning number on the meter from the number registered after the run. This will give you the gallons per minute (GPM). Having to make this calculation is the only reason for timing the run. You can accomplish the same result by just watching the meter and stopping the system when you have totaled the desired amount of gallons through the system. In any case, you must know the amount of product passing through the system before calibration can begin.

First, change the gallons pumped into ounces by multiplying total gallons (in our example 500) by 128 (128 oz. to a gallon). The answer is 64,000 ounces.

Second, divide by 1,000,000. The answer is .064. Since you are dealing in 1/1,000,000 (one part per million) of the

total for your ratio, you must find out what 1/1,000,000 of the 500 gallons is, .064 ounces is 1/1,000,000th (one part per million) of 500 gallons of fuel pumped.

Third, multiply the .064 x 250 (for 250 PPM). The answer is 16 ounces.

So, you should collect 16 ounces of additive for every 500 gallons of fuel pumped.

These are all large, round numbers. You may, for example, only be running at 100 GPM, not 500. Use the same formulas and change the numbers.

No two systems will ever perform exactly the same. For this reason, the procedures given for calibration are general in nature. Obviously, it is impossible to provide a graph or table that would be absolutely accurate in every case. With that in mind, all tables and graphs should be used as general guidelines. Remember, the calculated, timed and measured output that you gather is absolute. Trust your figures and your calculations.

NORMAL OPERATION

Following initial start up and calibration, the system requires very little attention other than making certain that additive tank levels are maintained. Operators will quickly become accustomed to the performance of the system by observing the Suction Sight Flow Indicators. On-spec injection will cause a certain response in the indicators, and with some practice, operators will be able to observe the system and quality performance at a glance. *This does not mean that system calibration should not be periodically checked!* However, during a busy workload, these visual checks will provide assurance to the operator that the system is functioning.

Assuming the system remains set up and operating at least intermittently, calibration is required perhaps every 1 – 3 months. Good record keeping of additive inventory and use levels compared to fuel handled can give a good indication that additive ratio is on specification. Test such as the refractometer for FSII content should be the final test to verify additive injection ratios.

See the section on preventative maintenance for suggestions as to regular maintenance.

PROPER INJECTION RATIOS

Your system should be equipped with some sort of calibration device, i.e.; suction calibration gauge, additive meter, Hammonds remote panel with pressure check valve, or a simple pressure check valve on the end of the bleed tube. If it is not equipped with any of these devices, calibration of your system will be done using only atmospheric pressure. Volumetric calibration at atmospheric pressure is not recommended. It will not necessarily bring you within an acceptable range of additive injection. The only true evaluation for proper ratio is the ASTM D-5006 evaluation for fuel system ice inhibitor (FSII). Do not depend on volumetric calibration to ensure on-spec performance because line pressures can vary and additive injector parts wear over time. Contact Hammonds Fuel Additives, Inc. for supply of quality fuel system ice inhibitor and fuel testing procedures.

TROUBLESHOOTING THE SYSTEM

The following conditions are given as a means of troubleshooting the system. Each condition lists a number of possible causes. In most cases, trouble can be solved by the use of this section. Please read it carefully before attempting repairs or making any changes in the system.

FLUID MOTOR IS NOT TURNING

A. Insufficient flow to turn the motor. A minimum flow of about 20 GPM needed to start the system.

B. A rag or some other object is jammed in the line preventing the fluid motor from turning.

C. A diverter valve is blocked downstream of the system, blocking the fuel flow through the system.

D. On a truck or hydrant system, a de-fueling valve is left open starving the fluid motor for product flow.

E. If the unit has been recently serviced internally, the rotor might be installed backwards. Consult the factory before disassembly.

F. The fluid motor may be installed in the wrong direction of flow.

FLUID MOTOR IS TURNING AND PUMP RUNS, BUT WITH NO OUTPUT

A. Pump is air-locked. In some cases where there is a very long line running from the injector head and the point of injection into the system, there is sufficient air volume to cause the pump to act as a compressor. It is not able to open the valves throughout the system and therefore, cannot pull a suction of fluid to the pump. Loosen the connection at the injection point check valve and allow it to remain open until the pump begins pumping.

B. One or more of the suction or discharge check valves are not working. While the pump is running, tap on the side of the valves, one at a time. This will generally jar them loose. The balls are very small, and will sometimes become stuck. After the valve is loosened and has a supply of fluid, usually it will not stick again.

C. The pump is not getting additive. Check that the valve between the pump and the tank is open. Check all the connections in the line between the pump and the tank.

D. The vent on the tank is not open causing the pump to pull a vacuum. Open the vent. Check to see if the cap has been removed from the dryer cartridge, if so equipped.

E. The pump stroke is set at zero.

F. The additive tank is empty...don't laugh, it happens.

INJECTOR IS OPERATING BUT WITH REDUCED OUTPUT

A. Leaking suction line or trash in one of the pump check valves.

B. Air leak in suction side of system. Note: leaks may be anywhere upstream of the additive pump, through the remote panel back to the additive container.

C. Defective tubing that has tiny holes or deterioration from ultra violet light.

D. Leaks in threaded connections - suction side.

E. Injector diaphragm may be pulled out in back, causing injector to pump in forward portion of stroke only. This will not create a visible leak, but will reduce output by 50%. It usually happens after many hours of operation.

F. On a refueler with flow rates over 180 GPM injecting FSII, the pump may be starved for fluid. The suction line from the additive source to the remote panel to the inlet of the additive injector pump must be ½" OD tubing. Some older systems in the field are equipped with 3/8" OD tubing on the suction side. This could be the problem.

G. If equipped with a plunger pump, the plunger seal (o-ring) may be worn and needs replacing. Also, check plunger for signs of wear, replace if necessary.

H. Performance of the system is slipping. Fluid motor vanes are badly worn. This would only be probable after a very high number of hours of operation.

PREVENTIVE MAINTENANCE

1. Make certain to use only clean, fresh additive that has been stored in a sealed container. Most additives are moisture sensitive. Some will form heavy crystals if allowed to accumulate moisture. These crystals will stop the pump in very short order, or cause calibration to be changed due to clogging of the valves and other parts.

2. Check the additive suction strainer or filter screen in the sight flow indicator, if so equipped, at least every six months. More often if there is an indication of possible contamination.

3. Check the system for leaks at every use. This is an extremely important safety procedure, since some additives are flammable, caustic and corrosive.

4. Check for leaks from the seal that is located at the exit point of the injector output shaft in the side plate housing. This should be done at each operation. Leakage at this point usually indicates that the mechanical seal inside the fluid motor housing is leaking. A leak here will be jet fuel, and is not only dangerous from a fire standpoint, but will quickly ruin the bearings on the rotor shaft, since all lubricant will be washed away.

5. Check the fittings for leakage around the suction strainer or sight flow indicator, if one is used on the pump. Check this fitting each time the filter is changed or cleaned. Make certain there are no leaks in the suction line. A very small leak will either change the operation of the pump or prevent it from operating altogether.

6. Visually check around the pump head and make certain there is no leaking of additive around the fluid end. If there is, check the tightness of the head bolts. (40 inch pounds each)

7. Check the grease around the eccentric drive bearing in the pump every 12 months. Use a good quality waterproof grease.

8. It is recommended that the injector diaphragm or plunger o-ring be changed at least every 12 months. Every 6 months under extreme operating conditions. Doing so will prevent unexpected failures and unscheduled downtime.

Hammonds injectors are very dependable. If installed properly and sized appropriately to the application, they require very little maintenance. With the exception of the grease on the eccentric bearing mentioned in STEP 7, there is very little actual maintenance to do. Remember, keep the additive and the suction filter clean. If you have problems with the pump working, it is usually in the suction side of the system (between the additive tank and the injection pump). Suction lines and fittings are notorious for leaking just enough to prevent the system from working. Always

check to ensure optimum suction conditions, should problems occur.

Remember, a leak in the suction allows air from the outside to be introduced into the system. It does not always mean a visible leak of additive. If the pump loses its prime or output is erratic, chances are good that there are problems in the suction side. Otherwise, if it is working...leave it alone!

PREVENTATIVE MAINTENANCE SCHEDULE

NOTE: It is important to read the previous pages on preventative maintenance. These intervals are general, and may vary according to individual applications and severity of service.

SERVICE FUNCTION	0-4 HRS DAILY	5-8 HRS DAILY	8+HRS DAILY
Check additive filter screen	Monthly	Monthly	Monthly
Check system for additive/fuel leaks	Daily	Daily	Daily
Inspect diaphragms/plunger seals	12 Months	6 Months	3 Months
Replace diaphragms/plunger seals	12 Months	As needed	As needed
Check eccentric bearing grease	6 Months	3 Months	Monthly
Check stroke adjustment parts for looseness	Monthly	Monthly	Monthly
Replace stroke adjustment parts	24 Months	As needed	As needed
Disassemble and inspect fluid motor housing and internal parts	24 Months	12 Months	8 Months

DESICCANT DRYER

Your Hammonds additive system may include either a custom additive tank or one of several Sight Flow Indicators. Both custom tanks and the 5-SF and 55-SF Sight Flow Indicator come equipped with a desiccant dryer cartridge. These units come in several different sizes.

Most systems come equipped with the standard 3/4" cartridge. This unit is attached to the tank or Sight Flow Indicator via a short length of black rubber hose. The cartridge has a housing constructed of a clear poly material and is filled with a blue colored desiccant crystal. All these units are shipped from the factory with a rubber cap on the unattached end of the cartridge.

Some systems may come equipped with a large canister measuring approximately 2" diameter and 10" in length. These units perform the same function, just on a larger scale. Due to their greater capacity, they last longer between service. These units are sealed from the factory by a small, plastic plug or rubber cap, which is located either on the bottom or one side of the canister.

The purpose of all desiccant dryers is simply to remove moisture from the air as the system breathes. All tanks or portable sources of additive supply must be vented to atmosphere in order for the injector to operate. If moisture in this venting air is not removed, some additives are either ruined or seriously damaged. Fuel system icing inhibitor (FSII) FIZZY® , for example, is designed to seek out water in a fluid. So, when enough moisture is absorbed into the container, the FIZZY® (FSII) is diluted, and at some point, will be ruined. Biobor® JF, an anti-fungal material, will form crystals in the presence of moisture and not only perform unsatisfactorily as an additive, but will stop up pumps and lines as well.

The following instructions apply to all desiccant cartridges:

A. Remove the rubber cap or plug when the system is placed into service.

B. Observe the color of the desiccant. The original color is blue. As moisture is absorbed, the color will change to pink. When the cartridge is ¾ pink, it should either have its contents removed, dried and replaced, or the entire unit replaced.

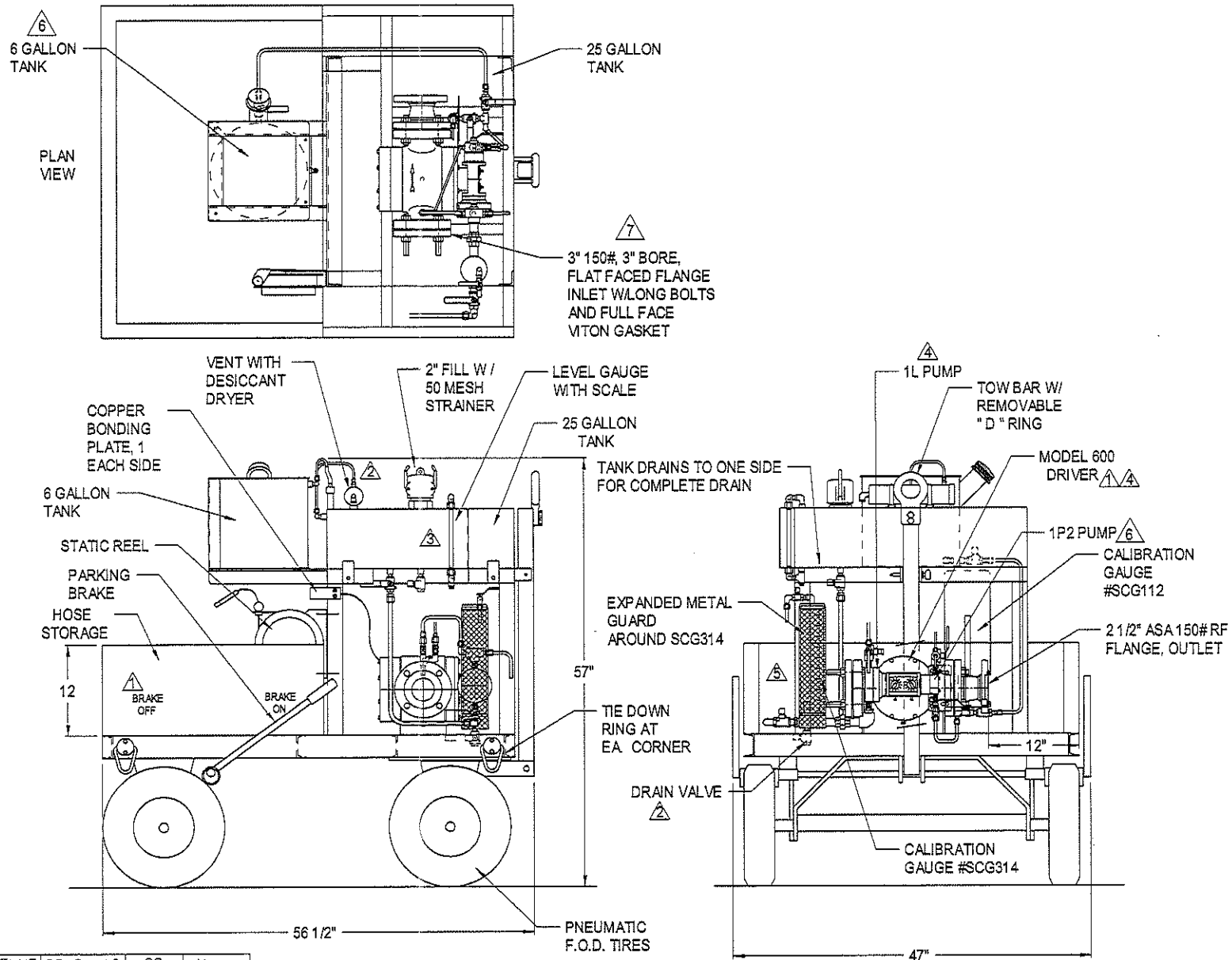
NOTE: The contents can be removed from plastic container, placed on a pan and baked at 400°F in a conventional oven until the moisture has been removed. When the color blue returns, the cooled material may be reinstalled into the cartridge and is again ready for service.

Color change and cartridge life is totally dependent on humidity. The more moist the air, the shorter the life. Keeping it dry is especially important if additive is not consumed rapidly. Check daily and service as needed.

TYPICAL ADDITIVE RATIO CHART

GALLONS	135 PPM*	270 PPM*	1250 PPM*
100	1.7	3.4	16.0
200	3.4	6.9	32.0
400	6.9	13.8	64.0
500	8.6	17.2	80.0
700	12.0	24.0	112.0
1000	17.2	34.5	160.0

*PPM amounts shown are in ounces



NO.	REVISION	DATE	BY	APPVD
7	WAS 2-1/2" RF FLNG	09/21/10	SS	X
6	1P2 / 6 GAL ADDED	07/27/10	SS	X
5	WAS SPR INLET	06/25/10	SS	X
4	NEW 600 & 1L PUMP	06/25/10	SS	X
3	REV TANK	05/25/99	SS	X
2	ADDED DRAIN VALVE AND LARGE DRYER	05/12/99	SS	X
1	REV TANK & TRAY	04/07/99	SS	X

DRAWING	LEVELS	VIEW
2353	7-15	1

FROM SER#	DATE	TO SER#	DATE
4953	X	X	X

TOLERENCES
ALL DIMENSINS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

*REMOVE BURRS AND BREAK EDGES .005 MIN.

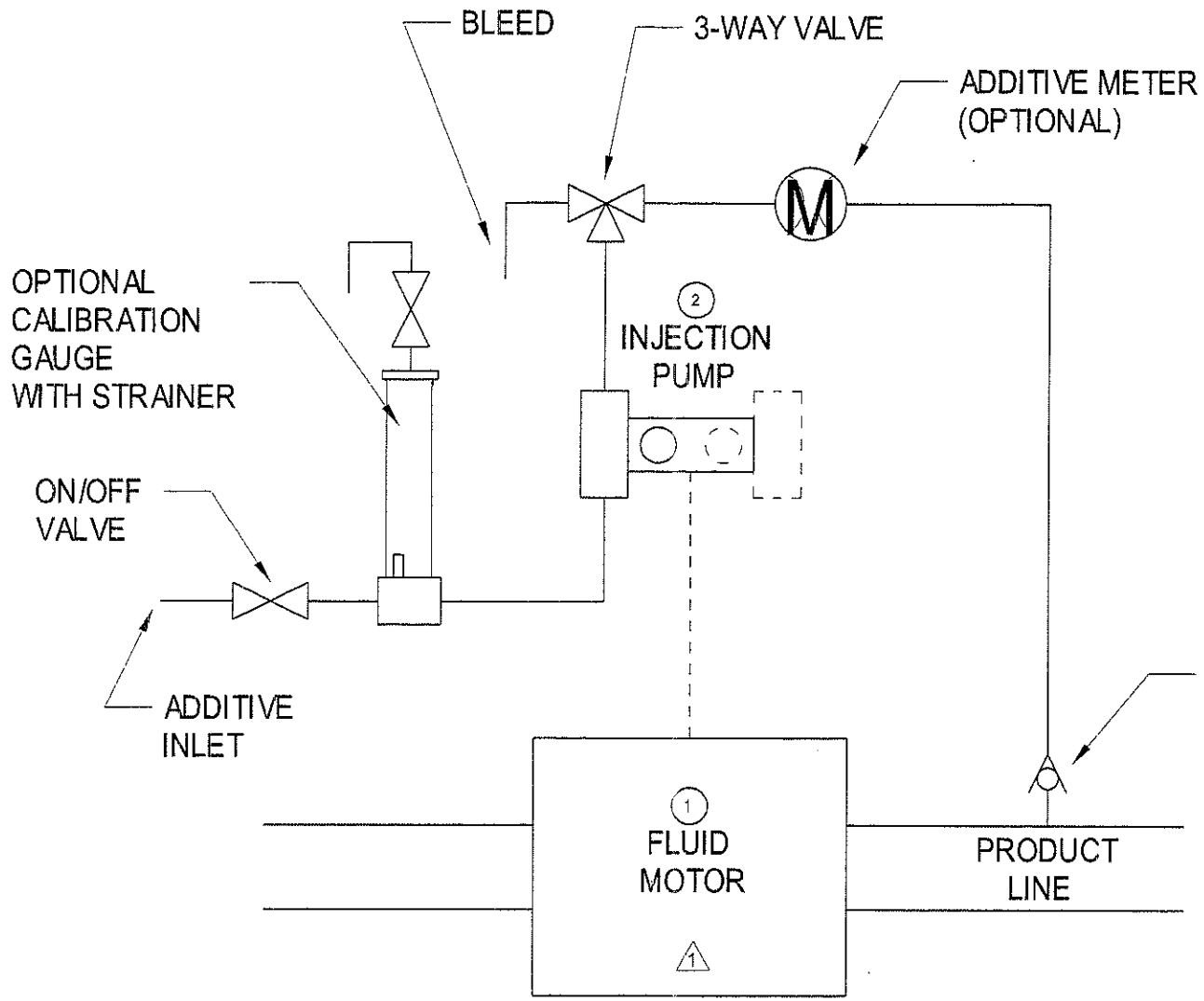
HAMMONDS TECHNICAL SERVICES, INC.

SCALE	NTS	APPROVED BY:		DRAWN BY	SS
DATE	05/20/98			REVISED	09/21/10

DRAWING TITLE
HAMMONDS MODEL AC600 CART

MODEL 600-1L-1P2

DRAWING NUMBER 2353-1



(1) FLUID MOTOR MODELS:

-PD-	-TURBINE-
150	4L/4T
600	6T
800	8T
△2 1000	10T
1400	12T
1600	
2000	
2400	
SPI	

(2) PUMP MODELS:
1S / 2S
1M / 2M
1L / 2L
1P2 THRU 2P15

NO.	REVISION	DATE	BY
△2	ADDED MODEL 1000	09/15/05	SS
△1	ADDED FLUID MOTOR	10/11/01	SS

DRAWING	LEVELS		VIEW
1707	5,6		1
FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

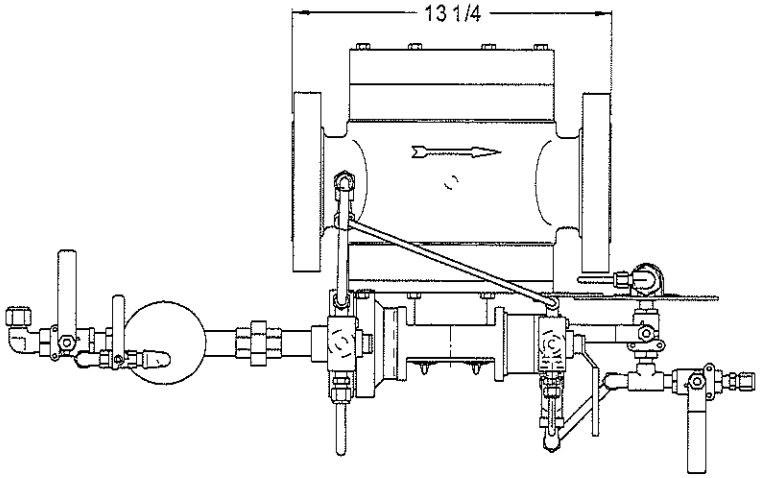
*REMOVE BURRS AND BREAK EDGES .005 MIN.

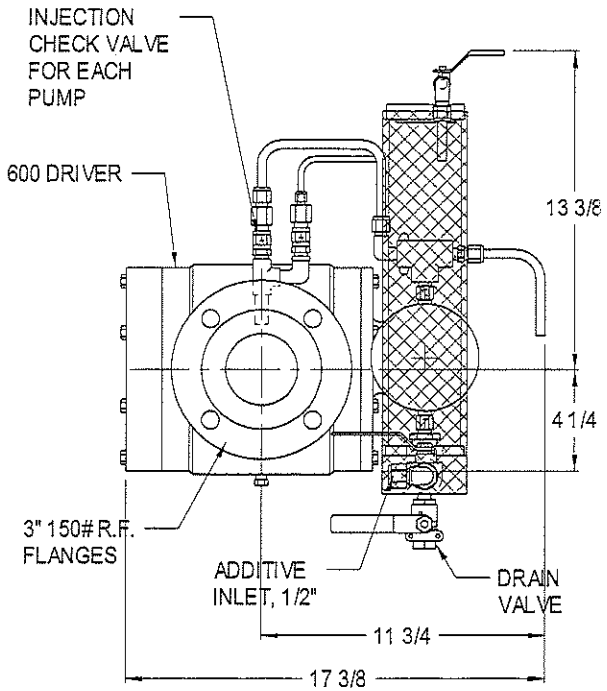
HAMMONDS TECHNICAL SERVICES, INC.

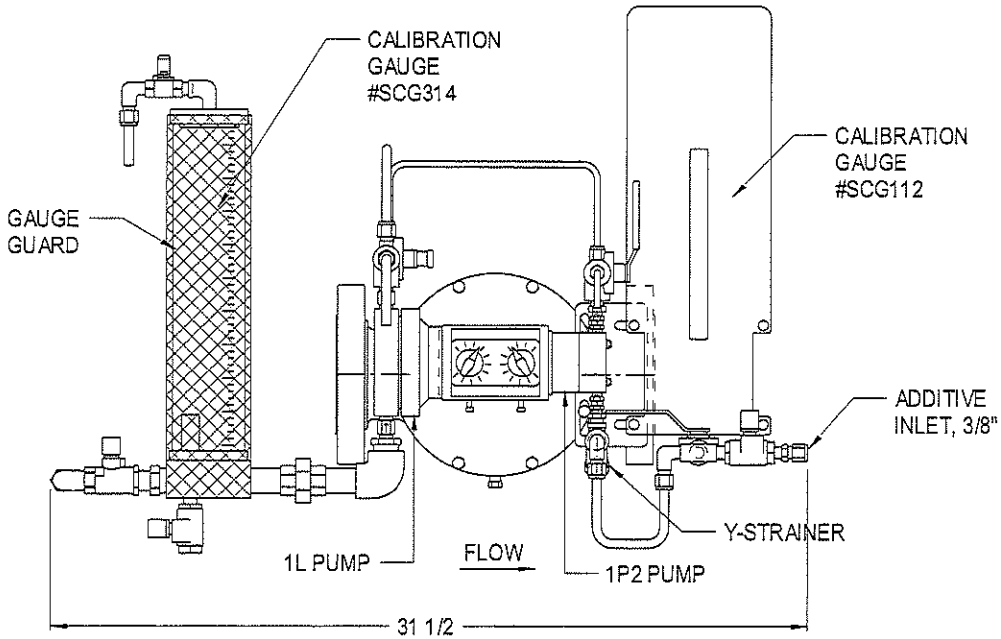
SCALE	NTS	APPROVED BY:		DRAWN BY	SS
DATE	01/30/98			REVISED	09/15/05

DRAWING TITLE
HYDRAULIC SCHEMATIC
FOR PUMP MODELS 1S - 2P15

DRAWING NUMBER 1707-1







NO.	REVISION	DATE	BY	APPVD
X	X	X	X	X

DRAWING	LEVELS	VIEW
2353	32,33	1

FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

*REMOVE BURRS AND BREAK EDGES .005 MIN.

HAMMONDS TECHNICAL SERVICES, INC.

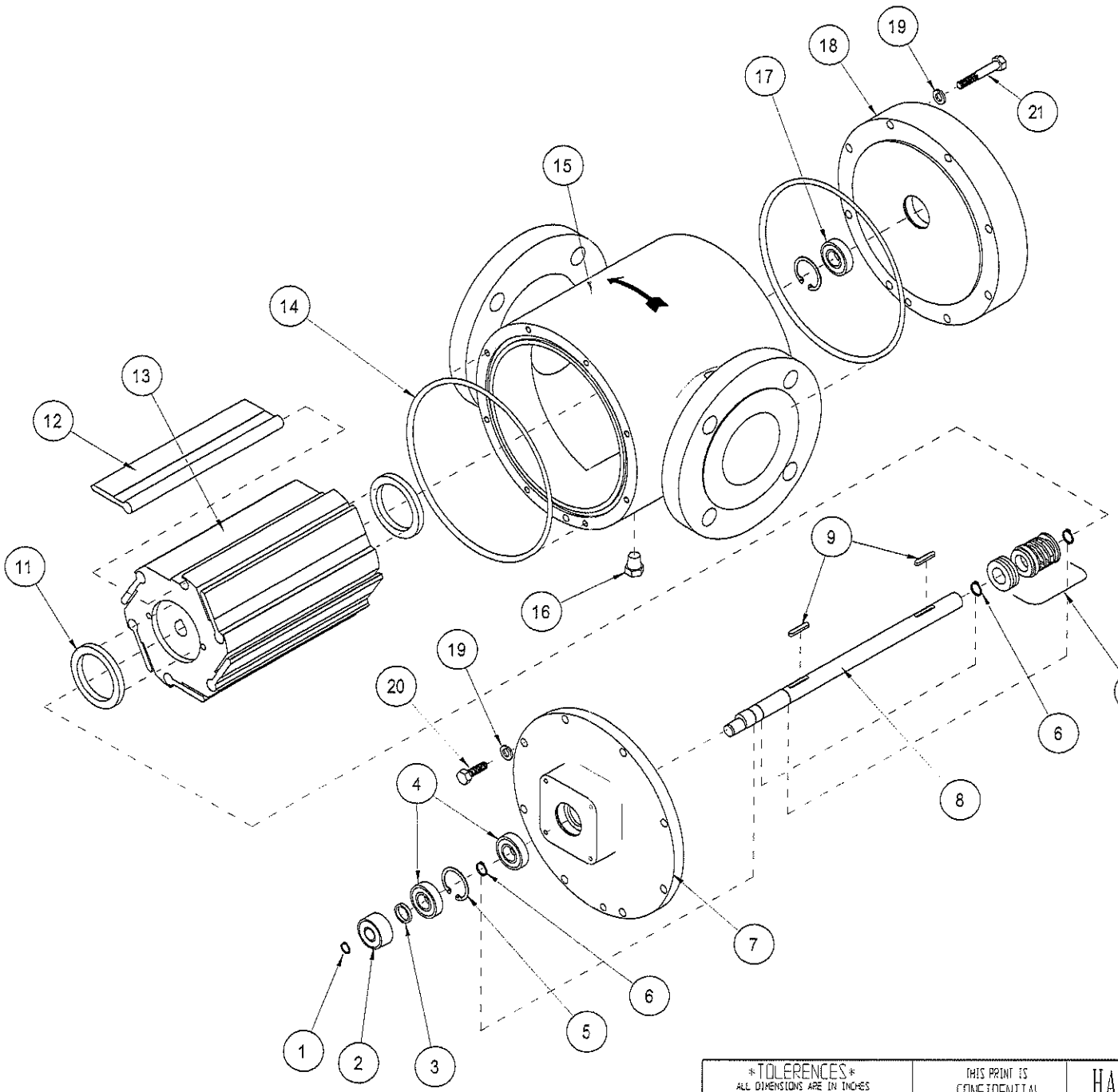
SCALE	NTS	APPROVED	PART NUMBER	DRAWN BY	SS
DATE	11/15/10		-	REVISED	-

DRAWING TITLE

MODEL 600-1L-1P2

FOR AC CART

DRAWING NUMBER 6458



ITEM	PART NO.	QTY.	DESCRIPTION
1	101045	1	SNAP RING
2	881157	1	PUMP DRIVE BEARING
3	881629	1	SPACER
4	881120	2	BEARING
5	881121	2	SNAP RING
6	881119	3	SNAP RING
7	882011	1	PUMP SIDE PLATE
8	212001	1	SHAFT
9	212002	2	KEY, 3/16" SQ. x 1"
10	141006	1	MECHANICAL SEAL
11	882012	2	WEAR RING
12	212097	6	VANE, TEFLON
13	212006	1	ROTOR
14	881910	2	O RING, VITON
15	212008	1	HOUSING, 3" VIC.
	212250	1	HOUSING, 3" 150#
16	151005	1	PIPE PLUG, 1/4"
17	212272	1	BEARING, SHIELDED
18	212473	1	BACK PLATE, HD
19	881124	16	LOCKWASHER, 5/16"
20	881125	8	BOLT, 5/16" x 1"
21	881269	8	BOLT, 5/16" x 2 1/4"

NO.	REVISION	DATE	BY	APPVD
X	X	X	X	X

DRAWING	LEVELS	VIEW
600DRVR	140, 151, 153-156, 158, 250	1

FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

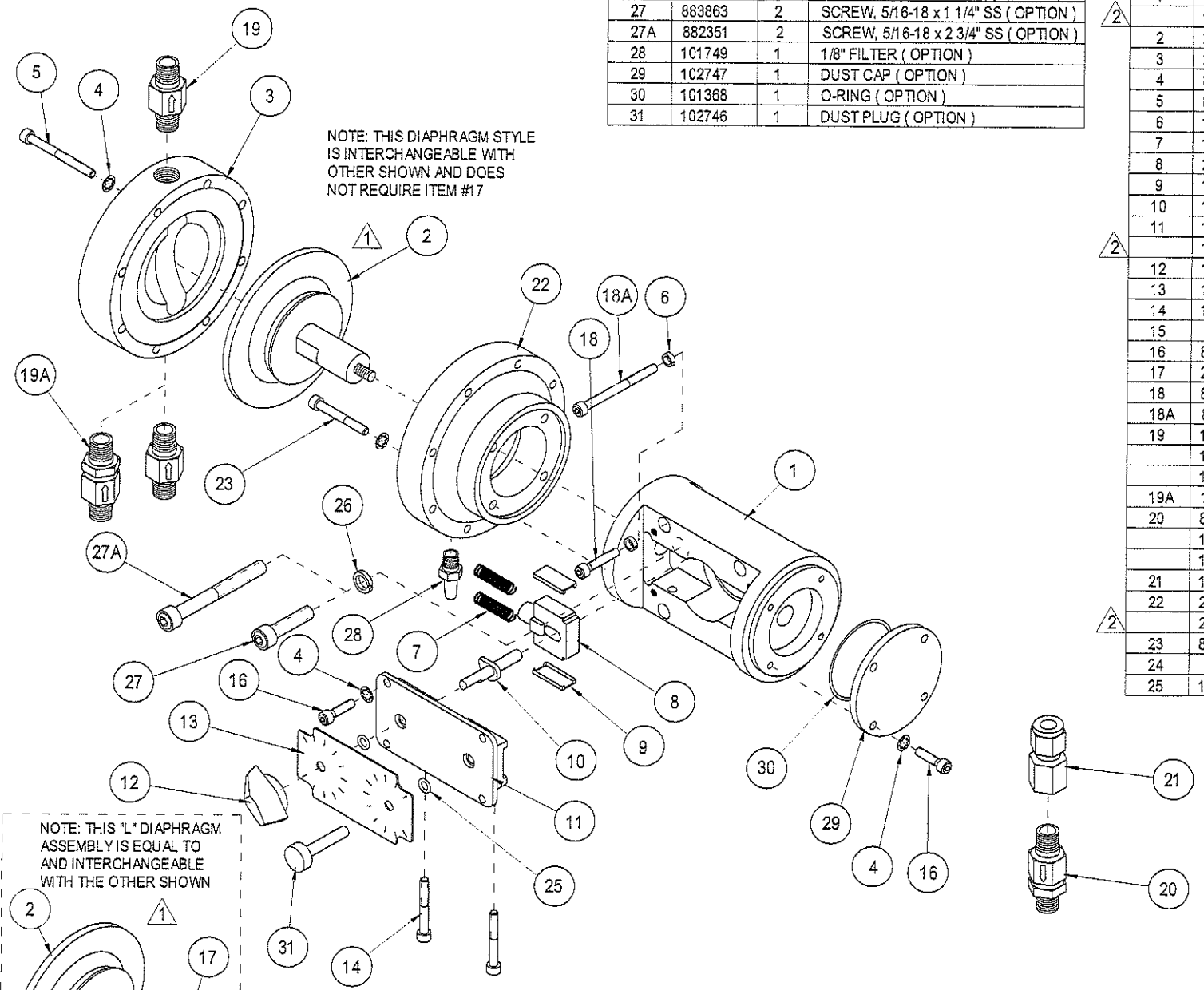
*REMOVE BURRS AND BREAK EDGES .005 MIN.

HAMMONDS TECHNICAL SERVICES, INC.

SCALE	APPROVED	PART NUMBER	DRAWN BY
NTS		-	SS
DATE 02/18/08			REVISED -

DRAWING TITLE
MODEL 600 DRIVER
EXPLODED VIEW

DRAWING NUMBER 5833



26	882352	2	LOCK WASHER, 5/16" SS (OPTION)
27	883863	2	SCREW, 5/16-18 x 1 1/4" SS (OPTION)
27A	882351	2	SCREW, 5/16-18 x 2 3/4" SS (OPTION)
28	101749	1	1/8" FILTER (OPTION)
29	102747	1	DUST CAP (OPTION)
30	101368	1	O-RING (OPTION)
31	102746	1	DUST PLUG (OPTION)

ITEM	PART NO.	QTY.	DESCRIPTION
1	102757	1	POWER FRAME, HD ALUM.
2	101774	1	POWER FRAME, HD SS
2	282004	1	DIAPHRAGM, L -
3	282001	1	FLUID END, L SS
4	882949	20	LOCK WASHER, #10, INT.TOOTH
5	881247	8	SCREW, 10-32 x 1 3/4"
6	101038	4	LOCK WASHER, #10 H.C.
7	101007	2	RETURN SPRING
8	282042	1	CROSSHEAD, SS
9	101152	2	SLIDE BEARING
10	101005	1	STROKE ADJUSTMENT CAM
11	102758	1	PUMP FRAME COVER, HD ALUM.
2	101659	1	PUMP FRAME COVER, HD SS
12	101001	1	STROKE ADJUSTMENT KNOB
13	101670	1	STROKE INDICATOR
14	101037	2	SCREW, 10-32 x 1 1/2"
15			
16	881126	8	SCREW, 10-32 x 1/2"
17	282005	1	ADAPTER SCREW
18	881301	4	SCREW, 10-32 x 1"
18A	883170	4	SCREW, 10-32 x 2 1/2" (OPT)
19	102463	2	1/4" CHECK VALVE, AFLAS
	102464	2	1/4" CHECK VALVE, VITON (OPT)
	102642	2	1/4" CHECK VALVE, KALREZ (OPT)
19A	102413	2	1/4" CHECK VLV, AFLAS, HI-VOL (OPT)
20	882911	1	CHECK VALVE, 5 PSI, AFLAS
	101576	1	CHECK VALVE, 5 PSI, VITON (OPT)
	102643	1	CHECK VALVE, 5 PSI, KALREZ (OPT)
21	101088	1	3/8 x 1/4 FNPT TUBE ADAPT.
22	282054	1	L ADAPTER RING, ALUM.
2	282016	1	L ADAPTER RING, SS
23	881545	4	SCREW, 10-32 x 1 1/4"
24			
25	102480	2	O-RING

NO.	REVISION	DATE	BY
2	ADDED SS MAT'L.	07/16/09	SS
1	ALTERNATE DIAPHRAGM	03/2008	SS

DRAWING	LEVELS	VIEW
INJECTOR	40,46,48-50,56,129,139-141, 143,208,237-239	7

FROM SER#	DATE	TO SER#	DATE
4014	12/08/97	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS: .XXX= +/-.005 .XX= +/-.015 .X= +/-.030

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

*REMOVE BURRS AND BREAK EDGES .005 MIN.

HAMMONDS TECHNICAL SERVICES, INC.

SCALE	NTS	APPROVED BY:		DRAWN BY	SS
DATE	02/16/07			REVISED	07/16/09

DRAWING TITLE

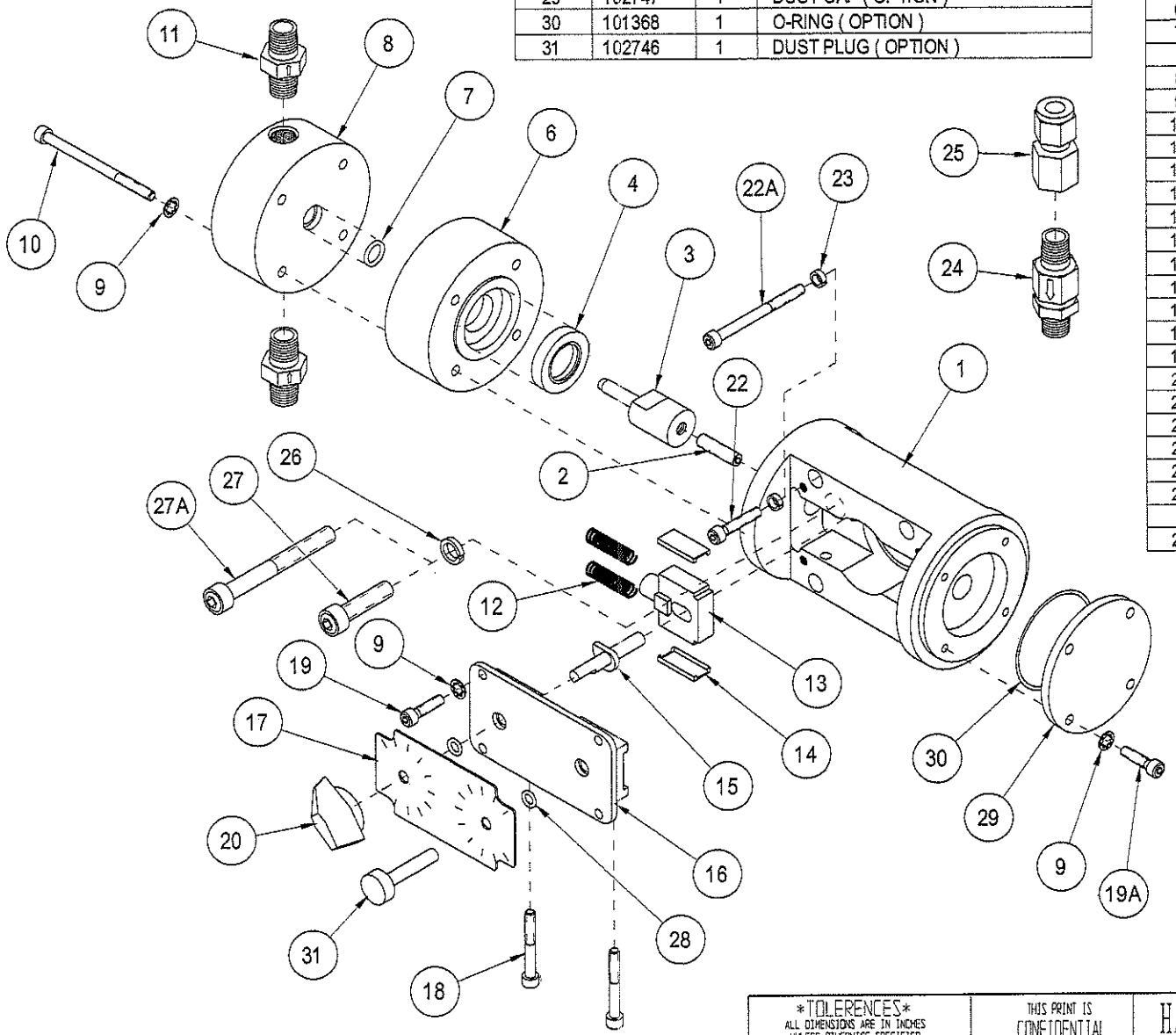
HAMMONDS 1L PUMP

HEAVY DUTY

DRAWING NUMBER 5548

26	882352	2	LOCK WASKER, 5/16" SS (OPTION)
27	883863	2	SCREW, 5/16-18 x 1 1/4" SS (OPTION)
27A	882351	2	SCREW, 5/16-18 x 2 3/4" SS (OPTION)
28	102480	2	O-RING (OPTION)
29	102747	1	DUST CAP (OPTION)
30	101368	1	O-RING (OPTION)
31	102746	1	DUST PLUG (OPTION)

ITEM	PART NO.	QTY.	DESCRIPTION
1	102757	1	POWER FRAME, HD ALUM.
2	881045	1	SETSCREW, 1/4-20 x 1 (PART OF #3)
3	102266	1	PLUNGER, P2
4	881024	1	SEAL, LIP
5			
6	102268	1	SEAL HOUSING, P2
7	102269	1	O-RING, AFLAS
	102270	1	O-RING, VITON (OPTION)
8	102267	1	FLUID END, P2
9	882949	12	LOCK WASHER, #10 INTERNAL
10	881780	4	SCREW, #10-32 x 2 3/4"
11	102783	2	CHECK VALVE, 1/8", VITON
12	101007	2	RETURN SPRING
13	101006	1	CROSSHEAD
14	101152	2	SLIDE BEARING
15	101005	1	STROKE ADJUSTMENT CAM
16	102758	1	PUMP FRAME COVER, HD ALUM
17	101670	1	STROKE INDICATOR
18	101037	2	SCREW, #10-32 x 1 1/2"
19	881126	4	SCREW, #10-32 x 1/2"
19A	881126	4	SCREW, #10-32 x 1/2" (OPTION)
20	101001	1	STROKE ADJUSTMENT KNOB
21			
22	881301	4	SCREW, #10-32 x 1"
22A	883170	4	SCREW, #10-32 x 2 1/2" (OPT)
23	101038	4	LOCK WASHER, #10 H.C.
24	882911	1	CHECK VALVE, 5 PSI, AFLAS
	101576	1	CHECK VALVE, 5 PSI, VITON (OPT)
25	101088	1	3/8 x 1/4 FNPT TUBE ADAPT.



DRAWING	LEVELS	VIEW
INJECTOR	40,90,139-141,143	1
	202,208,239,245	

FROM SER#	DATE	TO SER#	DATE
X	X	X	X

NO.	REVISION	DATE	BY	APPVD
X	X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

*REMOVE BURRS AND BREAK EDGES .005 MIN.

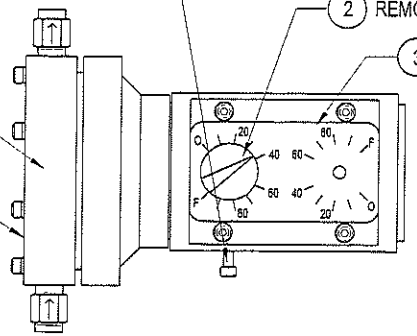
HAMMONDS TECHNICAL SERVICES, INC.

SCALE	NTS	APPROVED	PART NUMBER	DRAWN BY	SS
DATE	04/03/09		-	REVISED	-

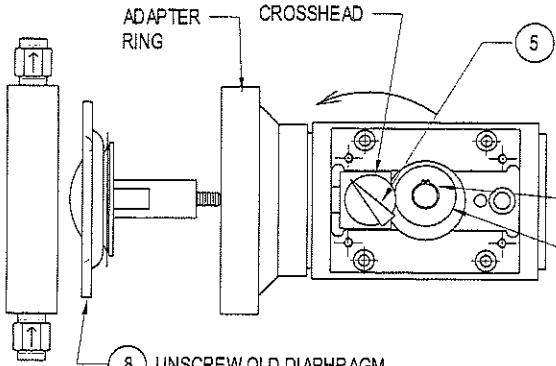
DRAWING TITLE
HAMMONDS 1P2 PUMP
HEAVY DUTY

DRAWING NUMBER 6120

NOTE: MARK STROKE SETTING BEFORE REMOVING ANY PART



1



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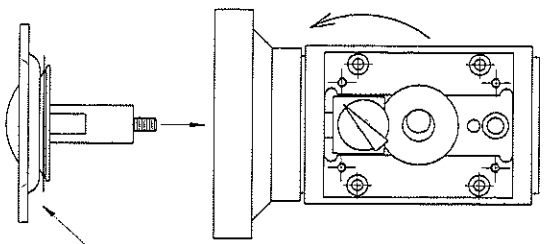
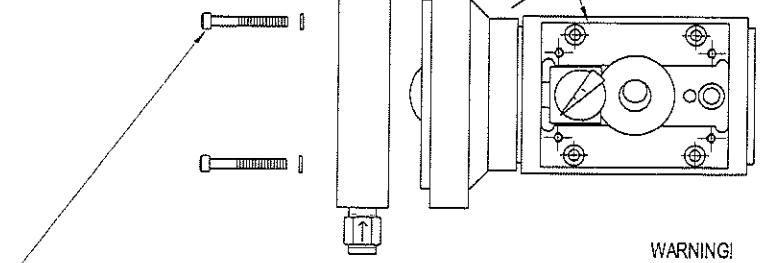


9 WITH DIAL SET IN SAME COUNTER CLOCKWISE (FULL OUT) POSITION, INSTALL NEW DIAPHRAGM, THREADING INTO CROSSHEAD ALL THE WAY. DO NOT OVER-TIGHTEN!

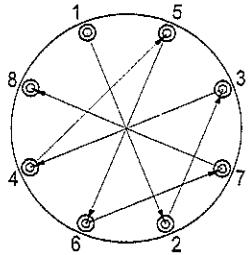
3

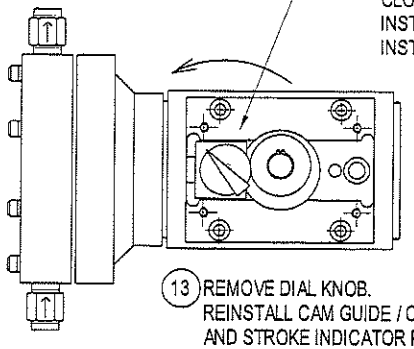
* WARNING...
FAILURE TO TORQUE SCREWS PROPERLY TO 40 IN. LBS. WILL REDUCE PUMP HEAD PERFORMANCE, RESULTING IN INSUFFICIENT INJECTION RATIO.



WARNING!
FAILURE TO FOLLOW THIS PROCEDURE WILL RESULT IN POOR PUMP PERFORMANCE WITH DIAPHRAGM DEFORMATION AND PREMATURE FAILURE.

4





NOTE: AFTER THIS PROCEDURE IS COMPLETE, YOU MUST RECALIBRATE THE INJECTOR TO YOUR SPECIFICATIONS.

5

FOR TECHNICAL ASSISTANCE CALL HAMMONDS TECH. SVS. (281) 999-2900

DRAWING	LEVELS	VIEW
1461	5,6	1

HAMMONDS TECHNICAL SERVICES, INC.

SCALE NTS	APPROVED	PART NUMBER	DRAWN BY SS
DATE 10/03/1997		.	REVISED -

DRAWING TITLE "L" DIAPHRAGM REPLACEMENT

HEAVY DUTY PUMP SERIES

DRAWING NUMBER 1461-1

HAMMONDS SUCTION CALIBRATION GAUGE

CALIBRATION INSTRUCTIONS

1) IN ORDER TO CALIBRATE, THE PUMP MUST BE PRIMED AND PURGED OF ALL AIR. THE 3-WAY VALVE MUST BE SET TO INJECT.

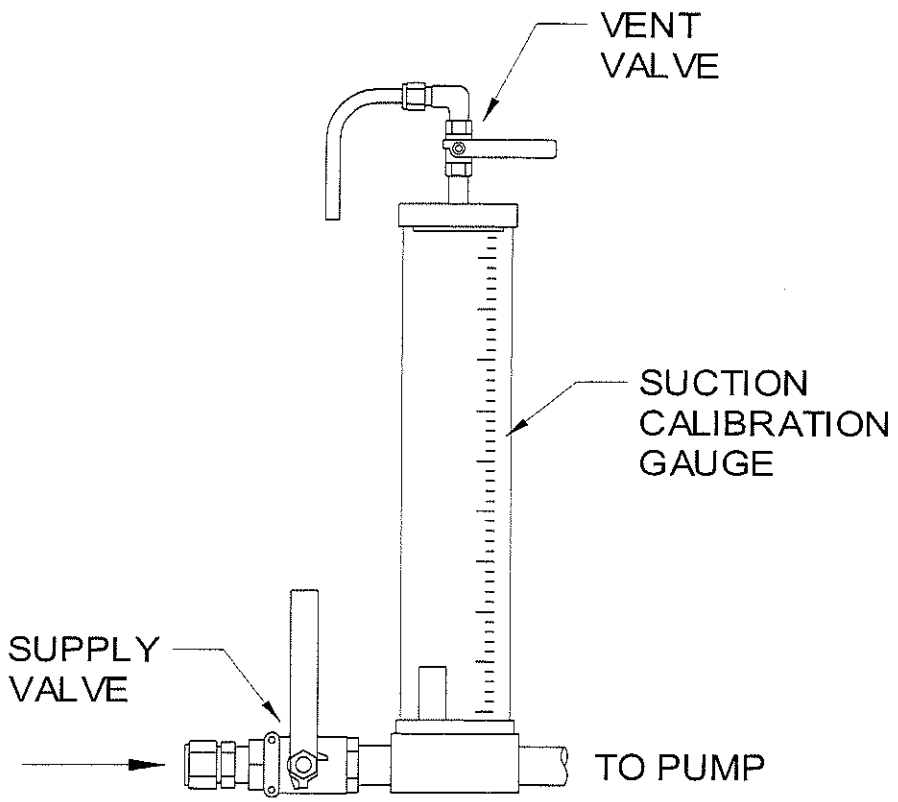
2) WITH SUPPLY VALVE OPEN, SLOWLY OPEN VENT VALVE. THIS WILL FILL CALIBRATION GAUGE. FILL TO ZERO MARK. DO NOT OVERFILL. ONCE FULL, CLOSE VENT VALVE.

3) MAKE NOTE OF ADDITIVE LEVEL IN CALIBRATION GAUGE AND MAIN PRODUCT METER READING. BEGIN CALIBRATION BY FIRST CLOSING THE SUPPLY VALVE AND THEN OPENING THE VENT VALVE. START THE PRODUCT FLOW (SET FOR A SHORT TRIAL RUN).

4) AT THE END OF THE RUN, RECORD THE AMOUNT OF ADDITIVE THAT WAS DRAWN FROM THE CALIBRATION GAUGE. RECORD THE AMOUNT OF FUEL PUMPED. CLOSE THE VENT VALVE. OPEN THE SUPPLY VALVE.

5) DIVIDE THE AMOUNT OF ADDITIVE USED BY THE VOLUME OF FUEL THAT WAS PUMPED GIVING YOU PPM.

6) INCREASE OR DECREASE PERCENTAGE OF STROKE ON DIAPHRAGM PUMP TO OBTAIN DESIRED INJECTION RATIO.



EXAMPLE: (METRIC)
ADDITIVE INJECTED = 500 ML
FUEL DELIVERED = 1785 LITERS

$$\frac{500}{1785} = .280$$

$$\frac{.280}{1000} = .000280 \text{ (280 MILLIONTHS)}$$
OR 280 PPM (PARTS PER MILLION)

EXAMPLE: (US)
ADDITIVE INJECTED = 11.5 oz
FUEL DELIVERED = 350 GALLONS

$$\frac{11.5}{350} = .0328$$

$$\frac{.0328}{128 \text{ oz/gal}} = .000256 \text{ (256 MILLIONTHS)}$$
OR 256 PPM (PARTS PER MILLION)

NO.	REVISION	DATE	BY
X		X	X

DRAWING	LEVELS		VIEW
1891	1,2		1
FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:	*TOL. ANGLES:
.XXX= +/-.005	+/- .5 DEGREES
.XX= +/-.015	*CONCENTRICITY:
.X= +/-.030	.005 T.I.R.

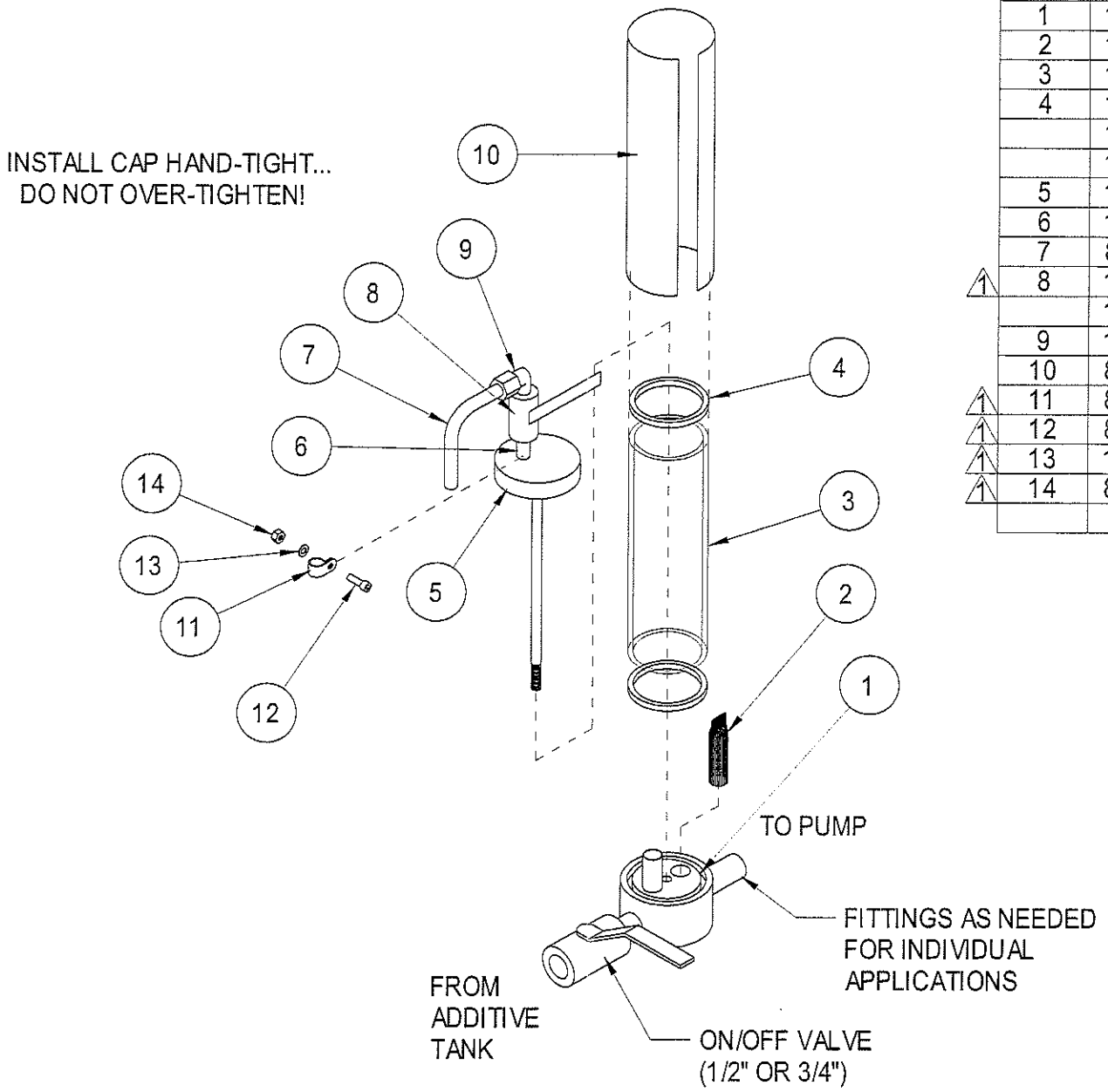
SURFACE FINISH 125/ *REMOVE BURRS AND BREAK EDGES .005 MIN.

HAMMONDS TECHNICAL SERVICES, INC.

SCALE	NTS	APPROVED BY:		DRAWN BY	SS
DATE	04/07/93			REVISED	

DRAWING TITLE: SUCTION CALIBRATION GAUGE

DRAWING NUMBER 1891



ITEM	PART NO.	QTY.	DESCRIPTION
1	152080	1	BODY, LARGE SIGHT FLOW
2	152025	1	FILTER ELEMENT
3	151014	1	GAUGE GLASS
4	151013	2	GASKET, VITON
	151010	2	GASKET, NEOPRENE, OPT.
	151025	2	GASKET, BUNA-N, OPT.
5	152042	1	CAP
6	101070	1	NIPPLE, 1/4" x 1 1/2"
7	881139	1	TUBING, 3/8" X .035"
1	8	102735	1	ON\OFF VALVE, STD. 1/4"
	101230	1	ON\OFF VALVE, MIL. 1/4", OPT.
9	101068	1	ELBOW TUBE FITTING
10	881899	1	GUARD, GAUGE GLASS
1	11	882562	1	STRAP, VINYL COATED
1	12	881292	1	1/4-20 x 3/4" SOC. HD. CAP SS
1	13	103028	1	1/4" FLAT WASHER SS
1	14	881881	1	1/4-20 LOCK NUT SS

NO.	REVISION	DATE	BY	APPVD
1	ADDED PARTS	06/2008	SS	X

DRAWING	LEVELS	VIEW
2395	1-3	1

FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125 *REMOVE BURRS AND BREAK EDGES .005 MIN.

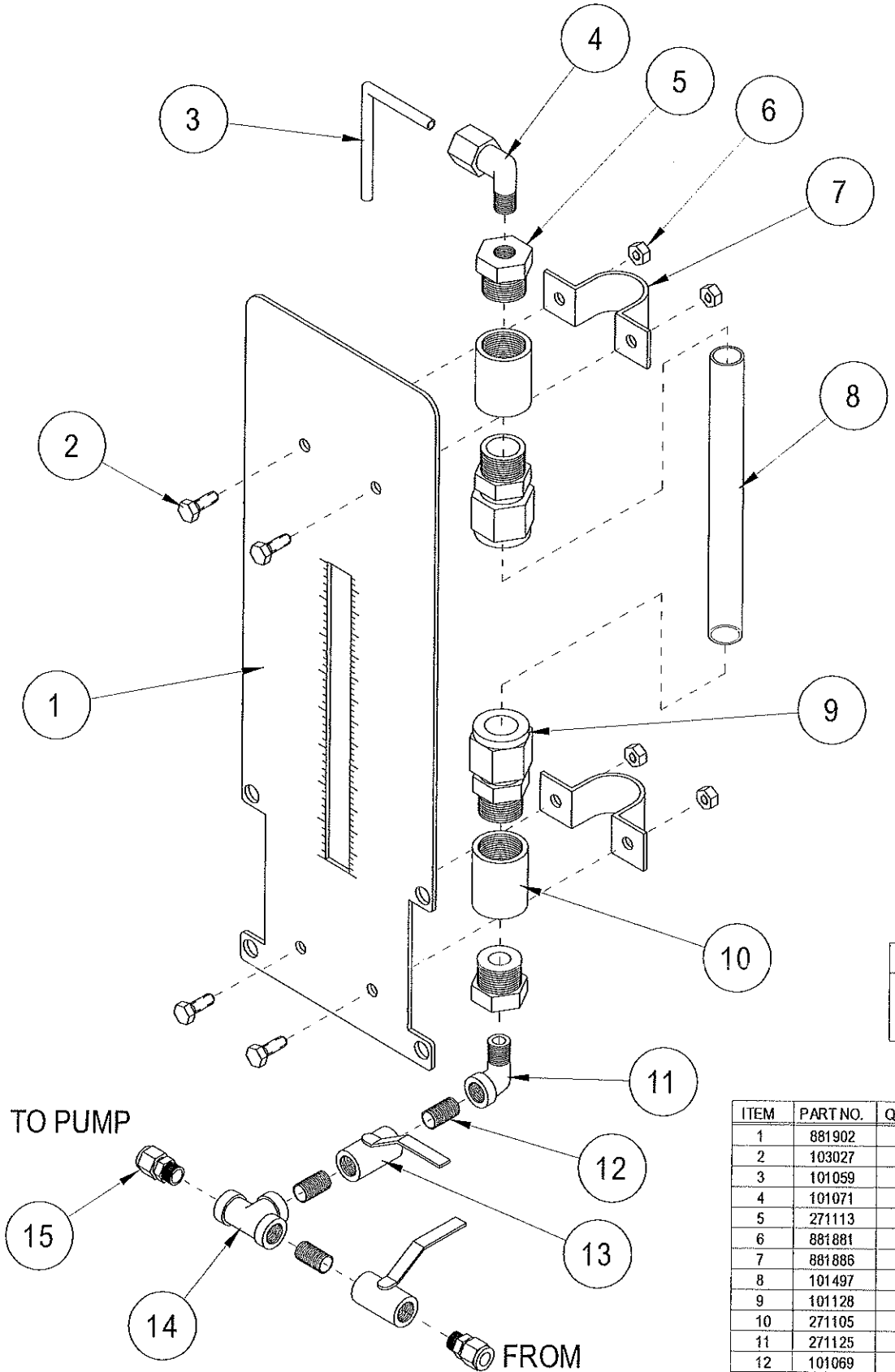
HAMMONDS TECHNICAL SERVICES, INC.

SCALE	APPROVED	PART NUMBER	DRAWN BY
NTS		SCG314	SS
DATE 07/20/93			REVISED 06/2008

DRAWING TITLE
SUCTION CALIBRATION GAUGE

MAT'L:

DRAWING NUMBER 2395



⚠2 FITTINGS AS NEEDED FOR INDIVIDUAL APPLICATIONS

⚠1

BOLT TORQUE SPECIFICATIONS	
Ref. No.	Assembly Torque
2	4 ft-lbs (5.4 N-m)

ITEM	PART NO.	QTY.	DESCRIPTION
1	881902	1	PANEL
2	103027	4	HEX BOLT, 1/4-20 x 3/4" SS
3	101059	1	1/4" x .035" SS TUBING
4	101071	1	1/4" ELBOW TUBE ADAPTER
5	271113	2	REDUCING BUSHING, 3/4" x 1/4"
6	881881	4	HEX LOCKNUT, 1/4-20
7	881886	2	MOUNT STRAP
8	101497	1	TEFLON TUBING, 3/4"OD x 5/8"ID
9	101128	2	TUBE ADAPTER, 3/4 TUBE x 3/4" MNPT
10	271105	2	PIPE COUPLING, 3/4"
11	271125	1	1/4" ST. EL.BOW
12	101069	3	1/4" x CL NIPPLE
13	101230	2	1/4" ON / OFF VALVE
14	101023	1	1/4" PIPE TEE
15	101034	2	1/4" x 3/8" TUBE ADAPTER

NO.	REVISION	DATE	BY
⚠2	ADDED NOTE	01/15/10	SS
⚠1	ADD BOLT TORQUE	11/01/06	SS

DRAWING	LEVELS		VIEW
CAL	20-23		1
FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERANCES: ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. TOL. DECIMALS: XXX= +/-.005, XX= +/-.015, X= +/-.030, FRAC. = +/-1/32. TOL. ANGLES +/- 5 DEGREES. CONCENTRICITY .005 T.I.R. SURFACE FINISH 125. REMOVE BURRS AND BREAK EDGES .005 MIN.

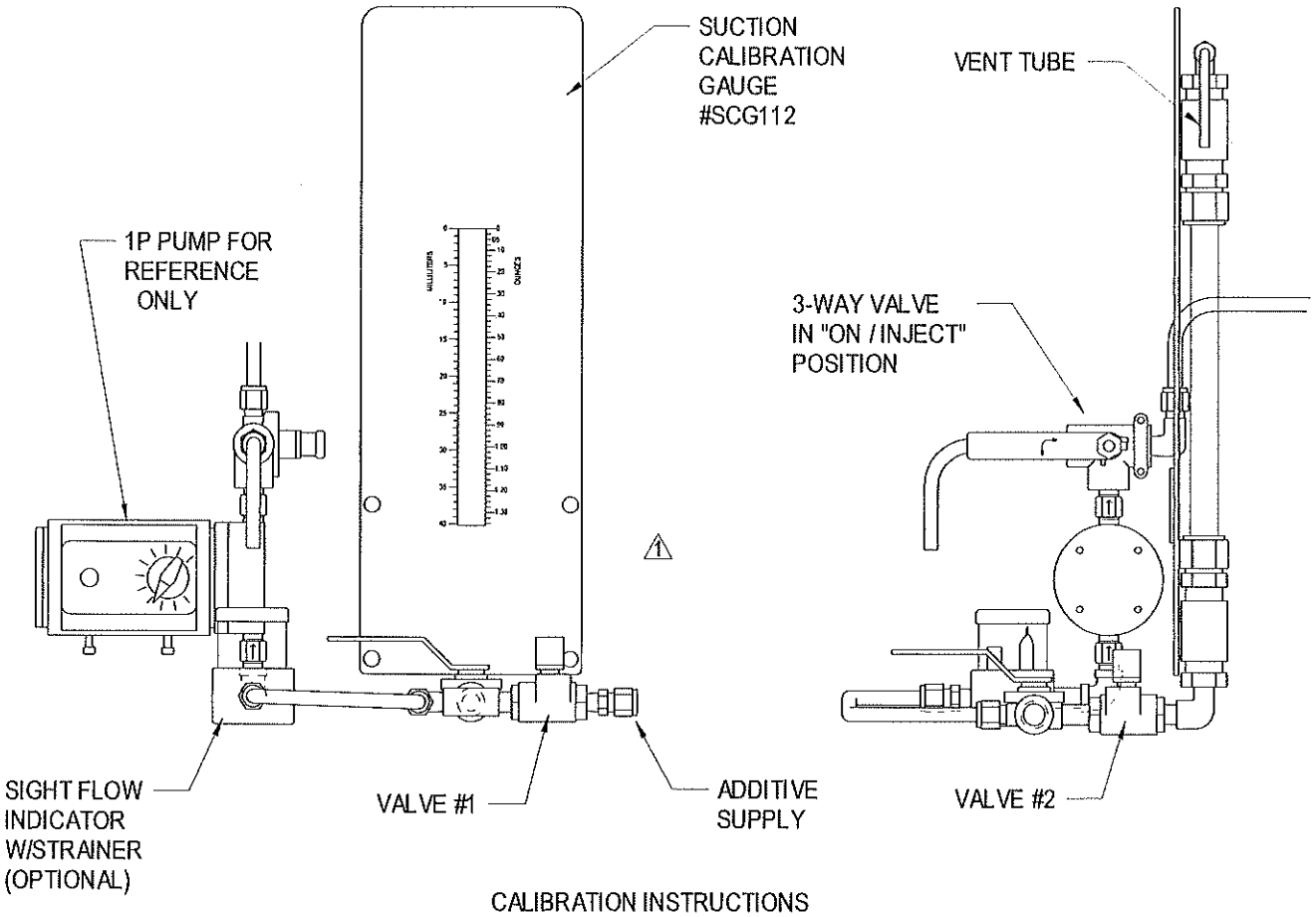
HAMMONDS TECHNICAL SERVICES, INC.

SCALE	NTS	APPROVED BY:	SCG112	DRAWN BY	SS
DATE	04/10/00			REVISED	01/15/10

DRAWING TITLE: SUCTION CALIBRATION GAUGE

MAT'L:

DRAWING NUMBER 3964



CALIBRATION INSTRUCTIONS

1) IN ORDER TO CALIBRATE, THE MAIN PRODUCT SHOULD BE FLOWING.
2) WITH 3-WAY VALVE AND VALVE #1 IN NORMAL OPERATION "ON" AND SYSTEM OPERATING, TURN VALVE #2 ON. THIS WILL FILL CALIBRATION TUBE. FILL TO ZERO MARK. DO NOT OVERFILL. ONCE FULL, TURN VALVE #2 OFF.
3) MAKE NOTE OF ADDITIVE LEVEL IN CALIBRATION TUBE AND MAIN PRODUCT METER READING. BEGIN CALIBRATION BY FIRST TURNING VALVE #1 "OFF" AND VALVE #2 "ON".
4) ONCE CALIBRATION TUBE IS NEAR THE BOTTOM, STOP TEST BY FIRST TURNING VALVE #2 "OFF" AND VALVE #1 "ON", AT THE SAME TIME MAKING NOTE OF THE MAIN PRODUCT METER READING.
5) COMPARE TOTAL AMOUNT OF ADDITIVE INJECTED FROM CALIBRATION TUBE TO AMOUNT OF FUEL DELIVERED DURING DURATION OF TEST.
6) INCREASE OR DECREASE PERCENTAGE OF STROKE ON DIAPHRAGM PUMP, REPEAT TEST UNTIL DESIRED INJECTION RATIO IS ACHIEVED.

EXAMPLE:
ADDITIVE INJECTED = 7.0 ML
FUEL DELIVERED = 350 LITERS

$$\frac{7.0}{350} = .020$$

$$\frac{.020}{1000} = .000020 \text{ (20 MILLIONTHS)}$$

OR 20 PPM (PARTS PER MILLION)

NO.	REVISION	DATE	BY	DRAWING	LEVELS	VIEW
1	UPDATED SCG	01/15/10	SS	CAL	9,10	1

FROM SER#	DATE	TO SER#	DATE
X	X	X	X

«TOLERANCES» ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
«TOL. DECIMALS: .XXX± +/-.005 .XX± +/-.015 .X± +/-.030
«TOL. ANGLES: +/- 5 DEGREES
«CONCENTRICITY: .005 T.I.R.
SURFACE FINISH 125
«REMOVE BURRS AND BREAK EDGES .005 MIN.

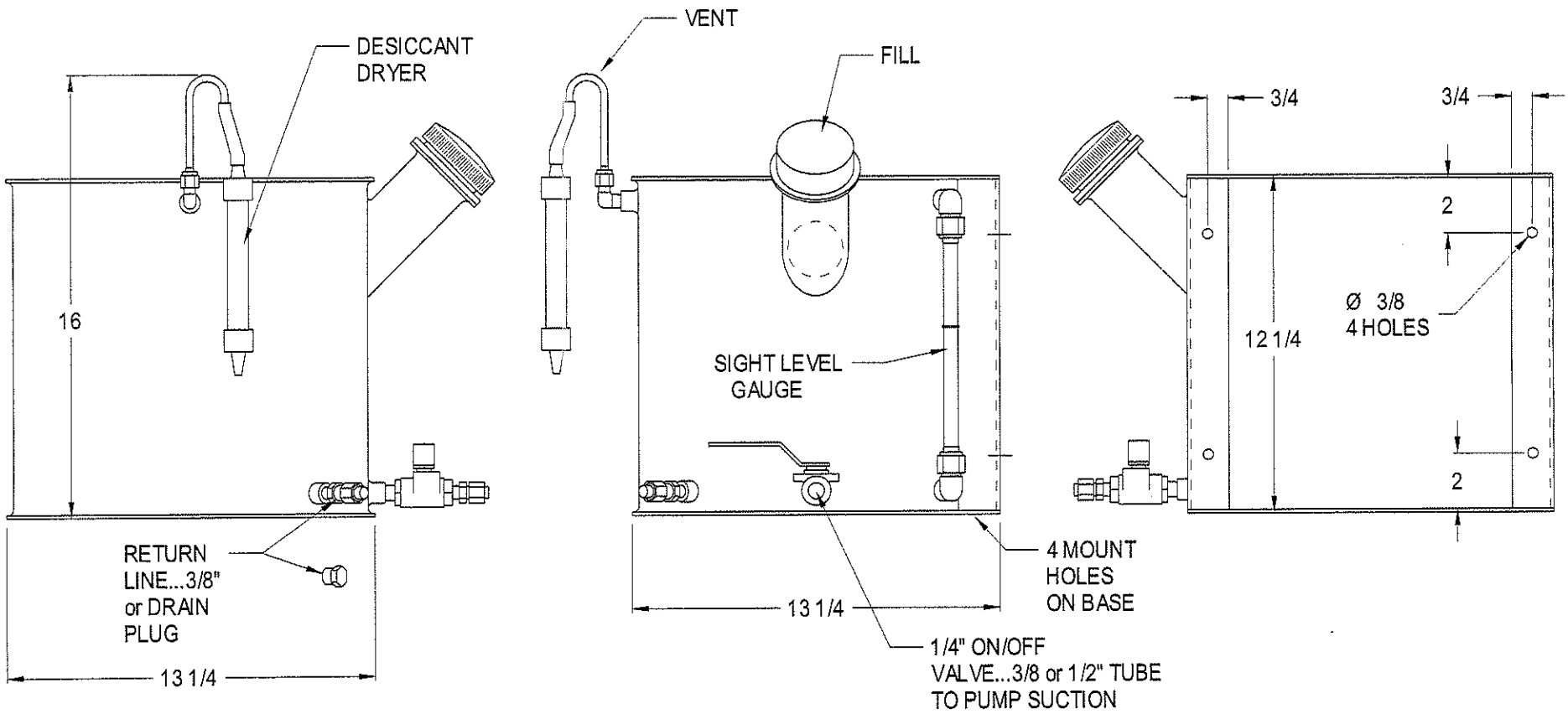
HAMMONDS TECHNICAL SERVICES, INC.

SCALE	NTS	APPROVED BY:		DRAWN BY	SS
DATE	04/07/93			REVISED	01/15/10

DRAWING TITLE: SUCTION CALIBRATION GAUGE

#SCG112

DRAWING NUMBER: CAL



DRAWING	LEVELS	VIEW
6GAL	12,13	1

NO.	REVISION	DATE	BY	APPVD
X	X	X	X	X

FROM SER#	DATE	TO SER#	DATE
X	X	X	X

TOLERENCES
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

*TOL. DECIMALS:
.XXX= +/-.005
.XX= +/-.015
.X= +/-.030
FRAC.= +/-1/16

*TOL. ANGLES: +/- .5 DEGREES

*CONCENTRICITY: .005 T.I.R.

SURFACE FINISH 125

*REMOVE BURRS AND BREAK EDGES .005 MIN.

HAMMONDS TECHNICAL SERVICES, INC.

SCALE	APPROVED	PART NUMBER	DRAWN BY
NTS		6GALL	SS
DATE 09/13/05			REVISED -

DRAWING TITLE
6 GALLON TANK ASSEMBLY
SIDE FILL...ROTATED

DRAWING NUMBER 5269

GAMMON

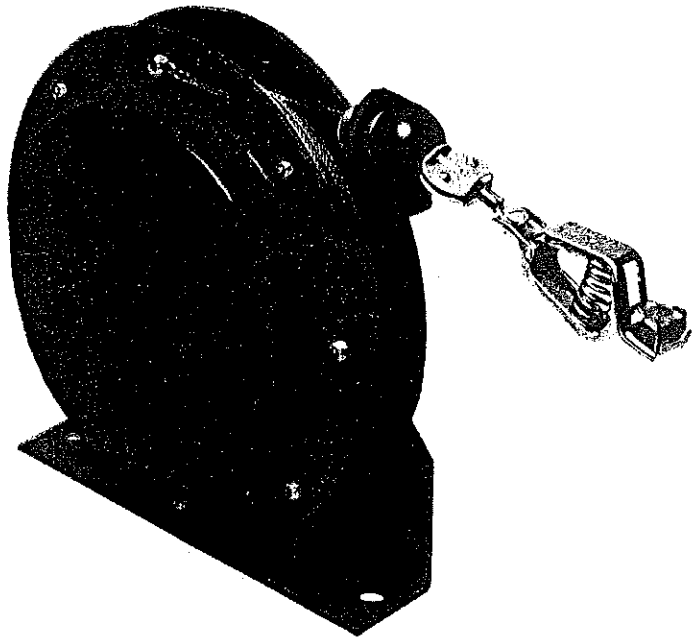
GAMMON TECHNICAL PRODUCTS, INC.
P.O.BOX 400 - 2300 HWY 34
MANASQUAN, N.J. 08736

PHONE *732-223-4600*
FAX *732-223-5778*
EMAIL *gammontech@gammontech.com*

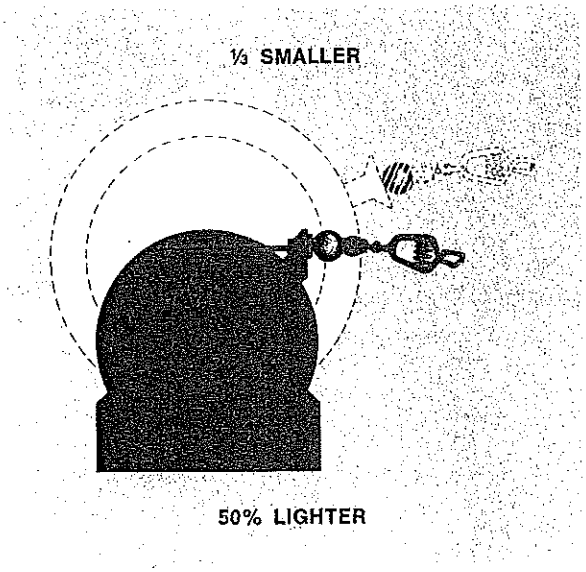
AMETEK HUNTER SPRING STATIC BONDING REEL

BULLETIN 54 (9-00)

- **AUTOMATIC SPEED CONTROL**
  Absolutely no whipping. Retracts at constant speed.
- **OVER-RUN CONTROL**
  No tangles from drum inertia.
- **TOTALLY ENCLOSED SPRING**



The Ametek Static Discharge and Bonding Reels provide for the retraction and compact storage of 50, 75 and 100 foot cable and clamp assemblies. These reels are used to bond the aircraft to the refueling truck and/or to ground both during aircraft refueling; also applicable for truck and tank car loading and unloading or other applications where static electricity could cause a spark and subsequent explosion. The 50 and 75 foot cable length models meet USAF MIL-R-83325 and U.S. Government specification A-A-50696 which replaces MIL-R-83232 which spell out that the reel must be functional under very severe environmental conditions.



NOTE: Bonding during fuel handling operations prevents external electrical discharge in the presence of fuel vapor. It does not remove bulk charges from the fuel and cannot prevent internal explosions. This hazard can only be prevented by increasing the conductivity of the fuel so that positive and negative static charges can be recombined.

A decided advantage of the Ametek Static Discharge Reel is that it is much more convenient to handle because it weighs only one-half as much as most competitive units meeting the above mentioned MIL Specification. Since it is also one-third smaller in overall size, the reel is easier to locate and mount on the vehicle.

A patented automatic latching mechanism holds cable at any desired length. Release and retraction is performed by a slight pull on the cable. Retraction need not be attended since speed is automatically governed by a special brake assembly which limits travel speed to within two to seven feet/second. This unique feature is not a requirement of A-A-50696, making the Ametek reel superior to all others on the market today.

Sturdy steel components and a cantilever type frame supporting the reel assembly, provide a rigid and durable unit which will function under the most adverse conditions. Baked on MIL spec red finish and gasketed drum construction protect operating parts from corrosion. A minimum of maintenance is required. Bearing surfaces are permanently lubricated.

SPECIFICATIONS:

CABLE: 7 x 7 Galvanized Steel; 3/32" clear plastic coated to 1/8" dia. is standard; 3/16" coated diameter, colors and stainless steel available. See Bulletin 98.

CABLE CLAMP: Standard: 100 amp copper, 3 3/4" length, 1.06" opening, model GTP-1096 C. See Bulletin 55 for other options including military specification plugs per MIL-C-83413/4A.

RESISTANCE: 10 OHMS Max. between Clamp and Mounting Base on all Models.

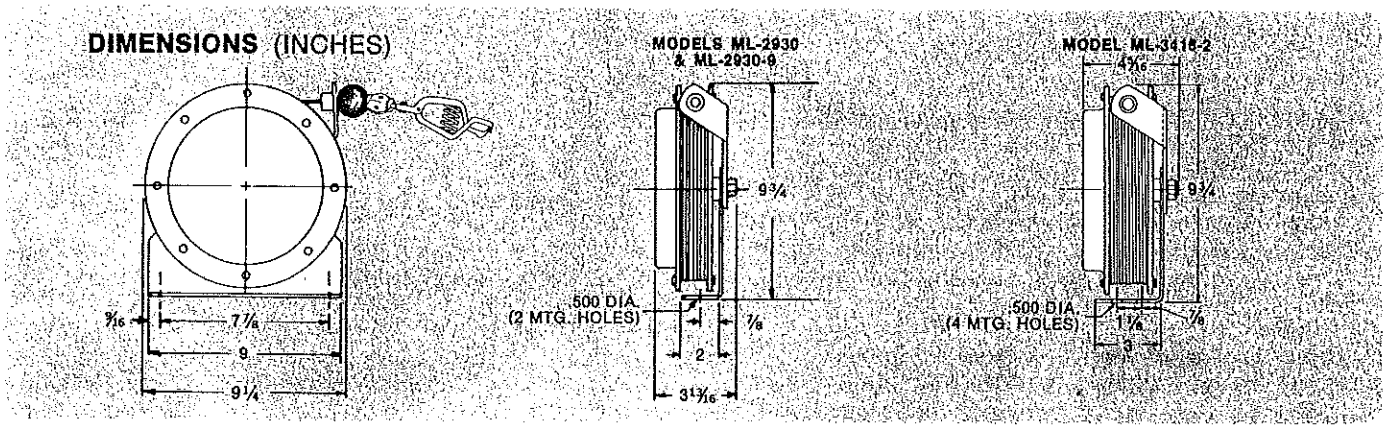
LIFE TEST: 5000 Cycles

RETRACTION SPEED: 2-7 Feet/Sec.

FINISH: Conforms to MIL-STD 808, Red Paint, Film Designation DG.

OPERATING TEMP.: -65°F to + 125°F

STORAGE TEMP.: -80°F to + 160°F



MODEL No. WITH OUT CABLE	MODEL No. WITH CABLE	STANDARD CABLE LENGTH (MAX)	NET WEIGHT STANDARD MODEL	DRUM CAPACITY INCLUDING "Y"S	
				1/8" DIA.	3/16" & 5/32" DIA.
ML-2930-150	ML-2930-15	50 ft.	14.5 lbs.	100 ft.	70 ft.
ML-2930-140	ML-2930-14	75 ft.	20 lbs.	100 ft.	70 ft.
ML-3416-20	ML-3416-2	100 ft.	23 lbs.	120 ft.	75 ft.

TO SPECIFY A REEL, USE THIS NUMBER SEQUENCE:

(☐ / ☐ ☐ — ☐)

ML-2930-15
ML-2930-14
ML-3416-2

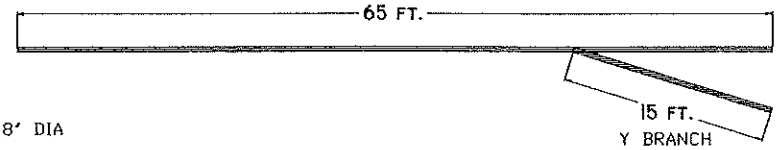
LENGTH TO BE RETRACTED. DO NOT EXCEED LENGTH IN COLUMN 2

LENGTH OF 'Y' BRANCH. DO NOT EXCEED DRUM CAPACITY.

C - IS CLEAR PLASTIC
D - IS DAY-GLO RED PLASTIC
*E - IS YELLOW HYTREL
*F - IS YELLOW VINYL
*H - IS HIGH VISIBILITY ORANGE PLASTIC

1/8" DIAMETER - 2
5/32" DIAMETER - 4
3/16" DIAMETER - 3

EXAMPLE: ML-2930-14 (65/15D-2) PLASTIC IS DAY-GLO RED DIAMETER IS 1/8"



OPTION C IS AVAILABLE IN 3/16" DIA AND 1/8" DIA
OPTION D IS AVAILABLE IN 3/16" DIA
*OPTION E IS AVAILABLE ONLY IN 5/32" DIA.
*OPTION F IS AVAILABLE ONLY IN 1/8" DIA.
*OPTION H IS AVAILABLE IN 3/16" DIA AND 1/8" DIA

Manufactured by Ametek Hunter Spring Division for world-wide distribution exclusively by Gammon.

Gammon Technical Products Inc.
2300 Highway 34, P.O. Box 400
Manasquan, N.J. 08736
Phone: (732) 223-4600 Fax: (732) 223-5778

GAMMON

GAMMON TECHNICAL PRODUCTS, INC.
P.O.BOX 400 - 2300 HWY 34
MANASQUAN, N.J. 08736

PHONE 908-223-4600
FAX 908-223-5778
TELEX 132484 GAMMONTEC - MNQN

Parts List and
Overhaul
Instructions
Bulletin 58
(11-95)

OVERHAUL INSTRUCTION MANUAL

AMETEK STATIC BONDING REEL

MODEL ML-2930-15 50 Feet
MODEL ML-2930-14 75 Feet
MODEL ML-3416-2 100 Feet

CAUTION

We specifically will not assume responsibility for injuries sustained in dissembling or reassembling one of these reels. We urge that you do not attempt to repair one of these reels and recommend that you send any malfunctioning reel to us for repair.

If you elect to repair one of these reels, this instruction bulletin is furnished to you with an urgent request that you never permit anyone to work on one unless he has read the cautionary notes and has satisfied his supervisor that he thoroughly understands the danger of a power spring getting away from him. The Ametek-Hunter spring has no resemblance to springs on other reels that your personnel are accustomed to repairing.

INTRODUCTION

The reels covered by this manual are intended for use on fuel equipment, oil servicing equipment, refuelers, etc., and meet all requirements of MIL-R-83232B and MIL-R-83325A. These reels are equipped with automatic speed control and overrun control.

INSTALLATION & USE

Mount reel using bolt holes provided in bracket. Check electrical continuity between the cable on the reel and the structure the reel has been attached to. If continuity is not found, it probably indicates that paint on the structure frame is isolating the reel.

Cable can be extended to desired length and latched at this position by simply allowing cable to retract slightly. Make connection with grounding connector.

For retraction of cable, release latching mechanism by extending cable 1 to 4 inches. Cable will now rewind on reel at constant speed.

INSTRUCTIONS ASSEMBLY AND DISASSEMBLY

Ametek reels have been made in 3 styles over a period of many years. You must determine which of the 3 styles you have. Style A and C have the 2 E-clip retaining rings (24) at the end of the shaft (11) opposite the threads. Style B retaining ring is near the threaded end of the shaft. Style B has a hex head bolt that retains the brake drum.

1. TO REPLACE CABLE:

1.1 Pull the old cable out until none remains on the drum. Latch the reel in this position.

1.2 Remove nut (17) so that cable eye (32) can be lifted off of the threaded stud and the cable (6) can be removed.

1.3 To insure that the retraction spring has the correct prewind, continue turning the reel until it stops. Unlatch reel and sllow it to wind back two full turns to establish normal prewind condition of spring. Latch reel at this position.

2. TO REPLACE SPRING AND O-RING (If only O-ring is to be replaced, see No.5)

CAUTION

TO PREVENT INJURY TO PERSONNEL, WEAR LEATHER GLOVES, AND A FACE SHIELD. EXERCISE CARE TO PREVENT COILS OF SPRING ASSEMBLY (11) FROM COMING OUT OF SPRING CUP AND FLANGE ASSEMBLY DURING REMOVAL IN PARAGRAPHS 2.4 THROUGH 2.6 BELOW. READ PARAGRAPHS 2.1 THROUGH 2.6 ENTIRELY BEFORE PROCEEDING WITH DISASSEMBLY.

2.1 Remove cable (6) as in paragraph1.2 above.

2.2 Unlatch reel and allow it to unwind completely.

2.3 Remove nut (21) cable guide bracket (18), and mounting bracket (4).

2.4 Lay reel flat on cover cup (5) and remove eight nuts (22) that attach flange cover (9). DO NOT REMOVE.

2.5 Carefully lift flange cover (9) just enough to slide a thin steel blade (approximately 1/16 x 1 x 12 inches) across coils of spring assembly (11) as close as possible to bearing hub. Remove flange cover while holding steel blade across spring coils, to prevent them from rising up.

To repair a reel if you have style A, you will need to purchase a new style hub bearing (1) and o-ring (39). If you have style B you will need to convert to Style C by purchasing a new shaft (33), new hub bearing (1), washer (40), and o-rings (16) and (39).

Some style A and B reels were made with a stamped ratchet wheel which is no longer avialable. The currently used ratchet wheel requires a hub bearing (1).

CAUTION

ALTHOUGH THE SPRING IS CONTAINED IN A RETAINING BAND, EXTREME CARE IN HANDLING MUST BE EXERCISED TO PREVENT SPRING COILS FROM COMING OUT OF THIS BAND LATERALLY AND CAUSING POSSIBLE INJURY.

2.6 If the spring (11) must be replaced, very carefully remove spring assembly (11) from spring case (2) by lifting upward while keeping the blade (2.5) in place.

CAUTION

AFTER SPRING IS REMOVED FORM SPRING CASE, SECURE ALL COILS OF SPRING IN CONTAINED POSITION WITH REINFORCED TAPE OR SAFETY WIRE TO PREVENT UNCONTROLLED UNWINDING OF SPRING WHICH MAY CAUSE INJURY.

2.7 Remove gasket (10).

2.8 Remove O-Ring packing (16) from bearing hub.

2.9 Install new O-ring packing (16) in the groove of bearing hub (1).

CAUTION

TO PREVENT INJURY TO PERSONNEL, WEAR LEATHER GLOVES, FACE SHIELD AND EXERCISE CARE TO PREVENT UNCONTROLLED UNWINDING OF SPRING ASSEMBLY (11) DURING INSTALLATION PER PARAGRAPHS 2.11 AND 2.12 BELOW.

2.11 Remove tape and/or safety wire from new spring assembly (11) and install into spring case (2) so that notch on outer end of spring is hooked on clip inside of the spring case. The hook on the inside end of the spring must be seated in the groove of hub spring ratchet (28).

CAUTION

USE EXTREME CARE TO PREVENT SPRING COILS FROM COMING OUT OF RETAINER LATERALLY.

2.12 Assemble flange cover (9) over gasket (10) and secure with eight nuts (22) and tighten to 7-10 inch-pounds torque.

2.13 Install o-ring (39) in square grove in the end face of bearing hub (1).

2.14 Place mounting bracket (4) on shaft (33) with the mounting base angled toward reel.

2.15 Place cable guide bracket (18) on shaft (33) with cable guide opening angled toward reel. The bracket can be positioned optionally, depending upon how the reel is to be mounted. Be sure that the cable guide is set so that the direction that the cable will be pulled is normally directly through the cable guide

2.16 Install washer (40) and nut (21) to secure brackets (4 and 18) to shaft (33) and tighten to 30 foot-pounds torque.

NOTE: During paragraph 2.16, check the latching and unlatching performance of ratchet wheel (13) and pawl assembly (14/15). These parts may have become dislocated while nut (21) was removed. Should such dislocation occur, proceed to paragraphs 3.1 through 3.13 for realignment of latching pawl.

2.17 Attach cable assembly (6) as in paragraph 1.4.

3. TO SERVICE LATCHING PAWL:

3.1 Remove cable (6) as in paragraph 1.2.

3.2 Remove all prewind from spring by allowing reel to unwind completely.

3.3 Lay reel down so that cup cover (5) is up.

3.4 Remove eight nuts (22) and remove cup cover (5) and gasket (10).

NOTE: If there are 2 E-clip retaining rings (29) holding the brake drum (8) in place.This reel is of style A or C, requiring that nut (21) be removed so that the shaft (33) and brake drum (8) can be removed as an assembly. If there is a hex nut holding the brake drum in place, you should up-grade the reel by ordering the new shaft (33) and hub bearing (1).

3.5 Remove ratchet wheel (13).

3.6 Using needle nosed pliers, remove retaining ring (20) that holds pawl (15) in place.

3.7 Lift pawl off and disengage pawl spring (14).

NOTE: Before installing new pawl and spring assembly, clean area and lubricate with Moly-Mist, dry film lubricant.

3.8 To install new pawl and spring assembly (14/15), slip free end of spring (14) in mounting hole and place pawl (15) over the stud. Using needle nosed pliers, reinstall retaining ring (20) which secures pawl (15).

3.9 Install ratchet wheel (13) on shaft (33), make sure brake arms (3) are inside the brake drum (8).

3.11 Slide shaft (33) through ratchet wheel (13), hub bearing (w/o groove) (27), hub spring ratchet (28) and hub bearing w/groove (1).

3.12 Using new gasket (10) reinstall cup cover (5) and secure with eight lock nuts (22) and tighten to 7-10 inch-pounds torque.

3.13 Turn the assembly over and follow instructins 2.13 through 2.17.

4. TO SERVICE BRAKE ARMS:

4.1 If pads on brake arms (3) are worn, replace the entire arm or install new pads (P/N GTP-2444). Remove old pad to bare metal. Bond new pad in place using 2-part wpoxy adhesive. Clamp tightly until epoxy has cured -- usually overnight. Make certain that arms move freely.

5. TO REPLACE O-RINGS (16) AND (39):

5.1 Remove cable (6) as in paragraph 1.2.

5.2 Unlatch reel and allow it to unwind completely.

5.3 Remove nut (21), washer (40), cable guide bracket (18), and mounting bracket (4), and o-ring (39).

5.4 Lay reel flat on cover cup (5).

5.5 Lift out hub bearing (1) and replace o-ring (16).

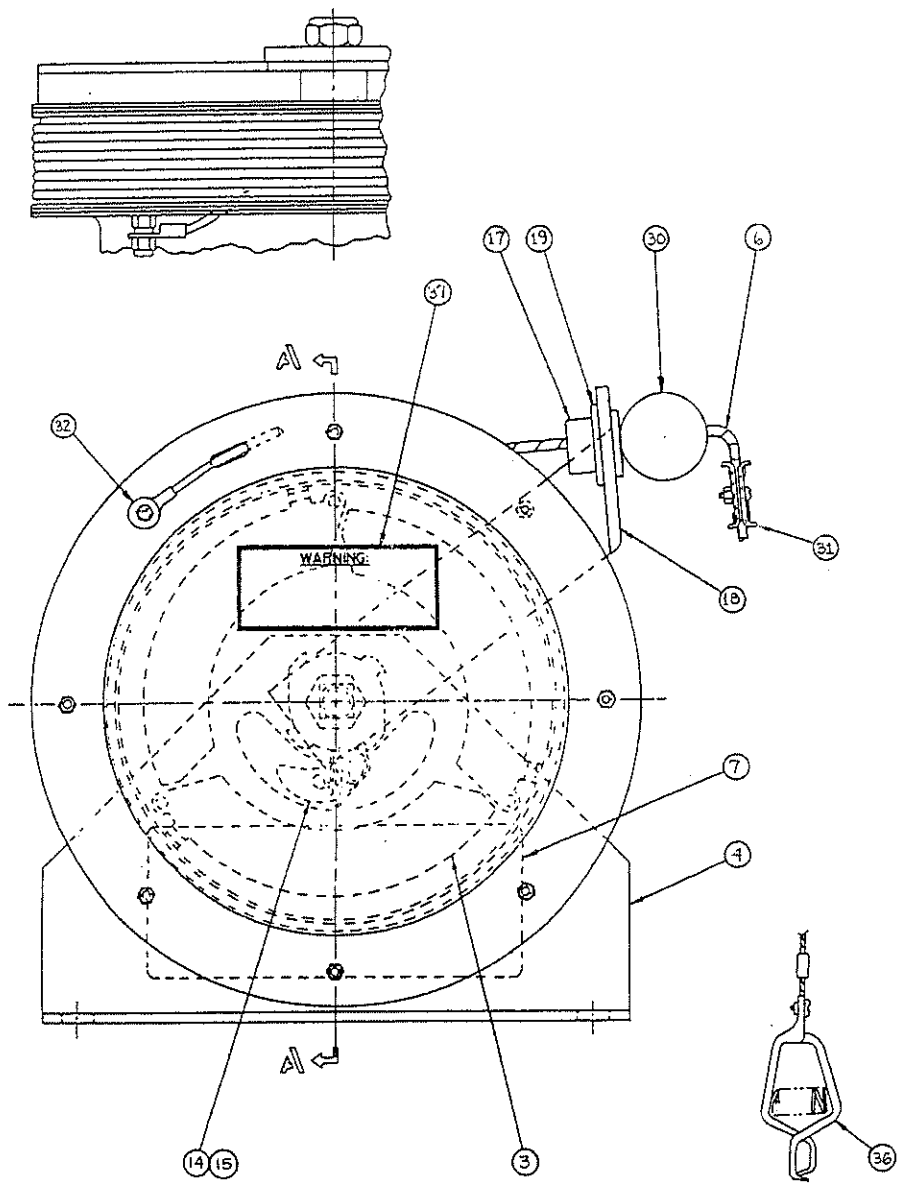
5.6 Install hub bearing (1). Place o-ring in square groove around the square shaft.

5.7 Reassemble as in 2.14 - 2.17.

ITEM	PART No.	DESCRIPTION	QUANTITY		
			ML-2930-15 50 ft.	ML-2930-14 75 ft.	ML-3416-2 100 ft.
1	GTP-1464	Hub Bearing w/Groove .610 long	1	1	1
2	GTP-1490	Spring Case	1	1	–
2	GTP-1490-1	Spring Case	–	–	1
3	GTP-1461	Break Arm	3	3	3
4	GTP-1462	Mounting Bracket	1	1	–
4	GTP-1462-1	Mounting Bracket	–	–	1
5	GTP-1463	Cup Cover	1	1	1
6		Cable Assy. (See Note)	1	1	1
7		I.D. Label	1	1	1
8	GTP-1465	Brake Drum	1	1	1
9	GTP-1466	Flange Cover	1	1	1
10	GTP-1467	Gasket, Flange	2	2	2
11	GTP-1468-S	Spring Assembly	1	–	–
11	GTP-1468-S-1	Spring Assembly	–	1	–
11	GTP-1468-S-2	Spring Assembly	–	–	1
13	GTP-1470-A	Ratchet Wheel	1	1	1
14/15	GTP-1472	Pawl & Pawl Spring Assy.	1	1	1
16	GTP-2200-020N	O-Ring	1	1	1
17	GTP-1474	Cable Guide	1	1	1
18	GTP-1475	Cable Guide Bracket	1	1	–
18	GTP-1475-1	Cable Guide Bracket	–	–	1
19	GTP-1476	External Cotter	1	1	1
20	GTP-1477	Retaining Ring	1	1	1
21	GTP-1478	Hex Lock Nut	1	1	1
22	GTP-1479	Hex Lock Nut	17	17	17
23	GTP-1480	Washer	3	3	3
24	GTP-1481	Nut, Push On	3	3	3
26	GTP-1482	MOLY-MIST (Not On Dwg.)	1	1	1
27	GTP-1483-A	Hub Bearing w/o Groove	1	1	1
28	GTP-1484	Hub Spring Ratchet	1	1	1
28	GTP-1484-1	Hub Spring Ratchet	–	–	1
29	GTP-1485	Retaining Ring	1	1	1
30	GTP-1486	Stop Ball	1	1	1
31	GTP-1487	Cable Stop Assy.	1	1	1
32	GTP-1771-1	Cable Eye	1	1	1
33	GTP-1471	Shaft (A & C Style)	1	1	–
33	GTP-1471-1	Shaft (A & C Style)	–	–	1
34	GTP-2742	Washer, Brake Drum (B style)	1	1	1
35	GTP-2743	Bolt, Brake Drum (B style)	1	1	1
36	GTP-1096S	Clip, Steel – Min. Order 12			
36	*GTP-1096C	Clip, Copper – Min. Order 12	1	1	1
37		Warning Label			
39	GTP-2200-012N	O-Ring	1	1	1
40	GTP-8586	Washer	1	1	1

NOTE: When ordering replacement cables and "Y" assemblies, refer to model number of reel and bulletin 54. For accessories on the cable, refer to bulletin 55.

* Each reel comes with 1 clip unless you order a reel with a "y". Then it will have 2 clips unless you specify a different clip.


WARNING:
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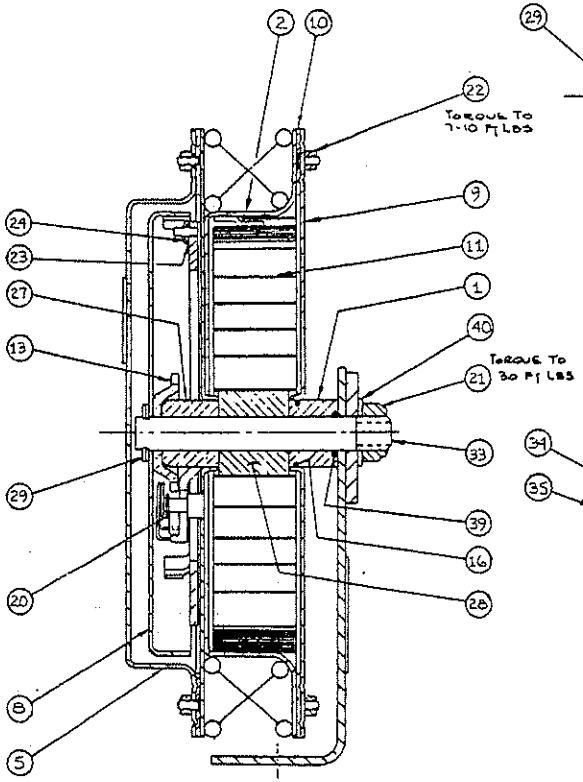
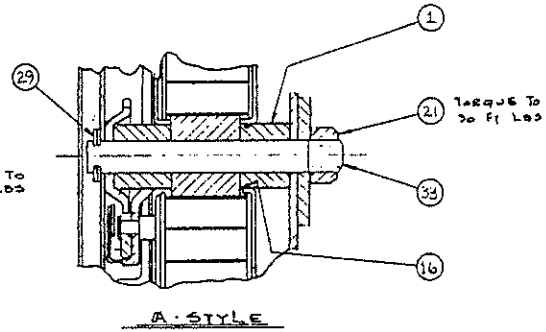
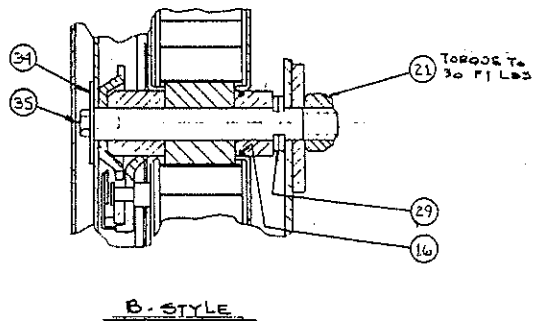

2
10
22
Torque To
7-10 Ft Lbs
9
24
23
11
27
1
13
40
Torque To
30 Ft Lbs
21
33
29
39
16
20
28
8
5
C-STYLE

SECT. A-A


1
29
Torque To
30 Ft Lbs
21
33
16
A-STYLE


34
21
Torque To
30 Ft Lbs
35
29
16
B-STYLE

Should it be necessary to disassemble the reel for examination or replacement of parts, we recommend the following procedure:

I REPLACE CABLE ASSEMBLY

Completely extend cable and allow reel to latch in fully extended position. Remove locknut and disconnect cable. Attach new cable with locknut, pull on cable to release latch mechanism and allow cable to retract on the reel.

Note: If for any reason correct assembly of spring is in doubt, prewind on the spring is 34 turns for 50 ft. reel, 47 turns for 75 ft. reel, and 58 turns for 100 ft. reel, or approximately two turns less than full wind of the spring.

II REPLACE SPRING OR O-RING

CAUTION: BE SURE TO WEAR LEATHER GLOVES WHEN REMOVING SPRING IN ORDER TO PREVENT POSSIBLE INJURY.

1. Remove cable assembly as in Paragraph I above.
2. Remove all prewind from spring by allowing reel to unwind completely.
3. Remove arbor nut, cable guide bracket and mounting bracket.
4. Lay reel flat with arbor up and while holding flange cover down, remove (8) nuts. After nuts are removed, carefully lift flange cover up just enough to slide a piece of flat steel (approximately 1/16 x 1 x 12) between flange cover and spring case, across the spring close to arbor. This piece of flat steel is used to hold spring down and prevent it from popping out while flange cover is removed. (If only O-Ring is to be replaced, do so and continue assembly with Steps 6 & 7.)
   ALTHOUGH SPRING IS CONTAINED IN A RETAINING RING EXTREME CARE IN HANDLING MUST BE EXERCISED TO PREVENT SPRING COILS FROM COMING OUT OF RETAINER LATERALLY AND CAUSING POSSIBLE INJURY. While holding coils in place with retainer, entire spring may be lifted and/or pried out of spring case.
   CAUTION: AFTER SPRING IS REMOVED FROM SPRING CASE, SECURE ALL COILS OF SPRING IN CONTAINED POSITION WITH TAPE TO PREVENT UNCONTROLLED UNWINDING OF SPRING AND CAUSING POSSIBLE INJURY.
5. To install, remove tape and slip spring into spring case while making certain that notched end of spring retainer is hooked on tab inside spring case. USE EXTREME CARE TO PREVENT SPRING COILS FROM COMING OUT OF RETAINER LATERALLY.
6. Reassemble cover using (8) small locknuts, tightening to approximately 9 lb. in. torque. Reassemble mounting bracket, cable guide bracket and tighten arbor nut to approximately 75 - 100 lb. in. torque.
7. Prewind spring fully, until rotation of case is no longer possible, back off two turns, and attach cable assembly. Allow cable to wind on reel.

III REPLACE CABLE GUIDE BRACKET OR MOUNTING BRACKET.

1. Remove cable assembly as in Paragraph I above.
2. Remove all prewind from spring by allowing reel to unwind completely.
3. Remove arbor nut, cable guide bracket and mounting bracket and replace damaged component(s) with new part(s).
4. Arbor nut should be tightened to approximately 75 - 100 lb. in. torque
5. Prewind spring fully, until rotation of case is no longer possible, back off two turns, and attach cable assembly. Allow cable to wind on reel.

Note: Opposite cover (over speed control and latching mechanism) may be removed for inspection.

STATIC DISCHARGE GROUNDING REEL
INSTALLATION / OPERATION INSTRUCTION SHEET
P/N 922-30-028

Introduction

Static Discharge Reels; 200-20R, 700-50R, ML2930, ML3416 and A-A-50696 Series to be used for bonding and grounding on mobile fuel equipment at bulk stations; airports, terminals, refineries, et cetera.

Bonding and Grounding Principles

Bonding connects various pieces of conductive equipment together to keep them at the same potential. Static sparking can not occur between objects that are at the same potential.

Grounding is a form of bonding in which conductive equipment is connected to an earthing electrode or to a building grounding system in order to prevent sparking between conductive equipment and grounding structures.

Refer to the National Fire Protection Association Codes, NFPA 77 and NFPA 99 for recommended practice on static electricity.

Reel Installation

Mount Grounding Reel to object or vehicle with bolts using holes provided in base. Underside of bracket is unpainted providing a conductive surface to interface with a clean conductive surface on the object or vehicle. After mounting reel check electrical continuity (25 ohms, max.) between object or vehicle and grounding clamps at the end of the cable.

Reel Operation

Extend cable to desired object or earthing ground lug and clamp alligator jaw grip or other grounding connector in place. A pawl and ratchet permits locking of cable at any desired length within the reel's capacity. A simple tug on the cable unlocks the reel for a smooth and steady **walk-back retraction**.

Perform periodic tests of the bonded object to the ground clamp on the end of the cable grounding reel with Ohm-Meter to confirm continuity. Maximum resistance to be 25 ohms. If higher, remove and replace reel. Inspect the entire cable length for kinks and/or broken wires. Inspect the cable clamp for good compression force and/or damage.

Caution: Do not use any part of the electrical current carrying system as a ground for static grounding. Arcing and fires could occur from current feedback where static controls grounds are tied into the electrical system neutral.

WARNING:

This product can aid in the discharge of static electricity. No prediction or advice, however, can be given about all the different conditions which can cause static discharges to accumulate. Moreover, it can not be guaranteed that the use of this product (without other precautionary steps) will prevent static ignited fires or explosions which may result in serious injury or death.

SEEK PROFESSIONAL ADVICE BEFORE INSTALLING AND / OR USING THIS PRODUCT.
08/07/02 Rev. 2