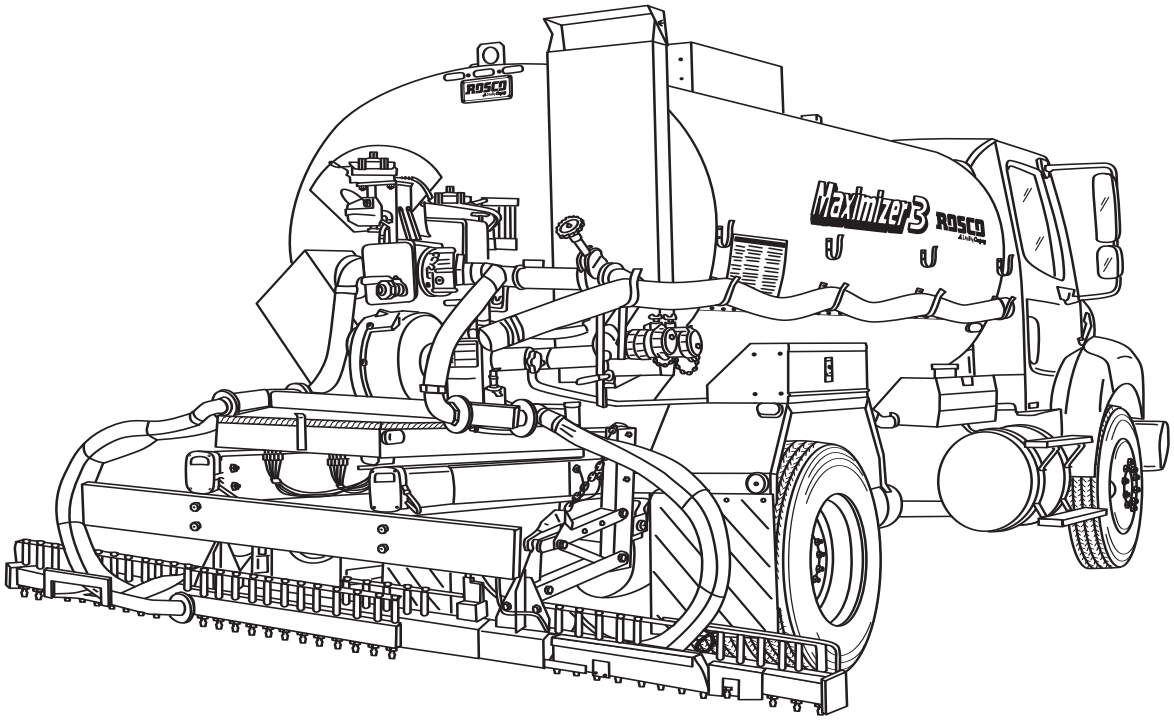
ROSCO

A LeeBoy Company

OPERATIONS, SERVICE AND PARTS MANUAL



MAXIMIZER3 ASPHALT DISTRIBUTOR

Manual No. 38409-01

For Units With Serial No. 40177 and higher

Revised 03-15-06

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LIMITED WARRANTY POLICY AND PROCEDURES

EFFECTIVE FOR UNITS SHIPPED AFTER DECEMBER 1, 2001

WARRANTY

1. If a defect in material or workmanship is found and the authorized dealer is notified during the warranty period, ROSCO will repair or replace any part of component of the unit or part that fails to conform to the warranty during the warranty period.

2. The warranty date will begin upon the completion of the warranty form by the initial customer and will expire after twelve (12) months have passed. The Warranty Card should be filled out within ten (10) days of delivery of the unit.

3. Engines are warranted by their manufacturers and may have warranty coverage that differs from that of ROSCO.

4. Replacement parts furnished by ROSCO are covered for the remainder of the warranty period applicable to the unit or component in which such parts are installed.

5. ROSCO has the right to repair any component or part before replacing it with a new part.

6. All new replacement parts purchased by a ROSCO dealer will carry a six (6) month warranty. Remanufactured parts purchased by a ROSCO dealer will carry a ninety (90) day warranty.

ITEMS NOT COVERED

ROSCO is not responsible for the following:

1. Charges for travel time, mileage, or overtime.

2. Charges related to transporting the product to and from the place at which warranty work is performed.

3. Airfreight charges related to transporting repair parts to the place at which warranty work is performed.

4. All used units or used parts of any kind.

5. Repairs due to normal wear and tear, or brought about by abuse or lack of maintenance of the equipment, except for premature failures, conveyor chains, polytrack pads, and track rails.

6. Attachments not manufactured or installed by ROSCO.

7. Liability for incidental or consequential damages of any type including, but not limited to lost profits or expenses of acquiring replacement equipment.

8. Miscellaneous charges.

LIMITATIONS

ROSCO has no obligation under this warranty for:

1. Any defects caused by misuse, misapplication, negligence, accident or failure to maintain or use in accordance with the most current operating instructions.

2. Unauthorized alterations.

3. Defects or failures caused by any replacement parts or attachments not manufactured by or approved by ROSCO.

4. Failure to conduct normal maintenance and operating service, including without limitation, providing lubricants, coolant, fuel, tune-ups, inspections or adjustments.

5. Unreasonable delay, as established by ROSCO, in making the applicable units or parts available upon notification of a service notice ordered by ROSCO.

6. The warranty responsibility on all engines and/or truck chassis rests with the respective manufacturer.

7. ROSCO may have support agreements with some engine and/or truck chassis manufacturers for warranty and parts support.

OTHER WARRANTIES

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED STATUTORY AND IMPLIED WARRANTIES APPLICABLE TO UNITS, ENGINES, OR PARTS WITH LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE OR PURPOSE. IN NO EVENT, WHETHER AS A RESULT OF BREACH OF CONTRACT OR WARRANTY, OR ALLEGED NEGLIGENCE OR LIABILITY WITHOUT FAULT, SHALL ROSCO BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOSS OF PROFIT OR REVENUE, COST OF CAPITAL, COST OF SUBSTITUTED EQUIPMENT, FACILITIES OR SERVICES, DOWNTIME COSTS, LABOR COSTS OR CLAIMS OF CUSTOMERS, PURCHASERS OR LESSEES FOR SUCH DAMAGES.

USERS' REFERENCE GUIDE

DELIVERY DATE _____

UNIT SERIAL NUMBER _____

ENGINE TYPE _____

ENGINE NUMBER _____

DEALER'S NAME AND ADDRESS

_____

_____

PHONE NUMBER _____

EQUIPMENT HOURS _____

SERVICE MANAGER _____

688 North Highway 16 • Denver, North Carolina 28037 • www.LeeBoy.com • (704) 483-9121

SAFETY SIGN-OFF FORM

ROSCO Manufacturing Company follows the general safety standards specified by the Society of Automotive Engineers (SAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or servicing the Maximizer3 must read and clearly understand all safety, operating and maintenance information presented in this manual. Do not operate or allow anyone to operate this equipment until such information has been learned. Annually review this information before the season start-up. Make periodic reviews of safety and operation a standard practice. **An untrained employee is not qualified to operate this machine.**

A sign-off form is provided below to show that all personnel who will be working with the Maximizer3 have read and understand the information in the Operator's Manual and have been instructed in the operation of this equipment.

Date	Employee Signature	Employer Signature

FORWARD

The ROSCO Maximizer3 is used for the transportation and distribution of asphalt-based products for road maintenance and repair. The machine can spray asphalt emulsions, asphalt cements and cut-back asphalts. ROSCO Manufacturing Company strongly recommends the use of asphalt emulsions. Water based emulsions reduce the risk of fire and explosion. The Maximizer3 *should not be used* to distribute water, calcium chloride or other de-icing liquids. These materials can corrode the pump and valves and dangerously contaminate the tank. **If these materials are used in a Maximizer3, the warranty is voided on those components affected by the material.**

This manual contains the correct operation and routine maintenance procedures needed by the owner/operator for the safe and efficient use of the ROSCO Maximizer3 Asphalt Distributor. In order to maximize the performance and efficiency of the Maximizer3, it is **VERY IMPORTANT** that the owner/operator and maintenance personnel read this manual thoroughly before operating or servicing the distributor. You must know to handle asphalt products and should be trained and licensed per state requirements before operating this equipment. Always keep this manual in a convenient place for instant reference and **never** attempt to make repairs or adjustments that you do not fully understand. If you require additional information or service, contact your authorized ROSCO Dealer.

The technical information found in this manual was correct at the time it was approved for publication. However, due to a continuous program of research and development, some procedures, specifications and parts may be altered in a constant effort to update and improve our products.

ROSCO Manufacturing Company reserves the right to make design or specification changes without prior notification and to make improvements without incurring an obligation to add them to any machine in existence. Please contact your local authorized ROSCO Dealer if you require further assistance.

SERIAL NUMBER LOCATION

Always give your dealer the Serial Number of your Asphalt Distributor when ordering parts or when requesting service or other information.

The Serial Number Plate is located on the center, left side of the Distributor, just ahead of the fender. (See Figure 1-1) Write the serial number in the space provided on page 3, Users' Reference Guide.

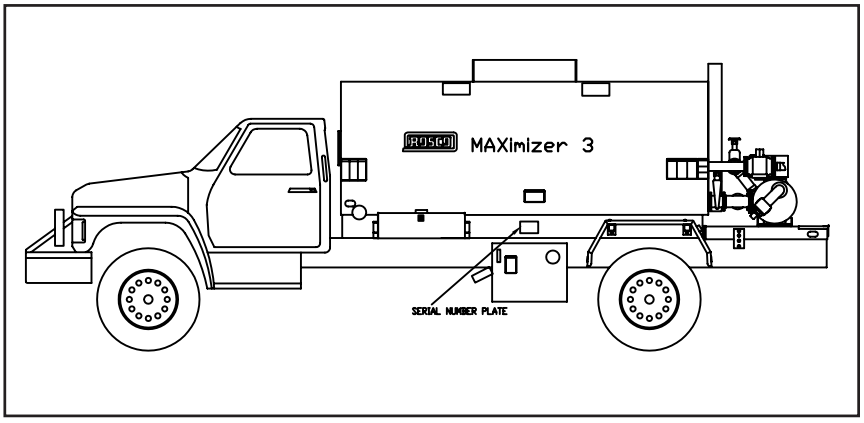


FIGURE 1-1. SERIAL NUMBER LOCATION

OVERVIEW

GENERAL INFORMATION

This manual contains Safety information, Specifications and Controls detail, Operation procedures, Maintenance and Troubleshooting guidelines, and an Illustrated Parts List for the Maximizer3 Asphalt Distributor.

INTRODUCTION AND SAFETY

Important Safety precautions related to specific areas of the machine and workplace are included to insure your safety, the safety of those around you, and the correct operation of the distributor.

SPECIFICATIONS AND CONTROLS

Refer to SPECIFICATIONS & CONTROLS, Section 2 in this manual, for all major system specifications and detailed information on this machine's components and controls.

MATERIAL AND OPERATION

Refer to MATERIAL & OPERATION, Section 3 in this manual, for important information regarding selection and handling of asphalt product and operating instructions. The operator of this equipment should READ, UNDERSTAND, and FOLLOW all instructions and **all** Safety precautions found in Section 1 of this manual, as well as all Cautions and Warnings provided throughout all sections of this manual.

CAUTION: **Do not attempt to operate the Maximizer3 Asphalt Distributor unless fully trained in the machine's operation. Only authorized personnel should operate this machine. All instructions provided in this manual and on the machine's operation and warning decals must be followed to prevent damage to the equipment and/or injury to operating personnel.**

MAINTENANCE AND TROUBLESHOOTING

Refer to MAINTENANCE & TROUBLESHOOTING, Section 4 of this manual, for all maintenance and repair procedures.

CAUTION: **All maintenance instructions provided in this manual should be followed to insure the safety of the personnel performing the maintenance and to prevent damage to the machine.**

SAFETY CONSIDERATIONS

SAFETY SYMBOL

This Safety Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! The Safety Symbol identifies important safety messages written on the Maximizer3 decals, as well as in this manual.

Even though you may be familiar with similar equipment, you MUST read and understand this manual before operating this unit.

Safety is everyone's business and is one of your primary concerns. Knowing the guidelines covered in the paragraphs below and in other sections of this manual will help insure your safety, the safety of those around you, and the correct operation of this equipment.

SAFETY WORDS

Note the use of key signal words DANGER, WARNING, and CAUTION with the safety message. The appropriate signal word for each message has been selected using the following guidelines:

DANGER: An immediate and specific hazard which **WILL** result in severe injury or death if the proper precautions are not taken.

WARNING: A specific hazard or unsafe practice which **COULD** result in severe injury or death if proper precautions are not taken.

CAUTION: Unsafe practices which **MAY** result in injury if proper precautions are not taken, or as a reminder of good safety practices.

MACHINE SAFETY

If your machine has been repainted, it is extremely important that all the decals referring to danger, warnings and cautions are replaced. If safety decals are illegible because of wear, you must replace the decals. Refer to **Safety Decals** later in this section, for information on their location.

NOTE: It is the responsibility of the owner and operator to make sure that all decals are readable and located on the machine as designated by the manufacturer.

EQUIPMENT DAMAGE SYMBOL

Throughout this manual, whenever you see this "Broken Bolt" symbol, it means ATTENTION. Equipment on the machine could be damaged through improper performance of an operation, maintenance, or repair procedure.

OPERATOR SAFETY CONSIDERATIONS

ASPHALT DISTRIBUTOR OPERATORS

Operation shall be limited to persons with the following minimum qualifications:

1. Designated persons selected or assigned by the employer or the employer's representative as being qualified to operate the Asphalt Distributor.

2. Trainees under the direct supervision of a designated person.

3. Maintenance and test personnel (when it is necessary in the performance of their duties).

No one other than the personnel specified above shall operate the Asphalt Distributor, with the exception of persons such as oilers, supervisors and those specified persons authorized by supervisors whose duties require them to do so, and then only in the performance of their duties and with the knowledge of the operator or other appointed person.

QUALIFICATIONS FOR OPERATORS

1. Operators shall be required by the employer to pass a practical operating examination. All operators must meet state licensing requirements including but not limited to a commercial driver's license (CDL) and a hazardous material handling license.

2. Operators and operator trainees shall meet the following physical qualifications:
   a. Vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses.

   b. Ability to distinguish colors, regardless of position, if color differentiation is required for operation.

   c. Adequate hearing, with or without hearing aid, for the specific operation.

3. Evidence of physical defects or emotional instability which could render a hazard to the operator or others, or which, in the opinion of the examiner, could interfere with the operator's performance, may be sufficient cause for disqualification. In such cases, specialized clinical or medical judgments and tests may be required.

4. Evidence that an operator is subject to seizures or loss of physical control shall be sufficient reason for disqualification. Specialized medical tests may be required to determine these conditions.

5. Operators and operator trainees should have normal depth perception, field of vision, reaction time, manual dexterity, coordination and no tendencies to dizziness or similar characteristics.

6. In addition to the above listed requirements, the operator shall:
   a. Demonstrate the ability to comprehend and interpret all labels, operator manuals, safety codes and other information pertinent to correct Asphalt Distributor operation.

   b. Possess knowledge of emergency procedures and the ability to implement them.

   c. Demonstrate to the employer the ability to operate the specific type of equipment.

   d. Be familiar with applicable safety regulations.

   e. Understand responsibility for maintenance requirements of the Asphalt Distributor.

   f. Be thoroughly familiar with the Asphalt Distributor and its control functions.

   g. Understand the operating procedures as outlined by the manufacturer.

CONDUCT OF OPERATORS

YOU are responsible for the safe operation and maintenance of your ROSCO Maximizer3. You must ensure that you and anyone else who is going to operate, maintain or work around the machine, be familiar with the operating and maintenance procedures and all related safety information contained in this manual.

1. The operator shall not engage in any practice which will divert his/her attention while actually engaged in operating the Asphalt Distributor.

2. Each operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall consult with the supervisor.

3. The operator should not leave the Asphalt Distributor when asphalt material is being loaded, unloaded, transferred or heated by the distributor's burner system.

4. If there is a warning sign on a switch, engine control or distributor component, the operator shall not close the switch, start the engine or use the component until the warning sign has been acknowledged and corrected by the appropriate person.

5. Before operating the Asphalt Distributor, the operator shall see that all controls are in the OFF or neutral position and that all personnel are in the clear.

6. In accordance with OSHA regulations 1928.51 and 1928.52, operating instructions must be provided initially to operators/employees before allowing them to operate the Maximizer3 and should be reviewed annually thereafter.

The most IMPORTANT safety device on this equipment is a well trained and safe operator. It is his/her responsibility to read and understand all safety and operating instructions in this manual. A person who has not read and understood all operating and safety instructions is not qualified to operate the Maximizer3. An untrained operator exposes himself/herself and bystanders to possible serious injury or death. All accidents can be avoided!

WARNING: **Do not modify the Maximizer in any way. Unauthorized modification may impair function and/or safety, causing severe injury or death. It may also affect the working life of the equipment.**

ROSCO Manufacturing Company assumes NO LIABILITY for accident or injury incurred through the improper use or modification of this equipment.

SAFETY PRECAUTIONS

GENERAL SAFETY

1. Read and fully understand the operator's manual and the safety decals on the machine before trying to operate or service this equipment.

2. Have a first-aid kit available and **know how to use it.**

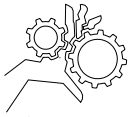
3. Keep a "charged" fire extinguisher within reach whenever you work in an area where fire may occur. Have the correct type of extinguisher for your situation and **know how to use it:**

   Type A: Wood, paper, textile and rubbish
   Type B: Flammable liquids
   Type C: Electrical equipment

4. Wear safe work clothing. Do not wear clothing that is loose fitting or in poor repair. Do not wear rings or wrist watches when working on machinery. They can catch on moving parts and pull you into the machinery, causing serious injury. Wear sturdy, rough-soled work shoes, safety glasses and any other protective gear that is warranted by the work environment.

5. Keep the work area organized and clean. Wipe up oil spills of any kind. Keep tools and parts off floor. Eliminate the possibility of a fall which could result in serious injury.

6. Wear appropriate ear protection for prolonged exposure to excessive noise. Permanent loss of hearing can result from prolonged exposure to loud noise.



7. After servicing and/or adjusting the machine, reinstall safety devices, guards or shields. Remove and store all tools, parts, or servicing equipment that were used.

8. **Do not hurry.** Use recommended hand holds and steps with at least three points of support when getting on and off the Maximizer3. Keep steps, floor, hand holds and controls clean and free from grease. Face the machine when climbing up and down and never jump off or dismount while the machine is in motion. Falling from the machine can cause serious injury.

9. Do not permit riders on the Maximizer3. Death or serious injury can occur if riders fall off or under the machine while it is in motion.

10. **Do not go into the tank!** Death can occur due to lack of oxygen, breathing poisonous fumes or explosion. **Keep others out!**

11. Do not smoke near the machine. Fuel, emulsion and fumes can explode when exposed to flames or heat from smoking or other sources.

12. Always wear your seat belt when travelling.

13. Keep the unit clean.

PRE-OPERATING

1. Follow the **Pre-Operating Check List** in Section 3, Material & Operation, before operating the machine. Be sure all controls and gauges are operating properly before starting a job. **Do not** operate the machine if any of the warning buzzers or lights are **ON**. If any malfunctions are found prior to or during operation, **shut down the machine and report the problem to a supervisor.**

2. Keep all hydraulic lines, fittings and couplers tight and free of leaks. Leaking fittings are a fire hazard.

3. Hydraulic fluid under pressure can pierce skin, causing serious injury or toxic reaction. **Do not feel for hydraulic leaks with your hands.**

4. Before starting or operating the machine, be sure that all controls are **OFF** or in the neutral position. Clear the area of people. Death or serious injury can occur to bystanders from being crushed under a moving machine or being hit by debris.

5. **Know and understand** the job site traffic flow patterns and obey flagmen, road signs and signals.

6. When transporting the machine, **know and use** all required signal devices. Use tail lights, Slow Moving Vehicle signs and warning beacons when on public roads. Provide an escort when necessary.

7. **Do not** allow riders on the machine when transporting. Death or serious injury can occur if riders fall off or under the machine while it is in motion.

8. Clean reflectors and lights before transporting to help avoid collisions with other traffic.

STARTING AND STOPPING

1. Walk around the machine and warn all personnel in the area **before** starting the machine. **Be sure the area is clear before starting.** Death or serious injury can occur to bystanders from being crushed under a moving machine or being hit by material.

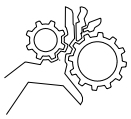
2. **Do not** operate the engine in an enclosed area without adequate ventilation. Exhaust gases contain carbon monoxide, an odorless and deadly poison.

3. **Always** park the machine on level ground whenever possible. Apply the parking brake. On grades, park the Distributor with the wheels securely blocked.

4. Stopping distances must be anticipated for **all** conditions. If stopping on a grade, the distance needed to come to a stop will be longer. Familiarize yourself with these variables so you can anticipate when a longer stopping distance is required.

OPERATING

1. **Know and use** the hand signals required for each job and know who has the responsibility for signaling.



2. Keep hands, feet, hair and clothing away from moving parts. Death or serious injury can occur from entanglement in moving parts.

3. Do not leave the machine unattended. **Never** allow anyone to reach into the machine while it is operating.

4. **Do not** go under the vehicle when the engine is running. Death or serious injury can occur if one becomes crushed by or entangled in moving parts.

5. After servicing, remove and store **all** tools, parts or servicing equipment that were used.

6. **Be sure** to reinstall safety devices, guards or shields after adjusting and/or servicing the machine. Death or serious injury can occur from entanglement in moving parts.

MAINTENANCE

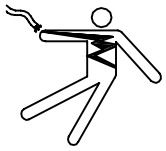
1. **Do not attempt repairs unless trained.** Refer to manuals and experienced repair personnel for help.

2. Follow **all** operating, maintenance and safety information in the manuals.

3. Support the machine with blocks or safety stands when changing tires or working beneath it. Death or serious injury can result from the machine falling off a jack and crushing you.

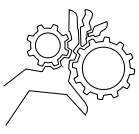
4. Place **all** controls in neutral, stop engine, remove ignition key and wait for **all** moving parts to stop **before** servicing, adjusting or repairing the machine. Death or serious injury can occur from entanglement in moving parts.

5. **Do not go into the tank.** Entry into a confined space requires special equipment and training. Serious injury or death can occur due to lack of oxygen, breathing poisonous fumes or explosion. **Keep others out.**



6. Follow good shop practices: Keep service area clean and dry. **Be sure** electrical outlets and tools are properly grounded. Use adequate light for the job at hand.

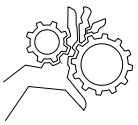
7. Make sure **all** guards are in place and properly secured after maintenance work is completed. Serious injury can occur from being caught in unguarded moving parts.



8. **Never** wear baggy or frayed clothing when working around or on any of the drive system components. Loose garments can become entangled in moving parts, pulling you into the machine, causing serious injury or death.

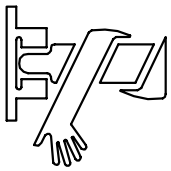
9. **Before** applying pressure to a hydraulic system, **be sure** all lines, fittings and couplers are tight and in good condition. Leaking fittings are a fire hazard.

10. Hydraulic fluid under pressure can pierce the skin, causing serious injury or toxic reaction. Wear protective glasses and other required safety equipment when servicing or repairing the Distributor.



11. Keep hands, feet, hair and clothing away from moving parts. Death or serious injury can occur from entanglement in moving parts.

12. Clear the area of bystanders when carrying out any maintenance, repairs or adjustments.



13. **Do not** service the machine while it is in motion or while the engine is running. If the engine must be running to service a component, apply parking brake, block wheels and use **extreme caution**.

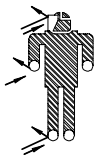
14. Do not make repairs on pressurized components, fluid, gas or machinery until the pressure has been properly released. Use **extreme caution** when removing radiator cap, drain plug, grease fitting or pressure taps. Park the machine and let it cool before opening a pressurized compartment.

15. When inflating tires, use a self attaching inflation chuck with a remote shut-off and **stand clear** of the tire. A tire can explode with great force.

16. **Do not** operate the unit with loose wheels or rims. Check wheel nuts periodically for tightness. Refer to the **Bolt Torque Charts** in Section 4, Maintenance & Troubleshooting, of this manual.

17. Keep brakes in good operating condition.

HOT MATERIAL PRECAUTIONS



1. Wear protective gear for face, hands, feet and body when working with hot material.

2. Allow machine to cool before repairing or servicing working components.

3. If hot asphalt touches the skin, flush area immediately with cold water. Do not apply ice directly to affected area. **Do not attempt to remove asphalt cement with products containing solvents or ammonia.** Natural separation will occur in about 48 - 72 hours. **Get medical attention immediately!**

4. Do not remove radiator cap, drain plugs, or service grease fittings or pressure taps when engine is hot. Add coolant to the radiator and perform other service only when the engine is stopped and fully cooled.

FIRE AND EXPLOSION PRECAUTIONS

1. Keep machine and asphalt material away from sparks, incandescent material and open flames. Fumes are flammable and can ignite and explode. Take extra care when using cutback asphalts. They have a much lower flash point, thereby posing a greater risk of explosion.

2. Do not load the Maximizer when there is water in the bottom of the tank. Hot material will turn the water into steam and can cause an explosion.

3. Do not mix different asphalt materials in the tank. Clean the tank and circulating system before adding a foreign substance. See **Cleanout Mode** in Section 3, Material & Operation. Due to the tremendous variety of asphalt products, the tank cleaning procedure will vary. Contact the supplier of your asphalt product for the correct procedure.

4. Purge cleanout solvent from the spraybar before circulating asphalt. Hot asphalt can vaporize fluid and cause an explosion.

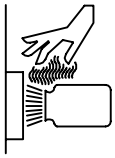
5. Do not smoke around the machine. Fuel, emulsion and their fumes can explode when exposed to flame or heat.

BURNER SAFETY PRECAUTIONS

1. Do not operate burner equipment while the vehicle is being loaded or while in transit.

2. Burner tubes must be covered by at least 8 inches of asphalt before burners are ignited. See **Burners & Torch Operation** in Section 3, Material & Operation, for determining flue tube coverage.

3. Do not exceed asphalt flash temperature. Hot fumes can explode. See **Material Considerations** in Section 3, Material & Operation, for information and guidelines.



4. Stay away from the burner and stack when heating material in the tank.

5. Keep others away from the machine when operating the burners.

6. Follow burner operator instructions. See **Burners & Torch Operation** in Section 3, Material & Operation.

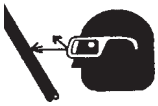
7. Use a liquid draw system at 10-20 PSI when using propane fired burners.

8. Use a torch to light LPG burners. **Do not** use a match or cigarette lighter.

HYDRAULIC SYSTEMS PRECAUTIONS

1. Make sure that all components are in good working condition. Replace any worn, cut, flattened or crimped hoses and metal lines.

2. Do not make repairs using tape, clamps or cements. The hydraulic system operates under extremely high pressure. Such repairs will fail suddenly and create a hazardous condition.



3. Wear proper hand and eye protection when searching for a high pressure leak. Use a piece of wood or cardboard as a back stop to isolate and identify leaks. **Do not use your hands.** Relieve pressure from the system before repairing or disconnecting lines, hoses and/or valves. Before reapplying pressure to a hydraulic system, be sure all lines, fittings and couplers are tight and in good repair.

4. Pressurized hydraulic fluid or oil has sufficient force to penetrate the skin, causing serious injury or serious toxic reaction. If injured by a high pressure stream of hydraulic fluid, **seek medical attention immediately.**

REFUELING PRECAUTIONS

1. Handle fuel with care. It is highly flammable. Do not smoke when refueling and never refuel near an open flame. Never refuel when the engine is running. Clean up spilled fuel before restarting the engine. Death or serious injury can occur due to explosion and/or fire.

2. When refueling, keep the hose nozzle or funnel and container in contact with the metal of the fuel tank to avoid the possibility of an electrical spark igniting the fuel.

3. Do not overfill the fuel tank. Allow room for expansion to reduce the risk of fuel expanding and spilling from the tank.

4. Prevent fires by keeping the machine clean of accumulated debris, grease and spilled fuel.

5. Fill the fuel tank outdoors to reduce the chance of fumes accumulating and causing a fire or explosion.

6. Do not spill fuel on hot components. Maintain control of the fuel nozzle when filling the tank. Fire can result when fuel contacts hot components.

7. Tighten the fuel tank cap securely. If the fuel cap is lost, replace it only with the original manufacturer's approved cap. Use of a non-approved cap without proper venting may result in pressurization of the tank.

8. Use the correct fuel grade for the operating season.

BATTERY PRECAUTIONS

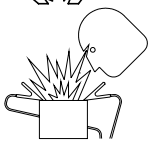
1. Keep all sparks and flames away from the battery. Fumes given off by electrolyte solution are explosive.

2. If you come in contact with battery electrolyte solution, wash off immediately with water. Chemical burns can cause injury and blindness.

3. Always disconnect the battery ground cable before working on the electrical system to avoid injury from spark or short circuit. Electrical shock and burns can occur.

4. Do not tip batteries more than 45 degrees, to avoid electrolyte loss and contact with the solution. Chemical burns can cause injury.

5. Wear safety glasses when working near batteries. Battery acid in the eyes can cause blindness.



6. Use jumper cables ONLY in recommended manner. Improper use can result in battery explosion or unexpected movement of the machine.

TIRE PRECAUTIONS

1. Follow proper procedure when mounting a tire on a wheel or rim. Failure to do so can result in an explosion which may result in serious injury or death.

2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.

3. Have a qualified tire dealer or repair technician perform required tire maintenance.

4. When inflating tires, use a self attaching inflation chuck with remote shut off. Stand clear of the tire.

5. Do not inflate the tire beyond the tire manufacturer's recommended inflation pressure.

6. Do not operate the machine with loose wheels or rims. Check wheel nuts periodically for proper tightening torque.

7. Do not hammer on rims with steel hammers. Use rubber, lead, plastic or brass faced mallets if necessary.

8. Block the tires and wheels on the opposite side of the vehicle before you place a jack in position.

9. Place hardwood blocks under the jack regardless of how hard the ground is. To reduce the risk of injury or death from being crushed, always support the vehicle with blocks, or preferably jack stands, in case the jack slips.

TRANSPORT PRECAUTIONS

1. Always comply with local regulations regarding transporting equipment on public roads and highways. **DO NOT DRINK AND DRIVE.**

2. Make sure that all lights and reflectors that are required by local highway and transport authorities are in place, are clean, in good repair and can be seen clearly by all overtaking and oncoming traffic.

3. Always raise and secure spraybar wings before transporting.

4. Do not permit riders on the Maximizer. Death or serious injury can occur when riders fall off or under the machine while it is in motion.

5. Do not exceed the legal speed limit and always wear your seat belt. Reduce speed on rough roads or surfaces and when making turns.

STORAGE PRECAUTIONS

1. Store the Maximizer in an area away from human activity.

2. Do not permit children to play on or around the stored machine. Serious injury can result from slips and falls.

3. Make sure the unit is stored in an area that is firm, level and free of debris.

4. Store the Maximizer inside a building or cover it with a weatherproof tarpaulin and anchor it securely.

PTO DRIVELINE SAFETY

1. Shut off the engine and remove ignition key before working on or near the PTO system.

2. Stay away from rotating driveline. Hands, feet, hair and clothing can get caught on rotating parts and cause serious injury or death.

3. Do not go under the vehicle when the engine is running.

4. Do not work on the PTO driveline when engine is running.

5. Do not engage or disengage PTO by hand from under the vehicle when the engine is running.

SAFETY DECALS

1. Become familiar with the content and the position of each Safety Decal. **Important information is written on the decals.** The location and description of each safety decal is described or illustrated on the following pages.

2. Keep Safety Decals and signs clean and legible at all times.

3. Replace decals and signs that are missing or cannot be read easily.

4. When replacing parts that previously displayed a safety decal, be sure to replace the decals that were on the original part.

5. Obtain replacement safety decals or signs from your authorized ROSCO Dealer.

DECAL INSTALLATION

1. Be sure that the installation area is clean and dry. Use hot soapy water and dry the area thoroughly before installing decals.

2. Decide on the exact position by taking measurements and test fitting before you remove any of the backing paper.

3. For decals with no top protection paper, decide on the location for the decal and remove the smallest adhesive backing of the split backing paper.

4. Align the decal over the specified area and carefully press the small portion of exposed adhesive backing into place.

5. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.

6. Use a pin to pierce small air pockets, and smooth out using a piece of decal backing paper.

7. If the decal has a protective top paper, use hot soapy water on the surface to which the decal is being applied. Leave wet. After deciding on the location, remove the backing paper and soak the decal in clean soapy water before application. This will help to prevent air bubbles in the finished decal.

8. Smooth the decal into place with a sponge and check for air bubbles. Small air pockets may be pierced with a pin and smoothed out. When the decal is completely smoothed out, carefully remove the top paper.

SAFETY DECALS

LOCATION OF SAFETY DECALS

39166 Decal Kit (See Figure 1-2)

39166-1	1.00	Inside cab
39141-5	1.00	Side of hydraulic tank
39141-19	1.00	On cab dash
39166-2	1.00	On hydraulic motor mount at rear of unit
39166-3	1.00	Inside cab
39166-4	1.00	On side of solvent tank
39166-7	1.00	On LPG burner, when equipped
39166-8	1.00	On left rear of tank, when equipped with diesel burner

39167 Decal Kit (See Figure 1-3)

39167-1	2.00	On either side at rear of tank
39167-2	1.00	Front side of tank at driver's side
39167-3	2.00	At tank top opening
39167-4	1.00	At tank top opening

Additional Decals (See Figure 1-4)

35566	1.00	On LP tank when equipped with optional hand torch
36202	1.00	On lower side of tank at ladder

See IPL (Illustrated Parts List) for additional decals

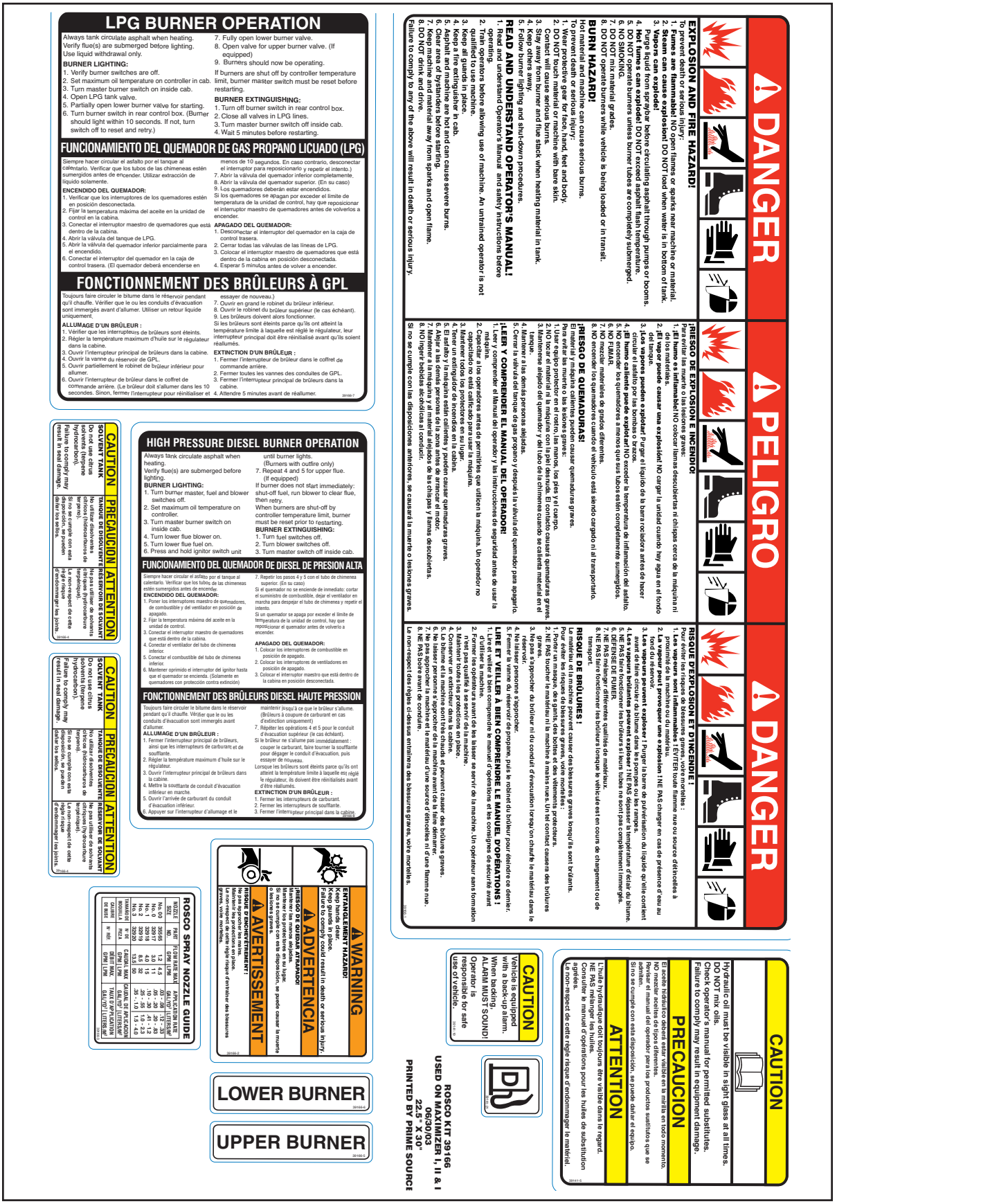


FIGURE 1-2. SAFETY DECAL KIT #39166

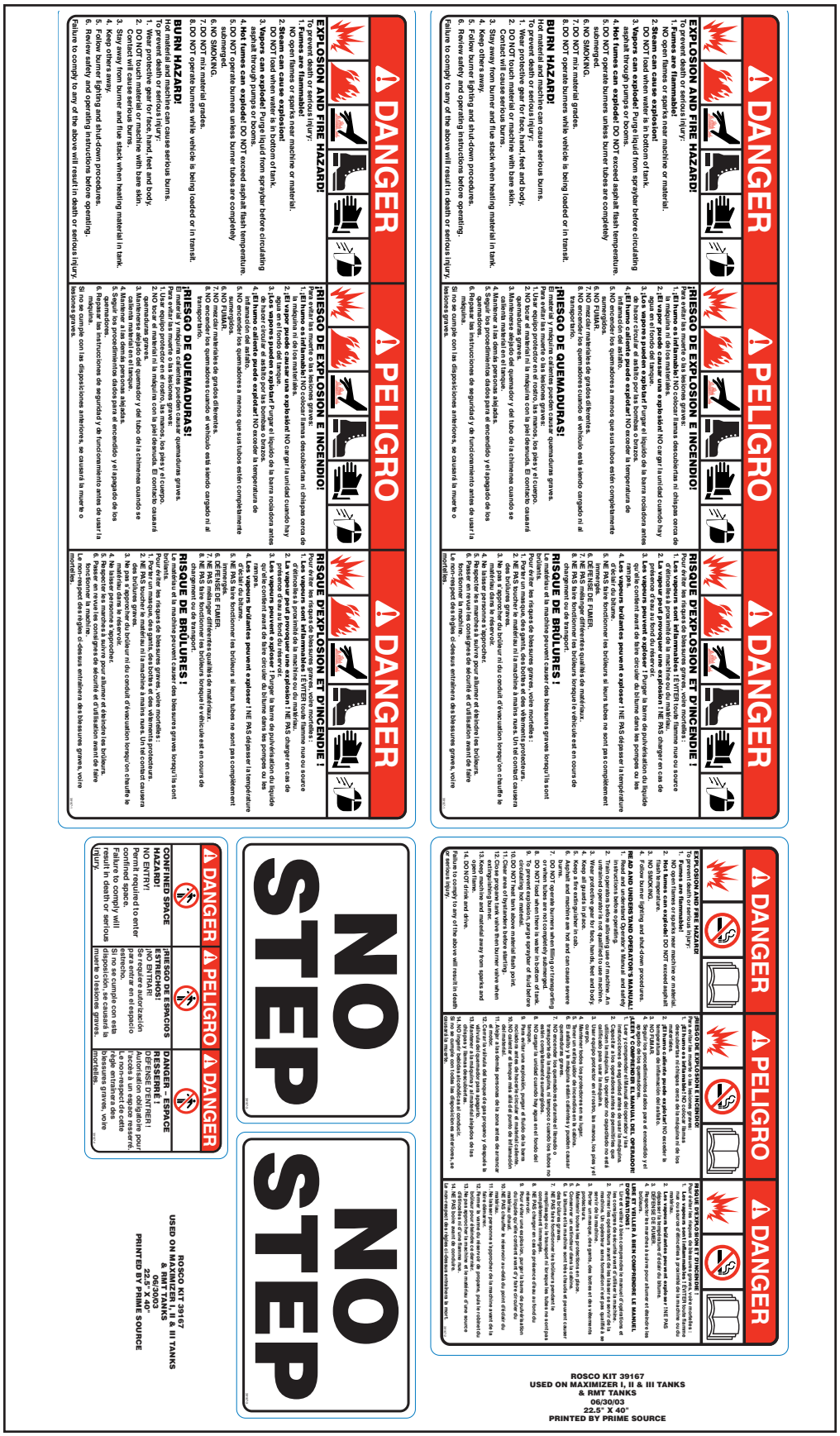


FIGURE 1-3. SAFETY DECAL KIT #39167

FIGURE 1-4. ADDITIONAL SAFETY DECALS

Section 2
SPECIFICATIONS & CONTROLS

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MACHINE SPECIFICATIONS

TANK CAPACITY
1000 U.S. gallons (3,785 L) to 4000 U.S. gallons (15,136 L) with overage for expansion.

TANK
Meets all applicable Federal DOT tank regulations. Elliptical shape. 10 gauge (3 mm) shell and 7 gauge (4.5 mm) flat heads, flanged reinforced and welded to shell inside & and outside of tank. All seams electrically welded.

THERMOMETERS
Armored pencil inspector's type 50° F to 500° F (10° C to 260° C) and 5 inch (127 mm) dial type 50° F to 500° F (10° C to 260° C) mounted on front left side of tank in pipe well. Tank temperature sensor, loated at rear of tank, displayed on LED of in-cab controller.

FULL SURGE PLATES
10 gauge (3 mm) steel with staggered openings.

INSULATION
2 inch (51 mm) rock wool with spacers to prevent compression, and clips to secure position of insulation. Weatherproof aluminum jacket.

TOP OPENING
22 inch (558 mm) diameter with weather tight and safety relieving cover. Inside splash guards, 3 inch (76 mm) diameter, steel measuring stick, basket type strainer, overflow pipe, and tank vent.

SUMP
8 inch (203 mm) diameter at rear of tank with 4 inch (102 mm) cleanout plug. Suction line from pump includes tank cut-off valve.

HEATING SYSTEM
Double flue with 8 inch (203 mm) inside diameter tubing.

EXHAUST STACK
Stainless steel with rain cover.

BURNERS
Dual diesel fired burner with electronic ignition and heat limit controls. Dual, U-type high-temperature flue pipe running the length of the tank.

ASPHALT PUMP
Viking 400 GPM (1514 LPM) capacity, rotary gear pump with built in relief valve for safety. Located at rear of unit with suction piping to tank sump. Driven by low-speed, high-torque, fixed displacement hydraulic motor connected by a flexible coupling.

DISTRIBUTING LINES
High-temperature, flexible metal hoses. Use of steel pipe with ball-and-socket joint is not acceptable.

CLEAN OUT
Connection to asphalt pump for cleanout of pump and piping. 25 gallon (94.6 L) flush tank.

SPRAY SYSTEM
16 foot (4.9 m) full circulating, extendable spraybar, comprised of two 8 foot (2.4 m) independently controlled spraybar sections. Each bar automatically turns On when extended and Off when retracted. All functions operated by the EZ-3S Controller in the cab.

NOZZLES AND VALVES
Brass, slotted nozzles with non-clogging, quick-disconnect valves. Allows the operator to change spray widths in 4 inch (10.16 cm) increments.

CONTROLLER
EZ-3S Controller for automatic application rate control with electronic pump speed control, and settings for flow, speed calibration, spraybar width and spraybar On/Off control in 1 foot (.3 m) and/or 4 inch (10.16 cm) increments. Mode selection switch controls automatic valves for cab control of Distributor functions. Memory feature capable of storing up to 6 preset combinations of application rates and flow calibrations. Selectable readouts include FPM, GPM, total feet sprayed, total gallons sprayed, total square yards sprayed, flow & speed calibration application rate, tank temperature, hour meter and spraybar width. Includes Radar Horn and rear controls in the tool box for controlling pump speed and direction.

TRANSMISSION
Hydrostatic front live power, driven by the engine crankshaft. The hydrostatic pump is a variable speed displacement axial piston pump. Hydraulic reservoir is 20 gallons (75.7 L) with temperature and sight gauge and level indicator.

ADDITIONAL STANDARD EQUIPMENT
Handspray gun with 25 foot (7.6 m) hose
Front and rear dial contents gauge
Sampling valve
ICC clearance lights and reflectors
Back up alarm
Rear bumper and a 4-way mirror
Mud flaps
Ladder and platform assembly
Grease gun

OPTIONAL EQUIPMENT
PTO driven hydraulic pump from truck transmission
Outfire protection on diesel burner
LPG burner in lieu of diesel burner
Portable LP torch with pressure regulators and connections to frame mount 52 gallon (197 L) tank
Low density electric heat
Washdown system with pump and hose for cleaning the spraybar
Hose reel for the washdown hose
Enviro-Flush recirculating cleanout system
Loading hose 3 inch by 15 foot (7.6 cm X 4.6 m) flexible steel with quick couplers
Loading hose 3 inch by 15 foot (7.6 cm X 4.6 m) rubber with quick couplers
18 foot (5.5 m) EZ-Spray spraybar system
20 foot (6.1 m) EZ-Spray spraybar system

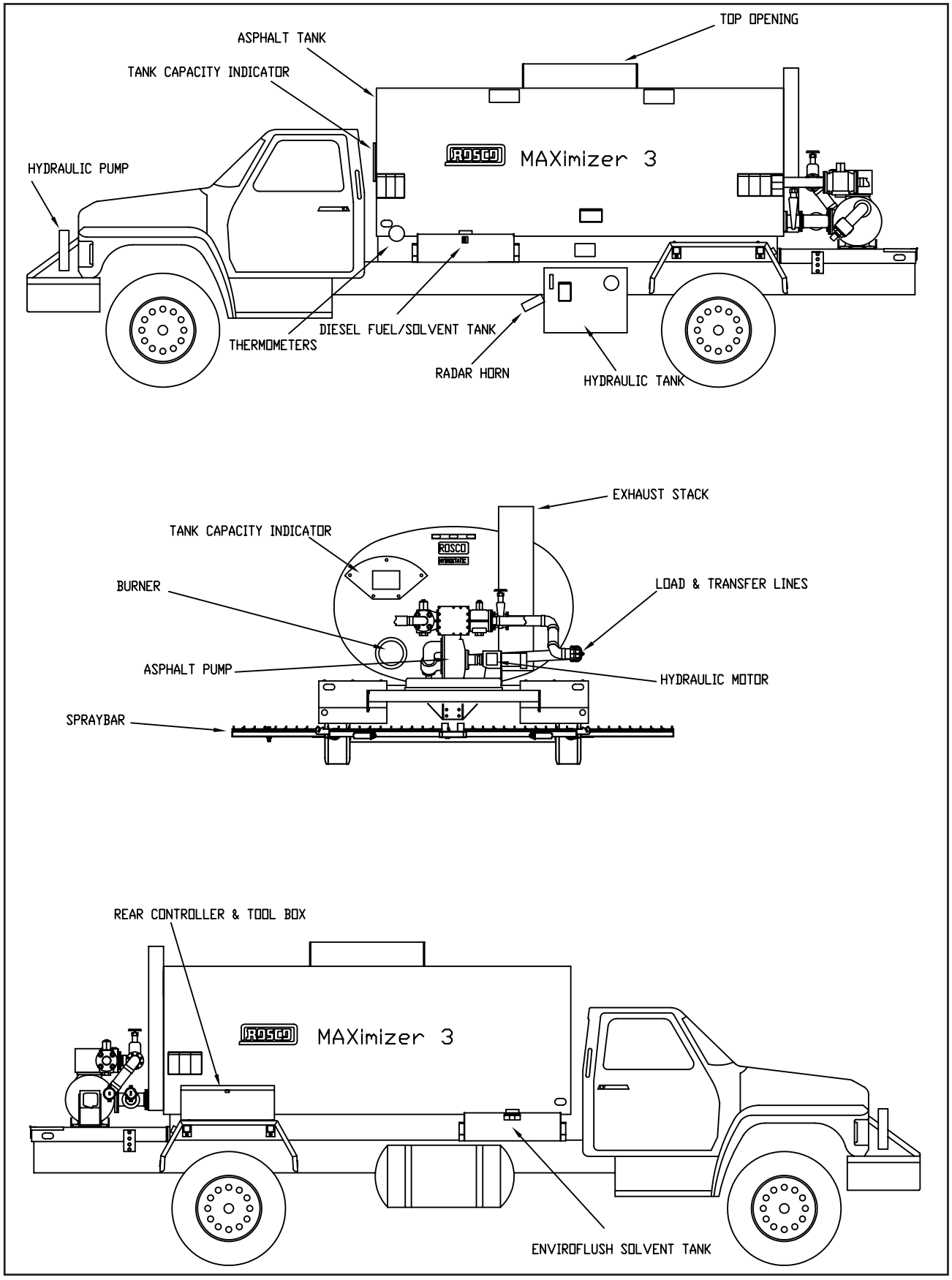

FIGURE 2-1. MAXIMIZER3 COMPONENTS

MAXIMIZER3 COMPONENTS

(See Figure 2-1)

1. ASPHALT TANK
An insulated tank for holding the hot bituminous asphalt material.

2. TANK TOP OPENING
Located at top of tank. Provides an opening for filling the tank. Has a dipstick for measuring tank quantity, a loading screen, overflow pipe, and tank vent.

3. LADDER
Provides access to top of tank and opening.

4. TANK CAPACITY INDICATORS
Located on the front and the rear of the tank. Measures the quantity of material in the tank.

5. THERMOMETERS
Located on the front, lower left side of the tank. Indicates the temperature of material in the tank. Pencil thermometer and dial thermometers are standard, with in-cab monitor of tank temperature displayed on EZ-3S Controller.

6. HYDRAULIC PUMP
Mounted on the front of truck. It is a variable displacement pump that provides power to the hydraulic motor that turns the asphalt pump.

7. HYDRAULIC TANK
Mounted on the left or right side of truck. Supplies hydraulic fluid to the hydrostatic system.

8. DIESEL FUEL/SOLVENT TANK
Mounted on the left or right side of tank. Diesel fuel is used for the diesel burners (when equipped). Tank may contain diesel fuel or solvent for internal cleanout and external cleaning.

9. BURNERS
Located at rear of Maximizer3. Used to heat the material in the tank.

10. EXHAUST STACK
Directs the burner exhaust up the rear of the tank and away from the operating area.

11. ASPHALT PUMP
Used to load, unload, circulate, spray the asphalt, transfer, reverse suction and cleanout.

12. HYDRAULIC MOTOR
Located on right side of Asphalt Pump. It is a fixed displacement motor used to turn the Asphalt Pump.

13. LOAD AND TRANSFER LINES
Used to load and unload asphalt into or out of tank and to transfer asphalt from one tank to another container.

14. SPRAYBAR
Located at the rear of the Maximizer3. Distributes material from the tank to road surface. The spraybar is extendable up to 4 feet on each side of the Distributor.

15. REAR CONTROLLER
The Pump Speed knob adjusts pump speed and direction. The spraybar controls adjust the extension and lift of the spraybar. Located in rear tool box.

16. RADAR HORN
Monitors the speed and distance traveled by the distributor and reports the information to the EZ-3S Controller in-cab. Can be mounted on left or right side of truck frame.

17. BREAKAWAY
A pivot, one foot in from the outside end on both spraybars, will break and allow the spraybar to swing away should an obstacle be hit while moving in forward or reverse.

18. HAND SPRAY WAND
A hand held spray gun on the end of a hose that is used by the operator to cover surfaces not reached by the spraybar.

19. LOAD HOSE (OPTION)
The steel or rubber hose used to load or unload material.

20. WASHDOWN (OPTION)
Used to wash the machine with solvent or diesel fuel to keep it clean. A valve is located on the washdown wand. Open the valve when starting to wash the machine and close it when the washdown is complete. Use the switch in the Rear Pump Control Box to turn on the pump. A buzzer will come on when the washdown pump is running.

NOTE: System Power must be ON in order to provide power to the washdown pump.

21. ENVIROFLUSH SOLVENT TANK (OPTION)
Tank holds and recycles the solvent used to clean out the spraybar. Located on right side of truck.

22. PTO CONTROL (OPTION)
PTO Control from transmission is used to power Asphalt Pump.

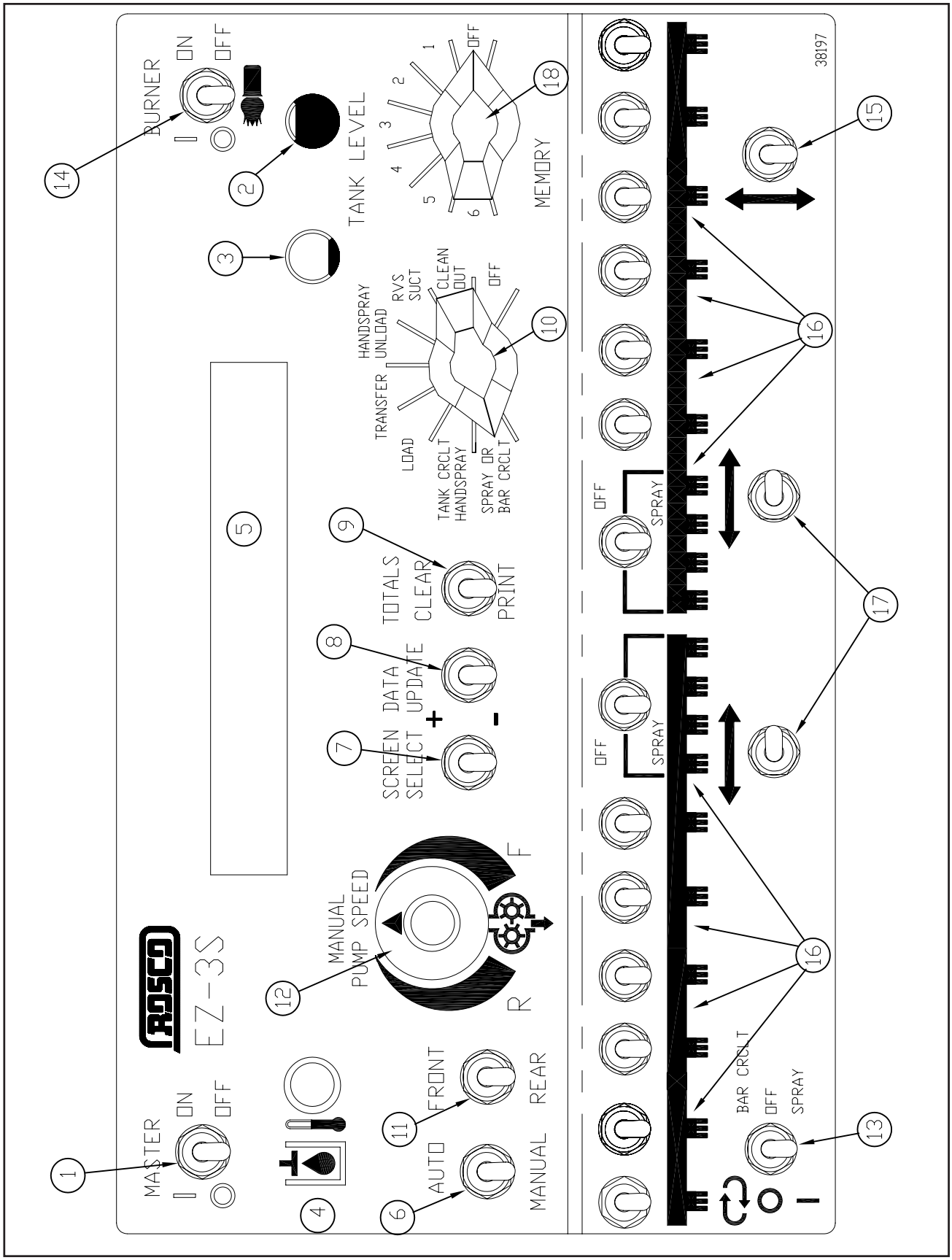

FIGURE 2-2. EZ-3S CONTROLLER

EZ-3S CONTROLLER

(See Figure 2-2)

The ROSCO EZ-3S Controller is mounted in the cab and is used to measure, monitor and control the operation of the machine.

The EZ-3S Controller has been designed to provide fast and accurate pump control while allowing for any changes in ground speed and spraybar width. It provides a consistent, accurate application rate.

The EZ-3S Controller is made up of two major components. The **Control Box** (white box with switches and display) and the **Microprocessor**. The Microprocessor is connected to the Control Box by a wire cable and is mounted on the control stand or at some other convenient location. The round circular connector on the Microprocessor is used if updates to the computer program are needed, so mount the box with this connector easily accessible.

NOTE: Use the EZ-3S in the AUTO mode only while spraying asphalt through the spraybar and during Bar Circulate function.

ATTENTION: All other functions such as Cleanout, Reverse Suction, Handspray/Unload, Transfer, Load, and Tank Circulate must be performed in the MANUAL mode.

1. MASTER CONTROL: The Master On/Off switch for the control panel. The panel must be turned ON before the machine can operate.

2. HI TANK LIGHT (OPTION): Indicates when volume in asphalt tank exceeds 80% full.

3. LOW TANK LIGHT (OPTION): Indicates when volume in asphalt tank falls below 20% full.

4. HYDRAULIC TEMP LIGHT: Indicates when the hydraulic oil exceeds 200° F (94° C).

5. LED DISPLAY SCREEN: The LED display screen can display all information to operate the Maximizer3. When the Auto/Manual switch (Item 6) is in the AUTO position the first operating screen displays four items:

a. The pump speed in gallons per minute or liters per minute.
b. The truck speed in feet per minute or meters per minute
c. The application rate in gallons per square yard or liters per square meters.
d. The spraybar length in feet or meters.

6. AUTO/MANUAL CONTROL: When switched to MANUAL, the Manual Pump Speed dial (Item 12) controls the asphalt pump speed and direction. This switch must be in MANUAL when the machine is operating in any of the following modes:

a. Cleanout
b. Reverse Suction
c. Unload
d. Handspray
e. Transfer
f. Load
g. Tank Circulate
h. Spray (MANUAL)
i. Bar Circulate (MANUAL)

When switched to AUTO, the EZ-3S controls the asphalt pump speed during Spray (ON) or Bar Circulate (BAR CRCLT) functions **only**.

7. SCREEN SELECT: Controls the display of the available screens.

8. DATA UPDATE: Allows changes in the following display readouts:

a. Application Rate
b. Spraybar Width
c. Speed Calibration
d. Flow Calibration
e. Spraybar Circulate Rate
f. Exit and Save Function
g. Change from English to Metric
h. Memory Settings

9. TOTALS: Used for calibrating functions and to clear display totals, or to print totals to an optional printer.

10. MODE SELECTION: Controls and determines the eight possible functions of the asphalt distributor.

11. FRONT/REAR SWITCH: Determines which Manual Pump Speed controller is activated. With the switch at FRONT, the Front Controller determines the speed and direction the asphalt pump will rotate. With the switch at REAR, the Rear Controller (Figure 2-3), located in the tool box at the back of the Maximizer, controls the speed and direction of the asphalt pump.

12. MANUAL PUMP SPEED CONTROL: Controls the GPM of the asphalt pump when the Auto/Manual switch (Item 6) is in the MANUAL position and the Front/Rear pump control (Item 11) is in the FRONT position.

13. SPRAYBAR MASTER: This is the master control switch for all of the nozzles on the spraybar. When turned on, all Individual Spraybar Segments (Item 16) will spray oil unless the the individual spraybar switches are turned OFF or the individual valve actuators on the spraybar are disengaged. This switch has three positions:

a. **BAR CRCLT (Up):** is used in conjunction with the AUTO setting and the Mode Selection switch in Spray or Bar Circulate to allow the controller to circulate asphalt in the bar at the rate that was set at the Flow Calibration screen during Setup.
b. **OFF (Center):** can be used to build pressure in the bar for starting or when spraying a heavy application.

NOTE: If the switch is left in the OFF position, excessive pressure (70 psi) can build in the spraybar resulting in too much oil being applied at the start of a spray run. For the most positive results when starting to spray, leave the switch in the BAR CRCLT position before switching to ON.

c. **ON (Down):** With all other settings as indicated for Spraybar Circulate, (position a, above) this is the normal operating position for spraying. The ON position opens all spraybar valves that are turned on.

14. BURNER CONTROL: The Master On/Off control for the burners. As a reminder, the message **Burner On** will be displayed instead of the application rate on the LED Display Screen (5).

15. SPRAYBAR LIFT: Lifts spraybar up or down.

16. INDIVIDUAL SPRAYBAR SEGMENTS: Each switch corresponds to a segment of the spraybar. For these switches, the DOWN position is ON and the UP position is OFF.

17. SPRAYBAR EXTEND SWITCHES: Moves the spraybar in or out as needed in 4 inch (10.16 cm) increments. There is one switch for the left spraybar section and one for the right spraybar section.

18. MEMORY SELECTION: The rotary dial accesses the 6 memory positions for preset application rates and flow calibrations. The operator sets these positions using the memory set-up. (See **Pre-Setting And Using The Memory Feature** in Section 3, Operation, of this manual.) Presetting memory positions allows the operator to change application rates while the machine is moving and spraying asphalt.

REAR CONTROLLER

The Rear Controller (Figure 2-3) is used to change pump speed, pump direction and to control the spraybar position from the back of the Maximizer. The Auto/Manual switch (Figure 2-2, Item 6) must be at MANUAL and the Front/Rear switch (Figure 2-2, Item 11) must be set to REAR.

1. MANUAL PUMP SPEED CONTROL: This dial controls and adjusts the GPM generated by the Asphalt Pump. The larger the number on the dial, the faster the pump will turn. Turning the dial clockwise adjusts the pump speed in the forward direction. Turning the dial counterclockwise adjusts the pump speed in the reverse direction. Always return the dial to (0).

2. SPRAYBAR EXTEND SWITCHES: Moves the spraybar sections in or out, as needed. There is one switch for the left side and one for the right side.

3. SPRAYBAR LIFT: Lifts or lowers the spraybar.

4. WASHDOWN SWITCH (OPTION): Activates washdown system and buzzer.

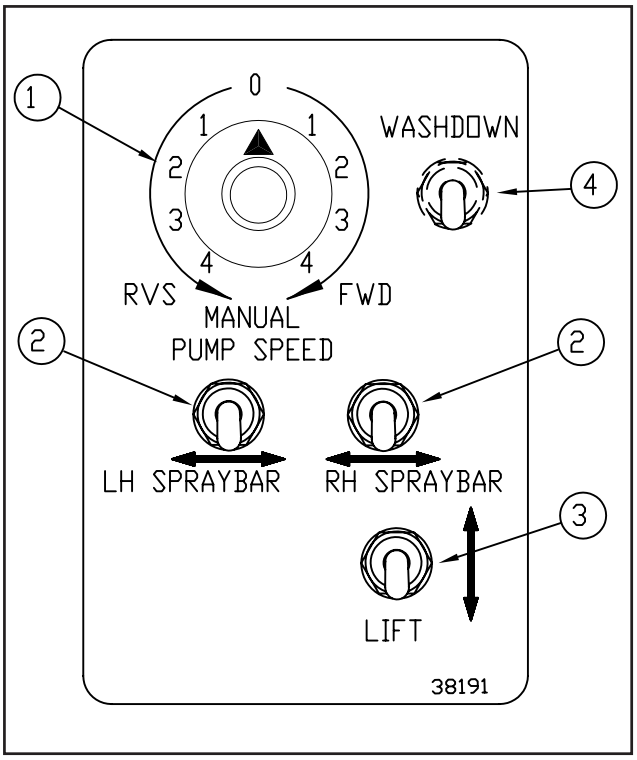

FIGURE 2-3. REAR CONTROLLER

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MATERIAL CONSIDERATIONS

MATERIAL TYPES AND GRADES

This section will help the operator better understand the properties of the asphalt product being used. Refer to Table 3-1, **Guideline Temperatures For Liquid Asphalts**, for additional information.

The selection of the right product is generally dependent on the following considerations:

1. Availability of various types of aggregate.
2. Availability of various liquid asphalt grades.
3. Climate conditions during applications.
4. Traffic conditions during application.
5. Contract specifications.

NOTE: The information given in the charts in this section is based on industry standards. It is important to note that some asphalt product manufacturers have grades or mixtures which do not conform to industry standards. These materials are often tailored to local geographic conditions and may provide superior performance to the standard grades.

There are many types and grades of asphalt products. The best results can be obtained through the trial of several different types of asphalt and aggregates. The following classifications and grades of asphalts are provided to help in the selection.

Asphalt Cement (AC): Asphalt that is refined to meet specifications for paving, industrial, and special purposes.

Emulsified Asphalt: An emulsion of asphalt cement and water with a small amount of an emulsifying agent. The emulsifying agent determines the charge of the asphalt particles. It may have a negative (-) charge called anionic, or a positive (+) charge called cationic.

An **anionic** type of emulsion will work best with aggregates having positive (+) surface charges such as limestone and dolomite.

A **cationic** type of emulsion will work best with aggregates having negative (-) surface charges such as siliceous or granitic aggregates.

ATTENTION: DO NOT mix emulsion types, especially anionic with cationic.

Standard grades of Emulsified Asphalt are:

Anionic: (- charge) RS-1, RS-2, MS-1, MS-2, MS-2h, HFMS-1, HFMS-2, HFMS-2h, HFMS-2s, SS-1, SS-1h.

Cationic: (+ charge) CRS-1, CRS-2, CMS-2, CMS-2h, CSS-1, CSS-1h.

RS, MS, SS: Indicate the emulsion setting rate. (Rapid Set, Medium Set, Slow Set)

h, s: Indicate if a hard or soft base asphalt is used in the mix.

HF: Indicates High-Float which means chemicals have been added to permit a thicker film of asphalt on the aggregate particles to prevent drain off of asphalt from the aggregate.

C: Indicates a cationic asphalt. The absence of the letter "C" means it is anionic asphalt.

Cutback Asphalt: An asphalt cement which has been liquefied by blending with petroleum solvents. Upon exposure to the air, the solvents evaporate, leaving the asphalt cement to perform its function of cementing and waterproofing.

DANGER: 

When using cutback asphalts, extreme caution must be used to prevent fire or explosion. Do not use open flames or sparks near these materials. Use controlled heat only. Never use open flames to examine tanks in which these materials have been used or stored. Be sure all vehicles transporting these materials are properly vented. Allow only experienced personnel to handle these materials. Be sure all applicable interstate and intrastate commerce requirements are met.

Cutback asphalts are divided into three main grades.

Rapid Curing (RC) Asphalt: A cutback asphalt of high volatility composed of asphalt cement using naphtha or gasoline-type dilutant.

Medium Curing (MC) Asphalt: Cutback asphalt of medium volatility composed of asphalt cement and kerosene-type dilutant.

Slow Curing (SC) Asphalt: A cutback asphalt of low volatility composed of asphalt cement and oils.

CAUTION: 

It is important to remember that cutback asphalts are often used at temperatures above their flash points. Serious injury can occur from burns.

VISCOSITY

Viscosity is a fluid's resistance to flow (how thick and gluey a fluid is). The recommended viscosity for spraying with a distributer is 25 to 50 Saybolt Furol seconds (45 - 100 Centistokes Kinematic Viscosity).

The recommended viscosity for loading or pumping is a maximum of 400 Saybolt Furol seconds (800 Centistokes Kinematic Viscosity).

Viscosities above these ranges will limit the performance of the machine. Your asphalt provider will be able to tell you the viscosity of your product.

CONTAMINATION

It is very important to remember that when you are loading a new material into the Maximizer, you must be sure that the new material is compatible with the residual material in the tank. The safest thing to do is to completely clean out the tank and the entire system. Total clean out is essential if you are not sure of the last material that was used in the unit.

However, some materials can be loaded with a small residual amount (0.5 % of capacity or less) of the previous material remaining in the tank. Refer to Table 3-2, **Guide for Loading Asphalt Products,** as a guideline.

Failure to follow the guidelines in Table 3-2 can cause several problems. When incompatible materials are mixed, it can increase the possibility that the material will not meet the job specifications. More importantly, mixing materials can increase the risk of fire or explosion. For example, light hydrocarbons may be present in a tank from previous loads or from diesel oil or solvents used in cleaning the tank.

To reduce the risks of fire or explosion, use the **Guide for Loading Asphalt Products** to eliminate contamination.

DANGER: 

Be sure the tank has no water in it before loading. Hot material will turn water into steam and can cause an explosion.

NOTE: All information in the Material Considerations Section was obtained from publications of the Asphalt Institute.

TABLE 3-1. GUIDELINE TEMPERATURES FOR LIQUID ASPHALTS

Type & Grade	Spraying Temperature		Storage Temperature		Min. Flash Point	
	°C	°F	°C	°F	°C	°F
Asphalt Cements						
AC -2.5	130+	270+	160	320	163	325
AC-5	140+	280+	166	330	177	350
AC-10	140+	280+	174	345	219	425
AC-20	145+	295+	177	350	232	450
AC-40	150+	300+	177	350	232	450
AR-1000	135+	275+	163	325	205	400
AR-2000	140+	285+	168	325	219	425
AR-4000	145+	290+	177	350	227	440
AR-8000	145+	290+	177	350	232	450
PEN 40-50	150+	300+	177	350	232	450
PEN 60-70	145+	295+	177	350	232	450
PEN 85-100	140+	280+	177	350	232	450
PEN 120-150	130+	270+	177	350	219	425
PEN 200-300	130+	270+	168	335	177	350
Emulsified Asphalts						
RS-1	20 - 60	70 - 140	20 - 60	70 - 140		
RS-2	50 - 85	125 - 185	50 - 85	125 - 185		
HFRS-2	50 - 85	125 - 185	50 - 85	125 - 185		
MS-1	20 - 70	70 - 160	10 - 60	50 - 140		
MS-2	20 - 70	70 - 160	50 - 85	125 - 185		
MS-2h	20 - 70	70 - 160	50 - 85	125 - 185		
HFMS-1	20 - 70	70 - 160	10 - 60	50 - 140		
HFMS-2	20 - 70	70 - 160	50 - 85	125 - 185		
HFMS-2h	20 - 70	70 - 160	50 - 85	125 - 185		
HFMS-2s	20 - 70	70 - 160	50 - 85	125 - 185		
SS-1	20 - 70	70 - 160	10 - 60	50 - 140		
SS-1h	20 - 70	70 - 160	10 - 60	50 - 140		
CRS-1	50 - 85	125 - 185	50 - 85	125 - 185		
CRS-2	50 - 85	125 - 185	50 - 85	125 - 185		
CMS-2	20 - 70	70 - 160	50 - 85	125 - 185		
CMS-2h	20 - 70	70 - 160	50 - 85	125 - 185		
CSS-1	20 - 70	70 - 160	10 - 60	50 - 140		
CSS-1h	20 - 70	70 - 160	10 - 60	50 - 140		
Cutback Asphalts						
MC-30	30+	80+	54	130	38	100
MC-70	50+	120+	71	160	38	100
MC-250	75+	165+	91	195	66	150
MC-800	95+	200+	99	210	66	150
MC-3000	110+	230+	99	210	66	150
RC-70	50+	120+	71	160	-	-
RC-250	75+	165+	91	195	27	80
RC-800	95+	200+	99	210	27	80
RC-3000	110+	230+	99	210	27	80
SC-70	50+	120+	71	160	66	150
SC-250	75+	165+	91	195	79	175
SC-800	95+	200+	99	210	93	200
SC-3000	110+	230+	99	210	107	225

TABLE 3-2. GUIDE FOR LOADING ASPHALT PRODUCTS

LAST PRODUCT IN TANK	+ + + + + + PRODUCT TO BE LOADED + + + + + +			
	Asphalt Cement	Cutback Asphalt	Cationic Emulsion	Anionic Emulsion
Asphalt Cement	OK to Load	OK to Load	Empty to No Measurable Quantity	Empty to No Measurable Quantity
Cutback Asphalt	* Empty	OK to Load	Empty to No Measurable Quantity	Empty to No Measurable Quantity
Cationic Emulsion	* Empty	Empty to No Measurable Quantity	OK to Load	Empty to No Measurable Quantity
Anionic Emulsion	* Empty	Empty to No Measurable Quantity	Empty to No Measurable Quantity	OK to Load
Crude Petroleum and Residual Fuel Oils	* Empty	Empty to No Measurable Quantity	Empty to No Measurable Quantity	Empty to No Measurable Quantity
Any Product Not Listed Above	Tank must be cleaned	Tank must be cleaned	Tank must be cleaned	Tank must be cleaned

*** WARNING: Any material remaining in tank will produce dangerous conditions.**

NOTE: All information in the Material Considerations Section was obtained from publications of the Asphalt Institute.

SYSTEM OVERVIEW

The ROSCO Maximizer3 Asphalt Distributor is the most important piece of equipment on a surface treatment project. It is made specifically to apply the asphalt product uniformly and in specified quantities.

The Maximizer3 consists of a truck-mounted insulated tank ranging in capacity from 1,000 to 4,000 gal. (4,000 to 16,000 liters). ROSCO Distributors are equipped with a heating system that will maintain the asphalt at the proper spray temperature.

The Distributor has a power driven asphalt pump capable of handling products ranging from light applications of emulsified asphalt to heavy asphalt cements heated to spraying viscosity. At the back of the tank is a system of spraybars with nozzles through which asphalt is forced under pressure and applied to the road surface. The spraybars cover widths ranging from 4 in. to 24 ft. (10 cm to 7.3 m) in one pass.

The **circulating system** and the **burner system** are the main systems on the Maximizer3. **Read these sections** so you are aware of the functions and capabilities of the unit and its systems.

CIRCULATING SYSTEM

The circulating system has an engine driven hydraulic pump which drives the hydraulic motor. The hydraulic motor powers the asphalt pump, allowing the pump to:

» fill the distributor tank,
» circulate material through the bar and tank,
» spray material through the bar or hand spray,
» draw material back to the tank from the bar or hand spray,
» pump material from the tank to outside storage and,
» transfer material from one storage tank to another.

The spraybar must have a constant and uniform pressure along the entire length of the bar for uniform output at each nozzle.

The ROSCO Distributor delivers a volume of asphalt to the spraybar which is regulated by a number of variables, including:

» the asphalt pump speed,
» the application rate setting,
» the truck speed and
» the spraybar width.

The on-board computer senses the different values and controls the asphalt pump speed to deliver the precise amount of asphalt to the spraybar.

Both the application rate and spray pattern are influenced by factors such as the selected application rate, the truck speed and nozzle size.

If the nozzles are too small for the application rate and truck speed, the liquid will atomize, the spray pattern will distort and the result will be excessive over-spray or inconsistent application rate. If the nozzles are too large, the result will be streaking caused by low spraybar pressure. Refer to **Valves and Nozzles** later in this section for guidelines.

BURNER SYSTEM

USE BURNERS PROPERLY! Burners are used to increase the temperature of liquid asphalt material to the correct spraying temperatures. The burners should **only** be used while the liquid asphalt material is being circulated in the tank.

ATTENTION: If the material has cooled to the point that it will not flow easily and will not circulate, the operator must use extra care. Improper heating will cause damage to the equipment and the material being heated.

The burners in the Maximizer3 have a very high heat output which must be dissipated through the asphalt. Asphalt is an excellent insulator and resists the conduction of heat through the material.

If the material is heated too hot or too quickly without the proper circulation, hot spots will be created near the rear of the tank at the flue tubes. This will damage the flue tubes and cause a break down of the material.

WARNING:  **Operating the burners without circulating the product can create explosive fumes. If the product can not be circulated after 15 minutes of heating, the fuel to the burners must be turned off, while leaving the blowers running. Do not try to heat material again for 30 minutes.**

If it is necessary to heat asphalt that has cooled more than 20 to 30 degrees below the optimum spraying temperature, the operator must use extreme care in reheating the material.

ATTENTION:  **Run the burners for short periods of time (15 minutes ON, 15 minutes OFF) to allow the heat to dissipate through the material. This will prevent damage to the flue liner.**

The amount of time necessary to heat the asphalt material to allow proper circulation and heating will vary depending on the type of material, the type of burners, the tank size and the amount of material in the tank. If you have any doubts about the proper way to heat cooled asphalt, contact your asphalt supplier or equipment manufacturer.

DANGER:  **Never operate burner equipment when the vehicle is being loaded or in transit. The flue tubes can become exposed, causing an explosion inside the tank, or igniting material being sprayed.**

DANGER:  **Never operate the burners if the flue tubes are not covered with at least 8 inches (20.32 cm) of material. The flue tubes can become red hot and ignite the vapors causing an explosion.**

DANGER:  **Always park the truck so that the burners are up wind. Some asphalt materials emit flammable vapors from the vent that can be ignited by the burner flame and cause an explosion.**

DANGER:  **Never operate the burners in a confined area such as a building or shed. Vapor build-up could cause an explosion.**

DANGER:  **Keep the tank vents clear to avoid a buildup of pressure in the tank when heating. Check the vents before starting the burners.**

DANGER:  **Never use gasoline, alcohol or any other unapproved fuel in a diesel burner. Fire and explosion can occur.**

DANGER:  **Do not operate the burners if the tank is leaking or a spill has occurred. Fire and explosion can occur.**

DANGER:  **Do not operate the burners while the wash down system is operating or has recently been used. Fire and explosion can occur.**

DANGER:  **Do not operate the burners with top tank cover open. Fire and explosion can occur.**

DANGER:  **Be sure to read, understand and follow all precautions for the type of cleaning material you are using.**

The Burners are located at the left rear of the Maximizer3. The flame from the burner is directed through the fire tubes along the bottom of the tank. Diesel or propane can be used as fuel, depending on the burner option specified. **Never operate the burners without first reviewing the instructions.**

MACHINE BREAK-IN

Although there are no operational restrictions on the Maximizer3 when used for the first time, it is recommended that the following mechanical items be checked:

BEFORE STARTING

1. Read the Maximizer3 Operator's Manual and all Safety Decals.

2. Read the truck manufacturer's manual before starting. Review and follow truck break-in instructions.

3. Tighten the tank tie-down hardware.

AFTER 2 HOURS OF OPERATION

1. Tighten all wheel bolts. Refer to **Bolt Torque Charts** in Section 4, Maintenance & Troubleshooting.

2. Tighten all fasteners and tank tie-down hardware as required. Refer to **Bolt Torque Charts** in Section 4, Maintenance & Troubleshooting.

3. Lubricate asphalt pump bearings with ROSCO hi-temperature grease. (#33384)

4. Check all fluid levels.

5. Perform truck break-in checks.

6. Check that no hydraulic lines are pinched or crimped.

AFTER 8 and 20 HOURS OF OPERATION

1. Repeat all steps described above for 2-Hour check.

2. Go to the **Maintenance Intervals Chart** in Section 4, Maintenance & Troubleshooting, and complete the maintenance check lists.

PRE-OPERATING CHECK LIST

It is important for both personal safety and for the efficient operation of the Maximizer3 that this check list be followed. Before operating the Distributor and each time thereafter, the following areas should be checked:

VISUAL INSPECTION

1. Check the tightness of the tank tie-down hardware and tighten as required. Refer to **Bolt Torque Charts** in Section 4, Maintenance & Troubleshooting.

2. Check for loose fasteners and hardware on the machine and spraybar. Tighten as required.

3. Check for any loose components. Tighten, secure or adjust as required.

4. Check the condition of all hydraulic lines, air lines, couplers, fittings and connections. Reroute, repair or replace any parts that are loose or damaged.

SERVICE AND MAINTENANCE

1. Perform all truck service checks specified in the truck manufacturer's manual.

2. Lubricate the asphalt pump bearings and circulating system valves using ROSCO hi-temperature grease. (#33384)

3. Check all fluid levels: Hydraulic Tank, Solvent Tank and Burner Fuel Tank. Fill or add as required.

4. Check for leaks. Repair before starting.

SPRAYBAR INSPECTION

1. Check for loose fasteners and hardware on the machine and spraybar. Tighten as required. Refer to **Bolt Torque Charts** in Section 4, Maintenance & Troubleshooting.

2. Check the condition of all hydraulic lines, asphalt lines, couplers, fittings and connections. Reroute, adjust, repair or replace any parts that are loose or damaged.

3. Check the angle of the spraybar valves using the Valve Alignment Wrench supplied with the machine. Valves set at the wrong angle will not open completely or will leak.

4. Check the angle of each nozzle using the Nozzle Alignment Wrench supplied with the machine. Be sure that they are all set at the same angle.

FUNCTIONAL CHECK

Before starting the day's work, perform a functional check on each system and major component to insure that each is functioning properly. Use two people - one person in the truck cab to run the engine and Maximizer3 controls, and one person at the appropriate check point.

HYDRAULIC CIRCUIT

The Maximizer3 is equipped with electric solenoids that control the hydraulic circuit. The solenoids are located inside the rear platform.

1. Start the truck engine and run at low idle.

2. Turn the EZ-3S Controller Master switch ON to activate the system. See Figure 3-1 on the following page.

NOTE: If equipped with PTO driven hydrostatic pump, follow steps 3 and 4. If not, go to step 5.

3. Engage the PTO clutch.

   Manual Transmission: Set parking brake. Depress clutch pedal, place transmission in neutral, engage PTO clutch and release clutch pedal. The hydraulic and hydrostatic systems should now be functioning.

   Automatic Transmission: Apply the vehicle brakes, place the transmission in DRIVE, engage the PTO clutch, place transmission in PARK and release the brake.

CAUTION:  **It may be necessary to let the truck creep forward slightly to allow the clutch to engage. Be sure that all personnel are clear of the vehicle.**

4. Apply the parking brake.

5. Unlock spraybar lock.

6. Unhook spraybar chains. Press the Spraybar Lift switch (Figure 3-1, next page) UP to raise the spraybar to its highest position.

7. Press the Spraybar Lift switch (Figure 3-1, next page) DOWN and verify that the spraybar moves to its down position.

8. Press the Left Bar Extend/Retract switch to the left and verify that the spraybar extends fully to the left.

9. Press the Right Bar Extend/Retract switch to the right and verify that the spraybar extends fully to the right.

HYDROSTATIC CIRCUIT

It may be necessary to run the engine at 1500 RPM to provide sufficient oil flow to the hydrostatic circuit to operate the asphalt pump.

NOTE: There is no material in the tank.

ATTENTION: Do not run the asphalt pump for more than 15 minutes with no material in the system. Seal damage could occur.

NOTE: If the machine is equipped with a PTO system, perform all functional checks after the PTO has been engaged and is running.

1. Start the truck engine and run at low idle.

2. Turn the EZ-3S Controller Master switch ON to activate the system. Set the Auto/Manual switch to MANUAL. (Figure 3-1)

3. Be sure the Mode Selection switch is OFF (Figure 3-2).

4. Set the Front/Rear switch (Figure 3-3) to the FRONT position. Turn the Manual Pump Speed dial clockwise and verify that the asphalt pump rotates in the clockwise direction as viewed from the right side of the machine. Turn the Manual Pump Speed dial to the center position to stop the pump.

5. Rotate the Manual Pump Speed dial counterclockwise and verify that the asphalt pump rotates in the counterclockwise direction as viewed from the right side of the unit. Return the Manual Pump Speed dial to the center position to stop the pump. (Figure 3-3).

6. Set the Front/Rear switch to the REAR position. Use the Manual Pump Speed dial on the Rear Controller (Figure 3-4) to operate the hydrostatic motor and asphalt pump in the forward and reverse directions. The center position, No. 0, will stop the pump. Visually verify that the pump turns in both directions.

NOTE: There is no material in the tank so be careful not to operate pump for more than 15 minutes.

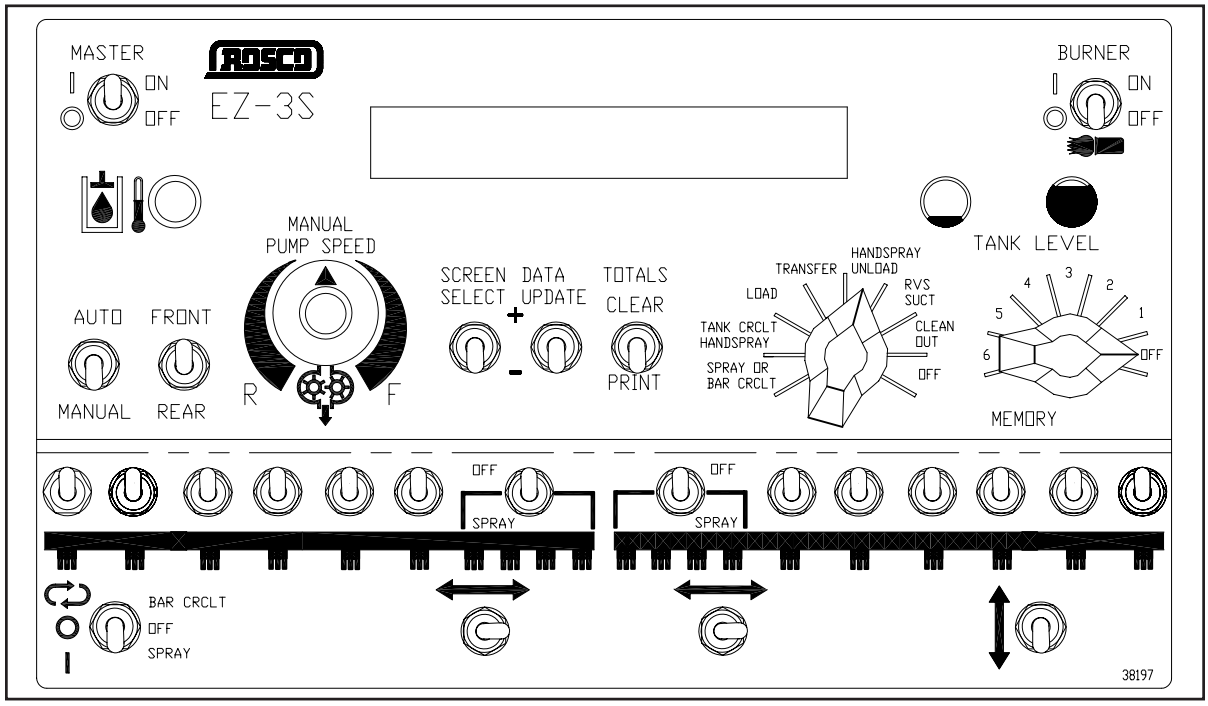

FIGURE 3-1. EZ-3S CONTROLLER

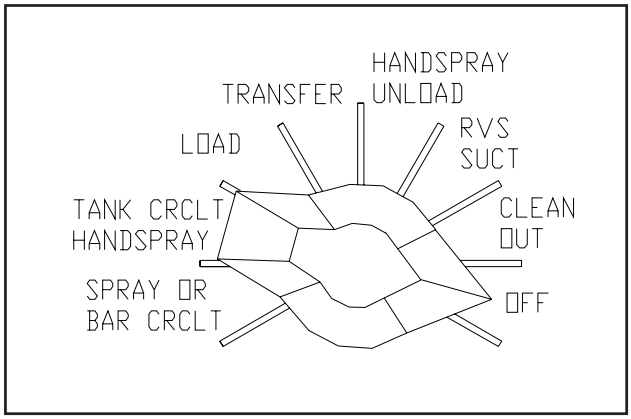

FIGURE 3-2. MODE SELECTION SWITCH

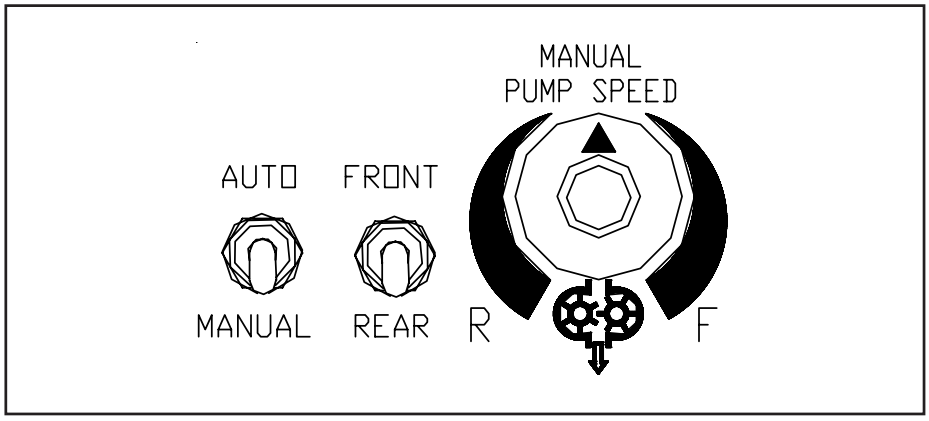

FIGURE 3-3. PUMP CONTROL & MANUAL PUMP SPEED DIAL

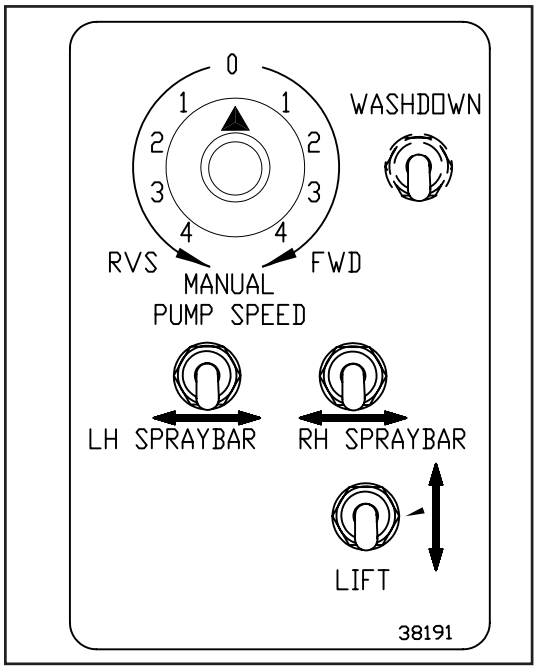

FIGURE 3-4. REAR CONTROLLER

AUTOMATIC VALVE SYSTEM

A functional check of the automatic valve system will verify that the air actuators and cylinders are operating properly. Review the plumbing circuit and familiarize yourself with the valve locations.

1. Set the engine speed at 1500 RPM to provide adequate power to the air system.

2. Turn the Mode Selection switch (Figure 3-3) to TANK CRCLT. Have a person at the back of the Maximizer verify that the circuit valves move into position.

Tank Valve

The Tank Valve has two positions, open or closed. Refer to **Modes Of Operation**, later in this section for further diagrams.

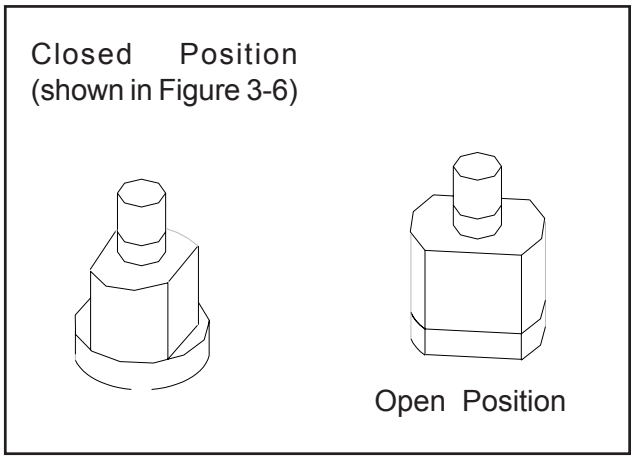

FIGURE 3-5. 2-WAY VALVE POSITIONS

2-Way Valve

The 2-Way Valve also has two positions, open or closed. You can tell which position is being used by the position of the directional stem on top of the valve. Figure 3-5 shows the positions as viewed from the rear of the unit.

3-Way Valve

The 3-Way Valve has three positions depending on the mode selected. The positions can be determined by looking at the corner welds on the socket below the assembly. (See Figure 3-6)

Position 1: Shown in Figure 3-6. Used in four modes:
- Off
- Spray
- Reverse Suction
- Cleanout

Position 2: The bottom actuator will move and the socket will move to the shown position. Used in three modes:
- Bar Circulate
- Transfer
- Unload

Position 3: To achieve this position the top actuator moves. Used in two modes:
- Load
- Tank Circulate

3. Continue to turn the Mode Selection switch through each mode and verify that each valve moves into position.

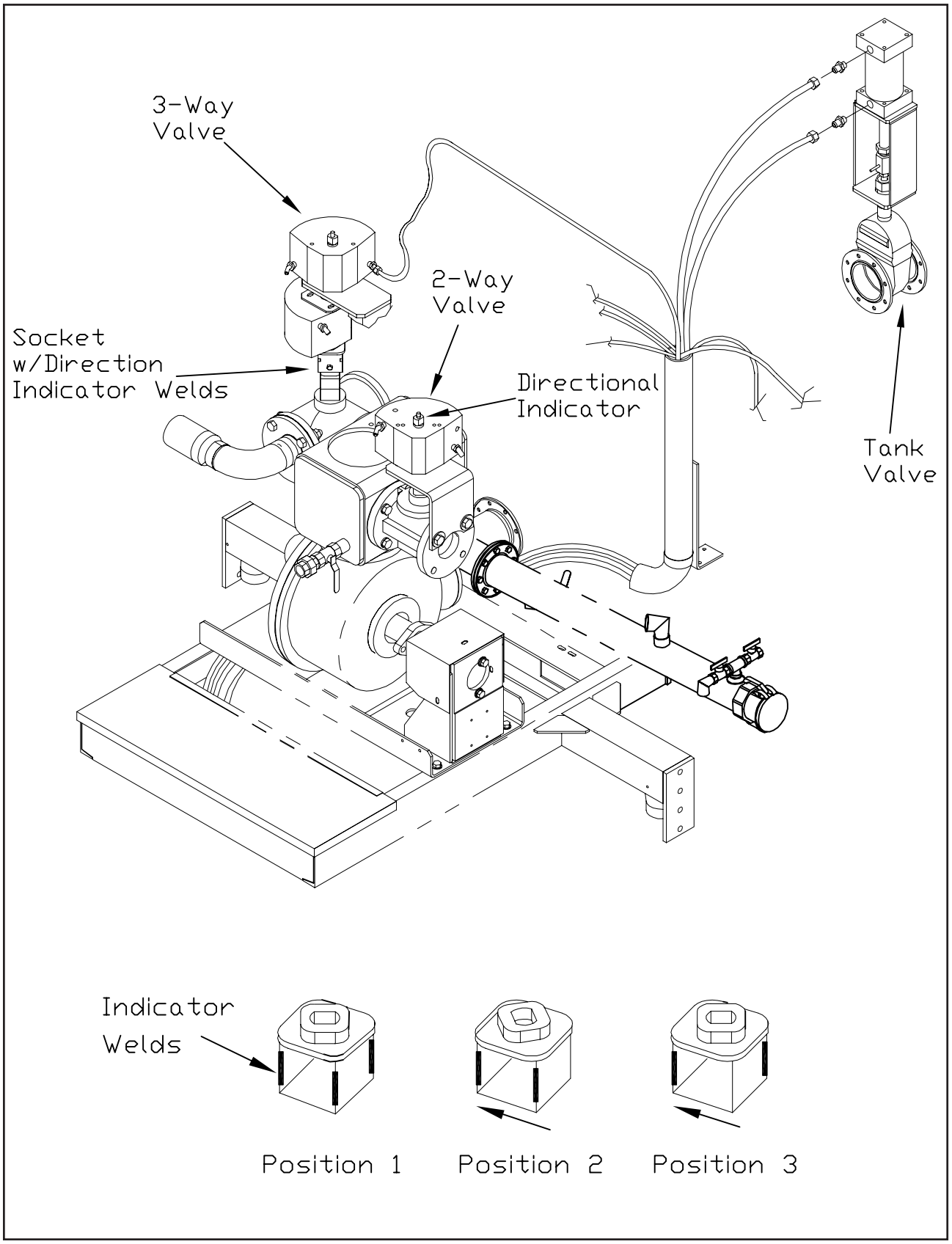

FIGURE 3-6. 3-WAY VALVE AND VALVE POSITIONS

ASPHALT SPRAYBAR

This component of the Distributor is considered the most important component. It is through the spraybar that the asphalt will be applied to the road surface. For best results, use the right size nozzle and proper spraybar height for your type and grade of asphalt and specific application rate. Before starting a job, check the nozzles for damage and proper settings.

SPRAY PATTERN

1. Set the long axis of the nozzle openings to 20 degrees as shown in Figure 3-7 so that the spray fans do not interfere with each other. This setting will give the best coverage without interference with the spray pattern.

2. Check the angle using the Nozzle Alignment Wrench provided with your unit. Refer to **Valves and Nozzles** later in this section.

SPRAYBAR HEIGHT

1. Set the spraybar height to provide exact triple coverage of the spray fans. Refer to Figure 3-8. Usually this coverage is found when the bar is set 9 to 11 inches (23 to 28 cm) above the ground.

NOTE: Different weights of material require slightly different heights. Generally, lighter weight materials should be sprayed at closer to the 9 inch height, while heavier weight material will need to be sprayed at a height closer to the 11 inch height.

2. To set the height, measure from the bottom of the nozzle to the ground, since the nozzle extends below the bar. The operator will have to try spraying to see which height gives the best coverage.

NOTE: Be sure the spraybar height is set properly to obtain a uniform asphalt spread. It is also important to maintain the correct height during the spraying procedure.

3. Once the best spraybar height has been determined, set the support chains by locking into the slot so there is no more than 13 mm (½ inch) variance during the spraying operation.

4. Mark the link of the chain that gives the proper height for a job so there is no need to recount the chain links each day. If the bar is improperly set, streaking or wind distortion of the spray fans may occur.

NOTE: Although there is rarely a difference in fan patterns as the truck load lightens, if you notice a change in the pattern, you may need to readjust the height of the bar.

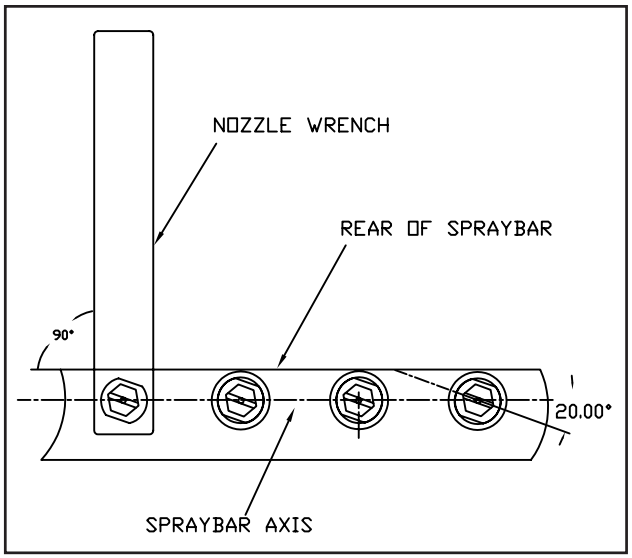

FIGURE 3-7. SETTING NOZZLE OPENINGS

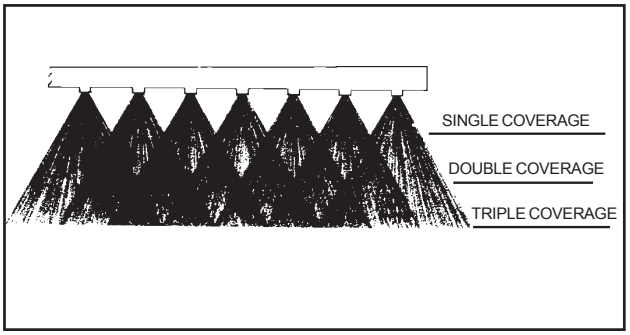

FIGURE 3-8. SPRAY FAN COVERAGE

PREVENTING SPRAYBAR FAILURE

It is very important to keep the spraybar cylinder rods free of asphalt build-up. Build-up on these rods may be pulled into the cylinder and cause premature failure of the cylinders.

Some asphalt materials may build up faster than others. Therefore, check the cylinder rods frequently. It may be necessary to clean the cylinder rods several times a day. The rods must be cleaned at the end of each day. See **Washdown**, later in this section, for recommended solvents.

DANGER: **Diesel and/or kerosene is extremely flammable. Use great care when using these substances to washdown the cylinder rods. Do not operate Burner System during cleaning!**

WARNING: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

VALVES AND NOZZLES

ADJUSTMENT

1. To adjust the nozzles, lay the Nozzle Alignment Wrench over a single nozzle and turn the wrench until the nozzle wrench is at a 90° angle with the rear of the spraybar. This will give the nozzle the proper 20° angle for spraying without interference with the other nozzles.

ATTENTION: **Do not overtighten nozzles. Constant overtightening will cause the threads inside the valve to wear, requiring replacement of the outer body of the valve.**

2. For spraybar valve assemblies controlled by the 1 foot control switches, align the components as follows: (See Figure 3-9)
   a. Position the valve on the top of each cylinder so that the nut on the valve is facing the return air line.

   b. Line up the lower air port on the cylinder body with the "tee" in the air line.

3. For spraybar valve assemblies activated by extensions, align the components as follows: (See Figure 3-9)
   a. Position the end of the valve without the nut towards the inside end of the bar and parallel to the bar.

   b. Line up the lower air port on the cylinder body with the "tee" in the air line.

ATTENTION: **When changing or repairing a spraybar valve assembly, be sure that all reinstalled components are aligned properly.**

NOTE: **The valve on top of each cylinder must be placed in the proper direction for correct function of the spray system.**

ATTENTION: **Always check the function of the valve after servicing and before starting a job. Be sure there is a proper connection and no leakage.**

For a further breakdown of the spraybar valve assembly, see Section 4 of the **Illustrated Parts List**.

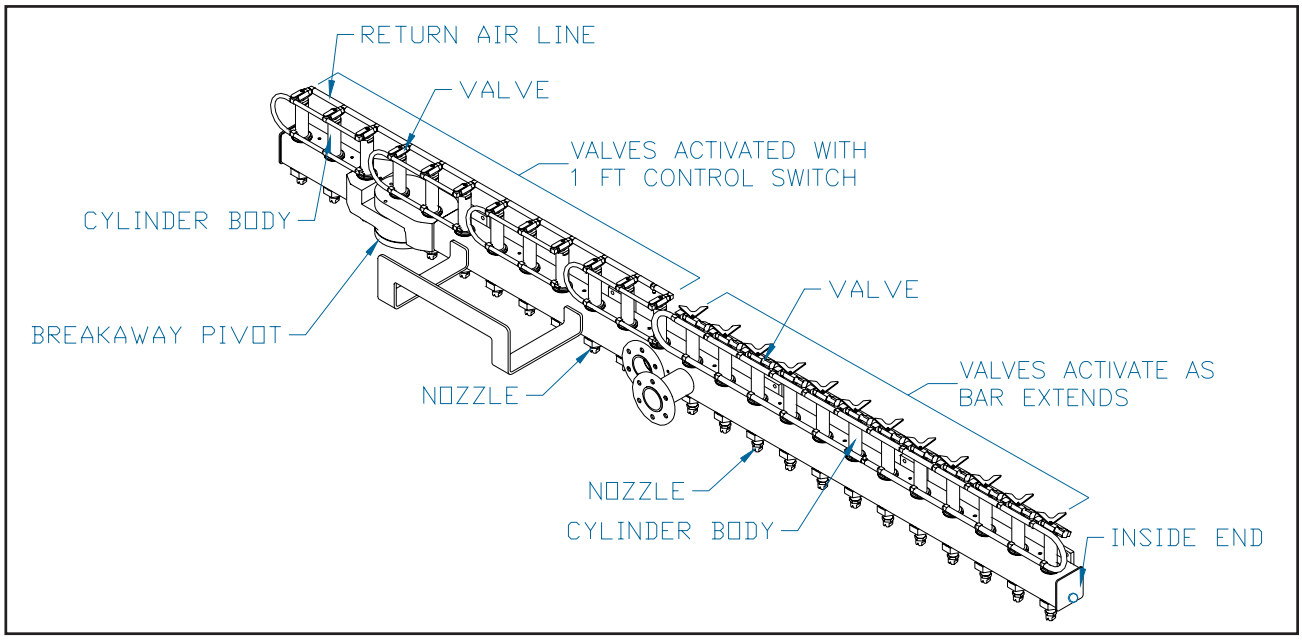

FIGURE 3-9. LEFT SPRAYBAR IN RETRACTED POSITION

NOZZLE SELECTION

The correct nozzle selection depends on:

1. the application rate setting,
2. the truck speed, and
3. the type of material being sprayed.

The standard ROSCO nozzle size is a NO. 1. However, other factors will determine efficiency and the quality of the spray pattern. Exceeding nozzle maximum flow rate may cause fogging and inconsistent application rates. Using a nozzle that is too large will cause a poor spray pattern. (See Tables 3-3 and 3-4.)

The recommended nozzle angle is 20° and is set to that specification at the factory. After changing nozzles, or when adjustments need to be made, use the Nozzle Alignment Wrench and the Valve Alignment Wrench for accurate positioning. Tools are provided with each unit. (Figure 3-7)

NOTE: For additional information about nozzle selection and adjustment, see applicable troubleshooting topics in Section 4, Maintenance & Trouble-shooting, in this manual.

TABLE 3-3. NOZZLE SIZE TO FLOW RATE

NOZZLE SIZE	RECOMMENDED FLOW RATE - GPM	APPLICATION RATE GAL/SQ.YD
00	1.2	.03 - .08
0	3.0	.05 - .20
1	4.0	.10 - .30
1.5	6.0	.15 - .40
2	8.5	.25 - .55
3	13.5	.35 - 1.00

TABLE 3-4. NOZZLE SIZE TO APPLICATION RATE

NOZZLE SIZE	APPLICATION RATES
00	Extremely Light
0	Light
1	General
1.5	Intermediate w/certain emulsions
2	Heavy

BURNERS & TORCH OPERATION

DIESEL BURNERS

Control switches for the electronic ignited diesel burners are mounted on the left rear fender. (Figure 3-10)

1. Fuel Switch: Activates burner fuel solenoid and ignites burner. Turn off to extinguish burner.

2. Blower Switch: Activates blower and fuel pump. Burner will ignite if fuel switch is on.

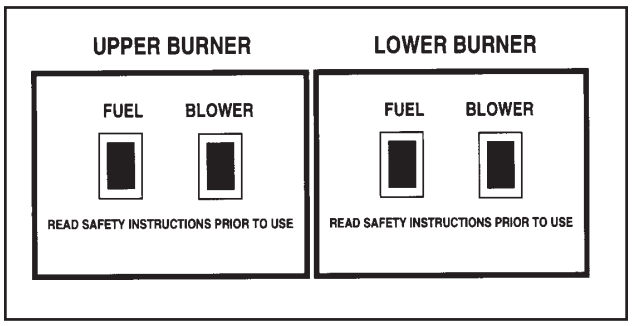

FIGURE 3-10. DIESEL BURNERS

Diesel Burner Ignition

ATTENTION: Before heating asphalt material, refer to Systems Overview, Burner System, earlier in this section for further information and precautions.

ATTENTION: Run the burners for short periods of time (15 minutes ON, 15 minutes OFF) to allow the heat to dissipate through the material. This will prevent damage to the flue liner.

NOTE: If your unit is equipped with dual diesel burners you will have separate controls for each burner (See Figure 3-10). This allows the operator to run one or both of the burners to heat the material. Light the upper burner using the same steps as with the lower burner.

1. Be sure the unit is sitting on a level area.

2. With a flash light, look into the tank from the top and check that there is no visible water or condensation in the tank. If there is, drain the tank to an approved container before lighting the burner. Dispose of material and water according to local, state and federal regulations.

DANGER: Do not put your head in the tank. Serious injury or death could result from breathing poisonous fumes.

DANGER: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.

DANGER: Hot material will turn water into steam and can cause an explosion.

3. Be sure that flue tubes are covered by at least 8 inches of material. Read the tank dipstick. If the amount in the tank is less than the recommended amount in Table 3-5 on the following page, do not use the burners. Using the burners without enough material in the tank will cause damage to the flue tubes and could cause an explosion.

DANGER: Never operate the burners if the flue tubes are not covered with at least 8" of material. The flue tubes can become red hot and ignite the vapors causing an explosion.

4. Start and run the engine at 1000 to 1200 RPM, engage PTO (if equipped). This provides power to the asphalt pump.

5. Do not load, unload, transport or spray while burners are operating.

TABLE 3-5. TANK CONTENTS CHART TO INSURE FLUE TUBE COVERAGE

Tank Size	Amount w/One Flue	Amount w/Two Flues
1000 - 1100 gal	500 gal	700 gal
3785 - 4164 L	1893 L	2650 L
1250 - 1350 gal	600 gal	900 gal
4732 - 5110 L	2271 L	3407 L
1500 - 1600 gal	650 gal	1000 gal
5678 - 6057 L	246 L	3785 L
1750 - 1850 gal (10 ft tank)	650 gal	1000 gal
6625 - 7003 L (304 cm tank)	2461 L	3785 L
1750 - 1850 gal (14 ft tank)	750 gal	1150 gal
6625 - 7003 L (427 cm tank)	2839 L	4353 L
1950 - 2000 gal	750 gal	1150 gal
7382 - 7571 L	2839 L	4353 L
2500 - 2600 gal	900 gal	1450 gal
9464 - 9842 L	3407 L	5489 L
3000 - 3100 gal	1000 gal	1600 gal
11,356 - 11,375 L	3785 L	6057 L
3500 - 3600 gal	1000 gal	1600 gal
13,249 - 13,627 L	3785 L	6057 L
4000 - 4100 gal	1150 gal	1800 gal
15,142 - 15,520 L	4353 L	6814 L

6. Set EZ-3S Controller Mode Selection switch to TANK CRCLT. See **Tank Circulate** instructions.

WARNING: **Operating the burners without circulating the product can create explosive fumes. If the product can not be circulated after 15 minutes of heating, the fuel to the burners must be turned off, while leaving the blowers running. Do not try to heat material again for 30 minutes.**

7. Set asphalt pump to the forward position at a flow of 75 - 100 GPM.

8. Turn the EZ-3S Controller Burner Master switch, and the fuel and blower switches on the fender controls OFF.

9. Set the EZ-3S Controller to the required temperature for the material being used. (See instructions for **screen 5** at **Operating Screens**, later in this section.)

10. Turn the Burner Master switch ON.

11. Turn lower flue blower switch on the fender controls ON. Wait 1 to 2 minutes to purge air from system before proceeding.

12. Turn lower flue fuel switch on the fender controls ON.

NOTE: **The burner should light. If it does not start immediately, shut OFF fuel, run blower to clear fuel from flue and retry in 1 to 2 minutes.**

CAUTION: **If the fuel is not cleared from the flue, the fuel may backfire through the burner when the operator tries to relight it. The operator could get burned.**

High Temperature Limit Control

NOTE: **This feature is designed as a safety feature only. It is not to be used for thermostatic control.**

This feature causes the burners to automatically shut off when the high temperature limit is reached. (See **screen 5** at **Operating Screens**, later in this section, for instructions on setting this control.) The burners will not restart until the Burner Master switch on the EZ-3S Controller is shut OFF to reset the control. However, until the material cools to less than the thermostat set temperature, the burners will not relight. This feature helps to prevent overheating the material.

CAUTION: **DO NOT leave the unit unattended while heating material. Monitor the Controller display temperature, as well as the dial or pencil thermometer, to insure that all equipment is functioning properly and that the material does not heat beyond the required spraying temperature. See Table 3-1, Guideline Temperatures For Liquid Asphalts.**

Diesel Burner Extinguishing

1. Turn fuel switch on the fender controls OFF.

2. Wait 3 to 5 minutes to allow the blower to cool the flue and the burner. Turn blower switch on the fender controls OFF.

3. Turn the EZ-3S Burner Master switch OFF inside the truck cab.

4. Wait 5 minutes before relighting burners.

LPG BURNERS

Before operating the propane burner system become familiar with the position, function and operation of each control in the system. See Figures 3-11 and 3-12.

1. Regulator Valve: This valve is used to set the pressure. Turn counterclockwise to open the valve and set the pressure. Turn clockwise to reduce the pressure or close the valve. Always set the pressure at 10 to 20 PSI for operation.

2. Pilot Light Valve (on manual ignition only): Controls the operation of the burner pilot light. Turn clockwise to close the valve when lighting the pilot light. Turn counterclockwise to allow full flow after the burners are ignited.

3. Shut-Off Valve: Controls the flow of fuel to the burner. Turn counterclockwise to open the valve to provide gas to the burner. Turn clockwise to close the valve and extinguish the burner.

4. Solenoid: (Not Shown) Shuts off fuel to burners when high temperature is reached.

5. Tank Valve: (Not Shown) Controls the flow of the fuel from the tank. Turn counterclockwise to open and clockwise to close.

LPG Burner Manual Ignition (Figure 3-11)

ATTENTION: Before heating asphalt material, refer to Systems Overview, Burner System, earlier in this section for further information and precautions.

ATTENTION: Run the burners for short periods of time (15 minutes ON, 15 minutes OFF) to allow the heat to dissipate through the material. This will prevent damage to the flue liner.

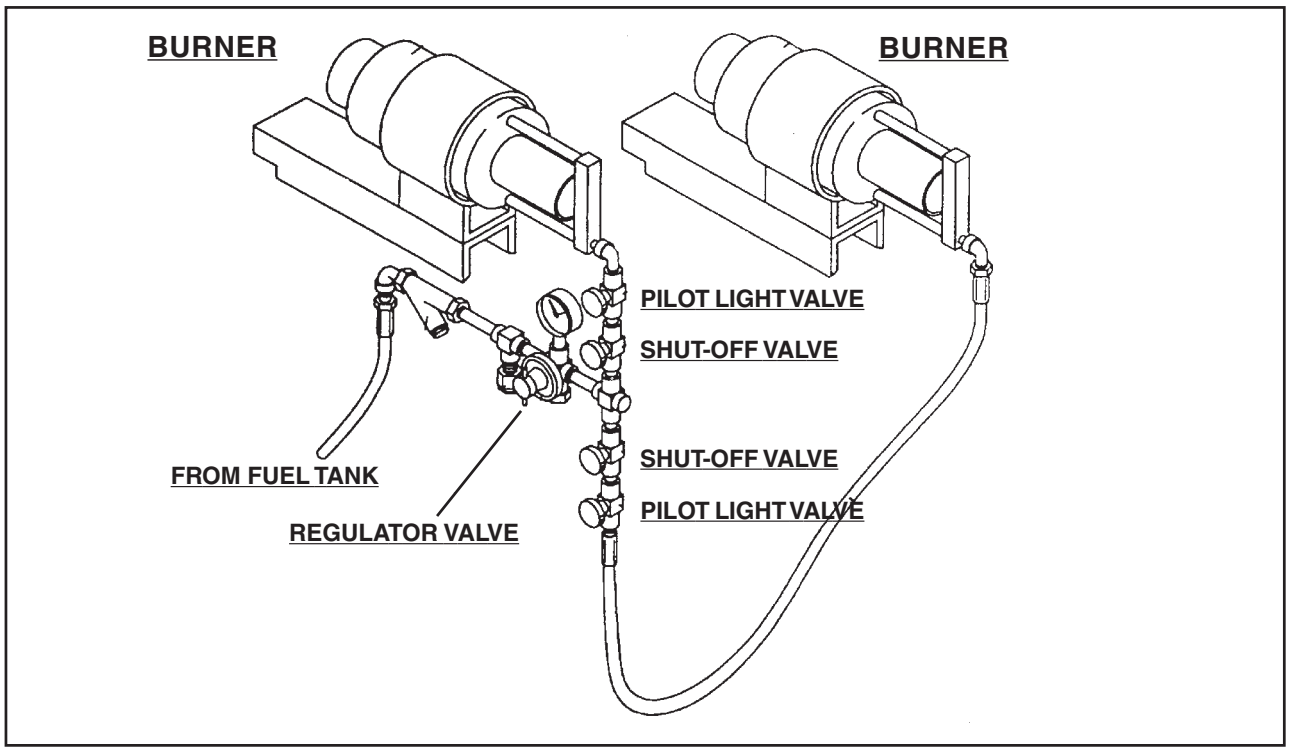

FIGURE 3-11. LPG BURNER SYSTEM (MANUAL IGNITION)

1. Be sure the unit is sitting on a level area.

2. With a flash light, look into the tank from the top and check that there is no water or condensation in the bottom of the tank. If there is, drain the tank to an approved container before heating. Dispose of material and water according to local, state and federal regulations.

DANGER: **Do not put your head in the tank. Serious injury or death could result from breathing poisonous fumes.**

DANGER: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

DANGER: **Hot material will turn water into steam and can cause an explosion.**

3. Be sure that flue tubes are covered by at least 8 inches of material. Read the tank dipstick. If the amount in the tank is less than the recommended amount in Table 3-5 on the previous pages, do not use the burners. Using the burners without enough material in the tank will cause damage to the flue tubes and could cause an explosion.

DANGER: **Never operate the burners if the flue tubes are not covered with at least 8" of material. The flue tubes can become red hot and ignite the vapors causing an explosion.**

4. Do not load, unload, transport or spray while burners are operating.

5. Start and run the engine at 1000 to 1200 RPM. Engage PTO (if equipped). This provides power to the asphalt pump.

6. Set EZ-3S Controller Mode Selection switch to TANK CRCLT. See **Tank Circulate** instructions.

WARNING: **Operating the burners without circulating the product can create explosive fumes. If the product can not be circulated after 15 minutes of heating, the fuel to the burners must be turned off, while leaving the blowers running. Do not try to heat material again for 30 minutes.**

7. Set the asphalt pump to the forward position at a flow of 75 - 100 GPM.

8. Close pilot valves and shut-off valves.

9. Turn the EZ-3S Burner Master switch OFF.

10. Set the EZ-3S Controller to required temperature for the material being used. (See **screen 5** at **Operating Screens**, later in this section, for instructions on setting this control.)

11. Turn EZ-3S Burner Master switch ON.

12. Open the LPG tank valve to start the flow of propane.

13. Open the shut-off valve to the lower burner a little to allow a small amount of fuel to flow to the burner.

CAUTION: **To prevent injury, use a wick type torch to light pilot flame and burner. DO NOT use a match or lighter.**

14. Light the pilot light on the lower burner using a wick type torch.

15. When the pilot flame is lit, open the shut-off valve completely. The pilot valve contains an orifice that will allow sufficient fuel through to maintain the pilot light.

16. Open the pilot valve to supply fuel to operate the burner.

17. Repeat procedure for the upper burner.

18. Use the regulator valve to set the fuel pressure at 10 to 20 PSI.

High Temperature Limit Control

NOTE: This feature is designed as a safety feature only. It is not to be used for thermostatic control.

This feature causes the burners to automatically shut off when the high temperature limit is reached. (See **screen 5** at **Operating Screens**, later in this section, for instructions on setting this control.) The burners will not restart until the Burner Master switch on the EZ-3S Controller is shut OFF to reset the control. However, until the material cools to less than the thermostat set temperature, the burners will not relight. This feature helps to prevent overheating the material.

CAUTION: 
DO NOT leave the unit unattended while heating material. Monitor the Controller display temperature, as well as the dial or pencil thermometer, to insure that all equipment is functioning properly and that the material does not heat beyond the required spraying temperature. See Table 3-1, Guideline Temperatures For Liquid Asphalts.

LPG Burner Manual Extinguishing

1. Close the tank valve and allow the fuel to flow to the burners until they go out.

2. Close the pilot and shut-off valves in the lines.

3. Wait 5 minutes before relighting to insure there are no fumes in the flue.

LPG Burner Auto Ignition (Figure 3-12)

ATTENTION: 
Before heating asphalt material, refer to Systems Overview, Burner System, earlier in this section for further information and precautions.

ATTENTION: 
Run the burners for short periods of time (15 minutes ON, 15 minutes OFF) to allow the heat to dissipate through the material. This will prevent damage to the flue liner.

1. Be sure the unit is sitting on a level area.

2. With a flash light, look into the tank from the top and check that there is no water or condensation in the bottom of the tank. If there is, drain the tank to an approved container before heating. Dispose of material and water according to local, state and federal regulations.

DANGER: 
Do not put your head in the tank. Serious injury or death could result from breathing poisonous fumes.

DANGER: 
DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.

DANGER: 
Hot material will turn water into steam and can cause an explosion.

3. Be sure that flue tubes are covered by at least 8 inches of material. Read the tank dipstick. If the amount in the tank is less than the recommended amount in Table 3-5 on the previous pages, do not use the burners. Using the burners without enough material in the tank will damage the flue tubes and could cause an explosion.

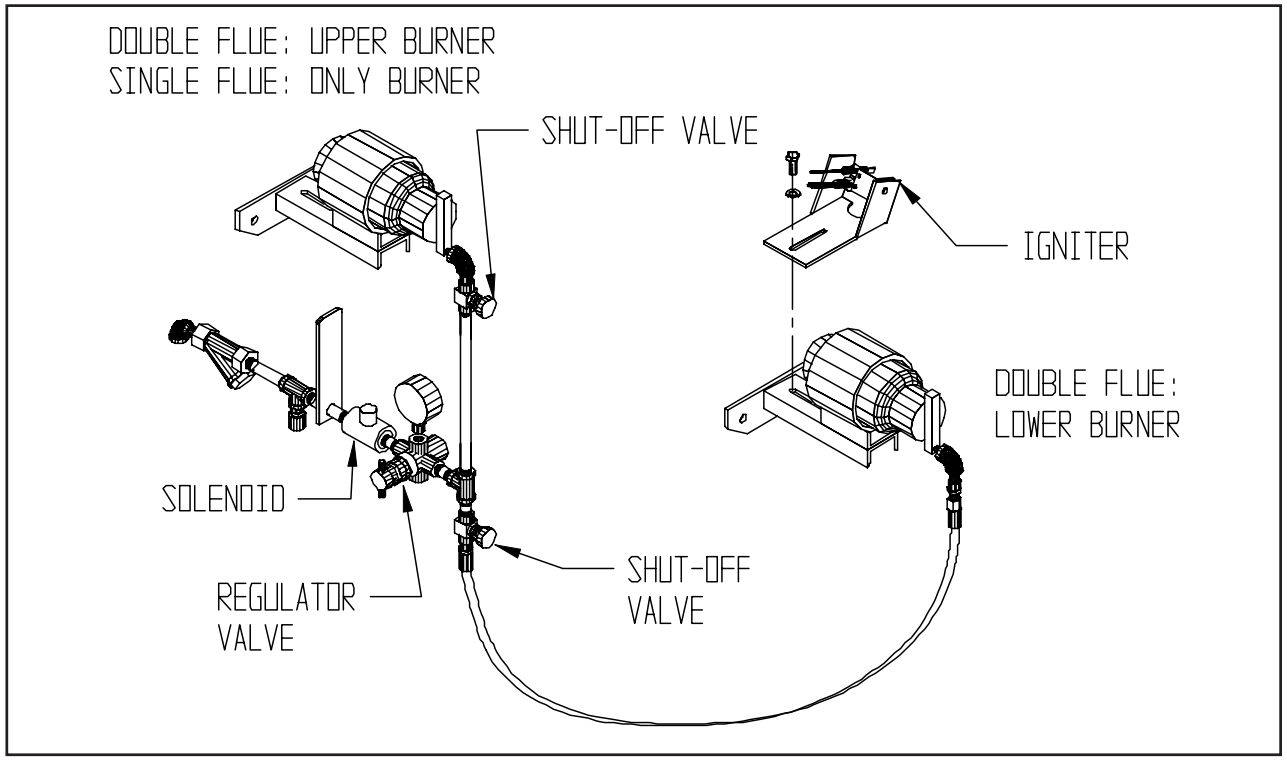

FIGURE 3-12. LPG BURNER SYSTEM (AUTO IGNITION)

DANGER: **Never operate the burners if the flue tubes are not covered with at least 8" of material. The flue tubes can become red hot and ignite the vapors causing an explosion.**

4. Do not load, unload, transport or spray while burners are operating.

5. Start and run engine at 1000 to 1200 RPM, engage PTO (if equipped). This provides power to the asphalt pump.

6. Set EZ-3S Controller Mode Selector switch to TANK CRCLT. See **Tank Circulate** instructions.

WARNING: **Operating the burners without circulating the product can create explosive fumes. If the product can not be circulated after 15 minutes of heating, the fuel to the burners must be turned off, leaving the blowers running. Do not try to heat material again for 30 minutes.**

7. Set asphalt pump to the forward position at a flow of 75 - 100 GPM.

8. Verify burner switch in rear control box is OFF.

9. Turn the EZ-3S Burner Master switch OFF.

10. Set the EZ-3S Controller to the required temperature for the material being used. (See **screen 5** at **Operating Screens**, later in this section, for instructions on setting this control.)

11. Turn EZ-3S Burner Master switch ON.

12. Open the LPG tank valve to start the flow of propane.

13. Partially open lower burner valve for starting.

14. Turn ON burner switch in rear control box. Burner should light within 10 seconds. If not, turn switch OFF to reset and retry.

15. After burners light, fully open lower burner valve.

16. Open valve for upper burner if equipped.

17. Burners should be operating. If not, turn off valves and troubleshoot. See Section 4, **Maintenance & Troubleshooting**.

High Temperature Limit Control

NOTE: This feature is designed as a safety feature only. It is not to be used for thermostatic control.

This feature causes the burners to automatically shut off when the high temperature limit is reached. (See **screen 5** at **Operating Screens**, later in this section, for instructions on setting this control.) The burners will not restart until the Burner Master switch on the EZ-3S Controller is shut OFF to reset the control. However, until the material cools to less than the thermostat set temperature, the burners will not relight. This feature helps to prevent overheating the material.

CAUTION: **DO NOT leave the unit unattended while heating material. Monitor the Controller display temperature, as well as the dial or pencil thermometer, to insure that all equipment is functioning properly and that the material does not heat beyond the required spraying temperature. See Table 3-1, Guideline Temperatures For Liquid Asphalts.**

LPG Burner Auto Extinguishing

1. Close the tank valve and allow the fuel to flow to the burners until they go out.

2. Close the pilot and shut-off valves in LPG lines.

3. Turn OFF burner switch in rear control box.

4. Turn EZ-2S Burner Master switch OFF.

5. Wait 5 minutes before relighting to insure there are no fumes in the flue.

PORTABLE LPG TORCH

A portable LPG torch may be supplied on the Maximizer3 as an option. If the unit is equipped with LPG burners for tank heating, the portable torch is plumbed into the unit's LPG burner regulator. If the unit is equipped with diesel fired burners, the portable torch will have its own LPG tank and regulator.

DANGER:  **Use extreme caution when operating a portable torch, either independently of the Maximizer3 or as an integral part of the Maximizer3 burner fuel system. Read and be familiar with the torch operating instructions. Any external flame is extremely hazardous around the Maximizer3 and can cause fire and explosion. Follow <u>all</u> of the safety precautions provided for burner operation in this manual.**

Portable LPG Torch Ignition

1. Open valve on LPG tank. If torch has separate regulator, set regulator for no more than 15 PSI.

2. Open the shut-off valve on the torch with the pilot valve closed. When the pilot valve is closed, the orifice will allow enough LPG flow to light the torch.

3. To prevent injury, use a wick-type torch to light the portable torch. Do not use a match or lighter.

DANGER:  **Using a portable torch is extremely hazardous. Use a sweeping motion when using the torch. Do not direct the flame on one point for an extended period of time. Fire and explosion will occur.**

4. Open pilot valve on torch to allow enough flow for torch operation.

Portable LPG Torch Extinguishing

1. Close pilot valve to shut down flame.

2. Close tank valve and allow the fuel to flow to the burners until they go out.

3. After pilot flame goes out, close shut-off valve and store torch.

EZ-3S CONTROLLER

The following instructions are used to set your application rate and calibration factors with the EZ-3S Controller (Figure 3-13). Review the job specifications to determine the application rate required. Start the truck and turn on the Master control switch. The display will show "Read The Operator's Manual Before Using Machine". After a few seconds the display will automatically change to the first operating screen.

NOTE: If the display does not come on, turn the Master control switch off and check the connectors on the black Microprocessor box as well as the in line fuse next to the truck fuse panel. The circular connector with the gray wire sends the signal to the EZ-3S Controller. Check to see that it is not damaged and is connected properly. Turn the power back on. The green Power light on the Microprocessor should be on (the Status light will illuminate briefly but does not stay on) and the small display window will indicate the program number installed in the Microprocessor. Be sure to record this number and refer to it when requesting service help.

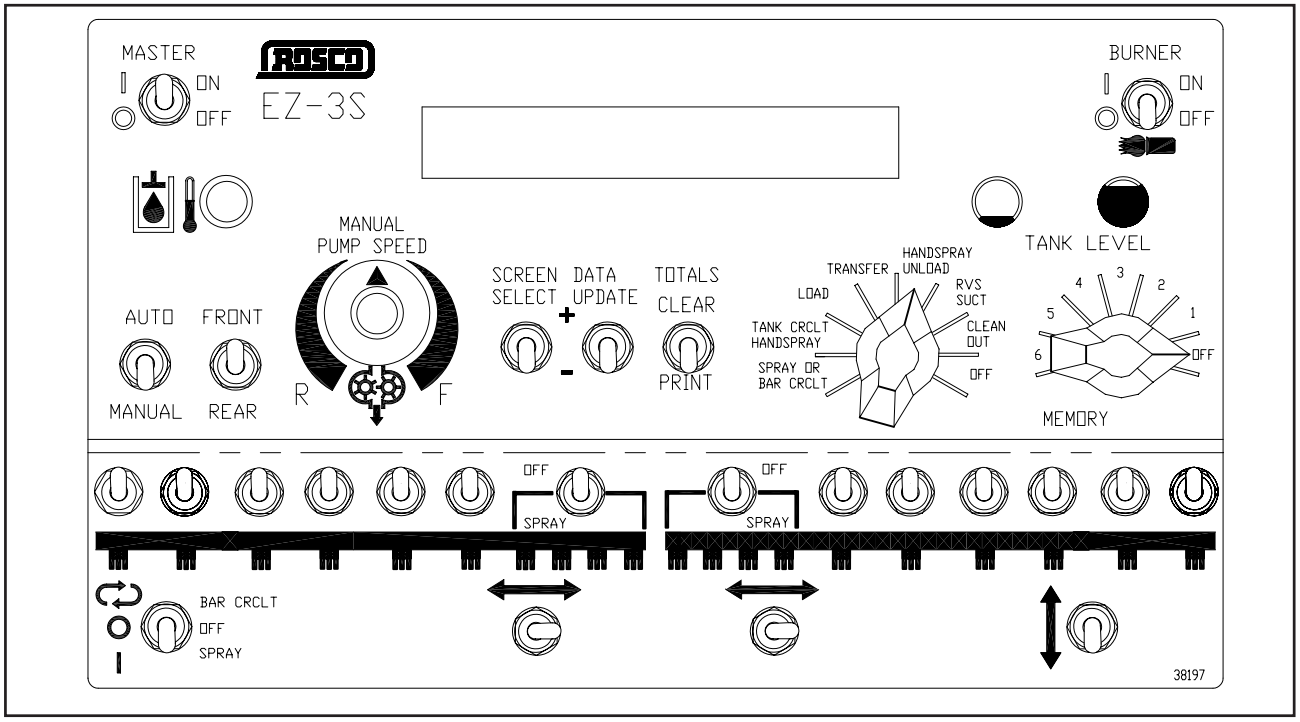

FIGURE 3-13. EZ-3S CONTROLLER

OPERATING SCREENS

When the Auto/Manual switch is set on AUTO, the **main operating screen (1)** will show the current application rate.

(1)

0 GPM	**.0 GAL/YD**
0 FPM	**0' 0" BAR**

The screen reads GPM (Gallons per Minute), FPM (Feet per Minute), GAL/YD (Gallons per Yard) and BAR (Spraybar Width in Feet and Inches). If the Auto/Manual switch is set to MANUAL, the GAL/YD will be replaced with the word MANUAL.

To set the application rate, turn the Memory Seclect switch OFF and turn the Auto/Manual switch to AUTO. Press down on the Screen Select switch once. The application rate (GAL/YD) will start flashing. Press the Data Update switch up (+) to increase the rate or down (-) to decrease the rate. For demonstration purposes, set the rate at .26 GAL/YD. Press the Screen Select switch up to stop the flashing or down to move on to the Spraybar Width operating screen.

(1)

0 GPM	**.26 GAL/YD**
0 FPM	**0' 0" BAR**

NOTE: If the burner switch on the control box is left on after heating the material, the display will read "Burner On" and the application rate is not displayed. Keep the burner switch OFF unless the burner is operating.

In normal operation, all spraybar switches are turned on and the display indicates total extended spraybar (min 8'0", max 16'0"). Each time the right or left extend/retract switch is pushed, the spraybar will extend or retract 4" and the Microprocessor will adjust the footage.

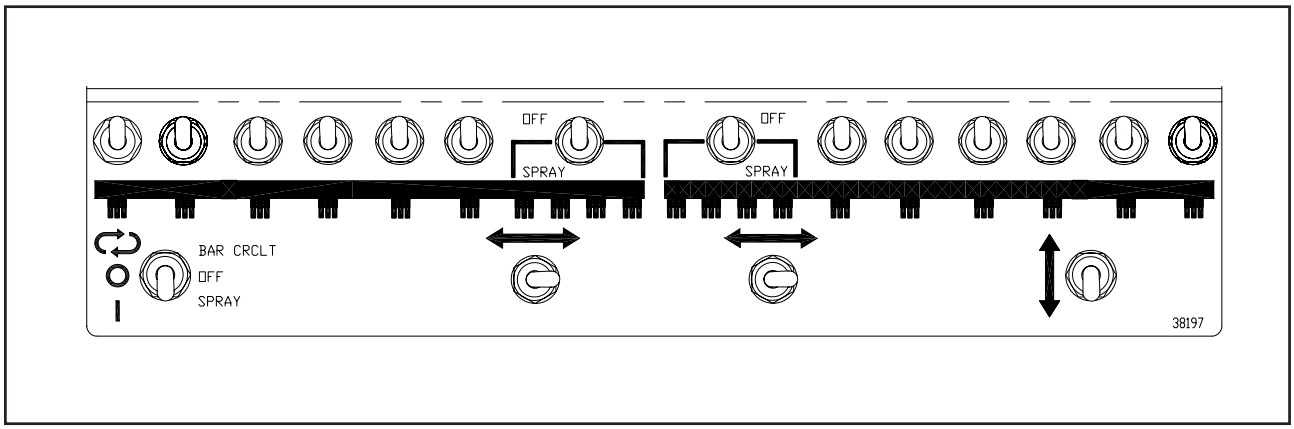

FIGURE 3-14. SPRAYBAR SWITCHES

Turning off the spraybar switches will deactivate sections of the spraybar. The display will indicate the length of bar that is active, regardless if the bar is extended or not.

NOTE: If you turn OFF all the spraybar switches, the display will read 0'0" even if the left and right bars are fully extended.

Press the Screen Select switch down to display the **second operating screen (2)** which allows the operator to see the position of each spraybar, and determine if all sections are active.

(2)

LEFT BAR		RIGHT BAR	
****	6' 0"	6' 0"	****

NOTE: If each spraybar is extended 2 feet and all the switches are ON, the display will appear as shown above. However, if you turn off the individual 1-foot switches, the ** will go off.**

(2)

LEFT BAR	RIGHT BAR	
0'0"	8' 0"	****

NOTE: If both bars are fully extended and all left spraybar switches are OFF, the display will show only the extended, active values as shown above.

Press the Screen Select down to show the **third operating screen (3)** which displays the working Totals. It shows the total gallons sprayed, the total feet traveled while spraying and the total area sprayed in square yards. (Because we are not operating an actual unit the totals displayed on your screen are going to show zeros).

(3)

TOTALS	0 GAL
0 FT	0 YD

The gallons and feet values will increase whenever the Spraybar Master switch is in the ON position, the truck is moving and the asphalt pump is turning. The total yards value automatically updates when the Spraybar Master switch is turned OFF or to the BAR CRCLT position.

Press the Totals switch up (CLEAR) to clear the displays and reset the totals to zero.

NOTE: If your unit is equipped with a printer, push the Totals switch down to the PRINT position. The controller will print a report and clear the totals.

Press the Screen Select down and the **fourth operating screen (4)** displays BAR PRESSURE and HOURS. (BAR PRESSURE will only be displayed if the unit is equipped with this option and a pressure transducer is installed in the system.) HOURS refers to the asphalt pump operation hours.

(4)		
	BAR PRESSURE	**XX PSI**
	HOURS	**XXX**

Press the Screen Select down again to go to the **fifth operating screen (5)**, which shows ACTUAL TANK TEMP and LIMIT TEMP. This screen allows the operator to monitor the tank temperature and set the High Temperature Limit Control which will prevent the burners from overheating the material.

(5)		
	ACTUAL TANK TEMP	**XXX**
	LIMIT TEMP	**XXX**

NOTE: This feature is designed as a <u>safety feature only.</u> It is <u>not</u> to be used for thermostatic control.

To change the LIMIT TEMP press the Data Update switch either up (+) to increase the temperature limit or down (-) to decrease the temperature. Each toggle of the Data Update switch will change the set limit by 5°. Press the Screen Select down again and the screen will return to the main operating screen.

NOTE: The temperature screen may also be accessed by pushing the Screen Select up once when the operator is in the main operating screen.

PRE-SETTING AND USING THE MEMORY FEATURE

The Memory Select switch (Figure 3-15) controls the Memory Preset. This function of the Controller is available for the operator's convenience but is not necessary for the operation of the unit. The Controller can preset up to six (6) frequently used application rates and associated flow calibrations.

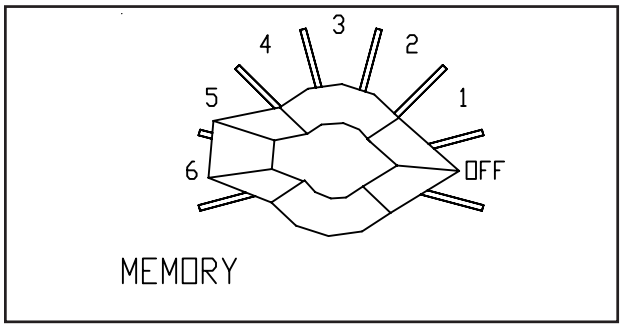

FIGURE 3-15. MEMORY SELECT SWITCH

The memory presets can be used in two different ways:

1. Different asphalt materials may require different flow calibration numbers for maximum accuracy. When the flow calibration is set for a specific material, the flow calibration and application rate for this material can be stored in one of the memory preset positions.

2. Changing application rates while spraying. For example, if the operator is spraying at the accepted rate on a straight stretch of road but wants to adjust the rate for an intersection or curve, he/she can make the adjustment without interrupting the asphalt flow. To change application rates while moving you must be operating in one of the preset memory selections.

NOTE: Use caution when changing memory selectins while moving. To keep the rate accurate, the memory setting that you switch to must have the same Flow Calibration number as you are currently using. The Flow Calibration number is based on the material being used. Therefore, this number must remain constant if you change the application rate (the amount of material being sprayed). Memory settings for rate changes on-the-go should be consecutive (i.e. Mem. "0" and Mem. "1") so there is less chance of switching to a setting with a different Flow Calibration number.

Turn the Memory Select Switch counterclockwise to read the application rates set at each memory level. The operator cannot program the presets at this screen.

To program the Controller's memory, turn ON the Master control switch while holding UP the Screen Select switch. The screen will show the current application rate and flow calibration rate. The application rate (GAL/YD) will be flashing. To save the current information at Memory Preset *1* press the Totals switch up (CLEAR).

MEM RATE	**.26 GAL/YD**
*** 1 ***	**FLOW RATE 1030**

To change the application rate, press the Data Update switch up (+) to increase the value or down (-) to decrease the value. Press the Screen Select switch down again and the flow calibration rate will start flashing. The operator can use the Data Update switch to increase or decrease that value as well.

MEM RATE	**.26 GAL/YD**
*** 1 ***	**FLOW RATE 1030**

Press the Screen Select switch down again and the display will move to Memory Preset *2*.

MEM RATE	**.27 GAL\YD**
*** 2 ***	**FLOW RATE 1030**

Follow the above procedure for each memory level that you choose to program. The memory screens number from 1 to 6. When you have programmed the Controller Memory to your satisfaction, turn the Master control switch OFF. The Controller will save all of the entries.

Restart the Controller by pressing the Master control switch ON. Turn the Memory dial to each preset position and check to see if the data is correct at all of the programmed memory levels.

To return to your current operating rate, turn the Memory dial OFF.

SET-UP DISPLAY

This series of displays is used to individually calibrate the Controller and set user preferences. The operator does not normally need to make changes in the Controller's set-up.

Spraybar Rate Screen

Enter this mode by turning ON the Master control switch while holding DOWN the Screen Select switch. The screen will briefly flash "Read The Operator's Manual..." and then automatically switch to the Spray/Bar Circulate display. If the display does not change automatically press DOWN on the Screen Select switch.

CIRCULATE GPM SET
30 GAL/MIN

The Spray/Bar Circulate Rate will be displayed. This rate was set at the factory to 30 GPM. To adjust the rate, press the Data Update switch up (+) to increase the rate or down (-) to decrease the rate. Higher rates are helpful when spraying asphalts that require a high spray temperature or those that are very viscous. Lower rates are needed when spraying very light application rates, using an asphalt emulsion, or using materials that do not have a high spray temperature.

Flow Calibration Screen

Press the Screen Select switch DOWN again and the Flow Calibration Screen will be displayed. The flow rate is set at the factory at 1030.

TO CALIBRATE FLOW	
PRESS CLEAR	****1030****

At this calibration number the asphalt pump provides one gallon of asphalt per revolution assuming 95% efficiency. However, this is not always the case. Let's say that you have manually measured the tank with the dipstick before and after spraying and have determined that 1800 gallons

of asphalt has been sprayed. The EZ-3S display total says that you have sprayed 2000 gallons. Follow the instructions on the screen and press the Totals switch up (CLEAR) to reach the flow calibration screen sub-menu.

ENTER RATE	**2000 SET**
HIT CLEAR	**1800 ACT**

Two numbers will be shown. The top number (SET) remains fixed for the calculation and represents the number of gallons that the Controller says has been sprayed. The bottom number (ACT) can be changed by pressing the Data Update switch up (+) to increase or down (-) to decrease the number. In the case discussed above, the Data Update switch would be pushed down until 1800 was displayed. 1800 is the actual quantity sprayed and 2000 is the quantity measured by the Controller.

Press the Totals switch up (CLEAR) and the screen will display the new flow calibration number. It would be 927 in this example, assuming that the old calibration number was 1030.

THE NEW CALIBRATION	
FLOW CONST. IS	**927**

Speed Calibration Screen

Press the Screen Select switch down until the speed (Distance) calibration screen is displayed.

TO CALIBRATE SPEED	
PRESS CLEAR	**** 1000 ****

The speed calibration factor should only be changed when the total distance of a sprayed area is known to be wrong because the Radar Speed Sensor has been damaged or replaced. The actual length of the area must be manually measured.

Follow the instructions on the display and press the Totals switch up (CLEAR).

PRESS CLEAR TO START	
DISTANCE =	**0 FT**

Position the truck at the start of a manually measured distance approximately 500 to 1000 feet. Press the Totals switch up (CLEAR) and begin driving. Press CLEAR again as you pass the beginning marker from a rolling start. Press CLEAR again as you pass the end distance marker.

PRESS CLEAR TO STOP	
DISTANCE =	**690 FT**

The display will show a number that the Controller calculates is the end distance traveled. It will then prompt the operator to enter the actual distance traveled.

ENTER REAL DISTANCE	
THEN HIT CLEAR	**700 FT**

Press the Data Update switch up (+) or down (-) until the manually measured distance is displayed.

Press the Totals switch up (CLEAR) and the screen will display the new speed calibration.

THE NEW CALIBRATION	
SPEED CONST. IS	**** 1011 *****

If the operator chooses to make corrections to the data, press the Screen Select switch up several times and reenter either the flow calibration, speed calibration or the bar circulate rate.

Unit of Measure Screen

Press the Screen Select switch down again and the Controller will prompt the operator to change from the English measurement system to the Metric measurement system.

ENGLISH
DECREASE TO CHANGE

Press the Data Update switch down (-) to change to Metric. (The operator can press the Data Update switch up (+) to return to English.) After the operator exits and saves the changes, (see **Saving Data**) the Controller will show liquid volume in liters, distance in meters, bar width in meters, application rate in liters per square meter and total area sprayed in square meters.

Bar Retract Offset Screen

This screen is used to adjust the spraybar retracting movement. Due to slight signal lag time, an offset count is used to get precise 4 inch increments in the bar movement.

BAR RETRACT OFFSET
15 COUNT

Normally, a number between 12 and 18 is correct for this adjustment. If the spraybar consistently moves **more** than 4 inches, **increase** this number by pressing the Data Update up (+). If the spraybar moves **less** than 4 inches, **reduce** the number by pressing the Data Update switch down (-).

Bar Extend Offset Screen

This screen is used to adjust the spraybar extending movement. Due to slight signal lag time, an offset count is used to get precise 4 inch increments in the bar movement.

BAR EXTEND OFFSET
15 COUNT

Normally, a number between 12 and 18 is correct for this adjustment. If the spraybar consistently moves **more** than 4 inches **increase** this number by pressing the Data Update up (+). If the spraybar moves **less** than 4 inches, **reduce** the number by pressing the Data Update switch down (-).

Spraybar Stagger Screen

The Spraybar Stagger Control turns the left spraybar on and off after the right hand spraybar so the two bars start and stop in a straight line. This screen is used to adjust the spraybar stagger control if necessary.

STAGGER 50% TO 150%
100%

A number of 100% will normally result in a straight line start/stop. However, if the left spraybar lags the right spraybar, or if the left bar starts too soon after the right bar, this number may have to be adjusted. If the left bar **lags,** press the Data Update switch down (-) to **reduce** the number. If the left bar **starts too soon,** press the Data Update switch up (+) to **increase** this number.

Spraybar Maximum Delay Screen

This screen adjusts the maximum delay time for the left spraybar. It can be adjusted from 100 to 500 milliseconds (.1 to .5 second).

MAXIMUM DELAY
250

Normally this will be set at 250 (¼ second). This can be reduced by pressing the Data Update switch down (-) for a quick start when starting from a standstill. For slow starts, increase this number by pressing the Data Update switch up (+).

Bar Width Option Screen

NOTE: This screen would usually be used for a short time in case of a malfunction or failure of a bar length sensor. This will allow operation of the unit to continue until repairs can be made.

Press the Screen Select switch down and follow the instructions on the screen by pressing the Data Update switch down (-).

BAR WIDTH SWITCH
DECREASE TO CHANGE

Pressing the Data Update switch up (+), returns the selection to SWITCH which is normally the desired operation mode.

Choose the OPERATOR selection if the operator needs to input the actual spraybar width and not have the Controller monitor the spraybar switches to determine the bar width.

BAR WIDTH OPERATOR
INCREASE TO CHANGE

Saving Data

Press the Screen Select switch down and the display will instruct the operator to EXIT and/or SAVE the changes that were inputted. Press Data Update down (-) to save changes and return to the first operational screen. EXIT will return you to the first operational screen without saving changes.

EXIT	**=**	**PUSH DATA INCR**
SAVE	**=**	**PUSH DATA DECR**

NOTE: When you make changes in Set-Up Display you must use SAVE to save changes, otherwise your new data will be lost.

The Controller will momentarily flash the opening display (Read The Operator's Manual....) and will then return to the first operational screen displaying the application rate.

(1)

0 GPM	**.26 GAL/YD**
0 FPM	**0' 0" BAR**

Press the Screen Select switch down until the BAR display is flashing. Press the Data Update up (+) or down (-) to increase or decrease the bar width at 4 inch increments.

NOTE: Do not change any screen value other than those described above. The remaining screens in the menu are needed only when Factory Installed components have been replaced. Contact the ROSCO service department for specifics.

MANUAL MODE

(See Figure 3-16)

Turn the Auto/Manual switch to MANUAL and the Manual Pump Speed knob midway between (R) reverse and (F) forward. The display should show MANUAL where the application rate was shown. Pump speed should be 0 GPM.

0 GPM	**MANUAL**
0 FPM	**0' 0" BAR**

Put the Pump Control switch to the FRONT position. Slowly turn the Manual Pump Speed knob clockwise and watch the GPM value increase. Select a gear that provides the desired speed for spraying asphalt while maintaining an engine speed of 1400 to 2500 RPM.

A fairly high engine speed is desirable to maintain good hydrostatic pump response. Use the Slide Rule Application Guide (supplied with your machine) to determine the desired pump rate for the selected application rate, bar width and ground speed. See **Manual Calibration** later in this section for information on using the Slide Rule Application Guide.

Use the Manual Mode and make a dry run at the desired ground speed. Adjust the Pump Speed knob to obtain the desired GPM. **Do not readjust this knob.** You are locked into a proportional relationship (true of manual transmission trucks only) and the application rate will hold consistently for varying ground speeds.

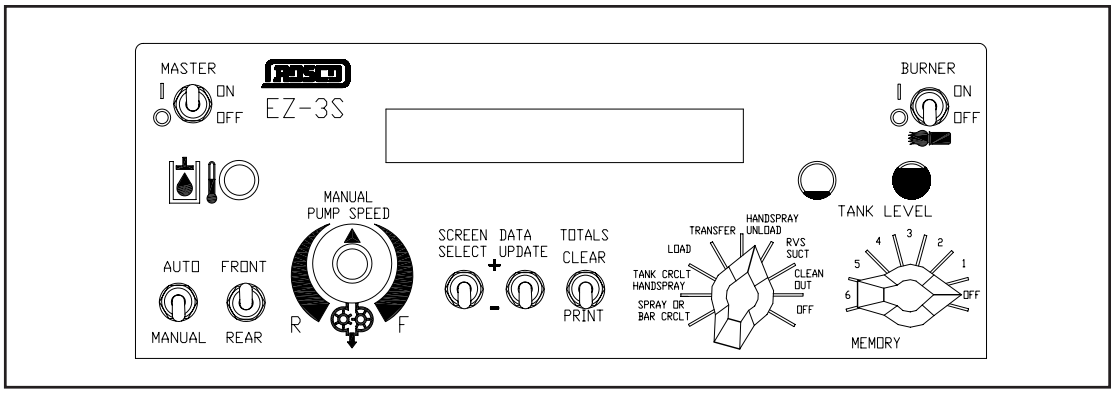

FIGURE 3-16. EZ-3S CONTROLLER

EZ-3S CONTROLLER ERROR MESSAGES

If the EZ-3S Controller malfunctions, it will flash an error message (2 seconds on, 2 seconds off) informing the operator that there is a problem. The error messages will appear on the top line of the LED display screen. If this occurs, do not try to repair the Controller on site. Call your authorized ROSCO Dealer or a ROSCO Factory Representative for assistance.

LOW BATTERY VOLTAGE - Displayed if supply voltage to the Controller is below 9.0 vdc. Check battery and wiring.

EDC OPEN-CK REAR SW - Displayed if the resistance of the EDC is calculated to be greater than 40 ohms for more than 1 second.

EDC CONTROL SHORTED - Displayed if the resistance of the EDC is calculated to be less than 5 ohms for more than 1 second.

NO RADAR SIGNAL - Displayed when the Master Spray switch is ON and the EDC valve current is greater than 70 ma. for approximately 2 seconds or longer and feedback is not detected from the Radar Sensor. See Section 4, **Maintenance & Troubleshooting**.

PUMP PICKUP ERROR - Displayed when the Master Spray switch is ON and the EDC valve current is greater than 70 ma. for approximately 2 seconds or longer and feedback is not detected from the Asphalt Pump. See Section 4, **Maintenance & Troubleshooting**.

RAM FAILURE - Displayed continuously after self-test fails to write or read the Controller's internal RAM correctly. The Controller is disabled and repair is required.

ROM FAILURE - Displayed continuously after self-test fails to calculate the proper check sum for PROM (Program Memory).

PROM FAILURE - Displayed continuously after self-test fails to calculate the proper check sum for ROM or PROM (Program Memory).

UNDER APPLICATION - Displayed when the Master Spray switch is ON and the EDC valve current is greater than 119 ma. (120 ma. is maximum current to the EDC)

OVER APPLICATION - Displayed when the Master Spray switch is ON and the EDC valve current is less than 1 ma.

PUMP SIGNAL AT MAX - Displayed when the Master Spray switch is OFF and the EDC valve current is greater than 100 ma. (Max Circulation Rate has been reached.)

PUMP SIGNAL AT MIN - Displayed when the Master Spray switch is OFF and the EDC valve current is less than 1 ma. (Min Circulation Rate has been reached.)

ELECTRO MOTIVE RADIATION INTERFERENCE

High Electro Motive Radiation (EMR) produced by citizen band radios and other sources can interfere with the function of the EZ-3S Controller. EMR causes stray voltages to be induced in the signals to and from the computer. As a result, the machine could unexpectedly speed up and/or the application rate could suddenly change.

ATTENTION: If EMR is present, the machine should be tested at a remote site to insure that there are no abrupt movements or extreme levels of application.

Possible solutions for problems caused by EMR include:

1. Remove the source of the radiation.

2. Move the source of the radiation away from the computer area.

3. Shield the computer and/or the wiring (particularly the power lead going to the computer) in metal enclosures.

MODES OF OPERATION

The remainder of this section will explain the different modes of operation for the Maximizer3 Asphalt Distributer. Each function is explained in detail and includes safety concerns that the operator must be aware of when operating the unit.

With each mode, there are illustrations to show the correct mode control selections and the path of travel of asphalt flow in the system. The flow illustration shows the proper orientation of the valves throughout the system. The illustrations may also be used to help troubleshoot the unit if a certain mode does not operate properly.

When operating the unit for the first time, be sure to read each mode section carefully before operating in that mode. Keep this book handy for reference during each mode of operation. If you are unsure how to perform a function with the unit, reread the instruction or seek the help of trained, experienced personnel.

NOTE: The Microprocessor has a program number that shows in the small display window on the front of the black controller box. Whenever you have questions or need service help with the controller or the program operation, have the identification number on hand when you call.

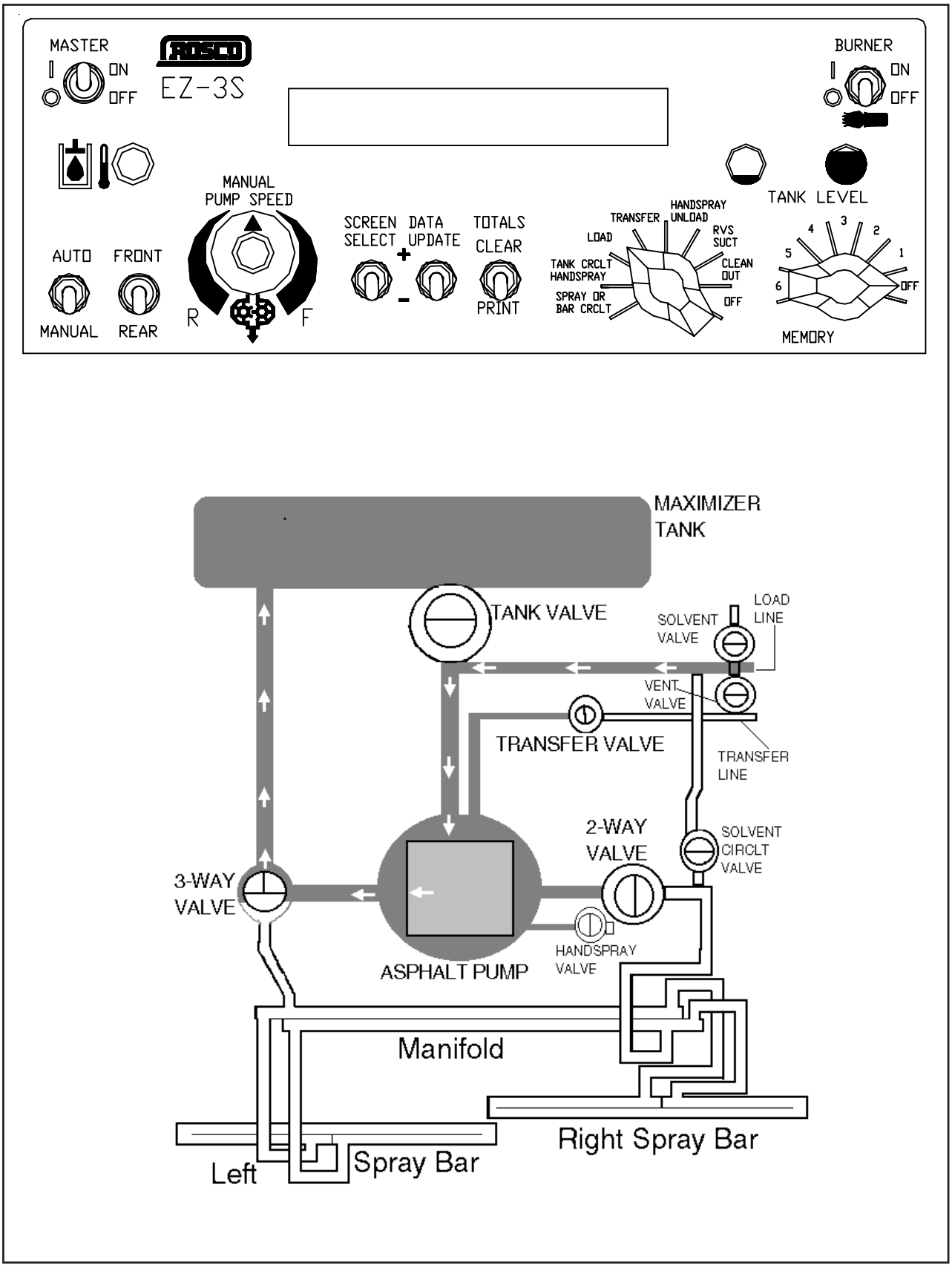

FIGURE 3-17. LOAD MODE

LOAD MODE
(See Figure 3-17)

Bottom Tank Loading

1. Review and follow the **Pre-Operating Check List** earlier in this section before starting.

2. Be sure the unit is sitting on a level area.

DANGER: **Do not put your head in the tank. Serious injury or death could result from breathing poisonous fumes.**

3. With a flashlight, look into the tank from the top and check for water or condensation in the bottom of the tank. If necessary, drain the tank contents into an approved container before loading. Dispose of material and water according to local, state and federal regulation.

DANGER: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

DANGER: **Hot material will turn water into steam and can cause an explosion.**

DANGER: **Check that the material being loaded is compatible with the previously used asphalt. See Material Considerations earlier in this section. Some asphalt material can be vaporized by high temperature materials and can explode. If material is not compatible, clean out the tank.**

WARNING: **Fumes from asphalt materials can be poisonous. When using the top opening, the operator should stand up-wind and to one side to avoid hot gases, fumes or being struck by a cover or hot asphalt spray.**

4. Move the Maximizer3 to the storage tank or transfer vehicle.

DANGER: **Never operate burner equipment when the vehicle is being loaded or in transit. The flue tubes can become exposed, causing an explosion inside the tank, or material being sprayed could ignite.**

CAUTION: **Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

5. Set the EZ-3S Controller Auto/Manual switch to MANUAL.

6. Set the EZ-3S Controller Mode Selection switch to LOAD.

7. Set the EZ-3S Controller Pump Control switch to REAR.

8. Set the EZ-3S Controller Spraybar Master switch to OFF or BAR CRCLT.

9. Using the Rear Controller (Figure 3-18), turn the Manual Pump Speed dial **slowly** in FORWARD direction to provide suction to the line (50 - 75 GPM).

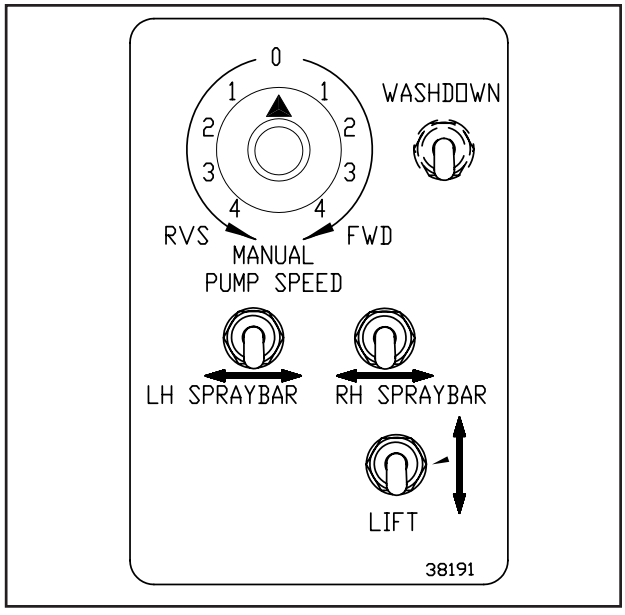

FIGURE 3-18. REAR CONTROLLER

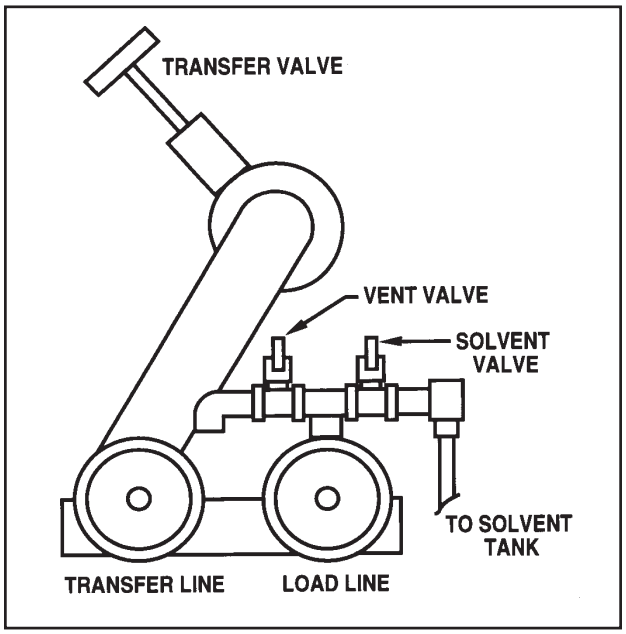

FIGURE 3-19. LOAD LINE & TRANSFER LINE

10. Slowly open the small vent valve to the top left of the Load Line coupler (Figure 3-19) to relieve the vacuum in the line. When suction relief is heard, remove the Load Line cap. If no relief is heard, do not remove the cap. Check that the pump is turning in the forward direction and that the vent valve is open.

WARNING: **Never remove the Load Line cap unless the pump is turning in the forward direction and the vent valve is open. Hot asphalt in the load line is under pressure and could spray the operator. Check the direction by opening the vent valve.**

11. After removing the Load Line cap, close the vent. Connect the loading hose. Be sure the over center latches lock the coupler in place.

12. Using the Rear Controller (Figure 3-18), run the asphalt pump in FORWARD at 50 - 150 GPM.

13. Fill until the tank is 80% to 90% full.

14. When the tank is filled, slow the pump speed so that it just provides suction to the line. (50 - 75 GPM)

15. Close the valve at the storage or transfer tank to stop the flow.

16. Open the small vent on the top left of the Load Line to allow the pump to draw material out of the load line.

CAUTION: **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

17. Disconnect the loading hose, replace the cap, secure latches, close the small vent valve and stow the loading hose.

18. Set the EZ-3S Controller Pump Control switch to FRONT.

19. Set the EZ-3S Controller Mode Selection switch to TANK CRCLT.

Top Tank Loading

1. Before starting this procedure, review and follow the **Pre-Operating Check List** earlier in this section.

2. Be sure the unit is sitting on a level area.

DANGER: **Do not put your head in the tank. Serious injury or death could result from breathing poisonous fumes.**

3. With a flash light, look into the tank from the top and check that there is no water or condensation in the bottom of the tank. If there is, drain the tank to an approved container before loading. Dispose of material and water according to local, state and federal regulations.

WARNING: **Fumes from asphalt materials can be poisonous. When using the top opening, the operator should stand up-wind and to one side to avoid hot gases, fumes or being struck by a cover or hot asphalt spray.**

DANGER: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

DANGER: **Hot material will turn water into steam and can cause an explosion.**

DANGER: **Check that the material being loaded is compatible with the previously used asphalt. (See Table 3-2.) Some asphalt material can be vaporized by high temperature materials and can explode. If material is not compatible, clean out the tank.**

4. Move the Maximizer3 to the storage tank or transfer vehicle.

DANGER: **Never operate burner equipment when the vehicle is being loaded or in transit. The flue tubes can become exposed, causing an explosion inside the tank, or material being sprayed could ignite.**

CAUTION: **Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

5. Carry the loading hose to the top of the tank and open the Top Opening cover.

6. Clean the strainer in the Top Opening cover before loading.

7. Lay the end of the hose in the strainer and start the pump on the storage tank or transfer vehicle to load the tank. Be sure that the hose stays in the Top Opening. It may be necessary to hold it or tie it to the lid hinges or platform to keep it in place.

8. Fill until the tank is 80% to 90% full.

9. Reverse the storage tank pump to draw the excess material out of the loading hose.

10. Remove the hose from the Top Opening and close the cover.

CAUTION: **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

11. Remove the hose from the storage tank and stow as appropriate.

12. Set the EZ-3S Controller Auto/Manual switch to MANUAL, the Pump Control switch to FRONT and the Mode Selection switch to TANK CRCLT.

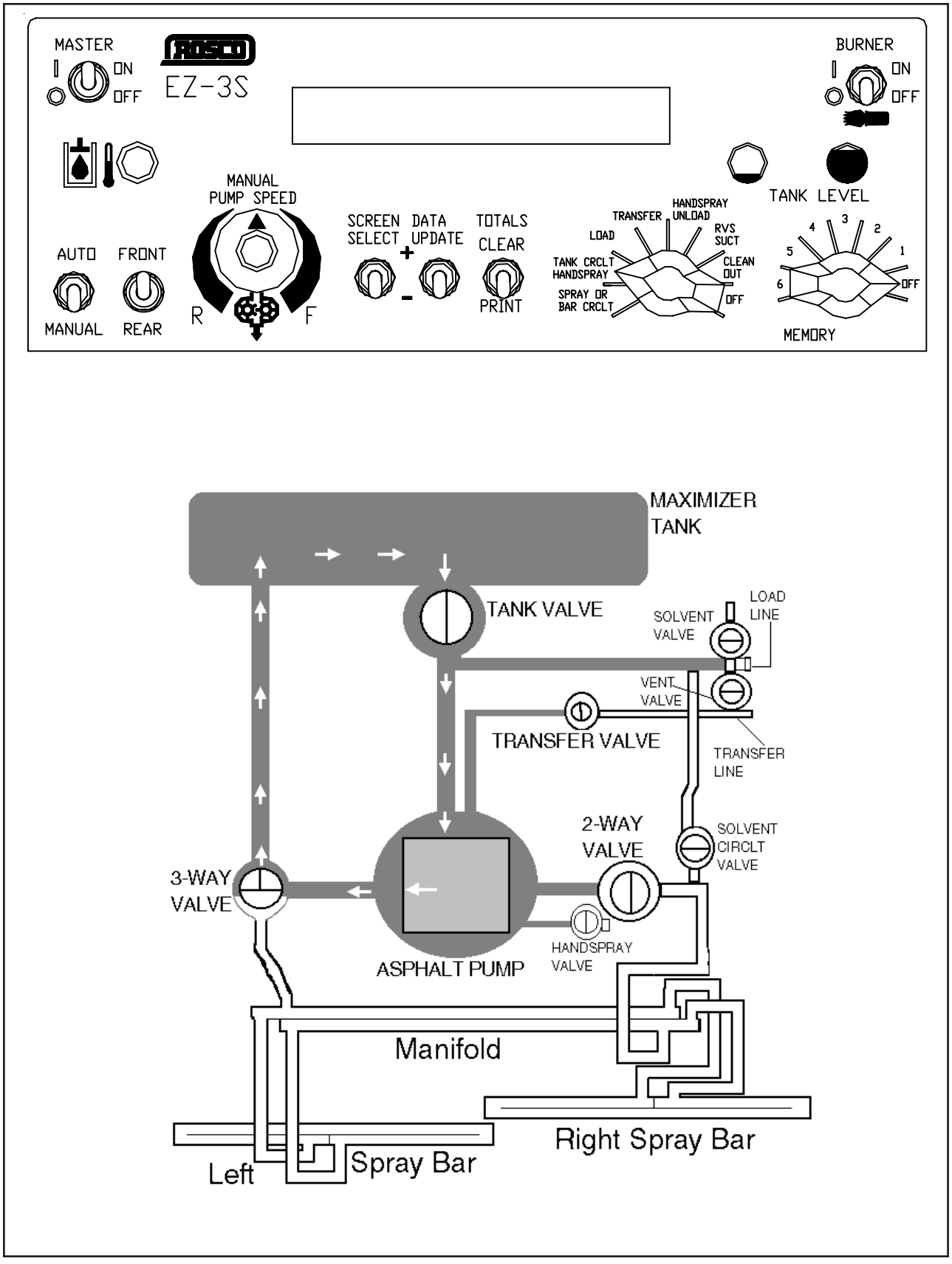

FIGURE 3-20. TANK CIRCULATE MODE

TANK CIRCULATE MODE
(See Figure 3-20)

When heating and transporting material, run the Maximizer3 in TANK CRCLT in order to mix and distribute the material in the tank and to minimize the loss of heat from the plumbing.

DANGER:  **Never operate burner equipment when the vehicle is being loaded or in transit. The flue tubes can become exposed, causing an explosion inside the tank, or material being sprayed could ignite.**

1. Set the EZ-3S Controller Auto/Manual switch to MANUAL.

2. Set the EZ-3S Controller Pump Control switch to FRONT.

3. Set the EZ-3S Controller Mode Selection switch to TANK CRCLT.

4. Turn the Manual Pump Speed dial in the FORWARD direction and run the pump at 50 - 75 GPM to circulate the asphalt.

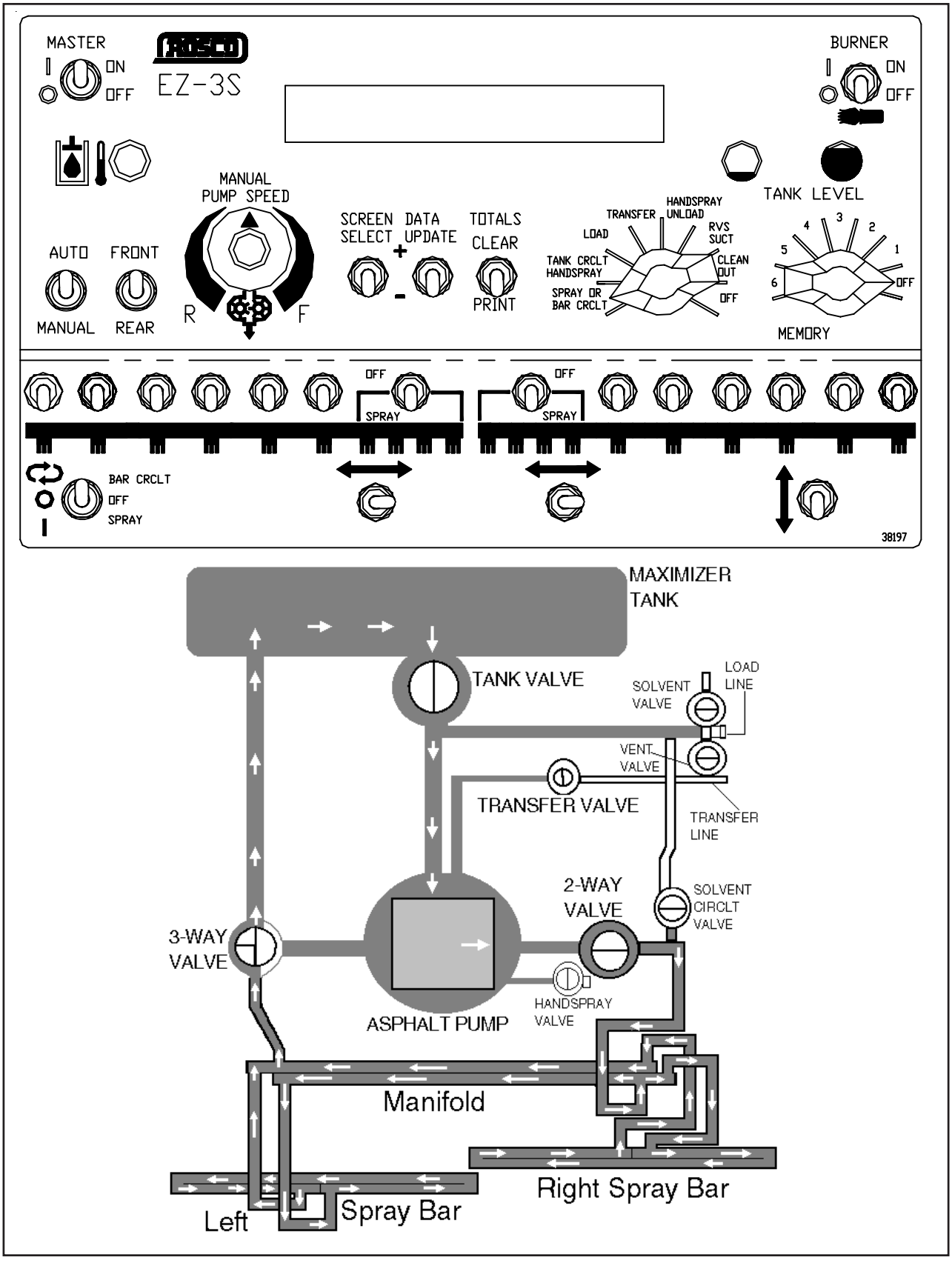

FIGURE 3-21. SPRAY/BAR CIRCULATE MODE

SPRAY / BAR CIRCULATE MODE
(See Figure 3-21)

This mode circulates the hot asphalt through the spraybar and is used to heat the spraybar and nozzles prior to spraying. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

1. Be sure that the material temperature is high enough to prevent setting up in the pump, plumbing and spraybar. Heat it before starting if it is at the low end of the operating range. (See **Material Considerations** and **Burner and Torch Operation** earlier in this section.)

2. Set the EZ-3S Controller Auto/Manual switch to AUTO and the Pump Control switch to FRONT. The Controller will then control the circulation rate. (This rate was set at the factory to 30 GPM.)

3. Turn the Mode Selection switch to the SPRAY/ BAR CRCLT mode.

WARNING: **Do not open spray nozzles. Asphalt spray will occur. Contact with hot asphalt can cause severe burns.**

CAUTION: **Beware of hot material in lines. Wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

4. Push the Spraybar Master switch UP to the BAR CRCLT position.

5. Before starting to spray, run for at least 5 minutes at 30 GPM for emulsion, or 75 - 100 GPM for cutbacks, to be sure that the spraybar, nozzles and other components have warmed up.

6. The unit is ready to spray.

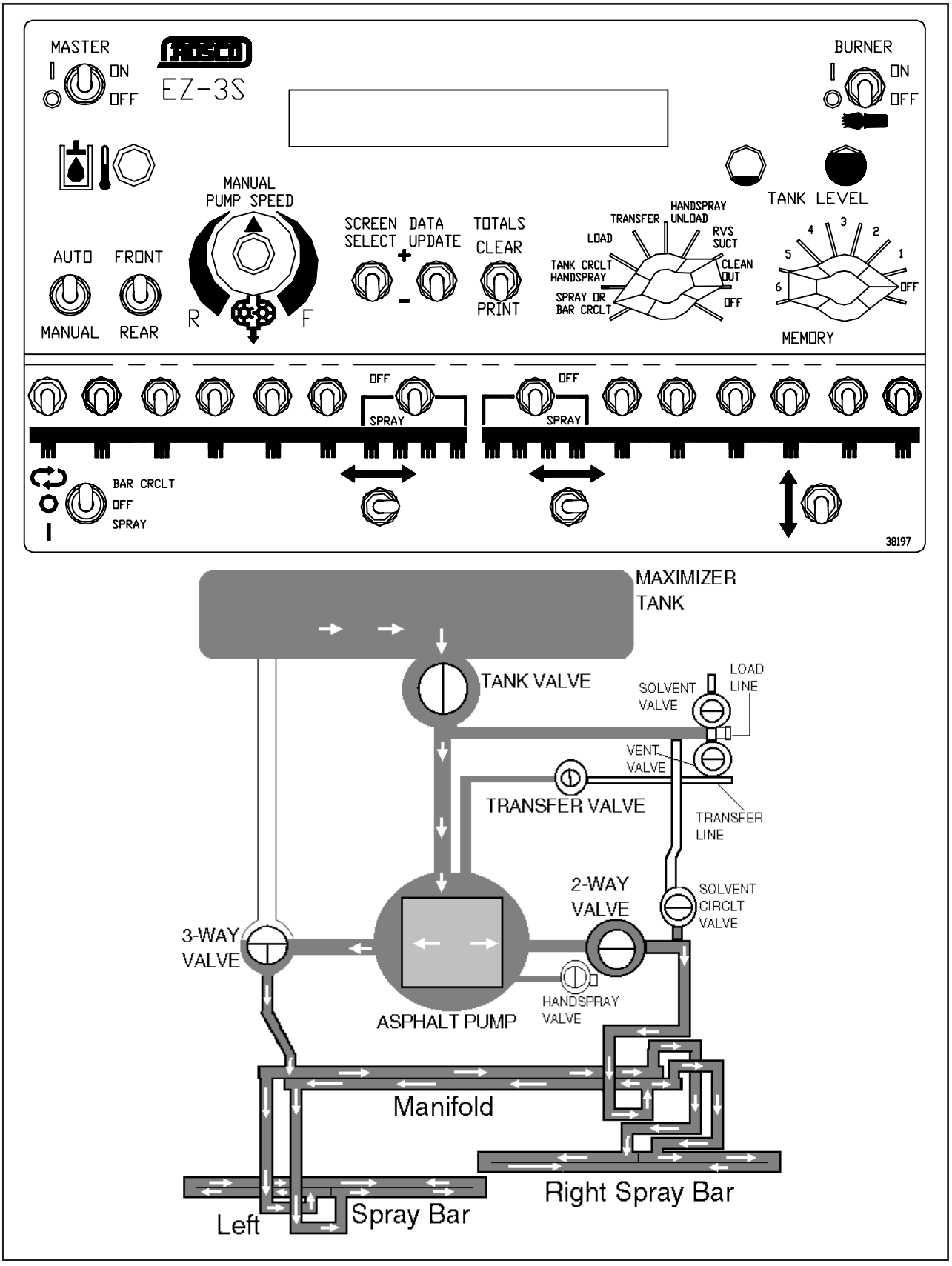

FIGURE 3-22. SPRAY MODE

SPRAY MODE
(See Figure 3-22)

This section explains the procedure to be followed when spraying asphalt. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

1. Set the EZ-3S Controller Auto/Manual switch to AUTO and the Pump Control switch to FRONT. The Controller will then control the spraybar circulate rate.

2. Turn the Mode Selection switch to SPRAY/BAR CRCLT position.

3. Push the Spraybar Master switch UP to the BAR CRCLT position.

4. Be sure that the EZ-3S Controller has been programmed to deliver the specified amount of asphalt. Turn on individual spraybar switches on the Controller panel for the spraybar sections to be used. (See **EZ-3S Controller** earlier in this section.)

5. Run the Maximizer3 in SPRAY/BAR CRCLT mode for at least 5 minutes to heat the spraybar components to operating temperature.

6. Check the temperature of the material in the tank. Heat the material before starting if it is at the low end of the operating range. (See **Material Considerations** and **Burner and Torch Operation** earlier in this section.)

7. Position the spraybar and wing extensions into their operating configuration.

8. Set the height of the spraybar to obtain triple fan coverage using the chains to fix the down position. If the day is very windy, use slightly less than triple coverage to avoid wind drift of the asphalt. (See **Asphalt Spraybar** earlier in this section for information on setting the spraybar height.)

9. Clear the area of bystanders.

WARNING: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

CAUTION: **Beware of hot material in lines. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

10. Align the truck with the area to be sprayed. Position the truck so the rear wheels are even with the stop point of the last shot. Do not let the rear wheels get into the fresh oil from the last shot.

11. Proceed toward the area to be sprayed. As the spraybar crosses the starting point, push the Spraybar Master switch DOWN to the ON position. The valves for each nozzle will be opened and the spraying will begin.

12. When the spraying run is finished, push the Spraybar Master switch UP to BAR CRCLT. The nozzle valves will close and the spraying will stop.

13. Leave the Mode Selection switch in SPRAY/BAR CRCLT if you want to keep the spraybar components hot, or refer to the **Reverse Suction Mode** for instructions on how to draw excess asphalt out of the spraybar and piping.

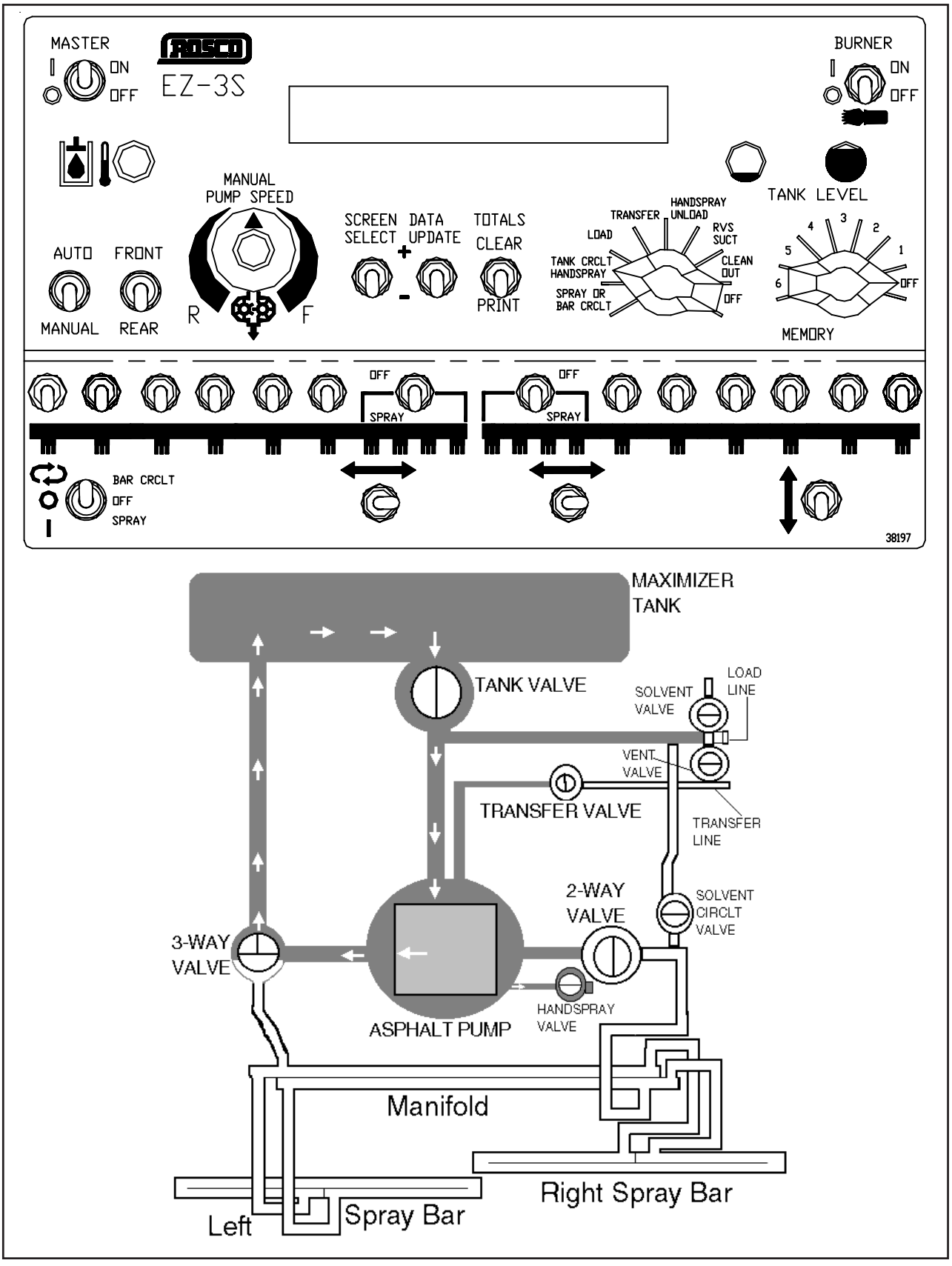

FIGURE 3-23. HANDSPRAY MODE (TANK CIRCULATE)

HANDSPRAY MODE (TANK CIRCULATE)
(See Figure 3-23)

This section explains the procedure to be followed when hand spraying asphalt. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

1. Set the EZ-3S Controller Auto/Manual switch to MANUAL.

2. Set the EZ-3S Controller Pump Control to REAR.

3. Push the Spraybar Master switch UP to the BAR CRCLT position.

WARNING: **DO NOT SMOKE around the machine. Fuel, asphalt material and their fumes can explode when exposed to flame or heat from smoking or other sources.**

CAUTION: **Contact with hot asphalt can cause severe burns. Always wear protective clothing, gloves and a face shield.**

4. Turn the Mode Selection switch to one of three modes to handspray: TANK CRCLT/ HANDSPRAY (Figure 3-23), HANDSPRAY/ UNLOAD (Figure 3-26), or SPRAY/BAR CRCLT (Figure 3-27). When the operator uses the TANK CRCLT mode to handspray, no asphalt will reach the spraybar while the handspray operation is being used. This is the accepted mode.

5. Open the Handspray Valve (Figure 3-24).

6. Remove the spray wand and hose from its storage position.

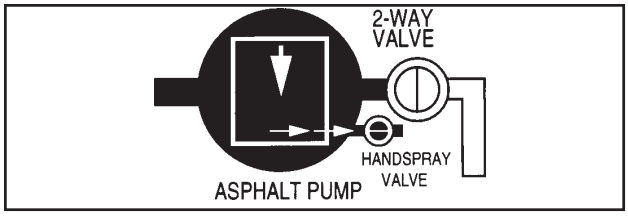

FIGURE 3-24. HANDSPRAY VALVE

7. Hold the spray wand **firmly** by the hand grips (Figure 3-25). The grips will remain cool while the hot asphalt flows through the wand.

8. Be sure that the area is free of bystanders to prevent possible injury from spray or splatter.

9. Be sure that you have a **firm grip** on the wand. Open the combination Grip & Spray Valve on the wand. Adjust pump speed to desired pressure.

10. Direct the wand to the spraying area. Use long sweeping arcs with the wand to evenly distribute the asphalt.

11. When spraying is complete, use the Rear Controller to reverse the pump and draw the excess asphalt from the spray wand and its hose. Then draw some cleanout solution into the hose to help prevent any material from setting up in the hose during storage.

12. Close the Handspray Valve and the Grip & Spray Valve. Place the wand back in its storage position.

13. Set the EZ-3S Controller Mode Selection switch to TANK CRCLT (Tank Circulate.)

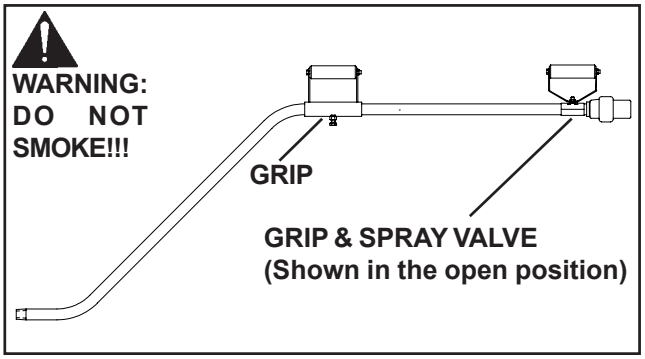

FIGURE 3-25. HANDSPRAY WAND

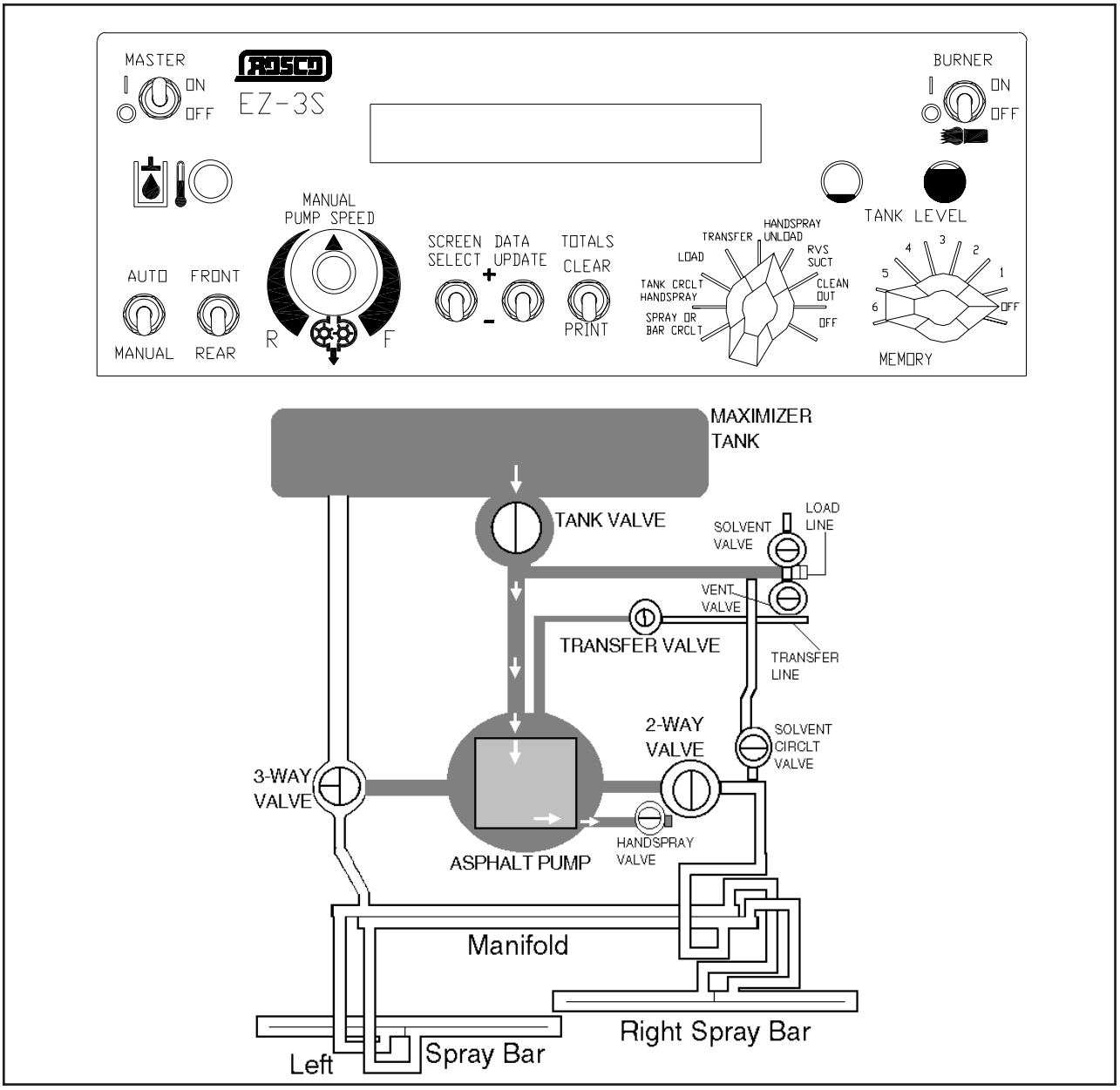

FIGURE 3-26. HANDSPRAY MODE (UNLOAD)

HANDSPRAY MODE (UNLOAD)
(See Figure 3-26)

The operator may choose to use the HANDSPRAY/ UNLOAD mode which allows the use of higher pressure. However, if the level of material in the tank is above the return line, this mode may allow material to return to the spraybar.

CAUTION: **This mode significantly increases the pump pressure since the 2-Way and 3-Way valves are closed. Be sure to maintain a firm grip on the handspray wand.**

NOTE: **All material that is being pumped will be sprayed, so running the pump at a slower GPM than in Tank Circulate Mode will still deliver higher pressure.**

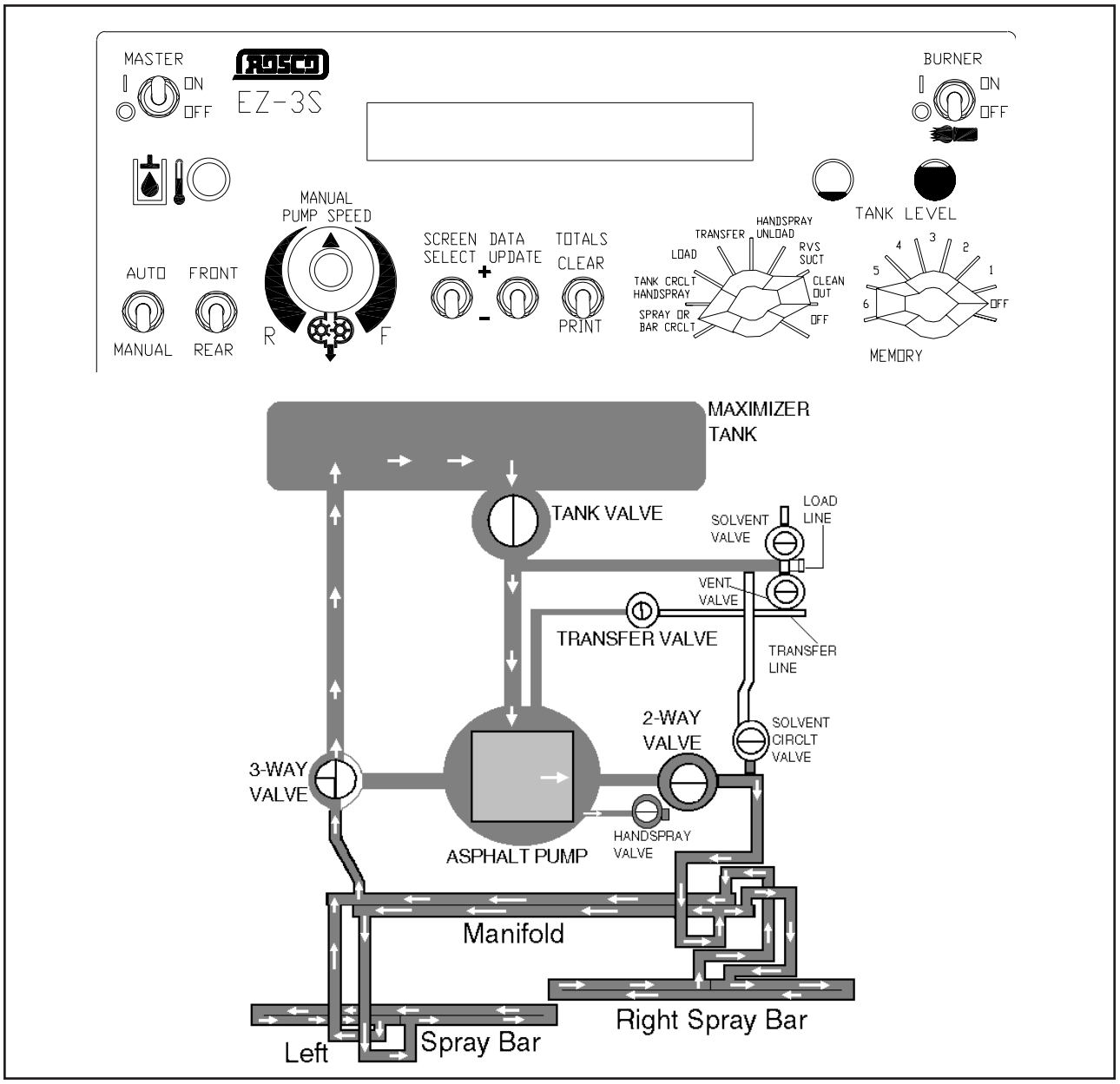

FIGURE 3-27. HANDSPRAY (SPRAY OR BAR CIRCULATE)

HANDSPRAY MODE (SPRAY OR BAR CRCLT) (See Figure 3-27)

Some operators have found that using the SPRAY/BAR CRCLT mode (Figure 3-27) allows better control of the handspray wand. SPRAY/BAR CRCLT mode will also eliminate any setup of material that is still in the spraybar.

NOTE: This mode significantly <u>reduces</u> the pump pressure since the 2-Way and 3-Way valves are open. The operator may have to increase the GPM 25 to 50 gallons to get sufficient pressure to the wand.

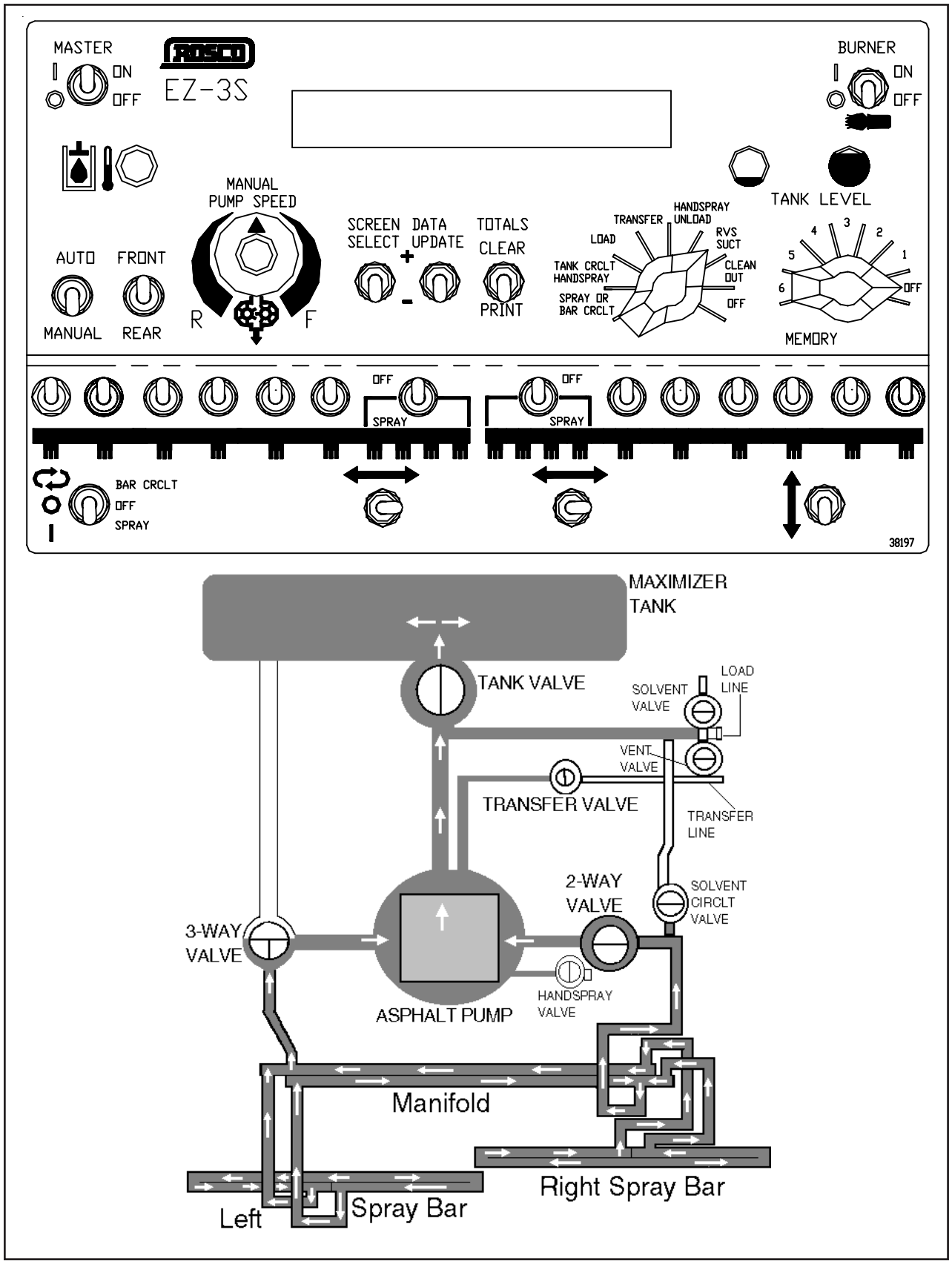

FIGURE 3-28. REVERSE SUCTION MODE

REVERSE SUCTION MODE
(See Figure 3-28)

When spraying is complete, and before starting the cleanout process, use the following instructions to remove asphalt from the spraybar and plumbing circuit. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

ATTENTION: If the operator fails to perform this function at the end of the day, the asphalt will set up over night and the Maximizer3 will not be able to spray the next time that it is used.

1. Set the EZ-3S Controller Auto/Manual switch to MANUAL.

2. Turn the Controller Spraybar Master switch to the OFF position.

3. Position the Spraybar so that it is parallel to the ground.

4. Turn the Controller Mode Selection switch to RVS SUCT (Reverse Suction).

5. Turn the Controller Pump Control to the FRONT position.

6. Turn all of the EZ-3S Controller individual spraybar switches OFF.

7. Turn the Controller Spraybar Master switch to the ON position.

8. Run the Manual Pump Speed control in REVERSE at 100 to 125 GPM.

9. Using the EZ-3S Controller individual spraybar switches, turn on the one-foot section farthest from the spraybar feed lines (right or left) for 2 seconds and then turn off. Do the same for the adjoining one-foot section and then the next, always working toward the spraybar feed lines.

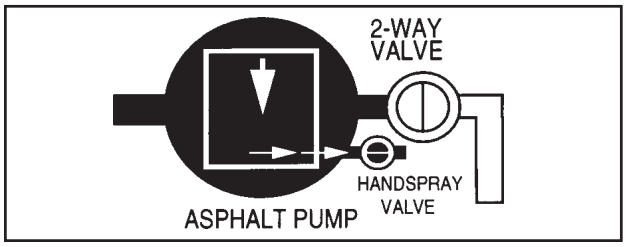

FIGURE 3-29. HANDSPRAY VALVE

ATTENTION: If the handspray wand was used, open the Handspray Valve (Figure 3-29) on the pump and leave it open for 30 to 60 seconds. Close the Handspray Valve, stow the wand and hose. It may be necessary to draw some cleanout material into the hand spray hose to remove any oil in the hose and spray nozzle.

WARNING: Beware of hot material in lines. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.

10. Turn the EZ-3S Controller Spraybar Master switch OFF and **without** turning off the pump or switching the pump to the forward position, turn the Mode Selection switch to CLEANOUT.

ATTENTION: If you switch the rotation of the pump or shut it off before you change the Mode Selection switch, all of the material removed from the spraybar with suction will gravity-feed back into the spraybar.

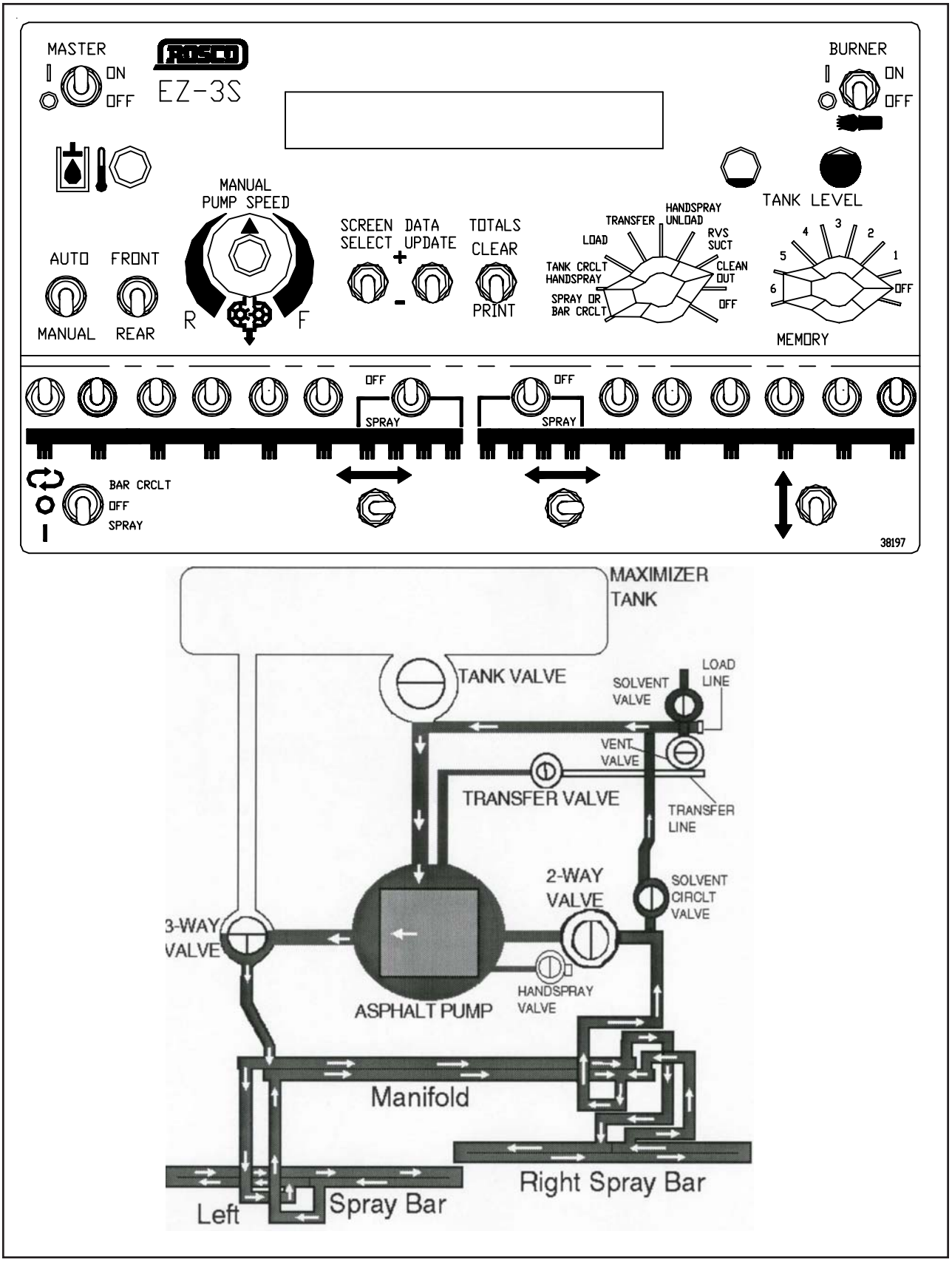

FIGURE 3-30. CLEANOUT MODE

CLEANOUT MODE
(See Figure 3-30)

When spraying is complete, **and Reverse Suction mode has been completed,** follow these instructions to flush and wash out the spraybar and plumbing circuit. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

ATTENTION: If the operator fails to perform this function at the end of the day the asphalt may set up over night and the Maximizer3 will not be able to spray the next time that it is used.

WARNING: Always use the Reverse Suction mode to remove excess asphalt from the system prior to going to Cleanout mode.

ATTENTION: DO NOT use any citrus solvent (Terpene Hydrocarbon or equivalent) to clean out the spraybar. It destroys the Viton seals.

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.

1. Check the level of solution in the solvent tank.
2. Set the EZ-3S Controller Auto/Manual switch to MANUAL.
3. Set the Spraybar Master switch to the OFF position.
4. Turn OFF all EZ-3S individual spraybar switches.

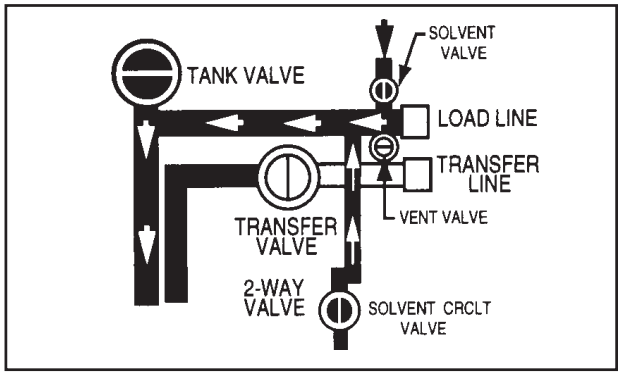

FIGURE 3-31. CLEANOUT VALVES

5. Set the Mode Selection switch to CLEANOUT.
6. Turn the Pump Control to the REAR position.
7. Go to the rear of the unit and run the Rear Pump Speed Control in the FORWARD position at approximately 100 GPM.
8. Open the Solvent Valve on the Load Line. (Figure 3-31) This valve and line connect to the solvent tank or the diesel burner fuel tank.
9. Place a container under the far left 1-foot spraybar valves. Open the spray valves and watch for solvent to appear. Close the valves.
10. Place a container under the far right 1-foot spraybar valves. Open the spray valves and watch for solvent to appear. Close the valves.
11. Close the Solvent Valve on the Load Line and open the Solvent Circulate Valve. (Figure 3-31) Run for 2 to 5 minutes to circulate solvent through the system.

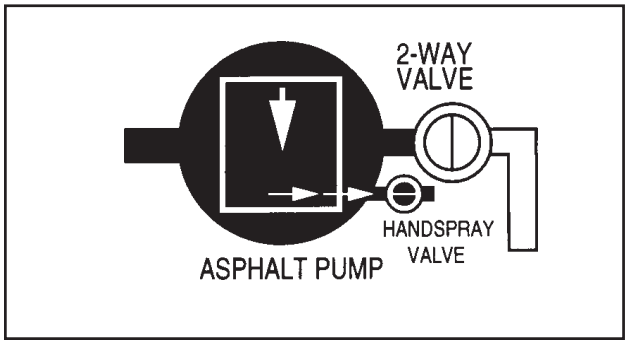

FIGURE 3-32. HANDSPRAY VALVE

NOTE: If the HANDSPRAY WAND was used, open the Handspray Valve (Figure 3-32) on the pump. Place a five gallon bucket under the wand to catch solvent. Be sure not to contaminate the environment. Open and close the combination Grip & Spray Valve handle until a small amount of solvent comes out of the wand. The on/off action will allow the air to come out of the hose and liquefy the asphalt in the wand to keep it from setting up. Close the Handspray Valve. Cover bucket with a snap on lid to contain cleaning material. Be sure to dispose of cleaning material according to local, state and federal regulations.

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.

CAUTION: Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.

12. Turn the EZ-3S Rear Pump Speed Control counterclockwise to the center position to stop the pump.

13. Close the Solvent Circulate Valve.

14. Leave the machine in the OFF mode when it will not be used for a period of time, such as overnight or when in storage.

Removing Solvent From The System

ATTENTION: Always drain solvent from the system before loading additional asphalt and before changing the mode of operation. Failure to do so could damage the system.

1. Set the EZ-3S Controller Pump Control to REAR, set the Controller Mode Selection switch to CLEANOUT and run the pump at approximately 100 GPM.

2. To remove solvent from the system open the Vent Valve at the Load Line (Figure 3-31).

3. Place a five gallon bucket under the far right side spraybar valves. Open the valves and pump the solvent into the container.

4. Close the spraybar valves and stop pump. Cover bucket with a snap on lid and dispose of cleanout material according to local, state and federal regulations.

WARNING: All solvent tank and vent valves must be closed for ALL OTHER FUNCTIONS.

5. If your machine is equipped with the optional EnviroFlush system, the larger valve in the line can be opened to allow for recycling previously used solvent (Figure 3-33).

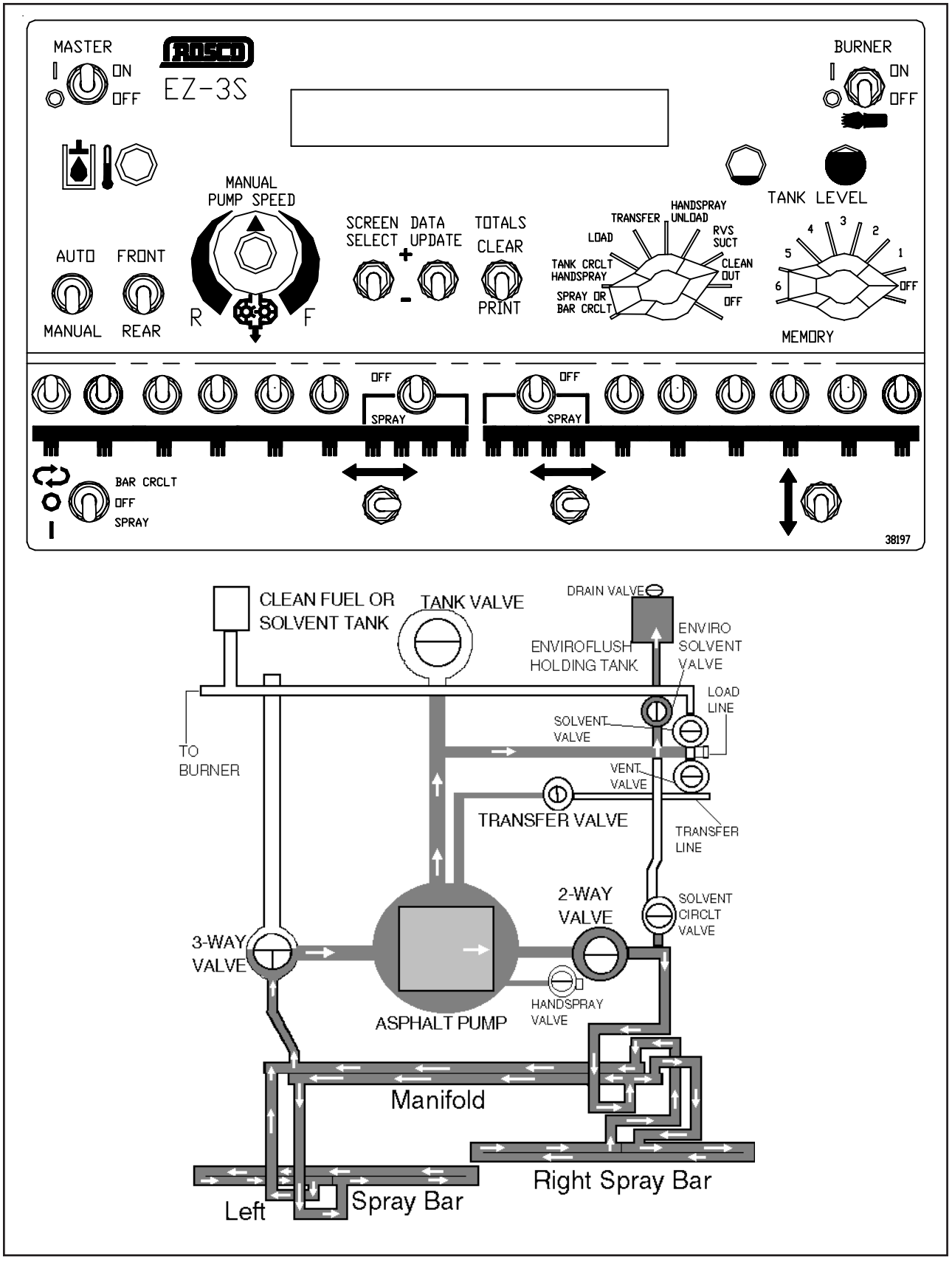

FIGURE 3-33. CLEANOUT MODE (ENVIROFLUSH SYSTEM)

CLEANOUT MODE (ENVIROFLUSH)
(See Figure 3-33)

Follow this procedure when flushing the spraybar and plumbing circuit using the optional Enviroflush System. See **Cleanout mode** and Figure 3-32 earlier in this section.

ATTENTION: DO NOT use any citrus solvent (Terpene Hydrocarbon or equivalent) to clean out the spraybar. It destroys the Viton seals.

1. To remove solvent from the system, run the pump in REVERSE at 100 GPM.

2. Open Enviro Solvent valve, close the Solvent Circulate valve and manually open Spraybar valves at the ends of the spraybar.

3. Run the pump for 1 to 2 minutes or until solvent is removed from the system.

4. Close Enviro Solvent valve and Spraybar valves and stop the pump.

5. Drain Enviroflush tank as necessary and dispose of solvent in accordance with local, state and federal regulations.

ATTENTION: Depending on the type of asphalt materials being used, the solvent in the Enviroflush tank can be used multiple times to clean the spraybar and pumping circuit. However, if the solvent is used too many times, the concentration of asphalt material in the tank may become so high that it will set up. This makes the tank unusable and the material is difficult to remove. The same problem will occur if the spraybar is full of asphalt and this asphalt is pumped into the Enviroflush tank.

To prevent the material from setting up in the tank, monitor the solvent in the tank by removing the fill cap and checking the fluid in the tank with a flashlight. Remove and replace the solvent before it becomes too thick to remove. This will require a container of at least 25 gallons.

Avoid contaminating the environment while draining the solvent. Dispose of material according to local, state and federal regulations. If the material becomes set, heat the Enviroflush tank with steam until the material becomes fluid enough to drain.

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.

CAUTION: Beware of hot material in lines. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.

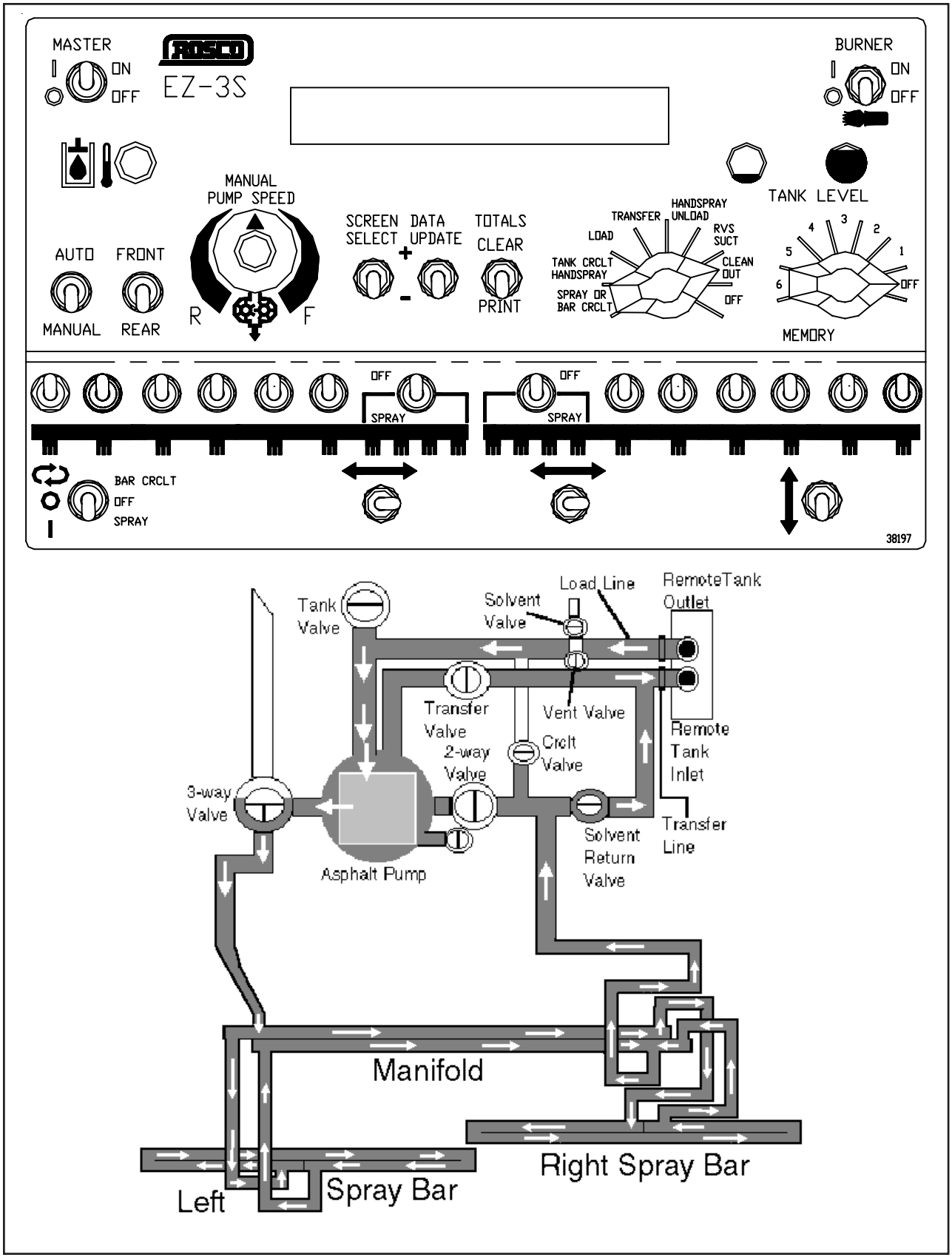

FIGURE 3-34. CLEANOUT MODE (REMOTE SOLVENT TANK)

CLEANOUT MODE (REMOTE SOLVENT TANK)

Refer to Figure 3-34 and follow this procedure for flushing the spraybar and plumbing circuit using the optional Remote Solvent Tank. Use this system when spraying thick substances such as rubberized asphalt.

WARNING:  **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

CAUTION:  **This procedure must be performed by properly trained and qualified personnel. Always wear protective clothing, gloves and face shields.**

1. **Immediately** after completing Reverse Suction procedure, turn the Mode Selection switch to CLEANOUT and then **stop the pump**. Turn the Controller Pump Control to REAR position.

ATTENTION:  **Do not run the pump in the FORWARD direction while in Reverse Suction mode. Doing so could cause material to be sucked back into the system.**

2. From the truck cab, open and close 1 foot of the left side spraybar. Then open the Load Line vent valve at the rear of the machine.

3. Make sure the hatch on the Remote Tank is open to prevent pressure build-up in the tank. Be sure the temperature of the solvent does not exceed 150˚ F (65.5° C).

4. With Transfer Line valve shut off and the Solvent Return valve closed, remove the cap on the transfer line and securely attach the hose from the inlet port on the Remote Tank to the Transfer Line connection.

CAUTION:  **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

5. Open the Solvent Return valve leaving the Transfer Valve closed.

6. With the Load Line vent valve open, start the pump turning in the FORWARD direction at approximately 50 GPM. Unlatch the Load Line cap and attach the hose that is connected to the outlet of the Remote Tank. Secure latches and close the vent valve.

7. After all hoses are secure, turn Rear Pump Control in the FORWARD direction to circulate solvent from the Remote Tank through the piping and spraybar. Run the pump for 3 to 5 minutes at approximately 150 GPM to clean the system.

8. After circulating, slow the pump to less than 50 GPM, open the Load Line vent valve and carefully unhook the Load Line hose from the cleanout tank. Lift the load hose if necessary, to drain any remaining solvent from the hose into the Distributor.

CAUTION:  **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

9. Unhook the Load Line hose from the Distributor and secure the Load Line cap.

10. With the Load Line vent valve open, run the pump at approximately 150 GPM to pump the rest of the solvent back to the Remote Tank.

11. Turn off pump and close the Transfer Valve.

12. Unhook the hose connected to the Transfer Line. Lift the hose to drain any remaining solvent in the hose into the Remote Tank using caution to avoid spilling hot solvent.

CAUTION:  **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

13. Close the Solvent Return valve and replace the Transfer Line cap.

14. Close the Load Line vent valve and make sure that all connections are secure. Cleanout is complete.

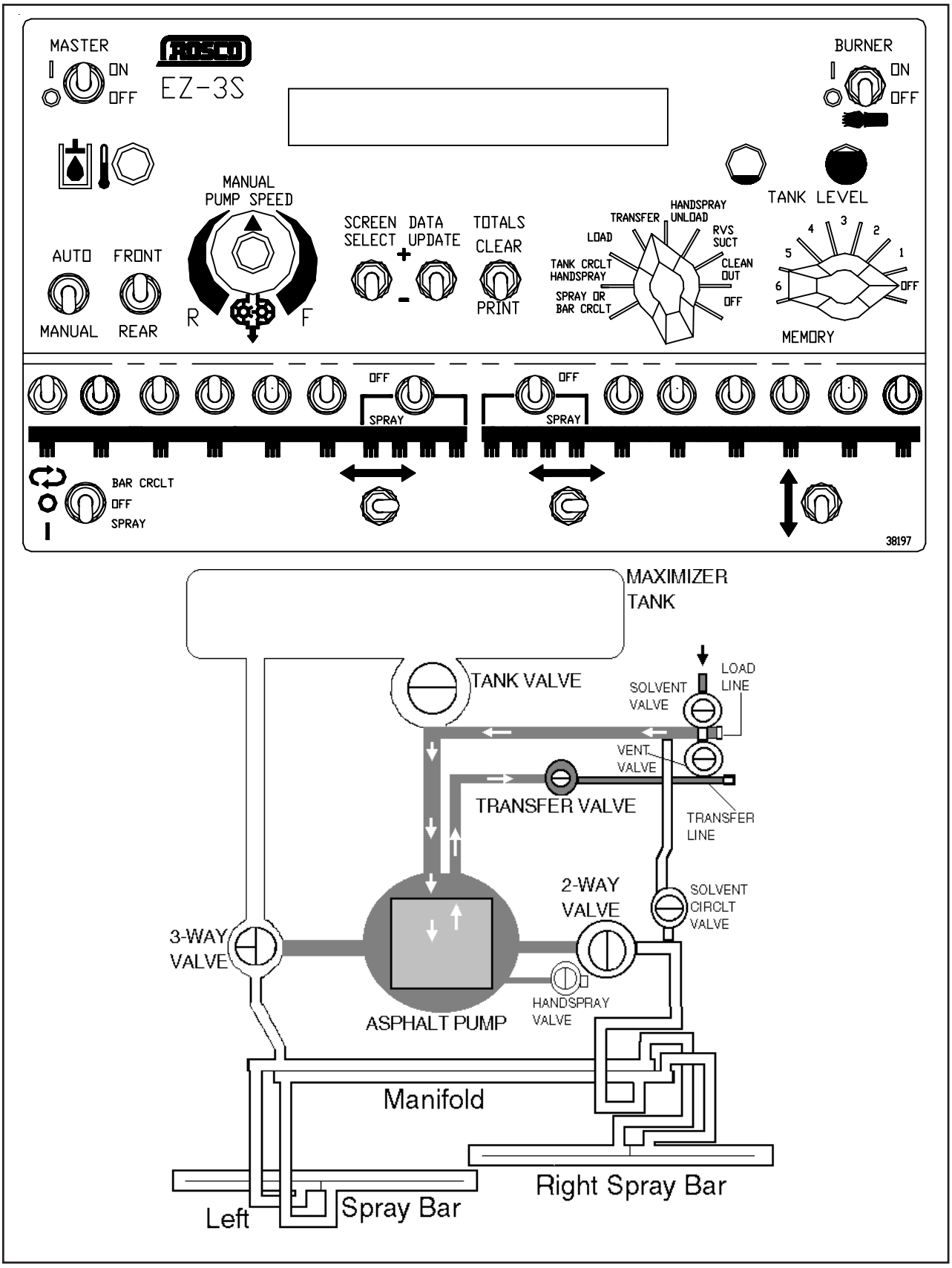

FIGURE 3-35. TRANSFER MODE

TRANSFER MODE
(See Figure 3-35)

When the Maximizer3 is used to transfer asphalt from one tank to another, follow these procedures. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

DANGER: **Be sure that the material in both tanks is compatible. If material is not compatible or you are not sure, do not transfer! See Material Considerations, earlier in this section, for guidelines.**

1. Check the temperature of the material in the external tanks. Be sure that it is hot enough to be transferred without setting up in the transfer lines or the pump. If the temperature is marginal or the material is starting to set up, heat the material before starting.

WARNING: **Heat material before moving the unit next to storage tanks. Some asphalt materials emit flammable vapors that can be ignited by the burner flame and cause an explosion.**

2. Move the Maximizer3 next to the tanks.

3. Set the EZ-3S Controller Auto/Manual to MANUAL.

4. Turn the Spraybar Master switch to OFF.

5. Set the Controller Mode Selection switch to TRANSFER.

6. Open vent valve to relieve pressure. Run the pump in FORWARD at 40 - 50 GPM before removing the Load Line cap.

7. Remove Load Line cap and Transfer Line cap. Attach loading hoses between the Maximizer3 and the external tank. Use the over-center clamps to secure the couplers. Be sure to connect the hoses so that material is drawn in through the Load Line and sent out through the Transfer Line. (See Figure 3-36.)

WARNING: **Never remove the Load Line cap unless the pump is turning in the Forward position and the vent valve is open. Hot asphalt in the Load Line is under pressure and could spray the operator if proper procedure is not followed.**

CAUTION: **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

8. Open the external tank valves.

9. Open the Maximizer Transfer Valve.

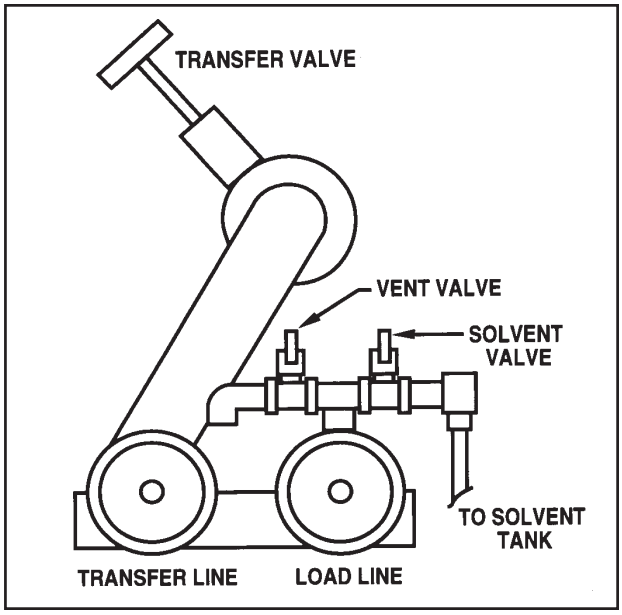

FIGURE 3-36. TRANSFER LINE & LOAD LINE

WARNING: **Do not open the Transfer Valve until transfer line is in place. Failure to follow this procedure could result in serious burns to the operator from hot asphalt in the lines. The Transfer Valve must be opened and closed manually.**

CAUTION: **Contact with hot asphalt can cause severe burns. Always wear protective clothing, gloves and a face shield.**

10. Turn the Pump Control to REAR. (If the Front Controller is used, set the Pump Control switch to FRONT and run the pump in the FORWARD direction.)

11. Run the Controller Pump Speed at 50 - 150 RPM.

12. When the transfer is completed, close the valve at the external tank.

13. Run the pump slowly to clean all the material out of the system.

14. Open the vent valve at the left of the Maximizer3 Load Line.

15. When the lines are cleaned out, close the valve on the Maximizer3 tank. To release pressure in the system, open the vent valve.

CAUTION: **Use extreme caution when removing the lines. The transfer line may still have some pressure in it.**

16. Remove the loading lines and place in their storage locations.

CAUTION: **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

17. Install and secure the Transfer Line and Load Line caps. Then stop the pump.

18. Set the EZ-3S Controller Mode Selection switch to CLEANOUT and follow instructions for **Cleanout Mode** earlier in this section.

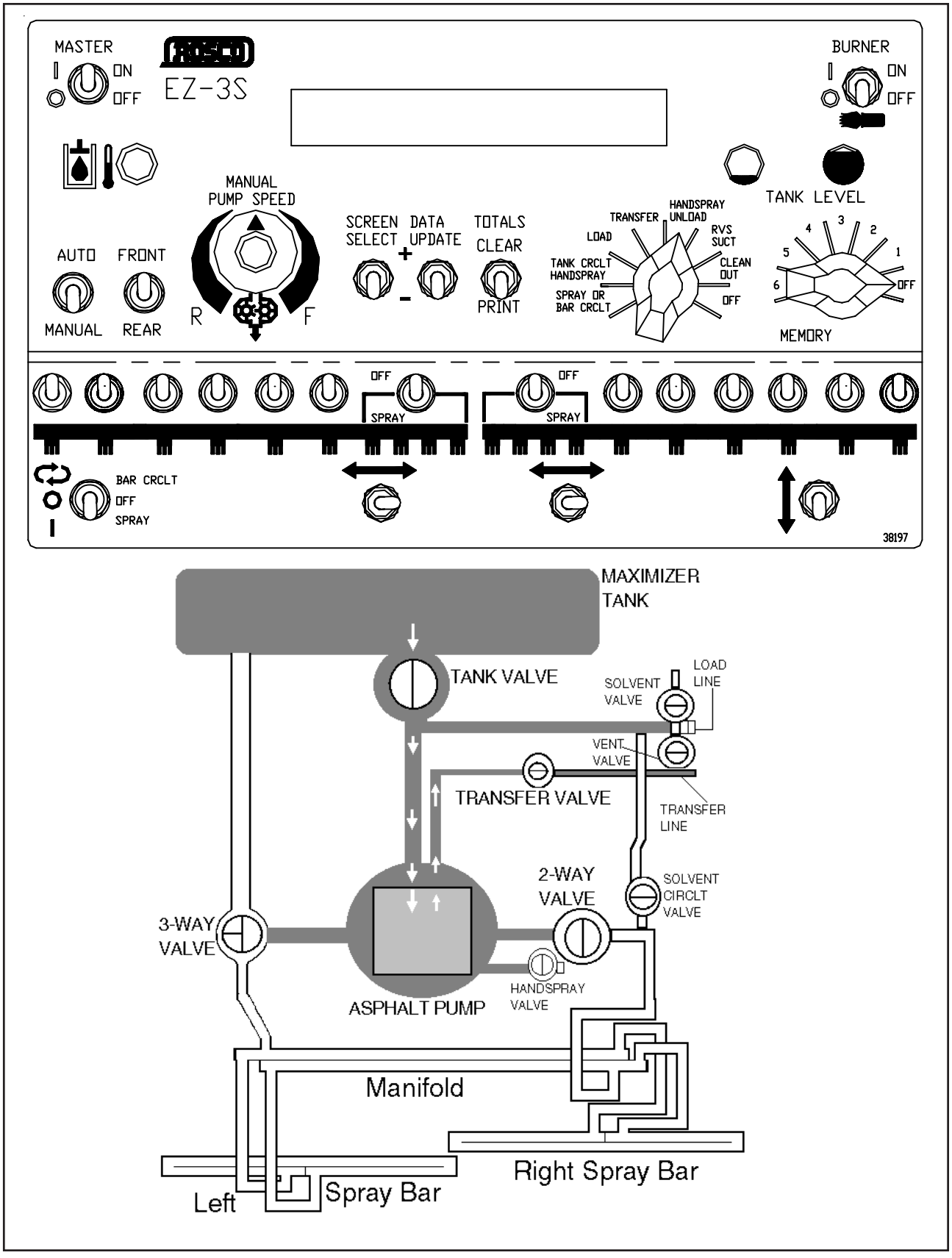

FIGURE 3-37. UNLOADING MODE

UNLOADING MODE
(See Figure 3-37

Follow these procedures when unloading excess asphalt from the Maximizer3. Review these instructions and follow them to insure the safety of the operator and to maintain a safe working environment.

DANGER: **Be sure that the material in both tanks is compatible. If material is not compatible or if you are not sure, do not transfer! See Material Considerations, earlier in this section, for guidelines.**

1. Check the temperature of the material in the tank. Be sure that it is hot enough to be transferred without setting up in the transfer lines or the pump. See **Material Considerations** earlier in this section for guidelines.

NOTE: **If the temperature is marginal or material is starting to set up, fill the tank with fresh, hot material to heat it. Turn the Mode Selection switch to TANK CRCLT for 5 minutes to mix and heat the remainder before unloading.**

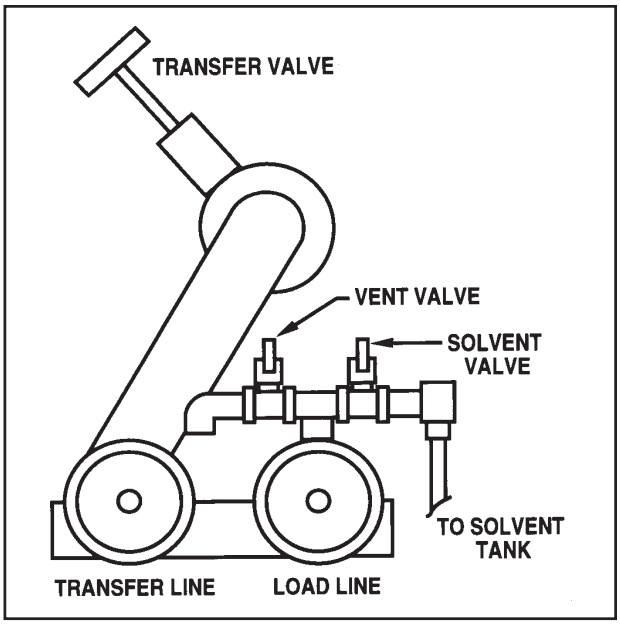

FIGURE 3-38. TRANSFER LINE & LOAD LINE

WARNING: **Heat material before moving the unit next to storage tanks. Some asphalt materials emit flammable vapors that can be ignited by the burner flame and cause an explosion.**

2. Move the Maximizer3 to the unloading site.

ATTENTION: **It may be necessary to operate the burners to heat the tank prior to unloading. In this case, be sure that the fire tubes are covered with at least 8 inches of material. (See Burner and Torch Operation earlier in this section.)**

DANGER: **Do not operate burner equipment when the vehicle is being loaded or unloaded. The flue tubes could be exposed causing an explosion inside the tank, or the material could ignite, causing a fire.**

WARNING: **Do not open the Transfer Valve until transfer line is in place. Failure to follow this procedure could result in serious burns to the operator from hot asphalt in the lines. The Transfer Valve must be opened and closed manually.**

WARNING: **Check the storage tank for condensation. If necessary drain the storage tank before unloading the Maximizer3.**

3. Check the Transfer Valve and be sure that it is closed (Figure 3-38).

4. Remove the Transfer Line cap.

5. Connect the loading hose to the Transfer Line coupler and to the storage tank coupler. Use the over-center latches to secure couplers.

6. Open the valve on the storage tank and the Transfer Valve.

7. Set the EZ-3S Controller Mode Selection switch to the HANDSPRAY/UNLOAD mode.

8. Put the Pump Control switch to FRONT. (If the Rear Controller is used, set the switch to REAR and run the pump in the FORWARD direction.)

9. Run the Manual Pump Speed control in the FORWARD direction at 50 - 150 GPM.

10. When the tank is empty, immediately close the valve on the storage tank and stop the pump. Open the vent valve to relieve pressure in the line.

11. Reverse pump for 10 seconds to be sure all pressure is released. Close Transfer Valve.

WARNING:  **Do not open the Transfer Valve until transfer line is in place. Failure to follow this procedure could result in serious burns to the operator from hot asphalt in the lines. The Transfer Valve must be opened and closed manually.**

12. Slowly remove loading hose.

CAUTION:  **Some residue will remain in the line. Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

13. Install the cap on the Transfer Line. Secure with the over-center latches.

14. Set the EZ-3S Controller Mode Selection switch to CLEANOUT and follow instructions for **Cleanout Mode** earlier in this section.

WASHDOWN

It is extremely important that the components, lights, reflectors and safety decals on the Maximizer3 are kept clean and visible.

ROSCO recommends the use of biodegradable cleaning solvents. However, if you will be using diesel fuel or kerosene, check with your state environmental authorities and dispose of all materials according to local, state and federal regulations.

DANGER:  **Diesel and/or kerosene is extremely flammable. Use great care when using these substances to wash the Maximizer3. <u>Be sure that the tank and burners are cool</u> to the touch.**

DANGER:  **<u>Do not operate Burner System during washdown!</u> The flue tubes could become exposed causing an explosion inside the tank, or the material could ignite causing a fire.**

WARNING:  **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from both can explode when exposed to flame or heat from smoking or other sources.**

COMBATING POOR VISIBILITY

Increasingly, asphalt maintenance equipment is being used during less than ideal light conditions, such as fog, smog and at night. Using the equipment during these conditions presents safety hazards to the workers, bystanders and passing traffic. People can be injured or killed by the equipment, passing traffic or driving into ditches, holes, other obstructions or down embankments.

WARNING:  **If you will be operating the machine under less than ideal light conditions, the unit should be equipped with special lighting. Such lighting will help prevent serious personal injury, as well as damage to machine and property .**

To help combat these hazards, the equipment must be equipped with front and rear lighting options, back up lights and shielded rotating beacons. The shielding protects the operator's vision and prevents eye strain. Use reflective tape on the sides of all machines that may be used at night.

Be sure that all personnel wear reflective vests. Use impact barriers (movable or stationary) to protect the workers from traffic and help direct the traffic flow away from road hazards.

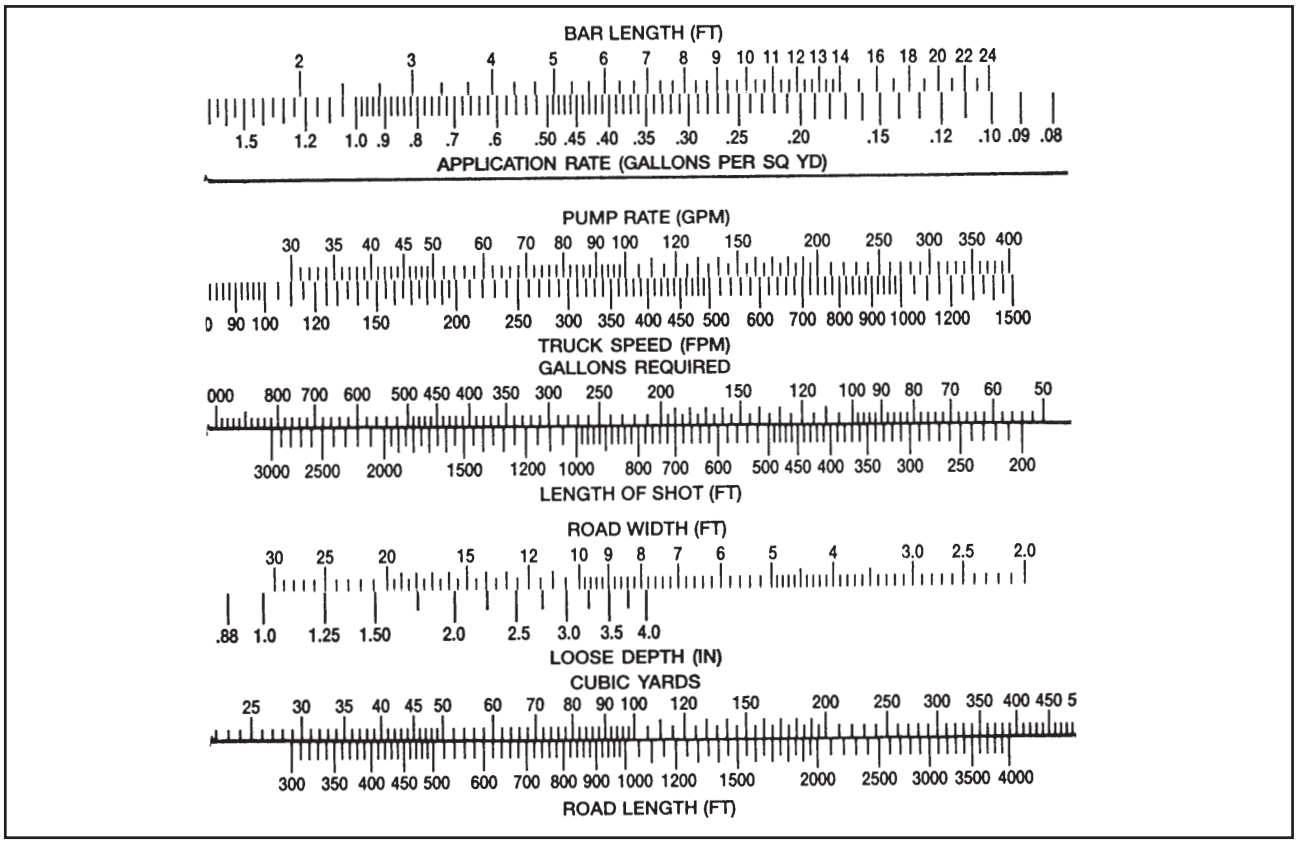

FIGURE 3-39. SLIDE RULE APPLICATION GUIDE

MANUAL CALIBRATION

The Maximizer3 comes equipped with the EZ-3S Controller that will automatically calibrate the operator's required application rate. ROSCO strongly recommends that the operator depend on the Controller rather than calibrating the application rate manually. The Controller's calculations are more reliable and accurate. However, in the event that manual calibration is required, follow the instructions provided in this section.

Asphalt application rates are dependent upon nozzle size, pump speed, ground speed and spraybar width. Carefully review and follow the procedures for **calculating** the required settings, **simulating a run** and doing a **trial run** to be sure the desired application rate is obtained.

CALCULATIONS

To obtain the desired performance, use the Slide Rule Application Guide (Figure 3-39), supplied with the Maximizer, to determine the settings of the machine.

Determine the type of nozzles used on the spraybar. The nozzle type will determine the range of pump flow that will give an acceptable nozzle spray pattern.

Determine the application rate in Gal/Sq. Yd. or Liter/Sq. Meter for the work to be done. This will be specified by the job requirements and selected nozzle size.

Determine the ground speed, pump flow and the spraybar width being used for each specific job.

The slide rule covers spraybar widths from 4 feet to 24 feet in 1 foot increments.

NOTE: In this example, we are using a 12-foot spraybar. Use your correct spraybar length and make appropriate adjustments to the calculations.

1. Go to the top scale for the Bar Length. Move the inner sleeve to the desired application rate with the correct bar length.
   For Example:
   • Spraybar Length = 12 Feet
   • Application Rate = .3 Gal/Sq.Yd.
   • For No. 1 Nozzles the recommended pump rate is 8 -14 GPM per feet bar length.
   • For 12 Ft bar, pump rate is 96 (12 x 8) to 168 (12 x 14) or approximately 100 - 170 GPM.

2. Go to the center scale (Pump Rate) and bracket the pump rate from the above example (100 - 170 GPM).

3. Look directly below the pump rate scale at the truck speed (FPM) scale. For 12 Ft bar and .3 rate setting you should read 250 FPM below 100 GPM and 425 FPM below 170 GPM.

4. Select a truck speed between 250 and 425 FPM that is appropriate for the terrain and operating conditions.

5. Select the pump flow rate above the selected truck speed.
   For example:
   • Select 350 FPM (4.0 MPH) as speed.
   • 140 GPM will be the pump setting.

NOTE: Do not exceed the nozzle maximum flow. 170 GPM is overflow for 36 #1 nozzles. Refer to Table 3-2 to determine maximum flow for your spraybar. Call a ROSCO factory representative for additional help.

RUN SIMULATION

For this phase of the calibration, a loaded Distributor operating in the **Bar Circulate Mode** will be driven per the operator's calculations. It is recommended that a data sheet be kept to record the machine performance and application information for future reference.

1. Before starting, review and follow the **Pre-Operating Check List** earlier in this section.

NOTE: Read Modes Of Operation earlier in this section before proceeding.

2. Load the tank.

3. Go to the simulation area.

4. Check that the material in the tank is at the proper application temperature.

NOTE: Application temperatures will vary depending on the product being used. Refer to the product supplier's recommendations for application temperatures.

NOTE: Temperature affects the viscosity of the material. If the temperature is not at the recommended rate, the range in viscosity could affect the accuracy of the calibration. Refer to Table 3-1 for additional temperature guideline information.

5. Select a transmission gear and axle ratio to give the required ground speed of 350 FPM. Use the panel readout to measure the speed. The best results are obtained when the engine speed is maintained between 1500 and 1800 RPM for a specific gear ratio.

6. Operate the unit in the **Bar Circulate Mode**. Use the Manual Pump Speed dial on the EZ-3S Controller to set the pump flow to 140 GPM at the specific engine RPM for operation.

7. Drive the unit over the application route in the specific gear, axle ratio, engine RPM and travel speed, and set the pump rate.

8. Record all operating parameters on your data sheet (Figure 3-40) for future reference.

Small variations in ground speed will not affect the application rate. As the truck speed increases or decreases, there will be a proportional increase or decrease in the flow from the hydrostatic pump. This will also give a proportional change in the asphalt pump flow.

TRIAL RUN

A trial run can be made with the unit spraying to verify the application rate. This may be required if the material being sprayed has a viscosity that is different than that normally sprayed.

1. Measure the amount of material in the tank. Read the measuring stick in the top opening or weigh the unit before and after the run to measure the volume sprayed during the run. This latter method requires that you know the density or the weight per gallon of the asphalt.

2. Mark out a known distance on the spraying area. Use even numbers such as 600 or 900 feet to make the calculations easy. Allow a starting distance before you begin spraying so the truck speed and pump flow stabilize.

3. Start spraying as you cross the start line. Maintain the ground speed and engine RPM at the values recorded on the data sheet.

4. Watch the pump GPM readout closely. You may have to adjust the speed slightly to compensate for the change between Bar Circulate and Spray. Use the Manual Pump Speed dial to make the adjustment.

5. Use the measuring stick or weigh the machine to determine the quantity sprayed.

6. Calculate the expected results.
   For example:
   $\frac{\text{900 Ft x 12 Ft Wide x .3 Gal/Sq Yd}}{\text{9 Sq Ft/Sq Yd}} = 360 \text{ Gal.}$

   or

   $\frac{\text{600 Ft x 12 Ft Wide x .3 Gal/Sq Yd}}{\text{9 Sq Ft/Sq Yd}} = 240 \text{ Gal.}$

7. If the measured volume does not equal the calculated volume, adjust the flow rate to make them equal.
   For example:
   Calculated Volume = 360 Gal
   If Measured Volume = 340 Gal

   $\frac{\text{Calculated Vol x Pump Flow}}{\text{Measured Volume}} = \text{Correct GPM}$

   $\frac{\text{360 Gal x 140 Gal}}{\text{340 Gal}} = 148 \text{ GPM}$

8. Reset the pump flow to 148 GPM to obtain an application rate of .3 Gal/Sq.Yd.

APPLICATION RATE	SPRAYBAR LENGTH	NOZZLE SIZE	TRUCK GEAR	TRUCK SPEED	PUMP FLOW
.3 GAL/SQ. YD.	12 FEET	1	LOW, 2ND	350 FPM	140 GPM

FIGURE 3-40. APPLICATION DATA SHEET

Section 4
MAINTENANCE & TROUBLESHOOTING

TABLE OF CONTENTS

TABLE OF CONTENTS

GENERAL INFORMATION

This section gives the necessary procedures for routine and general maintenance on the Maximizer3 Asphalt Distributor.

NOTE: By following a careful service and maintenance program for your Asphalt Distributor, you will insure many years of trouble free operation.

WARNING: Follow all safety precautions in this manual.

ROUTINE MAINTENANCE

GENERAL INFORMATION

Maintenance must be a planned program that includes periodic machine inspection and lubrication procedures. See Table 4-1, **Maintenance Intervals Chart**.

The maintenance program must be done based on the machine's "Operating Hours" recorded on the hourmeter, or on a "Periodic Schedule" which is done at daily, weekly, monthly or yearly intervals.

TABLE 4-1. MAINTENANCE INTERVALS CHART

3 HOURS or TWICE DAILY		
Asphalt System	Check	
Pump Bearing (1)	Lubricate	Rosco Hi-Temp Grease #33384
Pump Packing Gland (1)	Lubricate	Rosco Hi-Temp Grease #33384
Asphalt Circuit Valve Stems (2)	Lubricate	Rosco Hi-Temp Grease #33384
Hydraulic System	Check	
Air System	Check	
8 HOURS or DAILY		
Truck	Check	Service per Truck Operator's Manual
Tank Top Opening Cover	Check	
Cover Gasket	Check	
Cover Screen	Clean	Use Diesel Fuel or Kerosene
Overflow Vent	Clean	Use Diesel Fuel or Kerosene
Asphalt Distribution Hoses	Check	
Hydraulic Hoses	Check	
Fuel Level	Check	Add as Required
Engine Oil Level	Check	Add as Required
Coolant Level	Check	Add as Required
Cleanout Solvent Level	Check	Add as Required
Burners	Check	
Fuel Level	Check	Add as Required
Fire Tubes	Check	
Load Line Screen	Clean	Use Diesel Fuel or Kerosene
Radar Horn Face Cover	Clean	
Spraybar Hydraulic Cylinders	Clean	
20 HOURS or WEEKLY		
Asphalt Pump	Check	
Packing Gland	Tighten	
Chain Coupler	Check	
Tank Capacity Indicator	Check	
Float Shaft Packing	Tighten	
Spraybar	Check	
Nozzles	Check	Adjust Alignment if Necessary
Hardware	Check	Tighten if Necessary
Hydraulic Filter	Check	
Tank Tie-Down Hardware	Check	
Burner System	Check	
Fuel Strainers	Clean	
Hardware	Check	Tighten if Necessary
Tank Top Opening Cover Gasket	Check	
Wash Machine		
80 HOURS or MONTHLY		
Asphalt Pump	Check	
Load Line Screen	Clean	
Tank Sump	Clean	
Burner (Diesel)	Clean	(Requires removal of Burner Cover)
Burner Flue Liner	Check	(Requires removal of Diesel Burner)
400 HOURS or ANNUALLY		
Hydraulic System	Replace	Change Oil Filter
Spraybar	Replace	Extension and Pivot Point Gaskets and Washers
Burner	Replace	Fuel in Solvent & Burner Tank

FLUIDS AND LUBRICANTS

ASPHALT PUMP LUBRICATION

Use only ROSCO high-temperature, Teflon impregnated grease (part # 33384) at all times. Any other grease will be liquefied in the high operating temperature and will run out of the bearings. With no lubrication, the bearings will seize in a short time.

Use only a hand held grease gun for all greasing. Wipe grease fittings with clean cloth before greasing, to avoid injecting dirt and grit. Replace and repair broken grease fittings immediately. If a fitting will not take grease, remove and clean thoroughly. Clean lubricant passageway.

1. Lubricate asphalt pump bearings, 2 locations (Figure 4-1) every 3 hours or twice daily.

2. Lubricate asphalt circuit valve stems, one location on the 3-Way valve and the 2-Way valve every 3 hours or twice daily. Figure 4-2 shows the 3-Way valve.

ATTENTION: Lubricate the points described above at the end of the day to prevent seizing or setting up over night.

GREASE FOR OTHER COMPONENTS

Use an SAE multi-purpose high temperature grease with extreme pressure (EP) performance or an SAE multi-purpose lithium base grease.

HYDRAULIC OIL

When adding or changing the hydraulic oil, refer to Table 4-2, **Hydraulic Fluids Chart** later in this section. Fluids that are not equal to those listed could result in substandard performance or failure of components.

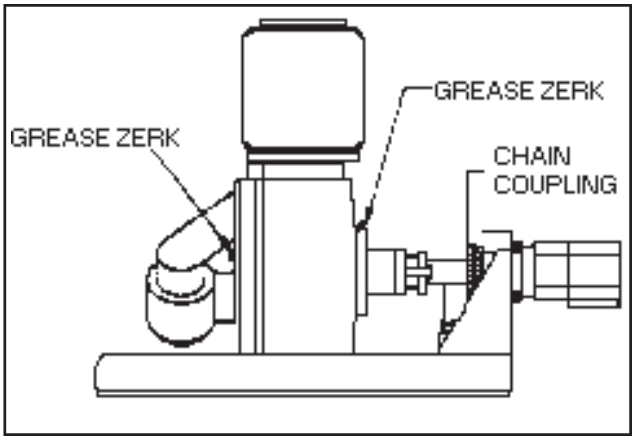

FIGURE 4-1. ASPHALT PUMP

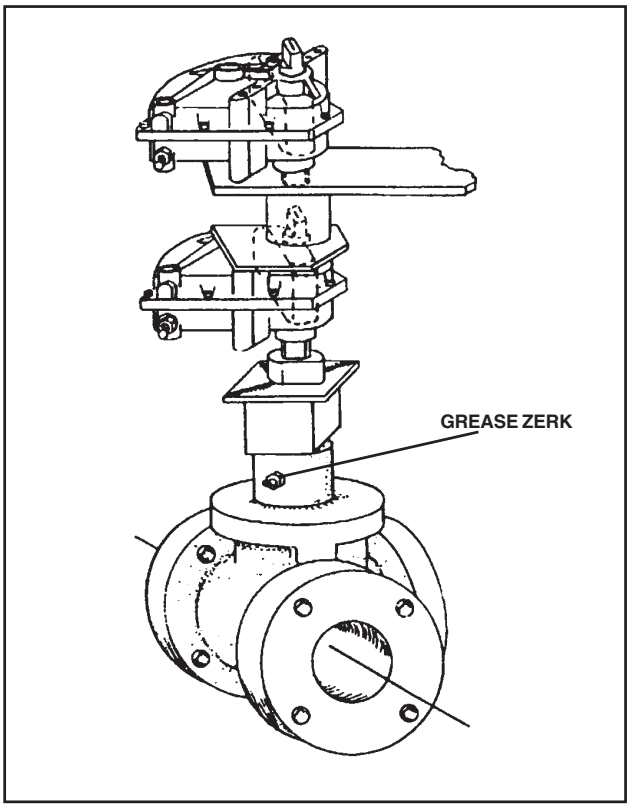

FIGURE 4-2. ASPHALT PUMP VALVE

CLEANOUT SOLVENT

Any commercially available diesel fuel or kerosene can be used to flush out the system. If the circuit is connected to the burner fuel supply, comply with the burner fuel specification when filling the tank.

ATTENTION: Do not use any citrus solvent (Terpene Hydrocarbon or equivalent) to clean out the spraybar. It destroys the Viton seals.

TRUCK SYSTEMS

Follow recommendations in the truck Operator's Manual for fuel, lubricating oils, coolants and lubricating greases. Consult with truck manual for system capacities and servicing frequencies.

TANK COMPONENTS

TANK SUMP

The Maximizer3 is designed with a sump in the bottom of the tank where the asphalt gathers and is drawn into the pump. The tank is equipped with a removable plug on the bottom for draining condensation from the tank and cleaning the sump. When opening the sump, follow this procedure:

1. Drain or clean the sump at the start of the day. If it is necessary to open the sump during the work day, be sure the tank is cool to the touch.

2. Stop the engine, place all controls in neutral, set the park brake, remove ignition key and make sure tank is empty before starting.

CAUTION: Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.

3. Remove the plug in the bottom of the sump. The water in the bottom of the tank will drain out.

4. When draining is complete, install and tighten the plug.

TOP OPENING

An overflow vent is located in the front of the top opening to allow excess material to overflow the tank if required. Check the overflow vent at the start of each day and remove any obstruction.

A gasket is used to seal the top opening cover to prevent water from getting into the tank. It must be kept in good condition. When inspecting or replacing the seal follow this procedure:

1. Stop the engine, place all controls in neutral, set the park brake and remove ignition key.

2. Be sure the tank is cool to the touch.

3. Loosen both latches and lift the top opening cover.

4. To provide a proper seal, the gasket material must be in good condition. If it is damaged in any way it must be replaced. To provide a good seal, the four (4) top opening crossbar adjustment bolts must be tightened to provide uniform pressure on the gasket.

5. To replace gasket, remove fasteners in gasket retainer.

6. Use a screw driver to remove the old gasket from the retaining ring and top opening cover.

7. Fit the new gasket in the top opening lid and reinstall the gasket retainer.

8. Adjust the four (4) adjustment bolts on the top opening crossbar to provide uniform gasket compression.

CAPACITY INDICATOR GAUGE

A pointer gauge is located on the front and on the rear of the tank to indicate the amount of asphalt in the tank. The float in the tank is attached to a shaft through the tank wall and moves the pointer accordingly. The shaft is sealed with packing material to prevent leakage. If the seal needs adjustment or replacement, follow this procedure:

1. Stop the engine, place all controls in neutral, set the park brake and remove ignition key.

2. Check under the float shaft at the start of each day for seal leakage. If seal is leaking, tighten the nut on the packing gland 1/3 turn at a time. Fill the tank and determine if the float shaft still leaks. Repeat if leaking continues. If the nut bottoms out and the shaft still leaks, replace the seal.

ATTENTION: Do not over-tighten the packing gland nut. If it is too tight it will bind the shaft, preventing the shaft from turning properly.

3. Before replacing seal, empty the tank and allow it to cool. Remove the pointer from the shaft. Loosen and remove the packing nut. Use a small screwdriver to remove the old packing material from the cavity.

4. Install the new packing into the cavity. Install the packing nut and turn until it contacts the packing material. Use vise grips to turn the shaft and lift the float. When the shaft is released, the float should turn the shaft easily as it moves down. Install the pointer in its previous position.

MOUNTING HARDWARE

The tank is attached to the truck frame with spring loaded bolts. Wooden blocks are mounted between the tank and the truck frame to absorb shock loads and to act as wear surfaces. During use, the blocks wear and mounting hardware will need to be tightened. To tighten, follow this procedure:

1. Stop the engine, place all controls in neutral, set the park brake and remove ignition key. Be sure the tank is cool to the touch.

2. The best time to check the hardware is at the start of the working day.

3. Tighten the anchor bolts. Measure spring length and maintain at 2.75 inches (7 cm). The spring coils should have a visible gap between them.

4. If mounting bolts can no longer be adjusted to proper spring compression, the wooden blocks must be replaced.

5. Keep the hardware tight at all times to prevent the tank from shifting on the frame.

ASPHALT PUMP SYSTEM

ASPHALT PUMP

The asphalt pump input shaft uses a special material that is packed into a cavity around the shaft to seal the hot material in the pump. To adjust this seal, follow this procedure:

CAUTION: Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.

1. Stop the engine, place all controls in neutral, set the park brake and remove ignition key. Be sure that all components are cool to the touch before adjusting.

2. Visually inspect the pump on a weekly basis for shaft leakage. Correct adjustment of the packing gland will allow for a slight weeping at the shaft. If there is no weeping, the gland is

probably too tight and shaft damage could occur. If more than slight weeping is observed, tighten the packing gland.

NOTE: When in CLEANOUT Mode, a small amount of diesel fuel may leak from the shaft. This is normal.

3. To adjust the packing material, tighten the bolts on the packing gland. Tighten both bolts one half (1/2) turn and check for seepage. Readjust if required. Adjust the mounting bolts an equal amount each time to maintain an even pressure on the packing material.

4. Replace packing material when gland adjustment does not stop shaft leakage.

RELIEF VALVE

The asphalt circuit is designed with a relief valve (Figure 4-3) to prevent damaging components when the system pressure gets too high. To adjust the relief pressure, follow this procedure:

1. The valve is set at the factory to 70 PSI for all operating conditions.

2. To check the relief pressure, there must be material in the tank. Stop the engine, place all controls in neutral, set park brake and remove ignition key.

3. Be sure the machine is cool to the touch.

4. Restart the engine. Turn the EZ-3S Controller Master switch ON.

5. Set the EZ-3S Controller Mode Selection switch to RVS SUCT (Reverse Suction). Set the Auto/Manual Switch to MANUAL and run the pump at 200 GPM.

6. Slowly open the 3/4 inch (19.05 mm) plug on top of the strainer box and listen for a suction sound. If sound is heard, remove the plug and install a 0-100 PSI pressure gauge with diaphragm (ROSCO part #5058) to the screen box. (Figure 4-4) If a suction sound is not heard, check all switches to be sure the right settings are being used.

7. After the gauge is installed, set the EZ-3S Controller Mode switch to SPRAY/BAR CRCLT for 3 to 5 minutes. Then set the Spraybar Master switch to OFF. Run the pump at 300 GPM. Check the pressure. It should read 70 PSI. If it does not, adjust with the adjusting screw.

8. Remove the valve cap that covers the adjusting screw.

9. Slowly turn the adjusting screw in to increase the relief pressure and turn it out to decrease

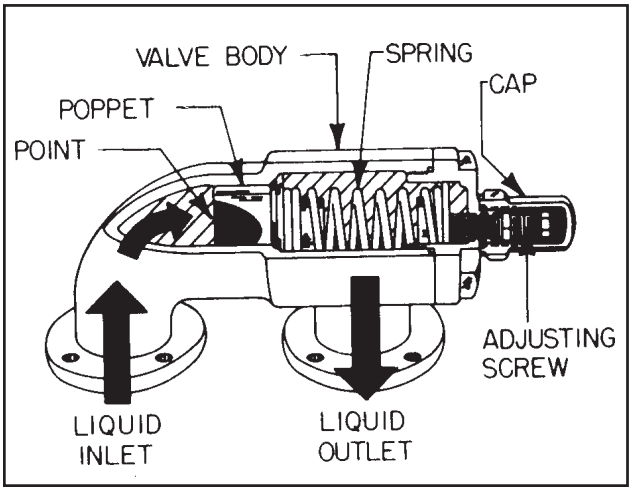

FIGURE 4-3. RELIEF VALVE

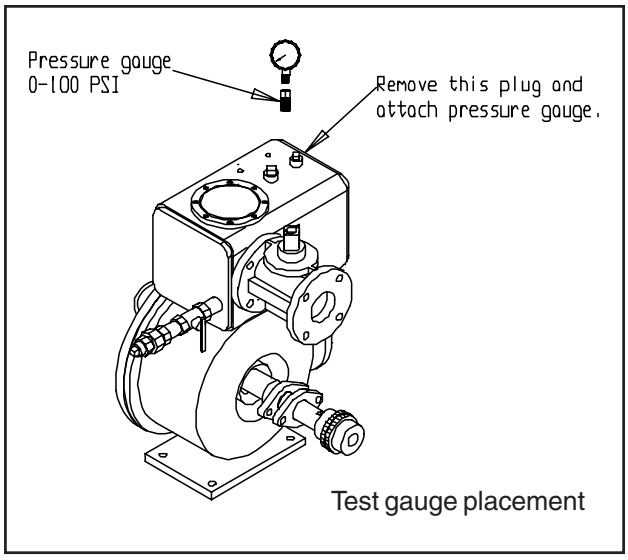

FIGURE 4-4. PRESSURE GAUGE

pressure. The screw height should extend 9/16 inch (14 mm) out of the bonnet casting for the needed pressure.

10. If proper pressure cannot be achieved, valve may need to be cleaned or replaced.

11. To clean the relief valve, disconnect the dump line from the asphalt pump housing. Remove the relief valve from the asphalt pump housing.

12. Use diesel fuel to thoroughly clean the valve. Dispose of cleaning material according to local, state and federal regulations.

13. Be sure nothing is stuck under the poppet. Check that the spring moves the poppet easily and seats it firmly in the base.

14. If any components are damaged or broken, replace the valve.

15. Set the adjusting screw to extend 9/16 inch out of the bonnet casting.

16. Attach to the pump housing and connect the dump line using new gaskets.

DISCHARGE SCREEN

The discharge screen (Figure 4-5) prevents large contaminants from reaching the nozzles. It is located on the outlet side of the pump manifold weldment box. Clean the screen monthly during the working season. To clean the screen, follow this procedure:

1. Stop the engine, place all controls in neutral, set the park brake and remove ignition key.

2. Be sure the tank is empty and the circuit is washed out.

3. Allow machine to cool to the touch.

4. Remove bolts holding access cover to pump weldment. Remove the access cover from the pump weldment box.

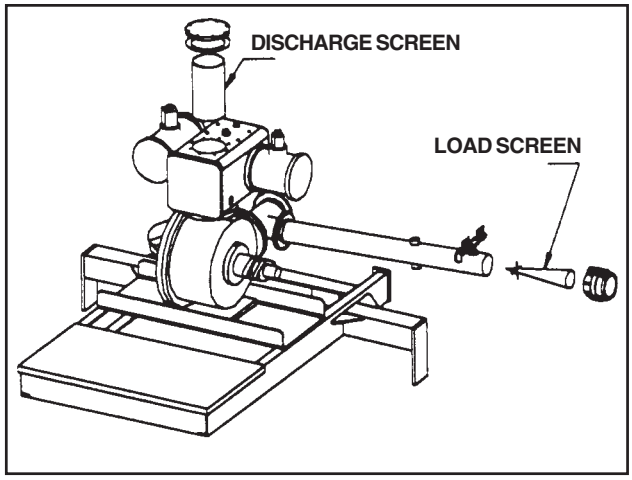

FIGURE 4-5. DISCHARGE SCREEN & LOAD SCREEN

5. Remove any trash or debris that has become caught in the screen.

6. If the screen is damaged in any way, replace it using genuine ROSCO parts.

7. Use a screwdriver or putty knife to remove the old gasket on the cover and housing.

8. Use ROSCO high temperature gasket sealant (part #33384) under this cover to prevent leakage.

9. Install the cover and tighten the mounting bolts to their specified torque (28 Ft/Lbs).

CAUTION: **Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.**

WARNING: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.**

LOAD LINE SCREEN

A conical screen (Figure 4-5) is located in the load line to stop debris or trash from entering the system. To inspect the screen, follow this procedure:

1. Visually inspect the screen at the start of each working day and whenever the cap is removed from the load line.

2. Remove any objects lodged against the screen. Do not remove the screen for cleaning.

3. Inspect the screen for damage or holes. If any are noticed, remove screen from the line and replace immediately.

ATTENTION: Do not operate the machine with a damaged screen. Objects that enter the system can damage the pump.

PUMP DRIVE

The asphalt pump is driven by a fixed displacement hydraulic pump through a double chain coupler (Figure 4-6). Inspect the components and maintain the system in good working order. To inspect the pump drive, follow this procedure:

1. Stop the engine, place all controls in neutral, set the park brake and remove ignition key.

2. Allow machine to cool to the touch.

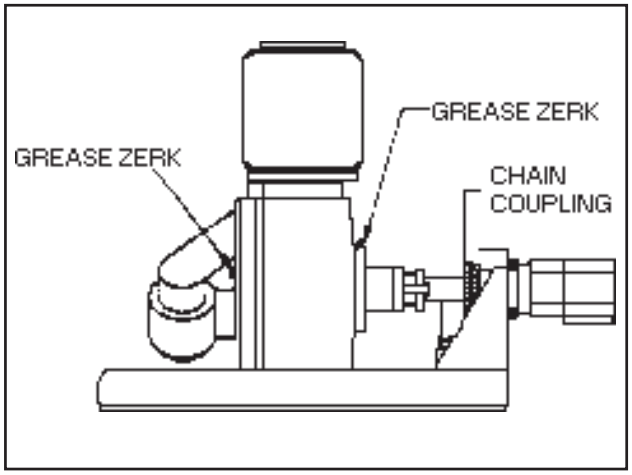

FIGURE 4-6. ASPHALT PUMP DRIVE

3. Visually check the condition of the coupler on a bi-weekly basis. If wear can be seen on the rollers or sprocket teeth, replace the coupler. Be sure the shafts are aligned and the sprockets securely fastened to the shaft before resuming operation.

4. A sensor is installed in the hydraulic motor to measure motor speed. If the sensor malfunctions, contact an authorized ROSCO dealer for assistance.

5. Check the tightness of the hydraulic motor mounting bolts. Tighten if necessary. Adjust the hydraulic motor mounts when aligning shaft and chain coupler.

AUTOMATIC VALVES

The asphalt flow is controlled by a 2-Way valve, a 3-Way valve and a Tank Valve. The valves are switched using electric solenoids controlling air actuators. Refer to Figures 4-7, 4-8, and 4-9 to understand the function of the 3-Way Valve System.

Functional Check

Turn the EZ-3S Controller Mode Selection switch from one position to another and watch the valve to see if it functions correctly.

Solenoid Check

The air valves are located in the rear valve compartment. To check the solenoids:

1. Shut Master switch OFF or disconnect the power wire from the solenoid on the valve.

2. Depress or turn the slotted button on the air valve. You should hear the valve or air actuator respond.

3. Reset to normal and the valve should return to its original position.

4. On the 3-Way valve, repeat with other solenoid.

5. Reconnect the power wire.

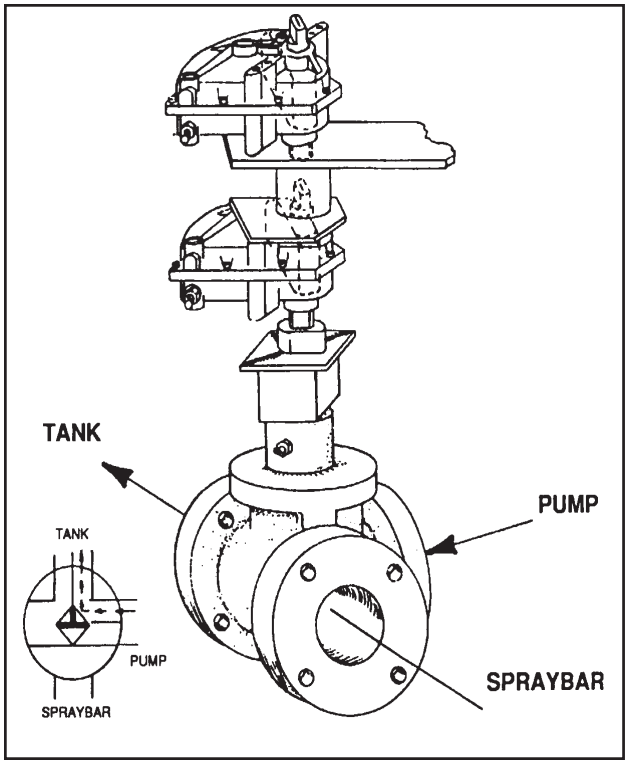

FIGURE 4-7. 3-WAY VALVE POSITION 1

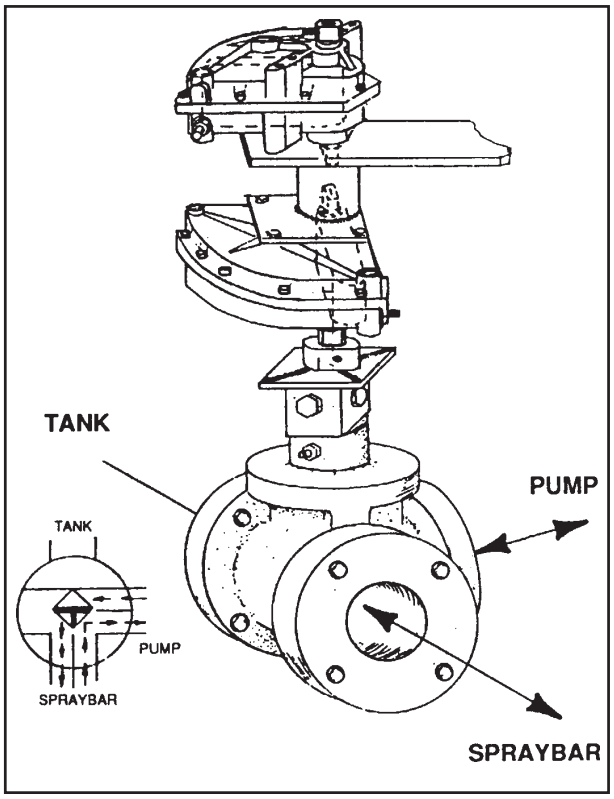

FIGURE 4-9. 3-WAY VALVE POSITION 3

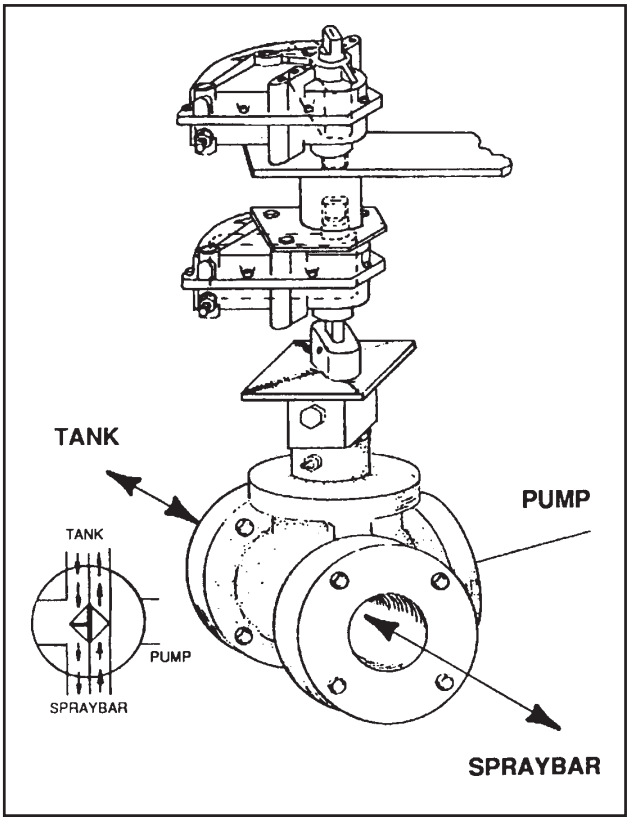

FIGURE 4-8. 3-WAY VALVE POSITION 2

Electrical Check

Disconnect power wire and use an ohmmeter to check the coil resistance. A good coil will have between 30 and 35 ohms resistance.

SPRAYBAR

The spraybar, mounted on the back of the Maximizer3, distributes asphalt over the road surface. The spraybar includes circuits to distribute asphalt to the nozzles, hydraulic lines for moving the bar and an air system for valve actuation. Maintain the system by following this procedure:

CAUTION: Always wear protective clothing, gloves and a face shield. Contact with hot asphalt can cause severe burns.

ATTENTION:  **Do not use any citrus solvent (Terpene Hydrocarbon or equivalent) to clean out the spraybar. It destroys the Viton seals.**

WARNING:  **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.**

1. Clean the internal asphalt system after each use by going through the **Reverse Suction** and **Cleanout** modes. See Section 3, **Material & Operation**. Keep the internal components clean to prevent clogging of components and asphalt set-up in the nozzles.

NOTE: **Some residue will always remain on the inner surfaces of the plumbing, but it will re-liquefy when the hot asphalt flows through the system in the SPRAY/BAR CIRCULATE mode.**

2. Clean all spraybar components at the end of each working day or more frequently if required.

3. Clean all joints and pivots of the asphalt, hydraulic and air systems to prevent caked dirt or asphalt from interfering with their function. Be sure to clean the exposed shafts of each air and hydraulic cylinder to prevent caked asphalt from being drawn into the system when the ram is retracted.

4. After cleaning, visually check all hoses, fittings and clamps for leaks or loose components. Leaks can affect the performance and function of the machine by causing uneven asphalt application and wasted asphalt.

CAUTION:  **Do not operate the unit with leaking or damaged parts. Leaks can result in hot asphalt spilling on the machine or the operator, creating a hazardous condition**

5. Check that all pivots, hinges and joints are tight and can move freely. Free up all points that are binding. Check that all fasteners are tight. Do not operate with loose components.

6. Refer to the **Bolt Torque Charts** and review torque specifications. Maintain bolts at their specified torque.

HYDRAULIC SYSTEM

Hydraulic power is used to drive the asphalt pump, raise the wings and move the spraybar. A PTO drive from the engine or transmission is used to power a variable displacement piston pump to drive the asphalt pump and auxiliary functions. The hydraulic motor powering the asphalt pump is a fixed displacement high torque low speed motor. To service and maintain the system, follow this procedure:

CAUTION:  **Always wear protective clothing, gloves and a face shield. Hydraulic fluid under pressure can penetrate skin and cause serious injury.**

WARNING:  **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.**

1. The hydraulic reservoir is located on the left side of the vehicle. Check the sight gauge at the start of each working day. The oil level should be at the center of the sight glass to allow room for expansion when the oil warms during operation.

2. Add oil through the filler cap on the side of the tank. Clean the cap and filler neck before filling to be sure that no dirt or contaminants enter the tank. Hydrostatic systems will fail in a short time if the oil is not clean. Watch the sight glass when adding oil. Add until the oil level is in the center of the gauge.

3. The reservoir has a temperature switch that is set at 210° F (99° C). The sight gauge also displays the hydraulic oil temperature. Check the sight gauge if the control panel hydraulic temperature light goes on. Check the temperature to assure operating temperature is below 225° F (107° C). If the temperature exceeds 225° F (107° C), check the system for a failing motor or pump. (See **Troubleshooting** later in this section.) Keep the tank exterior clean to act as a radiator to cool the oil in the system.

4. Change the oil in the reservoir annually or every 400 hours, whichever comes first. The drain plug is located in the bottom of the tank. Drain the oil when the system is warm or hot to remove the most contaminants. DO NOT SMOKE when working around hot oil. Use a large pail or container to collect the used oil. Dispose of the used oil in an approved manner. Refer to Table 4-2, **Hydraulic Fluids Chart** for recommended grades and manufacturers. Watch the sight gauge.

NOTE: Contaminants can enter the system when hydraulic cylinder rams are retracted. The asphalt can get past the seals and be dissolved by the oil. Changing the oil will remove these contaminants and prevent gum deposits from building up on the internal components.

5. The hydraulic system is equipped with an oil filter to remove dirt and other contaminants. Change the oil filter if the pointer is in the red position. To check the condition of the oil filter or change it:
   a. Start the engine.
   b. Engage PTO (if equipped) to operate the hydraulic system.
   c. Run the engine at 1200 RPM.
   d. Visually check the pointer on the gauge at the top of the filter. If the pointer is not in the red area, the filter does not need to be changed.
   e. Change the oil filter after 400 hours or annually.

ATTENTION: The pointer indicates the pressure drop across the filter. This can only give an accurate reading when oil is circulating through the system.

BURNER SYSTEM

DIESEL BURNERS

The diesel burners are located at the rear of the Maximizer3. Check the burner operation daily. Follow this procedure:

WARNING: DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.

CAUTION: Always wear protective clothing, gloves and a face shield. Burners are hot and contact with skin can cause severe injury.

1. Excessive smoke or trouble starting means burner cover must be removed for cleaning or adjustment. Visually inspect the burner and mounting system daily. Tighten, repair or replace components as required.

2. Check fuel level in the tanks on a daily basis. Add fuel as required.

3. Check the fuel filter and fuel lines before the burners are ignited. Tighten fittings that are leaking and replace any damaged parts. Clean filter as required.

4. On a monthly basis or every 80 hours remove burner covers and check condition of burner. Clean asphalt build-up from burner components.

5. On a monthly basis or every 80 hours remove burner from tank and check the condition of the flue liners and flue tubes. Replace liner if damaged and inspect flue tubes for damage.

WARNING: **Never operate burners if flue tubes are damaged. Asphalt material coming through the cracked tube could ignite when the burner is lit. Consult your ROSCO dealer for repair procedures.**

LPG BURNERS

The LPG Burners are located at the rear of the Maximizer3. Check the burner operation daily. Follow this procedure:

WARNING: **DO NOT SMOKE around the machine. Fuel, asphalt material and the fumes from either can explode when exposed to flame or heat from smoking or other sources.**

CAUTION: **Always wear protective clothing, gloves and a face shield. Burners are hot and contact with skin can cause severe injury.**

1. Visually inspect the burner and mounting system daily. Tighten, repair or replace components as required.

2. Check the fuel level in the tanks daily.

3. Check the valves and fuel lines before the burners are lit. If a leak is suspected, use soapy water to identify the source.

4. Use a wrench to tighten the burner mounting hardware before using the burners.

5. Visually inspect the fire tubes for cracks or other damage.

WARNING: **Never operate burners if flue tubes are damaged. Asphalt material coming through the cracked tube could ignite when the burner is lit. Consult your ROSCO dealer for repair procedures.**

RADAR HORN (See Figure 4-10)

The radar speed sensor is used to measure ground speed for the Maximizer3. It is mounted on the outside of the truck frame. The radar horn operates by directing a beam of microwave energy (fixed frequency) at the ground and comparing it with the frequency of energy reflected back from the ground (return frequency). The return frequency is then proportional to the true ground speed of the Maximizer3.

In addition to providing speed information to the EZ-3S Controller, this signal is used in calculating the asphalt application rate. The radar horn is capable of full time operation and is activated by the Master switch on the EZ-3S Controller.

Keep the face of the radar horn clean. Mounting bolts should be kept snug (10 Ft/Lb torque) but not over-tight as housing could be damaged. Mounting bracket to truck frame bolts should be tightened to 30 Ft/Lb torque.

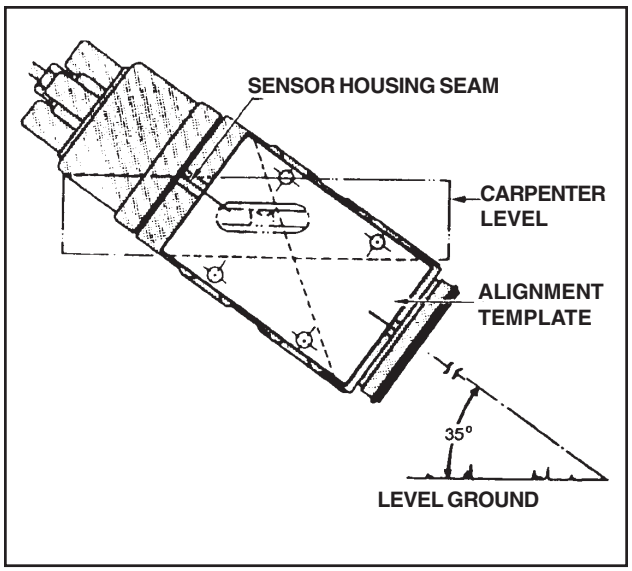

FIGURE 4-10. RADAR HORN

DAILY EXTERIOR MAINTENANCE

Clean the top platform, steps, railings, ladder and catwalk to prevent accidents during operation. Clean the instruction plates, decals and gauges so they can be seen and read by the operator at all times. Replace any decals or information plates that are damaged or illegible. Clean all lights and reflectors so they can be seen by other vehicles.

STORAGE

ATTENTION: Do not store equipment where it is subjected to damage from dirt and weather.

A stored machine requires as much periodic maintenance as a machine at work. Stored units must receive periodic scheduled maintenance. Many instances of customer downtime and dissatisfaction can be traced to parts that became defective due to inattention during storage.

The following procedures will help maintain equipment and lessen downtime:

1. Thoroughly clean the unit as you would at the end of the day. Be sure there is no asphalt in the tank, pump or piping. Use Table 4-1, **Maintenance Interval Chart** to check and/or clean every component listed.

2. Replace any worn or damaged parts. Touch up any scratched or chipped painted surfaces.

3. Lubricate all grease points. Make sure all grease cavities have been filled with grease.

4. Top up all fluid levels to minimize condensation during storage.

5. Inspect all air and hydraulic hoses, couplers, fittings and cylinders. Tighten any loose fittings and replace any hoses that are worn.

6. Check all safety decals. Replace any decals that are damaged or illegible.

7. Store the unit where it will be protected from adverse weather conditions. All replacement parts, whether complete assemblies, component repair parts or service kits should be stored in a dry sheltered area.

8. Fill the pump and spraybar with solvent as outlined in Section 3, **Cleanout mode**.

9. If a unit will not be used for more than two months, refer to Table 4-1, **Maintenance Interval Chart**. Follow the procedure for the monthly interval, as well as these preventative maintenance procedures:

   Check for Water in Hydraulic Fluid - Any machine that is stored for an extended period in a climate that has a wide range of temperatures and/or humidity, will develop condensation on the inside of the tank walls. Check the hydraulic fluid on a regular basis for possible moisture contamination.

ATTENTION: Hydraulic oil that is contaminated, must be drained, the filter elements replaced and the tank refilled with ROSCO approved fluid. Failure to do this could result in premature failure of the pumps and/or motors.

   Warm-up and Cycling - Start and run the engine until it is warm. Cycle all hydraulic and/or hydrostatic functions until all components are warm and the hydraulic fluid is up to operating temperature.

   Lubrication - After the machine is warmed up, grease all pivot points.

   Protection of Exposed Cylinder Rods - During periods of extended storage, (two months or longer), retract all cylinder rods as far as possible. Coat with grease any exposed part of the cylinder rod, to prevent rusting. Any stored cylinders, all exposed seals, o-rings, etc. should be coated with grease to prevent cracking.

HYDRAULIC FLUIDS

The hydraulic oils listed in Table 4-2 have been reviewed by ROSCO and are recommended as replacements. It is best to use the heaviest weight oil that can safely be used for the temperature range of machine operation. If your machine will never be used at temperatures below 0°F, use a heavier weight oil.

If you are considering using an oil that is not listed, contact the ROSCO factory to obtain the specifications that the hydraulic oil must meet to provide the needed lubrication and cooling for the unit's hydraulic components.

HYDRAULIC OIL REQUIREMENTS

ATTENTION: DO NOT MIX manufacturers or grade weights when adding hydraulic oil.

1. Be sure hydraulic oil selection is compatible with your hydraulic system.
2. Be sure to use mineral base hydraulic oil.
3. Be sure hydraulic oil selection assistance is from a reputable supplier.

Hydraulic oil must provide anti-wear properties that meet or exceed those found in the API (American Petroleum Institute) classification SD, SE or CC crank case oil.

Hydraulic oil viscosity must not fall below 70 SUS (13 cs) in the reservoir under the most adverse conditions. The best viscosity is 80-300 SUS (17 cs to 65 cs). The viscosity rating at the lowest expected start-up temperature should not exceed 10,000 SUS (2158 cs).

Hydraulic oil must have rust and oxidation inhibitors that will maintain chemical stability. When changing the hydraulic oil, the hydraulic system must be completely drained. Be sure to purge or drain all hoses, cylinders, valves, motors and pumps of hydraulic oil. All hydraulic oil filters must also be changed at this time.

HYDRAULIC FITTINGS

TIGHTENING FLARE TYPE TUBE FITTINGS

1. Check the flare and flare seat for defects that might cause leakage.

2. Align tube with fitting before tightening.

3. Lubricate connection and hand tighten swivel nut until snug.

4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second, tighten the swivel nut to the torque shown in Table 4-3.

TABLE 4-2. HYDRAULIC FLUIDS CHART

ISO 46 / SAE 20	ISO 68	ISO 100 / SAE 30
AMBIENT TEMP.	AMBIENT TEMP.	AMBIENT TEMP.
-15° F to 80° F (-26° C to 27° C)	0° F to 100° F (-18° C to 38° C)	15° F to 115° F (-9° C to 46° C)
Special Start-up Below 5°F (-15° C)	Special Start-up Below 20°F (-7° C)	Special Start-up Below 32°F (0° C)
Hyd Res Temp Max 165° F (74° C)	Hyd Res Temp Max 185° F (85° C)	Hyd Res Temp Max 200° F (93° C)
MOBIL DTE 25	MOBIL DTE 26	MOBIL DTE AW 100/DTE 18M
CITGO AW 46	CITGO AW 68	CITGO AW 100
CONOCO PHILLIPS 46	CONOCO PHILLIPS 68	CONOCO PHILLIPS 100
CHEVRON TEXACO AW 46	CHEVRON TEXACO AW 68	CHEVRON TEXACO AW 100
SHELL TELLUS 46	SHELL TELLUS 68	SHELL TELLUS 100
EXXON NUTO 46	EXXON NUTO 68	EXXON NUTO 100

TABLE 4-3. TORQUE SPECIFICATIONS FOR FLARE TYPE TUBE FITTINGS

Tube Size OD	Nut Size Across Flats	Torque Value		Recommended Turns to Tighten (After Finger Tightening)	
(in)	(in)	(N.m)	(lb-ft)	(Flats)	(Turns)
3/16	7/16	8	6	1	1/6
1/4	9/16	12	9	1	1/6
5/16	5/8	16	12	1	1/6
3/8	11/16	24	18	1	1/6
1/2	7/8	46	34	1	1/6
5/8	1	62	46	1	1/6
3/4	1 1/4	102	75	3/4	1/8
7/8	1 3/8	122	90	3/4	1/8

NOTE: The torque values shown are based on lubricated connections as in assembly.

TABLE 4-4. TORQUE SPECIFICATIONS FOR O-RING FITTINGS

NOTE: The torque values shown are based on lubricated connections as in assembly.

Tube Size OD	Nut Size Across Flats	Torque Value		Recommended Turns to Tighten (After Finger Tightening)	
(in)	(in)	(N.m)	(lb-ft)	(Flats)	(Turns)
3/8	1/2	8	6	2	1/3
7/16	9/16	12	9	2	1/3
1/2	5/8	16	12	2	1/3
9/16	11/16	24	18	2	1/3
3/4	7/8	46	34	2	1/3
7/8	1	62	46	1 1/2	1/4
1 1/16	1 1/4	102	75	1	1/6
1 3/16	1 3/8	122	90	1	1/6
1 5/16	1 1/2	142	105	3/4	1/8
1 5/8	1 7/8	190	140	3/4	1/8
1 7/8	2 1/8	217	160	1/2	1/12

TIGHTENING O-RING FITTINGS

1. Inspect O-ring and seat for dirt or obvious defects.
2. On angle fittings, back the lock nut off until washer bottoms out at top of groove.
3. Hand tighten fitting until back-up washer or washer face (if straight fitting) bottoms on face and O-ring is seated.
4. Position angle fittings by unscrewing no more than one turn.
5. Tighten straight fittings to torque shown in Table 4-4.
6. Tighten while holding body of fitting with a wrench.

BOLT TORQUE CHARTS

Table 4-5 and Table 4-6 give the correct torque values for standard and metric fasteners, and are intended as guides for average applications involving typical stresses and machined surfaces. Values are based on physical limitations of clean, plated and lubricated hardware. In all cases, when an individual torque value is specified, it should be followed instead of values given in this table.

Check tightness of bolts periodically, using this table as a guide. **ALWAYS** replace original equipment with hardware of equal grade. When using locking fastener, increase torque values by 5%.

N•m = Newton meter
FT. LBS = Foot Pound

TABLE 4-5. TORQUE SPECIFICATIONS FOR STANDARD INCH FASTENERS

		CAPSCREWS: SAE GRADE 5				CAPSCREWS: SAE GRADE 8			
SIZE	THREAD	TORQUE FT. LBS.		TORQUE N•m		TORQUE FT. LBS.		TORQUE N•m	
		Dry	Lubed	Dry	Lubed	Dry	Lubed	Dry	Lubed
1/4	20 UNC	8	6	11	9	12	9	16	12
	28 UNF	10	7	13	10	14	10	19	14
5/16	18 UNC	17	13	24	18	25	18	33	25
	24 UNF	19	14	26	20	27	20	37	28
3/8	16 UNC	31	23	42	31	44	33	59	44
	24 UNF	35	26	47	36	49	37	67	50
7/16	14 UNC	49	37	67	50	70	52	95	71
	20 UNF	55	41	75	56	78	58	105	79
1/2	13 UNC	75	57	100	77	105	80	145	110
	20 UNF	85	64	115	86	120	90	165	120
9/16	12 UNC	110	82	145	110	155	115	210	155
	18 UNF	120	91	165	125	170	130	230	175
5/8	11 UNC	150	115	205	155	210	160	285	215
	18 UNF	170	130	230	175	240	180	325	245
3/4	10 UNC	265	200	360	270	375	280	510	380
	16 UNF	295	225	405	300	420	315	570	425
7/8	9 UNC	430	320	580	435	605	455	820	615
	14 UNF	475	355	640	480	670	500	905	680
1	8 UNC	645	485	875	655	910	680	1230	925
	14 UNF	720	540	980	735	1020	765	1380	1040
1-1/8	7 UNC	795	595	1080	805	1290	965	1750	1310
	12 UNF	890	670	1210	905	1440	1080	1960	1470
1-1/4	7 UNC	1120	840	1520	1140	1820	1360	2460	1850
	12 UNF	1240	930	1680	1260	2010	1500	2730	2050
1-3/8	6 UNC	1470	1100	1990	1490	2380	1780	3230	2420
	12 UNF	1670	1250	2270	1700	2710	2040	3680	2760
1-1/2	6 UNC	1950	1460	2640	1980	3160	2370	4290	3210
	12 UNF	2190	1650	2970	2230	3560	2670	4820	3620

TABLE 4-6. TORQUE SPECIFICATIONS FOR METRIC FASTENERS

NOMINAL SIZE & PITCH	CLASS 8.8 (GRADE 5 EQUIVALENT)				CLASS 10.9 (GRADE 8 EQUIVALENT)			
	TORQUE FT. LBS		TORQUE N•m		TORQUE FT. LBS		TORQUE N•m	
	Dry	Lubed	Dry	Lubed	Dry	Lubed	Dry	Lubed
M4 x 0.7	2.27	1.70	3.07	2.30	2.27	2.31	4.17	3.13
M5 x 0.8	4.58	3.43	6.20	4.65	6.22	4.67	8.43	6.33
M6 x 1	7.75	5.83	10.5	7.9	10.60	7.97	14.3	10.8
M8 x 1.25	18.89	14.17	25.6	19.2	18.95	19.26	34.8	26.1
M10 x 1.25	39.11	29.52	53.0	40.1	53.87	40.59	73.0	55.0
M12 x 1.75	64.94	48.71	88.0	66.0	88.56	66.42	120.0	90.0
M14 x 2	103.32	77.49	140.0	105.0	140.22	107.01	190.0	145.0
M16 x 2	162.36	121.77	220.0	165.0	221.40	166.05	300.0	225.0
M20 x 2.5	317.34	236.16	430.0	320.0	428.04	321.03	580.0	435.0
M24 x 3	516.12	409.59	740.0	555.0	754.38	557.19	1010.0	755.0
M27 x 3	797.04	597.78	1080.0	810.0	1084.86	811.80	1470.0	1100.0
M30 x 3.5	1084.86	811.80	1470.0	1100.0	1476.00	1107.00	2000.0	1500.0

TROUBLESHOOTING

GENERAL

The following Troubleshooting Guide includes some problems that an operator may encounter during the course of operating the Maximizer II Asphalt Distributor. It also includes some acceptable corrections to these problems. Unless otherwise noted, the problems listed here are those which an operator can diagnose and repair. See an authorized ROSCO Dealer/Distributor for diagnosis and repair of problems not listed.

For specific engine and hydraulic problems not covered by this guide, refer to the Engine or Hydraulic Pump/Motor Manufacturer's manual.

ATTENTION: DO NOT attempt to service or repair major components, such as the engine, hydrostatic pump or motor, unless authorized to do so by your ROSCO Dealer/ Distributor. ANY UNAUTHORIZED REPAIR WILL VOID THE WARRANTY.

When a problem occurs, don't overlook the simple causes. For example, a starting problem could be caused by something as simple as an empty fuel tank. After a problem has been corrected, be sure to repair or replace the mechanical component that caused the problem.

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TROUBLESHOOTING CHART - AIR SOLENOIDS

SYMPTOM	CAUSE	REMEDY
Air solenoid valves leaking.	Spool section jammed or sticking on air valve.	Replace spool. **NOTE: Block at A & B ports with pipe plugs. Bench test assembly with shop air supplied to inlet. Manually and/or electrically operate each valve section to insure proper operation.**
Air solenoid valve sticking.	Dirt in valves or gummy deposits causing spool to hang up.	Clean or replace. Solvent washing of air valves creates problems by causing valve seals to swell. Replacement is the most reliable repair.
	Dirt in valves.	Check truck air system for water or contamination.
	Bodies of valves damaged or warped.	Replace valves.
Solenoids are hot. (Too hot to hold on to after they have been energized continuously for several minutes.) **NOTE: Solenoids will feel hot to the touch when operating properly.**	Short in solenoid wiring.	Check voltage marked on side of solenoid. Should show 12V DC.

TROUBLESHOOTING CHART - ASPHALT APPLICATION

SYMPTOM	CAUSE	REMEDY
Asphalt application is inconsistent.	Relief valve on asphalt pump stuck in open position.	Reset relief valve; should be set at 70 PSI.
	Relief valve not seating properly.	Take unit to an authorized dealer to check the seal between the seat and the poppet.
	Inconsistent temperature and viscosity between asphalt loads.	Monitor asphalt temperature and reheat when needed. Circulate spraybar for several minutes before spraying.
	Asphalt pump speed too high for type of nozzles used; relief valve on pump limits pressure to spraybar; excess flow bypasses to inlet of pump.	Decrease truck speed. Refer to calibration and application rate information at **Operating Screens** in Section 3, Material & Operation, to determine correct settings.
	2-Way and 3-Way control valves not fully open.	With asphalt tank empty and truck engine OFF, remove flanged hose ends from 2-Way and 3-Way valves. With ignition ON, power ON and air pressure available, turn Mode Selection knob to Spray mode. Check port alignment. There are two socket head adjusting screws on the vane air actuator which adjust amount of rotation. Loosen jam nut and turn set screw in or out to obtain proper port alignment. Only the set screw in contact with vane in air actuator should be adjusted.
Asphalt streaks during spraying.	Incorrect spraybar height.	Adjust spraybar high enough so spray fans completely overlap.
	Asphalt not heated to recommended temperature for spraying.	Heat material to temperature recommended by asphalt supplier.
	Spraybar nozzles not uniformly set at 20 degree angle.	Check angle setting of **all** nozzles with Nozzle Alignment Wrench.
	Valves not aligned correctly.	Check angle setting with Valve Alignment Wrench.
	Wrong size nozzle.	Refer to **Valves and Nozzles** in Section 3, Material & Operation.

TROUBLESHOOTING CHART - ASPHALT APPLICATION

SYMPTOM	CAUSE	REMEDY
Asphalt streaks during spraying (cont).	Asphalt pump speed too slow for spraybar width or size of nozzles.	Refer to calibration and application rate information at **Operating Screens** in Section 3, Material & Operation.
	Streaking during start of a "shot" indicates material in spraybar has cooled.	Run distributor in Spray/Bar Circulate mode for several minutes before starting to spray.
	Spraybar pressure too low.	Increase ground speed.
Asphalt is "fogging" during spraying.	Ground speed is too fast for desired application rate.	Decrease the ground speed.
	Nozzles are too small.	Increase the nozzle size.
	Asphalt viscosity is thinner than recommended for spraying.	Allow the asphalt to cool to spraying temperature recommended by the asphalt supplier.
	Asphalt pump is running too fast for desired application rate.	Adjust flow calibration and/or ground speed calibration. See **Spraybar & Valves Troubleshooting**. Refer to calibration and application rate information at **Operating Screens** in Section 3, Material & Operation.
Asphalt application rate is too light.	Ground speed is too fast.	Decrease truck speed.
	Engine RPM is not sufficient to maintain asphalt pump speed.	Gear down and/or idle up.
	Plugged or restricted inlet to asphalt pump.	Clean asphalt tank sump and suction screens.
	Nozzles are too small for application rate at given ground speed.	Decrease truck speed and/or use larger nozzles.
	Asphalt material viscosity is too thick, temperature is too low.	Heat material to a higher temperature.
	More spraybar extended or activated than used in calibration.	Refer to calibration and application rate informationat **Operating Screens** in Section 3, Material & Operation.
	Individual nozzles are clogged.	Clean nozzles.

TROUBLESHOOTING CHART - ASPHALT PUMP

SYMPTOM	CAUSE	REMEDY
Asphalt pump turns but won't pick up material.	Air leak on suction side of asphalt pump.	Check gasket on quick coupling cap of load inlet. No "air suction" should be heard.
		Check for hole in piping on the suction side of the asphalt pump.
		Make sure ball valve from solvent tank and load line vent valve are closed.
	Asphalt cold or too thick.	Heat material to the proper temperature recommended by asphalt supplier.
	Tank valve is closed.	Check operation of the tank valve. Free the valve if it is stuck and air cylinder cannot pull it open. Reversing rotation of asphalt pump may assist valve opening.
	Asphalt pump not turning in a "forward" rotation.	When viewed from the shaft end (motor end), shaft should turn clockwise for forward. Check that the pump moves in a forward direction when the Controller Manual Pump Speed dial is rotated clockwise. The pump control switch must be in FRT FWD position.
	Circulating system valves not set correctly for the required operating mode.	Refer to Section 3, Material & Operation, to determine correct valve positions for desired mode. Check corresponding air solenoids to see if they are activated.
	Asphalt tank is empty.	Fill asphalt tank with material.
	Load line hose plugged or collapsed.	Clean hose or replace.
	Valve on external tank closed on transport vehicle or remote tank. (Occurs on Tank Loading only.)	Open tank valve.
	Inlet screen plugged.	Clean inlet screen in load line and optional inlet box if so equipped.
Asphalt pump won't turn fast enough.	Asphalt not heated to recommended temperature.	Heat material to temperature recommended by asphalt supplier.
	Sump is full of asphalt or debris.	When in **Tank Circulate Mode**, run pump in reverse for about 1 minute.

TROUBLESHOOTING CHART - ASPHALT PUMP

SYMPTOM	CAUSE	REMEDY
Asphalt pump won't turn fast enough (cont).	Cold asphalt clogging pump or circulating system valves.	Apply heat with portable torch to asphalt pump, piping or valves in circulating system.
	Speed of hydraulic pump not matched to needs of asphalt pump. Truck engine too slow.	Increase truck engine RPM.
	Air trapped in hydraulic system.	See **Hydraulic System Troubleshooting**.
	High system temperature.	See **Hydraulic System Troubleshooting**.
	Malfunction of the hydraulic system components.	Check for leaks in hydraulic system hoses and fittings. See **Hydraulic System Troubleshooting**.
Asphalt pump leaks bitumen at rotor shaft gland.	Gland not properly tightened.	Tighten gland.
	Shaft packing worn.	Replace packing.
	Insufficient lubrication of pump rotor shaft.	Lubricate pump rotor shaft.
	Pump shaft grooved, bent or worn.	Replace pump shaft. Check for causes of shaft damage: misalignment, loose mounts, packing too tight.
Asphalt pump does not turn.	PTO not engaged; hydrostatic pump not turning.	Engage PTO.
	Hydrostatic pump failure.	With PTO engaged and low engine idle, check charge pressure of hydrostatic pump; should be at least 220 PSI. **NOTE: A plugged charge filter can cause low charge pressure.**
	Asphalt not heated to recommended temperature for spraying.	Heat material to temperature recommended by asphalt supplier.

TROUBLESHOOTING CHART - DIESEL BURNER

SYMPTOM	CAUSE	REMEDY
Burner motor will not run.	Check for power.	Run truck and check the truck alternator.
	Check for loose wires and connections.	Repair or replace. Tighten connections.
Burner fan turns too slowly.	Check for excessive dirt build up on blower fins.	Clean fins and fan shroud.
	Not enough voltage for proper fan operation.	Check voltage with truck running. Check truck electrical system.
	Check for loose wire connections.	Repair or replace. Tighten connections.
Burner getting no diesel fuel.	No fuel in tank.	Fill fuel tank.
	Faulty fuel solenoid.	Check solenoid. Repair or replace.
	Plugged fuel filter. Check both main and in-line filters.	Replace fuel filter(s).
	Contaminated fuel.	Drain fuel system and replace with known fuel quality.
	Loose or damaged fuel pump coupling.	Tighten or replace.
	Air in the fuel system.	Check and tighten hose connections or filter.
	Pressure plug not installed in return port of pump.	Contact a factory representative for instructions on installing the pressure plug.
Burner igniters not working.	Fuel combustion problems.	Test for combustibility. Remove fuel suction line. Insert line into a container of #1 diesel fuel or stove fuel, and run the burner. If burner lights and runs properly, it is a fuel problem due to low sulphur fuel. Use a fuel additive to aid combustion.
	Low fuel pressure.	Check fuel pressure. Must be 140 PSI.
	Igniter clearance is wrong.	The electrodes should be 1/4" (6.4 mm) from tip of nozzle and no more than 1/4" (6.4 mm) from electrode tip to tip.

TROUBLESHOOTING CHART - DIESEL BURNER

SYMPTOM	CAUSE	REMEDY
Burner igniters not working (cont).	Faulty relay inside burner control box.	Replace relay.
	Soot build up on fuel nozzle.	Replace nozzles.
	Air intake not set properly.	Adjust air inlet or band on blower.
Burner has fluttering and blow back.	Clogged fuel filter.	Replace in-line fuel filter.
	Air intake not set properly.	Adjust air inlet or band on blower.
	Low sulfur fuel is being used.	Use a fuel additive to aid combustion.
	Fan is running too slow.	Clean fan blade fins. Check voltage.
	Low fuel pressure.	Fuel pressure must be 140 PSI.
	Faulty fuel nozzle.	Replace with factory recommended nozzle.
	Air in the fuel system.	Check and tighten all fuel connections and filters.
	Flue liner plugged with soot or carbon.	Clean flue liner with pressure wash.

TROUBLESHOOTING CHART - HYDRAULIC SYSTEM

SYMPTOM	CAUSE	REMEDY
Hydraulic system "chatters". **NOTE: Some clicking or chattering noise is natural and can be heard at the asphalt pump motor. The geroter motor and the double link chain coupling make some noise.**	Air in hydraulic system is causing oil to foam. Possible causes: • clogged air filter • low oil level • leaks in system • hydraulic pump cavitation Pressure setting of hydrostatic pump relief valve too low. Tank valve closed causing asphalt pump to cavitate. Asphalt pump relief valve not operating.	 Change air filter. Add fluid to proper level. Purge air from system; check for leaks. Check for restrictions to inlet flow in hydrostatic and hydraulic pumps. Check hydrostatic pump relief pressure; should be 4350 PSI. Open tank valve; tank valve may be stuck closed and require additional force to open. Check asphalt pump relief valve; should be set at 70 PSI.
Hydraulic oil "High Temp" light is ON or higher than usual.	Low hydraulic oil level. Reservoir and/or hoses covered with asphalt. Hydraulic filter(s) plugged. Air trapped in hydraulic system. Asphalt viscosity is too thick causing excessive hydraulic pressures. Relief valve setting too low on hydrostatic pump. Hydraulic cooler is dirty or plugged. Spraybar Lift or Extend valve is stuck. Oil is being pumped over relief valve. Faulty temperature sender. Short in temperature sender wiring.	Add fluid to proper level. Clean with solvent. Replace filters. Check for leaks and/or restrictions in the hydraulic lines. Heat material to proper temperature recommended by the asphalt supplier. Check hydrostatic pump relief pressure; should be 4350 PSI. Relief is adjustable by adding shims. Refer to pump manual. Clean cooler. Manually operate hydraulic valves to see if any are activated when switches are OFF. Repair or replace any defective valves. Replace sender. Correct shorted wire.

TROUBLESHOOTING CHART - SPRAYBAR & VALVES

SYMPTOM	CAUSE	REMEDY
Spraybar doesn't circulate heated material.	Circulating system valves may not be set for Spray/Bar Circulate mode.	Refer to **Automatic Valve** information, Section 3, Material & Operation. Free stuck air actuators. Check that proper air solenoid valves are activated. See **Asphalt Pump Troubleshooting**.
	Cold asphalt material blocking passages in the spraybar.	Apply heat to spraybar with hot steam, air or electrical heat tapes to loosen material.
	Asphalt pump not turning, or tank valve is closed. (Pump should turn clockwise when looking at input shaft.)	See **Asphalt Pump Troubleshooting**.
	Plugged or restricted inlet to asphalt pump.	See **Asphalt Pump Troubleshooting**.
Spraybar doesn't heat material.	See Causes listed above.	See Remedies listed above.
Spraybar won't lift or lower.	Obstruction in the lifting mechanism.	Remove obstruction.
	Hydraulic solenoid valve not working.	Check solenoid operation.
	Hydraulic system relief valve set too low.	Reset relief valve. Should be 4350 PSI.
	Electrical wiring failure.	Check wiring.
Spraybar shuts off while spraying.	Blown fuse or circuit breaker.	Replace fuse or reset circuit breaker.
	Faulty wires; loose wiring plug on back of instrument panel.	Check wiring continuity; reconnect plugs on panel.
	Low air pressure; air leak.	Rebuild truck air pressure; check for and fix air leaks.
	Vibration from rough road surface affecting mercury switches.	Mercury switches located under the shields on the spraybar need to be readjusted.
Spraybar entire section not coming on.	Control switch for that section not activated.	Activate switch on instrument panel.
	Solenoid air valve for that section not coming on.	Check solenoid air valve by using manual override button. Check wiring and solenoid. Repair or replace.
	Air hose plugged, collapsed or broken.	Replace hose(s).

TROUBLESHOOTING CHART - SPRAYBAR & VALVES

SYMPTOM	CAUSE	REMEDY
Spraybar entire section not coming on (cont).	Asphalt feed hoses to that section are plugged or collapsed.	Clean or replace asphalt hose(s).
Spraybar sections spraying light.	Spraybar not heated properly.	Circulate asphalt in spraybar for several minutes before attempting to spray.
	Asphalt feed hose(s) partially plugged or collapsed.	Clean or replace hose(s).
Spraybar sprays streaks before coming on full.	Spraybar not heated properly.	Circulate asphalt in spraybar for several minutes.
	Asphalt pump not at correct speed.	Check flow and speed calibration factors and adjust if necessary. See **Asphalt Pump Troubleshooting**.
	Ground speed sensor not working properly.	See **Spraybar & Valves Troubleshooting** and **General Machine Troubleshooting**.
	Faulty wiring.	Check Radar Horn wiring. Check Controller wiring.
	Hydrostatic pump malfunction.	See **Asphalt Application Troubleshooting** and **Asphalt Pump Troubleshooting**.
	Truck transmission in too high a gear.	Use lower truck gear.
Spraybar lowers excessively. **NOTE: Normal lowering may be as much as 2 inches per hours.**	Internal leakage in the hydraulic cylinders or the valves. To check, raise the base end of the cylinders and open the rod end. If the bar doesn't settle, the problem is in the valves. If the bar does settle on the cylinders, repeat the check to see which cylinder is the problem.	Repack the cylinder or replace the valve section.
Spray valve (individual) staying ON or not fully closing.	Debris in spray valve.	Open spray valve, remove nozzle and clear debris with wire hook.
	Actuator handle on spray valve not correctly aligned with spray valve body.	Use Valve Alignment Wrench to align actuator with valve body. Refer to **Valves & Nozzles,** Section 3, Material & Operation.
Spray valve (individual) staying closed or not fully open.	Actuator handle on spray valve not correctly aligned with valve.	Use Valve Alignment Wrench to align actuator with valve body. Refer to **Valves & Nozzles,** Section 3, Material & Operation.

TROUBLESHOOTING CHART - TANK VALVES

SYMPTOM	CAUSE	REMEDY
Tank valves are difficult to operate.	Insufficient valve lubrication.	Lubricate valves.
	Cold asphalt material clogging valves.	Apply heat to valves with portable torch to restore operation. **NOTE: Do not heat air actuators or air lines.** Refer to **Cleanout Mode**, Section 3, Material & Operation.
	Low air pressure or no air pressure.	Increase truck air pressure to 90 - 110 PSI. Check for broken hoses.
	90 degree vane air actuators are stuck.	Check air actuators. They may not be getting lubricated or may be getting dirty air.
	Defective solenoid valve.	Replace valve. Contact a factory representative for help, if necessary.
Tank valves are stuck closed.	No air pressure on lift side (bottom) of spray valve air cylinder.	Check air solenoid valve operation. Check for kinked or blocked air hoses.
	Tank valve stem packing nut too tight.	Loosen stem nut slightly.

TROUBLESHOOTING CHART - GENERAL MACHINE

SYMPTOM	CAUSE	REMEDY
No GPM readout on display, or inconsistent readout.	Sensor not adjusted properly.	Contact a factory representative forinstructions on adjusting the sensor.
	Faulty wiring or sensor.	Check wiring and sensor. Replace if necessary.
Optional printer does not work.	Standard program shipped with the EZ-2S Controller does not include the software required to operate the printer.	Contact factory representative for program changes.
Ground speed reading when truck isn't moving. **NOTE: Ground speed reading with the truck not moving is fairly common and will not total as long as Spraybar Master switch is OFF or in Bar Crclt mode.**	Truck parked over/near open water or waving grass. Loose piece of trash hung up on or near the Radar Horn face. Mounting bolts on bracket of Radar Horn are loose. Radar Horn is picking up: • PTO shaft rotation • engine fan rotation • engine exhaust leaks • system vibration	Move truck to a clean, dry, litter-free area of pavement and check FPM reading. Inspect the area near the Radar Horn face and clean as needed. Tighten bolts. **NOTE: Radar Horn mountings are checked at factory prior to shipment. All work correctly when they leave. It may be necessary to remount sensor at a slightly different angle (redrill bracket) or rotate sensor and face it towards rear of truck at the same downward angle. The sensor gives an absolute speed reading so it doesn't matter which direction it is facing. The speed factor will have to be recalibrated in either case. See Section 3, Material & Operation. Shielding the radar horn from other interfering signal inputs may also be effective.**
No ground speed reading on display.	No power to Radar Horn.	Check fuses, circuit breakers and wiring. Replace, reset or repair as needed.

TROUBLESHOOTING CHART - GENERAL MACHINE

SYMPTOM	CAUSE	REMEDY
No ground speed reading on display (cont).	Vehicle not moving.	Vehicle must be moving to show ground speed reading.
	Obstruction blocking Radar Horn signal from reaching the ground.	Clear the obstruction.
	Faulty Radar Horn.	Replace Radar Horn.
Machine vibrates.	PTO drive shaft u-joints worn.	Replace u-joints.
	PTO drive shaft out of balance.	Have drive shaft balanced by qualified repair shop.
	Drive shaft not phased correctly.	Have drive shaft phased with both yoke ends parallel to each other. Just on spline off creates vibration.
	Input and output angles of drive shaft not equal or at angles greater than 8 degrees.	Check for worn/loose pump mounts. Realign pump with input at equal angle to PTO output.
	Hydraulic pump mounting bolts or bracket bolts loose.	Tighten bolts.
	Asphalt pump cavitating and running too fast.	Troubleshoot cause of pump cavitation; decrease pump speed.
Machine vibrates at front only.	Engine or driveline problems with truck.	Have truck inspected and repaired by qualified dealer mechanic.
	Set screw holding the splined coupling on the pump shaft is loose, allowing the coupling to back up.	Push the splined coupling back on to the pump shaft and torque the set screw to 24 Ft/Lb and replace locking wire.
	Drive shaft has been reassembled improperly and is out of balance.	Insure that the alignment arrows on the drive shaft are in line. If not, disassemble and realign.
	Bolts holding the drive shaft to the engine crankshaft are loose and have allowed the drive shaft to move out of alignment.	Align and properly torque the drive shaft to the engine crankshaft.
	Hydraulic pump mount has moved.	Loosen mounting bolts. Realign the pump and retighten the bolts.

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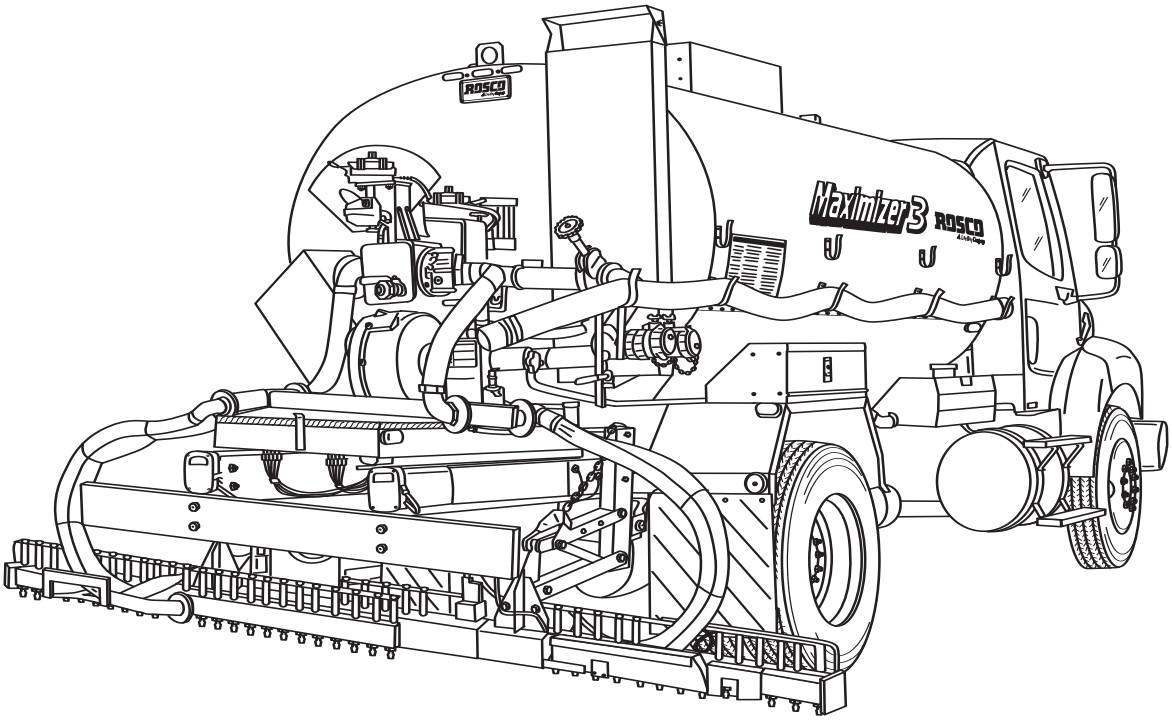
ILLUSTRATED PARTS LIST



MAXIMIZER3 ASPHALT DISTRIBUTOR

Manual No. 38409-01

For Units With Serial No. 40177 and higher

Revised 03-15-06

INTRODUCTION

This Illustrated Parts List (IPL) is intended for use in identifying and requisitioning replacement parts.

ILLUSTRATED PARTS LIST

EXPLANATION OF PAGE NUMBERING

The IPL is arranged in sections, and page numbers within each section begin with a hundred number series, signifying the section.

HOW TO USE THE IPL

In column 1, FIG refers to the corresponding illustration, and ITEM refers to the item number for the referenced illustration.

Parts with a dash preceding the ITEM number are not illustrated.

In column 2, PART NUMBER refers to the associated FIG and ITEM in column 1.

In column 3, NOMENCLATURE refers to the description of the associated PART NUMBER. Bullets preceding the description are explained in **General System Of Assembly Order**, in following paragraphs.

In the case of sub-assemblies, parts are captioned ATTACHING PARTS and are listed immediately following the attached part(s). The -----*----- symbol follows the last item of the attached parts group.

In column 4, UNITS PER ASSY refers to the quantity required to assemble the item illustrated in the associated FIG. Unit of measure may be EACH, FT, LBS or other.

In the case of sub-assemblies, the quantities listed for the attaching parts are the quantity required to attach one item.

NHA notations at item descriptions refer to Next Higher Assembly.

On the associated illustrations, numbers in parentheses next to the item number, refer to the quantities used at that assembly location.

EXPLANATION OF PART NUMBERS

If standard parts (those with AN, MS, NAF, NAS prefixes) are used, the standard part number is listed in the PART NUMBER column.

If a company other than LeeBoy is referred to as the original manufacturer, these parts may carry the original manufacturer's part number or a LeeBoy part number. These manufacturers are identified by an appropriate vendor code following the nomenclature. If the part number is a LeeBoy part number, the original manufacturer's part number is given after his vendor code. Vendor codes are in accordance with the current issue of Cataloguing Handbook , "Commercial and Government Entity" (H4-1 and H4-2) and are preceded by the capital letter "V".

When a vendor code cannot be obtained from the H4-1 and H4-2 Cataloguing Handbook, the manufacturer's full name and address are included in the parts list. Government standard parts such as AN, MS, NAF and NAS parts are not identified with a vendor code.

GENERAL SYSTEM OF ASSEMBLY ORDER

The indenture system used in the Illustrated Parts List shows relationship of parts and assemblies to the next higher assembly or installation as follows:

1 2 3 4 5 6 7

Installation

- Detail parts for installation
- Assembly
- Attaching parts for assembly

-----*-----

•• Detail parts for assembly
•• Sub-assembly
•• Attaching parts for sub-assembly

-----*-----

••• Detail parts for sub-assembly
••• Sub-sub-assembly
••• Attaching parts for sub-sub-assembly

-----*-----

•••• Detail parts for sub-sub-assembly

ALPHABETICAL INDEX

An Alphabetical Index is provided as a supplement at the end of the Illustrated Parts List.

EQUIPMENT DESIGNATOR INDEX

If equipment designators are used in place of part numbers at any place in the IPL, an Equipment Designator Index is provided, listing all equipment designators listed in the Illustrated Parts List.

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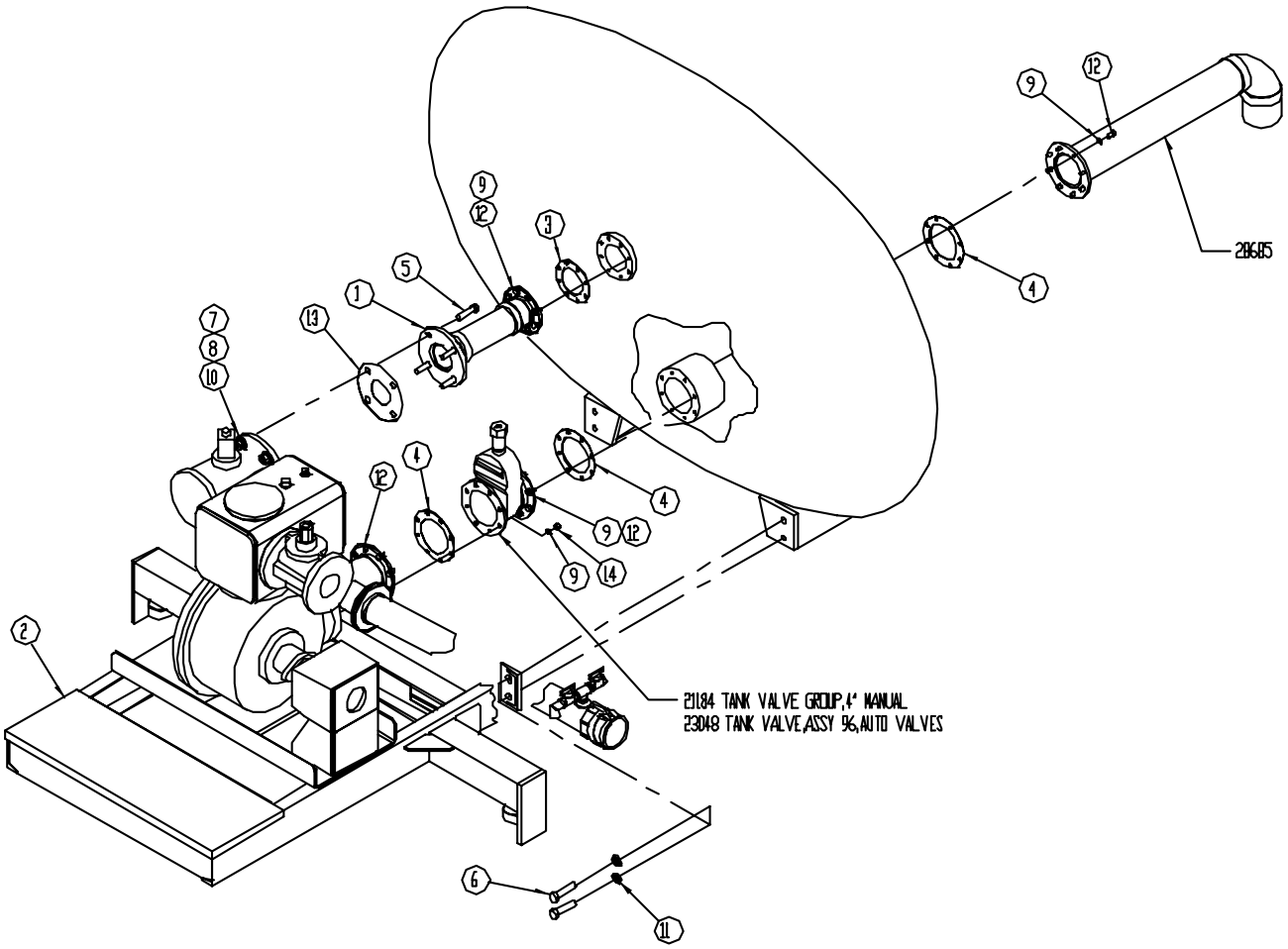


FIGURE 1-1. PLATFORM INSTALLATION, W/O HANDRAIL

TABLE 1-1. PLATFORM INSTALLATION, W/O HANDRAIL

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-1	**22712**	**PLATFORM INSTALLATION, W/O HANDRAIL**	**1**
1	20841	•HOSE,FLEX,MET,3.00X13.94	1
2	22711	•REAR PLATFORM & PIPING ASSY,96 (SEE FIG 1-2)	1
3	34981	•GASKET,3" FLANGE	1
4	34983	•GASKET,4" FLANGE	3
5	71640	•CSHH,.625-11X2.50,GR571678	4
6	71643	•CSHH,.750-10X1.75,GR5	4
7	80042	•NUT,HEX,.625-11	4
8	80146	•WASHER,TYPE A PLAIN,.625	4
9	80162	•WASHER,LOCK,.375	32
10	80166	•WASHER,LOCK,.625	4
11	80168	•WASHER,LOCK,.750	4
12	80219	•CSHH,.375-16X.75,GR5	32
13	911	•GASKET,3.00 COMPANION FLANGE	1
14	80038	•NUT,HEX,.375-16	8

See IPL-7 for optional Return Line Valve.

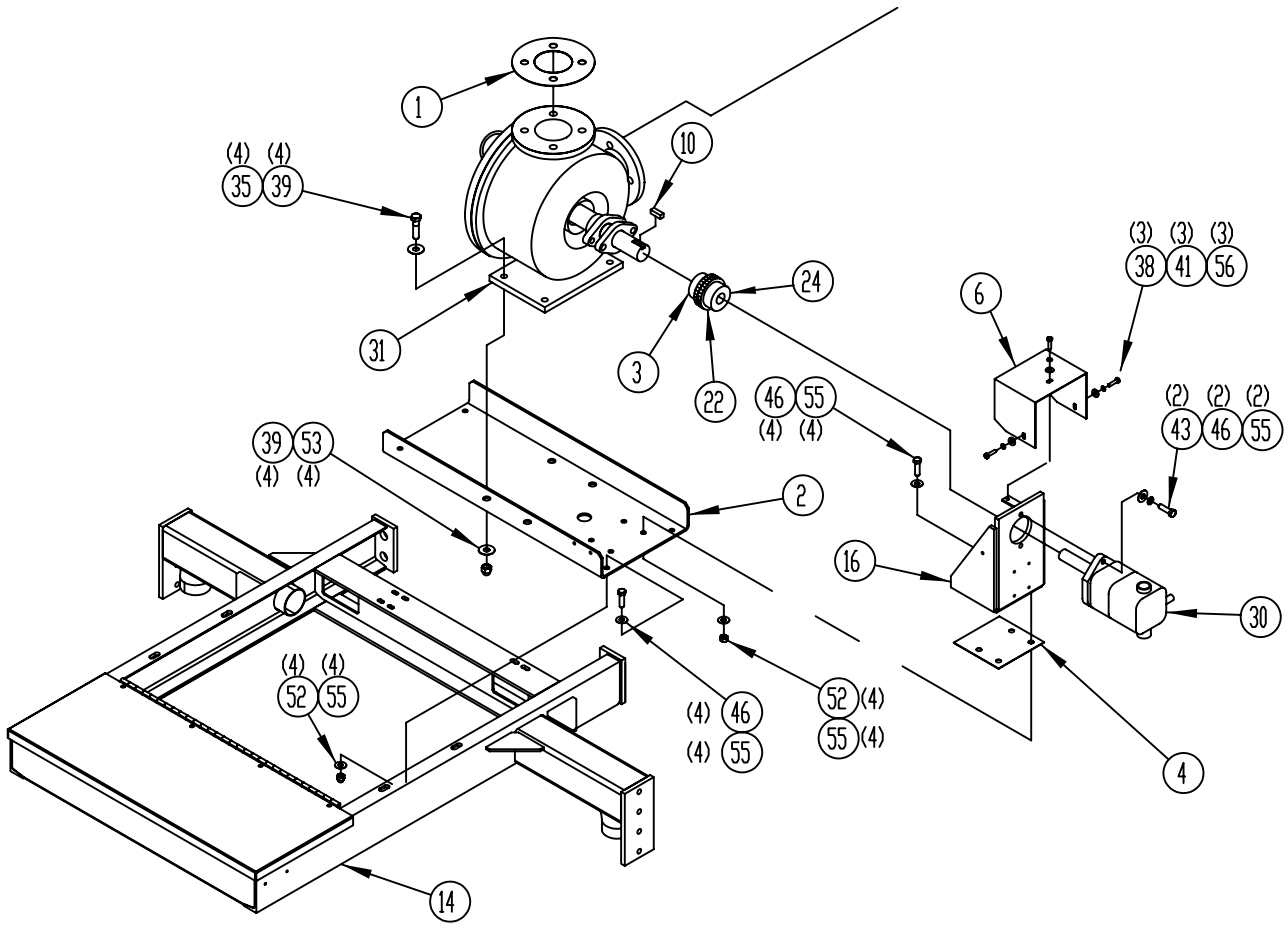


FIGURE 1-2. REAR PLATFORM & PIPING ASSY (SHEET 1 OF 2)

TABLE 1-2. REAR PLATFORM & PIPING ASSY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-2	**22711**	**•REAR PLATFORM & PIPING (SEE FIG 1-1 FOR NHA)**	**1**
1	1488	••GASKET,FLANGE,4.00	2
2	15772	••PLATFORM,PUMP	1
3	34985	••COUPLING HALF,PUMP	1
4	15787	••SHIM,MOTOR MOUNT	4
5	16420	••LOAD & SUCTION TEE W/M	1
6	16460	••GUARD	1
7	16464	••VLV,PLUG,3.00 2-WAY,MODIFIED	1
-701	34970-01	•••SEAL KIT,602 VLV	A/R
8	16465	••VLV,PLUG,3.00 3-WAY,MODIFIED	1
-801	34971-01	•••SEAL KIT,606 VLV	A/R
10	17431	••KEY,SQ,.500X1.75	1
11	19798	••COVER,STRAINER ACCESS	1
12	19800	••STRAINER W/M,DISCH MANIFOLD	1
13	21808	••WELDMENT,LOAD LINE,MODIFIED	1
14	25237	••PLATFORM W/M	1
15	22697	••PUMP DISCHARGE MANIFOLD W/M	1
16	22710	••MOTOR MOUNT,2000	1
17	28519	••SCREEN,WLDMT,CONE	1
18	36863	••CLAMP,HOSE,#K-24 KNOX	2
19	280210	••VALVE,BALL,1.00	2
20	34981	••GASKET,3" FLANGE	2
21	34983	••GASKET,4" FLANGE	1
22	34987	••COUPLING CHAIN W/ CONN. PIN	1
24	35043	••HALF COUPLING,MOTOR,1 1/4 SHAFT	1
25	35554	••THREADLOCKER,HIGH TEMP 272	0.01
26	36359	••GASKET,STRAINER ACCESS	1
27	36360	••SEALANT,PIPE,W/TEFLON,8.45 OZ	0.25
28	36622	••VLV,BALL,08 NPT,T HANDLE	2
29	36999	••HOSE,1.00 ID,HOT ASPHALT	1.5
30	37196	••MOTOR,HYD,2000 SERIES	1
-31	37196-1	•••GPM SENSOR	1
32	6289	••FITT,QD 3.00F-3.00FP,BRASS	1
-3201	6573	•••GSKT,3.00,CPLG,HOT OIL,BUNA	1

- ITEM NOT ILLUSTRATED

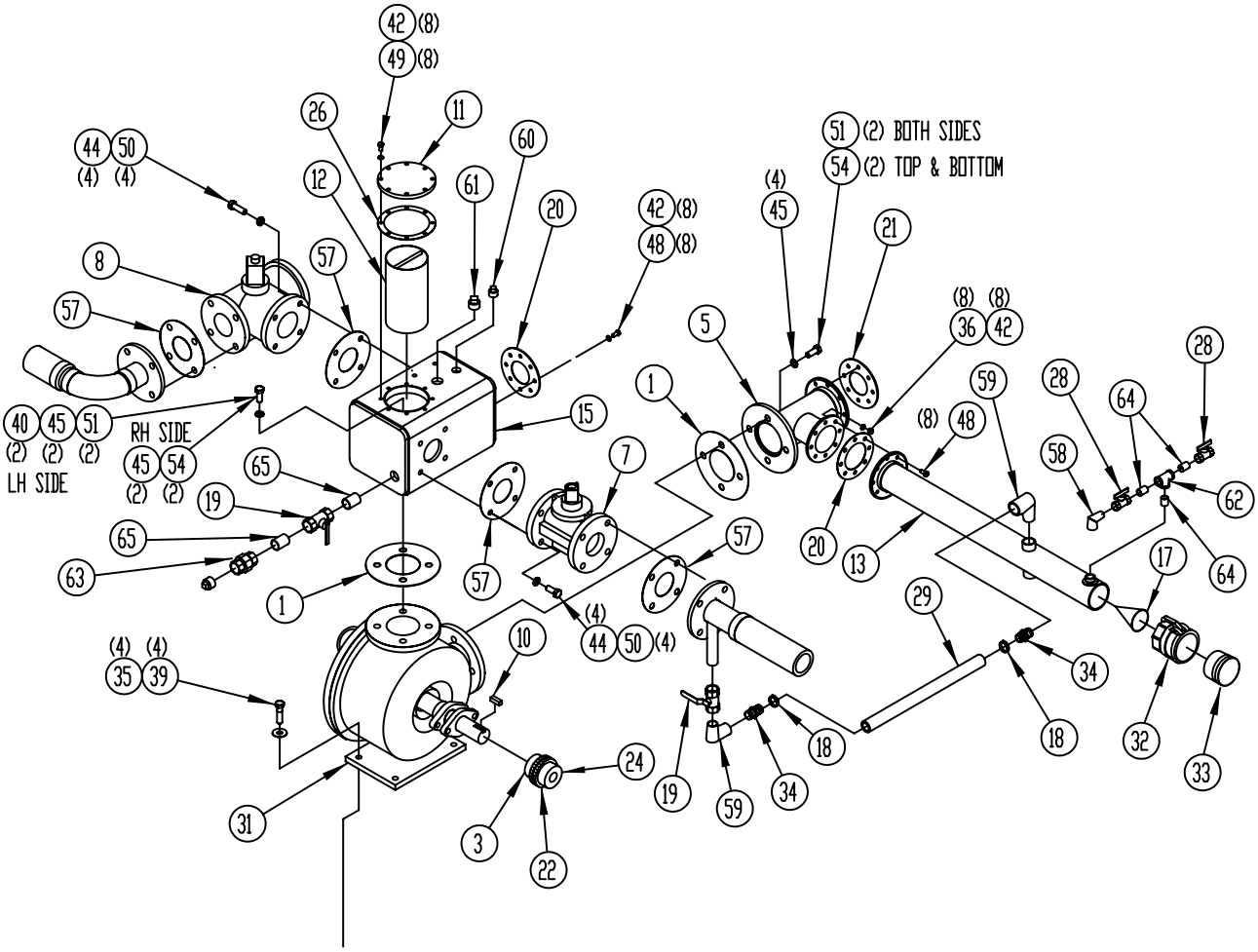


FIGURE 1-2. REAR PLATFORM & PIPING ASSY (SHEET 2 OF 2)

TABLE 1-2. REAR PLATFORM & PIPING ASSY (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-2	22711		
33	6290	••FITT,QD 3.00 PLUG	1
34	70036	••FITT,STR 16MP-16HB,CRIMPED	2
35	71640	••CSHH,.625-11X2.50,GR571678	4
36	80038	••NUT,HEX,.375-16	8
38	80141	••WASHER,FLAT,USS,.312	3
39	80146	••WASHER,TYPE A PLAIN,.625	8
40	80147	••WASHER,TYPE A PLAIN,.750	2
41	80161	••WASHER,LOCK,.312	3
42	80162	••WASHER,LOCK,.375	24
43	80164	••WASHER,LOCK,.500	2
44	80166	••WASHER,LOCK,.625	8
45	80168	••WASHER,LOCK,.750	8
46	80186	••CSHH,.500-13X1.75,GR5	10
48	80219	••CSHH,.375-16X.75,GR5	16
49	80224	••CSHH,.375-16X1.25,GR5	8
50	80280	••CSHH,.625-11X1.50,GR5	8
51	80291	••CSHH,.750-10X1.25,GR5	4
52	80354	••NUT,FLEXLOC,.500-13,FULL,LT	8
53	80356	••NUT,FLEXLOC,.625-11,FULL,LT	4
54	80500	••CSHH,.750-10X1.50,GR5	4
55	80695	••WASHER,SAE PLAIN,.500	18
56	80967	••CSHH,.312-18X.62,GR5	3
57	911	••GASKET,3.00 COMPANION FLANGE	4
58	99526	••PIPE,90,08MP-O8FP,MI	1
59	99528	••PIPE,90,16MP-16FP,MI	2
60	99538	••PIPE,PLUG,12MP,SQ HD,MI	1
61	99539	••PIPE,PLUG,16MP,SQ HD,MI	1
62	99569	••PIPE,TEE,08FP,MI	1
63	99589	••PIPE,UNION,16FP,MI	1
64	99596	••PIPE,NIPPLE,08XCLOSE	3
65	99606	••PIPE,NIPPLE,16XCLOSE	2

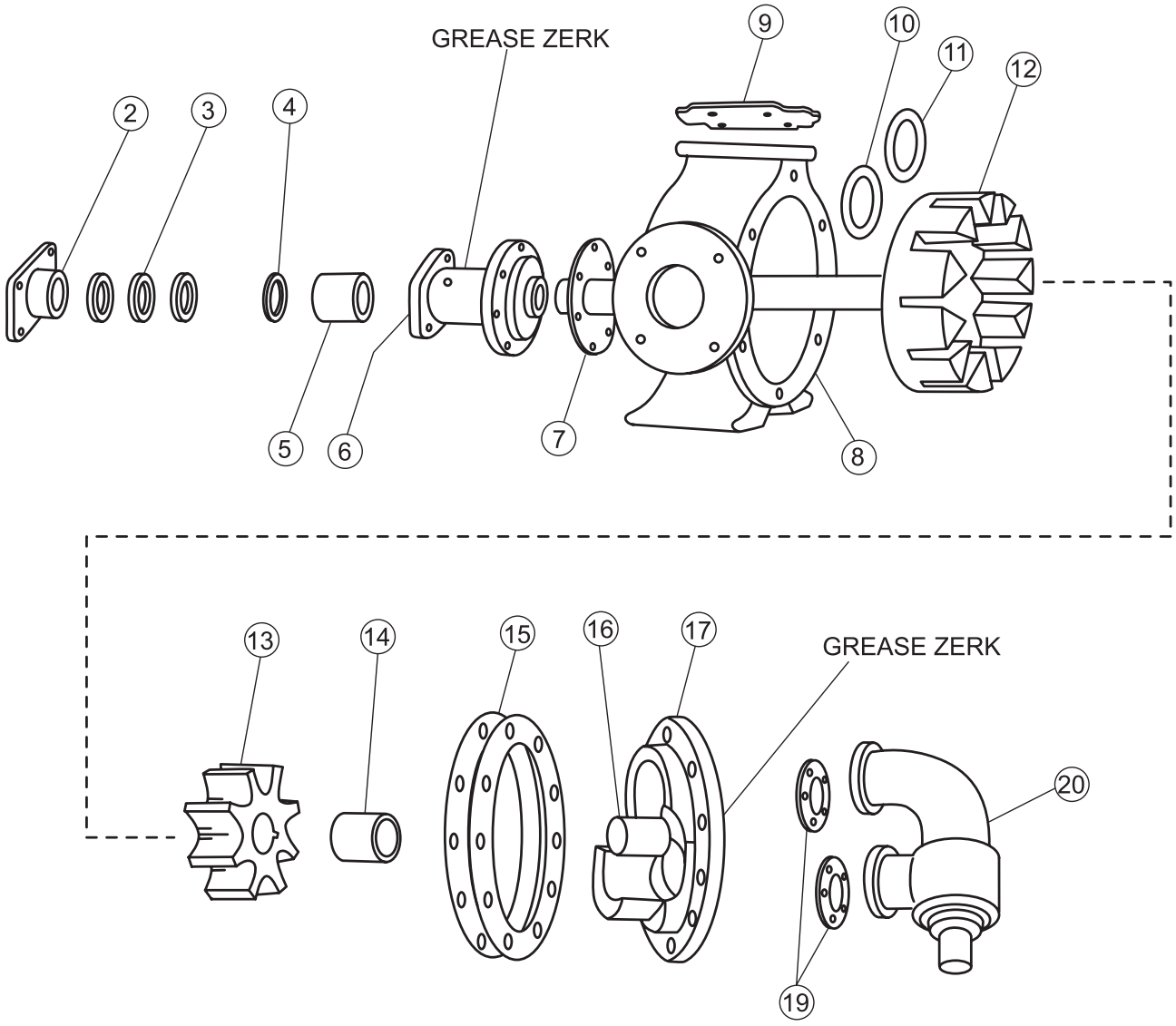


FIGURE 1-3. ASPHALT PUMP

TABLE 1-3. ASPHALT PUMP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-3	**4165-16**	**ASPHALT PUMP, VIKING**	**1**
2	5257	•PACKING GLAND	1
3	5249	•PACKING,10 PCS PER PACK	1
4	32821	•PACKING RETAINER WASHER	1
5	5247	•ROTOR BEARING SLEEVE BUSHING ONLY	1
6	5250	•ROTOR BEARING WITH BUSHING SLEEVE	1
7	6541	•ROTOR BEARING SLEEVE GASKET	1
8	5240	•CASING	1
9	1488	•GASKET,FLANGE,4.00	1
10	5251	•ROTOR BEARING SLEEVE WASHER	1
11	5248	•ROTOR THRUST WASHER	1
12	5241	•ROTOR AND SHAFT	1
13	5244	•IDLER WITH BUSHING	1
14	5255	•IDLER BUSHING ONLY	1
15	5246	•HEAD GASKET SET	1
16	5253	•IDLER PIN (For illustration only. Not sold separately.)	1
17	6313	•HEAD WITH IDLER PIN	1
19	6314	•RELIEF VALVE GASKET SET	1
20	6315	•RELIEF VALVE ASSY (SEE FIG 1-4)	1

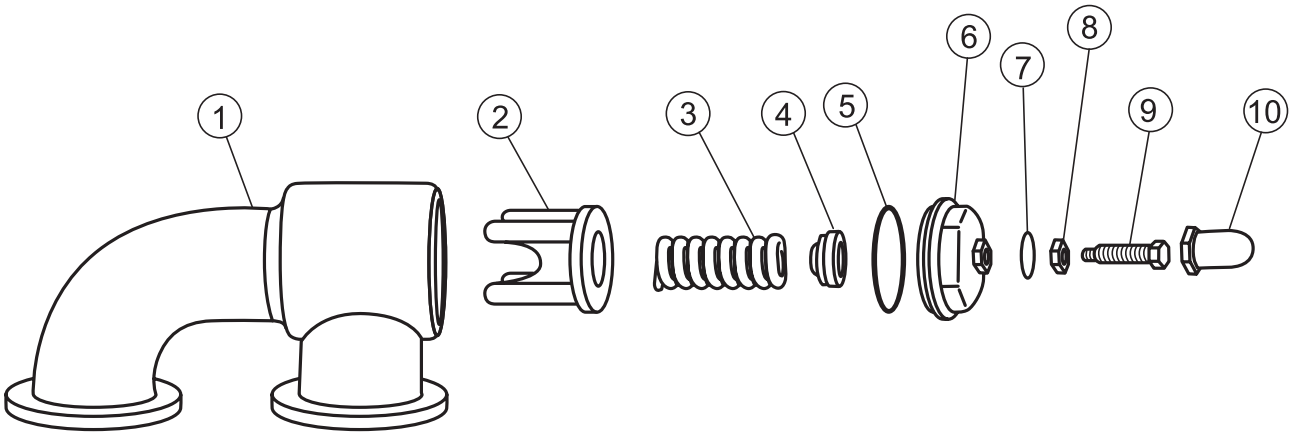


FIGURE 1-4. ASPHALT PUMP RELIEF VALVE

TABLE 1-4. ASPHALT PUMP RELIEF VALVE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-4	**6315**	**•RELIEF VALVE (SEE FIG 1-3 FOR NHA)**	**1**
1	6315-6	••VALVE BODY	1
2	6315-8	••POPPET	1
3	6315-7	••SPRING	1
4	6315-4	••SPRING GUIDE	1
5	6315-9	••FLAT BONNET GASKET	1
6	6315-5	••BONNET	1
7	6315-10	••FLAT CAP GASKET	1
8	6315-3	••LOCKNUT	1
9	6315-2	••ADJUSTING SCREW	1
10	6315-1	••CAP	1

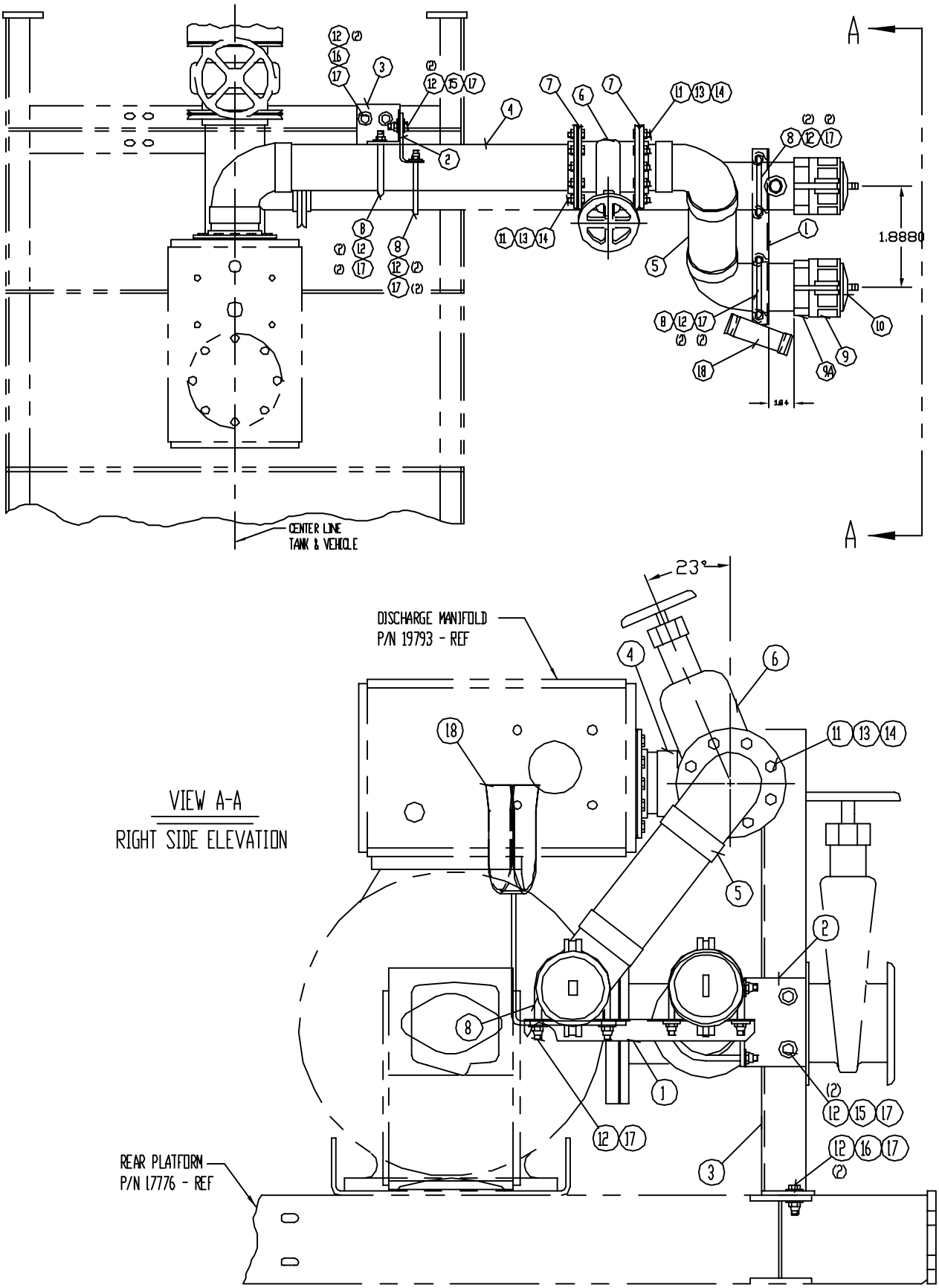


FIGURE 1-5. TRANSFER LINE, GROUND LEVEL

TABLE 1-5. TRANSFER LINE, GROUND LEVEL

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-5	**19895**	**TRANSFER LINE, GROUND LEVEL**	**1**
1	15855	•BRACKET,TRANSFER LINE SUPPORT	1
2	17374	•BAR,LOAD LINE SUPPORT	1
3	17376	•SUPPORT,W/M,LOAD & TRANSFER	1
4	19891	•TRANSFER LINE,UPPER,GRD LEVEL	1
5	19892	•TRANSFER LINE,LOWER,GRD LEVEL	1
6	34973	•VLV,GATE,3.00,FLANGED	1
7	34981	•GASKET,3" FLANGE	2
8	35089	•U-BOLT,.375-16,3.62IW,4.62IL	4
9	6289	•FITT,QD 3.00F-3.00FP,BRASS	1
9A	6573	••GSKT,3.00,CPLG,HOT OIL,BUNA	1
10	6290	•FITT,QD 3.00PLUG	1
11	80038	•NUT,HEX,.375-16	16
12	80142	•WASHER,FLAT,USS,.375	16
13	80162	•WASHER,LOCK,.375	16
14	80219	•CSHH,.375-16X.75,GR5	16
15	80224	•CSHH,.375-16X1.25,GR5	2
16	80226	•CSHH,.375-16X1.50,GR5	2
17	80352	•NUT,FLEXLOC,.375-16,FULL,LT	12
18	28847	•HOLSTER,LOAD HOSE	1

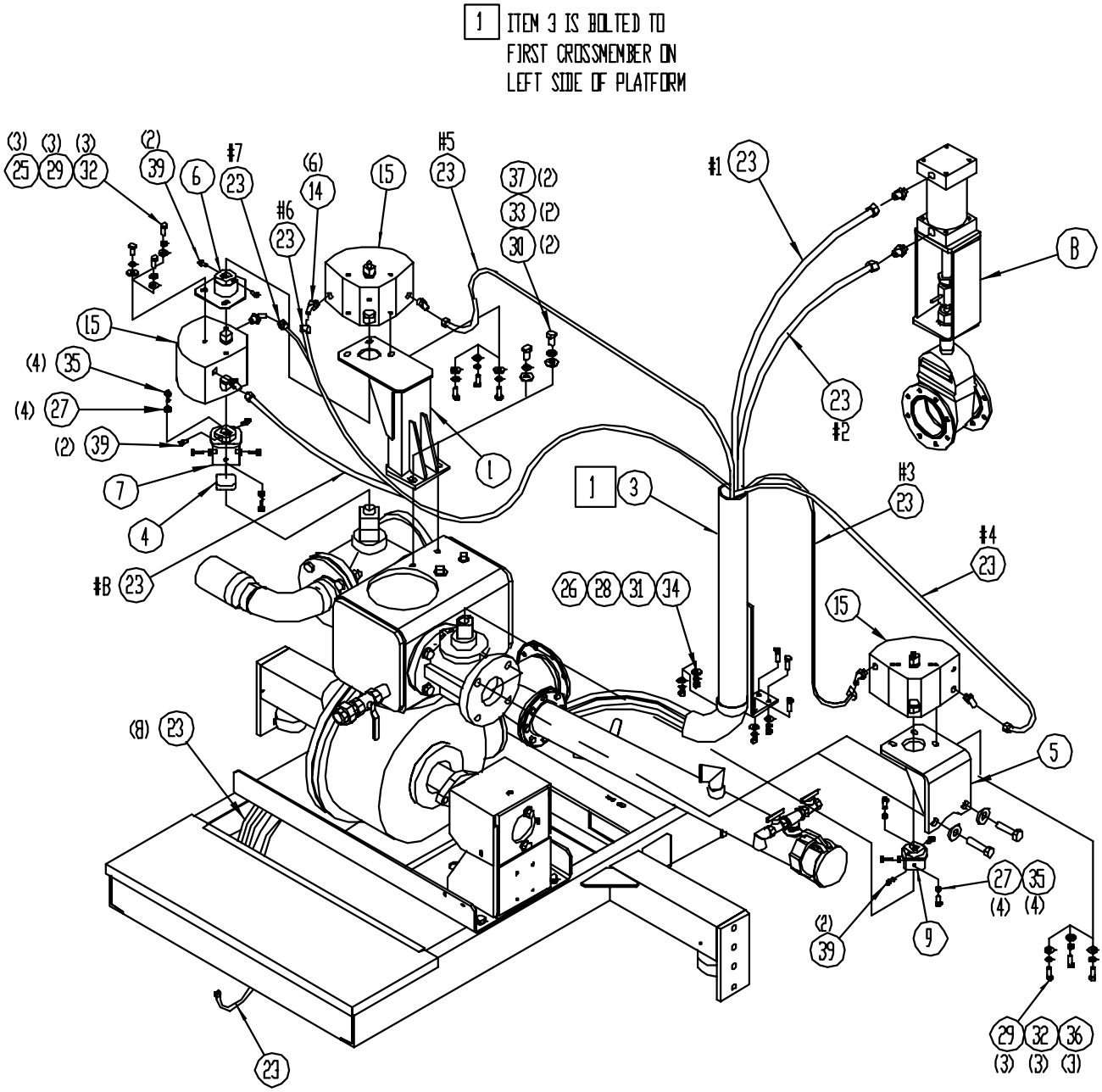


FIGURE 1-6. AUTOMATIC VALVES, CAB CONTROL

TABLE 1-6. AUTOMATIC VALVES, CAB CONTROL

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-6	**28291**	**AUTOMATIC VALVES, CAB CONTROL**	**1**
1	16431	•BRACKET,W/M,DBL ACTR	1
3	23503	•BRACKET,W/M,HOSE GUARD	1
4	20596	•SPACER,SOCKET,3.00 3 WAY VALVE	1
5	22638	•BRKT,MOUNT,SGL ACTUATOR W/M	1
6	22775	•CONNECTOR WLDMT,ACTUATOR	1
7	22776	•SOCKET WLDMT,2 SQ	1
8	27136	•VLV,ASSY,TANK,4 INCH (SEE FIG 1-7)	1
9	23059	•SOCKET WLDMT,1.50 SQ	1
11	37463	•FITT,STR 04MJ-08MP	2
14	33115	•FITT,45 04MJ-04MP	6
15	35149	•ACTUATOR,VANE,90 DEGREES	3
-1501	35149-01	••SEAL KIT,ACTUATOR (FOR ITEM 15)	1
22	35926	•TERM,PUSH-ON,.25,FEM,22-18 GA	4
23	23553	•KIT,HOSE & ADAPTER,AUTO VALVE	1
		ATTACHING PARTS	
#1	23553-01	••HOSE ASSY,AUTO VALVE,84.00 LG	1
#2	23553-02	••HOSE ASSY,AUTO VALVE,84.00 LG	1
#3	23553-03	••HOSE ASSY,AUTO VALVE,106.00 LG	1
#4	23553-04	••HOSE ASSY,AUTO VALVE,95.00 LG	1
#5	23553-05	••HOSE ASSY,AUTO VALVE,87.00 LG	1
#6	23553-06	••HOSE ASSY,AUTO VALVE,99.00 LG	1
#7	23553-07	••HOSE ASSY,AUTO VALVE,88.00 LG	1
#8	23553-08	••HOSE ASSY,AUTO VALVE,95.00 LG	1
		-----*-----	
25	71622	•CSHH,.375-16X.88,GR5	3
26	80037	•NUT,HEX,.312-18	4
27	80073	•NUT,HEX,JAM,.312-18	8
28	80141	•WASHER,FLAT,USS,.312	4
29	80142	•WASHER,FLAT,USS,.375	9
30	80144	•WASHER,FLAT,USS,.500	2
31	80161	•WASHER,LOCK,.312	4
32	80162	•WASHER,LOCK,.375	9

- ITEM NOT ILLUSTRATED

TABLE 1-6. AUTOMATIC VALVES, CAB CONTROL (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-6	**28291**		
33	80164	•WASHER,LOCK,.500	2
34	80206	•CSHH,.312-18X1.25,GR5	4
35	80208	•CSHH,.312-18X1.00,GR5	8
36	80221	•CSHH,.375-16X1.00,GR5	6
37	80248	•CSHH,.500-13X1.00,GR5	2
39	80397	•SET S,HSKT,KCUP,.312-18X.50	6

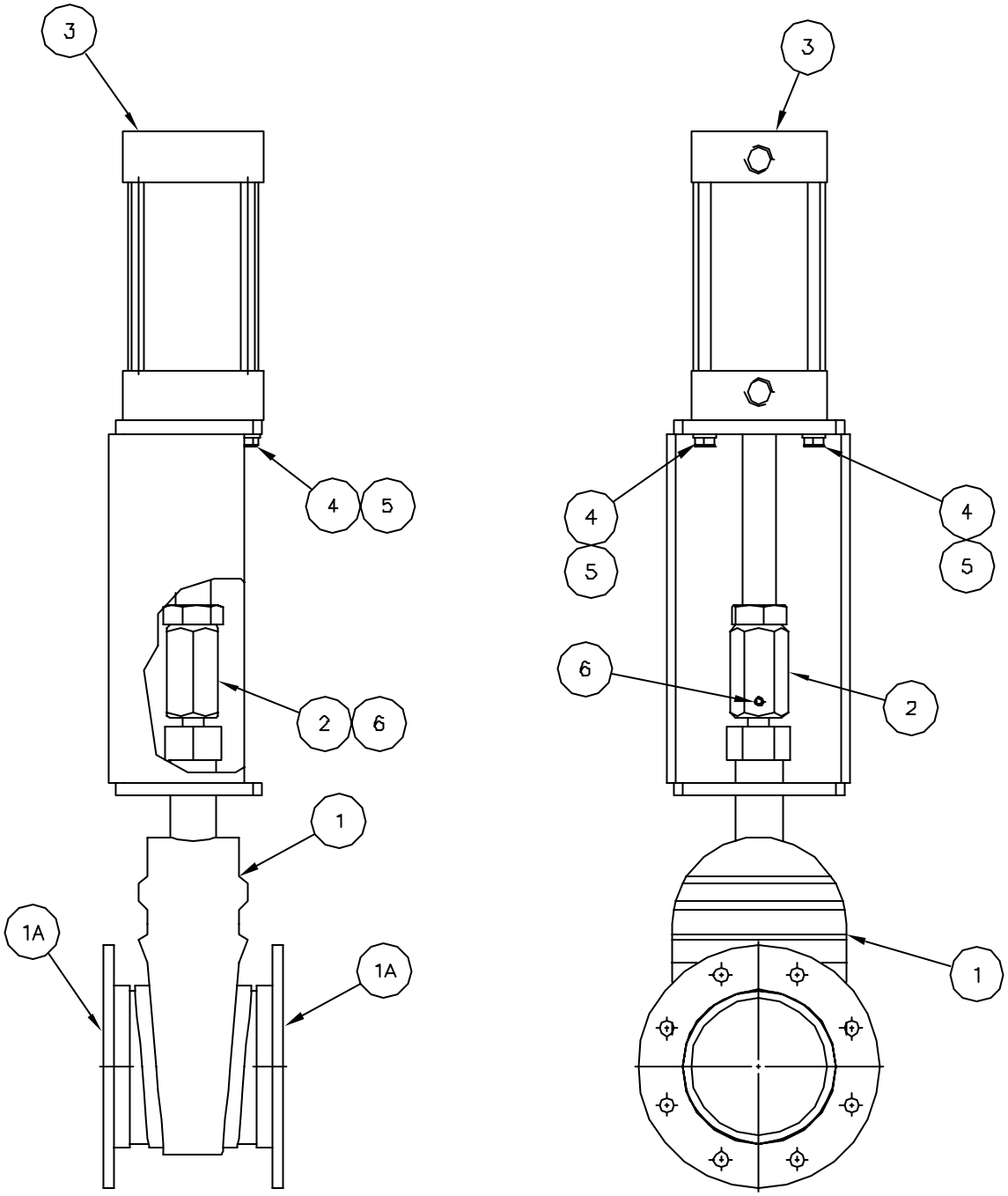


FIGURE 1-7. TANK VALVE ASSEMBLY

TABLE 1-7. TANK VALVE ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-7	**27136**	**•TANK VALVE ASSY, 4" (SEE FIG 1-6 FOR NHA)**	**1**
1	27135	••VLV,WLDMT,TANK,4"	1
1A	34983	•••GASKET,4" FLANGE	2
2	27137	••CONNECTOR,TANK VALVE	1
3	37301	••CYL,3/50X4.00,2.50PSI,11.17 OA	1
4	80162	••WASHER,LOCK,.375	4
5	80222	••CSHH,.375-24X1.00,GR5	4
6	80345	••ROLL PIN,.250X1.50	1
7	34972-01	••PACKING SET,3 RINGS	A/R

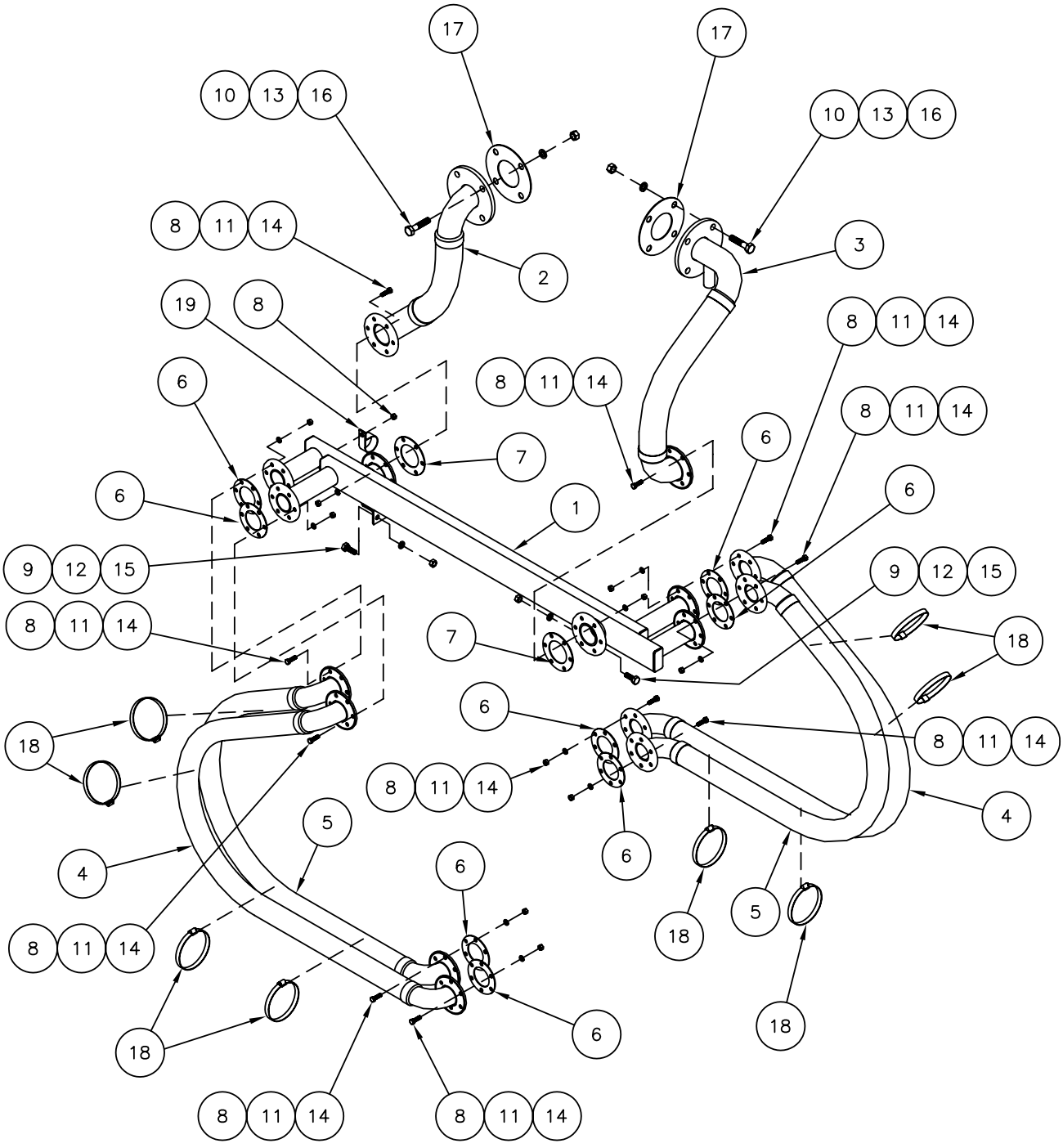
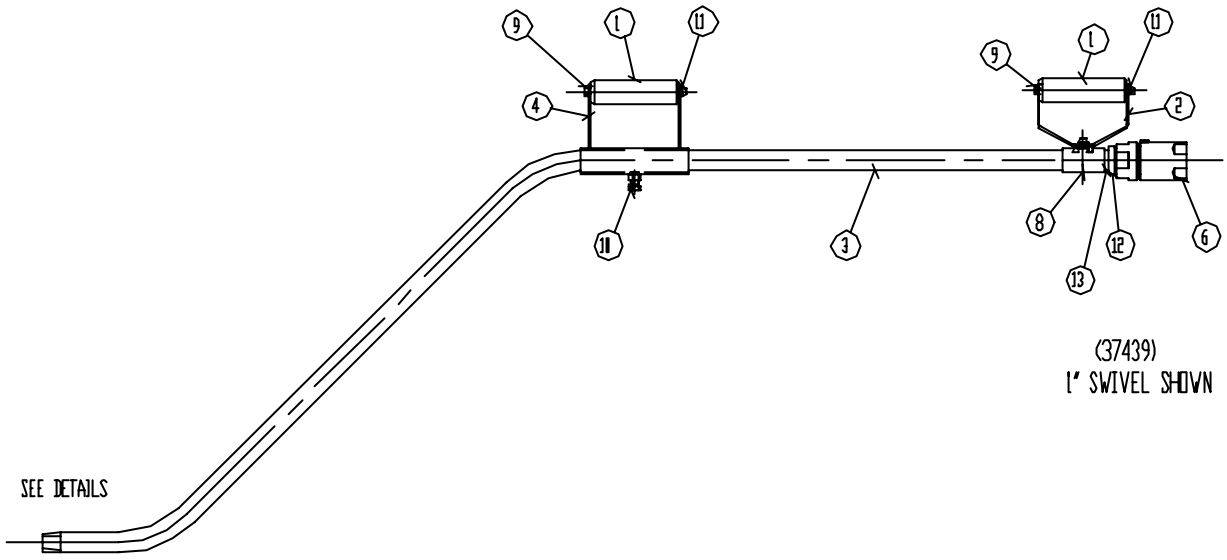
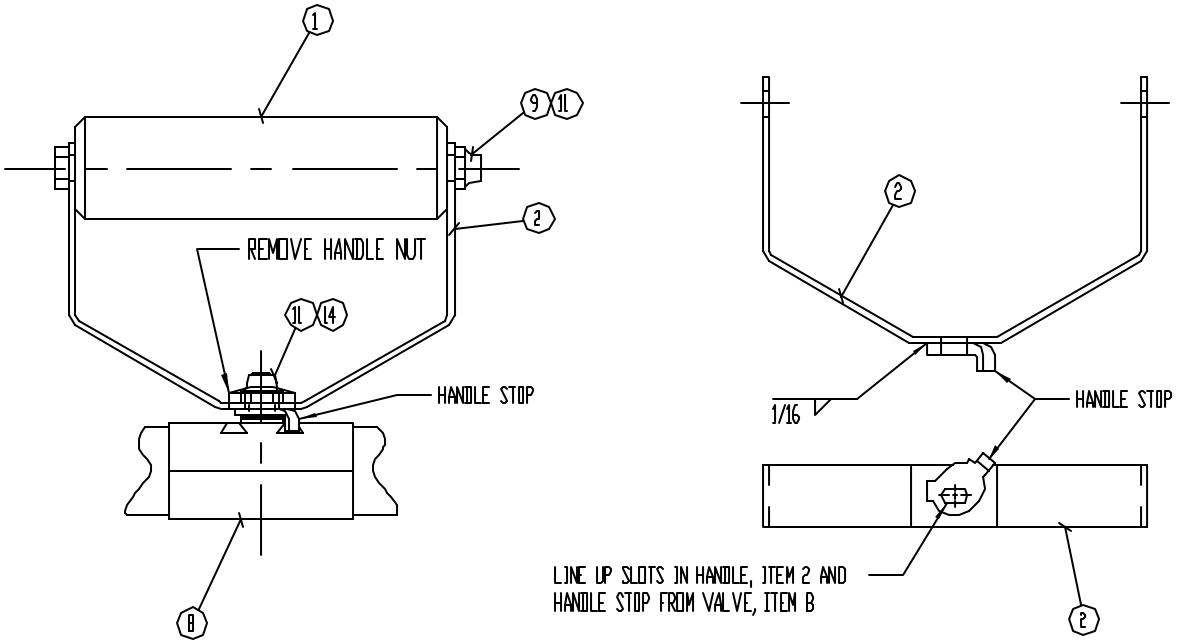


FIGURE 1-8. FLEX HOSE ASSEMBLY

TABLE 1-8. FLEX HOSE ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-8	**26145**	**FLEX HOSE ASSEMBLY**	**1**
1	25963	•MANIFOLD,MAXIII	1
2	26137	•HOSE,FEED,LH,MAX3	1
3	26138	•HOSE,FEED,RH,MAX3	1
4	26146	•HOSE,SPRAYBAR FEED,2.00IDX80	2
5	26147	•HOSE,SPRAYBAR FEED,2.00IDX72	2
6	38153	•GASKET,2.00 FLANGE	8
7	38212	•GASKET,2.50,FLANGE,GRAPHITE	2
8	80038	•NUT,HEX,.375-16	61
9	80040	•NUT,HEX,.500-13	4
10	80042	•NUT,HEX,.625-11	8
11	80162	•WASHER,LOCK,.375	60
12	80164	•WASHER,LOCK,.500	4
13	80166	•WASHER,LOCK,.625	8
14	80221	•CSHH,.375-16X1.00,GR5	60
15	71627	•CSHH,.500-13X1.50,GR5	4
16	80287	•CSHH,.625-11X3.00,GR5	8
17	911	•GASKET,3.00 COMPANION FLANGE	2
18	851437	•CLAMP,HOSE,#72 (4”)	8
19	36894	•CLAMP,LOOP,2.00 OD,PLSTC COVER	1
TBD	26146-H	HOSE,S-BAR FEED,2X80,HASTALLOY	A/R
TBD	26147-H	HOSE,S-BAR FEE,2X72,HASTALLOY	A/R





VALVE REWORK DETAIL

FIGURE 1-9. HANDSPRAY WAND ASSEMBLY (SHEET 1 OF 2)

TABLE 1-9. HANDSPRAY WAND ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-9	**18595**	**HANDSPRAY WAND ASSEMBLY**	**1**
1	1557	•HANDLE,HAND SPRAY	2
2	23489	•BENT HANDLE,BALL VALVE	1
3	18593	•WAND,HANDSPRAY	1
		ATTACHING PARTS	
-	18595-1	•HANDSPRAY WAND,1 NOZZLE,W/SWIVEL	1
5	91158	••PIPE,90,12FP-08FP,GALV	1
6	37439	••SWIVEL,IN-LINE,16FP	1
7	32923	••NOZZLE, #6	1
		-----*-----	
		ATTACHING PARTS	
-	18595-2	•HANDSPRAY WAND,2 NOZZLES,W/SWIVEL	1
5	19576	••SPRAYBAR,HANDSPRAY,2-NOZZLES	1
6	37439	••SWIVEL,IN-LINE,16FP	1
7	32923	••NOZZLE, #6	2
		-----*-----	
		ATTACHING PARTS	
-	18595-3	•HANDSPRAY WAND,3 NOZZLES,W/SWIVEL	1
5	19578	••SPRAYBAR,HANDSPRAY,3-NOZZLES	1
6	37439	••SWIVEL,IN-LINE,16FP	1
7	32923	••NOZZLE, #6	3
		-----*-----	
		ATTACHING PARTS	
-	18595-4	•HANDSPRAY WAND,1 NOZZLE,NO SWIVEL	1
5	91158	••PIPE,90,12FP-08FP,GALV	1
6	90126	••PIPE,CPLG,1.00	1
7	32923	••NOZZLE, #6	1
		-----*-----	

- ITEM NOT ILLUSTRATED

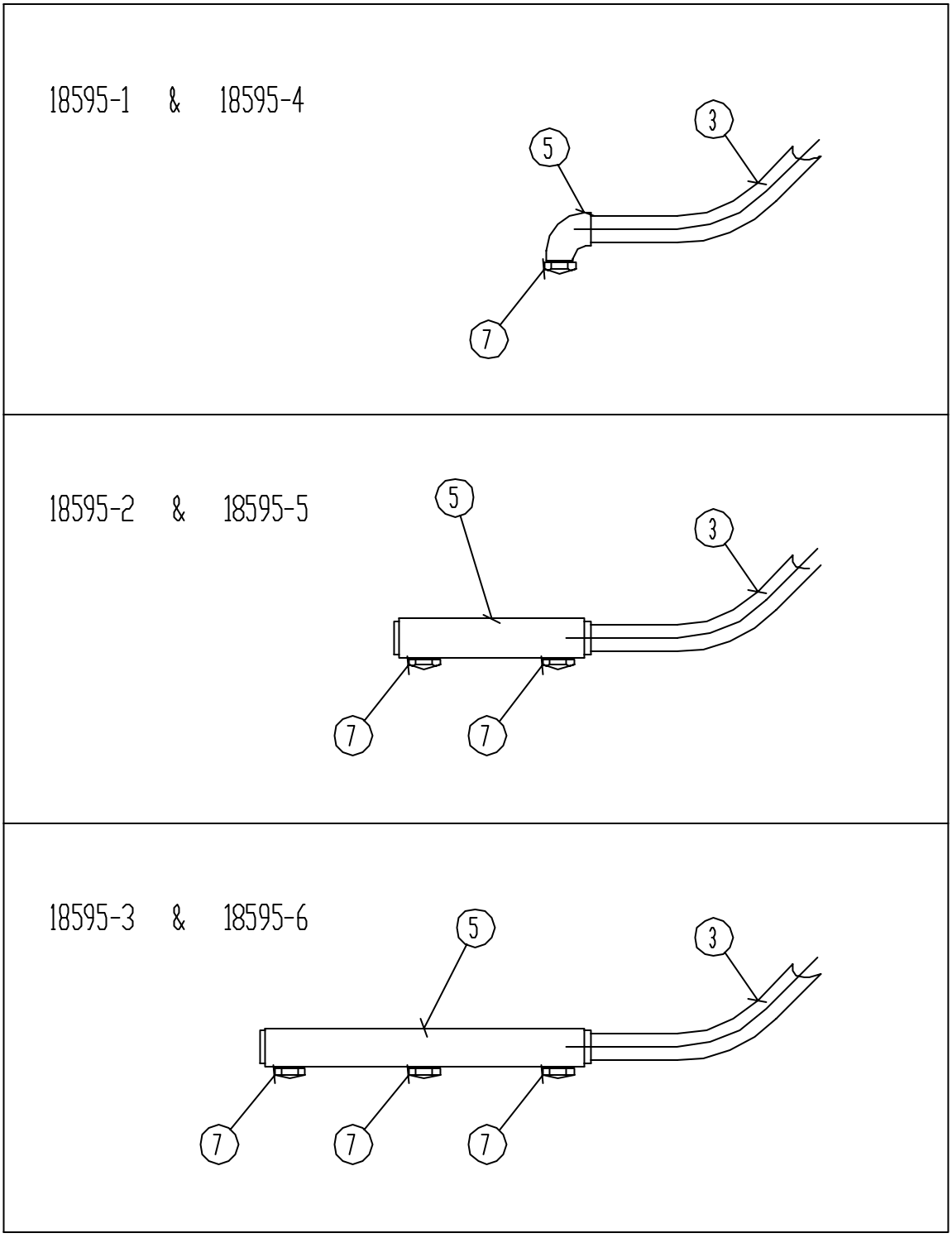


FIGURE 1-9. HANDSPRAY WAND ASSEMBLY (SHEET 2 OF 2)

TABLE 1-9. HANDSPRAY WAND ASSEMBLY (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
1-9	18595		
		ATTACHING PARTS	
-	18595-5	•HANDSPRAY WAND,2 NOZZLES,NO SWIVEL	1
5	19576	••SPRAYBAR,HANDSPRAY,2-NOZZLES	1
6	90126	••PIPE,CPLG,16FP	1
7	32923	••NOZZLE, #6	2
		-----*-----	
		ATTACHING PARTS	
-	18595-6	•HANDSPRAY WAND,3 NOZZLES,NO SWIVEL	1
5	19578	••SPRAYBAR,HANDSPRAY,3-NOZZLES	1
6	90126	••PIPE,CPLG,1.00	1
7	32923	••NOZZLE, #6	3
		-----*-----	
4	18597	•HANDLE W/M	1
8	35832	•VLV,BALL,12 NPT	1
9	80199	•CSHH,.250-20X5.00,GR5	2
10	80219	•CSHH,.375-16X.75,GR5	1
11	80350	•NUT,FLEXLOC,.250-20,FULL,LT	3
12	91159	•PIPE,BUSH,16MP-12FP,GALV,MI	1
13	99600	•PIPE,NIPPLE,12XCLOSE	1
14	35480	•PENETRATING THREAD LOCKER 29014	0.01
-100	5112R	•HOSE,16X25FT,HANDSPRAY,M END	1

- ITEM NOT ILLUSTRATED

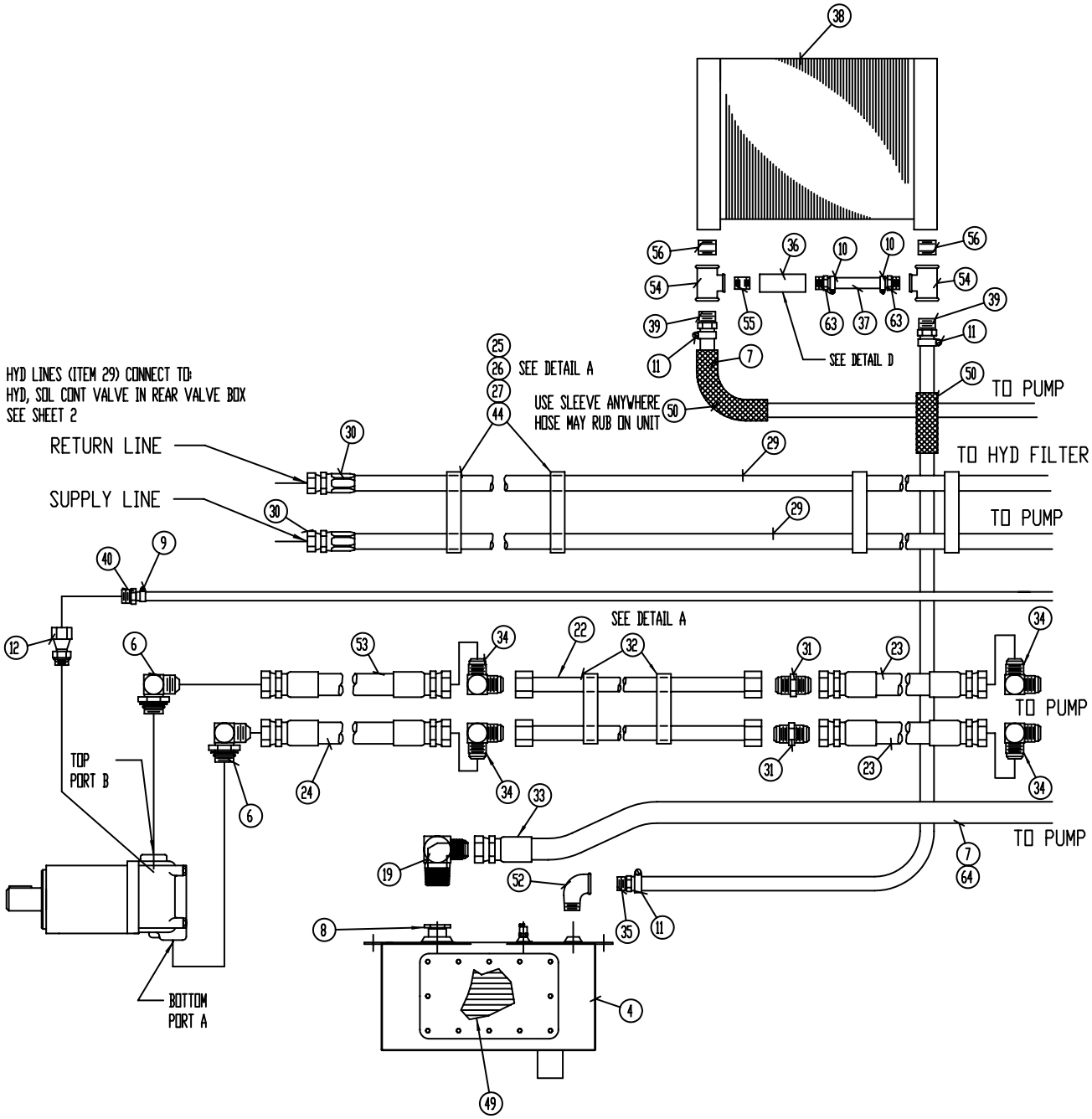


FIGURE 2-1. HYDRAULIC, FRONT LIVE (SHEET 1 OF 6)

TABLE 2-1. HYDRAULIC, FRONT LIVE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**	**HYDRAULIC, FRONT LIVE**	**1**
4	22490	•RESERVOIR,INSTALLATION,20 GAL (SEE FIG 2-3)	1
6	6250	•FITT,90,16MJ-12MB	2
7	32592	•HOSE,16,SUCTION,250	40
8	33148	•STRAINER,SUCT,2NPT,25GPM,100ME	1
9	33162	•CLAMP,HOSE,.44-.78,WORM,#06	2
10	33164	•CLAMP,HOSE,.56-1.06,WORM,#10	2
11	33167	•CLAMP,HOSE,.81-1.75,WORM,#20	4
12	33275	•FITT,STR 04MB-04FPX	1
19	33781	•FIT,90,16MJ-20MP	1
22	23383	•TUBE ASSY,HYDRAULICS,MAX II	1
23	35067	•HOSE ASSY,4000 PSI,-16 X 45.00	3
24	35068	•HOSE ASSY,4000 PSI,-16 X 21.00	1
25	34861	•COVER PLATE,HOSE CLAMP	4
26	34860	•CLAMP,HALF,HOSE,.750	8
27	35543	•WELD PLATE	4
29	38208	•HOSE,08,HYD,3000	60
30	38209	•FITT,HES,08FJ-08HB,FLD CRMP	4
31	36077	•FITT,STR 16MJ-16MH	4
32	36167	•CLAMP,TUBE,1.00 OD TWIN,SET	4
33	36606	•FITT,HES,16FJ-16HB,FLD CRMP	2
34	37245	•FITT,90 16MJ-16MJ	4
35	6342	•FITT,STR 12MP-16HB,CRIMPED	2
36	6351	•VLV,CHECK,08 NPT,20 PSI CRACK	1
37	6352	•HOSE,08,PUSH-ON,250	0.75
38	6364	•COOLER	1
-3801	23353	••SCREEN	1
39	70036	•FITT,STR 16MP-16HB,CRIMPED	2
40	X300	•FITT,STR 04MP-06HB,PUSH-ON	1
44	80212	•CSHH,.312-18X2.00,GR5	4
49	90735	•OIL,HYDRAULIC,MULTI SERVICE	27
50	90803	•SLEEVE,ABRASION,NYLON,1.75ID	8
52	99527	•PIPE,90,12MP-12FP,MI	1
53	37309	•HOSE ASSY,4000 PSI,-16 X 27.00	1
54	99581	•PIPE,TEE,16FP-16FP-08FP,MI	2
55	99596	•PIPE,NIPPLE,08XCLOSE	1
56	99606	•PIPE,NIPPLE,16XCLOSE	2
59	38579	•HOSE,06,LOW PRESS PUSH ON	30

- ITEM NOT ILLUSTRATED

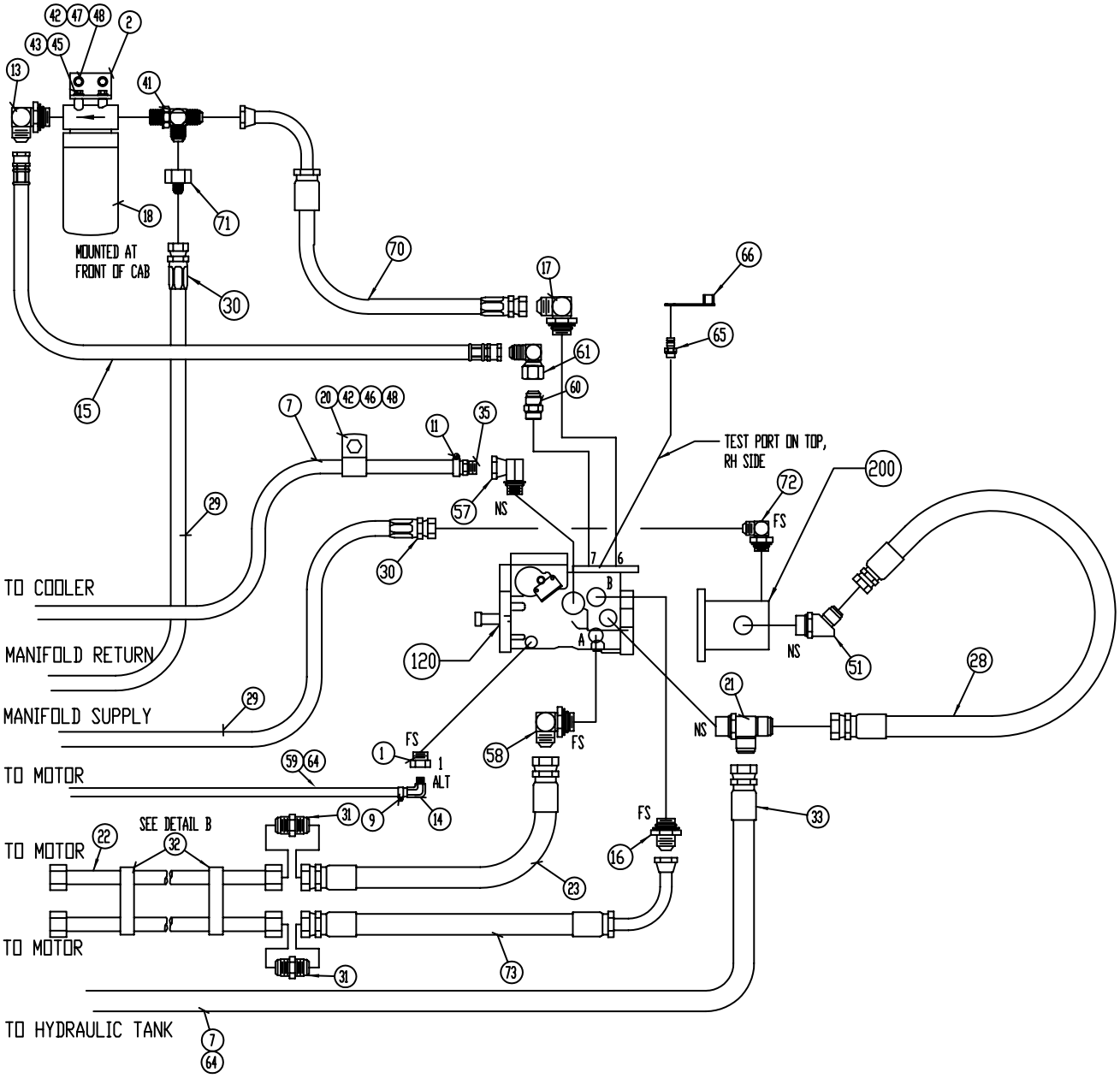


FIGURE 2-1. HYDRAULIC, FRONT LIVE (SHEET 2 OF 6)

TABLE 2-1. HYDRAULIC, FRONT LIVE (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**	**HYDRAULIC, FRONT LIVE**	**1**
1	15795	•FITT,PLUG,12MB,HEX,W/04FP	1
2	15984	•SUPPORT,FILTER	1
7	32592	•HOSE,16,SUCTION,250	40
9	33162	•CLAMP,HOSE,.44-.78,WORM,#06	2
11	33167	•CLAMP,HOSE,.81-1.75,WORM,#20	4
13	33307	•FITT,90 10MJ-12MB	1
14	33365	•FITT,90 04MP-06HB,CRIMPED	1
15	33863	•HOSE ASSY,1500 PSI,-10X34.00	1
16	33887	•FITT,STR 16MJ-16MB	1
17	34083	•FITT,90 12MJ-10MB	1
18	34463	•FILTER,RETURN,HP,-12SAE PORTS	1
-1801	34464	••FILTER ELEMENT,HYD (Element only)	1
-1802	35269	••GAUGE,SIGHT LH VISUAL (Restriction Indicator)	1
20	34799	•CLAMP,LOOP,1.562 OD,NPRN COVER	10
21	X329	•FITT,TEE 16MJ-16MB-16MJ	1
22	23383	•TUBE ASSY,HYDRAULICS,MAX II	1
23	35067	•HOSE ASSY,4000 PSI,-16 X 45.00	3
28	38205-25	•HOSE,12 12FJ-16FJ,300	1
29	38208	•HOSE,08,HYD,3000	60
30	38209	•FITT,HES,08FJ-08HB,FLD CRMP	4
31	36077	•FITT,STR 16MJ-16MH	4
32	36167	•CLAMP,TUBE,1.00 OD TWIN,SET	4
33	36606	•FITT,HES,16FJ-16HB,FLD CRMP	2
34	37245	•FITT,90 16MJ-16MJ	4
35	6342	•FITT,STR 12MP-16HB,CRIMPED	2
41	X324	•FITT,TEE 12MJ-12MB-12MJ	1
42	80142	•WASHER,FLAT,USS,.375	12
43	80162	•WASHER,LOCK,.375	4
45	80219	•CSHH,.375-16X.75,GR5	4
46	80224	•CSHH,.375-16X1.25,GR5	10
47	80226	•CSHH,.375-16X1.50,GR5	2
48	80352	•NUT,FLEXLOC,.375-16,FULL,LT	12

- ITEM NOT ILLUSTRATED

TABLE 2-1. HYDRAULIC, FRONT LIVE (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**		
51	38203	•FITT,45 12MJ-16MB	1
57	X269	•FITT,90 12MB-12FPX	1
58	X319	•FITT,90 16MJ-16MB	1
59	38579	•HOSE,06,LOW PRESS PUSH ON	30
60	X392	•FITT,STR 10MJ-10MB	1
61	X401	•FITT,90 10MJ-10FJX	1
64	33597	•TIE WRAP,.188X11.00	8
65	72689	•FITT,TEST 06MB-02PD	1
66	72372	•FITT,PLUG 02PD,DUST	1
70	38206-41	•HOSE,12 12FJ-12RJ9,3000	1
71	35402	•FITT,RED 08MJ-12FJ	1
72	70754	•FITT,90 08MJ-06MB	3
73	38207-49	•HOSE,16 16FJ-16FJ990T,4000	1
120	38120	•PUMP,HYD,M46,CC2,EDC,A PAD	1
200	38200	•PUMP,HYD,CONSTANT FLOW	1
-808	36808	•ORING,3.237 ID X .103,SAE 152	1
		LOCATED BETWEEN Part #38120 & Part #38200	

- ITEM NOT ILLUSTRATED

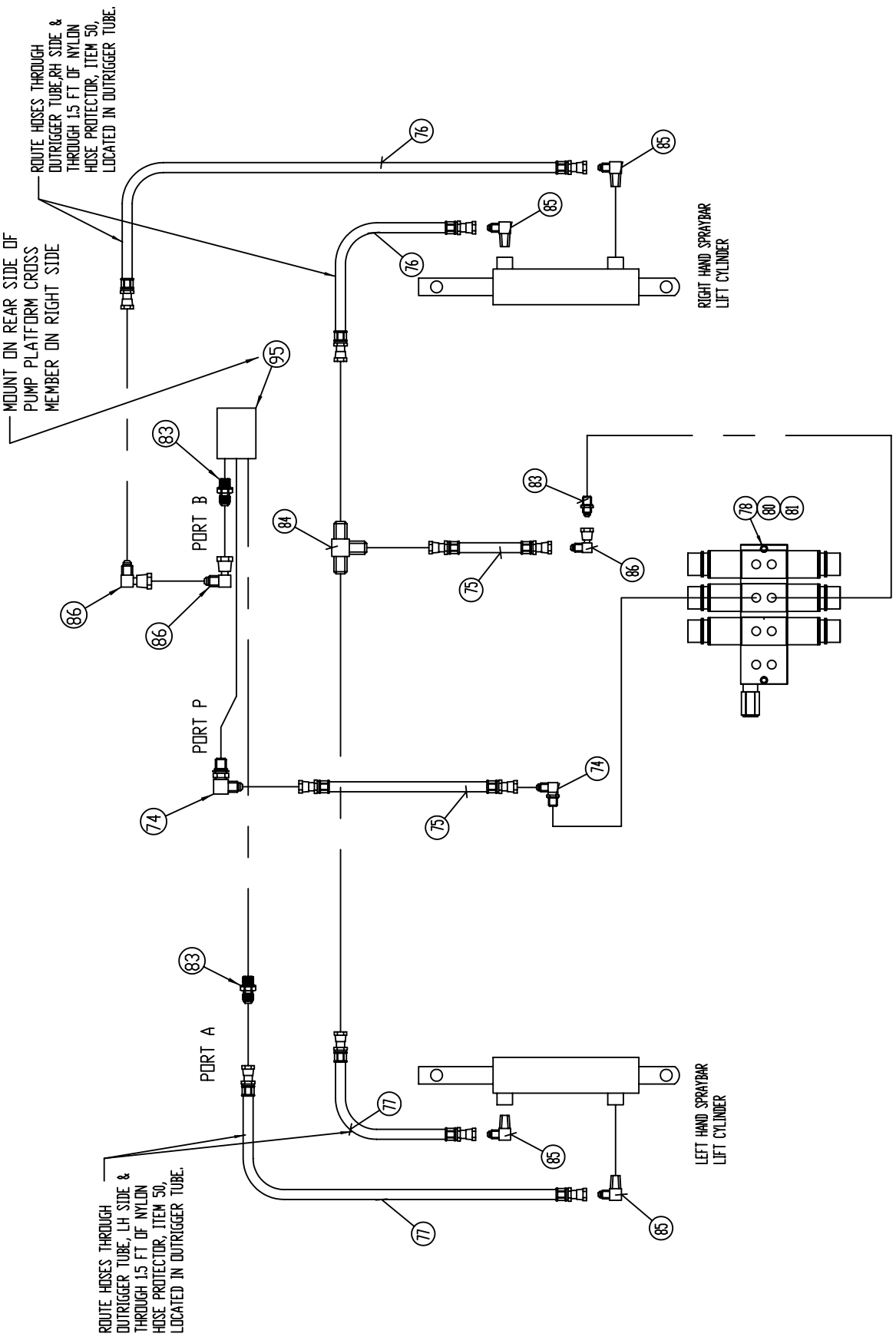


FIGURE 2-1. HYDRAULIC, FRONT LIVE (SHEET 3 OF 6)

TABLE 2-1. HYDRAULIC, FRONT LIVE (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**		
74	33892	•FITT,90 06MJ-06MB	4
75	35611	•HOSE ASSY,-06 X 36, 2500	2
76	35612	•HOSE ASSY,-06 X 61, 2500	2
77	35614	•HOSE ASSY,-06 X 52, 2500	2
78	80140	•WASHER,TYPE A PLAIN,.250	4
80	80350	•NUT,FLEXLOC,.250-20,FULL,LT	4
81	80941	•CSHH,.250-20X2.25	2
83	X217	•FITT,STR 06MJ-06MB	5
84	X275	•FITT,TEE 06MJ-06MJ-06MJ	1
85	X383	•FITT,90 06MJ-06MP	4
86	X387	•FITT,90 06MJ-06FJX	5
95	38210	•VLV,HYD,FLOW DIVIDER,	1

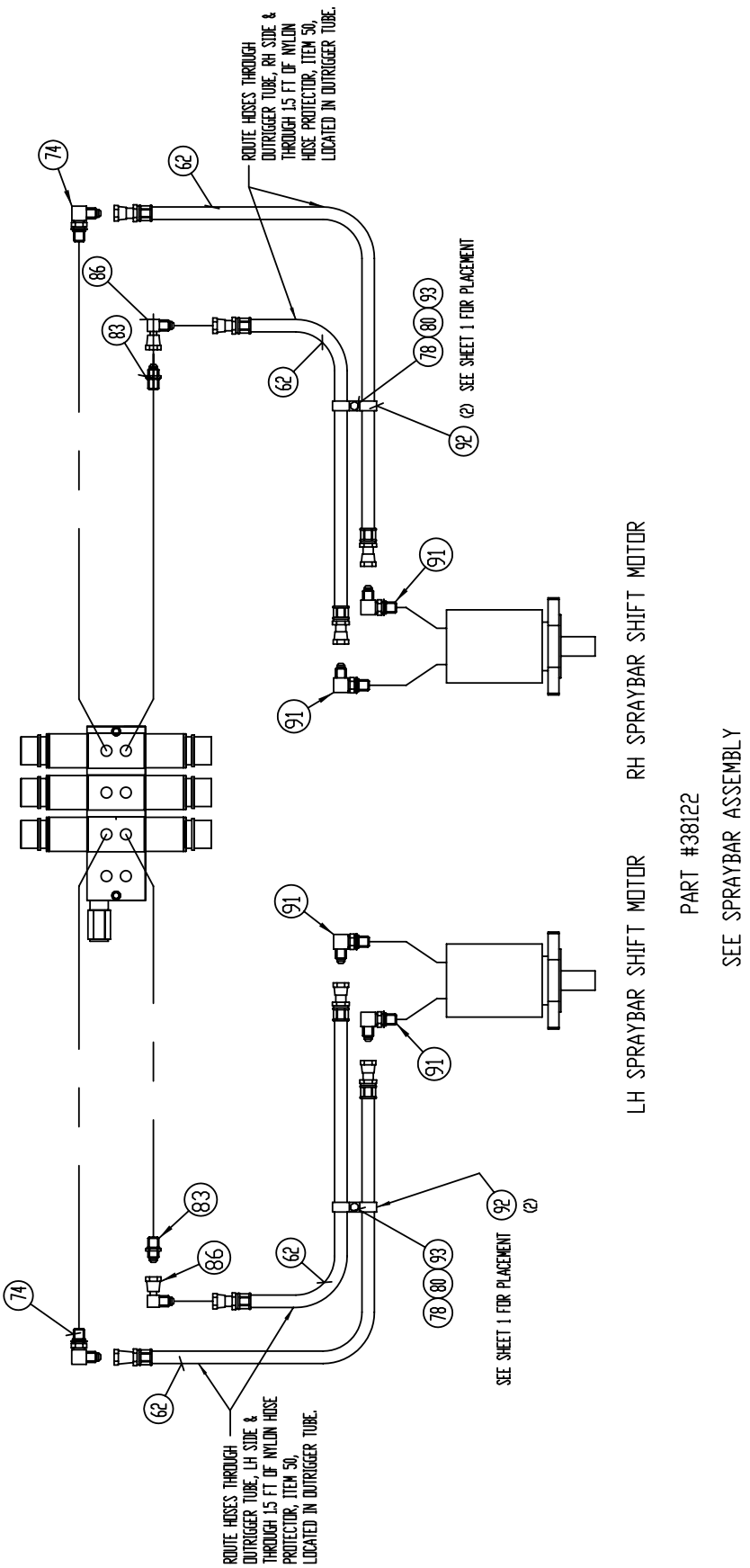


FIGURE 2-1. HYDRAULIC, FRONT LIVE (SHEET 4 OF 6)

TABLE 2-1. HYDRAULIC, FRONT LIVE (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**		
62	35664	•HOSE ASSY,-06X106,2500	4
74	33892	•FITT,90 06MJ-06MB	4
78	80140	•WASHER,TYPE A PLAIN,.250	4
80	80350	•NUT,FLEXLOC,.250-20,FULL,LT	4
83	X217	•FITT,STR 06MJ-06MB	5
86	X387	•FITT,90 06MJ-06FJX	5
91	34535	•FITT,90 06MJ-08MB	4
92	87111602	•CLAMP,LOOP,.75 OD,PLASTIC COVER	4
93	80185	•CSHH,.250-20X1.00,GR5	2

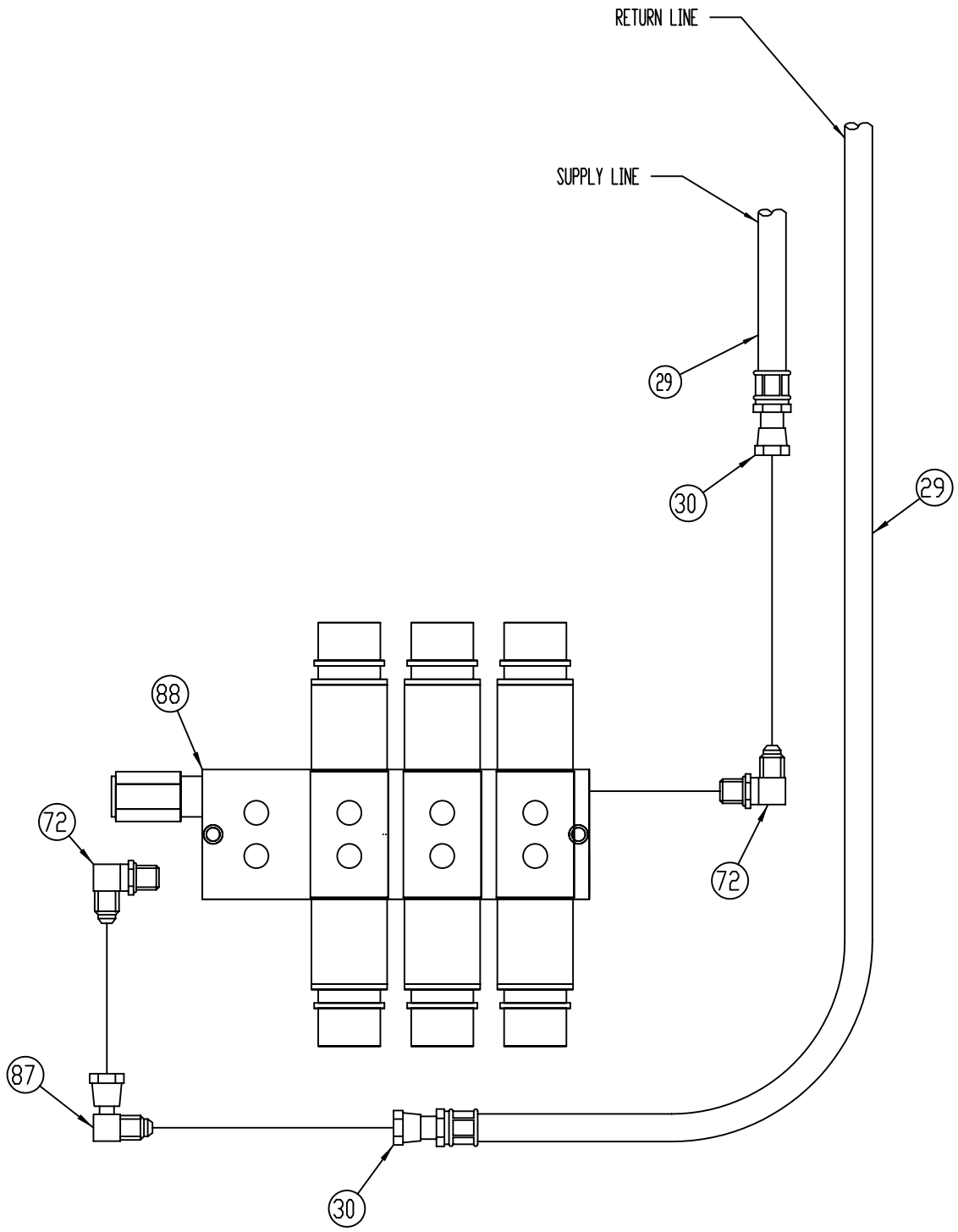
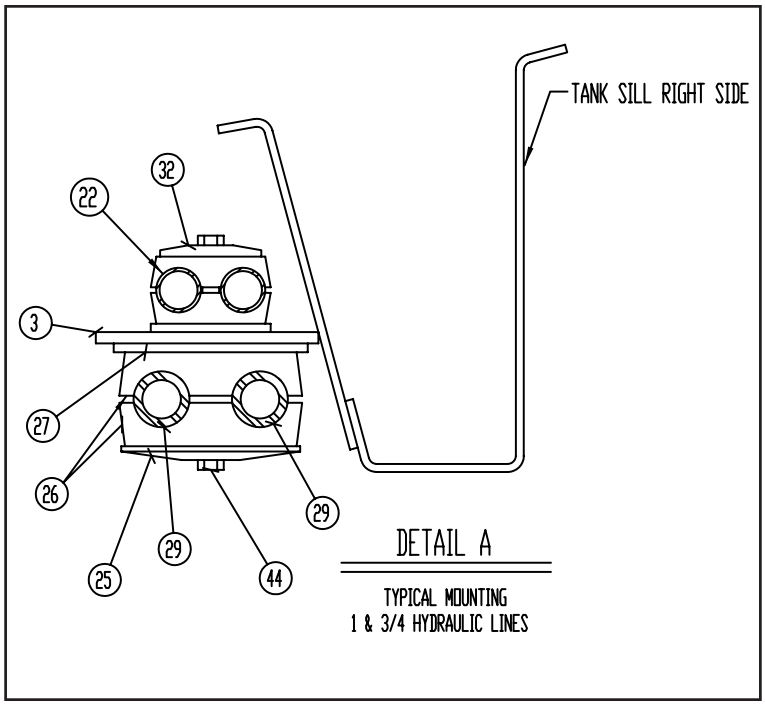


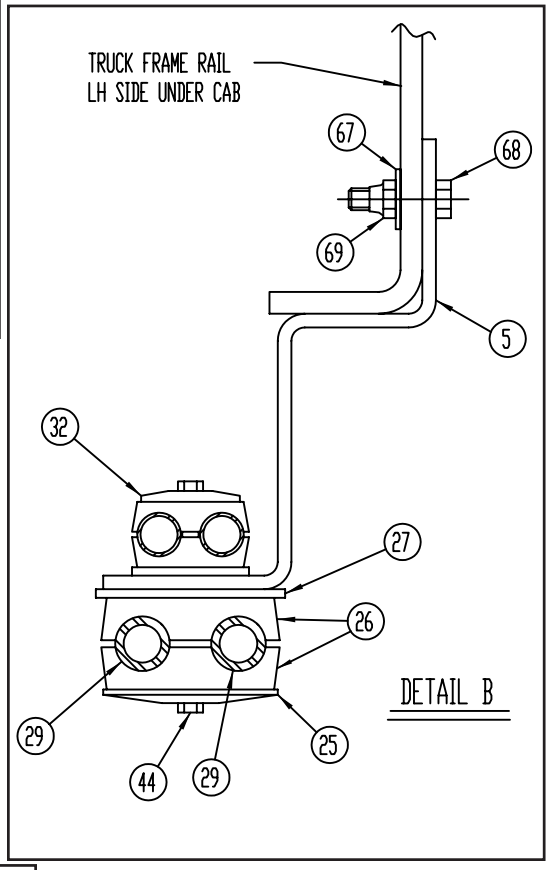
FIGURE 2-1. HYDRAULIC, FRONT LIVE (SHEET 5 OF 6)

TABLE 2-1. HYDRAULIC, FRONT LIVE (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**		
29	38208	•HOSE,08,HYD,3000	60
30	38209	•FITT,HES,08FJ-08HB,FLD CRMP	4
72	70754	•FITT,90 08MJ-06MB	3
87	33900	•FITT,90 08MJ-08FJX	1
88	38123	•MANIFOLD,HYD,4 STA,3 VLV W/REL (Part of Valve Box)	REF
		ATTACHING PARTS	
-8801	37488-01	••VALVE	REF
-8802	37488-03	••RELIEF VALVE	1
-8803	37488-04	••BOLT KIT,FOR VALVE	1
-8804	37488-05	••COVER PLATE,INCLUDES BOLTS	2
-8805	37488-06	••COIL,FOR VALVE	1
		-----*-----	

- ITEM NOT ILLUSTRATED





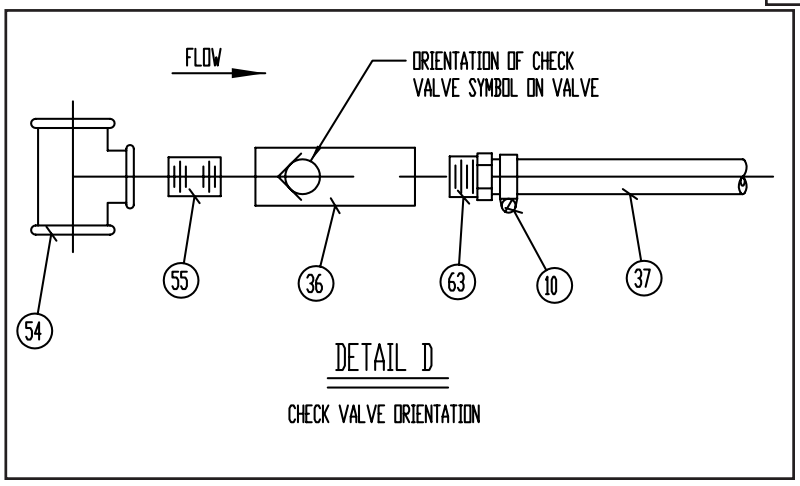


FIGURE 2-1. HYDRAULIC, FRONT LIVE (SHEET 6 OF 6)

TABLE 2-1. HYDRAULIC, FRONT LIVE (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-1	**26126**		
3	17211	•BAR,.250X3.00X5.00	2
5	23363	•BRACKET,HYDRAULIC LINE	2
10	33164	•CLAMP,HOSE,.56-1.06,WORM,#10	2
22	23383	•TUBE ASSY,HYDRAULICS,MAX II	1
25	34861	•COVER PLATE,HOSE CLAMP	4
26	34860	•CLAMP,HALF,HOSE,.750	8
27	35543	•WELD PLATE	4
29	38208	•HOSE,08,HYD,3000	60
32	36167	•CLAMP,TUBE,1.00 OD TWIN,SET	6
36	6351	•VLV,CHECK,08 NPT,20 PSI CRACK	1
37	6352	•HOSE,08,PUSH-ON,250	0.75
44	80212	•CSHH,.312-18X2.00,GR5	4
54	99581	•PIPE,TEE 16FP-16FP-08FP,MI	2
55	99596	•PIPE,NIPPLE,08XCLOSE	1
63	X427	•FITT,STR 08MP-08HB,CRIMPED	2
67	80144	•WASHER,FLAT,USS,.500	2
68	80255	•CSHH,.500-13X2.00,GR5	2
69	80354	•NUT,FLEXLOC,.500-13,FULL,LT	2

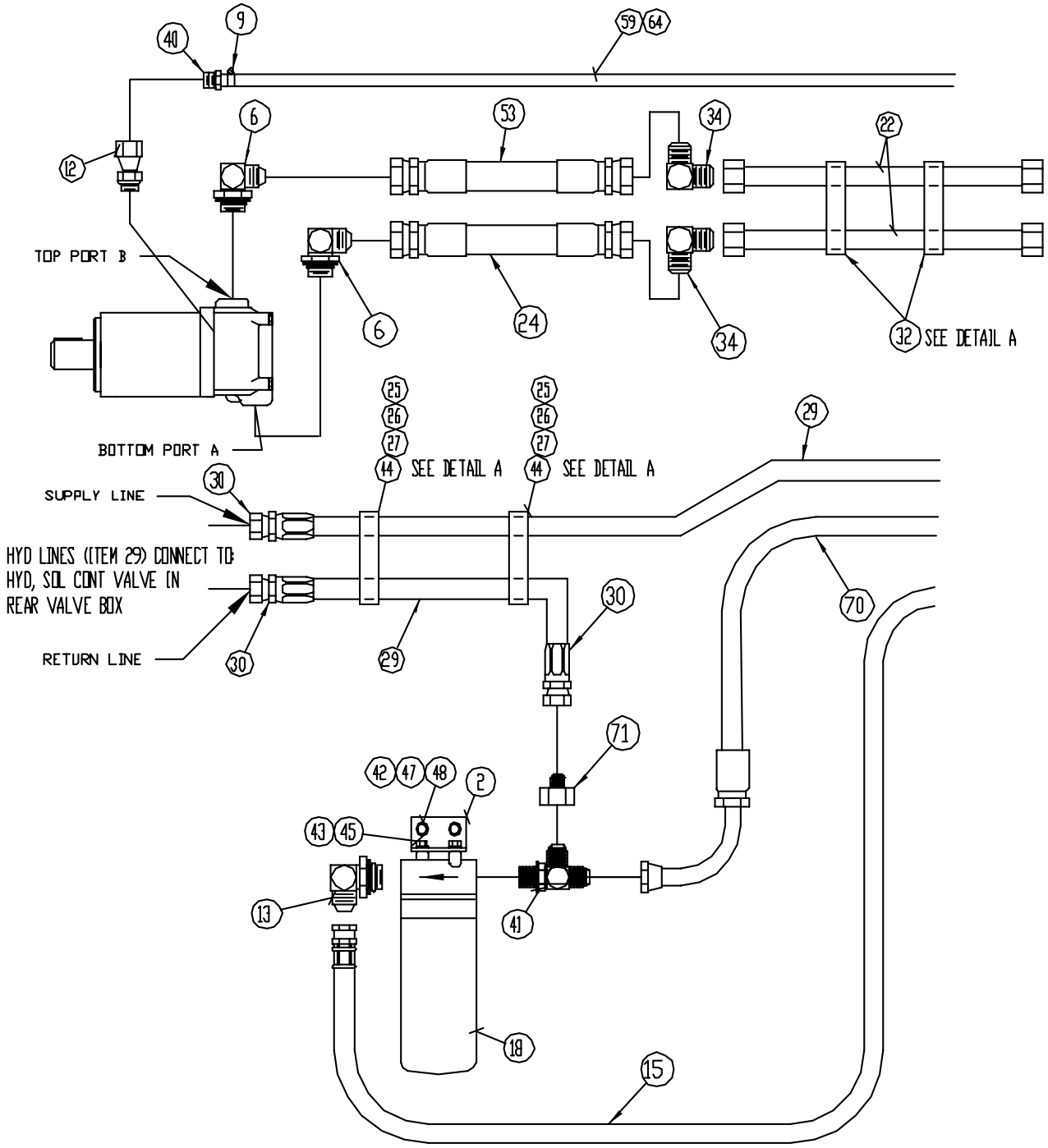


FIGURE 2-2. HYDRAULIC, PTO (SHEET 1 OF 6)

TABLE 2-2. HYDRAULIC, PTO

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**	**HYDRAULIC, PTO DRIVE**	**1**
2	15984	•SUPPORT,FILTER	1
6	6250	•FITT,90 16MJ-12MB	2
9	33162	•CLAMP,HOSE,.44-.78,WORM,#06	2
12	33275	•FITT,STR 04MB-04FPX	1
13	33307	•FITT,90 10MJ-12MB	1
15	33863	•HOSE ASSY,1500 PSI,-10X34.00	1
18	34463	•FILTER,RETURN,HP,-12SAE PORTS	1
22	27021	•TUBE ASSY,HYD,MAX,PTO	1
24	35068	•HOSE ASSY,4000 PSI,-16 X 21.00	1
25	34861	•COVER PLATE,HOSE CLAMP	2
26	34860	•CLAMP,HALF,HOSE,.750	4
27	35543	•WELD PLATE	2
29	38208	•HOSE,08,HYD,3000	40
30	38209	•FITT,HES,08FJ-08HB,FLD CRMP	4
32	36167	•CLAMP,TUBE,1.00 OD TWIN,SET	2
34	37245	•FITT,90 16MJ-16MJ	4
40	X300	•FITT,STR 04MP-06HB,PUSH-ON	1
41	X324	•FITT,TEE 12MJ-12MB-12MJ	1
42	80142	•WASHER,FLAT,USS,.375	12
43	80162	•WASHER,LOCK,.375	4
44	80212	•CSHH,.312-18X2.00,GR5	2
45	80219	•CSHH,.375-16X.75,GR5	4
47	80226	•CSHH,.375-16X1.50,GR5	2
48	80352	•NUT,FLEXLOC,.375-16,FULL,LT	12
53	37309	•HOSE ASSY,4000 PSI,-16 X 27.00	1
59	38579	•HOSE,06,LOW PRESS PUSH ON	30
64	33597	•TIE WRAP,.188X11.00	8
70	38206-41	•HOSE,12 12FJ-12RJ9,3000	1
71	35402	•FITT,RED 08MJ-12FJ	1

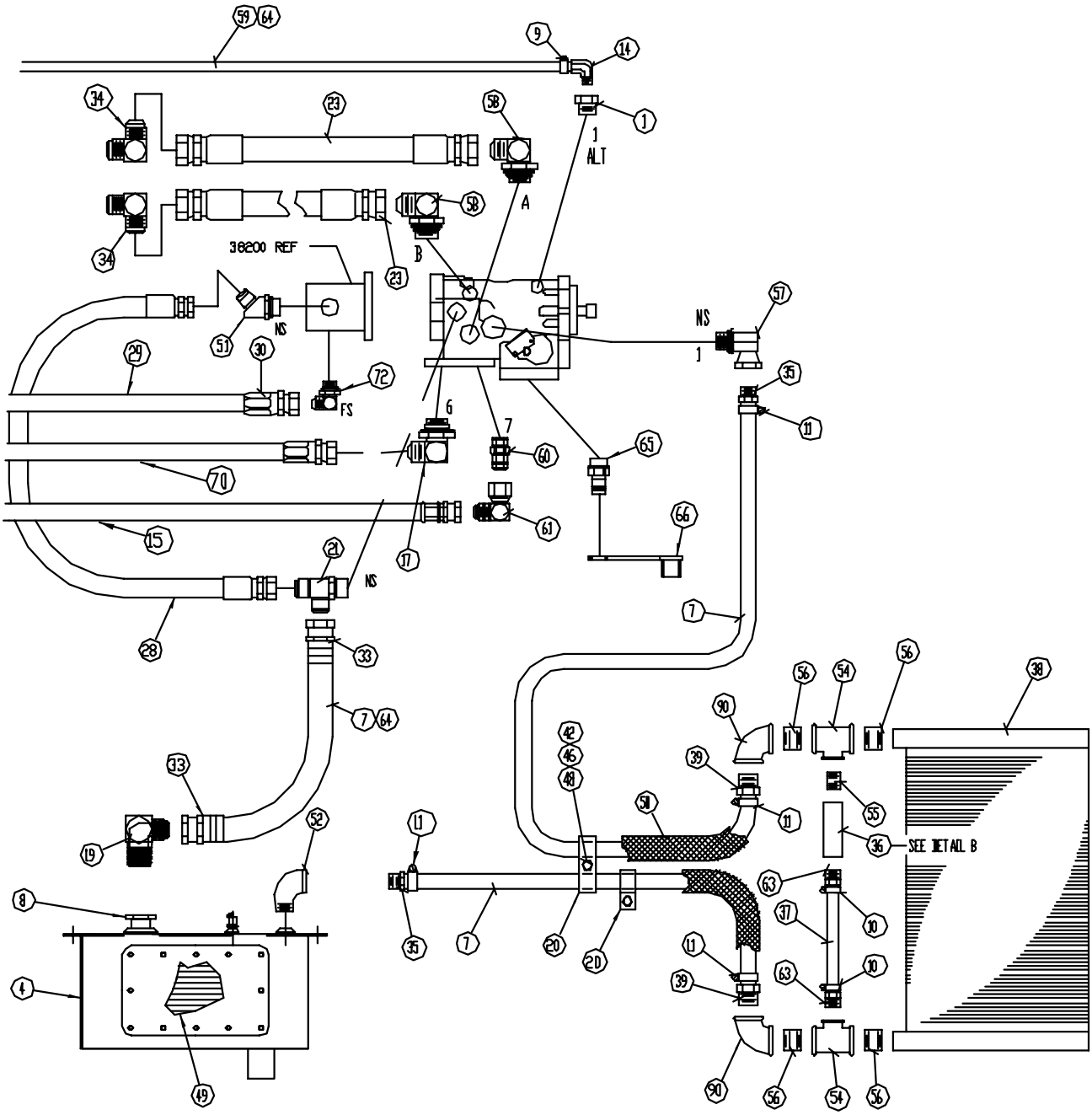


FIGURE 2-2. HYDRAULIC, PTO (SHEET 2 OF 6)

TABLE 2-2. HYDRAULIC, PTO (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**		
1	15795	•FITT,PLUG,12MB,HEX,W/04FP	1
4	22490	•RESERVOIR,INSTALLATION,20 GAL (SEE FIG 2-3)	1
7	32952	•HOSE,16,SUCTION,250	30
8	33148	•STRAINER,SUCT,2NPT,25GPM,100ME	1
9	33162	•CLAMP,HOSE,.44-.78,WORM,#06	2
10	33164	•CLAMP,HOSE,.56-1.06,WORM,#10	2
11	33167	•CLAMP,HOSE,.81-1.75,WORM,#20	4
14	33365	•FITT,90 04MP-06HB,CRIMPED	1
15	33863	•HOSE ASSY,1500 PSI,-10X34.00	1
19	35781	•FITT,90 16MJ-20MP	1
20	34799	•CLAMP,LOOP,1.562 OD,NPRN COVER	10
21	X329	•FITT,TEE 16MJ-16MB-16MJ	1
23	35067	•HOSE ASSY,4000 PSI,-16 X 45.00	2
28	38205-25	•HOSE,12 12FJ-16FJ,300	1
29	38208	•HOSE,08,HYD,3000	40
30	38209	•FITT,HES,08FJ-08HB,FLD CRMP	4
33	36606	•FITT,HES,16FJ-16HB,FLD CRMP	2
34	37245	•FITT,90 16MJ-16MJ	4
35	6342	•FITT,STR 12MP-16HB,CRIMPED	2
36	6351	•VLV,CHECK,08 NPT,20 PSI CRACK	1
37	6352	•HOSE,08,PUSH-ON,250	0.75
38	6364	•COOLER	1
39	70036	•FITT,STR 16MP-16HB,CRIMPED	2
42	80142	•WASHER,FLAT,USS,.375	12
46	80224	•CSHH,.375-16X1.25,GR5	10
48	80352	•NUT,FLEXLOC,.375-16,FULL,LT	12
49	91500	•OIL,HYDRAULIC,ISO68	27
50	90803	•SLEEVE,ABRASION,NYLON,1.75ID	8
51	38203	•FITT,45 12MJ-16MB	1
52	99527	•PIPE,90,12MP-12FP,MI	1
54	99581	•PIPE,TEE,16FP-16FP-08FP,MI	2
55	99596	•PIPE,NIPPLE,08XCLOSE	1
56	99606	•PIPE,NIPPLE,16XCLOSE	4

TABLE 2-2. HYDRAULIC, PTO (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**		
57	X269	•FITT,90 12MB-12FPX	1
58	X319	•FITT,90 16MJ-16MB	2
59	38579	•HOSE,06,LOW PRESS PUSH ON	30
63	X427	•FITT,STR 08MP-08HB,CRIMPED	2
64	33597	•TIE WRAP,.188X11.00	8
65	72689	•FITT,TEST 06MB-02PD	1
66	72372	•FITT,PLUG 02PD,DUST	1
70	38206-41	•HOSE,12 12FJ-12RJ9,3000	1
72	70754	•FITT,90 08MJ-06MB	3
90	99514	•PIPE,90,16FP,MI	2

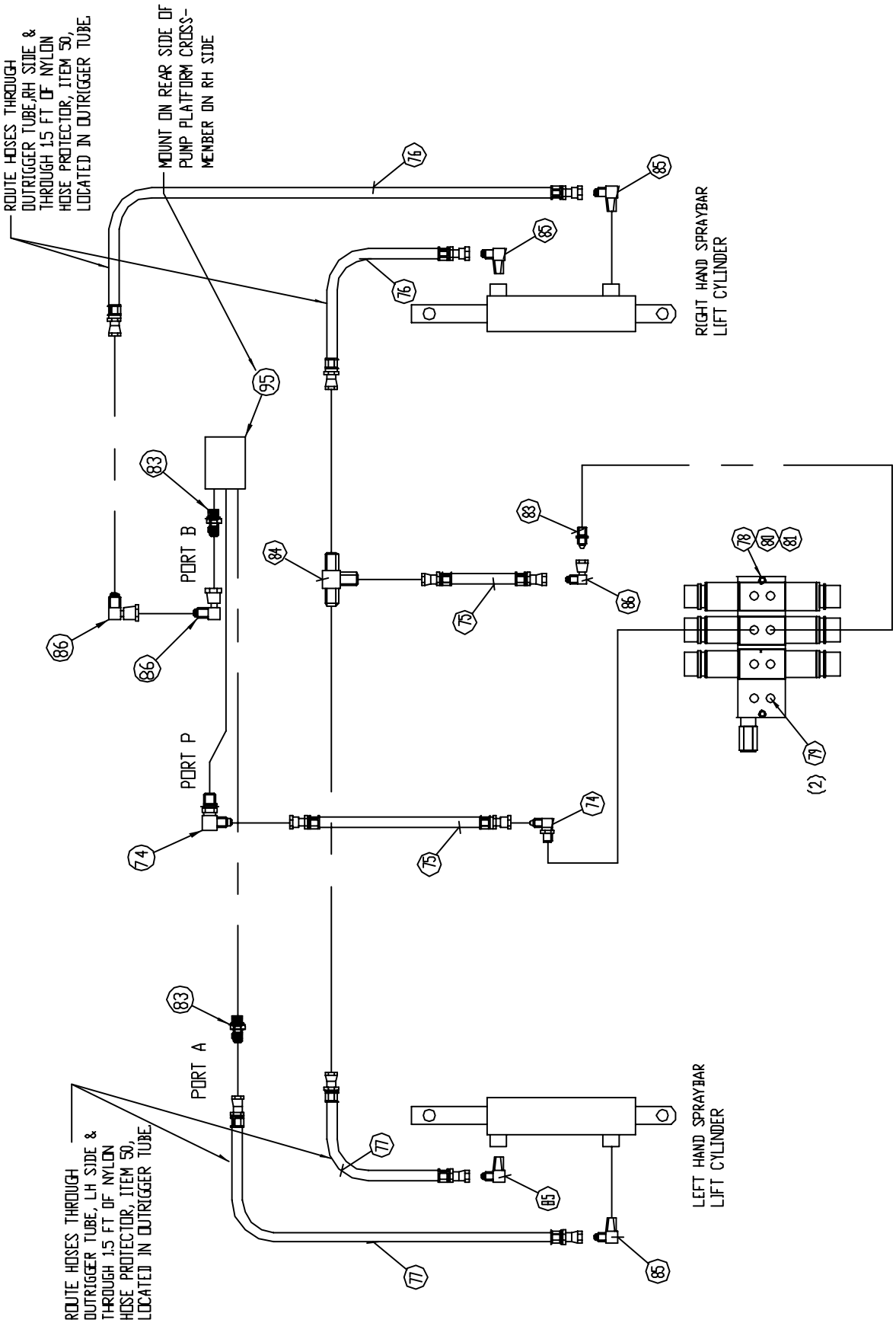


FIGURE 2-2. HYDRAULIC, PTO (SHEET 3 OF 6)

TABLE 2-2. HYDRAULIC, PTO (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**		
74	33892	•FITT,90 06MJ-06MB	4
75	35611	•HOSE ASSY,-06 x 36, 2500	2
76	35612	•HOSE ASSY,-06 x 61, 2500	2
77	35614	•HOSE ASSY,-06 x 52, 2500	2
78	80140	•WASHER,TYPE A PLAIN,.250	4
79	6408	•FITT,PLUG 06MB,HEX	2
80	80350	•NUT,FLEXLOC,.250-20,FULL,LT	4
81	80941	•CSSH,.250-20X2.25	2
83	X217	•FITT,STR 06MJ-06MB	5
84	X275	•FITT,TEE 06MJ-06MJ-06MJ	1
85	X383	•FITT,90 06MJ-06MP	4
86	X387	•FITT,90 06MJ-06FJX	5
95	38210	•VLV,HYD,FLOW DIVIDER,	1

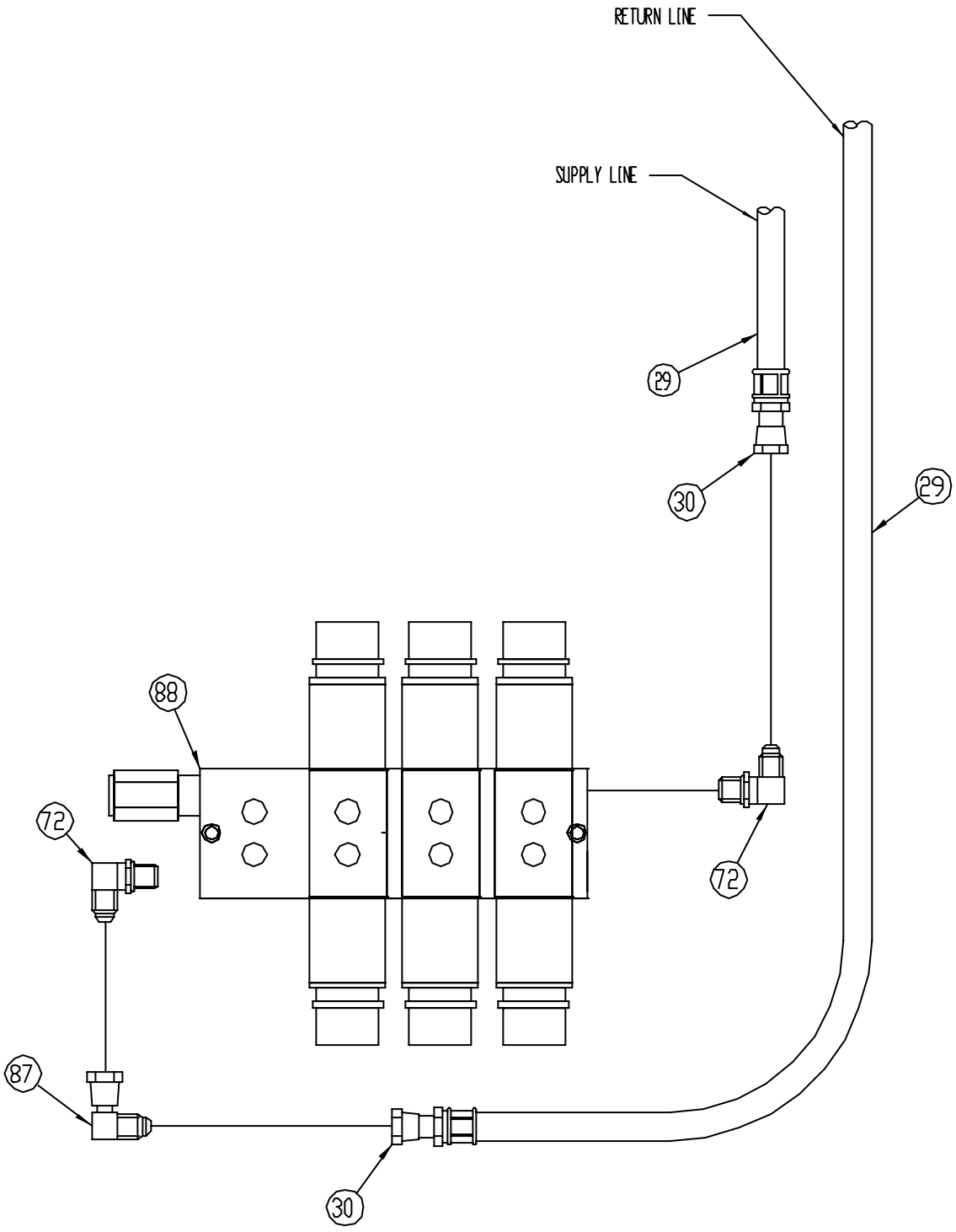


FIGURE 2-2. HYDRAULIC, PTO (SHEET 4 OF 6)

TABLE 2-2. HYDRAULIC, PTO (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**		
29	38208	•HOSE,08,HYD,3000	40
30	38209	•FITT,HES,08FJ-08HB,FLD CRMP	4
72	70754	•FITT,90 08MJ-06MB	3
87	33900	•FITT,90 08MJ-08FJX	1
88	38123	•MANIFOLD,HYD,4 STA,3 VLV,W/REL (Part of Valve Box)	REF

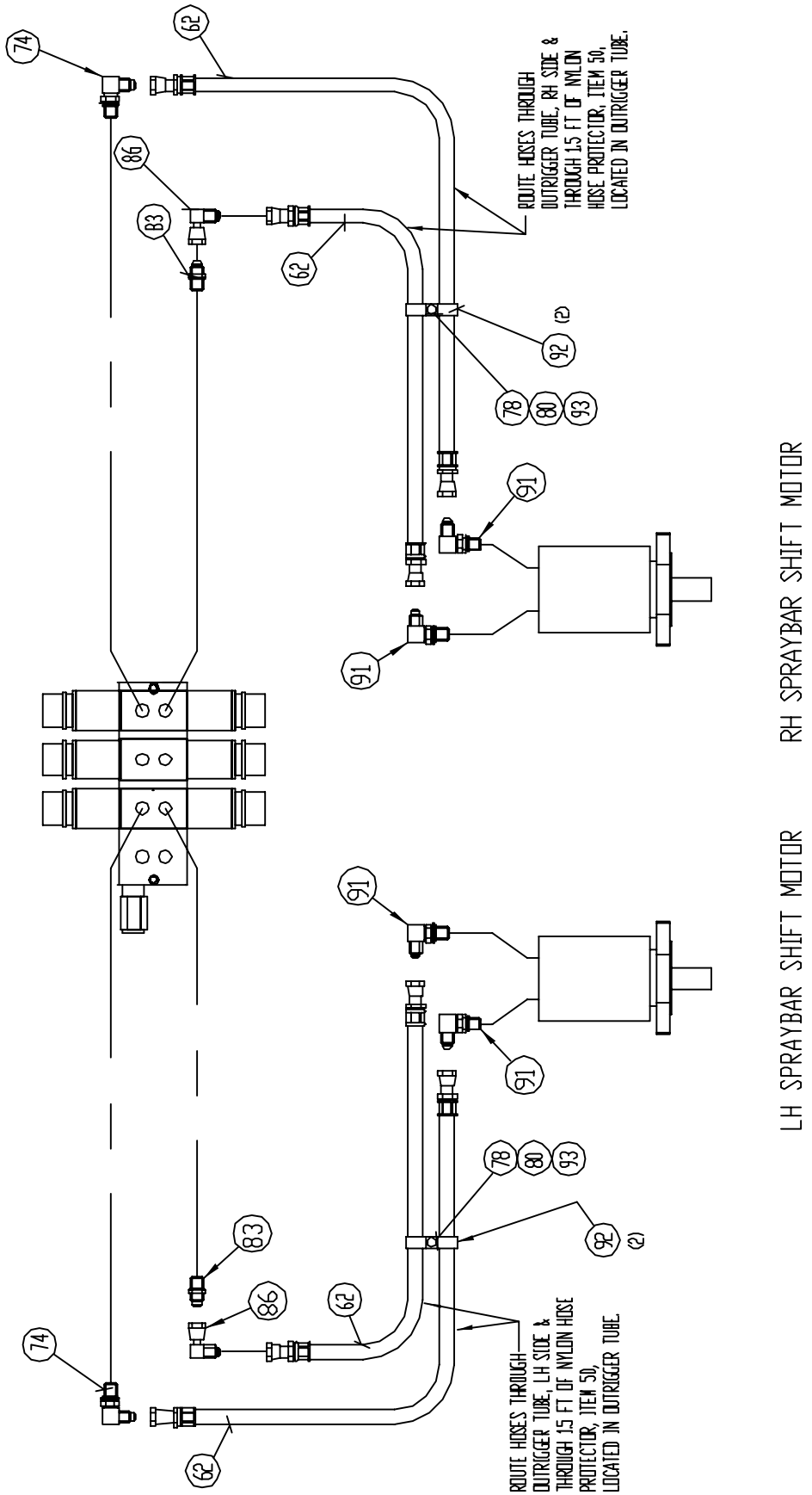
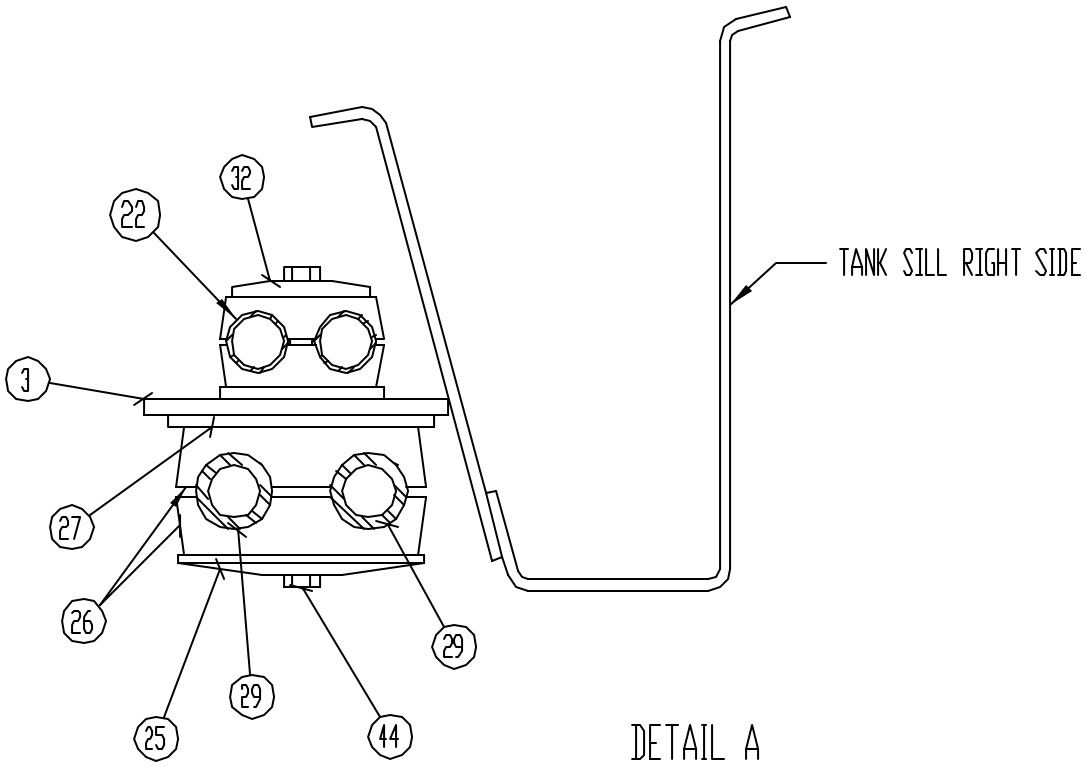


FIGURE 2-2. HYDRAULIC, PTO (SHEET 5 OF 6)

TABLE 2-2. HYDRAULIC, PTO (CONTINUED)

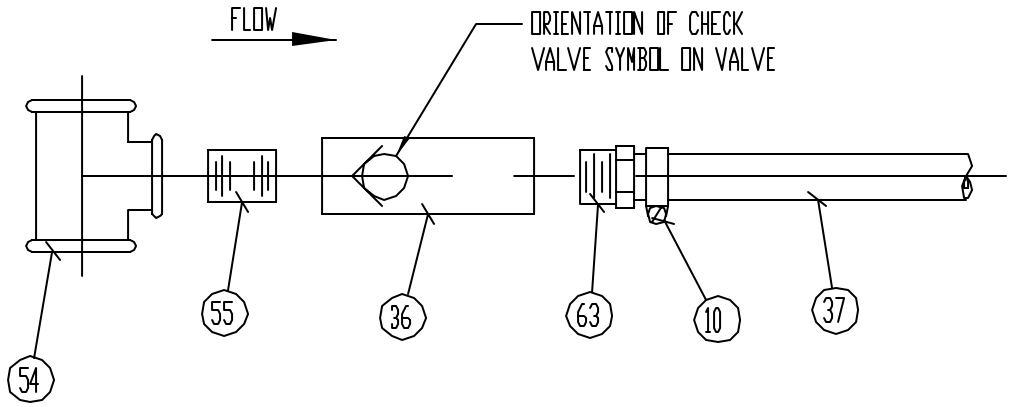
FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**		
61	X401	•FITT,90 10MJ-10FJX	1
74	33892	•FITT,90 06MJ-06MB	4
78	80140	•WASHER,TYPE A PLAIN,.250	4
80	80350	•NUT,FLEXLOC,.250-20,FULL,LT	4
83	X217	•FITT,STR 06MJ-06MB	5
86	X387	•FITT,90 06MJ-06FJX	5
91	34535	•FITT,90 06MJ-08MB	4
92	871111602	•CLAMP,LOOP,.75 OD,PLSTC COVER	4
93	80185	•CSHH,.250-20X1.00,GR5	2



DETAIL A

TYPICAL MOUNTING
1 & 3/4 HYDRAULIC LINES

NOTE: Use item 96 for safety wiring set screw on drive shaft.



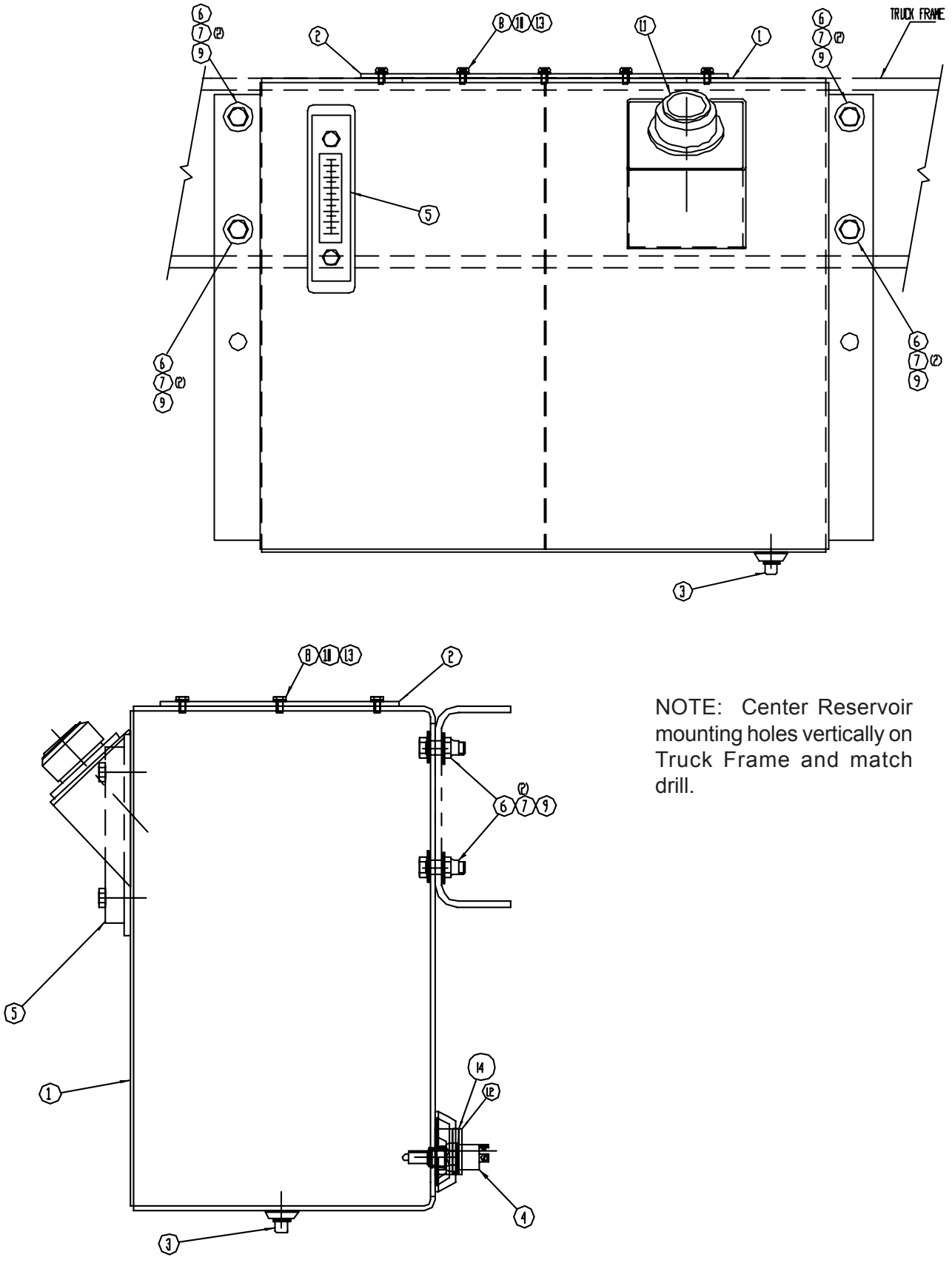
DETAIL B

CHECK VALVE ORIENTATION

FIGURE 2-2. HYDRAULIC, PTO (SHEET 6 OF 6)

TABLE 2-2. HYDRAULIC, PTO (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-2	**27022**		
3	17211	•BAR,.250X3.00X5.00	2
10	33164	•CLAMP,HOSE,.56-1.06,WORM,#10	2
22	27021	•TUBE ASSY,HYD,MAX,PTO	1
25	34861	•COVER PLATE,HOSE CLAMP	2
26	34860	•CLAMP,HALF,HOSE,.750	4
27	35543	•WELD PLATE	2
29	38208	•HOSE,08,HYD,3000	40
32	36167	•CLAMP,TUBE,1.00 OD TWIN,SET	2
36	6351	•VLV,CHECK,08 NPT,20 PSI CRACK	1
37	6352	•HOSE,08,PUSH-ON,250	0.75
44	80212	•CSHH,.312-18X2.00,GR5	2
54	99581	•PIPE,TEE,16FP-16FP-08FP,MI	2
55	99596	•PIPE,NIPPLE,08XCLOSE	1
63	X427	•FITT,STR 08MP-08HB,CRIMPED	2
96	38620	•WIRE,MECHANICS,16.5 GA	16



NOTE: Center Reservoir mounting holes vertically on Truck Frame and match drill.

FIGURE 2-3. HYDRAULIC RESERVOIR

TABLE 2-3. HYDRAULIC RESERVOIR

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
2-3	**22490**	**•HYDRAULIC RESERVOIR (SEE FIG 2-1 FOR NHA)**	**1**
1	22489	••RESERVOIR,20 GAL	1
2	22750	••RESERVOIR,CLEANOUT COVER	1
3	35254	••PIPE PLUG,MAG,06MP,SQ HD	1
4	36343	••SWITCH,TEMP,210 DEG F.,-08MP	1
5	500070	••GAUGE,HYD OIL LEVEL/TEMP	1
6	71627	••CSHH,.500-13X1.50,GR5	4
7	80144	••WASHER,FLAT,USS,.500	8
8	80160	••WASHER,LOCK,.250	12
9	80354	••NUT,FLEXLOC,.500-13,FULL,LT	4
10	80192	••CSHH,.250-20X.75,GR5	12
11	37680	••FILLER,HYD FLUID,10 PSI	1
12	99299	••PIPE PLUG,2.00MP,SKT HD,MI	1
13	81161	••WASHER,WEATHER SEAL,#10	12
14	99463	••PIPE,BUSH,1.25 MP-12FP,MI	1

TABLE 2-4. FRONT LIVE PUMP MOUNTING GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		FRONT LIVE PUMP MOUNTING GROUP	
	23196	PUMP MOUNTING GROUP	
		GMC, FORD TRUCKS	
-1	17645	•GUARD,FRONT LIVE POWER,4.0” LG	1
-2	21743	•CHANNEL,PUMP SUPPORT	1
-3	23194	•MOUNT,PUMP,FRONT LIVE	1
-4	23196	•SCREEN	1
-5	23354	•BRACKET,COOLER MOUNT	2
-6	23361	•MOUNT,COOLER	2
	23894	PUMP MOUNTING GROUP	
		FRTLINER, IHC TRUCKS	
-1	23893	•GUARD,FRONT LIVE POWER,2.5” LG	1
-2	21743	•CHANNEL,PUMP SUPPORT	1
-3	23194	•MOUNT,PUMP,FRONT LIVE	1
-4	23353	•SCREEN	1
-5	23354	•BRACKET,COOLER MOUNT	2
-6	23361	•MOUNT,COOLER	2

- ITEM NOT ILLUSTRATED

TABLE 2-5. DRIVE SHAFT GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		DRIVESHAFT	
	34851-20	FRONT LIVE POWER	1
		INTERNATIONAL TRUCKS	
-1	39105	•DRIVESHAFT,FLANGE,1350	1
-2	39107	•SOLID SHAFT ASSEMBLY	1
-3	39111	•DRIVESHAFT,END YOKE,15T SPLN	1
-4	39112	•DRIVESHAFT,SET SCREW W/WIRE LK	2
	34851-42	FRONT LIVE POWER	1
		FORD, STERLING, FREIGHTLINER, GMC TRUCKS	
-1	39104	•DRIVESHAFT,FLANGE,1310	1
-2	39107	•SOLID SHAFT ASSEMBLY	1
-3	39111	•DRIVESHAFT,END YOKE,15T SPLN	1
-4	39112	•DRIVESHAFT,SET SCREW W/WIRE LK	2
	34850-XXX	PTO, VARIES PER TRUCK	1
-1	39109	•DRIVESHAFT,END YOKE,1.25 W/5/16	1
-2	39108	•DRIVESHAFT,2" TUBE,55 3/4	1
-3	39111	•DRIVESHAFT,END YOKE,15T SPLN	1
-4	39112	•DRIVESHAFT,SET SCREW W/WIRE LK	2

- ITEM NOT ILLUSTRATED

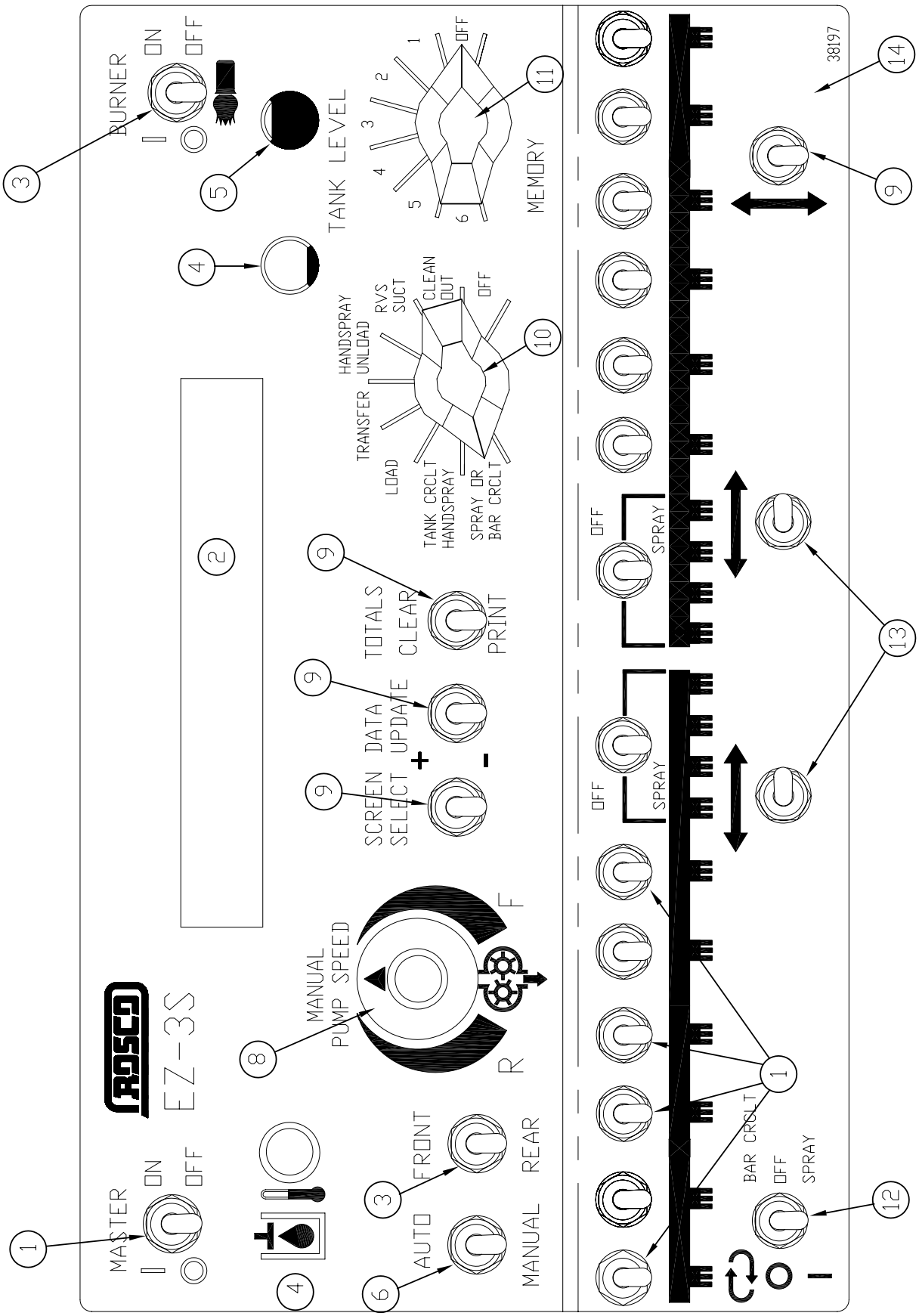


FIGURE 3-1. CONTROL BOX, EZ-3S, 16 FT SPRAYBAR

TABLE 3-1. CONTROL BOX, EZ-3S, 16 FT SPRAYBAR

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-1	**26095**	**CONTROL BOX, EZ-3S**	**1**
1	38157	•SWITCH,TOGGLE,DPST,2 POS	11
2	26965	•DISPLAY,KIT,LCD	1
		ATTACHING PARTS	
-201	21206	••WINDOW,AUTO CONTROLLER,EZ-1S	1
-202	26966	••HARNESS, DISPLAY	1
-203	38114	••DISPLAY,LCD,2X20,SINGLE UNIT	1
-204	39086	••WASHER,LOCK,EXT TOOTH,#6	4
		-----*-----	
3	38158	•SWITCH,TOGGLE,DPDT,2 POS,6 POLE	1
4	31983	•LIGHT,RED,DASH,.50 HOLE	2
5	31983	•LIGHT,RED,DASH,.50 HOLE	1
6	37342	•SWITCH,TOGGLE,3PDT,2 POS,9 POLE	2
8	35050	•POTENTIOMETER,100 OHM	1
-801	35049	••KNOB,.25 SHAFT	1
9	37516	•SWITCH,TOGGLE,SPDT,3-POS,MOM	4
10	35618	•SWITCH,RTRY,4 POLE,11 POS	1
-1001	35619	••KNOB,D-FLAT SHAFTS	2
11	38116	•SWITCH,RTRY,1POLE,11POS	1
-1101	35619	••KNOB,D-FLAT SHAFTS	1
12	36768	•SWITCH,TOGGLE,DPDT,3-POS,LONG	1
13	38185	•SWITCH,TOGGLE,DPDT,MOM,BLADE	2
14	38197	•DECAL,CONT BOX,MAX 3	1
-50	21236	•SPACER,LCD DISPLAY,EZ-1S	6
-51	26007	•BRACKET,CONT BOX MOUNT	1
-52	26008	•CONT BOX WLDMT,MAX 3	1
-53	26108	•J-PLUG DWG,MAX3 (SEE FIG 3-3)	0
-54	26427	•PANEL,CONT BOX,MAX 2	1
-55	26899	•HARNESS,MAX-3,CONT BOX-DC-2 (SEE FIG 3-2)	1

See Schematics at end of IPL for wiring diagrams.

- ITEM NOT ILLUSTRATED

TABLE 3-1. CONTROL BOX, EZ-3S, 16 FT SPRAYBAR (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-1	**26095**		
-56	34468	•CONN HOUSING,CAP,12 CIRCUIT	5
-57	34471	•CONTACT,SOCKET,20-14 GA	16
-58	35123	•TERM,RING,16-14 GA,#6 STUD	2
-59	35504	•TUBING,HEAT SHRINK,.250	2
-60	35926	•TERM,PUSH-ON,.25,FEM,22-18 GA	20
-61	35927	•RESISTOR,50 OHM,3 WATT	2
-62	36432	•DIODE,.001AMP,20 VOLTS	3
-63	36704	•EXPANSION BOARD,DC-2 CONTROL	1
-64	36705	•CONNECTOR,WIRE,30 PIN,20-22AWG	1
-65	36705-01	•COVER,LATCH,30 PIN CONNECT	1
-66	36705-02	•COVER,BACK,30 PIN CONNECTOR	1
-67	36706	•CONNECTOR,WIRE,20 PIN,20-22AWG	1
-68	36706-01	•COVER,LATCHING,20 PIN CONNECT	1
-69	36706-02	•COVER,BACK,20 PIN CONNECTOR	1
-70	36707-01	•CONTACT,CONNECTOR,22 AWG	3
-71	36758	•CONNECTOR,12 PIN,15 AMP RATING	1
-72	36765	•RESISTOR,560 OHM,3 WATT	1
-73	36766	•FUSE HOLDER,PANEL MT,.25X1.25	1
-74	36767	•FUSE,5 AMP,.25X1.25,SLO-BLO	1
-75	37127	•RESISTOR,100 OHM,5 WATT	1
-76	37229	•CONN HOUSING,CAP,8 WIRE	1
-77	37285	•TERM,SOCKET,METRI PACK,150 S	8
-78	37286	•SEAL,CABLE,METRI PACK,150 S	8
-79	38038	•TERM,BLOCK,4-GANG	1
-80	38476	•LOCKING RING,TOGGLE SWITCH	21
-81	38484	•CONNECTOR,HOUSING,10 PIN	1
-82	38607	•MICRO CONTROLLER,S2X	1
-8201	15300	••BRACE BAR,CONTROL BOX	1
-83	72143	•TERM,RING,22-16 GA,#8 STUD	24
-84	72203	•TERM,PUSH-ON,.18,FEM,16-14 GA	6
-85	851240145	•TERMINAL BLOCK	1
-200	22911	•STAND,EZ-1S CONTROLLER	1

- ITEM NOT ILLUSTRATED

TABLE 3-1. CONTROL BOX, EZ-3S, 16 FT SPRAYBAR (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-1	**26095**		
-300	26726	•HARNESS,BAR SENSOR	2
		ATTACHING PARTS	
-3001	36164	••TERM,SEALED CONN,16-14 GA,MALE	4
-3002	36165	••TERM,SEALED CONN,16-14 GA,FEM	3
-3003	36166	••SEAL,CABLE,18-16 GA	7
-3004	36300	••CONNECTOR,SEALED,TOWER,3-PIN	1
-3005	36351	••CONNECTOR,SEALED,SHROUD,4-PIN	1
-3006	38033	••WIRE,18GA,3 WIRE,SHIELDED	45
-3007	38520	••LOOM,SPLIT,CONVOLTD,.35,NYLON	12
-3008	71060	••LOOM,SPLIT,CONVOLUTED,.250	33
-3009	851201417	••TIE WRAP,.094X4.00	4
		-----*-----	

- ITEM NOT ILLUSTRATED

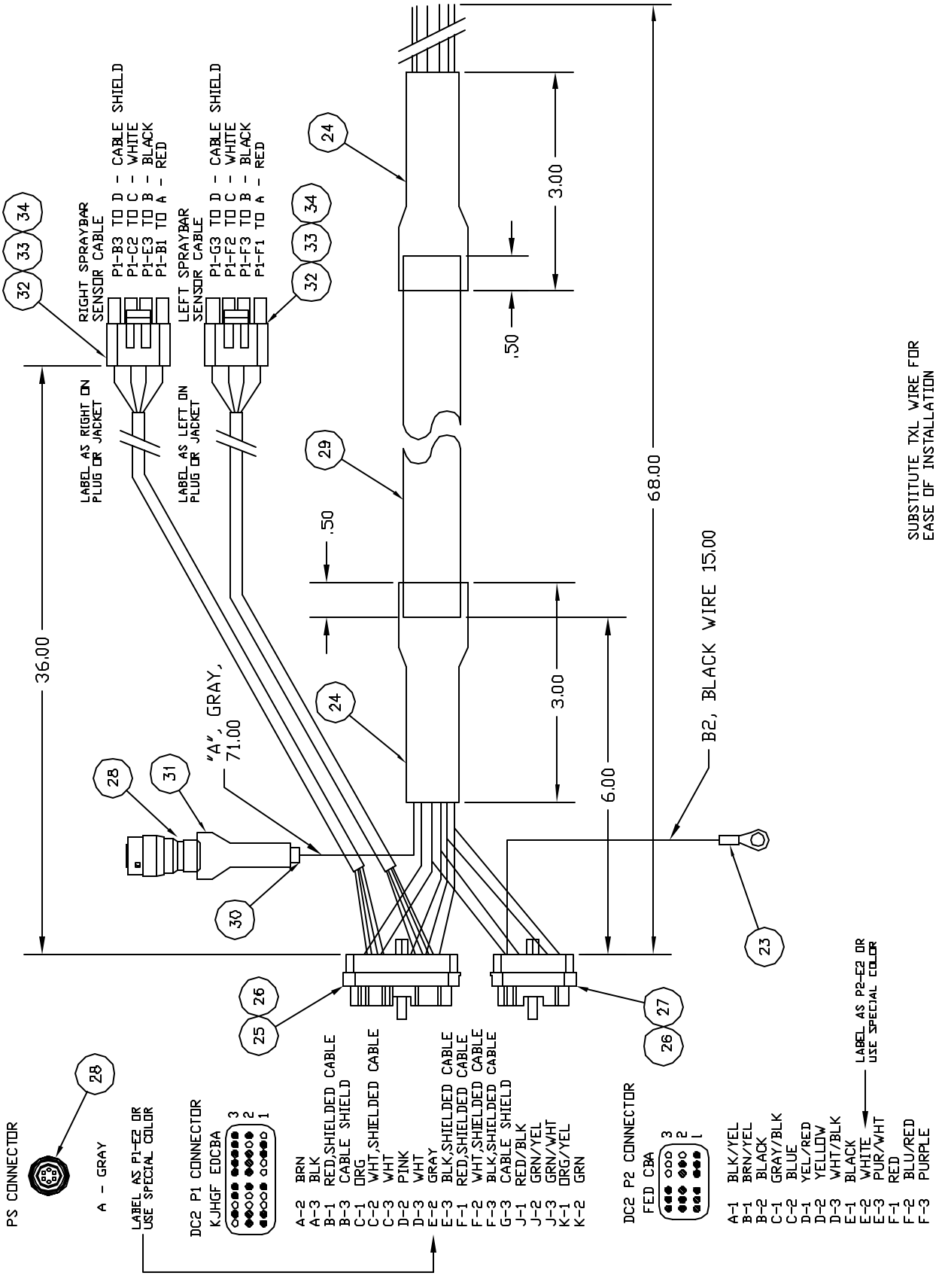
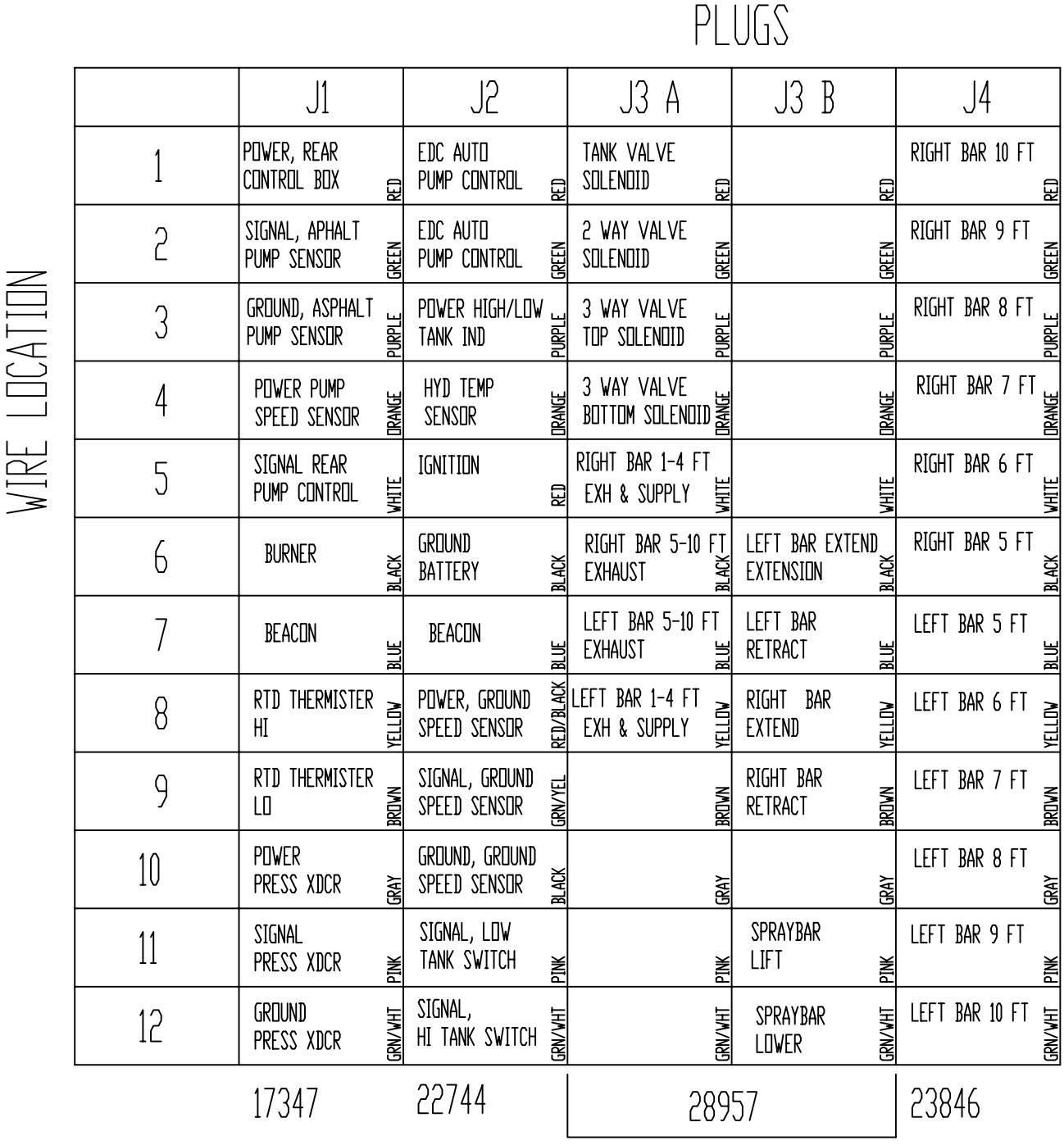


FIGURE 3-2. HARNESS, CONTROL BOX-DC-2

TABLE 3-2. HARNESS, CONTROL BOX-DC-2

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-2	**26899**	**•HARNESS,CONT BOX DC-2 (SEE FIG 3-1 FOR NHA)**	**1**
-1	33271-0	••WIRE,16 GA,GRAY	11.33
-2	33271-1	••WIRE,16 GA,BLACK	17
-3	33271-10	••WIRE,16 GA,GREEN/WHITE STRIPE	5.66
-4	33271-11	••WIRE,16 GA,BLUE	5.66
-5	33271-12	••WIRE,16 GA,RED/BLACK STRIPE	5.66
-6	33271-13	••WIRE,16 GA,BLACK/YELLOW STRIPE	5.66
-7	33271-14	••WIRE,16 GA,YELLOW/RED STRIPE	5.66
-8	33271-15	••WIRE,16 GA,BROWN/YELLOW STRIPE	5.66
-9	33271-16	••WIRE,16 GA,PURPLE/WHITE STRIPE	5.66
-10	33271-17	••WIRE,16 GA,WHITE/BLACK STRIPE	5.66
-11	33271-18	••WIRE,16 GA,BLUE/RED STRIPE	5.66
-12	33271-19	••WIRE,16 GA,GREEN/YEL STRIPE	5.66
-13	33271-2	••WIRE,16 GA,YELLOW	5.66
-14	33271-20	••WIRE,16 GA,GRAY/BLACK STRIPE	5.66
-15	33271-21	••WIRE,16 GA,ORANGE/YEL STRIPE	5.66
-16	33271-3	••WIRE,16 GA,BROWN	5.66
-17	33271-4	••WIRE,16 GA,GREEN	5.66
-18	33271-5	••WIRE,16 GA,WHITE	17
-19	33271-6	••WIRE,16 GA,ORANGE	5.66
-20	33271-7	••WIRE,16 GA,RED	5.66
-21	33271-8	••WIRE,16 GA,PINK	5.66
-22	33271-9	••WIRE,16 GA,PURPLE	5.66
23	33607	••TERM,RING,16-14 GA,.250 STUD	1
24	35568	••TUBING,HEAT SHRINK,.750	0.5
25	36762	••CONNECTOR,MERTI-PACK,30 WAY	1
26	36762-01	••TERMINAL,METRI-PACK, 150 SERIE	26
27	36763	••CONNECTOR,METRI-PACK,18 WAY	1
28	36764	••CONNECTOR,6 CONTACT,CIRCULAR	1
29	71870	••LOOM,SPLIT,CONVOLUTED,.750	2.5
30	33593	••LOOM,SPIRAL CUT,.25 OD,NATURAL	0.17
31	35514	••TUBING,HEAT SHRINK,.50	0.17
32	36352	••CONNECTOR,SEALED,TOWER,4-PIN	2
33	36165	••TERM,SEALED CONN,16-14 GA,FEM	8
34	36166	••SEAL,CABLE,18-16 GA	8
-35	38033	••WIRE,18GA,3 WIRE,SHIELDED	6

- ITEM NOT ILLUSTRATED



PLUGS

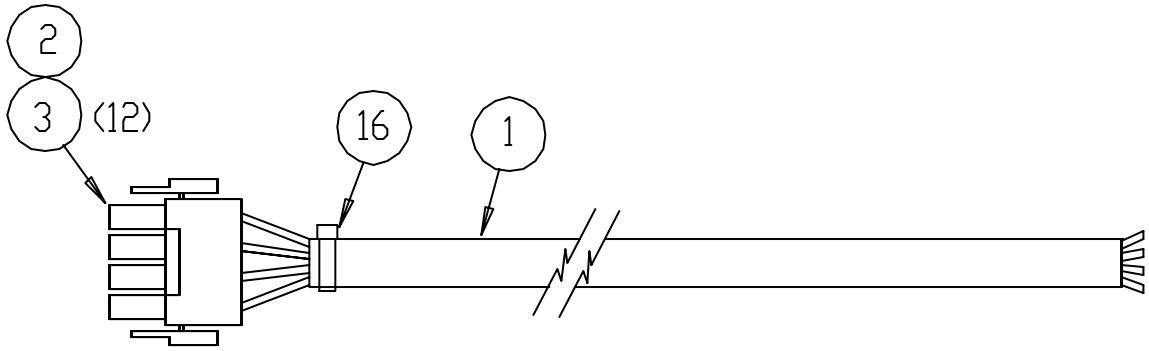
WIRE LOCATION

	J1	J2	J3 A	J3 B	J4
1	POWER, REAR CONTROL BOX RED	EDC AUTO PUMP CONTROL RED	TANK VALVE SOLENOID RED	RED	RIGHT BAR 10 FT RED
2	SIGNAL, APHALT PUMP SENSOR GREEN	EDC AUTO PUMP CONTROL GREEN	2 WAY VALVE SOLENOID GREEN	GREEN	RIGHT BAR 9 FT GREEN
3	GROUND, ASPHALT PUMP SENSOR PURPLE	POWER HIGH/LOW TANK IND PURPLE	3 WAY VALVE TOP SOLENOID PURPLE	PURPLE	RIGHT BAR 8 FT PURPLE
4	POWER PUMP SPEED SENSOR ORANGE	HYD TEMP SENSOR ORANGE	3 WAY VALVE BOTTOM SOLENOID ORANGE	ORANGE	RIGHT BAR 7 FT ORANGE
5	SIGNAL REAR PUMP CONTROL WHITE	IGNITION RED	RIGHT BAR 1-4 FT EXH & SUPPLY WHITE	WHITE	RIGHT BAR 6 FT WHITE
6	BURNER BLACK	GROUND BATTERY BLACK	RIGHT BAR 5-10 FT EXHAUST BLACK	LEFT BAR EXTEND EXTENSION BLACK	RIGHT BAR 5 FT BLACK
7	BEACON BLUE	BEACON BLUE	LEFT BAR 5-10 FT EXHAUST BLUE	LEFT BAR RETRACT BLUE	LEFT BAR 5 FT BLUE
8	RTD THERMISTER HI YELLOW	POWER, GROUND SPEED SENSOR RED/BLACK	LEFT BAR 1-4 FT EXH & SUPPLY YELLOW	RIGHT BAR EXTEND YELLOW	LEFT BAR 6 FT YELLOW
9	RTD THERMISTER LO BROWN	SIGNAL, GROUND SPEED SENSOR GRN/YEL	BROWN	RIGHT BAR RETRACT BROWN	LEFT BAR 7 FT BROWN
10	POWER PRESS XDCR GRAY	GROUND, GROUND SPEED SENSOR BLACK	GRAY	GRAY	LEFT BAR 8 FT GRAY
11	SIGNAL PRESS XDCR PINK	SIGNAL, LOW TANK SWITCH PINK	PINK	SPRAYBAR LIFT PINK	LEFT BAR 9 FT PINK
12	GROUND PRESS XDCR GRN/WHT	SIGNAL, HI TANK SWITCH GRN/WHT	GRN/WHT	SPRAYBAR LOWER GRN/WHT	LEFT BAR 10 FT GRN/WHT
	17347	22744	28957		23846

FIGURE 3-3. J-PLUG WIRE LOCATION CHART

TABLE 3-3. J-PLUG WIRE LOCATION CHART

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-3	**26108**	**•J-PLUG WIRE CHART (SEE FIG 3-1 FOR NHA)**	**1**
10	17347	••HARNESS,WIRE (SEE FIG 3-4)	1
20	22744	••HARNESS,WIRE,J-2,W/RCPT (SEE FIG 3-5)	1
30	28957	••HARNESS,WIRE,J3 A-B (SEE FIG 3-6)	2
40	23846	••HARNESS,WIRE (SEE FIG 3-7)	1



PIN	WIRE COLOR	WIRE ITEM NO
1	RED	11
2	GREEN	8
3	PURPLE	13
4	ORANGE	10
5	WHITE	9
6	BLACK	5
7	BLUE	15
8	YELLOW	6
9	BROWN	7
10	GRAY	4
11	PINK	12
12	GRN/WHT	14

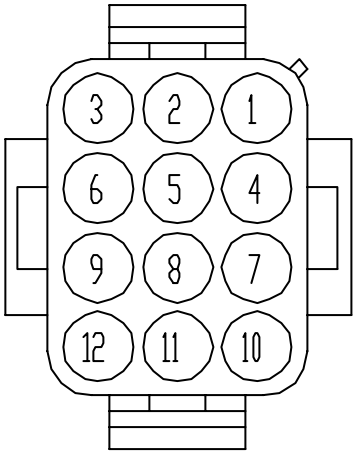
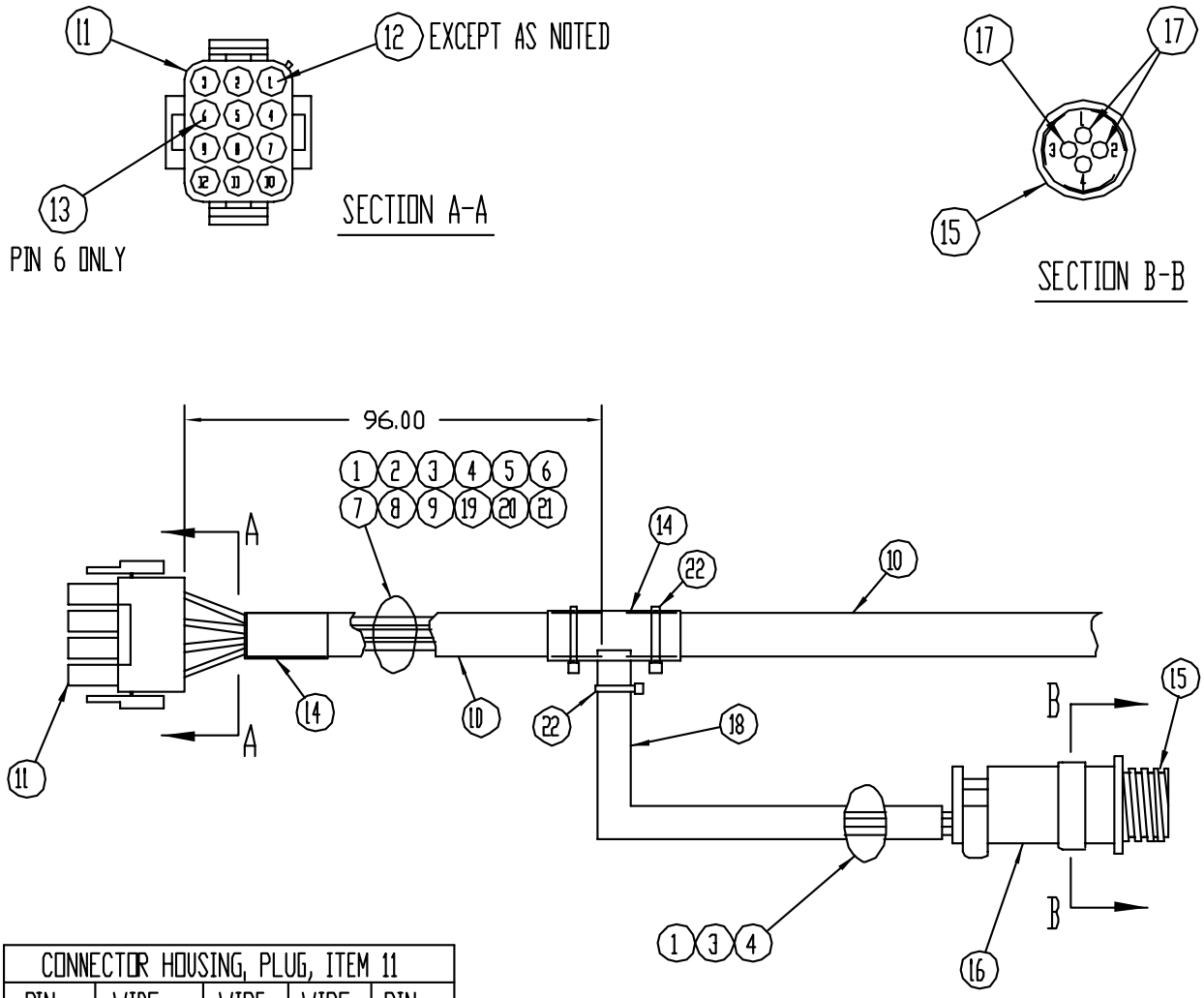


FIGURE 3-4. WIRE HARNESS

TABLE 3-4. WIRE HARNESS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-4	**17347**	**••WIRE HARNESS (SEE FIG 3-3 FOR NHA)**	**1**
1	33589	•••LOOM,SPLIT,CONVOLUTED,.500	35
2	34467	•••CONN HOUSING,PLUG,12 CIRCUIT	1
3	34469	•••CONTACT,PIN,20-14 GA	12
-4	33271-0	•••WIRE,16 GA,GRAY	35
-5	33271-1	•••WIRE,16 GA,BLACK	35
-6	33271-2	•••WIRE,16 GA,YELLOW	35
-7	33271-3	•••WIRE,16 GA,BROWN	35
-8	33271-4	•••WIRE,16 GA,GREEN	35
-9	33271-5	•••WIRE,16 GA,WHITE	35
-10	33271-6	•••WIRE,16 GA,ORANGE	35
-11	33271-7	•••WIRE,16 GA,RED	35
-12	33271-8	•••WIRE,16 GA,PINK	35
-13	33271-9	•••WIRE,16 GA,PURPLE	35
-14	33271-10	•••WIRE,16 GA,GREEN/WHITE STRIPE	35
-15	33271-11	•••WIRE,16 GA,BLUE	35
16	851201417	•••TIE WRAP,.094X4.00	4

- ITEM NOT ILLUSTRATED



CONNECTOR HOUSING, PLUG, ITEM 11					
PIN	WIRE COLOR	WIRE ITEM NO	WIRE GAUGE	PIN ITEM NO	
1	RED	7	16	12	
2	GREEN	5	16	12	
3	PURPLE	9	16	12	SEE NOTE 5
4	ORANGE	6	16	12	
5	RED	19	14	12	
6	BLACK	20	12	13	
7	BLUE	2	14	12	
8	RED/BLK	3	16	12	SEE NOTE 1
9	GRN/YEL	4	16	12	SEE NOTE 2
10	BLACK	1	16	12	SEE NOTE 3
11	PINK	8	16	12	
12	GRN/WHT	21	16	12	

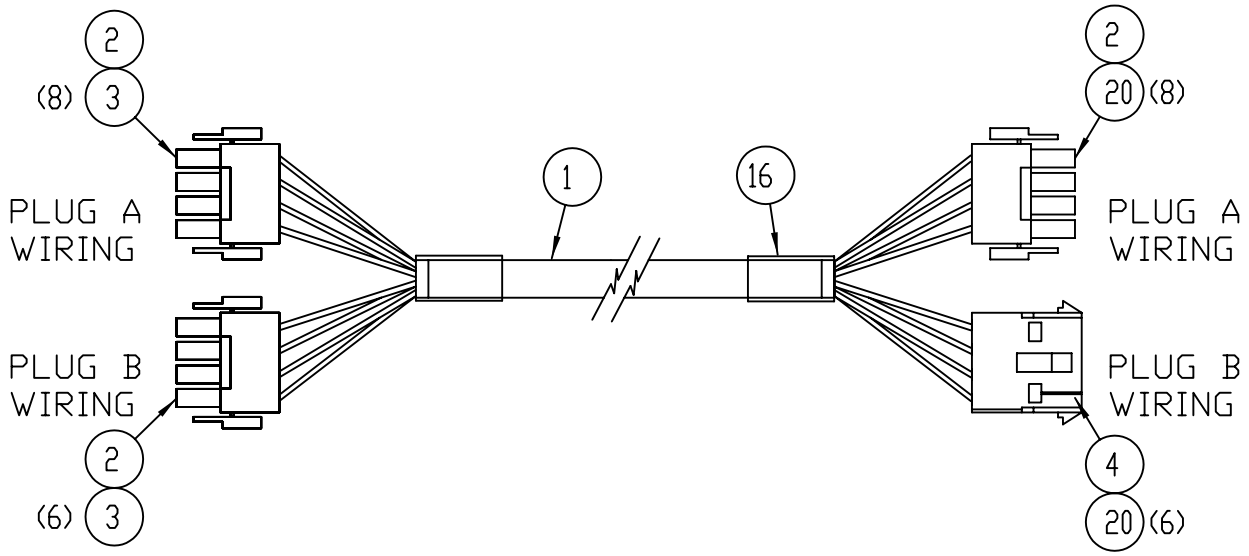
RECEPTACLE, ITEM 15					
SOCKET	WIRE COLOR	WIRE ITEM NO	WIRE GAUGE	SKT ITEM NO	
1	BLACK	1	16	17	SEE NOTE 3
2	GRN/YEL	4	16	17	SEE NOTE 2
3	RED/BLK	3	16	17	SEE NOTE 1
4	-	-	-	-	

FIGURE 3-5. WIRE HARNESS,J-2,MAX II,WITH RECEPTACLE

TABLE 3-5. WIRE HARNESS,J-2,MAX II,WITH RECEPTACLE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-5	**22744**	**••WIRE HARNESS,J-2 (SEE FIG 3-3 FOR NHA)**	**1**
1	33271-1	•••WIRE,16 GA,BLACK	10
2	33271-10	•••WIRE,16 GA,GREEN/WHITE STRIPE	25
3	33271-12	•••WIRE,16 GA,RED/BLACK STRIPE	10
4	33271-19	•••WIRE,16 GA,GREEN/YEL STRIPE	10
5	33271-4	•••WIRE,16 GA,GREEN	25
6	33271-6	•••WIRE,16 GA,ORANGE	25
7	33271-7	•••WIRE,16 GA,RED	25
8	33271-8	•••WIRE,16 GA,PINK	25
9	33271-9	•••WIRE,16 GA,PURPLE	25
10	33589	•••LOOM,SPLIT,CONVOLUTED,.500	25
11	33602	•••CONN,BUTT,16-14 GA	1
12	34467	•••CONN HOUSING,PLUG,12 CIRCUIT	1
13	34469	•••CONTACT,PIN,20-14 GA	11
14	35391	•••CONTACT,PIN,12-10 GA	1
15	36888	•••RCPT,FREE HNG,4 CONT,#11 SHELL	1
16	36889	•••CLAMP,CABLE,#11 SHELL	1
17	36890	•••CONTACT,SOCKET,18-14 GA	3
18	71060	•••LOOM,SPLIT,CONVOLUTED,.250	2
19	71062	•••WIRE,14 GA,BLUE	25
20	71065	•••WIRE,14 GA,RED	25
21	851201417	•••TIE WRAP,.094X4.00	3
22	851201595	•••WIRE,12 GA,BLACK	25

NOTES:
1. Wire from pin 8 connects to socket 3 on item 15.
2. Wire from pin 9 connects to socket 2 on item 15.
3. Wire from pin 10 connects to socket 1 on item 15.
4. Lay item 18, .250 loom, inside item 10, .500 loom, and apply electrical tape, item 14, over splice.
5. Add item 14 to end of purple wire.



PLUG A

PIN	WIRE COLOR	WIRE ITEM NO
1	RED	11
2	GREEN	8
3	PURPLE	13
4	ORANGE	10
5	WHITE	9
6	BLACK	5
7	BLUE	15
8	YELLOW	6
9		
10		
11		
12		

PLUG B

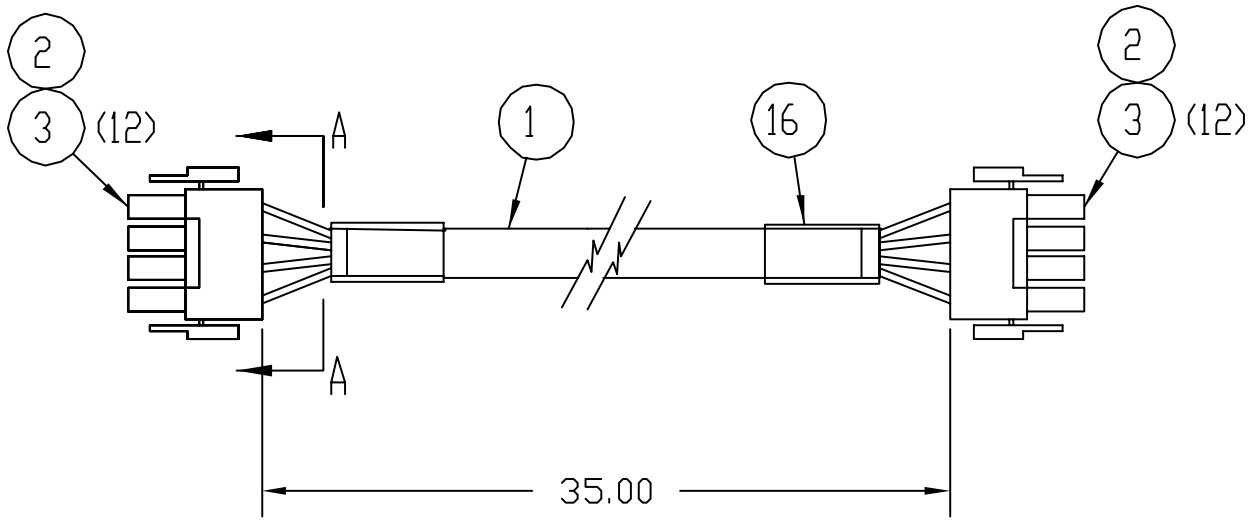
PIN	WIRE COLOR	WIRE ITEM NO
1		
2		
3		
4		
5		
6	BLK/YEL	17
7	BLU/RED	18
8	YEL/RED	19
9	BROWN	7
10		
11	PINK	12
12	GRN/WHT	14

FIGURE 3-6. WIRE HARNESS, J3 A-B

TABLE 3-6. WIRE HARNESS, J3 A-B

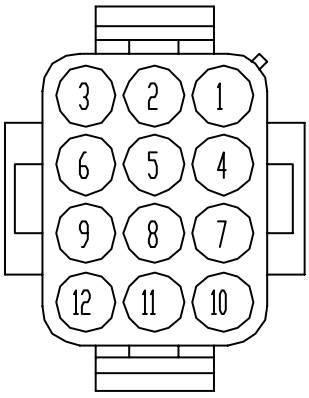
FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-6	**28957**	**••HARNESS,WIRE,J3 A-B (SEE FIG 3-3 FOR NHA)**	**1**
1	33589	•••LOOM,SPLIT,CONVOLUTED,.500	35
2	34467	•••CONN HOUSING,PLUG,12 CIRCUIT	3
3	34469	•••CONTACT,PIN,20-14 GA	14
4	34468	•••CONN HOUSING,CAP,12 CIRCUIT	1
-5	33271-1	•••WIRE,16 GA,BLACK	35
-6	33271-2	•••WIRE,16 GA,YELLOW	35
-7	33271-3	•••WIRE,16 GA,BROWN	35
-8	33271-4	•••WIRE,16 GA,GREEN	35
-9	33271-5	•••WIRE,16 GA,WHITE	35
-10	33271-6	•••WIRE,16 GA,ORANGE	35
-11	33271-7	•••WIRE,16 GA,RED	35
-12	33271-8	•••WIRE,16 GA,PINK	35
-13	33271-9	•••WIRE,16 GA,PURPLE	35
-14	33271-10	•••WIRE,16 GA,GREEN/WHITE STRIPE	35
-15	33271-11	•••WIRE,16 GA,BLUE	35
16	35568	•••TUBING,HEAT SHRINK,.750	6
-17	33271-13	•••WIRE,16 GA,BLACK/YELLOW STRIPE	35
-18	33271-18	•••WIRE,16 GA,BLUE/RED STRIPE	35
-19	33271-14	•••WIRE,16 GA,YELLOW/RED STRIPE	35
20	34471	•••CONTACT,SOCKET,20-14 GA	14

- ITEM NOT ILLUSTRATED



PIN	WIRE COLOR	WIRE ITEM NO
1	RED	11
2	GREEN	8
3	PURPLE	13
4	ORANGE	10
5	WHITE	9
6	BLACK	5
7	BLUE	15
8	YELLOW	6
9	BROWN	7
10	GRAY	4
11	PINK	12
12	GRN/WHT	14

BOTH ENDS



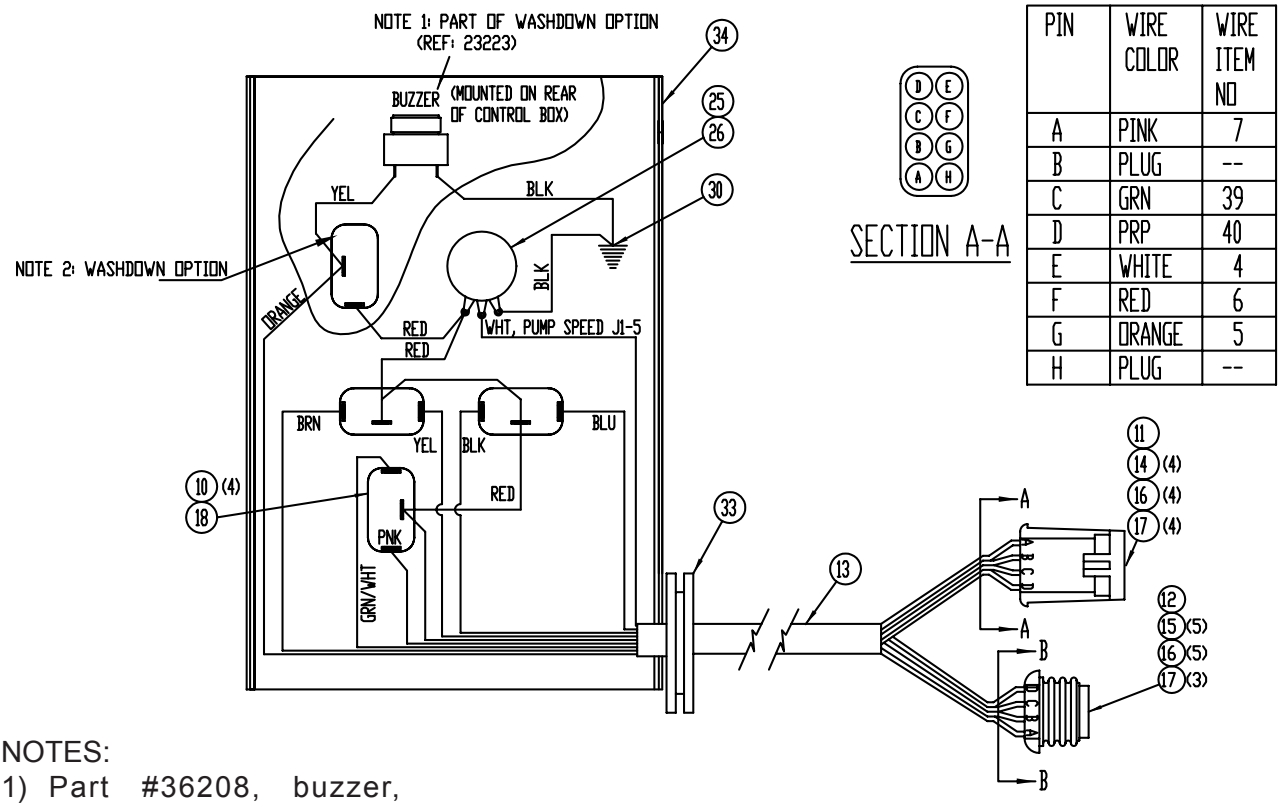
SECTION A-A

FIGURE 3-7. WIRE HARNESS

TABLE 3-7. WIRE HARNESS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-7	**23846**	**••WIRE HARNESS (SEE FIG 3-3 FOR NHA)**	**1**
1	33589	•••LOOM,SPLIT,CONVOLUTED,.500	35
2	34467	•••CONN HOUSING,PLUG,12 CIRCUIT	2
3	34469	•••CONTACT,PIN,20-14 GA	24
-4	33271-0	•••WIRE,16 GA,GRAY	35
-5	33271-1	•••WIRE,16 GA,BLACK	35
-6	33271-2	•••WIRE,16 GA,YELLOW	35
-7	33271-3	•••WIRE,16 GA,BROWN	35
-8	33271-4	•••WIRE,16 GA,GREEN	35
-9	33271-5	•••WIRE,16 GA,WHITE	35
-10	33271-6	•••WIRE,16 GA,ORANGE	35
-11	33271-7	•••WIRE,16 GA,RED	35
-12	33271-8	•••WIRE,16 GA,PINK	35
-13	33271-9	•••WIRE,16 GA,PURPLE	35
-14	33271-10	•••WIRE,16 GA,GREEN/WHITE STRIPE	35
-15	33271-11	•••WIRE,16 GA,BLUE	35
16	35568	•••TUBING,HEAT SHRINK,.750	6

- ITEM NOT ILLUSTRATED



PIN	WIRE COLOR	WIRE ITEM NO
A	PINK	7
B	PLUG	--
C	GRN	39
D	PRP	40
E	WHITE	4
F	RED	6
G	ORANGE	5
H	PLUG	--

NOTES:
1) Part #36208, buzzer, 12VDC, continuous tone.
2) Part #37552, toggle switch, SPST, 2-position.

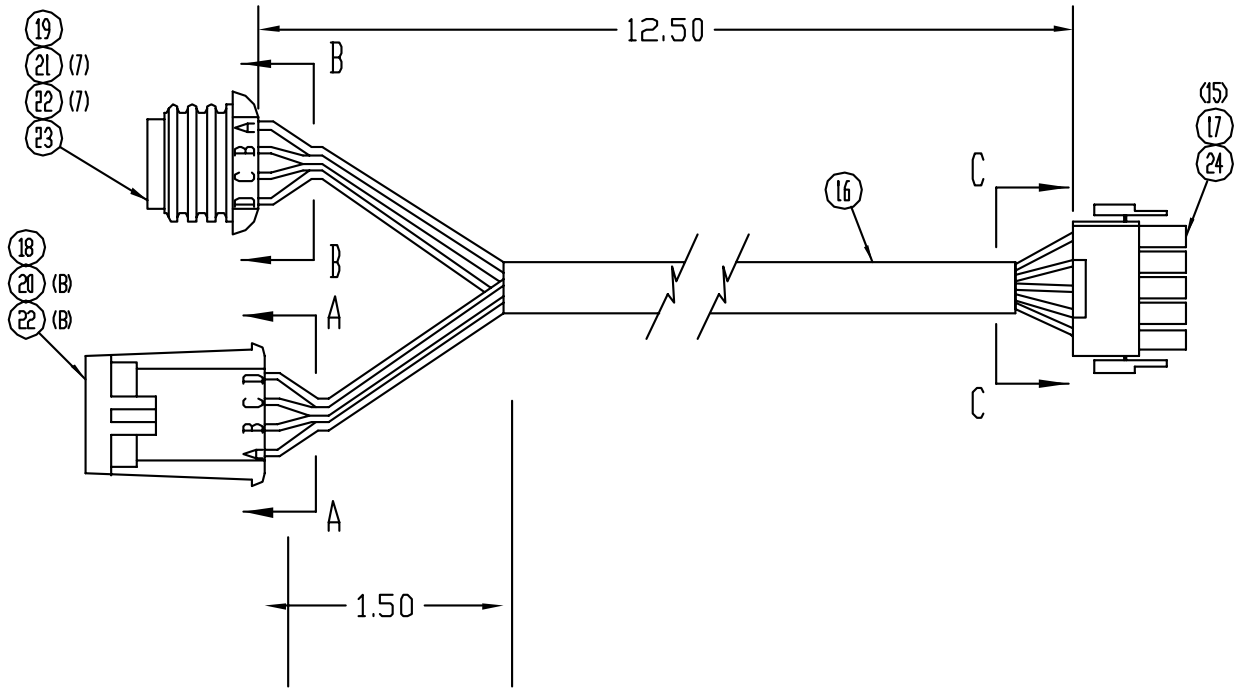
SOCKET	WIRE COLOR	WIRE ITEM NO
A	RED/BLK	37
B	GRN/YEL	38
C	GRN/WHT	8
D	PLUG	--
E	YELLOW	2
F	BROWN	3
G	BLUE	9
H	BLACK	1

FIGURE 3-8. REAR CONTROL BOX ASSEMBLY

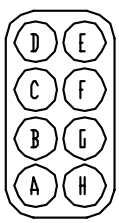
TABLE 3-8. REAR CONTROL BOX ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-8	**26160**	**REAR CONTROL BOX ASSY**	**1**
-1	33271-1	•WIRE,16 GA,BLACK	1.5
-2	33271-2	•WIRE,16 GA,YELLOW	1.5
-3	33271-3	•WIRE,16 GA,BROWN	1.5
-4	33271-5	•WIRE,16 GA,WHITE	1.5
-5	33271-6	•WIRE,16 GA,ORANGE	1.5
-6	33271-7	•WIRE,16 GA,RED	3
-7	33271-8	•WIRE,16 GA,PINK	1.5
-8	33271-10	•WIRE,16 GA,GREEN/WHITE STRIPE	1.5
-9	33271-11	•WIRE,16 GA,BLUE	1.5
10	35926	•TERM,PUSH-ON,.25,FEM,22-18 GA	17
11	37229	•CONN HOUSING,CAP,8 WIRE	1
12	37230	•CONN HOUSING,PLUG,8 WIRE	1
13	33589	•LOOM,SPLIT,CONVOLUTED,.500	1.5
14	37284	•TERM,PIN METRIC PACK 150 SERIES	6
15	37285	•TERM,SOCKET,METRI PACK,150 S	7
16	37286	•SEAL,CABLE,METRI PACK,150 S	13
17	37287	•PLUG,CAVITY,METRI PACK,150 S	3
18	37420	•TERM,PUSH-ON,.25,ADPTR,FM-M-M	3
25	35049	•KNOB,.25 SHAFT	1
26	35050	•POTENTIOMETER,100 OHM	1
27	37516	•SWITCH,TOGGLE,SPDT,3-POS,MOM	3
28	38191	•DECAL,MAX 3,REAR CONT BOX	1
30	33607	•TERM,RING,16-14 GA,.250 STUD	1
-32	23845	•HARNESS,15 WIRE,12.5FT (SEE FIG 3-9)	1
33	37560	•GROMMET,INS,.62 ID,1.38 HOLE	1
34	23976	•CONTROL BOX	1
35	80192	•CSHH,.250-20X.75,GR5	4
36	80350	•NUT,FLEXLOC,.250-20,FULL,LT	4
-37	33271-12	•WIRE,16 GA,RED/BLACK STRIPE	1.5
-38	33271-19	•WIRE,16 GA,GREEN/YEL STRIPE	1.5
-39	33271-4	•WIRE,16 GA,GREEN	1.5
-40	33271-9	•WIRE,16 GA,PURPLE	1.5

- ITEM NOT ILLUSTRATED

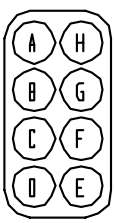


SOCKET	WIRE COLOR	WIRE ITEM NO
A	RED/BLK	13
B	GRN/YEL	15
C	GRN/WHT	11
D	GRAY	1
E	YELLOW	3
F	BROWN	4
G	BLUE	12
H	BLACK	2



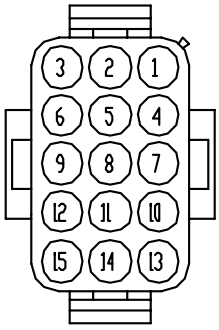
SECTION A-A

PIN	WIRE COLOR	WIRE ITEM NO
A	PINK	9
B	WHT/BLK	14
C	GREEN	5
D	PURPLE	10
E	WHITE	6
F	RED	8
G	ORANGE	7
H	PLUG	--



SECTION B-B

PIN	WIRE COLOR	WIRE ITEM NO
1	RED/BLK	13
2	GRN/YEL	15
3	GRN/WHT	11
4	GRAY	1
5	YELLOW	3
6	BROWN	4
7	BLUE	12
8	BLACK	2
9	PINK	9
10	WHT/BLK	14
11	GREEN	5
12	PURPLE	10
13	WHITE	6
14	RED	8
15	ORANGE	7



SECTION C-C

FIGURE 3-9. WIRE HARNESS, 15 WIRE

TABLE 3-9. WIRE HARNESS, 15 WIRE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
3-9	**23845**	**•WIRE HARNESS, 15 WIRE (SEE FIG 3-8 FOR NHA)**	**1**
-1	33271-0	••WIRE,16 GA,GRAY	12.5
-2	33271-1	••WIRE,16 GA,BLACK	12.5
-3	33271-2	••WIRE,16 GA,YELLOW	12.5
-4	33271-3	••WIRE,16 GA,BROWN	12.5
-5	33271-4	••WIRE,16 GA,GREEN	12.5
-6	33271-5	••WIRE,16 GA,WHITE	12.5
-7	33271-6	••WIRE,16 GA,ORANGE	12.5
-8	33271-7	••WIRE,16 GA,RED	12.5
-9	33271-8	••WIRE,16 GA,PINK	12.5
-10	33271-9	••WIRE,16 GA,PURPLE	12.5
-11	33271-10	••WIRE,16 GA,GREEN/WHITE STRIPE	12.5
-12	33271-11	••WIRE,16 GA,BLUE	12.5
-13	33271-12	••WIRE,16 GA,RED/BLACK STRIPE	12.5
-14	33271-17	••WIRE,16 GA,WHITE/BLACK STRIPE	12.5
-15	33271-19	••WIRE,16 GA,GREEN/YEL STRIPE	12.5
16	33589	••LOOM,SPLIT,CONVOLUTED,.500	12
17	34471	••CONTACT,SOCKET,20-14 GA	15
18	37229	••CONN HOUSING,CAP,8 WIRE	1
19	37230	••CONN HOUSING,PLUG,8 WIRE	1
20	37284	••TERM PIN METRIC PACK 150 SERIES	8
21	37285	••TERM,SOCKET,METRI PACK,150 S	7
22	37286	••SEAL,CABLE,METRI PACK,150 S	15
23	37287	••PLUG,CAVITY,METRI PACK,150 S	1
24	72593	••CONN HOUSING,PLUG,15 CIRCUIT	1

- ITEM NOT ILLUSTRATED

TABLE 3-10. RADAR HORN

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	18122	**RADAR HORN**	**1**
-1	15716	•BRACKET,RADAR VEL SENSOR	1
-2	35023	•RADAR HORN	1
-3	35023-01	•WINDOW ONLY, FOR RADAR HORN	1
-4	80142	•WASHER,FLAT,USS,.375	2
-5	80228	•CSHH,.375-16X1.75,GR5	2
-6	80350	•NUT,FLEXLOC,.250-20,FULL,LT	4
-7	80352	•NUT,FLEXLOC,.375-16,FULL,LT	2
-8	80411	•CSHH,.250-20X4.00,GR5	4

- ITEM NOT ILLUSTRATED

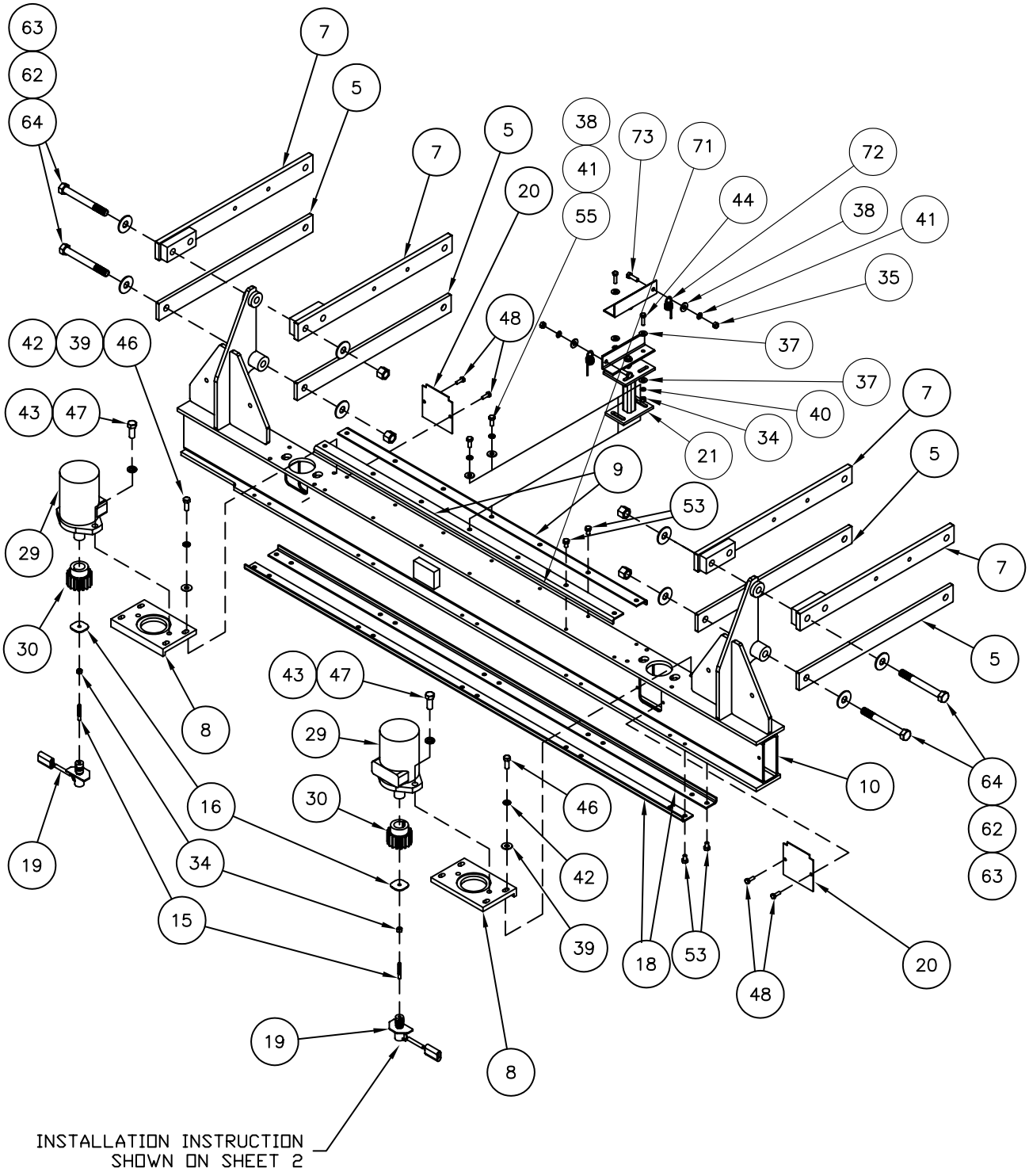
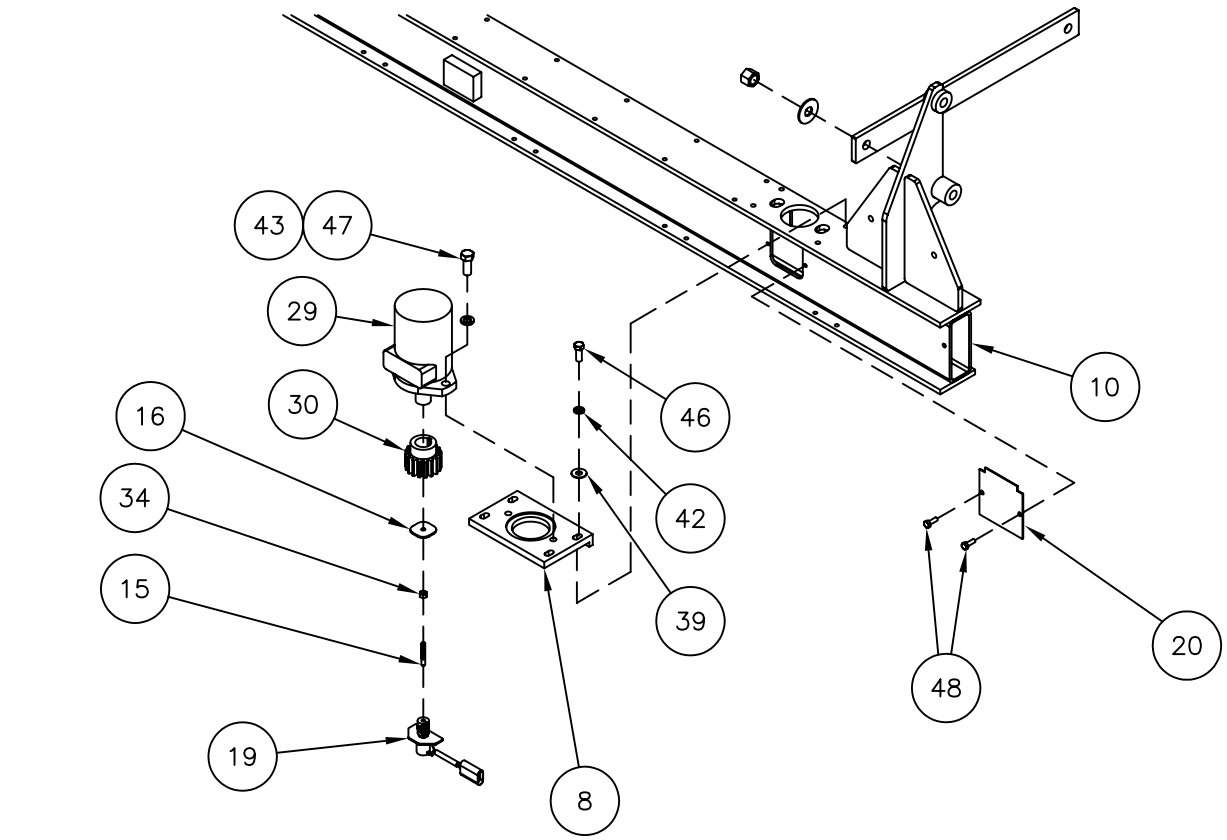


FIGURE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (SHEET 1 OF 5)

TABLE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-1	**25961**	**SPRAYBAR ASSEMBLY, 16 FOOT**	**1**
5	25948	•LINK,SUPPORT,BOTTOM	4
7	25997	•LINK,SUPPORT,TOP	4
8	26016	•MOUNT,MOTOR,SPRAYBAR	2
9	26017	•RAIL,BARSLIDE,TOP	2
10	26019	•BARSLIDE W/M	1
15	26059	•SHAFT,THD'D,1.75	2
16	26060	•WASHER,SQ,.281IDX1.5	2
18	26112	•RAIL,BARSLIDE,BTTM	2
19	26141	•POT ASSEMBLY,MAX3	2
20	26142	•PLATE,ACCESS	2
21	27594	•BRACKET,ACTUATOR	1
29	38122	•MOTOR,HYD,LSHT,8.0 DISP	2
-2901	38122-02	••SEAL KIT,38122 MOTOR	
30	38125	•GEAR,SPUR,PINION,8 D.P.,17T	2
34	80036	•NUT,HEX,.250-20	6
35	80037	•NUT,HEX,.312-18	10
37	80140	•WASHER,TYPE A PLAIN,.250	10
38	80141	•WASHER,FLAT,USS,.312	18
39	80142	•WASHER,FLAT,USS,.375	8
40	80160	•WASHER,LOCK,.250	4
41	80161	•WASHER,LOCK,.312	4
42	80162	•WASHER,LOCK,.375	8
43	80164	•WASHER,LOCK,.500	4
44	80185	•CSHH,.250-20X1.00,GR5	6
46	80221	•CSHH,.375-16X1.00,GR5	8
47	80250	•CSHH,.500-13X1.25,GR5	4
48	80324	•SCR,SLFTPG,HH,.250-20X.75	4
53	81211	•CSHH,.312-24X.50,GR5	34
55	81227	•CSHH,.312-24X.875,GR5	2
62	80146	•WASHER,TYPE A PLAIN,.625	20
63	80356	•NUT,FLEXLOC,.625-11,FULL,LT	10
64	80445	•CSHH,.625-11X5.50,GR 5	8
65	37187	•RING,SPLIT,2.02IDX.18,ZINC CTD	2
71	27591	•ARM,ACTUATOR	2
72	38660	•SPRING,MAX3,TORSION	2
73	80208	•CSHH,.312-18X1.00,GR5	2

- ITEM NOT ILLUSTRATED



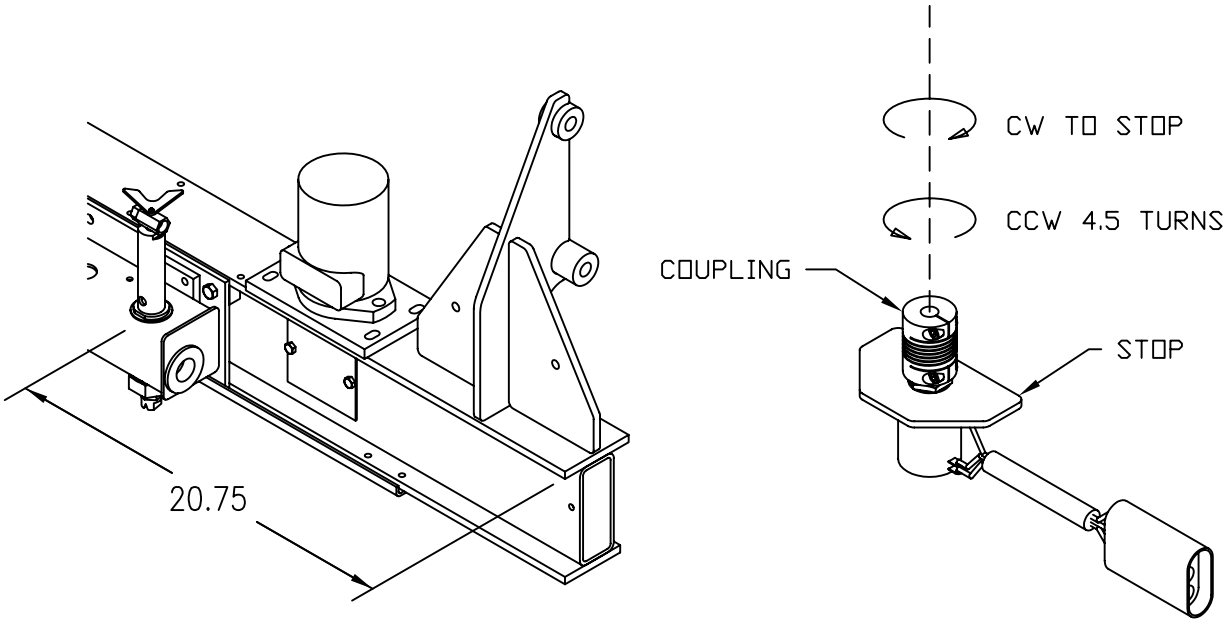


FIGURE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (SHEET 2 OF 5)

TABLE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-1	**25961**	**SPRAYBAR ASSEMBLY**	
8	26016	•MOUNT,MOTOR,SPRAYBAR	2
10	26019	•BARSLIDE W/M	1
15	26059	•SHAFT,THD'D,1.75	2
16	26060	•WASHER,SQ,.281IDX1.5	2
19	26141	•POT ASSEMBLY,MAX3 (SEE FIG 4-2)	2
20	26142	•PLATE,ACCESS	2
-26	34998	•LOCTITE,#242	0.1
29	38122	•MOTOR,HYD,LSHT,8.0 DISP	2
-2901	38122-01	••SEAL KIT,38122 MOTOR	
30	38125	•GEAR,SPUR,PINION,8 D.P.,17T	2
34	80036	•NUT,HEX,.250-20	6
39	80142	•WASHER,FLAT,USS,.375	8
42	80162	•WASHER,LOCK,.375	8
43	80164	•WASHER,LOCK,.500	4
46	80221	•CSHH,.375-16X1.00,GR5	8
47	80250	•CSHH,.500-13X1.25,GR5	4
48	80324	•SCR,SLFTPG,HH,.250-20X.75	4

Bar Extend Sensor Replacement

1. Fully extend bar.
2. Remove access plate.
3. Disconnect sensor wire harness.
4. Loosen socket head screws on coupling and remove the coupling.
5. Remove jam nut. Remove old sensor and replace with new one.
6. Reassemble and tighten jam nut.
7. Replace coupling, using Loctite (Item 26) on potentiometer shaft and turn clockwise until the coupler stops. Then turn counter clockwise 1.5 turns. Coupling may need to be adjusted to allow the tightening of the socket head screws.
8. Apply locktite to inside of bore on the coupling, then fit over shaft (Item 15) and tighten screws.
9. Connect wire harness and replace.

- ITEM NOT ILLUSTRATED

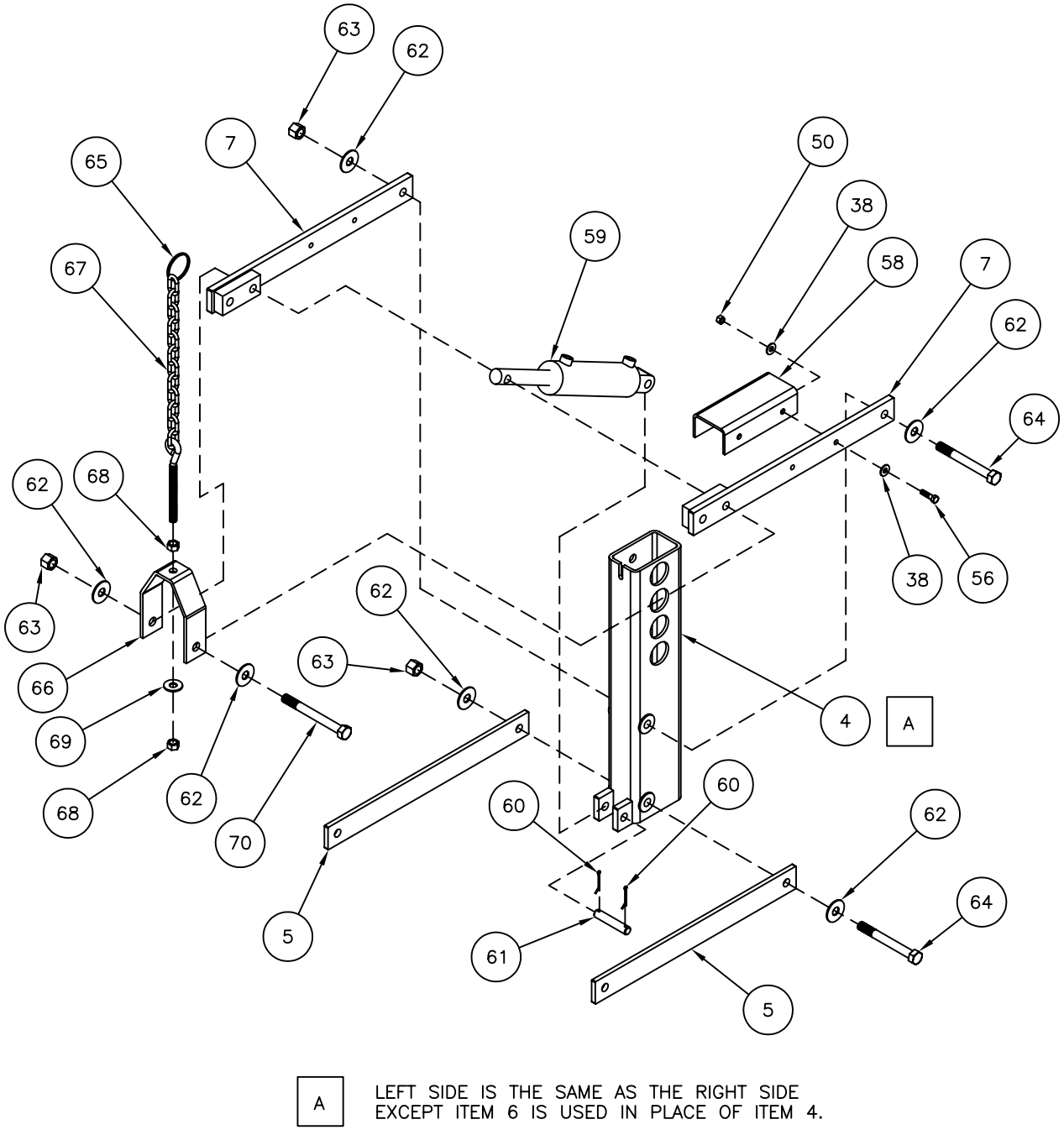


FIGURE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (SHEET 3 OF 5)

TABLE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-1	**25961**	**SPRAYBAR ASSEMBLY**	
4	25944	•SUPPORT,SPRAYBAR,RH	1
5	25948	•LINK,SUPPORT,BOTTOM	4
-6	25949	•SUPPORT,SPRAYBAR,LH	1
7	25997	•LINK,SUPPORT,TOP	4
38	80141	•WASHER,FLAT,USS,.312	18
50	80351	•NUT,FLEXLOC,.312-18,FULL,LT	48
56	80206	•CSHH,.312-18X1.25,GR5	8
58	26622	•STIFFENER,WIDE,SCISSOR BAR	2
59	6231	•CYL,HYD,2.00X5.75STROKE,12.50	2
-5901	6231-01	••SEAL KIT,FOR CYL	
60	80332	•COTTER PIN,.125X1.50	4
61	9081	•PIN,HYD,LIFT CYLINDER	2
62	80146	•WASHER,TYPE A PLAIN,.625	20
63	80356	•NUT,FLEXLOC,.625-11,FULL,LT	10
64	80445	•CSHH,.625-11X5.50,GR 5	8
65	37187	•RING,SPLIT,2.02IDX.18,ZINC CTD	2
66	26721	•CLEVIS	2
67	26725	•CHAIN,ADJUSTMENT	2
68	80040	•NUT,HEX,.500-13	4
69	80144	•WASHER,FLAT,USS,.500	2
70	71697	•CAP SCREW HT 5/8 X 6 1/2 NC	2

- ITEM NOT ILLUSTRATED

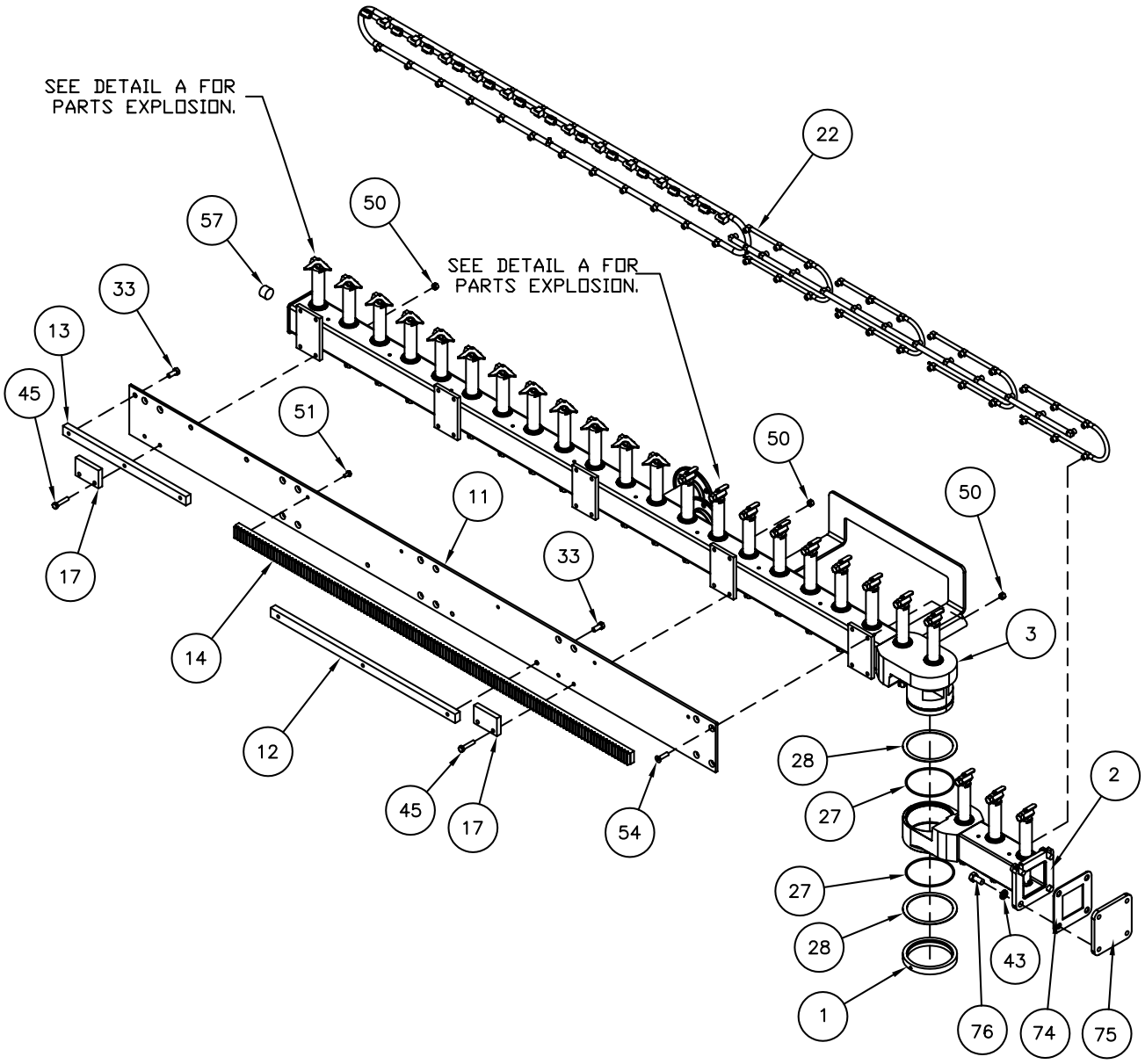


FIGURE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (SHEET 4 OF 5)

TABLE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-1	**25961**	**SPRAYBAR ASSEMBLY**	
1	15929	•NUT	2
2	28631	•EXTENSION,SPRAYBAR	2
3	25901	•SPRAYBAR W/M,EXTENDABLE	2
11	26033	•PLATE,SLIDE	2
12	26034	•BLOCK,SLIDE,BOTTOM	2
13	26035	•BLOCK,SLIDE,TOP	2
14	26036	•RACK,GEAR,8 D.P.,MODIFIED	2
17	26106	•BLOCK,STOP,EXTEND	4
22	28540	•CONTROL GRP,AIR,MAX3	1
		ATTACHING PARTS	
	28540	••WIRING DIAGRAM SCHEMATIC AT END OF IPL	1
-2201	37311	••FITT,90 02MP-02FP,BRASS	48
-2202	38130	••VALVE,3 WAY,AIR,SPRAY BAR	24
		(No seal kit available)	
-2203	38132	••VALVE,3 WAY,02X02X02, (No seal kit)	24
-2204	38201	••CLAMP,HOSE,BAND,.45DIA	296
-2205	38412	••FITT,TEE 04HB-O4HB-04HB,BRASS	4
-2206	5347	••HOSE,04,PUSH-ON,LOW PRESSURE	235
-2207	71796	••FITT,90 02MP-04HB,CRIMPED,BRAS	14
-2208	72700	••FITT,TEE 04HB-04HB-02MP,BRASS	130
-2209	90803	••SLEEVE,ABRASION,NYLON,1.75ID	22
		-----*-----	
27	35008	•O-RING,4.50 OD	4
28	35036	•WASHER,TEFLON	4
33	71622	•CSHH,.375-16X.88,GR5	12
43	80164	•WASHER,LOCK,.500	12
45	80209	•CSHH,.312-18X1.50,GR5	8
50	80351	•NUT,FLEXLOC,.312-18,FULL,LT	48
51	80876	•CSHH,.250-28X.50,GR5	10
54	81213	•CSFHS,.312-18X1.25,GR5	32
57	70700	•PIPE,PLUG,16MP,SQ CSK HEAD,MI	4
74	35035	•GASKET,SPRAYBAR EXT	2
75	15930	•CAP,END,SPRAYBAR	2
76	80248	•CSHH,.500-13X1.00,GR5	8

- ITEM NOT ILLUSTRATED

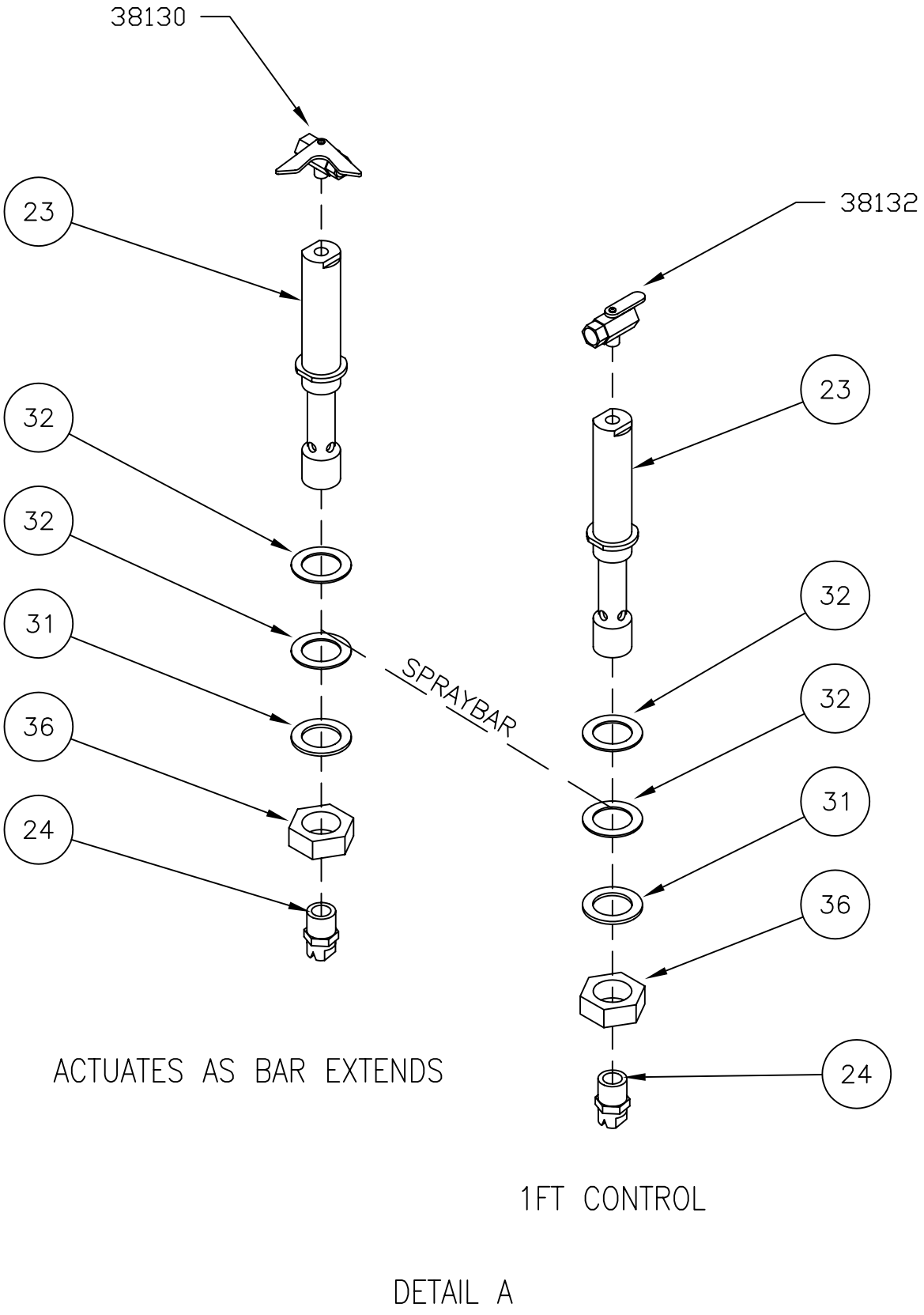


FIGURE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (SHEET 5 OF 5)

TABLE 4-1. SPRAYBAR ASSEMBLY, 16 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-1	**25961**	**SPRAY BAR ASSEMBLY - VALVES**	
23	26469	•SPRAY VALVE ASSEMBLY,MAX3 (SEE FIG 4-3)	48
24	35565	•NOZZLE #00	48
24	32917	•NOZZLE #0	A/R
24	32918	•NOZZLE #1, 5 GPM/40 PSI	A/R
24	36299	•NOZZLE #1.5	A/R
24	32919	•NOZZLE #2	A/R
24	32920	•NOZZLE #3	A/R
31	38141	•WASHER,1.50ODX1.187IDX.10THK	48
32	38149	•GASKET,SPRAY VALVE	96
36	80099	•NUT,HEX,JAM,1.125-12	48
-50	16070	•BAR,PLUG GROUP	1
		ATTACHING PARTS	
-5001	10166	••REWORK,BAR PLUG	1
-5002	99479	••PIPE,CAP,12FP,MI	1
-5003	99602	••PIPE,NIPPLE,12X3.00	1
		-----*-----	
-100	8695	•WRENCH,NOZZLE ALIGNMENT	1

- ITEM NOT ILLUSTRATED

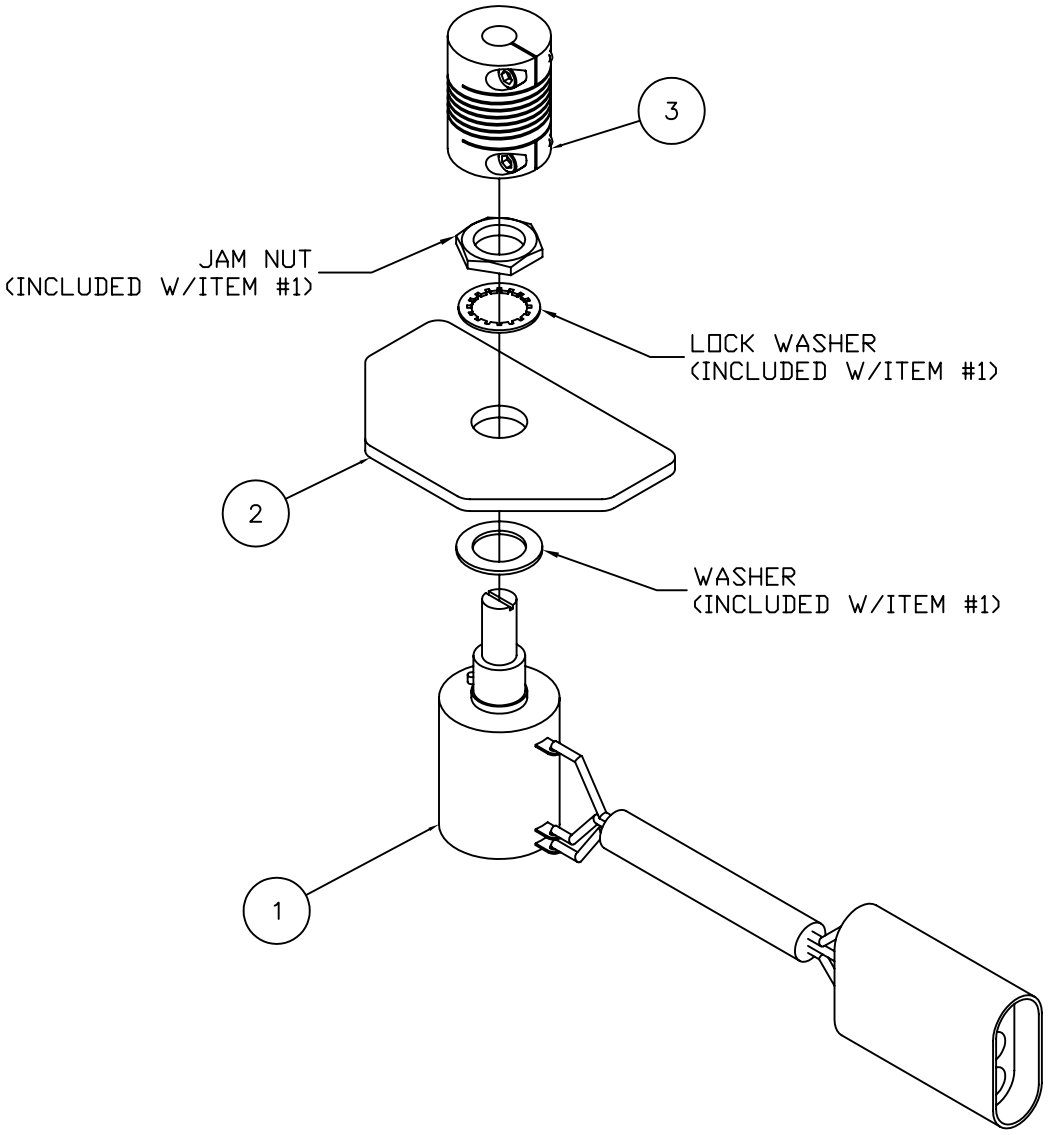
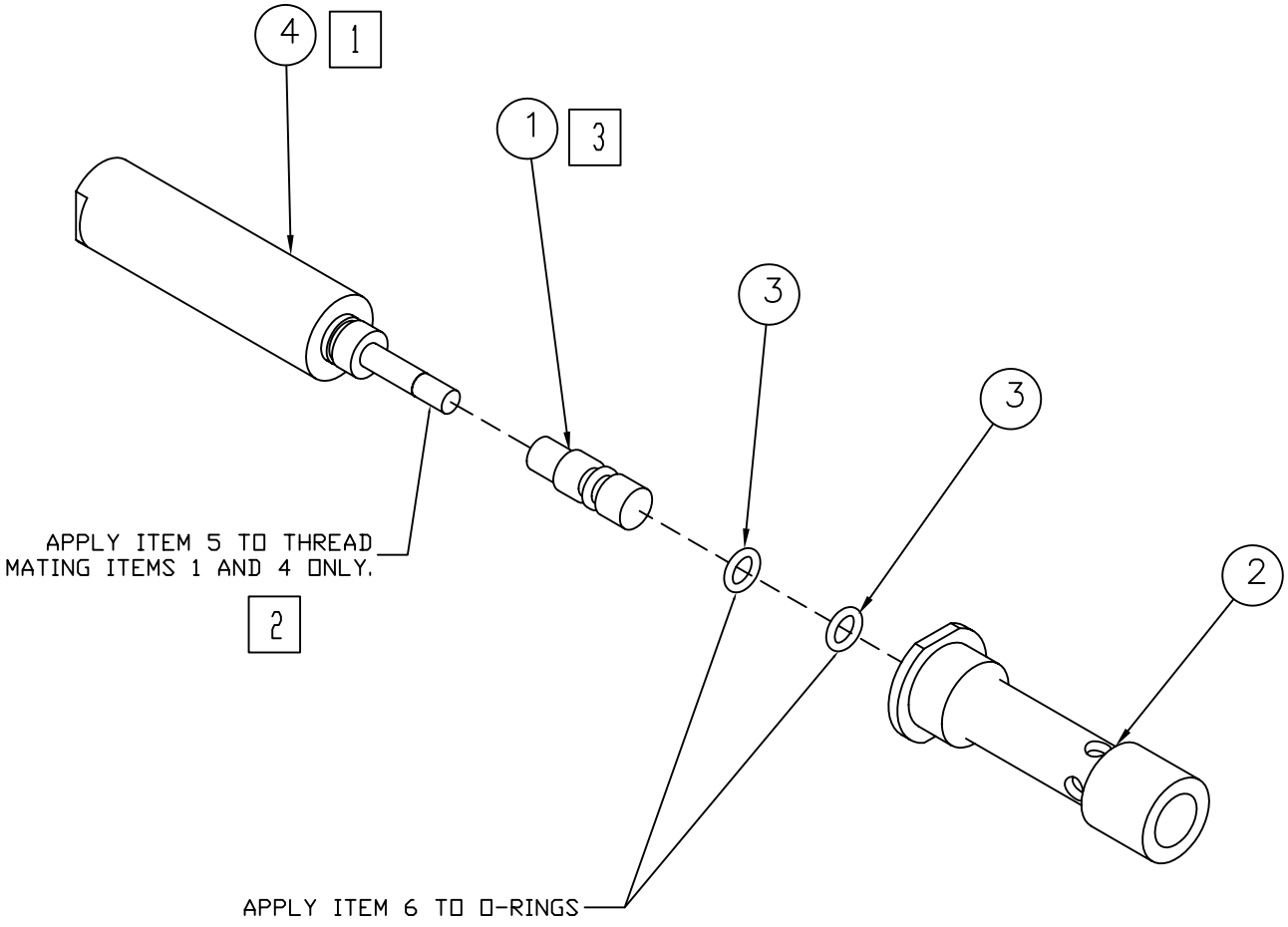


FIGURE 4-2. POTENTIOMETER

TABLE 4-2. POTENTIOMETER

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-2	**26141**	**•POT ASSEMBLY,MAX3 (SEE FIG 4-1 FOR NHA)**	**2**
1	26184	••POTENTIOMETER W/CONN,MAX3	1
2	26140	••STOP,POT BODY	1
3	38118	••COUPLING,FLEX,.25 BORE,.75 LEN	1



NOTES:
1. Torque cylinder, item 4, into body, item 2, with 25 Ft Lbs.
2. Use 4 drops of Loctite and wipe upexcess after assembly. Allow 30 minutes to harden.
3. Screw plunger, item 1, all the way onto threads of air cylinder rod, item 4.

FIGURE 4-3. SPRAY VALVE ASSEMBLY

TABLE 4-3. SPRAY VALVE ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-3	**26469**	**•SPRAY VALVE ASSEMBLY (SEE FIG 4-1 FOR NHA)**	**48**
1	25260	••PLUNGER	1
2	25261	••BODY,VALVE	1
3	38054	••O-RING,.103 X .362,VITON	2
4	38129	••CYL,1.06X.50,AIR,SPRING EXT	1
5	38992	••LOCTITE #272	0.05
6	36222	••LUBRICANT, ANTI-SEIZE, 8 OZ	0.01

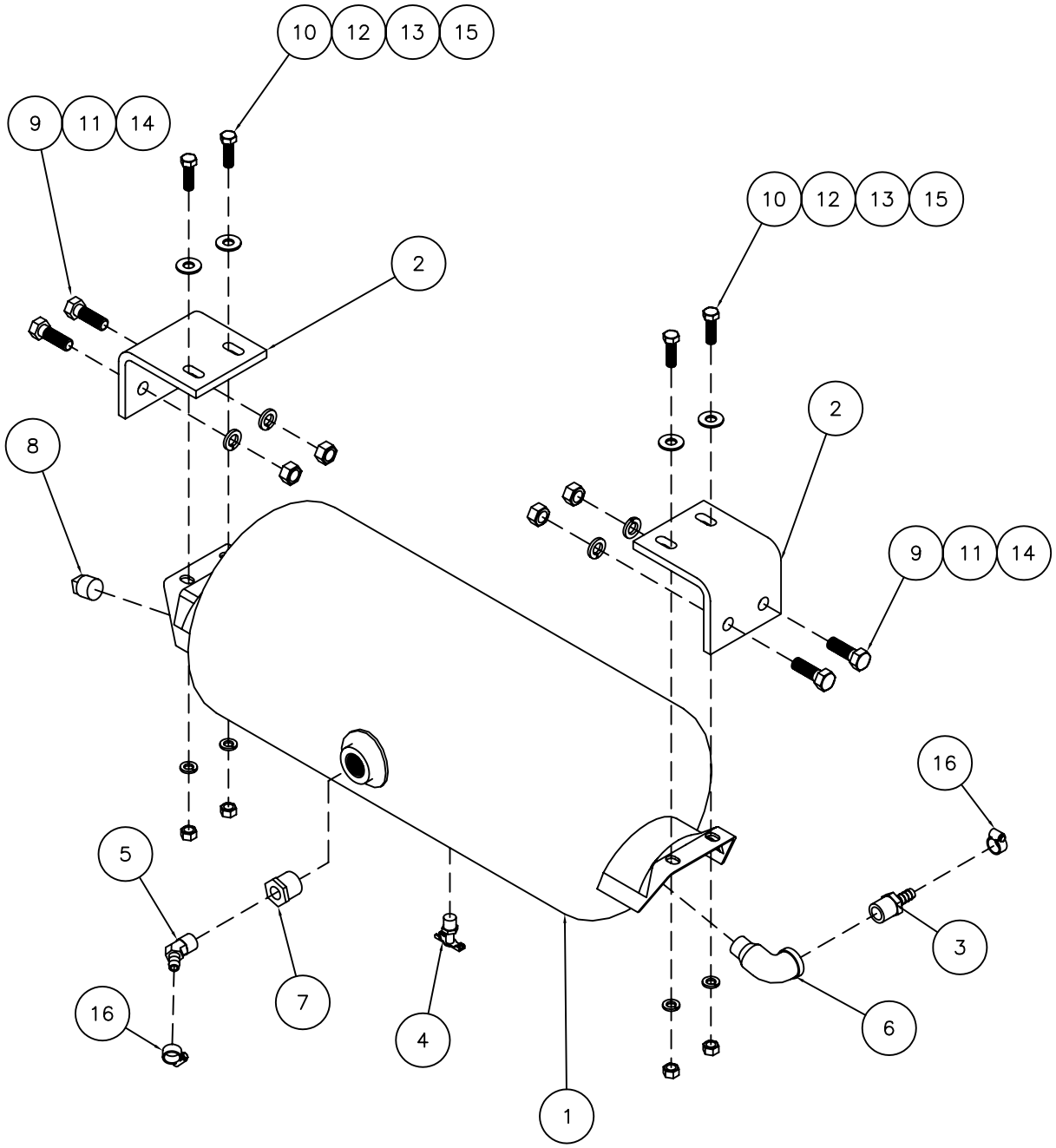


FIGURE 4-4. AIR RESERVOIR GROUP

TABLE 4-4. AIR RESERVOIR GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-4	**26424**	**AIR RESERVOIR GROUP**	**1**
1	72828	•AIR,RSVR,9.50X22.50,1488 CU IN	1
2	26420	•BRACKET,AIR TANK	2
3	X144	•FITT,STR 08MP-06HB,CRIMPED	1
4	910150	•VLV,DRAIN COCK,.250 NPT	1
5	35830	•FITT,45 06MP-06HB,CRIMPED	1
6	99526	•PIPE,90,08MP-08FP,MI	1
7	99984	•PIPE,BUSH,12MP-06FP,STL	1
8	99537	•PIPE,PLUG,08MP,SQ HD,MI	1
9	80164	•WASHER,LOCK,.500	4
10	80162	•WASHER,LOCK,.375	4
11	80040	•NUT,HEX,.500-13	4
12	80038	•NUT,HEX,.375-16	4
13	80224	•CSHH,.375-16X1.25,GR5	4
14	71627	•CSHH,.500-13X1.50,GR5	4
15	80142	•WASHER,FLAT,USS,.375	4
16	33162	•CLAMP,HOSE,.44-.78,WORM,#06	2

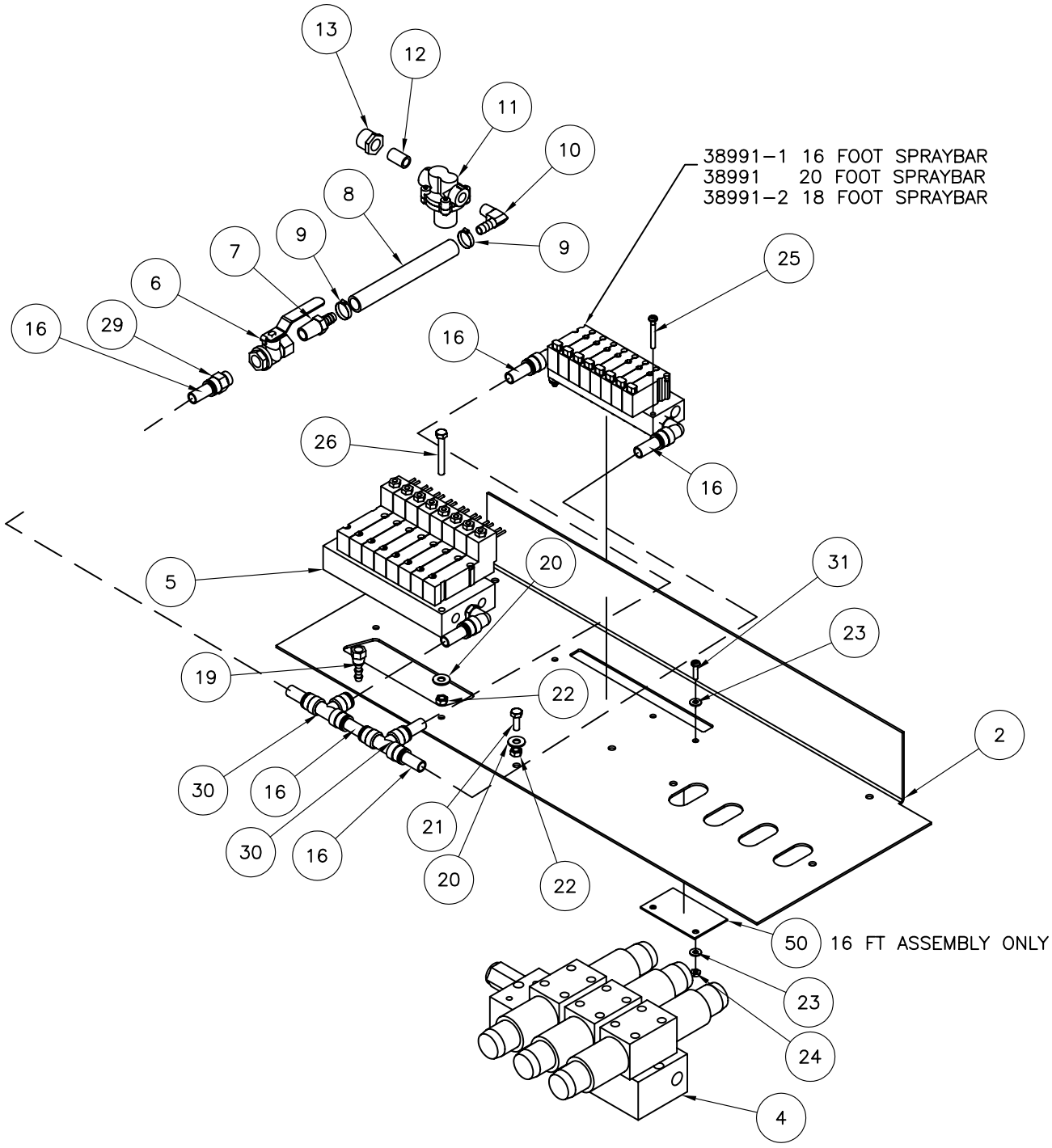


FIGURE 4-5. VALVE BOX, SUBASSEMBLY

TABLE 4-5. VALVE BOX, SUBASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-5	**28274**	**VALVE BOX, SUBASSEMBLY**	**1**
2	28953	•PLATE,VLV,MAX3	1
4	38123	•MANIFOLD,HYD,4 STA,3 VLV,W/REL	1
		ATTACHING PARTS	
-401	37488-01	••VALVE	A/R
-402	37488-03	••RELIEF VALVE	1
-403	37488-04	••BOLT KIT,FOR VALVE	1
-404	37488-05	••COVER PLATE,INCLUDES BOLTS	2
-405	37488-06	••COIL,FOR VALVE	1
		-----*-----	
5	38815	•VLV,SOL,AIR,8 POS,ASSY,1 CV	1
-501	38815-01	••MANIFOLD,8 POS,AIR	A/R
6	480160	•VLV,BALL,.375	1
7	31959	•FITT,STR 06MP-06HB,PUSH-ON	1
8	38579	•HOSE,06,LOW PRESS PUSH ON	10
9	33162	•CLAMP,HOSE,.44-.78,WORM,#06	4
10	33365	•FITT,90 04MP-06HB,CRIMPED	1
11	37049	•VLV,PRESS PROTECTION,102-88	1
12	99591	•PIPE,NIPPLE,04XCLOSE(7/8)	1
13	99980	•PIPE,BUSH,08MP-04FP,STL	1
16	36481	•TUBING,AIR BRAKE,BLK,08	2
19	70957	•FITT,STR 04FJX-04HB,PUSH-ON	6
20	80140	•WASHER,TYPE A PLAIN,.250	5
21	80192	•CSHH,.250-20X.75,GR5	3
22	80350	•NUT,FLEXLOC,.250-20,FULL,LT	5
23	80995	•WASHER,TYPE A PLAIN,#10	4
24	80824	•NUT,HEX,#10-24	3
25	81146	•MACH SCR,PH,#10-24 X 1.50	2
26	80196	•CSHH,.250-20X2.00,GR5	2
29	38913	•FITT,STR 06MP-08NT	1
30	38914	•FITT,TEE 08NT	2
31	71716	•MACH SCR,PH,#10-24X.75	1
32	28956	•HARNESS,WIRE,VLV BOX,MAX3 (SEE FIG 4-6)	1
50	28954	•SHEET, BLANKING	1

- ITEM NOT ILLUSTRATED

- ITEM NOT ILLUSTRATED

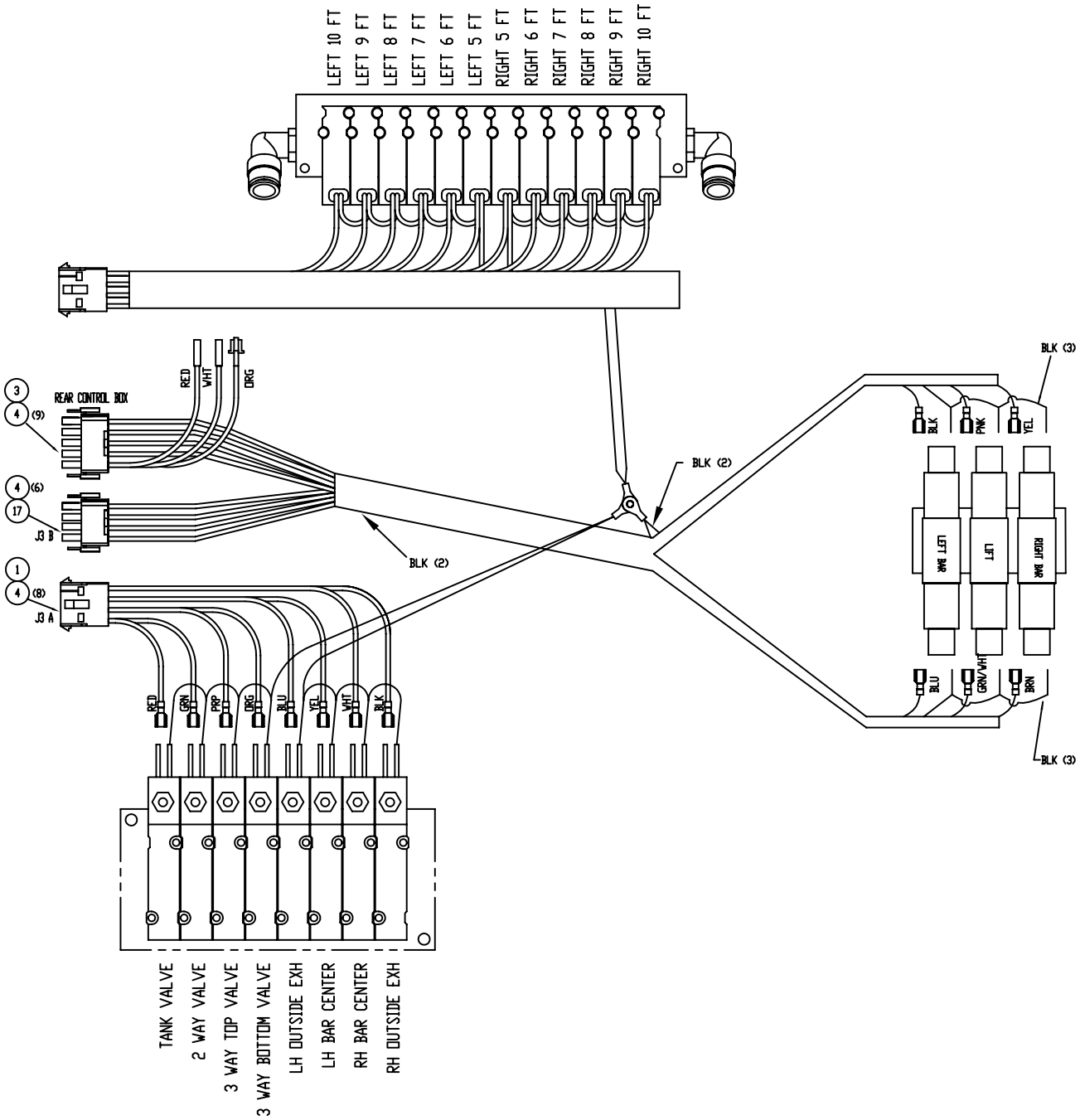


FIGURE 4-6. WIRE HARNESS, VALVE BOX (SHEET 1 OF 2)

TABLE 4-6. WIRE HARNESS, VALVE BOX

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-6	**28956**	**•WIRE HARNESS, VALVE BOX (SEE FIG 4-5 FOR NHA)**	**1**
1	34468	••CONN HOUSING,CAP,12 CIRCUIT	1
3	72594	••CONN HOUSING,CAP,15 CIRCUIT	1
4	34469	••CONTACT,PIN,20-14 GA	23
5	36348	••TERM,PUSH-ON,.25,M,18-14,SLV	14
7	33602	••CONN,BUTT,16-14 GA	2
8	36118-2	••TERM,CRIMP,16-14 GA	1
-10	33271-7	••WIRE,16 GA,RED	3
-11	33271-5	••WIRE,16 GA,WHITE	3
-12	33271-11	••WIRE,16 GA,BLUE	4
-13	33271-4	••WIRE,16 GA,GREEN	1.5
-14	33271-1	••WIRE,16 GA,BLACK	4
-15	33271-2	••WIRE,16 GA,YELLOW	5
-16	33271-3	••WIRE,16 GA,BROWN	3.5
17	34467	••CONN HOUSING,PLUG,12 CIRCUIT	1
-18	33271-9	••WIRE,16 GA,PURPLE	1.5
-19	33271-6	••WIRE,16 GA,ORANGE	3
-20	33271-8	••WIRE,16 GA,PINK	3.5
-21	33271-10	••WIRE,16 GA,GREEN/WHITE STRIPE	3.5
22	37422	••TERM,SOLDER SPLICE,20-10 AWG	6

- ITEM NOT ILLUSTRATED

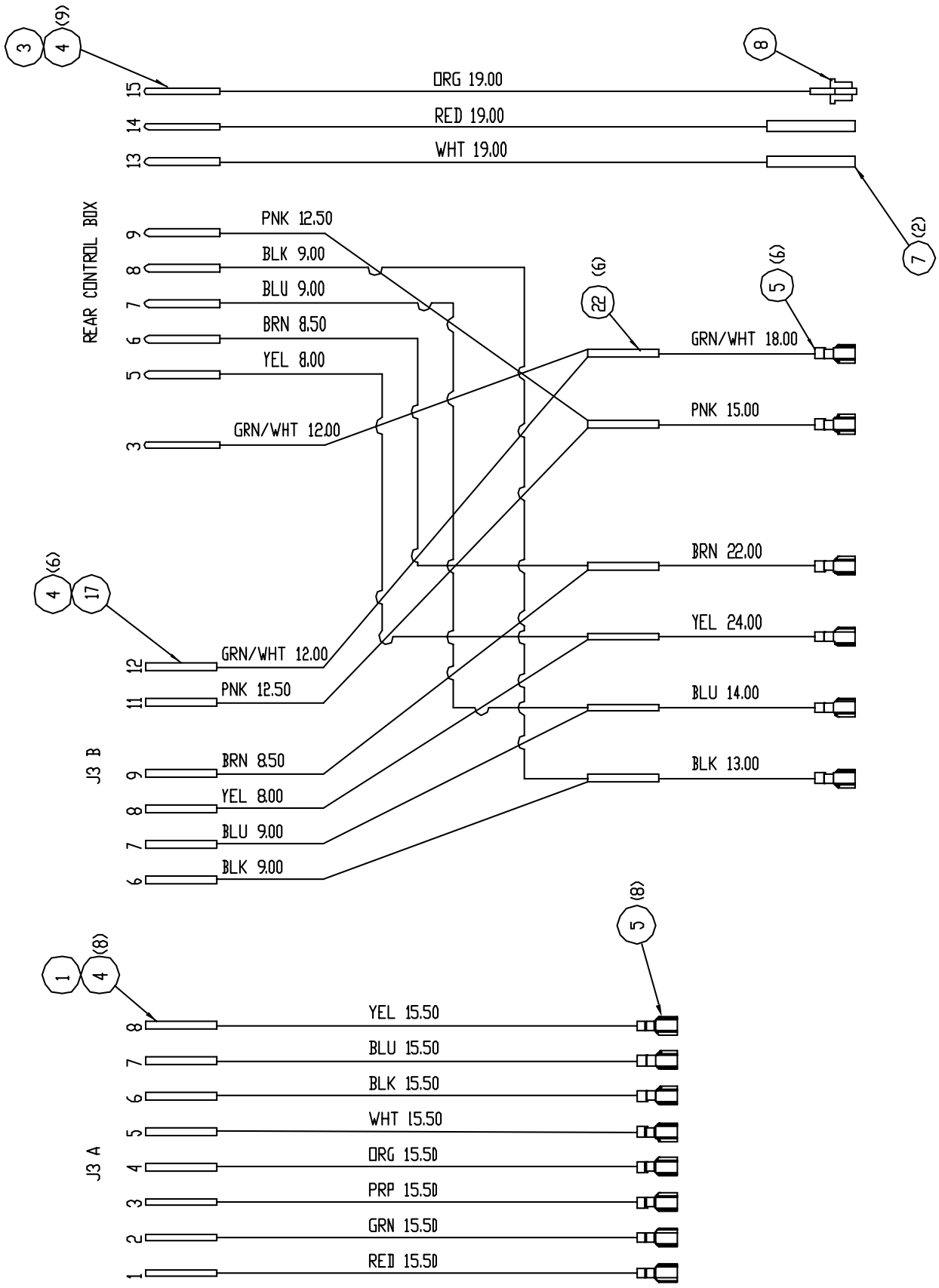


FIGURE 4-6. WIRE HARNESS, VALVE BOX (SHEET 2 OF 2)

TABLE 4-6. WIRE HARNESS, VALVE BOX (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-6	**28956**	**•WIRE HARNESS, VALVE BOX**	**1**
1	34468	••CONN HOUSING,CAP,12 CIRCUIT	1
3	72594	••CONN HOUSING,CAP,15 CIRCUIT	1
4	34469	••CONTACT,PIN,20-14 GA	23
5	36348	••TERM,PUSH-ON,.25,M,18-14,SLV	14
7	33602	••CONN,BUTT,16-14 GA	2
8	36118-2	••TERM,CRIMP,16-14 GA	1
-10	33271-7	••WIRE,16 GA,RED	3
-11	33271-5	••WIRE,16 GA,WHITE	3
-12	33271-11	••WIRE,16 GA,BLUE	4
-13	33271-4	••WIRE,16 GA,GREEN	1.5
-14	33271-1	••WIRE,16 GA,BLACK	4
-15	33271-2	••WIRE,16 GA,YELLOW	5
-16	33271-3	••WIRE,16 GA,BROWN	3.5
17	34467	••CONN HOUSING,PLUG,12 CIRCUIT	1
-18	33271-9	••WIRE,16 GA,PURPLE	1.5
-19	33271-6	••WIRE,16 GA,ORANGE	3
-20	33271-8	••WIRE,16 GA,PINK	3.5
-21	33271-10	••WIRE,16 GA,GREEN/WHITE STRIPE	3.5
22	37422	••TERM,SOLDER SPLICE,20-10 AWG	6

- ITEM NOT ILLUSTRATED

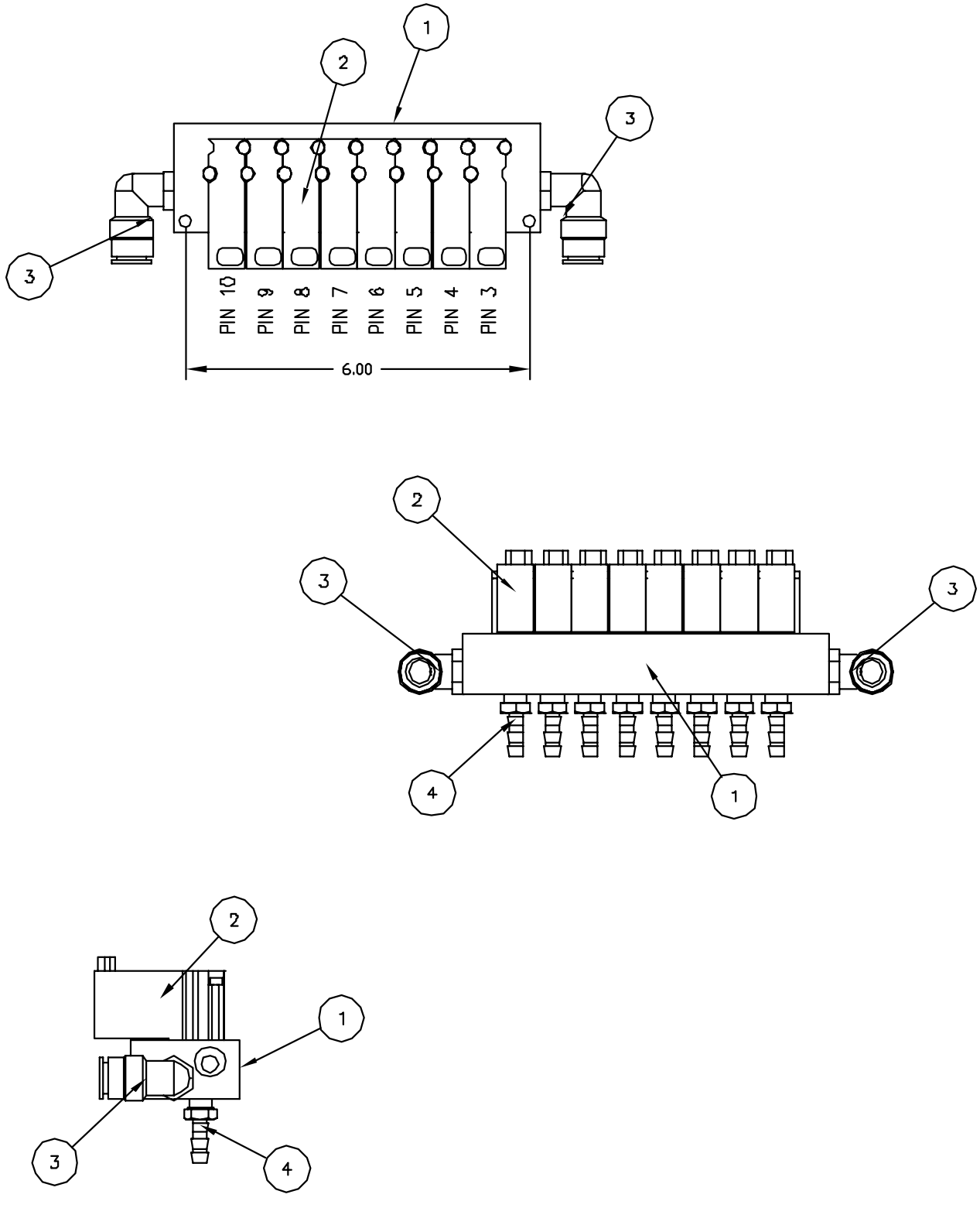
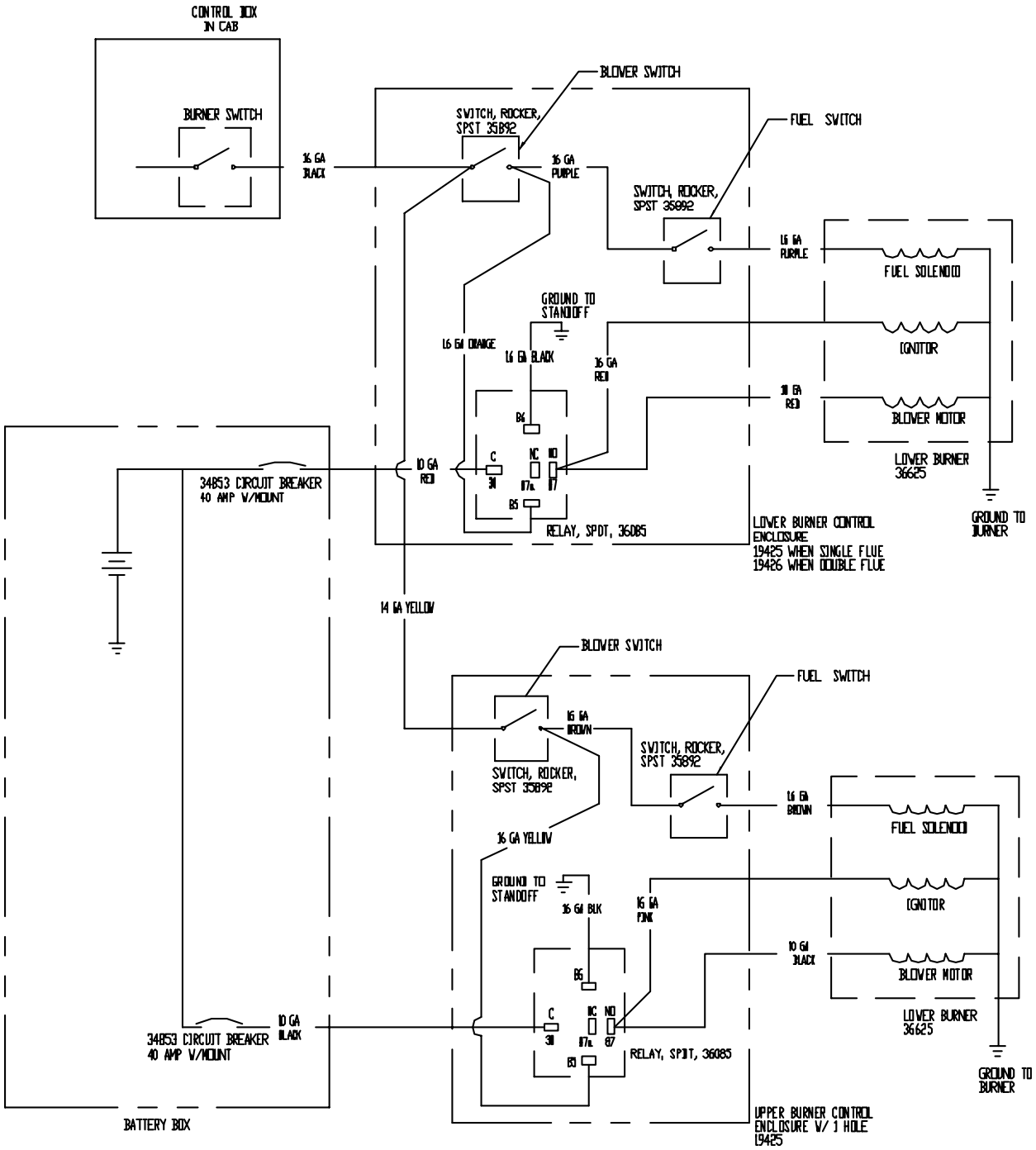


FIGURE 4-7. SOLENOID VALVE, 8 VALVE

TABLE 4-7. SOLENOID VALVE, 8 VALVE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
4-7	**38991-1**	**SOLENOID VALVE, 8 VALVE MANIFOLD**	**1**
1	38991-03	•MANIFOLD,8 STATION	1
2	38991-01	•VLV,36 SERIES	8
3	38915	•FITT,90 04MP-08NT	2
4	33926	•FITT,STR 02MP-04HB,CRIMPED	8
5	34468	•CONN HOUSING,CAP,12 CIRCUIT	1
6	34471	•CONTACT,SOCKET,20-14 GA	8



NOTE: THE DIESEL BURNER CONTROL BOX ASSEMBLY W/O OUTFIRE IS 29507-01

FIGURE 5-1. DIESEL BURNER, DOUBLE FLUE, NO OUTFIRE

TABLE 5-1. DIESEL BURNER, DOUBLE FLUE, NO OUTFIRE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
5-1	**29508-01**	**DIESEL BURNER,DBL FLUE,NO OUTFIRE**	**1**
-1	5347	•HOSE,04,PUSH-ON,LOW PRESSURE	18
-2	38662	•FILTER ASSY,FUEL OIL	1
-201	38662-01	••FILTER ONLY,SPIN ON TYPE	1
-3	99568	•PIPE,TEE,06FP,MI	1
-4	99980	•PIPE,BUSH,08MP-04FP,STL	1
-5	99638	•PIPE,NIPPLE,.375XCLOSE	2
-6	34185	•CONDUIT CONNECTOR, 1/2 NPT	2
-7	33277	•CLAMP,HOSE,# 04	3
-8	33612	•TERM,RING,12-10 GA,.375 STUD	2
-9	80141	•WASHER,FLAT,USS,.313	10
-10	80142	•WASHER,FLAT,USS,.375	14
-11	80161	•WASHER,LOCK,.312	10
-12	80352	•NUT,FLEXLOC,.375-16,FULL,LT	14
-13	986858	•FITT,90 04HB-06MP	1
-14	34311	•FITT,TEE 04MJ-04MJ-04MJ	1
-15	81160	•SCR,SLFDRL,HH,#10X1.00,#3PT	8
-16	81161	•WASHER,WEATHER SEAL,#10	8
-17	35246	•FITT,STR 04MP-04MS,LPG,BRASS	4
-18	70957	•FITT,STR 04FJX-04HB,PUSH-ON	5
-19	36625	•HP DSL BRNR, W/O CAD CELL (SEE TABLE 5-1A)	2
-20	33765	•NUT,LK,ELEC CND,.500-14 NPT	2
-21	33279	•FITT,STR 06MP-04HB,CRIMPED	1
-22	851201417	•TIE WRAP,.094X4.00	12

- ITEM NOT ILLUSTRATED

TABLE 5-1A. DIESEL BURNER, DOUBLE FLUE, NO OUTFIRE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	36625	**•HP DSL BRNR W/O CAD CELL (SEE FIG 5-1 FOR NHA)**	**2**
-1	36044-01	••BLOWER MOTOR	1
-2	36044-02	••MOTOR COUPLING	1
-3	36044-03	••IGNITION ASSY WITHOUT OUTFIRE	1
-4	36044-04	••FUEL VALVE,SHUT-OFF	1
-5	36044-05	••FLANGE GASKET,FELT	1
-6	36044-06	••SQUARE PLATE GASKET	1
-7	36044-08	••NOZZLE, 3.5 GAL, 45B	1
-8	36044-09	••AIR SHUTTER	1
-9	36044-10	••AIR BAND	1
-10	36044-11	••SQUARE PLATE	1
-11	36044-12	••AIR TUBE W/FLANGE (2 ELECTRODES)	1
-12	36044-14	••BLOWER WHEEL	1
-13	36044-15	••FUEL PUMP	1
-14	36044-16	••PUMP NOZZLE FITTING	1
-15	36044-17	••CONNECTOR TUBE ASSEMBLY	1
-16	36044-19	••LOCKNUT, NOZZLE LINE	1
-17	36044-25	••NOZZLE,3.0 GAL,45B	1
-18	36044-26	••ELECTRODE ASSY (2 ELECTRODES)	1
-19	36044-27	••NOZZLE,2.5 GAL,45B	1
-20	36044-28	••NOZZLE,3.0 GAL,60B (COLD WEATHER)	1
-21	36044-29	••NOZZLE,2.0 GAL,60B	1

See IPL-7 for optional Diesel Burner with Cad Cell.

- ITEM NOT ILLUSTRATED

TABLE 5-2. CONTROL BOX, DIESEL BURNER

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	29507-01	**CONTROL BOX,DIESEL BURNER, NO OUTFIRE**	**1**
-1	19344	•SWITCH PLATE,HP DIESEL BURNER	2
-2	19425	•ENCLOSURE,ELEC,4X4X6,W/1 HOLE	1
-3	19426	•ENCLOSURE,ELEC,4X4X6,W/2 HOLES	1
-4	19427	•CONDUIT,RIGID,.50X1.75	1
-6	33271-1	•WIRE,16 GA,BLACK	5
-7	33271-13	•WIRE,16 GA,BLACK/YELLOW STRIPE	12
-8	33271-14	•WIRE,16 GA,YELLOW/RED STRIPE	5
-9	33271-2	•WIRE,16 GA,YELLOW	4
-10	33271-20	•WIRE,16 GA,GRAY/BLACK STRIPE	5
-11	33271-3	•WIRE,16 GA,BROWN	5
-12	33271-4	•WIRE,16 GA,GREEN	2
-13	33600	•TERM,PUSH-ON,.25,FEM,16-14 GA	15
-16	33610	•TERM,PUSH-ON,.25,FEM,12-10 GA	4
-18	34185	•CONDUIT CONNECTOR, 1/2 NPT	2
-21	35163	•WIRE,14 GA,PINK	1
-22	35892	•SWITCH,ROCKER,SPST,OFF/ON	4
-24	36050	•STANDOFF,10-32UNFX3,MALE-FEM	8
-25	36085	•RELAY,SPDT,40AMP,12VDC	2
-27	36597	•DECAL,REAR CONTROL,DIESEL BNR,W/O IGN	2
-31	71062	•WIRE,14 GA,BLUE	1
-33	71864	•LOOM,SPLIT,CONVOLUTED,.375	7
-34	71870	•LOOM,SPLIT,CONVOLUTED,.750	5
-35	72116	•WIRE,14 GA,BROWN	5
-37	851390302	•FITT,CABLE 08MP,.250-.375	1
-50	3200DI	•WATER TIGHT CONN,1/2 X 1/2	2
-60	71861-2	•WIRE,10GA RED	10
-61	71861-4	•WIRE,10GA BLACK	10

- ITEM NOT ILLUSTRATED

TABLE 5-3. BURNER COVERS & FLUE LINERS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		BURNER COVER & FLUE LINER	
-1	27848	•FLUE LINER W/M, DIESEL BURNER, SST	2
		ATTACHING PARTS	
-101	22781	••FLANGE,FLUE LINER	1
-102	27849	••FLUE LINER HALF,HEX	2
		-----*-----	
-2	22475	•BURNER COVER, DOUBLE FLUE	1
		ATTACHING PARTS	
-201	22469	••MTG PLATE,BNR COVER,DBL FLUE	1
-202	22472	••BURNER COVER W/M,DOUBLE FLUE	1
		-----*-----	
-3	38662S2	•FILTER KIT,DOUBLE BURNER	2
		ATTACHING PARTS	
-301	31971	••FITT,90,04MP-04HB,CRIMPED	1
-302	33280	••FITT,STR,06MP-04HB,PUSH-ON	1
-303	38662	••FILTER ASSEMBLY,FUEL OIL	1
-304	99448	••PIPE,BUSH,06MP-04FP,STL	1
-305	99450	••PIPE,BUSH,08MP-06FM,MI	1
-306	99537	••PIPE,PLUG08MP,SQ HEAD	1
-307	99568	••PIPE,TEE,06FP,MI	1
-308	99569	••PIPE,TEE,08FP,MI	1
-309	99638	••PIPE,NIPPLE,.375XCLOSE	2
		-----*-----	

- ITEM NOT ILLUSTRATED

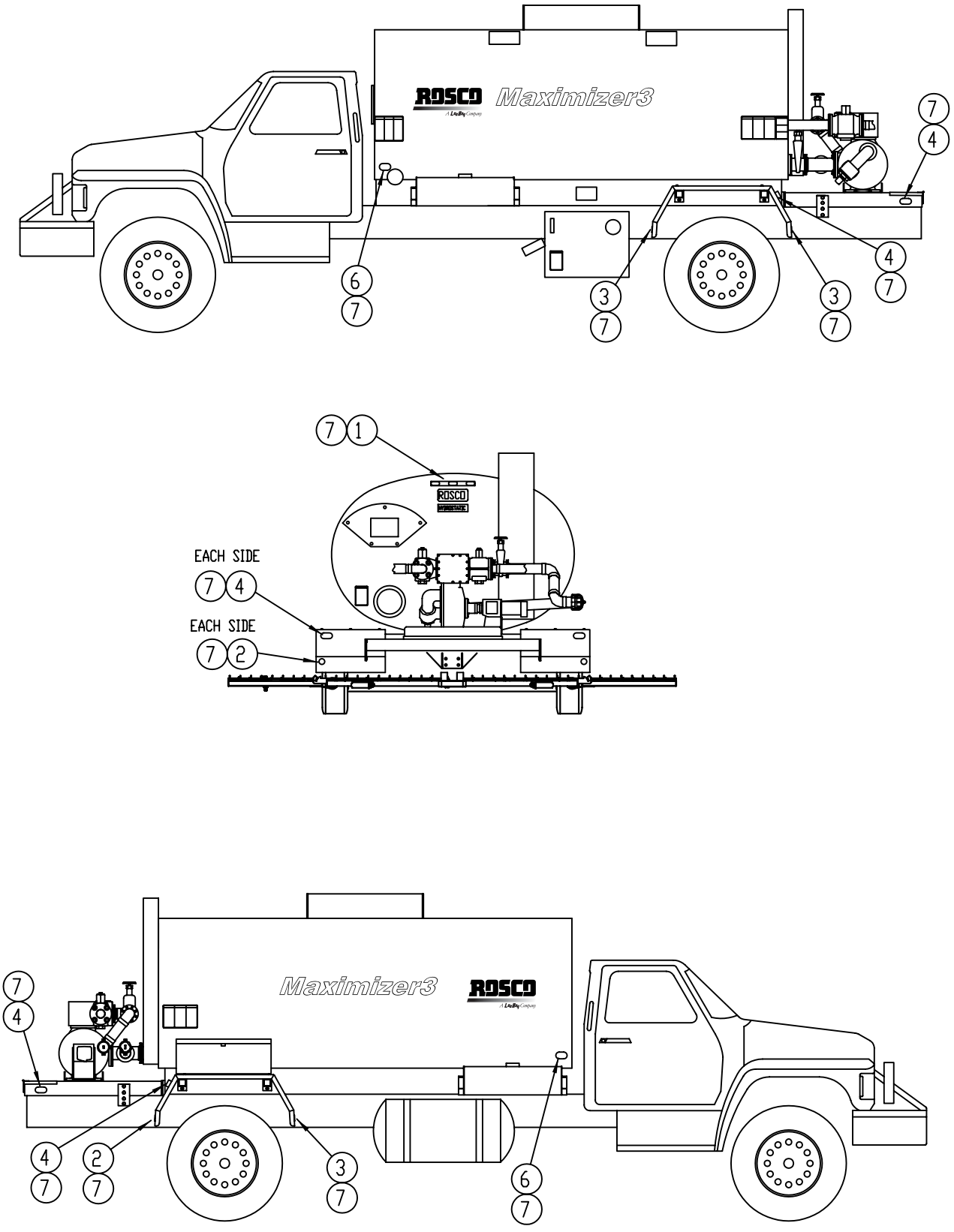
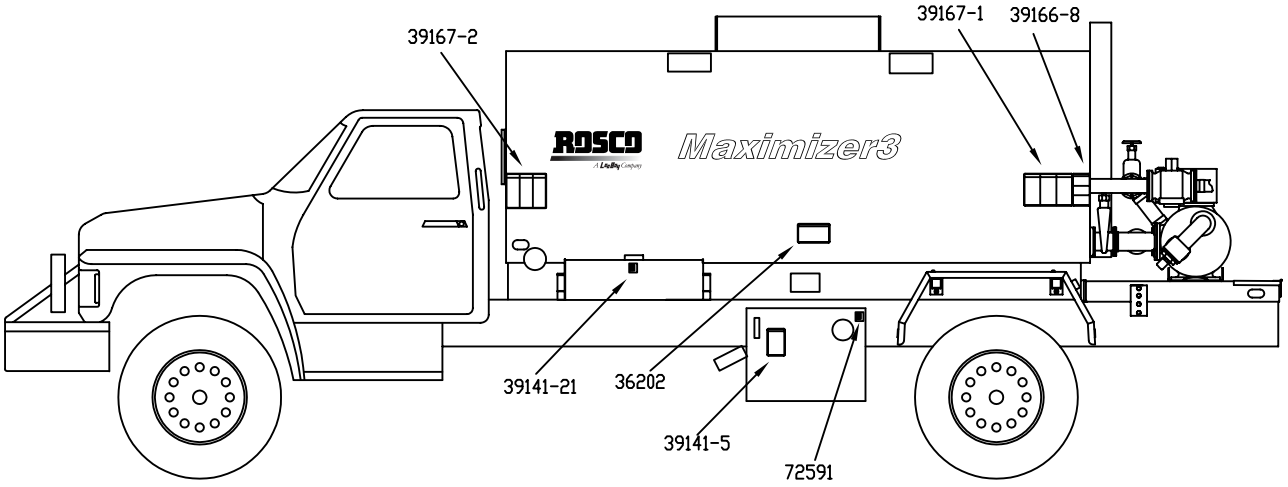


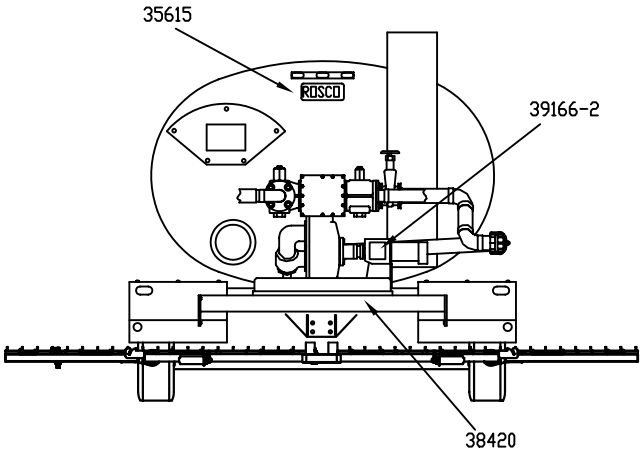
FIGURE 6-1. LIGHT & REFLECTOR GROUP

TABLE 6-1. LIGHT & REFLECTOR GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-1	**26421**	**LIGHT & REFLECTOR GROUP**	**1**
1	35663	•LIGHT BAR,RED,KD502	1
2	5036	•REFLECTOR,RED	2
3	5037	•REFLECTOR,AMBER	2
4	5096	•LIGHT,CLEARANCE,RED W/REFLECT	4
-5	5096-02	•GASKET,LIGHT,CLEARANCE	6
6	5097	•LIGHT,CLEARANCE,AMBER,W/REFLEC	2
7	81160	•SCR,SLFDRL,HH,#10X1.00,#3PT	22
-100	23966-01	•HARNESS,WIRE,LIGHTING,135.00”	1
		ATTACHING PARTS	
-1001	23867-3	••WIRE HARNESS,202.00”	1
-10001	33271-1	•••WIRE,16GA,BLACK	51.25
-10002	71060	•••LOOM,SPLIT,CONVOLUTED,.250	41.167
-1002	81160	••SCR,SLFDRL,HH,#10X1.00,#3PT	12
-1003	80036	••NUT,HEX,.250-20	11
		-----*-----	

- ITEM NOT ILLUSTRATED





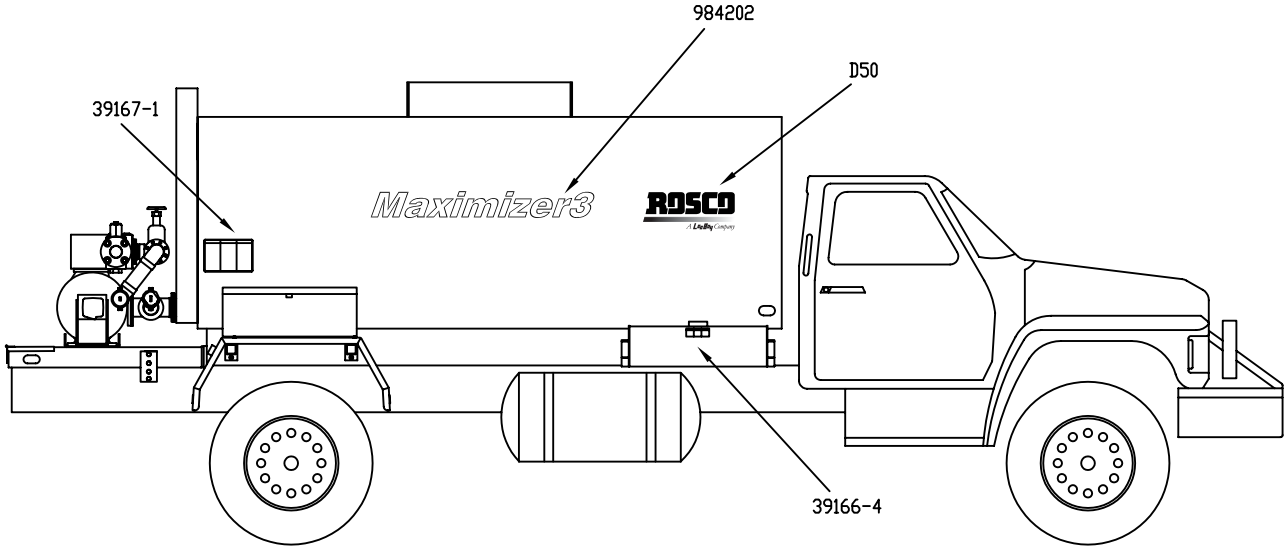


FIGURE 6-2. DECAL GROUP

TABLE 6-2. DECAL GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-2	**26422**	**DECAL GROUP**	**1**
-1	35244	•STRIP,ADH SPONGE,.75X.062	7.66
2	35615	•LICENSE PLATE,"ROSCO"	1
3	36202	•DECAL,WARNING,KEEP CLEAN	1
-4	36624	•DECAL PLATE,PROD IDENT NO,MAXI	1
-5	39166	•DECAL KIT,MAX MASTER	1
-6	39167	•DECAL KIT,DISTRIBUTOR TANKS	1
-7	81159	•TACK,DIA.146/.104X.04 GRIP LG	12
-8	81160	•SCR,SLFDRL,HH,#10X1.00,#3PT	38
-10	72589	•DECAL,DIESEL FUEL	1
20	72591	•DECAL,HYDRAULIC OIL	1
30	984202	•DECAL KIT,MAX3 LOGO	2
40	38420	•DECAL,VALVE CONFIGURATION	1
-50	38414	•TAPE,BUTYL,GLASS SETTING	3.33
60	D50	•DECAL,ROSCO LOGO,MEDIUM,BLACK	2

- ITEM NOT ILLUSTRATED

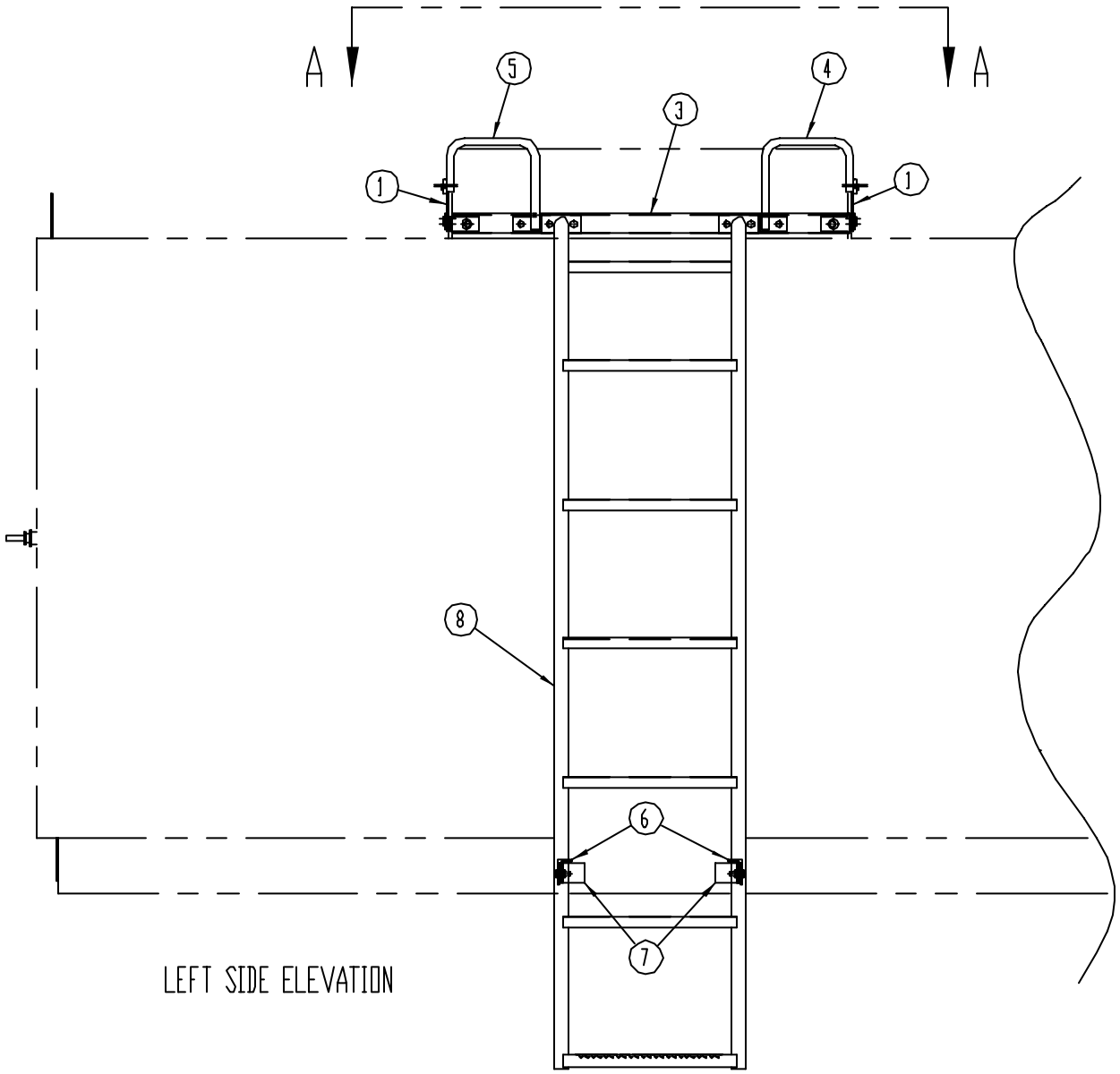


FIGURE 6-3. LADDER & PLATFORM GROUP (SHEET 1 OF 3)

TABLE 6-3. LADDER & PLATFORM GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-3	**21652**	**LADDER & PLATFORM GROUP**	**1**
1	21676	•END,PLATFORM	2
2	21677	•BRACKET	4
3	21678	•PLATFORM	1
4	21679	•HANDHOLD,RH	1
5	21680	•HANDHOLD,LH	1
6	21798	•BRACKET, LADDER	2
7	21799	•SPACER,LADDER	2
8	21683	•LADDER,56X84 & 52X80	1
10	80142	•WASHER,FLAT,USS,.375	40
-11	80162	•WASHER,LOCK,.375	4
12	80224	•CSHH,.375-16X1.25,GR5	20
13	80226	•CSHH,.375-16X1.50,GR5	4
14	80352	•NUT,FLEXLOC,.375-16,FULL,LT	24

- ITEM NOT ILLUSTRATED

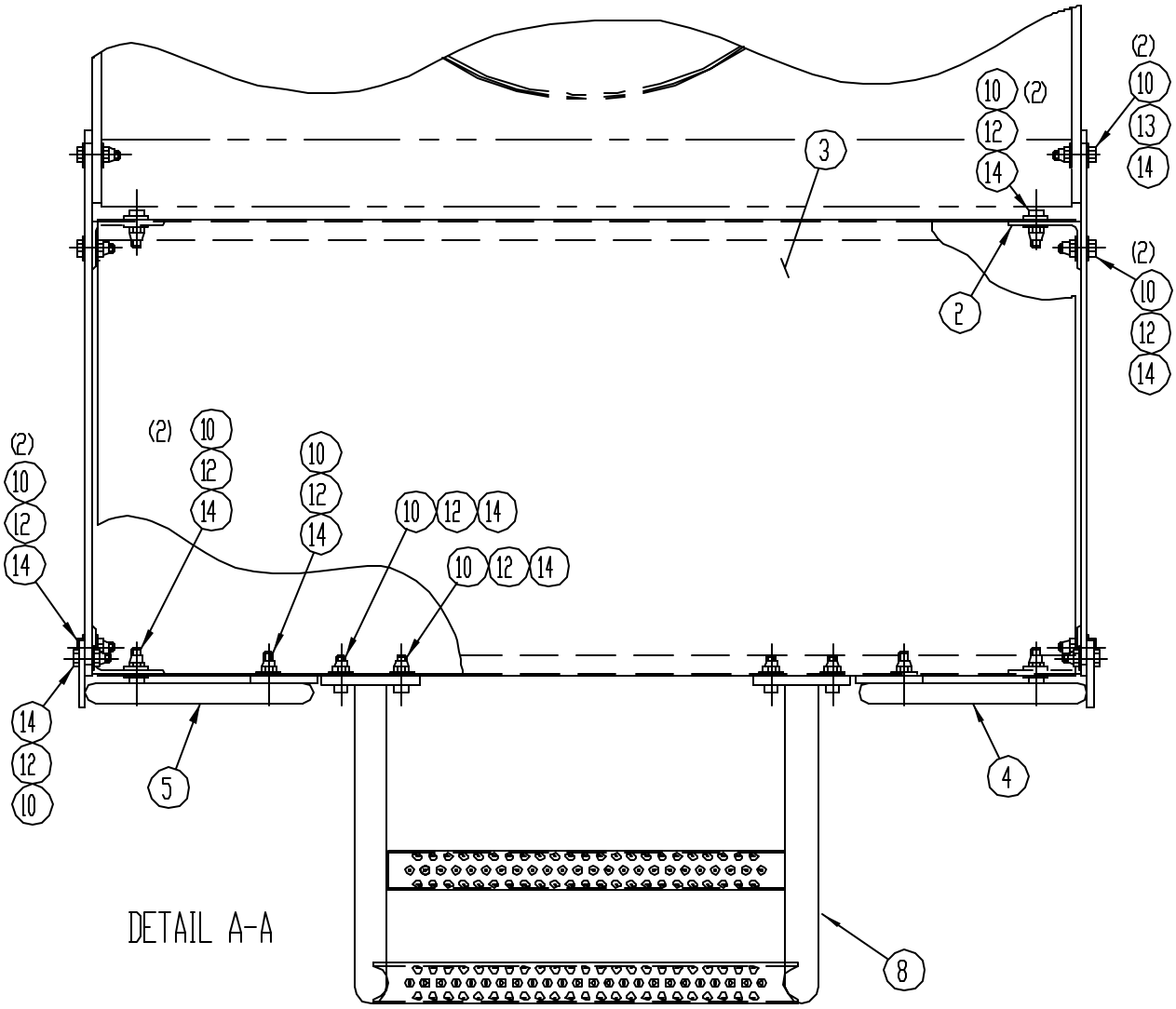
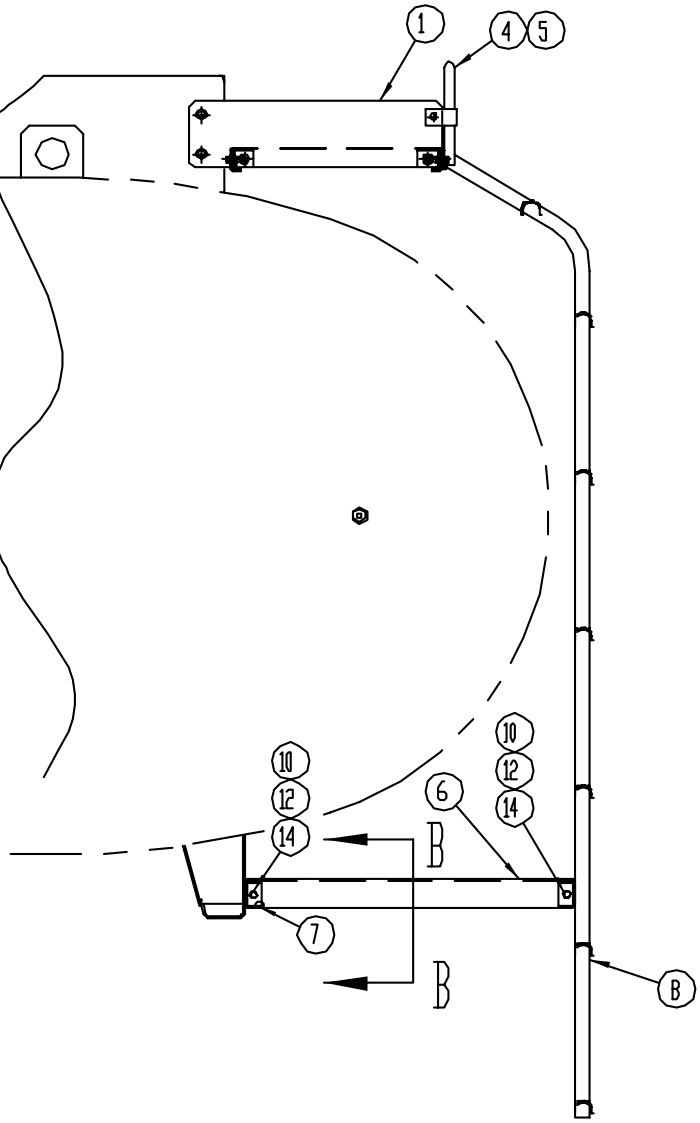


FIGURE 6-3. LADDER & PLATFORM GROUP (SHEET 2 OF 3)



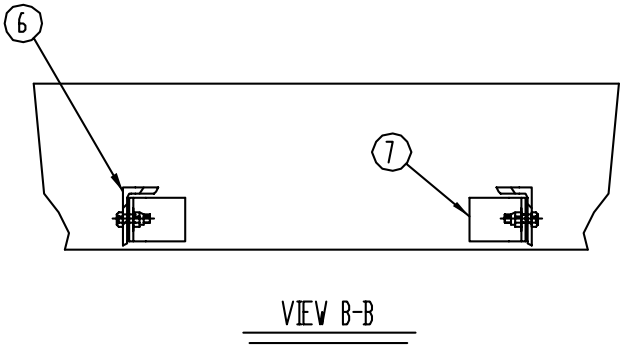


FIGURE 6-3. LADDER & PLATFORM GROUP (SHEET 3 OF 3)

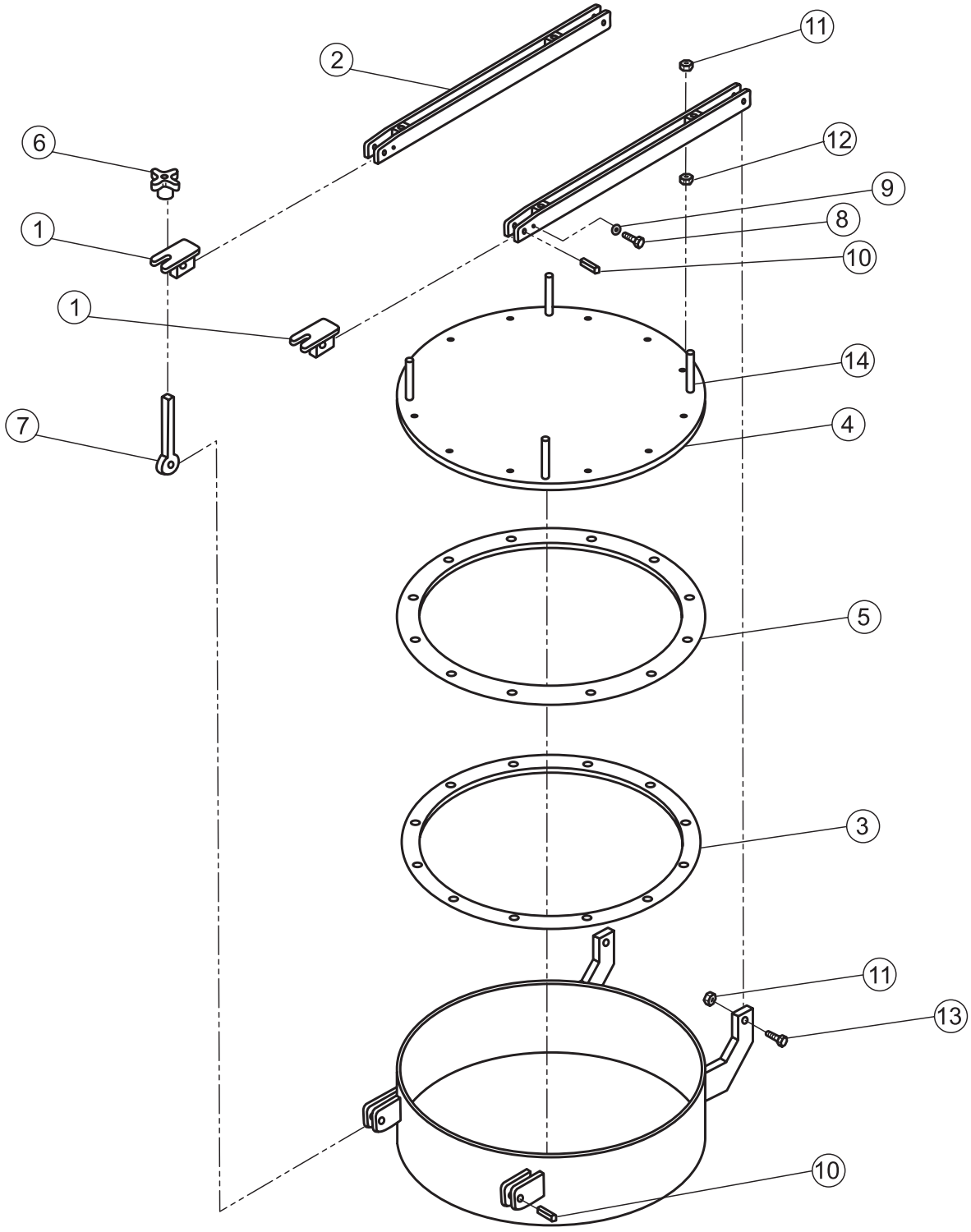


FIGURE 6-4. TANK TOP OPENING

TABLE 6-4. TANK TOP OPENING

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-4	**TBD**	**TANK TOP OPENING**	**1**
1	20162	•TOP OPENING COVER LATCH	2
2	20165	•TOP OPENING COVER CROSS BAR	1
3	20167	•TOP OPENING COVER RETAINER	1
4	20168	•TOP OPENING COVER	1
5	36062	•TOP OPENING COVER GASKET	1
6	6066	•TOP OPENING COVER KNOB	2
7	8530	•EYEBOLT	2
8	71716	•PAN HEAD SCREW,#10-24 UNC X3/4	2
9	871071601	•WASHER,LOCK,#10	2
10	80348	•ROLL PIN,.500X1.50	4
11	80354	•NUT,FLEXLOC,.500-13,FULL,LT	4
12	80076	•NUT,HEX,JAM,.500-13	4
13	80255	•CSHH,.500-13X2.00,GR5	2
14	20166	•THD'D ROD,.500-13X3.25	4
-15	21282	•TOP OPENING SCREEN ASSEMBLY,FULL	1
-50	23514	•MANHOLE SCREEN	1

- ITEM NOT ILLUSTRATED

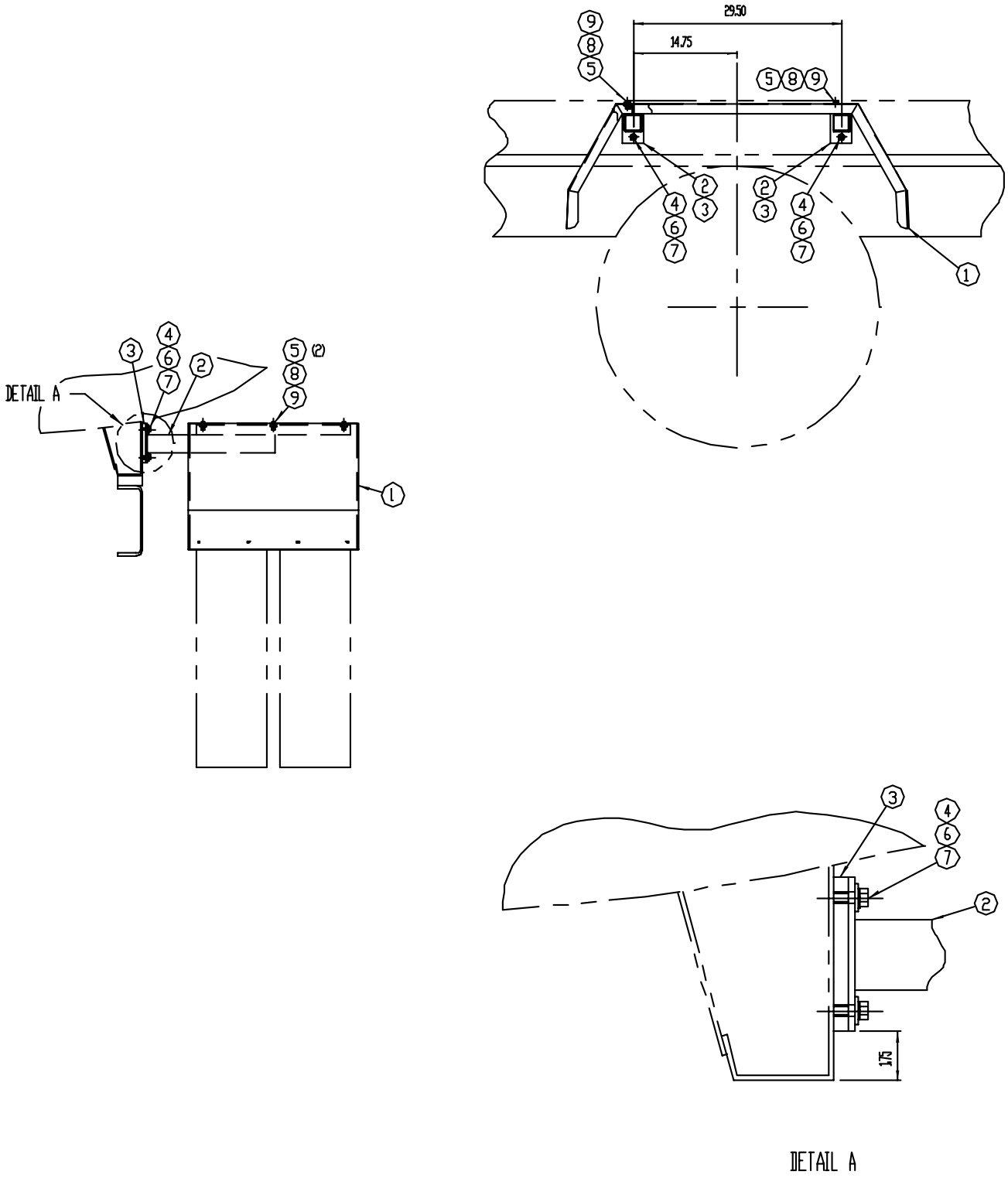


FIGURE 6-5. FENDER GROUP, SINGLE AXLE

TABLE 6-5. FENDER GROUP, SINGLE AXLE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-5	**21633**	**FENDER GROUP, SINGLE AXLE**	**1**
1	21634	•FENDER,SINGLE AXLE,AL	2
2	21635	•MOUNT,FENDER,WLDMT	4
3	21636	•PAD,TAPPED	4
4	71622	•CSHH,.375-16X.88,GR5	8
5	80141	•WASHER,TYPE A PLAIN,.312	24
6	80142	•WASHER,FLAT,USS,.375	8
7	80162	•WASHER,LOCK,.375	8
8	80208	•CSHH,.312-18X1.00,GR5	12
9	80351	•NUT,FLEXLOC,.312-18,FULL,LT	12

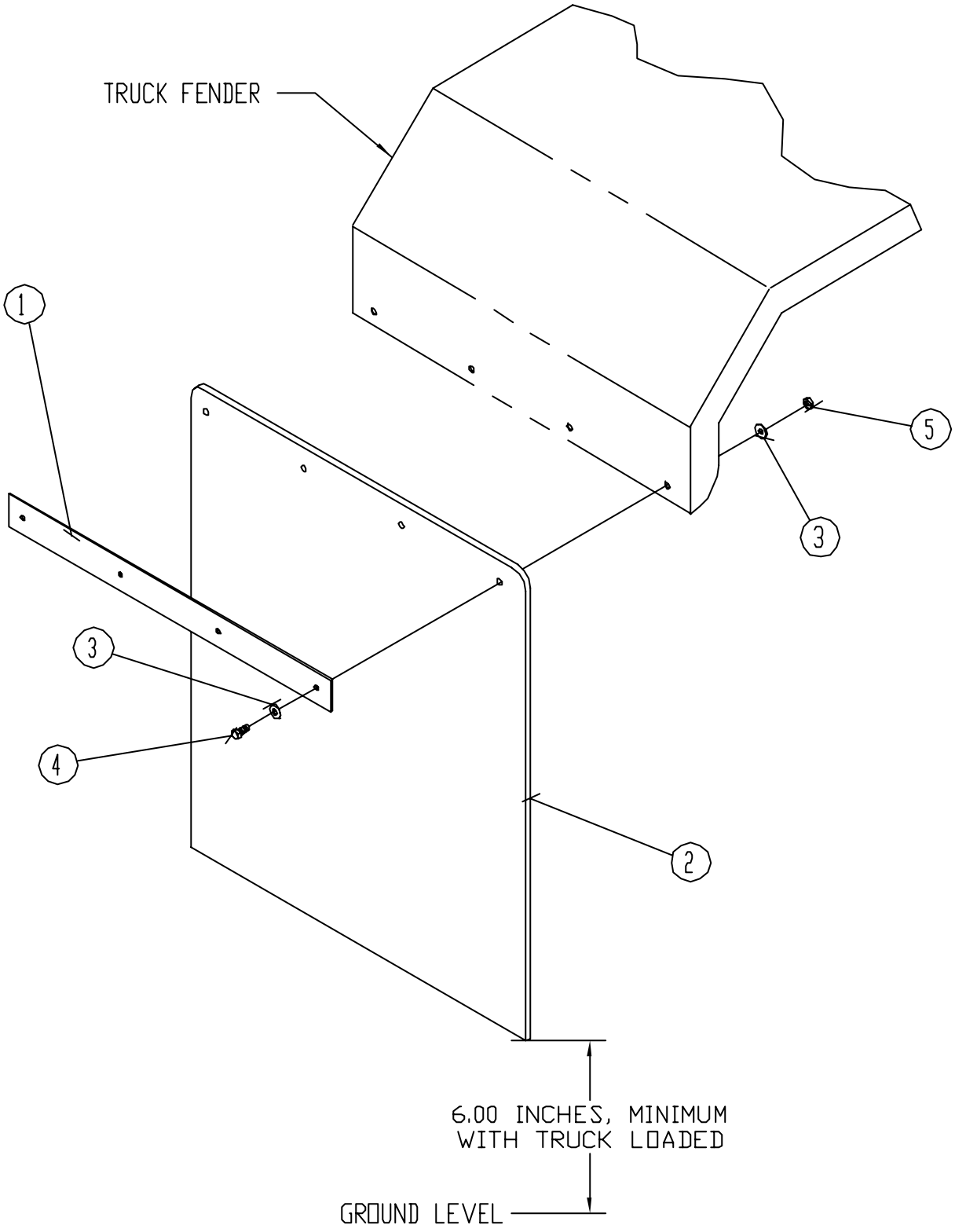


FIGURE 6-6. MUD FLAP INSTALLATION

TABLE 6-6. MUD FLAP INSTALLATION

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-6	**14402**	**MUD FLAP ASSEMBLY**	**1**
1	13960	•MOUNT BAR,MUD FLAP	2
2	27737	•MUD FLAP,24WX24	2
3	80141	•WASHER,FLAT,USS,.312	16
4	80208	•CSHH,.312-18X1.00,GR5	8
5	80351	•NUT,FLEXLOC,.312-18,FULL,LT	8

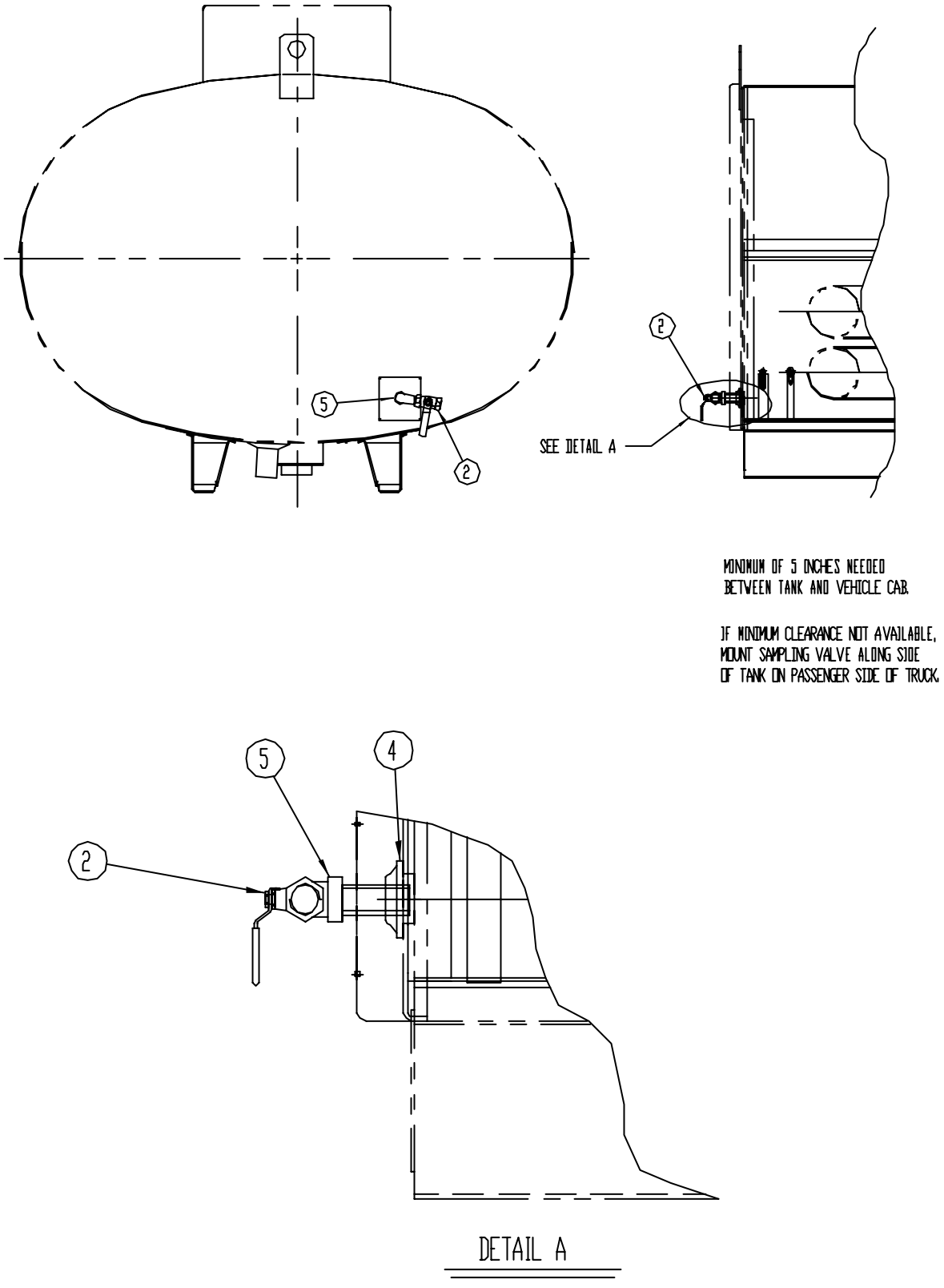


FIGURE 6-7. SAMPLING VALVE, FRONT HEAD

TABLE 6-7. SAMPLING VALVE, FRONT HEAD

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-7	**22468**	**SAMPLING VALVE, FRONT HEAD**	**1**
2	280210	•VALVE,BALL,1.00	1
4	71936	•FLANGE,WELD,1 NPT (Part of Tank)	REF
5	99528	•PIPE,90,16MP-16FP,MI	1

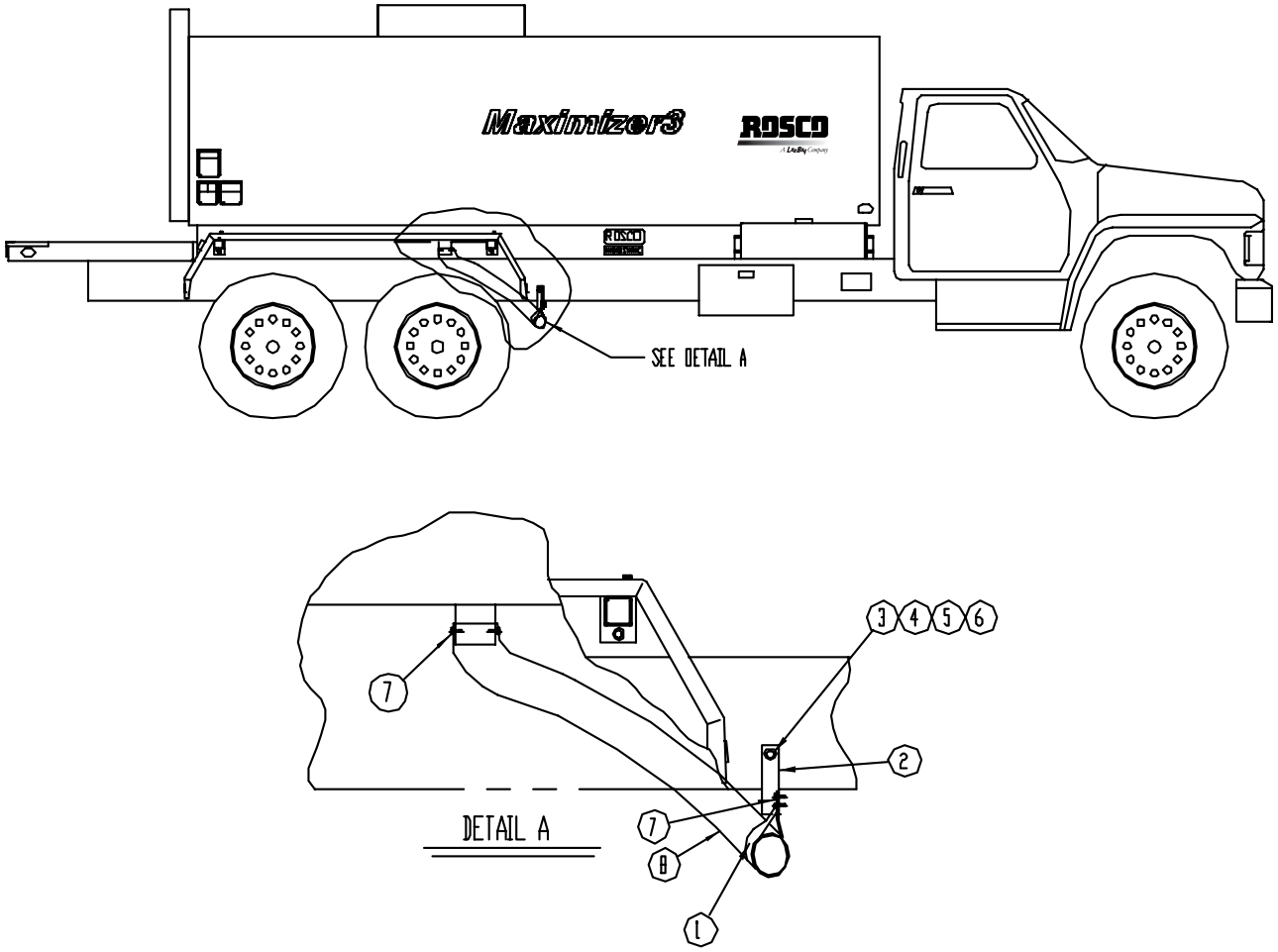


FIGURE 6-8. OVERFLOW ATTACHMENT GROUP

TABLE 6-8. OVERFLOW ATTACHMENT GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-8	**23572**	**OVERFLOW ATTACHMENT GROUP**	**1**
1	38771	•CLAMP,MUFFLER STRAP,3-1/2”	1
2	981708	•BRKT,WOOD RAIL JOINT	1
3	80038	•NUT,HEX,.375-16	1
4	80142	•WASHER,FLAT,USS,.375	2
5	80162	•WASHER,LOCK,.375	1
6	80224	•CSHH,.375-16X1.25,GR5	1
7	80324	•SCR,SLFTPG,HH,.250-20X.75	2
8	90268	•HOSE,3.50ID,FLEX,METAL	4.16

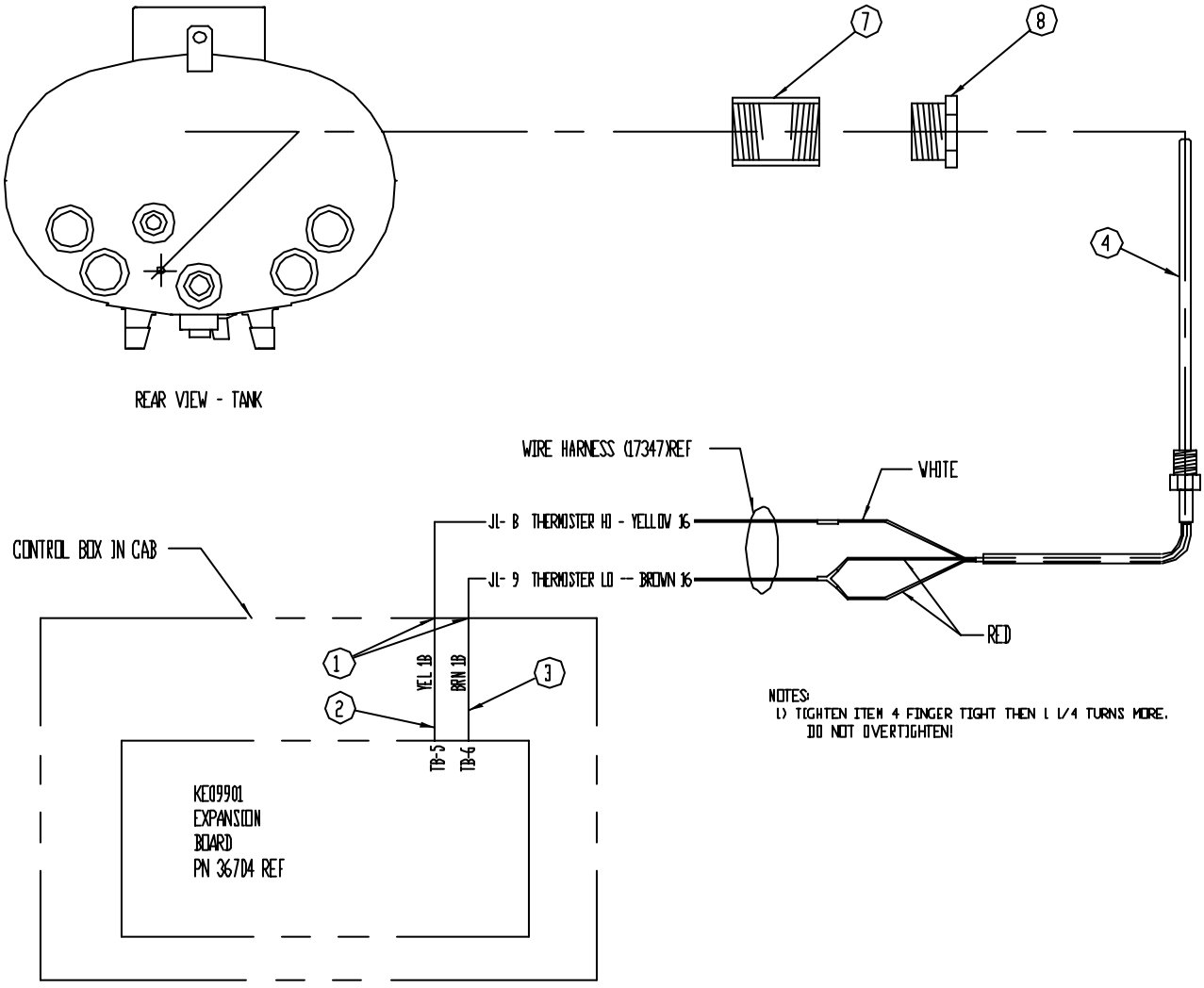


FIGURE 6-9. THERMOMETER GROUP

TABLE 6-9. THERMOMETERS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-9		**THERMOMETERS**	
100	22212	•THERMOMETER GROUP	1
		ATTACHING PARTS	
1	34471	••CONTACT,SOCKET,20-14 GA (Part of Control Box)	REF
2	35150-6	••WIRE,18 GA,YELLOW (Part of Control Box)	REF
3	35150-7	••WIRE,18 GA,BROWN (Part of Control Box)	REF
4	38435	••TEMP PROBE,RTD,9 IN,MIN INS	1
-6	71060	••LOOM,SPLIT,CONVOLUTED,.250	3
7	90126	••PIPE,CPLG,1.00	1
8	99460	••PIPE,BUSH,16MP-04FP,MI	1
		-----*-----	
-200	17862	•DIAL, THERM, 50° - 500° F, GROUP	1
		ATTACHING PARTS	
-2001	5470	••THERM, DIAL, 5.0 FACE, 500F	1
-2002	99450	••PIPE,BUSH,08MP-06FP,MI	1
-2003	99492	••PIPE, CPLG, 08FP	1
		-----*-----	
-300	5133	•THERM, ARMORED,PENCIL,100° - 600° F	1

- ITEM NOT ILLUSTRATED

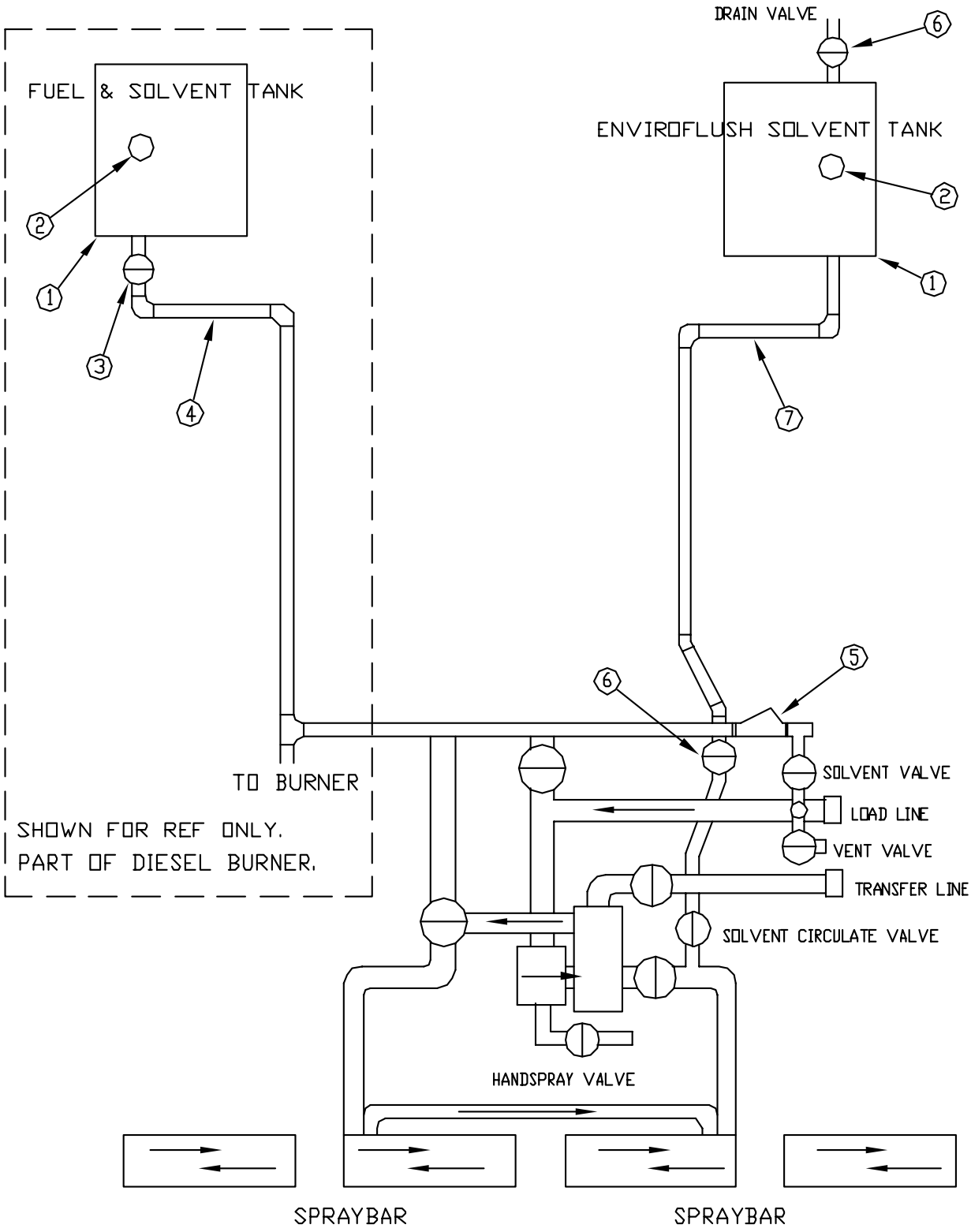


FIGURE 6-10. ENVIROFLUSH SYSTEM

TABLE 6-10. ENVIROFLUSH SYSTEM

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
6-10	**21810**	**ENVIRO FLUSH SYSTEM**	**1**
1	21701	•TANK WLDMT,DIESEL	1
2	36940	•CAP,FUEL,4.0 NPT,AL,W/GASKET	1
3	5499	•VLV,DRAIN COCK,.250 NPT (Part of Diesel Burner)	REF
4	6352	•HOSE,08,PUSH-ON,250 (Part of Diesel Burner)	REF
5	35569	•VLV,CHECK,08 NPT,SWING (Part of Flush Tank)	REF
6	280210	•VALVE,BALL,1.00	2
7	36999	•HOSE,1.00 ID,HOT ASPHALT	1.83'
-21	15944	•PLATE,TAPPED	2
-22	21813	•BRKT,PIPE SUPPORT	2
-23	33167	•CLAMP,HOSE,.81-1.75,WORM,#20	4
-24	33277	•CLAMP,HOSE,# 04	1
-25	5347	•HOSE,04,PUSH-ON,LOW PRESSURE	2
-26	70036	•FITT,STR 16MP-16HB,CRIMPED	4
-27	70444	•PIPE,PLUG,2.00MP,SQ HD,MI	1
-28	71622	•CSHH,.375-16X.88,GR5	4
-29	80162	•WASHER,LOCK,.375	4
-30	80142	•WASHER,FLAT,USS,.375	8
-31	99507	•PIPE,45,16FP,MI	1
-32	99514	•PIPE,90,16FP,MI	1
-33	99539	•PIPE,PLUG,16MP,SQ HD,MI	1
-100	10553	•DECAL,SOLVENT TANK	1

- ITEM NOT ILLUSTRATED

TABLE 6-11. INSULATED TANK & TANK COMPONENTS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		INSULATED TANK & TANK COMPONENTS	
-1	29473	•INSULATED TANK,56X84X132,W/STACK	1
-2	17283	•FLOAT RODS,VERTICAL	1
	17283-1	FOR TANK HEIGHTS OF 60" AND 68"	
	17283-2	FOR TANK HEIGHTS OF 48"	
	17283-3	FOR TANK HEIGHTS OF 56"	
	17283-4	FOR TANK HEIGHTS OF 52"	
-3	20793	•FLOAT RODS,HORIZONTAL	1
	20793-01	FOR TANK LENGTHS OF 96"	
	20793-02	FOR TANK LENGTHS OF 120"	
	20793-04	FOR TANK LENGTHS OF 140"	
	20793-05	FOR TANK LENGTHS OF 142"	
	20793-06	FOR TANK LENGTHS OF 170"	
	20793-07	FOR TANK LENGTHS OF 174"	
	20793-08	FOR TANK LENGTHS OF 176"	
	20793-09	FOR TANK LENGTHS OF 200"	
	20793-10	FOR TANK LENGTHS OF 132"	
-4	17288-1	•POINTER,W/M 17.25	1
-5	17288-2	•POINTER,W/M,FR HEAD	1
-6	22175	•MEASURING STICK	1
-7	22176	•CONTENTS GA,FR,56X84X132,DBL FLUE	1
-8	22177	•CONTENTS GA,REAR,56X84X132,DBL FLUE	1
-9	1270	•GLAND,RELIEF VALVE STEM	2
-10	35500	•FLOAT,BALL,SS	1
-11	4896-3	•GLAND PACKING	2
-12	80097	•NUT,HEX,JAM .875-14	2
-13	17565	•TANK MOUNTING,SINGLE	1
		ATTACHING PARTS	
-1301	16159	••TIE DOWN W/M,TANK	4
-1302	16243	••BENT PLATE	2
-1303	21934	••BAR,.250X1.00X3.00,HRS	4
-1304	21936	••BRACKET,END CAP	2
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 6-11. INSULATED TANK & TANK COMPONENTS (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		INSULATED TANK & TANK COMPONENTS	
-14	17564	•TRUCK MOUNTING,SINGLE	1
		ATTACHING PARTS	
-1401	14253	••TANK MOUNT,TRUCK ANGLE	4
-1402	35209	••SPR,1.62 DIAX3.5,1005 PSI	8
-1403	71684	••CSHH,.625-11X7.00,GR5	8
-1404	80146	••WASHER,TYPE A PLAIN,.625	16
-1405	80283	••CSHH,.625-11X2.00,GR5	8
-1406	80356	••NUT,FLEXLOC,.625-11,FULL,LT	16
-1407	90383-06	••WOOD,OAK,1.50X3.00X10FT	4
		-----*-----	
-15	17934	•FLUSH TANK SYSTEM	1
		ATTACHING PARTS	
-1501	10553	••DECAL,SOLVENT TANK	1
-1502	15944	••PLATE,TAPPED	2
-1503	21701	••TANK WLDMT,DIESEL	1
-1504	31971	••FITT,90 04MP-04HB,CRIMPED	1
-1505	33277	••CLAMP,HOSE,# 04	1
-1506	33328	••FITT,90 08MP-08HB,CRIMPED	2
-1507	35569	••VLV,CHECK,08 NPT,SWING	1
-1508	36940	••CAP,FUEL,4.0 NPT,AL,W/GASKET	1
-1509	5499	••VLV,DRAIN COCK,.250 NPT	1
-1510	70444	••PIPE,PLUG,2.00MP,SQ HD,MI	1
-1511	91315	••PIPE,TBE,08X83.00	1
-1512	91316	••PIPE,TBE,08X55.00	1
-1513	9672	••BRACKET,PIPE,0.50	4
-1514	99535	••PIPE,PLUG,04MP,SQ HD,MI	2
-1515	99980	••PIPE,BUSH,08MP-04FP,STL	1
-1516	99990	••PIPE,BUSH,16MP-08FP,STL	1
-1517	X427	••FITT,STR 08MP-08HB,CRIMPED	1
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 6-12. HOSES & MISCELLANEOUS ASSEMBLIES

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		HOSES & MISCELLANEOUS ASSEMBLIES	
-1	23977	•TOOLBOX ASSEMBLY	1
		ATTACHING PARTS	
-101	15956	••DOOR,TOOL BOX	1
-102	15963	••HINGE,DOOR	1
-103	23974	••TOOLBOX WLDMT,W/CONTROL BOX	1
-104	34865	••LOCK,RECESSED PADDLE	1
-105	34865-01	••KEY,545CH	1
		-----*-----	
-2	18234	•MISCELLANEOUS GROUP,MAX NON SKIRTED	1
		ATTACHING PARTS	
-201	5059	••PACKING,.125 SQ (For Contents Gauge)	2
-202	18233	••HOOK,HOSE,3.00	4
-203	8096	••HANGER, HANDSPRAY HOSE	4
-204	99539	••PIPE,PLUG,16MP,SQ HD,MI	2
-205	81062	••SCREW,SELF TAP,BTN HD,.312X	16
		-----*-----	
-3	5112R	•HOSE,16X25FT,HANDSPRAY,M END	1
-4	33384	•GREASE,TUBE. 50EP WITH DECAL	1
-4A	TBD	•MATERIAL SAFETY DATA SHEET (SEE FIG 6-13)	1
-5	34249	•GUN,GREASE	1
-6	36941	•GUIDE,SLIDE RULE APPLICATION	1

- ITEM NOT ILLUSTRATED

MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification		Manufacturer	US Petrolon Industrial, Inc.
Product Name	USPI 50 EP Grease		4900 RentworthDr.
Product Code	100		Lincoln, NE 68516 USA
Chemical Name	Not Applicable - Mixture	In Case of Emergency	1-800-755-4572
CAS #	Mixture	Uses	Lubricant

Section 2. Composition and Information on Hazardous Ingredients

Name	CAS #	% by Weight	OSHA PEL	ACGIH TLV
Acetone *	67-64-1	2-3%	1000 ppm TWA	750 ppm TWA, 1000 ppm STEL
Sodium nitrite *	7632-00-0	1-2%	None established	None established

* Subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372.

SPECIAL NOTE: MSDS data pertains to the product as dispensed from the container. Adverse health effects would not be expected under normal conditions of use, so long as recommended safety precautions are practiced.

Section 3. Hazards Identification		Section 4. First Aid Measures
Eye Contact	May cause tearing, redness, blurred vision, and irritation.	Flush eyes with clean water for at least 15 minutes. If irritation persists, call a physician.
Skin Contact	May cause drying of skin, irritation, and dermatitis.	Remove any contaminated clothing and wash skin with soap and water. If irritation occurs, call a physician.
Skin Absorption	Absorption through intact skin not anticipated to be route of entry.	Accidental high pressure injection under skin requires immediate medical attention.
Inhalation	May cause dizziness, headache, loss of coordination, and breathing difficulty.	Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention.
Ingestion	May cause gastrointestinal irritation, nausea, vomiting, and diarrhea.	If victim is conscious, do not induce vomiting and give 1 or 2 glasses of water. Never give anything by mouth to an unconscious person. Get medical attention.
Sensitization	Not a sensitizer under normal conditions.	
Chronic Effects	May cause dermatitis.	
Carcinogenic Effects	No ingredients listed as carcinogenic by IARC or NTP.	
Mutagenic Effects	No data.	
Teratogenic Effects	No data.	
Reproductive Effects	No data.	

Section 5. Fire and Explosion Hazards

Flash Point (method)	450°F (232°C) (COC)
Auto-Ignition Temp.	N/A
Flammable Limits in Air	lel: N/A uel: N/A
Combustion Products	Hydrogen fluoride, fluorine and its compounds, carbon monoxide.
Explosion Hazards	In the presence of mechanical impact or static discharge: no explosion risk.
Fire Fighting Measures	Use foam, CO_2, dry chemical, water fog. Water can be used to keep containers cool and to flush spills away from fire exposure. Firefighters must wear self-contained breathing apparatus in enclosed areas.

Section 6. Accidental Release Measures

Small Spill	Recover free product. Add sand, earth, or some other suitable adsorbent. Dispose of material in accordance with all state and local regulations.	Large Spill	Take care to keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered sewers, watercourses, or extensive land areas.

Section 7. Handling and Storage

Storage	Store in cool dry area in original or equivalent container in accordance with all applicable regulations. Do not expose to extreme heat or flame. Store below 150°F.	Handling	Wash thoroughly after handling. Do not get in eyes. Follow good hygiene and housekeeping practices. Use in ventilated areas.

FIGURE 6-13. MATERIAL SAFETY DATA SHEET (PAGE 1 OF 2)

Section 8. Exposure Controls and Personal Protection

Engineering Controls	Use with adequate ventilation.	Personal Protection	Splash proof eye protection is advisable. Oil impervious gloves for prolonged or repeated skin contact.

Section 9. Physical and Chemical Properties

Appearance and Odor	White, smooth semi-solid, mild odor	Vapor Pressure	No data
pH	Not applicable	Vapor Density (Air=1)	< 1
Boiling Point	No data	Odor Threshold	No data
Melting Point	No data	Evaporation Rate	< 1 (ether = 1)
Specific Gravity (H_2O=1)	1.0	Solubility in Water	Negligible
Water/Oil Distribution Coefficient	No data		

Section 10. Stability and Reactivity Data

Stability	Stable.	Incompatibilities	Strong oxidizers, acids.
Conditions to Avoid	Extreme heat.	Hazardous Decomposition Products	Carbon monoxide, toxic fluoride compounds, smoke, fumes.

Section 11. Toxicological Information

Routes of Entry	Eye, skin, ingestion.
Toxicological Data	No data

Section 12. Ecological Information

Eco toxicity	No data
BOD5 and COD	No data
Biodegradation Products and Toxicity	No data

Section 13. Disposal Considerations

Waste Information	Dispose of waste according to federal, state, and local regulations.

Section 14. Transport Information

DOT	Not regulated.
IMO	Not regulated.

Section 15. Other Regulatory Information

Hazardous Material Information System (HMIS) (USA)

Health	(Blue)	0
Fire	(Red)	1
Reactivity	(Yellow)	0
Personal Protection	(White)	B

SARA Section 313: Ingredients subject to reporting requirements: acetone, CAS# 67-64-1; sodium nitrite, CAS# 7632-00-0.

TSCA Inventory: All ingredients are listed or exempt.

California Prop. 65: No ingredients listed.

Canada DSL: All ingredients listed.

WHMIS Classification: Not controlled.

WHMIS: This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR. (Canada)

Section 16. Other Information

Date Revised	9/30/02	Prepared by	R.Rickels
For More Information Call	800-755-4572		

Important Notice **Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of this product for particular uses are beyond our control. Users should make their own investigation to determine the suitability of the information or products for their respective purposes.**

FIGURE 6-13. MATERIAL SAFETY DATA SHEET (PAGE 2 OF 2)

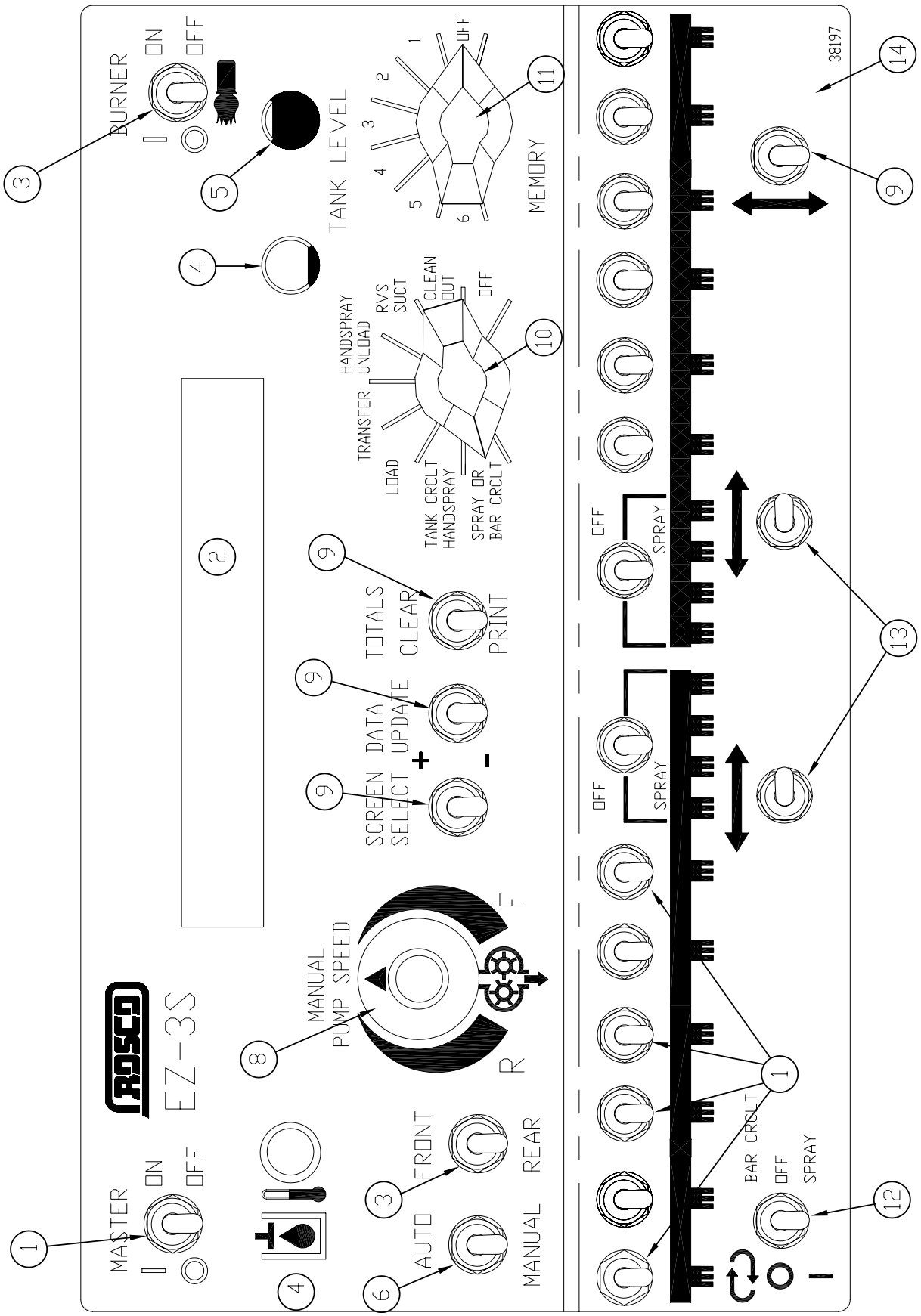


FIGURE 7-1. CONTROL BOX, EZ-3S, 18 FT SPRAYBAR

TABLE 7-1. CONTROL BOX, EZ-3S, 18 FT SPRAYBAR

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-1	**26095-01**	**CONTROL BOX, EZ-3S, 18 FOOT**	**1**
1	38157	•SWITCH,TOGGLE,DPST,2 POS	13
2	26965	•DISPLAY,KIT,LCD	1
		ATTACHING PARTS	
-201	21206	••WINDOW,AUTO CONTROLLER,EZ-1S	1
-202	26966	••HARNESS, DISPLAY	1
-203	38114	••DISPLAY,LCD,2X20,SINGLE UNIT	1
-204	39086	••WASHER,LOCK,EXT TOOTH,#6	4
		-----*-----	
3	38158	•SWITCH,TOGGLE,DPDT,2 POS,6 POLE	1
4	31983	•LIGHT,RED,DASH,.50 HOLE	2
5	31983	•LIGHT,RED,DASH,.50 HOLE	1
6	37342	•SWITCH,TOGGLE,3PDT,2 POS,9 POLE	2
8	35050	•POTENTIOMETER,100 OHM	1
-801	35049	••KNOB,.25 SHAFT	1
9	37516	•SWITCH,TOGGLE,SPDT,3-POS,MOM	4
10	35618	•SWITCH,RTRY,4 POLE,11 POS	1
-1001	35619	••KNOB,D-FLAT SHAFTS	2
11	38116	•SWITCH,RTRY,1POLE,11POS	1
-1101	35619	••KNOB,D-FLAT SHAFTS	1
12	36768	•SWITCH,TOGGLE,DPDT,3-POS,LONG	1
13	38185	•SWITCH,TOGGLE,DPDT,MOM,BLADE	2
14	38197	•DECAL,CONT BOX,MAX 3	1

See TABLE 3-1 in IPL-3 for additional non-illustrated hardware for this assembly. Quantities remain the same.
See FIGURES 3-2 thru 3-6 in IPL-3 for J-Plug chart & harnesses for this assembly. Quantities remain the same.

- ITEM NOT ILLUSTRATED

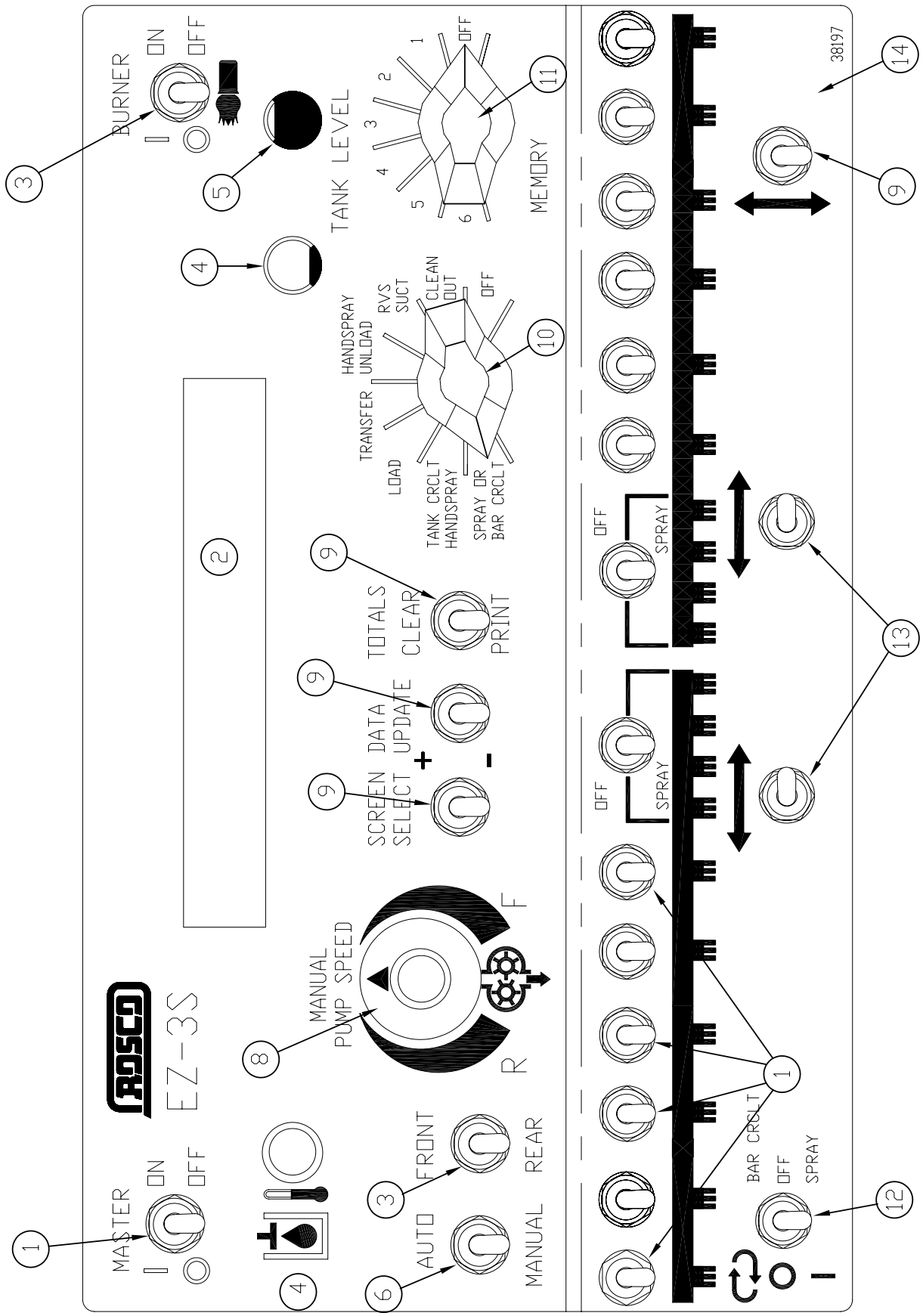


FIGURE 7-2. CONTROL BOX, EZ-3S, 20 FT SPRAYBAR

TABLE 7-2. CONTROL BOX, EZ-3S, 20 FT SPRAYBAR

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-2	**26095-02**	**CONTROL BOX, EZ-3S, 20 FOOT**	**1**
1	38157	•SWITCH,TOGGLE,DPST,2 POS	15
2	26965	•DISPLAY,KIT,LCD	1
		ATTACHING PARTS	
-201	21206	••WINDOW,AUTO CONTROLLER,EZ-1S	1
-202	26966	••HARNESS, DISPLAY	1
-203	38114	••DISPLAY,LCD,2X20,SINGLE UNIT	1
-204	39086	••WASHER,LOCK,EXT TOOTH,#6	4
		-----*-----	
3	38158	•SWITCH,TOGGLE,DPDT,2 POS,6 POLE	1
4	31983	•LIGHT,RED,DASH,.50 HOLE	2
5	31983	•LIGHT,RED,DASH,.50 HOLE	1
6	37342	•SWITCH,TOGGLE,3PDT,2 POS,9 POLE	2
8	35050	•POTENTIOMETER,100 OHM	1
-801	35049	••KNOB,.25 SHAFT	1
9	37516	•SWITCH,TOGGLE,SPDT,3-POS,MOM	4
10	35618	•SWITCH,RTRY,4 POLE,11 POS	1
-1001	35619	••KNOB,D-FLAT SHAFTS	2
11	38116	•SWITCH,RTRY,1POLE,11POS	1
-1101	35619	••KNOB,D-FLAT SHAFTS	1
12	36768	•SWITCH,TOGGLE,DPDT,3-POS,LONG	1
13	38185	•SWITCH,TOGGLE,DPDT,MOM,BLADE	2
14	38197	•DECAL,CONT BOX,MAX 3	1

See TABLE 3-1 in IPL-3 for additional non-illustrated hardware for this assembly. Part numbers and quantities as listed remain the same.
See FIGURES 3-2 thru 3-6 in IPL-3 for J-Plug chart & harnesses for this assembly. Part numbers and quantities as listed in their accompanying tables remain the same.

- ITEM NOT ILLUSTRATED

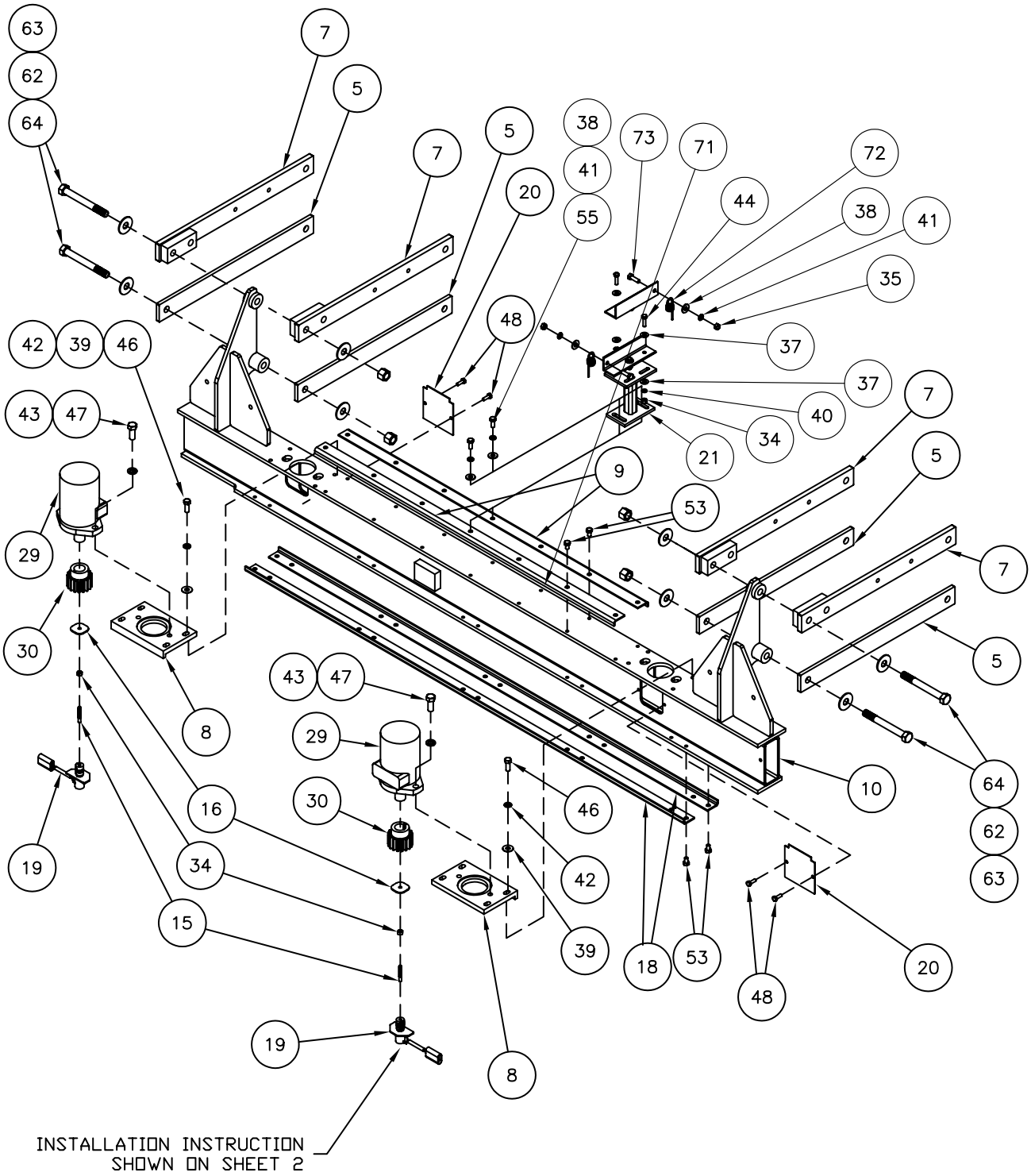
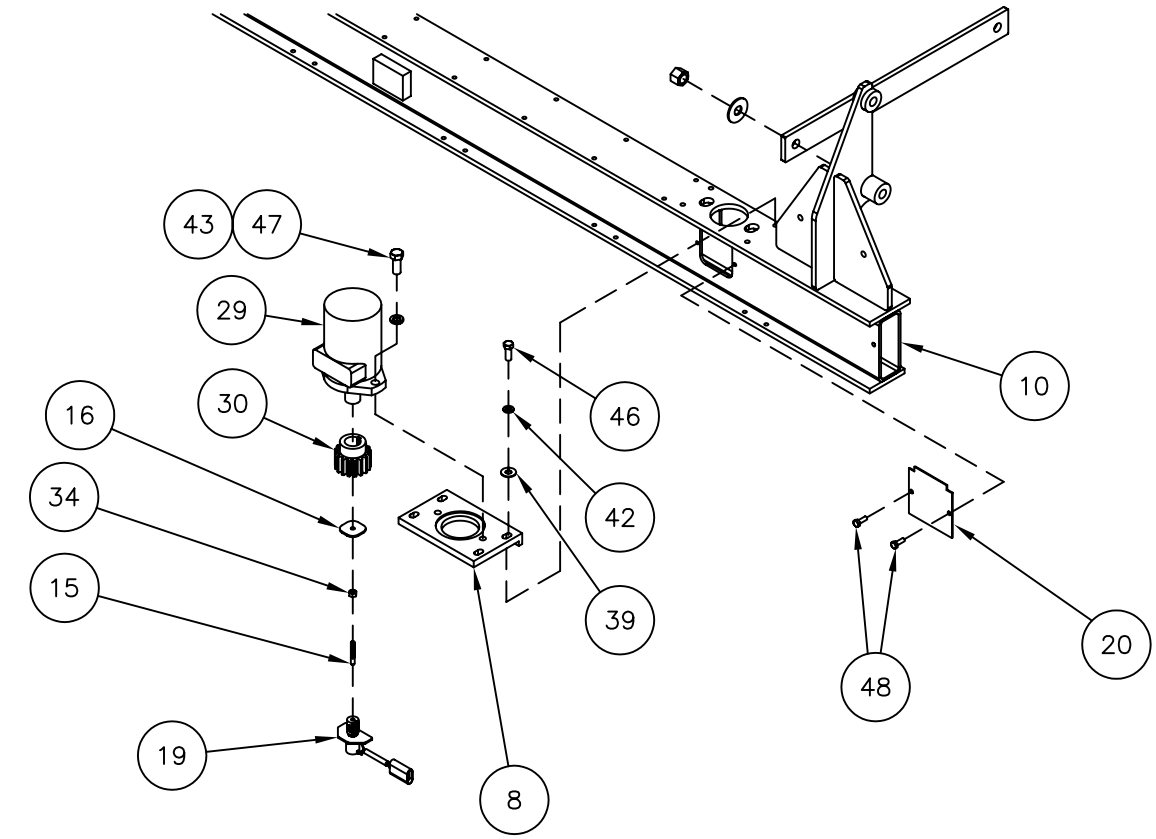


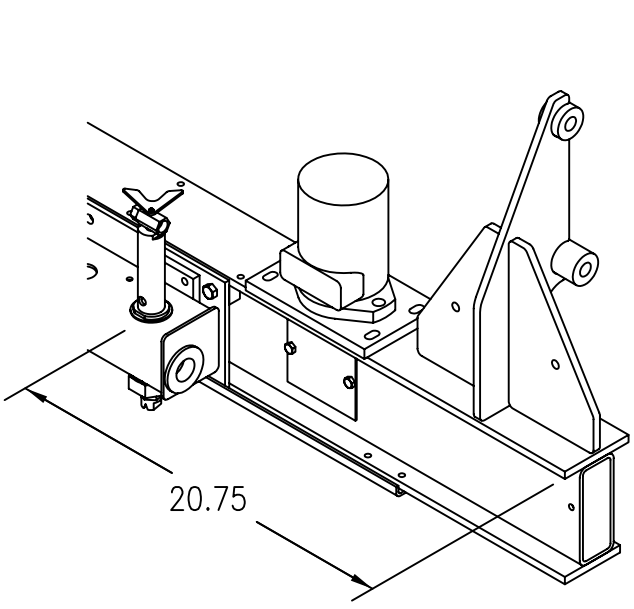
FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (SHEET 1 OF 5)

TABLE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT

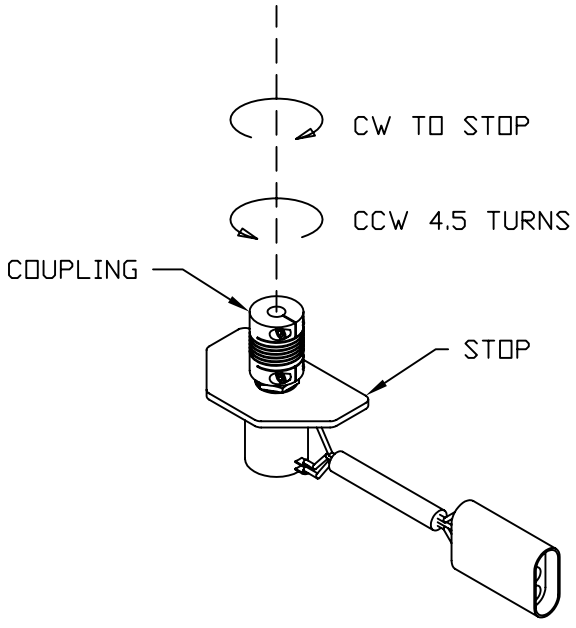
FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-3	**28762**	**SPRAYBAR ASSY, 18 FOOT**	**1**
5	25948	•LINK,SUPPORT,BOTTOM	4
7	25997	•LINK,SUPPORT,TOP	4
8	26016	•MOUNT,MOTOR,SPRAYBAR	2
9	26017	•RAIL,BARSLIDE,TOP	2
10	26019	•BARSLIDE W/M	1
15	26059	•SHAFT,THD'D,1.75	2
16	26060	•WASHER,SQ,.281IDX1.5	2
18	26112	•RAIL,BARSLIDE,BTTM	2
19	26141	•POT ASSEMBLY,MAX3	2
20	26142	•PLATE,ACCESS	2
21	27594	•BRACKET,ACTUATOR	1
29	38122	•MOTOR,HYD,LSHT,8.0 DISP	2
-2901	38122-02	••SEAL KIT,38122 MOTOR	
30	38125	•GEAR,SPUR,PINION,8 D.P.,17T	2
34	80036	•NUT,HEX,.250-20	6
35	80037	•NUT,HEX,.312-18	10
37	80140	•WASHER,TYPE A PLAIN,.250	10
38	80141	•WASHER,FLAT,USS,.313	18
39	80142	•WASHER,FLAT,USS,.375	8
40	80160	•WASHER,LOCK,.250	4
41	80161	•WASHER,LOCK,.312	4
42	80162	•WASHER,LOCK,.375	8
43	80164	•WASHER,LOCK,.500	20
44	80185	•CSHH,.250-20X1.00,GR5	6
46	80221	•CSHH,.375-16X1.00,GR5	8
47	80250	•CSHH,.500-13X1.25,GR5	4
48	80324	•SCR,SLFTPG,HH,.250-20X.75	4
53	81211	•CSHH,.312-24X.50,GR5	34
55	81227	•CSHH,.312-24X.875,GR5	2
62	80146	•WASHER,TYPE A PLAIN,.625	20
63	80356	•NUT,FLEXLOC,.625-11,FULL,LT	10
64	80445	•CSHH,.625-11X5.50,GR 5	8
65	37187	•RING,SPLIT,2.02IDX.18,ZINC CTD	2
71	27591	•ARM,ACTUATOR	2
72	38660	•SPRING,MAX3,TORSION	2
73	80208	•CSHH,.312-18X1.00,GR5	2

- ITEM NOT ILLUSTRATED





VIEW B



VIEW C

FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (SHEET 2 OF 5)

TABLE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-3	**28762**	**SPRAYBAR ASSEMBLY**	
8	26016	•MOUNT,MOTOR,SPRAYBAR	2
10	26019	•BARSLIDE W/M	1
15	26059	•SHAFT,THD'D,1.75	2
16	26060	•WASHER,SQ,.281IDX1.5	2
19	26141	•POT ASSEMBLY,MAX3 (SEE FIG 7-4)	2
20	26142	•PLATE,ACCESS	2
-26	34998	•LOCTITE,#242	.10
29	38122	•MOTOR,HYD,LSHT,8.0 DISP	2
-2901	38122-01	••SEAL KIT,38122 MOTOR	
30	38125	•GEAR,SPUR,PINION,8 D.P.,17T	2
34	80036	•NUT,HEX,.250-20	6
39	80142	•WASHER,FLAT,USS,.375	8
42	80162	•WASHER,LOCK,.375	8
43	80164	•WASHER,LOCK,.500	20
46	80221	•CSHH,.375-16X1.00,GR5	8
47	80250	•CSHH,.500-13X1.25,GR5	4
48	80324	•SCR,SLFTPG,HH,.250-20X.75	4

Bar Extend Sensor Replacement

1. Fully extend bar.
2. Remove access plate.
3. Disconnect sensor wire harness.
4. Loosen socket head screws on coupling and remove the coupling.
5. Remove jam nut. Remove old sensor and replace with new one.
6. Reassemble and tighten jam nut
7. Replace coupling, using Loctite (Item 26) on potentiometer shaft and turn clockwise until the coupler stops. Then turn counter clockwise 1.5 turns. Coupling may need to be adjusted to allow the tightening of the socket head screws.
8. Apply locktite to inside of bore on the coupling, then fit over shaft (Item 15) and tighten screws.
9. Connect wire harness and replace.

- ITEM NOT ILLUSTRATED

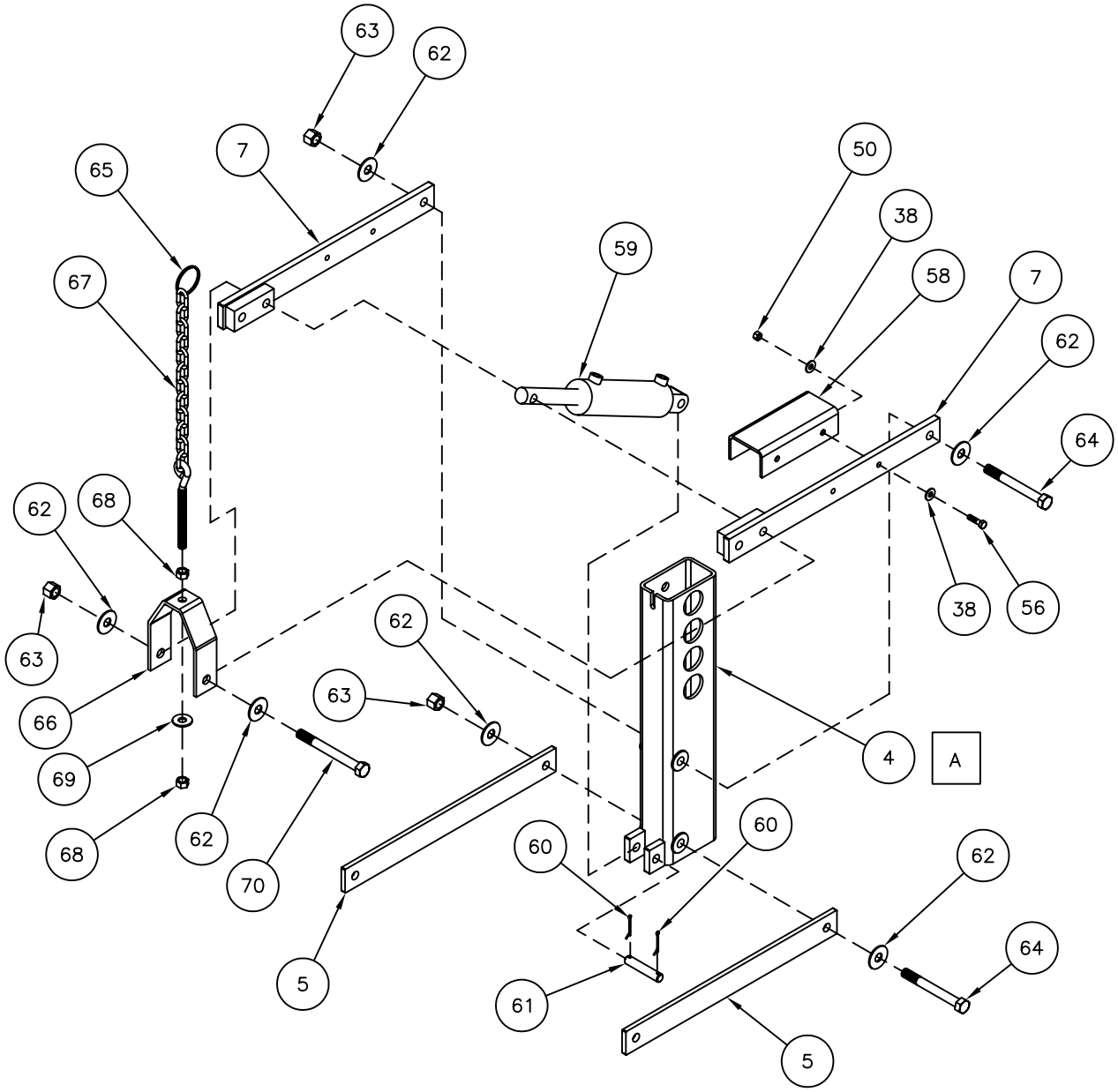


FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (SHEET 3 OF 5)

FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-3	**28762**	**SPRAYBAR ASSEMBLY**	
4	25944	•SUPPORT,SPRAYBAR,RH	1
5	25948	•LINK,SUPPORT,BOTTOM	4
-6	25949	•SUPPORT,SPRAYBAR,LH	1
7	25997	•LINK,SUPPORT,TOP	4
38	80141	•WASHER,FLAT,USS,.313	18
50	80351	•NUT,FLEXLOC,.312-18,FULL,LT	48
56	80206	•CSHH,.312-18X1.25,GR5	8
58	26622	•STIFFENER,WIDE,SCISSOR BAR	2
59	6231	•CYL,HYD,2.00X5.75STROKE,12.50	2
-5901	6231-01	••SEAL KIT,FOR CYL	
60	80332	•COTTER PIN,.125X1.50	4
61	9081	•PIN,HYD,LIFT CYLINDER	2
62	80146	•WASHER,TYPE A PLAIN,.625	20
63	80356	•NUT,FLEXLOC,.625-11,FULL,LT	10
64	80445	•CSHH,.625-11X5.50,GR 5	8
65	37187	•RING,SPLIT,2.02IDX.18,ZINC CTD	2
66	26721	•CLEVIS	2
67	26725	•CHAIN,ADJUSTMENT	2
68	80040	•NUT,HEX,.500-13	4
69	80144	•WASHER,FLAT,USS,.500	2
70	71697	•CAP SCREW HT 5/8 X 6 1/2 NC	2

- ITEM NOT ILLUSTRATED

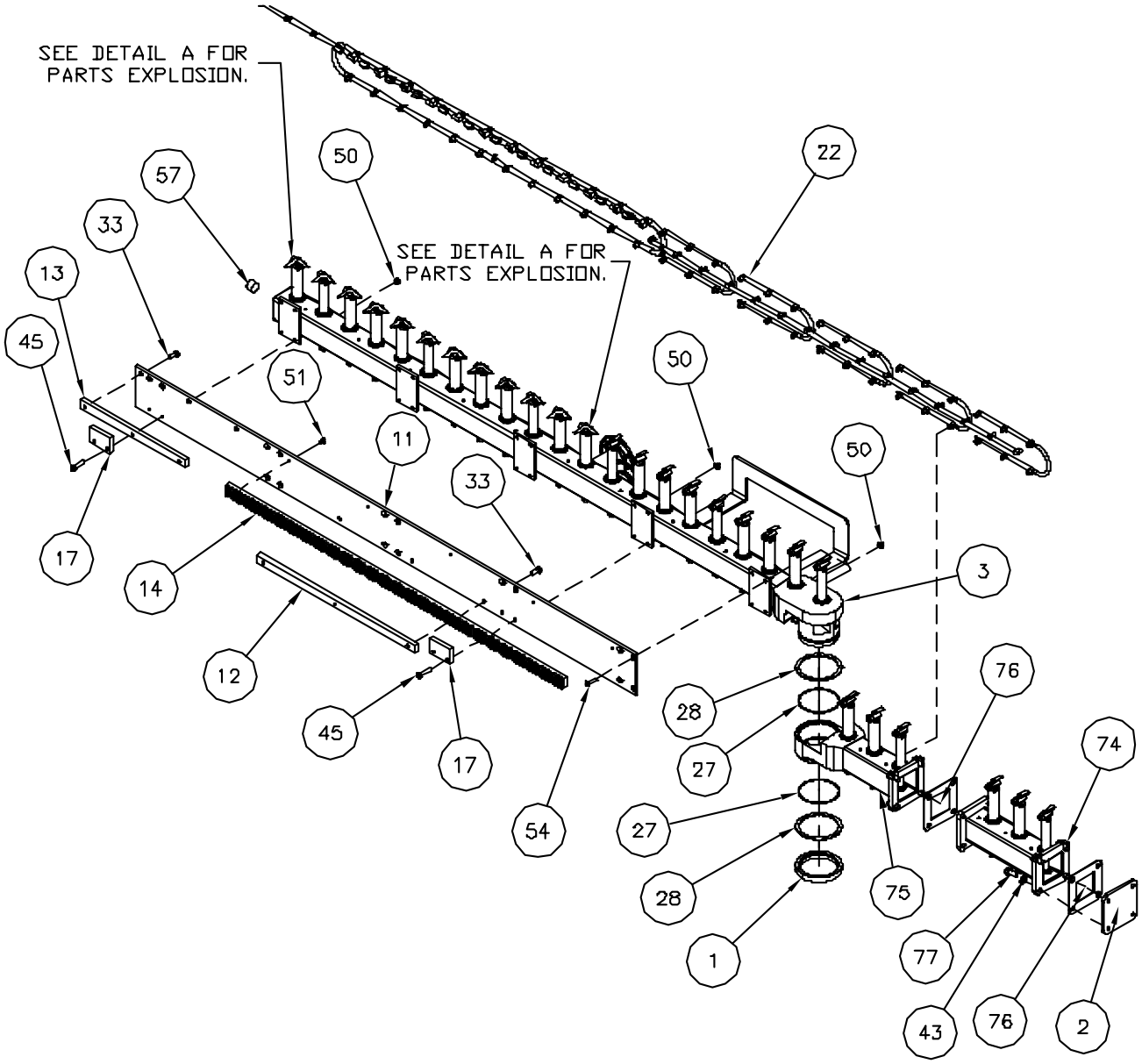


FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (SHEET 4 OF 5)

FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-3	**28762**	**SPRAYBAR ASSEMBLY**	
1	15929	•NUT	2
2	15930	•CAP,END,SPRAYBAR	2
3	25901	•SPRAYBAR W/M,EXTENDABLE	2
11	26033	•PLATE,SLIDE	2
12	26034	•BLOCK,SLIDE,BOTTOM	2
13	26035	•BLOCK,SLIDE,TOP	2
14	26036	•RACK,GEAR,8 D.P.,MODIFIED	2
17	26106	•BLOCK,STOP,EXTEND	4
22	28764	•CONTROL GRP,AIR,MAX3,18' BAR	1
		ATTACHING PARTS	
-2201	33343	••FITT,STR 02MP-04HB,PUSH-ON	8
-2202	35924	••FITT,PLUG 02QD	4
-2203	35925	••SOCKET,QUICK COUPLER,02NPT	4
-2204	37311	••FITT,90 02MP-02FP,BRASS	48
-2205	38130	••VALVE,3 WAY,AIR,SPRAY BAR (No seal kit avail.)	24
-2206	38132	••VALVE,3 WAY,02X02X02, (No seal kit)	30
-2207	5347	••HOSE,04,PUSH-ON,LOW PRESSURE	235
-2208	38201	••CLAMP,HOSE,BAND,.45DIA	320
-2209	38412	••FITT,TEE 04HB-O4HB-04HB,BRASS	4
-2210	71796	••FITT,90 02MP-04HB,CRIMPED,BRAS	16
-2211	72700	••FITT,TEE 04HB-04HB-02MP,BRASS	146
-2212	90803	••SLEEVE,ABRASION,NYLON,1.75ID	22
		-----*-----	
27	35008	•O-RING,4.50 OD	4
28	35036	•WASHER,TEFLON	4
33	71622	•CSHH,.375-16X.88,GR5	12
43	80164	•WASHER,LOCK,.500	20
45	80209	•CSHH,.312-18X1.50,GR5	8
50	80351	•NUT,FLEXLOC,.312-18,FULL,LT	48
51	80876	•CSHH,.250-28X.50,GR5	10
54	81213	•CSFHS,.312-18X1.25,GR5	32
57	70700	•PIPE,PLUG,16MP,SQ CSK HEAD,MI	4
74	28630	•SPRAYBAR,W/M,EXT	2
75	28631	•EXTENSION,SPRAYBAR	2
76	35035	•GASKET,SPRAYBAR EXT	4
77	80248	•CSHH,.500-13X1.00,GR5	16

- ITEM NOT ILLUSTRATED

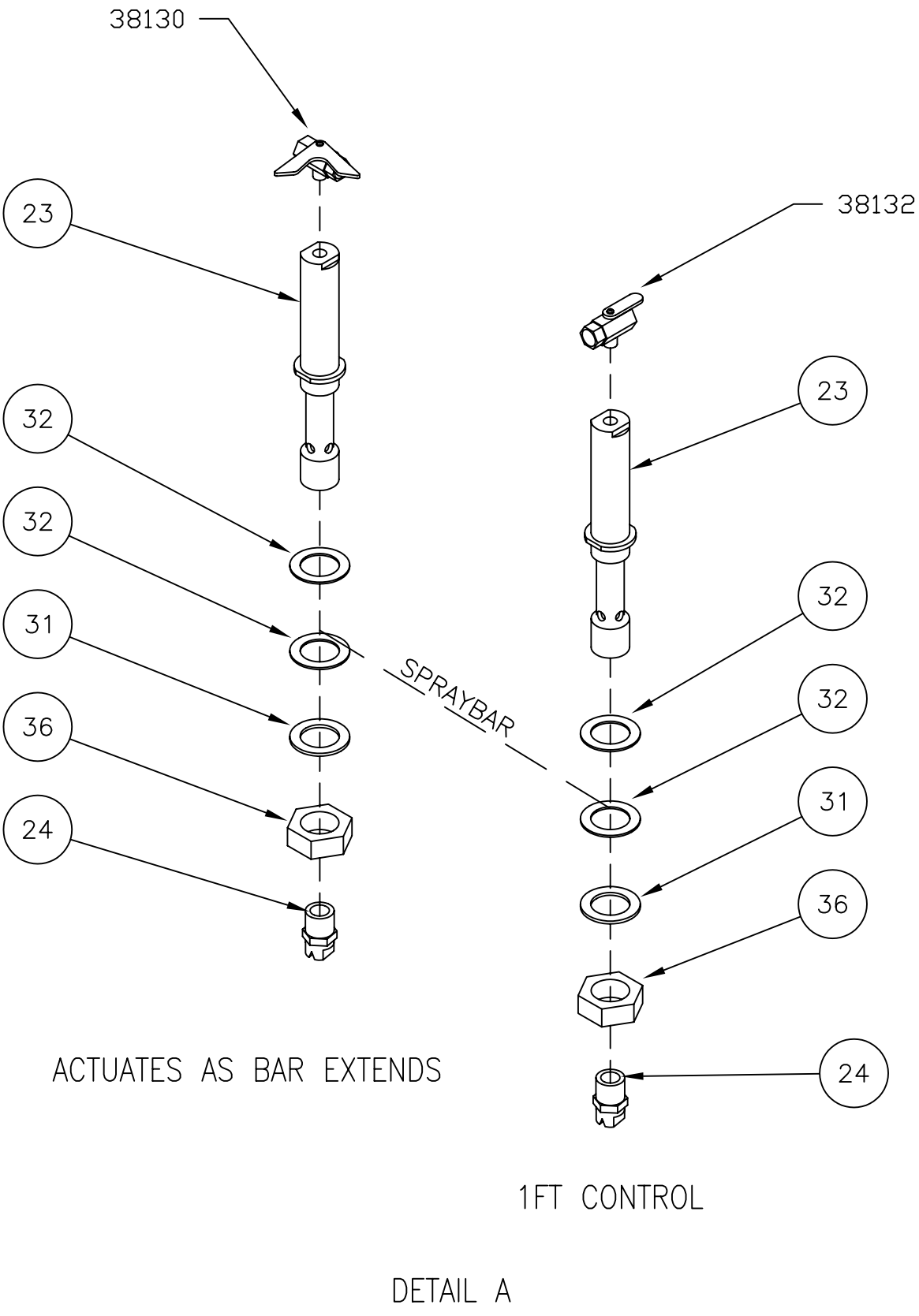


FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (SHEET 5 OF 5)

FIGURE 7-3. SPRAYBAR ASSEMBLY, 18 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-3	**28762**	**SPRAY BAR ASSEMBLY - VALVES**	
23	26469	•SPRAY VALVE ASSEMBLY,MAX3 (SEE FIG 7-5)	54
24	35565	•NOZZLE #00	54
24	32917	•NOZZLE #0	A/R
24	32918	•NOZZLE #1	A/R
24	36299	•NOZZLE #1.5	A/R
24	32919	•NOZZLE #2	A/R
24	32920	•NOZZLE #3	A/R
31	38141	•WASHER,1.50ODX1.187IDX.10THK	54
32	38149	•GASKET,SPRAY VALVE	108
36	80099	•NUT,HEX,JAM,1.125-12	54
-50	16070	•BAR,PLUG GROUP	1
		ATTACHING PARTS	
-5001	983602	••PIPE,HEX BUSHING,4X.75,BLK,MI	1
-5002	99479	••PIPE,CAP,12FP,MI	1
-5003	99602	••PIPE,NIPPLE,12X3.00	1
		-----*-----	
-100	8695	•WRENCH,NOZZLE ALIGNMENT	1

- ITEM NOT ILLUSTRATED

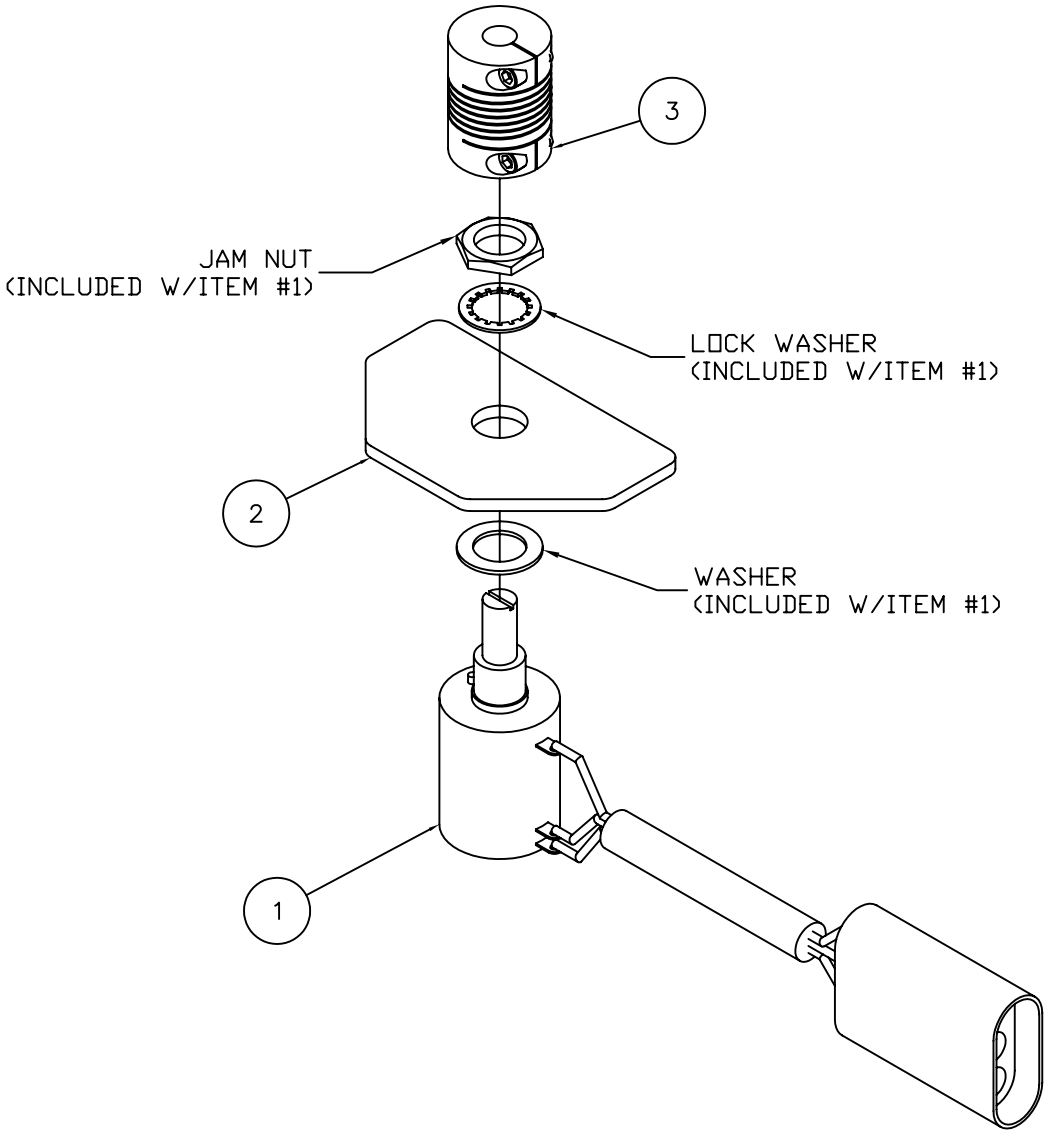
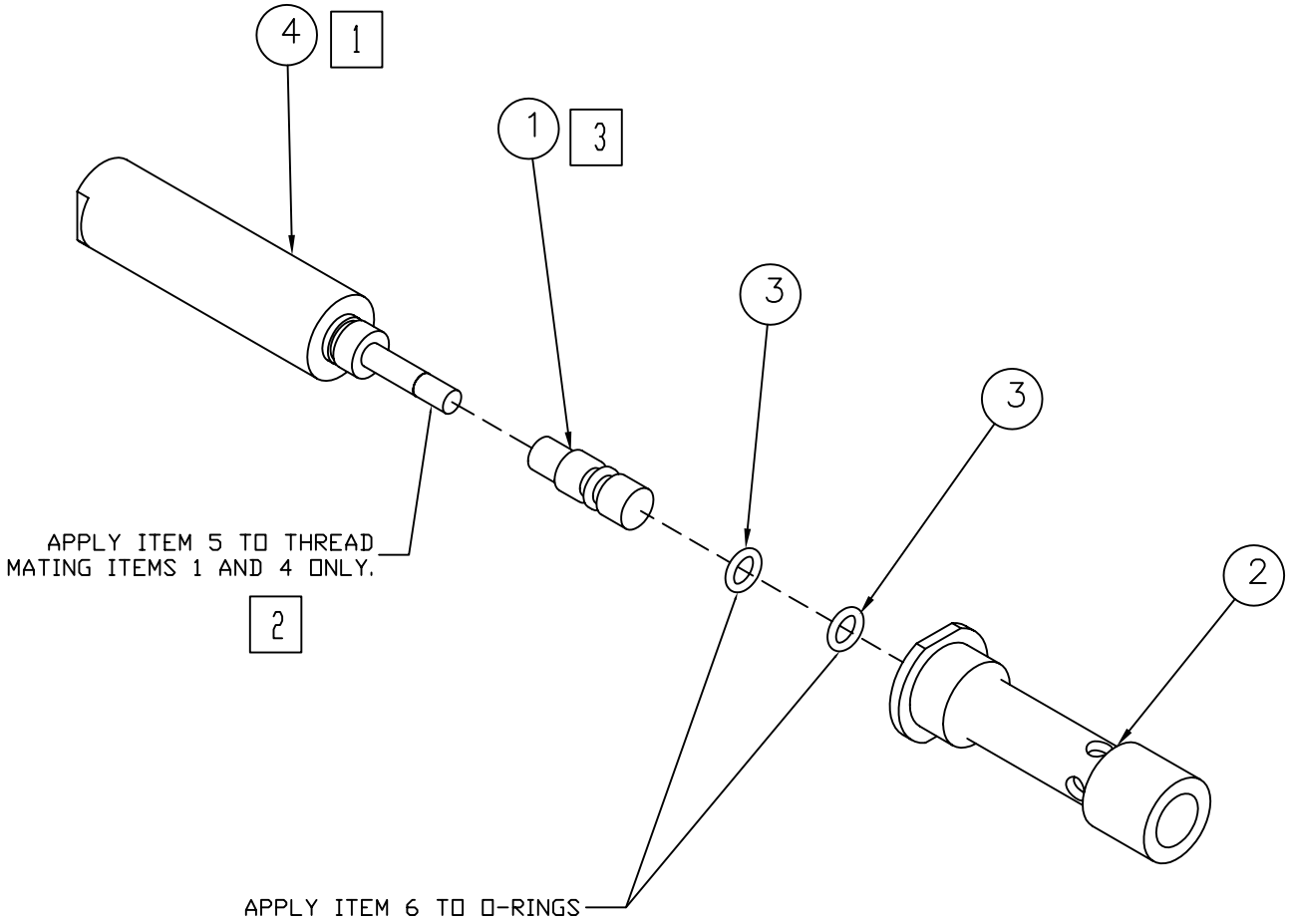


FIGURE 7-4. POTENTIOMETER

TABLE 7-4. POTENTIOMETER

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-4	**26141**	**•POT ASSEMBLY,MAX3 (SEE FIG 7-3 FOR NHA)**	**2**
1	26184	••POTENTIOMETER W/CONN,MAX3	1
2	26140	••STOP,POT BODY	1
3	38118	••COUPLING,FLEX,.25 BORE,.75 LEN	1

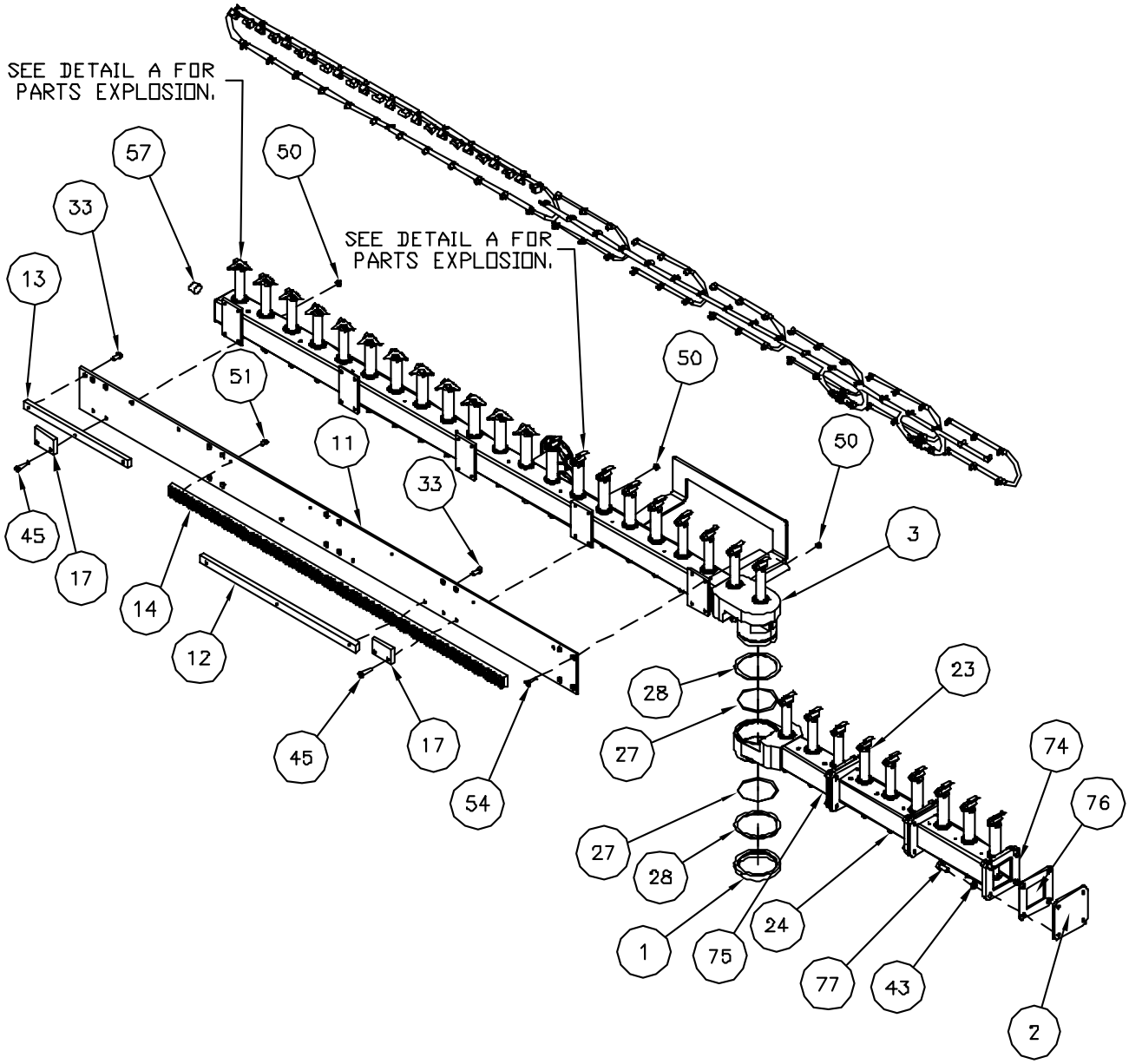


NOTES:
1. Torque cylinder, item 4, into body, item 2, with 25 Ft Lbs.
2. Use 4 drops of Loctite and wipe upexcess after assembly. Allow 30 minutes to harden.
3. Screw plunger, item 1, all the way onto threads of air cylinder rod, item 4.

FIGURE 7-5. SPRAY VALVE ASSEMBLY

TABLE 7-5. SPRAY VALVE ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-5	**26469**	**•SPRAY VALVE ASSEMBLY (SEE FIG 7-3 FOR NHA)**	**54**
1	25260	••PLUNGER	1
2	25261	••BODY,VALVE	1
3	38054	••O-RING,.103 X .362,VITON	2
4	38129	••CYL,1.06X.50,AIR,SPRING EXT	1
5	38992	••LOCTITE #272	.05
6	36222	••LUBRICANT, ANTI-SEIZE, 8 OZ	.01



Illustrations on sheets 1, 2 & 3 for the 20 ft spraybar are the same as those for the 18 ft spraybar. Part numbers and quantities as listed in their accompanying tables remain the same.

FIGURE 7-6. SPRAYBAR ASSEMBLY, 20 FOOT (SHEET 4 OF 5)

TABLE 7-6. SPRAYBAR ASSEMBLY, 20 FOOT

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-6	**28971**	**SPRAYBAR ASSEMBLY**	
1	15929	•NUT	2
2	15930	•CAP,END,SPRAYBAR	2
3	25901	•SPRAYBAR W/M,EXTENDABLE	2
11	26033	•PLATE,SLIDE	2
12	26034	•BLOCK,SLIDE,BOTTOM	2
13	26035	•BLOCK,SLIDE,TOP	2
14	26036	•RACK,GEAR,8 D.P.,MODIFIED	2
17	26106	•BLOCK,STOP,EXTEND	4
22	28972	•CONTROL GRP,AIR,MAX3,20' BAR	1
		ATTACHING PARTS	
-2201	33343	••FITT,STR 02MP-04HB,PUSH-ON	16
-2202	35924	••FITT,PLUG 02QD	8
-2203	35925	••SOCKET,QUICK COUPLER,02NPT	8
-2204	37311	••FITT,90 02MP-02FP,BRASS	48
-2205	38130	••VALVE,3 WAY,AIR,SPRAY BAR (No seal kit avail.)	24
-2206	38132	••VALVE,3 WAY,02X02X02, (No seal kit)	36
-2207	5347	••HOSE,04,PUSH-ON,LOW PRESSURE	300
-2208	38201	••CLAMP,HOSE,BAND,.45DIA	354
-2209	38412	••FITT,TEE 04HB-O4HB-04HB,BRASS	4
-2210	71796	••FITT,90 02MP-04HB,CRIMPED,BRAS	18
-2211	72700	••FITT,TEE 04HB-04HB-02MP,BRASS	162
-2212	90803	••SLEEVE,ABRASION,NYLON,1.75ID	22
		-----*-----	
27	35008	•O-RING,4.50 OD	4
28	35036	•WASHER,TEFLON	4
33	71622	•CSHH,.375-16X.88,GR5	12
43	80164	•WASHER,LOCK,.500	28
45	80209	•CSHH,.312-18X1.50,GR5	8
50	80351	•NUT,FLEXLOC,.312-18,FULL,LT	48
51	80876	•CSHH,.250-28X.50,GR5	10
54	81213	•CSFHS,.312-18X1.25,GR5	32
57	70700	•PIPE,PLUG,16MP,SQ CSK HEAD,MI	4
74	28630	•SPRAYBAR,W/M,EXT	4
75	28631	•EXTENSION,SPRAYBAR	2
76	35035	•GASKET,SPRAYBAR EXT	6
77	80248	•CSHH,.500-13X1.00,GR5	24

- ITEM NOT ILLUSTRATED

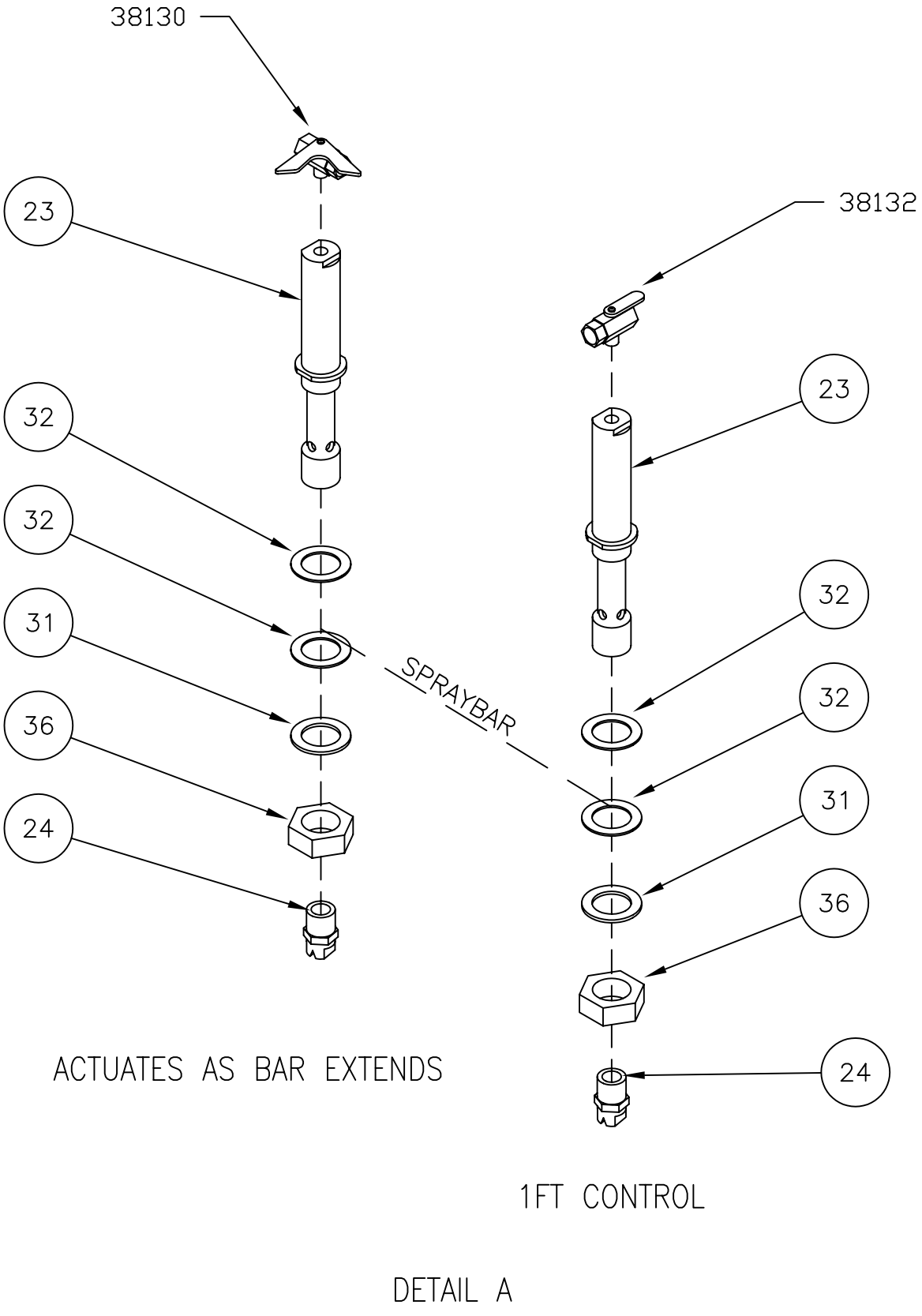
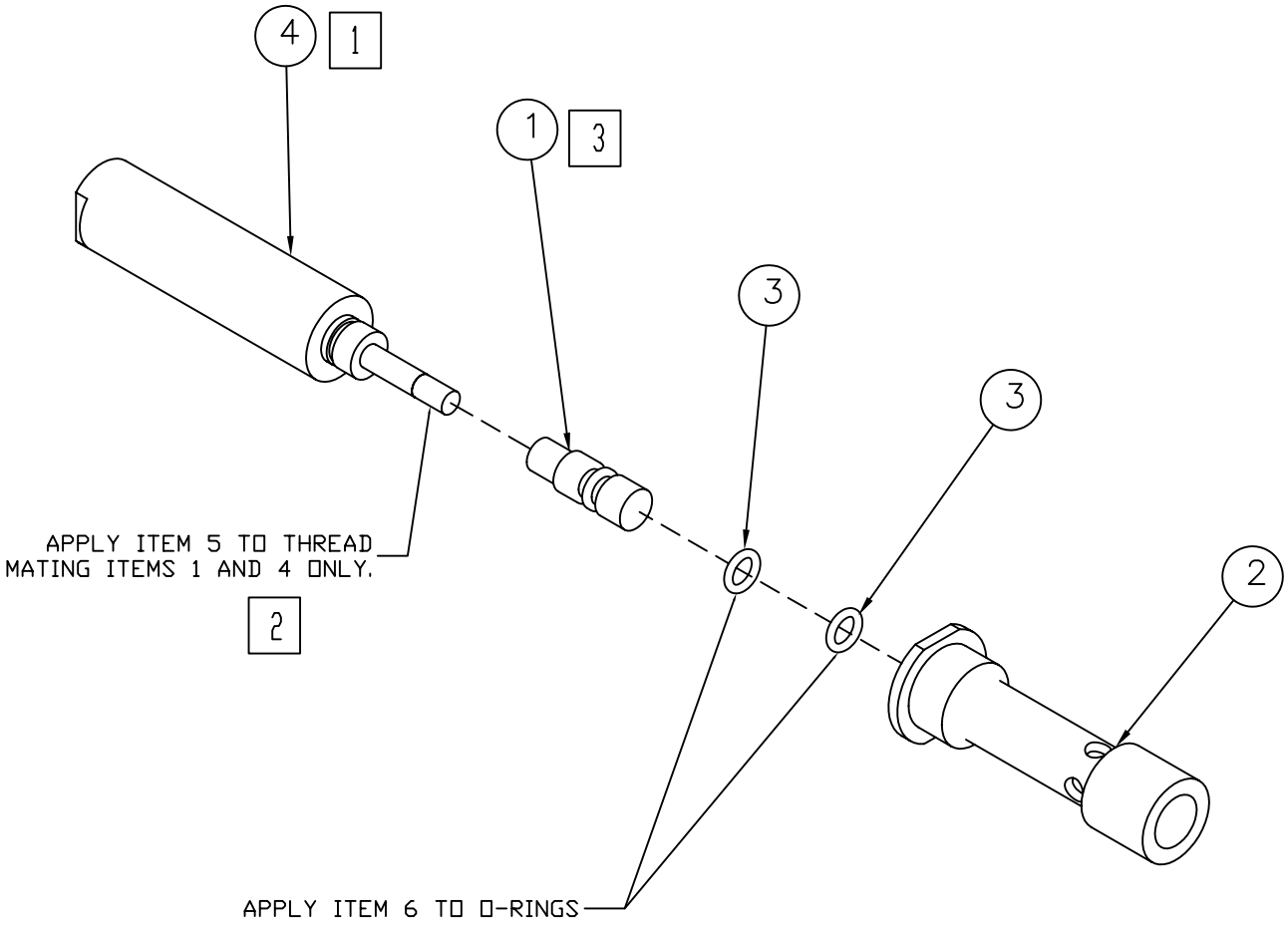


FIGURE 7-6. SPRAYBAR ASSEMBLY, 20 FOOT (SHEET 5 OF 5)

TABLE 7-6. SPRAYBAR ASSEMBLY, 20 FOOT (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-6	**28971**	**SPRAY BAR ASSEMBLY - VALVES**	
23	26469	•SPRAY VALVE ASSEMBLY,MAX3 (SEE FIG 7-7)	60
24	35565	•NOZZLE #00	60
24	32917	•NOZZLE #0	A/R
24	32918	•NOZZLE #1, 5 GPM/40 PSI	A/R
24	36299	•NOZZLE #1.5	A/R
24	32919	•NOZZLE #2	A/R
24	32920	•NOZZLE #3	A/R
31	38141	•WASHER,1.50ODX1.187IDX.10THK	60
32	38149	•GASKET,SPRAY VALVE	120
36	80099	•NUT,HEX,JAM,1.125-12	60
-50	16070	•BAR,PLUG GROUP	1
		ATTACHING PARTS	
-5001	983602	••PIPE,HEX BUSHING,4X.75,BLK,MI	1
-5002	99479	••PIPE,CAP,12FP,MI	1
-5003	99602	••PIPE,NIPPLE,12X3.00	1
		-----*-----	
-100	8695	•WRENCH,NOZZLE ALIGNMENT	1

- ITEM NOT ILLUSTRATED



NOTES:
1. Torque cylinder, item 4, into body, item 2, with 25 Ft Lbs.
2. Use 4 drops of Loctite and wipe upexcess after assembly. Allow 30 minutes to harden.
3. Screw plunger, item 1, all the way onto threads of air cylinder rod, item 4.

FIGURE 7-7. SPRAY VALVE ASSEMBLY

TABLE 7-7. SPRAY VALVE ASSEMBLY

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-7	**26469**	**•SPRAY VALVE ASSEMBLY (SEE FIG 7-6 FOR NHA)**	**60**
1	25260	••PLUNGER	1
2	25261	••BODY,VALVE	1
3	38054	••O-RING,.103 X .362,VITON	2
4	38129	••CYL,1.06X.50,AIR,SPRING EXT	1
5	38992	••LOCTITE #272	.05
6	36222	••LUBRICANT, ANTI-SEIZE, 8 OZ	.01

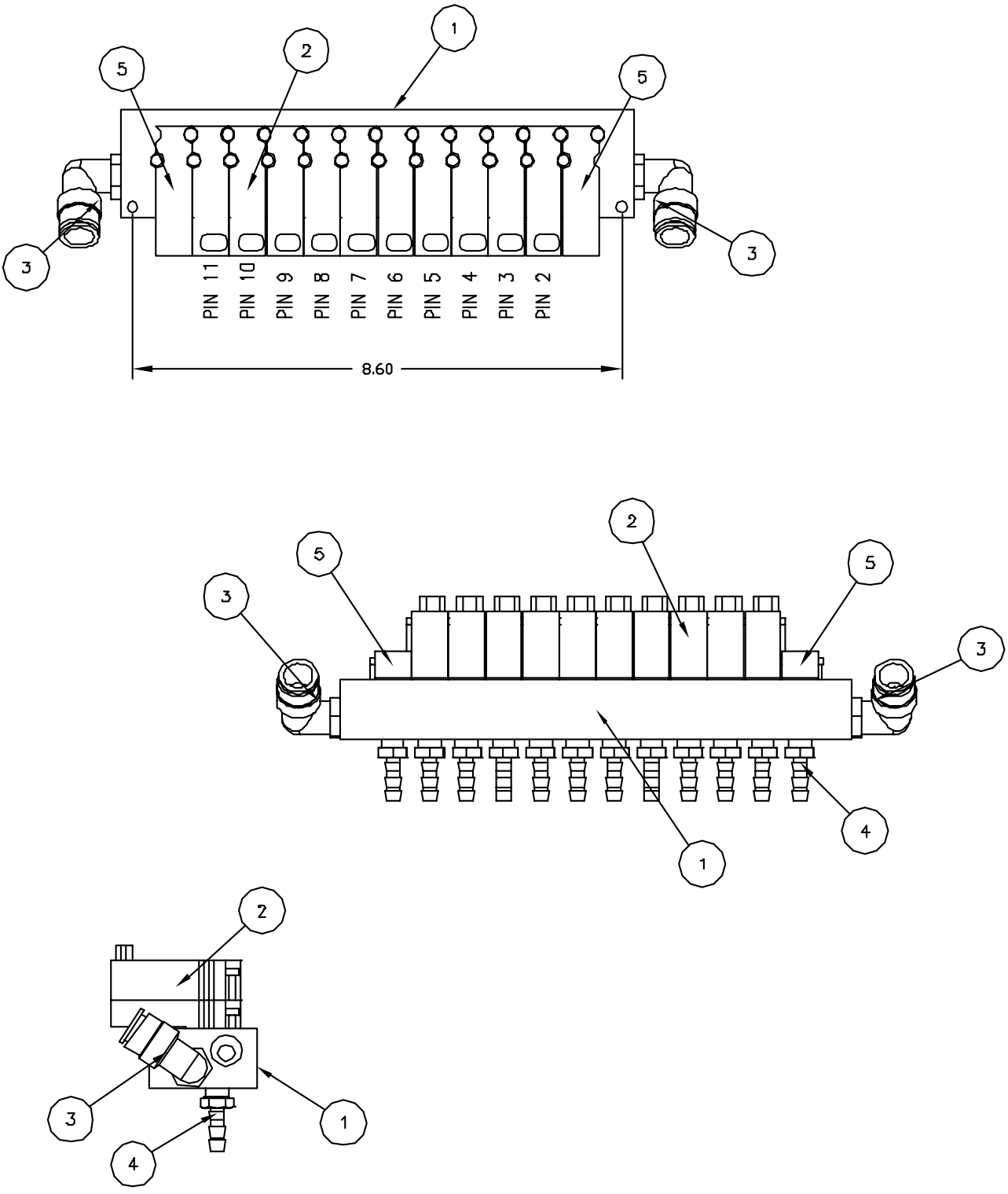
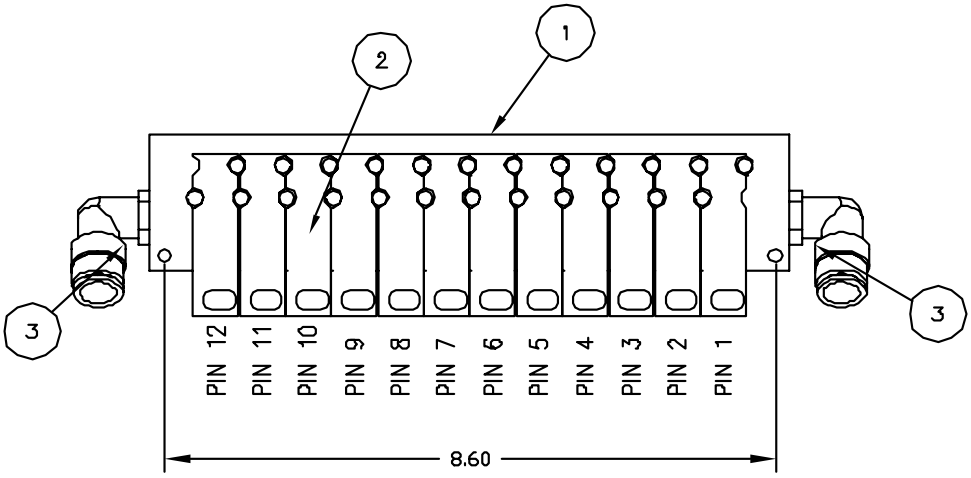
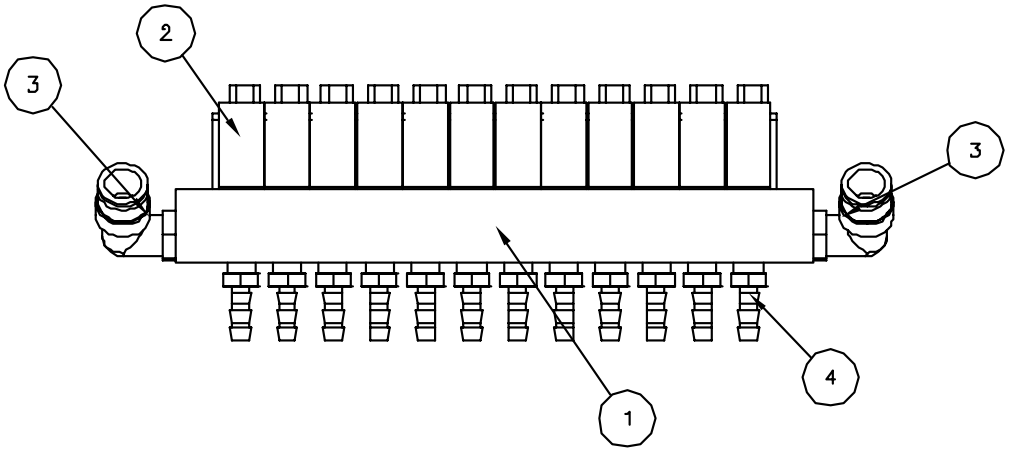


FIGURE 7-8. SOLENOID VALVE, 10/12 VALVE (FOR 18 FT SPRAYBAR)

TABLE 7-8. SOLENOID VALVE, 10/12 VALVE (FOR 18 FT SPRAYBAR)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-8	**38991-2**	**SOLENOID VALVE, 10/12 VALVE MANIFOLD**	**1**
1	38991-02	•MANIFOLD,12 STATION	1
2	38991-01	•VLV,36 SERIES	10
3	38915	•FITT,90 04MP-08NT	2
4	33926	•FITT,STR 02MP-04HB,CRIMPED	10
5	38991-04	•BLANKING KIT	2
6	34468	•CONN HOUSING,CAP,12 CIRCUIT	1
10	34471	•CONTACT,SOCKET,20-14 GA	7





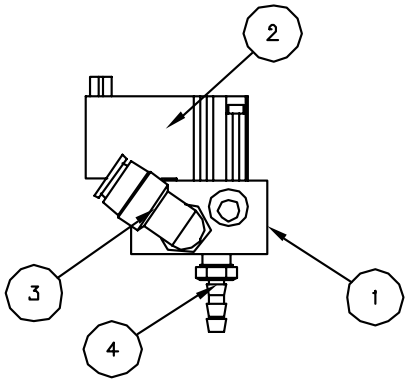
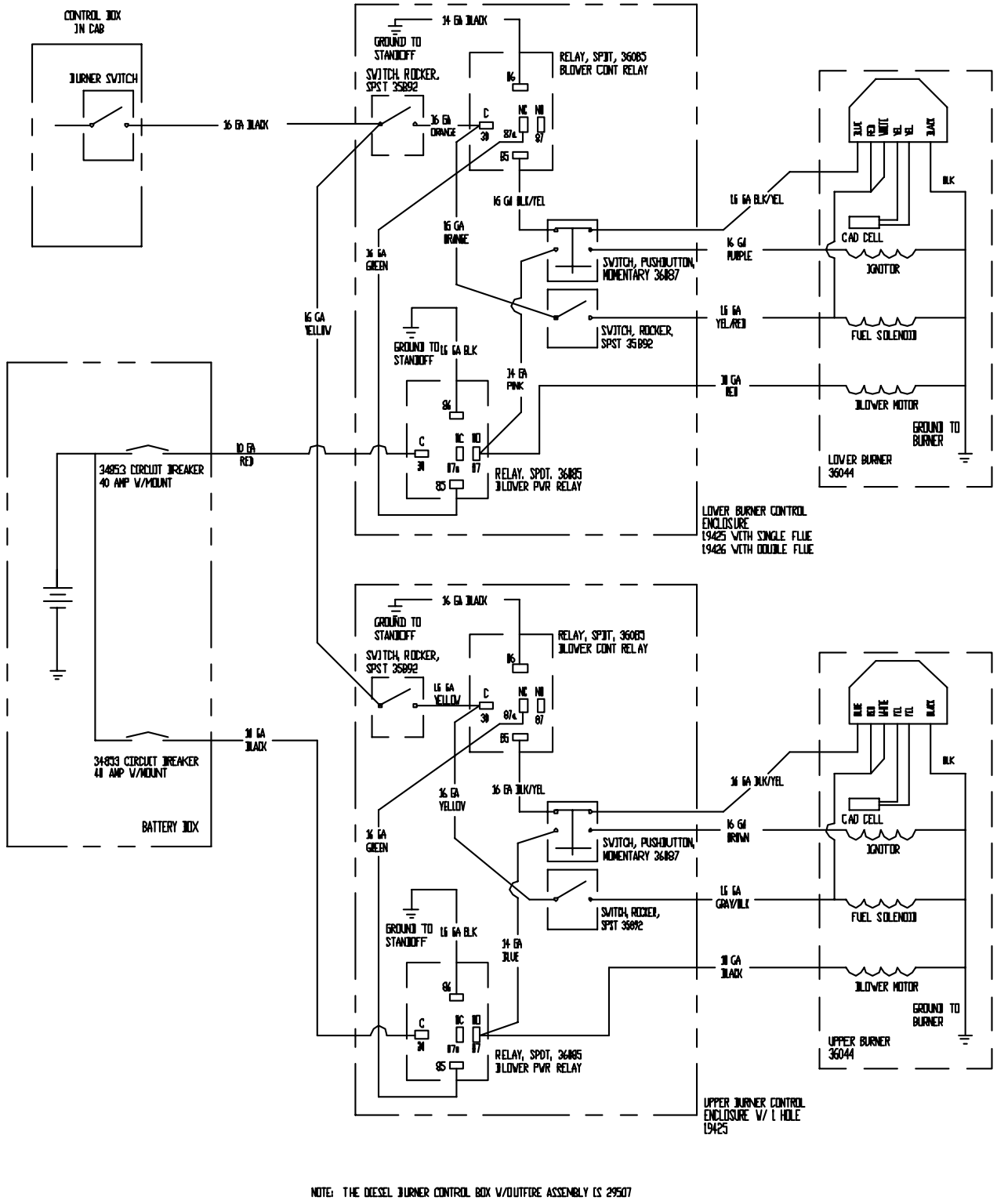


FIGURE 7-9. SOLENOID VALVE, 12 VALVE (FOR 20 FT SPRAYBAR)

TABLE 7-9. SOLENOID VALVE, 12 VALVE (FOR 20 FT SPRAYBAR)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-9	**38991**	**SOLENOID VALVE, 12 VALVE MANIFOLD**	**1**
1	38991-02	•MANIFOLD,12 STATION	1
2	38991-01	•VLV,36 SERIES	12
3	38915	•FITT,90 04MP-08NT	2
4	33926	•FITT,STR 02MP-04HB,CRIMPED	12
5	34468	•CONN HOUSING,CAP,12 CIRCUIT	1
6	34471	•CONTACT,SOCKET,20-14 GA	12



NOTE: THE DIESEL BURNER CONTROL BOX W/OUTFIRE ASSEMBLY IS 29507

TABLE 7-10. DIESEL BURNER, DOUBLE FLUE, OUTFIRE, NO THERM

TABLE 7-10. DIESEL BURNER, DOUBLE FLUE, OUTFIRE, NO THERM

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-10	**29508**	**DIESEL BURNER, DBL FLUE, OUTFIRE, W/O CONT**	**1**
-1	33277	•CLAMP,HOSE,# 04	3
-2	33612	•TERM,RING,12-10 GA,.375 STUD	2
-3	33765	•NUT,LK,ELEC CND,.500-14 NPT	2
-4	34853	•CIRCUIT BREAKER,40 AMP	2
-5	36044	•HP DSL BURNER, W/CAD CELL (SEE TABLE 7-10A)	2
-6	38662	•FILTER ASSY,FUEL OIL	1
-601	38662-01	••ELEMENT,SPIN ON TYPE	
-7	80141	•WASHER,FLAT,USS,.313	10
-8	80142	•WASHER,FLAT,USS,.375	14
-9	80161	•WASHER,LOCK,.312	10
-10	80352	•NUT,FLEXLOC,.375-16,FULL,LT	14
-11	81160	•SCR,SLFDRL,HH,#10X1.00,#3PT	8
-12	81161	•WASHER,WEATHER SEAL,#10	8
-13	851201417	•TIE WRAP,.094X4.00	13
-14	5347	•HOSE,04,PUSH-ON,LOW PRESSURE	18
-15	986858	•FITT,90 04HB-06MP	1
-16	34311	•FITT,TEE 04MJ-04MJ-04MJ	1
-17	34185	•CONDUIT CONNECTOR, 1/2 NPT	2
-18	99568	•PIPE,TEE,06FP,MI	1
-19	99980	•PIPE,BUSH,08MP-04FP,STL	1
-20	99638	•PIPE,NIPPLE,.375XCLOSE	2
-21	70957	•FITT,STR 04FJX-04HB,PUSH-ON	4
-22	33279	•FITT,STR 06MP-04HB,CRIMPED	1
-23	35246	•FITT,STR 04MP-04MS,LPG,BRASS	1

- ITEM NOT ILLUSTRATED

TABLE 7-10A. DIESEL BURNER, DOUBLE FLUE, OUTFIRE, NO THERM

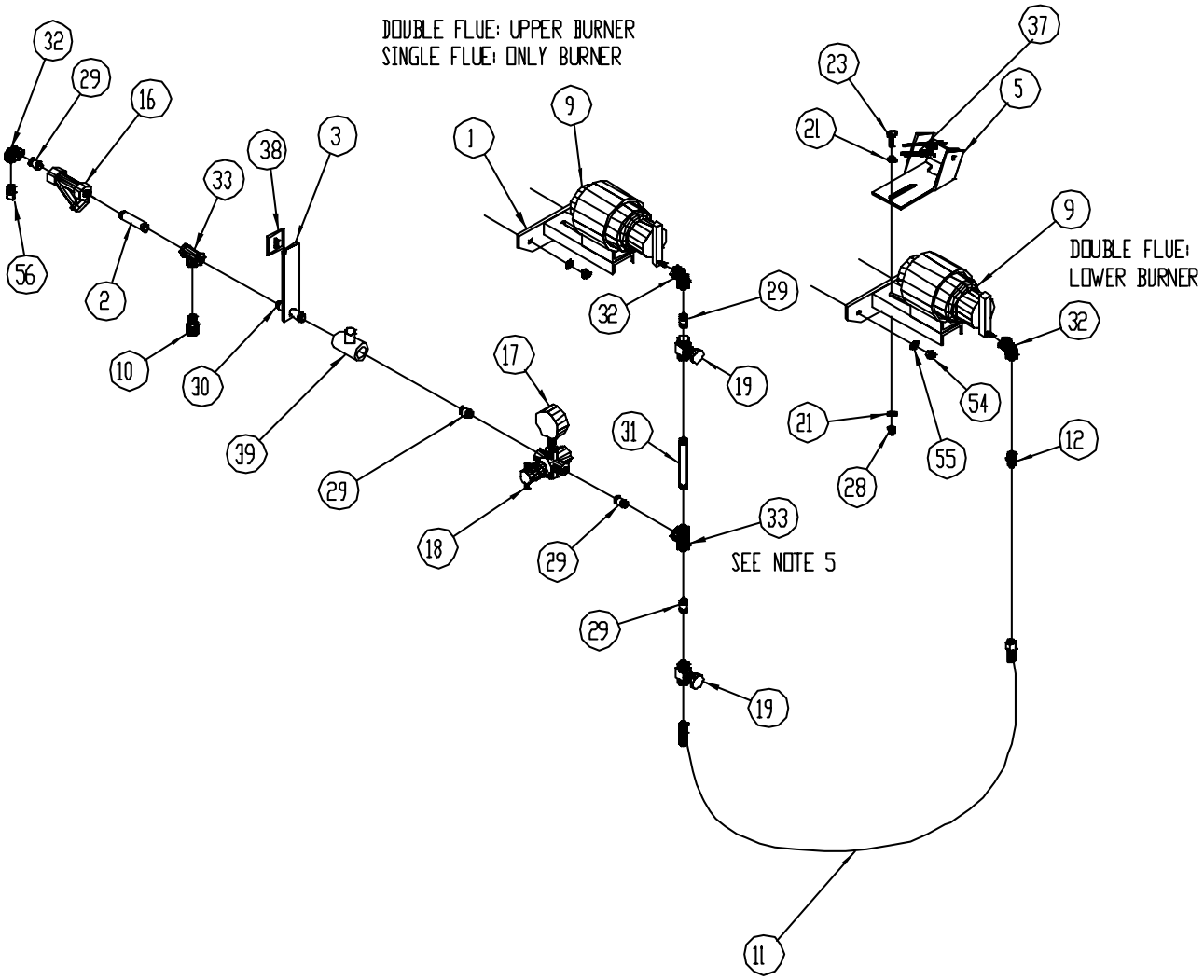
FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	36044	**•HP DSL BURNER W/CAD CELL (SEE FIG 7-10 FOR NHA)**	**2**
-1	36044-01	••BLOWER MOTOR	1
-2	36044-02	••MOTOR COUPLING	1
-3	36044-24	••IGNITION ASSY WITH OUTFIRE	1
-4	36044-04	••FUEL VALVE,SHUT-OFF	1
-5	36044-05	••FLANGE GASKET,FELT	1
-6	36044-06	••SQUARE PLATE GASKET	1
-7	36044-08	••NOZZLE, 3.5 GAL, 45B	1
-8	36044-09	••AIR SHUTTER	1
-9	36044-10	••AIR BAND	1
-10	36044-11	••SQUARE PLATE	1
-11	36044-12	••AIR TUBE W/FLANGE (2 ELECTRODES)	1
-12	36044-14	••BLOWER WHEEL	1
-13	36044-15	••FUEL PUMP	1
-14	36044-16	••PUMP NOZZLE FITTING	1
-15	36044-17	••CONNECTOR TUBE ASSEMBLY	1
-16	36044-19	••LOCKNUT, NOZZLE LINE	1
-17	36044-25	••NOZZLE,3.0 GAL,45B	1
-18	36044-26	••ELECTRODE ASSY (2 ELECTRODES)	1
-19	36044-27	••NOZZLE,2.5 GAL,45B	1
-20	36044-28	••NOZZLE,3.0 GAL,60B (COLD WEATHER)	1
-21	36044-29	••NOZZLE,2.0 GAL,60B	1
-22	36044-31	••CAD CELL	1

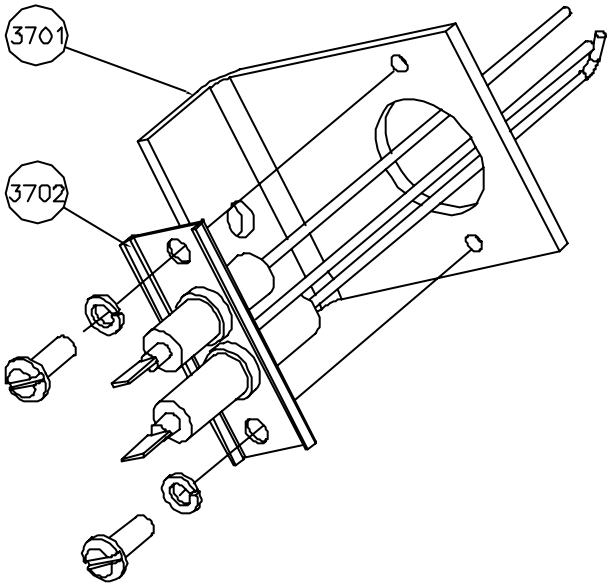
- ITEM NOT ILLUSTRATED

TABLE 7-11. CONTROL BOX, DIESEL BURNER, WITH OUTFIRE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	29507	**CONTROL BOX,DIESEL BNR,W/OUTFIRE**	**1**
-1	19344	•SWITCH PLATE,HP DIESEL BURNER	2
-2	19425	•ENCLOSURE,ELEC,4X4X6,W/1 HOLE	1
-3	19426	•ENCLOSURE,ELEC,4X4X6,W/2 HOLES	1
-4	19427	•CONDUIT,RIGID,.50X1.75	1
-6	33271-1	•WIRE,16 GA,BLACK	5
-7	33271-13	•WIRE,16 GA,BLACK/YELLOW STRIPE	12
-8	33271-14	•WIRE,16 GA,YELLOW/RED STRIPE	5
-9	33271-2	•WIRE,16 GA,YELLOW	4
-10	33271-20	•WIRE,16 GA,GRAY/BLACK STRIPE	5
-11	33271-3	•WIRE,16 GA,BROWN	5
-12	33271-4	•WIRE,16 GA,GREEN	2
-13	33600	•TERM,PUSH-ON,.25,FEM,16-14 GA	30
-14	33602	•CONN,BUTT,16-14 GA	6
-15	33603	•CONN,BUTT,12-10 GA	2
-16	33610	•TERM,PUSH-ON,.25,FEM,12-10 GA	4
-18	34185	•CONDUIT CONNECTOR, 1/2 NPT	2
-19	34469	•CONTACT,PIN,20-14 GA	1
-20	34471	•CONTACT,SOCKET,20-14 GA	1
-21	35163	•WIRE,14 GA,PINK	1
-22	35892	•SWITCH,ROCKER,SPST,OFF/ON	4
-24	36050	•STANDOFF,10-32UNFX3,MALE-FEM	8
-25	36085	•RELAY,SPDT,40AMP,12VDC	4
-26	36087	•SWITCH,PUSH BUT,MOMENTARY	2
-27	36088	•DECAL,REAR CONTROL,DIESEL BNR	2
-31	71062	•WIRE,14 GA,BLUE	1
-33	71864	•LOOM,SPLIT,CONVOLUTED,.375	7
-34	71870	•LOOM,SPLIT,CONVOLUTED,.750	5
-35	72116	•WIRE,14 GA,BROWN	5
-37	851390302	•FITT,CABLE 08MP,.250-.375	1
-50	3200DI	•WATER TIGHT CONN,1/2 X 1/2	2

- ITEM NOT ILLUSTRATED





NOTES:
1. Set ignition contacts gap at .09 inch.
2. Scrape paint away from hole on Igniter Bracket, Item 5, to insure proper ground.
3. Add Item 27 to the spark plug wire and the flame sensor wire at the burner end.
4. Weld Item 38 to the bottom of Item 1 (top burner on double flue). Drill and bolt Item 3 to Item 38.
5. Double burner shown. Single burner uses Item 32 instead of Item 33.

FIGURE 7-12. LPG BURNERS, DOUBLE FLUE, AUTO IGNITION (SHEET 1 OF 3)

TABLE 7-12. LPG BURNERS, DOUBLE FLUE, AUTO IGNITION

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-12	**24657-04**	**BURNER,LPG,B3,DBL FLUE,AUTO IGNITION**	**1**
1	23508	•BURNER BRKT ASSY W/M	2
2	90745	•PIPE,NIPPLE,04X1.50,300#	1
3	17648	•SUPPORT,BURNER PIPING	1
4	24659	•PLATE,SWITCH	1
5	22869	•BRACKET,IGNITOR	1
-6	22397	•FLUE TUBE FLANGE W/M,DSL BURN	2
7	25704	•CROSSOVER PIPE,LP BURNERS	1
8	24684	•ENCLOSURE,ELEC,6X6X4,MODIFIED	1
9	6118	•BURNER,PROPANE,LIQUID,B2	2
10	34318	•VLV,LPG,RELIEF,04 NPT,450 PSI	1
11	34448	•HOSE,04X14,04MP-04FJX,350	1
12	35245	•FITT,STR 04FP-04MS,LPG,BRASS	1
13	35465-09	•GROMMET,INS,.375ID X 1.00GRV	3
14	35892	•SWITCH,ROCKER,SPST,OFF/ON	1
-15	37777	•DECAL,LPG BURNER SAFETY	1
16	5121	•STRAINER,Y,.250PT,40 MESH	1
17	5122	•GAUGE,PRESS,0-100PSI,2.00,04MP	1
18	6119	•REGULATOR,LPG	1
19	6120	•VLV,NEEDLE,04 FEMALE,NPT	2
-20	71060	•LOOM,SPLIT,CONVOLUTED,.250	12
21	80141	•WASHER,FLATT,USS,.313	6
22	37422	•TERM,SOLDER SPLICE,20-10 AWG	2
23	80208	•CSHH,.312-18X1.00,GR5	5
24	33271-3	•WIRE,16 GA,BROWN	6
25	80351	•NUT,FLEXLOC,.312-18,FULL,LT	5
26	33271-7	•WIRE,16 GA,RED	6
-27	90723	•LOOM,BRAIDED FIBERGLASS,.375	4
28	33271-11	•WIRE,16 GA,BLUE	6
29	90744	•PIPE,NIPPLE,04XCLOSE,300#	3
30	90746	•PIPE,NIPPLE,04X2.50,300#	1
31	90749	•PIPE,NIPPLE,04X4.00,300#	1
32	91531	•PIPE,90,04FP-0FMP,FORGED,2000#	3
33	91532	•PIPE,TEE,04FP,FORGED,2000#	2

- ITEM NOT ILLUSTRATED

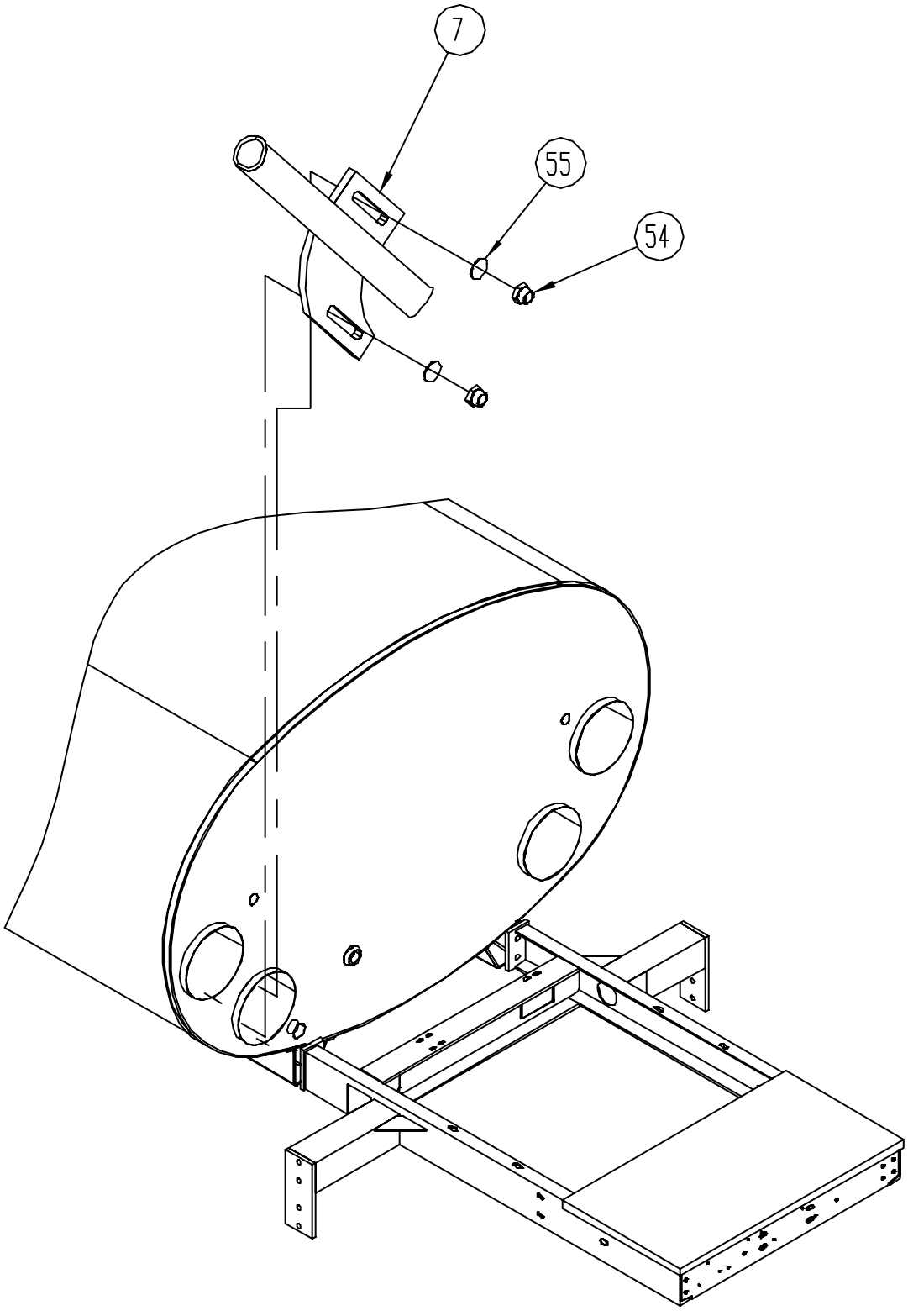
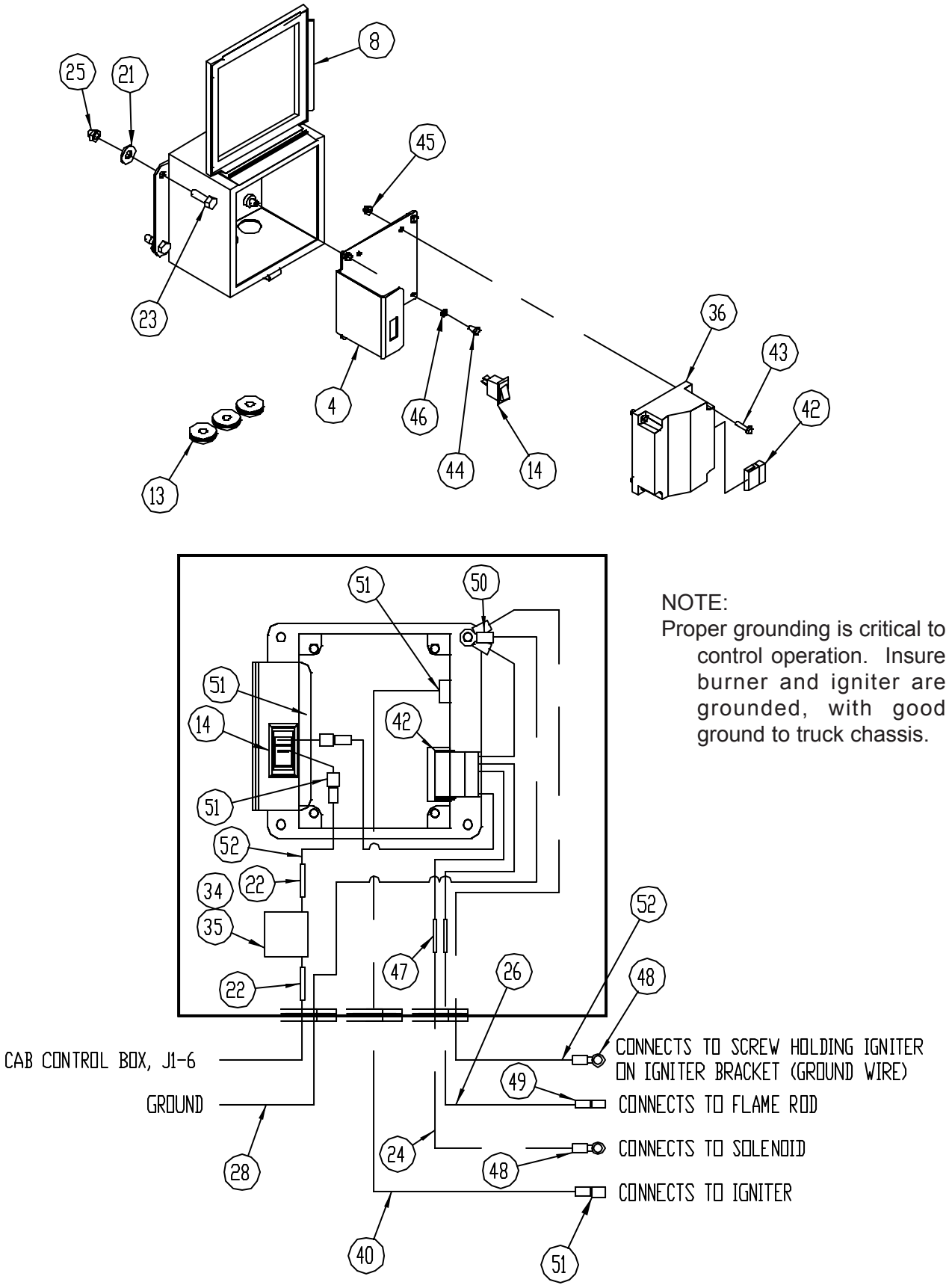


FIGURE 7-12. LPG BURNERS, DOUBLE FLUE, AUTO IGNITION (SHEET 2 OF 3)

TABLE 7-12. LPG BURNERS, DOUBLE FLUE, AUTO IGNITION (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-12	**24657-04**		
34	36964	•FUSE,BLADE,2 AMP	1
35	37118	•FUSE HOLDER,IN-LINE,BLADE,SEAL	1
36	37241-03	•CIRCUIT BOARD	1
37	38216	•IGNITER/FLAME ROD,W/BRACKET	1
		ATTACHING PARTS	
3701	38216-01	••BRACKET,IGNITER & FLAME ROD	1
3702	38216-02	••IGNITER/FLAME ROD	1
		-----*-----	
38	28539	•TAB,MT PIPING BRACKET	1
39	37241-07	•SOLENOID	1
40	37241-08	•IGNITION WIRE	3.17
42	37241-10	•HARNESS,WIRING	1
43	71716	•MACH SCR,PH,#10-24X.75	4
44	71720	•MACH SCR,PH,#10-32X.38	4
45	81005	•NUT,FLEXLOC,#10-24,FULL,LT	4
46	871071601	•WASHER,LOCK,#10	4
47	37421	•TERM,SOLDER SPLICE,22-14 AWG	2
48	35123	•TERM,RING,16-14 GA,#6 STUD	2
49	72203	•TERM,PUSH-ON,.18,FEM,16-14 GA	1
50	851390204	•TERM,RING,16-14 GA,#10 STUD	2
51	33600	•TERM,PUSH-ON,.25,FEM,16-14 GA	4
52	33271-1	•WIRE,16 GA,BLACK	7
54	80352	•NUT,FLEXLOC,.375-16,FULL,LT	6
55	80142	•WASHER,FLAT,USS,.375	6
56	X126	•FITT,STR 04MP-04FPX	1
57	985000	•BAR,LP LINE BRKT,S-SHAPED	1
58	7640	•BRKT,.250 PIPE	1
59	99636	•NIPPLE,04X11.00,STD	2
60	99490	•PIPE,CPLG,04FP	1
61	985812	•PIPE,NIPPLE,04X36.00	1
-100	23507	FLUE LINER W/M, LP BURNER, SST	2

- ITEM NOT ILLUSTRATED



NOTE:
Proper grounding is critical to control operation. Insure burner and igniter are grounded, with good ground to truck chassis.

FIGURE 7-12. LPG BURNERS, DOUBLE FLUE, AUTO IGNITION (SHEET 3 OF 3)

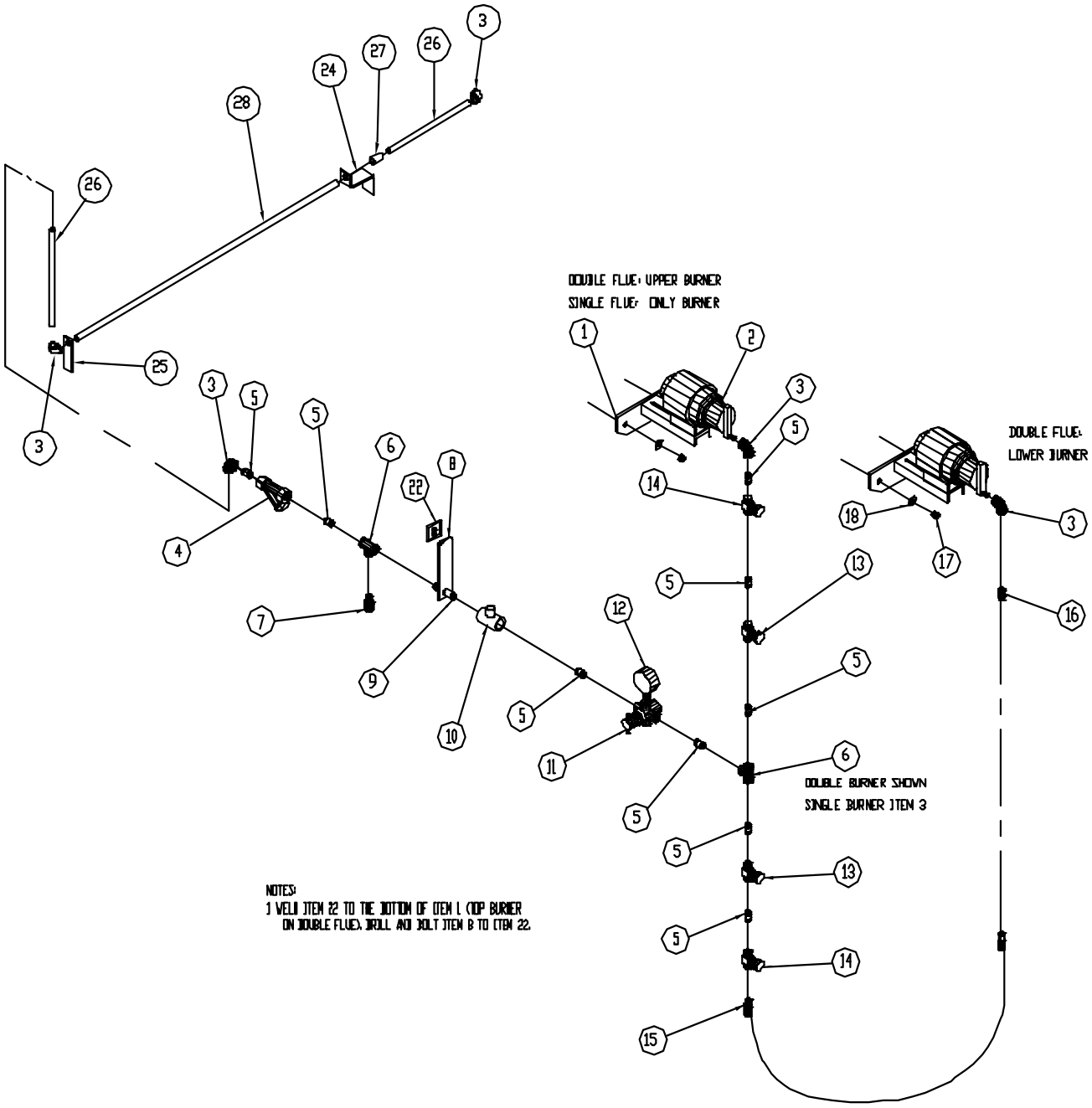


FIGURE 7-13. LPG BURNERS, DOUBLE FLUE, MANUAL IGNITION

TABLE 7-13. LPG BURNERS, DOUBLE FLUE, MANUAL IGNITION

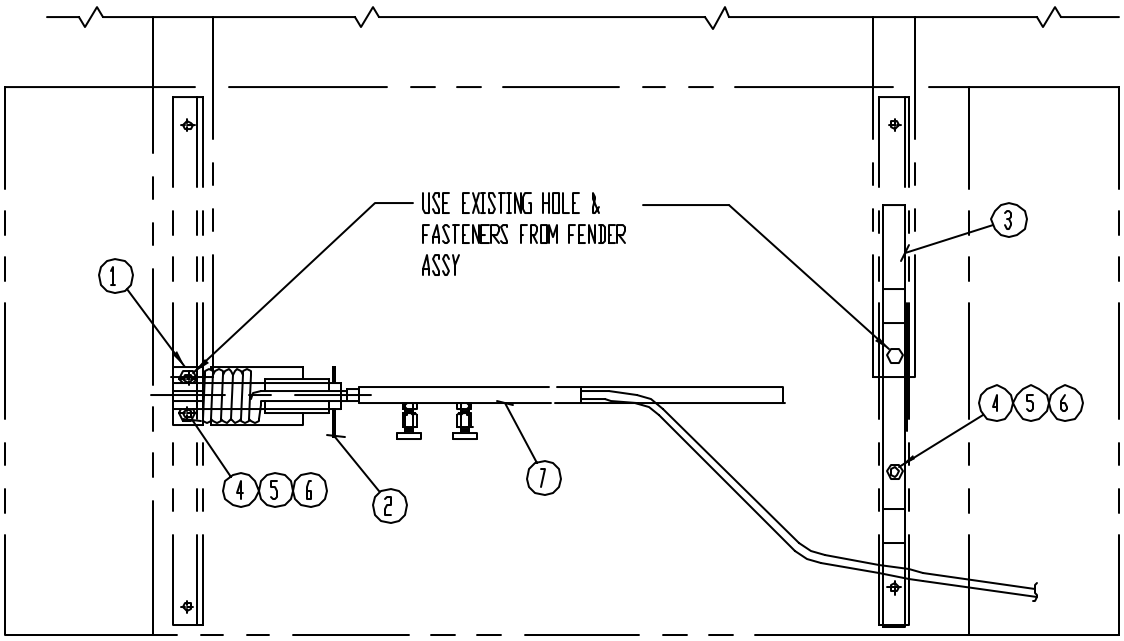
FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-13	**25179-04**	**BURNER,LPG,B3,DBL FLUE**	
1	23508	•BURNER BRKT ASSY W/M	2
2	31931	•BURNER,LPG,B3	2
3	91531	•PIPE,90,04FP-0FMP,FORGED,2000#	5
4	5121	•STRAINER,Y,.250PT,40 MESH	1
5	90744	•PIPE,NIPPLE,04XCLOSE,300#	9
6	91532	•PIPE,TEE,04FP,FORGED,2000#	2
7	34318	•VLV,LPG,RELIEF,04 NPT,450 PSI	1
8	17648	•SUPPORT,BURNER PIPING	1
9	90746	•PIPE,NIPPLE,04X2.50,300#	1
10	37241-07	•SOLENOID	1
11	6119	•REGULATOR,LPG	1
12	5122	•GAUGE,PRESS,0-100PSI,2.00,04MP	1
13	6120	•VLV,NEEDLE,04 FEMALE,NPT	2
14	6297	•VLV,PILOT	2
15	34448	•HOSE,04X14,04MP-04FJX,350	1
16	35245	•FITT,STR 04FP-04MS,LPG,BRASS	1
17	80352	•NUT,FLEXLOC,.375-16,FULL,LT	4
18	80142	•WASHER,FLAT,USS,.375	4
-19	22397	•FLUE TUBE FLANGE W/M,DSL BURN	2
-20	37850	•DECAL,LPG BURNER SAFETY	1
22	28539	•TAB,MT PIPING BRACKET	1
24	985000	•BAR,LP LINE BRKT,S-SHAPED	1
25	7640	•BRKT,.250 PIPE	1
26	99636	•NIPPLE,04X11.00,STD	2
27	99490	•PIPE,CPLG,04FP	1
28	985812	•PIPE,NIPPLE,04X36.00	1
-100	23507	FLUE LINER W/M, LP BURNER, SST	2

- ITEM NOT ILLUSTRATED

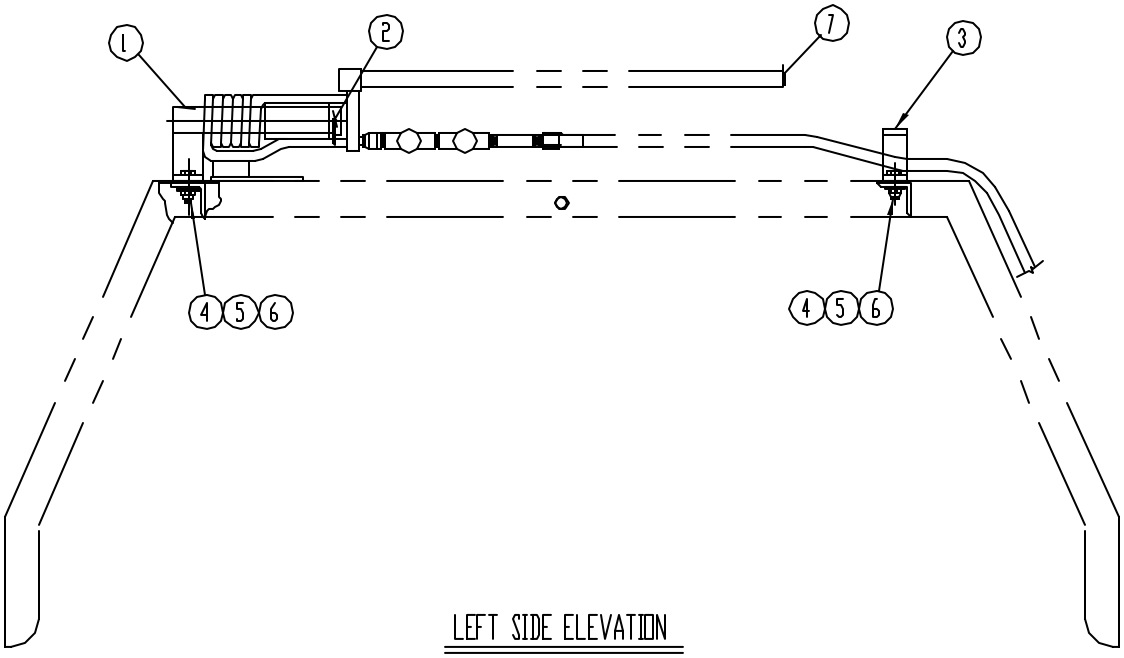
TABLE 7-14. LPG TANK, 52 GALLON

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	13766	**TANK,LPG,52GAL,FRAME MOUNT**	**1**
-1	34079	•TANK,LPG,52GAL (TANK ONLY)	1
		ATTACHING PARTS	
-101	34079-01	••GAUGE ASSY,TANK LEVEL	1
-102	34079-02	••GAUGE,FACE/DIAL ONLY	1
-103	34079-03	••SOLENOID,52GAL LP TANK	1
		-----*-----	
-2	34080	•BRACKETS,20",TANK MTG	2
-3	35657-96	•HOSE,04X96,350 PSI	1
-4	80144	•WASHER,FLAT,USS,.500	16
-5	80255	•CSHH,.500-13X2.00,GR5	8
-6	80354	•NUT,FLEXLOC,.500-13,FULL,LT	8

- ITEM NOT ILLUSTRATED



PLAN VIEW - LEFT CATWALK



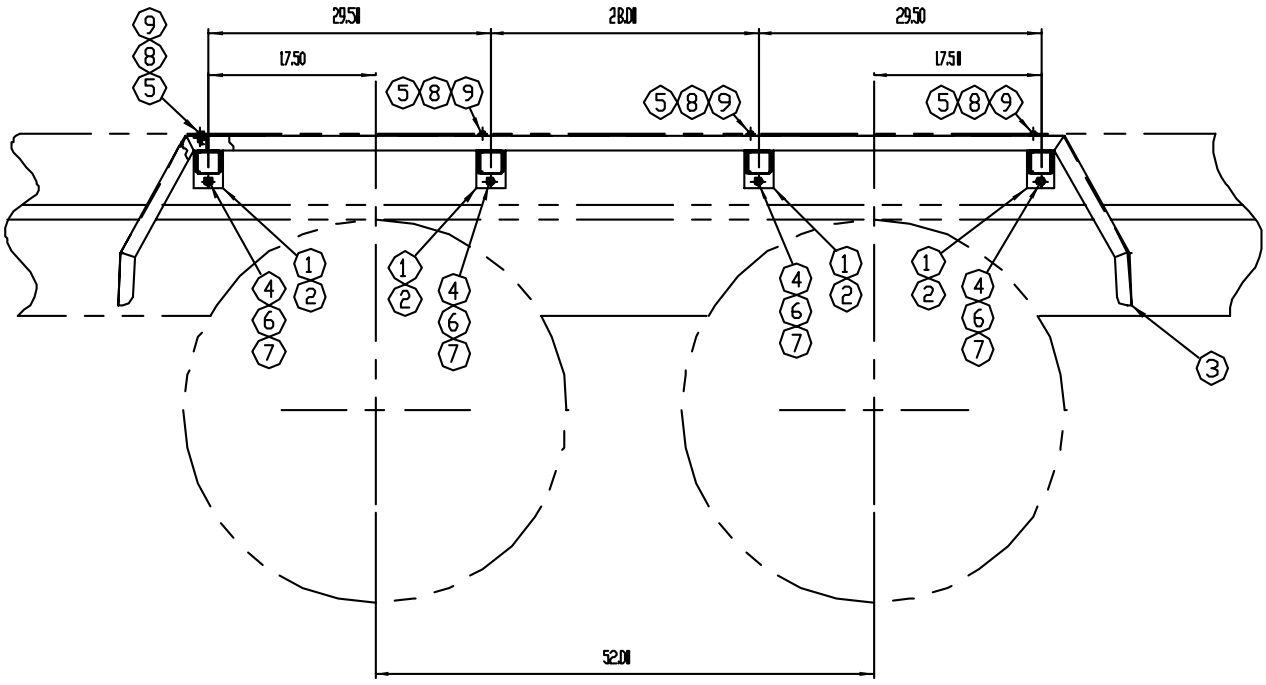
LEFT SIDE ELEVATION

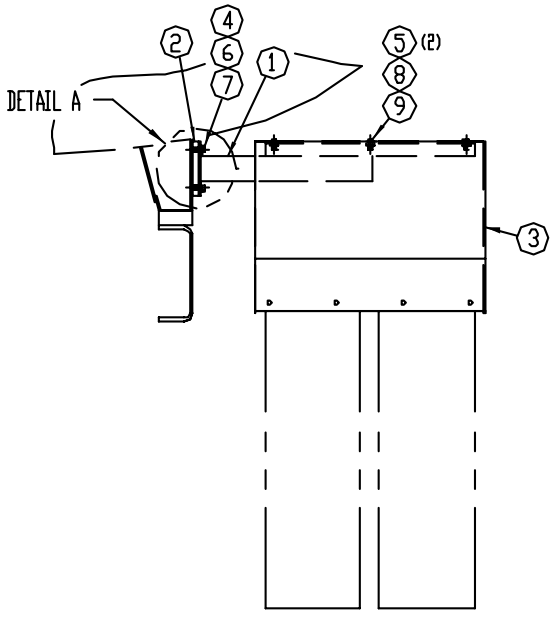
FIGURE 7-15. PORTABLE TORCH HOLDER ASSEMBLY, LPG

TABLE 7-15. PORTABLE TORCH HOLDER ASSEMBLY, LPG

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-15	**17442**	**PORTABLE TORCH HOLDER ASSEMBLY**	**1**
1	17438	•PORTABLE TORCH HOLDER,W/M	1
2	7303	•HAIRPIN CLIP,NO 11,1/8 DIA	1
3	16499	•HOOK,WASH DOWN HOSE	1
4	80141	•WASHER,FLAT,USS,.313	4
5	80208	•CSHH,.312-18X1.00,GR5	4
6	80351	•NUT,FLEXLOC,.312-18,FULL,LT	4
7	25666	•TORCH,PORTABLE,LPG	REF
		ATTACHING PARTS	
-701	12447	••PIPE W/SLUG THERM TUBE AMC ENG	1
-702	32881	••HOSE,04X300,04FPX-04RE,350	1
-703	32958	••BURNER J1 LPG LIQUID	1
-704	6120	••VLV,NEEDLE,04 FEMALE,NPT	2
-705	6297	••VLV,PILOT	1
-706	6298	••FITT,STR 04MP-09MPF,LH LP GAS	1
-707	90744	••PIPE,NIPPLE,04XCLOSE,300#	5
-708	90749	••PIPE,NIPPLE,04X4.00,300#	1
-709	90897	••PIPE,HALF CPLG,06FP,300#	1
-710	91531	••PIPE,90,04FP-0FMP,FORGED,2000#	1
-711	6119	••REGULATOR,LPG	1
-712	91532	••PIPE,TEE,04FP,FORGED,2000#	1
		-----*-----	

- ITEM NOT ILLUSTRATED





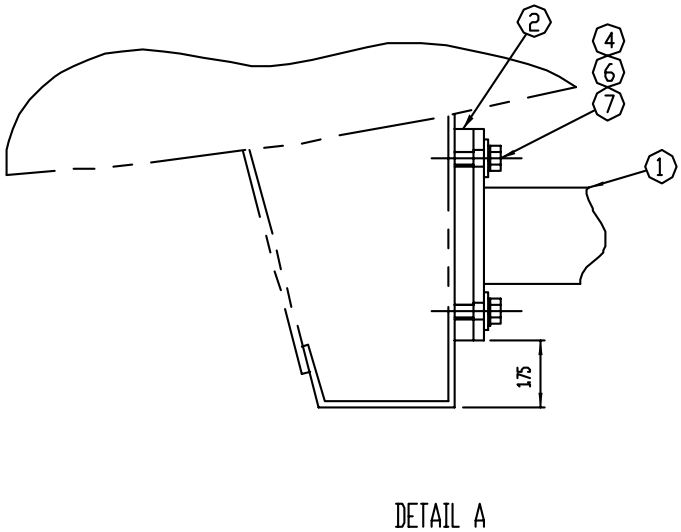
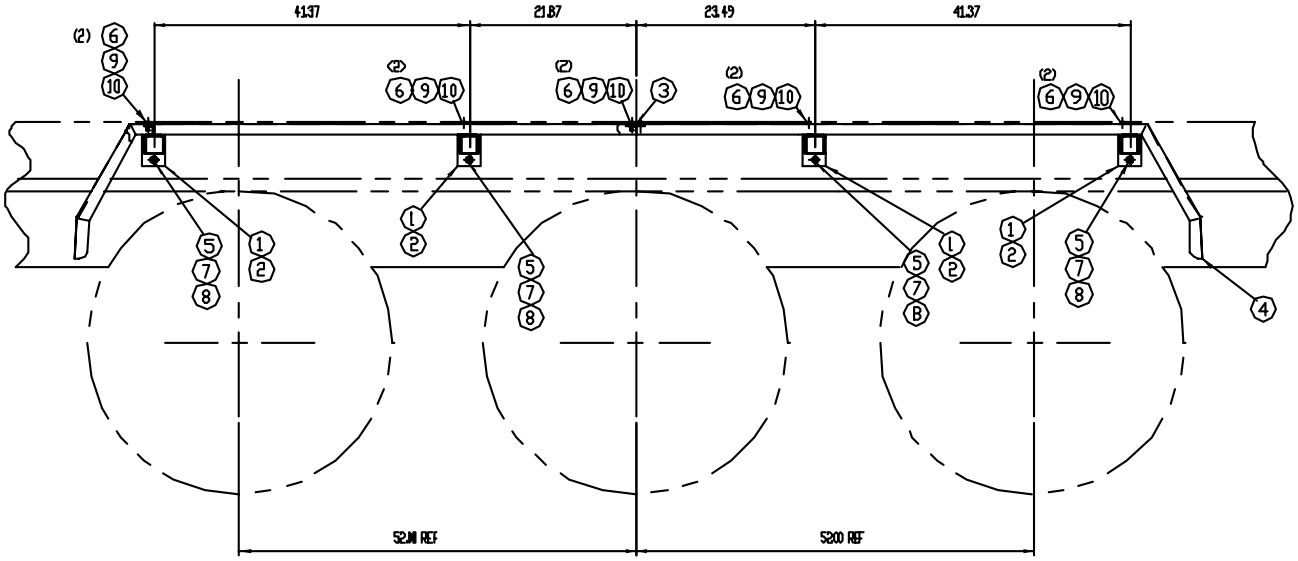
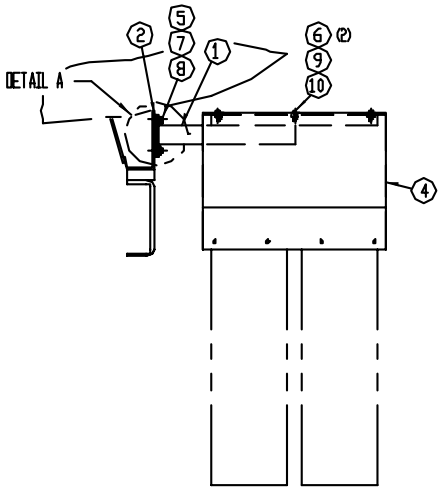


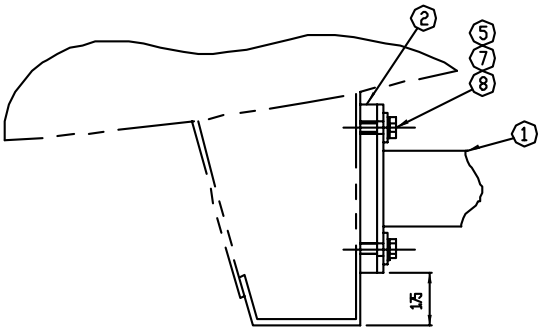
FIGURE 7-16. FENDER, TANDEM AXLE

TABLE 7-16. FENDER GROUP, TANDEM AXLE

ITEM	FIG PART NUMBER	UNITS NOMENCLATURE 1 2 3 4 5 6 7	PER ASSY
7-16	**29198**	**FENDER GROUP, TANDEM AXLE**	**1**
1	21635	•MOUNT,FENDER,WLDMT	8
2	21636	•PAD,TAPPED	8
3	21814	•FENDER,TANDEM AXLE	2
4	71622	•CSHH,.375-16X.88,GR5	16
5	80141	•WASHER,FLAT,USS,.313	48
6	80142	•WASHER,FLAT,USS,..375	16
7	80162	•WASHER,LOCK,.375	16
8	80208	•CSHH,.312-18X1.00,GR5	24
9	80351	•NUT,FLEXLOC,.312-18,FULL,LT	24







DETAIL A

FIGURE 7-17. FENDER GROUP, TRIPLE AXLE

TABLE 7-17. FENDER GROUP, TRIPLE AXLE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-17	**24124**	**FENDER GRP, TRIPLE AXLE**	**1**
1	21635	•MOUNT,FENDER,WLDMT	8
2	21636	•PAD,TAPPED	8
3	23959	•SPLICE,TRIPLE AXLE FENDER	2
4	24125	•FENDER,HALF,SPL,STL	4
5	71622	•CSHH,.375-16X.88,GR5	16
6	80141	•WASHER,FLAT,USS,.313	72
7	80142	•WASHER,FLAT,USS,.375	16
8	80162	•WASHER,LOCK,.375	16
9	80208	•CSHH,.312-18X1.00,GR5	36
10	80351	•NUT,FLEXLOC,.312-18,FULL,LT	36

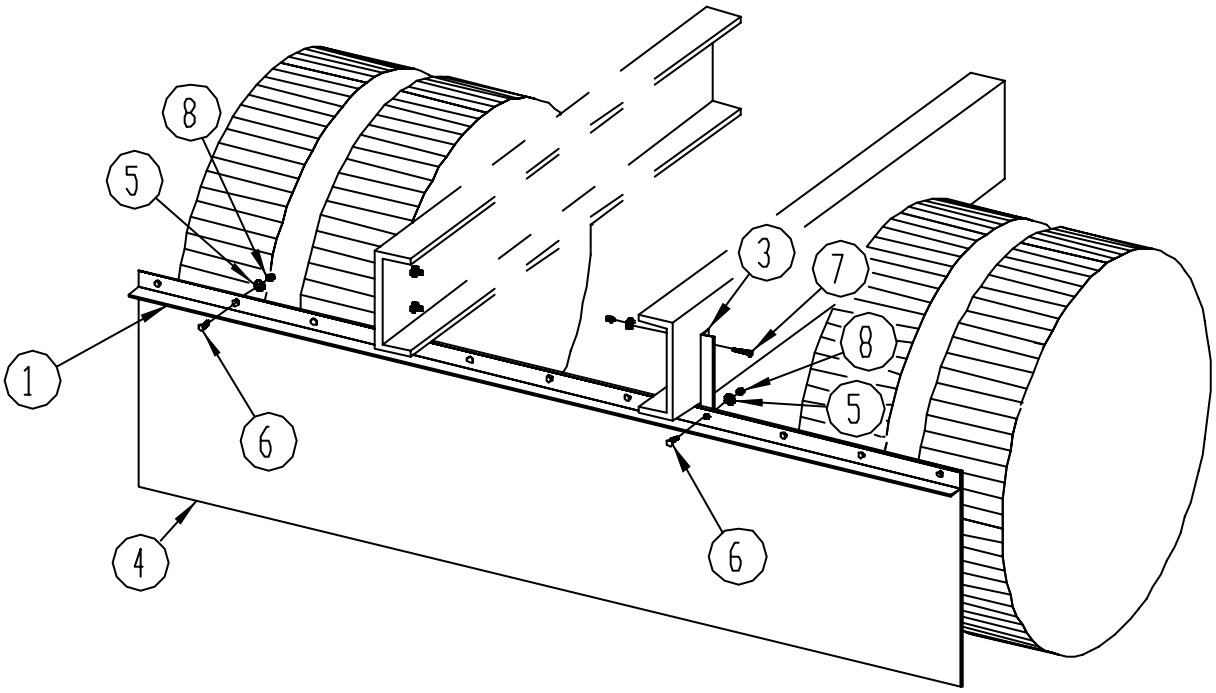
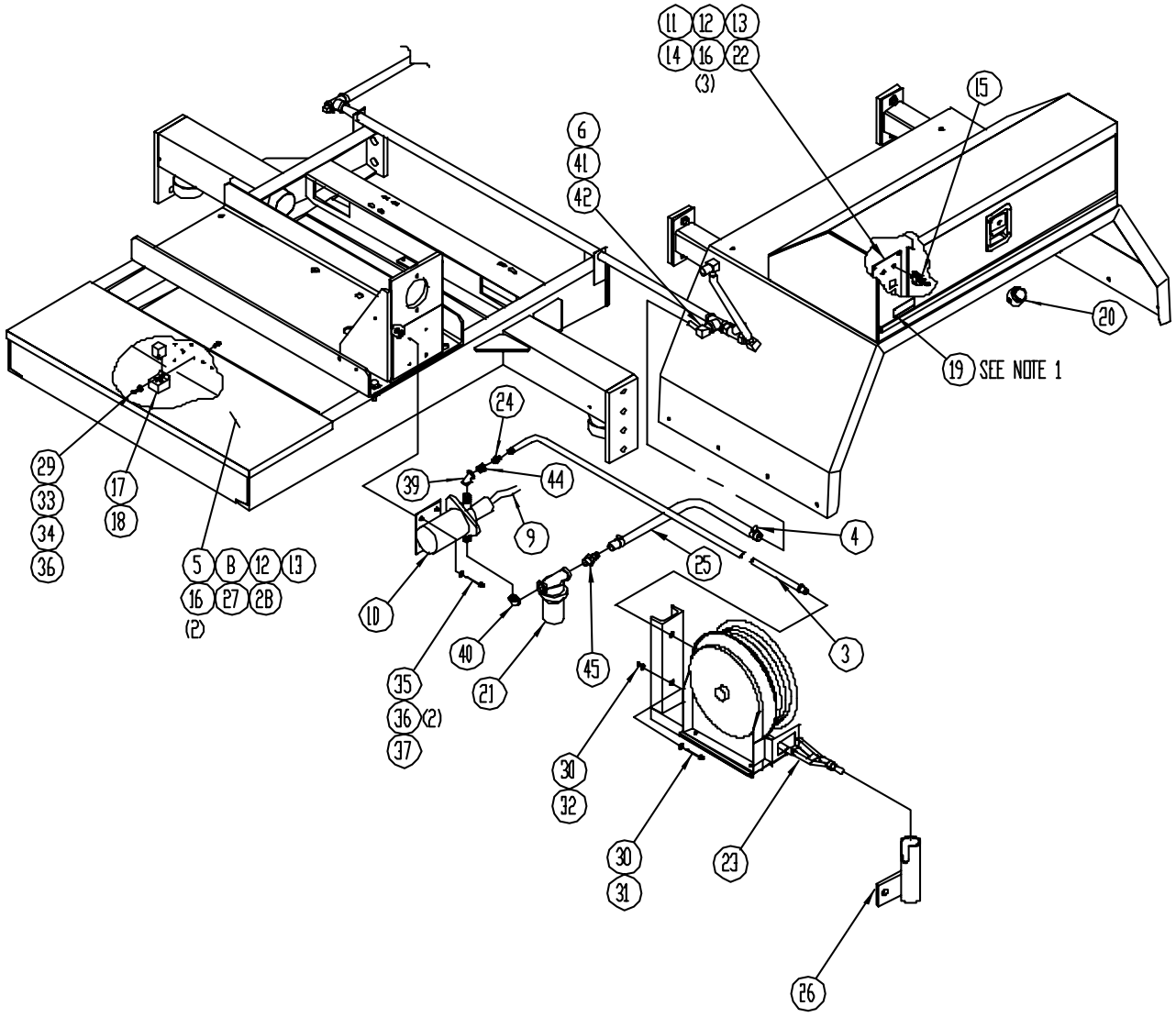


FIGURE 7-18. MUD FLAP GROUP, FULL WIDTH

TABLE 7-18. MUD FLAP GROUP, FULL WIDTH

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-18	**22942**	**MUD FLAP GROUP, FULL WIDTH**	**1**
1	22943	•ANGLE,MUD FLAP MOUNT	1
-2	22944	•ANGLE,HANGER BRACKET,LH	1
3	22945	•ANGLE,HANGER BRACKET,RH	1
4	37269	•BELT,MUD FLAP,30.00X96.00	1
5	80142	•WASHER,FLAT,USS,.375	15
6	80224	•CSHH,.375-16X1.25,GR5	11
7	80228	•CSHH,.375-16X1.75,GR5	4
8	80352	•NUT,FLEXLOC,.375-16, FULL,LT	15

- ITEM NOT ILLUSTRATED



NOTES:

1. ITEM 19, DECAL, TO BE MOUNTED INSIDE TOOL BOX COVER.
2. REFER TO DWG 23978 FOR WIRING & TERMINAL CONNECTION.
3. REFER TO DWG 24200 FOR WIRING OF REAR VALVE BOX.
4. ITEM 23 MOUNTS TO THE TRUCK FRAME
5. ITEM 26 MOUNTS TO THE SPRAYBAR SUPPORT

FIGURE 7-19. WASHDOWN SYSTEM

TABLE 7-19. WASHDOWN SYSTEM

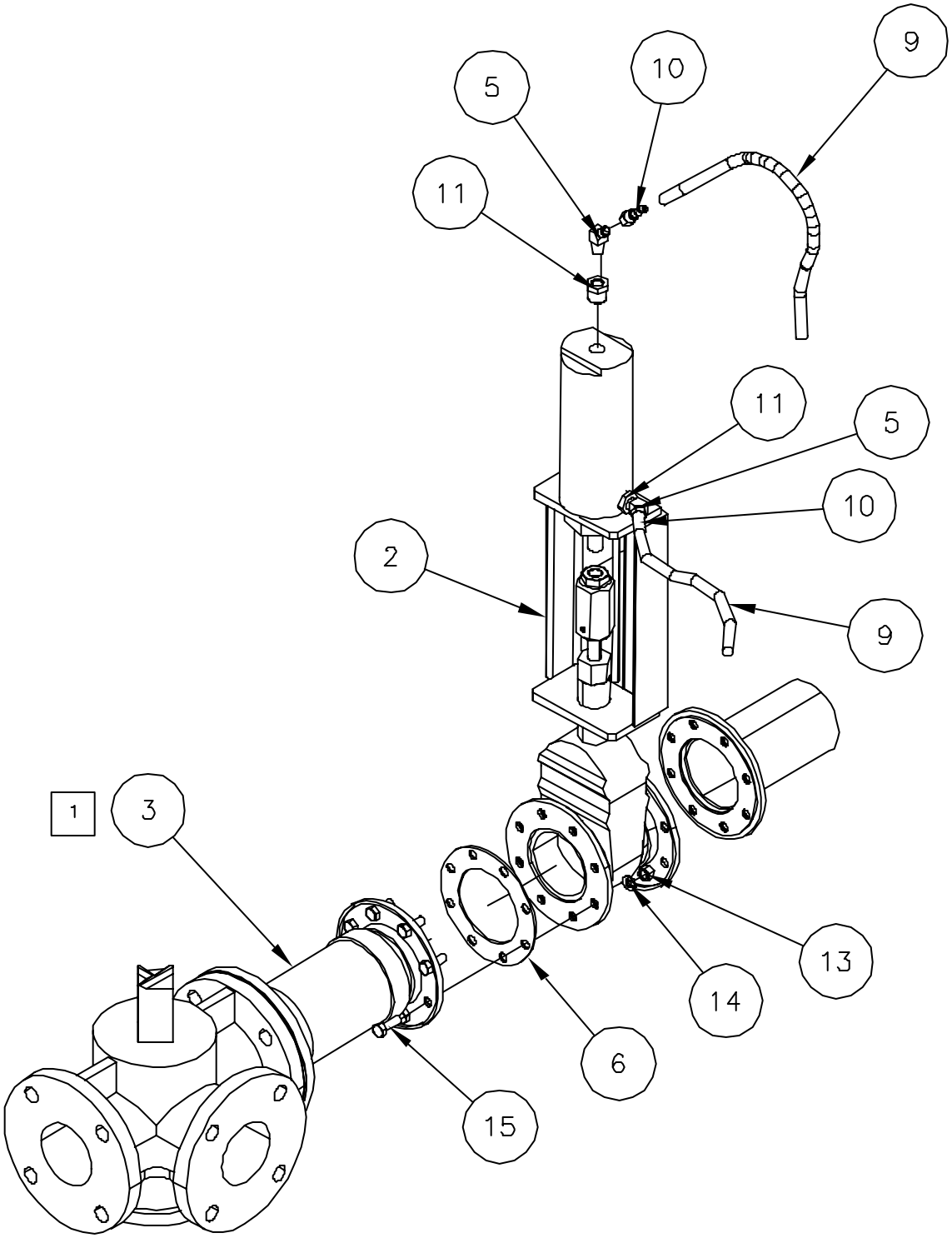
FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-19	**23223**	**WASHDOWN SYSTEM**	**1**
3	32881	•HOSE,04X300,04FPX-04RE,350	1
4	33163	•CLAMP,HOSE,.50-.91,WORM,#08	2
5	33320	•FUSE HOLDER,12 V,20 AMP	1
6	33328	•FITT,90 08MP-08HB,CRIMPED	1
-7	33596	•TIE WRAP,.188X7.5	4
8	33600	•TERM,PUSH-ON,.25,FEM,16-14 GA	2
9	33602	•CONN,BUTT,16-14 GA	2
10	985043	•PUMP,WATER/FUEL,DIAPHRAGM,12V	1
-1001	984385	••PORT KIT,08 THREADED	1
11	35150-1	•WIRE,18 GA,RED	1
12	35150-10	•WIRE,18 GA,ORANGE	10
13	35150-5	•WIRE,18 GA,BLACK	2
14	35150-6	•WIRE,18 GA,YELLOW	1
15	37552	•SWITCH,TOGGLE,SPST,2-POS	1
16	35926	•TERM,PUSH-ON,.25,FEM,22-18 GA	5
17	36085	•RELAY,SPDT,40AMP,12VDC	1
18	36086	•BRACKET,RELAY MOUNT	1
19	36206	•DECAL,WASHDOWN PUMP BUZZER	1
20	36208	•BUZZER,12 VDC,CONTINUOUS TONE	1
21	36926	•STRAINER,LQD,100MESH,NYL,08FP	1
22	37224	•TERM,RING,22-16GA,#10 STUD	1
23	986227	•REEL,W/HOSE,SPRAYDOWN	1
		ATTACHING PARTS	
-2301	80164	••WASHER,LOCK,.500	4
-2302	80186	••CSHH,.500-13X1.75 GR5	2
-2303	80354	••NUT,FLEXLOC,.500-13,FULL,LT	2
-2304	920200	••REEL,W/HOSE,SPRAY DOWN	1
-2305	920220A	••NOZZLE,FUEL WASHDOWN,W/HANDLE	1
-23051	901210A	•••NOZZLE,FUEL,WASHDOWN (NOZZLE ONLY)	1
-23052	984948	•••HANDLE,FUEL,WASHDOWN (HANDLE ONLY)	1
-2306	986226	••MOUNT ASSY,HOSE REEL	1
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 7-19. WASHDOWN SYSTEM (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-19	**23223**		
24	6298	•FITT,STR 04MP-09MPF,LH LP GAS	1
25	6352	•HOSE,08,PUSH-ON,250	5
26	986274	•HOLSTER ASSY,NOZZLE,WASHDOWN	1
		ATTACHING PARTS	
-2601	80963	••WASHER,FLAT,SAE,.312	1
-2602	986272	••HOLSTER TUBE,WASHDOWN SYSTEM	1
-2603	986273	••TAB,WASHDOWN HOLSTER	1
		-----*-----	
27	71065	•WIRE,14 GA,RED	40
28	71066	•WIRE,14 GA,YELLOW	10
29	71719	•MACH SCR,PH,#8-32X.50	1
30	80141	•WASHER,FLAT,USS,.313	4
31	80207	•CSHH,.312-18X.75,GR5	2
32	80351	•NUT,FLEXLOC,.312-18,FULL,LT	2
33	80792	•WASHER,SPLIT LOCK,#8	1
34	80793	•NUT,HEX,#8-32	1
35	80924	•NUT,FLEXLOC,#10-24,FULL,LT	4
36	80995	•WASHER,TYPE A PLAIN,#10	9
37	80997	•MACH SCR,PH,#10-24X2.00	4
38	99503	•PIPE,45,04FP,MI	1
39	99512	•PIPE,90,08FP,MI	1
40	99526	•PIPE,90,08MP-08FP,MI	1
41	99569	•PIPE,TEE,08FP,MI	1
42	99596	•PIPE,NIPPLE,08XCLOSE	1
43	99636	•NIPPLE,04X11.00,STD	1
44	99980	•PIPE,BUSH,08MP-04FP,STL	1
45	X427	•FITT,STR 08MP-08HB,CRIMPED	1

- ITEM NOT ILLUSTRATED



NOTES:
1) ITEM 3 REPLACES ITEM 1 FROM STANDARD PIPING.

FIGURE 7-20. RETURN LINE VALVE (SHEET 1 OF 3)

TABLE 7-20. RETURN LINE VALVE

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-20	**28725**	**RETURN LINE VALVE**	**1**
-1	20841	•HOSE,FLEX,MET,3.00X13.94	1
2	28184	•VALVE ASSY,TANK,3.00	1
3	28694	•HOSE WLDMT,FLEX,3.0 X 9.34	1
5	33115	•FITT,45 04MJ-04MP	2
6	34981	•GASKET,3" FLANGE	1
7	38816-01	•VALVE,SOL,AIR,3 CV	1
8	72649	•FITT,STR 04MJ-02MP	2
9	5347	•HOSE,04,PUSH-ON,LOW PRESSURE	16
10	70957	•FITT,STR 04FJX-04HB,PUSH-ON	4
11	99448	•PIPE,BUSH,06MP-04FP,STL	2
13	80038	•NUT,HEX,.375-16	8
14	80162	•WASHER,LOCK,.375	8
15	80221	•CSHH,.375-16X1.00,GR5	8

- ITEM NOT ILLUSTRATED

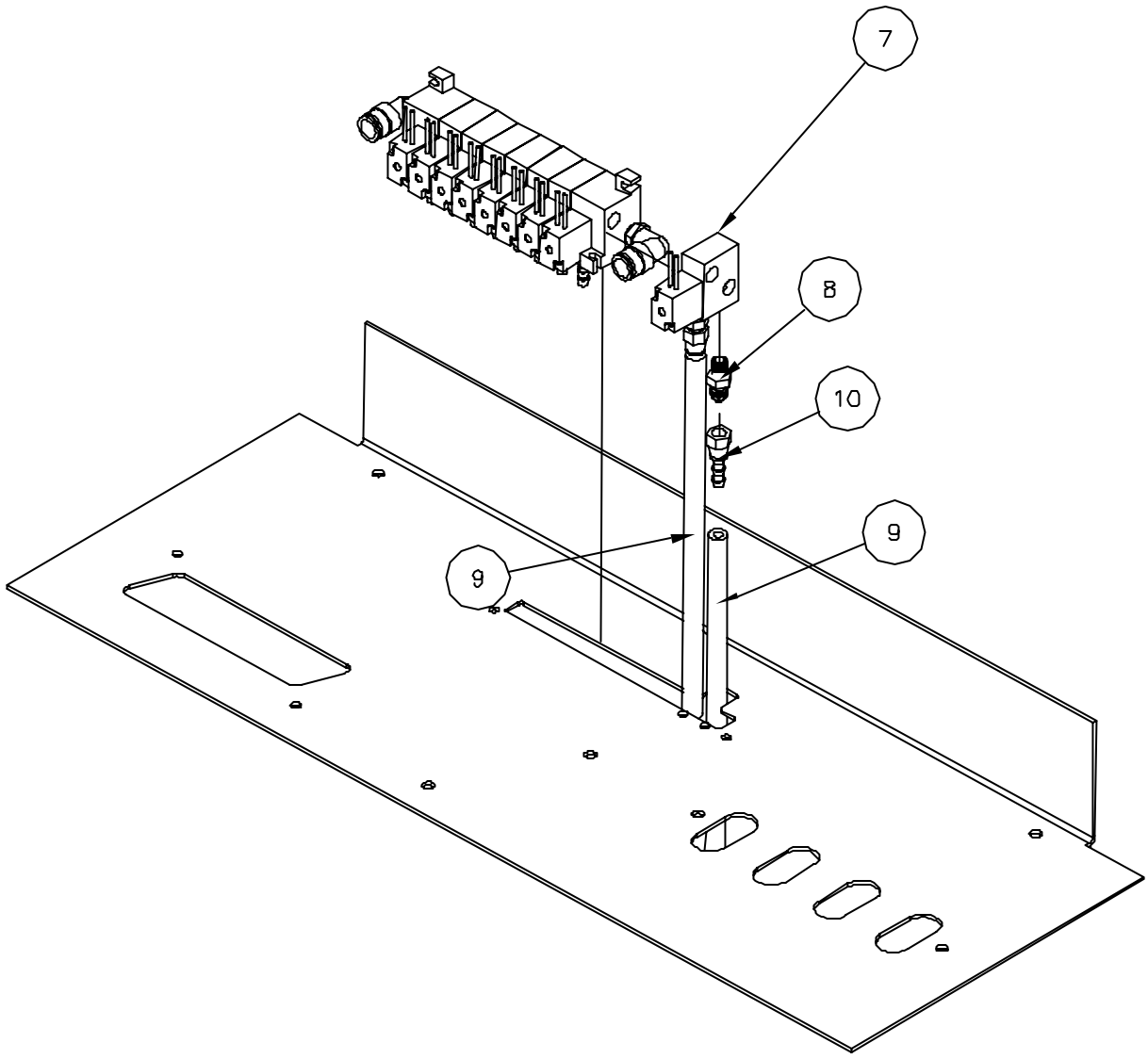


FIGURE 7-20. RETURN LINE VALVE (SHEET 2 OF 3)

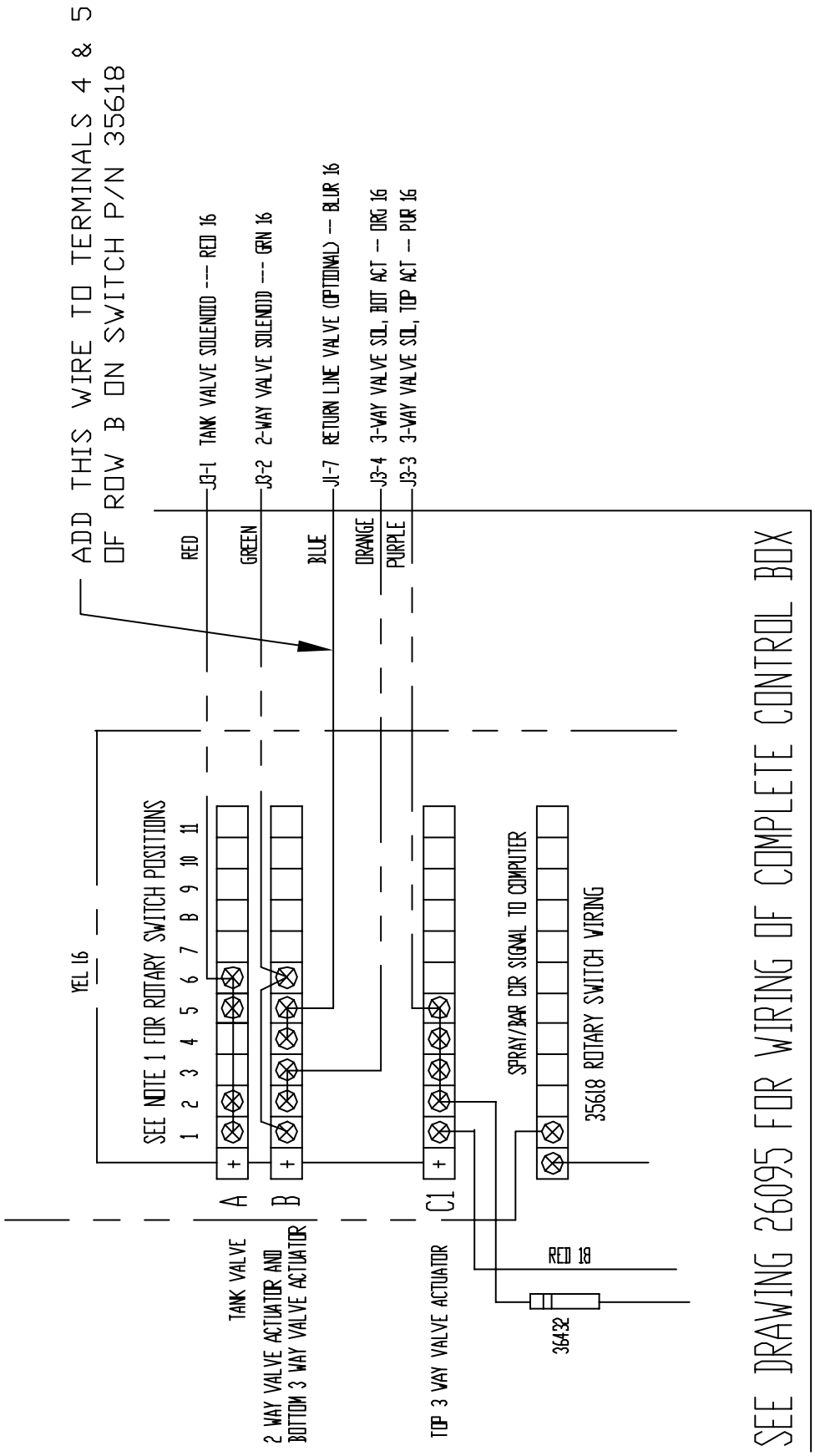
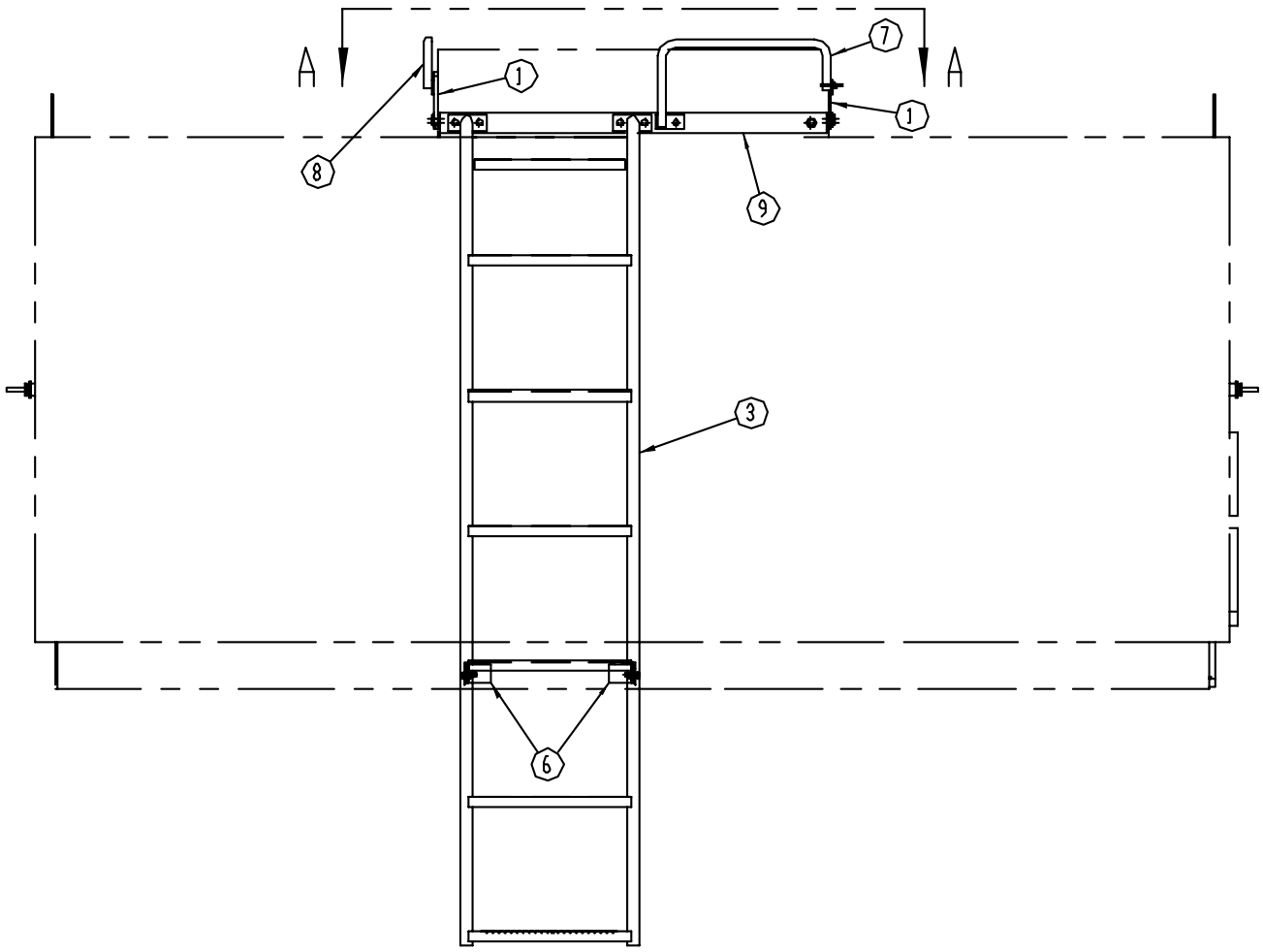


FIGURE 7-20. RETURN LINE VALVE (SHEET 3 OF 3)



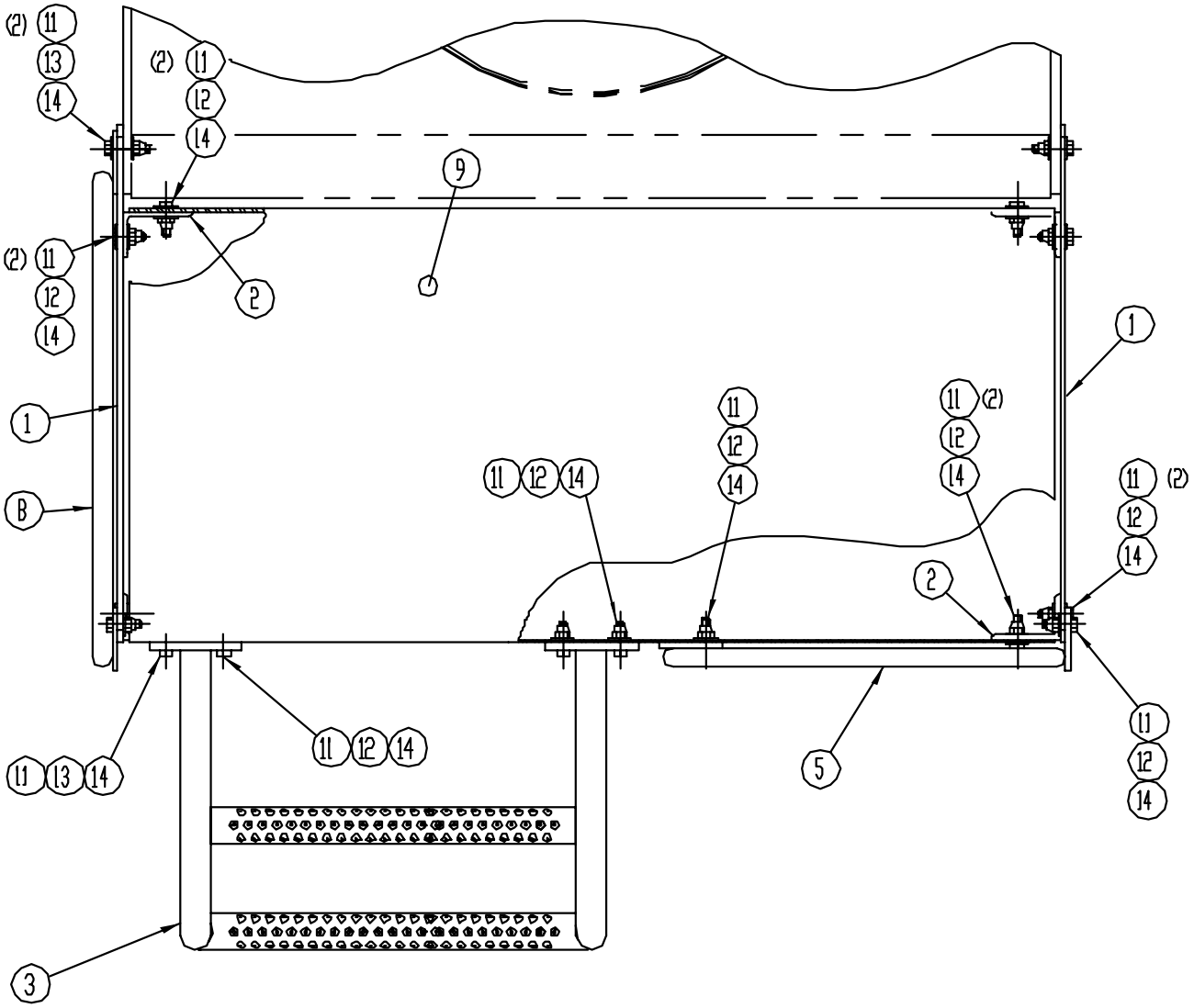
LEFT SIDE ELEVATION

FIGURE 7-21. TANK & LADDER GROUP, 1000 GAL TANK (SHEET 1 OF 3)

TABLE 7-21. TANK & LADDER GROUP, 1000 GAL TANK

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-21	**985597-10**	**TANK GRP,1000 GAL,48X74X96,DF**	**1**
-10	29468	•INS TANK,48X74X96,W/STACK	1
-20	17288-2	•POINTER,W/M,FR HEAD	2
-30	17300	•MEASURING STICK,48X74X96,D/F	1
-40	17311	•CONT GA,FR,48X74x96,D/F	1
-50	18045	•CONT GA,REAR,48X74X96,D/F	1
-60	25561	•SPACER,LADDER	1
-70	22485	•LADDER & PLATF,48X74 OFFSET	1
		ATTACHING PARTS	
1	21676	••END,PLATFORM	2
2	21677	••BRACKET	4
3	21683	••LADDER,56X84 & 52X80	1
5	21798	••BRACKET, LADDER	2
6	21799	••SPACER,LADDER	2
7	23088	••HANDLE,SIDE,RH	1
8	23089	••HANDLE,END,LH	1
9	22484	••PLATFORM,NON-SKIRT	1
11	80142	••WASHER,FLAT,USS,.375	33
12	80224	••CSHH,.375-16X1.25,GR5	17
13	80226	••CSHH,.375-16X1.50,GR5	5
14	80352	••NUT,FLEXLOC,.375-16,FULL,LT	22
		-----*-----	

- ITEM NOT ILLUSTRATED



DETAIL A-A

FIGURE 7-21. TANK & LADDER GROUP, 1000 GAL TANK (SHEET 2 OF 3)

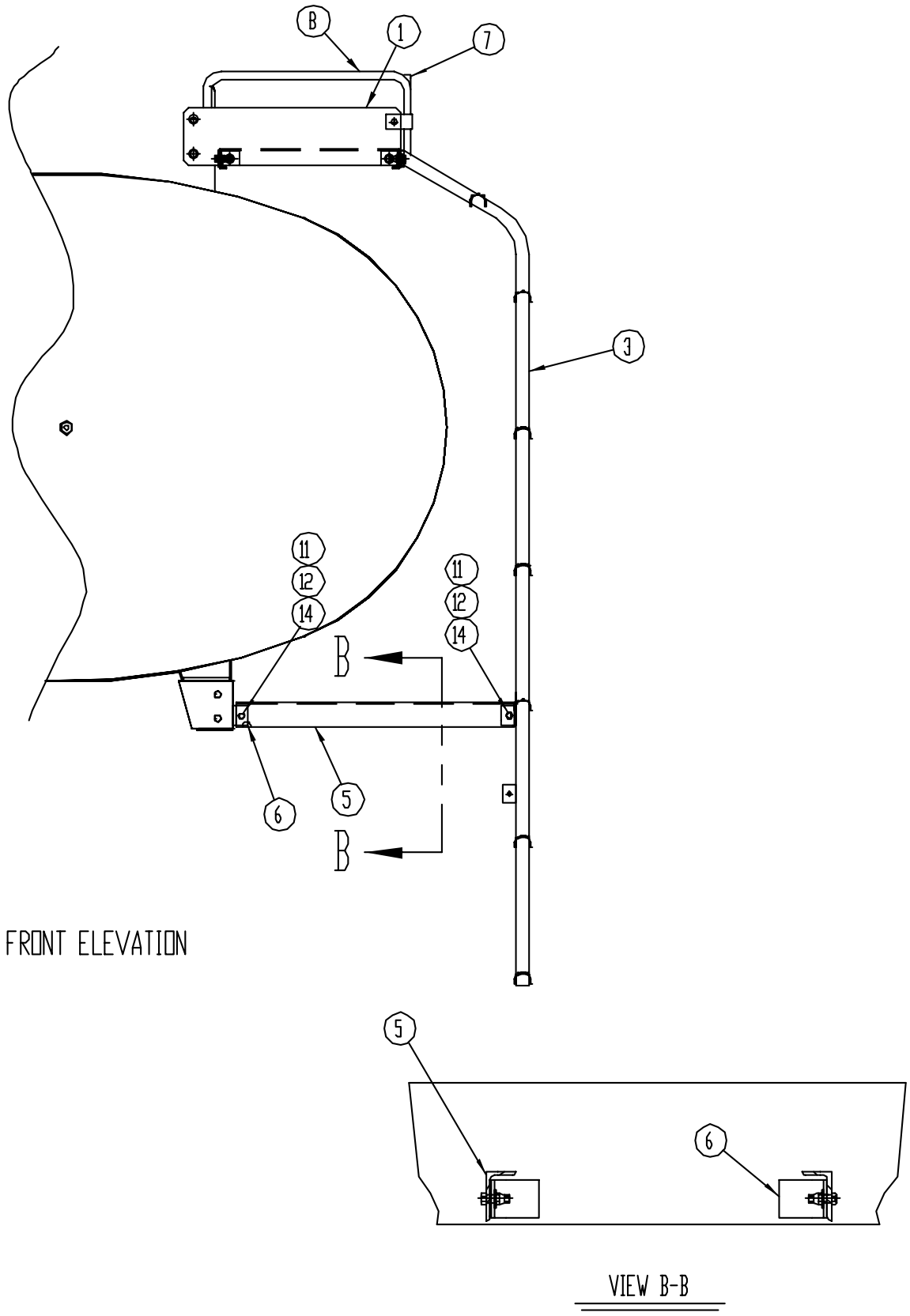


FIGURE 7-21. TANK & LADDER GROUP, 1000 GAL TANK (SHEET 3 OF 3)

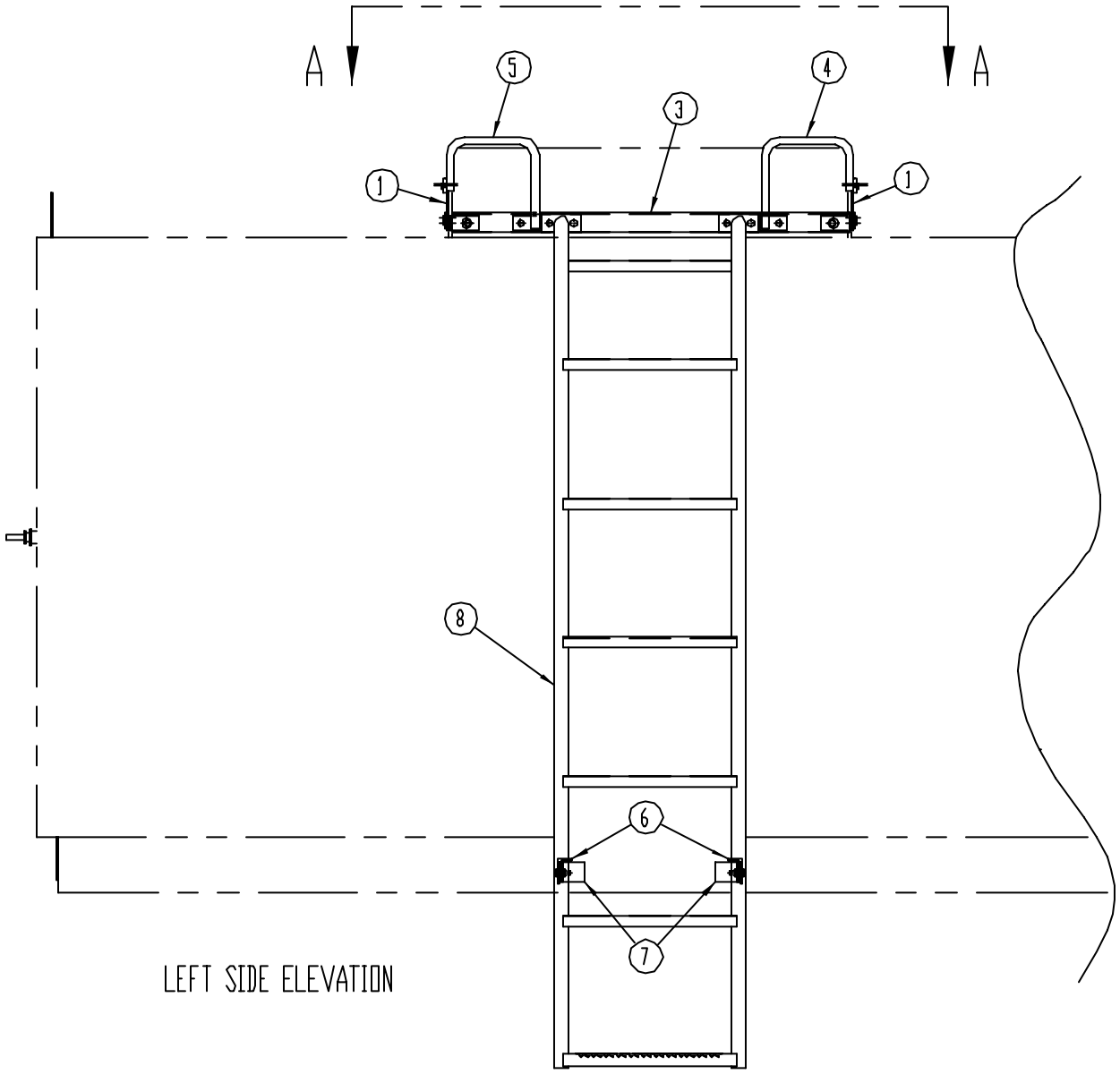


FIGURE 7-22. TANK & LADDER GROUP, 1500 GAL TANK (SHEET 1 OF 3)

TABLE 7-22. TANK & LADDER GROUP, 1500 GAL TANK

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-22	**985597-15**	**TANK GRP,1500 GAL,52X80X120,DF**	**1**
-10	29470	•INS TANK,52X80X120,D/F,AL	1
-20	17288-2	•POINTER,W/M,FR HEAD	2
-30	17303	•MEASURING STICK,52X80X120,D/F	1
-40	17314	•CONT GA,FR,52X80X120,D/F	1
-50	18049	•CONT GA,REAR,52X80X120,D/F	1
-60	21652	•LADDER & PLATF,56X84&52X80,95	1
		ATTACHING PARTS	
1	21676	••END,PLATFORM	2
2	21677	••BRACKET	4
3	21678	••PLATFORM	1
4	21679	••HANDHOLD,RH	1
5	21680	••HANDHOLD,LH	1
6	21683	••LADDER,56X84 & 52X80	1
7	21798	••BRACKET, LADDER	2
8	21799	••SPACER,LADDER	2
9	80142	••WASHER,FLAT,USS,.375	40
10	80162	••WASHER,LOCK,.375	4
11	80224	••CSHH,.375-16X1.25,GR5	20
12	80226	••CSHH,.375-16X1.50,GR5	4
13	80352	••NUT,FLEXLOC,.375-16,FULL,LT	24
		-----*-----	

- ITEM NOT ILLUSTRATED

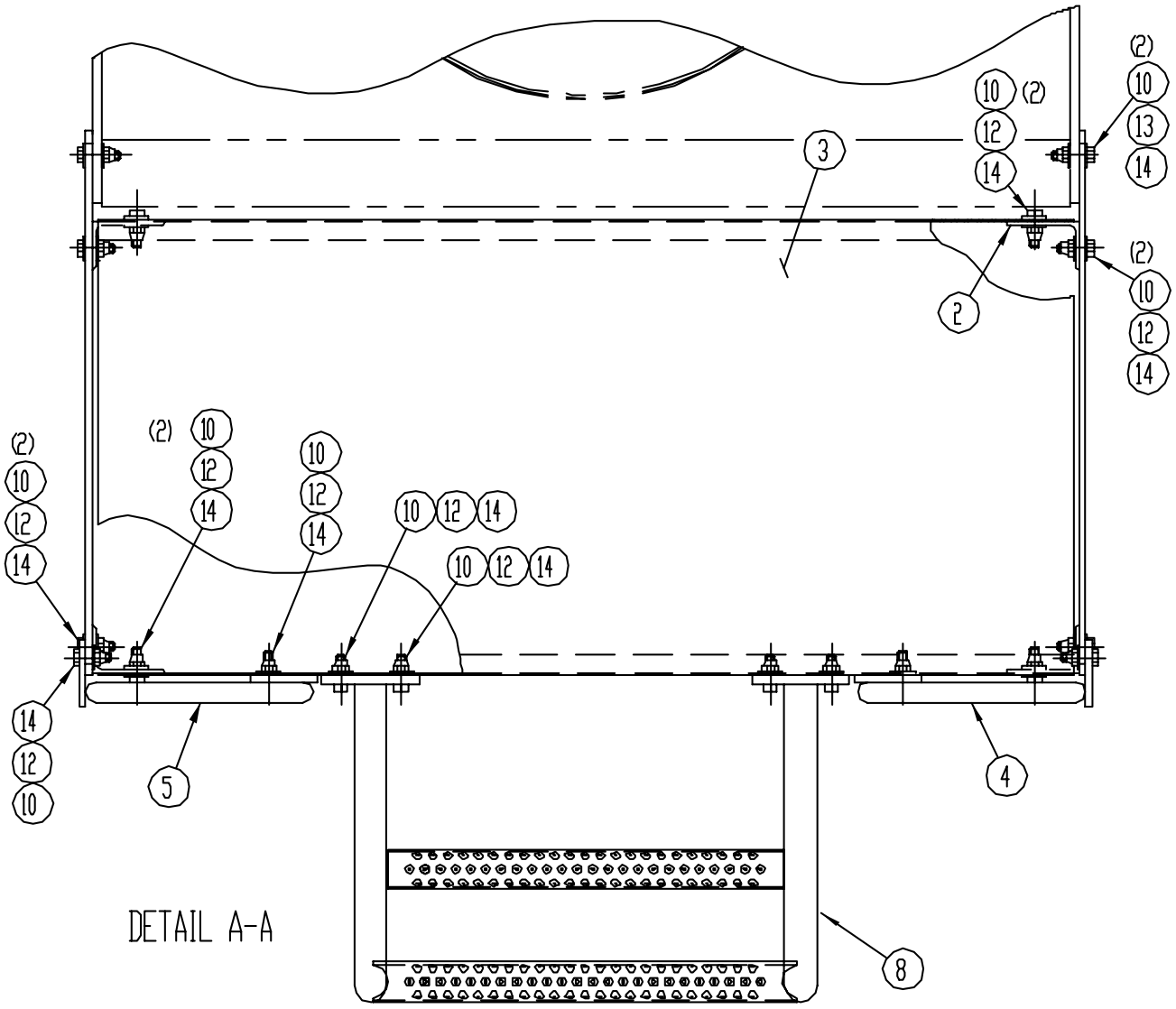


FIGURE 7-22. TANK & LADDER GROUP, 1500 GAL TANK (SHEET 2 OF 3)

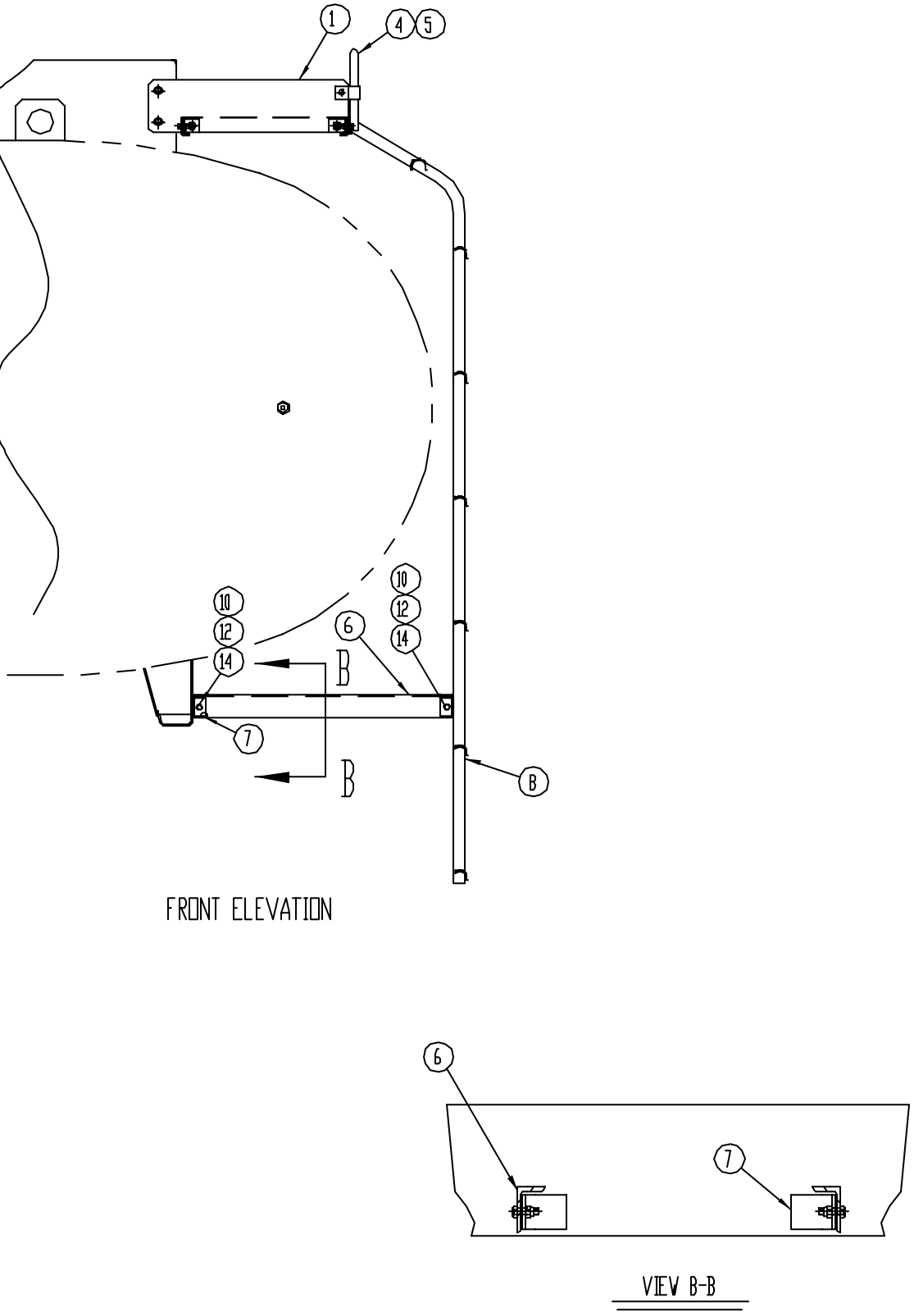


FIGURE 7-22. TANK & LADDER GROUP, 1500 GAL TANK (SHEET 3 OF 3)

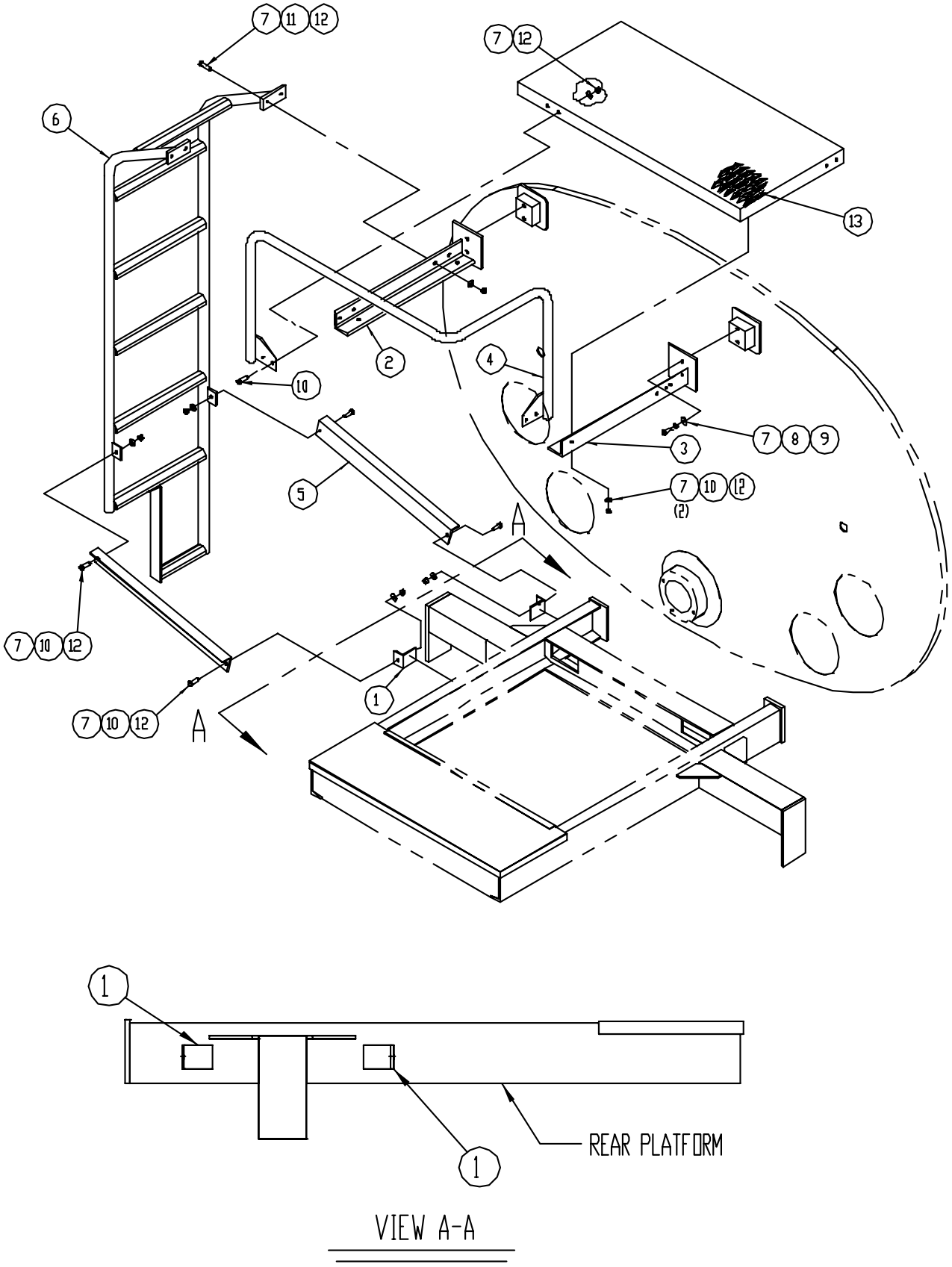
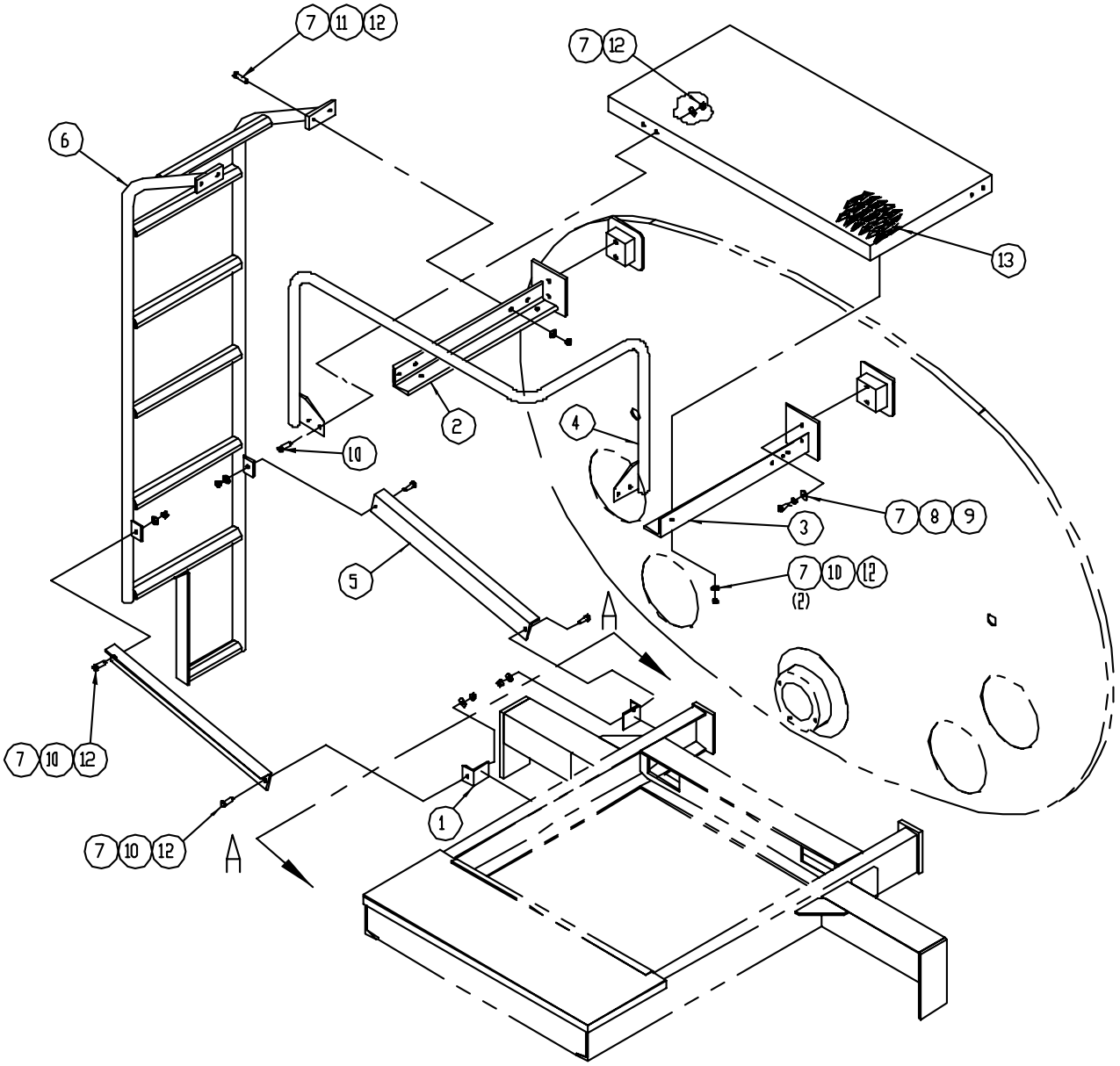


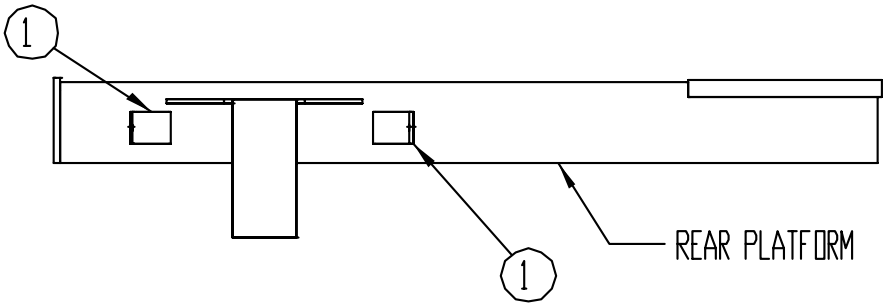
TABLE 7-23. TANK & LADDER GROUP, 3000 GAL TANK

TABLE 7-23. TANK & LADDER GROUP, 3000 GAL TANK

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-23	**985597-30**	**TANK GRP,3000 GAL,60X90X176,DF**	**1**
-10	29504	•INS TANK,60X90X176,W/STACK	1
-20	17288-1	•POINTER,W/M 17.25	2
-30	17319	•CONT GA,FR,60X90X176,D/F	1
-40	18053	•CONT GA,REAR,60X90X176,D/F	1
-50	23161	•MEASURING STICK,60X90X176,D/F	1
-60	986973	•PLATFORM,REAR,TANK ASSY	1
		ATTACHING PARTS	
-6001	27538	••RAIL SIDE	2
-6002	986975	••GRATING,24X45,TANK PLATFORM	1
-6003	986974	••ENDPLATE,TANK PLATFORM,LEFT	1
-6004	986976	••ENDPLATE,TANK PLATFORM,RIGHT	1
		-----*-----	
-70	21992	•LADDER GROUP,REAR,60X90	1
		ATTACHING PARTS	
1	21799	••SPACER,LADDER	2
2	21981-1	••LADDER BRACKET W/M,LH	1
3	21981-2	••LADDER BRACKET W/M,RH	1
4	986648	••RAIL W/M,SAFETY,LADDER PLATFORM	1
5	22322	••SPACER,LADDER,60X90	2
6	23567	••LADDER,68X90,REAR HEAD	1
-601	23559	•••BRACE,LADDER	1
-602	23562	•••PAD,MOUNT	2
-603	23563	•••BRACKET,STEP	2
7	80142	••WASHER,FLAT,USS,.375	24
8	80162	••WASHER,LOCK,.375	4
9	80221	••CSHH,.375-16X1.00,GR5	4
10	80224	••CSHH,.375-16X1.25,GR5	12
11	80226	••CSHH,.375-16X1.50,GR5	4
12	80352	••NUT,FLEXLOC,.375-16,FULL,LT	16
13	91302	••GRATING,STEP,12GAX18.75X40.00	1
		-----*-----	

- ITEM NOT ILLUSTRATED





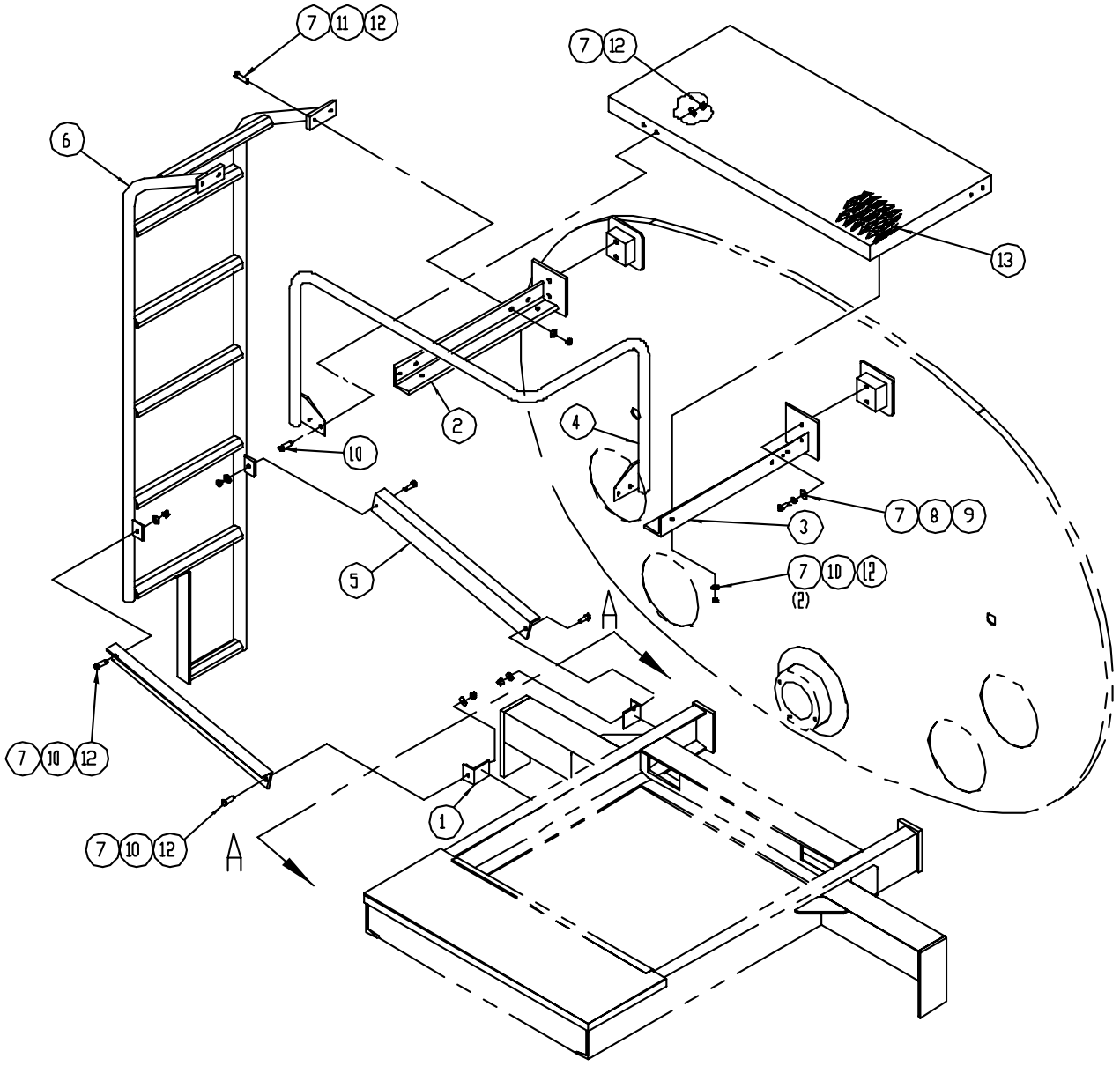
VIEW A-A

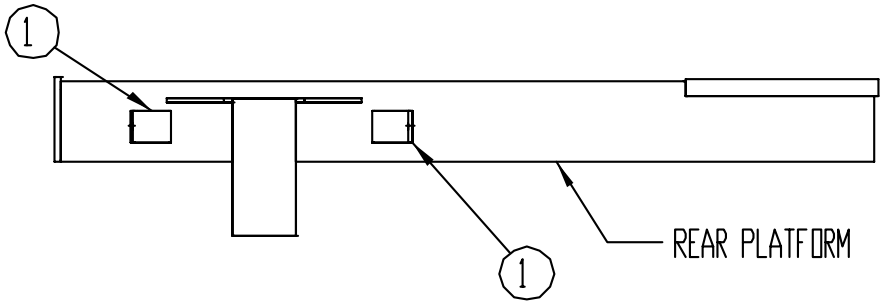
TABLE 7-24. TANK & LADDER GROUP, 3500 GAL TANK

TABLE 7-24. TANK & LADDER GROUP, 3500 GAL TANK

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-24	**985597-35**	**TANK GRP,3500 GAL,68X90X174,DF**	**1**
-10	29505	•INS TANK,68X90X174,W/STACK	1
-20	17288-1	•POINTER,W/M 17.25	2
-30	17310	•MEASURING STICK,68X90X174,D/F	1
-40	17321	•CONT GA,FR,68X90X174,D/F	1
-50	18055	•CONT GA,REAR,68X90X174,D/F	1
-60	986973	•PLATFORM,REAR,TANK ASSY	1
		ATTACHING PARTS	
-6001	27538	••RAIL SIDE	2
-6002	986975	••GRATING,24X45,TANK PLATFORM	1
-6003	986974	••ENDPLATE,TANK PLATFORM,LEFT	1
-6004	986976	••ENDPLATE,TANK PLATFORM,RIGHT	1
		-----*-----	
-70	21992-1	•LADDER GROUP,REAR,68X90	1
		ATTACHING PARTS	
1	21799	••SPACER,LADDER	2
2	21981-1	••LADDER BRACKET W/M,LH	1
3	21981-2	••LADDER BRACKET W/M,RH	1
4	986648	••RAIL W/M,SAFETY,LADDER PLATFORM	1
5	22322	••SPACER,LADDER,60X90	2
6	23567	••LADDER,68X90,REAR HEAD	1
-601	23559	•••BRACE,LADDER	1
-602	23562	•••PAD,MOUNT	2
-603	23563	•••BRACKET,STEP	2
7	80142	••WASHER,FLAT,USS,.375	24
8	80162	••WASHER,LOCK,.375	4
9	80221	••CSHH,.375-16X1.00,GR5	4
10	80224	••CSHH,.375-16X1.25,GR5	12
11	80226	••CSHH,.375-16X1.50,GR5	4
12	80352	••NUT,FLEXLOC,.375-16,FULL,LT	16
13	91302	••GRATING,STEP,12GAX18.75X40.00	1
		-----*-----	

- ITEM NOT ILLUSTRATED





VIEW A-A

TABLE 7-25. TANK & LADDER GROUP, 4000 GAL TANK

TABLE 7-25. TANK & LADDER GROUP, 4000 GAL TANK

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
7-25	**985597-40**	**TANK GRP,4000 GAL,68X90X200,DF**	**1**
-10	29506	•INS TANK,68X90X200,W/STACK	1
-20	17288-1	•POINTER,W/M 17.25	2
-30	19488	•MEASURING STICK,68X90X200,D/F	1
-40	19489	•CONT GA,FR,68X90X200,D/F	1
-50	19490	•CONT GA,REAR,68X90X200,D/F	1
-60	986973	•PLATFORM,REAR,TANK ASSY	1
		ATTACHING PARTS	
-6001	27538	••RAIL SIDE	2
-6002	986975	••GRATING,24X45,TANK PLATFORM	1
-6003	986974	••ENDPLATE,TANK PLATFORM,LEFT	1
-6004	986976	••ENDPLATE,TANK PLATFORM,RIGHT	1
		-----*-----	
-70	21992-1	•LADDER GROUP,REAR,68X90	1
		ATTACHING PARTS	
1	21799	••SPACER,LADDER	2
2	21981-1	••LADDER BRACKET W/M,LH	1
3	21981-2	••LADDER BRACKET W/M,RH	1
4	986648	••RAIL W/M,SAFETY,LADDER PLATFORM	1
5	22322	••SPACER,LADDER,60X90	2
6	23567	••LADDER,68X90,REAR HEAD	1
-601	23559	•••BRACE,LADDER	1
-602	23562	•••PAD,MOUNT	2
-603	23563	•••BRACKET,STEP	2
-7	80142	••WASHER,FLAT,USS,.375	24
-8	80162	••WASHER,LOCK,.375	4
-9	80221	••CSHH,.375-16X1.00,GR5	4
-10	80224	••CSHH,.375-16X1.25,GR5	12
-11	80226	••CSHH,.375-16X1.50,GR5	4
-12	80352	••NUT,FLEXLOC,.375-16,FULL,LT	16
-13	91302	••GRATING,STEP,12GAX18.75X40.00	1
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 7-26. FLOAT ROD GROUPS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		FLOAT RODS	
-1	17283	•FLOAT RODS,VERTICAL	1
	17283-1	FOR TANK HEIGHTS OF 60" AND 68"	
	17283-2	FOR TANK HEIGHTS OF 48"	
	17283-3	FOR TANK HEIGHTS OF 56"	
	17283-4	FOR TANK HEIGHTS OF 52"	
-2	20793	•FLOAT RODS,HORIZONTAL	1
	20793-01	FOR TANK LENGTHS OF 96"	
	20793-02	FOR TANK LENGTHS OF 120"	
	20793-04	FOR TANK LENGTHS OF 140"	
	20793-05	FOR TANK LENGTHS OF 142"	
	20793-06	FOR TANK LENGTHS OF 170"	
	20793-07	FOR TANK LENGTHS OF 174"	
	20793-08	FOR TANK LENGTHS OF 176"	
	20793-09	FOR TANK LENGTHS OF 200"	
	20793-10	FOR TANK LENGTHS OF 132"	

- ITEM NOT ILLUSTRATED

TABLE 7-27. TRUCK GROUPS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		TRUCK GROUPS	
-1	14850	•VENTED TANK CAR VALVE	1
		ATTACHING PARTS	
-101	14849	••VLV,3.00,2 WAY PLUG/W .25,NP	1
-102	15182	••VALVE HANDLE WELDMENT	1
-103	5499	••VLV,DRAIN COCK,.250 NPT	1
-104	90276	••CPLG,BOSS TANK CAR	1
		-----*-----	
-2	25358	•MIRROR GRP,4-WAY,MOTOR,HEATED	1
		ATTACHING PARTS	
-201	24735	••DECAL,REMOTE MIRROR	1
-202	33320	••FUSE HOLDER,12 V,20 AMP	1
-203	33954	••FUSE,20 AMP,.25X1.25	1
-204	35447	••SWITCH,TOGGLE,SPST,LIGHTED	1
-205	37283	••MIRROR,4-WAY,MOTORIZED,HEATED	1
		-----*-----	
-3	16244-1	•TANK MOUNTING HARDWARE (TANDEM)	1
		ATTACHING PARTS	
-301	16159	••TIE DOWN W/M,TANK	6
-302	16243	••BENT PLATE	2
-303	21934	••BAR,.250X1.00X3.00,HRS	4
-304	21936	••BRACKET,END CAP	2
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 7-27. TRUCK GROUPS (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		TRUCK GROUPS	
-4	16244-2	•TRUCK MOUNTING HARDWARE (TANDEM)	1
		ATTACHING PARTS	
-401	14253	••TANK MOUNT,TRUCK ANGLE	6
-402	35209	••SPR,1.62 DIAX3.5,1005 PSI	24
-403	80146	••WASHER,TYPE A PLAIN,.625	36
-404	80284	••CSHH,.625-11X2.25,GR5	12
-405	80356	••NUT,FLEXLOC,.625-11,FULL,LT	24
-406	80446	••CSHH,.625-11X11.00,GR5	12
-407	90383-06	••WOOD,OAK,1.50X3.00X10FT	24
		-----*-----	
-5	25872	•BUMPER,REAR,ASSY,S/M	1
		ATTACHING PARTS	
-501	23555	••BUMPER,REAR	1
-502	25871	••BRACKET,BUMPER,SHORT MOUNT	2
-503	80144	••WASHER,FLAT,USS,.500	8
-504	80186	••CSHH,.500-13X1.75,GR5	8
-505	80354	••NUT,FLEXLOC,.500-13,FULL,LT	8
		-----*-----	
-6	22012	•TOOLBOX ASSY,18X18X36	1
		ATTACHING PARTS	
-601	22008	••TOOLBOX WLDMT,18X18X36	1
-602	22021	••DOOR,TOOLBOX	1
-603	22022	••HINGE,TOOLBOX	1
-604	33220	••RIVET,BLIND,STL,.125,.188-.250	4
-605	37048	••LATCH,SLAM,FLUSH MTD,LOCKED,SS	1
-606	80964	••RIVET,BLIND,STL,.188,.126-250	18
-607	99535	••PIPE,PLUG,.250,SQ HEAD,MI	1
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 7-27. TRUCK GROUPS (CONTINUED)

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		TRUCK GROUPS	
-7	25933	•KIT,FILTER MAX II	1
		ATTACHING PARTS	
-701	34464	••FILTER ELEMENT,HYD (For Hydraulic System)	1
-702	38662-01	••FILTER ELEMENT (For Diesel Burner Strainer)	1
		-----*-----	
-8	26689	•KIT,PARTS,MAX3,1 YR	1
		ATTACHING PARTS	
-801	26141	••POT ASSEMBLY,MAX3	1
-802	26469	••SPRAY VALVE ASSEMBLY,MAX3	4
-803	32918	••NOZZLE #1, 5 GPM/40 PSI	6
-804	33384	••GREASE,TUBE. 50EP WITH DECAL	6
-805	34464	••FILTER ELEMENT,HYD	2
-806	38130	••VALVE,3 WAY,AIR,SPRAY BAR	3
-807	38132	••VALVE,3 WAY,02X02X02,	1
-808	38149	••GASKET,SPRAY VALVE	8
-809	38201	••CLAMP,HOSE,BAND,.45DIA	10
-8010	38402	••CLAMP,HOSE,.375,.18 ID HOSE	10
-8011	5249	••PACKING,10 PCS PER PACK	1
-8012	71814	••HOSE,03,PUSH-ON,250	4
-8013	5347	••HOSE,04,PUSH-ON,LOW PRESSURE	4
-8014	35008	••O-RING,4.50 OD	4
-8015	35035	••GASKET,SPRAYBAR EXT	1
-8016	35036	••WASHER,TEFLON	4
		-----*-----	
-9	38687	•LIGHT,STROBE,AMBER,8J,80SFPM	1
-10	16962	•MOUNT,RISER,STROBE LIGHT	1
-11	90276	•BOSS TANK CAR CPLG	1
-12	72350	•FITT,TEE 04MJ-04MJ-04MB	1
-13	27046	•SPACER,HYD TANK MOUNT	2
-14	33963	•ALARM,BACKUP	1

- ITEM NOT ILLUSTRATED

TABLE 7-28. PTO PUMP INSTALLATIONS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		PTO PUMP INSTALLATIONS	
-1	17965	•MOUNT,PUMP,INSTLN,PTO DRIVE,LH	1
		ATTACHING PARTS	
-101	13657	••SHIM PLATE	5
-102	16493	••MOUNT,MDT46 PUMP,W/M LH	1
-103	80144	••WASHER,TYPE A PLAIN,5.00	8
-104	80255	••CSHH,.500-13X2.00,GR5	4
-105	80257	••CSHH,.500-13X2.25,GR5	2
-106	80354	••NUT,FLEXLOC,.500-13,FULL,LT	6
		-----*-----	
-2	17964	•MOUNT,PUMP,INSTLN,PTO DRIVE,RH	1
		ATTACHING PARTS	
-201	13657	••SHIM PLATE	5
-202	16492	••MOUNT,MDT46 PUMP,W/M RH	1
-203	80144	••WASHER,FLAT,USS,.500	8
-204	80255	••CSHH,.500-13X2.00,GR5	4
-205	80257	••CSHH,.500-13X2.25,GR5	2
-206	80354	••NUT,FLEXLOC,.500-13,FULL,LT	6
		-----*-----	

- ITEM NOT ILLUSTRATED

TABLE 7-29. FRONT LIVE PUMP MOUNTING GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		FRONT LIVE PUMP MOUNTING GROUP	
	23196	PUMP MOUNTING GROUP	
		GMC, FORD TRUCKS	
-1	17645	•GUARD,FRONT LIVE POWER,4.0” LG	1
-2	21743	•CHANNEL,PUMP SUPPORT	1
-3	23194	•MOUNT,PUMP,FRONT LIVE	1
-4	23196	•SCREEN	1
-5	23354	•BRACKET,COOLER MOUNT	2
-6	23361	•MOUNT,COOLER	2
	23894	PUMP MOUNTING GROUP	
		FRTLINER, IHC TRUCKS	
-1	23893	•GUARD,FRONT LIVE POWER,2.5” LG	1
-2	21743	•CHANNEL,PUMP SUPPORT	1
-3	23194	•MOUNT,PUMP,FRONT LIVE	1
-4	23353	•SCREEN	1
-5	23354	•BRACKET,COOLER MOUNT	2
-6	23361	•MOUNT,COOLER	2

- ITEM NOT ILLUSTRATED

TABLE 7-30. DRIVE SHAFT GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		DRIVESHAFT	
	34851-20	FRONT LIVE POWER	1
		INTERNATIONAL TRUCKS	
-1	39105	•DRIVESHAFT,FLANGE,1350	1
-2	39107	•SOLID SHAFT ASSEMBLY	1
-3	39111	•DRIVESHAFT,END YOKE,15T SPLN	1
-4	39112	•DRIVESHAFT,SET SCREW W/WIRE LK	2
	34851-42	FRONT LIVE POWER	1
		FORD, STERLING, FREIGHTLINER, GMC TRUCKS	
-1	39104	•DRIVESHAFT,FLANGE,1310	1
-2	39107	•SOLID SHAFT ASSEMBLY	1
-3	39111	•DRIVESHAFT,END YOKE,15T SPLN	1
-4	39112	•DRIVESHAFT,SET SCREW W/WIRE LK	2
	34850-XXX	PTO, VARIES PER TRUCK	1
-1	39109	•DRIVESHAFT,END YOKE,1.25 W/5/16	1
-2	39108	•DRIVESHAFT,2" TUBE,55 3/4	1
-3	39111	•DRIVESHAFT,END YOKE,15T SPLN	1
-4	39112	•DRIVESHAFT,SET SCREW W/WIRE LK	2

- ITEM NOT ILLUSTRATED

TABLE 7-31. AIR LINE OILER GROUP

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
	19912	**AIR LINE OILER GROUP**	**1**
-1	21596	•SUPPORT,W/M,AIR LINE OILER	2
-2	33162	•CLAMP,HOSE,.44-.78,WORM,#06	2
-3	33590	•LOOM,SPIRAL,CUT,.50 ID,NATURAL	1
-4	34517	•LUBRICATOR,AIR SYSTEM	1
-5	80140	•WASHER,TYPE A PLAIN,.250	2
-6	80185	•CSHH,.250-20X1.00,GR5	2
-7	80350	•NUT,FLEXLOC,.250-20, FULL,LT	2
-8	99638	•PIPE,NIPPLE,06XCLOSE	2
-9	X304	•FITT,90 06MP-06HB,CRIMPED	2

- ITEM NOT ILLUSTRATED

TABLE 7-32. HOSE REELS & HOSE GROUPS

FIG ITEM	PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY
		HOSE GROUPS	
-1	23256	•MOUNT,HOSE REEL	1
		ATTACHING PARTS	
-101	23233	••PLATFORM W/M,HOSE REEL	1
-102	36863	••CLAMP,HOSE,#K-24,KNOX	2
-103	36999	••HOSE,1.00 ID,HOT ASPHALT	2
-104	70036	••FITT,STR 16MP-16HB,CRIMPED	2
-105	80142	••WASHER,FLAT,USS,.375	8
-106	80226	••CSHH,.375-16X1.50,GR5	4
-107	80352	••NUT,FLEXLOC,.375-16,FULL,LT	4
		-----*-----	
-2	35463	•REEL,W/O HOSE,HOLDS 1”X50’	1
-3	17247	•HANDLE REWRK,HOSE REEL	1
-4	17243	•HOLSTER,REEL CRANK	1
-5	38942	•HOSE,ASPHALT LOAD,3.00X10FT	1
-6	5131	•HOSE,3.00ID X 15FT,FLEX STL,M	1
-7	5131R	•HOSE,ASPH,LOAD,3.0X15FT,RUBBER	1
-8	6288	•FITT,QD 3.00M-3.00FP,BRASS	1
-9	6289	•FITT,QD 3.00F-3.00FP,BRASS	1
-10	35564	•ADAPTER,3 SPOOL,MALE X MALE	1

- ITEM NOT ILLUSTRATED

ALPHABETICAL INDEX

ALPHABETICAL INDEX FOR ALL STANDARD AND OPTIONAL PARTS.

FOR SPECIAL FEATURES, REFER TO SUPPLEMENTS IN THE BACK OF THIS BOOK.

ALPHABETICAL INDEX

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
		A	
15	35149	ACTUATOR,VANE,90 DEGREES	121
10	35564	ADAPTER,3 SPOOL,MALE X MALE	782
9	6315-2	ADJUSTING SCREW	117
9	36044-10	AIR BAND	504, 732
8	36044-09	AIR SHUTTER	504, 732
11	36044-12	AIR TUBE W/FLANGE (2 ELECTRODES)	504, 732
1	72828	AIR,RSVR,9.50X22.50,1488 CU IN	417
14	33963	ALARM,BACKUP	777
2	22944	ANGLE,HANGER BRACKET,LH	751
3	22945	ANGLE,HANGER BRACKET,RH	751
1	22943	ANGLE,MUD FLAP MOUNT	751
71	27591	ARM,ACTUATOR	403, 707
		B	
303	21934	BAR,.250X1.00X3.00,HRS	775
1303	21934	BAR,.250X1.00X3.00,HRS	624
3	17211	BAR,.250X3.00X5.00	215, 229
2	17374	BAR,LOAD LINE SUPPORT	119
24	985000	BAR,LP LINE BRKT,S-SHAPED	741
57	985000	BAR,LP LINE BRKT,S-SHAPED	737
50	16070	BAR,PLUG GROUP	411, 715, 723
10	26019	BARSLIDE W/M	403, 405, 707, 709
4	37269	BELT,MUD FLAP,30.00X96.00	751
2	23489	BENT HANDLE,BALL VALVE	129
302	16243	BENT PLATE	775
1302	16243	BENT PLATE	624
5	38991-04	BLANKING KIT	727
12	26034	BLOCK,SLIDE,BOTTOM	409, 713, 721
13	26035	BLOCK,SLIDE,TOP	409, 713, 721
17	26106	BLOCK,STOP,EXTEND	409, 713, 721
1	36044-01	BLOWER MOTOR	504, 732
12	36044-14	BLOWER WHEEL	504, 732
2	25261	BODY,VALVE	415, 719, 725
403	37488-04	BOLT KIT,FOR VALVE	419
8803	37488-04	BOLT KIT,FOR VALVE	213
6	6315-5	BONNET	117
11	90276	BOSS TANK CAR CPLG	777
8201	15300	BRACE BAR,CONTROL BOX	304

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
601	23559	BRACE,LADDER	769, 771, 773
2	21677	BRACKET	607, 761, 765
5	21798	BRACKET, LADDER	761
6	21798	BRACKET, LADDER	607
7	21798	BRACKET, LADDER	765
21	27594	BRACKET,ACTUATOR	403, 707
2	26420	BRACKET,AIR TANK	417
502	25871	BRACKET,BUMPER,SHORT MOUNT	776
51	26007	BRACKET,CONT BOX MOUNT	303
5	23354	BRACKET,COOLER MOUNT	232, 779
304	21936	BRACKET,END CAP	775
1304	21936	BRACKET,END CAP	624
5	23363	BRACKET,HYDRAULIC LINE	215
3701	38216-01	BRACKET,IGNITER & FLAME ROD	737
5	22869	BRACKET,IGNITOR	735
1513	9672	BRACKET,PIPE,0.50	625
1	15716	BRACKET,RADAR VEL SENSOR	322
18	36086	BRACKET,RELAY MOUNT	753
603	23563	BRACKET,STEP	769, 771, 773
1	15855	BRACKET,TRANSFER LINE SUPPORT	119
1	16431	BRACKET,W/M,DBL ACTR	121
3	23503	BRACKET,W/M,HOSE GUARD	121
2	34080	BRACKETS,20",TANK MTG	743
25	7640	BRKT,.250 PIPE	741
58	7640	BRKT,.250 PIPE	737
5	22638	BRKT,MOUNT,SGL ACTUATOR W/M	121
22	21813	BRKT,PIPE SUPPORT	623
2	981708	BRKT,WOOD RAIL JOINT	619
501	23555	BUMPER,REAR	776
5	25872	BUMPER,REAR,ASSY,S/M	776
1	23508	BURNER BRKT ASSY W/M	735, 741
202	22472	BURNER COVER W/M,DOUBLE FLUE	506
2	22475	BURNER COVER, DOUBLE FLUE	506
703	32958	BURNER J1 LPG LIQUID	745
2	31931	BURNER,LPG,B3	741
9	6118	BURNER,PROPANE,LIQUID,B2	735
20	36208	BUZZER,12 VDC,CONTINUOUS TONE	753

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
		C	
22	36044-31	CAD CELL	732
10	6315-1	CAP	117
70	71697	CAP SCREW HT 5/8 X 6 1/2 NC	407, 711
2	15930	CAP,END,SPRAYBAR	713, 721
75	15930	CAP,END,SPRAYBAR	409
2	36940	CAP,FUEL,4.0 NPT,AL,W/GASKET	623
1508	36940	CAP,FUEL,4.0 NPT,AL,W/GASKET	625
8	5240	CASING	115
67	26725	CHAIN,ADJUSTMENT	407, 711
2	21743	CHANNEL,PUMP SUPPORT	232, 779
36	37241-03	CIRCUIT BOARD	737
4	34853	CIRCUIT BREAKER,40 AMP	731
16	36889	CLAMP,CABLE,#11 SHELL	313
26	34860	CLAMP,HALF,HOSE,.750	203, 215, 217, 229
1	33277	CLAMP,HOSE,# 04	731
7	33277	CLAMP,HOSE,# 04	503
24	33277	CLAMP,HOSE,# 04	623
1505	33277	CLAMP,HOSE,# 04	625
18	851437	CLAMP,HOSE,#72 (4”)	127
18	36863	CLAMP,HOSE,#K-24 KNOX	111
102	36863	CLAMP,HOSE,#K-24,KNOX	782
8010	38402	CLAMP,HOSE,.375,.18 ID HOSE	777
2	33162	CLAMP,HOSE,.44-.78,WORM,#06	781
9	33162	CLAMP,HOSE,.44-.78,WORM,#06	203, 205, 217,
			219, 419
16	33162	CLAMP,HOSE,.44-.78,WORM,#06	417
4	33163	CLAMP,HOSE,.50-.91,WORM,#08	753
10	33164	CLAMP,HOSE,.56-1.06,WORM,#10	203, 215, 219, 229
11	33167	CLAMP,HOSE,.81-1.75,WORM,#20	203, 205, 219
23	33167	CLAMP,HOSE,.81-1.75,WORM,#20	623
2204	38201	CLAMP,HOSE,BAND,.45DIA	409
2208	38201	CLAMP,HOSE,BAND,.45DIA	713, 721
809	38201	CLAMP,HOSE,BAND,.45DIA	777
92	87111602	CLAMP,LOOP,.75 OD,PLASTIC COVER	211
92	871111602	CLAMP,LOOP,.75 OD,PLSTC COVER	227
20	34799	CLAMP,LOOP,1.562 OD,NPRN COVER	205, 219
1	38771	CLAMP,MUFFLER STRAP,3-1/2”	619
32	36167	CLAMP,TUBE,1.00 OD TWIN,SET	203, 205, 215,
			217, 229

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
66	26721	CLEVIS	407, 711
405	37488-06	COIL,FOR VALVE	419
8805	37488-06	COIL,FOR VALVE	213
6	34185	CONDUIT CONNECTOR, 1/2 NPT	503
17	34185	CONDUIT CONNECTOR, 1/2 NPT	731
18	34185	CONDUIT CONNECTOR, 1/2 NPT	505, 733
4	19427	CONDUIT,RIGID,.50X1.75	505, 733
1	34468	CONN HOUSING,CAP,12 CIRCUIT	421, 423
4	34468	CONN HOUSING,CAP,12 CIRCUIT	315
5	34468	CONN HOUSING,CAP,12 CIRCUIT	425, 729
6	34468	CONN HOUSING,CAP,12 CIRCUIT	727
56	34468	CONN HOUSING,CAP,12 CIRCUIT	304
3	72594	CONN HOUSING,CAP,15 CIRCUIT	421, 423
11	37229	CONN HOUSING,CAP,8 WIRE	319
18	37229	CONN HOUSING,CAP,8 WIRE	321
76	37229	CONN HOUSING,CAP,8 WIRE	304
2	34467	CONN HOUSING,PLUG,12 CIRCUIT	311, 315, 317
12	34467	CONN HOUSING,PLUG,12 CIRCUIT	313
17	34467	CONN HOUSING,PLUG,12 CIRCUIT	421, 423
24	72593	CONN HOUSING,PLUG,15 CIRCUIT	321
12	37230	CONN HOUSING,PLUG,8 WIRE	319
19	37230	CONN HOUSING,PLUG,8 WIRE	321
15	33603	CONN,BUTT,12-10 GA	733
7	33602	CONN,BUTT,16-14 GA	421, 423
9	33602	CONN,BUTT,16-14 GA	753
11	33602	CONN,BUTT,16-14 GA	313
14	33602	CONN,BUTT,16-14 GA	733
15	36044-17	CONNECTOR TUBE ASSEMBLY	504, 732
6	22775	CONNECTOR WLDMT,ACTUATOR	121
71	36758	CONNECTOR,12 PIN,15 AMP RATING	304
28	36764	CONNECTOR,6 CONTACT,CIRCULAR	307
81	38484	CONNECTOR,HOUSING,10 PIN	304
25	36762	CONNECTOR,MERTI-PACK,30 WAY	307
27	36763	CONNECTOR,METRI-PACK,18 WAY	307
3005	36351	CONNECTOR,SEALED,SHROUD,4-PIN	305
3004	36300	CONNECTOR,SEALED,TOWER,3-PIN	305
32	36352	CONNECTOR,SEALED,TOWER,4-PIN	307
2	27137	CONNECTOR,TANK VALVE	125
67	36706	CONNECTOR,WIRE,20 PIN,20-22AWG	304
64	36705	CONNECTOR,WIRE,30 PIN,20-22AWG	304
52	26008	CONT BOX WLDMT,MAX 3	303

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
40	17311	CONT GA,FR,48X74x96,D/F	761
40	17314	CONT GA,FR,52X80X120,D/F	765
30	17319	CONT GA,FR,60X90X176,D/F	769
40	17321	CONT GA,FR,68X90X174,D/F	771
40	19489	CONT GA,FR,68X90X200,D/F	773
50	18045	CONT GA,REAR,48X74X96,D/F	761
50	18049	CONT GA,REAR,52X80X120,D/F	765
40	18053	CONT GA,REAR,60X90X176,D/F	769
50	18055	CONT GA,REAR,68X90X174,D/F	771
50	19490	CONT GA,REAR,68X90X200,D/F	773
70	36707-01	CONTACT,CONNECTOR,22 AWG	304
14	35391	CONTACT,PIN,12-10 GA	313
3	34469	CONTACT,PIN,20-14 GA	311, 315, 317
4	34469	CONTACT,PIN,20-14 GA	421, 423
13	34469	CONTACT,PIN,20-14 GA	313
19	34469	CONTACT,PIN,20-14 GA	733
17	36890	CONTACT,SOCKET,18-14 GA	313
1	34471	CONTACT,SOCKET,20-14 GA	621
6	34471	CONTACT,SOCKET,20-14 GA	425, 729
10	34471	CONTACT,SOCKET,20-14 GA	727
17	34471	CONTACT,SOCKET,20-14 GA	321
20	34471	CONTACT,SOCKET,20-14 GA	315, 733
57	34471	CONTACT,SOCKET,20-14 GA	304
7	22176	CONTENTS GA,FR,56X84X132,DBL FLUE	624
8	22177	CONTENTS GA,REAR,56X84X132,DBL FLUE	624
34	23976	CONTROL BOX	319
22	28540	CONTROL GRP,AIR,MAX3	409
22	28764	CONTROL GRP,AIR,MAX3,18' BAR	713
22	28972	CONTROL GRP,AIR,MAX3,20' BAR	721
38	6364	COOLER	203, 219
60	80332	COTTER PIN,.125X1.50	407, 711
22	34987	COUPLING CHAIN W/ CONN. PIN	111
3	34985	COUPLING HALF,PUMP	111
3	38118	COUPLING,FLEX,.25 BORE,.75 LEN	413, 717
25	34861	COVER PLATE,HOSE CLAMP	203, 215, 217, 229
404	37488-05	COVER PLATE,INCLUDES BOLTS	419
8804	37488-05	COVER PLATE,INCLUDES BOLTS	213
69	36706-02	COVER,BACK,20 PIN CONNECTOR	304
66	36705-02	COVER,BACK,30 PIN CONNECTOR	304
65	36705-01	COVER,LATCH,30 PIN CONNECT	304
68	36706-01	COVER,LATCHING,20 PIN CONNECT	304

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11	19798	COVER,STRAINER ACCESS	111
104	90276	CPLG,BOSS TANK CAR	775
7	25704	CROSSOVER PIPE,LP BURNERS	735
54	81213	CSFHS,.312-18X1.25,GR5	409, 713, 721
10	80192	CSHH,.250-20X.75,GR5	231
21	80192	CSHH,.250-20X.75,GR5	419
35	80192	CSHH,.250-20X.75,GR5	319
6	80185	CSHH,.250-20X1.00,GR5	781
44	80185	CSHH,.250-20X1.00,GR5	403, 707
93	80185	CSHH,.250-20X1.00,GR5	211, 227
26	80196	CSHH,.250-20X2.00,GR5	419
81	80941	CSHH,.250-20X2.25	209
8	80411	CSHH,.250-20X4.00,GR5	322
9	80199	CSHH,.250-20X5.00,GR5	131
51	80876	CSHH,.250-28X.50,GR5	409, 713, 721
56	80967	CSHH,.312-18X.62,GR5	113
31	80207	CSHH,.312-18X.75,GR5	755
4	80208	CSHH,.312-18X1.00,GR5	615
5	80208	CSHH,.312-18X1.00,GR5	745
8	80208	CSHH,.312-18X1.00,GR5	613, 747
9	80208	CSHH,.312-18X1.00,GR5	749
23	80208	CSHH,.312-18X1.00,GR5	735
35	80208	CSHH,.312-18X1.00,GR5	123
73	80208	CSHH,.312-18X1.00,GR5	403, 707
34	80206	CSHH,.312-18X1.25,GR5	123
56	80206	CSHH,.312-18X1.25,GR5	407, 711
45	80209	CSHH,.312-18X1.50,GR5	409, 713, 721
44	80212	CSHH,.312-18X2.00,GR5	203, 215, 217, 229
53	81211	CSHH,.312-24X.50,GR5	403, 707
55	81227	CSHH,.312-24X.875,GR5	403, 707
10	80219	CSHH,.375-16X.75,GR5	131
12	80219	CSHH,.375-16X.75,GR5	109
14	80219	CSHH,.375-16X.75,GR5	119
45	80219	CSHH,.375-16X.75,GR5	205, 217
48	80219	CSHH,.375-16X.75,GR5	113
4	71622	CSHH,.375-16X.88,GR5	613, 747
5	71622	CSHH,.375-16X.88,GR5	749
25	71622	CSHH,.375-16X.88,GR5	121
28	71622	CSHH,.375-16X.88,GR5	623
33	71622	CSHH,.375-16X.88,GR5	409, 713, 721
9	80221	CSHH,.375-16X1.00,GR5	769, 771, 773

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14	80221	CSHH,.375-16X1.00,GR5	127
15	80221	CSHH,.375-16X1.00,GR5	757
36	80221	CSHH,.375-16X1.00,GR5	123
46	80221	CSHH,.375-16X1.00,GR5	403, 405, 707, 709
6	80224	CSHH,.375-16X1.25,GR5	619, 751
10	80224	CSHH,.375-16X1.25,GR5	769, 771, 773
11	80224	CSHH,.375-16X1.25,GR5	765
12	80224	CSHH,.375-16X1.25,GR5	607, 761
13	80224	CSHH,.375-16X1.25,GR5	417
15	80224	CSHH,.375-16X1.25,GR5	119
46	80224	CSHH,.375-16X1.25,GR5	205, 219
49	80224	CSHH,.375-16X1.25,GR5	113
11	80226	CSHH,.375-16X1.50,GR5	769, 771, 773
12	80226	CSHH,.375-16X1.50,GR5	765
13	80226	CSHH,.375-16X1.50,GR5	607, 761
16	80226	CSHH,.375-16X1.50,GR5	119
47	80226	CSHH,.375-16X1.50,GR5	205, 217
106	80226	CSHH,.375-16X1.50,GR5	782
5	80228	CSHH,.375-16X1.75,GR5	322
7	80228	CSHH,.375-16X1.75,GR5	751
5	80222	CSHH,.375-24X1.00,GR5	125
37	80248	CSHH,.500-13X1.00,GR5	123
76	80248	CSHH,.500-13X1.00,GR5	409
77	80248	CSHH,.500-13X1.00,GR5	713, 721
47	80250	CSHH,.500-13X1.25,GR5	403, 405, 707, 709
6	71627	CSHH,.500-13X1.50,GR5	231
14	71627	CSHH,.500-13X1.50,GR5	417
15	71627	CSHH,.500-13X1.50,GR5	127
2302	80186	CSHH,.500-13X1.75 GR5	753
46	80186	CSHH,.500-13X1.75,GR5	113
504	80186	CSHH,.500-13X1.75,GR5	776
5	80255	CSHH,.500-13X2.00,GR5	743
13	80255	CSHH,.500-13X2.00,GR5	611
68	80255	CSHH,.500-13X2.00,GR5	215
104	80255	CSHH,.500-13X2.00,GR5	778
204	80255	CSHH,.500-13X2.00,GR5	778
105	80257	CSHH,.500-13X2.25,GR5	778
205	80257	CSHH,.500-13X2.25,GR5	778
50	80280	CSHH,.625-11X1.50,GR5	113
406	80446	CSHH,.625-11X11.00,GR5	776
1405	80283	CSHH,.625-11X2.00,GR5	625

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
404	80284	CSHH,.625-11X2.25,GR5	776
5	71640	CSHH,.625-11X2.50,GR571678	109
35	71640	CSHH,.625-11X2.50,GR571678	113
16	80287	CSHH,.625-11X3.00,GR5	127
64	80445	CSHH,.625-11X5.50,GR 5	403, 407, 707, 711
1403	71684	CSHH,.625-11X7.00,GR5	625
51	80291	CSHH,.750-10X1.25,GR5	113
54	80500	CSHH,.750-10X1.50,GR5	113
6	71643	CSHH,.750-10X1.75,GR5	109
81	80941	CSSH,.250-20X2.25	223
4	38129	CYL,1.06X.50,AIR,SPRING EXT	415, 719, 725
3	37301	CYL,3/50X4.00,2.50PSI,11.17 OA	125
59	6231	CYL,HYD,2.00X5.75STROKE,12.50	407, 711
		D	
6	39167	DECAL KIT,DISTRIBUTOR TANKS	605
5	39166	DECAL KIT,MAX MASTER	605
30	984202	DECAL KIT,MAX3 LOGO	605
4	36624	DECAL PLATE,PROD IDENT NO,MAXI	605
14	38197	DECAL,CONT BOX,MAX 3	303, 703, 705
10	72589	DECAL,DIESEL FUEL	605
20	72591	DECAL,HYDRAULIC OIL	605
15	37777	DECAL,LPG BURNER SAFETY	735
20	37850	DECAL,LPG BURNER SAFETY	741
28	38191	DECAL,MAX 3,REAR CONT BOX	319
27	36088	DECAL,REAR CONTROL,DIESEL BNR	733
27	36597	DECAL,REAR CONTROL,DIESEL BNR,W/O IGN	505
201	24735	DECAL,REMOTE MIRROR	775
60	D50	DECAL,ROSCO LOGO,MEDIUM,BLACK	605
100	10553	DECAL,SOLVENT TANK	623
1501	10553	DECAL,SOLVENT TANK	625
40	38420	DECAL,VALVE CONFIGURATION	605
3	36202	DECAL,WARNING,KEEP CLEAN	605
19	36206	DECAL,WASHDOWN PUMP BUZZER	753
200	17862	DIAL, THERM, 50° - 500° F, GROUP	621
62	36432	DIODE,.001AMP,20 VOLTS	304
2	26965	DISPLAY,KIT,LCD	303, 703, 705
203	38114	DISPLAY,LCD,2X20,SINGLE UNIT	303, 703, 705
101	15956	DOOR,TOOL BOX	627
602	22021	DOOR,TOOLBOX	776

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
2	39108	DRIVESHAFT,2" TUBE,55 3/4	233, 780
1	39109	DRIVESHAFT,END YOKE,1.25 W/5/16	233, 780
3	39111	DRIVESHAFT,END YOKE,15T SPLN	233, 780
1	39104	DRIVESHAFT,FLANGE,1310	233, 780
1	39105	DRIVESHAFT,FLANGE,1350	233, 780
4	39112	DRIVESHAFT,SET SCREW W/WIRE LK	233, 780
		E	
18	36044-26	ELECTRODE ASSY (2 ELECTRODES)	504, 732
601	38662-01	ELEMENT,SPIN ON TYPE	731
2	19425	ENCLOSURE,ELEC,4X4X6,W/1 HOLE	505, 733
3	19426	ENCLOSURE,ELEC,4X4X6,W/2 HOLES	505, 733
8	24684	ENCLOSURE,ELEC,6X6X4,MODIFIED	735
1	21676	END,PLATFORM	607, 761, 765
6003	986974	ENDPLATE,TANK PLATFORM,LEFT	769, 771, 773
6004	986976	ENDPLATE,TANK PLATFORM,RIGHT	769, 771, 773
63	36704	EXPANSION BOARD,DC-2 CONTROL	304
2	28631	EXTENSION,SPRAYBAR	409
75	28631	EXTENSION,SPRAYBAR	713, 721
7	8530	EYEBOLT	611
		F	
4	24125	FENDER,HALF,SPL,STL	749
1	21634	FENDER,SINGLE AXLE,AL	613
3	21814	FENDER,TANDEM AXLE	747
11	37680	FILLER,HYD FLUID,10 PSI	231
2	38662	FILTER ASSY,FUEL OIL	503
6	38662	FILTER ASSY,FUEL OIL	731
303	38662	FILTER ASSY,FUEL OIL	506
702	38662-01	FILTER ELEMENT (For Diesel Burner	777
701	34464	FILTER ELEMENT,HYD	777
805	34464	FILTER ELEMENT,HYD	777
1801	34464	FILTER ELEMENT,HYD	205
3	38662S2	FILTER KIT,DOUBLE BURNER	506
201	38662-01	FILTER ONLY,SPIN ON TYPE	503
18	34463	FILTER,RETURN,HP,-12SAE PORTS	205, 217
19	33781	FIT,90,16MJ-20MP	203
5	33115	FITT,45 04MJ-04MP	757
14	33115	FITT,45 04MJ-04MP	121

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
5	35830	FITT,45 06MP-06HB,CRIMPED	417
51	38203	FITT,45 12MJ-16MB	207, 219
2201	37311	FITT,90 02MP-02FP,BRASS	409
2204	37311	FITT,90 02MP-02FP,BRASS	713, 721
2207	71796	FITT,90 02MP-04HB,CRIMPED,BRAS	409
2210	71796	FITT,90 02MP-04HB,CRIMPED,BRAS	713, 721
13	986858	FITT,90 04HB-06MP	503
15	986858	FITT,90 04HB-06MP	731
1504	31971	FITT,90 04MP-04HB,CRIMPED	625
10	33365	FITT,90 04MP-06HB,CRIMPED	419
14	33365	FITT,90 04MP-06HB,CRIMPED	205, 219
3	38915	FITT,90 04MP-08NT	425, 727, 729
86	X387	FITT,90 06MJ-06FJX	209, 211, 223, 227
74	33892	FITT,90 06MJ-06MB	209, 211, 223, 227
85	X383	FITT,90 06MJ-06MP	209, 223
91	34535	FITT,90 06MJ-08MB	211, 227
9	X304	FITT,90 06MP-06HB,CRIMPED	781
72	70754	FITT,90 08MJ-06MB	207, 213, 221, 225
87	33900	FITT,90 08MJ-08FJX	213, 225
6	33328	FITT,90 08MP-08HB,CRIMPED	753
1506	33328	FITT,90 08MP-08HB,CRIMPED	625
61	X401	FITT,90 10MJ-10FJX	207, 227
13	33307	FITT,90 10MJ-12MB	205, 217
57	X269	FITT,90 12MB-12FPX	207, 221
17	34083	FITT,90 12MJ-10MB	205
58	X319	FITT,90 16MJ-16MB	207, 221
34	37245	FITT,90 16MJ-16MJ	203, 205, 217, 219
19	35781	FITT,90 16MJ-20MP	219
301	31971	FITT,90,04MP-04HB,CRIMPED	506
6	6250	FITT,90,16MJ-12MB	203, 217
37	851390302	FITT,CABLE 08MP,.250-.375	505, 733
30	38209	FITT,HES,08FJ-08HB,FLD CRMP	203, 205, 213, 217,
			219, 225
33	36606	FITT,HES,16FJ-16HB,FLD CRMP	203, 205, 219
66	72372	FITT,PLUG 02PD,DUST	207, 221
2202	35924	FITT,PLUG 02QD	713, 721
79	6408	FITT,PLUG 06MB,HEX	223
1	15795	FITT,PLUG,12MB,HEX,W/04FP	205, 219
33	6290	FITT,QD 3.00 PLUG	113
9	6289	FITT,QD 3.00F-3.00FP,BRASS	119, 782
32	6289	FITT,QD 3.00F-3.00FP,BRASS	111

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2209	38412	FITT,TEE 04HB-O4HB-04HB,BRASS	713, 721
12	72350	FITT,TEE 04MJ-04MJ-04MB	777
14	34311	FITT,TEE 04MJ-04MJ-04MJ	503
16	34311	FITT,TEE 04MJ-04MJ-04MJ	731
84	X275	FITT,TEE 06MJ-06MJ-06MJ	209, 223
30	38914	FITT,TEE 08NT	419
41	X324	FITT,TEE 12MJ-12MB-12MJ	205, 217
21	X329	FITT,TEE 16MJ-16MB-16MJ	205, 219
65	72689	FITT,TEST 06MB-02PD	207, 221
101	22781	FLANGE,FLUE LINER	506
5	36044-05	FLANGE GASKET,FELT	504, 732
4	71936	FLANGE,WELD,1 NPT	617
5	6315-9	FLAT BONNET GASKET	117
7	6315-10	FLAT CAP GASKET	117
2	20793	FLOAT RODS,HORIZONTAL	774
3	20793	FLOAT RODS,HORIZONTAL	624
1	17283	FLOAT RODS,VERTICAL	774
2	17283	FLOAT RODS,VERTICAL	624
10	35500	FLOAT,BALL,SS	624
102	27849	FLUE LINER HALF,HEX	506
1	27848	FLUE LINER W/M, DIESEL BURNER, SST	506
100	23507	FLUE LINER W/M, LP BURNER, SST	737, 741
6	22397	FLUE TUBE FLANGE W/M,DSL BURN	735
19	22397	FLUE TUBE FLANGE W/M,DSL BURN	741
15	17934	FLUSH TANK SYSTEM	625
13	36044-15	FUEL PUMP	504, 732
4	36044-04	FUEL VALVE,SHUT-OFF	504, 732
5	33320	FUSE HOLDER,12 V,20 AMP	753
202	33320	FUSE HOLDER,12 V,20 AMP	775
35	37118	FUSE HOLDER,IN-LINE,BLADE,SEAL	737
73	36766	FUSE HOLDER,PANEL MT,.25X1.25	304
203	33954	FUSE,20 AMP,.25X1.25	775
74	36767	FUSE,5 AMP,.25X1.25,SLO-BLO	304
34	36964	FUSE,BLADE,2 AMP	737
		G	
6	38153	GASKET,2.00 FLANGE	127
7	38212	GASKET,2.50,FLANGE,GRAPHITE	127
3	34981	GASKET,3" FLANGE	109
6	34981	GASKET,3" FLANGE	757

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
7	34981	GASKET,3" FLANGE	119
20	34981	GASKET,3" FLANGE	111
13	911	GASKET,3.00 COMPANION FLANGE	109
17	911	GASKET,3.00 COMPANION FLANGE	127
57	911	GASKET,3.00 COMPANION FLANGE	113
4	34983	GASKET,4" FLANGE	109
21	34983	GASKET,4" FLANGE	111
1A	34983	GASKET,4" FLANGE	125
1	1488	GASKET,FLANGE,4.00	111
9	1488	GASKET,FLANGE,4.00	115
5	5096-02	GASKET,LIGHT,CLEARANCE	603
32	38149	GASKET,SPRAY VALVE	411, 715, 723
808	38149	GASKET,SPRAY VALVE	777
74	35035	GASKET,SPRAYBAR EXT	409
76	35035	GASKET,SPRAYBAR EXT	713, 721
8015	35035	GASKET,SPRAYBAR EXT	777
26	36359	GASKET,STRAINER ACCESS	111
101	34079-01	GAUGE ASSY,TANK LEVEL	743
102	34079-02	GAUGE,FACE/DIAL ONLY	743
5	500070	GAUGE,HYD OIL LEVEL/TEMP	231
12	5122	GAUGE,PRESS,0-100PSI,2.00,04MP	741
17	5122	GAUGE,PRESS,0-100PSI,2.00,04MP	735
1802	35269	GAUGE,SIGHT LH VISUAL	205
30	38125	GEAR,SPUR,PINION,8 D.P.,17T	403, 405, 707, 709
11	4896-3	GLAND PACKING	624
9	1270	GLAND,RELIEF VALVE STEM	624
31	37196-1	GPM SENSOR	111
6002	986975	GRATING,24X45,TANK PLATFORM	769, 771, 773
13	91302	GRATING,STEP,12GAX18.75X40.00	769, 771, 773
4	33384	GREASE,TUBE. 50EP WITH DECAL	627, 777
13	35465-09	GROMMET,INS,.375ID X 1.00GRV	735
33	37560	GROMMET,INS,.62 ID,1.38 HOLE	319
3201	6573	GSKT,3.00,CPLG,HOT OIL,BUNA	111
9A	6573	GSKT,3.00,CPLG,HOT OIL,BUNA	119
6	16460	GUARD	111
1	23893	GUARD,FRONT LIVE POWER,2.5” LG	232, 779
1	17645	GUARD,FRONT LIVE POWER,4.0” LG	232, 779
6	36941	GUIDE,SLIDE RULE APPLICATION	627
5	34249	GUN,GREASE	627

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		H	
2	7303	HAIRPIN CLIP,NO 11,1/8 DIA	745
24	35043	HALF COUPLING,MOTOR,1 1/4 SHAFT	111
5	21680	HANDHOLD,LH	607, 765
4	21679	HANDHOLD,RH	607, 765
3	17247	HANDLE REWRK,HOSE REEL	782
4	18597	HANDLE W/M	131
8	23089	HANDLE,END,LH	761
23052	984948	HANDLE,FUEL,WASHDOWN	753
1	1557	HANDLE,HAND SPRAY	129
7	23088	HANDLE,SIDE,RH	761
203	8096	HANGER, HANDSPRAY HOSE	627
202	26966	HARNESS, DISPLAY	303, 703, 705
32	23845	HARNESS,15 WIRE,12.5FT	319
300	26726	HARNESS,BAR SENSOR	305
55	26899	HARNESS,MAX-3,CONT BOX-DC-2	303
10	17347	HARNESS,WIRE	309
40	23846	HARNESS,WIRE	309
20	22744	HARNESS,WIRE,J-2,W/RCPT	309
30	28957	HARNESS,WIRE,J3 A-B	309
100	23966-01	HARNESS,WIRE,LIGHTING,135.00”	603
32	28956	HARNESS,WIRE,VLV BOX,MAX3	419
42	37241-10	HARNESS,WIRING	737
15	5246	HEAD GASKET SET	115
17	6313	HEAD WITH IDLER PIN	115
102	15963	HINGE,DOOR	627
603	22022	HINGE,TOOLBOX	776
26	986274	HOLSTER ASSY,NOZZLE,WASHDOWN	755
2602	986272	HOLSTER TUBE,WASHDOWN SYSTEM	755
18	28847	HOLSTER,LOAD HOSE	119
4	17243	HOLSTER,REEL CRANK	782
202	18233	HOOK,HOSE,3.00	627
3	16499	HOOK,WASH DOWN HOSE	745
75	35611	HOSE ASSY,-06 x 36, 2500	209, 223
77	35614	HOSE ASSY,-06 x 52, 2500	209, 223
76	35612	HOSE ASSY,-06 x 61, 2500	209, 223
62	35664	HOSE ASSY,-06X106,2500	211
15	33863	HOSE ASSY,1500 PSI,-10X34.00	205, 217, 219
24	35068	HOSE ASSY,4000 PSI,-16 X 21.00	203, 217
53	37309	HOSE ASSY,4000 PSI,-16 X 27.00	203, 217

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23	35067	HOSE ASSY,4000 PSI,-16 X 45.00	203, 205, 219
#3	23553-03	HOSE ASSY,AUTO VALVE,106.00 LG	121
#1	23553-01	HOSE ASSY,AUTO VALVE,84.00 LG	121
#2	23553-02	HOSE ASSY,AUTO VALVE,84.00 LG	121
#5	23553-05	HOSE ASSY,AUTO VALVE,87.00 LG	121
#7	23553-07	HOSE ASSY,AUTO VALVE,88.00 LG	121
#4	23553-04	HOSE ASSY,AUTO VALVE,95.00 LG	121
#8	23553-08	HOSE ASSY,AUTO VALVE,95.00 LG	121
#6	23553-06	HOSE ASSY,AUTO VALVE,99.00 LG	121
3	28694	HOSE WLDMT,FLEX,3.0 X 9.34	757
8012	71814	HOSE,03,PUSH-ON,250	777
1	5347	HOSE,04,PUSH-ON,LOW PRESSURE	503
9	5347	HOSE,04,PUSH-ON,LOW PRESSURE	757
14	5347	HOSE,04,PUSH-ON,LOW PRESSURE	731
25	5347	HOSE,04,PUSH-ON,LOW PRESSURE	623
2206	5347	HOSE,04,PUSH-ON,LOW PRESSURE	409
2207	5347	HOSE,04,PUSH-ON,LOW PRESSURE	713, 721
8013	5347	HOSE,04,PUSH-ON,LOW PRESSURE	777
11	34448	HOSE,04X14,04MP-04FJX,350	735
15	34448	HOSE,04X14,04MP-04FJX,350	741
3	32881	HOSE,04X300,04FPX-04RE,350	753
702	32881	HOSE,04X300,04FPX-04RE,350	745
3	35657-96	HOSE,04X96,350 PSI	743
8	38579	HOSE,06,LOW PRESS PUSH ON	419
59	38579	HOSE,06,LOW PRESS PUSH ON	203, 207, 217, 221
29	38208	HOSE,08,HYD,3000	203, 205, 213, 215,
			217, 219, 225, 229
4	6352	HOSE,08,PUSH-ON,250	623
25	6352	HOSE,08,PUSH-ON,250	755
37	6352	HOSE,08,PUSH-ON,250	203, 215, 219, 229
7	36999	HOSE,1.00 ID,HOT ASPHALT	623
29	36999	HOSE,1.00 ID,HOT ASPHALT	111
103	36999	HOSE,1.00 ID,HOT ASPHALT	782
70	38206-41	HOSE,12 12FJ-12RJ9,3000	207, 217, 221
28	38205-25	HOSE,12 12FJ-16FJ,300	205, 219
73	38207-49	HOSE,16 16FJ-16FJ990T,4000	207
7	32952	HOSE,16,SUCTION,250	219
7	32592	HOSE,16,SUCTION,250	203, 205
3	5112R	HOSE,16X25FT,HANDSPRAY,M END	627
100	5112R	HOSE,16X25FT,HANDSPRAY,M END	131
6	5131	HOSE,3.00ID X 15FT,FLEX STL,M	782

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8	90268	HOSE,3.50ID,FLEX,METAL	619
5	38942	HOSE,ASPHALT LOAD,3.00X10FT	782
7	5131R	HOSE,ASPHALT LOAD,3.00X15FT	782
2	26137	HOSE,FEED,LH,MAX3	127
3	26138	HOSE,FEED,RH,MAX3	127
1	20841	HOSE,FLEX,MET,3.00X13.94	109, 757
5	26147	HOSE,SPRAYBAR FEED,2.00IDX72	127
4	26146	HOSE,SPRAYBAR FEED,2.00IDX80	127
19	36625	HP DSL BRNR, W/O CAD CELL	503
5	36044	HP DSL BURNER, W/CAD CELL	731
		I	
14	5255	IDLER BUSHING ONLY	115
16	5253	IDLER PIN	115
13	5244	IDLER WITH BUSHING	115
3702	38216-02	IGNITER/FLAME ROD	737
37	38216	IGNITER/FLAME ROD,W/BRACKET	737
3	36044-24	IGNITION ASSY WITH OUTFIRE	732
3	36044-03	IGNITION ASSY WITHOUT OUTFIRE	504
40	37241-08	IGNITION WIRE	737
10	29468	INS TANK,48X74X96,W/STACK	761
10	29470	INS TANK,52X80X120,D/F,AL	765
10	29504	INS TANK,60X90X176,W/STACK	769
10	29505	INS TANK,68X90X174,W/STACK	771
10	29506	INS TANK,68X90X200,W/STACK	773
1	29473	INSULATED TANK,56X84X132,W/STACK	624
		J	
53	26108	J-PLUG DWG,MAX3	303
		K	
105	34865-01	KEY,545CH	627
10	17431	KEY,SQ,.500X1.75	111
7	25933	KIT,FILTER MAX II	777
23	23553	KIT,HOSE & ADAPTER,AUTO VALVE	121
8	26689	KIT,PARTS,MAX3,1 YR	777
25	35049	KNOB,.25 SHAFT	319
801	35049	KNOB,.25 SHAFT	303, 703, 705

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1001	35619	KNOB,D-FLAT SHAFTS	303, 703, 705
1101	35619	KNOB,D-FLAT SHAFTS	303, 703, 705
		L	
70	22485	LADDER & PLATF,48X74 OFFSET	761
60	21652	LADDER & PLATF,56X84&52X80,95	765
2	21981-1	LADDER BRACKET W/M,LH	769, 771, 773
3	21981-2	LADDER BRACKET W/M,RH	769, 771, 773
70	21992	LADDER GROUP,REAR,60X90	769
70	21992-1	LADDER GROUP,REAR,68X90	771, 773
3	21683	LADDER,56X84 & 52X80	761
6	21683	LADDER,56X84 & 52X80	765
8	21683	LADDER,56X84 & 52X80	607
6	23567	LADDER,68X90,REAR HEAD	769, 771, 773
605	37048	LATCH,SLAM,FLUSH MTD,LOCKED,SS	776
2	35615	LICENSE PLATE,"ROSCO"	605
1	35663	LIGHT BAR,RED,KD502	603
6	5097	LIGHT,CLEARANCE,AMBER,W/REFLEC	603
4	5096	LIGHT,CLEARANCE,RED W/REFLECT	603
4	31983	LIGHT,RED,DASH,.50 HOLE	303, 703, 705
5	31983	LIGHT,RED,DASH,.50 HOLE	303, 703, 705
9	38687	LIGHT,STROBE,AMBER,8J,80SFPM	777
5	25948	LINK,SUPPORT,BOTTOM	403, 407, 707, 711
7	25997	LINK,SUPPORT,TOP	403, 407, 707, 711
5	16420	LOAD & SUCTION TEE W/M	111
104	34865	LOCK,RECESSED PADDLE	627
80	38476	LOCKING RING,TOGGLE SWITCH	304
8	6315-3	LOCKNUT	117
16	36044-19	LOCKNUT, NOZZLE LINE	504, 732
5	38992	LOCTITE #272	415, 719, 725
26	34998	LOCTITE,#242	405, 709
27	90723	LOOM,BRAIDED FIBERGLASS,.375	735
30	33593	LOOM,SPIRAL CUT,.25 OD,NATURAL	307
3	33590	LOOM,SPIRAL,CUT,.50 ID,NATURAL	781
3007	38520	LOOM,SPLIT,CONVOLTD,.35,NYLON	305
6	71060	LOOM,SPLIT,CONVOLUTED,.250	621
18	71060	LOOM,SPLIT,CONVOLUTED,.250	313
20	71060	LOOM,SPLIT,CONVOLUTED,.250	735
3008	71060	LOOM,SPLIT,CONVOLUTED,.250	305
10002	71060	LOOM,SPLIT,CONVOLUTED,.250	603

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6	23361	MOUNT,COOLER	232, 779
1	985422	MOUNT,FENDER,WLDMT	747, 749
2	985422	MOUNT,FENDER,WLDMT	613
1	23256	MOUNT,HOSE REEL	782
102	16493	MOUNT,MDT46 PUMP,W/M LH	778
202	16492	MOUNT,MDT46 PUMP,W/M RH	778
8	26016	MOUNT,MOTOR,SPRAYBAR	403, 405, 707, 709
3	23194	MOUNT,PUMP,FRONT LIVE	232, 779
1	17965	MOUNT,PUMP,INSTLN,PTO DRIVE,LH	778
2	17964	MOUNT,PUMP,INSTLN,PTO DRIVE,RH	778
10	16962	MOUNT,RISER,STROBE LIGHT	777
201	22469	MTG PLATE,BNR COVER,DBL FLUE	506
2	27737	MUD FLAP,24WX24	615
		N	
26	99636	NIPPLE,04X11.00,STD	741
43	99636	NIPPLE,04X11.00,STD	755
59	99636	NIPPLE,04X11.00,STD	737
24	32917	NOZZLE #0	411, 715, 723
24	35565	NOZZLE #00	411, 715, 723
24	32918	NOZZLE #1, 5 GPM/40 PSI	411, 715, 723
803	32918	NOZZLE #1, 5 GPM/40 PSI	777
24	36299	NOZZLE #1.5	411, 715, 723
24	32919	NOZZLE #2	411, 715, 723
24	32920	NOZZLE #3	411, 715, 723
7	32923	NOZZLE, #6	129, 131
7	36044-08	NOZZLE, 3.5 GAL, 45B	504, 732
21	36044-29	NOZZLE,2.0 GAL,60B	504, 732
19	36044-27	NOZZLE,2.5 GAL,45B	504, 732
17	36044-25	NOZZLE,3.0 GAL,45B	504, 732
20	36044-28	NOZZLE,3.0 GAL,60B (COLD WEATHER)	504, 732
2305	920220A	NOZZLE,FUEL WASHDOWN,W/HANDLE	753
23051	901210A	NOZZLE,FUEL,WASHDOWN	753
1	15929	NUT	409, 713, 721
35	80924	NUT,FLEXLOC,#10-24,FULL,LT	755
45	81005	NUT,FLEXLOC,#10-24,FULL,LT	737
7	80350	NUT,FLEXLOC,.250-20, FULL,LT	781
6	80350	NUT,FLEXLOC,.250-20,FULL,LT	322
11	80350	NUT,FLEXLOC,.250-20,FULL,LT	131
22	80350	NUT,FLEXLOC,.250-20,FULL,LT	419

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36	80350	NUT,FLEXLOC,.250-20,FULL,LT	319
80	80350	NUT,FLEXLOC,.250-20,FULL,LT	209, 211, 223, 227
5	80351	NUT,FLEXLOC,.312-18,FULL,LT	615
6	80351	NUT,FLEXLOC,.312-18,FULL,LT	745
9	80351	NUT,FLEXLOC,.312-18,FULL,LT	613, 747
10	80351	NUT,FLEXLOC,.312-18,FULL,LT	749
25	80351	NUT,FLEXLOC,.312-18,FULL,LT	735
32	80351	NUT,FLEXLOC,.312-18,FULL,LT	755
50	80351	NUT,FLEXLOC,.312-18,FULL,LT	407, 409, 711,
			713, 721
8	80352	NUT,FLEXLOC,.375-16, FULL,LT	751
7	80352	NUT,FLEXLOC,.375-16,FULL,LT	322
10	80352	NUT,FLEXLOC,.375-16,FULL,LT	731
12	80352	NUT,FLEXLOC,.375-16,FULL,LT	503, 769, 771, 773
13	80352	NUT,FLEXLOC,.375-16,FULL,LT	765
14	80352	NUT,FLEXLOC,.375-16,FULL,LT	607, 761
17	80352	NUT,FLEXLOC,.375-16,FULL,LT	119, 741
48	80352	NUT,FLEXLOC,.375-16,FULL,LT	205, 217, 219
54	80352	NUT,FLEXLOC,.375-16,FULL,LT	737
107	80352	NUT,FLEXLOC,.375-16,FULL,LT	782
6	80354	NUT,FLEXLOC,.500-13,FULL,LT	743
9	80354	NUT,FLEXLOC,.500-13,FULL,LT	231
11	80354	NUT,FLEXLOC,.500-13,FULL,LT	611
52	80354	NUT,FLEXLOC,.500-13,FULL,LT	113
69	80354	NUT,FLEXLOC,.500-13,FULL,LT	215
106	80354	NUT,FLEXLOC,.500-13,FULL,LT	778
206	80354	NUT,FLEXLOC,.500-13,FULL,LT	778
505	80354	NUT,FLEXLOC,.500-13,FULL,LT	776
2303	80354	NUT,FLEXLOC,.500-13,FULL,LT	753
53	80356	NUT,FLEXLOC,.625-11,FULL,LT	113
63	80356	NUT,FLEXLOC,.625-11,FULL,LT	403, 407, 707, 711
405	80356	NUT,FLEXLOC,.625-11,FULL,LT	776
1406	80356	NUT,FLEXLOC,.625-11,FULL,LT	625
24	80824	NUT,HEX,#10-24	419
34	80793	NUT,HEX,#8-32	755
34	80036	NUT,HEX,.250-20	403, 405, 707, 709
1003	80036	NUT,HEX,.250-20	603
26	80037	NUT,HEX,.312-18	121
35	80037	NUT,HEX,.312-18	403, 707
3	80038	NUT,HEX,.375-16	619
8	80038	NUT,HEX,.375-16	127

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11	80038	NUT,HEX,.375-16	119
12	80038	NUT,HEX,.375-16	417
13	80038	NUT,HEX,.375-16	757
14	80038	NUT,HEX,.375-16	109
36	80038	NUT,HEX,.375-16	113
9	80040	NUT,HEX,.500-13	127
11	80040	NUT,HEX,.500-13	417
68	80040	NUT,HEX,.500-13	407, 711
7	80042	NUT,HEX,.625-11	109
10	80042	NUT,HEX,.625-11	127
12	80097	NUT,HEX,JAM .875-14	624
27	80073	NUT,HEX,JAM,.312-18	121
12	80076	NUT,HEX,JAM,.500-13	611
36	80099	NUT,HEX,JAM,1.125-12	411, 715, 723
3	33765	NUT,LK,ELEC CND,.500-14 NPT	731
20	33765	NUT,LK,ELEC CND,.500-14 NPT	503
		O	
49	91500	OIL,HYDRAULIC,ISO68	219
49	90735	OIL,HYDRAULIC,MULTI SERVICE	203
3	38054	O-RING,.103 X .362,VITON	415, 719, 725
808	36808	ORING,3.237 ID X .103,SAE 152	207
27	35008	O-RING,4.50 OD	409, 713, 721
8014	35008	O-RING,4.50 OD	777
		P	
2	21636	PAD,TAPPED	747, 749
3	21636	PAD,TAPPED	613
2	5257	PACKING GLAND	115
4	32821	PACKING RETAINER WASHER	115
7	34972-01	PACKING SET,3 RINGS	125
201	5059	PACKING,.125 SQ	627
3	5249	PACKING,10 PCS PER PACK	115
8011	5249	PACKING,10 PCS PER PACK	777
602	23562	PAD,MOUNT	769, 771, 773
8	71716	PAN HEAD SCREW,#10-24 UNC X3/4	611
54	26427	PANEL,CONT BOX,MAX 2	303
14	35480	PENETRATING THREAD LOCKER 29014	131
61	9081	PIN,HYD,LIFT CYLINDER	407, 711

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12	99299	PIPE PLUG,2.00MP,SKT HD,MI	231
3	35254	PIPE PLUG,MAG,06MP,SQ HD	231
701	12447	PIPE W/SLUG THERM TUBE AMC ENG	745
2003	99492	PIPE, CPLG, 08FP	621
38	99503	PIPE,45,04FP,MI	755
31	99507	PIPE,45,16FP,MI	623
3	91531	PIPE,90,04FP-0FMP,FORGED,2000#	741
32	91531	PIPE,90,04FP-0FMP,FORGED,2000#	735
710	91531	PIPE,90,04FP-0FMP,FORGED,2000#	745
39	99512	PIPE,90,08FP,MI	755
6	99526	PIPE,90,08MP-08FP,MI	417
40	99526	PIPE,90,08MP-08FP,MI	755
58	99526	PIPE,90,08MP-O8FP,MI	113
5	91158	PIPE,90,12FP-08FP,GALV	129
52	99527	PIPE,90,12MP-12FP,MI	203, 219
32	99514	PIPE,90,16FP,MI	623
90	99514	PIPE,90,16FP,MI	221
5	99528	PIPE,90,16MP-16FP,MI	617
59	99528	PIPE,90,16MP-16FP,MI	113
11	99448	PIPE,BUSH,06MP-04FP,STL	757
304	99448	PIPE,BUSH,06MP-04FP,STL	506
4	99980	PIPE,BUSH,08MP-04FP,STL	503
13	99980	PIPE,BUSH,08MP-04FP,STL	419
19	99980	PIPE,BUSH,08MP-04FP,STL	731
44	99980	PIPE,BUSH,08MP-04FP,STL	755
1515	99980	PIPE,BUSH,08MP-04FP,STL	625
305	99450	PIPE,BUSH,08MP-06FM,MI	506
2002	99450	PIPE,BUSH,08MP-06FM,MI	621
14	99463	PIPE,BUSH,1.25 MP-12FP,MI	231
7	99984	PIPE,BUSH,12MP-06FP,STL	417
8	99460	PIPE,BUSH,16MP-04FP,MI	621
1516	99990	PIPE,BUSH,16MP-08FP,STL	625
12	91159	PIPE,BUSH,16MP-12FP,GALV,MI	131
5002	99479	PIPE,CAP,12FP,MI	411, 715, 723
27	99490	PIPE,CPLG,04FP	741
60	99490	PIPE,CPLG,04FP	737
6	90126	PIPE,CPLG,1.00	129, 131
7	90126	PIPE,CPLG,1.00	621
709	90897	PIPE,HALF CPLG,06FP,300#	745
5001	983602	PIPE,HEX BUSHING,4X.75,BLK,MI	715, 723
5	99638	PIPE,NIPPLE,.375XCLOSE	503

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20	99638	PIPE,NIPPLE,.375XCLOSE	731
309	99638	PIPE,NIPPLE,.375XCLOSE	506
2	90745	PIPE,NIPPLE,04X1.50,300#	735
9	90746	PIPE,NIPPLE,04X2.50,300#	741
30	90746	PIPE,NIPPLE,04X2.50,300#	735
28	985812	PIPE,NIPPLE,04X36.00	741
61	985812	PIPE,NIPPLE,04X36.00	737
31	90749	PIPE,NIPPLE,04X4.00,300#	735
708	90749	PIPE,NIPPLE,04X4.00,300#	745
12	99591	PIPE,NIPPLE,04XCLOSE(7/8)	419
5	90744	PIPE,NIPPLE,04XCLOSE,300#	741
29	90744	PIPE,NIPPLE,04XCLOSE,300#	735
707	90744	PIPE,NIPPLE,04XCLOSE,300#	745
8	99638	PIPE,NIPPLE,06XCLOSE	781
42	99596	PIPE,NIPPLE,08XCLOSE	755
55	99596	PIPE,NIPPLE,08XCLOSE	203, 215, 219, 229
64	99596	PIPE,NIPPLE,08XCLOSE	113
5003	99602	PIPE,NIPPLE,12X3.00	411, 715, 723
13	99600	PIPE,NIPPLE,12XCLOSE	131
56	99606	PIPE,NIPPLE,16XCLOSE	203, 219
65	99606	PIPE,NIPPLE,16XCLOSE	113
607	99535	PIPE,PLUG,.250,SQ HEAD,MI	776
1514	99535	PIPE,PLUG,04MP,SQ HD,MI	625
8	99537	PIPE,PLUG,08MP,SQ HD,MI	417
60	99538	PIPE,PLUG,12MP,SQ HD,MI	113
57	70700	PIPE,PLUG,16MP,SQ CSK HEAD,MI	409, 713, 721
33	99539	PIPE,PLUG,16MP,SQ HD,MI	623
61	99539	PIPE,PLUG,16MP,SQ HD,MI	113
204	99539	PIPE,PLUG,16MP,SQ HD,MI	627
27	70444	PIPE,PLUG,2.00MP,SQ HD,MI	623
1510	70444	PIPE,PLUG,2.00MP,SQ HD,MI	625
306	99537	PIPE,PLUG08MP,SQ HEAD	506
1512	91316	PIPE,TBE,08X55.00	625
1511	91315	PIPE,TBE,08X83.00	625
6	91532	PIPE,TEE,04FP,FORGED,2000#	741
33	91532	PIPE,TEE,04FP,FORGED,2000#	735
712	91532	PIPE,TEE,04FP,FORGED,2000#	745
3	99568	PIPE,TEE,06FP,MI	503
18	99568	PIPE,TEE,06FP,MI	731
307	99568	PIPE,TEE,06FP,MI	506
41	99569	PIPE,TEE,08FP,MI	755

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
62	99569	PIPE,TEE,08FP,MI	113
308	99569	PIPE,TEE,08FP,MI	506
54	99581	PIPE,TEE,16FP-16FP-08FP,MI	203, 215, 219, 229
63	99589	PIPE,UNION,16FP,MI	113
20	26142	PLATE,ACCESS	403, 405, 707, 709
11	26033	PLATE,SLIDE	409, 713, 721
4	24659	PLATE,SWITCH	735
21	15944	PLATE,TAPPED	623
1502	15944	PLATE,TAPPED	625
2	28953	PLATE,VLV,MAX3	419
3	21678	PLATFORM	607, 765
14	25237	PLATFORM W/M	111
101	23233	PLATFORM W/M,HOSE REEL	782
9	22484	PLATFORM,NON-SKIRT	761
2	15772	PLATFORM,PUMP	111
60	986973	PLATFORM,REAR,TANK ASSY	769, 771, 773
17	37287	PLUG,CAVITY,METRI PACK,150 S	319
23	37287	PLUG,CAVITY,METRI PACK,150 S	321
1	25260	PLUNGER	415, 719, 725
4	17288-1	POINTER,W/M 17.25	624
20	17288-1	POINTER,W/M 17.25	769, 771, 773
5	17288-2	POINTER,W/M,FR HEAD	624
20	17288-2	POINTER,W/M,FR HEAD	761, 765
2	6315-8	POPPET	117
1001	984385	PORT KIT,08 THREADED	753
1	17438	PORTABLE TORCH HOLDER,W/M	745
19	26141	POT ASSEMBLY,MAX3	403, 405, 707, 709
801	26141	POT ASSEMBLY,MAX3	777
1	26184	POTENTIOMETER W/CONN,MAX3	413, 717
8	35050	POTENTIOMETER,100 OHM	303, 703, 705
26	35050	POTENTIOMETER,100 OHM	319
15	22697	PUMP DISCHARGE MANIFOLD W/M	111
14	36044-16	PUMP NOZZLE FITTING	504, 732
200	38200	PUMP,HYD,CONSTANT FLOW	207
120	38120	PUMP,HYD,M46,CC2,EDC,A PAD	207
10	985043	PUMP,WATER/FUEL,DIAPHRAGM,12V	753

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		R	
14	26036	RACK,GEAR,8 D.P.,MODIFIED	409, 713, 721
2	35023	RADAR HORN	322
6001	27538	RAIL SIDE	769, 771, 773
4	986648	RAIL W/M,SAFETY,LADDER PLATFORM	769, 771, 773
18	26112	RAIL,BARSLIDE,BTTM	403, 707
9	26017	RAIL,BARSLIDE,TOP	403, 707
15	36888	RCPT,FREE HNG,4 CONT,#11 SHELL	313
2	22711	REAR PLATFORM & PIPING ASSY,96	109
2304	920200	REEL,W/HOSE,SPRAY DOWN	753
23	986227	REEL,W/HOSE,SPRAYDOWN	753
2	35463	REEL,W/O HOSE,HOLDS 1”X50’	782
3	5037	REFLECTOR,AMBER	603
2	5036	REFLECTOR,RED	603
11	6119	REGULATOR,LPG	741
18	6119	REGULATOR,LPG	735
711	6119	REGULATOR,LPG	745
17	36085	RELAY,SPDT,40AMP,12VDC	753
25	36085	RELAY,SPDT,40AMP,12VDC	505, 733
402	37488-03	RELIEF VALVE	419
8802	37488-03	RELIEF VALVE	213
20	6315	RELIEF VALVE ASSY	115
19	6314	RELIEF VALVE GASKET SET	115
1	22489	RESERVOIR,20 GAL	231
2	22750	RESERVOIR,CLEANOUT COVER	231
4	22490	RESERVOIR,INSTALLATION,20 GAL	203, 219
75	37127	RESISTOR,100 OHM,5 WATT	304
61	35927	RESISTOR,50 OHM,3 WATT	304
72	36765	RESISTOR,560 OHM,3 WATT	304
5001	10166	REWORK,BAR PLUG	411
65	37187	RING,SPLIT,2.02IDX.18,ZINC CTD	403, 407, 707, 711
604	33220	RIVET,BLIND,STL,.125,.188-.250	776
606	80964	RIVET,BLIND,STL,.188,.126-250	776
6	80345	ROLL PIN,.250X1.50	125
10	80348	ROLL PIN,.500X1.50	611
12	5241	ROTOR AND SHAFT	115
5	5247	ROTOR BEARING SLEEVE BUSHING ONLY	115
7	6541	ROTOR BEARING SLEEVE GASKET	115
10	5251	ROTOR BEARING SLEEVE WASHER	115
6	5250	ROTOR BEARING WITH BUSHING SLEEVE	115
11	5248	ROTOR THRUST WASHER	115

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		S	
1002	81160	SCR,SLF DRL,HH,#10X1.00,#3PT	603
7	81160	SCR,SLFDRL,HH,#10X1.00,#3PT	603
8	81160	SCR,SLFDRL,HH,#10X1.00,#3PT	605
11	81160	SCR,SLFDRL,HH,#10X1.00,#3PT	731
15	81160	SCR,SLFDRL,HH,#10X1.00,#3PT	503
7	80324	SCR,SLFTPG,HH,.250-20X.75	619
48	80324	SCR,SLFTPG,HH,.250-20X.75	403, 405, 707, 709
4	23196	SCREEN	232, 779
4	23353	SCREEN	232, 779
3801	23353	SCREEN	203
17	28519	SCREEN,WLDMT,CONE	111
205	81062	SCREW,SELF TAP,BTN HD,.312X	627
2901	38122-02	SEAL KIT,38122 MOTOR	403, 707
2901	38122-01	SEAL KIT,38122 MOTOR	405, 709
701	34970-01	SEAL KIT,602 VLV	111
801	34971-01	SEAL KIT,606 VLV	111
1501	35149-01	SEAL KIT,ACTUATOR	121
5901	6231-01	SEAL KIT,FOR CYL	407, 711
34	36166	SEAL,CABLE,18-16 GA	307
3003	36166	SEAL,CABLE,18-16 GA	305
16	37286	SEAL,CABLE,METRI PACK,150 S	319
22	37286	SEAL,CABLE,METRI PACK,150 S	321
78	37286	SEAL,CABLE,METRI PACK,150 S	304
27	36360	SEALANT,PIPE,W/TEFLON,8.45 OZ	111
39	80397	SET S,HSKT,KCUP,.312-18X.50	123
15	26059	SHAFT,THD'D,1.75	403, 405, 707, 709
50	28954	SHEET, BLANKING	419
101	13657	SHIM PLATE	778
201	13657	SHIM PLATE	778
4	15787	SHIM,MOTOR MOUNT	111
50	90803	SLEEVE,ABRASION,NYLON,1.75ID	203, 219
2209	90803	SLEEVE,ABRASION,NYLON,1.75ID	409
2212	90803	SLEEVE,ABRASION,NYLON,1.75ID	713, 721
9	23059	SOCKET WLDMT,1.50 SQ	121
7	22776	SOCKET WLDMT,2 SQ	121
2203	35925	SOCKET,QUICK COUPLER,02NPT	713, 721
10	37241-07	SOLENOID	741
39	37241-07	SOLENOID	737
103	34079-03	SOLENOID,52GAL LP TANK	743

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2	39107	SOLID SHAFT ASSEMBLY	233, 780
13	27046	SPACER,HYD TANK MOUNT	777
1	21799	SPACER,LADDER	769, 771, 773
6	21799	SPACER,LADDER	761
7	21799	SPACER,LADDER	607
8	21799	SPACER,LADDER	765
60	25561	SPACER,LADDER	761
5	22322	SPACER,LADDER,60X90	769, 771, 773
50	21236	SPACER,LCD DISPLAY,EZ-1S	303
4	20596	SPACER,SOCKET,3.00 3 WAY VALVE	121
3	23959	SPLICE,TRIPLE AXLE FENDER	749
402	35209	SPR,1.62 DIAX3.5,1005 PSI	776
1402	35209	SPR,1.62 DIAX3.5,1005 PSI	625
23	26469	SPRAY VALVE ASSEMBLY,MAX3	411, 715, 723
802	26469	SPRAY VALVE ASSEMBLY,MAX3	777
3	25901	SPRAYBAR W/M,EXTENDABLE	409, 713, 721
5	19576	SPRAYBAR,HANDSPRAY,2-NOZZLES	129, 131
5	19578	SPRAYBAR,HANDSPRAY,3-NOZZLES	129, 131
74	28630	SPRAYBAR,W/M,EXT	713, 721
3	6315-7	SPRING	117
4	6315-4	SPRING GUIDE	117
72	38660	SPRING,MAX3,TORSION	403, 707
10	36044-11	SQUARE PLATE	504, 732
6	36044-06	SQUARE PLATE GASKET	504, 732
200	22911	STAND,EZ-1S CONTROLLER	304
24	36050	STANDOFF,10-32UNFX3,MALE-FEM	505, 733
58	26622	STIFFENER,WIDE,SCISSOR BAR	407, 711
2	26140	STOP,POT BODY	413, 717
12	19800	STRAINER W/M,DISCH MANIFOLD	111
21	36926	STRAINER,LQD,100MESH,NYL,08FP	753
8	33148	STRAINER,SUCT,2NPT,25GPM,100ME	203, 219
4	5121	STRAINER,Y,.250PT,40 MESH	741
16	5121	STRAINER,Y,.250PT,40 MESH	735
1	35244	STRIP,ADH SPONGE,.75X.062	605
3	17648	SUPPORT,BURNER PIPING	735
8	17648	SUPPORT,BURNER PIPING	741
2	15984	SUPPORT,FILTER	205, 217
6	25949	SUPPORT,SPRAYBAR,LH	407, 711
4	25944	SUPPORT,SPRAYBAR,RH	407, 711
1	21596	SUPPORT,W/M,AIR LINE OILER	781
3	17376	SUPPORT,W/M,LOAD & TRANSFER	119

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1	19344	SWITCH PLATE,HP DIESEL BURNER	505, 733
26	36087	SWITCH,PUSH BUT,MOMENTARY	733
14	35892	SWITCH,ROCKER,SPST,OFF/ON	735
22	35892	SWITCH,ROCKER,SPST,OFF/ON	505, 733
11	38116	SWITCH,RTRY,1POLE,11POS	303, 703, 705
10	35618	SWITCH,RTRY,4 POLE,11 POS	303, 703, 705
4	36343	SWITCH,TEMP,210 DEG F.,-08MP	231
6	37342	SWITCH,TOGGLE,3PDT,2 POS,9 POLE	303, 703, 705
3	38158	SWITCH,TOGGLE,DPDT,2 POS,6 POLE	303, 703, 705
12	36768	SWITCH,TOGGLE,DPDT,3-POS,LONG	303, 703, 705
13	38185	SWITCH,TOGGLE,DPDT,MOM,BLADE	303, 703, 705
1	38157	SWITCH,TOGGLE,DPST,2 POS	303, 703, 705
9	37516	SWITCH,TOGGLE,SPDT,3-POS,MOM	303, 703, 705
27	37516	SWITCH,TOGGLE,SPDT,3-POS,MOM	319
15	37552	SWITCH,TOGGLE,SPST,2-POS	753
204	35447	SWITCH,TOGGLE,SPST,LIGHTED	775
6	37439	SWIVEL,IN-LINE,16FP	129
		T	
22	28539	TAB,MT PIPING BRACKET	741
38	28539	TAB,MT PIPING BRACKET	737
2603	986273	TAB,WASHDOWN HOLSTER	755
7	81159	TACK,DIA.146/.104X.04 GRIP LG	605
401	14253	TANK MOUNT,TRUCK ANGLE	776
1401	14253	TANK MOUNT,TRUCK ANGLE	625
3	16244-1	TANK MOUNTING HARDWARE (TANDEM)	775
13	17565	TANK MOUNTING,SINGLE	624
1	21701	TANK WLDMT,DIESEL	623
1503	21701	TANK WLDMT,DIESEL	625
1	34079	TANK,LPG,52GAL (TANK ONLY)	743
50	38414	TAPE,BUTYL,GLASS SETTING	605
4	38435	TEMP PROBE,RTD,9 IN,MIN INS	621
20	37284	TERM, PIN METRIC PACK 150 SERIES	321
79	38038	TERM,BLOCK,4-GANG	304
8	36118-2	TERM,CRIMP,16-14 GA	421, 423
14	37284	TERM,PIN,METRIC PACK 150 SERIES	319
49	72203	TERM,PUSH-ON,.18,FEM,16-14 GA	737
84	72203	TERM,PUSH-ON,.18,FEM,16-14 GA	304
18	37420	TERM,PUSH-ON,.25,ADPTR,FM-M-M	319
16	33610	TERM,PUSH-ON,.25,FEM,12-10 GA	505, 733

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8	33600	TERM,PUSH-ON,.25,FEM,16-14 GA	753
13	33600	TERM,PUSH-ON,.25,FEM,16-14 GA	505, 733
51	33600	TERM,PUSH-ON,.25,FEM,16-14 GA	737
10	35926	TERM,PUSH-ON,.25,FEM,22-18 GA	319
16	35926	TERM,PUSH-ON,.25,FEM,22-18 GA	753
22	35926	TERM,PUSH-ON,.25,FEM,22-18 GA	121
60	35926	TERM,PUSH-ON,.25,FEM,22-18 GA	304
5	36348	TERM,PUSH-ON,.25,M,18-14,SLV	421, 423
2	33612	TERM,RING,12-10 GA,.375 STUD	731
8	33612	TERM,RING,12-10 GA,.375 STUD	503
50	851390204	TERM,RING,16-14 GA,#10 STUD	737
48	35123	TERM,RING,16-14 GA,#6 STUD	737
58	35123	TERM,RING,16-14 GA,#6 STUD	304
23	33607	TERM,RING,16-14 GA,.250 STUD	307
30	33607	TERM,RING,16-14 GA,.250 STUD	319
83	72143	TERM,RING,22-16 GA,#8 STUD	304
22	37224	TERM,RING,22-16GA,#10 STUD	753
33	36165	TERM,SEALED CONN,16-14 GA,FEM	307
3002	36165	TERM,SEALED CONN,16-14 GA,FEM	305
3001	36164	TERM,SEALED CONN,16-14 GA,MALE	305
15	37285	TERM,SOCKET,METRI PACK,150 S	319
21	37285	TERM,SOCKET,METRI PACK,150 S	321
77	37285	TERM,SOCKET,METRI PACK,150 S	304
22	37422	TERM,SOLDER SPLICE,20-10 AWG	421, 423, 735
47	37421	TERM,SOLDER SPLICE,22-14 AWG	737
85	851240145	TERMINAL BLOCK	304
26	36762-01	TERMINAL,METRI-PACK, 150 SERIE	307
14	20166	THD'D ROD,.500-13X3.25	611
300	5133	THERM, ARMORED,PENCIL,100° - 600° F	621
2001	5470	THERM, DIAL, 5.0 FACE, 500F	621
100	22212	THERMOMETER GROUP	621
25	35554	THREADLOCKER,HIGH TEMP 272	111
301	16159	TIE DOWN W/M,TANK	775
1301	16159	TIE DOWN W/M,TANK	624
13	851201417	TIE WRAP,.094X4.00	731
16	851201417	TIE WRAP,.094X4.00	311
21	851201417	TIE WRAP,.094X4.00	313
22	851201417	TIE WRAP,.094X4.00	503
3009	851201417	TIE WRAP,.094X4.00	305
64	33597	TIE WRAP,.188X11.00	207, 217, 221
7	33596	TIE WRAP,.188X7.5	753

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1	23977	TOOLBOX ASSEMBLY	627
6	22012	TOOLBOX ASSY,18X18X36	776
601	22008	TOOLBOX WLDMT,18X18X36	776
103	23974	TOOLBOX WLDMT,W/CONTROL BOX	627
4	20168	TOP OPENING COVER	611
2	20165	TOP OPENING COVER CROSS BAR	611
5	36062	TOP OPENING COVER GASKET	611
6	6066	TOP OPENING COVER KNOB	611
1	20162	TOP OPENING COVER LATCH	611
3	20167	TOP OPENING COVER RETAINER	611
15	21282	TOP OPENING SCREEN ASSEMBLY,FULL	611
7	25666	TORCH,PORTABLE,LPG	745
5	19892	TRANSFER LINE,LOWER,GRD LEVEL	119
4	19891	TRANSFER LINE,UPPER,GRD LEVEL	119
4	16244-2	TRUCK MOUNTING HARDWARE (TANDEM)	776
14	17564	TRUCK MOUNTING,SINGLE	625
22	27021	TUBE ASSY,HYD,MAX,PTO	217, 229
22	23383	TUBE ASSY,HYDRAULICS,MAX II	203, 205, 215
16	36481	TUBING,AIR BRAKE,BLK,08	419
59	35504	TUBING,HEAT SHRINK,.250	304
31	35514	TUBING,HEAT SHRINK,.50	307
16	35568	TUBING,HEAT SHRINK,.750	315, 317
24	35568	TUBING,HEAT SHRINK,.750	307
		U	
8	35089	U-BOLT,.375-16,3.62IW,4.62IL	119
		V	
401	37488-01	VALVE	419
8801	37488-01	VALVE	213
2	28184	VALVE ASSY,TANK,3.00	757
1	6315-6	VALVE BODY	117
102	15182	VALVE HANDLE WELDMENT	775
2203	38132	VALVE,3 WAY,02X02X02,	409
2206	38132	VALVE,3 WAY,02X02X02,	713, 721
807	38132	VALVE,3 WAY,02X02X02,	777
806	38130	VALVE,3 WAY,AIR,SPRAY BAR	777
2202	38130	VALVE,3 WAY,AIR,SPRAY BAR	409
2205	38130	VALVE,3 WAY,AIR,SPRAY BAR	713, 721

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2	280210	VALVE,BALL,1.00	617
6	280210	VALVE,BALL,1.00	623
19	280210	VALVE,BALL,1.00	111
7	38816-01	VALVE,SOL,AIR,3 CV	757
1	14850	VENTED TANK CAR VALVE	775
101	14849	VLV,3.00,2 WAY PLUG/W .25,NP	775
2	38991-01	VLV,36 SERIES	425, 727, 729
8	27136	VLV,ASSY,TANK,4 INCH	121
6	480160	VLV,BALL,.375	419
28	36622	VLV,BALL,08 NPT,T HANDLE	111
8	35832	VLV,BALL,12 NPT	131
36	6351	VLV,CHECK,08 NPT,20 PSI CRACK	203, 215, 219, 229
5	35569	VLV,CHECK,08 NPT,SWING	623
1507	35569	VLV,CHECK,08 NPT,SWING	625
3	5499	VLV,DRAIN COCK,.250 NPT	623
4	910150	VLV,DRAIN COCK,.250 NPT	417
103	5499	VLV,DRAIN COCK,.250 NPT	775
1509	5499	VLV,DRAIN COCK,.250 NPT	625
6	34973	VLV,GATE,3.00,FLANGED	119
95	38210	VLV,HYD,FLOW DIVIDER,	209, 223
7	34318	VLV,LPG,RELIEF,04 NPT,450 PSI	741
10	34318	VLV,LPG,RELIEF,04 NPT,450 PSI	735
13	6120	VLV,NEEDLE,04 FEMALE,NPT	741
19	6120	VLV,NEEDLE,04 FEMALE,NPT	735
704	6120	VLV,NEEDLE,04 FEMALE,NPT	745
14	6297	VLV,PILOT	741
705	6297	VLV,PILOT	745
7	16464	VLV,PLUG,3.00 2-WAY,MODIFIED	111
8	16465	VLV,PLUG,3.00 3-WAY,MODIFIED	111
11	37049	VLV,PRESS PROTECTION,102-88	419
5	38815	VLV,SOL,AIR,8 POS,ASSY,1 CV	419
1	27135	VLV,WLDMT,TANK,4"	125
		W	
3	18593	WAND,HANDSPRAY	129
31	38141	WASHER,1.50ODX1.187IDX.10THK	411, 715, 723
2601	80963	WASHER,FLAT,SAE,.312	755
3	80141	WASHER,FLAT,USS,.313	615
4	80141	WASHER,FLAT,USS,.313	745
5	80141	WASHER,FLAT,USS,.313	613, 747

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6	80141	WASHER,FLAT,USS,.313	749
7	80141	WASHER,FLAT,USS,.313	731
9	80141	WASHER,FLAT,USS,.313	503
21	80141	WASHER,FLAT,USS,.313	735
28	80141	WASHER,FLAT,USS,.313	121
30	80141	WASHER,FLAT,USS,.313	755
38	80141	WASHER,FLAT,USS,.313	113, 403, 407,
			707, 711
4	80142	WASHER,FLAT,USS,.375	322, 619
5	80142	WASHER,FLAT,USS,.375	751
6	80142	WASHER,FLAT,USS,.375	613, 747
7	80142	WASHER,FLAT,USS,.375	749, 769, 771, 773
8	80142	WASHER,FLAT,USS,.375	731
9	80142	WASHER,FLAT,USS,.375	765
10	80142	WASHER,FLAT,USS,.375	503, 607
11	80142	WASHER,FLAT,USS,.375	761
12	80142	WASHER,FLAT,USS,.375	119
15	80142	WASHER,FLAT,USS,.375	417
18	80142	WASHER,FLAT,USS,.375	741
29	80142	WASHER,FLAT,USS,.375	121
30	80142	WASHER,FLAT,USS,.375	623
39	80142	WASHER,FLAT,USS,.375	403, 405, 707, 709
42	80142	WASHER,FLAT,USS,.375	205, 217, 219
55	80142	WASHER,FLAT,USS,.375	737
105	80142	WASHER,FLAT,USS,.375	782
4	80144	WASHER,FLAT,USS,.500	743
7	80144	WASHER,FLAT,USS,.500	231
30	80144	WASHER,FLAT,USS,.500	121
67	80144	WASHER,FLAT,USS,.500	215
69	80144	WASHER,FLAT,USS,.500	407, 711
103	80144	WASHER,FLAT,USS,.500	778
203	80144	WASHER,FLAT,USS,.500	778
503	80144	WASHER,FLAT,USS,.500	776
9	871071601	WASHER,LOCK,#10	611
46	871071601	WASHER,LOCK,#10	737
8	80160	WASHER,LOCK,.250	231
40	80160	WASHER,LOCK,.250	403, 707
9	80161	WASHER,LOCK,.312	731
11	80161	WASHER,LOCK,.312	503
31	80161	WASHER,LOCK,.312	121
41	80161	WASHER,LOCK,.312	113, 403, 707

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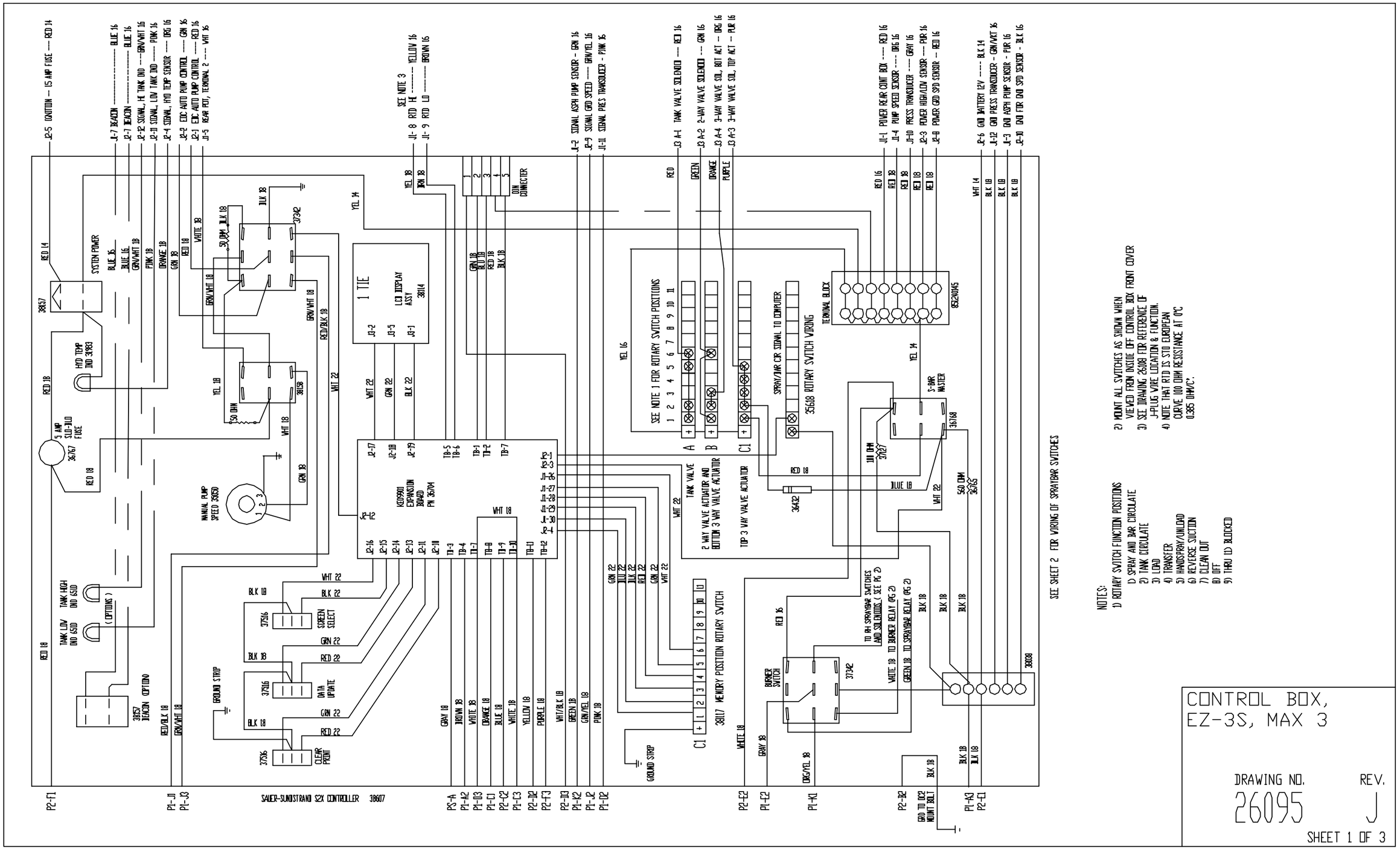
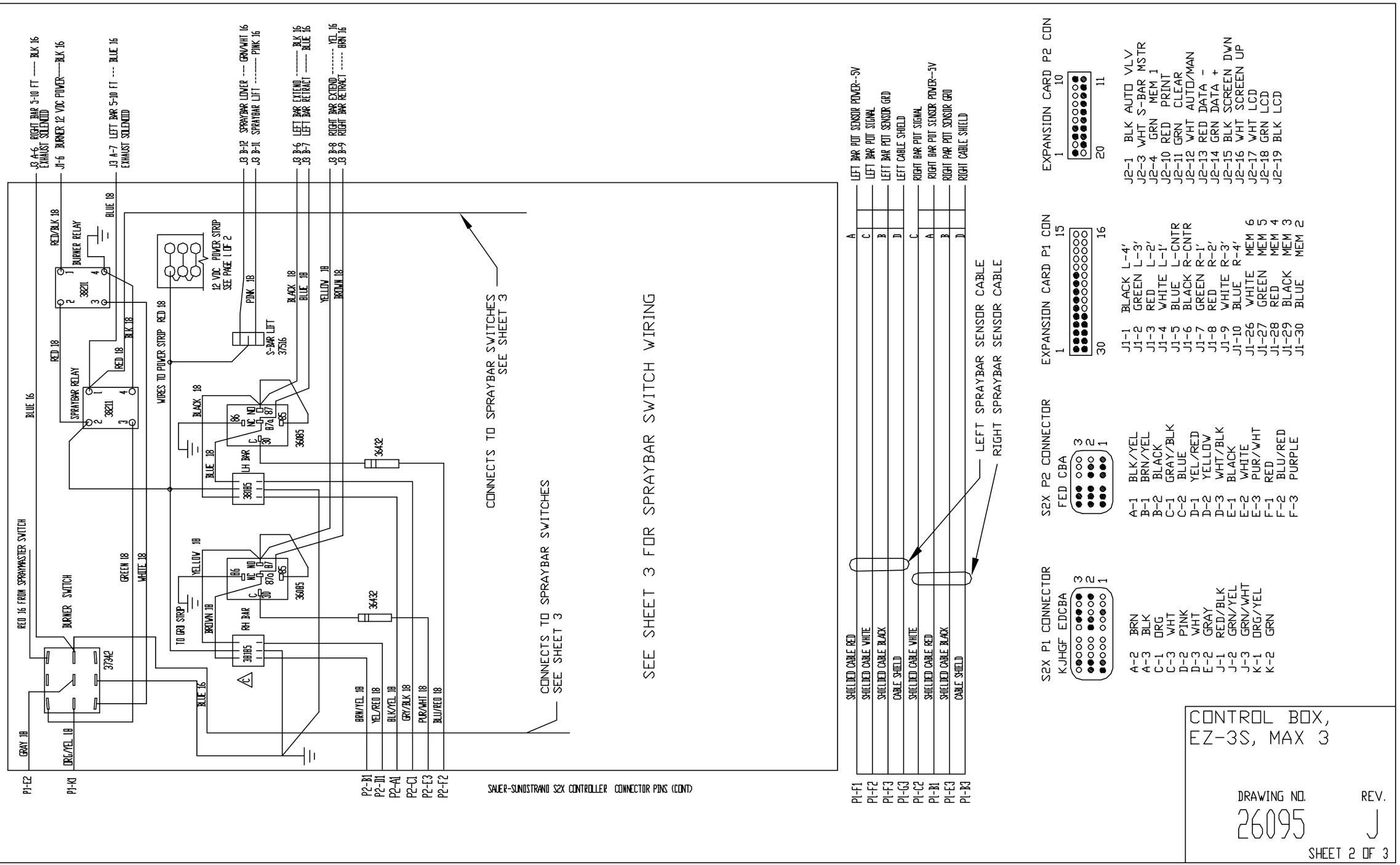
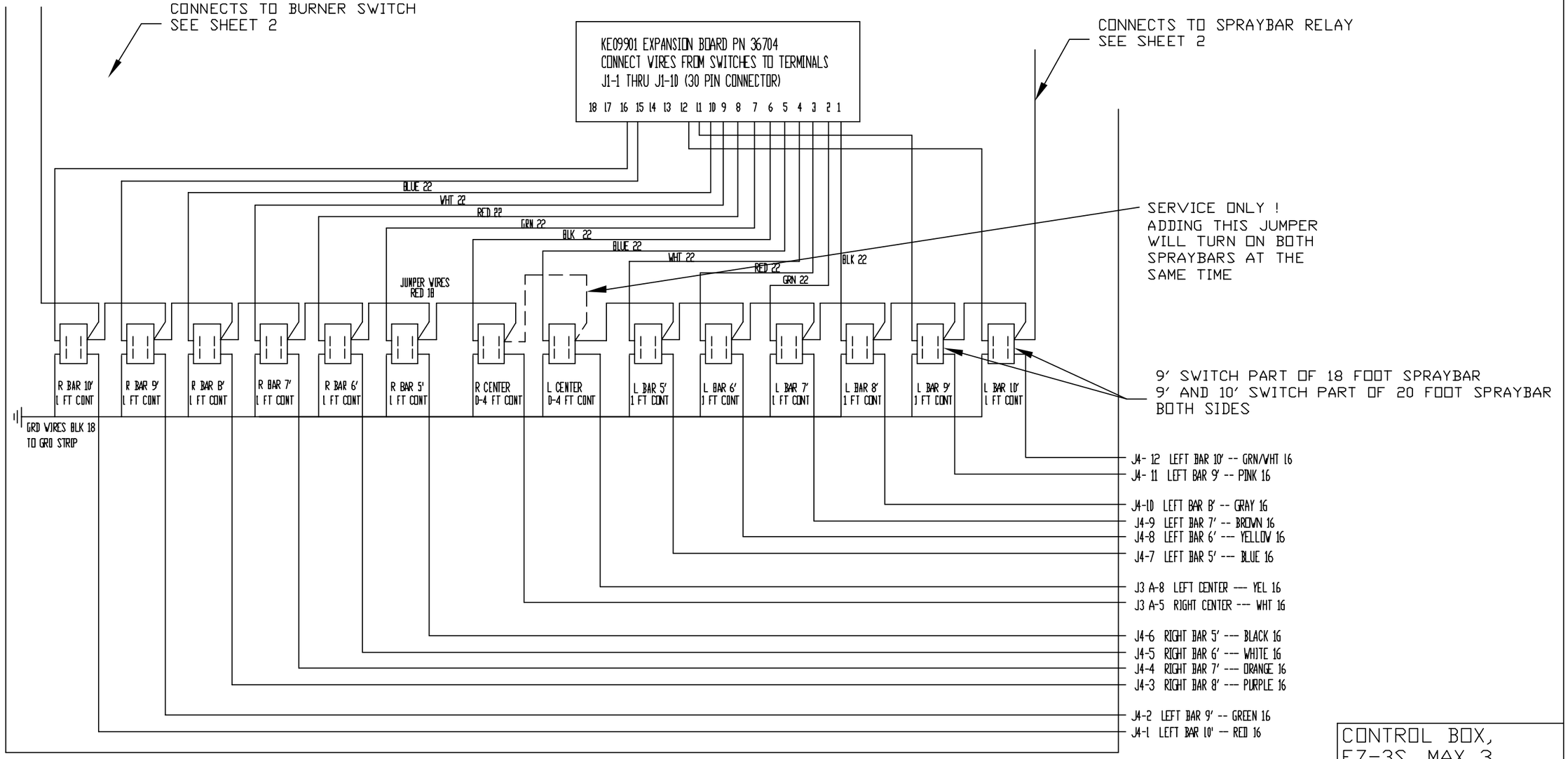
4	80162	WASHER,LOCK,.375	125
5	80162	WASHER,LOCK,.375	619
7	80162	WASHER,LOCK,.375	613, 747
8	80162	WASHER,LOCK,.375	749, 769, 771, 773
9	80162	WASHER,LOCK,.375	109
10	80162	WASHER,LOCK,.375	417, 765
11	80162	WASHER,LOCK,.375	127, 607
13	80162	WASHER,LOCK,.375	119
14	80162	WASHER,LOCK,.375	757
29	80162	WASHER,LOCK,.375	623
32	80162	WASHER,LOCK,.375	121
42	80162	WASHER,LOCK,.375	113, 403, 405, 707, 709
43	80162	WASHER,LOCK,.375	205, 217
9	80164	WASHER,LOCK,.500	417
12	80164	WASHER,LOCK,.500	127
33	80164	WASHER,LOCK,.500	123
43	80164	WASHER,LOCK,.500	113, 403, 405, 409, 707, 709, 713, 721
2301	80164	WASHER,LOCK,.500	753
10	80166	WASHER,LOCK,.625	109
13	80166	WASHER,LOCK,.625	127
44	80166	WASHER,LOCK,.625	113
11	80168	WASHER,LOCK,.750	109
45	80168	WASHER,LOCK,.750	113
204	39086	WASHER,LOCK,EXT TOOTH,#6	303, 703, 705
55	80695	WASHER,SAE PLAIN,.500	113
33	80792	WASHER,SPLIT LOCK,#8	755
16	26060	WASHER,SQ,.281IDX1.5	403, 405, 707, 709
28	35036	WASHER,TEFLON	409, 713, 721
8016	35036	WASHER,TEFLON	777
23	80995	WASHER,TYPE A PLAIN,#10	419
36	80995	WASHER,TYPE A PLAIN,#10	755
5	80140	WASHER,TYPE A PLAIN,.250	781
20	80140	WASHER,TYPE A PLAIN,.250	419
37	80140	WASHER,TYPE A PLAIN,.250	403, 707
78	80140	WASHER,TYPE A PLAIN,.250	209, 211, 223, 227
8	80146	WASHER,TYPE A PLAIN,.625	109
39	80146	WASHER,TYPE A PLAIN,.625	113
62	80146	WASHER,TYPE A PLAIN,.625	403, 407, 707, 711
403	80146	WASHER,TYPE A PLAIN,.625	776
1404	80146	WASHER,TYPE A PLAIN,.625	625
40	80147	WASHER,TYPE A PLAIN,.750	113

ITEM NUMBER	PART NUMBER	NOMENCLATURE	IPL PAGE NUMBER
12	81161	WASHER,WEATHER SEAL,#10	731
13	81161	WASHER,WEATHER SEAL,#10	231
16	81161	WASHER,WEATHER SEAL,#10	503
50	3200DI	WATER TIGHT CONN,1/2 X 1/2	505, 733
27	35543	WELD PLATE	203, 215, 217, 229
13	21808	WELDMENT,LOAD LINE,MODIFIED	111
3	35023-01	WINDOW ONLY, FOR RADAR HORN	322
201	21206	WINDOW,AUTO CONTROLLER,EZ-1S	303, 703, 705
1001	23867-1	WIRE HARNESS,202.00”	603
10001	33271-1	WIRE,16GA,BLACK	603
3	35150-7	WIRE,18 GA,BROWN	621
2	35150-6	WIRE,18 GA,YELLOW	621
3006	38033	WIRE,18GA,3 WIRE,SHIELDED	305
96	38620	WIRE,MECHANICS,16.5 GA	229
407	90383-06	WOOD,OAK,1.50X3.00X10FT	776
1407	90383-06	WOOD,OAK,1.50X3.00X10FT	625
100	8695	WRENCH,NOZZLE ALIGNMENT	411, 715, 723


SEE SHEET 2 FOR WIRING OF SPRAYBAR SWITCHES
NOTES:
1) ROTARY SWITCH FUNCTION POSITIONS
0) SPRAY AND BAR CIRCULATE
2) TANK CIRCULATE
3) LOAD
4) TRANSFER
5) HANDSPRAY/UNLOAD
6) REVERSE SUCTION
7) CLEAN OUT
8) OFF
9) THRU 10 BLOCKED
2) MOUNT ALL SWITCHES AS SHOWN WHEN VIEWED FROM INSIDE OF CONTROL BOX FRONT COVER
3) SEE DRAWING 26108 FOR REFERENCE OF J-PLUG WIRE LOCATION & FUNCTION.
4) NOTE THAT RTD IS STD EUROPEAN CURVE 100 OHM RESISTANCE AT 0°C 0.385 OHM/°C.
CONTROL BOX, EZ-3S, MAX 3
DRAWING NO. 26095
REV. J
SHEET 1 OF 3
SAUER-SUNDSTRAND S2X CONTROLLER 38607
SYSTEM POWER
1 TIE
LCD DISPLAY ASSY 38014
KEYPOINT EXPANSION BOARD PN 36704
SEE NOTE 1 FOR ROTARY SWITCH POSITIONS
35618 ROTARY SWITCH WIRING
3811 7 MEMORY POSITION ROTARY SWITCH
TERMINAL BLOCK
SPRAY/BAR CIR SIGNAL TO COMPUTER
TANK VALVE
2 WAY VALVE ACTUATOR AND BOTTOM 3 WAY VALVE ACTUATOR
TOP 3 WAY VALVE ACTUATOR
MANUAL PUMP SPEED SENSOR
HYD TEMP PMD 31983
TANK HIGH PMD 6510
TANK LOW PMD 6510
(OPTIONS)
38157 VISION OPTION
SCREEN SELECT
DATA UPDATE
CLEAR POINT
GROUND STRAP
BURNER SWITCH
TO RH SPRAYBAR SWITCHES AND SOLENOIDS (SEE PG 2)
TO BURNER RELAY (PG 2)
TO SPRAYBAR RELAY (PG 2)
5-BAR MANIFOLD
DIN CONNECTOR
SEE NOTE 3
RTD HI
RTD LO
SIGNAL ASPH PUMP SENSOR - GRN 16
SIGNAL GRD SPEED — GRN/YEL 16
SIGNAL PRES TRANSDUCER - PNK 16
TANK VALVE SOLENOID — RED 16
2-WAY VALVE SOLENOID -- GRN 16
3-WAY VALVE SOL, BOT ACT -- ORG 16
3-WAY VALVE SOL, TOP ACT -- PUR 16
POWER REAR CONT BOX — RED 16
PUMP SPEED SENSOR — ORG 16
PRESS TRANSDUCER — GRAY 16
POWER HIGH/LOW SENSOR — PUR 16
POWER GRD SPD SENSOR — RED 16
GND BATTERY 12V — BLK 14
GND PRESS TRANSDUCER - GRN/WHT 16
GND ASPH PUMP SENSOR - PUR 16
GND FOR GND SPD SENSOR - BLK 16
IGNITION — 15 AMP FUSE — RED 14
IGNITION — BLUE 16
SIGNAL, HI TANK IND — GRN/WHT 16
SIGNAL, LOW TANK IND — PINK 16
SIGNAL, HYD TEMP SENSOR — ORG 16
EDC AUTO PUMP CONTROL — GRN 16
EDC AUTO PUMP CONTROL — RED 16
REAR PTO, TERMINAL 2 — WHT 16
5 AMP SLO-BLO FUSE
36767
38157
38158
37342
37516
37516
37516
36768
36422
36423
36425
38608
37027
95240045
GRD TO DC2 MOUNT BOLT
P2-F1
P1-J1
P1-J3
P2-A
P1-A2
P1-B3
P1-C1
P2-C2
P1-C3
P2-D2
P2-F3
P2-D3
P1-K2
P1-J2
P1-D2
P2-E2
P1-E2
P1-H1
P2-B2
P1-A3
P2-E1


J3 A-6 RIGHT BAR 5-10 FT ---- BLK 16
EXHAUST SOLENOID
J1-6 BURNER 12 VDC POWER---BLK 16
J3 A-7 LEFT BAR 5-10 FT --- BLUE 16
EXHAUST SOLENOID
J3 B-12 SPRAYBAR LOWER --- GRN/WHT 16
J3 B-11 SPRAYBAR LIFT -------- PINK 16
J3 B-6 LEFT BAR EXTEND ------ BLK 16
J3 B-7 LEFT BAR RETRACT ----- BLUE 16
J3 B-8 RIGHT BAR EXTEND ------ YEL 16
J3 B-9 RIGHT BAR RETRACT ---- BRN 16
RED/BLK 18
BURNER RELAY
38211
BLUE 18
RED 18
BLK 18
WIRES TO POWER STRIP RED 18
12 VDC POWER STRIP
SEE PAGE 1 OF 2
PINK 18
S-BAR LIFT
37516
BLACK 18
BLUE 18
YELLOW 18
BROWN 18
SPRAYBAR RELAY
38211
BLUE 16
RED 16 FROM SPRAYMASTER SWITCH
BURNER SWITCH
37342
GRAY 18
ORG/YEL 18
BLUE 16
GREEN 18
WHITE 18
WIRES TO POWER STRIP RED 18
BLACK 18
BLUE 18
LH BAR
38185
86
87
87A
85
30
36085
36432
YELLOW 18
TO GRD STRIP
BROWN 18
RH BAR
38185
36085
36432
BRN/YEL 18
YEL/RED 18
BLK/YEL 18
GRY/BLK 18
PUR/WHT 18
BLU/RED 18
P1-E2
P1-K1
P2-B1
P2-J1
P2-A1
P2-C1
P2-E3
P2-F2
SAUER-SUNDSTRAND S2X CONTROLLER CONNECTOR PINS (CONT)
CONNECTS TO SPRAYBAR SWITCHES
SEE SHEET 3
SEE SHEET 3 FOR SPRAYBAR SWITCH WIRING
CONNECTS TO SPRAYBAR SWITCHES
SEE SHEET 3
A
C
B
D
C
A
B
D
LEFT BAR POT SENSOR POWER--5V
LEFT BAR POT SIGNAL
LEFT BAR POT SENSOR GRD
LEFT CABLE SHIELD
RIGHT BAR POT SIGNAL
RIGHT BAR POT SENSOR POWER--5V
RIGHT PAR POT SENSOR GRD
RIGHT CABLE SHIELD
LEFT SPRAYBAR SENSOR CABLE
RIGHT SPRAYBAR SENSOR CABLE
SHIELDED CABLE RED
SHIELDED CABLE WHITE
SHIELDED CABLE BLACK
CABLE SHIELD
SHIELDED CABLE WHITE
SHIELDED CABLE RED
SHIELDED CABLE BLACK
CABLE SHIELD
P1-F1
P1-F2
P1-F3
P1-G3
P1-C2
P1-B1
P1-E3
P1-B3
EXPANSION CARD P1 CON
1
15
30
16
J1-1 BLACK L-4'
J1-2 GREEN L-3'
J1-3 RED L-2'
J1-4 WHITE L-1'
J1-5 BLUE L-CNTR
J1-6 BLACK R-CNTR
J1-7 GREEN R-1'
J1-8 RED R-2'
J1-9 WHITE R-3'
J1-10 BLUE R-4'
J1-26 WHITE MEM 6
J1-27 GREEN MEM 5
J1-28 RED MEM 4
J1-29 BLACK MEM 3
J1-30 BLUE MEM 2
EXPANSION CARD P2 CON
1
10
20
11
J2-1 BLK AUTO VLV
J2-3 WHT S-BAR MSTR
J2-4 GRN MEM 1
J2-10 RED PRINT
J2-11 GRN CLEAR
J2-12 WHT AUTO/MAN
J2-13 RED DATA -
J2-14 GRN DATA +
J2-15 BLK SCREEN DWN
J2-16 WHT SCREEN UP
J2-17 WHT LCD
J2-18 GRN LCD
J2-19 BLK LCD
S2X P2 CONNECTOR
FED CBA
A-1 BLK/YEL
B-1 BRN/YEL
B-2 BLACK
C-1 GRAY/BLK
C-2 BLUE
D-1 YEL/RED
D-2 YELLOW
D-3 WHT/BLK
E-1 BLACK
E-2 WHITE
E-3 PUR/WHT
F-1 RED
F-2 BLU/RED
F-3 PURPLE
S2X P1 CONNECTOR
KJHGF EDCBA
A-2 BRN
A-3 BLK
C-1 ORG
C-3 WHT
D-2 PINK
D-3 WHT
E-2 GRAY
J-1 RED/BLK
J-2 GRN/YEL
J-3 GRN/WHT
K-1 ORG/YEL
K-2 GRN
CONTROL BOX,
EZ-3S, MAX 3
DRAWING NO.
26095
REV.
J
SHEET 2 OF 3



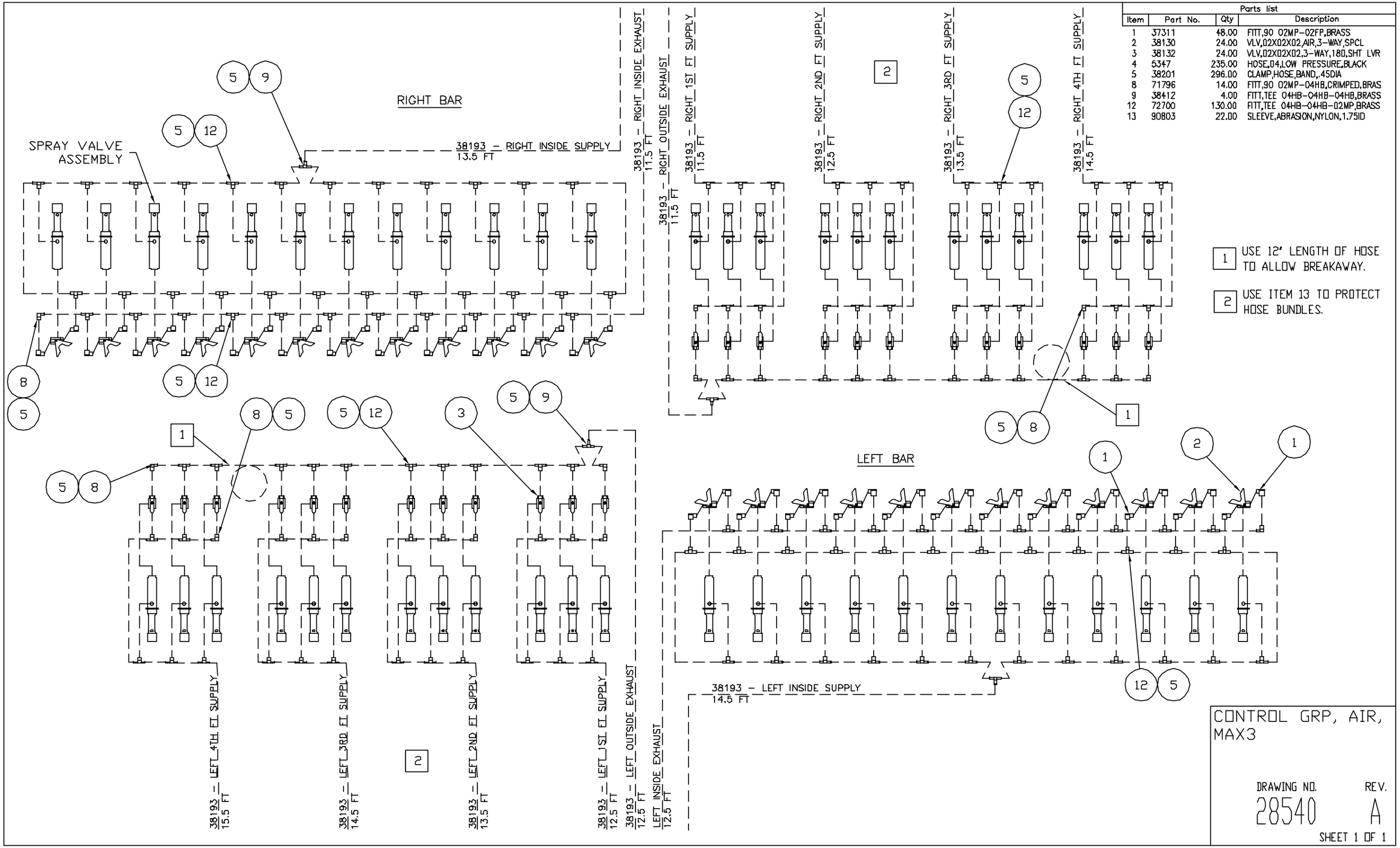
WIRING SCHEMATIC FOR SPRAYBAR SWITCHES

CONTROL BOX,
EZ-3S, MAX 3

DRAWING NO. 26095 REV. J

SHEET 3 OF 3

Parts list			
Item	Part No.	Qty	Description
1	37311	48.00	FITT,90 02MP-02FP,BRASS
2	38130	24.00	VLV,02X02X02,AIR,3-WAY,SPCL
3	38132	24.00	VLV,02X02X02,3-WAY,180,SHT LVR
4	5347	235.00	HOSE,04,LOW PRESSURE,BLACK
5	38201	296.00	CLAMP,HOSE,BAND,.45DIA
8	71796	14.00	FITT,90 02MP-04HB,CRIMPED,BRAS
9	38412	4.00	FITT,TEE 04HB-04HB-04HB,BRASS
12	72700	130.00	FITT,TEE 04HB-04HB-02MP,BRASS
13	90803	22.00	SLEEVE,ABRASION,NYLON,1.75ID



CONTROL GRP, AIR, MAX3

DRAWING NO. 28540 REV. A

SHEET 1 OF 1

Introduction

The purpose of this manual is to provide information useful in the normal servicing of the Series 40 - M46 Medium Duty Hydrostatic Pumps and Motors. This manual includes unit and component description, troubleshooting, adjustment, and minor repair procedures. Following the procedures in this manual, the minor repairs may be performed without affecting the unit warranty.

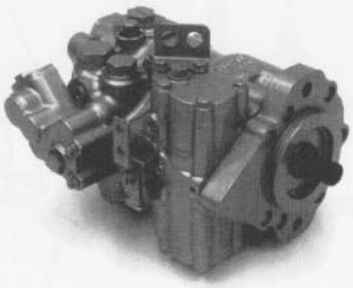
A Series 40 Transmission does occasionally require servicing, and these units have been designed with this in mind. Some repairs and adjustments can be accomplished without removing the unit from its installed location, provided that the unit is accessible and can be thoroughly cleaned before beginning any procedures. Since dirt or contamination is the greatest enemy of any hydraulic equipment, the greatest possible cleanliness is necessary.

For Technical Information on Series 40 products, refer to publication BLN-9989 (pumps) or BLN-9990 (motors).

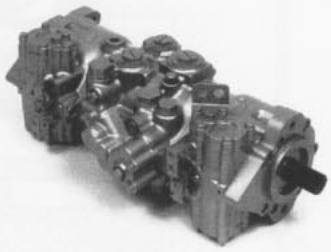
For Fluid Quality Requirements, refer to publication BLN-9887 or 697581.

Sauer-Sundstrand provides a complete repair service for its products. Contact any Sauer-Sundstrand Authorized Service Center for details. Sauer-Sundstrand Authorized Service Center locations are listed in publication BLN-2-40527 or 698266.

The torque values, pressures, and dimensions used throughout this manual are given in English and metric measurements.



Series 40 - M46 Variable Displacement Pump



Series 40 - M46 Variable Displacement Tandem Pump

Series 40 - M46 Fixed Displacement Motor

Series 40 - M46 Variable Displacement Motor

General Description

Series 40 - M46 Medium Duty Hydrostatic Transmission

The Series 40 - M46 Medium Duty pumps and motors can be applied separately or combined in a system to transfer and control power. When combined in such a system, these units provide an infinitely variable speed range between zero and maximum, in both forward and reverse modes of operation.

Series 40 - M46 variable displacement pumps are a compact, state-of-the-art design, using the parallel axial piston / slipper design in conjunction with a tiltable swashplate to vary the pump's displacement. Reversing the direction of tilt of the swashplate reverses the flow of oil from the pump and thus reverses the direction of the motor output rotation.

The Series 40 - M46 variable displacement pump and tandem pump are controlled by a compact responsive hydro-mechanical, closed loop control system. A choice of manual, hydraulic, or electrical displacement controls are available.

A charge relief valve and charge check valves are included in the pump end cap to control the makeup and cooling oil flow for the system. The charge check valves also incorporate the high pressure relief valve function into their design.

The Series 40 - M46 variable displacement pump is available with a 0.85 in3/rev (13.9 cc/rev) integral gerotor type charge pump. The Series 40 - M46 tandem pump is available with a 1.40 in3/rev (22.9 cc/rev) integral gerotor type charge pump.

The fixed and variable displacement motors also incorporate the parallel axial piston / slipper design. Fixed displacement motors utilize a fixed swashplate angle. The variable displacement motors use a variable angle swashplate with a hydraulic control system, designed to provide two positions of the swashplate: a maximum displacement and a minimum displacement.

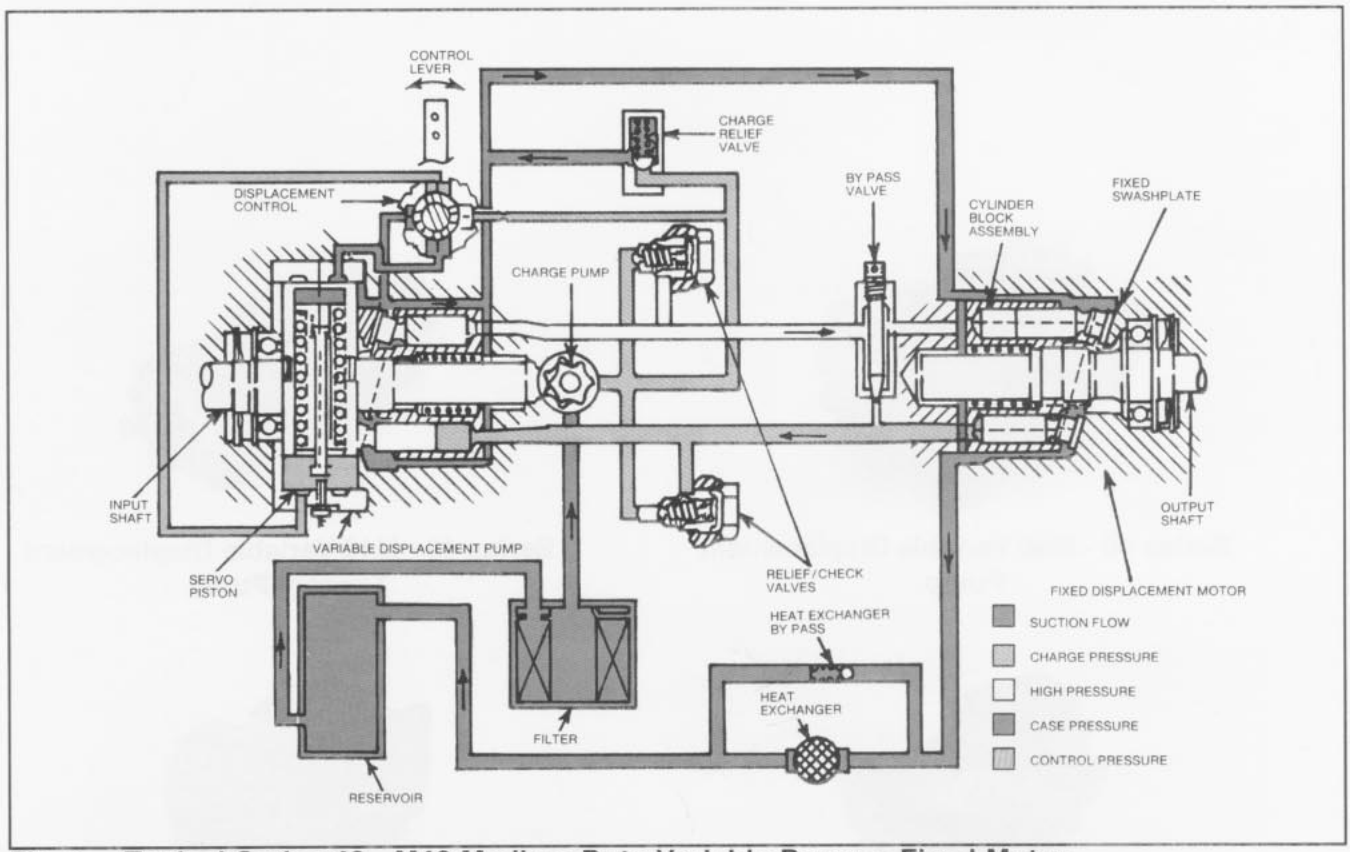


Fig. 1 - Typical Series 40 - M46 Medium Duty Variable Pump -- Fixed Motor Transmission Schematic

Transmission Hydraulic Support System

The Series 40 - M46 Pumps and Motors are easy to install, requiring no adjustments and few auxiliary components. They have their own hydraulic support system which is discussed in this section.

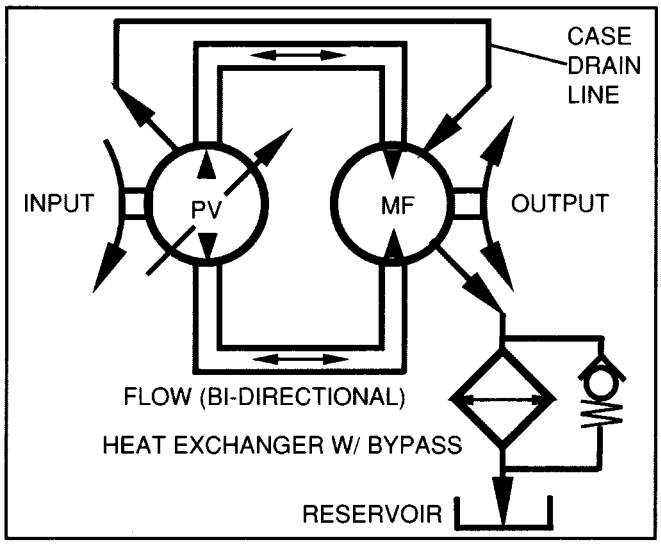


Fig. 2 - Basic Closed Circuit

Basic Closed Circuit

The main ports of the pump are connected by hydraulic lines to the main ports of the motor. Fluid flows, in either direction, from the pump to the motor then back to the pump in this closed circuit. Either of the hydraulic lines can be under high pressure. The direction and speed of fluid flow (and the motor output shaft rotation) depends on the position of the pump swashplate. The system pressure is determined by the machine load.

Case Drain and Heat Exchanger

The pump and motor require case drain lines to remove hot fluid from the system. The pump case should be drained from its upper drain port to insure the case remains full of fluid. The pump case drain is then connected to the lower drain port on the motor housing. The upper motor housing drain port is then connected to the reservoir.

A heat exchanger, with a bypass valve, may be required to cool the case drain fluid before it returns to the reservoir.

NOTE: When operating pump near rated speed, some case flow may have to be diverted around the motor to ensure pump case pressure remains within recommended limits.

CAUTION

Continuous case pressure should not exceed 25 PSI (1.7 BAR).

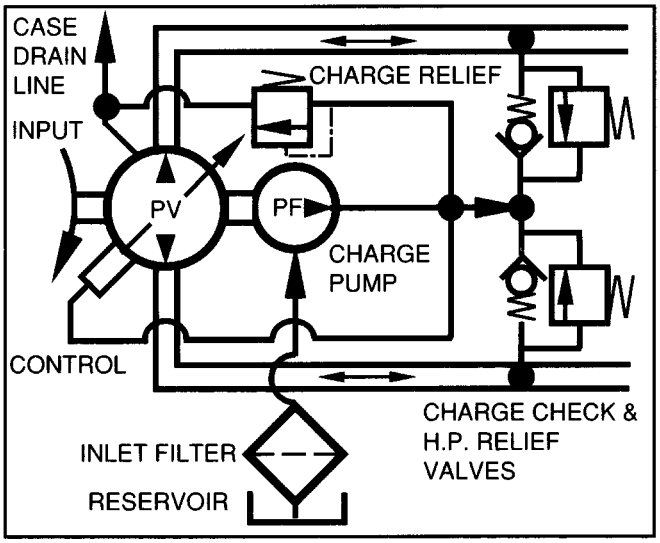


Fig. 3 - Charge System

Charge System and Inlet Filter

The charge pump supplies cool fluid to the system and keeps the closed loop charged to prevent cavitation. The charge pump draws its fluid from the system reservoir.

CAUTION

The inlet vacuum, measured at the charge pump inlet should not exceed 5 in. Hg (.8 BAR abs.), except during cold starts.

Since either of the main hydraulic lines can be high pressure, two (2) charge check valves are used to direct the charge supply into the low pressure line. These check valves are incorporated into the high pressure relief valves in the pump end cap. Any charge flow not being used for the closed circuit is discharged over a direct operating charge relief valve, through the pump and motor housings, and back to the system reservoir. The charge pressure relief valve is factory set for 220-240 ΔPSI (15.2-16.5 BAR) above case pressure under test conditions. Exact charge pressure may vary in various applications.

CAUTION

Charge Pressure must not be less than 220 PSI (15.2 BAR) for satisfactory operation. Pressure less than this may result in premature unit failure or loss of control.

High Pressure Relief Valves

Two (2) optional combination check / high pressure relief valves may be provided in the pump end cap for overload protection. These cartridge type relief valves are factory set, and are not field adjustable. Changing the maximum system pressure can be accomplished by installing different cartridges with the desired setting.

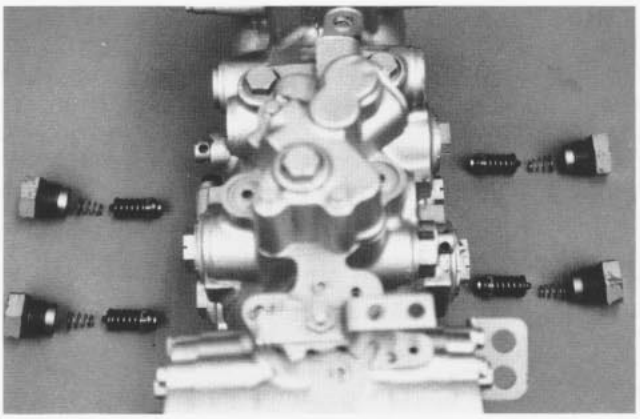


Fig. 4 - Charge Check and High Pressure Relief Valves (Tandem Pump Shown)

Safety Precautions

- **The loss of hydrostatic drive line power in any mode of operation may cause a loss of hydrostatic braking capacity. A braking system, redundant to the hydrostatic transmission must, therefore, be provided which is adequate to stop and/or hold the system should the condition develop.**

- **Certain service procedures may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing them in order to prevent injury to the technician and bystanders.**

- **Use caution when dealing with hydraulic fluid under pressure. Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury. This fluid may also be hot enough to burn. Serious infection or reactions can develop if proper medical treatment is not administered immediately.**

- **Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present.**

Technical Data - Variable Displacement Pump / Tandem Pump

Product Type		M46 Variable Pump	M46 Tandem Pump
Displacement			
In^3/Rev		2.8	2.8 (each section)
cc/Rev		46	46 (each section)
Input Speed			
Max - RPM (Full Angle)		5000	ALL UNITS
Continuous - RPM (Full Angle)		4000	
Input Mounting Flange (per SAE J744)			
		SAE B	SAE B
Input Shaft (Std. Spline)			
Number of Teeth		15	ALL UNITS
Pitch		16/32	
Weight			
LBS		73	131
KG		33	59
Pressure			
Maximum	PSI	5000	ALL UNITS
	BAR	345	
Continuous	PSI	3000	ALL UNITS
	BAR	210	
Case Pressure			
Continuous	PSI	25	ALL UNITS
	BAR	1.7	
Maximum	PSI	75	ALL UNITS
(Cold Start)	BAR	5.2	
Temperature at Hottest Point in Transmission (normally at case drain)			
Maximum	°F	220	ALL UNITS
	°C	104	
Continuous	°F	180	ALL UNITS
	°C	82	
Fluid Viscosity Limits -- SUS (CST)			
Optimum		70 (13)	
Min. Continuous		55 (9.0)	
Min. Intermittent		47 (6.4)	ALL UNITS
Max. Continuous		500 (110)	
Max. Cold Start		7500 (1600)	
Suggested Filtration			
Dedicated Reservoir		Beta 10 = 1.5 to 2.0	ALL UNITS
Common Reservoir		Beta 10 = 10 to 20	
Charge Inlet Vacuum at Sea Level			
Normal	in. Hg	5	
	BAR (abs.)	.8	ALL UNITS
Cold Start	in. Hg	10	
	BAR (abs.)	.7	

Technical Data - Fixed Displacement Motor / Variable Displacement Motor

Product Type		M46 Fixed Motor	M46 Variable Motor
Displacement			
In³/Rev		2.8	2.8 (Maximum)
cc/Rev		46	46 (Maximum)
Output Speed			
Full Angle (17°)	Max - RPM	5000	5000
	Continuous - RPM	4000	4000
Low Angle (< 11°)	Max - RPM	----	6000
	Continuous - RPM	----	5000
Output Mounting Flange (per SAE J744)			
		SAE B	SAE B
Output Shaft (Std. Spline)			
Number of Teeth		15	ALL UNITS ▸
Pitch		16/32	
Weight			
LBS		30	51
KG		14	23
Pressure			
Maximum	PSI	5000	ALL UNITS ▸
	BAR	345	
Continuous	PSI	3000	ALL UNITS ▸
	BAR	210	
Case Pressure			
Continuous	PSI	25	ALL UNITS ▸
	BAR	1.7	
Maximum	PSI	75	ALL UNITS ▸
(Cold Start)	BAR	5.2	
Temperature at Hottest Point in Transmission (normally at case drain)			
Maximum	°F	220	ALL UNITS ▸
	°C	104	
Continuous	°F	180	ALL UNITS ▸
	°C	82	
Fluid Viscosity Limits -- SUS (CST)			
Optimum		70 (13)	
Min. Continuous		55 (9.0)	
Min. Intermittent		47 (6.4)	ALL UNITS ▸
Max. Continuous		500 (110)	
Max. Cold Start		7500 (1600)	
Suggested Filtration			
Dedicated Reservoir		Beta 10 = 1.5 to 2.0	ALL UNITS ▸
Common Reservoir		Beta 10 = 10 to 20	

Controls and Options

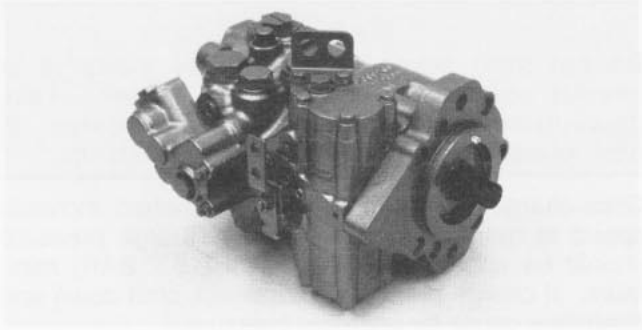


Fig. 5 - Variable Pump with Manual Displacement Control

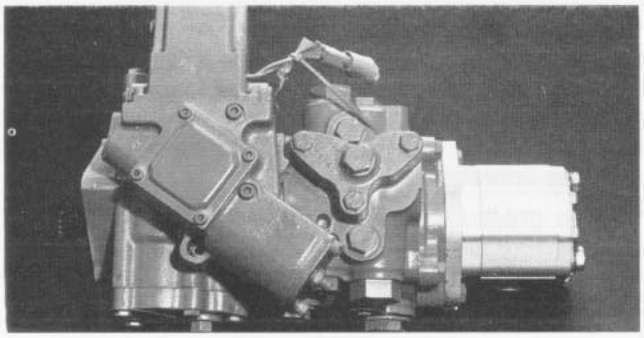


Fig. 6 - Variable Pump with Electric Displacement Control

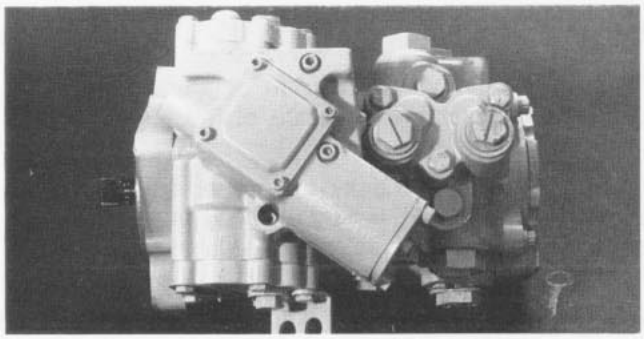


Fig. 7 - Variable Pump with Hydraulic Displacement Control

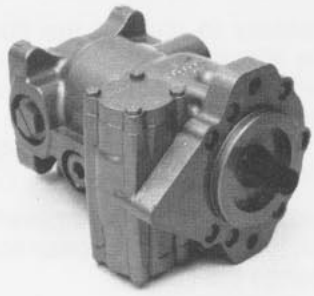


Fig. 8 - Variable Motor with Hydraulic Control

Manual Displacement Control

With the Manual Displacement Control (MDC), the pump displacement and output flow, in either direction, is approximately proportional to the angular movement of the control handle. The control will return to neutral if the pump control handle is released. the control centering mechanism is not sufficient to overcome external control linkage friction.

This control may have various sized orifices installed in the supply and drain passages for controlling maximum acceleration and deceleration (control response).

CAUTION

Torque on the control handle must not exceed 150 in.lbs. (17 Nm). Excessive torque may damage the control shaft.

Electric Displacement Control

With the Electric Displacement Control (EDC), the pump displacement and output flow, in either direction, is approximately proportional to an electrical input signal.

Orifices (various sizes available) are installed in the servo passages to control maximum acceleration and deceleration (control response).

Hydraulic Displacement Control

With the Hydraulic Displacement Control (HDC), the pump displacement and output flow, in either direction, is approximately proportional to a hydraulic pressure input signal.

Orifices (various sizes available) are installed in the servo passages to control maximum acceleration and deceleration (control response).

Bypass Valve

In some applications it is desirable to bypass fluid, allowing, for example, a vehicle to be moved short distances at low speeds without running the prime mover. This is accomplished by a manually operated bypass valve installed in the pump housing. When open (unscrewed 2 turns maximum), this valve connects both sides of the pump/motor closed circuit and allows the motor to turn. This valve must be fully closed for normal operation.

Variable Displacement Motor Hydraulic Control

The M46 Variable Motor Hydraulic Control is designed to provide two different positions of the swashplate: a maximum displacement and a minimum displacement. This control is available in several minimum displacement settings, including an infinitely adjustable stop.

Start-Up & Maintenance

Fluids

Hydraulic fluids used with Sauer-Sundstrand products should be carefully selected with assistance from a reputable supplier, following the guidelines presented in the "Fluid Quality Requirements" bulletin, BLN-9887.

Start-Up Procedure

The following start-up procedure should always be followed when starting-up a new Series 40 - M46 installation or when restarting an installation in which either the pump or motor had been removed from the system.

WARNING

The following procedure may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing the procedure in order to prevent injury to the technician and bystanders. Take necessary safety precautions before moving the vehicle/machine.

Prior to installing the pump and/or motor, inspect the units for damage incurred during shipping and handling. Make certain all system components (reservoir, hoses, valves, fittings, heat exchanger, etc.) are clean prior to filling with fluid.

Fill the reservoir with recommended hydraulic fluid, which should be passed through a 10 micron (nominal, no bypass) filter prior to entering the reservoir. The use of contaminated fluid will cause damage to the components, which may result in unexpected vehicle/machine movement.

The inlet line leading from the reservoir to the pump should be filled prior to start up. Check inlet line for properly tightened fittings and make sure it is free of restrictions and air leaks.

Be certain to fill the pump and/or motor housing with clean hydraulic fluid prior to start up. Fill the housing by pouring filtered oil into the upper case drain port.

Install a 0 to 500 PSI (35 BAR) pressure gauge in the charge pressure gauge port to monitor the charge pressure during start-up.

It is recommended that the external control input signal (linkage for MDC, hydraulic lines for HDC, or electrical connections for EDC) be disconnected at the pump control until after initial start-up. This will allow the pump to remain in its neutral position.

"Jog" or slowly rotate prime mover until charge pressure starts to rise. Start the prime mover and run at the lowest possible RPM until charge pressure has been established. Excess air may be bled from the high pressure lines through the high pressure gauge ports.

WARNING

Do not start prime mover unless pump is in neutral position (0° swashplate angle). Take precautions to prevent machine movement in case pump is actuated during initial start up.

Once charge pressure has been established, increase speed to normal operating RPM. Charge pressure should be approximately 220 PSI (15.2 BAR) minimum. If charge pressure is incorrect, shut down and determine cause for improper pressure.

WARNING

Inadequate charge pressure will affect the operator's ability to control the vehicle/machine.

Shut down prime mover and connect external control input signal. Start prime mover, checking to be certain pump remains in neutral. With prime mover at normal operating speed, slowly check for forward and reverse machine operation.

Charge pressure should remain at 220 to 240 PSI (15.2 to 16.5 BAR) minimum during forward or reverse operation. Continue to cycle slowly between forward and reverse for at least five (5) minutes.

Shut down prime mover, remove gauges, and plug ports. Check reservoir level and add fluid if necessary.

The transmission is now ready for operation.

Maintenance

To insure optimum service life on Series 40 - M46 products, regular maintenance of the fluid and filter must be performed.

Check the reservoir daily for proper fluid level, the presence of water (noted by a cloudy to milky appearance, or free water in bottom of reservoir), and rancid fluid odor (indicating excessive heat).

It is recommended that the fluid and filter be changed per the vehicle/machine manufacturer's recommendations or at the following intervals:

- System with a sealed type reservoir - 2000 hrs.
- System with a breathing type reservoir - 500 hrs.

It may be necessary to change the fluid more frequently than the above intervals if the fluid becomes contaminated with foreign matter (dirt, water, grease, etc.) or if the fluid has been subjected to temperature levels greater than the maximum recommended. Never reuse fluid.

The filter should be changed whenever the fluid is changed or whenever the filter indicator shows that it is necessary to change the filter.

Troubleshooting

Gauge Installation

Various pressure and vacuum gauge readings can be a great asset in troubleshooting problems with the Series 40 - M46 transmission or support system.

It will be necessary to install a high pressure gauge into the system pressure gauge ports to check the setting of the high pressure relief valves.

Measuring the charge pump inlet vacuum will help locate restrictions in the inlet lines, filter, etc.

Case pressure readings can help locate restrictions in the return lines, oil cooler, and return filter.

Gauge Information		
M1	System Pressure Port "A"	10,000 PSI or 600 BAR Gauge 9/16–18 O-Ring Fitting
M2	System Pressure Port "B"	10,000 PSI or 600 BAR Gauge 9/16–18 O-Ring Fitting
M3	Charge Pressure	1000 PSI or 60 BAR Gauge 9/16–18 O-Ring Fitting or Tee into Charge Pressure Filter Outlet Line
L1 L2	Case Pressure	1000 PSI or 60 BAR Gauge 1-1/16–12 O-Ring Fitting
S	Charge Pump Inlet Vacuum	Vacuum Gauge Tee into Charge Pump Inlet Line
M4	Servo Pressure	1000 PSI or 60 BAR Gauge 9/16–18 O-Ring Fitting - Later Units 7/16–20 O-Ring Fitting - Earlier Units
M5	Servo Pressure	1000 PSI or 60 BAR Gauge 9/16–18 O-Ring Fitting - Later units 7/16–20 O-Ring Fitting - Earlier units

NOTE: Tandem pumps have additional gauge and working ports in the rear section.

Snubbers are recommended to protect pressure gauges. Frequent gauge calibration is necessary to insure accuracy.

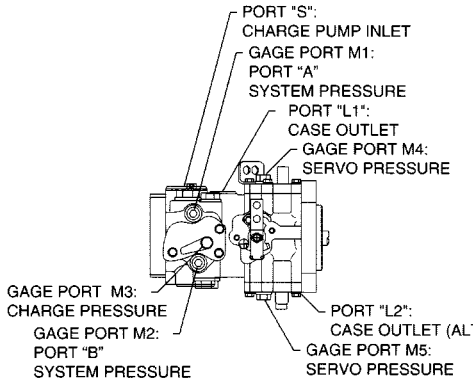


Fig. 9 - Gauge Connections — Variable Pump with Suction Filtration

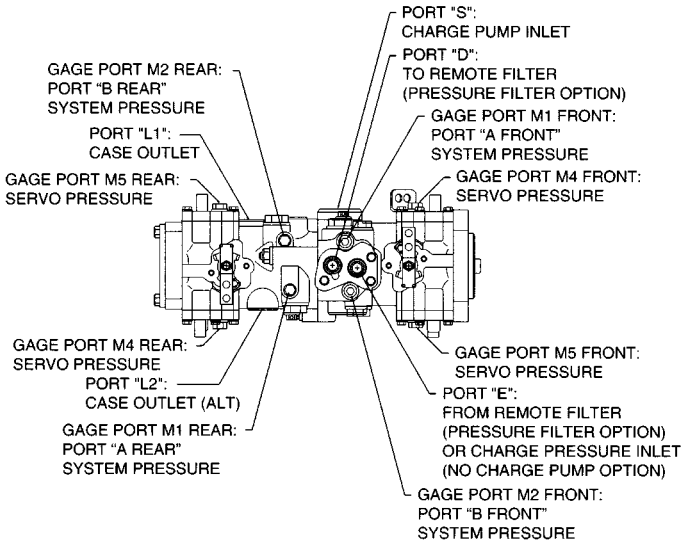
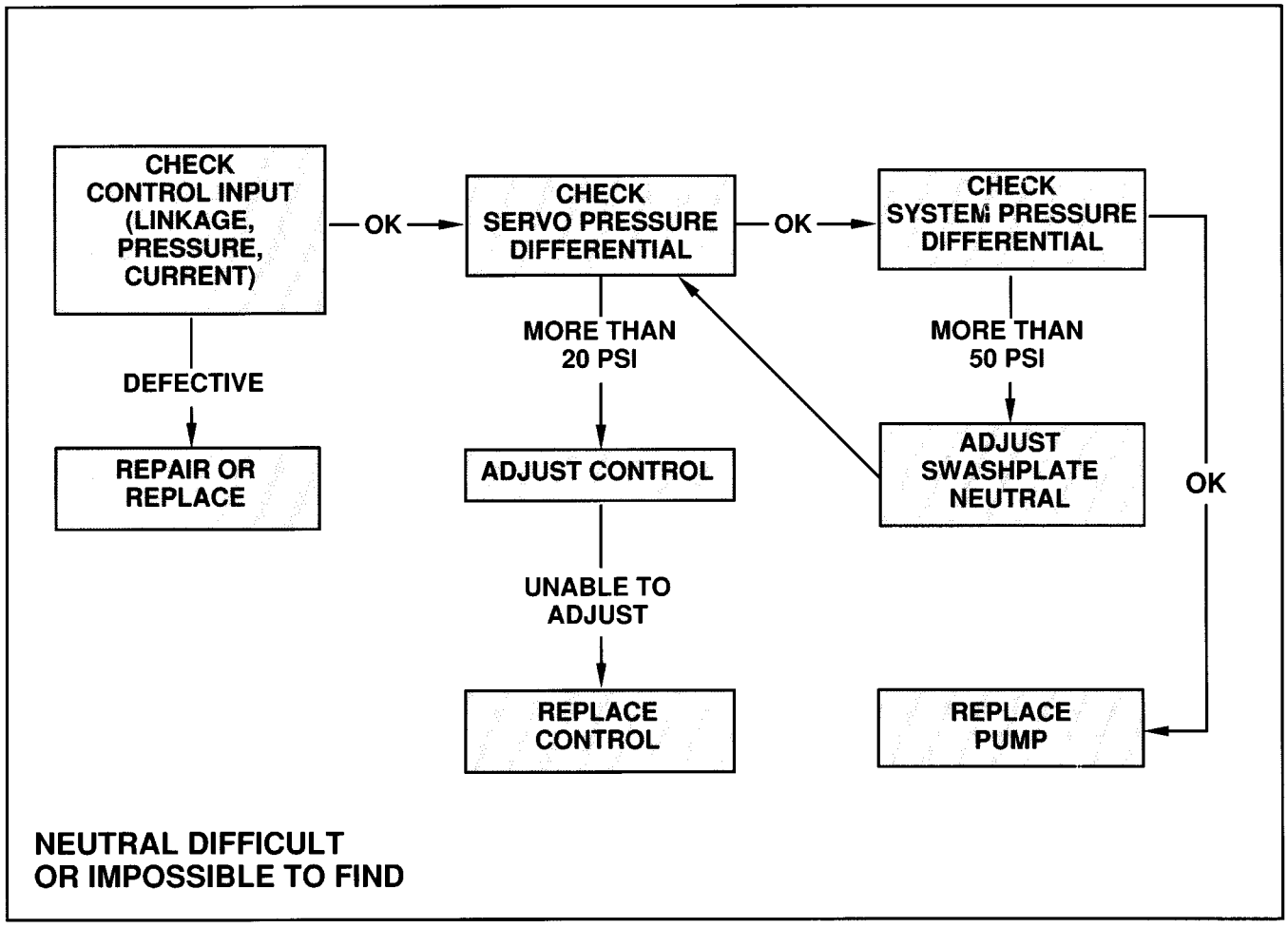
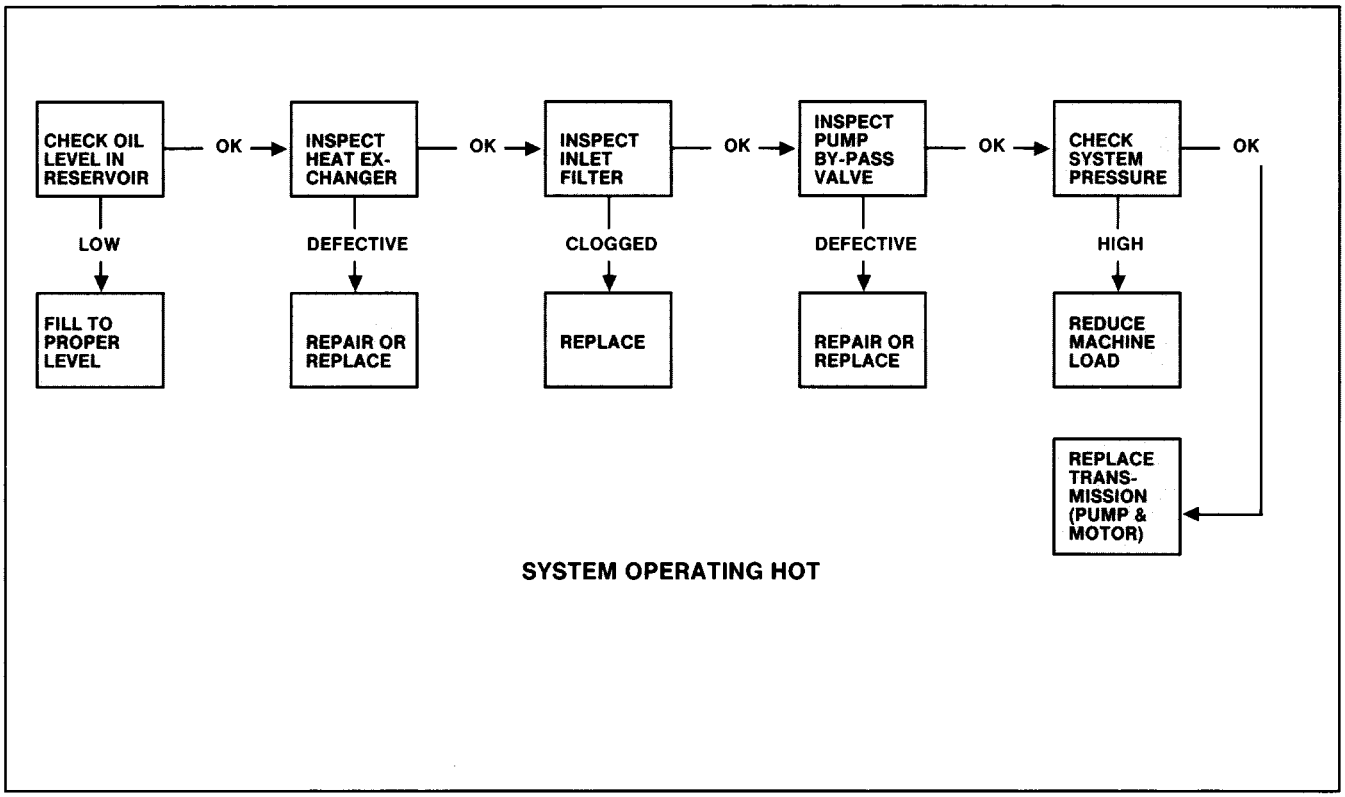


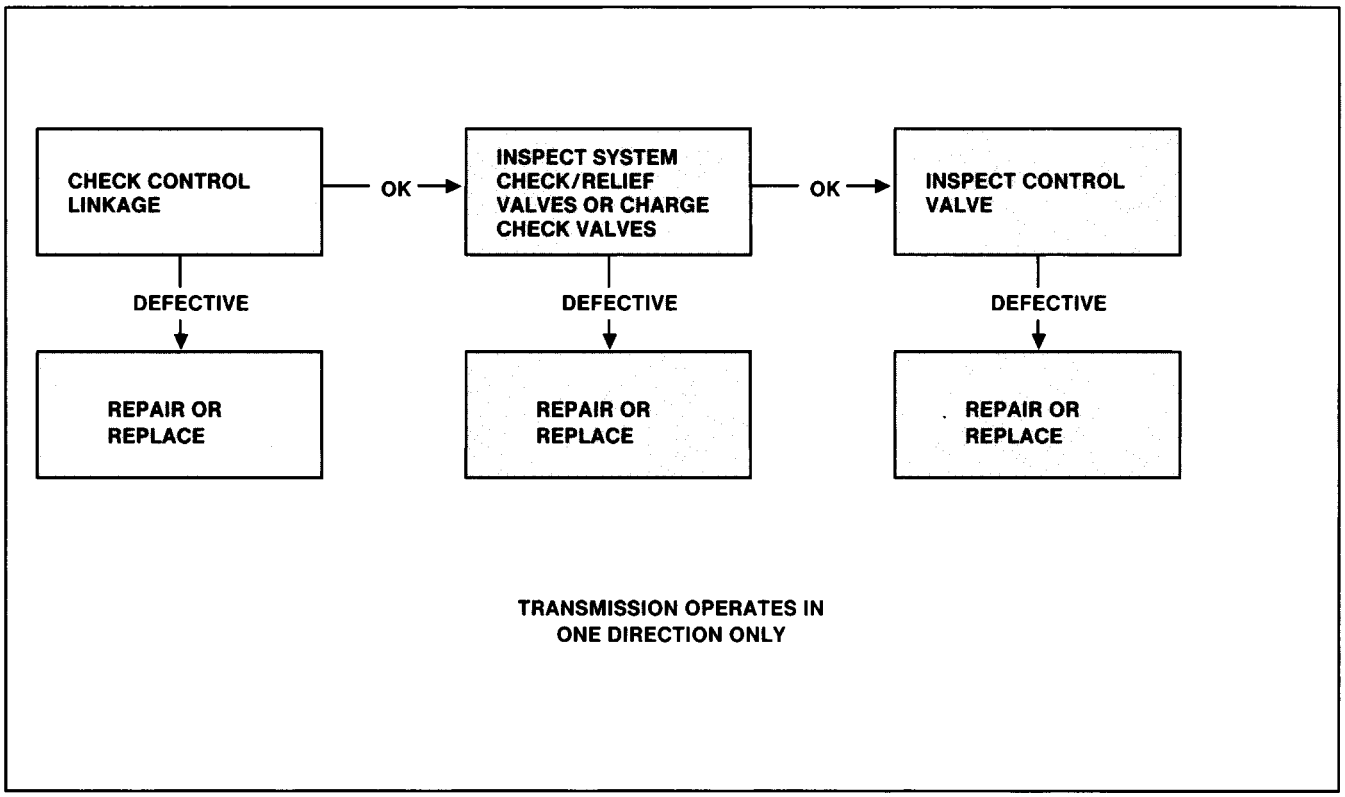
Fig. 10 - Gauge Connections — Tandem Pump with Remote Pressure Filtration

Fault-Logic Diagrams

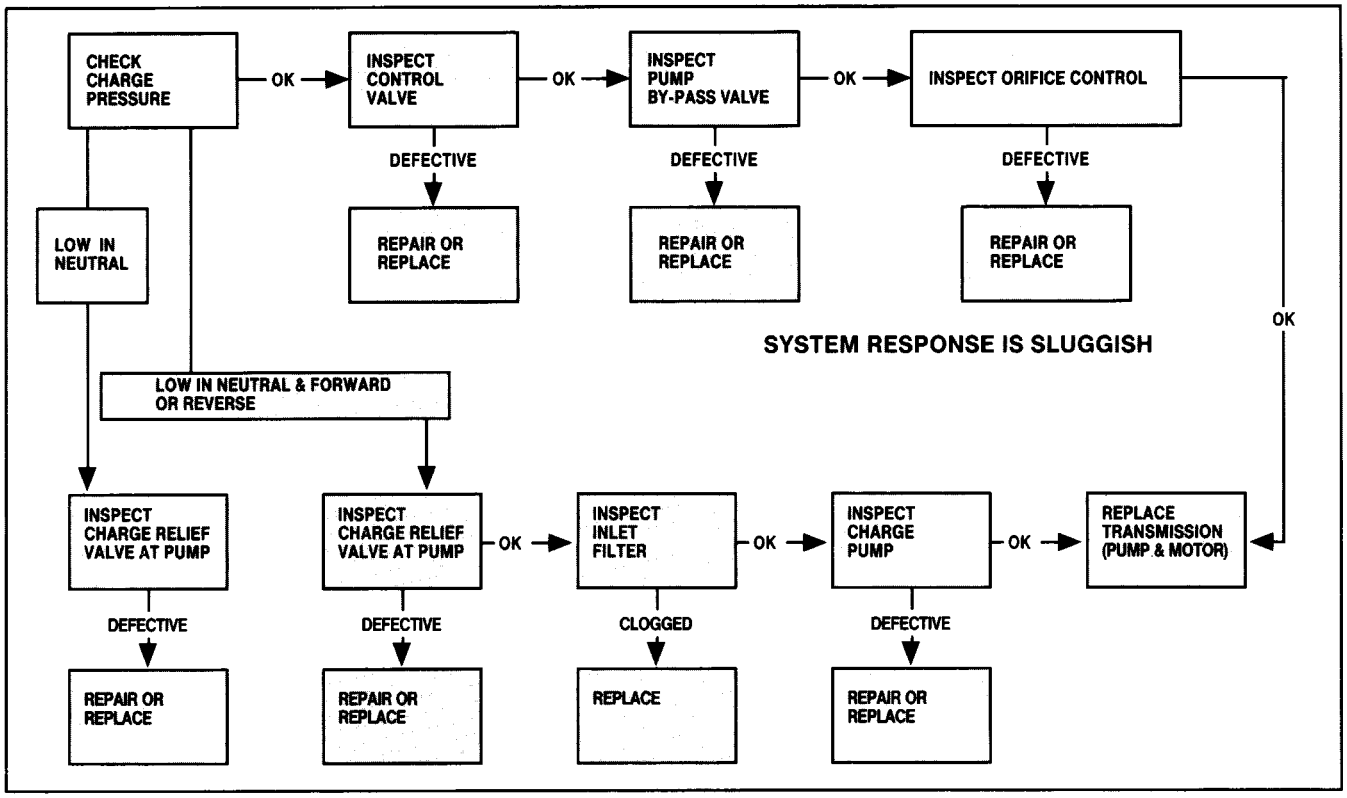


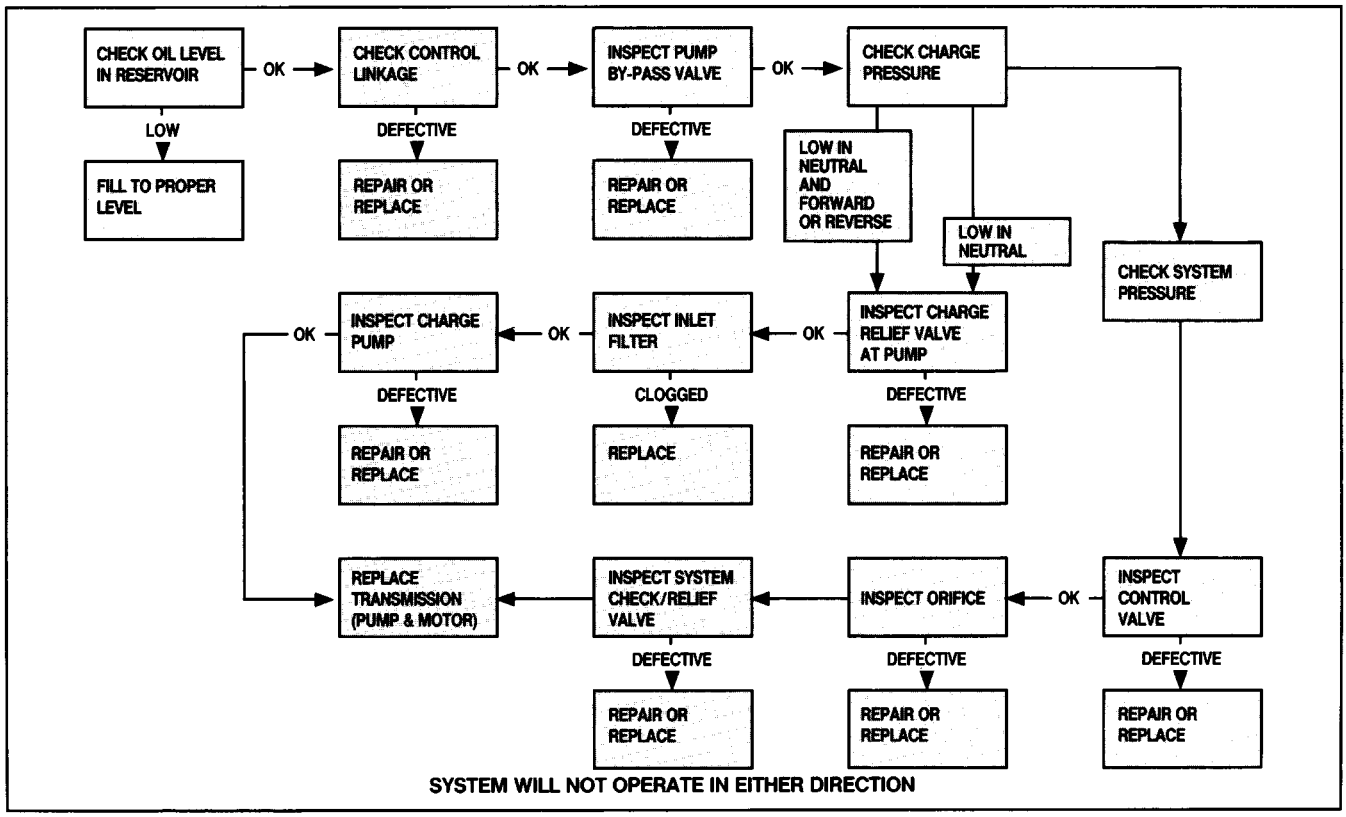


SYSTEM OPERATING HOT



TRANSMISSION OPERATES IN ONE DIRECTION ONLY


CHECK CHARGE PRESSURE
OK
INSPECT CONTROL VALVE
OK
INSPECT PUMP BY-PASS VALVE
OK
INSPECT ORIFICE CONTROL
DEFECTIVE
DEFECTIVE
DEFECTIVE
REPAIR OR REPLACE
REPAIR OR REPLACE
REPAIR OR REPLACE
LOW IN NEUTRAL
OK
SYSTEM RESPONSE IS SLUGGISH
LOW IN NEUTRAL & FORWARD OR REVERSE
INSPECT CHARGE RELIEF VALVE AT PUMP
INSPECT CHARGE RELIEF VALVE AT PUMP
OK
INSPECT INLET FILTER
OK
INSPECT CHARGE PUMP
OK
REPLACE TRANSMISSION (PUMP & MOTOR)
DEFECTIVE
DEFECTIVE
CLOGGED
DEFECTIVE
REPAIR OR REPLACE
REPAIR OR REPLACE
REPLACE
REPAIR OR REPLACE


CHECK OIL LEVEL IN RESERVOIR
OK
CHECK CONTROL LINKAGE
OK
INSPECT PUMP BY-PASS VALVE
OK
CHECK CHARGE PRESSURE
LOW
DEFECTIVE
DEFECTIVE
FILL TO PROPER LEVEL
REPAIR OR REPLACE
REPAIR OR REPLACE
LOW IN NEUTRAL AND FORWARD OR REVERSE
LOW IN NEUTRAL
CHECK SYSTEM PRESSURE
OK
INSPECT CHARGE PUMP
OK
INSPECT INLET FILTER
OK
INSPECT CHARGE RELIEF VALVE AT PUMP
DEFECTIVE
CLOGGED
DEFECTIVE
REPAIR OR REPLACE
REPLACE
REPAIR OR REPLACE
REPLACE TRANSMISSION (PUMP & MOTOR)
INSPECT SYSTEM CHECK/RELIEF VALVE
INSPECT ORIFICE
OK
INSPECT CONTROL VALVE
DEFECTIVE
DEFECTIVE
DEFECTIVE
REPAIR OR REPLACE
REPAIR OR REPLACE
REPAIR OR REPLACE
SYSTEM WILL NOT OPERATE IN EITHER DIRECTION

Inspections and Adjustments

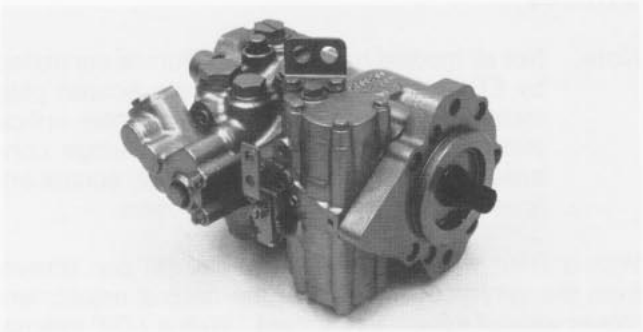


Fig. 11 - Pump with Manual Displacement Control

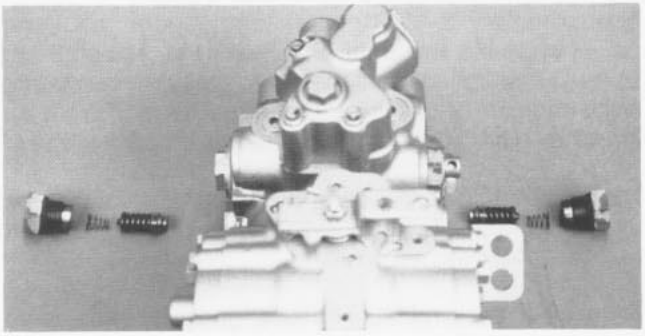


Fig. 12 - Check and High Pressure Relief Valves

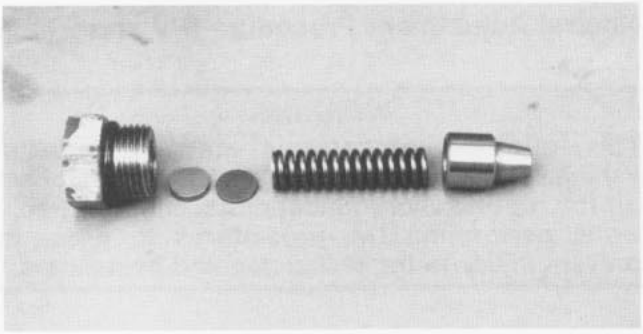


Fig. 13 - Pump Charge Relief Valve

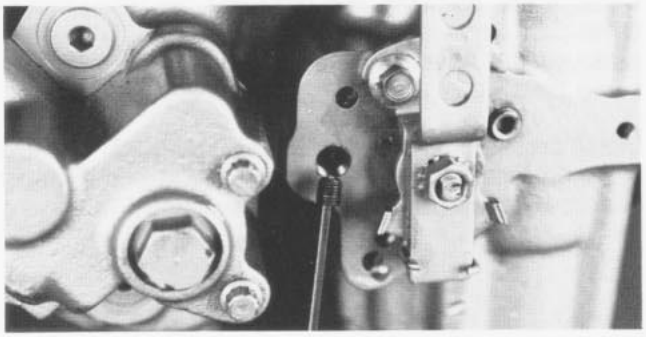


Fig. 14 - Manual Displacement Control Supply Orifice

Manual Displacement Control

Disconnect the external control linkage from the control handle and check for neutral by manually operating the control handle. Releasing the control handle should allow the pump to return to neutral. If operation is satisfactory with the external control linkage disconnected, the problem is not in the hydrostatic transmission.

If operation is not satisfactory with the external control linkage disconnected from the handle, the control may be incorrectly adjusted.

Check / High Pressure Relief Valves

The system check/relief valves have the dual purpose of providing make-up oil during by-directional rotation and providing protection from system over pressure. When the problem occurs in one direction only, interchange the check/relief valves to see if the problem changes to the other direction. If so, one check/relief valve cartridge is either malfunctioning or does not have the proper setting.

CAUTION

The relief valves are factory set and should not be tampered with except for replacing the entire cartridge. Disassembly may change the setting and cause erratic unit operation or premature failure.

Pump Charge Relief Valve

If charge pressure is low (less than 220 psi [15.2 BAR] above case pressure), the charge relief valve should be inspected. Inspect for foreign material holding the poppet open, and for scoring or wear on the poppet and seat in the housing.

Adjustment of the charge pressure is accomplished by changing the shim thickness behind the spring.

Manual Displacement Control (MDC) Supply Orifice

Note: Not all models have an orifice.

If the system is sluggish or will not operate in either direction, inspect the orifice. For pumps with serial number 02-XX-XX-XXXXX or below, remove the hex plug using a 9/16" wrench and remove the orifice with an 1/8" internal hex wrench. For pumps with serial number 03-XX-XX-XXXXX or above, remove the pipe plug with a 3/16" internal hex wrench and the orifice with a 5/32" internal hex wrench.

Fig. 15 - Remove Servo Cover (Opposite Neutral Adjustment)

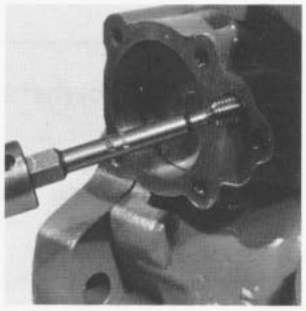


Fig. 16 - Remove Control Orifice

Fig. 17 - Install Spacer and Replace Cover

Fig. 18 - Remove Control Orifice (Neutral Adjustment Side)

Hydraulic Displacement Control (HDC) and Electrical Displacement Control (EDC) Orifices

Note: Not all models have orifices. Pumps controlled by EDC or HDC should have a screen plug installed in place of the control inlet orifice installed in pumps with MDC. Pumps controlled by EDC or HDC have two (2) control orifices located under the servo covers.

With a 7/16" wrench, remove the five (5) cap screws from the servo cover opposite the neutral adjustment (cover without adjustment screw). With a 7/32" internal hex wrench, remove and inspect the orifice.

Remove the (5) cap screws from the servo cover on the neutral adjustment side. Install a spacer or socket, approximately 3/4" (19 mm) long, under the servo cover opposite the neutral adjustment, reinstall cap screws, and tighten until the servo cover on the neutral adjustment side of the pump separates 1/8" from the housing. Turn cover and remove and inspect orifice.

NOTE: On later production pumps, the displacement control may first have to be removed in order to rotate the servo cover.

Remove spacer, reinstall orifices, gaskets, and covers. Torque grade 5 cap screws to 8 to 11 ft.lbs. (10.8 to 14.9 NM) and grade 8 cap screws to 11 to 13 ft.lbs. (14.9 to 17.8 Nm).

Neutral Adjustment Procedure (PV and PT)

WARNING

The following procedures may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing the procedures in order to prevent injury to the technician and bystanders.

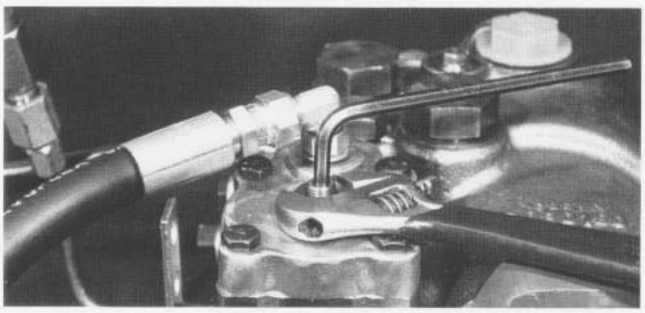


Fig. 19 - Install Servo Cross-Port Line

Swashplate Neutral Adjustment

Using a low pressure line (500 PSI [35 BAR] min.), cross-port servo port "F" to servo port "G". This removes the effects of any control pressure on the servo piston.

Install pressure gauges (10,000 PSI [690 BAR]) in the system pressure gauge ports. Start the prime mover and slowly accelerate to normal operating RPM.

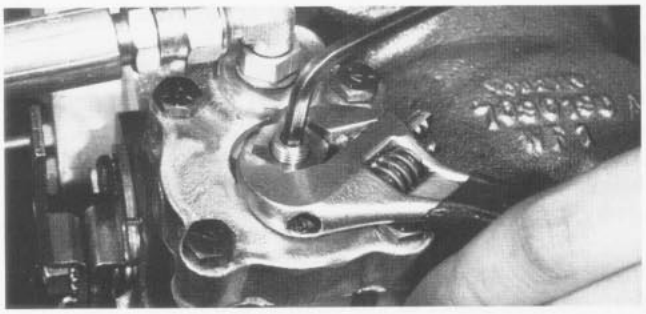


Fig. 20 - Loosen Neutral Adjustment Lock Nut

Remove the protective cap and loosen servo lock nut while holding the servo adjustment screw in position. Turn the servo adjustment screw until the two system pressure gauge readings are equal.

Turn the servo adjustment screw clockwise until one of the system pressures starts to increase. Noting the amount of rotation, turn the servo adjustment screw counter-clockwise until the other system pressure starts to increase.

Turn the servo adjustment screw clockwise half the amount of rotation noted above.

While holding the servo adjustment screw from turning, torque the servo lock nut to 13 to 18 ft.lbs. (17.6 to 24.4 Nm). Stop the prime mover, install a new protective cap, remove the servo cross-port line, and proceed to the appropriate control adjustment.

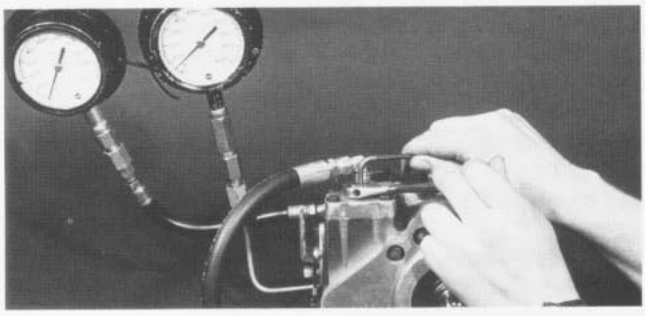


Fig. 21 - Adjusting Swashplate Neutral

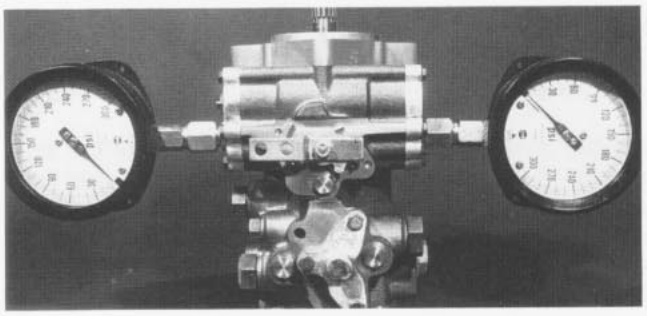


Fig. 22 - Install Servo Pressure Gauges

Manual Displacement Control (MDC) Neutral Bracket Adjustment

Remove the external control linkage from the control handle. Remove the servo cross-port line (installed while making the swashplate neutral adjustment) and install a 0 to 300 PSI (0 to 21 BAR) gauge in each servo gauge port.

Fig. 23 - Loosen Neutral Bracket Retaining Screw

Loosen the washer head screw to allow the neutral bracket to move, but not freely.

WARNING

The following procedure may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing the procedure in order to prevent injury to the technician and bystanders.

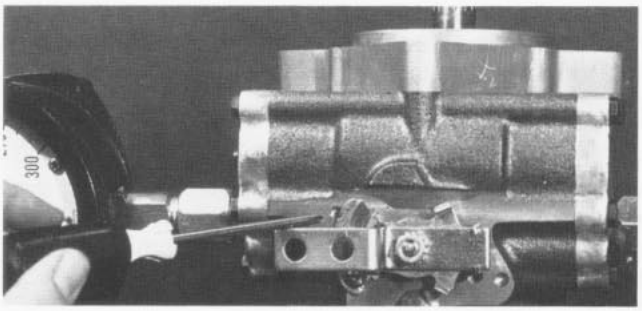


Fig. 24 - Rotate Neutral Bracket

Start the prime mover and slowly accelerate to normal operating RPM.

Insert a Phillips screwdriver into the 1/4" clearance hole and engage the slot of the neutral adjust bracket. Slowly rotate the neutral adjust bracket, using the Phillips screwdriver, until the pressure is equal on both servo gauges.

Slowly rotate the neutral adjust bracket until one of the servo gauges starts to increase in pressure. Mark the position of the neutral adjust bracket.

Slowly rotate the neutral adjust bracket in the opposite direction until the other servo gauge begins to increase in pressure. Mark the position of the neutral adjust bracket.

Rotate the neutral adjust bracket to a position between the two marks, and hold while torquing the washer head screw to 95 to 132 in.lbs. (10.8 to 14.9 Nm).

Stop the prime mover. Remove the gauges and install the gauge port plugs. Install and adjust, if necessary, the external control linkage.

Hydraulic Displacement Control (HDC) and Electrical Displacement Control (EDC) Neutral Adjustment

Remove the electrical connector at the EDC or the signal lines at the HDC. Remove the servo cross port line (installed while making the swashplate neutral adjustment) and install a 0 to 300 PSI (0 to 21 BAR) gauge in each servo port. (Refer to section on mechanical displacement control adjustment.)

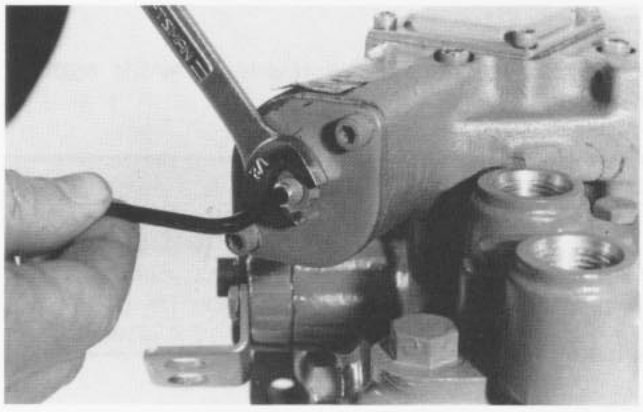


Fig. 25 - Adjusting Neutral for Hydraulic Displacement Control (HDC) or Electric Displacement Control (EDC)

WARNING

The following procedure may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing the procedure in order to prevent injury to the technician and bystanders.

Start the prime mover and slowly accelerate to normal operating RPM.

Loosen lock nut with 1/2" wrench and slowly rotate the neutral adjustment screw, with 5/32" internal hex wrench, until the pressure is equal on both servo gages.

Slowly rotate the neutral adjust screw until one of the servo gauges starts to increase in pressure.

Noting the amount of rotation, slowly rotate the neutral adjust screw in the opposite direction until the other servo gauge begins to increase in pressure.

Turn the neutral adjust screw back one-half the amount noted above. Hold the neutral adjust screw and torque the lock nut to 25 to 30 in.lbs. (2.8 to 3.4 Nm).

Stop the prime mover. Connect the control input. Remove the servo pressure gages. Return the machine to normal operating condition. Restart prime mover and assure that hydrostatic system is in neutral.

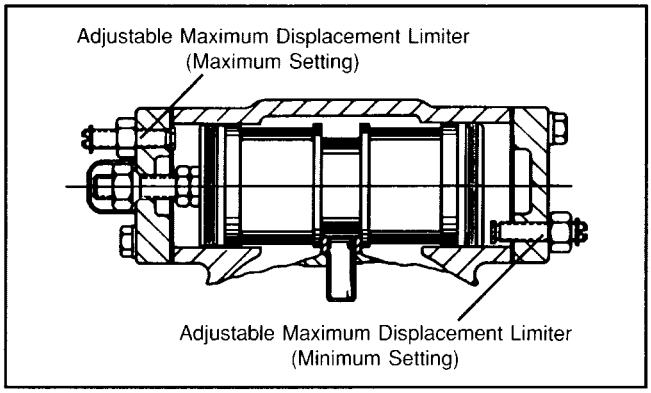


Fig. 26 - Displacement Limiter Adjustment (PV and PT)

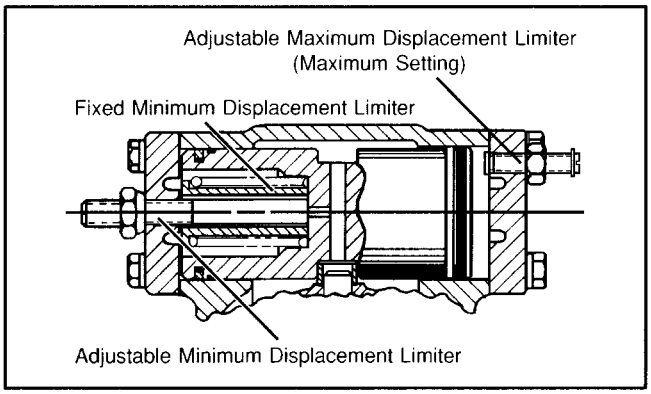


Fig. 27 - Displacement Limiter Adjustment (MV) (From 87-49)

Displacement Limiters

Variable pumps and tandem pumps may have optional maximum displacement (stroke) limiters located in the servo covers. To adjust, remove the protective sleeve and loosen the sealing lock nut (with a 5/16" hex wrench), and adjust the maximum displacement by rotating the stop with a screwdriver. Full pump displacement is attained with the stop at its maximum extension from the servo cover. Lock the adjustment by torquing the sealing lock nut to 4 to 7 lb.ft. (5.4 to 9.5 Nm) while holding the stop stationary. Install a new protective sleeve.

Variable motors may have an adjustable minimum displacement (stroke) limiter located in the bottom servo cover. To adjust, remove the protective sleeve and loosen the sealing lock nut (with an 11/16" hex wrench), and adjust the minimum displacement by rotating the stop with a 3/16" internal hex wrench. Minimum motor displacement is attained with the stop at its maximum extension from the servo cover. Lock the adjustment by torquing the sealing lock nut to 13 to 18 lb.ft. (17.6 to 24.4 Nm) while holding the stop stationary. Install a new protective sleeve.

Variable motors with date code 87-49 and above may also have an optional maximum displacement (stroke) limiter located in the top servo cover. This displacement limiter may be adjusted using the procedure outlined above for variable pumps and tandem pumps.

WARNING

Care should be taken in adjusting displacement limiters to avoid undesirable flow or speed conditions. The sealing lock nut must be retorqued after every adjustment to prevent an unexpected change in operating conditions and to prevent external leakage during unit operation. Use caution when adjusting minimum displacement on variable motors to avoid potential overspeed conditions during operation.

NOTE: One full revolution of the limiter stop produces a change in maximum or minimum displacement of approximately 9% (1.5° swashplate angle).

Minor Repair and Replacement

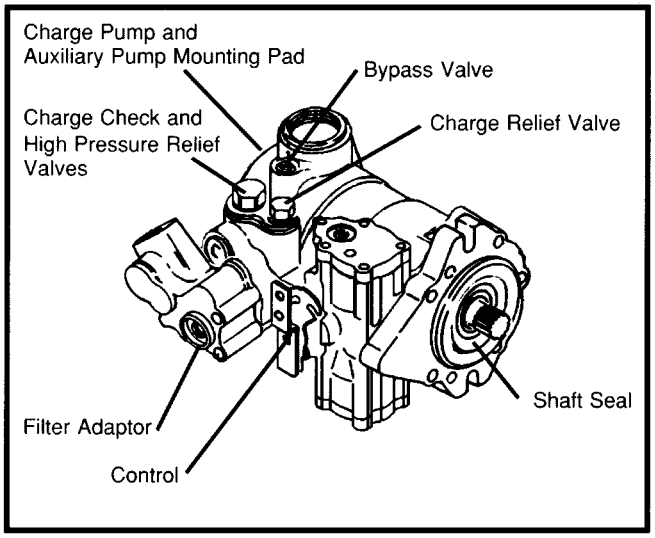
General

Minor Repairs may be performed, following the procedures in this section, without voiding the unit warranty.

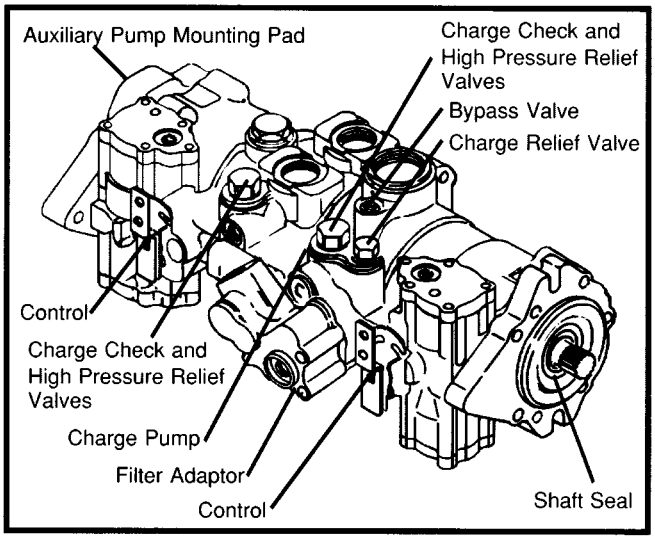
Cleanliness is a primary means of assuring satisfactory transmission life, on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals.

Protect all exposed sealing surfaces and open cavities from damage and foreign material.

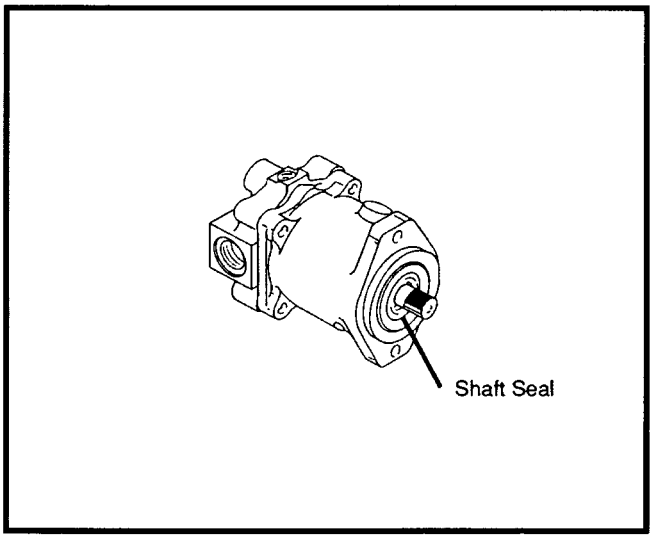
It is recommended that all gaskets and O-rings be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. All gasket sealing surfaces must be cleaned prior to installing new gaskets.



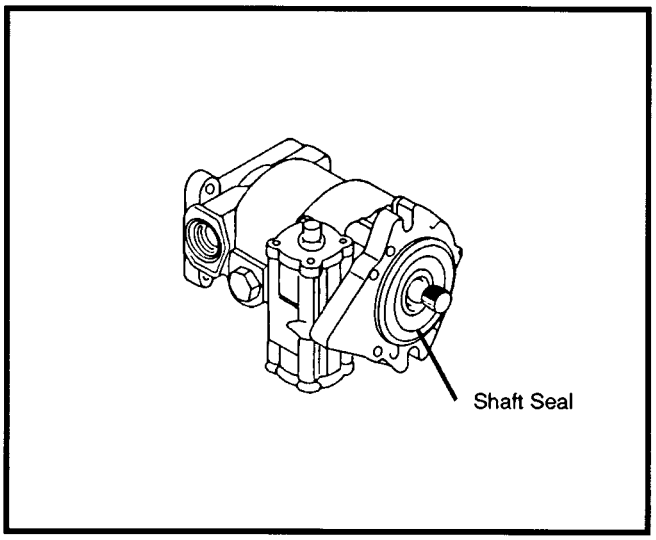
Variable Displacement Pump



Variable Displacement Tandem Pump



Fixed Displacement Motor



Variable Displacement Motor

Fig. 28 - Minor Repairs

Fig. 29 - Removing Shaft Seal

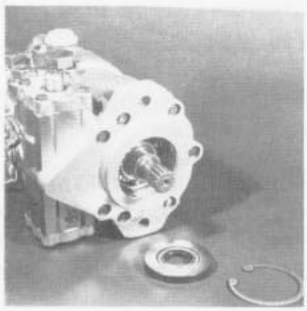


Fig. 30 - Shaft Seal Removed

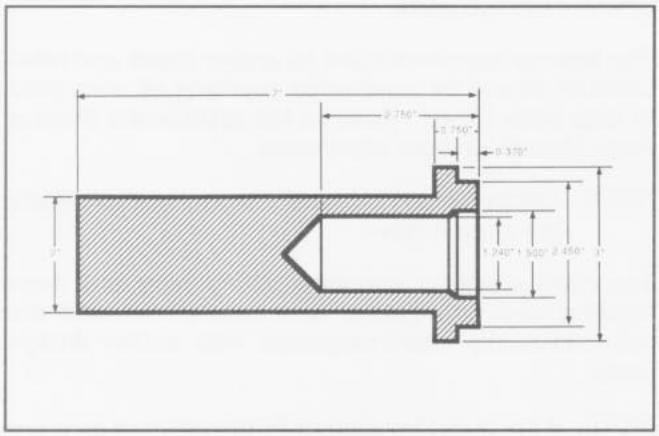


Fig. 31 - Shaft Seal Installation Tool Dimensions

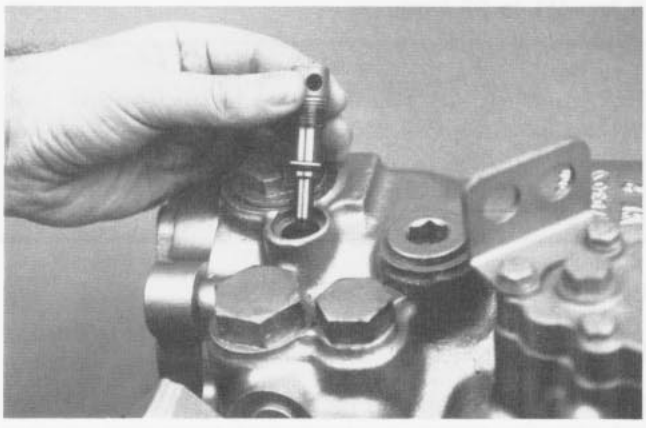


Fig. 32 - Bypass Valve

Shaft Seal

Lip type shaft seals are used on the Series 40 - M46 pumps and motors. These seals can be replaced without major disassembly of the unit. However, replacement of the shaft seal requires removal of the pump or motor from the machine.

Remove the retaining ring from the housing.

Carefully remove the seal from the housing bore. The face of the seal may be punctured with a sharp instrument (such as a screw driver) to aid in prying the seal out, or a slide hammer type puller may be used to remove the seal. Care must be taken so as not to damage the housing bore or shaft. Once removed, the seal is not reusable.

Prior to installing the new seal, inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

Wrap the spline or key end of shaft with thin plastic to prevent damage to the seal lip during installation. Lubricate the inside diameter of the new seal with petroleum jelly.

NOTE: The outside diameter of the seal may be lightly coated with a sealant (such as Loctite High Performance Sealant #59231) prior to installation. This will aid in preventing leaks caused by damage to the housing seal bore.

Slide the new seal over the shaft and press it into the housing bore. Be careful not to damage seal. A seal installer tool can be made to aid in installing the seal. Dimensions for this tool are shown in the accompanying drawing.

Reinstall the seal retaining ring.

Bypass Valve (Pump)

Unscrew the bypass valve from the housing. Inspect the valve and mating seat for damage or foreign material. It is recommended that the O-ring and back up ring be replaced.

NOTE: Bypass valves are available with integral bypass orifices for specific applications. Refer to the appropriate Service Parts Manual for more information.

Reinstall the bypass valve into the housing. Torque to 7 to 10 ft.lbsf. (9.5 to 13.6 Nm).

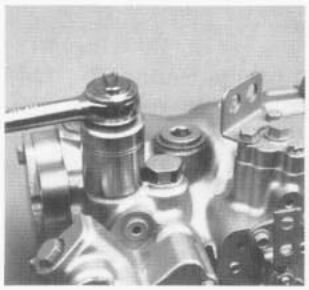


Fig. 33 - Removing Check and Relief Valve Plug

Fig. 34 - Remove Check and Relief Valves (PV Shown)

Fig. 35 - Charge Check Valve Components (Through 87-39)

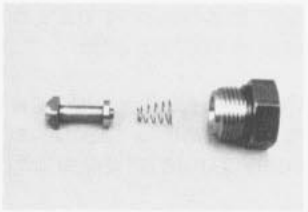
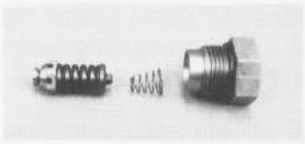


Fig. 36 - Charge Check Valve Components (From 87-40)



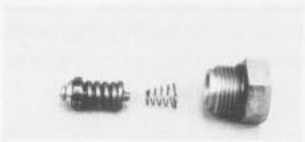


Fig. 37 - Charge Check and Relief Valve Components (Through 87-39)

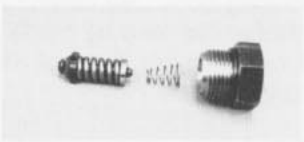


Fig. 38 - Charge Check and Relief Valve Components (From 87-40)

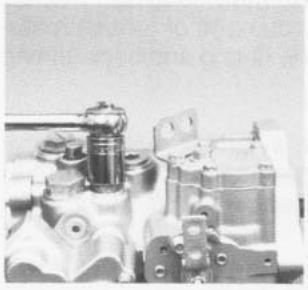


Fig. 39 - Removing Charge Relief Valve

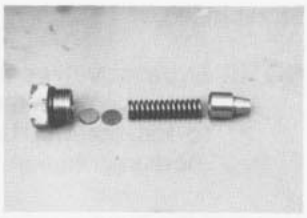


Fig. 40 - Charge Relief Valve Components

Charge Check and High Pressure Relief Valves

Remove the charge check and high pressure relief valve hex plug.

Remove the spring and check poppet or valve cartridge from the housing. Inspect the valve and mating seat in the housing for damage or foreign material. It will be necessary to replace the housing if the seat is damaged.

Several designs of charge check and high pressure relief valves have been used. Do not attempt to mix different vintage parts.

The appropriate check valve kit and/or check and relief valve kit should be used when servicing all units prior to date code 87-40. Refer to the appropriate Service Parts Manual for more information.

NOTE: Always replace ball type charge check valves with the poppet type.

The valve poppet or cartridge, spring, plug, and main housing were changed at date code 87-40, and are not individually interchangeable with earlier design parts.

NOTE: If the pump housing must be replaced on a unit with date code 86-14 through 87-39, the latest design charge check and high pressure relief valves must also be installed. Refer to the appropriate Service Parts Manual for more information.

Reinstall the valve cartridge, spring, and plug (with O-ring) into the housing. Torque the plug to 30 to 70 ft.lbs. (41 to 95 Nm).

CAUTION

The relief valves are factory set and should not be tampered with except for replacing the entire cartridge. Disassembly may change the setting and cause erratic unit operation or premature failure.

Charge Pressure Relief Valve

Remove charge relief valve hex plug.

Remove the spring and poppet from the housing. Do not alter the shims or interchange parts with another valve. Inspect the poppet and mating seat in the end cap for damage or foreign material.

Reinstall the poppet, spring, and plug (with shims and O-ring) into the housing. Torque the plug to 30 to 70 ft.lbs. (41 to 95 Nm).

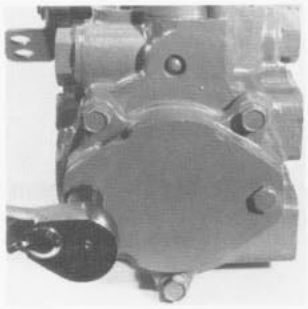


Fig. 41 - Remove Flange Cover

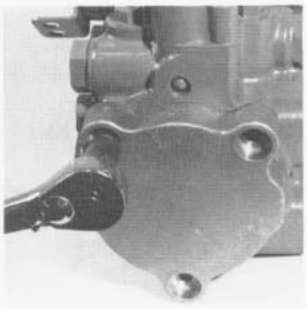


Fig. 42 - Remove Charge Pump Cover

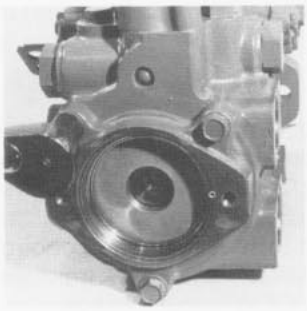


Fig. 43 - Remove Pad Adapter

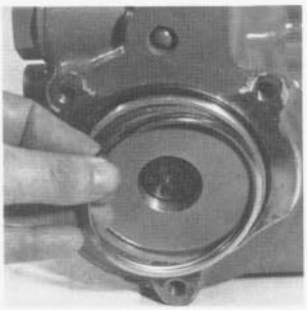


Fig. 44 - Remove Temper Load Ring

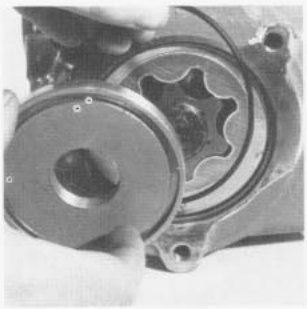


Fig. 45 - Remove Spacer Plate and O-Ring (Earlier Units)

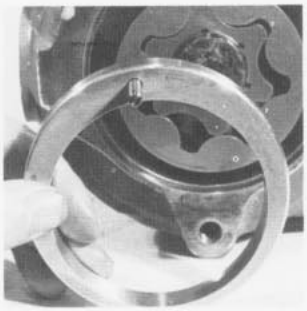


Fig. 46 - Remove Gerotor Ring and Pin (Earlier Units)

Fig. 47 - Remove Gerotor Cover (Later Units)

Fig. 48 - Remove Gerotor Assembly

Integral Charge Pump and Auxiliary Pump Mounting Pad (Variable Pump)

NOTE: Variable Pumps without an integral charge pump have no gerotor or drive parts installed in the charge pump cavity. Procedures for removing and installing the charge pump cavity cover or auxiliary mounting pad are similar to those for units with an integral charge pump.

If the unit is equipped with an auxiliary pump mounting pad, remove the two (2) hex head screws retaining the flange cover or auxiliary pump. Remove the flange cover or auxiliary pump and O-ring.

Using a 9/16" wrench, remove the three (3) hex head screws retaining the charge pump cover or adapter to the housing. Remove the cover or adapter.

Remove the temper load ring and discard. The temper load ring should always be replaced when the cover or adapter has been removed.

On earlier units, remove the O-ring, spacer plate, gerotor ring, and pin. On later units, remove the O-ring, gerotor cover, and pin.

NOTE: The gerotor ring and spacer plate are incorporated into a one (1) piece gerotor cover on pumps built after first quarter, 1986.

Note the orientation of the gerotor ring (or cover) and pin for reassembly.

Remove the gerotor assembly and woodruff key.

Each part should be inspected separately if they are to be reused. If either of the gerotor assembly parts needs to be replaced, they must both be replaced. Always replace the O-rings.

Inspect the woodruff key for damage or wear and replace it if necessary.

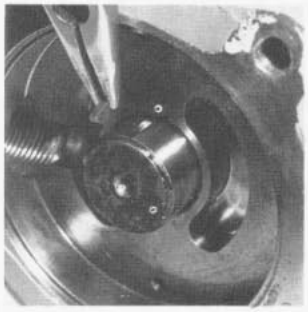


Fig. 49 - Install Drive Key

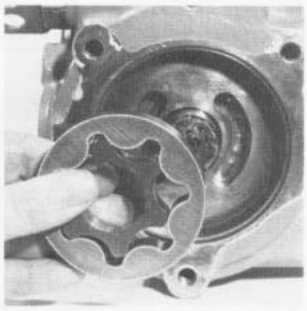


Fig. 50 - Install Gerotor Assembly

Prior to assembly, lubricate the gerotor assembly with clean hydraulic oil. Lubricate the O-rings with petroleum jelly.

Install the woodruff key into the drive shaft.

Slide the gerotor assembly into place in the pump housing. Be certain the gerotor engages the woodruff key in the drive shaft.

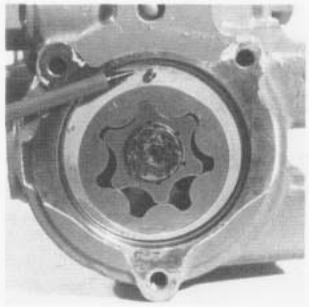


Fig. 51 - Orienting Gerotor Ring and Pin (CW) (Earlier Units Shown)

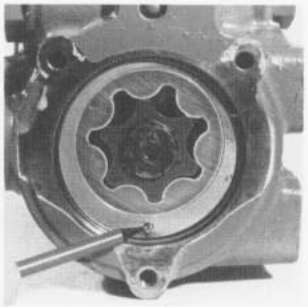


Fig. 52 - Orienting Gerotor Ring and Pin (CCW) (Earlier Units Shown)

NOTE: The charge pump rotation is determined by the position of the gerotor ring (earlier units) or gerotor cover (later units) and locating pin in the pump housing.

Install the gerotor ring and spacer plate or gerotor cover (with locating pin), over the gerotor assembly and into the pump housing, orienting them for the proper input shaft rotation direction. The pin in the gerotor ring or cover should be closest to the control for clockwise (CW) input rotation, and away from the control for counterclockwise (CCW) input rotation.

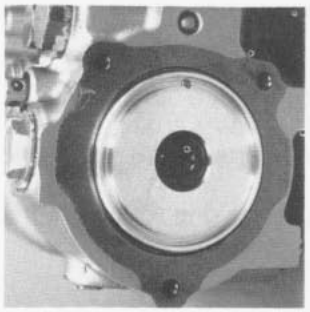


Fig. 53 - Orienting Gerotor Cover and Pin (CW) (Later Units Shown)

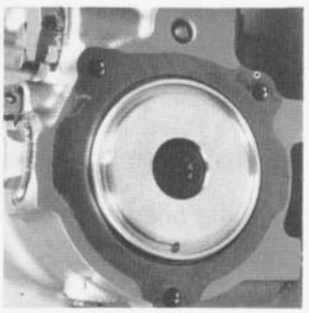


Fig. 54 - Orienting Gerotor Cover and Pin (CCW) (Later Units Shown)

Install a new temper load ring in the groove of the spacer plate or gerotor cover.

Install a new O-ring around the gerotor ring or cover. Install the charge pump cover or pad adapter onto the pump housing.

Reinstall the three (3) hex head screws and torque to 27 to 37 ft.lbs. (37 to 50 Nm). Check for proper internal assembly by slowly rotating the pump shaft while tightening these screws.

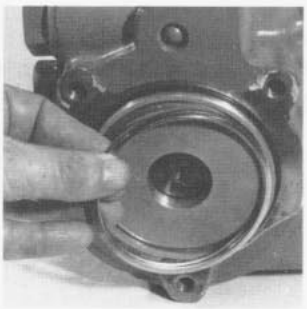


Fig. 55 - Install New Temper Load Ring

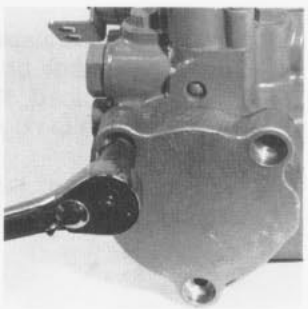


Fig. 56 - Install Charge Pump Cover or Pad Adapter

If the unit is equipped with an auxiliary pump mounting pad, install the O-ring and flange cover or auxiliary pump and secure with the hex head screws. Torque the screws to 20 to 25 ft.lbs. (27 to 34 Nm).

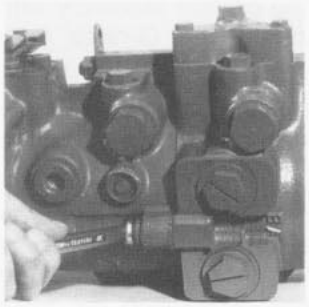


Fig. 57 - Remove 12 Point Screws

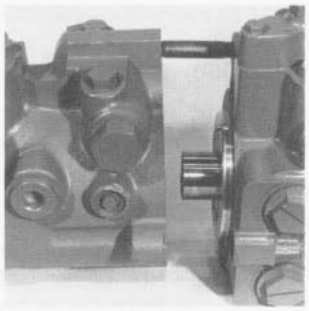


Fig. 58 - Separate Pump Sections

Integral Charge Pump (Tandem Pump)

NOTE: Tandem Pumps without an integral charge pump have a pilot ring and a drive coupling with spring locating pin installed in the charge pump cavity. Procedures for separating and attaching the front and rear pump sections are similar to those for units with an integral charge pump.

Remove the two (2) 12 point head screws (using a 1/2" wrench) and the hex nut (using a 3/4" wrench) which retain the front and rear pump sections together. Separate the front and rear sections of the pump. The gerotor plate (earlier units) usually stays in the rear section of the pump.

Remove the two (2) small O-rings and one (1) large seal ring (a small O-ring and a gasket are used on units manufactured before date code 86-14).

NOTE: The gerotor ring and gerotor plate are incorporated into a one (1) piece gerotor cover on pumps built after first quarter, 1986.

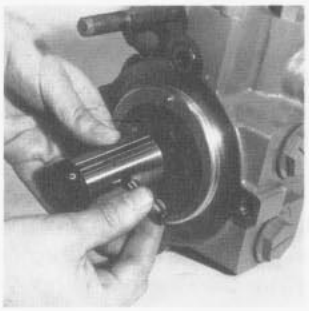


Fig. 59 - Remove Shaft Coupling (Earlier Unit Shown)

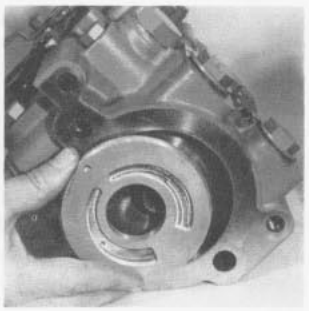


Fig. 60 - Remove Gerotor Plate (Earlier Unit)

On pumps with a separate gerotor ring and spacer plate, remove the shaft coupling and pin from the front section. Remove the gerotor assembly. Remove the gerotor ring and pin. Note the orientation of the gerotor ring and pin for reassembly. Remove the gerotor plate from the rear section of the pump.

On pumps with a one piece gerotor cover, remove the gerotor cover and pin. Note the orientation of the gerotor cover and pin for reassembly. Remove the shaft coupling and pin from the front section. Remove the gerotor assembly.

Remove the front gerotor spacer plate from units equipped with 0.95 in^3/rev (15.6 cc/rev) charge pumps.

Remove the outer O-ring from the rear section of the pump. Remove the inner O-ring from the gerotor plate or cover.

NOTE: Pumps with date code 87-34 and up use a modified gerotor cover and a smaller outer O-ring.

Each part should be inspected separately if they are to be reused. If either of the gerotor assembly parts needs to be replaced, they must both be replaced. Always replace the O-rings (and gaskets, where used).

Fig. 61 - Remove Gerotor Cover (Later Unit)

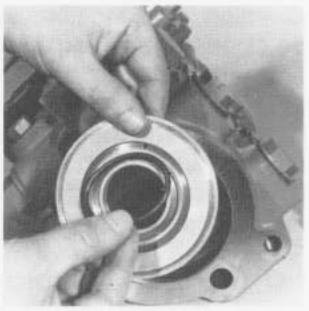


Fig. 62 - Remove O-Rings (Earlier Unit Shown)

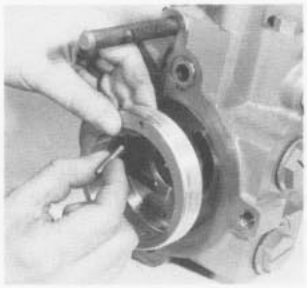


Fig. 63 - Orienting Gerotor Ring and Pin (CW) (Earlier Units)

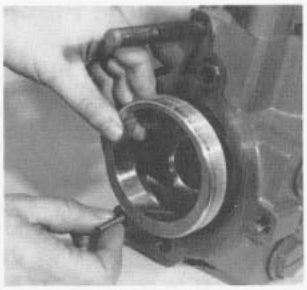


Fig. 64 - Orienting Gerotor Ring and Pin (CCW) (Earlier Units)

Fig. 65 - Install Gerotor Assembly (Earlier Units)

Fig. 66 - Install Drive Coupling (Earlier Units)

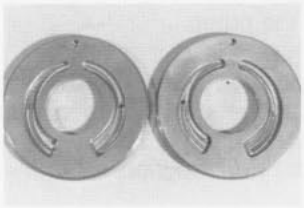


Fig. 67 - Location of Gerotor Plate Balance Hole

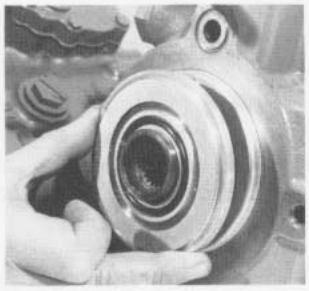


Fig. 68 - Install Gerotor Plate (Earlier Units)

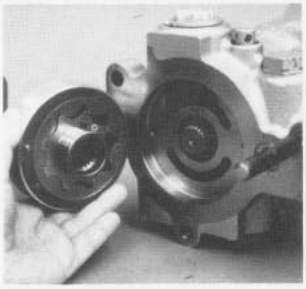


Fig. 69 - Orienting Gerotor Cover and Pin (CW) (Later Units)

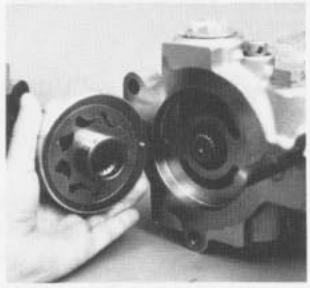


Fig. 70 - Orienting Gerotor Cover and Pin (CCW) (Later Units)

Prior to assembly, lubricate the gerotor assembly with clean hydraulic oil. Lubricate the O-rings with Petroleum jelly.

For units equipped with 0.95 in^3/rev (15.6 cc/rev) charge pumps, install the front gerotor spacer plate into the front pump housing.

NOTE: The charge pump rotation is determined by the position of the gerotor ring (earlier units) or gerotor cover (later units) and locating pin in the front pump housing. In addition, the gerotor plate or gerotor cover has a pressure balance hole which must always be installed on the outlet (pressure) side of the charge pump, opposite the charge inlet port. Different gerotor plates or covers are used for clockwise and counterclockwise rotation pumps.

Install the drive pin into the drive shaft coupling. Install the gerotor assembly into the gerotor ring or cover. Install the assembled gerotor and ring or cover onto the coupling, being certain the drive pin engages the slot in the gerotor.

For pumps with a separate gerotor ring and spacer plate, install the gerotor ring (with gerotor and coupling) into the pump housing, orienting it for the proper input shaft rotation direction. The locating pin hole in the gerotor ring should be closest to the control for clockwise (CW) input rotation, and away from the control for counterclockwise (CCW) input rotation. Install the locating pin into the gerotor ring and pump housing. Install the gerotor plate onto the gerotor ring. The pressure balance hole in the gerotor plate must always be located opposite the charge pump inlet. Install the inner O-ring in the groove on the back of the gerotor plate. Install the outer O-ring into the rear pump housing.

For pumps with a one piece gerotor cover, install the locating pin into the gerotor cover. Install the gerotor cover (with gerotor and coupling) into the pump housing, orienting it for the proper input shaft rotation direction. The locating pin in the gerotor cover should be closest to the control for clockwise (CW) input rotation, and away from the control for counterclockwise (CCW) input rotation. The pressure balance hole in the gerotor cover must always be located opposite the charge pump inlet. Be certain the drive pin engages the slot in the gerotor. Install the outer and inner O-rings in the grooves on the back of the gerotor cover.

NOTE: Pumps with date code 87-34 and up use a modified gerotor cover and a smaller outer O-ring. On these units, install the outer O-Ring into the groove on the gerotor cover, retaining it with petroleum jelly.

Minor Repair and Replacement (Continued)

Install the small O-ring and the gasket (two (2) small O-rings and a large seal ring on units manufactured after date code 86-14).

Slide the front and rear sections of the pump together, rotating the front pump shaft to align the splines on the coupling and rear pump shaft. Install the two (2) 12 point head screws and the hex nut to retain the front and rear pump sections together. Torque the screws and nut to 67 to 82 lbsf•ft (91 to 111 Nm). Check for proper internal assembly by slowly rotating the pump shaft while tightening these screws and nut.

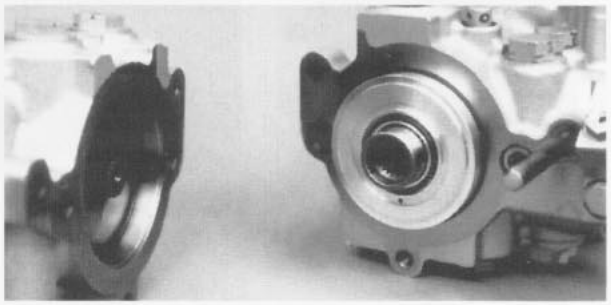


Fig. 71 - O-Rings Installed Between Sections (Later Production Shown)

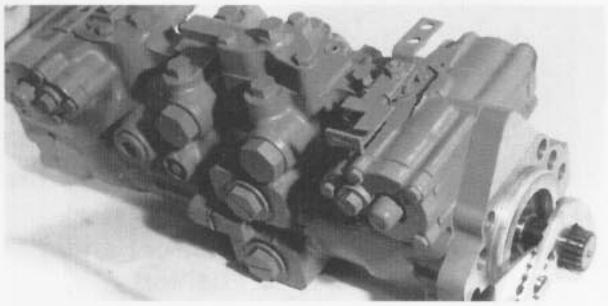


Fig. 72 - Rotating Shaft to Align Splines

Auxiliary Pump Pad

The auxiliary pad cover or auxiliary pump is attached to the auxiliary pad with hex head screws (hex screws and nuts on tandem pumps with SAE "B" pad) and is sealed with an O-ring. For SAE "A" pads, torque these screws to 27 to 37 lbsf•ft (37 to 50 Nm). For SAE "B" pads, torque these screws (and nuts) to 67 to 82 lbsf•ft (91 to 111 Nm).

Filter Adapter

Remove the filter adapter from the pump housing by removing three (3) hex head screws with a 1/2" wrench, or three (3) 12 point head screws with a 5/16" wrench. Remove the O-rings (earlier units) or gasket (later units).

Earliest production units use a filter adapter with two (2) O-rings. Later units have three (3) O-rings on the filter adapter. Always replace the O-rings.

Latest production units use a spacer/gasket between the adapter and the housing.

For earlier units, install new O-rings into the grooves of the filter adapter and install the adapter onto the pump housing. For later units, install the spacer/ gasket and adapter onto the housing. Reinstall the screws and torque to 16 to 21 lbsf•ft (22 to 28 Nm).

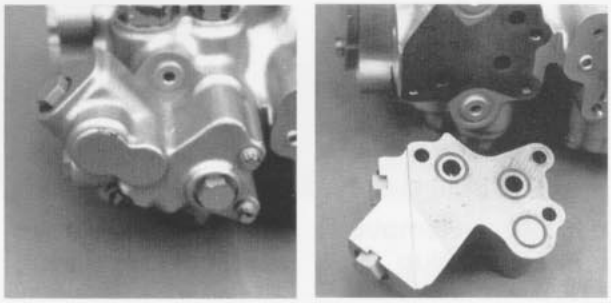


Fig. 73 - Filter Adapter and O-Rings (Earlier Production)

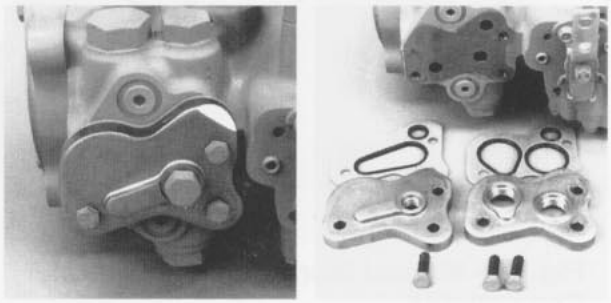


Fig. 74 - Filter Adapters and Gaskets (Later Production)

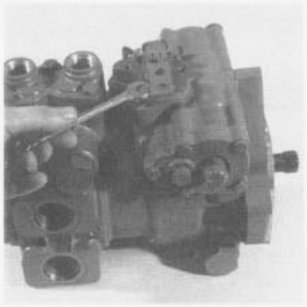


Fig. 75 - Remove Neutral Bracket Screw

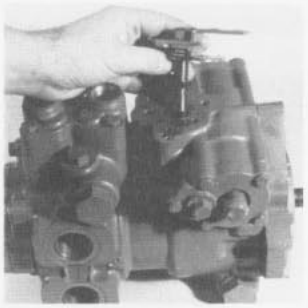


Fig. 76 - Remove Control Spool

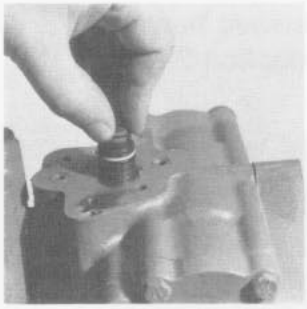


Fig. 77 - Remove Control Sleeve

Fig. 78 - Mark Control Handle Position

Fig. 79 - Remove Passage Plug

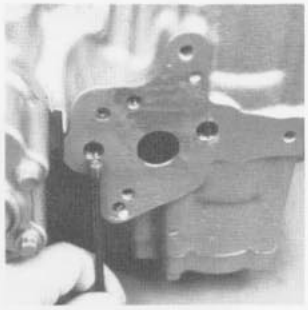


Fig. 80 - Remove Inlet Orifice Plug

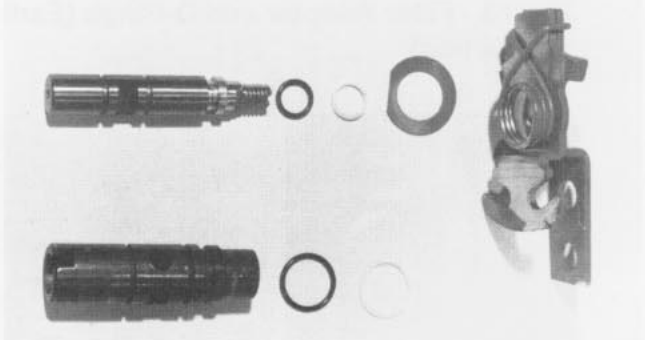


Fig. 81 - Manual Displacement Control Components

Manual Displacement Control (MDC)

CAUTION

The removal of any portion of the control mechanism may result in the loss of neutral, which will necessitate readjustment.

Before disassembly, note the position of the control handle and neutral bracket as either "up" or "down."

Remove the screw and washer or flange head screw retaining the neutral bracket to the housing using a 7/16" or 3/8" wrench.

The spool (with neutral bracket, neutral spring, control handle, and nut) can now be removed from the unit.

Remove the control sleeve from the unit by carefully gripping the end of the sleeve with pliers and pulling out.

If it is necessary to remove the control handle and neutral bracket from the spool, remove the nut from the spool using a 1/2" hex wrench. Remove the lock washer. Disengage the neutral spring from the handle and remove the handle from the spool. The neutral spring and neutral bracket can now be removed from the spool.

To gain access to the control inlet orifice, remove the plug located between the control sleeve bore and the filter adapter, using a hex wrench (9/16") on pumps with date code 86-13 or below, or an internal hex wrench (3/16") on pumps with date code 86-14 or above. Remove the inlet orifice plug using an internal hex wrench (1/8" for pumps with date code 86-13 or below, 5/32" for pumps with date code 86-14 or above).

After disassembly, all parts should be thoroughly cleaned in a suitable solvent. Replace the O-rings and backup rings. Lightly lubricate all O-rings with a small amount of clean petroleum jelly prior to assembly.

Minor Repair and Replacement (Continued)

Inspect the control inlet orifice for plugging.

Always install a control inlet orifice WITH a screen when servicing the pump. Pumps not equipped with an inlet orifice should have a screen plug with a 0.156" (3.96 mm) through-hole installed in the inlet orifice position. Pumps prior to date code 86-14 use an inlet orifice plug with a different thread from later units. Refer to the appropriate Service Parts Manual for orifice part numbers.

Inspect the control drain orifice, which is incorporated into the control valve sleeve. Refer to the appropriate Service Parts Manual for orifice size information and sleeve part numbers.

Install the control inlet orifice/screen plug and torque to 20 to 30 lbsf•ft (2.2 to 3.4 Nm). Install the external plug. Apply a thread sealant to the external pipe plug used on later units.

Install the neutral bracket and neutral spring onto the spool. Install the handle onto the spool, aligning the marks made at disassembly. Engage the neutral spring with the handle and neutral bracket. Install the external tooth lock washer and nut onto the spool and torque to 10 to 12 lbsf•ft (13.6 to 16.3 Nm).

Align the control sleeve so its slot will engage the swashplate feedback pin (slot positioned toward the pump cover) and insert the sleeve into the housing. Install the special washer onto the control sleeve.

Install the control spool assembly into the control sleeve, being certain that the control handle is oriented as noted during disassembly.

CAUTION

The slot in the handle end of the spool must be oriented toward the pump cover.

Orient the control sleeve washer (if used) so its flat clears the neutral bracket. Align the marks made at disassembly and fasten the neutral bracket to the housing with the locking flange head screw.

NOTE: Pumps using a hex head screw and star lock washer to retain the neutral bracket should have this hardware replaced with the locking flange head screw. Refer to the appropriate Service Parts Manual for the part number.

Readjust the neutral position of the control. Refer to the "Inspections and Adjustments" section of the M46 Service Manual for details.

Fig. 82 - Control Valve Sleeve Drain Orifices

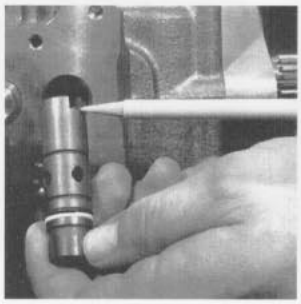


Fig. 83 - Slot in Control Sleeve

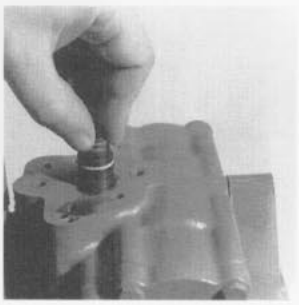


Fig. 84 - Install Control Sleeve

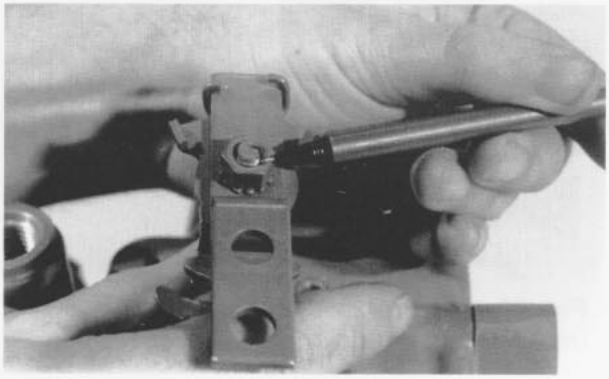


Fig. 85 - Install Control Spool

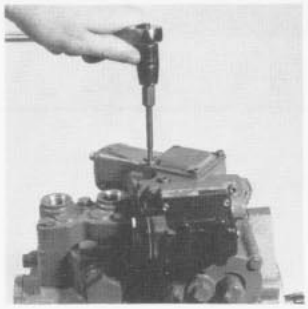


Fig. 86 - Remove Control Cover (SN 02-XX-XXXXX and Below)

Fig. 87 - Remove Control Mounting Screws

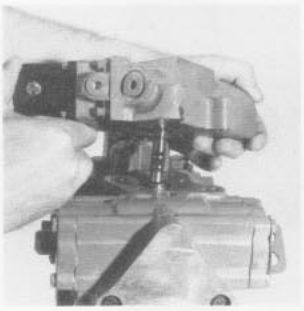


Fig. 88 - Remove Control

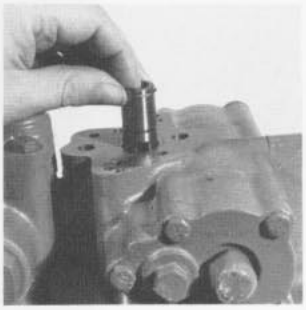


Fig. 89 - Remove Control Sleeve

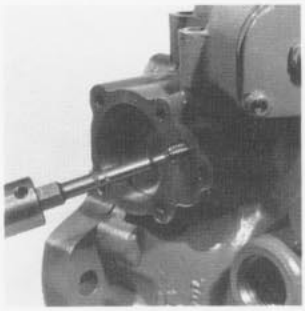


Fig. 90 - Control Orifice Plug

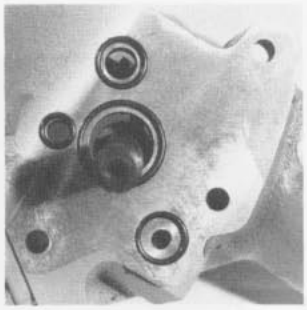


Fig. 91 - Control Housing O-Rings

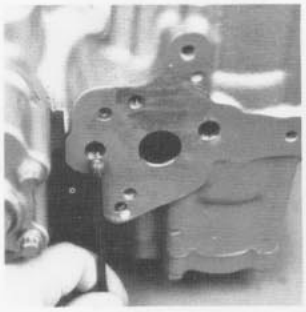


Fig. 92 - Control Inlet Screen Plug

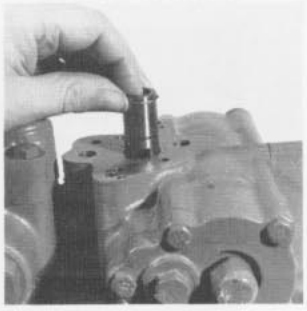


Fig. 93 - Install Control Sleeve

Electrical and Hydraulic Displacement Controls (EDC and HDC)

CAUTION

The removal of any portion of the control mechanism may result in the loss of neutral, which will necessitate readjustment.

On pumps with date code 86-13 or below, one of the control mounting screws is located under the control cover. On these pumps, first remove the four (4) control cover screws using an internal hex wrench (5/32"). Remove the cover and gasket to expose the screw. On pumps with date code 86-14 and above, all of the control mounting screws are external.

Remove the four (4) control mounting screws using an internal hex wrench (3/16").

Carefully lift the control off the pump housing.

Remove the control sleeve from the pump.

On later production pumps, remove the control inlet screen plug from the inlet passage next to the control sleeve bore, using an internal hex wrench (5/32").

The control orifice plugs are located in threaded passages under the servo piston covers. Remove the servo piston covers and gaskets, and remove the orifice plugs using an internal hex wrench (7/32").

Replace the O-rings on the bottom of the control housing. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. The control spool and sleeve are a matched set and are not available separately.

Reinstall the control orifice plugs into their passages and replace the servo piston covers.

Install the control inlet screen plug and torque to 20 to 30 in.lbs.(2.2 to 3.4 Nm). Always install a screen plug [with a 0.156" (3.96 mm) thru-hole] when servicing earlier production pumps. Pumps prior to date code 86-14 use a plug with a thread that is different from later units. Refer to the appropriate Service Parts Manual for plug part numbers.

Align the control sleeve so its slot will engage the swashplate feedback pin (slot positioned toward the pump cover) and insert the sleeve into the housing. Carefully align the control spool with the sleeve and install the control onto the pump housing. Install the four (4) mounting screws and torque to 10 to 11 ft.lbs (13 to 14 Nm).

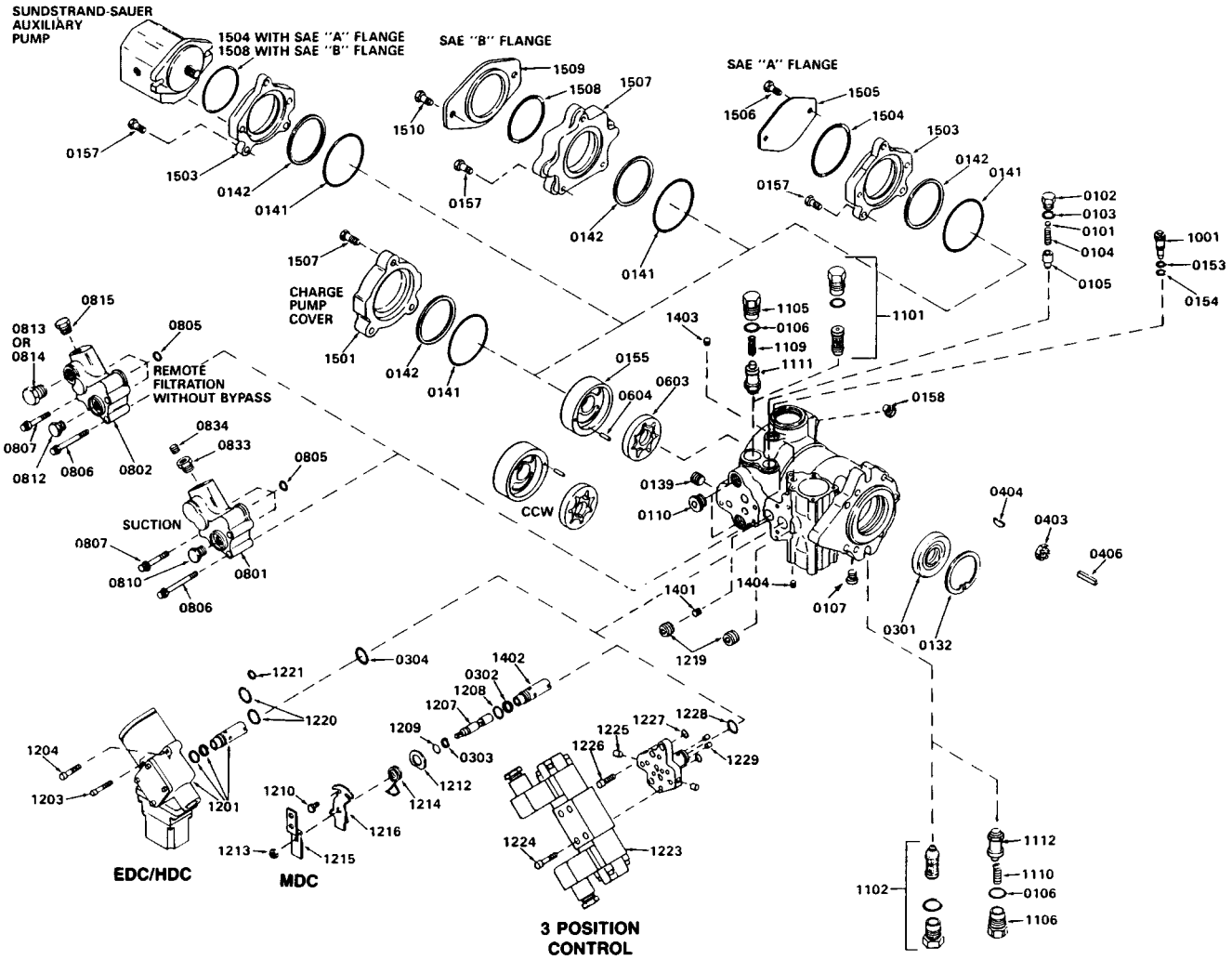
On pumps with date code 86-13 or below, install a new gasket and replace the control cover. Install the four (4) cover screws and torque to 18 to 24 in.lbs. (2.0 to 2.7 Nm).

Readjust the neutral position of the control. Refer to the instructions in the "Inspections and Adjustments" section for details.

General Parts Identification

The following Information is for general parts identification ONLY. Refer to the applicable Service Parts List when ordering service parts

M46 Variable Displacement Pump -- PV (Minor Repair)



M46 Variable Pump -- PV (Minor Repair)

COMMON PARTS GROUP 01		
ITEM	DESCRIPTION	QTY
0101	SHIM KIT CHG RELIEF VALVE	1
0102	PLUG	1
0103	O RING	1
0104	SPRING CHG RELIEF VALVE	1
0105	VALVE REL	1
0106	O-RING	2
0107	PLUG ST THD	2
0110	PLUG	2
0113	PLUG PLASTIC	2
0141	O-RING	1
0142	RING TEMPER LOAD	1
0153	RING BACK UP	1
0154	O-RING	1
0155	COVER GEROTOR	1
0157	SCREW HEX HD	3

SEAL GROUP 03		
ITEM	DESCRIPTION	QTY
0301	SEAL LIP	1
0302	O-RING MDC	1
0303	O-RING MDC	1
0304	O-RING EDC/HDC	1

INPUT/AUX DRIVE CONFIG. GROUP 04		
ITEM	DESCRIPTION	QTY
0403	NUT SLOTTED	1
0404	KEY	1

CHG PUMP DISPLACEMENT GROUP 06		
ITEM	DESCRIPTION	QTY
0603	GEROTOR ASSY	1
0604	PIN	1
0605	KEY WOODRUFF	1
0606	PLUG	1

FILTRATION GROUP 08		
ITEM	DESCRIPTION	QTY
0801	ADAPT SUCTION FILTER INLET	1
0802	ADAPT. REMOTE W/O BYPASS	1
0803	ADAPT. REMOTE W/BYPASS	1
0804	ADAPT. W/BYPASS AND FILTER	1
0805	O-RING	3
0806	SCREW	2
0807	SCREW	1
0808	SCREW	1
0809	SCREW 12 PT	2
0810	PLUG ST THD	2
0812	PLUG PLASTIC	1
0813	PLUG PLASTIC	1
0815	PLUG	1
0816	PLUG	1
0817	PLUG	1
0818	PLUG	1
0819	O-RING	1
0820	VALVE BYPASS	1
0821	SPRING	1
0822	WASHER	1
0823	PLUG EXPANDING	3
0824	PLUG SPECIAL	1
0825	O-RING	1
0826	VALVE BYPASS	1
0827	SPRING	1
0828	WASHER	1
0829	PLUG	2
0830	PLUG EXPANDING	1
0831	FILTER	1
0832	PLUG	1
0833	PLUG ST THD	1
0834	PIPE PLUG	1

BYPASS VALVE GROUP 10		
ITEM	DESCRIPTION	QTY
1001	BYPASS VALVE	1

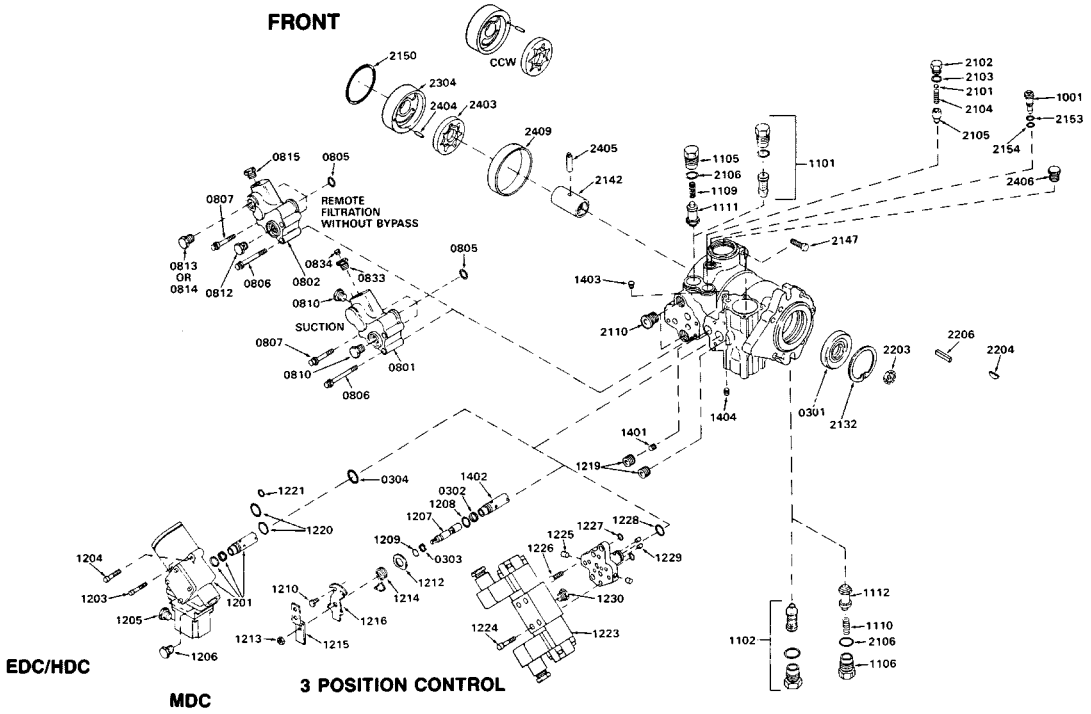
SYS PRESS PROTECTION GROUP 11		
ITEM	DESCRIPTION	QTY
1101	REL VALVE KIT	1
1102	REL VALVE KIT	1
1103	REL VALVE KIT	1
1104	REL VALVE KIT	1
1105	PLUG SPECIAL	1
1106	PLUG SPECIAL	1
1109	SPRING	1
1110	SPRING	1
1111	POPPET, CHECK	1
1112	POPPET, CHECK	1

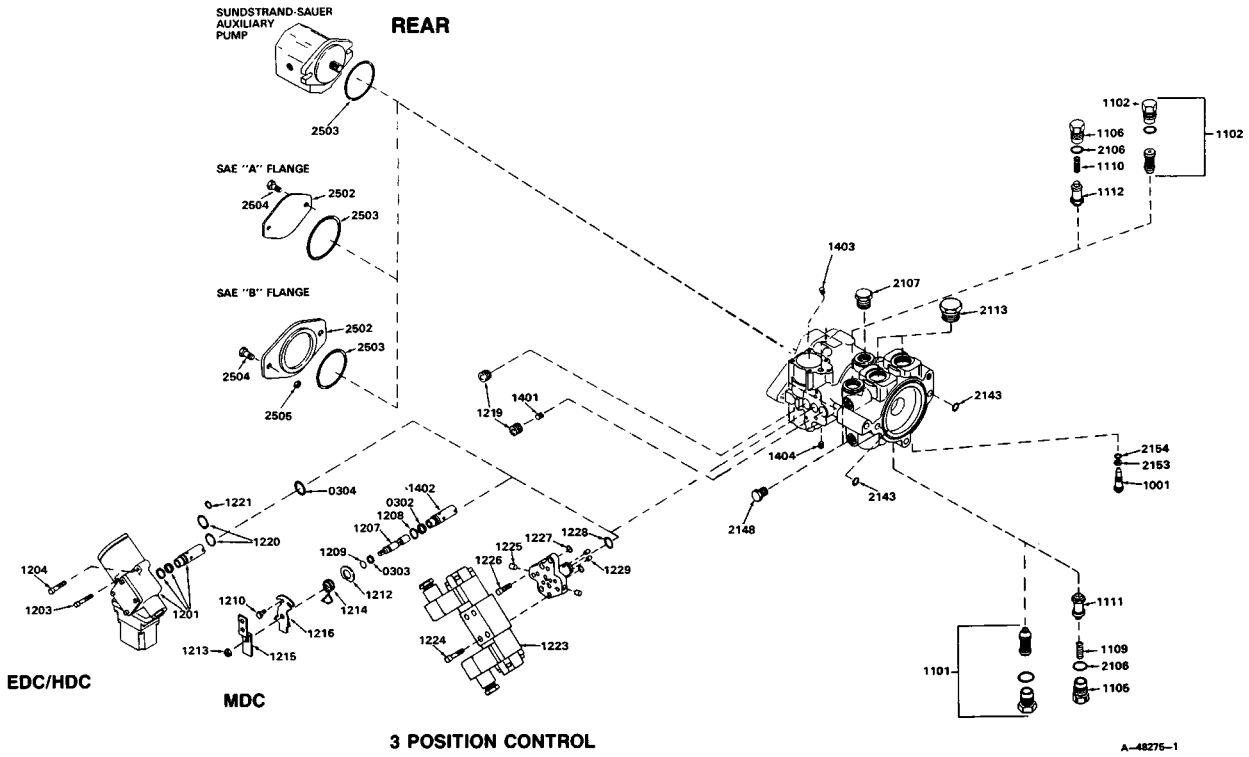
CONTROL GROUP 12		
ITEM	DESCRIPTION	QTY
1201	HDC	1
1201	EDC	1
1203	SCREW	2
1204	SCREW SOC HD	2
1205	CAP PLASTIC	1
1206	PLUG PLASTIC	2
1207	SPOOL ROT VALVE MDC	1
1208	BACK UP RING	1
1209	RING BACK UP	1
1210	SCREW HEX HD	1
1213	NUT SPECIAL	1
1214	SPRING NEUTRAL RETURN	1
1215	HANDLE CONTROL VALVE	1
1216	BRACKET NEUTRAL RETURN	1
1219	PLUG	2
1220	LOCK WASHER (MDC)	1
1220	O-RING (HDC & EDC)	2
1221	O-RING	1
1223	VALVE-SOLENOID CONTROL	1
1224	METRIC SCREW SOC HD	4
1225	MANIFOLD 3-POS CONTROL	1
1226	SCREW SOC HD	3
1227	O-RING	2
1228	O-RING	1
1229	PLUG	2
1230	PLUG	2
1231	COVER PLATE FOR SHIPPING	1
1232	GASKET COVER	1
1233	SCREW	2

CONTROL ORIFICE GROUP 14		
ITEM	DESCRIPTION	QTY
1401	PLUG ORIFICE/SCREEN	1
1402	SLEEVE CONTROL VALVE MDC	1
1403	PLUG ORIFICE HDC/EDC	1
1404	PLUG ORIFICE HDC/EDC	1

AUXILIARY FLANGE GROUP 15		
ITEM	DESCRIPTION	QTY
1501	COVER CHARGE PUMP	1
1503	ADAPTER "A" FLANGE	1
1504	O-RING	1
1505	PLATE COVER	1
1506	SCREW HEX HD	2
1507	ADAPTOR "B" FLANGE	1
1508	O-RING	1
1509	COVER PLATE	1
1510	SCREW HEX HD	2

M46 Tandem Pump -- PT (Minor Repair)





M46 Tandem Pump -- PT (Minor Repair)

SEAL GROUP 03		
ITEM	DESCRIPTION	QTY
0301	SEAL LIP(FRONT PUMP)	1
0302	O-RING MDC	1
0303	O-RING MDC	1
0304	O-RING EDC/HDC	1

FILTRATION GROUP 08		
ITEM	DESCRIPTION	QTY
0801	ADAPT. SUCTION FILTER INLET	1
0802	ADAPT. REMOTE W/O BYPASS	1
0803	ADAPT. REMOTE W/BYPASS	1
0804	ADAPT. W/BYPASS AND FILTER	1
0805	O-RING	3
0806	SCREW	2
0807	SCREW	1
0808	SCREW	1
0809	SCREW 12 PT	2
0810	PLUG ST THD	2
0812	PLUG PLASTIC	1
0813	PLUG PLASTIC	1
0814	PLUG	1
0815	PLUG	1
0816	PLUG	1
0817	PLUG	1
0818	PLUG	1
0819	O-RING	1
0820	VALVE BYPASS	1
0821	SPRING	1
0822	WASHER	1
0823	PLUG EXPANDING	3
0824	PLUG SPECIAL	1
0825	O-RING	1
0826	VALVE BYPASS	1
0827	SPRING	1
0828	WASHER	1
0829	PLUG	2
0830	PLUG EXPANDING	1
0831	FILTER	1
0832	PLUG	1
0833	PLUG ST THD	1
0834	PIPE PLUG	1

BYPASS VALVE GROUP 10		
ITEM	DESCRIPTION	QTY
1001	BYPASS VALVE	1

SYS PRESS PROTECTION GROUP 11		
ITEM	DESCRIPTION	QTY
1101	REL VALVE KIT	1
1102	REL VALVE KIT	1
1103	REL VALVE KIT	1
1104	REL VALVE KIT	1
1105	PLUG SPECIAL	1
1106	PLUG SPECIAL	1
1109	SPRING	1
1110	SPRING	1
1111	POPPET, CHECK	1
1112	POPPET, CHECK	1

CONTROL GROUP 12		
ITEM	DESCRIPTION	QTY
1201	HDC	1
1201	EDC	1
1203	SCREW	2
1204	SCREW SOC HD	2
1205	CAP PLASTIC	1
1206	PLUG PLASTIC	2
1207	SPOOL ROT VALVE MDC	1
1208	BACK UP RING	1
1209	RING BACK UP	1
1210	SCREW HEX HD	1
1213	NUT SPECIAL	1
1214	SPRING NEUTRAL RETURN	1
1215	HANDLE CONTROL VALVE	1

CONTROL GROUP 12 (CON'T)		
ITEM	DESCRIPTION	QTY
1216	BRACKET NEUTRAL RETURN	1
1219	PLUG	2
1220	LOCK WASHER (MDC)	1
1220	O-RING (HDC & EDC)	2
1221	O-RING	1
1223	VALVE-SOLENOID CONTROL	1
1224	METRIC SCREW SOC HD	4
1225	MANIFOLD 3-POS CONTROL	1
1226	SCREW SOC HD	3
1227	O-RING	2
1228	O-RING	1
1229	PLUG	2
1230	PLUG	2
1232	GASKET COVER	1
1233	SCREW	2

CONTROL ORIFICE GROUP 14		
ITEM	DESCRIPTION	QTY
1401	PLUG ORIFICE/SCREEN	1
1402	SLEEVE CONTROL VALVE MDC	1
1403	PLUG ORIFICE	1
1404	PLUG ORIFICE	1

COMMON PARTS GROUP 21		
ITEM	DESCRIPTION	QTY
2101	SHIM KIT REL VAL	1
2102	PLUG	1
2103	O-RING	1
2104	SPRING REL VAL	1
2105	VALVE REL	1
2106	O-RING	4
2107	PLUG ST THD	3
2110	PLUG ST THD	2
2113	PLUG PLASTIC	4
2132	RING	3
2142	COUPLING	1
2143	O-RING	2
2144	NUT	1
2145	STUD	1
2147	SCREW 12 PT	2
2148	PLUG ST THD	2
2150	O-RING OR GASKET	1
2153	RING BACK UP	2
2154	O-RING	2
2155	PLUG ST THD	2

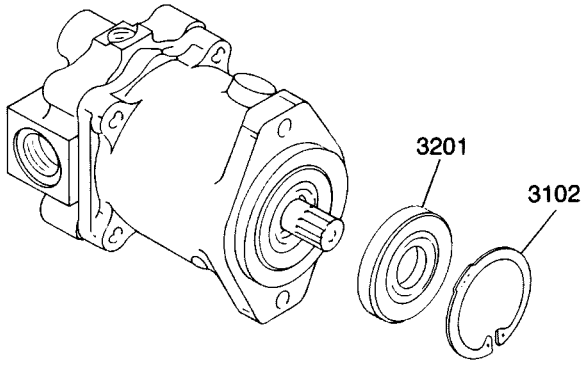
DRIVE SHAFT GROUP 22		
ITEM	DESCRIPTION	QTY
2203	NUT SLOTTED	1
2204	KEY	1
2206	KEY	1

ROTATION/CHARGE PUMP GROUP 23		
ITEM	DESCRIPTION	QTY
2304	COVER GEROTOR (CW / CCW)	1

CHG PUMP DISPLACEMENT GROUP 24		
ITEM	DESCRIPTION	QTY
2402	PLATE SPACER (.95 CIR)	1
2403	GEROTOR ASSY	1
2404	PIN	1
2405	PIN	1
2406	PLUG	1
2407	O-RING	1
2408	O-RING	1
2409	RING PILOT (LESS CHG. PUMP)	1

AUXILIARY FLANGE GROUP 25		
ITEM	DESCRIPTION	QTY
2502	COVER PLATE	1
2503	O-RING	1
2504	SCREW HEX HD	2
2505	NUT "B" FLANGE	2

M46 Fixed Displacement Motor -- MF (Minor Repair)

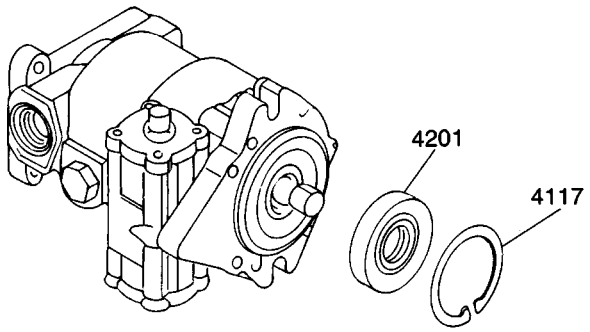


COMMON PARTS GROUP 31		
ITEM	DESCRIPTION	QTY
3102	RING	1
3117	PLUG ST THD	2

SEAL GROUP 32		
ITEM	DESCRIPTION	QTY
3201	SEAL LIP	1
3202	SEAL LIP THRU SHAFT	1

OUTPUT SHAFT / AUX DRIVE GROUP 33		
ITEM	DESCRIPTION	QTY
3303	NUT SLOTTED	1
3304	KEY	1
3306	KEY SQUARE	1

M46 Variable Displacement Motor -- MV (Minor Repair)

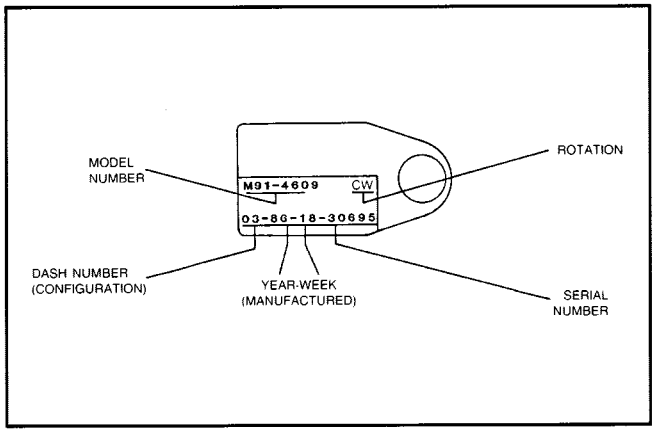


COMMON PARTS GROUP 41		
ITEM	DESCRIPTION	QTY
4117	RING	2
4127	PLUG ST THD	2

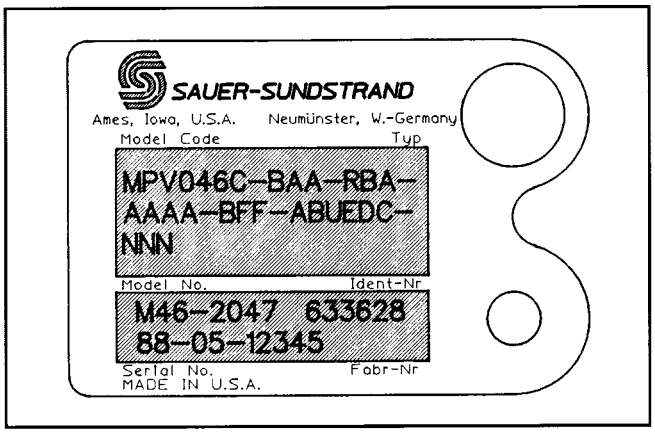
SEAL GROUP 42		
ITEM	DESCRIPTION	QTY
4201	SEAL LIP NITRILE	1
4202	SEAL NITRILE THRU SHAFT	1

OUTPUT SHAFT / AUX DRIVE GROUP 43		
ITEM	DESCRIPTION	QTY
4303	NUT SLOTTED	1
4304	KEY	1
4306	KEY THRU SHAFT	1

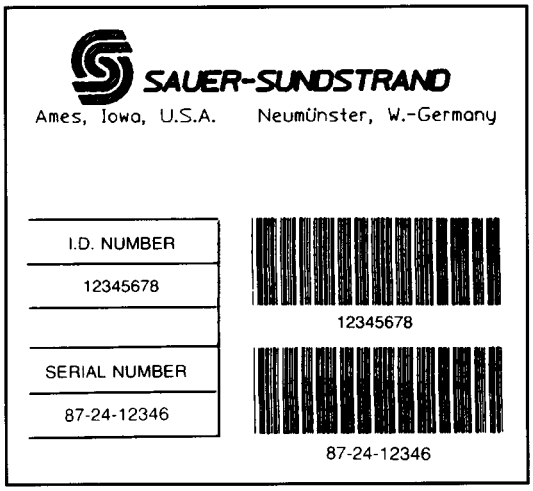
Unit Identification



Name Plate (Earlier Production)



Name Plate (Later Production)



Bar Coding - Tag

Name Plate

Each Series 40 pump and motor will have a name plate affixed to the housing. The name plate will include the following information:

Model (Identification) Number
The Model Number is used by the factory in manufacturing. On repeat orders, a complete unit can be ordered by the Model Number. The Model Number is cross referenced to the specific Model Code (Nomenclature) for the unit.

Model Code
The Model Code for the Series 40 pumps and motors is defined on the following pages. The Model Code completely defines the specific unit and must be used when ordering the complete unit for the first time or for ordering parts to service the product.

NOTE: Earlier production M46 units do not have the Model Code on the name plate.

Serial Number
The Serial Number is used to identify the manufacturing (assembly) location, the build date, and the unit sequence in the build. The Serial Number is also used to identify the unit's warranty time period, and MUST be referenced when ordering service parts.

A "Manufacturing Location" letter code was added to the Serial Number during 1988. This code indicates the location of original manufacture (assembly). "A" indicates the unit was originally assembled in Ames, Iowa, U.S.A.

The first four (4) digits in the Serial Number indicate the Build Date Code. The first number (2 digits) indicates the year of manufacture. The second number (2 digits) indicates the calendar week of manufacture. For example, "86-19" indicates a unit which was manufactured in the nineteenth calendar week of the year 1986.

The third number (5 digits) in the Serial Number is a sequential number used to identify a specific unit.

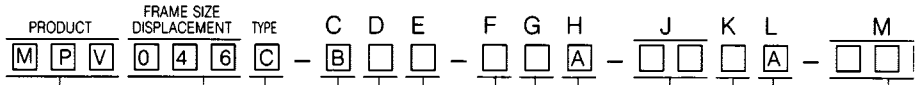
NOTE: Earlier production M46 units have a two (2) digit Dash Number (Configuration Code) preceding the Serial Number.

Bar Coding - Tag

A Universal Bar Code, representing the Identification Number and the Serial Number, will also be affixed to later production units so these items can be read electronically.

Model Code

M46 Variable Displacement Pump -- PV



PRODUCT
MPV = MEDIUM DUTY, PUMP, VARIABLE

DISPLACEMENT
046 = 46 CC/REV (2.8 CU. IN./REV)

TYPE
C = CLOSED CIRCUIT

C: SWASHPLATE GROUP
B = STANDARD

D: SEAL GROUP
A = SHAFT SEAL FOR MDC
B = SHAFT SEAL FOR EDC/HDC

E: INPUT SHAFT/AUXILIARY DRIVE
A = 13T 16/32P SPLINE/NONE
B = 13T 16/32P SPLINE/SAE "A" FLG 9T SPLINE
D = 13T 16/32P SPLINE/SAE "B" FLG 13T SPLINE
G = 15T 16/32P SPLINE/NONE
H = 15T 16/32P SPLINE/SAE "A" FLG 9T SPLINE
► J = 15T 16/32P SPLINE/SAE "A" FLG 11T SPLINE
K = 15T 16/32P SPLINE/SAE "B" FLG 13T SPLINE
► N = 1 IN. DIA TAPERED, 1.5 IN./FT./NONE
► P = 1 IN. DIA TAPERED, 1.5 IN./FT./SAE "A" FLG 9T SPLINE
► S = 1 IN. DIA TAPERED, 1.5 IN./FT./SAE "B" FLG 13T SPLINE
► V = 1 IN. DIA STR KEY/NONE
► W = 1 IN. DIA STR KEY/SAE "A" FLG 9T SPLINE

F: ROTATION
R = CW
L = CCW

G: CHARGE PUMP DISPLACEMENT
► A = NONE
B = 13.9 CC/REV (.85 CU. IN./REV)

H: CHARGE PRESSURE RELIEF VALVE SETTING*
A = 16.0 BAR (230 PSI)

J: FILTRATION
AA = SUCTION
BA = REMOTE PRESSURE W/O BYPASS
► BC = REMOTE PRESSURE W/O BYPASS (FOR NO CHARGE PUMP-OPT)

K: DISPLACEMENT
A = FULL DISPLACEMENT
► G = ADJUSTABLE MAX. STOPS - SUPPLIED WITH STOPS SET AT 46.0 CC/REV (2.8 CU. IN./REV)

L: BYPASS VALVE
A = BYPASS VALVE

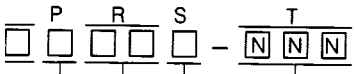
M: SYSTEM PRESSURE PROTECTION

	PROTECTION	
TYPE	**PORT "A"**	**PORT "B"**
A =	NONE	NONE
B =	PRESS. RELIEF	PRESS. RELIEF
C =	PRESS. RELIEF	NONE
D =	NONE	PRESS. RELIEF

SETTINGS (FOR PORT "A" & "B")*

A = NONE
M = 140 BAR (2030 PSI)
B = 175 BAR (2540 PSI)
C = 190 BAR (2755 PSI)
D = 210 BAR (3045 PSI)
E = 230 BAR (3335 PSI)
F = 250 BAR (3625 PSI)
G = 280 BAR (4060 PSI)
H = 300 BAR (4350 PSI)
J = 345 BAR (5000 PSI)

M46 Variable Displacement Pump -- PV (Continued)



T: SPECIAL HARDWARE FEATURES
NNN = NONE

S: AUXILIARY MOUNTING PAD
A = SAE "A" 9T SPLINE
D = SAE "A" 11T SPLINE
B = SAE "B" 13T SPLINE
C = NONE

R: CONTROL ORIFICE DIA

SUPPLY (MDC)	DRAIN (MDC)
F = NONE	F = NONE
A = .031 IN.	A = .031 IN.
B = .036 IN.	B = .036 IN.
C = .041 IN.	C = .041 IN.
D = .046 IN.	D = .046 IN.
E = .054 IN.	E = .054 IN.
ORIFICE "A" (EDC/HDC)	ORIFICE "B" (EDC/HDC)
G = .055 IN.	G = .055 IN.
H = .037 IN.	H = .037 IN.
J = NONE	J = NONE

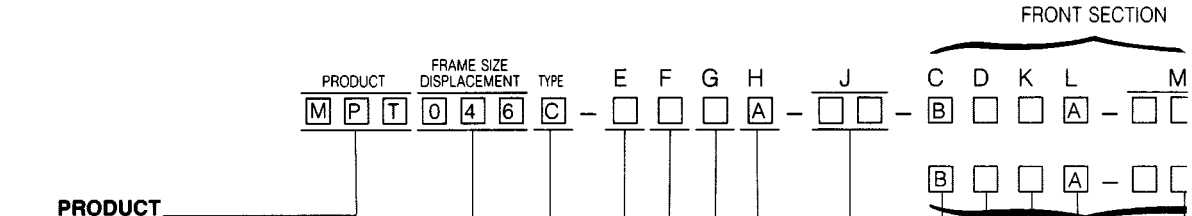
P: HANDLE POSITION
A = NOT APPLICABLE (EDC OR HDC)
D = DOWN
U = UP

N: CONTROL
AB = MDC
► BA = HDC
CA = EDC, SINGLE COIL, DRY CASE, PACKARD CONNECTOR
► CD = EDC, SINGLE COIL, OIL FILLED, MS CONNECTOR

► = Non-Standard

*All pressure settings above are nominal set pressure at factory test conditions. Actual pressures will vary due to actual conditions.

M46 Tandem Pump -- PT



PRODUCT
MPT = MEDIUM DUTY, PUMP, TANDEM

DISPLACEMENT (PER SECTION)
046 = 46 CC/REV (2.8 CU. IN./REV)

TYPE
C = CLOSED CIRCUIT

E: INPUT SHAFT
A = 15T 16/32P SPLINE
B = 19T 16/32P SPLINE
► C = 1 IN. DIA TAPERED, 1.5 IN./FT.
► D = 1 IN. DIA STR KEY

F: ROTATION
C = CW; W/22.9 CC/REV (1.40 CU. IN./REV) CHG PMP
D = CCW; W/22.9 CC/REV (1.40 CU. IN./REV) CHG PMP
► G = CW; W/O CHARGE PUMP
► H = CCW; W/O CHARGE PUMP

G: CHARGE PUMP DISPLACEMENT
A = NONE
C = 22.8 CC/REV (1.40 CU. IN./REV)

H: CHARGE PRESSURE RELIEF VALVE SETTING*
A = 16.0 BAR (230 PSI)

J: FILTRATION
AA = SUCTION
BA = REMOTE PRESSURE W/O BYPASS
► BC = REMOTE PRESSURE W/O BYPASS (FOR NO CHARGE PUMP-OPTION)

C: SWASHPLATE GROUP
B = STANDARD

D: SEAL GROUP
A = SHAFT SEAL FOR MANUAL DISPL. CONT-**FRONT SECTION**
B = SHAFT SEAL FOR EDC/HDC-**FRONT SECTION**
C = SHAFT SEAL FOR MANUAL DISPL. CONT—**REAR SECTION**
D = SHAFT SEAL FOR EDC/HDC-**REAR SECTION**

K: DISPLACEMENT
A = FULL DISPLACEMENT
► G = ADJUSTABLE MAX. STOPS - SUPPLIED WITH STOPS SET AT 46.0 CC/REV (2.8 CU. IN./REV)

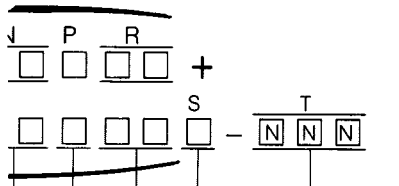
L: BYPASS VALVE
A = BYPASS VALVE

M: SYSTEM PRESSURE PROTECTION*

	PROTECTION	
TYPE	PORT "A" or "C"	PORT "B" or "D"
A =	NONE	NONE
B =	PRESS. RELIEF	PRESS. RELIEF
C =	PRESS. RELIEF	NONE
D =	NONE	PRESS. RELIEF

SETTINGS (SELECT FOR PORT "A" & "B" AND "C" & "D")
A = NONE
M = 140 BAR (2030 PSI)
B = 175 BAR (2540 PSI)
C = 190 BAR (2755 PSI)
D = 210 BAR (3045 PSI)
E = 230 BAR (3335 PSI)
F = 250 BAR (3625 PSI)
G = 280 BAR (4060 PSI)
H = 300 BAR (4350 PSI)
J = 345 BAR (5000 PSI)

M46 Tandem Pump -- PT (Continued)



T: SPECIAL HARDWARE FEATURES
NNN = NONE

S: AUXILIARY MOUNTING PAD
A = SAE "A" 9T SPLINE
► D = SAE "A" 11T SPLINE
B = SAE "B" 13T SPLINE
C = NONE

R: CONTROL ORIFICE DIA

SUPPLY (MDC OR DDC)	DRAIN (MDC OR DDC)
F = NONE	F = NONE
A = .031 IN.	A = .031 IN.
B = .036 IN.	B = .036 IN.
C = .041 IN.	C = .041 IN.
D = .046 IN.	D = .046 IN.
E = .054 IN.	E = .054 IN.
ORIFICE "A" (EDC/HDC)	ORIFICE "B" (EDC/HDC)
G = .055 IN.	G = .055 IN.
H = .037 IN.	H = .037 IN.
J = NONE	J = NONE

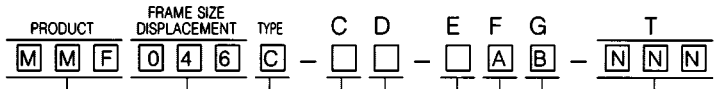
P: HANDLE POSITION
A = NOT APPLICABLE (EDC OR HDC)
D = DOWN
U = UP

N: CONTROL
AB = MDC
► BA = HDC
CA = EDC, SINGLE COIL, DRY CASE, PACKARD CONNECTOR
► CD = EDC, SINGLE COIL, OIL FILLED, MS CONNECTOR

= Non-Standard

*All pressure settings above are nominal set pressure at factory test conditions. Actual pressures will vary due to actual conditions.

M46 Fixed Displacement Motor -- MF



PRODUCT
MMF = MEDIUM DUTY, MOTOR, FIXED

DISPLACEMENT
046 = 46 CC/REV (2.8 CU. IN./REV)

TYPE
C = CLOSED CIRCUIT

C: SEAL GROUP
A = SHAFT SEAL
► B = SHAFT SEAL & SEAL FOR AUXILIARY DRIVE SHAFT

D: OUTPUT SHAFT/AUXILIARY DRIVE CONFIGURATION
A = 13T 16/32P SPLINE/NONE
F = 15T 16/32P SPLINE/NONE
► G = 15T 16/32P SPLINE/13T 16/32P SPLINE
► N = 1 IN. DIA TAPERED, 1.5 IN./FT./NONE
► P = 1 IN. DIA TAPERED, 1.5 IN./FT./13T 16/32P SPLINE
► U = 1 IN. DIA STR KEY/NONE

E: END CAP
A = RADIAL (SIDE) PORTS
B = AXIAL PORTS
► C = RADIAL (SIDE) PORTS W/AUXILIARY DRIVE

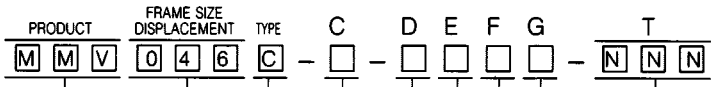
F: CYLINDER BLOCK GROUP
A = STANDARD BLOCK ASSEMBLY

G: BYPASS VALVE
B = NO BYPASS VALVE

T: SPECIAL HARDWARE FEATURES
NNN = NONE

► = Non-Standard

M46 Variable Displacement Motor -- MV



PRODUCT
MMV = MEDIUM DUTY, MOTOR, VARIABLE

DISPLACEMENT
046 = 46 CC/REV (2.8 CU. IN./REV)

TYPE
C = CLOSED CIRCUIT

C: SEAL GROUP
A = SHAFT SEAL
► B = SHAFT SEAL & SEAL FOR AUXILIARY DRIVE SHAFT

D: OUTPUT SHAFT/AUXILIARY DRIVE CONFIGURATION
A = 13T 16/32P SPLINE/NONE
► B = 13T 16/32P SPLINE/13T 16/32P SPLINE
E = 15T 16/32P SPLINE/NONE
► F = 15T 16/32P SPLINE/13T 16/32P SPLINE
► J = 1 IN. DIA TAPERED, 1.5 IN./FT/NONE

E: MINIMUM DISPLACEMENT
A = 11 DEGREE SWASHPLATE ANGLE, 29.5 CC/REV (1.8 CU. IN./REV)
B = 7 DEGREE SWASHPLATE ANGLE, 18.0 CC/REV (1.1 CU. IN./REV)
D = 6 DEGREE SWASHPLATE ANGLE, 16.1 CC/REV (.98 CU. IN./REV)
F = 9 DEGREE SWASHPLATE ANGLE, 24.6 CC/REV (1.5 CU. IN./REV)
H = 8.5 DEGREE SWASHPLATE ANGLE, 22.4 CC/REV (1.36 CU. IN./REV)

F: CONTROL FEATURES

	CONTROL PORT LOCATION	ADJUSTABLE MIN. DISPLACEMENT	MAX. DISPLACEMENT STROKE LIMITER
A =	BOTTOM	NO	NO
B =	BOTTOM & TOP	NO	NO

G: HOUSING/END CAP CONFIGURATION
A = STD. HOUSING/RADIAL (SIDE) PORTED END CAP
► B = STD. HOUSING/RADIAL (SIDE) PORTED END CAP FOR AUXILIARY DRIVE SHAFT

T: SPECIAL HARDWARE FEATURES
NNN = NONE

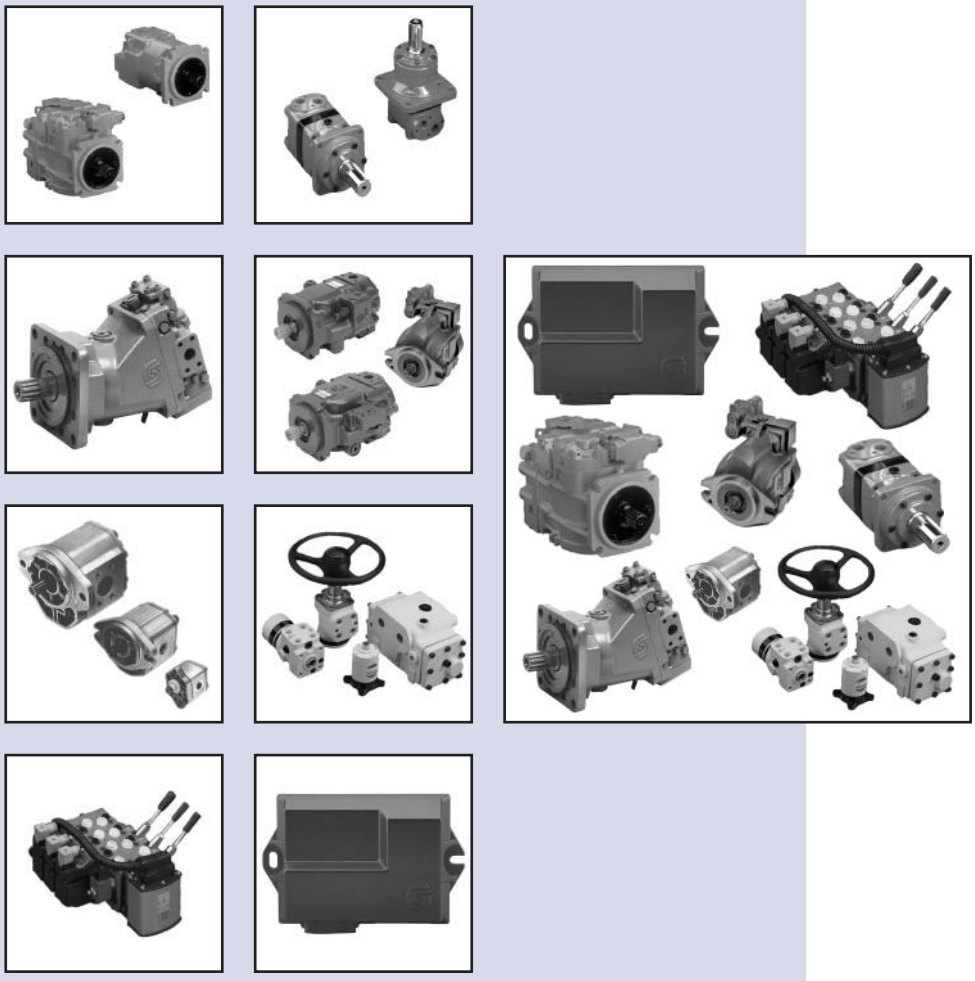
► = Non-Standard

Contents

SAUER DANFOSS

Sauer-Danfoss US Company All Products

Warranty Policies and Procedures



Sauer-Danfoss (US) Company
All Product
Warranty Policies and Procedures

WARRANTY

Sauer-Danfoss (US) Company ("Sauer-Danfoss") warrants for the applicable Warranty Period referred to below to the original equipment manufacturer or authorized distributor purchasing a Sauer-Danfoss Product ("Buyer") that the product will be free from defects in material and workmanship at the time of shipment from Sauer-Danfoss, and will conform to the drawings and specifications that apply to the product under Sauer-Danfoss ' sale agreement with Buyer.

Duration of warranty is printed in the section "WARRANTY PERIODS" (the "Warranty Period"). During the Warranty Period, Sauer-Danfoss shall repair or replace those products or their parts found by Sauer-Danfoss to be defective in material or workmanship at time of original shipment, provided that Sauer-Danfoss or its authorized representative is first advised in writing within the applicable Warranty Period of Buyer's contention of such defect, and that the product or, if applicable, the part in question is made available for inspection by Sauer-Danfoss or its authorized representative.

To facilitate inspection, Sauer-Danfoss may request return of the product and/or part Buyer contends to be defective. If so requested, Buyer will return the item to a Sauer-Danfoss Authorized Service Center or Factory Repair Facility ("Service Center").

Product or parts failures or malfunctions that are not attributable to defects in material and/or workmanship, and which are not covered by the said warranty include, but are not limited to:

- Inadequate, contaminated, or improper fluid.
- Accident, abuse, or neglect.
- Stripped keyways, or splines stripped or worn on external shaft end.
- Improper mounting of external pulleys, gears, etc.
- Operating above those speeds, pressures, or temperatures recommended by Sauer-Danfoss.
- Operating with improper electrical inputs (voltage, polarity, current, etc.).
- Repairs by personnel other than as authorized by Sauer-Danfoss.
- Use of the product in a manner or for a purpose not originally intended for by Sauer-Danfoss.
- Use of parts other than Genuine Sauer-Danfoss Parts in any repairs.

Sauer-Danfoss shall not be liable for labor costs or any other expenses incurred in removing or reinstalling products or parts.

THE WARRANTIES SET FORTH HEREIN ARE IN LIEU OF AND TO THE EXCLUSION OF ALL OTHER WARRANTIES, WHETHER EXPRESSED, IMPLIED, OR STATUTORY OR OTHERWISE, INCLUDING SPECIFICALLY, BUT NOT BY WAY OF LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Sauer-Danfoss ' liability, whether of warranty, negligence, or otherwise, is limited to the repair or replacement as herein provided or, at Sauer-Danfoss ' sole option, to a refund of the purchase price. **THIS SHALL BE SAUER-DANFOSS' MAXIMUM LIABILITY AND UNDER NO CIRCUMSTANCES SHALL SAUER-DANFOSS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR OTHER SIMILAR DAMAGES FROM ANY SOURCE WHATSOEVER (INCLUDING, SPECIFICALLY, BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF BUSINESS, OR ANY OTHER FINANCIAL LOSS BY BUYER OR ANY THIRD PARTY).**

If Buyer grants warranty on Sauer-Danfoss products of greater scope than the warranties provided by Sauer-Danfoss herein, or extends any Warranty Period beyond the applicable period described in "WARRANTY PERIODS," Buyer does so at its sole risk and expense. Buyer will indemnify and hold Sauer-Danfoss harmless from any claims of any party based on such greater warranty or period, and any expenses incurred in the defense of such claims. This warranty only applies to original-equipment manufacturers or authorized distributors, and by its terms does not extend to any person buying the product for personal, family, or household use. If Buyer extends its own warranty to its customer, and if the *Magnuson-Moss Warranty Improvement Act* (Pub. L. 93-637) or similar state laws should apply, Buyer assumes all responsibility for compliance with such laws and will indemnify and hold Sauer-Danfoss harmless from any claims of any party based on a violation of such laws and any expenses incurred in the defense of any such claims.

Sauer-Danfoss (US) Company
All Product
Warranty Policies and Procedures

WARRANTY PERIODS

New products

The Warranty Period is limited to the earlier of:

(i) 24 consecutive months (2 years) from the date of first use of the product, or

(ii) 36 consecutive months (3 years) from the date of original shipment of the product from Sauer-Danfoss.

Rebuilt products

If a product is rebuilt by a Service Center during the original new product Warranty Period, warranty on the rebuilt item shall be as set forth herein and shall continue for the balance of the original Warranty Period, or for a period equal to 50% of the original new product Warranty Period, whichever is later.

Service parts

The Warranty Period for Service Parts shall be 12 consecutive months (1 year) from date of original shipment of such service parts from Sauer-Danfoss.

REPAIR PROCEDURES

A. Major warranty repairs must be made by a Service Center and shall be obtained in accordance with all procedures set forth herein. To reduce unnecessary machine down time and freight costs, minor repairs may be performed in the field per the procedures in the applicable Sauer-Danfoss Service Manual, without affecting the product's warranty.

B. By forwarding a product to a Service Center for repair, Buyer acknowledges the Service Center's expertise and technical ability to determine by inspection whether a product was defective in material and/or workmanship when shipped from Sauer-Danfoss.

C. If upon receipt and inspection of the item, Sauer-Danfoss , in its sole discretion, determines that the product or part is defective in materials or workmanship, Sauer-Danfoss will, upon request, reimburse Buyer for its reasonable charges in returning the item via surface transportation, and will repair or replace the product or part at no charge to Buyer. If a product is returned to Sauer-Danfoss for warranty consideration and upon inspection and testing is found not to be defective, an inspection or repair charge will be assessed for this examination or repair even though the product is within the Warranty Period.

D. A Purchase Order must be supplied to the Service Center for all products returned for repair.

E. Damage or losses incurred during shipping and handling of products is the responsibility of Buyer.

F. Products submitted for repair may be updated at the Service Center's sole discretion, but no changes will be made that will detrimentally affect the form, fit, or function of the product. Sauer-Danfoss reserves the right to make changes in the design of its products at any time without incurring any obligation to make equivalent changes in products previously manufactured or shipped.

G. The Service Center has no responsibility for the return of customer's fittings, couplings, hoses, etc. attached to or included with products.

H. Upon inspection or repair of each product, an "Inspection Report" will be completed by the Service Center. This document reports the reason for malfunction and the condition of the hardware. A copy is available to Buyer upon request.

I. Products returned containing other than "Genuine" Sauer-Danfoss Parts will have those parts replaced with Genuine Sauer-Danfoss Parts. A charge will be assessed for all non-Sauer-Danfoss Parts replaced during repair.

J. A "Rebuilt" tag or stamp will be attached to each repaired product. This applies to all products that are repaired except for Buyer production line rejects. Production line rejects will be repaired and returned without this tag or stamp.

K. All repaired products will be tested and painted or refinished. The product will be assigned a new serial number or date code, except for Buyer production line rejects, which will retain original serial number.

L. The Service Center may, at its option, "Drop Ship" or ship to a location other than Buyer's place of business if requested by Buyer.

SAUER DANFOSS

OUR PRODUCTS

Hydrostatic transmissions

Hydraulic power steering

Electric power steering

Closed and open circuit axial piston pumps and motors

Gear pumps and motors

Bent axis motors

Radial piston motors

Orbital motors

Transit mixer drives

Planetary compact gears

Proportional valves

Directional spool valves

Cartridge valves

Hydraulic integrated circuits

Hydrostatic transaxles

Integrated systems

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Sensors

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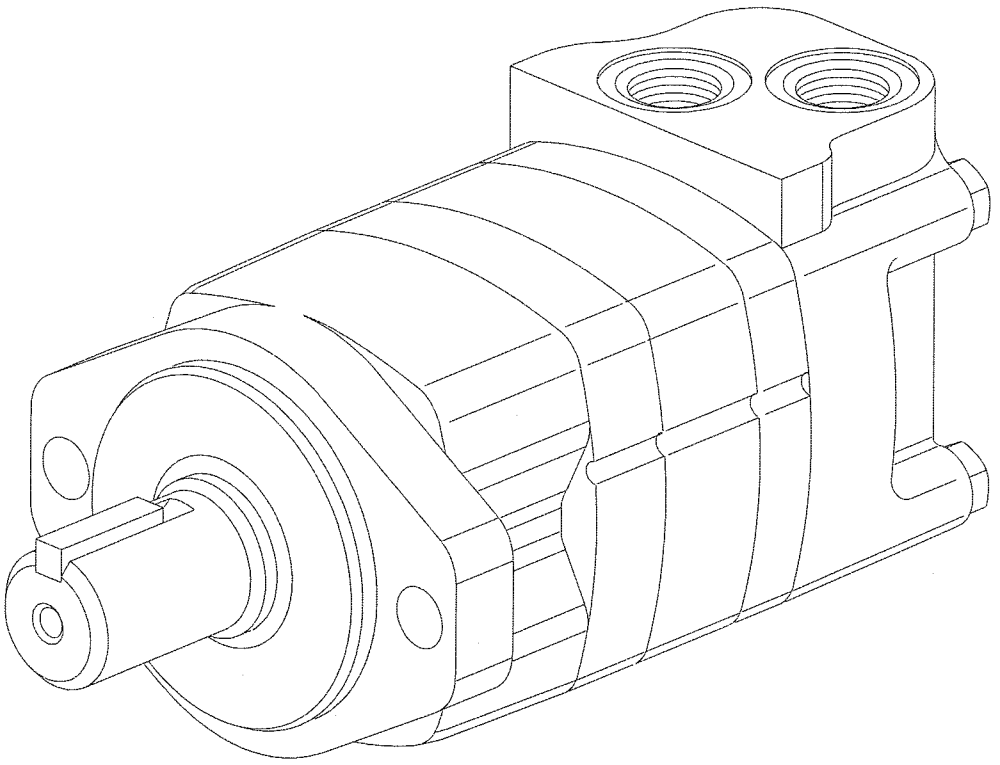
Char-Lynn®
Hydraulic Motor

No. 7-124
July, 1999

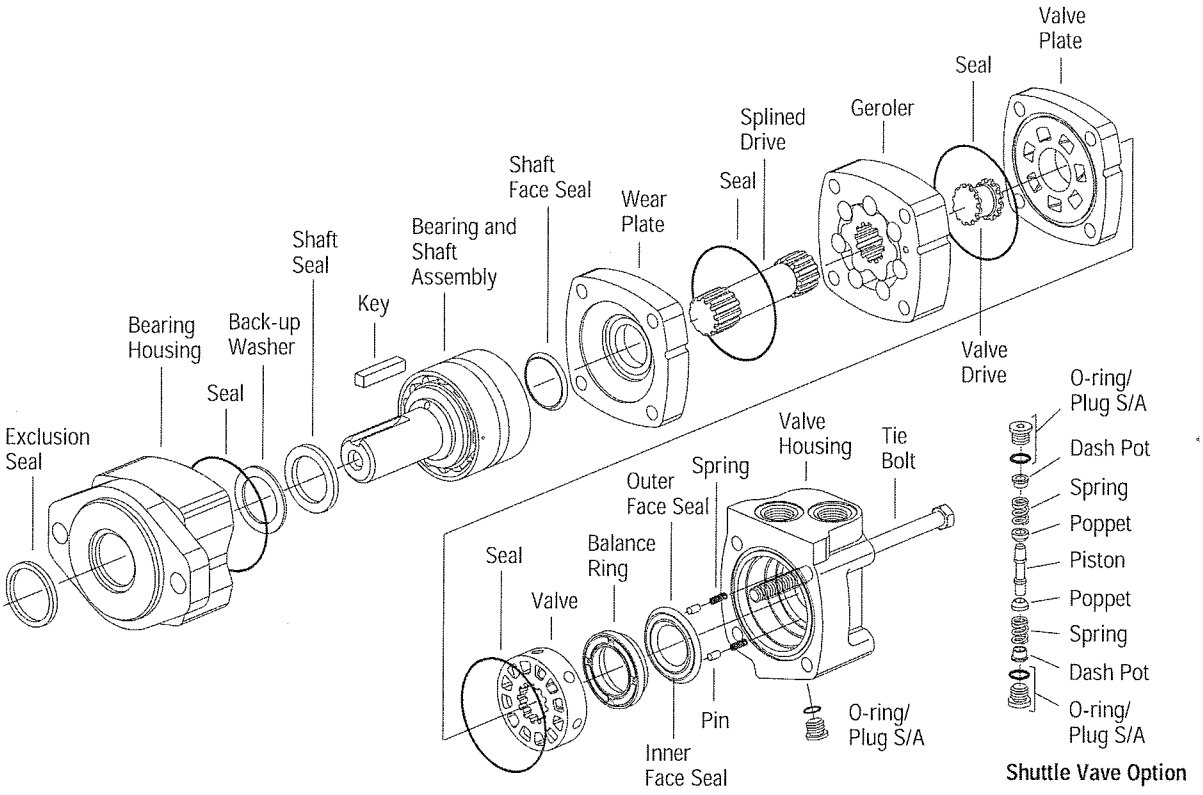
EATON

Repair Information



2000 Series
Disc Valve Geroler Motor

006



Shuttle Vave Option

Tools required for disassembly and reassembly.

Torque wrench 57Nm [500 lb-in] capacity
300-450 [12-16]* breaker bar
9/16 socket
Small screwdriver 150-200 x 6,5 [6-8 x 1/4] blade
3/16 Allen wrench
Press

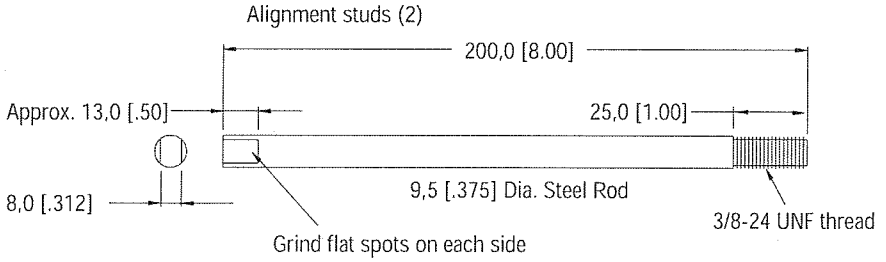
* Unless indicated otherwise, measurements are given in mm [inches]

** Shaft seal installation tool (600496)

** Bullet (600465) for 1 diameter shafts

The following tools are not necessary for disassembly and reassembly, but are extremely helpful.

Alignment studs (2)



Disassembly

Cleanliness is extremely important when repairing a hydraulic motor. Work in a clean area. Before disconnecting the lines, clean the port area of the motor thoroughly. Use a wire brush to remove foreign material and debris from around the exterior joints of the motor. Check the shaft and key slot, remove all nicks, burrs or sharp edges that might damage the bearing housing seals when installing the shaft and bearing assembly. Before starting the disassembly procedures, drain the oil from inside the motor.

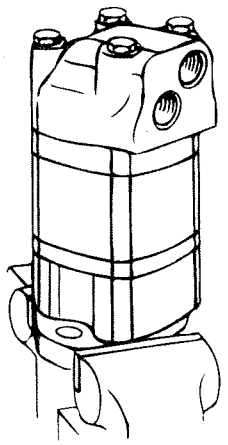


Figure 1

1 Place the motor in a vise with the output shaft down. Clamp across the mounting flange of the motor not the housing. Excessive clamping pressure will cause distortion. When clamping, use some protective device on the vise, such as special soft jaws, pieces of hard rubber or board.

Although not all drawings show the motor in a vise, we recommend that you keep the motor in the vise during disassembly and reassembly. Follow the clamping procedures explained throughout the manual.

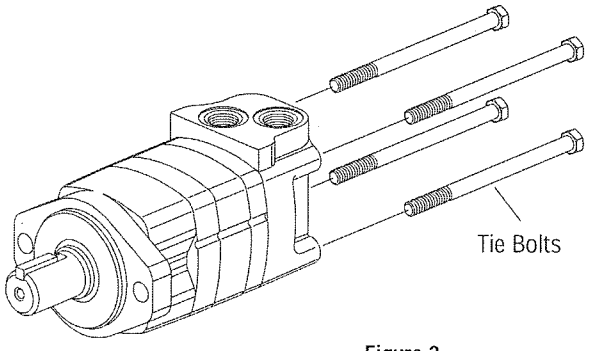


Figure 2

2 Remove 4 bolts from motor.

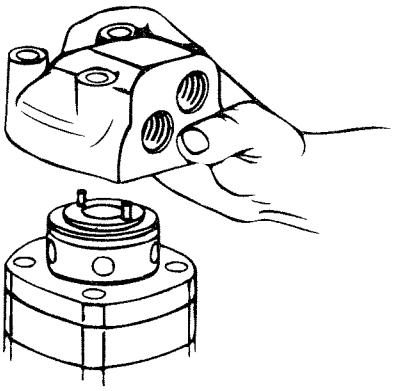


Figure 3

3 Lift valve housing straight up. If done carefully the pins, springs, balance ring assembly, and valve will remain on the valve plate.

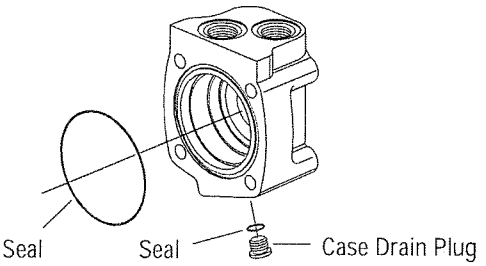


Figure 4

4 Carefully remove 76,0 [3.00] diameter seal from valve housing.

5 Remove case drain plug—with seal, from valve housing.

6 Remove 2 pins and 2 springs from balance ring assembly, see Figure 5.

Disassembly

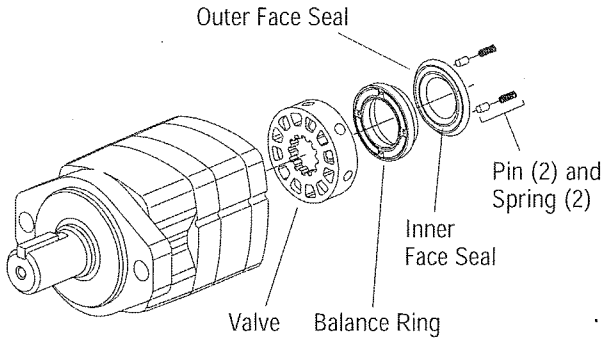


Figure 5

7 Remove balance ring assembly.

8 Remove inner and outer face seals from balance ring.

9 Remove the valve.

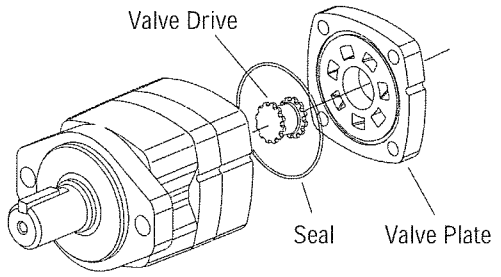


Figure 6

10 Remove the valve plate.

11 Remove the 76,0 [3.00] diameter seal from valve plate.

12 Remove the valve drive.

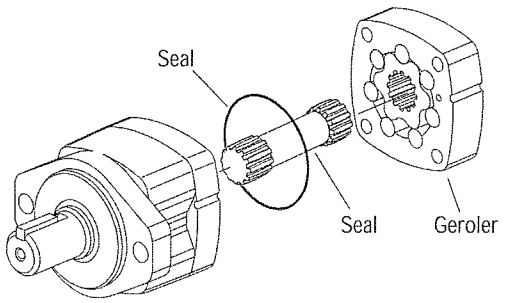


Figure 7

13 Remove the Geroler. Be sure to retain the rollers in the outer ring if they are loose.

14 Remove the drive.

15 Remove the 76,0 [3.00] diameter seal from wear plate, see Figure 7.

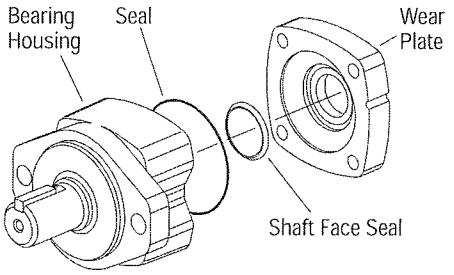


Figure 8

16 Remove the wear plate.

17 Remove the shaft face seal from the wear plate.

18 Remove the 76,0 [3.00] diameter seal from bearing housing.

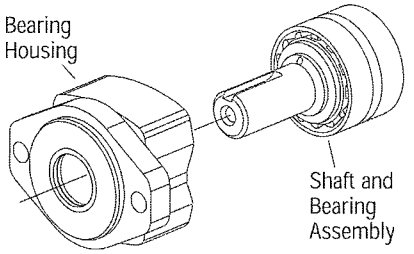


Figure 9

19 You may need a press to remove shaft and bearing assembly from bearing housing. (Key must be removed before removing shaft.)

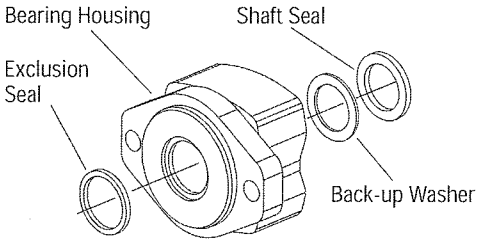


Figure 10

20 Use a small screwdriver to remove shaft seal, back-up washer and exclusion seal from bearing housing, see Figure 10. Do not damage bore of housing.

Note: Individual parts of shaft and bearing assembly are not sold separately. Replace as a unit.

Reassembly

Check all mating surfaces. Replace any parts that have scratches or burrs that could cause leakage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe dry with cloth or paper towel because lint or other matter can get in the hydraulic system and cause damage. Do not use a coarse grit or try to file or grind these parts. Check around the keyway and chamfered area of the shaft for burrs, nicks or sharp edges that can damage the seals when reassembling the bearing housing.

Note: Lubricate all seals (prior to installation) with petroleum jelly such as Vaseline. Use new seals when reassembling this motor. Refer to parts list (6-129) for proper seal kit number.

21 Use a press to install exclusion seal in outer bore of bearing housing. Lip of seal must face outward. See Figure 11. If a press is not available use a plastic or rubber hammer, being careful not to damage or cock seal in the bore.

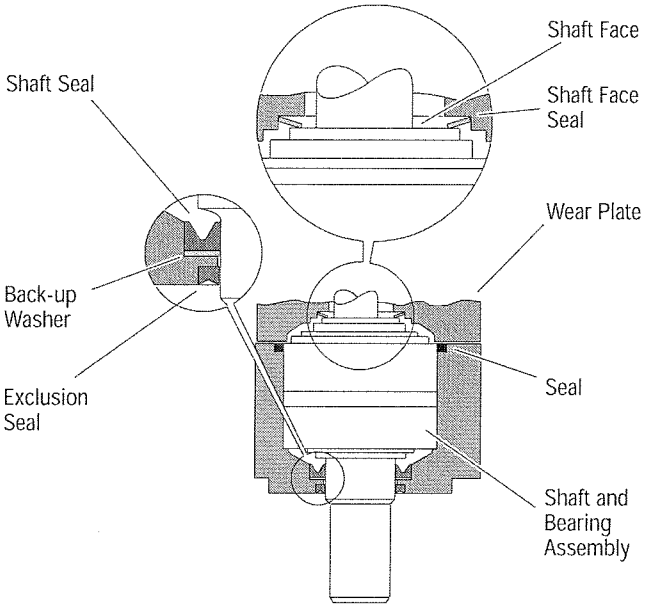


Figure 11

22 Place back-up washer into seal bore. Place shaft seal onto installation tool (600496) and press seal into seal bore of the housing.

23 Clamp housing in vise, see Figure 1.

24 Place protective bullet (see note below) over shaft. Apply petroleum jelly to inside diameter of dust and shaft seal. You may need a press to install shaft and bearing assembly. Do not distort shaft seal. Damage to this seal will cause leakage.

Note: Bullet (600465), for 1inch dia. shafts, available— by special order. Use tape over other shafts to prevent cutting the seals.

25 Apply petroleum jelly to the 76,0 [3.00] diameter seal. Install seal into the bearing housing.

26 Alignment studs can be very helpful in reassembly of the motor. See special tool listing page 2. If you use studs, install 2 studs diagonally opposed in the bearing housing.

27 Install the shaft face seal in the wear plate as shown in Figure 11. Do not distort seal.

28 Install the wear plate, see Figure 11.

29 Apply a light film of petroleum jelly to the 76,0 [3.00] diameter seal and install seal in the wear plate.

30 Install the drive into the output shaft.

31 Align the notch on the outside of the Geroler with the notch on the wear plate. Install the Geroler against the wear plate. Be sure to retain the rollers in the outer ring if they are loose.

32 Install the valve drive in the Geroler.

Note: Installation at this time involves 3 steps in the timing of the motor. Timing determines the direction of rotation of the output shaft. Timing parts include:

1. Geroler
2. Valve Drive
3. Valve Plate
4. Valve

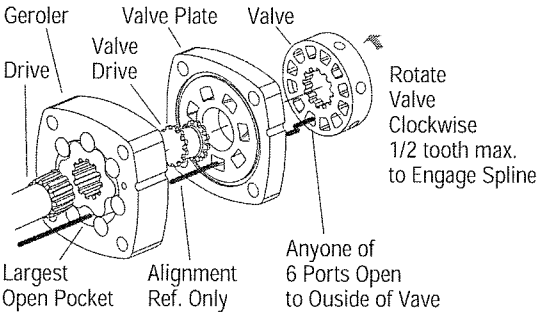


Figure 12 Timing Alignment

Timing Step # 1 — Locate the largest open pocket in the Geroler and mark it on the outside edge of the Geroler.

33 Apply a light film of petroleum jelly to the 76,0 [3.00] diameter seal. Install seal in groove of valve plate.

Reassembly

34 Align the notch on the outside of the valve plate with the notch on the Geroler as shown in Figure 12.

Timing Step # 2 — Locate the slot opening in the valve plate which is in line with the largest open pocket of the Geroler.

Timing Step # 3 — Locate any one of the side openings of the valve and align this opening with the open slot of the valve plate that is in line with the largest open pocket of the Geroler. Install the valve by rotating it clockwise until the spine teeth engage (1/2 spine tooth max.). This will provide the proper rotation when pressurized as shown in Figure 13.

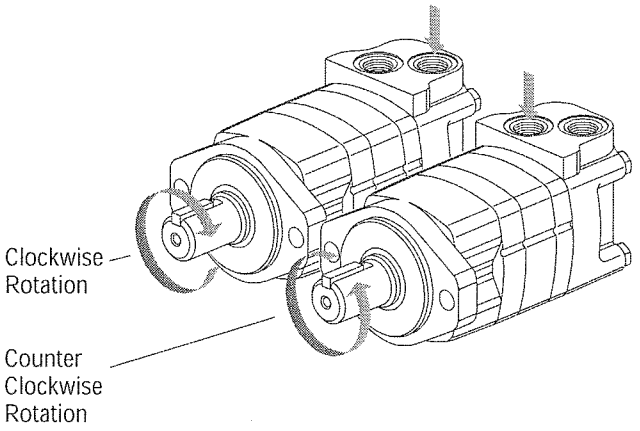


Figure 13

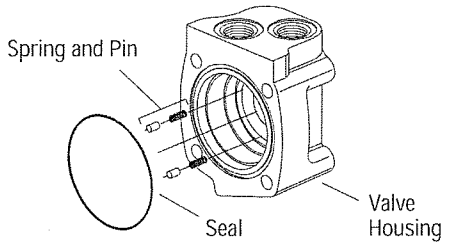


Figure 14

35 Install 2 springs and 2 pins in the holes located in the bore of the valve housing, as shown in Figure 14.

36 Apply a light film of petroleum jelly to the 76,0 [3.00] diameter seal. Install seal in the valve housing.

37 Apply petroleum jelly to inner and outer face seals. Install seals on balance ring as shown in Figure 15.

Important: Install face seals in the positions shown in Figure 15, or the motor will not operate properly. Do not force or bend the face seals. Any damage to these seals will affect the operation of the motor.

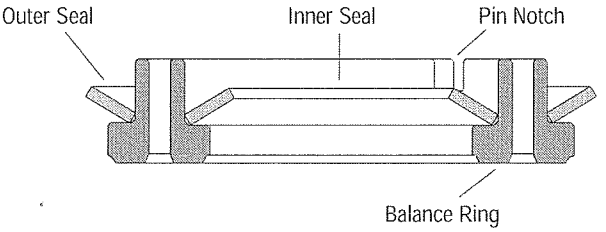


Figure 15

38 Align pin notches in balance ring with pins in bore of valve housing. Install balance ring assembly in valve housing.

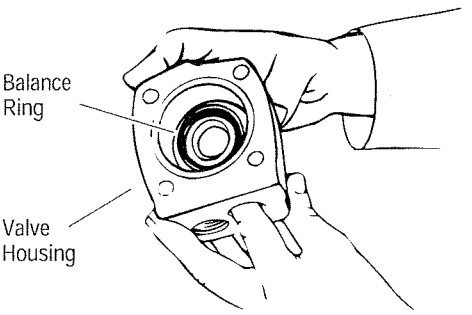


Figure 16

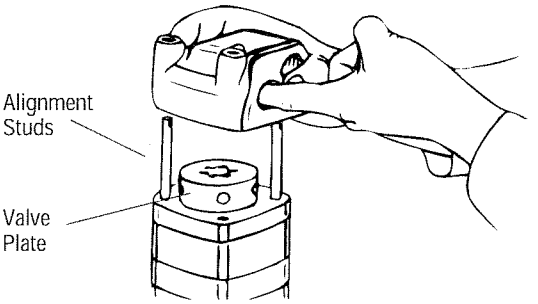


Figure 17

39 Insert your finger through port of valve housing. Apply pressure to side of balance ring as shown in Figure 16. Hold ring in position until valve housing is in place against valve plate (see Figure 17).

Note: After installing the valve housing on the valve plate check for proper placement. Push down on the valve housing. You should get a slight spring action.

Reassembly

40 Install tie bolts. If you use alignment Studs, install 2 bolts opposite the studs. Finger tighten the bolts. Remove the alignment studs and replace with the two remaining bolts. Torque all four bolts alternately to 50 Nm [450 lb-in].

41 Install seal on case drain plug then install in valve housing. Torque to 6 Nm [50 lb-in.]

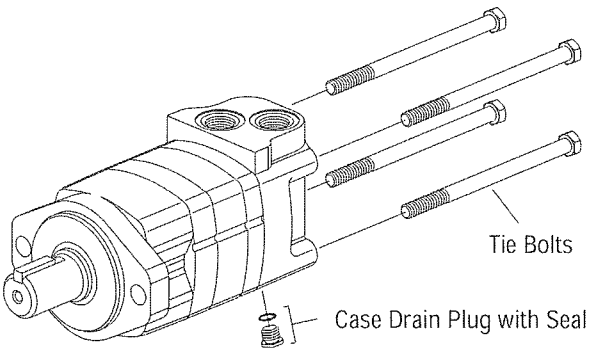


Figure 18

Wheel Motor

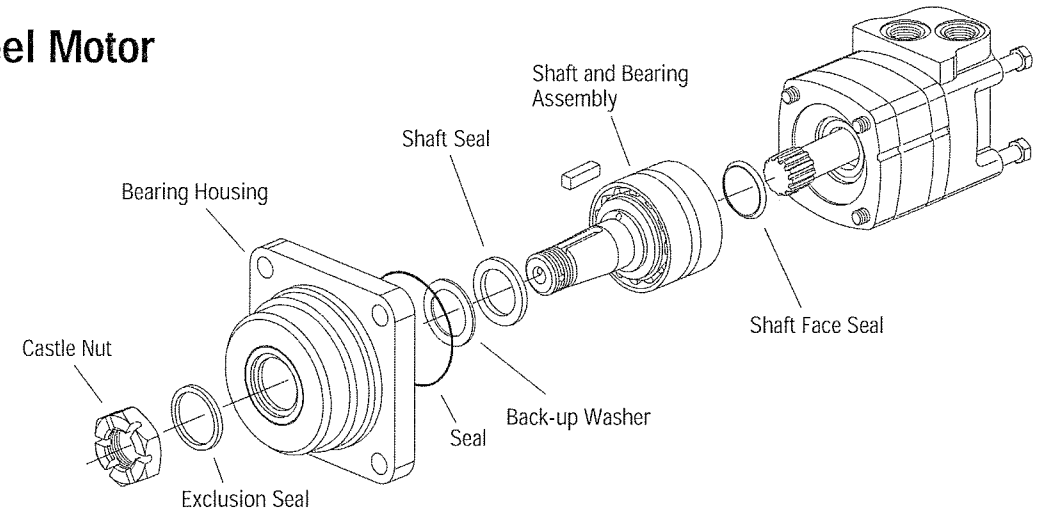
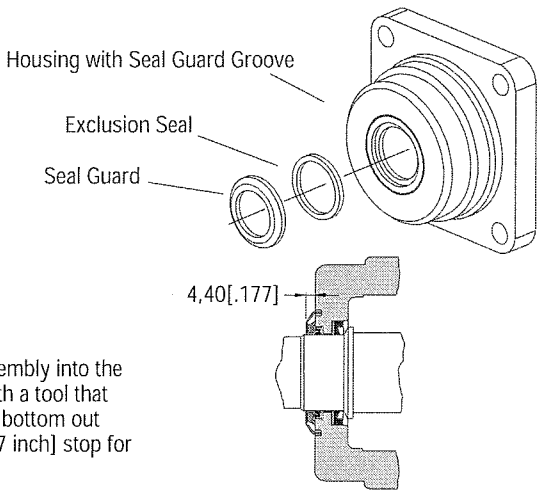


Figure 19

On wheel motors, a different bearing housing is used, see Figure 19. Other than this the parts are the same as the standard motor and the same disassembly and reassembly procedures apply.



Wheel Motor with Seal Guard

Installation of Seal Guard:

After completing assembly of the shaft and bearing assembly into the bearing housing, press the seal guard onto the shaft with a tool that will provide an even push over the seal. This tool must bottom out against the bearing housing and provide a 4,5 mm [.177 inch] stop for the seal guard.

Bearingless Motor

This motor is the same as the standard motor without the shaft/ bearing assembly, and bearing housing. The mounting flange replaces the bearing housing, see Figure 20. Follow same disassembly and reassembly procedures as rear section of standard motor.

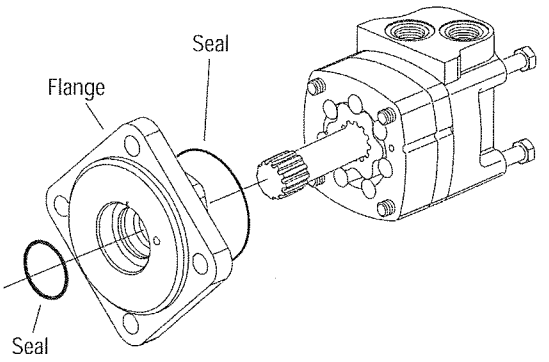
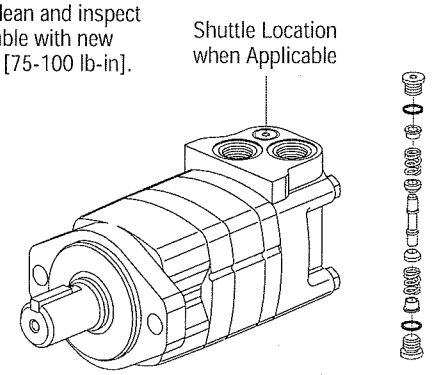


Figure 20

Disassembly Reassembly Shuttle Valve Option

Disassembly of shuttle valve option, this valve is located in the valve housing. Clean and inspect shuttle valve parts and reassemble with new seals, torque plugs to 8-11 Nm [75-100 lb-in].



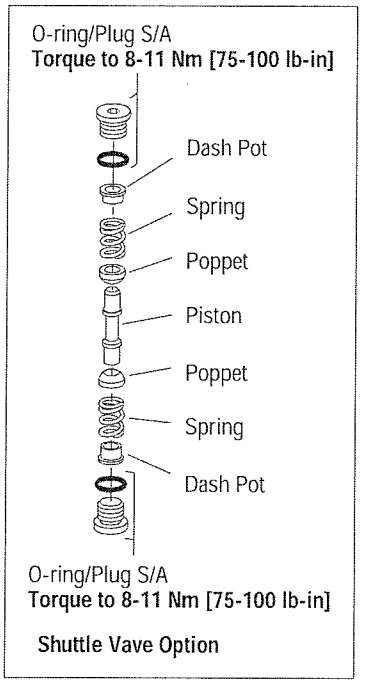


Figure 21

Reassembly — Speed Sensor

1 Rotate the motor shaft until a (gear/target) tooth is centered in the speed sensor port. If this is not done, the sensor may be damaged during the operation of the motor.

2 Make sure the lock nut and its threads are clean and dry for the proper torque. Position the lock nut against the alignment nut as shown in Figure 22.

3 Move the washer and the o-ring up against the speed sensor body threads as shown in Figure 22.

4 By hand, lightly thread the speed sensor body into the housing until the sensor touches against the motor (gear/target) tooth. **Do not force the sensor against the (gear/target) tooth, damage may occur.** Make sure the o-ring or the washer do not touch the housing — see Figure 23.

5 Turn the speed sensor body out one quarter turn (CCW) plus the additional amount (CCW) needed to make the alignment notches perpendicular to the motor shaft centerline (90° +/-5 degrees from the motor shaft centerline — Figure 24 and 25).

6 Maintain the speed sensor body alignment (Figure 25), and tighten the lock nut to 8,5-14 Nm [75-125 lb-in.] (torque values are for clean dry threads).

7 Check the speed sensor body for correct alignment (Figure 25), reinstall the sensor if it is not correct.

Speed Sensor Installation

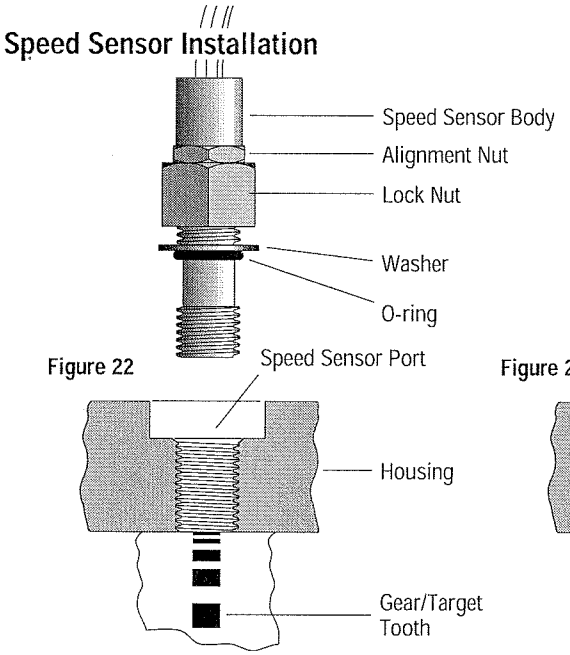


Figure 22

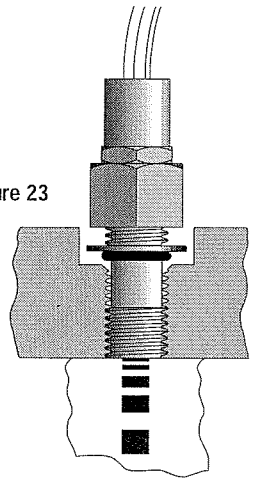


Figure 23

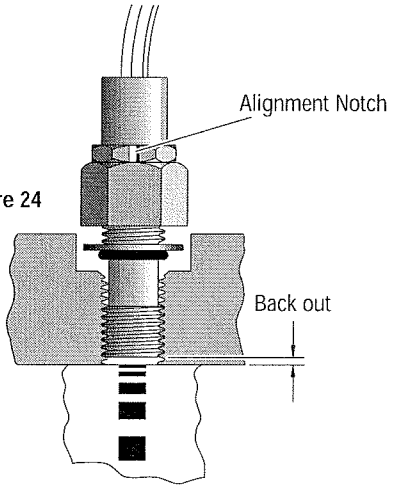


Figure 24

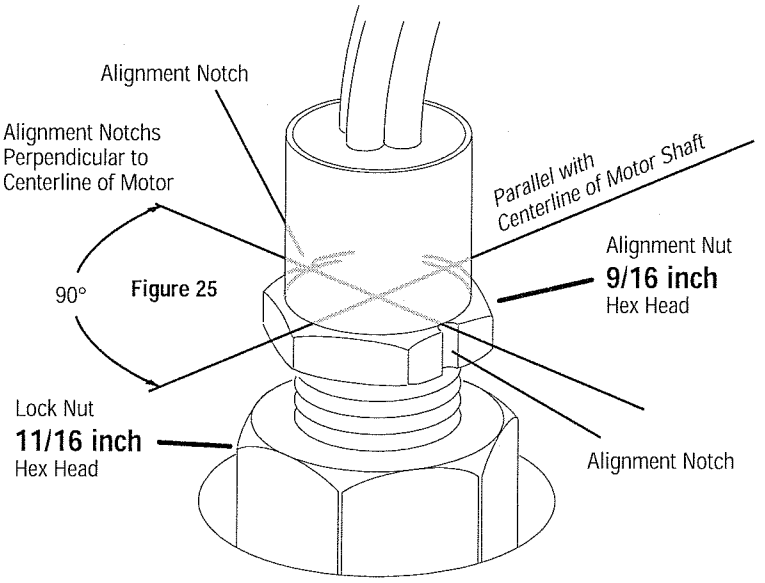


Figure 25

Product Identification

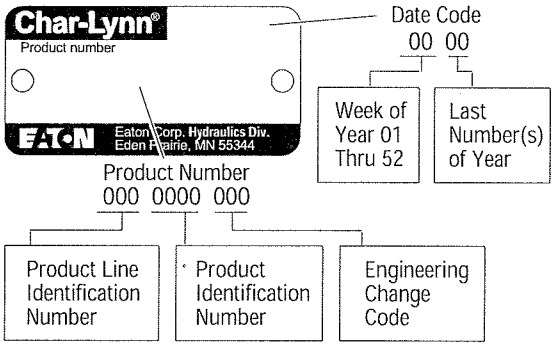
For Additional Literature Contact Eaton Corp. Hydraulics Division 15151 Highway 5 Eden Prairie, MN 55344.

- Specifications and performance data, Catalog No. 11-878
- Replacement part numbers and kit information — Parts Information No. 6-129

How to Order Replacement Parts

Each Order Must Include the Following:

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts



Product Numbers—2000 Series

Use digit prefix —104-, 105-, or 106- plus four digit number from charts for complete product number—Example 106-1039.

104-1007

Mounting	Shaft	Ports	Displacement cm³/r [in³/r] and Product Number								
			80 [4.9]	100 [6.2]	130 [8.0]	160 [9.6]	195 [11.9]	245 [14.9]	305 [18.7]	395 [24.0]	490 [29.8]
2 Bolt SAE A Flange	1 inch Straight	7/8-14 O-ring Staggered	104-1001	-1002	-1003	-1004	-1005	-1006	-1007	-1143	—
		1-1/16—12 O-ring 180° Apart	104-1037	-1038	-1039	-1040	-1041	-1042	-1043	-1044	—
	1-1/4 Inch Straight	7/8-14 O-ring Staggered	104-1022	-1023	-1024	-1025	-1026	-1027	-1028	-1228	-1420
		1-1/16—12 O-ring 180° Apart	104-1061	-1062	-1063	-1064	-1065	-1066	-1067	-1068	-1421
	1-1/4 Inch 14 T Splined	7/8-14 O-ring Staggered	104-1029	-1030	-1031	-1032	-1033	-1034	-1035	-1229	-1422
		1-1/16—12 O-ring 180° Apart	104-1087	-1088	-1089	-1090	-1091	-1092	-1093	-1094	-1423
2 Bolt SAE B Flange	1-1/4 Inch Straight	7/8-14 O-ring Staggered	104-1200	-1201	-1202	-1203	-1204	-1205	-1206	-1207	—
	1-1/4 In. Involute SAE C Splined	7/8-14 O-ring Staggered	104-1208	-1209	-1210	-1211	-1212	-1213	-1214	-1215	—
	1 Inch SAE 6B Splined	7/8-14 O-ring Staggered	104-1193	-1194	-1195	-1196	-1197	-1198	-1199	—	—
	7/8 Inch SAE B Splined	7/8-14 O-ring Staggered	104-1216	-1217	-1218	-1219	-1220	—	—	—	—
Standard with 4 Bolt Square Flange	32 mm Straight	G 1/2 (BSP)	104-1384	-1385	-1386	-1387	-1388	-1389	-1390	-1391	—
	1-1/4 Inch 14 T Splined	G 1/2 (BSP)	104-1376	-1377	-1378	-1379	-1380	-1381	-1382	-1383	—
Wheel Motor	1-1/4 Inch Straight	7/8-14 O-ring Staggered	105- —	—	—	—	—	—	—	—	-1148
		1-1/16—12 O-ring 180° Apart	105- —	—	—	—	—	—	—	—	-1149
	32 mm Straight	G 1/2 (BSP)	105-1134	-1135	-1136	-1137	-1138	-1139	-1140	-1141	—
	1-1/4 Inch Tapered	7/8-14 O-ring Staggered	105-1001	-1002	-1003	-1004	-1005	-1006	-1007	-1060	-1152
		1-1/16—12 O-ring 180° Apart	105-1071	-1072	-1073	-1074	-1075	-1076	-1077	-1078	—
	1-1/4 Inch 14 T Splined	7/8-14 O-ring Staggered	105-1029	-1030	-1031	-1032	-1033	-1034	-1035	-1096	—
		1-1/16—12 O-ring 180° Apart	105-1079	-1080	-1081	-1082	-1083	-1084	-1085	-1086	—
Bearingless		7/8-14 O-ring Staggered	106-1008	-1009	-1010	-1011	-1012	-1013	-1014	-1015	-1047
		G 1/2 (BSP)	106-1038	-1039	-1040	-1041	-1042	-1043	-1044	-1045	—

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CONTENTS

INTRODUCTION

The illustrations used in this manual are for identification purposes only and cannot be used for ordering parts. Obtain a parts list from the factory or a Viking® representative. Always give complete name of part, part number and material with model number and serial number of pump when ordering repair parts. The unmounted pump or pump unit model number and serial number are on the nameplate.

In the Viking model number system, basic size letters are combined with series number (32 and 432), indicating both unmounted or mounted pump unit.

UNMOUNTED PUMP AND UNIT MODEL NUMBERS

Model Number Chart

UNMOUNTED PUMP		UNITS
PACKED	MECH. SEAL	
G32 H32 HL32 J32 K32 KK32 L32 LQ32 LL32 Q32 M32 N32	G432 H432 HL432	Units Are Designed By The Un-Mounted Pump Model Numbers Followed By A Letter Indicating Drive Style. V = V-belt D = Direct Drive B = Bracket Mounted

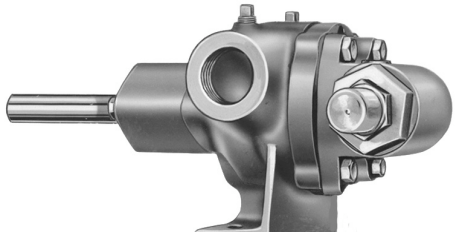


FIGURE 1 - G Size Unmounted Pump

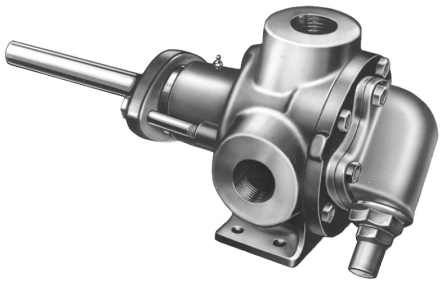


FIGURE 2 – H and HL Sizes Unmounted Pump

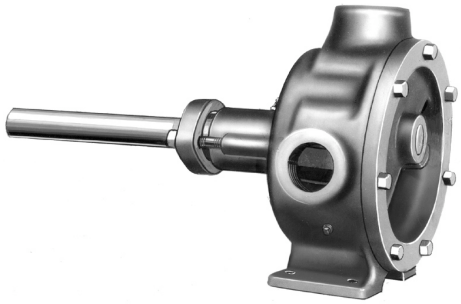


FIGURE 3 – J, K, KK, and L Sizes Unmounted Pump
(Shown without pressure relief valve)

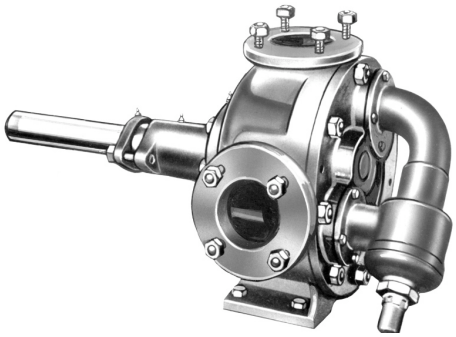


FIGURE 4 – LQ, LL, M and N Sizes Unmounted Pump

This manual deals only with Series 32 and 432 General Purpose Pumps. Refer to Figures 1 thru 12 for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 310, Series 32 and 432 General Purpose Pumps.

SPECIAL INFORMATION

DANGER

BEFORE OPENING ANY VIKING PUMP LIQUID CHAMBER (PUMPING CHAMBER, RESERVOIR, RELIEF VALVE ADJUSTING CAP FITTING ETC.) BE SURE:

1. THAT ANY PRESSURE IN CHAMBER HAS BEEN COMPLETELY VENTED THROUGH SUCTION OR DISCHARGE LINES OR OTHER APPROPRIATE OPENINGS OR CONNECTIONS.
2. THAT THE DRIVING MEANS (MOTOR, TURBINE, ENGINE, ETC.) HAS BEEN "LOCKED OUT" OR MADE NON-OPERATIONAL SO THAT IT CANNOT BE STARTED WHILE WORK IS BEING DONE ON PUMP.
3. THAT YOU KNOW WHAT LIQUID THE PUMP HAS BEEN HANDLING AND THE PRECAUTIONS NECESSARY TO SAFELY HANDLE THE LIQUID. OBTAIN A MATERIAL SAFETY DATA SHEET (MSDS) FOR THE LIQUID TO BE SURE THESE PRECAUTIONS ARE UNDERSTOOD.

FAILURE TO FOLLOW ABOVE LISTED PRECAUTIONARY MEASURES MAY RESULT IN SERIOUS INJURY OR DEATH.

ROTATION: Viking pumps operate equally well in a clockwise or counterclockwise rotation. Shaft rotation determines which port is suction and which is discharge. Port in area where pumping elements (gear teeth) come out of mesh is suction port.

PRESSURE RELIEF VALVES:

1. Viking pumps are positive displacement pumps and must be provided with some sort of pressure protection. This may be a relief valve mounted directly on the pump, an inline pressure relief valve, a torque limiting device or a rupture disk.
2. There are relief valve options available on those pump models designed to accept a relief valve. Options may include a return to tank relief valve and a jacketed relief valve. Pumps equipped with a jacketed head plate are generally not available with a relief valve.
3. If pump rotation is reversed during operation, pressure protection must be provided on *both* sides of pump.
4. Relief valve adjusting screw cap must *always* point towards suction side of pump. If pump rotation is reversed, remove pressure relief valve and turn end for end. Refer to Figures 1, 2, 3 and 4, page 1.
5. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure.

For additional information on pressure relief valves, refer to Technical Service Manual TSM000 and Engineering Service Bulletin ESB-31.

MAINTENANCE

Series 32 and 432 pumps are designed for long, trouble-free service life under a wide variety of application conditions with a minimum of maintenance. The points listed below will help provide long service life.

LUBRICATION: Periodic external lubrication should be applied slowly with a hand gun at all lubrication fittings provided. A good quality of general purpose grease is satisfactory in the majority of cases, however, applications involving very high or low temperatures may require other types of lubricants. Suggested frequency of lubrication is once every 500 hours of operation. Do not over-grease. Refer to Engineering Service Bulletin ESB-515. Consult factory with specific lubrication questions.

PACKING ADJUSTMENT: New packed pumps require initial packing adjustment to control leakage as packing 'runs in". Make initial adjustments carefully and do not over-tighten packing gland. After initial adjustment, inspection will reveal need for packing gland adjustment or packing replacement. Refer to instructions under Disassembly, page 6, and Assembly, page 6, regarding repacking pump.

CLEANING PUMP: Keep pump as clean as possible. This will facilitate inspection, adjustment and repair work and help prevent overlooking a dirt covered grease fitting.

STORAGE: If pump is to be stored, or not used for six months or more, pump must be drained and a light coat of non-detergent SAE 30 weight oil must be applied to all internal pump parts. Lubricate fittings and apply grease to pump shaft extension. Viking suggests rotating pump shaft by hand one complete revolution every 30 days to circulate the oil.

SUGGESTED REPAIR TOOLS: The following tools must be available to properly repair Series 32 and 432 pumps. These tools are in addition to standard mechanics' tools such as open end wrenches, pliers, screw drivers, etc. Most of the items can be obtained from an industrial supply house.

1. Soft Headed hammer
2. Allen wrenches (some mechanical seals and set collars)
3. Packing hooks, flexible (packed pumps)

   Small for 0.25 inch and 0.31 inch cross section packing
   Large for 0.38 inch and up cross section packing
4. Brass bar
5. Arbor press

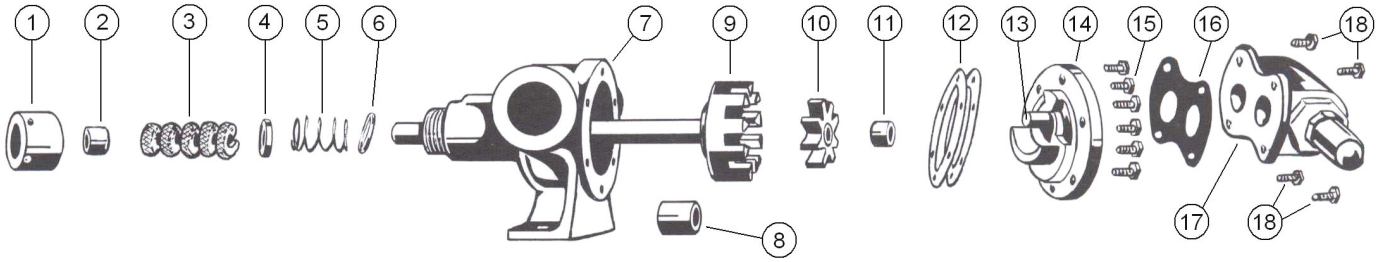


FIGURE 5 – EXPLODED VIEW MODEL G32 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Packing Nut	6	Packing Spring Washer	11	Idler Bushing	16	Relief Valve Gasket
2	Outer Packing Gland	7	Casing and Bushing	12	Head Gasket	17	Relief Valve
3	Packing	8	Casing Bushing	13	Idler Pin	18	Capscrew for Valve
4	Inner Packing Gland	9	Rotor and Shaft	14	Head and Idler Pin		
5	Packing Spring	10	Idler and Bushing	15	Capscrew for Head		

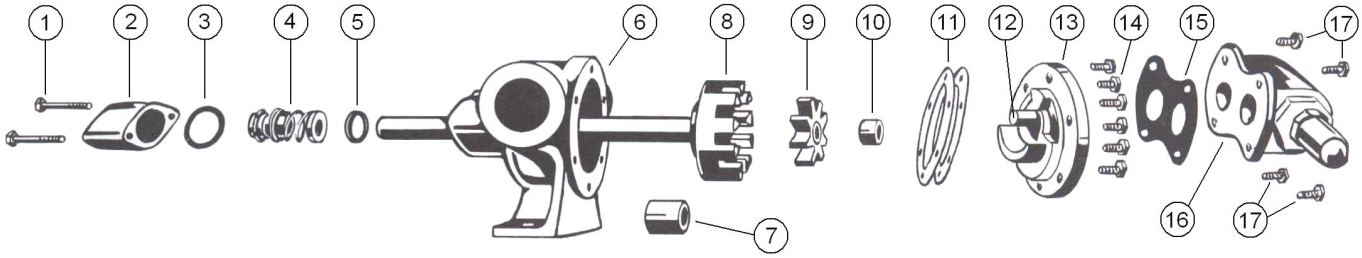


FIGURE 6 – EXPLODED VIEW MODEL G432 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Capscrew for End Cap	6	Casing and Bushing	11	Head Gasket	16	Relief Valve
2	End Cap	7	Casing Bushing	12	Idler Pin	17	Capscrew for Valve
3	Gasket for End Cap	8	Rotor and Shaft	13	Head and Idler Pin		
4	Mechanical Seal (Complete)	9	Idler and Bushing	14	Capscrew for Head		
5	Set Collar with Setscrew	10	Idler Bushing	15	Relief Valve Gasket		

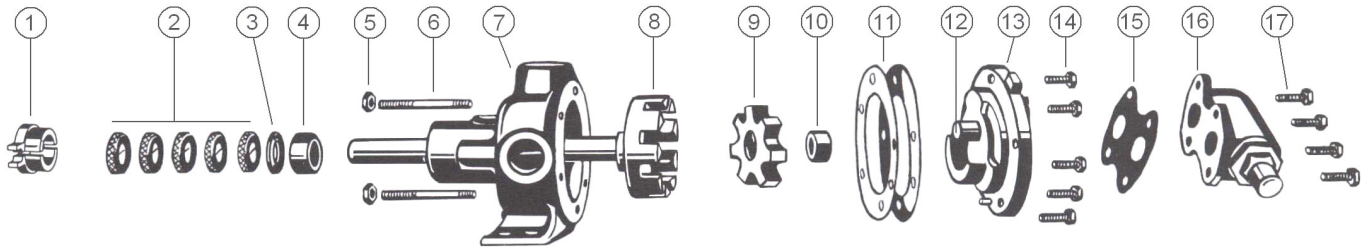


FIGURE 7 – EXPLODED VIEW MODEL H AND HL32 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Two Piece Packing Gland	6	Packing Gland Stud	11	Head Gasket	16	Relief Valve
2	Packing	7	Casing and Bushing	12	Idler Pin	17	Capscrew for Valve
3	Packing Retainer Washer	8	Rotor and Shaft	13	Head and Idler Pin		
4	Casing Bushing	9	Idler and Bushing	14	Capscrew for Head		
5	Packing Gland Nut	10	Idler Bushing	15	Relief Valve Gasket		

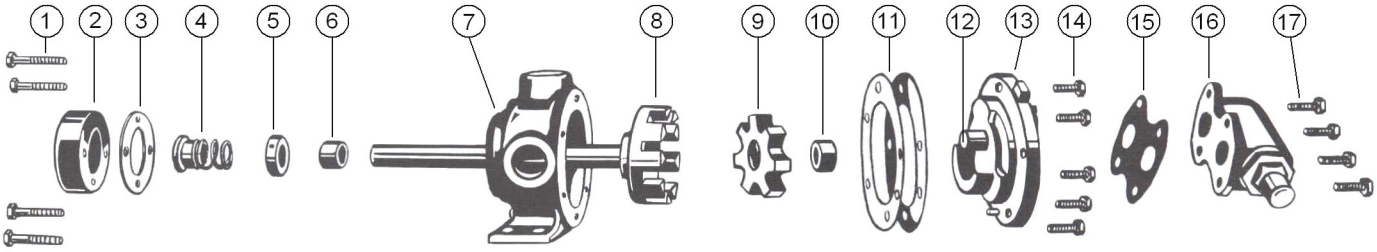


FIGURE 8 – EXPLODED VIEW MODEL H AND HL432 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Capscrew for End Cap	6	Casing Bushing	11	Head Gasket	16	Relief Valve
2	End Cap	7	Casing and Bushing	12	Idler Pin	17	Capscrew for Valve
3	Gasket for End Cap	8	Rotor and Shaft	13	Head and Idler Pin		
4	Mechanical Seal	9	Idler and Bushing	14	Capscrew for Head		
5	Set Collar with Setscrew	10	Idler Bushing	15	Relief Valve Gasket		

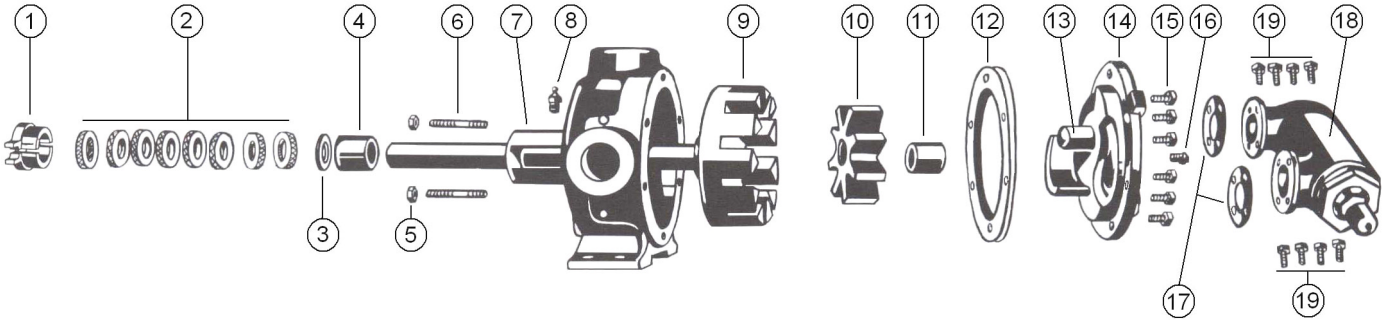


FIGURE 9 – EXPLODED VIEW MODEL J32, K32, KK32 AND L32 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Two Piece Packing Gland	6	Packing Gland Stud	11	Idler Bushing	16	Pipe Plug
2	Packing	7	Casing and Bushing	12	Head Gasket	17	Relief Valve Gasket
3	Packing Retainer Washer	8	Grease Fitting	13	Idler Pin	18	Relief Valve
4	Casing Bushing	9	Rotor and Shaft	14	Head and Idler Pin	19	Capscrew for Valve
5	Packing Gland Nut	10	Idler and Bushing	15	Capscrew for Head		

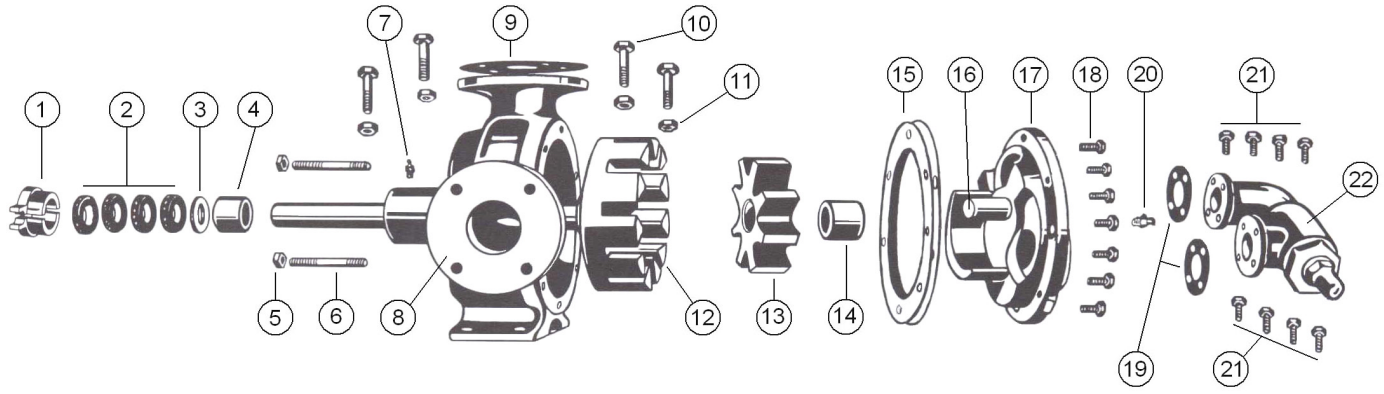


FIGURE 10 – EXPLODED VIEW MODEL LQ32 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Two Piece Packing Gland	7	Grease Fitting	13	Idler and Bushing	19	Relief Valve Gasket
2	Packing	8	Casing and Bushing	14	Idler Bushing	20	Pipe Plug
3	Packing Retainer Washer	9	Pipe Flange Gasket	15	Head Gasket	21	Capscrew for Valve
4	Casing Bushing	10	Capscrew for Flanges	16	Idler Pin	22	Relief Valve
5	Packing Gland Nut	11	Hex Nut for Flanges	17	Head and Idler Pin		
6	Packing Gland Stud	12	Rotor and Shaft	18	Capscrew for Head		

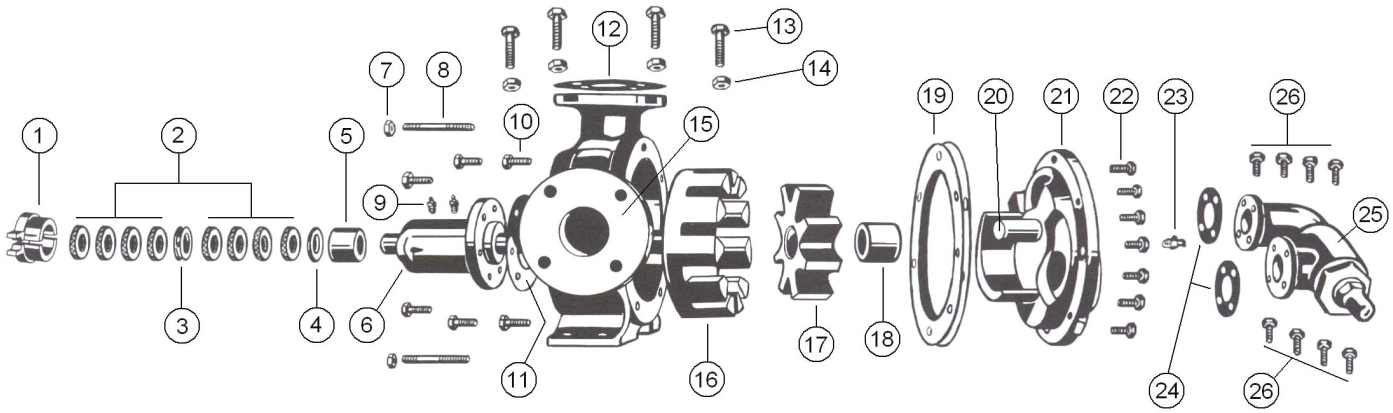


FIGURE 11 – EXPLODED VIEW MODEL LL32 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Two Piece Packing Gland	8	Packing Gland Stud	15	Casing	22	Capscrew for Head
2	Packing	9	Grease Fitting	16	Rotor and Shaft	23	Pipe Plug
3	Lantern Ring	10	Capscrew for Rotor Bearing Sleeve	17	Idler and Bushing	24	Relief Valve Gasket
4	Packing Retainer Washer	11	Gasket for Rotor Bearing Sleeve	18	Idler Bushing	25	Relief Valve
5	Bushing for Rotor Bearing Sleeve	12	Pipe Flange Gasket	19	Head Gasket	26	Capscrew for Valve
6	Rotor Bearing Sleeve and Bushing	13	Capscrew for Flanges	20	Idler Pin		
7	Packing Gland Nut	14	Nut for Flanges	21	Head and Idler Pin		

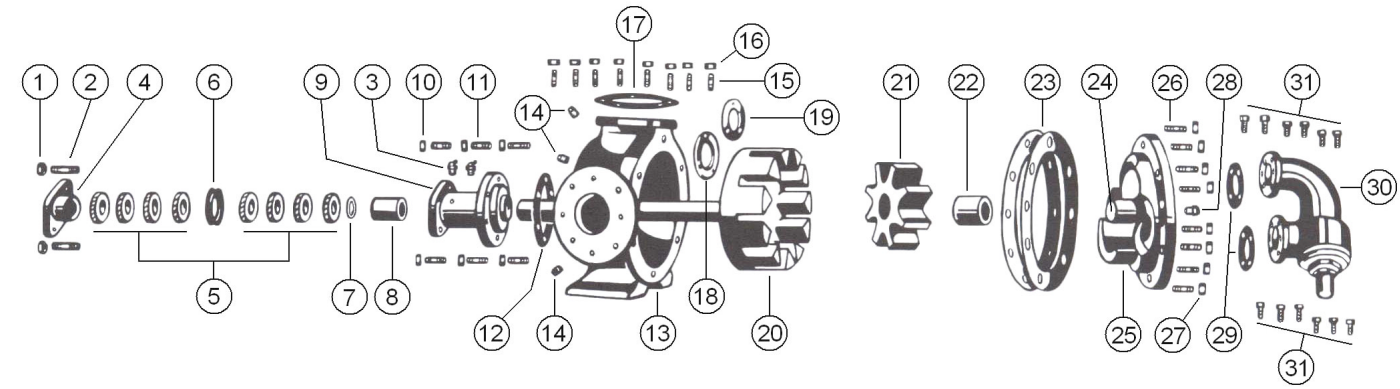


FIGURE 12 – EXPLODED VIEW MODEL O32, M32 AND N32 PUMP

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Packing Gland Nut	9	Rotor Bearing Sleeve and Bushing	17	Pipe Flange Gasket	25	Head and Idler Pin
2	Packing Gland Stud	10	Nut for Rotor Bearing Sleeve	18	Rotor Bearing Sleeve Washer	26	Stud for Head
3	Grease Fitting	11	Stud for Rotor Bearing Sleeve	19	Rotor Thrust Washer	27	Nut for Head
4	Packing Gland	12	Gasket for Rotor Bearing Sleeve	20	Rotor and Shaft	28	Pipe Plug
5	Packing	13	Casing	21	Idler and Bushing	29	Relief Valve Gasket
6	Lantern Ring	14	Pipe Plug	22	Idler Bushing	30	Relief Valve
7	Packing Retainer Washer	15	Stud for Flanges	23	Head Gasket	31	Capscrew for Valve
8	Bushing for Rotor Bearing Sleeve	16	Nut for Flanges	24	Idler Pin		

DISASSEMBLY

DANGER

BEFORE OPENING ANY VIKING PUMP LIQUID CHAMBER (PUMPING CHAMBER, RESERVOIR, RELIEF VALVE ADJUSTING CAP FITTING ETC.) BE SURE:

1. THAT ANY PRESSURE IN CHAMBER HAS BEEN COMPLETELY VENTED THROUGH SUCTION OR DISCHARGE LINES OR OTHER APPROPRIATE OPENINGS OR CONNECTIONS.
2. THAT THE DRIVING MEANS (MOTOR, TURBINE, ENGINE, ETC.) HAS BEEN "LOCKED OUT" OR MADE NON-OPERATIONAL SO THAT IT CANNOT BE STARTED WHILE WORK IS BEING DONE ON PUMP.
3. THAT YOU KNOW WHAT LIQUID THE PUMP HAS BEEN HANDLING AND THE PRECAUTIONS NECESSARY TO SAFELY HANDLE THE LIQUID. OBTAIN A MATERIAL SAFETY DATA SHEET (MSDS) FOR THE LIQUID TO BE SURE THESE PRECAUTIONS ARE UNDERSTOOD.

FAILURE TO FOLLOW ABOVE LISTED PRECAUTIONARY MEASURES MAY RESULT IN SERIOUS INJURY OR DEATH.

1. Refer to figures 5 through 12 for name of parts.
2. Mark head and casing before disassembly to insure proper reassembly. The idler pin, which is offset in pump head, must be positioned toward and equal distance between port connections to allow for proper flow of liquid through pump.
3. Remove the head capscrews.
   NOTE: The four valve capscrews, valve and gasket must be removed from the GG models before the six head capscrews are removed.
4. Remove head from pump. Do not allow idler to fall from idler pin. Tilt top of head back when removing to prevent this. Avoid damaging head gasket set, all gaskets are required to maintain end clearance.
5. Remove idler and bushing assembly. If idler bushing needs replacing, see step 11.

   Remove the packing gland.

   If you have a mechanical seal pump, remove the end cap and the mechanical seal is exposed.
   Remove the mechanical seal by sliding off the end of the shaft. Loosen the setscrew in the set collar and remove it.

CAUTION: Older pumps may have snap ring on shaft - remove the snap ring before removing rotor and shaft. Carefully remove the rotor and shaft from the pump to avoid damaging the casing or rotor bearing sleeve bushing.

THRUST WASHERS: Rotor thrust washer and rotor bearing sleeve thrust washer used in 0, M and N size pumps should be removed, examined for excessive wear and replaced if necessary. These thrust washers are located on the hub of the rotor and the casing end of rotor bearing sleeve.
If it is necessary to replace the casing, rotor bearing sleeve or idler bushing and/or repack the pump, remove the old packing and lantern ring and packing retainer washer. Some pumps don't have a lantern ring.

Clean all parts thoroughly and examine wear and damage. Check bushings, and idler pin and replace if necessary. Check all other parts for nicks, burrs, excessive wear and replace if necessary.

ASSEMBLY

1. Install casing or rotor bearing sleeve bushing. If bracket bushing has a lubrication groove, install bushing with groove at 12:00 o'clock position in bracket. If carbon graphite, refer to Installation of Carbon Graphite Bushings, page 7.
2. Thrust washers used in Q, M and N size pumps should be assembled on the rotor hub and rotor bearing sleeve. Put the plain washer on the two locating pins on the rotor hub. Put the grooved face washer on the pins on the rotor bearing sleeve with the grooved face toward the rotor.
3. Coat shaft of rotor shaft assembly with non-detergent SAE 30 weight oil. Start end of shaft in bracket bushing turning from right to left, slowly pushing rotor into casing.
4. Place the head gaskets on the head. The proper amount of gaskets should be used to provide the necessary end clearance within the pump so it turns freely with no appreciable end play. The Gasket Table (Figure 13) gives the normal amount of gaskets used on each pump.
5. Coat idler pin with non-detergent SAE 30 weight oil and place idler and bushing on idler pin in head. If replacing carbon graphite bushing, refer to installation of Carbon Graphite Bushings, page 7.
6. The head can now be assembled on the pump. Tilt the top of the head away from the pump slightly until the crescent enters the inside diameter of the rotor and rotate the idler until its teeth mesh with the rotor teeth. Do not damage the head gaskets. Tighten the head capscrews or nuts and then check the end clearance. If the pump shaft cannot be rotated, more gaskets must be added. If, however, the pump has any noticeable end play, remove enough gaskets so the pump has no appreciable end play but still turns freely.

ASSEMBLY

PUMP MODEL	NORMAL AMOUNT USED	ONE SET OF GASKETS CONSISTS OF THE FOLLOWING	STANDARD END CLEARANCE
G32 G432	.010" - .015"	2 - .006" 1 - .005" 2 - .002"	.003"
H, HL32 H, HL432	.010" - .015"	2 - .006" 2 - .002"	.003"
J, K, KK32	.015" - .020"	1 - .015" 1 - .010" 1 - .006"	.005"
L, LQ, LL32	.025" - .030"	1 - .015" 1 - .010" 1 - .006"	.005"
Q32	.012" - .030"	2 - .015" 1 - .006"	.010"
M, N32	.015" - .036"	2 - .015" 1 - .006"	.015"

FIGURE 13 – GASKET TABLE

7. Place packing retainer washer in bottom of packing chamber and pack pump with new packing. Use packing suitable for liquid being pumped. Install packing, staggering the joints from one side of shaft to other. Lubricate packing rings with oil, grease or graphite to aid assembly. A length of pipe will help to seat each packing ring.

NOTE: If the pump has a lantern ring it must be located below the grease fitting. The grease fitting may be removed to facilitate positioning of the lantern ring.

8. Install packing gland, capscrews and nuts.

DANGER

BEFORE STARTING PUMP, BE SURE ALL DRIVE EQUIPMENT GUARDS ARE IN PLACE.

FAILURE TO PROPERLY MOUNT GUARDS MAY RESULT IN SERIOUS INJURY OR DEATH.

NOTE: Pump may be equipped with a 2-piece split packing gland which allows installation of packing gland with rotor in place. See Figure 14.

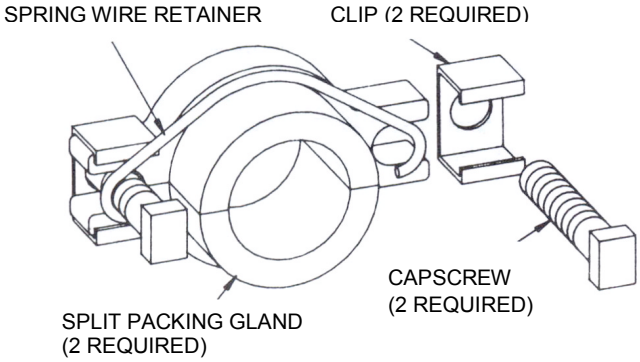


FIGURE 14

MECHANICAL SEAL OPTION

Install the mechanical seal: Place the set-collar on the shaft and tighten setscrew. See Figure 15 for set-collar location.

The seal used in this pump is simple to install and good performance will result if care is taken during installation.

The principle of the mechanical seal is contact between the rotary and stationary members. These parts are lapped to a high finish and their seating effectiveness depends on complete contact.

1. Never touch sealing faces with anything except clean hands or clean cloth. Minute particles can scratch the seal faces and cause leakage.
2. The spring washer and spring must be put on the shaft first and in that order. (See Figure 15).
3. Spread a film of lubricating oil on the inside diameter of the synthetic rubber bellows. Check the end of the pump shaft for sharp burrs or edges which might cut the bellows. Slide the seal rotary member over the shaft and up against the spring.
4. Coat the synthetic rubber seal seat with lubricating oil and push the seal seat into the end cap. Put the end cap gasket on the end of the casing. Slide end cap over the shaft and flush both the seal seat and carbon wear ring in the seal rotary member with oil. Push the end cap up until the mating surfaces or the seal meet. Install the capscrews and tighten evenly.

MECHANICAL SEAL OPTION

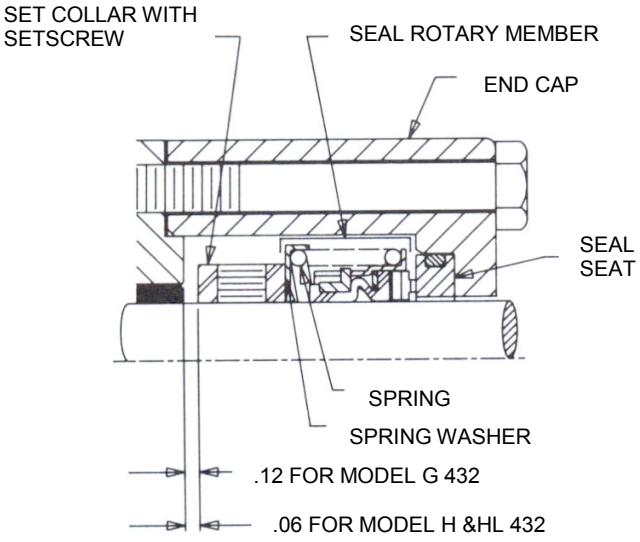


FIGURE 15 – SECTIONAL VIEW, SEAL AREA

INSTALLATION OF CARBON GRAPHITE BUSHINGS

When installing carbon graphite bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and easily cracked. If cracked, the bushing will quickly disintegrate. Using a lubricant and adding a chamfer on the bushing and the mating part will help in installation. The additional precautions listed below must be followed for proper installation:

1. A press must be used for installation.
2. Be certain bushing is started straight.
3. Do not stop pressing operation until bushing is in proper position. starting and stopping will result in a cracked bushing.
4. Check bushing for cracks after installation.

Carbon graphite bushings with extra interference fits are frequently furnished for high temperature operation. These bushings must be installed by a shrink fit.

1. Heat bracket or idler to 750ºF.
2. Install cool bushings with a press.
3. If facilities are not available to reach 750ºF. temperature, it is possible to install with 450ºF. temperature; however, the lower the temperature, the greater the possibility of cracking bushing.

Consult factory with specific questions on high temperature applications. Refer to Engineering Service Bulletin ESB-3.

PRESSURE RELIEF VALVE INSTRUCTIONS

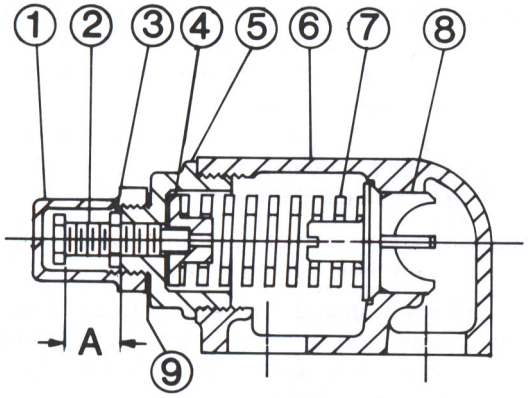


FIGURE 16 - Size G, H and HL

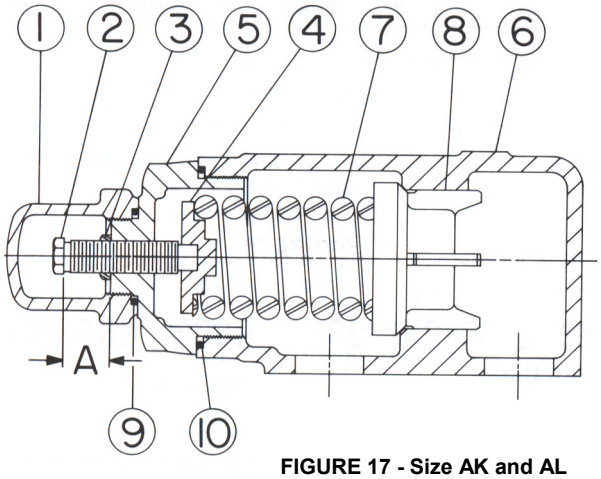


FIGURE 17 - Size AK and AL

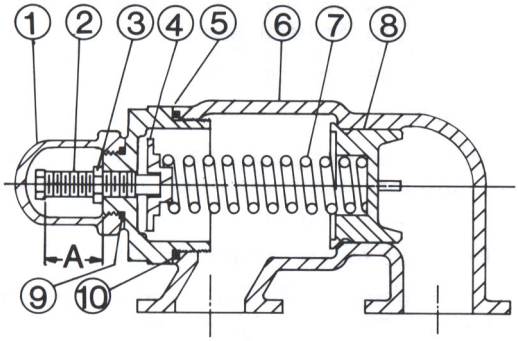


FIGURE 18 - Size K, KK, L, LQ and LL

VALVE - LIST OF PARTS			
1.	Valve Cap	6.	Valve Body
2.	Adjusting Screw	7.	Valve Spring
3.	Lock Nut	8.	Poppet
4.	Spring Guide	9.	Cap Gasket
5.	Bonnet	10.	Bonnet

DISASSEMBLY

DANGER

BEFORE OPENING ANY VIKING PUMP LIQUID CHAMBER (PUMPING CHAMBER, RESERVOIR, RELIEF VALVE ADJUSTING CAP FITTING ETC.) BE SURE:

1. THAT ANY PRESSURE IN CHAMBER HAS BEEN COMPLETELY VENTED THROUGH SUCTION OR DISCHARGE LINES OR OTHER APPROPRIATE OPENINGS OR CONNECTIONS.
2. THAT THE DRIVING MEANS (MOTOR, TURBINE, ENGINE, ETC.) HAS BEEN "LOCKED OUT" OR MADE NON-OPERATIONAL SO THAT IT CANNOT BE STARTED WHILE WORK IS BEING DONE ON PUMP.
3. THAT YOU KNOW WHAT LIQUID THE PUMP HAS BEEN HANDLING AND THE PRECAUTIONS NECESSARY TO SAFELY HANDLE THE LIQUID. OBTAIN A MATERIAL SAFETY DATA SHEET (MSDS) FOR THE LIQUID TO BE SURE THESE PRECAUTIONS ARE UNDERSTOOD.

FAILURE TO FOLLOW ABOVE LISTED PRECAUTIONARY MEASURES MAY RESULT IN SERIOUS INJURY OR DEATH.

Mark valve and head before disassembly to insure proper reassembly.

1. Remove valve cap.
2. Measure and record length of extension of adjusting screw. Refer to "A" on Figures 17, 18 and 19.
3. Loosen locknut and back out adjusting screw until spring pressure is released.
4. Remove bonnet, spring guide, spring and poppet from valve body. Clean and inspect all parts for wear or damage and replace as necessary.

ASSEMBLY

Reverse procedures outlined under Disassembly. If valve is removed for repairs, be sure to replace in same position. Relief valve adjusting screw cap must *always* point towards suction side of pump. If pump rotation is reversed, remove relief valve and turn end for end. Refer to Figures 1, 2, 3 and 4, page 1.

ASSEMBLY

DANGER

BEFORE STARTING PUMP, BE SURE ALL DRIVE EQUIPMENT GUARDS ARE IN PLACE.

FAILURE TO PROPERLY MOUNT GUARDS MAY RESULT IN SERIOUS INJURY OR DEATH.

PRESSURE ADJUSTMENT

If a new spring is installed or if pressure setting of pressure relief valve is to be changed from that which the factory has set, the following instructions must be carefully followed.

1. Carefully remove valve cap which covers adjusting screw.

   Loosen locknut which locks adjusting screw so pressure setting will not change during operation of pump.
2. Install a pressure gauge in discharge line for actual adjustment operation.
3. Turn adjusting screw in to increase pressure and out to decrease pressure.
4. With discharge line closed at a point beyond pressure gauge, gauge will show maximum pressure valve will allow while pump is in operation.

IMPORTANT

In ordering parts for pressure relief valve, always give model number and serial number of pump as it appears on nameplate and name of part wanted. When ordering springs, be sure to give pressure setting desired.

VIKING PUMP

WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. If, during said warranty period, any products sold by Viking prove to be defective in workmanship or material under normal use and service, and if such products are returned to Viking's factory at Cedar Falls, Iowa, transportation charges prepaid, and if the products are found by Viking to be defective in workmanship or material, they will be replaced or repaired free of charge, FOB. Cedar Falls, Iowa.

Viking assumes no liability for consequential damages of any kind and the purchaser by acceptance of delivery assumes all liability for the consequences of the use or misuse of Viking products by the purchaser, his employees or others. Viking will assume no field expense for service or parts unless authorized by it in advance.

Equipment and accessories purchased by Viking from outside sources which are incorporated into any Viking product are warranted only to the extent of and by the original manufacturer's warranty or guarantee, if any.

THIS IS VIKING'S SOLE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No officer or employee of IDEX Corporation or Viking Pump, Inc. is authorized to alter this warranty.

IDEX CORPORATION

CONTENTS

INSTALLATION

GENERAL

Before installation is started a few items of a general nature should be considered.

1. *Location* - always locate the pump as close as possible to the supply of liquid to be pumped. Locate it below the liquid supply if at all practical. Viking pumps are self priming but the better the suction conditions the better the performance.

2. *Accessibility* - the pump should be located where it is accessible for inspection, maintenance, and repair. For large pumps, allow room to remove the rotor and shaft without removing the pump from the base.

3. *Port Arrangement* - since the pumps have different port arrangements depending on the model, port location should be checked before starting the installation. The ports may be upright, opposite or at right angles to each other, see Figure 1. The right angle ports are normally right-hand, see Figure 2; some models are available with left-hand arrangements; still other models are available with the right angle ports located in any one of eight positions including right-hand and left-hand.

FIGURE 1

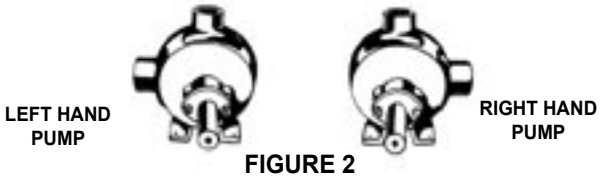


FIGURE 2

4. *Suction/Discharge* - shaft rotation will determine which port is suction and which is discharge. A look at Figure 3 will show how rotation determines which port is which; as the pumping elements (gears) come out of mesh, point "A" on Figure 3, liquid is drawn into the suction port; as the gears come into mesh, point "B", the liquid is forced out the discharge port. Reversing the rotation reverses the flow through the pump. When determining shaft rotation, always look from the shaft end of the pump. Unless otherwise specified, rotation is assumed to be clockwise (CW), which makes the suction port on the right side of the pump. The idler pin, which is offset in the pump head, should be properly positioned toward and an equal distance between the port connections.

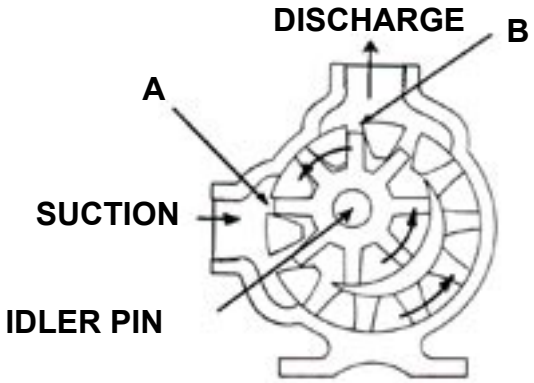
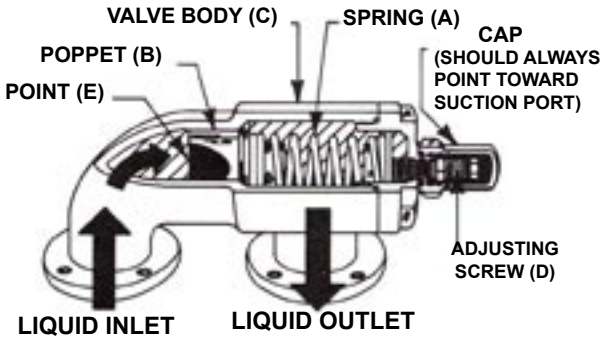


FIGURE 3

5. *Pressure Protection* - Viking pumps are positive displacement. This means that when the pump is rotated, liquid will be delivered to the discharge side of the pump. If there is no place for this liquid to go - discharge line is blocked or closed - pressure can build up until the motor stalls, the drive equipment fails, a pump part breaks or ruptures, or the piping bursts. Because of this, some form of pressure protection must be used with a positive displacement pump. This may be relief valve mounted directly on the pump, an inline relief valve, a torque limiting device or a rupture disk



CUT-AWAY OF VIKING INTERNAL PRESSURE RELIEF VALVE

FIGURE 4

The pressure relief valve mounted on Viking pumps and most in-line valves are of the spring loaded poppet design See Figure 4. The spring (A) holds poppet (B) against the seat in the valve body (C) with a given force determined by the spring size and by how tightly it is compressed by the adjusting screw (D). The pump discharge pressure pushes

against the underside of the poppet at point (E). When the force exerted by the liquid under the poppet exceeds that exerted by the spring, the poppet lifts and liquid starts to flow through the valve. As the discharge pressure builds up, more and more of the liquid flows through until a pressure is reached at which all of the liquid being pumped is going through the valve. This is pressure is the relief valve setting.

CAUTION !

Internal type relief valves mounted on Viking pumps should always have the cap or bonnet pointed toward the suction side of the pump. Return-to-tank-type relief valves should always be mounted on the discharge side of the pump. If pump rotation is reversed, change the relief valve. Turn the internal type end for end; move the return-to-tank type to the other port. If, on a particular installation rotation is reversed, e.g., *using one pump to fill a tank and then by use of a reversing switch or other means changing the rotation to permit the same pump to circulate the liquid through a heater or to load out)* **then pressure protection must be provided on both sides of the pump for both rotations. This may be a combination of relief valves, torque limiting devices or rupture disks.**

Pumps or systems without relief valves should have some form of pressure protection e.g. Torque limiting devices or rupture disks.

Viking pumps can be furnished with either an internal pressure relief valve - one which directs the flow from the valve back to the suction side of the pump - or a return-to-tank valve which directs the flow through piping back to the supply tank. See Figure 5. An inline relief valve mounted in the discharge piping also directs the flow back to the supply tank. This type of valve should be mounted close to the pump so that the pressure drop through the piping between the pump and the valve is at a minimum. Be sure there are no shutoff valves between the pump and relief valve. Piping from a return-to-tank or an in-line valve to the supply tank should also be as short and large as possible.

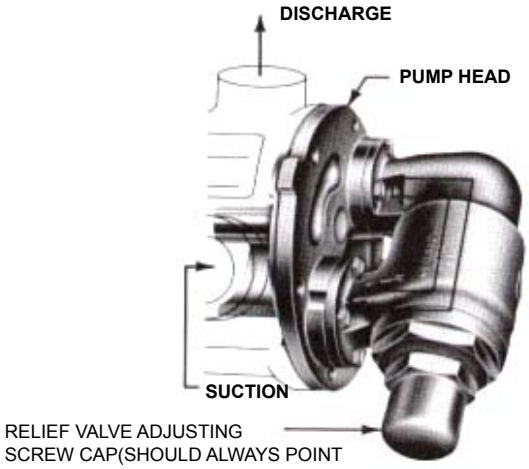


FIGURE 5A
INTERNAL PRESSURE RELIEF VALVE

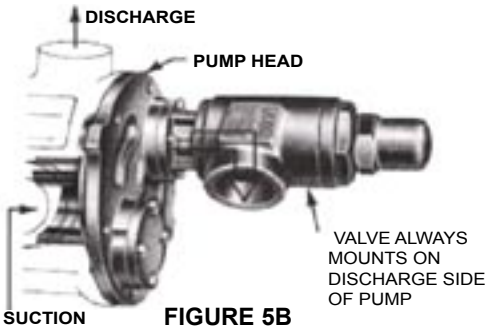


FIGURE 5B
RETURN-TO-TANK PRESSURE RELIEF VALVE

NOTE: on some models the relief valve is mounted on the pump casing instead of the pump head.

The spring loaded poppet-type valve is strictly a differential valve, sensing only those pressures on each side of the poppet. It should **not** be used as a pressure or flow control device. **It is intended strictly as a relief valve.**

The pressure at which either the return-to-tank or internal relief valve bypasses can be changed by turning the adjusting screw. Do not back the adjusting screw all the way out. Stop when spring tension is off the screw (the screw starts to turn easily). For details on maintenance of the relief valve see Technical Service Manual covering your model series.

6. Motor - follow local electrical codes when booking up motors.

FOUNDATION

Every pump should have a solid foundation. It may be any structure sufficiently strong to hold the pump rigid and to absorb any strain or shock that may be encountered.

A certified print of the pumping unit should be used in preparing the foundation. If a separate foundation is provided, make it at least four inches wider and longer than the base of the unit.

When the unit is placed on the foundation it should be leveled and checked for position against the piping layout and then fastened down.

ALIGNMENT

CHECK ALIGNMENT AFTER MOUNTING

For detailed coupling alignment procedures see Viking service bulletin ESB-61.

The pump, drive, and motor were properly aligned at the time they were assembled. During shipping and mounting the alignment is often disturbed. **BE SURE TO RECHECK ALIGNMENT AFTER THE PUMP UNIT IS INSTALLED!**

1. Check pump ports to be sure they are square and in proper position; shim or move pump as required. Do not force piping to line up with the ports.

2. If the pump is driven by a flexible coupling(s) either direct connected to the motor or through a reducer, remove any coupling guards or covers and check alignment of the coupling halves. A straightedge (a piece of key stock works nicely) across the coupling must rest evenly on both rims at the top, bottom, and sides. See Figure 6.

3. If the pump is driven by V-belts, check the alignment by using a long straightedge or tightly drawn string across the face of the sheaves. See Figure 6A.

4. Make a final check on alignment after piping is hooked up.

   See item 13 under “Installation - Piping”.
   Figures 7,8, and 9 show typical units - direct, gear reducer and V-belt drive.

5. For high temperature applications (those above 300°F) allow pump to reach operating temperature, then recheck alignment.

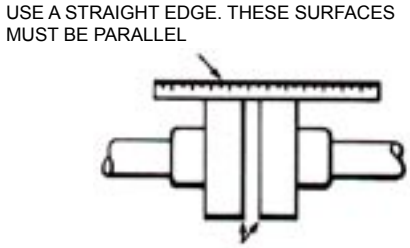
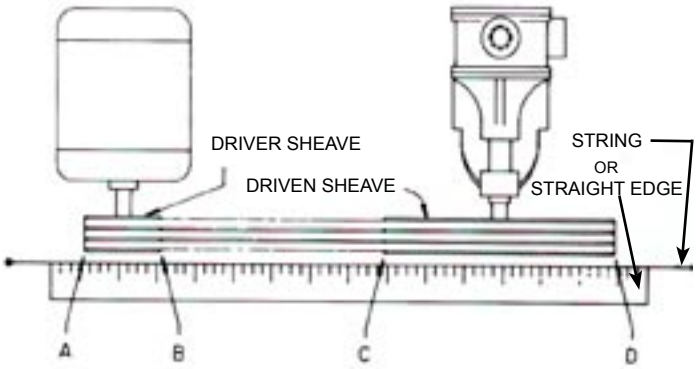


FIGURE 6



WHEN SHEAVES ARE PROPERLY ALIGNED ALL POINTS A, B, C, D WILL TOUCH STRING OR STRAIGHTEDGE.

FIGURE 6A

PIPING

The cause of many pumping problems can be traced to suction piping. It should always be as large and short as practical. For help in selecting the proper size piping, both suction and discharge, refer to Viking General Catalog Section 510.

Before starting layout and installation of your piping system, consider the following points:

1. Never use piping smaller than the pump port connections.

2. Be sure the inside of the pipe is clean before hooking it up.

3. *Foot valve* - When pumping a light liquid with a suction lift, a foot valve at the end of the suction piping or a check valve in the first horizontal run will hold the liquid in the line and make it easier for the pump to prime. Be sure the foot or check valve is big enough so that it doesn’t cause excessive line loss.

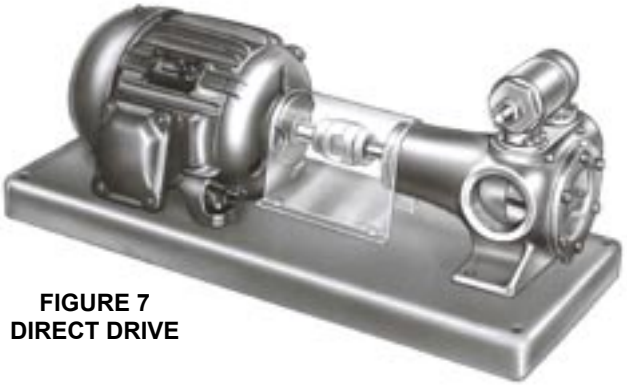


FIGURE 7
DIRECT DRIVE

FIGURE 8
GEAR REDUCER DRIVE

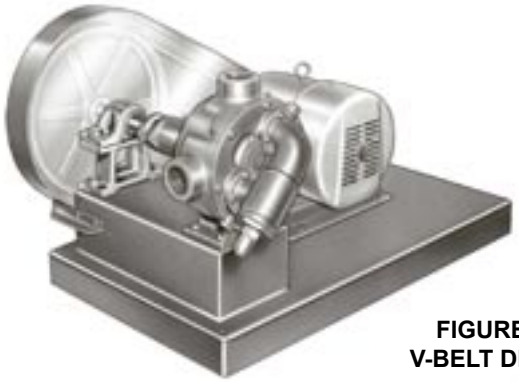


FIGURE 9
V-BELT DRIVE

4. When approaching an obstacle in the suction or discharge line, go around the obstacle instead of over it. Going over it creates an air pocket. See Figure 10.

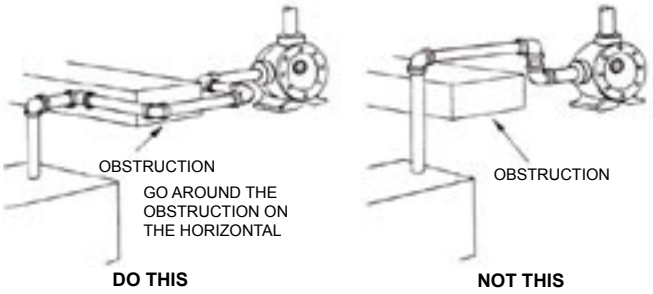


FIGURE 10

5. Where practical, slope the piping so no air or liquid pockets will be formed. Air pockets in the suction line make it hard for the pump to prime.

6. For a suction line with a long horizontal run keep the horizontal portion below the liquid level if possible. This keeps the pipe full so the pump does not have to remove so much air when starting; this is most helpful when there is no foot valve. See Figure 11.

7. When piping a hot or cold system (liquid being handled is at a temperature different from the air surrounding the pump), be sure allowance is made for expansion and contraction of the piping. Loops, expansion joints, or unsecured (this does not mean unsupported) runs should be used so the pump casing is not distorted or put into a bind.

8. **STRAINER -** It is always good practice to consider a strainer on the suction side of a positive displacement pump. The strainer will keep foreign objects from going into the pump; without a strainer some would go through; others would cause a jammed pump, a broken part, or a torn up drive. The strainer basket mesh or perforation size should be big enough so that it does not cause excessive pressure drop, but it should be fine enough to protect the pump. When in doubt as to the proper size, check with the manufacturer, giving him pipe size, flow rate, and viscosity involved. Provision should be made for cleaning the strainer. If the pump operates continuously, a bypass should be built around the strainer or two strainers should be put in parallel with proper valving so they can be isolated for cleaning. Use of a strainer is particularly important at start up to help clean the system of weld beads, pipe scale, and other foreign objects. For additional information, refer to TSM640.

9. If the pump is not equipped with a relief valve, consideration should be given to mounting one in the discharge line. See discussion on relief valves under START UP.

10. The pump should not be used to support the piping. The weight of the pipe should be carried by hangers, supports, stands, etc.

11. When fastening the piping to the pump it should not be necessary to impose any strain on the pump casing. “Springing” or “drawing” the piping up to the pump will cause distortion, possible misalignment, and probable rapid wear of the pump. Do not use the pump to correct errors in piping layout or assembly.

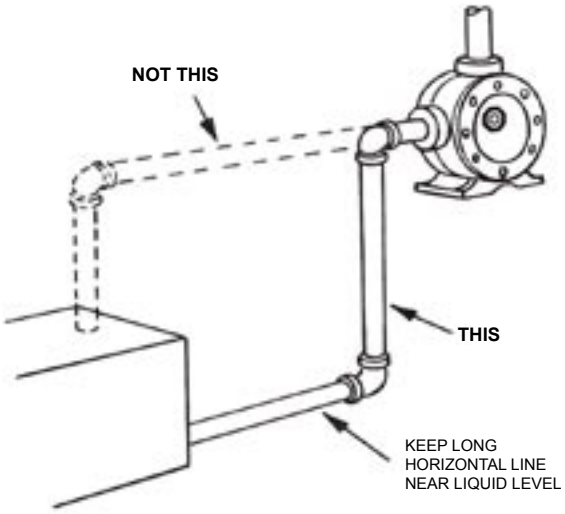


FIGURE 11

12. All joints of the piping system should be tight; pipe sealer or teflon tape will help assure leak-free threaded joints. Leaks in the suction line permitting air to be drawn in may cause a noisy pump, or a reduction in capacity.

13. **ALIGNMENT** - Check the alignment of the drive after the piping is hooked up. As a final check on pump alignment remove the head of the pump and with a feeler gauge determine if there is clearance all the way around between the rotor and casing. Because of manufacturing tolerances, bushing clearances, etc., the rotor may not be centered in the casing, but it should not drag; dragging would indicate unit misalignment or casing distortion from piping strain. Making this check is most desirable on installations involving Q, M and N size standard duty pumps.

14. The auxiliary piping hooked to jackets, glands, etc. for heating, cooling, quenching, or for other purposes should receive the same attention as the piping handling the liquid pumped.

15. Provide a pressure relief device in any part of a pump and piping system that can be valved off and, thus, completely isolated. This is particularly important:

a). When handling a cold liquid such as refrigeration ammonia that can warm up to ambient temperatures when the pump is shut off or

b). When handling a liquid such as asphalt or molasses that has to be heated before it can be pumped.

The rise in temperature causes the liquid to expand; if there is no provision for pressure relief in the closed off section, there is a chance that the pump or piping will rupture.

START UP

Before pushing the “start” button, check the following:

1. Are there vacuum and pressure gauges on or near the pump? These gauges are the quickest and most accurate way of finding out what is happening in the pump.

2. Check alignment - See suggestions under “Installation - Alignment” in this manual.

3. Check piping to be sure there is no strain on the pump casing.

4. Rotate the pump shaft by hand to be sure it turns freely. **MAKE SURE THE PUMP DRIVER IS LOCKED OUT OR CANNOT BE ENERGIZED BEFORE DOING THIS.**

5. Jog motor to be sure it is turning in the right direction; see discussion on pump rotation under “Installation - General” item 4 in this manual.

6. Check any relief valves to be sure they are installed correctly. See discussion on relief valves under “Installation - General”.

7. Check suction piping to be sure (a) it is all connected and tight, (b) valves are open, and (c) end of pipe is below liquid level.

8. Check discharge piping to be sure (a) it is connected and tight, (b) valves are open, and (c) there is a place for the liquid to go.

9. Lubricate any grease fitting on the pump using a good, general purpose #2 ball bearing grease. Check any gear reducer, motor, coupling, etc. for instructions and lubricate as recommended. See Engineering Service Bulletin ESB-515.

10. For packed pumps, loosen packing gland nuts so gland can be moved slightly by hand. Adjust gland to reduce leakage only after pump has run long enough to reach constant temperature. Packing should weep a little to keep it cool and lubricated.

11. Do **not** use the Viking pump to flush, pressure test or prove the system with water. Either remove the pump or run piping around it while flushing or testing. Pumping water, dirty or otherwise, can do more damage in a few minutes than months of normal service.

12. Check to be sure all guards are in place.

13. Now you are ready to push the “start” button - gently.

If the pump begins to deliver liquid within 60 seconds, you’re in business. If it does not, push the “stop” button. Do **not** run the pump longer than one minute without liquid in it; you may damage it. Review the steps just outlined, consider what the suction and discharge gauges indicate, see page 6; if everything appears to be in order, put some liquid in the pump, a lubricating liquid is best. This will help it prime.

Push the “start” button again. If nothing is flowing within two minutes, stop the pump. The pump is not a compressor, it will not build up much air pressure; it may be necessary to vent the discharge line until liquid begins to flow.

If the pump still does not deliver, the cause may be one or more of the following:

1. Suction line air leaks; vacuum gauge reading should help determine if this is the problem.

2. End of suction pipe not submerged deep enough in liquid.

3. Suction lift is too great or the suction piping is too small.

4. Liquid is vaporizing in the suction line before it gets to the pump.

If after consideration of these points it still does not pump, suggest you review again all points given under START UP; read through Troubleshooting in this manual and try again. If it still does not pump, contact your Viking representative.

TROUBLESHOOTING

A Viking pump that is properly installed and maintained will give long and satisfactory performance.
NOTE: Before making any pump adjustment or opening the pump liquid chamber in any manner, make sure that:

1) any pressure in the pumping chamber has been vented through the suction or discharge lines or other openings provided for this purpose,
2) the driver has been “locked out” so that it cannot inadvertently be started while work is being done on the pump and
3) the pump has been allowed to cool down to the point where there is no chance of anyone being burned.

If trouble does develop, one of the first steps toward finding the difficulty is to *install a vacuum gauge in the suction port and a pressure gauge in the discharge port*. Readings on these gauges often will give a clue as to where to start looking for the trouble.

Vacuum Gauge - Suction Port

1. High reading would indicate -
- **a).** Suction line blocked - foot valve stuck, gate valve closed, strainer plugged.
- **b).** Liquid too viscous to flow through the piping.
- **c).** Lift too high.
- **d).** Line too small.

2. Low reading would indicate -
- **a).** Air leak in suction line.
- **b).** End of pipe not in liquid.
- **c).** Pump is worn.
- **d).** Pump is dry - should be primed.

3. Fluttering, jumping, or erratic reading -
- **a).** Liquid vaporizing.
- **b).** Liquid coming to pump in slugs, possibly an air leak insufficient liquid above the end of the suction pipe.
- **c).** Vibrating from cavitation, misalignment, or damage parts.

Pressure Gauge - Discharge Port

1. High reading would indicate -
- **a).** High viscosity and small and/or long discharge line.
- **b).** Gate valve partially closed.
- **c).** Filter plugged.
- **d).** Vertical head did not consider a high specific gravity liquid.
- **e).** Line partially plugged from build up on inside of pipe.
- **f).** Liquid in pipe not up to temperature.
- **g).** Liquid in pipe has undergone a chemical reaction and has solidified.
- **h).** Relief Valve set too high.

2. Low reading would indicate -
- **a).** Relief valve set too low.
- **b).** Relief valve poppet not seating properly.
- **c).** Bypass around the pump partially open.

d). Too much extra clearance.
e). Pump worn.

3. Fluttering, jumping, or erratic reading -
a). Cavitation.
b). Liquid coming to pump in slugs.
c). Air leak in suction line.
d). Vibrating from misalignment or mechanical problems.

Some of the following may also help pinpoint the problem:

A). Pump does not pump.
1. Lost its prime - air leak, low level in tank, foot valve stuck.
2. Suction lift too high.
3. Rotating in wrong direction.
4. Motor does not come up to speed.
5. Suction and discharge valves not open.
6. Strainer clogged.
7. Bypass valve open, relief valve set too low, relief valve poppet stuck open.
8. Pump worn out.
9. Any changes in the liquid system, or operation that would help explain the trouble, e.g. new source of supply, added more lines, inexperienced operators, etc.
10. Too much end clearance.
11. Head position incorrect. See Fig. 3.

B). Pump starts, then loses its prime.
1. Supply tank empty.
2. Liquid vaporizing in the suction line.
3. Air leaks or air pockets in the suction line; leaking air through packing or mechanical seal.
4. Worn out.

C). Pump is noisy.
1. Pump is being starved (heavy liquid cannot get to pump fast enough). Increase suction pipe size or reduce length.
2. Pump is cavitating (liquid vaporizing in the suction line). Increase suction pipe size or reduce length; if pump is above the liquid, raise the liquid level closer to the pump; if the liquid is above the pump, increase the head of liquid.
3. Check alignment.
4. May have a bent shaft or rotor tooth. Straighten or replace.
5. Relief valve chatter; increase pressure setting.
6. May have to anchor base or piping to eliminate or reduce vibration.
7. May be a foreign object trying to get into the pump through the suction port.

D). Pump not up to capacity.
1. Starving or cavitating - increase suction pipe size or reduce length.
2. Strainer partially clogged.
3. Air leak in suction piping or along pump shaft.
4. Running too slowly; is motor the correct speed and is it wired up correctly.
5. Bypass line around pump partially open.
6. Relief valve set too low or stuck open.
7. Pump worn out.
8. Too much end clearance.
9. Head position incorrect. See Fig. 3.

E). Pump takes too much power.
1. Running too fast - Is correct motor speed, reducer ratio, sheave size, etc. being used?
2. Is liquid more viscous than unit sized to handle; heat the liquid, increase the pipe size, slow the pump down, or get a bigger motor.
3. Discharge pressure higher than calculated, check with pressure gauge. Increase size or reduce length of pipe, reduce speed (capacity), or get bigger motor.
4. Packing gland drawn down too tight.
5. Pump misaligned.
6. Extra clearance on pumping elements may not be sufficient for operating conditions. Check parts for evidence of drag or contact in pump and increase clearance where necessary.

F). Rapid Wear.
On most applications the pump will operate for many months or years before it gradually loses its ability to deliver capacity or pressure. Examination of such a pump would show a smooth wear pattern on all parts. Rapid wear, occurring in a few minutes, hours or days, shows up as heavy grooving, galling, twisting, breaking or similar severe signs of trouble. SEE CHART PAGE 7.

PREVENTATIVE MAINTENANCE

Performing a few preventative maintenance procedures will extend the life of your pump and reduce the overall cost of ownership.

A). Lubrication - Grease all grease fittings after every 500 hours of operation or after 60 days, whichever occurs first. If service is severe, grease more often. Do it gently with a hand gun. Use a NLGI #2 grease for normal applications. For hot or cold applications use appropriate grease. See Engineering Service Bulletin ESB-515.

B). Packing Adjustment - Occasional packing adjustment may be required to keep leakage to a slight weep; if impossible to reduce leakage by gentle tightening, replace packing or use different type. See Technical Service Manual on particular model series for details on repacking.

C). End Clearance Adjustment - After long service the running clearance between the end of the rotor teeth and the head may have increased through wear to the point where the pump is losing capacity or pressure. Resetting end clearance will normally improve pump performance. See TSM on particular model series for procedure on adjusting end clearance for pump involved.

D). Examine Internal Parts - Periodically remove the head, examine idler and bushing and head and pin for wear. Replacing a relatively inexpensive idler bushing and idler pin after only moderate wear will eliminate the need to replace more expensive parts at a later date. See TSM on particular model series for procedure in removing head of the pump. Be sure idler does not slide off idler pin as head is removed and drop and hurt someone or damage the part.

E). Cleaning the Pump - A clean pump is easier to inspect, lubricate, adjust, and runs cooler; plus, it looks better.

F). **Storage** - If pump is to be stored, or not used for six months or more, pump must be drained and a light coat of non-detergent SAE 30 weight oil must be applied to all internal pump parts. Lubricate fittings and apply grease to pump shaft extension. Viking suggests rotating pump shaft by hand one complete revolution every 30 days to circulate the oil. Retighten all gasketed joints before using the pump.

RAPID WEAR

	CAUSE	*EVIDENCE*	*POSSIBLE SOLUTION*
1.	**ABRASIVES**	Gouges or marks made by large, hard particles; a rapid wearing away of bushings from very small abrasives similar to pumice; or anything in between.	Flush the system with the pump removed. Install strainer in suction line. Oftentimes after a system has run for a few cycles or a few days the dirt is pretty well cleaned out and if the pump is rebuilt into good condition it will then last for a long time.
2.	**CORROSION**	Rust, pitting or metal appears to be “eaten” away.	Check the Viking General Catalog Liquid List for materials of construction recommendation. Consider whether all of the materials used in pump construction were attacked; consider other materials used in the system to determine how they resisted the liquid. Check to see whether or not the liquid has been contaminated to make it more corrosive than anticipated.
3.	**EXCEEDING OPERATING LIMITS**	Noisy operation, broken bushings, twisted shaft, parts show evidence of high heat (discoloration).	Review General Catalog for operating limits on particular model involved.
4.	**INSUFFICIENT EXTRA CLEARANCE**	Pump may stall. Evidence of heavy contact between end of rotor teeth and head or other parts.	Increase end clearance and/or contact your distributor or the factory with details of the application so that information regarding proper extra clearance may be provided.
5.	**LACK OF LUBRICATION**	Noisy bearings, localized heating at bearings or lip seal, smoke, rapid bushing wear.	Be sure all grease fittings are greased before starting and instructions for lubrication of drive equipment are followed; consider use of auxiliary lubricating equipment.
6.	**MISALIGNMENT**	Wear on only one part of a surface, e.g., one side of the casing, one side of the packing gland, only a portion of the face of the head.	Double check alignment of drive equipment and piping. Check the alignment under conditions as close to operating conditions as possible.
7.	**RUN DRY**	Pump stalls because parts have uneven expansion caused by frictional heat; galling between surfaces having relative motion; seal seats and idler pins changing colour because of high heat.	Be sure there is liquid in the system at the time of start up. Provide some kind of automatic alarm or shut-off if supply tank runs dry.

DO’S AND DON’TS -

Do’s and Don’ts for installation, operation, and maintenance of Viking pumps to assure safe, long, trouble-free operation.

INSTALLATION -

1. Do install pump as close to supply tank as possible.

2. Do leave working space around the pumping unit.

3. Do use large, short, and straight suction piping.

4. Do install a strainer in the suction line.

5. Do double check alignment after the unit is mounted and piping is hooked up.

6. Do provide a pressure relief valve for the discharge side of the pump.

7. Do cut out the center of gaskets used as port covers on flanged port pumps.

8. Do record pump model number and serial number and file for future reference.

OPERATION -

1. Don’t run pump at speeds faster than shown in the catalog for your model.

2. Don’t require pump to develop pressures higher than

those shown in the catalog for your model.

3. Don't operate pumps at temperatures above or below limits shown in the catalog for your pump.
4. Don't operate pumps without all guards being in place.
5. Don't operate pump without a relief valve on the pump or in the discharge piping; be sure valve is mounted and set correctly.
6. Don't exceed catalog limits for temperature and pressures of fluids in jacketed areas of pump.
7. Don't use the pump in a system, which includes a steam blow or an air or vapour blow or purge **without** provision for over-speed shutdown in case the pump starts to act as a turbine and over-speeds the drive.
8. Don't operate the pump with all of the liquid bypassing through a pump mounted internal type relief valve or without any flow of liquid going through the pump for more than a couple of minutes. Operation under either of these conditions may result in a heat build-up in the pump, which could cause hazardous conditions or happenings.

MAINTENANCE -

1. Do make sure any pump that has residual system pressure in it or that has handled high vapour pressure liquids, e.g., LP-gas, ammonia, Freons, etc. has been vented through the suction or discharge lines or other openings provided for this purpose.
2. Do make sure that if the pump is still hooked to the driver while maintenance is being performed that the driver has been "locked out" so that it cannot be inadvertently started while work is being done on the pump.
3. Do make sure any pump that has handled a corrosive, flammable, hot, or toxic liquid has been drained, flushed, vented and/or cooled before it is disassembled.
4. Don't drop parts during disassembly, e.g., idler can slip from the pin as the head is removed from the pump; it may drop on your foot, plus, it may get nicked or gouged.
5. Don't stick fingers in the ports of a pump! Serious injury may result.
6. Don't spin the idler on the idler pin! Fingers may be jammed between teeth and crescent.
7. Do remember that a few simple preventative maintenance procedures such as periodic lubrication, adjustment of end clearance, examination of internal parts, etc., will extend the service life of your pump.
8. Do **obtain**, read and keep maintenance instructions furnished with your pump.
9. Do have spare parts, pumps or standby units available, particularly if the pump is an essential part of a key operation or process.

VIKING PUMP

IDEX CORPORATION

WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. If, during said warranty period, any products sold by Viking prove to be defective in workmanship or material under normal use and service, and if such products are returned to Viking's factory at Cedar Falls, Iowa, transportation charges prepaid, and if the products are found by Viking to be defective in workmanship or material, they will be replaced or repaired free of charge, FOB. Cedar Falls, Iowa.

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