



Truck Probe

Models: TP and STP

Installation and Operation Manual

PNEG-2124

Version: 2.0

Date: 01-16-19



PNEG-2124

All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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1. Introduction

This manual covers the installation and operation for the Truck Probe (TP and STP). This manual provides guidelines for installing the product. You must retain a qualified contractor to provide on-site expertise. INTERSYSTEMS IS NOT RESPONSIBLE FOR THE INSTALLATION OF THIS PRODUCT.

InterSystems reserves the right to improve its product whenever possible and practical to do so. We reserve the right to change, improve and modify products at any time without obligation to make changes, improvements and modifications on equipment sold previously.

General Safety Statements

1. The Truck Probe is designed and manufactured with operator safety in mind. However, residual hazards remain due to the nature of material handling and specific material hazards. Use extreme caution at all times.
2. Modifications to equipment may cause extremely dangerous situations that could result in damage to the equipment as well as serious injury or death. Never modify the equipment.
3. InterSystems recommends that you contact the local power company to have a representative survey the installation to ensure wiring is compatible with their system and adequate power is supplied to the unit.
4. Consult InterSystems before making any changes to the Truck Probe or its operating environment. Careless changes could result in death or serious injury to people and reduce the performance and service life of the equipment.
5. Never perform any service on this equipment or any other powered equipment until all power has been shut off and locked out so that it cannot be restored without the consent and knowledge of the person who interrupted power. Power includes electrical, fluid, mechanical or pneumatic energy.
6. Never perform any service on this equipment without utilizing the required PPE (personal protective equipment). Refer to the MSDS(s), material safety data sheet(s), on all the products to which this equipment is in contact with to determine what PPE is required.



This equipment is to be operated only on the voltage designated on the certified electrical drawing(s). Fire or explosion may result, which can cause death, serious injury and extensive damage to equipment. Do not connect to voltages other than designated.

Replacement Parts

The InterSystems Truck Probe is a quality built piece of machinery. As with any machine, parts do wear out and fail. It is InterSystems' recommendation that a small supply of spare parts be kept on hand to cover any minor breakdowns. A separate priced Spare Parts List will be sent identifying the suggested spare parts. It is also necessary to check the certified drawings, which will list any special or custom components utilized on this equipment.

The certified drawings list the non-standard components that have been incorporated into the equipment. InterSystems normally stocks non-fabricated parts and non-custom OEM parts. Replacement parts for any other components, including fabricated parts and custom OEM components can be supplied upon request.

For direct parts orders or requests for technical assistance to your sales representative or to:

InterSystems

9575 No. 109TH AVE
Omaha, NE. 68142
Phone: (402) 330-1500
FAX: (402) 330-3350

Please have available the MODEL NUMBER, SERIAL NUMBER and CUSTOMER ORDER NUMBER of the equipment in question as well as the location where the truck probe is INSTALLED.

Repair Kits

The following chart lists repair kits and parts that are available from InterSystems. These kits are offered as a more economical solution by rebuilding the defective part rather than replacing it. However in some cases the part may be beyond repair and replacement will be necessary.

| Product Code | Description |
|--------------|---|
| 535634 | Gear Pump Seal Kit (Parker H Series) |
| 512853 | Actuator Repair Kit (Parker LTR Series) |
| 512524 | Valve Seal Kit (Parker) |
| XW4923 | 1-1/2" Bore Hydraulic Cylinder O-ring Repair Kit (Columbus LD series) |
| XW4922 | 3" Bore Hydraulic Cylinder O-ring Repair Kit (Columbus LDH series) |
| 35691 | Oil Filter Cartridge |
| 552917 | Hydraulic Oil (InterSystems Blue) 5 Gallon Pail |

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Save these safety guidelines for future reference.

As owner or operator, you are responsible for understanding the requirements, hazards and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in **SERIOUS INJURY or DEATH**.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

ST-0001-3

Cautionary Symbol Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.



This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**



This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**



This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**



This symbol is used to address practices not related to personal injury.



This symbol indicates a general hazard.



This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection



Respiratory Protection



Foot Protection



Hearing Protection



Head Protection



Fall Protection



Hand Protection



- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.



ST-0002-1

Maintain Equipment and Work Area

- Understand service procedures before doing work. Keep area clean and dry.
- Never service equipment while it is operating. Keep hands, feet, and clothing away from moving parts
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.



ST-0003-1

Stay Clear of Hoisted Equipment

- Always use proper lifting or hoisting equipment when assembling or disassembling equipment.
- Do not walk or stand under hoisted equipment.
- Always use sturdy and stable supports when needed for installation. Not following these safety precautions creates the risk of falling equipment, which could crush personnel and cause serious injury or death.



ST-0047-1

Sharp Edge Hazard

- This product has sharp edges, which can cause serious injury.
- To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment



ST-0036-2

Install and Operate Electrical Equipment Properly

- Electrical controls must be installed by a qualified electrician and must meet the standards set by applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe).
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Make sure all equipment is properly grounded.



ST-0027-4

2. Safety

Stay Clear of Moving Parts

- Stay clear - machine can start without warning.
- Entanglement in gate will cause serious injury.
- Keep all shields and covers in place at all times.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.



ST-0070-1

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

| Date | Employee Name | Supervisor Name |
|------|---------------|-----------------|
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ST-0007

The safety decals on your equipment are safety indicators which must be carefully read and understood by all personnel involved. If a decal is missing, damaged, or faded, contact us to receive a free replacement.

InterSystems

9575 N. 109th Ave.
Omaha, Nebraska 68142
Toll Free: (800) 228-1483

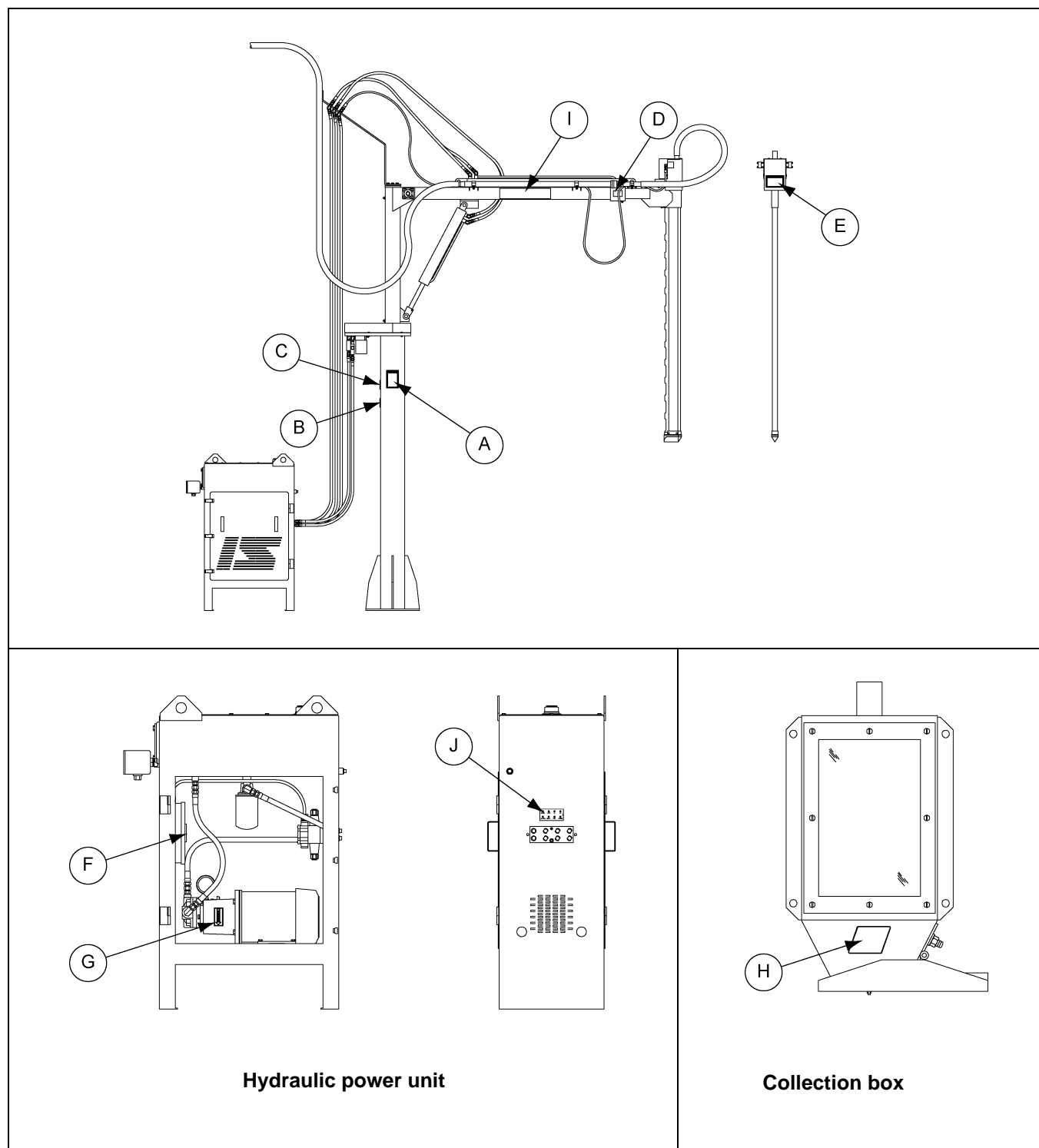
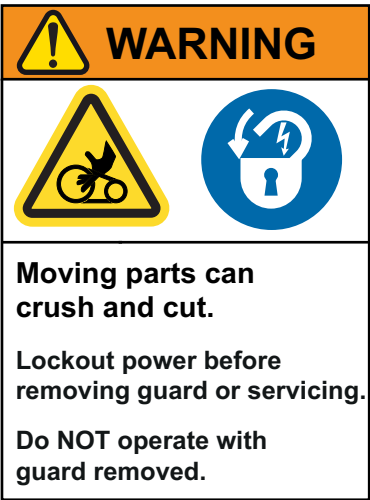





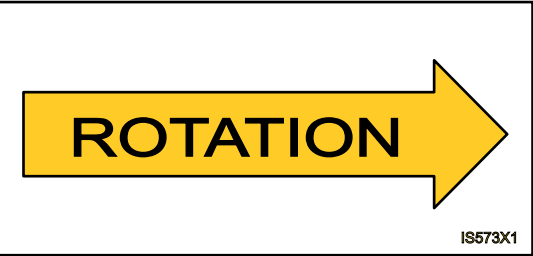


Figure 3A Truck Probe Safety Decals Locations



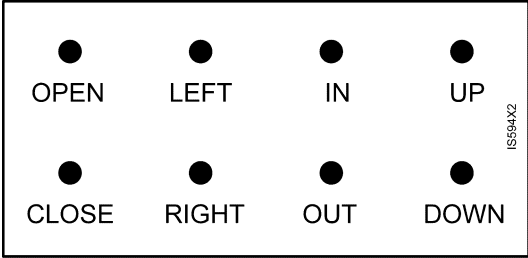
3. Decals

NOTE: These signs must never be removed, tampered with, painted over or obscured in anyway. If labels are damaged or became unreadable, replacement labels are available from intersystems.

| Ref # | Decal # | Decals | Description |
|-------|------------|--|--------------------|
| A | EMC 24 J3 |  <p>©Clarion clarionsafety.com Reorder No. EMC 24 J3</p> | Exposed Belt/Chain |
| B | EMC 403 34 |  <p>©Clarion clarionsafety.com Reorder No. EMC 403 34</p> | Stay Clear |
| C | EMC 402 34 |  <p>© Clarion Clarionsafety.com Reorder No. EMC 402 34</p> | Lock Out Machine |

| Ref # | Decal # | Decals | Description |
|-------|-----------|--|----------------|
| D | EMC 25 J3 |  <div> <p>! WARNING</p> <p>Rotating parts can crush, cut and entangle.</p> <p>Do NOT operate with guard removed.</p> <p>Lockout power before removing guard or servicing.</p> </div> <p><small>© Clarion Clarionsafety.com Reorder No. EMC 25 J3</small></p> | Rotating Parts |
| E | EMC 30 J3 |  <div> <p>! WARNING</p> <p>Moving parts can cut and crush.</p> <p>Lockout energy source before inspection or service.</p> </div> <p><small>© Clarion Clarionsafety.com Reorder No. EMC 25 J3</small></p> | Moving Parts |
| F | EMC 11 34 |  <div> <p>! DANGER</p> <p>Hazardous voltage will cause severe injury or death.</p> <p>Turn off power and lock out before servicing.</p> </div> <p><small>© Clarion Clarionsafety.com Reorder No. EMC 11 34</small></p> | High Voltage |
| G | IS 573X1 |  <p><small>IS573X1</small></p> | Rotation |

3. Decals

| Ref # | Decal # | Decals | Description |
|-------|------------|---|--------------------|
| H | IS 5214X11 |  | InterSystems Logo |
| I | IS 5517X4 |  | InterSystems Strip |
| J | IS 594X2 |  | Probe Manifold |

System Description

The Truck Probe is designed to collect a representative sample of granular, pellet, chip, flake or other materials from an open top hopper truck. [Figure 4A](#) illustrates a typical Truck Probe installation.

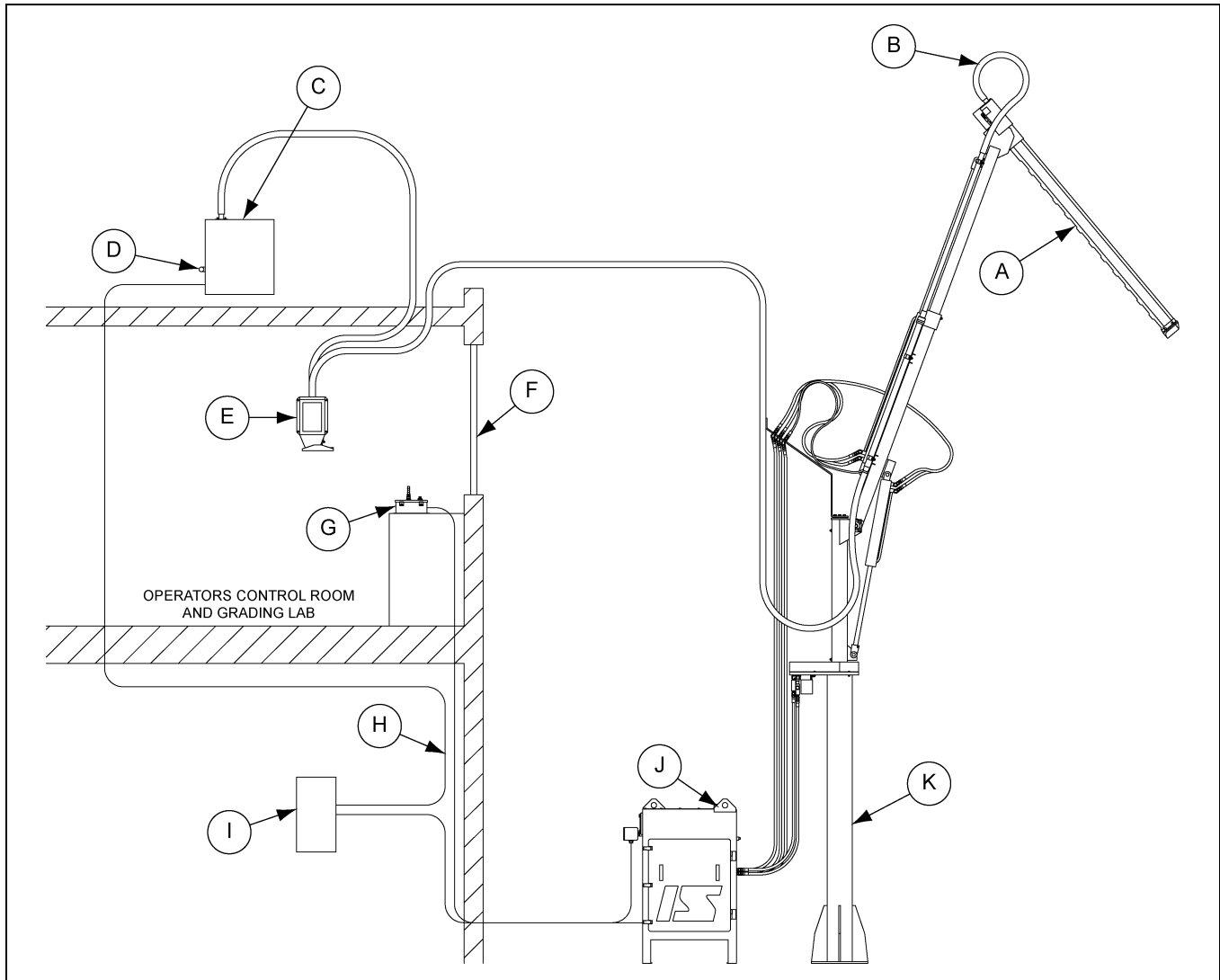


Figure 4A Typical Installation of Mega Truck Probe System

| Ref # | Description |
|-------|--------------------------------|
| A | Probe Tip (Compartmentalized) |
| B | 1-1/2" I.D. Sample Vacuum Line |
| C | Vacuum Motor Power Unit |
| D | Vacuum Exhaust |
| E | Sample Collection Cabinet |
| F | Window |

| Ref # | Description |
|-------|-------------------------|
| G | Operators Control Panel |
| H | Electrical Conduits |
| I | Circuit Breaker Panel |
| J | Hydraulic Power Unit |
| K | Probe Stand and Base |

4. General Information

Sample collection is initiated in response to the operator's manual command generated by controller logic. A sample cycle begins when the operator positions the probe tip for insertion into the truck by rotating the boom and stroking it in or out to the desired sampling position. The vacuum system is turned ON and then the probe tip is inserted down into the hopper truck with the sampling ports closed. The sampling ports are opened to receive a sample and then closed to dump the sample in the vacuum conveying chamber of the probe tip. The probe tip is raised and re-inserted into the material in a different location. This is repeated as required by the FGIS or other regulating guidelines. Once the truck has been properly sampled and sufficient time has elapsed for the sample to be thoroughly conveyed to the collection cabinet the operator will shut off the vacuum system. The sample can now be emptied from the collection cabinet to be analyzed.

Optional Features

The certified drawings indicate which, if any, optional features are included with a Truck Probe system. Some of the more frequently specified optional features are briefly described in the following list.

Additional optional items that may be furnished if described in the Equipment Quotation and if specifically ordered, may include some or all of the following items:

1. Traffic Control Lights
2. Intercom System
3. Aluminum Sample Conveying Tubing

Material Sampled

Most material from light to heavy density powders, granules, flakes and pellets.

Truck Probe Construction

Standard truck probe construction is of painted carbon steel, this includes the base, stand, booms, probe, etc. Other materials and/or finishes appropriate to the operating environment and the material or product being sampled may be used. Refer to the certified drawing(s) for any optional or special components installed on the Truck Probe.

Receiving Inspection

1. Carefully inspect the equipment for damage as soon as it is received. Also, verify that the quantity of parts or packages actually received corresponds to the quantity shown on the packing slip. Report any damage or shortage to the delivering carrier as soon as possible.
2. Intersystems responsibility for damage to the equipment ended with acceptance by the delivering carrier. Refer to the bill of lading for more detailed information.
3. Save all paperwork and documentation furnished with any of the Truck Probe components. For example, motor and reducer installation and lubrication instructions, etc.
4. A typical shipment of a standard truck probe, without any of the optional items described in material sampled section [on Page 16](#), has five (5) major units:
 - a. Hydraulic Power Unit
 - b. Main Stand and Boom Pivot
 - c. Probe Boom
 - d. Probe Tip
 - e. Bulkhead bracket, operators control panel, vacuum power unit, vacuum hose, sample collection cabinet, hydraulic hoses and fittings kit, hydraulic fluid, hydraulic power unit motor, starter and heaters and hardware package.

NOTE: *Anchoring devices and fasteners are not provided.*

Pre-Installation Preparation

1. Before starting Truck Probe system installation, study this manual, the certified drawing(s) furnished with the system and other applicable documents (including, but not limited to OSHA Regulations; the National Electrical Code; and all other applicable federal, state and local codes and regulations).
2. InterSystems truck probes are designed to be self-supporting when securely anchored to a reinforced concrete base constructed as specified by the certified drawing(s). The truck probe requires no bracing but it was not designed to support other equipment. Separate support must be provided for any accessory equipment. The user or installer is advised to retain a civil or architectural engineer to plan the overall installation and more specifically, the reinforced concrete bases for the probe itself and the hydraulic power unit.
3. InterSystems, Inc. does not assume turnkey responsibility for the installation. Therefore, the factors presented hereafter for consideration are just that and only that.
 - a. Before initiating the actual installation process, determine where the probe, sample cabinet, vacuum unit, control panel and hydraulic power unit will be situated.
 - b. As shown on the general data drawing, plan to locate the control panel so that the probe operator has a clear, unobstructed view of the loads to be sampled, so that the operator's signals to drivers of the loaded vehicles will be seen and understood.
 - c. The truck probe may be set up for either 180° rotation single lane or 300° rotation dual lane operation.
 - d. Plan the routing of the vacuum sampling hose for a minimum distance, number of bends and changes in elevation.

5. Installation

- e. The air exhausted from the vacuum power unit may include dust or other fines from the material being sampled. Plan to exhaust the air to a roof or another location away from pedestrian traffic where the occasional discharge will not be objectionable.
- f. Plan the location of the sample collection cabinet. Most often the desired site is at the beginning of the sample grading process in the grain inspection area. If the material other than grain is being sampled, other criteria may apply.
- g. Plan the location of the concrete base for the hydraulic power unit. Preferably, it should be located within 4' of the concrete probe base. If the probe is separated from the power unit by more than 4', the user or installer may have to purchase additional hydraulic hose. Maximum separation between the probe and power unit should be held to 10' or less.
- h. Excessively long hydraulic hoses can result in pressure loss, which in turn results in slow, erratic probe operation. Excessive vacuum hose length can produce low vacuum at the probe tip. The sample collection system may not function properly.
- i. It is recommended that guard posts and/or rails be placed around the probe and hydraulic power unit for protection from vehicular traffic.
- j. Review all installation plans once more. Double check to be sure that the probe will not interfere with any power and communications lines and that no conveyors or spouting are routed through the area where the probe is to operate.

Location

The truck probe is typically installed near the receiving truck scale and sample lab, as shown in [Figure 4A on Page 15](#). Locate the truck probe and associated equipment for ease of access and maintenance. The truck probe operator should have an unobstructed view of the entire area of boom movement.

The truck probe is to be installed only as shown on the certified drawing(s). If an alternate mounting arrangement is desired, contact InterSystems, prior to installation for proper guidance. The truck probe is of a general design with modifications specifically for your application. It may be necessary to rework the truck probe in order for it to function properly if you alter the application.

General Mounting Guidelines

The truck probe assembly is designed to support ONLY its own weight. As shown on the certified drawing, the truck probe must be installed on a special concrete foundation. The main stand base has eight (8) clearance holes for securing to the foundation. Refer to the certified drawing(s) of the truck probe for the dimensioned locations of these holes.



Truck probe cannot support any other equipment. Collapse of the whole system can cause death, serious injury and extensive damage to equipment. Properly support all electrical conduits and conveying lines.

1. Verify that the concrete probe and power unit bases have cured to develop adequate strength.
2. Position the main stand assembly on the concrete foundation as shown on the certified drawing(s). Install a washer and two (2) nuts on each of the anchor bolts. Verify that the main stand is plumb and tighten the anchor nuts.
3. Loosen the bearing set screws on the 1" diameter boom pivot shaft at the top of the main base assembly, remove cotter pin and pull the shaft out enough for the boom to be positioned in place. Hoist the boom assembly into position. Re-insert the boom pivot shaft, tighten the bearing set screws and re-install the cotter pin.

4. Remove the top up/down cylinder pivot pin from the cylinder. Cut the shipping strap on the up/down cylinder and attach to the boom assembly. Replace the cylinder pivot pin and spring clips.
5. Remove the 3/4" diameter nut and bolt from the end of the boom assembly. Position the probe tip assembly and re-install the 3/4" nut and bolt. Install the 1/8" diameter x 1-1/2" long cotter pin, from the hardware kit, into the castle nut.
6. Position the hydraulic bulkhead pipe assembly to the main stand. (See Page 34.) Use the four (4) 1/2"-13 UNC x 1-1/4" long bolts and washers from the hardware kit to fasten in place.
7. Position the hydraulic power unit assembly near the base of the main stand. Refer to the recommended placement as shown on the probe foundation drawing(s).

NOTE: The hydraulic power unit is shipped with 15 gallons of fluid already in the reservoir. Another 5 gallons of fluid is furnished with the probe and is to be added during initial start-up.

8. Refer to the drawing in the hydraulic fittings and hoses package on Page 46, it calls out the where each of the fittings and hoses are to be installed. The hoses from the hydraulic unit to the bulkhead bracket and to the rotational motor are to be made to fit.

NOTE: For the counter balance valve to work properly, the up and down hoses must be installed correctly.

Hose and Reusable Fitting Assembly Instructions

- a. Cut hose to length. (See Figure 5A.)
- b. Chamfer end of hose. (See Figure 5B.)

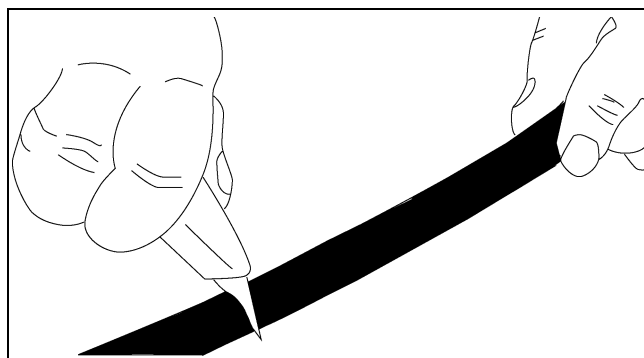


Figure 5A

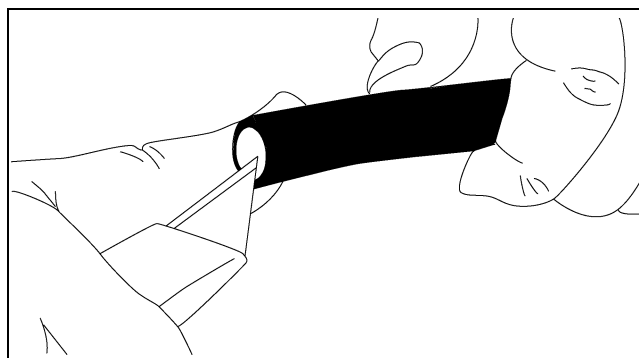


Figure 5B

- c. Screw the socket counterclockwise until it bottoms out. Back off 1/4" turn. (See Figure 5C.)
- d. Clamp socket in vise. (See Figure 5D.)

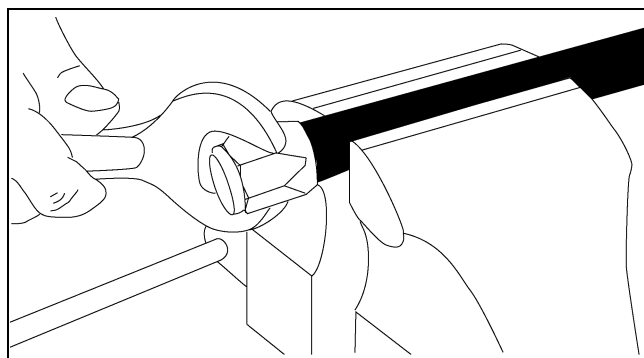


Figure 5C

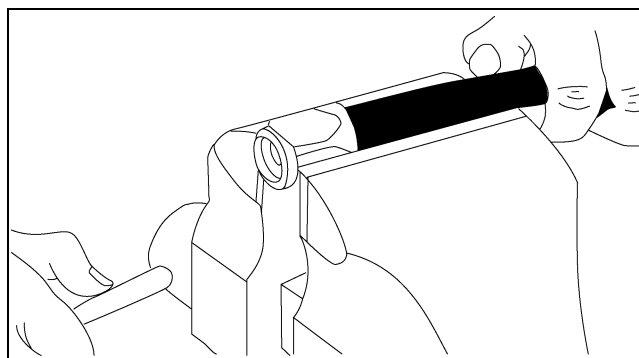


Figure 5D

5. Installation

- e. Lubricate nipple thread liberally. (See Figure 5E.)
- f. Screw the nipple clockwise into the socket. (See Figure 5F.)

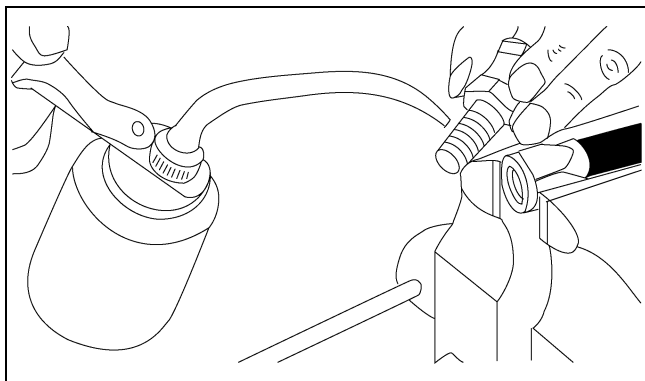


Figure 5E

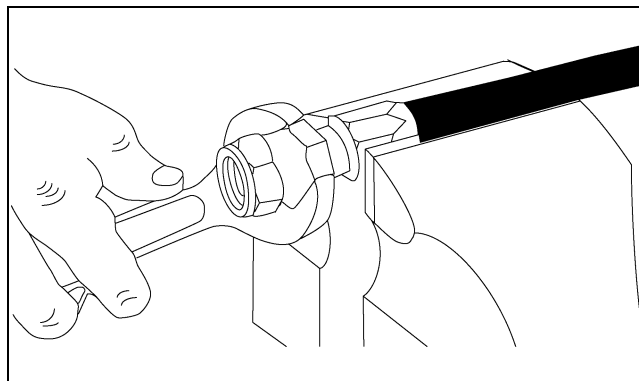


Figure 5F

7. **Compartmentized Probe only:** Cut and install one 5'-0" length of vacuum hose between the probe tip and the inner telescoping vacuum tube. Clamp in place using the worm screw clamps provided in the hardware package.
8. **Core Probe only:** Install the core vacuum tube kit provided. Refer to the kit installation drawing and the already installed vacuum tube assembly for proper placement. Cut and install two (2) 5'-0" lengths of vacuum hose between the core probe vacuum ports and the inner telescoping vacuum tubes. Clamp in place using the worm screw clamps provided in the hardware package.
9. Route the vacuum hose from the outer telescoping vacuum tube(s) to the sample collection cabinet and the vacuum power unit. Route the sample hose along the most direct and shortest path. Avoid tight bends and joints that may become locations that plug. Make all connections airtight and make sure all interior surfaces of joints are smooth and flush. Any ragged or raised tube ends will collect dust and debris as well as retard material flow. Escaping sample material can contaminate surrounding atmosphere and equipment. Clamp in place using the worm screw clamps provided in the hardware package.
10. Install the 1" x 1-1/2" x 1-1/2" rotational stops. The two (2) stops must be field-welded to the 1" thick top plate of the probe stand beneath the driven sprocket of the pivot tube. These stops limit clockwise and counterclockwise (right and left) probe rotation. The probe rotation must be limited to 180° for single lane or 300° for dual lane operation. This will prevent the probe from being swung around and hitting the hydraulic hoses. Reduce the amount of rotation if other obstructions such as buildings, poles, etc. are nearby. First lightly tack weld the stops to the plate on top of the probe stand. Then swing the probe through the entire range of travel to verify that it does not hit any obstruction. When proper stop placement is determined, weld the stops in their permanent position.
NOTE: When welding the stops, carefully shield the drive sprocket and other drive components from weld spatter.
11. Remove the pump shipping bracket from the hydraulic power unit. Install the drive coupling and spider from the hardware kit on the motor provided, but do not tighten yet. Place the motor in the cabinet, slide the pump mount onto the motor shaft and fasten the motor to the cabinet and the pump mount. Access the coupling through the hole in the pump mount. Make sure the motor coupling is almost fully engaged. (There should be about 0.03" to 0.06" end clearance within the coupling, so that no force is pushing on the pump shaft.) Tighten the coupling set screw and replace the pump mount cover.

12. The hydraulic power unit is furnished with the valves pre-wired to an electrical junction box. Have a qualified electrician complete the probe field wiring. This includes bringing the required power supplies to the hydraulic unit electrical junction box, motor starter, motor, tank heater, vacuum motor(s) and the operators control panel. Refer to the certified electrical drawings.

Initial Start-Up

1. On the operators control panel, turn the POWER switch ON. The hydraulic power unit motor should start, building system pressure. Verify proper hydraulic pump motor rotation. Correct wiring if necessary.
2. Use the push buttons or joysticks to move the probe around. Make sure the air is removed from all hydraulic lines. It may be necessary to loosen a hose where it connects to a cylinder, motor or actuator to bleed off trapped air.



Hydraulic lines under high pressure, fluid can escape with great velocity. Eye and skin injury may result. Use eye and hand protection when bleeding hydraulic lines.

3. While operating the probe, make sure that the hydraulic and vacuum hoses do not become pinched and are not pulled tight.
4. Adjust the relief valve pressure setting. Refer to relief valve V-5 [on Page 27](#).
5. Adjust the flow control valves which determine the rotational speed (left and right) of the boom. Turn a valve knob counterclockwise to increase fluid flow from a motor port; turn a knob clockwise to reduce flow and slow the motor.
6. After the probe has operated and air has been purged from the system, add hydraulic oil and raise the level up to the top line on the level gauge.
7. Turn the vacuum motor ON and verify proper operation.

Controller Location

1. Use vibration isolation pads when mounting the control enclosure or mount the controller in a vibration-free location.
2. Unless ordered for severe duty, locate controller so it is protected from water and dust.
3. Unless an explosion-proof rated controller was specifically ordered, DO NOT locate the controller in a hazardous area.
4. Most applications require that the truck probe be in easy view of the controller.

5. Installation

System Wiring

Refer to the certified electrical drawing(s) for specific wiring requirements.

The electrical installation must comply with O.S.H.A. Regulations; the National Electrical Code; and all other applicable federal, state and local codes and regulations.

If wiring between the controller and the truck probe unit is run through rigid conduit, use a short length of flexible conduit to connect wiring to the truck probe. This will isolate the rigid conduit from any vibration originating at the truck probe hydraulic unit.

Electrical Power Requirements

Refer to the certified electrical drawing(s) for specific wiring requirements.

Controller

Refer to the certified electrical drawing(s) for specific wiring requirements.

Solenoid Valve Coils

110/120 VAC, 50/60 Hz, Single Phase, 50 Watts

Optional - 220/240 VAC, 50/60 Hz, Single Phase, 90 Watts

Optional Hydraulic Tank Heater

120 VAC, 50/60 Hz, Single Phase, 500 Watts

Hydraulic Pump Motor

| Hydraulic Power Unit Horsepower | Voltage and Phase 60 Hz | Amps |
|---------------------------------|-------------------------|-----------|
| 3 HP TP Comp and Core | 230 VAC 1 PH | 14.0 |
| 3 HP TP Comp and Core | 230/460 VAC 3 PH | 8.29/4.14 |
| 3 HP TP Comp and Core | 575 VAC 3 PH | 3.32 |
| 5 HP STP Comp and Core | 230 VAC 1 PH | 21.5 |
| 5 HP STP Comp and Core | 230/460 VAC 3 PH | 13.2/6.6 |
| 5 HP STP Comp and Core | 575 VAC 3 PH | 5.28 |

NOTE: The motor chart amperages shown are for reference only. Verify by checking motor nameplate.

System Plumbing

The hydraulic power unit was pre-plumbed and tested before it left the factory. The final installation must comply with O.S.H.A Regulations and all other applicable federal, state and local codes and regulations.

As shown on the certified drawings, the solenoid valves and manifold were mounted on the hydraulic power unit at the factory.

The truck probe was also provided with hoses and fittings for connecting the hydraulic power unit to all the cylinders and actuators. When connecting the hoses to the hydraulic power unit, exercise caution in preventing any contaminants from entering into the hydraulic lines.



Hydraulic hose whip may cause minor injury. Clamp hoses to prevent excessive movement.

NOTE: Do not use Teflon tape or pipe sealant on “O-ring” type and “Jic” type connections.

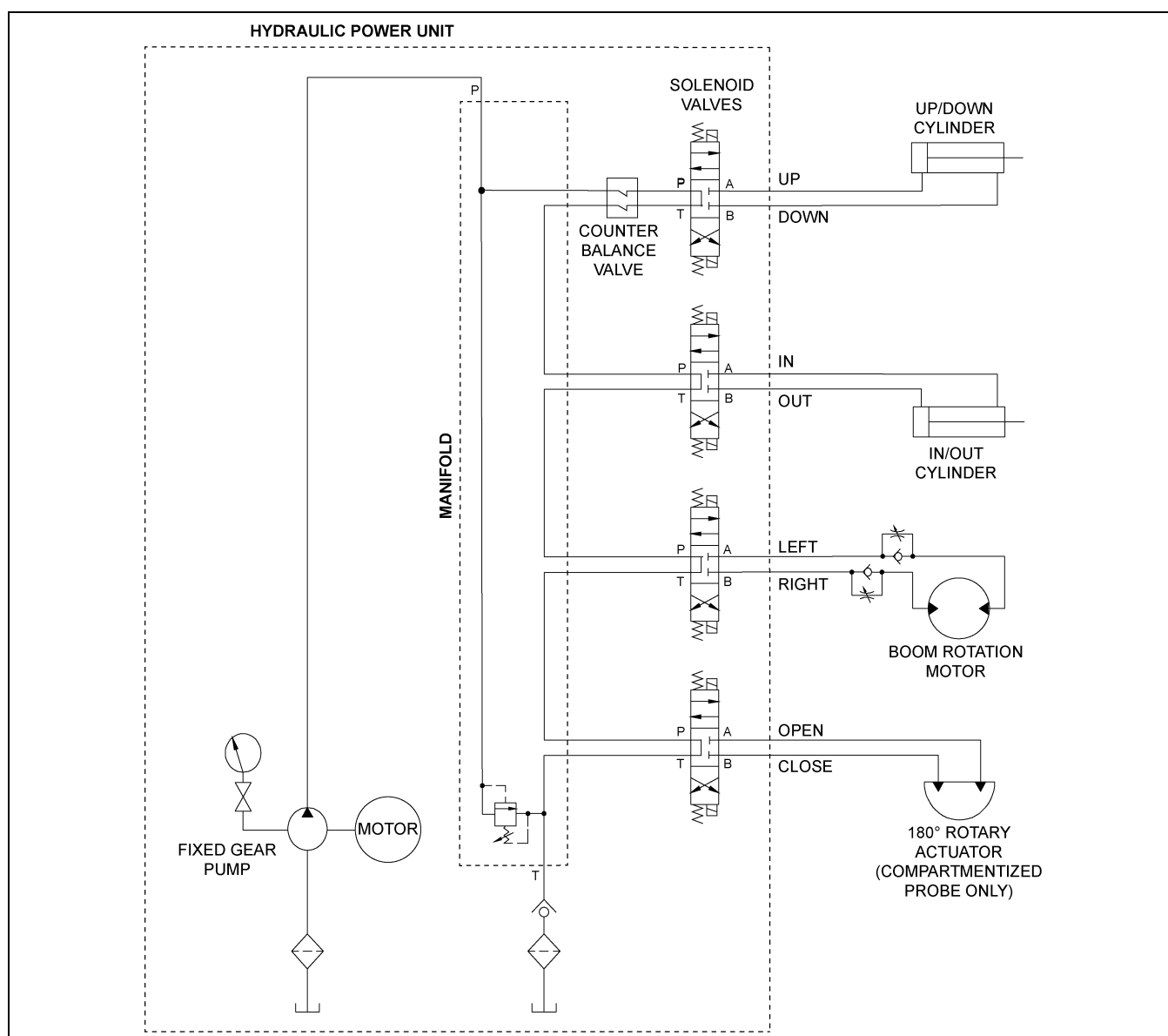


Figure 5G Hydraulic Schematic

6. Operation



Failure to observe all safety rules, written and implied and those suggested by common sense, can result in death, serious injury and/or equipment damage. Lock out power before performing any maintenance.

Operators Control Components and their Functions

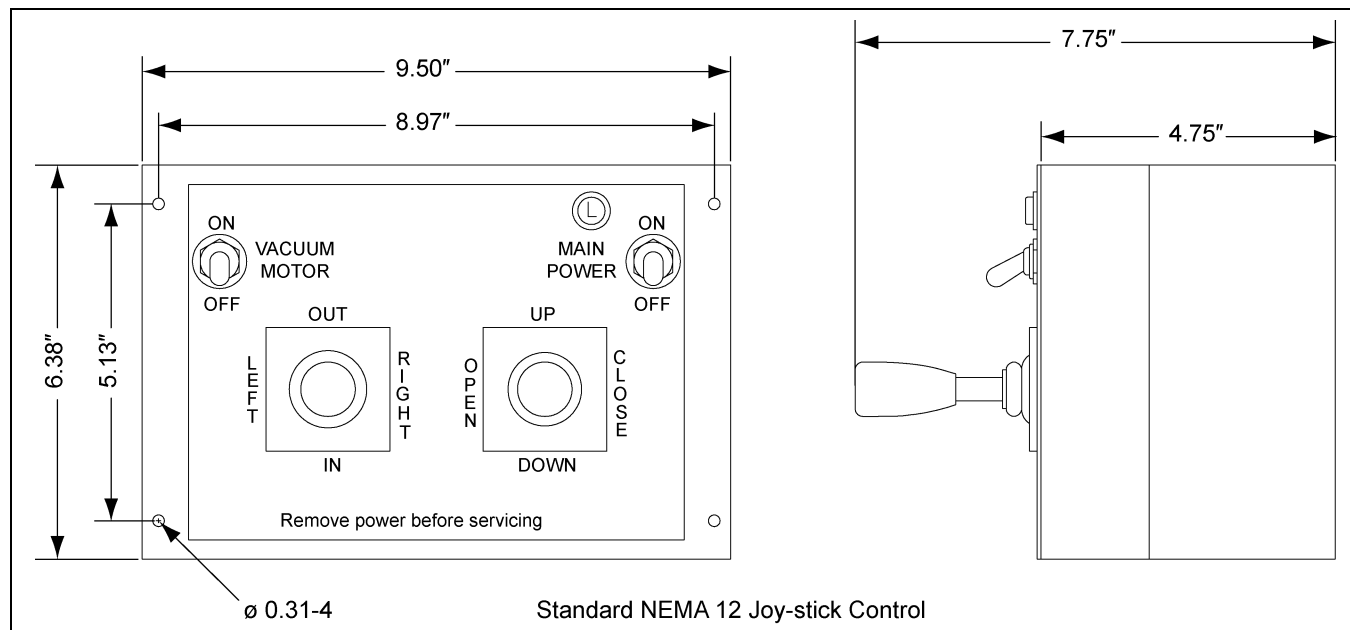


Figure 6A Standard NEMA 12 Operators Control Panel Detail

Refer to the certified electrical drawing(s) for dimensions on control panels with optional features.

Power OFF/ON Switch S-1 and Light

This illuminated selector switch controls electrical power to the controller, valve solenoid coils, vacuum motor relay coil and the hydraulic motor starter coil. The light is illuminated as long as power is available to the controller and the POWER switch is set to ON.

Vacuum Motor OFF/ON Switch S-2

This switch permits the operator to turn ON the vacuum motor when sampling. The motor will need to be turned OFF before opening the collection cabinet door.

Probe Movement Push-Button Switches S-3 through S-10 (Old Style Control)

The push-button control panel is wired so that only one of the eight (8) valve solenoids can be energized at any given time. This prevents probe operators from initiating contradictory actions.

Probe Movement Joy-Stick Switches S-3 and S-4 (Standard JS Control)

Due to the physical arrangement of the switches on the joy-sticks, only one of the four (4) valve solenoids controlled by each joystick can be energized at a given time. As a consequence, two (2) boom/probe motions can be initiated simultaneously. However, if two (2) boom motions are initiated simultaneously, both will occur at a slower rate because of the limited pump capacity. It is much harder to accurately control two (2) boom motions simultaneously.

Main Fuse

This fuse, located in a fuse block within the controller enclosure, protects the controller and probe components against overloads and short circuits.

For 110/120 VAC, 1 PH operation use ONLY a Buss Type FNM, 4 Amp, 250 Volt Slo-Blo fuse or equal. For 220/240 VAC, 1 PH operation use ONLY a Buss Type FNM, 2 Amp, 250 Volt Slo-Blo fuse or equal.

Terminal Strip

This 17 position barrier terminal strip is fastened to the sub-plate within the operators control enclosure. It serves as the controller's interface with and connection point for all external circuits and for the components mounted on the enclosure's front panel. Refer to the Certified Electrical Drawing(s).

Vacuum Motor(s) Relay

This 25 amp control relay makes and breaks the power to the vacuum motor(s).

Electrical Components

Hydraulic Pump Motor

This motor is coupled to the hydraulic pump via flexible shaft coupling and a pump adapter that bolts to the motor. The motor runs at fixed speed of ~1800 RPM. A label is located on the pump mount designating the correct direction of rotation. *(See Figure 3A on Page 11.)* Verify that the motor is turning the proper direction of rotation when wiring the system.

NOTE: *Do not run the motor in the wrong direction. Damage to the hydraulic pump will result.*

Pump Motor Starter and Thermal Overload

The motor starter makes and breaks the power to the hydraulic pump motor. The motor is protected with a set of overload heaters, that sense the motor current and trip if an overload occurs. If the overload trips, it will be necessary to determine the cause and manually reset the overload module inside the starter enclosure.

Hydraulic Oil Heater

The immersion heater is mounted in the side of the oil reservoir to heat the oil to a suitable operating temperature. The heater is rated at 500 watts and has an internal thermostat to shut it off when the oil has been heated. The thermostat should be set at 90° F.

Vacuum Motor

The vacuum motor(s) are used to create suction at the probe tip to convey the sample to the collection cabinet. The vacuum motor(s) are turned ON during the probing of a truck and must be turned OFF to retrieve the sample from the collection cabinet.

NOTE: *Shut the vacuum system OFF when emptying the collection cabinet. Failure to do so may result in mechanical damage to the vacuum motor(s) and will likely provide a biased sample.*

Hydraulic Components

Solenoid Valves V-1, V-2, V-3 and V-4

These valves are 4-way, 3-position, double-solenoid operated, spring-centered directional control valves. When both solenoids of a valve are de-energized, the valve spool is spring-centered and hydraulic fluid is routed directly into the manifold's return passage.

Each solenoid valve also has a manual operator that can be used to physically shift the valve spool. If a valve does not operate when the associated control switch is actuated, depressing the manual operator with a ball-point pen or a screwdriver will cause the valve to shift. If the valve shifts, it can be determined that the problem is in electrical circuit or solenoid.

The electrical connections to the solenoids are accessible by removing the cover of the terminal box on each valve. The valves are pre-wired to the electrical junction box inside the hydraulic power unit.

Refer to the certified drawings for additional valve information.

Boom UP/DOWN Valve V-1

This solenoid-operated directional control valve alternately pressurizes the piston end and rod end of the double-acting cylinder to raise and lower the boom. When the valve's "A" solenoid is energized, the valve spool shifts, pressurizing the piston end of the cylinder, thus raising the boom. When the "B" solenoid is energized, the valve spool shifts, pressurizing the rod end of the cylinder, thus lowering the boom. Note, when neither "A" nor "B" solenoid is energized the valve is spring centered so that all ports are blocked and movement is inhibited.

Counter Balance Valve V-12

When at rest, the probe's weight causes static hydraulic pressure. The purpose of the counter balance valve is to prevent the probe from free-falling slightly when the probe is initially powered down. The counter balance valve also prevents the probe from drifting down. If the probe drifts down, the counter balance valve will need to be adjusted as follows:

NOTE: *Prior to performing the counter balance Valve adjustment, first verify that the UP port, as shown on the power unit decal, is actually the up hose. If not, the UP and DOWN hoses and the control wires must be reversed.*

Counter Balance Valve Adjustment

1. Turn ON the pump and raise the boom half way up (horizontal), extend the boom all the way out. Turn OFF the Pump.
2. Push IN on the DOWN OVERRIDE SPOOL, on the UP/DOWN directional control valve. This is the valve's bottom override as looking inside the Hydraulic Power Unit.
3. While pressing in on the DOWN override, turn the counterbalance valve's adjusting screw clockwise (CW), to lower the pressure, until the boom just begins to drop. Slowly turn the screw CCW until the boom stops lowering. Turn the adjustment screw an additional 1/4" turn CCW.
4. The counterbalance is adjusted. If there is a problem probing down into the material, the system pressure may need to be increased in small increments until the probe operates normally. After each small increase in pressure, monitor the system pressure by deadheading the probe in the down position. DO NOT EXCEED THE RECCOMENDED SYSTEM PRESSURE. If the pressure was increased, the LEFT/RIGHT flow controls may need to be re-adjusted.

Boom LEFT/RIGHT Valve V-2

This solenoid-operated directional control valve alternately pressurizes opposing ports of the rotational motor to swing the boom left and right. When the valve's "A" solenoid is energized, the valve spool shifts, pressurizing the port that swings the boom to the left. When the "B" solenoid is energized, the valve spool shifts, pressurizing the port that swings the boom to the right. **NOTE:** When neither "A" nor "B" solenoid is energized the valve is spring centered so that all ports are blocked and movement is inhibited.

Boom IN/OUT Valve V-3

This solenoid-operated directional control valve alternately pressurizes the piston end and rod end of the double-acting cylinder to extend and retract the boom. When the valve's "A" solenoid is energized, the valve spool shifts, pressurizing the rod end of the cylinder, thus retracting the boom. When the "B" solenoid is energized, the valve spool shifts, pressurizing the piston end of the cylinder, thus extending the boom. **NOTE:** When neither "A" nor "B" solenoid is energized, the valve is spring centered so that all ports are blocked and movement is inhibited.

Sample Ports OPEN/CLOSE Valve V-4 (Compartmentalized Probe Only)

This solenoid-operated directional control valve alternately pressurizes opposing ports of the rotary actuator to rotate the sample ports to collect and dump samples. When the valve's "A" solenoid is energized, the valve spool shifts, pressurizing the port of the actuator that opens the sample ports. When the "B" solenoid is energized, the valve spool shifts, pressurizing the port of the actuator that closes the sample ports. **NOTE:** When neither "A" nor "B" solenoid is energized, the valve is spring centered so that all ports are blocked and movement is inhibited.

Relief Valve V-5



Excessive system pressure may cause hose or component breakage resulting in property damage, bodily injury and/or even death. Set relief valve to proper setting.

The relief valve limits the hydraulic pressure produced by the pump. Adjust the pressure to the recommended setting. Check the hydraulic pressure. First open the gauge shut off valve. If the pump motor is running and the probe operates at all, then the gauge should register some pressure. If it does not, then the gauge may be defective. It is normal for the gauge needle to vibrate slightly. In order to view the relief valve pressure setting on the gauge, a function must be dead headed momentarily to build pressure. Retract the boom all the way in. Now activate the probes down function until the cylinder bottoms out. Continue activating the solenoid momentarily while observing the pressure setting at which the relief valve is set on the pressure gauge. Adjust the relief valve as necessary.

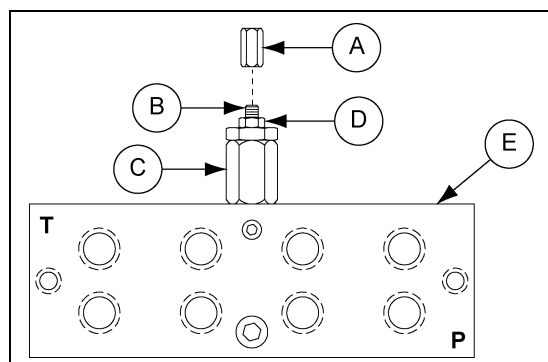


Figure 6B Relief Valve

| Ref # | Description |
|-------|--|
| A | 3/8" Hex Cap Nut (shown removed) |
| B | Relief valve pressure adjustment set screw 1/8" hex key size. |
| C | Relief Valve |
| D | 7/16" Hex Lock Nut |
| E | 4-Station Manifold |

6. Operation

To adjust the relief valve setting, remove the protective cap nut and loosen the lock nut on the valve stem. Use a 1/8" hex key to turn the valve stem clockwise to increase pressure or counterclockwise to reduce pressure. Make valve adjustments in small increments and observe the gauge while doing so. When adjustment is complete, tighten the lock nut to maintain valve adjustment, then tightly re-thread the cap nut onto the valve stem.

| Hydraulic Power Unit Horsepower | Relief Valve Pressure Setting |
|---------------------------------|-------------------------------|
| 3 HP TP Comp and Core | 750 |
| 5 HP STP Comp and Core | 1250 |

If no change in pressure is noted when making adjustments, the relief valve may be sticking or the gauge may be defective. If the gauge and relief valve have been eliminated as the source of the problem, then the pump may be worn, particularly if the problem is low pressure.

NOTE: *The gauge will last longer if it is not continuously subjected to pump pressure pulsations. Close gauge shut off valve after checking and setting pressure.*

Boom Left/Right Flow Control Valves V-6, V-7

A pair of in-line flow control valves mounted at the rotational motor, meters the flow of hydraulic fluid out of the rotational motor ports. (See [Figure 6C on Page 29.](#)) V-6 controls the speed of the boom swing to the left. V-7 controls the speed of the boom swing to the right. The flow controls will need to be adjusted upon initial start-up. To adjust, first loosen the small set screw on the metering screw. Turn clockwise to decrease boom swing speed and counterclockwise to increase boom swing speed. After desired speed is achieved, re-tighten the set screw to lock setting.

NOTE: *Avoid excessive boom swing speed, which will result in uncontrollable boom positioning and increased wear and tear on the truck probe.*

Hydraulic Cylinders

These double-acting, non-cushioned rod cylinders raise or lower and extend or retract the boom. The up/down cylinder is 3.00 bore x 24 stroke. The in/out cylinder is 1.50 bore x 48 stroke. The cylinders are attached at each end to the boom with a pivot pin. Solenoid valve V-1 controls the up/down movement. Solenoid valve V-3 controls the in/out movement.

Rotary Actuator (Compartmentalized Probe only)

The actuator is essentially a double-acting hydraulic cylinder that drives a rack and pinion unit, thus converting linear motion into rotary motion. The actuator is coupled directly to the inner tube of the compartmentalized probe. The rotary actuator opens the sampling ports to receive a sample. When the sampling ports are closed, the sample dumps into the vacuum conveying chamber of the probe. Solenoid valve V-4 controls rotary actuator motions.

Rotational Motor

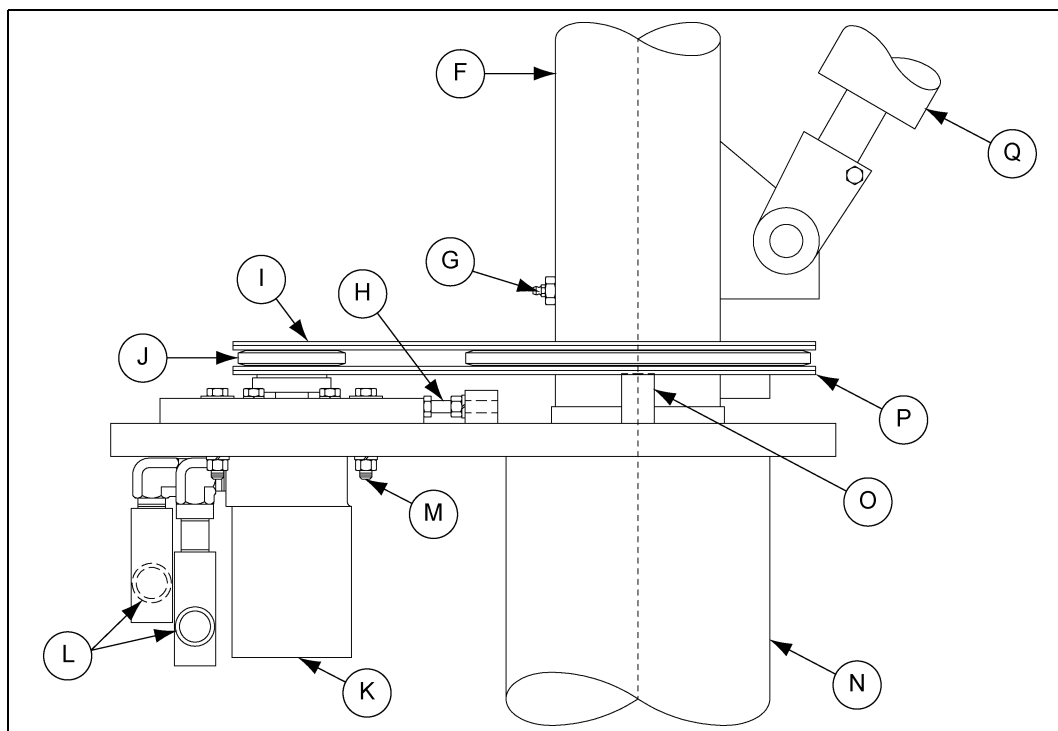


Figure 6C *Rotational Motor and Drive Chain*

| Ref # | Description |
|-------|--------------------------|
| F | Pivot Tube |
| G | Grease Zerk |
| H | Jack Bolts and Lock Nuts |
| I | #60H Drive Chain |
| J | Drive Sprocket |
| K | Rotational Motor |

| Ref # | Description |
|-------|--|
| L | Right and Left Flow Contrl Valves V-6 and V-7 |
| M | Loosen motor mount plate bolts during chain adjustment |
| N | Main Stand |
| O | Rotational stops (2) locate and field weld to main stand |
| P | Chain guards removed to permit chain adjustment |
| Q | Up/Down Cylinder |

The hydraulic torque motor swings the boom left or right by means of a pair of sprockets and roller chain. The motor is mounted to an adjustment plate located under the chain drive guards. The adjustment plate along with a pair of jack screws allow for tightening the drive chain. Solenoid valve V-2 controls left/right movement.

Hydraulic Pump

The hydraulic pump is a fixed displacement gear pump, that produces a flow of 5.6 GPM at 1800 RPM. The probe speed can be decreased by adding flow controls to any of the cylinders and actuators, but cannot be increased. Maximum speeds for troubleshooting are as follows.

| Probe Function | Approximate Time |
|----------------|------------------|
| IN | 2.5 Seconds |
| OUT | 4 Seconds |
| UP | 8 Seconds |
| DOWN | 7 Seconds |



Failure to observe all safety rules, written and implied and those suggested by common sense, can result in death, serious injury and/or equipment damage. Lock out power before performing any maintenance.

General Maintenance

A good maintenance program involves thorough general housekeeping, adequate periodic re-lubrication and replacement of worn or damaged components.

Periodic Inspection

At regularly scheduled intervals, while observing all safety precautions, observe the equipment as it operates. Inspect for:

1. Loose or missing hardware.
2. Proper hydraulic oil level.
3. Noisy motors or motor bearings.
4. Structural damage.
5. Rust or corrosion.
6. Damaged wiring, including exposed conductors and connections.
7. Hydraulic leaks, damaged hydraulic lines and components, hoses that are kinked, chaffed or that are binding.
8. Excessive dirt accumulation in the hydraulic power unit, vacuum unit, boom pivot and telescoping joints.
9. Vacuum hoses that are kinked or chaffed. Vacuum leaks.
10. Make sure that all guards and warning labels are in place and legible. GENERAL SAFETY INFORMATION from [Pages 6-14](#), explains the purpose and intended location of the warning signs. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY.

Lubrication

Boom Pivoting and Sliding Joints, Monthly

Lubricate all shafts and bearings with a liberal amount of multi-purpose grease. Bearings and shafts should be re-greased monthly. All boom motions should be smooth and constant. Jerky operation may indicate mechanical damage to the boom, to a cylinder or the rotation motor.

Boom Rotation Drive Chain and Sprockets, Every 6 Months

Because of the operating environment, the boom rotation drive chain and sprockets rapidly accumulate dust and dirt. At the recommended interval, thoroughly flush the chain with an approved solvent to rinse OFF all accumulated dirt. Then, while the boom is rotating, brush on a coat of lubricant. Be sure to work the lubricant into the chain pin joints.

Hydraulic Power Unit Service

The hydraulic power unit requires scheduled maintenance for long life and trouble free operation. Recommended hydraulic oil is "IS Blue All Season" (Viscosity 73.6 @ 100° F). This is a high performance anti-wear oil, with excellent low-temperature performance, suitable for environments with wide fluctuations in ambient temperature. An alternative is Exxon Mobil Univis N32 (Viscosity 177 @ 100° F).

NOTE: *Do not mix oil types. Completely drain and flush the system components when changing the hydraulic oil.*

Hydraulic Oil Inspection, Daily

1. Check the reservoir fluid level with the probe operating. The level must be above the RED Low Oil Level bar on the sight gage. Replenish reservoir as necessary to maintain minimum level.
2. Check fluid temperature after the truck probe has operated for a time. Fluid temperature should stabilize between 110° and 135° Fahrenheit.

Probable causes of hydraulic fluid overheating include:

- a. Prolonged periods of continuous operation in a hot environment. A heat exchanger may have to be installed to cool the fluid. If the high temperature environment is a temporary condition, a forced draft of cooling air may be sufficient.
- b. Low hydraulic fluid level. Fluid circulates through the system so rapidly that it cannot transfer heat to the reservoir. Add fluid.
- c. Dirty power unit. A coating of hydraulic fluid and dirt prevents the power unit from shedding heat to the surrounding air. Clean the hydraulic power unit.
- d. Pump cavitation is usually signaled by a crackling or popping sound originating in the pump, this is most often caused by a clogged suction strainer resulting in the fluid vaporizing in the pump. Cavitation causes the fluid to overheat and loss of system pressure. The pump and motor will run hotter and the pump will eventually be destroyed. Identify and correct the problem as soon as possible.

Breather Cap Cleaning, Every 3 Months

Remove the breather cap. Wash it thoroughly and blow it dry. Replace the cap.

Hydraulic Filter Replacement, Every 3 Months

Remove and replace the filter canister. A check valve between the filter and the oil reservoir prevents excessive oil spillage during replacement. Check the hydraulic pressure as outlined in relief valve V-5 [on Page 27](#).

Hydraulic Oil and Filter Replacement, Annually

1. Operate the probe until the fluid temperature has stabilized. Move boom to the fully extended and down position.
2. Shut off and lock out all power to the probe.



Unexpected movement of the probe boom can result in death or serious injury. Make certain lock outs are in place and the boom is at its lowest point of operation.

3. Immediately drain the reservoir of fluid. Remove the reservoir cover. It will probably have to be pried off since a bead of silicone sealant was applied at the factory to prevent fluid or vapors from leaking. Use an approved solvent to thoroughly flush any remaining fluid and dirt from the reservoir. DO NOT replace the cover at this time.

7. Maintenance and Repair

4. Disconnect the pressure and suction hoses at the pump to drain any remaining fluid and solvent. Then reconnect the hoses.
5. Make sure the hoses to the truck probe are labeled where they connect to the fittings on the end of the power unit. Disconnect the hoses to drain them of fluid. Then reconnect the hoses.
6. Replace the return line filter cartridge.
7. Temporarily remove the suction strainer. Wash it with solvent and blow it dry. Re-install the strainer or replace it if it cannot be cleaned.
8. Remove the breather cap. Wash it with solvent and blow it dry. Replace the breather.
9. Make sure the 1/2" NPT drain plug is threaded securely in the reservoir drain. Then refill the reservoir with fifteen gallons of approved hydraulic fluid.
10. Operate the truck probe until no air bubbles are apparent from the return line.
11. Re-check hydraulic fluid level gauge and add additional oil if required.
12. Wipe the rim of the reservoir and the cover with a solvent-soaked rag, to provide clean, dry sealing surfaces. Apply an even bead of silicone sealant around the rim of the reservoir. Re-install the cover. Sealing the cover to the reservoir is not essential but will help to keep the exterior of the power unit clean and minimize accumulation of dirt.
13. Check the hydraulic pressure as outlined in relief valve V-5 [on Page 27](#).

Compartmentized Probe Tip Inspection

This inspection is best done with the probe lowered near ground level.

1. While keeping the hands clear of the probe, have someone OPEN and CLOSE the probe tip through several cycles. The inner tube should rotate smoothly and evenly within the outer tube.
2. The plastic cap on the end of the probe tip should be in good condition. A damaged cap should be replaced at once; otherwise it will leak, reducing the vacuum drawn in the probe tip.
3. With the probe tip OPEN, the inner tube should be clear and free of any obstructions.
4. The probe tip should pivot freely on the end of the boom without side play.

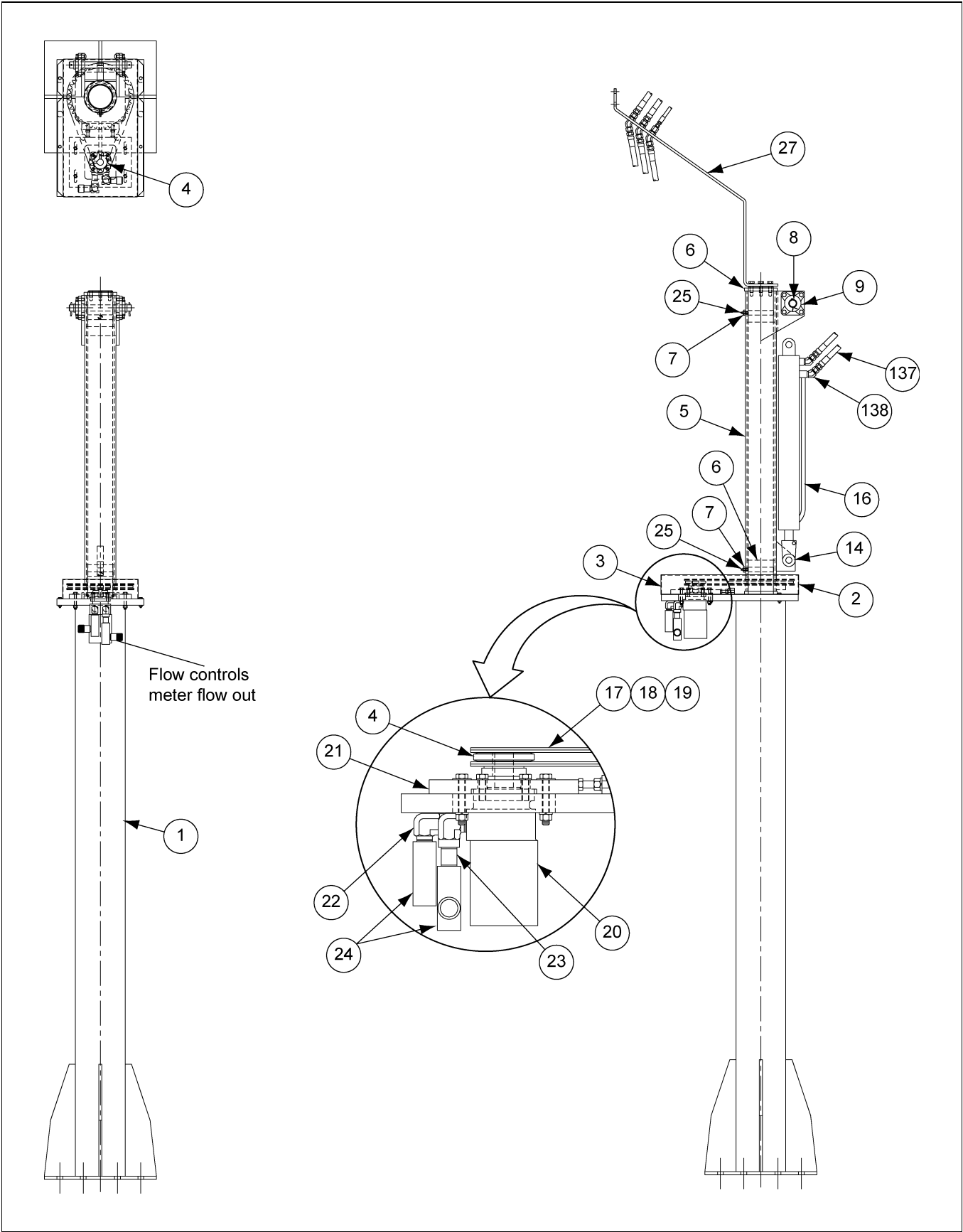
Core Probe Vacuum Pressure Equalization

The core probe is designed to be a balanced system such that air is neither being pulled into or pushed out of the sampling end of the tip. Check for correct air balance as follows.

1. Turn the vacuum motor ON.
2. Place a 3" square piece of paper over the sample opening.
3. The paper should stay in place without being sucked into the opening.
4. To correct air imbalance, loosen the vacuum hose where it connects to the probe tip.
5. To increase suction slide hose up to expose some of the existing relief holes.
6. To decrease suction slide hose down to cover up some of the relief holes.
7. Check for proper balance again and re-adjust if necessary.

1. Main Stand Assembly ([See Pages 34-35.](#))
2. Telescoping Boom Assembly ([See Page 36.](#))
3. Compartmentized and Core Probes ([See Page 37.](#))
4. Sample Cabinets ([See Pages 38-39.](#))
5. Vacuum Motor Units ([See Pages 40-41.](#))
6. Hydraulic Power Unit Assembly ([See Pages 42-43.](#))
7. Hydraulic Power Unit Fittings and Hoses ([See Pages 44-45.](#))
8. Hydraulic Hoses and Fittings ([See Pages 46-47.](#))

Main Stand Assembly

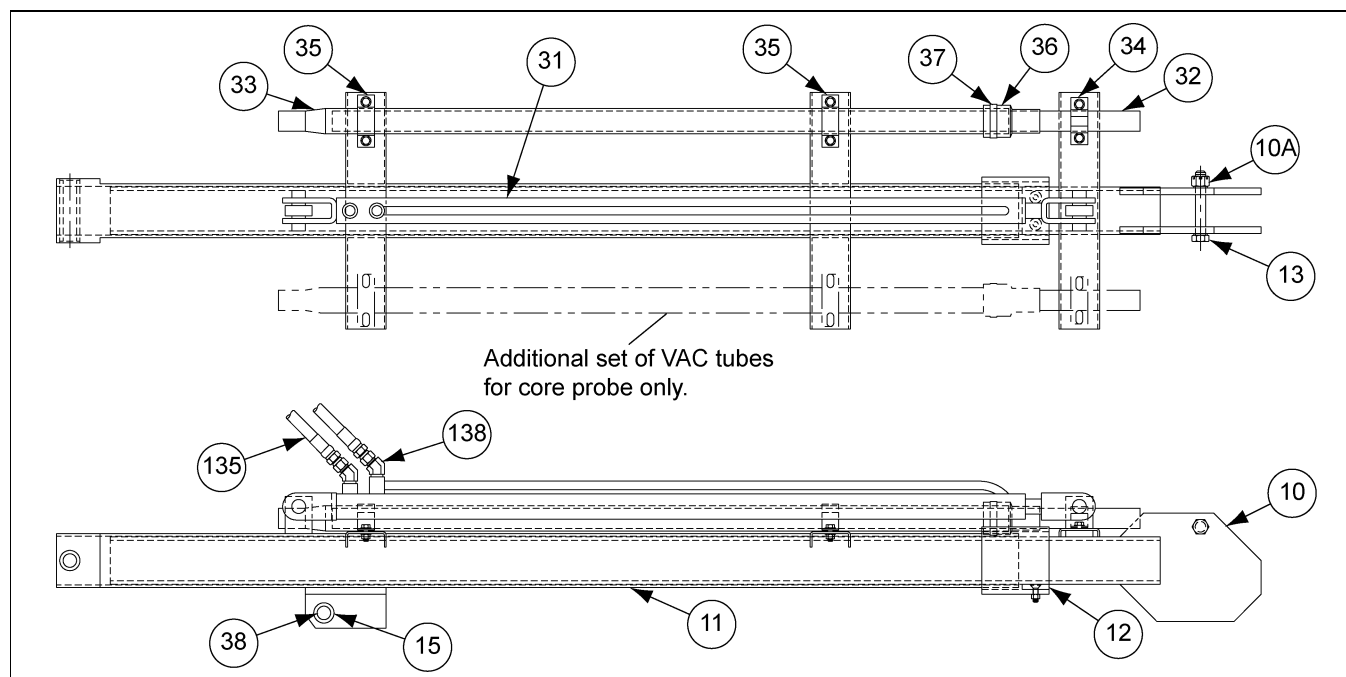


| Ref # | Part # | | Description | Qty | |
|-------|-----------|-----------|--|-----|-----|
| | TP | STP | | TP | STP |
| 1 | 531748-IG | 531749-IG | Main Stand Weldment | 1 | 1 |
| 2 | 531750 | 531752 | Chain Guard Small Half | 1 | 1 |
| 3 | 531751 | 531753 | Chain Guard Large Half | 1 | 1 |
| 4 | 35688 | 35688 | Drive Sprocket | 1 | 1 |
| 5 | 531900 | 543931 | Pivot Tube Weldment | 1 | 1 |
| 6 | 518911 | 529628 | Ryertex Tee Bushing | 2 | 2 |
| 7 | 531755 | 529787 | Zerk Bolt 1/2"-13 UNC (1/2" TP and 1-1/4" STP) | 2 | 2 |
| 8 | 35176 | XE8931 | Boom Shaft (1" TP and 1-1/4" STP) | 1 | 1 |
| 9 | 34792 | 24058 | 4 Bolt Flange Bearing (1" TP and 1-1/4" STP) | 2 | 2 |
| 14 | - | 531395 | Bushing 1-1/2" O.D. x 1.00" I.D. x 1" LG Duralon | - | 1 |

| Stand and Pivot Tube Components | | | |
|---------------------------------|--------|--|-----|
| Ref # | Part # | Description | Qty |
| 16 | XW4920 | Hydraulic Cylinder 3 Bore x 24 Stroke | 1 |
| 17 | 34029 | Chain Roller No. 60-H | A/R |
| 18 | 34758 | Chain Link No. 60-H Connector | 1 |
| 19 | 34033 | Chain Link No. 60-H Offset | A/R |
| 20 | 35687 | Hydraulic Torque Motor w/ 1.00" Shaft | 1 |
| 21 | 531754 | TP and STP Hydraulic Motor Slide Plate | 1 |
| 22 | 35628 | Elbow, 90° M-F 1/2" MPT x 1/2" FPT STL | 2 |
| 23 | 35623 | Pipe Nipple 1/2" NPT x 2" LG Black | 2 |
| 24 | 35629 | Adjustable Flow Control 1/2" NPT 15 GPM | 2 |
| 25 | 36298 | Grease Zerk Straight 1/4"-28 UNF | 2 |
| 26 | 522911 | Pivot Stop HR Bar 2" x 1-1/2" x 1-1/2" (Not Shown) | 2 |
| 27 | 531935 | Bulkhead Bracket Dual Lane | 1 |
| 28 | 516539 | Paint DTM Gray Touch Up Spray Can (Not Shown) | 2 |

| Dual Lane Hydraulic Hoses and Fittings Kit | | | | |
|--|--------|---|------|------|
| Ref # | Part # | Description | Qty | |
| | | | Core | Comp |
| 137 | 529538 | 1/2" Hydraulic Hose 96" LG 3/4" FJIC to 3/4" FJIC | 2 | 2 |
| 138 | 518921 | JIC 45° Elbow 1/2" MNPT x 3/4" MJIC | 4 | 4 |

Telescoping Boom Assembly

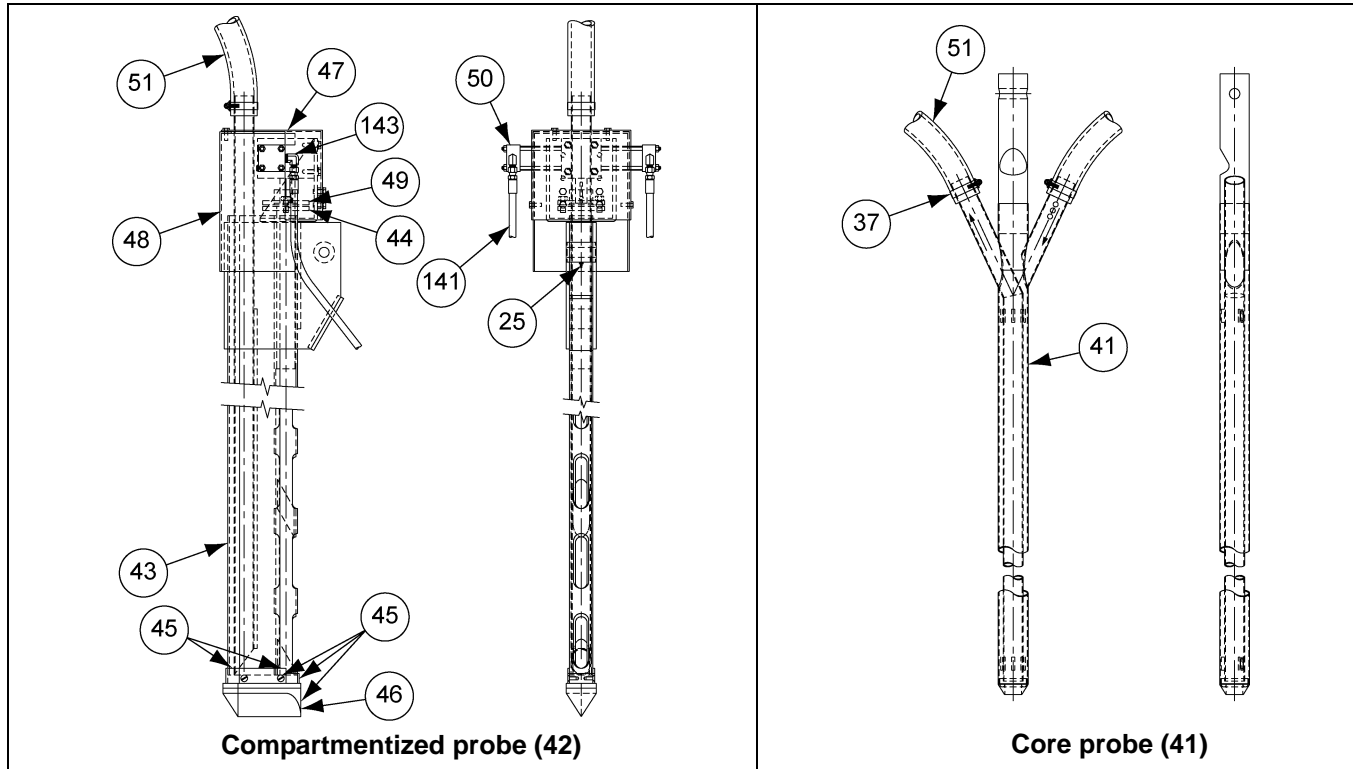


| Ref # | Part # | | Description | Qty | |
|-------|--------|--------|---|-----|-----|
| | TP | STP | | TP | STP |
| 10 | 531885 | 531887 | Inner Boom Weldment | 1 | 1 |
| 10A | | 543908 | Drill Bushing 3/4" I.D. x 1" O.D. x 1" LG | | 2 |
| 11 | 531886 | 531888 | Outer Boom Weldment | 1 | 1 |
| 12 | 531882 | 531883 | In/Out Ryertex Bearing Plate | 1 | 1 |
| 13 | 531884 | 542295 | Hex Head Bolt 3/4"-10 UNC | 1 | 1 |
| 15 | | 543933 | Bushing 1-1/2" O.D. x 1" I.D. x 1/2" LG Duralon | | 2 |
| 38 | 531395 | 531395 | Bushing 1-1/2" O.D. x 1" I.D. x 1" LG Duralon | 1 | 2 |

| Boom Components | | | | |
|-----------------|--------|--|-----|--|
| Ref # | Part # | Description | Qty | |
| 31 | XW4921 | Cylinder Hydraulic 1-1/2" Bore x 48 Stroke | 1 | |
| 32 | 531934 | Inner VAC Tube 60" LG | A/R | |
| 33 | 531933 | Outer VAC Tube 54-1/4" LG | A/R | |
| 34 | 527072 | Inner VAC Tube Mounting Bracket | A/R | |
| 35 | 527071 | Outer VAC Tube Mounting Bracket | A/R | |
| 36 | 527073 | Fitting Flex Hose 1-1/2" I.D. | A/R | |
| 37 | 34506 | Worm Clamp 1-9/16" to 2-1/2" | A/R | |

| Dual Lane Hydraulic Hoses and Fittings Kit | | | | |
|--|--------|---|------|------|
| Ref # | Part # | Description | Qty | |
| | | | Core | Comp |
| 135 | 529539 | 1/2" Hydraulic Hose 72" LG 3/4" FJIC to 3/4" FJIC | 2 | 2 |
| 138 | 518921 | Jic 45° Elbow 1/2" MNPT x 3/4" MJIC | 4 | 4 |

Compartmentized and Core Probes



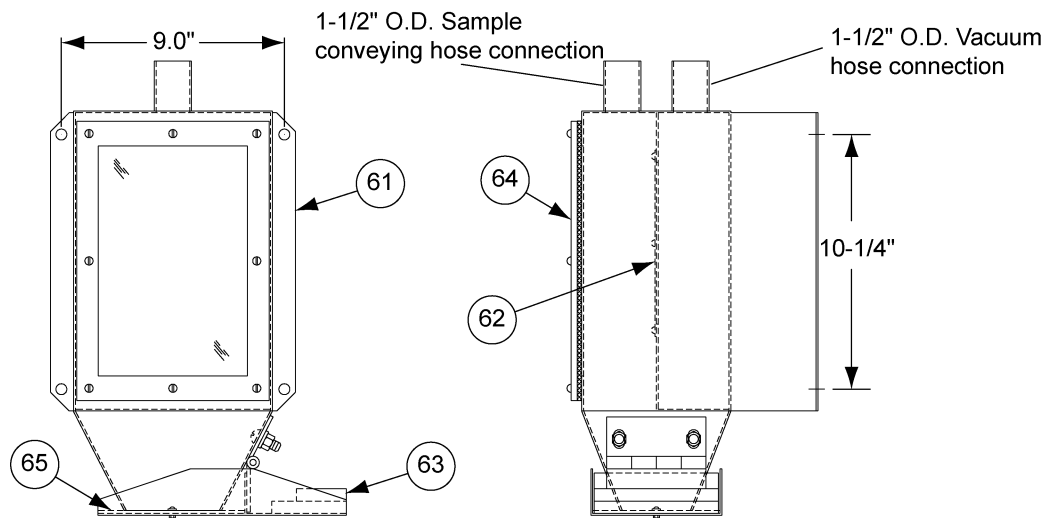
| Stand and Pivot Tube Components | | | |
|---------------------------------|--------|---------------------------------|-----|
| Ref # | Part # | Description | Qty |
| 25 | 36298 | Gease Zerk Straight 1/4"-28 UNF | 2 |
| Boom Components | | | |
| 37 | 34506 | Worm Clamp 1-9/16" to 2-1/2" | A/R |

| Ref # | Part # | | Description | Qty |
|-------|----------|----------|-------------------------------------|-----|
| | 7' Probe | 9' Probe | | |
| 41 | 531745 | 531746 | Core Probe | 1 |
| 42 | 531906 | 531907 | Complete Probe Assembly | 1 |
| 43 | 35593 | 35774 | Probe Assembly (Includes 44 and 46) | 1 |
| 44 | 35590 | 512140 | Inner Probe Weldment | 1 |

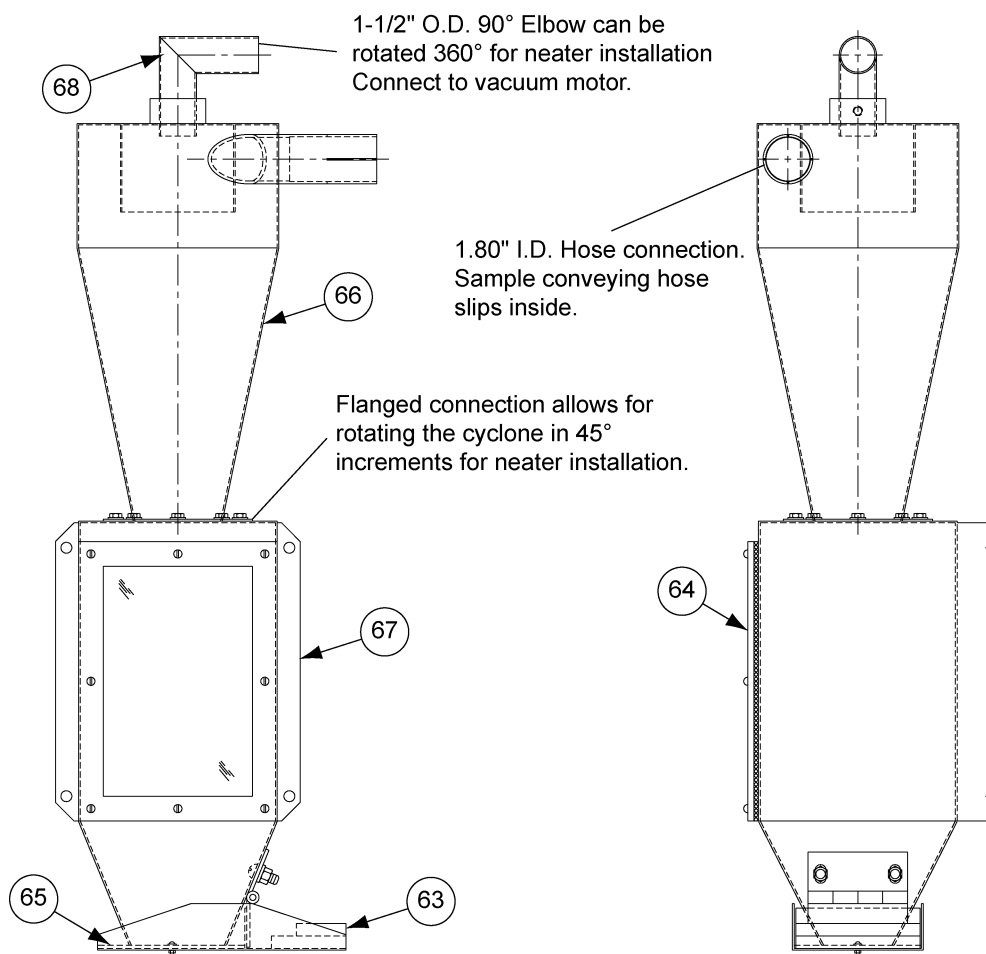
| Ref # | Part # | Description | Qty |
|-------|--------|------------------------------------|-----|
| 45 | 530288 | Urethane Probe Tip Replacement Kit | 1 |
| 46 | - | - | - |
| 47 | 531904 | Rain Cover Top Comp Probe | 1 |
| 48 | 531905 | Rain Cover Front Comp Probe | 1 |
| 49 | 35702 | Coupling Actuator | 1 |
| 50 | 35686 | Hydraulic Rotary Actuator 180° | 1 |
| 51 | 35611 | Vacuum Hose 1-1/2" I.D. | A/R |

| Dual Lane Hydraulic Hoses and Fittings Kit | | | | |
|--|--------|--|------|------|
| Ref # | Part # | Description | Qty | |
| | | | Core | Comp |
| 141 | 534765 | 1/4" Hydraulic Hose 192" LG 7/16" FJIC to 7/16" FJIC | - | 2 |
| 143 | 36476 | Jic 90° Elbow 1/4" MNPT x 7/16" MJIC | - | 2 |

Sample Cabinets



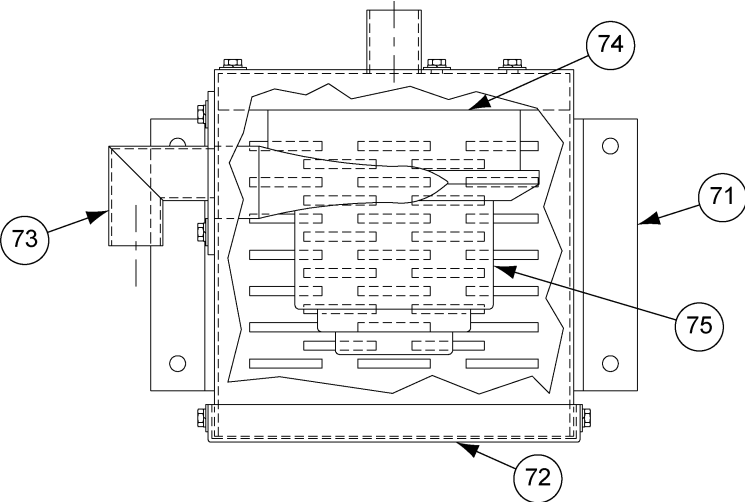
Standard cabinet #541011



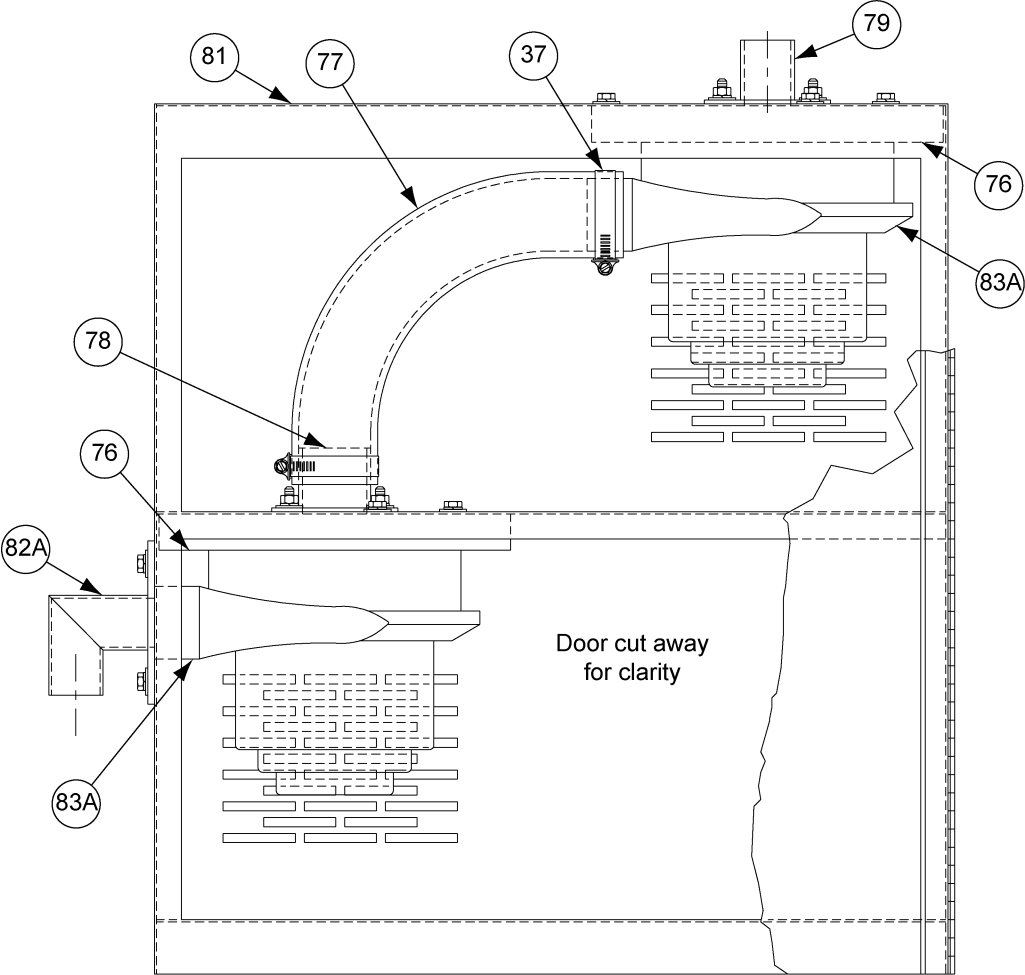
Optional cyclone cabinet #530551

| Collection Cabinet Components | | | |
|-------------------------------|--------|-------------------------------------|-----|
| Ref # | Part # | Description | Qty |
| 61 | 35790 | Collection Box Frame | 1 |
| 62 | 512871 | Collection Box Screen | 1 |
| 63 | 525643 | Collection Box Door | 1 |
| 64 | 523981 | Collection Box Window | 1 |
| 65 | 34670 | 1/8" Thick Neoprene 4.88" x 6.00" | 1 |
| 66 | 530552 | TP Cyclone | 1 |
| 67 | 530553 | TP Cyclone Collection Chamber | 1 |
| 68 | 530554 | TP Cyclone 1-1/2" O.D. Outlet Elbow | 1 |

Vacuum Motor Units



Standard vacuum unit #38124



Panel lock (80) (not shown)

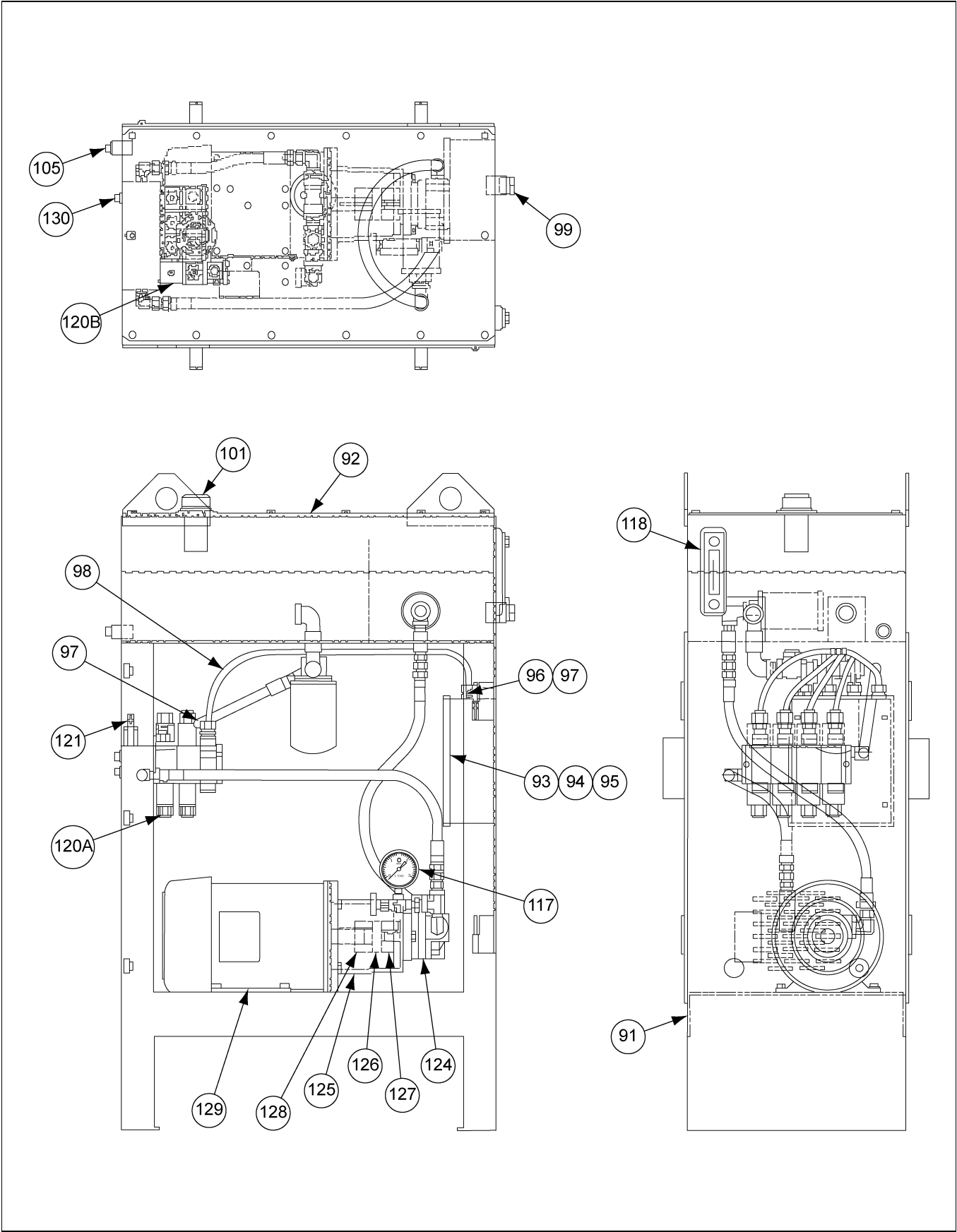
Optional dual vacuum unit #516209 or #529238

| Boom Components | | | |
|-----------------|--------|------------------------------|-----|
| Ref # | Part # | Description | Qty |
| 37 | 34506 | Worm Clamp 1-9/16" to 2-1/2" | A/R |

| Single 2-Stage VAC Unit Components | | | |
|------------------------------------|--------|---|-----|
| Ref # | Part # | Description | Qty |
| 71 | 34783 | VAC Housing Single 2-Stage | 1 |
| 72 | 35606 | VAC Housing Cover | 1 |
| 73 | 35940 | VAC Outlet 1-1/2" O.D. 90° | 1 |
| 74 | 35607 | VAC Gasket 9.7" x 9.7" x 1" | 1 |
| 75 | 35532 | 2-Stage VAC Motor w/ Tangential Discharge | 1 |

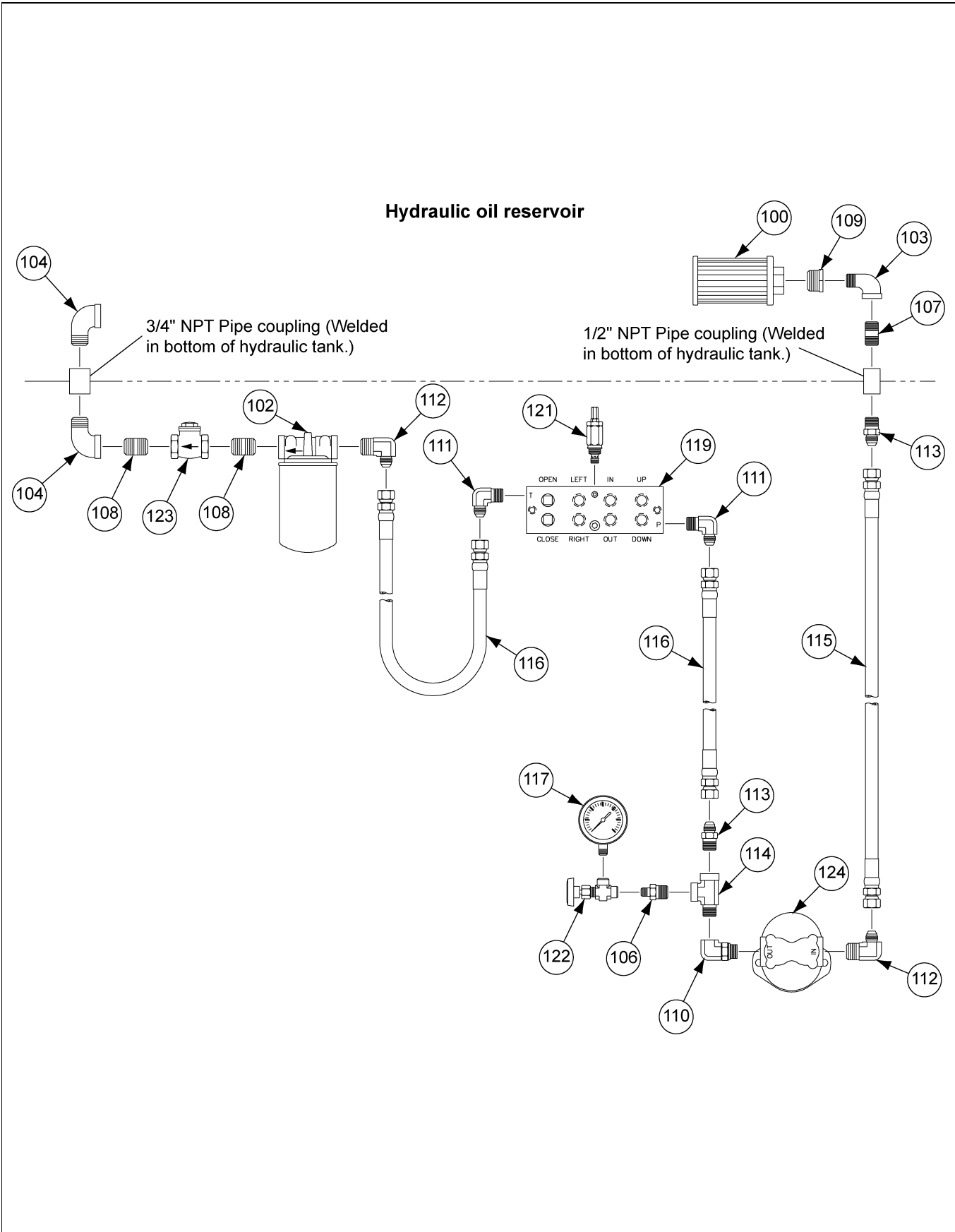
| Dual VAC Unit Components | | | |
|--------------------------|--------|---|-----|
| 76 | 35607 | VAC Gasket 9.7" x 9.7" x 1" | 2 |
| 77 | 34498 | Hose 2.0" I.D. Plastiflex | A/R |
| 78 | 35212 | VAC Hose Adapter 2.0" O.D. | 1 |
| 79 | 35605 | VAC Hose Adapter 1-1/2" O.D. | 1 |
| 80 | 34069 | Panel Lock w/ Key | 1 |
| 81 | 515495 | VAC Housing Dual 2-Stage or 3-Stage | 1 |
| 82A | 35940 | VAC Outlet 1.50" O.D. 90° | 1 |
| 82B | | VAC Outlet 2.38" O.D. 90° | 1 |
| 83A | 35532 | 2-Stage VAC Motor w/ Tangential Discharge | 2 |
| 83B | 529239 | 3-Stage VAC Motor w/ Tangential Discharge | 2 |

Hydraulic Power Unit Assembly

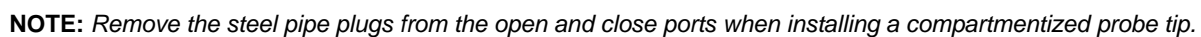


| Hydraulic Power Unit Components | | | |
|---------------------------------|------------------------------------|--|-----|
| Ref # | Part # | Description | Qty |
| 91 | 531744 | Hydraulic Unit Housing w/ Doors | 1 |
| 92 | 35786 | Hydraulic Unit Cover | 1 |
| 93 | 514539 | NEMA 1 Electrical Junction Box 10 x 8 x 4 | 1 |
| 94 | 514538 | Sub Panel | 1 |
| 95 | 34605 | Terminal Block 10 Space | 1 |
| 96 | 34726 | 1/2" Conduit Lock Ring | 4 |
| 97 | 35576 | Strain Relief Connector 1/2" NPT | 8 |
| 98 | 35575 | 16/3 S Conductor Cord | 20 |
| 99 | 35041 | Fit Pipe Plug 1" NPT Black | 1 |
| 101 | 35776 | Filler Filter Breather | 1 |
| 105 | 35624 | Black Pipe Plug 1/2" NPT | 3 |
| 117 | 35727 | Hydraulic Pressure Gauge 3000 PSI | 1 |
| 118 | 35766 | Oil Temperature Gauge | 1 |
| 120A | 551514 | Hydraulic Valve 4-Way Dual Coil | 4 |
| 120B | 531379 | Counter Balance Valve D03 | 1 |
| 121 | 35663 | Hydraulic Relief Valve | 1 |
| 124 | 35768 | Hydraulic Pump 5.6 GPM @ 1800 RPM | 1 |
| 125 | 35769 | Pump Mounting Adapter | 1 |
| 126 | 35781 | Coupling Spider Rubber L100 | 1 |
| 127 | 35782 | Coupling Half 3/4" Bore L100 | 1 |
| 128 | 35783 | Coupling Half 1-1/8" Bore L100 | 1 |
| 129 | TEFC C-Face, FT MT, Electric Motor | | 1 |
| | 35792 | 3 HP, 1 PH, 115/230 VAC, 60 Hz | |
| | 35791 | 3 HP, 3 PH, 230/460 VAC, 60 Hz, (190/380 VAC, 50 Hz) | |
| | 524368 | 3 HP, 3 PH, 575 VAC, 60 Hz | |
| | 35794 | 5 HP, 1 PH, 115/230 VAC, 60 Hz | |
| | 35770 | 5 HP, 3 PH, 230/460 VAC, 60 Hz, (190/380 VAC, 50 Hz) | |
| | 523135 | 5 HP, 3 PH, 575 VAC, 60 Hz | |
| 130 | 35781 | Fit Hydraulic Plug 3/4"-16MSAE | 2 |

Hydraulic Power Unit Fittings and Hoses



| Hydraulic Power Unit Components | | | |
|---------------------------------|--------|---|-----|
| Ref # | Part # | Description | Qty |
| 100 | 35767 | Intank Filter Strainer | 1 |
| 102 | 35619 | 1/2" FNPT Oil Filter and Block | 1 |
| 103 | 35683 | Black 90° Street Elbow 1/2" NPT | 1 |
| 104 | 35943 | Black 90° Street Elbow 3/4" NPT | 2 |
| 106 | 35547 | Pipe Nipple Adapter 1/4" MPT to 1/2" MPT | 1 |
| 107 | 35789 | Black Pipe Nipple 1/2" x 1-1/2" LG | 1 |
| 108 | 36440 | Black Pipe Nipple 3/4" x 1-1/2" LG | 2 |
| 109 | 35737 | Black Pipe Bushing 1" MNPT to 1/2" FNPT | 20 |
| 110 | 35742 | 7/8" MSAE O-Ring x 1/2" FNPT 90° Elbow | 1 |
| 111 | 548400 | Fit Hydraulic Elbow 90° 3/4"-16 SAE (or) x 3/4"-16 MJIC | 2 |
| 112 | 35546 | Jic 90° Elbow 3/4" MNPT x 3/4" MJIC | 2 |
| 113 | 36654 | Jic Adapter 1/2" MNPT x 3/4" MJIC | 2 |
| 114 | 511060 | Street Tee 1/2" NPT 2" FPT 1" MPT | 1 |
| 115 | 35743 | Hydraulic Hose 19.0" LG | 1 |
| 116 | 35745 | Hydraulic Hose 30-1/2" LG | 2 |
| 117 | 35727 | Hydraulic Pressure Gauge 3000 PSI | 1 |
| 119 | 547881 | Manifold 4 STA Hydraulic 8 3/4"-16 SAE-ORB Port | 1 |
| 121 | 35663 | Hydraulic Relief Valve | 1 |
| 122 | 35772 | 1/4" FNPT Shut Off Valve | 1 |
| 123 | 525502 | 3/4" FNPT Swing Check Valve | 1 |
| 124 | 35768 | Hydraulic Pump 5.6 GPM @ 1800 RPM | 1 |



| Stand and Pivot Tube Components | | | |
|---------------------------------|--------|--|-----|
| Ref # | Part # | Description | Qty |
| 16 | XW4920 | Cylinder Hydraulic 3 Bore x 24 Stroke | 1 |
| 20 | 35687 | Hydraulic Torque Motor w/ 1.00" Shaft | 1 |
| 22 | 35628 | Elbow, 90° M-F 1/2" MPT x 1/2" FPT STL | 2 |
| 23 | 35623 | Pipe Nipple 1/2" NPT x 2" LG Black | 2 |
| 24 | 35629 | Adjustable Flow Control 1/2" NPT 15 GPM | 2 |
| Boom Components | | | |
| 31 | XW4921 | Cylinder Hydraulic 1-1/2" Bore x 48 Stroke | 1 |

| Ref # | Part # | Description | Qty |
|-------|--------|---------------------------------|-----|
| 50 | 35686 | Hydraulic Rotary Actuator 180° | 1 |
| 130 | 548404 | Fit Hydraulic Plug 3/4"-16 MSAE | 2 |

| Dual Lane Hydraulic Hoses and Fittings Kit | | | | |
|--|--------|--|------|------|
| Ref # | Part # | Description | Qty | |
| | | | Core | Comp |
| 131 | 36654 | Jic Adapter 1/2" MNPT x 3/4" MJIC | 2 | 2 |
| 132 | 534762 | 1/2" Hydraulic Hose | 100 | 130 |
| 133 | 36655 | Hose End 1/2" to 3/4" FJIC | 12 | 16 |
| 134 | 529432 | Bulkhead 45° Elbow 3/4" MJIC to 3/4" MJIC | 4 | 6 |
| 135 | 529539 | 1/2" Hydraulic Hose 72" LG 3/4" FJIC to 3/4" FJIC | 2 | 2 |
| 136 | 529543 | 1-3/4" I.D. Hose Sleeve (Not Shown) | A/R | A/R |
| 137 | 529538 | 1/2" Hydraulic Hose 96" LG 3/4" FJIC to 3/4" FJIC | 2 | 2 |
| 138 | 518921 | Jic 45° Elbow 1/2" MNPT x 3/4" MJIC | 4 | 4 |
| 139 | 534763 | Reducer 3/4" FJIC to 7/16" MJIC | - | 2 |
| 140 | 534764 | 3/4"-16 Jic Nut | - | 2 |
| 141 | 534765 | 1/4" Hydraulic Hose 192" LG 7/16" FJIC to 7/16" FJIC | - | 2 |
| 142 | 534766 | 1/4" Hose Support Clamp (Not Shown) | | 6 |
| 143 | 36476 | Jic 90° Elbow 1/4" MNPT x 7/16" MJIC | - | 2 |
| 144 | 548403 | Jic Adapter 3/4"-16 or x 3/4" MJIC | 6 | 8 |

General Truck Probe Troubleshooting



Careless or accidental restoration of power can result in death or serious injury. Make certain area is clear before removing lock outs.

| Symptom | Possible Cause | Corrective Action |
|---|--|---|
| Truck probe does not operate (Power light OFF). | 1. Power switch OFF. | 1. Turn power switch ON. |
| | 2. Circuit breaker is open. | 2. Reset breaker. |
| | 3. Fuse(s) is blown. | 3. Replace. Refer to main fuse on Page 25 . |
| | 4. Faulty supply wiring. | 4. Correct it. Refer to certified electrical schematic. |
| | 5. Disconnect switch OFF. | 5. Turn disconnect switch ON. |
| | 6. Defective power switch. | 6. Replace switch. |
| Truck probe does not operate (Power light ON). | 1. Faulty system wiring. | 1. Correct. Refer to certified electrical schematic. |
| | 2. Starter overloads tripped. | 2. Reset. Refer to pump motor starter and thermal overload on Page 25 . |
| | 3. Pump motor power OFF. | 3. Turn motor power ON. |
| | 4. No or low hydraulic pressure. | 4. Check pressure gauge. |
| | 5. Defective control valve. | 5. Refer to table below . |
| Truck probe sluggish (Operates too slowly). | 1. Relief valve set too low. | 1. Reset. Refer to relief valve V-5 on Page 27 . |
| | 2. Cylinder seal leakage. | 2. Refer to cylinder leaking on Page 49 . |
| | 3. Hydraulic oil cold. | 3. Check temperature. Inspect oil heater. |
| | 4. Hydraulic pump worn out. | 4. Replace. |
| | 5. Partial blockage of solenoid valves. (Teflon tape used during installation) | 5. Check valves and spools. Clean or replace solenoids. |
| Probe drifts down | 1. Counter balance may need adjustment. | 1. Adjust. Refer to counter balance valve adjustment on Page 26 . |

Directional Solenoid Valve Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|--|----------------------------------|---|
| Valve does not shift but full line voltage signal is present at the terminal strip inside the control. | 1. No or low hydraulic pressure. | 1. Check. |
| | 2. Faulty field wiring. | 2. Check for full line voltage at the solenoid. |
| | 3. Solenoid coil burnt out. | 3. Replace coil if no continuity through coil. |
| | 4. Valve clogged or stuck. | 4. Remove and clean. Or replace. |

Hydraulic Components Troubleshooting

Cylinder Leaking

1. External Leakage

- a. Rod seal leakage can generally be traced to worn or damaged seals. Examine the piston rod for wear or damage. Replace the rod and seals if rod's surface is rough or worn out-of-round.

2. Internal Leakage

- a. The lip seal piston seals are virtually leak free unless they are worn or damaged. Replace defective seals.
- b. Contaminants in the hydraulic supply can lead to scored cylinder walls, resulting in rapid seal wear. If such is the case, check to see if the filter is being replaced frequently. A different type of filter may be required; one that can remove finer particles or one that can filter out different kinds of contaminants.
- c. Possible piston cylinder leakage, apparently indicated by piston drift is not always traceable to the piston. A leak through a closed valve port can also cause piston drift.

10. Appendix A - Automatic Truck Probe Maintenance Check List

Firm _____

City _____ State _____

Name _____

Date _____

Manager _____

A. Machine Type and Size _____ Serial No. _____

| S.# | Check Point/Defect Statement | Mark the Appropriate Column | |
|-----|--|-----------------------------|----|
| | | YES | NO |
| 1 | Check for leaks in hydraulic lines and fittings | | |
| 2 | Check in/out cylinder for leaks around piston and rod gland | | |
| 3 | Check up/down cylinder for leaks around piston and rod gland | | |
| 4 | Inspect chain on rotational motor | | |
| 5 | Check rotational stops on sprocket | | |
| 6 | Check for loose or missing hardware | | |
| 7 | Check telescoping boom for ease of movement | | |
| 8 | Lubricate shafts and bearings | | |
| 9 | Structural damage | | |
| 10 | Rust or corrosion | | |
| 11 | Check foundation bolts | | |
| 12 | Guards and safety labels in place | | |
| 13 | Inspect pivot guard for excessive play | | |
| 14 | Lubricate chain and sprocket | | |
| 15 | Check speed controls on rotational motor | | |
| 16 | Inspect all welds on probe | | |

B. Hydraulic Power Unit

| S.# | Check Point/Defect Statement | Mark the Appropriate Column | |
|-----|--|-----------------------------|----|
| | | YES | NO |
| 1 | Noisy motor or bearings | | |
| 2 | Overheated motor or pump | | |
| 3 | Check condition of oil (change at least once a year) | | |
| 4 | Check oil level in reservoir (must be above red low level) | | |
| 5 | Check oil pressure relief valve (750 PSI for 3 HP and 1250 PSI for 5 HP) | | |
| 6 | Check hydraulic line connections | | |
| 7 | Inspect oil filter cartridge (change if required) | | |
| 8 | Grease zerks | | |
| 9 | Clean breather vent and suction filter | | |
| 10 | Check hydraulic fluid temperature (110°F-135°F) | | |

10. Appendix A - Automatic Truck Probe Maintenance Check List

C. Control Box Type _____

| S.# | Check Point/Defect Statement | Mark the Appropriate Column | |
|-----|---|-----------------------------|----|
| | | YES | NO |
| 1 | Damaged wiring including exposed connections conductors | | |
| 2 | Check fuses | | |
| 3 | Box cleaned | | |
| 4 | Switches work properly | | |

D. Collection Box

| S.# | Check Point/Defect Statement | Mark the Appropriate Column | |
|-----|-------------------------------------|-----------------------------|----|
| | | YES | NO |
| 1 | Plex-glass okay | | |
| 2 | Check and clean screen | | |
| 3 | Gasketing okay | | |
| 4 | Door seals properly | | |
| 5 | Check for excessive dust in cabinet | | |

E. Sample Tube and Vacuum System

| S.# | Check Point/Defect Statement | Mark the Appropriate Column | |
|-----|--|-----------------------------|----|
| | | YES | NO |
| 1 | All fasteners securely attached to the tubing | | |
| 2 | Tube checked at entrance through walls for leaks | | |
| 3 | All hoses free of cracks | | |
| 4 | Inspect for dents or kinks in tubing lines | | |
| 5 | Check suction on vacuum motor | | |
| 6 | Check wear on vacuum motor housing | | |
| 7 | Inspect impeller blades on vacuum motor | | |

F. Probe Tip

| S.# | Check Point/Defect Statement | Mark the Appropriate Column | |
|-----------------------|---|-----------------------------|----|
| | | YES | NO |
| Core Tip | | | |
| 1 | Check balance on air suction | | |
| 2 | Check for blockage between inner and outer tube | | |
| 3 | Check for damage (dents, etc.) | | |
| Compartmentalized Tip | | | |
| 4 | Check open/close actuator | | |
| 5 | Inspect ceramic grout along length of tip | | |
| 6 | Remove urethane tip and clean | | |
| 7 | Inspect urethane tip (replace if necessary) | | |
| 8 | Inspect caulking on rain cover | | |
| 9 | Inspect rotating tube for wear | | |

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