DISTRIBUTION SHEET

To	From	Page 1 of 1
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Page 1 of 1

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7. Abstract

The 100 Ton Hydraulic Trailer is used to remove the mitigation pump from tank 241SY101. The Operation and Maintenance Manual explains how to inspect, operate and maintain the trailer in a state of readiness.

8. RELEASE STAMP

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Rev 0

OPERATION AND MAINTENANCE MANUAL

100 TON HYDRAULIC TRAILER

KAMP SYSTEMS
FOR
WESTINGHOUSE HANFORD COMPANY

February 10, 1995

DISCLAIMER

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SIGNATURE SHEET

The signatures below do hereby verify the approval of the contents of this document as written for release to, and utilization by all personnel involved with the operation and maintenance of the 100 ton hydraulic trailer.

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Cog Manager: C.E. Hanson Date: 2/28/95

TABLE OF CONTENTS

1 SYSTEM DESCRIPTION

The 100 ton hydraulic trailer is an 85 foot long fifth wheel trailer with 4 axles. It carries a strongback and a container for retrieval and storage of a mixer pump classified as radioactive mixed waste. The trailer is designed to hydraulically raise the strongback and container to a vertical position. When vertical, the mixer pump will be placed into the container and the assembly will then be lowered to a horizontal position for transport to a storage facility.

The trailer design takes into account the nature of the pumps hazardous characteristics and incorporates measures to limit personnel exposure to the extent that is reasonably achievable. All local controls for operating the trailer are at the front left hand corner. The controls for raising and lowering the strongback are located on a pendent at the end of a 100 foot cord. Once the pump is loaded, all personnel can perform the required functions at a safe distance from the hazardous material.

The trailer is designed to raise the strongback to 90 degrees vertical. The cylinder is designed so that it is at its full extension when the strongback reaches the vertical position. Therefore the strongback can not over rotate beyond 90 degrees (this has been analyzed for the entire design temperature range) and no structural stops or snubbers are required. A limit switch is also provided to stop the raising system when it gets to the vertical position. This limit switch is adjustable so the stopping position can be set at a specific point.

The trailer was manufactured in accordance with equipment specification WHC-S-0280, Revision 1. All capacities, limitations and performance criteria listed therein apply to the 100 ton trailer.

NOTE: The trailer mounted control panel has a placard requiring the use of this manual. Failure to comply with the direction in this manual could result in damage or injury.

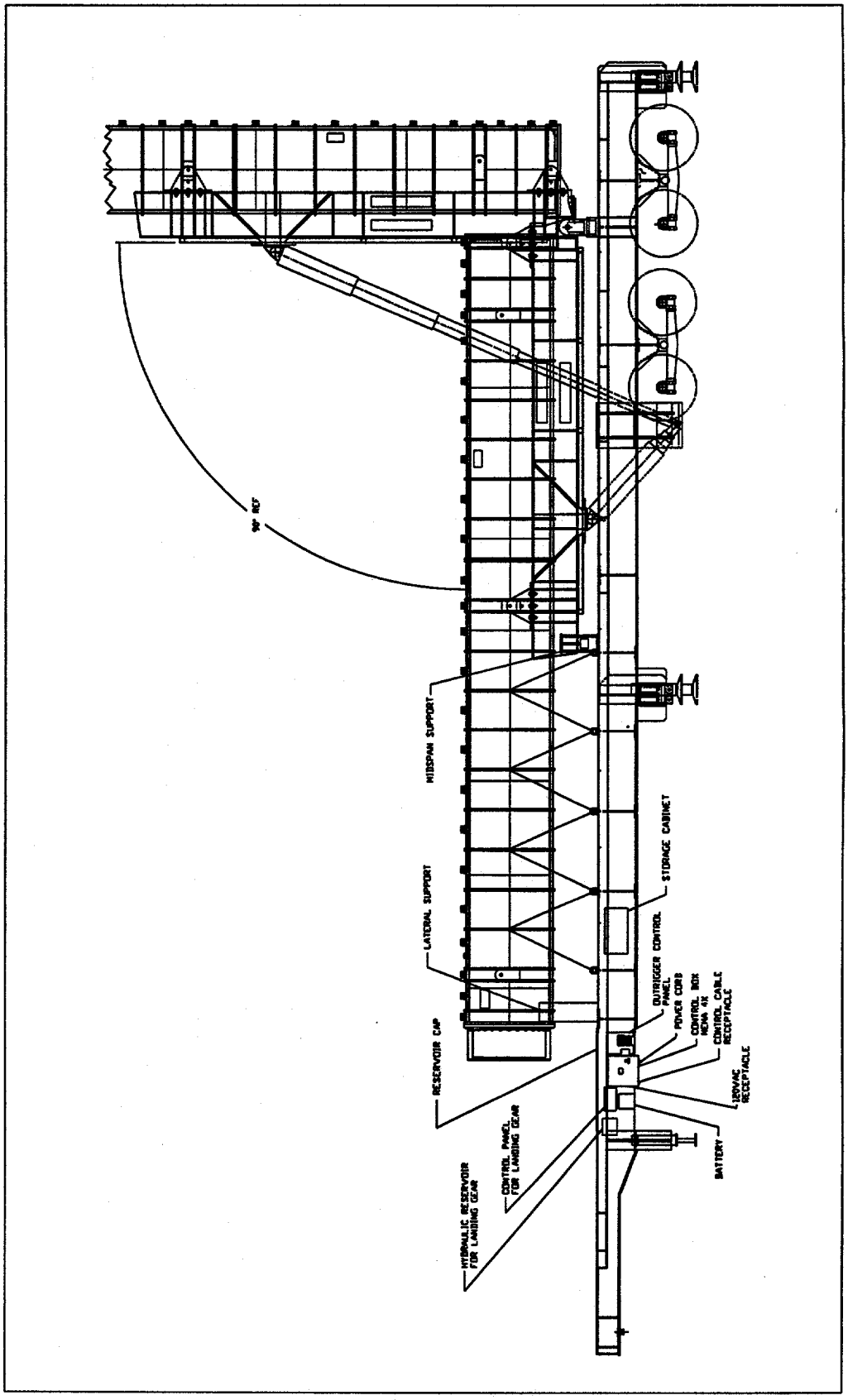


Figure 1, 100 TON TRAILER

2 SPECIFICATIONS

Trailer Length: 85 ft.

Deck Width: 11 ft.

Max Width[1]: 13 ft. 5 in.
W/O Sand Shoes: 12 ft. 2 in.

Deck Height: 6 ft.

Height, Container ℄: 11 ft. 6 in.

Kingpin Height: 60 in.

Kingpin Size: 3.5 in.

Main Cyl: REMCO Hydraulics, Inc
4 STAGE S/A TELESCOPIC
2400 psi, D/A LAST STAGE
247.13" TOTAL STROKE

Outrigger Cyl: REMCO Hydraulics, Inc
7.50" BORE, 18.0" STROKE
2400 psi, D/A HYD. CYL.

Deploy Cyl: REMCO Hydraulics, Inc
MDT, Spec. A-100587

Operating Temp: -20°F to 120°F
Cold Ops. -20°F to 40°F

Max Wind Speed: 15 mph

Protective Lube: Permatex®[3]
Silione Spray Lubricant

Fluid Type: Chevron ISO 68

Fluid Volume: 350 US Gallons

Return Filter: PALL, 10 micron
Spin On Filter
HH-7400-A-12-DPSAPL

Max Gross Wt: 320,000 lbs.

Empty Trailer Wt[2]: 120,000 lbs.

Empty Kingpin Load[2]: 37,750 lbs.

Tiedown Ring Load: 30 kip vertical
12 kip longitud

Tiedown Ring Qnty: 10 (5 each side)

Front Support Load: 150 kip lateral

Axle Rating: 60,000 lbs. per axle,
total: 240,000 lbs.

Brakes: Mechanical air brakes
20x8x3/4 FMS 4350

Hyd. Pumps: VICKERS®[3],
7.4 GPM @ 2500 PSI & 1800 RPM.
F3-20V-5-A-1-C-20-282

Motors: BALDOR®[3], WASH DOWN DUTY
15 hp, 480VAC 3ϕ, 1760 RPM
18.2 Full Load Current
CWDM23933T

Power Req: 50 Amp, 480VAC 3ϕ

Electrical Plug: APPLETON®[3] ACP6034BC

Transformer Size: 9 kVA

Aux Power Capacity: 15 Amp, 120 1ϕ
Expandable up to
65 Amp max.

Landing Gear: MILWAUKEE CYLINDER
Power Unit: 12 Volt DC
Cylinders: P/N 300050,
140,000 lb. per pair

[1]: The maximum width of the trailer is at the outrigger sand shoes. The sand shoes may be removed to obtain a narrower overall width.

[2]: Empty refers to the trailer structure and systems only. It does not include the strongback and container.

[3]: Permatex® is a Registered Trademark of Loctite Corp./Permatex Industrial, VICKERS® is a Registered Tradmark of Trinovo Corp./Vickers Inc., BALDOR® is a Registered Tradmark of the Baldor Electric Company, APPLETON® is a Registered Tradmark of Appleton Electric Company.

3 INSPECTIONS

The following inspections are intended to be performed prior to each usage of the 100 ton trailer. These inspections cover details that are vital to the safe and proper use of the trailer and the systems therein.

3.1 Pre Transit Check

Perform the following procedure prior to transporting the 100 ton trailer over highway.

1 Inspect maintenance/damage documentation to verify that no critical items are left open.

2 Perform a 360 degree inspection of the trailer and check for damage to electrical and air lines.

3 Check for correct operation of trailer brake and marker lights, and turn signals.

4 Purge condensate from brake canisters (section 5.23) and check operation of brakes.

5 Check tire pressure.

3.2 Pre Operation Check

Perform the following procedure prior to operating the hydraulic system of the 100 ton trailer.

1 Inspect maintenance/damage documentation to verify that no critical items are left open.

2 Perform a 360 degree inspection of the trailer hydraulic system and check for any signs of damage to the hydraulic system. Specifically check for signs of leakage, dented or chafed lines, excessive rust or corrosion on the lines and cylinders, and damage to any of the hydraulic cylinders.

3 Lubricate the trailer per Section 5.4.

4 Inspect the fluid level in the main hydraulic system reservoir per Section 5.11. Also check for any signs of contamination, dirt, or milky appearance (indicates water).

5 Check that both inlet line ball valves and the return line ball valve are open (Photo 1, page 29). Open is when the valve handle is aligned parallel with the line of flow through the valve.

6 Check the outrigger control valves for signs of damage (Figure 2, page 7). Check the actuation of each valve. The lever should move smoothly and solidly to the stops in both directions and should spring back to the neutral position.

7 Check that the pressure gage needle valve is fully open (Photo 2, Page 30). Open is when the valve knob is turned fully out (counter clockwise).

8 Inspect the fluid level in the landing gear hydraulic system reservoir per Section 5.11. Also check for signs of contamination, dirt, or milky appearance.

9 Check the landing gear control valves for signs of damage (Figure 2, page 7). Check the actuation of each valve. The lever should move smoothly to the stops in both directions and should spring back to the neutral position.

10 Check the condition of the battery for powering the landing gear and charge or replace if necessary. Verify the power unit runs and the landing gear legs operate smoothly.

11 Inspect wiring and turn all circuit breakers in the NEMA 4X box to ON. Verify that the NEMA 4X box is securely closed.

3.3 Pre Storage Check

1 If the trailer will be in storage for an extended period of time, it may be desirable to set the trailer on blocks.

2 Verify that the electrical power line is coiled and properly stored behind the NEMA 4X box. Verify that the remote pendent and cable are coiled and properly stored in the trailer mounted storage cabinet (Figure 1, page 2).

3 Perform a 360 degree inspection and look for any visible signs of damage to the trailer. Note any damage observed for repairs prior to next use.

4 Verify that the hydraulic reservoir cap for the main hydraulic system is securely in place (Figure 1, page 2). Cover the reservoir cap with plastic and tape to further protect the system from contaminants.

5 Coat all exposed sliding surfaces of all hydraulic cylinders with protective lube (refer to Specifications section).

6 Verify that all circuit breakers are in the off position and the NEMA 4X box is securely closed and bolted (Figure 1, page 2).

7 Cover the trailer to the extent possible to protect from rain, dust, and wind blown debris.

4 OPERATION

The operation procedures for the 100 ton hydraulic trailer are described in detail below. Refer to Vendor Information File #22624 for further information.

4.1 Landing Gear

1 Turn the key switch fully clockwise (Figure 2, page 7).

2 Flip the toggle switch up and hold to energize the pump. Release the toggle switch to stop the pump (the switch is spring centered to the OFF position).

3 With the pump running, move the lever of the control valve for the leg you wish to raise/lower:

- Push handle in to extend legs.
- Pull handle out to retract legs.

CAUTION: Warn personnel in the immediate vicinity of the intended operation.

4 Turn the key switch fully counter clockwise to shut off.

4.2 Transporting

1 Perform a pre transit check of the trailer as explained in section 3.1 of this manual.

2 Verify that the container is properly and adequately tied down using the trailer mounted D-rings (Figure 1, page 2).

3 Remove and store the sand shoes and hand rails.

4.3 Hydraulic Set Up

1 Perform a pre operational check of the trailer as explained in the section 3.2 of this manual.

2 Lower landing gear (section 4.1).

3 Locate the remote pendent and verify that all control switches on the pendent are in the neutral or OFF position. Plug the control cable into the receptacle located on the NEMA 4X control box (Figure 2, page 7). This is done by inserting the plug and twisting it counter clockwise.

4 Verify that the trailer mounted auxiliary pump switch is in the OFF position. Plug the power cord on the NEMA 4X box into the 480 VAC power supply.

5 Verify that the two inlet and return line ball valves are open (Photo 1, page 29) and that there is sufficient fluid volume in the reservoir. Verify that the motors rotate in the proper direction. This is best done by positioning the operator behind the pumps and bumping the motors using the remote pendent control. The motors should rotate in the direction indicated by the arrows drawn on the fan shroud (clockwise when looking toward the back of the trailer).

The trailer hydraulic system is ready for operation when all the above inspections are completed and all discrepancies corrected.

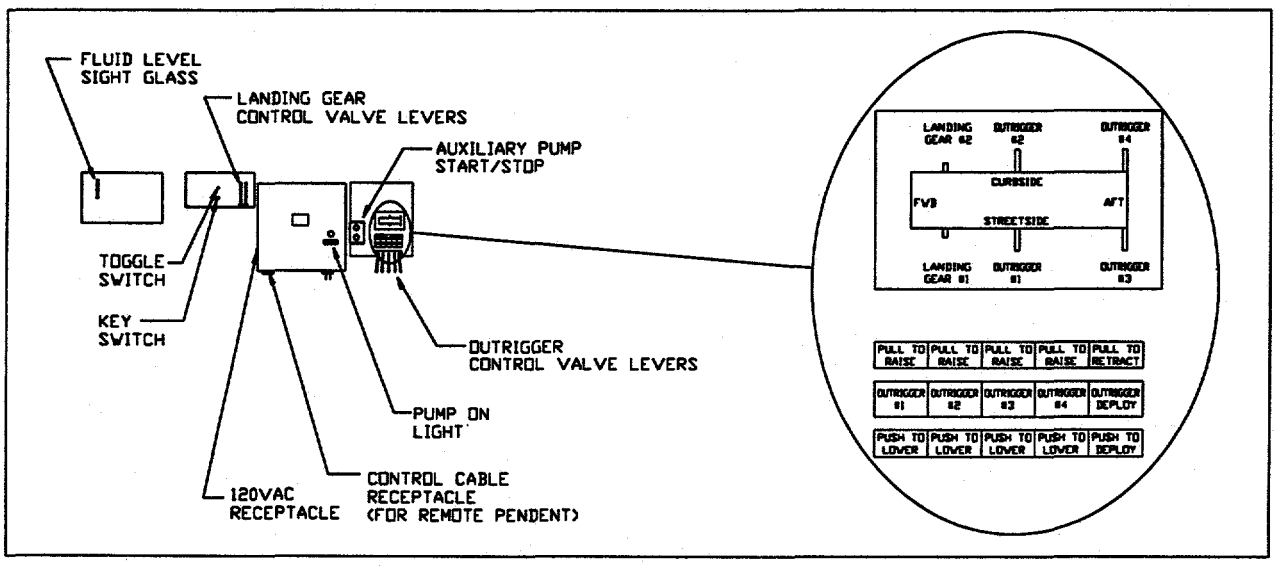


FIGURE 2, TRAILER MOUNTED CONTROLS

4.4 Cold Weather Operation (-20°F to 40°F)

Prior to performing any operation in cold weather or after the trailer has been sitting for more than two (2) hours in cold conditions, perform the following steps.

1 Start the auxiliary pump by pushing the pump start button located at the trailer mounted control panel.

2 Let the pump run until the pressure gage reads less than 600 psi. This may take several minutes.

3 Turn off the auxiliary pump and proceed with normal operation.

4.5 Leveling

To provide longitudinal stability for raising and lowering, the tractor must remain attached to the trailer with the brakes locked. Pay attention not to raise the tractor off the ground when leveling. The trailer tires should also remain in contact with the ground to the extent possible.

1 Perform the Hydraulic Set Up procedure of the trailer as explained in the section 4.3 of this manual.

2 Check that all personnel, equipment, and articles are clear of the deployment path of the outriggers.

3 Start the auxiliary pump by pushing the pump start button located at the trailer mounted control panel (Figure 2, page 7).

4 Deploy the outriggers to the operational position by pushing in the OUTRIGGER DEPLOY lever located at the trailer mounted control panel (Figure 2, page 7). The outriggers will move to the fully extended position one at a time.

5 Place the sand shoes on the ground below the outrigger cylinders. Verify that the sand shoe release pin and coupler are removed from the sand shoes (Figure 3, page 8).

6 The outriggers are raised and lowered by actuating the OUTRIGGER # levers located at the trailer mounted control panel (the lever # indicates the outrigger # as shown on the placard, Figure 2, page 7). Lower the outriggers one at a time so the ball of the cylinder fits into the socket of the sand shoe. Extend the outriggers just enough to load the cylinders slightly, do not lift the trailer with the outriggers at this point. Attach the sand shoe release couplers and pins (Figure 3, page 8).

7 Raise the trailer by extending first the two rear outriggers (numbers 3 and 4) until they are loaded. Then extend the front outriggers (numbers 1 and 2) until they are loaded. Extend the rear outrigger pair until the rear of the trailer is slightly higher than the front.

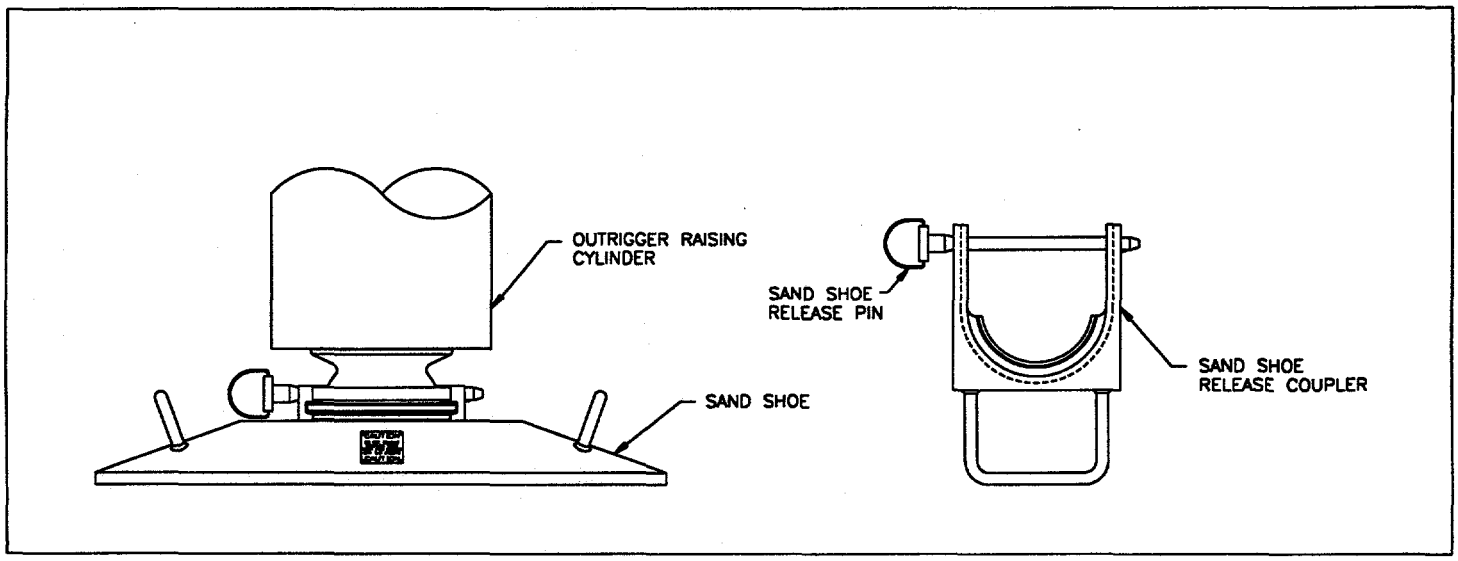


FIGURE 3, SAND SHOE

8 Level the rear of the trailer from side to side using levers 3 and 4, and the spirit level located across the rear of the trailer. Level the trailer longitudinally by using levers 1 and 2, and the spirit levels located along both sides of the trailer. Level the front of the trailer from side to side using levers 1 and 2, and the spirit level located above the front-left outrigger (outrigger #1).

9 Fine tune the trailer by adjusting the outriggers until the spirit levels indicate level to within 1/4 bubble width. Push the pump STOP at the trailer mounted control panel.

10 Lower the landing gear just enough to slightly load the legs. Verify that the trailer is still level.

11 The final configuration should be: all outriggers deployed and under load, landing gear just touching the ground, tractor attached with no upward load at fifth wheel and brakes on, and at least some of the trailer tires touching the ground.

4.6 Raising/Lowering Strongback

1 Perform the Leveling procedure of the trailer as explained in the section 4.5 of this manual.

2 Verify that the container is properly installed on the strongback as described in section 5.3 of this manual.

3 Locate the remote pendent at the desired operator location (the pendent is equipped with 100 feet of cable).

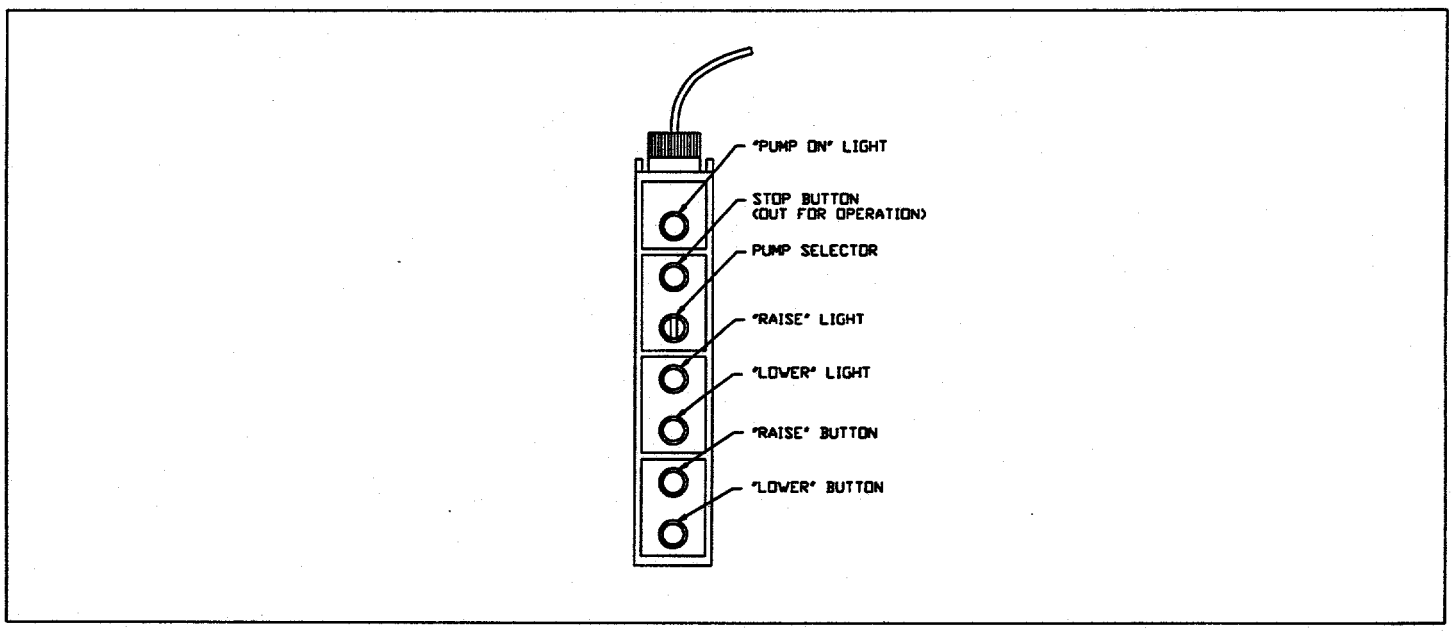


FIGURE 4, REMOTE PENDENT

4 Perform a check of the trailer to see that there are no loose items on the strongback or container that may fall during the raising operation. Clear all non essential personnel from the perimeter of the operation area.

5 On the remote pendent, pull the stop button out and turn the pump selector switch to the primary position (Figure 4, page 9). Verify that the POWER ON light is illuminated, this indicates that the pump is running.

6 Depress the RAISE button on the remote pendent and hold it down (Figure 4, page 9). This will raise the strongback to the vertical position. When the strongback reaches the vertical position it will stop automatically. If excessive bouncing occurs, stop operation and consult engineering.

7 When the strongback reaches the vertical position and stops, turn the pump selector switch to the off position and push the stop button in. Take precautionary steps to ensure that the pendent controls are not inadvertently engaged.

8 To lower the strongback, pull the stop button out on the remote pendent and turn the pump selector switch to the primary position. Verify that the POWER ON light is illuminated on the remote pendent (Figure 4, page 9).

9 Depress the LOWER button on the remote pendent and hold it down (Figure 4, page 9). This will lower the strongback to the horizontal position. If excessive bouncing occurs, stop operation and consult engineering.

10 When the strongback reaches the horizontal position and comes to rest on the supports, push the stop button in and turn the pump selector switch to the off position on the remote pendent.

4.7 Pump/Motor Failure

Perform the following steps in the event of hydraulic pump/motor failure at any time during the raising/lowering process.

1 Release the RAISE or LOWER button on the remote pendent and push the stop button in.

2 Turn the pump selector switch from the primary position to the auxiliary position and confirm that the POWER ON light is illuminated, (Figure 4, page 9).

3 Allow the auxiliary pump to run for a minimum of five (5) minutes before continuing with the prior operation. This will flush the system of any contaminants that may have been generated from the failed pump.

4 Continue with raising or lowering operations as before.

5 MAINTENANCE

Refer to the Vendor Information File #22624 for information on parts and assemblies for performance of maintenance, parts ordering, and parts replacement. Maintenance requiring the disassembly of the telescopic, outrigger lifting, and outrigger deploy hydraulic cylinders should be performed by REMCO or by a REMCO approved facility. Other maintenance items not identifiable in the vendor file are described below.

5.1 Maintenance Schedule

Table 1, Maintenance

MAINTENANCE ITEM	FREQUENCY	INDICATIONS	SECTION
Washing	As required, prior to use after storage.	Dirt/Grime buildup	5.2
Grease main cylinder bearings	As required, prior to use and after washing.	Chatter and squeaks from bearings.	5.4
Grease extension cylinder pins	As required	Chatter and squeaks from pins.	5.4
Grease king pin	As required	Dry appearance	5.4
Grease landing gear	As required	Dry appearance on inner legs, erratic motion of legs.	5.4
Pressure relief setting	As required	Pressure gage reading not 2,650 psi +/- 50.	5.5
Strongback raise/lower rate	As required	Raise/lower time > 30 minutes, < 20 minutes	5.6
Limit Switch	As required	Auto stop not at plumb vertical.	5.7
Clean Hydraulic Fluid	As required	Dirt/particulate contamination	5.8
Drain Reservoir	As required	Fluid contaminated with water (milky appearance)	5.9
Change Filters	As required	Red tab exposed on return filter housing	5.10
Check hydraulic fluid levels	Prior to every use	N/A	5.11
Bleed outrigger deploy cylinders	As required and after disassembly.	Erratic "lunging" motion during deployment.	5.12

Table 1, Maintenance

MAINTENANCE ITEM	FREQUENCY	INDICATIONS	SECTION
Bleed outrigger cylinders	As required, and after disassembly.	Erratic "lunging" motion of cylinder legs.	5.13
Bleed telescopic cylinder	As required, and after disassembly.	Erratic "lunging" motion of cylinder.	5.14
Service Cylinders	As required	Leaking seals, continued erratic motion after bleeding.	[1]
Adjust front support	As required	One or both supports not in contact with strongback.	5.21
Adjust midspan support	As required	One or more support points not in contact with container.	5.22
Purge brakes	Prior to use after storage.	N/A	5.23
Cycle systems	At least once every three (3) months.	N/A	5.24

[1] Refer to section 5.15 through 5.20 for removal and installation instructions. All work on the cylinders should be performed by a reputable hydraulic facility.

5.2 Washing

1 Cover the following items with plastic and tape, or a plastic cap to protect from the direct blast of the spray wash:

- Trailer light plugs and glad hands
- Vents and/or caps for both hydraulic reservoirs
- Transformer located at the front left of trailer behind the NEMA 4X box
- 480V main power plug
- Pendent control plug and 120V outlet on NEMA 4X box
- Remote pendent control

The above listed items shall be washed by hand with mild detergent and low pressure water.

2 Wash the trailer using high pressure water (heated if required) and strong detergents and solvents. Always check MSDS on solvents for compatibility and hazard warnings.

3 Towel dry all unfinished surfaces of the trailer after washing.

4 Lubricate telescopic cylinder bearings (Section 5.4).

5.3 Installation and Removal of Container

1 Place the container into position over the strongback using a two crane pick (Figure 5, page 14) or a 20 to 25 foot spreader bar minimum (Figure 6, page 14).

NOTE: The spreader bar method (Figure 6, page 14) may only be used when the container is empty. The two crane method (Figure 5, page 14) must be used when the container is loaded with the pump, shielding shot, or both.

2 Align the mounting holes on the strongback and container as much as possible by maneuvering the crane.

3 Refer to Westinghouse procedure, WHC-SD-WM-DA-170 Rev. 0, Bolting Sequence for attaching the Container to the Strongback for 241SY101. This procedure is attached as Appendix C.

NOTE: Always use NEW bolts for attaching the container to the strongback.

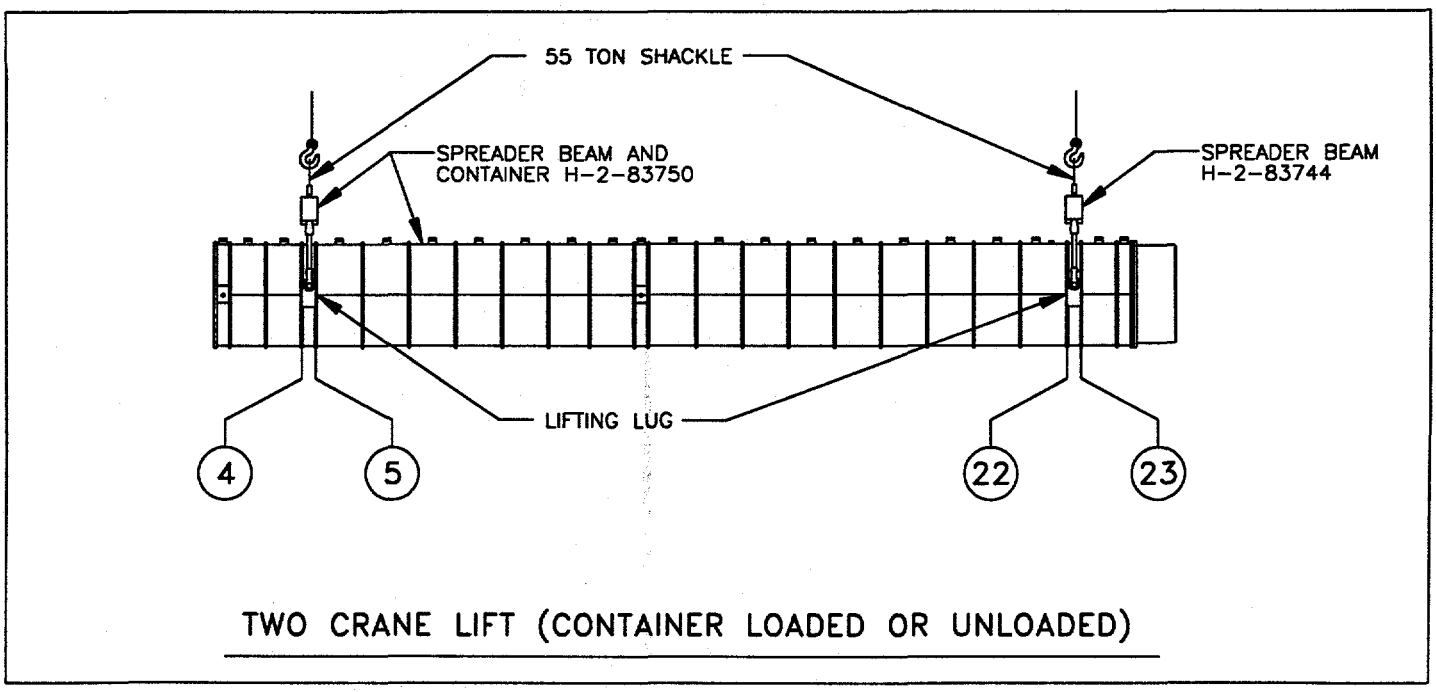


Figure 5, Two Crane Lift

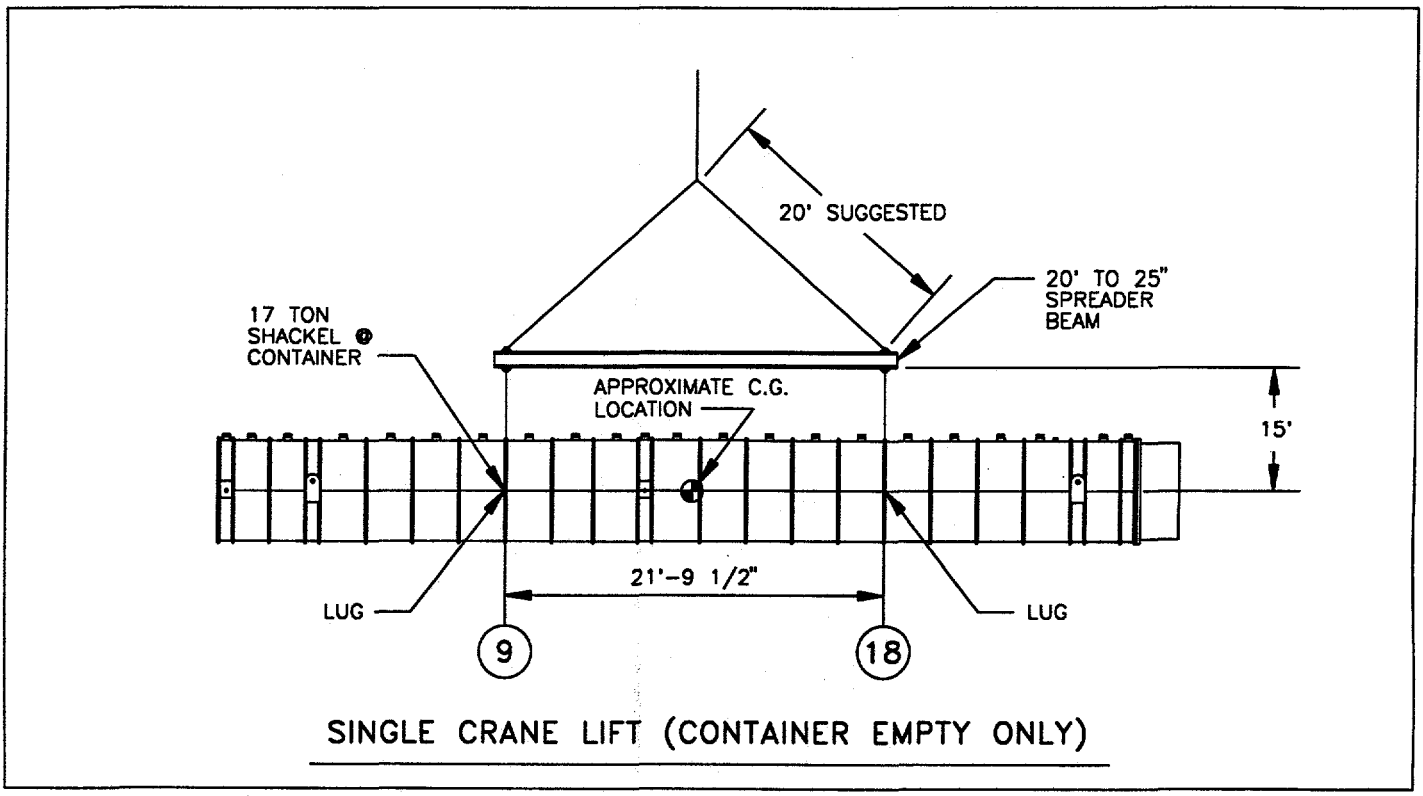


Figure 6, Single Crane Lift

5.4 Lubrication

The following items should be routinely lubricated.

1 Telescopic cylinder end bearings: Grease both ends through grease zerks (Figure 9, page 21).

2 Outrigger deploy cylinder pivot pins: Lightly lube both pins with grease.

3 King Pin: Light coat of grease.

4 Landing gear legs: With the landing gear fully retracted, pump grease through the fitting at the top of each leg until grease is observed exiting the lower area close to the sand shoe.

5.5 Setting Pressure Relief Valve

The system pressure is pre-set to 2650 psi. This pressure should not be knowingly exceeded under any circumstances. The system max operating pressure is adjusted at the pressure relief valve located below the pumps (Photo 2, page 30).

Adjust the pressure relief valve by performing the following steps:

1 Loosen the valve handle jam nut (Photo 2, page 30).

2 Turn the valve handle by hand. To increase the pressure turn the handle in (clockwise), to reduce pressure turn the handle out (counter clockwise). Adjust valve in 1/4 turn increments.

3 Verify the relief pressure by holding the deploy outriggers valve in the retract mode, with the pump running, and reading the pressure gage. The pressure gage should read approximately 2650 psi when properly set.

4 Tighten the jam nut when the desired pressure is attained. Verify the pressure setting after the jam nut is tightened.

5.6 Setting Strongback Raise/Lower Rate

The raise/lower rate is pre set at the factory to between 20 and 30 minutes. The raise/lower speed is adjusted by the three needle valves located below the pumps (Figure 7, page 16). Valve #1 controls the extension rate of the telescopic cylinder. Valve #2 controls the retraction rate of the telescopic cylinder. Valve #3 is a fine tune for extension of the final stage of the telescopic cylinder and is used to control the speed of the cylinder as it approaches the vertical.

To adjust the valves perform the following steps:

1 Loosen the jam nuts.

2 Turn the valve using an allen head wrench. To reduce flow turn the valve in, to increase flow turn the valve out.

3 Tighten jam nuts when finished.

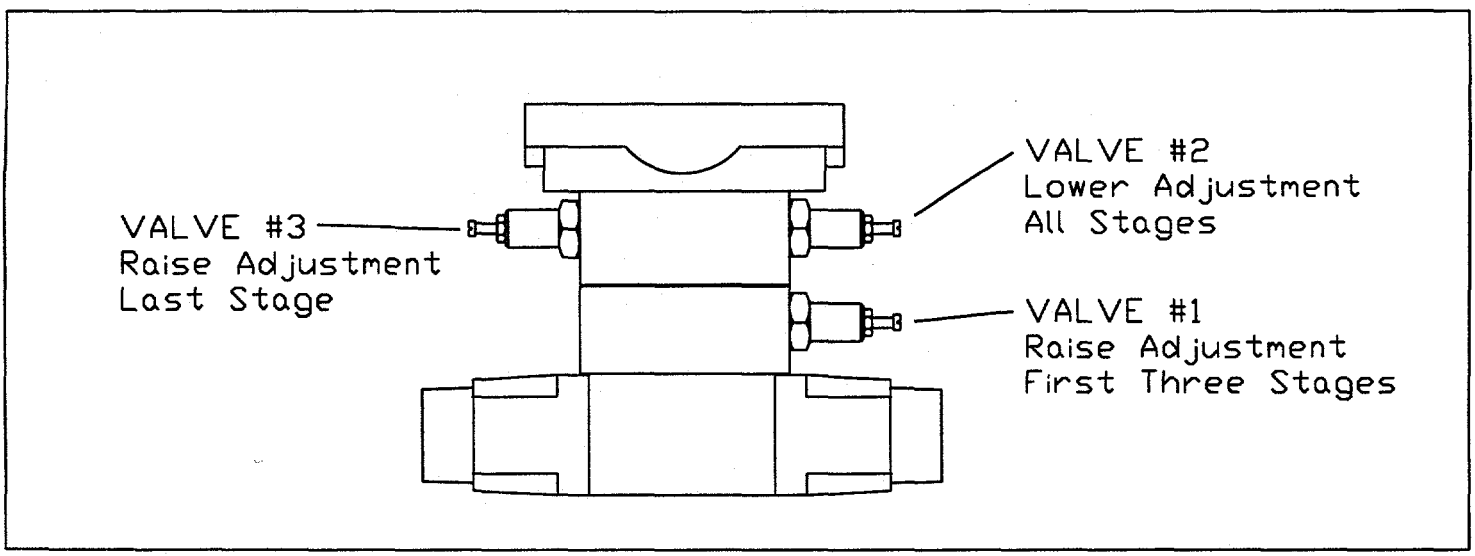


Figure 7. Flow Control Valve Stack

Perform the following procedure to set the flow control valves:

NOTE: The trailer must be set up for operation and leveled as detailed in the OPERATION section of this manual.

1 Raise the strongback through the first stage while recording the elapsed time. Adjust valve #1 until the elapsed time is between 7 to 10 minutes. Set jam nut for valve #1.

2 Lower the strongback through the first stage while recording the elapsed time. Adjust valve #2 until the elapsed time is between 7 to 10 minutes. Set jam nut for valve #2.

3 Raise strongback to the vertical position. Record the elapsed time from when the fourth stage starts to when the strongback reaches vertical. Adjust valve #3 until the elapsed time is between 5 to 7 minutes. Set the jam nut for valve #3.

5.7 Setting Limit Switch

The limit switch is pre-set by the manufacturer to stop the strongback when it reaches the vertical position. The limit switch is adjusted by altering the switch height at the mount located on the aft deck of the trailer (Figure 8, page 17).

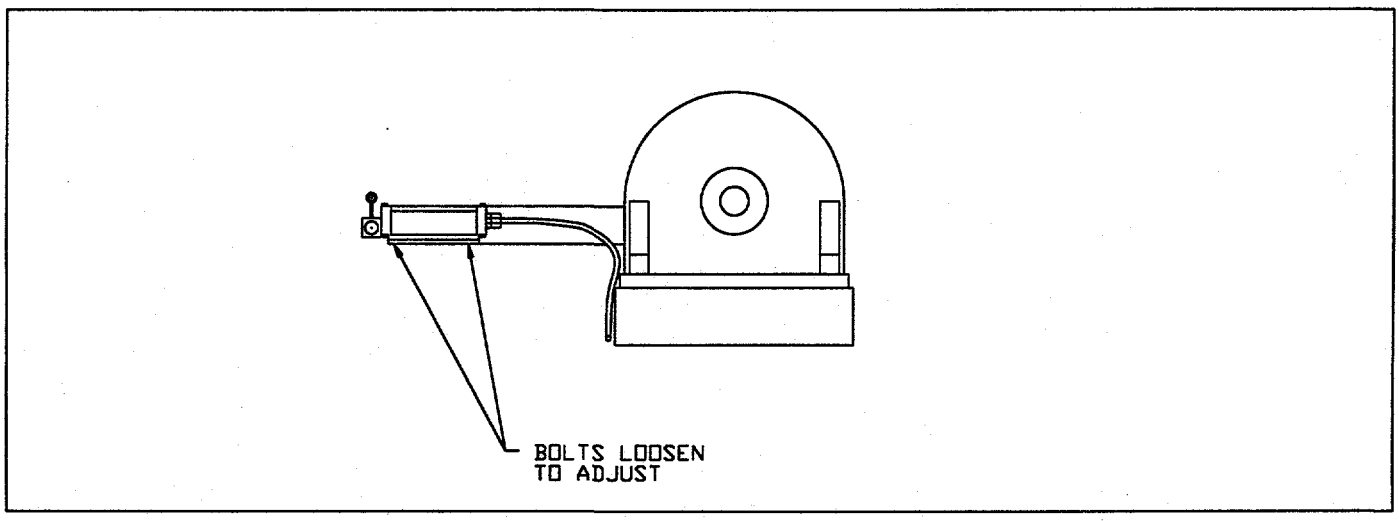


FIGURE 8, LIMIT SWITCH

NOTE: It is very important that the limit switch be properly adjusted to prevent possible system over pressurization.

The limit switch is adjusted by performing the following steps:

NOTE: The trailer must be set up for operation and leveled as detailed in the OPERATION section of this manual.

1 Raise the strongback to the vertical position. When the front of the strongback is approximately 1 foot off the midspan support, actuate the limit switch by pushing down on the trigger arm and hold. If the limit switch is functioning, the cylinder and strongback will stop.

2 Release the trigger arm and continue to raise the strongback to the vertical position. When the strongback stops at vertical, verify that the limit switch is adjusted properly. This is determined by continuing to hold the raise button on the pendent and reading the pressure gage located by the hydraulic pumps (Photo 2, page 30). If the pressure gage reads approximately 500 psi the limit switch is stopping the strongback. If the pressure gage reads the full relief pressure of approximately 2650 psi, then the limit switch is not adjusted properly.

3 Using whatever means are available, check that the strongback is vertical in the stopped position.

4 Adjust the limit switch if required by loosening the mounting bolts and repositioning as required. Lower the strongback through the fourth stage and go back to step 2 to check the new setting.

5.8 Sanitizing Hydraulic Fluid

If the fluid in the main reservoir becomes contaminated with dirt or other particulate matter it can be cleaned using a filter cart. A filter cart can be obtained/rented through local sources.

1 Connect the inlet line of the filter cart to the reservoir drain ball valve. Disconnect the system return line from the return line ball valve. Connect the return line of the filter cart to the return line ball valve on the trailer (Photo 1, page 29).

2 Open the reservoir drain ball valve and the return line ball valve. Check for leaks.

3 Start the filter cart and circulate the fluid for the amount of time specified by the cart manufacturer.

4 Disconnect the filter cart and reconnect the return line.

5 Change the return line filter, Section 5.10.

6 Purge lines of contaminated fluid by disconnecting at the cylinders and pumping the clean fluid from the reservoir through the lines. Do this for ALL cylinders.

5.9 Draining/Filling Main Reservoir

1 Close the two inlet line ball valves and the return line ball valve (Photo 1, page 29).

2 Obtain a hose with a 1 1/4" female NPT fitting on one end. Attach the hose and fitting to the reservoir drain ball valve.

3 Drain the tank by opening the reservoir drain ball valve (Photo 1, page 29) and emptying the fluid into drum containers. The reservoir holds approximately 350 gallons.

4 When emptied, close the tank drain ball valve and remove the hose assembly.

5 Removing the reservoir cover will allow access for cleaning, repairs and inspection to the reservoir. Fabricate a new 2 inch by 1/8 inch thick silicone gasket when reinstalling the cover.

6 Fill the reservoir with the specified fluid and open the two inlet line ball valves and the return line ball valve.

NOTE: Always use clean hydraulic fluid. Filter the fluid as it is pumped into the reservoir.

5.10 Changing Hydraulic Filter

1 Close the two inlet line ball valves and the return line ball valve (Photo 1, page 29).

2 Obtain an oil drain pan and locate it directly beneath the filter.

3 Remove the filter and drain it into the drain pan.

4 Clean the sealing surface of the filter housing and apply a thin film of hydraulic fluid to the seal of the new filter. Install the new filter and tighten by hand.

5 Open the inlet line ball valves and the return line ball valve.

5.11 Checking Hydraulic Fluid Levels

1 Verify that the outriggers are in the full up and retracted position and the telescopic cylinder is fully lowered. Verify that the landing gear are fully retracted if checking the level of the landing gear reservoir.

2 Visually check the level of the main hydraulic system through the reservoir cap. The level should be visible just above the bottom of the inlet screen (Figure 1, page 2).

3 Visually check the level of the landing gear hydraulic system through the sight glass located on the landing gear reservoir (Figure 2, page 7).

4 Add the specified fluid as required.

NOTE: Always use clean hydraulic fluid. Filter the fluid as it is pumped into the reservoir.

5.12 Bleeding Deployment Cylinders

1 Deploy and retract the outriggers as described in the operation section of this manual.

2 Perform step 1 a total of 3 to 5 times.

5.13 Bleeding Outrigger Cylinders

1 Deploy the outriggers as described in the operation section of this manual.

2 Cycle the lifting cylinders through the entire stroke in accordance with the leveling section of this manual. Repeat this step 3 to 5 times.

3 Fully retract the lifting cylinders and the outriggers as described in the operation section of this manual.

5.14 Bleeding Telescopic Cylinder

If air is present in sufficient volume, the cylinder will extend and retract in lunges rather than in a smooth continuous motion. If this effect is noticed the cylinder must be bled.

1 Level the trailer in accordance with section 4.5 of this manual.

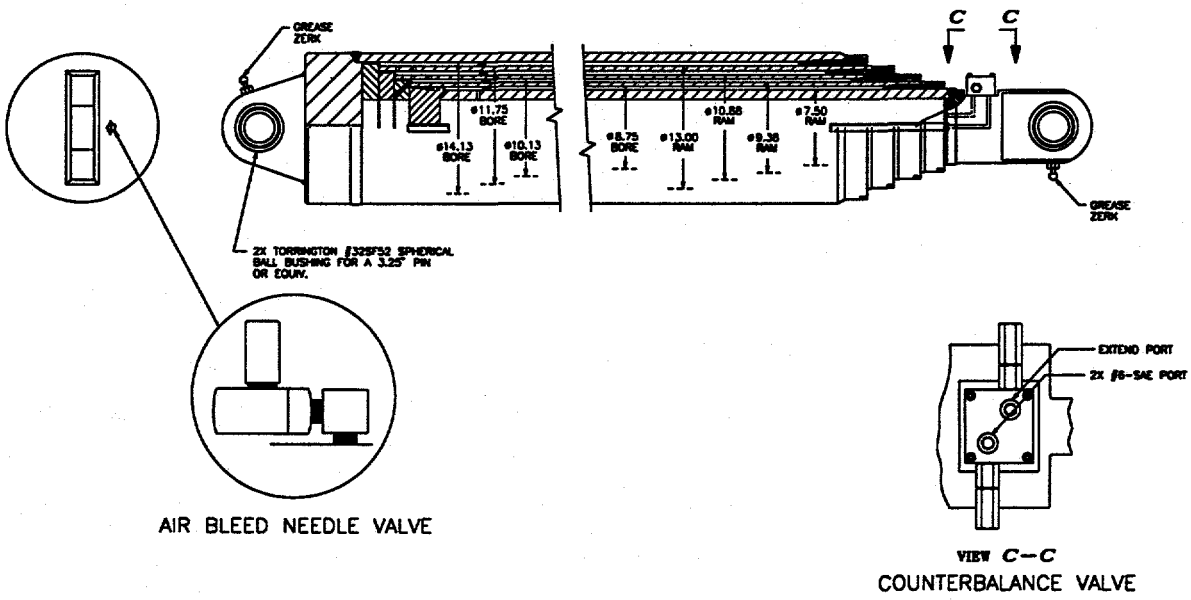


FIGURE 9, TELESCOPIC CYLINDER

2 Bleed the extend stage of the cylinder by attaching the bleeder hose assembly to the needle valve on top of the cylinder. Make sure the needle valve at the end of the bleeder hose is closed then open the needle valve located at the top of the cylinder (Figure 9, page 21).

3 Raise the container to the vertical position as described in the operation section of this manual. Occasionally open the needle valve at the end of the bleeder hose and bleed into a bucket.

4 Lower the container as described in the operation section of this manual. Occasionally open the needle valve at the end of the bleeder hose and bleed into a bucket.

5 If signs of air persist through the first three (3) stages of the cylinder translation repeat steps 3 and 4.

6 Close the upper needle valve and detach the bleeder hose assembly.

If the first three (3) stages operate smoothly but the fourth (4th) exhibits signs of air, the fourth stage retract chamber must be bled. The presence of air in the fourth (4th) stage is most noticeable as the strongback and container pass over center.

1 Raise the container to the vertical position as described in the operation section of this manual.

2 Lower the cylinder through the fourth (4th) stage only. Extend the cylinder back to full vertical again.

3 Repeat step 2 until the cylinder shows no sign of trapped air.

4 Lower the container as described in the operation section of this manual.

5.15 Removing Telescopic Cylinder

1 Remove and plug the hydraulic lines to the telescopic cylinder. Tag each line to aid in the reinstallation of the cylinder.

2 Support the telescopic cylinder as required to keep it from falling when the upper pin is removed.

3 Remove the upper cylinder pin by first removing the roll pins and tapping with a rubber mallet (Figure 10, page 22).

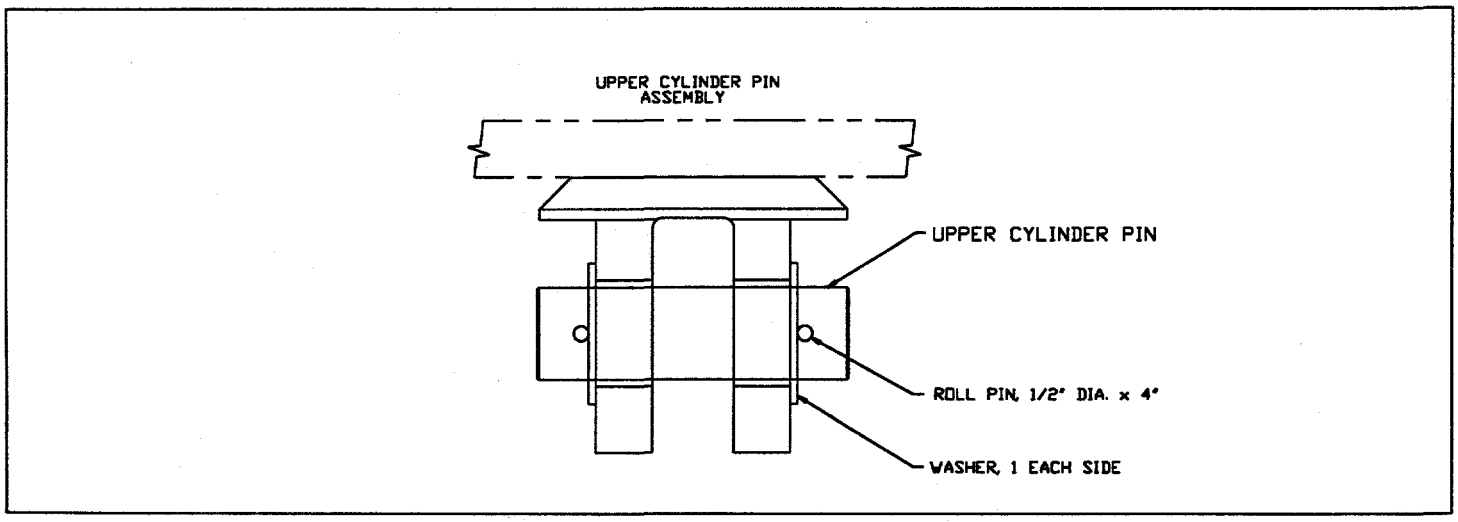


FIGURE 10, UPPER CYLINDER PIN

4 Raise the strongback clear or remove the strongback from the trailer by removing the pivot pins and hoisting off the trailer.

5 Attach rigging to the cylinder in a manner that will prevent the load from swinging and possibly injuring personnel when the lower pin is removed. Be carefull not to damage the counterbalance valve (Figure 9, page 21).

6 Remove the hex bolt and pin cap on the lower cylinder pin (Figure 11, page 23). Tap the lower pin free using a wood dowel and a mallet.

7 Hoist the cylinder free of the trailer and place it on a pallet or stand that will restrain it from rolling.

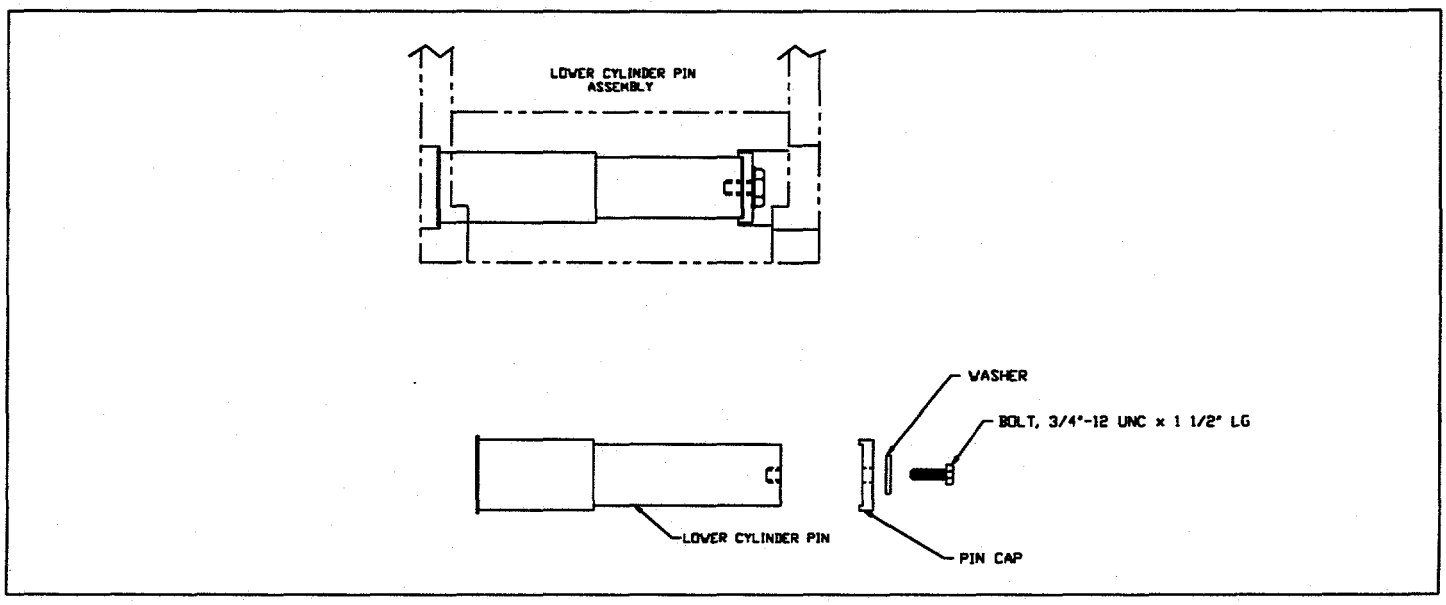


FIGURE 11, LOWER CYLINDER PIN

8 It is recommended that any repair work required to the telescopic cylinder be performed by REMCO. Due to difficulties in bleeding air from the telescopic cylinder, request that the cylinder be bled at the factory and delivered full of fluid.

REMCO Hydraulics, Inc.
934 South Main Street
Willits, CA 95490
(707)459-5301

5.16 Installing Telescopic Cylinder

1 Hoist the cylinder into position on the trailer and insert the lower pivot pin from the left side (street side) of the trailer. Be carefull not to damage the counterbalance valve (Figure 9, page 21).

2 Attach the pin cap and hex bolt on the lower cylinder pivot pin (Figure 11, page 23). Torque the hex bolt to snug tight.

3 Support the telescopic cylinder as required to keep it from falling when the rigging is removed.

4 Position the strongback for connecting the upper cylinder pin. If the strongback was removed, clean the bearing surfaces and instal the pivot pins and new roll pins.

5 Position the cylinder so the top pin bore and clevis bore are aligned. Insert the upper pivot pin, washers and new roll pins (Figure 10, page 22).

NOTE: It may be necessary to raise or lower the strongback to get the proper alignment.

6 Attach the hydraulic lines to the cylinder.

NOTE: After a cylinder is removed and disassembled, it may have accumulated trapped air. Actuate the cylinder to see if it shows signs of trapped air and if required bleed the cylinder as described in section 5.14.

5.17 Removing Outrigger Cylinders

1 Remove and plug each hydraulic line to the lifting cylinders. Tag each line to aid in the reinstallation of the cylinder.

2 Support the lifting cylinder with a hoist and chain as required to keep it from falling when the bolts are removed.

3 Loosen the eight (8) mounting bolts in even increments. Loosen the bolts in the reverse order of the tightening sequence (Figure 12, page 25).

4 Remove the bolts, mark them as used and discard.

5 It is recommended that any repair work required to the lifting cylinders be performed by REMCO.

REMCO Hydraulics, Inc.
934 South Main Street
Willits, CA 95490
(707)459-5301

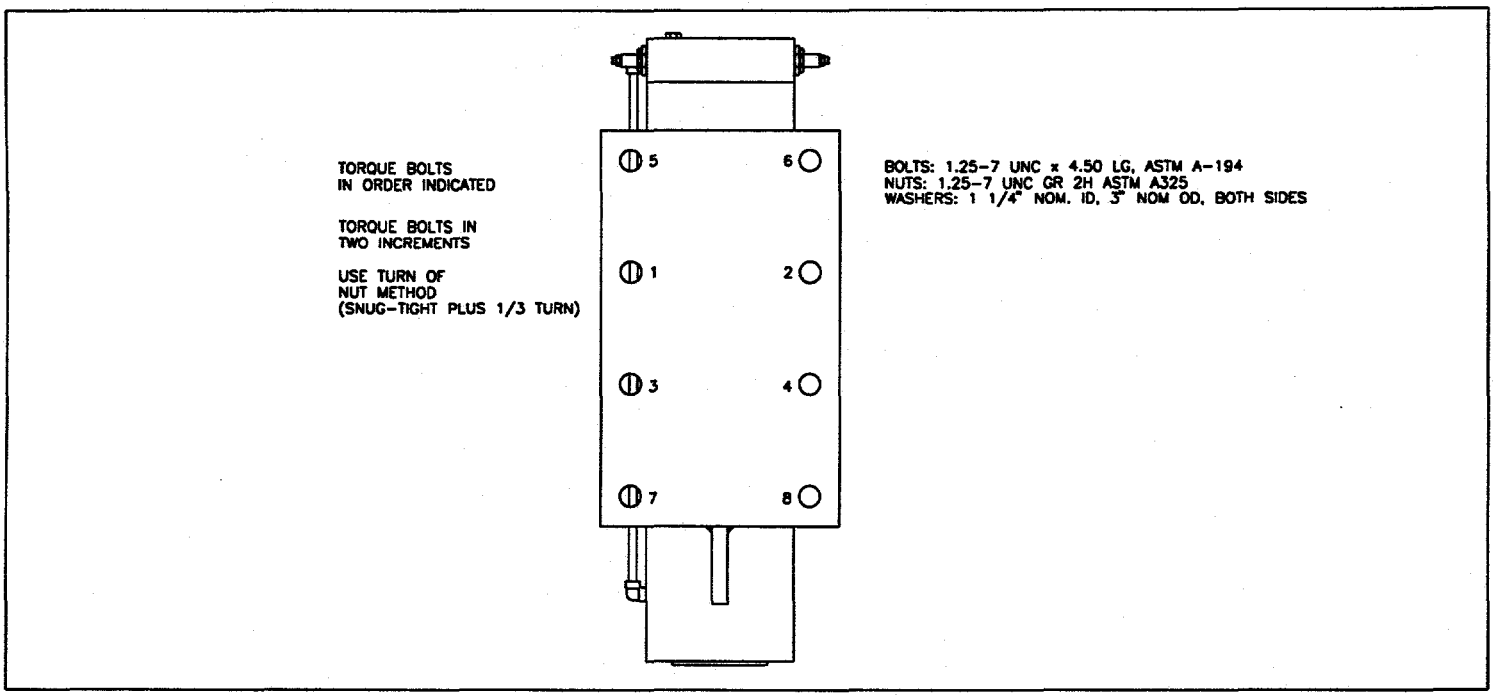


FIGURE 12, TORQUING SEQUENCE

5.18 Installing Outrigger Cylinders

1 Place the lifting cylinder into position using a hoist and chain as required.

2 Install eight (8) new bolts, washers, and nuts finger tight.

3 Tighten the eight (8) mounting bolts in even increments until all are snug tight. Tighten the bolts in the order of the tightening sequence (Figure 12, page 25).

4 Remove the chain and hoist and verify that the bolts are snug tight.

5 Tighten the eight (8) mounting bolts an additional 1/3 turn. Tighten the bolts in the order of the tightening sequence (Figure 12, page 25).

6 Attach the hydraulic lines to the cylinder.

NOTE: When a cylinder is removed and disassembled, it may have accumulated air. Actuate the cylinder to see if it shows signs of trapped air and if required bleed the cylinders as described in section 5.13.

5.19 Removing Deployment Cylinders

1 Remove and plug each hydraulic line to the lifting cylinders. Tag each line to aid in the reinstallation of the cylinder.

2 Remove the pins at both ends of the cylinder and remove the cylinder.

5.20 Installing Deployment Cylinders

1 Install the cylinders on the trailer by positioning them and inserting the pins in the ends. Lightly grease the pins prior to installation.

2 Attach the hydraulic lines to the cylinder.

5.21 Adjusting Front Support

1 Loosen the jamb nuts and bolts on the base support and side chocks (Figure 13, page 27).

2 With the container installed and fully lowered, install shim stock beneath the base support until it firmly seats against the container. Tighten the center support bolts on the base support.

3 Adjust the side chocks until they seat against the side of the container. Tighten the adjusting bolts and the jamb nuts on the side chocks and verify they are still seated properly.

5.22 Adjusting Midspan Support

1 Verify that the strongback is fully lowered and seated at the front support (Figure 13, page 27).

2 Turn the screw jack adjuster until the load box firmly seats against the strongback (Figure 14, page 27).

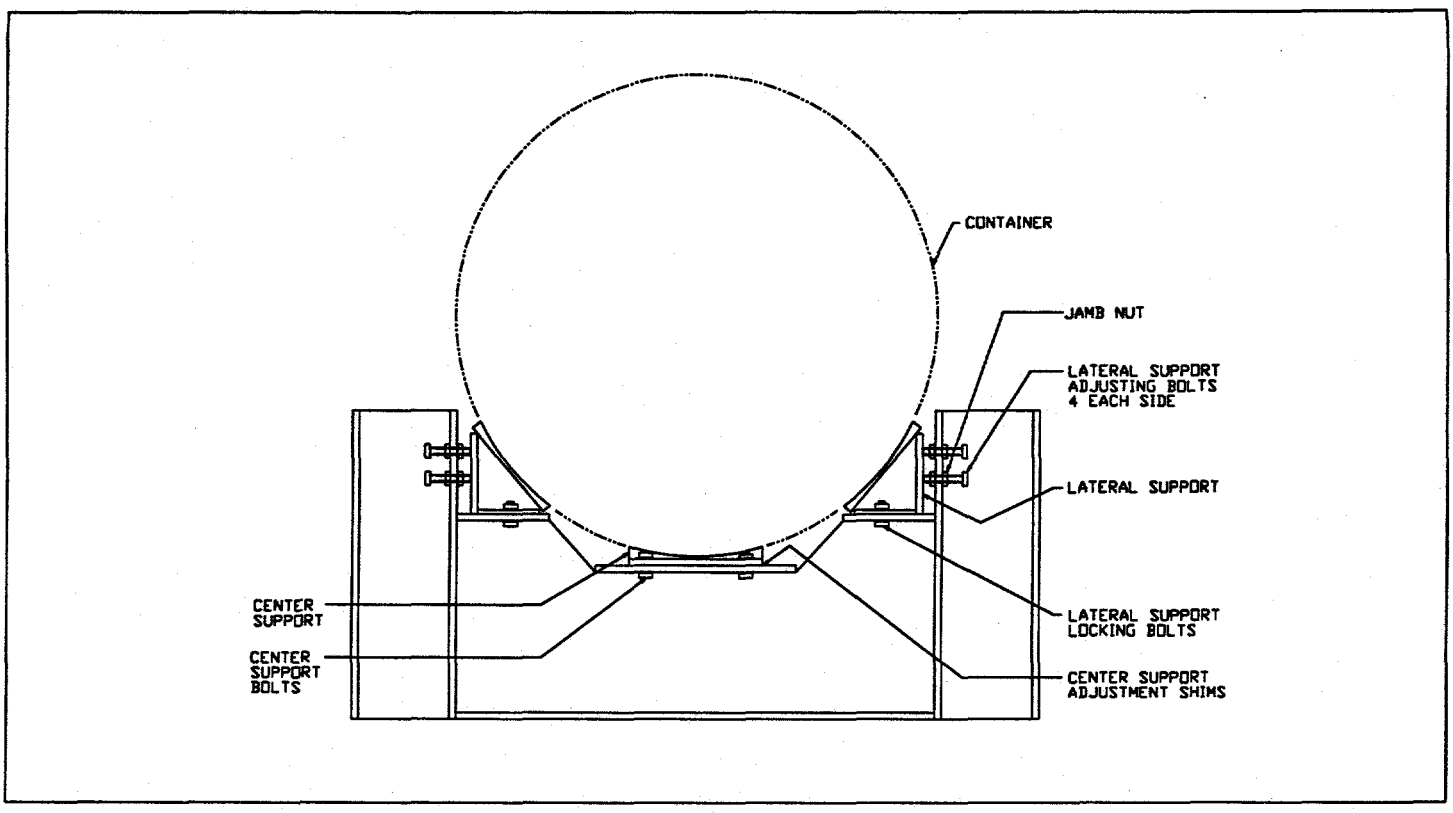


FIGURE 13. FRONT SUPPORT

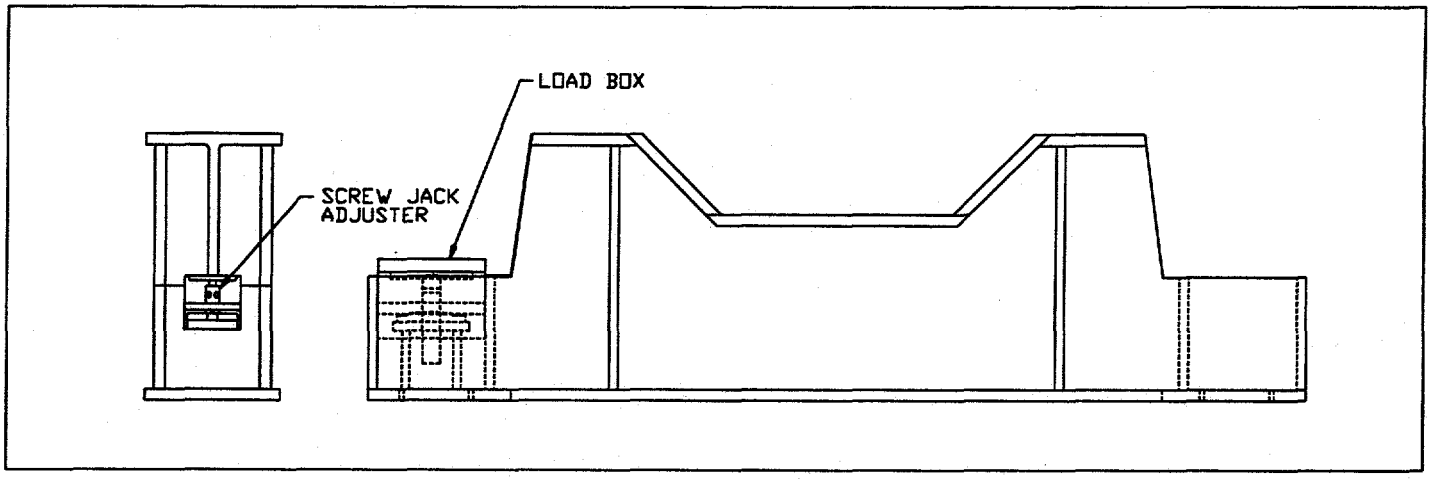


FIGURE 14. MIDSPAN SUPPORT

5.23 Purging Brakes

Purge both brake canisters to remove condensation in the system. Purge brakes by opening the petcock valve on the bottom of the canisters (Figure 15, page 28).

5.24 Cycling Systems

Cycle the hydraulic system by extending outriggers, leveling and raising strongback as specified in the operation section of this manual. This will keep the hydraulic system in good working condition over the life of the trailer.

5.25 Outrigger Beams

The outrigger beams are fabricated from AISI 4140 steel and received a quench and temper heat treatment. Welding on the outrigger beams is not permissible without the evaluation and approval of engineering.

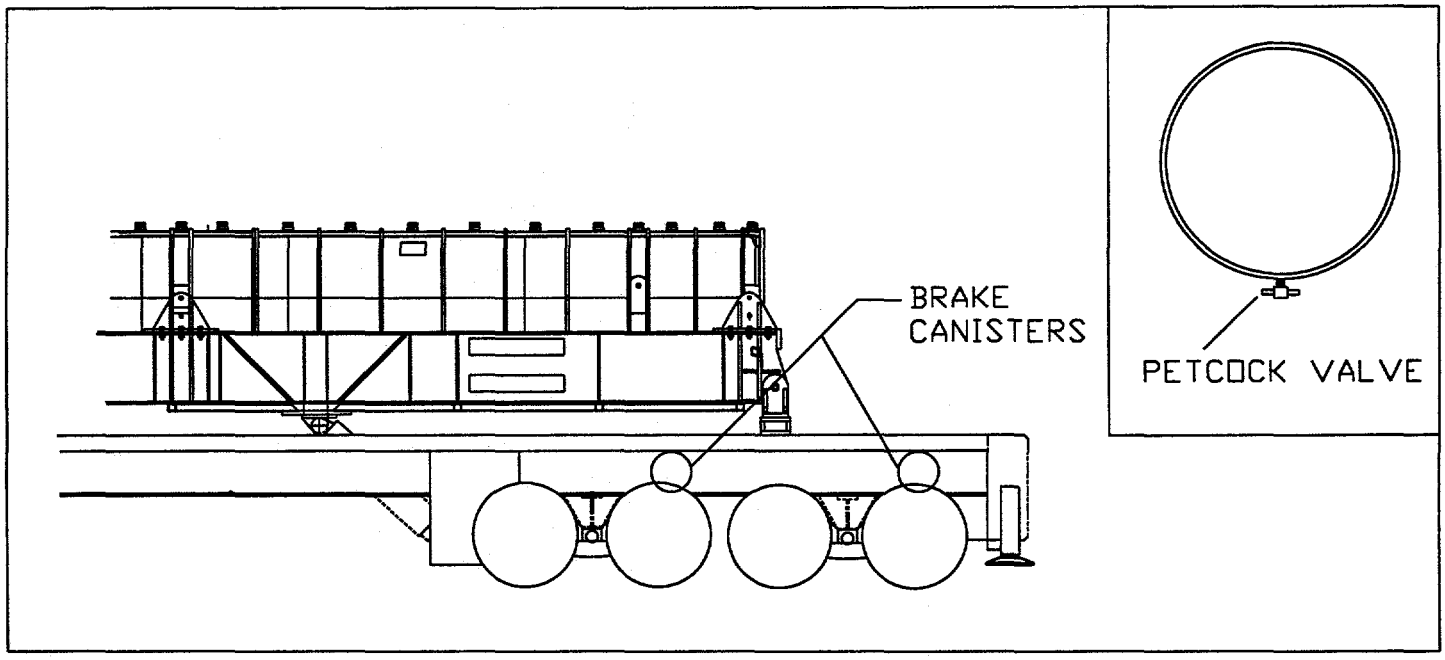


FIGURE 15, BRAKE CANISTERS

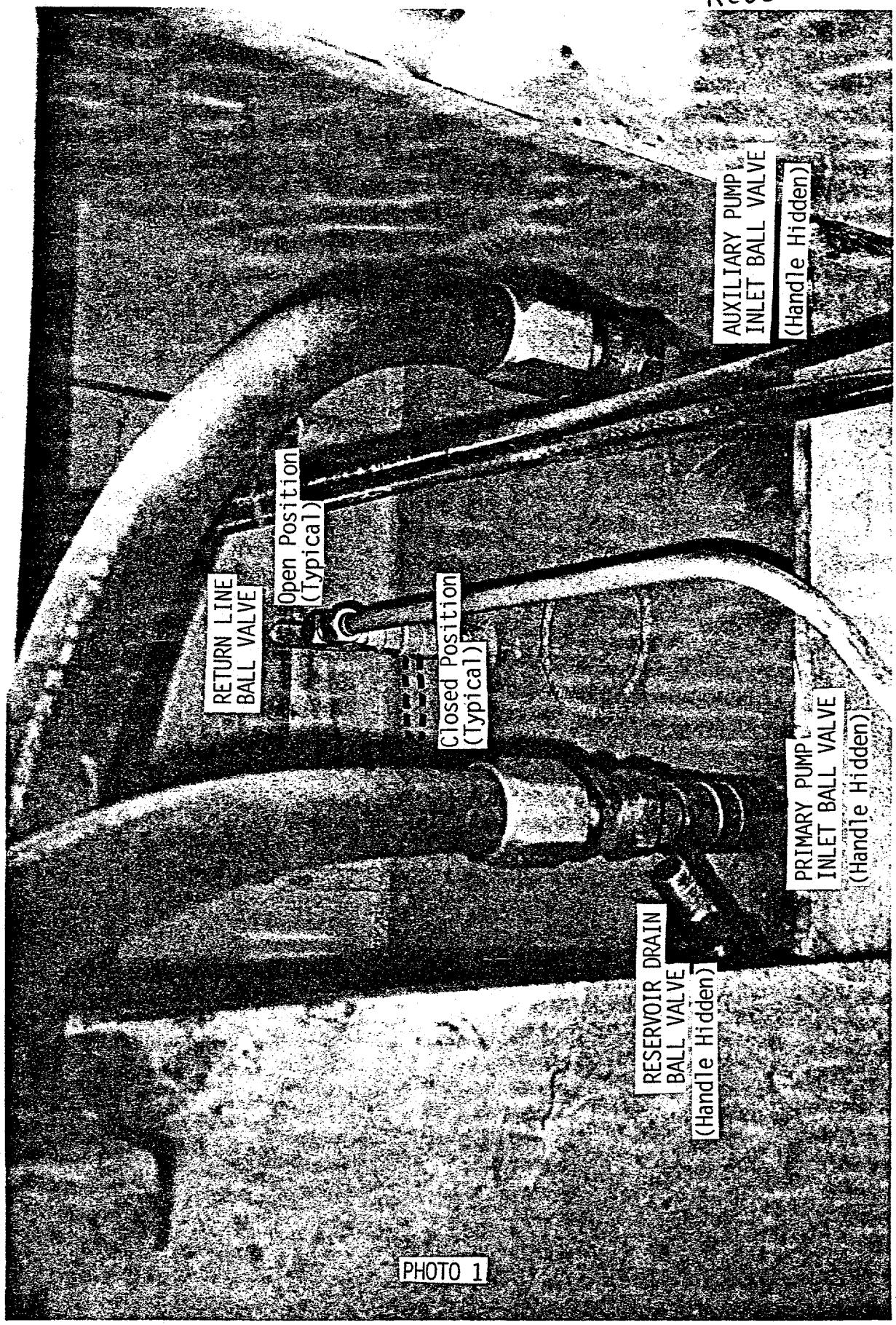

AUXILIARY PUMP INLET BALL VALVE
(Handle Hidden)
RETURN LINE BALL VALVE
Open Position (Typical)
Closed Position (Typical)
PRIMARY PUMP INLET BALL VALVE
(Handle Hidden)
RESERVOIR DRAIN BALL VALVE
(Handle Hidden)

PHOTO 1

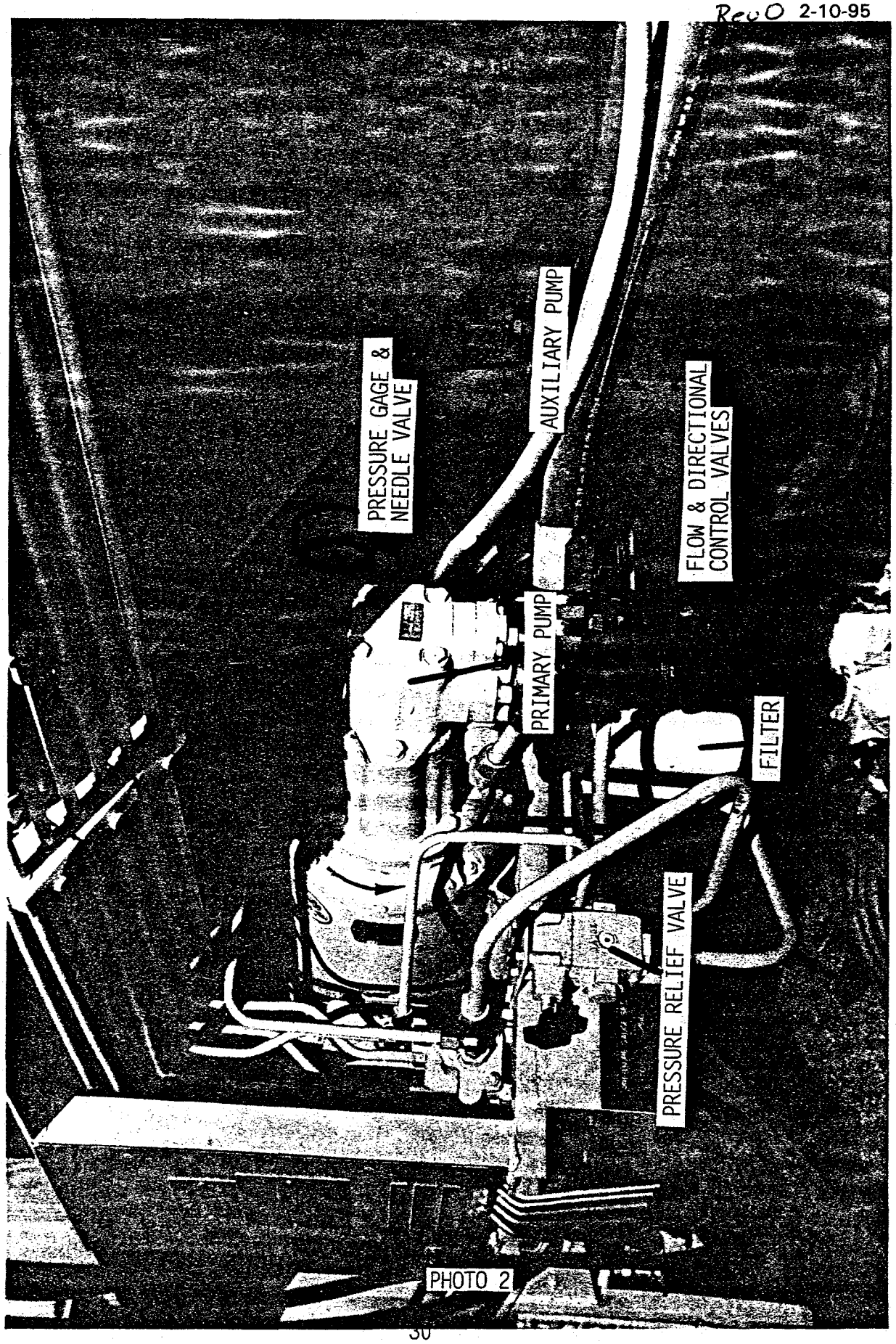

PRESSURE GAGE & NEEDLE VALVE
AUXILIARY PUMP
FLOW & DIRECTIONAL CONTROL VALVES
PRIMARY PUMP
FILTER
PRESSURE RELIEF VALVE

PHOTO 2

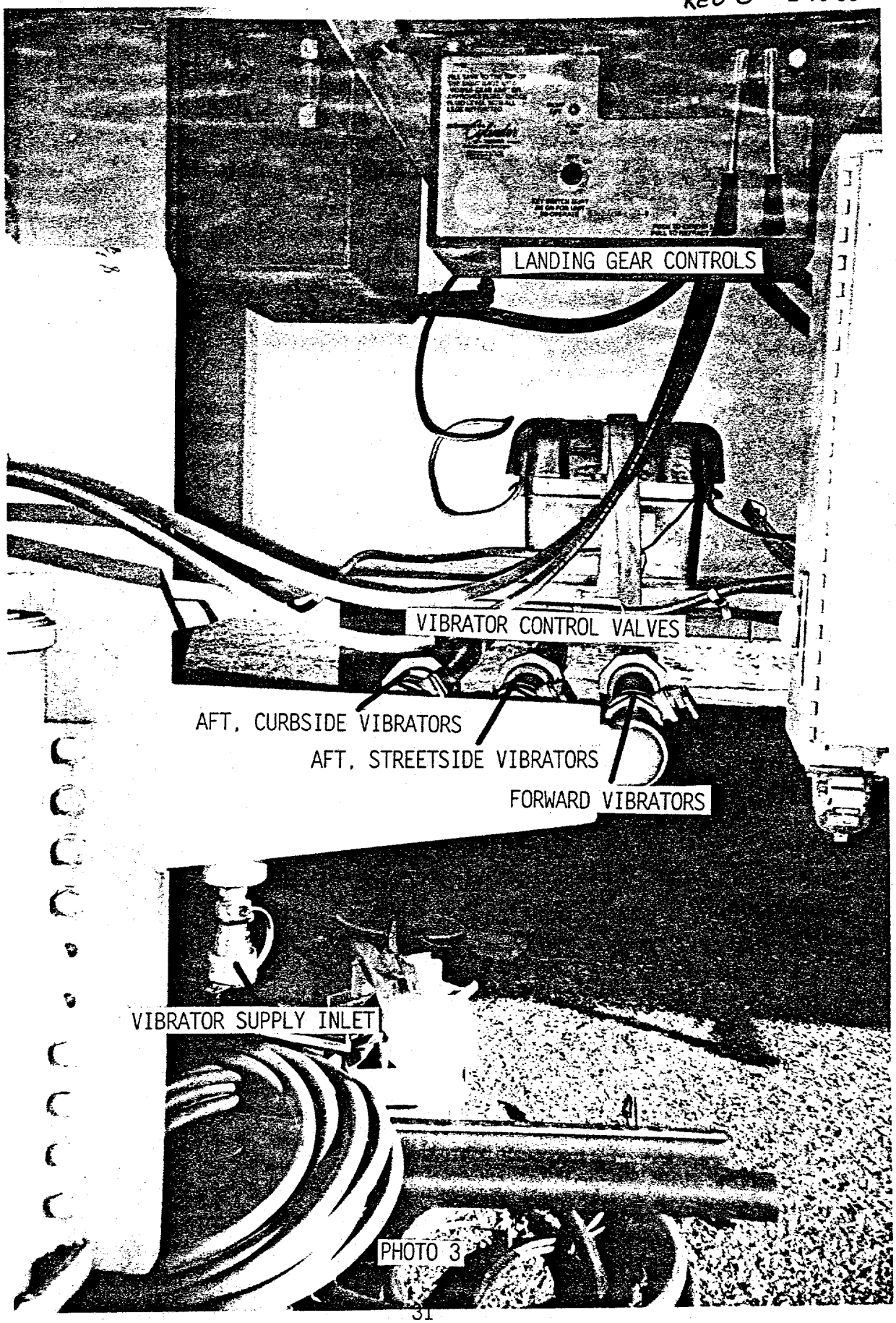
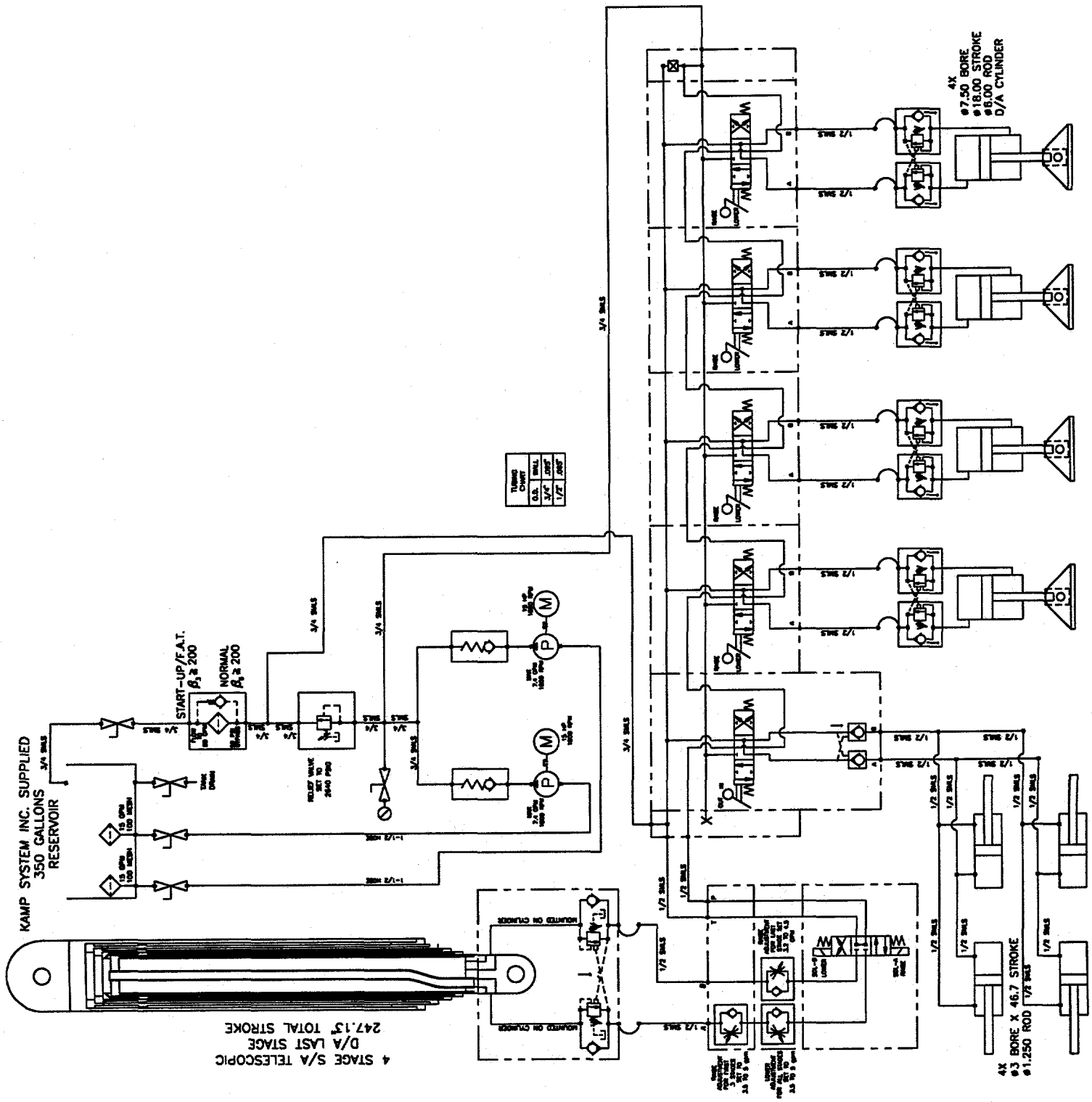

LANDING GEAR CONTROLS
VIBRATOR CONTROL VALVES
AFT. CURBSIDE VIBRATORS
AFT. STREETSIDE VIBRATORS
FORWARD VIBRATORS
VIBRATOR SUPPLY INLET

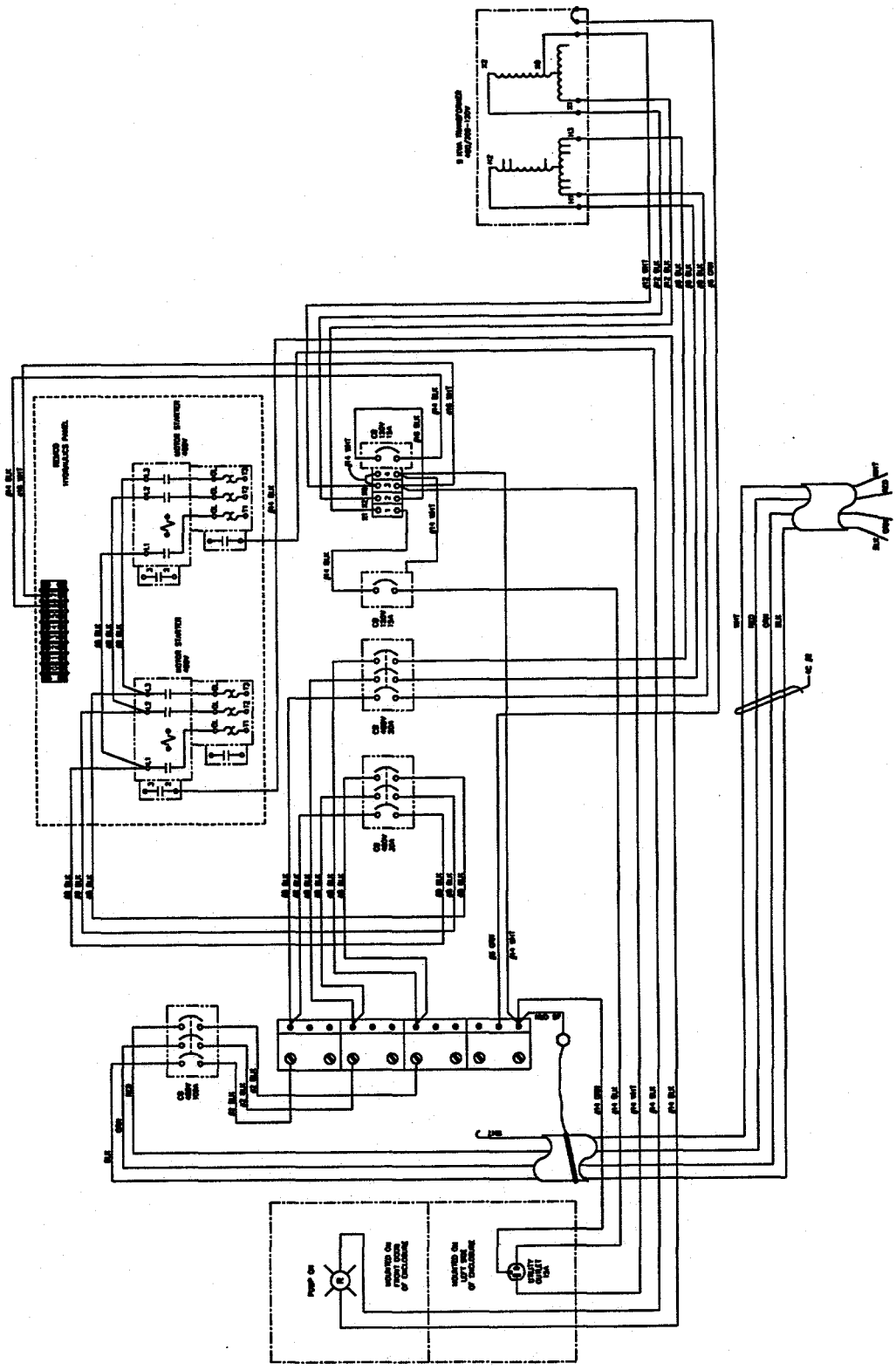
PHOTO 3

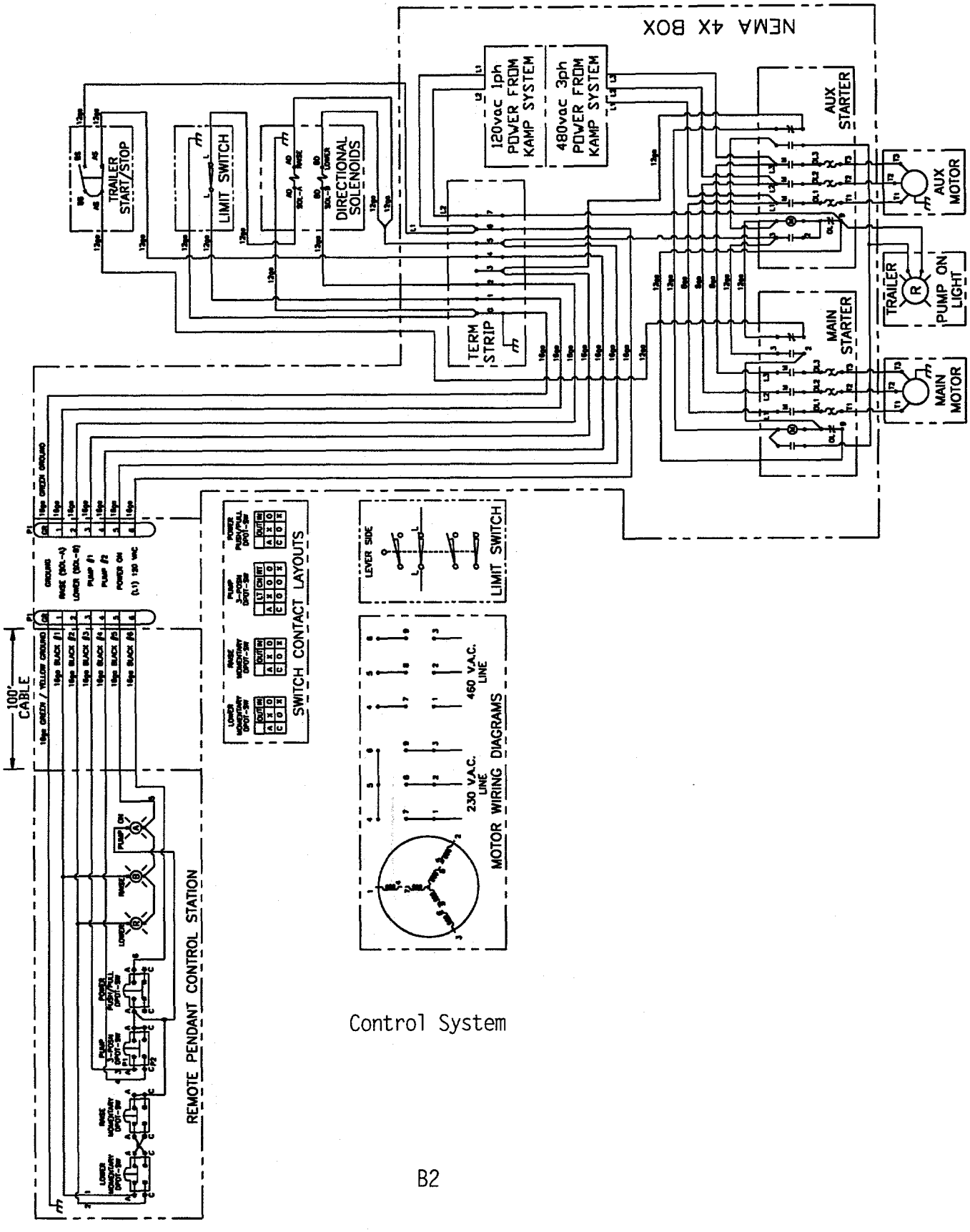
APPENDIX A, Hydraulic Schematic



APPENDIX B, Electrical Schematic

Power Supply





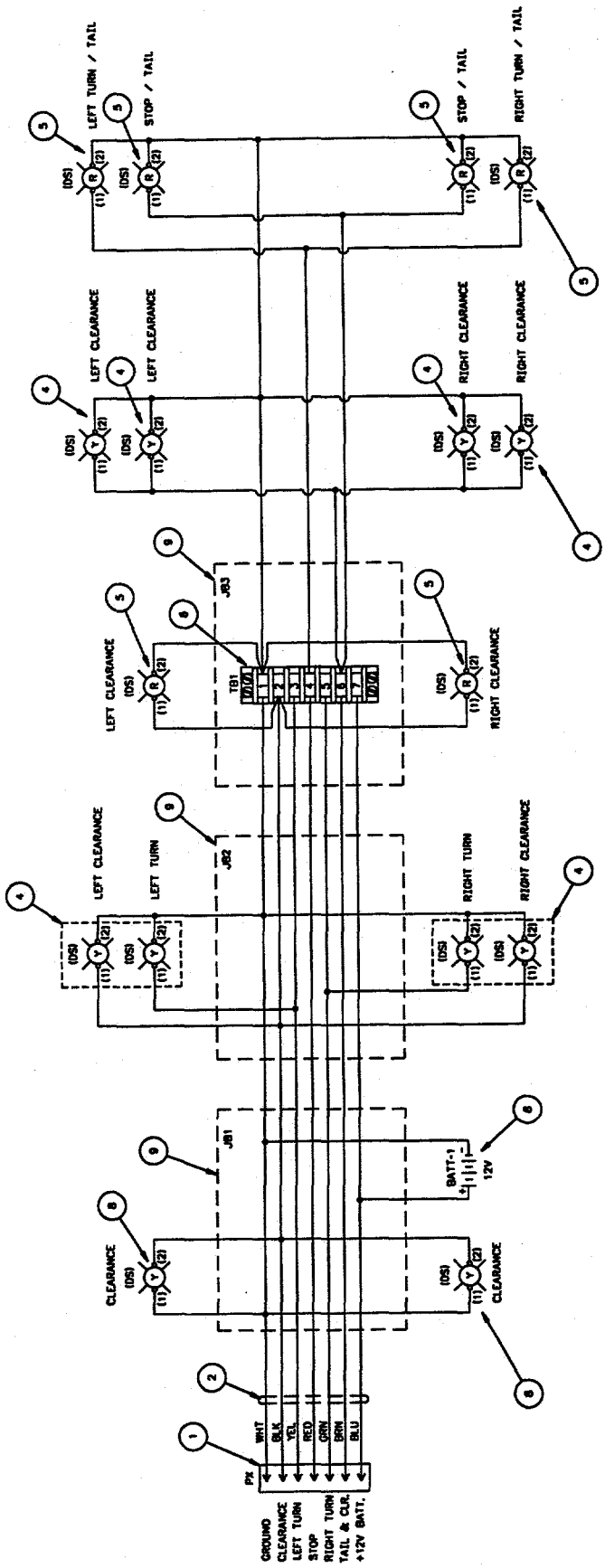
Control System

12 Volt

GENERAL NOTES:

1. MATERIAL SUBSTITUTIONS MUST BE APPROVED BY COGNIZANT ENGINEER.
2. LENGTH SHALL BE AS SPECIFIED ON FABRICATION OR WORK ORDER.
3. SOLID ENDBELL CONNECTORS MAY BE SUBSTITUTED FOR SPLIT ENDBELL CONNECTORS AS REQUIRED.
4. FIELD TO DETERMINE SINGLE CONDUCTOR COLOR/CONNECTOR PIN ASSIGNMENTS AS REQUIRED. SOCKET/PIN CONNECTION CONTINUITY CHECK SHALL BE PERFORMED.
5. PERMANENTLY IDENTIFY CABLE END WITH CONNECTOR NUMBER NOTED.
6. STRIP OUTER CABLE JACKET AS REQUIRED TO FIT CONNECTOR CABLE CLAMP. WRAP CONDUCTORS WITH THINNER JACKET OR HEAT SHRINK MATERIAL FOR SEALANT PROTECTION.

QTY 388	389	418	PART/DASH NUMBER	DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO.
		1	PH13-222	CONNECTOR, PLUG, 7 PIN			1
		AR		CABLE, 7 CONDUCTOR			2
			50880	REAR RUBBER BOOT			3
		8	60015Y	INDICATION UNIT (YELLOW)			4
		6	TRK40015R	INDICATION UNIT (RED)			5
		1		TERMINAL STRIP			6
		1	GROUP 42	BATTERY UNIT (12V) 350 CRANKING AMPS			7
		2	10205Y	INDICATION UNIT (YELLOW)			8
		3		JUNCTION BOX			9



APPENDIX C, Container Bolting Sequence

The information contained in this APPENDIX is directly from an approved Westinghouse procedure. This procedure has been analyzed and found to provide a safe and effective means of attaching the container to the strongback. Do not deviate from the step outlined herein.

All the required information is provide in this APPENDIX. Refer to WHC-SD-WM-DA-170, Bolting Sequence For Attaching The Container To The Strong-Back For 241SY101, for the complete procedure.

CONTENTS

BOLTING SEQUENCE FOR ATTACHING THE CONTAINER TO THE STRONG-BACK

1.0 INTRODUCTION

This supporting document includes information for the proper bolting sequence for attaching the container to the strong-back. The design of the container and strong-back is found in supporting document WHC-SD-WM-DA-165 (WHC 1994a) and is in accordance with *Standard Arch-Civil Design Criteria, Design Loads for Facilities* (SDC 4.1) Safety Class 3.

2.0 SUMMARY OF RESULTS

The following bolting sequence has been found, through field testing, to be the most effective method of attaching the container (WHC 1994d) to the strong-back (WHC 1994b). The diameter, length, and type of bolts required are calculated in WHC-SD-WM-DA-165 (WHC 1994a) and are shown in the drawings of WHC 1994b and WHC 1994c. This supporting document summarizes the bolt requirements and provides the fit up and bolting sequence required to most effectively attach the container to the strong-back.

3.0 DISCUSSION

During the fabrication process, the container attachment lugs are placed flush up against the strong-back attachment assemblies. After the container attachment lugs are matched to the strong-back attachment assemblies, the container attachment lug is welded into position. Finally, the container attachment lug is match drilled to the strong-back attachment assembly. This fabrication process ensures that a close fit up can be achieved between the container, the attachment assemblies, and the strong-back.

After the containers were matched to the strong-back, the containers were removed and painted. In order to effect the same match of the container to the attachment assemblies and strong-back, the container must be relocated to the matched position. The bottom of the attachment assemblies have slotted holes which allows the assembly to slide laterally during fit up.

4.0 CONCLUSIONS

This bolting sequence has been found to be structurally effective for attaching the container to the strong-back. Adherence to this supporting document for field installation should greatly reduce or eliminate field fit up and bolting problems.

5.0 RECOMMENDATIONS

The following recommendations shall be followed to ensure that the container is properly bolted to the strong-back:

Prior to installing any bolts, verify that the threaded portion of the bolts and nuts are clean and undamaged. Do not add lubricant of any type to the bolt or nut thread. The only lubricant that may be on the nut or bolt thread is the trace of machine oil that was applied at the factory during fabrication.

Never reuse bolts that have been previously torqued. Any bolts that have been torqued should be identified and removed from service.

Align the container, attachment assemblies and strong-back;

- The strong-back has four bearing blocks, two per side and approximately 24 feet apart, that are designed to support the weight of the container. The container attachment lugs (see Figure 1) should rest on the four bearing blocks. Carefully place the container into the strong-back. Insure that the container support is properly positioned on the deck of the hydraulic trailer.

- Place all four of the attachment assemblies on the strong-back. Verify that the bolts are A325, and verify the length and location of the bolts as shown in Figure 2. Loosely install all the 1" bolts and washers so that the attachment assemblies are free to slide laterally (see Figure 3a).

- Re-position the container as necessary to best match up to all four of the attachment assemblies. Some differences between the container, attachment assemblies, and strong-back are inevitable however no more than about 1/4" gap between mating surfaces should be present. This gap will become less as the bolts are tightened.

Install bolts

Note that "Snug tight" is defined as "the full effort of a man using an ordinary spud wrench". Therefore, do not use a breaker bar or excessive force to tighten the bolt. Only use full effort and an ordinary wrench to snug up the bolt.

- Install, to finger tight condition, all of the 2 1/2" bolts, nuts and washers (see Figure 3b). Do not use a wrench to tighten the bolts at this time.

- Install, to finger tight condition, all of the 1" bolts and washers. Do not use a wrench to tighten the bolts at this time.

- Determine which attachment assembly has the largest gap between the vertical face of the attachment assembly and the face of the container attachment lug. Proceed to tighten, only to a "snug tight" condition, the 2 1/2 " bolt at this attachment assembly.

- Document the length of the 2 1/2" bolt with a micrometer. If this can not be done then document the amount of gap between the vertical face of the attachment assembly and the face of the container attachment lug. The bolt length or gap will be checked after tightening the 1" bolts at the bottom of the assembly.

- Determine the next attachment assembly that has the largest gap, as described above, and tighten the 2 1/2" bolt as described above. Continue this process until all four of the 2 1/2" bolts are "snug tight".

- Determine which attachment assembly has the largest gap between the horizontal face of the attachment assembly and the horizontal face of the strong-back. Proceed to tighten, only to a "snug tight" condition, the 1" bolts at this attachment assembly. Sequence bolt tightening as "tightening shall progress systematically from the most rigid part of the joint to its free edges".

- Document the length of the 2 1/2" bolt with a micrometer. If this cannot be done then document the amount of gap between the vertical face of the attachment assembly and the face of the container attachment lug. Compare the bolt length or gap measurement with the measurement taken after the 2 1/2" bolts were tightened. If the bolt length or gap has increase more than .0833" then contact the engineer for further direction. If the bolt length or gap is less than .0833" then the bolted connection is adequate.

- Determine the next attachment assembly that has the largest gap, as described above, and tighten the 1" bolts as described above. Continue this process until all twenty four of the 1" bolts are "snug tight".

6.0 REFERENCES

AISC, 1989, *Manual of Steel Construction*, 9th Edition, American Institute of Steel Construction, Chicago, Illinois.

SDC 4.1, Rev. 12, 1989, *Standard Arch-Civil Design Criteria*, Westinghouse Hanford Company, Richland, Washington, 1993.

WHC 1994a, Structural Analysis of the Equipment Removal System for Tank 241SY101, WHC-SD-WM-DA-165, Westinghouse Hanford Company, Richland, Washington. 1994.

WHC 1994b, Strongback, drawing H-2-83736, Rev. 0, Westinghouse Hanford Company, Richland, Washington, 1994.

WHC 1994c, Hydrogen Mixer Pump Storage Transport Assembly Arrangement, H-2-83750, Rev. 0, Westinghouse Hanford Company, Richland, Washington, 1994.

WHC 1994d, Hydrogen Mixer Pump Storage Container, drawing H-2-83734, Westinghouse Hanford Company, Richland, Washington, 1994.