120-Ton Power Swivel
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OVERVIEW

The hydraulic motor-driven, Logan 120-Ton Power Swivel provides smooth, shock-free torque. It is rated to support tensile pipe loads of 120 tons at zero rpm and 65 tons of dynamic load at 100 rpm. The compact, swivel-head design weighs only 2,000 lbs and fits into most drilling or workover masts. Maximum torque is rated at 8,100 ft/lbs and 150 rpm maximum.

The design incorporates a reliable, custom drive train with hardened steel gears. For most applications, the Logan 120-Ton Power Swivel eliminates the use of dangerous spinning chains, tongs, and kelly spinners. The Power Swivel facilitates drilling with longer drill string lengths before the rig must be shut down to add pipe. Stops and start-ups are thereby reduced — improving rig efficiency and reducing wear on the pump, drawworks, and other rig equipment.

The Logan 120-Ton Power swivel uses a closed loop hydraulic system with variable displacement, bi-directional pump, and air, electric, or electric wireless remote controls. The variable volume pump and hydraulic system allow torque and speed to be infinitely adjusted within stated ranges, without shifting gears or stopping and restarting the unit. Speed control is continuously variable over the entire operating range. Pressure compensating-type torque control overrides the speed control to maintain maximum torque. The power unit's torque limits can be set, thereby eliminating the potential danger of twist-offs or swollen boxes in the drill string. An integral rotary swivel bearing, floating washpipe assembly, and gooseneck connection eliminates the need for a separate rotary swivel.

A 2-3/4" bore gooseneck and washpipe assembly allows circulation through the 2-11/16" I.D. stem while rotating or in static mode. An access plug allows wireline to be run through the unit.

Features include:
- Smooth, shock-free torque reduces drill string damage
- Fits many drilling and workover masts
- Allows use of longer drill string lengths
- Power unit torque limits can be set
- Separate rotary swivel is unnecessary
- Choice of diesel engines
- Increased environmental safety features on skids and trailers
- Easy to service
- Electric or hydraulic loading winch
- Control can be operated remotely or from the power unit

Extra cost options include:
- Lifting frame
- Cold weather package
- Hydraulic motor brakes

The complete Logan 120-Ton Power Swivel package includes an elevator-type bail; a unitized washpipe packing box assembly; a fixed displacement, piston-type, hydraulic motor rated at 5,000 psi; a torque rein assembly; safety cable; and 1-1/4" swivel joints. The components are available either trailer-mounted (gooseneck) or skid-mounted with powered hose reels to form a rugged unit. A swivel carrying stand is standard.

**CAUTION:** Refer to the installation procedure outlined on page 6 before installing the Logan 120-Ton Power Swivel on a rig. Failure to install the Power Swivel properly can result in injury to the operator and/or rig floor personnel. Read Important Safety Information on page 3.

USES

The Logan 120-Ton Power Swivel is ideally suited for use in fishing and workover operations — such as the internal or external cutting of tubing, casing, or drill pipe; drilling out plugs, packers, or cement; milling operations; or scraping casing — whenever shock-free, controlled torque is essential to eliminating the potential danger of twist-offs or damage to cutting tools.

The compact, lightweight swivel-head design also makes it extremely effective for light to medium drilling applications including water wells, pilings for piers and foundations, in addition to oil and gas wells. Suspending the swivel from a boom or crane eliminates a great deal of set-up time or shifts to additional locations.

The Logan 120-Ton Power Swivel is also ideal for coring operations. Any length of core may be taken. Accurate and smooth torque ensures against damage to core tools or strings.
IMPORTANT SAFETY INFORMATION

Before operating the Logan 120-Ton Power Swivel, users are advised of the following important safety precautions and procedures:

1. Verify the strength of the derrick structure and torque rein guide cable to ensure they are strong enough to withstand the loads imposed by the Power Swivel.

2. A Logan Safety Cable (provided as standard equipment on the Logan 120-Ton Power Swivel) should be used for torque rein and should be utilized at all times. Attach one end of the safety cable to the torque rein and secure the other end to the swivel. In the event of torque rein assembly failure, the safety cable will prevent the assembly from falling to the rig floor.

3. Carefully check the full range of travel in the derrick or mast before beginning operations. With the guide cable as nearly vertical as possible, ensure that the swivel can move freely up and down under full torque in either direction. Angles exceeding 5% can cause side loads on the swivel.

4. Tubing elevators should not be used with Power Swivel bails. Besides being a potentially dangerous practice, the use of an upset elevator reduces the contact between the elevator and bail, and accelerates wear.

5. Inspect elevators and bails for excessive wear according to guidelines published in API RP-8B. WARNING: Failure to comply with these safety procedures may cause physical injury to the operator and/ or rig floor personnel.

CONSTRUCTION

Power Swivel Assembly

The Logan 120-Ton Power Swivel is powered by two fixed displacement, piston-type, hydraulic motors rated at 5,000 psi. The motors are mounted on the underside of the swivel and is protected by a steel guard.

Two high pressure hydraulic hoses and the motor drain hose exit from the bottom of the assembly. The high pressure hydraulic hoses connect to the motor with quick disconnects with quick disconnect couplers. The motor drain hose is also fitted with a self-sealing quick disconnect coupling.

The one-piece gooseneck is constructed of cast steel. A 2-7/8” EUE access plug located in the top allows passage of wireline and small tools through the swivel for downhole operations. The access plug may be removed to permit passage of tools with diameters smaller than 2-1/4”. The gooseneck and swivel packing are hydrostatically tested and rated at 5,000 psi maximum circulating pressure.

The floating washpipe assembly and packing are self-aligning. Friction bearing surfaces of the washpipe (areas that contact the packing) are hard-surfaced for wear-resistance.

The elevator bail is machined from forged, heat-treated alloy steel for maximum strength. The bail, bail pins, and body are manufactured to API guidelines.

The design incorporates a reliable, custom drive train with hardened steel gears consisting of: a motor drive gear, reduction drive gear, an intermediate gear, and the main drive gear. Roller bearings hold the gears in close alignment.

A magnetic drain plug is located on the lower cover plate of the swivel assembly. A tell-tale hole in the lower plate indicates hydraulic oil leakage past the motor shaft seal or lubricating gear oil past the input pinion shaft. A filler/relief plug is located on the upper cover plate. The gear housing is equipped with an oil level sight glass so the operator may check oil level with a quick glance.

To protect the main stem oil seal from dirt, an excluder seal is installed below the packing nut.

Control Units

Air controls consist of an air compressor and tank, an air filter/regulator/lubricator unit, and a pedestal mounted control panel with extra lines fitted with quick disconnect couplers. A lever-operated air valve controls the engine speed. Another single-lever air valve controls the direction and speed of the Power Swivel. A torque gauge, calibrated in ft-lbs, indicates torque.

Control assemblies for the Logan 120-Ton Power Swivel are either air or electric. They can be operated remotely (extra cost option) for operator convenience and safety, or from the power unit. Remote control assemblies are pedestal mounted. The control assembly is lightweight and the pedestal base is removable for easy storage on the trailer or skid. A new wireless remote with an operating range of 150 feet is also available.

The electric control panel consists of a rotary switch for controlling swivel direction and speed, an engine rpm control switch, a digital torque gauge, and an engine kill switch. An emergency kill switch is available for hazardous locations.

Torque limits can be easily and accurately set on both air and electric control units. A torque control unit mounted on the fuel tank can be preset to the desired torque limit with the turn of a knob. Torque will be indicated on the control panel in ft-lbs.
Basic Power System
The Logan 120-Ton Power Swivel is equipped with a diesel engine to provide power. The engine is sized to provide sufficient horsepower to operate the swivel to full torque and rpm limits. Engines are equipped with heavy-duty radiators, rain caps, and optional side panels. The engines may be air-, electric-, or hydro-start.

Control systems may be either air or electric. On units equipped with air control systems, an air compressor, a three-gallon receiver tank, and an air filter-lubricator are also provided. Power for electric control systems is provided by the engine's generator and battery.

Pressure compensating type torque control overrides the speed control to maintain maximum torque. The power unit's torque limits can be set, thereby eliminating the potential danger of twist-offs or swollen boxes in the string. The torque gauge, calibrated in ft-lbs, is located on the remote control panel.

Hydraulic System
The hydraulic system includes a direct driven, variable displacement hydraulic pump and gear box that are mounted directly on the engine flywheel housing. All piping, valves, fittings, reservoirs, and other components required to complete the system are included. The hydraulic system is designed and rated at 5,000 psi working pressure.

The hydraulic reservoir is designed to dissipate heat and is adequately sized to disperse foam that may be generated during operation. A suction strainer, high pressure filters, and a tank return filter provide continuous filtration of the hydraulic fluid. Visual registers on the tank return filter and high pressure filters indicate when these elements need to be replaced. The pump's displacement setting controls flow and eliminates the necessity of relief valves. This closed loop system reduces the required hydraulic reservoir capacity by 50% of that needed for fixed displacement, relief valve type systems.

All hydraulic hoses are reel-mounted on the power unit. They are connected to the power swivel hydraulic motor with swivel joints and quick disconnects.

A swivel carrying rack allows the swivel to be loaded and unloaded without breaking the hose connections.

Power Unit
The compact, easily transportable Power Swivel units may be mounted on a trailer, skid, or containerized. All units consist of an engine with a hydraulic pump, hydraulic plumbing, a hydraulic fluid reservoir, a hose reel assembly and hoses necessary for supplying hydraulic power to the power swivel motor. Brackets to hold and transport the swivel and the control panel are included.

Trailer-Mounted Unit
The compact, tandem-axle trailer units meet all ICC regulations and are equipped with heavy-duty springs and electric brakes. Tongue weight is designed to ensure on-road stability and deck plate provides solid, skid resistant flooring over the all welded, steel frame.

Skid-Mounted Unit
Skid-mounted units are rugged and made of heavy-duty structural tubing with welded construction. Both ends are rounded for easy skidding. Ends are fitted with an integral pipe that may be used to attach boom lines or hoist slings. Main runners, running the length of the skid, are strengthened by cross-members for additional rigidity.

To meet environmental regulations, both trailer- and skid-mounted units are equipped with skirts to contain fluid spills.

Containerized Unit
Containerized units are built into a 20-foot ocean container. The containers are equipped with two bi-fold doors on one side, and double doors in the rear, to allow complete access. A louvered vent, which has an adjustable cover that can be sealed off for storage or transport, is installed on the front. The floor is diamond tread steel plate.

The entire frame is covered with diamond-patterned deck plate to provide a solid, skid resistant floor.
Logan 120-Ton Power Swivel

- Gooseneck Trailer-Mounted Unit
- Containerized Unit
INSTALLATION

Rig Up
Check all components to ensure that all accessory items (especially the portable control panel) and spare parts are packed, and that all equipment is in working condition. If time permits, the operator should run the power swivel for a short time to check control indicators, filter, and control response, etc., before leaving for the job site. Be sure to have an ample supply of fuel and that the hydraulic reservoir is full.

Upon arriving at the job site, the power unit should be placed in a level position a safe distance from the well head and other hazards. All corners of skid units should be supported. On trailer units, wheel chocks should be set in front and in back of the wheels and the jack lowered to level the trailer bed.

Using a catline or derrick line, lift the swivel unit from the rack. Suspend the swivel over the well head from the drilling hook or elevators. Be sure the elevator is the correct size for the elevator bail. Carefully inspect the elevator for excessive wear (refer to API RP-8B for guidelines).

Verify the strength of the derrick structure and torque rein guide cable to ensure they are strong enough to withstand the loads imposed by the Power Swivel. A Logan Safety Cable (provided as standard equipment on all Logan Power Swivels) should be utilized at all times. Attach one end of the safety cable to the torque rein and secure the other end to the swivel. In the event of torque rein assembly failure, the safety cable will prevent the assembly from falling to the rig floor.

WARNING: Refer to the Important Safety Information on page 3 before operating the Logan 120-Ton Power Swivel.

Remove the control cable or air control hoses and the pressure gauge hose from their storage hangers on the skid or trailer. Connect them to their respective connections on the power unit and control panel.

Pre-Operation Start-up Procedures

Electric Controls
1. Move the “ENGINE” throttle switch to “IDLE” position.
2. Move the swivel “SPEED” knob to the “STOP” position (left).
3. Turn on the control power at the Power Unit.
4. Start the engine and allow the unit to warm up.
5. Turn “ENGINE” switch to the “RUN” position.
6. Set torque limit using the control panel located on top of the fuel tank. Stroke the pump “FWD” and adjust the torque set knob to the desired maximum torque.
7. Set “DIRECTION” switch the desired rotation — “FWD” or “RVS” (center position is neutral).
8. Slowly increase “SPEED” knob until the swivel reaches the desired speed or maximum torque limit.
9. Check the high pressure filters located on the fuel tank. If indicator is in the red, change the filters.
10. Check the return filter. If the indicator gauge is in the red, replace the filter.
**Air Controls**

1. Move the “ENGINE THROTTLE” control lever to the idle position (DECREASE).

2. Move the “SWIVEL CONTROL” lever to the neutral position (center).

3. Start the engine and allow the unit to warm up.

4. Check the air filter/regulator/lubricator unit. Air pressure should read 100 psi or more. Lubricator should be full of oil. Filter should be free of water. If water is present, open the drain valve on the bottom of air reservoir to drain the water. Close the drain valve.

5. Set the torque control to the desired maximum torque. The torque control system is mounted on top of the fuel tank. The torque indicator gauge is calibrated in ft-lbs. Turn the adjustment knob until the desired maximum torque is indicated on the gauge.

6. Increase engine throttle until the desired swivel rpm is attained and the engine runs smoothly.

7. Move the swivel control handle to the “FORWARD” position.

8. Check the high pressure filter indicator.

The Logan 120-Ton Power Swivel is now ready for operation.

**NOTE:** Rotating the swivel without fluid circulation can result in premature washpipe packing failure.
Floating Washpipe Assembly

PS120 FLOATING WASHPIPE ASSEMBLY (PART NO. PS19738-001) REPLACEMENT PARTS

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<td>7</td>
<td>1/2&quot; Lock Washer</td>
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<td>O-Ring</td>
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<td>PS50732-003</td>
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<td>7</td>
<td>PS20128</td>
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<td>Washpipe Packing Nut Screw Retainer</td>
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8 • Logan 120-Ton Power Swivel
OPERATION

General Rules
Logan Oil Tools recommends the following rules be observed when operating the Power Swivel. These operational rules apply to all power swivel units, whether they are equipped with air or electric controls.

1. The pump displacement control should always be used to change the speed of the swivel. Setting the engine at the rated rpm will prolong engine and pump life, burn less oil, and result in fuel economy.

2. When changing the direction of rotation, move the Swivel Control to the center or neutral position, wait for the swivel to come to a complete stop, and then proceed with the change in rotation.

3. Filters should be checked on a daily basis.

4. The hydraulic fluid level should be checked weekly. If the level is below the sight gauge, add hydraulic fluid.

5. Filter indicators should be monitored daily.

6. Do not permit hydraulic oil temperature to exceed 190°F for extended periods.

Air Controls
The air control system utilizes a lever-type control valve that is mounted on the remote control panel. This control provides variable air pressure from 0 to 100 psi to the actuator positioners to control engine rpm and the speed/direction of swivel rotation.

When the swivel control is in the center position, the pump is in neutral and the Power Swivel is not rotating.

Electric Controls
Diesel engine rpm is controlled by the switch labeled “ENGINE” on the control panel.

Swivel rotation is controlled by the knob labeled “SPEED.” It utilizes a forward/neutral/reverse switch to control rotation direction. Moving the switch to the “FORWARD” position will cause the Power Swivel to move in a right-hand (clockwise) direction.

Push the “ENGINE THROTTLE” lever forward until the desired speed is attained. Increase the engine speed if the engine begins to overload or if a higher swivel rpm is required.

Pressure compensating-type torque control overrides the speed control to automatically maintain the maximum pre-established torque limit. This is accomplished by reducing the pump stroke while maintaining engine speed.

MAINTENANCE
The following guidelines are intended to ensure maximum life of the Logan 120-Ton Power Swivel. These are recommendations only. Extreme peak load usage, temperature, and other variables will affect suggested service intervals.

Power Swivel Maintenance

Lubrication
1. Check the gear lubricating oil prior to service. The oil level should be maintained at the oil level plug level at all times. If necessary, bring oil to the proper operating level by adding 85W-140 gear lubricant. Some lubricating oil may leak out when the oil level plug near the top cover plate is removed. If oil does not leak out, gear lubricating oil of proper type and grade should be added to the correct operating level.

2. Gear lubricating oil should be changed after the first 100 hours of initial operation. Check the magnetic drain plug for metal filings when changing the gear lubricating oil.

NOTE: Oil capacity of the Logan 120-Ton Power Swivel is five (5) gallons.

3. After the initial break-in period (first 100 hours of operation), the gear lubricating oil should be changed after each 1,000 hours of operation thereafter, or if the unit has been out of service for an extended period. Always check the magnetic drain plug for metal filings when changing the gear lubricating oil.

4. The elevator bail, stem, and saver subs should undergo a magnetic particle inspection every five years.

Breaking-In
During initial break-in, or after a long period of idleness, run the Power Swivel with a reduced load at slower speed until it reaches normal operating temperature ranging between 120 – 200°F. A somewhat higher operating temperature is permissible in very hot climates, provided that it increases gradually.

Storage
If the Logan 120-Ton Power Swivel must be stored, it should be completely filled with gear lubricating oil to prevent oxidation. Thread protectors or lift plugs should be installed on stems or saver subs to prevent damage to the threads. Grease or dope the threads before installing the thread protectors or lift plugs.

Open gear housings, ports, and removed motors should be covered with clean drop cloths to prevent dirt and trash from entering internal mechanisms. Before shipping parts for service, all openings should be sealed and parts wrapped in clean, heavy kraft paper.
Replacing the Floating Washpipe Assembly and Packing

The entire Floating Washpipe Assembly, including the upper and lower packing nuts, can be removed from the swivel without removing the gooseneck or bonnet.

Remove the four (4) retainers and retaining screws from the lower packing nut. Loosen the lower packing nut by turning it in a clockwise direction until it turns freely. Secure the upper stem to keep it from rotating while loosening and removing the lower packing nut. Use the same procedure to loosen and remove the upper packing nut from the gooseneck.

Remove the washpipe and packing assemblies. Press the washpipe out of the lower packing nut and slide the upper nut off. Remove the three upper packing locking pins and press the upper packing off the washpipe. Replace the washpipe if it shows any signs of wear (i.e., scoring or surface abrasion).

The average life expectancy of the packing is 200 – 250 hours. Remove the old packing from the packing nuts. Thoroughly clean the inside of both nuts. Using the drawing on page 8 as a reference, install the new packing. Assemble the packing and floating washpipe assembly in reverse of assembly procedure. Tighten the packing nuts securely, locking them in place with the retaining screws and retainers.

Power Unit Maintenance

The Power Unit includes the engine, plumbing, filters, reservoir, hoses, hose reel, cables, electrical components, and gauges.

Engine

Please refer to the specific engine manufacturer’s maintenance instructions included with your documentation.

Hydraulic Oil and Filters

The hydraulic fluid reservoir should be maintained at the proper level at all times. The oil level should be visible in the sight gauge at all times.

Filters

The return filter located at the top of the reservoir should be replaced when the pointer indicates that it needs cleaning. The indicator registers when the engine is running.

The high pressure filter in the pressure line should be serviced when the condition indicator displays red. Green indicates that the filter is in satisfactory condition. The filter indicators operate when the swivel is rotating.

Hoses

Lubricate the hose reel hub bearing with automotive chassis grease monthly.

Avoid contaminating the hydraulic fluid and hydraulic system, including the hoses and couplings, with dust, water, or other foreign matter. Introduction of foreign materials into the system will damage the machinery.

Torque gauge hose end connections should be kept clean at all times through the use of dust covers. Open, loose ends, especially those that have been dropped on the ground, should be thoroughly cleaned inside and out prior to use.

Extend the life of the hoses by never allowing them to become twisted or kinked, or unnecessarily stretched. Do not allow any sharp or heavy objects to drop or lay on the hoses. Doing so may cut or crush them.

In cold climates, it is particularly important to keep the hydraulic system free of moisture caused by condensation or water contaminated hydraulic fluid. Any moisture in the system may freeze and cause severe damage, especially to the pump and valves.

Power Unit

Inspect trailer-mounted units prior to use to ensure that it is safe and road-worthy. Pay particular attention when inspecting the following items:

1. Trailer hitch and safety chain
2. Brakes and tires
3. Tail and brake lights, and turn signals
4. Trailer tongue jack and supports

Thoroughly clean the power unit when the job has been completed. Replenish the engine fuel and hydraulic oil supplies. Make any necessary repairs at this time. Hoses should be reeled after cleaning and the hose ends covered.

Power Unit with Air Controls

Expel water condensate from the tank daily by opening the drain valve on the bottom of the air receiver. Pressurize the tank before opening the valve.

Visually inspect the filter/lubricator valve twice a day. Drain any water that has collected in the filter bowl and maintain the lubricating oil at the proper operating level with SAE 10W motor oil.

Always keep the pump stroke cylinder rod, rod bearing, and clevis coated with chassis grease.

Power Unit with Electric Controls

The electrical cable should be coiled and stored on the cable bracket when not in use. Cover the open end with the provided dust cap. Avoid kinking or placing undue tension on the cable.

Open the relay cabinet at least once a year (more often in humid climates) for cleaning. All exposed terminals and metal parts should be cleaned, dried, and sprayed with silicone or varnish.
**Power Swivel**

Power swivels should not be started or operated in freezing weather until the hydraulic system has been properly prepared for cold weather service by:

1. Charge the hydraulic system with hydraulic oil rated for cold weather.
2. Prepare the engine according to the manufacturer’s recommendations.
3. Ensure the hydraulic system is moisture-free.

**Swivel Disassembly**

Care should be taken to ensure that no foreign material enters the interior machinery of the swivel. All disassembly and major repairs should be conducted in a clean, well-equipped shop.

1. Remove all hydraulic hoses from the swivel. Hose ends should be covered to help prevent foreign matter from entering the interior.

*NOTE: When not in use, all hydraulic hoses should be reeled up to prevent kinking and other damage. Damaged hoses may cause blockage or other interference that the unit may not function properly.*

2. Place the swivel on a suitable rack (similar to the bracket on the skid or trailer) that supports the swivel on its bail pins.
3. Remove the hydraulic motor guard.
4. Place an open container under the magnetic drain plug and remove the plug. Check the drain plug and drained gear oil for metal filings and other foreign matter.
5. Remove the four retaining screws and their retainers from the lower packing nut. Secure the lower stem of the swivel to keep the upper stem from turning while loosening the lower packing nut. Turn the lower packing nut in a clockwise direction until it turns freely. Back the lower packing nut completely off the upper stem.

6. Press the washpipe out of the lower packing nut and slide the upper nut off. Remove the three upper packing locking pins and press the upper packing off the washpipe. Replace the washpipe if it shows any signs of wear (scoring or surface abrasion).
7. Remove the packing assembly parts from inside both nuts. (The lower packing assembly consists of an O-ring, packing bottom ring, plain spacer ring, spacer and lantern ring, and three packing seals. The upper packing assembly consists of an O-ring, upper packing nut ring, and one packing seal.) When replacing the packing, it is important that both packing nuts are clean and free of all old packing residue. Make sure both packing nuts are clean and free of foreign matter.
8. Remove and set aside the goose neck and bonnet.
9. Turn the swivel upside down. Remove the hydraulic motor and set it aside.

*NOTE: Do not disassemble the hydraulic motor. If trouble with the motor is known or suspected, carefully plug the ports and return the motor to Logan Oil Tools for inspection and repair.*

10. Remove the lower bearing retainer screws. Set the retainer aside and remove the gasket.
11. Remove the seal retainer snap ring from the bearing retainer and the two lower oil seals.
12. Turn the swivel upright and remove the upper seal protector from the top of the stem.
13. Remove the cap screws from the top cover plate. A rubber mallet may be used to break the gasket seal if necessary. Lift off the top cover plate.
14. Remove the upper gear cover shim and gasket. A putty knife or other thin tool may be used for prying and cleaning.
15. Remove the oil seal from the upper cover plate. Using an inside bearing puller, pull the outer race of the stem upper bearing from the top cover plate.
16. The inner race of the stem’s upper and lower bearings and seal wear ring at the bottom of the stem may be removed with a bearing puller. The final reduction gear is removed by first removing the six ring groove pins and then forcing the gear off the main stem.
17. Remove the screws from the lower gear cover plate. Tap the cover plate gently with a rubber mallet to break the seal if necessary.
18. Remove the first reduction pinion bearing spacer and the first reduction pinion lower bearing from the swivel body.
19. Lift out the final reduction pinion, main thrust bearing, second reduction pinion, and first reduction pinion. The gears may require rotation to facilitate removal.
20. Remove the remaining roller bearings, second reduction lower bearing with its retainer ring, and first reduction pinion upper bearing. As with all bearings, exercise caution when handling to guard against possible damage.
**NOTE:** Each part should be thoroughly cleaned (with steam or a high pressure washer for metal parts, or with a good grade solvent) as it is removed. Check parts for repair or replacement as they are cleaned. Dry all cleaned parts with compressed air or a clean, soft cloth. Coat all clean, dry parts with a thin coat of lubricating oil. Never leave parts exposed overnight without a coating of protective oil.

21. Remove the bail only when absolutely necessary. Lay the bail and swivel body down so the holes at the bottom of the bail pockets in the body can be reached. Use a rubber mallet to loosen the bail pin by tapping it in alternate directions. Pour penetrating oil around the pin to aid the loosening process. While pulling on the pin, repeat the loosening process until the pin is removed. Lift out the bail.

**NOTE:** In the event hydraulic motors, hoses, or similar items are to be stored or shipped for repair, all ports and openings should be carefully sealed to prevent foreign matter from entering interior parts.

**SWIVEL REASSEMBLY**

Care should be taken to ensure that no foreign material enters the interior machinery of the swivel. All major repairs and reassembly should be conducted in a clean, well-equipped shop.

In the event hydraulic motors, hoses, or similar items are to be stored or shipped for repair, all ports and openings should be carefully sealed to prevent foreign matter from entering.

**NOTE:** All parts should be thoroughly cleaned, dried, oiled, and in good operating condition. Never reuse the gear lubricating oil drained from the swivel. Always use new, fresh oil of the recommended type and grade. O-rings should never be reused. It is also recommended that all oil seals be replaced.

1. Place the swivel on a suitable rack (similar to the bracket on the skid or trailer) that supports the swivel on its bail pins.

2. Install component parts on the stem:
   a. Press final reduction gear back on the stem and install groove pin.
   b. Press on upper stem bearing.
   c. Install main thrust bearing.
   d. Install stem lower bearing spacer.
   e. Press on lower stem bearing inner race.
   f. Press on lower seal wear ring.

3. Install component parts onto shafts:
   a. Install key and second reduction gear onto final reduction pinion.
   b. Press roller bearings onto each end of final reduction pinion.
   c. Press roller bearing on upper end of second reduction pinion.
   d. Press first reduction pinion lower bearing onto first reduction pinion.

4. With the stem lower bearing in place, set the main stem through the stem lower bearing into position in the body.

5. Check the top face of the body, making sure that the surface is clean and free of burrs. Place a gasket on the face of the body.

6. Place a set of three shims (one each in thicknesses of .005", .007", and .020") on the body face.

7. With the upper cover plate upright, press the upper oil seal into position. Press the outer race of the stem upper bearing into the top cover plate.

8. Position the upper cover plate over the stem and into place on the body. Insert cap screws with lock washers into the upper plate and tighten.

9. Place a small hydraulic jack under the lower end of the stem and a micrometer against the top of the stem to detect and measure any vertical movement (end-play). Apply lift to the stem with the jack and note any movement shown on the micrometer.

10. Remove the jack, micrometer, and the top cover plate. Remove the shims and replace them with a combination of shims that will allow a sufficient total amount of end-play between .004" and .005".

**NOTE:** Do not tighten the cover plate without sufficient shims or over-tighten the upper plate cover screws. Doing so will cause the bearings to bind.

11. Press the second reduction pinion lower bearing into the lower cover plate. Set the retainer ring into position above the bearing and press the first pinion upper bearing into place in the body.

12. Set the first reduction pinion, first reduction gear, and first reduction pinion bearing spacer into place in the swivel body.

13. Remove the top cover plate and set the final and second reduction pinion into place. Rotate the shafts in order to mesh the gears. Reinstall the top cover plate and tighten the screws.
14. Turn the swivel upside down. Check the bottom surface of the body for burrs and flatness. Lay the lower cover gasket on the face. Position the lower cover plate on the body and insert the cap screws with lock washers. Tighten the screws.

15. Place the two lower stem oil seals into position on the stem’s lower bearing retainer. Set the seal retainer snap ring on the bearing retainer. When properly assembled, the lips of the oil seals should point upward. Exercise caution when assembling the oil seals over the wear ring, being careful not to tear or turn back the lips of the oil seals or cause other damage to the seals. Damaged seals will cause leakage. Set the lower bearing retainer over the stem and in place on the body. Insert the six (6) lower bearing retainer cap screws with lock washers. Tighten the screws.

16. Insert the first reduction pinion oil seal. Place the hydraulic motor with the hydraulic motor adapter attached into position. Insert the eight cap screws with lock washers. Tighten the screws. Attach the hydraulic motor guard.

17. Turn the body upright.

18. Grease the upper oil seal and place the upper seal protector in position on the stem. Make sure the seal protector is right-side up with the lip against the upper cover plate.

19. Assemble the bonnet to the upper cover plate and bolt the gooseneck to the bonnet. Insert the gooseneck pipe plug and tighten.

20. Coat the packing elements (O-rings, upper packing nut ring, packing, spacer and lantern ring, plain spacer ring, and packing bottom ring) generously with Logan packing lubricant and install them into their respective packing nuts. Reassemble the floating washpipe assembly and packing in reverse of the dis-assembly procedure outlined on page 9. Reinstall the packing nuts, retainers, and retainer screws, tightening and locking the packing nuts securely. Securely tighten the packing nuts and lock into place with their respective retainers and retainer screws.

21. Lay the unit flat on a workbench and insert the bail into the bail pockets of the body. Align the bail pins with the lock pin holes in the body. Secure the bail by driving the bails pins into place with a rubber mallet. As the lock pins come into alignment, drop a drift punch through them, driving lightly to laterally align them.

22. Drop the bail pin grooves into place and snug-up with a hammer. Hang up the swivel by the bail and support the underside of the swivel. Using a medium weight (2-1/2 lb) sledge hammer, drive the pins in straight through until the heads are flush with the top of the bail pockets.

23. Reattach all piping to the hydraulic motors before reattaching the motor guard.
# Troubleshooting

## GENERAL

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Cause and Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of charge pressure — pump in neutral.</td>
<td>Charge pressure gauge registers zero.</td>
<td>Gauge may be defective. Remove charge pump and inspect for broken parts.</td>
</tr>
<tr>
<td>Loss of charge pressure — pump in neutral.</td>
<td>Vacuum gauge reading is high (10&quot; Hg or more).</td>
<td>Suction strainer may be clogged. Replace filter.</td>
</tr>
<tr>
<td>Loss of charge pressure — pump on stroke.</td>
<td>Charge pressure is less than 60 psi when power swivel is rotating at full rpm.</td>
<td>Pump or motor may be defective. Close the ball valve in the high pressure line. Put pump stroke on stroke. If charge pressure is normal, the motor is defective. Replace motor. If charge pressure is not normal, the pump is defective. Replace the pump.</td>
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</tbody>
</table>

## Hydraulic oil overheats

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Cause and Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature gauge registers 190°F or higher.</td>
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<td>Hydraulic oil has been aerated (a milky appearance indicates presence of air in the oil). Check suction connections on charge pump. Check oil level in reservoir.</td>
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</tbody>
</table>

## AIR CONTROL SYSTEM

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Cause and Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to control speed</td>
<td>Power Swivel has low rpm</td>
<td>Engine is not at full rpm. Low air pressure. Adjust air pressure to 100 psi. Sticky air cylinder. Clean and lubricate air cylinder on pump. Defective air control valve. Replace valve section of pump control.</td>
</tr>
<tr>
<td>Swivel rotates when control is in neutral position (air controls)</td>
<td>Visual</td>
<td>Air cylinder rod is out of adjustment. Remove bolt and allow rod to center. Adjust rod end to match.</td>
</tr>
</tbody>
</table>

## ELECTRIC CONTROL SYSTEM

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Cause and Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of speed control</td>
<td>Visual</td>
<td>Defective rheostat. Voltage to control valve should be zero to 9 volts DC. Replace control valve if defective. Dirty or defective control valve. Free the sticky spool by rapidly moving the lever on the valve back and forth. Loose electrical connection at control valve or pressure safety switch. Clean and tighten connections.</td>
</tr>
<tr>
<td>Swivel rotates when control is in neutral position</td>
<td>Visual</td>
<td>Displacement control adjustment is not centered. Consult hydro-transmission manual.</td>
</tr>
<tr>
<td>Loss of direction control</td>
<td>Visual</td>
<td>Defective forward/reverse switch. If no voltage to pump control valve. Replace with new switch.</td>
</tr>
<tr>
<td>Swivel rotates when control is in neutral position</td>
<td>Visual</td>
<td>Control valve on pump is not properly centered. Loosen lock nut on hex bolt located on the front of the control. Turn bolt in one direction until the swivel turns. Turn the bolt in the opposite direction, counting the turns until the swivel turns in the opposite direction. Turn bolt to midpoint and fasten the lock nut.</td>
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</table>
## Swivel Head Parts List

Item numbers refer to drawing callouts on pages 16 – 19

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART NO.</th>
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<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>PS8272-001</td>
<td>1</td>
<td>2-7/8” EUE Gooseneck Plug</td>
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<td>2</td>
<td>PS8738</td>
<td>1</td>
<td>Gooseneck</td>
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<tr>
<td>3</td>
<td>HCLWA-500</td>
<td>15</td>
<td>1/2” Lock Washer</td>
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<tr>
<td>4</td>
<td>ACSA8-500-13-200</td>
<td>7</td>
<td>1/2 - 13 x 2” Socket Head Cap Screw</td>
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<tr>
<td>5</td>
<td>PS48303-001</td>
<td>1</td>
<td>Torque Rein Assembly (Long) Standard</td>
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<td>6</td>
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<td>PS90137</td>
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<td>8</td>
<td>PS99295</td>
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<td>9</td>
<td>PS67272</td>
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<td>Lower Gear Cover Gasket</td>
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<td>PS13595</td>
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<td>Lower Gear Cover Plate</td>
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<td>11</td>
<td>ACSA8-750-10-2000</td>
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<td>3/4 - 10 x 2” Socket Head Cap Screw</td>
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<td>12</td>
<td>HCLWA-750</td>
<td>32</td>
<td>3/4” Lock Washer</td>
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<td>13</td>
<td>PS82272</td>
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<td>Lower Stem Bearing Retainer</td>
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<td>14</td>
<td>ACSA8-750-10-1500</td>
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<td>3/4 - 10 x 1-1/2” Socket Head Cap Screw</td>
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<tr>
<td>15</td>
<td>PS84548</td>
<td>2</td>
<td>Hydraulic Motor</td>
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<td>16</td>
<td>PS135002</td>
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<td>Manifold Assembly Right/Left</td>
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<tr>
<td>17</td>
<td>PS93456</td>
<td>2</td>
<td>1-1/4” Pipe Swivel Joint</td>
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<td>18</td>
<td>PS22196</td>
<td>2</td>
<td>1-1/4” Quick Disconnect</td>
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<td>19</td>
<td>PS75886</td>
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<td>1-1/4” Dust Cap</td>
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<td>21</td>
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<td>22</td>
<td>PS00838-001</td>
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<td>Stem</td>
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<td>Lower Stem Bearing - Inner/Wear Ring</td>
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<td>24</td>
<td>PS61472</td>
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<td>Lower Oil Seal</td>
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<td>PS68272</td>
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<td>Lower Oil Seal - Inner</td>
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<td>PS62472</td>
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<td>Lower Stem Bearing - Outer</td>
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<td>PS97272</td>
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<td>Main Thrust Bearing</td>
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<td>29</td>
<td>PS83272</td>
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<td>Ring Gear Groove Pin</td>
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<td>30</td>
<td>PS80272</td>
<td>1</td>
<td>Main Drive Gear</td>
</tr>
<tr>
<td>31</td>
<td>PS28413</td>
<td>2</td>
<td>Bail Pin</td>
</tr>
<tr>
<td>32</td>
<td>PS44813</td>
<td>2</td>
<td>Retainer (Bolt &amp; Nut)</td>
</tr>
<tr>
<td>33</td>
<td>PS56144</td>
<td>1</td>
<td>Seal Protector Ring</td>
</tr>
<tr>
<td>34</td>
<td>PS19738-001</td>
<td>1</td>
<td>Floating Washpipe Assembly</td>
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### Torque Reins and Components

<table>
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<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>LENGTH/STROKE</th>
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<tbody>
<tr>
<td>PS48303-001</td>
<td>PS120 Long Torque Rein (standard with head or unit)</td>
<td>Retracted 32.5”/Extended 51.75” Long</td>
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<tr>
<td>PS48303</td>
<td>PS120 Short Torque Rein</td>
<td>Retracted 22.5”/Extended 36” Long</td>
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<tr>
<td>PS48303-014</td>
<td>PS120 Extra Short Torque Rein</td>
<td>Retracted 12”/Extended 22” Long</td>
</tr>
<tr>
<td>PS55116</td>
<td>PS120 Torque Rein Roller Assembly</td>
<td>G14085-BULK 85W-140 Gear Oil</td>
</tr>
<tr>
<td>PS71107-001</td>
<td>Hydraulic Motor Shaft Seal Kit</td>
<td></td>
</tr>
<tr>
<td>PS293512</td>
<td>Hydraulic Motor Brake</td>
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</tr>
<tr>
<td>SWEDGE-002</td>
<td>3” L.P. x 2” L.P. x 4 SWEDGE</td>
<td></td>
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</tbody>
</table>
Swivel Head – Front View

Refer to the Swivel Head Parts List on page 15 for part numbers and descriptions
Swivel Head – Side View
Refer to the Swivel Head Parts List on page 15 for part numbers and descriptions
Swivel Head – Top View
Refer to the Swivel Head Parts List on page 15 for part numbers and descriptions

(Log page 18 for Section A-A)
Section A-A – Through Gear Train

Refer to the Swivel Head Parts List on page 15 for part numbers and descriptions
Specifications

POWER SWIVEL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Model No.</th>
<th>PS120</th>
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<tbody>
<tr>
<td>MODEL NO.</td>
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<tr>
<td>NOMINAL LOAD RATING (tons)</td>
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<tr>
<td>DYNAMIC LOAD RATING @ 100 RPM (tons)</td>
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<td>MAXIMUM TORQUE (ft-lbs)</td>
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<td>MAXIMUM SPEED (rpm)</td>
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<td>STANDARD STEM CONNECTION</td>
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<td>GOOSENECK CONNECTION</td>
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<td>3” LP</td>
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<tr>
<td>SWIVEL HEAD ASSEMBLY WEIGHT (lbs)</td>
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POWER UNIT & CONTROL SPECIFICATIONS

<table>
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<tr>
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<tr>
<td>DIESEL ENGINE *</td>
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<td>Q386.7 or C6.6</td>
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<tr>
<td>ENGINE CONT HP @ 2000 RPM</td>
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</tr>
<tr>
<td>HYDRAULIC OUTPUT (max gpm/max psi)</td>
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<td>89/5,000</td>
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</table>

* Choice of Cummins or Caterpillar/Perkins engines

**CAUTION:** Before installing a Logan 120-Ton Power Swivel on a rig, refer to the installation procedure on page 6. Failure to properly install the Power Swivel can result in injury to the operator and rig floor personnel.
Power Swivel Performance Data

**Allowable Lift Load (lbs)**

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**Swivel Stem rpm**
Swivel Head – Dimensions
Hook Link Adapter Assembly

**MARK PART 6.00 (REF)**

**22.25 (REF)**

**16.13 (REF)**

**HOO L K INE ADAPTR ASSEMBLY (PART NO. PS433512)**

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## PS120 Power Unit Parts List

### LOGAN PART NO. QTY DESCRIPTION

#### HYDRAULIC PUMP
- PS511512 1 Hydraulic Pump for Air Controls
- PS511512-001 1 Hydraulic Pump for Electric Controls
- PS02196 1 Pump Stroke Positioner
- PS02196-002 1 Pump Stroke Positioner Repair Kit
- PS73426 1 1/4" Check Valve
- PS711512-001 1 Pump Drive
- PS260412 1 Auxiliary Pump (Hose Reel and Hydraulic Winch)

#### HYDRAULIC RESERVOIR
- PS34196-001 1 40 gal Hydraulic Tank Reservoir
- PS780412 1 Hydraulic Suction Strainer
- PS754T08N 1 Hydraulic Suction 2" Ball Valve
- PS099612 1 Hydraulic Return Filter Assembly
- PS099612-001 1 Hydraulic Return Filter Element Only
- PS80602 1 Hydraulic Vacuum Gauge
- PS02311 1 Filler Breather Cap
- PS30795-002 1 Oil Level Gauge with Temperature
- PS89046 1 Hydraulic Reservoir Only
- PS233612 1 Relief Back Pressure Orifice

#### FUEL TANK
- PS16892-001 1 60 gal Fuel Tank Assembly
- PS95526 1 Fuel Tank Only
- PS9692-2 2 Fuel Sight Tube
- PS94626 1 1-1/4" High Pressure Ball Valve
- PS61648 2 High Pressure Filter Assemblies

#### MISCELLANEOUS
- PS900712 1 Umbilical Stand
- PS28674 1 Control Stand
- PS57196 1 Heat Exchanger
- PS57196-002 1 Heat Exchanger Guard
- PS3MM9000 1 Electric Winch
- PS558612 1 Hydraulic Winch
- PS44046 1 Battery Box
- PS64044-003 1 Tool Box
- PS87477 1 Power Swivel Stand

### LOGAN PART NO. QTY DESCRIPTION

#### HOSE REEL
- PS94376 1 Hose Reel Assembly
- PS94376-HW 1 Hose Reel Assembly with Hydraulic Winch
- PS97556 1 100 ft High Pressure Hose Assembly
- PS24376 1 100 ft, 3/4" Case Drain Hose
- PS195412 1 Hydraulic Valve for Reel
- PS195412-001 1 Hydraulic Valve for Reel with Hydraulic Winch
- PS22250-1 1 Valve Handle Replacement Only
- PS220712-002 1 Hydraulic Motor Hose Reel
- PS89638-002 1 Flow Control Hose Reel
- PS490412 1 Three-Port Coupling Hub
- PS473912 1 Three-Port Coupling Seal Kit
- PS120712 1 Torque Hub

#### AIR TORQUE SET PANEL
- PS223612 1 Torque Set Panel Assembly
- PS17196 1 0 – 8,100 ft/lbs Torque Gauge
- PS98126 1 Torque Set Relief Valve
- PS220512 1 Torque Set Air Override Valve

#### AIR CONTROL PANEL
- PS09966-003 1 Pump Control Valve
- PS29966 1 Engine Throttle Control Valve
- PS17196 1 0 – 8,100 ft/lbs Torque Gauge
- PS220512 1 Engine Kill Valve
- PS80345-003 5 1/4" Quick Disconnect, Air Male x Male Pipe
- PS70345 1 1/4" Quick Disconnect, Hydraulic Male x Male Pipe
- PS217752 1 Control Umbilical Bundle
- PS70345-001 5 1/4" Quick Disconnect, Air Female
- PS80345 1 1/4" Quick Disconnect, Hydraulic Female

#### AIR PREPARATION PACKAGE
- PS81455-002 1 Air Preparation Package
- PS81455 1 3 gal Air Receiver
- PS24695 1 Gauge
- PS73565 1 Safety Pop-Off Valve
- PS93646-001 1 Filter Regulator/Lubricator
- PS81455-003 1 Tank Guard

#### ELECTRIC CONTROL BOX
- PSEC1009 1 Digital Torque Display
- PSEC1008 1 Electric Pump Stroke Control
- PSEC1041 1 Electric Control Cable Assembly
- PS89638-010 2 Control Cable Connector Plug
- PS89638-011 1 Panel Mount Connector Receptacle
- PSEC1006 1 Two-Position Switch/Engine Throttle
- PSEC1007 1 Three-Position Switch/Direction Selector

#### HYDRAULIC FILTERS
- PS915512 1 Charge Pump Filter
- PS780412-001 1 Suction Strainer
- PS099612-001 1 Return Filter Element
- PS921512-001 1 High Pressure Filter Element
Skid-Mounted Power Unit

The hydraulic system has been omitted from the drawing for clarity. Please refer to the hydraulic schematic on page 28.
Gooseneck Trailer-Mounted Power Unit

The hydraulic system has been omitted from the drawing for clarity. Please refer to the hydraulic schematic on page 28.
Containerized Power Unit

The hydraulic system has been omitted from the drawing for clarity. Please refer to the hydraulic schematic on page 28.
Hydraulic Schematic
Logan 120-Ton Power Swivel

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**Torque Controller**

For Air and Electric Controls

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**Torque Controller Assembly (PS65686-001) Replacement Parts**

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<td>PS220512</td>
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