

PEMAC PTE LTD

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1 GENERAL

1.1 Purpose

The purpose of this manual is to ensure proper installation, use and maintenance of the equipment without any damage to the equipment or injury to personnel.


1.2 Safety

For safety reasons, all instructions listed in this document shall be adhered to.

- ◆ Involved personnel shall be familiar with the contents of this user manual. This can be managed in a review meeting.
- ◆ Only qualified workers shall perform installation work.
- ◆ Only certified lifting gear rated for the actual load shall be used.
- ◆ During installation, adjustments and hook up will be carried out. These activities involve crew working on the machine above ground, consequently ground based personnel shall be made aware of the dropped object risks.
- ◆ Before putting the equipment into service a Function Test should be carried out. This is necessary to ensure that there is sufficient operating clearance between the Safety Push Arm and the surrounding equipment and also to ensure that the Arm cannot be pulled outside its luffing range by the HawkJaw lift cylinder or its load.
- ◆ Before starting any internal inspection, pressure in the hydraulic system shall be drained or released and the emergency stop valve shall be closed.
- ◆ The product must not be used as general lifting equipment. It is designed solely to horizontally position the drill string tong and / or casing power tong.

1.3 Restriction in Guarantee


All procedures, instructions and restrictions in the user manual for this product must be followed, otherwise the guarantee will cease to be valid.

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2 MAIN DATA

2.1 Design Data

1	Equipment	Safety Push Arm	
2	Service	Drill-floor, positioning of tubular make-up tools	
3	Design & manufacturing standard	ISO 9001	
4	Specification	Project Specification	
5	Codes	IMO MODU Code w/ 1991 Amendments.	
6	Certifying authority	N/A	
7	Environmental loads	Operating conditions; fixed drilling platform only	
8	Area classification	ZONE 1	
9	Design Temperature	0°C to 40°C	
10	Environment	Highly saliferous and corrosive	
11	Min. Hydr. flow rate	l/min	40 l/min
12	Min. working pressure	barg	20 bar
13	Max. operating pressure	barg	210 bar
14	Weight, SPA-7D-	kg	1050
15	Weight, SPA-7M-	kg	900
16	Equipment shipping size, SPA-7D (L x W x H)	mm	10,060 x 750 x 330
17	Equipment shipping size, SPA-7M (L x W x H)	mm	6,100 x 750 x 330
18	Load Rating (WLL)	kg	0
19	Reach, maximum	mm	5700
20	Extension stroke	mm	2135
21	Luffing range	degrees	±30°
22	Slewing range	degrees	±180°
23	Hydraulic cylinder stroke	mm	2135
24	Cylinder construction, bore/rod	mm	Welded, 80/40
25	Cylinder displacement	l	10.73 / 8.05
26	Cylinder stroke speed	m/s	Approx. 0.2
27	Hydraulic tubing & fittings		Rated 210 bar min. WP, SS-316
28	Hydraulic hoses		SAE 100R2
29	Fasteners & pins		AISI SS-304, U-bolts ASTM A325
30	Steel		ASTM A36 or better
31	Welding		In accordance with AWS D1.1
32	Surface Preparation		Hot-dip Galvanise to BS-729
33	Gritblasting		SA 2.5 (ungalvanised steel only)
34	Paint Specification		2-coat epoxy marine paint
35	Colour		White
36	Lubrication		EP-1 grease
37	Hydraulic Oil		ISO VG46 or equal
38	Required purity of hydraulic oil		NAS 1638, Class 8
39	Control location, SPA-7-S		Winch controls on HawkJaw 100K control handle
40	Control location, SPA-7-J		Valve mounted atop HawkJaw 65K control handle
41	FAT		Yes
42	Load Test		No
43	Data Book		Yes
44	Installation & Commissioning		By Owner

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2.2 Connection and Interface Requirements


Refer to the following documents:

Title	Sub-title	Document No.
SPA-7-DS, -DJ, MS, -MJ	Shipping Assembly	Dwg No. 06-0250-02
Mounting Kit, SPA-7D/-7M	Installation Sequence & Options	Dwg No. 06-0250-01
Flow Diagram	Hydraulic Schematics, SPA-7-S/-J	Dwg No. 06-0250-30
(This) User Manual	Section 4. Installation	SPA7-IOM-01, sect. 4

2.3 Shipping Data

The following assemblies and parts are included in the Safety Push Arm supply:

- 1 Support beam, 33 ft long for SPA-7D- or 20 ft long for SPA-7M-.
- 1 Spherical bearing assembly with mounting brackets.
- 1 Telescoping tube assembly with equipment nameplate.
- 1 Lift cylinder clamp assembly with pins, washers, clips, bolts and nuts.
- 1 Hydraulic assembly with hoses including internal relief valve for SPA-7-S or external control valve for SPA-7-J.
- 2 Clamp bracket plate.
- 2 Clamp bracket weldment.
- 1 Rig-down arm rest bracket.
- 4 Special 1½" stud bolts.
- 8 1½" nuts.
- 4 ¾" U-bolts, 26" long.
- 6 ¾" U-bolts, 10½" long.
- 20 ¾" Spring washers.
- 20 ¾" Nuts.
- 1 Safety sling, 2m long.
- 2 Anchor shackles.

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3 TECHNICAL DESCRIPTION

3.1 General Description

The Pemac Safety Push Arm enhances operation of the HawkJaw by means of a manually operated hydraulic control valve for powering the HawkJaw onto the tool joint and back to a convenient standby position. The control valve is mounted on, and moves with the HawkJaw. The arm is mounted well above the drill-floor, where it pushes or pulls the barrel of the HawkJaw's lift cylinder to the desired position.

Time is saved by avoiding the need to lower the HawkJaw to the drill floor for safe standby. Labour is reduced to one-man operation. Safety is improved by reducing floor crew fatigue. Components are selected and arranged to withstand an aggressive environment and to minimize requirements for routine maintenance, due to the elevated location of the equipment.

3.2 Standard Models


The Arm is manufactured as a basic 7 foot (2.1 m) stroke model; SPA-7 with two alternative mounting kits and two alternative hydraulic kits. Mounting Kits are configured either as 18 ft (5.5 m) span for use in drilling Masts with various size leg or vee-door members, or as 30 ft span (9.0 m) for use in drilling Derricks up to 30 ft x 30 ft base. Hydraulic Kits are configured for use with either the HawkJaw Senior 100K (utilises existing winch controls) or for the HawkJaw Junior 65K (includes directional valve and handle bracket).

This gives four standard models:

- SPA-7DS - for positioning a HawkJaw 100K in a Derrick.
- SPA-7DJ - for positioning a HawkJaw 65K in a Derrick.
- SPA-7MS - for positioning a HawkJaw 100K in a Mast.
- SPA-7MJ - for positioning a HawkJaw 65K in a Mast.

3.3 Support Beam Assembly

The support beam assembly is mounted in the derrick or mast by means of high tensile U-bolts and clamp brackets onto structural members. Only negligible bending moments and minor lateral forces are transmitted to the structure. Leg and arm brackets are adjustable to accommodate leg or vee-door sections from 5" to 14" and 1½" cadmium plated adjustment studs allow clamping on 5" to 12" angle bar. The beam can be installed on any suitable side of the derrick or mast. An arm rest cradle is mounted on the support beam to accept the outboard end of the arm when it is not clamped on the HawkJaw lift cylinder.

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3.4 Spherical Bearing Assembly

The spherical bearing assembly allows the push arm to be moved radially around its mounting point. The passive movement range is +/-30° luffing to accommodate the vertical travel of the HawkJaw lift cylinder and +/-180° slewing to reach well centre, mousehole and any suitable standby position. The assembly comprises of a stainless steel housing with bronze bearings, a 4" chromed ball bolted to a stainless steel pin, galvanised steel mounting brackets and high tensile U-bolts. The spherical bearing can be mounted above or below the arm. The arm bracket assembly is horizontally adjustable to optimise arm reach and the support beam bracket can be similarly adjusted to any position along the beam. Dropped-object safety is provided by a 3/8" stainless steel wire rope restraint sling, complete with stainless steel anchor shackles.

3.5 Telescoping Tube Assembly

The active component of the system is a telescoping tube assembly built out of galvanised square hollow sections with bronze linear bearings. The external housing tube is clamped to the spherical bearing with high tensile U-bolts. The hydraulic cylinder is housed inside a smaller galvanised tube, also with bronze linear bearings. This cylinder tube contains and protects the hydraulic tubing and anchors the blind end of the cylinder. The rod end clevis is anchored by a 1-3/8" stainless steel stud through the external housing tube. The assembly has cover plates at each end to totally enclose and protect the push cylinder.


3.6 Lift Cylinder Clamp Assembly

The lift cylinder clamp assembly is attached to the cylinder tube via an easily removable stainless steel pivot pin, to facilitate rapid de-coupling of the HawkJaw lift cylinder for tool service, casing operations, etc.. The cylinder clamp is able to rotate through 30° either side of vertical to accommodate the full stroke of the lift cylinder. It has cylindrical faces to suit the lift cylinder barrel and is secured with stainless steel bolts and nuts.

3.7 Hydraulic Kit, SPA-7-S

The hydraulic kit for positioning the HawkJaw 100K includes the 7 ft stroke cylinder, stainless steel tubing and fittings, plus a relief valve set at 300 psi to limit rod buckling force while providing 1,800 lbs push. These components are enclosed in the push arm and terminate at two ports on the moving end of the arm. The push cylinder has an over-sized rod for robustness and durability.

Two hydraulic control hose assemblies drop down from the arm ports for connection to HawkJaw at the winch hose ports. They are provided complete with quick disconnect couplings and adaptor fittings. Operation of the push arm can be safely performed by the operator at the HawkJaw right control handle assembly, via the HawkJaw 100K's air-pilot actuated winch directional valve. Because the HawkJaw hydraulic pull-back winch becomes redundant, it is normally dismantled from the unit, preserved and stored.

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3.8 Hydraulic Kit, SPA-7-J

The hydraulic kit for positioning the HawkJaw 65K includes the same 7 ft stroke cylinder, stainless steel tubing and fittings. These components are enclosed in the push arm and terminate at two ports on the moving end of the arm. The push cylinder has an over-sized rod for robustness and durability.

Two hydraulic control hose assemblies drop down from the arm ports for connection to a manually-operated directional valve which is housed in a protective enclosure designed to mount atop the HawkJaw 65K right control handle assembly. They are provided complete with quick disconnect couplings and adaptor fittings. Two additional hose assemblies with tees are connected to the HawkJaw pressure and return lines. Operation of the push arm can be safely performed by the operator at the HawkJaw via the manually-operated directional valve.

Optional Installation & Commissioning

Field service can be provided at current service rates, to supervise installation and/or commissioning of the push arm on the rig. This service can be accomplished at the same time as HawkJaw commissioning and training. Pemac standard terms and conditions of service shall apply.

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4 INSTALLATION

4.1 Requirements.


The following items are required for the installation of the Safety Push Arm:

- The ringline hydraulic power unit should be operational and filled with documented clean hydraulic fluid to NAS 1638 Class 8 or better.
- Lifting equipment, including soft slings, for mounting the push arm. The use of two utility winches and a 1-ton chain hoist will be most efficient.
- A HawkJaw drillstring tong with lift cylinder in position suspended from its static line.
- Hand tools, including wrenches, measuring tape, marker pen, spirit level, etc..
- Grease or pipe dope for applying to the stud and bolt threads prior to installation.
- A plan or sketch of the drill-floor which identifies the desired standby position for the HawkJaw, well centre, mousehole and arm pivot location.
- This manual, including the reference documents below.
- Red and white hazard tape, to bar entry to the drill-floor below the work area.

4.2 References

Refer to Pemac drawing no. 06-0250-01 for installation notes and dimensions.

Refer to Pemac drawing no. 06-0250-30 for hydraulic requirements.

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4.3 Installation Sequence

Check that the Safety Push Arm is complete per Section 2.3, Shipping Data and that there is no visible damage. Lift the arm as-shipped to the drill-floor, remove U-bolts to lay out the parts. Then:-

1. Identify the location for mounting the support beam, approx. 15 ft above the drillfloor.

If the support beam is too long and would cause an obstruction in the mast or derrick, cut off one end plate and the excess beam length. **CAUTION:** If cutting is done with oxy-acetylene, avoid breathing toxic fumes from paint and galvanising zinc. Weld the beam end plate onto the open end. Power wire brush and apply cold-galvanising spray paint to the effected area.

2. Temporarily mount the support beam brackets and arm rest cradle on the beam, in their proposed orientation.

Lift and temporarily secure the support beam into position and re-install each bracket around its selected structural member, using pipe dope on the stud threads.

3. Temporarily mount spherical bearing assembly on the push arm, in its proposed position. Lift and temporarily secure the push arm and bearing brackets into position and install two spherical bearing bracket U-bolts around the support beam, using pipe dope on the stud threads.

Set the outboard end of the arm in the arm rest cradle until it can be clamped on the HawkJaw lift cylinder.

4. Adjust the arm bracket along the arm as necessary to just reach the furthestmost operating position (well centre, mousehole or standby location).


Note that the retracted lift cylinder bracket must be within 8 ft (2.4m) of furthestmost operating position, because of the 7 ft stroke and approximately 1 ft distance from lift cylinder centre to tool joint centre.

5. Install the safety sling around the spherical bearing brackets and secure it with the 3/8" bolt type anchor shackles provided.

Ensure that the safety sling is secured in such a manner that it cannot shift away from the bearing brackets and it cannot become stressed by arm movement.

6. Extend the Hawkjaw lift cylinder to mid-stroke which is about 3 ft (900mm) extended.

With the push arm horizontal, install the lift cylinder clamp on the barrel of the HawkJaw lift cylinder. With the push arm retracted, the lift cylinder may be extended and retracted to verify that it cannot force the push arm outside of its luffing envelope.

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7. For the SPA-7-J, install the control valve housing on top of the HawkJaw 65K right control handle assembly, in place of the existing panel top cover plate. Connect the two supply hoses from control valve to the HawkJaw hydraulic pressure and return lines at the main manifold (see figure 1) via the tee fittings provided. Connect the two hydraulic control hose assemblies from the push arm to the manually-operated directional valve via the quick disconnect couplings. With hydraulic power to the unit, operate the directional valve to stroke the arm back and forth to purge air from the circuit. Adjust hose orientations as necessary to ensure hoses can move freely without chaffing.

For the SPA-7-S, connect the two hydraulic control hose assemblies from the push arm to the HawkJaw Senior's pull-back winch lines (see figure 2) via the quick disconnect couplings and adaptor fittings. The HawkJaw Senior's hydraulic pull-back winch becomes redundant, so it may be dismantled from the unit, preserved and stored. With hydraulic power to the unit, operate the 'Winch on' and 'Winch off' buttons on the right control handle assembly to stroke the arm back and forth to purge air from the circuit. Adjust hose orientations as necessary to ensure hoses can move freely without chaffing.



Figure 1 – 65K Pressure & Return Lines




Figure 2 – 100K Pull-back Winch Lines

8. Function the push arm to ensure that there is sufficient operating clearance between it and all of the surrounding equipment & structures throughout its operating envelope. If any interference is found which could accidentally arise during operation of the Arm or HawkJaw, make adjustments to the installation layout and/or note the interference and initiate appropriate safety procedures according to your Company's safety program.

When all adjustment of the push arm, bearing brackets, support beam brackets and arm rest cradle have been completed, check that all clamp nuts are installed with spring washers and are tight (one full turn beyond snug).


The Safety Push Arm will now be ready to be commissioned.

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5 Commissioning

5.1 General Requirements


- During commissioning, mechanical and hydraulic adjustments and hook up may be carried out. These activities may involve testing crew working on the machine above ground, consequently the commissioning area should be cordoned off with red and white hazard tape. To avoid any injury, personnel other than the commissioning crew shall attend from a safe distance.
- Before the start of commissioning, a designated test leader shall go through the planned test program, putting stress on safety aspects of the work.
- Before putting the equipment into service, a Function Test should be carried out to ensure that the equipment works correctly and that any interference with other equipment is properly avoided or mitigated.
- A Load Test is not required as the arm is not capable of lifting.
- Flushing of the hydraulic system is only possible in a rudimentary manner, due to the fact that the hydraulic system has only one hydraulic cylinder and control valve. The flushing shall be accomplished by repeatedly stroking the cylinder during installation and during commissioning.
- Before starting any internal inspection, all pressure in the hydraulic system shall be drained or released and the equipment isolation valve shall be closed.

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5.2 Activity Checklist

<i>Act. No.</i>	<i>Description of activity</i>	<i>Accepted or Punch Item no.</i>	<i>Vendor sign</i>	<i>Client/ Owner sign</i>	<i>Class sign</i>
1	Verify that all the Installation work has been completed in accordance with Section 4 and the references drawings.				
2	Start the ringline HPU. Check that system pressure is present and does not exceed 210 bar (3000 psi) to the HawkJaw.				
3	Pull the HawkJaw emergency stop button and verify that there is no sign of leakage on from any of the Push Arm hydraulic equipment.				
4	Operate the HawkJaw 'Raise' button to lift the tool clear of the drill-floor. Then pull the Arm control valve lever (65K) or press the 'Winch on' button (100k) to extend the Arm. Check that Arm movement control is smooth.				
5	Swing the HawkJaw to well centre, mousehole/s and standby position to verify the tool is able to reach all desired positions.				
6	Check that the Arm installation will not cause the lift cylinder static line to cut or chaff the rotary hose, service loops or other lines in the derrick or mast.				
7	Push the Arm control valve lever (65K) or press the 'Winch off' button (100k) to retract the Arm. Check movement control is smooth and proportional.				
8	Operate the HawkJaw 'Raise' button to lift the tool to its highest position. Then swing the HawkJaw through its entire arc of operation. Verify that the Arm has safe clearance all around, including the tail-swing.				
9	Extend and retract the Push Arm at least five times. Verify that the load moves smoothly and that there is no sign of leakage on from any part of hydraulic equipment.				
10	Move the HawkJaw to its standby position and stop the HPU. Using the correct size wrenches/spanners, check that all mounting fasteners are tight and the safety sling is secure.				

After all commissioning activities are completed, the Commissioning Leader and at least one representative from each witnessing party shall sign the Commissioning Signature Card on the next page.

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5.3 Signature Card


Commissioning

Safety Push Arm

Serial Number :

Rig Location / Date :

The Commissioning has been completed with punch items (if any) as noted on the Activity Checklist.				
Company	Position	Name in block letters	Initials	Signature

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6 OPERATION

6.1 Read First

Read Section 1 and this Section 6 before operating this equipment.

6.2 Instructions for SPA-7-J

with directional valve mounted on HawkJaw 65K

1. Check there is no visible damage to the Push Arm. Notify supervisor if anything looks wrong.
2. Attach the required HawkJaw or casing tong to the lift cylinder with a certified shackle.
3. Start hydraulic ringline pump/s.
4. Operate the HawkJaw 'Raise' button to lift the tool clear of the drill-floor.
5. Pull the control lever mounted above the right control handle assembly to extend the Push Arm.
6. While the Arm is extending, manually guide the HawkJaw towards and onto the pipe.
7. Operate the HawkJaw 'Raise' button or 'Lower' button to position the jaws on the tool-joint.
8. After the connection is made-up (or broken-out), check that the tong is properly un-clamped.
9. Pull the Arm control lever to retract the Push Arm and move the tong to a safe standby distance.
10. When the operation is over, lower the tong to the drill-floor and stop the HPU.


6.3 Instructions for SPA-7-S

using winch control buttons on HawkJaw 100K

1. Check there is no visible damage to the Push Arm. Notify supervisor if anything looks wrong.
2. Attach the required HawkJaw or casing tong to the lift cylinder with a certified shackle.
3. Start hydraulic ringline pump/s and pull out the HawkJaw emergency stop button.
4. Operate the HawkJaw 'Raise' button to lift the tool clear of the drill-floor.
5. Press the 'Winch on' button on the right control handle assembly to extend the Push Arm.
6. While the Arm is extending, manually guide the HawkJaw towards and onto the pipe.
7. Operate the HawkJaw 'Raise' button or 'Lower' button to position the jaws on the tool-joint.
8. After the connection is made-up (or broken-out), check that the tong is properly un-clamped.
9. Press the 'Winch off' button to retract the Push Arm & move the tong to a safe standby distance.
10. When the operation is over, lower tong to drill-floor, press emergency stop button & stop HPU.

6.4 Caution

**Do not attempt to move the Push Arm while the tong is clamped on the pipe.
This could cause unexpected movement and/or damage to pipe, tong or Push Arm.**

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7 MAINTENANCE

7.1 General Information

The Safety Push Arm is designed for minimal maintenance, through the use of an enclosed cylinder, stainless steel shafts, bronze bearings, galvanized steelwork and so forth. Routine maintenance comprises weekly lubrication and inspection, with any rectification found necessary and a more thorough annual inspection.

Before performing maintenance, check for any damage or hydraulic leakage. If possible, also perform a function test on the Push Arm to check that it is operating correctly.

7.2 Weekly Lubrication

The recommended lubricant for use with the Safety Push Arm is:


Chevron Dura-Lith EP NLGI #1 grease
or equivalent corrosion-inhibiting lithium-base grease.

- Grease the linear bearings in the telescoping tube assembly – 5 shots at 1 grease nipple.
- Grease the spherical bearings in the mounting pivot – 2 shots at each of 2 grease nipples.
- Grease journal bearings in the lift cylinder clamp pivot – 2 shots at 1 upper grease nipple.

7.3 Weekly Inspection

Perform a visual inspection to check the following items each week:


- Hoses are undamaged and have sufficient clearance to avoid chaffing. Replace damaged hoses.
- All hose fittings are tight and dry. Retighten if necessary.
- Mounting brackets and safety sling are secure with all nuts tight. Retighten if necessary.
- All five grease nipples are present and in good condition. Replace if necessary.
- Lift cylinder clamp assembly is free to rotate and undamaged. Replace any damaged parts.
- The Arm does not sag unduly when the push cylinder is fully extended.
If the centre deflection is more than 1 cm, refer to procedure in 7.4 'Annual Maintenance'.
- The spherical bearing can rotate freely when the lift cylinder is slack.
If the bearing is stiff or sloppy, refer to procedure in 7.4 'Annual Maintenance'.
- No damage to the control valve. If any parts are found damaged, replace and function test.
- Record any rectification work which was found necessary.

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7.4 Annual Maintenance

Perform a weekly inspection as described above. Then perform the following additional checks and service tasks each year:

- Remove end cover plates from both ends of the telescoping tube assembly. Inspect internals with a flashlight to look for signs of abnormal wear, damage, hydraulic leakage, debris or corrosion. Note findings and take any necessary remedial action.
- Unshackle the HawkJaw from the lift cylinder and remove restraints from control hoses to provide enough slack for free movement of the Arm. Fully extend the Arm with hydraulic power and measure the sag at the outboard end of the external housing tube against a taut line. If the centre deflection is more than 1 centimetre, the telescoping tube assembly will need to be brought down and disassembled for replacement of linear bearings.
- If necessary, the linear bearings can be accessed by sliding the cylinder tube out of the back of the external housing tube. To do this, remove the lift cylinder clamp assembly and two hydraulic bulkhead fittings from the outboard end, then unscrew a 1 $\frac{3}{8}$ " UNC stainless nut from cylinder rod pin-eye stud and withdraw the stud. The cylinder tube can now be pushed back to expose the bearings and capscrews. Thoroughly clean and repair the bearing surfaces and replace bearings as necessary. Reassemble the telescoping tube assembly on its side, carefully following the assembly drawing.
- If hydraulic leakage is evident, the cylinder assembly can be accessed by first removing the two hydraulic bulkhead fittings from the outboard end, then remove the blind end circlip and pin, then unscrew a 1 $\frac{3}{8}$ " UNC stainless nut from the rod pin-eye stud and withdraw the stud. The cylinder assembly can now be pulled out at the front. Replace or service parts as necessary and re-assemble according to the assembly drawing, ensuring that all tubing fittings remain tight.
- Using a dial test indicator, measure and note the play in the spherical bearing when lifting the Arm with soft sling and utility winch. If the bearing has more than 0.005" of play, slacken two $\frac{1}{4}$ " set screws, adjust the bearing housing retainer element clockwise to take up the play, retighten the set screws and recheck. If the spherical bearing is found to be stiff, open up the bearing housing, inspect & replace damaged parts.
- If necessary, dismount the spherical bearing housing bracket to expose the 1 $\frac{1}{8}$ " UNC hex. socket capscrew. Remove this capscrew and back out the two $\frac{1}{4}$ " set screws approximately $\frac{1}{4}$ " to allow the bearing housing retainer element to be disassembled. When the spherical bearing is open, inspect each bronze bearing race, the 4" stainless ball and the grease. Note the condition of each of these. If the bearings are severely worn or ball damaged, replace as necessary. Clean and repack with Dura-Lith EP NLGI #1 grease, then reassemble with copper or zinc thread compound on the retainer element threads. Adjust the bearing hand-tight, then tighten the two $\frac{1}{4}$ " set screws to lock the element in position. Remount the ball with Nordlock washer sets against both internal shoulders and with Loctite 243 on the capscrew threads.
- Pull the 'rapid decouple' pin from the lift cylinder clamp assembly. Inspect, note and replace any damaged parts. Re-assemble with fresh grease.
- Function test the Safety Push Arm according to the commissioning activity checklist in section 5.2 before returning it to floor-crew service.

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8 SPARE PARTS

8.1 Parts Identification

The Safety Push Arm is supplied in four standard model combinations. There are two types of Mounting Kit; SPA-7D- for derricks and SPA-7M- for masts. The only difference in these varieties is the length of the main Support Beam. This beam may have been cut shorter during installation and in any case is not considered to be a spare part.

More significantly, there are two types of Hydraulic Assembly; SPA-7-J includes an independent control valve for use with the HawkJaw 65K or other tong and SPA-7-S includes a relief valve for use with the HawkJaw 100K button controls. The original model number can be found on the equipment nameplate rivetted to the Telescoping Tube.

During the service life of a Safety Push Arm, a change in application or rig is sometimes required. Because of this, instructions and drawings for all models are included. Inapplicable data should be retained for future reference.

All component parts are shown on Assembly Drawings in Section 9. of this manual. Where possible, standard industrial components have been selected and identified by their generic descriptions and specifications. They can be supplied as spare parts by Pemac Pte Ltd. If purchased from another vendor, special care must be taken to ensure that they precisely meet the manufacturer's specifications. Incorrectly substituted parts may void the product warranty.


When enquiring or ordering spare parts, kindly indicate the **Rig** and/or **Pemac Job No.** and include the following information:

- **Quantity required**
- **Part number**
- **Description**
- **Drawing and Item numbers**


8.2 Recommended Spares

Recommended spare parts for three years of foreign operation are shown on attached drawing number 06-0250-09, Three-Years Foreign Spares Kit, in Section 9.

Due to engineering changes and hydraulic component availability, some Push Arms are manufactured with parts which vary from parts shown in the standard drawings. Details of such variations can be noted by the Rig Mechanic on the 'User Notes' page which follows.

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8.3 User Notes

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9 DRAWINGS

The following drawings are included and form part of this manual:

Title	Sub-title	Document No.
Push Arm Mounting Kit SPA-7D / -M	Installation Sequence & Options	06-0250-01
Safety Push Arm SPA-7	Shipping Assembly	06-0250-02-A
	Spherical Bearing Assembly	06-0250-03-B
	Lift Cylinder Clamp Assembly	06-0250-04
	Telescoping Tube Assembly	06-0250-05
	Hydraulic Assembly SPA-7S	06-0250-06
	Hydraulic Assembly SPA-7J	06-0250-07-A
	3-Years Foreign Spares kit	06-0250-09-A
Safety Push Arm Flow Diagram SPA-7-S / -J	Hydraulic Schematics	06-0250-30

10 SERVICE BULLETINS

Product Service Bulletins may be issued by the manufacturer from time to time. These should be appended to this User Manual. The following bulletins are attached:

Service Bulletin	Subject	Date
PPL-SB061	Additional Security for Ball Joint	27 May 2006