



Tool Code: PRC022

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6-Arm Production Roller Centraliser

PRODUCTION ROLLER CENTRALISER

2³/₈" , 6 Arm, Sondex Ends, MIT Type

Operational & Maintenance Manual

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0 ABOUT THIS MANUAL

0.1 MANUAL HISTORY

Date	Issue	Description	Auth	Chk	App
20/11/01	A	6 arm tool manuals created.	DO/PD	SA	PD
26/07/06	B	Template update, new layout. Also: ECR2896, 3601, 3781, 2174.	FV	SA	NH

0.2 UPDATES TO BE USED WITH THIS MANUAL

Consult the CD Directory for the appropriate Manual Updates to be used with this Manual.

0.3 TECHNICAL HELP

For further technical help contact Sondex as follows:

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0.4 FEEDBACK

Please help us improve future issues of this manual by sending your comments or corrections to Documentation-UK@sondex.com, referencing the document number.

Thank you.

Photographs and sketches are for illustration purposes only. Depending on the tool model that you have, certain features or dimensions may differ from those shown.

1 DESCRIPTION

This 6 arm, inline, roller centraliser is designed to centre production logging tools accurately in vertical or deviated wells.

Sondex Roller Centralisers feature hard wearing low friction rollers. The PRC022 has been designed with two sets of three arms to give a greater centralising force. It is particularly useful for centralising Multifinger Imaging Tools (MITs). The arms are linked to ensure accurate centering, providing a constant radial force through the full operating diameter. The radial spring force can be preset.

For safety both the upper and lower collars are free to slide on the centre rod.

An electrical feedthrough from upper to lower connector is provided as standard.

The PRC022 closes to $2\frac{3}{8}$ " , but larger rollers are also available to increase the closing diameter.

Corrosion resistant alloys are used suitable for normal or H₂S use. The PRC series tools now have plasma nitrided roller axles for improved wear resistance.

1.1 PURPOSE

Most Production Logging Tools give the best performance when they are centred in the borehole. Some tools, such as Gamma Ray and Temperature, are relatively insensitive to borehole position. The CCL gives a larger response when it is not centred.

The Sondex Knuckle Joint (PKJ series) can be used to isolate sections of the toolstring that must be centred from sections that are to be positioned against the casing or tubing wall, including any weights. Centred tools are less likely to suffer from wear and toolstring drag. Downhole video cameras must be centred normally to give evenly lighted pictures.

1.2 APPLICATION

- Centralisation of logging tools in vertical, deviated or horizontal wells.
- Centralisation of slickline tools.
- Minimisation of toolstring drag and wear.
- Can be used as a tubing end locator by observing line tension when pulling into the tubing.

1.3 INTERFACING & TOOL COMBINATIONS

- Simultaneous Operation with other PL Tools.
- $1\frac{3}{16}$ " UN 12 tpi Sondex, GO or other Heads.



Figure 1.1 PRC

1.4 SPECIFICATION

Parameter	Specification	Remarks
Temperature Rating	177°C (350°F)	
Pressure Rating	15000psi (103.2MPa)	
Diameter (min)	2 ³ / ₈ " (60.3mm) ^a	
Diameter (max)	9 ¹ / ₂ " (241mm) ^a	
Make-Up Length	36" (910mm)	
Overall Length	39.67" (1008mm)	Including Thread Protectors.
Weight	21.4lb (9.72kg)	Without closing ring
Centralising Force	60lb (27.2kg) ^b	
End threads (top/bottom)	Sondex 1 ³ / ₁₆ " UNF 12tpi (female/male)	
End connectors (top/bottom)	4mm single conductor (male pin/female socket)	
Materials	H ₂ S resistant, hard stainless steel rollers (carbide coating on standard rollers only), dry bearings.	

^a. Closing & Opening diameter can be changed with different rollers. Other rollers optional, see [Section 5.2.4](#).

^b. The tool can be upgraded to sustain a centralising force of 75lbs (34kg), see [Section 5.2.5](#).

2 SAFETY

**Warning!****SPRING FORCE!**

Take care when removing the Closing Ring. The Centraliser has strong Springs, which will cause the Arm to open with great force.

Care must be taken dismantling the Spring Housing as there is considerable force acting on the End Cap when it is being removed.

**Warning!**

HOT WORK! Sondex equipment may, under certain circumstances or failure modes, become a potential source of ignition. Using it must therefore be considered "**HOT WORK**" and appropriate precautionary procedures should be followed when testing at surface in areas where there is a risk of gas leaks or other potentially explosive atmospheres.

**High Temperature Grease**

A High Temperature Grease (Castrol Spheerol L-EP2 or Castrol LMX) is used to fill the Centraliser Body of the tool during maintenance. Contact with skin or eyes can be harmful.

For more details see the [Material Safety Data Sheet for Castrol Spheerol L-EP2](#) or [Material Safety Data Sheet for Castrol LMX](#) respectively.

**Liquid O-ring**

LOR101 is used for lubricating the tool during maintenance. Contact with skin or eyes can be harmful. For more details see the [Material Safety Data Sheet for Liquid O-ring](#).

3 OPERATING PROCEDURE

**Warning!****SPRING FORCE!**

Take care when removing the Closing Ring. The Centraliser has strong Springs, which will cause the Arm to open with great force.

3.1 PRE-LOGGING CHECKS

3.1.1 MECHANICAL

Ref.: PRC022 General Assembly *09417*

- 1 Clean and grease upper and lower O-ring seals. Replace O-rings (item 30) if damaged.

Note: Viton® O-rings are normally used, but the material choice depends on downhole conditions.

- 2 Check for excessive wear of Arms. Replace if necessary.
- 3 Check that wear on Rollers and Axles is acceptable. Check that all 6 Rollers (item 14) are free to rotate. If any do not run freely, they should be disassembled and serviced, see [Section 4.1.5 Centraliser Arms](#).
- 4 Check the spring action.
- 5 Check that all six Grub Screws (item 3) are tight. These hold the Ball Bearings (item 2) in place, which prevent the Upper and Lower Subs (items 1 & 29) from rotating on the main Shaft (item 24).
- 6 Check that the 2 Centraliser Bodies (item 8) are filled with high melting point grease (e.g. Castrol LMX), see [Section 5 Extended Checks](#).

Note: Grease is normally applied with the Centraliser Arms closed and the Closing Ring fitted.

- i. Remove the grease port Grub Screw (item 5) & fill the End Cap assembly with grease.
- ii. Replace the Grub Screw (item 5).

Note: If the Centraliser Arms are opened after Grease filling, grease will be forced out of the Spring Collar location slots and Arm Location positions.

- iii. Complete for both spring assemblies.

- 7 Ensure that upper and lower electrical connectors are clean, dry and undamaged.

3.1.2 ELECTRICAL

- 1 Using a Multimeter, measure the upper to lower pin resistance. The reading should be less than 0.5Ω.
- 2 Using a Megohm Meter, set to 500V, measure the pin to housing resistance. The reading should be greater than 5MΩ.

3.2 CONNECTING TO TOOLSTRING

Upper and lower tool joint O-rings and seal surfaces should be clean, undamaged and lightly greased. The PRC may be inserted into a Production Logging toolstring (wireline or memory) in any location or used with Coiled Tubing.

Note: The main tool joints are only pressure tight when connected to another pressure tight tool. If well fluid enters these joints, the PRC and the rest of the toolstring may be flooded.

In wireline applications, two centralisers will hold the full Sondex toolstring straight and ensure accurate centering in deviations up to 70°. If extra weights are included, they should be isolated from the centred string with a Sondex Knuckle Joint.

Knuckle Joints (PKJ) can be used within a toolstring to separate tools that need to be centralised, from tools that need to be positioned against the casing or tubing.

3.3 LOGGING

The following are guidelines only and must be used in conjunction with local policy and specific well site conditions both downhole and at surface. The table below is appropriate for near vertical wells and must be adjusted accordingly when in deviated wells. Use of a Head Tension Unit is highly recommended.

Note: Do not exceed the calculated safe working load of your selected weakpoint. If in doubt, use a head tension unit, especially in deviated wells where calculation from surface tension is less accurate.

Depth (ft)	Speed Pulling Out of Hole	Speed Running in Hole
In/out of catcher (pressure rig up only)	Dead slow or manual.	
30 to 150	30ft/min	
150 to 400	60ft/min	
>400 clear cased hole	Surface tension not to exceed 120% of tension when tool stationary. Speed not to exceed 150ft/min.	Surface tension should not be less than 80% of tension when tool stationary. Speed not to exceed 150ft/min.
>400 clear open hole	Surface tension not to exceed 130% of tension when tool stationary. Speed not to exceed 150ft/min.	Surface tension should not be less than 70% of tension when tool stationary. Speed not to exceed 150ft/min.
Approaching potential obstacles ^a	30ft/min	
Logging Data	Do not exceed the above speeds.	

^a. For example: Reduced diameters, gas lift mandrels, fluid levels, valves, tubing shoes, packers, cross overs and other downhole equipment.

Note: Although the mechanical arrangement allows very large centering forces to be achieved, large closing forces may result in undesirably high wireline tension as the toolstring enters a small tubing from a large casing. If possible use more centralisers rather than stronger centralisers.

3.4 POST-LOGGING DISASSEMBLY

The tool should be cleaned before the toolstring is disassembled.

Ensure that well fluid does not reach the electrical connectors. Refit Thread Protectors and Closing Ring (item 34, not shown on drawing).

Before storage:

- 1 Check that Rollers rotate. Spray them with WD-40[®] after every run.
- 2 Re-grease body spring assemblies, see [Section 5.2 Extraordinary Maintenance](#).

Always keep the tool in its transport case before and after logging.

3.5 TRANSPORT, HANDLING & STORAGE

Store with end thread lightly greased and water tight Thread Protectors fitted.

Do not store in the fully closed configuration for excessively long periods of time as the Springs may suffer from compression set.

Note: Continued storage of the centraliser with its Arms closed and its Retaining Collar fitted, may lead to Spring set and loss of performance. If the centraliser is to be stored for any long period of time, it is recommended that the centraliser is stored with its Arms open.

Do not subject tool to extreme shock such as dropping or hitting with a hard object.

Transport the tool with Thread Protectors and Closing Ring fitted.

4 MECHANICAL DESCRIPTION



Warning!

SPRING FORCE!

Care must be taken dismantling the tool as there is considerable force acting on the End Cap of the Spring Housing when disassembled.

Ref.: PRC022 General Assembly

09417

4.1 DISASSEMBLY

4.1.1 UPPER SUB & LOWER SUB

Note: It is not essential to release the Spring pressure prior to removing the Subs, but it is recommended, see [Section 4.1.4](#).

Note: The End Subs are matched to the Shaft. Before removing, mark each End Sub and the Shaft, so that they can be re-fitted in their original positions.

- 1 Remove Grub Screws (6x item 3) from Lower Sub (item 29) and Upper Sub (item 1).
- 2 Slightly rotate the Lower and Upper Sub (items 29 & 1) with respect to the Shaft (item 24).

Note: This releases the Ball Bearings (item 2), which normally prevent rotation of the Subs on the Shaft.

- 3 Unscrew both the Upper Sub (item 1) and Lower Sub (item 29) from the Shaft (item 24).

Note: The pair of O-rings (item 23) at each end of the Shaft prevent fluids passing beyond the thread of the Shaft. **The O-rings maintain integrity between the shaft and the sub, and care should be taken not to damage them. Replace if damaged.**

4.1.2 LOWER CONNECTOR

Note: This procedure is easier if the Lower Sub (item 29) has been removed first. Refer to [Section 4.1.1](#).

Note: It is not essential to release the spring pressure prior to removing the Lower Connector, but it is recommended, see [Section 4.1.4](#).

- 1 Remove the Hex Nut (item 19) from the end of the Connecting Rod (item 25).
- 2 Remove the Half Nut (item 20).
- 3 The Lower Insulator (item 27), PeekInsulator (item 31) and Washer (item 21) may now be removed.

The remaining upper Upper Connector Assembly and Connecting Rod may now be removed by withdrawing them from the upper end of the tool, refer to [Section 4.1.3](#).

4.1.3 UPPER CONNECTOR

Note: To avoid damage to the tool, remove the Lower Connector first. Refer to [Section 4.1.2](#).

Note: It is not essential to release the spring pressure prior to removing the Upper Connector, but it is recommended, see [Section 4.1.4](#).

- 1 Withdraw the Upper Connector Assembly and Connecting Rod (item 25) from the upper end of the tool.
- 2 Slide the PTFE Tubing (item 26) from the Connecting Rod (item 25).
- 3 Unscrew the Banana Pin (item 28) and Half Nut (item 20).
- 4 The Insulator (item 22) and Washer (item 21) may now be removed.

4.1.4 SPRING FORCE



Warning! SPRING FORCE! Care must be taken dismantling the Spring Housing as there is considerable force acting on the End Cap when it is being removed.

Note: When removing the Spring force, it is safer to leave the Centraliser Bodies and Subs positioned on the Shaft. This to ensure the Springs remain on the Shaft at all times and cannot cause serious damage or danger when accidentally exiting the Centraliser Bodies.



Warning! SPRING FORCE! Take care of fingers when Springs accidentally exit the Spring Bodies.

Note that there is a spring assembly on either side of the tool.

- 1 Hold the Centraliser Body (item 8) in a soft-jawed vice and using a C-spanner or tommy bar, slowly unscrew its End Cap (item 4).

Note: Care should be taken at this stage due to the large spring force acting on the End Cap.

Repeat this process for the other Centraliser Body and End Cap. This ensures that the stored spring force has been dissipated, making the tool safe to work on.

4.1.5 CENTRALISER ARMS

- 1 If not already done, release the spring pressure as described in [Section 4.1.4](#).
- 2 Remove the Screw (item 17), connecting the Upper Arm (item 12) and the Lower Arm (item 13). The Spacer (item 18) will come free.
- 3 Insert the Screw (item 17) into the Upper Arm (item 12), but from the other side from which the Screw (item 17) was extracted.
- 4 Place a small piece of metal into the slot of the Upper Arm (item 12), so when the Screw (item 17) is tightened, it presses against the metal and forces the two sides of the Arm apart.

- 5 Continue to part the two sides until there is enough space to allow the removal of the Roller Assembly (item 14, 15 & 16), then remove the Screw (item 17) and small piece of metal, releasing the stress in the splayed Arm.
- 6 Remove Spirol Pins (6x item 11). Note the position of the Arms (item 12 & 13) in the Centraliser Body (item 8), since they should be refitted in the same locations.

Note: The Spirol Pins do not have to be removed completely, unless replacement (due to poor fit or damage) is required.

4.1.6 SPRINGS & HOUSINGS



Warning! **SPRING FORCE!** Care must be taken dismantling the Spring Housing as there is considerable force acting on the End Cap when it is being removed.

- 1 If not already done, release the spring pressure as described in [Section 4.1.4](#).

Note: Care should be taken at this stage due to the large spring force acting on the End Cap.

- 2 The Spring (item 6) can now be removed.
- 3 The Spring Assembly has a Spring Collar (item 7) at its conical end. This can be removed from the body by a slight tilting action. Make a note of which Spring Housing each Spring Collar was removed from.

Note: The Collar becomes pitted where the Tungsten Pins on the ends of the Arms impinge upon the Collar. This is normal and is a design feature, as this 'bedding-in' maintains equal force on all Arms. Therefore, replace the Spring Collar into the same Spring Housing that it was removed from. This should then match up with the correct Arms, which should have already been positionally marked before removal.

4.2 REASSEMBLY

Note: Ensure that parts are clean and undamaged before reassembly.

4.2.1 SPRINGS & HOUSINGS

Note: If the Spring Collars are re-used, their position is relevant to the Centraliser Arms, removed previously, as the Arms have been through a 'bedding-in' process with their respective Spring Collars during previous use.

If new arms and Spring Collars are fitted, the orientation of the Spring Collars does not matter.

- 1 Replace the Spring Collar (item 7), ensuring that the Collar Pin (item 9) is in its slot.

Note: If the Centraliser Arms are replaced in [Section 4.2.2](#), the Spring Collars need replacement as well. To do this, slide the Spring Collar in an inclined angle until it is possible to rotate the pin into the slot.

- 2 Fit the Spring (item 6) onto the Centraliser Body (item 8).
- 3 Fit the End Cap (item 4) over the Shaft (item 1).

- 4 Temporarily screw on the respective End Sub.
- 5 Screw in the End Cap (item 4) just a few turns into the Centraliser Body (item 8). Ensure the Spring is not excessively compressed.



Warning! There will be some spring load acting on the parts within the Spring Housing assembly.

Note: A Spacer Collar can be used to compress the Spring. If a Collar is not available, vertical palm pressure against a flat, solid surface can be used. Maintain pressure and engage the thread on the Cap with the thread in the Centraliser Body.

- 6 Repeat for the other end of the tool.

4.2.2 CENTRALISER ARMS

Note: Take any previously fitted parts and any annotations applied to them into account, to ensure correct location for refitment. At this stage, the relationship between the Centraliser Arms, the Spring Housing and Spring Collar becomes especially important. The relationship with the End Subs will be ensured at a later stage.

Note: The Upper Arms (item 12) are weaker than the Lower Arms (item 13). The Upper Arms (item 12) are therefore fitted towards the top of the tool during manufacturing.

- 1 Inspect Arms for wear and replace if necessary.

Note: If the Centraliser Arms are replaced, the Spring Collars need to be replaced as well. When new Pins are fitted, the carbide Pins should contact the Spring Collar simultaneously and will move freely on the shaft. The pins should be located square to the design clearances. The Pins will find their own depth into the Collar.

- 2 Refit the Arms (items 12 & 13) into their original positions on the Centraliser Body (item 8) and secure with Spirol Pins (item 11).



Caution! DO NOT compress the centraliser Arms until **all** Arms are located in their respective positions. Dummy Pins can be used to assist assembly.

Note: Fit new Spirol Pins (item 11) and Bushes (item 10) to the Arm assembly if damaged, or if the Arms were difficult to rotate or particularly loose.

Note: If new Centraliser Arms are fitted then, once three arms have been located onto one Spring Housing, move them about over their full range. There will be some spring resistance, but it should not be excessive as the End Caps were not screwed in fully in [Section 4.2.1](#).

If there are any issues with physical clashes between parts, then investigate further. New Arms may need to be fitted in some areas. This can be done by dressing as required with suitable files.

- 3 Insert the Screw (item 17) into the Upper Arm (item 12) on the opposite side of the fitting location of Screw (item 17).
- 4 Place a small piece of metal into the slot of the Upper Arm (item 12), so when the Screw (item 17) is tightened, it presses against the metal and forces the two sides of the Arm apart.

- 5 Continue to part the two sides until there is enough space to allow fitting of the Roller Assembly (item 14, 15 & 16).

Note: Fit new Bushes (item 15) to the Arm Assembly if damaged, or if the arms were difficult to rotate or particularly loose.

- 6 Remove the Screw (item 17) and small piece of metal. Fit Spacer (item 18), line the Spacer (item 18) up with the screw holes in the Arms and secure the Upper Arm (item 12) and the Lower Arm (item 13) with the Screw (item 17).

4.2.3 SPRING FORCE

Note: Having refitted all Arms and reconnected all Arms to each other, it is now possible to reinstate the full spring pressure.

- 1 Full screw each End Cap (item 4) into its respective Centraliser Housing (item 8).



Warning! **SPRING FORCE!** Care must be taken dismantling the Spring Housing as there is considerable force acting on the End Cap when it is being removed.

4.2.4 UPPER & LOWER CONNECTOR

Remove the End Subs, temporarily fitted in [Section 4.2.1](#), remembering which Sub relates to which end of the Shaft and Fitted Arms.

4.2.4.1 Upper Connector

- 1 Fit the Insulator (item 22) and Washer (item 21) onto the Connecting Rod (item 25). Note the orientation of the Insulator (item 22).
- 2 Refit the Half Nut (item 20) and Banana Pin (item 28). Ensure the Banana Pin (item 28) is fully screwed on. Back off the Half Nut (item 20) until locked against the Banana Pin (item 28).
- 3 Slide the PTFE Tubing (item 26) onto the Connecting Rod (item 25).
- 4 Refit the entire assembly through the Upper End of the main Shaft (item 24).

4.2.4.2 Lower Connector

- 1 Fit the Lower Insulator (item 27), PeekInsulator (item 31) and Washer (item 21) onto the Connecting Rod (item 25).
- 2 Refit the Half Nut (item 20).

Note: The Half Nut (item 20) can be used to pull the Lower Insulator (item 27), PeekInsulator (item 31) and Washer (item 21) together. This action will also secure the 2 Insulators (item 31 & 22) against the Shaft (item 24), creating a clamping action.

- 3 Refit the Hex Connector (item 19) onto the Connecting Rod (item 25) and tighten against the Half Nut (item 20).

If the Upper and Lower Subs were not fitted previously, they can be fitted now as described in [Section 4.2.5](#).

4.2.5 UPPER SUB & LOWER SUB

Note: Although the Shaft (item 24) is symmetrical, it is recommended that the Subs are refitted in their original positions, so that the Ball Bearings (items 2) can engage with the original indentations.

- 1 Replace the O-rings (4x item 23), ensuring the grooves and O-rings are clean, greased and undamaged.
- 2 Refit the Lower Sub (item 29) and Upper Sub (item 1).
- 3 Replace the Ball Bearings (6x item 2) and secure the Lower Sub (item 29) and Upper Sub (item 1) with the Grub Screws (6x item 3).

4.2.6 FINAL REASSEMBLY STAGES - GREASE FILLING

Note: Grease is normally applied with the Centraliser Arms closed and the Closing Ring fitted.

- 1 Remove the grease port Grub Screw (item 5) & fill the End Cap assembly with grease.
- 2 Replace the Grub Screw (item 5).

Note: If the Centraliser Arms are opened after Grease filling, grease will be forced out of the Spring Collar location slots and Arm Location positions.

5 EXTENDED CHECKS

See also: [APPENDIX B Drawings & Parts Lists](#)

5.1 PREVENTATIVE MAINTENANCE

5.1.1 GREASE & LUBRICANTS

Sondex recommends the use of "Liquid O-ring type 101" (p/n LOR101) on threads and O-rings, see [APPENDIX A](#).

All O-rings and housing threads are assumed to be and must be lightly greased unless specifically indicated differently.

Correct use of grease and lubricants is essential to the maintenance of all Sondex downhole equipment.

Note that some threads are internal such that grease can get inside the tool. Do not use excessive quantities.

Sondex does not recommend Copper loaded greases since some types can cause electrical leaks. Some types are also not suitable for use on O-rings. Silicone grease may be used on O-rings, but must be kept clear of threads especially stainless to stainless.

Cavities, e.g. spring housings, should be filled with a suitable heavy high melting point grease, such as Castrol Spherol L-EP2 or LMX.



Warning! The use of certain greases, such as some types of Lubriplate, can cause electrical failure if they have any volatile content, which can burn off producing corrosive gasses inside the tool.

5.1.2 MECHANICAL

Ref.: PRC022 General Assembly [09417](#)

- 1 Remove dirt and old grease from pressure housing threads and O-rings and replace with fresh.
- 2 Inspect O-rings for damage or ageing/hardening and replace where required.
- 3 Check for:
 - Damaged components.
 - Loose screws/nuts/components/connectors.

Note: If RTV or similar compound is used to secure loose components, it must be fully cured before housing is replaced.

- Heat or chemical damage (discoloured components).
 - Incorrect thread grease or excessive quantity, see [Section 5.1.1](#).
 - cleanliness of connectors and loose/bent pins before replacing.
- 4 Check all fixings for tightness.

- 5 Check Grub Screws (6x item 3 & 2x item 5) are tight.
- 6 Ensure that upper and lower electrical connectors are clean, dry and undamaged.

5.1.3 ELECTRICAL

- 1 Using a Multimeter, measure the upper to lower pin resistance. The reading should be less than 0.5Ω.
- 2 Using a Megohm Meter, set to 500V, measure the pin to housing resistance. The reading should be greater than 5MΩ.

5.2 EXTRAORDINARY MAINTENANCE

Ref.: PRC022 General Assembly 09417

5.2.1 CORROSION & WEAR

The main mechanical parts of the Centraliser are made from corrosion resistant materials. However, the standard Springs are not fully corrosion resistant. Frequent greasing of the Spring Assemblies, as described below, not only reduces the potential for any corrosion to the Springs, but also lubricates the action of the Centraliser.

It is therefore recommended that the Centralisers are disassembled for inspection only about once a year, unless the well fluids are particularly corrosive, in which case inspection should be more frequent.

- 1 The Screws holding the arms onto the Spring Bodies should be checked for tightness before and after every job.
- 2 The Roller Bushes should be checked for wear between jobs and replaced if necessary.
- 3 The Rollers should be replaced if they have worn excessively.

5.2.2 O-RING REPLACEMENT

The following O-rings need replacement after every run.

- 2x item 30.

The following O-rings need replacement after 5 runs or every 3 months.

Note: All O-rings can be replaced without disassembly of the Spring Section.

- 4x item 23.

41It is advised to replace all O-rings when the tool is disassembled for inspection.

5.2.3 CONTACT WITH H₂S

In the case of high H₂S, the springs may need replacing after only a few days after initial H₂S contact. In this case, inspection of the Springs after every job is essential.

To determine contact with H₂S, check for discoloration of the Upper Sub (item 1) and Lower Sub (item 29). These parts are made of Al/Bronze and will turn black when in contact with H₂S.

Also replace the following O-rings:

- 4x item 23.
- 2x item 30.

5.2.4 ROLLER REPLACEMENT

Note: There is an option to fit an optional roller, instead of the standard roller (item 14), which changes the tool OD. Contact Sondex for details.

If the Pin (item 16) does not show any wear it may be re-used. The Bushes (item 15) do wear and should be replaced together with the Roller. Rollers are usually supplied with the Bush fitted.

5.2.5 SPRING REPLACEMENT

After 25th July 2005, the tool has been redesigned with new Spring Bodies and End Caps.

Part	Prior to 25/07/05	After 25/07/05
End Cap	p/n 06246	p/n 06393
Spring Body	p/n 06245	p/n 06394

All tools are supplied with Springs (p/n 06250), providing a centralising force of 60lbs. However, it is possible to upgrade to a centralising force of 75lbs with (p/n 93730). To cater for the stronger Springs, Spacer Ring (p/n 06392) needs to be fitted between the Spring Body and End Cap, see [Section 4.2.1](#).

Although it is possible to fit the stronger springs with the old version Ends Caps and and Spring Bodies, Sondex strongly recommends to fit the new Ends Caps and and Spring Bodies when upgrading to the higher spring force for safety reasons.

APPENDIX A EQUIPMENT & RECOMMENDED SPARES

Item	Part No	Description	Qty	Remarks
1	PRC022	Production Roller Centraliser, 2 ³ / ₈ " , Sondex Ends	1	

A.1 ANCILLARY EQUIPMENT

Item	Part No	Description	Qty	Remarks
1	17028	Closing Ring	1	

A.2 MAINTENANCE EQUIPMENT

Item	Part No	Description	Qty	Remarks
1	91296	Tool Kit for all 2 ¹ / ₈ " Tools SX and GO	1	Sufficient to service tool.
2	LOR101	Grease for O-rings & threads	1	5oz. pot
3	LOR101L	Grease for O-rings & threads	AR	12oz. pot

A.3 RECOMMENDED SPARES

Item	Part No	Description	Qty	Remarks
1	KITB-PRC020&022	Basic Spares Kit	1	To support 1 run in hole.
2	KITR-PRC020&022	Recommended Spares Kit	1	To support 25 runs in hole.

All spares kits, mentioned in this section, can be supplied upon request. Contact Sondex and quote the part number of the spares kit for additional information or when ordering the spares kit.

As a guidance:

- A Basic Spares Kit mainly contains essential maintenance equipment, O-rings and parts, which are likely to need replacing on a run-by-run basis (including spare parts for the initial tool run) or parts that can be lost easily (like grub screws).
- A Recommended Spares Kit has got a multitude of the same parts as a Basic Spares Kit, supplemented by parts that might need replacement at a lower frequency, i.e. 5 runs and/or 25 runs.

Note that the information above is a guidance only and Sondex reserves the right to change the contents of the Spares Kits as required.

Note: Spares kits suitable for remote logging operation can also be supplied upon request.

PARTS LISTING					
Part:	Issue:		Drawn:	Checked:	Approved:
91296	-		PD	PD	DJF
Description:			Date:	Date:	Date:
Tool Kit for all 2 1/8 Tools SX and GO			14/01/2002	14/01/2002	14/01/2002

CHANGE HISTORY					RELATED DOCUMENTS		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
-	14/01/2002	Initial Release	PD	DJF			

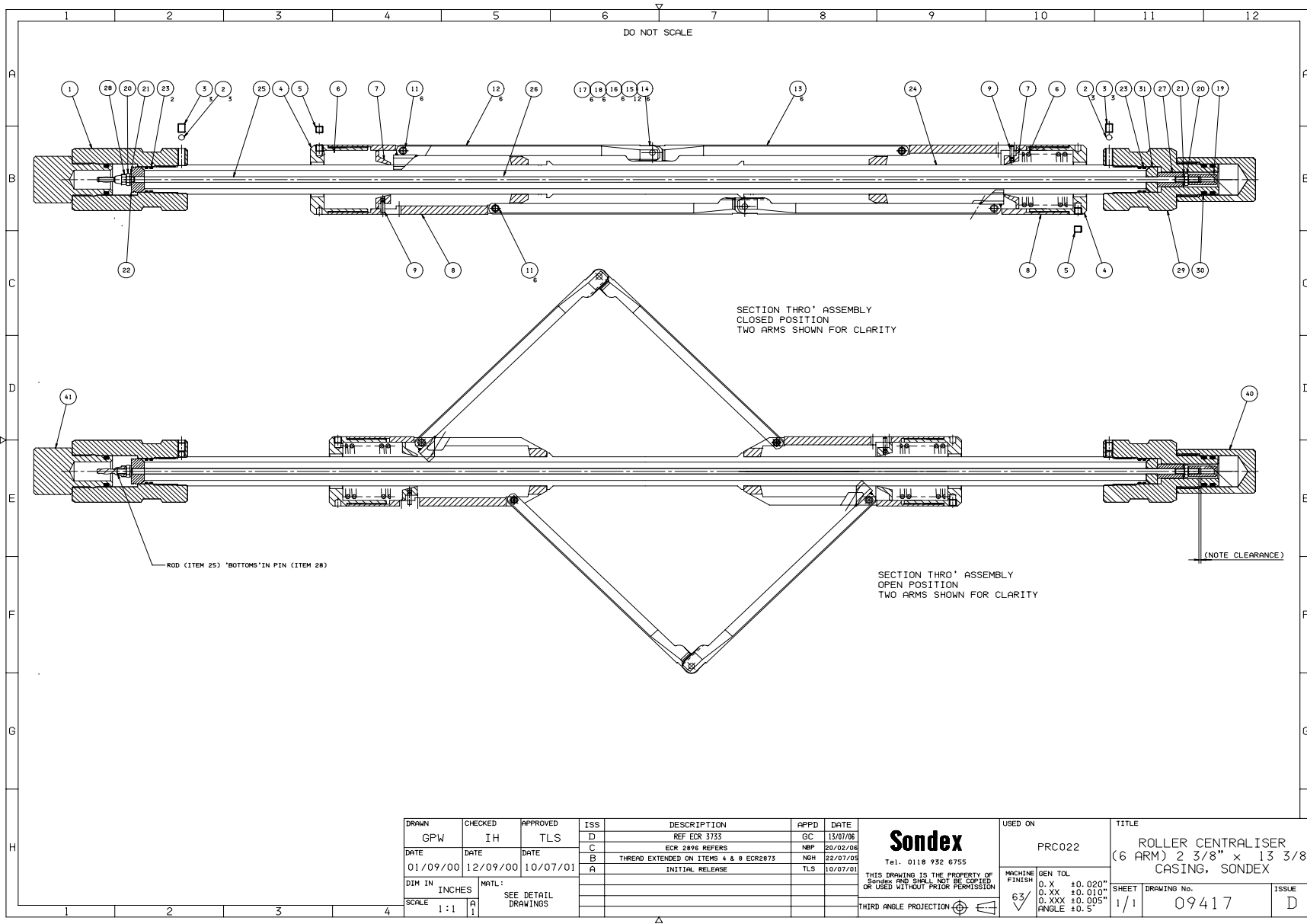
PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	91006	-	Spanner Open Ended 1 7/8x1 11/16 A/F		2	ea	
002	91023	-	Spanner C (50 - 80, 2 3/4) (WAS 91065)		1	ea	
003	10038	A	Spanner Box 3/8 x 5/16 Modified		2	ea	
004	91028	-	Spanner 3/8x5/16		1	ea	
005	91027	-	Spanner Single Open End 18mm		1	ea	
006	91029	-	Key Hex Metric		1	ea	
007	91030	-	Punch Pin Parallel set		1	ea	
008	00615	A	Assy Spanner PKJ		1	ea	
009	91293	PT1	Screwdriver Parallel tip (3 0 x 75)		1	ea	
010	91105	-	Toolroll With SX Badge Large Black		1	ea	
011	91104	-	Screwdriver Parallel tip (5 5 x 200)		1	ea	
012	91103	-	Pliers Circlip 812 Chrome/Van		1	ea	
013	91102	-	Pliers Mini Flat Nose 5 Inch		1	ea	
014	10037	A	Bar Tommy		2	ea	
015	10051	A	Kemlon tool Sondex - 4BA Hex Socket		1	ea	
016	91280	-	Hammer, 4oz ball pein		1	ea	
017	91131	-	Pin C Spanner 2 5		1	ea	
018	91551	-	Spanner open ended 1"		1	EACH	

(AR = As Required)

APPENDIX B DRAWINGS & PARTS LISTS

B.1 MECHANICAL DRAWINGS

Description	Drawing	Parts List
PRC022 General Assembly	09417-D	09417-D



DRAWN GPW	CHECKED IH	APPROVED TLS	ISS D	DESCRIPTION REF ECR 3733	APPD GC	DATE 13/07/06
DATE 01/09/00	DATE 12/09/00	DATE 10/07/01	C	ECR 2896 REFERS	NBP	20/02/04
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS		B	THREAD EXTENDED ON ITEMS 4 & 8 ECR2873	NBH	22/07/05
SCALE 1:1			A	INITIAL RELEASE	TLS	10/07/01

Sondex
Tel. 0118 932 6755

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THIRD ANGLE PROJECTION

USED ON PRC022	TITLE ROLLER CENTRALISER (6 ARM) 2 3/8" x 13 3/8" CASING, SONDEX
MACHINE FINISH 63/√	GEN TOL 0. X ±0.020" 0. XX ±0.010" 0. XXX ±0.005" ANGLE ±0.5°
SHEET 1/1	DRAWING No. 09417
	ISSUE D

PARTS LISTING					
Part:	Issue:		Drawn:	Checked:	Approved:
09417	D		GPW	IH	TLS
Description:			Date:	Date:	Date:
Roller Centraliser (6 Arm), 2 3/8 x 13 3/8 Casing, Sondex			01/09/2000	12/09/2000	10/07/2001

CHANGE HISTORY					RELATED DOCUMENTS		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
A	10/07/2001	INITIAL ISSUE	IH	TLS			
B	25/07/2005	Items 4 & 8 changed to longer threaded versions ref ECR 2873	NGH	NGH			
C	21/03/2006	ECR 3601 Refers - Items 004 & 008, qty was 1 off	JC	JC			
D	23/06/2006	REF ECR 3781 ITEM 6 WAS 06250	GC	GC			

PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	02203	C	Sub Upper 2 1/8		1	ea	
002	91000	-	Bearing Ball 3/16 Hard		6	ea	
003	01063	-	Screw, Grub Skt Hd, M6 x 8mm Long, St/Steel		6	ea	
004	06393	PT1	End Cap, Centraliser Spring Housing(Extended Thread Version)		2	ea	
005	01030	A	Screw, Grub Skt Hd, M6 x 6mm Long, St/Steel		2	ea	
006	94253	-	Spring, Centraliser		2	ea	
007	06249	B	Thrust Plate, Centraliser Spring		2	ea	
008	06394	PT2	Centraliser Spring Housing (Extended Thread Version)		2	ea	
009	00513	C	Pin Collar PRC		2	ea	
010	01059	A	Bush DU 3/16 x 1/4 x 1/4 Lg		24	ea	
011	93251	-	Pin Spirol 3/16 x 1 LG MCK SS		12	ea	
012	06270	E	Centraliser Arm, Machined		6	ea	
013	06271	C	Centraliser Arm		6	ea	
014	00508	C	Roller, 0 5		6	ea	
015	01058	-	Bush DU 1/4 x 5/16 x 3/8		12	ea	
016	00512	E	Axle, Centraliser Roller		6	ea	
017	01034	-	Screw, Skt Cap Hd, M5 x 16mm Long, St/Steel		6	ea	
018	00509	D	Spacer, Centraliser Arm		6	ea	
019	01004	A	Socket, Connector, Hex		1	ea	
020	01026	A	Half-Nut, Hex, 10-32UNF, St/Steel		2	ea	
021	01027	A	Washer, Plain, 10-32UN, St/Steel		2	ea	
022	02281	C	Insulator Upper Peek SX		1	ea	
023	99018	-	O Ring Viton 90 Type 018		4	ea	
024	06247	A	Shaft, Centraliser		1	ea	
025	06252	B	Rod Feedthrough, Centraliser		1	ea	
026	06297	A	PTFE Tubing 4.8mm I/D x 0.4mm Wall	Insulator, PTFE Tubing, So	1	ea	
027	02209	C	Insulator Lower SX		1	ea	
028	01028	C	Assy, Banana Pin (4mm)		1	ea	
029	02204	E	Sub Lower 2 1/8		1	ea	
030	99211	-	O Ring Viton 90 Type 211		2	ea	
031	02208	A	Insulator Peek 80 deg		1	ea	
032							(AR)
033	00523	B	Pin Carbide		12	ea	
040	01019	E	Thread Protector, Female, Standard (Lower End)		1	ea	
041	10148	A	Thread Protector, Male, Standard, (Upper End) with O'Ring		1	ea	

PARTS LISTING					
Part: 09417	Issue: D		Drawn: GPW	Checked: IH	Approved: TLS
Description: Roller Centraliser (6 Arm), 2 3/8 x 13 3/8 Casing, Sondex			Date: 01/09/2000	Date: 12/09/2000	Date: 10/07/2001

PARTS LIST							
<i>Item</i>	<i>Part No.</i>	<i>Issue</i>	<i>Description</i>	<i>Component Value</i>	<i>Qty</i>	<i>Units</i>	<i>Remarks</i>
042	17028	PT2	ASSY - CLOSING RING TRANSPORTATION		1	ea	
800	AD-09417	D	Assembly Drawing			(AR)	

(AR = As Required)