Tool Code: PSJ

Document: MN-PSJ-D

Production Swivel Joint

PRODUCTION SWIVEL JOINT

SONDEX ENDS & GO ENDS

Operational & Maintenance Manual

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0 ABOUT THIS MANUAL

0.1 MANUAL HISTORY

Date	Issue	Description	Auth	Chk	App
07/02/05	A	First Issue.This manual will replace the manuals for the tools, mentioned in *Section 1.5*.	FV	SA	KC
17/08/06	B	DWG/PL Updates & Oil Change, see ECR: 2834, 2454, 3219, 2157, 3664, 3629, 3837.	FV	FV	FV
18/03/09	C	DWG/PL Updates. ECRs: 2157, 3697, 3721, 3789, 5411, 5582, 6359, 6365. Recommendations added to Section 2.	RS	RS	(TG)
21/10/09	D	Addition of 03859, 03874, 03867, 03885 & 03893 Dwgs/PLs. See ECR 5-63357	RS	CD	TG

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 adding your comments or corrections to twww.ge-energy.com/oilfield, referencing the document number.

Thank You.

Documents from external sources (i.e. MSDS), supplied with/referenced in this manual, are considered the latest version at time of manual issue. However, the document can be altered by the external source without prior notice to Sondex.

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.

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1 DESCRIPTION

The Sondex Mono-conductor Swivel Joint allows free rotation between the upper and lower head while maintaining an electrical through connection.

The top and bottom sub assemblies are linked by a shaft, which is free to rotate on a set of ball bearings to support both lateral and vertical forces.

The unit is pressure balanced and oil filled to avoid any increase in seal friction at high ambient pressures and temperatures. Therefore, the tool requires little maintenance.

Figure 1.1 PSJ (Sondex & GO)

1.1 PURPOSE

The top and bottom sub-assemblies are linked by a shaft. This shaft is free to rotate on a set of bearings, which accommodate both vertical and lateral forces.

The electrical continuity of both conductor and armour is maintained by rotating low resistance contacts. A sliding sleeve relieves internal pressure changes caused by well pressure or expansion of the filling oil due to rising temperature. This prevents seal friction increases, minimising rotational resistance.

Braided electric line has a tendency to rotate as it is payed out and pulled in. When it is important that the toolstring does not rotate during logging, a swivel joint is connected at the top of the tool string directly beneath the electric line cable head. This allows the cable to rotate if necessary without the toolstring being forced to turn.

A swivel joint may also be used within a tool string if one part of the string should stay oriented with the well while the rest of the string should rotate.

1.2 APPLICATION

- Perforating jobs.
- Minimisation of tool rotation due to wireline torque.
- Multifinger imaging tool operations.

1.3 INTERFACING & TOOL COMBINATIONS

- Simultaneous use with other PL Tools.
- $1\,^{3}/_{16}$″ UN 12 tpi Sondex, GO or other Heads.

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1.4 SPECIFICATION

Parameter	Specification	Remarks
Pressure (max)	15,000psi (103.4MPa)	PSJ016: 20,000psi (137.9MPa)
Temperature (max)	392ºF (200ºC)	
Length	10.9″ (277mm) approx	
Weight	6.1lbs (3.0kg) approx.	
Diameters available	$1^{11}/_{16}$″ (43mm) $2^{1}/_{8}$″ (54mm)	
Materials	Corrosion Resistant Throughout	
Voltage Rating	300V	
End Connector (Top): - Sondex Ends - GO Ends	 Pin (4mm) Socket (4mm)	
End Connector (Bottom): - Sondex Ends - GO Ends	 Socket (4mm) Pin (4mm)	
End Threads (Top)	Sondex Male or GO Male	$1^{3}/_{16}$″ UNF 12 tpi.
End Threads (Bottom)	Sondex Female or GO Female	$1^{3}/_{16}$″ UNF 12 tpi.
Torque Required to turn	0.1 ft/lb	

1.5 STANDARD SWIVEL JOINTS

Sondex Ends

Tool Code	Tool Diameter	Remarks
PSJ008	$1^{11}/_{16}$″	
PSJ012	$2^{1}/_{8}$″	
PSJ015	$2^{1}/_{8}$″	Lockable

GO Ends

Tool Code	Tool Diameter	Remarks
PSJ010	$1^{11}/_{16}$″	
PSJ011	$2^{1}/_{8}$″	
PSJ014	$1^{11}/_{16}$″	Easy Entry
PSJ016	$1^{11}/_{16}$″	Easy Entry, High pressure

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2 SAFETY

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.

Liquid O-ring

LOR101 is used for lubricating the tool during maintenance. Contact with skin or eyes can be harmful. For more details, refer to the Material Safety Data Sheet for Liquid O-ring.

Compressor Oil

Compressor Oil is used to fill the body of the tool during maintenance. Contact with skin or eyes can be harmful. For more details, refer to the Material Safety Data Sheet for Capella WF32 oil.

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2.1 RECOMMENDATIONS

The product should be installed, adjusted and serviced by qualified electrical maintenance personnel. Improper installation or operation of the equipment may cause injury to personnel or equipment. Before beginning any installation or commissioning work ensure that electrical power is disconnected and locked out.

NOTE: Installation must meet National Wiring Regulations in accordance with IEC/UL 61010 latest revision.

WARNING 1: The outer casing of the product should be connected to a known good system ground before making any other electrical power connection. This system ground to be maintained until all electrical power connections are disconnected and locked out.

WARNING 2: Units with exposed Electrical Connectors are supplied with protective insulating end caps bearing a warning of High Voltage. These end caps should only be removed when Electrical Power is disconnected and locked out for the purposes of interconnection to other Units. Under no circumstances should equipment be operated with the Electrical Connectors exposed.

WARNING 3: Units with moving parts such as calipers can be activated immediately on application of Electrical Power. A safe area should be established around any such Units before the application of Electrical Power.

WARNING 4: Units with moving parts such as springs can retain significant Potential Energy. Great care should be exercised when removing Closing Rings or handling over tightened assemblies.

WARNING 5: Units containing seals may entrap pressure. Disassembly should only be carried out in accordance with recommended procedures ensuring the release of pressure prior to the disengagement of cap threads.

WARNING 6: If the equipment is not installed, commissioned and used in accordance with the manufacturer's specifications, protection provided may be impaired

Standard Personal Safety Gear must be worn at all times including but not limited to: Safety glasses, gloves and steel-toed boots.

Equipment exceeding 18Kg in weight should be handled with extreme care. Heavy items should be mechanically lifted. Any installation of equipment over 10Kg to be lifted over 1 metre should be at least a two man lift. Good lifting practice should be exercised at all times including but not limited to:

- Use of correct personal safety gear.
- Lift using legs not back
- Not proceeding with a lift in the presence of any doubt of completing the lift safely
- Use of mechanical lifting aids wherever possible
- Ensuring work area is free of clutter and tripping hazards

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3 OPERATING PROCEDURE

Ref.: PSJ General Assembly:
- Sondex Ends *Appendix B.1*
- GO Ends *Appendix B.2*

3.1 PRE-LOGGING CHECKS

3.1.1 MECHANICAL

1 Clean and grease upper and lower O-ring seals. Replace lower make-up joint O-rings (2x item 43) if damaged.

2 Check that joint rotates freely.

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

3.1.2 ELECTRICAL

1 Using a Megohm Meter (set to 250V) check the following:

- Insulation (between the housing and pins) >100MΩ.

2 Using a Multimeter, check the following:

- Through resistance (between upper and lower pins) < 0.5Ω.

3.2 CONNECTING TO TOOLSTRING

Upper and Lower tool joint O-rings, and seal surfaces should be clean, undamaged and lightly greased.

A Production Swivel Joint may be inserted into a Production Logging toolstring in any location where rotation is required. However it is usually placed between the cable head and the top of the tool.

A PSJ should not be used where rotation of the logging tool whilst logging is beneficial, i.e. in Multifinger Image surveys.

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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.** Recommended speed depends on the remaining tools.	

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

Check tool is not rotating relative to borehole while logging.

3.4 POST LOGGING DIS-ASSEMBLY

Ref.: PSJ General Assembly:
- Sondex Ends — *Appendix B.1*
- GO Ends — *Appendix B.2*

The tool should be cleaned before the toolstring is dis-assembled.

Ensure that well fluid does not reach the electrical connectors. Refit thread protectors.

Check the gap between moving sleeve (item 3) and bearing housing (item 1) is $^1/_8$″.

Note: If > $^1/_8$″, possibility of leakage of gas or water into the tool. If < $^1/_8$″, suspect oil has leaked out.

When compressing the Sliding sleeve, is the sleeve held solid or is the action spongy? A spongy action would indicate the existence of gas inside the tool.

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4 MECHANICAL DESCRIPTION

Ref.: PSJ General Assembly:
- Sondex Ends — *Appendix B.1*
- GO Ends — *Appendix B.2*

4.1 OVERVIEW

The mono-conductor Production Logging Swivel Joint is made up of upper, middle and lower sections.

4.1.1 UPPER SECTION

- Upper Connector Assembly.
- Upper Screw Plug.
- Upper Pressure Isolation Connector.
- Connector Jacket Assembly.
- Centraliser Connector.

4.1.2 MIDDLE SECTION

- Upper Bearing Housing.
- Thrust Bearings & Radial bearings.
- Main Shaft Assembly.
- Lower Pressure Isolation Connector.
- Lower Bearing Housing.

4.1.3 LOWER SECTION

- Moving Sleeve.
- Lower Screw Plug.
- Lower sub.
- Lower Connector Rod Assembly.

4.2 DIS-ASSEMBLY

Note: For the inspection of the internal connector, only a partial dis-assembly is required. Refer to *Section 5.2.1 Inspection of Internal Electrical Connector* for the dis-assembly and assembly procedure.

Refer to *Section 3.4 Post Logging Dis-assembly* before dis-assembling the tool.

4.2.1 DIS-ASSEMBLY OF THE LOWER SECTION

1 Remove Grub screws (item 23) and ball bearings (item 21) in the Lower sub (item 4).

2 Remove the Circlip (item 30) from the Lower Sub (item 4).

3 Remove the Lower Connector Rod assembly (item 11).

4 Unscrew and remove the Lower Sub (item 4) from the Main shaft (item 5).

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5 Position the tool vertically and remove the Upper Screw Plug (item 8).

6 With the tool over a suitable container, remove the Lower Screw Plug (item 8) and allow the oil to drain out.

Note: The sleeve may need reasonable force to remove as there are two external O-rings (item 41) and two internal O-rings (item 42) in the assembly.

4.2.2 DIS-ASSEMBLY OF THE UPPER SECTION

Note: The Upper Locking Spring (item 16) can be removed and refitted at any time.

1 Unclip the Locking Spring (item 16) from the slot in the Bearing Housing (item 1).

2 Unscrew the Upper sub (item 2) from the Thrust bearing housing (item 1).

Note: This is removed as a complete sub assembly. Add additional compressor oil to the level of the slot in the Thrust bearing housing when *Section 4.2.1* is **NOT** carried out.

3 With a suitable pair of long nose pliers, remove the internal connector assembly from the upper sub for visual inspection.

Note: This consists of the Outer connector centraliser (item 35), which is removed first and the Female connector assembly (item 36), followed by the Upper Pressure Isolation Connector (item 15).

Note: The Female connector assembly is contained within a plastic jacket, which forms part of the internal seal around the pressure connectors.

- Inspect the jacket for wear. If worn or damaged, a new connector assembly with jacket should be fitted.
- The Connector centraliser contains two small O-rings (item 44). Inspect and replace if damaged.

4.2.3 FINAL DIS-ASSEMBLY

1 Unscrew the Moving Sleeve (item 3) from the internal Threaded ring (item 7) and remove from the assembly.

2 The tool is now in a state where the bearings, O-rings and any other moving parts can be examined for signs of wear or damage.

4.3 RE-ASSEMBLY

4.3.1 RE-ASSEMBLY OF THE UPPER SECTION

Note: The Upper Locking Spring (item 16) can be removed and refitted at any time.

1 Fit the Upper Connector (item 10) into the Upper Sub (item 2) and secure with the Insulator Retainer (item 14).

2 Locate the Upper Sub (item 2) vertically, top end facing down.

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3 Fit the Female connector (item 36) and O-ring (item 44) onto the Connector Centraliser (item 35).

Note: Care should be taken not to damage the end of the jacket, as this has to locate around the end of the pressure connector on assembly.

4 Fit the Upper Pressure Isolation Connector (item 15) into the Upper Sub (item 2).

Note: Replace the O-ring on the Upper Pressure Isolation Connector (item 15) if required.

5 Fill the internal bore of the Upper Sub (item 2) with compressor oil.

6 Fit the Upper Screw Plug (item 8) into the Upper Sub (item 2).

7 Fit the Connector Centraliser assembly of operation *3* into the Upper Sub (item 2) over the Pressure Isolation Connector (item 15).

Note: The Connector Centraliser (item 35) should be fitted into the bore of the Upper Sub (item 2) until it is nominally 0.19″ from the Thrust Bearing Washer Seat, which will be approximately when the plastic jacket locates over the white ceramic portion of the pin.

Note: As the ceramic section of the isolation pin is below the oil level, the air within the Female connector will be forced out leaving only the oil. If required additional oil may be added to the jacket to top up the oil level.

8 Fit the Upper Thrust Bearing assembly (item 20) over the Lower Pressure Isolation Connector (item 15) and O-rings (item 44), fitted to the Main Shaft (item 5), ensuring it is correctly seated.

9 Fit the Lower Pressure Isolation Connector (item 15) into the Connector Centraliser (item 35).

Note: During this operation, the Thrust Bearing Housing (item 1) will mate with the Upper Sub (item 2). Care should be taken to keep the Upper Sub (item 2) vertical to avoid damage to the internal connection.

10 Fit the O-rings (item 39) and Lower Thrust Bearing assembly (item 20) over the Main Shaft (item 5).

11 Screw to Upper Sub (item 2) to the Thrust Bearing Housing (item 1), until the tang on the Locking Spring (item 16) is 1 to 2mm from the Thrust Bearing Housing (item 1).

12 Tighten the Thrust Bearing Housing (item 1) until the Thrust Bearings (2x item 20) mate.

Note: This can be determined by a slight increase in resistance in the shaft rotation. Do not over tighten the Upper Sub (item 2) as the Main Shaft (item 5) may lock up and damage the bearings.

13 Refit if required:

- O-Rings (item 41).
- Retaining Ring (item 7).
- Spring (item 17).
- Lower Bearing Housing (item 6) and Spirol Pin (item 33).
- Bearing (item 19).
- Retaining Ring (item 31).

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14 Screw the Moving Sleeve (item 3) over the Retaining Ring (item 7) until the Moving Sleeve (item 3) is tight onto the Bearing Housing (item 1).

15 Fit the Lower Screw Plug.

16 Oil Fill the Assembly, as described in *Section 5.1.4* until the gap between the Moving Sleeve (item 3) and shoulder on the Bearing Housing (item 1) is $^{1}/_{8}$″. Ensure that all air is removed from the tool.

Note: When the gap is too big, unscrew one of the Screw Plugs (item 8), apply gentle force against the Moving Sleeve (item 3) so that the the excess oil will be displaced and the specified gap achieved.

17 Refit the Screw Plug (item 8).

18 Reposition the Locking Spring (item 16) and locate the tang into the slot in the Bearing Housing (item 1).

4.3.2 RE-ASSEMBLY OF THE LOWER SECTION

1 Fit the Lower Sub (item 4) onto the Main Shaft (item 5) and secure with the Grub Screws (item 23) and Ball Bearings (item 21).

2 Refit the Lower Connector Rod assembly (item 11) into the Lower Sub (item 4) and secure with the Circlip (item 30).

3 Refit the Lower Screw Plug (item 8).

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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.

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

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

Note that some threads are internal, which can cause grease to 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 for grease are not suitable for use on O-rings. Silicone grease may be used on O-rings, but must be kept clear of threads, especially stainless steel to stainless steel.

Cavities e.g. spring housings, should be filled with compressor oil.

Caution! The use of certain greases, which contain volatile content, (e.g. some types of Lubriplate) can cause electrical failure due to production of corrosive gasses inside the tool when burned off.

5.1.2 MECHANICAL

Ref.: PSJ General Assembly:
- Sondex Ends *Appendix B.1*
- GO Ends *Appendix B.2*

1 Remove dirt and old grease from pressure housing threads and O-rings and replace with fresh.

2 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*.

3 Inspect O-rings for damage or ageing/hardening and replace where required.

4 The O-rings in the connector assemblies are not in contact with well fluids nor do they normally have a pressure across them. They are designed however to provide backup

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pressure isolation should the flexible tubing or its joints fail downhole.

Every 6-12 months they should be changed. The service interval depends on time and temperature of use. A shorter interval may be required for frequent hot use, especially when the internal ends become dirty.

Check connectors for cleanliness and loose/bent pins before replacing. Ensure that upper and lower electrical connectors are clean, dry and undamaged.

5 Check all fixings for tightness.

6 Check grub screws (item 23) are tight.

5.1.3 ELECTRONICS SECTION

1 Using a megohm meter (set to 250V) check the following:

- Insulation (between the housing and pins) >100MΩ.

2 Using a multimeter, check the following:

- Through resistance (between upper and lower pins) < 0.5Ω.

5.1.4 OIL FILLING

Ref.: PSJ General Assembly:
- Sondex Ends *Appendix B.1*
- GO Ends *Appendix B.2*

Prior to refilling the tool the new oil should be placed in a vacuum to remove gas from within the oil. This reduces the possibility of pockets of air forming inside the tool which would compromise performance.

1 Lay the part-assembled tool horizontally with the upper bleed screw hole facing upwards.

2 Remove the bleed screw (item 8) and fit the filler plug with bottle on to the tool. Return the tool to a vertical but upside-down position and slightly angled, so that the lower bleed screw is uppermost.

3 Squeeze the filler bottle to force oil up into the tool.

4 Continue filling until oil is expelled from the bleed hole in the sliding sleeve. Look carefully as the oil is expelled to ensure all the air has been forced from the tool.

5 Refit the lower bleed screw and position the tool horizontally with the filler plug facing upwards.

6 Remove the plug and refit the upper bleed screw.

7 Tighten the Bearing housing until the thrust bearings mate (this can be determined by a slight increase in resistance in the shaft rotation).

Note: Do not over tighten the upper sub as the shaft may lock up and damage the bearings.

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8 Now that the tool is pressurised the gap between the Sliding sleeve and shoulder on the Thrust bearing housing should be reduced to $^{1}/_{8}$″. By unscrewing one of the bleed screws and applying gentle force against the Sliding sleeve the specified gap will be achieved.

9 Retighten the bleed screw.

10 Reposition the Anti-rotation spring and locate the tang into the slot in the Bearing housing.

11 Refit the Lower sub with connector onto the Main shaft. Screw on until the anti rotation screw holes line up with their respective dimples in the shaft.

12 Refit the balls and grub screws.

5.2 EXTRAORDINARY MAINTENANCE

See also: *Section 3.1 Pre-Logging Checks*

5.2.1 INSPECTION OF INTERNAL ELECTRICAL CONNECTOR

Only a partial disassembly of the tool is required. Follow the procedure as written in *Section 4.2.2 Dis-assembly of the Upper Section*. Reassemble the tool as described in *Section 4.3.1 Re-assembly of the Upper Section*.

The oil will remain in the lower part of the tool. Add additional oil after operation 2 of *Section 4.3.1 Re-assembly of the Upper Section* to the level of the slot in the Thrust bearing housing.

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APPENDIX A EQUIPMENT & RECOMMENDED SPARES

Item	Part No.	Description	Qty	Remarks
1	PKJ..	Production Knuckle Joint	1	See *Section 1.5*.

A.1 ANCILLARY EQUIPMENT

Item	Part No.	Description	Qty	Remarks
None Required.				

A.2 MAINTENANCE EQUIPMENT

Item	Part No.	Description	Qty	Remarks
1	*91050*	Tool Kit for All $1^{11}/_{16}$″ Tools	1	See *Section 1.5*.
2	*91296*	Tool Kit for All $2^{1}/_{8}$″ Tools	1	See *Section 1.5*.
3	LOR101	Grease for O-ring & threads	1	5oz. pot.
4	LOR101L	Grease for O-ring & threads	AR	12oz. pot.
5	94240	Capella WF32 Compressor Oil	AR	1 litre can

A.3 RECOMMENDED SPARES

Item	Part No.	Description	Qty	Remarks
1	*KITB-PSJ1 11/16*	Basic Spares Kit, PSJ $1^{11}/_{16}$″	1	To support 1 run in hole.
2	*KITB-PSJ2 1/8*	Basic Spares Kit, PSJ $2^{1}/_{8}$″	1	To support 1 run in hole.
3	*KITR-PSJ1 11/16*	Recommended Spares Kit, PSJ $1^{11}/_{16}$″	1	Supports 25 runs in hole.
4	*KITR-PSJ2 1/8*	Recommended Spares Kit, PSJ $2^{1}/_{8}$″	1	Supports 25 runs in hole.

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All spares kits, mentioned in this section, can be supplied upon request. However, Sondex recommends the purchase of these kits to properly support your logging tools from job to job. 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.
- Spares Kits, suitable for remote logging operations, can be supplied upon request.

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 be supplied upon request.

PARTS LISTING

Part	*Issue*
91050	C

Description

Tool Kit for all 1 11/16 Tools SX and GO

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	91005	Spanner Open Ended 42mmx38mm	2	EA	
0002	91019	Spanner C 50mm 35mm	2	EA	
0003	10038	Spanner Box 3/8 x 5/16 Modified	2	EA	
0004	91028	Spanner O/E 3/8x5/16	1	EA	
0005	93876	Spanner Single Open End 18mm	1	EA	
0006	91029	Key, Hex Metric (Set)	1	EA	
0007	91030	Punch Pin Parallel set	1	EA	
0008	00615	Assy Spanner PKJ	1	EA	
0009	91293	Screwdriver Parallel tip (3 0 x 75)	1	EA	
0010	91105	Toolroll With SX Badge Large Black	1	EA	
0011	91104	Screwdriver Parallel tip (5 5 x 200)	1	EA	
0012	91103	Pliers Circlip 812 Chrome/Van	1	EA	
0013	91102	Pliers Mini Flat Nose 5 Inch	1	EA	
0014	10037	Bar Tommy	2	EA	
0015	10051	Kemlon tool Sondex - 4BA Hex Socket	1	EA	
0016	91280	Hammer, 4oz ball pein	1	EA	
0017	91130	Pin C Spanner 35-50mm	1	EA	
0018	91822	Medium Flat Blade Screwdriver, 5mm	1	EA	
0019	91255	T15 Torx driver, Sandvik Belzer 8915	2	EA	

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PARTS LISTING

Part	Issue
91296	C

Description

TOOL KIT ALL 2 1/8 TOOLS SX AND GO

PARTS LIST

Item	Part No	Description	Qty	Units	Remarks
Item	Component numbe	Object description	. Qty	Un	
0001	91108	Spanner Open Ended 1 7/8x 1 11/16	2	EA	
0002	91023	Spanner C (50 - 80, 2 3/4) (WAS 91065)	2	EA	
0003	10038	Spanner Box 3/8 x 5/16 Modified	2	EA	
0004	91028	Spanner O/E 3/8x5/16	1	EA	
0005	93876	Spanner Single Open End 18mm	1	EA	
0006	91029	Key, Hex Metric (Set)	1	EA	
0007	91030	Punch Pin Parallel set	1	EA	
0008	00615	Assy Spanner PKJ	1	EA	
0009	91293	Screwdriver Parallel tip (3 0 x 75)	1	EA	
0010	91105	Toolroll With SX Badge Large Black	1	EA	
0011	91104	Screwdriver Parallel tip (5 5 x 200)	1	EA	
0012	91103	Pliers Circlip 812 Chrome/Van	1	EA	
0013	91102	Pliers Mini Flat Nose 5 Inch	1	EA	
0014	10037	Bar Tommy	2	EA	
0015	10051	Kemlon tool Sondex - 4BA Hex Socket	1	EA	
0016	91280	Hammer, 4oz ball pein	1	EA	
0017	91131	Pin C Spanner 2 5	1	EA	
0018	91551	Spanner open ended 1	1	EA	

PARTS LISTING

Part	Issue
KITB-PSJ1 11/16	B

Description

Kit, Spares, Basic, PSJ (1 11/16)

PARTS LIST

Item	Part No	Description	Qty	Units	Remarks
0001	03848	Screw Plug	2	EA	
0002	91000	Bearing Ball 3/16 Hard	3	EA	
0003	01063	Scr, Grb Skt Hd, M6 x 8mm Long, St/Steel	3	EA	
0004	01047	CIRCLIP INTERNAL 5/8 SS N1300	1	EA	
0005	03874	Assy Connector Jacket	1	EA	
0006	04053	Assy Flushing Kit (QPS, ILS, PSJ, DBT)	1	EA	
0007	94240	OIL CHEVRON TEXACO CAPELLA WF32	1	L	

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PARTS LISTING

Part	Issue
KITB-PSJ2 1/8	A

Description

BASIC SPARTS KIT PSJ 2 1/8"

PARTS LIST

Item	Part No	Description	Qty	Units	Remarks
0010	03848	Screw Plug	2	EA	
0020	91000	Bearing Ball 3/16 Hard	3	EA	
0030	01063	Scr, Grb Skt Hd, M6 x 8mm Long, St/Steel	3	EA	
0040	01047	CIRCLIP INTERNAL 5/8 SS N1300	1	EA	
0050	03874	Assy Connector Jacket	1	EA	
0060	04053	Assy Flushing Kit (QPS, ILS, PSJ, DBT)	1	EA	
0070	94240	OIL CHEVRON TEXACO CAPELLA WF32	1	L	

PARTS LISTING

Part	Issue
KITR-PSJ1 $^{11}/_{16}$	B

Description

Kit, Spares, Recommended(25 Run), PSJ1 $^{11}/_{16}$

PARTS LIST

Item	Part No	Description	Qty	Units	Remarks
0001	03847	Ring Retaining	1	EA	
0002	03848	Screw Plug	2	EA	
0003	01849	Spring, Locking, 1 11/16 Inch Tools	1	EA	
0004	91000	Bearing Ball 3/16 Hard	6	EA	
0005	01063	Scr, Grb Skt Hd, M6 x 8mm Long, St/Steel	6	EA	
0006	91080	Cup Ball M5, c/w Spring Plunger	1	EA	
0007	01047	CIRCLIP INTERNAL 5/8 SS N1300	2	EA	
0008	03874	Assy Connector Jacket	1	EA	
0009	99008	O-ring 008 Viton 90	50	EA	
0010	99013	O-ring 013 Viton 90	50	EA	
0011	99124	O-ring 124 Viton 90	50	EA	
0012	95126	O-ring 126 Viton 75	50	EA	
0013	95209	O-ring 209 Viton 75	50	EA	
0014	99211	O-ring 211 Viton 90	50	EA	
0015	99009	O-ring 009 Viton 90	50	EA	
0016	94240	OIL CHEVRON TEXACO CAPELLA WF32	1	L	

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PARTS LISTING

Part	*Issue*
KITR-PSJ2 1/8	A

Description

Kit,Spares, Rec'd(25Run), PSJ(2 1/8)

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	03881	Ring Retaining 2 1/8 Mk2	1	EA	
0002	03848	Screw Plug	2	EA	
0003	03806	Spring Locking, 2 1/8	1	EA	
0004	91000	Bearing Ball 3/16 Hard	6	EA	
0005	01063	Scr, Grb Skt Hd, M6 x 8mm Long, St/Steel	6	EA	
0006	91080	Cup Ball M5, c/w Spring Plunger	1	EA	
0007	01047	CIRCLIP INTERNAL 5/8 SS N1300	2	EA	
0008	03874	Assy Connector Jacket	1	EA	
0009	95008	O-ring 008 Viton 75	50	EA	
0010	99013	O-ring 013 Viton 90	50	EA	
0011	95129	O-ring 129 Viton 75	50	EA	
0012	95133	O-ring 133 Viton 75	50	EA	
0013	95213	O-ring 213 Viton 75	50	EA	
0014	99211	O-ring 211 Viton 90	50	EA	
0015	95009	O-ring 009 Viton 75	50	EA	
0016	94240	OIL CHEVRON TEXACO CAPELLA WF32	1	L	

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APPENDIX B DRAWINGS & PARTS LISTS

B.1 MECHANICAL DRAWINGS - SONDEX ENDS

Tool Code	Specification	Drawing	Parts List
PSJ008			
PSJ008	Production Swivel Joint, $1^{11}/_{16}$″	*07003-K*	See drawing
PSJ008	Assy Connector & Rod Lower, $1^{11}/_{16}$”	*03859-C*	*03859-E*
PSJ008	Assy Connector Jacket	*03874-E*	See drawing
PSJ012			
PSJ012	Production Swivel Joint, $2^{1}/_{8}$″	*09352-F*	*09352-F.*
PSJ012	Assy Connector & Rod Lower, $2^{1}/_{8}$″	*03893-B*	*03893-D*
PSJ012	Assy Connector Jacket	*03874-E*	See drawing

B.2 MECHANICAL DRAWINGS - GO ENDS

Tool Code	Specification	Drawing	Parts List
PSJ010			
PSJ010	Production Swivel Joint, $1^{11}/_{16}$″	*07008-K*	See drawing
PSJ010	Assy Connector & Rod Lower - $1^{11}/_{16}$”	*03867-C*	*03867-E*
PSJ010	Assy Connector Jacket	*03874-E*	See drawing
PSJ011			
PSJ011	Production Swivel Joint, $2^{1}/_{8}$″	*07033-J*	See drawing
PSJ011	Assy Connector & Rod Lower - $2^{1}/_{8}$″	*03885-C*	*03885-E*
PSJ011	Assy Connector Jacket	*03874-E*	See drawing
PSJ014			
PSJ014	Production Swivel Joint, $1^{11}/_{16}$″, Easy Entry	*11534-D*	*11534-F*
PSJ014	Assy Connector & Rod Lower - $1^{11}/_{16}$”	*03867-C*	*03867-E*
PSJ014	Assy Connector Jacket	*03874-E*	See drawing
PSJ016			
PSJ016	Production Swivel Joint, $1^{11}/_{16}$″, Easy Entry, 20kPsi, 200ºC	*09699-A*	*09699-B*
PSJ016	Assy Connector & Rod Lower - $1^{11}/_{16}$”	*03867-C*	*03867-E*
PSJ016	Assy Connector Jacket	*03874-E*	See drawing

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ITEM NO.	Default/ QTY.	PART NUMBER	DESCRIPTION
1	1	03841	HOUSING BEARING$UPPER MKII
2	1	03842	SUB UPPER MKII
3	1	03843	SLEEVE MOVING MKII
4	1	03844	SUB LOWER DIA 1-11/16"$PSJ MK2
5	1	03845-1	ASSY SHAFT MAIN$PSJ ø1-11/16" MK2
6	1	03846	HOUSING BEARING LOWER
7	1	03847	RING RETAINING
8	2	03848	SCREW PLUG
10	1	03895	ASSY UPPER CONNECTOR SX
11	1	03859	ASSY CONNECTOR & ROD$LOWER SX PSJ
14	1	00693	RETAINER INSULATOR
16	1	01849	Spring, Locking, ø1-11/16"
49	1	03860	SPRING(COMP) S/S 100lbs/in
19	1	91036	BEARING RADIAL
20	2	91035	BEARING THRUST
21	3	91000	Bearing Ball 3/16 Hard
23	3	01063	SCREW GRUB SKT HD M6 x 08mm LG SS
30	1	01047	CIRCLIP INTERNAL 5/8 BORE N1300
31	1	93179	Ring Retaining VH137 for 1.375 Bore
33	1	93188	Pin Spirol 2.5mm x 06mm LG SS
34	1	93019	PIN SPIROL ø1 x 08mm LG SS
35	1	03873	CENTRALISER CONNECTOR
36	1	03874	ASSY CONNECTOR JACKET
38	2	99008	O'RING 008 VITON 90
39	2	99013	O'RING 013 VITON 90
40	2	99124	O'RING 124 VITON 90
41	2	95126	O Ring Viton 75 Type 126
42	2	95208	O Ring Viton 75 Type 208
43	2	99211	O'RING 211 VITON 90
44	4	99009	O'RING 009 VITON 90
46	1	10148	THREAD PROTECTOR$MALE SX STD UPR$(WITH O'RING)
47	1	01019	ASSY LOWER TP$and WARNING LABEL
48	-	94240	OIL CAPELLA

DO NOT SCALE

* CONNECTOR BALLOONED THUS IS SUPPLIED AS PART OF 03874 (ITEM 36)

14.66 OAL INCLUDING THREAD PROTECTORS

10.86 MAKE-UP LENGTH

OIL EMPTY POSITION

OIL FILLED POSITION

(0.40)

SECTION A-A

DRAWN: NGH	CHECKED: GHT	APP'D: NGH	ISS	DESCRIPTION	APPD	DATE	Sondex Tel. 0118 932 6755	USED ON	TITLE
DATE: 15/09/09	DATE: 16/10/09	DATE:16/10/09	K	ECR 5-63357 REFERS	NGH	16/10/09	THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	PSJ008	ASSY Ø1-11/16" SWIVEL JOINT MKII SX ENDS
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS/BOM							MACHINE FINISH 63	GEN TOL 0.X ±0.020" 0.XX ±0.010" 0.XXX ±0.005" ANGLE ±0.5°
SCALE 1:1	A1	HEAT TREATMENT/CONDITION: NOT APPLICABLE					THIRD ANGLE PROJECTION	SHEET 1/1	DRAWING No. AD 07003 ISSUE K S W

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ITEM NO.	Default/ QTY.	PART NUMBER	DESCRIPTION
1	1	03878	HOUSING BEARING$UPPER MKII
2	1	03877	SUB UPPER MKII
3	1	03880	SLEEVE MOVING MKII
4	1	03879	SUB LOWER MK2$DIA 2-1/8"
5	1	03882-1	ASSY SHAFT MAIN$PSJ ø2-1/8" Mk2
6	1	03883	HOUSING BEARING LOWER
7	1	03881	RING RETAINING
8	2	03848	SCREW PLUG
10	1	03895	ASSY UPPER CONNECTOR SX
11	1	03893	ASSY CONNECTOR & ROD$LOWER SX PSJ
14	1	00693	RETAINER INSULATOR
16	1	03806	Spring, Locking, ø2-1/8"
48	1	03887	SPRING(COMP) S/S 100lbs/in
19	1	91955	BEARING RADIAL
20	2	91014	BEARING THRUST
21	3	91000	Bearing Ball 3/16 Hard
23	3	01063	SCREW GRUB SKT HD M6 x 08mm LG SS
30	1	01047	CIRCLIP INTERNAL 5/8 BORE N1300
31	1	93238	Ring Retaining VH162 for 1.625 Bore
33	1	93188	Pin Spirol 2.5mm x 06mm LG SS
34	1	93019	PIN SPIROL ø1 x 08mm LG SS
35	1	03873	CENTRALISER CONNECTOR
36	1	03874	ASSY CONNECTOR JACKET
38	2	99008	O'RING 008 VITON 90
39	2	99013	O'RING 013 VITON 90
40	2	99129	O'RING 129 VITON 90
41	2	95133	O Ring Viton 75 Type 133
42	2	95213	O Ring Viton 75 Type 213
43	2	99211	O'RING 211 VITON 90
44	4	99009	O'RING 009 VITON 90
46	1	10148	THREAD PROTECTOR$MALE SX STD UPR$(WITH O'RING)
47	1	01019	ASSY LOWER TP$and WARNING LABEL
48	-	94240	OIL CAPELLA

DO NOT SCALE

* CONNECTOR BALLOONED THUS IS SUPPLIED AS PART OF 03874 (ITEM 36)

14.94 OAL INCLUDING THREAD PROTECTORS

11.13 MAKE-UP LENGTH

OIL EMPTY POSITION

OIL FILLED POSITION

(0.44)

SECTION A-A

DRAWN: NGH	CHECKED: GHT	APP'D: NGH	
DATE: 15/09/09	DATE: 16/10/09	DATE 16/10/09	
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS/BOM		
SCALE 1:1	A1	HEAT TREATMENT/CONDITION: NOT APPLICABLE	

ISS	DESCRIPTION	APPD	DATE
J	ECR 5-63357 REFERS	NGH	16/10/09

Sondex
Tel. 0118 932 6755

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THIRD ANGLE PROJECTION

USED ON: PSJ012

MACHINE FINISH: 63

GEN TOL: 0.X ±0.020" 0.XX ±0.010" 0.XXX ±0.005" ANGLE ±0.5°

TITLE: ASSY Ø2-1/8" SWIVEL JOINT MKII SX ENDS

SHEET 1/1 | DRAWING No. AD 09352 | ISSUE J | S/W

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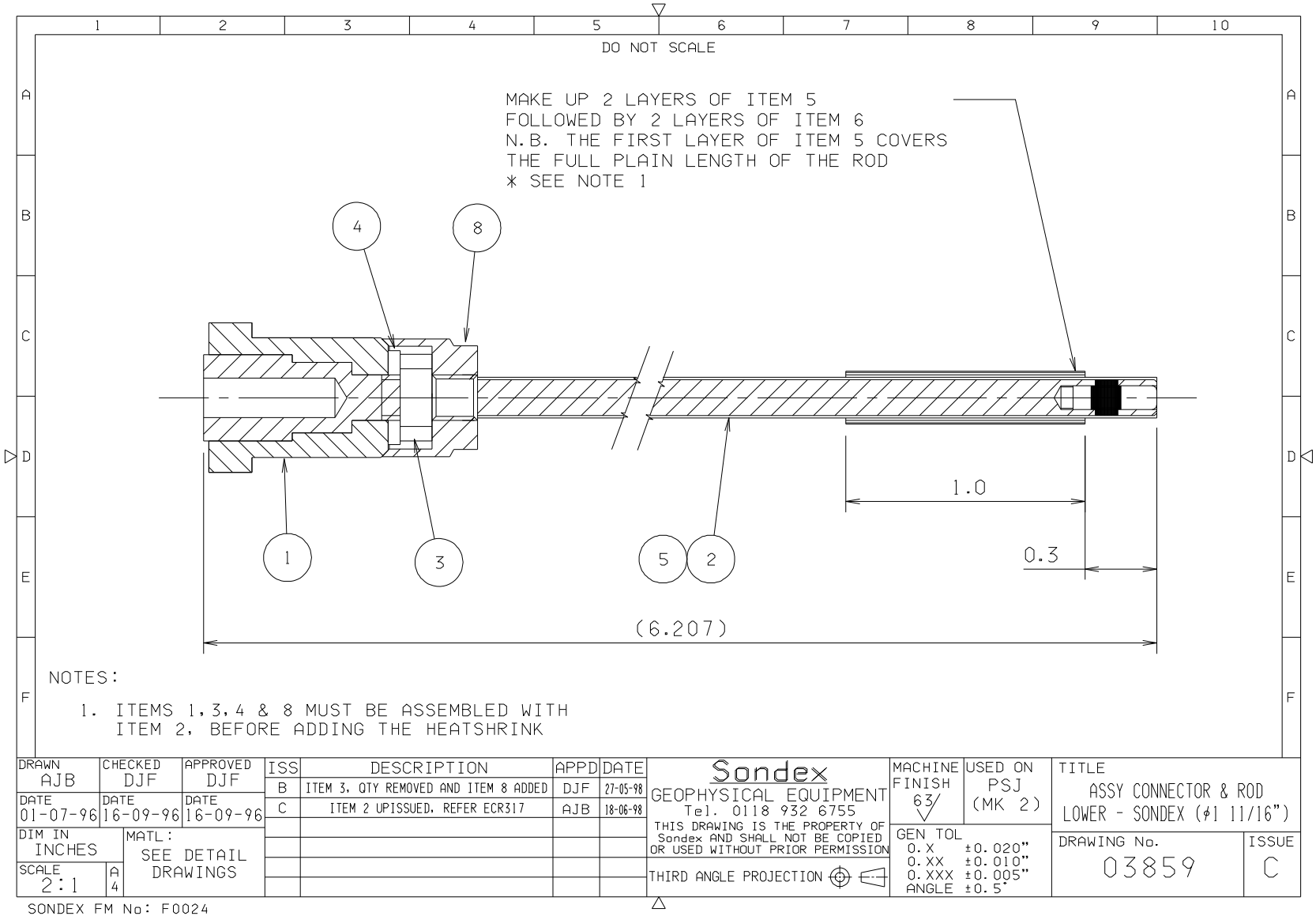

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PARTS LISTING

Part	*Issue*
03859	E

Description

Assy Lower Connector & Rod SX

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
Item	Component numbe	Object description	). Qty	Un	
0001	01025	Insulator, Lower Connector	1	EA	
0002	03869	Assy Connector Rod SX	1	EA	
0003	01026	Half-Nut, Hex, 10-32UNF, St/Steel	1	EA	
0004	93083	Washer Plain M5 SS-A2 DIN125 Form A	1	EA	
0005	94049	Sleeving Heatshrink 4 2mm Teflon	1	CM	
0006	A011-006M4	h'srnk Slv'g,Polyvinylidene Flu,+175C	0.01	M	
0008	10053	Insulator Lower Nut Shroud	1	EA	

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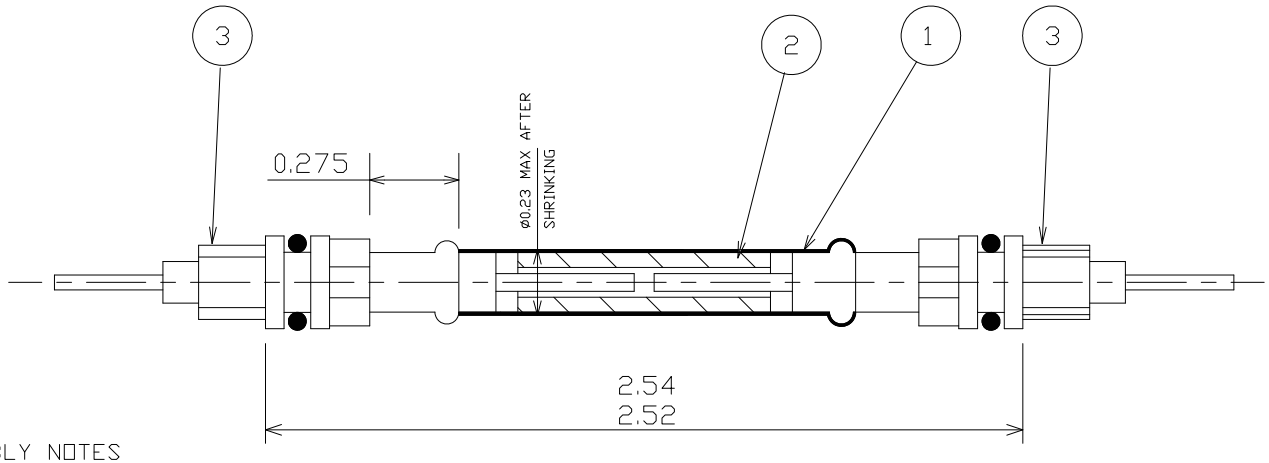
DO NOT SCALE



ASSEMBLY NOTES

1. CUT A LENGTH OF HEAT SHRINK (1) NOMINALLY 1.6" LONG
2. POSITION THE HEAT SHRINK OVER THE BODY CONNECTOR (2)
3. ASSEMBLE THE CONNECTORS (3) INTO THE BODY CONNECTOR (2).
   ENSURE THAT THE ASSEMBLY IS WITHIN THE SPECIFIED DIMENSION
4. USING A HOT AIR GUN, SHRINK THE SLEEVING AROUND THE BODY CONNECTOR
5. TAKE CARE NOT TO EXCEED 160°C WHEN REDUCING THE SIZE OF THE HEAT SHRINK
6. TRIM BACK ONE END OF THE HEAT SHRINK TO THE CERAMIC PORTION OF THE CONNECTOR AS SHOWN
   (USE A SCALPEL TO CUT THE HEAT SHRINK)

ITEM	PART	DESCRIPTION	QTY
3	92009	CONNECTOR	2
2	03826	BODY CONNECTOR	1
1	91081	HEAT SHRINK HIGH TEMP	A/R

ISS	DESCRIPTION	APPD	DATE
E	ECR 4240 REFERS-P/N 92009 WAS J029-00389	NPB	18/12/06
D	ECR 3629 REFERS-ITEM 3 WAS REF	JC	06/04/06
C	ECR 3203 REFERS-ITEM 3, P/N WAS 92009	JC	02/02/06
B	REF ECR 3219	GC	21/10/05
A	INITIAL ISSUE		

DRAWN	CHECKED	APPROVED
AJB	DJF	DJF
DATE 09-09-96	DATE 16-09-96	DATE 16-09-96

DIM IN INCHES | MATL: SEE ITEMS LIST | SCALE 2:1 | A4

Sondex
GEOPHYSICAL EQUIPMENT
Tel. 01734 326755

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THIRD ANGLE PROJECTION

MACHINE FINISH 63 | USED ON PSJ MK2

GEN TOL
0.X ±0.020"
0.XX ±0.010"
0.XXX ±0.005"
ANGLE ±0.5°

TITLE: ASSY CONNECTOR JACKET

DRAWING No. 03874 | ISSUE E

SONDEX FM No: F0024

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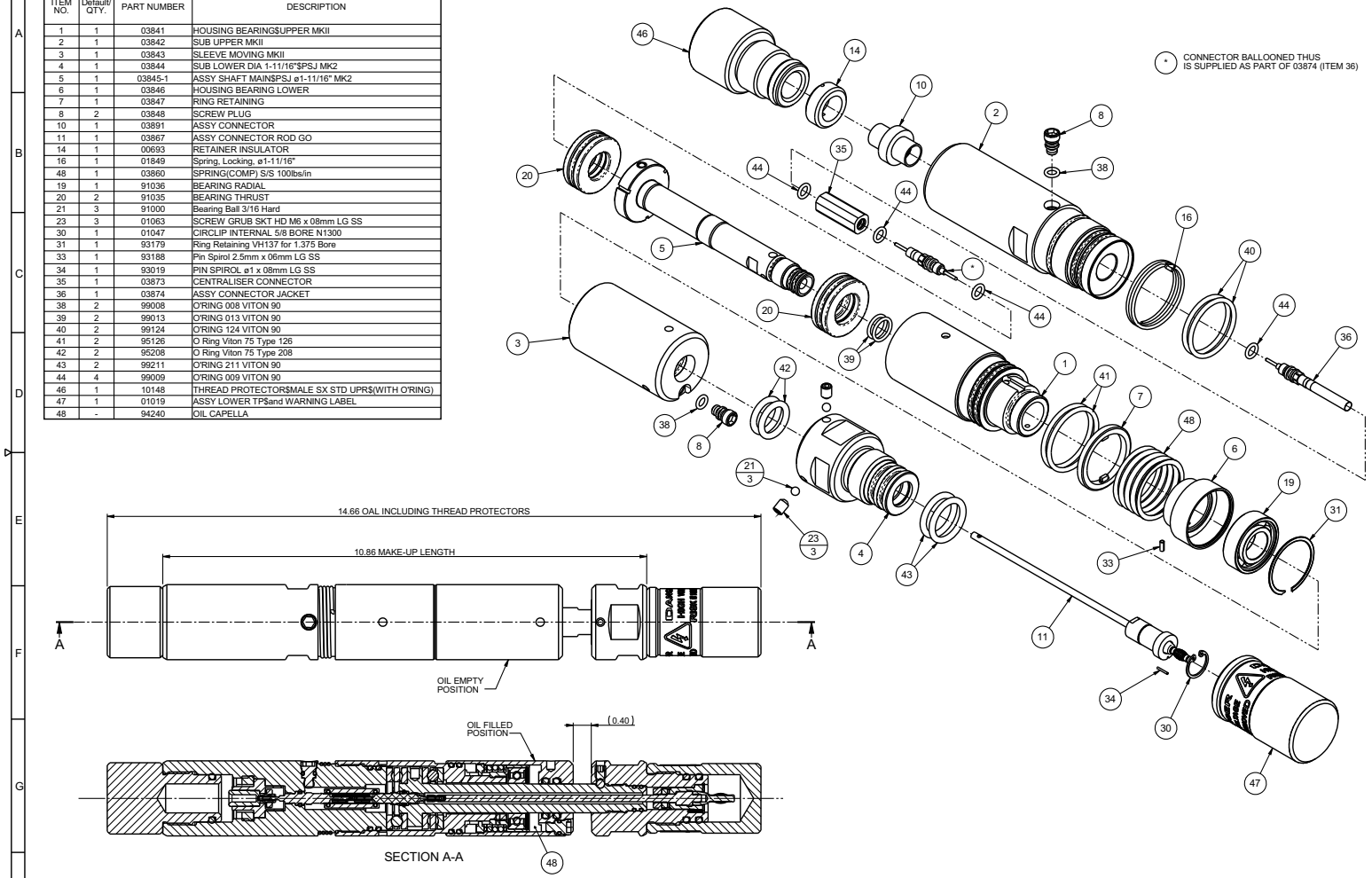
ITEM NO.	Default/ QTY.	PART NUMBER	DESCRIPTION
1	1	03841	HOUSING BEARING$UPPER MKII
2	1	03842	SUB UPPER MKII
3	1	03843	SLEEVE MOVING MKII
4	1	03844	SUB LOWER DIA 1-11/16"$PSJ MK2
5	1	03845-1	ASSY SHAFT MAIN$PSJ ø1-11/16" MK2
6	1	03846	HOUSING BEARING LOWER
7	1	03847	RING RETAINING
8	2	03848	SCREW PLUG
10	1	03891	ASSY CONNECTOR
11	1	03867	ASSY CONNECTOR ROD GO
14	1	00693	RETAINER INSULATOR
16	1	01849	Spring, Locking, ø1-1/16"
48	1	03860	SPRING(COMP) S/S 100lbs/in
19	1	91036	BEARING RADIAL
20	2	91035	BEARING THRUST
21	3	91000	Bearing Ball 3/16 Hard
23	3	01063	SCREW GRUB SKT HD M6 x 08mm LG SS
30	1	01047	CIRCLIP INTERNAL 5/8 BORE N1300
31	1	93179	Ring Retaining VH137 for 1.375 Bore
33	1	93188	Pin Spirol 2.5mm x 06mm LG SS
34	1	93019	PIN SPIROL ø1 x 08mm LG SS
35	1	03873	CENTRALISER CONNECTOR
36	1	03874	ASSY CONNECTOR JACKET
38	2	99008	O'RING 008 VITON 90
39	2	99013	O'RING 013 VITON 90
40	2	99124	O'RING 124 VITON 90
41	2	95126	O Ring Viton 75 Type 126
42	2	95208	O Ring Viton 75 Type 208
43	2	99211	O'RING 211 VITON 90
44	4	99009	O'RING 009 VITON 90
46	1	10148	THREAD PROTECTOR$MALE SX STD UPR$(WITH O'RING)
47	1	01019	ASSY LOWER TP$and WARNING LABEL
48	-	94240	OIL CAPELLA

DO NOT SCALE

* CONNECTOR BALLOONED THUS IS SUPPLIED AS PART OF 03874 (ITEM 36)



DRAWN: NGH	CHECKED: GHT	APP'D: NGH	ISS	DESCRIPTION	APP'D	DATE	Sondex Tel. 0118 932 6755	USED ON	TITLE		
DATE: 21/09/09	DATE: 16/10/09	DATE:16/10/09	K	ECR 5-63357 REFERS	NGH	16/10/09	THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	PSJ010	ASSY Ø1-11/16" SWIVEL JOINT MKII GO ENDS		
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS/BOM							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. AD 07008 / ISSUE K
SCALE 1:1	A1	HEAT TREATMENT/CONDITION: NOT APPLICABLE					THIRD ANGLE PROJECTION				S W

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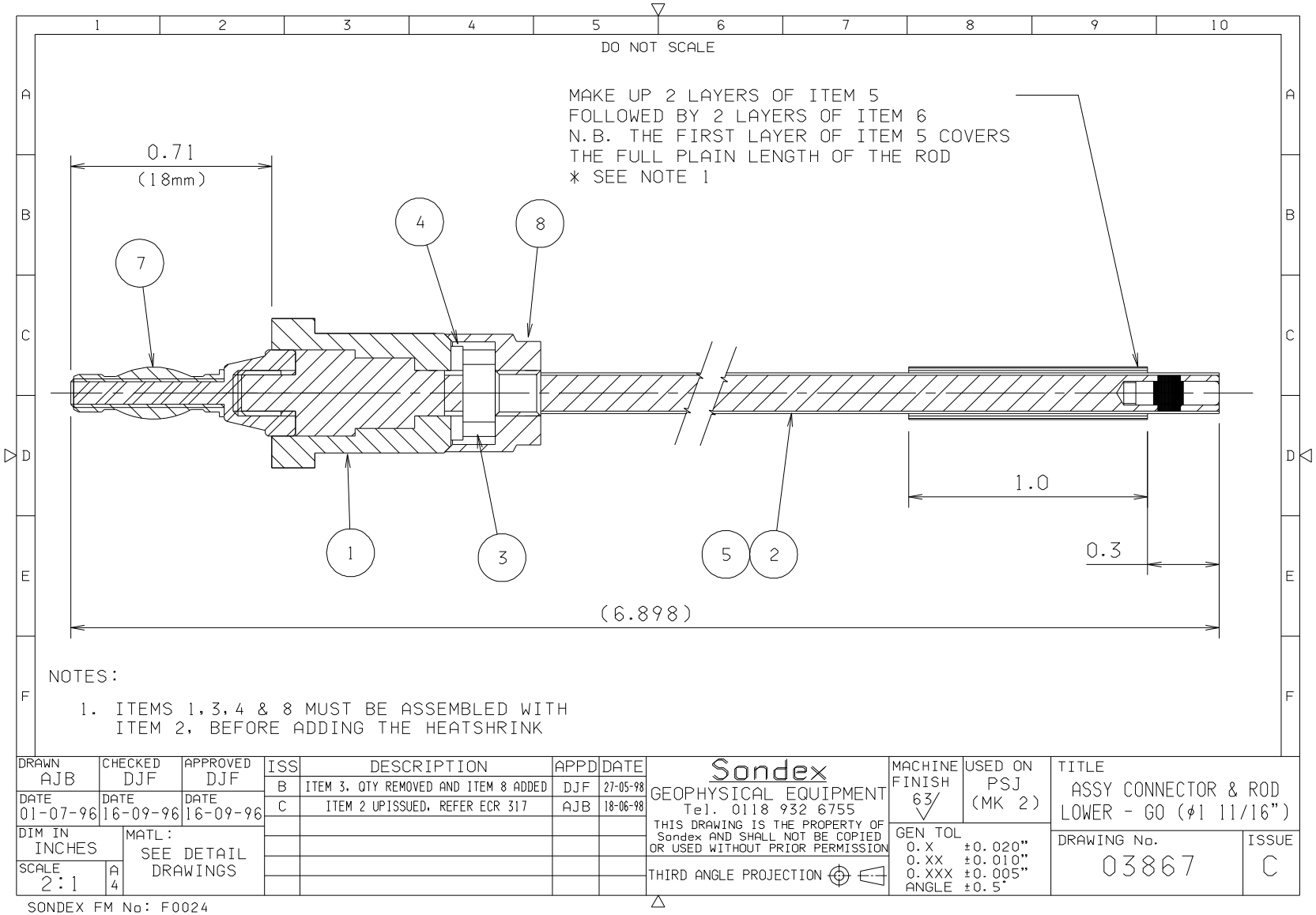

DRAWN	CHECKED	APPROVED
AJB	DJF	DJF
DATE	DATE	DATE
01-07-96	16-09-96	16-09-96
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS	
SCALE 2:1	A4	

ISS	DESCRIPTION	APPD	DATE
B	ITEM 3, QTY REMOVED AND ITEM 8 ADDED	DJF	27-05-98
C	ITEM 2 UPISSUED, REFER ECR 317	AJB	18-06-98

Sondex
GEOPHYSICAL EQUIPMENT
Tel. 0118 932 6755

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THIRD ANGLE PROJECTION

MACHINE FINISH	USED ON
63	PSJ (MK 2)

GEN TOL
0.X ±0.020"
0.XX ±0.010"
0.XXX ±0.005"
ANGLE ±0.5°

TITLE: ASSY CONNECTOR & ROD LOWER - GO (ϕ1 11/16")

DRAWING No. 03867

ISSUE C

SONDEX FM No: F0024

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PARTS LISTING

Part	*Issue*
03867	E

Description

Assy Connector Rod GO

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	01025	Insulator, Lower Connector	1	EA	
0002	03870	Assy Connector Rod GO	1	EA	
0003	01026	Half-Nut, Hex, 10-32UNF, St/Steel	1	EA	
0004	93083	Washer Plain M5 SS-A2 DIN125 Form A	1	EA	
0005	94049	Sleeving Heatshrink 4 2mm Teflon	1	CM	
0006	A011-006M4	h'srnk Slv'g,Polyvinylidene Flu,+175C	0.01	M	
0007	01028	Assy, Banana Pin (4mm)	1	EA	
0008	10053	Insulator Lower Nut Shroud	1	EA	

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ITEM NO.	Default/ QTY.	PART NUMBER	DESCRIPTION
1	1	03878	HOUSING BEARING$UPPER MKII
2	1	03877	SUB UPPER MKII
3	1	03880	SLEEVE MOVING MKII
4	1	03879	SUB LOWER MK2$DIA 2-1/8"
5	1	03882-1	ASSY SHAFT MAIN$PSJ ø2-1/8" Mk2
6	1	03883	HOUSING BEARING LOWER
7	1	03881	RING RETAINING
8	2	03848	SCREW PLUG
10	1	03891	ASSY CONNECTOR
11	1	03885	ASSY CONNECTOR ROD GO
14	1	00693	RETAINER INSULATOR
16	1	03806	Spring, Locking, ø2-1/8"
49	1	03887	SPRING(COMP) S/S 100lbs/in
19	1	91955	BEARING RADIAL
20	2	91014	BEARING THRUST
21	3	91000	Bearing Ball 3/16 Hard
23	3	01063	SCREW GRUB SKT HD M6 x 08mm LG SS
30	1	01047	CIRCLIP INTERNAL 5/8 BORE N1300
31	1	93238	Ring Retaining VH162 for 1.625 Bore
33	1	93188	Pin Spirol 2.5mm x 06mm LG SS
34	1	93019	PIN SPIROL ø1 x 08mm LG SS
35	1	03873	CENTRALISER CONNECTOR
36	1	03874	ASSY CONNECTOR JACKET
38	2	99008	O'RING 008 VITON 90
39	2	99013	O'RING 013 VITON 90
40	2	99129	O'RING 129 VITON 90
41	2	95133	O Ring Viton 75 Type 133
42	2	95213	O Ring Viton 75 Type 213
43	2	99211	O'RING 211 VITON 90
44	4	99009	O'RING 009 VITON 90
46	1	10148	THREAD PROTECTOR$MALE SX STD UPR$(WITH O'RING)
47	1	01019	ASSY LOWER TP$and WARNING LABEL
48	-	94240	OIL CAPELLA

DO NOT SCALE

* CONNECTOR BALLOONED THUS IS SUPPLIED AS PART OF03874 (ITEM 36)

14.94 OAL INCLUDING THREAD PROTECTORS

11.13 MAKE-UP LENGTH

OIL EMPTY POSITION

OIL FILLED POSITION

0.44

SECTION A-A

DRAWN: NGH	CHECKED: GHT	APP'D: NGH	ISS	DESCRIPTION	APP'D	DATE	Sondex Tel. 0118 932 6755	USED ON PSJ011	TITLE ASSY Ø2-1/8" SWIVEL JOINT MKII GO ENDS
DATE: 21/09/09	DATE: 16/10/09	DATE:16/10/09	J	ECR 5-63357 REFERS	NGH	16/10/09	THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	MACHINE FINISH 63	GEN TOL 0.X ±0.020" 0.XX ±0.010" 0.XXX ±0.005" ANGLE ±0.5°
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS/BOM						THIRD ANGLE PROJECTION	SHEET 1/1	DRAWING No. AD 07033
SCALE 1:1	A1	HEAT TREATMENT/CONDITION: NOT APPLICABLE							ISSUE J

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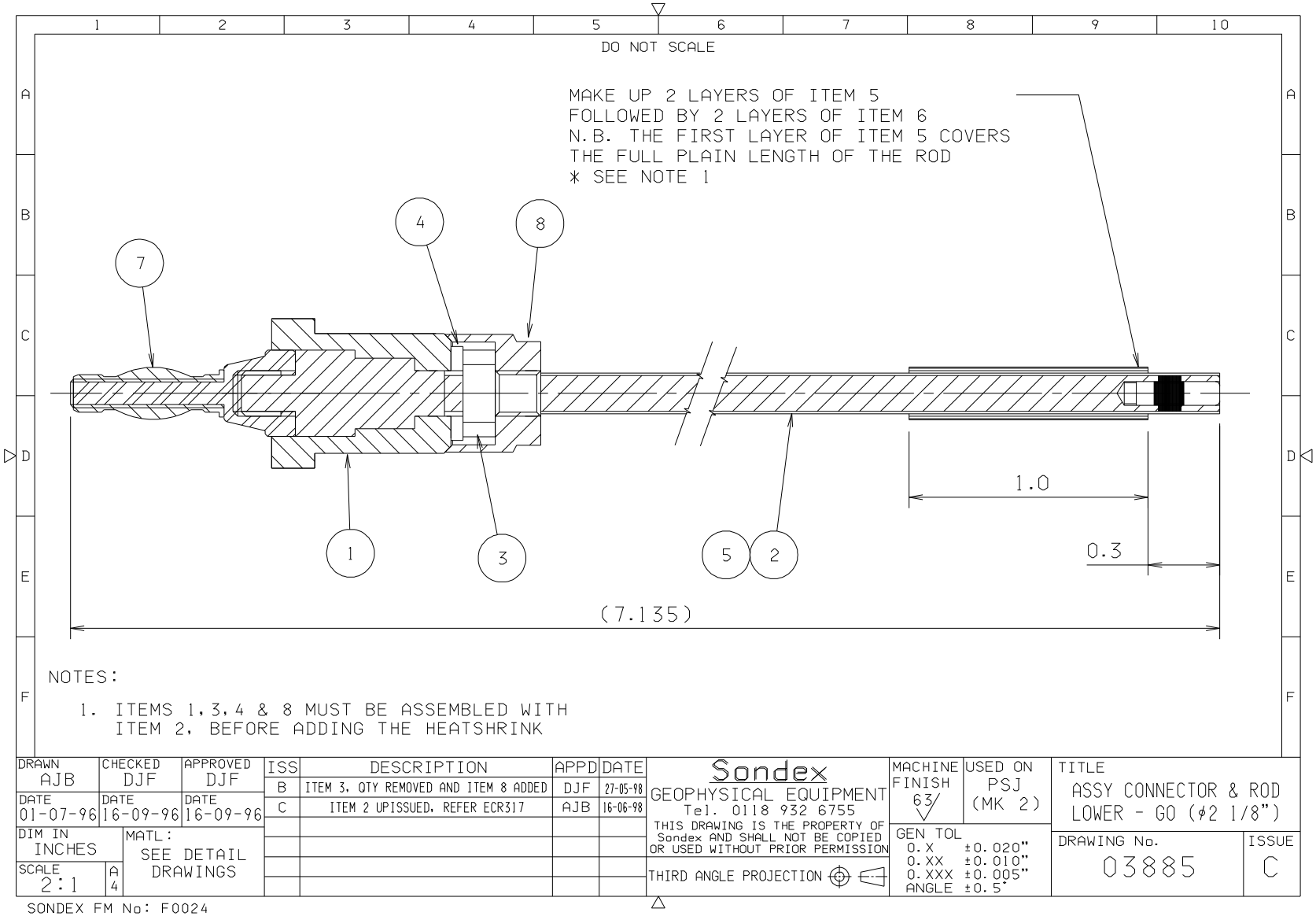

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PARTS LISTING

Part	*Issue*
03885	E

Description

Assy Connector Rod 2 1/8 GO

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	01025	Insulator, Lower Connector	1	EA	
0002	03886	Assy Connector Rod GO	1	EA	
0003	01026	Half-Nut, Hex, 10-32UNF, St/Steel	1	EA	
0004	93083	Washer Plain M5 SS-A2 DIN125 Form A	1	EA	
0005	94049	Sleeving Heatshrink 4 2mm Teflon	1	CM	
0006	A011-006M4	h'srnk Slv'g,Polyvinylidene Flu,+175C	0.01	M	
0007	01028	Assy, Banana Pin (4mm)	1	EA	
0008	10053	Insulator Lower Nut Shroud	1	EA	

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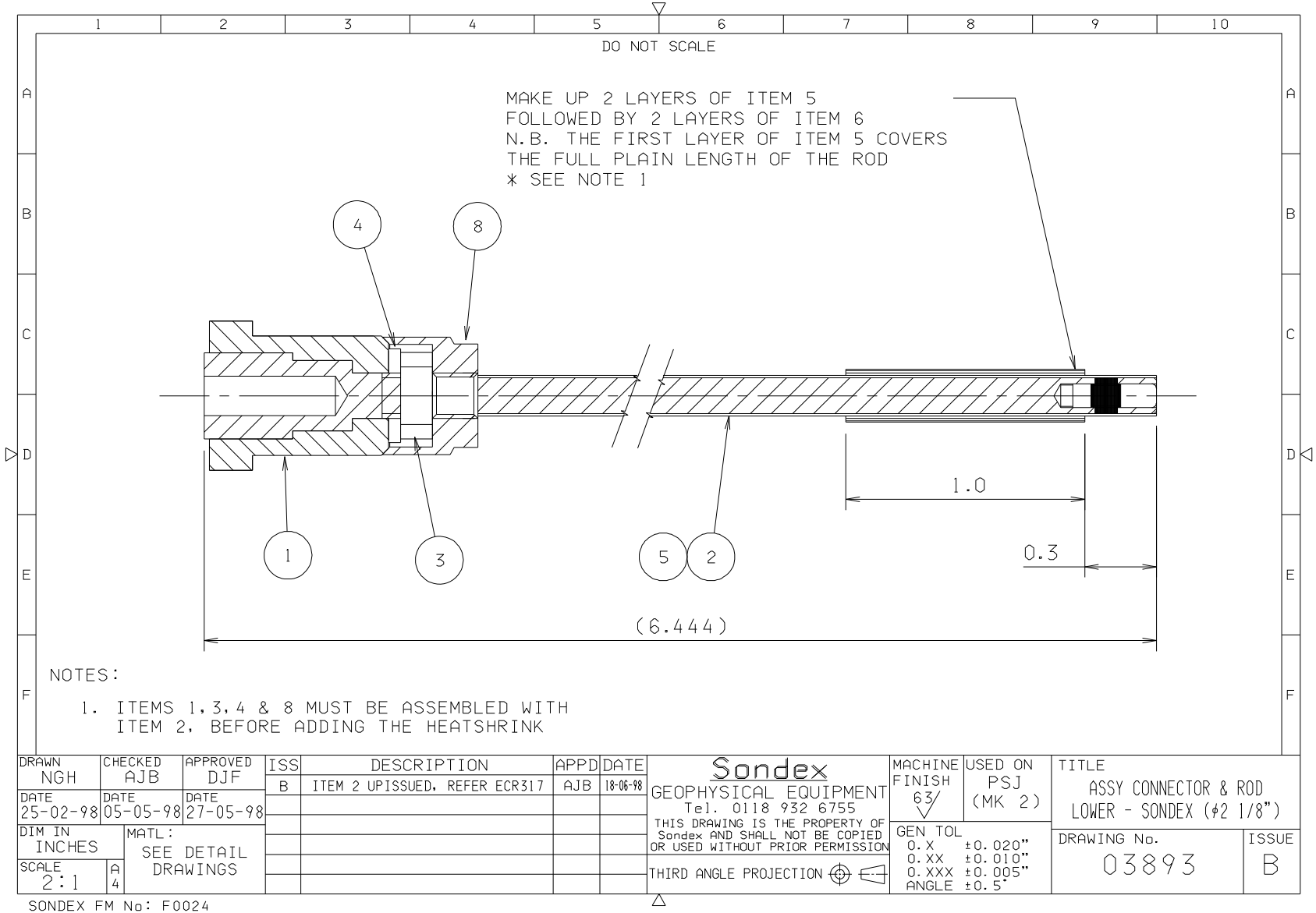

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PARTS LISTING

Part	*Issue*
03893	D

Description

Assy Connector Rod Lower 2 1/8 SX

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	01025	Insulator, Lower Connector	1	EA	
0002	03892	Assy Connector Rod Lower 2 1/8 SX	1	EA	
0003	01026	Half-Nut, Hex, 10-32UNF, St/Steel	1	EA	
0004	93083	Washer Plain M5 SS-A2 DIN125 Form A	1	EA	
0005	94049	Sleeving Heatshrink 4 2mm Teflon	1	CM	
0006	A011-006M4	h'srnk Slv'g,Polyvinylidene Flu,+175C	0.01	M	
0008	10053	Insulator Lower Nut Shroud	1	EA	

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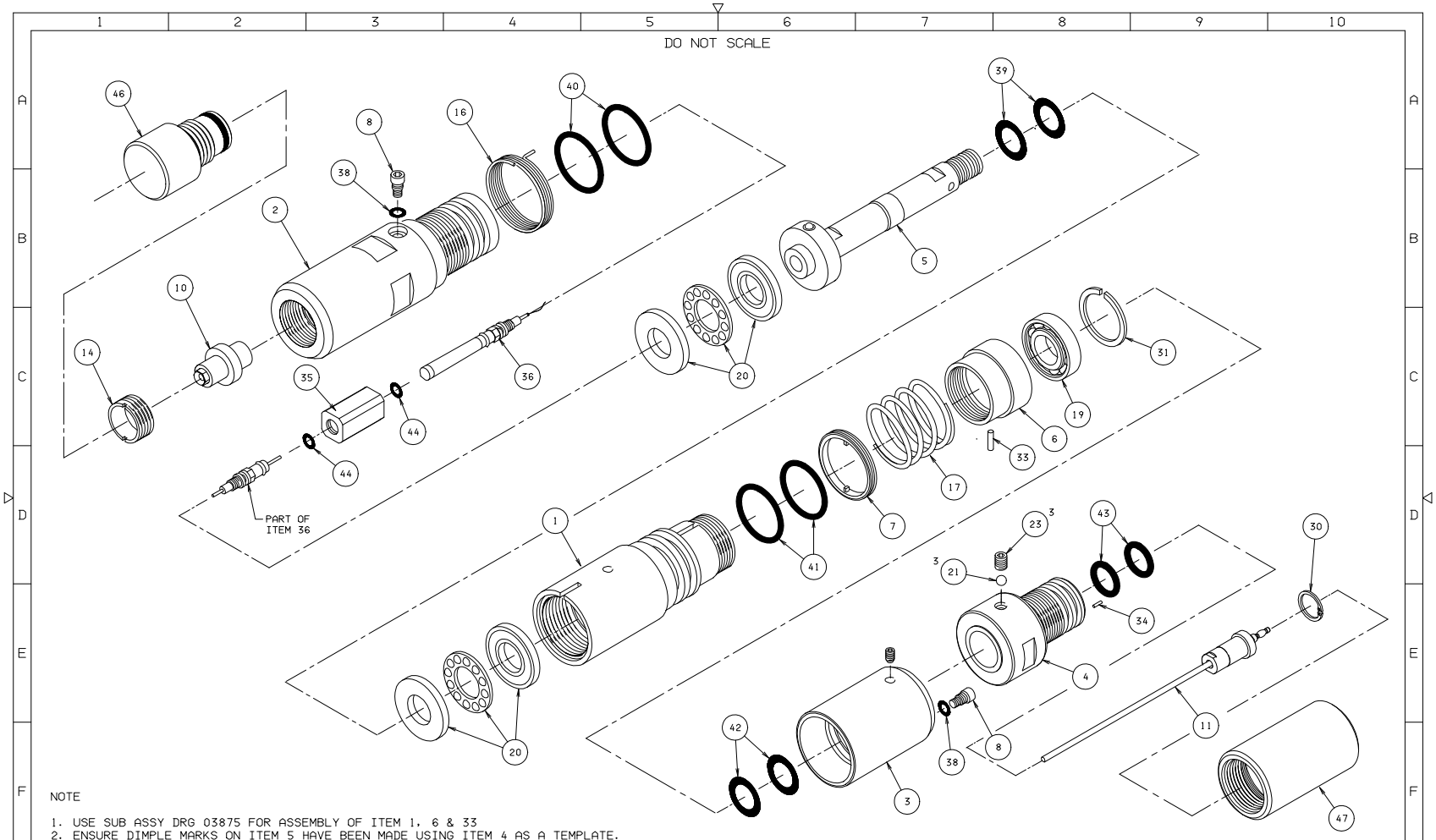

NOTE

1. USE SUB ASSY DRG 03875 FOR ASSEMBLY OF ITEM 1, 6 & 33
2. ENSURE DIMPLE MARKS ON ITEM 5 HAVE BEEN MADE USING ITEM 4 AS A TEMPLATE.

DRAWN	CHECKED	APPROVED
IH	GPW	TLS
DATE	DATE	DATE
05/07/01	05/07/01	10/07/01
DIM IN	MATL:	
INCHES	SEE DETAIL DRAWINGS	
SCALE	A2	
NTS		

SONDEX FM No: F0022

ISS	DESCRIPTION	APPD	DATE
D	ECR 3837 REFERS - ITEM 034 ADDED	JC	17/07/06
C	ECR 2834 REFERS - ITEMS 15, 44, 35, 36 REPOSITIONED	JC	06/07/05
B	ECR 2161 REFERS	NPB	28/02/05
A	INITIAL RELEASE	TLS	10/07/01

Sondex

Tel. 0118 932 6755

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THIRD ANGLE PROJECTION

MACHINE FINISH	USED ON
64	PSJ014

GEN TOL	
0.X	±0.020"
0.XX	±0.010"
0.XXX	±0.005"
ANGLE	±0.5°

TITLE: ASSY ϕ1 11/16" PRODUCTION SWIVEL JOINT Mk2 EASY ENTRY - GO

SHEET	DRAWING No.	ISSUE
1/1	11534	D

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PARTS LISTING

Part	*Issue*
11534	F

Description

Assy, 1 11/16, PSJ, Mk2, Easy Entry, GO

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	03841	Housing Bearing Upper 1-11/16 Mk2	1	EA	
0002	10808	Sub,Upper,1 11/16,PSJ,Mk2,Easy Entry	1	EA	
0003	03843	Sleeve Moving Mk2	1	EA	
0004	03844	Sub Lower 1 11/16 Mk2	1	EA	
0005	03845-1	Assy Shaft Main 1 11/16 Mk2	1	EA	
0006	03846	Housing Bearing Lower	1	EA	
0007	03847	Ring Retaining	1	EA	
0008	03848	Screw Plug	2	EA	
0010	03891	Assy Upper Connector 2 1/8 GO	1	EA	
0011	03867	Assy Connector Rod GO	1	EA	
0014	00693	Retainer Insulator	1	EA	
0016	01849	Spring, Locking, 1 11/16 Inch Tools	1	EA	
0017	03860	Spring Compression MOD	1	EA	
0019	91036	Bearing Radial, SKF 6003	1	EA	
0020	91035	Bearing Thrust, SKF51203	2	EA	
0021	91000	Bearing Ball 3/16 Hard	3	EA	
0023	01063	Scr, Grb Skt Hd, M6 x 8mm Long, St/Steel	3	EA	
0030	01047	CIRCLIP INTERNAL 5/8 SS N1300	1	EA	
0031	93179	Ring Retaining 1 3/8 SS	1	EA	
0033	93188	Pin Coiled 2.5mm x 06mm LG - SPIROL MCK	1	EA	
0034	93019	Pin Coiled 1mm x 08mm LG - SPIROL MCK	1	EA	
0035	03873	Centraliser Connector	1	EA	
0036	03874	Assy Connector Jacket	1	EA	
0038	99008	O-ring 008 Viton 90	2	EA	
0039	99013	O-ring 013 Viton 90	2	EA	
0040	99124	O-ring 124 Viton 90	2	EA	
0041	95126	O-ring 126 Viton 75	2	EA	
0042	95209	O-ring 209 Viton 75	2	EA	
0043	99211	O-ring 211 Viton 90	2	EA	
0044	99009	O-ring 009 Viton 90	2	EA	
0046	10148	Thd Prtctr Male SX Std Upr (with o'ring)	1	EA	
0047	01019	Thread Protector Female Std (Lower End)	1	EA	
0048	94240	OIL CHEVRON TEXACO CAPELLA WF32	0.25	L	

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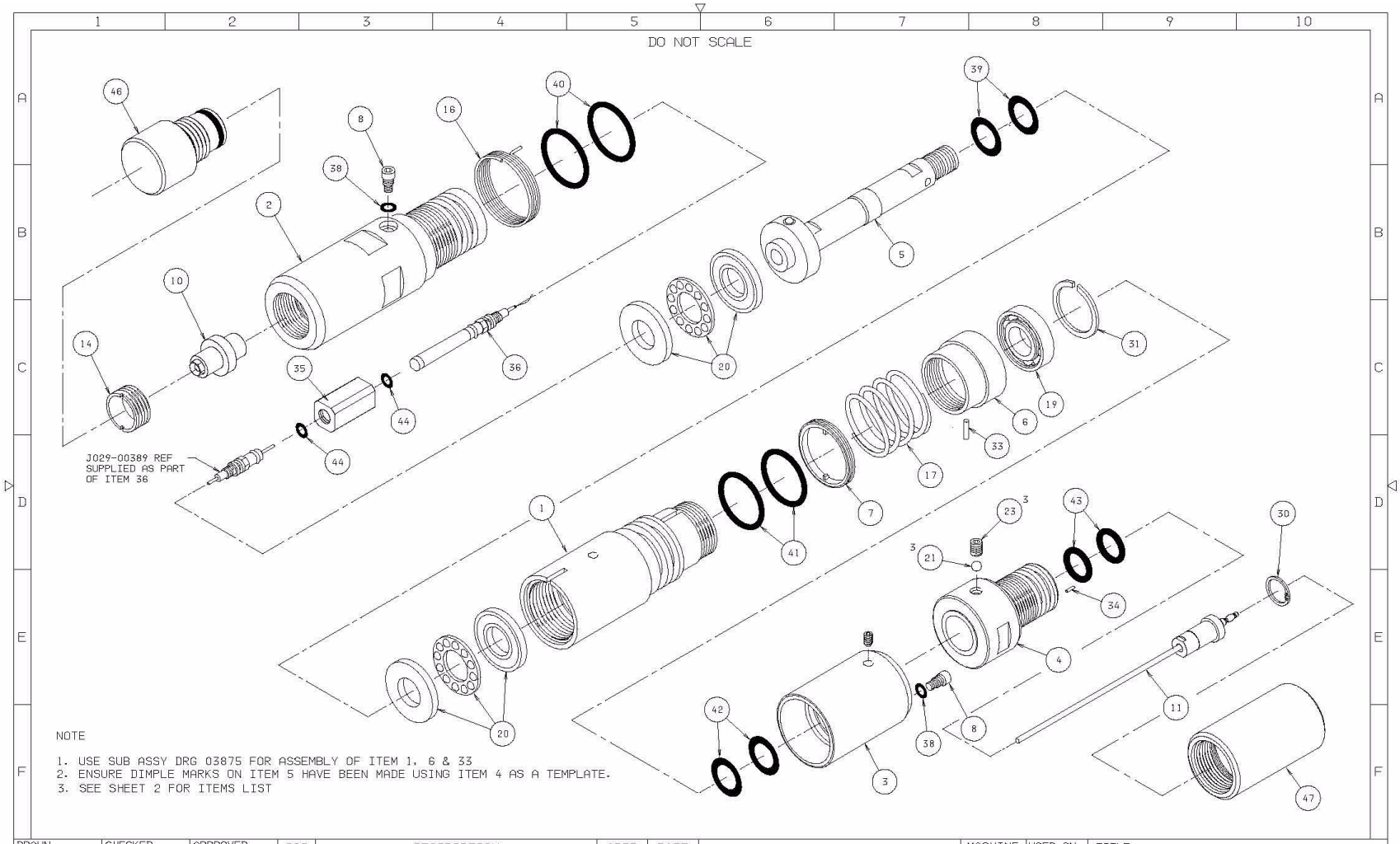

DRAWN	CHECKED	APPROVED
GC	KRC	PDD
DATE 16/02/05	DATE 23/02/05	DATE 23/02/05
DIM IN INCHES	MATL: SEE PARTS LIST	
SCALE NTS	A2	

SONDEX FM No: F0022

ISS	DESCRIPTION	APPD	DATE
A	ECR58057 REFERS	NPB	11/03/09
PT4	ECR 3837 REFERS - ITEM 34 ADDED	JC	17/07/06
PT3	ECR 3629 REFERS - SHT 2 ADDED	JC	04/06/04
PT2	ECR 2834 REFERS - ITEMS 15, 44, 35, 36 REPOSITIONED	JC	06/07/05
PT1	INITIAL RELEASE	PDD	23/02/05

Sondex
Tel. 0118 932 6755

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THIRD ANGLE PROJECTION

MACHINE FINISH 64	USED ON PSJ016

GEN TOL
0.X ±0.020"
0.XX ±0.010"
0.XXX ±0.005"
ANGLE ±0.5°

TITLE: ASSEMBLY 1 11/16" PRODUCTION SWIVEL JOINT MK2 EASY ENTRY - GO

SHEET	DRAWING No.	ISSUE
1/2	09699	A

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PARTS LISTING

Part	*Issue*
09699	B

Description

Assy, 1 11/16, PSJ, Mk2, GO, 20k, 200C

PARTS LIST

Item	*Part No*	*Description*	*Qty*	*Units*	*Remarks*
0001	03841	Housing Bearing Upper 1-11/16 Mk2	1	EA	
0002	18201	Sub, Upper, 1 11/16, PSJ, Mk2, Easy E	1	EA	
0003	03843	Sleeve Moving Mk2	1	EA	
0004	03844	Sub Lower 1 11/16 Mk2	1	EA	
0005	03845-1	Assy Shaft Main 1 11/16 Mk2	1	EA	
0006	03846	Housing Bearing Lower	1	EA	
0007	03847	Ring Retaining	1	EA	
0008	03848	Screw Plug	2	EA	
0010	03891	Assy Upper Connector 2 1/8 GO	1	EA	
0011	03867	Assy Connector Rod GO	1	EA	
0014	00693	Retainer Insulator	1	EA	
0016	01849	Spring, Locking, 1 11/16 Inch Tools	1	EA	
0017	03860	Spring Compression MOD	1	EA	
0019	91036	Bearing Radial, SKF 6003	1	EA	
0020	91035	Bearing Thrust, SKF51203	2	EA	
0021	91000	Bearing Ball 3/16 Hard	3	EA	
0023	01063	Scr, Grb Skt Hd, M6 x 8mm Long, St/Steel	3	EA	
0030	01047	CIRCLIP INTERNAL 5/8 SS N1300	1	EA	
0031	93179	Ring Retaining 1 3/8 SS	1	EA	
0033	93188	Pin Coiled 2.5mm x 06mm LG - SPIROL MCK	1	EA	
0034	93019	Pin Coiled 1mm x 08mm LG - SPIROL MCK	1	EA	
0035	03873	Centraliser Connector	1	EA	
0036	03874	Assy Connector Jacket	1	EA	
0038	99008	O-ring 008 Viton 90	2	EA	
0039	99013	O-ring 013 Viton 90	2	EA	
0040	99124	O-ring 124 Viton 90	2	EA	
0041	95126	O-ring 126 Viton 75	2	EA	
0042	95209	O-ring 209 Viton 75	2	EA	
0043	99211	O-ring 211 Viton 90	2	EA	
0044	99009	O-ring 009 Viton 90	2	EA	
0046	10148	Thd Prtctr Male SX Std Upr (with o'ring)	1	EA	
0047	01019	Thread Protector Female Std (Lower End)	1	EA	
0048	94240	OIL CHEVRON TEXACO CAPELLA WF32	0.25	L	

Sht 2 / 2

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