



CCL015

Document: MN-CCL015-J

Casing Collar Locator

CASING COLLAR LOCATOR

1¹¹/₁₆" , ULTRAWIRE™

Operational & Maintenance Manual

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0 ABOUT THIS MANUAL

0.1 MANUAL HISTORY

Date	Issue	Description	Auth	Chk	App
23/04/03	G	CD80062 up-issued as per ECR1348 & 1406.	SA	DMO	RLH
15/07/04	H	Drawings/Parts Lists/Electrical Diagrams updated as per ECR1528/1606/2098/2043.	SA	DMO	RLH
13/06/06	I	Drawings/Parts Lists/Electrical Diagrams updated. ECR3220, 2904, 2822, 3141.	FV	SA	RLH
02/03/07	J	Drawing updates. ECR3920, 4089.	FV	FV	RLH

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.

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.

1 DESCRIPTION

The Sondex Casing Collar Locator (CCL) responds to changes in metal volume, like tubing collars and perforations.

CCL015 operates as part of an Ultrawire™ toolstring and derives power and control from a suitable system controller, e.g. XTU.

The line conductor passes through the tool from upper to lower heads.

1.1 PURPOSE

As the tool passes a collar, or change in metal volume, lines of magnetic flux between two opposing permanent magnets are disturbed. This causes a low frequency voltage or Electro Magnetic Field (EMF) to be induced in a coil, mounted between the permanent magnets.

Finally the signal is converted by a voltage-controlled oscillator for recording in the Ultrawire™ section of the tool.

1.2 APPLICATIONS

- Depth control in casing or tubing.
- Location of casing or tubing damage.
- Confirmation of perforation depths or intervals.

1.3 INTERFACING & TOOL COMBINATIONS

- Simultaneous Operation with other Sondex Tools.
- Standard Sondex GO or other connections.



Figure 1.1 CCL

1.4 SPECIFICATION

Parameter	Specification	Remarks
Temperature (max)	177°C (350°C)	
Pressure (max)	15,000psi (103,4MPa)	
Tool Diameter	1 ¹¹ / ₁₆ " (43mm)	
Make Up Length	18.5" (470mm)	
Shipping Length	22.3" (566mm)	Incl. Thread Protectors.
Measure Point	6.5" (165.1mm)	Above lower tool joint.
Weight in air	12.1lbs (5.5kg)	
Operating voltage:		
- Nominal	+18V DC	
- Range	+13 to +23V DC	
- Absolute Max.	+24V DC	
Current consumption at 18V	16mA	
End threads (top/bottom)	1 ³ / ₁₆ " 12 UN2A GO	Female/Male
End connectors (top/bottom)	4mm single conductor (male pin/female socket)	Sondex Ends

2 SAFETY

2.1 GENERAL



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.

2.2 MAGNETS

The two magnets, used in the tool, produce a magnetic field which extends for a considerable distance. When the tool is dismantled, the magnets should be kept at least 1ft from any watches, analogue meters or cathode ray tubes to avoid any ill effects from the field.



Caution!

Do not store CCL with PGR or PGC tools. Keep at least 1 foot apart. Magnetic field may magnetise pressure housing and seriously reduce sensitivity.

The magnets are relatively fragile and can be cracked by small mechanical shocks. Care must be taken not to drop them. They must be carefully wiped free of any swarf before re-assembly. This is easily accomplished with a steel brush.

2.3 ELECTRO STATIC DISCHARGE



Caution!

Electro Static Discharge (ESD)

All tools with electronic boards that contain solid state circuits (transistors, diodes, semiconductors) may become damaged when contacted with an electrostatic charge.

When handling tools, which contain electronic parts that are ESD sensitive, the following guidelines should be followed to reduce any possible electrostatic charge build-up on the user's body and the electronic parts:

- Always ensure proper ESD precautions are taken when handling electronic parts that are ESD sensitive during maintenance.
- Avoid touching the tool electronics, unless stated otherwise in this manual.

Note that ESD is less likely to affect tools when the housing is fitted.

3 THEORY OF OPERATION

3.1 BLOCK DIAGRAM

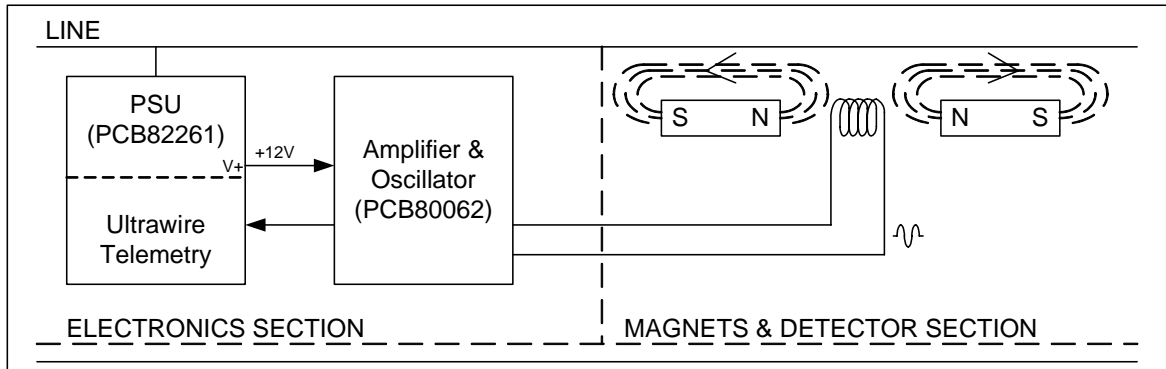


Figure 3.1 Ultrawire™ CCL Block Diagram

3.2 DESCRIPTION

See also: [Section 6 Electrical Description](#)

3.2.1 MAGNETIC MEASUREMENT

The fields of two opposing permanent magnets pass through a coil positioned between them. It is the movement of the lines of flux through the coil as they are altered by the variation in steel volume and position alongside the tool that produce a change in EMF across the coil output. The output from this coil is the conventional low frequency CCL, which is sent to surface in wireline tools.

This axial arrangement of 2 magnets minimises the unwanted signal from sideways motion in the well.

3.2.2 ELECTRONICS

The low frequency CCL is amplified and filtered before modulating a VCO (Voltage Controller Oscillator), which has a typical centre frequency of 6kHz or 17kHz, depending on revision level. This frequency is stored in the FPGA logic and is read out over the Ultrawire™ toolbus in response to requests from the Telemetry Controller, e.g. MPL or XTU. Various commands are supported in the protocol.

4 OPERATING PROCEDURE

4.1 PRE-LOGGING CHECKS

See also: [Section 7 Extended Checks](#)

4.1.1 MECHANICAL

Ref.: General Assembly [09528](#)

- 1 Clean and grease upper and lower O-ring seals. Replace O-rings (item 17) if damaged.
- 2 Ensure that upper and lower electrical connectors are clean, dry and undamaged.
- 3 Ensure 3 Grub Screws (item 22) are screwed out very tight; these are the telemetry ground return.

4.1.2 ELECTRICAL

- 1 Using a Multimeter, check the upper to lower pin resistance. The reading should be less than 0.5Ω .
- 2 Using a Multimeter, check the Pin to Housing resistance. The reading should be:
 - Pin +ve $3 - 4M\Omega$ (Depends on meter.)

4.1.3 OPERATING

The CCL must be electrically connected to a toolstring controller, e.g. UMT or XTU, and to a data acquisition or logging system, e.g. MEMLOG or MIDAS.

- 1 Move a magnetic material, such as a steel screwdriver, past the measure point. A positive and negative variation ($\pm 100\text{Hz}$ typical) from the centre frequency should be observed. Faster and closer movement causes a larger signal. Note that most stainless steels are non-magnetic.

Note: MEMLOG and MIDAS have optional normalisation filters to subtract any drift of the CCLs centre frequency.

- CCL centre frequency: 6 or 17kHz typical.
- MEMLOG normalisation frequency: 2.00kHz.
- MIDAS normalisation frequency: 0.00kHz.

4.2 CONNECTING TO TOOLSTRING

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

The CCL should be inserted into a suitable Ultrawire™ toolstring in any location below the telemetry controller. The use of centralisers is optional. However, for best results, the tool should be run eccentric by using conducting knuckle joints. This will produce a larger CCL signal since the casing collar will pass closer to the magnetic field.

4.3 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 is <30ft/min.	

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

Note: Slow logging speeds will reduce the magnitude of CCL signal.

4.4 POST LOGGING DISASSEMBLY

Clean the tool before the toolstring is disassembled.

Ensure that well fluid does not reach the electrical connectors.

Refit thread protectors.

4.5 TRANSPORT, HANDLING & STORAGE

Store with end threads lightly greased and with water tight thread protectors fitted.



Caution!

Do not store CCL with FDR, or PGR tools which contain photomultiplier tubes, since magnetisation can prevent these from operating. Keep at least 1ft (30cm) apart.

Do not store CCL tools along side another CCL tool, otherwise magnet strength may be reduced.

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

5 MECHANICAL DESCRIPTION

The CCL consists of a single main assembly attached to the Lower Head. A Pressure Housing slides over the internal components and screws onto the Lower Head.

The principal elements are as follows:

- Pressure Housing.
- Telemetry circuit board.
- CCL VCO oscillator circuit board.
- Detector Coil.
- Two permanent magnets housed in protective steel tube.
- Upper End fitted with monoconductor pin.
- Lower End fitted with monoconductor socket.

5.1 DISASSEMBLY

5.1.1 ELECTRONICS ACCESS

Ref.: General Assembly [09528](#)

- 1 Unscrew Housing (item 1) from Lower Head (item 5).

Note: The complete internal assembly remains attached to the Lower Head (item 5).

- 2 Remove Screws (4x item 21) and remove Large Top Cover (item 4).

Note: The Small Bottom Cover is an integral part of the chassis and should not be removed, particularly if the Large Top Cover is removed.

- 3 The 2 Circuit Boards (item 8) may be removed by unsoldering the wires as necessary.

Note: To service the Pressure Isolation Head (item 3), refer to Pressure Isolation Head Manual, [MN-PIH](#).

5.1.2 MAGNETS & DETECTOR COIL

Ref.: General Assembly [09528](#)
Assembly Coil and Magnets [00226](#)
CCL Wiring Diagram [WD-80075](#)

Note: All item numbers refer to drawing 00226, unless stated otherwise.

Note: The magnets and coil are normally treated as a unit assembly, but can be disassembled if necessary. If either of the magnets or the coil has been replaced, the locking pin holes will probably no longer be lined up and will need to be redrilled. Return the items to Sondex if necessary.

- 1 Unsolder the red and black wires connecting the Coil (item 1) to the Electronics (item 8, 09528).
- 2 Unsolder the yellow through wire from the Telemetry board, see WD-80075.

- 3 Screw in the Grub Screws (3x item 22, 09528) sufficient for the Lower Head (item 5, 09528) to be withdrawn from the Magnet Assembly (item 2, 09528). Separate the two parts carefully to avoid damaging the through wire as it is pulled through the centre of the magnet assembly.
- 4 With a 2mm pin punch, knock in the Spirol Pins (8x item 6) at the ends of the Magnet Cover Tubes (item 3) until they are just below the surface of the tube.
- 5 Unscrew the Lower Bulkhead (item 2) and remove the Lower Magnet (item 5).
- 6 Mark the N (coil end) and S (bulkhead end) pole positions of the Magnets.
- 7 Unscrew the Lower Magnet Cover Tube (item 3) from the Coil (item 1).
- 8 Unscrew the Coil (item 1) from the Upper Magnet Tube (item 3), taking care that the coil wires can freely rotate in the centre hole of the Upper Bulkhead (item 4) and Upper Magnet (item 5).
- 9 Remove the Upper Magnet from its Magnet Tube and mark N (coil end) and S (bulkhead end).
- 10 Carefully knock all Spirol Pins (item 6) through to the centre and thus out of the Coil (item 1) and Bulkheads (item 2 & 4).

Note: Avoid damaging the Coil (item 1) leads or it is likely the Coil (item 1) will need to be replaced.

5.2 REASSEMBLY

5.2.1 MAGNETS & DETECTOR COIL

Ref.: General Assembly 09528
 Assembly Coil and Magnets 00226

Note: All item numbers refer to drawing 00226, unless stated otherwise.

- 1 Check components and wires for damage and replace if necessary.

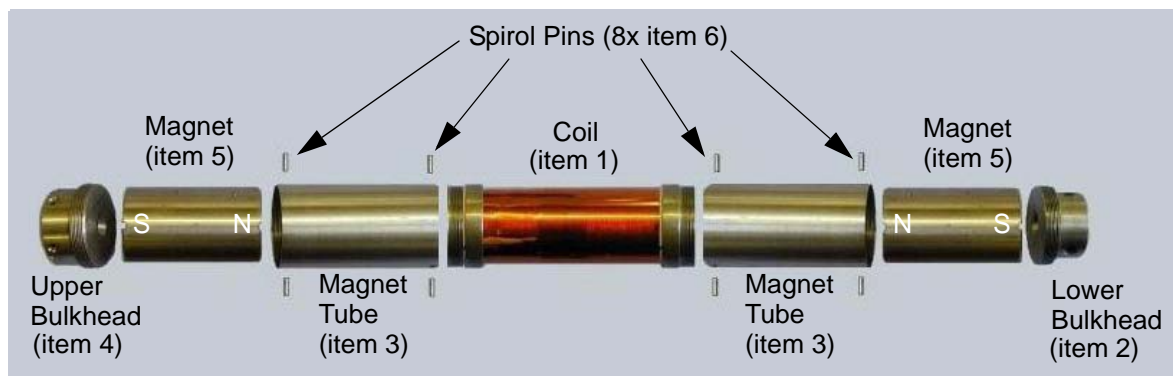


Figure 5.1 Coil & Magnets Assembly

**Caution!**

Due to the strength of the magnetic parts extreme care must be taken when handling magnets as they are prone to crack if subjected to impact.

Note: If any parts have been replaced it will be necessary to lock the Magnet Tubes (item 3) to the Coil Bulkheads (items 2 & 4) in some way. Sondex recommend that the 2mm Ø locking holes should be redrilled. Return to Sondex if necessary.

In an emergency, back off the cover tube a few turns and coat the end threads with Loctite® 242 then screw up hand tight once more.

- 2 Fit the Upper Magnet (item 5) onto the Coil (item 1), ensuring Magnet polarity orientation as shown in *Figure 5.1* (N facing the Coil).

Note: Ensure all inner spaces are free from debris. Pay particular attention to swarf in the region of the magnet.

- 3 Slide a Magnet Tube Cover (item 3) over each Magnet (item 5), screw hand tight to the Coil (item 1) and secure with Spirol Pins (2x item 6).
- 4 Feed the Coil Wire through the Upper Bulkhead (item 4) into the electronics cartridge.
- 5 Screw the Upper Bulkhead (item 4) hand tight into the Magnet Tube Cover (item 3), ensuring the coil leads are rotating freely until the Magnet is gripped tightly. Secure with 2x Spirol Pins (item 6), ensuring the Pins are flush with the component circumference and do not protrude.

Note: If no upper magnet or coil parts have been changed, the Spirol Pin holes should be aligned.

- 6 Screw the Magnet Tube Cover (item 3) onto the Coil Assembly (item 1). Secure with 2x Spirol Pins (item 6), ensuring the Pins are flush with the component circumference and do not protrude.

Note: If no lower magnet or coil parts have been changed, the Spirol Pin holes should be aligned.

- 7 Refit the Lower Magnet (item 5) into the Magnet Tube Cover (item 3), ensuring Magnet polarity orientation as shown in *Figure 5.1* (N facing the Coil).

Note: Ensure all inner spaces are free from debris. Pay particular attention to swarf in the region of the magnet.

- 8 Screw the Lower Bulkhead (item 2) hand tight into the Magnet Tube Cover (item 3). Secure with 2x Spirol Pins (item 6), ensuring the Pins are flush with the component circumference and do not protrude.
- 9 Before feeding the through wire through the assembly, it is advised to inspect the Lower Head Pressure Feedthrough (item 11, 09528), including the fitted O-ring, for damage and replace if necessary.
- 10 Feed the through wire attached to the Lower Sub (item 5, 09528) up through the central hole, which runs through the Magnet & Coil Assembly (item 2, 09528), until it exits into the Electronics Cartridge.

- 11 Check O-rings (2x item 17 & 2x item 16, 09528) on the Lower Sub (item 5, 09528) and replace if required. Apply Liquid O-ring to the O-rings and the O-ring grooves.
- 12 Fit the Lower Bulkhead (item 2) into the Lower Sub (item 5, 09528) and align the three locking holes.
- 13 Screw out the Grub Screws (3x item 24, 09528) until tight.

5.2.2 ELECTRONICS

Ref.: General Assembly
CCL Wiring Diagram

09528
WD-80075

- 1 If removed previously for servicing, reconnect the Pressure Isolation Head (item 3) to the Lower Half Shell (item 4) and secure with Screws (2x item 23).
- 1 Resolder coil and line wires as indicated in WD-80075 and refit the Electronics Boards (item 8).
- 2 Replace the Upper Halfshell (item 4) and secure with Screws (2x item 21).
- 3 Check O-ring (item 15) on the Pressure Isolation Head (item 3) and replace if required. Apply Liquid O-ring to the O-ring and the O-ring groove.
- 4 Replace the Pressure Housing (item 1) and screw it tight onto the Lower Sub (item 5).

Note: Clean pressure seal surfaces at both ends of the Pressure Housing. Ensure housing is free from debris.

6 ELECTRICAL DESCRIPTION

6.1 TELEMETRY CIRCUIT BOARD

Ref.: Circuit Diagram (PCB82269)

CD-82261

The Ultrawire™ Tool Telemetry Board is based on a common PCB (82260) which is populated and programmed according to the tool in which it is fitted. The main functional blocks of the circuit are the power supply, the Ultrawire™ interface (together with its drivers and receivers) and the sensor interface.

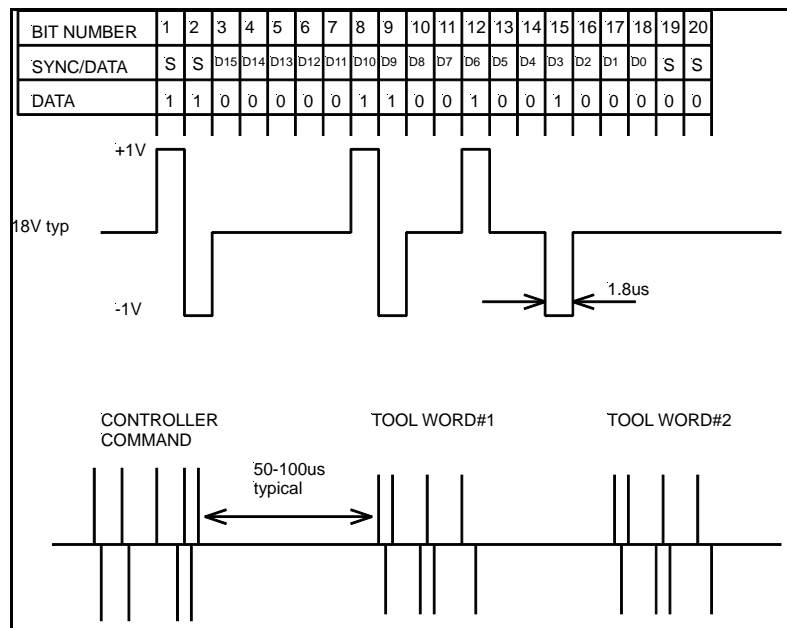
Control is implemented by a PIC microcontroller in conjunction with FPGA logic. The code in the PIC differs according to the tool.

Communication between the Telemetry Controller and the tool is via the Ultrawire™ toolbus. This is a single pin bus, which carries power to the tool in addition to its telemetry function. The return for both power and signal is via the chassis.

The Ultrawire™ line carries 18V DC (nom). Power is supplied to the SMPS via Q7, which with associated components generates local power rails at 12V and 5V.

The tool is protected by fuse (F1), which in conjunction with diode (D1) gives overvoltage and reverse polarity protection.

The telemetry is modulated onto the line as 1V AMI (alternate mark inversion) pulses at 500kbaud, see below a typical tool response.



The Ultrawire™ telemetry is a master slave protocol. The controller, which is always the master, sends a command to the tool. This may be a global command (to all tools) or a tool specific command which contains the address of the target tool. Tool specific commands are acknowledged by the tool, global commands are executed but do not generate a response.

For rate-meter type tools, count pulses are collected from the sensor on inputs 1 - 7 of the PCB. These are counted in hardware by the FPGA logic, (U1) and accumulated by the PIC (U3).

When the controller is in logging mode, it will periodically send a global sample command to all the tools and then poll each tool individually for data. The sample command causes the latest count to be frozen in a shadow register, and this count is then passed to the controller in response to the data request.

Electrically, the telemetry is a.c. coupled from the line to the drivers and receivers by capacitor (C7). The received data is removed from the line by a comparator (U4), and passed to the FPGA logic, which validates the address. The command is interpreted by the PIC which if necessary generates the response packet and passes it to the FPGA logic for placement on the line.

6.2 CCL VCO OSCILLATOR CIRCUIT BOARD

Ref.: Circuit Diagram *CD-80062*

U5 provides a stable 5.00V reference which is amplified to provide 10V power for the amplifier/filter (U1), 6V analogue ground and 9V power for the 555 oscillator U2.

CCL coil is biased to the 6V analogue ground.

D1 and D4 limit the maximum coil voltage.

Amplifier U1b has a gain of around 20 set by the coil resistance (2.5k Ω typical), R1, R2 and R3. R3 reduces the effect of temperature drift on the coil.

U1b output is limited by D2 and D3.

Low pass filter, U1a, compensates for line speed by attenuating the larger CCL coil signals obtained by fast magnetic field variation.

U2 is configured as an oscillator, usually set to a nominal 6kHz. The CCL signal modulates the 'Control Voltage' pin, therefore the 6kHz carrier frequency is modulated.

7 EXTENDED CHECKS

7.1 PREVENTATIVE MAINTENANCE

7.1.1 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.



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.

7.1.2 MECHANICAL

Ref.: General Assembly 09528

- 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 CCL coil.
 - Damaged wires.
 - Wires that are loose and likely to be crushed on reassembly.
 - 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.

- Electrical components shorting to chassis.
 - Heat or chemical damage (discoloured components).
 - Incorrect thread grease or excessive quantity, see [Section 7.1.1](#).
 - Cleanliness of connectors and loose/bent pins before replacing.
- 4 Check Line wire inside magnet assembly to lower end.
 - 5 Check all fixings for tightness.

- 6 Check Grub Screws (3x item 22) are tight.
- 7 Check the magnets:
 - For cracks and replace if necessary.
 - Oppose each other, normally north poles facing.

7.1.3 ELECTRICAL

- 1 Check through line resistance and tool current, see [Section 4.1.2](#).
- 2 Check tool current 16mA at 18V.
- 3 Connect to Logging System and check for correct data. Apply some gentle vibration, rotation and invert tool to expose potential failure.
- 4 With an Oscilloscope, check line for +1V and -1V, 2 μ s pulses. Make sure to check tool pulses not those from the controller which occur first, see figure in [Section 6.1](#).

Pulses should have no ringing, if ringing, also attach bottom tool (CTF, other bottom flowmeter or toolstring terminator (BUL006)).

7.1.4 AGEING OF ELECTRONICS

At 150°C, significant electronic ageing failures are expected after 4000hrs typical use, hence PCB replacement should be considered at this point. Every additional 10°C halves the time. Life of the electronics is also accelerated by vibration and corrosive gas inside the chassis. Visual inspection and logging previous history is recommended, but is unlikely to predict premature failure.

Tools that may be suspected of reliability problems due to age or unusual log response may be heated to 120°C, which would not normally age the electronics, and afterwards subjected to moderate vibration. A moderately hard blow from a wooden hammer is recommended.

DO NOT USE METAL HAMMERS.

7.1.5 HEAT TESTING ABOVE 150°C

This is not generally recommended since it shortens tool life expectancy.

Heat testing may be required for contractual reasons, tool out of use for a long period, or job with unusually high well temperature. The test should be carried out slightly above expected well temperature only and the tool should not be kept at temperature for more than 1 hour.

7.2 EXTRAORDINARY MAINTENANCE

Ref.: General Assembly 09528

See also: [Section 4.1 Pre-Logging Checks](#)

If the tool experiences H₂S gas or temperatures above 150°C, the following O-rings must be replaced:

- 2x item 16.
- 2x item 17.
- 1x item 15.

The Pressure Housing (item 1) is Al/Bronze and will change colour from bronze to black as a sulphide layer is created by H₂S gas. This layer should not be removed by polishing.

Magnetic strength may reduce with time, vibration and bad storage. Magnets can be re-magnetised or replaced.

7.3 TROUBLESHOOTING

Refer to [Section 5.1 Disassembly](#) and [Appendix B](#) where necessary.

An Oscilloscope, Multimeter and other basic test equipment will be required.

Initial inspection	<p>Check for:</p> <ul style="list-style-type: none"> • Damaged wires. • Damaged components. • Electrical components shorting to chassis. • Heat or chemical damage (discoloured components). • Incorrect thread grease or excessive quantity, see Section 7.1.1. <p>Also check all fixings are tight.</p>
Excessive current	<p>Disconnect wires to isolate fault to:</p> <ul style="list-style-type: none"> • Upper head isolation assembly. • CCL Coil (see Faulty CCL coil below). • Line wire through lower pressure feedthrough and connector. • PCB82269 (CD82261). • PCB80062 (coil disconnected). <p>Apply Line Signal or 18V direct to PCB82269 Line connection.</p> <p>Fault find or replace PCB82269.</p> <p>Upper Head, line wire and lower connector may be tested to 250V relative to chassis to check for electrical leak. Line connection to PCB82269 circuit must be disconnected. Resistance should exceed 100MΩ.</p> <p>Upper head, line wire and lower pressure feedthrough and connector may be disassembled to locate fault.</p> <p>Isolate high current to either PCB82269 or PCB80062. Fault find or replace PCB.</p>
Little or no current	<p>On PCB82269 check LINE = 18V, V+ = 12V and Vc = 5V and 0V wire connects to chassis. Fault find or replace PCB.</p>

<p>No telemetry counts</p>	<p>On PCB82269 check LINE = 18V, V+ = 12V and Vc = 5V and 0V wire connects to chassis. Fault find or replace PCB.</p> <p>On PCB82269 check P6 for 4MHz >3V clock. Replace U2 if faulty. Reduce R14 value if clock <3V amplitude.</p> <p>Check line for +1V and -1V, 2µs pulses from the controller and similar pulses from the tool.</p> <p>Logic pulses should be present on PCB82269 TP2 - 5.</p> <p>If no tool response words on the Line, fault find or replace PCB82269.</p>
<p>Faulty CCL coil</p>	<p>Disconnect coil from circuit and check:</p> <ul style="list-style-type: none"> • Resistance 2.5 - 3.1kΩ. • Insulation at 250V >100MΩ.
<p>Small signal</p>	<p>Weak magnets: re-magnetise or replace.</p> <p>Magnets not fitted with poles opposing: check orientation.</p>

APPENDIX A EQUIPMENT & RECOMMENDED SPARES

Item	Part No.	Description	Qty	Remarks
1	CCL015	Casing Collar Locator, 1 ¹¹ / ₁₆ " , Ultrawire™	1	

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 SX and GO	1	
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	<i>KITB-CCL1 11/16</i>	Basic Spares Kit.	1	To support one run in hole.
2	<i>KITR-CCL1 11/16</i>	Recommended Spares Kit	1	Support 25 runs in hole.
3	KITRem-PIH, SX	Spares Kit for Pressure Isolation Head	1	See Pressure Isolation Manual <i>MN-PIH</i> .

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

PARTS LISTING					
Part:	Issue:		Drawn:	Checked:	Approved:
91050	-		NGH	PD	DJF
Description:			Date:	Date:	Date:
Tool Kit for all 1 11/16 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	91005	-	Spanner Open Ended 42mmx38mm		2	ea	
002	91019	-	Spanner C 50mm 35mm		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	91130	-	Pin C Spanner 35-50mm		1	ea	

(AR = As Required)

PARTS LISTING					
Part:	Issue:	Drawn:	Checked:	Approved:	
KITB-CCL1 11/16	B	MB	PJ	PJ	
Description:		Date:	Date:	Date:	
Kit, Spares, Basic, CCL 1 11/16		04/03/2002	04/05/2002	04/05/2002	

CHANGE HISTORY				RELATED DOCUMENTS			
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
A	05/04/2002	Initial release	PJ	PJ			
B	07/05/2002	Parts updated	RH	RH			

PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	99211	-	O Ring Viton 90 Type 211		2	ea	
002	99124	-	O Ring Viton 90 Type 124		2	ea	

(AR = As Required)

PARTS LISTING					
Part:	Issue:	Drawn:	Checked:	Approved:	
KITR-CCL1 11/16	B	MB	PJ	PJ	
Description:		Date:	Date:	Date:	
Kit, Spares, Recommended(25Run), CCL(1 11/16)		04/05/2002	04/05/2002	04/05/2002	

CHANGE HISTORY				RELATED DOCUMENTS			
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
A	05/04/2002	Initial release	PJ	PJ			
B	07/05/2002	Updated parts	RH	RH			

PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	95008	-	O Ring Viton 75 Type 008		1	ea	
002	93019	-	Pin, Spirol, 1mm x 8mm Lg, SS		2	ea	
003	01047	-	Circlip, Internal, 5/8, St/Steel		1	ea	
004	01030	-	Screw, Grub Skt Hd, M6 x 6mm Long, St/Steel		3	ea	
005	99211	-	O Ring Viton 90 Type 211		50	ea	
006	99124	-	O Ring Viton 90 Type 124		50	ea	
007	95211	-	O Ring Viton 75 Type 211		5	ea	
008	01029	-	Screw, Csk Hd(Slotted), M3 x 06mm Lg, St/Steel		4	ea	
009	01028	C	Assy, Banana Pin (4mm)		1	ea	

(AR = As Required)

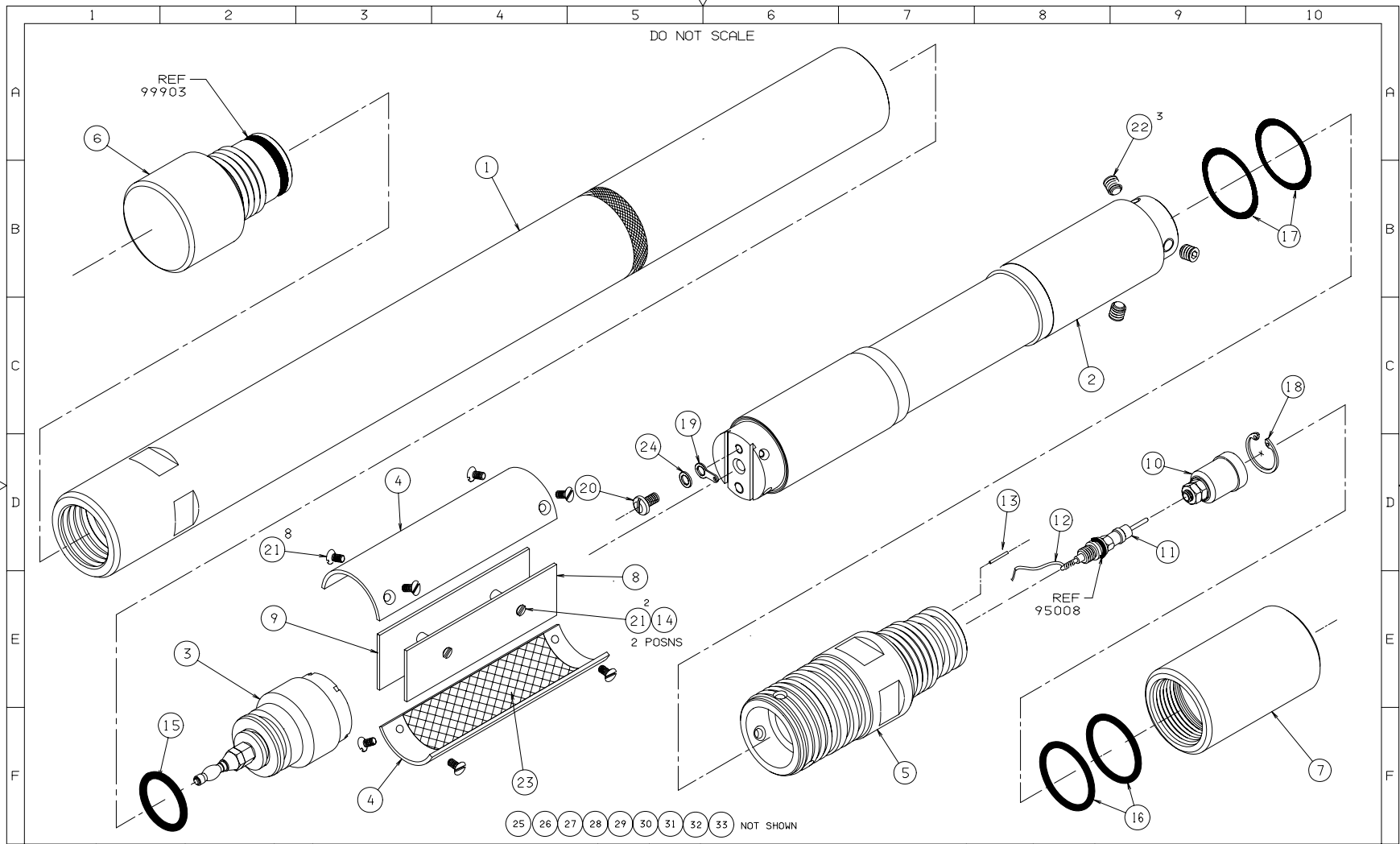
APPENDIX B DRAWINGS & PARTS LISTS

B.1 MECHANICAL DRAWINGS

Description	Drawing	Parts List
CCL015 General Assembly	09528-C	See Drawing.
Coil and Magnets	00226-F	00226-E

B.2 ELECTRONIC DRAWINGS

Description	Type	Drawing
Electronics Assembly	Wiring Diagram	WD-80075-C
Telemetry Board (PCB 82269)	Circuit Diagram	CD-82261-F00x
CCL VCO Oscillator	Circuit Diagram	CD-80062-G



ISS	DESCRIPTION	APPD	DATE	MACHINE FINISH	USED ON	TITLE
C	ECR 2822 - WASHER & SHEET 2 ADDED	GC	21/07/05	64	CCL015	CASING COLLAR LOCATOR
B	REFER TO ECR 1528	DJF	06/06/03			1 11/16 UW (177C) SX
A	INITIAL RELEASE	RH	03/05/02			(ENHANCED OUTPUT)
DRAWN AJB CHECKED IH APPROVED RH DATE 14/03/02 DATE 03/05/02 DATE 03/05/02 DIM IN INCHES SCALE NTS MATL: SEE PARTS LIST A 2				GEN TOL 0.X ±0.020" 0.XX ±0.010" 0.XXX ±0.005" ANGLE ±0.5°		SHEET 1 / 2 DRAWING No. 09528 ISSUE C

SONDEX FM No: F0022

Casing Collar Locator

CCL015

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B-2

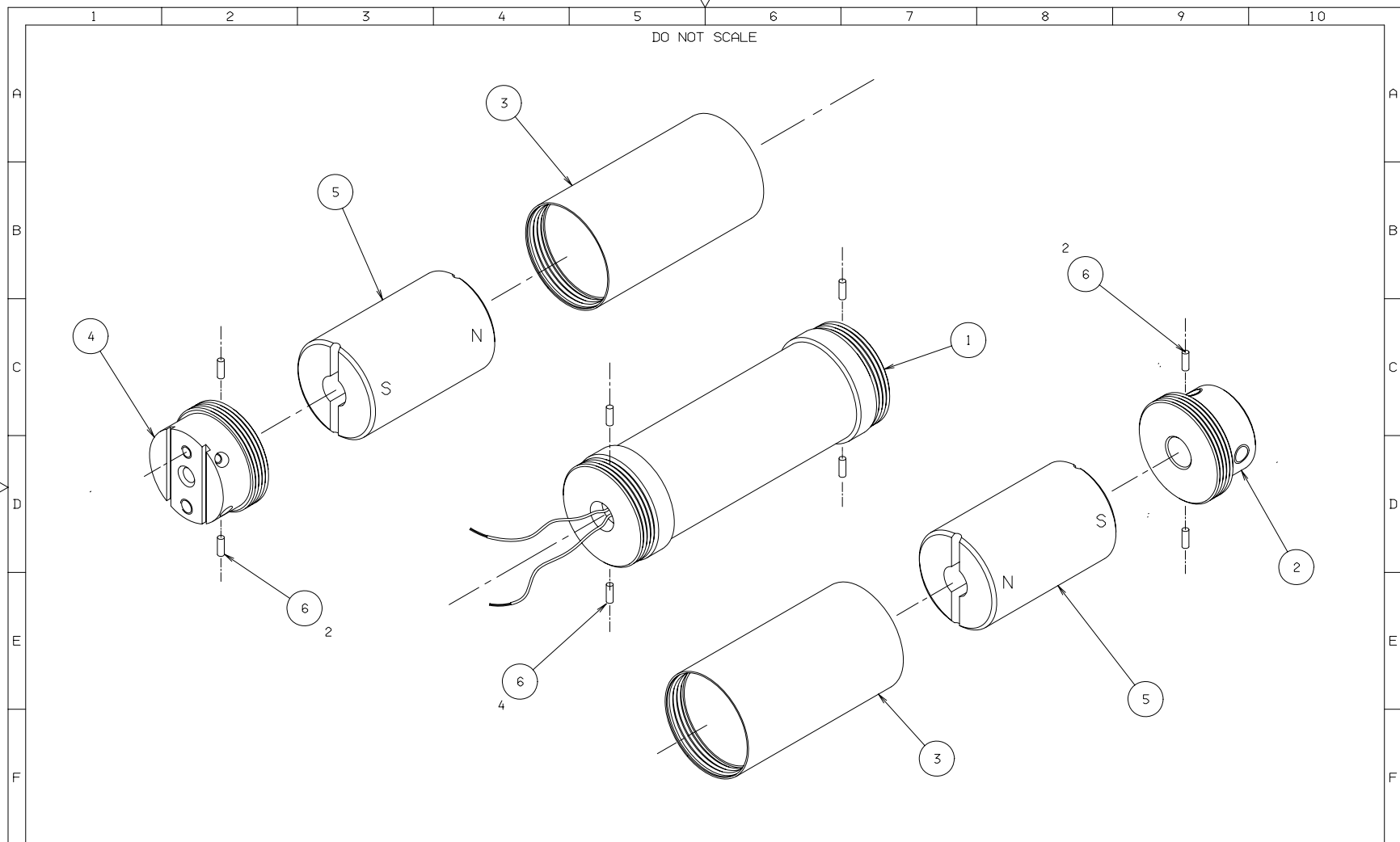
1	2	3	4	5	6	7	8	9	10
DO NOT SCALE									
FOR KIT NO. 1 USE PARTS LIST M39007									
FOR KIT NO. 2 USE PARTS LIST M39008									
Item	Part No.	Description	Qty	Kit no.					
01	00201	Housing Pressure, 1-11/16	1	2					
02	00226	Assy, Coil & Magnets, Mk2, 1-11/16, CCL	1	1					
03	10537	Assy, Upper Electronics Bulkhead, Memory, SX (Isolation)	1	1					
04	01015	Halfshells, Chassis & Cover, Electronics, 1 Module	1	1					
05	00222	Hd Lower MKII	1	2					
06	10148	Thread Protector, Male, Standard, (Upper End) with O'Ring	1	2					
07	01019	Thread Protector, Female, Standard (Lower End)	1	2					
08	80062	Assy CCT CCL (MEM)	1	1					
09	82269	Assy, PCB, PSU & Telemetry, UW Single Ratemeter, Programmed	1	1					
10	10036	Assy Connector Lower SX With Socket	1	2					
11	92009	Connector Pressure Isolation Mono Long (use J029-00389)	1	2					
12	W001-00104	Wire, PTFE, Type A, 300V, 6A, 200C	AR	2					
13	93019	Pin, Spirol, 1mm x 8mm Lg, SS	1	2					
14	93261	Spacer, Round, M3 Thru, 4.75mmOD x 12.7mmLG, Brass/NickelP	2	1					
15	95211	O Ring Viton 75 Type 211	1	1					
16	99211	O Ring Viton 90 Type 211	2	2					
17	99124	O Ring Viton 90 Type 124	2	2					
18	01047	Circlip, Internal, 5/8, St/Steel	1	2					
19	01049	Tag Solder 10-32	1	1					
20	93081	Screw Pan Hd Slotted M4 x 06mm Long St/Steel	1	1					
21	01029	Screw, Csk Hd(Slotted), M3 x 06mm Lg, St/Steel	12	1					
22	01030	Screw, Grub Skt Hd, M6 x 6mm Long, St/Steel	3	1					
23	T004-008AP	Tape Tygaflor 208AP/03T 80mm x 30M		1					
24	93029	Washer Serrated M4 SS (DIN6798A)	1	1					
25	W001-00200	Wire, PTFE, Type A, 300V, 3A, 200C	AR	1					
26	W001-00202	Wire, 7/0.12, PTFE Type A, Red	AR	1					
27	W001-00207	Wire, 7/0.12, PTFE Type A, Violet	AR	1					
28	W001-00209	Wire, 7/0.12, PTFE Type A, White	AR	1					
29	W001-00210	Wire, 7/0.12, PTFE Type A, Pink	AR	1					
30	A013-00000	Sleeving, Silicone Rubber, Class H, 180C, Wall 0.5mm, Black	AR	1					
31	A015-01M01	PTFE Sleeve Natural 1 01mm bore wall thickness 0 30	AR	1					
32	A006-0099C	Solder Wire, Alloy Sn99.3/Cu0.7, High Activity Rosin 309	AR	1					
33	A006-0099CA	Solder Wire, 331 0.W/Sol., Alloy Sn99.3/Cu0.7, Core#66(3.3%)	AR	1					

DRAWN AJB	CHECKED IH	APPROVED RH	ISS C	DESCRIPTION ECR 2822 - WASHER & SHEET 2 ADDED	APPD GC	DATE 02/09/05	Sondex Tel. 0118 932 6755 THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	USED ON CCL015	TITLE CASING COLLAR LOCATOR 1 11/16 UW (17C) SX (ENHANCED OUTPUT)			
DATE 14/03/02	DATE 03/05/02	DATE 03/05/02	ISS B	DESCRIPTION EFR 1528 REFERS	APPD DJF	DATE 06/06/03		MACHINE FINISH 63/	GEN TOL 0.X ±0.020" 0.XX ±0.010" 0.XXX ±0.005" ANGLE ±0.5°	SHEET 2/2	DRAWING No. 09528	ISSUE C
DIM IN INCHES	MATL: SEE PARTS LIST		ISS A	DESCRIPTION INITIAL RELEASE	APPD RH	DATE 03/05/02		THIRD ANGLE PROJECTION				

Casing Collar Locator

CCL015

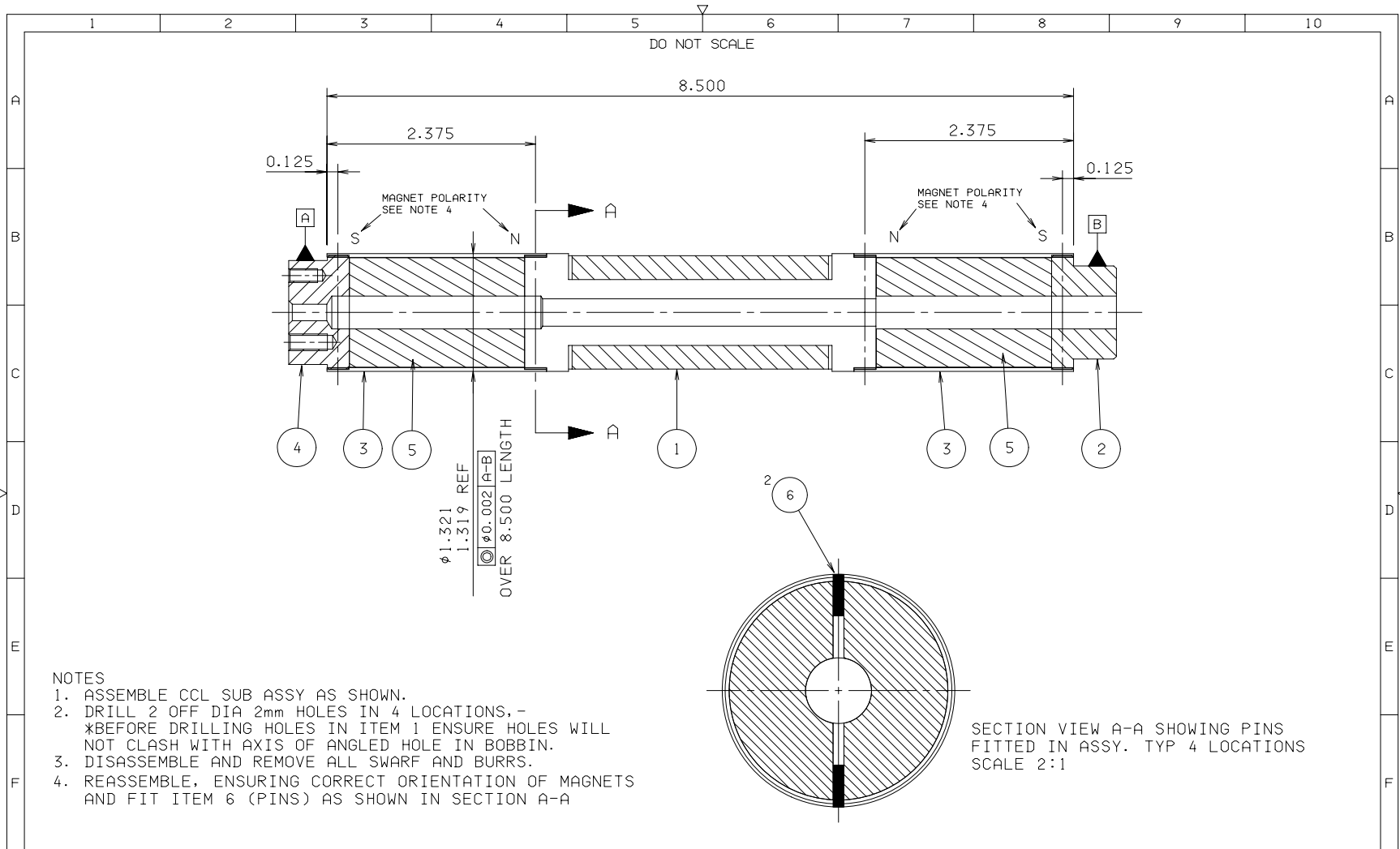
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DRAWN NGH	CHECKED AJB	APPROVED DJF	ISS	DESCRIPTION	APPD	DATE	Sondex Tel. 0118 932 6755 THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	USED ON	TITLE
DATE 29/08/97	DATE 18/03/98	DATE 23/03/98	F	ECR 3220 REFERS - SHT 2, ITEM 4, BORE REVISED	NGH	07/02/06		10562	ASSY COIL & MAGNETS
DIM IN			E	GEOMETRIC TOL ADDED. REMOVE NOTE 5 - ECR 477	AJB	12/07/01	MACHINE FINISH 63/	GEN TOL 0.X ±0.020" 0.XX ±0.010" 0.XXX ±0.005" ANGLE ±0.5°	SHEET
INCHES			D	SEE SHEET 2 FOR UP ISSUE DETAILS.	DJF	18/03/98			1/2
SCALE 1:1			C	THIS SHEET GENERATED, DRG IS NOW 2 SHEETS	AJB	18-03-98	DRAWING No. 00226		ISSUE
MATERIAL: SEE DETAIL DRAWINGS			B	SEE SHEET 2 FOR OLD UP-ISSUE	-	-	THIRD ANGLE PROJECTION		F

Casing Collar Locator

CCL015



NOTES

1. ASSEMBLE CCL SUB ASSY AS SHOWN.
2. DRILL 2 OFF DIA 2mm HOLES IN 4 LOCATIONS, -
*BEFORE DRILLING HOLES IN ITEM 1 ENSURE HOLES WILL NOT CLASH WITH AXIS OF ANGLED HOLE IN BOBBIN.
3. DISASSEMBLE AND REMOVE ALL SWarf AND BURRS.
4. REASSEMBLE, ENSURING CORRECT ORIENTATION OF MAGNETS AND FIT ITEM 6 (PINS) AS SHOWN IN SECTION A-A

SECTION VIEW A-A SHOWING PINS FITTED IN ASSY. TYP 4 LOCATIONS SCALE 2:1

DRAWN NGH	CHECKED AJB	APPROVED DJF	ISS	DESCRIPTION	APPD	DATE	Sondex Tel. 0118 932 6755 THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	USED ON	TITLE
DATE 29/08/97	DATE 18/03/98	DATE 23/03/98	F	ECR 3220 REFERS - SHT 2, ITEM 4, BORE REVISED	NGH	07/02/06		10562	ASSY COIL & MAGNETS
DIM IN INCHES		MATERIAL:		E	GEOMETRIC TOL ADDED. REMOVE NOTE 5 - ECR477		MACHINE FINISH 63/	GEN TOL Q.X ±0.020" Q.XX ±0.010" Q.XXX ±0.005" ANGLE ±0.5°	SHEET 2 / 2
SCALE 1:1		SEE DETAIL DRAWINGS		D	NOTE 5 & OD DIMENSION ADDED. REF PVR 328.				
				C	NOW SHOWN ON TWO SHEETS				
				B	ITEM 6 IS NOW Ø2mm, REFER C/R176(240CT96)				

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Casing Collar Locator

CCL015

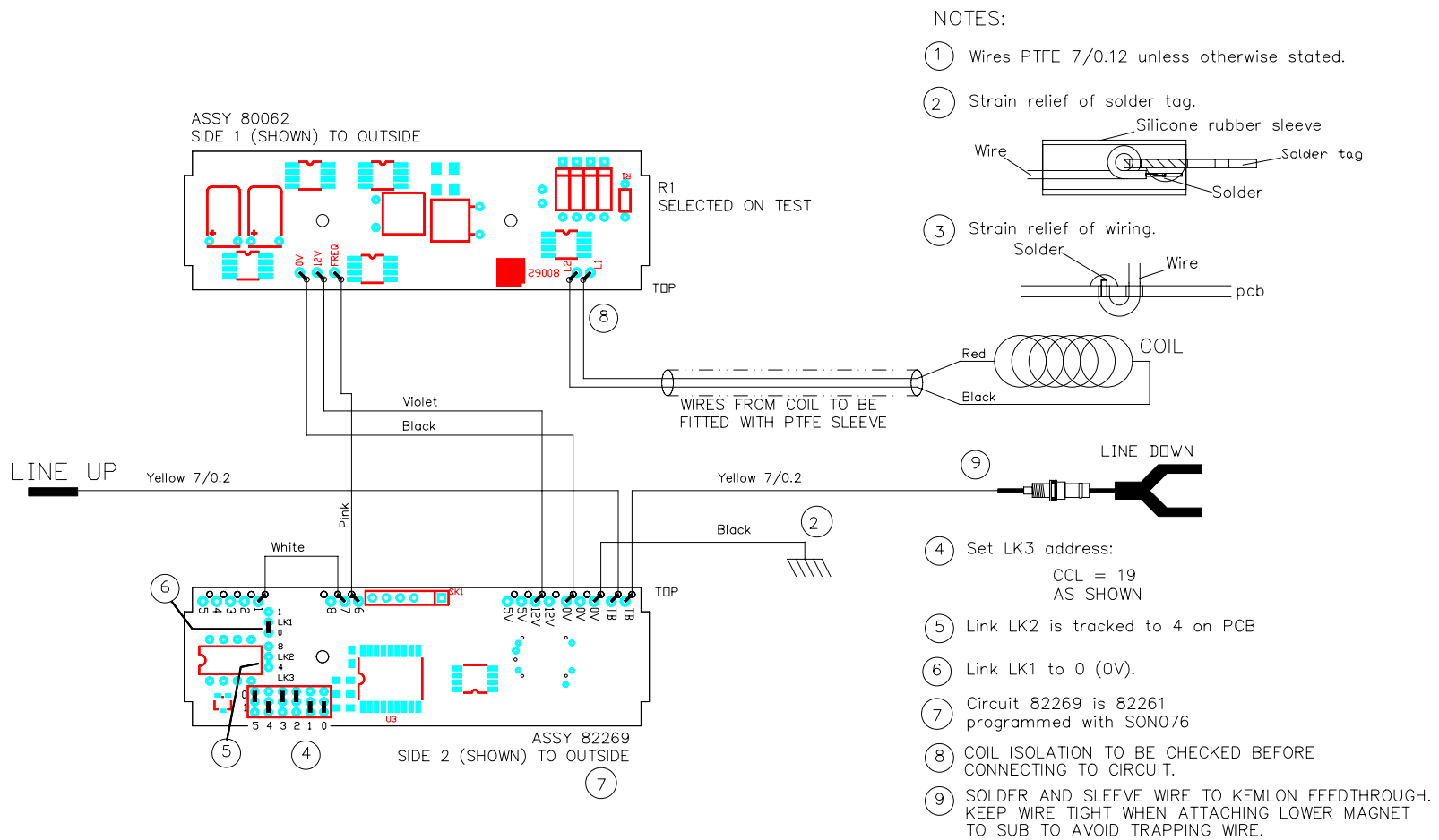
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PARTS LISTING					
Part:	Issue:		Drawn:	Checked:	Approved:
00226	E		NGH	AJB	DJF
Description:			Date:	Date:	Date:
Assy, Coil & Magnets, Mk2, 1-11/16, CCL			29/08/1997	18/03/1998	23/03/1998

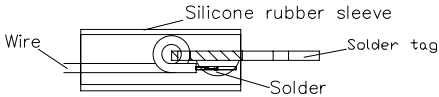
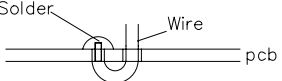
CHANGE HISTORY					RELATED DOCUMENTS		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
D	18/03/1998	Refer to PVR 328	DJF	DJF	01 AR-00226	PT1	Assembly Record
E	12/07/2001	Refer to ECR 477	NGH	AJB	02 AI-00226	PT1	Assembly Instruction
					03 AD-00226	F	Assembly Drawing

PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	00213	B	Assy, Coil, Mk2, 1-11/16		1	ea	
002	00220	B	Bulkhead Tube Mounting		1	ea	
003	00221	B	Tube Cover Magnet		2	ea	
004	00224	C	BulkHead, Upper, Mk2		1	ea	
005	00203	B	Magnet, 1-11/16		2	ea	
006	93170	-	Pin Spirol 2mm x 6mm Long St/Steel		8	ea	

(AR = As Required)



NOTES:

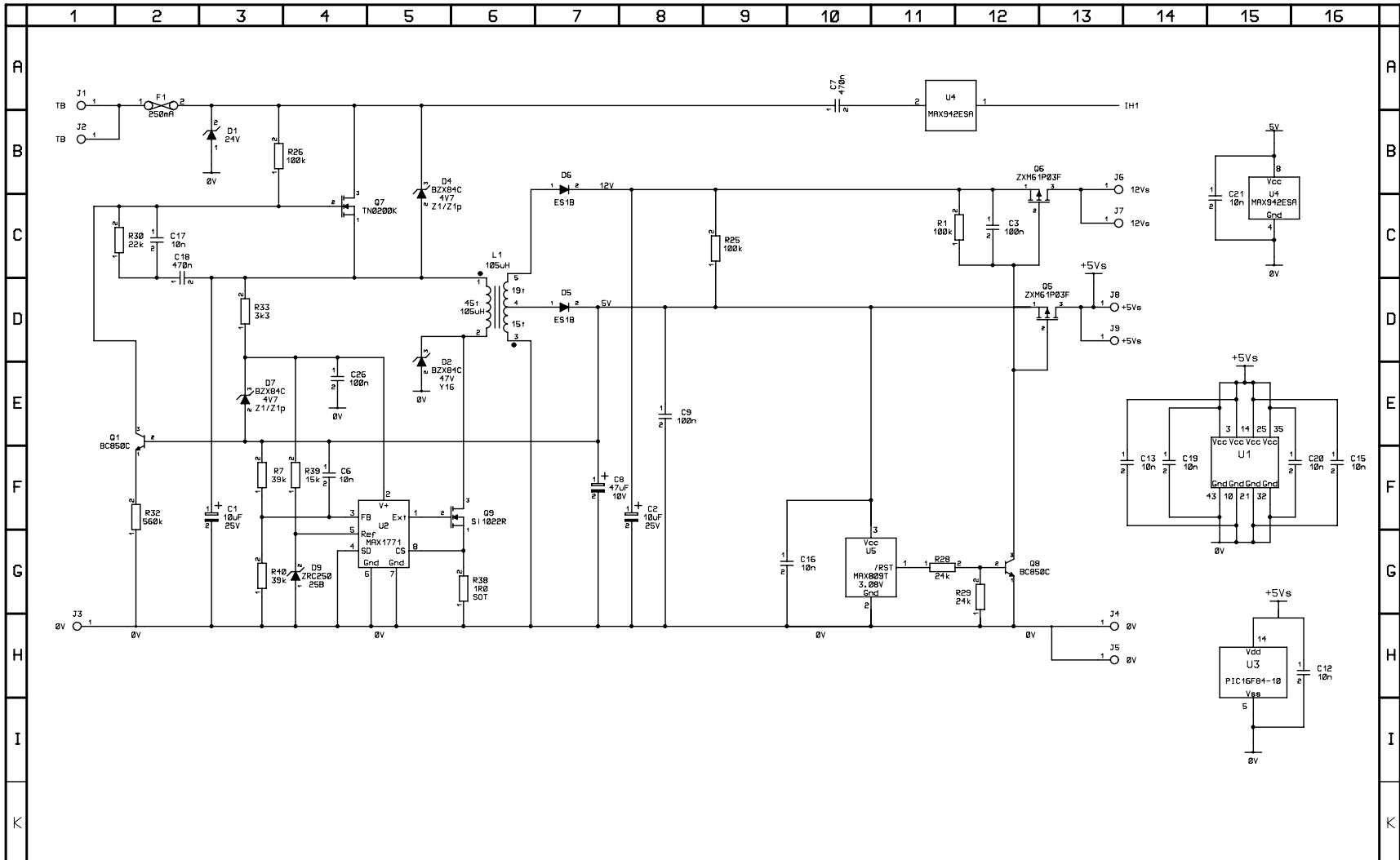
- ① Wires PTFE 7/0.12 unless otherwise stated.
- ② Strain relief of solder tag.
 
- ③ Strain relief of wiring.
 
- ④ Set LK3 address:
CCL = 19
AS SHOWN
- ⑤ Link LK2 is tracked to 4 on PCB
- ⑥ Link LK1 to 0 (0V).
- ⑦ Circuit 82269 is 82261 programmed with SON076
- ⑧ COIL ISOLATION TO BE CHECKED BEFORE CONNECTING TO CIRCUIT.
- ⑨ SOLDER AND SLEEVE WIRE TO KEMLON FEEDTHROUGH. KEEP WIRE TIGHT WHEN ATTACHING LOWER MAGNET TO SUB TO AVOID TRAPPING WIRE.

ISS	REV	DATE	CHANGES	CHKD	APPD
B		7/6/04	ECR2043. Redrawn Resistor deleted	(RH)	(RH)
C		9/9/04	ECR1692 82269 was 82224	(PR)	(PR)

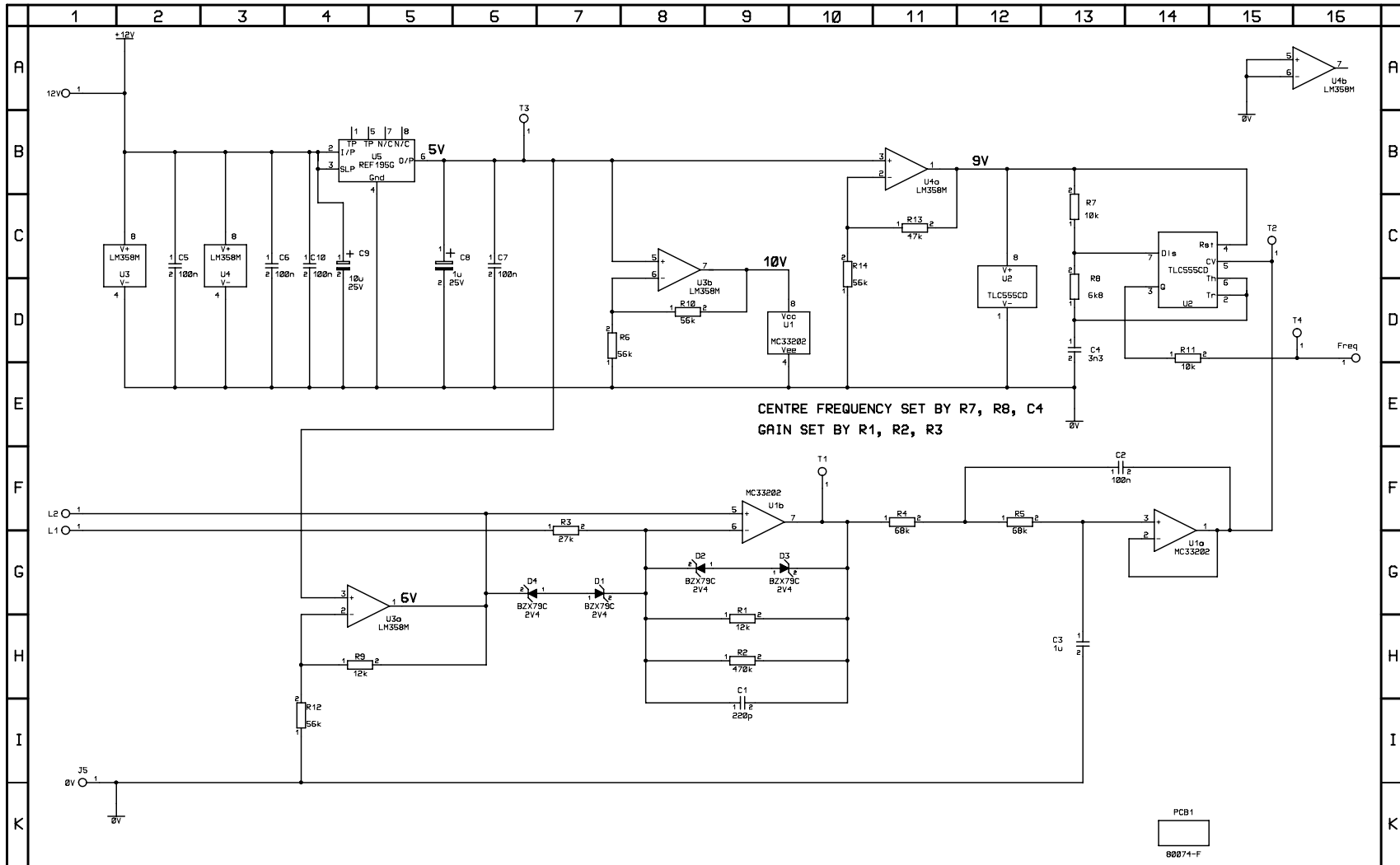
SONDEX
 FORD LANE, BRAMSHILL,
 HOOK RG27 0RH,
 ENGLAND.
 tel 44 118 9326755 fax 9326704

TITLE:	DRAWN	CHECKED	APPROVED
WIRING DIAGRAM TOOL ELECTRONICS ULTRAWIRE CCL	D.Jackson	(RH)	(RH)
	DATE 4/6/04	DATE 7/6/04	DATE 7/6/04
	DRAWING No. WD 80075	ISSUE C	REVISION

DATE	DATE	DATE
4/6/04	7/6/04	7/6/04
WD 80075	C	



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE	TITLE	DRAWING NUMBER	ISSUE	REVISION
C	01		PR	PR	21/11/03	SONDEX LTD FORD LANE, BRAMSHILL, HOOK, HAMPSHIRE, RG27 0RH, ENGLAND TEL: +44 (0) 118 932 6755 FAX: +44 (0) 118 932 6704 This document contains proprietary information. Copyright 2001 © Sondex Ltd.	CD-82261	F	00x
D	00		DJ	PR	23/07/07				
D	00		PEJR	PEJR	06/01/05				
D	01		PEJR	PEJR	08/06/05				
D	02		PEJR	PEJR	03/8/05				
F	00		PEJR	PEJR	29/06/06				
						Ultrawire PSU & Telemetry CTF Tool Circuit Diagram	DRAWN PEJR	CHECKED DJ	APPROVED PR
							DATE 17/04/03	DATE 05/08/03	DATE 05/08/03
							SHEET 1	OF 2	



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE	SONDEX LTD	TITLE	DRAWING NUMBER	ISSUE	REVISION
E	03	ECR1384. R1,R7,R13,D6 changed	JT	RH	22/10/02	FORD LANE, BRAMSHILL, HOOK, HAMPSHIRE, RG27 0RH, ENGLAND	CCL Signal Amplifier, Filter and Freq Converter	CD-80062	G	
E	04	ECR1406. C9 was 10nF Elec, was connected to 6V rail	RH	RH	02/12/02					
F	00	ECR1606. N/F comps removed. All Comps re-numbered	RH	RH	11/09/03					
F	01	ECR2098. R1 was 120k, C4 was 10nF, R8 now SOT	RH	RH	02/07/04	TEL: +44 (0) 118 932 6755 FAX: +44 (0) 118 932 6704				
F	02	ECR2778 Change to R8 & U2	RH	RH	25/8/05					
G		ECR4089 R1 was SOT	RH	RH	25/09/06	This document contains proprietary information. Copyright 2001 © Sondex Ltd.				

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Casing Collar Locator

CCL015