UMT005

Document: MN-UMT005-C

Ultrawire™ Memory Tool

ULTRAWIRE™ MEMORY TOOL

Operational & Maintenance Manual

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0 ABOUT THIS MANUAL

0.1 MANUAL HISTORY

Date	Issue	Description	Auth	Chk	App
03/08/06	A	First Issue.	FV	KW	KW
05/03/07	B	Drawing updates. ECR4156, 4395.	FV	FV	RLH
05/06/08	C	Drawing update ECR4631(CD-85062)	RS	RH	RH

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

Ultrawire™ Logging Tools can be run on slickline or coiled tubing to acquire and store data from Ultrawire™ PL and Inspection tools.

A Memory section is programmed and downloaded using an IBM® compatible PC, running MEMLOG software, via an interface. Once powered by a high capacity Lithium battery within a separate battery holder (MBH), data is acquired and stored in accordance with a user defined 'profile'. This controls the sensors logged, the sampling rates and the profile scheduling.

Sondex MEMLOG software is supplied with all memory tools, providing a graphical interface for programming and downloading the tool, together with capabilities for merging memory tool data with depth-time files from the Sondex Depth Time Recorder (DTR).

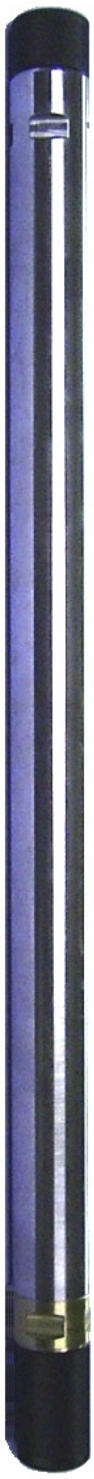


Figure 1.1 UMT

1.1 OPERATING PRINCIPLE

Data from the logging sensors is transmitted via the Toolbus to the memory tool at the top of the string. Data is stored in nonvolatile flash memory chips under the control of a downhole processor. The tool can support all the standard Sondex Ultrawire™ tools and record readings from every sensor at up to 50 sets per second.

1.2 APPLICATIONS

- Slickline & Coiled Tubing Production Logging.
- Production/Injection Well Profiling.
- Multifinger Imaging Tool Surveys.

1.3 SPECIFICATION

Parameter	Specification	Remarks
Diameters Available	$1^{11}/_{16}$″ (43mm)	
Maximum Temperature	350°F (177°C)	
Maximum Pressure	20,000psi (138MPa)	
Tool Shipping Length	29.1″ (739mm)	
Tool Make-up Length	25.3″ (643mm)	
Weight	10.6lb (4.8kg)	
Supply Voltage	+13.5 - 20VDC	
Standby Current	2mA	
Writing Current	15 - 25mA	
Tool Programming	via MIP interface box	
Tool Downloading	via MIP up to 4MB/min (computer dependent)	
Sample Rates	Programmable from 20ms to days in 20ms increments, independent for each tool and each profile.	
Number of channels	Up to 62 tools (Ultralink™)	
Capacity	Dependent on tool type and sampling rate	64MB will record up to 6 PL tool outputs plus pressure data @ 1 sec intervals for 100 hours.
Memory	128MB Flash Logging Memory.	
Maximum Toolbus Rate	500kbps	
Materials	Corrosion Resistant Throughout	
End Connectors		
Top	9 pin Fischer connector (female socket)	For connection to MBH or MCU (via lead)
Bottom	4mm single conductor (female socket)	For connection to Sondex Ultrawire™ Tools
Tools Supported	Sondex Ultrawire™ Tools.	

2 SAFETY

Do not apply mains power to the tool. This will seriously damage the tool, and put personnel at risk of electric shock if the tool is open.

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.

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 UMT OPERATION OVERVIEW

The UMT sends scheduled Ultrawire™ commands to tools and logs their response in Flash memory.

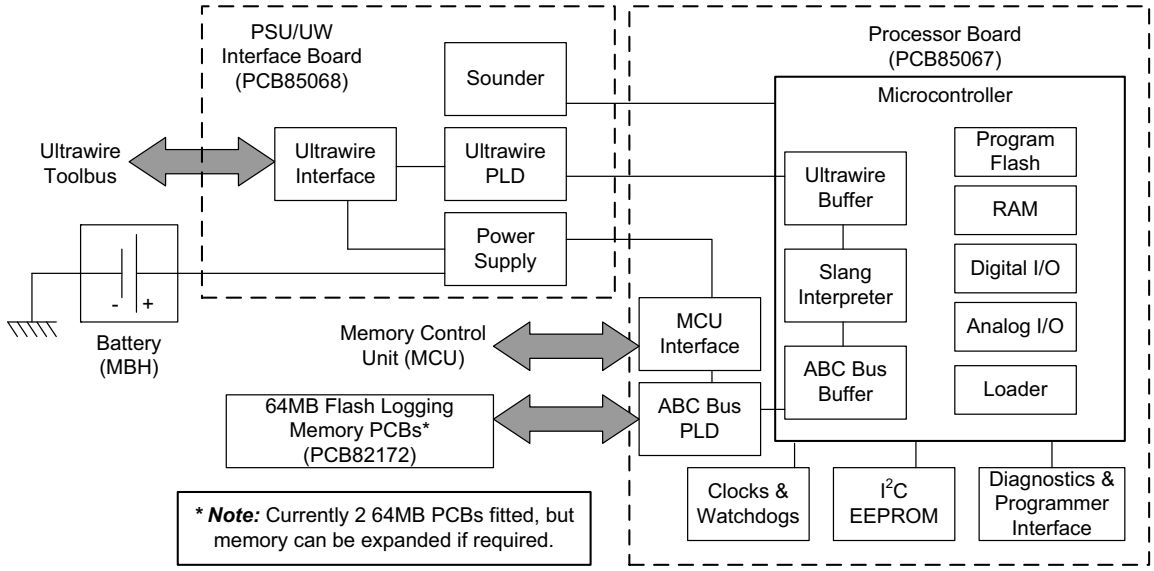


Figure 3.1 UMT Block Diagram

UMT comprises nine main functional blocks, which combine microcontroller firmware with electronic hardware:

- Microcontroller.
- Clocks & Watchdogs.
- Power Supply.
- SLang Interpreter.
- Ultrawire™ Interface
- ABC Bus Flash Logging Memory.
- MCU ABC Bus Interface.
- Sounder.
- Debug & Programming Interface.

3.2 DESCRIPTION

3.2.1 MICROCONTROLLER

The microcontroller is a Renesas 16bit M16C series part and includes 128kB of Flash program memory and 10kB RAM. In addition, the device has a host of on-chip peripherals including digital and analog I/O, serial ports and timers.

The UMT firmware is embedded in the microcontroller Flash program memory at manufacture, and may be subsequently reloaded or upgraded using PC software and a Sondex MCU.

3.2.2 CLOCKS & WATCHDOGS

The main system clock runs at 8MHz and is operational during data logging. In order to save power, the microcontroller can switch to a 32kHz clock and turn off the 8MHz clock before sleeping. The 32kHz clock is always running and is generated by a PIC microcontroller, which also provides a temperature-compensated 1 second pulse for sleep timing. The PIC firmware reads the UMT temperature from a combined LT1019 voltage reference/temperature sensor, using an ADC channel, and indexes a table of pre-calculated compensation values, which are used to adjust a 1 second timer.

A watchdog monostable resets the system should the 1 second timer fail. A second watchdog system counts 1 second ticks and resets the system after 255 seconds if not triggered. These watchdogs will automatically be deactivated if necessary, to allow operation without sleep should the 1 second timer fail.

3.2.3 POWER SUPPLY

The main power supply, used during logging, is a switch mode type providing regulated 5V and 3V3 rails from a nominal 18V supply. During low power sleep periods, this is disabled by the microcontroller and the 32kHz oscillator, and watchdogs are run from a series regulator. The microcontroller RAM and register contents are also maintained by this regulator. Note that the 32kHz oscillator PIC runs from a slightly higher voltage to aid restart at high temperatures.

The Toolbus supply includes a programmable and resettable current limit, as well as tool and toolstring current monitors and a battery voltage monitor.

3.2.4 SLANG INTERPRETER

SLang (Sondex Logging Language) comprises a list of commands - a logging schedule - which is interpreted by the UMT. Most of these commands generate Ultrawire™ words to operate and log tools over the Toolbus, some of them are concerned with internal UMT operations and some with flow control of the logging schedule itself. SLang code is generated from its high-level representation (Graffiti) by PC software and is downloaded to UMT before use.

The SLang interpreter operates from a 20ms timer interrupt and is responsible for the correct sequencing and timing of all UMT operations while logging. Ultrawire™ words are assembled and sent to the Ultrawire™ buffer, and block header information is sent to the ABC Flash buffer. Returned Ultrawire™ words are routed to the ABC Flash buffer.

3.2.5 ULTRAWIRE™ INTERFACE

The Ultrawire™ electrical interface comprises a Sondex capacitor-coupled, choke-isolated AMI interface, which uses a single conductor (the Toolbus) for both power and half duplex data. The serialization and coding is split between a 32 macrocell Coolrunner Programmable Logic Device (PLD), two microcontroller synchronous serial ports and several microcontroller digital I/O pins.

Ultrawire™ commands are queued if necessary and transmitted at high speed. Received data is checked and queued for Flash writing. Data transmission and reception is controlled by an intelligent buffering algorithm, which takes account of timeouts and errors.

3.2.6 ABC BUS FLASH LOGGING MEMORY

Sondex ABC bus Flash logging memory is supplied as 64MB modules. UMT can support 2GB of logging memory: the available module addressing scheme allows up to 512MB at present.

Received Ultrawire™ data is queued, if necessary, and written to logging Flash memory over the ABC bus along with queued header data. Firmware automatically checks the integrity of individual Flash chips while logging to ensure a high degree of fault-tolerance.

The interface between the microcontroller and Flash logging memory is implemented in a 32 macrocell Coolrunner PLD, which is accessed by using microcontroller digital I/O lines.

3.2.7 MCU ABC BUS INTERFACE

A Sondex MCU may be connected to the UMT ABC bus, using a bi-directional buffered interface. This allows the MCU to monitor logging operations and to directly access the logging memory.

File transfer routines allow uploading and downloading of UMT firmware, SLang logging control files and Chip Allocation Tables to and from the UMT. These routines are separate from the main firmware and are initiated by a MCU master line control sequence at boot-up.

3.2.8 SOUNDER

A piezoelectric sounder is used to signal various conditions using short pips or tunes. SLang, generated from high-level Graffiti, automatically inserts a binary sequence of four pips into each scan loop to indicate the loop number starting from 1. For example, Bop-Bop-Bip-Bop indicates 0010 binary or loop number 2.

3.2.9 DEBUG & PROGRAMMING INTERFACE

The M16C microcontroller contains a factory programmed bootloader, which uses one of the serial ports, and is activated by holding the program line Hi while resetting. An external level shifter and inverter allows connection to a PC serial port. Normally, this would only be used for initial programming, service and development as the MCU ABC bus interface is more readily available for program updates.

This same connection can also be used to run an ANSI terminal (in practice, a terminal emulator program running on a PC) at 38,400 baud, which allows the Test Engineer to monitor and control most of the UMT functionality with single keystrokes.

4 OPERATING PROCEDURE

4.1 PRE-LOGGING CHECKS

4.1.1 MECHANICAL

1 Clean and grease upper and lower O-ring seals. Replace O-rings if damaged.

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

4.1.2 ELECTRICAL

1 Using a multimeter, measure the pin to housing resistance:

Upper Connector:

- Pin 1: >400kΩ
- Pin 2: <0.5Ω
- Pin 3: >1MΩ
- Pin 4: >1MΩ
- Pin 5: >1MΩ
- Pin 6: approx. 10kΩ
- Pin 7: >400kΩ
- Pin 8: approx. 10kΩ
- Pin 9: >1MΩ

Lower Connector:

- Ultrawire™ Line: 3-4MΩ

4.1.3 PROGRAMMING

1 Before the UMT can be used for logging, it must be programmed with a job profile. MEMLOG software can be used to create the job profile and does not require the UMT to be connected during this process, see *MN-MEMLOG*.

2 When the job profile has been created, remove upper thread protector and connect the UMT as shown in *Figure 4.1*. Refer to *Appendix A* for equipment details.

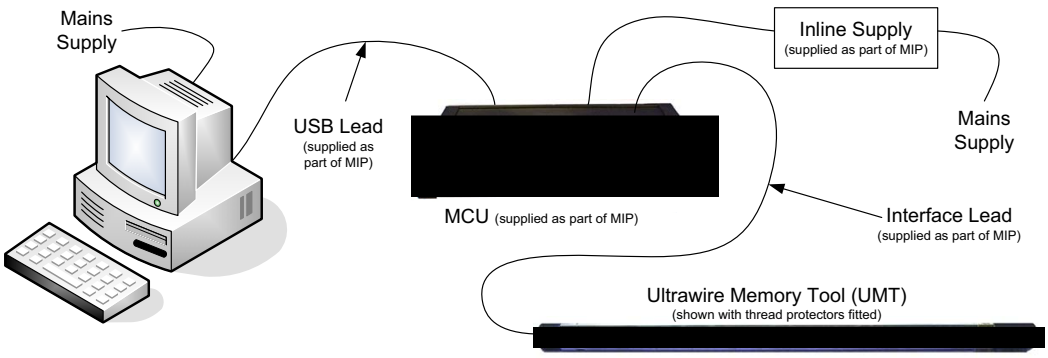


Figure 4.1 Programming Connection Diagram

3 Program the UMT as detailed in the MEMLOG manual *MN-MEMLOG*.

4 Remove power and disconnect. To protect the electrical connectors, ensure both thread protectors are fitted until the toolstring is ready for logging.

4.2 CONNECTING TO TOOLSTRING

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

The UMT should be located below the MBH at the top of the toolstring and above the Ultrawire™ tools.

The UMT includes a sounder, which indicates the operating mode. The various sounds emitted, and their timing, depend on the stored logging profile, see Memlog Manual *MN-MEMLOG* for further details.

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.

4.4 POST LOGGING DISASSEMBLY

4.4.1 TOOLSTRING

Clean the tool before the toolstring is disassembled.

Ensure that well fluid does not reach the electrical connectors.

Refit thread protectors.

4.4.2 PROGRAMMING

Remove the upper thread protector and connect the UMT as per *Figure 4.1*. All operations are performed within the MEMLOG software. Refer to *MN-MEMLOG* for procedure.

4.5 TRANSPORT, HANDLING & STORAGE

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

5 MECHANICAL DESCRIPTION

5.1 DESCRIPTION

The Ultrawire™ Memory Tool (UMT) comprises a number of circuit boards contained in a pressure housing.

The top tool joint is designed to connect to a logging battery pack (MBH) or a Sondex MIP lead.

The lower tool joint is a standard Sondex monoconductor.

The principal elements are as follows:

- Pressure Housing.
- Processor Circuit Board.
- PSU/UW Interface Circuit Board.
- 64MB Memory Circuit Boards.
- Upper End fitted with Fischer connector.
- Lower End fitted with monoconductor socket.

5.2 DISASSEMBLY

Note: Item numbers refer to the general assembly, unless stated otherwise.

5.2.1 PRESSURE HOUSING

Ref.: General Assembly *09709*

Unscrew pressure housing (item 5) from lower sub (item 6).

Note: The electronics section internal chassis is hard wired to the lower sub and remains fixed by grub screws (3x item 13).

5.2.2 LOWER CONNECTOR

Ref.: General Assembly *09709*
Lower Connector Assembly *10057*

1 Remove circlip (item 11).

2 Carefully unscrew nut with wire attached (item 3, 10057) from connector and remove the connector assembly from the lower sub (item 6). It is not necessary to remove the anti-rotation pin (item 12).

5.2.3 LOWER SUB

Ref.: General Assembly *09709*

Note: It is generally not necessary to separate the lower sub from the chassis.

1 Carry out *Section 5.2.1* and *Section 5.2.2* before continuing.

2 Screw grub screws (3x item 13) **inwards (clockwise)**. This will release the lower sub (item 6) from the electronic chassis (item 3).

3 Remove wavy washer (item 7).

5.2.4 ELECTRONICS

Carry out *Section 5.2.1* before continuing.

Ref.: Electronics Assembly *85072*

Remove screws (8x item 3, 85072) and remove top closing brackets (4x item 2, 85072).

Note: The lower closing brackets keep the PCB's in position and do not require removing.

5.3 REASSEMBLY

Note: Item numbers refer to the general assembly, unless stated otherwise.

5.3.1 ELECTRONICS

Ref.: Electronics Assembly *85072*

Check for damaged or crushed wires, replace where necessary. Ensure the chassis is free from debris.

Replace top closing brackets (4x item 2, 85072) and secure with screws (8x item 3, 85072).

5.3.2 LOWER SUB

Ref.: General Assembly *09709*

1 Inspect the line wire for damage, replace if necessary. Ensure all inner spaces are free from debris.

2 Fit wavy washer (item 7) into lower sub (item 6).

3 Align lower sub (item 6) and hold in place by screwing the grub screws (3x item 13) evenly **outwards (anti-clockwise)** until tight.

5.3.3 LOWER CONNECTOR

Ref.: General Assembly *09709*
Lower Connector Assembly *10057*

1 Replace and grease O-ring (item 8) in lower sub (item 6).

2 Carefully replace nut with wire attached (item 3, 10057) on to the connector.

3 Fit lower connector assembly (item 2) into lower sub (item 6), ensuring that lower connector assembly seats correctly against anti-rotation pin (item 12) and the wire is not crushed.

4 Replace circlip (item 11).

5.3.4 PRESSURE HOUSING

Ref.: General Assembly *09709*
Electronics Assembly *85072*

1 Check upper connector (item 11, 85072) for damaged contacts.

2 Clean and grease O-ring seals. Replace the following O-rings if damaged:

- 2x item 10.
- 2x item 9.

3 Clean pressure seal surfaces at both ends of the pressure housing (item 5). Ensure that the housing is free from debris.

4 Screw pressure housing (item 5) on to the lower sub (item 6).

5 Ensure thread protectors (item 1 & 4) are fitted.

6 ELECTRICAL DESCRIPTION

Ref.: UMT General Assembly Wiring Diagram *WD-85069*

6.1 PROCESSOR, PSU & INTERFACE

Ref.: Processor Board Circuit Diagram *CD-85062*
PSU/UW Interface Board Circuit Diagram *CD-85064*

[**This_Style** denotes a microcontroller I/O pin or other named signal.]

Reset

After a reset, the microcontroller I/O pins become high impedance inputs awaiting configuration. Several of these pins are used to control peripherals and are connected to external pull-up or pull-down resistors to assert their status after a reset.

A global reset is provided by U4, which holds the **$\overline{\text{RST}}$** signal low for 100ms after power up or after a watchdog reset.

Switch Mode Power Supply (SMPS)

The SMPS, based around U13, provides a single 5V supply and two 3V3 supplies. These supplies should be accurate to ±0.25V and are generated with reference to the 2.5V output of U14.

In addition the 5V rail is supplemented by a 4.5V linear regulator based around U1 and Q8. This acts a 'catcher' and allows this rail to supply momentary high current pulses to accommodate some types of memory chip.

LF Oscillator Operation

The LF oscillator is implemented, using a PIC12F675 8-pin processor, which also provides a temperature compensated 1Hz clock.

The LF Oscillator PIC is run from the battery supply with a shunt regulator, formed by R6 resistor and a forward biased diode, D1 sitting atop the 2V8 linear regulator rail. This gives a nominal 3V5 supply when in standby and about 3V9 when the system is fully powered.

Elapsed Time Clock

The 1Hz **Ticks** signal feeds a 32bit counter chain within the microcontroller that acts as the Elapsed Time Clock (ETC) giving a maximum of 136 years before rollover, which is considered to be sufficient for most logging jobs. This continues to count while the microcontroller is in stop mode and is used to restart the microcontroller after a programmed SLang sleep.

The PIC, which forms part of the ETC, uses the tool temperature monitor voltage, connected to an internal Analogue to Digital Converter (ADC), to provide temperature compensation for crystal frequency drift with temperature. This compensation is applied to the 1Hz output, but not to the 32kHz output.

Toolstring Power Supply

The power supply is capable of passing up to 2.0A and has a programmable current trip, controlled by a microcontroller Digital to Analogue Converter (DAC). In normal use, the 0-2.5V DAC output is connected to **TBctrl** and the trip status monitor input is **TBtrip**. These may also be configured as microcontroller digital outputs to reset and trip the toolstring supply.

Toolstring current is monitored by U17, a MAX4080 hi-side current monitor IC, configured to give 200 ADC counts for 2A, which is 1.96V with a 2.5V ADC reference.

Thus:

$$\text{Istring (Amps)} = \frac{\text{Nadc}}{100} \qquad \textbf{Equation 6.1}$$

The current trip level DAC on **`TBctrl`** is set using the same scaling.

Should the monitored current exceed the set point, the op-amp output will switch to the positive rail and switch off the power control MOSFET. Positive feedback then holds the non-inverting input at a zener-limited 2.7V, which is higher than the absolute maximum DAC output.

PSU current is routed to **`IBmon`**, battery voltage is routed to **`VBmon`** and tool temperature is routed to **`TTmon`**. Tool temperature and the 2.5V ADC reference **`ADCref`** are derived from the same chip. An additional MAX4080 current monitor measures the memory tool current as 200 ADC counts = 50mA and this is connected to **`ITmon`** giving:

$$\text{Iumt (Milliamps)} = \frac{\text{Nadc}}{4} \qquad \textbf{Equation 6.2}$$

The battery voltage monitor is scaled and buffered to give 20V = 200 ADC counts, which is a full scale of 25.5V, thus:

$$\text{Vb (Volts)} = \frac{\text{Nadc}}{10} \qquad \textbf{Equation 6.3}$$

The temperature output is specified as approximately 2.1mV/K, but in practise conforms more accurately to the LT1019 data sheet graph. Empirically, the temperature calibration accurate to about ±3C is given by:

$$\text{Tc (Celcius)} = (\text{Nadc} \times 0.881) - 11.2 \qquad \textbf{Equation 6.4}$$

$$\text{Tf (Fahrenheit)} = (\text{Nadc} \times 1.585) + 11.9 \qquad \textbf{Equation 6.5}$$

Ultrawire™ Interface

The Ultrawire™ Memory Tools (UMT) uses a mono-conductor to interface to the Ultrawire™ toolstring. This conductor, designated ‘LINE’ on Sondex circuit schematics provides the following functions:

- Supplies power to the toolstring.
- Carries data and commands from the memory tool to the toolstring.
- Carries data and diagnostics from the toolstring to the memory tool.

Chokes L1 and L2 (two are used for space and power reasons) isolate the DC Power Supply from data pulses on the Line. Transients on the Line are limited to ±3V by diodes D19 and D20. Ultrawire™ data pulses are ±1V.

ABC Bus Interface

The ABC bus provides a data path between logging memory, the UMT microcontroller and a surface PC. The bus connects to the UMT microcontroller via U7, to the logging memory boards via their on board CPLD, and to a surface PC via bidirectional buffers and a Sondex MCU. The ABC bus may be used in four ways:

- Before logging, the ABC bus is used to connect a surface PC to the UMT microcontroller to load firmware and SLang prior to running a log.
- While logging, the ABC bus connects logging memory to the UMT microcontroller to allow data storage.
- After logging, the ABC bus connects a surface PC to logging memory to allow transfers of logged data.
- During testing, the ABC bus connects logging memory to the UMT microcontroller and connects a surface PC in listen-only mode to monitor bus transactions.

Beeper

The piezoelectric sounder is controlled by **`Beep`**, which is driven from a microcontroller on-chip oscillator (Timer 4) under firmware control.

Programming Port

The programming port uses microcontroller UART1. If **`CNVss`** is held Hi and the microcontroller is reset, manufacturer-supplied internal embedded bootcode uses **`Loader_TX`** and **`Loader_RX`** to download firmware from an RS232 interface. Level shifting and inversion between RS232 levels and 3.3V logic levels (e.g. MAX3232) must be provided externally.

After initial firmware loading at assembly time, UMT may be reprogrammed via the MCU and ABC bus using firmware routines.

Diagnostic Port

The diagnostic port also uses microcontroller UART1. An external level and polarity converter is used to provide an RS232 interface running at 38462 baud (at 25°C). This port can connect to a terminal (or more usually a terminal emulator running on a PC), which is configured to be ANSI escape sequence compatible and having a display area of 24 rows by 64 columns.

6.2 64MB FLASH MEMORY

Ref.: 64MB Memory Board Circuit Diagram *CD-80693*

The ABC bus is monitored by programmed devices (U1 & U2) looking for its uniquely addressed wake up command, set by links LK1. On receiving its wake up command, it either stores or retrieves Log Data in the Log Data Memory (U3 & U4) as required by ABC bus commands. When all data transactions are complete, a sleep command on the ABC bus then places the Log Data Memory into its power saving sleep mode.

Further Memory boards can be added to increase the memory beyond its initial 64MB, each board adding another 64MB of Log Data Memory. Sondex does not currently offer tools with more than 128MB of Log Data Memory.

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 *09709*

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 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*.
- Check any connectors for cleanliness and loose/bent pins before replacing.

4 Check all fixings for tightness.

5 Check grub screws (3x item 13) are tight.

7.1.3 ELECTRICAL

1 Tool current <25mA @ 18V.

2 Connect to Logging System and check for correct data. Apply some gentle vibration, rotation and invert tool to expose potential failure.

3 With an appropriate logging profile running, check line for +1V and -1V, 2μs pulses, with an oscilloscope. Make sure to check tool pulses, not those from the controller which occur first.

Pulses should have no ringing, if ringing, also attach a Ultrawire™ terminator at the bottom of the toolstring (e.g. Ultrawire™ bullnose terminator (BUL006) or a suitable Ultrawire™ bottom end flowmeter).

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 *09709*

If the tool experiences H_2S, gas or temperatures above 150°C, then the following O-rings must be replaced:

- 2x item 10.
- 2x item 9.

7.3 TROUBLESHOOTING

Refer to *Section 5.2 Disassembly* and *Appendix B Drawings & Parts Lists* where necessary.

An oscilloscope, multimeter and other basic test equipment will be required.

Initial inspection	Check for: • 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*. • Check any connectors for cleanliness and loose/bent pins before replacing. Also check all fixings are tight.
Not operating	Check connections to the MBH. With the UMT disconnected from the toolstring and MBH, connect 18VDC power supply current limited to 200mA via the Fischer connector (+18V to Kemlon, 0V to chassis). The quiescent current should be between 10mA and 25mA.
Little or no current	Check the fuse, F1, on the UMT PSU board (PCB85062).
Power supply is current limiting	Check for short-circuits on the PCBs and connectors.
Current within range, but not operating	Check the supply rails at the link J31 on PCB85062. These should be 5V ±0.25V and 3.3V ±0.25V. Check the output of the oscillator U6 is 8MHz ±2kHz. Check the *RST signal at either end of R5 on PCB85062 is reading approx. 3.3V. Check the 1second pulses at either end of R5 on PCB85062 is producing a short pulse every second. If the above is OK, re-load the UMT firmware using Memlog.

APPENDIX A EQUIPMENT & RECOMMENDED SPARES

Item	Part No.	Description	Qty	Remarks
1	UMT005	Ultrawire Memory Tool, $1^{11}/_{16}$″, 128MB.	1	20kPSI

A.1 ANCILLARY EQUIPMENT

Item	Part No.	Description	Qty	Remarks
1	MIP006	Memory Control Unit (MCU) and leads.	1	Refer to *MN-MCU003*.
2	-	PC or notebook running Windows® 98SE, ME, 2000 or XP with a USB connection.	1	Refer to *MN-MEMLOG* for further details.

A.2 MAINTENANCE EQUIPMENT

Item	Part No.	Description	Qty	Remarks
1	*91050*	Hand Tool Kit for $1^{11}/_{16}$″ Tools.	1	
2	LOR101	Grease for O-rings and threads.	1	5oz pot.
3	LOR101(L)	Grease for O-rings and threads.	1	12oz pot.

A.3 RECOMMENDED SPARES

Item	Part No.	Description	Qty	Remarks
1	*KITB-UMT1 11/16*	$1^{11}/_{16}$″ Basic Spares Kit.	1	To support 1 run in hole.
2	*KITR-UMT1 11/16*	$1^{11}/_{16}$″ Recommended Spares Kit.	1	Support 25 runs in hole.

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

PARTS LISTING

Part:	Issue:		Drawn:	Checked:	Approved:
91050	-		NGH	PD	DJF
			Date: 14/01/2002	Date: 14/01/2002	Date: 14/01/2002

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

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-UMT1 11/16	A		SCA	KW	KW
			Date: 06/06/2005	Date: 06/06/2005	Date: 06/06/2005

Description:
Kit, Spares, Basic, UMT 1 11/16" Tools

CHANGE HISTORY					RELATED DOCUMENTS		
Iss	*Date*	*Remarks*	*Chkd*	*Appr*	*# Documents*	*Issue*	*Notes*
A	06/06/2005	Initial release.	KW	KW			

PARTS LIST

Item	*Part No.*	*Issue*	*Description*	*Component Value*	*Qty*	*Units*	*Remarks*
001	99124	-	O Ring Viton 90 Type 124		2	ea	
002	99211	-	O Ring Viton 90 Type 211		2	ea	
003	95212	-	O Ring Viton 75 Type 212		1	ea	

(AR = As Required)

PARTS LISTING

Part:	Issue:		Drawn:	Checked:	Approved:
KITR-UMT 1 11/16	A		SCA	KW	KW
			Date: 06/06/2005	Date: 06/06/2005	Date: 06/06/2005

Description:
KIT, SPARES, RECOMMENED(25 RUN), UMT 1 11/16" Tools

CHANGE HISTORY					RELATED DOCUMENTS		
Iss	*Date*	*Remarks*	*Chkd*	*Appr*	*# Documents*	*Issue*	*Notes*
A	06/06/2005	Initial release.	KW	KW			

PARTS LIST

Item	*Part No.*	*Issue*	*Description*	*Component Value*	*Qty*	*Units*	*Remarks*
001	99211	-	O Ring Viton 90 Type 211		50	ea	
002	99124	-	O Ring Viton 90 Type 124		50	ea	
003	95212	-	O Ring Viton 75 Type 212		25	ea	
004	01047	-	Circlip, Internal, 5/8, St/Steel		2	ea	
005	93019	-	Pin, Spirol, 1mm x 8mm Lg, SS		2	ea	
006	95112	-	O Ring Viton 75 Type 112		2	ea	
007	93171	-	Screw Grub Skt Hd M6x05mm Lg SS - Refer 01082		3	ea	
008	01029	-	Screw, Csk Hd(Slotted), M3 x 06mm Lg, St/Steel		10	ea	

(AR = As Required)

APPENDIX B DRAWINGS & PARTS LISTS

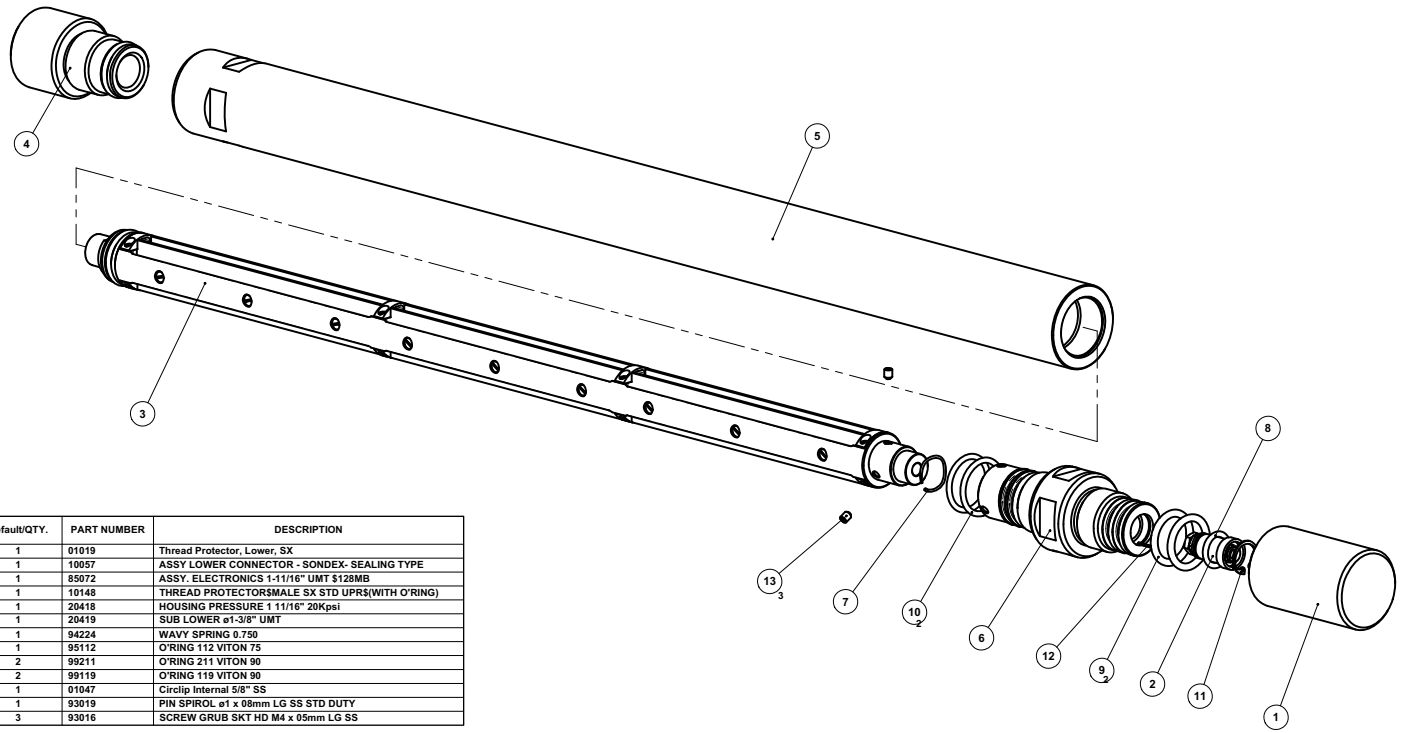
B.1 MECHANICAL DRAWINGS

Description	Drawing	Parts List
General Assembly	*09709-PT1*	See Drawing.
Electronics Assembly	*85072-A*	See Drawing.
Lower Connector Assembly	*10057-D*	*10057-D*

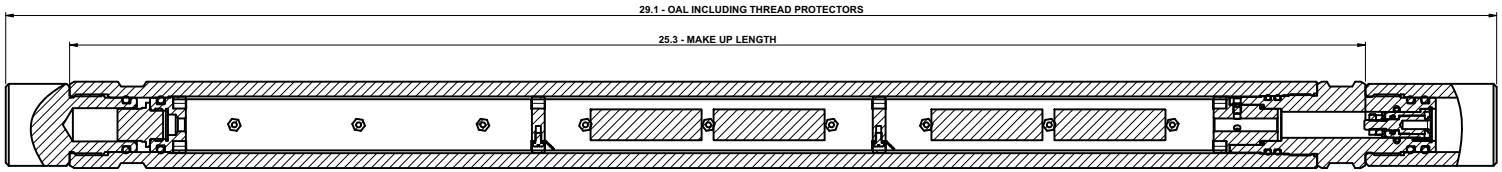
B.2 ELECTRICAL DIAGRAMS

Description	Type	Drawing
UMT General Assembly	Wiring Diagram	*WD-85069-PT3*
Processor Board (PCB85067) - 3 sheets	Circuit Diagram	*CD-85062-E00*
PSU/UW Interface Board (PCB85068) - 3 sheets	Circuit Diagram	*CD-85064-Ax*
64MB Flash memory Board (PCB82172)	Circuit Diagram	*CD-80693-C*

DO NOT SCALE



ITEM NO.	Default/QTY.	PART NUMBER	DESCRIPTION
1	1	01019	Thread Protector, Lower, SX
2	1	10057	ASSY LOWER CONNECTOR - SONDEX- SEALING TYPE
3	1	85072	ASSY. ELECTRONICS 1-11/16" UMT $128MB
4	1	10148	THREAD PROTECTOR$MALE SX STD UPR$(WITH O'RING)
5	1	20418	HOUSING PRESSURE 1 11/16" 20Kpsi
6	1	20419	SUB LOWER ø1-3/8" UMT
7	1	94224	WAVY SPRING 0.750
8	1	95112	O'RING 112 VITON 75
9	2	99211	O'RING 211 VITON 90
10	2	99119	O'RING 119 VITON 90
11	1	01047	Circlip Internal 5/8" SS
12	1	93019	PIN SPIROL ø1 x 08mm LG SS STD DUTY
13	3	93016	SCREW GRUB SKT HD M4 x 05mm LG SS



DRAWN: SGC	CHECKED: GC	APP'D: NGH	ISS	DESCRIPTION	APPD	DATE
DATE: 24/08/05	DATE: 01/09/05	DATE12/09/05	PT1	INITIAL RELEASE	NGH	09/09/05
DIM IN INCHES	MATL: SEE PARTS LIST					
SCALE 1:1	A 1	HEAT TREATMENT/CONDITION: N/A				

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THIRD ANGLE PROJECTION

USED ON: UMT005

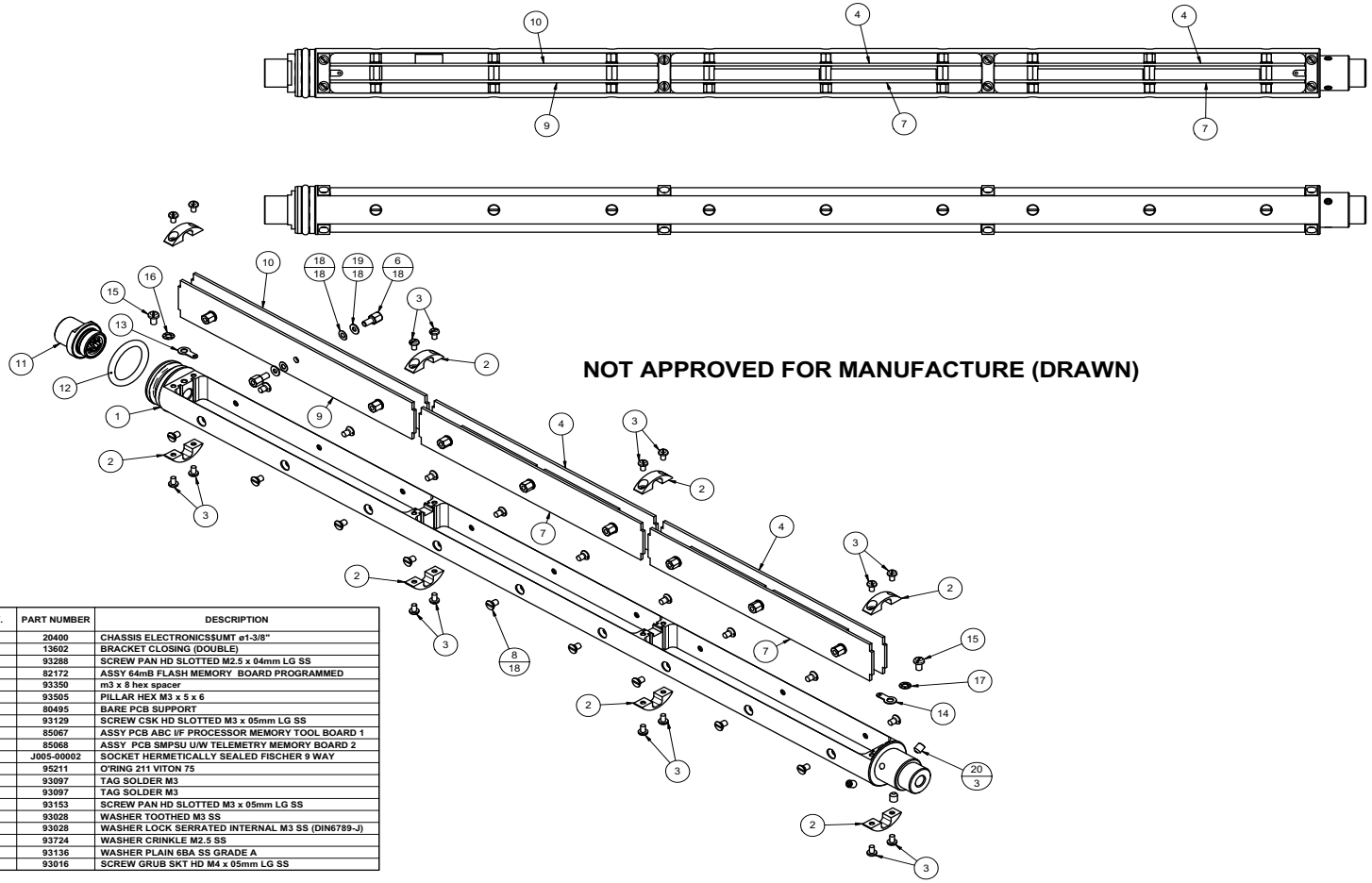
MACHINE FINISH: 63

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

TITLE: ULTRAWIRE MEMORY TOOL 128MB DIA 1-11/16 20KPSI

SHEET 1/1 | DRAWING No. AD 09709 | ISSUE PT1 S/W

DO NOT SCALE



NOT APPROVED FOR MANUFACTURE (DRAWN)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	20400	CHASSIS ELECTRONICS$UMT ø1-3/8"
2	8	13602	BRACKET CLOSING (DOUBLE)
3	16	93288	SCREW PAN HD SLOTTED M2.5 x 04mm LG SS
4	2	82172	ASSY 64mB FLASH MEMORY BOARD PROGRAMMED
5	9	93350	m3 x 8 hex spacer
6	18	93505	PILLAR HEX M3 x 5 x 6
7	2	80495	BARE PCB SUPPORT
8	18	93129	SCREW CSK HD SLOTTED M3 x 05mm LG SS
9	1	85067	ASSY PCB ABC I/F PROCESSOR MEMORY TOOL BOARD 1
10	1	85068	ASSY PCB SMPSU U/W TELEMETRY MEMORY BOARD 2
11	1	J005-00002	SOCKET HERMETICALLY SEALED FISCHER 9 WAY
12	1	95211	O'RING 211 VITON 75
13	1	93097	TAG SOLDER M3
14	1	93097	TAG SOLDER M3
15	2	93153	SCREW PAN HD SLOTTED M3 x 05mm LG SS
16	1	93028	WASHER TOOTHED M3 SS
17	1	93028	WASHER LOCK SERRATED INTERNAL M3 SS (DIN6789-J)
18	18	93724	WASHER CRINKLE M2.5 SS
19	18	93136	WASHER PLAIN 6BA SS GRADE A
20	3	93016	SCREW GRUB SKT HD M4 x 05mm LG SS

DRAWN: GC	CHECKED: GC	APP'D: NGH	
DATE: 29/06/06	DATE: 01/09/05	DATE: 12/09/05	
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS		
SCALE 1:1	A1	HEAT TREATMENT/CONDITION: NOT APPLICABLE	

ISS	DESCRIPTION	APPD	DATE
A	ECRS 3510, 4436 & 4556 APPLIED		
	ECR 3233 REFERS	PEJR	
PT1	INITIAL RELEASE	NGH	09/09/05
PT			01/09/05

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THIRD ANGLE PROJECTION

USED ON: UMT005

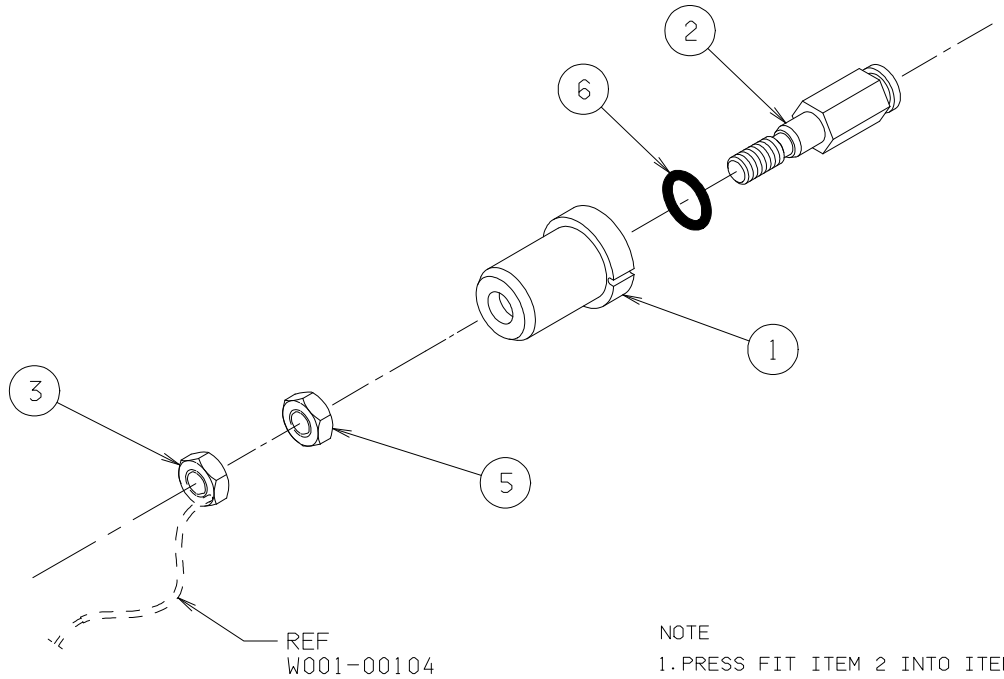
MACHINE FINISH: 63

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

TITLE: ASSY. ELECTRONICS Ø1-11/16" UMT 128MB

SHEET 1/1 | DRAWING No. AD 85072 | ISSUE A | S/W

DO NOT SCALE



NOTE

1. PRESS FIT ITEM 2 INTO ITEM 1.
2. HAND TIGHTEN ONLY NUT ITEM 5, LOCK SECOND NUT ITEM 3 TO ITEM 5 USING TWO SPANNERS BEING CAREFUL NOT TO OVERTIGHTEN AND DEFORM ITEM 1.

DRAWN	CHECKED	APPROVED
JDR	AJG	DJF
DATE 07-10-98	DATE 04-01-99	DATE 21-01-99

DIM IN INCHES | MATL: SEE DETAIL DRAWINGS | SCALE 1:1 | A4

ISS	DESCRIPTION	APPD	DATE
D	REF ECR 2653	GC	22/06/05
C	REF ECR 2382 ITEM 4 REMOVED	NPB	14/01/05
B	REFER TO ECR 1524	DJF	06/06/03
A	INITIAL RELEASE		

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THIRD ANGLE PROJECTION

MACHINE FINISH 63 | USED ON COM

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

TITLE: ASSY CONNECTOR LOWER SONDEX SEALING TYPE

SHEET 1/1 | DRAWING No. 10057 | ISSUE D

SONDEX FM No: F0024

PARTS LISTING

Part:	Issue:		Drawn:	Checked:	Approved:
10057	D		JDR	AJG	DJF
			Date: 07/10/1998	Date: 04/01/1999	Date: 21/01/1999

Description:

Assy Connector Lower SX Sealing Type

CHANGE HISTORY

Iss	*Date*	*Remarks*	*Chkd*	*Appr*
A	21/01/1999	Initial Release	AJG	DJF
B	--/--/--	DESIGN MOD TO PREVENT STRAY BURR SHORTING TOOL, ECR 1046		
C	11/05/2003	Re: ECR 1527	DJF	DJF
D	06/01/2005	Re: ECR 2382	NPB	NPB

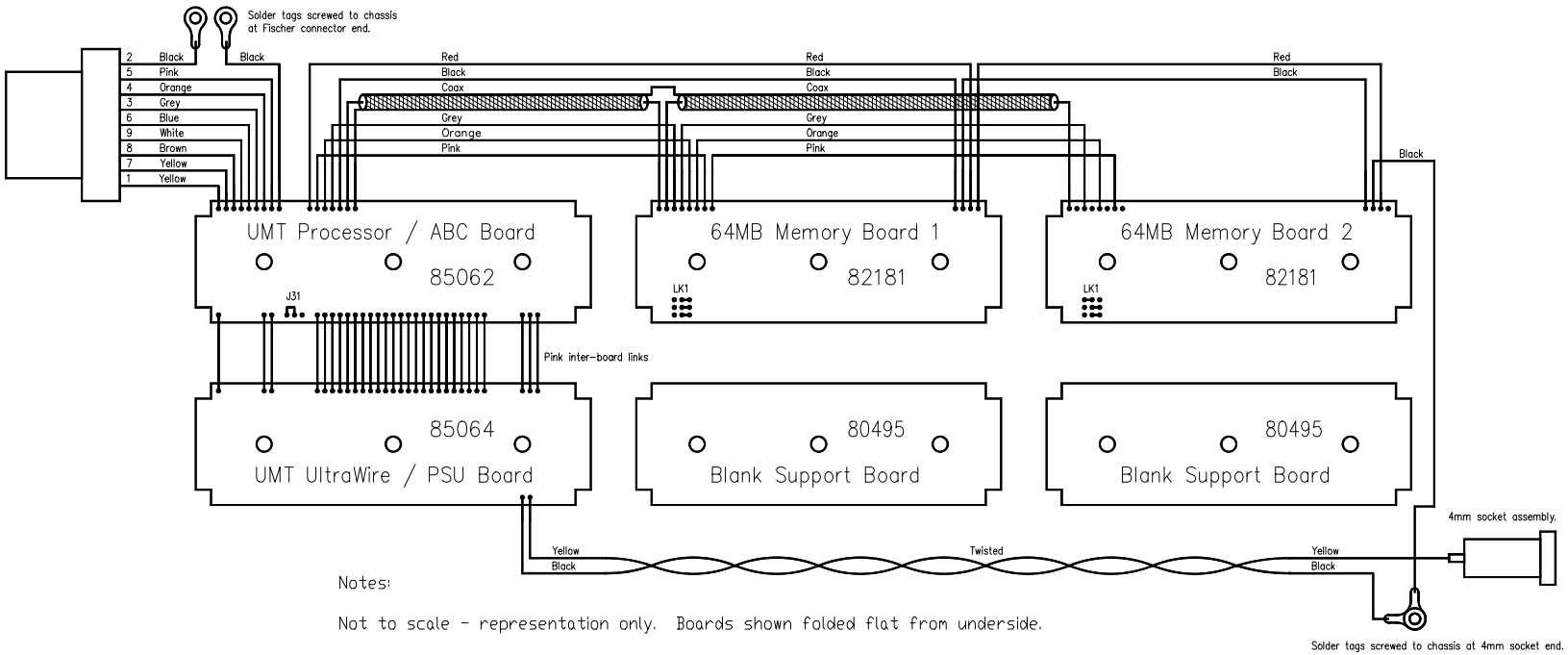
RELATED DOCUMENTS

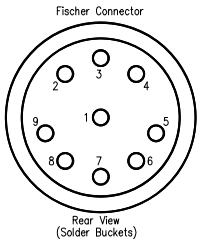
#	*Documents*	*Issue*	*Notes*
01	AD10057	D	ASSEMBLY DRG

PARTS LIST

Item	*Part No.*	*Issue*	*Description*	*Component Value*	*Qty*	*Units*	*Remarks*
001	00690	E	Insulator Lower Sub		1	ea	
002	00695	C	Pin Hex Female Lower		1	ea	
003	10016	B	Nut, Hex, 10-32UNF, Brass/Nickel Plate, (with wire hole)		1	ea	
005	93133	-	Nut Hex 10-32 BNP		1	ea	
006	95009	-	O Ring Viton 75 Type 009		1	ea	

(AR = As Required)





Notes:

Not to scale - representation only. Boards shown folded flat from underside.

Coax is RG178B/U 50R Brown PTFE insulated 7/0.12
Inter-board links are Pink 7/0.12 PTFE type A
All other wires are 7/0.2 PTFE typeA
Protect wires at vulnerable positions.

Coax screen connected at one end to 85062.
Screens connected between both coax lengths at first 80693 board as shown.

Fischer connections, solder tag connections, the 4mm socket connection and coax screen connections must be sleeved.

J31 on 85062 linked centre to 3V3 on PCB top.

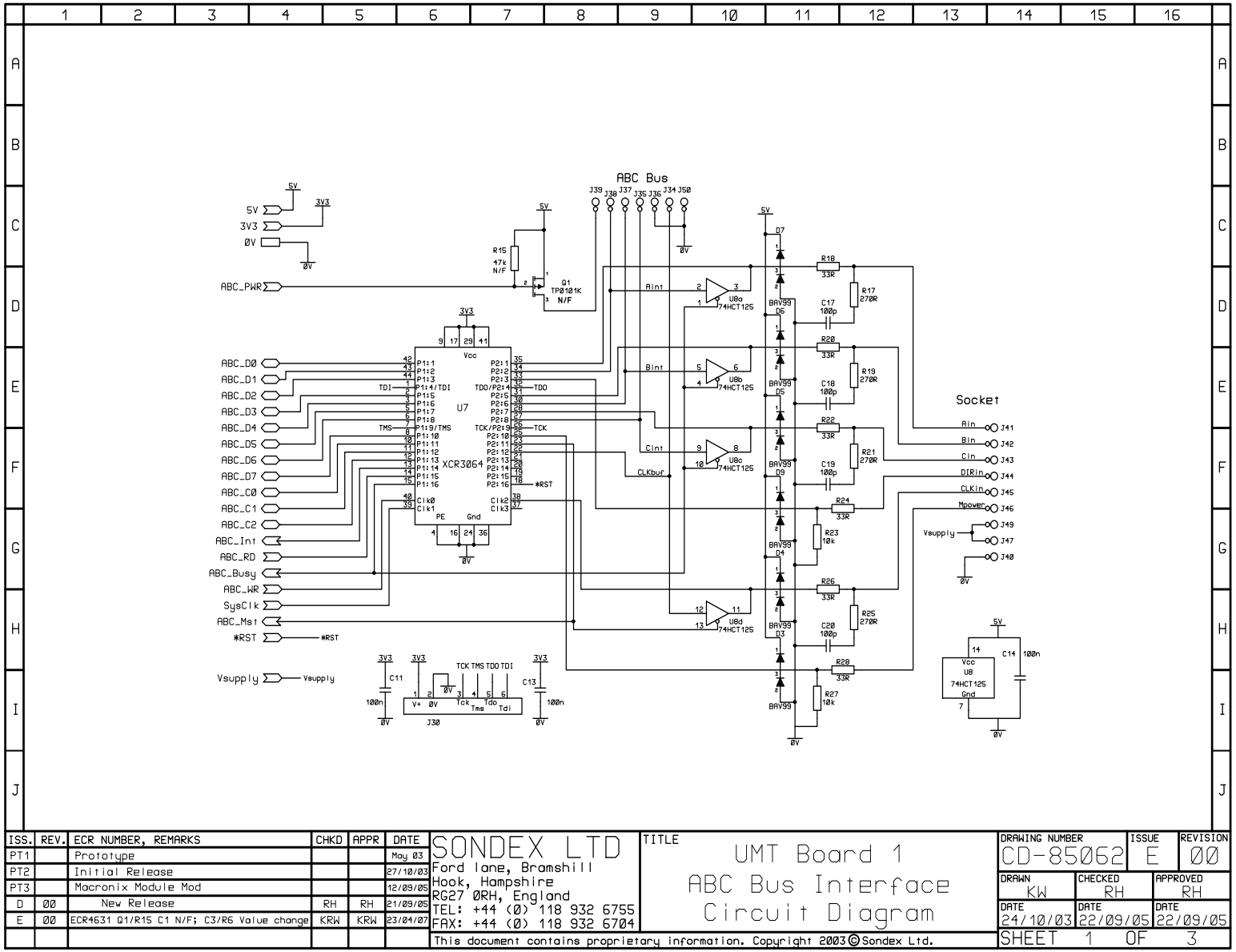
LK1 on 80693 board 1 top side set 0V to centre on positions 0, 1 & 2.

LK1 on 80693 board 2 top side set 5V to centre on position 0, and 0V to centre on positions 1&2.

PT2		29/06/06	ECR3873 Add ground wire	KW	KW
PT3		10/04/07	ECR4556 82181 was 80693	KRW	KRW

UMT Wiring Diagram
128MB Versions

KRW	BT	KRW
06/07/05	13/07/05	13/07/05
WD-85069	PT3	



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE
PT1		Prototype			May 03
PT2		Initial Release			27/10/03
PT3		Macronix Module Mod			12/09/05
D	00	New Release	RH	RH	21/09/05
E	00	ECR4631 Q1/R15 C1 N/F; C3/R6 Value change	KRW	KRW	23/04/07

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Hook, Hampshire
RG27 0RH, England
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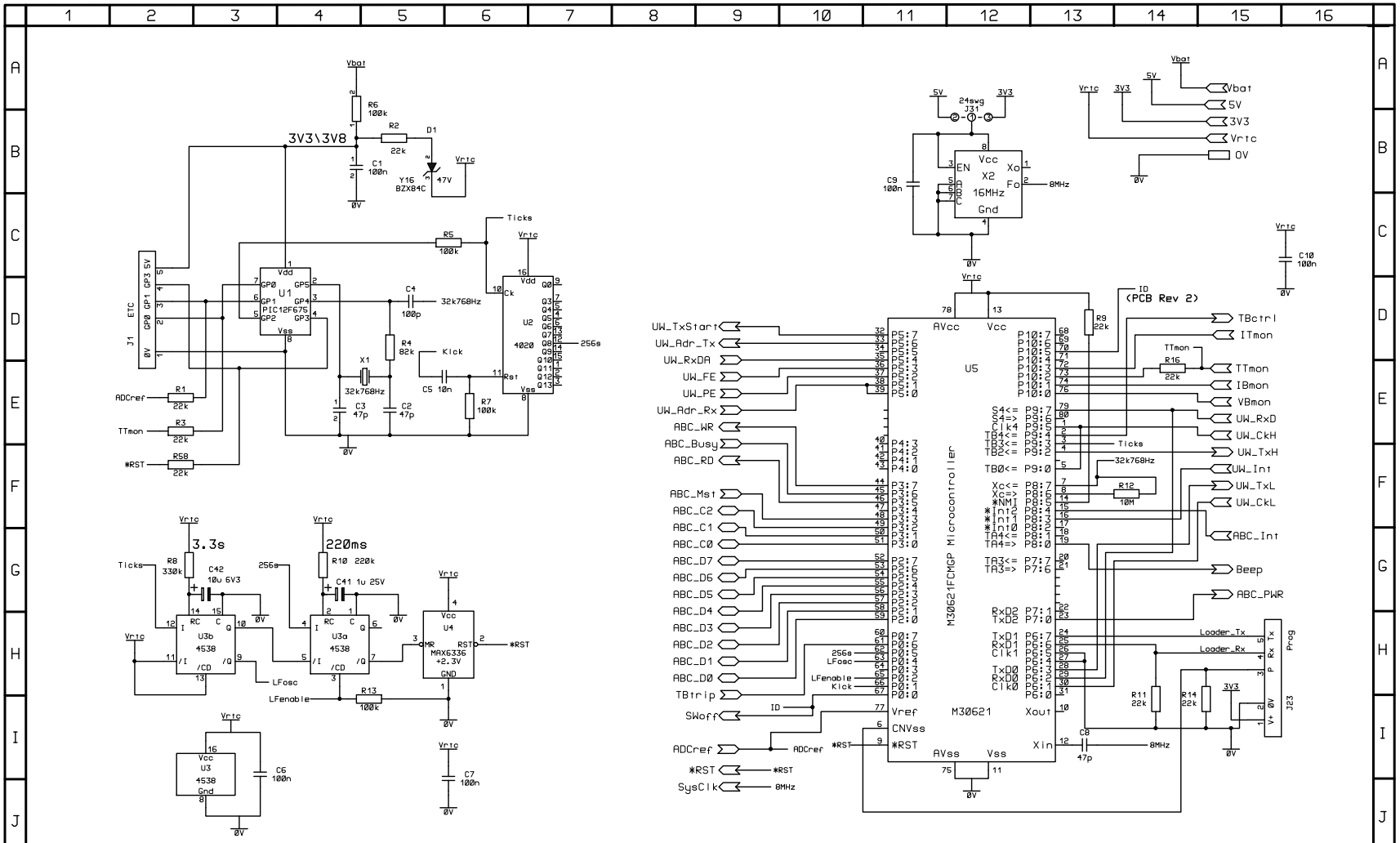
FAX: +44 (0) 118 932 6704

TITLE
UMT Board 1
ABC Bus Interface
Circuit Diagram

DRAWING NUMBER	ISSUE	REVISION
CD-85062	E	00

DRAWN	CHECKED	APPROVED
KW	RH	RH
DATE 24/10/03	DATE 22/09/05	DATE 22/09/05

SHEET 1 OF 3



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE
PT1		Prototype			May 03
PT2		Initial Release			27/10/03
PT3		Macronix Module Mod			
D	00	New Release	RH	RH	21/09/05
E	00	ECR4631 Q1/R15 C1 N/F; C3/R6 Value change	KRW	KRW	23/04/07

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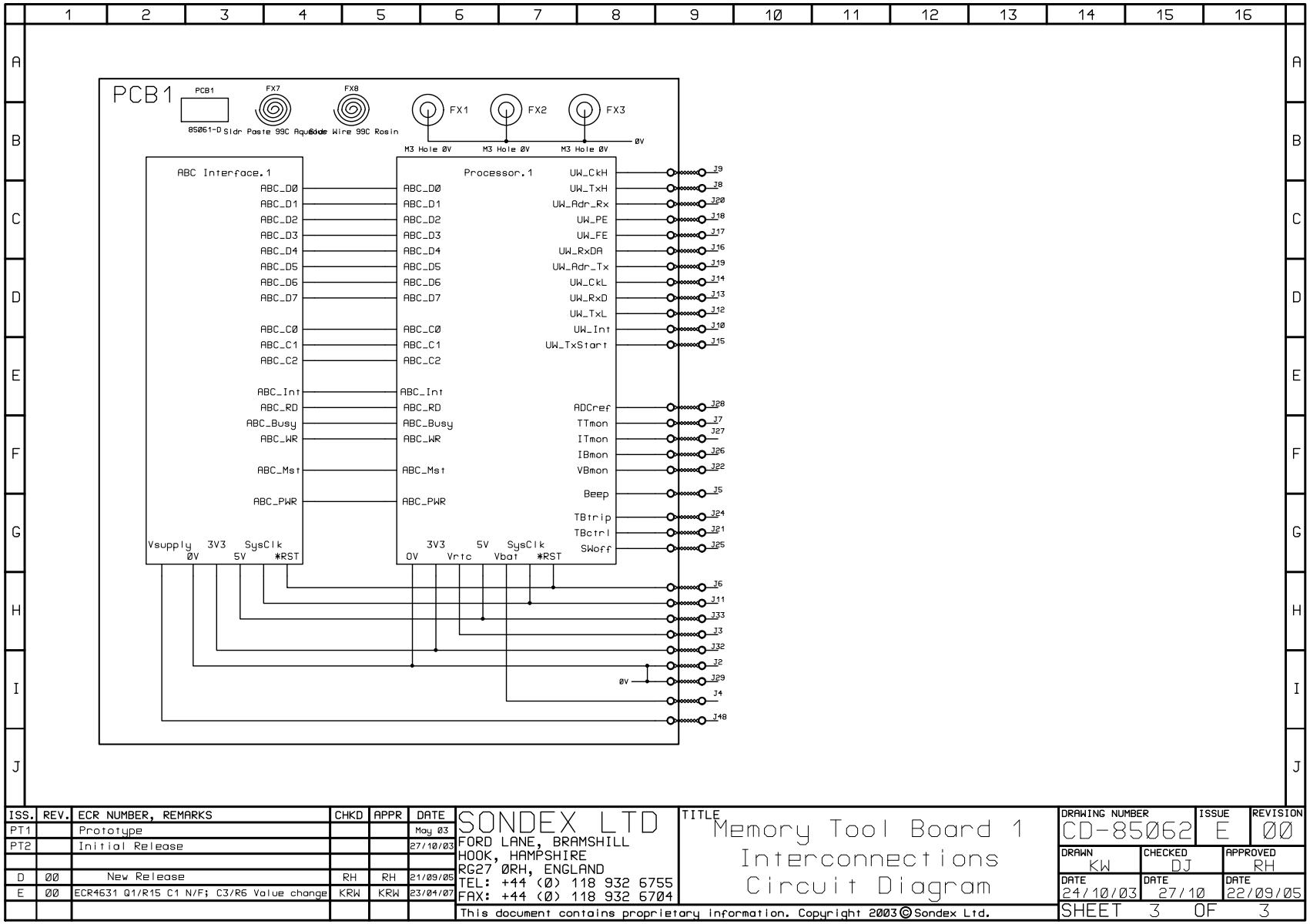
UMT Board 1
Processor
Circuit Diagram

DRAWING NUMBER	ISSUE	REVISION
CD-85062	E	00

DRAWN	CHECKED	APPROVED
KW		RH
DATE 12/09/05	DATE 00/00/00	DATE 22/09/05

SHEET 2 OF 3



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE
PT1		Prototype			May 03
PT2		Initial Release			27/10/03
D	00	New Release	RH	RH	21/09/05
E	00	ECR4631 Q1/R15 C1 N/F; C3/R6 Value change	KRW	KRW	23/04/07

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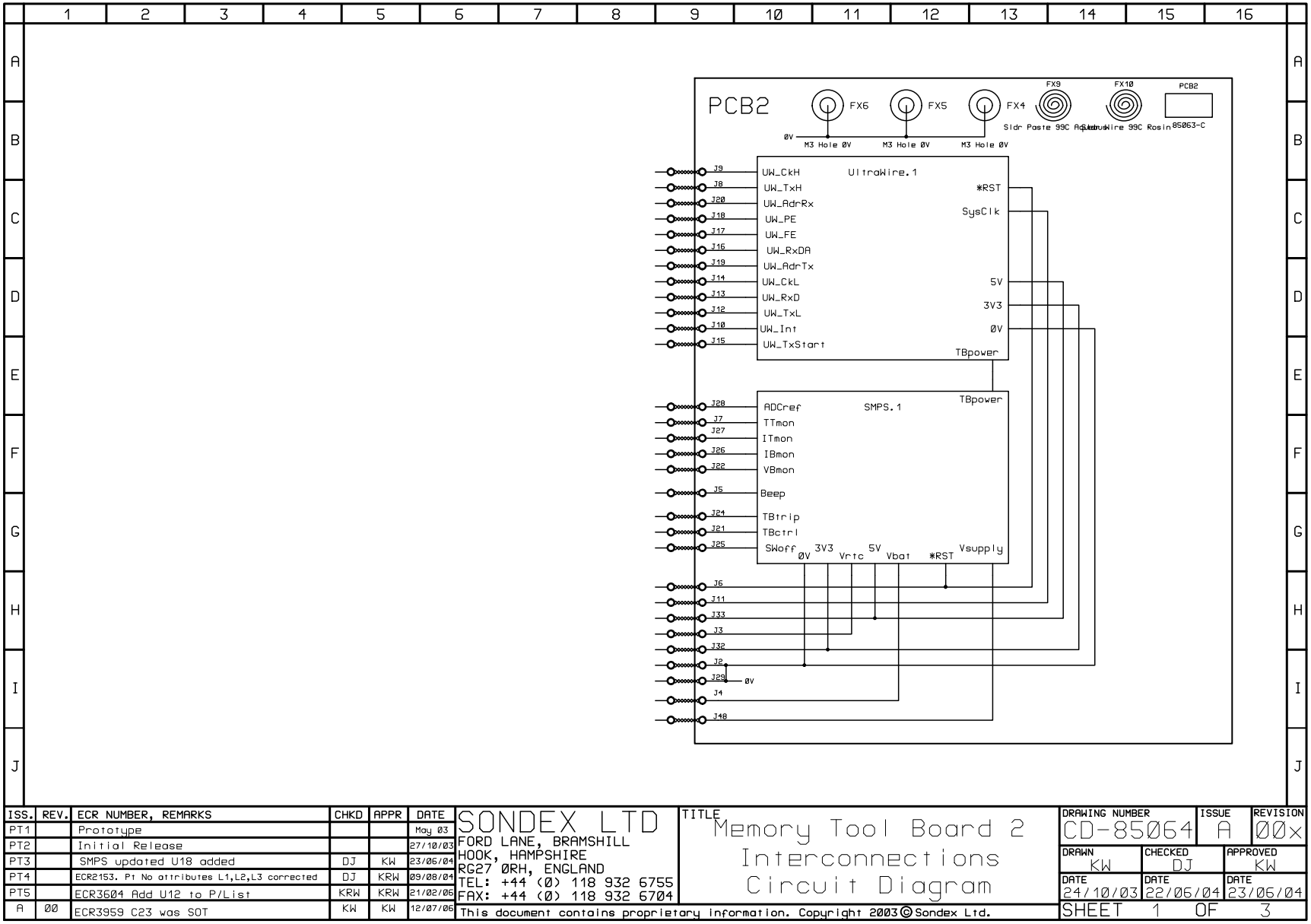
TITLE
Memory Tool Board 1
Interconnections
Circuit Diagram

DRAWING NUMBER	ISSUE	REVISION
CD-85062	E	00

DRAWN	CHECKED	APPROVED
KW	DJ	RH
DATE 24/10/03	DATE 27/10	DATE 22/09/05

SHEET 3 OF 3



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE
PT1		Prototype			May 03
PT2		Initial Release			27/10/03
PT3		SMPS updated U18 added	DJ	KW	23/06/04
PT4		ECR2153. Pt No attributes L1,L2,L3 corrected	DJ	KRW	09/08/04
PT5		ECR3604 Add U12 to P/List	KRW	KRW	21/02/05
A	00	ECR3959 C23 was SOT	KW	KW	12/07/06

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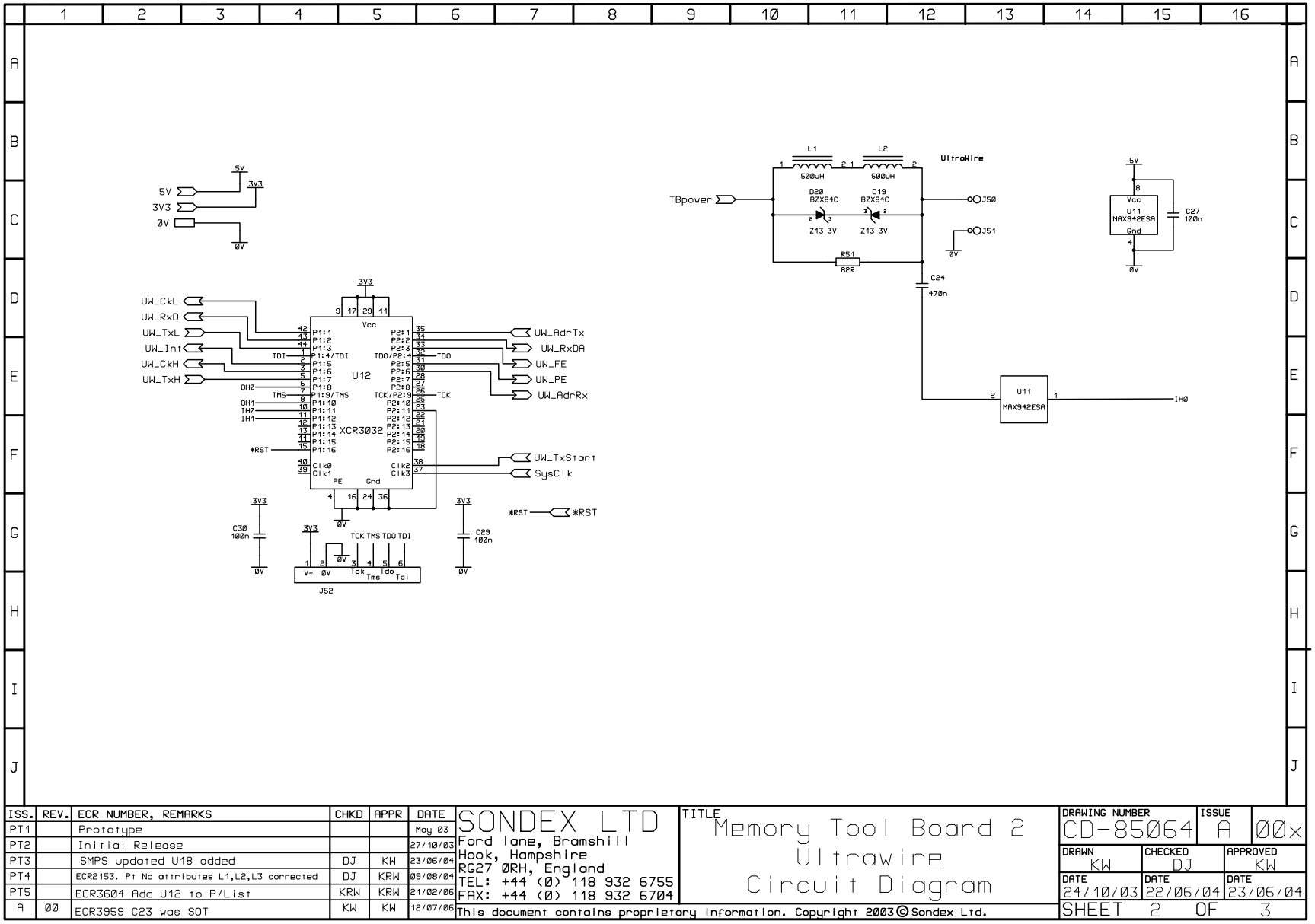
TITLE
Memory Tool Board 2
Interconnections
Circuit Diagram

DRAWING NUMBER	ISSUE	REVISION
CD-85064	A	00x

DRAWN	CHECKED	APPROVED
KW	DJ	KW
DATE 24/10/03	DATE 22/06/04	DATE 23/06/04

SHEET 1 OF 3



ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE
PT1		Prototype			May 03
PT2		Initial Release			27/10/03
PT3		SMPS updated U18 added	DJ	KW	23/06/04
PT4		ECR2153. Pt No attributes L1,L2,L3 corrected	DJ	KRW	09/08/04
PT5		ECR3604 Add U12 to P/List	KRW	KRW	21/02/06
A	00	ECR3959 C23 was SOT	KW	KW	12/07/06

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FAX: +44 (0) 118 932 6704

TITLE
Memory Tool Board 2
Ultrawire
Circuit Diagram

DRAWING NUMBER	ISSUE	
CD-85064	A	00x

DRAWN	CHECKED	APPROVED
KW	DJ	KW
DATE 24/10/03	DATE 22/06/04	DATE 23/06/04

SHEET 2 OF 3

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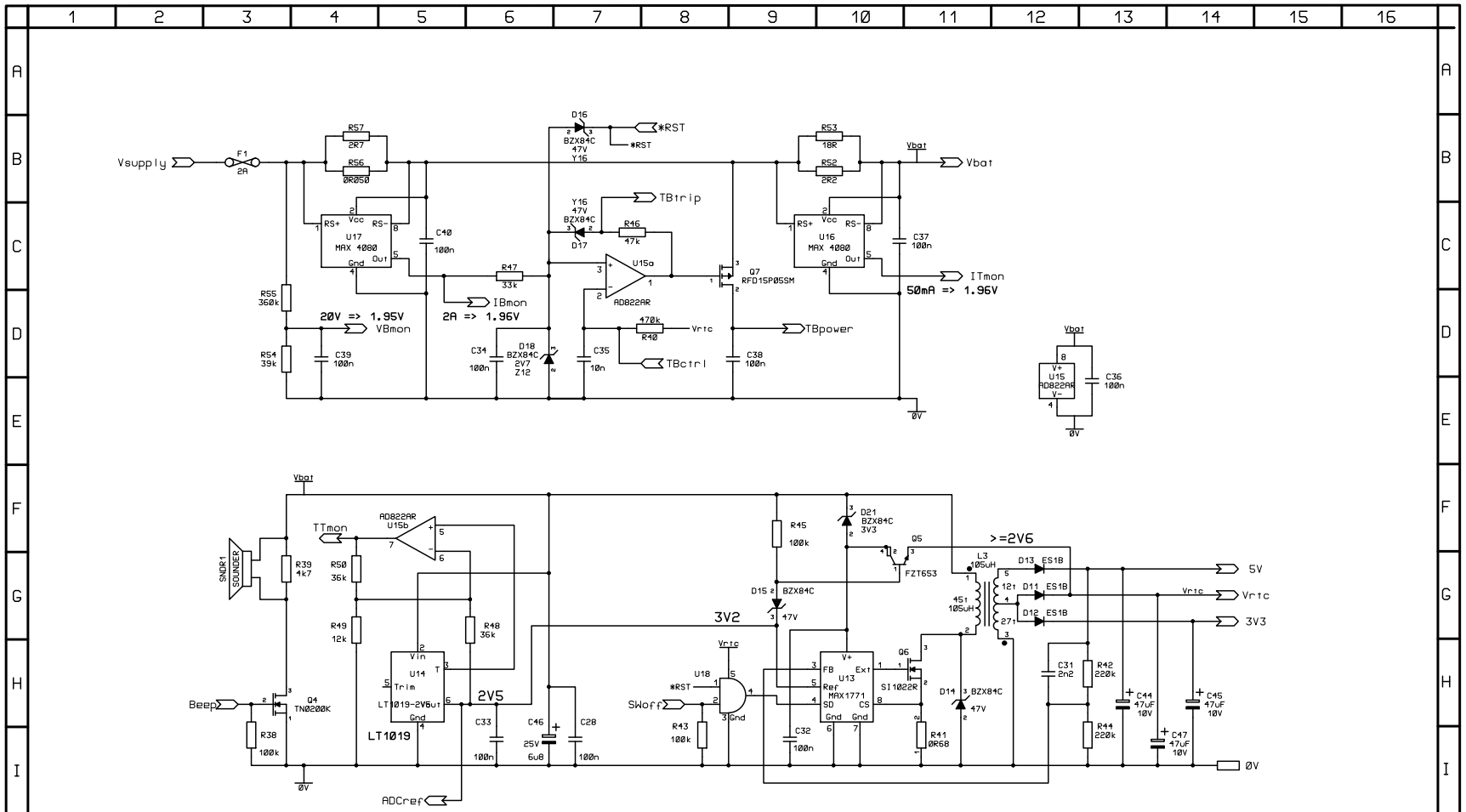

ISS.	REV.	ECR NUMBER, REMARKS	CHKD	APPR	DATE
PT1		Prototype			May 03
PT2		Initial Release			27/10/03
PT3		SMPS updated U18 added	DJ	KW	23/06/04
PT4		ECR2153. Pt No attributes L1,L2,L3 corrected	DJ	KRW	09/08/04
PT5		ECR3604 Add U12 to P/List	KRW	KRW	21/02/06
A	00	ECR3959 C23 was SOT	KW	KW	12/07/06

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RG27 0RH, England
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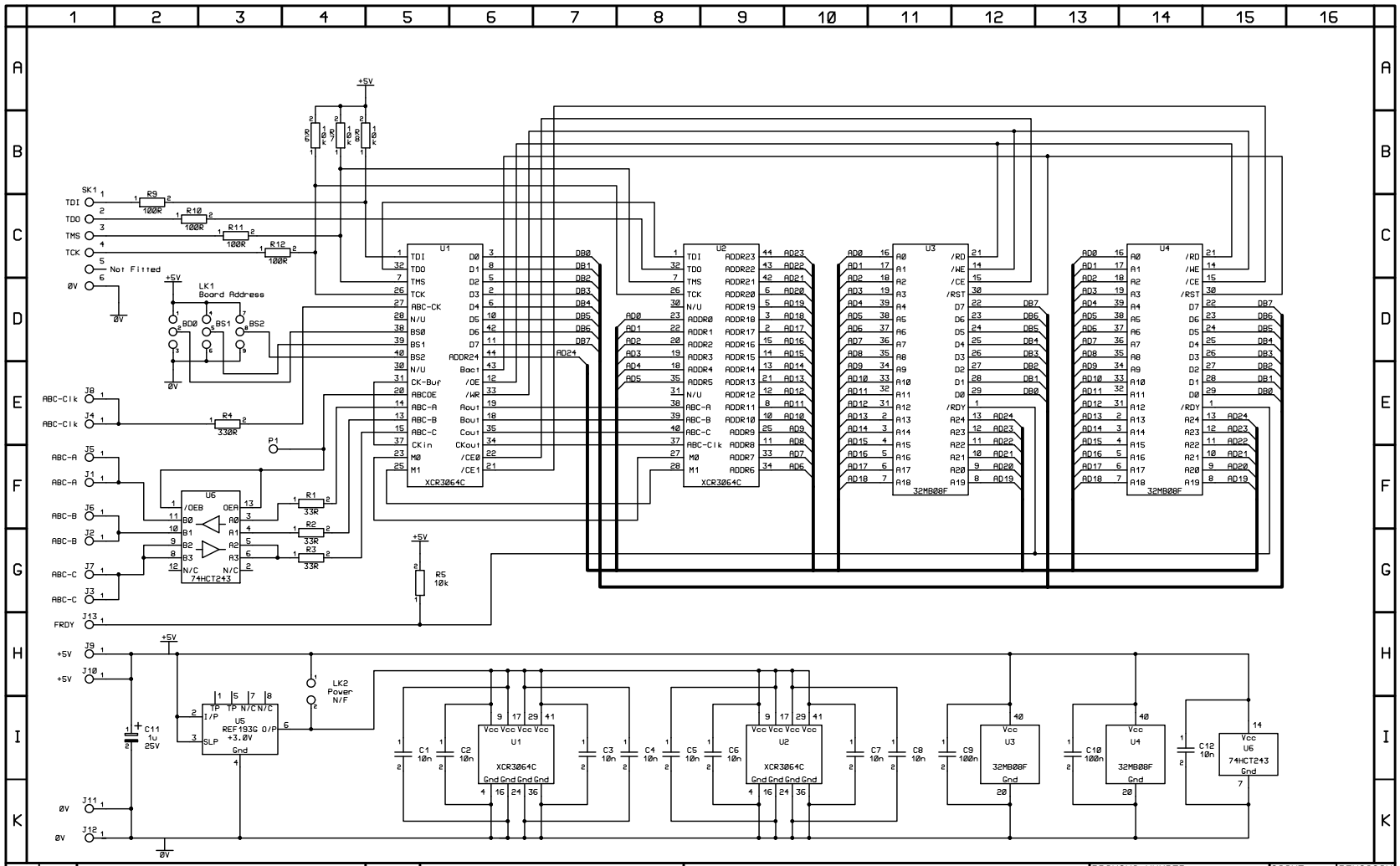
FAX: +44 (0) 118 932 6704

TITLE
Memory Tool Board 2
SMPS
Circuit Diagram

DRAWING NUMBER	ISSUE	REVISION
CD-85064	A	00x

DRAWN	CHECKED	APPROVED
KW	DJ	KW
DATE 24/10/03	DATE 22/06/04	DATE 23/06/04

SHEET 3 OF 3



ISS.	REV.	CHANGE DETAILS	DATE
A	02	C11 value changed from 10uF to 1uF	07/02/01
A	03	ECR769. C12, 13, 14, D1, 2, 3, 4 Removed	28/02/01
		ABC Clk buffer Added. (pins 27, 31)	
B	--	ECR771. Diagram Issue raised to match New PCB issue	14/3/01
B	01	C11 assy note added. SK1 Pt No changed	30/11/01
C		ECR4156 U1 & U2 were 5V, U5 & U6 added	03/11/06

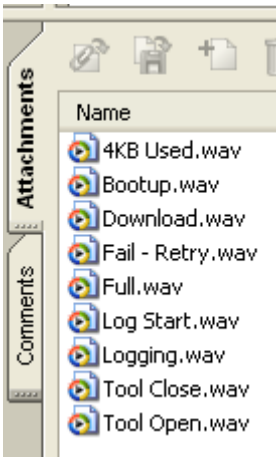
APPENDIX C UMT SOUND LIBRARY

This manual contains a range of sounds that can be expected during operation of the UMT.

To listen to a sound, click to the Attachment tab on the far lefthand side of the screen. The attachment tab looks like the picture shown on the left.

If it is not shown, go to View - Navigation Tabs on the menubar.

Once the Attachment Tab is selected, the following navigation pane is shown (see picture on the right).



The files are in WAV format, which can be played in most Media Players, like Windows Media Player.

Windows Media Player opens automatically when the file is opened, of the program can be opened via:

Start Menu - Programs - Accessories - Entertainment
(depending on operating system).

The following sounds are available:

Sound Name	Occurs
Bootup	During boot up.
Log Start	When logging commences.
Logging	During logging (general sound).
4KB Used	This is heard every time 4kB of memory is used.
Tool Open	When Tool Open command is sent.
Tool Close	WhenTool Close command is sent.
Fail - Retry	When an Open or Close fails and is retried.
Full	When tool memory is full.
Download	When memory downloading commences.