Ultrasound Technologies Ltd

fetatrack® DD250

desk doppler

Service Manual
Issue 1

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Contents

About This Manual

This booklet explains the operation and service of the *FETATRACK DD250 Desk doppler*. Care has been taken during the design and manufacture of this product so that it satisfies all of the current safety standards set down by BS EN60601-1-2006.

To achieve the best from this product read the following sections several times and if you have any problems in the operation of a particular part of the product then contact your dealer immediately or contact :

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This service manual contains circuit descriptions, diagrams, parts and spares lists for the *FETATRACK DD250*

To maintain the *FETATRACK DD250*'s performance it is recommended that it be included in a periodic maintenance program. The user preventative maintenance program is covered in this manual. Maintenance outside the scope of the user should be undertaken on an annual basis by trained service personnel; full details are available from your supplier, service centre or from Ultrasound Technologies Ltd.

The FETATRACK DD250 is supplied complete with the following: -

Choice of 2, 3, 5, 8MHz doppler probes	
Ultrasound Coupling Gel 0.25ltr	1
AC line cord	1
User Instructions	1

Special Precautions

Your *FETATRACK DD250* has been designed for electrical safety. All the safety and operating instructions should be read before operating the *FETATRACK DD250*. Failure to do so could result in injury to the user, patient, or damage to the system and accessories.

Electrical Shock Hazard

Do not defeat the grounding integrity of this system. Protection against electrical shock, in the event of failure of basic insulation, is provided by the connection of the chassis to the safety ground. Safety grounding occurs only when the 3-wire cable and plug provided with the system are connected to a properly grounded receptacle.

Do not remove the system cover. The system should be serviced by trained and qualified personnel only. Contacting the hazardous voltages within the system could cause serious injury.

Do not use the system if the power cord has any cuts or openings.

Do not use the transducer if the cable has any cuts or openings.

Do not use the transducer if the transducer face is cracked or chipped.

Do not immerse the transducer cable connectors in any liquids.

Should the electrical safety fuses have to be replaced, use only fuses of the same type and rating.

Explosion Hazard

Do not operate or use this system in the presence of flammable anesthetics, gases or oxygen rich environments as it could lead to explosion.

Handling the Delicate Transducers

The transducers are delicate parts of the ultrasound system and should be treated with care. The delicate crystals in the transducer may crack and render the transducer unusable if the transducer is subject to shock. Room temperature liquids should be used for cleaning.

NEVER use alcohol or mineral oil as an acoustic coupling agent as transducer face and cable damage will occur.

ONLY use approved ultrasound coupling gels.

Symbols Used

The following symbols are used on the *FETATRACK DD250* and are in accordance with BS EN60601-1-2006.
Where they are associated with the connection of external equipment, that equipment **must meet** the relevant safety standards in all cases.


Type B equipment


Alternating Mains Current


Unit On / Off

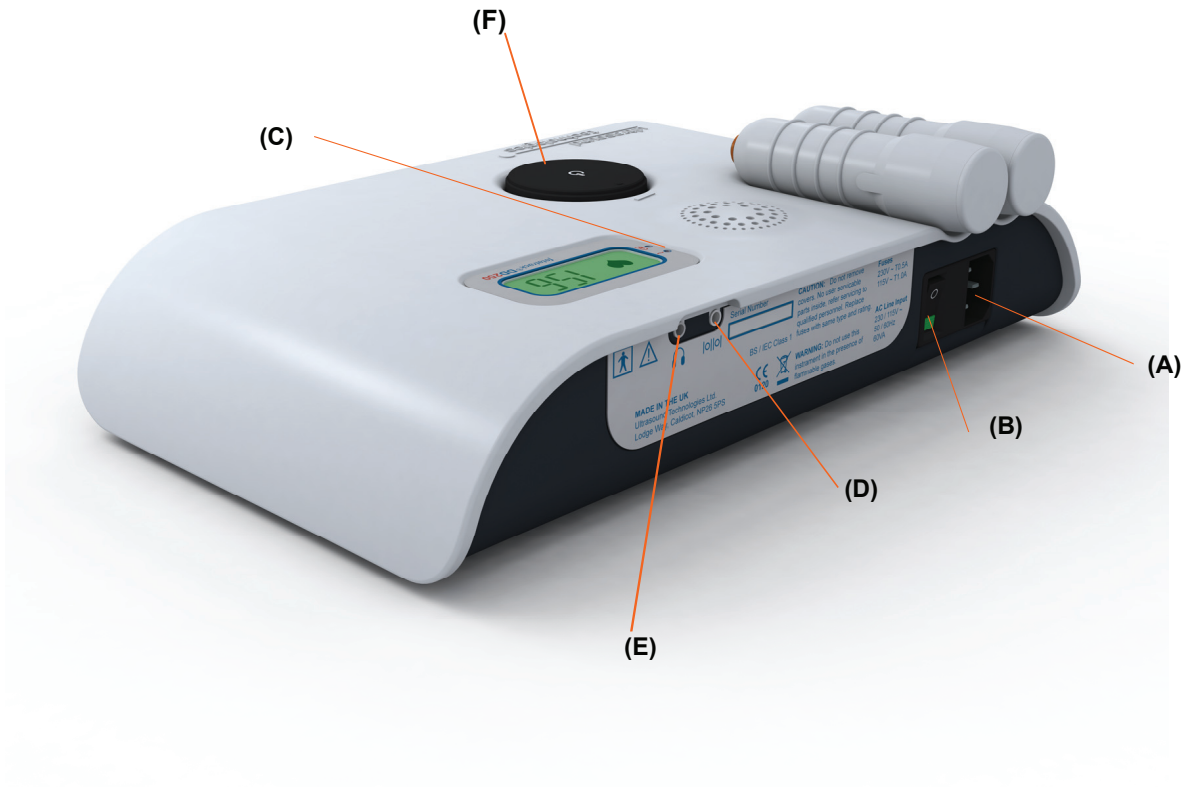

Consult accompanying documents


DO NOT disposed of with your normal waste


Battery Charge / Discharge state

FETATRACK DD250 Front Panel Controls

The front panel control area contains 1 button and one rotary volume contol, these controls are combinded.



(A) IEC 3pin mains cord inlet

(B) Illuminated Mains on/ off switch. The mains switch is illuminated green when AC mains power is connected and the switch is on, a green mains on indicator **(C)** is also situated on the units front panel.

(D) Serial RS232 connection.

(E) Headset connection.

(F) Volume Control / unit on push switch

RS232 Output

This output is for the connection of an external computer for data transfer. The maximum voltage that can be applied to this output is 15VDC.

WARNING: Any external equipment connected to this output must meet the equivalent **MEDICAL** safety standard to this product.
Connection must only be made by a qualified technician.
An isolation connection may be necessary when connection is to be made to a personal computer.

Transducer Input.

Transducers are connected via the pug on the retractile cable.
This is for the connection of Fetatrack DD250 transducers ONLY. The maximum voltage that can be applied to this output is 15VDC.

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Operating the *FETATRACK DD250*

In this section, information is supplied which will help you use the *FETATRACK DD250* for the fist time.

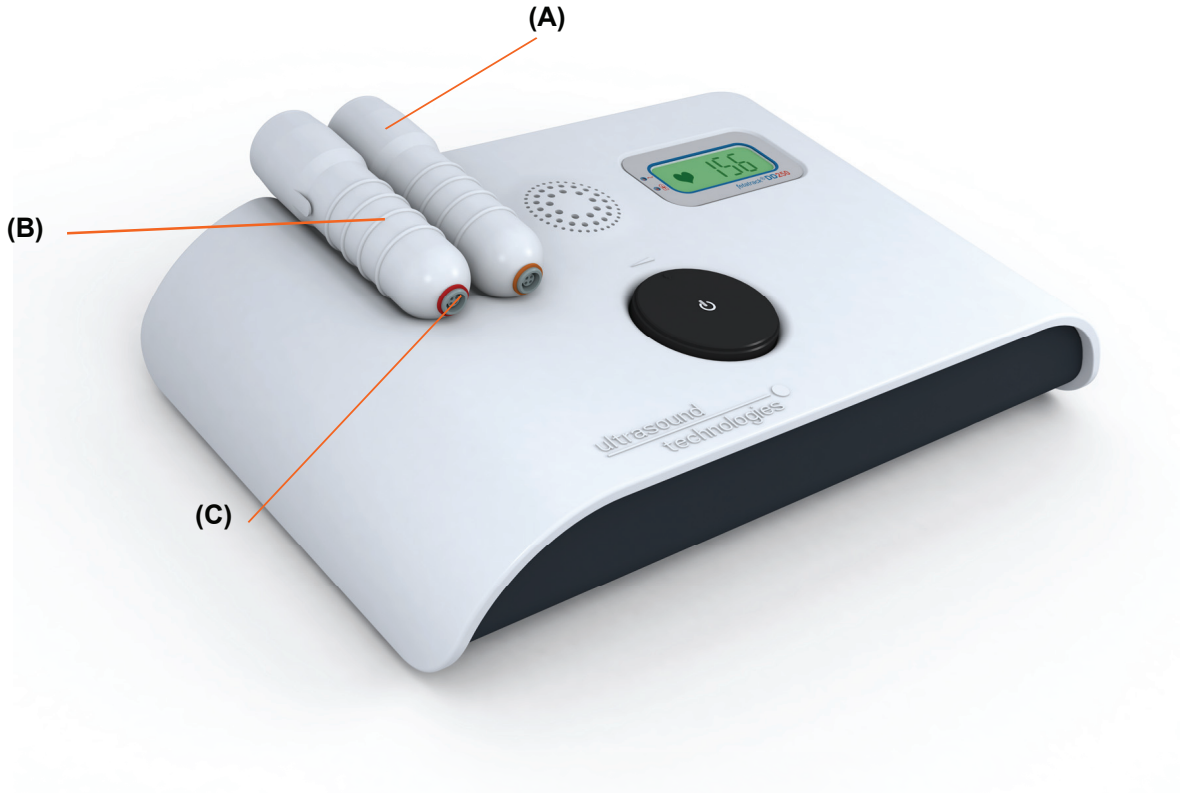
General

The **DD250 is a mains or rechargeable battery operated desk** Doppler designed to suit the needs of the General Practitioner and clinic where multiple disciplines require interchangeable transducers.

The **DD250** can take a choice of 4 transducers, 2 for fetal heart rate detection (2 and 3 MHz) and 2 for vascular flow detection (5 and 8MHz).

The **DD250** provides for the audio presentation of the fetal or vascular signal as well as digital fetal heart rate detection with the fetal heart rate displayed on an LCD display.

RS232 data port is included for the transfer of data to a PC to review the fetal heart rate traces



The DD250 includes a storage area from 2 transducers (**A).** These are held in place using magnetic retention.

There is a choice of up to 4 transducers that can be used with the DD250, 2 for fetal use and 2 for vascular use. These are connected to the DD250 using a retractile cable with a latching connector.

The selected transducer **(B)** is connected to the unit by the connector **(C)** , to disconnect pull back on the outer cover of the connector, **DO NOT TWIST**. To connect a transducer align the red dots and lightly push the connector into the transducer socket.

The transducers are colour coded at the socket to indicate frequency**.**

Transducer colour coding

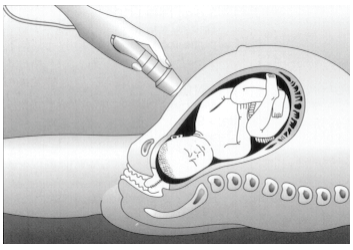
	Connector ring colour
2MHz	**Red**
3MHz	**Orange**
5MHz	**Green**
8MHz	**Grey**

Obstetrics

The **DD250** can be used to detect the beating fetal heart from approximately the 10th week of gestation, though this will vary between patients.

Apply a liberal amount of coupling gel to the area just above the symphysis pubis and position the transducer face flat against the abdomen. Tilt the transducer slowly until the fetal heart is heard in
the loudspeaker or headset (in early pregnancy the headset helps to eliminate ambient noise making it easier to detect the weaker signals).

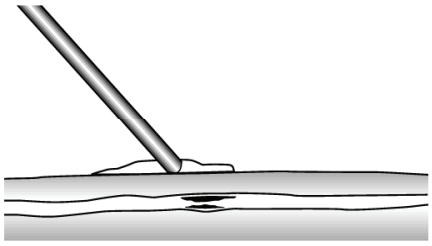
Later on in pregnancy the best signals are generally found higher up the abdomen.
Avoid sliding the transducer over the abdomen as this results in an increase in the background noise and makes it more difficult to detect the fetal heart sounds.



The **DD250** may be used to locate the position of the placenta, thus aiding in the early diagnosis of placenta praevia or eliminating placental site where amniocentesis is to be performed.
The sound from the placenta is an indistinct swishing, caused by bloodflow in many vessels. There is no distinct beat pattern to the sound. The vessels of the umbilical cord give rise to a higher pitched sound than the normal fetal heart, with pulsations at the fetal rate.

Vascular

The **DD250** can be used to detect both surface vessels, deeper arteries and veins using either the 5MHz or 8MHz transducers.
To obtain the best signal, apply a liberal amount of coupling gel to the area of the vein or artery under investigation. Tilt the transducer at approximately 45 degrees to the vessel. Arteries give a high pitched pulsatile sound, with veins giving a sound like a roaring wind. The optional headset helps to eliminate ambient noise, making it easier to detect the weaker signals.



It is also usual for the **DD250** to be used in association with a pressure cuff and sphygmomanometer to indicate the location and extent of arterial occlusion in the form of ankle/brachial pressure index and segmental pressures.
Due to the variation of leg blood pressure over a wide range with the systemic pressure, the actual values are less useful than the pressure index, which relates the ankle pressure to the pressure obtained at the brachial artery. Using the **DD250** to measure both pressures will ensure compatibility. In cases where patients have peripheral arterial disease using the **DD250** , due to its high sensitivity, can be the only technique suitable for the measurement of leg blood pressure.

$$\text{Pressure Index} = \frac{\text{Ankle systolic pressure}}{\text{Brachial systolic pressure}}$$

Normal - ankle systolic pressure > brachial pressure.
Normal pressure index >1
Abnormal pressure index <1

The information in this section will help you to check and correct common operation and system problems. Refer to the troubleshooting hints which deal with your problem. Perform the suggested steps. If the problem is not solved, check once again to make sure that you have used all of the suggested steps to resolve the problem.

Electronic failures and service procedures are not included in this manual, as all servicing of the system must be performed by a qualified service technician. Valuable time however can be saved by documenting the problem .

In general, when you have a problem, check your control settings to be sure that they are in proper operating position. Consult the appropriate section in this manual for specific information on particular controls or operating modes.

WARNING:

Disconnect system from the power source before checking fuses and connections.

Check all connections and fuses. Replace fuses with same type and rating as indicated on the rear panel of the unit.

No display information on LCD

- Verify the system is on and that the fuses are intact.:

Keyboard does not respond

- Reset system by turning off then back on.
- Verify the system is on and that the fuses are intact.

No sound from loudspeaker.

- Verify the system is on and that the fuses are intact.
- Check volume control is set high.
- Check that a transducer has been connected.
- If possible change the transducer.

No FHR information on display or FH trace printed on recorder.

- Check that a transducer has been connected.
- Check connection of the transducer.
- Check for audio FH complex and reposition transducer until clearly heard.

Unit will not operate from batteries.

- Verify the system is on and that the fuses are intact.
- Leave the unit for 5 Hours to charge with mains connected
- Check on off button is pressed

The following are the user preventative maintenance tasks. It is recommended that these be performed on a regular basis at a frequency determined by the usage of the equipment, but not less than once every month.

WARNING:

Before undertaking any of these tasks disconnect the unit from the mains.

General

Check all cables, connectors and transducers for damage and repair or replace where necessary. The repair may involve your local service centre, supplier or Ultrasound Technologies Ltd. For advise on any damaged part contact them immediately.

Cleaning - Enclosure

Clean the exterior of the system with a soft dry cloth. In the event of stubborn spots, disconnect the system from the power source. Use a soft cloth that has been dampened - not soaked - in a mild detergent solution. Be sure to keep excess moisture from entering the cabinet via any openings that may be present.

Cleaning - Transducers

Use a cloth dampened in a mild detergent solution to clean the transducer and cable. Remove all traces of the detergent by wiping with a cloth dampened in clear water. Never soak the transducer cable or connector.

WARNING:

Transducers must never be exposed to gas or heat sterilization or be left immersed in any liquid for more that a few seconds.

Specification

ULTRASOUND

Type:	Continuous Doppler
Transducer:	2 crystal narrow beam
Operating Frequency	option of 2, 3, 5, 8 MHz +/- 10%
Power Output	<5mW/cm² SATA (2, 3 MHz fetal probe)
	<15mW/cm² SATA (5 and 8MHz vascular probe)
Audio:	Response 300Hz—1KHz (2, 3 MHz fetal)
	300Hz—4KHz (5, 8 MHz vascular)
Audio output	500mW
Signal Processing	Software AUTOCORRELATOR
Range:	50 to 210 bpm

CONTROLS

Keys:	1 key for unit on / off (Push Volume control)
Controls:	Rotary Volume
Indicators:	LCD Display with icon for battery low and pulse, battery charge LED, mains on LED.

POWER SUPPLY

Voltage:	100-130 VAC or 200-260 VAC 46/64 Hz
Power:	20VA
Battery Charge Life:	>30 hours of use (battery's will self discharge when not used)
Battery Charge Time:	<5 Hours

ENCLOSURE

Material	Plastic PCABS
Size:	32 x 19 x 6 cm
Weight:	1.9kg

ENVIRONMENTAL

Working temperature	+10°C to +40°C
Relative humidity	30% to 75%
Storage/Transport temperature	-10°C to +70°C

COMPUTER INTERFACE

Transfer	3 wire RS232
Data Rate	9600 baud
Data Standard	8 bits no parity 1 stop bit
Data Format	UltraTec Comms Standard

SAFETY

Classification:	Complies with EN60101-1:2006 Class 1 Type B

The following Consumables are available for use with the FETATRACK DD250

Power Cord
Coupling gel (0.25ltr) (12 per box)

This Equipment complies with the essential requirements of the European Council Directive. 93/42/EEC

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Guidelines for Identifying and resolving adverse EMC conditions

Emissions

Care has been taken through the design and manufacturing processes to minimise the EM emissions that may be produced by this equipment. However, in the unlikely event that the unit causes an EM disturbance to adjacent equipment, we suggest that the procedure is carried out 'out of range' of the affected equipment.

Immunity

If the user has any doubt regarding the unit's EM immunity during routine operation, we suggest that the source of EM disturbance is identified and its emissions reduced.

If the user has any doubt regarding the identification and resolution of adverse EM conditions, they may contact Ultrasound Technologies Ltd to seek advice

EMC Testing

During conformity testing the Fetatrack DD250 was subjected to International Standard EMC tests. During the majority of these tests no non conformances were observed.

During EN60601-1-1:2001 testing the FetaTrack DD250 was shown to be susceptible to the following tests.

Conductive disturbance induced by applied RF field	Test applied a 3Vrms RF magnetic field to transducer cables with a 2Hz modulation.	Effect was a displayed rate of 115 to 125 bpm at each harmonic and sub harmonic of the transducer frequency. No disturbance was detected at other frequencies	Applied test signal is very high for high sensitivity electronics and non applied transducers. With correctly applied transducers interference from in band RF signals is unlikely.
Radiated RF	Test applied: 3V/m 80Mz to 2.5GHz	Effect was a disturbance to the UA transducer causing a static UA reading of up to 9 units	Normal operation is unaffected and the static reading can be cancelled by pressing the toco zero button
Electrical fast transients and bursts	Test applied: +/-2KV AC power, +/-1KV Signal Cables	Effect was a FHR reading of 198 BPM .	Normal mains power is unlikely to cause such a transient / burst. Displayed rate is unlikely to occur when transducers are connected to a patient.
Electro Static Discharge	Test applied: +/-2KV, +/-4Kv, +/-8KV Air Discharge, +/-2KV, +/-4KV, +/-6KV Contact Discharge. Repetition Rate 1second	Effect was a FHR reading of 58 BPM .	Unit should be used in a low static environment. Displayed rate is unlikely to occur when transducers are connected to a patient.
Surge	Test applied: +/-0.5KV, +/-1KV, +/-2KV AC power line to ground, +/-0.5KV, +/-1KV, +/-6KV AC power line to line	Effect was a FHR reading of 58 BPM .	Normal mains power is unlikely to cause such a surge. Displayed rate is unlikely to occur when transducers are connected to a patient.

Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC)

There is an increasing interest in the proper disposal of used electronic equipment. The European Union (EU) has developed the WEEE (Waste Electrical and Electronic Equipment) Directive to ensure that systems for collection, treatment and recycling of electronic waste will be in place throughout the European Union.

Ultrasound Technologies Position with regard to the WEEE Directive

Product recycling is nothing new and Ultrasound Technologies have implemented processes in each member state where the company has a presence. Ultrasound Technologies will comply with the provisions of the WEEE Directive and national implementing legislation.

Instructions for Disposal of Waste Equipment by Users in Private Households

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local waste disposal authority, your household waste disposal service or the supplier where you purchased the product.

As a producer of electronic devices, Ultrasound Technologies will provide for the financing of the treatment and recycling of waste returned through these designated collection points in accordance with local requirements.

Instructions for Disposal of Waste Equipment by Commercial Users

For users of Ultrasound Technologies equipment, other than private households, Ultrasound Technologies will provide free recycling of equivalent medical electronic equipment once a customer has returned the equipment to Ultrasound Technologies, with all transport and importation costs paid, and where a replacement product is being supplied by Ultrasound Technologies. Where a replacement product is not being supplied, recycling services may be provided on request at additional cost.

RoHS

The RoHS (Restriction of Hazardous Substances) directive (2002/95/EC), compliments the WEEE Directive by banning the presence of specific hazardous substances in the products at the point of manufacture.

Ultrasound Technologies is a manufacturer of Medical Devices and is currently exempt from this directive.

However at Ultrasound Technologies we take our responsibilities to the environment very seriously and currently 100% of our entire manufacturing process and parts meet the RoHS directive and we are therefore fully compliant..

Dismantling Procedure

WARNING:- ELECTROCUTION RISK

Mains voltages are present at these points and adjustment **MUST NOT** be untertaken with the mains lead connected.

NO electrical **TEST, SERVICE** or **INSPECTION** of the board should be undertaken without the board being fitted to the base of the DD250.

Note: Before disassembling the unit, unplug the transducers, accessories cable (if present), and the power cord from the instrument.

To remove the Top Cover, remove the four screws around the edge on the bottom of the unit and carefully lift the lid upwards. The Top Cover can now be removed taking care to disconnect the connections between the lid and the base..

Internal Layout

The mains and charge board are connected to the base and the audio and compute board to the lid.

Technical Descriptions

The following sections provides a technical explanation of each of the sections within the Fetatrack DD250 and its accompanying transducers.: -

Unit Power Supply

The unit operates from either a mains connection or the internal rechargeable battery packs B1 and B2.

Mains voltage is supplied to the unit via an IEC 3pin mains inlet (J5) where it is routed to spade jumpers J14, J15, J16, J17, J18 this allows the unit to be set to 110V or 220V input voltages.

WARNING:- ELECTROCUTION RISK

Mains voltages are present at these points and adjustment **MUST NOT** be untertaken with the mains lead connected.

NO electrical **TEST, SERVICE** or **INSPECTION** of the board should be undertaken without the board being fitted to the base of the DD250.

The selected mains voltage is converted into the unit's operating voltage of 14 – 16VDC by passing via an encapsulated toroidal transformer T1, L1 to remove any common mode signals and D3 a diode bridge rectifier. The resultant DC voltage is smoothed by C5 and C6.

When mains is connected and turned on the mains inlet on/off switch is illuminated green, this is also mirrored by the DC supply illuminating D7 via R2. The Doppler circuits are powered from the mains derived DC after it has been regulated to 10V by U3 and passes through D5 where D6 blocks current being drawn from the batteries.

With the mains connected and switched on, the batteries will be placed into a charge mode. The state of this mode is indicated by the rate of flashing of D8. The charge controller U2 varies the rate of charge dependent on the state of battery packs B1 and B2 and allows a current source of 500mA (U1) to be connected or disconnected from the batteries until a set charge state is reached. R9 and D4 allow a trickle charge to be present at all charge states. Temperature state of the batteries is monitored by R14 and U2.

When there is no mains connected current is supplied to the Doppler system from the battery packs B1 and B2 via diode D6. Fuse F1 protects the batteries and circuits from any short circuits.

The Doppler circuits are connected to the power supply at J2.

(the following descriptions and circuit references refer to the PD1 plus s3 circuits)

The Doppler detection circuits are turned on by the pressing the volume control which activates an integral push – push switch, which is mounted on the front of the unit. Closing the switch, grounds the CLK input of U2 pin 11, the output on pin 12 switches on Q2 allowing current to flow into the various circuits.

The unit will remain switched on for approximately 3 minutes from the last detected signal (monitored by U6) after which it turns off automatically, U6 activates Q1 which pulls the clock signal at U2 pin 11 low, unless the user forces the unit off by pressing the ON/OFF switch again.

Battery Low Indicator

U6 also monitors the input voltage via R9 and R10. When the voltage on pin 26 drops below the threshold set by R9 and R10 (7.3V), U6 enables the battery ICON on the LCD display.

(the following descriptions and circuit references refer to the PD1 doppler transducer circuits)

Ultrasound Transducer

The ultrasound transducer operates on the continuous wave Doppler principle. There are a number of transducer frequencies suitable for different applications, however the basic operating principles are identical.

Each transducer consists of a pair of piezo ceramic crystals, each crystal pair is arranged as a transmitter and receiver, the ultrasonic output beam is focused through a lens or faceplate. With all the transducers, the electronics are housed in the probe.

The oscillator and detector are built up of four discrete sections. These are the master oscillator, transmitter amplifier, receiver amplifier and detector.

These operate to produce a continuous wave ultrasound signal that is passed to the transmitting crystal in the transducer.

The signal is then reflected from moving interfaces within the body to the receiver crystal in the transducer, amplified and then detected so the audio Doppler shift of that moving interface can be heard audibly and / or converted into a velocity signal.

Oscillator and Transmitter Amplifier

Field effect transistor Q2, with L1, C16, C17 and associated components form a Colpitts oscillator. This oscillator runs at a nominal frequency of 2, 3, 5 or 8MHz producing a sinewave of amplitude of approximately 5V Pk.

The signal is then fed to output transistor Q3 that drives the transmitter crystal in the transducer. The signal is fed to the transducer via a tuned transformer L2 (C20), the output impedance of which is set correctly to match the transducer crystal impedance. The output drive signal is nominally 1.5V Pk.

Receiver and Detector

The reflected Doppler signal is fed via a resonant transformer L4 (C25) to the gate of Q5, the drain of this FET connects to the source of Q4 to form a cascode amplifier the drain of which contains the resonant circuit L3,(C21).

From the drain of Q4 the amplitude complex of the received signal is detected by passing the signal through synchronous detector Q6 with the high frequency signals being filtered by R12 and C15.

The raw low frequency complex is then amplified and filtered by U1 where its associated components form a band pass filter amplifier with a bandwidth of 150Hz to 1KHz for the obstetrics or 300Hz to 4KHz in the vascular transducer.

This signal is passed to the main unit via the retractile cable.

(the following descriptions and circuit references refer to the PD1 plus s3 circuits)

Audio Amplifier

The audio signal is routed via the retractile cable to J4 pin 4 on the audio circuit board. The signal passes through the potentiometer VR1 to the audio amplifier U3, where it is amplified and output to the loudspeaker connected to J3.

Digital Signal Processing

The audio signal is fed from the band pass amplifier, U4d through the AGC circuit formed around U4c and U7. The microprocessor controls in input gain to maximise the signal between the limits of 1V and 4.5V at the A/D converter. The signal then passed via the average value circuit (U4b and U4a) and into the A/D converter U6 pin 25.

The digitally converted signal is correlated to find the input rate which is displayed on the LCD display driven by the display interface circuit (U5). RS232 data output of the rate information is provided at connector SK2 as a digital RS232 stream from U8 of +/- 5Vdc.

Introduction

The following sections details tests to ensure that the FETATRACK DD250 is operating within specification. These tests may be performed in whole or part, however, if any repairs are carried out to the power supply circuits then it is recommended that the whole test/calibration procedure is undertaken.

The test procedures may be performed without removal of the circuit board from the unit.

Performance Checks

The following procedure is intended to provide a means of determining the functional status of the unit. It should be included as part of a preventive maintenance plan and should be performed on a regular basis.

1) Plug the monitor line cord into a grounded receptacle of suitable line voltage and frequency as indicated on the rear panel of the FETATRACK DD250

2) Turn monitor on. The green front panel LED will illuminate.

3) The display will first show the system selftest followed by the software revision, this indicates the instrument is switched on and awaiting inputs.

Ultrasound

4) Connect an ultrasound probe to the retractile cable, and increase volume.

5) Place transducer in palm of hand and gently stroke the back of the hand at a constant rate of about 2 times a second.

6) Check audio volume is present, digital display will display the simulated rate (approx 120).

The following pages contain drawing data to assist in the service of the product.

Parts lists (Bills of material)

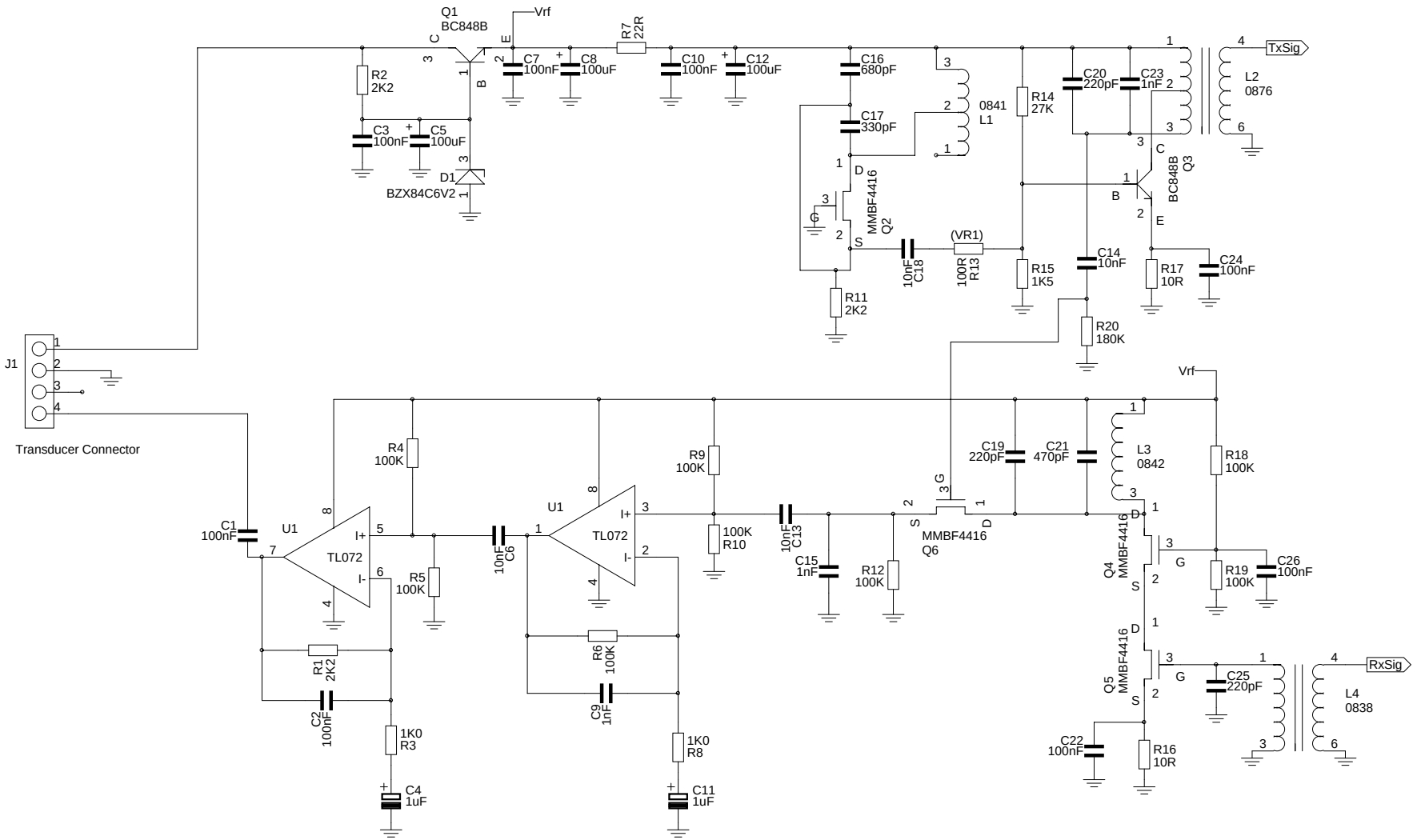
Fetatrack DD250 Mains Battery Circuit
Fetatrack DD250 PD1 Plus Circuit
Fetatrack DD250 Pocket Doppler Transducer 2MHz
Fetatrack DD250 Pocket Doppler Transducer 5MHz
Fetatrack DD250 Pocket Doppler Transducer 8MHz

Circuit Data

Fetatrack DD250 Mains Battery Circuit
Fetatrack DD250 PD1 Plus s3 Audio Circuit
Fetatrack DD250 PD1 Plus s3 Digital Signal Processor
Fetatrack DD250 Pocket Doppler Fetal Transducer 2MHz

Assembly Drawings

Fetatrack DD250 Assembly Base
Fetatrack DD250 Assembly Top
Fetatrack DD250 Assembly Main PCB
Fetatrack DD250 Assembly PD1 Plus PCB
Fetatrack DD250 Assembly Main



Issue	ECN	Date
1		March 98
2		15/05/98
3	158	18/01/99
4	181	18/05/00
5		12/05

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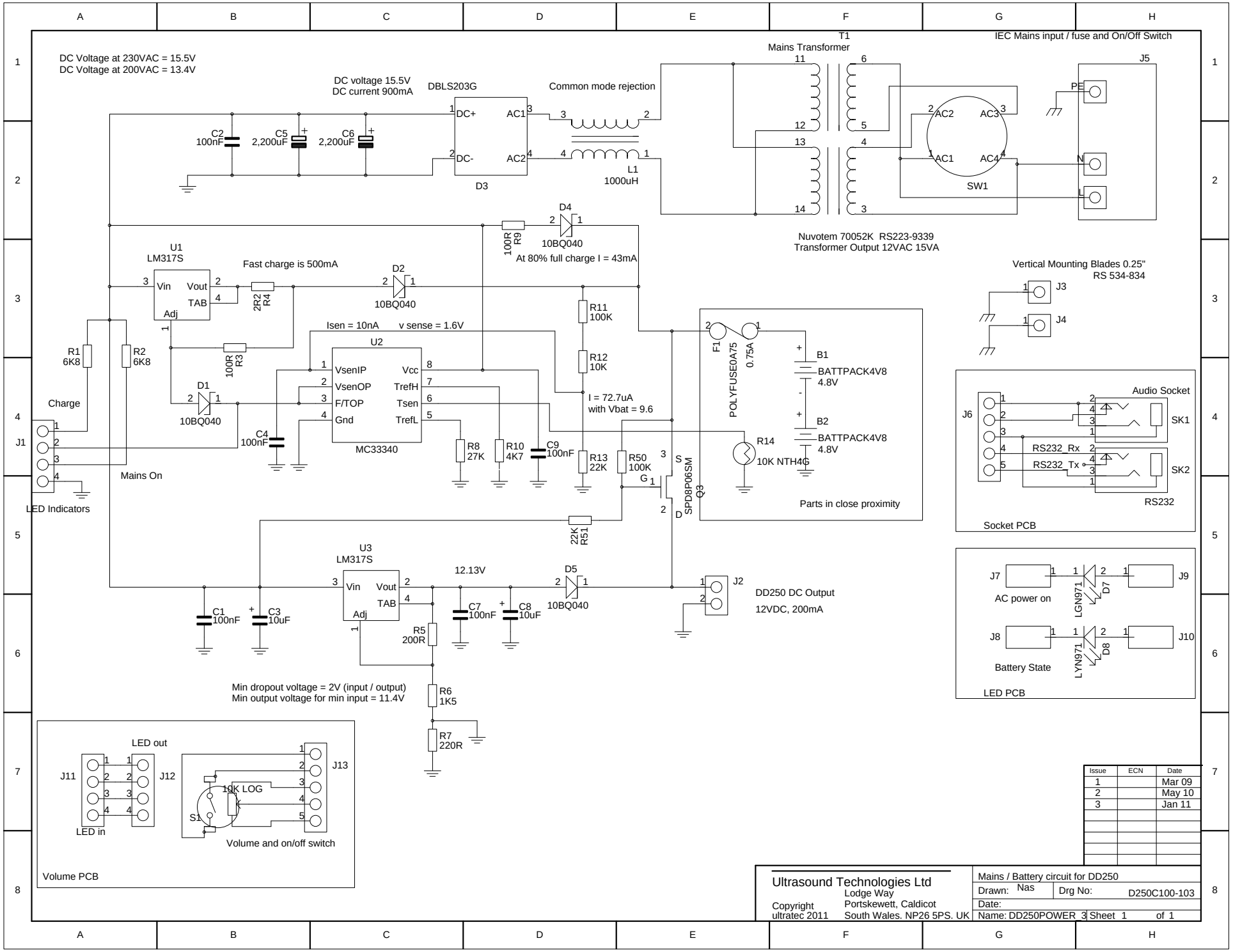
Pocket Doppler Fetal Transducer 2MHz

Drawn: nas - utl | Drg No: PD1D110-ASSY

Date: 18/05/2000

Name: FETALTDR_R5 | Sheet 1 of 1



Issue	ECN	Date
1		Mar 09
2		May 10
3		Jan 11

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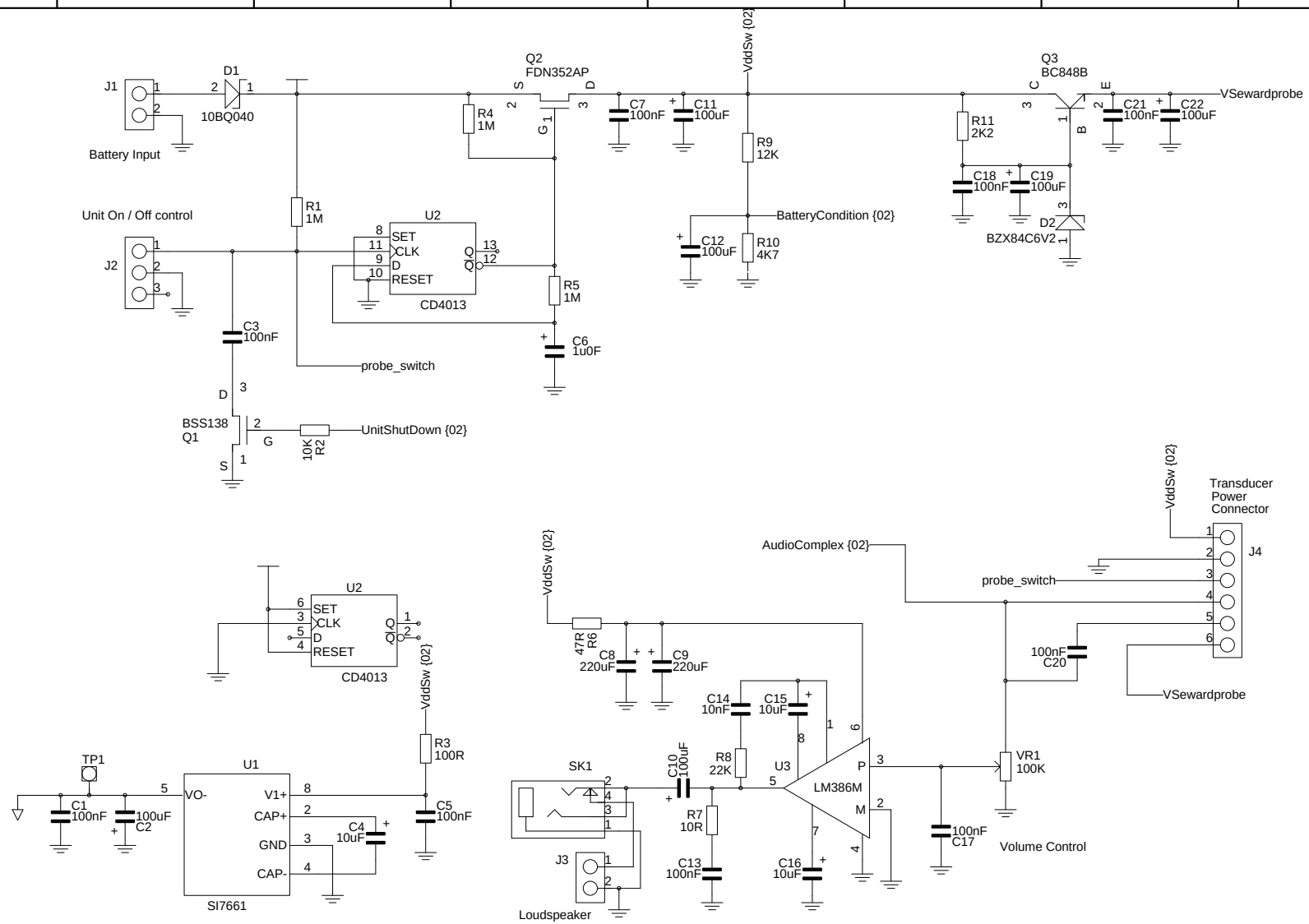
Mains / Battery circuit for DD250

Drawn: Nas | Drg No: D250C100-103

Date:

Name: DD250POWER_3 | Sheet 1 of 1



Issue	ECN	Date
1		June 98
2	176	Sept 99
3	178	Nov 99
4	182	Jun 00
5	210	Aug 02
6	228	Jan 05
7	230	Aug 05
8		Aug 07

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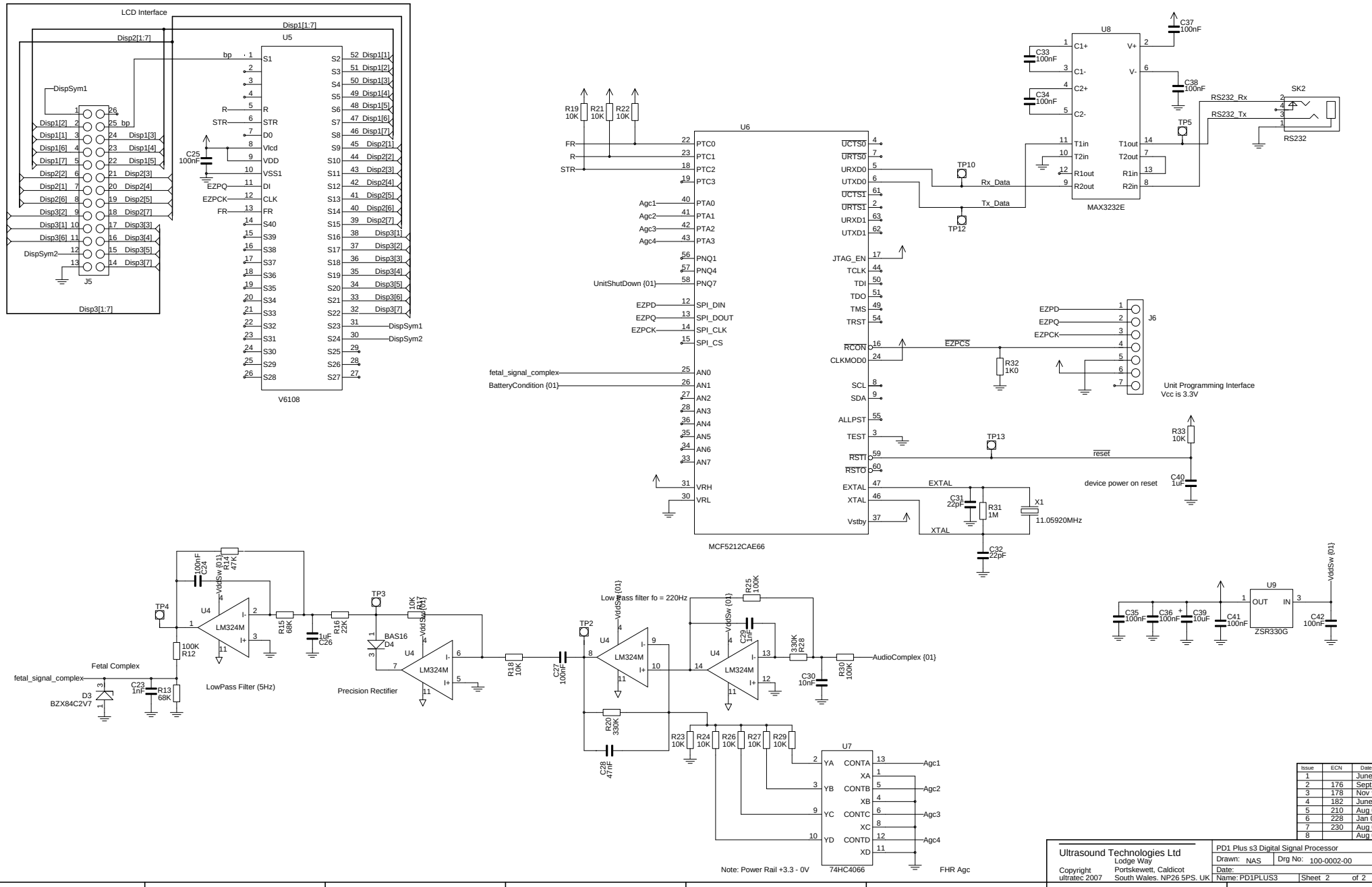
PD1 Plus s3 Audio Circuit

Drawn: NAS | Drg No: 100-0002-00

Date:

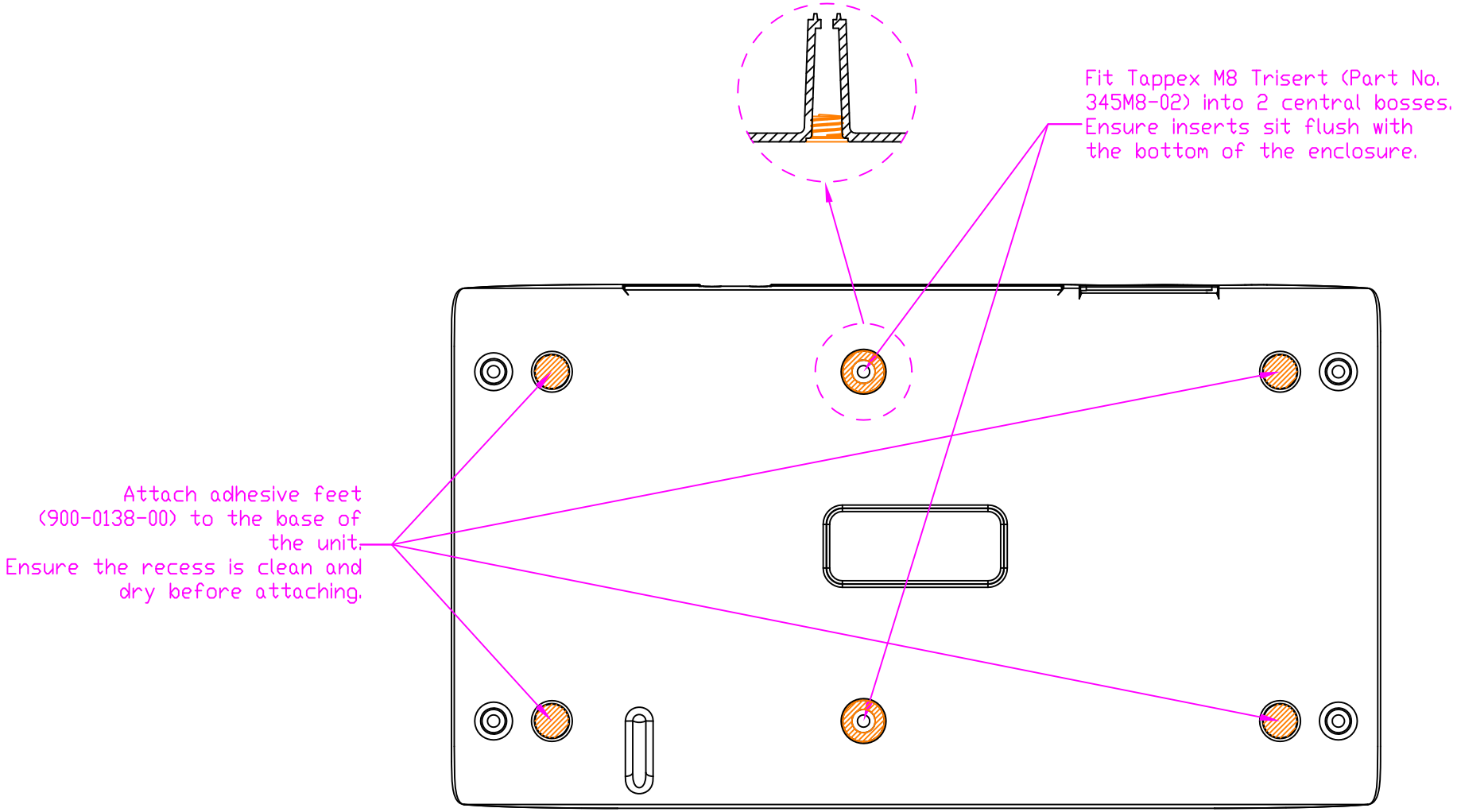
Name: PD1PLUS3 | Sheet 1 of 2



Issue	ECN	Date
1		June 98
2	176	Sept 99
3	178	Nov 99
4	182	June 00
5	210	Aug 02
6	228	Jan 05
7	230	Aug 05
8		Aug 07

Ultrasound Technologies Ltd
Lodge Way
Portskewett, Caldicot
South Wales. NP26 5PS. UK

PD1 Plus s3 Digital Signal Processor
Drawn: NAS
Drg No: 100-0002-00
Date:
Name: PD1PLUS3
Sheet 2 of 2



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	20/07/10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±0.25	P Nancollis		
FINISH:	0.0	±0.15			
	0.00	±0.10	3rd ANGLE PROJECTION		
	0.000	±0.05	DO NOT SCALE PRINT		
	ANGULAR	±0.5°			

ULTRA TEC

TITLE:	SCALE:	DIMENSIONS:	USED ON:
Fetatrack DD250 Enclosure Base Assembly	1:2	metric	DD250

DRAWING No.	SHEET
DD250D118-102	1 OF 3

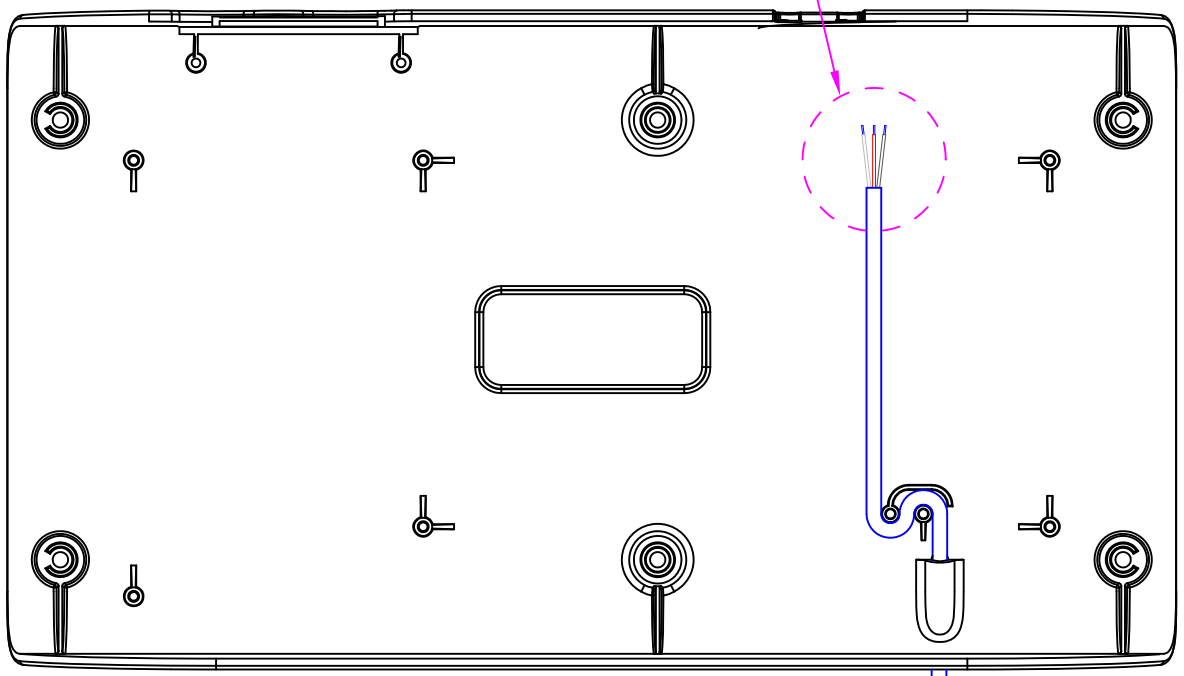
File: file store\design\Designs\Ultrasound\310\Drawings\Details\DD250D118-102 Assembly Enclosure Base.dwg

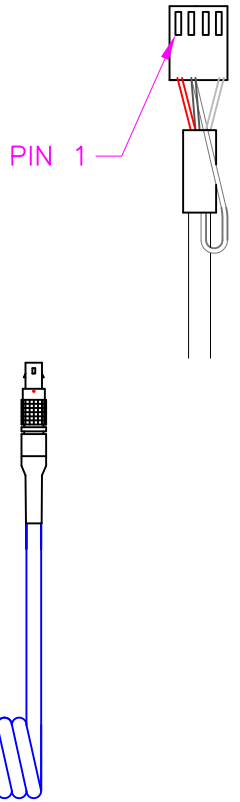
C.A.D. DRAWING

Feed the transducer cable into the enclosure and through the cable clamp.
Fit the Molex 4-way housing to the cable according to the table.

Molex Housing

PIN 1	RED
PIN 2	BLACK+SCREEN TAIL
PIN 3	N/C
PIN 4	WHITE





ISSUE	DATE	DRAWN	CHECK	A.N.NO.
2	24/01/11	k nancollis		
1	20/07/10	P.Nancollis		

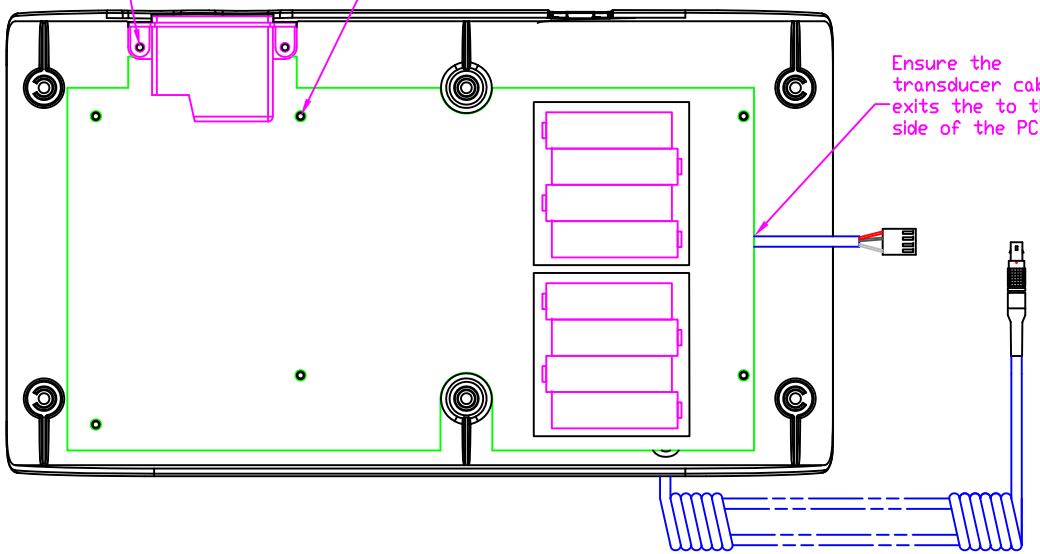
MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	±0.25	P Nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	Fetatrack DD250 Enclosure Base Assembly	1:2	metric	DD250
FINISH:	0.0	±0.15				THIS DOCUMENT IS SUPPLIED IN CONFIDENCE. NO REPRODUCTION OF THE DOCUMENT OR OF THE ITEMS SHOWN THEREON MAY BE MADE WITHOUT THE COPYRIGHT OWNERS PERMISSION.	DRAWING No. DD250D118–202	SHEET 2 OF 3		
	0.00	±0.10	3rd ANGLE PROJECTION							
	0.000	±0.05	DO NOT SCALE PRINT							
	ANGULAR	±0.5°								

File: file store\design\Designs\Ultrasound\310\Drawings\Details\DD250D118–102 Assembly Enclosure Base.dwg

C.A.D. DRAWING

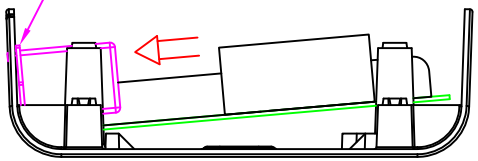
Secure mains inlet using 2 M3x8 Self Tapping screws (961-0079-00).

Fit the main PCB into the enclosure and secure with 6 M3x8 Self Tapping Screws (961-0079-00) with M3 plain and shakeproof washers



Ensure the transducer cable exits the to the side of the PCB.

Insert the mains inlet into the opening in the enclosure before lowering the PCB onto the mounting posts.



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	20-07-10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	P.Nancollis		
FINISH:	0.0	±0.5			
	0.00	±0.2			
	0.000	±0.1			
	ANGULAR		3rd ANGLE PROJECTION DO NOT SCALE PRINT		

ULTRA TEC

TITLE:
Fetatrack DD250
Enclosure Base
Assembly

SCALE:	DIMENSIONS:	USED ON:
1:2	mm	DD250

DRAWING No. DD250D118-302

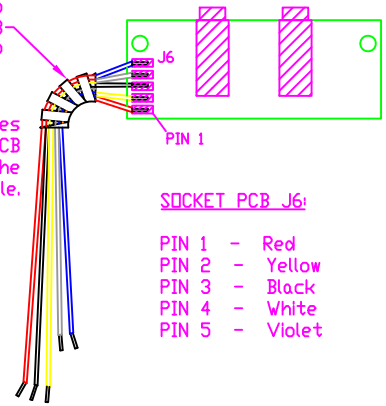
SHEET 3 OF 3

A4

\\Biggit\filestore\design\Designs\Ultrasound\DD250\Drawings\DD250D118-102 Assembly Enclosure Base.dwg

C.A.D. DRAWING

Socket to PD1+ PCB (DD250D115)

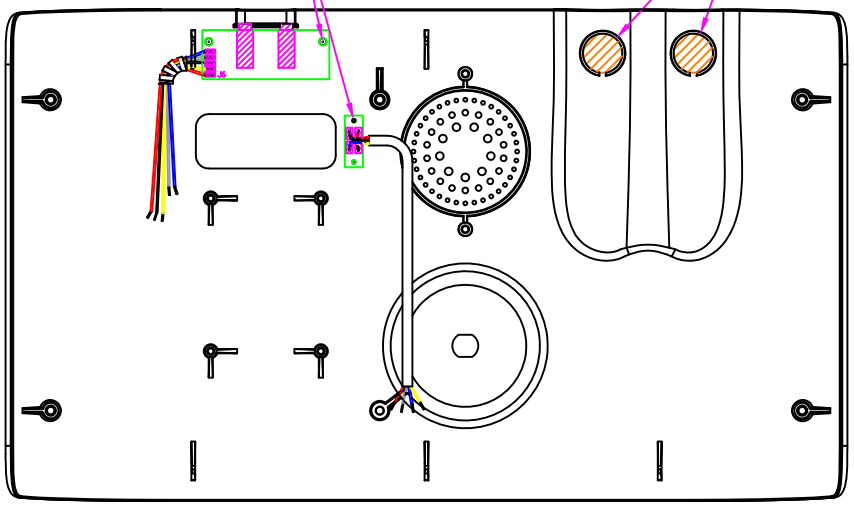


Solder the wires onto the PCB according to the table.

SOCKET PCB J6:

PIN 1 - Red
PIN 2 - Yellow
PIN 3 - Black
PIN 4 - White
PIN 5 - Violet

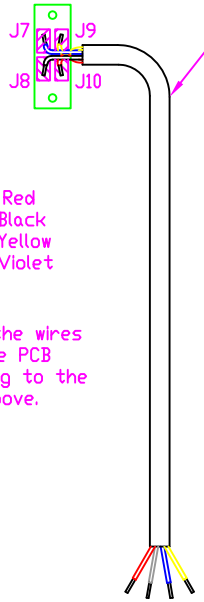
Fit the wired Socket and LED PCBs into the enclosure in the locations shown. Secure in place with 3140 Silicone Rubber applied around the pegs.



Apply a layer of Araldite adhesive to the magnet recesses and fit 2 15x5mm Magnets (900-0132-00).

Press the magnets fully into the recesses and apply additional Araldite around the top edge of the magnets.

Ensure that the polarity of the magnets is aligned.



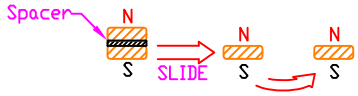
LED to Volume Control PCB (DD250D112)

LED PCB:

J10 - Red
J8 - Black
J9 - Yellow
J7 - Violet

Solder the wires onto the PCB according to the table above.

To ensure aligned magnet polarities, slide the magnets apart from their storage spacer retaining their storage alignment. Fit the magnets immediately after separating from their storage state.



WARNING!

The magnets are very powerful.

Do not allow magnets to pull together as they could fracture and/or damage trapped skin.

Keep away from credit cards, mobile phones, computers and programmable devices.

The magnets could cause damage to these devices and result in data loss.

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	20-07-10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	P.Nancollis		
FINISH:	0.0	±0.5			
	0.00	±0.2	3rd ANGLE PROJECTION		
	0.000	±0.1	DO NOT SCALE PRINT		
	ANGULAR				

ULTRA TEC

TITLE: Fetatrack DD250 Enclosure Top Assembly

SCALE:	DIMENSIONS:	USED ON:
1:2	mm	

DRAWING No. DD250D121-101

SHEET 1 OF 4

A4

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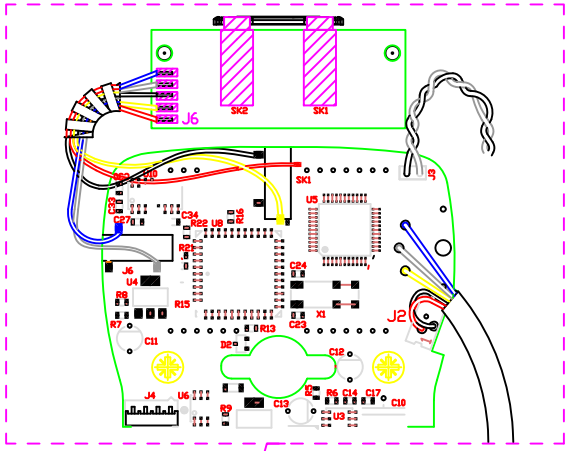
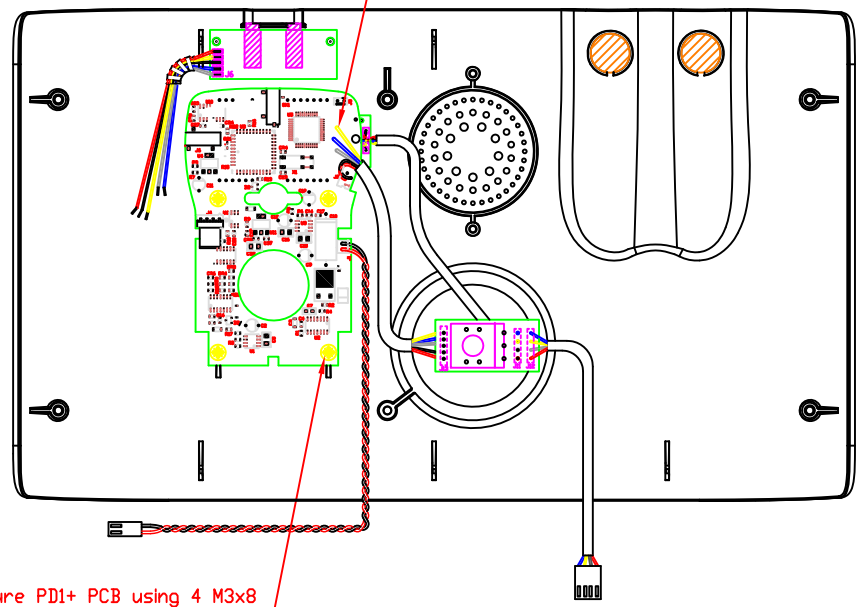
C.A.D. DRAWING

Solder the Volume Control wires to the PD1+ PCB according to the table. The wires should be mounted in from the back of the PCB to keep them clear of the LCD.

PD1+ PCB:

J2 PIN 1 - RED
J2 PIN 2 - BLACK
VR1 Vin - YELLOW
VR1 Vout - WHITE
VR1 GND - VIOLET

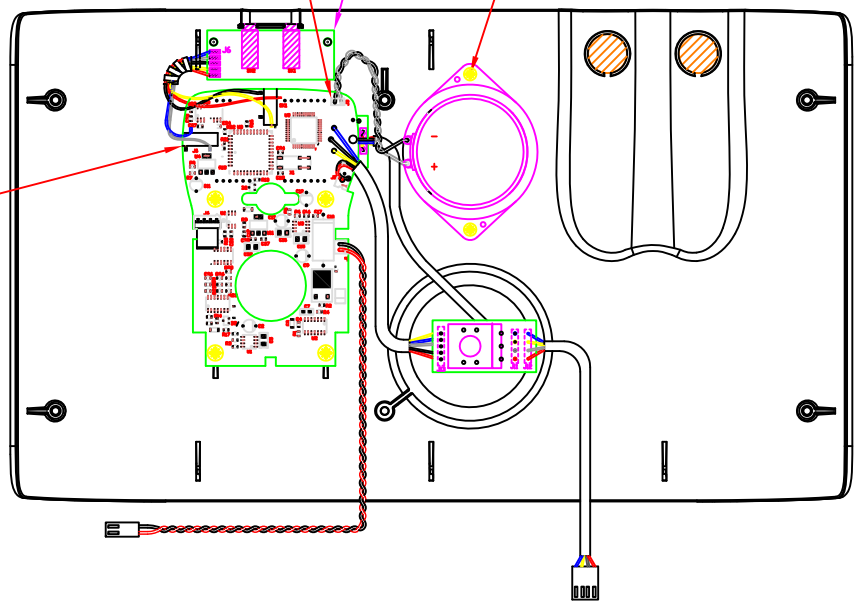




Secure PD1+ PCB using 4 M3x8 PT Self-Tapping screws (961-0079-00) with M3 Plain and Shakeproof washers.

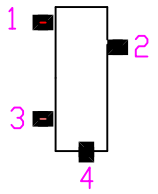
Plug the Speaker cable onto J2 on the PD1+ PCB.

Fit Speaker into case using 2 M3x6 PT Self Tapping screws (961-0080-00) with M3 Plain and Shakeproof washers.



Solder the Accessory Socket PCB wires onto the PD1+ PCB according to the table.

SK1&2 Pins



PD1+ PCB:

SK1 PIN 1 - BLACK
SK1 PIN 2 - RED
SK1 PIN 3 - N/C
SK1 PIN 4 - YELLOW

SK2 PIN 1 - N/C
SK2 PIN 2 - WHITE
SK2 PIN 3 - VIOLET
SK2 PIN 4 - N/C

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	20-07-10	P.Nancollis		

MATERIAL:

FINISH:

STANDARD TOLERANCES	
0	±1
0.0	±0.5
0.00	±0.2
0.000	±0.1
ANGULAR	

DRAWN	CHECK	APPROVED
P.Nancollis		

3rd ANGLE PROJECTION
DO NOT SCALE PRINT

ULTRA TEC

TITLE:
Fetatrack DD250
Enclosure Top
Assembly

SCALE: 1:2

DIMENSIONS: mm

USED ON:

DRAWING No.
DD250D121-301

SHEET 3 OF 4

A4

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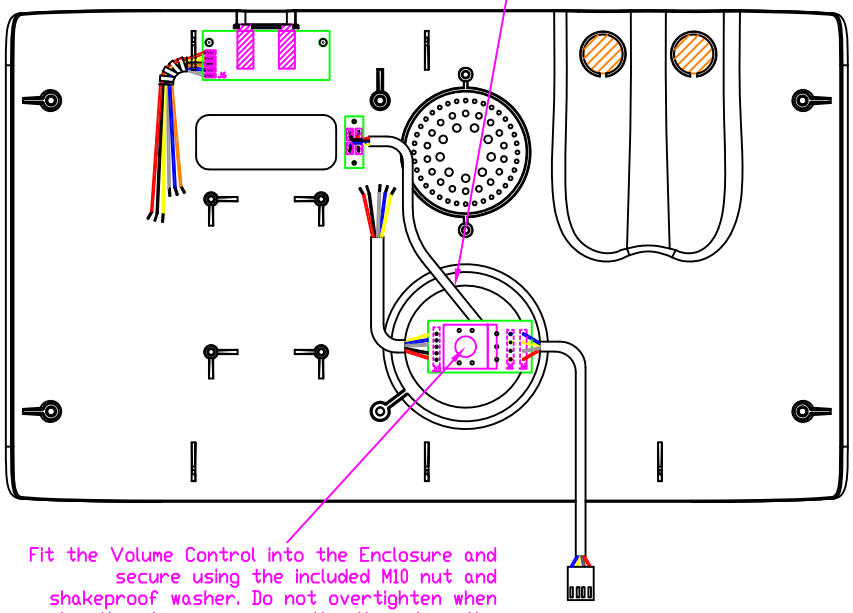
C.A.D. DRAWING

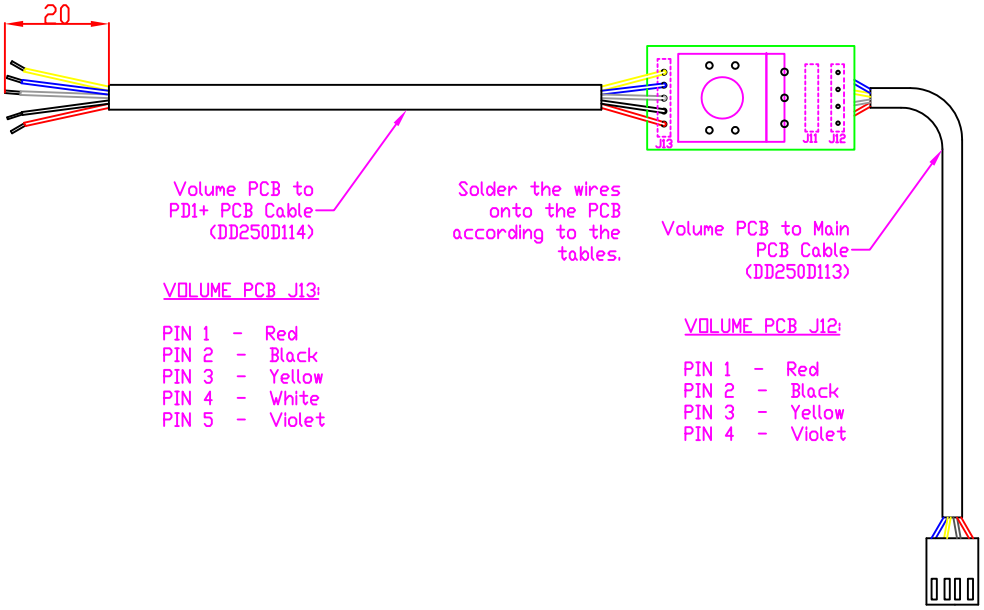


VOLUME PCB J11:

PIN 1 - Red
PIN 2 - Black
PIN 3 - Yellow
PIN 4 - Violet

Solder the LED Cable (DD250D112) onto the Volume PCB J11 according to the table.

Fit the Volume Control into the Enclosure and secure using the included M10 nut and shakeproof washer. Do not overtighten when using the ring spanner or the thread on the volume control could become damaged.



Volume PCB to PD1+ PCB Cable (DD250D114)

Solder the wires onto the PCB according to the tables.

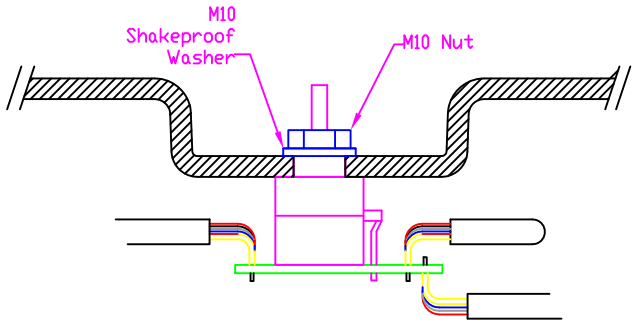
Volume PCB to Main PCB Cable (DD250D113)

VOLUME PCB J13:

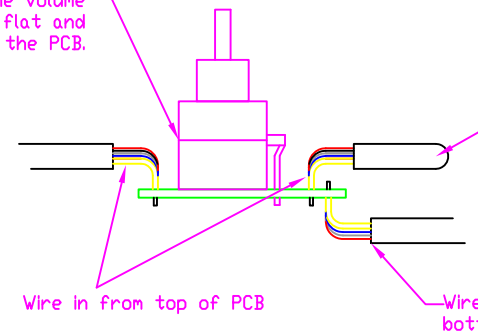
PIN 1 - Red
PIN 2 - Black
PIN 3 - Yellow
PIN 4 - White
PIN 5 - Violet

VOLUME PCB J12:

PIN 1 - Red
PIN 2 - Black
PIN 3 - Yellow
PIN 4 - Violet



Solder the OMEG volume control (500-0121-00) on to the PCB. Ensure the volume control sits flat and flush to the PCB.



LED to Volume PCB Cable

Wire in from top of PCB

Wire in from bottom of PCB

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	20-07-10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	P.Nancollis		
FINISH:	0.0	±0.5			
	0.00	±0.2	3rd ANGLE PROJECTION		
	0.000	±0.1	DO NOT SCALE PRINT		
	ANGULAR				

ULTRA TEC

TITLE:
Fetatrack DD250
Enclosure Top
Assembly

SCALE:	DIMENSIONS:	USED ON:
1:2	mm	

DRAWING No. DD250D121-201

SHEET 2 OF 4

A4

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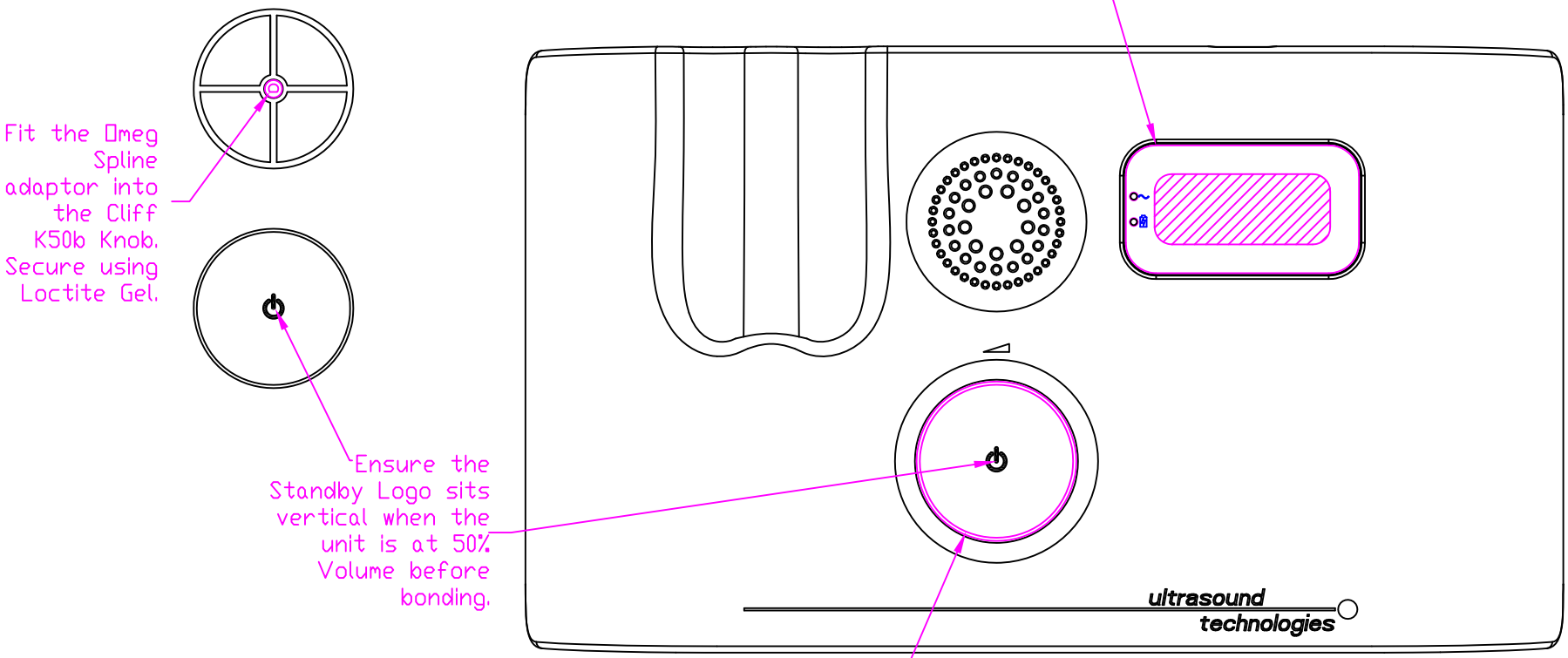
C.A.D. DRAWING



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	22-07-10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	P.Nancollis		
FINISH:	0.0	±0.5			
	0.00	±0.2			
	0.000	±0.1			
	ANGULAR		3rd ANGLE PROJECTION DO NOT SCALE PRINT		

ULTRA TEC

TITLE: FETATRACK DD250 Enclosure Top Assembly

SCALE:	DIMENSIONS:	USED ON:
1:1	mm	

DRAWING No. DD250D121-401

SHEET 4 OF 4

A4

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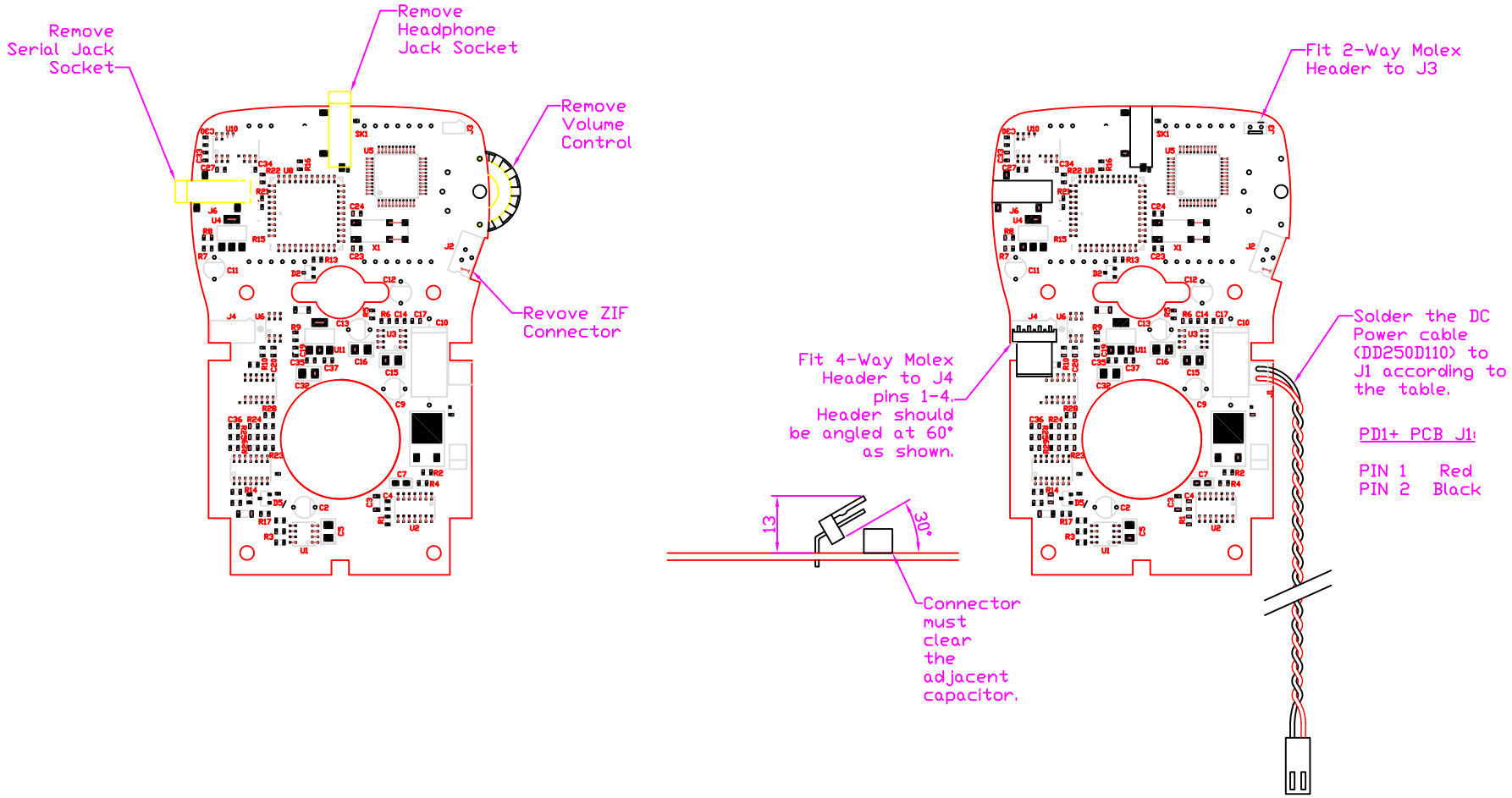
C.A.D. DRAWING



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	22-07-10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	P.Nancollis		
FINISH:	0.0	±0.5			
	0.00	±0.2	3rd ANGLE PROJECTION		
	0.000	±0.1	DO NOT SCALE PRINT		
	ANGULAR				

ULTRA TEC

TITLE:
Fetatrack DD250
PD1+ PCB
Assembly

SCALE:	DIMENSIONS:	USED ON:
1:2	mm	DD250

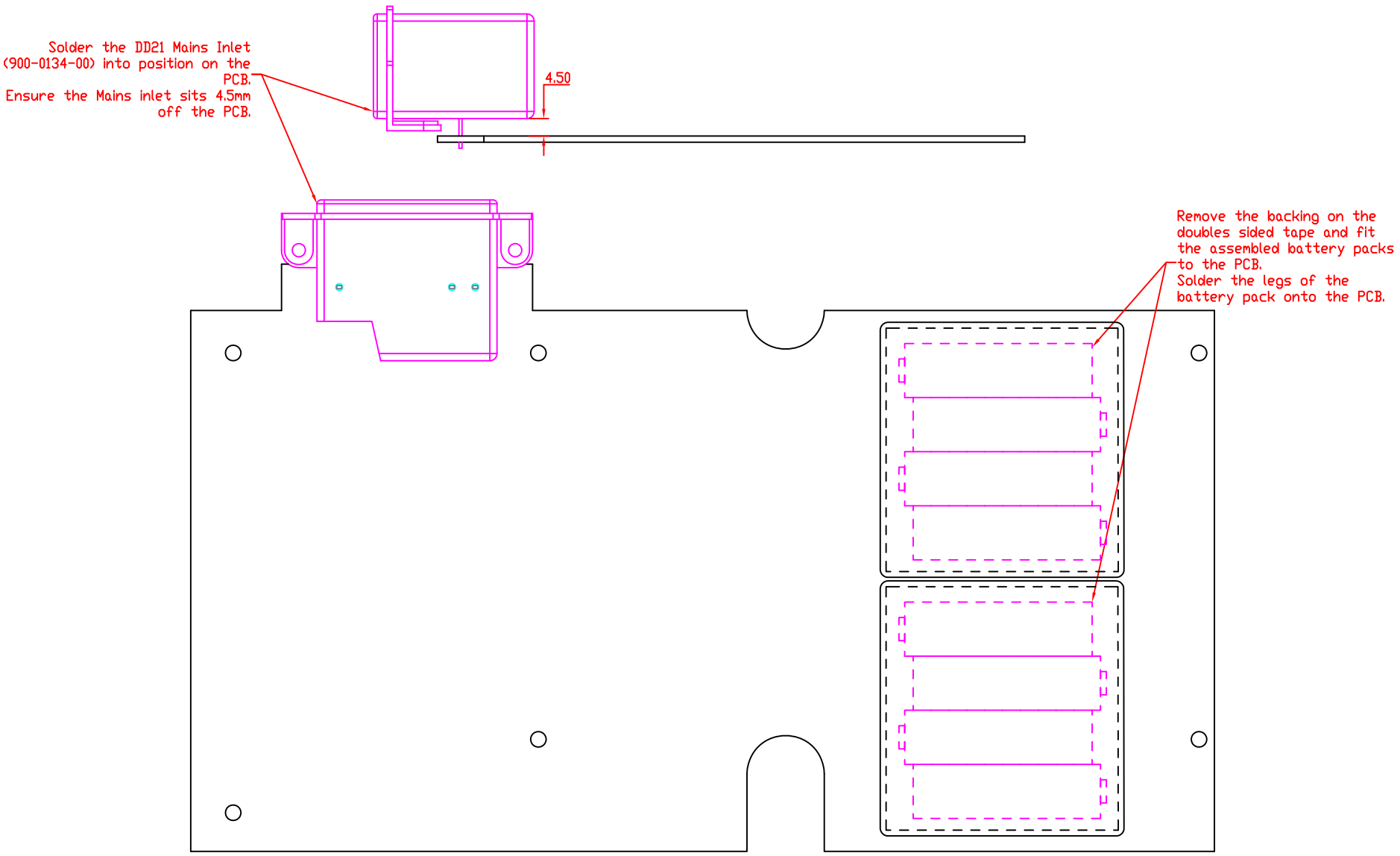
DRAWING No. DD250D122-101

SHEET 1 OF 1

A4

\\Bigpit\filestore\design\Designs\Ultrasound\DD250\Drawings\DD250D122-101 Assembly PD1 PCB.dwg

C.A.D. DRAWING



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	26-05-10	P.Nancollis		

MATERIAL: Material Thickness 1.6mm	STANDARD TOLERANCES: 0 ±1; 0.0 ±0.5; 0.00 ±0.2; 0.000 ±0.1; ANGULAR	DRAWN: P.Nancollis	CHECK	APPROVED
FINISH:		3rd ANGLE PROJECTION DO NOT SCALE PRINT		

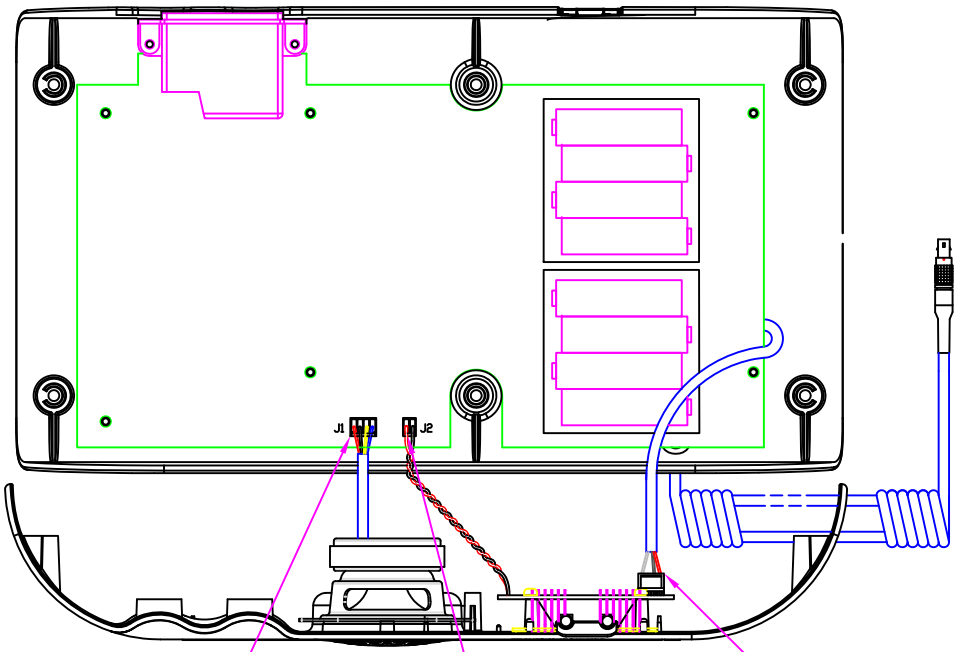
ULTRA TEC

TITLE: Fetatrack DD250 Main PCB Assembly	SCALE: 1:1	DIMENSIONS: mm	USED ON: DD250
	DRAWING No. DD250D119-101		SHEET 1 OF 1

A4

\\Biggit\filestore\design\Designs\Ultrasound\DD250\Drawings\DD250D119-101 Assembly Main PCB.dwg

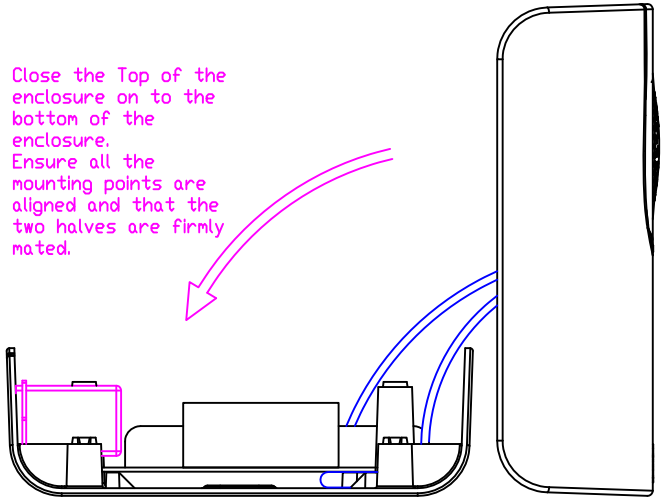
C.A.D. DRAWING



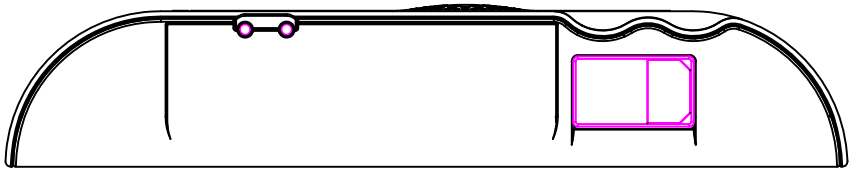
Connect the LED Cable (from the Volume PCB J12) to J1 on the Main PCB.

Connect the DC Power coble to J2 on the Main PCB.

Connect the transducer cable to J4 on the PD1+ PCB.



Close the Top of the enclosure on to the bottom of the enclosure. Ensure all the mounting points are aligned and that the two halves are firmly mated.



Secure the enclosure with 6 x M4x12 PT Self Tapping Screws (961-0081-00). Ensure that all screws are tight and the case halves sit tightly together.

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	20-07-10	P.Nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	P.Nancollis		
FINISH:	0.0	±0.5			
	0.00	±0.2	3rd ANGLE PROJECTION		
	0.000	±0.1	DO NOT SCALE PRINT		
	ANGULAR				

ULTRA TEC

TITLE:
Fetatrack DD250
Final Assembly

SCALE:	DIMENSIONS:	USED ON:
1:2	mm	

DRAWING No. DD250D123-101

SHEET 1 OF 2

A4

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C.A.D. DRAWING