Fetatrack 310
Service Manual
Issue 3

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About This Manual

This booklet explains the operation and service of the *FETATRACK 310 Antenatal Cardiotocograph*. 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 EN60601-1-1990.

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 310* ..

To maintain the *FETATRACK 310*'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 310 is supplied complete with the following: -

FETATRACK 310 Single Fetus
Monitor
US1 Monitoring Transducer
External Toco Transducer
Patient Event Marker
Belt and Buckle set (x2)
Chart pack (x1)
Power Cord
Operating instructions
Coupling gel (0.25ltr)

FETATRACK 310 Twin Fetus
Monitor
US1 Monitoring Transducer
US2 Monitoring Transducer
External Toco Transducer
Patient Event Marker
Belt and Buckle set (x3)
Chart pack (x1)
Power Cord
Operating instructions
Coupling gel (0.25ltr)

About This Manual

Special Precautions

Your *FETATRACK 310 Antenatal Cardiotocograph* has been designed for electrical safety. All the safety and operating instructions should be read before operating the *FETATRACK 310*. 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 or gases as it could lead to explosion.

About This Manual

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 310* and are in accordance with BS EN60601-1-1990.
Where they are associated with the connection of external equipment, that equipment **must meet** the relevant safety standards in all cases.

Alternating current
Associated with power on indicator

Type B Equipment
Unit classification

Off (power: disconnection from the mains)

On (power: connection to the mains)

Attention, consult accompanying documents.
Associated with auxiliary connections see operating instructions.

This symbol on the product or on its packaging indicates that this product must not be disposed of with your normal waste.

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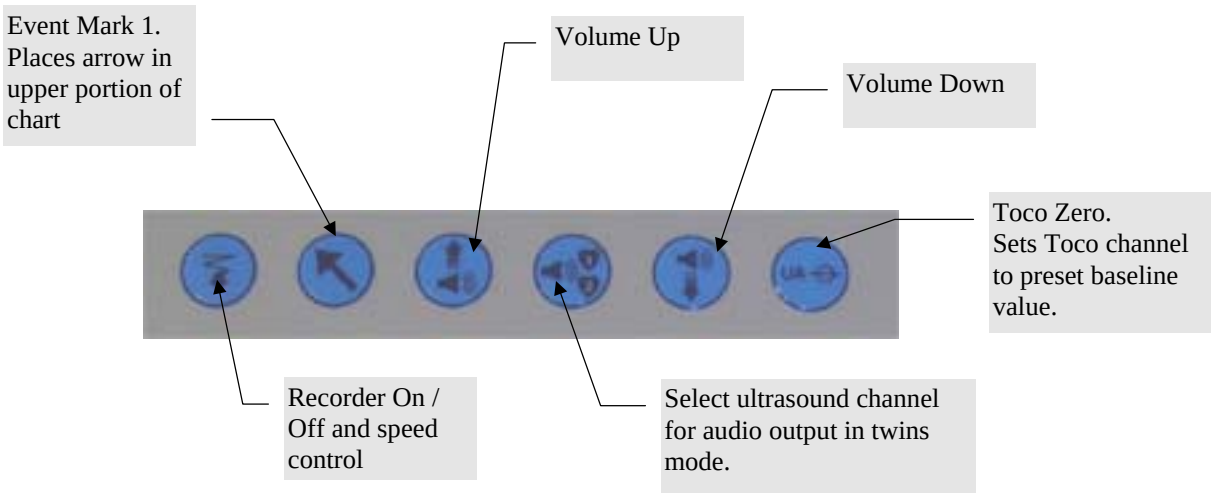
Parts and Their Functions

FETATRACK 310 Front Panel Controls

The front panel control area contains 6 buttons used to control the operation of the unit, they are all indicated by icons to aid language variations.



Recorder On/Off and Speed Change

This button is used to control the operation of the recorder. Press once and the chart recorder will start, each consecutive short press will change the speed . Pressing and holding the button down will stop the recording.

Event Mark 1

Places an event mark arrow at the top of the FHR scale .

Volume Up

This button is used to increase the audio volume level, or in configuration mode to change user options.

Volume Down

This button is used to decrease the audio volume level, or in configuration mode to change user operations.

US1 / US1 Transducer Select in Twins mode

Pressing this button changes the selected probe from US1 to US2 for volume output. This is used when the unit is in twins mode with two US channels for listening to either of the two fetuses. Press and hold to activate twins trace offset.

Toco Zero

This button zeros the Toco trace to the selected baseline.

Inputs / Outputs and Displays

'Power On' Indication

The green LED associated with the above symbol indicates that power is connected to the apparatus when illuminated.

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.

Remote Event Marker

Connection of an external event mark switch allows the patient to indicate events by printing an arrow in the gap between the FHR and UA traces. The maximum voltage that can be applied to this output is 15VDC.

Probe Connections US1, US2, Toco

This is for the connection of approved Doppler and Toco transducers. The maximum voltage that can be applied to this output is 15VDC.

Operating the *FETATRACK 310*

In this section, information is supplied which will help you use the *FETATRACK 310* for the fist time.

User Configuration

Firstly connect the *AC supply cord.*

It is necessary to set the operation of the *FETATRACK 310* to meet your requirements.
Before turning the *FETATRACK 310* on, press and hold down the *Toco Zero* button. Then, whilst keeping the *Toco Zero* button pressed down, turn the *FETATRACK 310* on by flicking the *AC input on/off* switch which is located on the rear of the unit as part of the *AC line input socket*. When the unit is on the front panel LED ∿ will be illuminated.

The *FETATRACK 310* starts and then enters its *User Configuration* Mode, release the Toco Zero button as soon as '*Calibrate System'* is displayed .

You are then prompted to enter the date if different to that displayed.
To change the day and month press the *Volume Up* button. One press advances the day by one, pressing the *Volume Up* button for longer advances the day by 10.

To change the year press the *Volume Down* button. One press advances the year by one, pressing the *Volume Down* button for longer advances the year by 10.

When the correct date is displayed press the *Toco Zero* button once.

You are then prompted to enter the time if different to that displayed.
This works in a similar manner to the date with the *Volume Up* button advancing the hours and the *Volume Down* button advancing the minutes.

When the correct time is displayed press the *Toco Zero* button once.

You are then prompted to enter the Toco Base Line offset.
This sets an artificial zero line for the toco transducer above zero, it can be set by pressing the *Volume Up or Volume Down* buttons for a value between 0 - 20.
After setting this value the Toco will be set to this every time the *Toco Zero* switch is pressed, and allows small negative Toco excursions to be seen on the chart.

When the chosen zero offset is displayed press the *Toco Zero* button once.

You are then prompted to enter the Toco Filter Value.
This sets the filtering within the monitor to produce a smoother Toco trace if required. (The filter can remove some of the maternal breathing artifact). It is set by pressing the *Volume Up* button for a value soothing value between 1sec and 2sec..

When the correct filter value is displayed press the *Toco Zero* button once.

You are then prompted to enter the Toco Range.
This sets the response of the Toco transducer to either a full scale of 100 or 200 on the chart print out. It is set by pressing the *Volume Up* button for a value between 100 and 200..

When the correct range is displayed press the *Toco Zero* button once.

You are then prompted to enter the Chart recorder speed.
This sets the initial turn-on speed of the chart recorder. Then once the chart is running the speed can be further changed to 1 ,2 or 3 cm/min. It is set by pressing the *Volume Up* button for a value of 1, 2 or 3 cm/min..

When the correct speed is displayed press the *Toco Zero* button once.

You are then prompted to select the Data Block on or off.
The Data Block is printed at the start of each recording, this function can be disabled by setting Data Block to off. It changes from on to off and back again by pressing the *Volume Up* button..

When the Data Block is set to your requirements press the *Toco Zero* button once.

You are then prompted to select the Tachycardia Alarm on or off.
The Tachycardia Alarm is triggered when the system detects a Tachycardia above a preset value that the user can choose. The Alarm can be a level alarm or one calculated from a complex. Press the *Volume Up* button to change the setting. The alarm is tone is silenced by pressing the units *Volume* button.

When the Tachycardia Alarm is set to your requirements press the *Toco Zero* button once.

You are then prompted to select the Bardycardia Alarm on or off.
The Bradycardia Alarm is triggered when the system detects a Bradycardia below a preset value that the user can choose. The Alarm can be a level alarm or one calculated from a complex. Press the *Volume Up* button to change the setting. The alarm is tone is silenced by pressing the units *Volume* button.

When the Bradycardia Alarm is set to your requirements press the *Toco Zero* button once.

The *FETATRACK 310* will then restart and operate according to your settings.
The *FETATRACK 310* is now operational, and the LCD screen will show US1 --- us2 ---
(if the unit is only a single fetus monitor it will only display US1 ---) and a Toco value.

The Printer

The FETATRACK 310 prints on preprinted z-fold thermal paper using a thermal array print head. Fetal heart rate, uterine activity, and fetal movement are recorded together with date, time, recorder speed, operating mode and alarm status. The printer also prints a header block each time the printer is turned on, that contains Time and Date, Patient Name, Gestational Age, Patient or Bed Number, Hospital or Doctor along with a print viability test bar that prints to all dots of the printhead.

To load the printer with paper, open the printer door by pulling the recorder door using the opening provided on the printer. It will then release and opens downwards exposing the printer paper tray. Remove the new paper pack from its protective plastic cover and insert the pack into the recorder so that the printed side of the paper is uppermost and the FHR trace is on the left.

Pull the paper out of the front of the unit making sure it is positioned parallel to the roller and the close the door. The pack will self align when the recorder is run.

To operate the printer press the Recorder On/Off button. The printer will start to run and the chart speed will be shown in the LCD display. To turn the printer off press and hold the Recorder On/Off button until the printer stops. (This only operates after the data block has been printed). A small amount of paper will be fed out at high speed.

The printer will record at 1, 2 or 3 cm/min. To change the speed during recording simply press the Recorder On/Off button momentarily. The FETATRACK 310 can be run at the speed of your choice, and will always start at this pre-programmed speed every time the printer is turned on. For details of how to change the pre-programmed speed refer to ‘User Configuration’.

When the paper pack runs out the Fetatrack 310 will sound a short alarm and display “Paper ?”. For the next 30 min the system will store HR1 , HR2 and Toco until either the store becomes full, the user presses and holds the Recorder On/Off button to reset the store and loose the stored data or the user inserts a new paper pack, presses Recorder On/Off button once and the Fetatrack 310 prints the stored data and returns to normal printing.

When the store reaches 90% full the Fetatrack 310 will “Alarm” and show “StoreLow”, if the store then becomes full the display changes to “StoreFull” and there will be no further storage. The data can still be printed by pressing Recorder On/Off button once or reset by pressing and holding the Recorder On/Off button.

The print from store is lighter than the normal trace to distinguish stored data.

Ultrasound Fetal Monitoring

The *FETATRACK 310* ultrasound transducer is used to detect and monitor the fetal heart beat. The *FETATRACK 310* can monitor twins and if this option is chosen it is supplied with two Ultrasound transducers. The primary Ultrasound Transducer (always supplied) has a yellow coded plug while the twin channel has a blue coded plug. Push the relevant plug firmly into is colour coded front panel US socket and turn the unit on.

Locate a clear fetal heart sound using a Doppler Fetal Heart Detector and secure the stretch belt in position, so that it passes over the transducer site, and clamp in place by fastening the buckle after feeding the belt through the transducer.

Apply gel to the surface of the transducer locating it approximately in the position determined by the Doppler detector. Position the transducer to obtain the clearest fetal heart sound. The heart rate processor will start to calculate heart rate within a few seconds and the heart rate can be observed on the LCD display. Correct operation can be verified by observing that the pulse lamp is flashing at the heart rate.

The heart shaped fetal pulse indicator is also used as a signal quality indicator. When positioning the transducer observe the indicator, which should be solid under the best signal conditions. If this indicator is only showing an outline heart then this is an indication that the signal quality is not optimum. Improved recordings can be obtained by repositioning the transducer so that this indicator always shows a solid heart. In the absence of signals of adequate quality this indicator will be permanently off.

The audio volume can be increased by pressing the volume up button marked with the up arrow. Conversely to decrease audio volume press the button marked with the down arrow. In twins mode the audio output is selected for either channel by pressing the US 1/2 button. The selected channel is indicated on the LCD display by the capital US letters. Once a clear fetal heart signal has been located set the volume to the desired level using these controls.

Transducer position should be checked at least half-hourly during labour-monitoring or prolonged NST. When repositioning the transducer, further coupling gel may be required When repositioning the transducers always ensure that the fetal pulse indicates the optimum signal conditions.

Results will vary from one patient to another, but in all cases good transducer positioning is essential, and this may be aided by the use of a liberal amount of coupling gel.

With the fetus in the vertex presentation, and the mother sitting or supine, the clearest sound will normally be found on the midline below the umbilicus. In the lateral position, clearer sounds may be found with the transducer displaced from the centre line to the upper surface of the abdomen. The clearest signals in breach presentation may be located higher and to one side.

Transducer position which results in sounds with a strong placental or cord signal should be avoided, as these frequently render traces with artifacts.

It is important that a distinct fetal heart sound is present during monitoring for correct function of the unit . Any doubt about fetal variability should be checked by listening to the audible signal, or by an alternative diagnostic technique.
A simple check of the ultrasonic system can be made by holding the transducer against the palm of the hand and stroking the back of the hand at a fixed rate, for example, twice per second. A clear audible signal should be heard and the digital display should show a rate after approximately five seconds. With the printer running this rate will be recorded on the chart.

In the event of HR1 and HR2 traces overlapping or having similar rates the HR2 (US2) trace can be offset by –20bpm by pressing and holding the US½ key. This is reset when the recording session finishes.

Uterine Activity Monitoring

The Toco transducer is used to monitor uterine activity. The transducer plug is colour coded grey for ease of identification. To monitor uterine activity plug the Toco transducer into the grey UA input socket.

The Toco transducer is sealed to prevent the ingress of fluids. NO coupling gel is required for this transducer to operate correctly.

Place the transducer on the centre line over the fundus in a position where the uterus is firm, and secure in place with the stretch belting. Attach belt in the same fashion as with the ultrasound transducer.

Once the transducer is in position, push the Toco Zero button on the front panel to zero the recording. The position of the zero baseline can be set to suit individual preferences. For details of how to change the pre-programmed baseline refer to ‘User Configuration’.

Fetal Activity

Fetal activity may be recorded with the assistance of the patient. A hand-held marker switch is provided for this purpose and this is plugged into the socket immediately to the right of the UA input on the front of the unit.
If the patient feels movement of the fetus she may press the switch and this will mark the paper with an arrow in the gap between the HR and UA traces. Alternatively this marker may be used by the midwife to indicate any changes made during the procedure, such as repositioning of the transducers or movement of the patient.
A front panel event marker is also provided, and this marks the trace on the top edge of the HR scale. This can be used where two types of indication are required.

Alarms:

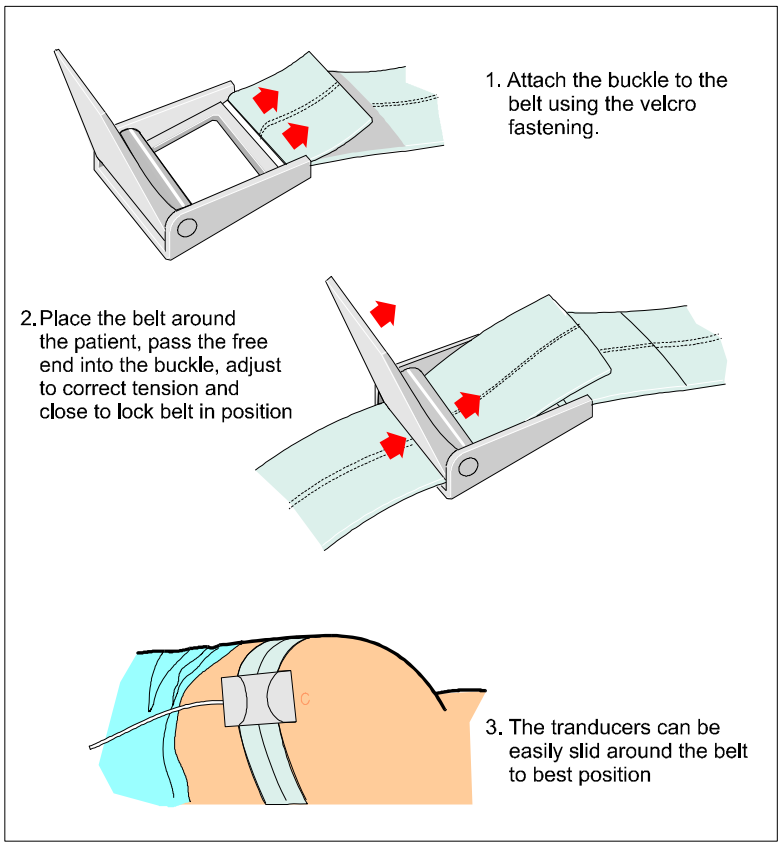
The Fetatrack 310 has built in Bradycardia and Tachycardia alarms. These can be set On or Off in the setup program. The status of the alarms are printed in the center of trace between the UA and FHR traces. When an alarm is activated a down arrow with an “A” is printed at the top of the trace and an audio alarm sounds. Pressing either volume up or down can reset the alarm.

When set to “Level” the Fetatrack 310 monitors the average of the last 30 sec of Heart Rate data and alarms if this falls below the selected numeric value.
When set to “Complex” the Fetatrack 310 monitors the last 3 time periods of 20 sec each of Heart Rate data and alarms if the fall below the selected numeric value and are in a descending rate for Bradycardia or ascending for Tachycardia.

Paper Out will sound a short alarm to draw attention to the monitor, if the paper out store reaches 90% full the Alarm will sound again until cancelled by the user pressing either volume up or volume down.

Transducer Belts

Both the ultrasound and contractions transducers are held in position with elastic belting which maintains the active elements in contact with the abdomen. The belts should first be placed around the patient and held in place at the correct tension with the plastic buckles. As the transducers are free to slide on the belt final positioning can be easily achieved. Similarly repositioning of the transducers is made very much simpler.



Interpretation

The following is intended only as a brief guide. For a fuller explanation of the interpretation of chart records, refer to suitable reference books.

During the antepartum period the Non Stress Test (NST) is an accurate means of predicting fetal well-being. The criteria proposed by Schifrin et al for the interpretation of the NST is summarised.

Reactive - accelerations of 15 BPM or more which last for 15 seconds or longer twice in any 10 minute period. These may be accompanied by fetal activity.

Non-reactive - evidence of fetal movement during a forty minute period, but without the reactivity indicated above.

Unsatisfactory - recording quality too poor to determine the above criteria. Stimulation of the fetus, or repositioning of the transducers may result in an improved recording.

Results from the NST may indicate the requirements to perform other diagnostic checks such as the Contractions Stress Test (CST).

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 the correct transducer has been selected.
- Check connection of the transducer.

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

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

No chart printed .

- Verify the system is on and that the fuses are intact.
- Check that the recorder is turned on.
- Check paper is inserted into the recorder correctly.
- Check recorder door is correctly closed
- Check that paper moves out of the recorder at the correct rate.

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 or isopropyl alcohol. 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 or isopropyl alcohol to clean the transducer and cable. Remove all traces of the detergent or alcohol 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

Frequency	1.5 or 2.1 and 1.8 MHz continuous wave
Transducer	Multi element wide angle
Audio Response	300 - 1 KHz
Range	50 - 210 bpm
Power Output	5 mW/sq cm max. SATA
Signal Processing	Software AUTOCORRELATOR
Indicators	LCD heart rate and pulse indication

Toco

Transducer	Differential external pressure transducer
Response	0 - 5 Hz
Scale	0 - 100
Indicators	LCD Toco numeric level indication

Event Mark

Hand held	User operated
Unit Front Panel	User operated

Alarms

Bradycardia	Complex and Level alarms
Tachycardia	Complex and Level alarms
Paper Out	Short Alarm

Data Presentation

Strip chart recorder and alphanumeric display module.

Printhead	4 inch thermal solid state printhead
Resolution	8 dots / mm
Speeds	1,2,3,cm/min
Speed accuracy	Better than 1%
Paper	Z fold
Paper type	Black thermal
Paper out storage	30 mins
Display	32 character by 2 line LCD display module
Controls	6 control buttons (for Paper Start /Stop, Volume Up, Volume Down, US½, Toco Zero and Event Mark)
Indicators	Green power on/ off

Power Supply

AC input voltage	200 - 260 VAC or 100 - 130 VAC (User selected)
Frequency	46 - 64 Hz
Power	60VA

Enclosure

Material	Aluminum

Environmental

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

Safety

Unit	Designed to BS EN60601-1-1990.
Electrical Designation	Class 1 Type B

Computer interface

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

The following Consumables are available for use with the FETATRACK 310

Belt / Buckle set (10 belts / 2 Buckles per pack)
Chart pack (10 per pack))
Power Cord
Coupling gel (0.25ltr) (12 per box)

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

CE
0120

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 310 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 310 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

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. Open the recorder door and then carefully lift the lid upwards. The Top Cover can now be removed taking care to disconnect the earth bonding cable connecting the lid to the base, and carefully disconnecting the front panel pcb interface cables.

The recorder and display module can be removed from the lid by careful removal of the 2 screws holding the parts in place. Be careful not to loose the spacers lying behind these cards.

Internal Layout

With the top cover removed and the front panel facing you, there is one large printed circuit board fixed to the base of the monitor this contains all the power supply circuits, all the control circuits and the Ultrasound, Toco and digital signal processing circuits.

In addition, there is the Front panel displays, keyboard interface and printer drive circuits card mounted on the Lid of the unit.

Power supply Circuit

The 240/110 VAC supply enters the FETATRACK 310 via an IEC double fused inlet / mains filter and switch and is fed to a torroidal transformer. The input supply voltage is stepped down to a nominal 24 VAC and is then bridge rectified by D19, smoothed by C130.

Regulated Supplies

The voltage regulators (U28 and U29) are fed from D19 at a voltage of around 36VDC. These oscillate at approximately 120 KHz transferring pulses of current into L12 and L14 respectively. The output of inductor is fed back directly into U28 (29) which at pin 1 is reference comparator and alters the pulses transferred into the inductor to obtain a stable voltage output. The output of U28 is 5V DC and U29 is 12V DC. Pulses of current in to inductor L14 are also taken into a charge pump to provide a stable –12V DC after regulator transistor Q14.

D19 also supplies current to the printhead and motor drive circuits via Q13 and U30 which provides a stable 24V DC .

Printhead and Motor Drive Supply

The printhead requires pulses of current equalling 10A but for a very small amount of time, therefore current is taken from the charge built up in C144 rather than expecting the power supply to supply the pulses. Q13 is connected as an ON/OFF switch to the printhead voltage circuits to act as protection. An explanation of its operation can be found in section PRINTER INTERFACE. When ON, current is fed to U30 connected as a variable voltage regulator with a range of +18 v to +24 v where VR1 adjusts this voltage.

Print density is controlled by this voltage but it is recommended that this voltage should be no greater than 24Vdc.

Ultrasound Circuit

Overview

The ultrasound circuit is built up of four discrete sections.
These are:

Oscillator and Transmitter amplifier
Receiver and Detector
Audio amplifier
Signal pre-processing.

These operate to produce a continuous wave of 2MHz ultrasound which is passed to the transmitter 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 or passed via signal pre-processing to the A/D converter for rate calculation.

The circuit board has the option of two ultrasound circuits which operated at different frequencies, the operation of each is identical as so only one is described here. The current nominal frequencies are 2.1MHz (1.5MHz special order) for US1 and 1.8MHz for US2.

Oscillator and Transmitter output.

L4 forms an oscillator with Q4 and its associated capacitors producing a sine wave drive at the required frequency. This is fed via a high current output driver Q1 and output transformer L2.

Receiver and Detector

The reflected Ultrasound signal is fed via a resonant transformer L1 to the gate of Q3, the drain of this FET connects to the source of Q2 to form a tuned cascode amplifier with L3. From the drain of Q2 the amplitude complex of the received signal is detected by passing the signal through a detector diode D3 . The raw low frequency heart complex is then amplified and filtered by U1 where its associated components form a bandpass filter amplifier with a bandwidth of 150Hz to 1KHz. This signal is passed to the audio section and the signal pre-processing .

Audio Amplifier

The audio signal then passes to a input selector U25 where the user can select via the front panel which Ultrasound channel will pass to the audio circuits and then to digital gain control U24 and buffer amplifier U32, where the volume setting is determined by the microprocessor subject to the user setting. From here the gain controlled signal is fed to the input of a monolithic power amplifier U27 and from here to the loudspeaker at J11.

The power rail for U27 is provided by the unregulated 36V fed from D19.

Signal Pre-processing

The detected audio complex is fed to U5 a bandpass amplifier where the filter characteristics are arranged to reject signals below 150Hz and above 330Hz , and the output is taken do a digital AGC U3. The amplitude stabilised signal is then amplified and full wave rectified by U2 . This full wave rectified signal is then buffered and smoothed by an active filter. The smoothing is achieved by the low pass active filter having a 3db at 5Hz hence giving the average value, or “power envelope”, of the audio complex. This signal is then passed to the A/D converter stage of the cpu U8 for further digital signal processing .

Ultrasound Channel 2

Ultrasound 2 is identical in operation to Ultrasound Channel 1 with only a change in component references.

Toco Circuit

A stabilised 5V is fed to the toco transducer along with 0V which form the excitation of a Whetstone bridge in the transducer. The Differential output of the transducer is fed via a high gain differential amplifier U26 to a low pass filter U32 for signal smoothing into the A/D converter U11 further digital signal processing U8.
Toco Zero is automatically adjusted by D/A converter U31 providing an offset voltage into the input of U32 . Overall gain is adjusted by VR2.

Event Marker

The fetatrack 310 is supplied with a hand held event marker. This is a switch wich when pressed connects an input on the microprocessor U8 to 0V via resistors R110 and R106..

Microprocessor Circuit

The microprocessor circuit is arranged around MC68HC812 (U8) a fast second generation central processing unit (CPU). When power is applied to the circuit a monitor circuit waits for the power rail to become stable and then 100 ms later takes the reset on the CPU high (logic 1) to 5 v. This starts the CPU working by reading the bytes at the very top of its memory map from the EPROM (ROM) (U9). This shows the CPU the start position in ROM from which to start executing. This sets up all the peripheral devices, which includes an interrupt timer, starts the system clock which consists of interrupts from the cpu to the watchdog ic at the rate of 1 every millisecond. As all functions are time dependant nothing starts without this clock. The CPU now reads all the preset variables from the battery protected RAM within the real time clock (U13). The battery source is a lithium 3.6 v cell (B1) with a nominal life of 10 years.

After the CPU has loaded the variables it rums a system check for any internal problems which are reported on the system display.

Selection of the individual devices is controlled by cpu internal the chip select circuits.

Most analogue signals eventually require digital signal processing for display, chart recording or digital transmission, the signals are presented to CPU, where an internal 8 bit A/D converter with an 8 way multiplexed input converts the signals to digital form. The converter accepts unipolar signals of 0 - 5 v..

The CPU interfaces with the display and keyboard circuit using on chip peripheral interface , as well as detecting selection of ultrasound and the presence of an Event keypress.

Printer Interface

A proportion of the micro-circuit is dedicated to printer interface and control, the primary interface circuit contains timers, serial drivers and peripheral drivers. The principal of operation of the printhead and motor drive circuit is as follows :

Data is decoded by the software into bit positions within the allowable area of the printhead . This data is then passed in serial form with a clock signal into the printheads serial buffer. The data is latched by a pulse from the cpu via CMOS buffer, this gives added protection in the case of device failure. Data is then burnt onto the printhead by strobes 1 to 4 from the cpu which last less than 1 mS .

The data is passed to the Display and Recorder interface board via ribbon cables J6 and J7. Printhead data is buffered on the interface board by U1 before being passed directly to the printhead. (J1)

Under normal conditions with the printer OFF there is no supply connected to the printhead or chart motor. Only when printing is requested does the cpu turn on the 24VDC supply.

The cpu also drives the chart recorder stepper motor via the high current microstep interface. The data is again passed to the Display and Recorder interface board via ribbon cables J6 and J7, after first being processed by microstep controller U23. The signals generated are turned in to phase data by driver U2 on the interface board before energising the coils of the motor. (J4)

Display

The microprocessor calculated rate value is passed as parallel bit values to the display module connected to the Display and Recorder interface board. The display phase can be adjusred by VR1 to allow for a better viewing angle.

Data Storage

Chart data is stored within the RAM (U22) when the paper pack runs out. A reflective opto sensor on the recorder module instructs the microprocessor when paper is out and the system will the buffer the data for 20 mins.

Introduction

The following sections details tests to ensure that the FETATRACK 310 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 310 .

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.

4) Load chart paper to recorder (for assistance see operating instructions) ensure paper is correctly aligned.

5) Depress printer on/off and recorder will run at either 1,2 or 3 cm/min dependent on the user preset value.

Ultrasound

6) Connect ultrasound transducer to the yellow or blue US sockets on the front panel and increase volume to maximum.

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

8) Check audio volume is present, digital display will display the simulated rate (approx 120) and correspond with the data being printed on the chart paper.

UA / Toco / Contractions

9) Connect the toco transducer to the grey UA input socket on the front panel and press UA zero to set the baseline (baseline resets to value 1 -> 20 as selected in set up procedure).

10) Apply pressure onto the centre of transducer and check that the toco trace on chart recording increases to 100 + 10%. Remove load and trace will return to baseline.

Event Marker

11) Connect the hand held remote event marker to the external mark socket. Depress the button once and note that a half arrow is printed on the bottom of FHR recording.

Setting up the monitors

The mode of operation of the monitor is programmable through the front panel to give a certain amount of customisation. The programming mode is entered by pressing and holding UA Zero while turning the monitor ON.

Details of the user programmable options are at the beginning of this manual.

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

Parts lists (Bills of material)

Fetatrack 310 main assembly
Fetatrack 310 recorder interface PCB
Fetatrack 310 main PCB
Fetatrack 310 Ultrasound 1 Transducer
Fetatrack 310 Toco Transducer
Fetatrack 310 Ultrasound 2 Transducer

Circuit Data

Control PCB Placement Diagram
Ultrasound 1 Circuit
Ultrasound 2 Circuit
Digital Printer Control and user interface Circuit
Power Supplies and Audio Circuit
Toco Circuit
Front panel PCB Placement Diagram
Frontpanel Circuit

Assembly Drawings

Fetatrack 310 Recorder Interface board connector Detail
Fetatrack 310 24V power lead
Fetatrack 310 Display module back light wiring
Fetatrack 310 Transformer wiring
Fetatrack 310 Speaker wiring
Fetatrack 310 Event marker input wiring
Fetatrack 310 US2 cable wiring
Fetatrack 310 US1 cable wiring
Fetatrack 310 Toco Input Socket
Fetatrack 310 US2 Input Socket
Fetatrack 310 US1 Input Socket
Fetatrack 310 Toco cable wiring

100-0108-00		
Fetatrack 310 Main Assy		
Part Number	**Description**	**Quantity**
		Per
100-0106-00	Fetatrack 310 Main PCB FT310Ms1	1
100-0107-00	Fetatrack 310 Recorder Interface PCB	1
100-1099-00	Foam 30x18x6mm Strips Black Polyethylene	2
100-1095-00	Base Unit Casting Fetatrack 310	1
100-1096-00	Top Unit Casting Fetatrack 310	1
100-1097-00	Door Unit Casting Fetatrack 310	1
100-1100-00	Feta 310 Pcb Bracket Drg F310D101-103	1
100-1101-00	Feta 310 Printer Bracket Drg F310D102-102	1
100-1102-00	Feta 310 Roller Bracket Drg F310D103-102	1
100-1104-00	Papertray RHS 1.2-304 DP1 s/s F310D105-105	1
100-1105-00	Papertray LHS 1.2-304 DP1 s/s F310D106-105	1
100-1106-00	Papertray Top 1.2-304 DP1 s/s F310D107-104	1
100-1107-00	Papertray Bottom 1.2-304 DP1 s/s F310D108-104	1
433-0001-00	IC Digital SM (32x8) Eprom 27C256	1
500-0019-00	Connector Socket Redel/ODU Yellow	1
500-0020-00	Connector Socket Redel/ODU Blue	1
500-0021-00	Connector Socket Redel/ODU Grey	1
500-0022-00	Socket Jack 0.25in	1
500-0044-00	Pillar M3x12 M-F	2
500-0046-00	Header Straight 14 (20W cut down)	1
500-0048-00	Socket Vert SIL 14w (20w cut down)	1
500-0050-00	Socket 16w IDC	1
600-0018-00	Cable Assy Ribbon Int Feta310 Drg F310D104	2
800-0014-00	LCD Backlit for F310	1
800-0015-00	Fuse 500mA Antisurge 250V Glass T 20mm	2
800-0016-00	Transformer Mains (Traceable Product)	1
800-0017-00	Loudspeaker 3in 10W	1
900-0026-00	Filter Mains Inlet (Traceable Product)	1
900-0027-00	Feet Heavy Duty ABS	4
900-0030-00	Battery Lithium 1/2AA 3.6v	1
900-0048-00	Printer Mechanism 108mm	1
900-0072-00	Bush Nylon TO-220	1
961-0028-00	Spade Terminal 0.25 RT Angle	2
961-0038-00	Screw Security CSK M6x50 St/St Lobe Pin	1
961-0045-00	Screw Security Button Hd M4x12 Pin St/St	2
100-1082-00	Label Set Fetetrack 310 Keypad with Green LED	1

100-0108-00		
Fetatrack 310 Main Assy		
Part Number	**Description**	**Quantity**
		Per
600-0022-00	Wire Eqpt Type 44 24AWG White (uom=mtrs)	0.42
900-0008-00	Cable Tie	10
900-0064-00	Connector Crimp Terminal 4.8x0.8mm	5
961-0014-00	Crimp Terminal Shrouded 0.25in	2
961-0027-00	Eyelet Connector 3mm	2
500-0012-00	Crimps Molex	31
500-0011-00	Housing Molex 4 Way 22-01-2045	3
500-0030-00	Housing Molex 2 Way 22-01-2025	3
500-0017-00	Housing Molex 6 Way 22-01-2065	3
961-0039-00	Screw M2.5x10 Pan Hd Pozi St/Steel A2	2
961-0040-00	Washer M2.5 Plain St/Steel A2	2
961-0041-00	Washer M2.5 Shakeproof St/Steel A2	2
961-0042-00	Nut M2.5 St/Steel A2	2
961-0026-00	Washer M3.5 Plain St/Steel A2	4
961-0033-00	Screw M3x5 Pan Hd Pozi St/Steel A2	2
961-0015-00	Screw M3x8 Pan Hd Pozi St/Steel A2	2
961-0003-00	Screw M3x6 Pan Hd Pozi St/Steel A2	6
961-0018-00	Washer M3 Plain St/Steel A2	16
961-0006-00	Washer M3 Internal Shakeproof St/Steel A2	16
961-0005-00	Nut M3 Full St/Steel A2	7
961-0043-00	Screw M4x20 Pan Hd Pozi St/Steel A2	2
961-0044-00	Screw M4x40 Pan Hd Pozi St/Steel A2	2
961-0024-00	Screw M3.5x10 Pan Hd Pozi St/Steel A2	4
961-0025-00	Washer M3.5 Internal Shakeproof St/Steel A2	4

100-0107-00			
Fetatrack 310 Recorder Interface PCB			
Part Number	**Ref**	**Description**	**Quantity**
			Per
311-0227-00	C1,7	Cap Electrolytic 220uF 35V BCC 136 60221	2
311-0106-00	C2,12	Cap Electrolytic Min 100uf 16V 5mm Radial	2
220-0204-00	VR1	Resistor Variable Multi-Turn SM 200K 3224W	1
223-0101-00	R19,20,21,22	Resistor MF 100R 1% 0805	4
223-0102-00	R14,17	Resistor MF 1K 1% 0805	2
223-0103-00	R2,3,4,5,6,7,8,9	Resistor MF 10K 1% 0805	8
223-0133-00	R18	Resistor MF 13K 1% 0805	1
223-0180-00	R11	Resistor MF 180R 1% 0805	1
223-0273-00	R10	Resistor MF 27K 1% 0805	1
223-0471-00	R1	Resistor MF 470R 1% 0805	1
224-0022-00	R13,16	Resistor MF 2R2 5% 1206	2
323-0103-00	C8,9	Cap Cer SM X7R 10nf 50V 20% 0805	2
323-0104-00	C3,6,11	Cap Cer SM X7R 100nf 50V 20% 0805	3
323-0472-00	C10	Cap Cer SM X7R 4.7nf 50V 20% 0805	1
432-0001-00	U1	IC Digital SM 74HCT541	1
432-0003-00	U2	IC Digital SM 3777	1
500-0023-00	J6	Header Straight 2 Way 22-27-2021	1
500-0024-00	J5	Header Straight 4 Way 22-27-2041	1
500-0041-00	J2	Header Straight 8 WayHarwin	1
500-0042-00	J4	Conn Flex Cable Flat 1.25mm 7 Circuit	1
500-0043-00	J1	Header IDC 16 Way Straight	1
500-0040-00	J7,8	Header IDC 20 Way Straight	2
800-0030-00		PCB Fetatrack 310 FT310FPs1 Recorder Interface	1

100-0106-00			
Fetatrack 310 Main PCB FT310Ms1			
Part Number	**Ref**	**Description**	**Quantity**
			Per
311-0109-00	C130	Cap Electrolytic 10000uF 35V Snap In Panasonic TSUP Series	1
311-0108-00	C134	Cap Electrolytic 1000uF 35V Panasonic FC Series	1
311-0277-00	C142,148	Cap Electrolytic 270uF/330uF 16V Panasonic FA Series	2
311-0227-00	C133,138	Cap Electrolytic 220uF 35V BCC 136 60221	2
311-0127-00	C131,136	Cap Electrolytic 120uF 50V Panasonic FC Series	2
311-0106-00	C38,81,119,156	Cap Electrolytic Min 100uf 16V 5mm Radial	4
311-0225-00	C143,146,151	Cap Electrolytic 22uF 100V Panasonic FC Series	3
324-0105-00	C37,80,160,162	Cap Cer SM Z5U 1uf 25V +20-80% 1206	4
323-0104-00	C1,2,6,10,11,13,14,19,20,21,23,24,28,32,33,40,41,44,45,49,53,54,56,57,63,64,66,67,71,75,76,83,84,87,90,91,93,94,97,98,100,104,107,109,110,111,113,115,116,117,120,121,122,123,125,127,128,129,132,135,141,145,149,150,154,155,157,161,163,164	Cap Cer SM X7R 100nf 50V 20% 0805	70
323-0473-00	C43,86	Cap Cer SM X7R 47nf 50V 20% 0805	2
323-0333-00	C88	Cap Cer SM X7R 33nf 50V 20% 0805	1
323-0103-00	C9,18,29,34,35,36,39,52,61,72,77,78,79,82,137,140,	Cap Cer SM X7R 10nf 50V 20% 0805	16
323-0332-00	C89	Cap Cer SM X7R 3.3nf 50V 20% 0805	1
323-0102-00	C4,8,17,26,42,47,60,62,69,85,124	Cap Cer SM COG 1.0nf 50V 20% 0805	11
323-0681-00	C7,15,50,58	Cap Cer SM COG 680pf 50V 20% 0805	4
323-0471-00	C48	Cap Cer SM COG 470pf 50V 20% 0805	1
323-0221-00	C3,16,46,51,55,59	Cap Cer SM COG 220pf 50V 20% 0805	6
323-0101-00	C5	Cap Cer SM COG 100pf 50V 20% 0805	1
323-0470-00	C12	Cap Cer SM COG 47pf 50V 20% 0805	1
323-0220-00	C101,102	Cap Cer SM COG 22pf 50V 20% 0805	2
320-0106-01	C153	Cap Tant SM 10uf 20V 20% Case B	1
320-0105-00	C118,126,139,144	Cap Tant SM 1uf 35V 20% Case A	4
320-0474-00	C25,31,68,74	Cap Tant SM 0.47uf 25V 20% Case A	4
431-7404-00	U15	IC Digital SM 74HCT04 SO14	1
434-0001-00	U8	IC Digital SM 68HC812 (OBSOLETE)	1
433-0001-00	U9	IC Digital SM (32x8) Eprom 27C256	1

100-0106-00			
Fetatrack 310 Main PCB FT310Ms1 PQ2109			
Part Number	**Ref**	**Description**	**Quantity Per**
432-0002-00	U22	IC Digital SM 62256 (43256)	1
432-0004-00	U23	IC Digital SM 39612	1
440-1076-00	U28,29	IC SM LT1076CQ	2
411-0338-00	U30	IC TH TO220 LM338T	1
436-1305-00	U13	IC SM DS1305E	1
431-0202-00	U14	IC Digital SM MAX202 SO16	1
431-0549-00	U31	IC Digital SM MAX549ACUA or AEUA	1
431-1243-00	U11	IC Digital SM MAX1243 SO8	1
431-0001-00	U12	IC Analogue SM 33064 or 560 SOT223	1
431-0211-00	U25	IC Analogue SM DG211BDY	1
431-0324-00	U1,2,4,5,6,26,32	IC Analogue SM LM324 SO14	7
411-2614-00	U27	IC Analog Power Amp SIL9MPF TDA2614/N1	1
431-9103-00	U3,7,24	IC Analogue SM X9C103S SO8	3
431-0336-00	U10	IC Analogue SM LM336M-2.5 SO8	1
533-0032-00	U9	Socket IC SM 32W PLCC	1
420-1004-00	D20,21,22,23	Diode SM 10BQ040 or SS14 SMB	4
420-0016-00	D1,2,6,7,9,10,14,15,17,18,24,25	Diode SM BAS16 SOT23	12
420-0054-00	D3,11	Diode SM BAT54 SOT23	2
420-8451-00	D8,16,26,27	Diode Zenner SM BZX84C5V1 SOT23	4
420-8410-00	D28	Diode Zenner SM BZX84C10 SOT23	1
411-0004-00	D19	Diode Bridge 4 Pin SIL GBU4A	1
420-0805-00	Q13	Transistor SM RFD8P05SM TO252AA	1
420-0848-00	Q1,6,11,12	Transistor SM BC848B SOT23	4
420-0001-00	Q14	Transistor SM FZT751 SOT223	1
420-4416-00	Q2,3,4,7,8,9	Transistor SM 4416 SOT23	6
820-0002-00	X2	Crystal 32.768Hz 85SMX	1
820-0003-00	X3	Crystal SM 12MHz 86SMX	1

100-0106-00			
Fetatrack 310 Main PCB FT310Ms1 PQ2109			
Part Number	**Ref**	**Description**	**Quantity**
			Per
224-0220-00	R100,132	Resistor MF 22R 1% 1206	2
223-0000-00	R14,52	Resistor MF 0R 5% 0805	2
223-0010-00	R98	Resistor MF 1R 1% 0805	1
223-0100-00	R2,6,40,44,133,158	Resistor MF 10R 1% 0805	6
223-0220-00	R100,132,	Resistor MF 22R 1% 0805	2
223-0101-00	R1,9,32,36,39,47,70,74108,110,122,141,152,	Resistor MF 100R 1% 0805	13
223-0471-00	R165	Resistor MF 470R 1% 0805	1
223-0102-00	R13,17,37,51,55,75,120,121,130,148,149,172,179,	Resistor MF 1K 1% 0805	13
223-0122-00	R125	Resistor MF 1K2 1% 0805	1
223-0152-00	R8,46	Resistor MF 1K5 1% 0805	2
223-0222-00	R11,19,49,57,77, 79, 80, 82, 140,143	Resistor MF 2K2 1% 0805	10
223-0272-00	R135,138,139	Resistor MF 2K7 1% 0805	3
223-0332-00	R180,181	Resistor MF 3K3 1% 0805	2
223-0472-00	R34,72,144,150,151,154,155	Resistor MF 4K7 1% 0805	7
223-0103-00	R5,20,21,22,23,24,35,38,43,58,59,60,61,62,73,76,83,85,86,87,97,99,101,104,106,114,115,116,126,131,153,160,161,162,167,170,173,174,178,	Resistor MF 10K 1% 0805	39
223-0153-00	R123,128	Resistor MF 15K 1% 0805	2
223-0163-00	R84	Resistor MF 16K 1% 0805	1
223-0223-00	R27,65,137,156,157	Resistor MF 22K 1% 0805	5
223-0273-00	R7,45,127	Resistor MF 27K 1% 0805	3
223-0363-00	R25,63	Resistor MF 36K 1% 0805	2
223-0473-00	R30,68,124,159	Resistor MF 47K 1% 0805	4
223-0683-00	R12,16,28,50,54,66	Resistor MF 68K 1% 0805	6
223-0104-00	R3,4,10,15,29,33,41,42,48,53,67,71,78, 81, 109,134,136,171	Resistor MF 100K 1% 0805	18
223-0184-00	R26,64	Resistor MF 180K 1% 0805	2
223-0224-00	R163,177	Resistor MF 220K 1% 0805	2
223-0334-00	R31,69,129,145,147,175	Resistor MF 330K 1% 0805	6
223-0684-00	R169	Resistor MF 680K 1% 0805	1
223-0105-00	R146	Resistor MF 1M 1% 0805	1

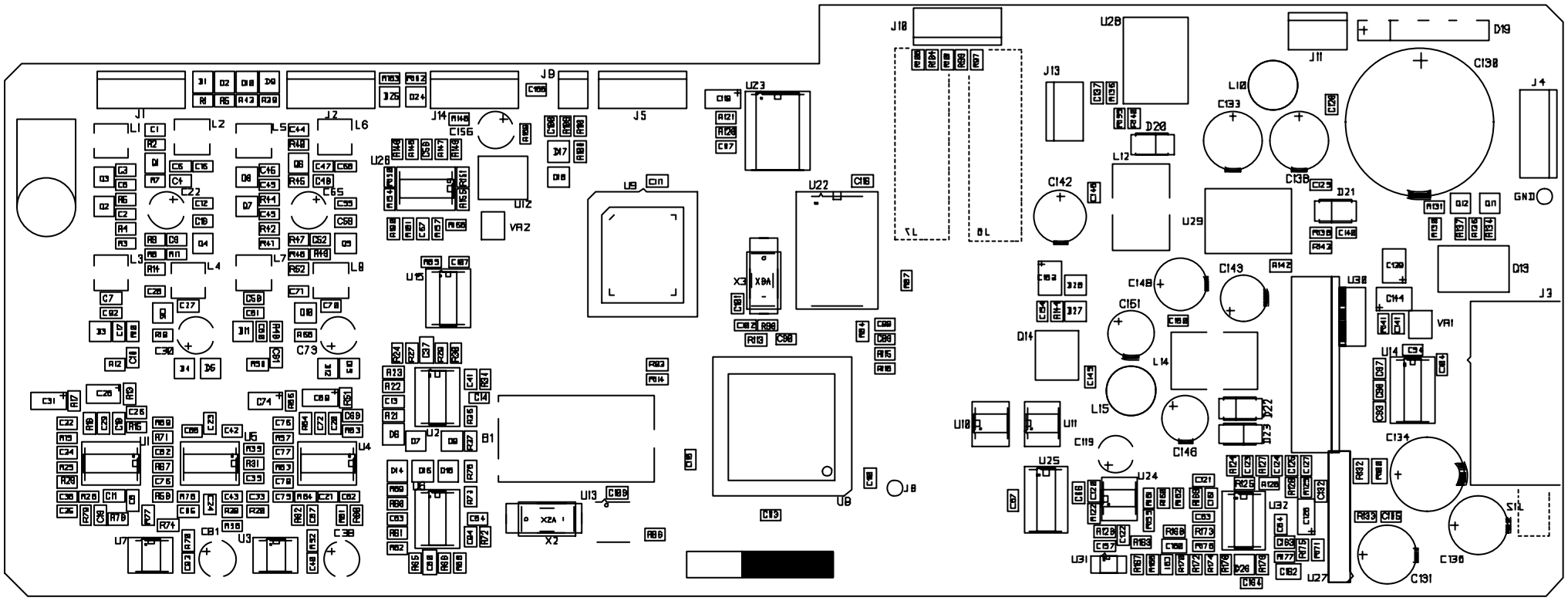
100-0106-00			
Fetatrack 310 Main PCB FT310Ms1 PQ2109			
Part Number	**Ref**	**Description**	**Quantity Per**
223-0106-00	R113	Resistor MF 10M 2% 0805	1
223-0133-00	R142	Resistor MF 13K 1% 0805	1
220-0202-00	VR1	Resistor Variable Multi-Turn SM 2K 3224W	1
220-0502-00	VR2	Resistor Variable Multi-Turn SM 5K 3224W	1
311-0226-00	L10,15	Inductor 22uH Panasonic ELC	2
320-0001-00	L12,14	Inductor	2
311-0838-00	L1,L5	Inductor Fixed Toco 0838 (332PN-3613X)	2
311-0842-00	L3,7	Inductor Fixed Toco 0842 (332PN-A453HM)	2
311-0841-00	L4,8	Inductor Fixed Toco 0841 (332PN-4108HF)	2
311-0876-00	L2,6	Inductor Fixed Toco 0876 (332PN-4109N)	2
500-0036-00	J12 **(fit on reverse)**	Connector Right Angle 2 Way	1
500-0023-00	J9	Header Straight 2 Way 22-27-2021	1
500-0024-00	J11,13 **(fit on reverse)**	Header Straight 4 Way 22-27-2041	2
500-0025-00	J1,2,14	Header Straight 6 Way 22-27-2061	3
500-0040-00	J6,7 **(fit on reverse)**	Header IDC 20 Way Straight	2
500-0029-00	J3	Connector Socket RS232C D 9 way	1
900-0029-00		Heatsink Ultratec PFM1S2	1
961-0032-00		Insulating Kit TO220 Silicone	1
600-0010-00		Wire Black 24AWG UL1061 (300m Reel) UOM = Mtrs	0.12
961-0027-00		Eyelet Connector 3mm	1
961-0015-00		Screw M3x8 Pan Hd Pozi St/Steel A2	2
961-0003-00		Screw M3x6 Pan Hd Pozi St/Steel A2	2
961-0018-00		Washer M3 Plain St/Steel A2	2
961-0006-00		Washer M3 Internal Shakeproof St/Steel A2	2
961-0005-00		Nut M3 Full St/Steel A2	4
900-0030-00	B1	Battery Lithium 1/2AA 3.6v	1

100-0106-00			
Fetatrack 310 Main PCB FT310Ms1 PQ2109			
Part Number	**Ref**	**Description**	**Quantity**
			Per
800-0029-00		PCB Fetatrack 310 FT310ms1	1

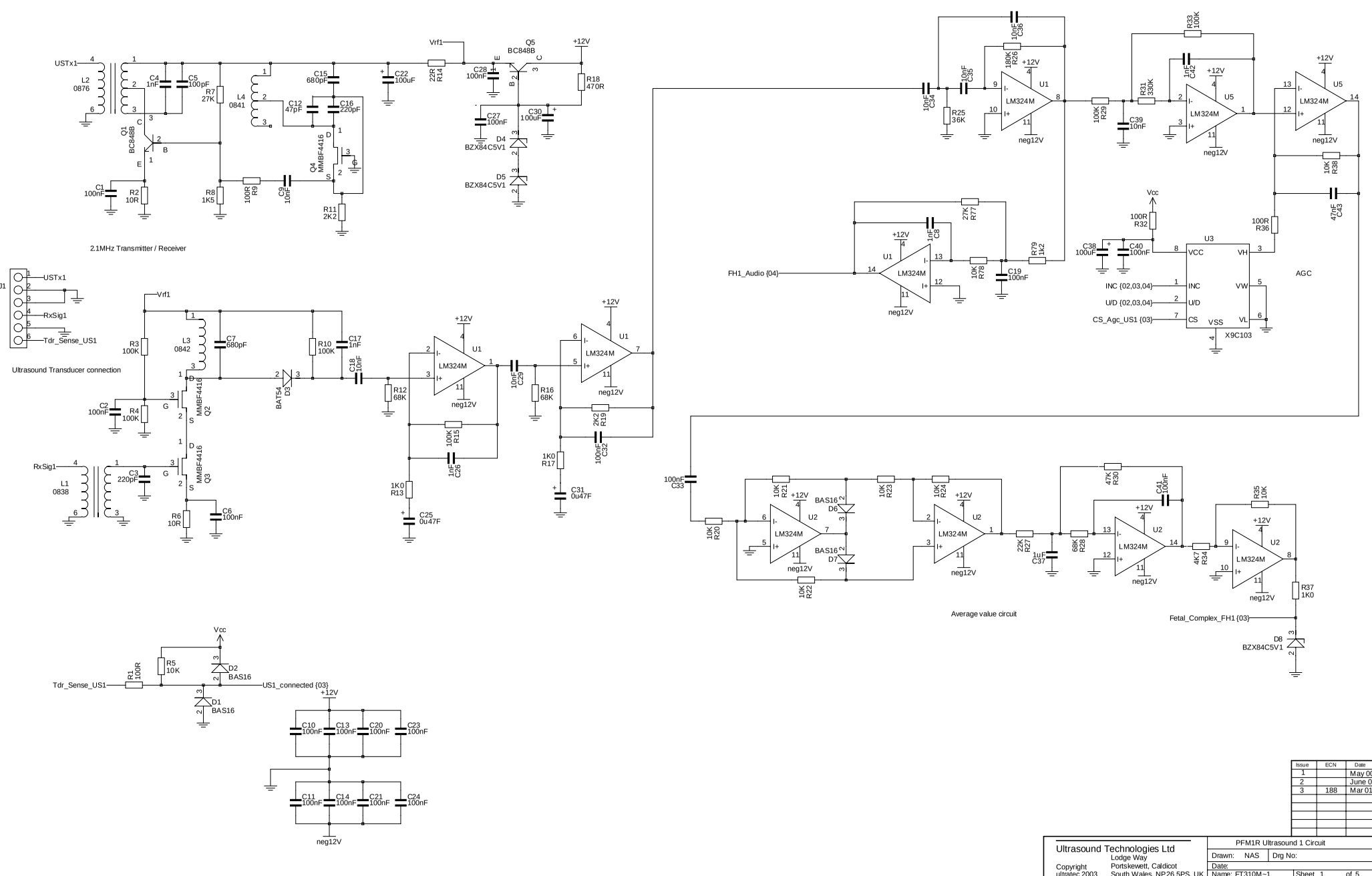
100-0042-00		
F310 Ultrasound 1 Transducer Yellow (Seward)		
Part Number	**Description**	**Quantity**
		Per
100-1094-00	Faceplate Seward Ultrasound 0210-3239	1
100-1130-00	Transducer Body White Seward 0210-3232	1
100-1141-00	Label FHR US1/US2 F360 Transducer	1
500-0007-00	Connector Plug Redel/ODU Yellow	1
500-0061-00	Lemo Collett 5.2mm	1
600-0019-01	Cable 360 Transducer US1/US2 Seward Grey 2m lengths	1
800-0027-00	Crystal Set Seward Transducer consisting of 1pcs. – Pz27 Discs	1
800-0031-00	PCB Ultrasound F310 Transducer iss 6	1
900-0039-00	Grommet Extended Black Rubber Small	1
100-1140-00	Label Serial Number 33 Series F360 Transducer	1
900-0008-00	Cable Tie	1

100-0118-00		
F310 Toco Transducer Grey (Seward)		
Part Number	**Description**	**Quantity**
		Per
100-1072-00	Probe Cable Clamp PD120 PD1D132-101	1
100-1087-00	Membrane PVC Seward To-Co Transducer	1
100-1130-00	Transducer Body White Seward 0210-3232	1
100-1131-00	Faceplate Toco Seward F360	1
100-1132-00	Toco Button F360 Transducer F360D126-101	1
100-1133-00	Toco Clamp Ring F360 Transducer F360D125-101	1
100-1134-00	Toco Spring Diaphragm F360 Transducer	1
100-1135-00	Toco Adjustment Plate F360 Transducer F360D128-101	1
100-1137-00	Toco Beam Assy F360 Transducer (includes hardware)	1
100-1138-00	Label UA F360 Toco Transducer	1
500-0009-00	Connector Plug Redel/ODU Grey	1
500-0061-00	Lemo Collett 5.2mm	1
600-0012-01	Cable K2 Tri Pair Toco (Cut to 2m lenghts)	1
800-0032-00	PCB Toco F360 Transducer iss	1
900-0039-00	Grommet Extended Black Rubber Small	1
961-0053-00	Toco Button Screw F360 Transducer F360127-101	1
961-0054-00	Screw M2x6 Pan Hd Pozi St/Steel A2	3
961-0055-00	Screw M2x5 Csk Hd Pozi St/Steel A2	3
961-0056-00	Screw M2x6 Csk Hd Pozi St/Steel A2	2
100-1136-00	Label Serial Number 34 Series F360 Transducer	1

100-0052-00		
F310 Ultrasound 2 Transducer Blue (Seward)		
Part Number	**Description**	**Quantity**
		Per
100-1094-00	Faceplate Seward Ultrasound 0210-3239	1
100-1130-00	Transducer Body White Seward 0210-3232	1
100-1141-00	Label FHR US1/US2 F360 Transducer	1
500-0008-00	Connector Plug Redel/ODU Blue	1
500-0061-00	Lemo Collett 5.2mm	1
600-0019-01	Cable 360 Transducer US1/US2 Seward Grey 2m lengths	1
800-0027-00	Crystal Set Seward Transducer consisting of 1pcs. – Pz27 Discs	1
800-0031-00	PCB Ultrasound F310 Transducer iss 6	1
900-0039-00	Grommet Extended Black Rubber Small	1
100-1140-00	Label Serial Number 33 Series F360 Transducer	1
900-0008-00	Cable Tie	1



ULTRASOUND TECHNOLOGIES LTD.
FT310M ISS.1 NOVEMBER 2004
COMPONENT ASSY OVERLAY
FT310MI-ASSY.GBX



Issue	ECN	Date
1		May 00
2		June 00
3	188	Mar 01

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

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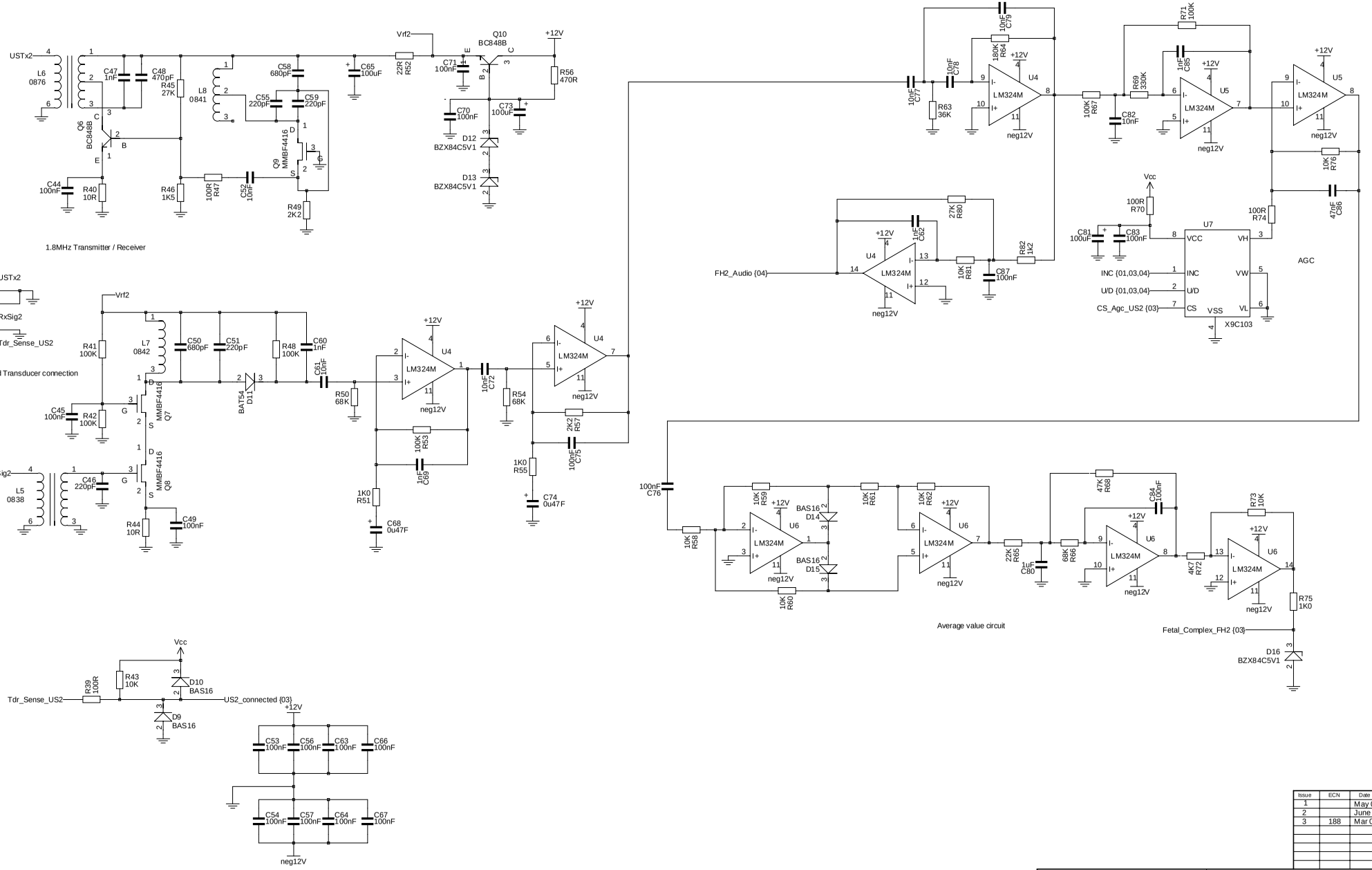
PFM1R Ultrasound 1 Circuit

Drawn: NAS | Drg No:

Date:

Name: FT310M~1 | Sheet 1 of 5



Issue	ECN	Date
1		May 00
2		June 00
3	188	Mar 01

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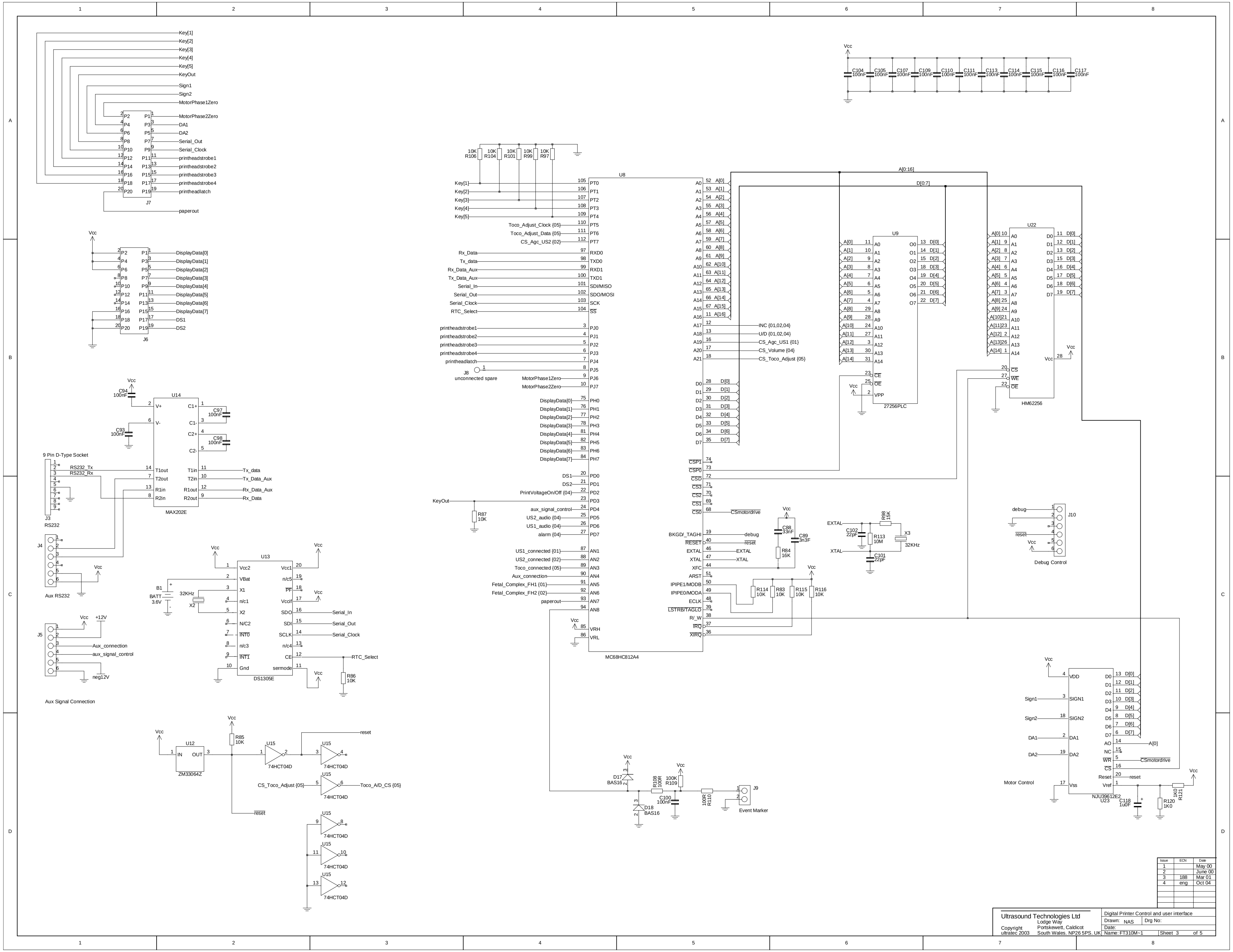
PFM1R Ultrasound 2 Circuit

Drawn: NAS | Drg No:

Date:

Name: FT310M~1 | Sheet 2 of 5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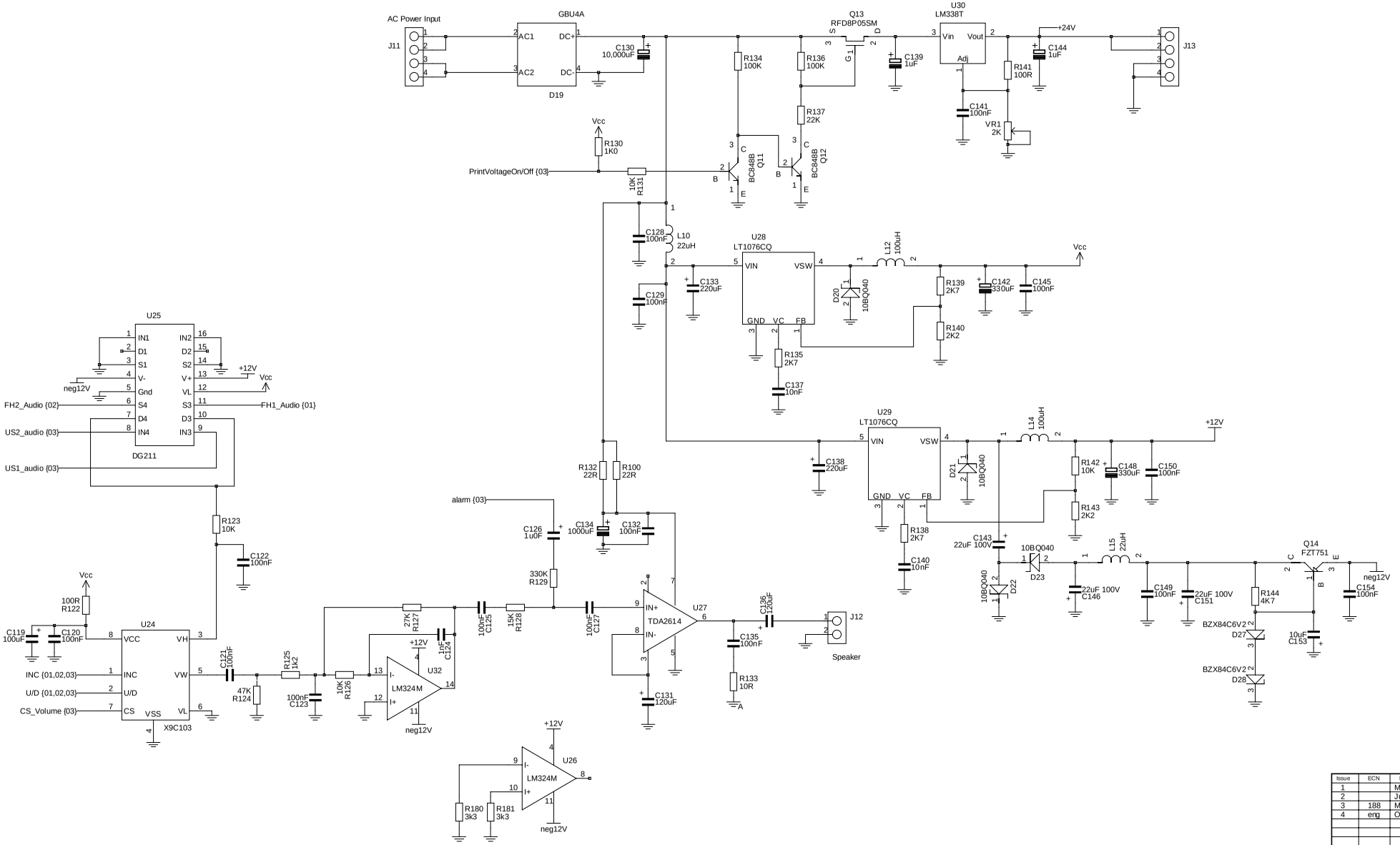
Digital Printer Control and user interface
Drawn: NAS
Drg No:
Date:
Name: FT310M−1
Sheet 3
of 5
Issue
ECN
Date
1
May 00
2
June 00
3
188
Mar 01
4
eng
Oct 04
MC68HC812A4
27256PLC
HM62256
NJU39612E2
MAX202E
DS1305E
ZM33064Z
74HCT04D
9 Pin D-Type Socket
RS232
Aux RS232
Aux Signal Connection
Debug Control
Event Marker
Motor Control



Issue	ECN	Date
1		May 00
2		June 00
3	188	Mar 01
4	eng	Oct 04

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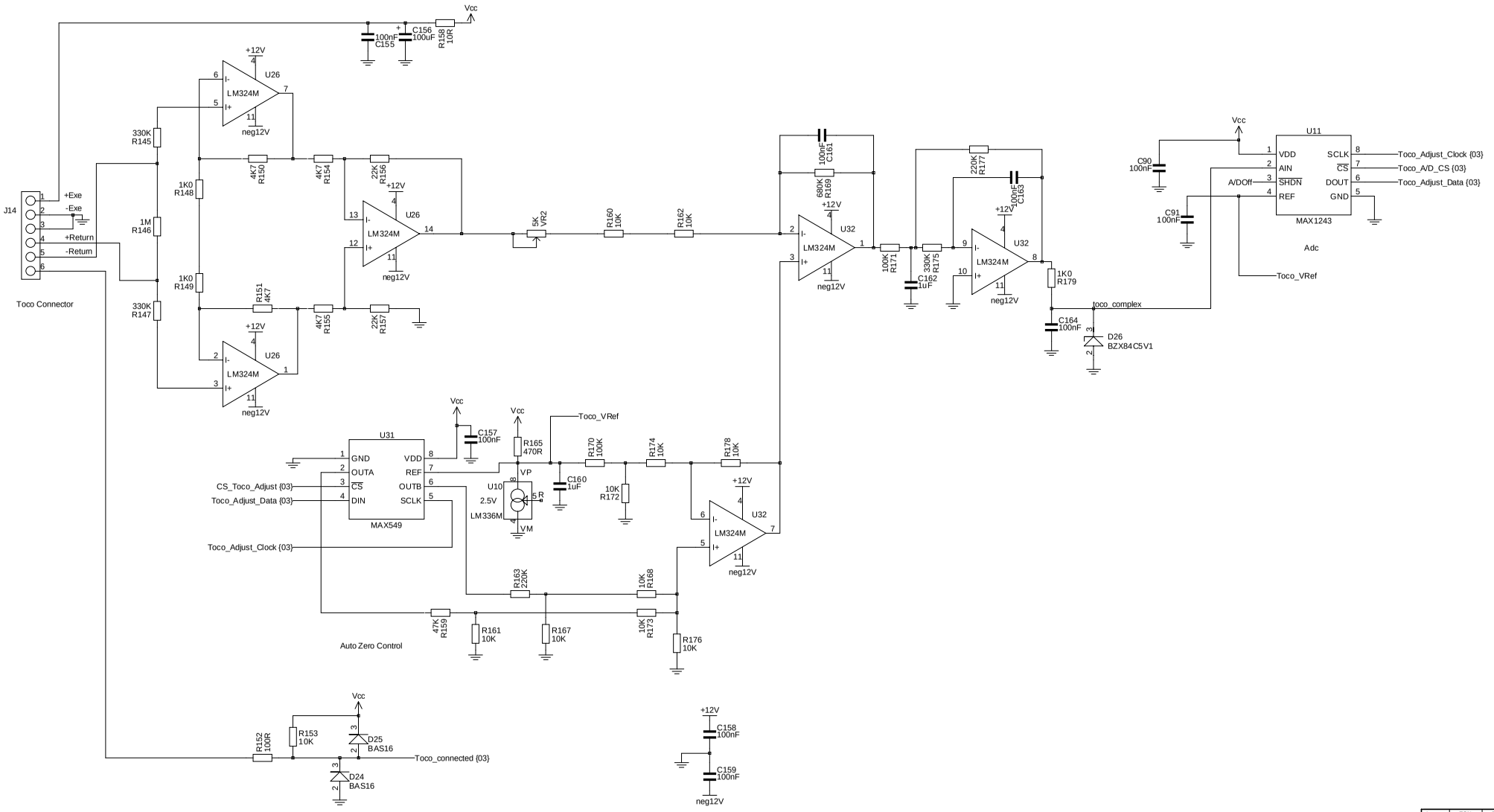
Power supplies and Audio circuit

Drawn: NAS | Drg No:

Date:

Name: FT310M~1 | Sheet 4 of 5



Issue	ECN	Date
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2		June 00
3	188	Mar 01

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Lodge Way
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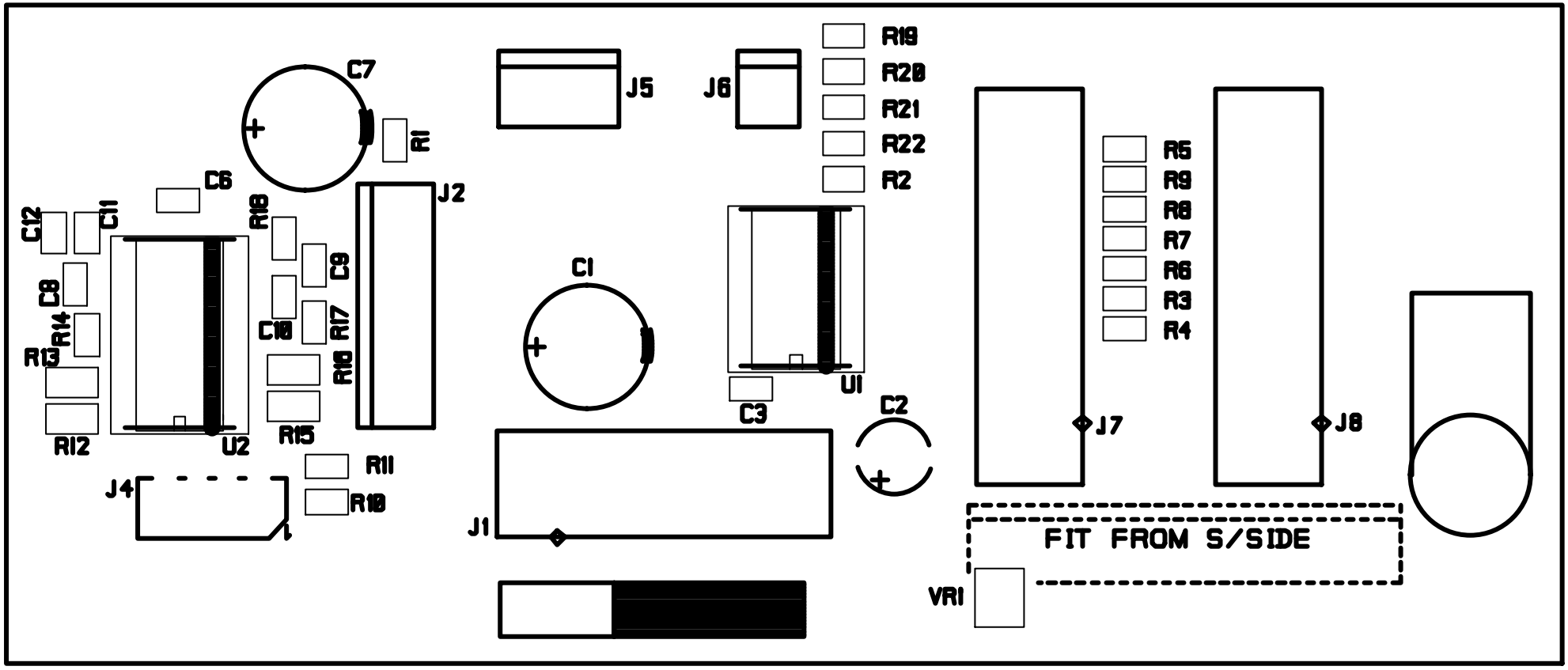
South Wales, NP26 5PS, UK

PFM1R Toco Circuit

Drawn: RN | Drg No:

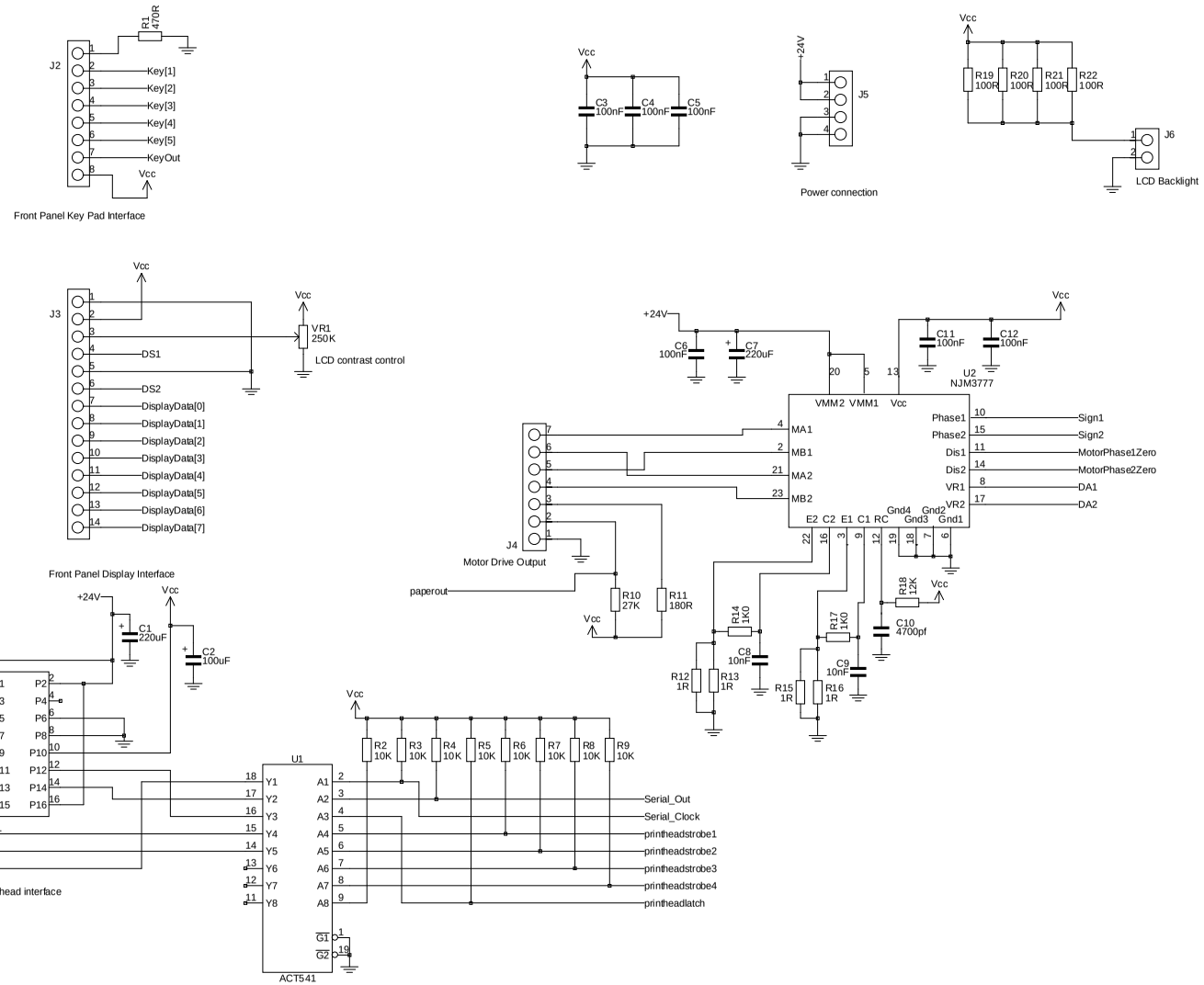
Date:

Name: FT310M~1 | Sheet 5 of 5



ULTRASOUND TECHNOLOGIES LTD.
FT310FP ISS.1 OCTOBER 2004

COMPONENT ASSY OVERLAY
FT310FP1-ASSY.GBX



Issue	ECN	Date
1	eng	Oct 04

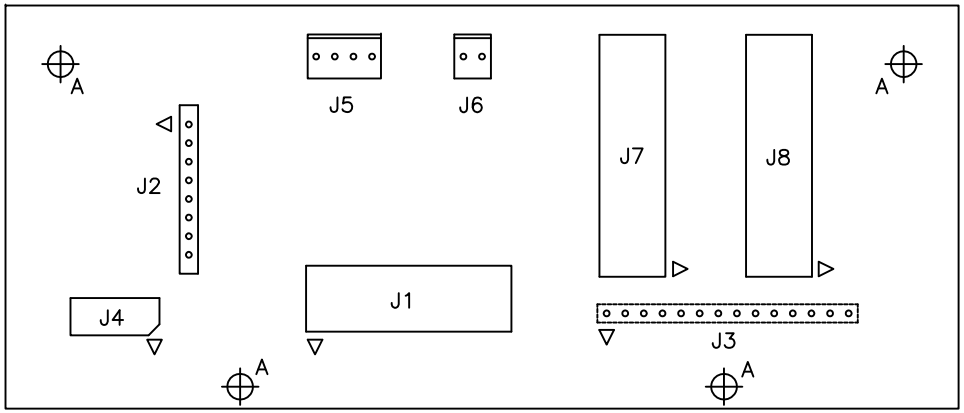
Ultrasound Technologies Ltd
Lodge Way
Portskewett, Caldicot
South Wales, NP26 5PS, UK

Fetatrack 310 recorder interface board

Drawn: NAS | Drg No:

Date:

Name: FT310F~1 | Sheet 1 of 1



'A' holes – 3.5mm dia.

ISSUE	1
DATE	06–12–04
DRAWN	k nancollis
CHECK	
A.N.NO.	

MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE: Not to scale / DIMENSIONS: mm	USED ON: Feta 310
FINISH:	0 / 0.0 / 0.00 / 0.000 / ANGULAR	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	Fetatrack 310 Cable Interface Board – Connector positioning	DRAWING No. F310D100–101	SHEET 1 OF 1
		3rd ANGLE PROJECTION DO NOT SCALE PRINT			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.			

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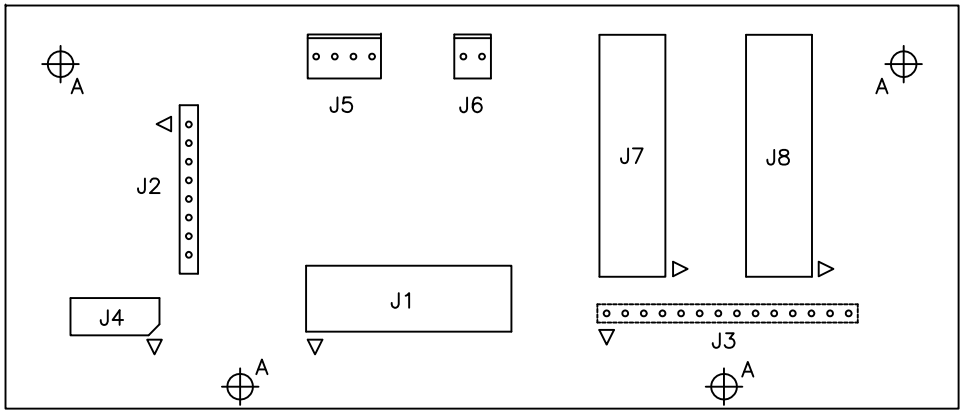
C.A.D. DRAWING



'A' holes – 3.5mm dia.

ISSUE	1
DATE	06–12–04
DRAWN	k nancollis
CHECK	
A.N.NO.	

MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE: Not to scale / DIMENSIONS: mm	USED ON: Feta 310
FINISH:	0 / 0.0 / 0.00 / 0.000 / ANGULAR	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	Fetatrack 310 Cable Interface Board – Connector positioning	DRAWING No. F310D100–101	SHEET 1 OF 1
		3rd ANGLE PROJECTION DO NOT SCALE PRINT			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.			

A4

C.A.D. DRAWING

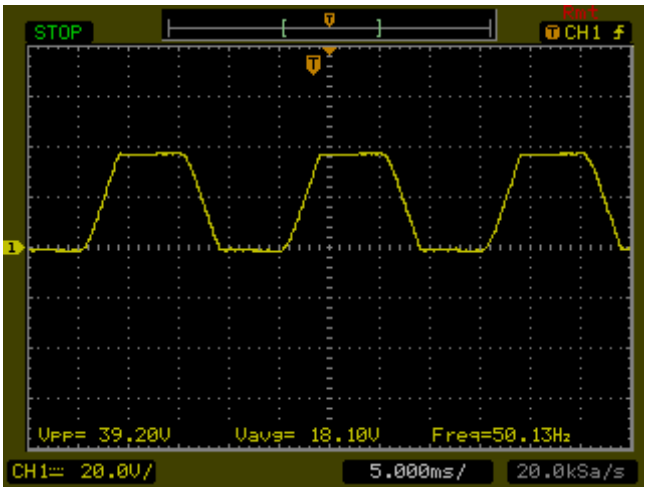
Ultrasound Technologies Service Engineer Guide

Document contains information of signals at key points throughout the specified product.

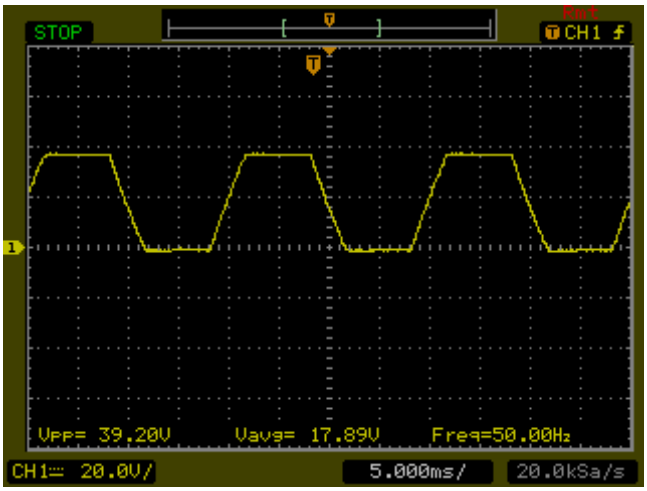
- Fetatrack 310

The following images are oscilloscope snap shots of signals acquired from the Fetatrack 310 main PCB and correspond to the ‘Fetatrack 310 Power Supplies and Audio Circuit’ diagram.

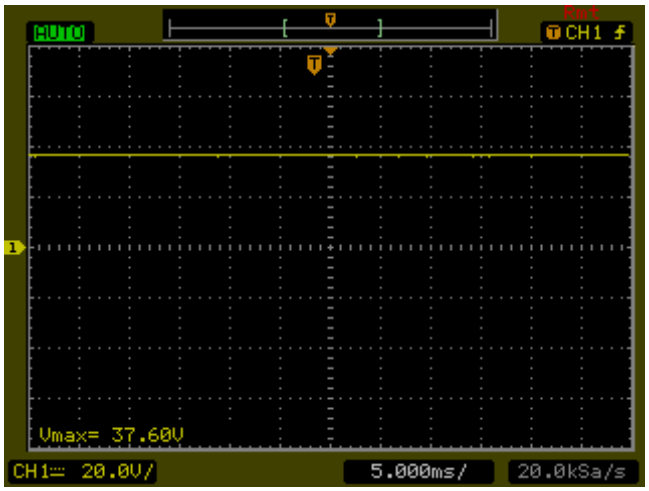
Note: images of digital signals that are directly linked to the microprocessor can be found on the oscilloscope image document related to the ‘Fetatrack 310 digital central processor’ diagram.



J11 pin 1
AC power input

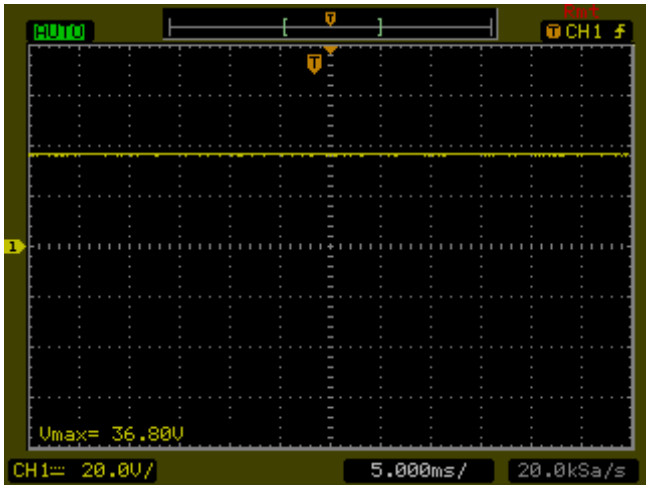


J111 pin 4
AC power input

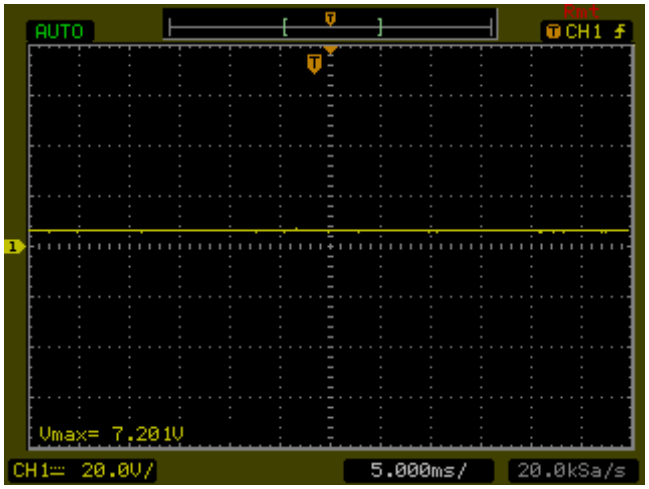


D19 pin 1, DC supply rail.

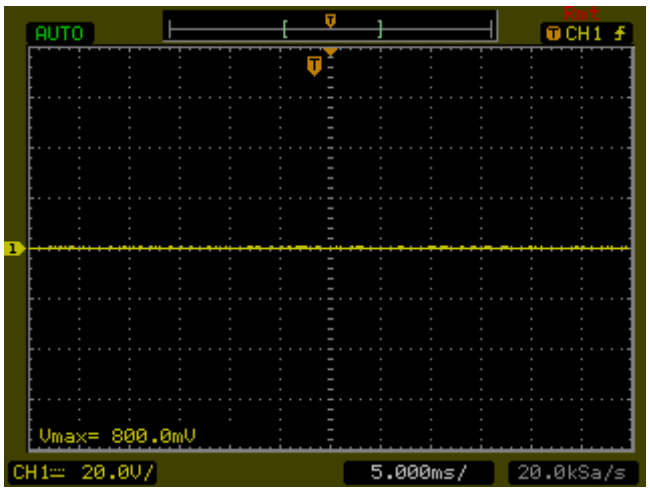
Pin 4 = GND



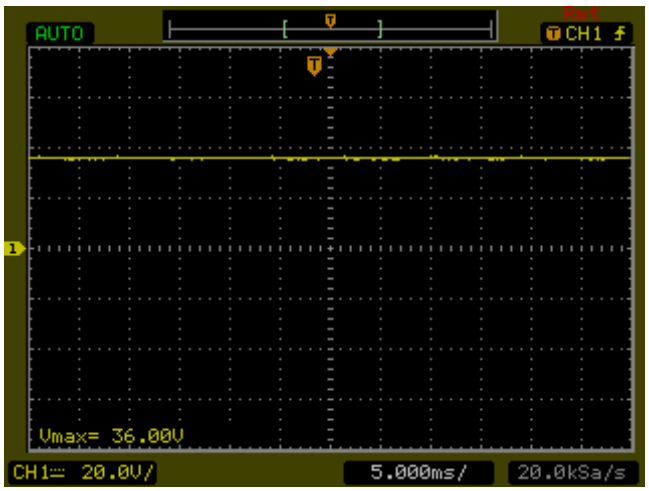
Q13 gate,
Unit not printing



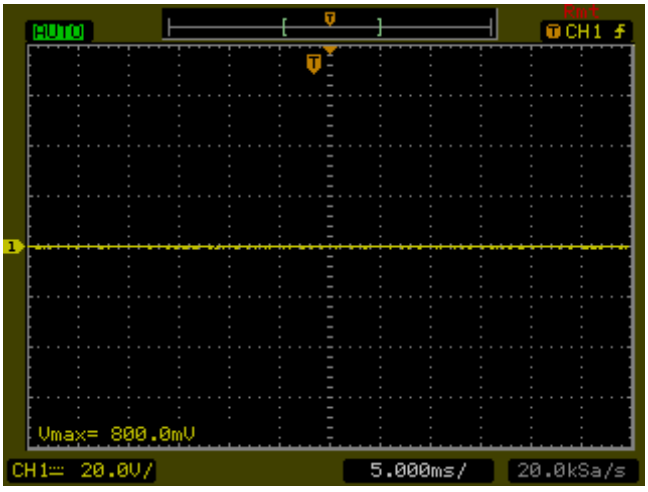
Q13 gate
Unit printing



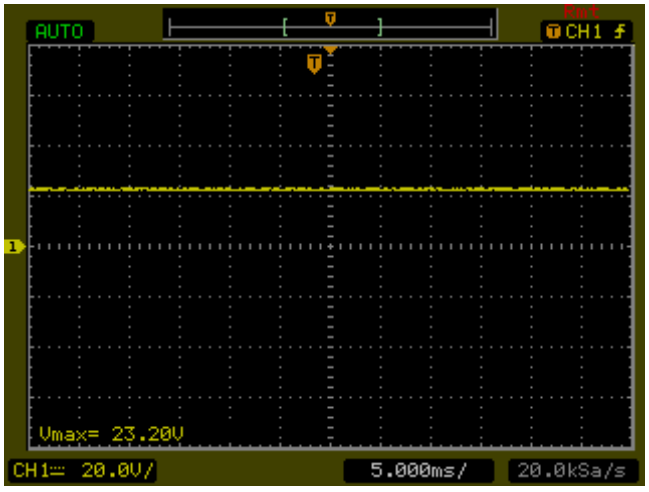
Q13 drain
Unit not printing



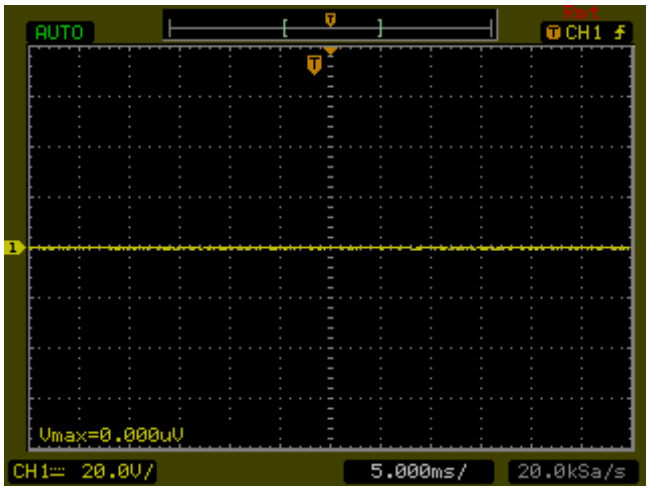
Q13 drain
Unit printing



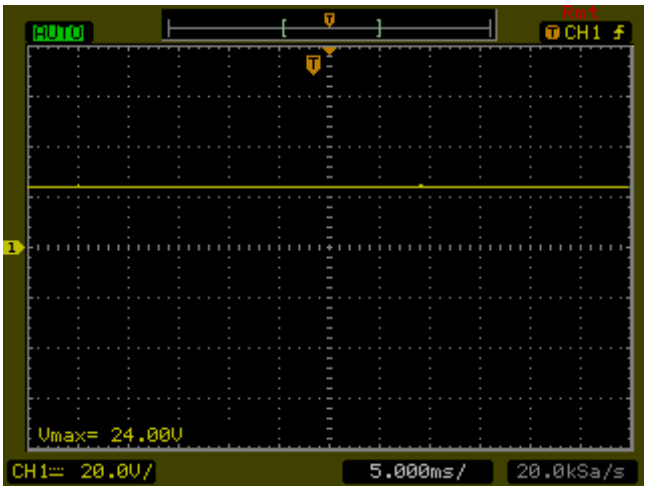
U30 pin 1
Unit not printing



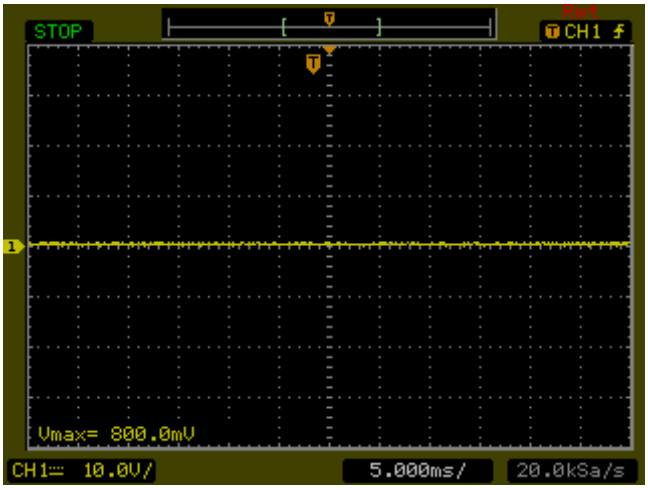
U30 pin 1
Unit printing



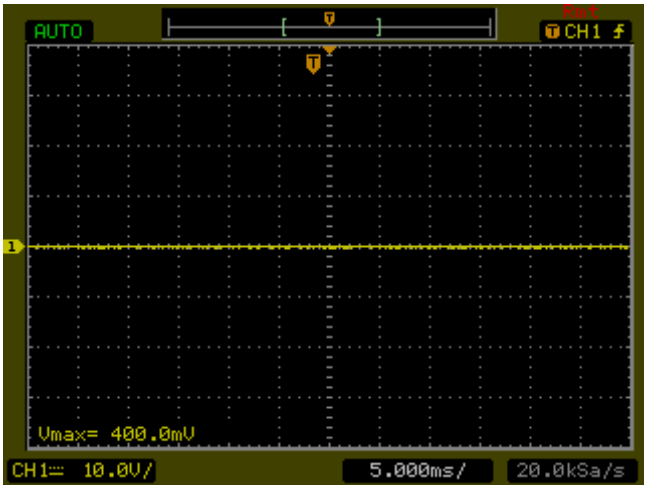
U30 pin 2
Unit not printing



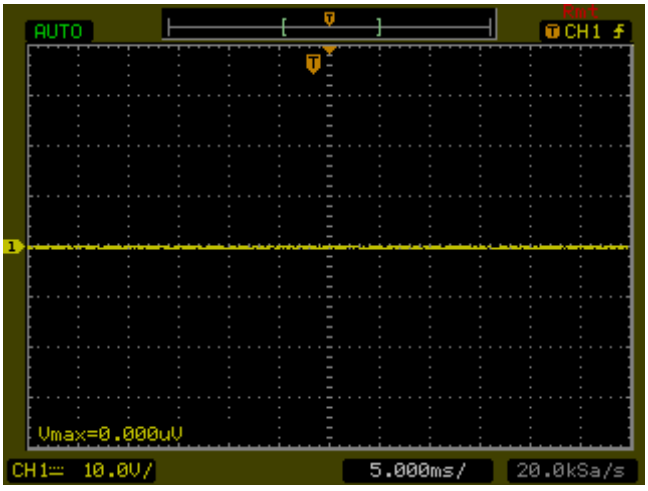
U30 pin 2
Unit printing



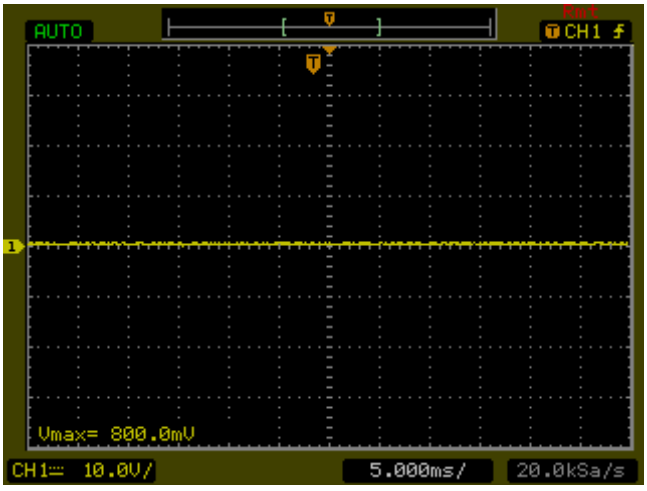
Q11 base
Unit not printing



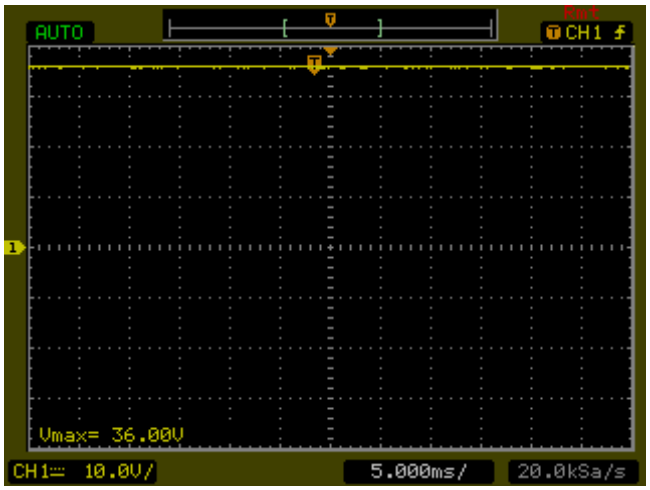
Q11 base
Unit printing



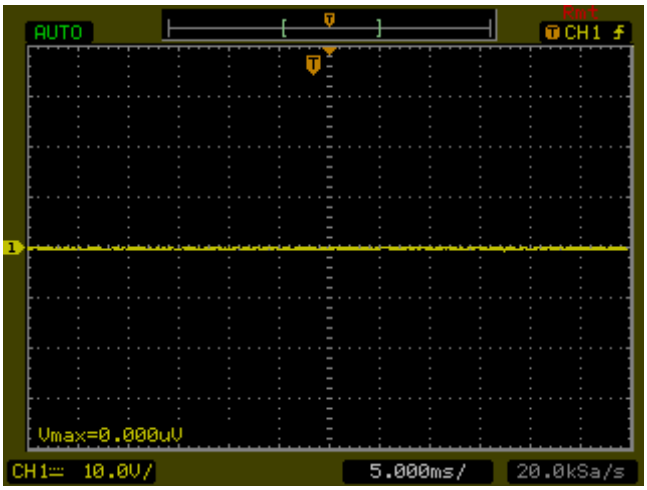
Q11 collector
Unit not printing



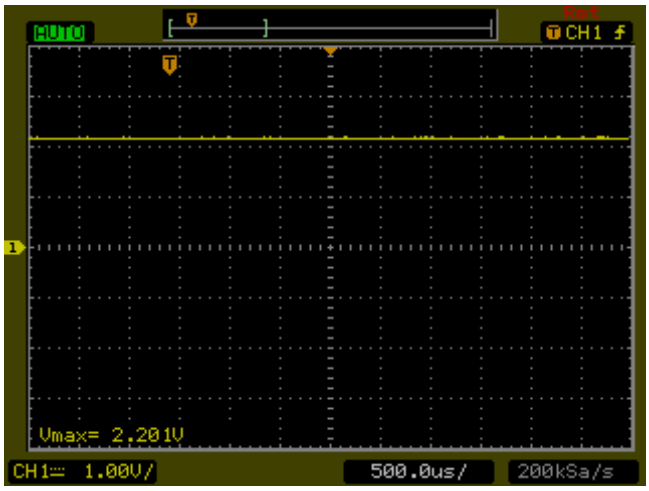
Q11 collector
Unit printing



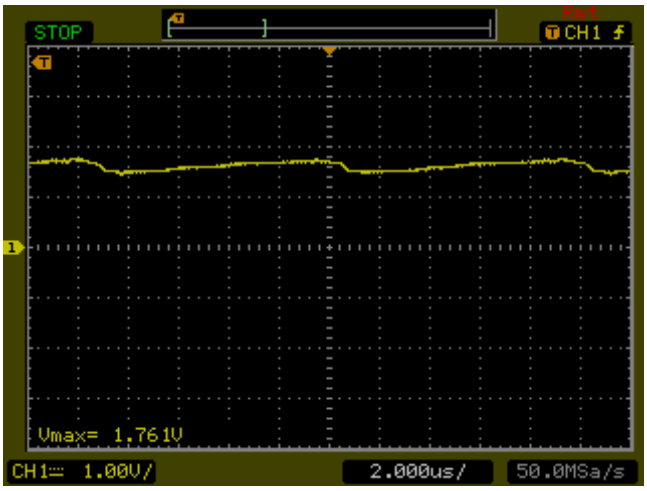
Q12 collector
Unit not printing



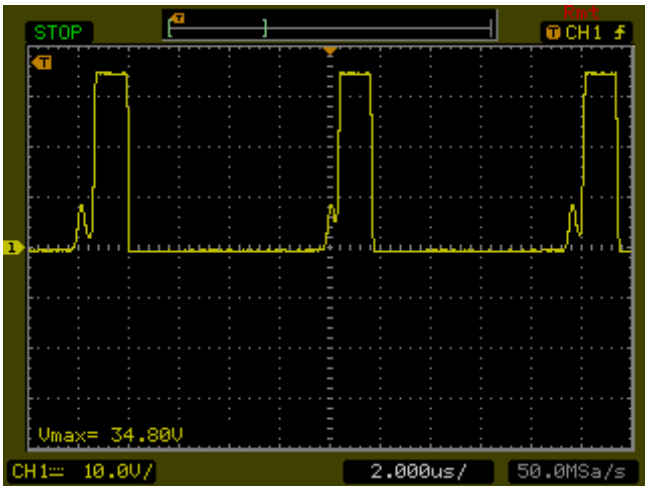
Q12 collector
Unit printing



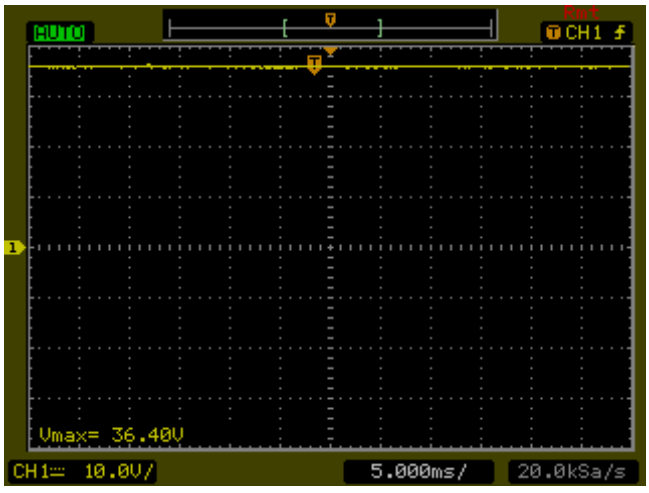
U28 pin 1



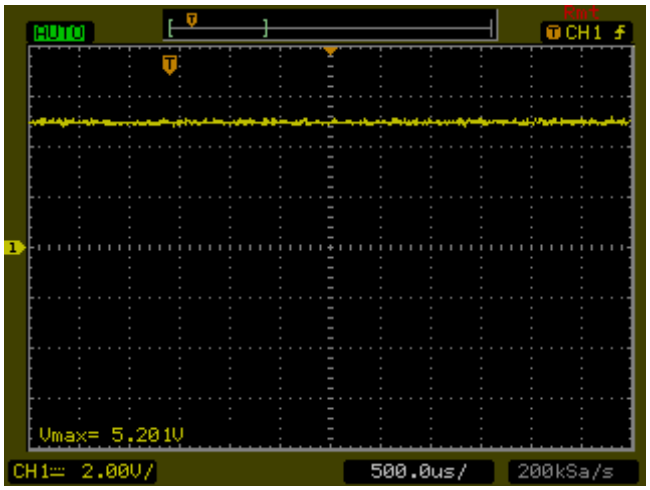
U28 pin 2



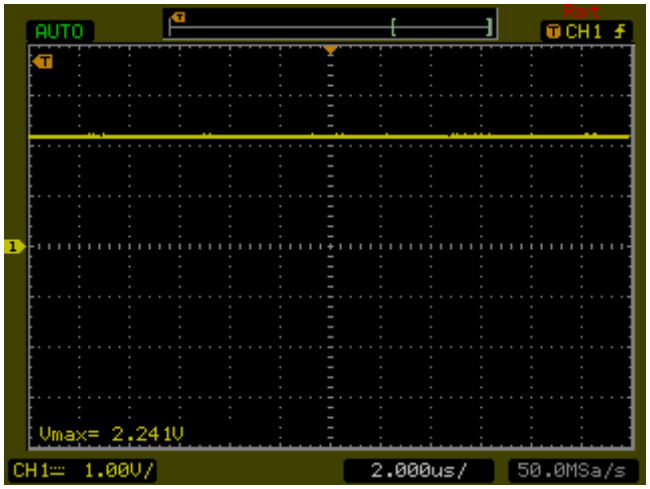
U28 pin 4



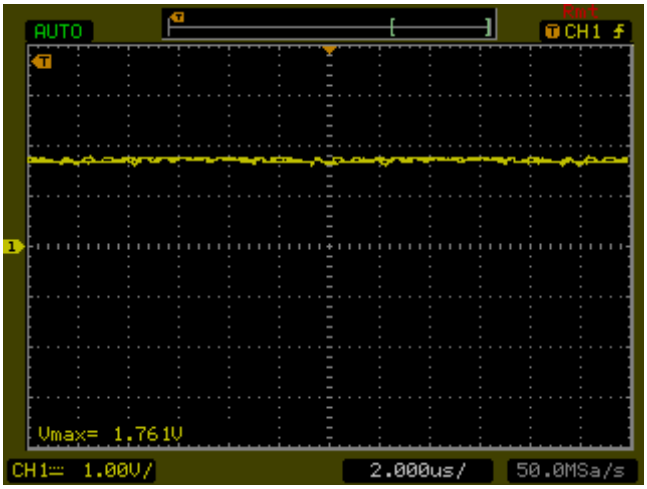
U28 pin 5



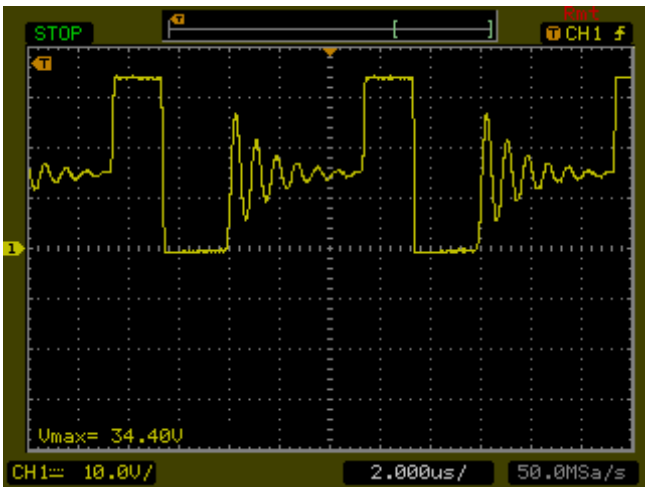
L12 pin 2,
VCC



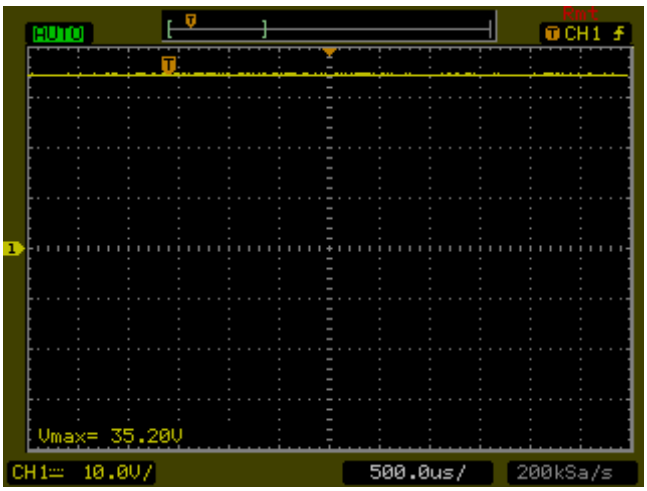
U29 pin 1



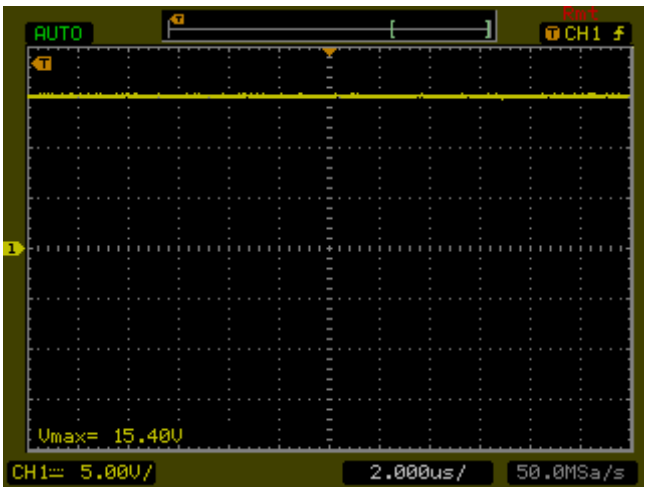
U29 pin 2



U29 pin 4

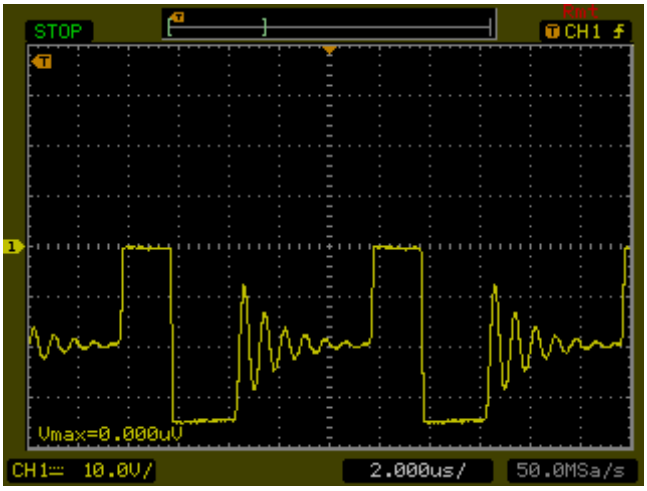


U29 pin 5

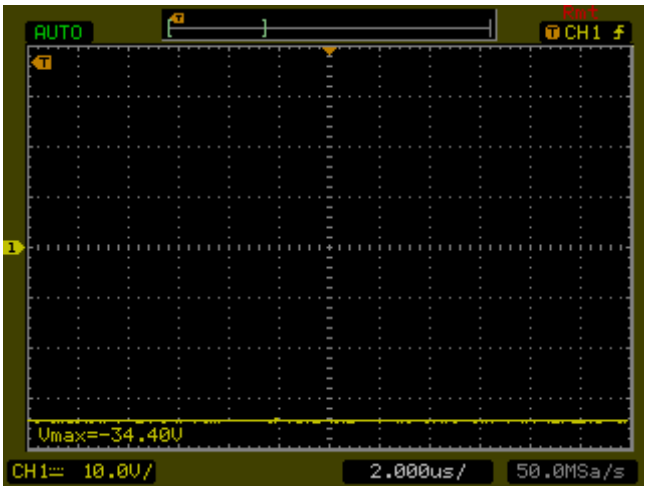


L14 pin 2

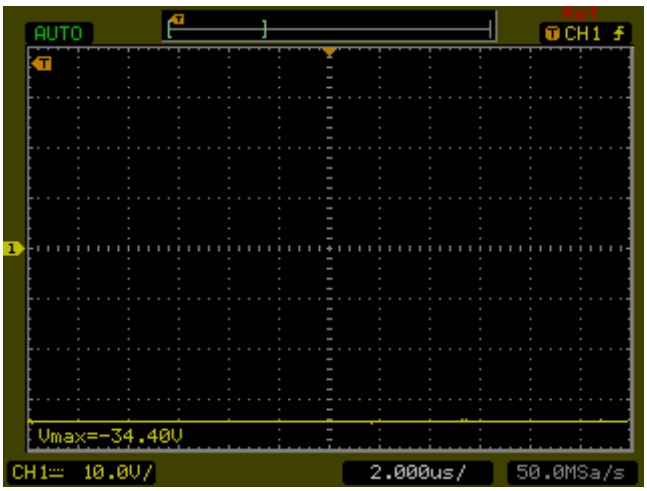
+ 15V Supply Rail



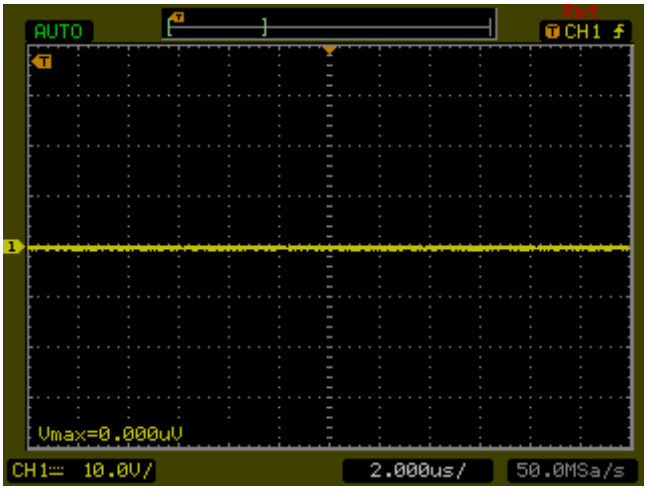
D22 pin 2, D23 pin 1 Junction



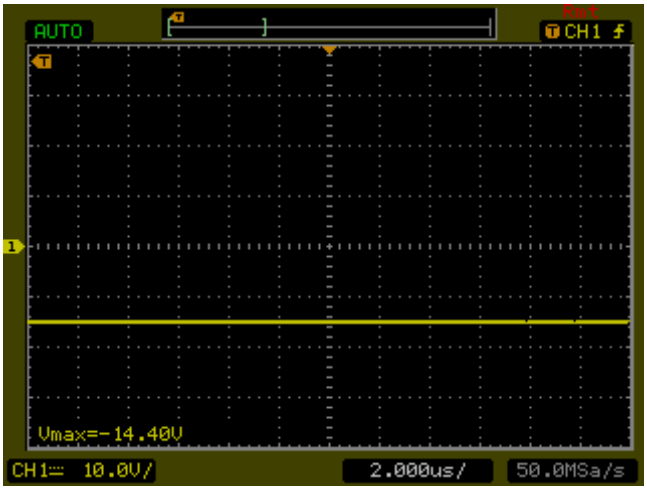
L15 pin 1



Q14 Collector

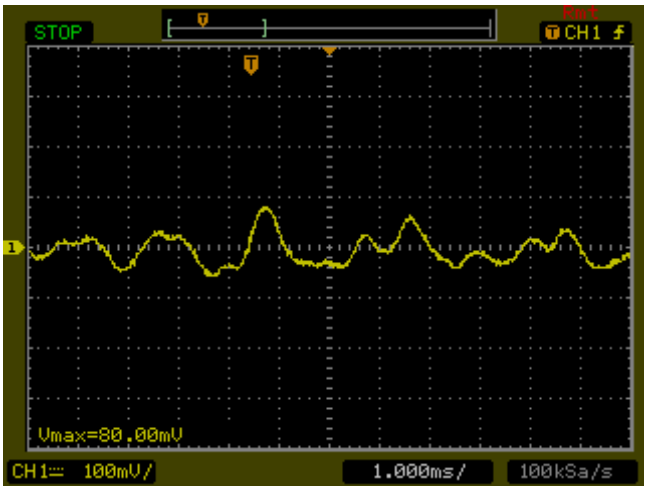


Q14 Base



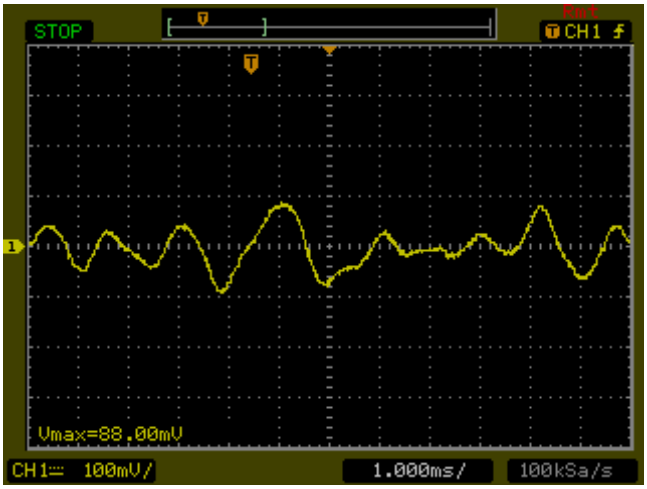
Q14 Emitter

- 15V Supply Rail



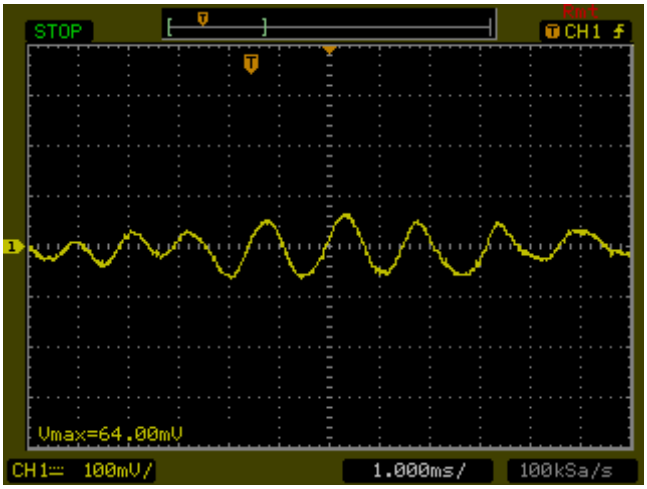
U25 Pins 10 & 7

Image captured whilst stroking US1 transducer



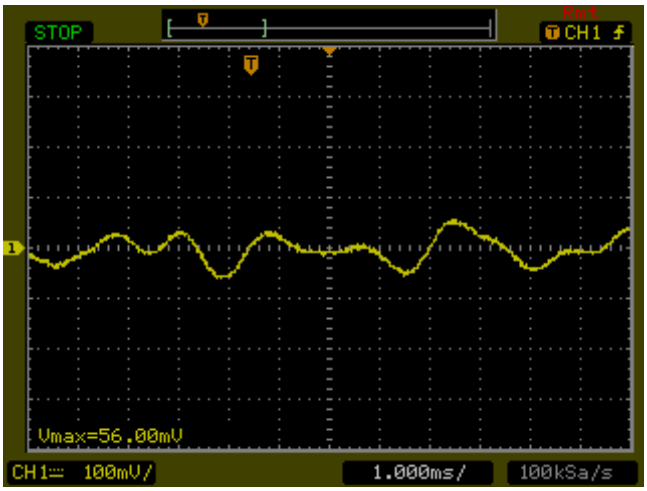
U25 Pins 10 & 7

Image captured whilst stroking US2 transducer



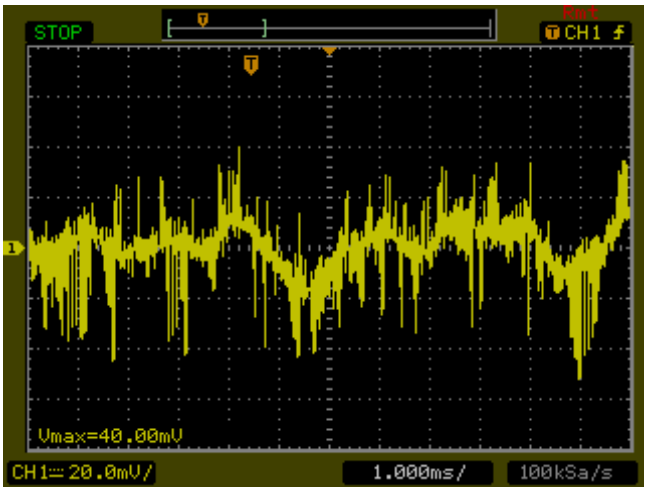
U25 Pins 10 & 7

Image captured whilst stroking US1 & US2 transducers simultaneously.



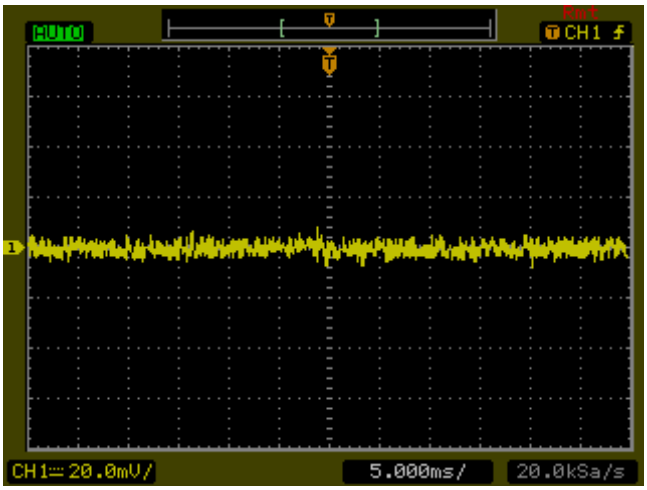
U24 Pin 3

Image captured whilst stroking US1 transducer. Use with US2 transducer will result in an equivalent signal.



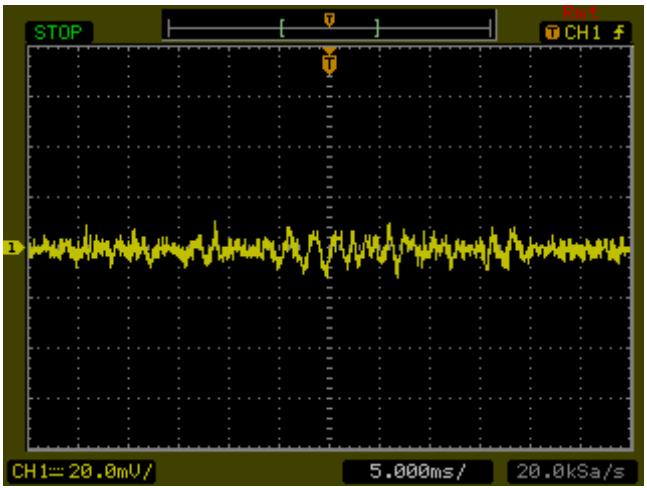
U24 Pin 5

Image captured whilst stroking US1 transducer. Use with US2 transducer will result in an equivalent signal.



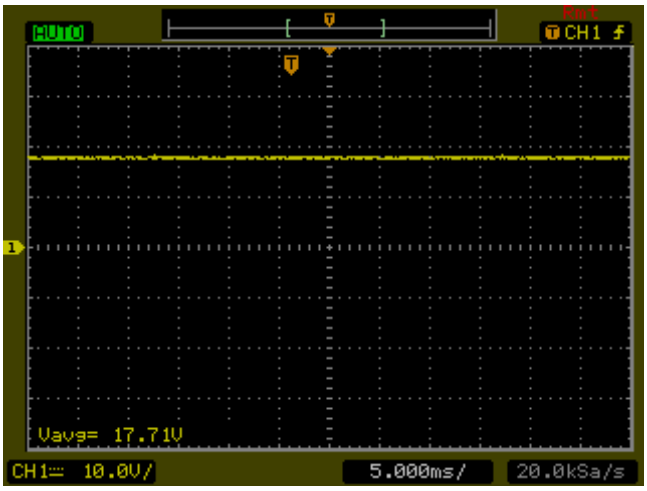
U32 Pin 13

Image captured whilst stroking US1 transducer. Use with US2 transducer will result in an equivalent signal.



U32 Pin 14

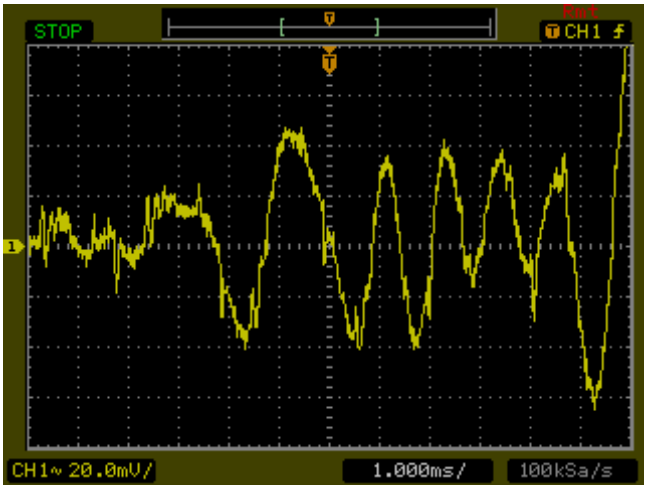
Image captured whilst stroking US1 transducer. Use with US2 transducer will result in an equivalent signal.



U27 Pin 9

DC level with super imposed audio signal.

Audio signal level very low.

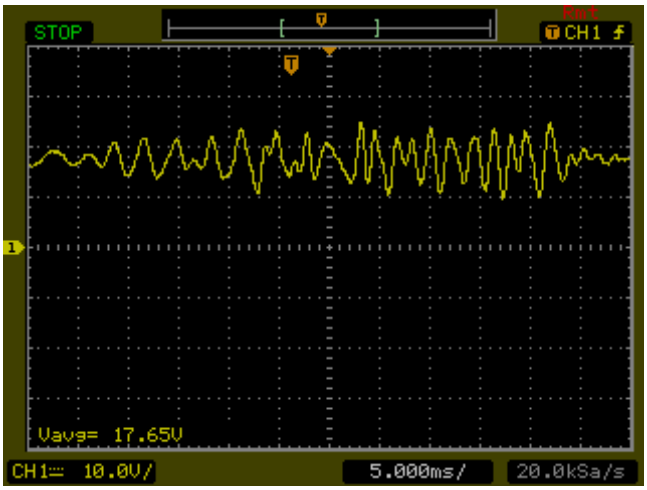


U27 Pin 9

DC level with superimposed audio signal

Audio signal very low.

(zoomed in image of audio signal)



U27 Pin 6

DC level with superimposed audio signal.

Audio signal of audible amplitude.

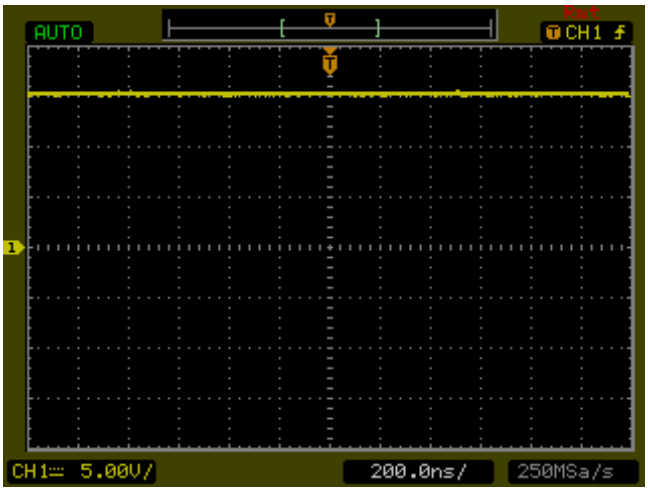
Ultrasound Technologies Service Engineer Guide

Document contains information of signals at key points throughout the specified product.

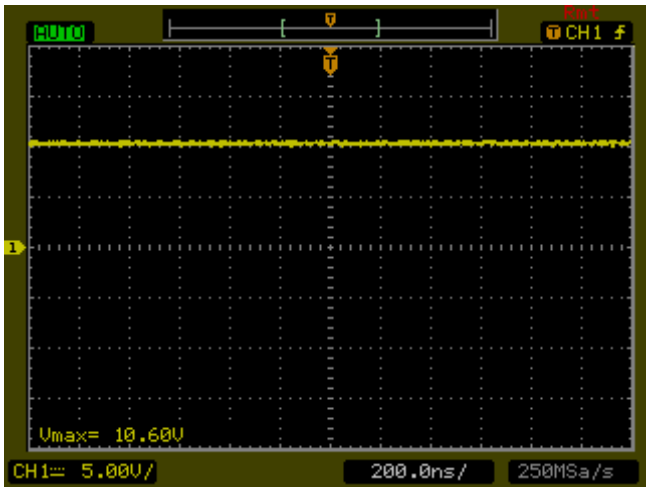
- Fetatrack 310

The following images are oscilloscope snap shots of signals acquired from the Fetatrack 310 main PCB and correspond to the ‘Fetatrack 310 Ultrasound 1 Circuit’ diagram. This document also applies to the two Ultrasound circuits. The service engineer should allow for signal differences on the transmit side of the circuit as US1 & US2 transmit signals of different frequencies and amplitude.

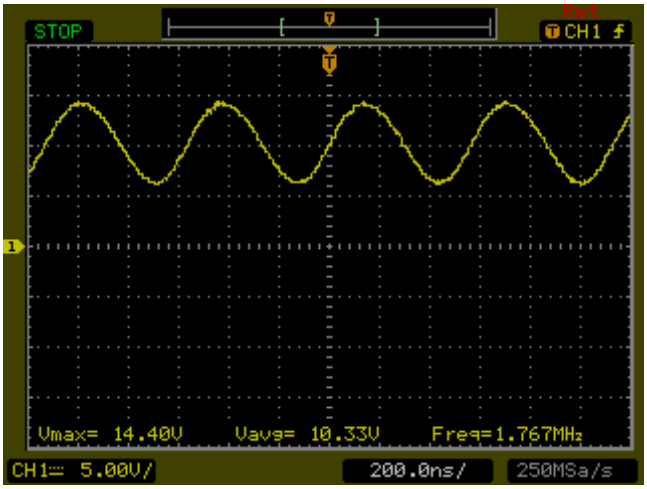
Note: images of digital signals that are directly linked to the microprocessor can be found on the oscilloscope image document related to the ‘Fetatrack 310 digital central processor’ diagram.



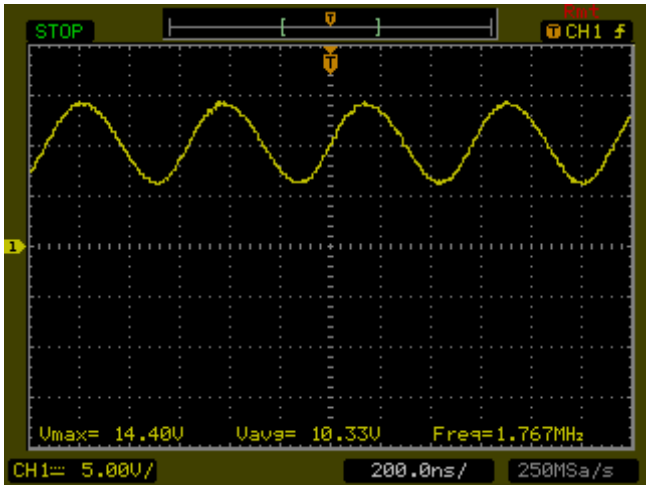
Transmitter circuit
U16 pin 3
+ 15V supply rail



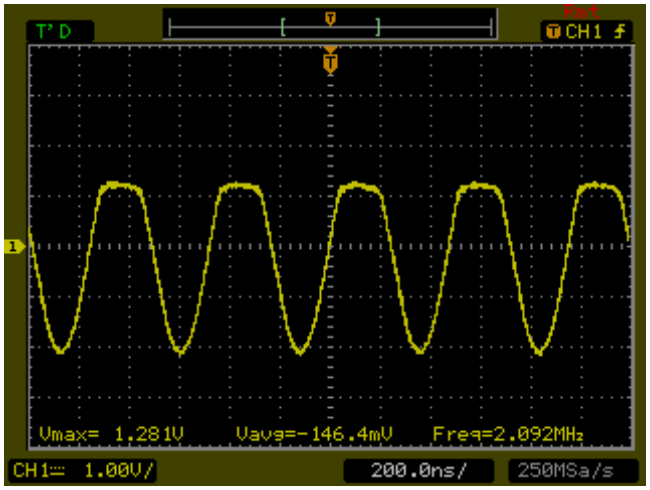
Transmitter circuit
U16 pin 1
+ 10V (Vrf1) Supply rail



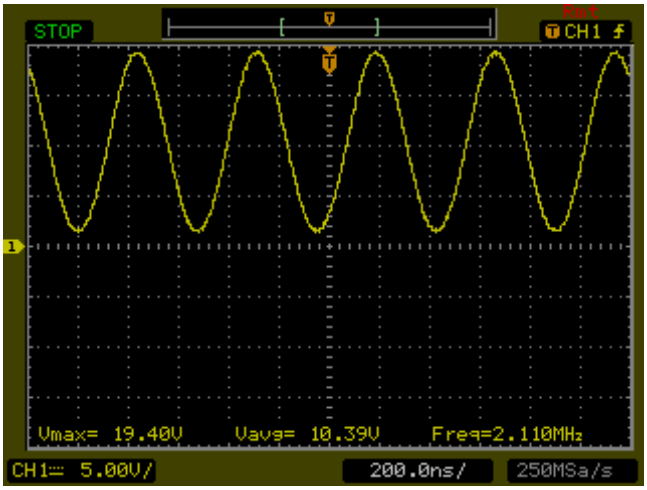
Transmitter circuit
Q4 Drain (pin 1)



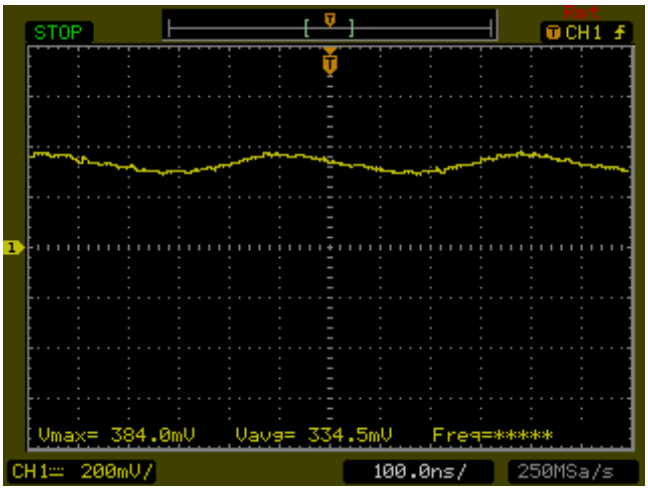
Transmitter circuit
Q4 Source (pin 2)



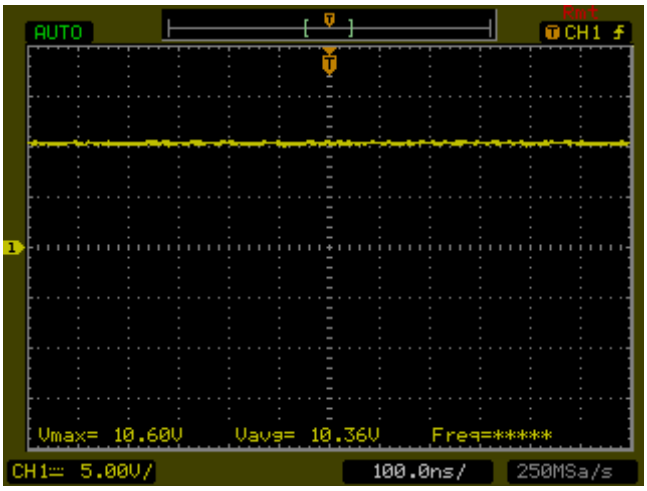
Transmitter circuit
Q1 Base (Pin 2)



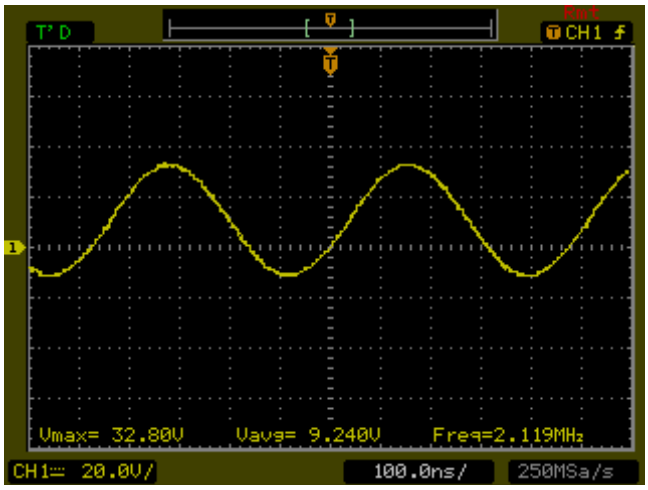
Transmitter circuit
Q1 Collector (Pin 3)



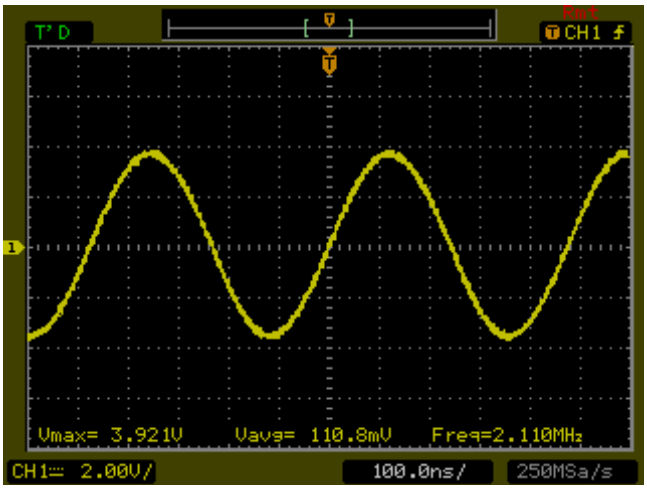
Transmitter circuit
Q1 Emitter (Pin 2)



Transmitter circuit
L2 Pin 1
(Vrf1) 10V Supply rail

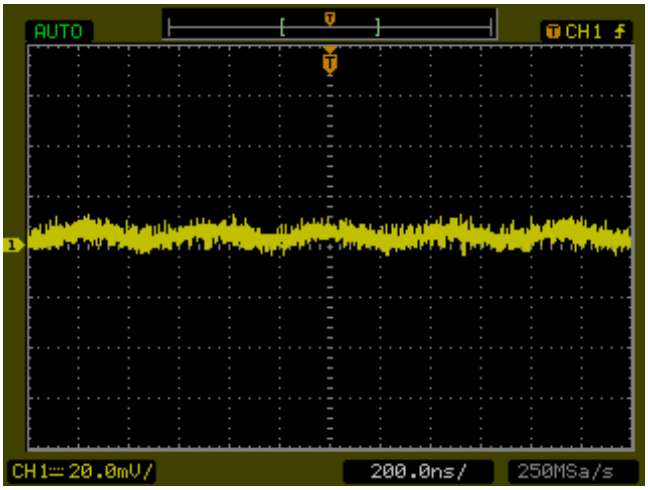


Transmitter circuit
L2 Pin 3

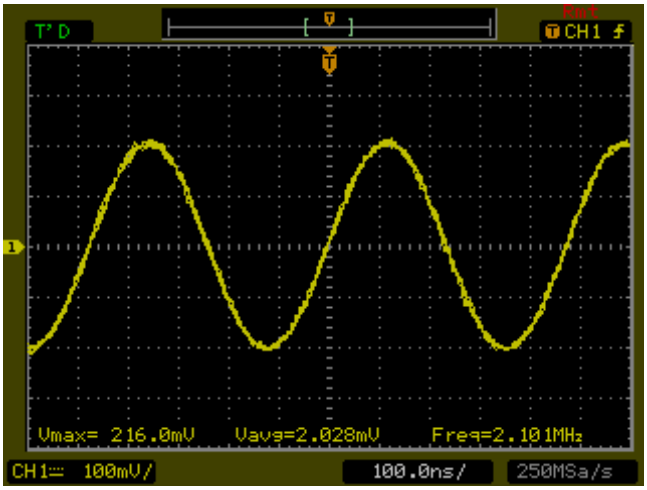


Transmitter circuit
L2 Pin 4
Transmit signal (USTx1)

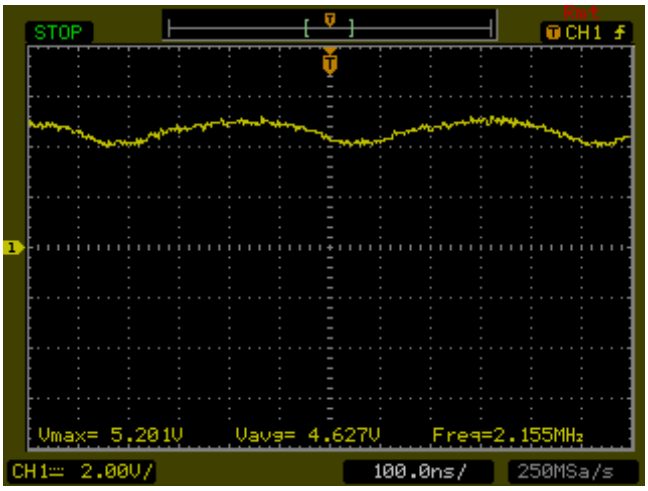
2.1Mhz for US1 1.8Mhz for US2



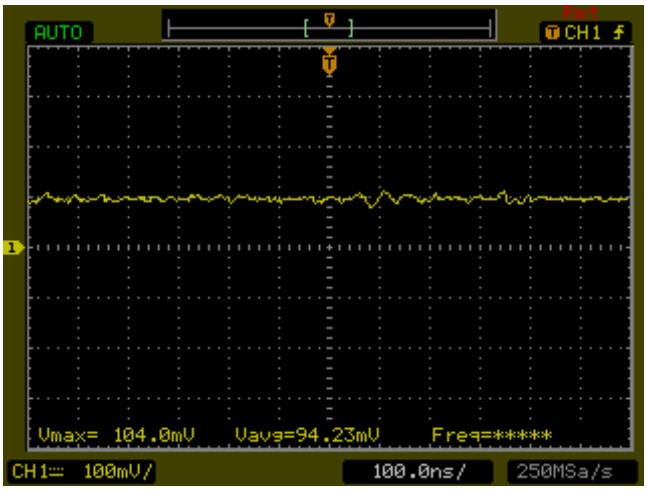
Receiver Circuit
L1 Pin 4 (RxSig1)



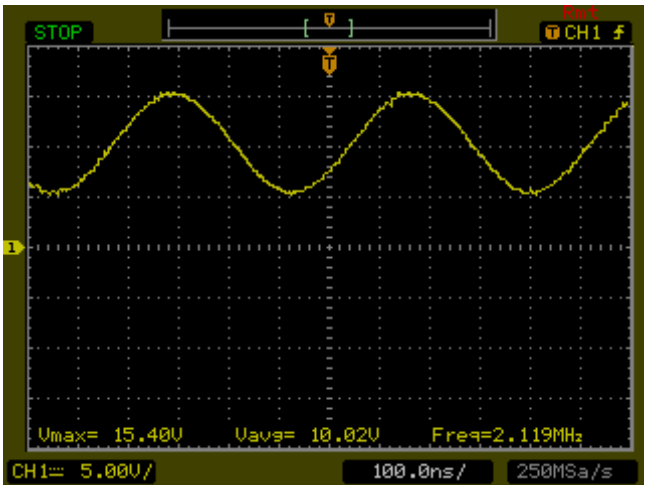
Receiver circuit
L1 Pin 1, (Q3 gate)



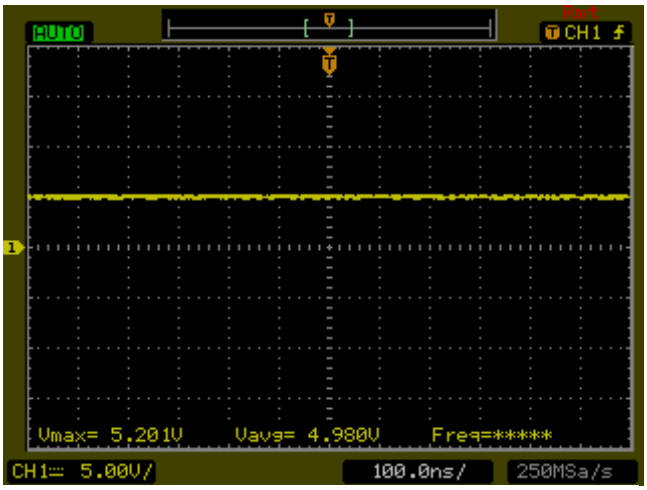
Receiver Circuit
Q3 Drain



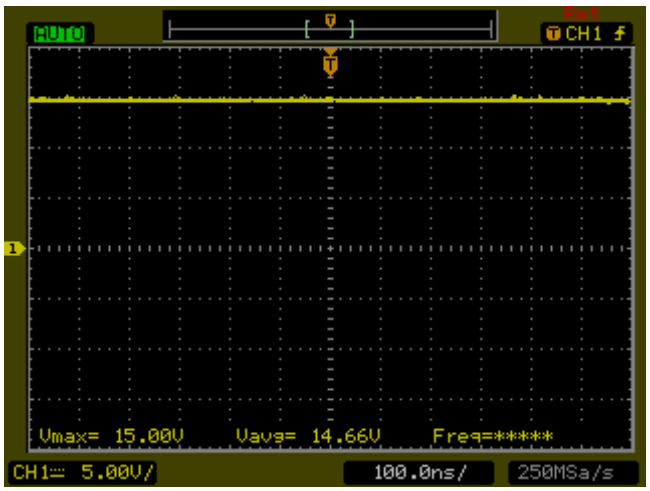
Receiver Circuit
Q3 Source



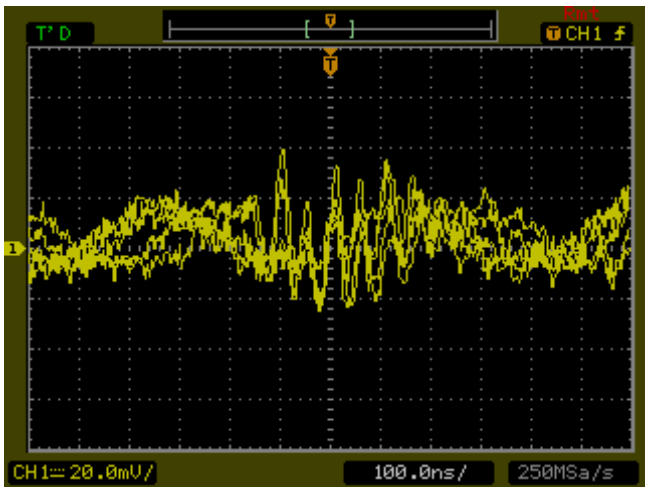
Receiver Circuit
Q2 Drain



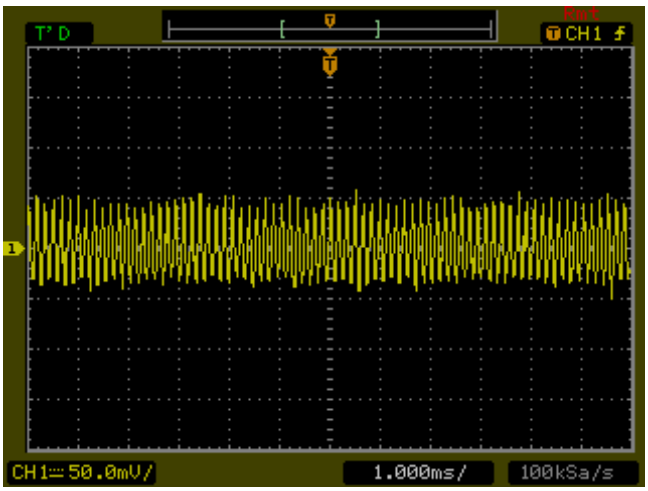
Receiver Circuit
Q2 Gate



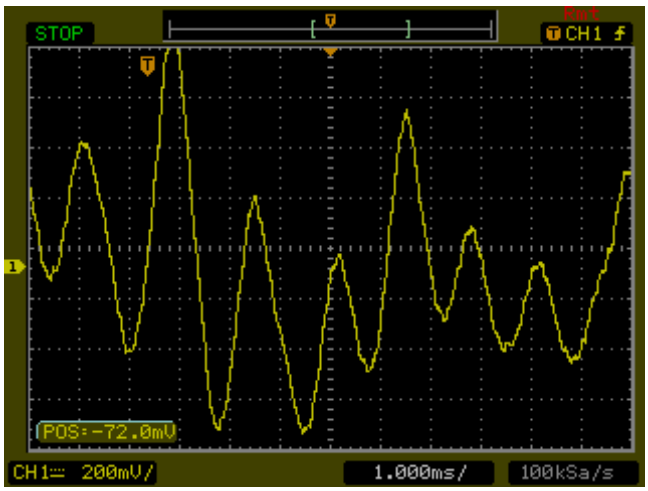
Receiver Circuit D3 Pin 3
At high sensitivity, variation in DC level can be observed when stroking transducer.



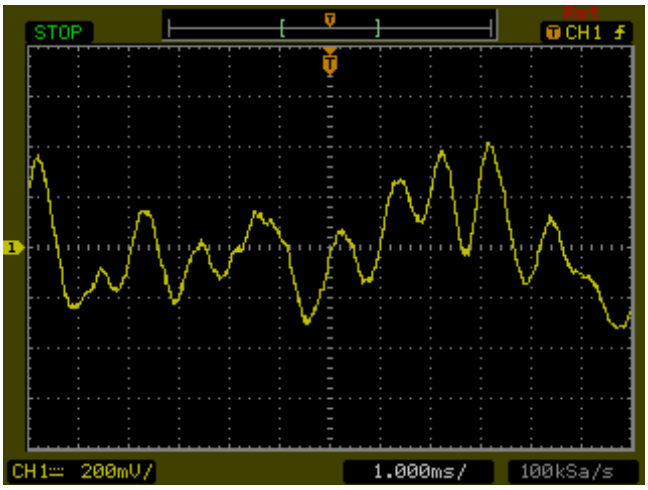
Receiver Circuit
U1 pin 2
Stroking Transducer



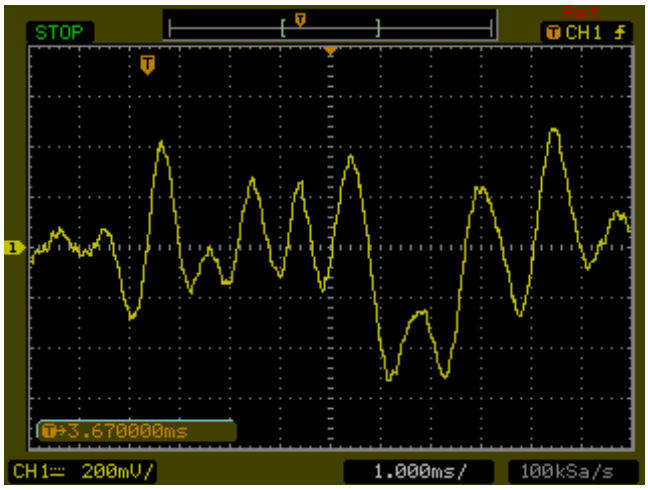
Receiver Circuit
U1 pin 3
Stroking Transducer



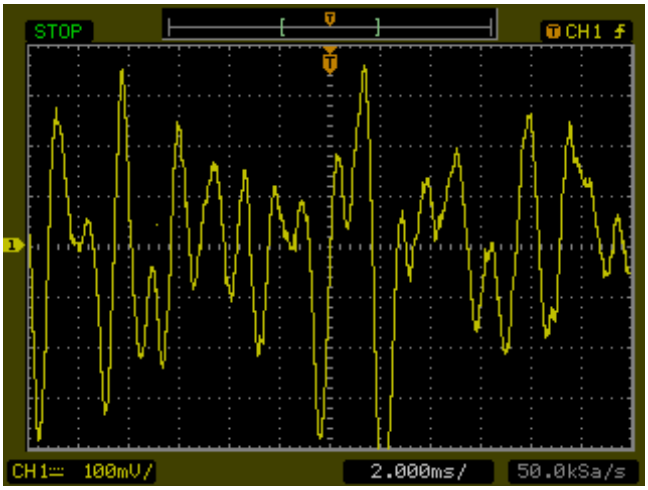
Receiver Circuit
U1 Pin 1
Stroking Transducer



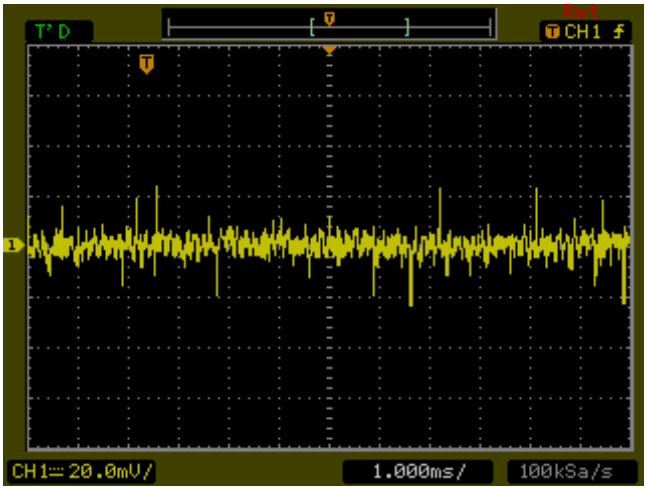
Receiver Circuit
U1 Pin 6
Stroking Transducer



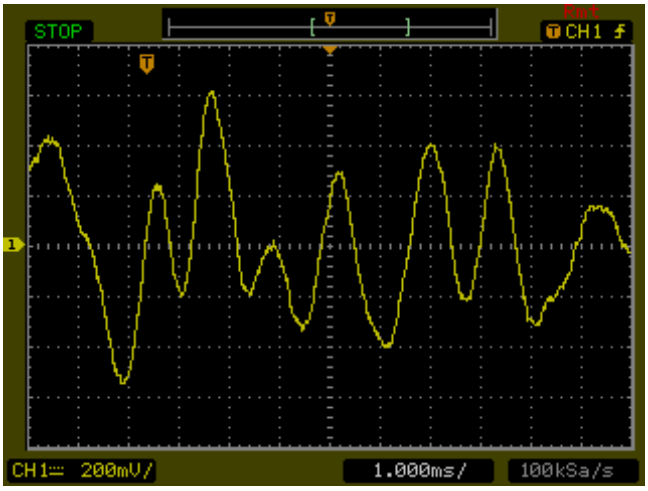
Receiver Circuit
U1 Pin 5
Stroking Transducer



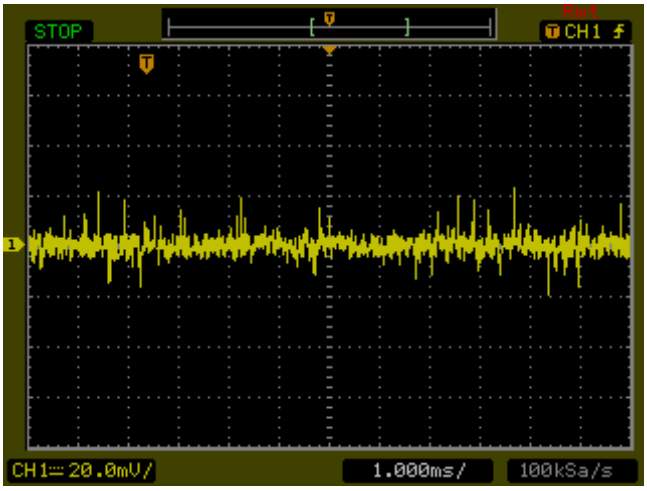
Receiver Circuit
U1 Pin 7
Stroking Transducer



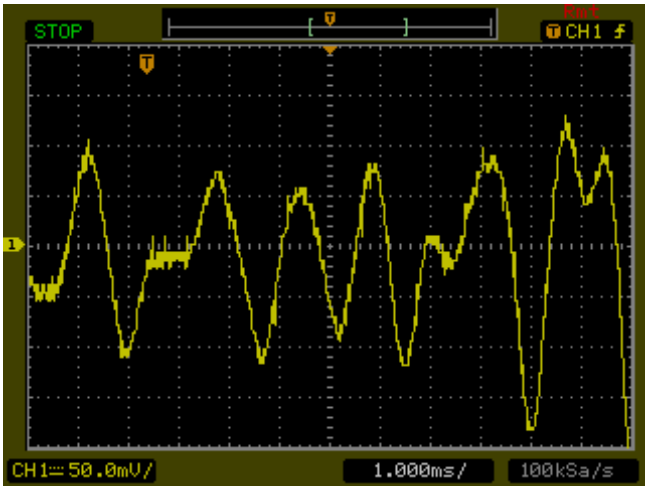
Receiver Circuit
U1 Pin 9
Stroking transducer, but viewing very little response



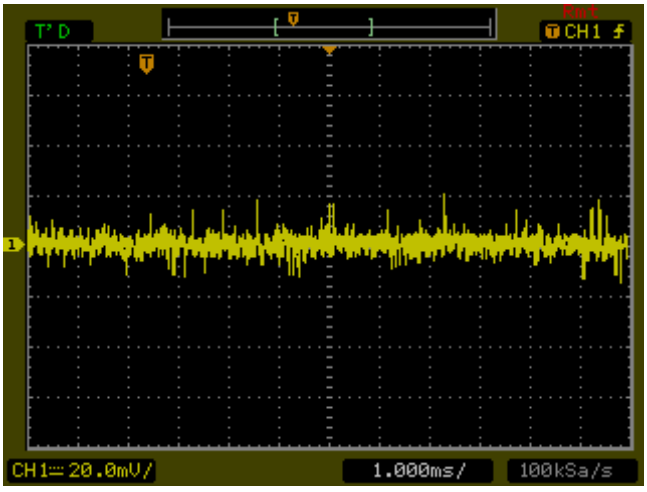
Receiver circuit
U1 pin 8
Stroking transducer



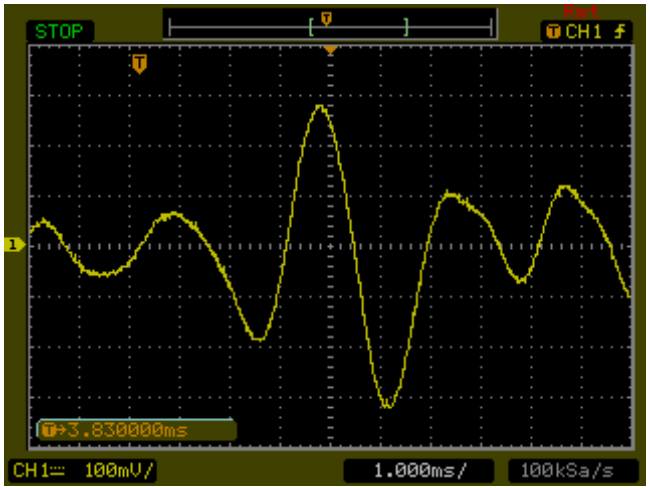
Receiver Circuit
U1 Pin 13
Stroking Transducer, but viewing very little response



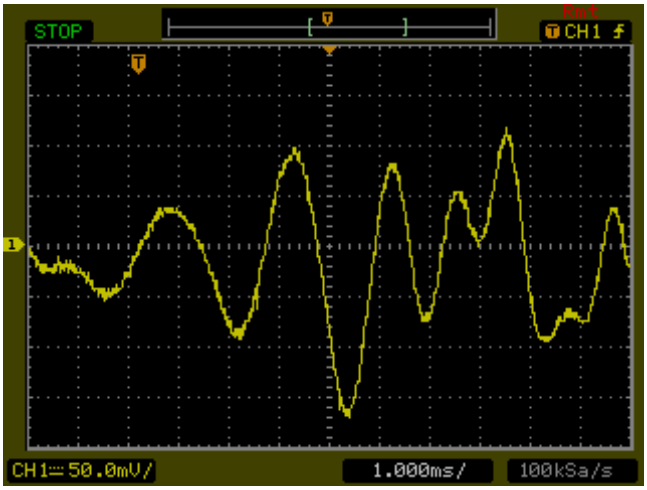
Receiver circuit
U1 Pin 14 (FH1_Audio)
Stroking Transducer



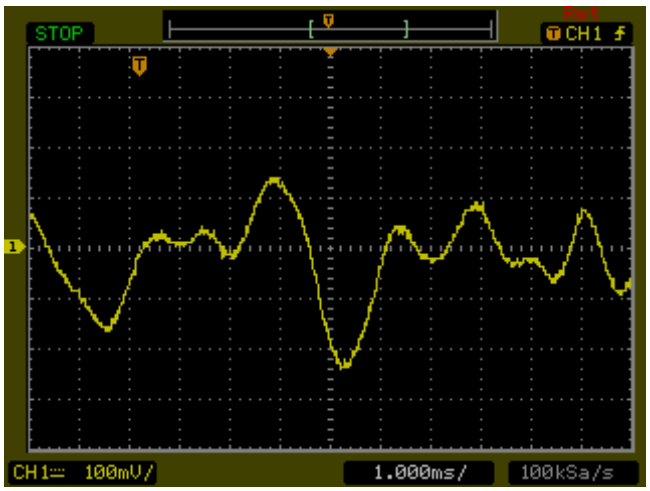
Receiver Circuit
U5 Pin 2
Stroking Transducer, but viewing very little response



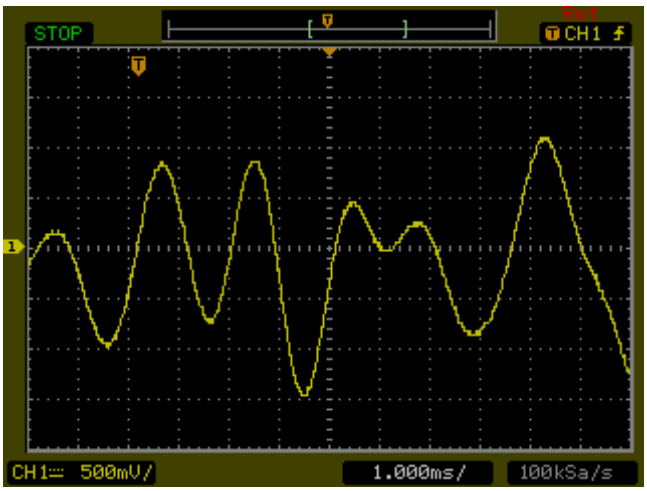
Receiver circuit
U5 Pin 1
Stroking Transducer



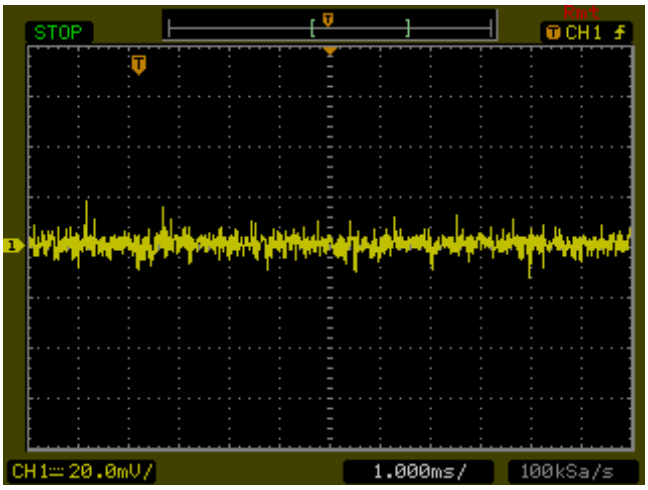
Receiver Circuit
U5 Pin 12
Stroking Transducer



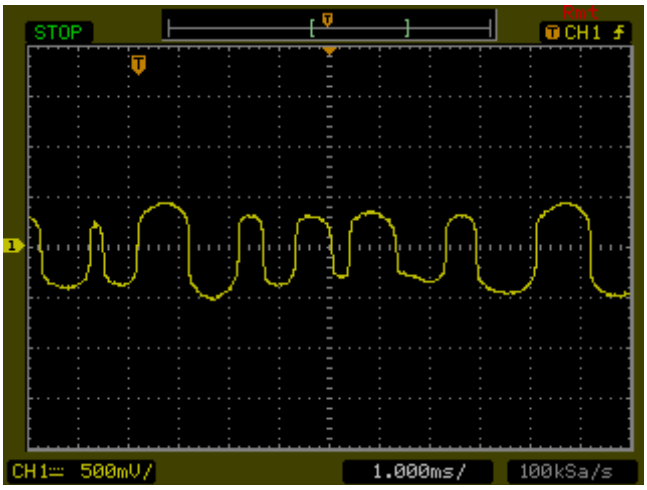
Receiver Circuit
U5 Pin 13
Stroking Transducer



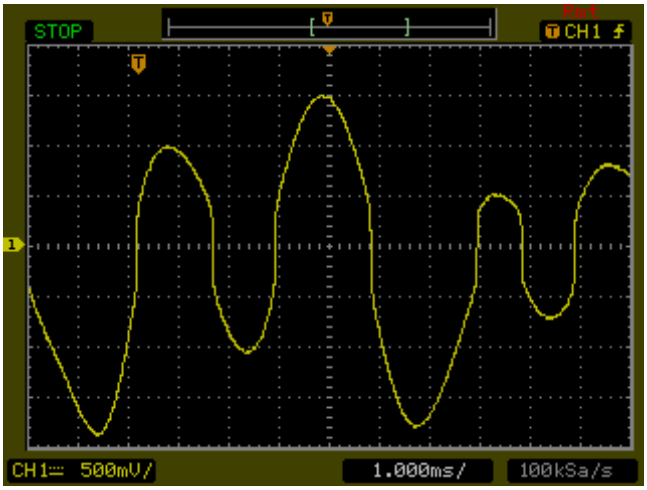
Receiver Circuit
U5 Pin 14
Stroking Transducer



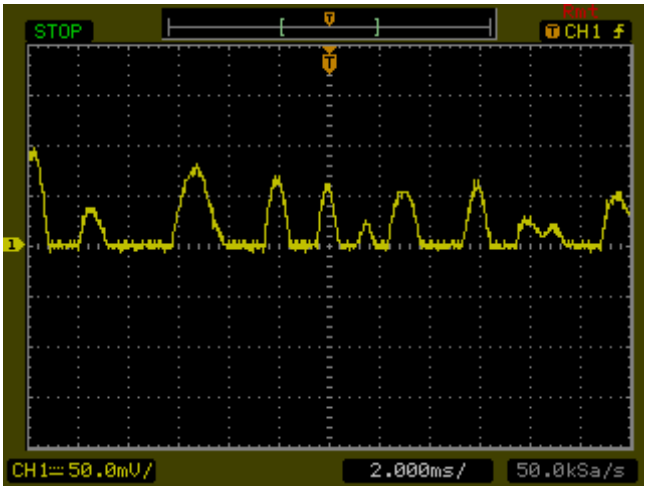
Receiver Circuit
U2 Pin 6
Stroking transducer, but viewing very little response



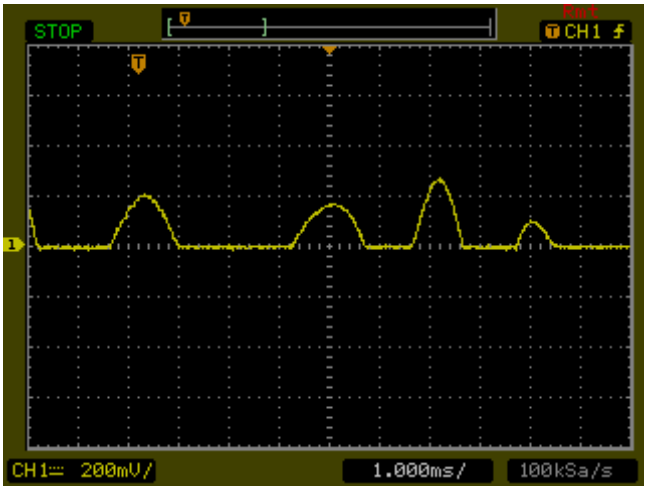
Receiver Circuit
U2 Pin 7
Not stroking Transducer



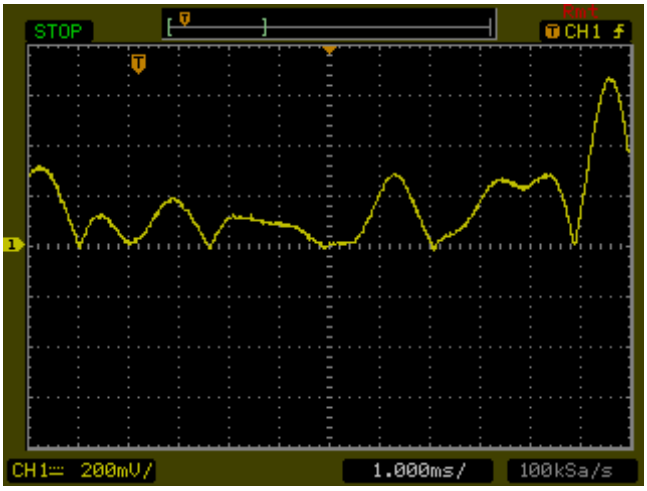
Receiver Circuit
U2 Pin 7
Stroking Transducer



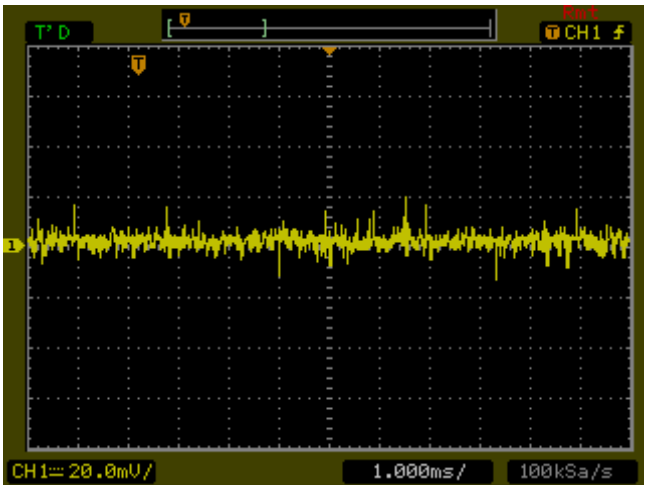
Receiver Circuit
U2 Pin 2
Stroking Transducer



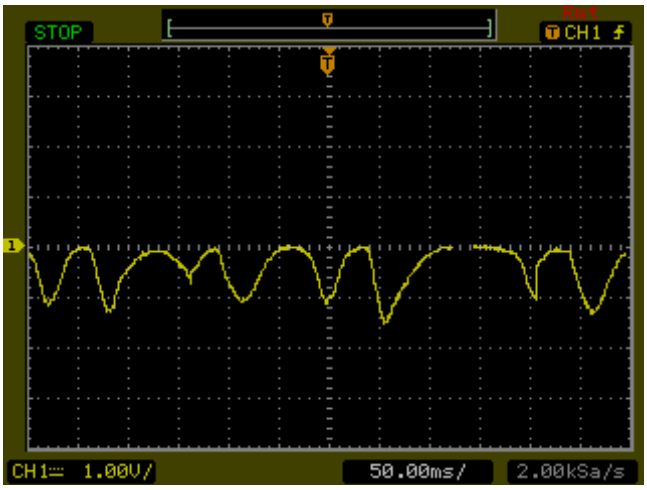
Receiver Circuit
U2 Pin 3
Stroking Transducer



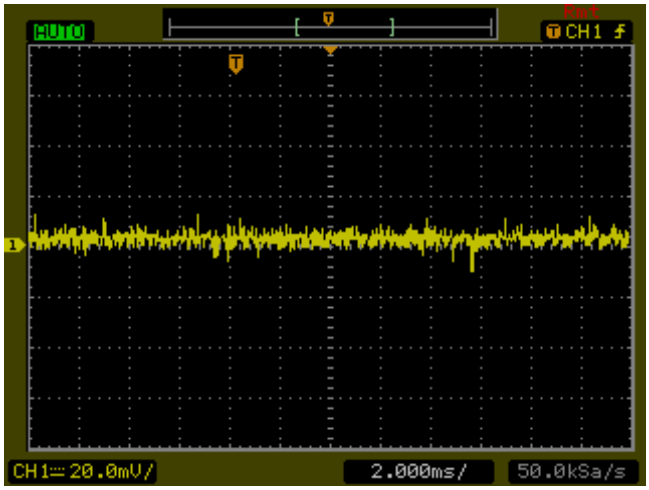
Receiver Circuit
U2 Pin 1
Stroking Transducer



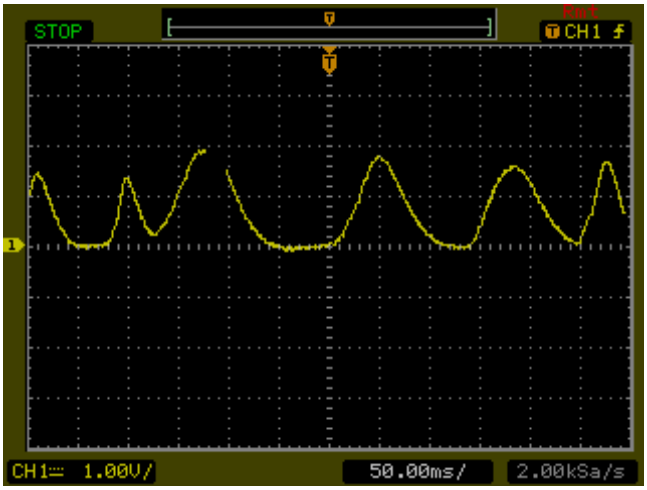
Receiver Circuit
U2 Pin 13
Stroking Transducer, but viewing very little response



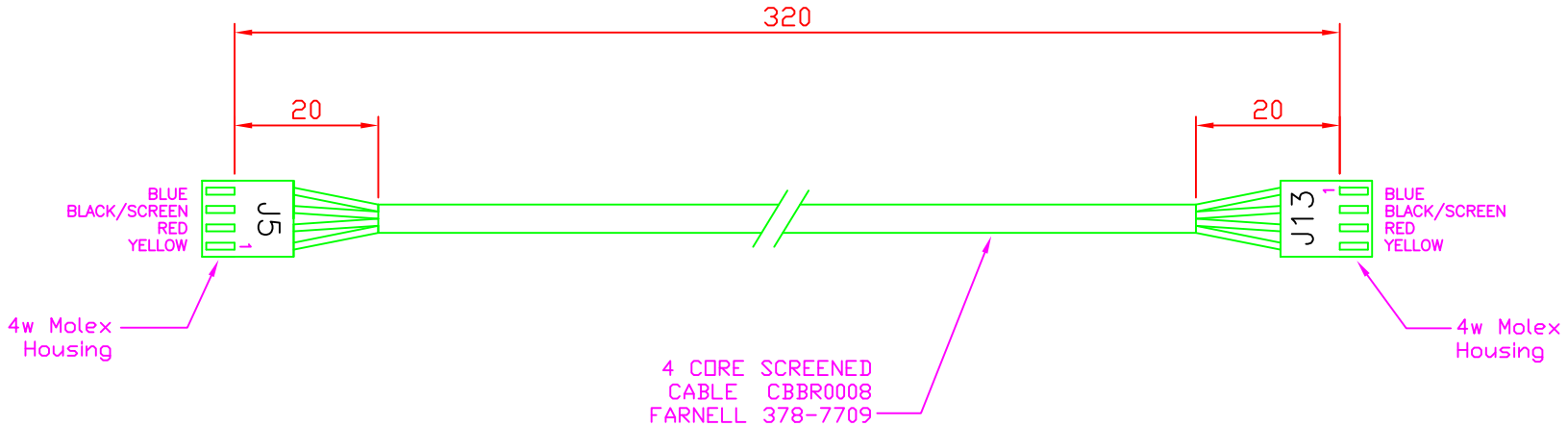
Receiver Circuit
U2 Pin 14
Stroking Transducer



Receiver Circuit
U2 Pin 9
Stroking Transducer, but viewing very little response



Receiver Circuit
U2 Pin 8
Stroking Transducer

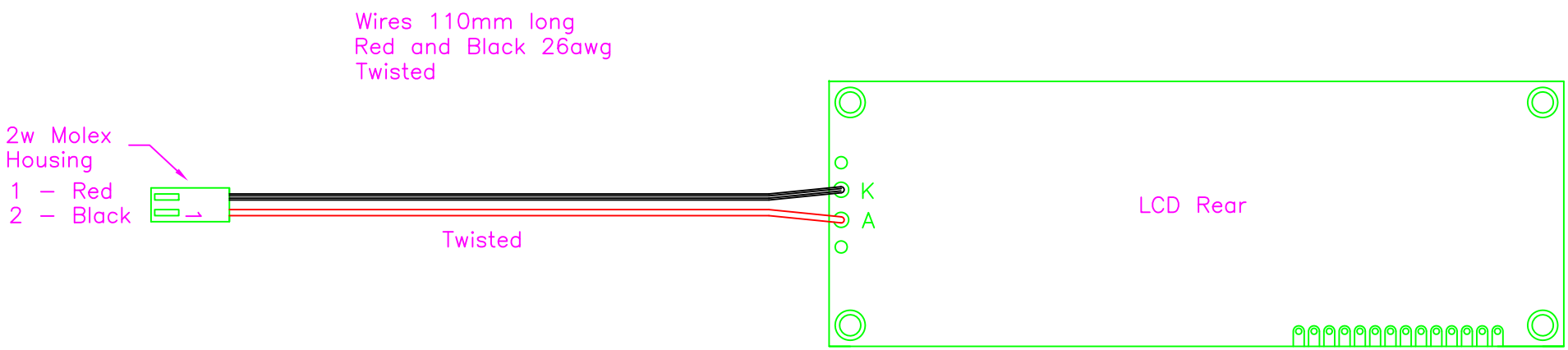


ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	11-05-05	k nancollis		

MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 24v POWER LEAD		mm	FETA 310
FINISH:	0.0	3rd ANGLE PROJECTION			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. F310D113-101	SHEET OF		
	0.00	DO NOT SCALE PRINT							
	0.000								
	ANGULAR								

A4

C.A.D. DRAWING



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	17-05-05	k nancollis		

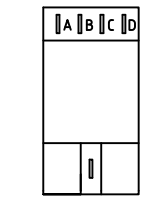
MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 LCD BACKLIGHT WIRING		mm	FETA 310
FINISH:	0.0	3rd ANGLE PROJECTION			THIS DOCUMENT IS SUPPLIED IN CONFIDENCE. NO REPRODUCTION OF THE DOCUMENT OR OF THE ITEMS SHOWN THEREON MAY BE MADE WITHOUT THE COPYRIGHT OWNERS PERMISSION.	DRAWING No. F310D112-101			SHEET 1 OF 1
	0.00	DO NOT SCALE PRINT							
	0.000								
	ANGULAR								

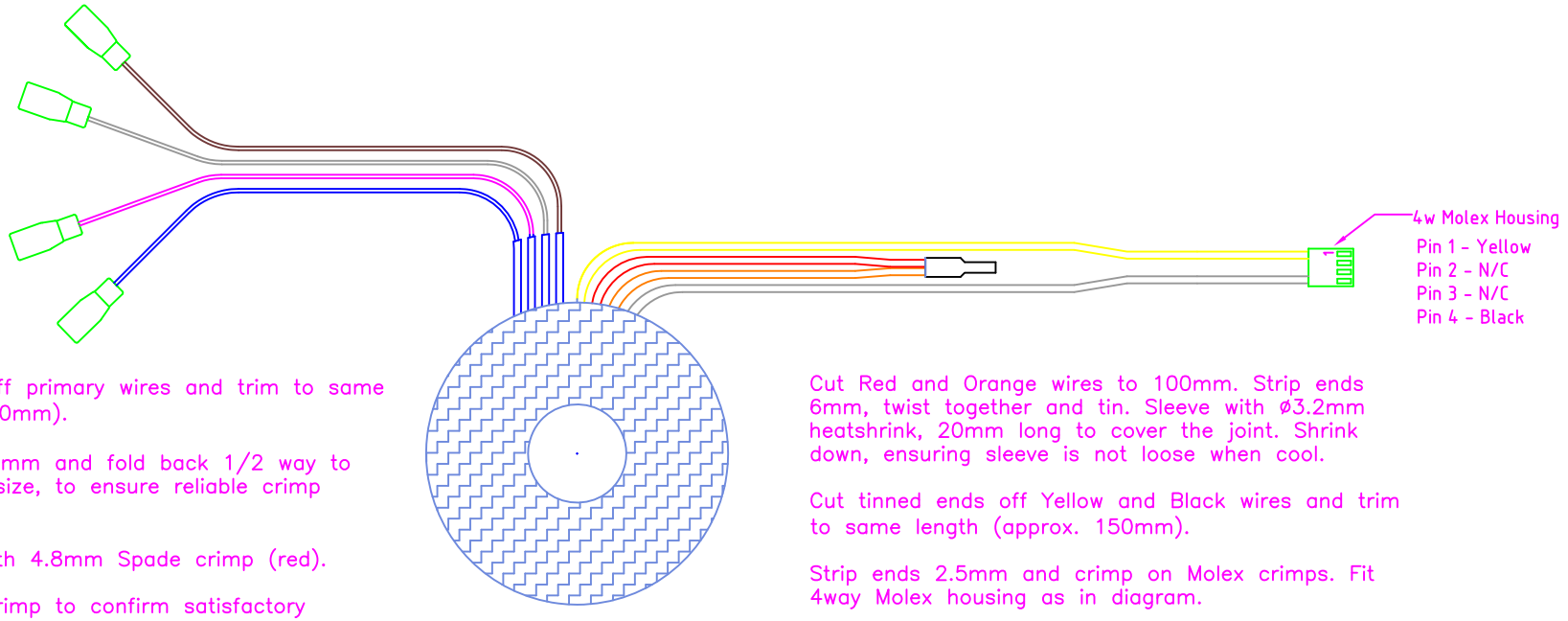
A4

C.A.D. DRAWING

MAINS FILTER CONNECTIONS

A - BLUE
B - PURPLE
C - GREY
D - BROWN





Cut tinned ends off primary wires and trim to same length (approx. 150mm).

Strip wire ends 13mm and fold back 1/2 way to double conductor size, to ensure reliable crimp termination.

Terminate each with 4.8mm Spade crimp (red).

Pull check each crimp to confirm satisfactory termination.

Cut Red and Orange wires to 100mm. Strip ends 6mm, twist together and tin. Sleeve with ø3.2mm heatshrink, 20mm long to cover the joint. Shrink down, ensuring sleeve is not loose when cool.

Cut tinned ends off Yellow and Black wires and trim to same length (approx. 150mm).

Strip ends 2.5mm and crimp on Molex crimps. Fit 4way Molex housing as in diagram.

Transformer

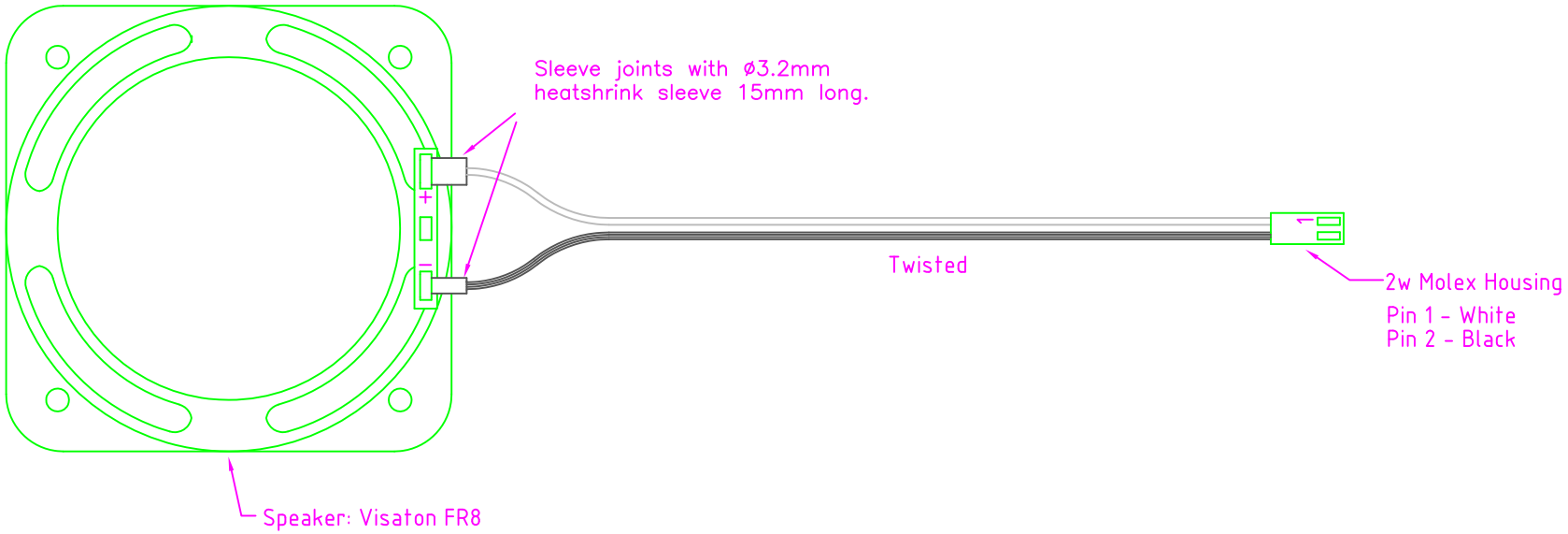
Primary: 2 x 115V
Secondary: 2 x 12V 30VA

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	16/05/05	k nancollis		

MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
FINISH:	0 / 0.0 / 0.00 / 0.000 / ANGULAR	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 TRANSFORMER PREPARATION		METRIC	FETA 310
		3rd ANGLE PROJECTION DO NOT SCALE PRINT			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. F310D111-101			SHEET 1 OF 1

A4

C.A.D. DRAWING



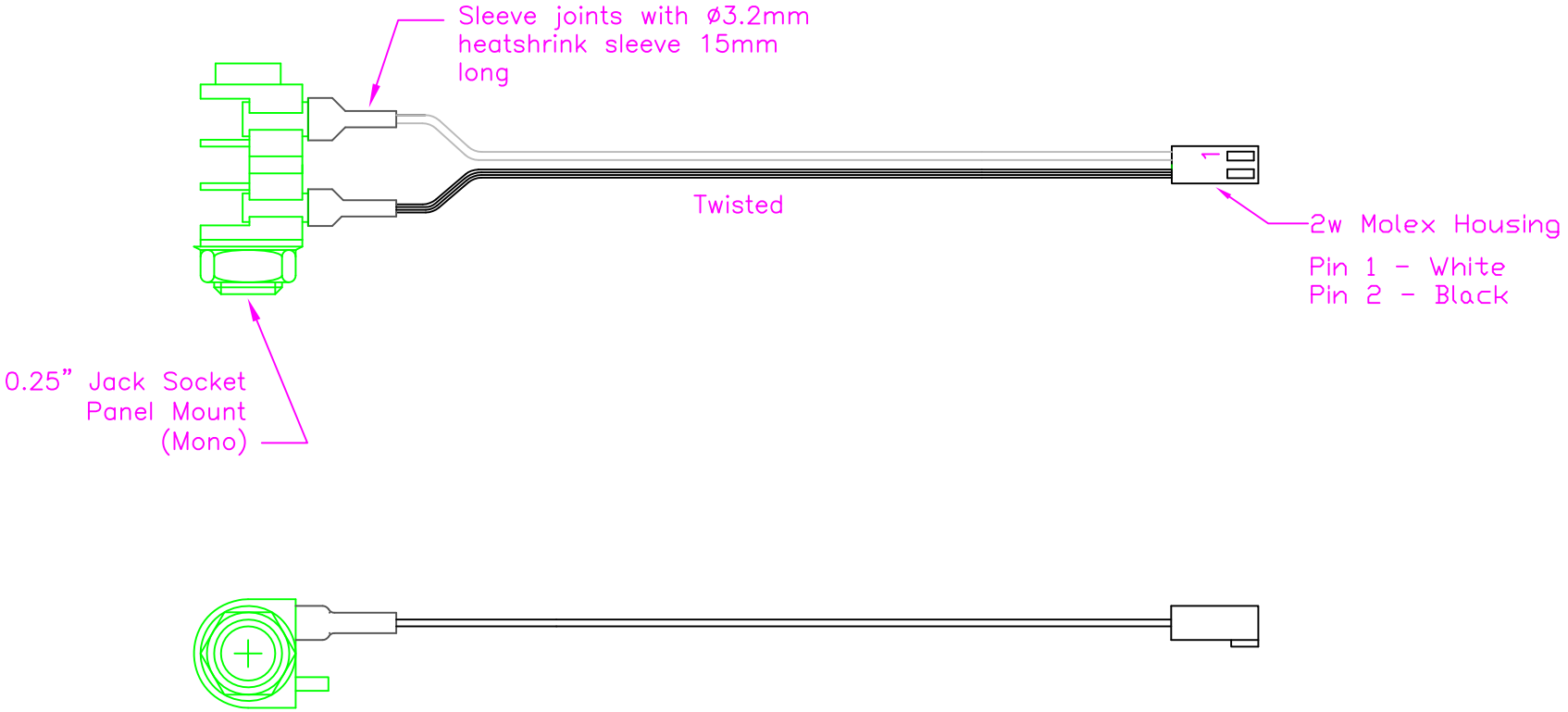
ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	12/05/05	k nancollis		

MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 SPEAKER WIRING		METRIC	FETA 310
FINISH:	0.0	3rd ANGLE PROJECTION			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. F310D110–101		SHEET 1 OF 1	
	0.00	DO NOT SCALE PRINT							
	0.000								
	ANGULAR								

A4

C.A.D. DRAWING

Event Marker wires 130mm long
White and Black 26awg, twisted



ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	13/05/05	k nancollis		

MATERIAL:	STANDARD TOLERANCES	DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 EVENT MARKER INPUT SOCKET WIRING	1:1	METRIC	FETA 310
FINISH:	0.0	3rd ANGLE PROJECTION			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. F310D114-101	SHEET 1 OF 1		
	0.00	DO NOT SCALE PRINT							
	0.000								
	ANGULAR								

A4

C.A.D. DRAWING

PART Nos.

CONNECTOR
Ultratec..... 500–0008–00 Redel..... PAG.M0.6GL.AC39A
COLLET
Ultratec..... 500–0061–00 Redel..... PLA.75.2UG.0

CABLE
Ultratec..... 600–0019–01

Cable 2 metres overall

Strip outer sheath 12mm at one end of cable.
Peel back PTFE tape and cut away.
Cut away Kevlar fillers close to outer sheath.

Strip red coax 8mm. Unpick screen wires. Select approx. 14 adjacent screen wires, neatly twist, and tin end 2mm. Strip signal wire 2mm, neatly twist, and tin.

Strip white coax 8mm. Unpick screen wires. Select approx. 14 adjacent screen wires, neatly twist, and tin end 2mm. Strip signal wire 2mm, neatly twist, and tin.

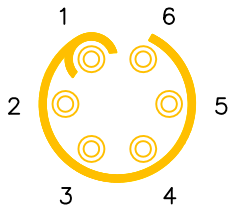
Dis–assemble connector.
Solder wires to connector pins as in diagram, sleeving each with ø1.6mm heatshrink sleeving 4.5mm long, with an overall sleeve (4.5mm) over each coax to isolate exposed screen wires.

Solder link between pin 5 and pin 6 using 30awg wire wrapping wire (heatshrink sleeving not required here).

Shrink down heatshrink to support joints. Slide collet and back shell on to opposite end of cable and re–assemble connector.

REDEL CONNECTIONS

Viewed from rear of connector.



Pin 1 Coax Core (Tx Signal)
Pin 2 Coax Screen (Tx Gnd)
Pin 3 Coax Core (Rx Signal)
Pin 4 Coax Screen (Rx Gnd)
Pin 5 Link Pin 5 to Pin 6 with
Pin 6 blue link wire, 13mm

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	07/05/08	k nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	±1	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 US2 TRANSDUCER CABLE ASSEMBLY			FETA 310
FINISH:	0.0	±0.5	3rd ANGLE PROJECTION			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. F310D127–101		SHEET 1 OF 1
	0.00	±0.2	DO NOT SCALE PRINT							
	0.000	±0.1								
	ANGULAR									

\FileStore\design\Designs\Ultrasound\310\drawings\details\f310d127-101_us2 tdr cable (blue)

C.A.D. DRAWING

PART Nos.

CONNECTOR
Ultratec..... 500–0007–00 Redel..... PAG.M0.4GL.AC39J
COLLET
Ultratec..... 500–0061–00 Redel..... PLA.75.2UG.0

CABLE
Ultratec..... 600–0019–01

Cable 2 metres overall

Strip outer sheath 12mm at one end of cable.
Peel back PTFE tape and cut away.
Cut away Kevlar fillers close to outer sheath.

Strip red coax 8mm. Unpick screen wires. Select approx. 1/2 screen wires, neatly twist, and tin end 2mm.
Strip signal wire 2mm, neatly twist, and tin.

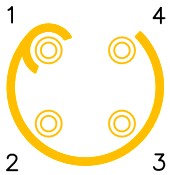
Strip white coax 8mm. Unpick screen wires. Select approx. 1/2 screen wires, neatly twist, and tin end 2mm.
Strip signal wire 2mm, neatly twist, and tin.

Dis–assemble connector.
Solder wires to connector pins as in diagram, sleeving each with ø1.6mm heatshrink sleeving 4.5mm long, with an overall sleeve (4.5mm) over each coax to isolate exposed screen wires.

Shrink down heatshrink to support joints. Slide collet and back shell on to opposite end of cable and re–assemble connector.

REDEL CONNECTIONS

Viewed from rear of connector.



Pin 1 TX Core (Signal)
Pin 2 TX Screen (Gnd)
Pin 3 RX Core (Signal)
Pin 4 RX Screen (Gnd)

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	06/05/08	k nancollis		

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

TITLE:
FETATRACK 310
US1 TRANSDUCER
CABLE ASSEMBLY

SCALE: | DIMENSIONS: | USED ON:

DRAWING No. F310D126–101

SHEET OF

A3

\FileStore\design\Designs\Ultrasound\310\drawings\details\f310d126-101_us1 tdr cable (yellow)

C.A.D. DRAWING

CONNECTORS

5way Chassis Socket Grey: Redel Part No. PLG.M0.5GL.LG

6way Crimp Terminal Housing: Molex No. 22-01-2065
Crimp Terminal: Molex No. 08-50-0032

All wires 26awg UL1061 150mm long.

Cut wires: 26awg black, red, orange, yellow and white, 150mm long (one each per socket).

Strip one end of each wire 3mm, twist and tin.

Solder wires to 5W Redel socket as in diagram, sleeving each with ø1.2mm heatshrink, 7mm long. Shrink heatshrink over joints.

Strip second end of each wire 2.5mm and crimp Molex terminal on to each wire, maintaining similar orientation for loading into mating Molex housing.

Note: Do not fit Molex housing until after fitting Input socket into the chassis.

Toco – 5w Redel Socket

Grey

Redel	Connections	6W Molex
Pin 1	– Black	– [Pin 1]
Pin 2	– Red	– [Pin 2]
Pin 3	– Orange	– [Pin 6]
Pin 4	– Yellow	– [Pin 4]
Pin 5	– White	– [Pin 5]

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
2	17/04/08	k nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED
	0	±1	k 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 310
TOCO INPUT SOCKET
WIRING

SCALE:

DIMENSIONS:

USED ON:
FETA 310

DRAWING No.
F310D125-102

SHEET
1
OF
1

A3

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C.A.D. DRAWING

CONNECTORS

6way Chassis Socket Blue: Redel Part No. PLG.M0.6GL.LA

6way Crimp Terminal Housing: Molex No. 22-01-2065
Crimp Terminal: Molex No. 08-50-0032

All wires 150mm long
Co-ax = Rachem 44A1111-24-9-9
Singles = 26awg UL1061

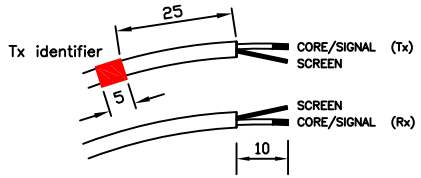
Cut Raychem co-ax cable 150mm long (two per socket).

Fit heatshrink (Tx) identifier 25mm from each end of 1 cable.

Strip outer sheath of one end of each cable 10mm.

Separate out screen wires. Select 1/3 of screen wires, twist neatly and tin end 3mm; neatly cut away excess wire strands.

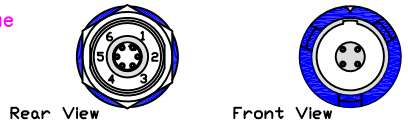
Strip signal(core) wire 3mm, twist and tin.



Solder wires to socket as in diagram, sleeving each with ø1.2mm heatshrink, 5mm long. Shrink down heatshrink over joints.

U/S 2 – 6w Redel Socket

Blue



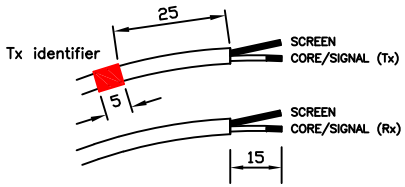
Redel	Connections	6W Molex
Pin 1	Co-ax 1 signal/core (Tx)	[Pin 1]
Pin 2	Co-ax 1 screen.	[Pin 2]
Pin 3	Co-ax 2 signal/core (Rx)	[Pin 4]
Pin 4	Co-ax 2 screen.	[Pin 5]
Pin 5	Black (26awg 150mm)	[Pin 3]
Pin 6	Black (26awg 150mm)	[Pin 6]

Sleeve each co-ax overall at the connector using ø2.4mm heatshrink, 15mm long (to isolate screen wires). Take care not to use excessive heat when shrinking down.

When cool, slide down another 15mm length of ø2.4mm heatshrink on to each co-ax (DO NOT SHRINK DOWN YET).

Separate out screen wires and neatly twist all strands together. Fit 10mm length of ø1.2mm heatshrink over screen wires and shrink down.

Strip signal(core) wires 3mm.
Trim screen and signal wires to the same length on each co-ax _ crimp heights must be the same on each co-ax to locate properly in the housing.



Crimp Molex crimps on to each signal wire/screen pair, maintaining similar orientation for loading into Molex housing.

Slide the ø2.4mm sleeves down to cover exposed screen wires and shrink down.

Note: Do not fit Molex housing until after fitting Input socket into the chassis.

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
2	17/04/08	k nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	±1	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 US2 INPUT SOCKET WIRING			feta 310
FINISH:	0.0	±0.5	3rd ANGLE PROJECTION			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. F310D124-102		SHEET 1 OF 1
	0.00	±0.2	DO NOT SCALE PRINT							
	0.000	±0.1								
	ANGULAR									

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C.A.D. DRAWING

CONNECTORS

4way Chassis Socket Yellow: Redel Part No. PLG.M0.4GL.LJ

6way Crimp Terminal Housing: Molex No. 22-01-2065
Crimp Terminal: Molex No. 08-50-0032

All wires 150mm long
Co-ax = Rachem 44A1111-24-9-9

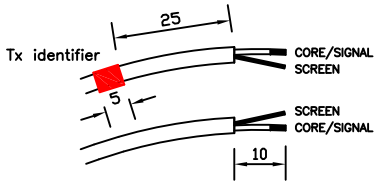
Cut Raychem co-ax cable 150mm long (two per socket).

Fit heatshrink (Tx) identifier 25mm from each end of 1 cable.

Strip outer sheath of one end of each cable 10mm.

Separate out screen wires. Select 1/2 of screen wires, twist neatly and tin end 3mm. Neatly cut away excess wire strands.

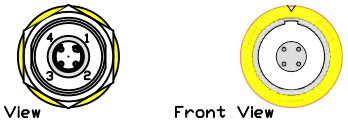
Strip signal(core) wire 3mm, twist and tin.



Solder wires to socket as in diagram, sleeving each with ø1.2mm heatshrink, 5mm long. Shrink down heatshrink over joints.

U/S 1 – 4w Redel Socket

Yellow



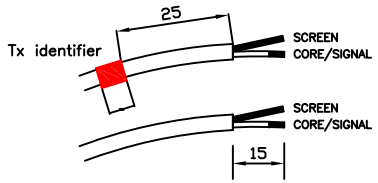
Redel	Connections	6W Molex
Pin 1	– Co-ax 1 signal/core (Tx)	– [Pin 1]
Pin 2	– Co-ax 1 screen.	– [Pin 2]
Pin 3	– Co-ax 2 signal/core (Rx)	– [Pin 4]
Pin 4	– Co-ax 2 screen.	– [Pin 5]

Sleeve each co-ax overall at the connector using ø2.4mm heatshrink, 15mm long (to isolate screen wires). Take care not to use excessive heat when shrinking down.

When cool, slide down another 15mm length of ø2.4mm heatshrink on to each co-ax (DO NOT SHRINK DOWN YET).

Separate out screen wires and neatly twist all strands together. Fit 10mm length of ø1.2mm heatshrink over screen wires and shrink down.

Strip signal(core) wires 3mm.
Trim screen and signal wires to the same length on each co-ax _ crimp heights must be the same on each co-ax to locate properly in the housing.



Crimp Molex crimps on to each signal wire/screen pair, maintaining similar orientation for loading into Molex housing.

Slide the ø2.4mm sleeves down to cover exposed screen wires and shrink down.

Note: Do not fit Molex housing until after fitting Input socket into the chassis.

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
2	17/04/08	k nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	±1	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 US1 INPUT SOCKET WIRING			feta 310
FINISH:	0.0	±0.5				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.		SHEET
	0.00	±0.2	3rd ANGLE PROJECTION					F310D123-102		1 OF 1
	0.000	±0.1	DO NOT SCALE PRINT							
	ANGULAR									

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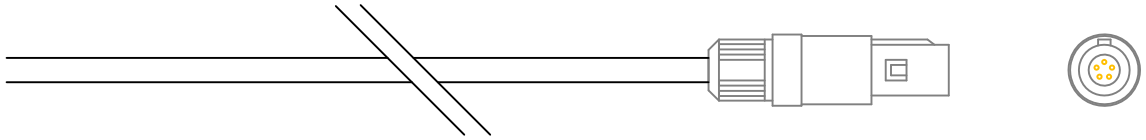
C.A.D. DRAWING

PART Nos.

CONNECTOR
Ultratec..... 500–0009–00 Redel..... PAG.M0.5GL.AC39G
COLLET
Ultratec..... 500–0061–00 Redel..... PLA.75.2UG.0

CABLE
Ultratec..... 600–0012–01

Cable 2 metres overall



NOTE – This cable is easily marked – keep away from pens and pencils; maintain a clean work area.

Strip outer sheath 12mm at one end of cable.
Neatly fold back screen wires over sheath.
Peel back PTFE tape and carefully cut away.
Carefully cut away grey/mauve twisted pair.

Untwist red/black twisted pair and also yellow/white pair.
Select 2 bunches of screen wires (approx. 14 strands) between the black and yellow wires, neatly twist, and tin the end 2–3mm.

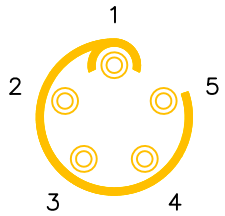
Strip end of red wire 2mm, neatly twist, and tin.
Repeat for black, yellow, and white wires.

Dis–assemble connector.
Solder wires to connector pins as in diagram, sleeving each with ø1.6mm heatshrink sleeving 5mm long.
Note: Link from pin 2 (with black wire) to pin 3 (with screen wire) is 30awg wire wrapping wire, 20mm long.

Shrink down heatshrink to support joints. Slide collet and back shell on to opposite end of cable and re–assemble connector.

REDEL CONNECTIONS

Viewed from rear of connector.



CONNECTIONS

Pin 1 – Red (+V energisation)
Pin 2 – Black (0v) + Link to Pin 3
Pin 3 – Screen (Gnd) + Link from Pin 2
Pin 4 – Yellow (Gauge O/P +ve)
Pin 5 – White (Gauge O/P –ve)

ISSUE	DATE	DRAWN	CHECK	A.N.NO.
1	09/05/08	k nancollis		

MATERIAL:	STANDARD TOLERANCES		DRAWN	CHECK	APPROVED	ULTRA TEC	TITLE:	SCALE:	DIMENSIONS:	USED ON:
	0	±1	k nancollis			© ULTRASOUND TECHNOLOGIES LTD ALL RIGHTS RESERVED	FETATRACK 310 TOCO TRANSDUCER CABLE ASSEMBLY			FETA 310
FINISH:	0.0	±0.5	3rd ANGLE PROJECTION			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. F310D128–101		SHEET 1 OF 1	
	0.00	±0.2	DO NOT SCALE PRINT							
	0.000	±0.1								
	ANGULAR									

\FileStore\design\Designs\Ultrasound\310\drawings\details\f310d128-101_toco tdr cable (grey)

C.A.D. DRAWING