Eddystone

GENERAL-PURPOSE HIGH STABILITY COMMUNICATION RECEIVERS

MODEL 1837 SERIES

MODEL 1837/1

Manufactured in England by

EDDYSTONE RADIO LIMITED
MEMBER OF MARCONI COMMUNICATION SYSTEMS LIMITED
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The Manufacturer reserves the right to modify the content of this publication as necessary to accommodate modifications, design improvements etc. Relevant Amendment Sheets will be incorporated at date of issue.

NOVEMBER 1979

NOTE :: (1) Unless otherwise specified, all Eddystone 1837 Series Receiver's are despatched from the factory premises with the ANCILLARY PLUG (terminals 5-9) wired to function in the INT SPEAKER ONLY, MUTING mode.

(2) It is important to note that the equipment will NOT function unless the ANCILLARIES PLUG is fitted.

(3) Full connection data is given at page 2.5 to 2.8 of the Technical Manual.

INTRODUCTION

This manual provides comprehensive instructions for the installation, operation and maintenance of all models in the 1837 Series of Receivers. Current versions are Model 1837/1, for CW, AM and USB reception, and Model 1837/2 for CW, AM, USB, LSB and FSK reception. The frequency range 100kHz - 31MHz is covered in 9 ranges. The receivers can be operated conventionally with medium stability or locked to the internal reference oscillator for high stability. Power supply can be taken from any standard 40-60Hz AC supply, or from low voltage DC supplies via a separate inverter unit.

The receiver is available in either rack-mounting form, for installation in standard 483mm (19in) racking, or in a cabinet for bench mounting. Accessories available include shock absorbent mountings for use under very arduous conditions, a plinth loudspeaker, cabinet loudspeaker, matching panoramic display units, f.s.k. teleprinter drive units (where the internal unit available with model 1837/2 is inappropriate), headphones, and aerial systems.

GUARANTEE

All 1837 Series receivers are suitable for use under arduous operating conditions and should require very little routine maintenance over long periods of operation. With the exception of the semi-conductors all components are guaranteed by the Manufacturer for a period of one year from the date of purchase; the semi-conductors are covered by a separate guarantee.

SERVICING

Spares for user servicing can be supplied and advice will be freely given when required. Any enquiries relating to service matters should be directed to the "Sales and Service Department" at our usual address, quoting the Model Number and Serial Number in all communications. Should major servicing become necessary the unit can, by prior arrangement, be returned to the Manufacturer for attention; care should be taken to ensure that the unit is well protected against possible damage during transit.

CONTENTS

GENERAL SPECIFICATION

Application

1837 Series receivers are intended for maritime and high stability applications in the frequency band 100kHz to 31MHz.

Frequency Coverage

100kHz to 31MHz in 9 ranges with "Fine Tune" facility on ranges 1-5.

Range 1	18.0MHz	-	31MHz
Range 2	10.0MHz	-	19MHz
Range 3	5.5MHz	-	10MHz
Range 4	2.9MHz	-	5.5MHz
Range 5	1.5MHz	-	2.9MHz
Range 6 *	840 kHz	-	1600 kHz
Range 7	400 kHz	-	850 kHz
Range 8	200 kHz	-	400 kHz
Range 9	100 kHz	-	210 kHz

* Not high stability.

Scale Resolution

Display indicates to 100Hz over the whole band.

Intermediate Frequencies

1st. I.F: Tunable 1340-1360kHz nominal to provide fine-tune facility on ranges 1-5. Fixed at 1350kHz on ranges 7-9. Not used on range 6.

2nd. I.F: 100kHz. BFO/Carrier insertion.
±3kHz swing for variable BFO, fixed 100kHz for USB (Model 1837/1).
±3kHz swing for CW, fixed 100kHz for USB/LSB (Model 1837/2).

Aerial Impedance

Model 1837/1

50/75Ω nominal (unbalanced) for frequencies 4MHz to 31MHz.
10Ω in series with 250p for frequencies 1.6MHz to 4MHz.
10Ω in series with 220-560p for frequencies below 1.6MHz.

Model 1837/2

50/75Ω nominal (unbalanced) for all frequencies.

Reception Modes

A1, A2, A2H telegraphy, A3, A3A, A3H and A3J telephony. (All models).
Upper sideband in SSB mode (Model 1837/1).
Upper or lower sideband selectable in SSB mode, and optional FSK working (Model 1837/2).

Environmental

The receiver conforms to the climatic and shock/vibration requirements of British MPT 1201 and 1204, and CEPT draft recommendations, and generally to DEF 133 clause L2.

Operating temperature rating	:	-15°C to +55°C.
Humidity	:	95% relative humidity at 40°C.

Muting

Internal reed relay controlled from associated transmitter interrupts aerial feeder and earths input circuit during transmission.

Power Supply

100-130V or 200-260V, 40-60Hz single phase AC. Consumption approximately 50VA.

Dimensions and Weight

Rack Mounting

Width	:	483mm (19in)
Height	:	159mm (6.25in)
Intrusion into rack	:	334mm (13.125in)
Weight (approx)	:	16.8kg (37lb)

Bench Mounting (with cabinet)

Width	:	502mm (19.75in)
Height (with feet)	:	191mm (7.5in)
Depth (overall)	:	376mm (14.8in)
Weight (approx)	:	21.8kg (48lb)

(Not to be interpreted as a Test Specification)

Sensitivity

Input level to give 15dB S+N/N ratio from 50/75Ω input:-

3µV emf for AM 30% modulation in intermediate bandwidth
1µV emf for SSB in SSB bandwidth
0.7µV emf for CW in narrow bandwidth.

IF Selectivity

Switch Position	-6dB	-60dB	(Notes)
V. Narrow	400kHz	2.4kHz	1837 Series only.
Narrow	1.3kHz	4.5kHz	1837 Series only.
CW	1.3kHz	4.5kHz	Models 1838/2 & 1838/3 only.
SSB	2.4kHz	3.9kHz	Asymmetrical response to MPT 1201 & CEPT draft recommendations.
Intermediate	3kHz	12kHz	1837 Series only.
AM DSB	5.4kHz	10.5kHz	1838 Series only.
Wide	8kHz	24kHz	1837 Series only.

Image Rejection

100 kHz	-	525 kHz	:	80dB	(1837 Series and Model 1838/3 only).
525 kHz	-	18MHz	:	70dB	
18MHz	-	30MHz	:	50dB	

IF Rejection

100 kHz	-	1600 kHz	:	60dB	(1837 Series and Model 1838/3 only).
1.6MHz	-	2.9MHz	:	60dB	
2.9MHz	-	30MHz	:	85dB	

Frequency Stability

Figures quoted after 30 minutes warm-up period.

'Tune' mode : 1 part in 10 000 per degree C (typically 5 parts in 100 000 per degree C).

'Lock' mode .	Typically not worse than 5Hz per day at constant temperature, or 5Hz in any period of 15 minutes for 7°C change in ambient temperature.

Cross Modulation

With a wanted signal of level 60dBμV producing standard output, unwanted output will be at least 30dB below this level with an interfering signal 20kHz off-tune and of level 90dBμV.

Intermodulation

The level of third-order intermodulation products given by two signals of level 80dBμV lying at (carrier + 1kHz) and (carrier + 1.6kHz) will be at least 30dB below the level of either signal.

With a wanted signal of level 30dBμV producing standard output, two unwanted signals adjusted to produce a third-order intermodulation product at the wanted frequency must each be of a level greater than 80dBμV to produce standard output when neither signal is closer than 30kHz to the wanted frequency.

Blocking

With a wanted signal of level 60dBμV, output will be affected by less than 3dB with an interfering carrier 20kHz off-tune of level 100dBμV.

AGC Characteristic

Output is maintained within 6dB for 90dB increase in signal from threshold reference level (measured at 8MHz).

AGC Time Constant

1837 Series.	Charge 30mS (short) 200mS (long), Discharge 0.5 sec (short) 1.5 sec (long).
1838 Series.	Charge 30mS, Discharge 0.5 sec.

Audio Output

External loudspeaker (3Ω)	:	500mW at 5% distortion. Max 1.5W.
Line (600Ω)	:	10mW (adjustable).
Headphones	:	Low/Medium impedance : 10mW max.

Audio Response

Within 3dB over the range 200Hz to 4.5kHz. Overall response is dependent on IF selectivity.

IF Output

3μV emf (1.5μV pd on Model 1837/2) at aerial produces an IF output of at least 20mV at 100kHz across 75Ω.

Radiation

Less than 400pW (typically 20pW).

FSK Cat. No. 1534 (available for Model 1837/2 only)

Minimum shift of 85Hz enables a transmission rate of 100 bauds to be resolved. Maximum rate in excess of 300 for shifts greater than 150Hz.

INSTALLATION

2.1. ASSEMBLY INSTRUCTIONS

Accessories Kit

A kit of accessories is supplied with the receiver. The contents of the kit should be checked against Table 2.2.

Rack Mounting Receivers

The rack mounting versions can be installed directly in 483mm (19in) racks, using four suitable screws. Plain washers should be used beneath the screw heads to prevent damage to the panel finish. Fixing slots conform to standard with centre spacing of 57mm (2¼in). Dimensions of the receiver are shown in Fig. 2.1E and F.

Bench Mounting Receivers

Four mounting feet are included with the Accessories Kit. These should be fixed to the bottom corners of the cabinet using the four M4 x 10mm screws provided. Dimensions of the receiver are shown in Fig. 2.1B.

Conversion of Mounting Style

Rack-Mounting receivers may easily be converted to bench mounting and vice-versa. The accessories required are listed in Table 2.3.

Anti-Vibration Mountings

These are available to order for bench mounting receivers for use under extremely arduous conditions. The dimensions of the receiver and cabinet fitted with anti-vibration mountings are shown in Fig. 2.1A.

To fit anti-vibration mountings Cat. No. 1547 proceed as follows:-

1. Remove the cabinet feet (if fitted).

2. If access to the underside of the mounting surface (ie the bench or shelf) is available, drill 16 clearance holes on the centres shown in Fig. 2.2 to enable the anti-vibration mountings to be bolted to the surface. If access to the underside of the surface is not available, these holes must be drilled and tapped to take suitable hexagon-headed screws.

3. Fix the four anti-vibration mountings to the base of the cabinet using M6 x 20mm screws, ensure the bases are correctly aligned.

4. Secure the bases of the mountings to the mounting surface.

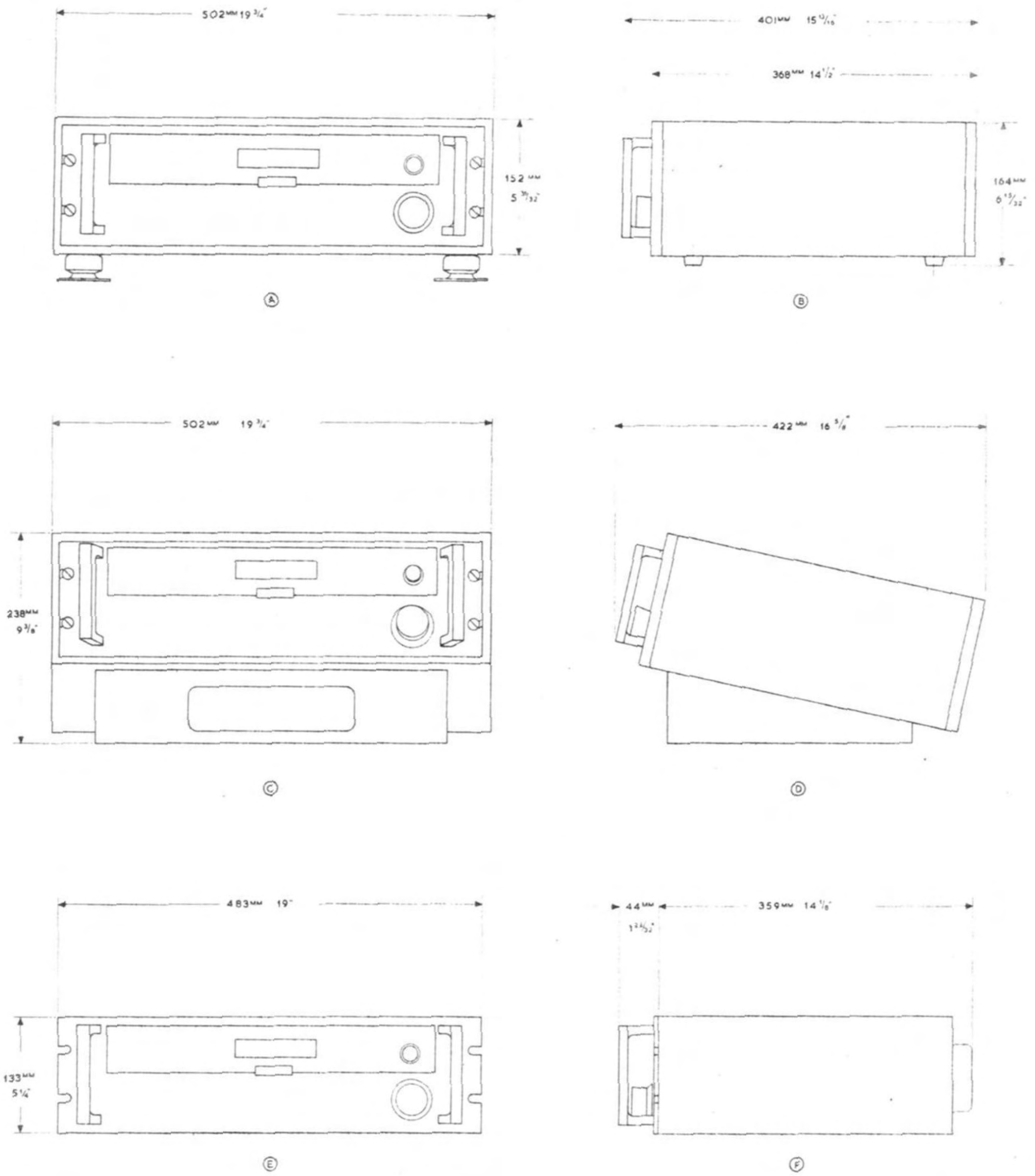


Fig. 2.1. Dimensions of the Receiver in all mounting styles.

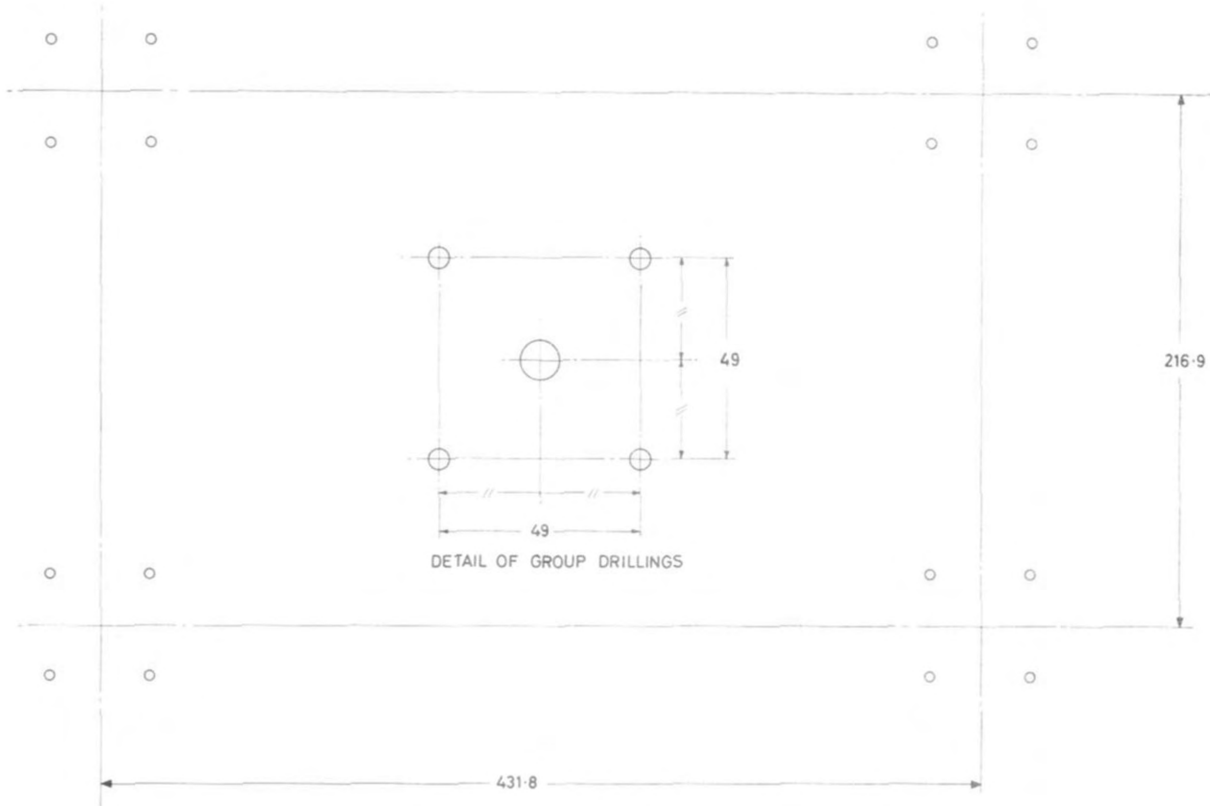


Fig. 2.2. Drilling details for fixing Anti-Vibration Mountings Cat. No. 1547.

Plinth Loudspeaker Unit

The unit should be secured to the underside of the cabinet with four M4 x 6mm screws, using the inner group of fixing holes. Dimensions of the receiver fitted with the Plinth Loudspeaker Unit are shown in Fig. 2.1C and D.

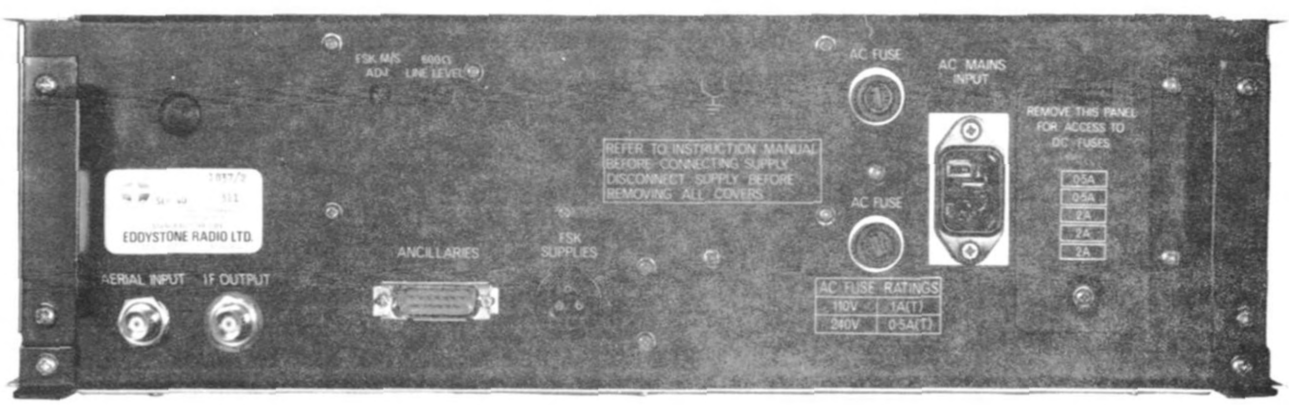


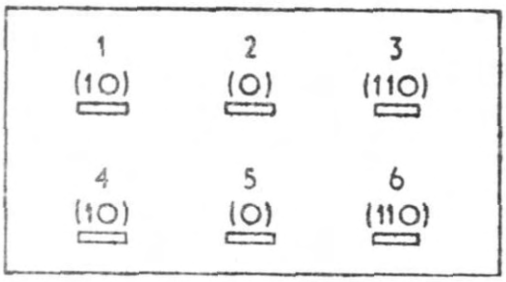
Fig. 2.3. Rear View of Model 1837/2 receiver. Only this model in the 1837 and 1838 series has the FSK Supplies connector and the FSK adjust control.

2.2 POWER SUPPLIES

THE RECEIVER MUST BE DISCONNECTED FROM THE SUPPLY BEFORE ATTEMPTING TO ADJUST THE TRANSFORMER TAPS. FAILURE TO DO SO WILL EXPOSE THE OPERATOR TO LETHAL VOLTAGES.

The unit may be powered from any standard 40-60Hz AC supply. Before connecting the supply check that the mains transformer taps are set to suit the local supply. Standard receivers are despatched from the factory set for 240V operation; other voltages may be specified at the time of ordering in which case a label will be attached to the receiver indicating the voltage to be used. The voltage setting may be adjusted as follows:-

1. Disconnect the supply.
2. Remove the cabinet (if Bench mounting version).
3. Locate the mains transformer primary connections. These are visible through a window in the left-hand side plate of the receiver. (Remove FSK connector on Model 1837/2 if necessary).
4. Remove the transparent safety cover, refer to Fig 2.4 and make the connections applicable.
5. Check the Fuse Ratings and replace the safety cover.



AC SUPPLY VOLTAGE	LINK	TAKE SUPPLY TO N	L
105 – 115	2&5 3&6	2	6
115 – 125	1&4 3&6	1	6
210 – 230	3&5	2	6
230 – 250	3&4	1	6

Fig. 2.4. Transformer Taps and connections.

Fuse Ratings

AC Fuses.

The mains transformer primary circuit is double-pole fused. The fuse rating is

100 - 130V : 1A Time-lag 200 - 260V : 0.5A Time-lag.

DC Fuses.

These are located beneath a protective cover on the rear panel. To gain access to the fuses first disconnect the supply, then loosen the captive screw and remove the cover. The designation of each fuse and its ratings is shown in Fig. 2.5.

Spare Fuses are supplied in the Accessories Kit.

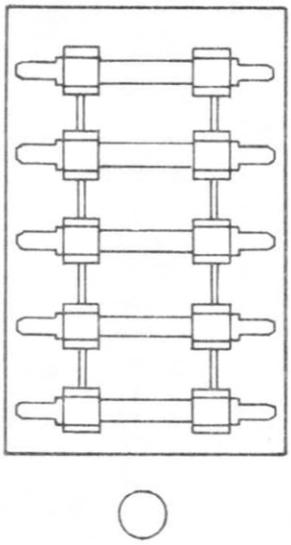


Fig. 2.5. Fuse Locations and ratings.

2.3 EXTERNAL CONNECTIONS

With the exception of the headphone socket all external connections are made at the rear of the receiver. Appropriate connectors are included in the Accessories Kit. A rear view of the receiver is shown in Fig. 2.3.

AC Mains Input. This socket accepts a 40-60Hz mains supply within the ranges 100-130V or 200-260V, using a standard IEC connector. If the plug and lead supplied in the Accessories Kit is used a connector to suit the local supply arrangements can be fitted to the free end, observing the colour-code which is as follows:-

LINE	:	BROWN
NEUTRAL	:	BLUE
EARTH	:	GREEN/YELLOW

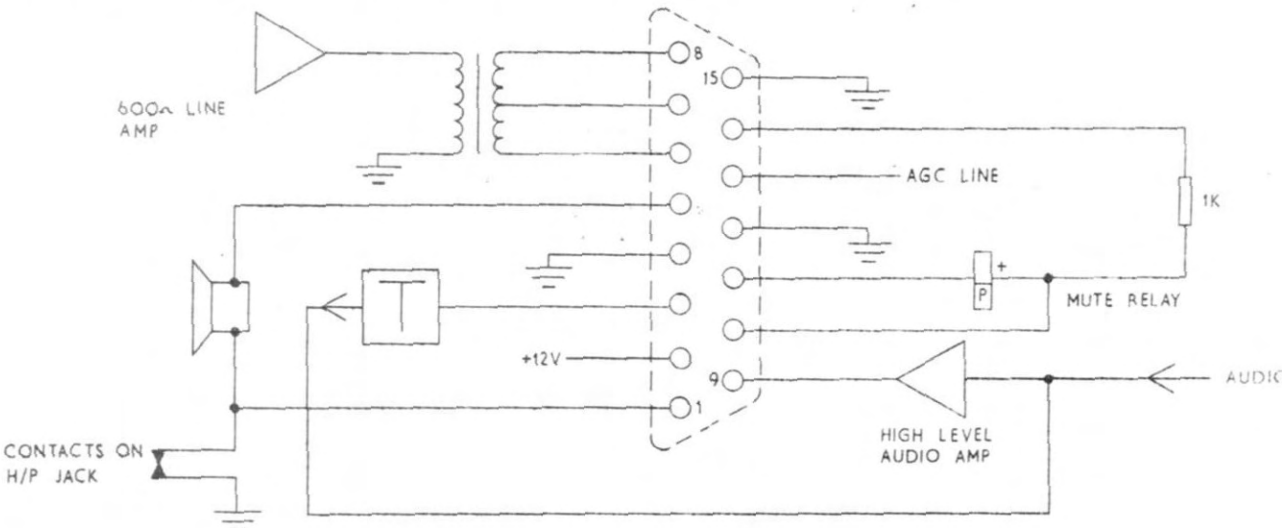
Aerial Input. This socket accepts a BNC Bayonet-lock co-axial connector.

Models 1837/1, 1838	:	For frequencies below 1.6MHz 10Ω in series with 220-560p. For frequencies of 1.6-4MHz 10Ω in series with 250p. For frequencies of 4-31MHz 50/75Ω nominal.
Model 1837/2	:	For all frequencies 50/75Ω nominal.

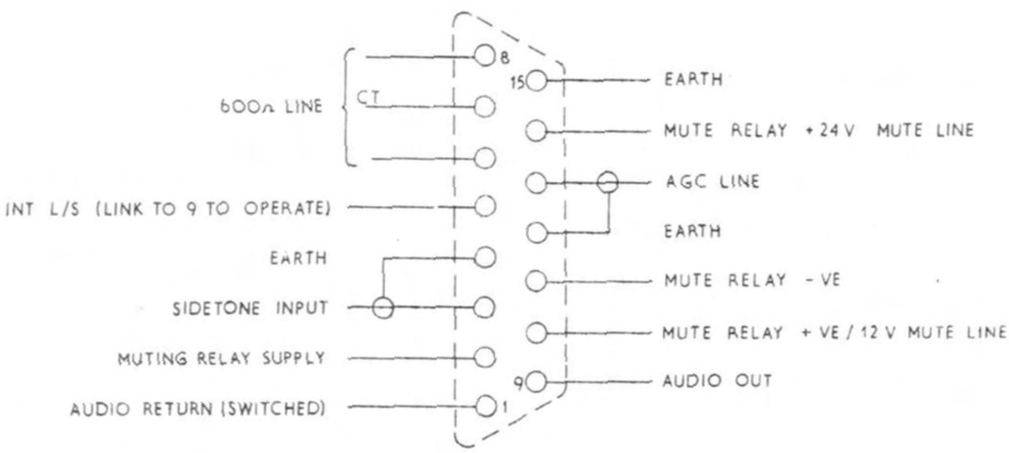
IF Output. This socket accepts a BNC Bayonet-lock co-axial connector. The signal is approx 20mV into 75Ω at 100kHz for a 3μV aerial input.

Ancillaries Connector

A 15 way connector is used, the connection details are shown in Fig. 2.6.



RECEIVER INTERNAL CONNECTIONS
(VIEWED ON FIXED CONNECTOR PIN SIDE)



FREE CONNECTOR
(VIEWED FROM WIRING SIDE)

Fig. 2.6. Ancillaries connector.

Loudspeakers. The loudspeakers can be arranged either to mute when the headphone plug is inserted or to remain operational as required. The options and connection arrangements are shown in Table 2.1.

600Ω Line. Connect to pins 6 & 8. The transformer centre tap is pin 7 which may be earthed to pin 15 if required. The output is adjustable by means of a preset control accessible through the rear panel to a maximum level of +10dBm.

IF AGC. The IF AGC line is pin 13, the cable should be screened and the screen connected to pin 12.

Muting. The receiver can be muted by connecting an earth to pin 11 (in which case link pin 10 to pin 2) or by connecting an external positive supply (12V to pin 10 or 24V to pin 14) in which case link pin 11 to pin 15.

Side tone input. An audio signal from an associated transmitter may be connected to pin 3 (earth to pin 4). The signal required for full output (AF gain control at MAX) is approx 5V into 300kΩ.

Earths. All earths on the ancillaries connector are ultimately connected to the chassis and hence to the supply earth. No additional earthing is required.

FSK Supplies Socket (Model 1837/2 only). Keying of the teleprinter is by means of an electronic switch. External supplies of ±80V, ±6V, 100V or 12V can be switched. For bipolar working connect the supplies to "Ext Supply" (polarity reversed will effect a Mark/Space reversal) and for unipolar working to either "Ext Supply" contact (use of other contact will effect a Mark/Space reversal). Connect the printer to "pole" and the supply earth (or 0 volt line). See section 4.9 and check that the correct current limiting resistors are fitted.

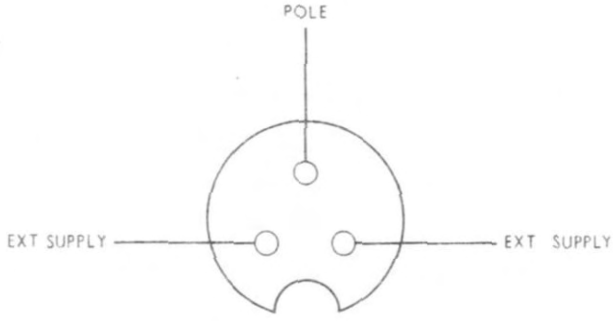


Fig. 2.7. FSK Supplies connector - view on wiring side of plug.

Diversity Installation

Two receivers can be combined for dual diversity operation.

1. Link the IF OUTPUT sockets with a screened RF cable having a standard BNC connector at each end.
2. Link the AGC lines. These are pin 13 on each ancillaries connector. A screened cable should be used with the screen connected to pin 12. Ensure the receiver earths are returned to a common earth point on the rack, to avoid earth loops.
3. Take the audio output from either receiver as convenient.

Refer to Section 3 for operating instructions.

Table 2.1. Loudspeaker Muting.

Both speakers operate	Link 5-9, link 1-15	Ext LS to 9 & 15
Internal mutes, external operates	Link 5-9	Ext LS to 9 & 15
Internal operates, external mutes	Not available	
Both speakers mute	Link 5-9	Ext LS to 9 & 1
Ext speaker only, muting		Ext LS to 9 & 1
Ext speaker only, non-muting		Ext LS to 9 & 15
Int speaker only, muting	Link 5-9	
Int speaker only, non-muting	Link 5-9, link 1-15	

Table 2.2 List of Accessories supplied with the receiver.

Quantity	Description	Part No.
4	*Cabinet Mounting Feet (with screws)	9817P
2	BNC Bayonet-lock plug	8012P
1	AC Supply Connector (complete with cable)	D4815
1	Ancillaries Connector, 15 way locking	8631P
6	**(Spare Fuses - 1A.T (Time-lag)	9816P
	(Spare Fuses - 0.5AT (Time-lag)	9714P
6	Spare Fuses - 0.5A	6710P
9	Spare Fuses - 2A	6704P
1	Trimming Tool TT1	8451P
1	Trimming Tool HS3	8450P
1	Trimming Tool (insulated)	8333PA
1	Box Spanner (for control knobs)	9057P
1	***Teleprinter Supplies Connector	8855P

Notes *Not supplied for rack-mounting receiver.

**0.5AT supplied if Receiver adjusted for 200-260V operation.

1AT supplied if Receiver adjusted for 100-130V operation.

***Supplied with Model 1837/2 only.

Table 2.3. List of Accessories available to order.

Description	Part No.
Standard Cabinet (for converting rack-mounting to bench-mounting style).	LP3538
Anti-vibration Mounting Kit	Cat. No. 1547
Drip-proof Cowl	Cat. No. 1548
Cabinet Loudspeaker Unit	Cat. No. 935/3
Plinth Loudspeaker Unit	Cat. No. 989
Headphones	LP3242
Headphones	LP3301
FSK Teleprinter Drive Module	Cat. No. 1529
FSK Teleprinter Drive Module fitted internally to 1837/2 only.	Cat. No. 1534
High-pass Aerial Filter	Cat. No. 1526
Low-pass Aerial Filter	Cat. No. 1527
Basic Spares Kit (1837 Series)	LP3554
Basic Spares Kit (1838 Series)	LP3554/1

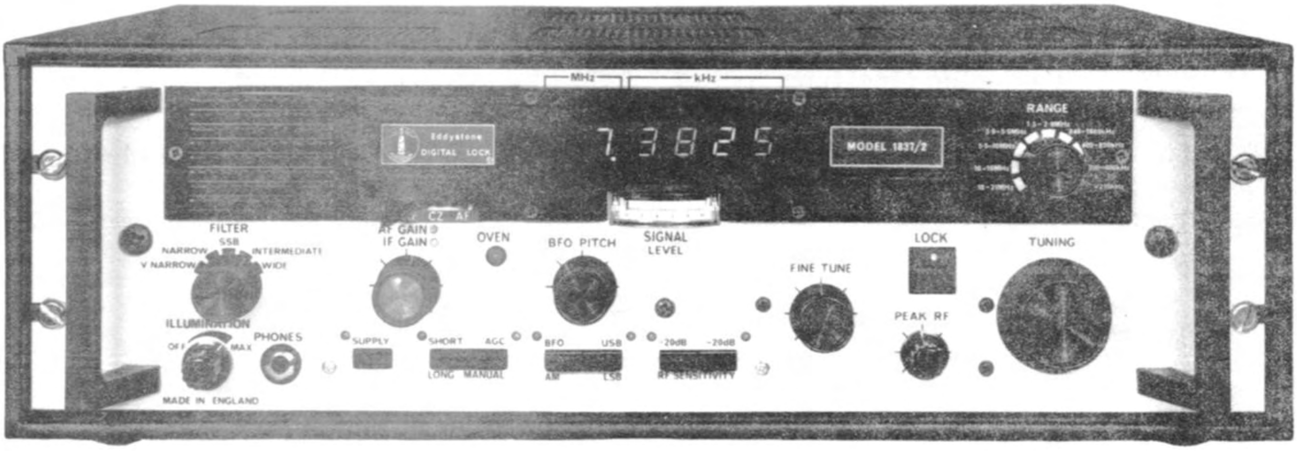


Fig 3.1 Front View of Model 1837/2 receiver.

3.1 Control Functions.

AF Gain Adjusts the level of the audio output of the internal loudspeaker, the external loudspeaker and headphones.

AGC When pushed in the button brings the automatic gain control circuit into operation. Where a second push button is fitted this selects short or long time constant in AGC mode.

BFO Pitch Adjusts the Beat Frequency in CW mode.

Filter Switch gives different bandwidth options.

Fine Tune Operative at frequencies above 1.5MHz only, this control enables small changes to be made to the tuned frequency.

IF Gain Controls the gain of the Second Intermediate Frequency Amplifier, provided AGC is not used.

Illumination A four-position switch which controls the brightness of the display and LED indicators. Three levels of brightness and an 'off' position are provided.

Lock When operated changes receiver from medium stability mode to high stability mode, and vice-versa. Light indicates high stability mode.

Meter On all models except 1837/2 this indicates the RF Carrier Signal, on model 1837/2 switchable to indicate RF, Centre Zero or AF. The centre zero position is only used when the FSK module Cat. No. 1534 is fitted.

Mode	Selects the desired mode of operation: AM, SSB or CW.
Oven *	Indicates presence of the oven heater supply; the light is illuminated as soon as the AC supply is connected to the receiver.
Peak RF	The action of this control is to bring the RF stages into more exact alignment when using Fine Tune control. Adjust for maximum RF signal.
RF Gain) RF) Sensitivity)	Push button(s) to insert attenuation into aerial feed. Used to prevent overload with high level signals.
Range	Selects the required Frequency Range.
Supply	Pushbutton switch controls the low voltage supply to the receiver. Note that the crystal oven is permanently powered, thus no prolonged 'warm-up' period is needed provided the AC supply remains connected.
Tune	In conjunction with the range switch this enables the tuned frequency to be set.

* Designated standby on 1837/2.

3.2 Operating Procedure.

It is assumed that the supply is connected to the receiver and the internal crystal standard has attained normal operating temperature. Optimum stability is reached after about 30 minutes from switch-on. If the display is not turned off with the ILLUMINATION control, the OVEN lamp will be on.

Depress the SUPPLY pushbutton, power is applied to the receiver and the display will light. Use the ILLUMINATION control to set the required display brightness.

Select the required RANGE, set FINE TUNE to mid-position, set PEAK RF to mid-position, ensure LOCK lamp is off.

Select FILTER and/or MODE as required. On 1838 series receivers the two functions are controlled by the same switch and are set automatically. On model 1837/1 select AM (both buttons out), BFO or SSB as required. On model 1837/2 select AM (button out), or BFO (button in); SSB is selected automatically by the FILTER switch and the second pushbutton selects USB or LSB as required.

Set AGC/MANUAL as required. On 1837 series select SHORT time constant initially for tuning.

Set RF GAIN (SENSITIVITY) to maximum (button(s) out).

Set IF Gain to maximum.

Set AF Gain as required.

Set TUNING to give the required frequency on the display, adjust FINE TUNE as necessary (FINE TUNE is not operational below 1.6MHz).

If the wanted signal is present adjust for maximum RF on meter.
(on model 1837/2 set meter switch to RF)

Adjust PEAK RF for maximum, adjust RF GAIN (SENSITIVITY) and/of IF GAIN as necessary.

If a CW signal is being received, adjust BFO PITCH as required (not fitted on model 1838/1).

If an SSB signal is being received:

Model 1838/1 : for USB with fixed carrier injection, use FINE TUNE as a clarifier control.
Model 1837/2 : for LSB and USB with fixed carrier injection, use FINE TUNE as a clarifier control.
Models 1837/1, 1838/2 and 1838/3 : for LSB, select BFO, use FINE TUNE and BFO PITCH as clarifier controls.

There is no LSB facility on model 1838/1.

When the signal is satisfactorily tuned, depressing the LOCK pushbutton will change the operating mode to high-stability, and the LOCK lamp will light.
The display may be dimmed or turned off with the ILLUMINATION control.

HEADPHONES may be used if required. The internal and external loudspeakers may or may not be muted when the plug is inserted, according to the wiring of the ancillaries connector- see Installation section.

EMERGENCY WATCHKEEPING

The control settings on 1837/1 and 1838 Series receivers are marked with a RED outline.
Set TUNING so that the display shows 2.1820.

Diversity Operation

Two receivers can be operated in dual-diversity by interconnecting the IF OUTPUT sockets and the IF AGC lines (pin 13 on the ancillaries connector). The audio output can be taken from either receiver without the need for a mixer or hybrid transformer.

When tuning it is necessary to disable one receiver in order to tune the other: this is easily done by setting the MANUAL/AGC pushbutton to MANUAL and the IF GAIN to minimum.

4.0.1. Introduction

This section, which is applicable to both 1837 Series and 1838 Series receivers, contains full circuit descriptions complete with alignment and maintenance procedures, parts lists, printed circuit board layouts and circuit diagrams. It is divided into subsections, each containing all the information for a particular module or unit. Note that there are some modules which change according to the receiver variant, these are listed in Table 4.0.1.

4.0.2. Basic Circuit Description

The signal path follows a conventional "double superhet" configuration with a 1st IF of 1350kHz (nominal) and a fixed Second IF of 100kHz. The exact frequency of the 1st IF depends of the setting of the 'Fine Tune' control, and the amount of correction applied via the drift correction system. Various 2nd IF bandwidths can be selected, the choice of bandwidths and the method of switching depends on the receiver variant; symmetrical and asymmetrical passbands are provided. The 2nd IF amplifier provides the major part of the receiver gain; it can be controlled by its own AGC loop or manually. Product and envelope detectors are provided which drive a high level audio amplifier and a 600Ω line amplifier.

a) RF Circuits. The aerial input signal passes through the muting relay and "Tee" section attenuators to the 1st section of the RF Amplifier, two FET transistors in cascode configuration with permanently applied AGC. The coupling to the 1st Mixer, a dual gate MOSFET follows various forms and is chosen to maintain sensibly constant gain over the whole tuning range. The second input to the mixer is from the 1st Oscillator, a single-gate MOSFET in the tuned gate configuration. The RF circuits are all ganged together and trimming for the signal frequency circuits is provided by the 'Peak RF' control. The mixer output is then fed to the Tunable 1st IF circuits, or, when Range 6 is selected, direct to the 100kHz Selectivity Unit.

b) Tunable 1st IF Circuits. Two bandpass filters separated by a common-source FET amplifier stage with preset gain control are each tuned over the range 1330-1370kHz by varicap diodes controlled by the fine tune control and the drift correction system. The frequency of the 2nd Oscillator, a tuned-gate configuration, is variable over the range 1230-1270kHz and controlled the same way to track a constant 100kHz below the frequency of the signal circuits. The oscillator output is buffered before being fed to the 2nd mixer, a double-balanced mixer integrated circuit device. The output at 100kHz feeds into the Selectivity unit which houses the 100kHz filters.

c) 100kHz 2nd IF. The 100kHz filters which precede the 2nd IF amplifier wholly determine the receiver bandwidth. A combination of L-C Filter sections and Crystal Filters is used, the choice depending on the receiver variant. The amplifier is a wideband unit with four cascoded common-source FET amplifier stages, AGC being applied to the first three. The IF AGC detector is driven from the fourth stage, whilst the RF AGC detector is fed in parallel with the first stage. The detected RF AGC signal is amplified by two operational amplifiers before being applied to the RF amplifier in the coilbox.

d) Detectors. The 100kHz output is fed in parallel to the AM detector, the Product Detector and, to the FSK Module when fitted. The Product Detector can, on all variants except Model 1838/1, utilise either fixed 100kHz injection derived from the master oscillator or a variable BFO signal from the BFO unit (Model 1838/1 has fixed injection only). Analogue gates are used to select the required signal for the product detector integrated circuit, the output of which is fed via a low pass filter to the mode switching.

e) Audio Stages and Metering. The audio signal from the appropriate detector (AM for double sideband working, product for CW and single sideband) is routed via the mode switching (which in the case of Model 1837/2 is partially performed by analogue gates) to the audio output stages. The 600Ω Line amplifier is fed via the preset line level control and a source follower and is a single integrated circuit package, which drives a balanced line via the isolating transformer. The high level audio stage is fed via the AF Gain control and is a similar integrated circuit package. The output of this feeds either the internal loudspeaker, an external loudspeaker or headphones, as required. Provision is made for a side-tone input.

f) FSK Demodulator (Model 1837/2 only). This optional unit takes the 100kHz IF signal and provides an electronically switched output to drive a teleprinter. IC1 is a combined limiter and quadrature discriminator which feeds the demodulated signal to a D.C. amplifier IC2 and then to a schmitt trigger IC3. The output switch circuit, which is isolated electrically from the rest of the receiver, consists of TR2 and TR3 in push-pull configuration driven by TR1. The diode network is arranged so that the correct polarity is always present on the transistors and that reversing the polarity effects a Mark-Space reversal.

g) Drift Correction System and Frequency Display. This operates by measuring a change in the sum of the two oscillator frequencies (which is of course equal to the total drift in both oscillators) and correcting the 2nd oscillator to reduce this change to zero. Outputs from the 1st and 2nd oscillators, f_1 and f_2, are fed to digital counters. These provide a binary number equivalent to the frequencies to which the oscillators have been set. This number is stored in the memory latch. 'Lock' mode is then selected and any change in the oscillators' frequencies is converted into an equivalent binary number which is transferred to the residual latch. This number is generated by comparing each successive new count with the original number stored in the memory latch. The 'error' count stored in the residual latch is converted into a proportional analogue voltage which is used to alter the 2nd oscillator only, to compensate for any changes in either oscillator. The voltage is applied via an integrator, to optimise the loop dynamic response, and a combining amplifier which adds in the 'Fine Tune' control voltage. The total range of correction is limited to about $\pm$10kHz. When the end of the range is approached a 'window' detector, which is driven from the output of the integrator, provides an output which causes the whole frequency display to flash about five times per second.

The true tuned frequency of the receiver is displayed on the six digit front panel display with a resolution of 100Hz. The display is driven by a digital counter. Outputs from the first and second oscillators are fed to this counter (after each has been divided by two) which is pre-loaded to allow for the offset between oscillator and tuned frequencies due to the IF. The gating period for the counters is derived from the master oscillator which ultimately determines the accuracy of the display.

4.0.3. General Maintenance

All sub-assemblies and modules used in the 1837 and 1838 Series of receivers are arranged so that they can be removed for access to components which would otherwise be inaccessible. In most cases the procedure for removal is obvious from visual inspection. As a general rule, should it be necessary to unsolder any leads from modules or printed circuit boards, a careful note should be made of the wire colour or other coding and the point to which it is attached to facilitate correct reconnection.

WHEN WORKING ON THE RECEIVER IT MAY BE NECESSARY FOR POWER TO BE CONNECTED. IT IS RECOMMENDED THAT THE RECEIVER IS FED FROM AN ISOLATED POWER SUPPLY AND THAT NORMAL PRECAUTIONS FOR SAFETY UNDER THESE CONDITIONS ARE OBSERVED.

Attention is particularly drawn to the presence of mains voltages in the power supply unit, and in the case of Model 1837/2, of teleprinter drive voltage (upto 160V DC) in the FSK Module. Also beware high induced voltages on the aerial and input circuitry.

The receiver is constructed generally to METRIC dimensions. Any IMPERIAL screw used will be marked with a red dye.

4.0.4. Fault Diagnosis

The purpose of this section is to provide a convenient guide to the possible fault area without using any test equipment. When it is obvious that a fault lies in one particular module, refer to the section relating to that module.

Symptoms	Check
1. Set completely dead.	AC supply is present.
2. Set operates normally but some or all front panel indicators do not function.	Setting of illumination control and illumination control circuitry.
3. Set completely dead, but front panel indicators operate normally.	Ancillaries connector is connected, correct speaker links are wired on ancillaries connector, correct muting relay links are wired on ancillaries connector.
4. Speaker does not mute correctly when headphone plug is inserted.	Ancillaries connector pin 1 for unwanted earth.
5. Speaker(s) and headphones do not work, line output normal.	High Level audio module and wiring.
6. Tuning meter does not function correctly.	Line Amp. and Meter Amp. module.
7. Set does not function on some settings of Filter switch.	Selectivity module.
8. Set does not receive SSB correctly.	1837 Series: Select INTERMEDIATE bandwidth and variable BFO. Tune signal using BFO PITCH and FINE TUNE controls. If satisfactory, 100kHz feed to BFO unit absent, otherwise faulty BFO unit. 1838 Series: Check 100kHz feed to BFO unit. If satisfactory, faulty BFO unit.

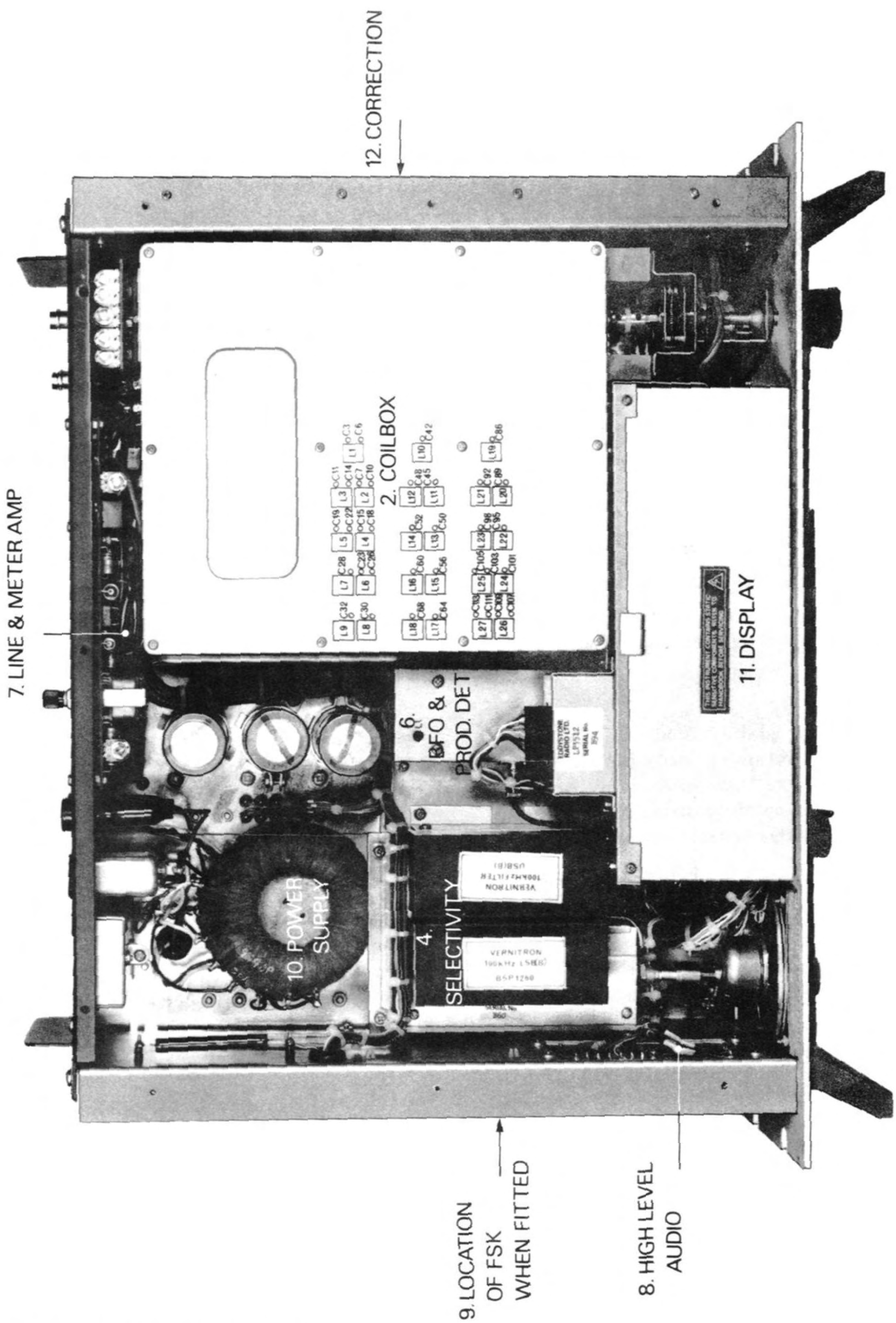


Fig 4.0.1. Plan View of Receiver

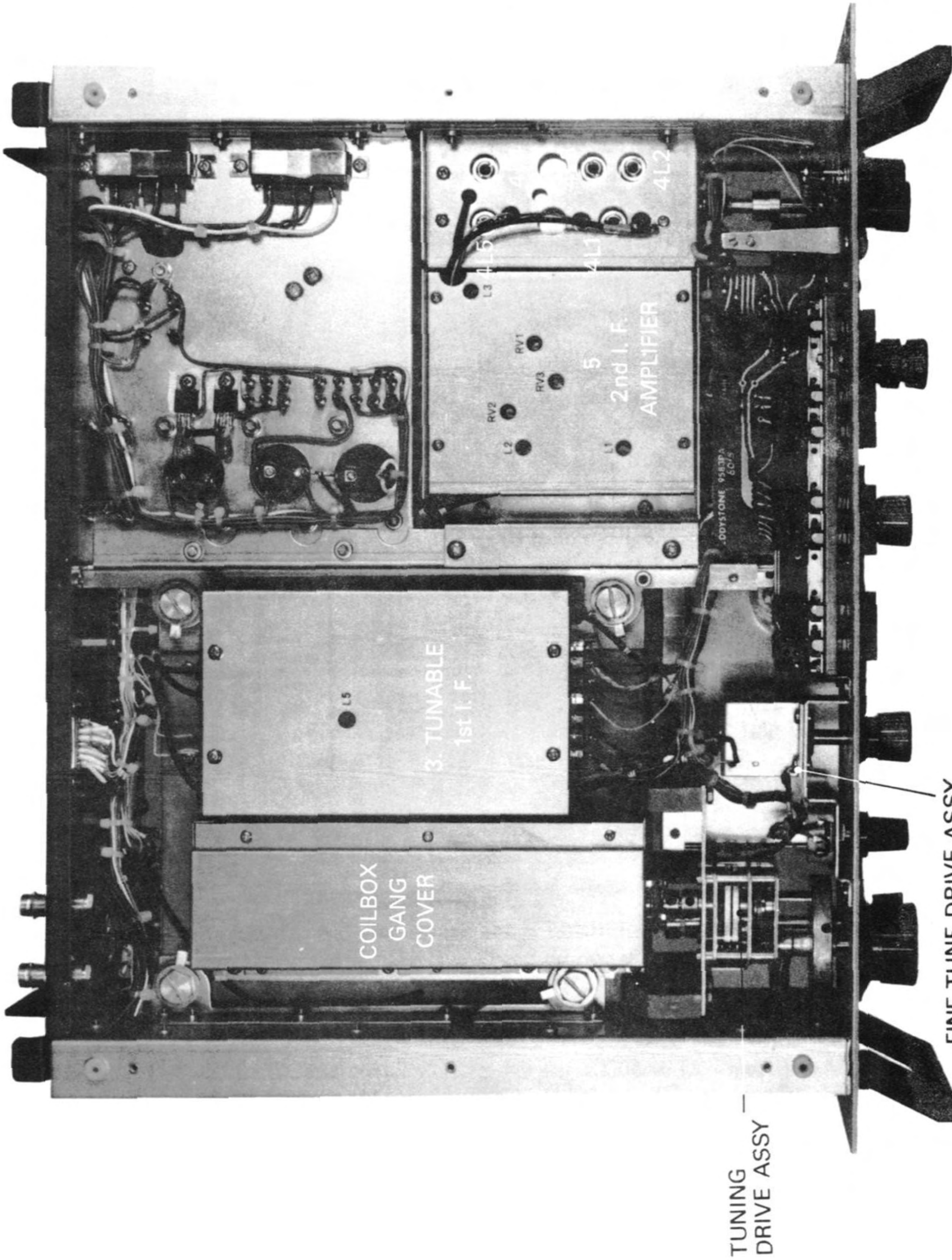


Fig 4.0.2. Underside View of Receiver

Symptoms		Check
9.	Set works on range 6 only.	Tunable IF and switching.
10.	Set will not enter High Stability mode.	Correction and/or Tunable IF module(s).
11.	Display shows approx "986500" on ranges 1-5, 7-9 and "999000" on range 6 with FINE TUNE at mid-range.	Coilbox: 1st oscillator not working.
12.	Display shows approx 1.35MHz higher than correct 'end of range' frequency on ranges 1-5, 7-9 but is correct on range 6.	Tunable IF: 2nd oscillator not working.

4.0.5. Testing and Realignment.

Full details regarding the testing and realignment of each module are given in the section relating to that module. The modules should be tested and realigned in the order given below:-

1. Power Supply Unit (Ref 10).
2. High Level Audio Amplifier (Ref 8).
3. 600Ω Line Amp. and Meter Amp. (Ref 7).
4. 2nd IF Amplifier (Ref 5).
5. Selectivity (Ref 4).
6. BFO and Product Detector (Ref 6).
7. Display (Ref 11).
8. Tunable 1st. IF (Ref 3).
9. Coilbox (Ref 2).
10. Correction (Ref 12).
11. FSK (if fitted, Ref 9).

Test Instruments.

The use of the test equipment listed is recommended, but other equipment with equivalent specification and performance can be used.

RF Signal Generator 100kHz - 31MHz AM/FM/CW

Output 1V emf from 75Ω or 50Ω.	Marconi TF2002B
Audio Signal Generator 20Hz - 20kHz 600Ω	Marconi TF2000
Output Power Meter 1mW - 10W	Marconi TF893A
High Impedance Voltmeter	Marconi TF2603
Multimeter 20kΩ/V	AVO 8
HF Oscilloscope. Input impedance 1MΩ in parallel with 20p.	
Frequency Counter Max frequency 50MHz.	Marconi TF2416.

Initial Test Procedure.

The following procedure may be found helpful when testing the signal path of the receiver.

a) Check the presence of all the power supply voltages on the power supply (Module no. 10).

b) Inject a 1kHz audio signal at 15mV at Module 8 pin 1. Full output should be available (Set AF Gain control to 50%). Repeat at Module 7 pin 8, full output should be obtained for 5mV input with the line level control at maximum. Set Mode to AM and repeat at Module 5 pin 7.

c) Select Range 5, set Mode to AM and select intermediate bandwidth and inject via a 0.1μ 250V DC blocking capacitor a 100kHz signal modulated to 30% AM at Module 4 pin 1, disconnecting the existing lead for this test only. Signal input should be less than 50μV for 10dB S+N/N. Increase the input signal in steps to a maximum of 50mV and check AGC action. In the case of no signal progression from this test, check the output of the Selectivity Unit and the input of the Second IF Amplifier, however expect spurious results as the amplifier is wideband (Module 5 pin 1).

d) Inject a signal across 2C70 (mixer section of tuning gang, for location see section 4.2) of level 10μV at 1350kHz for 10dB S+N/N ratio.

e) Connect the signal generator to the Aerial input and check that the specified S+N/N ratio can be obtained at a convenient frequency near the centre of each range.

Voltage Measurements.

All voltages given are typical only, variations of 10% may be expected as a result of component tolerances. The loading effect of a standard 20 000 Ω/V testmeter has been allowed for in the figures stated.

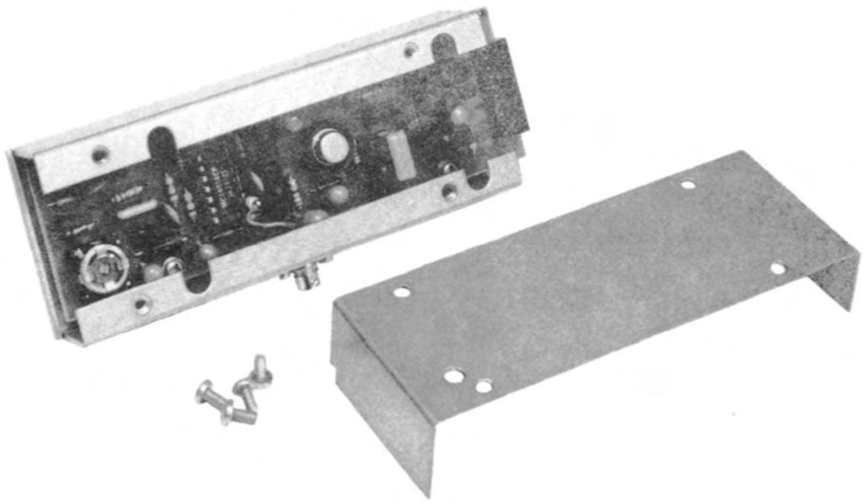


Fig. 4.0.3. View of BFO Module showing its' construction.

Table 4.0.1. List of Modules for each Receiver Variant.

		Variant				
Ref	Module	1837/1	1837/2	1838/1	1838/2	1838/3
2	Coilbox	LP3528	LP3528/2	LP3528/1	LP3528/1	LP3528/3
3	Tunable 1st IF	LP3533	LP3533	LP3533	LP3533	LP3533
4	Selectivity	LP3510	LP3546	LP3536	LP3535	LP3535
5	2nd IF Amplifier	LP3506/10	LP3506/10	LP3506/10	LP3506/10	LP3506/10
6	BFO and Product Detector	LP3530	LP3530	LP3531	LP3530	LP3530
7	600Ω Line Amp and Meter Amp	LP3506/12	LP3506/36	LP3506/12	LP3506/12	LP3506/12
8	High Level Audio Amplifier	LP3506/11	LP3506/11	LP3506/11	LP3506/11	LP3506/11
9	FSK (optional)	-	Cat. No. 1534	-	-	-
10	Power Supply Unit	LP3519	LP3519	LP3519	LP3519	LP3519
11	Display	LP3512	LP3512	LP3512	LP3512	LP3512
12	Correction	LP3506/1	LP3506/1	LP3506/1	LP3506/1	LP3506/1
13	Switchboard	LP3537/1	LP3537/2	LP3537/3	LP3537/3	LP3537/3

4.1.0. *Introduction*

This section encompasses the front and rear panels, controls (except the pushbutton switches) and external connectors i.e. all the components which do not form part of a module or unit. The format of this sub-section is of a necessity different to that of the sub-section which follow.

4.1.1. Front Panel

This carries a large number of the controls (but not the Tuning, Range, Selectivity controls nor the pushbuttons, all of which are part of their respective modules and simply protrude through apertures in the panel) the meter and loudspeaker.

Removal of knobs. All knobs are the collet-fixing type. Prise out the cap and using the box spanner supplied in the Accessories Kit turn the nut anticlockwise whilst holding the body of the knob stationary. The peak RF and Illumination knobs have a screw instead of a nut but the method is identical.

Access to the components is improved by removing the Switchboard (set all buttons 'in', remove 2 x M2.5 screws and remove unit unplugging the connectors). To remove the loudspeaker first remove the escutcheon (remove range knob, 6 x M3 countersunk screws), the speaker securing screws (4 x M3) are then revealed.

Removal of Meter. First remove the escutcheon (see above) when 2 x M3 screws securing the meter will be revealed.

Removal of Tune/Lock switchboard, Fine Tune control assembly and Peak R.F. control. Remove the Fine Tune and Peak RF knobs, remove 2 x M3 screws at the right-hand side of Peak RF control and 1 x M3 screw above and to the left of the Fine Tune control.

Removal of Meter Switch (Model 1837/2 only). First remove the Display Unit (section 4:11:3), then remove 2 x M2.5 screws at the ends of the slot. The knob pulls off.

4.1.2. Rear Panel.

The rear panel must be removed for access to the 600Ω Line Amplifier and Meter Amplifier board, Power Unit and to remove the Coilbox. Remove the Fusebox cover, 8 x M4 screws (two securing panel to each side plate and four to the power unit) and 2 x M3 screws holding the panel to the centre rail. The panel may now be hinged down on the wiring and fastened in the horizontal position to the power unit using the 2 x M3 screws. The sockets and PCB are now readily accessible.

4.1.3. Components List. Module Prefix 1.

Resistors

Ref	Value Ω
R 1	560
R 2	4.7k
R 3	680
R 4	15k
R 5	120k
R 6	220
R 7	560
R 8	not fitted
R 9	not fitted
R10	1.8k
R11	56k
R12	not fitted
R13	10k
R14	68k
R15 *	Selected, see section 4.9
R16	1k

Potentiometers

Ref	Value/Type	Description	Part No.
RV1	50k Antilog	IF Gain) Concentric	9767P
RV2	50k Log	AF Gain) Concentric	9767P
RV3	100k Lin	BFO Pitch	9763P
RV4	100k Lin	Fine Tune	9763P
RV5	20k Log	Peak RF	8727/1P

Diodes

Ref	Type
D1	Tune/Lock LED Part of LP3506/34
D2	CQY 74L (Telefunken) Oven LED

Sockets

Ref	Description	Part No.
SK1	Aerial Input. BNC	7225P
SK2 *	FSK Supplies	7130P
SK3	IF Output. BNC	7225P

Sockets continued...

Ref	Description	Part No.
SK4	Ancillaries (with retainer) DA15P	9857P
SK5	Headphones $\frac{1}{4}$" Jack	8463P

Switches

Ref	Description	Part No.
S1	Tune/Lock (Assembled on circuit board) with LED	LP3506/34
S2	Illumination, comprising	
	clicker	9766P
	switch wafer	8950P
S3 *	Meter	7491P

Miscellaneous

Description		Part No.
Front Panel	Model 1837/1	D5073
	Model 1837/2	D5073/1
Escutcheon	Model 1837/1	D5077
	Model 1837/2	D5078
Rear Panel	Model 1837/1	D5074
	Model 1837/2	D5074/1
Loudspeaker		8567P
Loudspeaker Baffle		9773PA
Loudspeaker Grille		9772PA
Meter		8470P
Display Filter (Orange)		9765P
Knobs	Peak RF	9858/1P
	Illumination	9858/1P
	Range	LP3560
	Tuning	LP3558
	IF/AF Gain (Concentric)	LP3561/1
	Filter	LP3559
	BFO Pitch	LP3559
	Fine Tune	LP3562
	Skirt for above	D4933/1

Miscellaneous continued.....

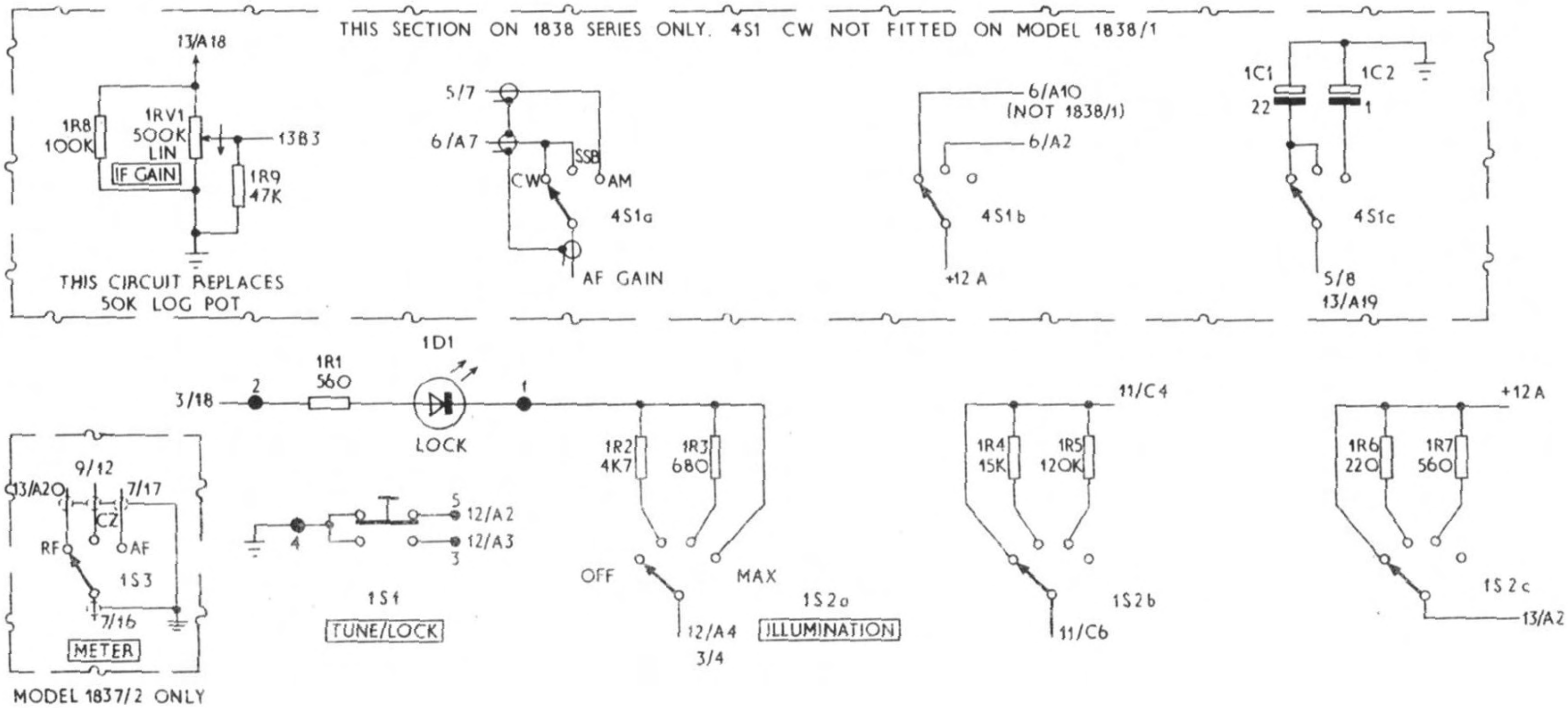
Description	Part No.
Handles	8253/1P
Fine Tune Drive Assembly Comprising Peak RF potentiometer, Fine Tune potentiometer, Tune/Lock switchboard and slow motion drive	LP3545
Top Cover	9640P
Bottom Cover	9641P
Earth Terminal	6371P
Fusebox Cover	D5075

* Fitted on Model 1837/2 only.

Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

TELEPHONE: 021-475-2231
TELEX: 337081
CABLES: EDDYSTONE BIRMINGHAM


THIS SECTION ON 1838 SERIES ONLY. 4S1 CW NOT FITTED ON MODEL 1838/1
13/A18
1R8
100K
1RV1
500K
LIN
IF GAIN
13B3
1R9
47K
THIS CIRCUIT REPLACES
50K LOG POT
5/7
6/A7
CW
SSB
AM
4S1a
AF GAIN
6/A10
(NOT 1838/1)
6/A2
4S1b
+12 A
1C1
22
1C2
1
4S1c
5/8
13/A19
1D1
1R1
560
3/18
2
1
LOCK
1R2
4K7
1R3
680
OFF
MAX
1S2a
12/A4
3/4
ILLUMINATION
11/C4
1R4
15K
1R5
120K
1S2b
11/C6
+12 A
1R6
220
1R7
560
1S2c
13/A2
9/12
13/A20
7/17
CZ
RF
AF
1S3
7/16
METER
MODEL 1837/2 ONLY
5
12/A2
12/A3
3
4
1S1
TUNE/LOCK

4.2.1. Introduction.

The coilbox module comprises a large cast box which houses the tuned circuits; the main tuning capacitor, and a number of switch wafers mounted on the rear of the box provide various switching functions associated with range selection. Muting and aerial attenuation functions are also part of this module. Receivers covering 1.5MHz to 31MHz only have the same basic unit but the components for ranges 6-9 will be omitted and S1 will therefore have only 5 positions.

4.2.2. *Circuit Description.*

The aerial input signal from the rear panel socket enters the unit on co-axial lead A, which is connected to the muting relay RLA. Protection diode array D1-8 is wired directly across the aerial input, its principal function is to protect the input transistors from high voltages which may be induced from a nearby transmitter. By interchanging the input lead connections the receiver may be either muted or operational when the relay is energised, in each case in the muted condition the aerial input is open-circuited and the input to the receiver is short-circuited. The coil circuit of the relay is brought out to contacts in the ancillaries connector, so that by fitting the appropriate links the relay can be operated either by a switched external supply of 12V or 24V or by the internal supply and a switched earth.

The signal then passes via one or two (according to the model) relay operated 'Tee' section 20dB attenuators to the 1st section of the RF Amplifier. This utilises a junction FET and a single-gate MOSFET in cascode configuration which is permanently connected to a delayed AGC line derived from the second IF amplifier via the AGC amplifier.

The aerial input uses bandpass tuning on Ranges 1-6 and changes to single tuned circuits on Ranges 7-9. All tuning circuits are ganged and provision is made for independent adjustment (Peak RF Control) when using the fine tune facility.

Various forms of coupling are employed between the cascode stage and the mixer, these being chosen to maintain sensibly constant gain over the whole tuning range. Signal input is applied to Gate 1 of the dual gate MOSFET used in the mixer.

Peak RF Board

The three separate pairs of "varicap" diodes located on this board are wired directly across the first three sections of the main tuning gang to permit independent adjustment of the signal frequency circuits when using the fine tune facility. Controlling voltage for the diodes is derived from the Peak RF control which is fed from the 12V supply. On ranges 6-9 (when fitted) resistors R20, R23, R25, R27 provide a D.C. return for the varicap diodes operating in the mixer section, note too that on these ranges this control functions primarily as an aerial trimmer and should be adjusted for maximum signal in the normal manner.

The First Oscillator

This stage employs a single-gate MOSFET using the tuned-gate configuration with feedback winding in the drain circuit. The tuned circuits are temperature compensated and tracked to tune 1350kHz above the signal frequency ($\pm$20kHz to allow for fine tune and correction range). Oscillator output is taken via a FET source follower to Gate 2 of the mixer dual-gate MOSFET and via an emitter follower to the correction module.

The mixer output is then fed to the Tunable IF Module or, when Range 6 is selected, direct to the selectivity module.

4.2.3. Removal of Coilbox and Access to Printed Boards.

Peak RF Board. This is located beneath the coilbox inside the tuning gang cover.

Remove the gang cover (6 x M2.5 screws). The Peak RF board is mounted on the 3 gang variable capacitor.

Remove the rear panel (section 4:1) to gain access to all wiring and components on the rear face of the coilbox.

RF Board, Mixer Board and Oscillator Board. Each of these boards may be removed complete with switch wafers, the procedure is as follows:

1. Remove coilbox cover plate (12 x M2.5 taptite screws).
2. Remove gang cover (6 x M2.5 screws).
3. Slacken switch spindle coupler, remove plastic plug in rear panel and withdraw spindle through the hole.
4. Disconnect the leads to the appropriate section(s) of the tuning gang at the tuning gang. It is recommended that two lengths of differently coloured wire, minimum length 8" (200mm), be attached to the free ends of these leads to facilitate replacement.
5. Disconnect the leads to the board within the coilbox with the exception of the gang leads (RF Section 2 leads, Mixer section 5 leads, Oscillator section 4 leads), taking careful note of their position for replacement.
6. Remove 4 x M3 screws; two at left-hand end, one near the centre of each long edge of the board.
7. Carefully remove screws etc. which retain the top end of switch brackets and retrieve the spindle earthing wipers and spacers.
8. Lift the board clear of the box.

Replacement

1. Use the coloured wires attached in step 5 to thread the gang leads through the holes beneath the board.
2. Place the board in position and replace the switch spindle to locate the board before securing.
3. Proceed generally in the reverse order to the removal instructions above.

Muting and Attenuator Unit.

This is secured to the rear face of the coilbox by 4 x M3 screws.

4.2.4. Fault Diagnosis

Failure of the oscillator will result in the display showing approximately "986500" on ranges 1-5 and 7-9 and "999000" on range 6 with the Fine Tune control at mid-position.

In cases of complete failure of the "front end" circuits, first check that the mute relay is operating correctly (check links on ancillaries connector) and that the protection diodes D1-8 are not short-circuited. Check also that under no-signal conditions the correct RF AGC Voltage is present on FC6. (See section 4.5.6 for setting-up instructions). If only one range has failed, check particularly the coils and switch contacts for that range.

Inspect the unit carefully for signs of burnt components, broken wires etc., particularly if the receiver has been subjected to mechanical shock or vibration, then check that the correct voltages are present (see Voltage Analysis). Note that the supply to the mixer (TR3) is taken via the selectivity module (Ref 4). If any of the internal wiring has been disturbed realignment may be required.

4.2.5. Performance Check

A preliminary check of the performance is obtained by measuring the signal noise ratio at a convenient frequency near the centre of each range. If this is outside the specification given in Section 1 then realignment is necessary.

4.2.6. Realignment

Before attempting realignment of the Coilbox circuitry it is essential that the alignment of the 100kHz 2nd IF Filter (Module No. 4), 100kHz 2nd IF Amplifier (Module No. 5) and the Tunable 1st IF Amplifier (Module No. 3) is checked and corrected if necessary. For models having 5 ranges only ignore all references to ranges 6, 7, 8 or 9. Realignment should only be undertaken by competent technicians with the appropriate test equipment.

1st. Oscillator Circuits

Since there is no fixed scale provided on the receiver, alignment of the 1st Oscillator consists of setting the limits of each range, i.e. the frequencies corresponding to maximum and minimum capacity of the tuning gang. These frequencies are given in Table 4.2.1. below. Note that the frequencies given are as read on the receiver display and are the receiver tune frequencies and not the actual oscillator frequencies. The FINE TUNE control must be set to mid-position.

Table 4.2.1. Oscillator Alignment

Range	Frequency	Adjust Core	Frequency	Adjust trimmer
1	17.1500MHz	L19	31.8000MHz	C 86
2	9.8750MHz	L20	19.3500MHz	C 89
3	5.4600MHz	L21	10.2000MHz	C 92

Table 4.2.1. continued.....

Range	Frequency	Adjust Core	Frequency	Adjust trimmer
4	2.8750MHz	L22	5.5500MHz	C 95
5	1.4800MHz	L23	2.9400MHz	C 98
6	833.0 kHz	L24	1610.0MHz	C101
7	396.0 kHz	L25	855.0 kHz	C105
8	198.0 kHz	L26	406.0 kHz	C109
9	97.0 kHz	L27	212.0 kHz	C113

Note that C103 (range 7), C107 (range 8), and C111 (range 9) are tracking trimmers and should only be adjusted if poor tracking is evident on these ranges when the mixer and RF circuits are aligned.

R.F. and Mixer Circuits

Set PEAK RF control to mid-position. Connect signal generator via a matching network if necessary to simulate the impedances given in Table 4.2.3 below, to aerial socket, set level as required, 30% AM at 1kHz. Connect Audio Output meter to Ext LS output, set to 4Ω impedance. Set Selectivity to INTERMEDIATE/AM and RF GAIN/SENSITIVITY to maximum, i.e. push button(s) out.

Adjust the trimmers and cores at the frequencies given in Table 4.2.2. below. The primary cores of the RF bandpass circuits should be adjusted by passing the long end of the hexagonal trimming tool (Part No. 8450P packed in Accessories Kit) through the secondary cores. The TUNING control should be rocked slightly to combat any pulling of the 1st oscillator which may occur when adjusting the Mixer circuits on ranges 1 & 2.

Table 4.2.2. RF and Mixer Alignment

Range	Frequency	Adjust Core			Frequency	Adjust trimmer		
		Bandpass		Mixer		Bandpass		Mixer
		Pri	Sec			Pri	Sec	
1	18.5MHz	L1 Lwr	L1 Uppr	L10	28.0MHz	C 3	C 6	C42
2	10.2MHz	L2 Lwr	L2 Uppr	L11	18.5MHz	C 7	C10	C45
3	5.6MHz	L3 Lwr	L3 Uppr	L12	9.7MHz	C11	C14	C48
4	3.0MHz	L4 Lwr	L4 Uppr	L13	5.3MHz	C15	C18	C50
5	1550 kHz	L5 Lwr	L5 Uppr	L14	2.8MHz	C19	C22	C52
6	870 kHz	L6 Lwr	L6 Uppr	L15	1555 kHz	C23	C26	C56
7	405 kHz	L7		L16	830 kHz	C28		C60
8	210 kHz	L8		L17	390 kHz	C30		C64
9	105 kHz	L9		L18	190 kHz	C32		C68

Table 4.2.3. Dummy Aerial.

1837/1)	(100kHz - 1605 kHz	10Ω in series with 220p
)	(1605kHz - 4MHz	10Ω in series with 250p
1838/3)	(above 4MHz	50Ω
1837/2)	100kHz - 4MHz	50Ω
1838/1)	(1650kHz - 4MHz	10Ω in series with 250p
1838/2)	(above 4MHz	50Ω

Having aligned the RF and Mixer circuits on ranges 7-9 as stated above, it is necessary to check the accuracy of the tracking over these ranges. This is done by tuning the receiver to approx. mid-range and then tuning the signal generator to the receiver. Note the position of the mixer core and trim slightly, checking the audio output level on the output meter. The audio output should be at a maximum if the range is tracked.

If the audio output increases as the core is screwed into the coil, the value of the oscillator tracking trimmer (range 7 : C103, range 8 : C107, range 9 : C111) needs to be increased giving a reduction of the frequency indicated on the display. It is then necessary to repeat the Oscillator alignment for the range which has been adjusted, followed by realignment of the RF and Mixer circuits.

If the audio output increases as the core is screwed out of the coil, the value of the oscillator tracking trimmer needs to be reduced giving an increase in the frequency indicated on the display. Again it is necessary to repeat the Oscillator, RF and Mixer alignment.

1st IF gain equalising potentiometers.

1. Set receiver to Range 3 and tune signal generator and receiver to approximately 7.5MHz.
2. Set IF Gain to maximum.
3. Adjust generator output to 2μV emf (except Model 1837/2 : 1μV at aerial input) with 30% AM at 1kHz.
4. Set Filter to Intermediate/AM.
5. Set Mode to AM.
6. Set Manual/AGC switch to AGC, and adjust AF gain to give an output of approx 50mW.
7. Switch Manual/AGC switch between Manual and AGC, and adjust RV3 until the output level on AGC is 2dB less than on Manual.
8. Note output power reading on Manual.
9. Set receiver to Range 2 and tune signal generator to receiver.
10. Adjust RV2 to give the same reading on Manual as noted in step 8.
11. Repeat steps 9 & 10 with receiver set to ranges 1, 4, 5, 7, 8 and 9 adjusting RV1, 4, 5, 6, 7 and 8 respectively. Note there is no adjustment for range 6.

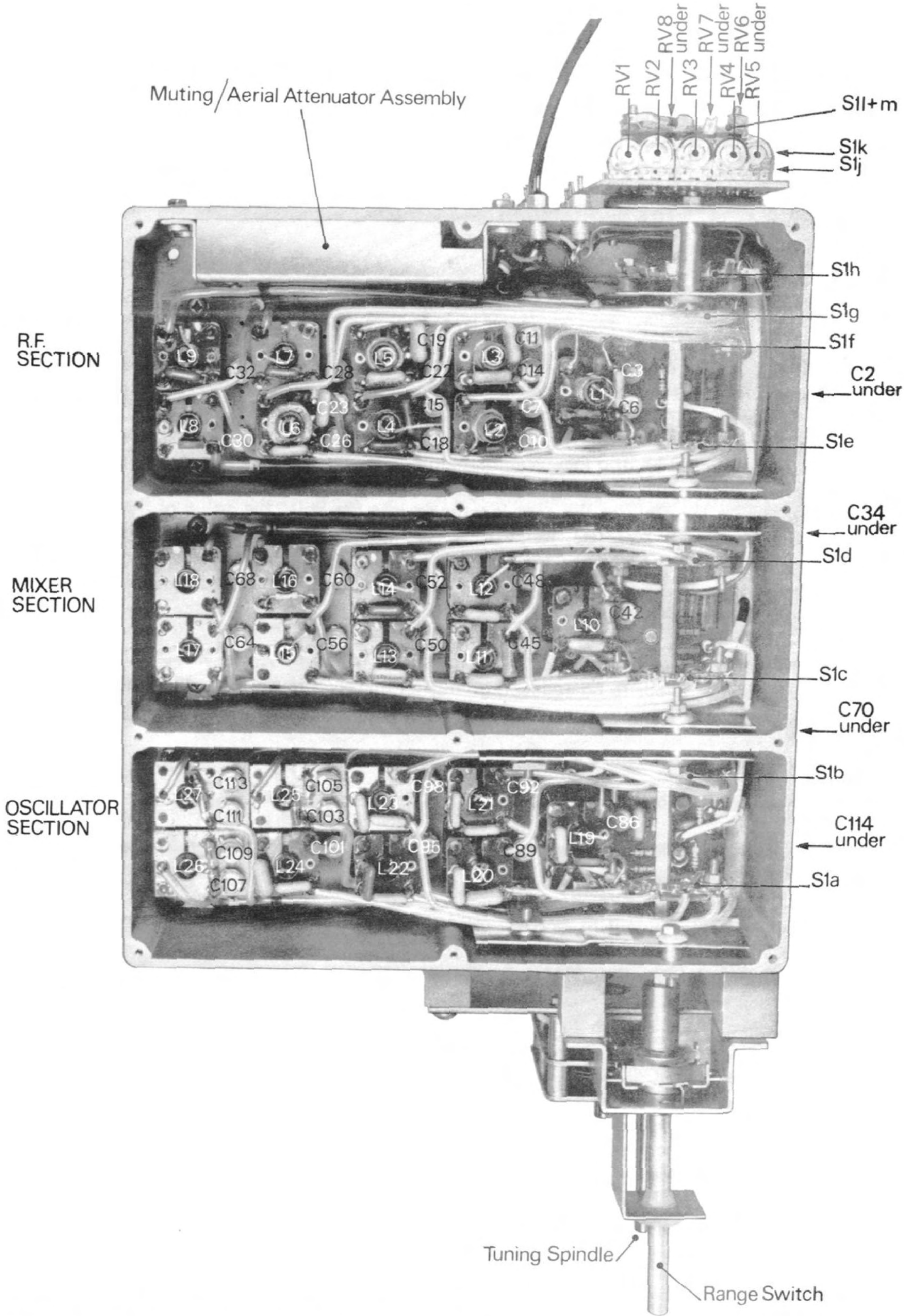


Fig 4.2.1. View of Coilbox with cover removed.

4.2.7. Voltage Analysis

The voltages are measured under no-signal conditions with the controls set as follows (unless otherwise stated). AVO8 on lowest applicable range.

Range	:	5	Tuning	:	2.5MHz
Fine Tune	:	mid-position	Peak RF	:	mid-position
Tune/Lock	:	Tune			

a) Feed-through capacitors on rear face of coilbox.

FC1	+ 12V	on range 6-9
FC2	+ 12V	when mute relay energised
FC3	+ 12V	
FC4	0V	when mute relay energised
FC5	+ 12V	when sensitivity (gain) push-button pressed
FC6	+1.3V	(RF AGC)
FC7	+ 12V	when second sensitivity (gain) push-button pressed (if fitted).

b) Printed Circuit Board pins.

RF Section

Pin 11	+ 1.3V	(RF AGC)
Pin 12	+10.5V	measured on 25V range of meter

Mixer Section

Pin 17	+ 12V	
Pin 20	+14.5V	6.8V on range 6

Peak RF Section

Pin 29	+ 2.5V	measured on 10V range of meter

Oscillator Section

Pin 32	+ 12V

c) Semiconductors

	Emitter/Source	Base/Gate 1	Gate 2	Collector/Drain	
TR1	0.8V	0V	-	1.75V	Note 1
TR2	1.75V	0.5V	-	10.5V	Note 1
TR3	0.5V	0V	0.4V	14.5V	
TR4	0.2V	0V	-	9.1V	
TR5	2.0V	0.3V	-	12V	
TR6	5.4V	7.3V	-	12V	

Note 1. Measure TR1 Drain/TR2 Source on case of TR2.

The current drawn by the module is : 12V A : 56mA
12V B : 3.4mA

4.2.8. Components List. Module Prefix 2.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	100n	Polycarbonate	100V	20%
C 2	12-358p	Gang $\frac{1}{3}$ of 7357P		
C 3	7-35p	Trimmer 8468P		
C 4	150p	Silvered Mica	350V	5%
C 5	180p	Silvered Mica	350V	5%
C 6	7-35p	Trimmer 8468P		
C 7	7-35p	Trimmer 8468P		
C 8	68p	Silvered Mica	350V	5%
C 9	68p	Silvered Mica	350V	5%
C10	7-35p	Trimmer 8468P		
C11	7-35p	Trimmer 8468P		
C12	68p	Silvered Mica	350V	5%
C13	56p	Silvered Mica	350V	5%
C14	7-35p	Trimmer 8468P		
C15	7-35p	Trimmer 8468P		
C16	39p	Silvered Mica	350V	5%
C17	33p	Silvered Mica	350V	5%
C18	7-35p	Trimmer 8468P		
C19	7-35p	Trimmer 8468P		
C20	33p	Silvered Mica	350V	5%
C21	22p	Silvered Mica	350V	5%
C22	7-35p	Trimmer 8468P		
C23 **	7-35p	Trimmer 8468P		
C24 **	39p	Silvered Mica	350V	5%
C25 **	33p	Silvered Mica	350V	5%
C26 **	7-35p	Trimmer 8468P		
C27 **	not fitted			
C28 **	7-35p	Trimmer 8468P		
C29 **	22p	Silvered Mica	350V	5%
C30 **	7-35p	Trimmer 8468P		
C31 **	not fitted			
C32 **	7-35p	Trimmer 8468P		
C33	not fitted			
C34	12-358p	Gang $\frac{1}{3}$ of 7357P		
C35	60p	Tube Ceramic	750V	10%
C36	100n	Polycarbonate	100V	20%
C37	100n	Polycarbonate	100V	20%
C38	100n	Polycarbonate	100V	20%
C39	100n	Polycarbonate	100V	20%
C40	6p	Tube Ceramic	750V	5%
C41	100p	Silvered Mica	350V	5%
C42	7-35p	Trimmer 8468P		
C43	6p	Tube Ceramic	750V	5%
C44	47p	Silvered Mica	350V	5%

Capacitors continued....

Ref	Value	Type	Voltage	Tolerance
C45	7-35p	Trimmer 8468P		
C46	6p	Tube Ceramic	750V	5%
C47	39p	Silvered Mica	350V	5%
C48	7-35p	Trimmer 8468P		
C49	33p	Silvered Mica	350V	5%
C50	7-35p	Trimmer 8468P		
C51	18p	Silvered Mica	350V	5%
C52	7-35p	Trimmer 8468P		
C53 **	47p	Silvered Mica	350V	5%
C54 **	10n	Tubular Paper	200V	20%
C55 **	22p	Silvered Mica	350V	5%
C56 **	7-35p	Trimmer 8468P		
C57 **	1n	Silvered Mica	350V	5%
C58 **	10n	Tubular Paper	200V	20%
C59 **	not fitted			
C60 **	7-35p	Trimmer 8468P		
C61 **	1n	Silvered Mica	350V	5%
C62 **	10n	Tubular Paper	200V	20%
C63 **	not fitted			
C64 **	7-35p	Trimmer 8468P		
C65 **	1n	Silvered Mica	350V	5%
C66 **	10n	Tubular Paper	200V	20%
C67 **	not fitted			
C68 **	7-35p	Trimmer 8468P		
C69	not fitted			
C70	18-364p	Gang $\frac{1}{3}$ of 7357P		
C71	60p	Tube Ceramic	750V	5%
C72	100n	Polycarbonate	100V	20%
C73	150p	Silvered Mica	350V	5%
C74	100n	Polycarbonate	100V	20%
C75	100n	Polycarbonate	100V	20%
C76	100n	Polycarbonate	100V	20%
C77	10n	Disc ceramic	25V	+80%-20%
C78	1µ	Tantalum	35V	20%
C79	10n	Disc ceramic	25V	+80%-20%
C80	not fitted			
C81	10n	Disc ceramic	25V	+80%-20%
C82	68µ	Tantalum Electrolytic	20V	20%
C83	10n	Disc ceramic	25V	+80%-20%
C84	5n7	Silvered Mica	350V	1%
C85a	82p	Ceramic N150	100V	2%
C85b	39p	Silvered Mica	350V	5%
C86	7-35p	Trimmer 8468P		
C87	3n1	Silvered Mica	350V	1%
C88a	68p	Ceramic N150	100V	2%
C88b	18p	Silvered Mica	350V	5%

Capacitors continued......

Ref	Value	Type	Voltage	Tolerance
C89	7-35p	Trimmer 8468P		
C90	1n8	Silvered Mica	350V	1%
C91a	70p	Tube ceramic N750	750V	5%
C91b	33p	Silvered Mica	350V	5%
C92	7-35p	Trimmer 8468P		
C93	1n05	Silvered Mica	350V	1%
C94a	50p	Tube Ceramic N750	750V	5%
C94b	33p	Silvered Mica	350V	5%
C95	7-35p	Trimmer 8468P		
C96	540p	Silvered Mica	350V	1%
C97a	50p	Tube Ceramic N750	750V	5%
C97b	27p	Silvered Mica	350V	5%
C98	7-35p	Trimmer 8468P		
C99 **	3n3	Silvered Mica	350V	1%
C100 **	68p	Silvered Mica	350V	5%
C101 **	7-35p	Trimmer 8468P		
C102 **	200p	Polystyrene	125V	1%
C103 **	7-35p	Trimmer 8468P		
C104 **	120p	Polystyrene	125V	2%
C105 **	7-35p	Trimmer 8468P		
C106 **	140p	Polystyrene	125V	5%
C107 **	7-35p	Trimmer 8468P		
C108a **	180p	Polystyrene	125V	5%
C108b **	47p	Silvered Mica	350V	5%
C109 **	7-35p	Trimmer 8468P		
C110 **	100p	Polystyrene	125V	1%
C111 **	7-35p	Trimmer 8468P		
C112a **	150p	Silvered Mica	350V	5%
C112b **	180p	Polystyrene	125V	5%
C113 **	7-35p	Trimmer 8468P		
C114	18-364p	LP3563		
C115	100p	Silvered Mica	350V	5%
C116	100p	Silvered Mica	350V	5%
C117	10n	Disc Ceramic	25V	+80%-20%
C118	1n	Disc Ceramic	250V	+80%-20%
C119	100n	Polycarbonate	100V	20%
C120	68μ	Tantalum Electrolytic	20V	20%
C121	10n	Disc Ceramic	25V	+80%-20%
C122	1μ	Tantalum Electrolytic	35V	20%
C123	220n	Polycarbonate	100V	20%

Note C85a and C85b are wired in parallel, etc.

Filtered Connectors

Ref	Value	Type
FC1	1n5	9871P
FC2	1n5	9871P
FC3	1n5	9871P
FC4	1n5	9871P
FC5	1n5	9871P
FC6	1n5	9871P
FC7	1n5	9871P

Resistors

Ref	ValueΩ
R 1	2M2
R 2	68
R 3	18
R 4	68
R 5	68
R 6	18
R 7	68
R 8	100k
R 9	22
R10	270
R11	100k
R12	1M
R13	180
R14	not fitted
R15	not fitted
R16	not fitted
R17	2k7
R18	820
R19 **	2k2
R20 **	100k
R21 **	2k2
R22 **	33k
R23 **	100k
R24 **	2k2
R25 **	100k
R26 **	2k2
R27 **	100k
R28	1M
R29	4k7
R30	470k
R31	33k
R32	22
R33	270
R34	1M8
R35	47k

Ref	ValueΩ
R36	1M8
R37	47k
R38	1M8
R39	47k
R40	120
R41	S.O.T.
R42	S.O.T.
R43	S.O.T.
R44	S.O.T.
R45	S.O.T.
R46	S.O.T.
R47	S.O.T.
R48	S.O.T.
R49	S.O.T.
R50	100k
R51	56
R52	100k
R53	270
R54	560
R55	2k7
R56	6k8
R57	180
R58	150
R59	not fitted
R60 **	10k)TR4 1%)high stab
R61 **	15k)low noise
R62	15k
R63	not fitted
R64 *	47
R65 *	47
R66 *	47
R67	100k

* fitted on Model 1837/2 only.

All resistors except R60, R61 are Mullard CR25, 0.3W, 5%.

Potentiometers

Ref	Value/Type	Part No.
RV1	47k linear cermet preset	9489P
RV2	47k linear cermet preset	9489P
RV3	47k linear cermet preset	9489P
RV4	47k linear cermet preset	9489P
RV5	47k linear cermet preset	9489P
RV6 **	47k linear cermet preset	9489P
RV7 **	47k linear cermet preset	9489P
RV8 **	47k linear cermet preset	9489P

Coils

Ref	Value/Type/Part No.
CH1	100mH. Sigma SC60
CH2	4.7mH. Sigma SC60
L 1	D5033
L 2	D5034
L 3	D5035
L 4	D5036
L 5	D5307
L 6 **	D5038
L 7 **	D5039
L 8 **	D5040
L 9 **	D5041
L10	D5042
L11	D5043
L12	D5044
L13	D5045

Ref	Value/Type/Part No.
L14	D5046
L15 **	D5047
L16 **	D5048
L17 **	D5049
L18 **	D5050
L19	D5051
L20	D5052
L21	D5053
L22	D5054
L23	D5055
L24 **	D5056
L25 **	D5057
L26 **	D5058
L27 **	D5059

Diodes

Ref	Type
D 1	IN4148
D 2	IN4148
D 3	IN4148
D 4	IN4148
D 5	IN4148
D 6	IN4148

Ref	Type
D 7	IN4148
D 8	IN4148
D 9	BAIII
D10	BAIII
D11	BAIII
D12	BAIII

Diodes continued....

Ref	Type
D13	BAIII
D14	BAIII
D15	BZX79 C9V1
D16	1S44

Transistors

Ref	Type
TR1	UC 734B
TR2	3N128
TR3	40673
TR4	3N128 or BFR29
TR5	UC734B
TR6	BFW30

Relays

Ref	Type	Part No.
RLA	RH12	8445P
RLB	RH12	8445P
RLC	RH12	8445P
RLD	RH12	8445P
RLE	RH12	8445P

Switches

Ref	Description	Part No.
S1	Range switch comprising	
	Clicker	9726P
	Coupler	7136P
	Spindle	9727P
	Switch Wafers	
	a	D5114
	b-g	8308P
	j-k (k not on 5 range)	7014P
	h **	9567P
	l+m **	9567P

*** not fitted on 5 range versions*

Description	Part No.
Printed Circuit Board: Muting & Aerial Attenuator Unit	9574P
Printed Circuit Board: Muting & Aerial Attenuator Unit Assembled, 1837 Series	LP3506/5
Printed Circuit Board: Muting Assembled, 1838 Series	LP3506/22
Printed Circuit Board: Mixer Section	9575P
Printed Circuit Board: Mixer Section, Assembled (9 ranges)	LP3506/6
Printed Circuit Board: Mixer Section, Assembled (5 ranges)	LP3506/17
Printed Circuit Board: RF Section	9576P
Printed Circuit Board: RF Section, Assembled (9 ranges)	LP3506/7
Printed Circuit Board: RF Section, Assembled (5 ranges)	LP3506/18
Printed Circuit Board: Oscillator Section	9577P
Printed Circuit Board: Oscillator Section, Assembled (9 ranges)	LP3506/8
Printed Circuit Board: Oscillator Section, Assembled (5 ranges)	LP3506/19
Printed Circuit Board: Peak R.F. Section	9974P
Printed Circuit Board: Peak R.F. Section, Assembled	LP3506/42
Printed Circuit Board: Switch Mounting	9573P
Printed Circuit Board: Switch Mounting, Assembled (9 ranges)	LP3506/4
Printed Circuit Board: Switch Mounting, Assembled (5 ranges)	LP3506/20
Tuning Drive Assembly	LP3539
Spindle Coupler (2 off)	LP3463
Tuning Gang Assembly comprising Tuning Gangs, coupler and cradle	LP3581
Coilbox Assembly Complete: Model 1837/1	LP3528
Models 1838/1 & 1838/2	LP3528/1

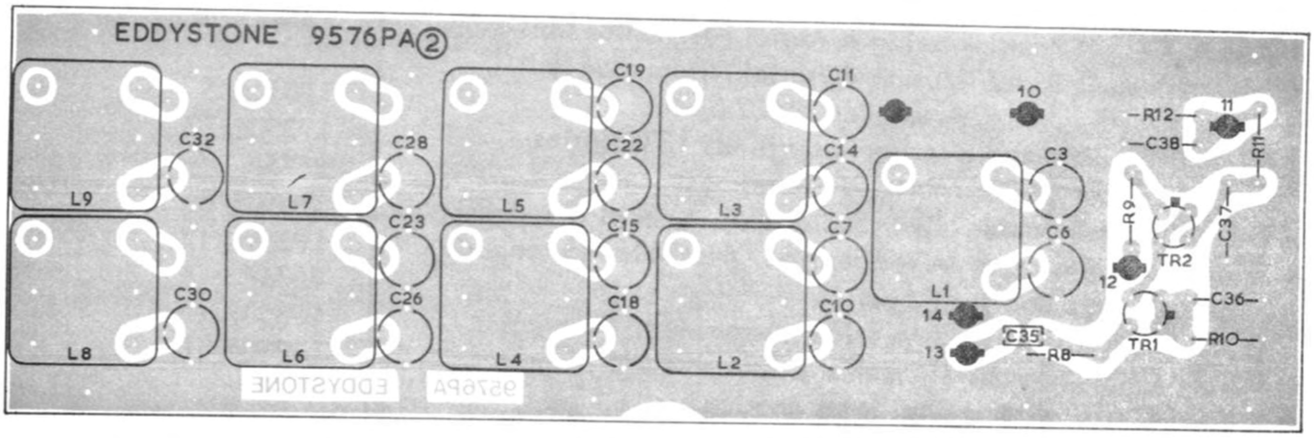
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

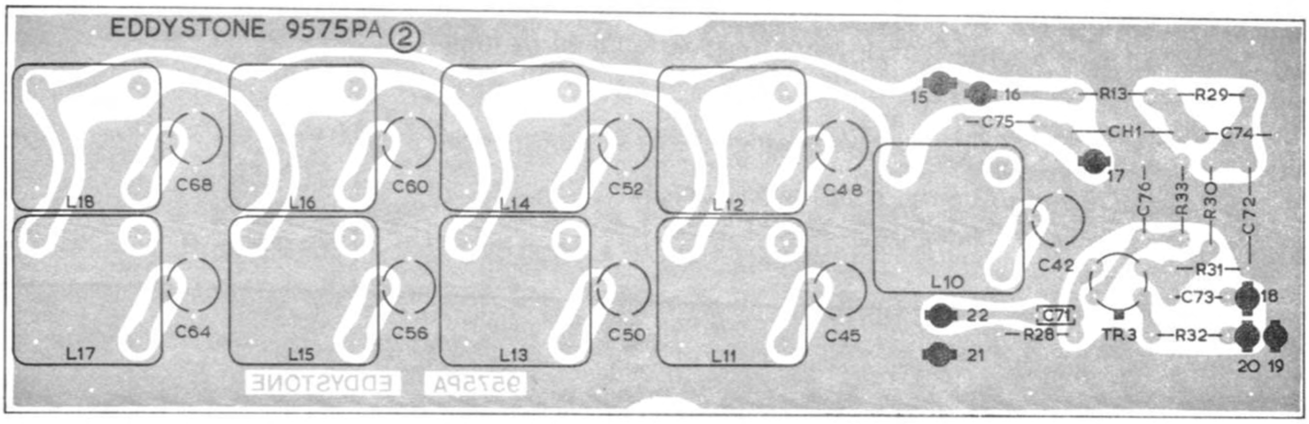
TELEPHONE: 021-475-2231.
TELEX: 337081
CABLES: EDDYSTONE BIRMINGHAM

4.2.9. Printed Circuit Boards.

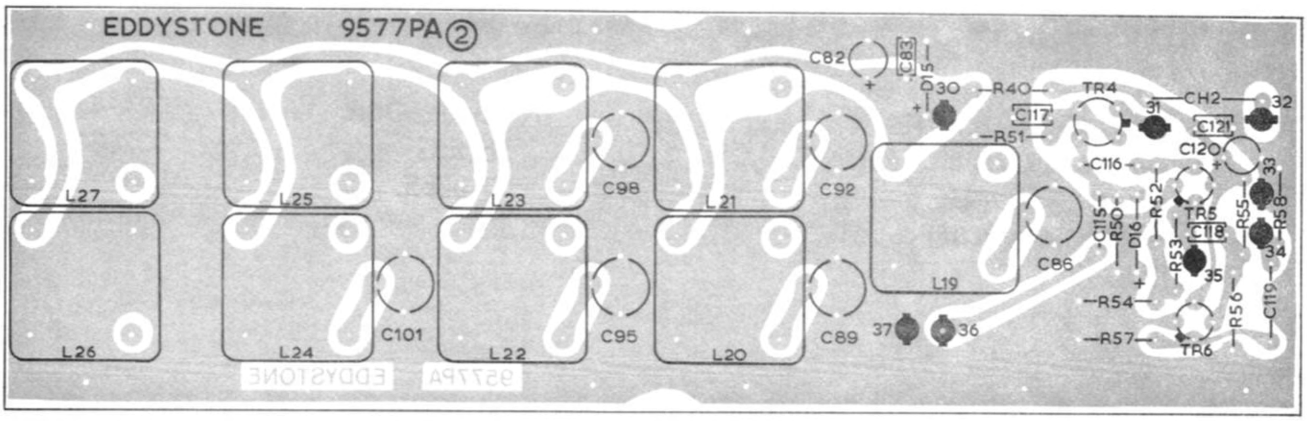
All printed circuit boards are shown viewed from the legend side, and are actual size. The small board mounted on top of the coil formers is not shown.



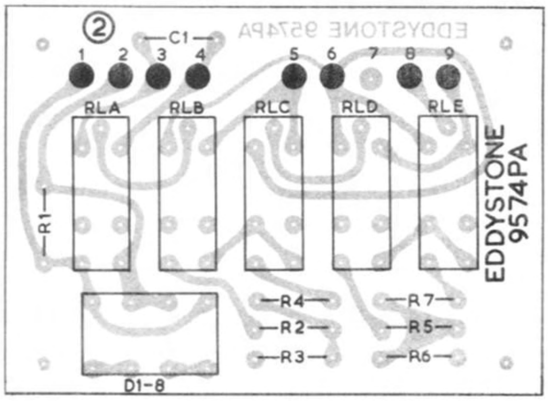
Aerial Section



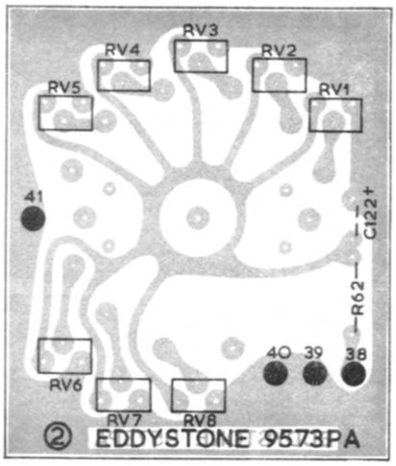
Mixer Section



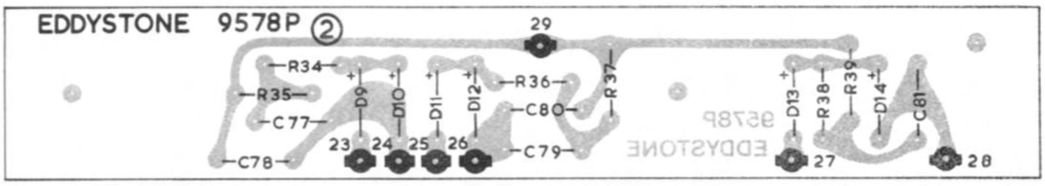
Oscillator Section



Muting & Aerial Attenuator Section



Switch Mounting Board



Peak RF Section

4.3.1. Introduction

This module contains the first I.F. variable tuned circuits, the second mixer, the second oscillator, and associated circuits. The analogue section of the drift correction system is also situated in this unit, as is the "End of Range" detector which causes the display to flash when the control range is exceeded.

The tunable IF amplifier is not used on Range 6.

4.3.2. Circuit Description

The signal from the first mixer (TR3 in coilbox, Ref. 4:2) is inductively coupled into the first coil L1. Note that the DC drain voltage for that mixer is supplied via the primary of L1 and the resistor R1. Coils L1 and L2 with their associated capacitors form the first bandpass filter, which is tuned over the range 1330 and 1370kHz by varicap diodes D1, D2. The diodes are controlled by a common line from IC2a. L2, the output coil of the first filter, drives a common source amplifier TR1. The gain of this is set independently on each range by a gate bias voltage derived from the preset potentiometer selected by wafer S1j of the 'Range' switch (RV1 - 8inc. in coilbox, Ref 4:2). This arrangement enables the absolute gains of the ranges to be equalized. The output of TR1 is inductively coupled into a similar second bandpass filter via L3. The output of this filter drives the bootstrapped buffer amplifier TR2 and thence the double balanced mixer IC1.

The second oscillator (TR3) is a tuned gate type covering the range 1230 to 1270kHz and controlled by the varicap diode D7. The output of IC2a drives this diode as well as those in the bandpass filters, the filter centre frequency and oscillator frequency are thus adjusted simultaneously with a constant 100kHz separation to give the required 100kHz second IF. The voltage supply to the oscillator is stabilized at 8V by IC3. The output from the oscillator is taken from the gate of TR3 and fed to the bootstrapped buffer TR4, and an output from this is taken to the double balanced second mixer IC1, the oscillator level at pin 3 of this device is in the region of 150mV rms. Another output from the bootstrapped buffer is taken to an emitter follower TR5, which feeds (at about 400mV rms) the Correction module (Ref. 4:12).

As already noted the drive to all the varicap diodes is from IC2a. This output is also fed to an emitter follower TR6 and thence to the reference input of the D/A converter in the Correction module in order to "linearise" the varicap law. IC2a acts as a combining stage for the two sources of control voltage for the varicap diodes. The first source is the front panel 'Fine Tune' control (1RV4) which provides, via voltage follower IC2b, a $\pm$10kHz range.

The second control source is from the DCS, and gives an additional $\pm$10kHz control range. The output from the D/A convertor is a series of discrete steps, which are integrated over a 1 second period in order to avoid a step change in frequency. The integrator is disabled by RLA/1 when the receiver is operated in the tune mode.

IC2c and IC2d are connected to form a 'window' detector. This is driven from the output of the integrator and detects when the extreme ends of the range are approached. The output of the detector is clamped at +5V (i.e. a logic "1" level determined by the potential divider R47/R48) when the input is in the middle of its range, the Op-amps being isolated by diodes D8 and D9. When the input is within 2.5V of the positive supply rail, the output of IC2c goes to -15V causing the output of the detector to go to zero volts (i.e. a logic "0" level).

Similarly when the input is within 5V of the negative supply rail, the output of IC2d goes to -15V and again the detector output goes to zero volts. The logic "0" output thus produced at both ends of the correction range is fed to the Display module (Ref. 4:11) and causes the whole display to flash about five times a second so indicating 'end of (correction) range'.

The ±15V supplies are provided by voltage regulators IC5 and IC6. The positive regulator IC5 also supplies the first mixer (Coilbox, Ref. 4:2) via the primary of L1.

4.3.3. Removal/Replacement

Remove the cover (4 x M3 Screws) to obtain access to the printed circuit board. This is retained by 5 x M2.5 screws.

4.3.4. Fault Diagnosis

The oscillator may be checked on any range except 6 by disabling the 1st Oscillator in the coilbox (short-circuit the oscillator section of the tuning gang - 2C114) and observing the display, which should read 98650 with the fine tune control central. Check the fine tune control changes the display by ±10kHz approx. on ranges 1-5. If these checks are satisfactory, then the oscillator, varicap diodes and drivers are working correctly.

If sensitivity is low, then it is necessary to check D.C. voltages and signal progression through the unit.

4.3.5. Performance Check

Performance may be checked by measuring the signal/noise ratio at the audio output. This should be 10dB S+N/N with approx. 3kHz bandwidth for an input injected across 2C70 of approx. 10µV at 1350kHz. Also check that the gain of the unit does not vary by more than ±2dB as the fine tune control is adjusted over its range.

4.3.6. Realignment

This module should only be adjusted when fitted in the receiver, and then only when special instruments required are available. In the absence of a Spectrum Analyser realignment should not be attempted unless absolutely essential.

Equipment required (in addition to that shown at the beginning of this section).
Marconi Instruments. Spectrum Analyser Type TF 2370
with High Impedance Probe Type TK 2374

The procedure is described for a receiver having 9 ranges, for receivers with 5 ranges the appropriate instructions are given in brackets. Note that access to components inside the Coilbox gang cover (Module No. 2), is also required. The receiver should be in the 'Tune' mode, i.e. the LOCK lamp should be off.

1. Select range 9 (range 5 and set FINE TUNE control to mid-position) and disable the 1st Oscillator by temporarily short-circuiting 2C114 - this is the oscillator section of the tuning gang.

2. Apply the output from the Spectrum Analyser, via a 30dB attenuator, across 2C70, the mixer section of the tuning gang.
3. Remove lid of Tunable IF module and using the high impedance probe at test point 1 adjust L1-4 to obtain the response shown in Fig. 4.3.1.
4. Select range 5, adjust the FINE TUNE control over its full range and check that, although the frequencies change, the shape of the curve in Fig. 4.3.1. remains substantially the same. If the shape alters it is probable that one of the varicap diode circuits D1-D4 is faulty. Remove the Spectrum Analyser.
5. Replace the lid of the Tunable IF module, select range 9 (range 5 with FINE TUNE control at mid-position) and adjust L5 on the inner core setting to give an oscillator frequency of 1.2500MHz. This may be measured using the internal reference standard, provided this is known to be correct, by disabling the 1st Oscillator by short-circuiting 2C114 when the display will read 98650.0.
6. Select range 5, and check that the FINE TUNE control varies the frequency by ±10kHz (within 2kHz). Check that the oscillator output at pin 19 is approx. 400mV rms.
7. Check the gain as follows:-

   Select Range 5 and set 2RV5 fully anti-clockwise. Inject a 1mV signal across 2C70 at 1350kHz. Disable the 1st Oscillator by short-circuiting 2C114.
   Check that the signal level at test point 1 is 20mV.
   Check that the signal level at TR1 gate is 5mV.
   Check that the oscillator level at IC1 pin 3 is approx. 150mV.

8. Remove all temporary short-circuits and replace covers.
9. Note. The 1st IF gain equalising potentiometers (located in the coilbox module : 2RV1 -8) are adjusted as part of the coilbox realignment.

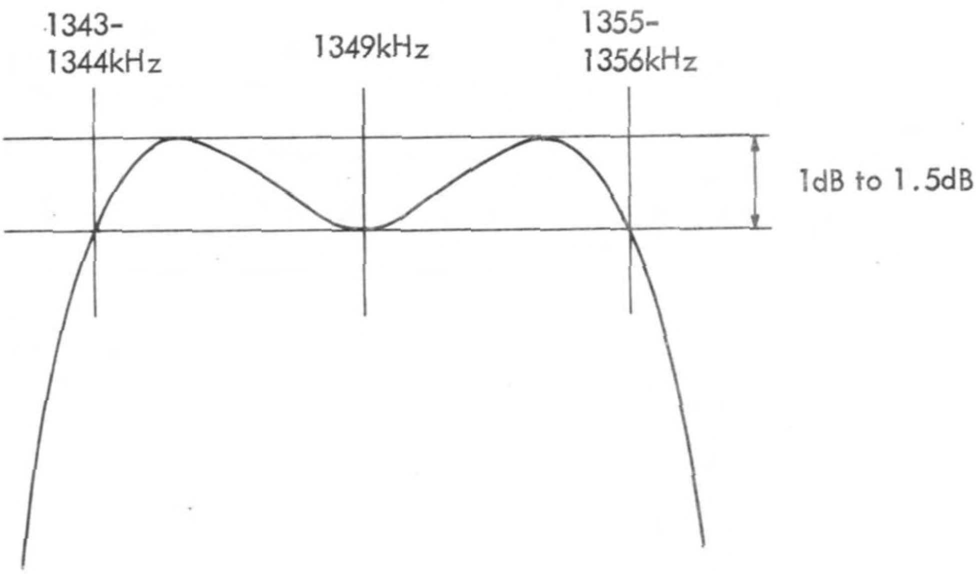


Fig. 4.3.1. Frequency response at Test Point 1.

Alternative procedures for realignment using Signal General and RF Millivoltmeter.

1. Select Range 9 (range 5 and set FINE TUNE control to mid-position) and disable the 1st Oscillator by temporarily short-circuiting 2C114 - this is the oscillator section of the tuning gang.
2. Remove lid of Tunable IF module and connect a 10kΩ, 0.3W, 5% resistor in parallel with each of the coils L1-L4 using the terminal pins provided.
3. Connect an RF millivoltmeter with high impedance probe to test point 1.
4. Connect signal generator across 2C70, the mixer section of the tuning gang. Set frequency to 1349kHz and level to give approximately 30mV at TP1.
5. Tune coils L1-L4 for maximum at TP1.
6. Remove the 10kΩ resistors connected at step 2, reduce the generator output to give 30mV at TP1 and check that the response is as shown in Fig. 4.3.1. Remove Signal generator and RF millivoltmeter.
7 Replace the lid of the Tunable IF module, select range 9 (range 5 with FINE TUNE control at mid-position) and adjust L5 on the inner core setting to give an oscillator frequency of 1.2500MHz. This may be measured using the internal reference standard provided this is known to be correct, by disabling the 1st Oscillator by short-circuiting 2C114 when the display will read 98650.0.
8. Select range 5, and check that the FINE TUNE control varies the frequency by ±10kHz (within 2kHz). Check that the oscillator output at pin 19 is approx. 400mV rms.
9. Check the gain as follows:

   Select Range 5 and set 2RV5 fully anti-clockwise. Inject a 1mV signal across 2C70 at 1350kHz. Disable the 1st Oscillator by short-circuiting 2C114.
   Check that the signal level at test point 1 is 20mV.
   Check that the signal level at TR1 gate is 5mV.
   Check that the oscillator level at IC1 pin 3 is approx. 150mV.

10. Remove all temporary short-circuits and replace covers.
11. Note. The 1st IF gain equalising potentiometers (located in the coilbox module : 2RV1 - 8) are adjusted as part of the coilbox realignment.

4.3.7. Voltage Analysis

All voltages measured with respect to 0V rail (pin 20), AVO8 on lowest applicable range. Normal tolerances apply.

a. Integrated Circuits

IC1	pin	1	0	pin	5	2.2V	
		2	2.5V		6	-	
		3	2.8V		7	2.6V	
		4	6.2V		8	0	
IC2	pin	1	+7.2V *	pin	8	+14.5V	
		2	+5.5V *		9	-10.5V	
		3	+4.8V *		10	0	Tune/Lock
		4	+15.0V		11	-15V	switch in tune
		5	+5.5V *		12	+12.5V	
		6	+6.9V *		13	0	
		7	+6.9V *		14	+14.5V	

IC4 pin	1	-13.0V	pin	5	-14.0V	
	2	0		6	0	Tune/Lock
	3	0		7	+15.5V	switch in tune
	4	-15.0V		8	-0.5V	

	E	C	B
IC3	+12.0V	0	+8.0V
IC5	+20.0V	0	+15.0V
IC6	-15.0V	-20.0V	0

b. Transistors

	Emitter/Source	Base/Gate	Collector/Drain	
TR1	+2.2V	0	+11.2V	
TR2	+2.9V	0	+11.2V	
TR3	+2.7V	0	+7.0V	
TR4	+6.5V	+1V	+11.5V	
TR5	+3.8V	+4.3V	+11.5V	
TR6	+6.7V *	+7.2V *	+15.0V	Tune/Lock Switch in Tune

N.B. * Voltages dependent on setting of fine tune control.

The currents drawn by the module are:

+12V supply : 50mA
+20V supply : 22mA
-20V supply : 12mA

4.3.8. Components List. Module Prefix 3.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	10µ	Tantalum Electrolytic	25V	20%
C 2	680n	Tantalum Electrolytic	35V	20%
C 3	150p	Tube Ceramic	750V	5%
C 4	680p	Polystyrene	125V	2%
C 5	10n	Disc Ceramic	25V	+80%-20%
C 6	8p2	Ceramic	100V	20%
C 7	10n	Disc Ceramic	25V	+80%-20%
C 8	680p	Polystyrene	125V	2%
C 9	150p	Tube Ceramic	750V	5%
C10	10n	Disc Ceramic	25V	+80%-20%
C11	680n	Tantalum Electrolytic	35V	20%
C12	10µ	Tantalum Electrolytic	25V	20%
C13	10n	Disc Ceramic	25V	+80%-20%
C14	150p	Tube Ceramic	750V	5%
C15	680p	Polystyrene	125V	2%
C16	10n	Disc Ceramic	25V	+80%-20%
C17	8p2	Ceramic	100V	20%
C18	10n	Disc Ceramic	25V	+80%-20%
C19	680p	Polystyrene	125V	2%
C20	150p	Tube Ceramic	750V	5%
C21	10n	Disc Ceramic	25V	+80%-20%
C22	10µ	Tantalum Electrolytic	25V	20%
C23	10n	Disc Ceramic	25V	+80%-20%
C24	10n	Disc Ceramic	25V	+80%-20%
C25	10µ	Tantalum Electrolytic	25V	20%
C26	100n	Polycarbonate	100V	20%
C27	10µ	Tantalum Electrolytic	25V	20%
C28	10n	Disc Ceramic	25V	+80%-20%
C29	27p	Silvered Mica	350V	5%
C30	820p	Silvered Mica	350V	1%
C31	100n	Polycarbonate	100V	20%
C32	10µ	Tantalum Electrolytic	25V	20%
C33	10µ	Tantalum Electrolytic	25V	20%
C34	27p	Silvered Mica	350V	5%
C35	100n	Polycarbonate	100V	20%
C36	10n	Disc Ceramic	25V	+80%-20%
C37	100n	Polycarbonate	100V	20%
C38	10n	Disc Ceramic	25V	+80%-20%
C39	10n	Disc Ceramic	25V	+80%-20%
C40	10µ	Plastic Film 9569P	30V	
C41	330p	Polystyrene or ceramic	100V	10%
C42	10µ	Tantalum Electrolytic	25V	20%
C43	10µ	Tantalum Electrolytic	25V	20%
C44	68µ	Tantalum Electrolytic	20V	20%
C45	68µ	Tantalum Electrolytic	20V	20%
C46	4µ7	Tantalum Electrolytic	35V	20%
C47	4µ7	Tantalum Electrolytic	35V	20%

Resistors

Ref	Value (Ω)
R 1	220
R 2	1k
R 3	1M
R 4	1M
R 5	270k
R 6	330
R 7	1k
R 8	1M
R 9	1M
R10	270k
R11	100
R12	180
R13	1k
R14	270
R15	100k
R16	33k
R17	1M
R18	470k
R19	150
R20	180
R21	680
R22	270k
R23	68
R24	5k6

Ref	Value (Ω)
R25	180
R26	1k
R27	22k
R28	22k
R29	68
R30	470
R31	560
R32	470
R33	330
R34	10k
R35	82k
R36	220k) TR4 1% high stab
R37	220k) low noise
R38	100
R39	not fitted
R40	100k
R41	390k
R42	2k7
R43	22k
R44	4k7
R45	10k
R46	10k
R47	22k
R48	10k

All resistors except R36, R37 are Mullard CR25, 0.3W 5%.

Coils

Ref	Value/Type
L1	D5093
L2	D5085
L3	D5093
L4	D5085
L5	D5076

Diodes

Ref	Type
D1	MV1656
D2	MV1656
D3	MV1656
D4	MV1656
D5	BZX79 C6V2

Ref	Type
D 6	BAX13
D 7	MV1656
D 8	BAX13
D 9	BAX13
D10	BAX13

Transistors

Ref	Type
TR1	UC734B
TR2	UC734B
TR3	UC734B
TR4	UC734B
TR5	2N4254
TR6	BC107B

Integrated Circuits

Ref	Type	
IC1	SL641C	Plessey
IC2	MC4741CP	Motorola
IC3	MC78L08CP	Motorola
IC4	AD301ALN	Analog Devices
IC5	MC7815CT	Motorola
IC6	MC7915CT	Motorola

Miscellaneous

Description	Part No.
Printed Circuit Board	9571P
Printed Circuit Board Assembled	LP3506/2
RLA Relay RH12	8445P
Tunable 1st IF. Complete Module	LP3533

Filtered Connectors

Ref	Value	Type
FC1-10	1500p	9871P

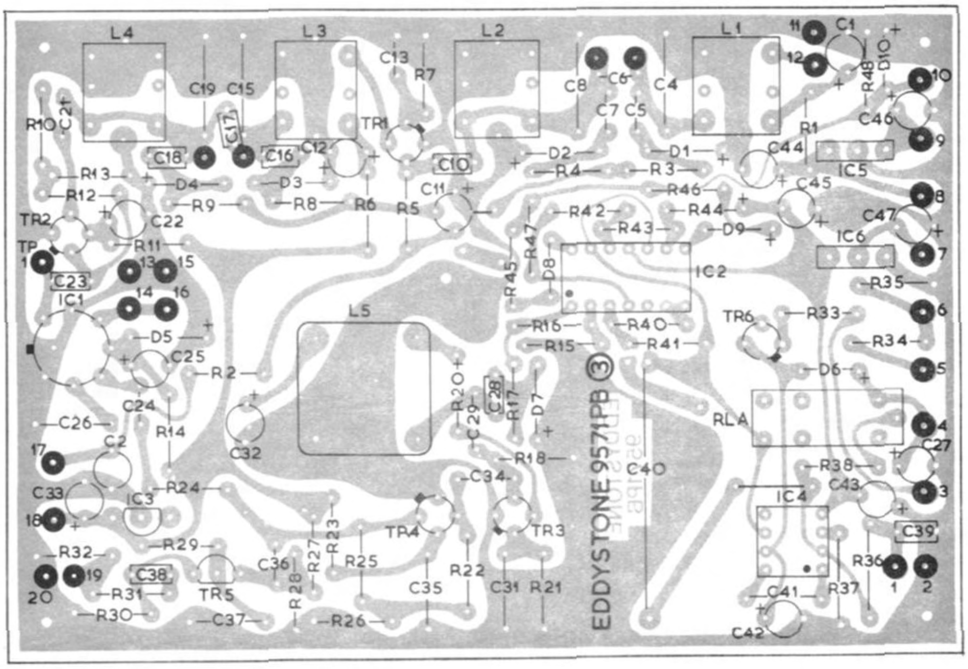
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP
ENGLAND.

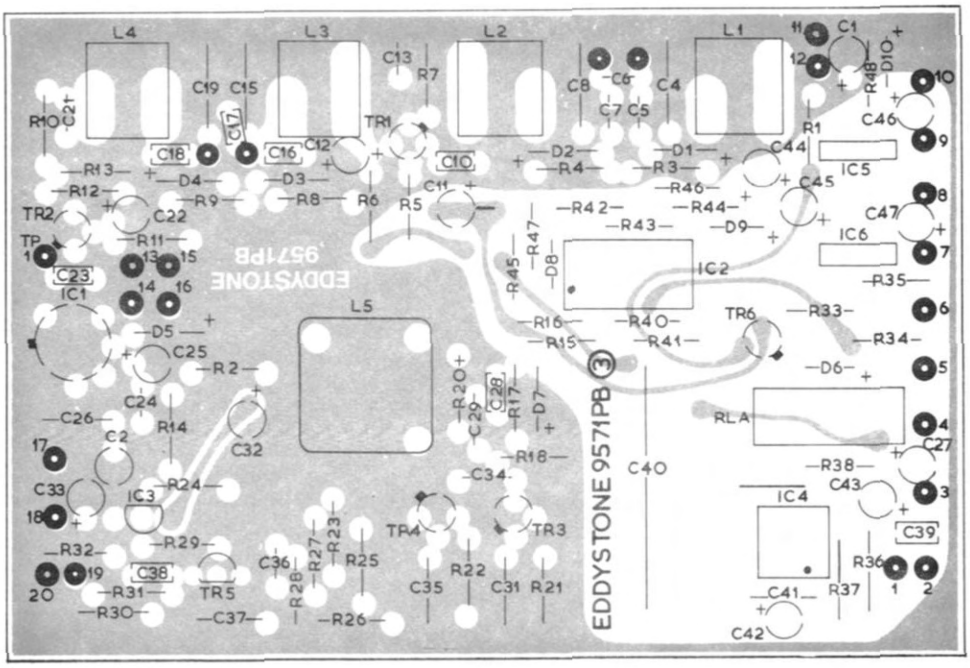
TELEPHONE : 021-475-2231
TELEX : 337081
CABLES : EDDYSTONE BIRMINGHAM

4.3.9. Printed Circuit Board

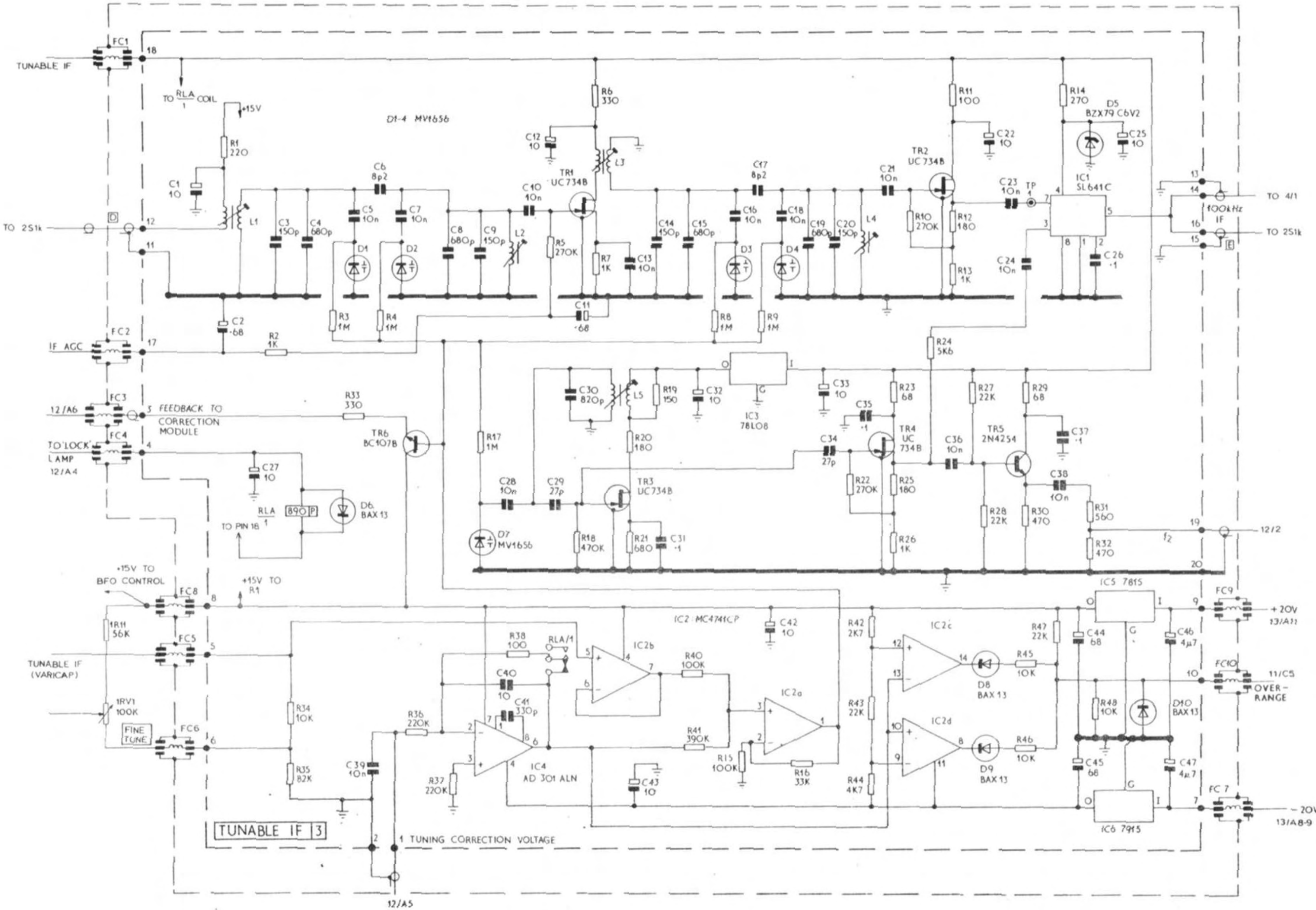
The printed circuit board is shown viewed from the legendside and is actual size.



Showing rear copper pattern



Showing front copper pattern



TUNABLE IF 3
TUNABLE IF
TO 2S1k
IF AGC
12/A6
FEEDBACK TO CORRECTION MODULE
TO LOCK LAMP 12/A4
+15V TO BFO CONTROL
+15V TO R1
TUNABLE IF (VARICAP)
1RV1 100K
FINE TUNE
1R11 56K
TO RLA/1 COIL
TO PIN 18
D1-4 MV1656
TO 4/1
100kHz IF
12/2
+20V 13/A11
11/C5 OVER-RANGE
-20V 13/A8-9
12/A5
1 TUNING CORRECTION VOLTAGE
IC1 SL641C
IC2 MC4741CP
IC3 78L08
IC4 AD 301 ALN
IC5 7815
IC6 7915
TR1 UC734B
TR2 UC734B
TR3 UC734B
TR4 UC 734B
TR5 2N4254
TR6 BC107B
D5 BZX79 C6V2
D6 BAX13
D7 MV1656
D8 BAX13
D9 BAX13
D10 BAX13

4.4. Selectivity Unit

4.4.1. Introduction

This Unit provides the 100kHz selectivity options required for the 1837 Series receivers. Model 1837/1 is simplified by having only one SSB filter, whereas Model 1837/2 has both USB and LSB filters.

On both models the same five-section L-C filter is used to provide the symmetrical passbands for AM and CW operation, the required bandwidth being selected by variation in the coupling and damping of the sections.

4.4.2. Circuit Description

The input to the unit is directly from the 1st Mixer in the Coilbox when the Receiver is set to range 6, but via the Tunable IF on all other ranges. The first mixer, 2TR3, requires a dc feed, and on Range 6 this is supplied by D1 via either L1 or CH2, depending on the selectivity switch position. The operation of the 5-Section L-C Filter is fundamental. On ranges 1-5 and 7-9 this dc feed is applied to 3IC1, and the dc feed to 2TR3 is obtained from the 1st IF Module.

When SSB is selected, a crystal filter is brought into operation. Model 1837/2 has two filters, the one required being selected by RLA and RLB which are controlled by a front panel switch. Note that because of IF inversion, the USB filter has the response of an LSB filter and vice-versa. Model 1837/1 has only one crystal filter, for USB reception (LSB response) and this is wired direct omitting the relays. CH1 and C2 are fitted to eliminate a spurious response inherent in the crystal filter.

4.4.3. Removal

Disconnect leads, including output coaxial lead at pins 1 and 2 on the 2nd IF Amplifier. Remove 2 x M3 screws adjacent to Headphones socket, 2 x M3 screws at rear filter bracket and, on Model 1837/2, 2 x M3 screws at the supporting bracket. Slacken switch coupler and lift unit out.

4.4.4. Fault Diagnosis

In case of total failure check the connectors and the +12V feed on pin 2. Also check the 6.8V supply to the mixer on the input lead pin 1, for all positions of the selectivity switch.

If the SSB mode has failed check the crystal filter switching (Model 1837/2), if there is a failure for any other position, a systematic check of the unit is required.

Note that there are no active components in the unit.

4.4.5. Performance Check and
4.4.6. Realignment

Realignment should only be attempted by competent technicians with the appropriate test equipment.
Remove the gang cover (underside of the coilbox).
Disable the 1st Oscillator by short-circuiting the oscillator section of the tuning gang (coilbox - 2C114) to earth. Feed the Signal Generator and Counter at 100kHz across the mixer section of the tuning gang (Coilbox - 2C70). Connect the AF Power meter to pins 1 (earth) and 9 of the ancillaries connector and set to 4Ω, and the RF Millivoltmeter to the IF Output socket. Set the receiver to Range 6.

1. Set Selectivity to Narrow, set Generator frequency to 100.000kHz and level to give approx 100mV at the IF Output socket.
2. Adjust L1-L5 for maximum output, adjusting generator output as necessary to maintain the output level.
3. Set Selectivity to V. Narrow and repeat step 2 until no further improvement is possible.
4. Note the IF Output level and increase the generator output by 6dB. Detune the generator either side of 100.000kHz to restore the IF Output level. Note the generator frequency in each case, bandwidth should be as given in Table 4.4.1. below.
5. Repeat step 4 but with the generator output increased by 60dB.
6. Set Selectivity to Narrow, Intermediate and Wide repeating steps 4 and 5 in each case. Bandwidths should be as given in Table 4.4.1. below.
7. Set Selectivity to SSB (and USB/LSB push button to USB on Model 1837/2) and tune generator to give maximum IF Output, adjusting the level to give 100mV at the IF Output socket.
8. Increase the generator output by 6dB, 20dB, 40dB and 60dB in turn, detuning the generator each time to restore the IF Output level and noting the frequencies which should be as given in Table 4.4.1. below.
9. Model 1837/2 only. Repeat steps 7 and 8 but with the USB/LSB pushbutton set to LSB.

Table 4.4.1.

Bandwidth	Wide	Intermediate	Narrow	V. Narrow	SSB or USB	LSB
Minimum passband 6dB	±4kHz	±1.5kHz	±500Hz	±200Hz	99.650kHz 97.300kHz	100.350kHz 102.700kHz
Minimum attenuation 20dB	-	-	-	-	96.800kHz	103.200kHz
Minimum attenuation 40dB	-	-	-	-	100.250kHz 96.500kHz	99.750kHz 103.500kHz
Minimum attenuation 60dB	±20kHz	± 6kHz	±3.5kHz	±2.0kHz	100.500kHz 96.200kHz	99.500kHz 103.800kHz

4.4.7. Voltage Analysis

All voltages measured with respect to 0V rail, AVO8 on lowest applicable range.

Module connections.

Pin 1	+6.8V	
2	+ 12V	
3	+ 12V	SSB Mode only
4	+ 12V	LSB Mode Model 1837/2 only.

The current drawn by the module is 25mA.

4.4.8. Components List. Module Prefix 4.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	47n	Polycarbonate	100V	20%
C 2	820p	Polystyrene	125V	5%
C 3	22µ	Tantalum Electrolytic	16V	20%
C 4	100n	Polycarbonate	100V	20%
C 5	300p	Silvered Mica	350V	5%
C 6	400p	Silvered Mica	350V	5%
C 7	370p	Silvered Mica	350V	5%
C 8	4n4	Polystyrene	125V	2%
C 9	300p	Silvered Mica	350V	5%
C10	100p	Ceramic	100V	20%
C11	220p	Silvered Mica	350V	5%
C12	33p	Ceramic	100V	10%
C13	350p	Silvered Mica	350V	5%
C14	400p	Silvered Mica	350V	5%
C15	12p	Ceramic	100V	10%
C16	4n4	Polystyrene	125V	2%
C17	300p	Silvered Mica	350V	5%
C18	300p	Silvered Mica	350V	5%
C19	100p	Ceramic	100V	20%
C20	220p	Silvered Mica	350V	5%
C21	33p	Ceramic	100V	10%
C22	390p	Silvered Mica	350V	5%
C23	400p	Silvered Mica	350V	5%
C24	12p	Ceramic	100V	10%
C25	4n4	Polystyrene	125V	2%
C26	300p	Silvered Mica	350V	5%
C27	100p	Ceramic	100V	20%
C28	220p	Silvered Mica	350V	5%
C29	20p	Ceramic	100V	10%
C30	370p	Silvered Mica	350V	5%
C31	400p	Silvered Mica	350V	5%
C32	12p	Ceramic	100V	10%
C33	4n4	Polystyrene	125V	2%
C34	300p	Silvered Mica	350V	5%
C35	120p	Silvered Mica	350V	5%
C36	270p	Silvered Mica	350V	5%
C37	33p	Ceramic	100V	10%
C38	350p	Silvered Mica	350V	5%
C39	400p	Silvered Mica	350V	5%
C40	12p	Ceramic	100V	10%
C41	4n4	Polystyrene	125V	2%
C42	12p	Ceramic	100V	10%
C43	10p	Ceramic	100V	10%
C44	50p	Ceramic	100V	10%
C45 *	10µ	Tantalum Electrolytic	25V	20%
C46 *	10µ	Tantalum Electrolytic	25V	20%
C47 *	10n	Disc Ceramic	25V	+80%-20%

Note: Capacitor "TYPE" may vary subject to component availability.

Resistors

Ref	Value (Ω)
R 1	120
R 2	22k
R 3	82k
R 4	10k
R 5	82k
R 6	10k
R 7	82k
R 8	22k

Ref	Value (Ω)
R 9	10k
R10	82k
R11	1k
R12	1k
R13 *	1k
R14 *	1k
R15 *	33
R16 *	33

All resistors are Mullard CR25, 0.3 Watt 5%.

Coils

Ref	Value/Type/Part No.
CH1	470µH Sigma SC60
CH2	4.7mH Sigma SC60
L1	D5025
L2	D5026
L3	D5026
L4	D5026
L5	D5026

Diodes

Ref	Type
D1	BZX79 C6V8

Switches

Ref	Description	Part No.
S1	Comprising	
	Clicker + Spindle	9800P
	Coupler	7353P
	ext. spindle	8382P
	Switch wafers:	
	a, b	8537P
	c, d	8538P
	e, h	8537P
	f, g	8538P

Relays

Ref	Description	Part No.
RLA *	RH12	8445P
RLB *	RH12	8445P

Filters

Ref	Description	Part No.
FL1	LSB Filter (for USB reception)	9050P
FL2 *	USB Filter (for LSB reception)	9049P

Miscellaneous

Description	Part No.
Printed Circuit Board (Filter)	9674P
Printed Circuit Board (Filter) Assembled	LP3506/24
Printed Circuit Board (Relays)	9749P
Printed Circuit Board (Relays) Assembled	LP3506/35

Selectivity Module complete (Model 1837/1) LP3510A
(Model 1837/2) LP3546A

*Fitted on Model 1837/2, LP3546A only.

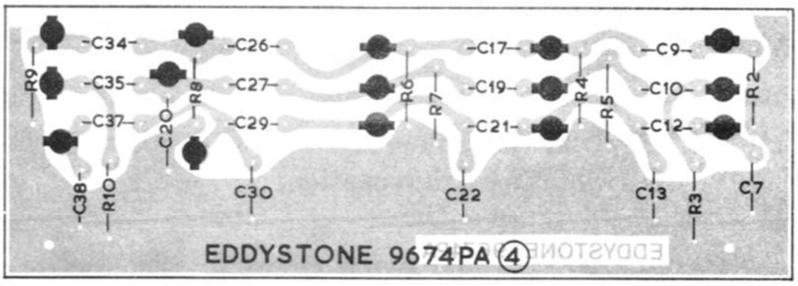
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LIMITED.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

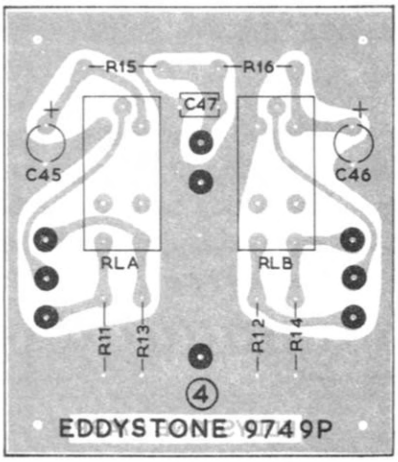
TELEPHONE : 021-475-2231
TELEX : 337081
CABLES : EDDYSTONE BIRMINGHAM

4.4.9. Printed Circuit Boards.

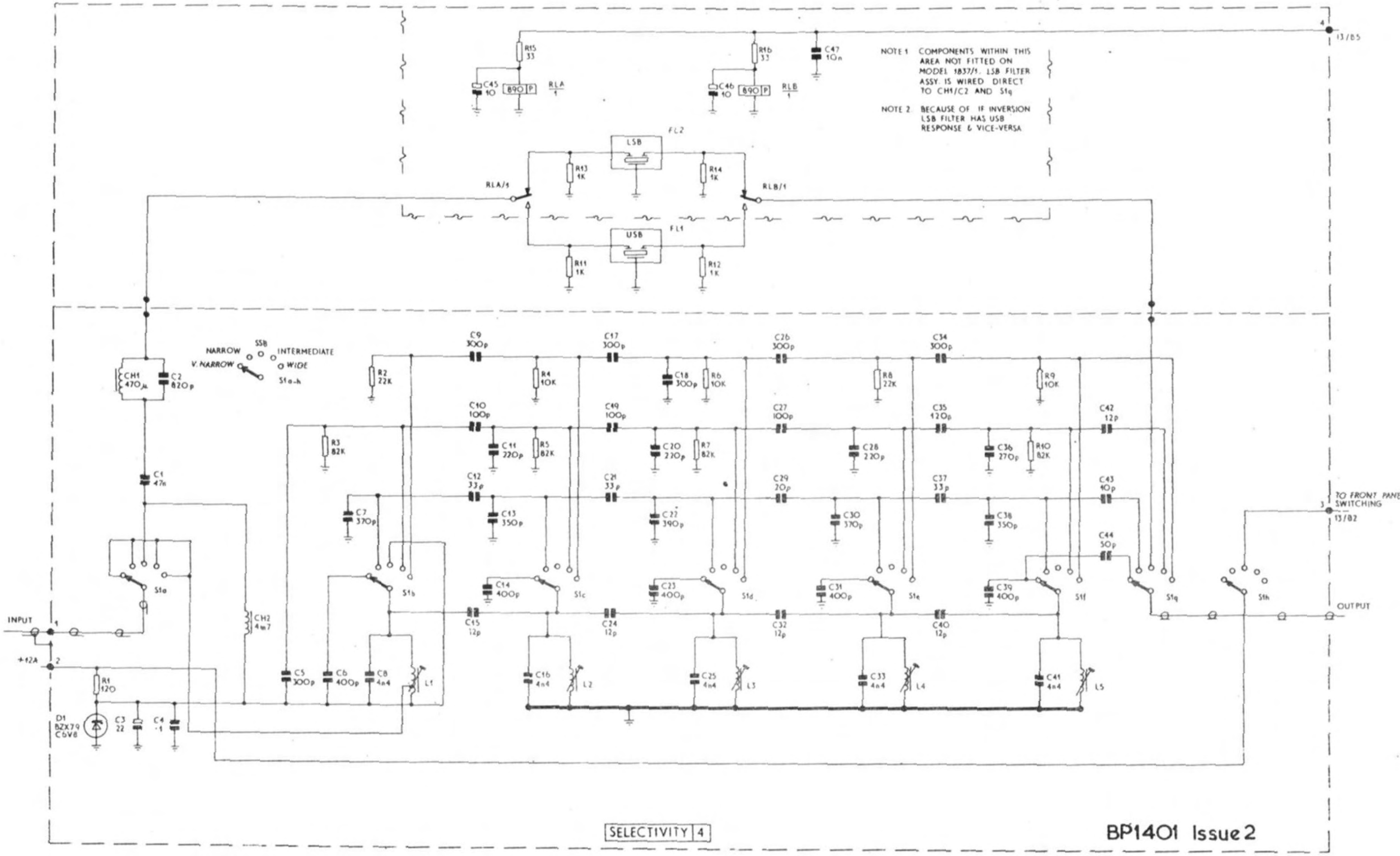
All printed circuit boards are shown viewed from the legend side and are actual size.



Filter Board



Relay Board (Model 1837/2 only)


NOTE 1 COMPONENTS WITHIN THIS AREA NOT FITTED ON MODEL 1837/1. LSB FILTER ASSY. IS WIRED DIRECT TO CH1/C2 AND S1g
NOTE 2 BECAUSE OF IF INVERSION LSB FILTER HAS USB RESPONSE & VICE-VERSA
FL2
LSB
FL1
USB
RLA/1
RLB/1
NARROW
SSB
INTERMEDIATE
V. NARROW
WIDE
S1a-h
INPUT
+12A
OUTPUT
TO FRONT PANEL SWITCHING
13/B2
13/B5
SELECTIVITY 4
BP1401 Issue 2

4.5. Second IF Amplifier and AGC

4.5.1. Introduction

This module receives the 100kHz IF signal from the Selectivity Unit, ref 4. The bulk of the receiver gain is provided by this stage, which provides a 20mV output at 100kHz to the rear panel IF Output socket, a demodulated AM output to the audio stages and IF and RF AGC outputs to be used on the 100kHz amplifier itself and on the coilbox circuits respectively.

4.5.2. Circuit Description

Four Junction FET stages in series form the IF amplifier with IF AGC being applied to the first three. Signal from the fourth stage is passed firstly to a buffer stage which drives the 75Ω IF Output and the AM Detector and secondly to a further stage of amplification and then to the IF AGC Detector. From here the IF AGC output is fed out of the module to the Diversity AGC output, the time-constant determining network and the RF signal metering circuit. The AGC signal returns to the module via the Manual/AGC switch, where manual control from the IF Gain potentiometer can be selected, to operate on the first three stages of the 100kHz amplifier.

A parallel feed of the input signal is taken to the RF AGC section where it is subjected to one stage of amplification before the detector. Gain and threshold adjustment is provided at the two stages of d.c. coupled operational amplifiers, the output of which is fed back to the coilbox.

4.5.3. Removal of the Unit

Access to this module is from underneath the receiver. Remove 4 x M2.5 screws to release cover, allowing access to the module.

4.5.4. Fault Diagnosis

As the major part of the receiver's overall gain is provided by this module, the module itself is best checked by measuring the sensitivity. The action of the AGC stages can also be checked, the performance should be as given in Section 1.

4.5.5. Performance Check

Select Range 5 and Intermediate/AM bandwidth. Remove the lead from pin 1 of the Selectivity Unit (module no. 4) and connect a signal generator via a 100n 250V DC blocking capacitor. Measure the performance as follows, noting that by using a 50Ω source the characteristics as measured will not necessarily be the same as when the unit is fed from the normal point. Apply a 100kHz signal modulated 30% AM at 1kHz and with AGC off, AF and IF gain controls set as necessary. AM mode selected, check that an input of less than 50μV enables a 10dB S+N/N ratio to be obtained at the ext. LS output. Check also that, for 150mV measured at the IF Output socket using a true RMS millivoltmeter, a CW input of less than 220μV is required.

Check AGC action as follows: Select CW mode and measure the level at the IF Output socket.

IF AGC	Threshold less than 220µV	IF Output - 0dB (reference)
	Threshold + 20dB	+5dB
	Threshold + 40dB	+7dB
	Threshold + 60dB	+8dB

RF AGC starts to operate at between (Threshold +35dB) and (Threshold +40dB) giving a -0.1V change (depending on the settings of RV1 and RV2) in the voltage at pin 10.

4.5.6. Realignment

Realignment should be performed with the unit in the receiver.

1. 100kHz amplifier and IF AGC.

a. Adjust the receiver as follows:

Range	:	5
Mode	:	AM
Manual/AGC	:	Manual
IF Gain	:	Max
AF Gain	:	Mid-range

b. Connect the signal generator across 2C70 and tune generator to 1350.00kHz. Disable 1st Oscillator by shorting 2C114. Connect an RF Millivoltmeter terminated in 75Ω to the IF Output socket.

c. Set Selectivity switch to V. Narrow and tune generator accurately to the peak response (generator output:- CW).
Adjust L1 for maximum IF output.

d. Select 'AGC' and adjust L2 for a minimum in the IF Output.

2. RF AGC.

a. Reselect 'Manual', transfer the millivoltmeter to pin 10 (RF AGC output). Set generator output past threshold level and adjust L2 for a maximum negative-going voltage.

b. Set RV1 fully anti-clockwise. With no signal adjust RV3 to give +1.5V at output (pin 10).

c. Increase the signal level to +60dB (ref 1µV) and adjust RV2 to give - 1.3V at output (pin 10). These settings are chosen to give a good all-round performance. If it is required to adjust the RF AGC performance in order to optimise a particular parameter, then it is possible to adjust RV1, 2 & 3 as required, however care should be taken to ensure that other aspects of the performance are not degraded unacceptably. RV1 controls the RF AGC threshold, RV2 the RF gain at high signal level and RV3 the RF gain at low signal level.

3. First IF Gain

Instructions for setting up the 1st IF Gain equalisation potentiometers are included as part of Section 4.2. (coilbox).

4.5.7. Voltage Analysis

All voltages measured with respect to 0V rail (pin 14), AVO8 on lowest applicable range unless stated. Normal tolerances apply.

a. Module pins

Pin	Voltage	Pin	Voltage
1	0V	9	0V
2	0V	10	AGC offset (1.5V typical) (10V range)
3	-3V Dependent on IF Gain or AGC level.	11	+22.5V
4	0V	12	-22.5V
5	0V	13	-15V
6	0V	14	0V
7	0V	15	+12V
8	-3V Dependent on IF Gain or AGC level.		

b. Semiconductors

Transistors

	Emitter/Source	Base/Gate	Collector/Drain
TR1	0V	-3V**	+12V
TR2	0V	-3V**	+12V
TR3	0V	-3V**	+12V
TR4	+1.6V	0V	+10.7V
TR5	0V	+0.7V	+10V
TR6	+1.8V*	0V	+7V
TR7	0V	+0.7V*	+5.8V
TR8	+1.7V*	+0.7V*	+9.1V
TR9	0	+0.7V*	+7.6V

*measured on 10V range
**measured on 100V range

Integrated Circuits

IC1 pin	1	0V
	2	0V
	3	-
	4	-15V
	5	-
	6	AGC Offset/2 (0.65V typical) 10V range
	7	" " "
	8	-
	9	+15V
	10	AGC Offset (1.5V typical) 10V range
	11	-
	12	0V
	13	+15V
	14	-
IC2	O	+15V
	I	+22.5V
	G	0V
IC3	O	-15V
	G	0V
	I	-22.5V

The currents drawn by the module are:

+12V supply 54mA (AGC on)
+20V supply 13mA
-20V supply 7.3mA

4.5.8. Components List. Module Prefix 5.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	1n	Disc Ceramic	250V	+80%-20%
C 2	100n	Polycarbonate	100V	20%
C 3	100n	Polycarbonate	100V	20%
C 4	47n	Polycarbonate	100V	20%
C 5	1n	Disc Ceramic	250V	+80%-20%
C 6	100n	Polycarbonate	100V	20%
C 7	100n	Polycarbonate	100V	20%
C 8	47n	Polycarbonate	100V	20%
C 9	1n	Disc Ceramic	250V	+80%-20%
C10	100n	Polycarbonate	100V	20%
C11	100n	Polycarbonate	100V	20%
C12	47n	Polycarbonate	100V	20%
C13	1n	Disc Ceramic	250V	+80%-20%
C14	560p	Silvered Mica or Ceramic	350V	10%
C15	100n	Polycarbonate	100V	20%
C16	47n	Polycarbonate	100V	20%
C17	1n	Disc Ceramic	250V	+80%-20%
C18	100n	Polycarbonate	100V	20%
C19	2n	Silvered Mica	350V	5%
C20	1n	Disc Ceramic	250V	+80%-20%
C21	1n	Disc Ceramic	250V	+80%-20%
C22	1n	Disc Ceramic	250V	+80%-20%
C23	15p	Ceramic	750V	10%
C24	47n	Polycarbonate	100V	20%
C25	1n	Disc Ceramic	250V	+80%-20%
C26	100n	Polycarbonate	100V	20%
C27	2n	Silvered Mica	350V	5%
C28	1n	Disc Ceramic	250V	+80%-20%
C29	10µ	Tantalum Electrolytic	25V	20%
C30	100n	Polycarbonate	100V	20%
C31	100n	Polycarbonate	100V	20%
C32	100p	Silvered Mica or Ceramic	350V	10%
C33	15p	Ceramic	750V	10%
C34	100n	Polycarbonate	100V	20%
C35	1n	Disc Ceramic	250V	+80%-20%
C36	100n	Polycarbonate	100V	20%
C37	100n	Polycarbonate	100V	20%
C38	3n3	Silvered Mica	350V	5%
C39	10n	Disc Ceramic	25V	+80%-20%
C40	100n	Polycarbonate	100V	20%
C41	10µ	Tantalum Electrolytic	25V	20%
C42	22µ	Tantalum Electrolytic	16V	20%

Capacitors continued.....

Ref	Value	Type	Voltage	Tolerance
C43	100n	Polycarbonate	100V	20%
C44	10µ	Tantalum Electrolytic	25V	20%
C45	4µ7	Tantalum Electrolytic	35V	20%
C46	10µ	Tantalum Electrolytic	25V	20%
C47	100n	Polycarbonate	100V	20%
C48	4µ7	Tantalum Electrolytic	35V	20%

Resistors

Ref	Value Ω	Ref	Value Ω
R 1	270k	R26	1k
R 2	330	R27	47k
R 3	5k6	R28	22k
R 4	1k	R29	100
R 5	270k	R30	10k
R 6	330	R31	3k3
R 7	1k2	R32	270k
R 8	1k	R33	22k
R 9	270k	R34	330
R10	330	R35	470k
R11	5k6	R36	1k
R12	1k	R37	47k
R13	270	R38	22k
R14	100k	R39	100
R15	330	R40	150
R16	8k2	R41	1k
R17	1k	R42	3k3
R18	47k	R43	47k
R19	22k	R44	10k
R20	100	R45	10k
R21	47	R46	4k7
R22	47k	R47	10k
R23	6k8	R48	4k7
R24	270k	R49	10k
R25	1k5	R50	10k

All resistors are Mullard CR25, 0.3 Watt 5%.

Potentiometers

Ref	Description	Part No.
RV1	1k Cermet linear preset	9859P
RV2	470k Cermet linear preset	9483P
RV3	1k Cermet linear preset	9859P

Coils

Ref	Value/Type/Part No.
L1	D5090 Eddystone
L2	D5092 Eddystone
L3	D5091 Eddystone
CH 1	68mH Sigma SC60
CH 2	100mH Sigma SC60
CH 3	68mH Sigma SC60
CH 4	100mH Sigma SC60
CH 5	68mH Sigma SC60
CH 6	68mH Sigma SC60
CH 7	1mH Sigma SC60
CH 8	100mH Sigma SC60
CH 9	4.7mH Sigma SC60
CH10	68mH Sigma SC60
CH11	68mH Sigma SC60

Diodes

Ref	Type	
D1	OA47	Mullard
D2	BAX13	Mullard
D3	BAX13	Mullard
D4	BAX13	Mullard

Transistors

Ref	Type
TR1	UC734B
TR2	UC734B
TR3	UC734B
TR4	UC734B
TR5	2N4254
TR6	UC734B
TR7	2N4254
TR8	UC734B
TR9	2N4254

Integrated Circuits

Ref	Type	
IC1	MC 1747 CP	Motorola
IC2	MC 78L15 CP	Motorola
IC3	MC 79L15 CP	Motorola

Miscellaneous

Description	Part No.
Printed Circuit Board	9579P
Printed Circuit Board	LP3506/10 (complete module)

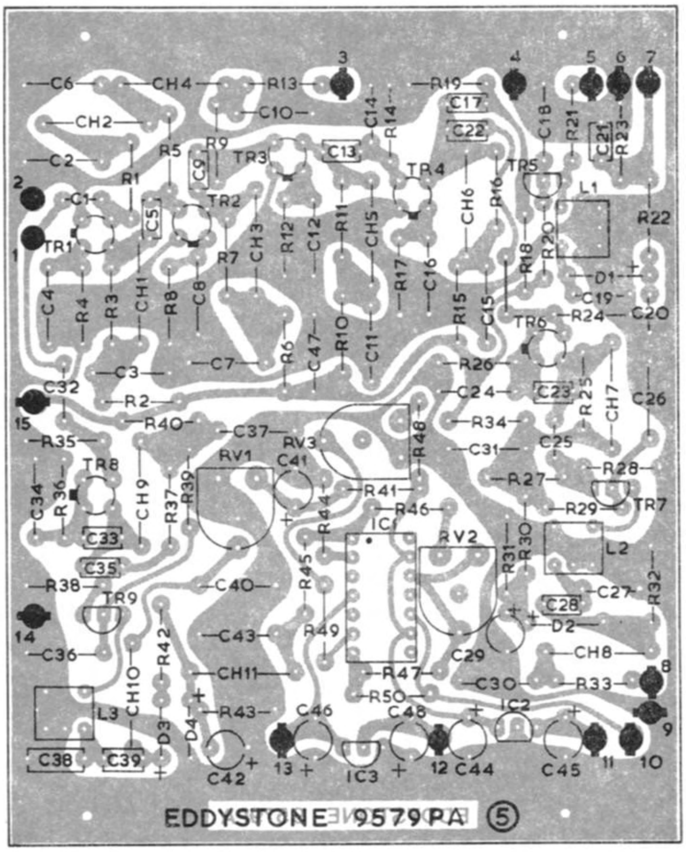
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

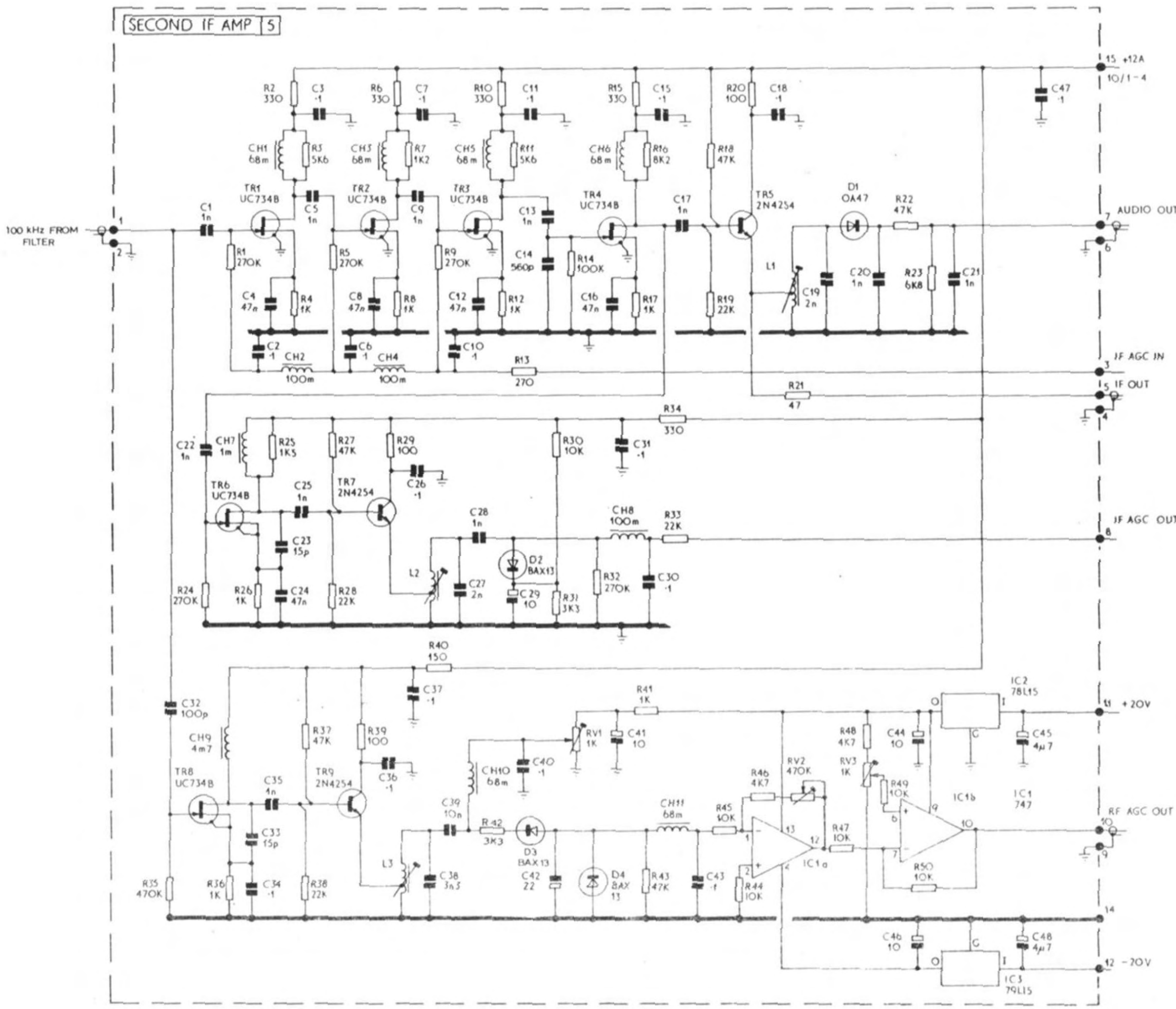
EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

TELEPHONE: 021-475-2231
TELEX: 337081
CABLES: EDDYSTONE BIRMINGHAM

4.5.9. Printed Circuit Board.

The printed circuit board is shown viewed from the legend side and is actual size.





SECOND IF AMP 5
100 kHz FROM FILTER
AUDIO OUT
IF AGC IN
IF OUT
IF AGC OUT
+20V
RF AGC OUT
-20V
15 +12A
10/1-4
TR1 UC734B
TR2 UC734B
TR3 UC734B
TR4 UC734B
TR5 2N4254
TR6 UC734B
TR7 2N4254
TR8 UC734B
TR9 2N4254
D1 OA47
D2 BAX13
D3 BAX13
D4 BAX13
IC1 747
IC2 78L15
IC3 79L15

4.6. BFO and Product Detector

4.6.1. Introduction

This module, which in the case of Model 1838/1 does not contain a BFO, accepts the IF signal from the 2nd IF amplifier and mixes this with either a high stability 100kHz signal from the master oscillator or an internally generated BFO signal. The audio output from the module is routed via the mode switching to the audio output stages.

4.6.2. Circuit Description

a. Beat Frequency Oscillator and Gating.

The oscillator transistor is tuned by L1 and the parallel combination of C3, C4 and varicap diode D1; this enables the frequency to be controlled by a D.C. voltage derived from the BFO control. Thermal stability is ensured by the different temperature coefficients of C3 and C4. The output from the BFO is routed via two transmission gates in series (IC1 c, d) to the mixer (IC2). The high-stability 100kHz input from SKB is routed via the other pair of transmission gates (IC1 a, b) to the same input of the mixer.

BFO is selected by applying +12V to SKA pin 10, this also supplies TR1 and via D2, the mixer. SSB is similarly selected via SKA pin 2, in this case the mixer is powered via D4.

b. Mixer and Low Pass Filter.

The other input to the mixer is a direct feed of the 100kHz IF signal. The mixer output is taken via the Low Pass Filter CH2, CH3, C13, 15 and 16 to the audio output of SKA pin 7.

On model 1838/1 power for the mixer is taken directly from SKA pin 2, there being no intervening diode. The gating circuit is also omitted and the stable 100kHz input is fed directly to pin 3 of IC2.

4.6.3. Removal of Unit.

Unplug the miniature coaxial connector. Remove 2 x M3 screws from underside of IF chassis. Lift out unit complete with fixing bracket, unplugging 10-way connector at the front of the unit.

4.6.4. Fault Diagnosis.

Check that +12V is present on either SKA/2 (SSB Selected) or SKA/10 (BFO Selected). Check the presence of 100kHz IF signal at rear panel socket and at IC2 pin 7, and an oscillator signal at IC2 pin 3. If both are present check IC2 and the low-pass filter network to SKA/7 (Audio output to mode switch).

(Model 1838/1: The 100kHz standard is fed directly to IC2 pin 3. If this is not present check the lead and the Correction Module (12)). Select BFO and check IC1 pin 4 for signal, if no signal is present the oscillator should be carefully checked. Select SSB, the 100kHz standard is present on SKB at all times and should be present on IC1 pin 4.

If there is a signal present at the inputs of the gates (pins 4 and 11) but no output the transmission gates are suspect. These are analogue devices which present a low impedance (low kilohm region) when the control terminals (pins 5, 6, 12 or 13) are at "high" (12V) voltage.

4.6.5. Performance Check.

Set the receiver as follows: AGC to Manual. BFO on, IF Gain to minimum, Range 6. The BFO injection signal measured with a high impedance RF millivoltmeter at IC2 pin 3 should be within the range 50-150mV. The frequency should be 100kHz with the BFO control central. This control should have a range of ±3.5kHz.

4.6.6. Realignment.

Set the receiver as for the performance check above. Centralise the BFO control and connect the high impedance RF millivoltmeter to IC1 pin 9. Adjust the core of L1 to give a frequency of 100.000kHz. Check that the BFO control has a range greater than ±3.5kHz. Check the signal level at IC2 pin 3, this should be within the range 50-150mV.

Apply a CW signal of 1mV to the Aerial input (tune to the receiver frequency) and adjust the IF gain control so that 100mV is measured at the IF Output socket. Adjust the input frequency for a 1kHz audio output tone. Check that the audio signal at pin 7 is 15mV approx. The distortion should be less than 1%. Vary the frequency of the input signal and check the frequency response. The upper -3dB point should be within the range 3.5 - 3.7kHz.

Select SSB and introduce a 100kHz CW signal of level 400mV at SKB. Check that the signal at IC2 pin 3 is within the range 50-150mV.

Increase the signal to 1V, select BFO and tune a second signal generator connected to the aerial input to give a 1kHz tone as above. Check that this is unaffected by the generator connected to SKB.

a. Module Connections. SKA

Pin	1	+5.8V - 15V	(30V range) according to BFO control setting.
	2	+12V	SSB Mode only.
	3	0	
	4	0	
	5	0	
	6	0	
	7	0	
	8	0	
	9	+12V	BFO Mode only.

b. Semiconductors

TR1	Source	0V	
	Gate	-2.2V	(30V range)
	Drain	12V	BFO Mode only

IC1	Pin	1	+5.5V	(30V range) SSB Mode
		2	+5.5V	(30V range) SSB Mode
		3	+5.5V	(30V range) SSB Mode
		4	+5.5V	(30V range) SSB Mode
		5	+12V	(30V range) SSB Mode
		6	+12V	(30V range) BFO Mode
		7	0V	
		8	+5.5V	(30V range) BFO Mode
		9	+5.5V	(30V range) BFO Mode
		10	+5.5V	(30V range) BFO Mode
		11	+5.5V	(30V range) BFO Mode
		12	+12V	(30V range) BFO Mode
		13	+12V	(30V range) SSB Mode
		14	+11V	(30V range)

IC2	Pin	1	0V
		2	+2.9V
		3	+2.9V
		4	+6.2V
		5	+5.4V
		6	-
		7	+2.9V
		8	0V

Current drawn by the module (pin 10), quiescent conditions: 25-30mA. (BFO)
18mA. (SSB)

4.6.8. Components List. Module Prefix 6.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1*	680n	Tantalum Electrolytic	35V	20%
C 2*	10n	Disc Ceramic	25V	+80%-20%
C 3*	180p	Silvered Mica	350V	1%
C 4*	39p	Polystyrene	125V	10%
C 5*	56p	Silvered Mica or ceramic	350V	5%
C 6*	10μ	Tantalum Electrolytic	25V	20%
C 7*	10n	Disc Ceramic	25V	+80%-20%
C 8*	10μ	Tantalum Electrolytic	25V	20%
C 9*	100n	Polycarbonate	100V	20%
C10	100n	Polycarbonate	100V	20%
C11	100n	Polycarbonate	100V	20%
C12	10μ	Tantalum Electrolytic	25V	20%
C13	47n	Polycarbonate	100V	20%
C14	10μ	Tantalum Electrolytic	25V	20%
C15	150n	Polycarbonate	100V	20%
C16	47n	Polycarbonate	100V	20%
C17	10μ	Tantalum Electrolytic	25V	20%
C18	10μ	Tantalum Electrolytic	25V	20%
C19	10n	Disc Ceramic	25V	+80%-20%
C20*	100n	Polycarbonate	100V	20%

Resistors

Ref	Value (Ω)
R1*	1M
R2*	47k
R3*	270k
R4*	100k
R5*	100k
R6*	1k
R7	1k5

Ref	Value (Ω)
R 8	470
R 9	270
R10	470
R11*	100k
R12*	100k
R13*	2k2
R14*	10k

All resistors are Mullard CR25, 0.3 Watt 5%.

Coils

Ref	Value/Type	
L1*	D5030	
CH1*	1mH	Sigma SC60
CH2	33mH	Sigma SC60
CH3	33mH	Sigma SC60

Diodes

Ref	Type	
D1 *	MV1656	Motorola
D2 *	BAX13	Mullard
D3	BZX79 C6V2	Mullard
D4 *	BAX13	Mullard

Transistors

Ref	Type
TR1 *	UC734B

Integrated Circuits

Ref	Type	
IC1 *	ⱡ MC14016CP	Motorola
IC2	SL641C	Plessey

ⱡ MOS Device. See appendix for handling instructions.

Miscellaneous

Description	Part No.
Printed Circuit Board	9572P
Printed Circuit Board Assembled (all models except 1838/1)	LP3506/3
Printed Circuit Board Assembled (Model 1838/1 only)	LP3506/37
SKA 10 way connector	9863P
PLA 10 way connector, free (mating for above)	9864P
SKB Miniature Coaxial socket	7292P
PLB Miniature Coaxial plug (mating for above)	7293P

Note Components marked * are not present on Model 1838/1, Assembly LP3506/31

BFO and Product Detector Module complete

(All except Model 1838/1)	LP3530
(Model 1838/1)	LP3531

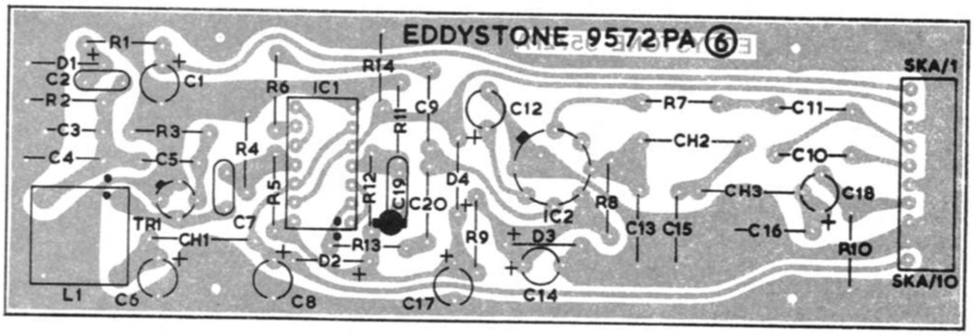
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

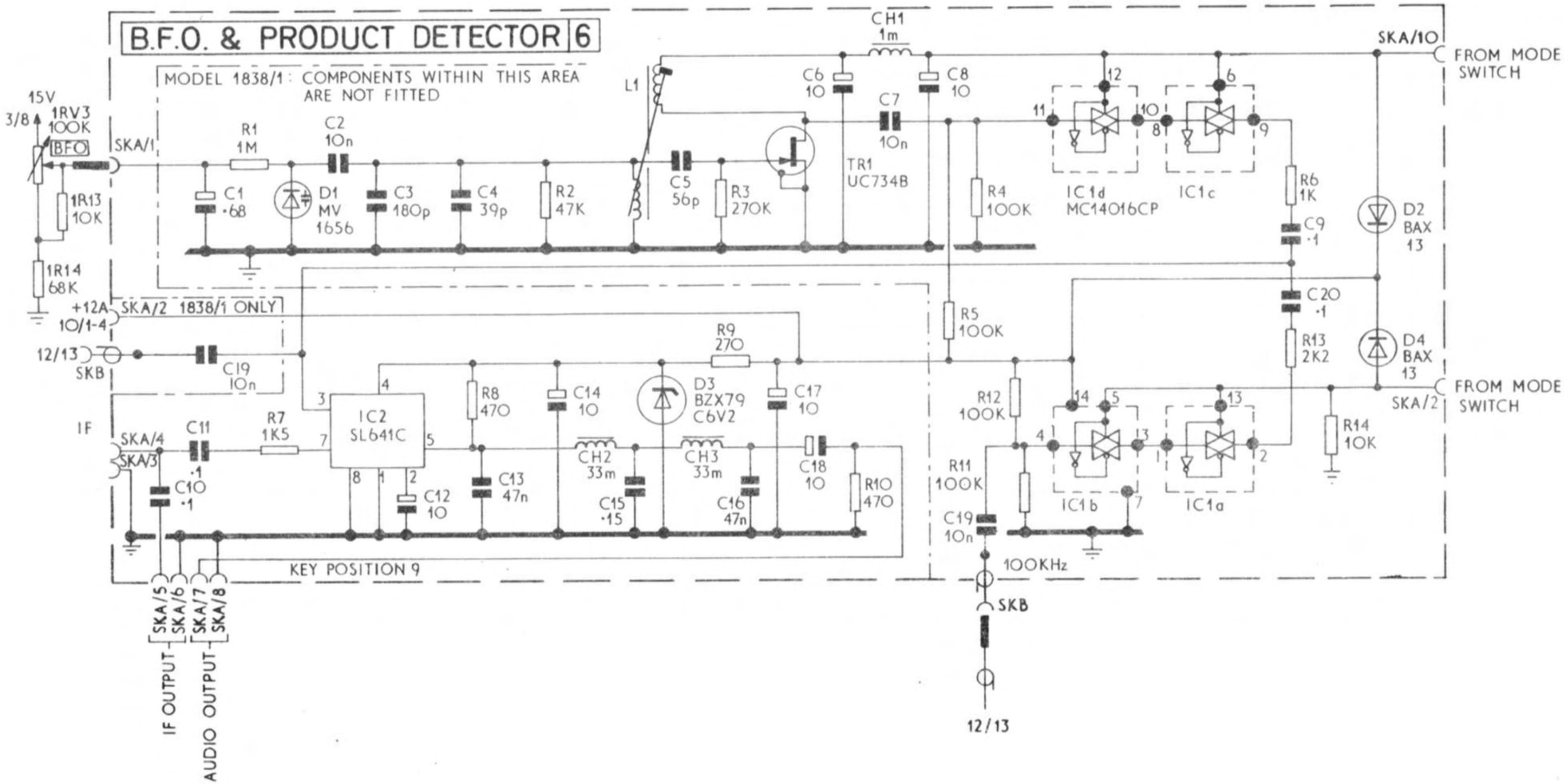
EDDYSTONE RADIO LIMITED,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP
ENGLAND.

TELEPHONE: 021-475-2231
TELEX: 337081
CABLES: EDDYSTONE BIRMINGHAM

4.6.9. Printed Circuit Board

The printed circuit board is shown viewed from the legend side and is actual size.





B.F.O. & PRODUCT DETECTOR 6
MODEL 1838/1: COMPONENTS WITHIN THIS AREA ARE NOT FITTED
15V
3/8
1RV3 100K
BFO
1R13 10K
1R14 68K
SKA/1
R1 1M
C1 ·68
D1 MV 1656
C2 10n
C3 180p
C4 39p
R2 47K
L1
C5 56p
R3 270K
C6 10
CH1 1m
C7 10n
C8 10
TR1 UC734B
R4 100K
IC1d MC14016CP
IC1c
R6 1K
C9 ·1
C20 ·1
R13 2K2
D2 BAX 13
D4 BAX 13
SKA/10
FROM MODE SWITCH
SKA/2
FROM MODE SWITCH
R14 10K
+12A
10/1-4
SKA/2 1838/1 ONLY
12/13
SKB
C19 10n
R5 100K
R9 270
IC2 SL641C
R8 470
C14 10
D3 BZX79 C6V2
C17 10
IF
SKA/4
SKA/3
C11 ·1
C10 ·1
R7 1K5
C12 10
C13 47n
CH2 33m
C15 ·15
CH3 33m
C16 47n
C18 10
R10 470
R12 100K
R11 100K
IC1b
IC1a
100KHz
KEY POSITION 9
SKA/5
SKA/6
SKA/7
SKA/8
IF OUTPUT
AUDIO OUTPUT

4.7. 600Ω Line Amp + Meter Amp.

4.7.1. Introduction

This module contains the 600Ω line amplifier, the audio peak detector, the meter amplifier and preset potentiometer for the FSK Mark/Space ratio adjustment. Except on model 1837/2 some components are omitted, see circuit diagram for details.

4.7.2. Circuit Description

The detector output appears at pin 8 and after passing through the line level control RV1 and buffer stage TR1 is amplified by IC1. The signal bandwidth is controlled by the combination of R3 and C5, and C7-10; R5-7 form the usual stabilising network. The amplifier output is capacitively coupled to the output transformer T1, which has a centre-tapped secondary suitable for feeding a 600Ω balanced line.

On model 1837/2 only the output signal is also fed to the audio peak detector IC2a. C12 is charged by current pulses passed by D1 and the discharge time is defined by R9. The output (across C12) passes to the meter amplifier via RV2 (AF calibration preset) and the meter switch to return to the module at pin 16.

On all models except 1837/2 the AGC line is connected directly to pin 16, the meter amplifier input. On model 1837/2 the meter selection switch is wired in circuit to allow the meter to also read the line output level (from the peak detector) or the FSK module 'tuning' voltage. The meter amplifier IC2b works in the standard inverting configuration, the gain being determined by external resistors. The meter, connected to pin 15, is damped by C17. Note that in the AF mode the meter is peak-reading.

The positive supply is taken from the 12V 'A' supply, the 15V negative supply for IC2 and the meter centre-zero preset is taken from the -20V rail and internally regulated by IC3.

4.7.3. Removal of the unit.

Remove the rear panel as described in section 4:1. The printed circuit board is mounted on this and is now accessible.

4.7.4. Fault Diagnosis

Line Amplifier. Check that the audio signal is present at pin 8 and that the Line Level control is adequately advanced. Any failure in the integrated circuit amplifier will normally be total. If the signal is present at the transformer primary winding check the transformer and the wiring to the ancillaries connector.

Meter Amplifiers. Check the switching and meter continuity. Check the voltages given below.

4.7.5. Performance Checking

Check that +12V is present on pin 11, -20V on pin 5 and that pin 4 is earthed. Disconnect the lead at pin 8 and connect an audio signal generator set to give 5mV emf at 1kHz. Connect an output power meter to pins 12 and 13, ensuring the ancillaries plug is disconnected, and set to give a 600Ω load. Check that with the line level control set at maximum an output of at least +10dBm is obtained, and that the bandwidth to the -3dB points is at least 260 - 7kHz. If a distortion factor meter is available increase the input signal to give +12dBm output and check that the distortion is less than 1%. Restore the connection to pin 8.

Select Range 5, CW, AGC off, Meter RF (1837/2 only) connect a signal generator set to CW to the aerial input and tune the receiver. Adjust IF Gain and input signal to give full deflection on the meter. Measure the IF voltage at module no. 5, pin 8, which should be -5.2V.

Check that the deflection is linearly proportional to the voltage.

4.7.6. Realignment

Line Amplifier. There are no realignment adjustments to be made to the Line amplifier, excepting the line level control which should be set on installation.

Meter Amplifier.

a. All models except 1837/2

There are no realignment adjustments.

b. Model 1837/2 only.

Meter set to RF. There is no realignment adjustment for this function.
Meter set to CZ. Set receiver IF gain to minimum, AGC off. Adjust RV3 so that the meter indicates centre scale. This only applies if internal FSK module is fitted.
Meter set to AF. Disconnect the lead pin 8 and inject at pin 8 a 15mV signal at 1kHz. Connect the output power meter to pins 12 and 13, set to 600Ω ensuring the ancillaries connector is disconnected and adjust RV1 to give 10mW output. Set RV2 so that the meter indicates full scale.
Note RV4 is adjusted with the FSK Module.

4.7.7. Voltage Analysis

All voltages are measured with respect to the 0V rail (pins 4 & 10), AVO8 on lowest applicable D.C. range. Normal tolerances apply.

TR1.

Source	1V	(10V range)
Gate	0V	
Drain	9.5V	(30V range)

IC1 pin	1	0V	
	4	+4V	
	6	+3.5V	
	7	+4.3V	
	8	+7.4V	
	9	+9.5V	(30V range)
	11	+9.5V	(30V range)
	13	+4.5V	
	16	0V	
IC2 pin	4	-15V	
	6	0V	
	7	0V	
	10	0V	
	13	+11.5V	
IC3	I	-22.5V	
	G	0V	
	O	-15.0V	

The current drawn by the module (quiescent conditions) is

+12V supply	13mA
-20V supply	7mA

4.7.8. Components List. Module Prefix 7.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	47n	Polycarbonate	100V	20%
C 2	22µ	Tubular Electrolytic	25V	+50%-10%
C 3	220µ	Tubular Electrolytic	16V	+50%-10%
C 4	100n	Polycarbonate	100V	20%
C 5	4n7	Polystyrene or ceramic	100V	10%
C 6	100µ	Tubular Electrolytic	25V	+50%-10%
C 7	22µ	Tubular Electrolytic	25V	+50%-10%
C 8	22µ	Tubular Electrolytic	25V	+50%-10%
C 9	22µ	Tubular Electrolytic	25V	+50%-10%
C10	150n	Polycarbonate	100V	20%
C11	22µ	Tubular Electrolytic	25V	+50%-10%
C12*	100µ	Tubular Electrolytic	10V	+50%-10%
C13*	10n	Disc Ceramic	25V	+80%-20%
C14	22µ	Tubular Electrolytic	25V	+50%-10%
C15	22µ	Tubular Electrolytic	25V	+50%-10%
C16	15µ	Tubular Electrolytic	40V	+50%-10%
C17	100µ	Tubular Electrolytic	10V	+50%-10%
C18	22µ	Tubular Electrolytic	25V	+50%-10%

Resistors

Ref	Value (Ω)
R 1	47k
R 2	100
R 3	2k2
R 4	470
R 5	47
R 6	100
R 7	1
R 8*	4k7

Ref	Value (Ω)
R 9*	2k7
R10	120k
R11	68k
R12	27k
R13*	1k5
R14	220
R15	220

All resistors are Mullard CR25, 0.3 Watt 5%.

Potentiometers

Ref	Description	Part No.
RV1	47k Carbon linear preset	9438P
RV2*	47k Cermet linear preset	9489P
RV3*	470k Cermet linear preset	9860P
RV4*	1k Carbon linear preset	9033P

Diodes

Ref	Type
D1*	OA47

Transistors

Ref	Type
TR1	UC734B

Integrated Circuits

Ref	Type	
IC1	TCA760A	Mullard
IC2	MC1747CP	Motorola
IC3	MC79L15CP	Motorola

Miscellaneous

Description	Part No.
T1. Transformer.	8641P
Printed Circuit Board	9581P
Printed Circuit Board Assembled (All models except 1837/2)	LP3506/12 (complete module)
Printed Circuit Board Assembled (Model 1837/2 only)	LP3506/36 (complete module)

Components marked * used on Model 1837/2, Assembly LP3506/36 only.

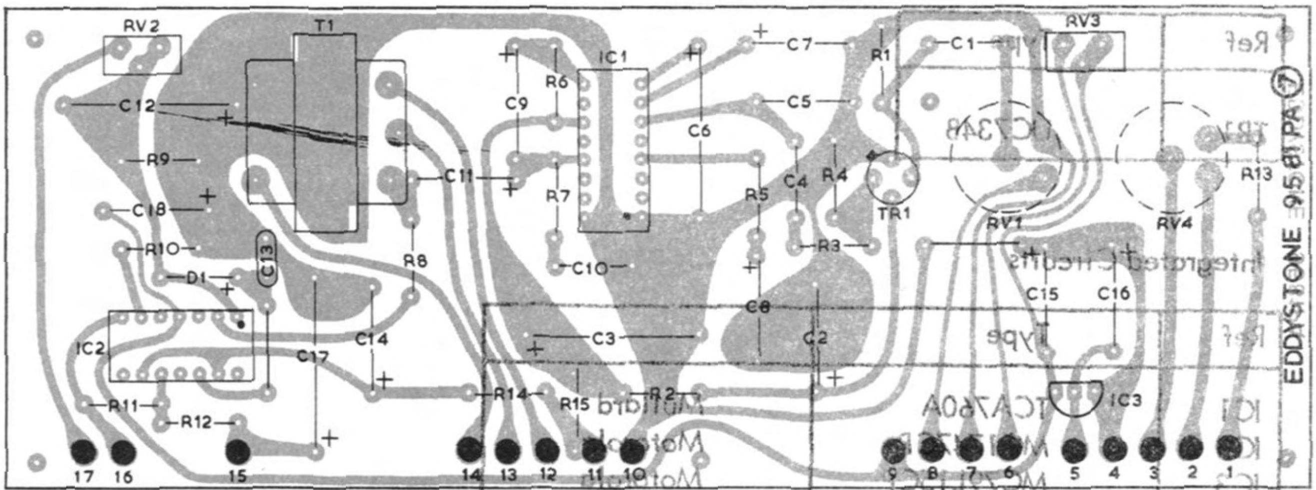
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

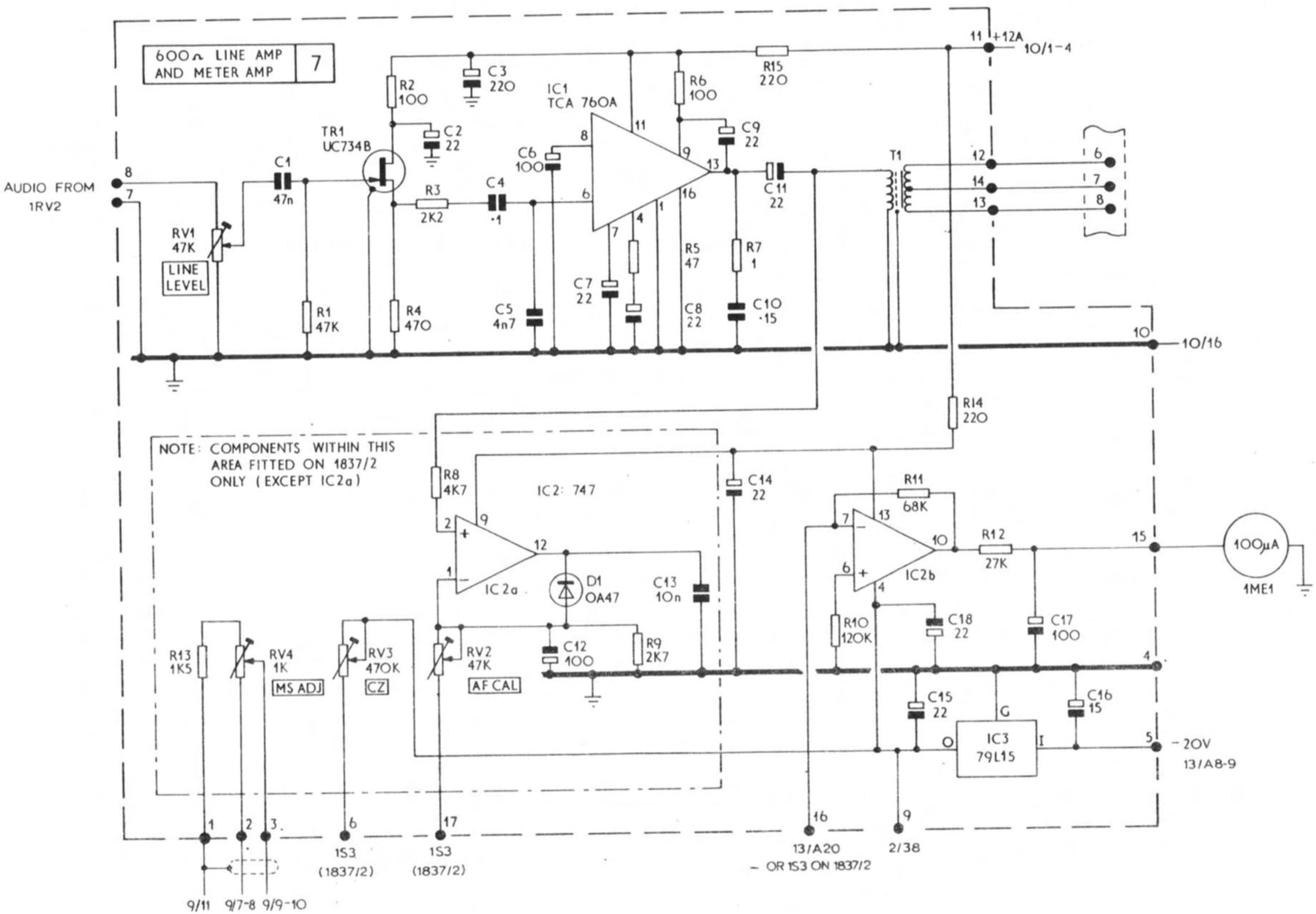
EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

TELEPHONE : 021-475-2231
TELEX : 337081
CABLES : EDDYSTONE BIRMINGHAM

4.7.9. Printed Circuit Board

The printed circuit board is shown viewed from the legend side and is actual size.





600Ω LINE AMP AND METER AMP
7
AUDIO FROM 1RV2
RV1 47K
LINE LEVEL
C1 47n
R1 47K
TR1 UC734B
R2 100
C2 22
C3 220
R3 2K2
R4 470
C4 ·1
C5 4n7
C6 100
IC1 TCA 760A
C7 22
R5 47
C8 22
R6 100
C9 22
R7 1
C10 ·15
C11 22
R15 220
T1
11 +12A 10/1-4
10 10/16
R14 220
NOTE: COMPONENTS WITHIN THIS AREA FITTED ON 1837/2 ONLY (EXCEPT IC2a)
R8 4K7
IC2: 747
IC 2a
D1 OA47
C13 10n
C12 100
R9 2K7
C14 22
R11 68K
IC2b
R12 27K
R10 120K
C18 22
C17 100
100μA
1ME1
C15 22
C16 15
IC3 79L15
-20V 13/A8-9
R13 1K5
RV4 1K
MS ADJ
RV3 470K
CZ
RV2 47K
AF CAL
1S3 (1837/2)
1S3 (1837/2)
9/11 9/7-8 9/9-10
13/A20 - OR 1S3 ON 1837/2
2/38

4.8. HIGH LEVEL AUDIO MODULE

4.8.1. Introduction

This printed circuit board assembly carries the audio power amplifier which drives both internal and external loudspeakers and headphones. It has two signal inputs, the received signal via the volume control and a sidetone signal from an associated transmitter via a contact in the ancillaries connector.

4.8.2. Circuit Description

The sidetone input from the ancillaries connector is fed in via pin 4 and the "Tee" attenuator R7-9, the main input from the AF Gain control enters the unit at pin 1 and both input signals are mixed together at the input of the amplifier IC1. Resistors R2-4 and capacitors C2-7 provide the usual stabilising and bandwidth limiting networks. The d.c. bias on the output is removed by C8 and the main output is taken from pin 12 to the external loudspeaker. Pin 9 provides the headphone output with R5 limiting the power available at this point. R6 is the power limiting resistor for the internal loudspeaker which is fed by a link between pins 5 and 9 in the ancillaries connector. Various muting options are available for both internal and external loudspeakers, these operate on the 'earthy' sides of the speakers and full details are given in the installation section.

Power is taken from the 12V 'A' supply.

4.8.3. Removal of the Unit.

The printed circuit board assembly is secured to the left-hand side plate of the receiver by four M3 screws.

4.8.4. Fault Diagnosis.

The integrated circuit amplifier is protected against overload and so failure as a result of this is unlikely. In cases of loss of output, check that the input is present at pin 1 and that the output is not short-circuited, also check that the power supply is present. Failure of passive components in the stabilising network may result in overload leading to the protection circuitry coming into operation.

4.8.5. Performance Check

Check that the +12V supply is present at pin 6 and that pin 5 is earthed. Disconnect the lead from pin 1 and connect an audio signal generator set to give 15mV at 1kHz. Connect an Output Power meter between pins 11 (earth) and 12, ensuring that the ancillaries connector is disconnected, and set to give a 4Ω load. Check that at least 1W output can be obtained. Transfer the signal generator to pin 4 and check that the sensitivity is approximately 1V for 1W output. Afterwards restore the connection to pin 1.

4.8.6. Realignment

There are no adjustments to be made on this module.

4.8.7. Voltage Analysis

All voltages are measured with respect to 0V rail (pin 5), AVO8 on lowest applicable D.C. range. Normal tolerances apply.

IC1 pin	1	12V
	4	12V
	5	0V
	6	1.2V
	7	6.2V
	8	0V
	9	0V
	10	0V
	12	6V
Tabs		0V

The current drawn by the module (quiescent conditions) is +12V supply 15mA.

4.8.8. Components List. Module Prefix 8.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	100n	Polycarbonate	100V	20%
C 2	220µ	Tubular Electrolytic	4V	+50%-10%
C 3	100µ	Tubular Electrolytic	10V	+50%-10%
C 4	100µ	Tubular Electrolytic	10V	+50%-10%
C 5	1n8	Polystyrene or ceramic	100V	20%
C 6	10n	Polycarbonate	400V	20%
C 7	100n	Polycarbonate	100V	20%
C 8	220µ	Tubular Electrolytic	10V	+50%-10%
C 9	100n	Polycarbonate	100V	20%
C10	1000µ	Tubular Electrolytic	16V	+50%-10%
C11	10n	Disc Ceramic	25V	+80%-20%

Resistors

Ref	Value (Ω)
R1	100k
R2	18
R3	100
R4	1
R5	100

Ref	Value (Ω)
R 6	22
R 7	330k
R 8	10k
R 9	100k
R10	5R1 Wirewound

All resistors except R10 are Mullard CR25, 0.3 Watt 5%.

Integrated Circuits

Ref	Type	
IC1	TBA 810S	S.G.S. ATES

Miscellaneous

Description	Part No.
Printed Circuit Board	9580P
Printed Circuit Board Assembled	LP3506/11 (complete module)

Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

TELEPHONE: 021-475-2231
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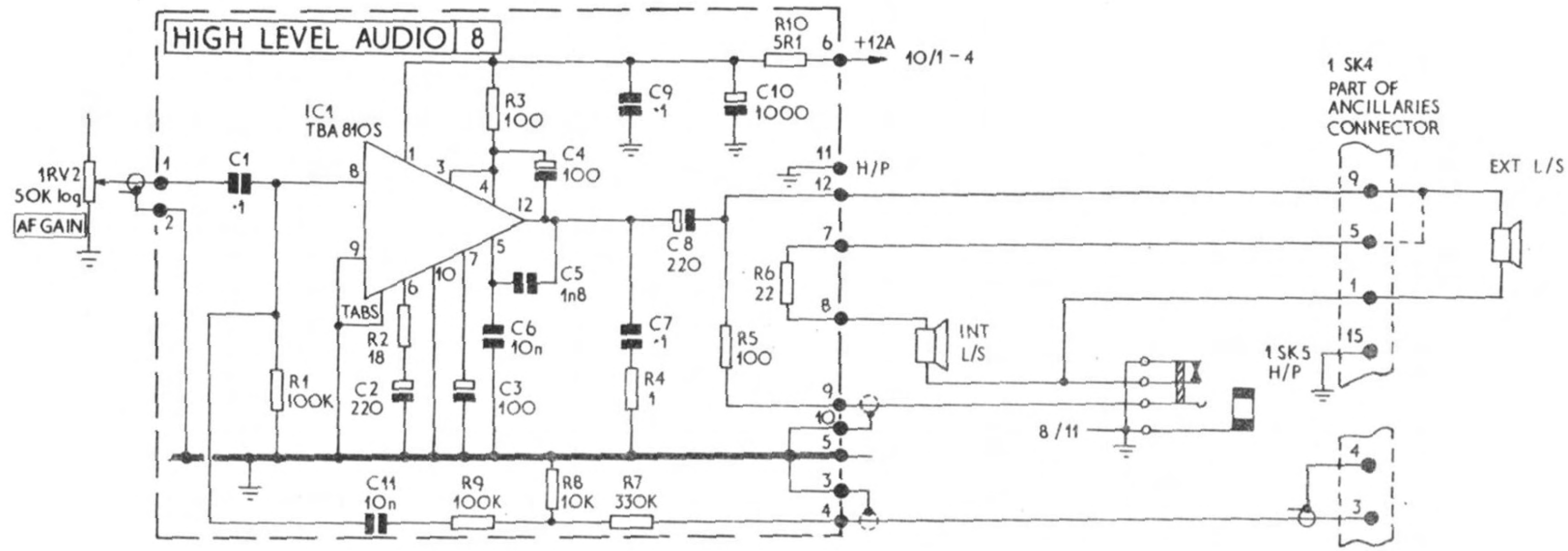


HIGH LEVEL AUDIO 8
IC1
TBA 810S
1RV2
50K log
AF GAIN
C1
·1
R1
100K
TABS
R2
18
C2
220
C3
100
C6
10n
C5
1n8
C4
100
R3
100
C9
·1
C10
1000
R10
5R1
+12A
10/1 - 4
H/P
C8
220
C7
·1
R4
1
R5
100
R6
22
INT
L/S
C11
10n
R9
100K
R8
10K
R7
330K
8 / 11
1 SK4
PART OF
ANCILLARIES
CONNECTOR
EXT L/S
1 SK5
H/P

4.9.1. General Description

The FSK Module takes a 100kHz signal directly from the IF Amplifier and provides solid-state switching for an external teleprinter supply. Bipolar supplies of ±80V or unipolar supplies of up to 100V can be switched. A Mark : Space adjustment is provided external to the module on the rear panel of the receiver. The module can be fitted to Model 1837/2 receivers only.

4.9.2. Circuit Description

Input and Pulse Shaping Circuits.

A signal at 100kHz is coupled via R1 and C1 into IC1. This first stage is a combined limiter and quadrature discriminator. The discriminator characteristic is determined by the phase-shift network formed by L1 and the series/parallel combination of C4, C6 and C7. A further 90° phase shift (to provide mid-range discriminator output at the peak response of the tuned circuit) is given by the phase-shift bridge network consisting of C6, C7, C8, R5. The output (at test point A) is a series of pulses which is coupled to IC2, a D.C. amplifier which provides a waveform of about 6V peak-to-peak amplitude. The D.C. level of this is adjusted under no-signal conditions to a nominal 5.5V by means of RV1. This stage limits when the RF input reaches about 400Hz peak-to-peak deviation. Pulses at the output of IC2 are shaped by the integration circuits R13/C16 and R15/C17 and fed to the tuning meter and a Schmitt trigger IC3. The trigger level is set by 7RV4 which is accessable through an aperture in the rear panel of the receiver, and is nominally 5.5V. The output from IC3 drives in antiphase the two LED's, which form part of the opto-isolators IC4 and IC5.

The power supply for the input and pulse shaping circuits is the receiver's 12V supply. Two independent 9V rails are derived from this by zener stabilisation. The discriminator and DC amplifier are fed from one rail and the Schmitt trigger and opto-isolators from the other, the total current drawn being about 40mA. Note that this part of the circuit is connected to the receiver circuit earth and is isolated from the output switching network.

Output Switching Network.

The drive to the switch is rectified so that voltage of the correct polarity is always applied to the switching transistors. In the description which follows the components used with Pin 5 positive and Pin 1 negative are shown without brackets whilst those used only when the polarities are reversed are bracketed.

When the L.E.D. in opto-isolator IC4 (IC5) is illuminated, the transistor will be turned "on" allowing a current to flow into the base of TR1. The supply for this is from the +80V rail via D9 (D10) and R22 (R23) and zener regulated and smoothed at 6.2V by D5 (D6) and C18 (C19). As the two L.E.D's are driven in anti-phase reversing the teleprinter supply will effect a mark-space reversal. With TR1 switched "on", TR2 will be "off" and TR3 "on". Current will flow through TR3 and D12 (D13) to the -80V supply and the output will therefore be held close to -80V and will sink current from the teleprinter.

When the L.E.D. in IC4 (IC5) is extinguished TR1 will be biassed "off" by R20, and current will flow via R21 into the base of TR2, turning it "on". TR3 will be "off". In this case current will flow from the +80V supply via D11 (D14) and TR2 and so the output will be held close to +80V and will source current to the teleprinter. Diodes D7 and D8 protect the transistors from high voltages generated by the inductive load of the 'printer. The output current is limited by 1R15 (mounted in the receiver) and R21, R22 and R23 should be adjusted in value to suit the current required and the supply voltage. The current drawn from the teleprinter supply is 25mA (at 80-0-80V) in addition to the current drawn by the teleprinter. This part of the circuit is isolated from the receiver circuit earth.

4.9.3. Installation of FSK Module Cat. No. 1534.

1. Locate the four nylon mounting pillars in the left-hand side plate of the receiver.
2. Fix the printed circuit board assembly, using the four self-tapping screws supplied, so that the connector is towards the rear of the receiver and the components are on the outside. Fix the aluminium cover supplied using the two upper fixing screws. Connect the multi-way connector, and align the meter circuit as described in section 4.7.
3. Output Switching Network.

   The components fitted in this network suit a teleprinter supply of 80-0-80V to give an absolute maximum output current of 100-0-100mA bipolar, or 100V at 100mA unipolar. For different voltages and/or currents, the values should be altered according to the following table. In the case of intermediate values, the next highest resistance value should be used. It may be found that it is not necessary to lower the resistor values when a lower voltage is used. This is in order provided the 'printer operates satisfactorily. The reverse is NOT true and damage may result.

SUPPLY

Bipolar	Unipolar	R21	R22	R23	1R15
80-0-80V at 50-0-50mA	100V at 50mA	8k2 6 watt wirewound	33k 1 watt wirewound	33k 1 watt wirewound	1k 12 watt wirewound
40-0-40V at 50-0-50 to 25-0-25mA	50V at 50 to 25mA	4k7 3 watt wirewound	15k 1 watt metal film	15k 1 watt metal film	390Ω to 1k 12 watt wirewound
20-0-20V at 50-0-50 to 25-0-25mA	25V at 50 to 25mA	2k2 3 watt wirewound	4k7 0.5 watt metal film	4k7 0.5 watt metal film	150Ω 6 watt to 390Ω 12 watt wire-wound
10-0-10V at 50-0-50 to 25-0-25mA	10V at 50 to 25mA	1k 1 watt metal film	680Ω 0.3 watt carbon film	680Ω 0.3 watt carbon film	100Ω 3 watt to 150Ω 6 watt wirewound
6-0-6V at 25-0-25mA		470Ω 0.3 watt carbon film	100Ω 0.3 watt carbon film	100Ω 0.3 watt carbon film	100Ω 3 watt wirewound

WARNING

BEWARE OF HIGH VOLTAGES DERIVED FROM AN EXTERNAL TELEPRINTER SUPPLY PRESENT ON THE ENTIRE OUTPUT SECTION OF THIS MODULE. DISCONNECT THIS SUPPLY UNLESS ABSOLUTELY NECESSARY, WHEN NORMAL PRECAUTIONS MUST BE OBSERVED.

4.9.4. Fault Diagnosis

Switch the receiver into CW mode, connect an RF signal generator to the aerial input and tune generator and receiver to a convenient frequency. A CW beat note should be heard from the loudspeaker, provided the ancillaries plug is inserted and wired correctly. If a beat note is not heard it is likely that a fault exists elsewhere in the receiver.

Connect a D.C. Voltmeter to Pin 3, connect the printer supply (or use a bench supply) and check that a small change in frequency of the input signal, say ±200Hz causes the output to switch between the two states. Check +12V at Pins 14, 15 and earth connections. Check the input lead.

4.9.5. Performance testing and
4.9.6. Realignment

Temporarily short-circuit the IF input at pins 19, 20 and adjust RV1 to give +5.5V (±0.2V) at test point C (AVO8 - 25V DC).

Inject a 100kHz unmodulated signal of 50mV emf by removing the test link (in series with R1) and adjust L1 to give +5.5V (±0.5V) at test point C. Note that slight adjustment of the core should swing the voltage at TP 'C' a few volts either way. Check that an input of 999.750kHz gives approx. +8.8V and 100.250kHz gives approx. +2.3V at TP 'C'. Restore the input signal to 50mV emf at 100.000kHz. Monitor the voltage (AVO8 - 25V DC) at test point D and adjust 7RV4 so that this voltage just switches (between 2.5V and 8.0V). The following conditions will then be found.

Using a low capacity probe (7pF in parallel with 10MΩ) and oscilloscope or RF meter check the response at TP'B'. The bandwidths to 3dB points should be approx. 2.5kHz and the response at 100kHz should be within 1dB of the peak. Check the limiting action of IC1. Increasing the input level up to 200mV emf should cause only a small change in output, if any.

Set the IF input to the module at 100.000kHz, 50mV emf, frequency modulated at 50Hz with a peak-to-peak deviation of 85Hz. Connect the appropriate supply voltage at the FSK Supplies connector and check that a square wave with an amplitude of approx. 2.5V less than the supply voltage is present at the output with printer disconnected. Slight adjustment of input frequency and of 7RV4 should change the mark-space ratio over nearly the full range. Repeat the check with 150Hz modulation at 150Hz peak-to-peak deviation. Check that the mark-space ratio remains sensibly constant when the IF input is increased to 100mV.

4.9.7. Voltage Analysis

The following voltages should be present, subject to usual tolerances to take account of manufacturing spreads in comoponent values.

a. Input and Pulse Shaping Circuits.

IC1	Pin 1		+4.3V	
	5		+1.4V	
	12		+3.7V	
	13		+9.5V	
IC2	Pin 2		+4.7V)	With TP 'C' set at 5.5V
	3		+4.7V)	by RV1
	6		+5.5V)	
IC3	Pin 2		+5.5V	
	3		4-7V	Set by 7RV4. Output switches at 5.5V.
	6		+8.5V	"High" state
		or	+2.5V	"Low" state
	7		+9.5V	
IC4	Pin 2		8.5V	TP 'D' high
		or	4.9V	TP 'D' low
IC5	Pin 1		5.0V	TP 'D' high
			2.5V	TP 'D' low

b. Output Switching Network.

All voltages measured with respect to -80V line. AVO8 on 25V or lowest available range D.C. Normal tolerances apply.

	+80V pin 5 -80V pin 1		-80V pin 5 +80V pin 1	
	Output high	Output low	Output high	Output low
IC4 pin 4	0.8V	1.5V	1.6V	1.5V
pin 5	7.0V	2.1V	1.6V	1.0V
IC5 pin 5	1.6V	1.0V	7.0V	2.1V

	Output high	Output low	Output high	Output low
TR1 collector	160V	1.0V	160V	1.0V
emitter	0.6V	0.6V	0.6V	0.6V
TR2 collector	160V	160V	160V	160V
base	160V	1.0V	160V	1.0V
emitter	160V	0.6V	160V	0.6V
TR3 collector	0.6V	0.8V	0.6V	0.6V

Note IC4 pin 4; IC5 pin 4; TR1 base are common
TR1 collector; TR2 base; TR3 base are common
TR2 emitter, TR3 emitter are common.

The current drawn by the module is (12V supply) is 40mA.

4.9.8. Components List. Module Prefix 9.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	100n	Polycarbonate	100V	20%
C 2	100n	Polycarbonate	100V	20%
C 3	220n	Polycarbonate	100V	10%
C 4	100p	Polystyrene	63V	2%
C 5	220n	Polycarbonate	100V	10%
C 6	4n7	Polystyrene	63V	2%
C 7	4n7	Polystyrene	63V	2%
C 8	68p	Polystyrene	63V	2%
C 9	1µ	Tantalum Electrolytic	35V	20%
C10	100n	Polycarbonate	100V	20%
C11	22µ	Tantalum Electrolytic	16V	20%
C12	22µ	Tantalum Electrolytic	16V	20%
C13	22µ	Tantalum Electrolytic	16V	20%
C14	22µ	Tantalum Electrolytic	16V	20%
C15	22µ	Tantalum Electrolytic	16V	20%
C16	1µ	Tantalum Electrolytic	35V	20%
C17	1µ	Tantalum Electrolytic	35V	20%
C18	22µ	Tantalum Electrolytic	16V	20%
C19	22µ	Tantalum Electrolytic	16V	20%
C20	1n	Disc Ceramic	500V	20%
C21	100n	Polycarbonate	200V	20%

Resistors

Ref	Value (Ω)
R 1	390
R 2	220
R 3	100
R 4	120
R 5	22k
R 6	6k8
R 7	1k
R 8	1k
R 9	6k8
R10	6k8
R11	6k8
R12	68k

Ref	Value (Ω)
R13	680
R14	100k
R15	680
R16	1k
R17	22k
R18	220
R19	330
R20	10k
R21	8k2) AoT see
R22	3k3) table for
R23	33k) values and ratings

All the above are Mullard CR25, 0.3W 5%, except R21-23, see table.

Potentiometers

Ref	Value	Type
RV1	1kΩ	Cermet preset

Coils

Ref	Description/Part No.	
L1 CH1	Discriminator coil 100mH choke	D5032 Eddystone 7350P Eddystone

Diodes

Ref	Type
D1	BZX79 C9V1
D2	BZX79 C9V1
D3	BZX79 C3V3
D4	BZX79 C3V3
D5	BZX79 C6V2
D6	BZX79 C6V2
D7-D14	IN4004

Transistors

Ref	Type
TR1	2N3439
TR2	2N3439
TR3	2N5416

Integrated Circuits

Ref	Type	
IC1	MC1357P	Motorola
IC2	MC1741CP1	Motorola
IC3	MC1741CP1	Motorola
IC4	MCT2	Monsanto
IC5	MCT2	Monsanto

Miscellaneous

Description	Part No.
Printed Circuit Board	9747P
PLA 20 Way Connector	9867/1P
SKA 20 Way Connector (mating for above)	9868P

F.S.K. Module complete. Cat. No. 1534.

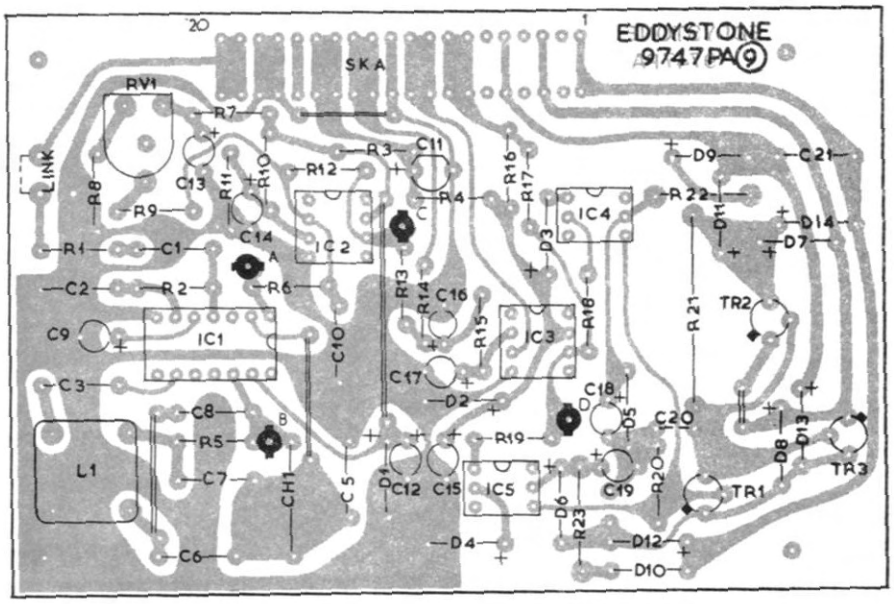
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

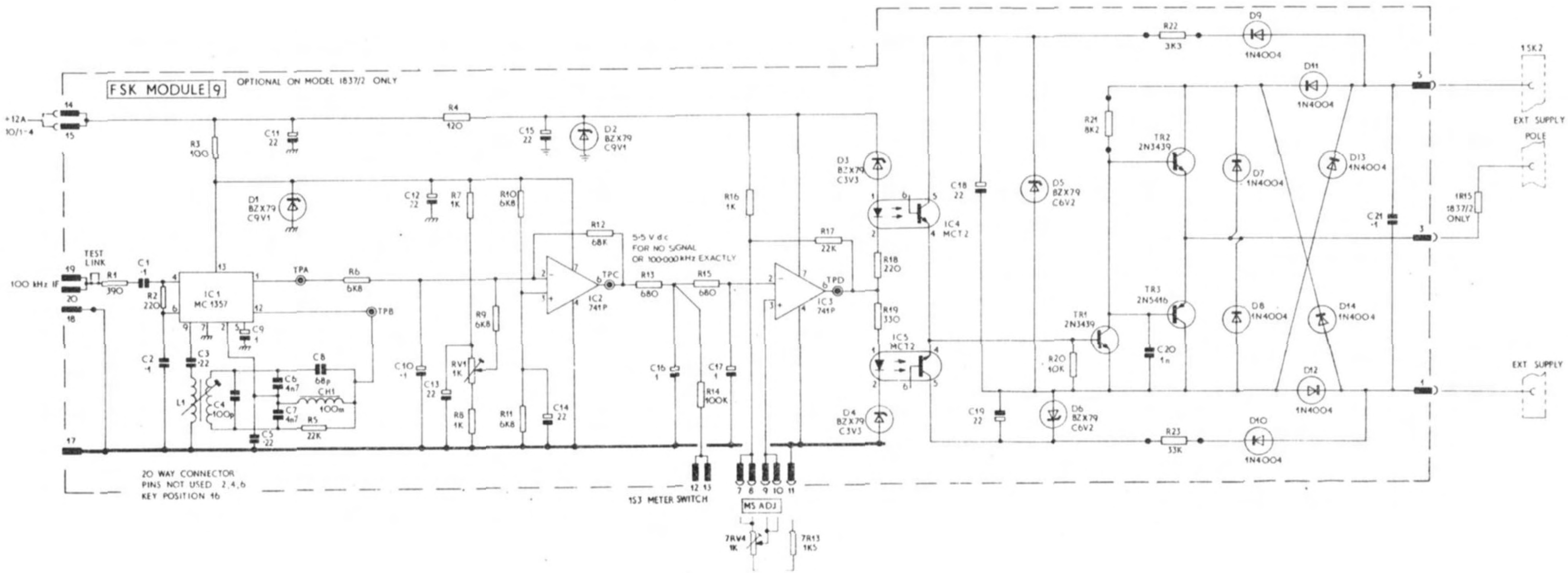
EDDYSTONE RADIO LTD.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

TELEPHONE : 021-475-2231
TELEX : 337081
CABLES : EDDYSTONE BIRMINGHAM

4.9.9. Printed Circuit Board.

The printed circuit board is shown viewed from the legend side, and is actual size.





FSK MODULE 9
OPTIONAL ON MODEL 1837/2 ONLY
+12A
10/1-4
100 kHz IF
TEST LINK
IC1 MC1357
IC2 741P
IC3 741P
IC4 MCT2
IC5 MCT2
TPA
TPB
TPC
TPD
5-5 V d c
FOR NO SIGNAL
OR 100·000 kHz EXACTLY
TR1 2N3439
TR2 2N3439
TR3 2N5416
D1 BZX79 C9V1
D2 BZX79 C9V1
D3 BZX79 C3V3
D4 BZX79 C3V3
D5 BZX79 C6V2
D6 BZX79 C6V2
D7 1N4004
D8 1N4004
D9 1N4004
D10 1N4004
D11 1N4004
D12 1N4004
D13 1N4004
D14 1N4004
20 WAY CONNECTOR
PINS NOT USED 2,4,6
KEY POSITION 16
1S3 METER SWITCH
MS ADJ
7RV4 1K
7R13 1K5
1SK2
EXT SUPPLY
POLE
1R15
1837/2
ONLY
EXT SUPPLY

4.10. Power Supply Unit.

4.10.1. Introduction

This unit houses the mains input socket, transformer, rectifiers and fuses. Some of the supply regulators are mounted on this unit, the remainder being in the modules.

4.10.2. Circuit Description.

Power is fed via the filtered mains input socket and the two AC Fuses to the primary of the mains transformer. This is split into two windings of 120V each, tapped at 10V which may be connected in series or parallel to suit the supply voltage. (See Installation, Section 1).

There are three isolated secondary windings. The first winding is centre-tapped and feeds the bridge rectifier D1, the direct voltage output being smoothed by C1 and C2. This gives the +20V and -20V supplies, which are regulated to +15V and -15V at their destination. The second winding feeds a similar circuit consisting of D2, C3 and C4 to give the +9V and -9V (digital) supplies, which are regulated to +5V and -5V on the digital boards. The third winding feeds the bridge rectifier D3. The output is smoothed by C5 and fed to the pair of regulator integrated circuits IC1 and IC2, their outputs being decoupled by C6 and C7. Fusing is provided by FS1-5, in the secondary circuits and FS6 and 7 in the primary. Note that the earths for the digital and analogue circuits are separate.

Supply switching.

The Supply On/Off switch on the front panel interrupts the +20V, -20V, +9V and -9V supplies and the +12V supply from IC1. When the supply switch is ON this feed is returned to the module for distribution as the 12V 'A' supply. The 12V 'B' supply from IC2 is permanently powered irrespective of the state of the Supply Switch.

4.10.3. Removal of the Unit

Remove the rear panel as described in section 4.1, and disconnect the leads from pins 1-16. Remove 3 x M4 screws in the left-hand side plate and 2 x M4 screws from the centre rail. The unit can now be removed.

4.10.4. Fault Diagnosis.

The presence of a fault in the unit can only be confirmed by checking the performance of the unit with a dummy load.

4.10.5. Performance check.

As a preliminary check, the following voltages should be measured with the receiver operating.

Across C1 (pins 12 & 16 (earth))	+19.5V	-	+23V
Across C2 (pins 13 & 16 (earth))	-19.5V	-	-23V
Across C3 (pins 9 & 14 (earth))	+9V	-	+12V
Across C4 (pins 11 & 14 (earth))	-9V	-	-12V
Across C6 (pins 5 & 16 (earth))	+12V ± 0.5V		
Across C7 (pins 7 & 16 (earth))	+12V ± 0.5V		

The performance of the unit is ultimately best checked by disconnecting all the outputs and measuring voltages under conditions of open-circuit and full load. The expected voltages and load currents are shown in the voltage table.

Blown fuses are most likely a result of a fault elsewhere in the receiver. In this case the power consumed by each module should be checked.

4.10.6. Realignment.

There are no adjustments to be made to this unit, other than adjustment of transformer tappings. See section 2 for this.

4.10.7. Voltage Analysis.

All voltages measured on AVO8 on lowest applicable range. Mains voltage 240V with primary taps set also to 240V.

"20V" winding	Open-circuit	Loaded
Across transformer winding	34V AC	32.4V AC) 100mA load
Across C1 (pins 12 & 16)	26V DC	19.7V DC) across pins
Across C2 (pins 16 & 13)	26V DC	19.7V DC) 12 & 13.
"9V" winding		
Across transformer winding	18.3V AC	16.9V AC) 1.6A load
Across C3 (pins 9 & 14)	11.7V DC	9.1V DC) across pins
Across C4 (pins 14 & 11)	11.7V DC	9.1V DC) 9 & 11
"12V" winding		
Across transformer winding	16.4V AC	15.5V AC) 750mA load
Across C5	20.8V DC	16.9V DC) across pins
Across C6	12V ± 0.5V	12V ±0.5V) 7 & 16 and
Across C7	12V ± 0.5V	12V ±0.5V) pins 5 & 16

4.10.8. Components List. Module Prefix 10

Capacitors

Ref	Value	Type	Voltage	Tolerance
C1	680µ	Tube Electrolytic	40V	+50%-10%
C2	680µ	Tube Electrolytic	40V	+50%-10%
C3	10 000µ	Tube Electrolytic	16V	+50%-10%
C4	10 000µ	Tube Electrolytic	16V	+50%-10%
C5	6 800µ	Tube Electrolytic	25V	+50%-10%
C6	10µ	Tantalum Electrolytic	25V	20%
C7	10µ	Tantalum Electrolytic	25V	20%

Diodes

Ref	Type
D1	SKB1, 2/01
D2	SKB40C/3200/2200
D3	SKB40C/3200/2200

Integrated Circuits

Ref	Type	
IC1	MC7812 CT	Motorola
IC2	MC7812 CT	Motorola

Fuses

Ref	Value/Type		Part No.
FS1	20mm	500mA	6710P
FS2	20mm	500mA	6710P
FS3	20mm	2A	6704P
FS4	20mm	2A	6704P
FS5	20mm	2A	6704P
FS6	20mm Time-lag (	1A (110V)	9816P
	(	500mA (230V)	9714P
FS7	20mm Time-lag (	1A (110V)	9816P
	(	500mA (230V)	9714P

Transformer

Ref	Description	Part No.
T1	Mains	9590P

Sockets

Ref	Description	Part No.
SK1	Mains Input	9715P

Fuse Holders

Description	Part No.
for FS1-5 for FS6 for FS7	D5060 10340P 10340P

Power Supply

Description	Part No.
Power Supply Unit complete	LP3519

Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LIMITED.,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP,
ENGLAND.

TELEPHONE: 021-475-2231
TELEX: 337081
CABLES: EDDYSTONE BIRMINGHAM

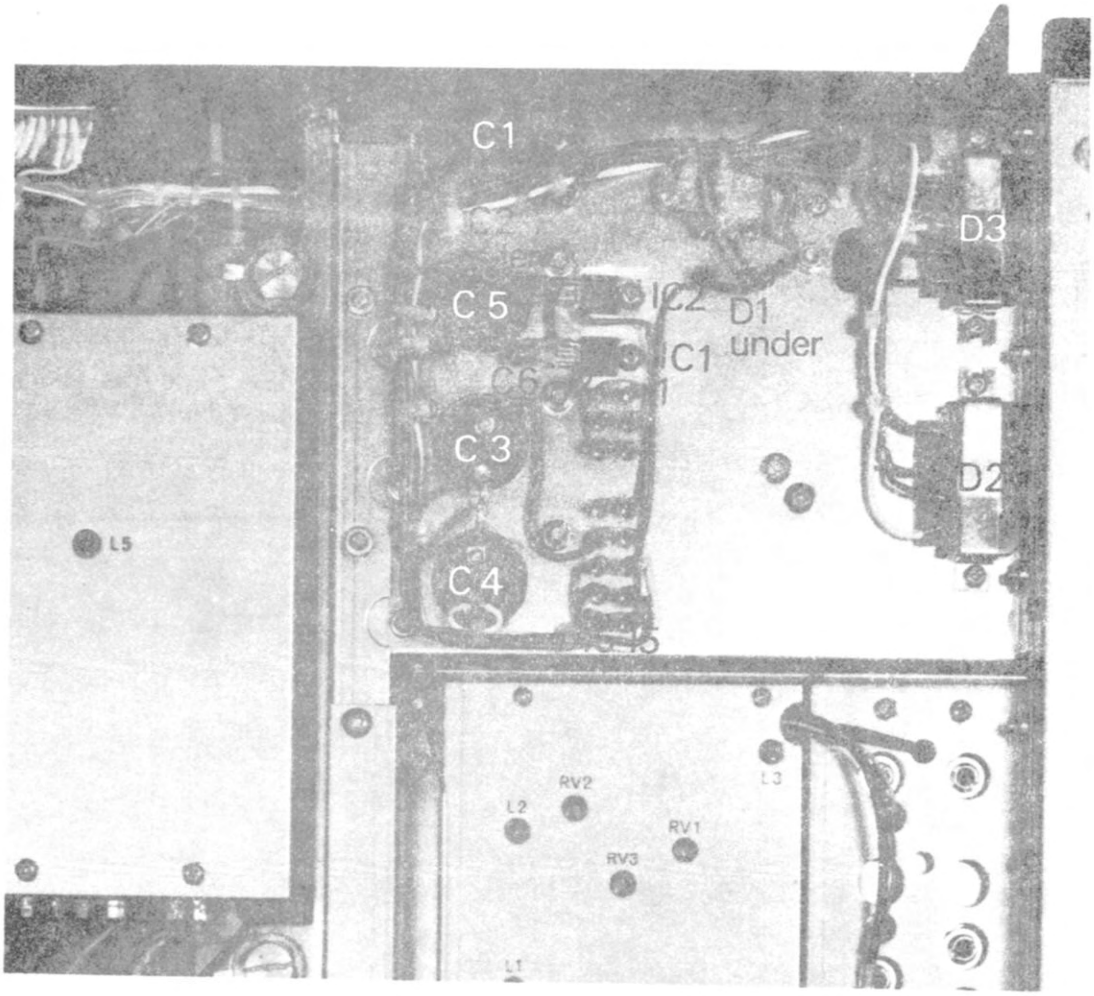
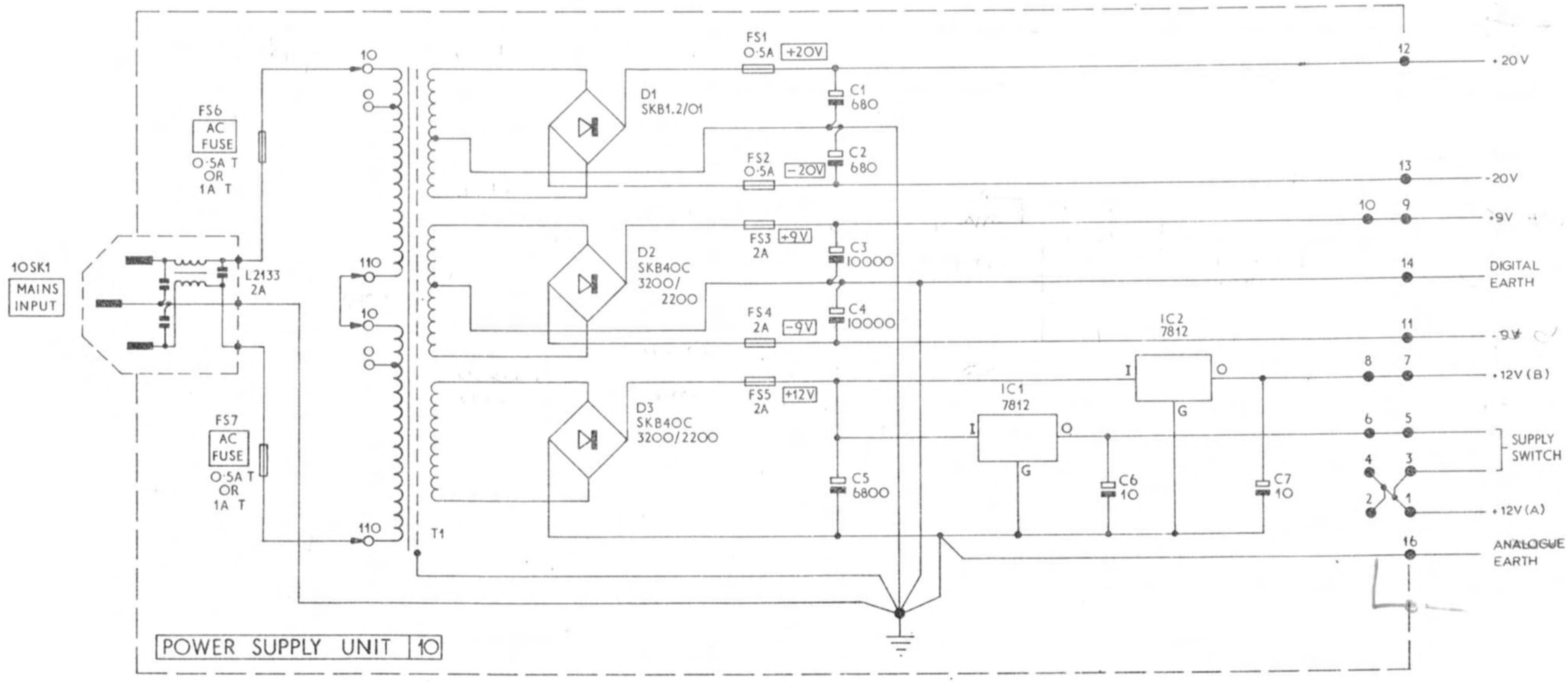


Fig. 4.10.1. Power Unit Component location.



1OSK1
MAINS INPUT
FS6
AC FUSE
O·5A T OR 1A T
FS7
AC FUSE
O·5A T OR 1A T
L2133
2A
10
110
T1
D1
SKB1.2/O1
D2
SKB4OC
3200/
2200
D3
SKB4OC
3200/2200
FS1
O·5A
+20V
FS2
O·5A
-20V
FS3
2A
+9V
FS4
2A
-9V
FS5
2A
+12V
C1
680
C2
680
C3
10000
C4
10000
C5
6800
C6
10
C7
10
IC1
7812
IC2
7812
I
O
G
12
13
10
9
14
11
8
7
6
5
4
3
2
1
16
+20V
-20V
+9V
DIGITAL EARTH
-9V
+12V (B)
SUPPLY SWITCH
+12V (A)
ANALOGUE EARTH
POWER SUPPLY UNIT
10

4.11 Frequency Display Module

4.11.1 Introduction

This module contains all the digital circuitry used to measure and display the tuned frequency of the receiver. The 1MHz oscillator used as the receiver's standard is also fitted in this module. The frequencies of the oscillators are measured by a gated up-down counter, which is pre-loaded so that the resulting count is equal to the tune frequency. This is displayed on six L.E.D. seven segment displays giving a resolution of 100Hz. The display flashes (about five times a second) when extreme ends of the correction range are reached. Section 4:3 (tunable 1st IF) and 4:12 (correction module) should be consulted with this unit.

4.11.2 Circuit Description

The circuitry can be conveniently described in four parts. These are the control, the input and counter, the latch and lastly the display sections.

a) Control.

This section generates the series of control pulses required to operate the module, which are derived from the Master Oscillator. This consists of an inverting buffer IC21f with crystal XL1, and capacitors C4 and C2 in a pi feedback network. Since the accuracy and the stability of the oscillator determines the accuracy of the display, the crystal is contained within an oven, temperature stabilised at approximately 65°C. Capacitor C2 is a trimmer type used to set the frequency. The Oscillator output passes through inverting buffers IC21 e/d/c and thence to the decade divider IC14a. The output of IC21c also goes to the correction module (Ref 4:12) via a further two inverting buffers IC21 b/a. This final output is a 4.5 volt peak to peak, 1MHz pulse train. The 1MHz pulse train is divided down to 1kHz in the three decade dividers IC14 a/b and IC15b. These 1kHz pulses clock the Johnson decade divider, IC19 which has an internal decoder providing one high level pulse at a time from each of the ten outputs. The first six of these outputs are used to strobe the latches and displays via inverting buffers IC20a to IC20f (lines 0 to 5 inc). The output on these lines is a 1ms low level pulse every six or ten milliseconds depending on the state of the 'Stop' line. When either counter gate is open (IC2a or IC2b) the stop line is "1". After the six strobe pulses a "1" also appears on the counter output Q_6. This is combined with the 'Stop' line level in NAND gate IC18a to give a "O" output (the 20µS delay is required by the leading zero suppression circuit). This is inverted in IC18b to give a "1" reset pulse for the counter which sets the output Q_0 at "1". Thus the counter output cycle has been 'short-circuited' from ten to six outputs taking just six milliseconds (the output on Q_6 being instantaneously transferred to Q_0 by the reset pulse generated). When the counting periods have ceased i.e. gates IC2a/b disabled, the 'Stop' line goes to "O" and a reset pulse can no longer be generated by Q_6. The "1" output is therefore transferred to Q_7 by the next clock pulse. Q_7 output is used to enable the dual latches IC10, 11 and 12 and transfers data from the counters to the latches. The next clock pulse transfers the "1" output to Q_8 which is solely used as a 1ms delay period. The next clock pulse transfers the "1" output to Q_9 which pre-loads the counters IC3-9 inc. via the inverting buffer IC17b. It also provides a logical "1" pulse via IC17b/a to reset the divider IC15a and clear the dividers IC16a/b. The next clock pulse restarts the cycle by transferring the "1" output back to Q_0.

The control pulses required to gate the counters are generated by the 4 bit decade counter IC16b. The 1kHz pulse train from IC15b is first divided by ten in the decade divider IC15a. This drives the 4 bit decade counter IC16a via two inverting buffers IC17e/f. The output of

IC16a is 10Hz pulse train, i.e. one pulse every 100ms, which drives the counter IC16b. The final pulse in the sequence from IC19, as already noted, clears these three decade dividers so that outputs Q_b and Q_c of IC16b are set to "O". The 'Down' gate IC2a is thus enabled (via inverters IC17d/c for Q_b and Q_c respectively). Note that IC17c output is the 'Stop' line. Q_b remains at "O" for two full 100ms clock periods thus providing the required 200ms gating period for the counter. For the next two clock periods Q_b goes to "1" thus enabling the 'Up' gate for the required 200ms and disabling the 'down' gate. Q_c remains at "O" so the 'Stop' line is still at "1". The next clock pulse to IC16b causes Q_c to go to "1" thus disabling both count gates IC2a/b and causing the 'Stop' line to go to "O". As already explained this allows IC19 to generate extra pulses to enable the latches, load the counters and reset or clear the counters IC16a/b and IC15b. This last action restarts the counter gating sequence with Q_b and Q_c of IC16b set back to zero. The complete counter sequence thus takes a few milliseconds over the 400ms required for gating.

The remaining gating in the control section, IC22, 24, 25 controls the operation of the overrange indication, display dimming, the positioning of the decimal point in the display and the suppression of the leading zero. When extreme ends of the correction range are reached, the overrange output from the tunable first IF goes to "O" (Ref. 4:3). This enables NAND gate IC18d to pass 5Hz pulses, derived from the counter IC16b, to the blanking gate IC22b. The pulses pass through IC22b which is enabled by "O" on its' other inputs (see description of leading zero suppression) causing the display to flash at about 5 times per second.

The position of the decimal point is determined by the state of the opto-isolator IC23. On the four lowest frequency ranges, 6 to 9, the isolator is switched on by a voltage derived from switch S1J in the coilbox (Ref 4:2). Pin 5 of the isolator thus goes to "O" and via IC24 and TR7 switches the "kHz" decimal point diode in DS5 on. The other "MHz" diode in DS2 is held "off" as it is driven via a NAND gate IC24d, from pin 5 of the isolator. On the frequency ranges 1 to 5, the position is reversed with the decimal point in DS5 held "off" by the "1" on pin 5 of the isolator, and the decimal point in DS2 switched "on" via IC24 and TR3. The second input of IC24c/d is a variable width pulse for controlling the display intensity generated in IC25a. The time constant is determined by C8 and resistors selected by the intensity switch. The monostable is triggered every 1ms by clock pulses at the input of IC19, and its output is used to enable IC24 (for the decimal point) and IC22b (for the figures). The display intensity is, of course, overridden by the leading zero suppression and overrange circuitry.

Leading Zero Suppression

Leading Zero Suppression is achieved by enabling the display with the first non-zero in the display scan.

The operation is as follows: Q_0 of IC19 selects display DS1 and Tri-state latch IC12b. Now gate IC22a detects the presence of a non-zero on the B.C.D. data bus and, if present, resets the bistable IC25b to "O" so enabling the display via the blanking gate IC22b. The next display DS2 is selected with Tri-state latch IC12a by Q_1 IC19. If the previous digit was a non-zero i.e. bistable IC25b is at "O" the digit now selected on the B.C.D. data bus will be displayed (even if it is zero). If the previous digit was a zero, bistable IC25b would have been "1" and the display blanked and the present digit will only be displayed if it is a non-zero as identified by NOR gate IC22a. Operation of Q_2 IC19 to Q_5 IC19 is similar once a non-zero is detected the rest of the scan is displayed including any zeros. Q_6 IC19 sets bistable IC25b for the next display scan. Tri-state latches IC10, 11, 12 are all in their high impedance state so a 'phantom 0' is provided by R38-41, to allow bistable IC25b to be set. Q_6 IC19 is also used to reset IC19 to Q_0 - removing the output on Q_6 - so R50/C7 provide a delay of 20µs to ensure adequate time to set bistable IC25b.

b) Input and Counter

This section contains the pre-loadable counters, the counter gating and the interface circuits between counters and the drives from the two oscillators. Note that these drives are routed via the correction module (Ref. 4:12) where they are divided by two giving $f_1/2$ and $f_2/2$. F_1 is from the first oscillator, TR4 in the coilbox (Ref. 4:2), and f_2 is from the second oscillator, TR3 in the tunable 1st IF (Ref. 4:3).

The differential oscillator drives are terminated in load resistors R1 to R4 on the inputs of differential line receivers IC1a/b. The outputs of these drive counter gates IC1c/d which are enabled by a "1" on the 'Stop' line and 200ms gating pulses from the control section. 200ms gating periods are required to give 100Hz resolution in the display since f_1 and f_2 are prescaled by two in the correction module and by ten in IC3 (a decade which is not displayed but is used to reduce count jitter in the readout).

The tuned point of the receiver is $f_1 - f_2$ - (2nd IF) which equals $f_1 - f_2$ - 100kHz. The counter measures this by preloading IC4 to IC9 with the tens complement of 100kHz then counting 'down' on pulses of $f_2/2$ for 200ms then 'up' on pulses of $f_1/2$ for 200mS. The resulting count in IC4 to IC9 is therefore numerically equal to the tuned frequency of the receiver. The prescaling divider IC3 is preloaded with 5 (0101) to prevent miscounting being caused by an initial short pulse as the gate opens. The counters are preloaded by a 1ms logical "O" pulse from IC17b in the control section.

c) Latch

This section consists of three dual 4 bit latches IC10 to 12. When enabled by a "1" from IC19 in the control section these store the count from IC4-9 (which is numerically equal to the tuned frequency). Each 4 bit latch is strobed synchronously with the appropriate display, the number to be displayed being fed onto the data bus, in B.C.D. form to the decoder IC13. The strobe pulses are generated by IC19 via IC20 and lines 0 to 5.

d) Display

This section contains the displays and the B.C.D. to seven segment decoder IC13. The displays are seven segment yellow L.E.D.s with right hand decimal points on the 2nd and 5th most significant digits (for MHz and kHz indication respectively). Each display has a common cathode which is driven via a transistor from the strobe lines 0 to 5. The anodes of the displays (seven per display) are driven from IC13 via a common bus line. The decimal point anodes are also driven via transistors from the opto-isolator IC23 and gates in IC24. Logical "O" inputs to the blanking terminal are also provided by the control section to blank leading zeros and flash the display when extreme ends of the correction range are reached (Tunable 1st IF Ref. 4:3).

4.11.3 Removal

Remove the escutcheon from the front panel (remove range knob and 6 x M3 countersunk screws) to gain access to 2 x M3 countersunk screws. Also remove M3 screw from counter bracket assembly on main chassis. Unplug 10-way connector from rear of unit and withdraw to the extent permitted by remaining leads. Remove 4 x M2.5 screws from top and bottom and pull the cover off forwards, giving access to printed circuit boards and leads. WARNING M.O.S. devices are used in this unit - see appendix for handling instructions.

4.11.4 Realignment

The only realignment possible in this module is the master oscillator frequency adjustment. This should only be attempted by skilled technicians with the appropriate equipment.

Remove the counter from the receiver and remove the cover, reconnect the 10-way connector and place the counter upside down on a sheet of insulating material resting on the coil-box lid (for convenience). Switch the receiver on and allow at least 30 minutes warm-up time before continuing.

Connect a frequency counter capable of reading to ±1Hz to the output to the correction module (board pin 5 and adjust C2 to give a frequency of 1.0MHz ±1Hz. Refit the cover and replace the module.

The current drawn by the module (display showing 999.000) is:

+9V supply: 400mA
-9V supply: 11mA
+12V supply: 400mA
depending on ambient temperature.

4.11.5. Components List. Module Prefix 11.

Capacitors

Ref	Value	Type	Voltage	Tolerance
C 1	10n	Disc Ceramic	25V	+80%-20%
C 2	2P5-27p	Trimmer 8735P		
C 3		NOT FITTED		
C 4	220p	Polystyrene	125V	2%
C 5	470n	Polycarbonate	100V	20%
C 6	10n	Disc Ceramic	25V	+80%-20%
C 7	270p	Polystyrene	125V	2%
C 8	10n	Disc Ceramic	25V	+80%-20%
C 9	100µ	Tubular Electrolytic	25V	+50%-10%
C10	22µ	Tantalum Electrolytic	16V	+50%-10%
C11	10n	Disc Ceramic	25V	+80%-20%
C12	100µ	Tubular Electrolytic	25V	+50%-10%
C13	10µ	Tantalum Electrolytic	16V	20%
C14	22µ	Tantalum Electrolytic	16V	20%
C15	10n	Disc Ceramic	25V	+80%-20%
C16	10n	Disc Ceramic	25V	+80%-20%
C17	10n	Disc Ceramic	25V	+80%-20%
C18	10n	Disc Ceramic	25V	+80%-20%
C19	10n	Disc Ceramic	25V	+80%-20%
C20	10n	Disc Ceramic	25V	+80%-20%
C21	10n	Disc Ceramic	25V	+80%-20%
C22	10n	Disc Ceramic	25V	+80%-20%
C23	22µ	Tantalum Electrolytic	16V	20%
C24	10n	Disc Ceramic	25V	+80%-20%
C25	220µ	Tubular Electrolytic	16V	+50%-10%

Resistors

Ref	Value (Ω)
R 1	47
R 2	47
R 3	47
R 4	47
R 5	1k
R 6	1k
R 7	3k3
R 8	3k3
R 9	3k3
R10	3k3
R11	3k3
R12	3k3
R13	3k3
R14	3k3
R15	3k3
R16	3k3

Ref	Value (Ω)
R17	3k3
R18	3k3
R19	3k3
R20	3k3
R21	3k3
R22	3k3
R23	not fitted
R24	3k3
R25	3k3
R26	3k3
R27	3k3
R28	3k3
R29	3k3
R30	3k3
R31	3k3
R32	100k

Resistors continued...

Ref	Value (Ω)
R33	100k
R34	100k
R35	100k
R36	100k
R37	100k
R38	100k
R39	100k
R40	100k
R41	100k
R42	100k
R43	10M
R44	3k3

Ref	Value (Ω)
R45	3k3
R46	1k
R47	10k
R48	4k7
R49	22k
R50	100k
R51	18
R52	12k
R53	18
R54	12k
R55	1k
R56	5R1 3 Watt W.W.

All resistors except R56 are Mullard CR25, 0.3 Watt 5%.

Coils

Ref	Value/Type/Part No.
CH1	D5116 Eddystone
CH2	D5116 Eddystone
CH3	3.3mH Sigma SC60

Transistors

Ref	Type
TR1	BC214KB)
TR2	BC214KB)
TR3	BC214KB)
TR4	BC214KB) TEXAS
TR5	BC214KB)
TR6	BC214KB)
TR7	BC214KB)
TR8	BC214KB)

Diodes

Ref	Type
D1	BAX13 Mullard

Displays

Ref	Type	
DS1	5082-7663	Hewlett-Packard
DS2	5082-7663	Hewlett-Packard
DS3	5082-7663	Hewlett-Packard
DS4	5082-7663	Hewlett-Packard
DS5	5082-7663	Hewlett-Packard
DS6	5082-7663	Hewlett-Packard

Integrated Circuits

Ref	Type	
IC 1	SN75107N-00	Texas
IC 2	SN74LS10N-00	Texas
IC 3	SN74LS192N-00	Texas
IC 4	SN74LS192N-00	Texas
IC 5	SN74LS192N-00	Texas
IC 6	SN74LS192N-00	Texas
IC 7	SN74LS192N-00	Texas
IC 8	SN74LS192N-00	Texas
IC 9	SN74LS192N-00	Texas
IC10	MC14508BCP	Motorola
IC11	MC14508BCP	Motorola
IC12	MC14508BCP	Motorola
IC13	MC14511BCP	Motorola
IC14	MC14518BCP	Motorola

Ref	Type	
IC15	MC14518BCP	Motorola
IC16	SN74490N-00	Texas
IC17	MC14049BCP	Motorola
IC18	MC14011BCP	Motorola
IC19	MC14017BCP	Motorola
IC20	MC14049BCP	Motorola
IC21	MC14049BCP	Motorola
IC22	MC14002BCP	Motorola
IC23	MCT2	Monsanto
IC24	MC14011BCP	Motorola
IC25	MC14528BCP	Motorola
IC26	MC7805CT	Motorola
IC27	MC79L05CP	Motorola

MOS Device. See appendix for handling instructions.

Miscellaneous

Ref	Description	Part No.
XL1	1MHz Crystal	9605P
	Crystal Oven	8647P
SKA	10 way connector top entry	9863P
SKB	10 way connector top entry	9863P
SKC	10 way connector side entry	9865P
PLC	10 way free connector (mating for above)	9866P
	Printed Circuit Board (Display)	9584P
	Printed Circuit Board Assembled (Display)	LP3506/27
	Printed Circuit Board (Input, Counter and latch)	9593PA
	Printed Circuit Board Assembled (Input, counter and latch)	LP3506/29

Miscellaneous continued...

Ref	Description	Part No.
	Printed Circuit Board (Control)	9764PB
	Printed Circuit Board Assembled. (Control)	LP3506/28
	Display Module Complete	LP3512

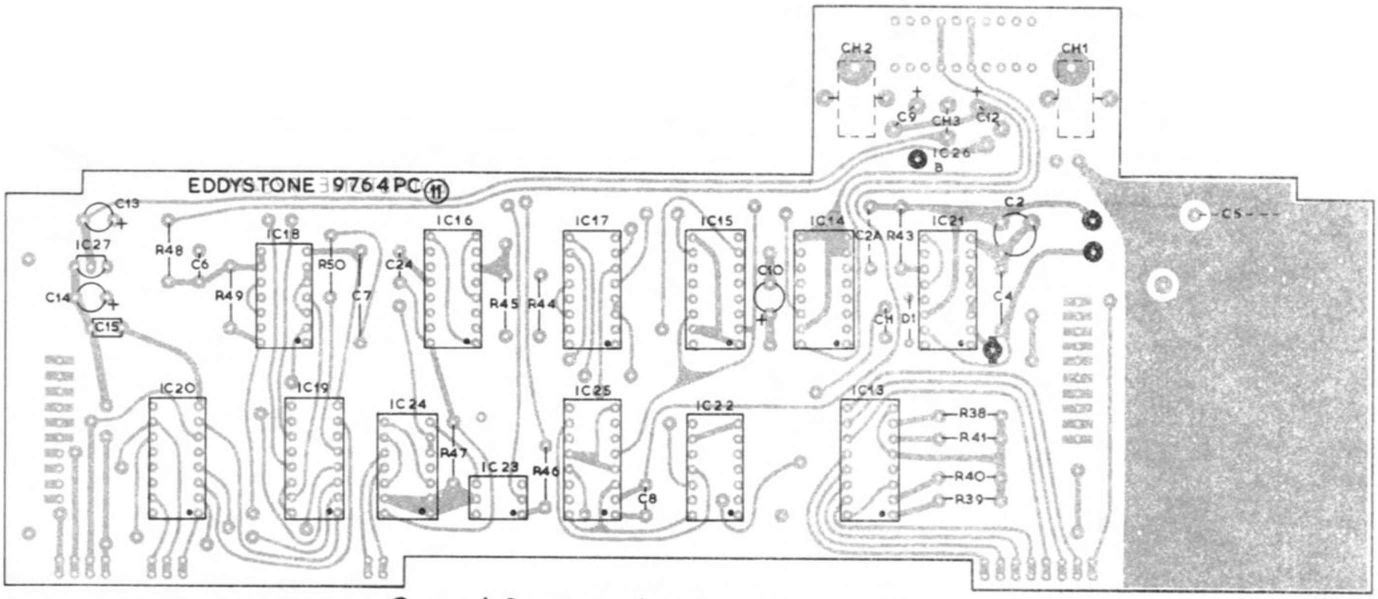
Spares should be ordered by quoting the complete Circuit Reference including the module prefix (where applicable), the description and the part number given in the list. From time to time, components of the type listed may be unavailable and equivalent types may be fitted or supplied as spares. All orders and enquiries should be directed to the address below, quoting the Type and Serial Nos. of the receiver in all communications.

EDDYSTONE RADIO LIMITED,
SALES AND SERVICE DEPT.,
ALVECHURCH ROAD,
BIRMINGHAM B31 3PP.
ENGLAND.

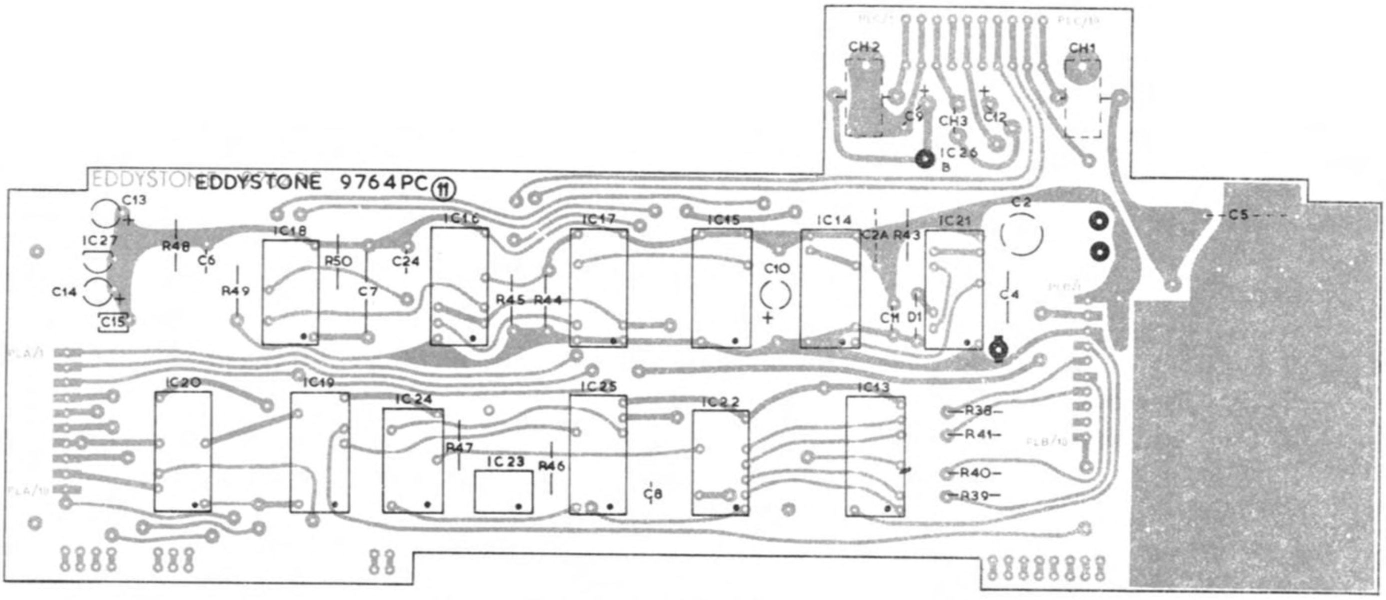
TELEPHONE : 021-475-2231
TELEX: 337081
CABLES: EDDYSTONE BIRMINGHAM

4.11.9. Printed Circuit Boards.

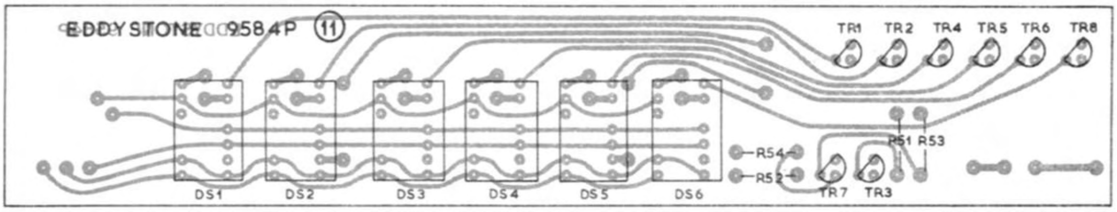
The printed circuit boards are shown viewed from the legend side, and are slightly less than actual size. Each board is shown firstly with legend and rear copper track superimposed and secondly with legend and front copper track superimposed.



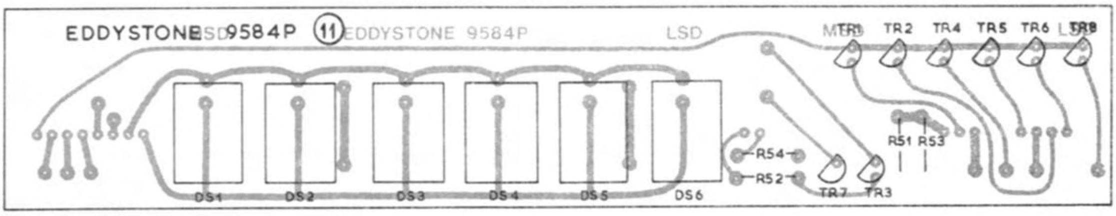
Control Section, showing rear copper track



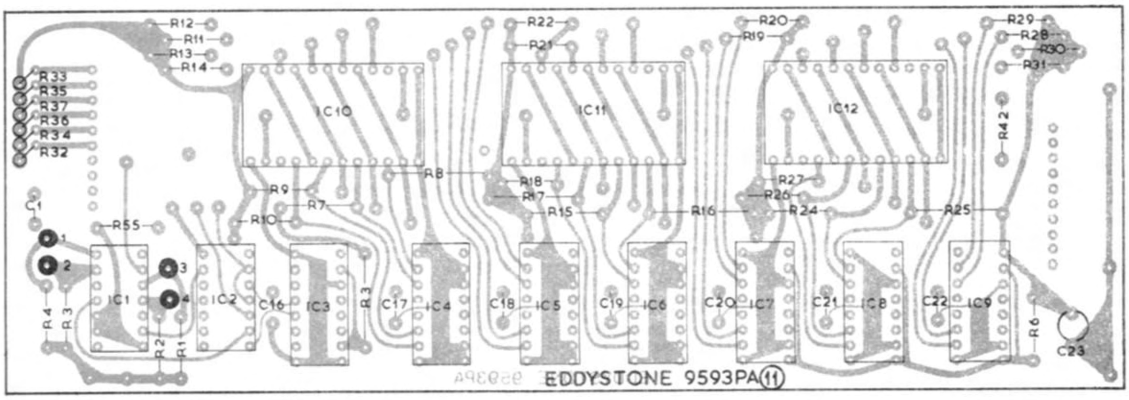
Control Section, showing front copper track



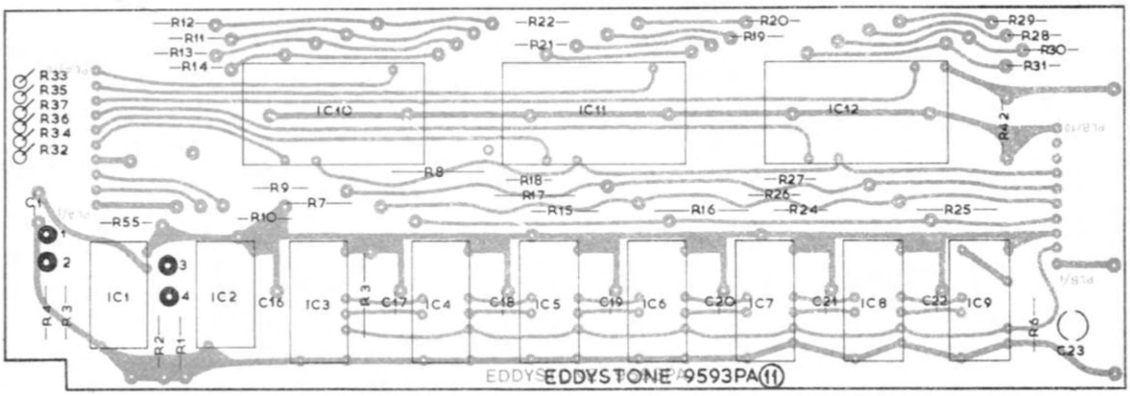
Display Section, showing rear copper track



Display Section, showing front copper track



Input, Counter and Latch Section, showing rear copper track



Input, Counter and Latch Section, showing front copper track

4:12 Correction Module

4.12.1. Introduction

This module contains the digital section of the drift correcting system, the interface circuitry between the oscillators and the digital circuitry (including that for the display module, no. 11) and two prescalers to drive the display module. The operation of the drift correction system (DCS) uses the following sequence of events. The manual tuning controls set the required oscillator frequencies which are then digitally counted, summed and stored. This stored value is compared with successive counts of the oscillator frequencies, any drift in these producing a difference or error count. The error is converted into a proportional analogue voltage which is used to correct the frequency of the oscillator(s) to the original memorised point. The DCS can therefore be considered as a sampling negative feedback loop.

4.12.2. Circuit Description

The frequency of the signal as it appears in the 2nd IF module equals $f_1 - f_2 - f_t$, where f_1 is the frequency of the first oscillator (2TR4 in the coilbox), f_2 is the frequency of the second oscillator (3TR3, in the tunable 1st IF) and f_t is the tuned frequency. Stability of the IF is maintained by measuring the initial value of $f_1 - f_2$, then reducing any error in succeeding counts by changing f_2 only. A total correction range of approximately $\pm$10kHz is possible, the maximum drift measurable between any two successive counts is however limited to $\pm$128Hz. The correction voltage, which is applied to the 1st IF tuned signal circuits as well as the 2nd oscillator to maintain tracking, is supplied via an integrator in the Tunable 1st IF (module no. 3).

The circuitry details can be conveniently described in three parts. These are the interface, the control and the counter/memory circuits.

(a) Interface

The 1st oscillator signal f_1 from the coilbox is fed into an ECL line receiver connected as a Schmitt trigger with 200mV hysteresis (IC 3b). Another line receiver (IC 3a) is used to invert this signal which is then fed to an ECL to TTL level translator (IC 4a). The TTL level output of this drives a Shottky divide by two (IC 2a) which provides an output of half f_1 to drive the display module (Ref. 4:11).

The 2nd oscillator signal f_2 from the tunable 1st IF module is fed into a line receiver (IC 1). The output at TTL level is fed into the gating circuit for the counter/memory section, also it is used to drive a Shottky divide by two (IC 2b) acting as a prescaler for the display unit.

The outputs of IC 2a and IC 2b to the display module are tapped down to give balanced 50Ω outputs carrying a square wave of 100mV peak-to-peak.

(b) Control

The control section generates the sequence of pulses required to initiate each event occuring during the oscillator stabilization cycle.

The sequence of pulses is synchronised with a 1MHz signal from the oscillator in the display module (Section 4:11). This is first divided by ten in IC 15a. The 100kHz output of this is fed to gating in the counter/memory section of the module (IC 5) and also to a low-pass filter (CH 1, C8, C9, C10) where a 100kHz sinewave is reconstituted to drive the product detector (Module no. 6). The level of the 100kHz sinewave is about 400mV RMS. The 100kHz pulse output of IC 15a is then divided by ten a further three times (IC 15b, IC 16a, IC 16b) to give a 100Hz pulse train from which the control pulses are derived. A gating pulse for the counter section of the module, of length equal to 99 pulses i.e. 0.99 sec, is also generated from this pulse train.

Two basic modes of operation are possible, 'TUNE' or 'LOCK'. In 'TUNE' the receiver's oscillators are set manually as required and no correction for any subsequent drift takes place. In 'LOCK' the correction loop is activated and initially counts the set frequency of the oscillators and then continues by measuring any drift from this point and providing a suitable correction voltage. The 'LOCK' switch controls the correction circuitry via a R-S bistable (two cross coupled NAND gates IC 22a and IC 22b) and a divide by two (IC 23). A pulse is provided from IC 22a/b each time the mode is changed from 'TUNE' to 'LOCK' or vice-versa by depression of the push-button. The divide by two output, line 'F', is thus "O" in the 'TUNE' mode and '1' in the 'LOCK' mode. In the 'LOCK' mode the associated LED indicator is switched on by TR1 which is controlled from line 'F'. Relay 'A' in the tunable 1st IF (Module no. 3) is also activated by TR1 and open circuits the integrator capacitor. In the 'TUNE' mode the "O" on 'F' holds various counters and latches at clear. The residual latch IC 13 is held at clear via an R-S bistable (two cross coupled NAND gates IC 22c/d) which ensures that the output of the D/A converter (IC 14) is zero. The J-K bistable IC 18 is held clear by 'F' and the $\overline{Q}$ output of this holds the dual decade divider IC 17 clear. The "O" on 'F' also holds clear the main counters in the module (IC 11 and IC 12). Shift register IC 20 provides the sequence of pulses required for 'LOCK' mode operation. The 0.99 sec pulse used to gate the main counters in the module is generated by counting 99 of the basic 100Hz pulses in the dual decade divider IC 17. Gates IC 19a and IC 19c with the J-K bistable IC 18 act as control elements for this part of the circuit. When switched on in the 'TUNE' mode, the shift register may contain a spurious pattern of ones and zeros. Since the output of the NAND gate IC 21 is at "1" (input from 'F' is at "O"), the data input to the register is fixed at "1". Therefore after at most six clock pulses, all the register outputs will also be "1".

'LOCK' mode can now be selected and again two modes of operation must be considered. During the first cycle of operations the set frequencies are counted in IC11, 12, 6 and the results stored in the memory latches IC 9 and IC 10. In each following (correction) cycle the complement of the stored frequency is loaded back into IC 11 and 12 which are again used to count the frequencies (with IC 6). As explained in the next section the remainder in IC 11 and 12 is the error which is equivalent to any drift in the frequencies. This is now transferred to the residual latch IC 13. The basic difference therefore between the initial memorising mode and the following correction modes is that in the former the data from the counter is transferred to the memory latch and in the latter it is transferred to the residual latch. The latch enabled is determined by the state of the output of the R-S bistable IC 22c/d. When 'LOCK' is selected, 'F' goes to '1' and therefore the output of NAND gate IC 21 goes to "O". The next clock pulse to IC 20 therefore shifts a "O" into the first stage of the register, output line 'A'. Line A is used to clear the J-K bistable IC 8 and via an inverter (IC 7a) to clear the dual binary counter IC 6. The period Line A is "O" provides a 10mS delay to prevent a race hazard between the removal of the clear from IC 18 (as the switch is operated) and the pulse at its' $\overline{J}$ input provided by the second output from the register. After this delay, the $\overline{J}$ input to IC 18 thus becomes "O" (J is "1") and since the K input is also "O" the next clock pulse makes $\overline{Q}$ go to "O". This inhibits, via gate IC 19a, any further clock pulses to the register and instead directs them, via gate IC 19c, to the dual decade counter IC 17. After 99 pulses are counted in IC 17, the two outputs of IC 17 are simultaneously "1". Now, both J and K inputs to IC 18 are "1" and the next clock pulse causes it to change stage, thus $\overline{Q}$ goes back to "1". Clock pulses are now fed to the register via IC 19a and isolated from IC 17 by IC 19c. The Q output of IC 18 has thus been "1" for 0.99 sec and this is used (line 'B') to gate the oscillator input to the counter IC 17. The next clock pulse shifts the "O" in the register to the third position, line 'C'. This enables 100kHz pulses from IC 15a to be fed into the dual binary counter IC 6 and the counters IC 11/12 via gates IC5. IC 7b inverts the "O" on line 'C' for this purpose. The reason for this particular part of the sequence is explained in detail in the next section. The fourth register output, line 'D', goes to "O" on the next clock pulse. This, via IC 7c, enables the memory latch IC 9/10 to be loaded with the count in IC 11/12. Note that the residual latch IC 13 is not completely enabled as it is still being held at clear by the output of IC 22c which is still at "O". The following clock pulse shifts the "O" to the fifth stage of the register which is solely used as a 10mS delay before the final output on line 'E'. This reloads the counter IC 11/12 with the complement of the data transferred to it, from the latch, by pulse 'D' (hence the need for a delay between the two pulses). The R-S bistable (IC 22c/d) output is also changed to "1" by this pulse, so that on following cycles the residual latch rather than the memory latch is enabled by pulse 'D'. The next clock pulse clears the "O" from the register and thus all the inputs to the NAND gate IC 21 become "1" and its' output "O". Hence the data input of the register also becomes "O" which is propagated through the register, as before, by the next six clock pulses. Note that a single "O" is propagated because as soon as the first stage becomes "O", the output of IC 21, and thus the data input of the register, goes to "1" where it remains until the "O" is completely cleared from the register.

In the correction cycles which follow the initial memorising cycle, the sequence of operations is the same except for the pulses on lines 'D' and 'E'. Line 'D', as already noted, transfers the data from the counter into the residual latch instead of the memory latch as in the memorising cycle. It does this because the first 'E' pulse in that cycle forces the output of IC 22c to "1" (line 'G'). This puts a "O" via IC 7c, on the enable lines of the memory latch (IC 9/10), which disables it. It also removes the clear input, a "O" to the residual latch so that it can be enabled by pulses on line 'D'. Pulses on line 'E', in the correction mode, are only used to load the counter with the complement of the data in the memory latch. The output of the R-S bistable, IC 22c/d, will remain "1" until 'TUNE' mode is again selected.

(c) Counter/memory

This section is used to measure $f_1 - f_2$, store the initial required value, and provide an analogue output proportional to subsequent changes in that value. $F_1 - f_2$ is measured as follows. F_1 and f_2 are counted for 0.99 sec in counters IC 11/12 and IC 6 respectively. A series of 100kHz pulses are then fed into both counters until IC 6 is detected full by the J-K bistable IC 8. The number of pulses required is $256 - f_2'$, (f_2' is the difference between f_2 and the nearest lowest multiple of 256, i.e. counters have counted through several times, similarly for f_1'). The total count in IC 11/12 is therefore $f_1' + (256 - f_2')$, so $f_1 - f_2$ measurements are relative rather than absolute and the maximum error that can be accommodated in any one count period is limited by the counter capacity i.e. drifts equivalent to multiples of 256 per period produce the same error count and therefore for an unambiguous output from the counters, drift rate must be limited to 256Hz per period. However, because the most significant bit of the counter is used to indicate to the D/A converter whether the drift is positive or negative, the maximum drift rate that the system can cope with is limited to 128Hz per period. The count in IC 11/12 is $f_1' - f_2' + 256$ which equals $f_1' - f_2'$. The initial value of $f_1' - f_2'$ is stored in the memory latch. The complement of this is loaded back into IC 11/12 prior to each following correction cycle. This means that any residual count in IC 11/12 after further $f_1' - f_2'$ measurements is equivalent to any change in the value of $f_1 - f_2$. The residue is transferred to the residual latch and converted into an equivalent correction voltage for the second oscillator f_2 (TR 3 in tunable 1st IF, module no. 3). The D/A converter, IC 14, is set to give mid-range output for zero residual error so that positive and negative corrections are possible. Quiescent 'output' current produced by bias current in the integrator etc. is balanced out using a preset control. The D/A converter is a multiplying type, and so to offset loop gain variations caused by changes in oscillator gain at different varicap voltage, the reference voltage for the D/A converter is taken from the varicap drive line in the tunable 1st IF via 3TR6.

Inputs to the counters are controlled by the dual AND-OR-INVERT gate IC 5. F_1 and f_2 are gated into the counters from the interface circuitry whilst control line 'B' is "1" (0.99s). 100kHz pulses are gated into the counter when the output of IC 7b goes to "1". This occurs when a "O" appears on control line 'C'. The Q output of IC 8 is "O" since this device has been cleared. Since both inputs to IC 7b are now "O" its' output goes to "1" and gates 100kHz pulses into the counters, via IC 5, until counter IC 6 is full. IC 6 then produces an output which clocks IC 8 causing the Q output of IC 8 to go to "1" which returns the output of IC 7b to "O" thus isolating the 100kHz pulses from the counters.

This period has a maximum length equal to 256 ten microsecond pulses i.e. 2.56 milliseconds, which is much less than ten milliseconds before the pulse on line 'C' returns to "1".

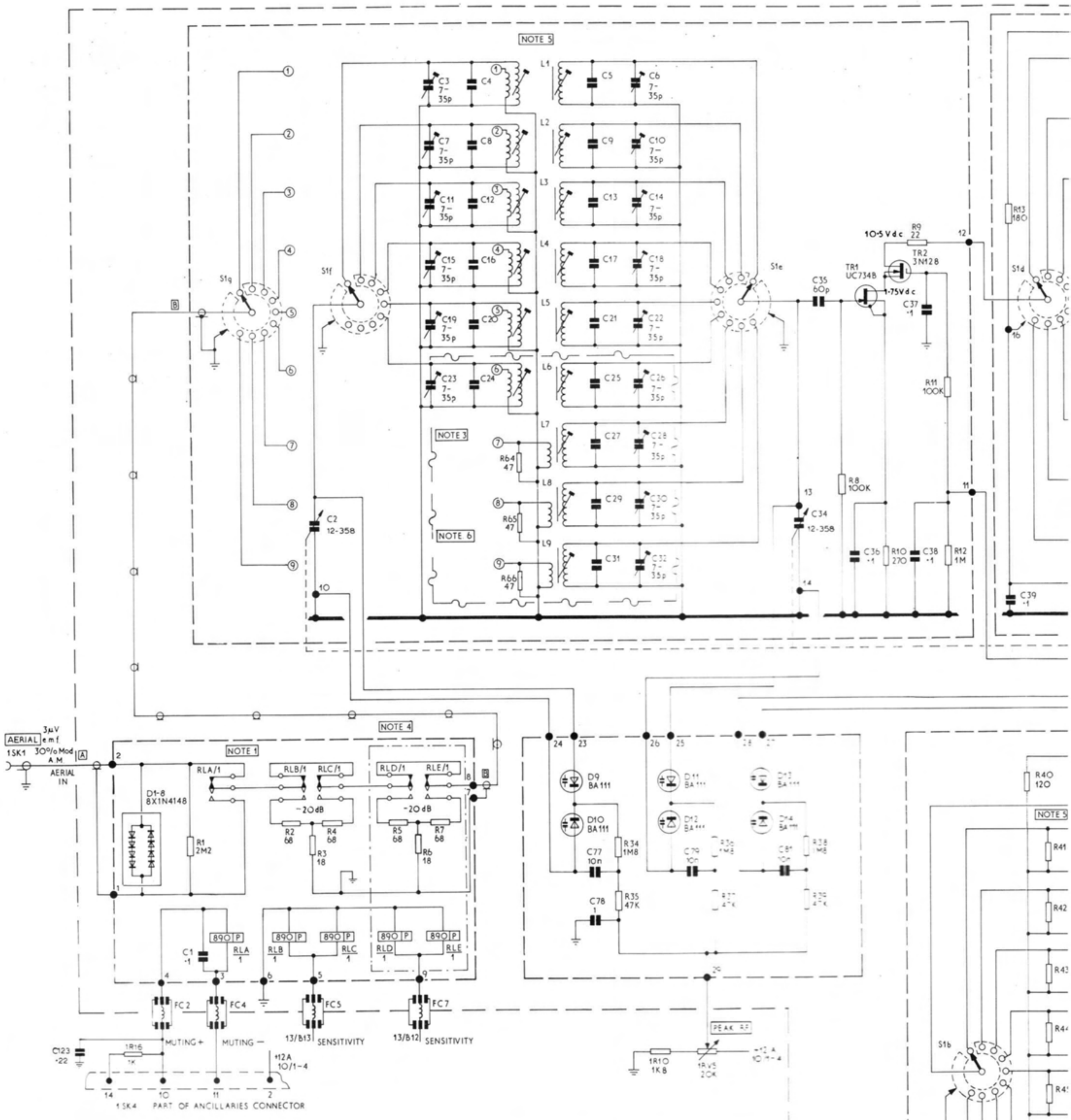
The error count is converted into a proportional analogue voltage by the D/A converter IC 14. The most significant bit is inverted in IC 7d so that a zero error count of 00000000 is converted to 10000000. This is equal to the mid-range input of the converter and thus enables positive or negative errors to be identified and corrected. To offset the output current generated by this particular input (and bias currents generated by the integrator etc), a current of the opposite polarity and of level determined by RV1, is also fed to the integrator. The gain of the loop, which determines dynamic performance, is set by RV2.

4.12.3. Removal

Remove the cover from the right-hand side plate (12 x M2.5 screws) to gain access to the printed board.

4.12.4. Realignment

Realignment should only be attempted by skilled technicians with the appropriate test equipment. A counter capable of reading to 1Hz is required. With the receiver set to Range 5 and in the Tune Mode, short-circuit SKA pin 4 to earth. Connect the counter to board pin 2 (f_2 input) and adjust RV1 for the lowest possible frequency drift. Remove the short-cir-



NOTES: 1. RECEIVER IS MUTED WHEN RLA IS ENERGISED. COAXIAL LEAD TO PINS 1 & 2 REVERSED WHEN RECEIVER IS TO OPERATE WITH RLA ENERGISED.

2. OSCILLATOR PADDING CAPACITORS MAY CONSIST OF TWO OR MORE CAPACITORS IN PARALLEL HAVING DIFFERENT TEMPERATURE COEFFICIENTS SEE COMPONENTS LIST FOR VALUES.

3. COMPONENTS ENCLOSED BY —⌒⌣— NOT FITTED ON VERSIONS WHICH COVER THE FREQUENCY RANGES 1.6 MHz TO 30MHz ONLY LINKS ARE THEN FITTED WHERE SHOWN.

4. COMPONENTS ENCLOSED BY —·— NOT FITTED ON VERSIONS WHICH HAVE ONLY ONE AERIAL ATTENUATOR. LINK FITTED IN PLACE OF RLD AND RLE CONTACTS.

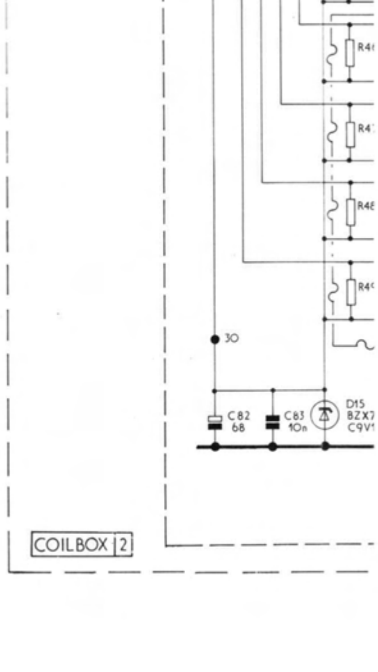
5. FOR VALUES OF PADDING CAPACITORS AND DAMPING RESISTORS SEE COMPONENTS LIST.

6. R64, R65 & R66 FITTED TO MODEL 1837/2 ONLY

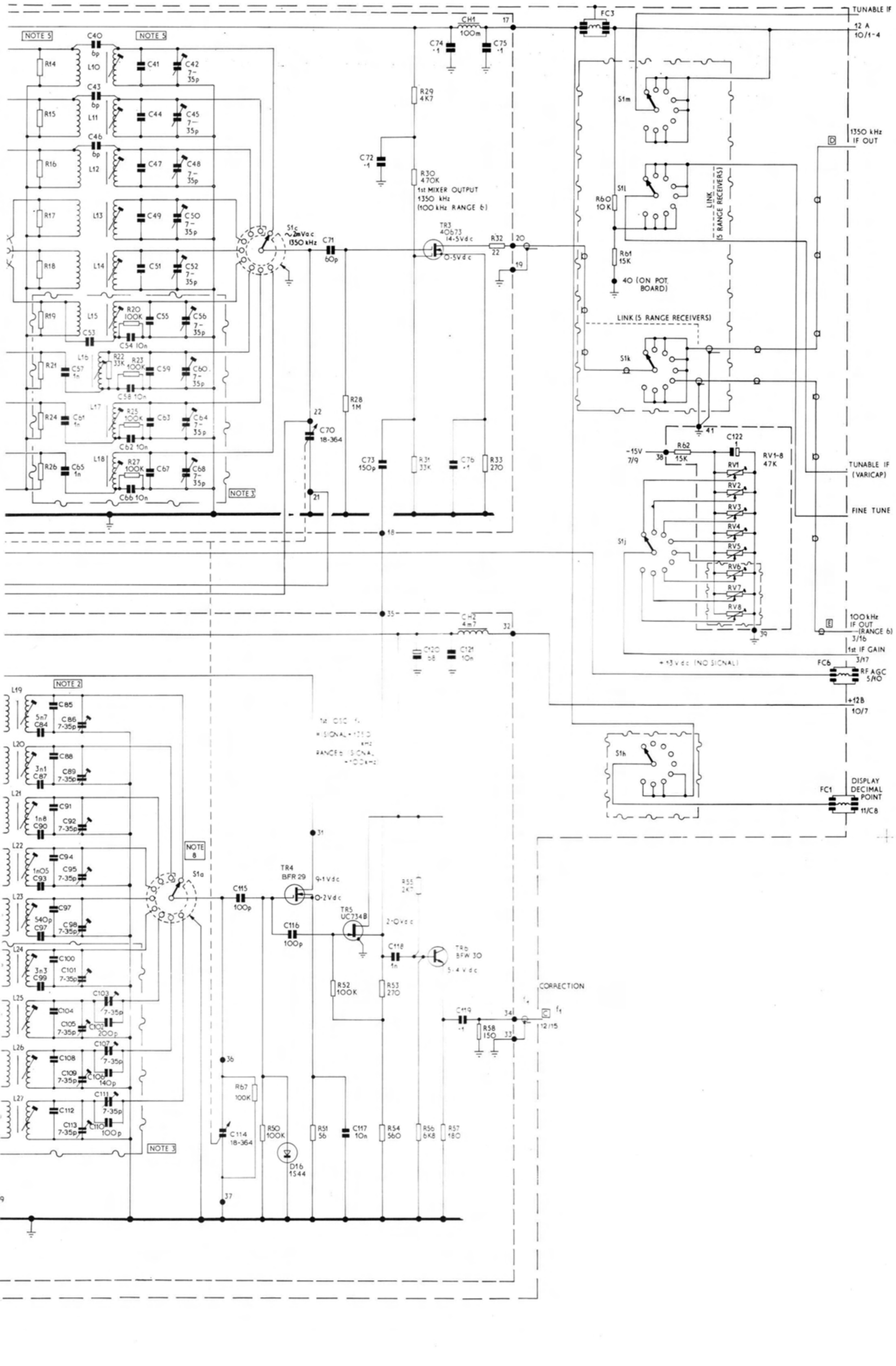
7. RANGE SWITCH S1 SHOWN ON RANGE 1

8. NO SHORTING PLATE CONNECTION ON RANGES 7 & 8.

9. VOLTAGES SHOWN ARE APPROXIMATE ONLY. FOR SPECIFIED PERFORMANCE



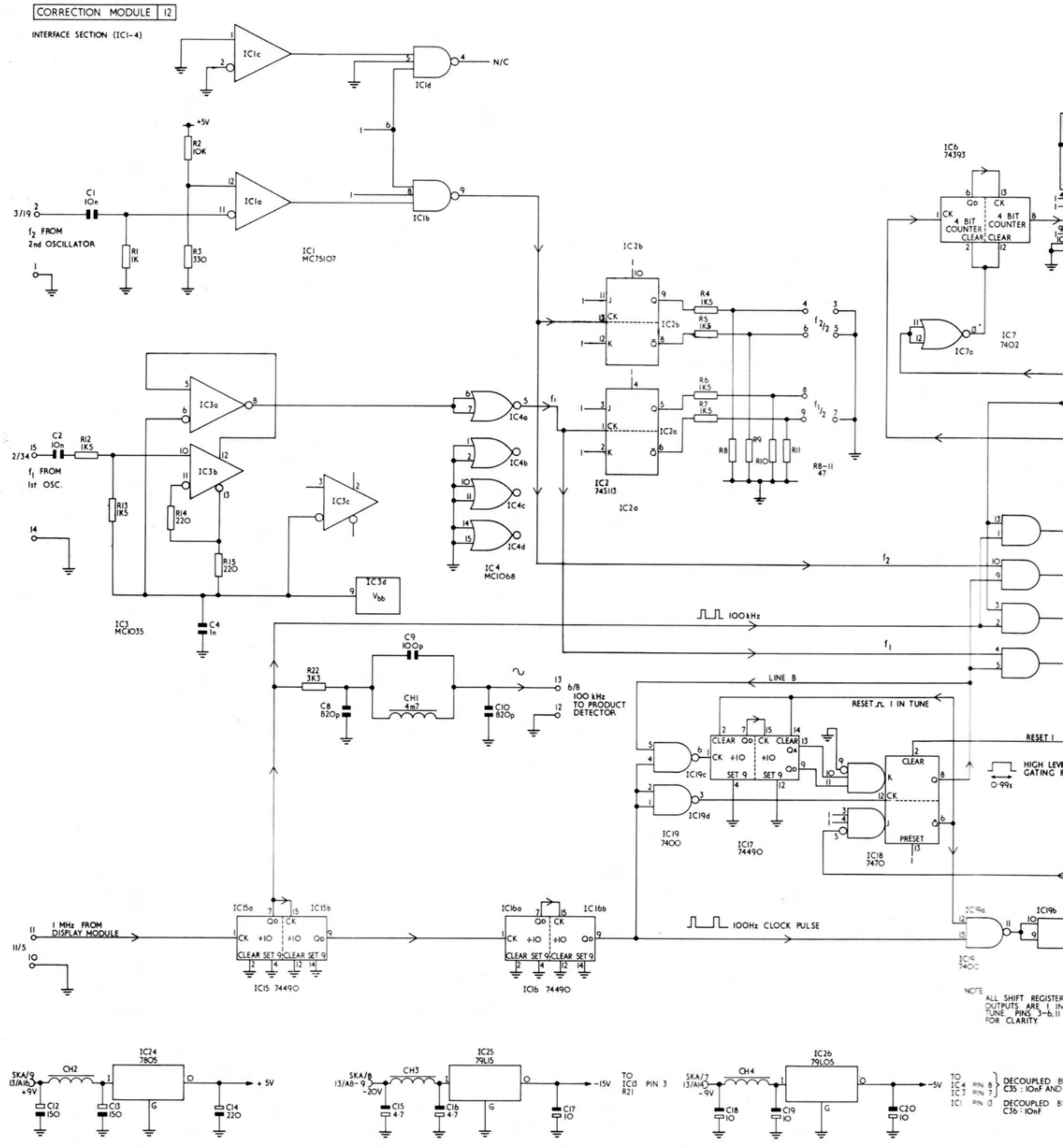
COILBOX 2



TUNABLE IF
12 A
10/1-4
FC3
CH1
100m
C74
·1
C75
·1
NOTE 5
C40
6p
R14
L10
C41
C42
7-35p
C43
6p
R15
L11
C44
C45
7-35p
C46
6p
R16
L12
C47
C48
7-35p
R17
L13
C49
C50
7-35p
R18
L14
C51
C52
7-35p
R19
L15
R20
100K
C55
C56
7-35p
C53
C54 10n
R21
C57
1n
L16
R22
33K
R23
100K
C59
C60
7-35p
C58 10n
R24
C61
1n
L17
R25
100K
C63
C64
7-35p
C62 10n
R26
C65
1n
L18
R27
100K
C67
C68
7-35p
C66 10n
NOTE 3
R29
4K7
C72
·1
R30
470K
1st MIXER OUTPUT
1350 kHz
(100 kHz RANGE 6)
S1c
2mVac
1350 kHz
C71
60p
TR3
40673
14·5Vdc
0·5Vdc
R32
22
20
19
17
C70
18-364
22
21
R28
1M
C73
150p
R31
33K
C76
·1
R33
270
18
35
CH2
4m7
32
C120
68
C121
10n
S1m
1350 kHz
IF OUT
D
LINK
(5 RANGE RECEIVERS)
S1l
R60
10K
R61
15K
40 (ON POT. BOARD)
LINK (5 RANGE RECEIVERS)
S1k
41
-15V
7/9
38
R62
15K
C122
1
RV1-8
47K
RV1
RV2
RV3
RV4
RV5
RV6
RV7
RV8
S1j
39
TUNABLE IF
(VARICAP)
FINE TUNE
100 kHz
IF OUT
(RANGE 6)
3/16
E
1st IF GAIN
3/17
+13Vdc (NO SIGNAL)
FC6
RF AGC
5/10
+12B
10/7
S1h
DISPLAY
DECIMAL
POINT
FC1
11/C8
NOTE 2
L19
C85
5n7
C84
C86
7-35p
L20
C88
3n1
C87
C89
7-35p
L21
C91
1n8
C90
C92
7-35p
L22
C94
1n05
C93
C95
7-35p
NOTE 8
S1a
L23
C97
540p
C98
7-35p
L24
C100
3n3
C99
C101
7-35p
L25
C103
C104
7-35p
C105
7-35p
C102
200p
L26
C107
C108
7-35p
C109
7-35p
C106
140p
L27
C111
C112
7-35p
C113
7-35p
C110
100p
NOTE 3
C115
100p
TR4
BFR 29
9·1Vdc
0·2Vdc
31
C116
100p
TR5
UC734B
2·0Vdc
C118
1n
TR6
BFW 30
R52
100K
R53
270
C119
·1
R58
150
34
33
CORRECTION
C
12/15
36
R67
100K
C114
18-364
R50
100K
D16
1S44
R51
56
C117
10n
R54
560
R56
6K8
R57
180
37

CORRECTION MODULE | 12

INTERFACE SECTION (IC1-4)



5V FEED TO

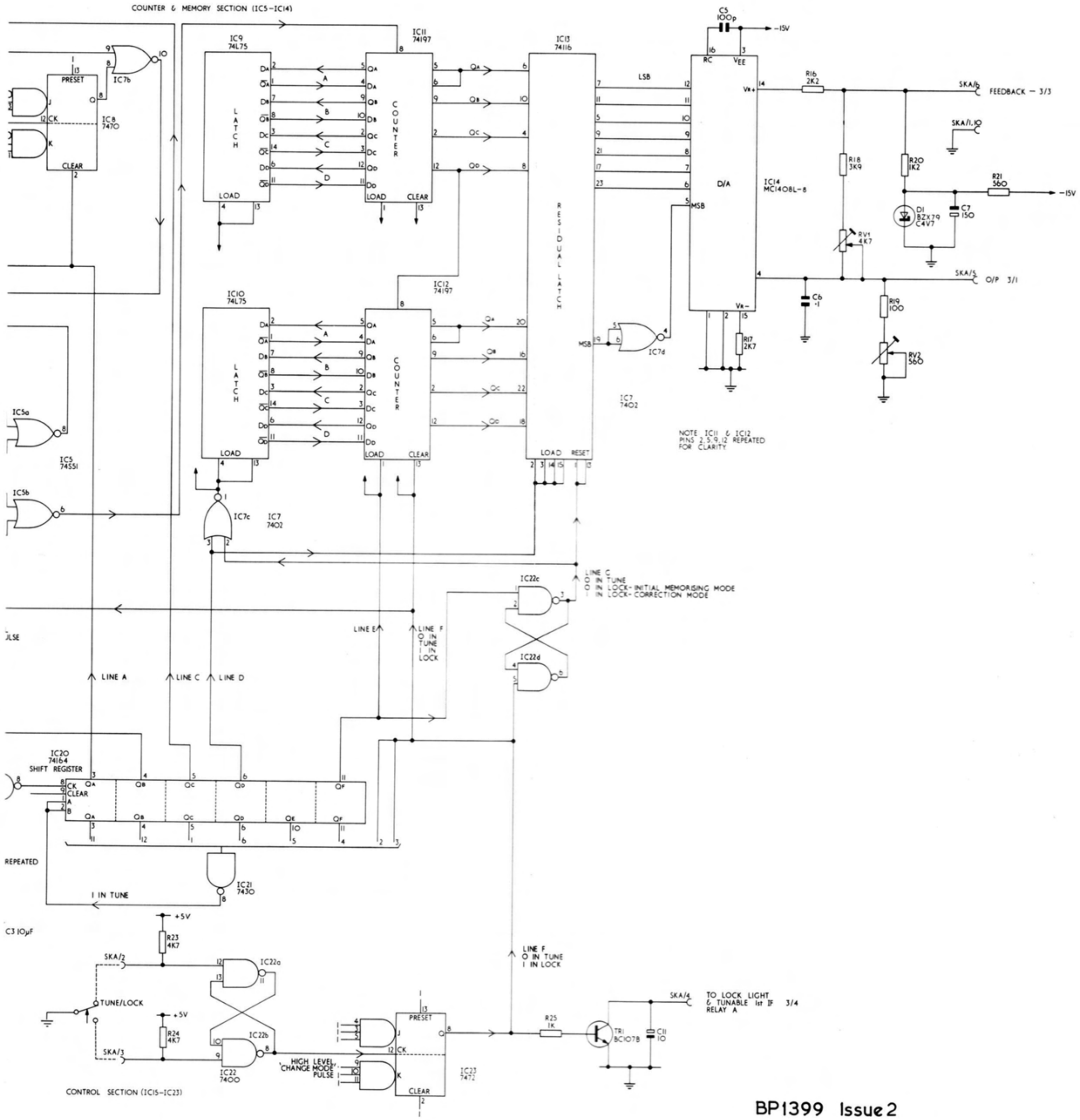
IC	PIN	10nF DECOUPLER	IC	PIN	10nF DECOUPLER
1	14	C21	11	14	C28
2	14	C22	12	14	C29
4	9	C23	13	22	
5	14		14	13	
6	14	C24	15	16	C30
7	14	C37	16	16	C31
8	14	C25	17	16	C32
9	5	C26	18	14	C33
10	5	C27	19	14	
			20	14	C34
			21	14	
			22	14	
			23	14	

THE FOLLOWING PINS ARE EARTHED IN ADDITION TO THOSE SHOWN:

IC2	PIN 7	IC15	PIN 8
3	14	16	8
4	16	17	8
5	7	18	7
6	7	19	7
7	7	20	7
8	7	21	7
9	12	22	7
10	12	23	
11	7		
12	7		
13	12		

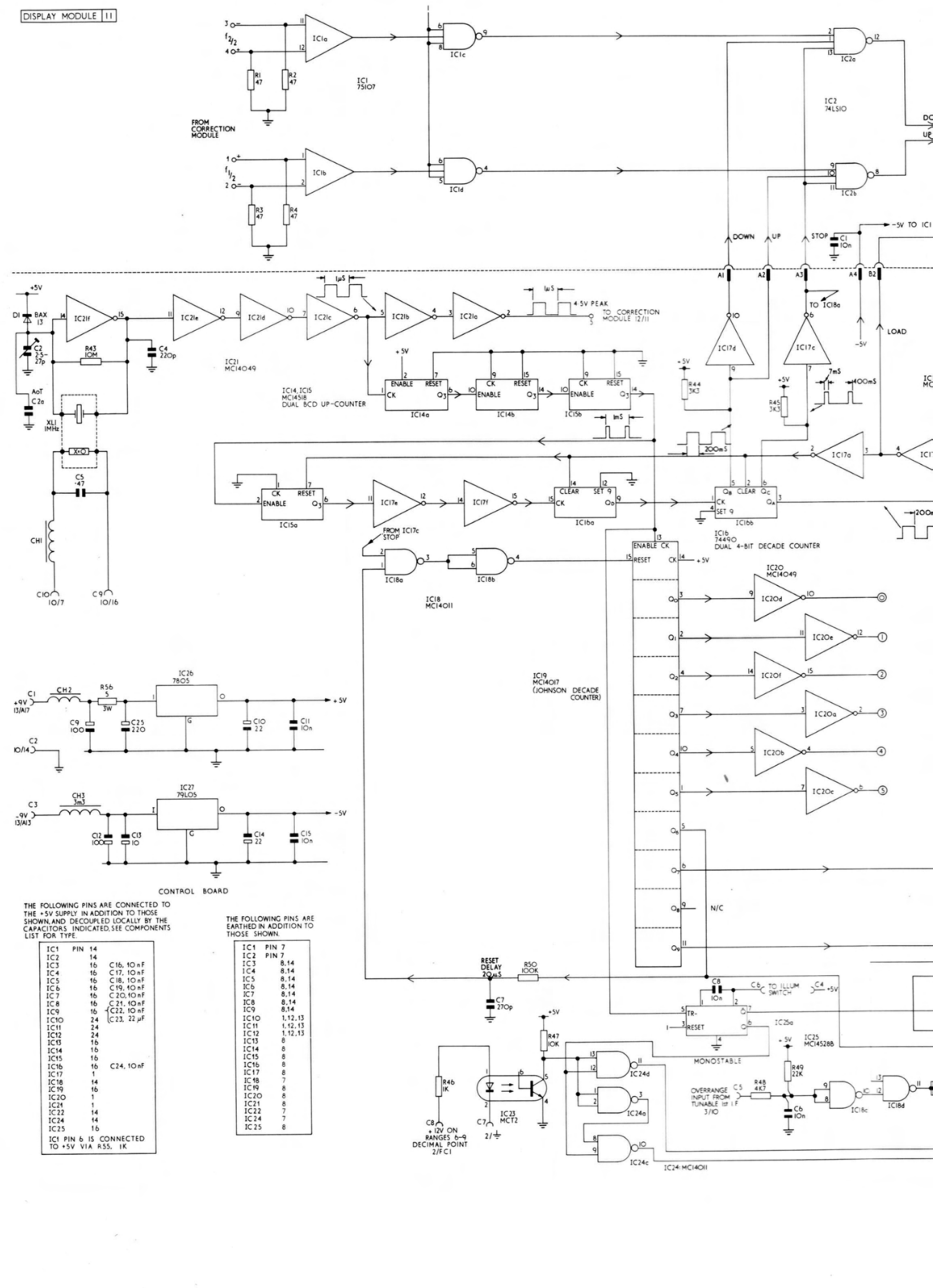
THE FOLLOWING PINS ARE CONNECTED TO LOGICAL '1' BY 1KΩ RESISTORS:

IC1	PINS	6,8	VIA	R26
IC2	PINS	2,3,4,10 11,12	VIA	R27
IC8	PINS	3,4,9,13	VIA	R28
IC18	PINS	3,4,13	VIA	R29
IC23	PINS	2,3,4,5, 9,10,11, 13	VIA	R30



BP1399 Issue 2

DISPLAY MODULE 11



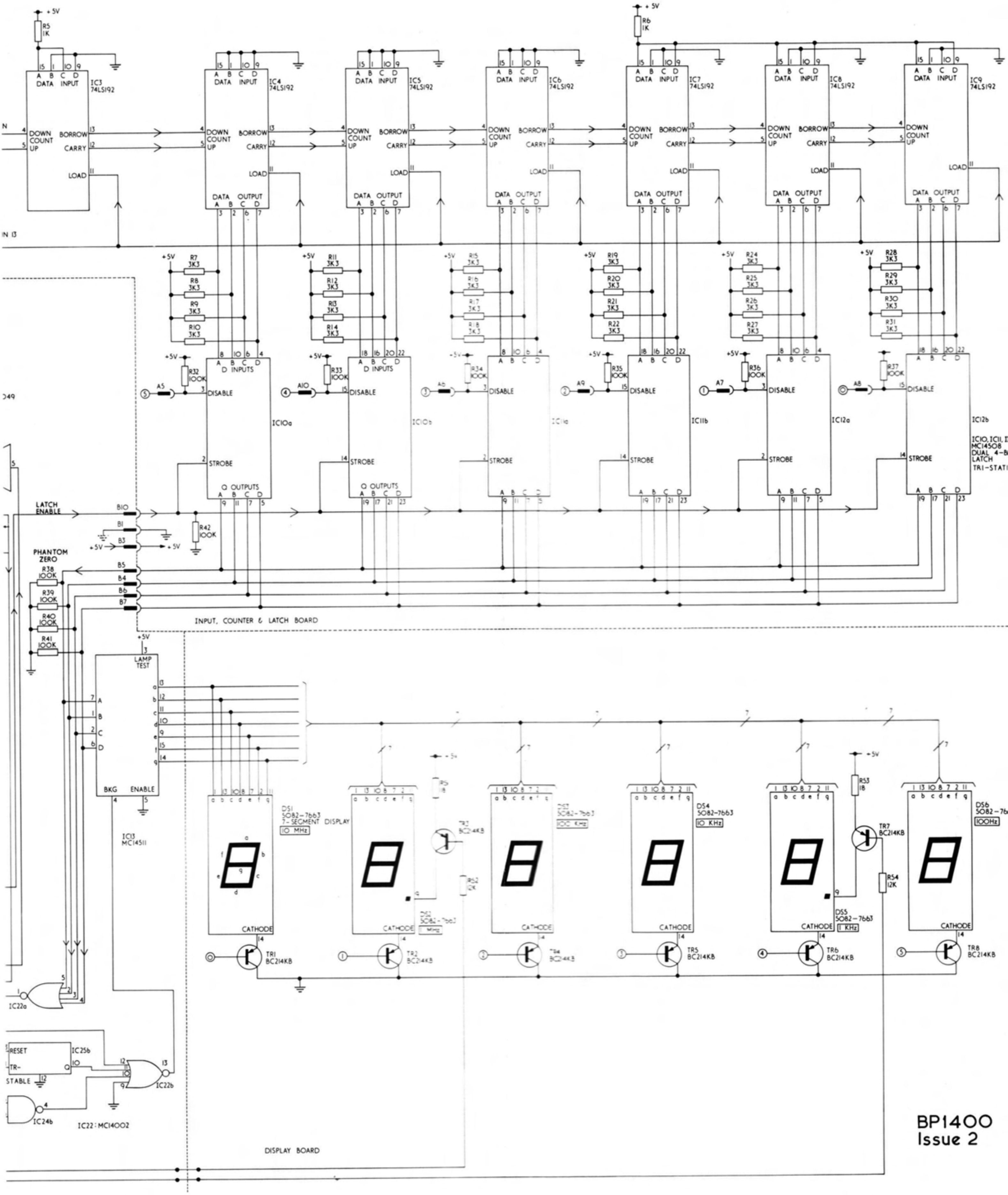
THE FOLLOWING PINS ARE CONNECTED TO THE +5V SUPPLY IN ADDITION TO THOSE SHOWN, AND DECOUPLED LOCALLY BY THE CAPACITORS INDICATED, SEE COMPONENTS LIST FOR TYPE.

IC1	PIN 14	
IC2	14	
IC3	16	C16, 10nF
IC4	16	C17, 10nF
IC5	16	C18, 10nF
IC6	16	C19, 10nF
IC7	16	C20, 10nF
IC8	16	C21, 10nF
IC9	16	C22, 10nF / C23, 22 µF
IC10	24	
IC11	24	
IC12	24	
IC13	16	
IC14	16	
IC15	16	
IC16	16	C24, 10nF
IC17	1	
IC18	14	
IC19	16	
IC20	1	
IC21	1	
IC22	14	
IC24	14	
IC25	16	

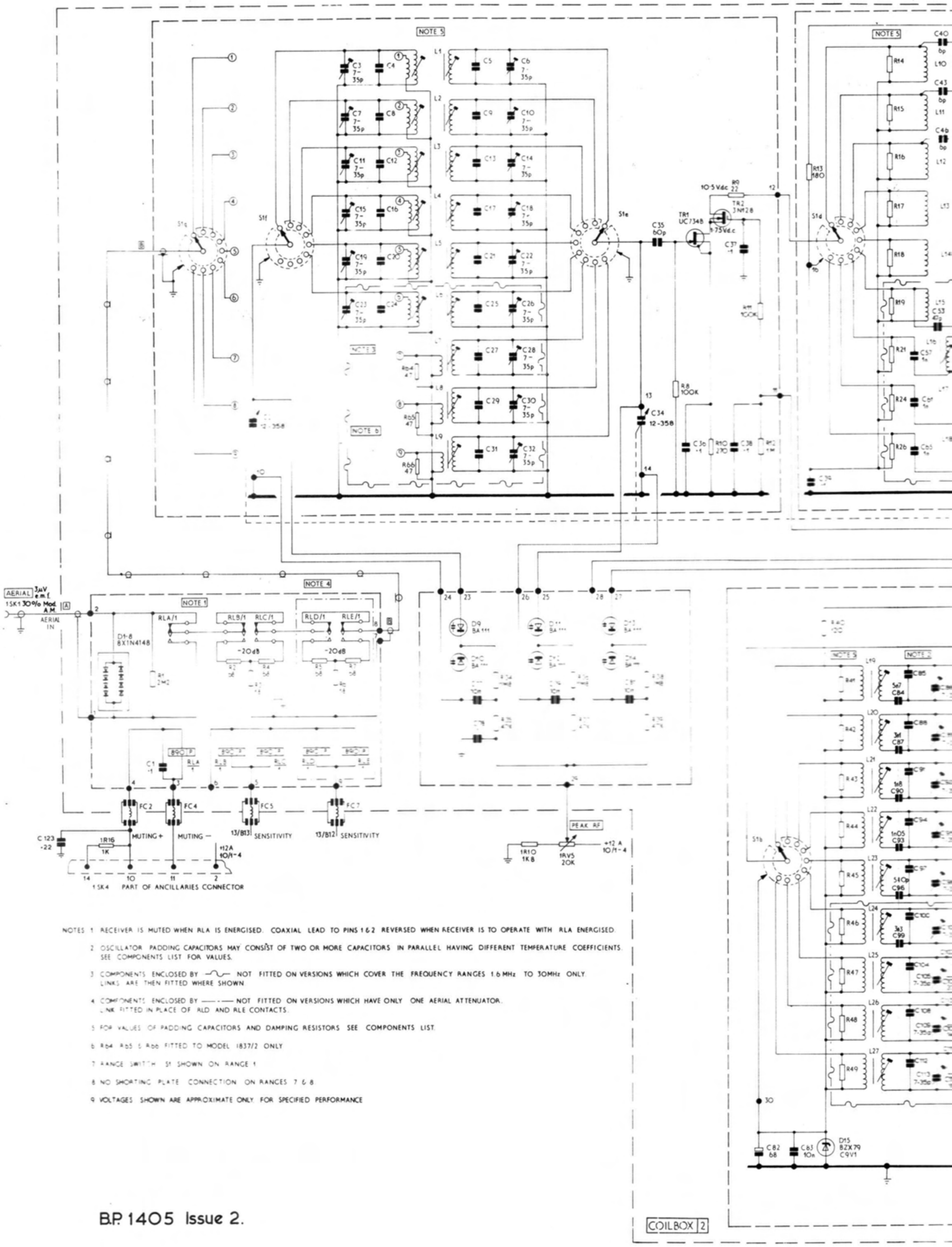
IC1 PIN 6 IS CONNECTED TO +5V VIA R55, 1K

THE FOLLOWING PINS ARE EARTHED IN ADDITION TO THOSE SHOWN.

IC1	PIN 7
IC2	PIN 7
IC3	8,14
IC4	8,14
IC5	8,14
IC6	8,14
IC7	8,14
IC8	8,14
IC9	8,14
IC10	1,12,13
IC11	1,12,13
IC12	1,12,13
IC13	8
IC14	8
IC15	8
IC16	8
IC17	8
IC18	7
IC19	8
IC20	8
IC21	8
IC22	7
IC24	7
IC25	8



BP1400
Issue 2



NOTES 1 RECEIVER IS MUTED WHEN RLA IS ENERGISED. COAXIAL LEAD TO PINS 1 & 2 REVERSED WHEN RECEIVER IS TO OPERATE WITH RLA ENERGISED.

2 OSCILLATOR PADDING CAPACITORS MAY CONSIST OF TWO OR MORE CAPACITORS IN PARALLEL HAVING DIFFERENT TEMPERATURE COEFFICIENTS. SEE COMPONENTS LIST FOR VALUES.

3 COMPONENTS ENCLOSED BY ~ NOT FITTED ON VERSIONS WHICH COVER THE FREQUENCY RANGES 1.6 MHz TO 30MHz ONLY. LINKS ARE THEN FITTED WHERE SHOWN.

4 COMPONENTS ENCLOSED BY —·— NOT FITTED ON VERSIONS WHICH HAVE ONLY ONE AERIAL ATTENUATOR. LINK FITTED IN PLACE OF RLD AND RLE CONTACTS.

5 FOR VALUES OF PADDING CAPACITORS AND DAMPING RESISTORS SEE COMPONENTS LIST.

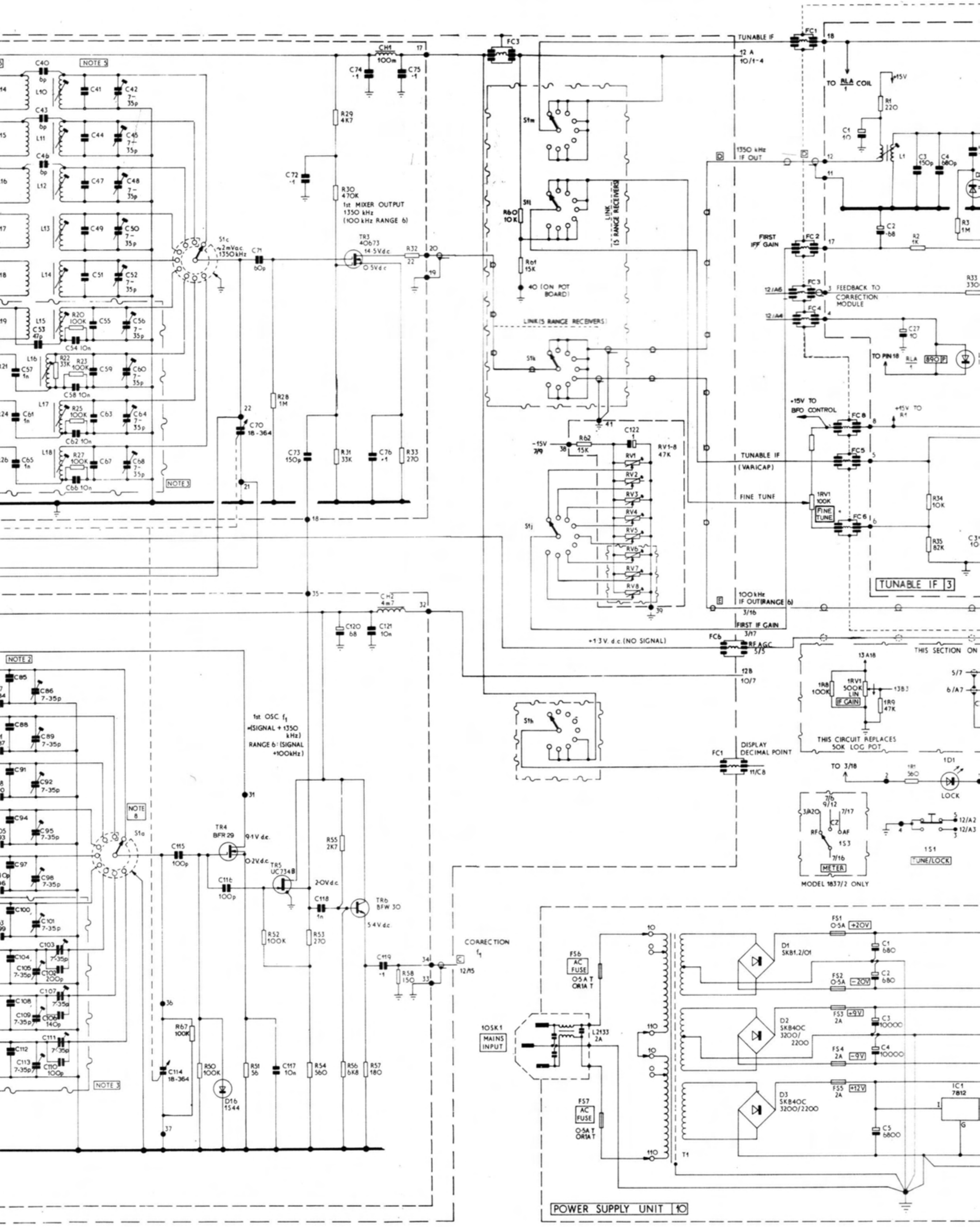
6 R64 R65 & R66 FITTED TO MODEL 1837/2 ONLY

7 RANGE SWITCH S1 SHOWN ON RANGE 1

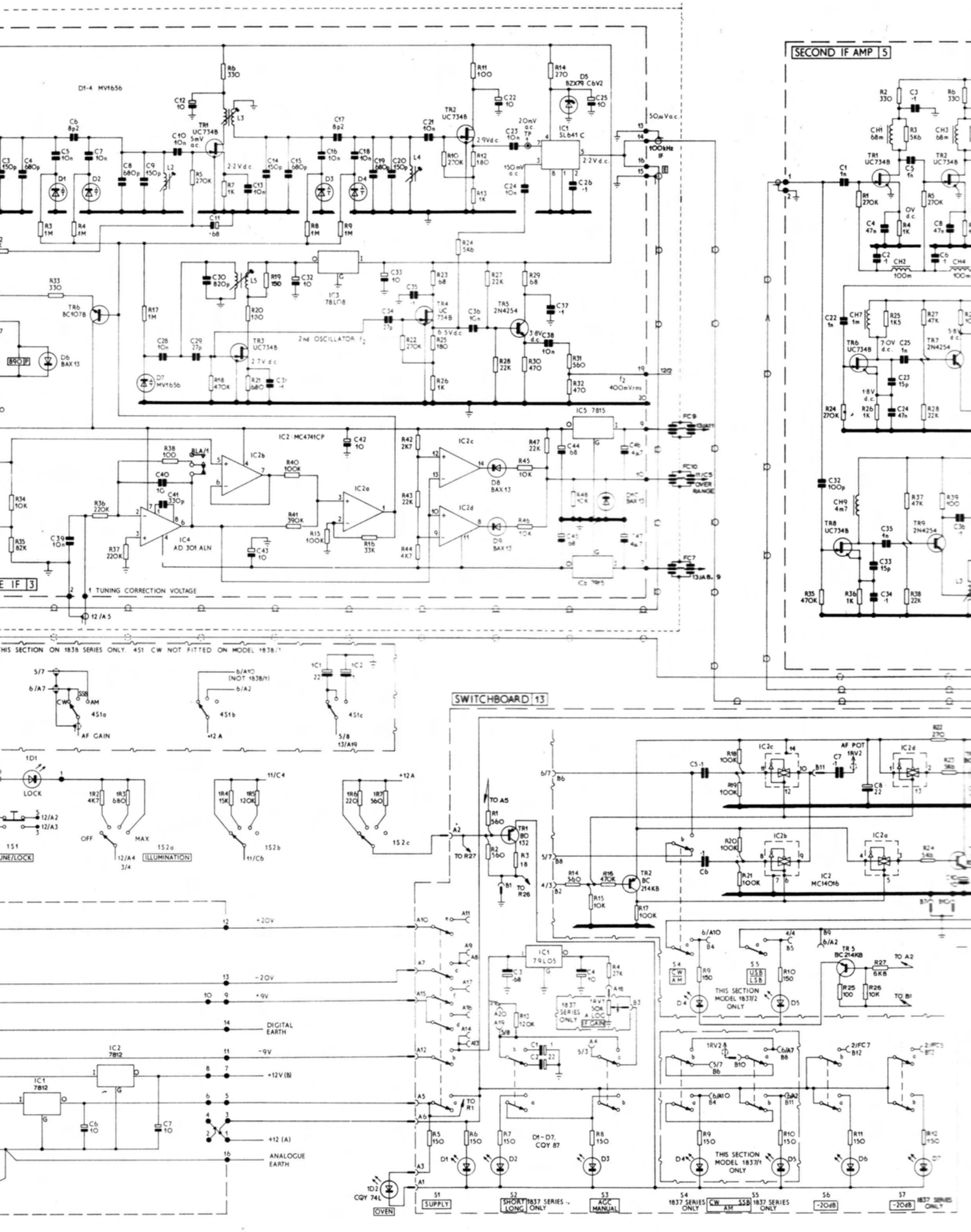
8 NO SHORTING PLATE CONNECTION ON RANGES 7 & 8

9 VOLTAGES SHOWN ARE APPROXIMATE ONLY FOR SPECIFIED PERFORMANCE

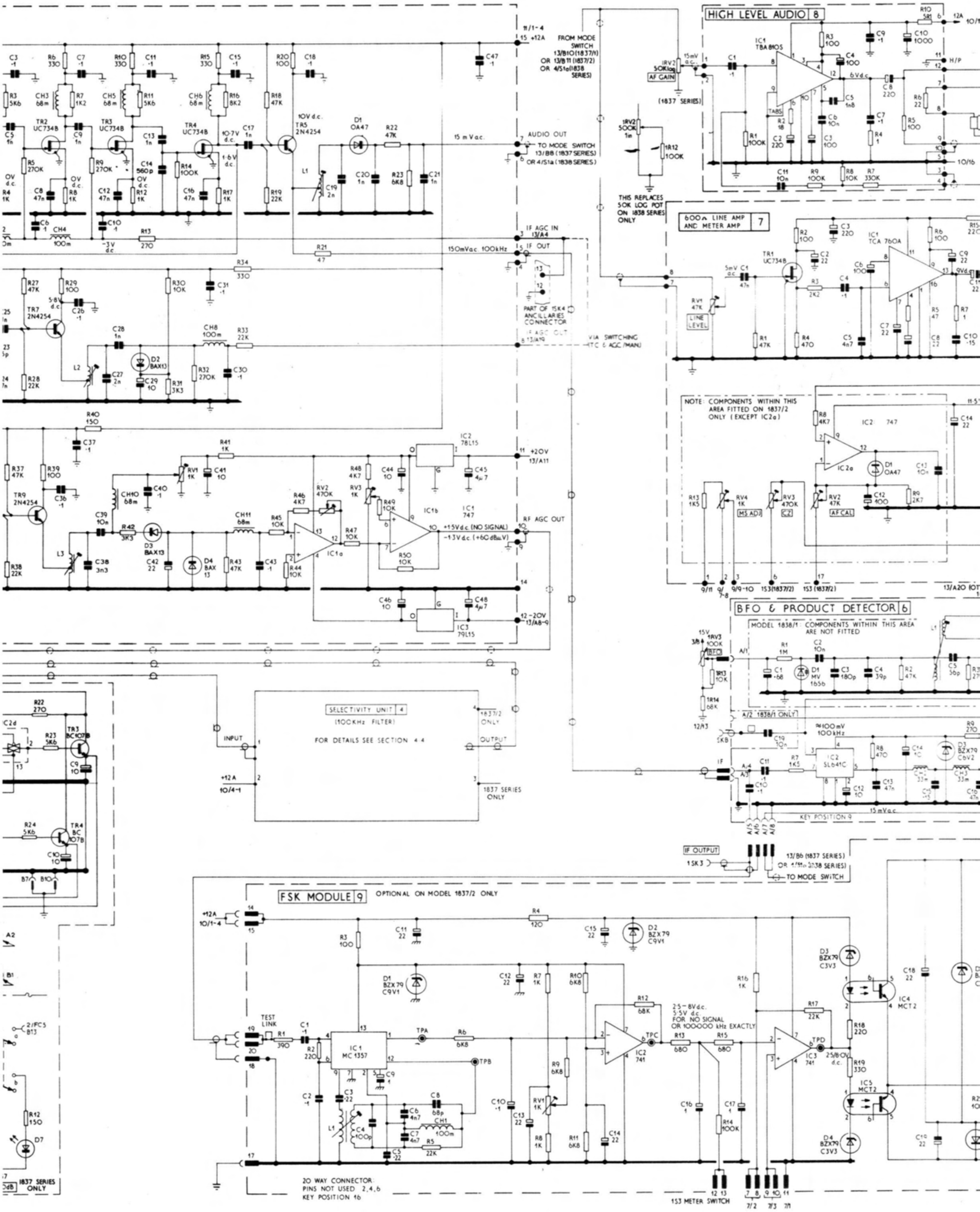
B.P. 1405 Issue 2.



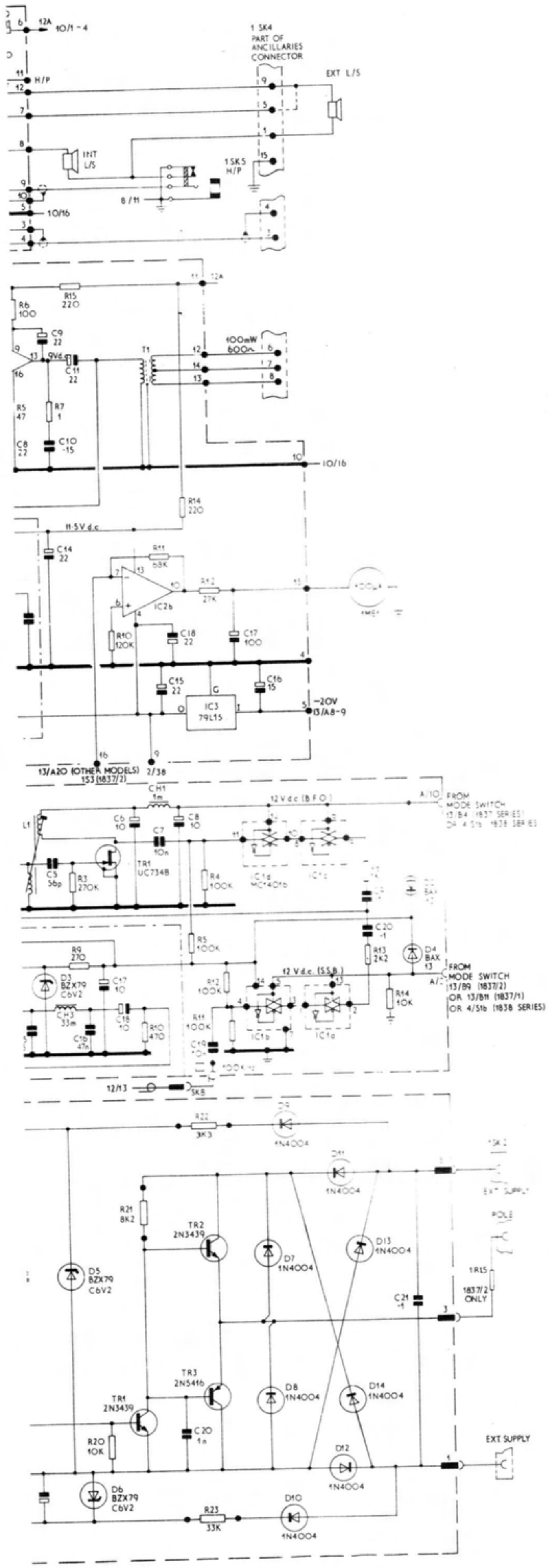
NOTE 5
NOTE 3
NOTE 2
NOTE 8
CH1 100m
C74 ·1
C75 ·1
R29 4K7
C72 ·1
R30 470K
1st. MIXER OUTPUT 1350 kHz (100 kHz RANGE 6)
TR3 40673
14·5Vd.c.
0·5Vd.c.
R32 22
S1c
C71 60p
C70 18-364
R28 1M
C73 150p
R31 33K
C76 ·1
R33 270
FC3
S1m
S1l
R60 10K
R61 15K
40 (ON POT BOARD)
LINK (5 RANGE RECEIVERS)
LINK (5 RANGE RECEIVERS)
S1k
S1j
-15V 7/9
R62 15K
C122 1
RV1-8 47K
TUNABLE IF
12 A 10/1-4
1350 kHz IF OUT
FIRST IFF GAIN
TUNABLE IF (VARICAP)
FINE TUNE
100 kHz IF OUT (RANGE 6) 3/16
FIRST IF GAIN 3/17
+1·3 V. d.c. (NO SIGNAL)
FC6
RF AGC 5/5
12B 10/7
S1h
FC1
DISPLAY DECIMAL POINT 11/C8
FC1
TO RLA COIL
+15V
R1 220
C1 10
L1
C3 150p
C4 680p
C2 ·68
R2 1K
R3 1M
FC2
FC3
FEEDBACK TO CORRECTION MODULE
12/A6
12/A4
FC4
C27 10
TO PIN 18
RLA
B90 F
+15V TO BFO CONTROL
+15V TO R1
FC8
FC5
1RV1 100K FINE TUNE
FC6
R34 10K
R35 82K
TUNABLE IF 3
THIS SECTION ON
13A18
1R8 100K
1RV1 500K LIN IF GAIN
1R9 47K
13B3
THIS CIRCUIT REPLACES 50K LOG POT
TO 3/18
1R1 560
1D1
LOCK
METER
MODEL 1837/2 ONLY
1S3
1S1
TUNE/LOCK
12/A2
12/A3
CH2 4m7
C120 68
C121 10n
1st. OSC. f1 =(SIGNAL + 1350 kHz) RANGE 6: (SIGNAL +100kHz)
TR4 BFR 29
9·1V d.c.
0·2V d.c.
C115 100p
C116 100p
TR5 UC734B
2·0V d.c.
C118 1n
TR6 BFW 30
5·4V d.c.
R55 2K7
R52 100K
R53 270
C119 ·1
R58 150
CORRECTION f1
12/15
R67 100K
C114 18-364
R50 100K
D16 1S44
R51 56
C117 10n
R54 560
R56 6K8
R57 180
S1a
FS6 AC FUSE 0·5A T OR1A T
FS7 AC FUSE 0·5A T OR1A T
1OSK1 MAINS INPUT
L2133 2A
T1
FS1 0·5A +20V
FS2 0·5A -20V
D1 SKB1.2/01
C1 680
C2 680
D2 SKB40C 3200/2200
FS3 2A +9V
FS4 2A -9V
C3 10000
C4 10000
D3 SKB40C 3200/2200
FS5 2A +12V
C5 6800
IC1 7812
POWER SUPPLY UNIT 10



SECOND IF AMP 5
D1-4 MV1656
2nd OSCILLATOR f2
IC1 SL641 C
IC2 MC4741CP
IC4 AD 301 ALN
IC5 7815
IC3 78L08
1 TUNING CORRECTION VOLTAGE
THIS SECTION ON 1838 SERIES ONLY. 4S1 CW NOT FITTED ON MODEL 1838/1
SWITCHBOARD 13
AF GAIN
LOCK
TUNE/LOCK
ILLUMINATION
OFF
MAX
DIGITAL EARTH
ANALOGUE EARTH
THIS SECTION MODEL 1837/2 ONLY
THIS SECTION MODEL 1837/1 ONLY
1837 SERIES ONLY
IF GAIN
D1-D7, CQY 87
CQY 74L
OVEN
SUPPLY
SHORT LONG
AGC MANUAL
CW AM
USB LSB
-20dB
IC2 MC14016
AF POT



HIGH LEVEL AUDIO 8
IC1 TBA 810S
AF GAIN
(1837 SERIES)
FROM MODE SWITCH 13/B10 (1837/1) OR 13/B11 (1837/2) OR 4/S1a (1838 SERIES)
THIS REPLACES 50K LOG POT ON 1838 SERIES ONLY
AUDIO OUT
TO MODE SWITCH 13/B8 (1837 SERIES) OR 4/S1a (1838 SERIES)
IF AGC IN 13/A4
IF OUT
150mVac. 100kHz
15 mVac.
PART OF 1SK4 ANCILLARIES CONNECTOR
VIA SWITCHING RTC & AGC/MAN)
600Ω LINE AMP AND METER AMP 7
IC1 TCA 760A
LINE LEVEL
NOTE: COMPONENTS WITHIN THIS AREA FITTED ON 1837/2 ONLY (EXCEPT IC2a)
IC2 747
MS ADJ
CZ
AF CAL
IC2 78L15
IC3 79L15
+20V 13/A11
-20V 13/A8-9
RF AGC OUT
+1.5Vd.c. (NO SIGNAL)
-1.3Vd.c. (+60dBμV)
IC1 747
BFO & PRODUCT DETECTOR 6
MODEL 1838/1: COMPONENTS WITHIN THIS AREA ARE NOT FITTED
A/2 1838/1 ONLY
IC2 SL641C
KEY POSITION 9
IF OUTPUT
13/B6 (1837 SERIES) OR 4/S1a 1838 SERIES) TO MODE SWITCH
SELECTIVITY UNIT 4
(100KHz FILTER)
FOR DETAILS SEE SECTION 4.4
INPUT
OUTPUT
1837/2 ONLY
1837 SERIES ONLY
+12A 10/4-1
FSK MODULE 9
OPTIONAL ON MODEL 1837/2 ONLY
IC1 MC 1357
TEST LINK
IC2 741
IC3 741
IC4 MCT2
IC5 MCT2
2.5 – 8Vd.c. 5.5V d.c. FOR NO SIGNAL OR 100000 kHz EXACTLY
20 WAY CONNECTOR PINS NOT USED 2,4,6 KEY POSITION 16
1S3 METER SWITCH
1837 SERIES ONLY



12A
10/1 - 4
1 SK4
PART OF
ANCILLARIES
CONNECTOR
EXT L/S
H/P
INT
L/S
1 SK5
H/P
8 / 11
10/16
R15
220
R6
100
C9
22
9Vd.c
C11
22
T1
100mW
600Ω
R5
47
R7
1
C8
22
C10
·15
10/16
R14
220
11·5 V d.c
C14
22
R11
68K
R12
27K
IC2b
C18
22
C17
100
R10
120K
C15
22
C16
15
IC3
79L15
-20V
13/A8-9
13/A2O (OTHER MODELS)
1S3 (1837/2)
2/38
CH1
1m
A/10
12 V d.c (B.F.O.)
FROM
MODE SWITCH
L1
C6
10
C7
10n
C8
10
C5
56p
R3
270K
TR1
UC734B
R4
100K
IC1d
MC14016B
C20
·1
R13
2K2
D4
BAX
13
R9
270
D3
BZX79
C6V2
C17
10
R5
100K
R12
100K
12 V d.c. (S.S.B.)
FROM
MODE SWITCH
13/B9 (1837/2)
OR 13/B11 (1837/1)
OR 4/S1b (1838 SERIES)
R14
10K
CH3
33m
C18
10
R10
470
C16
47n
R11
100K
IC1b
IC1a
12/13
SKB
R22
3K3
1N4004
D11
1N4004
R21
8K2
TR2
2N3439
D7
1N4004
D13
1N4004
POLE
1R15
1837/2
ONLY
D5
BZX79
C6V2
C21
·1
TR3
2N5416
D8
1N4004
D14
1N4004
TR1
2N3439
C20
1n
R20
10K
EXT. SUPPLY
D12
1N4004
D6
BZX79
C6V2
R23
33K
D10
1N4004