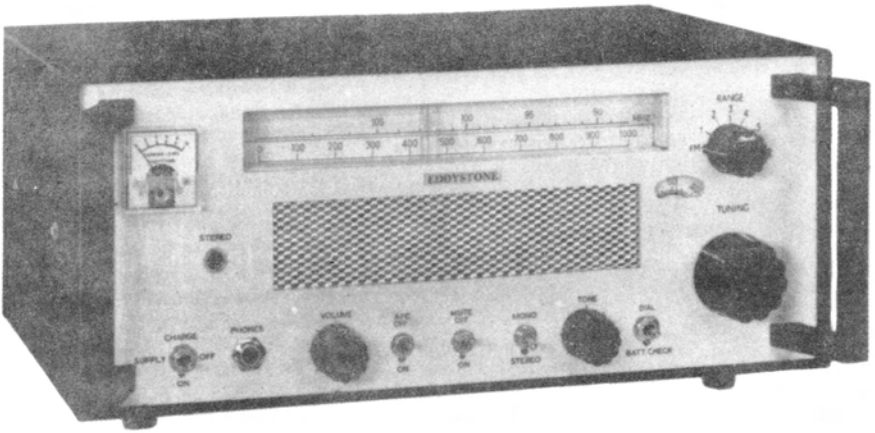
Eddystone
AM/FM BROADCAST RECEIVER
MODEL 1002



150kHz – 350kHz & 550kHz – 30MHz
88MHz – 108MHz

Manufactured in England by

Eddystone Radio Limited

Member of Marconi Communication Systems Limited
Alvechurch Road, Birmingham B31 3PP, England
Telephone: 021-475 2231
Cables: Eddystone Birmingham Telex: 337081

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AMENDMENT RECORD

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The manufacturer reserves the right to modify the contents of this publication to accommodate modifications, design improvements etc. Amendment sheets will be incorporated where applicable at date of issue.

MODEL 1002

AMENDMENT NO.2.

This amendment incorporates Amendment No. 1. issued in June 1974.

There have been a number of changes in the RF, Oscillator and Mixer sections and several components have been changed or added in these sections. There have also been changes on the FM, IF and Decoder Board and an extra capacitor has been added to the IF AGC circuit. An IF rejector circuit (L6 & C6) has been incorporated in the RF Input section on range 5. Model 1002/2 has been added to the range and Appendices E & F are therefore extended.

PERFORMANCE SUMMARY (Page 6)

N.B. Performance figures in the data below are typical and should not be interpreted as a test specification.

Sensitivity:	10µV on range 1.5µV on ranges 2-4, 15µV on ranges 5 & 6, 8µV on VHF/FM range (taken for 15dB S/N ratio with 30% modulation on AM or 22.5kHz deviation on FM, and at an output level of 50mW).
Selectivity:	AM: 10kHz bandwidth at - 6dB points, 28kHz at - 40dB FM: 250kHz bandwidth at - 6dB points.
Image rejection:	2.0MHz - 50dB, 18MHz - 27dB, 95MHz - 35dB.
IF rejection:	Greater than 55dB on range 6, 60dB on ranges 4,5 & VHF/FM, 80dB on ranges 1,2 & 3.
AGC Characteristic:	Less than 14dB change in output for 75dB increase in input (taken from 6µV at 2.0MHz).
Stereo performance:	Channel separation better than 25dB at 1kHz. Pilot tone suppression better than 25dB at 19kHz and 38kHz.
Audio Output:	Int./Ext. loudspeaker (8Ω): 500mW at 5% distortion; maximum output is typically 1W.
	Mono recording output: distortion less than 0.3% hum level 50dB down.
	L.H. & R.H. Stereo output: 100mV into 1KΩ distortion less than 5% (typically 2%)
	Headset: Low/Medium - z output.
	A.F. response: Level within 6dB from 200Hz - 8kHz.

PERFORMANCE TESTING (Page 31)

Amend as follows:

A modulation frequency of 1kHz is used throughout in place of the 400Hz specified for the AM stages.

Overall Performance Checks:

(1)(e) Sensitivity figures should be better than 10µV on range 1, 5µV on ranges 2 - 4, 15µV on ranges 5 & 6.

(2)(b) Sensitivity should be better than 8µV.

Audio & I.F. Performance Checks

(1)(e) Check that the audio response is level within 6dB over the range 200Hz to 8kHz.

Re-Alignment

Table 6.1 Range 6, for "330kHz" read "350kHz"

(2)(h) On completion of alignment, reduce generator output to 10µV on range 1, 5µV on ranges 2-4, 15µV on ranges 5 & 6 and check S+N/N ratio.

(2)(j) Tune generator to 455kHz. Set receiver to range 5 and trim L6 for maximum rejection. Slight readjustment of L5 may be required after setting L6.

(4)(a) For "2V" read "2.6V" (Avo 8 set to 10VDC range).

(4)(b)(c)(d)For 90MHz & 107MHz read 89MHz and 105MHz respectively.

(4)(g) For "5µV" read "8µV".

TRANSISTOR VOLTAGES (Page 41)

Table 1. Transistor Voltages (FM stages)

TR302	for	2.3V	1.7V	2.5V	8.2V
	read	2.4V	2.5V	2.7V	8.2V respectively

APPENDIX C

The following changes and additions have been made:

C3A	15pF	Polystyrene	± 1pF	125V	Cde C	
C6	.003µF	Polystyrene	± 1%	125V	C	
C8	160pF	Polystyrene	± 2%	125V	C	change from 150pF
C8A	10pF	Polystyrene	± 5%	125V	C	
C23	100pF	Polystyrene	± 2½%	125V	C	changed from 47pF
C24	200pF	Polystyrene	± 2%	125V	C	changed from .001µF
C49	175pF	Polystyrene	± 2%	125V	C	changed from 140pF
C56	40pF	Polystyrene	± 5%	125V	C	

C120	150pF	Polystyrene	± 5%	125V	C	
C153	0.01µF	Disc Ceramic	+80% - 20%	250V	N	
C324	2400pF	Polystyrene	± 2%	125V	C	changed from 3900pF
C324A	200pF	Polystyrene	± 5%	125V	C	
C328A	.001µF	Disc Ceramic	+80% - 20%	500V	H	
R10	1500Ω		± 5%	0.1W	CR 25	
R10A	680Ω		± 5%	0.1W	CR 25	
R11	270Ω		± 5%	0.1W	CR 25	changed from 2700Ω
R21	390Ω		± 5%	0.1W	CR 25	
R21A	470Ω		± 5%	0.1W	CR 25	
R22	180Ω		± 5%	0.1W	CR 25	changed from 470Ω
R23	120Ω		± 5%	0.1W	CR 25	changed from 220Ω
R313	22kΩ		± 5%	0.1W	CR 25	changed from 33000Ω
R334A	470kΩ		± 5%	0.1W	CR 25	

APPENDIX D

The following changes and additions have been made:

Control knobs:

Tuning	Part No. LP3459/1
Range Switch	Part No. LP3473
Tone Control	Part No. LP3460
Volume Control	Part No. LP3460

Inductors

L6	Range 5	IF Rejector Coil	Part No. D3204
L18	Range 5	Oscillator Coil	Part No. D4638
L19	Range 4	Oscillator Coil	Part No. D4637

APPENDIX E

R105 and R106 have been removed. The connection from the bridge rectifier to pin 78 is transferred to pin 76.

Pages 63 to 69 have been added, giving details of the Model 1002/2 variant.

APPENDIX F

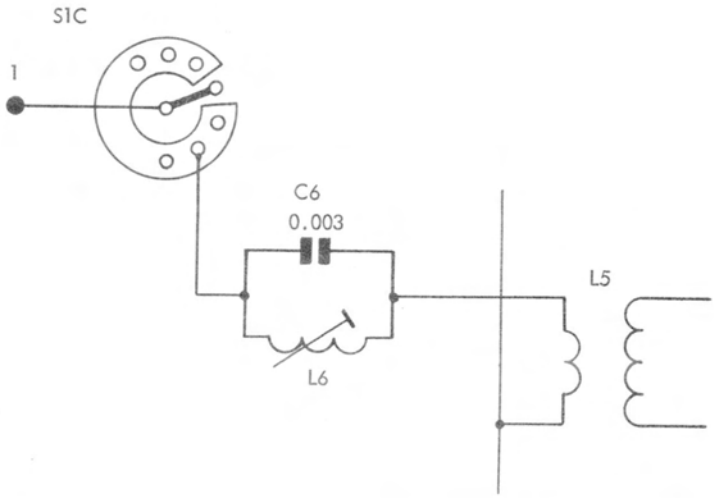
Renumber the existing page 63 to read 70 and note that an extra page (71) showing the additional printed circuit boards used in the Model 1002/2 has been added. Make a corresponding change to the contents list (P3).

CIRCUIT DIAGRAM CHANGES

Change the values of the components as shown in Appendix C.
Add the components in the positions listed below and add the values shown.

C3A	15pF	in parallel with C3
C8A	10pF	in parallel with C8
C56	40pF	in parallel with C67
C120	150pF	in parallel with R76
C153	0.01μF	in parallel with secondary of T2
C324A	200pF	from Pin 309 to common rail
C328A	.001μF	from IC302 Pin 4 to common rail
R10	1500Ω	in parallel with C20
R10A	680Ω	in parallel with primary of L10 (ie S1F side)
R21	390Ω	in parallel with primary of L16 (ie drain circuit)
R21A	470Ω	in parallel with primary of L17 (ie drain circuit)
R334A	470kΩ	in parallel with C325

Add C6 and L6 as shown



Eddystone Radio Limited, Alvechurch Road, West Heath, Birmingham B31 3PP Tel:021-475 2231
April 1976

Model 1002

AMENDMENT NO. 3

When testing receivers fitted with a telescopic aerial, it has been found that noise picked up by the aerial is being injected into the front end, thus invalidating measurements of signal/noise ratio. To overcome this the telescopic aerial should be disconnected during performance testing and realignment.

Page 31	(1)	(a)	)	
Page 32	(2)	(a)	)	
Page 37	(2)	(b)	)	Add "Disconnect the telescopic aerial"
Page 40	(4)	(b)	)	

Pages 64 & 69, Line Level preset potentiometer. For "RV604" read "RV8"

Pages 15 & 64. Add to the contents of the Accessories Kit:

1 Box Spanner, part No. 9057P

1 Allen Key, 1/16" AF, part No. 8449P

Also add these items to "Miscellaneous" on Page 61.

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July 1976

Section 1

GENERAL DESCRIPTION AND PERFORMANCE SUMMARY

GENERAL DESCRIPTION

Eddystone Model 1002 is a solid-state receiver for reception of FM transmissions in the 88–108MHz VHF band, and AM transmissions in the long, medium, and short wave bands 150–350kHz and 550kHz–30MHz. AM coverage is divided into six frequency bands, with provision for accurate logging of short wave stations. The VHF/FM section of the receiver incorporates a stereo decoder, the outputs of which can be fed to any external dual-channel amplifier and loudspeaker system. Other facilities on VHF/FM include AFC and a fast-acting mute circuit to suppress inter-station noise.

An integral power unit is provided for operation from all standard 40–60Hz AC supplies. The standard receiver also incorporates a re-chargeable nickel-cadmium accumulator for emergency use in the event of mains failure (not fitted to 1002/1). This battery provides up to seven hours' continuous operation and can also be used for occasional portable use. An external battery of higher capacity can be connected for permanent battery working in the absence of a local AC mains supply. The internal circuitry is isolated from the frame/cabinet, so that any battery arrangement, including floating supply, can be used with safety. All normal types of domestic aerial including special dipole and multi-element arrays for FM can be connected to the receiver. A retractable telescopic rod antenna is fitted at the rear of the receiver for use on both AM and VHF FM (not fitted to 1002/1).

Two internal loudspeakers are provided for normal monophonic reproduction, and a socket on the rear panel allows a local extension loudspeaker to be connected. A front panel jack socket provides a low/medium impedance monophonic output for headset use.

As well as the left and right-hand stereo outputs from the FM section of the receiver, a third output is available for tape recording of both AM and FM broadcasts. Finally, an AF input socket is provided so that the internal audio amplifier can be used as an independent unit if required: insertion of a plug into this socket disconnects the amplifier from the rest of the receiver.

GENERAL SPECIFICATION

FREQUENCY COVERAGE	150kHz–350kHz, 550kHz–30MHz and 88MHz–108MHz in seven ranges.
FREQUENCY RANGES	**Range 1** : 18.0MHz–30MHz (SW1). **Range 2** : 8.5MHz–18.0MHz (SW2). **Range 3** : 3.6MHz–8.5MHz (SW3). **Range 4** : 1.5MHz–3.8MHz (SW4). **Range 5** : 550kHz–1500kHz (MW). **Range 6** : 150kHz–350kHz (LW). **VHF/FM** : 88.0MHz–108.0MHz.
INTERMEDIATE FREQUENCIES	**AM (Ranges 1–6)** : 455kHz. **VHF/FM** : 10.7MHz.
RECEPTION MODES	AM and FM.

SCALE ACCURACY	Within 1% on all ranges: logging scale provided.
AERIAL INPUT	**Ranges 1–4 & VHF** : 75Ω. **Ranges 5 & 6** : 400Ω.
POWER SUPPLY	**DC**: 12V from internal rechargeable nickel cadmium battery (where fitted) for short periods or 12V from external battery of higher capacity. Consumption of the order of 38mA quiescent, 230mA at 1W audio output. **AC**: 100/130V or 200/260V (40–60Hz). Consumption: 12VA approx.
DIMENSIONS AND WEIGHT	See page 12.
SEMI-CONDUCTORS	The complete circuit employs a total of 18 transistors, 4 integrated circuits and 31 diodes. A full list of types and circuit functions is given in Appendix 'B' on page 44.

PERFORMANCE SUMMARY

N.B. Performance figures in the data below are typical and should not be interpreted as a test specification.

SENSITIVITY	5μV on ranges 1–4 and VHF/FM, and 15μV on ranges 5 & 6. (Taken for 15dB S+N/N ratio with 30% modulation at 1kHz on AM or 22.5MHz deviation on FM – and at an output level of 50mW.)
SELECTIVITY	**AM:** 10kHz B/W at -6dB, 22kHz at -40dB. **FM:** 250kHz B/W at -6dB.
IMAGE REJECTION	2.0MHz : 50dB, 18MHz : 35dB, and greater than 40dB at 88MHz VHF/FM.
IF REJECTION	Greater than 85dB on ranges 1–4, greater than 65dB on ranges 5 & 6, and greater than 60dB on VHF/FM.
AGC CHARACTERISTIC	Less than 12dB change in output for 80dB increase in input (taken from 6μV at 2.0MHz).
STEREO PERFORMANCE	**Channel Separation:** better than 25dB at 1kHz. **Pilot suppression:** greater than 35dB down at 19kHz; greater than 25dB down at 38kHz.
AUDIO OUTPUT	**Int/Ext loudspeaker (8Ω):** 500mW @ 5% distortion; (Maximum output is typically 1 watt.) **Mono recording output:** distortion less than 0.3%; hum level 50dB down. **L.H. & R.H. Stereo Output:** 100mV in 1kΩ; distortion less than 5% (Typically 2%).

Headset: Low/Medium-Z output.

Response: Level within 6dB from 100Hz–10kHz AM, 100Hz–15kHz on FM.

Section 2

CIRCUIT DESCRIPTION

THE RF SECTION

TUNABLE STAGES – AM (TR1, TR2, TR3, TR4 & TR5)

Aerial connections are made either between aerial socket A1 and AE or to socket A2. Input protection at A1 is provided by diode package PC1 which is permanently wired across A1 and earth. When the aerial is connected to A1 the input signal is fed to a signal tuning network L1–L7 selected by RANGE SWITCH S1C. The primaries are fully insulated from the tuned secondaries and are returned to the frame/cabinet earth to preclude any danger of the aerial feeder attaining a high potential when operating the receiver with floating circuit earth. Wafer S1E connects the tuned secondaries to the RF Amplifier via C14. Signals applied to aerial socket A2 are fed direct to the RF Amplifier via C164. Signals from the telescopic aerial, where fitted, are fed direct to the RF Amplifier via C163 and wafer S1D.

The RF Amplifier comprises TR1 and TR2 in cascode configuration with a delayed AGC line permanently connected to the gate of TR2. Amplified signals at the drain of TR2 are taken via L8–L14 to gate 1 of the dual gate MOSFET used in the Mixer position TR3. Various forms of coupling are employed at L8–L14 to ensure sensibly constant gain from range to range. 455kHz IF output is taken from the Mixer via L22/L23 to the IF section.

Local oscillator injection is derived from TR4 with isolation provided by the FET Source Follower TR5. A tuned gate oscillator configuration is employed, with initial operating conditions set by D2 and R28. Damping resistors are provided across the feedback windings of some coils in order to make the output on all ranges comparable.

All stages TR1–TR5 run from a zenered 11 volt rail which is reduced to 9.1V for TR4 & TR5 by zener D4.

TUNABLE STAGES – FM (TR201, TR202 & TR203)

RF signals are applied to the FM Tuner from an external aerial connected to socket SK1, or where fitted, via the telescopic aerial when the RANGE SWITCH is set to FM.

The input circuit L201 has its tuned secondary fully insulated from the primary to ensure safety when operating the receiver with floating circuit earth. The RF Amplifier TR201 is operated in the grounded base, tuned collector mode. Input and output circuits for this stage are tuned by variable-capacitance (vari-cap) diodes D201, D203, the controlling voltage for which is fed via the FM Tune potentiometer RV7, driven by the main drive assembly.

Amplified signals are taken from the collector tuned circuit to the base of Mixer TR203, which is a grounded emitter tuned collector stage. The 10.7MHz IF output is then taken from T201 and T202 to the FM IF and Decoder Board.

The local oscillator signal is derived from TR202 and is applied to the base of Mixer TR203. The oscillator frequency is controlled by vari-cap diode D202 from the same variable voltage source as the RF and Mixer stages. In addition, the frequency may be controlled by an automatic frequency control (AFC) voltage applied to D202, and derived from IF Amplifier IC301.

IF AMPLIFIER AND DETECTOR/AGC CIRCUITS – AM

455kHz IF AMPLIFIER (TR8, TR9 & PART IC1)

IF output from the Mixer is taken through a pair of tuned circuits L22/L23 to the IF filter, FL2. The filtered signal is fed to the 1st IF stage and the RF AGC Amplifier, both of which employ transistors in IC1 (transistor package).

The 1st and 2nd IF Amplifiers are choke/capacity coupled via a diode attenuator D5/D6 which is part of the IF AGC circuit. The final IF stage is a further transistor from IC1.

DETECTOR AND AGC (D9, TR10, TR11 & PART IC1)

Detector: The AM Detector D9 is fed from the final IF stage via L24 and is forward biased by the potential across D7 & D8. An emitter follower (using another transistor ex - IC1) passes the recovered audio to the audio amplifier via AF input socket JK4.

RF AGC: The RF AGC Amplifier is fed directly from the output of FL2 and drives a pair of diodes D10/D11 in a voltage doubler circuit to provide a controlling voltage for the cascode RF Amplifier. The circuit has a fast attack/decay time constant and is arranged to operate only at high signal levels.

IF AGC: Control of signal level in the IF part of the receiver circuit is effected by a diode attenuator (D5/D6) between the 1st and 2nd IF stages. The diode current is controlled by junction – FET TR10 to vary the shunting effect of the diodes on the signal path.

A DC output is taken from D14 via R72 to operate the carrier-level meter when the DIAL/METER SWITCH S7 is set to either 'DIAL' or unmarked centre position.

IF AMPLIFIER/DETECTOR AND STEREO DECODER – FM (TR301, TR302, TR303, TR304, IC301 & IC302)

10.7MHz IF signals from the FM Tuner are fed via two stages of amplification TR301, TR302 to ceramic filter FL301.

IC301 is a multi-function integrated circuit which provides further IF amplification, limiting and detection. The detected audio appears at pin 6. Other functions performed by IC301 are as follows:

(a) An AFC voltage which is applied to the local oscillator of the tuner appears at pin 10.

(b) From pin 13, a voltage proportional to signal strength, is fed to the front panel meter to serve as a tuning indicator.

(c) A mute circuit, together with the threshold adjustment potentiometer RV301 and a front panel switch, provides inter-station muting.

AF signals from IC301 are fed to the stereo decoder IC302. This utilises phase-locked techniques for the generation of left/right switching waveforms used to decode the signal from IC301. If the decoder detects the presence of a low level 19kHz pilot tone in this signal (indicating a stereo transmission is being received), it switches to the stereo mode, unless the MONO/STEREO switch is set to MONO. This feeds left and right channel signals to pins 9 and 10 of IC302 respectively. At the same time, the light emitting diode (L.E.D.) D23 is illuminated.

If there is no 19kHz pilot tone present, or the MONO/STEREO switch is set to MONO, the decoder is disabled and normal mono output is provided, i.e. the same signal appears at pins 9 and 10 of IC302.

The left and right channel output, from IC302 are fed via identical emitter followers TR303 and TR304 to sockets JK1 and JK2 on the rear panel. The left channel is also fed to the internal mono audio amplifier.

THE AUDIO SECTION

AF signals from both the FM and AM stages are fed to the rear-panel sockets JK3 and JK4 (TAPE OUTPUT and AUDIO INPUT respectively) and then via VOLUME CONTROL RV5 to the input of IC2. TONE CONTROL RV4 varies the degree of HF roll-off caused by C171.

IC2 is a complete integrated circuit audio amplifier, employed to drive the two 4Ω series-connected internal loudspeakers. DIN socket SK2 allows any 8Ω external loudspeaker to be used instead of the small internal loudspeakers, and front-panel jack socket JK5 provides an output for headset use, and again, mutes the internal loudspeakers (together with any external loudspeaker).

This amplifier can also be used independently: inserting a plug into AUDIO INPUT socket JK4 disconnects the rest of the receiver, and provides a direct connection to the VOLUME CONTROL.

POWER SUPPLY SECTION

DC/DC CONVERTER

To cover the VHF/FM broadcast band 88–108MHz, the control voltage for the vari-cap diodes in the FM Tuner needs to swing from 2V to 18V. A +18 volt supply is derived from the +11 volt stabilised line by means of the DC/DC converter.

Output from oscillator TR401, operating at approximately 25kHz, is fed to a voltage doubler and is then smoothed and stabilised to +18 volts by zener diode D403. It is then fed to the FM Tune potentiometer RV7. The minimum voltage (+2V) is adjusted by the FM Trim potentiometer RV401.

GENERAL

The receiver can be operated from AC supplies of 100/130V or 200/260V (40–60Hz) and from a 12V internal nickel-cadmium battery. The 3-position SUPPLY SWITCH S8A-D provides supply ON/OFF switching and a CHARGE position at which the battery is charged from the AC supply via the bridge rectifier D22 and meter ME1 shunted by R106. For external DC operation the link fitted to socket SK3 must be removed. (See Fig.4.2.)

N.B. An internal battery is not fitted to Model 1002/1, and the SUPPLY SWITCH is a 2-position switch, the CHARGE position being omitted.

AC WORKING

When operating from an AC supply the mains voltage is stepped down by T1 and rectified by

the full-wave bridge rectifier D22 to feed D18 and TR14 which provide +11V and +9V supplies respectively.

Fuses are included in both legs of the AC supply: the DC fuse remains in circuit during AC operation.

The 12V supply from the battery is zenered by D18 as in AC operation to give a regulated 11V line which feeds all stages except the IF and audio: these are fed at 9V as before via the series transistor regulator TR14.

Battery state can be checked on the panel meter by setting S7 to the 'BATT CHECK' position. This applies to both internal and external supplies. When S8 is at the 'CHARGE' position the meter indicates the rate of charge.

EARTHING

Circuit earth (negative supply rail) is isolated from the frame of the receiver to permit operation from supplies which have their positive pole at true earth potential: C100A and C147 provide a 'signal' (RF/IF/AF) path between the circuit earth and the frame. Terminals are provided so that the frame and the circuit earth can be commoned when operating from supplies with negative pole earthed.

Section 3

MECHANICAL CONSTRUCTION

GENERAL

Receiver Model 1002 is a cabinet-contained equipment suitable for bench mounting. Shock absorber mounts can be supplied to special order.

DIMENSIONS

See Fig.3.1 below.

WEIGHT

8.2kg. (18lb)

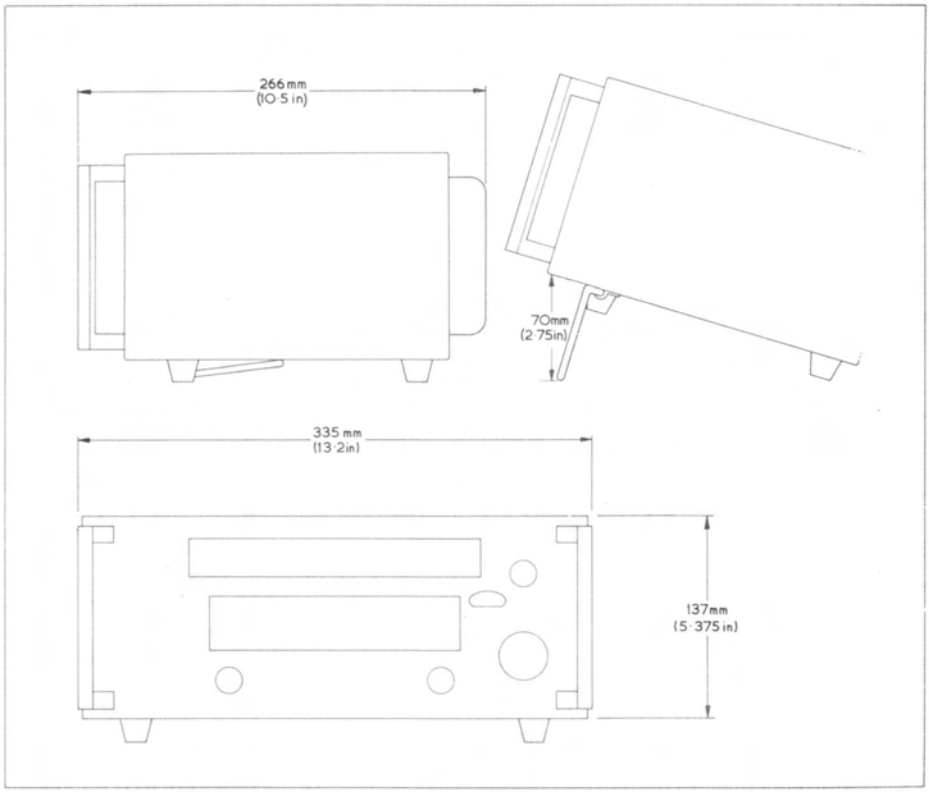


Fig.3.1 Outline Drawing showing Major Dimensions

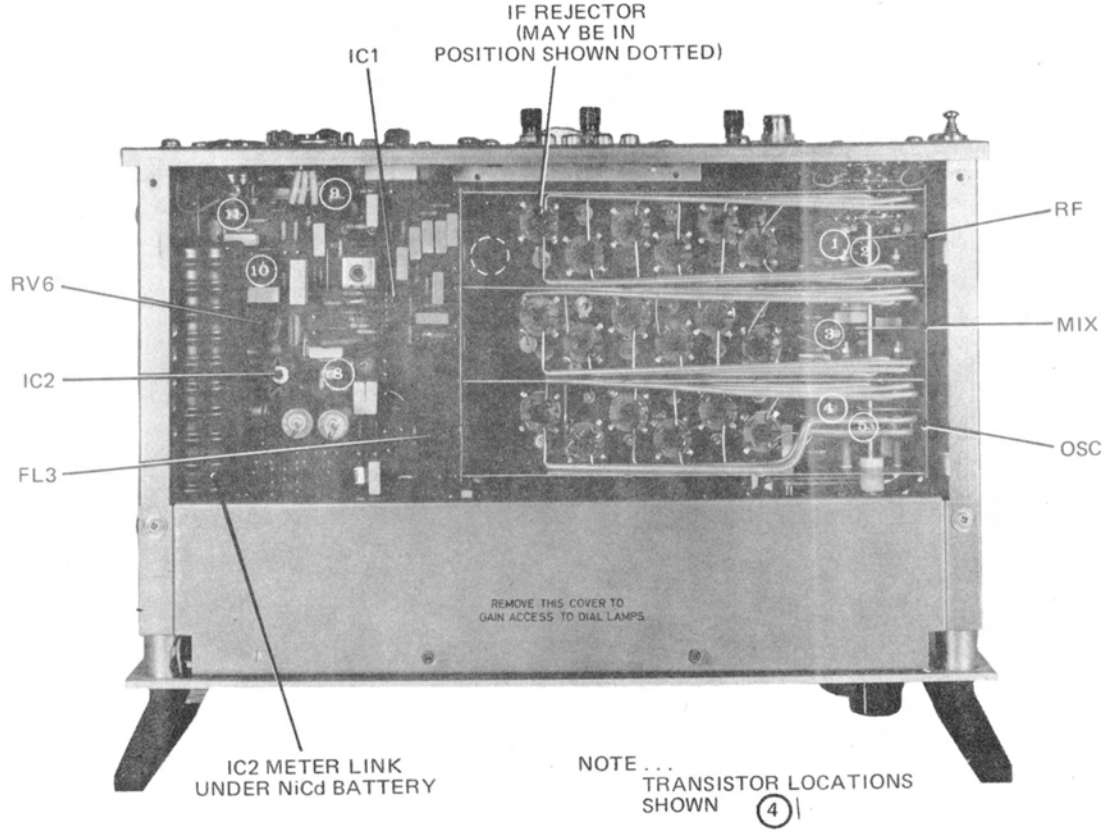


Fig.3.2 Plan View showing Major Component Locations

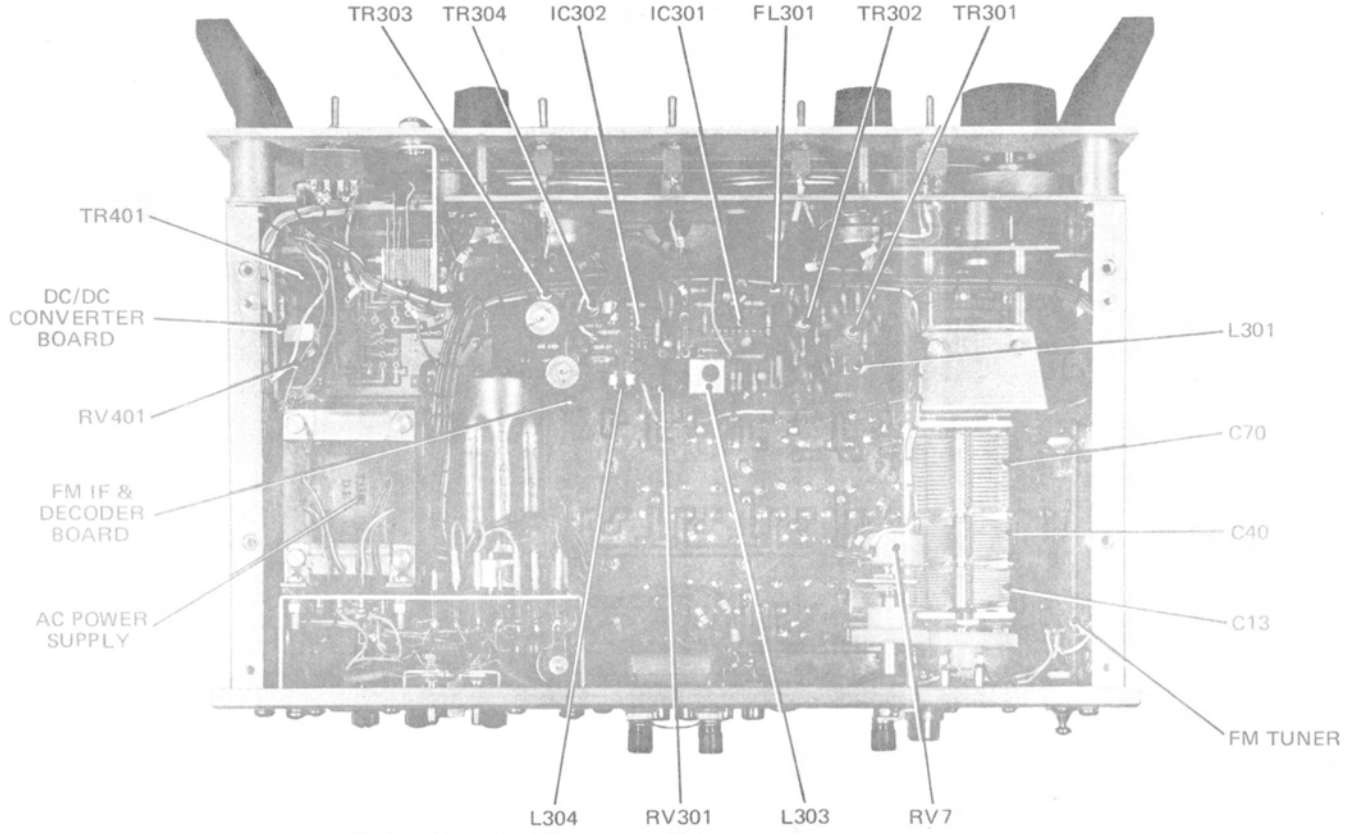


Fig.3.3 Underside View showing Major Component Locations

Section 4

INSTALLATION

TABLE 4.1 CONTENTS OF ACCESSORY KIT

Quantity	Description	Part No.
1	AC SUPPLY CONNECTOR (complete with 3-core cable)	D2311/1
1	DC SUPPLY CONNECTOR (wired with link for AC working)	D3640
1	SUPPLY LEAD (2000mm of 2-core cable for DC Connector)	8686P
2	AERIAL PLUGS (for A1/A2)	6247P
1	COAXIAL PLUG (for FM Aerial)	6079P
1	PLUG (TAPE OUTPUT)	6943P/White
1	PLUG (AUDIO INPUT)	6943P/Black
1	PLUG (STEREO L.H.)	6943P/Red
1	PLUG (STEREO R.H.)	6943P/Green
1	EXTERNAL LOUDSPEAKER PLUG	8689P
1	SPARE DIAL BULB (12V @ 80mA, wire-ended)	8448P
2	SPARE FUSES (1 @ 1A + 1 @ 2A, or 2 @ 2A if delivered for 100/130V operation)	1-Amp: 7173P 2-Amp: 6704P
2	TRIMMING TOOLS (1 off each type)	8333P & 8450P

OPERATING VOLTAGES

AC : : 100/130V or 200/260V (40–60Hz).
DC : : 12V (from internal re-chargeable low-capacity battery, or external battery for long periods of operation).

MAINS TRANSFORMER VOLTAGE ADJUSTMENT

The receiver is normally set for 240V operation when despatched. Other voltages can be accommodated by adjusting the mains transformer tappings in accordance with Table 4.2. Fig.4.1 shows the tapping points on the transformer, which is accessible after removing the receiver covers.

N.B. For AC operation, the DC SUPPLY CONNECTOR must be fitted, wired with a link as shown in Fig.4.2(a).

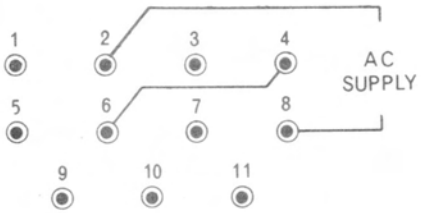


Fig.4.1 Mains Transformer Tappings
(shown set for 240V operation)

TABLE 4.2 TAPPING CONFIGURATIONS

Voltage	Link	Supply
100V	2–6, 3–7	2 & 3
110V	1–5, 3–7	1 & 3
120V	2–6, 4–8	2 & 4
130V	1–5, 4–8	1 & 4
200V	3–6	2 & 7
210V	3–6	2 & 7

Voltage	Link	Supply
220V	3–5	1 & 7
230V	3–6	1 & 8
240V	4–6	2 & 8
250V	4–6	1 & 8
260V	4–5	1 & 8

FUSE COMPLEMENT

AC : : 2 @ 1A for 200/260V, 2 @ 2A for 100/130V.
DC : : 1 @ 2A (remains in circuit for AC operation).

FRAME/CIRCUIT EARTH TERMINALS

The negative supply rail (circuit earth) is isolated from the frame of the receiver to facilitate operation from all forms of battery supply. The Circuit Earth and Frame Earth terminals should be linked with a wire strap to provide a common earth connection when operating the receiver from:–

(1) AC Mains.

(2) Battery with NEGATIVE pole earthed.

(3) Battery to which no other connection is made.

The link must be removed to allow circuit earth to float when the receiver is operated from:–

(1) Battery with POSITIVE pole earthed.

(2) Battery on float charge with both poles at a potential other than earth.

INSTALLATION FOR AC WORKING

When operating from an AC supply, the internal re-chargeable battery is kept on trickle-charge. In the event of mains failure, this will provide up to seven hours emergency operation (without need for switching from mains to battery) and will automatically revert to mains if power is restored within this period.

(1) The DC SUPPLY CONNECTOR is employed for both AC and DC operation: for AC operation; the connector should be linked as shown in Fig.4.2(a) – supplied ready-linked, but not fitted, to prevent possible discharge of the battery during transit – and then mated to the DC SUPPLY INPUT socket on the rear panel of the receiver.

(2) Check that the mains transformer tappings are set to the appropriate supply voltage – refer to paragraphs headed: Mains Transformer Voltage Adjustment.

(3) Connect link between FRAME EARTH and CIRCUIT EARTH terminals on the rear panel of the receiver.

(4) Connect AC SUPPLY CONNECTOR to AC INPUT socket on the rear panel of the receiver, and connect the mains lead to the local supply: BROWN = LIVE; BLUE = NEUTRAL; GREEN/YELLOW = EARTH.

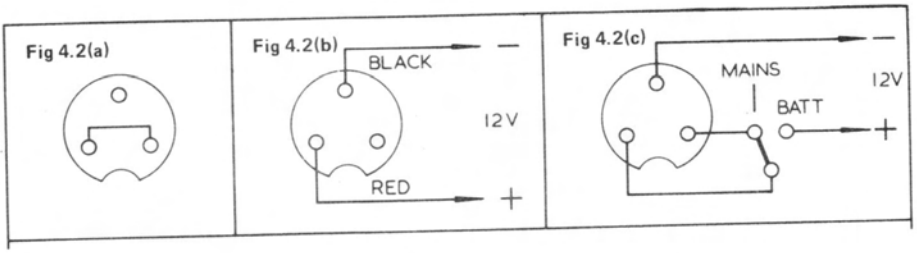


Fig.4.2 DC Supply Connector viewed on wiring side

INSTALLATION FOR DC WORKING

As stated in the previous paragraphs, the internal re-chargeable battery will provide up to seven hours operation. For permanent DC operation, the following procedure should be adopted:

(1) Refer to the paragraphs in this section headed: Frame/Circuit Earth Terminals, and if necessary fit, or remove, the link between these terminals.

(2) Connect 12V DC supply to DC SUPPLY CONNECTOR as shown in Fig.4.2(b).

(3) Alternatively, the wiring can be arranged as shown in Fig.4.2(c) to obviate the need for changing the connector when switching between external battery and mains/internal battery.

AERIAL INPUT: Fig.4.3 shows connections for various types of aerial/feeder. The input

impedance is nominally 75Ω on VHF/FM and Ranges 1–4, and 400Ω on Ranges 5 and 6. Diode protection against high induced aerial voltages is incorporated on the A1 socket.

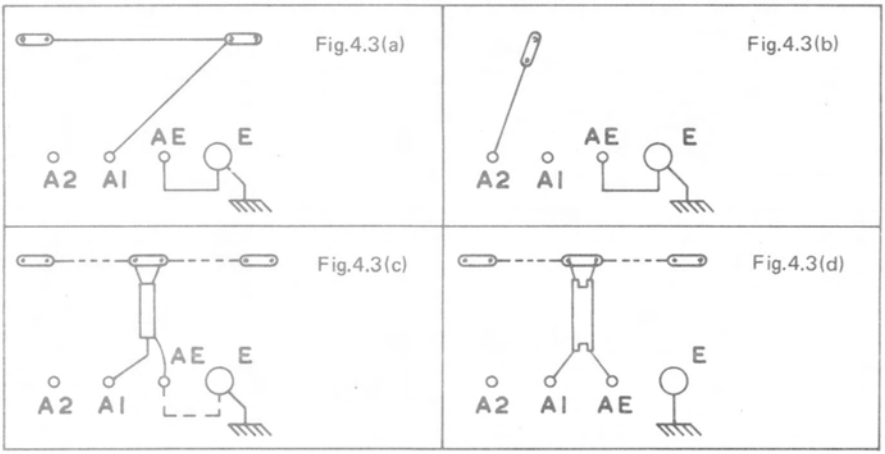


Fig.4.3 AM Aerial Input Connections

The built-in telescopic aerial can be used for both AM and FM reception merely by extending it and selecting the appropriate range. For general short-wave reception, Eddystone dipole, catalogue No.731 is recommended.

More elaborate AM aerial systems can be accommodated as shown in Figs.4.3(c) and 4.3(d). If an external FM aerial is used to improve the signal to noise ratio, e.g. the stereo reception, this should be connected to the coaxial socket marked 'FM'.

EARTH: When operating the receiver with the FRAME/CIRCUIT EARTH link removed, e.g. when using a floating DC supply, it is desirable for safety reasons to ensure that the frame of the receiver is at true earth potential. Therefore, if a local earth is available, it should be connected directly to either terminal 'E' (located next to the aerial input sockets) or to the FRAME EARTH terminal.

The link between the aerial earth (AE) socket and the cabinet earth (E) terminal should be fitted for most aerial configurations, except when using a twin or balanced feeder as shown in Fig.4.3(d). Use of a coaxial feeder – Fig.4.3(c) – normally warrants this link, but in some cases an improvement in the signal to noise ratio may be obtained by removing it. The link can be stored in the A2 socket when not in use.

HEADSET: Connect to 'PHONES' socket on panel. Output is primarily intended for use with telephone headsets of 8Ω – 600Ω impedance but satisfactory results will be obtained with impedances up to 4,000Ω. The internal and external loudspeaker circuits are interrupted when the headset is connected. Headset circuit is returned to frame of receiver for safety when operating with floating circuit earth. Eddystone headsets LP3242 and LP3301 are recommended for use with Model 1002.

EXT. L.S.: An external loudspeaker can be connected using the DIN plug provided in the Accessory Kit. Insertion of the plug will disable the internal loudspeakers. Loudspeaker impedance should be 8Ω – 15Ω and circuit must be isolated from earth.

AUDIO INPUT: This socket allows the receiver to be used purely as an audio amplifier in conjunction with other equipments such as a tape cassette or record player. The receiving sections of the set are automatically disabled when connection is made to this socket. Connection should be made using a screened cable terminated in the plug supplied (black).

TAPE OUTPUT: A low-level audio output to feed tape recorder or hi-fi amplifier. Distortion is less than 0.3% and hum level 50dB down. Connection should be made using a screened cable terminated in the plug supplied (white). The signal level should be adjusted by the gain control on the recorder or amplifier.

L.H. & R.H. STEREO OUTPUT: For stereo reception these outputs must be connected to an external stereo amplifier and loudspeaker system as the internal amplifier and loudspeakers of the receiver are not wired for stereo output. The L.H. & R.H. STEREO OUTPUTS are of the order 100mV in 1kΩ with distortion less than 5% (Typically 2%). Connection should be made using a screened cable terminated in the plugs supplied. (R.H. green plug; L.H. red plug.)

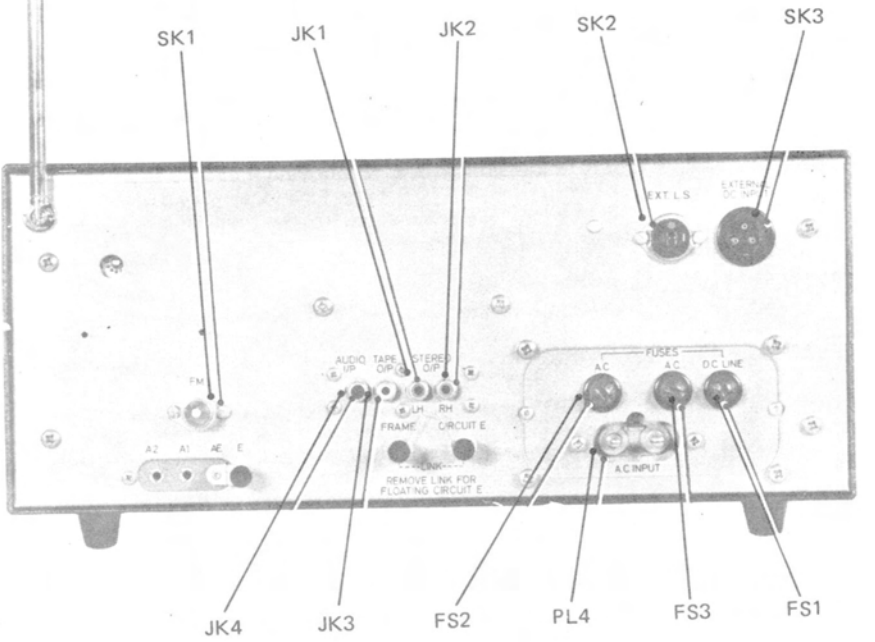


Fig.4.4 Rear View of Receiver showing External Connections

Section 5

OPERATION

CONTROL FUNCTIONS

TUNING CONTROL — Operates tuning cursor and vernier scale. Accurate dial settings can be recorded by combining readings on logging scale (0—1000) and vernier scale (0—100). e.g. if cursor lies between 600/700 and vernier reads 56, log "656".

RANGE SWITCH — Effects all circuit changes when switching from AM ranges to FM. Scale calibration is in MHz on AM ranges 1—4 and FM; kHz on ranges 5 and 6.

VOLUME CONTROL — Controls the audio output to internal or external loudspeakers and headset. The AUDIO INPUT can also be adjusted by this control but it does not affect the signal level at the TAPE OUTPUT socket.

TONE CONTROL — Controls the bass/treble content of the audio output to give satisfactory listening quality.

***MUTE ON/OFF SWITCH** — **ON:** Muting circuit functions.
OFF: Muting circuit disabled.

***MONO/STEREO SWITCH** — **MONO:** L.H. & R.H. channel outputs (and internal loudspeakers) provide MONO signals: STEREO INDICATOR lamp is disabled.

STEREO: L.H. & R.H. channels both operate in STEREO and STEREO INDICATOR lamp functions. (See Stereo Reception Page .) The internal loudspeakers will only reproduce one channel of the stereo signal.

***AFC SWITCH** — **ON:** Automatic frequency control circuit functions.
OFF: Automatic frequency control circuit disabled.

***Note:** MUTE, AFC and MONO/STEREO switches are only operative on the FM range.

SUPPLY SWITCH — **CHARGE:** Internal battery charges from DC output of AC power unit: meter indicates charge current (100mA f.s.d.). Charge current may be 60mA to greater than 100mA, depending on battery state.

SUPPLY OFF: All circuits disabled.

ON: Receiver circuits connected to appropriate supply, i.e. (1) DC output of AC power unit (with internal battery on trickle charge for emergency use), or (2) external 12V battery. Internal battery is not in-circuit when using external battery.

DIAL/METER SWITCH — **DIAL:** Dial lights on — meter indicates relative carrier level and

serves as tuning indicator for AM and FM ranges.

CENTRE: Dial lights off – meter as above.

BATT CHECK: Dial lights off – meter shows state of internal battery (or external battery if receiver is installed with external battery connected). Charge battery if needle lies below red sector of meter scale (see page 23).

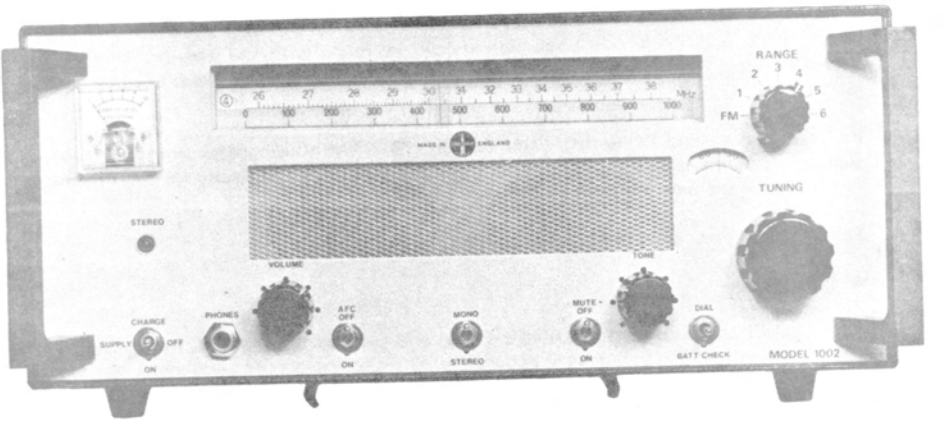


Fig.5.1 Front Panel View of 1002 Series Receivers

CONTROL FACILITIES

All receiver controls function when receiving both AM and FM signals with the exception of the AFC, MONO/STEREO and MUTE SWITCHES, which operate on FM reception only.

AUTOMATIC FREQUENCY CONTROL (AFC): Automatic frequency control is provided to give greater receiver tuning stability. This is done by creating a signal in one part of the receiver circuit (FM detector) which will correct any unwanted change in frequency in a previous stage (local oscillator in the FM Tuner). Always set the AFC SWITCH to 'ON' when receiving stereo transmissions. When receiving a weak signal adjacent to a strong local transmission the AFC SWITCH should be set to 'OFF'.

MUTING: The muting circuit provides a means of suppressing background noise when tuning between stations on the FM Band. The circuit is adjusted during manufacture so that only stations of adequate strength for good listening will be heard when the MUTE SWITCH is set to 'ON'. The switch must be set to 'OFF' to receive weaker signals from more distant stations.

TUNING INSTRUCTIONS

GENERAL

1. Set SUPPLY SWITCH to 'ON'.

2. If operating from internal or external battery, check that the meter reads in the red sector of the SCALE when DIAL/METER SWITCH is set to 'BATT CHECK' position.

3. Set DIAL/METER SWITCH to 'DIAL' if scale illumination is required. Prolonged use of dial illumination is not recommended when operating receiver from internal battery.

4. Connect the telephone headset to the 'PHONES' socket if personal listening is required. When connections are made to this socket both the internal loudspeakers and the EXT. L.S. socket are disabled.

5. If increased bass response is required a larger external loudspeaker should be connected to the EXT. L.S. socket. Connection should be made with the plug provided in the accessory kit. The receiver internal loudspeakers are muted when the EXT. L.S. socket is used.

6. Pull out and extend the aerial by removing it from the housing near the top left hand side corner of the rear panel. The aerial should be positioned vertically for AM reception but tilted for the best signal when listening on FM.

7. Adjust the receiver controls as follows:—

(1) AM Reception

(a) Select the appropriate RANGE (1—6) and tune to the required frequency. The receiver can be tuned most accurately by using the carrier level meter at the top left of the front panel. (See page 21.) Always adjust the receiver TUNING control for the highest deflection on the meter.

(b) Adjust the TONE and VOLUME controls for a satisfactory listening level.

(2) FM Reception (Mono)

(a) Set the RANGE SWITCH to FM.

(b) Set the AFC SWITCH and MUTE SWITCH to 'OFF' and the MONO/STEREO SWITCH to 'MONO'.

(c) Adjust TUNING to the centre of the required station frequency i.e. the highest reading on the carrier level meter.

(d) Set the AFC SWITCH to 'ON'.

(e) If reception of local transmission only is required, the MUTE SWITCH can be set permanently to the 'ON' position so that background noise is suppressed when tuning from one station to another. Weak signals will not be heard with the muting facility in use but will become audible when the MUTE SWITCH is set to 'OFF'.

(3) FM Reception (Stereo)

(a) Set the MONO/STEREO SWITCH to STEREO.

(b) Satisfactory stereo reception requires that the transmitted signal is received at adequate strength as shown by steady illumination of the STEREO INDICATOR.

The latter is activated by a pilot tone which is radiated with the transmission when this is in 'stereo' mode. The tone is absent in the case of a 'mono' transmission.

(c) If the received stereo signal is too weak for proper operation of the receiver circuits, then these will automatically switch to 'mono' reception and a composite non-stereo signal will be passed to both channels of the external amplifier.

(d) Flickering of the STEREO INDICATOR shows that the received signal is not quite strong enough for satisfactory stereo reception and variable programme quality will be caused by the receiver circuits switching continuously from 'mono' to 'stereo'. More acceptable reception will be obtained under this condition if the MONO/STEREO SWITCH is set permanently to 'MONO'.

(e) The STEREO INDICATOR may occasionally respond to noise pulses when a 'mono' transmission is received with the MONO/STEREO SWITCH at 'STEREO'. Reference to the relevant published programme details will show whether the transmission is 'mono' or 'stereo'.

CARRIER LEVEL METER

The panel meter gives indication of relative signal strength except when the DIAL/METER SWITCH is set to 'BATT CHECK'. Meter functions on both AM and FM and receiver should always be tuned for maximum meter deflection. Meter registers battery state with DIAL/METER SWITCH at 'BATT CHECK' and charge current with SUPPLY SWITCH at 'CHARGE'.

BATTERY CHARGING

The internal battery used in the 1002 receiver is a nickel-cadmium type, chosen for its extreme tolerance to over-charge and over-discharge; it will require no special attention and will not deteriorate in the manner experienced with normal dry batteries.

Its capacity in a fully charged state is sufficient to provide up to seven hours' continuous operation at normal volume level: a 12-hour charge will restore the battery to full capacity.

When operating the receiver from an AC source, a small current will be drawn from the battery during periods of above-average audio output. Trickle-charging will occur at normal audio output, the average rate being adequate to maintain the battery in a fully charged condition in readiness for emergency use in the event of supply failure.

The internal battery should always be fully DISCHARGED when the receiver is to be operated for a prolonged period from an external battery on a site where a local AC supply is not available. This is the normal storage condition for a battery of this type which will be restored to full capacity on completion of three or four cycles of charge and discharge at normal rate.

To charge battery, connect receiver to AC mains supply and set the SUPPLY SWITCH to 'CHARGE'. Meter will indicate charge current (100mA f.s.d.). To check battery voltage SUPPLY SWITCH must be set to 'ON' position and DIAL/METER SWITCH to 'BATT CHECK'. Readings should lie in red sector of meter scale.

Note: When charging a fully discharged battery, the initial current will exceed 100mA (meter

full scale deflection), but will eventually reduce to 60 to 100mA. The meter movement will not be damaged by this large indication.

Section 6

MAINTENANCE

GENERAL

The 1002 Receiver has been designed for maximum reliability and should require very little in the way of routine maintenance even when used continuously under arduous operating conditions.

This section of the Handbook gives guidance for simple operations such as changing fuses and dial lights, and more detailed instructions on performance testing, re-alignment etc. Appendix 'A' on page 41 contains a comprehensive analysis of voltages to facilitate fault-finding. Spares can be supplied ex-stock for user-servicing and arrangements can be made for equipment to be returned to the manufacturer for specialised attention. The Receiver Type and Serial No. should be quoted in all communications.

FUSE REPLACEMENT

Bulgin Type F.270 quick action cartridge fuses (or equivalent 5mm x 20mm fuses) are supplied as spares in the Accessories Kit sent out with the receiver. Part Nos. 1 Amp fuse 7173P, 2 Amp 6704P.

Fuse ratings are as follows:— AC FUSES : : 1A (200/260V)
2A (100/130V)

DC FUSE : : 2A

N.B. DC Fuse remains in circuit when receiver is operated from AC supply.

CABINET REMOVAL

1. Place the receiver in the normal position, remove the two screws on either side of the cabinet, and lift off the top cover (See Fig.6.1).

2. Invert the receiver, remove the four bottom cover screws and lift the cover off. (See Fig.6.2).

DIAL LAMP REPLACEMENT

One spare dial lamp is supplied with the receiver; additional lamps can be ordered by quoting Part No. 8448P. To replace a lamp, the following procedure should be adopted:—

1. Remove top outer cover as detailed in previous paragraphs.

2. Remove the two short Philips-headed screws which retain the inner cover, slowly withdraw this cover and disengage the dial lamp supply connector (See Fig.6.3).

3. Unsolder faulty bulb from printed circuit termination and then push the bulb out of retainer (towards centre of cover).

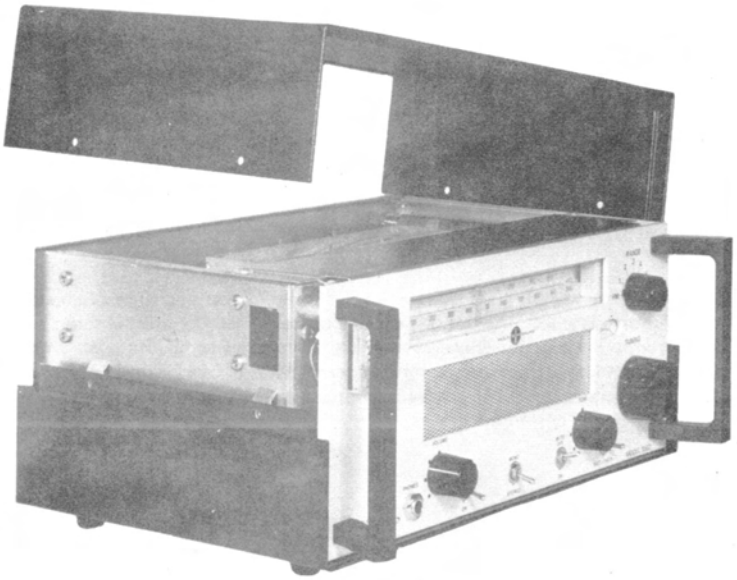


Fig.6.1 Top Cover Removal

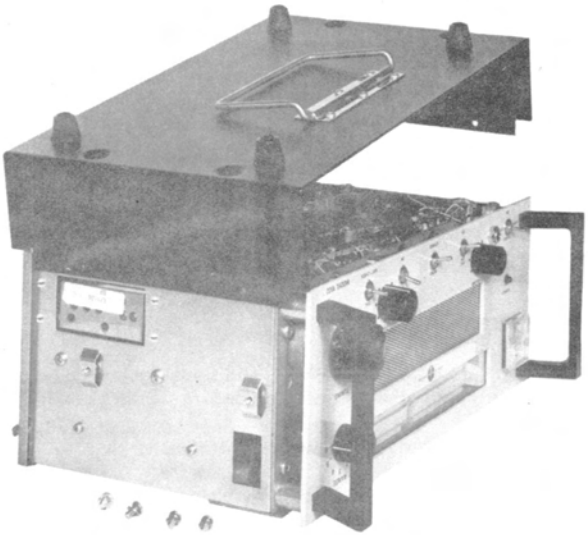


Fig.6.2 Bottom Cover Removal

4. Insert new bulb (wire-end first) and solder to printed circuit termination. Examine soldering for possible short-circuit.

5. Reconnect dial lamp supply, apply power to the receiver and check that both bulbs light normally.

6. Replace both covers and tighten screws.

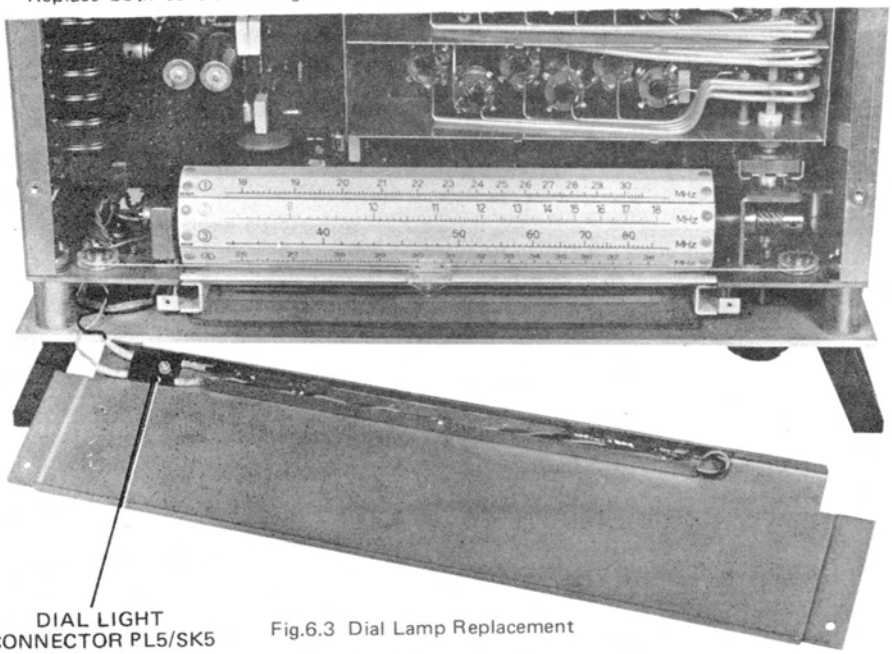


Fig.6.3 Dial Lamp Replacement

INSTRUCTIONS FOR RE-STRINGING CURSOR DRIVE CORD

A replacement drive cord can be obtained from the manufacturer by quoting Part No. D4709. The cord is supplied complete with eyelets which are spaced 848mm (33$^{3}/_{8}$in.). Procedure for fitting is as follows:–

1. Remove the four screws, 2 on each side, and carefully lift off the outer cover. Remove inner dial light cover.

2. Remove calibrated scale drum for access to guide pulleys on rear drive mounting plate. Proceed as follows:–

   (a) Set Range Switch to Range 1 for access to interior of scale drum.

   (b) Locate scale drum locking screws and slacken about 1½-turns (the drum will rotate due to tension of coil spring at right-hand end).

   (c) Slacken screw in scale drum spindle collar (adjacent to meter).

(d) Slide collar off spindle and remove also the steel shim washer which is trapped behind it.

(e) Grip helical gear and withdraw spindle through right-hand side-plate (support drum and extract coil spring as spindle clears end bearing).

(f) Lift drum clear and store with other loose items in readiness for re-assembly.

3. Remove panel for access to vernier dial and flywheel.

(a) Unsolder leads from loudspeaker and meter.

(b) Remove all control knobs (set Tuning to full extreme of anti-clockwise travel before removal).

(c) Slacken and remove the panel nuts/washers which retain toggle switches and push the switches through panel.

(d) Place receiver in face down position resting on blocks so that handles are clear of bench.

(e) Remove the screws holding the panel and handles to the side-plates and lift the receiver clear of the panel.

4. Remove vernier dial and flywheel to expose aperture in drive mounting plate for access to cord drum.

5. Re-string cursor drive cord by proceeding as follows:—

(a) Take off broken cord and remove cursor.

(b) Check that drive is set in fully anti-clockwise position and that slot in cord drum lies at 6 o'clock.

(c) Trap one eyelet of replacement cord in rear end of cord drum slot.

(d) Lay cord over cord drum, winding on approximately ½-turn with cord leaving pulley towards right-hand side plate.

(e) Pass cord under 1st guide pulley, then vertically upwards and over 2nd guide pulley — keep cord in tension.

(f) Run cord across dial aperture, over 3rd guide pulley, and then downwards under sprung jockey pulley — keep cord in tension.

(g) Pass cord back across dial aperture, over 4th guide pulley, over vernier spindle and then bring free end out through aperture in front of cord drum — keep cord in tension.

(h) Maintain tension on free end of cord and rotate tuning spindle clockwise to extreme of travel so that just over 5-turns of cord are wound onto cord drum.

(i) Grip free end of cord with tweezers or long-nose pliers, pass over cord drum to wind on ½-turn in clockwise direction, and then trap eyelet in front end of cord drum slot.

(j) Temporarily fit control knob and rotate through complete travel to ensure that cord runs smoothly.

6. Re-fit flywheel and vernier dial with Tuning at fully anti-clockwise position (secure vernier with '0' at 12 o'clock).

7. Fit cursor and set to '0' on logging scale: check for smooth operation.

8. Replace front panel by reversing procedure given in (3) on page 28.

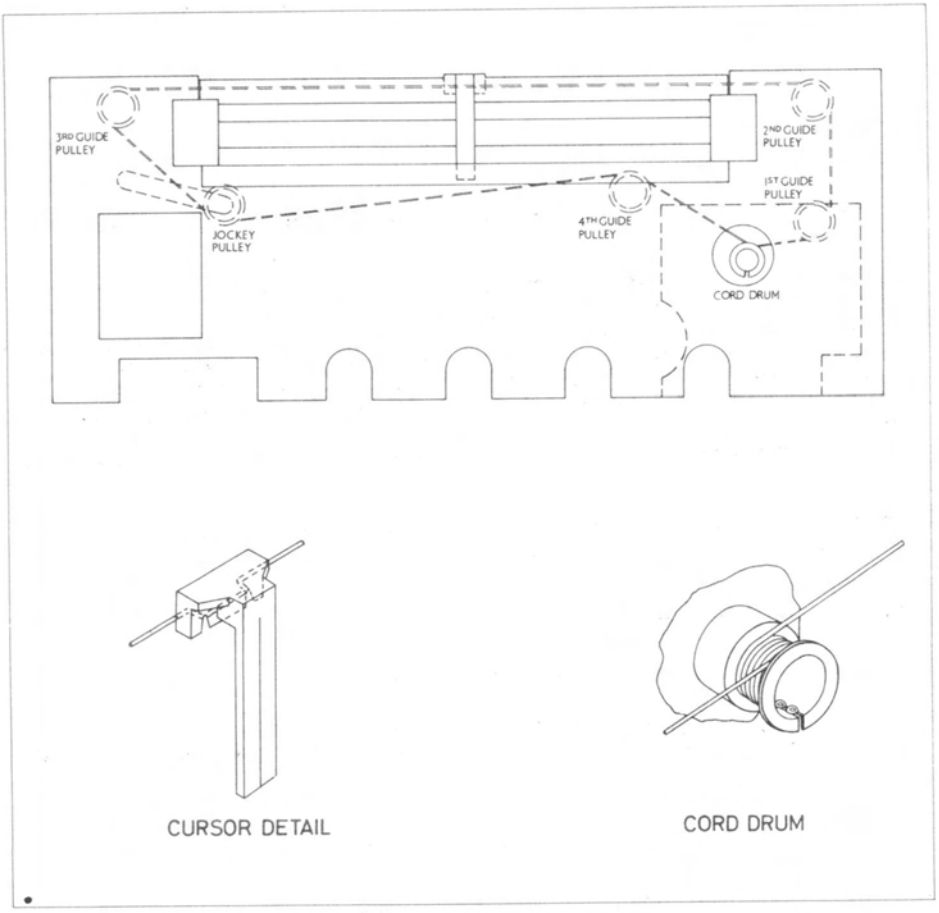


Fig.6.4 Cording arrangement for Cursor Drive

9. Replace calibrated scale drum using procedure detailed below.

   (a) Pass scale drum spindle through right-hand bearing and slide in the tension spring removed in 2(e). Locate tail of spring in hole in bearing bracket.

   (b) Cradle scale drum in left hand and continue feeding in spindle until it passes through bearing at left hand end. Slide on the steel shim washer and retaining collar.

   (c) Push helical gear against bearing surface and secure collar so that gear is retained in this position.

   (d) Insert other tail of tension spring in hole in end of drum. Rotate drum with fingers approximately four complete revolutions to apply tension to spring. Tighten retaining screws through rear of drum set so that Range 1 shows through scale window: ensure that drum is central in window.

   (e) Select all ranges in turn and observe that drum movement is positive in each position. If more positive action is required, increase spring tension by one or possibly two more turns.

10. Check calibration accuracy and replace covers removed in (1).

REMOVAL OF PRINTED CIRCUIT BOARDS

Most fault finding can be carried out without need for removal of the printed circuit boards, but occasions may arise when it becomes necessary to gain access to the underside of the board in order to change a faulty component. The FM Tuner board and the DC/DC Converter board are attached to plastic mounting pillars. Use the minimum amount of pressure to release these boards. The IF and Decoder board can be detached by removing the two fixing screws. All three boards may be pulled out on their cable looms or can be completely removed by unsoldering the connections.

Removal of the large p.c.b. should not be necessary since access can be gained to all parts of the underside by removing the power unit chassis.

PROCEDURE FOR REMOVING POWER UNIT

1. Remove top and bottom covers as detailed in 'Cabinet Removal'.

2. Remove the two screws securing the FM IF and Decoder Board and lift the board free of the plastic retaining clips to provide enough clearance for withdrawal of the Power Unit.

3. Unplug leads from Pin Nos. 71, 72, 73 and 79 on the Power Unit.

4. Remove the four screws located at the corners of the Power Unit aperture in the back-plate.

5. Slide Power Unit forward and upward to remove. (Receiver inverted.)

   N.B. When complete removal of the Power Unit is required, it is necessary to free the Supply Switch from the front panel, and to disconnect the DC input lead.

WARNING

The 1002 Receiver has provision for operation with floating circuit earth to permit direct connection to DC power supplies which do not have their negative pole connected to earth. Personnel should note, that when the receiver is operated in this manner, there is a possibility that on some installations a dangerous potential may exist between the internal circuitry and the outer frame. Caution must therefore be exercised in handling the set with the covers removed, and special precautions should be taken when connecting test equipment. Wherever possible the receiver should be transferred to an alternative power source which allows it to be operated with the FRAME/CIRCUIT EARTH LINK in position.

VOLTAGE ANALYSIS: A complete list of voltage values for all IC's and Transistors etc., will be found in Appendix 'A' on page 41

TEST EQUIPMENT: The following equipment in the Marconi Instruments range is recommended for performance testing and re-alignment of Receiver Model 1002. In addition to the instruments listed below, any adjustments to the FM IF circuitry necessitates a combined swept frequency oscillator and display, e.g. a Rhode and Schwarz Polyscop.

TF2002AS SIGNAL GENERATOR
Freq. range: 10kHz–72MHz,
with 1MHz markers.
Incremental tuning facility.

TF10066 FM SIGNAL GENERATOR
Freq. range: 10MHz–470MHz.

TF1101 R-C OSCILLATOR
Freq. range: 20Hz–200kHz.
Thermistor stabilised.
60dB step attenuator.
Integral O/P level meter.

TF2500 AF POWER METER
Seven power ranges.
Wide impedance range.
Also usable as voltmeter with
range 15mV–150V.

OVERALL PERFORMANCE CHECKS: If substandard performance is suspected, withdraw the receiver from service and carry out the overall performance checks given in the following paragraphs.

(1) Ranges 1–6 (AM)

(a) Connect 75Ω signal generator output to AERIAL INPUT (A1 socket and Earth).

(b) Connect AF power meter (matched to 8Ω) to EXT. L.S. PLUG. **N.B.** Loudspeaker circuit is positive with respect to earth – take care to avoid shorting leads.

(c) Set SUPPLY SWITCH to 'ON', VOLUME CONTROL to maximum, and TONE CONTROL to mid-position. Adjust other controls during test as detailed below. (The STEREO, AFC, and MUTE switches are inoperative on AM ranges.)

(d) Tune Receiver/generator to frequencies listed below and check sensitivity for 15dB (S+N/N) ratio with output 50mW (generator modulated 30% at 400Hz).

RANGE 1 : :	24MHz	RANGE 4 : :	2.1MHz
RANGE 2 : :	12MHz	RANGE 5 : :	750kHz
RANGE 3 : :	5MHz	RANGE 6 : :	210kHz

(e) Sensitivity figures should be better than 5μV on ranges 1–4 and better than 15μV on ranges 5 & 6.

(f) If the overall sensitivity is found to be low on some but not all ranges, the receiver should be re-aligned in accordance with the instructions on page 34. If the overall sensitivity is low on ALL ranges, carry out the audio and IF tests detailed in sub-sections (1) and (2) of the 'Audio and IF Performance Checks' which succeed this section.

(2) FM Range

(a) Set the FM signal generator to 105MHz and connect to FM AERIAL SOCKET (SK1). Set the receiver RANGE SWITCH to 'FM'.

(b) Adjust the tuning of the receiver to 105MHz and check that the sensitivity for 15dB (S+N/N) ratio with output of 50mW (22.5kHz deviation at 1kHz) is better than 5μV.

(c) If the overall sensitivity is low, carry out the audio and IF tests detailed in sub-sections (1) and (4) of the 'Audio and IF Performance Checks' which succeed this section. If these tests are satisfactory, the receiver should be re-aligned in accordance with the instructions on page34.

AUDIO AND IF PERFORMANCE CHECKS: The following checks should be made if the overall sensitivity, as measured in the previous sections, is found to be low on all ranges.

(1) Audio Sensitivity Check

(a) Connect audio generator to top end of VOLUME CONTROL.

(b) Set VOLUME CONTROL to maximum and TONE CONTROL to mid-position.

(c) Connect AF power meter as for the Overall Performance Checks.

(d) Tune audio generator to 1kHz and check that an output of 50mW is obtained for 4–10mV input.

(e) Check that the audio response is level within 6dB over the range 100Hz to 10kHz.

(2) IF Sensitivity Check (AM)

(a) Connect RF signal generator to stator of C40 (middle section of tuning gang).

(b) Connect AF power meter as for Overall Performance Check.

(c) Set receiver controls as follows:

RANGE SWITCH	: 6
TUNING CONTROL	: 150kHz
VOLUME CONTROL	: max.
TONE CONTROL	: mid-position

(d) Tune generator to 455kHz, modulated 30% at 400Hz, and adjust attenuator for reading of 50mW with signal at centre of IF passband. Sensitivity should lie in the range 4–8μV.

(e) If sensitivity is below normal, re-align IF circuits as described on page 34.

(f) If low sensitivity still persists, carry out the stage by stage testing described in section (3) of the Audio and IF Performance Checks.

(3) Stage Testing

The following tests will assist in fault location when the AM IF strip exhibits low overall sensitivity.

NOTE 1. Live generator lead must be blocked to DC with a 0.1μF capacitor when carrying out the tests below.

NOTE 2. AF power meter should be connected as for the Overall Performance Check.

NOTE 3. Front panel controls should be set as paragraph (c) of the IF Sensitivity Check (AM).

NOTE 4. Direct connection to IC1 is facilitated by using the blade of a screwdriver as a probe (outer braid of generator lead can be earthed to coil pack screens).

NOTE 5. When testing from pin No. 38 on the AM Board, the wide bandwidth and high gain of the amplifier may give rise to errors in measurement unless screening of the generator output lead is complete. Soldered connections are recommended with earthing to adjacent pin No. 39.

Connect RF generator (modulated 30% at 400Hz and tuned to 455kHz) to each input point in turn. Allow 10% deviation in measured result to accommodate semiconductor spread.

Generator Input Point	Sensitivity for 100mW o/p
IC1 Pin 1	44mV
IC1 Pin 2	1.1mV
IC1 Pin 11	360μV
PCB Pin 38	50μV
PCB Pin 23*	80μV

(*) Check that generator is tuned to centre of filter response.

(4) IF Sensitivity Check (FM)

(a) Set receiver controls as follows:

RANGE SWITCH : FM
MUTE SWITCH : OFF
MONO/STEREO SWITCH: MONO
AFC SWITCH : OFF
VOLUME CONTROL : max.
TONE CONTROL : mid-position

(b) Connect AF power meter as for Overall Performance Check.

(c) Disconnect coaxial lead at pin 301 on the FM IF and Decoder Board, and connect the RF generator (tuned to 10.7MHz, with 22.5kHz deviation at 1kHz) to pin 301. Sensitivity should be 50–100μV for 50mW output.

(d) If sensitivity is below normal, re-align IF circuits as described below.

(5) Stereo Decoder Performance Check

(a) Set receiver controls as follows:

RANGE SWITCH	: FM
TUNING CONTROL	: 90MHz
MUTE SWITCH	: OFF
MONO/STEREO SWITCH	: STEREO
AFC SWITCH	: OFF

(b) Connect the FM signal generator to the AERIAL INPUT socket (SK1), and set to 90MHz at a level of 200μV. Connect the AF signal generator, set to 19kHz, to the modulation input of the FM signal generator, and adjust deviation to 2kHz.

(c) Check that the STEREO INDICATOR becomes illuminated. If this does not occur, refer to 'Stereo Decoder Adjustments' on page 36.

RE-ALIGNMENT

GENERAL: Close-tolerance components are used in all tuned circuits throughout the receiver and re-alignment is not likely to be required unless coils and/or associated capacitors have been changed. Detailed instructions for re-aligning all pre-set circuits are given below on the assumption that the necessary adjustments will be carried out by skilled technicians with a sound knowledge of the basic procedures involved. A suitable range of test equipment is listed on page 31. Receivers can be returned to the manufacturers if this course of action is preferred.

N.B. (1) Refer to warning on page 31.

(2) All cores and trimmers are self-locking.

IF RE-ALIGNMENT: The following paragraphs detail the procedures for re-aligning the AM and FM IF stages: if the sensitivity of the receiver varies from range to range, it is probable that the RF stages need attention, and reference should be made to the 'RF Re-alignment' instructions in this section.

(1) AM IF Stages (Fig.6.5)

(a) Connect signal generator to stator of C40 (middle section of tuning gang).

(b) Connect AF power meter (matched to 8Ω to EXT. L.S. socket. **N.B.** Loudspeaker circuit is positive with respect to earth – take care to avoid shorting leads.

(c) Set receiver controls as follows:

RANGE SWITCH : 6
TUNING CONTROL : 150kHz
VOLUME CONTROL : max.
TONE CONTROL : mid-position

(d) Tune generator to centre of IF pass-band, modulated 30% at 400Hz, and adjust L22, L23 and L24 for maximum AF output.

(e) Check that sensitivity is of the order 4—8μV and 50mW output.

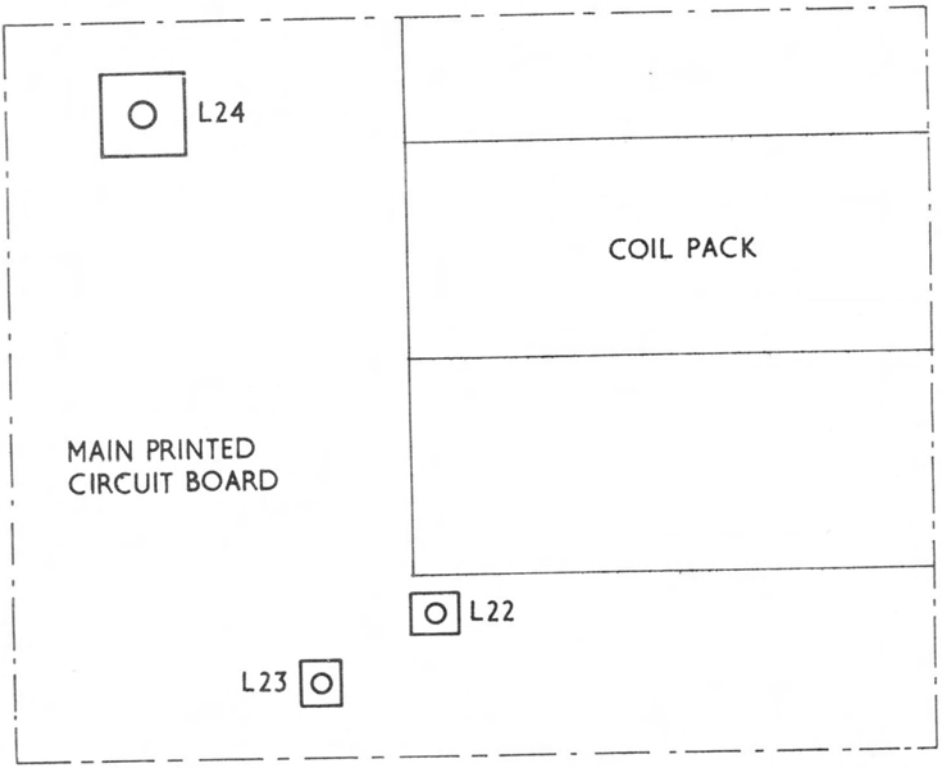


Fig.6.5 Location of AM IF Trimming Adjustments

(2) FM IF Stage (Fig.6.6)

(a) Set receiver controls as follows:

RANGE SWITCH : FM
MONO/STEREO SWITCH : MONO
MUTE SWITCH : OFF
AFC SWITCH : OFF
VOLUME CONTROL : max.
TONE CONTROL : mid-position

(b) Disconnect the coaxial lead at pin 301 on the FM IF and Decoder board, and connect the RF output from the Polyscop (set to 10.7MHz at an attenuator level of -80dB) to this pin, and the detector probe between pins 1 and 2 on IC301 (pin 2 is the 'earthy' side).

(c) Adjust L301 for maximum output, and check that the response is centred around 10.7MHz, with a 6dB bandwidth of 250kHz.

(d) Connect a non-detector probe to the top end of the VOLUME CONTROL and adjust L303 for a symmetrical 'S' curve, centred at 10.7MHz.

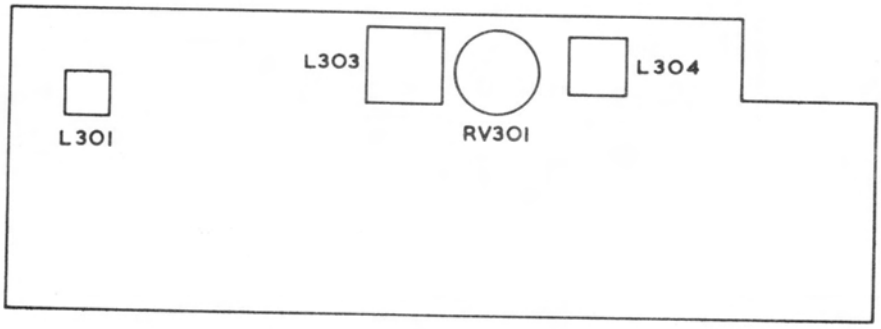


Fig.6.6 Location of FM IF & Decoder Trimming Adjustments

STEREO DECODER ADJUSTMENTS: If the STEREO INDICATOR failed to illuminate during the 'Stereo Decoder Performance Check', the 19kHz pilot tone detector should be checked/adjusted in accordance with the following paragraphs. Fig.6.6 shows the location of L304.

(a) Set receiver controls as follows:

RANGE SWITCH	: FM
TUNING CONTROL	: 90MHz
MUTE SWITCH	: OFF
MONO/STEREO SWITCH	: STEREO
AFC SWITCH	: OFF

(b) Connect the FM signal generator to the AERIAL INPUT socket (SK1), and set to 90MHz at a level of 200μV. Connect the AF signal generator, set to 19kHz, to the modulation input of the FM signal generator.

(c) Vary the frequency of the AF signal generator a kHz or so either side of 19kHz, and check that at some point the STEREO INDICATOR becomes illuminated. Progressively reduce the deviation, at the same time adjusting L304, until the indicator is illuminated for a 19kHz modulating frequency. The indicator should just light with 1–2kHz deviation.

RF RE-ALIGNMENT: The following sub-sections detail the procedure for re-aligning the local oscillator and RF stages of both AM and FM circuits. Figs.6.7 and 6.8 show the location of trimmers and cores associated with the AM and FM ranges respectively.

(1) Re-alignment of AM Local Oscillator Stages (Fig.6.7)

Re-alignment of the local oscillator should only be carried out if scale errors in excess of 1% have been noted. The signal source employed for the following tests should possess an internal scale check facility: Marconi Instruments signal generator Type TF.2002AS is recommended.

If this instrument (or one with a comparable specification) is not available, the necessary adjustments can be carried out by combined use of any stable standard signal generator with a separate crystal-controlled harmonic generator. The procedure given below assumes use of the TF.2002AS because the alternative method can be tedious. Under no circumstances should the re-alignment be attempted using an unchecked signal source.

(a) Connect signal generator to AERIAL INPUT (A1 socket and Earth).

(b) Select Range 1 on the receiver, and set the cursor accurately to 28MHz.

(c) Standardise the generator to 28MHz, modulated 30% at 400Hz.

(d) Trim C61 for maximum signal response, using the carrier-level meter as a tuning indicator.

(e) Standardise the generator at 19MHz, and set receiver cursor to the same frequency.

(f) Adjust core in L15 for maximum signal response.

(g) Repeat adjustments of trimmer and core until inter-action is nullified.

(h) Select Ranges 2 to 6 and repeat the procedure from (b) to (g), adjusting the appropriate trimmers and cores at the frequencies indicated in Table 6.1.

TABLE 6.1 LOCAL OSCILLATOR ALIGNMENT FREQUENCIES AND ADJUSTMENTS

Range	Freq.	Core	Freq.	Trimmer
1	19MHz	L15	28MHz	C61
2	9MHz	L16	16MHz	C62
3	3.8MHz	L17	7.5MHz	C63
4	1.6MHz	L19	3.5MHz	C65
5	600kHz	L18	1300kHz	C64
6	160kHz	L21	330kHz	C67

(2) Re-alignment at AM RF stages (Fig.6.7)

(a) Twist tabs and remove cover from coil pack.

(b) Connect signal generator to AERIAL INPUT (A1 socket and Earth) and set to 28MHz, modulated 30% at 400Hz.

(c) Connect AF power meter (matched to 8Ω) to the EXT. L.S. Socket.
Caution: loudspeaker circuit is at +ve potential w.r.t. earth — take care to avoid shorting leads.

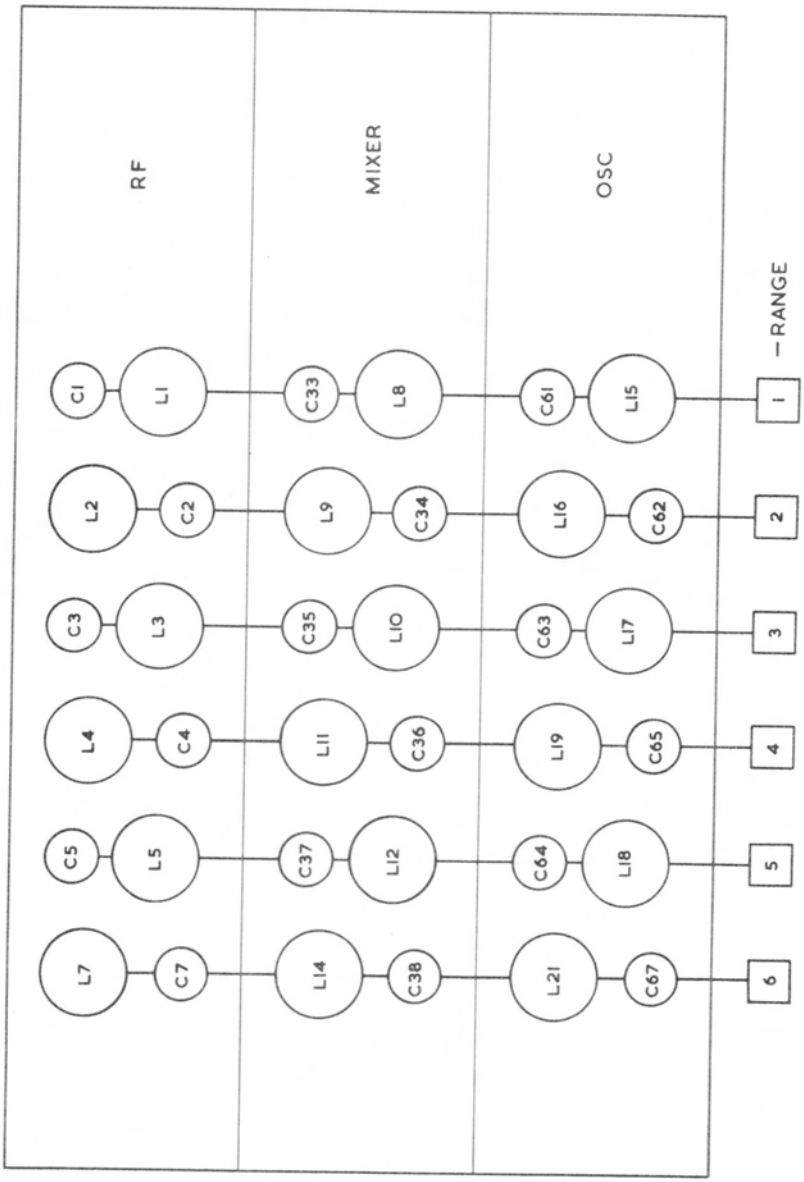


Fig.6.7 Location of AM RF, Mixer, and Oscillator Trimming Adjustments

(d) Tune receiver/generator to 28MHz and adjust trimmers C1 and C33 for maximum reading on output meter. Local oscillator frequency will pull when adjusting C33 but calibration accuracy can be preserved by 'rocking' tuning during adjustment.

(e) Tune receiver/generator to 19MHz and adjust cores in L1 & L8 for maximum output: rock tuning as before.

(f) Repeat adjustments (d) and (e) until interaction is nullified.

(g) Select Ranges 2–6 in turn and adjust trimmers and cores at the frequencies indicated in Table 6.2. Rock tuning for adjustments marked (*).

(h) On completion of alignment on each range, reduce generator o/p to 5μV (15μV on Ranges 5 & 6) and check that the S+N/N ratio is at least 15dB (50mW audio output).

TABLE 6.2 RF/MIXER ALIGNMENT FREQUENCIES AND ADJUSTMENTS

Range	Core Adjustments			Trimmer Adjustments		
	Freq.	RF	Mixer	Freq.	RF	Mixer
1	19MHz	L1	L8*	28MHz	C1	C33*
2	9MHz	L2	L9*	16MHz	C2	C34*
3	3.8MHz	L3	L10	7.5MHz	C3	C35
4	1.6MHz	L4	L11	3.5MHz	C4	C36
5	600kHz	L5	L12	1300kHz	C5	C37
6	160kHz	L7	L14	330kHz	C7	C39

(*) Rock tuning during adjustment

(3) Procedure for setting FM Tuning Potentiometer (RV7)

(a) Set the TUNING CONTROL to the maximum clockwise position.

(b) Slacken the grub screw in one of the nylon gears at the rear of the tuning gang.

(c) Set RV7 for maximum anti-clockwise rotation viewed from the front of the receiver.

(d) Re-tighten the grub screw and check that the tuning potentiometer rotates as the tuning control is moved over the whole of the frequency scale.

(4) Re-alignment of FM Tuner Unit (Fig.6.8)

(a) Set receiver to 88MHz on the scale and adjust RV401 on the DC/DC converter board (mounted adjacent to the mains transformer) to give 2V measured between pin 203 on the FM tuner board and earth. (Avo 8 set to 2.5V DC range.)

(b) Set FM signal generator to 90MHz and connect to AERIAL INPUT (socket SK1).

(c) Set receiver to 90MHz and adjust the oscillator, RF, and aerial coils for maximum reading on the carrier-level meter.

(d) Set generator and receiver to 107MHz.

(e) Adjust the oscillator, RF, and aerial trimmers for maximum reading on the carrier-level meter.

(f) Adjust IF output cores for maximum reading on the carrier-level meter.

(g) Repeat (c) to (e) until no further improvement can be obtained. The sensitivity should be 5μV for 15dB S+N/N.

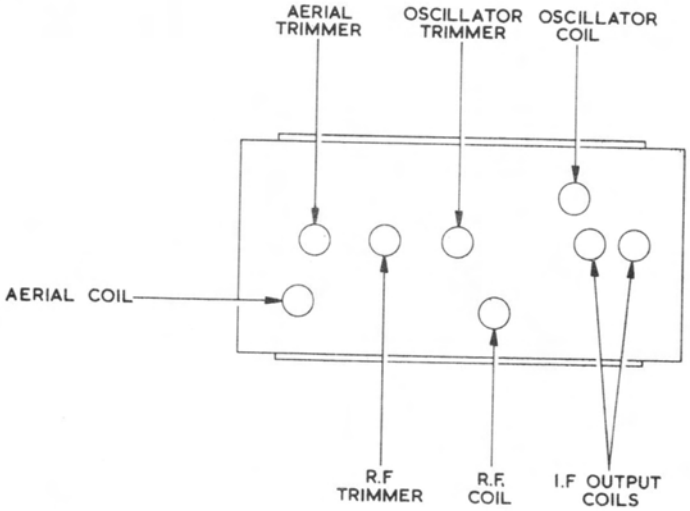


Fig.6.8 Location of FM Tuner Unit Trimming Adjustments

MUTING THRESHOLD: Adjustment of the muting threshold should only be carried out after establishing that the overall FM sensitivity is correct.

(a) Set receiver controls as follows:

RANGE SWITCH	: FM
TUNING CONTROL	: 90MHz
MONO/STEREO SWITCH	: MONO
AFC SWITCH	: OFF
MUTE SWITCH	: ON

(b) Connect the FM signal generator to the AERIAL INPUT (SK1) and set to 90MHz, with 22.5kHz deviation at 1kHz.

(c) Set the output level from the FM signal generator to the desired muting threshold (e.g. 5μV), and adjust RV301 until the receiver just mutes. The location of this component is shown in Fig.6.6 on page 36.

Appendix 'A'

VOLTAGE ANALYSIS

GENERAL

In the event of the receiver failing to operate normally, voltage analysis should be carried out in the sequence given below. Voltages quoted here were taken with a standard 20,000Ω/V testmeter (AVO Model 8): 10% variation should be allowed on all readings to cover the usual zener and semiconductor spread. All voltages are positive w.r.t. circuit earth.

1. Check availability of +11V supply at Power Unit termination No.71, and +9V at No.72.

2. Check availability of +11V, +9V and +18V supplies at PCB terminations listed below:—

Nos.4, 10, 22, 49 & 53	:	+11V when RANGE SWITCH set to positions 1—6.
No.316 (FM IF & Decoder PCB)	:	+11V when RANGE SWITCH set to 'FM'.
No.404 (DC/DC Converter PCB)	:	+11V when RANGE SWITCH set to 'FM'.
No.43	:	+9V when RANGE SWITCH set to positions 1—6.
No.208 (FM Tuner PCB)	:	+9V when RANGE SWITCH set to 'FM'.
No.303 (FM IF & Decoder PCB)	:	+9V when RANGE SWITCH set to 'FM'.
No.50 (Main board)	:	+9V under all conditions of switching.
No.401 (DC/DC Converter PCB)	:	+18V when RANGE SWITCH set to 'FM'.

TRANSISTOR VOLTAGES (FM STAGES)

Table 1 details transistor voltages for the FM stages: all measurements should be made with a 20,000Ω/V testmeter, and with the receiver front panel controls set to the following positions:

SUPPLY SWITCH	: ON
RANGE SWITCH	: FM
AFC SWITCH	: OFF
MONO/STEREO SWITCH	: MONO
MUTE SWITCH	: OFF

TABLE 1 TRANSISTOR VOLTAGES (FM STAGES)

Ref.	Base/Gate 1	Gate 2	Emitter/Source	Collector/Drain
TR301	2.5V	6.4V	3.3V	8.6V
TR302	2.3V	1.7V	2.5V	8.2V
TR303	5V	—	4.7V	10.7V
TR304	5V	—	4.7V	10.7V
TR401	10.4V	—	10.8V	1.9V

Note: Semiconductors in FM Tuner are not accessible for voltage analysis.

IC VOLTAGES (FM STAGES)

The front panel controls should be set to the positions detailed in the previous FM transistor voltages check.

IC301

1 : 1.8V	5 : 0V (Note 1)	9 : 5.3V	13 : 0.25V (Note 4)
2 : 1.8V	6 : 5.4V	10 : 5.3V	14 : 0V
3 : 1.8V	7 : 5.3V (Note 2)	11 : 8.8V	15 : 4.4V
4 : 0V	8 : 5.3V	12 : 4.7V (Note 3)	16 : N/C

IC302

1 : 2.7V	5 : 0V	9 : 5V	13 : 0V
2 : 3.3V	6 : 1.3V (Note 7)	10 : 5V	14 : 2.2V
3 : 1.2V (Note 5)	7 : 0.25V	11 : 10.6V	15 : 2.9V
4 : 0V (Note 6)	8 : 0.25V	12 : 9.5V (Note 8)	16 : 2.9V

Note 1: Voltage rises to 3.2V with mute 'ON' and mute threshold set to maximum.

Note 2: No change when AFC 'ON' and receiver tuned accurately to signal. Swings from 4.9V to 5.7V when the receiver is tuned through the signal.

Note 3: Voltage falls to between 2.8V and 4V with MUTE SWITCH set to 'ON', depending upon setting of mute threshold pot. Voltage falls to zero with signal present.

Note 4: Voltage rises with increasing signal input.

Note 5: Voltage rises to 2V with MONO/STEREO SWITCH set to 'STEREO'. Voltage rises to 3.5V when STEREO indicator lamp illuminated.

Note 6: Voltage rises to 2.2V with MONO/STEREO SWITCH set to 'STEREO'.

Note 7: Voltage rises to 2.2V with MONO/STEREO SWITCH set to 'STEREO'. Voltage rises to 3.7V when STEREO indicator lamp illuminated.

Note 8: Voltage falls to 0.5V with MONO/STEREO SWITCH set to 'STEREO', and STEREO indicator lamp illuminated.

TRANSISTOR VOLTAGES (AM STAGES)

Table 2 details transistor voltages for the AM stages: all measurements should be made with a 20,000Ω/V testmeter, and with the receiver front panel controls set to the following positions:

SUPPLY SWITCH : ON
RANGE SWITCH : RANGE 5
TUNING CONTROL : 1.5MHz
VOLUME CONTROL : Minimum
TONE CONTROL : Mid-position

TABLE 2 TRANSISTOR VOLTAGES (AM STAGES)

Ref.	Emitter/Source	Base/Gate (1)	Gate 2	Collector Drain
TR1	0.85V	0V	–	2.8V
TR2	2.8V	1.2V*	–	9.5V
TR3	0.35V	0V	0.4V**	10.8V
TR4	0.65V	0V	–	9.2V
TR5	3.7V	0.8V*	–	9.3V
TR6	Not fitted			
TR7	Not fitted			
TR8	0.25V	0.8V	–	5.9V
TR9	1.4V	0V	–	6.0V
TR10	4.5V	1.6V*	–	10.5V
TR11	0.85V	1.4V*	–	3.3V
TR12	Not fitted			
TR13	Not fitted			
TR14	9V	10V	–	14V

(*) 10V range
(**) 2.5V range

IC VOLTAGES (AM STAGES)

The front panel controls should be set to the positions detailed in the previous AM transistor voltage check.

IC1

1 : 8.15V	5 : 0V	9 : 5.9V	13 : 0V
2 : 1.3V	6 : 0.4V	10 : 5.3V	14 : 4V
3 : 0.6V	7 : 12μV (Note 1)	11 : 8.1V	
4 : 0V	8 : 8.2V	12 : 0.7V	

IC2 (Note 2)

1 : 0V	4 : 8.6V	7 : 3.7V	10 : 0V
2 : 4.1V	5 : 8.6V	8 : 4V	
3 : 8.6V	6 : 6.5V	9 : 3.2V	

Note 1: Pin 7 measured with testmeter set to 50μA range.

Note 2: RV6 adjusted to set IC2 quiescent current to 10mA.

Appendix 'B'

SEMICONDUCTOR COMPLEMENT

MAIN BOARD AND POWER UNIT

Ref	Type	Mfr	Circuit Function
TR1	UC734B	Solidev	Cascode RF Amplifier
TR2	3N128	RCA	
TR3	40673	RCA	Mixer
TR4	3N128	RCA	Local Oscillator (VFO)
TR5	UC734B	Solidev	Local Oscillator (Buffer)
TR6			Not fitted
TR7			Not fitted
TR8	BC107B	Mullard	2nd 455kHz IF Amplifier
TR9	UC734B	Solidev	IF AGC Isolator
TR10	UC734B	Solidev	IF AGC Controller
TR11	BC107B	Mullard	IF AGC Amplifier
TR12			Not fitted
TR13			Not fitted
TR14	2N4921	RCA	Voltage Regulator (9V supply)
IC1	CA3046	RCA	(1) 1st 455kHz IF Amplifier (2) 3rd 455kHz IF Amplifier (3) Emitter Follower (AM Det.) (4) RF AGC Amplifier
IC2	TAA300	Mullard	Main Audio Amplifier
PC1	8 x 1N4148	Newmarket	Input Protection (Diode Package)
D1			Not fitted
D2	1S44	Texas	Oscillator Bias Diode
D3			Not fitted
D4	BZY88/C9V1	Mullard	Zener Regulator (9.1V)
D5/6	2 x 1S44	Texas	IF AGC Control Elements
D7/8	2 x 1S44	Texas	AM Detector Bias Diodes
D9	1S44	Texas	AM Detector
D10/11	2 x 1S44	Texas	RF AGC Rectifier
D12	BZY88/C6V8	Mullard	Zener Regulator (6.8V)
D13/14	2 x 1S44	Texas	IF AGC Rectifier

MAIN BOARD AND POWER UNIT (continued)

Ref	Type	Mfr	Circuit Function
D15			Not fitted
D16			Not fitted
D17			Not fitted
D18	BZY95/C11	Mullard	Zener Regulator (11V)
D19			Not fitted
D20	BZY88/C10	Mullard	Zener Regulator (10V)
D21	DD0006	Lucas	Reverse Polarity Protection
D22	0SH01/A-100	Mullard	Supply Rectifier (Bridge)

FM IF AND DECODER BOARD

Ref	Type	Mfr	Circuit Function
TR301	40841	RCA	1st 10.7MHz IF Amplifier
TR302	40841	RCA	2nd 10.7MHz IF Amplifier
TR303	BC107B	Mullard	Stereo L.H. Output buffer
TR304	BC107B	Mullard	Stereo R.H. Output buffer
IC301	CA3089	RCA	(1) Limiter (2) Detector (3) AFC Function (4) Muting Function
IC302	CA3090	RCA	(1) Stereo Decoder (2) Stereo Indicator Drive (3) Mono/Stereo selection
D23	LED/5082/4440	Hewlett Packard	Mono/Stereo Indicator

FM TUNER BOARD

Ref	Type	Mfr	Circuit Function
TR201			RF Amplifier (FM Tuner)
TR202			Local Oscillator (FM Tuner)
TR203			Mixer (FM Tuner)
D201			FM Tuning
D202			AFC
D203			FM Tuning
D204			

DC/DC CONVERTER BOARD

Ref	Type	Mfr	Circuit Function
TR401	2N3702	Texas	Oscillator
D401	1S44	Texas	
D402	1S44	Texas	Voltage Doubler
D403	BZY88/C18	Mullard	Zener Regulator

APPENDIX 'C'

COMPONENT VALUES TOLERANCES AND RATINGS

MAIN PRINTED CIRCUIT BOARD

CAPACITORS (see page 56 for Code/Manufacturers' Ref. Nos. etc.)

Ref	Value	Type	Tol	Wkg V	Cde
C1	4–30pF	Foil Trimmer	–	–	A
C2	4–30pF	Foil Trimmer	–	–	A
C3	4–30pF	Foil Trimmer	–	–	A
C4	4–30pF	Foil Trimmer	–	–	A
C5	4–30pF	Foil Trimmer	–	–	A
C6	–	Ref. not allocated	–	–	–
C7	4–30pF	Foil Trimmer	–	–	A
C8	170pF	Polystyrene	5%	125V	C
C9	50pF	Polystyrene	5%	125V	C
C10	–	Ref. not allocated	–	–	–
C11	–	Ref. not allocated	–	–	–
C12	–	Ref. not allocated	–	–	–
C13	12–358pF	Air-spaced Variable	–	–	–
C14	60pF	Tubular Ceramic	10%	750V	G
C15	0.1μF	Polycarbonate	10%	100V	E
C16	0.1μF	Polycarbonate	10%	100V	E
C17	0.1μF	Polycarbonate	10%	100V	E
C18	0.1μF	Polycarbonate	10%	100V	E
C19	25pF	Tubular Ceramic	0.25pF	750V	X
C20	2pF	Tubular Ceramic	0.25pF	750V	F
C21	3pF	Tubular Ceramic	0.25pF	750V	G
C22	–	Ref. not allocated	–	–	–
C23	47pF	Polystyrene	10%	125V	C
C24	0.001μF	Disk Ceramic	+80% -20%	500V	H
C25	200pF	Polystyrene	5%	125V	C
C26	50pF	Polystyrene	5%	125V	C
C27	–	Ref. not allocated	–	–	–
C28	–	Ref. not allocated	–	–	–
C29	–	Ref. not allocated	–	–	–
C30	–	Ref. not allocated	–	–	–
C31	0.01μF	Metallised Paper	20%	250V	I

CAPACITORS (continued)

Ref	Value	Type	Tol	Wkg V	Cde
C32	0.01μF	Metallised Paper	20%	250V	I
C33	4–30pF	Foil Trimmer	–	–	A
C34	4–30pF	Foil Trimmer	–	–	A
C35	4–30pF	Foil Trimmer	–	–	A
C36	4–30pF	Foil Trimmer	–	–	A
C37	4–30pF	Foil Trimmer	–	–	A
C38	–	Ref. not allocated	–	–	–
C39	4–30pF	Foil Trimmer	–	–	A
C40	12–358pF	Air-spaced Variable	–	–	–
C41	60pF	Tubular Ceramic	10%	750V	G
C42	0.1μF	Polycarbonate	10%	100V	E
C43	150pF	Polystyrene	2%	125V	C
C44	0.1μF	Polycarbonate	10%	100V	E
C45	0.1μF	Polycarbonate	10%	100V	E
C46	0.1μF	Polycarbonate	10%	100V	E
C47	0.1μF	Polycarbonate	10%	100V	E
C48	0.047μF	Polycarbonate	10%	100V	E
C49	140pF	Polystyrene	5%	125V	C
C50	0.0049μF	Polystyrene	1%	125V	C
C51	39pF	Polystyrene	5%	125V	C
C52	0.003μF	Polystyrene	1%	125V	C
C53	1370pF	Polystyrene	1%	125V	C
C54	470pF	Polystyrene	1%	125V	C
C55	180pF	Polystyrene	1%	125V	C
C56 to C59	–	Ref. not allocated	–	–	–
C60	–	Ref. not allocated	–	–	–
C61	7–35pF	Disk Ceramic Trimmer	–	–	J
C62	7–35pF	Disk Ceramic Trimmer	–	–	J
C63	7–35pF	Disk Ceramic Trimmer	–	–	J
C64	7–35pF	Disk Ceramic Trimmer	–	–	J
C65	7–35pF	Disk Ceramic Trimmer	–	–	J
C66	–	Ref. not allocated	–	–	–
C67	7–35pF	Disk Ceramic Trimmer	–	–	J
C68	–	Ref. not allocated	–	–	–
C69	–	Ref. not allocated	–	–	–
C70	18–364pF	Air-spaced Variable	–	–	–

CAPACITORS (continued)

Ref	Value	Type	Tol	Wkg V	Cde
C71	100pF	Polystyrene	5%	125V	C
C72	100pF	Polystyrene	5%	125V	C
C73	0.047μF	Plate Ceramic	+80% -20%	30V	K
C74	0.1μF	Polycarbonate	10%	100V	E
C75	0.01μF	Polycarbonate	10%	100V	E
C76	–	Ref. not allocated	–	–	–
C77	–	Ref. not allocated	–	–	–
C78	0.047μF	Plate Ceramic	+80% -20%	30V	K
C79	10μF	Tantalum	20%	16V	L
C80 to C84	–	Ref, not allocated	–	–	–
C85	0.0047μF	Polystyrene	1%	63V	C
C86	0.0047μF	Polystyrene	1%	63V	C
C87	100pF	Polystyrene	5%	125V	C
C88	0.1μF	Polycarbonate	10%	100V	E
C89	0.001μF	Polystyrene	2%	125V	C
C90	0.1μF	Polycarbonate	10%	100V	E
C91	10μF	Tantalum	20%	16V	L
C92	0.0032μF	Polystyrene	5%	125V	C
C93	0.1μF	Polycarbonate	10%	100V	E
C94	0.1μF	Polycarbonate	10%	100V	E
C95	0.1μF	Polycarbonate	10%	100V	E
C96	0.1μF	Polycarbonate	10%	100V	E
C97	0.001μF	Polystyrene	2%	125V	C
C98	0.1μF	Polycarbonate	10%	100V	E
C99A	0.1μF	Polyester Film	20%	250V	B
C100	0.1μF	Polycarbonate	10%	100V	E
C101	0.0022μF	Silvered Mica	5%	200V	M
C102	0.001μF	Disk Ceramic	+80% -20%	500V	H
C103	0.1μF	Polycarbonate	10%	100V	E
C104	200pF	Polystyrene	5%	125V	C
C105	0.047μF	Plate Ceramic	+80% -20%	30V	K
C106	0.001μF	Disk Ceramic	+80% -20%	500V	H
C107	0.1μF	Disk Ceramic	+80% -20%	500V	P
C108	0.1μF	Polycarbonate	10%	100V	E
C109	0.1μF	Polycarbonate	10%	100V	E
C110	0.1μF	Polycarbonate	10%	100V	E

CAPACITORS (continued)

Ref	Value	Type	Tol	Wkg V	Cde
C111	0.1μF	Polycarbonate	10%	100V	E
C112	0.1μF	Polycarbonate	10%	100V	E
C113	0.47μF	Polycarbonate	10%	100V	E
C114	–	Ref. not allocated	–	–	–
C115	0.47μF	Polycarbonate	10%	100V	E
C116	0.1μF	Polycarbonate	10%	100V	E
C117	0.005μF	Metallised Paper	20%	250V	I
C118	0.1μF	Polycarbonate	10%	100V	E
C119	0.1μF	Polycarbonate	10%	100V	E
C120 to C135	–	Ref. not allocated	–	–	–
C136	0.022μF	Polycarbonate	10%	100V	E
C137	0.01μF	Polycarbonate	10%	100V	E
C138	150μF	Tubular Electrolytic	+50% -10%	16V	V
C139	470μF	Tubular Electrolytic	+50% -10%	25V	U
C140	22μF	Tantalum	20%	16V	L
C141	0.047μF	Plate Ceramic	+80% -20%	30V	K
C142	470μF	Tubular Electrolytic	+50% -10%	25V	U
C143	0.1μF	Disk Ceramic	+80% -20%	500V	P
C144	1000μF	Tubular Electrolytic	+100% -20%	16V	R
C145	7500μF+				
C146	7500μF	Dual Electrolytic	+50% -10%	16V	T
C147	1μF	Polycarbonate	10%	400V	E
C148	0.005μF	Disk Ceramic	+80% -20%	3000V	S
C149	0.005μF	Disk Ceramic	+80% -20%	3000V	S
C150	0.005μF	Disk Ceramic	+80% -20%	3000V	S
C151 to C160	–	Ref. not allocated	–	–	–
C161*	0.001μF	Disk Ceramic	+80% -20%	500V	H
C162*	0.001μF	Disk Ceramic	+80% -20%	500V	H
C163**	15pF	Polystyrene	1%	125V	C
C164	3pF	Tubular Ceramic	¼pF	750V	F
C165	0.1μF	Disk Ceramic	20%	500V	P
C166	0.1μF	Disk Ceramic	20%	500V	P
C167	0.1μF	Disk Ceramic	+80% -20%	500V	P

*Mounted on FM Tuner Board **Not fitted on 1002/1

CAPACITORS (continued)

Ref	Value	Type	Tol	Wkg V	Cde
C168*	4.7μF	Tantalum	20%	20V	L
C169*	0.047μF	Plate Ceramic	+80% -20%	30V	K
C170*	0.1μF	Polycarbonate	10%	100V	E
C171	0.047μF	Polycarbonate	10%	100V	E

*Mounted on FM Tuner Board **Not fitted on 1002/1

RESISTORS (see page 55 for Manufacturers' Ref. No.)

Ref	Value	Tol	Rtg
R1	Not used	–	–
R2	Not used	–	–
R3	Not used	–	–
R4	1.8M	10%	0.1W
R5	270	5%	0.1W
R6	22	5%	0.1W
R7	0.1M	5%	0.1W
R8	4.7M	10%	0.1W
R8A	0.47M	10%	0.1W
R9	180	10%	0.1W
R10	Not used	–	–
R11	2,700	5%	0.1W
R12	2,200	5%	0.1W
R13	2,200	5%	0.1W
R14	1M	5%	0.1W
R15	4,700	5%	0.1W
R16	0.47M	5%	0.1W
R17	33,000	5%	0.1W
R18	270	5%	0.1W
R19	22	5%	0.1W
R20	220	5%	0.1W
R21	Not used	–	–
R22	470	5%	0.1W
R23	220	5%	0.1W

Ref	Value	Tol	Rtg
R24	390	5%	0.1W
R25	Not used	–	–
R26	0.1M	5%	0.1W
R27	22	5%	0.1W
R28	330	5%	0.1W
R29	0.22M	5%	0.1W
R30	100	5%	0.1W
R31	270	5%	0.1W
R32	820	5%	0.1W
R33	Not used	–	–
R34	Not used	–	–
R35	47	5%	0.1W
R36 to R40	Not used	–	–
R41	220	5%	0.1W
R42	5,600	5%	0.1W
R43	8,200	5%	0.1W
R44	27,000	5%	0.1W
R45	3,300	5%	0.1W
R46	47,000	5%	0.1W
R47	5,600	5%	0.1W
R48	3,300	5%	0.1W
R49	390	5%	0.1W
R50	27,000	5%	0.1W

RESISTORS (continued)

Ref	Value	Tol	Rtg
R51	5,600	5%	0.1W
R52	2,700	5%	0.1W
R53	390	5%	0.1W
R54	150	5%	0.1W
R55	0.47M	5%	0.1W
R56	1.8M	10%	0.1W
R57	470	5%	0.1W
R58	1,000	5%	0.1W
R59	1,000	5%	0.1W
R60	4,700	5%	0.1W
R61	33,000	5%	0.1W
R62	47,000	5%	0.1W
R63	330	5%	0.1W
R64	3,300	5%	0.1W
R65	0.22M	5%	0.1W
R66	47,000	5%	0.1W
R67	22,000	5%	0.1W
R68	3.3M	10%	0.1W
R69	Not used	—	—
R70	Not used	—	—
R71	22,000	5%	0.1W
R72	27,000	5%	0.1W
R73	3,300	5%	0.1W
R74	390	5%	0.1W
R75	68,000	5%	0.1W
R76	12,000	5%	0.1W

Ref	Value	Tol	Rtg
R77	330	5%	0.1W
R78	4,700	5%	0.1W
R79	Not used	—	—
R80 to R95	Not used	—	—
R96	47	5%	0.1W
R97	8 WW	5%	2.5W
R98	10 WW	5%	6W
R99	0.15M	5%	0.1W
R100	10	10%	0.5W
R101	330	5%	0.1W
R102	5 WW	5%	2.5W
R103	Not used	—	—
R104	33	10%	0.5W
R105	5 WW	5%	2.5W
R106	2.2 WW	5%	2.5W
R107 to R118	Not used	—	—
R119*	220	5%	0.1W
R120 to R160	Not used	—	—
R161	2.2M	5%	0.1W
R162	2.2M	5%	0.1W
R163	10,000	5%	0.1W
R164	6,800	5%	0.1W

*Mounted on FM Tuner Board

FM IF AND DECODER BOARD

CAPACITORS (see page 56 for Code/Manufacturers' Ref. No. etc.)

Ref	Value	Type	Tol	Wkg V	Cde
C301	–	Ref. not allocated	–	–	–
C302	–	Ref. not allocated	–	–	–
C303	0.001μF	Disk Ceramic	+80% -20%	500V	H
C304	0.001μF	Disk Ceramic	+80% -20%	500V	H
C305	0.001μF	Disk Ceramic	+80% -20%	500V	H
C306	0.001μF	Disk Ceramic	+80% -20%	500V	H
C307	36pF	Polystyrene	1pF	125V	C
C308	0.001μF	Disk Ceramic	+80% -20%	500V	H
C309	0.001μF	Disk Ceramic	+80% -20%	500V	H
C310	0.001μF	Disk Ceramic	+80% -20%	500V	H
C311	0.001μF	Disk Ceramic	+80% -20%	500V	H
C312	0.001μF	Disk Ceramic	+80% -20%	500V	H
C313	0.001μF	Disk Ceramic	+80% -20%	500V	H
C314	0.01μF	Polycarbonate	10%	100V	E
C315	0.01μF	Polycarbonate	10%	100V	E
C316	100pF	Polystyrene	2%	125V	C
C317	0.047μF	Plate Ceramic	+80% -20%	30V	K
C318	0.047μF	Plate Ceramic	+80% -20%	30V	K
C319	3.3μF	Tantalum	20%	16V	L
C320	3.3μF	Tantalum	20%	16V	L
C321	3.3μF	Tantalum	20%	16V	L
C322	3.3μF	Tantalum	20%	16V	L
C322A	100pF	Polystyrene	5%	125V	C
C323	470μF	Tubular Electrolytic	+50% -10%	25V	U
C324	0.0039μF	Polystyrene	5%	125V	C
C325	0.047μF	Plate Ceramic	+80% -20%	30V	K
C326	22μF	Tantalum	20%	16V	L
C327	0.47μF	Tantalum	20%	35V	L
C328	1μF	Tantalum	20%	35V	L
C329	0.0047μF	Polystyrene	5%	125V	C
C330	0.0047μF	Polystyrene	5%	125V	C
C331	470μF	Tubular Electrolytic	+50% -10%	25V	U

RESISTORS (see page 55 for Manufacturers' Ref. No.)

Ref	Value	Tol	Rtg
R301	Not used	–	–
R302	Not used	–	–
R303	330	5%	0.1W
R304	27,000	5%	0.1W
R305	12,000	5%	0.1W
R306	3,300	5%	0.1W
R307	10,000	5%	0.1W
R308	100	5%	0.1W
R309	1,000	5%	0.1W
R310	330	5%	0.1W
R311	27,000	5%	0.1W
R312	10,000	5%	0.1W
R313	33,000	5%	0.1W
R314	8,200	5%	0.1W
R315	100	5%	0.1W
R316	100	5%	0.1W
R317	680	5%	0.1W
R318	680	5%	0.1W
R319	680	5%	0.1W
R320	330	5%	0.1W
R321	10	5%	0.1W

Ref	Value	Tol	Rtg
R322	2,700	5%	0.1W
R323	4,700	5%	0.1W
R324	47,000	–	–
R325	10,000	5%	0.1W
R326	47,000	5%	0.1W
R327	12,000	5%	0.1W
R328	6,800	5%	0.1W
R329	27,000	5%	0.1W
R330	47,000	5%	0.1W
R331	1,000	5%	0.1W
R332	22	5%	0.1W
R333	680	5%	0.1W
R334	27,000	5%	0.1W
R335	390	5%	0.1W
R336	10,000	5%	0.1W
R337	10,000	5%	0.1W
R338	47	5%	0.1W
R339	1,800	5%	0.1W
R340	1,800	5%	0.1W
R341	8,200	5%	0.1W
R342	2,200	5%	0.1W

FM TUNER UNIT

Spares not available for this item.

DC/DC CONVERTER BOARD

CAPACITORS (see page 56 for Code/Manufacturers' Ref. No. etc.)

Ref	Value	Type	Tol	Wkg V	Cde
C401	1400pF	Polystyrene	2%	125V	C
C402	1400pF	Polystyrene	2%	125V	C
C403	10µF	Tantalum	20%	20V	L
C404	250pF	Polystyrene	2%	125V	C
C405	0.47µF	Polycarbonate	10%	100V	E
C406	3.3µF	Tantalum	20%	35V	L
C407	10µF	Tantalum	20%	20V	L

RESISTORS (see below for Manufacturers' Ref. No.)

Ref	Value	Tol	Rtg
R401	560	5%	0.1W
R402	1,500	5%	0.1W

Ref	Value	Tol	Rtg
R403	22,000	5%	0.1W
R404	22	5%	0.1W

MANUFACTURERS' REFERENCE NUMBERS

RESISTORS

All resistors listed in Appendix C, with the following exceptions, are MULLARD Type CR25.

R97	WELWYN Type W.21
R98	WELWYN Type W.22
R100	ERIE Type BTT
R102	WELWYN Type W.21
R104	ERIE Type BTT
R105	WELWYN Type W.21
R106	WELWYN Type W.21

CAPACITORS

Code	Manufacturer	Type	Ref. No.
A	Dau	Foil Dielect. Trimmer	107-34S
B	Mullard	Polyester film	C280AE/P100K
C	GEC	Polystyrene	PF125
D	–	Not allocated	–
E	ITT	Met. Polycarbonate	PMA
F	Lemco	Tub. Ceramic	310S
G	Lemco	Tub. Ceramic	310
H	Erie	Disk Ceramic	K350081/831
I	Erie	Met. Paper	W99
J	Steatite	Disk Cer. Trimmer	7S Triko N1500-02
K	Lemco	Plate Ceramic	1212K
L	Union Carbide	Tantalum	Kemet 'E' Series
M	Matthey	Silvered Mica	C12F
N	Erie	Disk Ceramic	K800011/801
O	–	Not allocated	–
P	Erie	Disk Ceramic	K800011/CD17
Q	Erie	Disk Ceramic	K350081/811
R	Erie	Tubular Electrolytic	211 Series
S	Erie	Disk Ceramic	K350011
T	Mullard	Tub. Electrolytic	072-15752
U	Mullard	Tub. Electrolytic	017-16471
V	Mullard	Tub. Electrolytic	016-15151
W	Erie	Tub. Ceramic	SN1300/YD
X	Erie	Tub. Ceramic	NPO/YD
Y	Mullard	Tub. Electrolytic	016-16101
Z	Mullard	Tub. Electrolytic	015-16229

N.B. EQUIVALENT TYPES WILL BE FITTED WHERE SPECIFIED COMPONENTS ARE NOT AVAILABLE AT TIME OF MANUFACTURE.

Appendix 'D'

LIST OF SPARES FOR MODEL 1002 RECEIVER

The following list details all major spares applicable for use with the Receiver. Spares should be ordered by quoting the Circuit Ref. (where applicable), the written description given in the list and the Part No. in the right-hand column.

Spares falling in the following categories are not included in this list but will be found in Appendices 'B' and 'C':—

SEMICONDUCTORS CAPACITORS (excluding variables) RESISTORS

The Serial No. of the receiver should be quoted in all communications which should be addressed to:—

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

Ref	Description	Part No.
	MAJOR SUB-ASSEMBLIES	
	Main Printed Circuit Board	LP3354/1
	FM IF & Decoder Board	LP3354/2
	* FM Tuner Unit (on support board)	LP3354/4
	DC/DC Converter Board	LP3354/3
	Power Unit	D4701/1
	(*) Spares are not available for this unit.	
	SWITCHES	
S1	RANGE SWITCH : : Wafers S1A, B, & D†	D4695
	Wafers S1C, E, F, G, H, & I	8528P
	Clicker Mechanism	D4603
S2	AFC SWITCH (Min. SPDT toggle)	6760P
S3	MUTE SWITCH (Min. SPDT toggle)	6760P
S4	MONO/STEREO SWITCH (Min. SPDT toggle)	6760P
S5	SUPPLY SWITCH : : Min. 4 pole 3-posn toggle	8634P
	SUPPLY SWITCH MODEL 1002/1 : : Min. 2-posn toggle	7352P
S6	DIAL/METER : : Min. biased 3-posn toggle	8733P

†Not fitted on 1002/1

Ref	Description	Part No.
	POTENTIOMETERS	
RV1	Ref. not allocated	
RV2	Ref. not allocated	
RV3	Ref. not allocated	
RV4	TONE CONTROL : 50,000Ω	8700P
RV5	VOLUME CONTROL : 50,000Ω	8700P
RV6	IC2 ADJUSTER : : 22,000Ω pre-set	8734P
RV7	FM TUNING POT : : 20,000Ω 20% Log	8727P
RV301	MUTE THRESHOLD ADJ : : 47,000Ω	6488P
RV401	FM TRIM ADJ : : 4,700Ω	6844P
	VARIABLE CAPACITORS AND TRIMMERS	
	3-gang Tuning Capacitor (2 x 12 – 358pF + 1 x 18 – 364pF)	7357PD
	4–30pF Disk Trimmer (foil dielectric)	8735P
	7–35pF Disk Trimmer (coamic)	8468P
	PLUGS AND SOCKETS	
PL1	Ref. not allocated	
PL2	Loudspeaker Plug	8687P
PL3	DC Supply Connector (Chassis mounted)	7130P
PL4	AC Supply Connector (Chassis mounted)	D2310/2
PL5	Scale lamp Connector (male portion)	6083P
–	Telephone Plug	6567P
SK1	FM Aerial Socket	6087P
SK2	Loudspeaker socket	8857P
SK3	DC Supply Connector (with 2-core lead)	D3641
SK4	AC Supply Connector (with 3-core lead)	D2311/1
SK5	Scale lamps Connector (female portion)	6089P
JK1	L.H. Stereo Socket	
JK2	R.H. Stereo Socket	
JK3	TAPE Socket (Combined unit)	7840P
JK4	AF INPUT Socket	
JK5	Telephone headset socket	8736P

Ref	Description	Part No.
	FILTERS	
FL1	Ref. not allocated	
FL2	455kHz Ceramic ladder Filter	8859P
FL301	10.7MHz Ceramic ladder Filter	9010P
	INDUCTORS	
L1	Range 1 RF Coil	D4630
L2	Range 2 RF Coil	D4578
L3	Range 3 RF Coil	D4579
L4	Range 4 RF Coil	D4631
L5	Range 5 RF Coil	D4632
L7	Range 6 RF Coil	D4583
L8	Range 1 Mixer Coil	D4584
L9	Range 2 Mixer Coil	D4585
L10	Range 3 Mixer Coil	D4586
L11	Range 4 Mixer Coil	D4633
L12	Range 5 Mixer Coil	D4634
L14	Range 6 Mixer Coil	D4590
L15	Range 1 Oscillator Coil	D4635
L16	Range 2 Oscillator Coil	D4592
L17	Range 3 Oscillator Coil	D4636
L18	Range 5 Oscillator Coil	C4637
L19	Range 4 Oscillator Coil	D4638
L21	Range 6 Oscillator Coil	D4687
L22	455kHz IF Bandpass Coil (pri)	D4571
L23	455kHz IF Bandpass Coil (sec)	D4571
L24	455kHz Detector transformer	D4570
L301	10.7MHz IF Coil	D4689
L302	Inductor	D4688
L303	FM Detector Coil	D4690
L304	Multiplex Coil	D4691
	CHOKES	
CH1	100mH	7350P
CH2	4.7mH	7755P
CH3	560mH	8042P

Ref	Description	Part No.
	CHOKES (continued)	
CH4	Ref. not allocated	
CH5	Mains filter	D2854
CH6	Mains filter	D2854
CH7	Headset filter	D2854
CH401	Choke	8428P
CH402	100mH	7350P
	TRANSFORMERS	
T1	Mains Transformer	8527P
	DRIVE MECHANISM & ASSOCIATED ITEMS	
	Drive Mechanism (complete with cord drum)	LP3326
	Vernier Dial	D4608
	Drive Cord (complete with eyelets)	D4709
	Cursor	8244/1P
	Flywheel	8469P
	Guide Pulleys	6125P
	Jockey Spring	5237P
	Coil Spring (for scale drum)	8355P
	Dial Window	8601P
	Vernier Window	8598P
	Diffusion Strip	8597P
	CONTROL KNOBS	
	Tuning	D4704
	Range Switch	D4706
	Tone Control	D4705
	Volume Control	D4705
	FUSES & LAMPS	
	Fuseholder	6372P
	Cartridge Fuse 1-Amp rating	7173P
	Cartridge Fuse 2-Amp rating	6704P
	Scale Lamp (12V @ 80mA, wire-ended)	8448P
	Stereo Indicator (LED/5082/4440)	9011P

Ref	Description	Part No.
	MISCELLANEOUS	
	Panel Handles	8253/1P
	Meter	8619P
	Loudspeakers	8860P
	Flexible coupler	LP3310
	Solid coupler	7353P
	Trimming Tool No. 1	8333P
	Trimming Tool No. 2 Type H.S.1.	8450P
	Top Cover	8489P/TOP
	Dial Light Cover (complete with lamps)	D4628
	Bottom Cover	8489P/BTM
	Receiver Support	8602P
	Mounting Plate for 8602P	8603P
	Dial Strips – FM & Range 1	8696P
	Ranges 2 & 3	8551P
	Ranges 4 & 5	8554P
	Range 6	8697P
	* Telescopic Aerial	9012P
	* Ni Cd Battery (DEAC 10/500DKZ – DB328)	8863P

*Not fitted on 1002/1

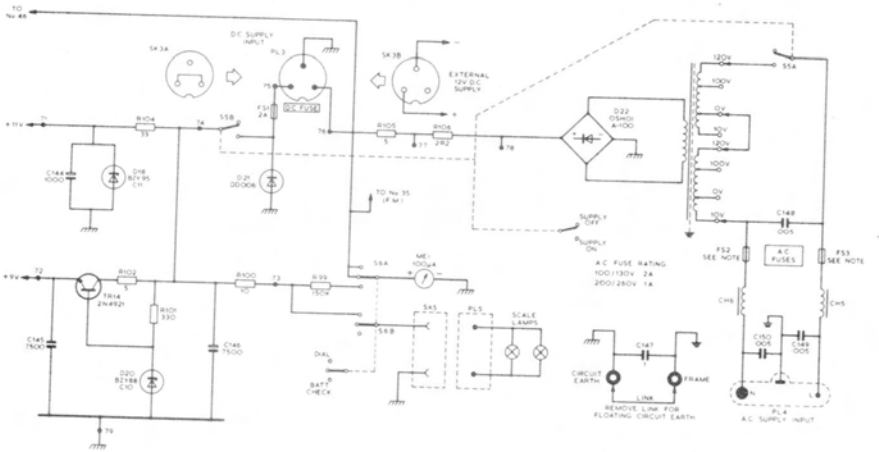
Appendix 'E'

RECEIVER VARIANTS

MODEL 1002/1

This is identical to Model 1002, except for the following details:

1. No telescopic aerial.
2. No internal battery.
3. The 3-position SUPPLY SWITCH is charged to a 2-position switch (i.e. there is no CHARGE position).
4. Switch wafer S1D is omitted.
5. C163 (15pf) is omitted.



Modified Power Supply Circuit for Model 1002/1

MODEL 1002/2

This is based on Model 1002. It differs from the basic model in that:

1. No telescopic aerial is fitted, the AM aerial input is different.
2. No standby battery is fitted.
3. The 3 position SUPPLY SWITCH is changed to a 2 position switch, as on the 1002/1.
4. The STEREO DECODER, INDICATOR LAMP and SWITCH have been removed.
5. A 600Ω line output is fitted.
6. A new aerial protection circuit is fitted.

These changes are detailed below. When this handbook is supplied with a Model 1002/2 receiver it is recommended that these changes are marked in the body of the texr.

Performance Summary. Audio output. Add:
Line output: 10mW maximum into 600Ω (adjustable preset level).

Circuit Description. (The RF Section)
Tunable stages - AM

The input sockets A1, A2 and AE, and diode package PC1 are not fitted to the 1002/2. The first three sentences of this section should be ignored and the following description substituted:

> Aerial connection is made to SK6 and this feeds to the make contact of relay RLA/1. From the moving contact of RLA/1 the signal passes to the wiper of RANGE SWITCH SIC and so to the input tuned stages on the AM Board. The break contact of the relay is connected to chassis earth. The protection circuit functions thus: an increasing signal at the input is detected by diode D501 and C504 and appears as an increasing current flowing into the base of TR501. TR501 turns "on" turning TR502 "off" and releasing the relay. The receiver input is therefore open circuited and the input tuned stages are shorted to chassis. Spark gap SG501 connected across the input provides some measure of protection from high voltage transients during the time taken for the relay to operate. The supply for this circuit is taken from the + 11V rail.

IF Amplifier/Detector and Stereo Decoder - FM
The stereo decoder is not fitted to the model 1002/2. A preamplifier is added to make up the gain lost in removing IC302. The audio section is extended by the addition of the 600Ω line amplifier and the description which follows replaces the last paragraph of page 9 and the first three of page 10.

> AF signals from the output of IF Amplifier/Limiter/Detector IC301 are coupled via C321 and R328 to the audio preamplifier stage incorporating TR303. This is a common emitter amplifier providing approximately 6dB gain to replace that lost by removing IC302. Signals from the output of the AM stage are combined at the output of this amplifier and fed to the volume control RV5 via C326. R336 provides some buffering for the output to JK3 (Recording output).

The Audio Section.

Combined audio signals from the AM and FM stages are fed to the volume control RV5 and line level preset potentiometer RV604 in parallel. The wiper of RV5 is connected to IC2 as on the standard 1002, and the wiper of RV604 feeds the 600Ωline amplifier board. The line amplifier is a two stage common emitter RC coupled amplifier with the primary winding of the output transformer forming the collector load of the second stage. The output from the transformer secondary is 10mW maximum into 600Ω and appears on three screw terminals on the rear panel, so allowing connection to be made in the balanced floating, balanced earthed or single-ended modes. The adjacent earth terminal (and the transformer screen) are connected to chassis earth.

INSTALLATION

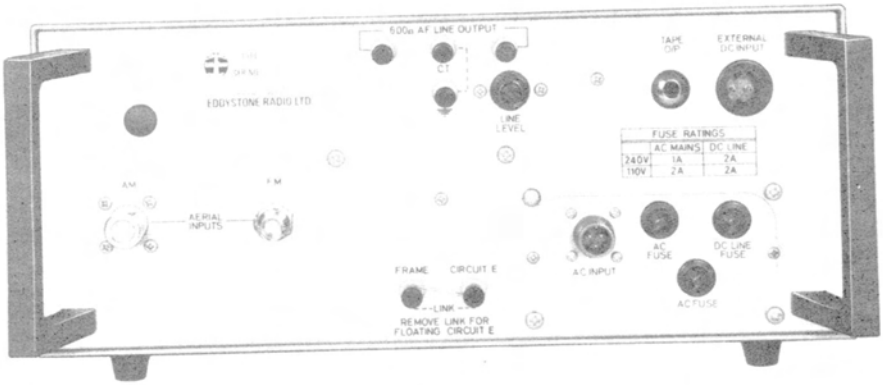
The contents of the accessories kit have changed. Table 4.1 will now read:

Quantity	Description	Part No.
1	AC SUPPLY CONNECTOR (complete with 3 core cable)	D4970
1	DC SUPPLY CONNECTOR (wired with link for AC working)	D3640
1	DC SUPPLY LEAD (2m 2 core cable for DC connector)	8686P
1	AERIAL PLUG (BNC for SK1.FM)	8012P
1	AERIAL PLUG ('N' Type for SK1.AM)	9421P
1	TRIMMING TOOL	8333P
1	TRIMMING TOOL	8450P
1	SPARE FUSE 1- Amp	7173P
1	SPARE FUSE 2- Amp	6704P
1	SPARE DIAL BULB (12V at 80mA, wire ended)	8448P

Fig 4.3 and the notes regarding input connections A1,A2 and AE are not applicable to model 1002/2. Instead two coaxial aerial input sockets are provided, one for ranges 1 - 6 (AM) and one for the VHF range. A suitable external aerial system should be connected to each of these input sockets. For safety reasons, a local earth should be used if available. The AM input is protected against high voltages by a signal operated relay.

The EXT LS, AUDIO INPUT and LH & RH STEREO OUTPUT facilities are also not fitted, a 600Ω balanced line output being present instead. The following paragraph should therefore be added:

LINE OUTPUT: A 600Ω output is available on the screw terminals on the back panel. The centre tap may be connected to earth if required. This is clearly shown in the photograph.



Rear View of Model 1002/2

OPERATION

The operating procedures for the model 1002/2 variant are the same as for the standard 1002, with the exception that some facilities are omitted. Therefore the notes regarding the CHARGE position of the SUPPLY SWITCH, BATTERY CHARGING, STEREO RECEPTION, MONO/STEREO SWITCH and STEREO INDICATOR should be deleted.

MAINTENANCE

Removal of Printed Circuit Boards. Note that the Aerial Protection Board is fastened by four pillars onto the Main Board, and it may be necessary to remove it to gain access to desolder some main board components below. The 600Ω line amplifier board is similarly mounted in the position shown for the internal battery.

Audio Sensitivity Check. The paragraph below should be added:-

The sensitivity of the 600Ω line output can be checked as follows:

(a) Connect the Audio Generator to the feed to the volume control.
(b) Connect the AF Power Meter matched to 600Ω to the line output.
(c) Tune the Audio Generator to 1kHz and check that an output of 10mW is obtained for 4 - 10mV input with the line level control set to maximum.

Stereo Decoder Performance Check. This section, and the section for stereo decoder realignment, should be ignored.

Fig 6.6 (Location of FM IF Trimming Adjustments) remains applicable with the exception that L304 is not fitted.

APPENDIX A Voltage Analysis

The + 11V supply should be available at all times at Pin 101 on the Line Amplifier Board. When the Range Switch is on FM, the + 11V supply to the FM IF Board is on Pin 312, not on Pin 316 as stated for the FM, IF and Decoder Board.

Table 1. Amend this to read for TR303 "1.1V - 0.5V 5.5V" and delete reference to TR304.

IC Voltages (FM Stages). Delete reference to IC302 and notes 5 - 8 inclusive.

Table 2. Add:-

TR501	0.6V	0V	-	2.5V
TR502	1.9V	2.5V	-	2.6V
TR601	0.5V	0.7V*	-	5.0V
TR602	0.9V	1.5V*	-	10.5V

APPENDIX B. Semiconductor Complement

FM and IF Board, Delete:

TR303 (BC107B)

TR304 (BC107B)

IC302 (CA3090)

Add:

TR303; BC107B; Mullard; Audio Pre-amplifier

Aerial Overload Protection Board, Add:

TR501; 2N1613; Mullard; DC Amplifier

TR502; 2N1613; Mullard; Relay Driver

D501; BAW62; Mullard; Detector

Line Amplifier Board, Add:

TR601; BC107B; Mullard; Audio Amplifier

TR602; BC107B; Mullard; Audio Output

APPENDIX C Components

Main Board, Delete

C165	(0.1μF)	R163	(10k)
C166	(0.1μF)	R164	(6.8k)
C167	(0.1μF)		

Add:

R95; 100Ω; 5% 0.3W; Mullard Type CR25

FM and IF Board. The following additions and deletions convert the list for the FM, IF and Decoder Board to that for the FM and IF Board:

Delete:

C322	3.3μF	R313	33k
C322A	100pf	R328	6.8k
C323	470μF	R329	27k
C324	0.0039μF	R331	1k
C324A	200pF	R332	22Ω
C325	0.047μF	R333	680Ω
C326	22μF	R334	27k
C327	0.47μF	R334A	470k
C328	1μF	R335	390Ω
C328A	0.001μF	R336	10k
C329	0.0047μF	R337	10k
C330	0.0047μF	R338	47Ω
C331	470μF	R339	1.8k
		R340	1.8k
		R341	8.2k
		R342	2.2k

Add:

C332	0.01μF	Polycarbonate	± 10%	100V	Code E
C323	470μF	Tubular Electrolytic	+ 50% - 10%	25V	U
C324	0.1μF	Polycarbonate	± 10%	100V	E
C325	0.1μF	Disc Ceramic	+ 80% - 20%	500V	P
C326	0.1μF	Disc Ceramic	+ 80% - 20%	500V	P
C327	3.3μF	Tantalum Electroytic	± 20%	16V	L
R313	22k				
R328	10k				
R329	4.7k				
R331	47k				
R332	3.3k				
R333	22	All resistors are 5%, 0.3W Mullard Type CR25			
R334	150				
R335	150				
R336	6.8k				
R337	10k				

Aerial Overload Board. Add:

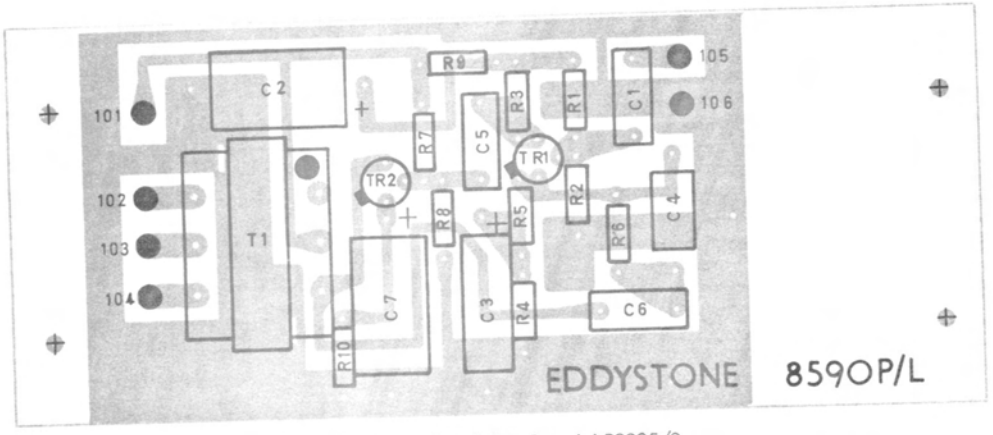
C501	0.001µF	Disc Ceramic	+ 80% - 20%	500V	Code	H
C502	3pF	Tubular Ceramic	± 0.2pF	750V		G
C503	4.7pF	Tubular Ceramic	± 10%	750V		G
C504	0.001µF	Disc Ceramic	+ 80% - 20%	500V		H
C505	10µF	Tantalum Electrolytic	± 20%	16V		L
R501	47k					
R502	33k					
R503	56k					
R504	12k					
R505	8.2k	All resistors are 5% 0.3W Mullard Type CR25				
R506	470					
R507	12k					
R508	390					

Line Amplifier Board Add:

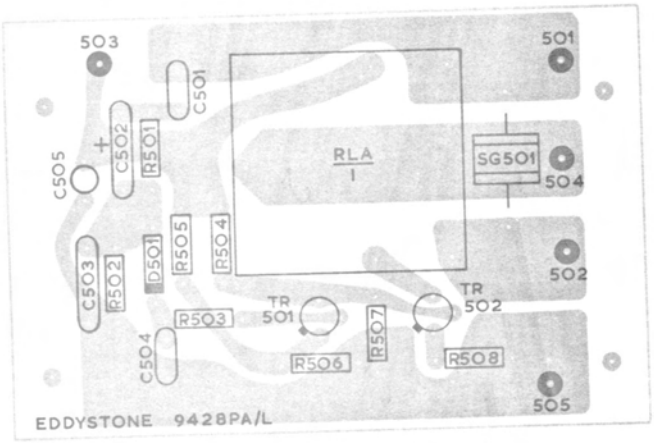
C601	0.01µF	Polycarbonate	± 10%	100V	Code	E
C602	100µF	Tubular electrolytic	+ 50% - 10%	25V		Y
C603	22µF	Tubular electrolytic	+ 50% - 10%	25V		Z
C604	0.005µF	Metallised paper	± 20%	250V		I
C605	1µF	Polycarbonate	± 10%	100V		E
C606	0.1µF	Polycarbonate	± 10%	100V		E
C607	100µF	Tubular Electrolytic	+ 50% - 10%	25V		Y
R601	1M					
R602	100k					
R603	82k					
R604	10k					
R605	39					
R606	10k					
R607	47k	All resistors are 5% 0.3W Mullard Type CR25				
R608	8.2k					
R609	150					
R610	150					

APPENDIX D List of Spares:
Change the FM IF and Decoder Board, LP 3354/1 to FM and IF Board LP 3354/7

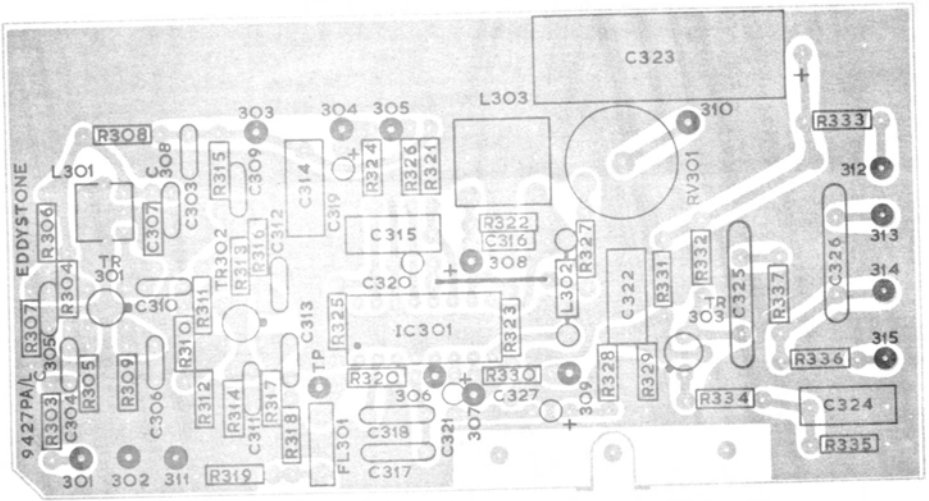
Add	600Ω Line Amplifier Board LP 3325/3
Add	Aerial Protection Board LP 3354/8
Delete	S4
Add	RV604 Line level preset, Part No. 6077P
Change	PL4 Part No. from D2310/2 to 9425P
Change	SK4 Part No. from D2311/1 to D4970
Add	PL6 "N" Type Co-axial Plug, Part No. 9421P
Add	SK6 Aerial Input Socket, Part No. 9420P
Delete	L304 Multiplex Coil
Add	T601 600Ω Output Transformer, Part No. 7524P
Delete	Stereo Indicator LED
Add	RL501 Aerial Protection Relay RS Components Type 913
Add	SG501 Spark Gap Siemens BC - C90



600Ω Line Amplifier Board LP3325/3

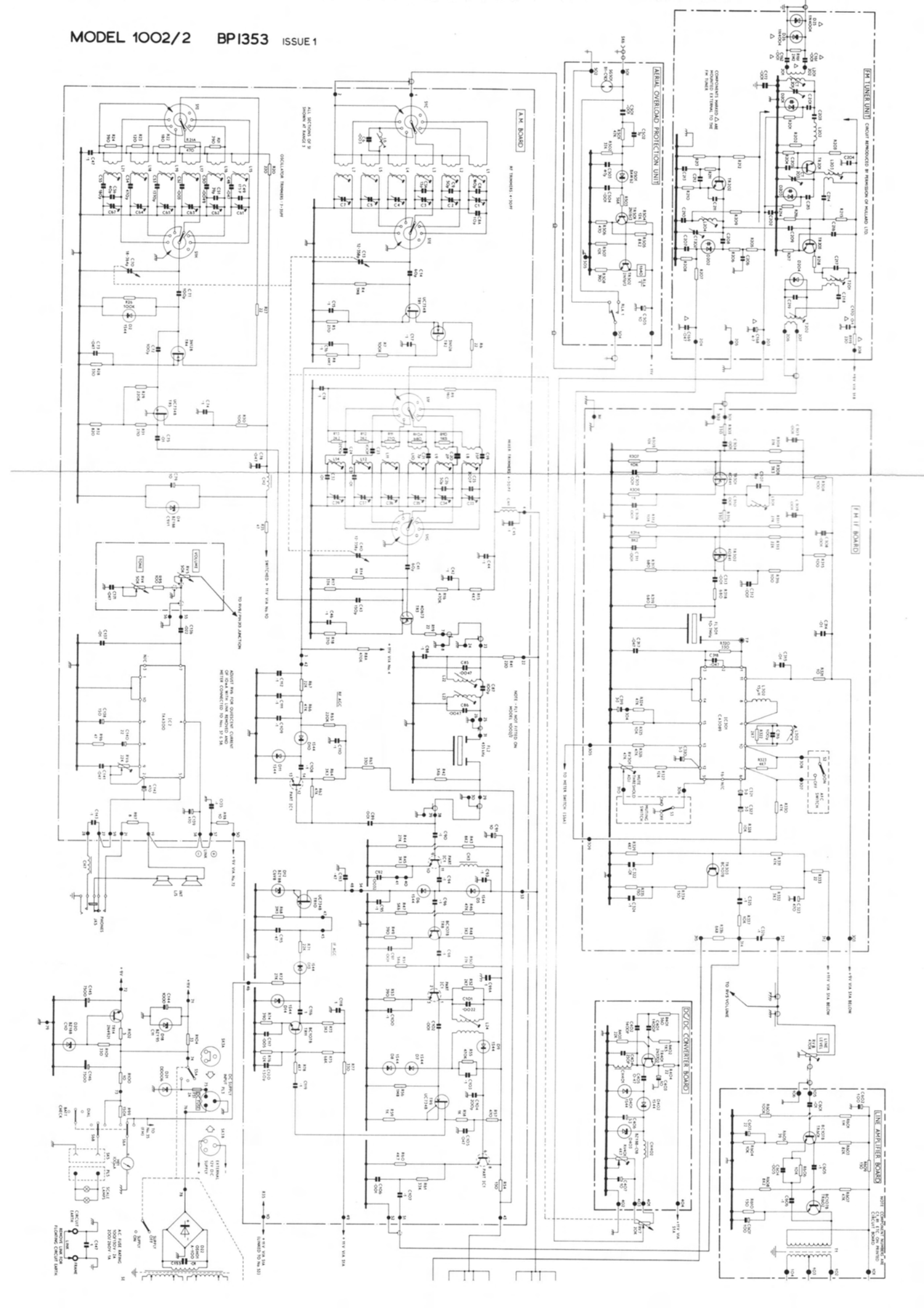


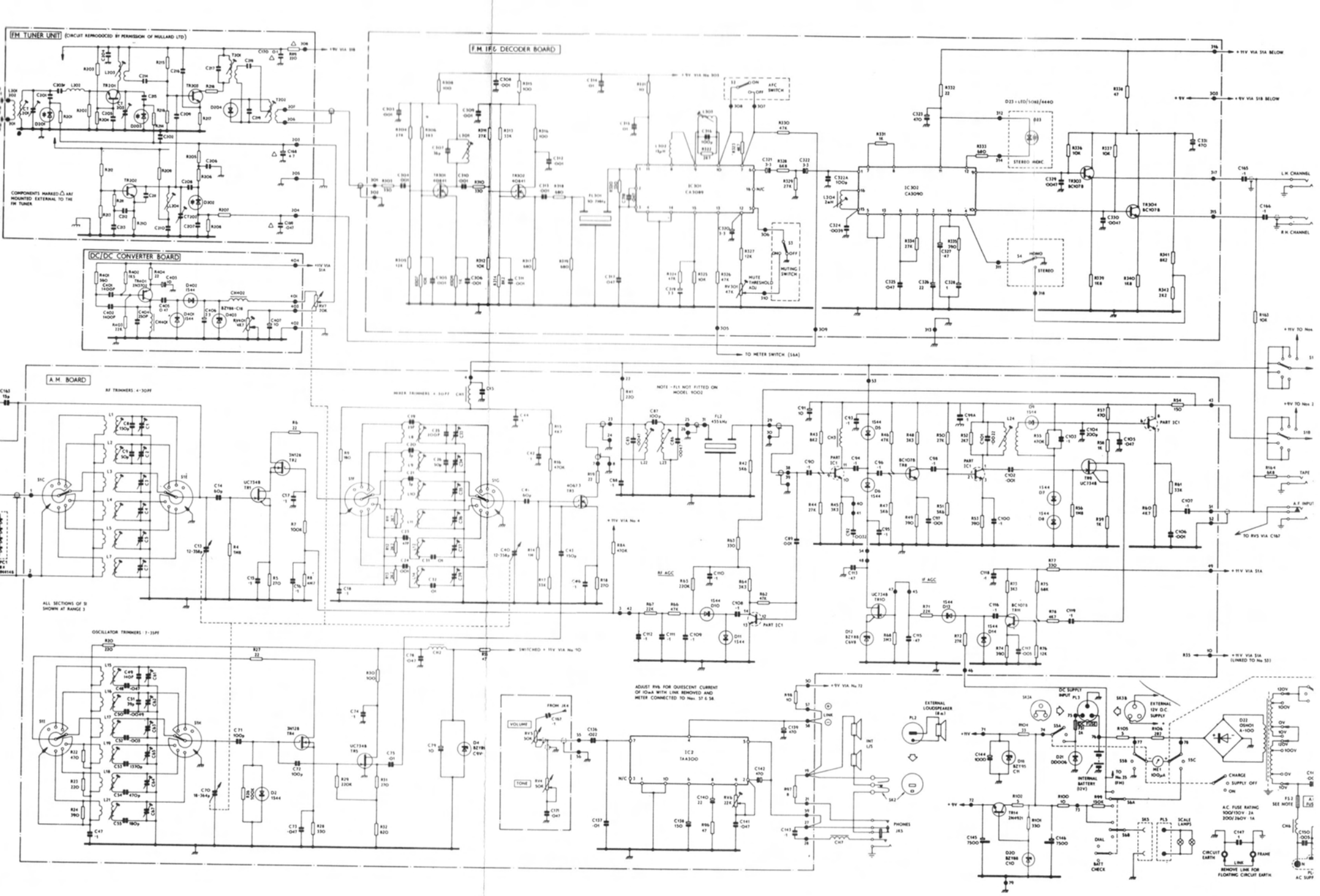
Aerial Protection Board LP3354/8

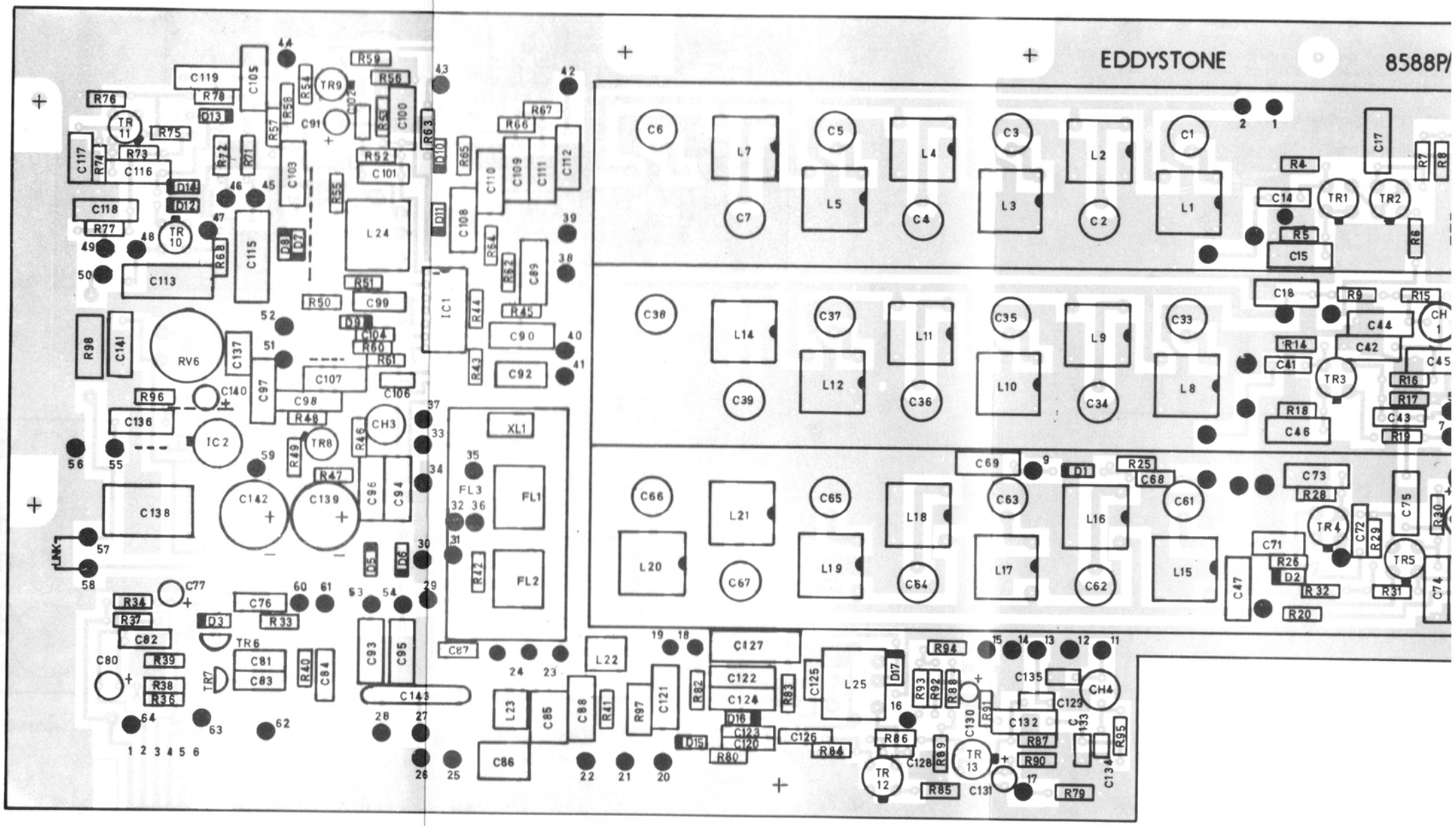


FM & IF Board LP3354/7

MODEL 1002/2 BP1353 ISSUE 1




FM TUNER UNIT (CIRCUIT REPRODUCED BY PERMISSION OF MULLARD LTD)
COMPONENTS MARKED △ ARE MOUNTED EXTERNAL TO THE FM TUNER
F.M. IF & DECODER BOARD
AFC SWITCH
MUTING SWITCH
MUTE THRESHOLD ADJ
STEREO INDIC
STEREO
MONO
L.H. CHANNEL
R.H. CHANNEL
TO METER SWITCH (S6A)
DC/DC CONVERTER BOARD
A.M. BOARD
RF TRIMMERS 4-30PF
MIXER TRIMMERS 4-30PF
OSCILLATOR TRIMMERS 7-35PF
ALL SECTIONS OF S1 SHOWN AT RANGE 3
NOTE - FL1 NOT FITTED ON MODEL 9002
RF AGC
IF AGC
ADJUST RV6 FOR QUIESCENT CURRENT OF 10mA WITH LINK REMOVED AND METER CONNECTED TO Nos. 57 & 58.
VOLUME
TONE
INT L/S
PHONES JK5
EXTERNAL LOUDSPEAKER (8 ohm)
DC SUPPLY INPUT PL3
EXTERNAL 12V D.C SUPPLY
INTERNAL BATTERY (12V)
CHARGE
SUPPLY OFF
ON
DIAL
BATT CHECK
SCALE LAMPS
CIRCUIT EARTH
FRAME
LINK
REMOVE LINK FOR FLOATING CIRCUIT EARTH
A.C. FUSE RATING 100/150V 2A 200/260V 1A
TAPE
A.F. INPUT
TO RV5 VIA C167
+11V VIA S1A BELOW
+9V VIA S1B BELOW
+11V TO Nos
+9V TO Nos 2
+11V VIA S1A
+11V VIA S1A (LINKED TO No. 53)
+9V VIA No. 72
SWITCHED + 11V VIA No. 10
+11V VIA No. 4
+9V VIA No. 303
TO No. 25 (FM)


EDDYSTONE
8588P/

Appendix 'F'

PRINTED CIRCUIT BOARDS

ı Printed Circuit Board shown overleaf is a multipurpose board which is used on other ies Receivers, including Models 1000, 1001, and 1004. For this reason, the following nts shown on the board overleaf are not fitted on the Model 1002:—

C66, C68, C69, C76, C77, C80 to C84, & C120 to C135.

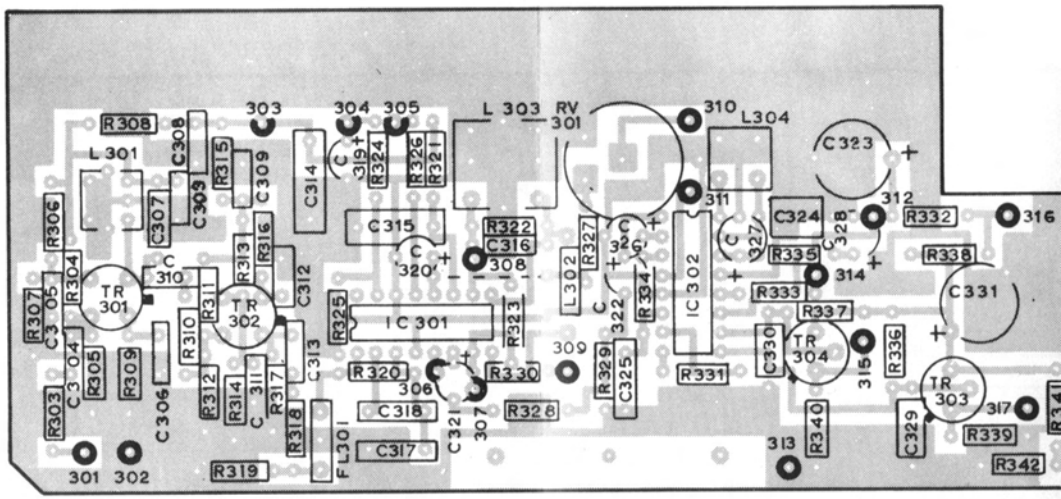
3, R34, R36 to R40, & R79 to R95.

& D15 to D17.

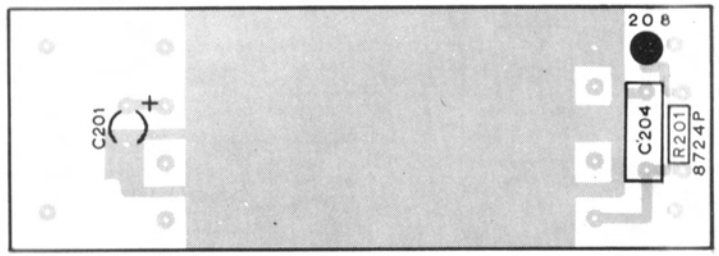
5, & CH5.

7, TR12 & TR13.

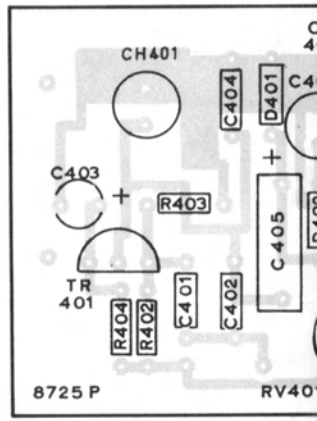
Printed Circuit Board	Part No.
Main Board (Model 1002 version)	LP3354/1
FM IF and Decoder Board	LP3354/2
DC/DC Converter Board	LP3354/3
FM Tuner Unit	LP3354/4



FM IF and Decoder Board : LP3354/2



FM Tuner Unit : LP3354/4



DC/DC Converter Board