

Eddystone

**1830
SERIES**

INSTALLATION NOTES OPERATING INSTRUCTIONS AND SERVICE DATA

Eddystone Radio Limited

Member of Marconi Communication Systems Limited

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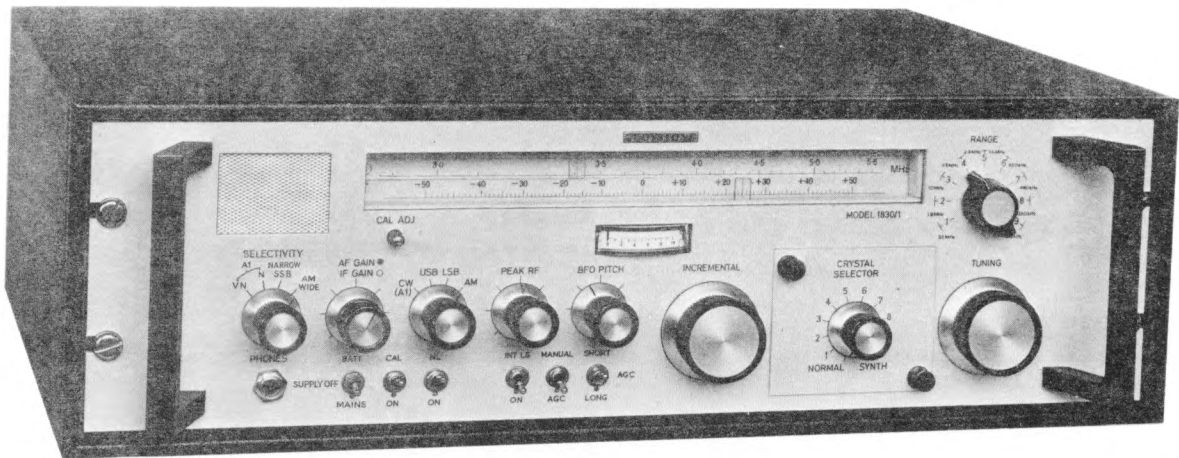
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Eddystone

GENERAL-PURPOSE HF/MF COMMUNICATION RECEIVERS MODEL 1830 SERIES



Model 1830/1 (Civil Aviation)
Ref. No. 10D/CA.10696

120kHz-31MHz

THIS HANDBOOK COVERS MODELS 1830/1 – 1830/8. A SUPPLEMENT IS INCORPORATED WHEN THE HANDBOOK IS ISSUED WITH A RECEIVER TO ANY OTHER 1830 SPECIFICATION.

Manufactured in England by



EDDYSTONE RADIO LIMITED

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ALVECHURCH ROAD, BIRMINGHAM B31 3PP

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CIRCUIT DIAGRAM OF 1830 SERIES RECEIVERS

Rear Cover

A M E N D M E N T R E C O R D

Amend No.	Pages subject to change	Amended by	Date
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Section 1

GENERAL DESCRIPTION AND PERFORMANCE SUMMARY

Model 1830 is the 'Series' designation for a family of HF/MF communication receivers intended for maritime and general-purpose applications in the frequency band 120kHz to 31MHz. The parent receiver (Model 1830/1) is designed primarily as a marine equipment and provides reception facilities for CW, MCW & AM signals in accordance with the requirements of the British MPT Specification for a Marine Reserve Receiver: it also has provision for USB and LSB reception of A3A, A3H and A3J transmissions. Operation is from any standard 40-60Hz supply or 12/24V battery.

The receiver has a 483mm (19in) panel to suit standard racking and is also available complete with cabinet for use in bench-mounted installations: it can be equipped with shock-mounts for mobile use. Other accessories include a cabinet loudspeaker unit and a plinth loudspeaker in matching style.

A highly advanced circuit design is employed, utilising single-conversion on the low frequency ranges and double-conversion from 1.5MHz up. The 1st IF is tunable when using double-conversion, providing an incremental tuning facility with a coverage of ± 50 kHz relative to any frequency selected with the main tuning control: incremental calibration is directly in kHz with calibration figures at 10kHz intervals. A built-in crystal calibrator is provided for standardising the frequency scales.

The normal tunable 1st Oscillator can be taken out of circuit to permit crystal-controlled working at frequencies in the band 1.5-31MHz. Up to ten crystals can be installed at any one time, these being housed in a plug-in crystal box fitted at the front of the receiver. Interchangeable boxes are available to order when more than ten crystal-controlled channels are required.

The incremental 1st IF tuning facility is normally retained when using the internal crystal-controlled 1st Oscillator, so relaxing the usual requirement for precise choice of crystal frequency in this mode of operation. Alternatively, the 2nd Oscillator can also be fitted with a crystal to permit fully unattended high-stability working. Circuit arrangements are such that both 1st Oscillators can be disabled to allow use of an external synthesizer for frequency control.

Selectivity is adjustable to suit signal mode and the normal diode detector is replaced by a product detector when receiving CW and SSB. The associated beat oscillator generates pre-tuned carrier insertion frequencies for SSB reception, fine adjustment being possible by use of the BFO control which functions with reduced coverage in this mode of operation. A noise limiter is fitted and 100kHz IF output is available for connection to ancillary equipment.

Separate AGC systems are employed for the RF and IF stages with provision for manual control of IF gain when required. The IF AGC line is brought out for interconnection when operating receivers in dual-diversity and is also used to operate the integral carrier-level meter: the RF AGC is permanently connected. Audio outputs are available for loudspeaker, headset and lines, the line output being fed from an independent low-level amplifier with adjustable pre-set gain control. A monitor speaker is fitted and all external connections except the headset socket are located at the rear.

1830 Variants: Current versions of the 1830 covered by this handbook fall into two distinct groups which are variants of either Model 1830/1 or Model 1830/3. The latter differs from the parent receiver only in that there is a gap in the overall coverage from 535kHz to 920kHz to allow greater bandspread of the range 200-535kHz. A full list of 1830 types is given in the Appendices, each basic version being available with either ten or fifty crystal channels to suit operational requirements. The 50-channel versions have a deeper panel and are available in rack-mounting style only.

GENERAL DESCRIPTION AND PERFORMANCE SUMMARY

GENERAL SPECIFICATION

Frequency Coverage

1830/1, /2, /5 & /7 : 120kHz to 31MHz in nine ranges with incremental facility and crystal-control on Ranges 1-5.

Range 1	::	18.0MHz - 31.0MHz
Range 2	::	10.0MHz - 19.0MHz
Range 3	::	5.5MHz - 10.0MHz
Range 4	::	2.9MHz - 5.5MHz
Range 5	::	1.5MHz - 2.9MHz
Range 6	::	920kHz - 1750kHz
Range 7	::	480kHz - 950kHz
Range 8	::	240kHz - 480kHz
Range 9	::	120kHz - 250kHz

1830/3, /4, /6 & /8 : As above but with gap in coverage from 535-920kHz. (Ranges 7 & 8 only differ from 1830/1 etc.).

Range 1	::	18.0MHz - 31.0MHz
Range 2	::	10.0MHz - 19.0MHz
Range 3	::	5.5MHz - 10.0MHz
Range 4	::	2.9MHz - 5.5MHz
Range 5	::	1.5MHz - 2.9MHz
Range 6	::	920kHz - 1750kHz
Range 7	::	400kHz - 535kHz
Range 8	::	200kHz - 400kHz
Range 9	::	120kHz - 250kHz

Intermediate Frequencies

1st IF	::	Tunable 1300 - 1400kHz to provide incremental tuning facility on Ranges 1-5. 1350kHz at 'Ø' setting.
2nd IF	::	100kHz.
BFO/CIO	::	± 5kHz swing at 'CW' and ± 100Hz at 'USB'/'LSB'.

Aerial Input Impedance

75Ω (unbalanced) on all ranges.

Reception Modes

A1, A2 & A2H telegraphy. A3, A3A, A3H & A3J telephony with upper or lower side-band selectable in SSB mode.

Environmental

-15°C to +55°C (-20°C to +70°C storage)

Power Supplies

AC :: 100/130V or 200/260V (40-60Hz).
Consumption of the order 16VA.

DC :: 12V or 24V (+ve earth, -ve earth or floating battery).
Consumption: 320mA quiescent, 700mA at 1.5W audio output.

Semiconductor Complement

Thirty-three transistors plus twenty-six diodes and one integrated circuit.

Mounting Styles

Rack-mounting, bench-mounting and bench-mounting with resilient mounts. Plinth loudspeaker unit available to order.

Dimensions and Weight

Refer to pages 14 and 15.

TYPICAL PERFORMANCE †

Sensitivity (taken with 3kHz B/W)

AM	::	3μV for 15dB S/N ratio.
CW/SSB	::	1μV for 15dB S/N ratio.

IF Selectivity ('VN' = crystal filter)

Position		-6dB	-60dB
'A1 (VN)'	VERY NARROW	0.1kHz	2.0kHz
'A1 (N)'	NARROW	1.3kHz	4.5kHz
'AM NARROW - SSB'		3.0kHz	9.0kHz
'AM WIDE'		8.0kHz	18.0kHz

Image Rejection

120kHz	-	1.5MHz	::	60dB
1.5MHz	-	18MHz	::	70dB
18MHz	-	31MHz	::	50dB

IF Rejection

120kHz	-	1750kHz	::	60dB
1.5MHz	-	2.9MHz	::	60dB
2.9MHz	-	31MHz	::	85dB

Any given image or 1st IF breakthrough can be eliminated by off-setting the 1st IF and retuning.

Frequency Stability

Figures quoted after 15-minute warm-up period with free-running 2nd Oscillator.

1 part in $10^4/^\circ\text{C}$ with free-running 1st Oscillator (typically 5 parts in $10^5/^\circ\text{C}$).

3 parts in $10^5/^\circ\text{C}$ with crystal-controlled 1st Oscillator.

Cross Modulation

With a wanted signal 60dB above $1\mu\text{V}$, the interference produced by an unwanted signal 20kHz off-tune and of level 90dB above $1\mu\text{V}$ will be more than 30dB below standard output.

Blocking

With a wanted signal 60dB above $1\mu\text{V}$, an unwanted carrier 20kHz off-tune must be of a level exceeding 100dB above $1\mu\text{V}$ to affect the output by 3dB.

Intermodulation

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

With a wanted signal 30dB above $1\mu\text{V}$, two unwanted signals whose sum or difference frequency equals that of the wanted signal, must each be of a level 80dB above $1\mu\text{V}$ to produce standard output.

AGC Characteristic

Output is maintained within 9dB for 90dB increase in signal from $3\mu\text{V}$ reference level. (taken at 8MHz)

AGC Time Constant

<u>Position</u>	<u>Charge</u>	<u>Discharge</u>
SHORT	30mS	0.5 sec
LONG	200mS	6.5 secs

Audio Output

Ext. speaker (3Ω) : 500mW at 5% distortion (1.5W max.)

Line (600Ω) : 10mW (adjustable).

Headset : Low/medium-Z.

Audio Response

Within 6 dB over the range 200Hz to 6kHz.

IF Output (100kHz)

$3\mu\text{V}$ at aerial produces an IF output of at least 20mV across 75Ω .

Radiation

Less than 400pW (typically 20pW).

Calibration Accuracy

Main scale: 0.5% with incremental set to '0' and Cal. Adj. at mid-setting.

Incremental: 1kHz after standardising the main scale at nearest crystal marker.

NOTE 1st IF coverage, IF selectivity & AGC time constants differ on Models 1830/5-8. Refer to relevant Appendix at rear.

(†) Not to be interpreted as a test specification.

Section 2

C I R C U I T D E S C R I P T I O N

Introduction

All variants in the 1830 Series employ a fully solid-state circuit and include an integral power unit for operation from any standard 40-60Hz supply: provision is also made for direct connection to a 12V or 24V battery when portable or emergency working is required. Supplies with positive earth, negative earth and even batteries on float charge with neither pole at earth potential can be accommodated by virtue of the type of construction employed: this provides complete isolation between the internal circuit earth rail and the main frame of the receiver, i.e. its cabinet, panel etc.

Isolation is extended to include external connections to Aerial, IF Output, Synth. Input and Headset, so ensuring complete safety when the internal circuitry is operating at other than true earth potential. A capacitor (C333) is fitted to provide an RF path between the two earths, and terminals at the rear permit linking circuit earth to the frame when isolation is not required. External earth returns from the loudspeaker, muting control circuit and diversity AGC outlet are taken directly to circuit earth and will therefore require isolated wiring in certain installations.

The Table which follows lists all the major sub-assemblies that make up the complete receiver. Terminations on each sub-assembly are coded and the associated wiring harness is numbered for convenience in servicing. Pages 9 to 14 are devoted to a brief description of each sub-assembly - a block diagram appears on pages 10 and 11.

TABLE 2.1 SUB-ASSEMBLIES USED IN 1830 SERIES RECEIVERS

Receiver Section	Sub-assemblies
<u>RF SECTION</u>	CALIBRATOR/RELAY UNIT MAIN RF ASSEMBLY (Coil Box) PEAK-RF BOARD *CRYSTAL OSCILLATOR UNIT *CRYSTAL BOX (Plug-in Unit)
<u>IF SECTION</u>	TUNABLE IF UNIT (2nd Mixer and Incremental Oscillator) 100kHz IF FILTER UNIT 100kHz IF AMPLIFIER BOARD CW/SSB DETECTOR AND BFO UNIT
<u>AUDIO SECTION</u>	AUDIO AMPLIFIER BOARD (Comprises two separate amplifiers)
<u>MISCELLANEOUS</u>	NOISE LIMITER, METER & NEGATIVE SUPPLY BOARD POWER UNIT (for AC working)

(*) Models 1830/2, /4, /7 & /8 have five complete 10-channel Crystal Oscillators.

Calibrator/Relay Unit

Aerial Relay: Aerial input to the coupling coils in the RF Assembly is routed via the normally-closed contacts of relay RLA/1 which is utilised for desensitizing the receiver when installed with an associated transmitter. The relay is a high-speed reed type with SPCO contact which is arranged to interrupt the aerial feeder and short down the input when switched to the muted condition. It is energised from the internal +11V supply by closing an external control circuit wired between pins 2 & 4 of the Ancillary Connector PL7. RLA/1 is also employed to limit interference from outside signals when carrying out a scale calibration check. In this function it is energised from one section of the CAL SWITCH when this is set to 'ON'.

Protection against high induced voltages on the aerial is provided by the diode package PC1 (8 x 1N4148) which is wired directly across the aerial feeder at its point of entry into the Calibrator/Relay Unit.

Crystal Calibrator: The calibrator circuit employs a 500kHz Crystal Oscillator (TR1 :: BC107B) with an associated Harmonic Amplifier (TR2 :: BC107B) from which output is taken via a small capacitor C69 (3pF) to the drain of TR6. Markers are available at all 500kHz points on the main scale which is standardised by adjustment of the CAL ADJ CONTROL (independently adjustable cursor).

Main RF Assembly

This unit is divided into three screened compartments which house the circuitry for the RF Amplifier (rear section), 1st Mixer (centre section) and tunable 1st Oscillator (front section).

The RF Amplifier utilises a junction-FET and a single-gate MOSFET in a cascode circuit which is permanently connected to a delayed AGC outlet taken from the 100kHz IF: manual gain control is not applied. The aerial input uses bandpass tuning on Ranges 1-6 and changes to single tuned circuits on Ranges 7-9. An IF rejector is introduced on the lowest range. All tuning circuits are ganged and provision is made for independent adjustment when using the incremental facility (see Peak-RF Board below).

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

Peak-RF Board

The three separate pairs of reverse-biased voltage-variable capacitors located on this board are wired directly across the first three sections of the main tuning gang to permit independent adjustment of the signal frequency circuits when using the incremental facility on Ranges 1-5. Controlling voltage for the VVC's is derived from the PEAK-RF CONTROL which is a potentiometer wired directly across the 11V supply. It should be noted that on Ranges 6-9 this control functions primarily as an 'aerial-trimmer' and should be adjusted for maximum signal in the normal manner. R42-44 & R46 provide a DC path for the Mixer VVC's when operating on these ranges. R69 is introduced by S1F-B to reduce the diode capacity swing on Range 1.

1st Oscillator Circuitry

General: Two totally separate 1st Oscillator circuits are provided - one for normal operation with manual tuning, and the other for use when crystal-controlled oscillator injection is required for high-stability working. The appropriate oscillator is selected by means of the OSC SYSTEM SWITCH which applies +11V to the tunable oscillator in the 'NORMAL' position and transfers this supply to the other oscillator when any one of the ten 'CRYSTAL' positions is selected. A further position marked 'SYNTH' disables the two internal oscillators to permit operation with an external frequency synthesizer for frequency control: the synthesizer input cable is switched by relay RLB/1.

CIRCUIT DESCRIPTION

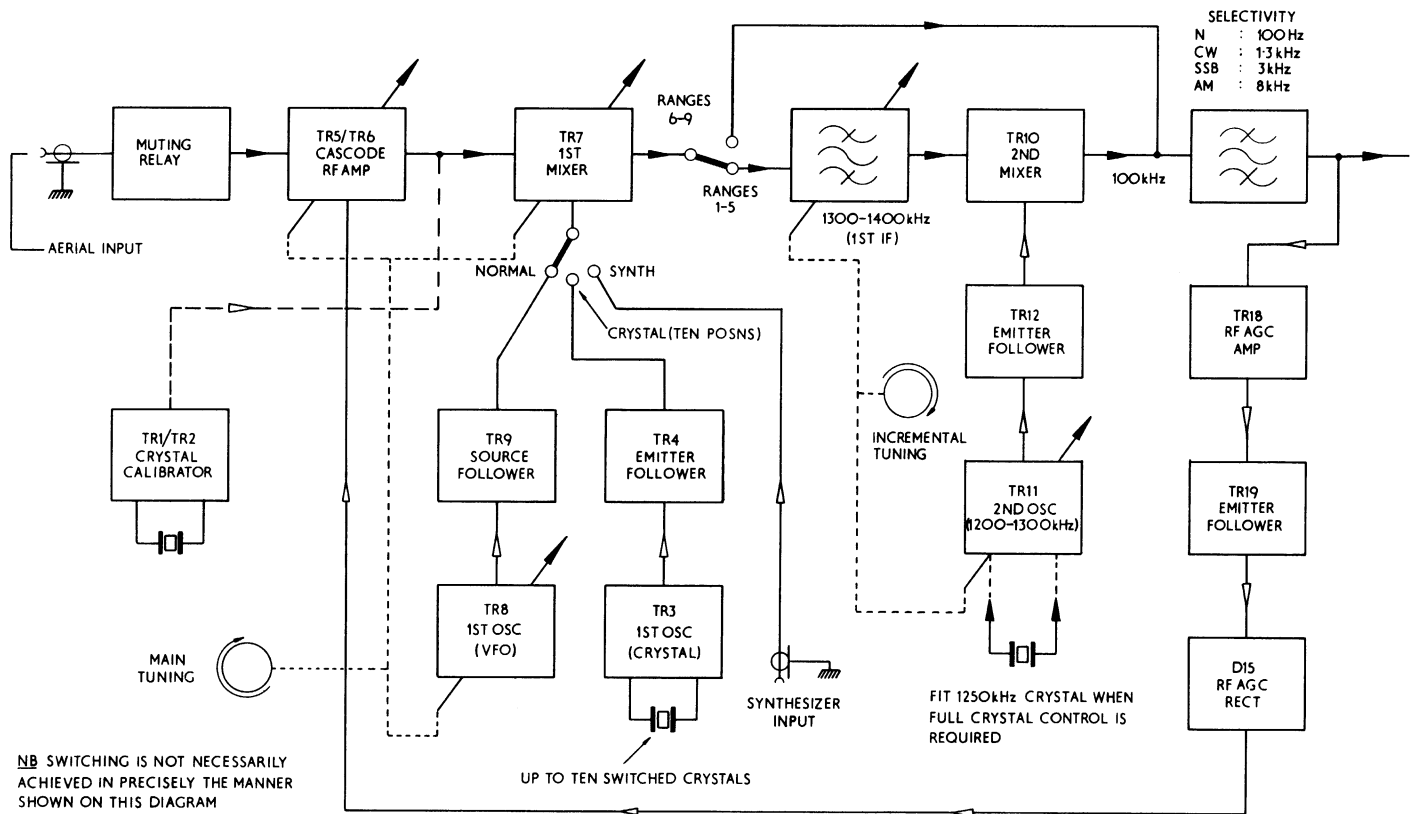


Fig. 2.1 Block diagram of basic 1830/1 receiver.

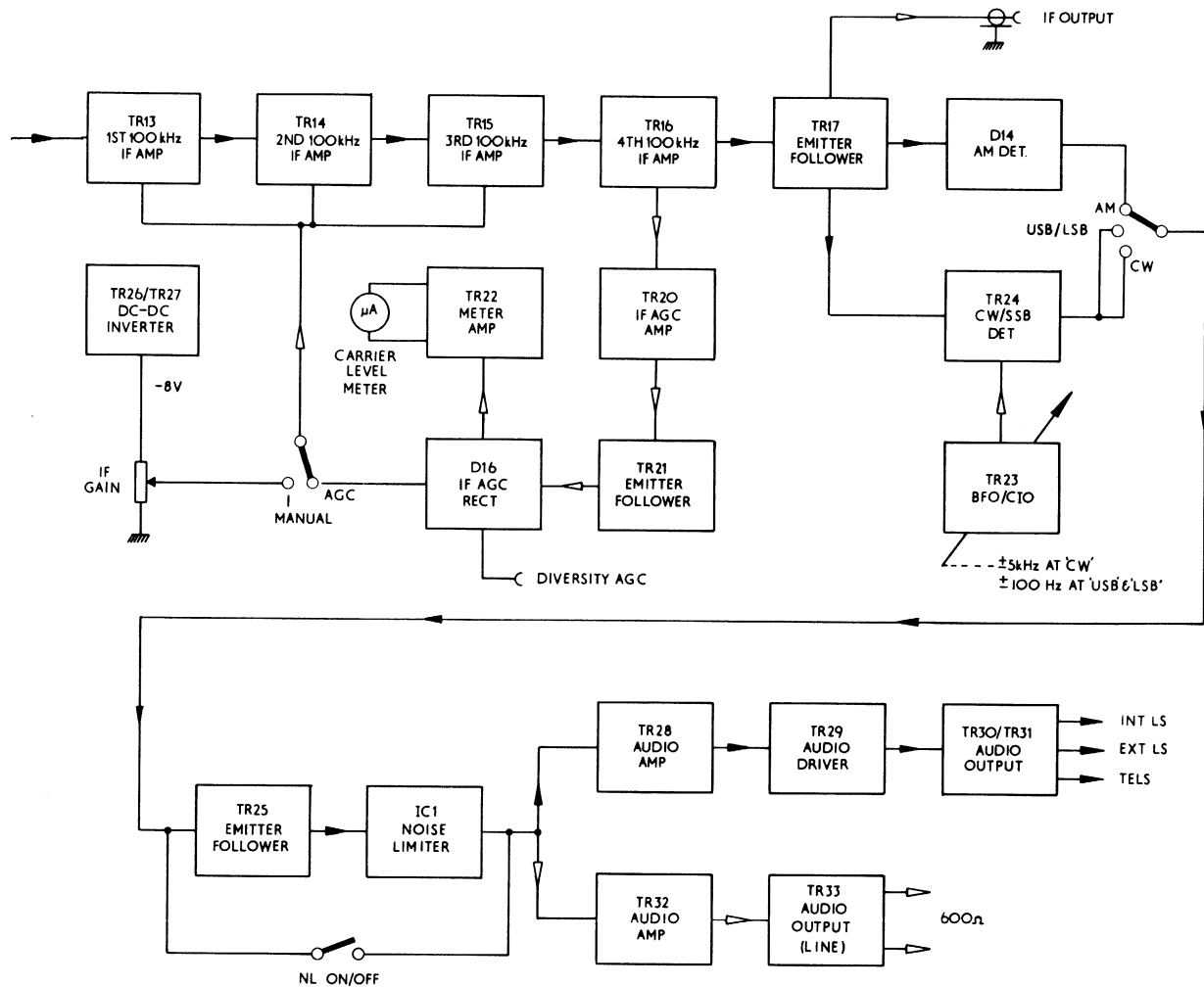
NOTE On Models 1830/5-8, Tunable IF is aligned to cover 1301.5 - 1401.5kHz in lieu of 1300 - 1400kHz. Refer to Appendix at rear.

1st Oscillator Circuitry (contd.)

Tunable 1st Oscillator: This stage employs a single-gate MOSFET using the tuned-gate configuration with feedback winding in the drain circuit. The tuned circuits are temperature-compensated and tracked to tune 1350kHz above the signal on Ranges 1-5 and 100kHz above on Ranges 6-9. Oscillator output is taken via an isolating junction-FET source follower to gate 2 of the MOSFET 1st Mixer.

Crystal Oscillator Unit: This unit makes use of an untuned oscillator circuit with isolating emitter follower feeding output to the 1st Mixer gate in parallel with the output connection from the tunable 1st Oscillator. Crystals are housed in a removable box which is equipped with sockets for up to ten Style 'D' crystals. The OSCILLATOR SYSTEM SWITCH is part of this unit and serves also as crystal selector.

Calculation of the required crystal frequency for reception of any particular signal channel is quite straightforward and is covered in detail in the Section dealing with 'Operation' which appears later in the book. Briefly, the nominal oscillator injection frequency will be 1350kHz above or below the wanted signal channel but it can lie up to 50kHz away from the nominal frequency if advantage is taken of the incremental facility which is available at the 1st IF. Circuit arrangements permit use of the fundamental, 2nd harmonic or 3rd harmonic of the crystal, a feature which is of great value when it is necessary to control frequencies in the higher part of the range.



Crystal Oscillator - Models 1830/2, /4, /7 & /8: These variants have provision for crystal controlled operation on up to fifty channels in the band 1.5-31MHz. Five separate integral Crystal Oscillator Units are employed, these being selected by a modified form of OSC SYSTEM SWITCH as shown in the inset on the circuit diagram at the rear of the handbook. The units are similar to the single one used on Model 1830/1.

Tunable IF Unit (see note on page 10)

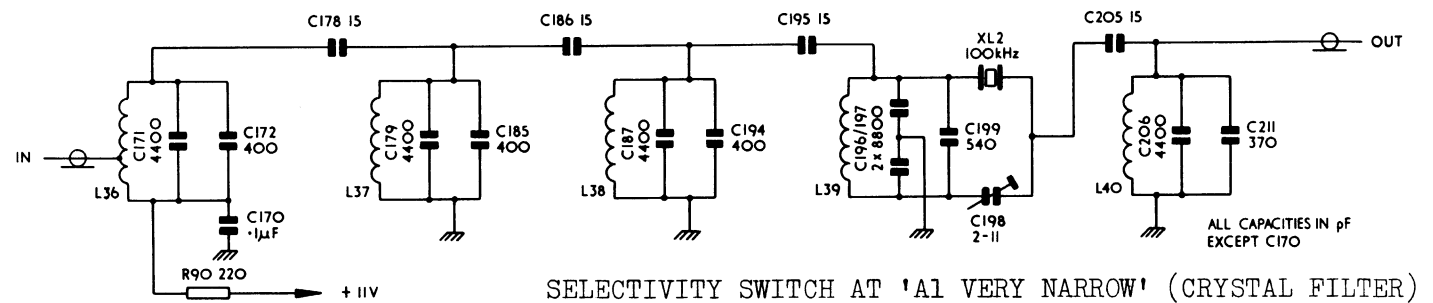
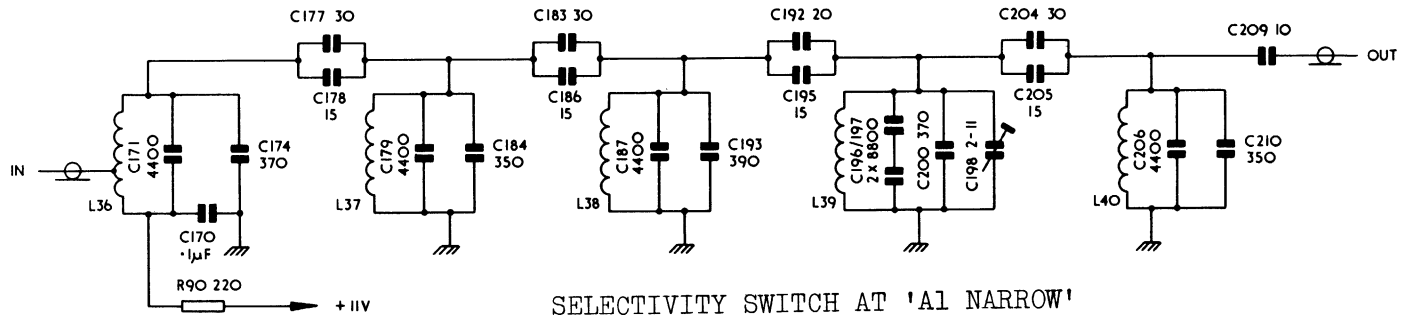
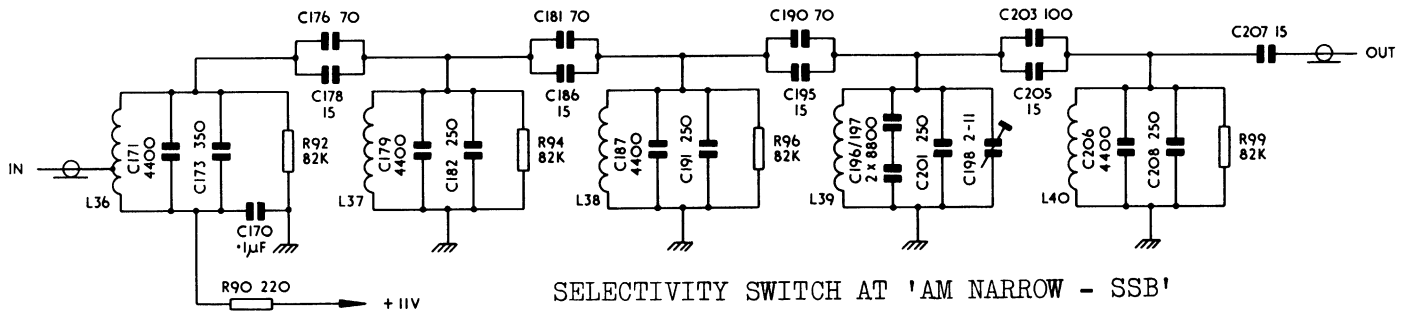
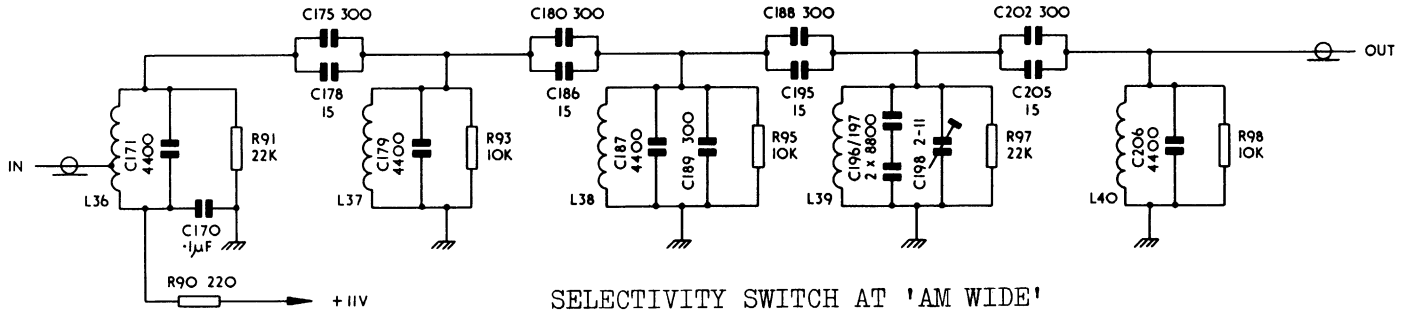
On Ranges 1-5, the drain of the 1st Mixer is switched to the input of the Tunable IF Unit and coupled to the 2nd Mixer via a gang-tuned bandpass circuit covering the range 1300 to 1400kHz. The 2nd Mixer uses a similar circuit configuration to that used in the 1st Mixer with oscillator injection applied to gate 2 and signal (IF) to gate 1.

Oscillator injection for the 2nd Mixer is derived from a high-stability oscillator which covers the range 1200-1300kHz and is ganged to the IF bandpass circuit. An isolating emitter follower is included and the oscillator supply is zenered at 8.2V from the main 11V supply rail. Provision is made for operating the receiver with its 2nd Oscillator controlled by a 1250kHz crystal: in this mode of operation the INCREMENTAL TUNING CONTROL is set to '0' to correctly align the IF and oscillator circuits.

Output from the 2nd Mixer is routed to the 100kHz IF Filter Unit in parallel with the direct connection from the 1st Mixer used on Ranges 6-9. The 11V supply is removed from the Tunable IF Unit when using single-conversion.

100kHz IF Filter Unit

The standard IF filter used on Models 1830/1-4 provides bandwidths of 8kHz, 3kHz, 1.3kHz and 0.1kHz, and utilises a pre-phased crystal in the narrowest position. The filter is a five-section unit in which the coupling and damping is switched to provide the required bandwidths. Selectivity arrangements on Models 1830/5-8 differ from Models 1830/1-4 and reference should be made to the relevant Appendix at the rear.



Corrigenda: C185 & 211 340pF
C194 & 199 470pF

Fig. 2.2 Simplified circuits of standard filter (Models 1830/1-4).

100kHz IF Amplifier Board

Output from the IF Filter Unit is taken to a four-stage junction-FET amplifier which feeds the AM Detector via an emitter follower. A low-level 100kHz output is provided for the CW/SSB Detector Unit and for connection to external ancillaries.

Separate RF and IF AGC circuits are included, the RF system being fed directly from the output of the IF Filter and having its control line permanently connected to the RF Amplifier. A large delay is applied to the RF AGC diode which conducts only at high signal levels.

The IF AGC system is fed from the final FET amplifier and controls the first three FET stages when the MANUAL/AGC SWITCH is set to 'AGC'. In the 'MANUAL' position, the controlling voltage is derived from the IF GAIN which is wired across the negative supply provided by the low power DC/DC Inverter (TR25/26). The AGC time constant is selected by switching C268 or C269 to the IF control line.

CW/SSB Detector and BFO Unit (See also special notes on Models 1830/5-8 at rear).

A dual-gate MOSFET is used as CW/SSB Detector with a junction-FET in the associated BFO which also serves as carrier insertion oscillator for SSB reception.

At 'CW', the beat oscillator is tunable in the conventional manner by means of the BFO CONTROL which provides a tuning swing of ± 5 kHz. Moving the MODE SWITCH to 'USB' or 'LSB' introduces a fixed capacitor which pre-tunes the oscillator to the nominal frequency required for carrier insertion (101.5kHz at 'USB' and 98.5kHz at 'LSB')*. The BFO CONTROL remains in circuit but provides a much reduced tuning swing (of the order ± 100 Hz) to permit fine adjustment of the carrier frequency when resolving an SSB signal. RV7 is adjusted during test to match the output level on the CW/SSB path to that on the AM channel.

(*) These frequencies accommodate the signal inversion due to the 1st Mixer which normally operates with its local oscillator on the 'high' side of the received signal.

Noise Limiter, Meter and Negative Supply Board

Noise Limiter: Audio output from the selected detector is fed via an emitter follower to the integrated circuit IC1 which functions as a clipper and is effective in reducing certain types of impulse noise. The limiter can be used in all signal modes and is bypassed with the NOISE LIMITER SWITCH at 'OFF'.

Meter: The carrier-level meter is operated from the IF AGC line through a junction-FET amplifier and is scaled in arbitrary divisions 0-10. It has a logarithmic movement at 'AGC' and is essentially linear at 'MANUAL'. An adjustable pre-set potentiometer is provided for setting the needle to '0' under no-signal conditions.

Negative Supply: The DC/DC Inverter which produces the negative voltage required for the manual IF gain control circuit employs a 300Hz oscillator followed by an emitter follower which drives the rectifier diode: the output is zenered at 8.2V by D17A.

Audio Amplifier Board

This board carries a high-level amplifier which feeds the external loudspeaker, internal loudspeaker and telephones, plus a separate low-level amplifier for connection to 600 Ω line circuits. Balanced or unbalanced line terminations are available and the output transformer has an electrostatic screen connected to frame earth. An adjustable pre-set control is provided for setting the required line output level.

The telephone output is taken via an isolating transformer which has its secondary winding returned to frame. Auxiliary contacts on the headset socket mute the external speaker when telephones are in use: the internal speaker is muted by S9.

CIRCUIT DESCRIPTION

Power Supply Unit

The power supply circuit is of semi-conventional design with screened transformer, bridge rectifier and R/C smoothing. The main output is 12-13V DC which is fed directly to the Audio Amplifier Board and also to zener diode D18 which provides a regulated supply of +11V for all other stages except the 100kHz IF Amplifier: this is connected to a +10V rail obtained from the +11V supply via R248.

The SUPPLY SWITCH is a three-position toggle which allows instantaneous changeover from mains to battery working. In the latter mode of operation the output from the rectifier is disconnected and the smoothing circuit is connected to the DC Supply Input socket at the rear. D18 remains in circuit for battery operation and is supplemented by D21 when operating from a 24V supply. D19 is included to provide reverse-polarity protection and will blow the DC fuse if the battery is connected incorrectly.

Both sides of the AC supply input are fused and the DC fuse remains in circuit when operating the receiver from an AC supply. The scale lamps are fed direct from the +11V supply rail.

Section 3

M E C H A N I C A L C O N S T R U C T I O N

General

All versions of the 1830 are basically rack-mounting equipments with standard panel heights to suit 483mm (19in) racking. Models 1830/1, /3, /5 & /6 have a panel height of 133mm (5.25in) and Models 1830/2, /4, /7 & /8 222mm (8.75in).

Matching cabinets can be supplied for those versions with 133mm (5.25in) panel but the other versions are available in rack-mounting style only. Accessories for cabinet receivers include anti-vibration mountings and a detachable plinth loudspeaker unit which may be advantageous in certain bench-mounting installations.

Overall dimensions for 1830/1, /3, /5 & /6 Receivers can be taken from Fig. 3.1 on the facing page. The other versions differ only in panel height: add 89mm (3.5in) to the figures shown on the drawing.

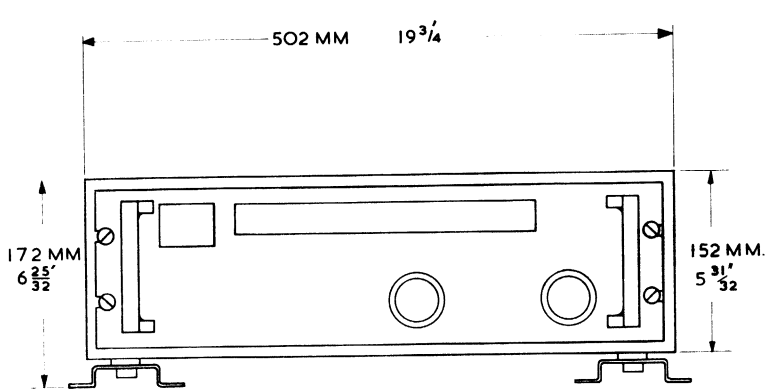
Weights

Models 1830/1, /3, /5 & /6:	Rack mtg.	13.1kg (29lb)	Bench mtg.	18.1kg (40lb)
Models 1830/2, /4, /7 & /8:	Rack mtg.	kg (lb)	-	
Anti-vibration Mounting Kit:		0.9kg (2 lb)		
Plinth Loudspeaker Unit:		1kg (2.25 lb)		

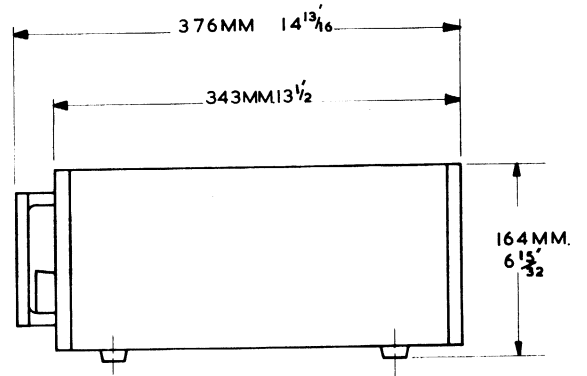
Internal Construction

The various units and printed board assemblies which make up the complete receiver are mounted on insulated fixing points which completely isolate the circuit earth rail from the outer frame, i.e. the panel, side-plates and cabinet etc. This form of construction eliminates the possibility of short-circuiting the supply when operating from a battery which has its positive pole already earthed, and provides maximum safety when the receiver is powered from a battery which is on charge with both poles floating at a dangerous potential above true earth.

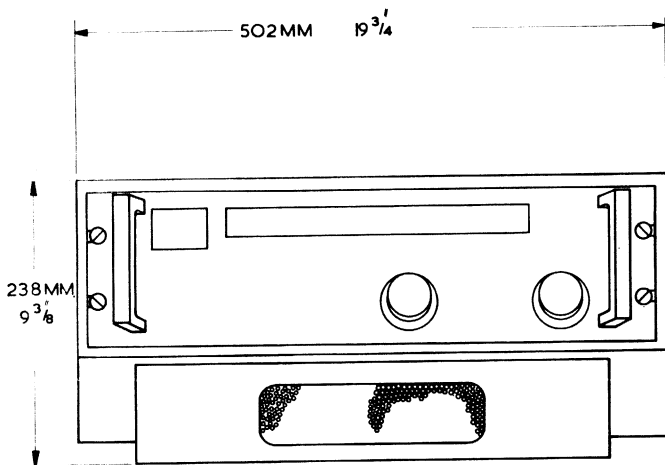
Direct earthing of the receiver frame is possible in either mode of operation and protection extends to aerial connections etc. which are likewise totally isolated from the supply.



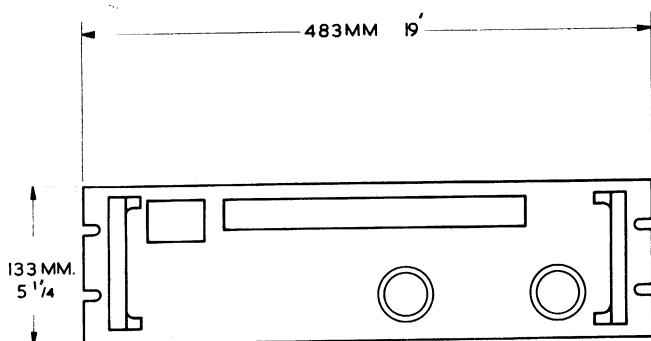
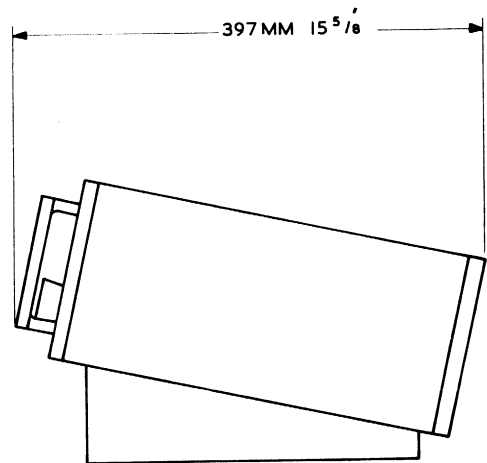
(A) Front view of 1830 Receiver in Cabinet 8256P fitted with LP2817/2 Shock Mounting.



(B) Side view of 1830 Receiver in Cabinet 8256P fitted with Mounting Feet 7132P.



(C) Front and side views of 1830 Receiver mounted on Plinth Loudspeaker Unit Cat. No. 989.



(D) Front and side views of 1830 Receiver in standard form for installation in 483mm (19in) racking.

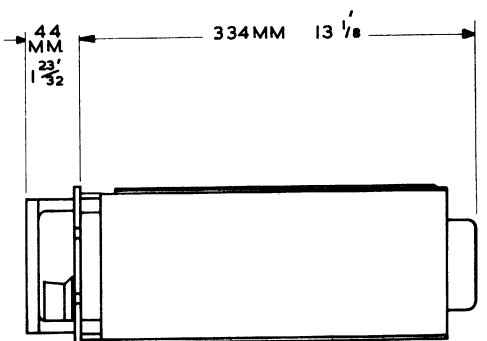


Fig. 3.1 Overall dimensions of 1830 Series in all mounting styles.

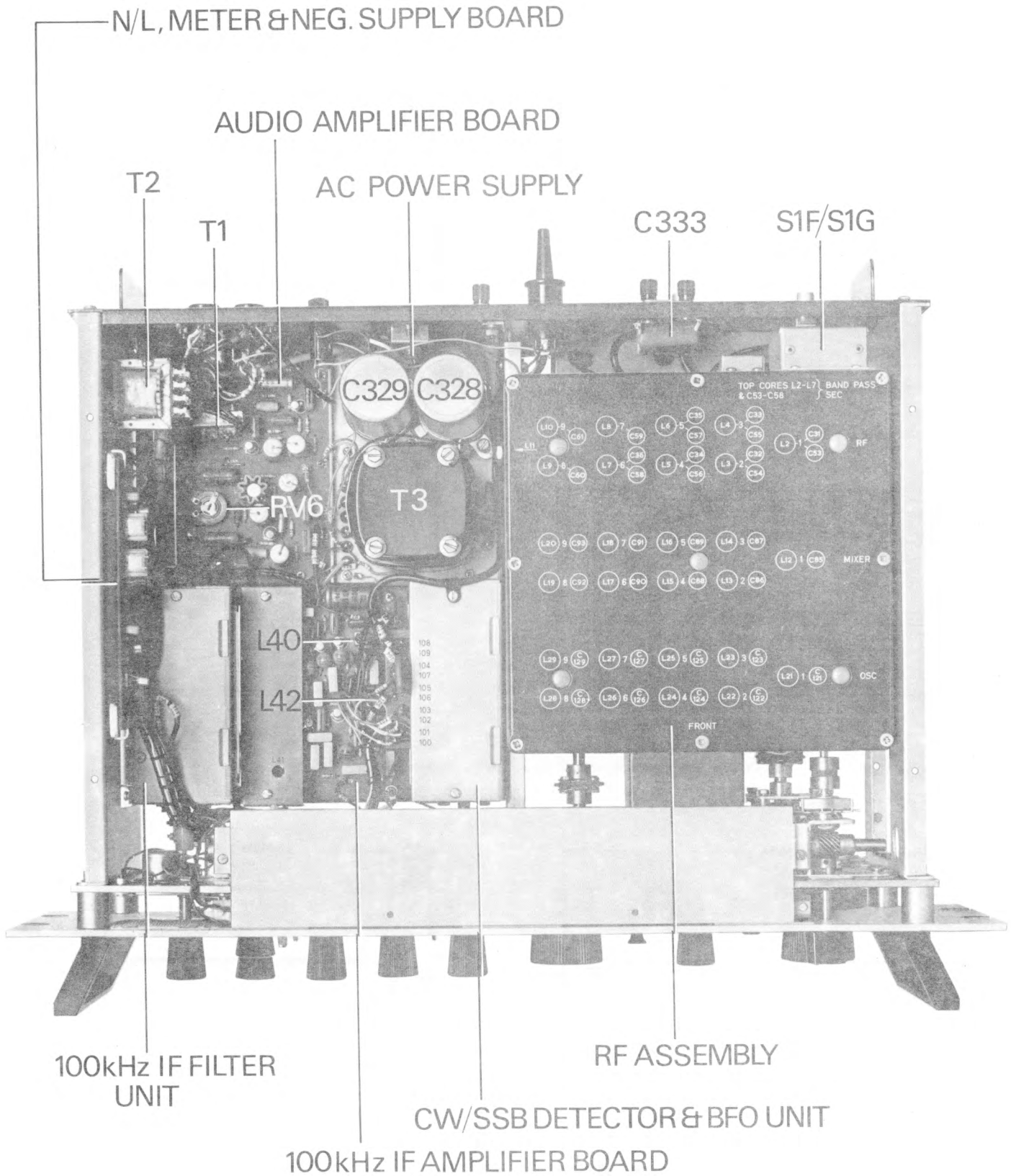


Fig. 3.2 Plan view of 1830/1 Receiver.

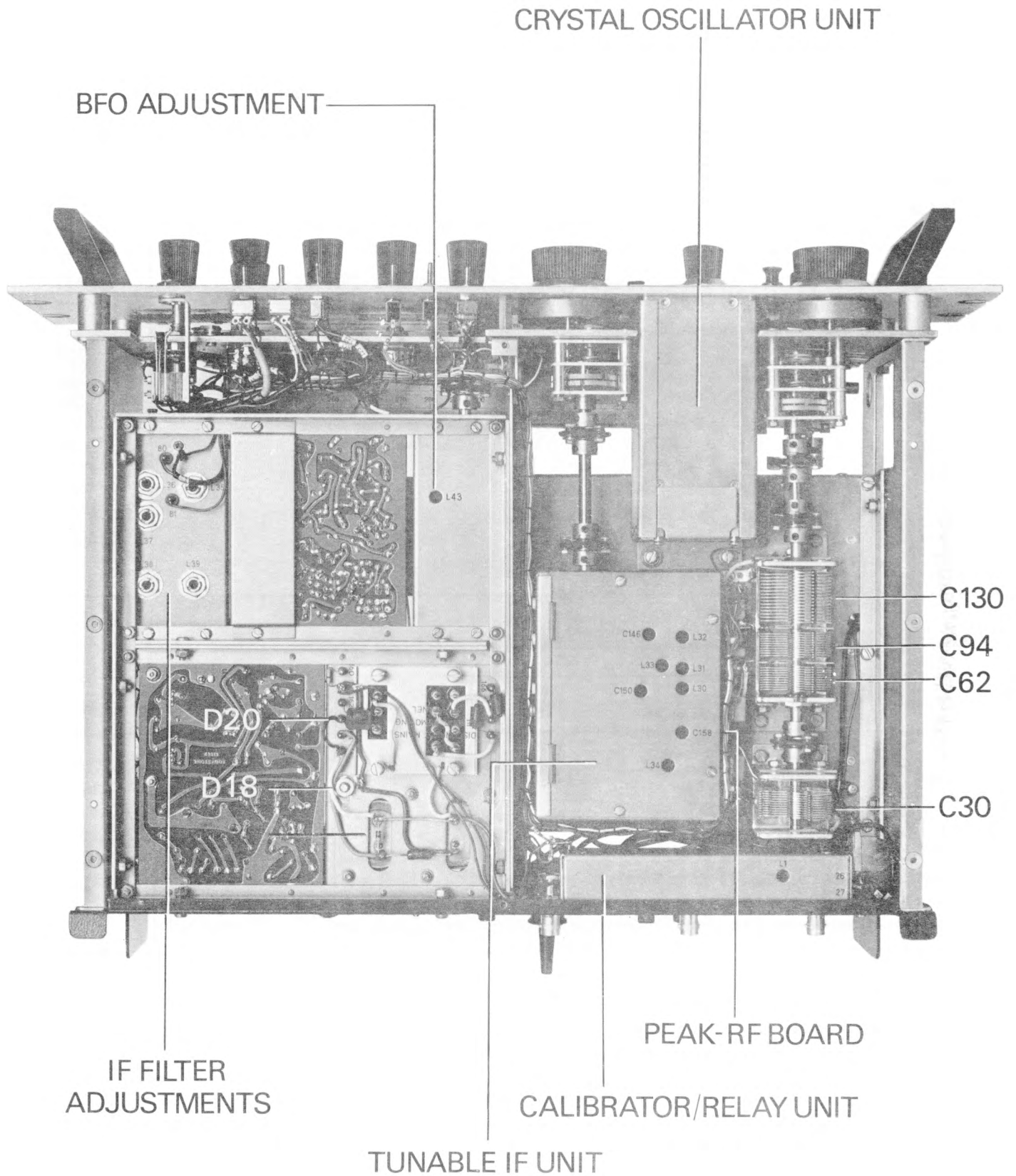


Fig. 3.3 Underside view of 1830/1 Receiver.

INSTALLATIONSection 4I N S T A L L A T I O NG E N E R A L

TABLE 4.1 LIST OF ACCESSORIES SUPPLIED WITH 1830 SERIES RECEIVERS

Quantity	Description	Part No.
4	*Cabinet Mounting Feet (complete with 4 x 2BA screws)	7132P
1	Ancillaries Plug (12-way, unwired)	8037P
3	BNC bayonet-lock coaxial plugs (for Aerial Input, Synth. Input and IF Output)	8012P
1	AC Supply Connector (complete with 2000mm of 3-core cable)	D2311/1
1	DC Supply Connector (complete with 2000mm of 2-core cable)	D3641
2	Spare Dial Bulbs (12V, 1W, 5mm wire-ended)	8448P
2	Spare Fuses (1 Amp, miniature glass-cartridge)	7173P
1	Allen Key (to fit control knob screws)	8449P
1	Trimming Tool - Eddystone	8363P
1	Trimming Tool - Neosid H.S.1.	8450P
1	Trimming Tool - T.T.1.	8451P
	(*) Not supplied with rack-mounting versions.	

TABLE 4.2 LIST OF ADDITIONAL ACCESSORIES AVAILABLE TO ORDER

Description	Part No.
Shock-absorbent Mounting Kit (supplied unassembled)	LP2817/2
Plinth Loudspeaker Unit	Cat. 989
Cabinet Loudspeaker Unit	Cat. 935
Telephone Headset	LP3242
Telephone Headset	LP3301
Standard Cabinet (for converting rack receiver to bench-mounting)	8256P
Spares Kit (list of items on request)	-
Special shock-mounts for Reserve Receiver installations (4 off reqd.)	8632P

Mounting

1830 Receivers are available for bench-mounting or rack-mounting, the latter being designated Model 1830/suffix/RM, e.g. Model 1830/1/RM. Bench-mounted receivers can be installed in standard 483mm (19in) racking after removing the normal cabinet. Both versions are equipped with protective dust covers - Part Nos 8419P (top) and 8420P (bottom). Spare cabinets are available to order for converting rack receivers for bench-mounting.

Installation as a Reserve Receiver on board ship

1830/1 Receivers installed as Reserve Receivers on board ships should be fitted with special shock-mountings (Part No. 8632P). Four mounts are required and these are supplied complete with screws and bench drilling diagram giving all dimensions.

A S S E M B L Y I N S T R U C T I O N S

Rack-mounting Receivers

Rack-mounting versions of the 1830 can be installed directly in 483mm (19in) racks, using four $\frac{1}{4}$ in. BSF chromium-plated screws Eddystone Ref. 40A-330. Plain washers Ref. 27E-57 should be used to prevent damage to the panel finish. Fixing slots conform to standard, the centre-spacing being 57.2mm (2.25in) in the case of receivers with 133mm (5.25in) panel, and 146mm (5.75in) for 222mm (8.75in) panel.

Bench-mounting Receivers

A total of eight hank-bushes are provided in the underside of the cabinets used on standard bench-mounting receivers. These provide fixing points for (1) normal mounting feet, (2) Plinth Loudspeaker Unit Cat. No. 989, and (3) Anti-vibration Mounting Type LP2817/2.

The mounting feet should be attached using the four 2BA screws supplied, the correct fixing points being those nearest to the corners of the cabinet. These hank-bushes are also used when fitting the Anti-vibration Mounting, whereas the Plinth Loudspeaker Unit is screwed to the inner group of fixing points.

Instructions for fitting Anti-vibration Mountings LP2817/2

1. Invert receiver.
2. Place the large neoprene washers over the fixing holes provided in the underside of the cabinet with stepped face uppermost.
3. Lower the channel-shaped mountings onto the washers, keeping the fixing flanges towards the outside of the receiver and at the same time making sure that the step on the washers locates with the holes in the mountings.
4. Place the smaller neoprene washers on the inside of the channel-shaped pieces and pass the 2BA screws (with brass washers) through both neoprene washers.
5. Locate screws in hank-bushes and tighten.
6. Attach channel-shaped mountings to bench top with suitable screws: mountings should be bonded to bench if this is of metal construction.

M A I N S V O L T A G E A D J U S T M E N T

Transformer Input Tappings

Unless otherwise specified at the time of ordering, all receivers are dispatched from the factory with the power transformer input tappings set for 240V operation. Receivers set to other voltages on delivery can be readily identified by a small label attached to the rear which indicates the actual setting in use.

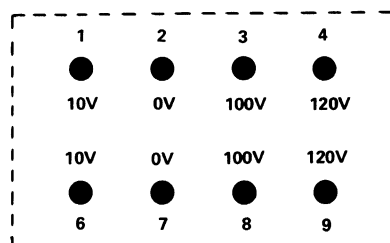


Fig. 4.1 Power Transformer Primary Tappings.

REAR OF RECEIVER →

The power transformer is located near the rear of the receiver and tappings are accessible from the underside after removing the bottom cover plate. The transformer has two separate 130V primaries which are tapped as shown in Fig. 4.1.

INSTALLATION

Transformer Input Tappings (contd.)

The two primaries are operated in series for voltages in the range 200/260V and in parallel for 100/130V. Connections should be arranged as detailed in Table 4.3.

TABLE 4.3 POWER TRANSFORMER VOLTAGE ADJUSTMENT

Voltage	Link	Input	Voltage	Link	Input
100V	2 & 7 3 & 8	7 & 8	220V	3 & 6	1 & 8
110V	1 & 6 3 & 8	6 & 8	230V	3 & 7	1 & 9
120V	2 & 7 4 & 9	7 & 9	240V	3 & 6	1 & 9
130V	1 & 6 4 & 9	6 & 9	250V	2 & 6	4 & 9
200V	3 & 7	2 & 8	260V	4 & 6	1 & 9
210V	3 & 6	2 & 8			

DISCONNECT FROM SUPPLY BEFORE ADJUSTING TAPS

Fuses

Separate AC and DC fuses are provided in holders at the rear of the receiver. The fuse complement should be as follows:-

100/130V supply:	<u>AC Fuses</u>	2 Amps.	<u>DC Fuse</u>	1 Amp. (for all battery supplies - remains in circuit for AC working).
200/260V supply:		1 Amp.		

E X T E R N A L C O N N E C T I O N S

Earthing

1830 Series Receivers are assembled in such a manner that all internal circuitry is totally isolated from the outer frame - i.e. the panel, cabinet etc. This form of construction provides a floating circuit earth which allows complete freedom in earthing the outer frame in situations where the receiver is powered either from a battery which has its positive pole connected to earth, or a battery that is connected to a charging circuit which places both poles above true earth potential. In neither case will there be any risk of short-circuiting the supply and with the latter arrangement there is no danger of aerial connections etc. attaining an unsafe potential.

Isolation of circuit earth from frame is unnecessary when operating from AC supplies or from a battery which has its negative pole connected to earth: the same applies if the battery is free from any other connection. In all three cases the receiver should be installed with a wire link fitted between the CIRCUIT EARTH and FRAME EARTH terminals located at the rear. The link must be removed when using any of the battery arrangements detailed in the previous paragraph.

In AC operation, it is desirable for reasons of safety that the earth lead (coloured green/yellow) attached to the AC Supply Connector should always be wired to the earth pin of the local supply socket: this lead is connected internally to the frame of the receiver. A separate earth connected to the EARTH terminal adjacent to the MAINS INPUT socket is essential for reception on Range 9 and advantageous on the other low frequency ranges where local noise levels are high. Earthing is advisable for battery working.

Operating 1830 Receivers from an AC Mains Supply

1830 Series Receivers are suitable for operation from 40-60Hz supplies in the ranges 100/130V and 200/260V. Reference should be made to the opposite page for instructions on setting the transformer tappings to suit the local mains supply voltage.

The free end of the 3-core cable connected to the AC Supply Connector should be terminated with a plug suitable for connection to the local supply socket. The lead is coded:- LIVE :: BROWN NEUTRAL :: BLUE EARTH :: GREEN/YELLOW

NB: A 12V or 24V battery can be permanently connected at the DC Supply Input socket to provide standby power in the event of mains failure. The three-position toggle used for supply switching allows instantaneous changeover from mains to battery operation.

Operating 1830 Receivers from a Battery Supply

The receiver is dispatched from the factory with the Battery Voltage Selector set for 24V operation. The selector takes the form of a soldered link and is located on the left-hand side plate. TRANSFER LINK TO ADJACENT POSITION TO ADJUST RECEIVER FOR 12V OPERATION - see Fig. 4.2 below.

The DC Supply Connector is ready wired with 2000mm of twin-core flexible lead as shown in Fig. 4.3. Colour-coding is as follows:-

RED :: POSITIVE BLACK :: NEGATIVE

NB: Early 1830 Receivers are suitable for 12V operation only - refer Appendix 'E'.

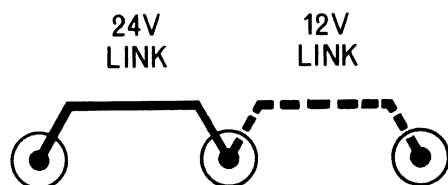


Fig. 4.2 Battery Voltage Selector Link (located on L/H side-plate).

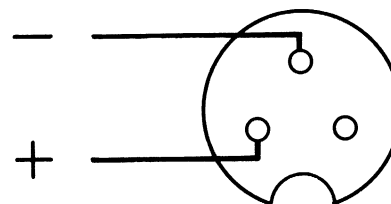


Fig. 4.3 Terminations on DC Supply Connector (viewed on wiring side)

Aerial Input

The BNC bayonet-lock coaxial connector supplied for connection to the Aerial Input socket is suitable for coaxial cable of up to 6.35mm (0.25in) outside diameter. The input impedance is close to 75Ω throughout the entire frequency coverage and efforts should be made to use aerial systems which approximate to this feed impedance.

Synthesizer Input

The two internal 1st Oscillator circuits can be disabled by setting the OSCILLATOR SYSTEM SWITCH to the 'SYNTH' position. 1st Oscillator drive can then be taken from a synthesizer connected to the SYNTH INPUT socket using the BNC connector supplied. The injection frequency should be 1350kHz away from the signal channel on Ranges 1-5, and 100kHz away on Ranges 6-9. Drive should be of the order 1V p-p at low impedance.

INSTALLATION

IF Output

The IF OUTPUT socket provides drive at 100kHz for use with external ancillary equipment. Output impedance is nominally 75Ω and bandwidth is governed by the setting of the SELECTIVITY SWITCH. Connection is by means of a BNC bayonet-lock connector. The output is blocked to DC by a series capacitor which allows safe connection to other equipment when the receiver is operated with floating circuit earth.

Telephone Output

This is located at the front of the receiver and is suitable for any low/medium impedance headset. The external loudspeaker circuit is interrupted when the telephones are connected.

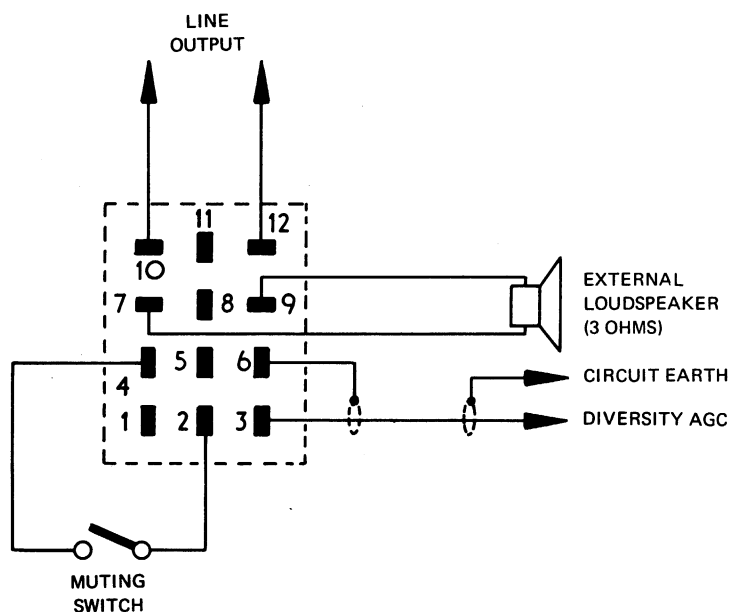
Ancillaries Connector

External connections for LOUDSPEAKER, 600 Ω LINES, MUTING and DIVERSITY AGC are provided on the 12-way Ancillaries Connector: terminations are shown in Fig. 4.4.

IMPORTANT: IT SHOULD BE NOTED THAT THE EARTHY CONNECTIONS FROM THE LOUDSPEAKER, MUTING AND DIVERSITY AGC CIRCUITS ARE RETURNED TO CIRCUIT EARTH WITHIN THE RECEIVER. CARE SHOULD BE TAKEN TO ARRANGE INSULATED EARTH RETURNS FROM THESE FACILITIES WHEN OPERATING THE RECEIVER WITH FLOATING CIRCUIT EARTH.

Fig. 4.4 External connections to Ancillaries Connector.

Viewed on wiring side.



Loudspeaker Output: Suitable for connection to any 3Ω loudspeaker. Provides an output of 500mW at 5% distortion, 1.5W maximum.

600 Ω Line Output: Output is adjustable up to 10mW maximum by means of pre-set LINE LEVEL CONTROL at rear of set. Pins 8 and 11 in the 12-way plug can be linked to provide a balanced output with transformer centre-tap returned to frame of receiver.

Muting: The external control circuit must close to operate the relay to desensitize the receiver. The relay is energised from the receiver supply and can be operated from a second relay to permit normal operation when the external control circuit is open in the muted condition.

Diversity AGC: The IF AGC line is brought out at pin 3. Connection should be made with screened cable, the braid being earthed to pin 6 (circuit earth). Refer to page 31 for information on installation and operation of 1830 Receivers in dual-diversity.

MODELS 1830/5-8

IF SELECTIVITY, AGC TIME
CONSTANT & MODE SWITCHING
DIFFER FROM MODELS 1830/1-4
COVERED BY THIS SECTION.
REFER TO APPENDIX AT REAR.

Section 5O P E R A T I O NC O N T R O L S

The following list details the full complement of operational controls provided on 1830 Series Receivers. All are located on the front panel with the exception of the two marked with an asterisk (*): these are pre-set controls mounted on the back-plate. Model 1830/2 has five separate switches for crystal selection.

RANGE SWITCH (9)	CURSOR ADJUSTER (4)
MAIN TUNING CONTROL (17)	BFO PITCH CONTROL (7)
INCREMENTAL TUNING CONTROL (8)	NOISE LIMITER SWITCH (12)
PEAK-RF CONTROL (6)	MANUAL/AGC SWITCH (14)
OSCILLATOR SYSTEM SWITCH (16)	AGC TIME CONSTANT SWITCH (15)
MODE SWITCH (5)	INTERNAL LOUDSPEAKER SWITCH (13)
SELECTIVITY SWITCH (1)	SUPPLY SWITCH (10)
IF GAIN CONTROL (3)	*LINE LEVEL CONTROL
AF GAIN CONTROL (2)	*METER ZERO ADJUSTER
CALIBRATOR SWITCH (11)	<u>Numbers refer to Fig. 5.1 on page 26.</u>

C O N T R O L F U N C T I O N S

RANGE SWITCH Rotates scale drum to display selected frequency range in the upper half of the scale aperture. Calibration is in MHz on Ranges 1-5 and kHz on Ranges 6-9. Circuit configuration changes to double-conversion on Ranges 1-5 and the incremental facility becomes available for fine tuning.

Range 1	18.0 - 31.0MHz	Range 6	920 - 1750kHz
Range 2	10.0 - 19.0MHz	* Range 7	480 - 950kHz
Range 3	5.5 - 10.0MHz	* Range 8	240 - 480kHz
Range 4	2.9 - 5.5MHz	Range 9	120 - 250kHz
Range 5	1.5 - 2.9MHz		

(*) 1830/3/4/6/8 : Range 7 = 400-535kHz, Range 8 = 200-400kHz.

MAIN TUNING CONTROL The setting of this control determines the frequency to which the receiver is tuned as indicated by the main scale tuning cursor. On Ranges 1-5, the indicated frequency will be affected by the setting of the INCREMENTAL TUNING CONTROL and this should therefore be set to 'Ø' when the receiver is to be tuned by means of the MAIN TUNING CONTROL alone.

In crystal-controlled working, or when using an external synthesizer to provide the 1st Oscillator frequency, the MAIN TUNING CONTROL must be adjusted to align the signal frequency circuits to the appropriate reception channel.

OPERATION

INCREMENTAL TUNING CONTROL

Operative on Ranges 1-5 only. Provides electrical band-spread with a coverage of 50kHz above and 50kHz below any frequency selected by the MAIN TUNING CONTROL. Calibration is directly in 'kHz' and is read against the second tuning cursor in the lower part of the scale aperture.

Incremental settings should be added to or subtracted from the main scale reading to determine the actual frequency to which the receiver is tuned. For greatest accuracy and ease of calculation, the MAIN TUNING CONTROL should always be set to a 100kHz calibration mark when using this facility.

Refer also to Peak-RF Control below.

PEAK-RF CONTROL

The actual function of this control is governed by the setting of the RANGE SWITCH, but operationally it must always be adjusted for maximum signal in much the same way as when using the 'aerial trimmer' fitted on other types of communication receiver.

On Ranges 1-5 it is used to correct misalignment of the signal frequency circuits which occurs when the receiver is tuned by means of the INCREMENTAL TUNING CONTROL. One exception to this rule is that when using the crystal-controlled 1st Oscillator or an external synthesizer, full correction for 1st IF offset can be accomplished by using the MAIN TUNING CONTROL. In this event, the PEAK-RF CONTROL should be set to its mean position.

On Ranges 6-9 the PEAK-RF CONTROL serves primarily to correct detuning of the input circuit caused by variations in the characteristics of the aerial in use.

OSCILLATOR SYSTEM SWITCH

This control is located at the front of the plug-in crystal box used for crystal-controlled working on Ranges 1-5. In addition to its main function of selecting the appropriate oscillator arrangement, it also serves as a crystal selector switch. Crystal positions are numbered 1-10, and this same numbering is repeated alongside the holders within the box.

The other two positions of the switch are labelled 'NORMAL' and 'SYNTH'. The 'NORMAL' position activates the tunable 1st Oscillator for manual tuning and the 'SYNTH' position disables both internal 1st Oscillators to permit operation with external synthesized drive.

NB: The receiver is disabled when the Crystal Box is removed.

Models 1830/2, /4, /7 & /8 : The OSCILLATOR SYSTEM SWITCH fitted on these receivers has only seven positions:-

'NORMAL' - 'A' - 'B' - 'C' - 'D' - 'E' - 'SYNTH'

The 'NORMAL' and 'SYNTH' positions are as on the other types of receiver. Positions 'A' - 'E' select the appropriate CRYSTAL SELECTOR SWITCH from five such switches located in the lower part of the panel.

Crystal Boxes can be removed without disabling receiver.

- MODE SWITCH The MODE SWITCH selects the appropriate detector and effects various other circuit changes to suit the type of signal to be received. The four positions are marked:-
'CW (A1)' - 'USB' - 'LSB' - 'AM'
- SELECTIVITY SWITCH Provides a choice of four IF bandwidths to suit the various types of signal for which the receiver is designed. The bandwidths corresponding to each position of the switch are as follows (6dB figures quoted):-
'AM WIDE' : 8kHz 'A1 (N)' : 1.3kHz
'AM NARROW - SSB' : 3kHz 'A1 (VN)' : 0.1kHz
- BFO PITCH CONTROL This control is operative for both 'CW' and 'SSB' reception. With the MODE SWITCH at 'CW' it provides a BFO tuning swing of approximately ± 5 kHz and functions as a normal pitch control. In the two 'SSB' positions, the control swing is reduced to some 200Hz overall to permit fine adjustment of the carrier insertion frequency which is coarsely tuned by capacitors selected by the MODE SWITCH. A reduction drive is fitted for ease of adjustment.
- IF & AF GAIN CONTROLS Dual-concentric potentiometer with AF GAIN on centre shaft. The IF GAIN is rendered inoperative when the MANUAL/AGC SWITCH is set to 'AGC'.
NB: An RF gain control is not provided on this receiver and the RF Amplifier is therefore permanently connected to a delayed AGC outlet derived from the 100kHz IF.
- CALIBRATOR SWITCH Miniature toggle switch labelled 'CAL'. Setting the switch to 'ON' activates the internal crystal calibrator and operates the muting relay to prevent confusion between the calibration markers and normal signals. Markers appear at all 500kHz points throughout the entire range, i.e. 500kHz, 1000kHz, 1500kHz etc.
NB: In normal operation when using the tunable 1st Oscillator on Ranges 1 - 5, incremental scale errors are automatically corrected when calibrating the main tuning scale against the appropriate crystal marker.
- CURSOR ADJUSTER This is a mechanical control which permits lateral movement of the main tuning cursor independently of the MAIN TUNING CONTROL to allow correction for all scale errors. It is labelled 'CAL ADJ'.
- NOISE LIMITER SWITCH Introduces an audio type noise clipper when set to 'ON'. The degree of limiting is dependent to some extent on the setting of the IF GAIN CONTROL which should always be adjusted for optimum limiting action when using the 'MANUAL' position of the MANUAL/AGC SWITCH. The limiter is effective in all signal modes.

OPERATION

- MANUAL/AGC SWITCH Permits choice of manual or automatic control of the pre-detector gain. Manual control is by means of the IF GAIN CONTROL which is rendered inoperative when the MANUAL/AGC SWITCH is set to 'AGC'.
- AGC TIME CONSTANT SWITCH Operative only at 'AGC' setting of MANUAL/AGC SWITCH. Allows choice of time constant to suit type of signal received. The 'SHORT' position is suitable for all modes of reception, while the 'LONG' position can be used for 'SSB' when a hang characteristic is required to prevent noise bursts during pauses in transmission.
- INTERNAL LOUDSPEAKER SWITCH Mutes internal loudspeaker when set to 'OFF'. The external loudspeaker is muted on insertion of the telephone plug.
- SUPPLY SWITCH Provides AC and Battery ON/OFF switching.
- LINE LEVEL CONTROL Used for independent adjustment of the audio output on the 600Ω line channel. Adjustment should be made by reference to the normal line monitoring facilities provided on the installation. Output is adjustable to 10mW maximum.
- METER ZERO ADJUSTER Permits adjustment of carrier-level meter to zero reading under no-signal conditions. Adjust with IF GAIN at minimum and MANUAL/AGC SWITCH at 'MANUAL'. Infrequent adjustment only will be required. Meter indicates relative carrier level and is calibrated in arbitrary divisions 0-10.

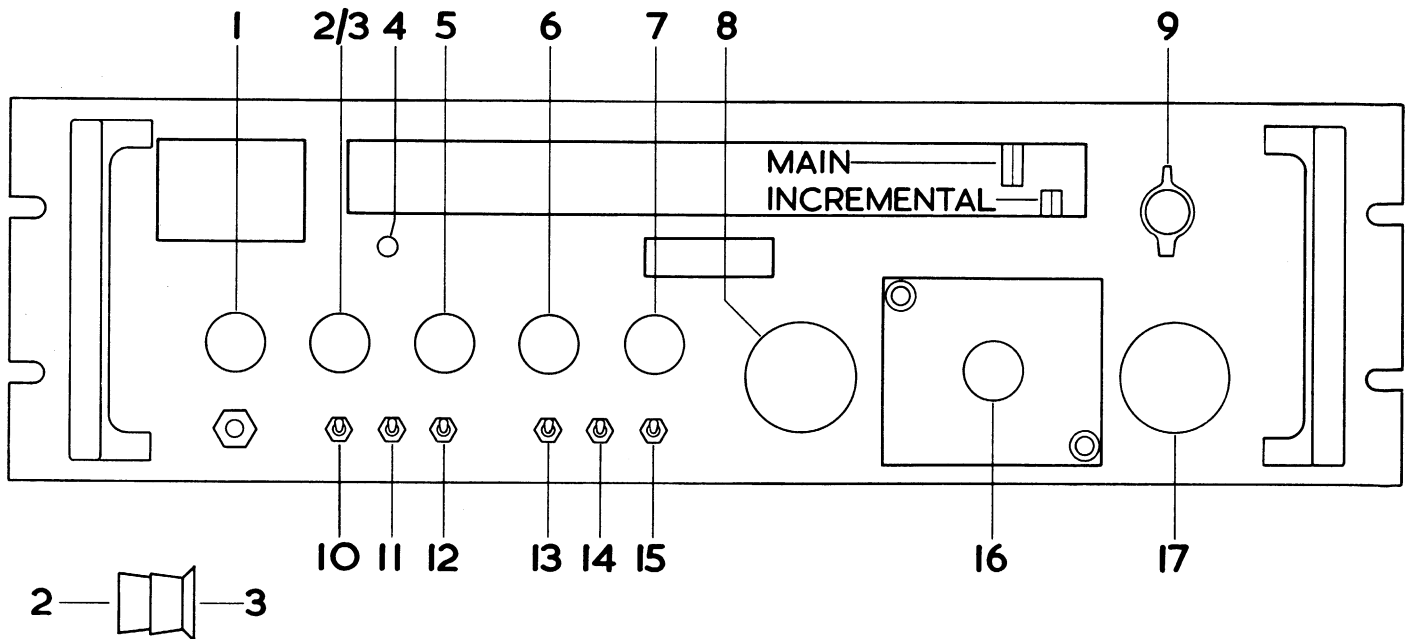


Fig. 5.1 1830 Series Panel Controls (Numbers correspond with text opposite)

T U N I N G I N S T R U C T I O N S

Manual Tuning

1. Install receiver in accordance with instructions given in Section 4. Set INT LS SWITCH (13) to 'ON' if telephones or external loudspeaker are not available.
2. Set controls as follows:- SUPPLY SWITCH (10) to 'BATT' or 'MAINS' - CRYSTAL SELECTOR SWITCH (16) to 'NORMAL' - CAL ADJ (4) to mid-position - INCREMENTAL TUNING (8) to 'Ø' (Ranges 1-5 only) - PEAK-RF CONTROL (6) to mid-position.
3. Set MODE SWITCH (5) and SELECTIVITY SWITCH (1) to suit type of signal. SELECTIVITY SWITCH should be set to appropriate 'wide' position for initial tuning of A1 and A3 signals - shift to 'narrow' positions to reduce adjacent channel interference.
4. Set RANGE SWITCH (9) and MAIN TUNING CONTROL (17) to obtain required frequency. NB: If precise scale accuracy is required, carry out scale calibration check as described below. Refer also to Incremental Tuning Facility.
5. Adjust IF GAIN (3) and AF GAIN (2) for suitable output. IF GAIN is inoperative with MANUAL/AGC SWITCH (14) at 'AGC'.
6. Adjust PEAK-RF CONTROL (6) for maximum signal - or maximum noise in the absence of signal.
7. Adjust BFO PITCH CONTROL (7) as follows:- CW Reception: set for desired audio beat (swing \pm 5kHz). SSB Reception: use for fine adjustment of re-inserted carrier frequency (swing reduced to \pm 100Hz).
8. Set NL SWITCH (12) to 'ON' if impulse noise is present.
9. Set MANUAL/AGC SWITCH (14) for manual or automatic gain control.
10. If using 'AGC' position, set AGC TIME CONSTANT SWITCH (15) to 'SHORT' for CW/AM reception, 'LONG' for SSB reception.

Scale Calibration Check (See also page 31 - Standardising Crystal Calibrator)

1. Set INCREMENTAL TUNING CONTROL (8) to 'Ø' (Ranges 1-5 only).
2. Set MODE SWITCH (5) to 'CW' and BFO PITCH (7) to 12 o'clock position.
3. Set CAL SWITCH (11) to 'ON'.
4. Adjust MAIN TUNING CONTROL (17) to nearest scale check-point, locate marker and tune to zero-beat. Markers occur at all 500kHz points.
5. Turn CAL ADJ CONTROL (4) to set cursor coincident with correct calibration mark.
6. Set CAL SWITCH (11) to 'OFF' and tune to working frequency.

Incremental Tuning Facility (Ranges 1-5 only)

1. Carry out scale calibration check at nearest 500kHz point and then re-set main scale to the 100kHz point nearest to required frequency.
2. Tune to wanted signal with INCREMENTAL TUNING CONTROL (8).
3. Add (or subtract) incremental reading to (from) main scale reading to obtain actual tune frequency.
4. Adjust PEAK-RF CONTROL (6) for maximum signal - or maximum noise in the absence of signal.
5. Refer to pages 29/30 for instructions on use of this facility when using crystal-control or synthesized 1st Oscillator.

CRYSTAL CONTROLLED WORKINGGeneral

Although provision is made for operating both the 1st and 2nd Oscillators with crystal control, most receivers will be operated with only the 1st Oscillator controlled in this manner. Fitting a crystal in the 2nd Oscillator circuit results in loss of the incremental tuning facility and would normally be contemplated only in the case of unattended installations where ultimate stability is required.

Operation with crystal-controlled 1st Oscillator

Crystals for control of the 1st Oscillator are fitted in the plug-in crystal box at the front of the receiver. This can be equipped with up to ten crystals for reception on channels in the band 1.5 - 31MHz, crystals being selected by the 'CRYSTAL SELECTOR' which activates the internal Crystal Oscillator Unit when set to any crystal position.

The plug-in crystal box is removed by pulling the two captive retainers and sliding it forward away from the panel: slight resistance will be felt as the plug and socket disengage. The crystal sockets are numbered to correspond with the ten switch positions and it is suggested that a small card is kept with the receiver detailing the signal frequency for each switch position: a note should also be made of the incremental setting required for each channel.

The usual requirement for precise choice of crystal frequency for reception on a specific signal channel is relaxed in the case of 1830 Series Receivers by virtue of the tunable 1st IF arrangement which is available in this mode of operation. Crystal-controlled injection frequencies up to 50kHz from the nominal frequency required can be accommodated, the resultant tune error being corrected by suitable adjustment of the INCREMENTAL TUNING CONTROL.

At signal frequencies higher than 3.0MHz, the crystal-controlled injection frequency can be chosen either above or below the desired signal channel. Below 3.0MHz, the injection frequency must be on the high side of the signal to prevent possible interference in the range of the 1st IF circuits.

Further freedom in the choice of crystal is possible at the higher frequencies in the tuning range where either the 2nd or 3rd harmonic of the crystal can be used to furnish the appropriate injection frequency.

*Standard procedure for calculating crystal frequency

In many cases it will be necessary to order a crystal specially, in which event it will usually be found most convenient to calculate the frequency so that the desired signal channel occurs at the '0' setting of the INCREMENTAL TUNING CONTROL (i.e. with a 1st intermediate frequency of 1350kHz).

The appropriate frequency can easily be determined by applying the formula:-

$$\begin{aligned} \text{CRYSTAL FREQ.} &= \text{SIGNAL FREQ.} + 1350\text{kHz} \quad (\text{for signal frequencies below } 3.0\text{MHz}) \\ \text{or} & \quad \text{SIGNAL FREQ.} \pm 1350\text{kHz} \quad (\text{for signal frequencies above } 3.0\text{MHz}) \end{aligned}$$

When the calculated crystal frequency lies above 20MHz, divide by 2 or 3 and use the second or third crystal harmonic to furnish the required oscillator injection.

* SSB Channels: Calculated injection frequency must be adjusted by $\pm 1.5\text{kHz}$ if channel is required for SSB reception: the following rules apply:-

<u>CRYSTAL FREQ. CHOSEN ABOVE SIGNAL FREQ.</u>	<u>CRYSTAL FREQ. CHOSEN BELOW SIGNAL FREQ.</u>
ADD 1.5kHz for USB	ADD 1.5kHz for LSB
DEDUCT 1.5kHz for LSB	DEDUCT 1.5kHz for USB

(*) Consult Appendix at rear for
Models 1830/5-8.

Ordering crystals for 1st Oscillator control

Crystals can be ordered direct from Eddystone Radio Limited at our usual address. The order should be worded as follows:-

Quantity - Crystal Unit(s) for use with 1830 Series Receiver.

Frequency or frequencies of crystal(s) quoted in kHz.

If crystals are ordered from other suppliers, the full specification should be given as detailed below:-

Crystal Unit - Inter-Services Style 'D' (International Style 'AA'). Frequency in kHz (for parallel mode oscillator service with load capacity of 30pF). Tolerance 0.005% calibrated at 25°C.

NB: Tolerance should be 0.0015% when the crystal(s) is/are to be fitted in a receiver which also has its 2nd Oscillator crystal-controlled.

Alternative procedure for calculating crystal frequency

If a large stock of crystal frequencies is already available, it is quite possible that one of these could be pressed into service by taking advantage of the incremental tuning facility. In this event, determine all possible crystal frequencies which could be used to control the required signal channel by following the procedure detailed below.

1. Assume that it is necessary to crystal-control a reception frequency of 18.1MHz.
2. Apply the standard formula to determine the nominal frequencies which could be employed:-

$$18100 + 1350 = \underline{19450\text{kHz}} \quad \text{and} \quad 18100 - 1350 = \underline{16750\text{kHz}}$$

3. Calculate the full range of crystal frequencies which provide reception on 18.1MHz when use is made of the incremental tuning facility.

$$(19450 - 50) \text{ to } (19450 + 50) = \underline{19400 \text{ to } 19500\text{kHz}} \quad (\text{oscillator 'high'})$$

$$(16750 - 50) \text{ to } (16750 + 50) = \underline{16700 \text{ to } 16800\text{kHz}} \quad (\text{oscillator 'low'})$$

4. If a crystal in either of these ranges is not available, divide by 2 and by 3 to check whether an existing lower frequency crystal would perhaps be suitable.

Continuing the example above gives the following additional frequency bands which could also be used:-

	<u>INJECTION FREQ. HIGH</u>	<u>INJECTION FREQ. LOW</u>
2nd harmonic operation	<u>9700 to 9750kHz</u>	<u>8350 to 8400kHz</u>
3rd harmonic operation	<u>6466.6 to 6500kHz</u>	<u>5566.6 to 5600kHz</u>

Determining the incremental setting in crystal-controlled working

In cases where a random crystal frequency is employed, rather than one chosen to produce a 1st IF of 1350kHz, it will be necessary to determine the incremental setting which corresponds to the signal frequency required. The simplest approach is to first calculate the intermediate frequency produced by the available crystal, and then obtain the incremental setting from Table 5.1 on the following page.

OPERATION

The intermediate frequency is calculated as follows:-

Oscillator injection on 'high' side: 1st IF = OSC. INJECTION FREQ. - SIGNAL FREQ.

Oscillator injection on 'low' side: 1st IF = SIGNAL FREQ. - OSC. INJECTION FREQ.

TABLE 5.1 INCREMENTAL SETTING VERSUS INTERMEDIATE FREQUENCY

1st IF	1300kHz	1310kHz	1320kHz	1330kHz	1340kHz	1350kHz
Setting	+50	+40	+30	+20	+10	0

1st IF	1360kHz	1370kHz	1380kHz	1390kHz	1400kHz	-
Setting	-10	-20	-30	-40	-50	-

IMPORTANT: When operating the receiver with oscillator injection on the 'low' side of the signal, the direction of the incremental calibration becomes reversed: i.e. 'plus' settings indicate frequencies lower than those shown by the main scale tuning cursor. In addition, the SSB settings of the MODE SWITCH will also become reversed - the 'USB' position should be used for lower sideband reception and the 'LSB' position for upper sideband.

Synthesized operation

Both internal 1st Oscillators are disabled when the OSC SYSTEM SWITCH is set to 'SYNTH' to permit operation with an external synthesizer. The synthesizer frequency is calculated as follows:-

Ranges 1-4 :: SIGNAL FREQ. \pm 1350kHz.
Range 5 :: SIGNAL FREQ. + 1350kHz.
Ranges 6-8 :: SIGNAL FREQ. \pm 100kHz.
Range 9 :: SIGNAL FREQ. + 100kHz.

NOTE

Nominal 1st IF on Models 1830/5-8 is 1351.5kHz.

Synthesized drive should be connected to the SYNTH INPUT socket at the rear using low-impedance coaxial cable: drive level should be of the order 1V p-p.

The incremental facility can be retained in the normal manner, or alternatively the 2nd Oscillator can be fitted with a crystal when optimum stability is required.

Operation with crystal-controlled 2nd Oscillator

A crystal for controlling the 2nd Oscillator can be supplied to order: specification is as follows:-

Crystal Unit. Inter-Services Style 'D' (International Style 'AA').

*1250kHz series mode. Tolerance 0.005% calibrated at 25°C.

Increase tolerance to 0.0015% if 1st Oscillator is also crystal-controlled.

Fit crystal as follows: Remove cover from Tunable IF Unit, locate crystal holder and remove (unsolder) the wire link from the two printed circuit terminals adjacent to it. Fit 1250kHz crystal and replace cover.

(*) 1251.5kHz on 1830/5-8

NB: Any crystal in the range 1200-1300kHz can be used to control the 2nd Oscillator but the main scale calibration will be correct only when a crystal of 1250kHz is employed.

When using the receiver with crystal-controlled 2nd Oscillator, the INCREMENTAL TUNING CONTROL must be set to ' \emptyset ' to align the 1st IF and 2nd Oscillator circuits to the appropriate frequencies. Some pulling of the crystal frequency is possible by fine adjustment of the INCREMENTAL TUNING CONTROL, so allowing accurate tuning when the receiver has its 1st Oscillator crystal-controlled.

The wire link must be replaced if the receiver is returned to normal service with tunable 2nd Oscillator. The crystal can remain in its holder for safe storage if so desired.

Dual-Diversity Working

Two 1830 Series Receivers can be operated in dual-diversity by interconnecting (1) their IF OUTPUT sockets, and (2) their IF AGC lines. Audio output can be taken from either receiver without need for the usual outboard combining transformer.

Consideration should be given to the possibility of crystal-control for the two 1st Oscillators, not only because of the greater stability which then obtains, but also because it allows much simpler adjustment when setting up the installation to any given channel. Tuning is effectively by use of the two INCREMENTAL TUNING CONTROLS when operating in this manner, the two MAIN TUNING CONTROLS tuning the signal frequency circuits only, and therefore not requiring such precise adjustment.

It should be borne in mind that when tuning the two receivers by reference to their carrier-level meters, both meters will register the same reading due to commoning of the IF AGC lines. It is therefore necessary to disable one receiver when the other is being tuned: this is most easily accomplished by setting the MANUAL/AGC SWITCH to the 'MANUAL' position with the IF GAIN at minimum.

Standardising the crystal calibrator

1. Remove receiver from cabinet.
2. Adjust receiver for AM reception with INCREMENTAL TUNING CONTROL at ' \emptyset '.
3. Tune to convenient frequency standard transmission on 5, 10, 15 or 20MHz (MSF, WWV etc.). Make positive identification by monitoring call sign etc.
4. Transfer SELECTIVITY SWITCH to 'VN' and tune INCREMENTAL TUNING CONTROL very carefully for peak reading on carrier-level meter.
5. Set CAL SWITCH to 'ON'.
6. Adjust crystal trimmer C4 for peak reading on carrier-level meter (C4 is accessible through trimming aperture in underside of Calibrator Unit at rear of receiver: use miniature insulated screwdriver for adjustment).
7. Replace receiver in cabinet.

Section 6

M A I N T E N A N C E

G E N E R A L

1830 Series Receivers have been designed for maximum reliability and should require very little in the way of routine maintenance even when used continuously under arduous operating conditions. Any faults which may develop should be of a minor nature, well within the capabilities of properly trained technicians equipped with a reasonable range of test equipment.

This section of the Handbook gives guidance for simple operations such as changing fuses and dial lights, and more detailed instructions on re-alignment etc. Appendix 'A' on page 44 contains a comprehensive analysis of all circuit voltages for reference when carrying out fault finding. A full circuit diagram is bound at the rear. Spares for user-servicing can be supplied ex-stock and helpful advice will be freely given when required.

If major servicing should become necessary, or the user considers a complete overhaul desirable after many years of operation, the receiver can be returned to the manufacturer for specialised attention. It can be sent either direct or via one of the many Eddystone Agents, care being taken to ensure that packing is adequate to prevent damage during transit. Prior arrangements should be made if the equipment is sent direct, all communications being directed to the 'Sales and Service Department' at our usual address. The Receiver Type and Ser. No. should be quoted when writing.

F U S E R E P L A C E M E N T

Three fuses are fitted in holders at the rear of the receiver. Two of these are in series with the live and neutral poles of the AC supply and the other is wired in the low-voltage DC circuit. The AC fuses are rated at 1-Amp for supply voltages in the range 200/260V and 2-Amp for 100/130V.

The DC fuse is rated at 1-Amp and remains in circuit during AC operation. Spare fuses are supplied with the receiver, relevant Part Nos being 7173P for 1-Amp fuse, 6704P for 2-Amp fuse.

D I A L L A M P R E P L A C E M E N T

1. Remove two 6BA screws at ends of dial cover plate: lift off and then unsolder faulty bulb from printed circuit termination.
2. Push bulb out of retainer towards centre of cover plate.
3. Insert new bulb (wire-end first) and solder to printed circuit termination. Examine soldering for possible short-circuit.
4. Apply power to receiver and check that new bulb lights normally before re-fitting the dial cover plate.
5. Replace dial cover plate and tighten 6BA screws taking care not to trap wires.

Two spare bulbs are supplied with the receiver and additional spares can be ordered from Eddystone Radio by quoting Part No. 8448P.

INSTRUCTIONS FOR RE-STRINGING CURSOR DRIVE CORDSGeneral

Both cursor drive systems employ nylon cords and with normal use should never require attention during the operational life of the receiver. The instructions which follow are included as a guide for use in the unlikely event of a cord breaking or being inadvertently dislodged from the pulley system when working on the receiver. Replacement cords can be ordered from Eddystone Radio by quoting Part No. 8446P for the main cord, or Part No. 8447P for the incremental cord. Both cords are supplied ready knotted (knots spaced 1122.3mm (42.25in) on main cord, 927mm (36.5in) on incremental).

Main Cursor Drive (see Fig. 6.1)

NB: Left-hand and right-hand etc. with receiver viewed from front.

1. Remove scale drum for access to complete drive system:-
 - (a) Take out two 6BA screws and remove scale cover plate.
 - (b) Slacken 6BA grub screws in drum spindle collar (adjacent to panel loudspeaker).
 - (c) Slide collar off spindle and remove steel shim washer (trapped behind collar).
 - (d) Set Range Switch to Range 3 to place blank scale strip in uppermost position.
 - (e) Locate access holes at each end of blank scale strip.
 - (f) Slacken 4BA screws (about $1\frac{1}{2}$ turns) through access holes to free scale drum on its spindle. Drum will rotate due to tension of coil spring (right-hand end).
 - (g) Grip helical gear and withdraw spindle through right-hand side-plate, supporting drum and extracting coil spring as spindle clears end bearing.
 - (h) Lift drum clear and store with other loose items in readiness for re-assembly.
2. Take off broken cord and remove cursor.
3. Rotate Main Tuning Control to full extreme of anti-clockwise travel to position cord drum slot at 3 o'clock.
4. Trap one knotted end of replacement cord in front end of cord drum slot. Wind on approximately one turn in a clockwise direction and bring free end of cord out through aperture in right-hand side-plate.
5. Maintain tension on free end of cord and rotate Main Tuning Control to full extreme of clockwise travel. This operation will wind a further five turns of cord onto the cord drum, making six turns in all.
6. Feed free end of cord under jockey pulley, then upwards and over top right-hand guide pulley. Secure cord in tension to prevent turns spilling off drum (a Bulldog clip or similar retainer is ideal for this application - clip to drive support plate, adjacent to Range Switch spindle).
7. Form the remaining length of cord into a loop with the knotted end towards the slow motion reduction drive. Loop should follow roughly the normal pulley route but do not attach to pulleys at this stage.
8. Pass knotted end of cord under top left-hand reduction drive support pillar and over cord drum: trap knot in back end of cord drum slot.
9. Attach cord loop to other pulleys by reference to Fig. 6.1 and then remove the Bulldog clip.

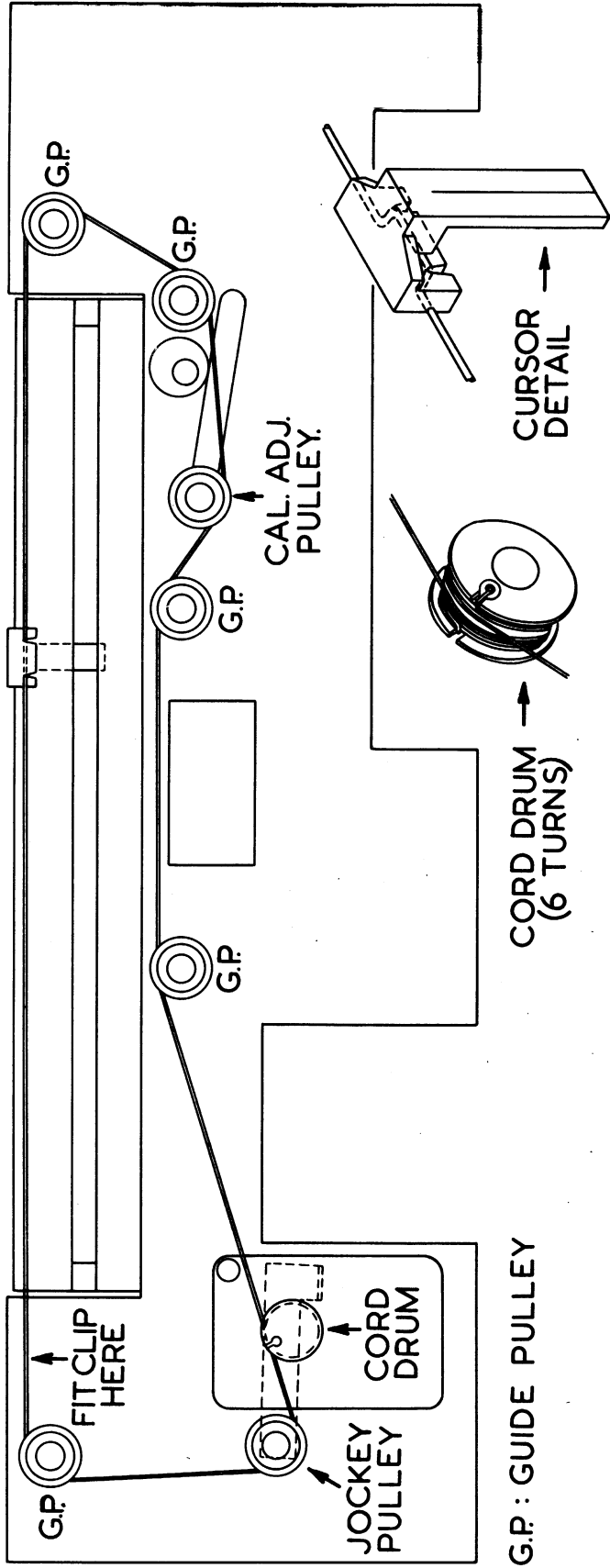


Fig. 6.1 Cording arrangement on main cursor drive.

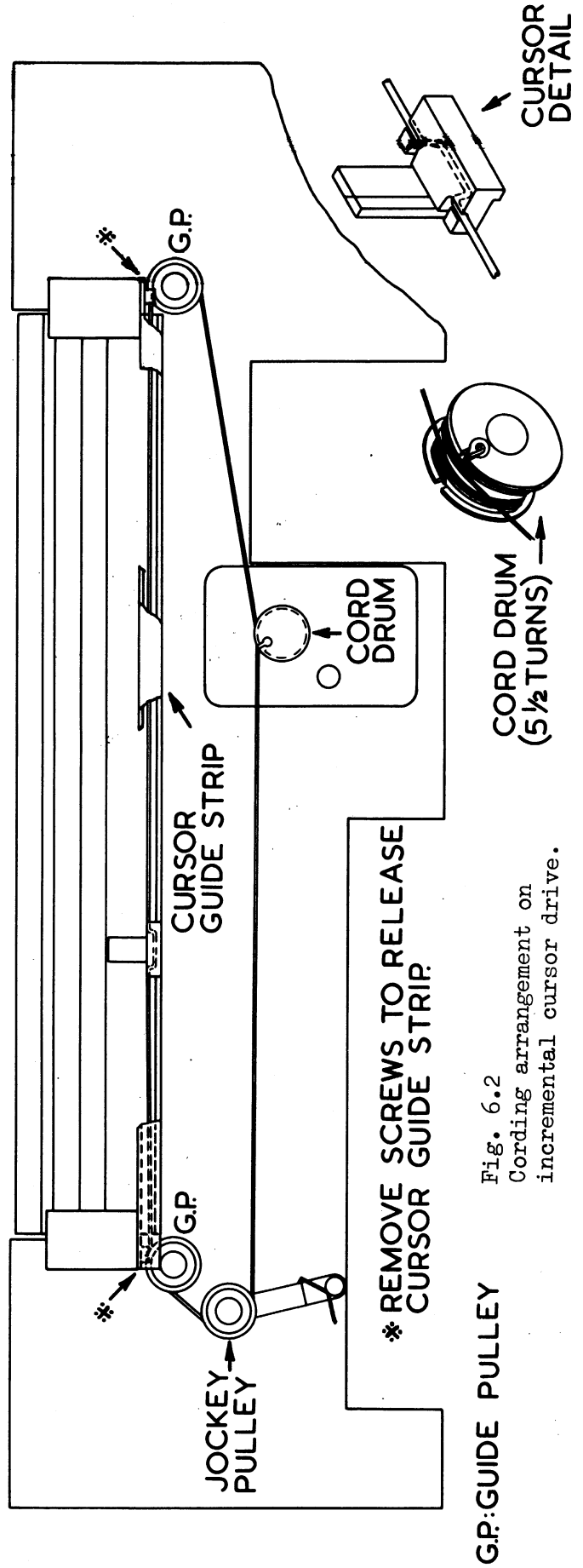


Fig. 6.2 Cording arrangement on incremental cursor drive.

Main Cursor Drive (contd.)

10. Rotate Main Tuning Control anti-clockwise through full travel and check that cord runs smoothly.
11. Replace scale drum by following procedure detailed below:-
 - (a) Pass scale drum spindle through right-hand bearing and slide on the tension spring removed in 1(g). 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 the 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 apertures in blank scale strip with drum set so that Range 3 shows through the 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.

DO NOT REPLACE SCALE COVER PLATE AT THIS STAGE.

12. Rotate Main Tuning Control five turns in clockwise direction and then attach the cursor to the drive cord in a position roughly one inch from left-hand end of dial.
13. Operate Cal. Adj. Control and observe cursor movement. Leave control set in position corresponding to middle of cursor adjustment range.
14. Rotate Main Tuning Control once more to fully anti-clockwise setting. Slide cursor along cord and position coincident with setting mark at left-hand end of scale calibration (adjacent to ringed 'Range' number).
15. Replace scale cover plate and tighten two 6BA screws taking care not to trap dial light leads. Check scale calibration against internal crystal calibrator.

Incremental Cursor Drive (see Fig. 6.2)

NB: Left-hand and right-hand etc. with receiver viewed from front.

1. Remove panel for access to complete drive system:-
 - (a) Remove crystal box, knobs, switch nuts/washers and telephone socket nut.
 - (b) Place receiver face-down with support blocks under outer edges near handles.
 - (c) Remove four handle retaining screws and lift receiver assembly clear of panel.
 - (d) Store all loose items in readiness for re-assembly.
2. Take out two 8BA screws and remove incremental cursor guide strip.
3. Take off broken cord and remove cursor.
4. Rotate Incremental Tuning Control to full extreme of clockwise travel to position the cord drum slot at 4 o'clock.

MAINTENANCE

Incremental Cursor Drive (contd.)

5. Trap one knotted end of replacement cord at rear of cord drum slot with cord passing over drum from right to left.
6. Maintain tension on free end of cord and rotate Incremental Tuning Control to full extreme of anti-clockwise travel. This operation will wind on 5/5.5 turns of cord.
7. Pass cord under jockey pulley, over left-hand guide pulley, across scale and over right-hand guide pulley.
8. Pass cord over cord drum and trap in front end of cord drum slot.
9. Attach cursor and slide along cord towards left-hand end of scale. Set coincident with setting mark after checking that Incremental Tuning Control is set to its fully anti-clockwise position.
10. Replace cursor guide strip and check that drive functions smoothly.
11. Check incremental scale calibration at +50kHz and -50kHz using internal calibrator.
12. Replace panel by reversing procedure in (1) above.

INSTRUCTIONS FOR REMOVING UNITS, PRINTED BOARDS ETC.

General

All sub-assemblies used in 1830 Series Receivers are arranged so that they can be removed easily for access to components which would otherwise be inaccessible with the units in-situ. In most cases the procedure for removal is obvious from visual inspection and the notes which follow serve merely for guidance in cases where caution is necessary or minor difficulties may be encountered. The procedure for removing the panel is particularly straightforward and allows immediate access to the meter and all operational controls.

Power Unit Chassis

Remove transparent cover over transformer connections to avoid risk of breakage when lifting chassis clear.

Audio Output Board

Remove board with heatsink attached (two screws in left-hand side-plate).

BFO and Filter Units

Remember to slacken screws in couplers before removing. Unit fixing screws are accessible from underneath.

Tunable IF Unit

Take off lid for access to four fixing screws.

Calibrator/Relay Unit

Tilt bottom of unit forward to facilitate removal.

RF Assembly

Access holes are provided in the back-plate to facilitate removal of the screws which hold the rear switch cover and aerial input shield.

RF Assembly (contd.)

The RF, Mixer and Oscillator board assemblies can be removed complete with their associated switch wafers. The following procedure is applicable to all boards:-

1. Slacken switch spindle coupler and withdraw spindle through hole in back-plate after removing plastic plug.
2. Disconnect all board terminations:-
RF Board : 8 leads.* Mixer Board : 9 leads. Oscillator Board : 6 leads.
3. Remove four 6BA screws with washers (at extreme left and centre of board).
4. Remove screws etc. which retain top end of switch brackets - retrieve the spindle earthing wipers.
5. Lift board clear of box.

NB: When replacing, align switch wafers with spindle before tightening fixing screws removed in (3) and (4) above.

(*) Excluding two leads to 100kHz IF rejector on side wall of box.

Panel and Scale Drum

Refer to instructions on page 33 (scale drum) and page 35 (panel).

R E - A L I G N M E N T

NOTE: The instructions which follow apply only to Models 1830/1-4. Refer to Appendix at rear for information on Models 1830/5-8.

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. An adequate range of test equipment must be available if the task is to be performed satisfactorily: receivers can be returned to the manufacturer for re-alignment if this course of action is preferred.

Reference should be made to the paragraphs on Performance Testing which should be read in conjunction with the instructions which follow.

NOTE: ALL CORES AND TRIMMERS ARE SELF-LOCKING: SEALING COMPOUNDS SHOULD NOT BE USED.

Re-alignment of the 100kHz IF Amplifier and Filter

- | | |
|-------------------------|---|
| Test Equipment
..... | Standard Signal Generator covering 100kHz with slow tuning rate or incremental tuning facility. |
| | Frequency Counter. |
| | Valve or Solid-State Voltmeter with RF probe. |
| | Insulated Screwdriver. |
| | Terminating Resistor (75Ω $\frac{1}{2}$ -watt). |

Re-alignment of the 100kHz IF Amplifier and Filter (contd.)

1. Adjust receiver controls as follows:-

RANGE SWITCH: Range 7. CRYSTAL SELECTOR: 'SYNTH' IF GAIN: Maximum.
MAIN TUNING: 450kHz. MANUAL/AGC SWITCH: 'MANUAL' AF GAIN: Mid-setting.
MODE SWITCH: 'AM'

2. Connect generator to Mixer section of main tuning gang (ground earthy lead to frame of gang, not to side-plate).
3. Terminate IF Output socket with 75Ω resistor and connect valve voltmeter probe.
4. Set SELECTIVITY SWITCH to 'VN' (crystal filter) and tune generator accurately to crystal peak (unmodulated signal).
5. Align core in L40 for maximum reading on valve voltmeter.
6. Switch to 'AGC' and adjust core in L42 for DIP in indicated reading (IF AGC).
7. Revert to 'MANUAL' and transfer valve voltmeter (DC range) to No. 99 on 100kHz IF Amplifier Board.
8. Increase generator output past AGC threshold level and then adjust core in L41 for DIP in voltmeter reading (RF AGC).
9. Re-connect valve voltmeter at IF Output socket (with probe). Check that generator is still accurately tuned to crystal peak.
10. Change SELECTIVITY SWITCH to 'A1 (N)' position and align the five filter inductors (L35-L39) for maximum output reading. Repeat adjustments to ensure correct tuning.
11. Move SELECTIVITY SWITCH back to 'VN' and connect Frequency Counter in parallel with IF Output termination. Detune generator 50Hz on either side of centre-frequency, noting carefully the filter attenuation at both settings.
12. If the attenuation at +50Hz and -50Hz is found to differ by more than 2dB, adjust C198 slightly to achieve a more symmetrical response. Bandwidth on completion of this adjustment should be of the order 100Hz at -6dB.
13. Increase generator output by 60dB and examine skirt selectivity. If alignment is correct, the 60dB points will lie approximately 1kHz either side of the centre frequency. Trim L38 and L39 slightly if necessary to achieve symmetrical response.
14. Re-check symmetry/bandwidth at 6dB points.
15. Switch to 'A1 (N)', 'AM NARROW - SSB' and 'AM WIDE' positions and check that the response agrees closely with the figures quoted:- 'A1 (N)' : 1.3kHz (-6dB) / 4.5kHz (-60dB). 'AM NARROW - SSB' : 3kHz / 9kHz. 'AM WIDE' : 8kHz / 18kHz.

Re-alignment of the BFO

Test Equipment Standard Signal Generator covering 100kHz and insulated trimming
..... tool (Neosid T.T.1.).

1. Proceed as (1) and (2) of instructions for IF alignment above.
2. Set SELECTIVITY SWITCH to 'VN' and tune generator for peak reading on carrier meter.
3. Select 'USB' and 'LSB' positions of MODE SWITCH and compare pitch of beat notes with BFO PITCH CONTROL at mid-setting (index at 12 o'clock).
4. Adjust core in L43 through trimming aperture in underside of unit to equalise beat notes which should approximate to 1,500 cycles. Check that BFO PITCH gives a swing of the order ± 100Hz at 'USB' and 'LSB'.
5. Change to 'CW (A1)' setting of MODE SWITCH. Check that zero-beat occurs with index at or close to 12 o'clock setting, and that swing is approximately ± 5kHz.

Re-alignment of Incremental Oscillator

Test Equipment Crystal-controlled harmonic generator providing 100kHz markers and 10kHz markers in the range 1300kHz to 1400kHz.
Trimming Tool Type T.T.1.

Connect harmonic generator to Mixer section of main tuning gang and adjust receiver controls as for 100kHz alignment, except RANGE SWITCH (Range 5), MAIN TUNING (1.5MHz), MODE SWITCH ('CW') and BFO (12 o'clock). Set harmonic generator to provide 100kHz markers.

Check incremental scale accuracy at +50kHz and -50kHz (corresponding to 1300kHz and 1400kHz respectively): tune for zero-beat in each case. Errors greater than 1kHz should be corrected by adjusting C158 at -50kHz and L34 at +50kHz.

Change to 10kHz markers and check accuracy at all intermediate 10kHz points throughout the range. Errors in excess of 1kHz are unlikely if the end-frequencies have been set correctly, but if errors are detected they can be easily corrected by slight fanning of the vanes on the oscillator section of the tuning gang (C159).

Re-alignment of Tunable IF Transformer L32/L33

Test Equipment Standard Signal Generator covering the range 1300 - 1400kHz with 50-75Ω output impedance and 30% modulation at 400Hz.
Power Output Meter matched to 3Ω.
Trimming Tool Type T.T.1.

IMPORTANT: CHECK INCREMENTAL OSCILLATOR ALIGNMENT BEFORE CARRYING OUT ADJUSTMENTS BELOW

Connect generator (modulated output) to Mixer section of main tuning gang and adjust receiver controls as for 100kHz alignment except RANGE SWITCH (Range 5) and MAIN TUNING (1.5MHz). Set INCREMENTAL TUNING to +50kHz and generator to 1300kHz: adjust generator output level to give suitable reading on Output Meter.

Trim cores in L32 and L33 for maximum output and then re-tune generator to 1400kHz with INCREMENTAL TUNING set to -50kHz. Trim C146 and C150 for maximum output. Repeat core and trimmer adjustments as necessary until maximum output is produced at both alignment points with no interaction between trimmers and cores.

Re-alignment of the RF Section

Test Equipment Standard Signal Generator covering 120kHz to 31MHz with output matched to 75Ω and 30% modulation at 400Hz.
Crystal-controlled harmonic generator providing markers at 1MHz, 100kHz and 10kHz up to 31MHz.
Power Output Meter matched to 3Ω.
Trimming Tools: Neosid H.S.1., T.T.1. and Eddystone 8363P.

1st Oscillator Circuits: Re-alignment of the 1st Oscillator circuits should be carried out if main scale errors greater than 0.5% are observed with the CAL ADJ CONTROL at mid-travel setting (and INCREMENTAL TUNING CONTROL at 'Ø' on Ranges 1-5).

Scale accuracy should be checked by using the internal crystal calibrator in conjunction with an external harmonic generator providing outputs at 1MHz, 100kHz and 10kHz. Standardise both calibrators before commencing the calibration check.

MAINTENANCE

Re-alignment of the RF Section (contd.)

The alignment procedure is quite conventional - trimmers and cores being adjusted at the frequencies listed in Table 6.1 below. Pre-set adjustments can be identified by reference to the legend printed on the coil box lid.

The slight change in calibration which occurs when the lid is replaced after alignment should be ignored: it can be corrected by very minor adjustment of the CAL ADJ CONTROL, the shift in cursor position being a very small proportion of the total travel available.

TABLE 6.1 1ST OSCILLATOR ALIGNMENT FREQUENCIES AND ADJUSTMENTS

NB: Ranges 7 & 8 - frequencies in brackets apply to Models 1830/3, 4, 6 & 8.

Range	Freq.	Core	Freq.	Trimmer
1	19.0MHz	L21	30.0MHz	C121
2	10.5MHz	L22	19.0MHz	C122
3	5.75MHz	L23	9.5MHz	C123
4	3.0MHz	L24	5.25MHz	C124
5	1.55MHz	L25	2.85MHz	C125
6	950kHz	L26	1700kHz	C126
7	500kHz (415kHz)	L27	950kHz (520kHz)	C127
8	250kHz (210kHz)	L28	450kHz (360kHz)	C128
9	130kHz	L29	240kHz	C129

SET CAL ADJ CONTROL TO MID-TRAVEL AND INCREMENTAL TO ZERO BEFORE COMMENCING ALIGNMENT

RF and 1st Mixer Circuits: Front-end alignment should be carried out if an overall performance check reveals substandard performance on one or several ranges. Standard alignment procedure applies and the appropriate pre-set adjustments can be determined from the coil box legend. Tables 6.2, 6.3 and 6.4 list the alignment frequencies to be used on all versions of the receiver.

It should be noted that the primary cores of the bandpass circuits L2-L7 are adjusted by passing the long end of the H.S.l. trimming tool through the secondary cores. All cores must be adjusted on their upper peak except the primary core of L2 which is set on the lower peak. The tuning gang should be rocked slightly to combat a minor degree of pulling which occurs when adjusting the Mixer circuits on Ranges 1 and 2.

100kHz IF Rejector: On completion of re-alignment on Range 9, leave the receiver tuned to 130kHz and set the generator to 100kHz. Increase generator output until IF breakthrough signal is audible and then trim core in L11 for minimum signal. L11 is accessible through hole in side of coilbox. Re-tune generator to 130kHz, reduce output and re-trim L10 for maximum signal. Repeat both adjustments until interaction is eliminated.

TABLE 6.2 RF/MIXER ALIGNMENT FREQUENCIES AND ADJUSTMENTS : RANGES 1-6

Range	Freq.	Bandpass Core		Mixer Core	Freq.	Bandpass Trimmers		Mixer Trim.
		Pri.	Sec.			Pri.	Sec.	
1	19.0MHz	L2 Bttm.	L2 Top	L12	30.0MHz	C31	C53	C85
2	10.5MHz	L3 Bttm.	L3 Top	L13	19.0MHz	C32	C54	C86
3	5.75MHz	L4 Bttm.	L4 Top	L14	9.5MHz	C33	C55	C87
4	3.0MHz	L5 Bttm.	L5 Top	L15	5.25MHz	C34	C56	C88
5	1.55MHz	L6 Bttm.	L6 Top	L16	2.85MHz	C35	C57	C89
6	950kHz	L7 Bttm.	L7 Top	L17	1700kHz	C36	C58	C90

TABLE 6.3 RF/MIXER ALIGNMENT FREQUENCIES AND ADJUSTMENTS : RANGES 7-9 (1830/1,2,5,7)

Range	Freq.	Core		Freq.	Trimmer	
		RF	Mixer		RF	Mixer
7	500kHz	L8	L18	950kHz	C59	C91
8	250kHz	L9	L19	450kHz	C60	C92
9	130kHz	L10	L20	240kHz	C61	C93

TABLE 6.4 RF/MIXER ALIGNMENT FREQUENCIES AND ADJUSTMENTS : RANGES 7-9 (1830/3,4,6,8)

Range	Freq.	Core		Freq.	Trimmer	
		RF	Mixer		RF	Mixer
7	415kHz	L8	L18	520kHz	C59	C91
8	210kHz	L9	L19	360kHz	C60	C92
9	130kHz	L10	L20	240kHz	C61	C93

P E R F O R M A N C E T E S T I N GGeneral

A selection of essential performance figures covering overall and stage testing is included below to assist personnel engaged in fault-finding on 1830 Series Receivers. Unit terminations are accessible without difficulty to permit attachment of test equipment when checks are necessary at intermediate circuit points.

Overall Performance Check

If substandard performance is suspected, the receiver should be withdrawn from service and subjected initially to an overall performance check at the mid-frequency in each of the nine frequency ranges. An accurately calibrated standard signal generator should be used, having an output impedance of 75Ω with reliable attenuator and low signal leakage. A power output meter matched to 3Ω should be connected to pins 7 & 9 of PL7 to serve as an output indicator.

Sensitivity readings should be taken for 15dB signal + noise to noise ratio with the controls set as indicated below. The normal sensitivity should be better than 3μV for 50mW output with the generator modulated 30% at 400Hz.

INCREMENTAL TUNING	::	'∅'	N/L SWITCH	::	'OFF'
CRYSTAL SELECTOR	::	'NORMAL'	MANUAL/AGC	::	'MANUAL'
PEAK-RF CONTROL	::	Max. signal	IF GAIN	::	Maximum
MODE SWITCH	::	'AM'	AF GAIN	::	Adjust for
SELECTIVITY SWITCH	::	'SSB'			50mW o/p.

Audio Sensitivity Checks3Ω Channel:

Connect audio generator to No. 151 on Audio Board and output meter matched to 3Ω to pins 7 & 9 of PL7. Sensitivity should be 12-18mV for 50mW output at 1kHz with the controls adjusted as follows:-

AF GAIN :: Maximum. LINE LEVEL :: Maximum. N/L SWITCH :: 'OFF'

This test can also be performed from No. 121 on the N/L Board, at which point the performance check will include the N/L SWITCH and AF GAIN.

600Ω Channel:

Connect audio generator to No. 147 on Audio Board and output meter matched to 600Ω to pins 10 & 12 of PL7. Sensitivity should be of the order 30mV for 10mW output at 1kHz with controls adjusted as for 3Ω Channel above.

This test can also be performed from No. 121 on the N/L Board, at which point the performance check will include the N/L SWITCH and LINE LEVEL CONTROL.

Noise Limiter:

An indication of normal operation can be obtained by feeding a 1kHz signal to No.121 and adjusting the input level to give 50mW output with the N/L SWITCH 'OFF' and AF GAIN at max. Switching to N/L 'ON' should show a drop in output of the order 6dB.

100kHz IF Sensitivity

Overall Check:

Connect standard signal generator with 50Ω output to stator of C149 in the Tunable IF Unit, and output meter matched to 3Ω to pins 7 & 9 of PL7. Modulate carrier 30% at 400Hz and adjust receiver controls as follows:-

MODE SWITCH	::	'AM'	SELECTIVITY	::	'SSB'	IF GAIN	::	Max.
AF GAIN	::	Maximum.	MANUAL/AGC	::	'MANUAL'	N/L	::	'OFF'

Sensitivity should be of the order 6.5μV for 50mW output.

With MODE SWITCH transferred to 'CW', and with BFO adjusted for 1kHz beat, 50mW o/p should be obtained with a 3μV unmodulated carrier applied at stator of C149.

Stage Checks:

Sensitivities for 50mW output with modulated generator applied via 0.1μF blocking capacitor are as follows:-

Gate TR13	:	8μV	Gate TR15	:	600μV	Base TR17	:	30mV
Gate TR14	:	140μV	Gate TR16	:	3.2mV			

IF Output:

A valve or solid-state RF voltmeter connected across a 75Ω terminating resistor should show an output of the order 100mV for 60μV applied at input of IF Filter. The SELECTIVITY SWITCH should be set to 'SSB' and the generator output lead must be blocked with a 0.1μF capacitor.

Tunable IF Sensitivity (1300kHz - 1400kHz)

Connect standard signal generator to Mixer section of main tuning gang and output meter matched to 3Ω to pins 7 & 9 of PL7. Tune generator to 1350kHz with modulation 30% at 400Hz: set receiver controls as follows:-

IF/AF GAINS	::	Maximum.	RANGE SWITCH	::	Range 5
MODE SWITCH	::	'AM'	MAIN TUNING	::	1.5MHz
SELECTIVITY	::	'AM'	INCREMENTAL	::	'∅'
N/L SWITCH	::	'OFF'			
CRYSTAL SELECTOR	::	'SYNTH' (to stop 1st Oscillator)			

Sensitivity should be of the order 1μV for 50mW output.

Check also with INCREMENTAL at +50kHz (generator tuned to 1300kHz*), and at -50kHz (generator to 1400kHz*). Sensitivities should be within 3dB of figure obtained with the INCREMENTAL set at '∅'.

(*) Highest intermediate frequency occurs at low frequency end of incremental scale to accommodate frequency inversion in 1st Mixer.

A P P E N D I X ' A '
V O L T A G E A N A L Y S I S

In the event of the receiver failing to operate normally, first check all voltages at the unit/board terminations listed in Table 1 below. If these voltages check out normally, refer to Table 2 on page 46 and carry out a detailed check of individual transistor voltages. The readings given in the Tables were taken with a standard 20,000 Ω /V testmeter (AVO Model 8*): 10% variation should be allowed to cover the usual zener/semiconductor spreads. All voltages are relative to circuit earth.

Voltage readings should be taken with the essential receiver controls adjusted as follows, or as indicated in the relevant column in the Tables.

RANGE SWITCH	::	Range 5	MODE SWITCH	::	'AM'
MAIN TUNING	::	2.0MHz	IF GAIN	::	Maximum
INCREMENTAL	::	' \emptyset '	CAL SWITCH	::	'OFF'
CRYSTAL SELECTOR	::	'NORMAL'	MAN/AGC SWITCH	::	'MANUAL'
PEAK-RF CONTROL	::	Mid-position			

(*) using 10V DC range unless otherwise stated.

TABLE 1 UNIT/BOARD SUPPLIES ETC.

Unit/Board	Pin	Service	Voltage/Remarks
POWER UNIT	160	Rectifier output	+10V
	161		+11V
	162		+12V (nom.)
	164		+12V (nom.)
			NB: AC input to CH20/CH21 can be checked with meter connected to Nos 166 & 167
CALIBRATOR/ RELAY UNIT	24	Relay supply	+11V
	25	Relay switching	+10V. 0V with CAL SWITCH at 'ON' or with external muting control circuit (SK7/2-4) closed externally.
	28	Calibrator supply	+11V with CAL SWITCH at 'ON'.
PEAK-RF BOARD	30 31 32	VVC control voltage	+0.7V to +10.5V for full swing of PEAK-RF CONTROL.
CRYSTAL OSC. UNIT	41	1st Oscillator supply	+11V (Remove Crystal Box for access). NB: Refer to Table 2 and associated note which details the procedure to be adopted when more detailed analysis of the Crystal Oscillator Unit is required. USE 25V RANGE WHERE NECESSARY

Unit/Board	Pin	Service	Voltage/Remarks
RF ASSEMBLY	52	RF AGC feed	+0.4V under no-signal conditions
	54	Supply to TR5, TR6 and TR7	+11V under all conditions of switching
	55	Drain of TR7 (IF o/p)	+10.5V
	57	Supply to TR8 & TR9	+11V with CRYSTAL SELECTOR SWITCH at 'NORMAL'
TUNABLE IF UNIT	72	Supply to TR10, TR11 and TR12	+11V with RANGE SWITCH at Ranges 1-5
	75	Drain of TR10	+11V under all conditions of switching
	76		
	70	Input to L32	+10.5V with RANGE SWITCH at Ranges 1-5
100kHz IF FILTER UNIT	80	Input to L36	+10.5V under all conditions of switching
	81	Supply to drains of TR7 and TR10	+11V under all conditions of switching
100kHz IF AMPLIFIER BOARD	92	Gain control to TR13, TR14 and TR15	0V to -2.6V* for full rotation of IF GAIN with MANUAL/AGC SWITCH at 'MANUAL' (*) Dependent on value of R159 fitted
	97	Supply to TR13-TR21	+10V under all conditions of switching
	98	IF AGC line	0V under no-signal conditions
	99	RF AGC line	+0.4V under no-signal conditions
CW/SSB DET & BFO	107	Supply to TR22 & TR23	+11V with MODE SWITCH at CW/USB/LSB
N/L, METER & NEG SUPPLY BOARD	126	Supply to TR24, TR25, TR26, TR27 & IC1	+11V under all conditions of switching
	128	Neg. supply outlet	-8.2V under all conditions of switching
	129	RV3 supply	+8V)
	130	Meter line	+7V) with meter zero'd
	131	IF AGC line	0V under no-signal conditions
	132	Feed from RF Assy (R35)	+8.7V
AUDIO BOARD	150	Supply to TR28, TR29, TR30, TR31, TR32 & TR33	+12V under all conditions of switching

TABLE 2 TRANSISTOR VOLTAGES

NOTE: Control settings should be as detailed on page 44, except where modified by the Notes listed in the right-hand column. A 10% tolerance applies and all readings are POSITIVE w.r.t. circuit earth unless otherwise indicated.

Unit/Board	Ref.	Emitter /Source	Base/ Gate/Gate 1	Gate 2	Collector / Drain	Notes
Calibrator/Relay Unit	TR1	0.7V*	1.2V*	-	10.7V [†]	NOTE 1
	TR2	0V	0V	-	10.7V [†]	-do-
Crystal Osc. Unit	TR3	0.8V*	1.2V	-	7V	NOTE 2
	TR4	6.5V	7V	-	10V	-do-
RF Assembly	TR5	0.7V*	0V	-	1.8V	NOTE 3
	TR6	1.8V	0.4V	-	8.7V	-do-
	TR7	0.85V*	0V	0.4V*	10V	-do-
	TR8	0.6V*	0V	-	10V	-do-
	TR9	3.5V	0.8V	-	10V	-do-
Tunable IF Unit	TR10	0.5V*	0V	0.38V*	10.5V [†]	
	TR11	2.4V	0V	-	8V	
	TR12	5.2V	5.8V	-	10V	
100kHz IF Amplifier Board	TR13	1.7V	0V	-	8V	
	TR14	1.7V	0V	-	8V	
	TR15	1.7V	0V	-	8V	
	TR16	1.4V	0V	-	8V	
	TR17	0V	0.7V*	-	10.5V [†]	
	TR18	1.4V	0V	-	7V	
	TR19	0V	0.7V*	-	10.5V [†]	
	TR20	1.4V	0V	-	5V	
	TR21	0V	0.7V*	-	10.5V [†]	
CW/SSB Detector & BFO Unit	TR22	0V	0V	-	7.6V	NOTE 4
	TR23	1V	0V	1V	7.6V	-do-

(*) 2.5V range. (†) 25V range.

Unit/Board	Ref.	Emitter /Source	Base/ Gate/Gate 1	Gate 2	Collector / Drain	Notes
N/L, Meter & Neg. Supply Board (IC1 - see below)	TR24	5V**	5.6V**	-	10.5V [†]	
	TR25	0.4V*	1V*	-	9.5V	
	TR26	9.5V	10V	-	0.15V*	
	TR27	1.5V	0V	-	7V	
Audio Board	TR28	6.2V**	6.8V**	-	10V	
	TR29	10.5V [†]	10V	-	6V	
	TR30	5.5V	6V	-	12.5V [†]	
	TR31	5.5V	4.9V	-	0V	
	TR32	0.4V*	0.8V*	-	6V	
	TR33	0.9V*	1.5V	-	10V	

(**) 100V range.

IC1 voltages: Lead 1 : 6.8V. Lead 3 : 0V. Lead 5 : 6.8V. Lead 6 : 8.8V.
 Lead 7 : 3.7V. Lead 8 : 8.8V. Leads 2 & 4 : no connection.

N O T E S

- NOTE 1 :: CAL SWITCH to 'ON'. Remove unit from back-plate for access to p.c.b.
- NOTE 2 :: Crystal Box removed. Link Nos 1 & 3 on 6-way socket to simulate CRYSTAL SELECTOR SWITCH at 'CRYSTAL' (No. 1 is at right-hand side when underside of receiver is viewed from front).
- NOTE 3 :: Measure TR5 drain and TR6 source on can of TR6 (internally connected to source).
 Voltage quoted for TR6 drain falls to 3.5V on Ranges 7-9.
 Readings quoted for TR7, TR8 & TR9 subject to 20% variation (dependent on actual level of oscillator drive).
- NOTE 4 :: MODE SWITCH at 'CW'.

A P P E N D I X ' B '

S E M I C O N D U C T O R C O M P L E M E N T

Ref	Type	Manufacturer	Circuit Function	Loc
TR1	BC107B	Mullard	Crystal Oscillator (Calibrator)	A
TR2	BC107B	Mullard	Harmonic Amplifier	A
TR3	2N4254	Texas	1st Oscillator (CRYSTAL)	C
TR4	2N4254	Texas	Emitter Follower (CRYSTAL Buffer)	C
TR5	UC734B	Union Carbide	RF Amplifier	D
TR6	3N128	RCA		D
TR7	40673	RCA	1st Mixer	D
TR8	BFR29	Mullard	1st Oscillator (VFO)	D
TR9	UC734B	Union Carbide	Source Follower (VFO Buffer)	D
TR10	40673	RCA	2nd Mixer	E
TR11	UC734B	Union Carbide	2nd Oscillator (INCREMENTAL)	E
TR12	2N4254	Texas	Emitter Follower (Inc Osc Buffer)	E
TR13	UC734B	Union Carbide	1st 100kHz IF Amplifier	G
TR14	UC734B	Union Carbide	2nd 100kHz IF Amplifier	G
TR15	UC734B	Union Carbide	3rd 100kHz IF Amplifier	G
TR16	UC734B	Union Carbide	4th 100kHz IF Amplifier	G
TR17	2N4254	Texas	Emitter Follower	G
TR18	UC734B	Union Carbide	RF AGC Amplifier	G
TR19	2N4254	Texas	Emitter Follower	G
TR20	UC734B	Union Carbide	IF AGC Amplifier	G
TR21	2N4254	Texas	Emitter Follower	G
TR22	UC734B	Union Carbide	BFO/CIO	H
TR23	40673	RCA	CW & SSB Detector	H
TR24	BC107B	Mullard	Emitter Follower	I
TR25	2N4254	Texas	Emitter Follower	I
TR26	2N3702	Texas	300Hz Oscillator (Neg. Inverter)	I
TR27	UC734B	Union Carbide	Meter Amplifier	I
TR28	BC107B	Mullard	Audio Amplifier	J
TR29	BFX88	Mullard	Audio Driver	J
TR30	2N4921	RCA		J
TR31	2N4918	RCA	Push-pull Audio Output (3Ω)	J
TR32	BC107B	Mullard	Audio Amplifier	J
TR33	BC107B	Mullard	Audio Output (600Ω Channel)	J
IC1	CA3053	RCA	Noise Limiter	I
PC1	8 x 1N4148	Newmarket	Input Protection (packaged circuit)	A
D5-10	6 x BA111	STC	Peak RF VVC's	B
D11	1S44	Texas	Breakdown Protection	C
D12	1S44	Texas	Oscillator Bias Diode	D
D13	BZY88C8V2	Mullard	Zener Regulator (Inc Osc supply)	E
D14	OA47	Mullard	AM Detector	G
D15	1S44	Texas	RF AGC Rectifier	G
D16	1S44	Texas	IF AGC Rectifier	G
D17	1S44	Texas	300Hz Rectifier (Neg. Inverter)	I
D17A	BZY88C8V2	Mullard	Zener Regulator (Neg. supply)	I
D18	BZY93C11	Mullard	Zener Regulator (+11V supply)	K
D19	DD006	Lucas	Reverse Polarity Protection	†M
D20	OSH01A-100	Mullard	Supply Rectifier (Bridge)	K
*D21	BZY93C13	Mullard	Zener Regulator	N

D1-D4 : References not allocated.

APPENDIX 'C'

COMPONENT VALUES TOLERANCES AND RATINGS

Location Code

A	Calibrator/Relay Unit	H	CW/SSB Detector & BFO Unit
B	Peak-RF Board	I	Noise Limiter, Meter & Neg. Supply
C	Crystal Osc. Unit (C- = Crystal Box)	J	Audio Amplifier Board (Board
D	RF Assembly (Coil Box)	K	Power Unit
E	Tunable IF Unit	L	Panel
F	100kHz IF Filter Unit	M	Back-plate
G	100kHz IF Amplifier Board	N	Side-plate

Capacitors

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C1	0.1 μ F	Polycarbonate	20%	100V	A
C2	340pF	Silvered Mica	5%	350V	A
C3	275pF	Silvered Mica	5%	350V	A
C4	6-30pF	Disk Ceramic Trimmer	-	-	A
C5	33pF	Tubular Ceramic	5%	200V	A
C6	10 μ F	Tantalum	20%	16V	A
C7	0.1 μ F	Polycarbonate	20%	100V	A
C8	0.001 μ F	Tubular Ceramic	10%	750V	A
C10	0.1 μ F	Polycarbonate	20%	100V	B
C11	0.1 μ F	Polycarbonate	20%	100V	B
C12	0.1 μ F	Polycarbonate	20%	100V	B
C13	0.047 μ F	Polycarbonate	20%	100V	B
C14	0.047 μ F	Polycarbonate	20%	100V	B
C17	0.01 μ F	Polycarbonate	20%	100V	C-
C18	0.047 μ F	Polycarbonate	20%	100V	C-
C19	0.047 μ F	Polycarbonate	20%	100V	C-
C20	0.001 μ F	Disk Ceramic	20%	500V	C
C21	20pF	Tubular Ceramic	5%	750V	C
C22	60pF	Tubular Ceramic	5%	750V	C
C23	0.0047 μ F	Silvered Mica	5%	350V	C
C24	-	Reference not allocated	-	-	-
C25	80 μ F	Tubular Electrolytic	+50% -10%	25V	C
C26	80 μ F	Tubular Electrolytic	+50% -10%	25V	C
C27	70pF	Polystyrene	5%	125V	C
*C28	0.1 μ F	Disk Ceramic	+80% -20%	500V	C
C29	0.1 μ F	Polycarbonate	20%	100V	C
C30	12-358pF	Air-spaced Variable	-	-	D
C31	7-35pF	Disk Ceramic Trimmer	-	-	D
C32	7-35pF	Disk Ceramic Trimmer	-	-	D
C33	7-35pF	Disk Ceramic Trimmer	-	-	D
C34	7-35pF	Disk Ceramic Trimmer	-	-	D
C35	7-35pF	Disk Ceramic Trimmer	-	-	D
C36	7-35pF	Disk Ceramic Trimmer	-	-	D
C37	120pF	Silvered Mica	5%	350V	D
C38	70pF	Silvered Mica	5%	350V	D
C39	60pF	Silvered Mica	5%	350V	D

C9, C15 & C16 : References not allocated.

(*) Not fitted on 1830/2,4,7,8.

C5 may be 10pF on some receivers.

APPENDIX 'C'

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C40	50pF	Silvered Mica	5%	350V	D
C41	40pF	Silvered Mica	5%	350V	D
C42	50pF	Silvered Mica	5%	350V	D
C43	0.0047 μ F	Polystyrene	2%	125V	D
C44	0.0047 μ F	Polystyrene	2%	125V	D
C45	0.007 μ F	Polystyrene	1%	125V	D
C46	110pF	Silvered Mica	5%	350V	D
C47	40pF	Polystyrene	2%	125V	D
C48	40pF	Silvered Mica	5%	350V	D
C49	25pF	Silvered Mica	5%	350V	D
C50	10pF	Silvered Mica	10%	350V	D
C51	30pF	Silvered Mica	5%	350V	D
*C52	285pF	Silvered Mica	1%	350V	D
C53	7-35pF	Disk Ceramic Trimmer	-	-	D
C54	7-35pF	Disk Ceramic Trimmer	-	-	D
C55	7-35pF	Disk Ceramic Trimmer	-	-	D
C56	7-35pF	Disk Ceramic Trimmer	-	-	D
C57	7-35pF	Disk Ceramic Trimmer	-	-	D
C58	7-35pF	Disk Ceramic Trimmer	-	-	D
C59	7-35pF	Disk Ceramic Trimmer	-	-	D
C60	7-35pF	Disk Ceramic Trimmer	-	-	D
C61	7-35pF	Disk Ceramic Trimmer	-	-	D
C62	12-358pF	Air-spaced Variable	-	-	D
C62A	15pF	Tubular Ceramic	10%	750V	D
C63	60pF	Tubular Ceramic	10%	750V	D
C64	0.1 μ F	Polycarbonate	20%	100V	D
C65	0.1 μ F	Polycarbonate	20%	100V	D
C66	0.1 μ F	Polycarbonate	20%	100V	D
C67	0.1 μ F	Polycarbonate	20%	100V	D
C68	6pF	Tubular Ceramic	10%	750V	D
C69	3pF	Tubular Ceramic	10%	750V	D
C70	-	Reference not allocated	-	-	-
C71	50pF	Silvered Mica	5%	350V	D
C72	0.001 μ F	Silvered Mica	5%	350V	D
C73	0.001 μ F	Silvered Mica	5%	350V	D
C74	0.001 μ F	Silvered Mica	5%	350V	D
C75	90pF	Silvered Mica	5%	350V	D
C76	40pF	Silvered Mica	5%	350V	D
C76A	6pF	Tubular Ceramic	10%	750V	D
C77	40pF	Silvered Mica	5%	350V	D
C77A	6pF	Tubular Ceramic	10%	750V	D
C78	30pF	Silvered Mica	5%	350V	D
C79	15pF	Silvered Mica	5%	350V	E
C80	0.01 μ F	Metallised Paper	10%	200V	D
C81	25pF	Silvered Mica	5%	350V	D
C82	0.01 μ F	Metallised Paper	10%	200V	D
C83	0.01 μ F	Metallised Paper	10%	200V	D
C84	0.01 μ F	Metallised Paper	10%	200V	D
C85	7-35pF	Disk Ceramic Trimmer	-	-	D

(*) Fitted on 1830/3,4,6,8 only.

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C86	7-35pF	Disk Ceramic Trimmer	-	-	D
C87	7-35pF	Disk Ceramic Trimmer	-	-	D
C88	7-35pF	Disk Ceramic Trimmer	-	-	D
C89	7-35pF	Disk Ceramic Trimmer	-	-	D
C90	7-35pF	Disk Ceramic Trimmer	-	-	D
C91	7-35pF	Disk Ceramic Trimmer	-	-	D
†C91A	285pF	Silvered Mica	1%	350V	D
C92	7-35pF	Disk Ceramic Trimmer	-	-	D
C93	7-35pF	Disk Ceramic Trimmer	-	-	D
C94	12-358pF	Air-spaced Variable	-	-	D
C94A	12pF	Tubular Ceramic	10%	750V	D
C95	60pF	Tubular Ceramic	10%	750V	D
C96	0.1μF	Polycarbonate	20%	100V	D
C97	150pF	Silvered Mica	5%	350V	D
C98	0.1μF	Polycarbonate	20%	100V	D
C99	0.1μF	Polycarbonate	20%	100V	D
C100	0.1μF	Polycarbonate	20%	100V	D
C101	0.047μF	Polycarbonate	20%	100V	D
C102	0.1μF	Polycarbonate	20%	100V	D
C103	0.0022μF	Silvered Mica	1%	350V	D
C104	0.0028μF	Silvered Mica	1%	350V	D
C105	0.0016μF	Silvered Mica	1%	350V	D
C106	0.001μF	Silvered Mica	1%	350V	D
C107	540pF	Silvered Mica	1%	350V	D
C108	0.0028μF	Silvered Mica	1%	350V	D
*C109	0.0022μF	Silvered Mica	1%	350V	D
*C110	0.001μF	Silvered Mica	1%	350V	D
C111	680pF	Silvered Mica	1%	350V	D
C112A	30pF	Silvered Mica	5%	350V	D
C112B	80pF	Tubular Ceramic N750	5%	750V	D
C113A	20pF	Silvered Mica	5%	350V	D
C113B	50pF	Tubular Ceramic N750	5%	750V	D
C114A	20pF	Silvered Mica	5%	350V	D
C114B	70pF	Tubular Ceramic N750	5%	750V	D
C115A	20pF	Silvered Mica	5%	350V	D
C115B	50pF	Tubular Ceramic N750	5%	750V	D
C116A	20pF	Silvered Mica	5%	350V	D
C116B	50pF	Tubular Ceramic N750	5%	750V	D
C117	56pF	Polystyrene	±2pF	125V	D
*C118	39pF	Polystyrene	±3pF	125V	D
*C119	39pF	Polystyrene	±3pF	125V	D
C120	40pF	Polystyrene	±2pF	125V	D
C121	7-35pF	Disk Ceramic Trimmer	-	-	D
C122	7-35pF	Disk Ceramic Trimmer	-	-	D
C123	7-35pF	Disk Ceramic Trimmer	-	-	D
C124	7-35pF	Disk Ceramic Trimmer	-	-	D
C125	7-35pF	Disk Ceramic Trimmer	-	-	D
C126	7-35pF	Disk Ceramic Trimmer	-	-	D

(†) Fitted on
1830/3,4,6,8 only.

(*) On 1830/3,4,6,8 : C109 0.0042μF, C110 800nF, C118 390nF and C119 27nF. -51-

APPENDIX 'C'

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C127	7-35pF	Disk Ceramic Trimmer	-	-	D
C128	7-35pF	Disk Ceramic Trimmer	-	-	D
C129	7-35pF	Disk Ceramic Trimmer	-	-	D
C130	18-364pF	Air-spaced Variable	-	-	D
C131	100pF	Silvered Mica	5%	350V	D
C132	100pF	Silvered Mica	5%	350V	D
C133	0.047μF	Polycarbonate	20%	100V	D
C134	0.1μF	Polycarbonate	20%	100V	D
C135	0.01μF	Polycarbonate	20%	100V	D
C136	150μF	Tubular Electrolytic	+50% -10%	16V	D
C137	150μF	Tubular Electrolytic	+50% -10%	16V	D
C140	0.1μF	Polycarbonate	20%	100V	E
* C141	370pF	Silvered Mica	5%	350V	E
* C142	150pF	Silvered Mica	1%	350V	E
C143	0.047μF	Polycarbonate	20%	100V	E
C144	0.0016μF	Silvered Mica	1%	350V	E
C145	300pF	Polystyrene	1%	125V	E
C146	8-135pF	Foil-dielectric Trimmer	-	-	E
C147	20pF	Tubular Ceramic	10%	750V	E
C148	12-358pF	Air-spaced Variable	-	-	E
C149	12-358pF	Air-spaced Variable	-	-	E
C150	8-135pF	Foil-dielectric Trimmer	-	-	E
C151	300pF	Polystyrene	1%	125V	E
C152	0.0016μF	Silvered Mica	1%	350V	E
C153	0.047μF	Polycarbonate	20%	100V	E
C154	0.1μF	Polycarbonate	20%	100V	E
C155	0.047μF	Polycarbonate	20%	100V	E
C156	0.0016μF	Silvered Mica	1%	350V	E
C157	90pF	Tubular Ceramic	10%	500V	E
C158	7-35pF	Disk Ceramic Trimmer	-	-	E
C159	18-364pF	Air-spaced Variable	-	-	E
C160	20pF	Silvered Mica	5%	350V	E
C161	0.1μF	Polycarbonate	20%	100V	E
C162	0.1μF	Polyester Film	20%	250V	E
C163	27pF	Polystyrene	5%	125V	E
C164	0.1μF	Polycarbonate	20%	100V	E
C165	0.047μF	Polycarbonate	20%	100V	E
C166	0.01μF	Polycarbonate	10%	100V	E
C167/9	-	References not allocated	-	-	-
C170	0.1μF	Polycarbonate	20%	100V	F
C171	0.0044μF	Polystyrene	2%	30V	F
C172	400pF	Silvered Mica	5%	350V	F
C173	350pF	Silvered Mica	5%	350V	F
C174	370pF	Silvered Mica	5%	350V	F
C175	300pF	Silvered Mica	5%	350V	F
C176	70pF	Tubular Ceramic	10%	750V	F
C177	30pF	Tubular Ceramic	10%	750V	F
C178	15pF	Tubular Ceramic	10%	750V	F
C179	0.0044μF	Polystyrene	2%	30V	F

C138 & C139 : References not allocated.

(*) Fitted on early receivers only.

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C180	300pF	Silvered Mica	5%	350V	F
C181	70pF	Tubular Ceramic	10%	750V	F
C182	250pF	Silvered Mica	5%	350V	F
C183	30pF	Tubular Ceramic	10%	750V	F
C184	350pF	Silvered Mica	5%	350V	F
C185	340pF	Silvered Mica	5%	350V	F
C186	15pF	Tubular Ceramic	10%	750V	F
C187	0.0044μF	Polystyrene	2%	30V	F
C188	300pF	Silvered Mica	5%	350V	F
C189	300pF	Silvered Mica	5%	350V	F
C190	70pF	Tubular Ceramic	10%	750V	F
C191	250pF	Silvered Mica	5%	350V	F
C192	20pF	Tubular Ceramic	10%	750V	F
C193	390pF	Silvered Mica	5%	350V	F
C194	470pF	Silvered Mica	5%	350V	F
C195	15pF	Tubular Ceramic	10%	750V	F
C196	0.0088μF	Polystyrene	2%	30V	F
C197	0.0088μF	Polystyrene	2%	30V	F
C198	2-11pF	Air-spaced Trimmer	-	-	F
C199	470pF	Silvered Mica	5%	350V	F
C200	370pF	Silvered Mica	5%	350V	F
C201	250pF	Silvered Mica	5%	350V	F
C202	300pF	Silvered Mica	5%	350V	F
C203	100pF	Silvered Mica	5%	350V	F
C204	30pF	Tubular Ceramic	10%	750V	F
C205	15pF	Tubular Ceramic	10%	750V	F
C206	0.0044μF	Polystyrene	2%	30V	F
C207	12pF	Tubular Ceramic	10%	750V	F
C208	250pF	Silvered Mica	5%	350V	F
C209	10pF	Tubular Ceramic	10%	750V	F
C210	350pF	Silvered Mica	5%	350V	F
C211	340pF	Silvered Mica	5%	350V	F
C212					
-219	-	References not allocated	-	-	-
C220	0.001μF	Disk Ceramic	20%	500V	G
C221	0.1μF	Polycarbonate	20%	100V	G
C222	0.047μF	Polycarbonate	20%	100V	G
C223	0.1μF	Polycarbonate	20%	100V	G
C224	0.1μF	Polycarbonate	20%	100V	G
C225	0.001μF	Disk Ceramic	20%	500V	G
C226	0.047μF	Polycarbonate	20%	100V	G
C227	0.1μF	Polycarbonate	20%	100V	G
C228	0.1μF	Polycarbonate	20%	100V	G
C229	0.001μF	Disk Ceramic	20%	500V	G
C230	0.047μF	Polycarbonate	20%	100V	G
C231	0.1μF	Polycarbonate	20%	100V	G
C232	0.001μF	Disk Ceramic	20%	500V	G
C233	540pF	Silvered Mica	5%	350V	G
C234	0.047μF	Polycarbonate	20%	100V	G
C235	0.1μF	Polycarbonate	20%	100V	G

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C236	0.001 μ F	Disk Ceramic	20%	500V	G
C237	0.1 μ F	Polycarbonate	20%	100V	G
C238	0.1 μ F	Polycarbonate	20%	100V	G
C239	0.002 μ F	Silvered Mica	5%	350V	G
C240	0.001 μ F	Disk Ceramic	20%	500V	G
C241	0.001 μ F	Disk Ceramic	20%	500V	G
C242	100pF	Silvered Mica	5%	350V	G
C243	0.1 μ F	Polycarbonate	20%	100V	G
C244	0.001 μ F	Disk Ceramic	20%	500V	G
C245	0.1 μ F	Polycarbonate	20%	100V	G
C246	0.002 μ F	Silvered Mica	5%	350V	G
C247	0.001 μ F	Disk Ceramic	20%	500V	G
C248	10 μ F	Tubular Electrolytic	+50% -10%	16V	G
C249	0.1 μ F	Polycarbonate	20%	100V	G
C250	0.1 μ F	Polycarbonate	20%	100V	G
C251	0.1 μ F	Polycarbonate	20%	100V	G
C252	0.001 μ F	Tubular Ceramic	20%	750V	G
C253	0.047 μ F	Polycarbonate	20%	100V	G
C254	0.001 μ F	Disk Ceramic	20%	500V	G
C255	0.1 μ F	Polycarbonate	20%	100V	G
C256	0.1 μ F	Polycarbonate	20%	100V	G
C257	0.001 μ F	Disk Ceramic	20%	500V	G
C258	0.002 μ F	Silvered Mica	5%	350V	G
C259	10 μ F	Tubular Electrolytic	+50% -10%	16V	G
C260	0.1 μ F	Polycarbonate	20%	100V	G
C261	-	-	-	-	-
-266	-	References not allocated	-	-	-
C267	0.47 μ F	Polycarbonate	20%	100V	L
C268	1 μ F	Tubular Electrolytic	+100% -10%	40V	L
C269	22 μ F	Tantalum	20%	16V	L
C270	-	-	-	-	-
-279	-	References not allocated	-	-	-
C280	30pF	Silvered Mica	5%	350V	H
C281	110pF	Silvered Mica	5%	350V	H
C282	30pF	Silvered Mica	5%	350V	H
C283	170pF	Silvered Mica	5%	350V	H
C284	17-253pF	Air-spaced Variable	-	-	H
C285	680pF	Silvered Mica	5%	350V	H
C286	130pF	Tubular Ceramic	5%	500V	H
C287	50pF	Silvered Mica	5%	350V	H
C288	0.1 μ F	Polycarbonate	20%	100V	H
C289	0.005 μ F	Metallised Paper	20%	250V	H
C290	0.1 μ F	Polycarbonate	20%	100V	H
C291	0.001 μ F	Tubular Ceramic	20%	750V	H
C292	0.1 μ F	Disk Ceramic	+80% -20%	500V	H
C293	10 μ F	Tubular Electrolytic	+50% -10%	16V	H
C294	0.1 μ F	Polycarbonate	20%	100V	H
C295	10 μ F	Tubular Electrolytic	+50% -10%	16V	H
C296	0.005 μ F	Metallised Paper	20%	250V	H

NB: See facing page for C244A & C254A.

Ref	Value	Type	Tolerance	Wkg. V.	Loc
C297	0.001 μ F	Disk Ceramic	20%	500V	H
C298	0.001 μ F	Disk Ceramic	20%	500V	H
C299	80 μ F	Tubular Electrolytic	+50% -10%	25V	H
C300	0.1 μ F	Polycarbonate	20%	100V	I
C300A	10 μ F	Tantalum	20%	25V	I
C301	10 μ F	Tantalum	20%	25V	I
C302	10 μ F	Tantalum	20%	25V	I
C303	0.1 μ F	Polycarbonate	20%	100V	I
C304	10 μ F	Tantalum	20%	25V	I
C305	80 μ F	Tubular Electrolytic	+50% -10%	25V	I
C305A	10 μ F	Tantalum	20%	25V	I
C306	10 μ F	Tantalum	20%	25V	I
C307	0.047 μ F	Polycarbonate	20%	100V	I
C308	0.047 μ F	Polycarbonate	20%	100V	I
C309	0.1 μ F	Polycarbonate	20%	100V	I
C310	0.1 μ F	Polycarbonate	20%	100V	J
C311	80 μ F	Tubular Electrolytic	+50% -10%	25V	J
C312	0.01 μ F	Polycarbonate	20%	100V	J
C313	10 μ F	Tubular Electrolytic	+50% -10%	16V	J
C314	0.005%	Metallised Paper	20%	250V	J
C315	80 μ F	Tubular Electrolytic	+50% -10%	25V	J
C316	0.047 μ F	Polycarbonate	20%	100V	J
C317	80 μ F	Tubular Electrolytic	+50% -10%	25V	J
C318	470 μ F	Tubular Electrolytic	+50% -10%	25V	J
C319	80 μ F	Tubular Electrolytic	+50% -10%	25V	J
C320	0.01 μ F	Polycarbonate	20%	100V	J
C321	25 μ F	Tubular Electrolytic	+50% -10%	25V	J
C322	0.1 μ F	Polycarbonate	20%	100V	J
C323	0.005 μ F	Metallised Paper	20%	250V	J
C324	0.1 μ F	Polycarbonate	20%	100V	J
C325	80 μ F	Tubular Electrolytic	+50% -10%	25V	J
C326	-	Reference not allocated	-	-	-
C327	400 μ F	Tubular Electrolytic	+50% -10%	16V	K
C328	6400 μ F	Tubular Electrolytic	+50% -10%	16V	K
C329	6400 μ F	Tubular Electrolytic	+50% -10%	16V	K
C330	0.005 μ F	Disk Ceramic	+80% -20%	3000V	K
C331	0.005 μ F	Disk Ceramic	+80% -20%	3000V	M
C332	0.005 μ F	Disk Ceramic	+80% -20%	3000V	M
C333	1 μ F	Polycarbonate	20%	400V	M
C334	-	-	-	-	-
-339	-	References not allocated	-	-	-
†C340	0.1 μ F	Disk Ceramic	+80% -20%	500V	L
C244A	15pF	Tubular Ceramic	10%	750V	G
C254A	15pF	Tubular Ceramic	10%	750V	G

(†) Fitted on
1830/2,4,7,8 only.

Resistors

Ref	Value	Tol	Rtg	Loc	Ref	Value	Tol	Rtg	Loc
R1	56,000Ω	5%	0.1W	A	R54	470Ω	5%	0.1W	D
R2	47,000Ω	5%	0.1W	A	R54A	680Ω	5%	0.1W	D
R3	390Ω	5%	0.1W	A	R55	470Ω	5%	0.1W	D
R4	3,900Ω	5%	0.1W	A	R56	560Ω	5%	0.1W	D
R5-R9	Not allocated	-	-	-	R57	0.1MΩ	5%	0.1W	D
R10	1.8MΩ	10%	0.05W	B	R58	22Ω	5%	0.1W	D
R11	1.8MΩ	10%	0.05W	B	R59	330Ω	5%	0.1W	D
R12	1.8MΩ	10%	0.05W	B	R60	0.22MΩ	5%	0.1W	D
R13	47,000Ω	5%	0.1W	B	R61	270Ω	5%	0.1W	D
R14	47,000Ω	5%	0.1W	B	R62	820Ω	5%	0.1W	D
R15	47,000Ω	5%	0.1W	B	R63	100Ω	5%	0.1W	D
R16					R64/8	Not allocated	-	-	-
-18	Not allocated	-	-	-	R69	3,900Ω	5%	0.1W	D
R19	1,800Ω	5%	0.1W	L	R70	220Ω	5%	0.1W	E
R20	47,000Ω	5%	0.1W	C	R71	0.47MΩ	5%	0.1W	E
R21	0.27MΩ	5%	0.1W	C	R72	2,200Ω	5%	0.1W	E
R22	150Ω	5%	0.1W	C	R73	0.68MΩ	5%	0.1W	E
R23	4,700Ω	5%	0.1W	C	R74	47,000Ω	5%	0.1W	E
R24	1,000Ω	5%	0.1W	C	R75	220Ω	5%	0.1W	E
R25	1,000Ω	5%	0.1W	C	R76	0.47MΩ	5%	0.1W	E
R26	Not allocated	-	-	-	R77	180Ω	5%	0.1W	E
R27	100Ω	5%	0.1W	C	R78	680Ω	5%	0.1W	E
R28	Not allocated	-	-	-	R79	150Ω	5%	0.1W	E
R29	Not allocated	-	-	-	R80	22,000Ω	5%	0.1W	E
R30	1.8MΩ	10%	0.05W	D	R81	47,000Ω	5%	0.1W	E
R31	270Ω	5%	0.1W	D	R82	470Ω	5%	0.1W	E
R32	1MΩ	5%	0.1W	D	R83	68Ω	5%	0.1W	E
R33	0.1MΩ	5%	0.1W	D	R84	330Ω	5%	0.1W	E
R34	22Ω	5%	0.1W	D	R85/9	Not allocated	-	-	-
R35	180Ω	5%	0.1W	D	R90	220Ω	5%	0.1W	F
R36	2,700Ω	5%	0.1W	D	R91	22,000Ω	5%	0.1W	F
R37	2,700Ω	5%	0.1W	D	R92	82,000Ω	5%	0.1W	F
R38	2,200Ω	5%	0.1W	D	R93	10,000Ω	5%	0.1W	F
R39	2,200Ω	5%	0.1W	D	R94	82,000Ω	5%	0.1W	F
R40	2,200Ω	5%	0.1W	D	R95	10,000Ω	5%	0.1W	F
R41	2,200Ω	5%	0.1W	D	R96	82,000Ω	5%	0.1W	F
R42	0.1MΩ	5%	0.1W	D	R97	22,000Ω	5%	0.1W	F
R43	0.1MΩ	5%	0.1W	D	R98	10,000Ω	5%	0.1W	F
R44	0.1MΩ	5%	0.1W	D	R99	82,000Ω	5%	0.1W	F
R45	Not allocated	-	-	-	R100				
R46	0.1MΩ	5%	0.1W	D	-109	Not allocated	-	-	-
R47	1MΩ	5%	0.1W	D	R110	0.27MΩ	5%	0.1W	G
R48	33,000Ω	5%	0.1W	D	R111	1,000Ω	5%	0.1W	G
R49	270Ω	5%	0.1W	D	R112	5,600Ω	5%	0.1W	G
R50	4,700Ω	5%	0.1W	D	R113	330Ω	5%	0.1W	G
R51	0.47MΩ	5%	0.1W	D	R114	0.27MΩ	5%	0.1W	G
R52	22Ω	5%	0.1W	D	R115	1,000Ω	5%	0.1W	G
R53	220Ω	5%	0.1W	D					

(*) May be adjusted on test. (**) Adjusted on test and omitted if not required.

Ref	Value	Tol	Rtg	Loc	Ref	Value	Tol	Rtg	Loc
R116	1,200Ω	5%	0.1W	G	R175	4,700Ω	5%	0.1W	H
R117	330Ω	5%	0.1W	G	R176	Not allocated	-	-	-
R118	0.27MΩ	5%	0.1W	G	R177	5,600Ω	5%	0.1W	H
R119	1,000Ω	5%	0.1W	G	R178	100Ω	5%	0.1W	H
R120	5,600Ω	5%	0.1W	G	R179	33,000Ω	5%	0.1W	H
R121	330Ω	5%	0.1W	G	R180				
R122	0.1MΩ	5%	0.1W	G	-189	Not allocated	-	-	-
R123	1,000Ω	5%	0.1W	G	R190	0.33MΩ	5%	0.1W	I
R124	8,200Ω	5%	0.1W	G	R191	0.22MΩ	5%	0.1W	I
R125	330Ω	5%	0.1W	G	R191A	0.1MΩ	5%	0.1W	I
R126	47,000Ω	5%	0.1W	G	R192	0.27MΩ	5%	0.1W	I
R127	22,000Ω	5%	0.1W	G	R193	3,900Ω	5%	0.1W	I
R128	100Ω	5%	0.1W	G	R194	1,500Ω	5%	0.1W	I
R129	22,000Ω	5%	0.1W	G	R195	1,000Ω	5%	0.1W	I
R130	33,000Ω	5%	0.1W	G	R196	1,000Ω	5%	0.1W	I
R131	47Ω	5%	0.1W	G	R197	2,700Ω	5%	0.1W	I
R132	270Ω	5%	0.1W	G	R198	12,000Ω	5%	0.1W	I
R133	0.47MΩ	5%	0.1W	G	R199	2,700Ω	5%	0.1W	I
R134	330Ω	5%	0.1W	G	R200	2,700Ω	5%	0.1W	I
R135	22,000Ω	5%	0.1W	G	R201	0.15MΩ	5%	0.1W	I
R136	47,000Ω	5%	0.1W	G	R202	47,000Ω	5%	0.1W	I
R137	100Ω	5%	0.1W	G	R203	Not allocated	-	-	-
R138	0.27MΩ	5%	0.1W	G	R204	68,000Ω	5%	0.1W	I
R139	10,000Ω	5%	0.1W	G	R205	12,000Ω	5%	0.1W	I
R140	2,200Ω	5%	0.1W	G	R206	220Ω	5%	0.1W	I
R141	47,000Ω	5%	0.1W	G	R207	220Ω	5%	0.1W	I
R142	0.27MΩ	5%	0.1W	G	R208	1,500Ω	5%	0.1W	I
R143	1,000Ω	5%	0.1W	G	R209	560Ω	5%	0.1W	I
R144	1,500Ω	5%	0.1W	G	R210	15,000Ω	5%	0.1W	I
R145	47,000Ω	5%	0.1W	G	R211	2.2MΩ	5%	0.1W	I
R146	22,000Ω	5%	0.1W	G	R212	1MΩ	5%	0.1W	I
R147	100Ω	5%	0.1W	G	R213	1,000Ω	5%	0.1W	I
R148	150Ω	5%	0.1W	G	R214	1,000Ω	5%	0.1W	I
R149	330Ω	5%	0.1W	G	R215	3,300Ω	5%	0.1W	I
R150	10,000Ω	5%	0.1W	G	R216	Not allocated	-	-	-
R151	3,300Ω	5%	0.1W	G	R217	Not allocated	-	-	-
R152	0.27MΩ	5%	0.1W	G	R218	390Ω	5%	0.1W	M
R153	22,000Ω	5%	0.1W	G	R219	4,700Ω	5%	0.1W	M
R154	10,000Ω	5%	0.1W	G	R220	33,000Ω	5%	0.1W	J
R155/7	Not allocated	-	-	-	R221	27,000Ω	5%	0.1W	J
**R158	1MΩ	5%	0.1W	L	R222	0.1MΩ	5%	0.1W	J
*R159	0.18MΩ	5%	0.1W	L	R223	18Ω	5%	0.1W	J
R160					R224	2,200Ω	5%	0.1W	J
-169	Not allocated	-	-	-	R225	680Ω	5%	0.1W	J
R170	0.27MΩ	5%	0.1W	H	R226	39Ω	5%	0.1W	J
R171	680Ω	5%	0.1W	H	R227	82Ω	5%	0.1W	J
R172	22,000Ω	5%	0.1W	H	R228	22Ω	5%	0.1W	J
R173	2,200Ω	5%	0.1W	H	R229	1Ω w.w.	5%	6W	J
R174	1,000Ω	5%	0.1W	H					

Resistors (contd.)

Ref	Value	Tol	Rtg	Loc
R230	1Ω w.w.	5%	6W	J
R231	220Ω	5%	0.1W	J
R232	12Ω	5%	0.1W	J
R233	1MΩ	5%	0.1W	J
R234	0.1MΩ	5%	0.1W	J
R235	82,000Ω	5%	0.1W	J
R236	39Ω	5%	0.1W	J
R237	10,000Ω	5%	0.1W	J
R238	10,000Ω	5%	0.1W	J
R239	150Ω	5%	0.1W	J
R240	47,000Ω	5%	0.1W	J
R241	8,200Ω	5%	0.1W	J
R242	150Ω	5%	0.1W	J
R243	47Ω	5%	0.1W	J
R244	27,000Ω	5%	0.1W	J
R245/6	Not allocated	-	-	-
*R247	10Ω w.w.	5%	20W	N
R248	33Ω	5%	0.1W	K
R249	3.3Ω w.w.	5%	2.5W	K
	(*) Not fitted on Ser. Nos 0001-0050			

Potentiometers

Ref	Value	Type	Loc
RV1	20,000Ω 20% log	Carbon	L
RV2	50,000Ω inv log	Carbon	L
RV3	3,300Ω lin.	Carbon pre-set	M
RV4	0.47MΩ lin.	Carbon pre-set	M
RV5	50,000Ω log.	Carbon	L
RV6	250Ω lin.	Carbon pre-set	J
RV7	470Ω lin.	Carbon pre-set	H
	NB: RV2/RV5 are combined in dual-gang assembly with concentric spindles.		

Thermistors

Ref	Type	Mfr.	Loc
TH1	VA1097	Mullard	J

A P P E N D I X ' D 'LIST OF SPARES FOR 1830 SERIES RECEIVERS

The following list details all major spares for 1830 Series Receivers. 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. All orders and enquiries should be directed to the address below, quoting the Serial No. of the receiver in all communications.

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

Telephone : 021-475 2231
Telex : 337081
Cables : EDDYSTONE, Birmingham

Ref	Description	Part No.
	<u>UNITS</u> (COMPLETE)	
	100kHz Calibrator/Relay Unit (as used on early receivers)	LP3300
	500kHz Calibrator/Relay Unit (current receivers)	LP3300A
	Crystal Box (less crystals) (10 channel version)	LP3299
	(50 channel version)	LP3299/1
	RF Assembly (less gangs) 1830/1, 2, 5 & 7	D4544
	1830/3, 4, 6 & 8	D4545
	Tunable IF Unit	LP3296A
	100kHz IF Filter Unit 1830/1-4	LP3298
	1830/5-8	LP3356
	CW/SSB Detector & BFO Unit	LP3297/1
	Power Unit Chassis (early receivers)	D4546
	Power Unit Chassis (current version, 12/24V & AC)	D4546A
	<u>PRINTED CIRCUIT BOARDS</u> (EX-UNITS ABOVE)	
	100kHz Calibrator/Relay Board	LP3293/1
	500kHz Calibrator/Relay Board	LP3293/1A
	*RF Amplifier Board (complete with coils, switches etc.)	LP3293/4
	*Mixer Board (complete with coils, switches etc.)	LP3293/5
	*Oscillator Board (complete with coils, switches etc.)	LP3293/6
	(*) Part Nos quoted are for 1830/1, 2, 5 & 7 For Models 1830/3, 4, 6 & 8 quote:-	
	RF : LP3293/14	
	Mixer : LP3293/15	
	Oscillator : LP3293/16	
	Tunable IF Board	LP3293/7A
	100kHz IF Filter Board (1830/1-4)	LP3293/8
	100kHz IF Filter Board (1830/5-8)	LP3293/17
	CW/SSB Detector & BFO Board	LP3293/11A

Ref	Description	Part No.
	<u>PRINTED CIRCUIT BOARDS (OTHERS)</u>	
	Peak-RF Board	LP3293/2
	Crystal Oscillator Board (10-channel versions)	LP3293/3
	Crystal Oscillator Board (50-channel versions)	LP3293/20
	100kHz IF Amplifier Board (1830/1-4)	LP3293/9
	100kHz IF Amplifier Board (1830/5-8)	LP3293/19
	N/L, Meter & Neg Supply Board	LP3293/10
	Audio Amplifier Board (less o/p transistors & heatsink)	LP3293/12
	<u>SWITCHES, SWITCH WAFERS & ASSOCIATED ITEMS</u>	
S1	RANGE SWITCH :: Wafers S1A, S1B, S1C, S1D, S1E, S1H and S1I (1P-10W with shorting plate) *Wafer S1F (2P-5W no shorting plate) Wafer S1G (1P-10W no shorting plate) Clicker Mechanism (with gear/bracket) Insulated Coupler	6302/1P 5393P 7014P D4510 6863P
	(*) Operates through 9 positions as other wafers	
S2	CALIBRATOR SWITCH :: Miniature DPDT Toggle	7352P
S3	OSCILLATOR SYSTEM SWITCH (CRYSTAL SELECTOR) :: Wafer S3A (1P-12W without shorting plate) Wafers S3B & C (1P-10W with shorting plate) Clicker Mechanism	8388P 8308P 8385P
S4	SELECTIVITY SWITCH :: Wafers S4A (and S4AA on 1830/5-8), S4B/C, S4G/H (2P-5W) Wafer S4D/E/F (3P-4W) Clicker Mechanism Insulated Coupler	7285PA 8359P 8360P 7353P
S5	MODE SWITCH :: Wafer S5A/B/C (3P-4W) Clicker Mechanism	D4547 8360P
S6	MANUAL/AGC SWITCH :: Miniature DPDT Toggle	6760P
S7	AGC TIME CONSTANT SWITCH :: Miniature SPDT Toggle	7352P
S8	NOISE LIMITER SWITCH :: Miniature SPDT Toggle	6760P
S9	INTERNAL SPEAKER SWITCH :: Miniature SPDT Toggle	6760P
S10	SUPPLY SWITCH :: Miniature 4PDT Toggle (Centre-'off')	8634P
**S11	OSCILLATOR SYSTEM SWITCH :: Wafer S11A (1P-7W no plate) Wafer S11B (1P-7W with plate) Clicker Mechanism	6303P 6302P 8461P
	(**) Used on 50-channel versions only	

Ref	Description	Part No.
<u>VARIABLE CAPACITORS & TRIMMERS ETC.</u>		
C30	Main Tuning Gang - Aerial Section : 1 x 12-358pF	D4507
C62 etc.	RF Mixer and Osc. Sections : 2 x 12-358pF + 1 x 18-364pF	7357PD
C148 etc.	Incremental Tuning Gang : 2 x 12-358pF + 1 x 18-364pF	7357PD
C198	Crystal Phasing Trimmer : 2-11pF (air-spaced)	8467P
C284	BFO Pitch : 2 x 8.5-126.5pF	6716P
	Disk Ceramic Trimmer (as used in RF Assy. etc.) : 7-35pF	8468P
	Flexible Coupler (as used on tuning gangs)	LP2428
	Reduction Drive (as used on BFO Pitch)	8466P
C146/150	Film dielectric trimmer (8-135pF) - Tunable IF	8633P
C4	Disk Ceramic Trimmer (Calibrator) : 6-30pF	7566P
<u>PLUGS AND SOCKETS</u>		
PL1	Aerial Input plug (BNC bayonet-lock coaxial)	6084P
PL2	Crystal Oscillator Box plug (6-way moulded)	6081P
PL3	Synthesizer Input plug (BNC bayonet-lock coaxial)	6084P
PL4	IF Output plug (BNC bayonet-lock coaxial)	6084P
PL5	DC Supply Connector (fixed male : 3-pole polarised)	7130P
PL6	AC Supply Connector (fixed male : 2-pole with earthing)	D2310/1
PL7	Ancillaries Connector (free male : 12-way with cover)	8037P
PL8	Dial Light Connector (free male : 2-pin)	6083P
SK1	Aerial Input socket (BNC)	7225P
SK2	Crystal Oscillator Unit socket (6-way moulded)	6082P
SK3	Synthesizer Input socket (BNC)	7225P
SK4	IF Output socket (BNC)	7225P
SK5	DC Supply Connector (with 2000mm twin lead for battery)	D3641
SK6	AC Supply Connector (with 2000mm 3-core lead)	D2311/1
SK7	Ancillaries Connector (fixed female : 12-way)	8036P
SK8	Dial Light Connector (fixed female : 2-pin)	6089P
JK1	Telephone socket (with auxiliary switching contact)	8463P
	Telephone plug	6567P
<u>CRYSTALS & SSB FILTERS</u>		
XL1	Calibrator 500kHz $\pm 0.005\%$ series resonant (GEC QC1107)	8900P
XL2	Filter 100kHz $\pm 0.005\%$ series resonant (GEC QC855)	8465P
FL1	LSB Filter	8731P
FL2	USB Filter 1830/5-8 only	9014P
<u>NB:</u> The filter description given above relates to the filter proper. Sideband reversal occurs in the first conversion process such that an LSB signal at the aerial input becomes a USB signal at the 100kHz IF. Thus, when ordering filters, it is necessary to specify the USB filter for LSB reception and vice versa.		

Ref	Description	Part No.
	<u>INDUCTORS</u>	
*L1	Crystal Calibrator coil (500kHz)	D4623
L2	Range 1 RF Bandpass coil	D4452B
L3	Range 2 RF Bandpass coil	D4453A
L4	Range 3 RF Bandpass coil	D4454B
L5	Range 4 RF Bandpass coil	D4455A
L6	Range 5 RF Bandpass coil	D4456A
L7	Range 6 RF Bandpass coil	D4457A
L8	Range 7 RF coil (1830/1, 2, 5 & 7)	D4458A
L8	Range 7 RF coil (1830/3, 4, 6 & 8)	D4519
L9	Range 8 RF coil (1830/1, 2, 5 & 7)	D4459
L9	Range 8 RF coil (1830/3, 4, 6 & 8)	D4522
L10	Range 9 RF coil	D4460
L11	IF Rejector coil (100kHz)	D4528
L12	Range 1 Mixer coil	D4461
L13	Range 2 Mixer coil	D4462A
L14	Range 3 Mixer coil	D4463
L15	Range 4 Mixer coil	D4464
L16	Range 5 Mixer coil	D4465
L17	Range 6 Mixer coil	D4466
L18	Range 7 Mixer coil (1830/1, 2, 5 & 7)	D4467
L18	Range 7 Mixer coil (1830/3, 4, 6 & 8)	D4520
L19	Range 8 Mixer coil (1830/1, 2, 5 & 7)	D4468
L19	Range 8 Mixer coil (1830/3, 4, 6 & 8)	D4523
L20	Range 9 Mixer coil	D4469
L21	Range 1 Oscillator coil	D4470A
L22	Range 2 Oscillator coil	D4471
L23	Range 3 Oscillator coil	D4472
L24	Range 4 Oscillator coil	D4473
L25	Range 5 Oscillator coil	D4474
L26	Range 6 Oscillator coil	D4475
L27	Range 7 Oscillator coil (1830/1, 2, 5 & 7)	D4476
L27	Range 7 Oscillator coil (1830/3, 4, 6 & 8)	D4521
L28	Range 8 Oscillator coil (1830/1, 2, 5 & 7)	D4477
L28	Range 8 Oscillator coil (1830/3, 4, 6 & 8)	D4524
L29	Range 9 Oscillator coil	D4478
**L30	Tunable IF Rejector coil (No. 1)	D3883
**L31	Tunable IF Rejector coil (No. 2)	D3883
L32	Tunable IF coil (primary)	D4481
L33	Tunable IF coil (secondary)	D4481
L34	Incremental Oscillator coil	D4480B
L35	100kHz IF Filter coil No. 1	D3840A
L36	100kHz IF Filter coil No. 2	D3841A
L37	100kHz IF Filter coil No. 3	D3841A
L38	100kHz IF Filter coil No. 4	D3841A
L39	100kHz IF Filter coil No. 5	D3841A
L40	AM Detector coil	D3871A
L41	RF AGC coil	D3869A
L42	IF AGC coil	D3870A
L43	BFO coil	D3853B
	(* L1 on 100kHz Calibrator = D4479	
	(** Fitted on early receivers only	

Ref	Description	Part No.
<u>CHOKES</u>		
CH1	100mH RF Choke	Calibrator/Relay Unit
CH2	100mH RF Choke	RF Assembly
CH3	4.7mH RF Choke	RF Assembly
CH4	68mH RF Choke	100kHz IF Amplifier
CH5	68mH RF Choke	100kHz IF Amplifier
CH6	68mH RF Choke	100kHz IF Amplifier
CH7	68mH RF Choke	100kHz IF Amplifier
CH8	100mH RF Choke	100kHz IF Amplifier
CH9	100mH RF Choke	100kHz IF Amplifier
CH10	4.7mH RF Choke	100kHz IF Amplifier
CH11	68mH RF Choke	100kHz IF Amplifier
CH12	1mH RF Choke	100kHz IF Amplifier
CH13	100mH RF Choke	100kHz IF Amplifier
CH14	1mH RF Choke	CW/SSB Detector & BFO
CH15	68mH RF Choke	CW/SSB Detector & BFO
CH16	100mH RF Choke	CW/SSB Detector & BFO
CH17	100mH RF Choke	N/L, Meter & Neg. Supply
CH18	500mH Choke	N/L, Meter & Neg. Supply
CH19	500mH Choke	N/L, Meter & Neg. Supply
CH20	3 μ H RF Choke	Power Unit
CH21	3 μ H RF Choke	Power Unit
CH22	4.7mH RF Choke	Tunable IF Unit
		7760P
		7760P
		7472P
		7759P
		7759P
		7759P
		7759P
		7760P
		7760P
		7472P
		7759P
		7754P
		7760P
		7754P
		7759P
		7760P
		7760P
		8428P
		8428P
		8428P
		D2854
		D2854
		7472P
<u>TRANSFORMERS</u>		
T1	Line Output Transformer (centre-tapped with shielded secondary)	
T2	Headset Isolating/Matching Transformer	
T3	Power Transformer	
		7524P
		7141P
		7022P
<u>POTENTIOMETERS</u>		
RV1	PEAK-RF CONTROL :: 20,000 Ω 20% log. carbon	
RV2/5	IF/AF GAINS :: 50,000 Ω inv. log./50,000 Ω log. carbon with concentric spindles	
RV3	METER ZERO CONTROL :: 3,300 Ω lin. carbon pre-set	
RV4	LINE LEVEL CONTROL :: 0.47M Ω lin. carbon pre-set	
RV5	See RV2	
RV6	TR30/TR31 Ic ADJUSTER :: 250 Ω lin. carbon pre-set	
RV7	CW/SSB LEVEL ADJUSTER :: 470 Ω lin. carbon pre-set	
		8358PD
		8354P
		7850P
		6077P
		8462P
		8710P

APPENDIX 'D'

Ref	Description	Part No.
	<u>DRIVE MECHANISM & ASSOCIATED ITEMS</u>	
	Main Tuning Drive Assembly (less flywheel)	LP3294
	Incremental Tuning Drive Assembly (less flywheel)	LP3295
	Flywheel (complete with grub screw)	8469P
	Drive Cord (Main Tuning Cursor)	8446P
	Drive Cord (Incremental Tuning Cursor)	8447P
	Drive Cord Drum (Main and Incremental)	8284P
	Guide Pulleys	6125P
	Main Tuning Cursor	8244PA
	Incremental Tuning Cursor	8242PA
	Reduction Drive for BFO Pitch	8466P
	<u>KNOBS</u>	
	Main Tuning Control	D3613/3
	Incremental Tuning Control	D3613/3
	Skirt for Main and Incremental Controls	7089/1P
	Range Switch	D4529
	Mode Switch	D3614*
	Peak-RF Control	D3614*
	Selectivity Switch	D3614*
	IF Gain	D3724*
	AF Gain	D3723*
	BFO Pitch Control	D3957*
	Skirt for BFO Pitch Control	D3958
	Crystal Selector Switch	D3617/4
	Cal. Adj. (less cap)	8487P
	Cap for Cal. Adj.	8532P
	(*) add suffix '/BLACK'	
	<u>MISCELLANEOUS</u>	
	Top Cover Plate	D4620
	Bottom Cover Plate	8420P
	Panel Handles	8253P
	Fuses (1 Amp)	7173P
	Fuses (2 Amp)	6704P
	Fuseholder	6372P
	Dial Bulbs (12V, 0.08A, 5mm wire-ended)	8448P
	Loudspeaker	6101P
	Panel Fixing Screws	40A-330
	Washers for 40A-330	27E-57
	Cabinet	8256P
	Cabinet Mounting Feet	7132P
	Meter	8470P
	Muting Relay (RLA)	8471P
	Synth. Relay (RLB)	8472P
	Trimming Tools:	Eddystone 8363P
		Neosid H.S.l. 8450P
		T.T.l. 8451P

APPENDIX 'E'

CIRCUIT VARIATIONS :: MODELS 1830/1-1830/4

Early 1830/1-4 receivers (in particular Ser. Nos. 0001-0050) differ from current versions in some or all of the following respects:-

Power Supplies

1. Facilities are provided for AC and 12V DC operation only.
2. The SUPPLY SWITCH is a conventional 'on/off' switch and does not allow instantaneous changeover from AC Mains to Battery operation.
3. A single AC fuse is fitted in lieu of two AC fuses.
4. The power supply wiring is as shown in Fig. 1.
5. The DC supply connector must be in place for AC working, with link wired as shown in Fig 1 (see SK5A). The receiver is disabled if link is omitted.

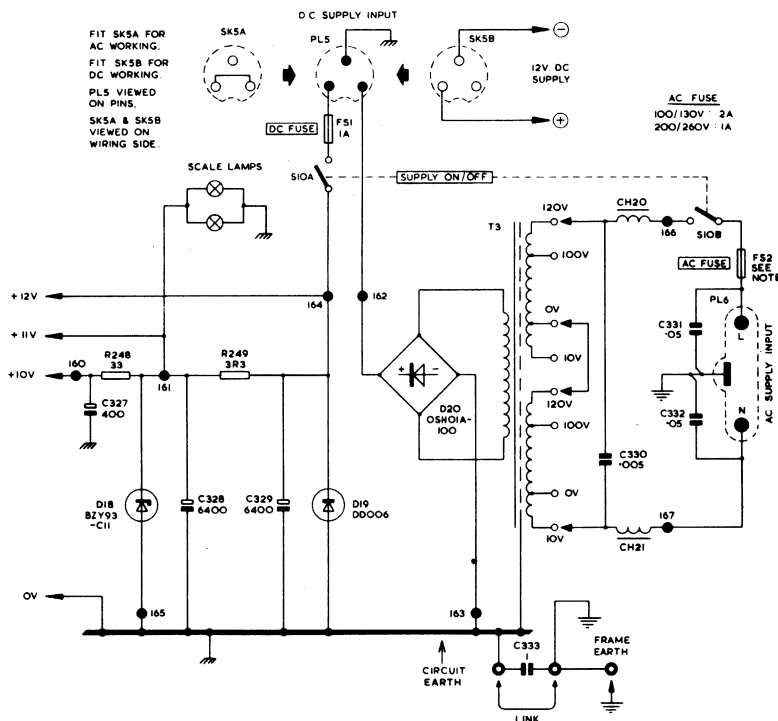


Fig. 1. Power Supply Circuit for early 1830 Series Receivers.

Tunable IF Unit

1. Rejector coils (L30 and L31) are included in the feed from TR7 drain to the bandpass circuit L32/L33.
2. The trimming capacitors C146 and C150 are of lower value (7-35 pF) than those fitted on current receivers: values of C145 and C151 are also different.
3. A circuit of the Tunable IF Unit used on early receivers is shown in Fig. 2.
4. If re-alignment of the Tunable IF Unit is required, the cores in L30/L31 should not be disturbed from their initial factory settings.

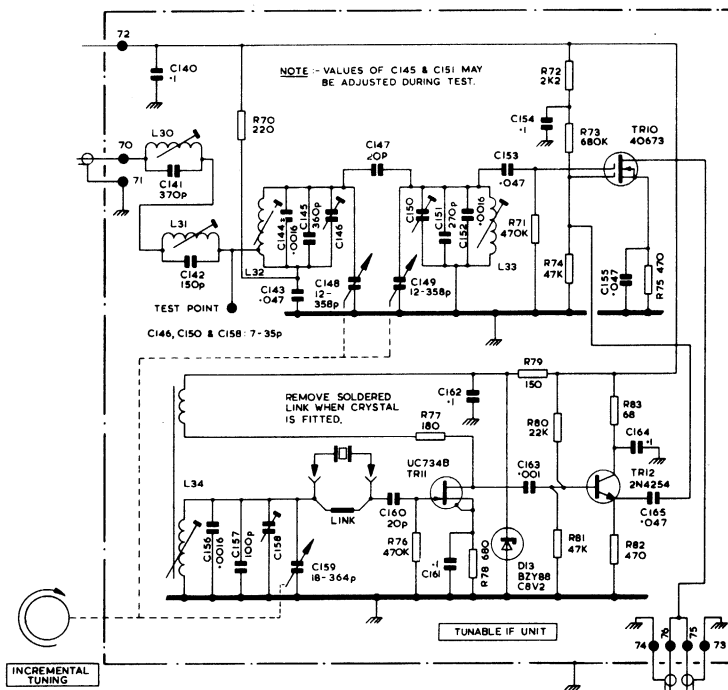


Fig. 2. Tunable IF Unit as used on early 1830 Series Receivers.

APPENDIX 'E'

CW/SSB Detector & BFO Unit

The pre-set level adjustment control RV7 is fitted on current receivers only. Earlier receivers have a fixed resistor (R176 :: 1K) in this position as shown in Fig. 3.

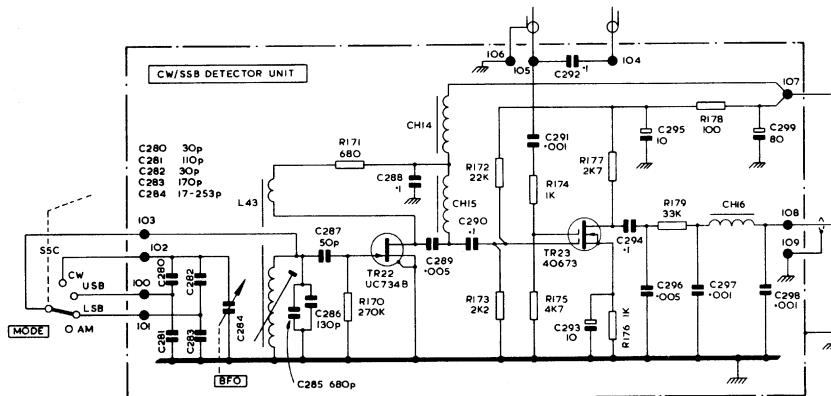


Fig. 3 Circuit of CW/SSB Detector and BFO Unit for early 1830 Series Receivers.

Crystal Calibrator

The Crystal Calibrator fitted on earlier receivers provided markers at 100kHz in lieu of 500kHz. The circuit of the 100kHz Calibrator/Relay Unit is given in Fig. 4 which also shows the earlier form of input protection circuit (diodes D1-D4 in lieu of the current PC1 package).

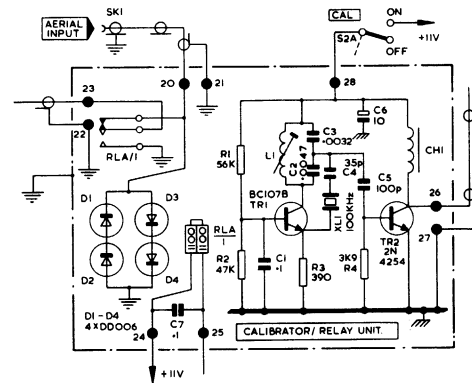


Fig. 4. 100kHz Calibrator/Relay Unit.

N/L, Meter and Neg Supply Board

R214 may be mounted separately from the p.c.b. If this is the case, it will be found on two stand-off tags adjacent to the rear of the board.

Panel Marking

The SUPPLY SWITCH and SELECTIVITY marking is as follows:-

SUPPLY SWITCH :: 'SUPPLY OFF' - 'ON'

SELECTIVITY :: 100kHz position marked 'N'
 1.3kHz 'CW'
 3kHz 'SSB'
 8kHz 'AM'

The 'CW(A1)' position of the MODE SWITCH is marked 'CW' only.

Peak-RF Control

A 50,000Ω 10% log. law potentiometer may be fitted in lieu of the standard PEAK-RF CONTROL. (20,000Ω 20% log. law). In this event the circuit is modified as shown in Fig. 5.

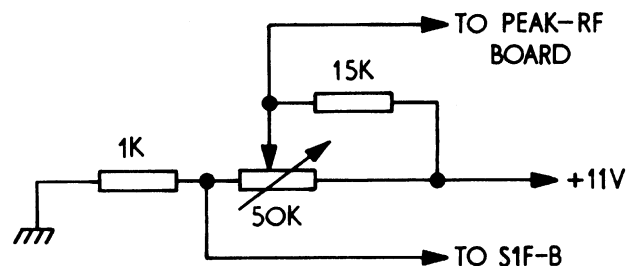


Fig. 5. Modified Peak-RF Circuit.

APPENDIX 'F'

CIRCUIT MODIFICATIONS/OPERATING INSTRUCTIONS

MODIFIED ALIGNMENT PROCEDURES : : MODELS 1830/5-1830/8

This group of 1830 receivers comprises four variants which differ from Models 1830/1-1830/4 in that they incorporate circuit modifications to provide improved reception of single-sideband transmissions. The modifications are restricted mainly to the intermediate frequency part of the circuit and the receivers are otherwise identical to one or other of the standard variants, viz:—

- Model 1830/5: Based on Model 1830/1 with continuous coverage from 120kHz to 31MHz: 10 crystal channels.
- Model 1830/6: Based on Model 1830/3. Coverage from 120kHz to 31MHz with gap between 535-920kHz: 10 crystal channels.
- Model 1830/7: 50-channel version of Model 1830/5 (i.e. relates to Model 1830/2).
- Model 1830/8: 50-channel version of Model 1830/6 (i.e. relates to Model 1830/4).

Each of the 'special' variants is available in two versions identified by suffix letters 'A' or 'B' following the type designation.

- Models 1830/5-A, 6-A, 7-A & 8-A: Equipped with single SSB filter
- Models 1830/5-B, 6-B, 7-B & 8-B: Equipped with separate USB and LSB filters

CIRCUIT MODIFICATIONS APPLICABLE TO 'A' VERSIONS OF 1830/5-1830/8

Tunable IF Unit

This unit is identical to that used on models 1830/1-1830/4 but is aligned to cover the range 1301.5kHz to 1401.5kHz in lieu of the normal 1300-1400kHz coverage. A 1251.5kHz crystal should be used if crystal control of the 2nd Oscillator is required.

The upward shift of 1.5kHz in the Tunable IF coverage compensates for the modified carrier insertion frequencies used on Models 1830/5-8 and allows 1st Oscillator crystals calculated for upper sideband reception on other versions to be used directly for USB reception on Models 1830/5-8 (see calculation of crystal frequencies on page 73).

100kHz IF Filter Unit

The standard IF Filter Unit LP3298 used on Models 1830/1-4 is replaced by IF Filter Unit LP3356 which provides three degrees of selectivity as follows:—

SELECTIVITY SWITCH POSITION	OVERALL BANDWIDTH		REMARKS
	—6dB	—60dB	
'A1 (VN)' VERY NARROW	0.1kHz	2kHz	} As on LP3298
'A1 (N)' NARROW	1.3kHz	4.5kHz	
'AM NARROW — SSB'	—	—	See SSB Filter
'AM WIDE'	6kHz	18kHz	8kHz at —6dB on LP3298

SSB Filter

The 3kHz bandwidth provided by the standard filter is omitted on the LP3356 unit, and this position ('AM NARROW-SSB') is arranged instead to introduce a multi-element ceramic bandpass filter (FL1) which is designed specifically for SSB reception. FL1 has an asymmetrical response with a 6dB bandwidth of 2.35kHz and a 6/60dB shape factor of the order 1.8 to 1: It is arranged to pass the lower sideband of a 100kHz signal.

A circuit diagram of 100kHz IF Filter Unit LP3356 showing the switching arrangement for FL1 is given in Fig. 3.

CW/SSB Detector Unit

This unit is identical to the CW/SSB Detector Unit used on Models 1830/1-4 except that capacitors C278 and C279 have been added from Terminations Nos. 100 & 101 to earth (see Fig. 1).

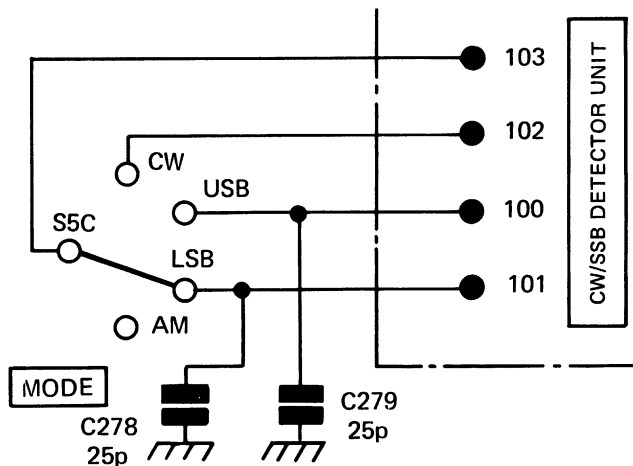


Fig. 1. Wiring Mode Switch Wafer S5C

These capacitors provide modified carrier insertion frequencies of 100kHz with the MODE SWITCH at 'USB' and 97.2kHz at 'LSB'. The BFO CONTROL provides ± 100 Hz shift as on Models 1830/1-4.

AGC Time Constants

The 'LONG' AGC time constants have been reduced to 50ms attack and 1.5sec decay by altering the wiring of the AGC TIME CONSTANT SWITCH S7 (see Fig. 2).

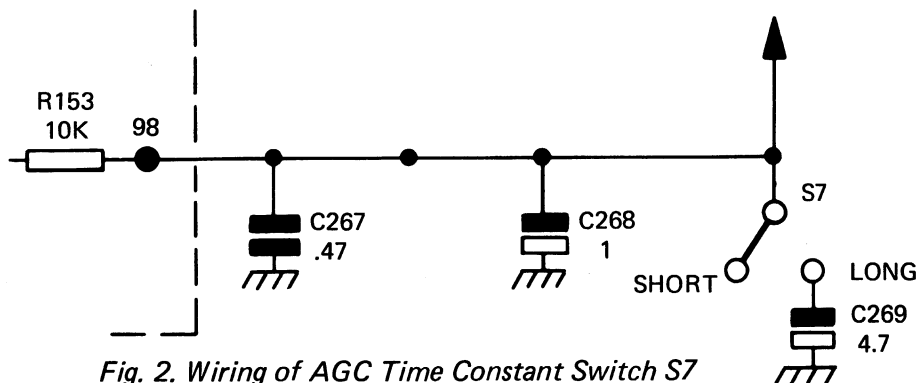


Fig. 2. Wiring of AGC Time Constant Switch S7

C267 : As on 1830/1-4

C268 : Permanently in circuit

C269 : Reduced to 4.7 μ F

R153 : Reduced from 22,000 Ω to 10,000 Ω

LIST OF CAPACITORS/RESISTORS FOR 100kHz IF FILTER TYPE LP3356

Ref	Value	Type	Tolerance	Wkg. V. or Rtg.
C169	0.047 μ F	Polycarbonate	10%	100V
C169A	820pF	Polystyrene	5%	125V
C170	0.1 μ F	Polycarbonate	10%	100V
C171	0.0044 μ F	Polystyrene	2%	30V
C172	400pF	Silvered Mica	5%	350V
C173	350pF	Silvered Mica	5%	350V
C174	370pF	Silvered Mica	5%	350V
C174A	150pF	Silvered Mica	5%	350V
C175	170pF	Silvered Mica	5%	350V
C175A	150pF	Silvered Mica	5%	350V
C177	30pF	Tubular Ceramic	10%	750V
C178	15pF	Tubular Ceramic	10%	750V
C179	0.0044 μ F	Polystyrene	2%	30V
C180	170pF	Silvered Mica	1%	350V
C180A	150pF	Silvered Mica	5%	350V
C183	30pF	Tubular Ceramic	10%	750V
C184	350pF	Silvered Mica	5%	350V
C185	340pF	Silvered Mica	5%	350V
C186	15pF	Tubular Ceramic	10%	750V
C187	0.0044 μ F	Polystyrene	2%	30V
C188	170pF	Silvered Mica	1%	350V
C189	170pF	Silvered Mica	1%	350V
C192	30pF	Tubular Ceramic	10%	750V
C193	390pF	Silvered Mica	5%	350V
C194	470pF	Silvered Mica	1%	350V
C195	15pF	Tubular Ceramic	10%	750V
C196	0.0088 μ F	Polystyrene	2%	30V
C197	0.0088 μ F	Polystyrene	2%	30V
C198	2-11pF	Differential Trimmer	—	—
C199	470pF	Silvered Mica	1%	350V
C200	370pF	Silvered Mica	5%	350V
C202	170pF	Silvered Mica	1%	350V
C202A	150pF	Silvered Mica	5%	350V
C204	30pF	Tubular Ceramic	10%	750V
C205	15pF	Tubular Ceramic	10%	750V
C206	0.0044 μ F	Polystyrene	2%	30V
C209	10pF	Tubular Ceramic	10%	750V
C209A	150pF	Silvered Mica	5%	350V
C210	350pF	Silvered Mica	5%	350V
C211	340pF	Silvered Mica	5%	350V
R86	1,000 Ω	Carbon	5%	0.1W
R87	1,000 Ω	Carbon	5%	0.1W
R88	1,000 Ω	Carbon	5%	0.1W
R89	1,000 Ω	Carbon	5%	0.1W
R90	220 Ω	Carbon	5%	0.1W
R91	22,000 Ω	Carbon	5%	0.1W
R95	10,000 Ω	Carbon	5%	0.1W
R97	22,000 Ω	Carbon	5%	0.1W
R98	10,000 Ω	Carbon	5%	0.1W
CH23	470 μ H	Choke	—	—

CIRCUIT MODIFICATIONS APPLICABLE TO 'B' VERSIONS OF 1830/5-1830/8

The 'B' versions of 1830/5-1830/8 differ from the 'A' versions in that separate SSB filters are used for upper and lower sideband reception. The switching arrangement used is shown in Fig. 4. In addition the carrier insertion frequency is 100kHz with the MODE switch at both 'USB' and 'LSB'. This is achieved as shown in Fig. 5. In all other respects, the 'B' version is identical to the 'A' version.

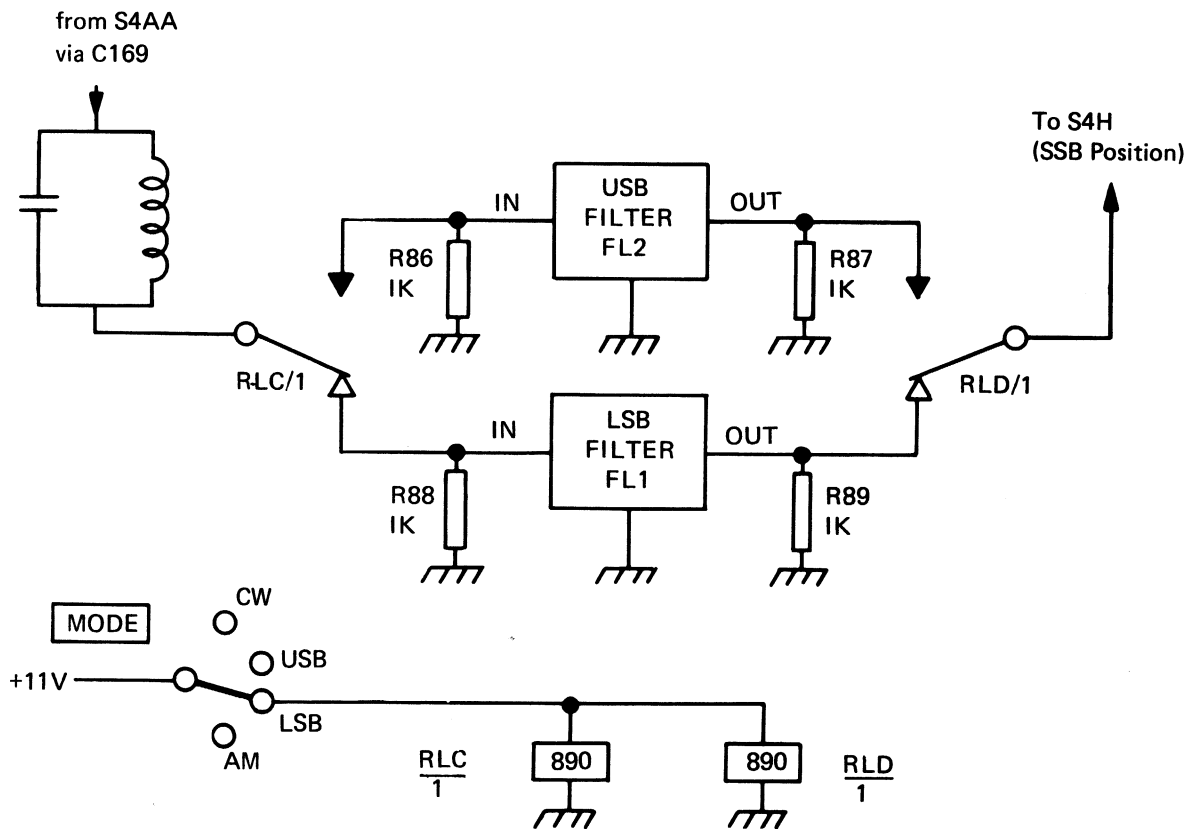


Fig. 4. USB and LSB Filter Switching

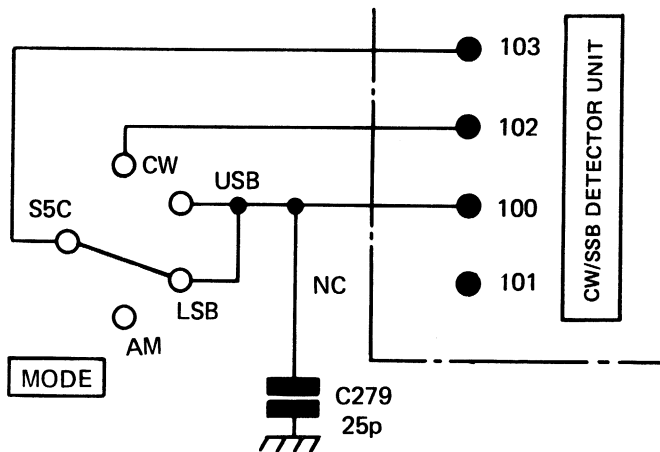


Fig. 5. Wiring Mode Switch Wafer S5C

OPERATION

General

'A' Versions of 1830/5-1830/8

These versions are equipped with a single LOWER sideband filter* in lieu of the normal 3kHz (SSB) selectivity position. Carrier re-insertion frequencies of 100kHz (USB) and 97.3kHz (LSB) can be selected by the MODE switch to permit USB/LSB selection when operating the receiver with tunable 1st Oscillator. The tuning must be set 2.7kHz below the allocated frequency if the station is transmitting LSB.

When Operating with crystal-controlled 1st Oscillator, the receiver sideband is determined by the choice of 1st Oscillator crystal. Oscillator injection should be chosen on the 'high' side of the signal frequency for UPPER sideband signals and on the 'low' side for LOWER sideband signals. Carrier re-insertion is at 100kHz for either sideband, the MODE switch being set permanently to USB—also marked SSB (CRYSTAL & SYNTH).

The BFO control provides an adjustment of ± 100 Hz during SSB reception as on 1830/1-1830/4 receivers.

The 'AM WIDE' selectivity position is modified to give a nominal 6dB bandwidth of 6kHz with shape factor of 3 to 1.

The 'LONG' AGC time constants have been reduced to 50 msec attack, 1.5sec decay.

'B' Versions of 1830/5-1830/8

These versions are equipped with separate filters* for upper and lower sideband reception. Selection of the appropriate filter is achieved by use of the MODE switch after setting the SELECTIVITY switch to 'SSB'. Relay switching is employed and carrier re-insertion is at 100kHz for either sideband. BFO variation of ± 100 Hz is available as on 1830/1-1830/4 receivers.

Crystals for control of the 1st Oscillator can be chosen to lie above or below the signal frequency for either sideband. However, if the 1st Oscillator injection lies on the low side of the signal it is necessary to read the panel legend in reverse — i.e. use 'USB' position for lower sideband reception and vice-versa.

Unlike the 'A' version, the calibration accuracy is maintained when taking LSB signals with free-running 1st Oscillator.

Changes in AM bandwidth and AGC time constant are as for 'A' versions.

(*) Filters fitted to Models 1830/5-1830/8 are multi-element ceramic ladder type with 6/60dB shape factor of the order 1.4 to 1. The response is assymmetrical with 6dB passband of 2.6kHz and carrier 35dB down.

Crystal Controlled Working

The tunable 1st IF range on both 'A' and 'B' versions has been modified to cover the band 1301.5-1401.5kHz. The upward shift of 1.5kHz allows both versions to be operated on 'USB' with existing crystals calculated for reception of upper sideband channels on 1830/1-1830/4 receivers.

The nominal 1st IF thus becomes 1351.5kHz and the formulae for calculating crystal frequencies are as follows:

'A' Version

- a) For UPPER sideband reception, $f_{\text{xstal}} = f_{\text{sig}} (\text{carrier}) + 1351.5\text{kHz}$
- b) For LOWER sideband reception, $f_{\text{xstal}} = f_{\text{sig}} (\text{carrier}) - 1351.5\text{kHz}$

'B' Version

For both UPPER and LOWER sideband reception.

$$f_{\text{xstal}} = f_{\text{sig}} (\text{carrier}) + 1351.5\text{kHz}$$

When the calculated crystal frequency lies above 20MHz, divide by 2 or 3 and use the 2nd or 3rd harmonic to furnish the required oscillator injection. A slight degradation in sensitivity may occur.

2nd Oscillator

If crystal control of the 2nd Oscillator is also required, the correct crystal frequency for both 'A' and 'B' versions is 1251.5kHz.

NOTE On 1830/6A receivers supplied for Swedish requirements the nominal 1st IF frequency is 1350kHz and not 1351.5kHz. In the above calculations for crystal frequency, 1350 should be substituted for 1351.5kHz, and the correct crystal frequency for the 2nd Oscillator is 1250kHz.

TUNING INSTRUCTIONS

1830/5-1830/8 receivers should be operated as the 1830/1-1830/4 receivers except for SSB reception when the following instructions replace those given in the main portion of the handbook.

Models 1830/5-1830/8 'A' Versions

Normal operation with tunable 1st Oscillator

1. Set SELECTIVITY switch to 'SSB' position.
2. For UPPER sideband reception, set MODE switch to 'USB' and tune to wanted frequency.
3. For LOWER sideband reception, set MODE switch to 'LSB' and tune receiver so that the 'carrier' frequency produces a final IF of 97.3kHz. This corresponds to a tuning scale off-set of 2.7kHz **below** the wanted signal frequency – e.g. for lower sideband signal with carrier frequency of 4106kHz, set scale to 4103.3kHz.

Operation with crystal-controlled 1st Oscillator

1. Calculate crystal frequency as detailed on page (28).
2. Set SELECTIVITY switch to 'SSB' position.
3. Set MODE switch to 'USB' position – marked SSB (CRYSTAL & SYNTH) – for EITHER sideband. Appropriate sideband is determined by choice of crystal as in (1) above

APPENDIX F

The 'LSB' mode switch position is not used when operating the receiver with crystal controlled 1st Oscillator.

Models 1830/5-1830/8 'B' Versions

Normal operation with tunable 1st Oscillator

1. Set SELECTIVITY switch to 'SSB' position.
2. Set MODE switch to 'USB' or 'LSB' to suit transmitted sideband.
3. Tune receiver to wanted frequency.

Operation with crystal-controlled 1st Oscillator

1. Calculate crystal frequency as detailed on page 73. This should be chosen to lie **above** the wanted carrier frequency in order to preserve the validity of the USB/LSB marking on the panel legend. If the oscillator injection lies on the low side of the signal it is necessary to read the panel legend in reverse i.e. use 'USB' position for lower sideband reception and vice versa.
2. Set SELECTIVITY to 'SSB' and MODE to 'USB' or 'LSB' to suit transmitted sideband.

NOTE The BFO control provides a normal adjustment of $\pm 100\text{Hz}$ on both versions when using the SSB positions of the MODE switch.

M A I N T E N A N C E

Re-alignment of 100kHz IF Amplifier and Filter, models 1830/5-1830/8

The procedure detailed in the main portion of the handbook applies also to 1830/5-1830/8. The figures quoted in paragraph 15, however, will be incorrect and should read as follows:—

‘A1 (N)’	: : 1.3kHz (-6dB)/4.5kHz (-60dB)
‘AM WIDE’	: : 6kHz/18kHz
‘AM NARROW-SSB’	: : determined by ceramic ladder filter — no adjustment is possible. The frequencies of the -6 and -60dB points should be:—
Upper 6dB point	99.65kHz min
Lower 6bD point	97.30kHz max
Upper 60dB point	100.50kHz max
Lower 60dB point	96.20kHz min

Re-alignment of the BFO, models 1830/5-1830/8 ‘A’ and ‘B’ versions

Test Equipment Standard signal generator covering 100kHz
 Frequency counter
 Power output meter matched to 3Ω

1. Proceed as (1) and (2) of instructions for IF alignment as on Page 38.
2. Set SELECTIVITY SWITCH to ‘A1 (N)’, and MODE SWITCH to ‘USB’.
3. Connect frequency counter to IF Output socket.
4. Tune generator to give a reading on the counter of 100.00kHz.
5. Set BFO PITCH control to mid-setting (index at 12 o’clock).
6. Adjust core in L43 through aperture in underside of unit to give zero beat in audio output, as indicated on power output meter.
7. Select ‘CW (A1)’ position on MODE SWITCH. Check that zero beat occurs with index on BFO PITCH control at or close to 12 o’clock setting and that swing is approximately ± 5 kHz.
8. Return the BFO PITCH control to mid setting (index at 12 o’clock).
9. (‘A’ versions only). Select ‘LSB’ position on MODE SWITCH. Check that zero beat occurs with an IF of approx 97.3kHz.
 (‘B’ versions only). Select ‘LSB’ position on MODE SWITCH. Check that zero beat occurs with an IF of 100,000kHz.
10. Check that BFO PITCH control gives a swing of the order of ± 100 Hz at ‘USB’ and ‘LSB’.

APPENDIX F

NOTE The following sections, dealing with re-alignment of the Incremental Oscillator and the Tunable IF Transformer L32/L33 do not apply to 1830/6A receivers supplied for Swedish requirements. For these receivers use alignment instructions for 1830/1-1830/4 on page 39.

Re-alignment of Incremental Oscillator

Test Equipment: Crystal controlled harmonic generator providing 100kHz markers and 10kHz markers in the range 1300kHz to 1400kHz.

Trimming Tool Type TT1

Connect harmonic generator to Mixer section of main tuning gang and adjust receiver controls as for 100kHz IF alignment, except RANGE SWITCH (Range 5), MAIN TUNING (1.5MHz), MODE SWITCH ('CW') and BFO (12 o'clock). Set harmonic generator to provide 100kHz markers.

Check incremental scale accuracy at +51.5kHz and -48.5kHz (corresponding to 1300kHz and 1400kHz respectively). The +51.5kHz point is obtained by interpolation. Tune for zero-beat in each case. Errors greater than 1kHz should be corrected by adjusting C158 at -48.5kHz and L34 at +51.5kHz.

Change to 10kHz markers and check accuracy at all intermediate 10kHz points throughout the range. Note that the 10kHz markers will occur 1.5kHz HF from the appropriate scale calibration point i.e. the +30kHz marker occurs at a scale reading of +31.5kHz. The -20kHz marker occurs at a scale reading of -18.5kHz.

Errors in excess of 1kHz are unlikely if the end frequencies have been set correctly, but if errors are detected they can be easily corrected by slight fanning of the vanes on the oscillator section of the tuning gang (C159).

Re-alignment of Tunable IF Transformer L32/L33

Test Equipment: Standard Signal Generator covering the range 1301.5-1401.5kHz with 50-75 Ω output impedance and 30% modulation at 400Hz.

Power Output Meter matched to 3 Ω

Trimming Tool Type TT1

IMPORTANT: CHECK INCREMENTAL OSCILLATOR ALIGNMENT BEFORE CARRYING OUT ADJUSTMENTS BELOW.

Connect generator (modulated output) to Mixer section of main tuning gang and adjust receiver controls as for 100kHz IF alignment except RANGE SWITCH (Range 5) and MAIN TUNING (1.5MHz). Set INCREMENTAL TUNING to +50kHz and generator to 1301.5kHz : adjust generator output level to give suitable reading on Output Meter.

Trim cores in L32 and L33 for maximum output and then re-tune generator to 1401.5kHz with INCREMENTAL TUNING set to -50kHz. Trim C146 and C150 for maximum output. Repeat core and trimmer adjustments as necessary until maximum output is produced at both alignment points with no interaction between trimmer and cores.

APPENDIX 'G'

PRINTED CIRCUIT BOARD PATTERNS AND LEGENDS

All boards are shown viewed from legend side (i. e. copper side is seen through the laminate). Two views are provided for all double-sided boards. All illustrations are slightly less than actual size.

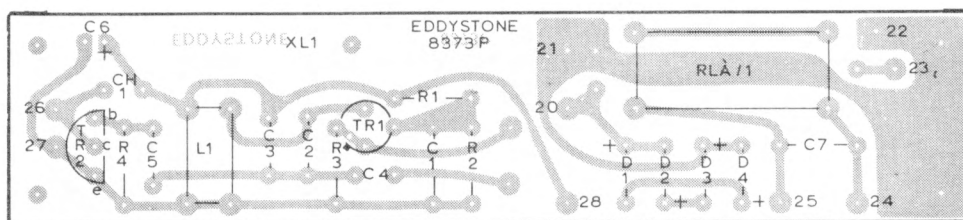


Fig. 1. 100kHz Calibrator/Relay Board LP3293/1.

NB: 100kHz Calibrator/Relay Board LP3293/1 was used on early receivers only.

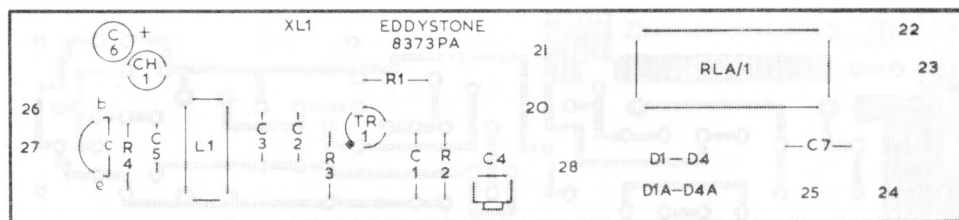


Fig. 2. 500kHz Calibrator/Relay Board LP3293/1A.

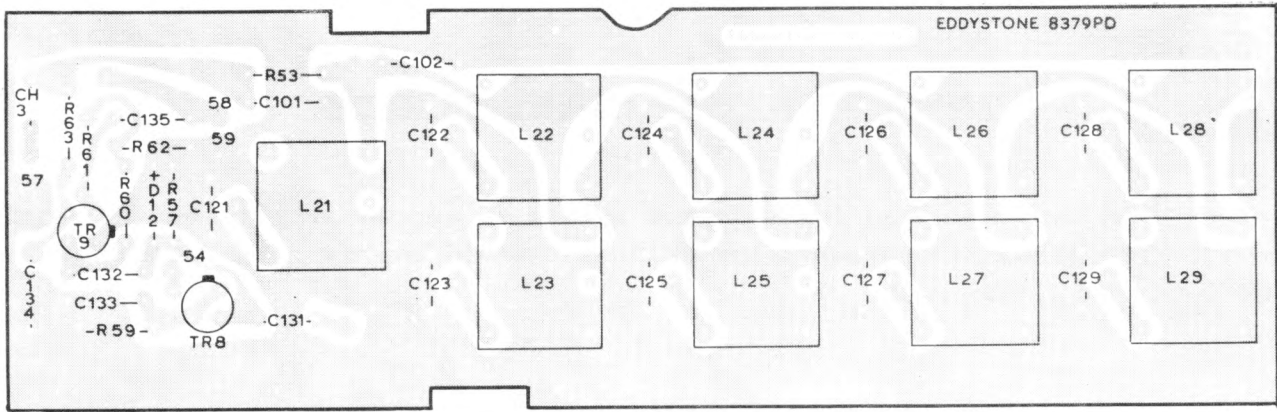


Fig. 3. Oscillator Board LP3293/6.

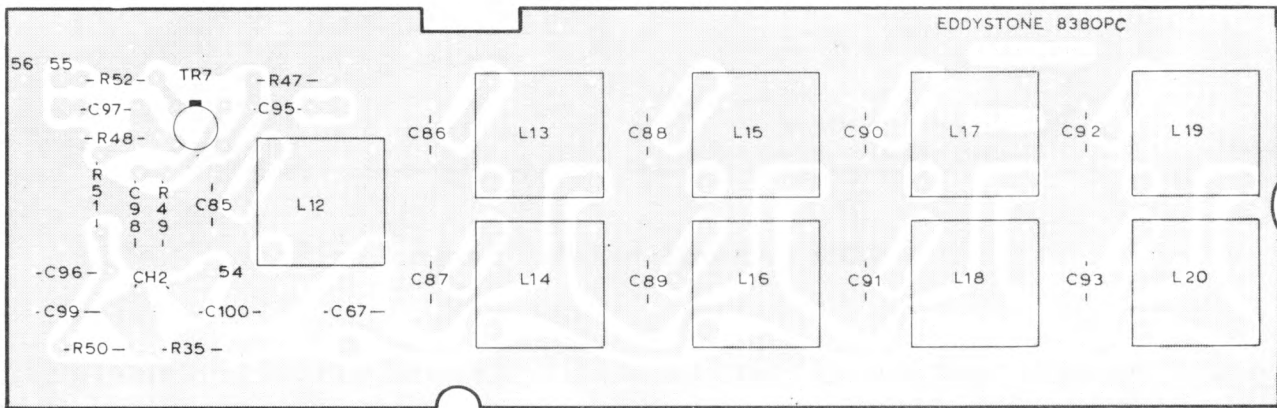


Fig. 4. Mixer Board LP3293/5.

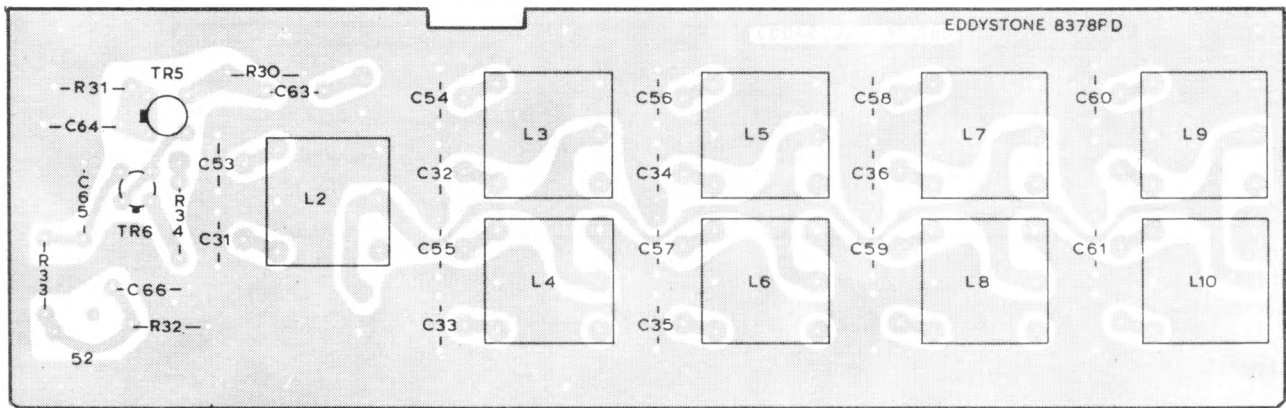


Fig. 5. RF Amplifier Board LP3293/4.

NB: Boards LP3293/14-15-16 used on Models 1830/3, 4, 6 and 8 are identical to boards illustrated above except for coils fitted in range 7 and 8 positions.

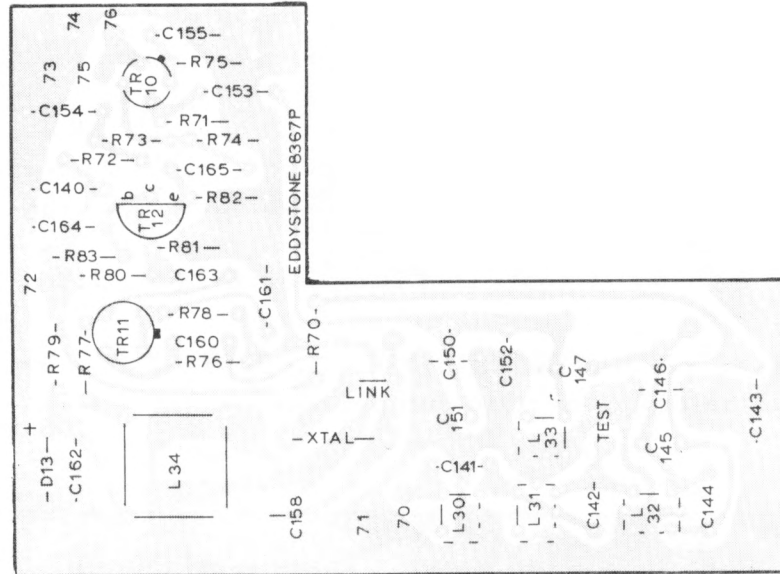


Fig. 6. Tunable IF Board LP3293/7.

NB: Tunable IF Board LP3293/7 used on early receivers only.

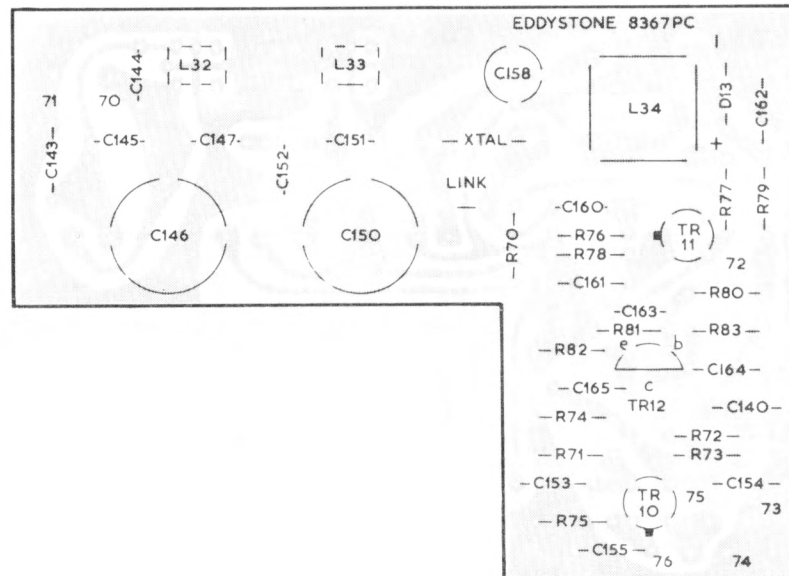


Fig. 7. Tunable IF Board LP3293/7A.

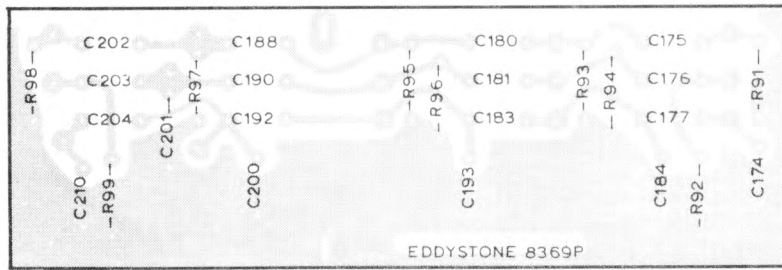


Fig. 8. 100kHz IF Filter Board LP3293/8.

NB: LP3293/8 is used on Models 1830/1-4. LP3293/17 used on Models 1830/5-8 differ only in the omissions of certain components.

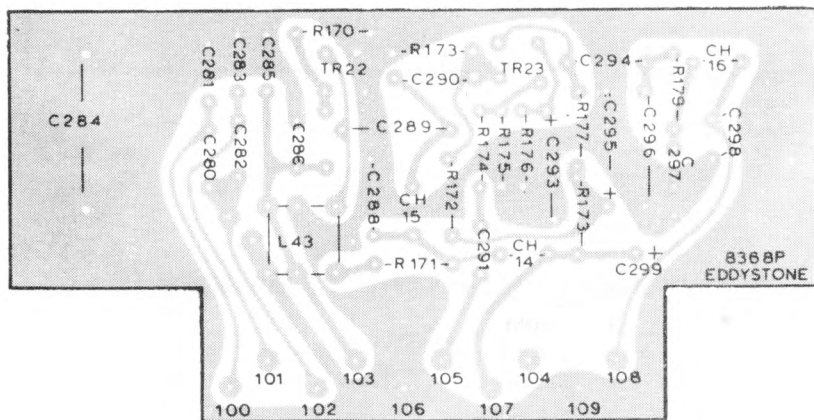


Fig. 9. CW/SSB Detector Board LP3293/11.

NB: CW/SSB Detector Board LP3293/11 was used on early receivers only.

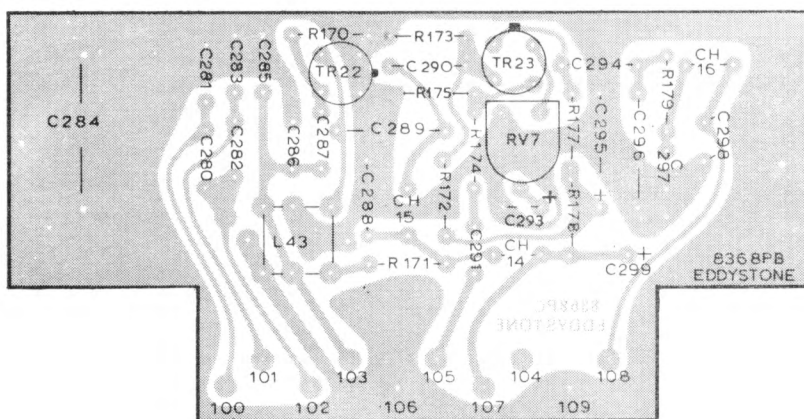


Fig. 10. CW/SSB Detector Board LP3293/11A.

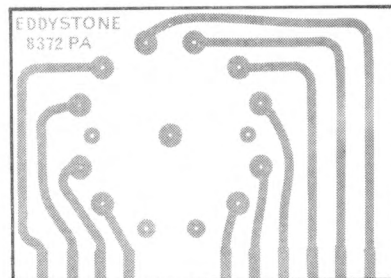
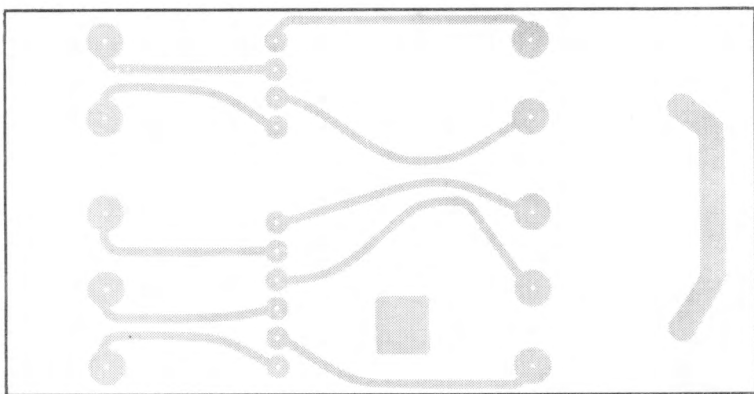
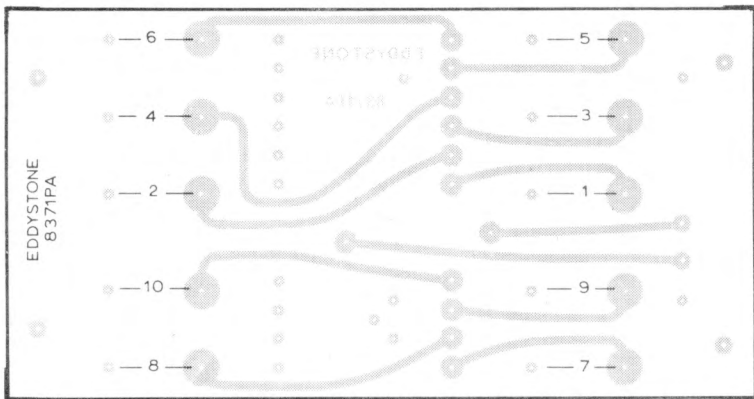


Fig. 12. Crystal Switching Board.

Fig. 11. Crystal Mounting Board.

NB: Boards in Figs. 11 and 12 are double-sided boards which are mounted to form one complete assembly. In Fig. 12, one side only shown as the other side is a mirror image.

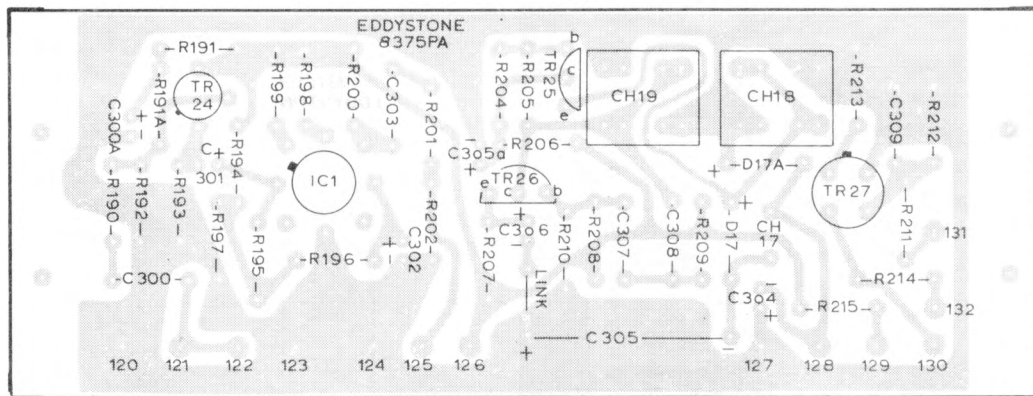


Fig. 13. N/L, Meter and Neg Supply Board LP3293/10.

NB: Resistor R214 may be mounted on side plate on early receivers.

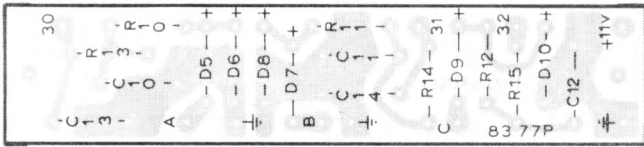


Fig. 14. Peak - RF Board
LP3293/2.

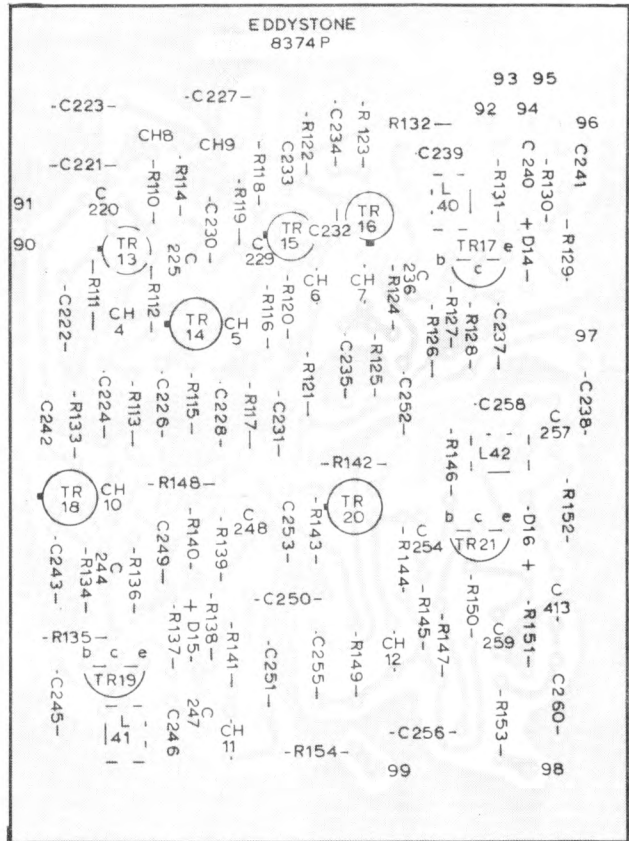


Fig. 16. 100kHz IF Amplifier Board
LP3293/9.

NB: LP3293/9 is used on Models 1830/1-4. On Models 1830/5-8, resistor R153 is changed in value and Part No. becomes LP3293/19.

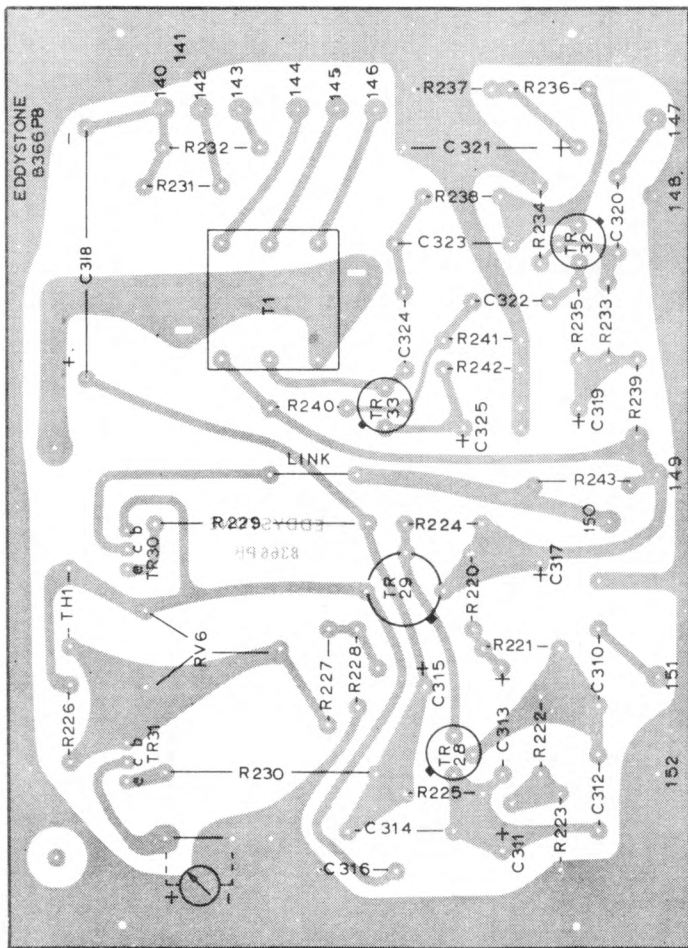


Fig. 15. Audio Amplifier Board
LP3293/12.

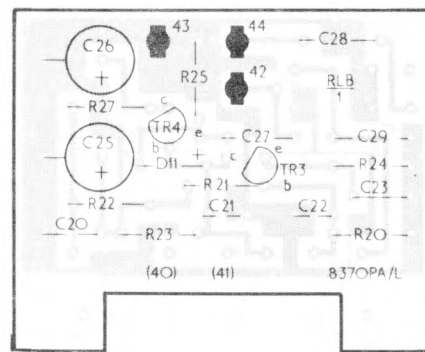


Fig. 17. Crystal Oscillator Board.

NOTES

1. PREFIX INCOMPLETE REFERENCE DESIGNATIONS WITH 2A1
2. UNLESS OTHERWISE SPECIFIED:
 - A. ALL RESISTORS ARE 1/4 WATT, ± 10% TOLERANCE
 - B. ALL RESISTANCE VALUES ARE IN OHMS. K INDICATES THOUSANDS OF OHMS
 - C. ALL DIODES ARE 1N277
 - D. ALL TRANSISTORS ARE 2N1613
 - E. ALL CAPACITANCE VALUE ARE IN PICO FARADS
3. THE LETTERS CW PLACED ADJACENT TO TERMINAL 3 OF A POTENTIOMETER INDICATES THE DIRECTION OF CLOCKWISE ROTATION WHEN VIEWED FROM THE SHAFT END. TERMINALS ARE NUMBERED IN A CCW DIRECTION AS VIEWED FROM THE KNOB ON ACTUATOR END OF CONTROL
4. INDICATES EQUIPMENT OPERATION MARKINGS (FRONT PANEL CONTROL)
5. WAFER SWITCHES S1 AND S3 ARE SHOWN IN THE EXTREME CCW POSITION AS VIEWED FROM THE KNOB END OF THE SWITCH (Sheets 3 AND 4)
6. AS SUPPLIED, TERMINALS 1 AND 2 OF TB1 ARE JUMPERED FOR OPERATION WITH 60 CPS PRIMARY POWER. IF 400 CPS PRIMARY POWER IS TO BE USED REMOVE JUMPER FROM TERMINALS 1 AND 2 AND CONNECT TERMINALS 2 AND 3
7. EARLY MODULES USED 2N1613. REPLACE WITH 2N2102
8. C2, C3 USED ON S/N 261 AND OVER, EXCEPT 271, 272, 273, 293 AND 295 (Sheet 2)
9. A5R11 AND A5R12 ARE SELECTED IN FACTORY TEST. TYPICALLY, R11 IS 3.3K AND R12 IS 2.2K (Sheet 4)
10. R9 WAS CHANGED FROM 4.7K TO 10K ON S/N 431 AND OVER (Sheet 2)
11. C4 USED ON S/N 431 AND OVER (Sheet 2)
12. FOR UNITS WITH T1 PART NO. 0902-6135 ONLY:
 - A. FOR 115 VAC OPERATION STRAP T1-1 TO T1-10 AND STRAP T1-2 TO T1-9.
 - B. FOR 230 VAC OPERATION STRAP T1-9 TO T1-10.

REFERENCES IN THIS MANUAL ARE MADE WITH RESPECT TO A PRIMARY POWER SOURCE OF 115 VAC. SOME UNITS ARE SUPPLIED WITH A 115/230 VAC PRIMARY POWER TRANSFORMER (PART NO. 0902-6135). WHEN USED WITH THE RF-130 AND AN/URT-23 TRANSMITTING SYSTEMS, THE RF-601A DERIVES ITS POWER FROM THE TRANSMITTER, WHICH IS NORMALLY 115 VAC REGARDLESS OF PRIMARY POWER. THE RF-601A SHOULD, THEREFORE, BE STRAPPED FOR 115 VAC.

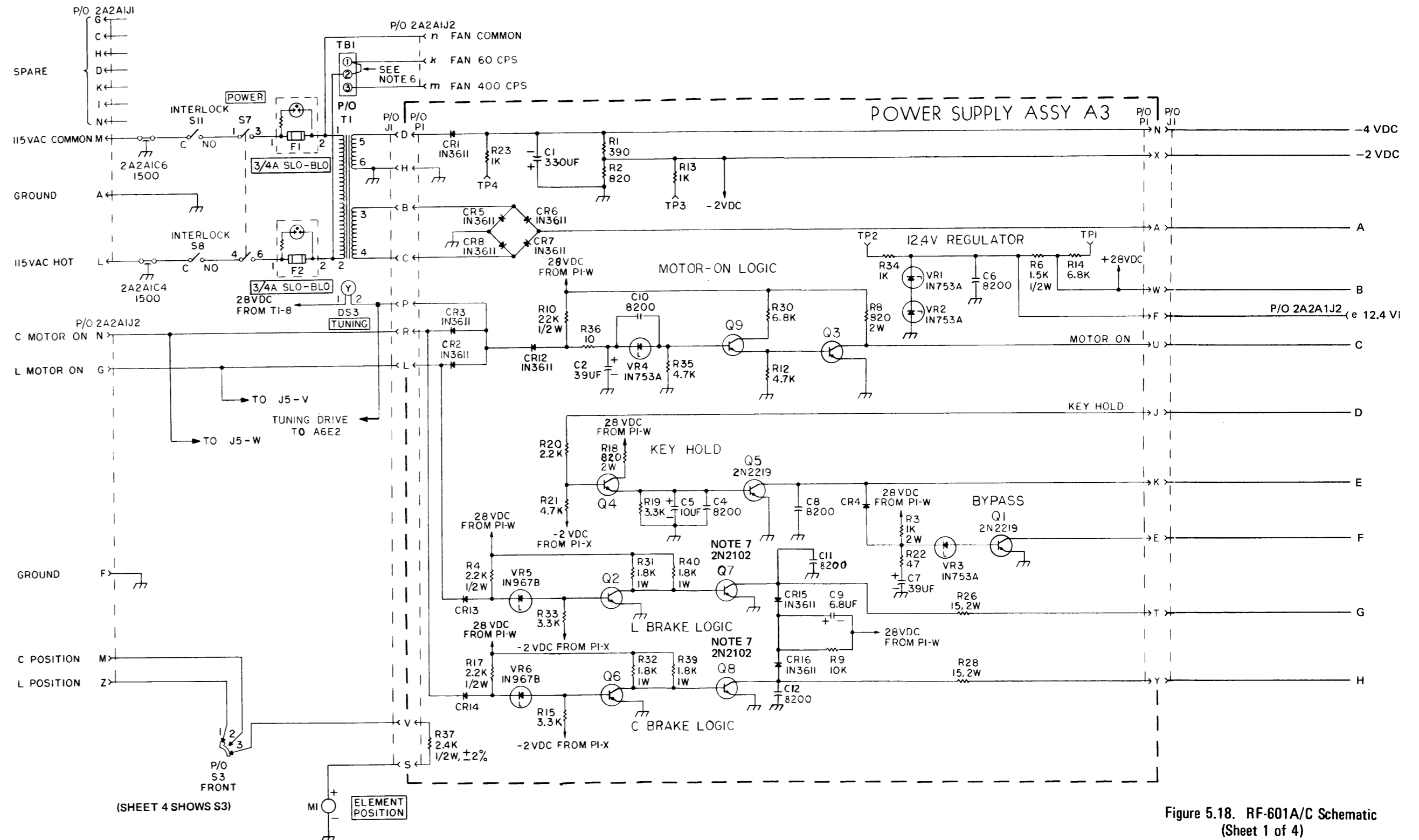
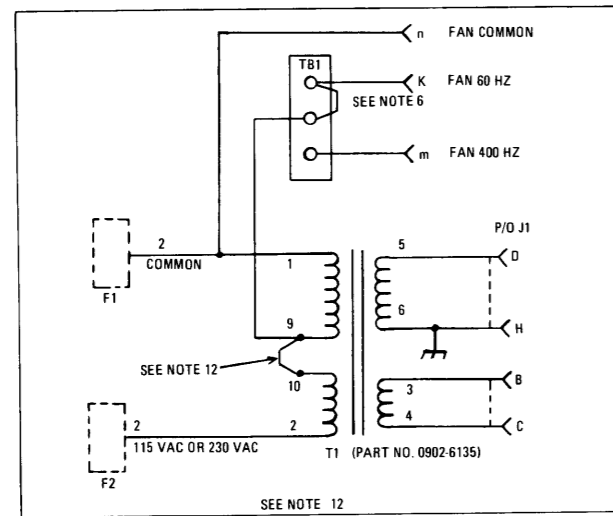
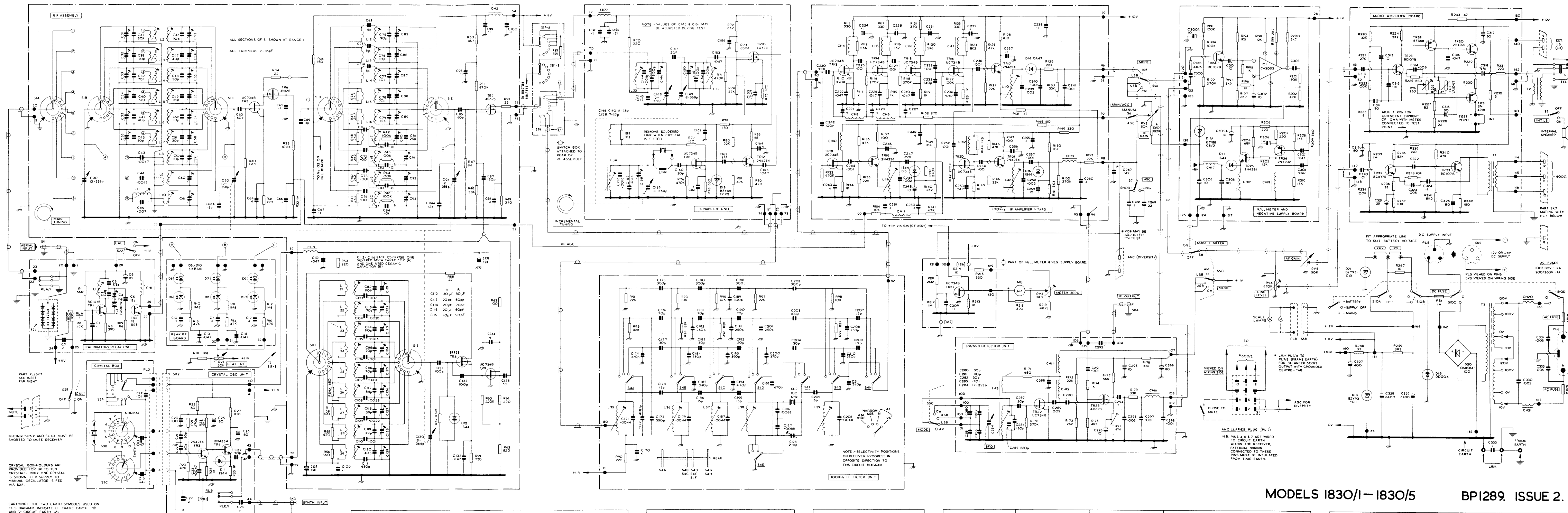


Figure 5.18. RF-601A/C Schematic (Sheet 1 of 4)



MODELS 1830/1-1830/5 BP1289, ISSUE 2.

CIRCUIT MODIFICATION RECORD

ADDITIONS	CHANGE OF VALUE	DELETIONS
<p>CB : : 0.000uF FROM CIRCUIT EARTH TO FRAME IN CALIB/RELAY UNIT.</p> <p>C244A & C254A : : 150pF FROM DRAIN TO SOURCE OF TR18 & TR20.</p> <p>R158 : : 1MΩ (NOMINAL) FROM PIN NO. 99 OF 100kHz IF AMPLIFIER BOARD TO +11V SUPPLY. MAY BE OMITTED ON SOME RECEIVERS.</p> <p>R244 : : 27KΩ IN SERIES WITH CONNECTION FROM C310 TO PIN NO. 151 (AUDIO AMPLIFIER BOARD).</p>	<p>C4 : : 6-30pF</p> <p>C5 : : 330pF</p> <p>C7 : : 120pF</p> <p>C9 : : 60pF</p> <p>C16 : : 110pF</p> <p>C48 : : 80pF</p> <p>C71 : : 40pF</p> <p>C103 : : 0.0022uF</p> <p>C157 : : 90pF</p> <p>R75 : : 220Ω</p> <p>R134 : : 330Ω</p> <p>R215 : : 3.300Ω</p>	<p>C52 (NOT FITTED ON 1830/1, 1830/2 OR 1830/5)</p>

