

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.

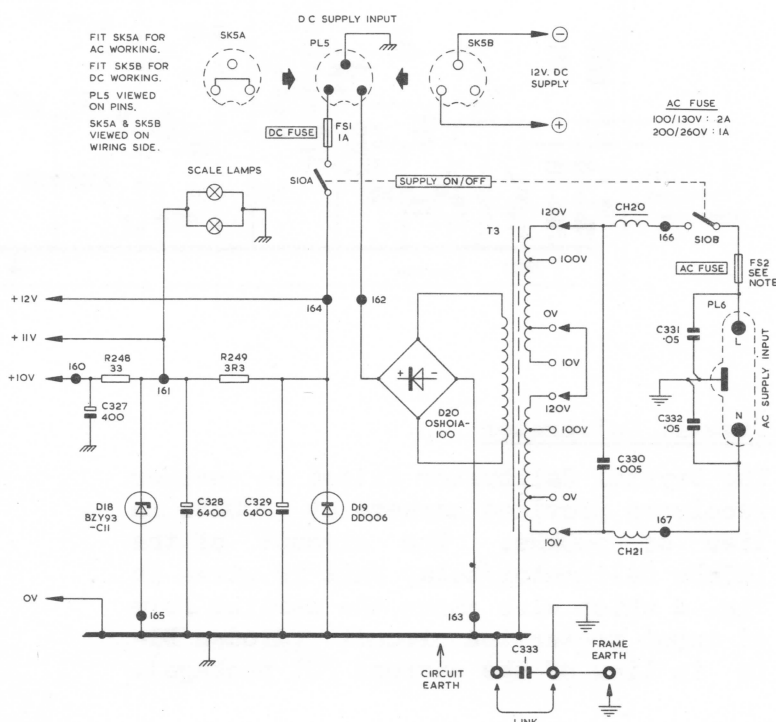


Fig. 1. Power Supply Circuit for early 1830 Series Receivers.

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.

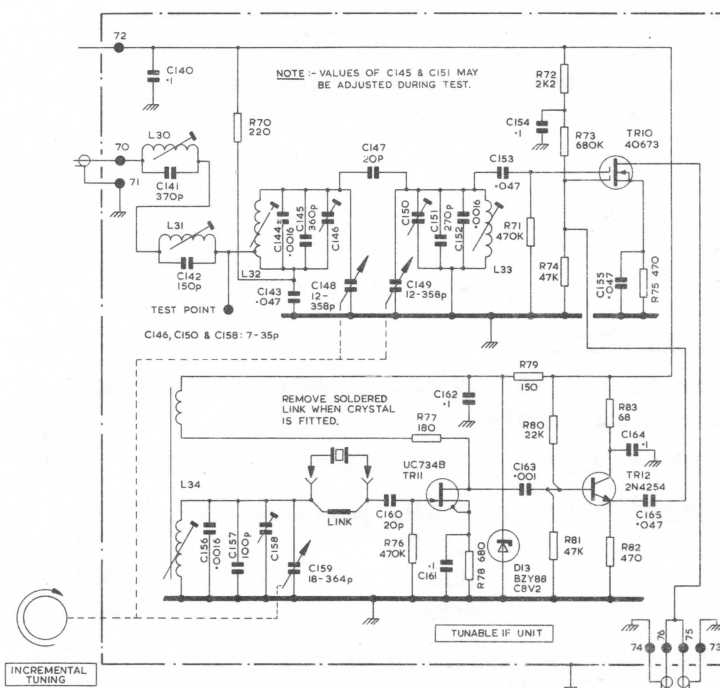


Fig. 2. Tunable IF Unit as used on early 1830 Series Receivers.

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.

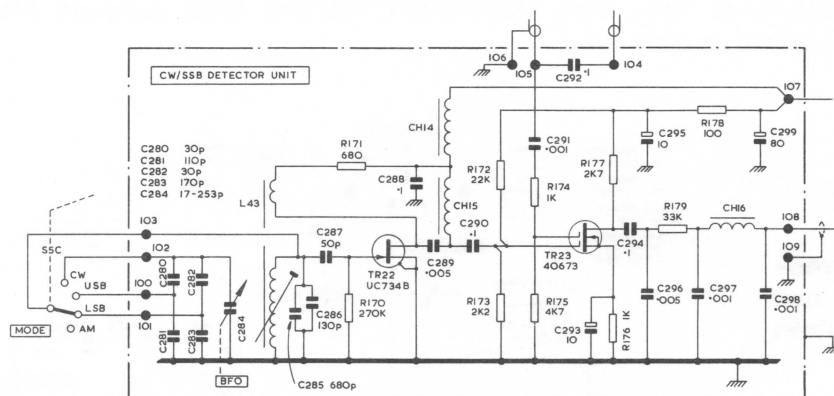


Fig. 3 Circuit of CW/SSB De-tector and BFO Unit for early 1830 Series Receivers.

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).

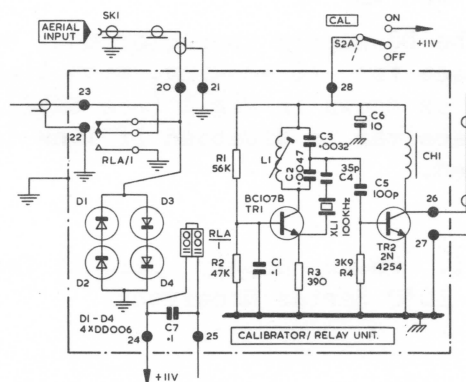


Fig. 4. 100kHz Calibrator/Relay Unit.

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(Al)' 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.

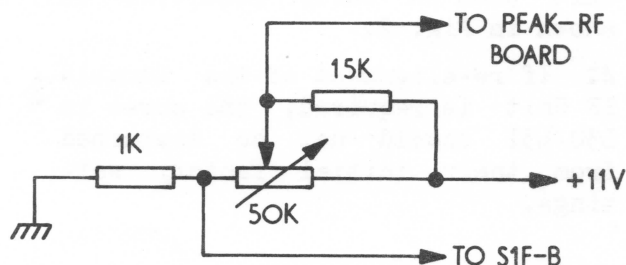


Fig. 5. Modified Peak-RF Circuit.

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).

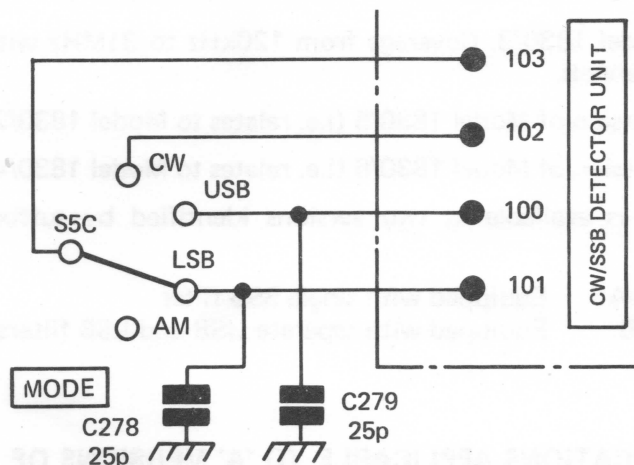


Fig. 1. Wiring Mode Switch Wafer S5C

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).

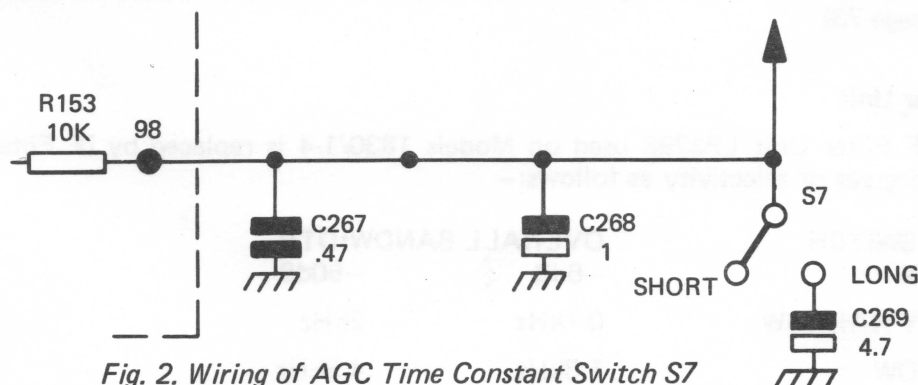


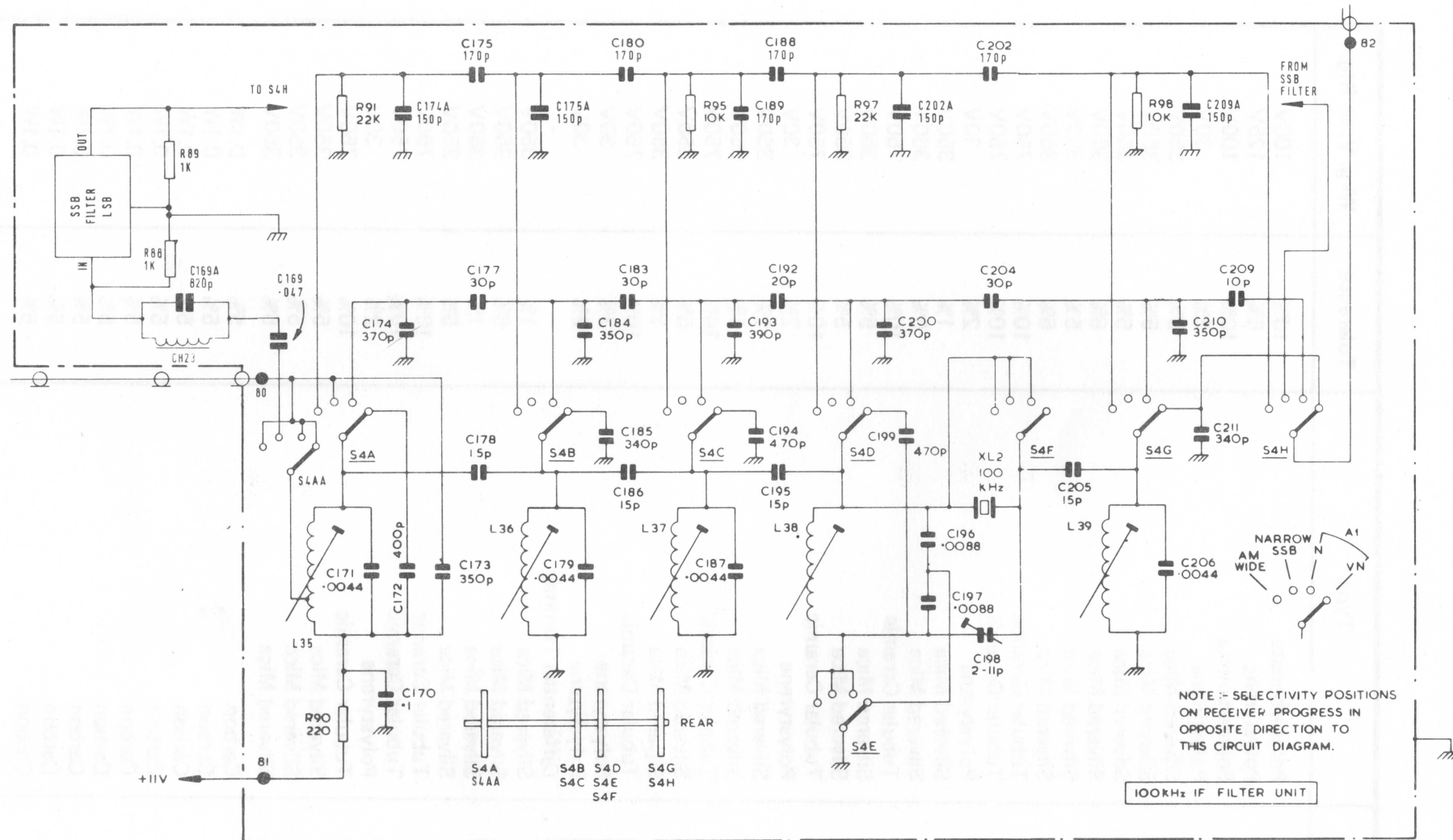
Fig. 2. Wiring of AGC Time Constant Switch S7

C267 : As on 1830/1-4

C268 : Permanently in circuit

C269 : Reduced to $4.7\mu\text{F}$

R153 : Reduced from $22,000\Omega$ to $10,000\Omega$



LIST OF COMPONENTS IS ON PAGE 70

Fig. 3. Circuit of 100kHz IF Filter Unit LP3356 used on Models 1830/5-8

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.

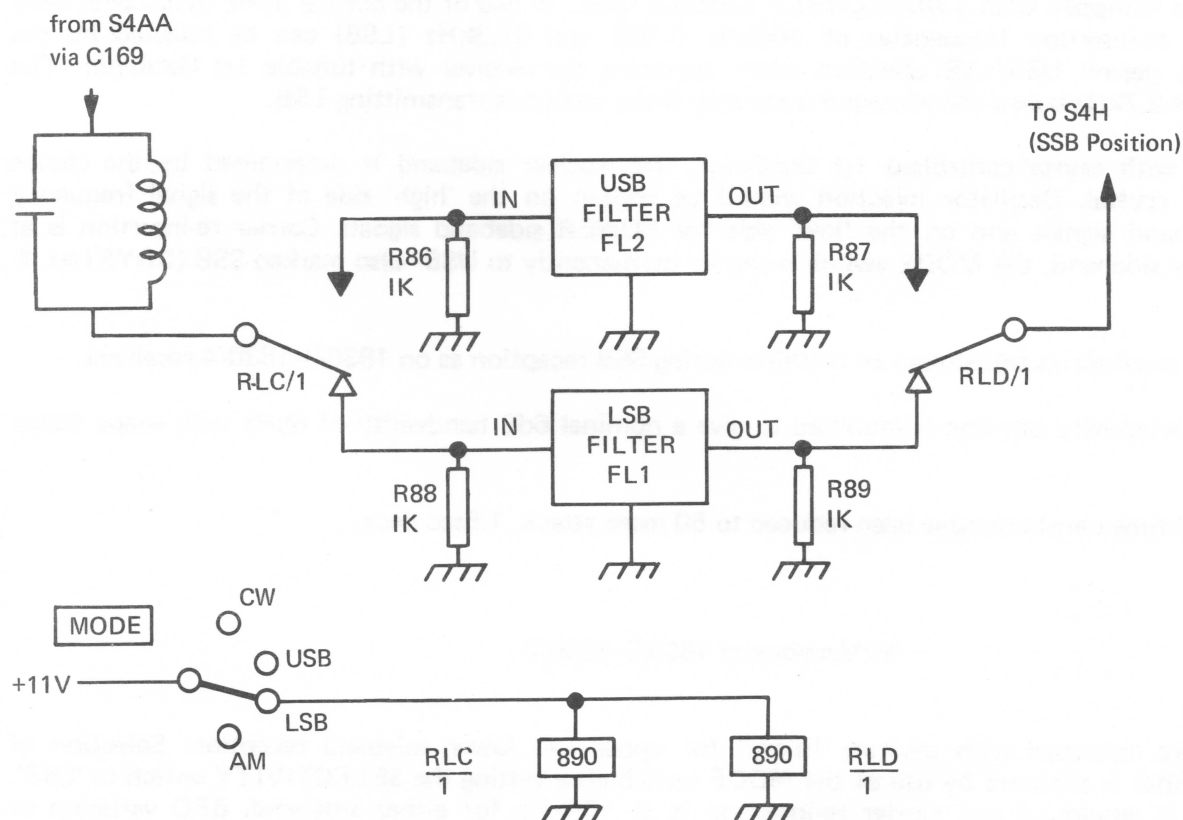


Fig. 4. USB and LSB Filter Switching

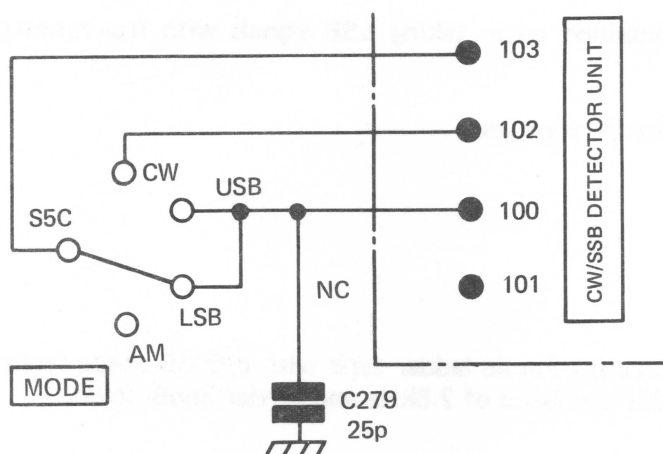


Fig. 5. Wiring Mode Switch Wafer S5C

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 $\pm 100\text{Hz}$ 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 $\pm 100\text{Hz}$ 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 asymmetrical 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.

MAINTENANCE

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 6dB 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'.

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.

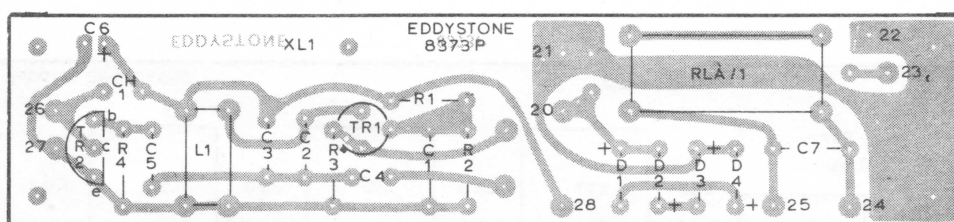


Fig. 1. 100kHz Calibrator/Relay Board LP3293/1.

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

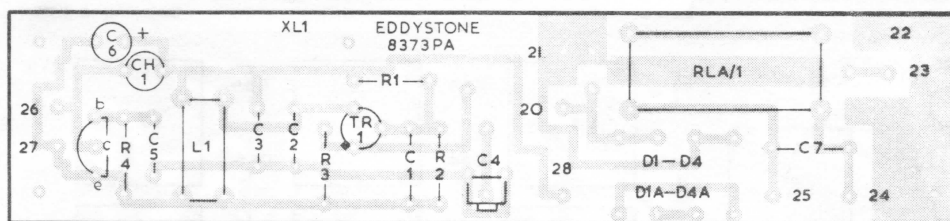


Fig. 2. 500kHz Calibrator/Relay Board LP3293/1A.

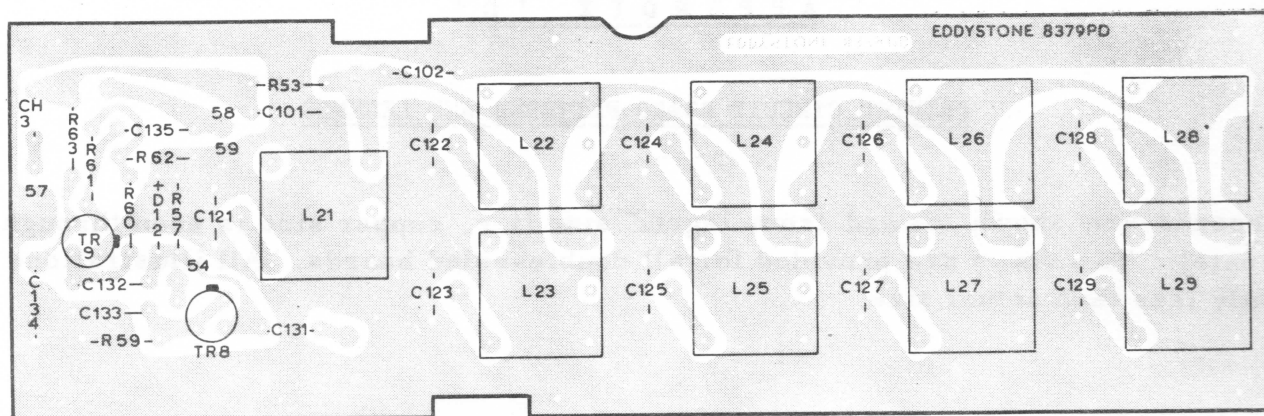


Fig. 3. Oscillator Board LP3293/6.

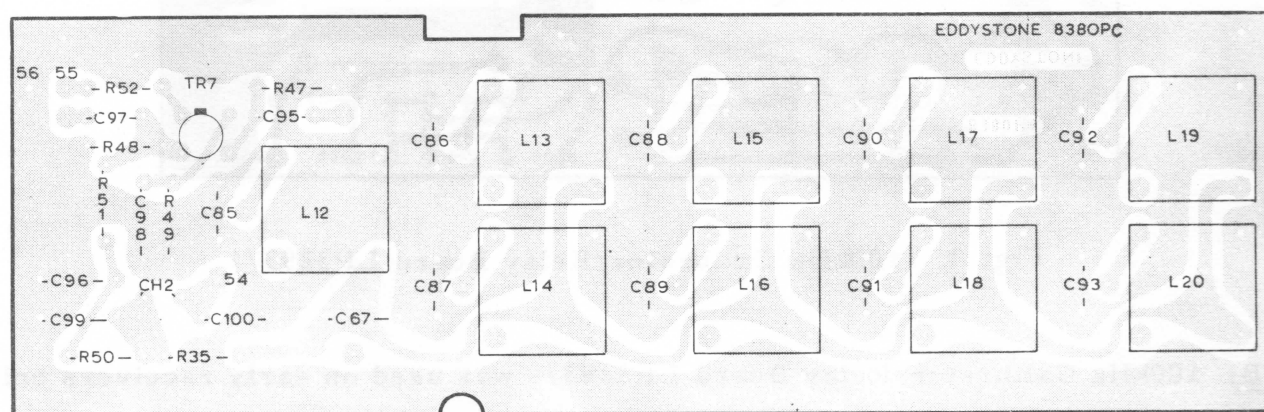


Fig. 4. Mixer Board LP3293/5.

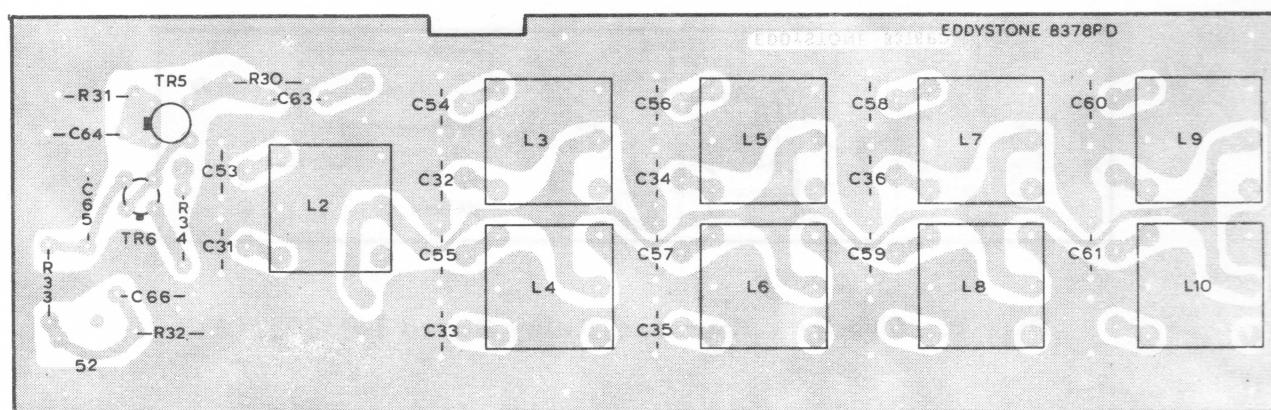


Fig. 5. RF Amplifier Board LP3293/4.

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.

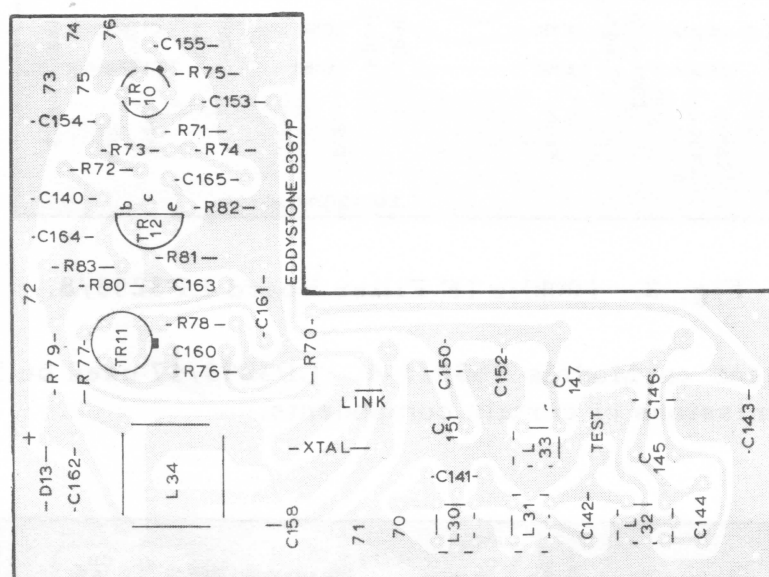


Fig. 6. Tunable IF Board LP3293/7.

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

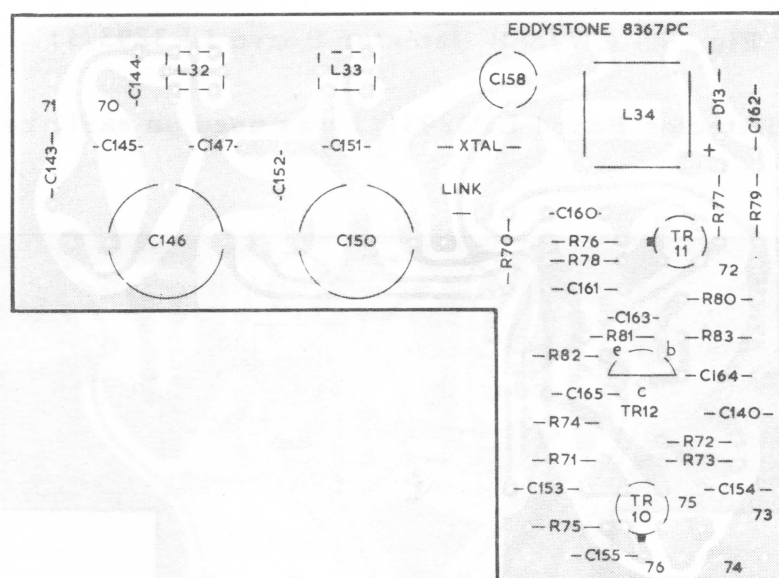


Fig. 7. Tunable IF Board LP3293/7A.

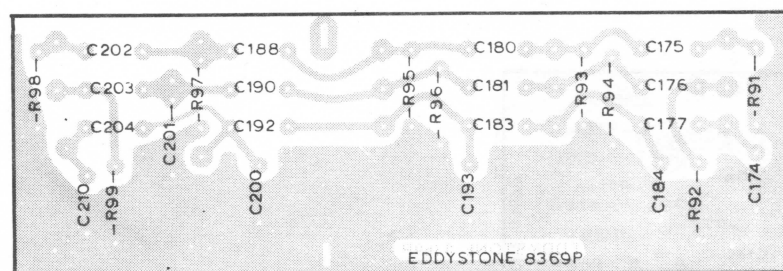


Fig. 8. 100kHz IF Filter Board LP3293/8.

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.

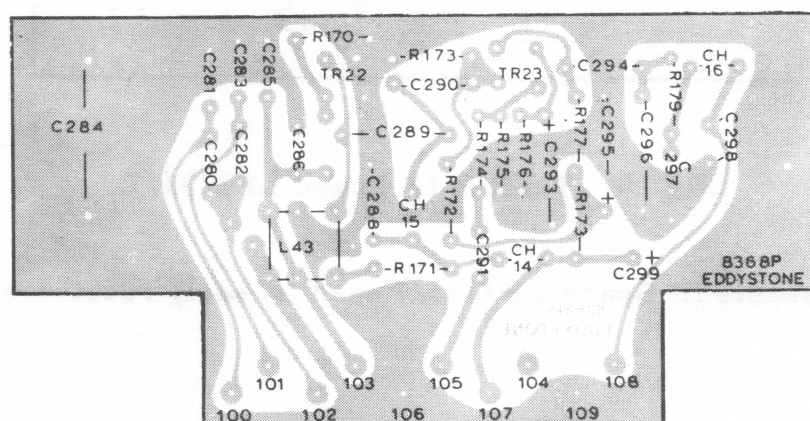


Fig. 9. CW/SSB Detector Board LP3293/11.

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

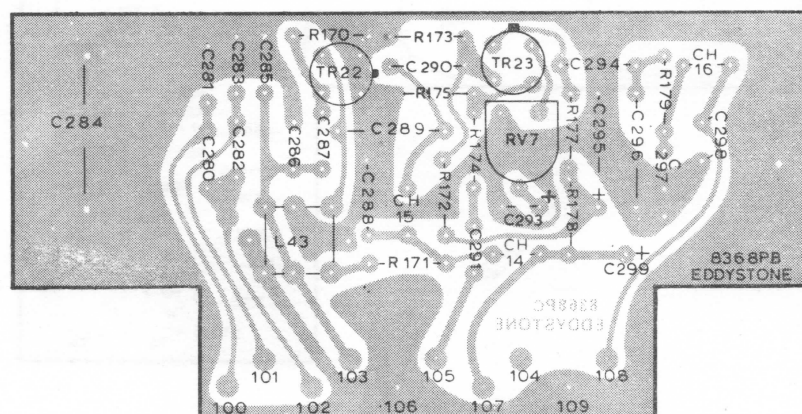


Fig. 10. CW/SSB Detector Board LP3293/11A.

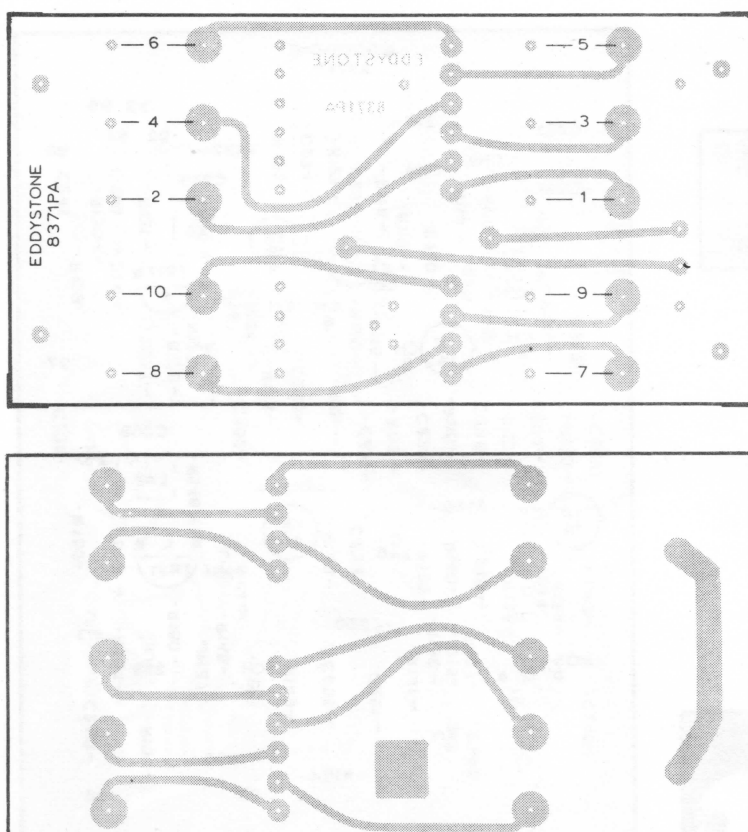


Fig. 11. Crystal Mounting Board.

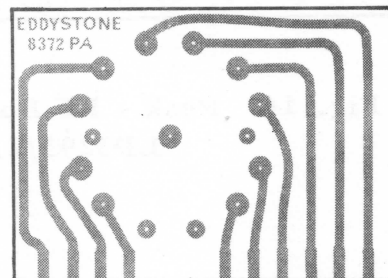


Fig. 12. Crystal Switching Board.

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.

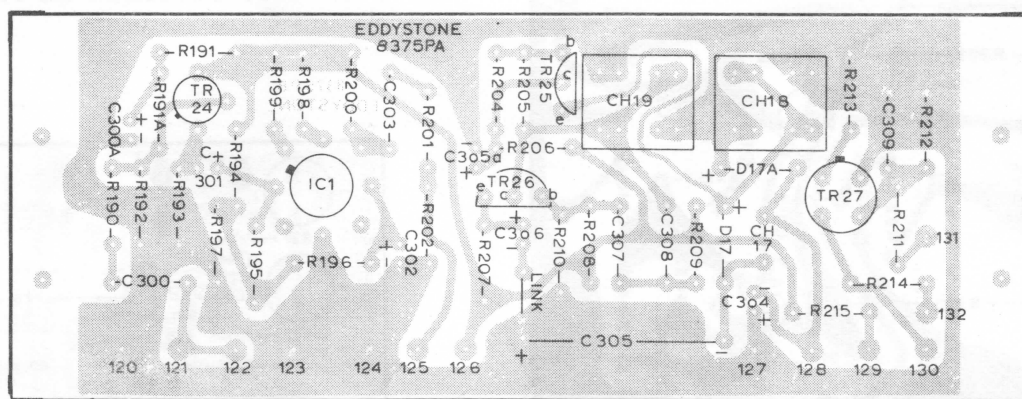


Fig. 13. N/L, Meter and Neg Supply Board LP3293/10.

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

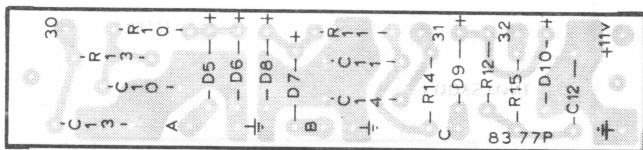


Fig. 14. Peak - RF Board
LP3293/2.

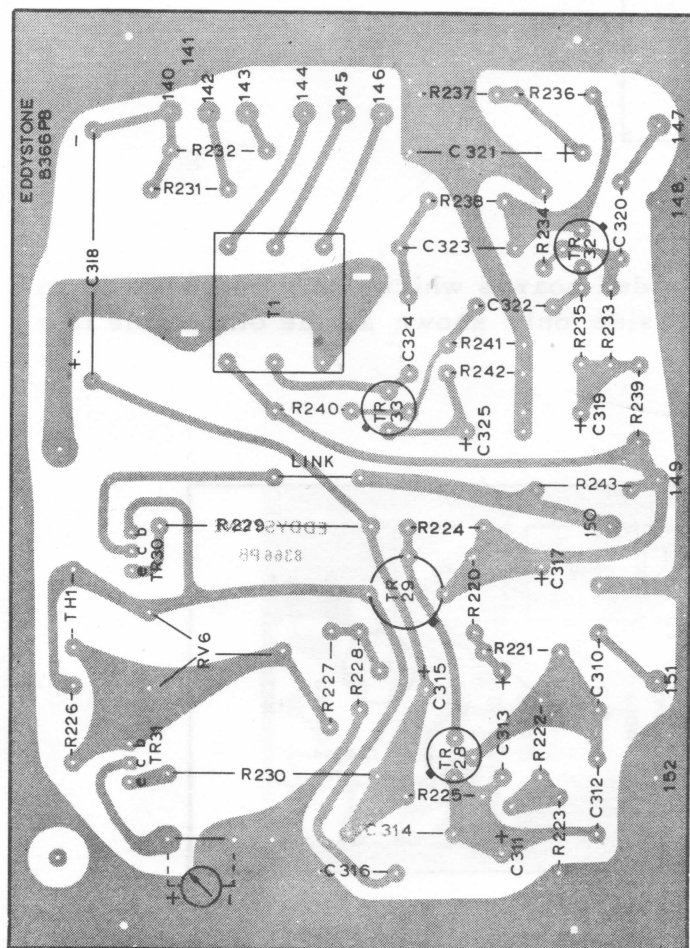


Fig. 15. Audio Amplifier Board
LP3293/12.

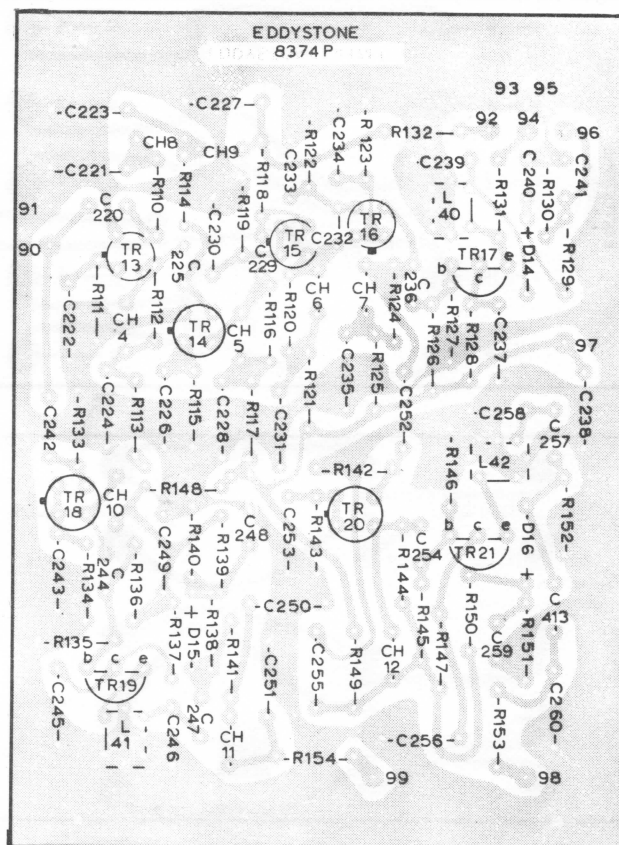


Fig. 16. 100kHz IF Amplifier Board
LP3293/9.

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.

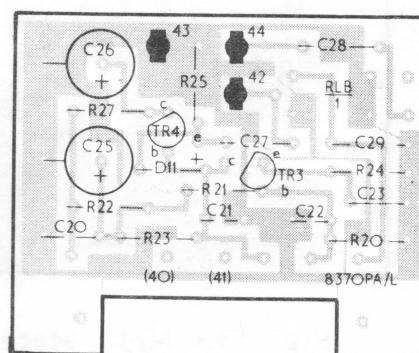


Fig. 17. Crystal Oscillator Board.