ELECTRICAL AND MECHANICAL ENGINEERING REGULATIONS
(By Command of the Army Council)

TELECOMMUNICATIONS
E 722
(Part 1)

RECEIVER, RADIO, RACAL, TYPE RA17

TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

SUBJECT INDEX

Distribution - Class 1235. Code No 4

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INTRODUCTION

1. This receiver can be supplied as a cabinet model for table use or for rack mounting in standard 19 in. racks. It is a high grade general purpose communication receiver. The electrical design is unique and is combined with a high standard of mechanical workmanship which makes the receiver suitable for vehicle installations, as well as ground stations, without impairing its performance.

2. (a) A variety of adaptors are manufactured to make the receiver suitable for a range of applications such as single sideband operation, panoramic reception and frequency shift keying (f.s.k.) in h.f. telegraph communications. The adaptors and equipments available are as follows:-

- (i) L.F. adaptor, type RA37
- (ii) S.S.B. adaptor, type RA121 (in Service use)
- (iii) Panoramic adaptor, type RA66 (in Service use)
- (iv) Frequency shift terminals, type FSW 1
- (v) Regenerative repeater, type TRRIA
- (vi) Cathode ray monitor unit, type CRMI

(b) Two receivers used in conjunction with (iv), (v) and (vi) above would make a complete terminal for dual diversity reception.

BRIEF DESCRIPTION

Principles of operation
(Fig 2001)

3. The aerial is coupled to the r.f. amplifier through a low-pass filter (0-30Mc/s). The r.f. amplifier can be switched for wide band untuned operation or tuned operation over six bands. The aerial loading of 75Ω (unbalanced) is designed for optimum performance when the input is tuned.

4. The r.f. amplifier is coupled to the first mixer M1 by another 0-30Mc/s low pass-filter and the input signal is mixed with the output from the variable frequency oscillator v.f.o.1 (MC/S TUNING). This oscillator has a frequency range of 40.5-69.5Mc/s and the mixing produces the first intermediate frequency of 40Mc/s ±650kc/s.

The first i.f. tuned circuits are eight sections forming a comprehensive band-pass filter and according to the setting of v.f.o.1 any spectrum of signals 1Mc/s wide in the range 0.98-30Mc/s can be mixed in M1 to produce an output acceptable to the band-pass filter.

5. The output from v.f.o.1 is also mixed with harmonics from a 1Mc/s crystal oscillator in a harmonic mixer M4. This mixing produces an output at 37.5Mc/s which is amplified and passed through another band-pass filter with a handwidth of 300kc/s. This mixing process restricts the setting of v.f.o.1 to steps of 1Mc/s in order to produce an output acceptable to the 37.5Mc/s filter and amplifier.

6. The first i.f. from the 40Mc/s filter is mixed with the 37.5Mc/s from M4 in the second mixer M2 to produce an output between 2 and 3Mc/s. This is the second i.f. which is passed to mixer M3. This mixer is preceded by a tunable band-pass filter network which is ganged with the tuning of the second variable oscillator v.f.o.2 (2.1-3.1Mc/s) and the mixing process produces the final i.f. of 100kc/s. The final i.f. amplifier sections include crystal lattice and l.f. filters providing six alternative bandwidths.

7. These are followed by a conventional a.f. stage with facilities for metering the output.

8. Separate signal and a.v.c. diodes are employed and alternative time-constants give optimum conditions for telegraphy and telephony reception. An additional i.f. amplifier is incorporated to give an independent output of 100kc/s.

9. A calibrator unit controlled by the 1Mc/s crystal provides outputs at 100kc/s intervals for checking v.f.o.2 (KC/S TUNING).

Power supplies

10. The power supply unit is conventional and operates from 45-65c/s a.c. mains of 100-125 and 200-250V. The power consumption of the receiver is approximately 85W.

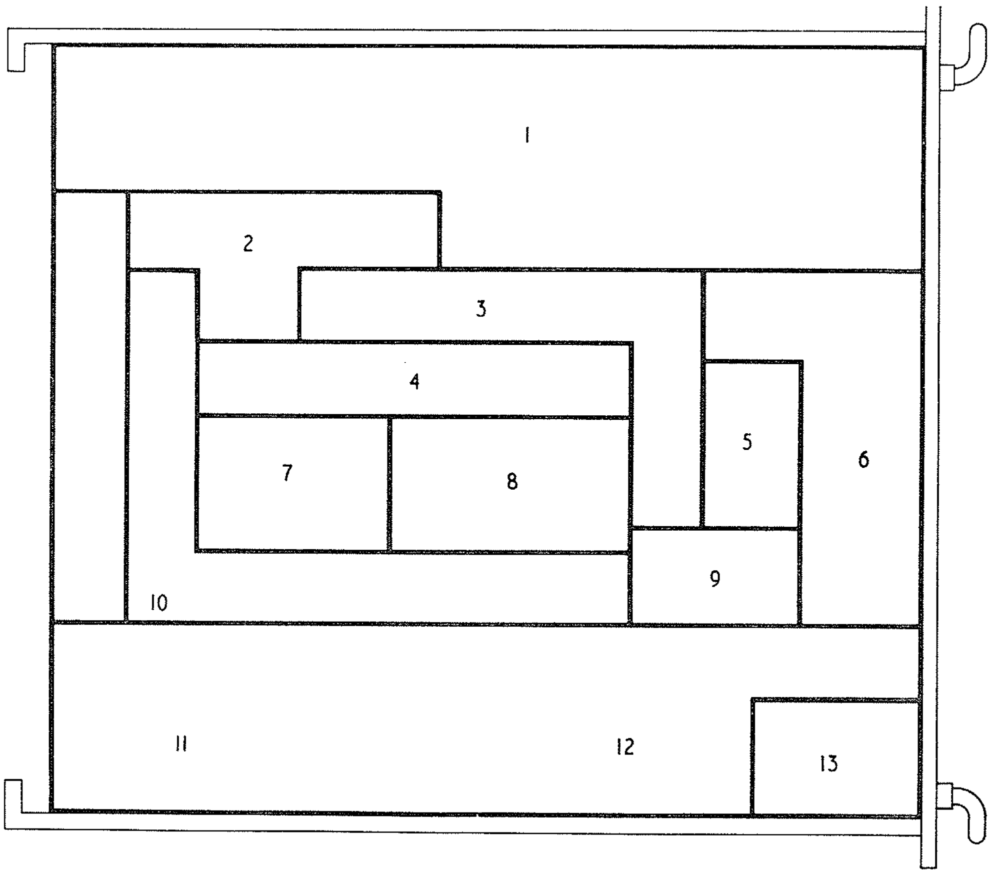
Construction

11. (a) The receiver comprises a main chassis assembly on which the following sub-units are mounted:-

(i) First variable frequency oscillator v.f.o.1
(ii) Second variable frequency oscillator v.f.o.2
(iii) 100kc/s i.f. strip
(iv) B.F.O.
(v) Calibrator unit

(b) Connection from sub-units to the main chassis is by coaxial cable, plugs and sockets and a minimum of soldered connections.

12. The main chassis is of cast aluminium construction with integral screening ribs separating stages, see Fig 1. Individual screening covers are provided for sections 2, 3, 10 and 13 and one cover screens sections 4, 7 and 8. These covers are in addition to the cover plate which screens completely the underside of the chassis.



1. 100Kc/s IF
2. SECOND MIXER
3. 40Mc/s IF
4. HARMONIC FILTER
5. FIRST VFO SUPPLY FILTER
6. SYSTEM COMPARTMENT
7. CRYSTAL OSCILLATOR AND HARMONIC GENERATOR
8. HARMONIC MIXER AND 37·5Mc/s AMPLIFIER
9. SUPPLY FILTER FOR 7 & 8
10. 37·5Mc/s BAND PASS FILTER
11. POWER SUPPLIES
12. AUDIO STAGES
13. AERIAL ATTENUATOR

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1082/30

Fig 1 - Under chassis layout

13. The sub-units are assembled on their own individual chassis and mounted on top of the main chassis. V.F.O.1 and v.f.o.2 chassis are of cast aluminium and the 100kc/s i.f. strip, b.f.o. and calibrator chassis are of aluminium plate. Each sub-unit can be calibrated individually before final assembly.

Controls

14. The layout of the controls on the front panel is shown in Fig 2 and the function of each is given in Table 1.

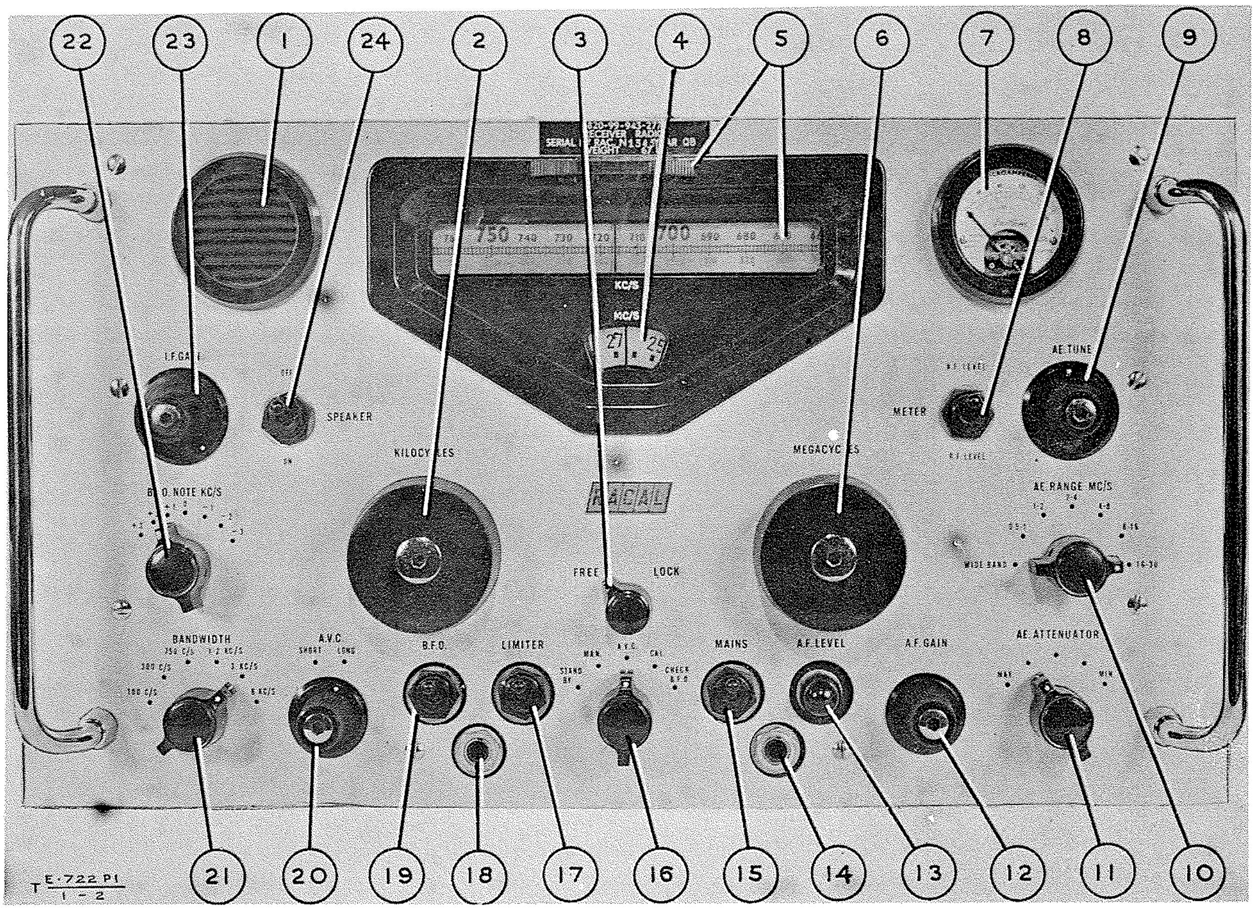

Fig 2 - Front panel controls

Table 1 - Front panel controls

Key ref (Fig 2)	Control etc	Circuit ref	Function
1	Loudspeaker	-	Monitoring on h.f. communication networks
2	KILOCYCLES	C123, 126, 129 & 139	Tunes through a range of 1.0Mc/s above that which is set up by the MEGACYCLES control.
3	FREE/LOCK	-	Locks the tuning mechanism (MEGACYCLES and KILOCYCLES)

Table 1 - (cont)

Key ref (Fig 2)	Control etc	Circuit ref	Function
4	MC/S scale	-	Indicates the megacycle band being covered. (Engraved in Mc/s steps)
5	Kc/s scale and cursor adjustment	-	Indicates the number of kc/s above each Mc/s step set up on the MC/S scale. The adjustable cursor allows for periodical calibration against an internal crystal.
6	MEGACYCLES	C76	For setting the 1.0Mc/s band to be covered between 0-30Mc/s
7	METER	M1	Indicates the signal diode current or the a.f. output level to the 10mW 600Ω line.
8	A.F./R.F. LEVEL	SJ	Switches the meter for the conditions given in 7 above.
9	AE. TUNE	C18	For tuning the input to the first r.f. stage.
10	AE. RANGE MC/S	SB	For selecting the appropriate coil for tuned input
11	AE. ATTENUATOR	SA	Introduces up to 40dB attenuation to avoid overloading of the early stages of the receiver.
12	A.F. GAIN	RV2	Controls the output to (a) Internal loudspeaker (b) Phone jacks (14 and 18) (c) 50mW 3Ω line (d) Three separate 3mW 600Ω lines
13	A.F. LEVEL	RV3	Preset control for setting the output to the 10mW 600Ω line
14) 18)	Phone jacks	JK1 JK2	
15	MAINS	SK	Two pole switch in the primary of the mains transformer.
16	System switch	SE1-SE3	Controls the receiver system for STANDBY manual gain (MAN), A.V.C., crystal calibration (CAL) and CHECK B.F.O.

Table 1 - (cont)

Key ref (Fig 2)	Control etc	Circuit ref	Function
17	LIMITER	SH	Switches the noise limiter into circuit.
19	B.F.O.	SG	Switches in the b.f.o.
20	A.V.C. SHORT/LONG	SF	Selects either long or short a.v.c. time constants to compensate for different fading characteristics.
21	BANDWIDTH		Controls the i.f. bandwidth as follows:-
		SC	100c/s) 300c/s) Crystal filter 750c/s)
		SD	1.2kc/s) 3.0kc/s) LC filter 8.0kc/s)
22	B.F.O. NOTE KC/S	C200	Varies the pitch of the c.w. beat note (±3kc/s)
23	I.F. GAIN	RV1	Varies the gain of the 100kc/s i.f. amplifier by adjusting the negative potential on the a.v.c. line
24	SPEAKER OFF/ON	SL	In the OFF position a 10Ω load is inserted across the output transformer.

DETAILED TECHNICAL DESCRIPTION (Fig 2501)

R.F. amplifier

15. A 75Ω unbalanced aerial source is connected to the r.f. amplifier input through a three-section 0-30Mc/s low-pass filter and an attenuator of approximately 40dB. The attenuator is switched; step one is 13dB and the rest are 8dB ±2dB. The input to the amplifier can be untuned ie wide band, or tuned to any of six frequency bands by coils L4-L9 and C18 which is the aerial tuning (A.E. TUNE) capacitor. C18 is switched out of circuit in the WIDE BAND position. The valve used for the r.f. amplifier is a high gain low noise pentode which ensures sufficient gain over the frequency range covered. Adequate cathode decoupling over the range is ensured by capacitors C40, C41, C49 and C57.

16. The output from the r.f. amplifier is coupled via another 0-30Mc/s low-pass filter (Fig 2503b) and C74 to the grid of the first mixer V7. L27, C47 and R28 constitute the first L half-section of the filter which has a considerably flat response over the frequency range. The output impedance of the filter is 680Ω and

the input capacitance of V7 forms the required capacitance to earth between L15 and L17 to complete the filter network. No adjustment of this capacitance is provided since its value is not critical.

First v.f.o. (v.f.o.1)

17. V.F.O.1, V5, is a cathode-coupled Hartley oscillator which can be turned continuously over the range 40.5-69.5Mc/s by C76. The aluminium core of L36 and trimming capacitor C77 provide for initial alignment. The variable capacitance C76 is coupled to the MC/S dial which is calibrated 0-29Mc/s and is the band-setting dial.

18. The anode load of V5 is provided by L20 which is wound on a 470Ω resistor R18. The oscillator is coupled to the first mixer V7 and the harmonic mixer V4 via C85 and C42 respectively. If V5 is changed the calibration of the band-setting dial may be affected and adjustment should be made by C77 with the dial set at 29Mc/s.

First mixer (V7)

19. The output of the 0-30Mc/s low-pass filter and v.f.o.1 are mixed in V7 to provide first intermediate frequency of 40Mc/s ±650kc/s. This signal is fed to a 40Mc/s band-pass filter (see Fig 2503b) consisting of eight over-coupled tuned circuits. This filter has a passband of 650kc/s, centred on 40Mc/s.

Crystal oscillator (V1) and harmonic generator(V2)

20. V1 is a Colpitts oscillator which can be set precisely to 1Mc/s by the adjustment of trimmer C2. L2 and C9-C11 form a tuned anode circuit which is adjusted to 1Mc/s by means of a iron-dust core. The output is fed to the harmonic generator V2 via C8 and also to the coaxial plugs PL2, PL3 and PL3A.

21. V2 is operated in a non-linear state, the time constant of C8 and R13 producing a suitable bias. The screen grid is not de-coupled. The valve generates strong harmonics of the 1Mc/s fundamental and they are fed to an 0-32Mc/s low-pass filter which prevents harmonics other than those required from reaching the harmonic mixer V4. Some control over the cut-off frequency is provided by trimmer C7, across L13, which is adjusted to equalize the output from the filter at the harmonic frequencies corresponding to 28 and 29Mc/s on the band-setting dial.

Harmonic mixer (V4)

22. The output from v.f.o.1 para 17, and from the harmonic generator, are mixed in V4 by applying 1Mc/s harmonics to the suppressor grid and the v.f.o.1 output to the control grid. The anode load consisting of L28 and C50 is tuned to 37.5Mc/s by the iron-dust core of L28, therefore mixing of the v.f.o.1 output and 1Mc/s harmonics will only produce an output from V4 at every 1Mc/s step of v.f.o.1 from 40.5-69.5Mc/s, eg 40.5 from v.f.o.1 mixes with the 3rd harmonic from the crystal oscillator to produce 37.5Mc/s, or 53.5Mc/s mixes with the 16th harmonic to produce 37.5Mc/s.

37.5Mc/s amplifier, V6, V8 and V10

23. The harmonic mixer is followed by a three stage 37.5Mc/s amplifier, the second stage being coupled to the third stage via a 37.5Mc/s band-pass filter (Fig 2503b). The anode load of V6 is a parallel tuned circuit formed by L33 and C67. The anode load of V8 is formed by the first section of the band-pass filter ie L24, C24 and C25.

24. The filter consists of eight under-coupled circuits in cascade and has a band-width of 300kc/s to allow for drift in v.f.o.1. The high attenuation of frequencies outside the passband prevents spurious signals from reaching the second mixer V9.

25. The output from V10 is passed to V9 via C107 together with the first i.f. of 40Mc/s ±650kc/s, from the 40Mc/s band-pass filter. To prevent interaction between the 40Mc/s band-pass filter and the 37.5Mc/s tuned circuit L50-C113, and to enable either circuit to be adjusted without affecting the other, a balancing circuit is included which is shown simplified in Fig 3.

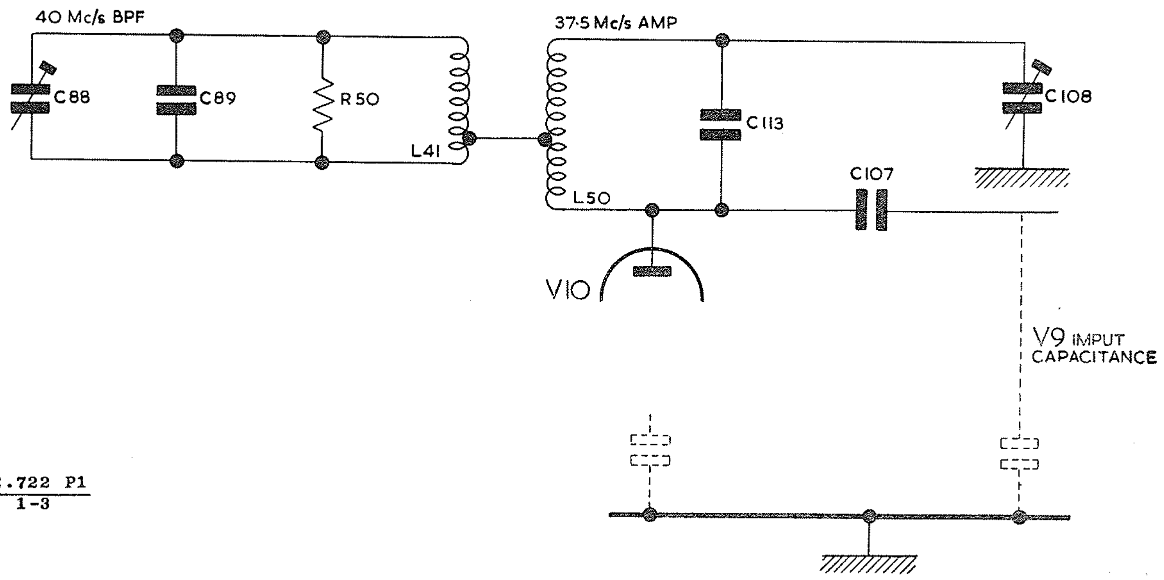

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Fig 3 - Balance circuit - simplified

The 40Mc/s signal is introduced into the 37.5Mc/s tuned circuit at a point of zero r.f. potential since L50 is centre tapped and C108 is adjusted to be equal to the total of the capacitances of V10 anode to earth, C107 and the input capacitance of V9. The anode load of V10 (L50-C113) is adjusted to 37.5Mc/s by the iron-dust core in L50. The balancing circuit is not affected if V9 or V10 is changed.

Second mixer (V9)

26. This mixer produces the second intermediate frequency of 2-3Mc/s by mixing the output from the 40Mc/s band-pass filter with the 37.5Mc/s signal from V10. The anode choke L51 and the series tuned circuit formed by C116 and L52 (37.5Mc/s) remove the 37.5Mc/s, and other h.f. components, so that only the second i.f. is passed to the 2-3Mc/s band-pass circuit preceding the third mixer V11.

27. As stated previously, the pass-bands of the 40Mc/s and 37.5Mc/s filters are ±650kc/s and ±150kc/s respectively. Any drift in v.f.o.1 within the limits of the 37.5Mc/s band-pass filter, will not affect the tunable second intermediate frequency of 2-3Mc/s because the outputs of the two filters will be altered in the same sense and to the same extent. To clarify this, some examples of dial settings and intermediate frequencies corresponding to various incoming signals are shown in Table 2. (It will be seen that the low frequency end of the tunable i.f. corresponds to the highest setting of the KC/S tuning scale). The resetting accuracy and stability of the receiver can be seen to be of a very high order.

Table 2 - Typical dial settings and frequencies

MC/S dial	KC/S scale	Signal freq Mc/s	V.F.O.1. (Mc/s)	Crystal harmonic	1st i.f. (Mc/s)	V10 output	2nd i.f. (Mc/s)
4	1000	5.0	44.5	7th	39.5	37.5	2.0
4	1000	5.0	44.6	7th	39.6	37.6	2.0
5	0	5.0	45.5	8th	40.5	37.5	3.0
5	0	5.0	45.4	8th	40.4	37.4	3.0
18	600	18.6	58.5	21st	39.9	37.5	2.4

Third mixer (V11)

28. (a) The output from V9 is fed to V11 via a tunable band-pass circuit, which is ganged with the second variable frequency oscillator v.f.o.2, and consists of three sections as follows:-

- (i) Inductance L59 and capacitors C129, C128 and C127.
- (ii) Inductance L58 connected in series with coupling coil L60 and capacitors C126, C124 and C125.
- (iii) Inductance L57 and capacitors C123, C121 and C122.

(b) L59 in the first section is tapped to provide an input connection from the coaxial plug PL5 so that the 2-3Mc/s low impedance output of the l.f. adaptor, type RA37 may be connected.

29. The filter is directly coupled to the signal grid of V11, the output from v.f.o.2 (2.1-3.1Mc/s) being fed via C143 to the oscillator grid with R68 forming the d.c. path for this grid. The mixing process produces the final intermediate frequency of 100kc/s which is fed via coaxial plug PL6 and socket SKT6 to the crystal filter.

Second variable frequency oscillator (v.f.o.2)

30. The second variable frequency oscillator (v.f.o.2) is an electron coupled Hartley circuit, the frequency determining components being L55, C137, C136 and variable capacitor C139. L55 is adjusted by ferrite core during manufacture, and sealed C139 is ganged with the three variable capacitors in the 2-3Mc/s tunable band-pass circuit. This 4-gang capacitor is coupled with the KC/S film scale, which is calibrated from 0-1000kc/s.

100kc/s i.f. filters
(Fig 2503b)

31. (a) In the 100kc/s intermediate frequency stages a crystal filter and LC filter are employed. Six alternative bandwidths are available as follows:-

100c/s) 300c/s) 750c/s)	Crystal filter	1.2kc/s) 3.0kc/s) 8.0kc/s)	LC filter

(b) In the crystal positions the third mixer (V11) anode is connected to L48 in the crystal filter unit. L47 and L49 provide a balanced output which is tuned by capacitors C109 and C110. In the 100c/s position the balanced output is connected through crystals XL2 and XL5 to the first tuned section of the 100kc/s LC filter and C118 is a preset phasing control for this bandwidth. XL3, XL6, C119 and XL4,XL7, C120 form similar circuits for 300c/s and 750c/s respectively.

32. In the three LC bandwidth positions the crystals are by-passed and the anode of V11 is connected direct to the first tuned section of the LC filter. The first tuned section then acts as the anode load, and coupling to the second, third and fourth sections are inductive. Damping resistors are included in the fourth section. These are R86, 87 and 88 according to the bandwidth in use. In the LC bandwidth positions the output is taken from a capacitive divider formed by C161 and C161A with C170 to equalize the gains in the LC and crystal positions. The bandwidth is determined by the degree of coupling between each section in addition to the damping resistors in the final stage. Capacitor C175 in the final stage is included to compensate for the effective reduction of the input capacitance of V14, appearing across the tuned circuit when switching from crystal to LC positions.

33. To maintain the input capacitance of the LC filter, in the crystal positions, C148 is switched into circuit. This is adjusted to be equal to the output capacitance of V11 and the coaxial cable. Note that damping resistors R77 and R80 are only connected during filter alignment.

100kc/s amplifiers

34. The output from the LC filter is passed through coupling capacitance C164 to V14. The grid of V14 is returned via R96 to the a.v.c. line. This stage is coupled to the second stage, V16, and the auxiliary i.f. amplifier V17 by a transformer with an over-coupled characteristic. The control grids of V16 and V17 are returned to the a.v.c. line via L73 and L74. L77, the primary of the transformer in the anode of V16, is heavily damped by R112 and the secondary, L78 and L79, by R120A.

35. V17 is an auxiliary i.f. amplifier with the output taken to coaxial plugs on the rear of the chassis. The auto transformer L76 provides a 70Ω output.

Detector and noise limiter (V21)

36. The low potential end of L79 is connected through an RC filter, comprising C209, R128, C210, R129 and C211, to the signal diode load R130. When the meter M1 is switched to RF LEVEL it indicates the detector diode current. Resistor R131 is included to complete the detector circuit when the meter is switched to AF LEVEL.

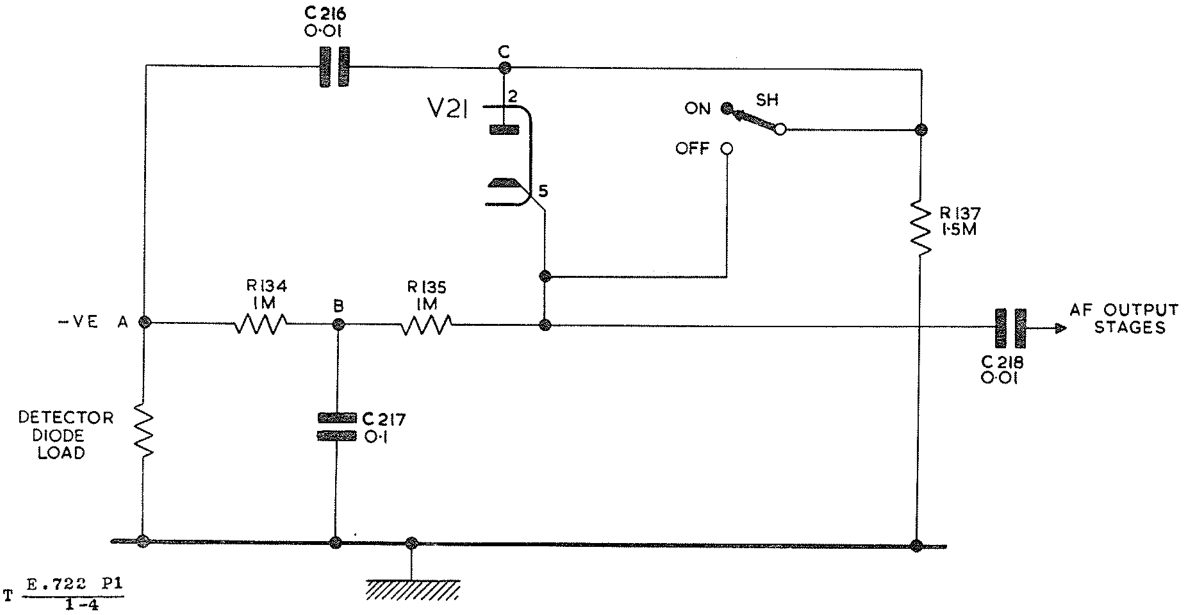

Fig 4 - Noise limiter

37. The noise limiter section of V21 (pins 2 and 5) is connected in a series circuit to operate at approximately 30% modulation. Its operation can be followed by reference to Fig 4. The d.c. path from point A is through R134, R135, the diode and R137. The a.f. signal path from the detector diode load is through C216, the diode and C218 when SH is open. In the presence of a signal a negative potential varying with the depth of modulation will be developed at point A thus causing the diode to conduct. The negative potential at B will be lower than that at A and will be maintained at a constant level due to the long timeconstant of R134 and C217. R135 allows the cathode potential to vary in sympathy with the modulation, provided the modulation depth does not exceed 30%.

38. The potential appearing at the cathode of the noise limiter diode therefore consists of a steady negative potential with the modulation superimposed. When noise impulses corresponding to high modulation peaks appear at point A, and via C216 at point C, the voltage across the diode changes sign thereby causing the diode to stop conducting and open the a.f. signal path. SH renders the limiter inoperative.

A.V.C. and time-constant diodes (V18)

39. The signal appearing at the anode of V16 is passed through coupling capacitor C193 to the anode (pin 7) of the a.v.c. diode. The diode load is R116. A positive potential derived from R120, R121, and R122, supplies the required a.v.c. delay voltage to the cathode of this diode. When the a.v.c. switch is in the SHORT position and the system switch is set to a position where the a.v.c. is operative, ie A.V.C., CAL or CHECK B.F.O., the anode of the a.v.c. diode is connected to the a.v.c. line via L81 and R127. The choke L81 is tuned by C203 to a frequency slightly below 100kc/s so that it presents a small capacitance at 100kc/s, thus R127 is prevented from shunting the diode load. When the A.V.C. switch is in the LONG position the a.v.c. de-coupling capacitors C182 and C173 are charged through R127, the time-constant

diode and R119. When the signal level falls, the capacitors C182 and C173 discharge through R119, R118, R127 and L81 into the diode load resistor R116. The a.v.c. potential is brought out via R123 to the tag strip at the rear of the receiver for external use if required. With the system switch set to the MANUAL position, the a.v.c. line is connected to the I.F.GAIN control RV1, thus the gain of the 100kc/s amplifiers may be varied by adjusting the negative potential applied to the a.v.c. line.

System switch

40. With the h.t. adaptor terminals linked the following conditions exist for each setting of the system switch:-

(a) STANDBY - SE1 disconnects the h.t. from all stages and connects R119A across the h.t. as a compensating load.

(b) MANUAL
- (i) In this position h.t. is connected through SE1 and one section of SE3 to all stages of the receiver except the calibrator unit.
- (ii) When the b.f.o. is switched on, by SG, h.t. is connected to it via one section of SE2.
- (iii) The a.v.o. line is disconnected from the a.v.c. diode by the second section of SE2 and connected to the I.F. GAIN control RV1 by the second section of SE3.

(c) A.V.C. In addition to (b) (i) and (b) (ii) above SE3 renders the I.F. GAIN control inoperative and SE2 connects the a.v.c. line to the a.v.c. diode.

(d) CAL. In this position h.t. is connected to the calibrator unit by SE1 and disconnected from V3, V5, V7, V9, V10 and the b.f.o. The I.F. GAIN is still inoperative in this position and the a.v.c. line is connected to the a.v.c. diode.

(e) CHECK B.F.O.
- (i) As in (d) above except that h.t. is applied to the b.f.o.
- (ii) The I.F. GAIN control is rendered inoperative by SE3 and the a.v.c. line is connected to the a.v.c. diode by SE2.

Audio output stages

41. Two audio frequency output stages are provided. These are V22 and V23. Audio frequencies are applied to V22 via the (A.F. GAIN) control RV2. The output transformer T2 provides four separate outputs as follows:-

(a) 50mW into 3Ω

(b) 3 outputs of 3mW into 600Ω

42. Headphone jacks JK1 and JK2 and the internal monitor loudspeaker are connected across the 3Ω winding. The loudspeaker may be switched out of circuit by switch SL. A 10Ω dummy load is provided in the speaker OFF position of the switch.

43. Audio frequencies are also applied to V23 via the A.F. LEVEL control RV3 and the output transformer T3 provides a 10mW output at 600Ω for connection to landlines. RV3 is a preset control but is accessible through the front panel. A bridge rectifier MR1 is connected across the output of T3 via R142 and R143 to enable the output to be monitored on the built in meter when switch SJ is in the A.F. LEVEL position.

Beat frequency oscillator

44. An electron-coupled Hartley circuit is employed for the b.f.o. (V19). The frequency of the b.f.o. is determined by a fixed inductor L82 and a variable capacitor C200 in parallel with C202 and trimmer capacitor C201. The trimmer is adjusted to produce an output frequency of exactly 100kc/s when the variable control C200 is set to zero. The b.f.o. output is coupled to the diode detector anode via capacitor C215. H.T. is applied to the b.f.o. via switch SG except when the system switch is in the CAL or STANDBY positions.

Crystal calibrator

45. The calibrator is controlled by the 1.0Mc/s crystal oscillator V1. It feeds signals at 100kc/s intervals to the signal grid of the third mixer stage V11 to provide calibration check points.

46. The 1.0Mc/s signal is fed via PL2 and SKT2 to the first grid of V13. The anode load of V13 consists of a 100kc/s tuned circuit (L70, C167). The anode is coupled to the control grid of V15 through C168. V15 acts as a frequency multiplier and the anode load consisting of L75 and C177 is tuned to 900kc/s, the ninth harmonic of the input. V15 is coupled back to the third grid of V13 via C178. The difference frequency of 100kc/s relative to the 1.0Mc/s input from the crystal appears across L70 and C167 and is coupled via L69 to the third grid of mixer V11. The crystal-controlled regenerative circuit of the calibrator is self-maintaining.

Power supplies

47. The power supply is conventional, employing a capacity input filter, and provides 240V h.t. supply. A 165Ω resistor R124 is connected between the negative line of the power supply and earth thus providing 25V negative d.c. supply for gain control purposes. The resistor R136 has been included to limit the peak current of V20 to a safe value. All valve heaters and the scale illuminating lamp are supplied from one 6.3V 7.0A winding. The mains transformer T1 has input taps at 0, 5, 0, 110, 125, 210, 230 and 250V.

Note: The next page is Page 1001

R E S T R I C T E D

Fig 2001 - Receiver block diagram

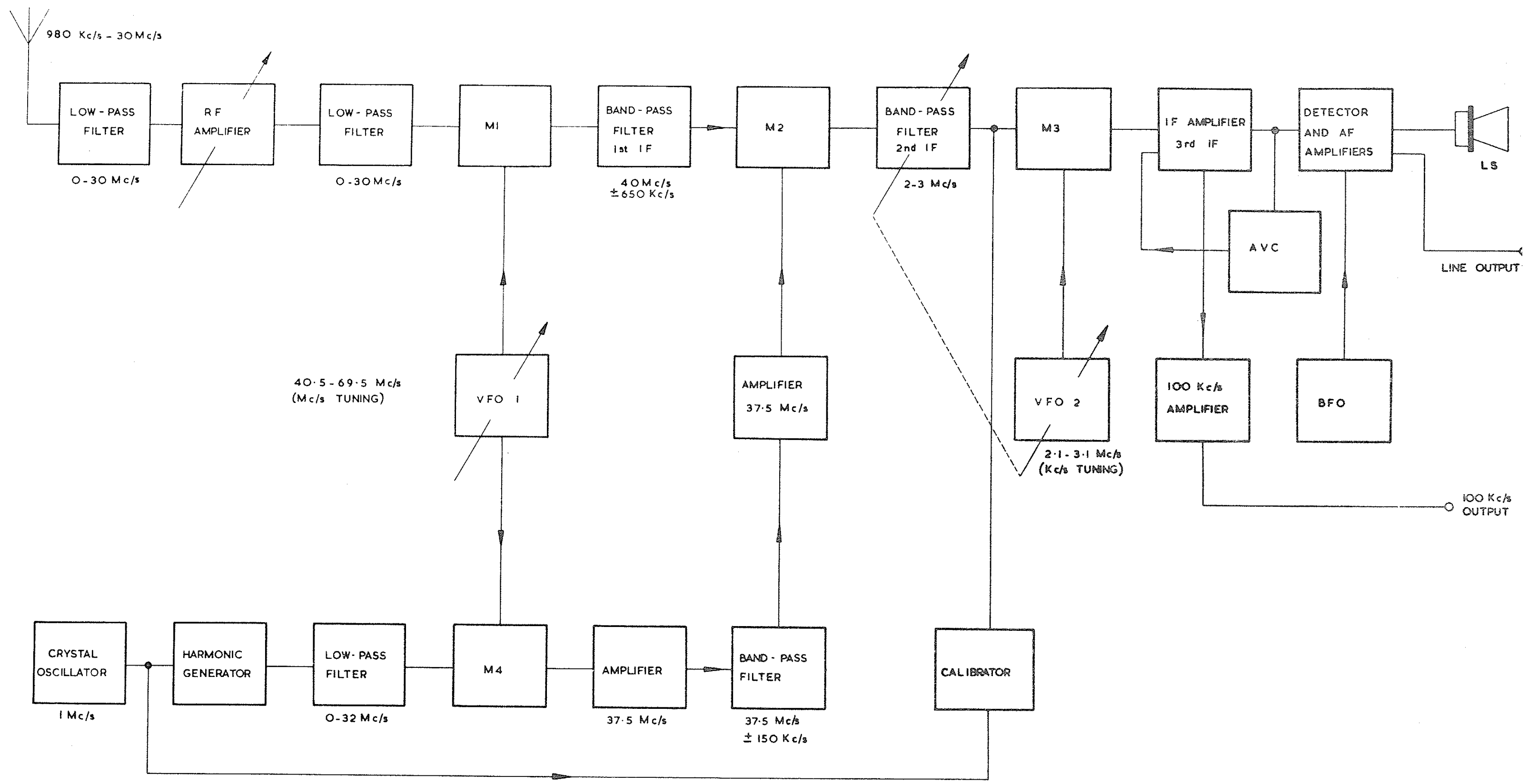

Fig 2001 - Receiver block diagram

END of Part 1