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

TELECOMMUNICATIONS
F 752

STATION, RADIO, 119B

TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

There will be no Tels F 753, F 754 or F 758 published in this series. This regulation contains the technical description, setting up procedure, circuit diagrams and general repair data.

SUBJECT INDEX

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INTRODUCTION

1. The SR119B is an h.f. station operating in the frequency range of 1.5 to 20Mc/s and designed mainly for c.w. operation. The station is designed to work from a.c. mains 110 to 240V, 50c/s or a 6V accumulator, and is normally used with a half wave end fed antenna. The station consists of four units comprising:-

(a) Transmitter

(b) Receiver

(c) Power supply unit

(d) Cases, spare parts

2. When in use the transmitter, receiver and power supply unit are interconnected with short flexible connectors.

BRIEF TECHNICAL DESCRIPTION

Transmitter

3. The transmitter is crystal controlled and employs two stages; a crystal oscillator-doubler and a power amplifier. The frequency range of 1.5 to 20Mc/s is covered in the six bands listed in Table 1.

Band	Frequency range (Mc/s)
1	1.5 - 2.3
2	2.3 - 3.5
3	3.5 - 5.5
4	5.5 - 8.5
5	8.5 - 13
6	13 - 20

Table 1 - Transmitter frequency ranges

4. A built-in morse key is included but provision has also been made for external keying. Although designed mainly for c.w. operation a small number of transmitters have been modified for telephony.

5. Details of the panel layout and controls are shown in Fig 1.

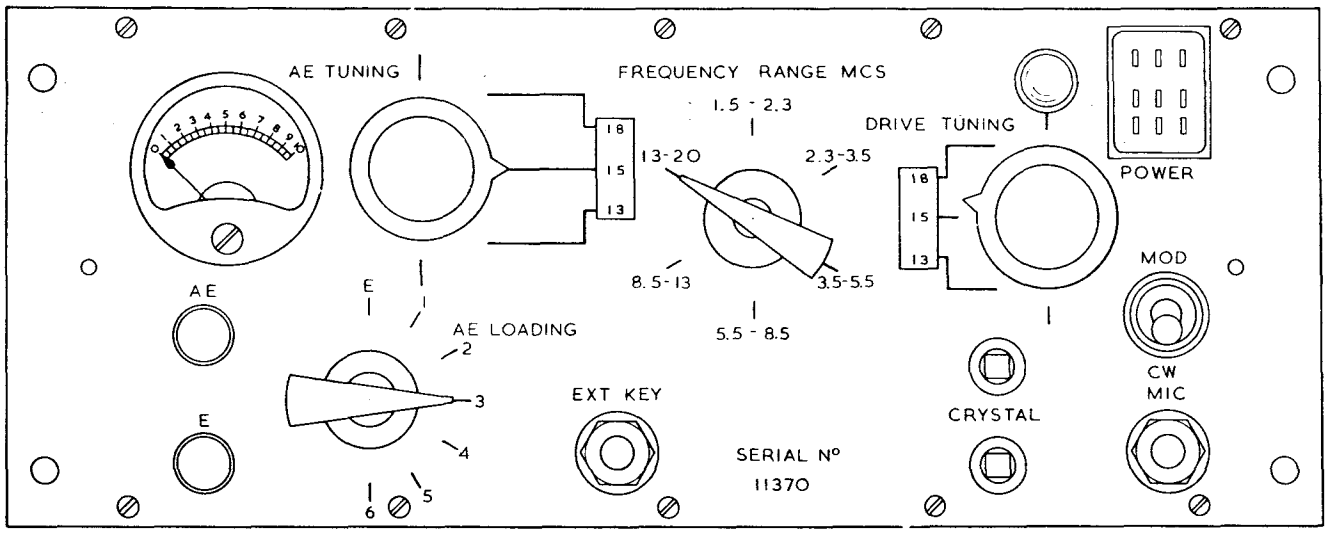

Fig 1 - Transmitter panel controls (119 R.T.)

Receiver

6. The receiver is a conventional super-heterodyne. An r.f. amplifier is followed by a pentode mixer stage with a separate triode-connected oscillator. The resultant i.f. is amplified and then applied to a valve diode which combines the functions of detector and a.v.c. rectifier. The audio output is amplified by an output pentode and the rectified d.c., after filtering, is applied as a.g.c. to the r.f., and i.f. amplifiers. (In later models of receivers the valve diode has been replaced by a semi-conductor). A triode-connected pentode beat oscillator is employed for the reception of c.w. signals.

7. The receiver covers the frequency range of 0.5 to 20Mc/s in five bands as shown in Table 2.

Band	Frequency range (Mc/s)
1	0.5 - 1.05
2	1.05 - 2.2
3	2.2 - 4.7
4	4.7 -10.0
5	10.0 -20.0

Table 2 - Receiver frequency ranges

8. Details of the panel layout and controls are shown in Fig 2.

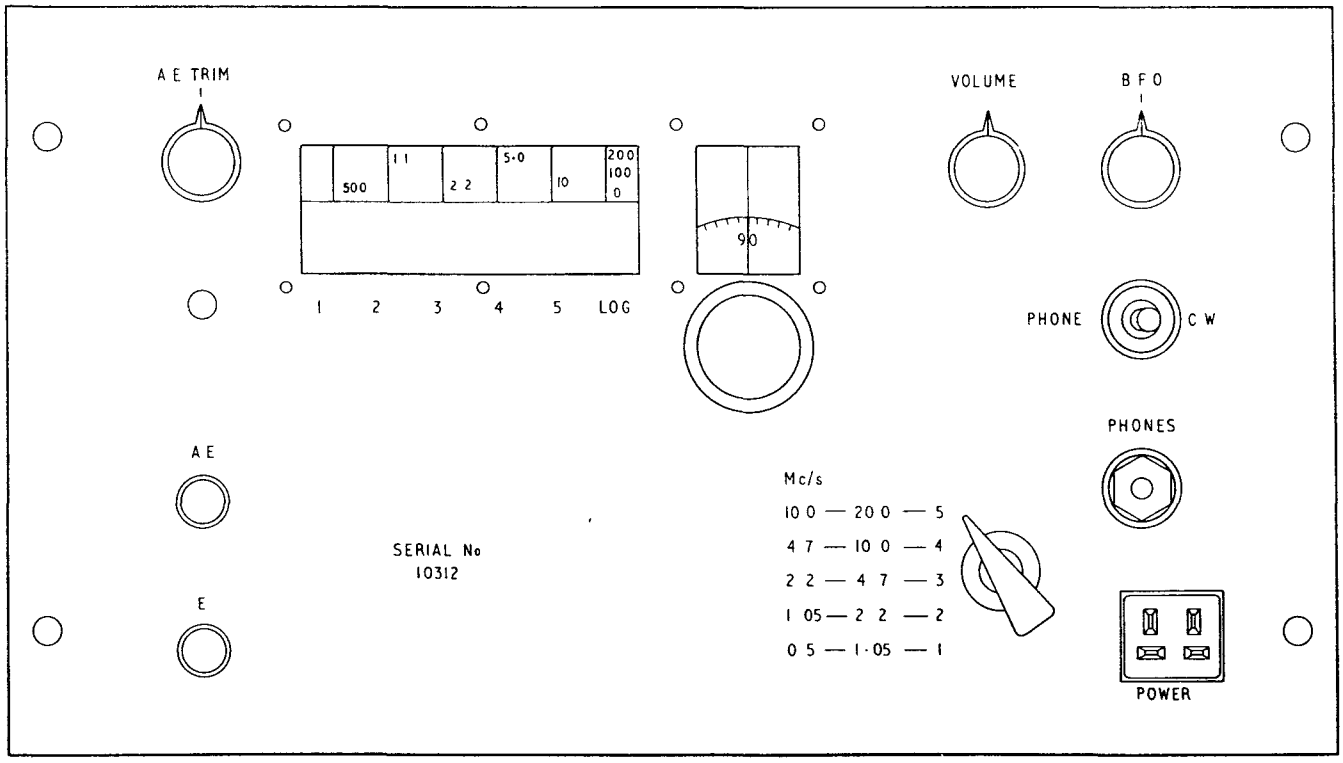

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Fig 2 - Receiver panel controls

Power supply unit

9. The power supply unit is designed for a.c. mains and 6V battery operation. The power transformer primary winding is tapped for 110 to 240V a.c. and has two secondary windings. One supplies h.t., the other is used for the valve heaters, battery charging and as a primary in conjunction with a vibrator for operating from a 6V battery. The unit supplies both transmitter and receiver and incorporates the transmit/receive switch for changing the h.t. supply and antenna from one to the other.

10. The panel layout and controls of the power supply unit are shown in Fig 3.

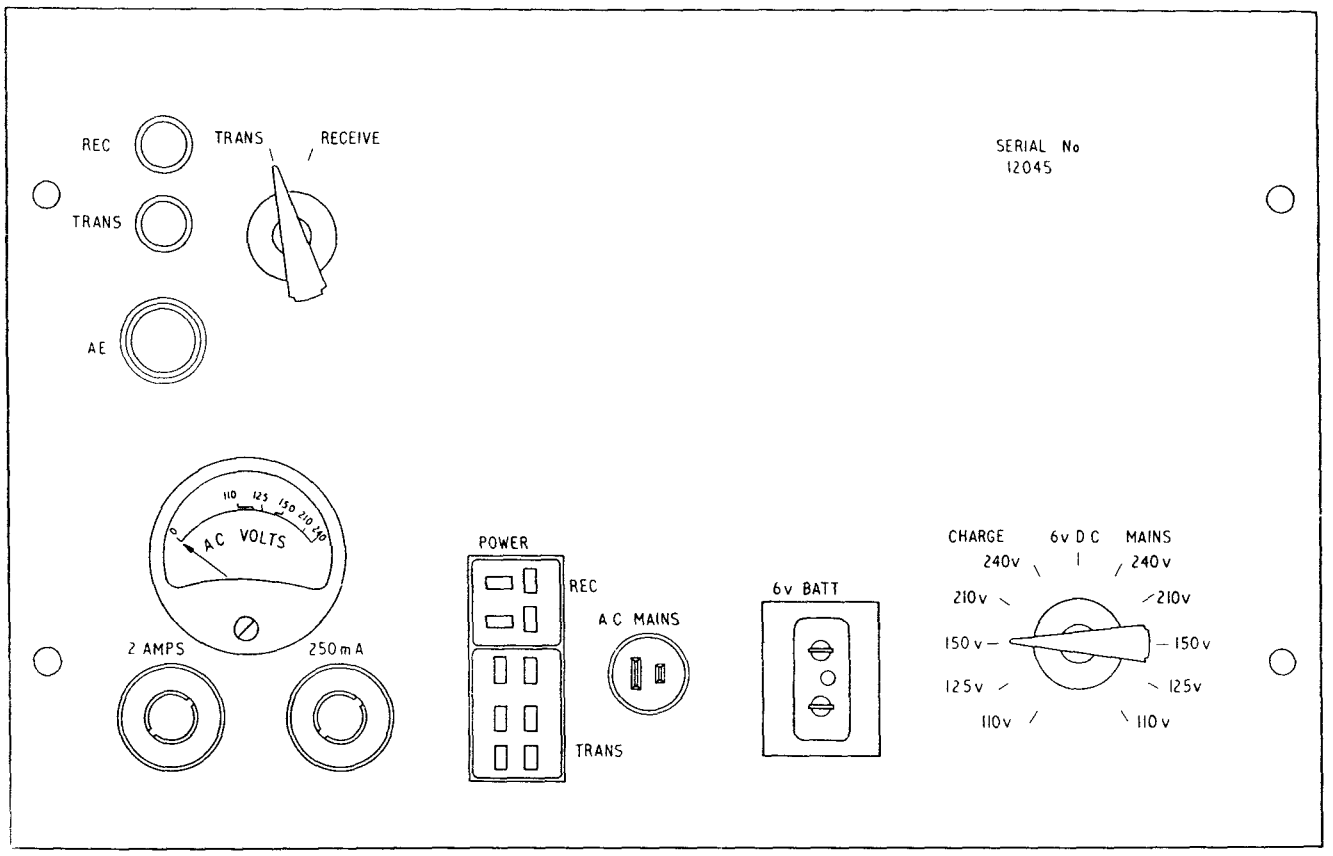

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Fig 3 - Power supply unit panel controls

DETAILED TECHNICAL DESCRIPTION

Transmitter
(Fig 2001)

Oscillator-doubler V1 and V2 (2, CV138)

11. V1 and V2 connected in parallel, function as oscillator or oscillator-doubler using crystals in the frequency range of 1.5 to 10Mc/s. The 'anode' (g_2) of the crystal oscillator section is earthed for r.f. (through C2) and this, together with electron coupling gives sufficient isolation from the anode circuit to permit the latter to be tuned to the fundamental as well as to the second harmonic frequency of the crystal. R3 in series with L14 provides protective bias. Additional bias is developed due to grid current across R2.

12. The oscillator normally operates on the crystal fundamental frequency up to 10Mc/s; above 1CMc/s, the anode circuit is tuned to double the frequency of the crystal. The required coil is selected by S1 and tuned by VC1. Resonance of the tuned circuit and maximum drive to the power amplifier is indicated by an increase in glow from the neon indicator NL1.

Power amplifier V3 (CV3990)

13. The r.f. output from the oscillator is applied via the coupling capacitor C6 to the tuning indicator neon NL1 and to the grid of V3 via a parasitic stopper comprising L13 and R7 in parallel.

14. The stage is operated in class C from bias developed by grid current through R9 and cathode current through R10. S2B in series with R10 renders V3 inoperative when set to 'E' during crystal changing and tuning of the oscillator stage.

15. Both oscillator and power amplifier are keyed by grid block keying. Reference to Fig 2006 power supply unit circuit shows that when S2/2 is set to TRANS, the power transformer centre tap connection is disconnected from chassis earth. The return to earth is now via pin 2 of SKT2 of the power supply unit to pin 2 of PL1 of the transmitter and R11 and R12 in parallel to chassis earth. The voltage drop across R11 and R12 in series with the power transformer centre tap is sufficient to bias V1 and V2 to cut-off and reduces the cathode current of V3 to a very low value. When the key is pressed this bias is short circuited so allowing the valves to function normally. L18 and C18 minimize sparking of the key contacts and interference to local receivers.

16. The anode is shunt fed via the r.f. choke L15 and coupled to a tap on the p.a. coil through C11 and C12. The coil in circuit is tuned by VC2 whilst coils on adjacent bands are short circuited and earthed. Taps on the turret coils selected by S2 permit optimum antenna coupling. Indication of power amplifier resonance and maximum output to the antenna is given by the panel meter M1. Connection to the meter circuit from the antenna is made via the capacitance potentiometer C16 and C17. RT2 rectifies the applied r.f. and applies the d.c. via R14 and R15 to M1. L17 provides the return path for the diode current.

17. A protective circuit to limit the current flowing through the meter is provided by RT1, R13 and R16. When the rectified r.f. voltage from RT2 exceeds the delay voltage applied to RT1 from the junction of R13 and R16, RT1 will conduct and effectively shunt the meter with R16.

18. A number of transmitters have been modified for telephony working. The modification consists of a small panel containing the additional components. There are also minor changes in resistor and capacitor values. A full circuit diagram is shown in Fig 2002.

Modulator panel V4 and V5 (EL70 and EF72)

19. The power amplifier V3 is screen modulated by a conventional two stage audio amplifier. The audio input from a dynamic microphone is fed via T1 to V5 thence to V4 and after amplification applied to the screen of V3 from the secondary of transformer T2 in series with the d.c. screen voltage.

20. The modulator is switched into circuit by S3. Contacts 1 and 2 make the h.t. connection and contacts 3 and 4 short circuit the h.t. centre tap (keying bias) to earth. It should be noted that to obtain optimum modulation conditions the value of the screen feed resistor (R18) to V3 has been changed and an additional bleeder resistor (R17) added. The value of the p.a. screen decoupling capacitor (C10) has also been changed.

21. No internal morse key is fitted to transmitters modified as in para 18 to 20, c.w. operation is carried out by means of an external key. A layout of components for both types of transmitters is shown in Fig 2003 and schedule of components in Table 2001. Additional components for r.t. modified transmitters are shown in Table 2002.

Receiver
(Fig 2004)

R.F. stage (V1, CV131)

22. This is a conventional r.f. amplifying stage employing a variable mu r.f. pentode. The signal is applied to the grid of V1 via the r.f. transformer selected by S1 and tuned by a section of the three gang capacitor VC1-1. S1 also short circuits the unused coils to prevent variations in sensitivity due to absorption effects. L1-C1 form a series resonant rejector circuit for signals at the intermediate frequency of 455kc/s. VC2 is a small antenna trimmer with front panel control allowing correct tracking of the grid circuit irrespective of the length or type of antenna in use. C2 and C3 adjacent to L2 form a capacitance attenuator and are only in use on band 1. All coils in this stage as well as the mixer and oscillator stages are fitted with dust iron cores for correct alignment at the low frequency end of each range. A.G.C. to the stage is shunt fed to permit direct earthing of the grid coils and is applied to the grid from the a.g.c. line via R1. The stage gain of V1 is further controlled by increasing the standing bias due to R2 by the manual gain control RV1.

Mixer stage (V2, CV138)

23. The amplified output from V1 developed across the primary of the selected r.f. transformer and inductively coupled to the secondary tuned by VC1-2, is applied to the grid of a pentode mixer via C18. Cathode injection is employed, the cathode bias resistor (R6) being returned to earth via the grid coils of the oscillator stage. Fixed cathode bias is applied to the grid of V2 by the shunt grid resistor R5. Separate trimmer capacitors are fitted for each band for alignment purposes and, as with the r.f. stage, all coils have adjustable dust iron cores.

Oscillator (V3, CV138)

24. The oscillator uses a triode connected pentode in a shunt fed tuned anode circuit. The h.t. voltage to this stage, the beat oscillator (V6) and the mixer screen grid is stabilized by the neon stabilizer NL1. The oscillator operates above the signal frequency ie s.f. + i.f., tuning being by means of VC1-3. Separate trimmer and padding capacitors are fitted for all bands except band 5 where no padding capacitor is necessary.

I.F. amplifier (V4, CV131), detector (V7, EA50) and audio amplifier (V5, CV138)

25. The 455kc/s i.f. signal from the mixer is applied via IF/T1 to V4 and after amplification via IF/T2 to the diode detector V7. The signal, after detection is applied via the r.f. filter C38, R15, C40, the coupling capacitor C41, and the grid stopper R21 to the grid of the audio amplifier V5. After amplification the output is applied via AF/T1 to the headphones.

26. A.G.C. control voltage is taken from the junction of R15, C40, C41 and after removal of the audio component by R17 and C39 is applied via R12 to V4 and R4, R1, to V1.

Beat oscillator (V6, CV138)

27. For c.w. operation the heterodyning voltage is generated by a Hartley oscillator and injected to the detector by means of VC4. This capacitor consists of twisted pair wires, adjusted until the correct heterodyning voltage is obtained. Coarse adjustment of the oscillator frequency is carried out by means of the tuning core of L18, or in the case of a fixed core by a built-in trimmer capacitor. Front panel control is by means of VC3.

Stabilizer (NL1)

28. This is a miniature neon lamp type, and is fed from the main h.t. line through R10 and R23. The stabilized voltage is applied to V3, V4 and the screen of V2. It is mounted with its anode close to a hole in the front panel and when operating indicates that h.t. voltage is present in the receiver.

29. The component layout and schedule of components for the receiver is given at Fig 2005 and Table 2C03.

Power supply unit
(Fig 2006)

30. Warning: Points to be noted before using on a.c. mains supplies. The power supply unit is designed to operate from a.c. supplies of 100 to 250V. Before connecting to the supply the master switch S1 must be set to MAINS 240V. Failure to observe this rule may result in damage to the power transformer. When connected, read the voltage on the panel meter and, if necessary, switch to the voltage indicated.

A.C. operation

31. The a.c. supply if applied via PL1 through the fuse F1 to the panel a.c. voltmeter comprising R4, RT1 and M1, and via the master switch section S1/2 to the desired voltage tapping on the primary of the power transformer.

32. The transformer is wound with two multi-tapped secondary windings. The high voltage winding provides a nominal 250V and 400V each side of the centre tap for receiver and transmitter respectively. A common low voltage winding is used for the valve heaters, battery charging, and as the primary in conjunction with a vibrator when operated from a 6V battery.

33. On RECEIVE the 250V secondary taps are selected by the master switch section S2/2 and rectified by the full wave metal rectifier RT2. C5 and C6 connected in series across the primary winding prevent modulation hum and reduce any mains borne interference. Smoothing is by means of the block capacitor C1 (2+2+2μF), CH1 and R1.

34. On TRANS the 400V winding is selected and R1 and one section of C1 are disconnected. The transformer centre tap is also disconnected from the chassis earth and used as a means of keying the transmitter, or in the case of transmitters modified for r.t., is returned to earth by the transmitter MOD/CW switch.

35. For battery charging the full 10-0-10V winding is used and rectified by the metal rectifier RT3. R3 in series with the negative lead limits the charging current of a 6V battery to about 1A.

6V d.c. operation

36. When operating from a 6V battery all valve heaters are supplied direct from the battery via the master switch section S1/3. L5 and C7 form a filter to prevent vibrator interference from entering the receiver by the heater supply leads.

37. The vibrator, a shunt driven interrupter type, is switched into circuit by S1/1 and is connected to the 5.7V taps of the low voltage secondary winding of the power transformer. This is now used as a primary winding and the interrupted d.c. current due to the vibrator, flowing through each half of the winding, produces a square wave alternating voltage at the transformer h.t. secondary. This is rectified and smoothed in a similar manner to the mains a.c.

38. C9 to C14 inclusive, L2, L3 and L4 are fitted close to the vibrator to reduce sparking at its contacts to a minimum and to prevent 'hash' from entering the remainder of the equipment. The capacitors C2, C3 and C4 across the secondary h.t. winding are buffer capacitors to limit surges and to increase vibrator contact life. C8 at the battery input socket is to prevent any remaining traces of vibrator interference from being radiated by the battery leads.

39. A component layout and schedule of components for the power supply unit is given in Fig 2C7 and Table 2C04.

SETTING UP PROCEDURE

Preliminaries

40. (a) Unscrew the lids of each case and examine the equipment. Ensure that all valves are firm in their sockets.

(b) Remove headphones, connectors and any other items required from the spare parts case.

(c) Set the master control switch on the power supply unit to MAINS 240V.

(d) Connect the transmitter to the p.s.u. by means of the cable with the 6-pin plugs.

(e) Connect the receiver to the p.s.u. by means of the cable with the 4-pin plugs. These cables are not interchangeable and are so constructed that no live pins are accessible.

(f) Connect the antenna to the AE terminal on the p.s.u.

(g) Connect the transmitter and receiver antenna terminals with the interconnecting leads provided.

(h) Connect the earth wire to the earth (E) terminal of the transmitter and extend it to the earth (E) terminal of the receiver.

(j) Plug the headphones into the jack on the receiver and where applicable, the morse key into the transmitter.

(k) Plug the mains connector into the power supply and connect to the a.c. mains supply, read the voltage of the incoming mains from the p.s.u. voltmeter. If it reads 240V leave the switch set in this position, but should the meter show a lower voltage rotate the switch clockwise to the appropriate position.

Tuning the receiver

41. (a) Set the TRANS/RECEIVE switch on the p.s.u. to RECEIVE. A faint hum should be heard in the headphones.

(b) Set the frequency band switch to the desired band.

(c) If c.w. is to be received set the PHONE/C.W. switch to C.W.

(d) Set the tuning control to the required frequency as indicated on the dial and advance the VOLUME control towards maximum until a satisfactory signal level is obtained. Adjust the antenna trimmer for maximum volume of the received signal.

(e) For c.w. reception the following points will ensure best reception. The beat oscillator is provided with a control for varying the pitch of the note received. Set the B.F.O. tuning knob with its pointer to 12 o'clock. Adjust the main tuning control to give the lowest possible pitch and then set the B.F.O. control to give the required note for morse reception. Setting the B.F.O. on either side of 12 o'clock (zero beat) will provide the required note. If interference from another station is experienced, setting the control to a similar position on the other side of zero beat should be tried. This will give the same pitched note for the wanted station but a different note for the interfering one thereby permitting the operator to discriminate in favour of his own station. When searching for a station the B.F.O. control should be set to 12 o'clock.

Tuning the transmitter

Transmitting on the fundamental frequency

42. Assuming the transmitter has been connected ready for operation as described at para 40 and a crystal of 2.690Mc/s is to be used proceed as follows:-

(a) Set the TRANS/RECEIVE switch on the p.s.u. to TRANS.

(b) Plug the crystal into its socket and set the FREQUENCY RANGE switch to the band covering the frequency 2.3-3.5Mc/s.

(c) Set the antenna loading switch to E.

(d) With the morse key depressed adjust the DRIVE TUNING control to give maximum glow in the neon indicator.

(e) Set the AE LOADING switch to position 1 and with the key depressed adjust the AE TUNING control for maximum reading on the meter. Switch to the next position and again adjust for maximum reading. The transmitter operates with maximum efficiency on the tap giving the highest meter reading. Tuning should be carried out as quickly as possible after depressing the key.

Transmitting on the second harmonic of the crystal

43. The transmitter will 'double' on any crystal. It is assumed that the same crystal (2.690Mc/s) is to be used and that the transmitter frequency is to be 5.380Mc/s which is the second harmonic or double the crystal frequency. The transmitter is set up as for fundamental working except that the FREQUENCY RANGE switch is set to the band covering the doubled frequency ie 3.5 to 5.5Mc/s. It is necessary to re-tune the transmitter whenever a change of frequency is made by doubling or by change of crystal.

44. For frequencies up to 10Mc/s, crystals in the range 1.5 to 5Mc/s are normally used on their fundamental frequency and second harmonic frequencies. Above 10Mc/s crystals in the range 5 to 10Mc/s are used on their second harmonic frequencies. They may of course, be used on their fundamental frequency also.

MECHANICAL ADJUSTMENTS AND REPLACEMENTS

Variations in component values

45. Resistors and capacitors listed in the component schedule tables are preferred values and may not agree with some fitted in equipments, eg 250kΩ fitted instead of 270kΩ, 47pF instead of 50pF, etc. These variations are within permissible tolerances and replacements will not affect performance.

46. Due to different production runs some minor variations in equipments may be found. These have been noted on the relevant circuit diagrams.

Component replacement

47. The adjustment and replacement of components is self-evident. When making component replacements it is essential that a high standard of soldering is maintained and that the wiring is disturbed as little as possible. Particular attention must be paid to earthing points in the r.f. and oscillator circuits.

Soldering valveholder tags

48. When it is necessary to solder a B7G valveholder tag the valve must be removed and a wiring jig (part of the basic telecommunications tool kit) inserted in its place.

Adjustment of tuned circuits

49. When making adjustments to the trimming capacitors and to the iron dust cored coils, non-metallic trimming tools should be used. As the alignment of any particular section is completed, the trimming capacitors and iron dust cores must be sealed with a suitable sealing compound.

Preferred instrument		Suitable alternative	
Part No	Designation	Part No	Designation
Z4/6625-99-943-1523	Multimeter, Avo, model 7, panclimatic	Z4/ZD 00207	Instrument, testing, Avometer, universal 50-range, Mk 2
Z4/WY 1639	Shunt, d.c., 100A, No 1		Nil
Z4/WD 02674	Signal generator No 12	Z4/ZD 00391	Signal generator No 1, Mk 3
Z4/WD 3941	Signal generator No 13		
Z1/ZC 1411	Frequency meter SCR211	Z4/ZA 14269/1	Wavemeter, class D, No 1, Mk 2
Z4/ZD 00198	Oscillator, b.f., No 8	Z4/ZD 04247	Signal generator, video frequency, No 1, equipment No 2
Z4/6625-99-949-0510	Wattmeter, absorption, a.f., No 1	Z4/ZD 00664	Meter, output power, No 4, Mk 1
Z4/6625-99-913-8618	Oscilloscope set, CT436	Z4/10S/831	Oscilloscope, type 13A
Z4/6625-99-949-0470	Voltmeter, valve, No 3	Z4/ZD 00617	Instrument, testing, electronic, multirange, No 1
X2/6240-99-996-5715	Lamp, electric, carbon filament, clear, tubular, 250W (Robertson lamp)	Locally made non-inductive dummy antenna of between 300 and 600Ω	
Z4/5950-99-949-3781	Transformer, variable power	Z4/ZD 02183	Transformer, variac, type 10ORM

Table 3 - Test equipment schedule, field and base repairs

TRANSMITTER SPECIFICATION TESTS

Standard test conditions for transmitter 119 (C.W. model)

(Additional tests for the R.T./C.W. model are given in para 68 to 71)

50. (a) Transmitter untuned:-

(i) FREQUENCY RANGE switch set to 5.5-8.5Mc/s.
(ii) Drive tuning capacitor set to minimum capacitance.
(iii) Antenna tuning capacitor set to maximum capacitance.
(iv) No crystal inserted.

(v) No antenna load.

(b) Transmitter tuned:-

(i) FREQUENCY RANGE switch set to 5.5-8.5Mc/s.
(ii) Crystal of approximately 7.5Mc/s inserted.
(iii) Dummy antenna load of 300 to 600Ω connected.
(iv) Transmitter tuned for maximum output.

51. With the exception of the stability test at para 62 all tests may be made with the transmitter removed from its case.

Test frequencies

52. Crystals with the following approximate frequencies are required for test purposes: 1.5, 1.8, 2.3, 3.5, 4.4, 5.5, 6.5, 7.5, 8.5 and 10Mc/s.

53. Under actual service conditions the tests may be limited to the crystals issued to the User unit.

Transmitter output test

54. Connect a resistive dummy antenna of between 300 and 600Ω capable of dissipating approximately 20W to the antenna and earth terminals of the transmitter. A suitable dummy antenna can be made up using the tubular Robertson lamp specified in Table 3. The resistance of this lamp when dissipating 15W is a nominal 350Ω.

55. Connect a V.V. No 3 across the dummy antenna and with the transmitter tuned for maximum output read the voltage. This will be in the region of 60-80V. The transmitter power output may now be calculated from the formula $\frac{V^2}{R}$ where V is the voltage read on the valve voltmeter and R the resistance of the dummy antenna. All leads to the dummy antenna must be kept as short as possible.

56. Test the transmitter on each of the following frequencies:-

(a) On the crystal fundamental of 1.5, 1.8, 2.3, 3.5, 4.4, 5.5, 6.5, 8.5 and 10Mc/s.

(b) Doubling the crystal frequency of the 6.5, 8.5 and 10Mc/s crystals to 13.0, 17.0 and 20Mc/s.

57. Where the frequency coincides with the change-over frequency between bands tune the transmitter on both bands.

58. At each of the test frequencies the following tests must be made:-

(a) Measure the power output when the transmitter is tuned.

(b) Monitor the transmission on a wavemeter and check that the frequency is that of the crystal in use.

(c) Check that the keying is clean, not chirpy and that the crystal oscillates immediately the key is pressed.

59. In the case of some crystals the drive turing may require slight re-adjustment to obtain proper keying. There should be no trace of modulation from the neon indicator unless the drive tuning is very much off resonance.

60. The specified power output is:-

Between	1.5 to 8.5Mc/s	: Not less than 15W
	8.5 to 13.0Mc/s	: Not less than 13W
	13.0 to 20.0Mc/s	: Not less than 10W

Antenna meter deflection test

61. Tune the transmitter to a frequency near the middle of each band in turn without any antenna load. Starting with the AE LOADING switch on position 1 and keeping the transmitter on tune, check that an increasing meter deflection is obtained on each switch position up to and including No 6. Nominal meter readings are as follows:-

Switch position	Min	Max
1	0.5	2.0
2	1.0	3.0
3	2.4	5.0
4	3.5	6.0
5	5.4	7.5
6	6.5	10.0

Self oscillation test without crystal

62. The transmitter must be mounted in its case for this test. With the morse key pressed, the antenna loading switch on position 2 and no dummy antenna load, it should not be possible to obtain a reading on the antenna meter for any setting of the DRIVE and AE TUNING controls on any band. Oscillation is most likely to occur at the h.f. end of the 5.5-8.5Mc/s band and special care must be taken to check at this point.

Voltage measurements

63. All voltages are read on the Multimeter, Avo, model 7 using the 10 and 100V ranges where appropriate. The morse key should be pressed for the minimum time whilst the transmitter is in the untuned condition.

64. The following voltage readings are taken with the transmitter untuned as at para 50 and the AE LOADING switch set to position 1.

(a) Power plug voltages

	Min	Max
Pin 1 to pin 2 unkeyed d.c. voltage	540V	590V
Pin 1 to pin 2 keyed d.c. voltage	335V	380V
Pin 2 to pin 4 unkeyed d.c. bias voltage	75V	100V
Pin 2 to pin 4 keyed d.c. voltage	6V	7.5V
Pin 3 to pin 4 unkeyed a.c. voltage	5.9V	6.6V

(b) D.C. voltages measured to chassis

Transmitter keyed

		Min	Max
V1 and 2	Anode pin 5	240V	260V
	Screen pin 7	215V	235V
	Cathode pin 2	2V	2.5V
V3	Anode T.C.	335V	365V
	Screen pin 3	270V	300V
	Cathode pin 1	15V	19V

Current measurements

65. For these measurements switch the Multimeter to the d.c. 0-100mA range and using a locally made lead fitted with a jack plug connect it to the meter and insert the plug into the external key socket of the transmitter.

(a) Transmitter untuned

		Min	Max
AE LOADING switch set to E	D.C. mA	15	20
AE LOADING switch set to 1	D.C. mA	85	95
(b) Transmitter tuned	D.C. mA	85	95

Overload test

66. For this test the power supply unit should preferably be supplied from a 6.6V d.c. source as this represents the most severe operating condition. Alternatively, the supply can be from a.c. mains 10% greater than the voltage setting in use. The most suitable keying signal is one providing equal length mark and space intervals of about one third of a second duration. Operate for five minutes and check that there is no overheating of components or significant change in total anode current as measured in para 65.

Neon tuning indicator

67. Check that with the transmitter untuned there is a slight glow from the neon indicator.

Additional tests for 119B (R.T./C.W. model)

68. (a) Test conditions as at para 50, switched to C.W. and untuned.

Voltage measurements at power input plug

	Min	Max
Pin 1 to pin 2 unkeyed d.c. voltage	480V	500V
Pin 1 to pin 2 keyed d.c. voltage	320V	365V
Pin 2 to pin 4 unkeyed d.c. bias voltage	50V	70V
Pin 2 to pin 4 keyed d.c. voltage	5.5V	7.0V
Pin 3 to pin 4 unkeyed a.c. l.t. voltage	5.9V	6.6V
Pin 3 to pin 4 keyed a.c. voltage	5.8V	6.5V

(b) Switched to MOD and untuned

Voltage measurements

	Min	Max
Pin 1 to pin 2 d.c. h.t. voltage	360V	380V
Pin 2 to pin 4 d.c. bias voltage	5.5V	7.0V
Pin 3 to pin 4 a.c. l.t. voltage	5.8V	6.5V

Valve electrode voltages (measured to chassis)

69. (a) Switched to C.W. (key down)

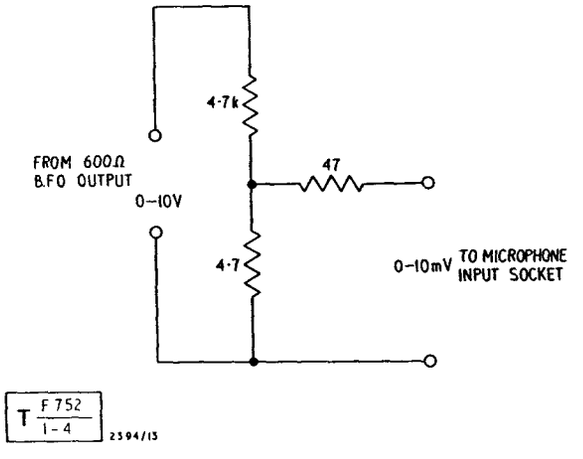
		Min	Max
V1 and V2	Anode pin 5	225V	255V
	Screen pin 7	205V	225V
	Cathode pin 2	2V	2.5V
V3	Anode T.C.	330V	360V
	Screen pin 3	230V	260V
	Cathode pin 1	12V	15V

(b) Switched to MOD

V1 and V2	Anode pin 5	230V	260V
	Screen pin 7	210V	240V
	Cathode pin 2	2.2V	2.7V
V3	Anode T.C.	355V	375V
	Screen pin 3	105V	125V
	Cathode pin 1	4.0V	5.5V
V4	Anode pin 5	90V	110V
	Screen pin 7	100V	120V
	Cathode pins 2, 4 or 8	8V	9V
V5	Cathode pins 2, 4 or 8	0.45V	1.65V

Modulation tests

70. Modulate the transmitter via the MIC input socket by means of a B.F.O. No 8 connected to the potential divider shown at Fig 4. With the b.f.o. set to 1000c/s the input to the MIC socket must not exceed 1.2mV for 100% modulation (as checked by oscilloscope) at any frequency. Check the voltage to the potential divider with a V.V. No 3.



T F 752 1-4 2594/15

Fig 4 – Beat oscillator potential divider

Power output

71. The specified power output, measured as laid down in para 54 to 56 is:-

		C.W.	R.T. (at 100% mod)
between 1.5 to 6.5Mc/s:	Not less than	9W	4.5W
6.5 to 10Mc/s:	Not less than	8W	4W
10.0 to 20Mc/s:	Not less than	5W	2.25W

RECEIVER SPECIFICATION TESTS

General

72. Test point connections to the mixer (V2), h.f. oscillator (V3) and i.f. amplifier (V4) valve grids for measurement or alignment purposes are provided directly below the valveholders. They are made accessible through large circular holes on removal of the cover plate on the rear of the receiver chassis.

Test conditions

73. (a) Receiver

(i) Power supply unit connected and set to MAINS 240V a.c.
(ii) VOLUME control fully clockwise (maximum gain).
(iii) PHONE/C.W. switch to PHONE.
(iv) Output meter set to 8kΩ impedance in parallel with a pair of high resistance headphones (2000Ω) plugged into the PHONES socket.

(b) Signal generator

Unless specified the signal generator is to be modulated at 1000c/s to a depth of 30%.

(c) The standard output as measured on the output meter in parallel with a pair of high resistance phones is 1mW.

(d) Before taking readings it is important to check with the headphones that no unwanted signals are being picked up by the receiver set to C.W.

A.F. gain

74. (a) VOLUME control (operative on r.f. and i.f. only) set to minimum.

(b) B.F.O. No 8 set to 600Ω and 1000c/s connected via a suitable potential divider to the junction of R19 and R21.

(c) The input required for the standard output of 1mW must lie between 50mV (minimum) and 70mV (maximum).

I.F. sensitivity

75. (a) VOLUME control at maximum.

(b) Receiver switched to band 1 and tuned to 1000kc/s.

(c) Oscillator made inoperative by short-circuiting VC1-3.

(d) Signal generator tuned to 455kc/s and 'directly' connected via a 0.01μF isolating capacitor to the grid of the mixer V2.

(e) Adjust the cores (or trimmers) of IF/T1 and IF/T2 for maximum output.

(f) The specified input from the signal generator is between 20 and 45μV for the standard output.

I.F. bandwidth

76. (a) Conditions as at para 75.

(b) After reading the input required to produce the standard output, de-tune the signal generator approximately 20kc/s and increase the input by 20dB. The signal generator should now be re-tuned on either side of 455kc/s to again obtain the standard output.

(c) The bandwidth must be within the limits of 7.5 ± 2.5kc/s.

C.W. b.f.o. setting

77. (a) Conditions as at para 75 but signal generator set to C.W.

(b) Receiver PHONE/C.W. switch set to C.W.

(c) B.F.O. control pointer set to mid-position (twelve o'clock) with VC3 rotor plates set half in mesh.

(d) Adjust the core of L18 (or trimmer capacitor if fitted) to zero beat with signal generator at 455kc/s.

(e) The frequency range of the B.F.O. control should be ±10kc/s ±1kc/s.

B.F.O. injection

78. With conditions as at para 77 adjust VC4 (twisted pair wires in some sets) until the rectified d.c. voltage at the junction of R15 and R17 lies between 0.6 and 1.2V. The V.V. No 3 set to d.c. should be used for this test. Re-check to make sure that any alteration of VC4 has not altered the frequency of the b.f.o. and re-adjust if necessary.

I.F. rejection adjustment

79. (a) Receiver switched to band 1.

(b) VOLUME control at maximum.

(c) Receiver tuned to 550kc/s.

(d) Antenna trimmer peaked for maximum output.

(e) Signal generator 'directly' connected via a 390Ω non-inductive resistor to the antenna terminal of the receiver.

(f) With the signal generator set to 455kc/s, inject a signal of about 1mV and adjust the core (or trimmer) of the i.f. rejector inductance L1 for minimum output.

Calibration, r.f. alignment and second channel rejection

80. Conditions as at para 73 but with the signal generator 'directly' connected via a 390Ω non-inductive resistor to the antenna terminal of the receiver; ensuring that the signal generator is correctly calibrated by its internal calibrator or by means of a wavemeter, carry out calibration, r.f. alignment and second channel rejection tests, following the order laid down in Table 4. Due to 'pulling' of the oscillator during the alignment of the mixer and r.f. stage circuits it is essential to slightly re-tune the signal generator after each adjustment to ensure that the circuits are correctly peaked. The oscillator tuning must not be re-adjusted unless the calibration has been pulled out of tolerance. Failure to observe this procedure may result in poor second channel rejection figures particularly on bands 3, 4 and 5.

81. During these operations make sure that the antenna circuit resonates within the range of the antenna trimmer VC2 on all wavebands. In addition to the test frequencies listed in Table 4, all frequencies at the extreme ends of each waveband must also be tuneable.

I.F. rejection test

82. Check that the attenuation of a 455kc/s signal compared with the signal at 550kc/s (Table 4, operation 3) is greater than 56dB.

Table 4 - Receiver r.f. alignment procedure

Operation	Range switch position	Test frequency	Trimmer or inductance adjusted	Adjusted for	Sensitivity for standard output	Minimum second channel rejection	Nominal h.f. oscillator voltages (para 84)
1	1	550kc/s	L12	calibration			
2	1	1000kc/s	C21	calibration			
	Repeat 1 and 2 until all main dial calibrated points are within 10 vernier divisions of the logging dial. This tolerance may be increased to 20 divisions at mid-scale on range 1 only						Band 1 1.7-3.8V
3	1	550kc/s	L2, L7	max output	80-160μV		
4	1	1000kc/s	VC2, C11	max output	70-140μV		
5	1	700kc/s	VC2 only	max output	70-140μV		
6	2	1.1Mc/s	L13	calibration			
7	2	2.0Mc/s	C23	calibration			
	Repeat 6 and 7 until all calibrated points are within 10 vernier divisions of the logging dial						Band 2 1.3-2.4V
8	2	1.1Mc/s	L3, L8	max output	43-85μV	-65dB	
9	2	2.0Mc/s	VC2, C12	max output	30-60μV	-55dB	
10	2	1.5Mc/s	VC2 only	max output	33-65μV	-60dB	
11	3	2.4Mc/s	L14	calibration			
12	3	4.5Mc/s	C25	calibration			
	Repeat 11 and 12 until all calibrated points are within 10 vernier divisions of the logging dial						Band 3 1.2-2.9V
13	3	2.4Mc/s	L4, L9	max output	3.5-7.0μV	-60dB	
14	3	4.5Mc/s	VC2, C13	max output	5.0-10μV	-45dB	
15	3	3.2Mc/s	VC2 only	max output	6.0-12μV	-55dB	
16	4	5.0Mc/s	L15	calibration			
17	4	10.0Mc/s	C27	calibration			
	Repeat 16 and 17 until all calibrated points are within 10 vernier divisions of the logging dial						Band 4 1.5-4.6V

Table 4 - (cont)

Operation	Range switch position	Test frequency	Trimmer or inductance adjusted	Adjusted for	Sensitivity for standard output	Minimum second channel rejection	Nominal h.f. oscillator voltages (para 84)
18	4	5.0Mc/s	L5, L10	max output	5-10μV	-50dB	
19	4	10Mc/s	VC2, C14	max output	15-30μV	-30dB	
20	4	7.0Mc/s	VC2 only	max output	8-16μV	-40dB	
21	5	11.0Mc/s	L16	calibration			
22	5	20.0Mc/s	C29	calibration			
	Repeat 21 and 22 until all calibrated points are within 10 vernier divisions of the logging dial						Band 5 0.7-2.8V
23	5	11.0Mc/s	L6, L2	max output	35-60μV	-36dB	
24	5	20.0Mc/s	VC2, C15	max output	12-25μV	-21dB	
25	5	14.0Mc/s	VC2 only	max output	17-35μV	-29dB	

Voltage measurements

83. (a) Test conditions

(i) Receiver tuned to 500kc/s.
(ii) VOLUME control set to maximum.
(iii) PHONE/C.W. switch to C.W.
(iv) No signal input.
(v) H.T. voltage at power input plug 230-255V, l.t. voltage 5.9-6.5V.
(vi) Readings taken on the Multimeter, Avo, model 7,1000V or 10V range.

(b) Valve electrode voltages (with valves in position)

Valve	Anode	Screen	Cathode
V1	220-250V	220-250V	2-3V
V2	230-250V	60-70V	
V3	60-70V	60-70V	Nil
V4	225-250V	225-250V	5-6V
V5	215-240V	230-255V	2.5-3.0V
V6	37-45V	37-45V	Nil

H.F. oscillator voltages

84. The rectified d.c. voltage at the oscillator grid (V3), measured with a V.V. No 3 should be within the limits of the figures quoted in Table 4. This is not a specification test and is given to assist in fault finding.

POWER SUPPLY UNIT SPECIFICATION TESTS

Standard test conditions

85. All tests are carried out inconjunction with a 119 transmitter and receiver of proved performance. The standard settings for these are as follows:-

(a) Receiver:-

(i) Tuned to 500kc/s.
(ii) VOLUME control set fully clockwise (maximum gain).

(iii) Beat oscillator switched on.

(Under these conditions the h.t. current is approximately 30mA)

(b) Transmitter: Tuned for maximum output into a dummy antenna load in the range 3.5 to 5.5Mc/s.

(Under these conditions the h.t. current is approximately 95mA)

Measurements

86. All voltage and current readings are made with the Multimeter, Avo, model 7. A 10A d.c. shunt (Z4/WY 1639) is required to read the current on battery operation. Voltages are read on the 10 or 100V range.

Voltmeter calibration

87. The panel meter must be mechanically balanced within approximately the width of its pointer. The meter calibration error must not exceed ±4% at any calibrated point on its scale.

A.C. mains operation, h.t. and l.t. voltages

88. Check the following voltages at all settings of the master control switch with the input voltage adjusted accordingly.

	Min	Max
Receiver h.t. line voltage	230V	255V
Receiver l.t. voltage	5.9V	6.6V
Transmitter keyed l.t. voltage	5.9V	6.6V
Transmitter unkeyed h.t. voltage plus bias (No 2 to No 1 on power socket)	540V	600V
Transmitter keyed h.t. voltage	335V	385V
Transmitter unkeyed bias voltage	75V	100V

A.C. mains operation, input current

89. Current readings are as follows:-

Supply voltage	Receiver on		Transmitter on (key down)	
	Min	Max	Min	Max
240V	0.3A	0.52A	0.44A	0.65A
210V	0.35A	0.57A	0.49A	0.7A
150V	0.5A	0.95A	0.67A	1.1A
125V	0.69A	1A	0.79A	1.2A
110V	0.75A	1.1A	0.87A	1.3A

A.C. ripple voltage test

90. This is measured from the main h.t. lines of receiver and transmitter to chassis earth using a V.V. No 3.

	Average	Max
Receiver h.t. ripple	4.5V	6.0V
Transmitter keyed h.t. ripple	25V	35V

Battery charging test

91. (a) Master control switch set to 24CV and input voltage adjusted to suit. With 6V battery connected; check charging rate with multimeter.

Typical charging current: 1.0-1.2A

(b) Battery disconnected:-

Open circuit voltage	10V	12V
Short circuit current	1.5A	2.7A

(c) The short circuit condition must be limited to a few seconds.

6V d.c. operation

92. The following tests require the battery voltage, measured at the battery clips, to be 6 ± 0.1V.

Input current

	Min	Max
Receiver on	6A	6.5A
Transmitter key up	4.4A	5.1A
Transmitter key down	13.5A	14.5A

Voltage measurements

93. (a) Voltage readings are as follows:-

	Min	Max
Receiver h.t. line voltage	230V	255V
Receiver l.t. voltage	5.7V	6.1V
Transmitter unkeyed, h.t. voltage plus bias (pin 1 to pin 2 on power socket)	535V	565V
Transmitter keyed, h.t. voltage	360V	390V
Transmitter keyed, l.t. voltage	5.6V	6.1V

(b) With a 5.4V supply the transmitter keyed h.t. voltage must read between 320 and 340V without fluctuations.

Overload test

94. With 6.6V d.c. input to the power supply unit operate the transmitter (as para 66) and the receiver continuously for five minutes each. Check that there is no over-heating of components and that the transmitter and receiver h.t. line voltages are still within the limits specified in para 93.

Transmit/receive switch test

95. Disconnect the power supply unit from the mains and the equipment. Using the Multimeter, Avo, model 7, set to its lowest resistance range, connect one lead to the antenna terminal and the other to the REC antenna terminal of the p.s.u. Set the TRANS/RECEIVE switch to RECEIVE and check that the meter reads zero. Re-set several times to ensure that the switch action is positive. Disconnect the meter lead from the REC terminal, connect it to the TRANS terminal and repeat the procedure.

Note: The next page is Page 1001.

Table 2001 - Transmitter component schedule

Cct ref	Component location: 119B (C.W.) Main cct	119B (R.T.) Main cct	Main layout	Value (Ω)	Rating (W)	Type and limit (± %)	Part No Z/5905-99
			RESISTORS, FIXED				
R1	A2	A2	D3	10k	4.1/2	w.w. 5	-011-3511
R2	A7	B7	D2	100k	1/2	comp ins 10	-022-3039
R3	B7	C7	C2	180	1/4	comp ins 10	-022-1143
R4	C4	C4	L2	6.8k	1/2	comp ins 10	-022-2111
R5	C1	D1	D3	10k	6	w.w. 5	-011-3421
R6	C2	D2	L2	10M	1/4	comp ins 10	-022-3290
R7	E5	C5	H3	47	1/4	see L13	
R8	D2	NA	D3	20k	6	w.w. 5	-011-3428
R9	D8	E8	D3	10k	1/2	comp ins 10	-022-2131
R10	D6	F6	D4	220	4.1/2	w.w. 5	-011-3471
R11	E8	H8	D2	47k	3/4	comp ins 10	-021-2214
R12	E8	H8	D2	47k	3/4	comp ins 10	-021-2214
R13	G2	J2	L4	220k	3/4	comp ins 10	-022-3311
R14	F7	J5	M7	2.7k	1/2	comp ins 10	-022-2060
R15	F7	J6	M7	2.7k	1/2	comp ins 10	-022-2060
R16	G5	K6	M7	180			

Cct ref	Component location: 119B (C.W.) Main cct	119B (R.T.) Main cct	Main layout	Value (F)	Rating (V)	Type and limit (± %)	Part No Z/5910-99 *Z1/5910-99
			CAPACITORS, FIXED				
C2	A5	A6	C2	0.01μ	1000	pap met tub 20	-011-5503
C3	A6	A7	C2	0.01μ	500	pap met tub 20	-011-5525
C4	B6	B6	C1	47p	750	mlded silvd mica 10	-012-3912
C5	B7	B7	D1	330p	750	mlded mica 5	-012-3942
C6	B4	B4	H2	100p	750	cer tub ins 2	-011-8321
C7	C4	D4	H2	0.01μ	1000	pap met tub 20	-011-5503
C8	C2	D3	M2	47p	750	mlded silvd mica 10	-012-3913
C9	C7	D7	G4	0.002μ	350	mica mlded 20	Z1/ZA 48017
C10	D7	E7	L4	0.001μ	1500	pap tub 20	Z1/ZA 52100
C11	D5	E5	G5	100p	750	cer tub ins 2	-011-8321
C12	D5	E5	C5	100p	750	cer tub ins 2	-011-8321
C13	D7	E7	L4	0.1μ	75	ins tub 20	Z1/ZA 52071
C14	D7	F7	C5	0.002μ	1500	mlded mica 20	*-911-4926
C15	D8	G8	D4	0.01μ	500	pap met tub 20	-011-5525
C16	F6	H2	M8	1.5p	750	cer tub ins 0.25p	-940-1724

Table 2001 - (cont)

Cct ref	Component location: 119B (C.W.) Main cct	119B (R.T.) Main cct	Main layout	Value (F)	Rating (V)	Type and limit (± %)		Part No Z/5910-99 *Z1/5910-99
			CAPACITORS, FIXED - (cont)					
C17	F7	H7	M8	62p	750	cer tub ins	2	-011-8316
C18	F8	L8	D2	0.01μ	500	pap met tub	20	-011-5525
C19	F7	J7	M7	330p	750	mlded mica	5	-012-3942
C20	G6	J4	M7	330p	750	mlded mica	5	-012-3942
C21*	G2	-	-	0.C02μ	1500	mlded mica	20	-911-4926

* Note: C21 is only fitted to models where pin 5 of PL1 is connected to the main h.t. supply.

Cct ref	Component location: 119B (C.W.) Main cct	119B (R.T.) Main cct	Main layout	Value (F)	Type and limit	Part No
			CAPACITORS, VARIABLE			
VC1	C5	C5	A2	92.4p	variable	Z/5910-99-016-0200
VC2	E4	F4	M5	75p	variable	Z1/ZA 52076

Cct ref	Component location: 119B (C.W.) Main cct	119B (R.T.) Main cct		Description	Part No
			VALVES		
V1	B5	B5	D1	Valve, electronic, CV138 (EF91)	Z/5960-99-000-0138
V2	C5	C5	C1	Valve, electronic, CV138 (EF91)	Z/5960-99-000-0138
V3	D5	E5	H4	Valve, electronic, CV3990 (RCA2E29)	Z/5960-99-000-3990
NL1	C3	D3	M2	Lamp, neon glow, 80V, 0.25W	X2/6240-99-996-2115
			INDUCTORS		
L1	A3	B3	G2	) M.O. inductor assy,	
L2	A3	B3	G2	) bands 1, 2 & 3	
L3	A3	B3	G2	)	

Table 2001 - (cont)

Cct ref	Component location: 119B (C.W.) Main cct	119B (R.T.) Main cct	Main layout	Type and limit	Part No
INDUCTORS - (cont)					
L4	A4	B4	G2	) M.O. inductor assy,	
L5	A4	B4	G2	) bands 4 & 5	
L6	A4	B4	G2	M.O. inductor assy, band 6	
L7	E4	G4	C3	)	
L8	F3	H3	C3	) P.A. turret assy,	
L9	F3	H3	C3	) bands 1-6	
L10	F3	G3	C3	) Turret coil No 11	Z1/ZA 51629
L11	E3	G3	C3	)	
L12	E3	G3	C3	)	
L13	C5	D5	H3	Inductor, r.f., 12-turns 30 s.w.g. on R7	Z1/ZA 51695
L14	B7	G7	D2	Choke, r.f., 2mH	Z1/ZA 51622
L15	D4	E4	G5	Choke, r.f., 2mH	Z1/ZA 51622
L16	C6	D6	L4	Choke, r.f., 2.3mH	Z1/ZA 51623
L17	F7	J6	M8	Choke, r.f., 2.3mH	Z1/ZA 51623
L18	E8	K8	E3	Choke, r.f., 2.3mH	Z1/ZA 51623
MISCELLANEOUS					
RT1	F6	J4	L7	Semi-conductor, diode CV425	Z/5960-99-000-0425
RT2	F6	J5	M7	Semi-conductor, diode CV425	Z/5960-99-000-0425
NL1	C3	D3	M2	Lampholder SBC	X2/6250-99-949-0092
M1	G7	J7	H5	Instrument, indicating, scaled 0-10	Z1/ZA 53681
S1	B3	C3	H3	Switch, wafer, single-pole, ceramic	Z1/ZA 52172
S2	E5	F5	B5	Switch, rotary, ceramic wafer, 7-way	Z1/ZA 52088
PL1	G5	04	N2	Plug, electrical, miniature, Jones type	Z3/5935-99-100-0528
SKT1	A6	A6	B2	Socket, electrical (crystal holder)	Z/5935-99-901-0038
J1	G8	M8	B4	Jack, telephone	Y1/YA 8277
K1	F8	-	B1	Key, w.t., single contact, No 5	Z1/ZA 51600

Table 2001 - (cont)

Cct ref	Component location: 119B (C.W.) Main cct	Component location: 119B (R.T.) Main cct	Component location: Main layout	Type and limit	Part No
MISCELLANEOUS - (cont)					
				Terminal post, spring-loaded	Z1/ZA 51594
				Knob, pointer, 1 in. dia x 1/4 in. bore	Z1/ZA 26407
				Knob, round base, pointed 1.3/8 in. long	Z1/ZA 47361
				Knob, round, with pointer 3/4 in. dia	Z1/5355-99-901-0037
				Holder, valve, B7G	Z/5935-99-056-0094
				Holder, valve, octal	Z1/ZA 15890
				Screen, valve, B7G	Z/5960-99-097-0008
				Board, terminal, tag, 3-way	Z1/ZA 51570
				Board, terminal, tag, 14-way	Z1/ZA 51590

Table 2002 - Additional components used in 119B (R.T. model)

Cct ref	Component location: Main cct	Component location: Main layout	Value (Ω)	Rating (W)	Type and limit (± %)	Part No
RESISTORS, FIXED						
R16	J5	M7	200			
R17	K3	E3	20k			
R18	K2	E3	6k			
R19	L7	C8	270			
R20	M7	D8	470k			
R21	M7	C8	1.8k			
R22	M4	C7	270k			
R23	M4	C7	1M			

Cct ref	Component location: Main cct	Component location: Main layout	Value (μF)	Rating (V)	Type and limit (± %)	Part No
CAPACITORS						
C22	K7	D7	8			
C23	L7	D7	10			
C24	L5	C7	0.01			
C25	M5	C7	0.002			
C26	M7	D8	10			
C27	N7	C7	0.1			
C28	L7	C7	0.002			

Table 2002 - (cont)

Cct ref	Component location: Main cct	Component location: Main layout	Description	Part No
			TRANSFORMERS	
T1	N6	D7	Transformer, microphone	
T2	L2	C8	Transformer, modulation	
			VALVES	
V4	L5	D7	EL70	
V5	M5	D8	EF72	
			MISCELLANEOUS	
J2	06	B2	Jack, telephone	Y1/YA 8277
S3	L3	B2	Switch, 2-pole, on/off	

Table 2003 - Receiver component schedule

Cct ref	Component location: Main cct	Component location: Main layout	Value (Ω)	Rating (W)	Type and limit (±%)		Part No Z/5905-99
				RESISTORS			
R1	D4	B4	270k	1/4	comp ins	10	-022-3092
R2	D4	B4	330	1/4	comp	10	-022-1173
R3	E1	C4	1k	1/2	comp ins	10	-022-2006
R4	E-F5	B4	270k	1/4	comp ins	10	-022-3092
R5	H4	D4	1M	1/4	comp ins	10	-022-1173
R6	H4	D3	470	1/8	comp ins	10	-940-8185
R7	J1	D4	1k	1/2	comp ins	10	-022-2006
R8	H7-8	D-E4	10k	1/8	comp ins	10	Z1/5905-99 -940-8184
R9	L-M6	F4	39k	1/2	comp ins	10	-022-2207
R10	K5	C3	39k	1/2	comp ins	1●	-022-2207
R11	L1	F7	1k	1/2	comp ins	10	-022-2006
R12	K3-4	E4	270k	1/4	comp ins	10	-022-3092
R13	M7	F4	470k	1/4	comp ins	10	-022-3121
R14	L3-4	F7	1.2k	1/2	comp ins	10	-022-2018
R15	N3	F6	47k	1/4	comp ins	10	-022-2214
R16	M3-4	F6	270k	1/4	comp ins	10	-022-3092
R17	N3-4	F6	270k	1/4	comp ins	1●	-022-3092
R18 A & B	N5	F7	47k	1/4	comp ins	10	-022-2214
R19	N-04	F6	470k	1/4	comp ins	10	-022-3121
R20	03-4	F6	1k	1/2	comp ins	10	-022-2006
R21	03	F2	1k	1/2	comp ins	10	-022-2006
R23	K6	C4	82k	1/2	comp ins	10	-022-3030
RV1	M5	F1	5k	3	w.w. linear		Z1/ZA 52045

Table 2003 - (cont)

Cct ref	Component location: Main cct	Component location: Main layout	Value (F)	Rating (V)	Type and limit (± %)		Part No Z/5910-99
			CAPACITORS				
C1	A3	A1	120p	500	cer tub	2	Z1/ZA 52099
C2	A1	B7	47p	750	cer tub ins	2	-011-8313
C3	B1	B7	100p		cer tub ins	2	-011-8321
C4) C5) C6) C7)			))))	Replaced by antenna trimmer			
C8	B4	B5	3-30p		variable concentric		-016-7006
C9	D2	B4	100p	750	cer tub ins	2	-011-8321
C10	D5	B4	0.01µ	200	pap tub met	25	-011-5627
C11	F1	C7	3-30p		variable concentric		-016-7006
C12	F2	C7	3-30p		variable concentric		-016-7006
C13	F3	C7	3-30p		variable concentric		-016-7006
C14	F3	C6	3-30p		variable concentric		-016-7006
C15	F4	C5-6	3-30p		variable concentric		-016-7006
C15A	G4	C5-6	15p	750	mlded mica	10	
C16	E4	C4	0.01µ	350	pap tub met	25	-011-5625
C17	D4	B3	0.1µ	75	pap tub	20	Z1/ZA 52071
C18	H2	C4	100p	750	cer tub ins	2	-011-8321
C19	J4	C4	0.01µ	350	pap tub met	25	-011-5625
C20	H4	D3	0.1µ	75	pap tub	20	Z1/ZA 52071
C21	F6	D7	3-30p		variable concentric		-016-7006
C22*	F6	D7	324p				
C23	F6	D7	3-30p		variable concentric		-016-7006
C24*	F6	D7	639p				
C25	F7	D7	3-30p		variable concentric		-016-7006
C26*	F7	D7	1346p				
C27	F7	D6	3-30p		variable concentric		-016-7006
C28*	F8	D6	2732p				
C29	F8	D5	3-30p		variable concentric		-016-7006
C30	F8	D5-6	15p	350	mlded mica	10	-012-3902
C31	M7	F3	330p	750	mlded mica	5	-012-3942
C32	H6	E4	100p	750	cer tub ins	2	-011-8321
C33	H7	E4	100p	750	cer tub ins	2	-011-8321
C34	K8	C3	2µ	250	pap tub met	25	-011-9840
C35	K4	E4	0.01µ	200	pap tub met	25	-011-5627
C36	K4	F3	0.01µ	350	pap tub met	25	-011-5625

Table 2003 - (cont)

Cct ref	Component location: Main cct	Main layout	Value (F)	Rating (V)	Type and limit (±%)		Part No Z/5910-99
			CAPACITORS - (cont)				
C37	L4	E2-3	0.1µ	75	pap tub	20	Z1/ZA 52071
C38	M8	F6	100p	750	cer tub ins	2	-011-8321
C39	N5	F7	0.01µ	200	pap tub met	25	-011-5627
C40	N4	F6	100p	750	cer tub ins	2	-011-8321
C41	N5	F6	0.01µ	200	pap tub met	25	-011-5627
C42	●.	E2	2µ	250	pap tub met	25	-011-9840
C43	01	F2	0.001µ	350	mlded mica	10	-012-4702
C44	●5	F-G2	2µ	500	pap rect met	15	Z1/ZA 52703
C45	L7	F3	30p	500	cer tub	5	-013-2279
C46	C4	E6	6.8p	750	cer tub	0.5p	-011-8276
C47	G4	C6	6.8p	750	cer tub	●.5p	-011-8276
C48	E8	D6	6.8p	750	cer tub	0.5p	-011-8276
C49	J8	C3	0.0015µ	350	mlded mica	10	-012-4705
Note:	Capacitors indicated thus * are groups of standard preferred types selected as near as possible to the ideal values shown. Replacements should be demanded from those listed below.						
C22		Qty 1	330p	750	mlded mica	2	-012-3941
C24		Qty 1	620p	350	mlded mica	2	Z1/5910-99 -940-8227
C26		Qty 2	680p	350	mlded mica	2	-940-3953
C28		Qty 2	1350p	350	mlded mica	2	-940-8228
			CAPACITORS, VARIABLE				
VC1-1	C4	C2	243p		Cap, variable, 3-section, 242.2pF swing		Z1/ZA 52103
VC1-2	H4	C2	243p				
VC1-3	E8	D2	243p				
VC2	D4	B1	22.8p		Cap, variable		Z1/ZA 521●1
VC3	E8	F-G1	13.3p		Cap, variable		Z1/ZA 521●2
VC4	N4		5.5p		Cap, variable		-016-0039

Cct ref	Component location: Main cct	Main layout	Description	Part No Z/5960-99
			VALVES	
V1	D2	B4	Valve, electronic, CV131 (EF92)	-000-0131
V2	H2	C-D4	Valve, electronic, CV138 (EF91)	-000-0138
V3	J6-7	E4	Valve, electronic, CV138 (EF91)	-000-0138
V4	L2	E3	Valve, electronic, CV131 (EF92)	-000-0131
V5	O2	F3	Valve, electronic, CV138 (EF91)	-000-0138
V6	M6-7	F4	Valve, electronic, CV138 (EF91)	-000-0138

Table 2003 - (cont)

Cct ref	Component location: Main cct	Component location: Main layout	Description	Part No Z/5960-99
			VALVES - (cont)	
V7	N2	F2	Valve, electronic, CV1092 (EA50)	-000-1092
			or	
	N2	G2	Semi-conductor diode, CV425	-000-0425
NL1	K8	B1-2	Valve, electronic, 9512S	Z1/ZA 28449
			TRANSFORMERS AND INDUCTORS	
IF/T1	K2	E-F4	Transformer, i.f., No 16	Z1/ZA 49721
IF/T2	M2	E-F2	Transformer, i.f., No 16	Z1/ZA 49721
AF/T1	N-O1	F1	Transformer, a.f., No 46	Z1/ZA 22420
L1	A4	A4	Inductor, r.f.	Z1/ZA 51628
L2	B1	A7	Transformer, r.f., band 1	Z1/ZA 51616
L3	B2	A7	Transformer, r.f., band 2	Z1/ZA 51625
L4	B3	A7	Transformer, r.f., band 3	Z1/ZA 51619
L5	B3	A6	Transformer, r.f., band 4	Z1/ZA 51618
L6	B4	A6	Transformer, r.f., band 5	Z1/ZA 51617
L7	F1	B7	Transformer, r.f., mixer, band 1	Z1/ZA 51615
L8	F2	B7	Transformer, r.f., mixer, band 2	Z1/ZA 51614
L9	F3	B7	Transformer, r.f. mixer, band 3	Z1/ZA 51607
L10	F3	B6	Transformer, r.f. mixer, band 4	Z1/ZA 51608
L11	F4	B6	Transformer, r.f. mixer, band 5	Z1/ZA 51609
L12	G6	C7	Transformer, r.f. osc, band 1	Z1/ZA 51612
L13	G6	C7	Transformer, r.f. osc, band 2	Z1/ZA 51611
L14	G7	C7	Transformer, r.f. osc, band 3	Z1/ZA 51610
L15	G7-8	C6	Transformer, r.f., osc, band 4	Z1/ZA 51626
L16	G8	C6	Transformer, r.f. osc, band 5	Z1/ZA 51627
L17	J6	D4	Inductor, r.f., 3.5mH	Z1/ZA 51630
L18	K-L7	G4	Transformer, b.f.o., 455kc/s	Z1/ZA 51621
			SWITCHES	
S1-1	A3C3	B6	Switch, wafer, 2-pole, 6-way	Z1/ZA 52084
S1-2	E3G3	C6	Switch, wafer, 2-pole, 6-way	Z1/ZA 52084
S1-3	F7H7	D6	Switch, wafer, special, No 37	Z1/ZA 52087
S2	L6	F-G1	Switch, lever-operated, 2-pole, change-over	Z/5930-99-940-2534

Table 2003 - (cont)

Cct ref	Component location: Main cct	Component location: Main layout	Description	Part No
			MISCELLANEOUS	
PL1	06	F-G1	Plug, fixed, 4-pole	Z/5935-99-011-6722
J1	N1	F-G1	Jack, telephone	Y1/5935-99-932-6349
			Terminals, post, spring-loaded	Z1/ZA 51594
			Knob, round, with pointer	Z1/5355-99-901-0037
			Knob, round, fluted, 1.3/16 in. dia	Z1/ZA 51580
			Knob, moulded pointer	Z1/ZA 59765
			Drum, dial, metal	Z1/ZA 51603
			Dial, scale, plastic	Z1/ZA 51595
			Gear, spur, bushed	Z1/ZA 51601
			Lampholder SBC	X2/6250-99-949-0092
			Board, terminal, 5-way, 1.15/16 in. x 3/4 in.	Z1/ZA 51591
			Board, terminal, 5-way, 1.7/16 in. x 1.1/8 in.	Z1/ZA 51592
			Board, terminal, 6-way	Z1/ZA 51593
			Board, terminal, 22-way	Z1/ZA 51588
			Speed nuts	Z1/ZA 11434
			Screws, special, BA, knurled head	Z1/ZA 51606

Table 2004 - Power supply unit component schedule

Cct ref	Component location: Main cct	Component location: Main layout	Value (Ω)	Rating (W)	Type and limit (± %)		Part No
			RESISTORS				
R1	G2	G6-7	680	10	w.w.	5	Z/5905-99-011-3060
R2	F2	C7	270k	3/4	comp	5	Z/5905-99-021-3091
R3	E6	H3	3	6	w.w.	5	Z1/ZA 52052
R4	B2-3	B6	450k	3/4	film	1	Z1/5905-99-022-5925

Cct ref	Component location: Main cct	Component location: Main layout	Value (μF)	Rating (V)	Type and limit (± %)		Part No
			CAPACITORS				
C1A	F2	D6-7	2	600	pap rect met		Z1/ZA 52074
C1B	F2	D6-7	2	600			
C1C	F-G3	D6-7	2	400			
C2	D2-3	F4	0.01	1000	pap ins tub	20	Z/5910-99-011-5503

Table 2004 - (cont)

Cct ref	Component location: Main cct	Component location: Main layout	Value (µF)	Rating (V)	Type and limit (± %)		Part No
CAPACITORS - (cont)							
C3	E2	F4	0.01	1000	pap ins tub	20	Z/5910-99-011-5503
C4	C2	F4	0.01	1200 a.c.	pap met tub	10	Z1/ZA 48691
C5	A3	F3	0.01	1000	pap ins tub	20	Z/5910-99-011-5503
C6	A3-4	C6	0.01	1000	pap ins tub	20	Z/5910-99-011-5503
C7	G6	G5-6	2	250	pap met tub	25	Z/5910-99-011-9840
C8	A8	G3	2	250	pap met tub	25	Z/5910-99-011-9840
C9	D4	N7	0.5	75	pap non met	25	Z1/5910-99-940-8585
C10	E4	N7	0.5	75	pap non met	25	Z1/5910-99-940-8585
C11	D4	N8	1	200	pap met tub	25	Z/5910-99-011-9836
C12	E5	N8	0.5	75	pap non met	25	Z1/5910-99-940-8585
C13	D5	N7	1	200	pap met tub	25	Z/5910-99-011-9836
C14	D5	N7	0.5	75	pap non met	25	Z1/5910-99-940-8585

Cct ref	Description	Part No
MISCELLANEOUS		
M1	Instrument, indicating	Z1/ZA 54211
RT1	Rectifier, copper oxide, 1mA, inst type	Z1/6130-99-100-2549
RT2	Rectifier, metal, selenium, half-wave	Z1/ZA 52089
RT3	Rectifier, metal, selenium, full-wave	Z/ZA 52090
S1	Switch, rotary, 4-wafer, ceramic	Z1/ZA 52091
S2	Switch, rotary, 8-pole, 2-way, ceramic	Z1/ZA 52083
PL1	Plug, 2-pole, fixed	Z1/ZA 49760
PL2	Plug, 2-pole, fixed, polarized	Z1/ZA 35437
SKT1	Socket, electrical, fixed, 4-pole	
SKT2	Socket, electrical, fixed, 6-pole	Z1/5939-99-940-2297
T1	Transformer, power, 100/240V	Z1/ZA 51596

Table 2004 - (cont)

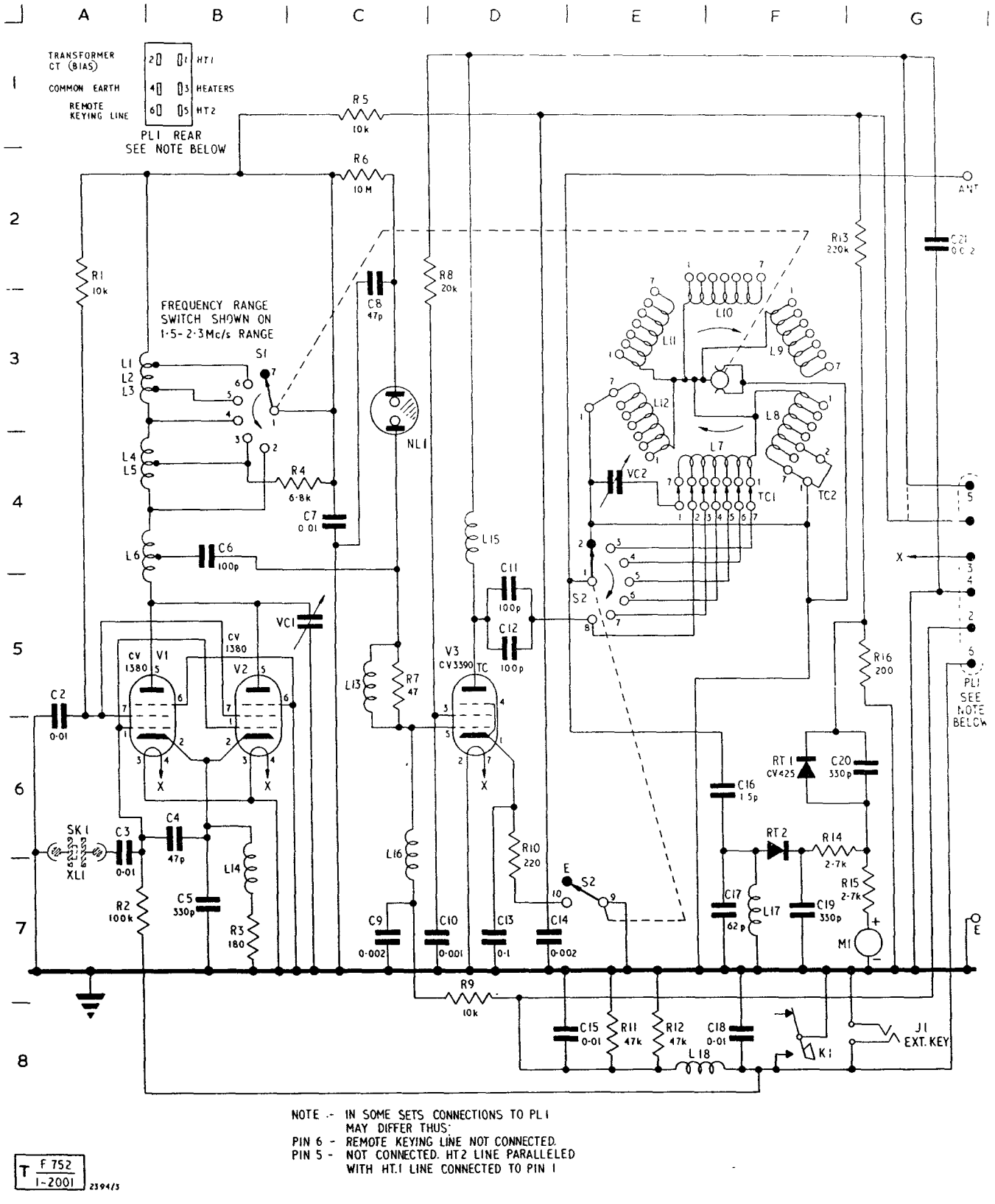
Cct ref	Description	Part No
	MISCELLANEOUS - (cont)	
L1	Inductor, a.f., 4.5H, 10CmA	Z1/ZA 51587
L2	Inductor, r.f., 10.1/2 turns 14 s.w.g.	Z1/ZA 51613
L3	Inductor, r.f., 10.1/2 turns 14 s.w.g.	Z1/ZA 51613
L4	Inductor, r.f., 10.1/2 turns 14 s.w.g.	Z1/ZA 51613
L5	Inductor, r.f., 10.1/2 turns 14 s.w.g.	Z1/ZA 51613
	Fuse unit, single way, 7A, 250V	X2/5920-99-059-0100
	Carrier, fuse link, cap, single way, 7A	X2/5920-99-059-0101
	Fuse link, cartridge, 2A, 440V a.c.	X2/5920-99-059-0110
	Fuse link, cartridge, 250mA	X2/5920-99-059-0107
	Holder, valve, electronic, 4-pin, UX	Z/5935-99-056-1111
	Knob, round base, pointed	Z1/ZA 47361
	Board, terminal, tag, 3-way	Z1/ZA 51575
	Board, terminal, tag, 5-way	Z1/ZA 51574
	Panel, tag, 2-way, single row	Z1/ZA 43871
	Panel, tag, 5-way, single row	Z1/ZA 43747
	Panel, tag, 7-way, single row	Z1/ZA 43746
	Screws, special, knurled head	Z1/ZA 51606
	Terminal post, spring-loaded	Z1/ZA 51594
	Vibrator, non sync, 6V	Z1/ZA 48490
	Clip, vibrator retaining	Z1/ZA 30974

Table 2005 - Contents of Cases, spare parts to CES 42630 (Service Edition)

Item	Qty	Description	Part No
		MISCELLANEOUS	
1	1	Iron, soldering, 2.1/2 oz	F1/FA 13432
2	1	Pliers, snipe nose, 5 in.	F1/5120-99-910-5533
3	1	Screwdriver, electricians, 2.1/2 in.	F1/FA 16770
4	1	Fuse link, cartridge, 25A, 25V	X2/XB 21081
5	1	Kit, adaptor, lampholder and plug	X2/XB 20779
6	1	Lamp, neon, glow, 80V, 0.25W	X2/6240-99-996-2115
7	1	Headset, earphone	Y1/YA 11355
8	3	Fuse, cartridge, No 1, 250mA	Z1/ZA 3579
		or	
		Fuse link, cartridge, 250mA	X2/5920-99-059-0107

Table 2005 - (cont)

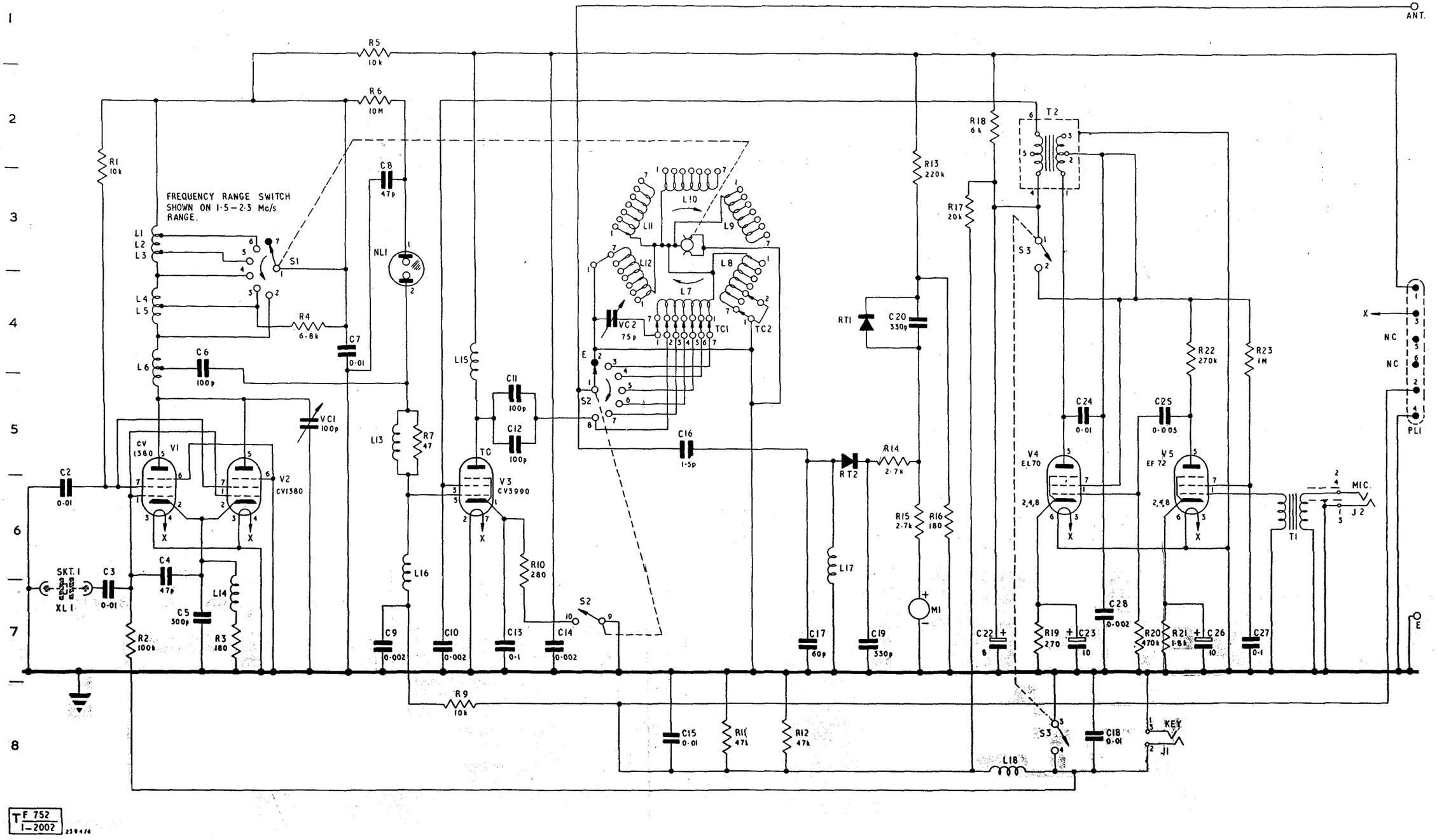
Item	Qty	Description	Part No
		MISCELLANEOUS - (cont)	
9	3	Fuse, cartridge, No 1, 2A or Fuse link, cartridge, 2A	Z1/ZA 3586 X2/5920-99-059-0110
10	2	Valve, electronic, CV131	Z/5960-99-000-0131
11	2	Valve, electronic, CV138	Z/5960-99-000-0138
12	1	Valve, electronic, CV1092	Z/5960-99-000-1092
13	1	Valve, electronic, CV3990	Z/5960-99-000-3990
14	1	Valve, electronic, 9512S	Z1/ZA 28449
15	1	Adaptor, crystal, 2-pin	Z1/ZA 49402
16	2	Connector, single, No 225, 1 ft	Z1/ZA 51202
17	1	Connector, 1/2 pt, No 1, 12 ft x 1 ft	Z1/ZA 51201
18	1	Connector, 2 pt, No 23 incl fuse,cartridge (battery lead)	X2/XB 21081
19	1	Connector No 22 (mains lead)	Z1/ZA 51212
20	1	Connector, 4 pt, No 114, 1 ft 6 in.	Z1/ZA 51211
21	1	Connector, 6 pt, No 75, 1 ft 6 in.	Z1/ZA 51210
22	4	Insulators, w.t., shackle	Z1/ZA 28381
23	1	Mains tester neon No 1	Z1/ZA 49403
24	1	Reel, antenna, 2.5/8 in. x 2.1/8 in. x 1.1/16 in., No 2	Z1/ZA 51205
25	1	Case,metal	Z1/ZA 51203
26	1	Cover, metal	Z1/ZA 51209



NOTE :- IN SOME SETS CONNECTIONS TO PL1 MAY DIFFER THUS:
PIN 6 - REMOTE KEYING LINE NOT CONNECTED.
PIN 5 - NOT CONNECTED. HT2 LINE PARALLELED WITH HT.1 LINE CONNECTED TO PIN 1

T F 752 1-2001 2394/3

Fig 2001 - Transmitter circuit diagram (119B)



TF 752 i-2002

Fig 2002 - Transmitter circuit diagram (119 R.T.)

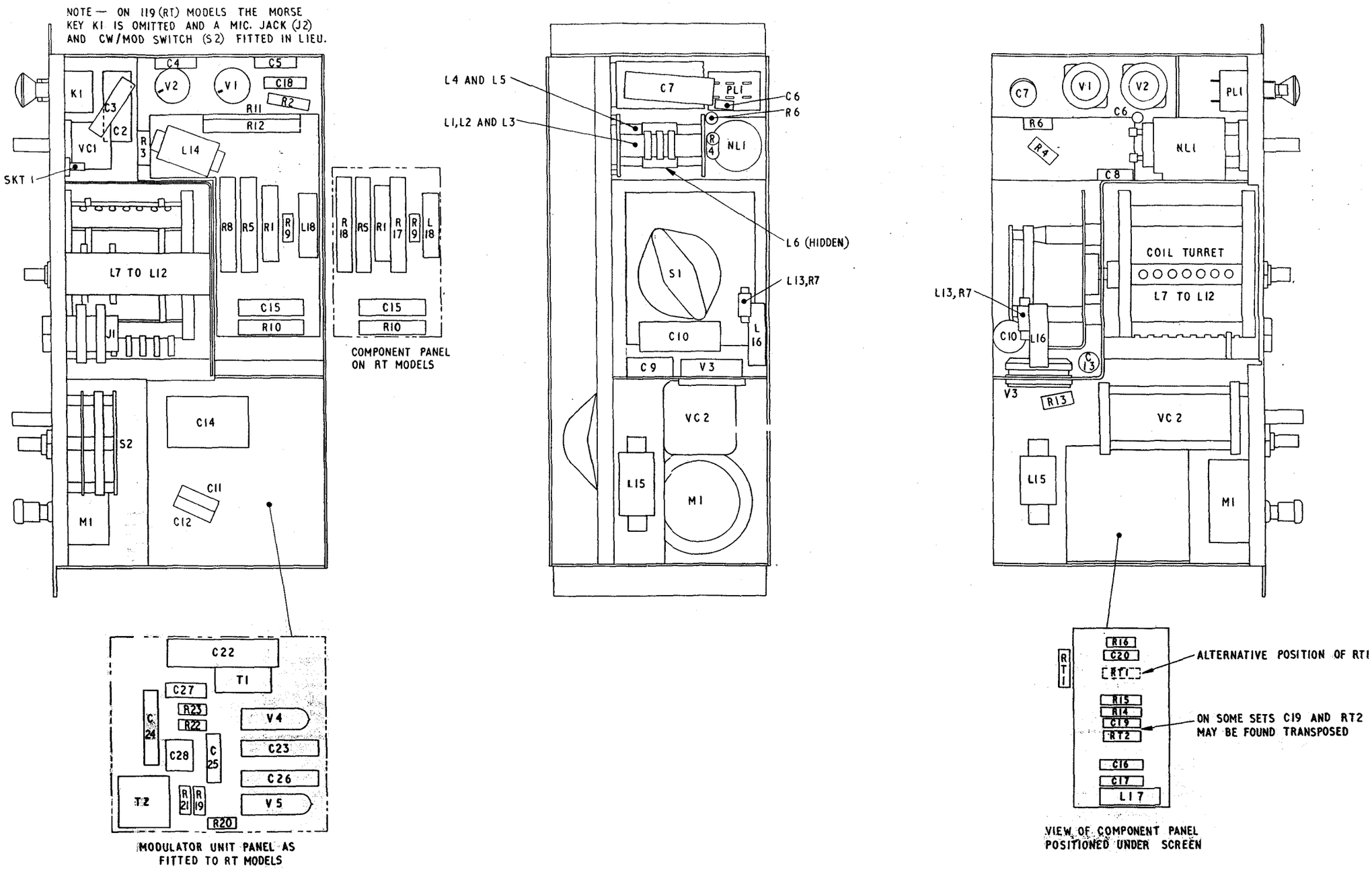


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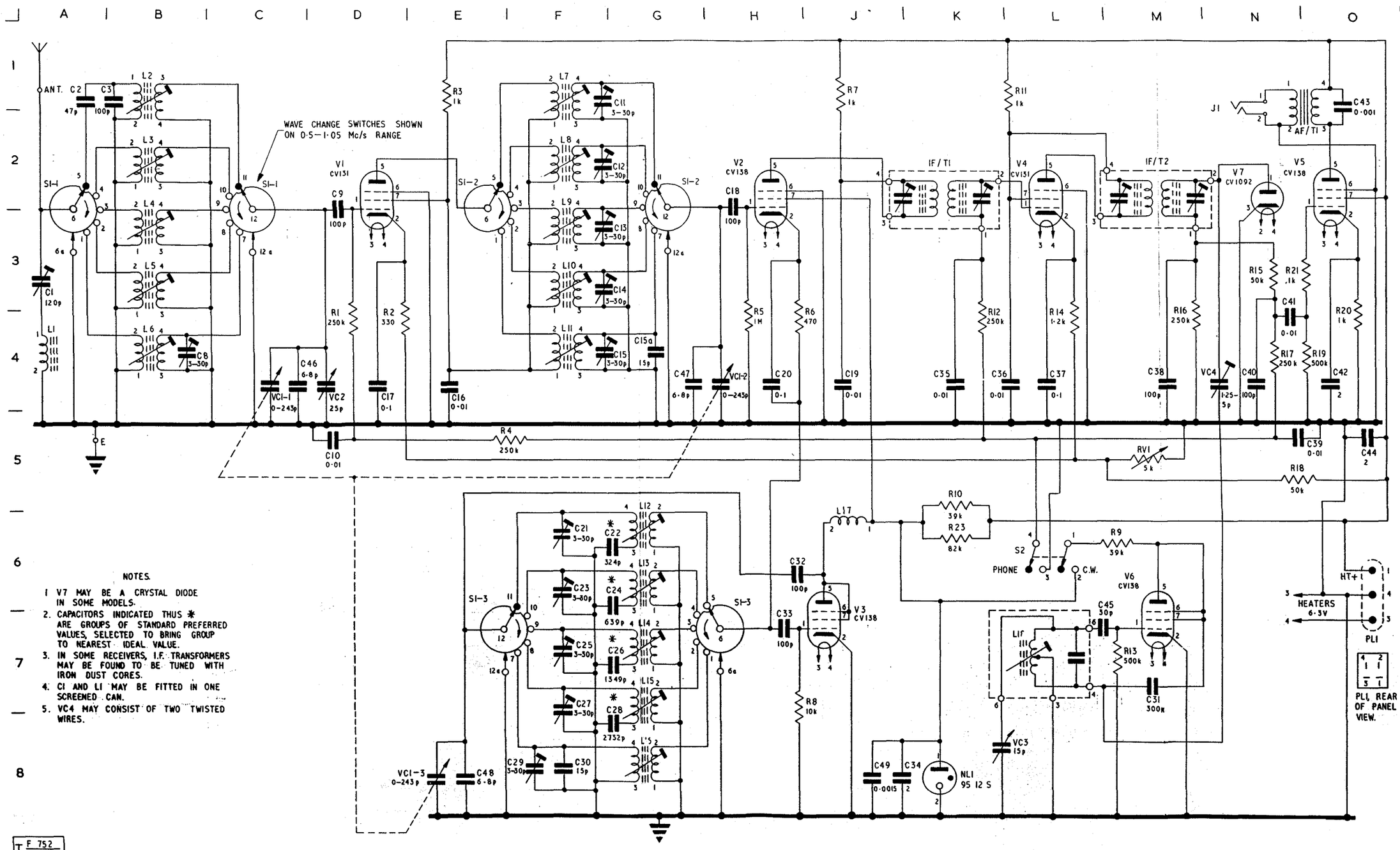
Fig 2003 - Transmitter component layout



NOTES.

1. V7 MAY BE A CRYSTAL DIODE IN SOME MODELS.
2. CAPACITORS INDICATED THUS * ARE GROUPS OF STANDARD PREFERRED VALUES, SELECTED TO BRING GROUP TO NEAREST IDEAL VALUE.
3. IN SOME RECEIVERS, I.F. TRANSFORMERS MAY BE FOUND TO BE TUNED WITH IRON DUST CORES.
4. C1 AND L1 MAY BE FITTED IN ONE SCREENED CAN.
5. VC4 MAY CONSIST OF TWO TWISTED WIRES.

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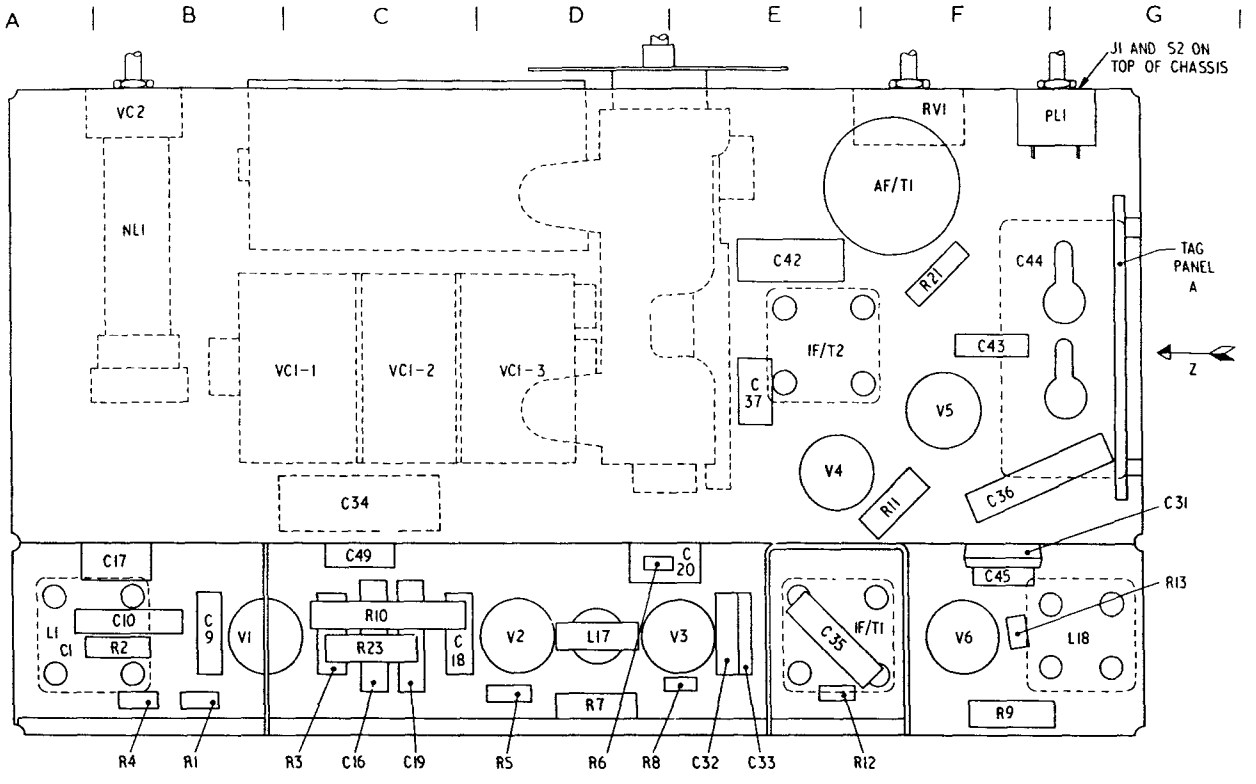
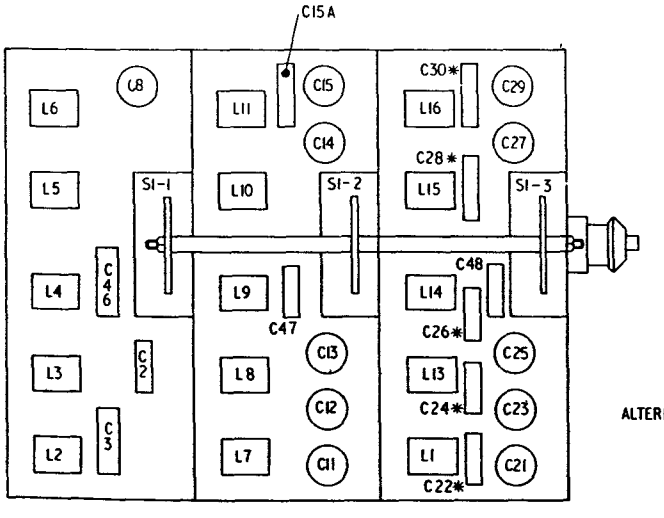
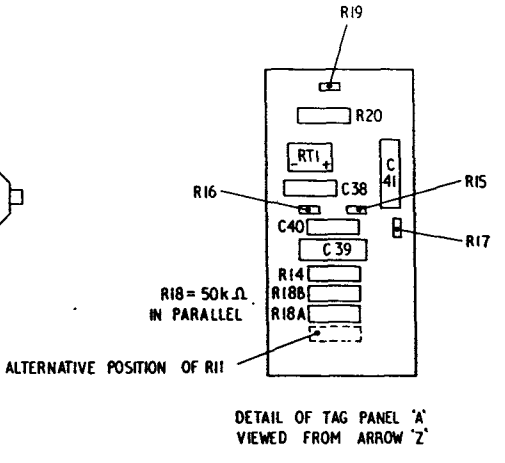
Fig 2004 - Receiver circuit diagram



RECEIVER 119B– COMPONENT LAYOUT (COIL UNIT AND INTERNAL SCREEN REMOVED)



DETAILS OF COIL UNIT



DETAIL OF TAG PANEL 'A' VIEWED FROM ARROW 'Z'

NOTE:- CAPACITORS INDICATED THUS * ARE GROUPS OF STANDARD PREFERRED VALUES, SELECTED TO BRING GROUP TO NEAREST IDEAL VALUE

T F 752 / 1-2005 2394/10

Fig 2005 - Receiver component layout

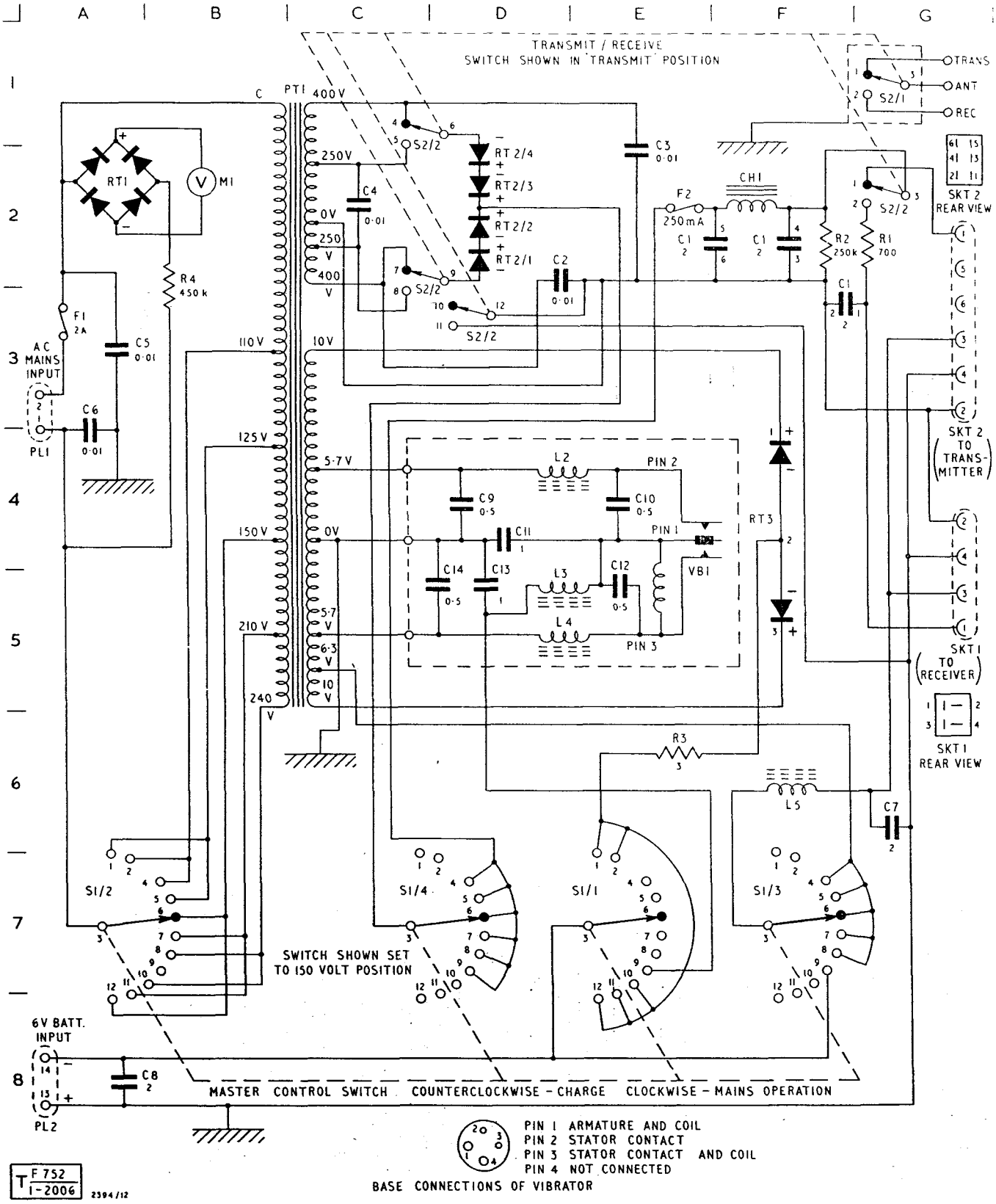
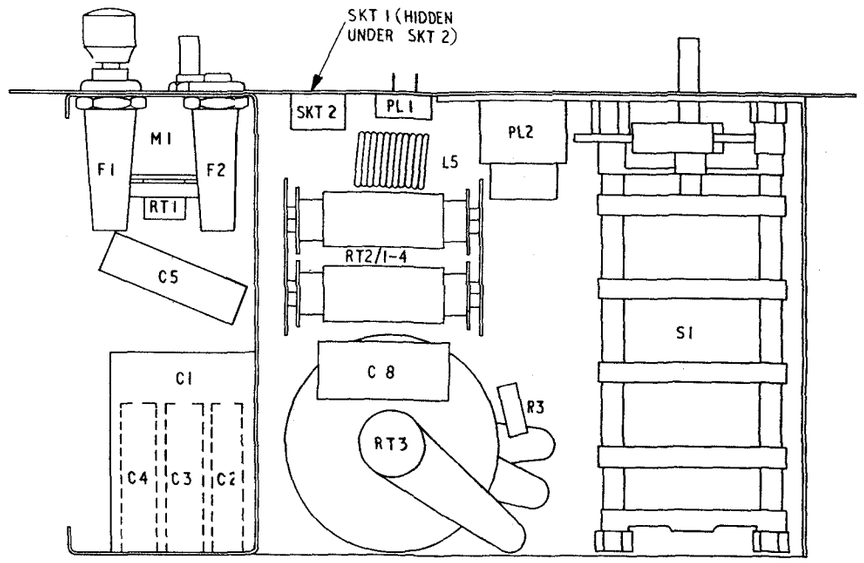
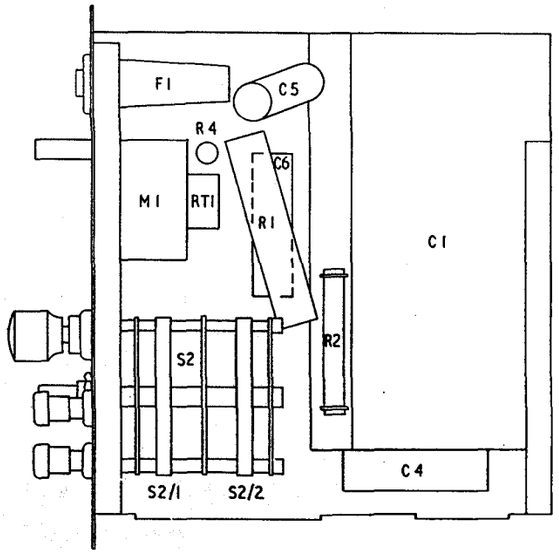
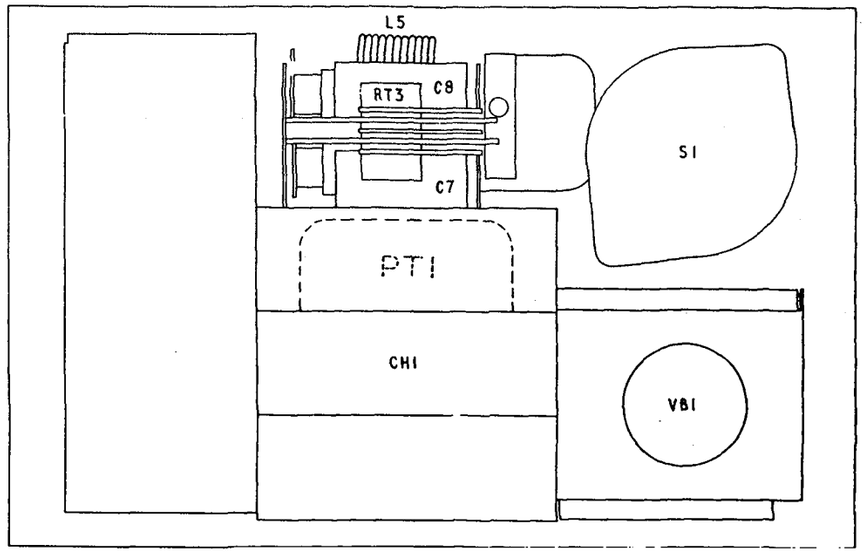
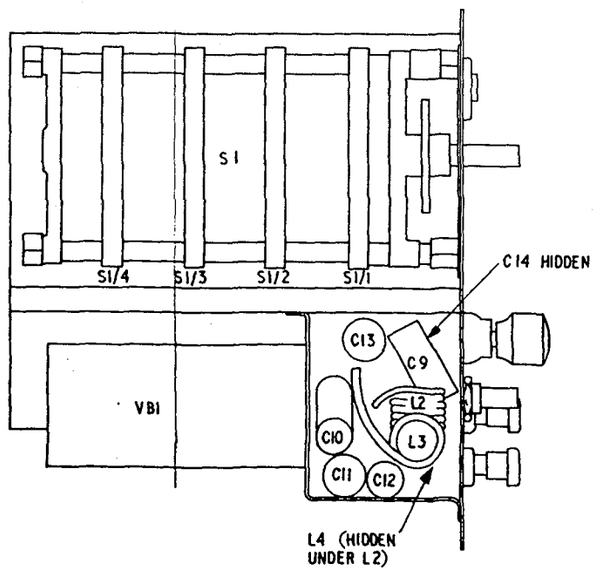


Fig 2006 - Power supply unit circuit diagram









T F 752 I-2007 2384/7

Fig 2007 - Power supply unit component layout

END