F 724

R E S T R I C T E D

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

TELECOMMUNICATIONS
~~F 564~~

WIRELESS SET NO. 88, TYPE 'A', A.F.V.

TECHNICAL HANDBOOK - SECOND TO FOURTH ECHELON WORK

ERRATA

Note: This Page C will be filed immediately in front of Page 1, Issue 1, dated 3 Nov 1950.

1. The following amendments will be made to this regulation:-

Page 8, para 29, line 2

For: '0.6 and 0.65A'
Read: '0.55 and 0.65A'

Page 18, para 54, line 1

For: 'The regulator is wound with 1,600 turns of No. 32 S.W.G. Lewmex F wire.'
Read: 'The regulator is wound with 600 turns of No. 26 S.W.G., or 575 turns of No. 25½ S.W.G. Lewmex F wire.'

F. 424

Page 18, sub.para.55(b), line 1,

For: '0.6 to 0.65μ'
Read: '0.55 to 0.65μ'

Encl 2 to 57/Maint/3513

ELECTRICAL AND MECHANICAL ENGINEERING REGULATIONS
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TELECOMMUNICATIONS
F ~~664~~ 724

WIRELESS SET NO.88, TYPE 'A', A.F.V.

TECHNICAL HANDBOOK - SECOND TO FOURTH ECHELON WORK

Erratum

Note: This Page 02 will be filed immediately in front of Page 1, Issue 1, dated 3 Nov 50.

1. The following amendment will be made to this Regulation:-

Page 9, para 34, line 1,

After 'the cooler' insert ', or locking screw'

57/Maint/3513

WIRELESS SET NO. 88, TYPE 'A', A.F.V.

TECHNICAL HANDBOOK - SECOND TO FOURTH ECHELON WORK

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VOLTAGE ADJUSTMENT

1. Before installing the equipment in a vehicle it is necessary to adjust the L.T. output from the power supply unit to 1.4V, when connected to the Wireless set No. 88 with which it is to be installed. To do this, remove the case from the power supply unit, connect to the Wireless set No. 88 and a 12V battery, switch on and allow to run for 15 minutes for the carbon-pile regulator to warm up. Measure the L.T. voltage with an Avometer, universal, 40-range. The measurement can conveniently be made between the chassis and that end of the slide resistor RV2 which is nearer the front panel. If this voltage is not 1.4V correct by adjusting RV2.

SPECIFICATION TESTING

Test equipment

2. Test equipment required to maintain the Power supply and L.F. amplifier unit No. 2 is listed in Table 1. With regard to Item 2 therein, the instruments are specified in order of preference. Should only the Meter output power No. 5 be available it will be necessary to use an attenuator in conjunction with it in order to increase its range. A suitable arrangement is shown in Fig. 1; in this case the range is increased twelve times, i.e. the indication on the meter will be a twelfth of the total power applied.

Table 1 - Power supply and L.F. amplifier unit No. 2 - equipment required for testing

Item No.	Quantity	Test equipment
1	1	Avometer, universal, 40-range
2	1	Wattmeter, absorption, No. 1; Meter output power No. 3 Mk. 1 or 2; or Meter output power No. 5 (see para. 2)
3	1	Oscillator, beat frequency No. 5
4	1	Voltmeter, valve, 150V, No. 1 or No. 2
5	2	Voltmeters - range 0 to 20V

Table 1 - (contd.)

Item No.	Quantity	Test equipment
6	2	Ammeters - range 0 to 2.5A
7	1	Ammeter - range 0 to 1A
8	2	12V secondary batteries
9	1	1.0Ω resistor, 50W rating, ± 10%
10	1	2.0Ω potentiometer, 100W rating
11	1	8.5Ω potentiometer, 20W rating
12	1	3.6Ω resistor, 20W rating, ± ½%
13	1	6.0Ω resistor, 10W rating, ± 2%
14	1	500Ω resistor, ½W rating, ± 2%
15	2	50Ω resistors, ½W rating, ± 2%
16	1	5.0Ω resistor, ½W rating, ± 2%
17	1	100Ω resistor, ¼W rating, ± 2%
18	2	450Ω resistors, ½W rating, ± 2%
19	1	45Ω resistor, ½W rating, ± 2%
20	1	6.8Ω resistor, 1W rating, ± 2%
21	1	7,000Ω resistor, 1W rating, ± 2%
22	1	3,900Ω resistor, 1W rating, ± 2%
23	1	14.00Ω resistor, 1W rating, ± ½%
24	1	4.00Ω resistor, 1W rating, ± ½%
25	1	2.33Ω resistor, 1W rating, ± ½%
26	1	Transformer assemblies, microphone and output No. 1 (ZA 33402)

3. The test equipment required to maintain the Wireless set No. 88 is listed in Tels. F 654.

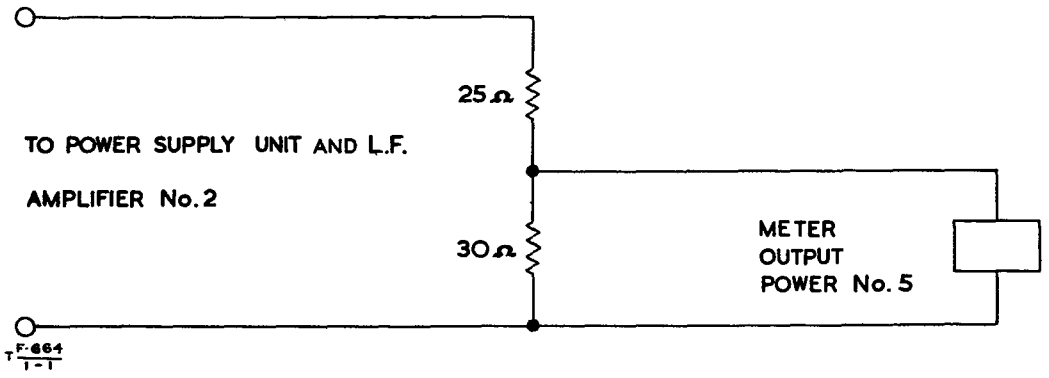

Fig. 1 - Attenuator for use with Meter output power No. 5

Battery connections and loading

4. It is preferable that the power supply shall be continuously variable over a limited range. This may be achieved externally by connecting a Supply unit rectifier No. 13 or No. 19 and varying either the input or output. Alternatively, secondary batteries may be used and connected as follows: Connect two 12V secondary batteries in series. Across the 10 and 18V terminals on the batteries connect a 2Ω potentiometer, and across the 18 and 24V terminals connect a 1Ω resistor. The potentiometer

gives a variable supply to PL1 on the Power supply and L.F. amplifier unit to cover the range 11 to 16V; the resistor discharges the remaining cells by an approximately equal amount, see Fig. 2.

5. Connect dummy load resistors of 7kΩ, 3.9kΩ, 1kΩ, 2.33Ω and 1Ω between pins A, B, C, D and E of PL2 and earth, respectively. Note that the value of the resistors are allowed very little tolerance. It is advised that when any quantity of power supply units are to be repaired a test panel is constructed as described in paras. 35 to 39.

6. Switch ON the supply, adjust it to 12V and set up:-

(a) RV1 to give 7.00V across C3

(b) RV2 to give 1.4V output across the 2.33Ω resistor.

7. Leave the supply switched ON for 15 minutes and then readjust the supply voltage, using, if necessary, RV1 and RV2. Filament voltages should then be within the limits shown in Table 2.

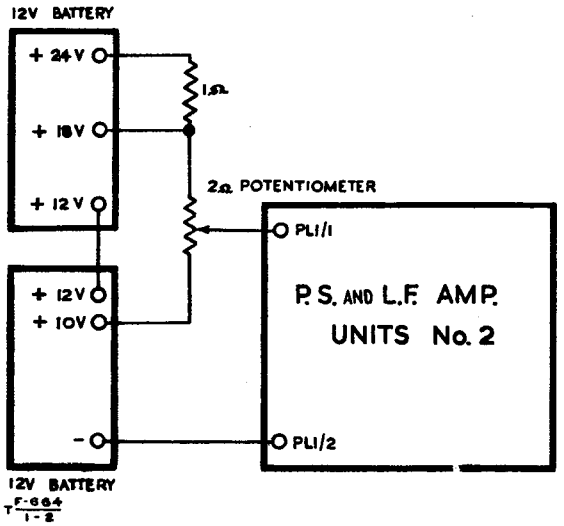

Fig. 2 - Method of obtaining variable D.C. supply

Valve	CV No.	Type	Filament voltages	
			Minimum	Maximum
V1	CV 135	DDR3	6.0V	6.6V
V2	CV 135	DDR3	6.0V	6.6V
V3	CV 807	3A4	2.6V	3.0V
V4	CV 784	1S5	1.2V	1.5V

Table 2 - Valve filament voltages

Supply voltages

8. Using the circuit described in para. 4, reduce the input voltage to 11V and measure the regulator output across C3 and the H.T. voltage across the 7,000Ω resistor. Change from RECEIVE to SEND by short-circuiting pins 3 and 5 on PL3, and repeat the measurement. (The voltages should be within the limits as shown in Table 3).

9. Remove the connection between the pins and repeat the test with an input of 16V. The voltages should again be within the limits shown in Table 3.

Test points	Voltages	
	Minimum	Maximum
Regulator output voltage (across C3)	6.75V	7.25V
H.T. voltage across 7,000Ω resistor	70V	115V

Table 3 - H.T. and regulator voltage check

10. Link the Power supply and L.F. amplifier unit No. 2 to the Wireless set No. 88 by means of PL2 and adjust RV2 for the correct voltages on the sender and receiver as in para. 6. This final check is essential.

11. Disconnect the Wireless set No. 88 from the Power supply and L.F. amplifier unit No. 2 before proceeding to carry out the tests detailed in paras. 12 to 34.

L.F. amplifier on RECEIVE (see Fig. 3)

12. The output meter of the Oscillator, beat frequency, No. 5, on the 600Ω range is scaled up to 50V. To permit voltages of the order of 0.4 to 0.6V to be measured, a simple attenuator is used between the output of the B.F.O. and the circuit under test. Suitable values for an attenuator giving a 20db. loss (10/1 voltage ratio) are given in Fig. 3.

13. Connect the B.F.O., with output impedance switched to 600Ω, through the attenuator to the phone and earth plug on PL4. Connect the output meter to pins 2 and 5 of PL3 as shown in Fig. 3. With the volume control RV3 at maximum, adjust the output of the B.F.O. at 1,000c/s to give an output of 150mW on the meter. The input required will be between 0.4 and 0.6V.

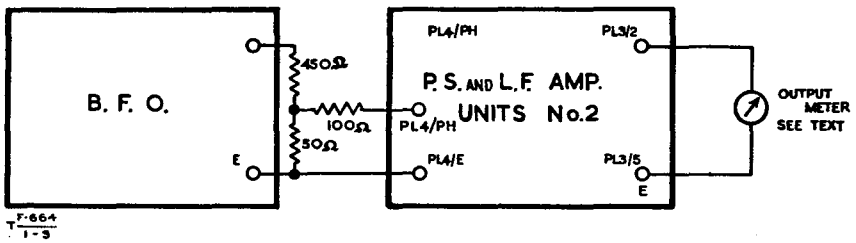

Fig. 3 - L.F. amplifier - test on RECEIVE

14. Repeat the test for input frequencies of 5,000c/s and 400c/s. At each frequency adjust the B.F.O. output so that the output meter indicates 150mW. The input voltages required at 5,000c/s and 400c/s will be within 1.3 and 0.8, and 1 and 1.6 times the input at 1,000c/s, respectively.

Sidetone and miscrophone amplifier on SEND (see Fig. 4)

15. Connect the B.F.O., again switched to 600Ω, through the attenuator as shown in Fig. 4, to pins 1 and 6 of PL3 and the output meter to pins 2 and 5 of PL3. Between the microphone plug of PL4 and pin E of PL2 connect the primary of a Wireless set No. 88 microphone transformer, shunting it with a 6.8Ω resistor. Connect the valve voltmeter (range 1.5V) across the secondary and short-circuit pins 3 and 5 of PL3.

16. To obtain voltages of the order of 20mV from the B.F.O. on the 600Ω range, a simple attenuator giving a 40db. loss (100/1 voltage ratio) is used as shown in Fig. 4.

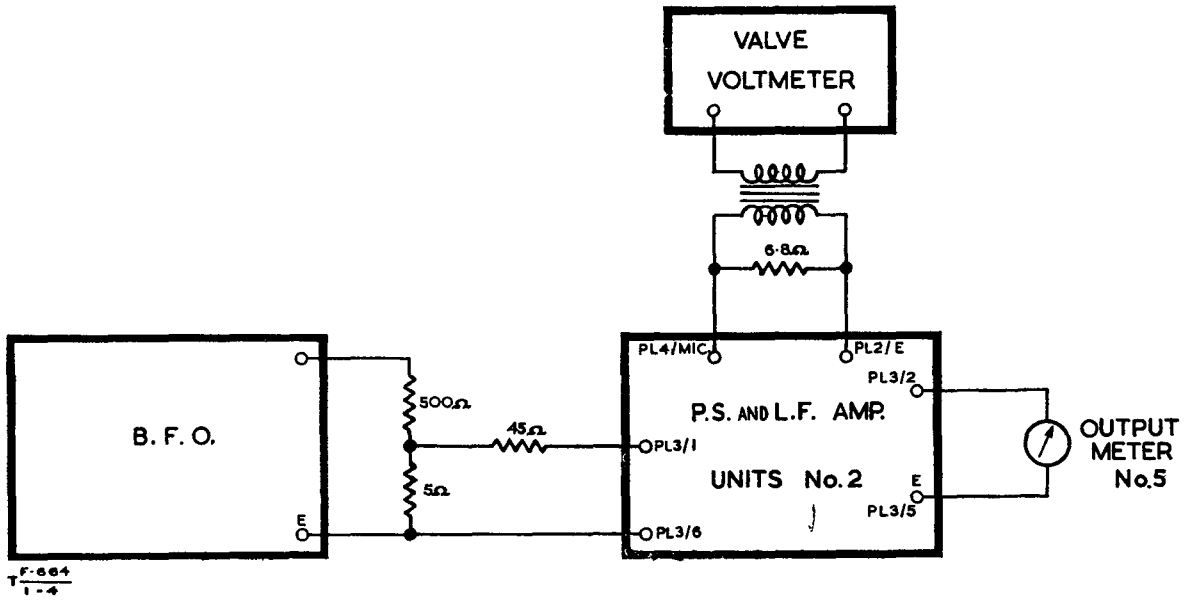

Fig. 4 - Sidetone and microphone amplifier - test on SEND

17. Apply a fixed input voltage of 20mV (i.e. 2V on the B.F.O. output meter), at 1,000c/s. Take a reading of sidetone power on the output meter, and another of the output voltage appearing at the secondary of the microphone transformer. These values should be between 12 and 50mW and 0.65 and 0.95V, respectively.

18. Repeat the test at 5,000c/s and 400c/s. The results obtained should be as follows:-

(a) The sidetone power at 5,000c/s should be between 1 and 1.5 times the value at 1,000c/s

(b) The output voltage at 5,000c/s should be between 1.1 and 1.6 times the value at 1,000c/s

(c) The sidetone power at 400c/s should be between 1.0 and 0.3 times the value at 1,000c/s

(d) The output voltage at 400c/s should be between 0.7 and 0.3 times the value at 1,000c/s.

Intercommunication amplifier on RECEIVE

19. Switch the B.F.O. to 600Ω. Feed the output of the B.F.O. through a attenuator arrangement to pins 4 and 5 of PL3, and connect the output meter across pins 2 and 5 of the same plug as shown in Fig. 5.

20. Adjust the B.F.O. at 1,000c/s so that an output of 50mW is obtained; the input voltage will lie between 1.5 and 1.9V.

Note: This Issue, Pages 7 and 8, supersedes Pages 7 and 8 of Issue 1, dated 3 Nov 50. Paras and Fig marked thus ✱ have been amended.

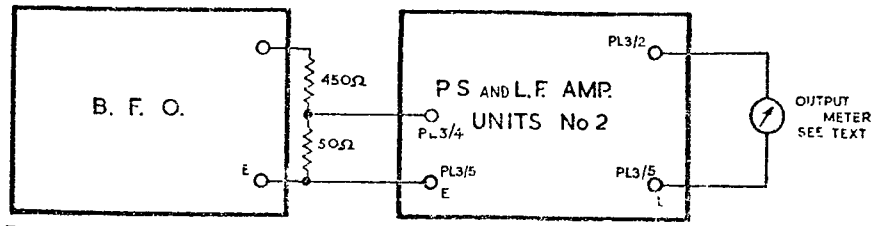

Fig 5 - Intercommunication amplifier - test on RECEIVE

21. Repeat the test for frequencies of 5,000c/s and 400c/s, re-adjusting the REC as necessary so that the output is again 50mW. The input voltages will be from 1.2 to 0.8 times the input at 1,000c/s.

22. With the power supply switched off, check for zero resistance between pins 2 and 4 of PL3. Switch S1A should short-circuit these pins in order that the operator is connected to IC when the Wireless set No 88, AFV is OFF.

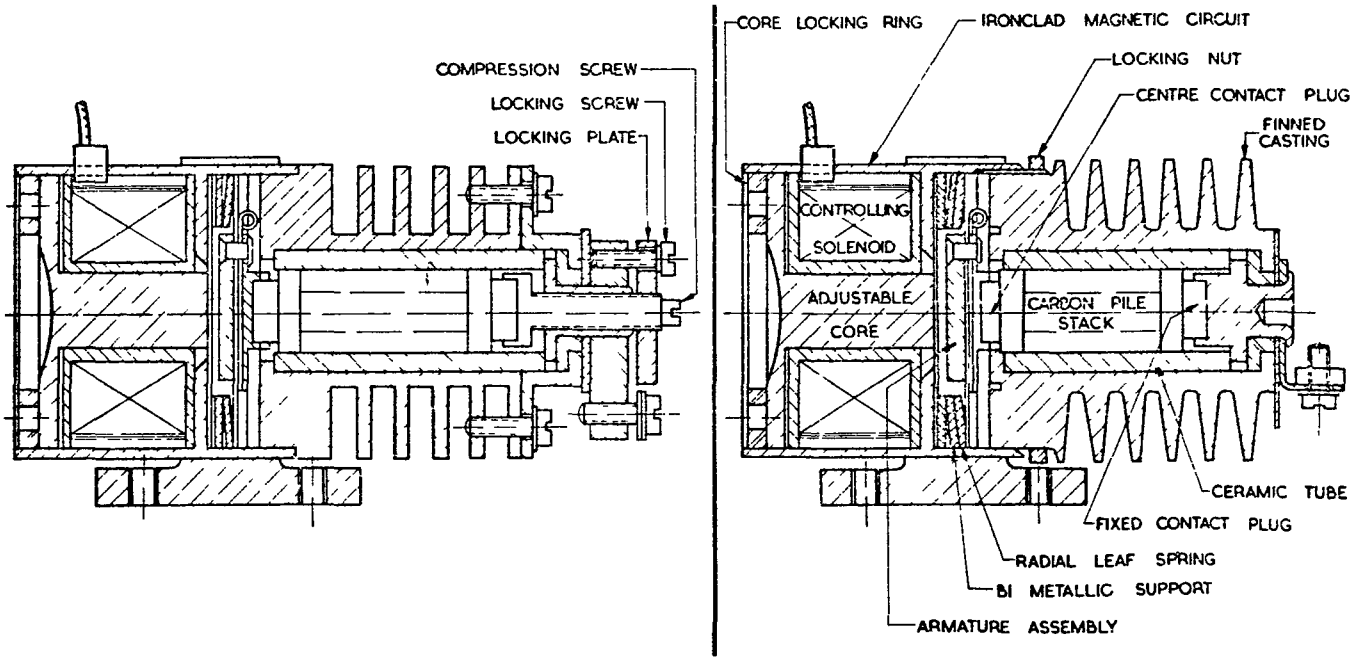

Fig 6 - Voltage regulator

Voltage regulator adjustment

23. IMPORTANT: Only when the regulator is completely out of adjustment should the procedure in paras 24 to 34 be carried out. The regulators used in PS and LF amplifier units No 2 are illustrated in Fig 6. Those fitted to later equipments are of the modified type.

24. Remove the regulator from the equipment. Slacken the locking ring and unscrew the cooler (on the old type regulator), or slacken the locking screw and remove the compression screw (on the modified regulator). The complete pile may now be removed (in both cases) by placing a stiff rod through the centre holes of the carbon washers. The pile is made up of 24 x 10.9mm diameter carbon washers, the end ones being 3mm thick and the remainder 1mm thick. Remove any surface dust, with a camel-hair brush, and replace any damaged or badly fitting washers. Do not handle the washers more than is necessary.

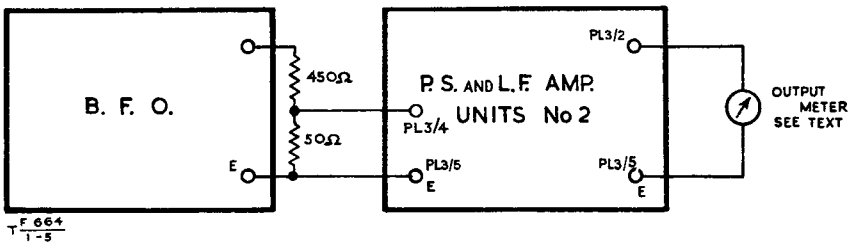

Fig. 5 - Intercommunication amplifier - test on RECEIVE

21. Repeat the test for frequencies of 5,000c/s and 400c/s, readjusting the B.F.O. as necessary so that the output is again 50mW. The input voltages will be from 1.2 to 0.8 times the input at 1,000c/s.

22. With the power supply switched off, check for zero resistance between pins 2 and 4 of PL3. Switch S1A should short-circuit these pins in order that the operator is connected to I.C. when the Wireless set No. 88, A.F.V. is OFF.

Voltage regulator adjustment

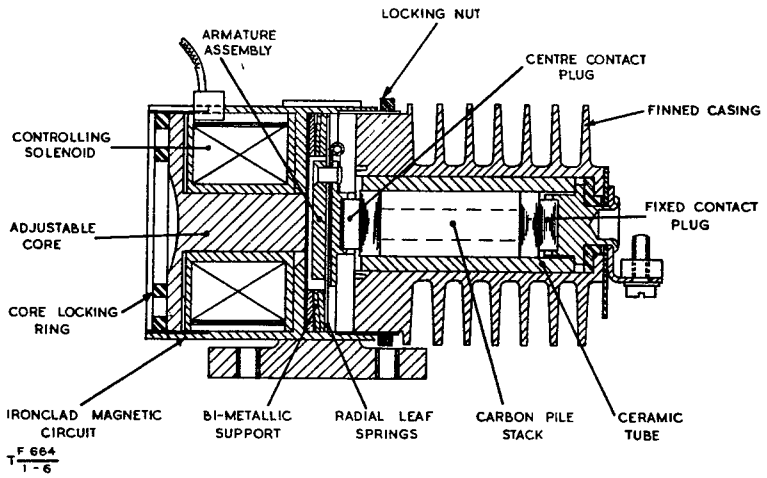

Fig. 6 - Voltage regulator

23. IMPORTANT: Only when the regulator is completely out of adjustment should the procedure described in paras. 24 to 34 be carried out.

24. Remove the carbon-pile regulator from the equipment, slacken the locking ring and unscrew the cooler. Place a stiff rod through the centre holes of the carbon washers and remove the complete pile stack by tilting the regulator. Should the regulator be fitted with solid carbon discs place a sheet of paper on the bench and allow the discs to drop gently out of the ceramic tube. There are 22 carbon washers of 1 mm. thickness and two of 3 mm. thickness, all washers being 10.9 mm. diameter, making up the pile. The two thick ones are at the extremities. Brush the washers lightly with a camel-hair brush to remove any dust adhering to the surfaces and replace any that are damaged or badly fitting. The washers should not be handled unnecessarily.

25. Examine the ceramic tube, clean, if necessary, and blow with a jet of dry air. Inspect the carbon insert, fixed to the armature spring assembly, and clean if necessary by lightly rubbing on a piece of close grained paper placed on a surface plate.

26. To reassemble the regulator, unscrew the core locking ring and turn the core anti-clockwise about three turns. Replace the pile in the ceramic tube. Screw the cooler on until the spring of the armature assembly is fully compressed, i.e., until it is fully wrapped on the bi-metal support. Care must be taken not to use undue pressure during this operation otherwise damage to the carbon-pile will result.

27. Turn the core clockwise until it comes into contact with the armature assembly, i.e., no gap position. Now slacken the cooler by three quarters of a turn.

28. Check the voltage coil and ballast resistor (8.5Ω max.) for continuity. Connect the voltage regulator to the test circuit shown in Fig. 7. Short-circuit the pile and apply a switched 15V supply across the voltage coil and ballast resistor. Switch this on and off at least three times. Remove the short-circuit from the carbon-pile.

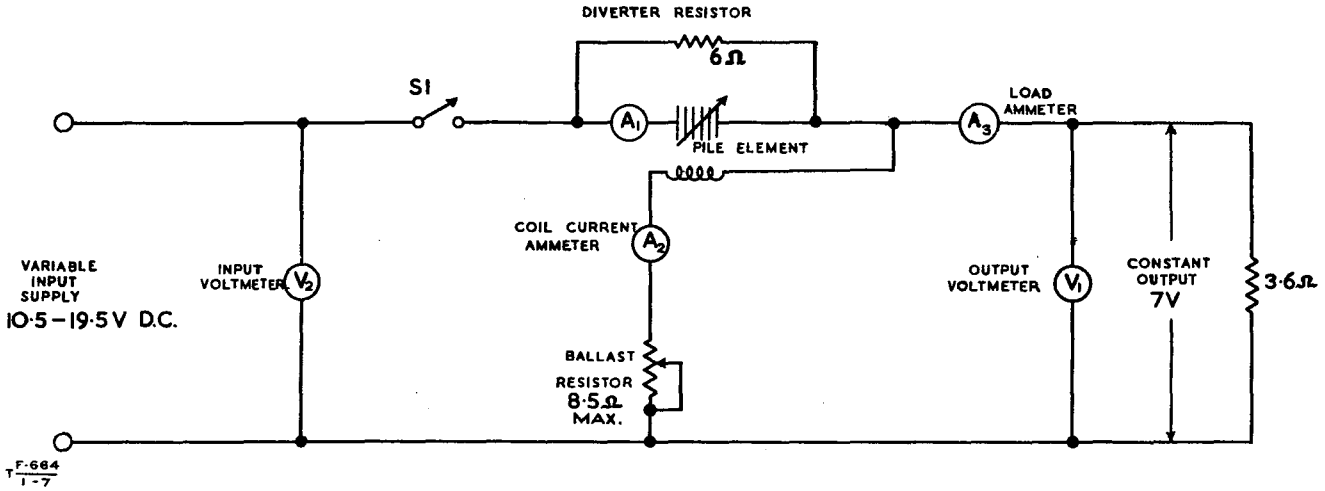

Fig. 7 - Voltage regulator - test circuit diagram

29. With an input of 13.5V the output read on meter V1 should be 7V and meter A2 should read between 0.6 and 0.65A; if this is not so adjust the core slightly to obtain this, readjusting ballast resistor to maintain an output of 7V.

30. Slacken the cooler locking ring, and with an input of 17V rotate the main body of the cooler clockwise keeping a careful watch on V1. If the voltage decreases, continue to turn until the voltage reaches a minimum and begins to rise again. The correct setting is at this minimum voltage position, which gives optimum regulation. Should the voltage rise on turning the cooler rotate it in an anti-clockwise direction to find the minimum position. Tighten the cooler locking ring. Adjust the ballast resistor to give exactly 7V output with an input of 13.5V. Provided that the cooler is adjusted to the minimum position and that the controlled voltage is correct and the operating coil within the limits specified, the regulator will operate satisfactorily.

31. Test the operation of the regulator by running it for not less than 15 minutes with an input of 17V. Before the regulator has time to cool vary the input voltage smoothly and continuously between limits of 10.5 and 17.0V to give a pile resistance range of 1.8 to 11.5Ω, (the upper limit of current through the meter A1 is 1.85A,

Note: See note on page 7

25. Examine the ceramic tube and clean and dry if necessary. Inspect the carbon insert, fixed to the armature spring assembly and clean if necessary by rubbing it lightly on a piece of glossy paper resting on a surface plate.

26. To re-assemble an old type regulator, unscrew the core locking ring and turn the core anti-clockwise about three turns. Replace the pile in the tube and screw down the cooler until the armature assembly spring is fully compressed. The modified type may be re-assembled by slackening the locking screws in the magnet end-plate and turning the core anti-clockwise until two threads protrude. Insert the pile into the ceramic tube and replace the compression screw, tightening it until the armature spring assembly is fully compressed.

27. Turn the core clockwise until it comes into contact with the armature assembly. Slacken the cooler (old type) or compression screw (modified type) by three quarters of a turn.

28. Check the voltage coil and ballast resistor (8.5Ω max) for continuity. Connect the voltage regulator to the test circuit shown in Fig 7. Short-circuit the pile and apply a switched 15V supply across the voltage coil and ballast resistor. Switch this on and off at least three times. Remove the short-circuit from the carbon pile.

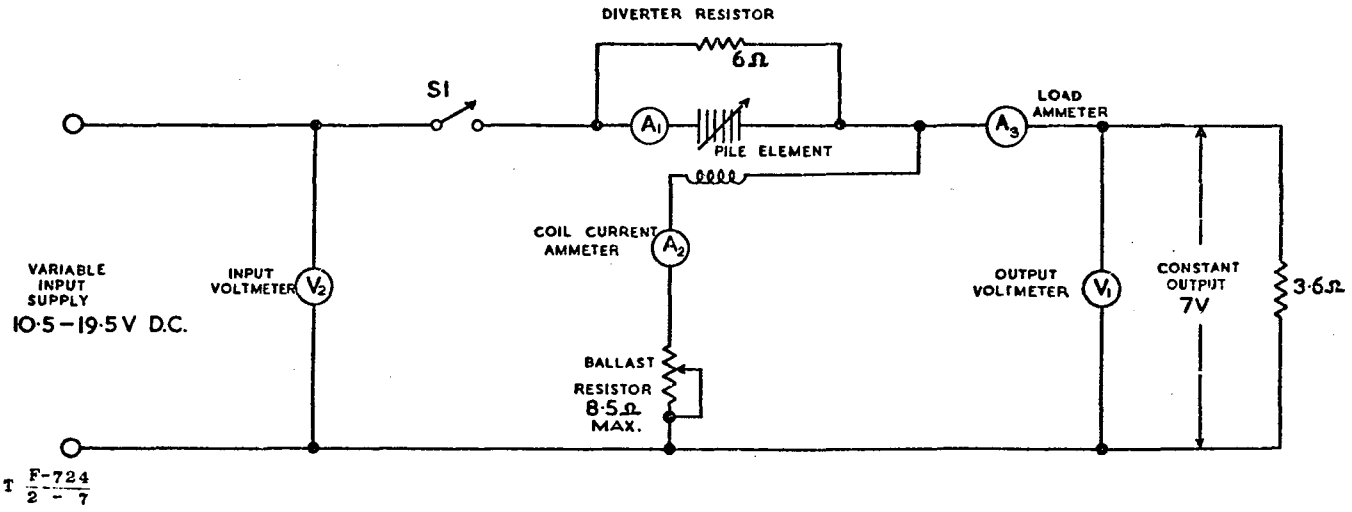

Fig 7 - Voltage regulator - test circuit diagram

• 29. With an input of 13.5V the reading of meter V1 should be 7V and that of meter A2 between 0.55A and 0.65A. If necessary adjust the core to bring the reading of meter A2 within these limits. Re-adjust the ballast resistor to maintain an output of 7V.

• 30. Slacken the cooler locking ring (old type) and, with an input of 17V, rotate the body of the cooler clockwise. The modified type should be adjusted by slackening the locking screw and turning the compression screw clockwise. On both models, if the reading of V1 decreases continue the clockwise movement until a minimum is reached. If the reading increases turn the body, or compression screw, anti-clockwise to obtain the minimum. Lock the body, or compression screw, in this position. With an input of 13.5V adjust the ballast resistor to give 7V output.

• 31. Test the operation of the regulator by running it for not less than 15 minutes with an input of 17V. Before the regulator has time to cool vary the input voltage continuously between 10.5V and 17V and check that the pile resistance varies from 1.8Ω to 11.5Ω (The upper limit of current through the meter A1 is 1.85A,

for the low voltage of 10.5V; the lower limit of current through A1, 0.85A, for the high voltage of 17V) over a complete cycle, i.e., increase from 1.8 to 11.5Ω and decrease back to 1.8Ω measured by the ratio $\frac{V2-V1}{A1}$.

Note: The meter A1 reads pile current only not the total load. During this cycle the output voltage will be maintained at 7 ± 0.25V.

32. To ensure that the armature movement does not limit the top resistance, when the regulator is hot increase the input voltage until a pile resistance of 18Ω is obtained (about 19.5V input required). Under this condition the controlled voltage should still be maintained within the specified limits.

33. To check the stability of the regulator adjust the input voltage to 17V, and switch on and off at least three times. The regulator should respond without tendency towards hunting (i.e., it must be critically damped). A pair of phones across the pile should be used to check this.

34. Slacken the cooler $\frac{1}{16}$ of a turn and repeat the test detailed in para. 32. The regulator should respond without any tendency to hunt. Provided this test is satisfied, restore the cooler to its original setting and repeat the test detailed in para. 30. On replacing the carbon-pile voltage regulator into the Power supply and L.F. amplifier unit No. 2 it will be necessary to follow the procedure laid down in paras. 4 to 10.

TEST PANEL FOR THE POWER SUPPLY AND L.F. AMPLIFIER UNIT NO. 2

35. The tests described in paras. 12 to 34 are most conveniently effected, when any quantity of equipments are being repaired, by means of a test panel, see Fig. 1005. The voltage regulator test circuit of Fig. 7 may also be included if desired; component values and manufacturing details are given in Tables 4 and 5, together with a suggested panel and chassis layout which are shown in Figs. 1006 and 1007.

36. The design shown was found to be most suitable for utilizing the components specified, but any suitable construction may be used, bearing in mind that a fair amount of heat has to be dissipated.

37. With regard to the provision of close tolerance resistors, these should be selected from components of normal tolerance utilizing a bridge Megger. It has been found that an average of six to eight normal tolerance resistors are required to select one of close tolerance.

38. It will be noted that four rotary switches are shown in Figs. 1006 and 1007 whereas only three are used in the circuit diagram. The extra one was included so that the panel may be utilized for testing vibrator packs or rotary transformers using the existing L.T. distribution. Provision of extra facilities such as this is left to the discretion of individual workshops, but should be given consideration in order to conserve test equipment.

39. The switches S1 to S3 perform the following functions:-

S1 - This switches the B.F.O. output to the various amplifiers in turn, (i.e. L.F. amplifier, intercommunication amplifier and microphone amplifier). It also operates the SEND/RECEIVE relay on the microphone amplifier test.
S2 - Input voltage, H.T. voltage and L.T. voltage check.
S3 - Battery ON/OFF switch.

Table 4 - Test panel - components list (including voltage regulator test circuit (see Fig. 7))

Item	Circuit ref.	Qty.	Test equipment	Cat. No.	Remarks
1		1	Instrument testing, Avometer		
2		1	Wattmeter, absorption, No. 1, Meter output power No. 3, Mk. 1 or 2, or Meter output power No. 5 (see para. 2)		
3		1	Oscillator, beat frequency No. 5		
4		1	Voltmeter, valve, 150V, No. 1 or No. 2		
5		2	Voltmeters - range 0 to 20V	ZA 7366	Or ZA 14511 suitably altered with series resistor
6	A1 and A3	2	Ammeters - range 0 to 2.5A		ZA 14511 with modified shunt and recalibration
7	A2	1	Ammeter - range 0 to 1A		
8		2	12V secondary batteries		
9	R6	1	1Ω resistor, 50W rating, ± 10%		See Table 5
10	RV1	1	2Ω potentiometer, 100W rating		See Table 5
11	Voltage regulator ballast resistor	1	3.6Ω resistor, 20W rating, ± ½%		See Table 5
12	Diverter resistor	1	6Ω resistor, 10W rating, ± 2%	Z/Z 243010 12Ω 5W	2 connected in parallel (from W.S. No. 88 Parts List)
13	Ballast resistor	1	8.5Ω (max.) potentiometer, 20W rating		See Table 5
14	R10	2	50Ω resistors, ½W rating, ± 2%	ZA 6040 100Ω ¼W or ZA 11319 47Ω ½W	2 in parallel selected Selected
15	R11	1	5Ω resistor, ½W rating, ± 2%		See Table 5
16	R7	1	100Ω resistor, ¼W rating, ± 2%	ZA 6040 100Ω ¼W	Selected
17	R8	1	450Ω resistor, ¼W rating, ± 2%	ZA 2625 450Ω ¼W	Selected
18	R9	1	45Ω resistor, ½W rating, ± 2%	ZA 11319 47Ω ½W	Selected
19	R13	1	6.8Ω resistor, 1W rating, ± 2%	Z1/ZA 33497 6.8Ω 1W	Selected (from W.S. No. 88 Parts List)

Table 4 - (contd.)

Item	Circuit ref.	Qty.	Test equipment	Cat. No.	Remarks
20	R5	1	7,000Ω resistor, 1W rating, ± 2%	ZA 4827 Resistor, tub., 2,500Ω ZA 4829 Resistor, tub., 4,000Ω ZA 5011 Resistor 500Ω 1W	ZA 4827 and ZA 4829 (from W.S. No. 12 Parts List) ZA 5011 Resistor 500Ω selected so that the three resistors in series equal 7,000Ω
21	R4	1	3,900Ω resistor, 1W rating, ± 2%	ZA 23620 Resistor No. 54 1W	From Sig. Eqpt. No. 10 Parts List
22	R3	1	14.00Ω resistor, 1W rating, ± ½%		See Table 5
23	R1	1	4.00Ω resistor, 1W rating, ± ½%		See Table 5
24	R2	1	2.33Ω resistor, 1W rating, ± ½%		See Table 5
25	T1	1	Transformer assemblies, microphone and output No. 1	Z1/ZA 33402	From W.S. No. 88 Parts List
26	S1, S2, S3	3	Switches, rotary disc, 3-pole, 3-position, 3-bank	ZA 2828	From W.S. No. 19 Mk. 3 Parts List. Not all banks are required, but in the case of the L.T. switch (S3) all banks are paralleled in order to carry the necessary current
27	S1 (see Fig.7)	1	Switches ON-OFF s.p. No. 2	ZA 8724	From W.S. No. 19 Mk. 3 Parts List
28		8	Terminals, instrument, insulated, single No. 3	WB 3037	These are used for the connection of the actual test equipment, i.e. O/P meter, V.V. meter, etc.. From Sig. Gen. No. 1, Mk. 1, Mk. 2 and Mk. 3 Parts List

Table 4 - (contd.)

Item	Circuit ref.	Qty.	Test equipment	Cat. No.	Remarks
29	LP1		Indicator lamp and holder consisting of:-		
		1	Holder lamp No. 1	ZA 4201	
		1	Holder lamp cover front (red)	ZA 9254	
		1	Bulbs 6VJ	WB 0071	

Table 5 - Constructional details of special test panel resistors

Item	Resistance data	Cat. No.	Remarks
9 (R6 see Fig. 1005)	1Ω resistor, 50W rating, approx. 8 ft. 11 in. of Wire, resistance, cupro-nickel, No. 18 S.W.G. (0.048 in.)	WB 1254	To be wound on a suitable ceramic or porcelain former at least $1\frac{1}{2}$ in. dia.
10 (RV1 see Fig. 1005)	2Ω potentiometer, 100W rating, approx. 29 ft. of Wire, resistance, cupro-nickel, No. 16 S.W.G. (0.064 in.)	WB 1255	A suitable former is one used for the tuning coils of an Amplifier R.F. No. 4 (W.S. No. 53). Inductance, variable, No. 16. Cat. No. Z1/ZA 14754
11 (Load resistor see Fig. 7)	3.6Ω resistor 20W rating, approx. 9 ft. 10 in. of Wire, resistance, cupro-nickel, No. 22 S.W.G. (0.028 in.)	WB 1250	To be wound on a ceramic or porcelain former of at least $1\frac{1}{2}$ in. dia. or a strip of asbestos 1 in. wide by $\frac{1}{4}$ in. thick
13 (Ballast resistor	8.5Ω potentiometer, 20W rating, approx. 23.5 ft. of Wire, resistance, cupro-nickel No. 22 S.W.G. (0.028 in.)	WB 1250	The former is an asbestos strip 9 x 1 x $\frac{1}{4}$ in. The slider is made from the W.S. No. 19 rotary transformer (L.T. side) brush gear quoted opposite, suitably mounted in brass rods so that it may slide smoothly along the element and be accessible from the front panel
	Brush, dynamo, No. 10	ZA 0750	
	Brush, holder, No. 12	ZA 18979	
16 (R11 see Fig. 1005)	5Ω resistor, $\frac{1}{2}$W rating, approx. 1 ft. 6 in. of Wire, resistance, cupro-nickel, No. 34 S.W.G. (0.0092 in.)	WB 1241	Wound on suitable former
23 (R3 see Fig. 1005)	1Ω resistor, 1W rating, approx. 4 ft. 2 in. of Wire, resistance, cupro-nickel, No. 34 S.W.G. (0.0092)	WB 1241	Wound on suitable former

Table 5 - (contd.)

Item	Resistance data	Cat. No.	Remarks
24 (R1 see Fig. 1005)	4Ω resistor, 1W rating, approx. 1 ft. 2 in. of Wire, resistance, cupro-nickel, No. 34 S.W.G. (0.0092 in.)	WB 1241	Wound on suitable former
25 (R2 see Fig. 1005)	2.33Ω resister, 1W rating, approx. 8 in. of Wire, resistance, cupro-nickel, No. 34 S.W.G. (0.0092 in.)	WB 1241	Wound on suitable former

COMPONENT SPECIFICATION

R.F. smoothing chokes L1, L2 and L3 (see Fig. 1001 and Table 6)

40. The test specification for these chokes are as follows:-

(a) D.C. resistance 0.18Ω ± 20%

(b) Inductance at 1,000kc/s 6.15μH ± 25%

No. of turns	Wire	Remarks
40	No. 28 S.W.G. enamelled copper	Ends of winding secured to split pins with soft solder. Winding given one coat of stoving bakelite varnish.

Table 6 - R.F. smoothing chokes L1, L2 and L3 - winding details

H.T. smoothing choke, L4 (see Fig. 1001 and Table 7)

41. The test specifications for this choke are as follows:-

(a) D.C. resistance 170Ω ± 20%

(b) With an applied voltage across the choke winding of 1V at 400c/s and a D.C. current of 60mA flowing, the inductance is not to be less than 20H.

(c) The insulation resistance, after impregnation, with 500V D.C. between the winding and the core not to be less than 10MΩ

(d) Voltage proof after impregnation. With 500V at 400c/s applied between the winding and core for a period of 1 minute, there should be no signs of a breakdown.

No. of turns	No. of turns per layer	Wire	Remarks
2,080	110	No. 36 S.W.G. enamelled copper	Each layer interleaved with 1 turn of 1 mil. matt. Kraft tissue 1 3/16 in. wide. Covered by 2 layers of 5 mil. matt. Kraft tissue 1 3/16 in. wide with ends overlapping 1 in. and secured. The complete assembly impregnated with Trinidite compound to a thickness of $\frac{1}{8}$ in.

Table 7 - H.T. smoothing choke, L4 - winding details

Vibrator transformer, T1 (see Fig. 1001 and Table 8)

42. The complete assembly is impregnated with Trinidite compound to a thickness of 1/32 in. at the core and 3/32 in. at the winding.

43. The test specifications for the vibrator transformer are as follows:-

(a) With 16.0V A.C. at 150c/s applied across the whole primary, the voltage across the half primary should be 8.0V ± 5% and the magnetizing current not greater than 50mA

(b) With the same supply as in (a), again connecting the primary, the voltage across each half of the secondary should be 80V ± 5% when each half is loaded with a resistor of value 1,500Ω

(c) Insulation resistance, after impregnation, with 500V D.C. applied between each winding and all other windings connected together and earthed to the core, should not be less than 10MΩ

(d) Voltage proof after impregnation. With 1,000V at 150c/s applied between each winding, and all other windings connected together and earthed to the core for a period of one minute, there should be no signs of breakdown.

Winding	No. of turns	Turns per layer	Wire	Remarks
Primary (inner)	96+96 centre-tapped	24	No. 22 S.W.G. enamelled copper	Each layer interleaved with one turn of 1 mil. matt. Kraft tissue $1\frac{1}{8}$ in. wide. Insulation using 2 layers of 5 mil. matt. Kraft tissue $1\frac{1}{8}$ in. wide
Secondary (outer)	990+990 centre-tapped	90	No. 36 S.W.G. enamelled copper	As in primary

Table 8 - Vibrator transformer, T1 - winding details

Input transformer to output valve, T2 (see Fig. 1001 and Table 9)

44. The complete assembly is impregnated to a minimum thickness of 1/32 in. with Trinidite compound.

45. The following figures are the test specifications of the transformers T2 and T6:-

(a) Turns ratio to be 25 : 1

(b) D.C. resistance of the primary and secondary to be 3.6Ω ± 20% and 575Ω ± 20%, respectively

(c) Primary inductance to be 0.02H ± 25% with 0.4V at 400c/s
Secondary inductance to be 12.5H ± 25% with 1V at 400c/s

Winding	No. of turns	Wire	Method of winding	Ends		Remarks
				Start	Finish	
Primary (outer)	120	No. 36 S.W.G.	Layer	2	1	Layers interleaved with one turn of 1 mil. matt. Kraft tissue 7/16 in. wide. Covering made by 4 layers of 1 mil. matt. Kraft tissue 7/16 in. wide
Secondary (inner)	3,000.	No. 46 S.W.G. enamelled copper	Random	4	3	Insulation with 4 layers of 1 mil. matt. Kraft tissue 27/64 in. wide

Table 9 - Input transformers, T2 and T6 - winding details

Intercommunication transformer, T3 (see Fig. 1001 and Table 10)

46. The complete transformer assembly is impregnated with Trinidite compound to a minimum thickness of 1/32 in.

47. The test specifications of the transformer are as follows:-

(a) Turns ratio to be 1.25 : 1

(b) Primary D.C. resistance to be 4.5Ω ± 20%

(c) Secondary D.C. resistance to be 6.0Ω ± 20%

(d) Insulation resistance after impregnation. With 100V D.C. applied between each winding and the other winding or windings earthed to the core, resistance to be not less than 100MΩ

(e) Voltage proof after impregnation. With 270V, 50c/s, applied between each winding and the core for one minute there should be no signs of breakdown.

Winding	No. of turns	Wire	Method of winding	Ends		Remarks
				Start	Finish	
Primary (inner)	200	No. 36 S.W.G. enamelled copper	Layer	2	1	Layers interleaved with 1 turn of 1 mil. matt. Kraft tissue 7/16 in. wide. Insulation by 4 layers of 1 mil. matt. Kraft tissue 27/64 in. wide
Secondary	250	No. 36 S.W.G. enamelled copper	Layer	4	3	Layers interleaved as in primary. Covered by 4 layers of 1 mil. matt. Kraft tissue 7/16 in. wide

Table 10 - Intercommunication transformer, T3 - winding details

L.F. output transformer, T4 (see Fig. 1001 and Table 11)

48. The complete transformer assembly is impregnated with Trinidite compound to a minimum thickness of $\frac{1}{16}$ in.

49. Test specifications for T4 are as follows:-

(a) Turns ratio to be 8.57 : 1

(b) D.C. resistance of primary and secondary to be 260Ω and 6.5Ω ± 20%, respectively

(c) Primary inductance to be 3.0H ± 25% with 1V at 400c/s and 20mA D.C. through the primary.
Secondary inductance to be 0.03H ± 25% with 0.12V at 400c/s and 20mA D.C. through the primary

(d) Insulation resistance, after impregnation and with 100V D.C. applied between each winding and the other winding or windings earthed to the core, to be not less than 100MΩ

(e) Voltage proof after impregnation. With 270 at 50c/s applied between each winding and the core for a period of one minute there should be no signs of breakdown seen.

Microphone amplifier output transformer, T5 (see Fig. 1001 and Table 12)

50. The complete transformer is fitted into a screened case and sealed with soft solder. The assembly is impregnated with Trinidite compound to a minimum thickness of 1/32 in.

Winding	No. of turns	Turns per layer	Wire	Remarks
Primary (inner)	3,000	125	No. 40 S.W.G. enamelled copper	Layers interleaved with one turn of 1 mil. matt. Kraft tissue $\frac{7}{8}$ in. wide. Insulation by 2 layers of 5 mil. matt. Kraft tissue $\frac{7}{8}$ in. wide, the ends overlapping by 1 in.
Secondary (outer)	350	50	No. 30 S.W.G. enamelled copper	As in primary

Table 11 - L.F. output transformer, T4 - winding details

Winding	No. of turns	Wire	Method of winding	Ends		Remarks
				Start	Finish	
Primary (inner)	1,500	No. 42 S.W.G. enamelled copper	Random	2	1	Insulation by 4 layers of matt. Kraft tissue 27/64 in. wide
Secondary (outer)	150	No. 34 S.W.G. enamelled copper	Layer	4	3	Layers interleaved by 1 turn of 1 mil. matt. Kraft tissue 7/16 in. wide. Covering as in insulation of primary

Table 12 - Microphone amplifier output transformer, T5 - winding details

51. Test specifications for transformer T5 are as follows:-

(a) Turns ratio to be 10 : 1

(b) Primary and secondary D.C. resistance should be 115Ω and 3.4Ω ± 20%, respectively

(c) Primary inductance should be 3.2H ± 25% with 1V at 400c/s.
Secondary inductance should be 0.032H ± 25% with 0.1V at 400c/s

(d) Insulation resistance after impregnation, with 100V D.C. applied between each winding, the other winding to be earthed to the core, should not be less than 100MΩ

(e) Voltage proof after impregnation. With 270V at 50c/s applied between each winding and the other connected and earthed to the core, there should be no signs of breakdown.

Microphone amplifier input transformer, T6 (see Fig. 1001 and Table 8)

52. The assembled transformer is fitted into a screened case and sealed with soft solder and given one coat of clear cellulose lacquer.

53. The test specification and winding details for T6 are the same as those for T2.

Voltage regulator

54. The regulator is wound with 1,600 turns of No. 32 S.W.G. Lewmex F wire. The overall dimensions of the finished windings can be seen from Fig. 6.

55. Specifications for testing the regulator are as follows:-

(a) The coil resistance is approximately 6Ω

(b) The coil current limits are 0.6 to 0.65A and good regulation will only be obtained if the coil current at the nominal controlled voltage is within these limits.
The method of carrying out (b) is described in paras. 29 to 34

G.E.C. miniature relay

56. Repairs to the relay will only be done in an emergency. Use a spare unit if available as adequate resealing is very difficult.

57. To unseal the relay saw the can off above the base. Unsealing by application of heat is very apt to damage the winding and insulation of the operating coil and possibly the insulation between the spring sets.

58. The operating coil is made up of 3,950 turns of No. 40 S.W.G. enamelled copper wire, the D.C. resistance of which is 180Ω. The normal coil operating voltage is 12V.

59. After repair, the relay is no longer tropicalized but keep the contacts clean and the unit as dry as possible so that the relay may carry out its proper function until a spare component is available.

Alignment of Wireless set No. 88, type 'A', A.F.V.

60. Connect the adaptor as shown in Fig. 8 and carry out the alignment as detailed in Tels. F 654. The adaptor should be constructed locally, of locally procurred stores.

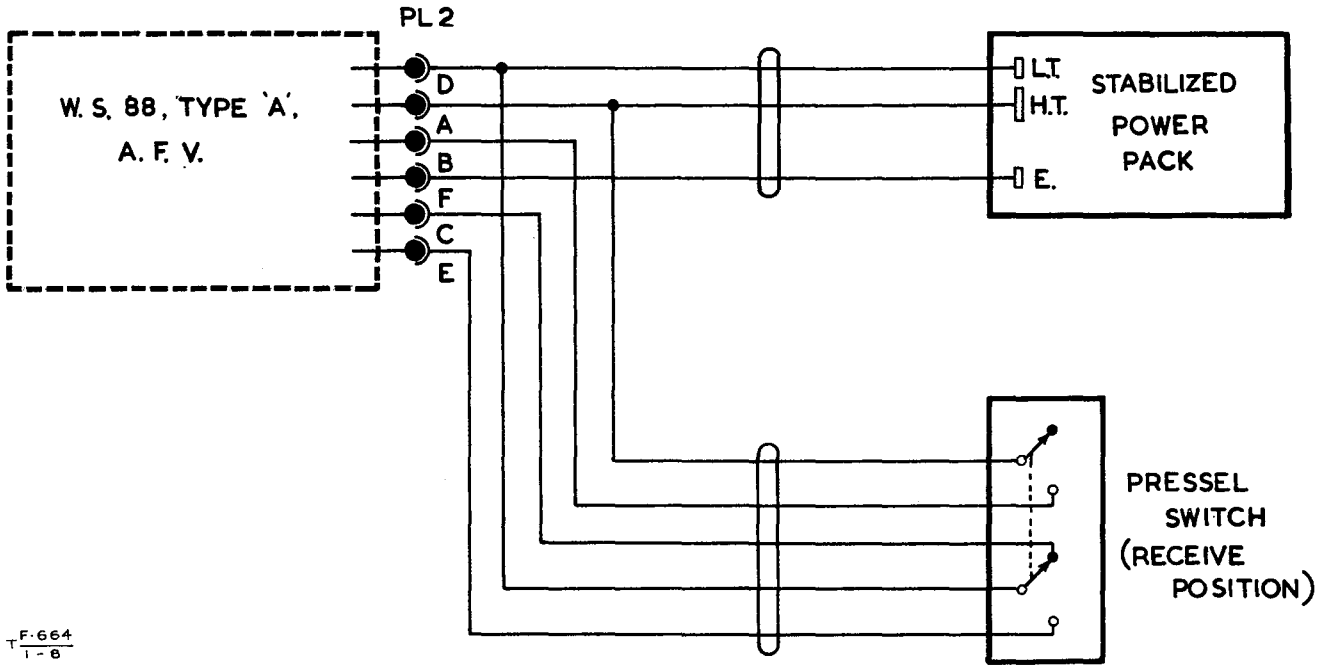

Fig. 8 - Power supply and Pressel switch adaptor

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F 664

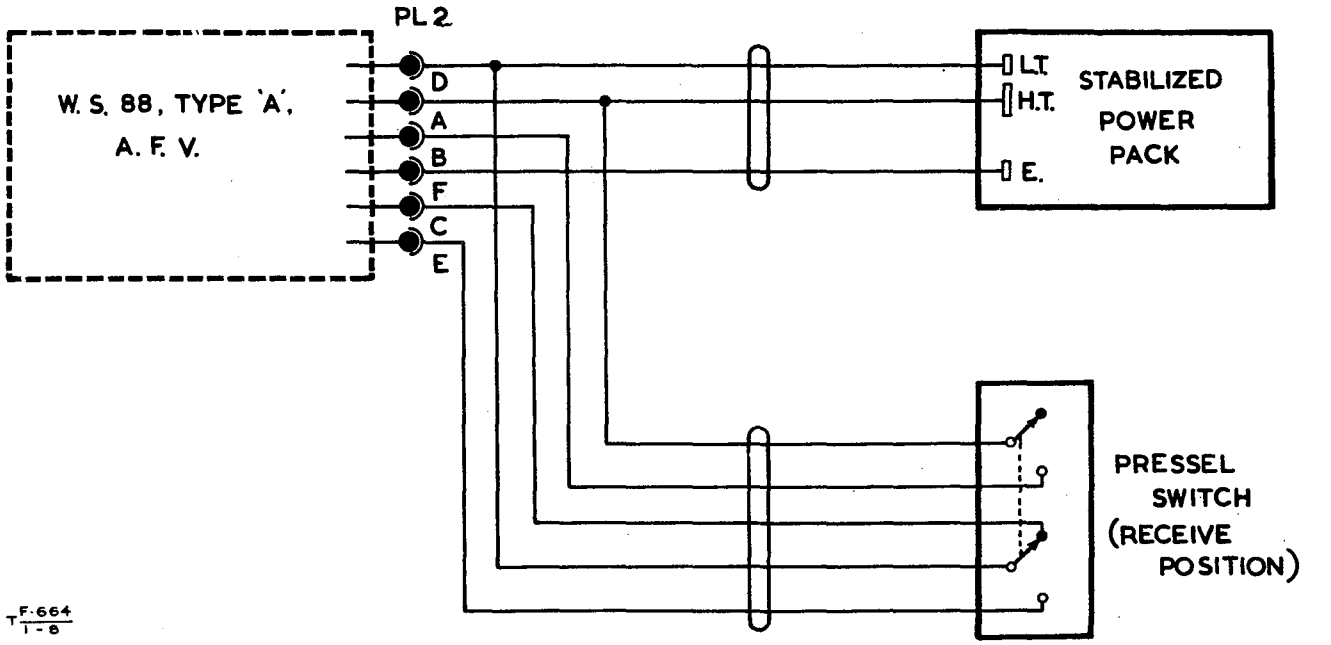
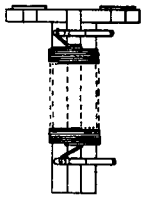
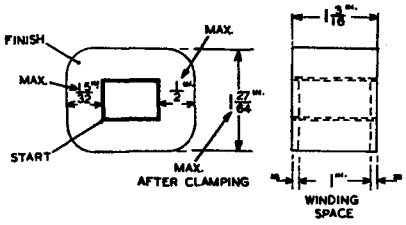
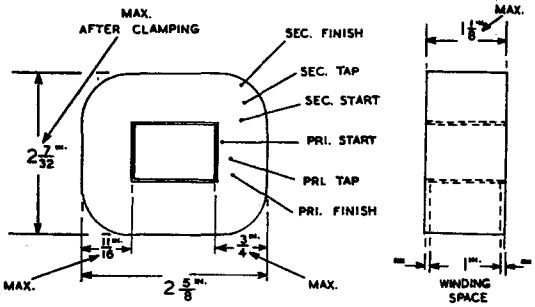
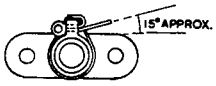


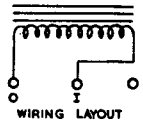
Fig. 8 - Power supply and Pressel switch adaptor





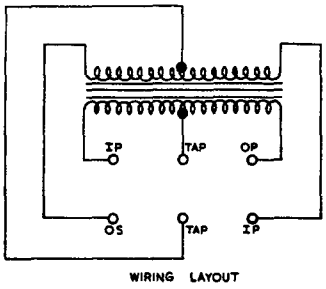




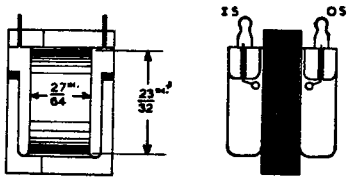


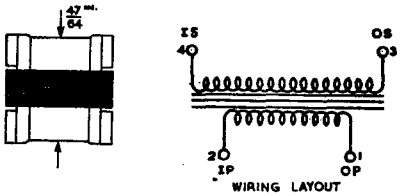
CHOKE L4

CHOKES L1, L2 AND L3

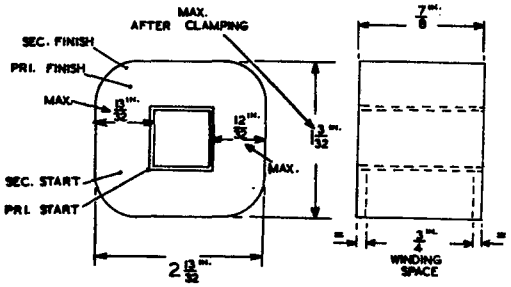


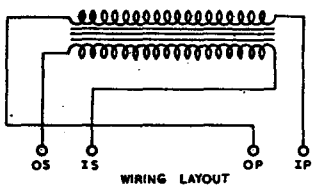
TRANSFORMER T1





TRANSFORMERS T2, T3, T5 AND T6

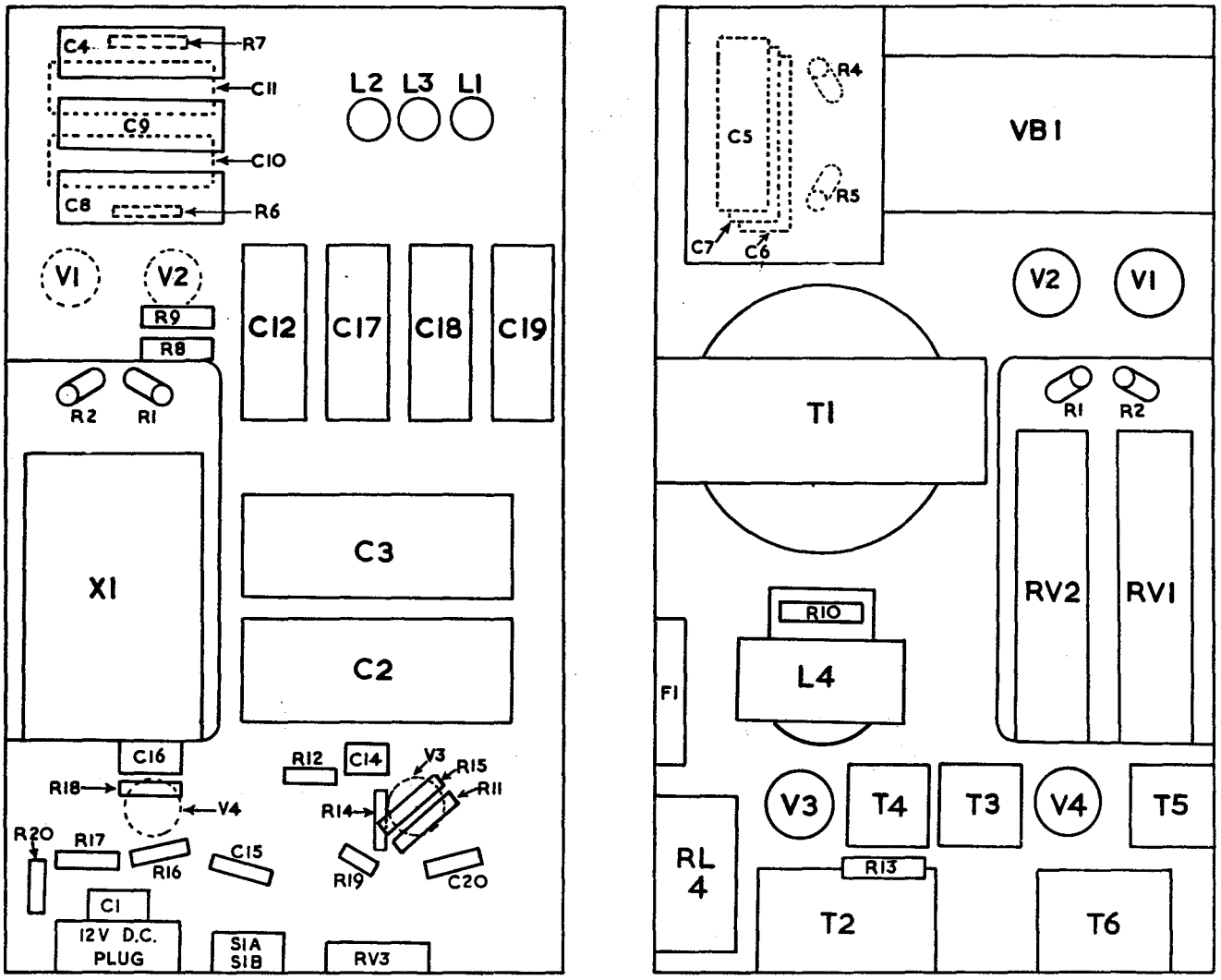




TRANSFORMER T4

T F-664 1-1001

Fig. 1001 - Chokes and transformers - winding details



T F-664 1-1002 BOTTOM VIEW

TOP VIEW

Fig. 1002 - Power supply and L.F. amplifier unit No. 2 - top and bottom views - component layout

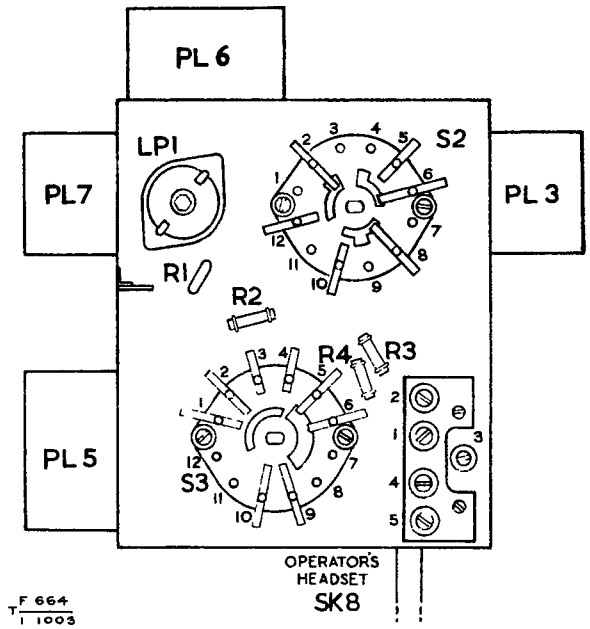


Fig. 1003 - Control unit No. 16 - component layout

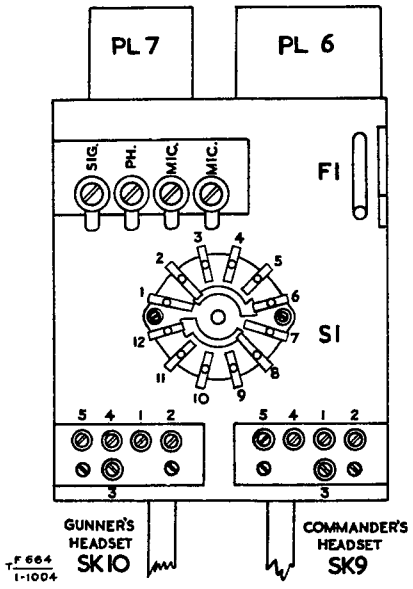


Fig. 1004 - Control unit No. 17 - component layout

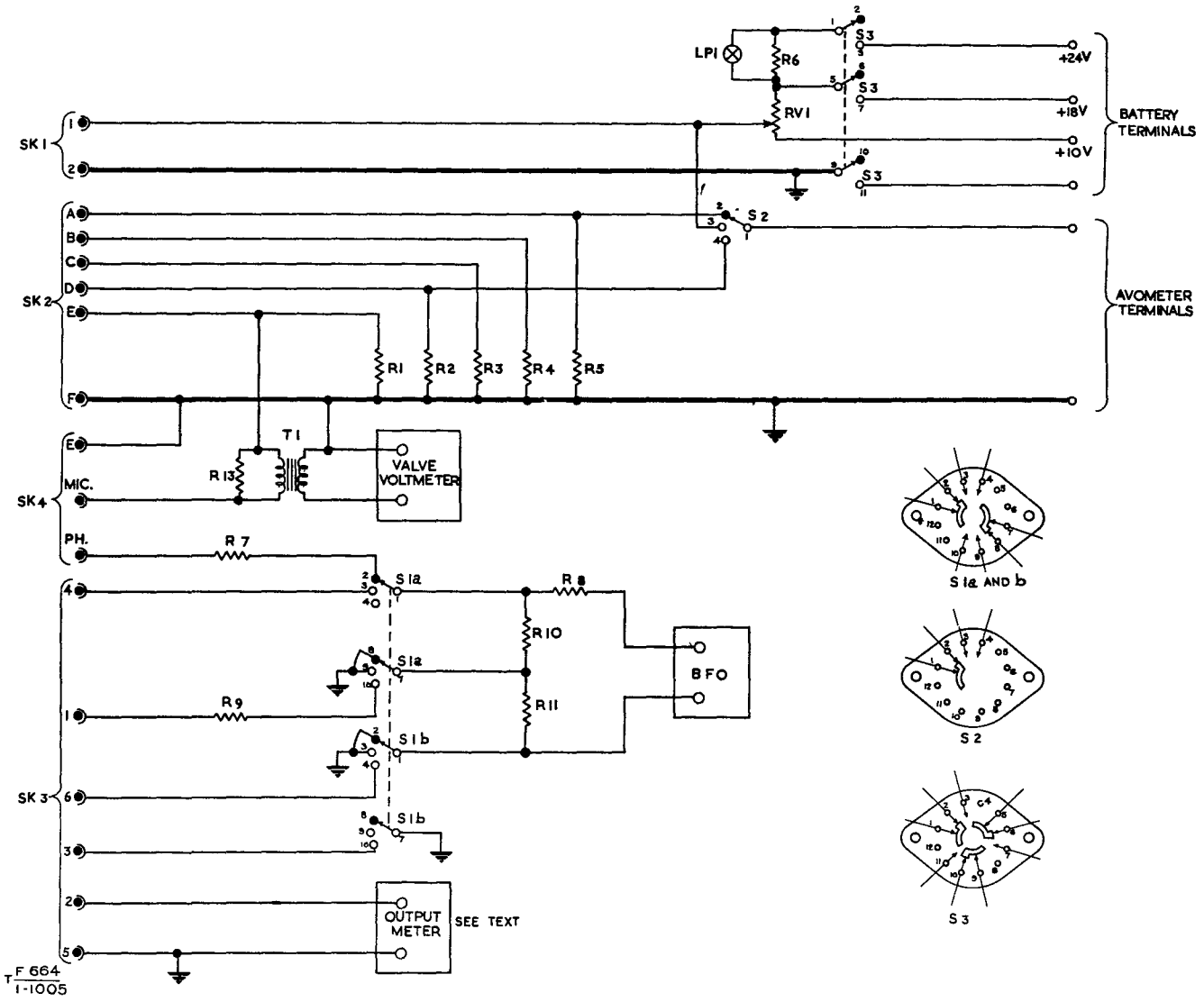


Fig. 1005 - Power supply and L.F. amplifier unit No. 2 - test panel

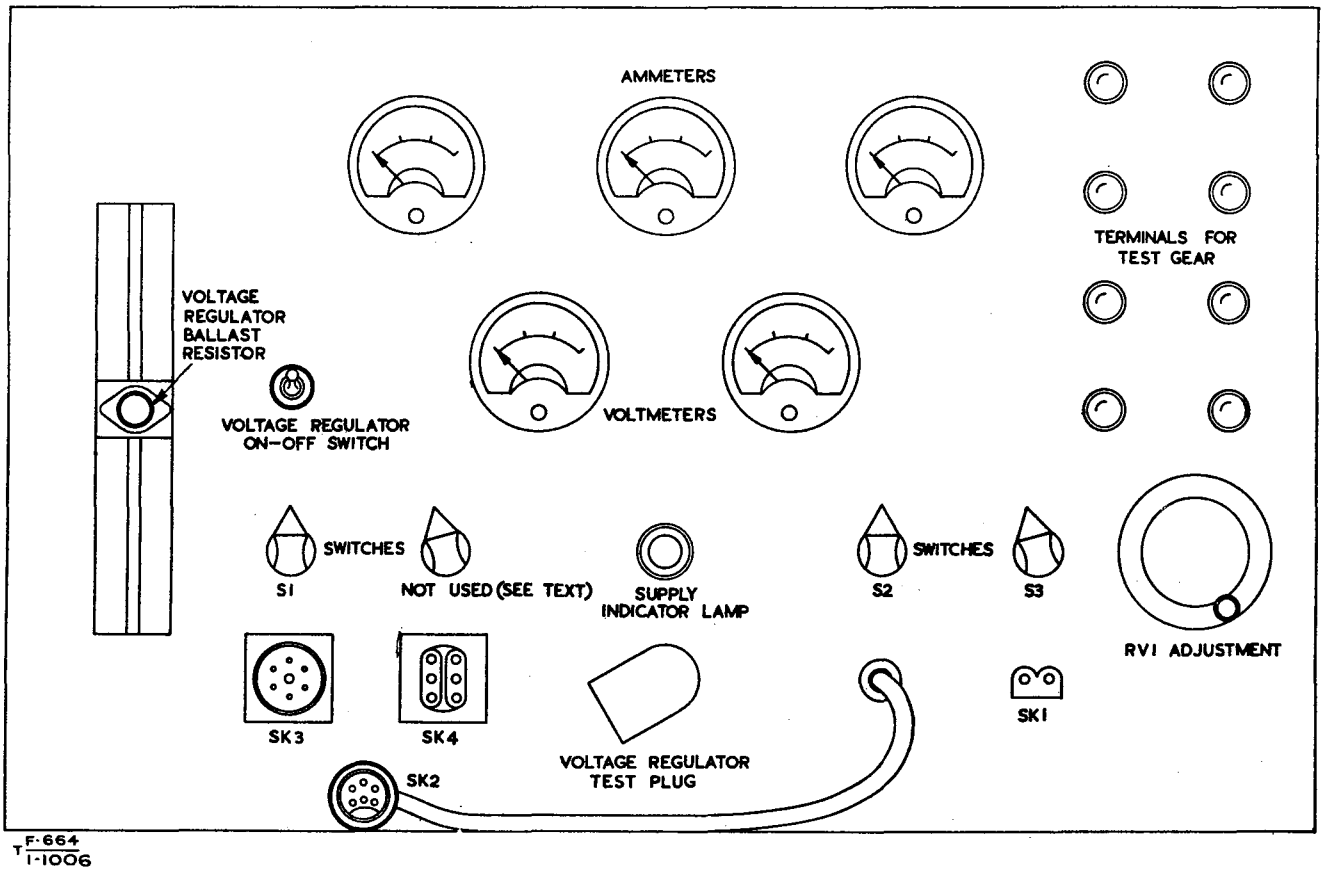


Fig. 1006 - Power supply and L.F. amplifier unit No. 2 - front panel layout - test panel

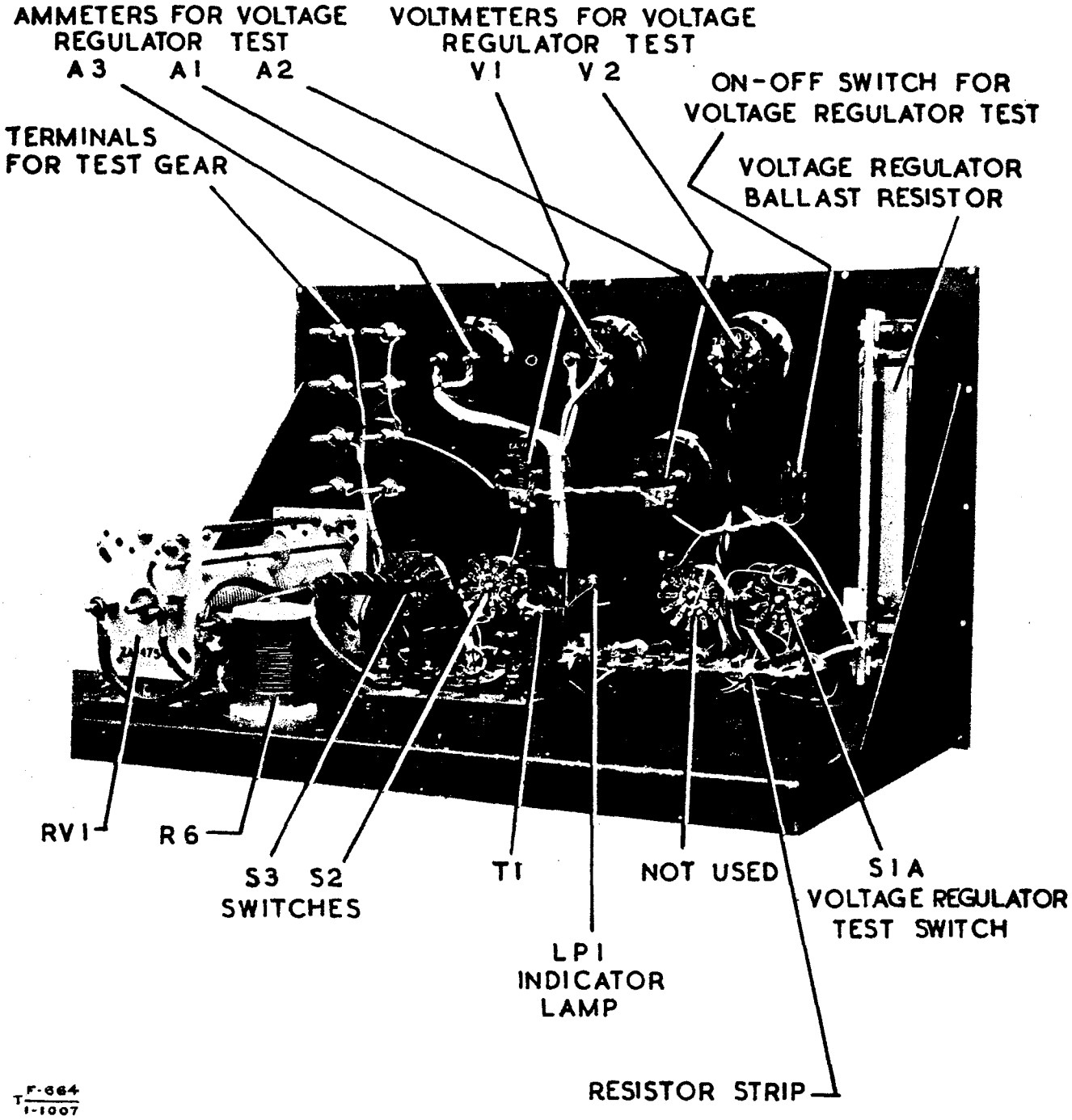


Fig. 1007 - Test panel - rear view

57/Maint./3513

END