

## MEASURING-SET, R.I., No. 2

### Description, Operation and Maintenance

**1. Introduction.**—This Instruction describes the Measuring-set, R.I., No. 2 and associated equipment, its operation and maintenance. The set is designed for the measurement of noise fields and voltages in the frequency range 30 Mc/s. to 220 Mc/s.

**2.** The Measuring-set, R.I., No. 2 is essentially a superheterodyne receiver with an I.F. of 10 Mc/s. incorporating calibrated attenuators and an output metering circuit consisting of a detector-voltmeter. The measuring-set is adjusted to standard gain by reference to first circuit noise. The attenuator readings are converted to field strength or terminal voltages by the addition of constants obtained during initial calibration. The measuring set may be operated from either 200–250V. A.C. mains or a 6-V. car battery.

#### DESCRIPTION

**3.** The complete equipment consists of:—

(a) Frequency-changers Nos. 7A (30 to 60 Mc/s.), 7B (55 to 100 Mc/s.), 7C (95 to 150 Mc/s.), and 7D (145 to 220 Mc/s.). See Figs. 1 and 2.

(b) Amplifier No. 44A (I.F. unit), including the coaxial cable for inter-connecting the amplifier and frequency-changer, and the two screened leads for connecting the units to a power unit. See Figs. 1 and 2.

(c) Power-unit No. 2A which operates from 200 – 250V. A.C. See Fig. 1.

(d) Power-unit No. 2B which operates from a 6-V. battery. See Fig. 2.

(e) Aerial-unit No. 10 (tripod base) and Aerials Nos. 10A (50 to 100 Mc/s. dipole) and 10B (100 to 220 Mc/s. dipole). See Fig. 2.

(f) Unit, Isolating, R.F., No. 2A for measurement of noise voltages at the terminals of electrical apparatus. See Fig. 1.

**4. Frequency-changer No. 7A.**—This unit covers the frequency range 30 to 60 Mc/s. The circuit diagram is shown in Fig. 5 and the position of the controls can be seen in Fig. 1. The input of the unit consists of a piston attenuator which has six steps of 10 db. from 0 to 60 db. and provides a balanced input of 75 to 80 ohms which is resistive throughout the

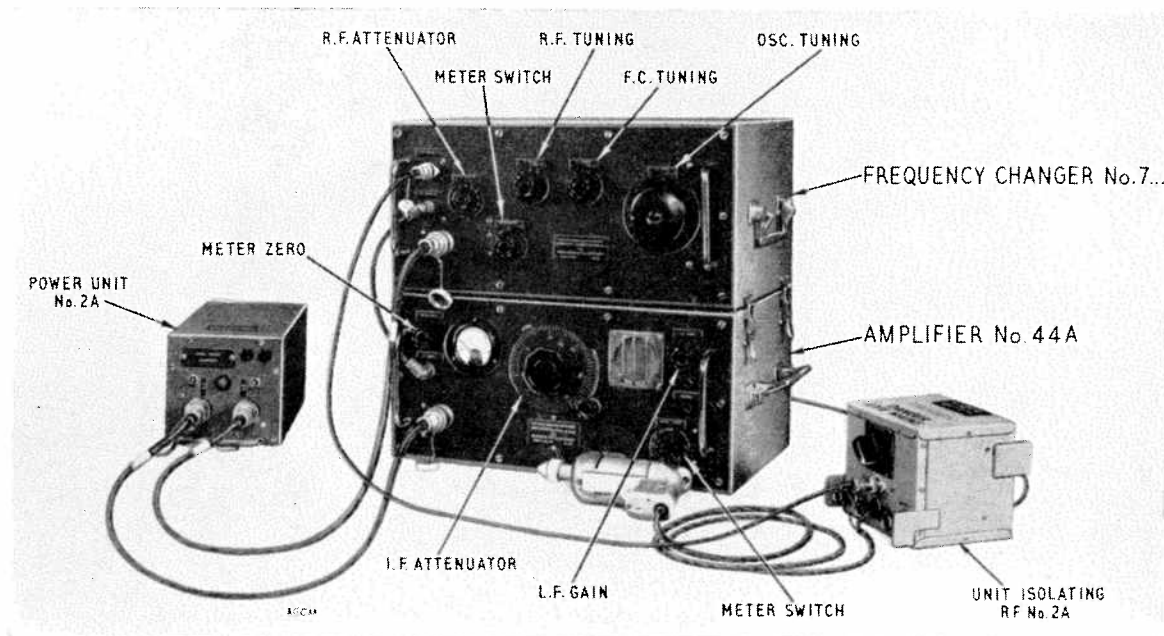


FIG. 1—MEASURING-SET, R.I., No. 2 (VOLTAGE MEASUREMENTS)

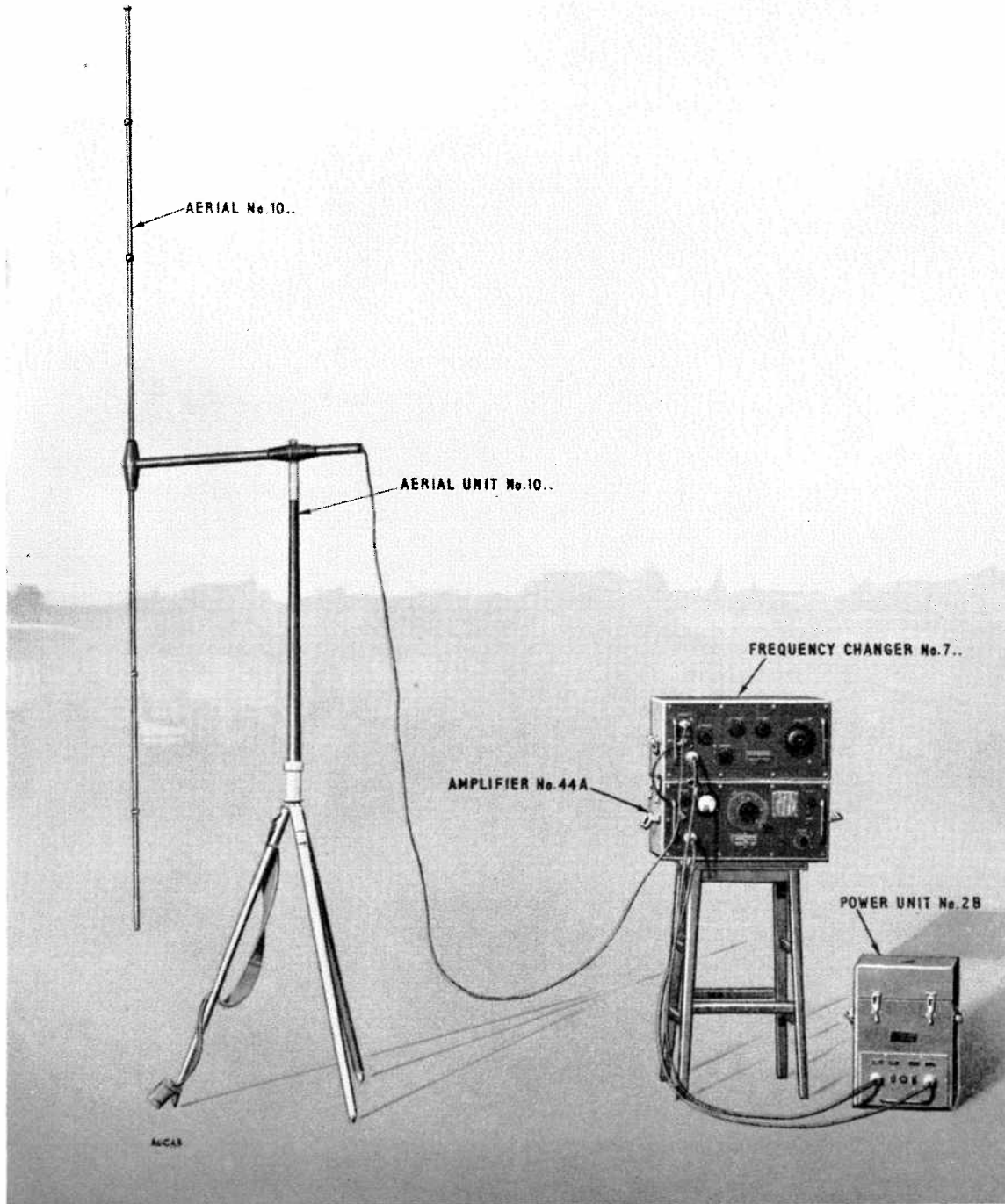


FIG. 2—MEASURING-SET, R.I., No. 2 (FIELD-STRENGTH MEASUREMENTS)

frequency band. The unit itself consists of a r.f. amplifier, a frequency-changer with separate local oscillator, and one stage of i.f. amplification (10 Mc/s). The output from the i.f. stage is connected to a coaxial socket on the left of the front panel and connexion is made to the input of the Amplifier No. 44A by means of a short length of double-screened 75-ohm coaxial cable. The r.f. amplifier, frequency-changer and oscillator stages are tuned separately (see Fig. 1). A switch at the bottom left-hand side of the front panel enables the anode current of each valve to be monitored on the meter in the Amplifier No. 44A. The power input circuits are filtered to prevent stray pick-up via the power-unit or leads which may affect the accuracy of the measurements.

**5. Frequency-changer No. 7B.**—This unit covers the frequency range 55 to 100 Mc/s, and is similar to the Frequency-changer No. 7A except for minor changes of component values necessary for the higher frequency range. The circuit diagram is shown in Fig. 6.

**6. Frequency-changer No. 7C.**—This unit covers the frequency range 95 to 150 Mc/s, and is basically similar to Frequency-changers Nos. 7A and 7B. The main difference is that a modified frequency-changer stage has been used to obtain an improved performance at the higher frequencies. The circuit diagram is shown in Fig. 7.

**7. Frequency-changer No. 7D.**—This unit covers the frequency range 145 to 220 Mc/s, and is basically similar to the other frequency-changers. The circuit diagram is shown in Fig. 8.

**8. Amplifier No. 44A.**—The circuit diagram of the Amplifier No. 44A is shown in Fig. 9 and the position of the controls in Fig. 1. The 10 Mc/s output from the frequency-changer unit is fed to the grid of the initial valve via a continuously variable 0 to 50 db piston attenuator which provides an input impedance of 75 ohms resistive at 10 Mc/s to match the coaxial input. The amplifier consists of three stages of i.f. amplification, the first two stages being common to both audio and measuring chains, audio detector and a.f. amplifier, a.f. output stage feeding a built-in loudspeaker and phone jacks and a detector-voltmeter of C.I.S.P.R. type.

**9.** In the measuring chain, the third i.f. stage is a beam-tetrode capable of meeting the overload requirements for measuring impulsive interference. This is followed by a detector-voltmeter consisting of a diode-detector feeding a balanced metering circuit, consisting of two triodes with an ammeter (f.s.d. 250  $\mu$ A) connected between their anodes. This circuit can tolerate appreciable changes of h.t. and l.t. voltages without disturbing the meter zero sufficiently to introduce appreciable measuring errors.

**10.** The audio chain is conventional and a small built-in loudspeaker is provided so that signals can be monitored during measurements without disturbing the accuracy of the results. A telephone jack is also provided for use in acoustically noisy situations, *but phones should not be left plugged in while making measurements.*

**11.** The l.t. and h.t. voltages and the anode current of each stage can be measured by means of the switch at the bottom right of the front panel of the amplifier, the voltages and currents being correct if the needle of the meter in the unit falls within the red sector marked on the meter scale. Serious measuring errors can occur on impulsive noise if the overload capacity deteriorates, and it is therefore important that the h.t. and l.t. voltages and anode currents should not fall below the specified figures. A failing valve in the last i.f. stage on the measuring side (monitored in the switch position marked IF4) will most seriously affect the overload capacity.

**12.** To prevent unwanted pick-up in the power-unit and leads affecting the accuracy of the measurements, the incoming power leads to the Amplifier No. 44A are filtered. This can be seen in Fig. 9.

**13. Bandwidth.**—The nominal bandwidth for 6 db below peak response is 100 kc/s; the whole of the response curve is stringently specified by a mask. The bandwidths of the frequency-changers are not narrow enough to appreciably affect the overall response.

**14. Meter time-constants.**—To ensure that measurement of a noise voltage shall give reasonable agreement with the radio interference value of the noise, tested subjectively, the metering circuit is electrically weighted. This is accomplished by a suitable choice of the charge and discharge time-constants of the detector circuit and of the mechanical time-constant of the meter. The time-constants of the metering circuit are as follows :—

(a) *The charge time-constant* is one millisecond and is the time taken for the voltage across the diode load capacitor C26 to reach 63.2% of its steady value when a sinusoidal signal at the frequency of maximum response is applied to the input of the Amplifier No. 44A.

(b) *The discharge time-constant* is 500 milliseconds and is the time taken for the voltage across C26 to drop to 36.8% of its initial value.

(c) *The mechanical time-constant* of the meter is 100 milliseconds and is one-third of the time taken for the pointer to reach 80% of its final reading. Although a small degree of overswing is specified, the meter is essentially critically damped.

**15. Overload capacity.**—If an isolated short pulse is applied to the input of the measuring-set, the voltage developed across C26 of the metering detector circuit is a very small proportion of the peak voltage applied to that circuit. Further, the meter deflexion will only reach 64% of the peak voltage pulse developed across C26. Thus the measuring-set must be linear for a sine-wave input of much greater amplitude than that required to give the standard deflexion of the set meter, i.e. the amplifier requires a large overload capacity. As the repetition rate or width of pulse increases, the overload capacity required decreases. The Amplifier No. 44A has an overload capacity of 40 db which is adequate for the measurement of short isolated pulses of interference. The overload capacity of the frequency-changer units is not so high and is only adequate for short isolated pulses if their output is less than that which will require 30 db attenuation in the Amplifier No. 44A.

**16.** To ensure that the measuring-set is used with the maximum overload capacity, the Amplifier No. 44A attenuator should be set below 30 db whenever possible. This means that the maximum level of a short isolated pulse that can be safely measured is 90 db plus the correction constant (see par. 17). If the repetition rate is greater than 10 p.p.s., the maximum level that can safely be measured is raised to 100 db plus constant, and is further raised to 110 db plus constant if the repetition rate is greater than 50 p.p.s. or the noise pulse, although isolated, is wider than about 500 microseconds.

**17. Correction constants.**—Each measuring-set is supplied with a set of correction constants for voltage and field-strength measurements, which should be added to the attenuator readings, so that the measurements is given in db relative to 1  $\mu$ V, or db relative to 1  $\mu$ V per metre. The voltage correction constants were obtained by measuring an input from a standard signal generator and give an accuracy of better than  $\pm 1$  db. The field-strength constants were obtained by adding a calculated constant to the voltage constant. These correction constants are individual to each frequency-changer unit. Changes of gain in the measuring-set are compensated for by adjusting the attenuator marker of the Amplifier No. 44A so that, with zero attenuation indicated, the first circuit noise produces a standard deflexion of the meter, i.e. mid-scale.

**18.** The presence of set noise on weak signals detracts from the accuracy of measurements and it is found that with plain or modulated carriers, the inaccuracy becomes more than 0.5 db when the Amplifier No. 44A attenuator reading is less than 10 db. The error for all other signals (including noise) is less, the precise error depending on the type of signal. If it is not possible to set the Amplifier No. 44A attenuator above 10 db, a correction factor can be applied to the attenuator reading which will

give a fairly accurate measurement in the presence of set noise. The correction factors for use when measuring plain or modulated carriers are given in Table 1 and for ignition interference in Table 2. The latter also apply approximately to any type of impulsive noise. These factors, which are applicable to both voltage and field-strength measurements and common to all models, should be deducted from the measured level for settings of the Amplifier No. 44A attenuator between 2 and 10 db.

TABLE 1. MEASUREMENT OF PLAIN CARRIER.  
CORRECTIONS FOR SET NOISE

I.F. attenuator reading in db	Correction factor in db to be deducted from measured level
2.0	6.3
3.0	5.0
4.0	4.0
5.0	3.1
6.0	2.4
7.0	1.9
8.0	1.3
9.0	0.9
10.0	0.6

TABLE 2. MEASUREMENT OF IGNITION INTERFERENCE.  
CORRECTIONS FOR SET NOISE

I.F. attenuator reading in db	Correction factor in db to be deducted from measured level
1.5	1.8
2.0	1.4
3.0	0.9
4.0	0.6
5.0	0.4
6.0	0.2
7.0	0.1

**19. Power supply.**—The measuring-set requires 4 amp at 6.3V and 100 mA at 250V. These supplies may be obtained from either of two power-units which are as follows :—

(a) *Power-unit No. 2A*, which is a mains (200-250V a.c.) operated power-unit, giving a heater voltage within the limits 6.1V and 6.3V with a load current of 5 amp and an anode voltage within the limits 240V and 270V with a load current of 100 mA. The power consumption from the mains is 90 watts.

(b) *Power-unit No. 2B*, which is a battery-operated permanent-magnet rotary transformer giving an output of 300V, 100 mA with an input of 6V d.c. After smoothing and with the battery approaching complete discharge, the voltage at the output socket still exceeds the minimum allowable value of 240V on the full load of 100 mA. The unit is designed to

form a container for the battery. The container completely screens the battery and leads and prevents the use of long leads which would introduce a serious voltage drop that cannot be tolerated. The total current taken from the 6V battery is 17 amp.

**20. Aerial.**—The aerial for the measuring-set consists of :—

(a) *Aerial-unit No. 10*, which is a tripod base complete with a cross-arm of non-metallic tubing, a dipole mounting and a  $4\frac{1}{2}$  metre length of screened balanced-twin feeder held at right angles to the dipole by the cross-arm.

(b) *Aerial No. 10A*, which is the dipole used for measurements in the range 30 to 100 Mc/s. Each half of the dipole consists of three telescopic sections of brass tubing which enables the length of the dipole to be adjusted to correspond to a half-wavelength at frequencies from 50 to 100 Mc/s. Measurements at frequencies between 30 and 50 Mc/s are made with the aerial adjusted for 50 Mc/s as this is the longest length that can reasonably be mounted on a tripod at ground level. If a greater sensitivity is essential below 50 Mc/s, a full half-wave dipole could be used ; a calibration constant can be supplied by the Eng. Dept. (WP2/3). The correct settings for the telescopic rods are indicated in terms of frequency on the rods.

(c) *Aerial No. 10B*, which is similar to the Aerial No. 10A except that it is for measurements in the range 100 to 220 Mc/s and its length can be adjusted to correspond to a half-wavelength in the range 100 to

200 Mc/s. Measurements between 200 and 220 Mc/s are made with the aerial adjusted for 200 Mc/s.

★**21. Unit, Isolating, R.F., No. 2A.**—This unit is intended for making measurements of noise voltage at the terminals of an appliance. Its object is to :—

(a) ensure that the impedance of the mains does not modify the measuring impedance

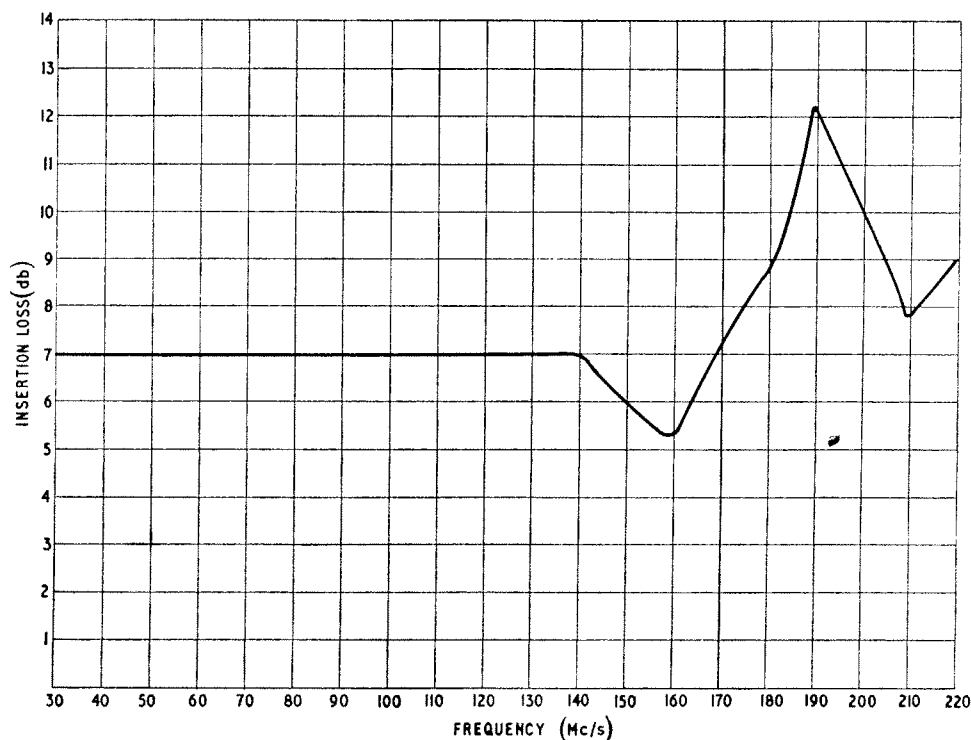
(b) prevent noise currents that may exist on the supply mains affecting the measurements being made

(c) provide a termination for the line that is not being measured

(d) match the unbalanced noise source to the balanced input of the measuring set.

The loss through the unit is practically constant from 30 to 140 Mc/s but varies above 140 Mc/s. A graph showing how the loss varies with frequency is given in Fig. 2.1. There is some variation between individual units and the figure shows a mean curve. In the frequency range 30 to 180 Mc/s the loss should be within  $\pm 1$  db of the curve and in the frequency range 180 to 220 Mc/s the loss should be within  $\pm 3$  db of the curve.

The isolating unit incorporates a mains switch, mains fuses and a rotary switch for selecting either line for measurement and has a current rating of 15 amp.



★FIG. 2.1. INSERTION LOSS OF UNIT, ISOLATING, R.F., NO. 2A

TABLE 3

Equipment	Dimensions in inches			Weight
	Width	Depth	Height	
Amplifier No. 44A	19	10½	9	33 lb. approx.
Frequency-changers	19	10½	9	26 lb. approx.
Power-unit No. 2A	6	10½	6	17 lb.
Power-unit No. 2B	10½	7½	16	58 lb. with battery
Unit, Isolating, R.F., No. 2A	6¼	5	5	4½ lb.

**22. Mechanical description.**—The dimensions and weights of the various units are given in Table 3.

### OPERATION

**23. Procedure for setting-up before making measurements.**—The equipment should be set-up and adjusted as follows before making measurements of field strength or noise voltages :—

(a) Connect the required frequency-changer unit to the Amplifier No. 44A by means of the short length of coaxial cable provided. The frequency-changer unit should be attached to the Amplifier No. 44A by means of the four trunk clips provided.

(b) Connect each unit to the battery or mains power-unit with the screened leads provided.

(c) Switch on the heater supply on the power-unit. This switch is marked FILAMENTS on the battery unit and A.C. ON on the mains unit; the other switch on each unit controls the high-tension voltage and should be left in the off position. *Allow five minutes for the heaters to warm up*, then switch on the high-tension voltage; this switch is marked ROTARY on the battery unit and H.T. ON on the mains unit. This ensures that the set is operated after a stable condition has been obtained and that the valves and meter are not damaged.

(d) Turn the meter switch on the lower right of the front panel of the Amplifier No. 44A to the positions marked H.T. and L.T. to check the low-tension and high-tension voltages and to the positions marked IF2, IF3, IF4, IF5, LF1 and LF2 to check that each valve of the amplifier is passing the correct anode current. The meter needle should come to rest within the red sector in each case. Now turn the meter switch to FC UNIT and whilst in this position turn the meter switch on the frequency-changer unit to the positions marked, RF, FC, OSC and IF1. The meter needle should again come to rest within the red sector in each case indicating that the anode currents of the valves in the frequency-changer are correct. If any meter reading is incorrect it should be corrected before measurements are made. When checking the oscillator current, the oscillator should be adjusted to the lowest frequency. In the position FC on Frequency-changers

Nos. 7C and 7D, the needle should come to rest at the mid-scale mark and not in the red sector.

(e) Return the meter switch on the Amplifier No. 44A to the measure position (MEAS).

(f) Disconnect the input and set the frequency-changer unit attenuator and the Amplifier No. 44A attenuator to maximum loss. Adjust the SET ZERO control on the Amplifier No. 44A to bring the meter pointer to zero. *During prolonged tests repeat this check of the meter zero from time to time.*

(g) Adjust the RF, FC and OSC tuning controls of the frequency-changer unit to approximately the required frequency as indicated by the calibration of the dials.

(h) Turn the Amplifier No. 44A attenuator to minimum loss and keep the frequency-changer attenuator at maximum loss.

(j) Adjust the RF and FC tuning controls on the frequency-changer unit to give the maximum indication on the meter of first circuit noise. This noise is used to adjust the set to standard gain. Set the Amplifier No. 44A attenuator to bring the meter needle to the calibrate mark (mid-scale) and then set the attenuator marker to the zero mark on the attenuator scale. Whilst making measurements at this frequency the marker must not be moved. (In strong fields, i.e. above 90 db plus constant, calibrate a little to one side of the frequency at which it is intended to measure).

*NOTE* :—The operations given in (g), (h) and (j) must be repeated each time measurements are made at a different frequency.

**24. Field-strength measurements.**—After setting-up the equipment as indicated in par. 23, field-strength measurements should be made as follows :—

(a) If the measurement of noise field radiated by an appliance is being made to confirm that the appliance complies with a specific regulation, e.g. B.S. 800 'Limits of Radio Interference,' the measurement should be made as required by the regulation concerned. Fig. 3 shows the method of connecting the appliance under test as laid down in B.S. 727 : 1954 ; this method is called for in B.S. 800 : 1954. Two methods of connecting an appliance to the isolating unit are

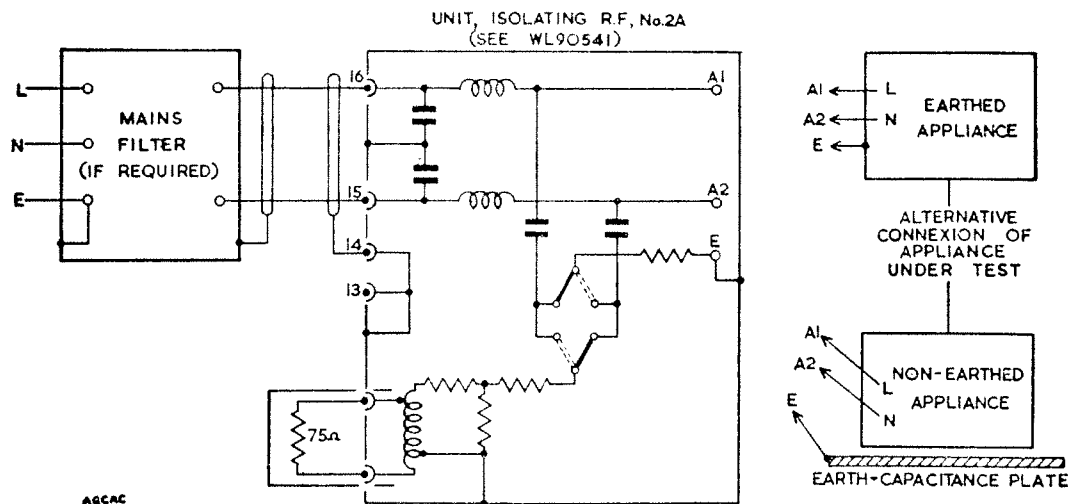


Fig. 3—ARRANGEMENT FOR NOISE-FIELD MEASUREMENTS

shown : one method for appliances whose frame or case is earthed and the other for appliances whose frame or case is not intended to be earthed, e.g. all-insulated or double-insulated appliances. The leads (A1) (A2) and (E) to an earthed appliance or (A1) and (A2) to an unearthed appliance should be the flexible cable supplied with the appliance. The earth lead (E) to the earth-capacitance plate should be a separate lead not more than 9 in. long. If the appliance is of the fixed or solidly-earthed type, the leads (A1), (A2) and (E) should be not more than 9 in. long. An unearthed appliance should be placed on an earth-capacitance plate, which may have an insulating covering to prevent unwanted short-circuits during testing work. The plate should extend at least 12 in. on all sides beyond the projection of the appliance upon it. The mains filter is only required if the mains noise is high in relation to the noise being measured and is insufficiently filtered by the isolating unit.

(b) Adjust the length of dipole to the value appropriate to the frequency at which the measurement is to be made and connect the aerial to the measuring-set. Measurements at frequencies between 30 and 50 Mc/s are made with the aerial adjusted for 50 Mc/s. The correct setting for the telescopic rods is indicated when the engraved figures are just fully visible. Adjust the RF, FC and OSC tuning controls on the frequency-changer unit so that the signal to be measured gives maximum deflexion of the meter needle. If necessary, adjust the attenuator to keep the meter needle on the scale.

(c) Adjust the attenuator to bring the meter needle back to the calibrate mark ; use the frequency-changer attenuator so that the Amplifier No. 44A attenuator is set at the lowest value possible in excess of 10 db.

(d) Note the sum of the two attenuators and add the appropriate correction constant. If the Amplifier No. 44A attenuator is set below 10 db, the

appropriate additional correction constant for the type of signal being measured should be deducted. This gives the field strength in db above 1  $\mu$ V per metre, which should be logged to the nearest 1 db. For convenience, the relationship between voltages expressed in db relative to 1 microvolt and microvolts is given in Table 4.

**25. Noise-voltage measurement.** — Radio-frequency noise-voltage measurements at the terminals of an appliance should be made as follows :—

(a) Set-up the equipment as described in par. 23.

(b) Connect the appliance under test to the mains and the measuring equipment. If the tests are being made to confirm that the appliance complies with a specific regulation, e.g. B.S. 800, the measurement should be made as required by the regulation concerned. Fig. 4 shows the method of connecting the measuring-set and apparatus under test as laid down in B.S. 727 : 1954 ; this method is called for in B.S. 800 : 1954. The conditions applying to the two methods of connecting the appliance to the isolating unit, length of leads and the need for a mains filter are the same as when measuring the radiated noise field [see par. 24 (a)].

(c) Set the line-selector switch on the isolating unit to LINE 1 and switch the appliance on by means of the switch on the isolating unit.

(d) Adjust the attenuators to bring the meter needle back to the calibrate mark ; use the frequency-changer attenuator so that the Amplifier No. 44A attenuator is set at the lowest possible value in excess of 10 db.

★(e) The voltage, in db relative to 1  $\mu$ V, is given by the sum of two attenuator readings, the appropriate correction constant and the loss introduced in the Unit, Isolating, R.F., No. 2A (see Fig. 2.1). If the Amplifier No. 44A attenuator is set below

10 db the appropriate additional correction constant for the type of signal being measured should be deducted. The total should be logged to the nearest 1 db.

measurements made for outside bodies or firms should be forwarded to the Eng. Dept. (WI3/3) before the information is passed on.

(f) Repeat (d) and (e) with the line-selector switch set to LINE 2.

MAINTENANCE

26. All measurements should be recorded with the exception of the lower of the two line readings which normally need not be recorded. The results of

27. Repairs.—The measuring-set should always be maintained in good working condition, local arrangements being made for the prompt repair of minor faults and the replacement of faulty valves.

TABLE 4. RELATIONSHIP BETWEEN VOLTAGES EXPRESSED IN DECIBELS RELATIVE TO 1 MICROVOLT AND MICROVOLTS

Voltages expressed in db relative to 1 $\mu$ V	Microvolts	Voltages expressed in db relative to 1 $\mu$ V	Microvolts	Voltages expressed in db relative to 1 $\mu$ V	Microvolts
0	= 1.0	41	= 112	81	= 11,200
1	= 1.1	42	= 126	82	= 12,600
2	= 1.3	43	= 141	83	= 14,100
3	= 1.4	44	= 158	84	= 15,800
4	= 1.6	45	= 178	85	= 17,800
5	= 1.8	46	= 200	86	= 20,000
6	= 2.0	47	= 224	87	= 22,400
7	= 2.3	48	= 251	88	= 25,100
8	= 2.5	49	= 282	89	= 28,200
9	= 2.8	50	= 316	90	= 31,600
10	= 3.2	51	= 355	91	= 35,500
11	= 3.6	52	= 398	92	= 39,800
12	= 4.0	53	= 447	93	= 44,700
13	= 4.5	54	= 501	94	= 50,100
14	= 5.0	55	= 562	95	= 56,200
15	= 5.6	56	= 631	96	= 63,100
16	= 6.3	57	= 708	97	= 70,800
17	= 7.1	58	= 794	98	= 79,400
18	= 7.9	59	= 891	99	= 89,100
19	= 8.9	60	= 1,000	100	= 100,000
20	= 10.0	61	= 1,120	101	= 112,000
21	= 11.2	62	= 1,260	102	= 126,000
22	= 12.6	63	= 1,410	103	= 141,000
23	= 14.1	64	= 1,580	104	= 158,000
24	= 15.8	65	= 1,780	105	= 178,000
25	= 17.8	66	= 2,000	106	= 200,000
26	= 20.0	67	= 2,240	107	= 224,000
27	= 22.4	68	= 2,510	108	= 251,000
28	= 25.1	69	= 2,820	109	= 282,000
29	= 28.2	70	= 3,160	110	= 316,000
30	= 31.6	71	= 3,550	111	= 355,000
31	= 35.5	72	= 3,980	112	= 398,000
32	= 39.8	73	= 4,470	113	= 447,000
33	= 44.7	74	= 5,010	114	= 501,000
34	= 50.1	75	= 5,620	115	= 562,000
35	= 56.2	76	= 6,310	116	= 631,000
36	= 63.1	77	= 7,080	117	= 708,000
37	= 70.8	78	= 7,940	118	= 794,000
38	= 79.4	79	= 8,910	119	= 891,000
39	= 89.1	80	= 10,000	120	= 1,000,000
40	= 100.0				

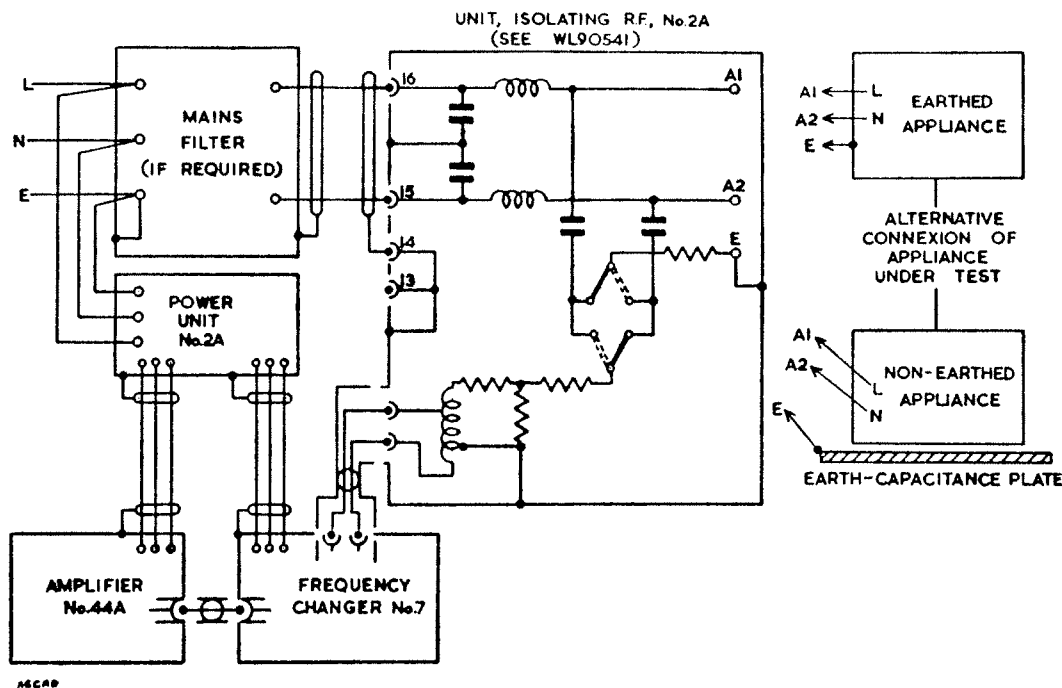


FIG. 4—ARRANGEMENT FOR NOISE-VOLTAGE MEASUREMENTS

No attempt should be made to re-align the r.f. or i.f. stages of the measuring-set. If a complete overhaul is considered necessary, the measuring-set (Amplifier No. 44A and frequency-changers) complete with valves should be returned under maintenance exchange procedure (see STORES, Workmen's Procedure, I 0011).

**28. Calibration check.**—An approximate check on the calibration of the measuring-set can be made if, when first received, it is set-up in an open space clear of overhead wires and wire fences and a field-strength measurement of the local television transmission is made. The comparison of this measurement, which should be recorded, to those made at later dates from exactly the same site and position will serve as a guide to the accuracy of the measuring-set. It should be borne in mind that this check is only applicable in the non-fading area of a transmission. The level of vision signal varies with picture content and it is therefore necessary to measure on the sound channel.

**29.** It is advisable that the calibration of the measuring-set should be checked at intervals. The officer holding the equipment is responsible for initiating the request for calibration on form A 343, at intervals not exceeding 18 months. If any doubt exists as to the accuracy of calibration between successive checks, arrangements should be made to have the calibration checked as early as possible and a similar method should be followed for repairs when

M.E. procedure is not considered necessary. The Amplifier No. 44A and all frequency-changer units should be forwarded for calibration at one time.

**30.** Form A 343 should be completed in triplicate using a separate set of forms for each item to be checked and the requisition references should be serialized as laid down in STORES, General, B 0011. The delivery address should be that at which the equipment can be collected and to which it should be returned after attention. The lines referring to coaxial line links, cable pairs and manufacturers are not applicable to radio interference equipment. After completion of the forms, the C copy should be retained and the A and B copies sent to Birmingham Test Section (Group 72), Fordrough Lane, Birmingham, 9 (Tele. No. Birmingham VICTORIA 2361, Extn. 158).

Collection and delivery will then as far as possible be arranged by the Test Section, which has at its disposal vehicles suitable for the transport of test equipment without the need for special packing.

The A copy will be retained by the Test Section and a receipt for the set will be given by the driver on the back of the C copy when the set is collected.

**31.** Where no attention other than the calibration check is found to be necessary, the set will, in normal circumstances, be returned within 14 days of its collection ; more urgent attention should be arranged by telephone in an emergency.

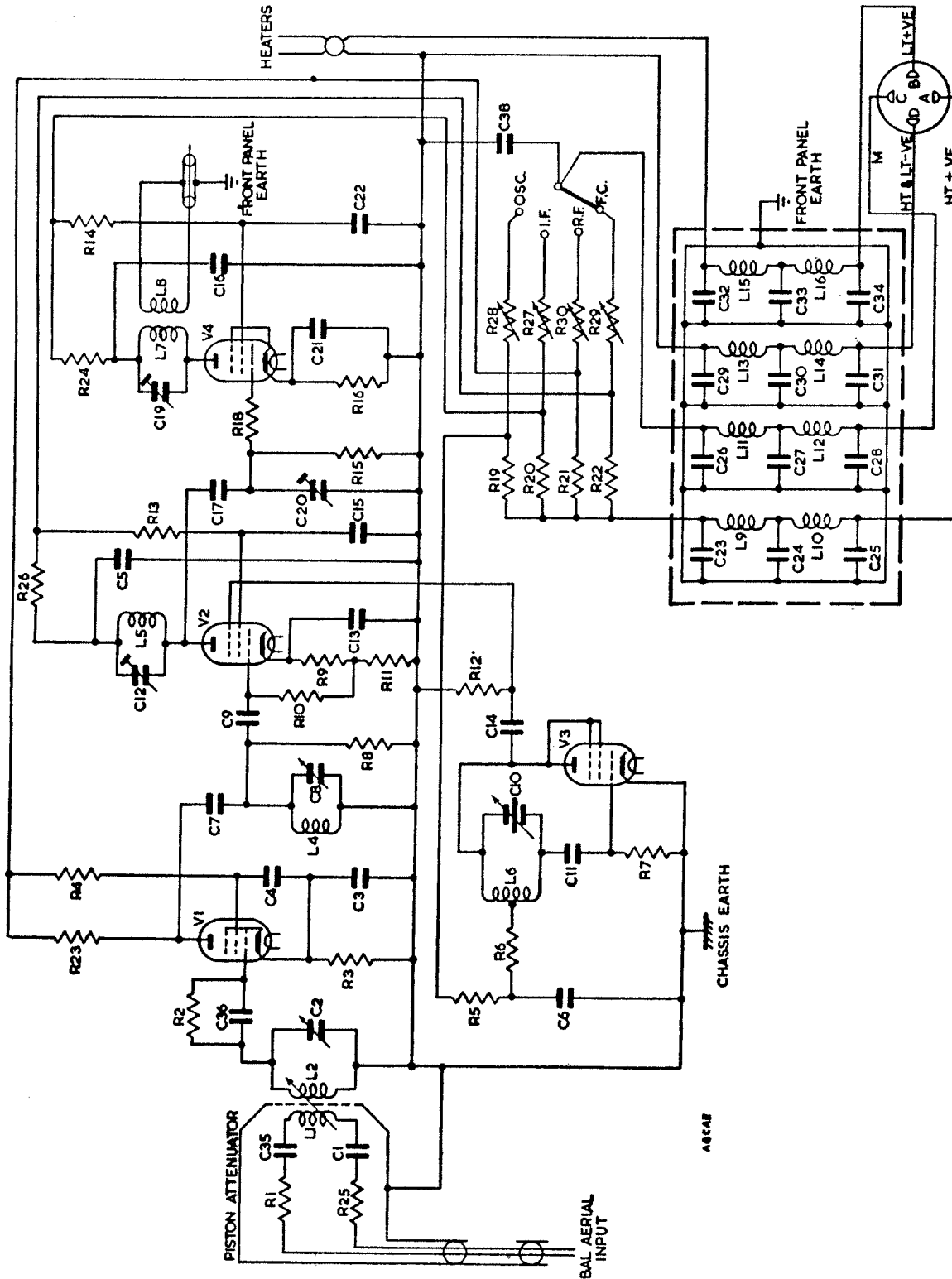


FIG. 5. FREQUENCY-CHANGER No. 7A  
(For components see Table 5)

TABLE 5—LIST OF COMPONENTS FOR FREQUENCY-CHANGER No. 7A  
(see Fig. 5)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
R1	Resistor, $39\Omega \pm 5\% \frac{1}{8} W.$ , high stability	C11	Capacitor, 10 pF., Erie Type N750K
R2	" 47K $\Omega$ , R.M.A.9	C12	" 3–33 pF., Wingrove & Rogers Type C30–01
R3	" 220 $\Omega$ , R.M.A.8	C13	" 0.01 $\mu F.$ , T.C.C. Type CP 32N
R4	" 20K $\Omega$ , R.M.A.8	C14	" 22 pF., Erie Type N750K
R5	" 560 $\Omega$ , R.M.A.8	C15	" 0.01 $\mu F.$ , T.C.C. Type CP 32N
R6	" 6.8K $\Omega$ , R.M.A.8	C16	" 0.01 $\mu F.$ , T.C.C. Type CP 32N
R7	" 47K $\Omega$ , R.M.A.8	C17	" 4.7 pF., Erie Type P100K
R8	" 4.7K $\Omega$ , R.M.A.8	C19	" 3–33 pF., Wingrove & Rogers Type C30–01
R9	" 560 $\Omega$ , R.M.A.8	C20	" 3–33 pF., Wingrove & Rogers Type C30–01
R10	" 56K $\Omega$ , R.M.A.8	C21	" 0.01 $\mu F.$ , T.C.C. Type CP 32N
R11	" 15K $\Omega$ , R.M.A.8	C22	" 0.01 $\mu F.$ , T.C.C. Type CP 32N
R12	" 47K $\Omega$ , R.M.A.8	C23–C34	" 500 pF., $-0 + 50\%$ , Mica-disc, T.C.C. Type CM30
R13	" 22K $\Omega$ , R.M.A.8	C35	" 220 pF., Dubilier Type S635
R14	" 4.7K $\Omega$ , R.M.A.8	C36	" 10 pF., Erie Type N750K
R15	" 100K $\Omega$ , R.M.A.9	C38	" 0.1 $\mu F.$ , T.C.C. Type CP45N
R16	" 220 $\Omega$ , R.M.A.8	L1	Inductor, 3 turns, 18 S.W.G., close wound on $\frac{3}{8}$ in. dia. former
R18	" 10 $\Omega$ , R.M.A.8	L2	" 7 " 16 S.W.G. on $\frac{3}{8}$ in. dia. former
R19	" 270 $\Omega \pm 10\%$ , R.M.A.8	L4	" 6 " 16 S.W.G. on $\frac{1}{2}$ in. dia. former
R20	" 120 $\Omega \pm 10\%$ , R.M.A.8	L5	" 17 " 24 S.W.G., D.S.C.
R21	" 220 $\Omega$ , R.M.A.8	L6	" 10 " 16 S.W.G. on $\frac{1}{2}$ in. dia. former tapped 5 $\frac{3}{4}$ turns from C11 end
R22	" 680 $\Omega$ , R.M.A.8	L7	" 18 " 24 S.W.G., D.S.C.
R23	" 2.2K $\Omega$ , R.M.A.8	L8	" 5 " 24 S.W.G., D.S.C.
R24	" 1K $\Omega$ , R.M.A.8	L9–L12	" H.F. choke, Eddystone list 1011
R25	" $39\Omega \pm 5\% \frac{1}{8} W.$ , high stability	L13–L16	" 22 turns, 18 S.W.G., close wound on $\frac{3}{8}$ in. dia. former
R26	" 1K $\Omega$ , R.M.A.8		
R27–R30	Potentiometer, 2.5K $\Omega$ , Colvern Type 1106/11S		
V1	Valve, H.F. pentode, CV 380		
V2–V4	" H.F. pentode, CV 1091		
C1	Capacitor, 220 pF., Dubilier Type S635		
C2	" 100 pF., Wingrove & Rogers Type C8–04		
C3	" 0.0047 $\mu F.$ , T.C.C. Type CTH 315/LT		
C4	" 0.01 $\mu F.$ , T.C.C. Type CTH 422		
C5	" 0.01 $\mu F.$ , T.C.C. Type CP 32N		
C6	" 100 pF., Erie Type N750L		
C7	" 22 pF., Erie Type N750K		
C8	" 100 pF., Polar Type C8–04		
C9	" 100 pF., Erie Type N750L		
C10	" 2 x 40 pF., Wingrove & Rogers Type C38–12		

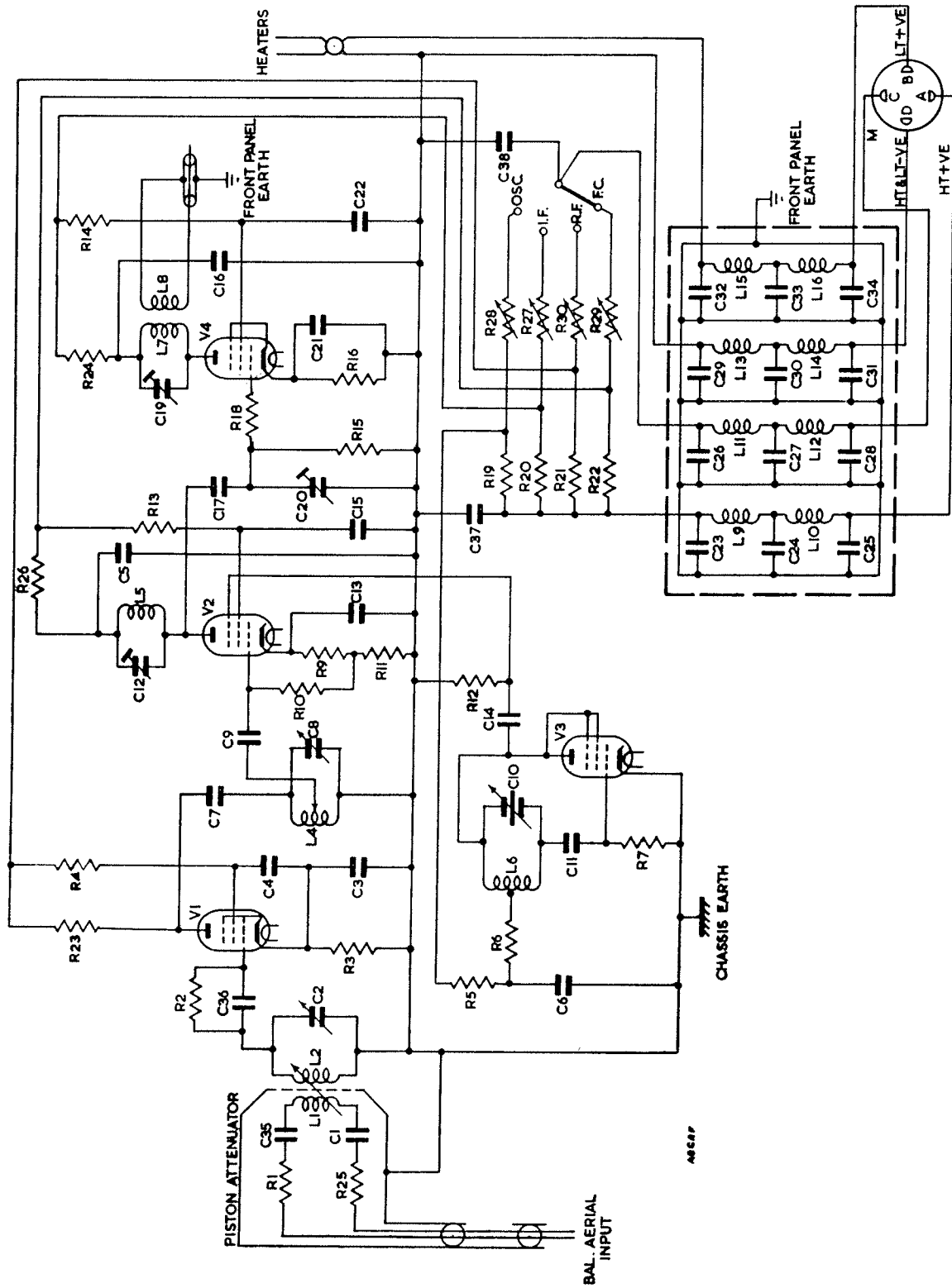


FIG. 6—FREQUENCY-CHANGER No. 7B  
(For components see Table 6)

TABLE 6—LIST OF COMPONENTS FOR FREQUENCY-CHANGER NO. 7B  
(see Fig. 6)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
R1	Resistor, 39Ω ± 5%, $\frac{1}{8}$ W., high stability	C11	Capacitor, 10 pF., Erie Type N750K
R2	„ 47KΩ, R.M.A.9	C12	„ 3-33 pF., Wingrove & Rogers Type C30-01
R3	„ 150Ω, R.M.A.8	C13	„ 0.01 μF., T.C.C. Type CP32N
R4	„ 22KΩ, R.M.A.8	C14	„ 22 pF., Erie Type N750K
R5	„ 560Ω, R.M.A.8	C15	„ 0.01 μF., T.C.C. Type CP32N
R6	„ 6.8KΩ, R.M.A.8	C16	„ 0.01 μF., T.C.C. Type CP32N
R7	„ 22KΩ, R.M.A.8	C17	„ 10 pF., Erie Type P100K
R9	„ 560Ω, R.M.A.8	C19	„ 3-33 pF., Wingrove & Rogers Type C30-01
R10	„ 56KΩ, R.M.A.8	C20	„ 3-33 pF., Wingrove & Rogers Type C30-01
R11	„ 15KΩ, R.M.A.8	C21	„ 0.01 μF., T.C.C. Type CP32N
R12	„ 47KΩ, R.M.A.8	C22	„ 0.01 μF., T.C.C. Type CP32N
R13	„ 22KΩ, R.M.A.8	C23-C34	„ 500 pF. - 0 + 50%, Micadisc, T.C.C. Type CM30
R14	„ 4.7KΩ, R.M.A.8	C35	„ 100 pF., Erie Type N750L
R15	„ 100KΩ, R.M.A.9	C36	„ 20 pF., Erie Type N750K
R16	„ 220Ω, R.M.A.8	C37	„ 0.1 μF., T.C.C. Type CP45N
R18	„ 10Ω, R.M.A.8	C38	„ 0.1 μF., T.C.C. Type CP45N
R19	„ 220Ω, R.M.A.8	V1	Valve, H.F. pentode, CV 380
R20	„ 150Ω, R.M.A.8	V2-V4	„ H.F. pentode, CV 1091
R21	„ 150Ω, R.M.A.8	L1	Inductor, 1 $\frac{3}{4}$ turns, 18 S.W.G. enamelled, close wound, $\frac{3}{8}$ in. sq. former
R22	„ 470Ω, R.M.A.8	L2	„ 2 „ 16 S.W.G. tin CU, $\frac{3}{8}$ in. sq. former
R23	„ 4.7KΩ, R.M.A.8	L4	„ 2 $\frac{3}{4}$ „ 16 S.W.G. tin CU, $\frac{3}{8}$ in. tapped 1 $\frac{3}{4}$ turns from earth end
R24	„ 1KΩ, R.M.A.8	L5	„ 17 „ 24 S.W.G., D.S.C.
R25	„ 39Ω ± 5%, $\frac{1}{8}$ W., high stability	L6	„ 5 „ 16 S.W.G. on $\frac{1}{2}$ in. dia. former
R26	„ 1KΩ, R.M.A.8	L7	„ 18 „ 24 S.W.G., D.S.C.
R27-R30	Potentiometer, 2.5 KΩ, Colvern Type 1106/11S	L8	„ 5 „ 24 S.W.G., D.S.C.
C1	Capacitor, 100 pF., Erie Type N750L	L9-L12	„ H.F. choke, Eddystone list 1011
C2	„ 100 pF., Wingrove & Rogers Type C8-04	L13-L16	„ 22 turns, 18 S.W.G. enamelled, close wound, $\frac{3}{8}$ in. former
C3	„ 0.047 μF., T.C.C. Type CTH 315/LT		
C4	„ 0.01 μF., T.C.C. Type CTH 422		
C5	„ 0.01 μF., T.C.C. Type CP32N		
C6	„ 100 pF., Erie Type N750L		
C7	„ 22 pF., Erie Type N750K		
C8	„ 100 pF., Wingrove & Rogers Type C8-04		
C9	„ 100 pF., Erie Type N750L		
C10	„ 2 x 40 pF., Wingrove & Rogers Type C38-12		

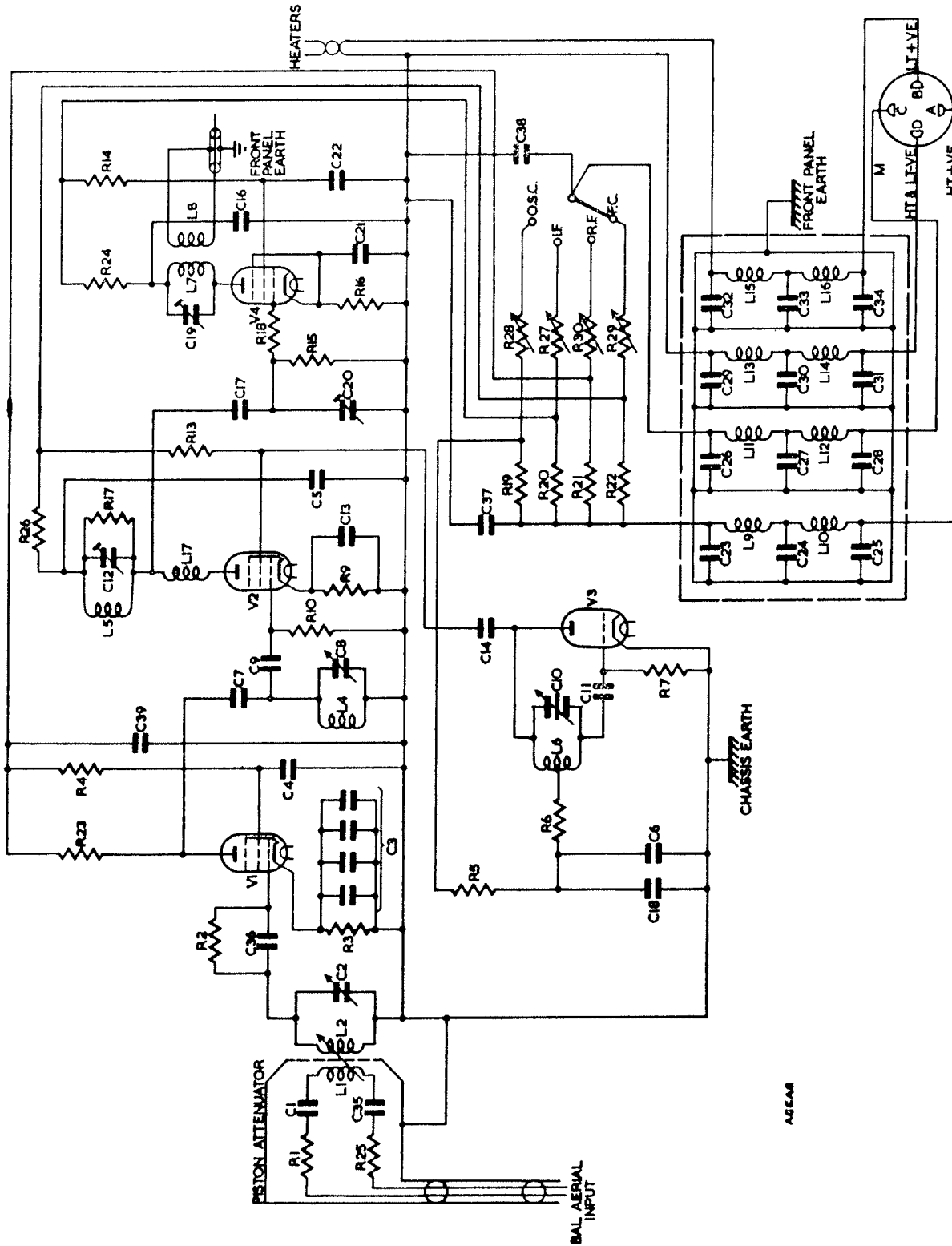


FIG. 7—FREQUENCY-CHANGER No. 7C  
(For components see Table 7)

TABLE 7—LIST OF COMPONENTS FOR FREQUENCY-CHANGER No. 7C  
(see Fig. 7)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
R1	Resistor, 39Ω ± 5%, 1/8 W., high stability	C9	Capacitor, 22 pF., Erie Type N750K
R2	" 47KΩ, R.M.A.9	C10	" 2 × 40 pF., Wingrove & Rogers Type 38-12
R3	" 150Ω, " 8	C11	" 10 pF., Erie Type N750K
R4	" 4.7KΩ, " 8	C12	" 3-33 pF., Wingrove & Rogers Type C30-01
R5	" 100KΩ, " 8	C13	" 100 pF., Erie Type N750K
R6	" 2KΩ, " 8	C14	" 1.5 pF., Erie Type P750K
R7	" 47KΩ, " 8	C16	" 0.01 μF., T.C.C. Type CP32N
R9	" 10KΩ, " 8	C17	" 10 pF., Erie Type N750K
R10	" 68KΩ, " 8	C18	" 2 μF., Micropack, T.C.C.
R13	" 10KΩ, " 8	C19	" 3-33 pF., Wingrove & Rogers Type C30-01
R14	" 4.7KΩ, " 8	C20	" 3-33 pF., Wingrove & Rogers Type C30-01
R15	" 100KΩ, " 9	C21	" 0.01 μF., T.C.C. Type CP32N
R16	" 150Ω, " 8	C22	" 0.01 μF., T.C.C. Type CP32N
R17	" 47KΩ, " 8	C23-C34	" 500 pF. 10 + 50%, Micadisc, T.C.C. Type CM30
R18	" 10Ω, " 8	C35	" 50 pF., Erie Type N750K
R19	" 470Ω, " 8	C36	" 4.7 pF., Erie Type P750K
R20	" 150Ω, " 8	C37	" 0.1 μF., T.C.C. Type CP45N
R21	" 150Ω, " 8	C38	" 0.1 μF., T.C.C. Type CP45N
R22	" 6.8KΩ, " 8	C39	" 1500 pF., T.C.C. Type CTH 315/LT
R23	" 2.2KΩ, " 8		
R24	" 1KΩ, " 8		
R25	" 39Ω ± 5%, 1/8 W., high stability		
R26	" 1KΩ, R.M.A.8		
R27-R30	Potentiometer, 2.5KΩ, Colvern Type 1106/11S		
V1-V2	Valve, H.F. pentode, CV 380	L1	Inductor, 1 1/2 turns, 18 S.W.G., close wound on 3/8 in. sq. former
V3	" Triode, CV 1137	L2	" 2 " 16 S.W.G., on 3/8 in. × 5/8 in. rect. coil
V4	" H.F. pentode, CV 1091	L4	" 3 " 18 S.W.G., on 1/8 in. dia. former
C1	Capacitor, 50 pF., Erie Type N750K	L5	" 17 " 24 S.W.G., D.S.C.
C2	" 100 pF., Wingrove & Rogers Type C8-04	L6	" 2 " 16 S.W.G., 3/4 in. dia.
C3	" 4 × 1500 pF., T.C.C. Type CTH 315/LT	L7	" 18 " 24 S.W.G., D.S.C.
C4	" 1500 pF., T.C.C. Type CTH 422	L8	" 5 " 24 S.W.G., D.S.C.
C5	" 0.01 μF., T.C.C. Type CP32N	L9-L12	" H.F. choke, Eddystone list 1011
C6	" 100 pF., Erie Type N750L	L13-L16	" 22 turns, 18 S.W.G., close wound on 3/8 in. dia former
C7	" 10 pF., Erie Type N750K	L17	" H.F. choke, Eddystone list 1011
C8	" 100 pF., Wingrove & Rogers Type C8-04		

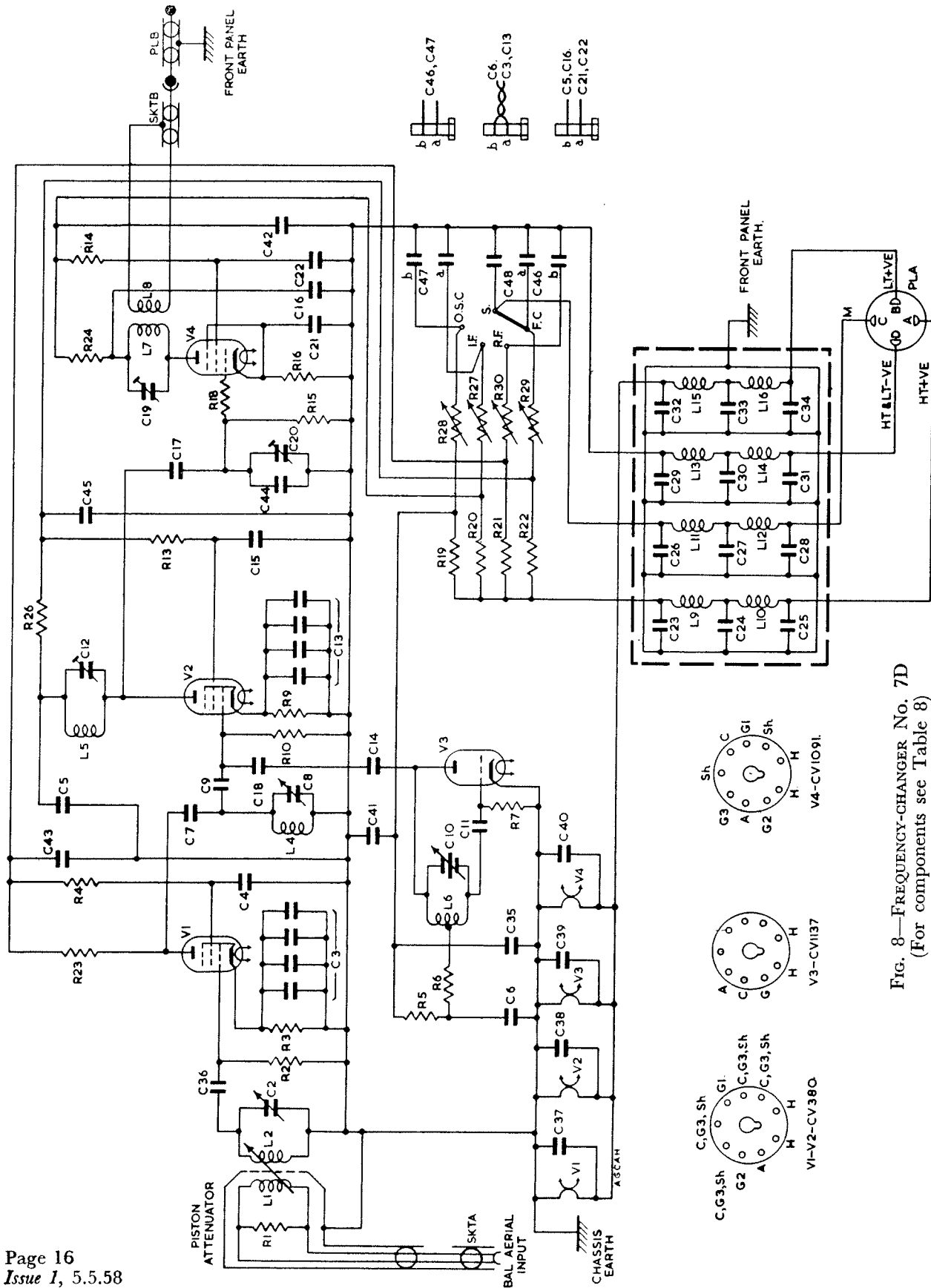


Fig. 8—FREQUENCY-CHANGER No. 7D  
(For components see Table 8)

TABLE 8—LIST OF COMPONENTS FOR FREQUENCY-CHANGER NO. 7D  
(see Fig. 8)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
R1	Resistor, 75Ω ± 5%, ¼ W., high stability	C14	Capacitor, 1.5 ± 0.5 pF., Erie Type P100K
R2	„ 47KΩ, ¼ W., R.M.A.9	C15	„ 3300 pF., T.C.C. Type CTH 315/LT
R3	„ 150Ω ± 10%, ½ W., R.M.A.8	†C16	„ 1500 pF.
R4	„ 22KΩ, ½ W., R.M.A.8	C17	„ 6.8 ± 0.5 pF., Erie Type P100K
R5	„ 4.7KΩ ± 10%, ½ W., R.M.A.8	C18	„ 20 pF. ± 20%, Erie Type N750K
R6	„ 6.8KΩ, ½ W., R.M.A.8	C19	„ 3–33 pF., Wingrove & Rogers Type C30–01
R7	„ 33KΩ ± 10%, ¼ W., R.M.A.9	C20	„ 3–33 pF., Wingrove & Rogers Type C30–01
R9	„ 4.7KΩ, ½ W., R.M.A.8	†C21	„ 1500 pF.
R10	„ 68KΩ ± 10%, ¼ W., R.M.A.9	†C22	„ 1500 pF.
R13	„ 10KΩ ± 10%, ½ W., R.M.A.8	C23	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R14	„ 4.7KΩ, ½ W., R.M.A.8	C24	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R15	„ 100KΩ ± 10%, ¼ W., R.M.A.9	C25	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R16	„ 150Ω ± 10%, ½ W., R.M.A.8	C26	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R18	„ 10Ω, Morganite Type T.R.M.A.9	C27	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R19	„ 270Ω ± 10%, ½ W., R.M.A.8	C28	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R20	„ 120Ω ± 10%, ½ W., R.M.A.8	C29	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R21	„ 180Ω ± 10%, ½ W., R.M.A.8	C30	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R22	„ 4.7KΩ, ½ W., R.M.A. 8	C31	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R23	„ 10KΩ ± 10%, ½ W., R.M.A.8	C32	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R24	„ 1KΩ, ½ W., R.M.A.8	C33	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R26	„ 1KΩ, ½ W., R.M.A.8	C34	„ 500 pF. — 0 + 50%, Micadisc, T.C.C. Type CM30
R27	Potentiometer, 2.5KΩ, Colvern Type 1106/115	C35	„ 3300 pF., T.C.C. Type CTH 315/LT
R28	„ 5KΩ, „ „ „	C36	„ 4.7 ± 0.5 pF., Erie Type P100K
R29	„ 5KΩ, „ „ „	C37	„ 3300 pF., T.C.C. Type CTH 315/LT
R30	„ 2.5KΩ, „ „ „	C38	„ 3300 pF., T.C.C. Type CTH 315/LT
S	Switch, to Drg. WL 94344	C39	„ 3300 pF., T.C.C. Type CTH 315/LT
Skt. A.	Socket, Belling-Lee Type L 789/BS	C40	„ 3300 pF., T.C.C. Type CTH 315/LT
Skt. B.	„ Interservices No. 10H/3185	C41	„ 8 μF., Drilitic, Dubilier Type BR
V1–V2	Valve, H.F. pentode, CV 380	C42	„ 3300 pF., T.C.C. Type CTH 315/LT
V3	„ Triode CV 1137	C43	„ 3300 pF., T.C.C. Type CTH 315/LT
V4	„ H.F. pentode CV 1091	C44	„ 20 pF. ± 20%, Erie Type N750K
†C2	Capacitor, 50 pF., Wingrove & Rogers Type C8–04 modified	C45	„ 3300 pF., T.C.C. Type CTH 315/LT
C3	„ 4 × 2 × 1500 pF., T.C.C. Type 2 CTH 315/S (4 off)		
C4	„ 3300 pF., T.C.C. Type CTH 315/LT		
†C5	„ 1500 pF.		
C6	„ 2 × 1500 pF., T.C.C. Type 2 CTH 315/S (1 off)		
C7	„ 10 pF. ± 20%, Erie Type N750K		
C8	„ 50 pF., Wingrove & Rogers Type C8–04		
C9	„ 10 pF. ± 20%, Erie Type N750K		
C10	„ 2 × 40 pF., Wingrove & Rogers Type C38–12		
C11	„ 4.7 ± 0.5 pF., Erie Type P100K		
C12	„ 3–33 pF., Wingrove & Rogers Type C30–01		
C13	„ 4 × 2 × 1500 pF., T.C.C. Type 2 CTH 315/S (4 off)		

TABLE 8 (contd.)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
†C46	Capacitor, 2 × 1500 pF.	L6	Inductor, 1 turn, 14 S.W.G., Tinned copper, ½ in. dia. approx.
‡C47	„ 2 × 1500 pF.	L7	„ 18 „ 24 S.W.G., D.S.C.
C48	„ 0.1 μF. ± 20 %, 350V., T.C.C. Type CP45N	L8	„ 5 „ 24 S.W.G., D.S.C.
L1	Inductor, 3 turns, 18 S.W.G., enamelled, slightly spaced on ⅜ in. sq. former	L9-L12	„ H.F. choke, Eddystone list 1011
L2	„ To Drg. WL 93708	L13-L16	„ 22 turns, 18 S.W.G., close wound on ⅜ in. dia. former
L4	„ To Drg. WL 93709	PLA	Plug, Breeze CZ 51327 Plessey
L5	„ 17 turns, 22 S.W.G., D.S.C.	PLB	„ Interservices No. 10H/628

†Modified to Drg. WL 94100

‡The pairs of capacitors C5 and C21, C16 and C 22, C46 and C47 each comprise T.C.C. Type 2 CTH 315/5 (3 off)

TABLE 9—LIST OF COMPONENTS FOR AMPLIFIER NO. 44A

(see Fig. 9)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
R1	Resistor, 22KΩ, R.M.A.8	R27	Resistor, 1KΩ, R.M.A.9
R2	„ 47KΩ, „ 8	R28	„ 100Ω, „ 9
R3	„ 4.7KΩ, „ 9	R29	Potentiometer, 1MΩ, Morgan Type H
R4	„ 220Ω, „ 8	R30	Resistor, 1KΩ, R.M.A.9
R5	„ 10KΩ, „ 9	R31	„ 47KΩ, „ 2
R6	Potentiometer, 100KΩ, 3W., CLR4001/11S	R32	„ 47KΩ, „ 2
R7	Resistor, 22KΩ, R.M.A.8	R33	„ 1.5KΩ, „ 9
R8	„ 4.7KΩ, „ 9	R34	Potentiometer, 10KΩ, CLR 4001/11S
R9	„ 22KΩ, „ 8	R35	Resistor, 5.6KΩ ± 10%, R.M.A.16
R10	„ 4.7KΩ, „ 9	R36	„ 1.8KΩ, R.M.A.16
R11	„ 220Ω, „ 8	R37	„ 100KΩ, Welwyn Type A3634
R12	„ 4.7KΩ, „ 9	R38	„ 330Ω, R.M.A.9
C13	„ 4.7KΩ, „ 9	R39	„ 150Ω, „ 9
R14	„ 470KΩ, „ 9	R40	„ 33Ω, „ 9
R15	„ 220Ω, „ 8	R41	„ 150Ω, „ 9
R16	„ 220Ω, „ 8	R42	„ 1.5KΩ, „ 9
R17	„ 4.7KΩ, „ 9	R43	„ 150Ω, „ 9
R18	„ 47KΩ, „ 9	R44	„ 3.9KΩ, Welwyn Type A3611
R19	„ { 5.8MΩ } in series Welwyn Type A3634	R45	„ 4.7 KΩ, R.M.A.9
R20	„ 3.4MΩ, Welwyn Type SA3634	R47-R53	Potentiometer, 2.5KΩ, CLR 1106/11S
R21	„ 100KΩ, R.M.A.2	R54	Resistor, 470Ω, Welwyn Type A3611
R22	„ 100Ω, „ 9	R55	Potentiometer, 2.5KΩ, CLR 1106/11S
R23	„ 220KΩ, „ 9	R56	Resistor, 10KΩ, R.M.A.8
R24	„ 1KΩ, „ 9	R57	„ 75Ω, „ 9
R25	„ 100KΩ, „ 8	R58	„ 330Ω, Welwyn Type A3622
R26	„ 470KΩ, „ 9	R59	„ 1KΩ, Welwyn Type A3622

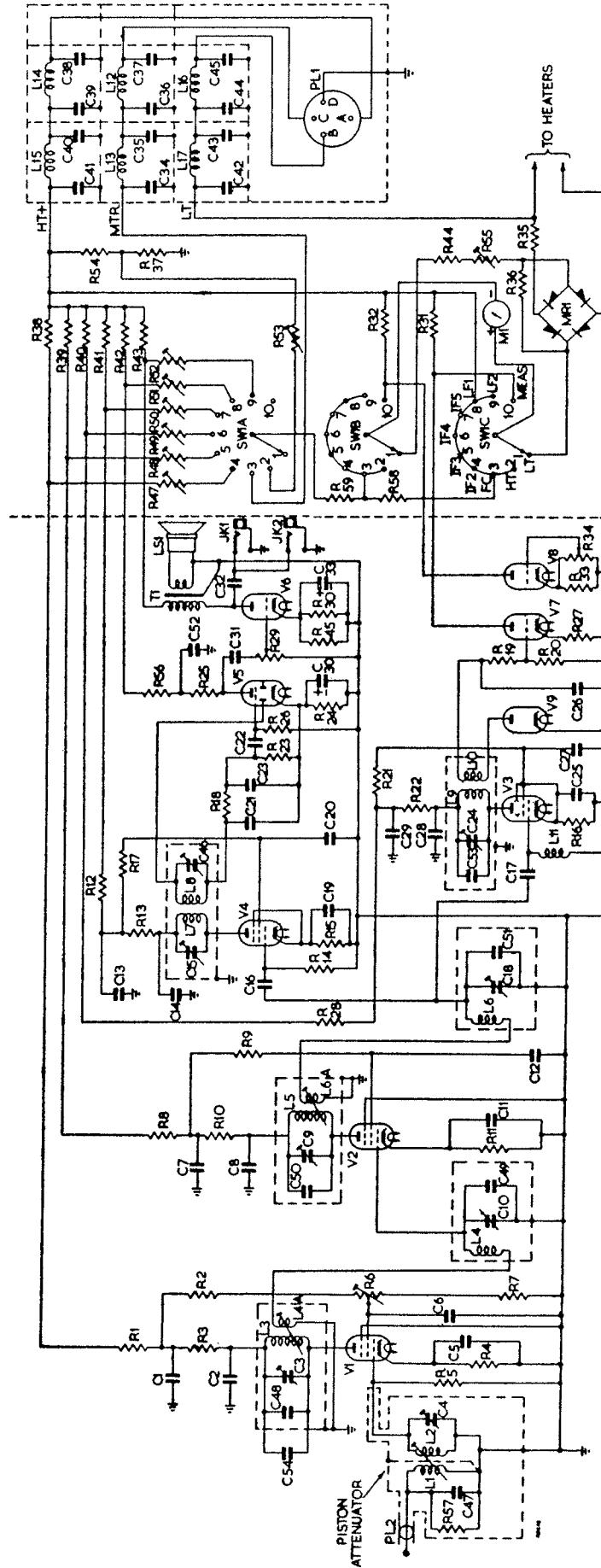


Fig. 9—AMPLIFIER No. 44A  
(For components see Table 9)

TABLE 9 (cont.)

<i>Cct. ref.</i>	<i>Description</i>	<i>Cct. ref.</i>	<i>Description</i>
C1	Capacitor, 0.01 $\mu$ F., T.C.C. Type CP32N	C44	Capacitor, 0.01 $\mu$ F., Hunt Type L6/4
C2	" 0.01 $\mu$ F., T.C.C. Type CP32N	C45	" 0.01 $\mu$ F., " " "
C3	" 50 pF., variable, Polar Type C8-03.	C46	" 20 pF., variable, Polar Type C30-01
C4	" 20 pF., variable, Polar Type C30-01.	C47	" 220 pF., Erie Type H.I.K.
C5	" 0.01 $\mu$ F., T.C.C. Type CP32N	C48	" 47 pF., " " N750A
C6	" 0.01 $\mu$ F., " " "	C49	" 47 pF., " " "
C7	" 0.01 $\mu$ F., " " "	C50	" 68 pF., " " N750B
C8	" 0.01 $\mu$ F., " " "	C51	" 47 pF., " " N750A
C9	" 50 pF., variable, Polar Type C8-03	C52	" 0.5 $\mu$ F., T.C.C. Type CP47N
C10	" 50 pF., variable, Polar Type C8-03	C53	" 4.7 pF., Erie Type P100A
C11	" 0.01 $\mu$ F., T.C.C. Type CP32N	C54	" 22 pF., " " P100C
C12	" 0.01 $\mu$ F., " " "	V1	Valve, Type CV 1091
C13	" 0.01 $\mu$ F., " " "	V2	" " CV 1091
C14	" 0.01 $\mu$ F., " " "	V3	" " CV 309
C15	" 20 pF., variable, Polar Type C30-01	V4	" " CV 1091
C16	" 2.2 pF., Erie Type P100A	V5	" " CV 587
C17	" 10 pF., Erie Type N750A	V6	" " CV 1067
C18	" 50 pF., variable, Polar Type C8-03	V7	" " CV 1067
C19	" 0.01 $\mu$ F., T.C.C. Type CP32N	V8	" " CV 1067
C20	" 0.01 $\mu$ F., " " "	V9	" " CV 1054
C21	" 100 pF., Erie Type N750B	PL1	Plug, Mk. IV, fixed 4-pin, Type CZ 51327 Plessey
C22	" 0.01 $\mu$ F., T.C.C. Type CP45W	PL2	" 1-way fixed coaxial Type 75361 Pyc
C23	" 100 pF., Erie Type N750B	M1	Meter, 250 $\mu$ A. F.S.D., Special, Type 505 E. Turner
C24	" 20 pF., variable, Polar Type C30-01	SW1	Switch, 3-pole, 10-way, non-shorting B.N.S.F.
C25	" 0.01 $\mu$ F., T.C.C. Type CP32N	MR1	Rectifier, Meter, 1mA., Westinghouse
C26	" 0.033 $\mu$ F., P.S.M. $\pm$ 1%, Precision Components Ltd.	JK1	Jack, Telephone P72 Igranic
C27	" 0.01 $\mu$ F., T.C.C. Type CP32N	JK2	" " " "
C28	" 0.01 $\mu$ F., " " "	LS1	Speaker, 3 in., Midget Rola
C29	" 0.01 $\mu$ F., " " "	T1	Transformer, Output, Type 1036 Rola
C30	" 25 $\mu$ F., " " CE18D	L1	Moving coil assembly } in piston attenuator
C31	" 0.01 $\mu$ F., 1000V., T.C.C. Type CP32N	L2	Fixed coil assembly }
C32	" 0.01 $\mu$ F., 1000V., T.C.C. Type CP45W	L3	I.F. transformer No. 1
C33	" 25 $\mu$ F., T.C.C. Type CE18D	L4	Input coil
C34	" 500 pF., Hunt Type L1/2	L4A	I.F. transformer No. 1
C35	" 500 pF., " " "	L5	" " " 2
C36	" 0.01 $\mu$ F., " " L6/4	L6	Input coil
C37	" 0.01 $\mu$ F., " " "	L6A	I.F. transformer No. 2
C38	" 0.01 $\mu$ F., " " "	L7	" " " 3
C39	" 0.01 $\mu$ F., " " "	L8	" " " 3
C40	" 500 pF., " " L1/2	L9	" " " 4
C41	" 500 pF., " " "	L10	" " " 4
C42	" 500 pF., " " "	L11	H.F. choke, Eddystone list 1022
C43	" 500 pF., " " "	L12	" " " " " 1011
		L13	" " " " " 1011
		L14	" " " " " 1022
		L15	" " " " " 1011
		L16	" " 37 turns, 18 S.W.G., D.S.C.
		L17	" " " " " " "

Reference:—STORES, Workmen's Procedure, I 0011 (WP2/3)

END