WIRELESS SET NO. 22

GENERAL DESCRIPTION

INDEX TO CONTENTS

INDEX TO FIGURES

PRELIMINARY DESCRIPTION

Facilities

1. The Wireless set No. 22 is a sender-receiver working on frequencies between 2 and 8Mc/s. It forms parts of various stations, *e.g.*, ground station, man pack station, truck station. It normally employs a 12 ft. vertical rod aerial when used in a vehicle, and a vertical rod aerial of from 16 to 34 ft. when operated on the ground. It is also possible to use a wire aerial 140 ft. in length when a condenser shunt is used in conjunction with it. For further details see para. 42.

Brief electrical description (Fig. 5)

2. The receiver is of the superheterodyne type, employing an R.F. amplifier, mixer, separate local oscillator, two I.F. stages, a combined diode detector and diode A.V.C. rectifier, and an output pentode. There is a separate oscillator for heterodyne reception of C.W. signals.

3. On send, an R.F. pentode acts as master oscillator and doubler; a diode limiter is used for drive levelling; and the master oscillator feeds direct into the P.A. stage which consists of three valves in parallel. The P.A. stage is grid-modulated by the triode section of a double-diode-triode. This in turn is fed from a microphone amplifier whose gain is controlled by bias set up by a diode fed from the sidetone amplifier (output valve).

4. During listening watch, the sender may be switched off, thus conserving the battery. Facilities are also provided for either R/T or C.W. working.

5. Power is derived from Power supply unit No. 4, which on send supplies approximately 275V H.T. and 50V negative bias. Both R.F. and L.F. filtering are provided in the unit. The H.T. voltage rises to 375V on receive, but is reduced by series resistors to 100-150V. The L.T. voltage is supplied direct from the 12V battery, the valve filaments being connected in a series-parallel circuit.

6. It is possible to use remote control by means of Remote control units F, Nos. 1 and 2. No. 1 is fitted adjacent to the set and must be in the hands of an operator, although, once controls have been set to a given system, all operating can be done from the remote end (Control unit No. 2).

7. Remote aerials may be used in conjunction with Aerial unit J. It allows the set to be operated from cover at distances up to 90 ft. from the aerial.

Mechanical details

8. The sender-receiver is assembled on one chassis, all valves and tuning controls being above, and nearly all resistors, condensers and wiring below the chassis. The carrying case has harness attached to the top for man pack use, while for vehicle use a rubber-mounted carrier is used. Both the Power supply unit No. 4 (in its own case) and the set are mounted side by side on the carrier and are held in position

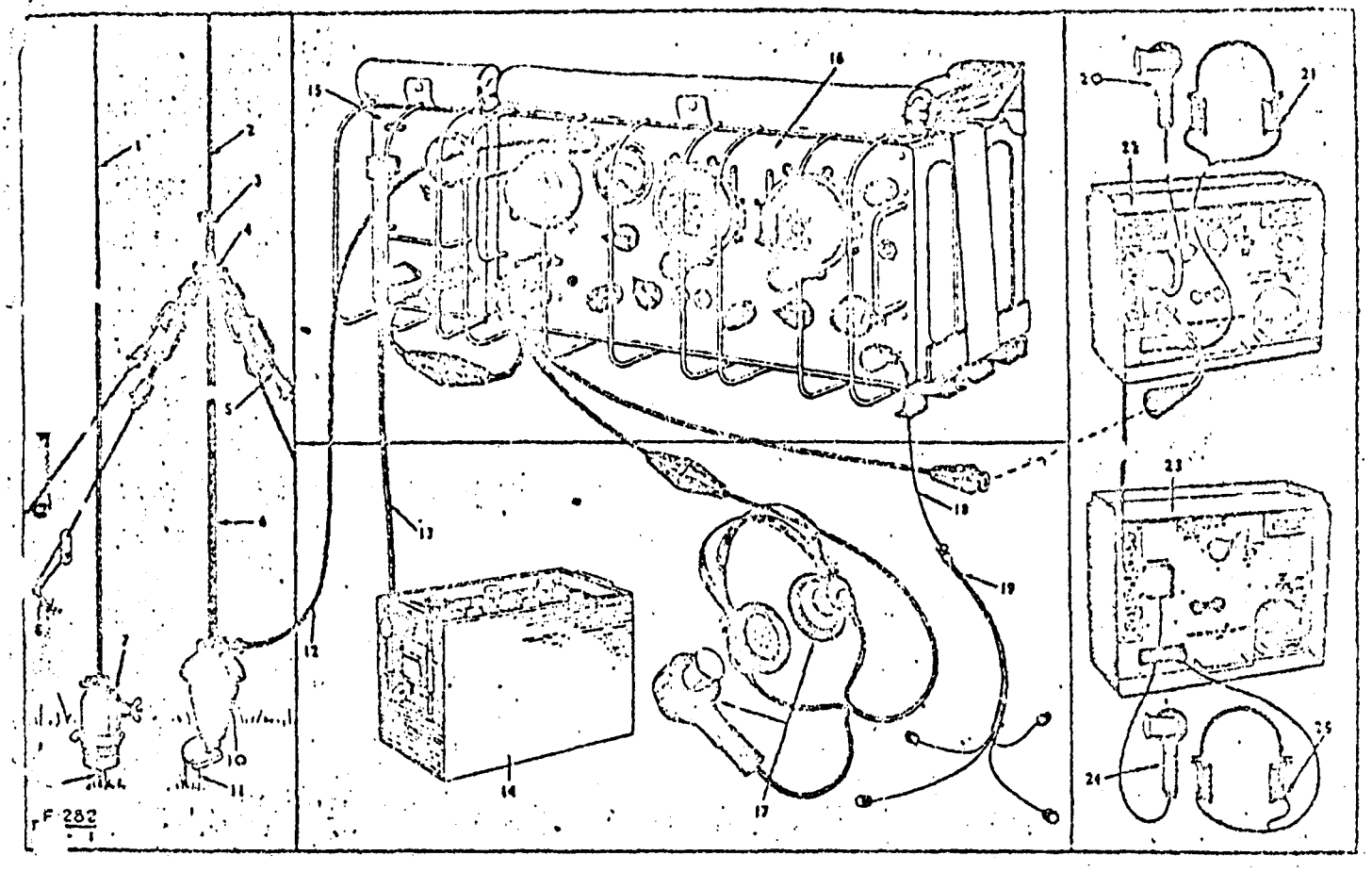

Fig. 1—Layout of complete station

Index to Fig. 1

1. Antennæ rod F
2. Antennæ rod F
3. Adaptor No. 1
4. Stayplate No. 4
5. Insulators, W.T., chain, small, three-link
6. Antennæ rod D, 3 ft.
7. Aerial base No. 11
8. Pegs
9. Aerial base spike
10. Insulator, W.T., B
11. Ground spike
12. Connector, single, No. 10A
13. Connector, twin, No. 78
14. Battery, secondary, 12V 75Ah
15. Power supply unit No. 4
16. Wireless set No. 22
17. Microphone and receiver headgear No. 1
18. Connector, single, No. 33
19. Leads, counterpoise, No. 2, Mk. II
20. Microphone, hand, No. 8
21. Receiver, headgear, D.L.R., No. 1
22. Remote control unit F, No. 1
23. Remote control unit F, No. 2
24. Microphone, hand, No. 8
25. Receiver, headgear, D.L.R., No. 1

... strap and tension spring. All controls are to the front of the set, and are protected by a metal grill. Also, held in position by the grille, is a waterproof cover, intended mainly to prevent rain, etc. entering the set via the front panel. When the set is carried as a man pack, the power supply unit is carried separately, and, therefore, has a separate grille and waterproof cover. Sender-receiver and the power unit are connected together by rubber snatch plugs and sockets. A similar type of snatch plug and socket is used to connect the headsets to the wireless set.

Controls (Fig. 2.)

(a) FREQUENCY. This is the main tuning control for both receiver and sender. There is a click mechanism for quickly selecting one of two pre-set frequencies.

(b) AERIAL COUPLING. This, in conjunction with AERIAL TUNING, tunes the aerial circuit to the correct frequency. The combination of these controls adjusts the matching for maximum output from the sender.

(c) NETTING TRIMMER. In order to compensate for inevitable errors in the tracking, this control is brought to the front panel for final adjustment of sender frequency.

(d) Range switch. This has two positions, one for 2-4½Mc/s and the other for 4½-8Mc/s. It changes the frequency band of both sender and receiver.

(e) System switch. For selecting R/T or C.W. or NET. operation.

(f) AERIAL TUNING. See AERIAL COUPLING (b).

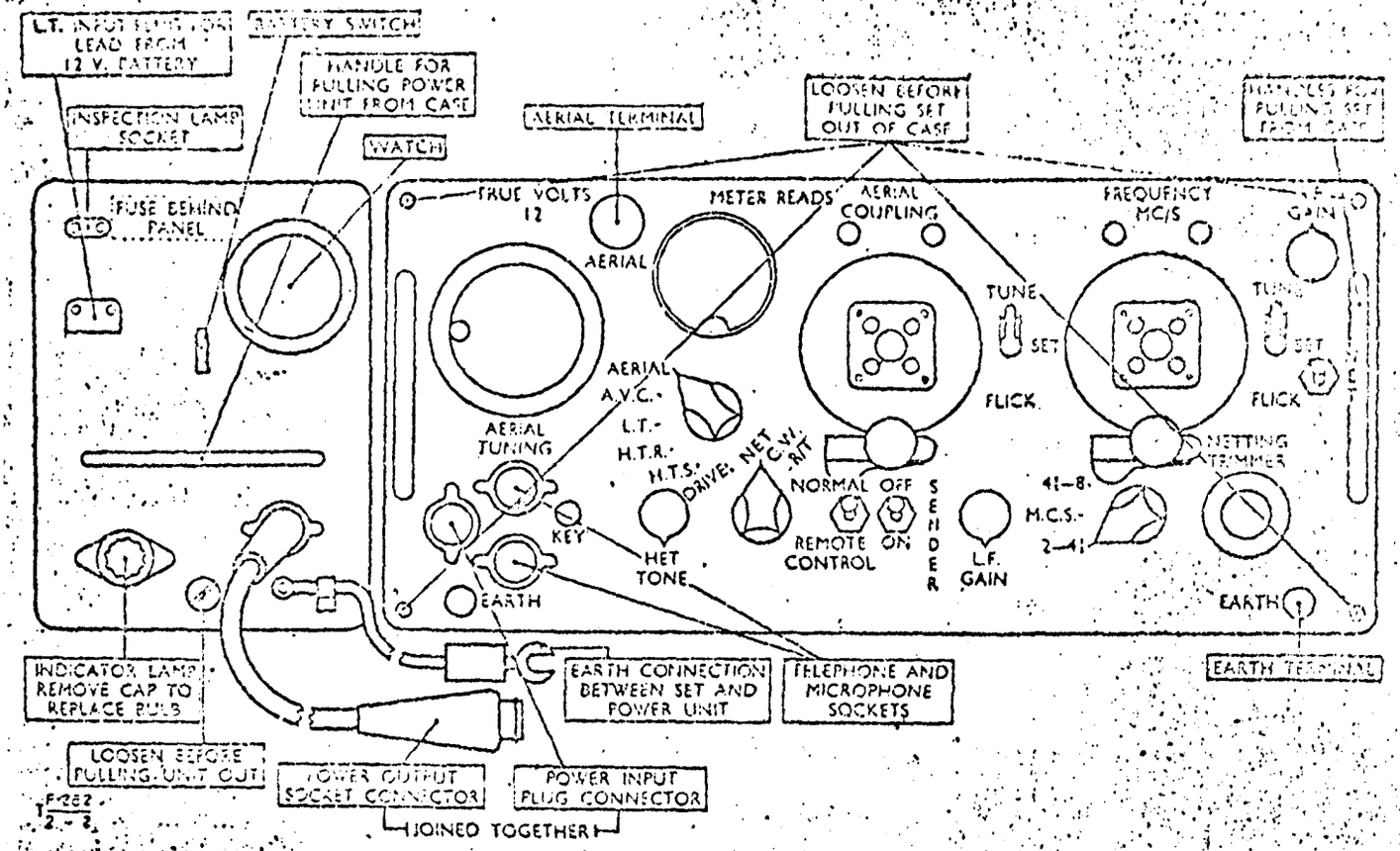

Fig. 2—Front panel view of Wireless set No. 22

(*g*) L.F. GAIN. For controlling volume.
(*h*) R.F. GAIN. For controlling sensitivity.
(*i*) HET. TONE. For adjusting beat note frequency for C.W. reception.
(*j*) Meter-switch. This switches the meter on the panel to indicate aerial current, act as an A.V.C. meter for the receiver and indicates L.T., H.T.R. (receive) or H.T.S. (send) voltages, or the drive by measuring the cathode current in the P.A. stage.
(*k*) Netting switch. For switching on the master oscillator during the time the receiver is working.
(*l*) SENDER ON/OFF. This switches off the sender during periods of extensive listening.
(*m*) NORMAL/REMOTE SWITCH. For use when set is used with Remote control unit F.

TECHNICAL DESCRIPTION

RECEIVER (Figs. 3, 1091)

R.F. amplifier (V1A)

10. The aerial tuning system consists of L4A and C8A in series, the aerial being connected to the top of L4A and the earthing system to the bottom of C8A. Thus the whole constitutes a series resonance circuit with the input to the R.F. amplifier taken from C8A via a blocking condenser C17H. Bias is obtained via L5B from the A.V.C. line and the fixed bias obtained from the 100 Ω portion of the bias dropping resistor R16A plus that set up between the tap of R15A and the earthy end of R15A (depending upon the setting of the R.F. gain control). The screen voltage together with that of V1D is obtained from the main receiver H.T. line via R1A, and is decoupled by C10B.

11. Transformer coupling is used in the anode circuit, the primary (L8A or L10A) being untuned, and the secondary (L9A or L11A) being tuned by a section of the four-gang condenser (C1A). The output from the secondary is fed to the grid of the mixer valve (V1B).

Mixer (V1B)

12. The signal is fed to the grid of V1B from the tuned secondary of the R.F. transformer L8A, 9A, 10A, 11A. The output from the local oscillator, which is working at signal frequency plus 465kc/s, is injected into the filament circuit of the mixer, the two filaments being in series. L2A prevents the filament supply short-circuiting the local source of R.F. L2B ensures an even distribution of D.C. voltage across the filaments of the four valves V1A, C, D and E, and thus reduces the risk of low filament voltage on V1C, the local oscillator.

13. The signal frequency is mixed with the local oscillation, f + 465kc/s, and the resultant 465kc/s is selected at the anode of V1B by the primary of the I.F. transformer L12A. The screen of V1B is fed from the main receiver H.T. line via R1B.

Local oscillator (V1C)

14. V1C is another R.F. pentode with anode and screen strapped together. The oscillator is a modified Hartley oscillator with the additional tertiary winding to increase

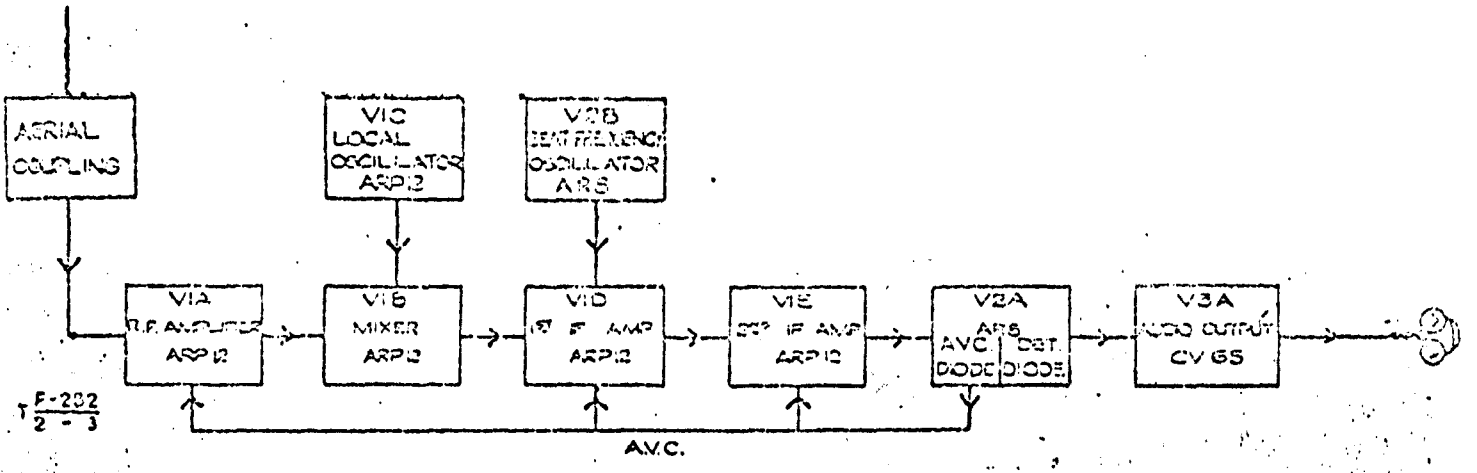

Fig. 3—Block schematic of receiver

the coupling between the portion below the tap and the portion above. The tuned windings are coded L13A and L14A, the tertiary or coupling coils, L30A and L31A. Self-bias is used and the method of injecting into the mixer is described in para. 12. Tracking is achieved by means of padding condensers C14A on the H.F. band, and C3A, C15A on the L.F. band. These padding condensers are arranged so as to be in series with the gang in preference to the usual procedure of putting them in series with the coils. Thus the full voltage set up across the coils is utilized. The circuit is tuned by one section of the gang condenser (C1B) and to allow for variation in circuit "strays" C1A and C2C are included. These trim the H.F. and L.F. bands respectively. Self-bias is used (C17C and R1C). H.T. is obtained from the main receiver line via R3B.

1st I.F. amplifier (V1D)

5. V1D is a variable-mu R.F. pentode, biassed by the same means as the R.F. amplifier V1A. It is transformer-coupled to the grid of V1E. H.T. is applied to the screen from the same feed resistor (R1A) as that which supplies V1A.

2nd I.F. amplifier (V1E)

6. This valve functions in the same way as V1D. It derives its bias from the same source. H.T. is obtained from the main sender-receiver H.T. line via R8A and R21A. This line is decoupled by C19C and C19E and, on send only, by C31D. The valve is transformer-coupled to the signal diode, the primary being shunted by R4M to provide the necessary bandwidth. A.V.C. indication on the panel meter is derived from the chain of resistors R4C, R7A and R6A between H.T. and chassis. The screen is connected to the junction of R4C and R7A and the meter connected across R6A. An increase in signal amplitude will cause an increase in A.V.C. and consequently an increase in bias applied to the control grid. Screen current through R4C will decrease, screen voltage will increase, and the resultant increase in voltage across R6A will cause an increase in meter reading. A change in the setting of the R.F. gain control will produce a similar effect. Screen decoupling is provided by C19F, and the meter is by-passed by C23D.

Signal detector, A.V.C. rectifier (V2A)

7. This valve is a double-diode-triode of the low-consumption class. Only the diodes are used on receive. The signal diode has a filter network consisting of R4E, C18A and C19A. The diode load consists of a variable potentiometer R9A, the bottom end of which is returned to the filament of V2A to prevent any delay being applied to the signal diode. The A.F. voltage set up between the tap and the bottom end of R9A is applied to the grid of V3A via a blocking condenser C20A.

18. The A.V.C. diode is fed via C11A from the secondary of L15A. The load resistance R10A is returned to the slider of R15A to prevent any change in fixed bias when the system is altered from R/T to C.W., or vice versa. Decoupling is achieved by R10B and C10G with an additional condenser C10F at the R.F. end of the A.V.C. line. Fixed bias is obtained from the voltage set up across a portion of R16A (the 100Ω section), and a variable bias, adjusted by the R.F. gain control, can be added to this. The manual gain plus fixed bias is coupled to the A.V.C. line via R10C to prevent the line being shorted when the control is in the position of maximum gain. Delay for the A.V.C. diode is obtained by returning the load resistance R10A to the junction of R10C and the slider of R15A. Thus the voltages are as follows:—

(*a*) 2V approximately, developed across the 100Ω portion of R16A,

(*b*) 4V developed across the filaments of V3A in series with V1A, D and E,

thus making a total of 6V, with the R.F. gain control at maximum. With the R.F. gain control at any other point, the extra voltage developed is added to this figure. This increase in delay with decrease in gain has a tendency to reduce the A.V.C. effect to a certain degree which is not detrimental. On C.W. the A.V.C. is removed by means of the switch S1H, only manual bias being left.

A.F. amplifier (V3A)

19. The grid of this valve, an L.F. pentode, has, as an additional filter, a grid stopper R11A. In the anode circuit there is an output transformer (ratio 1¼ : 1 stepdown) matching the output to the moving coil telephones. The H.T. supply is obtained via R12A from the main H.T. supply to the set. The screen supply is fed from the same point. Grid bias is derived by returning the grid resistor to earth, thus biassing the grid 2V negative in respect to the filaments. The two volts are those dropped across the filaments of

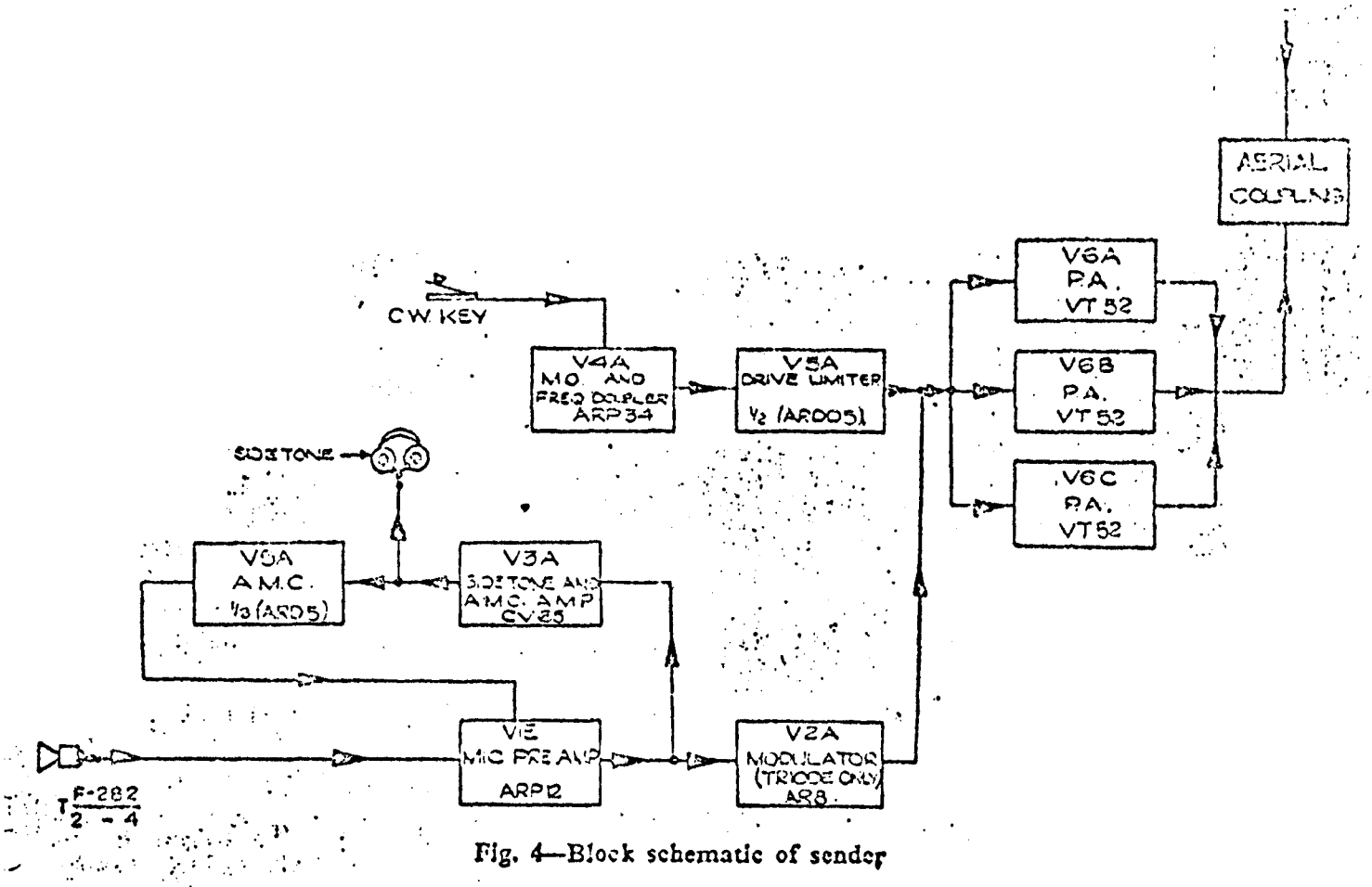

Fig. 4—Block schematic of sender

V1A, V1D and V1E. The relay switching S5B and system switching S1D are to allow remote control operation and do not affect the receiver.

Beat oscillator (V2B)

20. This valve is another double-diode-triode in which the diodes are not used. The triode portion is coupled with L16A, C19B and C25A to form a Colpitts circuit oscillating at 465kc/s. Self-bias is obtained by the grid condenser and leak, C12B and R17A. From the high potential side of L16A a lead is connected to the No. 2 pin of V1D, which is adjacent to the anode of V1D, and thus constitutes a capacitive coupling between the beat oscillator and the I.F. chain.

21. Coupled to the tuned winding L16A, is a small coil L17A, and shunting this coil is a variable resistor R19A. The effect of this variable shunt is to vary the oscillator frequency of 465kc/s by approximately ± 5kc/s. In the NET position, however, the variable shunt is substituted by a fixed resistor R32A, which adjusts the frequency to the same as that obtained in the centre position of the HET TONE control. The H.T. supply to V2B is supplied from the main set supply via R13A, and is switched by S1F so that it is operating only on C.W. and NET.

SENDER (Figs. 4, 1001)

Master oscillator and frequency doubler (V4A)

22. The master oscillator and frequency doubler valve is a steep slope R.F. pentode of the E series. It operates as a tuned grid oscillator between screen and grid, and frequency doubles in the anode circuit. A self-biassed oscillator is used and is driven fairly hard to ensure a copious supply of harmonics. The tuned grid circuit C1C and L15A or L20A operates, with the associated trimmers, etc., between 1 and 2·25Mc/s, and 2·25 and 4Mc/s. The screen circuit is inductively coupled to the grid circuit by L19A or L21A, and the suppressor is earthed. The grid tuned circuit is provided with a padding condenser C23A, and this padding condenser is shunted by R3D to provide a D.C. path. This padding condenser is incorporated to maintain tracking over the L.F. band, and for this reason S3C short-circuits it via L18A when the set is switched to the H.F. band. Also, to compensate for any tracking errors between the sender and receiver, there is a panel-controlled trimmer, C6A, connected across the gang condenser section tuning the grid circuit.

23. The anode circuit consists of a tuned circuit working at the emitted frequency. The tuning condenser for this circuit is section C1D of the gang condenser.

24. The internal screen to anode capacity of V4A is neutralized by C9A. This condenser is virtually connected between grid and anode, and its object is to feed a voltage from grid to anode 180° out of phase with the voltage fed to the anode from the screen through the internal capacity of screen and anode. This is achieved by utilizing the phase difference between the tuned circuit and its feedback winding.

25. H.T. supplies to V4A anode and screen are taken from a potentiometer across the H.T. supply consisting of R14A, R3C and R18A, the anode being connected to the higher voltage junction. The whole network keeps the anode and screen voltages at a constant predetermined ratio, thus providing a much greater degree of frequency stability. It also allows keying of the master oscillator by interrupting

the screen potential without introducing "chirps", etc. Drive is taken from the anode via C7A. Netting is accomplished by applying approximately half the working H.T. voltage to the valve and at the same time short-circuiting the drive section of the four-gang condenser. This is to prevent the P.A. stage from amplifying the R.F. voltage from the master oscillator.

Drive limiter and A.M.C. rectifier (V5A)

26. This valve is a double-diode type with separate cathodes. It is connected across the secondary winding of a 1 : 1 transformer; the primary winding of each is the tuned drive coil. Across the diode is a delay voltage which varies with the system switching. The windings are tightly coupled so that the diode damps down excessive oscillations in the drive circuit to an amplitude approximately equal to the delay voltage. In the R/T position the delay is derived from the low potential end of R16A, in common with the bias to the P.A. stage, and is of the order of 40V. Thus the oscillations are sufficient to take the P.A. grids to about the cathode potential at the positive peaks. In the C.W. position the position the P.A. bias is taken from an intermediate tapping on R16A. As a result the P.A. valves conduct more heavily and the voltage drop across R16A and the delay on the diode are increased. The voltage distribution stabilizes with the P.A. bias at about 30V and the delay at about 50V. Thus the P.A. works at a point further up the characteristic curve and an increased output is obtained.

27. The other half of the valve is used as a rectifier. Sidetone from the output valve V3A is fed to the anode of the diode via C16D and R8B. It is then rectified and the voltage set up across R4H is fed via R4G and the relay contacts S5D to the grid circuit of V1E. C22A and R4G give a time constant of approximately ½ sec. C19D is connected between the anode of this diode and earth. This is to bypass any R.F. which enters the audio circuit from the drive limiter.

Power amplifier (V6A, 6B, 6C)

28. These three valves are connected in parallel in order to obtain a greater output than would be possible from one valve of the same class. Also, this greater output is obtained without using a larger valve requiring high anode and screen voltages. The R.F. is fed from V4A, and, after being levelled by the drive limiter, is passed via C7A to the grid of the P.A. stage. The P.A. stage is biased by a resistor in the H.T. negative lead. On R/T the voltage set up for use as bias is approximately 45V. On C.W. this is reduced to approximately 35V. With no drive applied, the bias on R/T is sufficient to reduce the standing cathode current for the three valves to something near 6-8mA. When drive is applied this increases to approximately 30-36mA. Modulation increases it still further. On C.W. the driven condition is approximately 45mA. In the drive position on the meter switch, the meter indicates cathode current. To achieve this a resistor R23A, by-passed by C10S, is connected in series with the cathode lead, and the meter is connected across R23A. Thus the meter will read approximately 100mA full scale.

29. Each of the three valves has a grid stopper inserted in series with its grid lead close to the top cap. Without these stoppers and with valves on the higher limit of slope, there is a tendency for any two of the P.A. valves to become a push-pull oscillator at a high frequency (dependent upon length of leads, etc.) and this causes interference in other sets. Some sets may not have these stoppers, but they will be found normal in operation unless high-limit valves are used. Fitting the resistors will in every case effect a cure. These stoppers are coded R29B-D. The screen is supplied from the main H.T. line via R22A, and is decoupled by C10J. The valves are grid-modulated.

30. The output circuit consists of a reactance transformer C8A and L4A, which steps down the impedance of the valves to that of the aerial circuit. It replaces the tank circuit and aerial inductance normally used in a set of this description, and thus avoids unnecessary losses associated with two circuits. C26A is inserted to prevent H.T. being applied to the aerial or C8A. L1B is placed in the anode circuit to prevent the R.F. circuit being shunted by the H.T. supply.

31. The aerial current transformer T1A consists of a toridal coil for the secondary, through the centre of which passes the aerial lead on its way to the output terminal. A bridge metal rectifier W1A is connected across the secondary which is loaded by R27A. Across the output from W1A is connected a half-wave metal rectifier W2A. This rectifier acts as a variable shunt. The rectified current then passes through the R.F. filter C23C and L5A, through the series adjusting resistor R28A, via the switch to the meter.

Microphone amplifier (V1E)

32. This valve operates as an I.F. amplifier on receive and as a controlled microphone amplifier on send. The grid circuit is switched from the A.V.C. line on receive to the A.M.C. bias line on send. In the cold side of the grid circuit is connected T2A, the microphone transformer. This has a resistor R5A across its primary to level the response. C13B is connected to earth from the junction of L12B and T2A in order to by-pass T2A at the intermediate frequency. The screen H.T. is derived from the same source as when the valve operates as an I.F. amplifier. The anode of V1E derives its H.T. from the main H.T. line via R21A and R3A. R21A and C21B are used for audio decoupling. R5A is used as the load resistance on send and is a decoupling resistance (with C19C and C19E) on receive. The A.F. output is, therefore, taken from the junction of R5A and L15A. A filter choke L1A is inserted in series with the output in order to prevent any R.F. getting through to the modulator. The coupling condenser C16A then passes the output on to the modulator and the sidetone amplifier.

Modulator (V2A)

33. This is a double-diode-triode, only the triode section being used on send. The output of V1E is received via C16A and is fed to the grid of the modulator. A bias of 4V is derived from the filament supply. This is the voltage dropped by the filaments of the R.F., I.F. and output valves. On R/T the anode circuit consists of R4K, which is the lead resistance of C10K, the coupling condenser. From here the A.F. passes through an R.F. filter circuit which consists of C12C, L1C, C23F and R4J, to the grid of the P.A. amplifier.

Sidetone and A.M.C. amplifier (V3A)

34. Input to this valve is applied via R4D, C16F and R11A from the same point which supplies V2A. C16F is the coupling condenser, R11A the grid stopper which is used mainly as an R.F. stopper on receive, and R4D, in conjunction with R7B, which reduces the input to the sidetone amplifier to the correct level. The sidetone output is taken

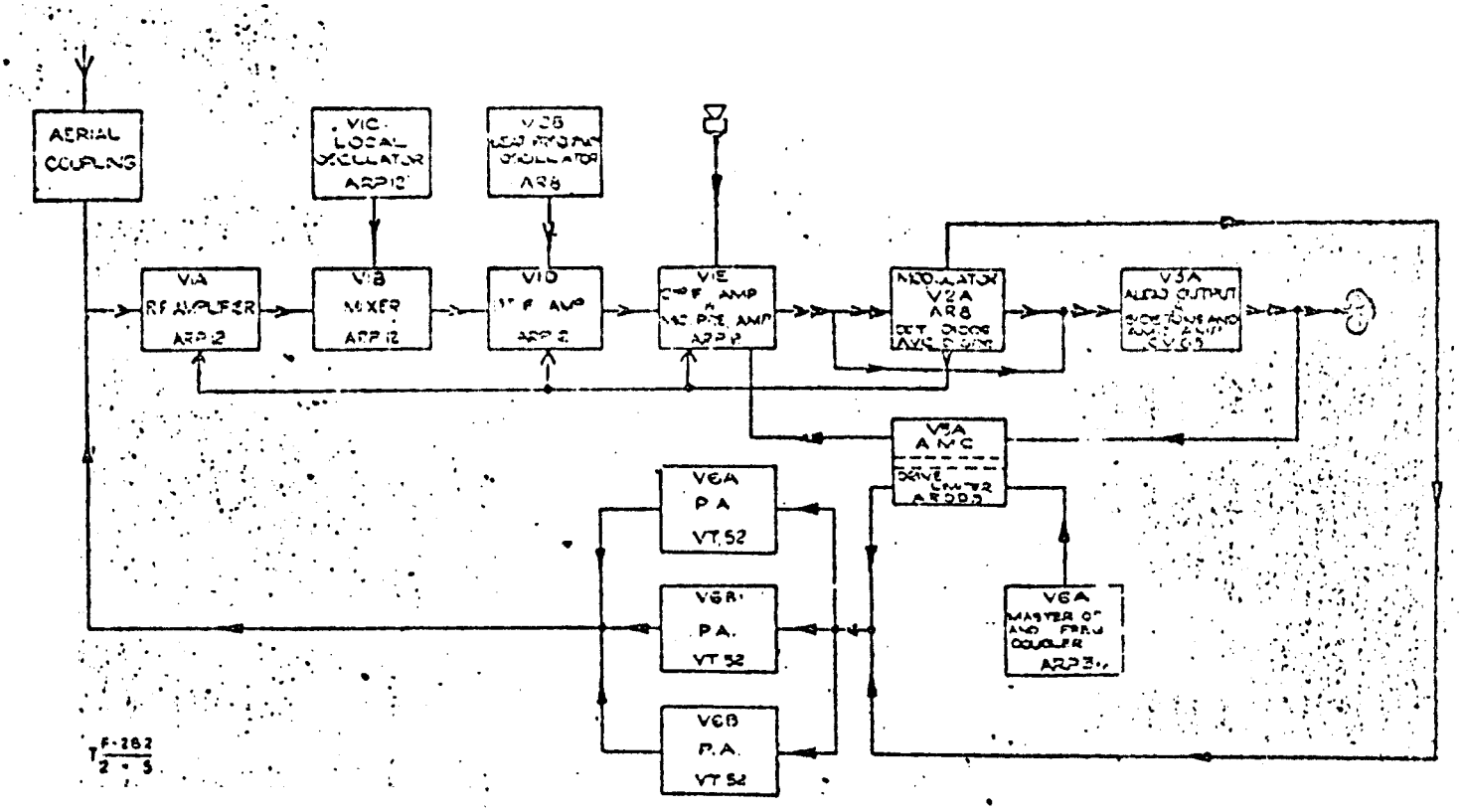

Fig. 5—Block schematic of sender-receiver

from the output transformer secondary. Also from the anode circuit a feed goes to the A.M.C. diode. Details of this circuit are given in para. 27. H.T. supply, bias, etc., are as described in para. 19.

RELAY SWITCHING

35. There are two relays, a high-speed keying relay, and a slugged or delayed relay, which returns the set to receive approximately ½ sec. after the key has been lifted. This provides break-in working. The high-speed relay L7A, with contacts S9A-C, operates at keying speed and is controlled by either a key inserted in J1A or the pressel switch on the microphone. Contacts S9A are switched by the system switch S1A-C to key the screen of the master oscillator for C.W. operation. The next set of contacts, S9B, control L6A, the slugged relay. The last set, S9C, are in parallel with a pair of contacts S5E on the slugged relay. These contacts control the H.T. to the P.A. stage as it is essential that the H.T. is applied as soon as the key is pressed and that it remains on until the set returns to the receive condition. Therefore, only the master oscillator is keyed, the P.A. stage remaining in operation throughout the period the slugged relay is operated.

36. The slugged relay is more elaborate. There are four makes and four breaks on send. Two makes and two breaks are electrically coupled to operate as two change-over switches (S5C and S5D). The relay coil itself, L6A, is slugged by C27A. To prevent damage to the high-speed relay contacts S9B, a resistance, R29A, is added in series with C27A to limit the charging current to just over 1A.

The contacts of the slugged relay have the following functions:—

(*a*) S5A. This switches off the H.T. to valves C1A-D when the set is on send.

(*b*) S5B. The telephones are silenced on C.W. send by this contact. It also provides certain facilities when used with the Remote control unit F.

(*c*) S5C. As V3A is used as an A.F. output valve on receive, and a sidetone and A.M.C. amplifier on send, it is necessary to change the feed to the grid circuit. S5C accomplishes this.

(*d*) S5D. Here the relay switching changes the grid circuit of V1E from the A.V.C. line on receive, to the A.M.C. diode on send.

(*e*) S5E. This contact is in parallel with S9C, and, as explained in para. 35, keeps the H.T. on the P.A. stage during sending periods.

SYSTEM SWITCHING

37. For this purpose a nine-pole three-way rotary wafer type switch is used. The sections have the following functions:—

(*a*) S1A. This section, in conjunction with S1B, switches the relay contacts S9A from keying the screen of the master oscillator on C.W. to breaking the H.T. feed to V2A on R/T.

(*b*) S1B. See (*a*).

(*c*) S1C. On R/T it is necessary for the master oscillator to remain on during speech transmission or while keying the modulation. For this reason S1C replaces the relay contacts S9A, and maintains

H.T. on the screen of the master oscillator throughout sending periods.

(*d*) S1D. This section is mainly for operation on remote control. Basically it allows the telephone to be connected to the output transformer in any position of the switch when receiving, but when on send the operator will hear sidetone on R/T, the phones being disconnected on C.W. Therefore no clicks are to be heard.

(*e*) S1E. It is at this point that the bias on the P.A. stage is reduced when sending on C.W. It merely moves the grid return from the H.T. negative end of R16A to a point approximately ¼ up.

(*f*) S1F. This switch applies the H.T. to V2B, the beat oscillator, on C.W. and in NET position.

(*g*) S1G. Not used.

(*h*) S1H. A.V.C. is removed from V1A and V1D-E on C.W. only. This is accomplished by S1H. Manual R.F. gain control is still operating.

(*i*) S1J. This section of the system switch changes over the load on the beat oscillator from a variable (HET. TONE control) to a fixed resistance for netting.

FILAMENT CIRCUIT (Fig. 1004)

38. The wiring of the filaments of the Wireless set No. 22 is rather complicated, and, besides accounting for the low filament consumption, also provides bias for most of the receiver valves. The valves are arranged in a series-parallel manner, all the directly-heated low-consumption valves being in one part of the chain.

39. The master oscillator and the three P.A. valves are arranged in series-parallel with a switch S7A so that they may be switched off on listening watch.

40. Bias for some of the valves is derived from the filament voltage drop. V3A has the 2V dropped by the preceding valves in the chain. V2A, which, when on send, has 4V bias, has the grid resistor R4F returned to earth, 4V negative to the filament of V2A. Delay on the A.V.C. diode is the same amount.

41. Switch S4A is incorporated so that the filament voltage set up across the battery valves may be measured. The figure obtained in this way must be equal to half that obtained with the switch over in the 12V position.

AERIALS

42. Rod aerials of heights not less than 12 ft. and up to 34 ft. may be used. Horizontal aerials can be used, the main lengths being either odd multiples of a quarter wave-length or a 140 ft. length used with shunt condensers. Information regarding the latter type of aerial is given on the power supply unit case. Horizontal aerials should be erected as high as possible, and may be taken between the truck and a convenient tree. An earth spike or a radial earth is also beneficial.

HEADGEAR

Microphone and receiver headgear

43. This has a moving coil microphone and with the Wireless set No. 22 it is necessary to speak into the microphone at a distance of not more than 2 in. There are two sets of contacts on the pressel switch, one set to operate the send-receive relay, and the other set to switch the microphone into circuit. The headphones are also of the moving coil type and are fitted with rubber caps to exclude external noise. Moving coil units are used to give a good response over a wide frequency band, as this gives greatly increased intelligibility under noisy conditions.

WIRELESS REMOTE CONTROL UNITS F., NOS. 1 AND 2

Brief electrical description (Figs. 6 and 7)

44. The units are illustrated in Figs. 6 and 7 where the connecting points and controls are shown. Unit No. 1 is set up adjacent to the set, being connected to it by a drop lead (Fig. 6), and must always be used whenever remote control of the set is required. Unit No. 2 is connected to Unit No. 1 by a two-wire line and normally ¼ mile of D3 twin cable is provided for this purpose, although the distance may be increased considerably if required. In all cases the wireless set must first be adjusted to a given frequency and system, and send/receive switching is done at the remote control unit concerned, after the appropriate connections and control adjustments for the facility required have been made. The following facilities are provided:—

(*a*) *By the unit No. 1 only*
- (i) C.W. and R/T operation of the Wireless set No. 22.
- (ii) Calling between unit and exchange connected to it.
- (iii) R/T operation from the exchange.
- (iv) Rebroadcast through a separate sender of signals received either by the Wireless set No. 22 or by a separate receiver.
- (v) Rebroadcast through the Wireless set No. 22 sender of signals received by a separate set.

(*b*) *By both the units Nos. 1 and 2 together*
- (i) Calling between the two units.

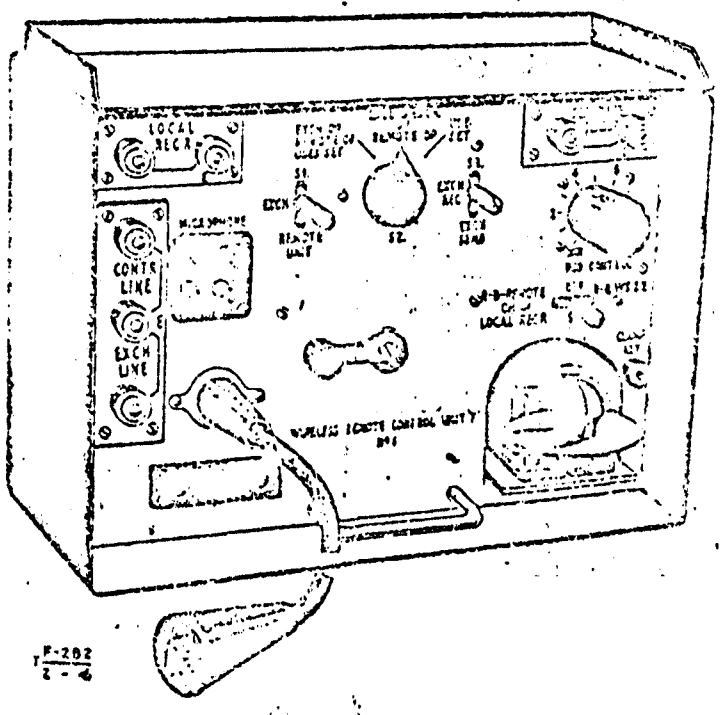

Fig. 6—Front panel view of Remote control unit F, No. 1

(ii) C.W. and R/T operation of the Wireless set No. 22 from unit No. 2.

(iii) R/T operation from an exchange connected to unit No. 2.

(iv) Rebroadcasting through the Wireless set No. 22 or through a separate sender connected to unit No. 1 of signals received by a receiver connected to unit No. 2.

(c) *By two Wireless sets No. 22 and two units No. 1.* Signals received by one set may be rebroadcast by the other through the two remote control units which are connected together. Rebroadcasting is always done with the sender concerned adjusted for R/T operation.

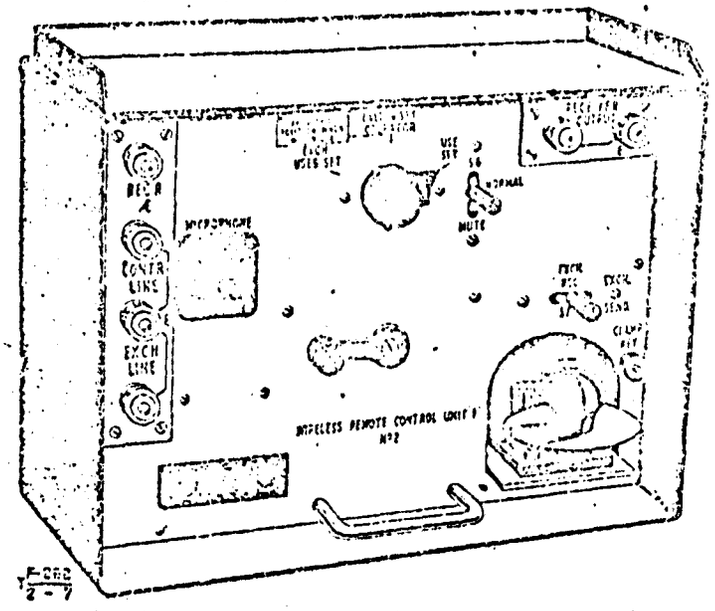

Fig. 7—Front panel view of Remote control unit F, No. 2

Mechanical details

45. Each unit is built on a steel chassis. On the front panel are mounted all the controls, plugs, sockets and terminals which are accessible by raising the front lid. The connection to the set is made by a snatch plug; the line connections by terminals; and the headphones and microphone by standard type plugs and sockets. Both units are fitted with a magneto. The chassis is fitted in a metal case where it is held at the back by a captive screw with a large head. This screw is readily tightened or released by hand and the chassis is withdrawn by means of a handle on the front panel. Inside each unit is a bracket for holding the 3V microphone battery. Unit No. 2 also has a bracket for a 24V battery. The morse key is carried in a recess in the front panel and, being mounted on a slide and connected internally, is easily withdrawable for operation. A clamp is provided for holding the key in position. The case has a carrying strap and a hinged front cover, in which is held a card with brief operating instructions on one side and circuit diagram on the other.

TECHNICAL DESCRIPTION (FIG. 1002)

46. The complete circuit of the two units and the connections to a Wireless set No. 22 are shown in Fig. 1002. The various circuits as determined by the switch settings are described relative to the facilities they provide.

Operation of the Wireless set No. 22 from unit No. 1

47. The switch settings are as follows:—
S1—Either position.
S2—USE SET.
S3—Either position.
S4—OFF.

The output of the set receiver is connected through snatch plug point 2 and S2A/2 to the headphones of unit No. 1. The secondary of the microphone transformer T1A in the unit is connected through S2A/4 and point 4 of the snatch plug to the input of the microphone amplifier in the Wireless set No. 22. The send/receive relay coil L7A in the set is connected through point 1 of the snatch plug and S2A/3 to the microphone pressel switch and morse key, connected in parallel in the unit. Signals from the set receiver are heard until either the pressel switch for R/T or the morse key for C.W. operation is pressed, when the relay L7A is actuated to the send condition (S5B, S5F operate) by completion of the circuit through point 3 of the snatch plug. The pressel switch also completes the microphone circuit through the 3V battery and the primary of T1A. Sidetone from the set is heard during R/T transmission. Note that either an exchange or the unit No. 2, according to the setting of S1, may call unit No. 1 with the above conditions.

Calling between unit No. 1 and an exchange

48. The switch settings are as follows:—
S1—EXCH.
S2—CALL EXCH OR REMOTE OP.
S3—Either position, preferably EXCH MEC.
S4—OFF.

The bell is connected through the magneto switch C1A and S1A/1 to the non-earthy EXCH LINE terminal, and one side of the magneto winding is connected through S2A/5 to earth which is common to the other side of the bell and to the other EXCH LINE terminal. If the exchange calls, the bell in unit No. 1 rings, and if the magneto generator in unit No. 1 is turned, the magneto is automatically connected in place of the bell and calls the exchange. When exchange speaks the message is heard in the headphones at unit No. 1 via S2A/6, T1A and S2A/2, and when unit No. 1 operator speaks (with microphone pressel switch closed) the message is transmitted via T1A, S2A/6 and S1A/1 to the exchange line. Note that the exchange can ring unit No. 1 if S1 is in the EXCH position, whatever the positions of the other switches, but intercommunication is impossible until S2 is properly set.

R/T operation from an exchange through unit No. 1

49. The switch positions are as follows:—
S1—EXCH.
S2—EXCH OP. REMOTE OP. USES SET.
S3—EXCH REC. or EXCH SEND, as required.
S4—OFF.

The output from the set receiver is connected through snatch plug point 5, S2A/1, C1C and S1A/1 to the non-earthy EXCH LINE terminal. This connection is broken by S5B in the set on send; so that monitoring must be carried out at unit No. 1, the headphones being connected through S2A/2 and snatch plug point 2. The exchange line is also connected via S1A/1 and C1C through S2A/4 and snatch plug point 4 to the microphone amplifier input in the set; this connection is broken by S5F on receive. The coil of

the send/receive relay in the set is connected through snatch plug point 1, S2A/3 and S1A/2 to one side of S3A, which is closed on send to complete the relay circuit through snatch plug point 3. Monitoring at unit No. 1, therefore, includes manipulation of the EXCH SEND/REC switch S3.

Rebroadcast of signals received by the Wireless set No. 22

50. The switch positions are as follows:—
S1—Either position.
S2—USE SET.
S3—Either position.
S4—R-B W.S. 22.

The output from the set receiver is connected through snatch plug point 2, S4 and R7A to the SEPARATE SENDER terminals, which are in turn connected to the modulation input of another sender. The MOD CONTROL (R7A) is used to adjust the input to this sender. From snatch plug point 2 there is also a connection through S2A/2 to the headphones of unit No. 1 so that the rebroadcast may be monitored from there. Note that the signals from a separate receiver, whose output is connected to the LOCAL RECEIVER terminals may be heard at the exchange or unit No. 2, according to the setting of S1. If no extra receiver is in operation, the rebroadcast may be heard in its place by changing over S2 to the EXCH OP. REMOTE OP. USES SET position.

Rebroadcast by the Wireless set No. 22 sender

51. The switch positions are as follows:—
S1—EXCH.
S2—EXCH. OP. REMOTE OP. USES SET.
S3—EXCH. SEND.
S4—R-B W.S. 22.

The output from a receiver connected to unit No. 1 is connected through S4, S2A/4 and snatch plug point 4 to the modulation amplifier input of the Wireless set No. 22. The coil circuit of the send/receive relay L7A in the set is completed through snatch plug point 1, S2A/3, S1A/2, S3A and snatch plug point 3, so that the relay is actuated and S5B, S5F in the set are operated. The opening of S5B contacts prevents direct feed of the receiver output to the headphone circuit via S2A/1 and snatch plug point 5. The rebroadcast is monitored by sidetone from the Wireless set No. 22 through snatch plug point 2 and S2A/2 to the headphones of unit No. 1. The output from the receiver may be heard through C1C and S1A/1 at the exchange if this is connected to the EXCH. LINE terminals.

Rebroadcast of separate receiver by separate sender

52. The switch positions are as follows:—
S1—Either position.
S2—CALL EXCH. OR REMOTE OP.
S3—Either position.
S4—R-B REMOTE OR LOCAL RECR.

The output from the receiver connected to the LOCAL RECR. terminals passes through S4 and R7A to the SEPARATE SENDER terminals on unit No. 1. The input to the sender is adjusted by the MOD. CONTROL (R7A). In addition the receiver output is connected through S4, C1C, S2A/3, T1A, C2A and S2A/2 to the headphones of unit No. 1, where monitoring is carried out. Unit No. 1 operator may also transmit speech over the separate sender. The output is also connected through S1A/1 to either the CONTR LINE or EXCH. LINE non-earthy terminal. The return path for all circuits is through the common earthy connections.

Calling between unit No. 1 and unit No. 2

53. The switch positions are as follows:—
Unit No. 1. S1—REMOTE UNIT.
S2—CALL EXCH. OR REM. OP.
S3—Either position.
S4—OFF.
Unit No. 2. S5—CALL SET OPERATOR.
S6—NORMAL.
S7—Either position.

In unit No. 1 the circuit is the same as that described in para. 48 except that the CONTR LINE terminal, instead of the EXCH. LINE terminal, is in circuit through S1A/1. The unit No. 2 operator may also ring unit No. 1, provided S1 is set at REMOTE UNIT, whatever the other switch positions on unit No. 1, but intercommunication is impossible until S2 is properly set. In unit No. 2 the bell is connected through the magneto switch to the CONTR LINE terminal. When the magneto is rung the switch automatically changes over to connect the magneto coil to the CONTR LINE terminal in place of the bell. The other side of the coil is connected to the common earthy circuit through S5A/4, S5A/3, S5A/2, the 24V battery and S5A/1. The 24V battery is connected so that it causes relay B/1 to operate in unit No. 1, thus opening contact B1 so that relay A/1 is not actuated by ringing, otherwise the Wireless set No. 22 might be inadvertently switched to send by A1. Unit No. 1 may call unit No. 2 unless S6 is at MUTE, when the bell in unit No. 2 is shunted through L1B, S6A and C4A. When unit No. 1 operator speaks the message is heard in the headphones at unit No. 2 through the magneto switch, C3A, T1A and C2A. When unit No. 2 operator speaks (with microphone pressel switch closed) the message passes via T1A, C3A and the magneto switch to line. The output from a receiver, if connected to the RECEIVER OUTPUT terminal on unit No. 2, would be heard at both units unless S6 is put to MUTE.

Operation of the Wireless set No. 22 from unit No. 2

54. The switch positions are as follows:—
Unit No. 1. S1—REMOTE UNIT.
S2—EXCH. OP. REMOTE OP. USES SET.
S3—Either position.
S4—OFF.
Unit No. 2. S5—USE SET.
S6—NORMAL or MUTE, as required.
S7—Either position.

At unit No. 2, S6 is put to NORMAL if no receiver (connected to RECEIVER OUTPUT terminals) is in operation; or to MUTE if such a receiver is in operation. The output from the Wireless set No. 22 receiver passes through snatch plug points No. 2 and No. 3 to unit No. 1, the former feeding the headphones via S2A/2 in this unit and the latter feeding the unit No. 2, via S2A/1, C1C, S1A/1 and the control line. In unit No. 2 the receiver output passes via the magneto switch C3A and T1A to the headphones and thence through C2A to the common earthy return path. To send from unit No. 2 either the morse key or the microphone (pressel switch closed) is used depending on whether C.W. or R/T operation is required. Depressing the morse key or the microphone switch connects the 24V battery to line, the positive side through S5A/1 and the key or through S5A/3 pressel switch, S5A/4 and L1A, and the negative side through S5A/2 to the

earthy line. If S6A is at MUTE, the relay A/2 is connected across the battery and is thus actuated; contacts A1, A2 then operate to mute the receiver connected to unit No. 2. In unit No. 1 the line voltage is applied through S1A/1, S2A/6 and S1A/3 to the circuit of relays A/1 and B/1. Relay B/1 is unaffected as rectifier W1B is a high impedance in this direction, but W1A is conducting and relay A/1 is actuated, so that its contact A1 closes and completes the circuit of the send/receive relay coil (L7A) in the Wireless set No. 22 through S2A/3 and snatch plug point 1. The set is thus switched to the send condition. Relay A/1 is a high-speed type and will follow keying from the unit No. 2. Relay A/2 in unit No. 2 is shunted by the 20μF condenser C4A and so will not release during normal hand-speed keying. When the Wireless set No. 22 is in the send condition the contacts S5B open so that there is no sidetone back to unit No. 2 but there is sidetone on R/T through snatch plug point 2 and S2A/2 to the headphones at unit No. 1. The pressel switch at unit No. 2 also completes the microphone circuit through T1A which couples the speech tones through C3A to the control line. In unit No. 1, tone passes through S1A/1, C1C, S2A/4 and snatch plug point 4 to the modulation input circuit of the Wireless set No. 22.

R/T operation from an exchange through unit No. 2

55. The switch positions are as follows:—

Unit No. 1. S1—REMOTE UNIT.
S2—EXCH. OP. REMOTE OP. USES SET.
S3—Either position.
S4—OFF.

Unit No. 2. S5—EXCH. USES SET.
S6—NORMAL or MUTE, as required.
S7—EXCH. REC. or EXCH. SEND, as as required.

No facility is provided for ringing the exchange from unit No. 2, but this might be done from unit No. 1. When switch S5 is thrown to EXCH. USES SET, the exchange indicator may be tripped or call be rung—caused by a condenser discharge in unit No. 2. The exchange operator should clear this immediately. The exchange is connected to the microphone and headphone circuit in unit No. 2 through C3C, S5A/5, C3A, T1A, so that intercommunication is possible. When the exchange is to use the Wireless set No. 22, the send/receive switching is done by S7A in unit No. 2. On send, S7A is closed (EXCH. SEND) and this connects the positive side of the 24V battery through S5A/3, S7A, S5A/4 and L1A to the control line. The exchange connection to the line is completed through the magneto switch. The circuit action in unit No. 1 is the same as that described in para. 54. If a wireless receiver is connected to the RECEIVER OUTPUT terminals on unit No. 2, S6A is closed to mute the receiver while the exchange is using the line.

Rebroadcast of signals received by a set at unit No. 2

56. The switch positions are as follows:—

Unit No. 1. S1—REMOTE UNIT.
S2—EXCH. OP. REMOTE OP. USES SET or CALL EXCH. or REM. OP.
S3—Either position.
S4—OFF or R-B REMOTE or LOCAL RECR.

Unit No. 2. S5—USE SET.
S6—NORMAL.
S7—Either position.

The output from the receiver at unit No. 2 is connected across the control line through C3B and A1, and also back to the headphone circuit through the magneto switch and C3A. For rebroadcast by the Wireless set No. 22 sender, the circuit of unit No. 1 is the same as that described in para. 54. If the rebroadcast is to be through a separate sender at unit No. 1, the alternative positions of switches S2 and S4 are used. In this case, connection to the Wireless set No. 22 is broken and made via S4 and R7A to the SEPARATE SENDER terminals and also via S2A/6, T1A and S2A/2 to the headphones. The rebroadcast is monitored at unit No. 1, R7A being adjusted to control the input to the sender. A set must not be connected to the LOCAL RECR. terminals since its output would be rebroadcast simultaneously with the wanted signal. Unit No. 2 operator can hear the receiver output and will monitor this at the remote end.

General circuit notes

57. Each microphone transformer T1A in the units has its secondary windings connected as an anti-sidetone circuit. In unit No. 1 this circuit comes into operation when the operator is speaking to either the exchange or the unit No. 2 operator or is operating the separate sender. At any given instant currents flowing in the two windings of T1A will pass in opposite directions through C2A and R2B to the headphones (in parallel) and so the current through the headphones will be attenuated. The amount of attenuation will depend upon the balance between the external circuit connected from point 3 of T1A to earth and the circuit C3A and R2C from point 5 to earth, the windings 3-4, 5-6 being in the ratio 1 : 2. The same principle is applied in unit No. 2 when the microphone is used. The condensers C2A and C3A in both units block D.C. leak from the remote control unit battery; condensers C1A, C1C, C3B and C3C perform the same function. Since the microphone (Microphones, hand, No. 7) used with the Wireless set No. 22 harness are rather insensitive, the attenuating and coupling network R2A, R4A, R3A in unit No. 1 is included for matching inputs through unit No. 1 to the high-gain modulation amplifier of the Wireless set No. 22. Similarly, since the receiver output transformer T3A is designed to match into the moving coil headphones of the Microphone and receiver headgear assembly No. 1 used with the set, the resistor R6A is connected in series with the low-resistance headphones used at unit No. 1 to reduce mis-matching.

POWER SUPPLY UNIT NO. 4, MKS. I, I* AND II

Brief electrical description

58. The power supply unit consists basically of a non-synchronous vibrator unit, using a bridge metal rectifier. It operates from a 12V accumulator and gives approximately 425V at no load, dropping to 325V at 60mA. Lower voltages are obtained by the inclusion of series resistors in the set. The 12V supply is filtered to ensure that the noise level in the receiver due to the vibrator is low. The Mks. I and I* are electrically identical. The Mk. II, however, has an additional filter, both R.F. and L.F., to improve signal/noise ratio and hum level in the Wireless set No. 22.

Mechanical details

59. The power unit is assembled on a single chassis and

panel. On the front panel there is a double-pole ON/OFF switch S10A-B; immediately above and to the left there is a recessed input plug, and above that an inspection lamp is placed, and a watch case is fixed to the top right-hand corner of the panel. At the top, but behind the panel, is mounted a fuse and holder of the Lucas type. The chassis is of the platform type, and has the smoothing chokes, smoothing condensers and general filtering below the chassis. Above the chassis are the metal rectifiers, L.T. filters and vibrator, and through the chassis is mounted the transformer. The whole is enclosed in a metal case, with pigeon holes in which are stored a spare vibrator and a card of fuse wire. The front is protected by a grille which holds the waterproof cover. On top of the vibrator unit case is mounted information in relation to the aerials used by the set. Mks. I and I* are identical except that webbing chapes are used on the Mk. I* as against a carrying strap of the Mk. I. Externally the Mk. I* and Mk. II are identical; internally, however, there is additional filtering which necessitates a slightly modified assembly.

TECHNICAL DESCRIPTION (FIG. 1003)

60. The L.T. supply is fed into the unit via the input plug. Between the L.T. positive plug and earth is connected C23A, the L.T. positive side being on the plug itself. This is to prevent a noise voltage being set up in the battery or the lead itself. Further noise suppression is carried out by C33C, and a certain amount of arcing is prevented by the connection of R31A-B across the vibrator contacts. The transformer T4A has an electrostatic screen between primary and secondary further to reduce R.F. noise. Also a shroud is fitted both above and below the transformer in order to enclose the winding. C34A, connected across the secondary of the transformer, is the tuning capacity and its value is such as to obtain optimum wave form from the vibrator. From this point the two leads are connected to a bridge circuit of selenium rectifiers W3A-D. From here the negative lead is taken direct to the H.T. negative contact in the snatch socket. It is by-passed to earth by C33A for H.F. and C35C for L.F. and its point of entry to the snatch lead. The power unit has a swinger choke input filter and for this reason the positive lead feeds direct into L28A. This choke has a high impedance at 110c/s (vibrator frequency), being roughly of the order of 100kΩ with no D.C. flowing. This high impedance means that, owing to the power unit having a choke input, the output is lower than it would be with a condenser input by some 60-80V. Therefore, smoothing condensers, etc., need not be of such high voltage rating. When the set takes H.T. current the impedance begins to drop until, at about 60mA, the impedance is approximately 300Ω. With this value of impedance the input is of the condenser type and the voltage is consequently about 20% higher than with a choke input. The nett result is a general levelling-off of the regulation curve. C35A is the condenser used for the input circuit. It is by-passed by C33B to eliminate R.F. noise in the H.T. positive lead. Further low-frequency smoothing is accomplished by L29A and C35C.

61. There are no electrical differences between the Mks. I and I*. In the Mk. II, however, a filter network has been added to remove R.F. noise, and a L.F. choke and condenser included to cut down the hum level introduced into the filament leads. The filter network consists mainly of the chokes L33A-B and condensers C23H and J, C36A-B. This combination filters noise from the leads going to the transformer T4A, while another choke L33C and condenser C23K filters the transformer lead from the centre tap to L.T+. The additional smoothing in the filament line consists of L32A and C32A. In addition, a R.F. choke, L2C, and a condenser, C23K, filters noise from the energizing coil lead.

Table 1001—Details of components (Figs. 1001 and 1003)

CONDENSERS

Circuit reference	Value	Tolerance	Rating	Type
C1A-D		Four section, variable		
C2A-D	3-30pF	Trimmer		Mica
C3A	150-600pF	Trimmer		Mica
C4A-C	1-15pF	Trimmer		Mica
C5A	3-50pF	Trimmer		Mica
C6A	2·8-10pF	Variable, netting trimmer		
C7A	4-8pF	Trimmer		Mica
C8A	540pF max.	Variable, aerial coupling		
C9A	1-7·5pF	Trimmer		Ceramic
C10A-S	0·1μF	±20%	350V	Paper
C11A	20pF	±20%		Silvered mica
C12A-C	30pF	±10%		Silvered mica
C13B	50pF	± 2%		Silvered mica
C14A	1600pF	± 2%		Silvered mica
C15A	1300pF	± 2%		Silvered mica
C16A-F	0·01μF	±20%	350V	Paper
C17A-H	140pF	± 2%		Silvered mica
C18A-B	0·0001μF	±15%		Mica
C19A-E	0·0005μF	±15%		Mica
C20A	0·002μF		450V	Paper
C21A-B	2μF		350V	Electrolytic
C22A	4μF		12V	Electrolytic
C23A-G	0·001μF	±25%		Mica
C24A	100μF		6V	Electrolytic
C25A	30pF	± 2%		Silvered mica
C26A	0·004μF	±15%		Mica
C27A	200μF		12V	Electrolytic
C28A-B	0·005μF	± 5%		Silvered mica
C29A-B	10pF	±10%		Silvered mica
C30A	0·005μF		450V	Paper
C32A	0·005μF			Mica
C33A-C	0·1μF		450V	Paper
C34A	0·01μF	±10%	2,200V	Paper
C35A-C	8μF		500V	Electrolytic

RESISTORS

Circuit reference	Value	Tolerance	Type
R1A-E	47kΩ	±10%	Ceramic
R2A-B	39Ω	± 5%	Ceramic
R3A-D	10kΩ	±10%	Ceramic
R4A-M	100kΩ	±20%	Ceramic
R5A	220Ω	±10%	Ceramic
R6A	3,300Ω	±10%	Ceramic
R7A-B	470kΩ	±20%	Ceramic
R8A-B	22kΩ	±10%	Carbon
R9A	1MΩ		L.F. gain control
R10A-C	1MΩ	±20%	Ceramic
R11A	15kΩ	±10%	Ceramic
R12A	47kΩ	±10%	Carbon
R13A	20kΩ	±10%	Wire-wound
R14A	4·7kΩ	±10%	Carbon
R15A	100kΩ		R.F. gain control
R16A	860Ω		Wire-wound
R17A	22kΩ	±10%	Ceramic
R18A	39kΩ	±10%	Carbon
R19A	6Ω		Het. tone control
R20A	39kΩ	±10%	Carbon
R21A	68kΩ	±10%	Carbon
R22A	1,500Ω	±10%	Carbon
R23A	2·5Ω	± 5%	Wire-wound
R24A	29·5kΩ	± 2%	Carbon } Special
R25A	1·2MΩ	± 5%	Carbon } meter
R26A	1·2MΩ	± 5%	Carbon } resistance
R27A	33Ω	±10%	Ceramic
R28A	550Ω		Semi-adjustable car.
R29A-D	10Ω	± 5%	Wire-wound
R30A	22Ω	±20%	Carbon
R31A-B	270Ω	±10%	Carbon

Circuit reference	*INDUCTORS*
L1A-C	R.F. choke
L2A-B	R.F. choke (filament)
L3A	Modulation choke
L4A	Aerial tuning
L5A-B	Aerial trans. filter choke
L6A	Slugged relay energizing coil
L7A	High-speed relay energizing coil (keying)
L8A	Receiver anode coil, H.F. coupling
L9A	Receiver anode coil H.F. tuned
L10A	Receiver anode coil L.F. coupling
L11A	Receiver anode coil L.F tuned
L12A-B	1st and 2nd I.F. transformers
L13A	Receiver oscillator coil H.F. tuned
L14A	Receiver oscillator coil L.F. tuned
L15A	3rd I.F. transformer
L16A	Beat oscillator coil tuned
L17A	Beat oscillator coil tuned
L18A	M.O. L.F. coil tuned
L19A	M.O. L.F. coil coupler
L20A	M.O. H.F. coil tuned
L21A	M.O. H.F. coil coupler
L22A	Drive H.F. coil tuned
L23A	Drive H.F. coil coupler
L24A	Drive L.F. coil tuned
L25A	Drive L.F. coil coupler
L26A-B	L.T. filter chokes
L27A	Vibrator energizing coil
L28A	Swinger choke
L29A	Smoothing choke
L30A	Receiver oscillator coil H.F. coupler
L31A	Receiver oscillator coil L.F. coupler

Circuit reference	*MISCELLANEOUS*
T1A	Aerial meter transformer
T2A	Microphone transformer
T3A	Output transformer
T4A	Vibrator transformer
S1A-J	R/T—C.W.—M.C.W. System switch
S2A-E	Wave-change switching, S.P.D.T.
S3A-D	Wave-change switching, S.P.D.T. (earth contact)
S4A	L.T test switch, S.P.D.T.
S5A-F	Slugged relay
S6A-B	Netting switch
S7A	Sender on/off, S.P.S.T.
S8A	Meter switch
S9A-C	High-speed relay
S10A-B	On/off switch
S4B	Remote/normal switch
F1A	Fuse (34 S.W.G. Cu. wire)
V1A-E	ARP12, variable-mu R.F. pentode
V2A-B	AR8, double-diode-triode
V3A	CV65, output pentode
V4A	ARP34, variable-mu R.F. pentode
V5A	ARDD5 double-diode
V6A-C	VT52, L.F. pentode
PL1A	Power input plug (snatch)
So1A-B	Snatch sockets (headgear)
So2A	Inspection lamp socket
J1A	Key jacks
W1A	Bridge rectifier (metal)
W2A	Half-wave rectifier (metal)
W3A-D	Selenium rectifiers (power supply)
P1A	Indicator lamps

Table 1001—Details of components (Figs. 1001 and 1003)

Circuit reference	*Value*	*Rating or type*
C1A-C	1·5 or 2μF	Condenser, 2AE
C2A	0·1μF	» P1U
C3A	0·5μF	» P5AC
R1A	200Ω	Resistor, ¼W
R2A-C	600Ω	» »
R3A	10Ω	» »
R4A-B	50Ω	» »
R5A	500Ω	» »
R6A	1,500Ω	» »
R7A	100Ω	» variable
W1A-B	Rectifiers, selenium, No. 50	
A/1	Relays, W.T., No. 5A	
B/1	Relays, W.T., No. 66	
S1A/1-3	Ex/RU key No. 73 (engraved S1 on unit)	
S2A/1-6	System switch, switches, rotary disc, 3-pole, 3-position, 2-bank, No. 3 (engraved S2 on unit)	
S3A	Ex rec/ex send key No. 68 (engraved S3 on unit)	
S3A/1-2	Rebroadcast key No. 212 (engraved S4 on unit)	
T1A	Transformer	

Table 1002—Details of components of Remote control unit F, No. 1 (Fig. 1002)

Circuit reference	*Value*	*Rating or type*
C1A	2μF	Condenser, 2AE
C2A-B	0·1μF	» P1U
C3A-C	0·5μF	» P5AC
C4A	20μF	» 20C
R1A	200Ω	Resistor, ¼W
R2A	600Ω	» »
L1A-B	Unit, choke, No. 1	
A/2	Relay, W.T., No. 67	
S6A	Normal/mute key No. 68 (engraved S6 on unit)	
S7A	Ex rec/ex send key No. 68 (engraved S7 on unit)	
S5A/1-5	System switch (engraved S8 on unit)	
T1A	Transformer	

Table 1003—Details of components of Remote control unit F, No. 2 (Fig. 1002)

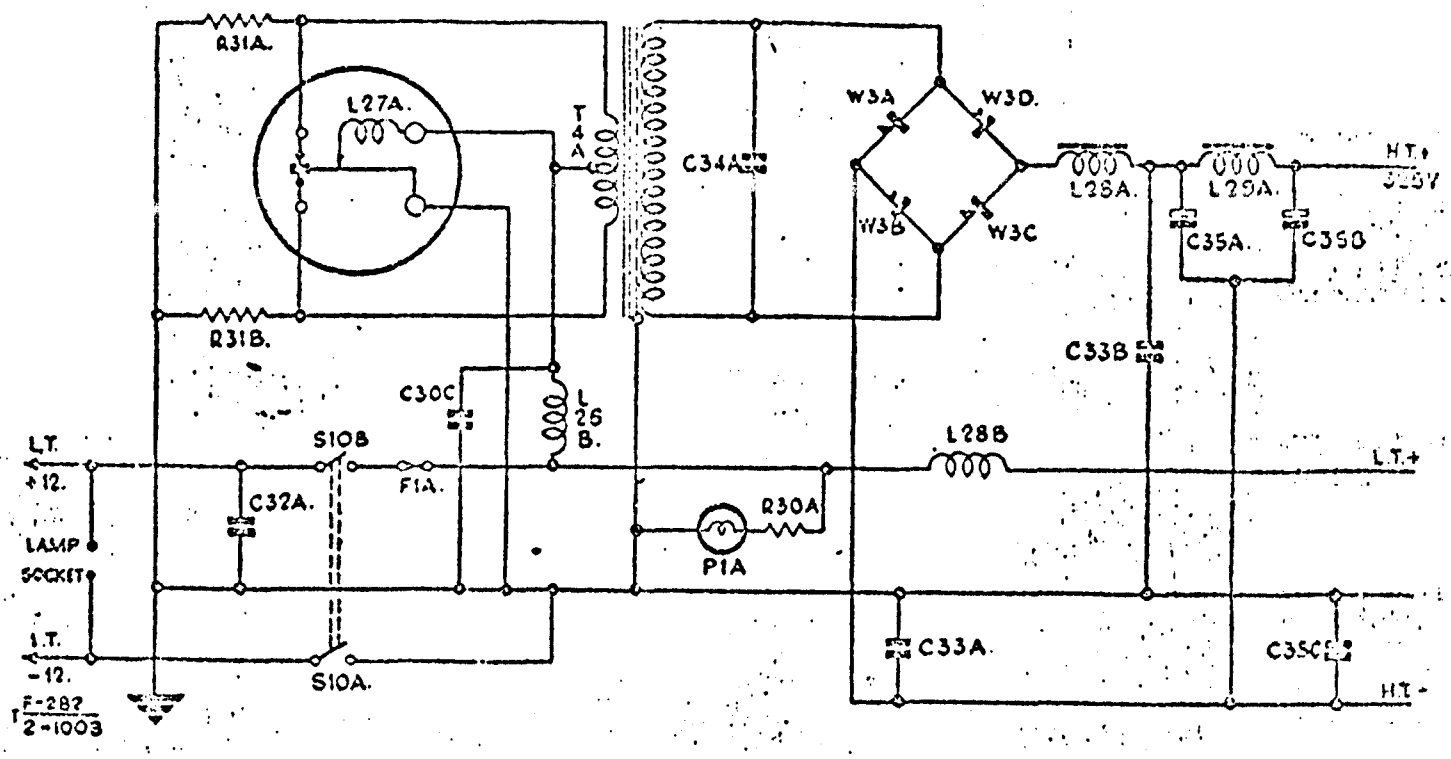

Fig. 1003—Circuit diagram of Supply unit No. 4, Mks. I, I* and II

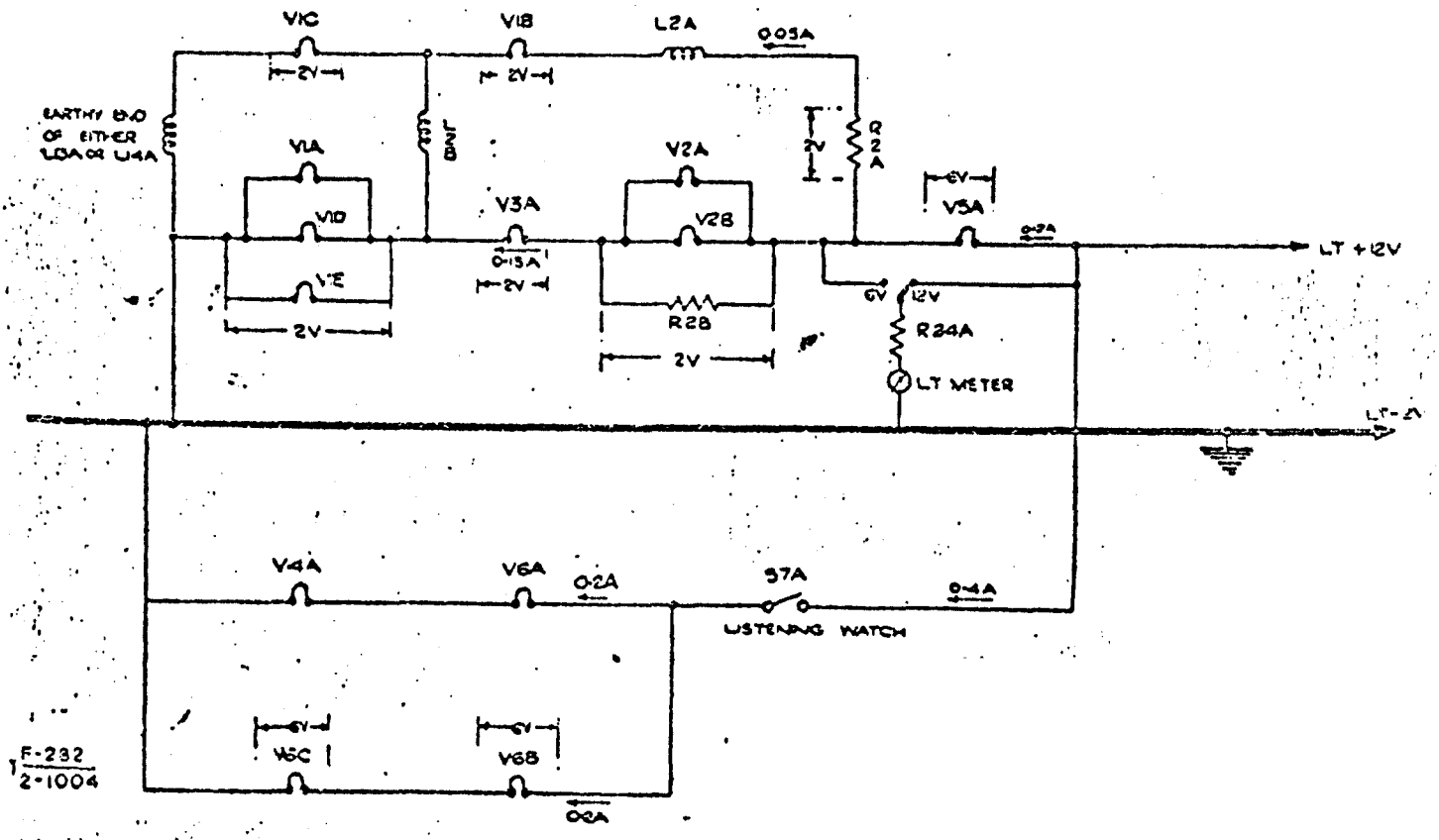

Fig. 1004—Wiring diagram of filament circuits

END

This replaces Tels. F 282, Issue 1, dated 25 Aug. 1943, which has been amended throughout.