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Richard Hankins
VMARS Archivist
March 2004

(A.C.I. 2031 of 1942)

WIRELESS SET NO. 19, MK. III AND MK 3/1

GENERAL DESCRIPTION

MAIN FEATURES

The "A" set

1. This is a sender-receiver working on frequencies between 2 and 8 Mc/s. It normally employs a vertical rod aerial 4, 8 or 12 ft. long mounted on the vehicle. It has the following controls for operating:—

(*a*) Frequency. This is the main tuning control for both sender and receiver. There is a flick mechanism for quickly selecting one of two pre-set frequencies, and a two-speed slow-motion drive for fine tuning.

(*b*) P.A. This tunes the P.A. anode circuit and receiver input circuit. As with the frequency control, no re-tuning is necessary between send and receive. It is fitted with flick mechanism and a single-speed slow-motion drive.

(*c*) Variometer. This tunes the aerial to resonance on send and receive.

(*d*) Wavechange switch. This has two positions, one for 2–4½ Mc/s, the other for 4½–8 Mc/s.

(*e*) System switch. For selecting RT, CW or MCW operation.

(*f*) A.F. gain. For controlling volume.

(*g*) R.F. gain. For controlling sensitivity.

(*h*) Het. tone control. For adjusting beat note frequency for CW reception.

(*i*) Meter switch. This enables the meter on the panel to indicate aerial current, act as an A.V.C. meter for the receiver, measure L.T., H.T.1 or H.T.2 voltages, or indicate the sender drive input to the P.A. stage.

(*j*) Netting switch.

(*k*) "A" on-off switch.

The "B" set

2. This is a sender-receiver working on a frequency of 235 Mc/s with a range up to about 1 mile, depending on the nature of the ground. Obstructions such as buildings, woods, etc., considerably reduce the range. It operates on RT only. The controls are as follows:—

(*a*) Tuning. For netting with control station.

(*b*) Gain. For controlling volume.

(*c*) Quench. Used only in initial adjustments, for reducing interference between sets.

(*d*) "B" on-off switch.

The intercommunication amplifier

3. This is used for communication between members of the crew of the vehicle. The only control provided is the "IC" on-off switch.

TECHNICAL DESCRIPTION

"A" SET RECEIVER (Figs. 1, 1001 and 1002)

R.F. amplifier

4. The aerial is tuned by the variometer, and the signal from this is fed through blocking condensers C24A and C1A and a screened feeder to a low impedance tap on L3A. This coil is tuned by the variable condenser C3A and is coupled by C2A to the grid of V1A, which is a variable-mu R.F. pentode. This valve is biassed by R2A and also receives bias from the A.V.C. through L10A. Its screen, together with that of V1B, is supplied through the potentiometer R33B and R44A. Its anode is coupled to the hexode grid of V2A by an R.F. transformer L22A and B or L23A and B, tuned by C9A, a section of the gang condenser.

Frequency changer

5. V2A is a triode-hexode. The triode section sets as the local oscillator, working at a frequency 465 Kc/s higher than the signal frequency. The main elements of the oscillator tuned circuit are the coil L24 and condenser C9B. C6A is a special ceramic condenser with a negative temperature coefficient to correct frequency drift. The triode is internally coupled to the hexode section of the valve, which acts as the mixer. The resultant signal at 465 Kc/s on the hexode anode is fed through the 1st I.F. transformer L8A to the control grid of V1B. V2A is biassed by R3A, and for reasons of frequency stability is not supplied with A.V.C. Its screen is supplied through the potentiometer R45A and R4A.

1st I.F. amplifier

6. V1B is a variable-mu R.F. pentode, biassed by R9A and by A.V.C. It is coupled to V1C by the 2nd I.F. transformer L8B.

2nd I.F. amplifier

7. V1C is another variable-mu R.F. pentode. It is biassed by R3B, and also receives A.V.C. on RT and MCW but not on CW. Its screen is supplied through a series resistance R19B. Its anode is coupled by the 3rd I.F. transformer L9A to the signal diode of V3A.

Signal detector, A.F. amplifier and A.V.C.

8. V3A is a double-diode pentode with common cathode. One diode, acting as a signal detector, is connected to the secondary of L9A and has a load resistance R7C and R1B. R7C, C14A and C15A form a filter to keep I.F. out of the A.F. amplifier. The A.F. voltage developed across R1B is fed through C17A to the A.F. gain control R13A, whence it is taken to the control grid for amplification by the pentode section of V3A. The pentode anode is coupled by the transformer T2A to the headphone line. The second diode in V3A is used as the A.V.C. rectifier. It is fed from L9A through C18A and has a load resistance R8A across which a negative D.C. voltage is developed by rectification of a strong signal. This voltage is fed back through the filter R8B and C38A to the amplifier stages. A delay voltage is applied to the diode due to the cathode current flowing through resistances R9E and R11A (increased by the addition of R5G on CW), so that there is no A.V.C. on weak signals.

Beat frequency oscillator

9. The triode portion of the triode hexode V2B acts as a beat frequency oscillator at 465 Kc/s. It is switched on by the netting switch S9A or by switching to CW. A portion of its output is fed through the condenser C39A to the primary of L8B in the I.F. amplifier. The B.F.O. thus produces a heterodyne note with the I.F. signal and, when netting, the set can be accurately tuned in by adjusting it for zero beat note.

Stability

13. Owing to the composite nature of the sender and receiver, certain precautions are necessary to maintain stability. For this reason, on receive, the anode and screen voltages of V2B hexode, V5A, and V4A are switched off, and a large positive bias is applied to the cathodes of V4A and V6A. On send, the anode and screen voltages of V1A and the screen voltages of V1B and V1C are switched off.

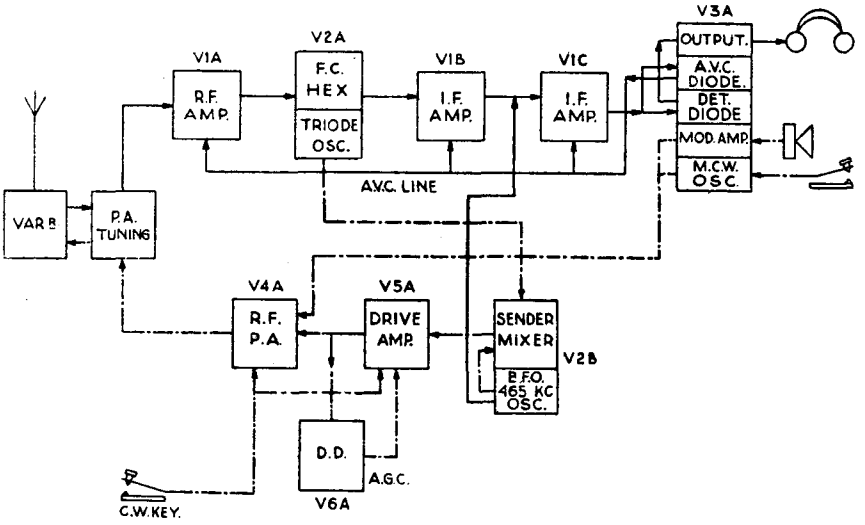


Fig. 1. Block schematic of "A" set sender receiver

Reception of CW

10. The B.F.O. is switched on by S7A/6 and the het. tone control comes into operation through S7A/9. This control enables the beat note to be adjusted to the required pitch without detuning the set. Adjustment of the potentiometer R14A varies the B.F.O. frequency to either side of 465 Kc/s by means of the network L6A–C42A–R14A shunting L5C. Also on CW, the response of the A.F. amplifier V3A is sharply tuned to approx. 1000 c/s by means of a negative feed-back circuit consisting of the double-T network C40A–C40B–R48A and R47A–R47B–C5A, connected between anode and grid circuits. This provides A.F. selectivity for separating CW signals of different pitch, and the het. tone control should be adjusted so that the pitch of the wanted signal coincides with the peak of the filter circuit.

Reception of MCW

11. The frequency response of the A.F. amplifier is restricted to reduce noise and interference. A bass cut is provided by reducing the size of the screen by-pass condenser on V3A : C29E, 0·01 μF, is always in circuit, and C45I, 0·05 μF, is added in parallel on RT only. A top cut is provided by a filter in the grid circuit of V3A consisting of a series resistance R8C, followed by the shunt capacity of the screened leads.

R.F. gain control

12. This consists of a variable resistance R46A connected in the cathode circuit of V1A and V1B. The potentiometer R33B–R44A is also returned through R46A to chassis. Thus, increasing the resistance of R46A reduces the gain of the R.F. and lst I.F. stages by increasing the bias on the grids of V1A and V1B.

"A" SET SENDER (Figs. 1, 1001 and 1003)

Master oscillator stage

14. The triode section of the receiver frequency changer V2A acts as the master oscillator when the set is on send, working at a frequency 465 Kc/s higher than the signal frequency. Its circuit is unaffected by the send-receive switching. It is coupled through C21A and R42C to the hexode grid of the sender frequency changer V2B.

Sender frequency changer

15. V2B is a triode-hexode. The triode section, oscillating at 465 Kc/s, has the same circuit as when it is used as the beat oscillator for netting on receive. The grid is tuned by L5A and C41A, and feed-back from the anode is obtained through C19A and L5B. The frequency is made independent of the setting of R14A by leaving its slider open-circuited. A slight difference between send and receive frequencies is caused by switching on the hexode screen of V2B on send; this is compensated by means of the adjustable coil L25A; connected across L5C, it has in series with it C4J on send, and C4J and C17B on receive, C17B being small enough to render the shunting effect on L5C negligible on receive. The output of this oscillator is mixed with the output of the master oscillator in the hexode section of the valve, and the difference between them, representing the carrier frequency, is passed on to V5A by a circuit consisting of the transformer L7A and B or L21A and B tuned by C9D. V2B obtains its screen voltage from the potentiometer R45B and R4D. On send, it is biassed by the resistances R27A and R37B in series, with R10A in parallel, the whole of the bias being applied to the triode grid and the portion of it across R37B to the hexode grid. (On receive, the hexode is switched off, and

the bias for the triode is maintained by connecting L19A, R10A, R37B and R27A in series across the L.T. supply, using the voltage dropped across R37B and R27A for bias.)

Drive amplifier stage

16. V5A is a steep-slope pentode valve, used to amplify the drive voltage to the power amplifier valve V4A. It is biassed by R20B, and its screen is supplied through R17A. The output from V5A is tuned by the transformer L4A and B or C and D and C9C, and is fed through C2D to the control grid of V4A and to one anode of the double diode V6A. This diode provides a negative automatic gain control voltage across its load resistance R15A, which is fed back through the decoupling circuit R1C and C15D and the grid leak R1E to the control grid of V5A. This control voltage is delayed by the other diode, shunted across the A.G.C. line, to an extent determined by the positive bias through the resistance R43A, the effect being to maintain the drive voltage applied to V4A constant at a predetermined value. The actual drive at the grid of V4A is adjusted by the pre-set series condenser C34A. The drive is measured by switching the meter across R42B, thus measuring the current through the A.G.C. diode.

Power amplifier stage

17. V4A is a beam-tetrode valve which acts as a grid-modulated power amplifier. Keying on CW is described in para. 19 below. On RT and MCW, V4A is biassed by the voltage drop due to its anode current flowing through R16A, connected in the H.T.2 negative line. On CW, R16A is short-circuited, and V4A is biassed by grid current flowing through R7D. The output of V4A is tuned by L3A and C3A and fed from a low impedance tap on L3A, through the screened feeder, to the variometer L1A, which tunes the aerial.

Variometer and aerial circuit

20. The variometer coil L1A consists of two windings, a rotor and a stator, which can be connected in series or in parallel by means of switches operated by the rotor spindle. For dial readings between 0 and 100 the coils are in series, and between 100 and 200 they are in parallel. From 0 to 50 and from 150 to 200 the coil fields are aiding each other, and from 50 to 150 they are in opposition. Thus, to increase inductance from minimum to maximum, the dial must be rotated first from 100 to 200 and then from 100 to 0. The places where the switches are changing over are marked on the scale by red bands, and the variometer should not be operated in these positions. The variometer case also contains the meter transformer. On send, the R.F. current from the variometer to the aerial is passed through the primary of the meter transformer T1A, the current in the secondary is rectified by W1A, and the resultant D.C. is fed back through R.F. filters to the panel meter, where it gives an indication of the aerial current. This meter reading is not directly proportional to aerial current owing to W2A, which is included to compress the scale at high readings. R29A is a pre-set resistance to control the sensitivity of the meter transformer. C24A is a high voltage condenser included to protect the set in case the aerial touches overhead power lines. The entire aerial circuit within an armoured vehicle is fully screened to reduce interference from other electrical equipment in the vehicle.

"B" SET SENDER-RECEIVER (Figs. 2 and 1004)

General

21. The "B" set is an U.H.F. transceiver, designed to work on a frequency of 235 Mc/s, but adjustable over a range of about 229–241 Mc/s. When switched to receive, it acts as a super-regenerative receiver, with a quench frequency adjustable over a range of about 55 Kc/s lying between limits of 158 Kc/s and 228 Kc/s. When switched to send, it acts as an anode-modulated oscillator.

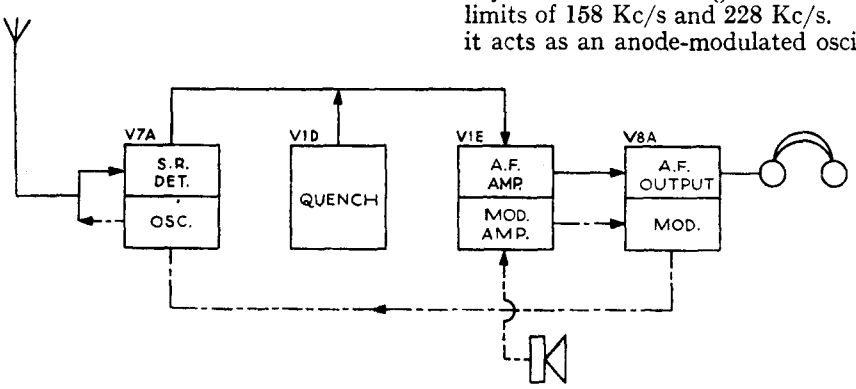


Fig. 2. Block schematic of "B" set sender-receiver

Modulation

18. On RT, the pentode V3A acts as a modulation amplifier. The output from the microphone is taken to its grid via the microphone transformer T3A. The output of V3A is applied through C22B and R7G to the control grid of V4A. Sidetone is taken through the transformer T2A to the headphones. On MCW the microphone circuit is switched out, and V3A is made to oscillate by coupling its control grid to the reaction winding on T2A. Keying is done in the H.T. lead to anode and screen of V3A.

CW keying

19. Keying is done in the H.T. lead to the screen of V4A and the anode and screen of V5A. V3A is switched off, and no sidetone is provided.

Receiver detector

22. V7A is an U.H.F. triode which oscillates at signal frequency due to the circuit L11A–C25A connected between anode and grid. This oscillation is interrupted by the output from the quench oscillator V1D, tuned by L14A, C28A, C37A. A super-regenerative detector may be compared with a leaky grid detector with very critically adjusted reaction. V7A and V1D are coupled at quench frequency by the anode choke L15A. R31A and C37A form a filter to prevent U.H.F. signals from getting into the rest of the set. Similarly C15H, K and L are by-pass condensers for stray U.H.F. The choke L13A in the cathode of V7A reduces the damping on the tuned circuit due to losses in the valve. The aerial is connected through a tuned feeder and a filter circuit to a tap on L11A: V7A

and V1D produce various spurious signals, and C46A and L12A form a filter designed to prevent those of lower frequency (particularly between 2 and 8 Mc/s) from reaching the aerial and so causing interference on the "A" receiver. For this reason C46A is small, and so the coil L26A is inserted to offset most of the loss which would otherwise be caused by C46A.

Receiver A.F. amplifier

23. The A.F. output of the detector is coupled by R33A, C29A and the "B" gain control R35A to the grid of the pentode V1E. C30A, R6H and C30B form a filter to keep quench signals out of the A.F. circuits. V1E is biassed by R9B (not by-passed——to produce negative feed-back), and its screen is supplied through R1A. Its anode is coupled by R7J, C29B and R8D to the grid of the output valve V8A, which is a beam-tetrode power valve, over-biassed for economy by the cathode resistances R49A and R9D. The output from its anode is supplied to the headphones by T5A.

Sender modulation amplifier

24. The output from the microphone is taken through the microphone transformer T4A to the control grid of V1E, which is coupled to V8A as on receive. V8A modulates the anode of V7A through the transformer T5A, which also supplies sidetone to the headphones. V8A is biassed by R49A only, so that it can deliver its maximum power output. Level frequency response is ensured by employing negative feed-back from the phone winding of T5A, through R36A, to the primary of T4A.

Sender H.F. oscillator

25. V7A employs the same oscillator circuit and coupling to the aerial as on receive. Its anode voltage is increased and its grid leak reduced to obtain maximum power output. The quench oscillator is, of course, stopped, its screen feed being open-circuited.

"IC" AMPLIFIER (Fig. 1005)

26. This is a two-stage A.F. amplifier. The output from the microphone is taken through the transformer T4B to the grid of the pentode V1F, which is biassed by R9C and has its screen supplied through R1F. The anode of V1F is coupled by R7K, C29C and R8F to the grid of the beam-tetrode power output valve V8B, biassed by R39A. The anode of V8B supplies the headphones through the transformer T6A. Level frequency response is ensured by employing negative feed-back, firstly from the secondary of T6A, through R21B, to the primary of T4B, and secondly by means of the cathode resistances R9C and R39A, which are not by-passed.

SEND-RECEIVE SWITCHING (Figs. 1001 and 1004)

Pressel switch

27. The pressel switch on the microphone of a headset no. 1 closes two pairs of contacts: one completes the microphone circuit, the other is used to operate the relay of the set to which the control unit is switched, S5A for the "A" set, S5B for the "B" set. The relay coils L19A and B each have one side connected to L.T.+. The other side is taken via the control units and pressel switches to chassis. When the circuit is completed, the current flowing through the coil actuates the relay and switches over the contacts. In the case of the "A" set, another relay S15A in the power supply unit switches on the H.T.2 rotary transformer when the pressel switch is operated and the control unit is switched to "A."

Key jack ("A" set)

28. Auxiliary contacts on the keyjack J1A are wired in parallel with the "A" pressel switch line. When the key plug is fully inserted in the jack, these contacts are closed, and the "A" set relays are operated. Therefore, when using CW or MCW, send-receive switching is automatically performed by pushing the key-plug into the jack for send, and half withdrawing it for receive.

POWER SUPPLY UNIT (Fig. 1006)

General

29. The power supply unit contains the rotary transformers for supplying H.T. to the set, together with the necessary filter circuits, etc.

Rotary transformers

30. There are two of these. One runs all the time when the main switch S6A is on, and supplies H.T.1 to the set. It is rated to deliver 250 volts at 125 mA with 11·5 volts input to the brushes. In practice, with a 12-volt battery, the H.T.1 will vary from about 250 volts with full load from the set, to about 300 volts on light load, e.g. "IC" only working. The second machine is switched on by the relay S15A only when the "A" set is on send. It supplies H.T.2 anode and bias voltages to the "A" sender P.A. valve V4A. It is rated to deliver 490 volts at 65mA with 11·5 volts input to the brushes. In practice, with a 12-volt battery,it supplies about 550 volts with the set on RT or MCW, and about 500 volts on CW. In all cases, however, the panel meter on the set will indicate about 500 volts for H.T.2, as it does not measure the bias voltage on RT and MCW.

Filter circuits

31. The L.T. line to the valve heaters is filtered by C22C and an R.F. choke L17A. The indicating lamp P1A, which lights when the power unit is switched on, is also connected to this line. The L.T. connections to the machines are filtered by C4AP and C4BP. The H.T. output of the H.T.1 machine is filtered by C38B for R.F. interference and by C32A for hum. There is also a screened lead between the positive terminal of the machine and the fuse F1B to remove R.F. interference produced at the frequency of the "B" set. The H.T. output of the H.T.2 machine is filtered by C44A and an R.F. choke L18A. Its negative side is by-passed by C4CP, which is shunted by R7F to prevent damage to the condenser if the machine is run on open circuit. Each of the H.T. positive leads is fused.

"A" set	"B" set	"IC"	Current (amps.)
Off	Off	On	3·5
Off	Receive	Off	3·5
Off	Send	Off	4·5
Receive	Off	Off	4·6
Send RT	Off	Off	7·8
Receive	Off	On	6·4
Send RT	Off	On	9·5
Receive	Receive	On	7·1
Send RT	Receive	On	10·0
Receive	Send	On	7·9
Send RT	Send	On	10·7
Send CW (key down)	Send	On	13·1

Table 1. L.T. battery consumption (12 volts).

Table 1001. Details of components

Circuit reference	Component
	INDUCTANCES
L1A	Aerial tuning variometer
L2A–B	R.F. choke
L3A	Power amplifier tuning inductance
L4A	Drive R.F. tuning inductance, H.F.
L4B	Drive R.F. coupler, H.F.
L4C	Drive R.F. tuning inductance, L.F.
L4D	Drive R.F. coupler, L.F.
L5A	Beat oscillator tuning inductance
L5B	Beat oscillator reaction coupler
L5C	Beat oscillator control coupler
L6A	Het. tone control inductance
L7A	Sender R.F. tuning inductance, H.F.
L7B	Sender R.F. coupler, H.F.
L8A	1st I.F. transformer
L8B	2nd I.F. transformer
L9A	3rd I.F. transformer
L10A	Receiver R.F. choke
L11A	"B" tuning inductance
L12A	"B" aerial choke
L13A	"B" cathode choke
L14A	Quench tuning inductance
L15A	Quench anode choke
L16A	
L17A	L.T. filter choke
L18A	H.T. filter choke
L19A–B	Relay energising coils
L20A	Buzzer energising coil
L21A	Sender R.F. tuning inductance, L.F.
L21B	Sender R.F. coupler, L.F.
L22A	Receiver R.F. tuning inductance, H.F.
L22B	Receiver R.F. coupler, H.F.
L23A	Receiver R.F. tuning inductance, L.F.
L23B	Receiver R.F. coupler, L.F.
L24A	R.F. oscillator tuning inductance, H.F.
L24B	R.F. oscillator coupler, H.F.
L24C	R.F. oscillator tuning inductance, L.F.
L24D	R.F. oscillator coupler, L.F.
L25A	B.O. compensating inductance
L27A	Relay energising coil
L26A	"B" aerial coil
	TRANSFORMERS
T1A	Aerial current meter transformer
T2A	Output transformer, "A" set
T3A	Microphone transformer, "A" set
T4A	Microphone transformer, "B" set
T4B	Microphone transformer, "IC" amp.
T5A	Output transformer, "B" set
T6A	Output transformer, "IC" amp.
T7A–B	Power microphone transformer
	LAMPS
P1	Lamp, 12V pilot and signal.

Circuit reference	Component
	SWITCHES
S1A–D	Six-pole 3-way control switch
S2	Pressel switch in hand microphone
S3	Press button switch
S4	Press button switch in power microphone
S5A–B	Relays, send-receive
S6A	Two-pole on-off power switch
S7A	Nine-pole 3-way system switch
S8A	Two-pole 6-way meter switch
S9A	Single-pole on-off toggle switch ("A" set net)
S10A–C	Double-pole on-off toggle switch ("A," "B," "IC" on-off)
S11A	Twelve-pole 2-way wave-change switch
S12	Four-pole 4-way control switch
S13	Nine-pole 3-way control switch
S14	Twelve-pole 2-way control switch
S15A	Relay for H.T.2 generator
	VALVES
V1A–F	6K7G variable-mu R.F. pentode
V2A–B	6K8G triode-hexode frequency changer
V3A	6B8G double-diode pentode
V4A	ATS25 (807) beam power tetrode
V5A	ARP35 (EF50) R.F. pentode
V6A	ARDD5 (EB34) double diode
V7A	CV6 U.H.F. triode
V8A–B	6V6G (ARP32) beam power tetrode
	PLUGS
Pl.1C	6-point Pye plug
Pl.2A–C	12-point Pye plug
Pl.3	5-point snatch plug.
Pl.4A–B	Feeder plugs, "A" set and variometer
Pl.5A	Feeder plug, "B" set
	SOCKETS
So.1C	6-point Pye socket
So.2A–C	12-point Pye socket
So.3	5-point socket for snatch plug
So.4A–B	Feeder socket, "A" set and variometer
So.5A	Feeder socket, "B" set
	JACKS
J1A	Key jack, "A" set
	KEYS
K1A	Key and plug assembly no. 9
	RECTIFIERS
W1A	Westinghouse rectifier, 5mA instrument type
W2A	Westinghouse rectifier, type SH1A
	FUSES
F1A–C	250mA fuse

Table 1001. Details of components—*continued*

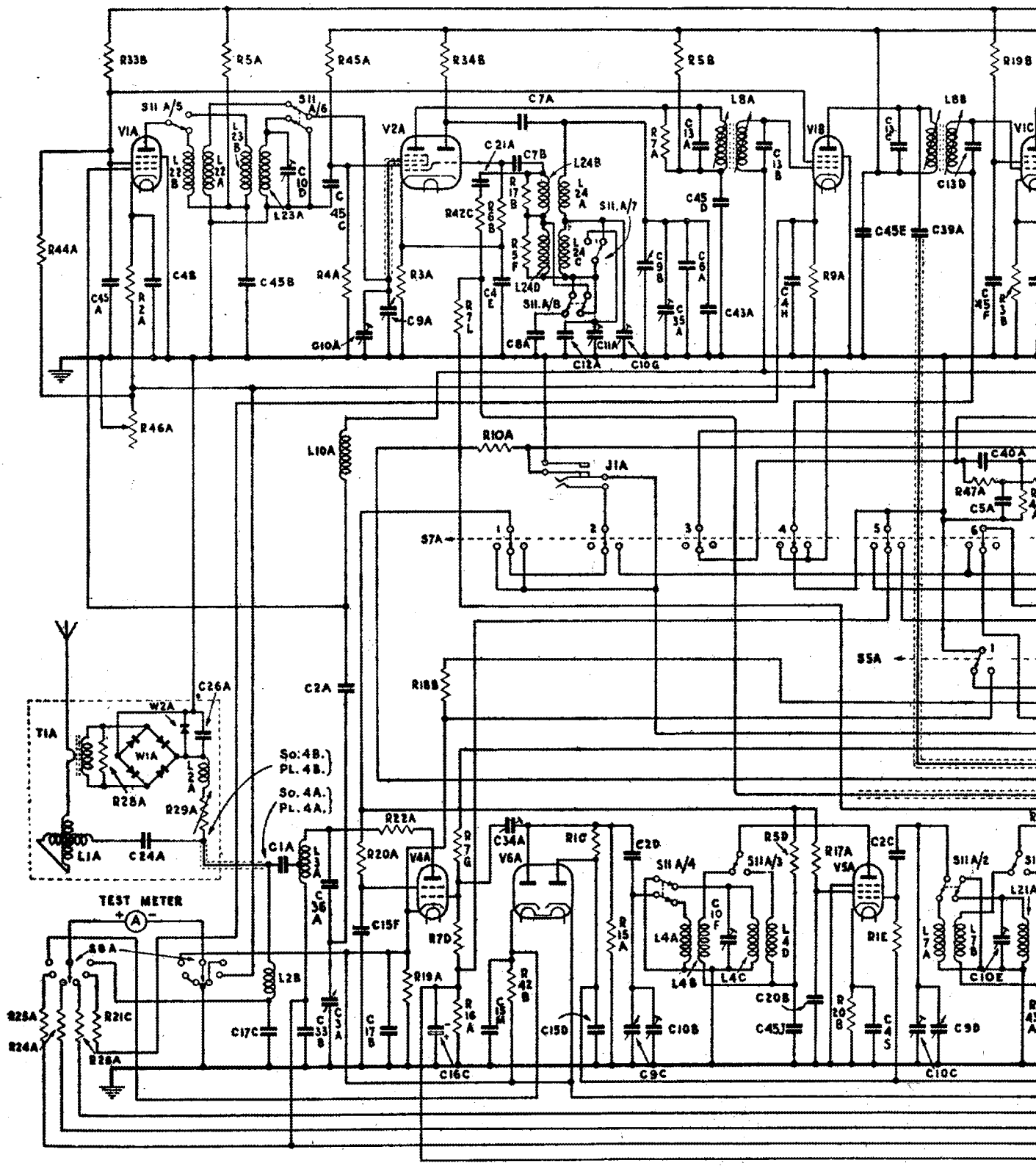
CONDENSERS

Circuit reference	Capacity	Tolerance	Rating	Type
C1A	0·004μF	±15%	2,200V test	Mica
C2A, C–D	100pF	±10%		Silvered mica
C3A	540pF max. variable condenser			
C4B,E,H, J, K, N, Q, S, & AP–CP	0·1μF		350 volts	Paper
C5A	500pF	± 5%		Silvered mica
C6A	15pF	± 2%		Ceramic, Conda C
C7A–B	50pF	±10%		Silvered mica
*C8A	5,000pF	± 5%		Silvered mica
C9A–D	Four section variable condenser			
C10A	50pF max. trimmer condenser			Mica
C10B–C	50pF max. trimmer condenser			Mica
C10D–G	50pF max. trimmer condenser			Mica
C11A	750pF max. trimmer condenser			Mica
C12A	2,000pF	± 2%		Silvered mica
C13A–F	140pF	± 2%		Silvered mica
C14A–B	100pF	±15%		Mica
C15A, D–H, J–M	500pF	±15%		Mica
C16A–B	12μF	−20+50%	50 volts	Electrolytic
C16C	12μF	−20+50%	50 volts	Electrolytic
C17A–C	0·002μF	±20%	450 volts	Paper
C18A	20pF	±10%		Silvered mica
C19A	90pF	± 2%		Silvered mica
C20B	0·002μF	±15%		Mica
C21A	5pF	±20%		Silvered mica
C22A–C	0·025μF		350 volts	Paper
C23A	0·005μF		450 volts	Paper
C24A	0·001μF		5000 volts	Mica
C25A	Split-stator variable condenser			
C26A	0·001μF	±25%		Mica
C27A	20pF	±20%		Ceramic
C28A	700pF	± 5%		Silvered mica
C29A–E	0·01μF		350 volts	Paper
C30A–B	0·001μF	±15%		Mica
C31A–C	2μF	−20+50%	350 volts	Electrolytic
C32A	30μF	−20+50%	450 volts	Electrolytic
C33B	0·1μF		1500 volts	Paper
C34A	110pF max. trimmer condenser			Mica
C35A	15pF max. trimmer condenser			Mica
C36A	0·01μF	±10%	2200V test	Mica
C37A	500pF	± 2%		Silvered mica
C38A–B	0·1μF		550 volts	Paper
C39A	2pF	±20%		Ceramic
C40A–B	250pF	± 5%		Silvered mica
C41A	200pF	± 2%		Silvered mica
C42A	0·05μF		350 volts	Paper
C43A	45pF	± 2%		Silvered mica
C44A	1μF		1000 volts	Paper
*C45A–O	0·05μF		500 volts	Paper
C46A	5pF	±10%		Silvered mica

RESISTANCES

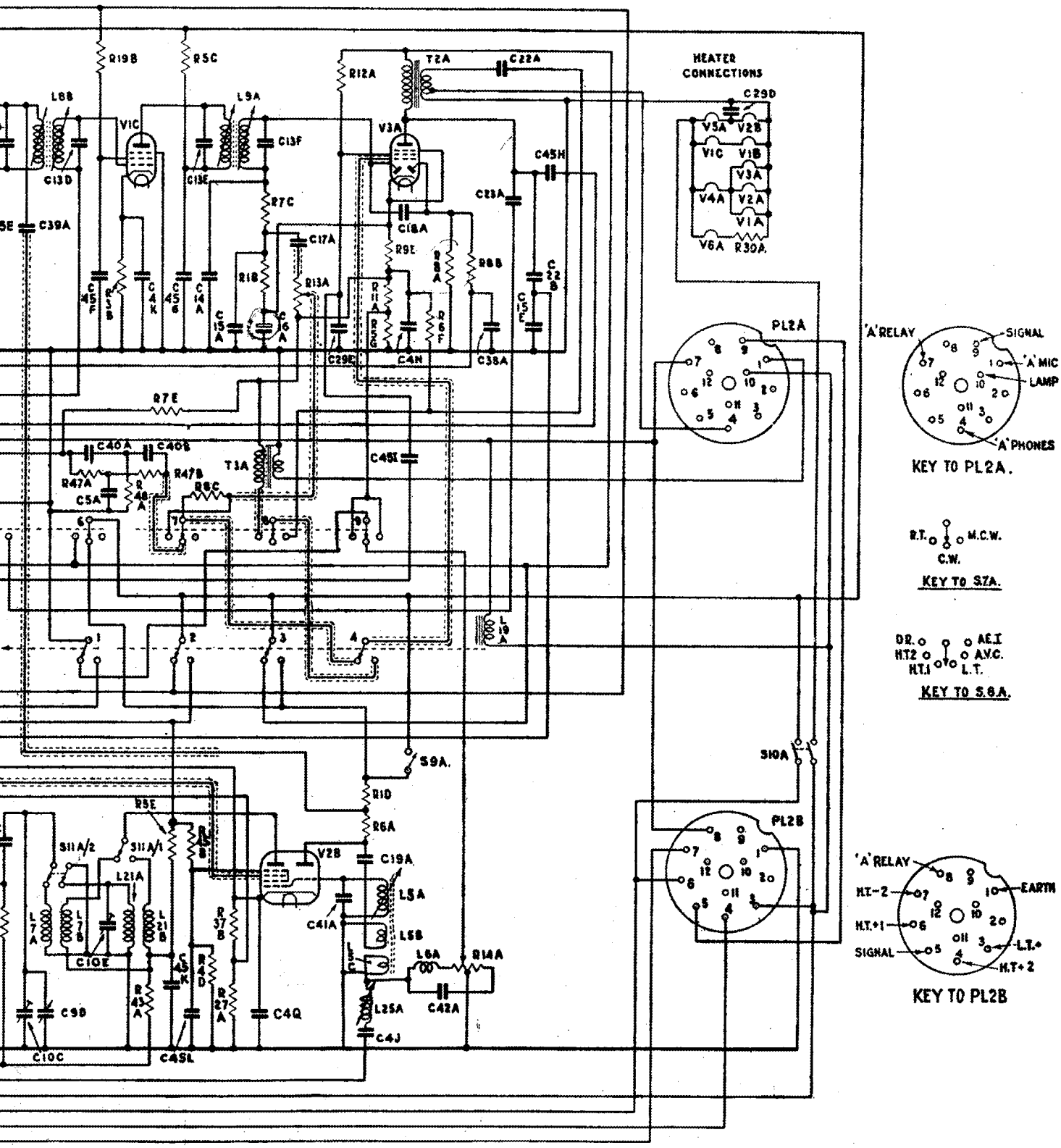
Circuit reference	Value	Tolerance	Type
R1A–F	470KΩ	±20%	Ceramic
R2A, C–E	220Ω	±10%	Ceramic
R3A–B	270Ω	±10%	Ceramic
R4A & D	22KΩ	±10%	Ceramic
R5A–G	2·2KΩ	±10%	Ceramic
R6A–B, F–H	47KΩ	±10%	Ceramic
R7A, C–H, J–L	100KΩ	±20%	Ceramic
R8A–D, F	1MΩ	±20%	Ceramic
R9A–E	1KΩ	±10%	Ceramic
R10A	1·5KΩ	±10%	Ceramic
R11A–B	3·3KΩ	±10%	Ceramic
R12A	68KΩ	±10%	Ceramic
R13A	1MΩ		Vol. control
R14A	20Ω C.T.		W.W. var.
R15A	220KΩ	±20%	Ceramic
R16A	1·8KΩ	±10%	Carbon
R17A–B	3·9KΩ	±10%	Ceramic
R18B–C	270KΩ	±20%	Ceramic
R19A–B	82KΩ	±10%	Ceramic
R20A–B	100Ω	±10%	Ceramic
R21B–C	27KΩ	±10%	Ceramic
R22A	47Ω	±10%	*Ceramic*
R23B–E	22KΩ	±10%	Ceramic
R24A	1·2MΩ	± 5%	Carbon
R25A	1·2MΩ	± 5%	Carbon
R26A	29·5KΩ	± 2%	W.W. or carbon film
R27A	470Ω	±10%	Ceramic
R28A	33Ω	±10%	Ceramic
R29A	750Ω		Adjustable
R30A	30Ω	± 5%	Carbon
R31A	2·2KΩ	±10%	Ceramic
R32A	15KΩ	±10%	Ceramic
R33A–B	27KΩ	±10%	Carbon
R34A–B	47KΩ	±10%	Ceramic
R35A	100KΩ		Vol. control
R36A	39KΩ	±10%	Ceramic
R37B	390Ω	±10%	Ceramic
R38A	65Ω	± 5%	Wire wnd.
R39A	820Ω	±10%	Ceramic
R40A	20Ω	±10%	Carbon
R41A–B	2Ω	±10%	Wire wnd.
R42B–C	10KΩ	±10%	Ceramic
R43A	3·3MΩ	±10%	Ceramic
R44A	82KΩ	±10%	Ceramic
R45A–B	22KΩ	±10%	Carbon
R46A	10KΩ		W.W. var.
R47A–B	1MΩ	±10%	Ceramic
R48A	150KΩ	±10%	Ceramic
R49A	390Ω	±10%	Ceramic

* NOTES:—On early sets, condensers C45A–O were 0·1μF 350V.
0·1μF 500V condensers are used as alternative to 0·05μF 500V.
On sets with serial numbers below 52566, C8A was 3200pF ± 2% and L24A and C were of slightly different inductance.



NOTES:—System switch S7A is shown
Relay S5A is shown in recei
Wave-change switch S11A/1
C9A, B, C, D is gang conden

Fig. 1001. Circuit diagram



ch S7A is shown in CW position.
s shown in receive position.
e switch S11A/1–8 is shown on H.F. band.
D is gang condenser.

rcuit diagram of complete "A" set

NOTES:—System switch shown in RT position.
Wave-change switch shown on H.F. band.

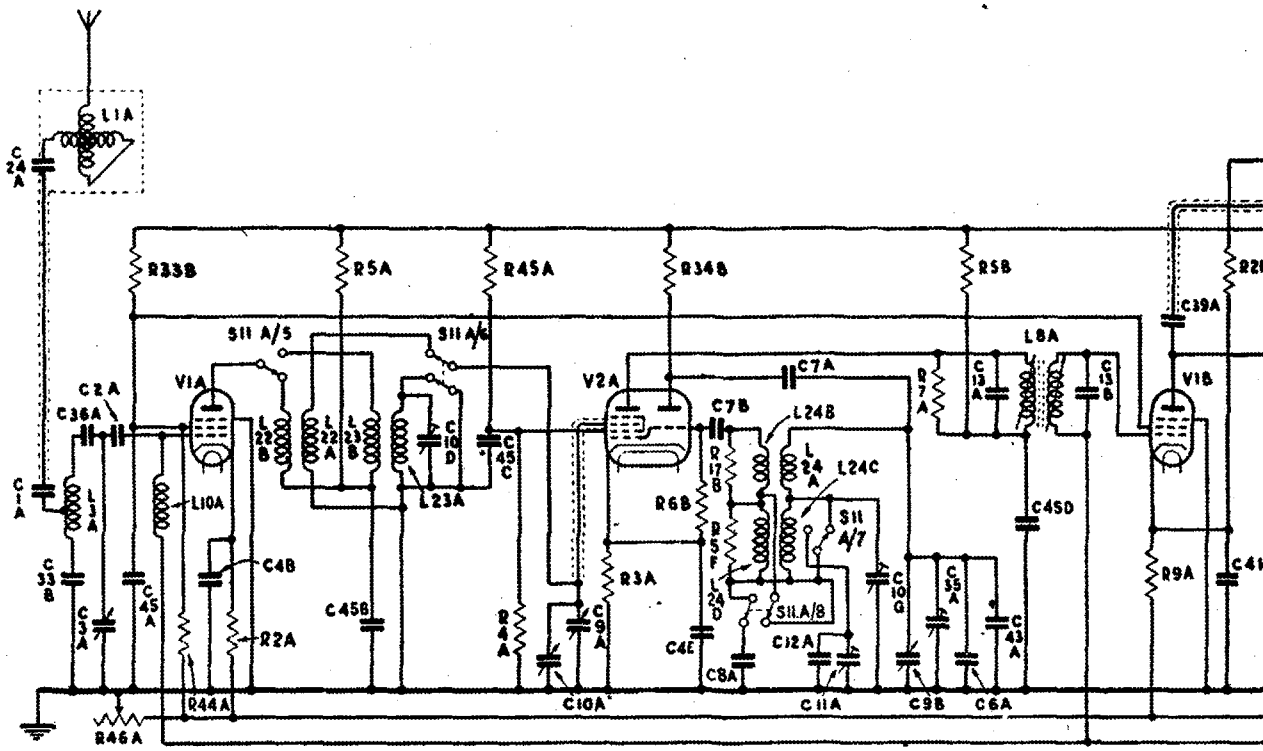


Fig. 1002. Simplified circuit diagram of "A" receiver

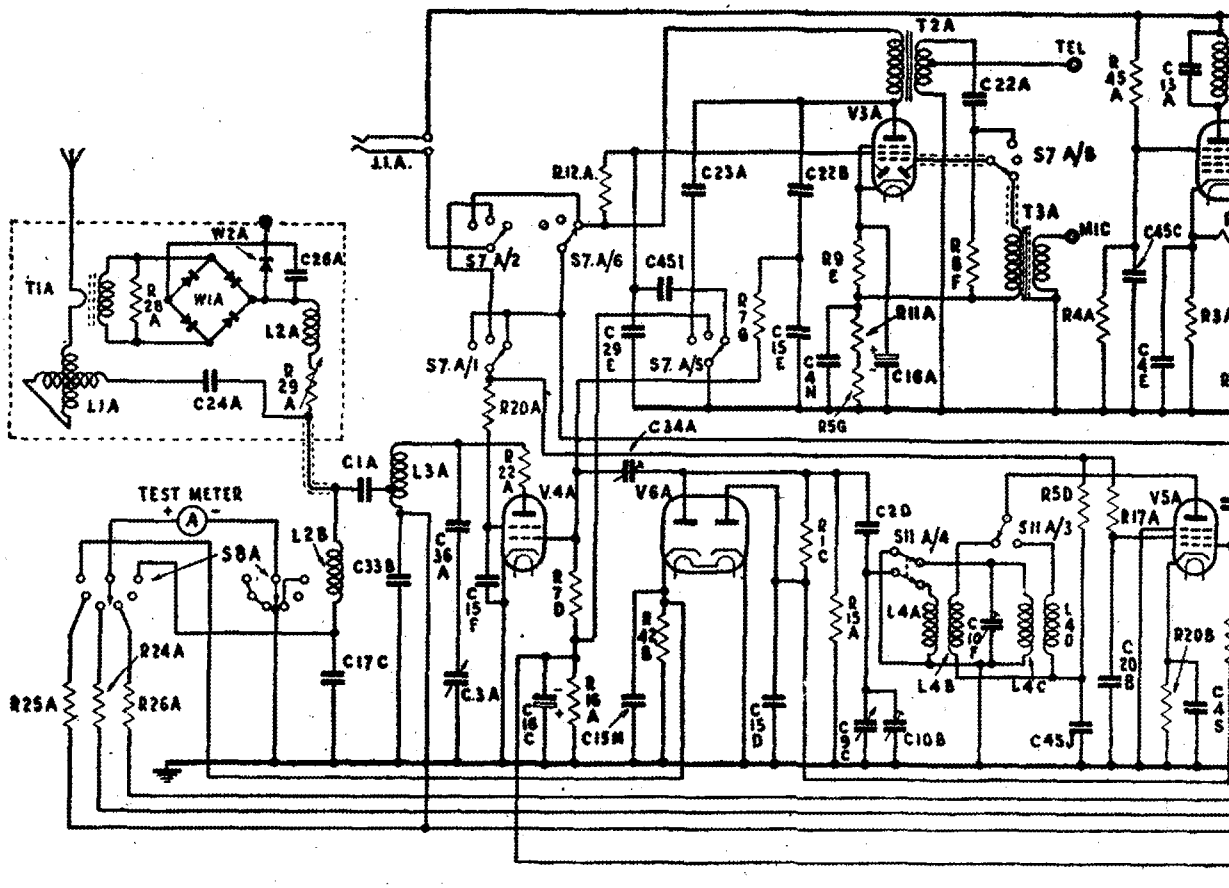
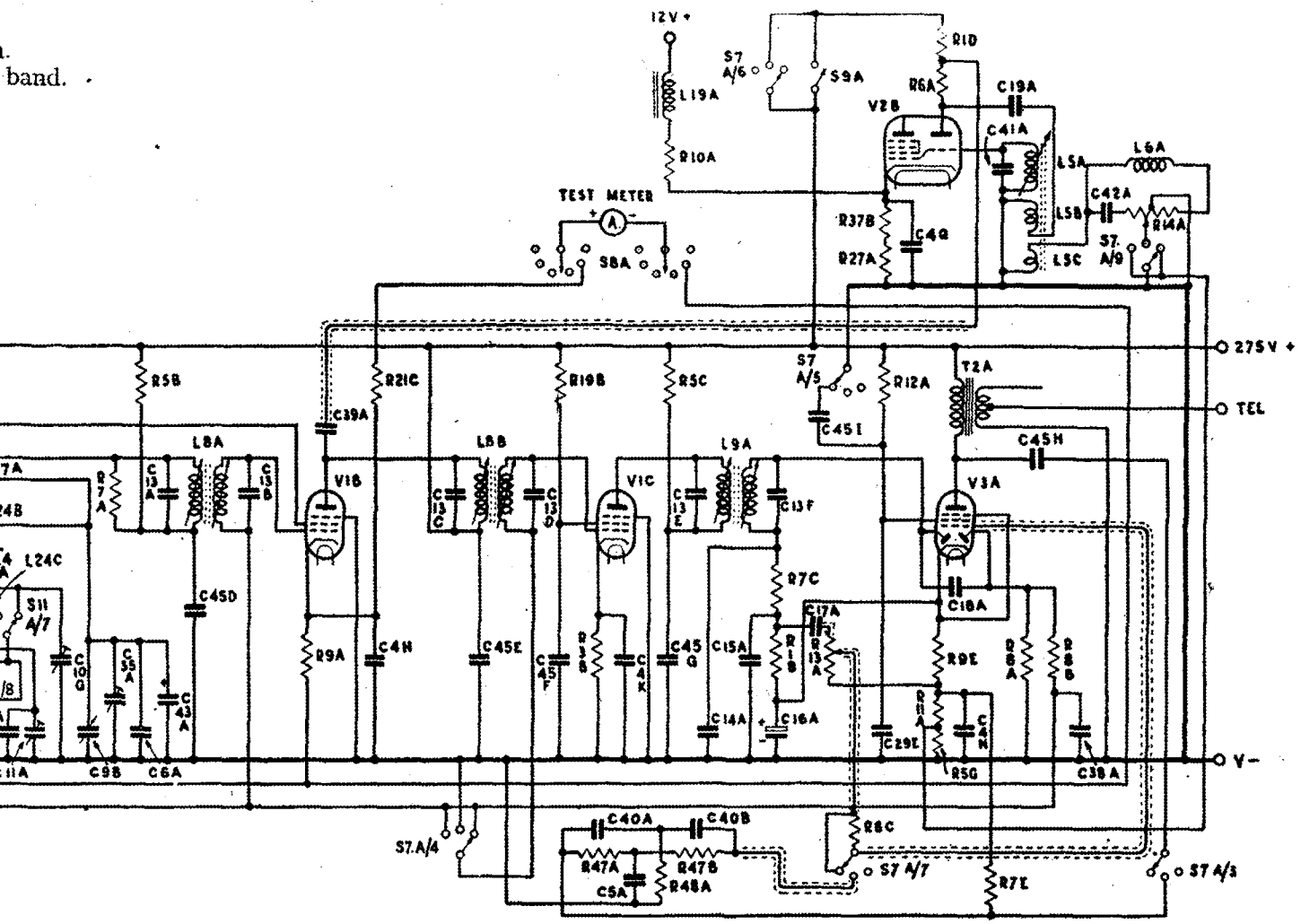
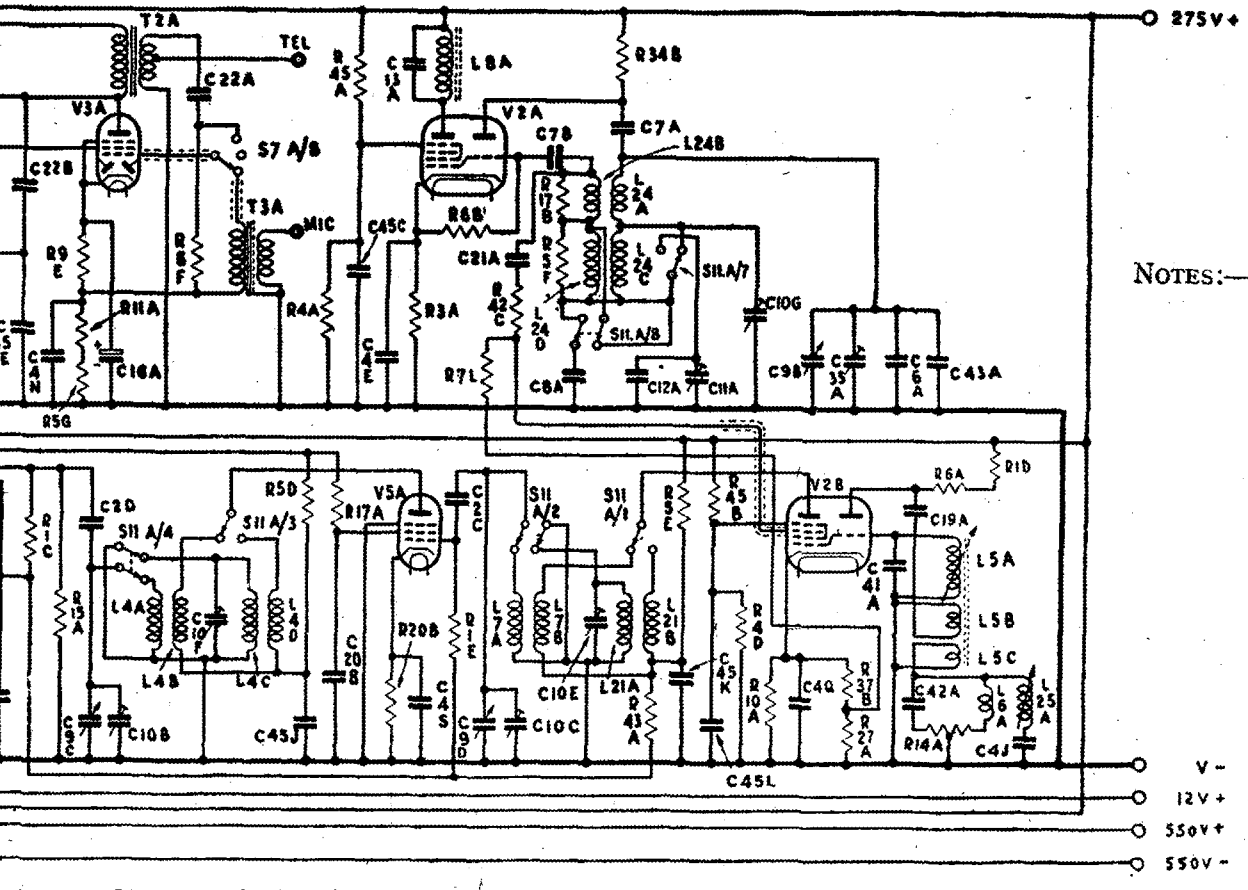


Fig. 1003. Simplified circuit diagra

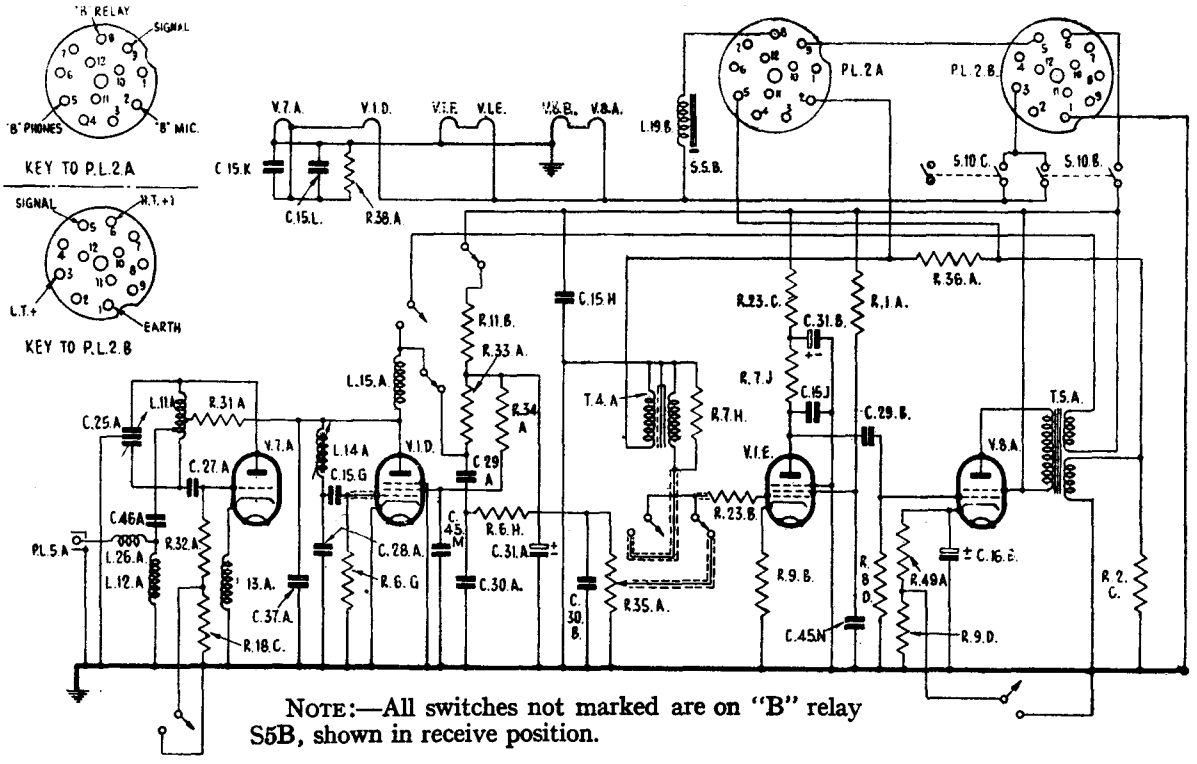
band.





NOTES:—System switch shown in RT position. Wave-change switch shown on H.F. band

1003. Simplified circuit diagram of "A" sender



NOTE:—All switches not marked are on "B" relay S5B, shown in receive position.

Fig. 1004. Circuit diagram of "B" set

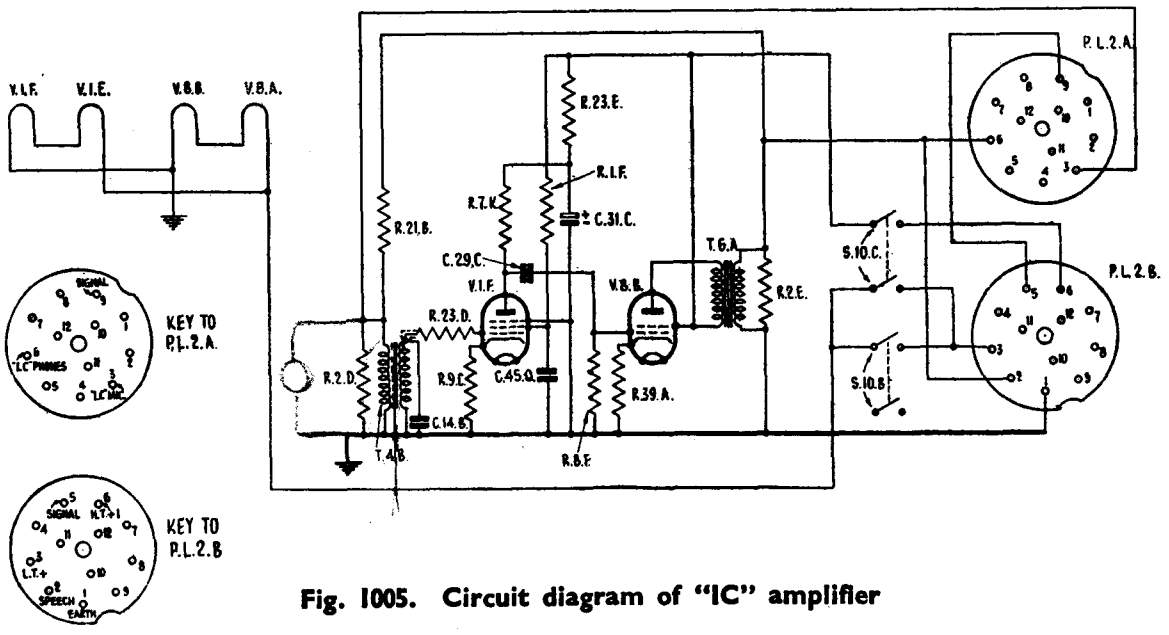


Fig. 1005. Circuit diagram of "IC" amplifier

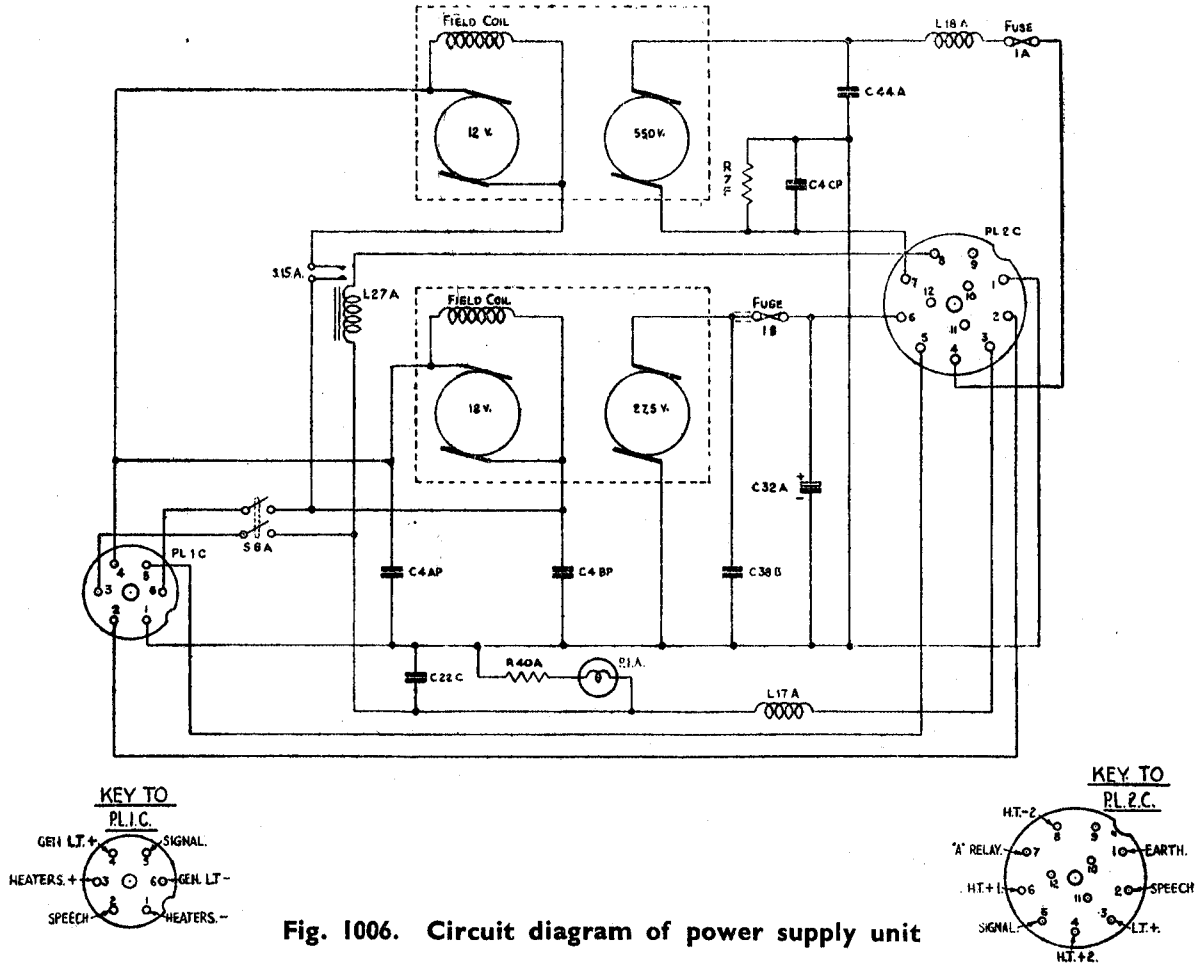


Fig. 1006. Circuit diagram of power supply unit

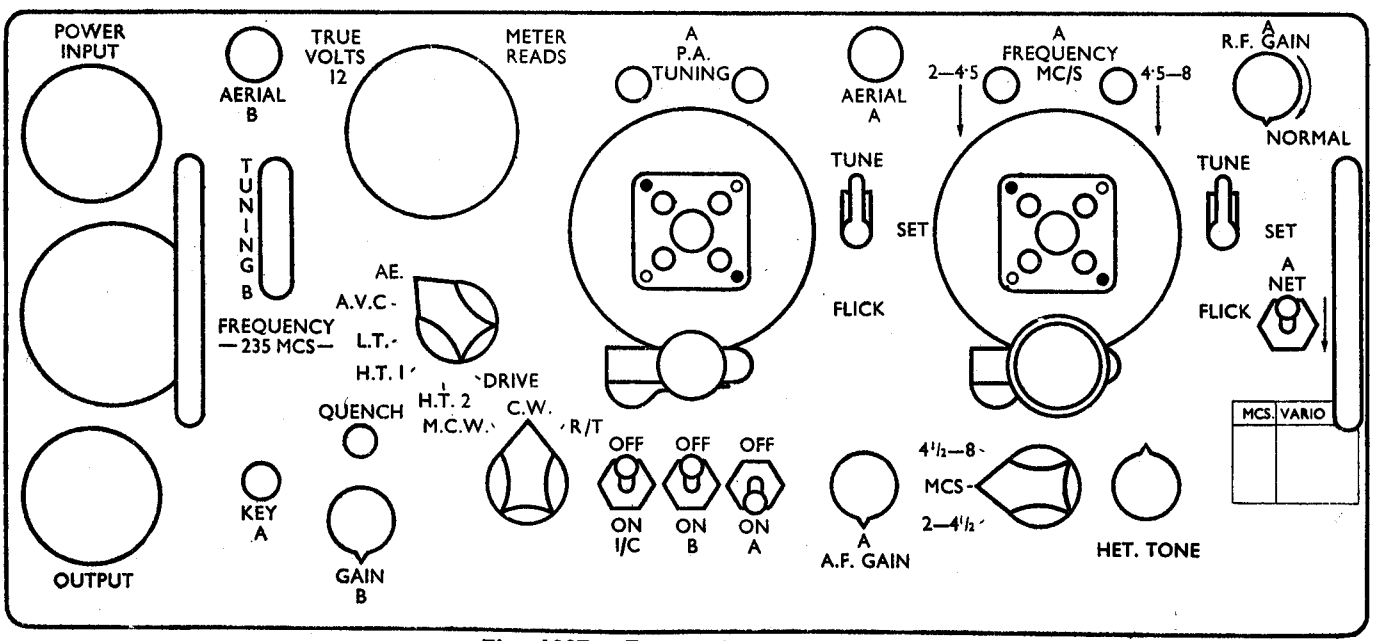


Fig. 1007. Front view of panel

END