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WIRELESS SENDER No. 53

*Working
Instructions*

**The War Office
Whitehall**

ZA 22877

August, 1944

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WIRELESS SENDER No. 53

General Description and Working Instructions

CHAPTER I GENERAL DESCRIPTION

1. Purpose and facilities.

The Wireless Sender No. 53 is designed for long range communication. It comprises a power supply unit, modulator unit, R.F. amplifier with master oscillator, and an aerial coupling unit (see Fig. 1).

CW, MCW, and RT transmissions are provided.

2. Power output.

The nominal available carrier power is about 250 watts.

3. Frequency band.

The frequency band of 1.3 Mc/s to 17.5 Mc/s is covered in five ranges by the R.F. amplifier and the appropriate range selected by switching :—

Range 1a	1.2— 1.7 Mc/s.
„ 1b	1.7— 2.2 „
„ 2	2.2— 4.4 „
„ 3	4.4— 8.8 „
„ 4	8.8—17.5 „

In the master oscillator the above ranges 1a and 1b are grouped together into a single range 1.

4. Power Supply.

The set requires an A.C. supply of 230 volts 50-500 c/s single phase and a 12-V D.C. supply capable of providing 4 amps. The maximum power consumption of the set is approximately 1.8 kW.

5. Aerials.

The aerial coupling unit feeds into a rod or end-fed wire aerial. It embodies a resistance for use as an artificial or dummy aerial. It also has a feeder plug for an 80 ohm feeder line for connection to a dipole aerial.

6. Control.

The LOCAL H.T. CONTROL on the R.F. amplifier panel or a Remote Control Unit G or H No. 1 may be used for actuation of the send/receive aerial change-over switch. Remote control facilities can be provided by use of the corresponding G or H No. 2 unit.

7. Receiver.

The receiver used with the set is usually a Reception Set R107.

8. Sender assembly.

The units of the sender may be mounted in a single rack (see Fig. 1) with :—

- (1) The Power Supply Unit No. 26 at the bottom ;

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(2) The Modulator Unit No. 27 immediately above the Power supply Unit ;

(3) The Amplifier R.F. No. 4 and Unit Master Oscillator No. 2 above the Modulator Unit.

(4) The Aerial Coupling Unit No. 2A, bolted to the top.

The chassis of the units are of mild steel and are held to the steel angle rack by quick release fasteners along each side. Steel sheets cover the back and sides of the rack assembly ; the side sheets are louvred at the bottom and an exhaust fan is mounted at the top back part for cooling purposes (Fig. 2). The assembly is provided with rubber blocks for mounting on the floor of a vehicle. The various units are interconnected by leads. Other forms of mounting than the rack mounting may be used for example in vehicle installations.

9. Brief circuit description.

The circuit sequence is :—

In the master oscillator,	Master oscillator (variable tuning or crystal control).	Type VT 501 valve
	Buffer	Type VT 501 valve.
	Driver	Type ATS25 valve.
	Voltage stabilisers	2 type AW3 valves.
In the R.F. amplifier,	Power amplifier	2 valves type CV26 in parallel, Class C.
	Grid bias for P.A. valves.	Type 6X5G valve (housed in m.o. unit).
In the modulator unit,	Sub-modulator 1st stage.	Type ARP34 valve resistance coupled to—
	Sub-modulator 2nd stage.	Type 6J5G valve, resistance coupled to—
	Sub-modulator 3rd stage.	2 type 6J5G valves in floating paraphase coupled to—
	Sub-modulator 4th stage.	2 valves type ATS25, push-pull transformer coupled to—
	Output stage	2 valves type CV177 in push-pull, class B, anode modulating the P.A. (Type CV26 valves are being used initially instead of type CV177 valves.)
	Automatic modulation control.	Type 6X5G valve.
	Keying and M.C.W. oscillator unit.	2 type 6J5G valves (one keying and other for 900 c/s M.C.W. note).

In the power supply unit, Two type CV128 valves giving full-wave rectification for 1500V., 450 mA supply and two type 5U4G valves giving full-wave rectification for 350V. 400 mA supply. Smoothing provided by chokes and parallel-connected condensers.

10. Weights and Dimensions.

TABLE I—WEIGHTS AND DIMENSIONS.

	Weight.	Length.	Height.	Depth.
Power Supply Unit, Modulator Unit, Amplifier R.F. with Master Oscillator, Aerial Coupling Unit, Rack Mounting. Fan at back of top part of Chassis.	600 lbs. approx.	2 ft. 5 in.	4 ft. 7 in.	2 ft. 3 in.

CHAPTER II OPERATION.

11. Preliminary.

- (1) See that the various units are firmly fixed in their correct positions. The quick release fasteners enable the units to be quickly fixed and released ; the side fasteners are turned with their heads horizontal for release and fixed with their heads vertical.
- (2) See that the associated receiver and Unit G or H No. 1 (if used) are suitably set up.

12. Setting up.

- (1) Open the FUSES door of the power supply unit and see that correct fuse wires are inserted in the fuse holders. Close FUSES door.
- (2) Check each unit for proper insertion of valves and necessary internal inter-connections :—
 - (a) R.F. Amplifier and Master Oscillator (see Fig. 8).
 - (i) The R.F. amplifier has two type CV26 valves. See that these are firmly inserted in their sockets and that the top clamping bar is screwed down firmly on the control pillar.
 - (ii) The master oscillator has two type VT501, one type ATS25, one type 6X5G and two type AW3 valves.
 - (iii) See that the screened lead has its two terminating 12-point sockets inserted firmly into the two 12-point plugs at right-hand rear part of unit.
 - (iv) See that concentric feeder connects up master oscillator and R.F. amplifier at back of unit.

CHAPTER II—Sections 12-13

- (v) See that 2-point socket is inserted into plug at back of unit and that other end of lead is inserted into fan.
- (b) Modulator Unit No. 27 (see Fig. 7).
 - (i) The sub-modulator has one type ARP34, three type 6J5G, two type ATS25 and one type 6X5G valves. See that these are properly inserted.
 - (ii) The keying and MCW oscillator unit has two type 6J5G valves. Check proper insertion of these valves.
 - (iii) Two type CV177 valves are at the left-hand side of the unit. See that these are firmly secured in their sockets.
 - (iv) See that a 12-pin socket is inserted firmly into plug at back of keying and MCW oscillator unit.
 - (v) See that a 4-point plug (PLUG B) is inserted into socket at top front of sub-modulator unit.
 - (vi) See that a 6-point socket is inserted into plug (PLUG B) at rear left of sub-modulator unit.
- (c) Power Supply Unit No. 26 (see Fig. 6.)
 - (i) See that two type 5U4G valves are inserted in front left of panel.
 - (ii) See that two type CV128 valves are properly inserted in rear left of panel.

13. Connecting up (see Fig. 1).

- (1) Connect EARTH terminal on power supply unit to earth.

Connect the EARTH terminal on the front panel of the modulator unit to the front panel of power supply unit, fixing terminating cleat tightly with screw.

Connect the E terminal on the R.F. amplifier front panel to the front panel of the modulator unit, fixing terminating cleat tightly with screw.

- (2) Set MAIN A.C. SUPPLY switch on power supply unit to OFF.

(3) Connect A.C. SUPPLY plug on power supply unit to source of supply, 230 volts A.C. 50-500 c/s.

(4) Connect a 12-V. D.C. supply, capable of giving 4 amps, to socket which is to be inserted into 6-pin plug engraved FROM CONTROL UNIT on R.F. amplifier.

When a control unit G or H No. 1 is used, connection to the 12-V. supply is made through this unit No. 1.

Set fan ON/OFF switch to ON. Exhaust fan should be heard to start immediately. Check this.

(5) Connect the associated receiver (e.g. Reception Set R107) to its source of supply.

(6) Interconnect the various units as in Table II below using appropriate leads.

TABLE II—INTERCONNECTION OF UNITS.

Unit of Wireless Sender No. 53.		Connect to—		
Designation.	Engraving.	Unit or Apparatus.	Engraving.	Remarks.
Power Supply Unit No. 26.	Aux. Supplies to Modulator Unit.	Modulator Unit No. 27.	Aux. Supplies from Supply Unit.	Socket ZA.6543. Lead Con. 4 Pt. 9B ZA.15038.
”	1500 V. supply to Modulator Unit.	Modulator Unit.	1500 V. supply from supply Unit.	Socket ZA.11125. Lead Con. Sin. 29B. ZA.15040
Modulator Unit No. 27.	Local Test Key.	A local test key.		To give keying signals.
”	Mic. and side tone from Control Unit.	Control Unit.		Or from microphone and head-set direct.
”	Aux. supplies to R.F. Unit.	R.F. Amplifier.	Aux. supplies from Mod. Unit.	
”	Screen and H.T. supply to R.F. Unit.	R.F. Amplifier.	Screen and H.T. supply from Mod. Unit.	
Amplifier R. F. No. 4.	From Control Unit.	Control Unit.		Or 12 V. supply direct. Check that fan starts.
”	To AE Coupling Unit.	AE Coupling Unit No. 2A.		By metal bar encased in box.
”	Sockets at front and top.	AE Coupling Unit No. 2A.	(Sockets at front and back.)	Gate switch sockets inter-connection.
”	To Reception Set R107.	Reception Set R107.	Dipole Feeder.	Aerial connection.

14. To operate.

Preliminary.

- (a) Turn AE LOADING, AE COUPLING and P.A. TUNING handles on R.F. amplifier anti-clockwise so that all three turn indicators, viewed through holes in the panel, read A—1—0. Set DRIVE CONTROL switch to minimum.
- (b) Open BAND CHANGING door on the R.F. amplifier and set the adjustable links according to the frequency band required as indicated in the diagram on the back of the door. The links must lie parallel to one another. Close this door.
- (c) Set LOW POWER AND TUNE/HIGH POWER switch on power supply unit to LOW POWER AND TUNE.
- (d) Set SYSTEM SWITCH on modulator unit to RT-MCW position. Set RT/MCW switch to RT or MCW as required. Set H.T. ON/OFF switch to OFF.
- (e) Open door of aerial coupling unit and set link in position as indicated by engraving on the back of the door, for :—
 - (i) Vertical aerial.
 - or (ii) Artificial aerial.
 - or (iii) Feeder.
 as required ; close this door.
- (f) Insert KEY plug fully into LOCAL TEST KEY socket on modulator unit (or into local unit G or H No. 1).
- (g) Set master oscillator XTALS—M.O. switch to M.O.

15. Netting Procedure.

(1) *Notes.*

- (i) The drills given below are to be used by outstations when netting to control, or by any station when netting to a wave-meter.

- (ii) The timing of the netting drill will be as follows :—

<i>Operation.</i>	<i>In harbour.</i>	<i>At a distance.</i>
Tuning call	1 minute	1 minute
Netting Call	1 minute	1 minute
Pause		2 minutes.

Group call from control to check net follows immediately.

- (iii) (a) If netting on RT the tuning call will be sent on RT and will consist of the initial letter of the code-sign of the outstation first in order of answering. It will terminate with the words "Hear netting call, net now." The netting call will be sent with the pressel switch pressed and will terminate with the words "Netting call ends."
- (b) If netting on CW the tuning call be will sent on CW and will consist of the initial letter of the code-sign of the outstation first in order of answering. The netting call will be sent by keeping the key pressed and will be terminated by sending the initial letter of the code-sign of that outstation once on the key.

- (2) *Opening up and Prepare to Net Drill* (to be done at least 30 minutes before netting time).
- (i) Plug in operators' headset and check that it is switched to the 53 set.
 - (ii) Carry out daily maintenance tasks.
On R107.
 - (iii) POWER switch to ON.
 - (iv) L.S. switch to ON or OFF as required.
 - (v) Range switch to correct range.
 - (vi) Turn MAIN TUNING DIAL to ordered frequency.
 - (vii) Turn AUDIO GAIN, R.F. GAIN and TELE OUTPUT fully clockwise.
 - (viii) Adjust AERIAL TRIMMER for max. mush in phones or speaker and lock.
 - (ix) I.F. switch to WIDE.
 - (x) BFO-AVC switch to AVC if netting on RT, and to BFO if netting on CW.
 - (xi) BFO DIAL to centre and lock.
 - (xii) LIM switch to OFF.
 - (xiii) AUDIO FILTER (if fitted) to OFF.
Generator.
 - (xiv) Start generator.
On Wireless Remote Control Unit H.1 (if used).
 - (xv) ON-OFF switch to ON (red lamp lights).
Check that the other two switches are at NORMAL.
On Wireless Remote Control Unit G.1 (if used).
 - (xvi) Set switch to LOCAL CONTROL CW if netting on CW or to LOCAL PRESSEE R/T if netting on RT.
On 53 set.
 - (xvii) Switch on MAIN AC SUPPLY (green lamp should light).
 - (xviii) Check LOW POWER AND TUNE—HIGH POWER switch is on LOW POWER AND TUNE.
 - (xix) RANGE switch to correct range.
 - (xx) Turn MO DIAL to approximate frequency.
 - (xxi) MO—XTAL switch to MO.
 - (xxii) DRIVER TUNING to approximate frequency.
 - (xxiii) Turn DRIVE INCREASE fully anti-clockwise.
 - (xxiv) Set BAND CHANGE LINKS to correct band from readings on chart.
 - (xxv) SYSTEM switches to required system.
 - (xxvi) PA TUNING to approximate reading on chart.
 - (xxvii) AE COUPLING to A1.
 - (xxviii) AE LOADING to A1.
 - (xxix) AE LINKS as on chart.
 - (xxx) Switch on FAN.
 - (xxx1) ON-OFF switch on Modulator Unit to ON.

(3) *Netting Drill.*

During tuning call.

On R107.

- (i) Search boldly with MAIN TUNING DIAL and adjust for maximum signal.
- (ii) Reduce signal strength to 2 using RF GAIN.

CHAPTER II—Section 15

During Netting Call.

- (iii) BFO-AVO switch to BFO.
- (iv) Turn MAIN TUNING DIAL for zero beat in phones or speaker and lock.

On 53 set.

- (v) Switch LOCAL HT CONTROL to ON. (Red lamp should light.)
- (vi) Turn MO DIAL for zero beat in phones or speaker and lock.

During pause.

- (vii) Turn DRIVER TUNING for a maximum in PA GRID CURRENT meter, and lock.
- (viii) Rotate DRIVE INCREASE until PA GRID CURRENT meter shows 12-20 mA.
- (ix) Rotate PA TUNING for a minimum in PA ANODE CURRENT meter.
- (x) If reading of PA GRID CURRENT meter is now greater than 20 mA., rotate DRIVE INCREASE in an anti-clockwise direction until reading falls to less than 20 mA.

If NO wireless silence.

With DUMMY AERIAL or DIPOLE on all frequencies or with Rod or Open Wire on frequencies over 5 mc/s.

- (xi) Rotate AE COUPLING clockwise a few turns.
- (xii) Check for minimum in PA ANODE CURRENT meter by rotating PA TUNING.
- (xiii) Repeat (xi) and (xii) until PA ANODE CURRENT meter reads 110 mA.
- (xiv) LOW POWER AND TUNE-HIGH POWER switch to HIGH-POWER.
- (xv) Check PA ANODE CURRENT does NOT exceed 250 mA on RT, or 300 mA on CW. If it exceeds these figures, reduce it to the required value by switching immediately to LOW POWER AND TUNE, repeating (xi) to (xiii) to give a proportionately lower reading of the PA ANODE CURRENT meter and switching back to HIGH POWER.

With ROD or OPEN WIRE AERIAL on frequencies below 5 mc/s.

- (xi) Rotate AE COUPLING to A3.
- (xii) Rotate AE LOADING for maximum in PA ANODE CURRENT meter.
- (xiii) If no maximum, switch off HT and put one AE LINK to OUT. Switch on HT and repeat (xii).
- (xiv) Check for minimum in PA ANODE CURRENT meter rotating PA TUNING.
- (xv) Rotate AE COUPLING a few more turns.

- (xvi) Lock PA TUNING, AE COUPLING and AE LOADING.
- (xvii) LOCAL HT CONTROL to OFF.
- (xviii) RF GAIN control on R107 fully clockwise, and if working on RT turn BFO-AVC switch to AVC.
- (xvi) Repeat (xiv) and (xv) until PA ANODE CURRENT meter reads 110 mA.
- (xvii) LOW POWER AND TUNE-HIGH POWER switch to HIGH POWER
- (xviii) Check PA ANODE CURRENT meter does NOT read more than 250 mA on RT, or 300 mA on CW. If it exceeds these figures, reduce it to the required value by switching immediately to LOW POWER AND TUNE, repeating (xi) to (xiii) to give a proportionately lower reading of the PA ANODE CURRENT meter, and switching back to HIGH POWER.
- (xix) Lock PA TUNING, AE COUPLING and AE LOADING.
- (xx) LOCAL HT CONTROL to OFF.
- (xxi) RF GAIN control on R107 fully clockwise.

(4) *Establishing Communication.*

Communication will then be established, control sending a group call to which outstations reply.

(5) *Closing Down Drill.*

On 53 Set.

- (i) ON-OFF switch on Modulator Unit to OFF.
 - (ii) LOW POWER AND TUNE-HIGH POWER switch to LOW POWER AND TUNE.
 - (iii) MAIN A.C. SUPPLY switch to OFF.
 - (iv) Switch fan OFF.
- Generator.*
- (v) Switch off.
R.107.
 - (vi) POWER switch to OFF.
 - (vii) Carry out daily maintenance tasks.
 - (viii) Check spares. Replace faulty fuses, valves, etc.
 - (ix) Clean and dry headsets and stow where they will not be damaged.

Clean and dry key contacts if used.

CHAPTERS II-III—Sections 15-16

(6) *Crystal Control Operation.*

To tune up a sender using crystal control, proceed as above except :—

- (i) At (2) (xx) set MO-XTAL switch to XTAL.

The frequencies of the crystals employed must be between 1.2 to 2.2 or 4.4 to 8.8 Mc/s. The frequency range of 1.1 to 2.2 Mc/s is covered by the fundamental of a 1.1—2.2 Mc/s crystal, while the 2.2 to 4.4 Mc/s is covered using the second harmonic of a 1.1—2.2 Mc/s crystal. The frequency range of 4.4 to 8.8 Mc/s is covered by the fundamental of a 4.4—8.8 Mc/s crystal, while the 8.8 to 17.5 Mc/s range is covered using the second harmonic of a 4.4 to 8.8 Mc/s crystal.

- (ii) After (3) (vi) note that XTAL CURRENT lamp glows. Proceed further as set out above.

CHAPTER III MAINTENANCE.

16. Maintenance.

(1) *Daily Maintenance.*

(a) Mechanical.

Keep the outside of the apparatus free from dust.

Keep the meter glasses clean.

Examine earth leads for defective joints or corrosion and clean and repair as necessary.

Give attention to the aerial insulator as the accumulation of dirt on the surface may lead to leakage of power.

Check the controls for smooth traverse over their entire range. See that movement is satisfactory and that knobs are securely held.

Check the switches for satisfactory positive action.

Check that the interconnecting plugs and sockets make firm contact and that the interconnecting leads are free from any sign of wear.

(b) Electrical.

Tune and load the set on 5 Mc/s using the dummy aerial. Check the dial settings and meter readings against the last corresponding entry. If time permits, tune and load also on 1.2, 1.8, 2.5 and 10 Mc/s.

Check that the aerial current increases and the P.A. anode current alters when the set is modulated by a sustained note. Check the operation on C.W.

It is essential that the insulators supporting the terminals of the smoothing condensers C1A-D on lower part of Power Supply Unit No. 26 be kept clean and dry to avoid leakage to the condenser cases.

These insulators should be cleaned daily. Make sure power is switched off before gaining access to interior.

If any of the condensers C1B-D should become defective through breakdown of the insulator on the high-tension side, a temporary repair may be effected by disconnecting the faulty condenser, reversing it and reconnecting with the broken-down insulator on the earth side. In the case of condenser C1A this condenser when defective must be interchanged with one of the condensers C1B-D, otherwise resistance R3C would be ineffective if C1A were merely reversed.

(2) *Weekly maintenance.*

Make sure power is switched off before gaining access to interior.

Clean out the interior of the apparatus to remove all dust.

Ensure that all terminal connections are tight.

Clean wiper wheels of anode tuning, aerial coupling and aerial loading inductances in Wireless Sender No. 53, with carbon tetrachloride applied on a rag to the wheel grooves.

Test that the aerial change-over contactor in Wireless Sender No. 53 is making good contact. View contactor by opening side and back door, if possible.

Ensure the H.T. switch is OFF. Switch on 12 volts supply to operate change-over contactor into send position. Feel contacts to ensure they press home properly. If contacts are unsatisfactory have contactor replaced.

WIRELESS SENDER No. 53.

Details of Components.

Power Supply Unit No. 26.

Circuit Reference.	Value and Rating.	
R1A	30K ohms	200 W.
R2A-B	15K ohms	12 W.
R3A-C	150 ohms	200 W.
C1A-D	4 microfarad	2000 V. wkg.
C2A-F	4 microfarad	750 or 500 V. D.C. wkg.
C3A-C	8 microfarad	750 or 500 V. D.C. wkg.
CH1A-B	10H, 450 mA. L.F. choke.	
CH2A-B	10H, 250 mA. L.F. choke.	
V1A-B	Type 5U4G.	
V2A-B	Type CV128.	
T1A	1600-0-1600 V. transformer.	
T2A	450-0-450 V. transformer. (210 V. primary tap used for 230 V input.)	
T3A	5-0-5, 2.5-0-2.5 V. filament transformer.	
S1A-B	Switch D.P. 10 amp., S1A, Main A.C. Supply ; S1B LOW POWER & TUNE/HIGH POWER	
S2A	Gate switch.	
S3A.	Switch on H.T. plug PL.C.	
M1A	0-300 V. A.C. A.C. VOLTS SUPPLY.	
F1A-E	5 amp. fuses.	
F2A-B	10 amp. fuses.	
CON1A	H.T. contactor, 12 V. D.C. operating coil.	
PLA	2-pt. A.C. SUPPLY.	
PLB	4-pt. AUX SUPPLIES TO MOD. UNIT.	
PLC	Single-pt. 1500 V. SUPPLY TO MOD. UNIT.	

Details of Components

Modulator Unit No. 27.

Circuit Reference.	Value and Rating.	
R1A	820K ohm	$\frac{1}{2}$ W.
R2A	510K	$\frac{1}{2}$ W.
R3A	500K	$\frac{1}{2}$ W.
R4A	470K	1 W.
R5A	270K	$\frac{1}{2}$ W.
R6A-B	240K	$\frac{1}{2}$ W.
R7A	200K	$\frac{1}{2}$ W.
R8A-C	150K	$\frac{1}{2}$ W.
R9A-C	100K	$\frac{1}{2}$ W.
R10A	75K	$\frac{1}{2}$ W.
R11A	51K	1 W.
R12A-C	51K	$\frac{1}{2}$ W.
R13A-B	50K	var. resis.
R14A	27K	1 W.
R15A	220K	1 W.
R16A	22K	1 W.
R17A-D	20K	1 W.
R18A	20K	$\frac{1}{2}$ W.
R19A-B	15K	12 W.
R20A-B	15K	1 W.
R21A-B	10K	$\frac{1}{2}$ W.
R22A	5.1K	$\frac{1}{2}$ W.
R23A	5K	12 W.
R24A	5K	$\frac{1}{2}$ W.
R25A	3.9K	$\frac{1}{2}$ W.
R26A	3K	$\frac{1}{2}$ W.
R27A	2K	$\frac{1}{2}$ W.
R28A	1K	$\frac{1}{2}$ W.
R29A-B	820 ohms	$\frac{1}{2}$ W.
R30A	510 ohms	$\frac{1}{2}$ W.
C1A	4 microfarad	2000 V. wkg.
C2A	4 microfarad	750V. or 500 V. D.C. wkg.
C3A-B	4 microfarad	400 V. wkg.
C4A-D	4 microfarad	200 V. wkg.
C5A-P	0.1 microfarad	350 V. D.C. wkg.
C6A-B	0.05 microfarad	300 V. D.C. wkg.
C7A-E	0.01 microfarad	1000 V. D.C. wkg.
C8A-B	0.005 microfarad	1000 V. D.C. wkg.

Modulator Unit No. 27 (cont.)

Circuit Reference.	Value and Rating.
C9A-B	0.0001 microfarad.
L1A	Mod. choke in 1500 V. supply.
L2A	” ” ”, 400 V. supply.
L3A-B	R.F. choke.
L4A	Choke 0.75H.
T1A	5-0-5, 0-6.3, 3.15-0-3.15 V. filament trans.
T2A	Mod. transformer.
T3A	Driver transformer.
T4A	Microphone transformer, 1-100 ratio.
Rel A/1	Keying relay.
Rel B/1	M.C.W. oscillator relay.
S1A	SYSTEM SWITCH.
S2A	R.T.-M.C.W. switch.
S3A	ON-OFF switch (interlocked with S1A)
J1A	LOCAL TEST KEY.
V1A-B	CV26 or CV177.
V2A-B	ATS25.
V3A	6X5G.
V4A-E	6C5G or 6J5G.
V5A	ARP34.
PLA	12-pt. on Keying and M.C.W. unit.
PLB	6-pt. on Sub-modulator unit.
PLC	4-pt. AUX. SUPPLIES FROM SUPPLY UNIT.
PLD	10-pt. AUX. SUPPLIES TO R.F. UNIT.
PLE	4-pt. on Sub-modulator unit.
PLF	2-pt. SCREEN and H.T. SUPPLY to R.F. UNIT.
PLG	Single-pt. 1500 V. SUPPLY FROM SUPPLY UNIT.
PLH	4-pt. MIC. AND SIDETONE FROM CONTROL UNIT.
SOA	12-pt.—fits into PLA.
SOB	6-pt.—fits into PLB.
SOE	4-pt.—on M.C.W.-R.T. switch sub-assembly.
	R.F. Amplifier.
R1A	100 ohms ½ W.

Details of Components

R. F. Amplifier (cont.)

Circuit Reference.	Value and Rating.	
R2A	500 ohms	12 W.
R3A	1000 ohms	12 W. (sometimes made up of 2x500 ohms)
R4A	10K ohms	1 W.
R5A	22K	1 W.
R6A	47K	1 W.
R7A	100K	1 W.
R8A	220K	1 W.
C1A	Air-spaced.	
C2A	Air-spaced, 39-45 PF, 3000 V. A.C. test.	
C3A-B	600PF, 2000 V. R.M.S. max, 8 amps. R.F. max.	
C4A-B	0.001 microfarad, 2500 V. D.C. wkg.	
C5A-C	0.002 microfarad, 3000 V. D.C. 700 V. R.M.S.	
C6A-E	0.01 microfarad, 2200 V. D.C. wkg.	
C7A-B	8 microfarad, 350 V. D.C. wkg. at 140° F.	
M1A	0-50 mA D.C. P.A. GRID CURRENT.	
M2A	0-350 mA D.C. P.A. ANODE CURRENT.	
M3A	0-12A R.F. AE CURRENT.	
CH1A	20H, 100 mA L.F. choke.	
CH2A-10	R.F. choke.	
CH3A	16 mH. R.F. choke.	
S1A	Gate switch on BAND CHANGING door.	
S2A	Switch on H.T. plug PLD.	
S3A-B	Switch SP ON-OFF, S3A—LOCAL H.T. CONTROL ON-OFF. S3B—FAN ON- OFF.	
S4A	6-way wafer switch, DRIVE INCREASE.	
T1A	120-0-120, 5-0-5, 3.15-0-3.15 L.T. Trans- former.	
L1A-C	48 mH variable, L1A—P.A. TUNING. L1B—AERIAL COUPLING L1C—AERIAL LOADING.	
V1A-B	CV26.	
C0N1A	Aerial c/o switch, 12 V. D.C. operating coil.	
P1A-B	Meter illuminating lamps (6VJ).	
P1C	H.T. SUPPLY lamp (red) (6VJ).	
P1D	A.C. SUPPLY LAMP (green) (6VJ).	
PLA	6-pt. plug FROM CONTROL UNIT.	

R.F. Amplifier (cont.)

Circuit Reference.	Value and Rating.
PLB	10-pt. plug AUX. SUPPLIES FROM MOD. UNIT.
PLC	12-pt. plug to M.O. unit.
PLD	2-pt. SCREEN & H.T. SUPPLY FROM MOD. UNIT.
PLE	Concentric plug from M.O. unit.
PLF	Concentric plug TO RECEPTION SET R.107

Master Oscillator.

R1A-B	47 ohms	$\frac{1}{2}$ W.
R2A	330 ohms	$\frac{1}{2}$ W.
R3A	1K ohm	1 W.
R4A	4K	12 W.
R5A-B	8K	12 W.
R7A	47K	1 W.
R8A	100K	$\frac{1}{2}$ W.
R9A	100K	1 W.
R10A-B	270K	$\frac{1}{2}$ W.
C1A-B	0.1 microfarad 500 V. D.C. wkg.	
C2A-F	0.1 microfarad 350 V. D.C. wkg.	
C3A-D	0.01 microfarad 2200 V. D.C. wkg.	
C4A	0.01 microfarad 750 V. D.C. wkg.	
C6A	0.002 microfarad	
C7A	0.001 microfarad 350 V. D.C. wkg.	
C8A	200 PF. 750 V. D.C. wkg.	
C9A-B	70 PF.	
C10A-B	50 PF. (neg. temp. coeff.).	
C11A	50 PF. MICA.	
C12A	40 PF.	
C13A	15 PF.	
C14A-C	500 PF 3-gang assembly.	
C15A-B	500 PF 2-gang assembly DRIVER TUNING.	
C16A-B	100 PF trimmer.	
C17A-J	30 PF preset.	
(C171 not used).		
C18A-B	20 PF neg. temp. coeff.	
C19A	10 PF neg. temp. coeff.	

Details of Components

Master Oscillator (cont.)

Circuit Reference.	Value and Rating.
C20A	60 PF mica.
L1A-F	R.F. chokes.
L2A-B	Heater chokes.
L9A-L20A	Preset inductances.
S1A-E	Range switches, single leaf. S1A, C, D, E ganged with S2A, B, C, D. S1B—XTALS selector switch.
S3A	XTALS—M.O. switch.
V1A-B	VT501.
V2A	ATS25.
V3A	6X5G.
V4A-B	AW3.
P1A	XTAL CURRENT lamp 6VJ.
P1B-C	Scale illuminating pilot lamps, 6VJ.
PLA	12-pt. to R.F. Amplifier.
PLB	2-pt. gate connections to Aerial Coupling Unit No. 2A.
PLC	Concentric plug, R.F. output.

Aerial Coupling Unit No. 2A.

R1A	
C1A	0.0015 microfarad, 6600 V. 50 c/s MAX. wkg. max. super-imposed current 10 amps.
L1A	

APPENDIX I.

AERIAL LENGTH CHART.

1. Decide whether you are working "Mobile," "Sky-wave," or "Ground-wave."
2. Look on the table for the frequency *next below* the working frequency.
3. Read off the type and length of aerial. If using end-fed wire subtract the length of the aerial lead-in.

Example : You are trying to work 150 miles on an allotted frequency of 3220 kilocycles—and you are halted for some time.

1. You must use "sky-wave" for this range and frequency.
2. The *next below* frequency in the table is 3000.
3. From the table, *either* use *Dipole A* (Aerial Dipole No. 9B) set to 148 ft. *or* End-fed Aerial D (Aerial 185 ft. No. 2) with total length 195 ft.

If using the end-fed aerial connected, for instance, to the top of an 18 ft. rod on the vehicle, set it to 195 ft. — 18 ft. = 177 ft.

IMPORTANT NOTES.

**Length of End-fed Wire.* Length on table includes lead-in. Subtract length of lead-in from length in table; remainder is actual length of wire required.

†*Accuracy.* All dipoles and end-fed wire lengths not marked * must be correct to a foot or two; feeders may be damaged if used with dipoles not correctly adjusted. Where marked * shorter lengths may be used, but are not so good. If using this type of aerial for two alternative frequencies, one not less than 60 per cent. the other, the aerial should be set for the *higher* frequency and used for both.

‡*Vertical Rod* may be used for very long range sky-wave working from 12000—17500 Kc/s.

Types of Aerial.

1. Dipoles.

- Type A Aerial Dipole No. 9B (210 ft.).
- Type B Aerial Dipole No. 9 (95 ft.).
- Type C Aerial Dipole No. 9A (53 ft.).

2. End-fed Wires.

- Type D Aerial 185 ft. No. 2.
- Type E Aerial 75 ft. No. 2.

3. Vertical Rod.

- "D" Sections at the bottom, suitably stayed with an adaptor and
- "F" Sections on top.

4. Twin Rod.

- Two lengths of "F" Section in a "V" adaptor.

Frequency	"SKY-WAVE" Use Dipole if possible				"GROUND-WAVE" Use Rod if possible				"MO-BILE"	
	DIPOLE		END-FED WIRE		VERTICAL ROD			END-FED WIRE	TWIN ROD	
	Type	Length	Type	Length*	"D"	"F"	Total	Type	Length*	Length
1200 1300 1400 1500	Use End-Fed Wire		D	145'	18'	16'	34'	D	145'	16'
		D	134'	18'	16'	34'	D	134'		
		D	125'*	18'	16'	34'	D	125'*		
		D	118'*	18'	16'	34'	D	118'*		
1600 1700 1800 1900	Use End-Fed Wire		D	110'*	18'	16'	34'	D	110'*	16'
		D	103'*	18'	16'	34'	D	103'*		
		D or E	87'-97'*	18'	16'	34'	D or E	87'-97'*		
		D or E	87'-93'*	18'	16'	34'	D or E	87'-93'*		
2000 2200 2400 2600 2800	A	210'	E	84'*	18'	16'	34'	E	84'*	16'
	A	204'	E	78'*	18'	16'	34'	E	78'*	
	A	187'	E	72'*	18'	16'	34'	E	72'*	
	A	173'	E	66'*	18'	16'	34'	E	66'*	
	A	162'	E	62'*	18'	16'	34'	E	62'*	
3000 3300 3600 4000 4300 4600	A	148'	D	195'	18'	16'	34'	E	56'*	16'
	A	135'	D	180'	18'	16'	34'	E	51'*	
	A	123'	D	162'	18'	16'	34'	E	46'*	
	A	112'	D	151'	18'	16'	34'	E	43'*	
	A	106'	D	142'	18'	16'	34'	E	40'*	
	B	95'	D	130'	18'	16'	34'	E	38'*	
5000 5500 6000 6500 7000	B	88'	D	118'	18'	16'	34'	Use Vertical Rod	16'	
	B	81'	D	107'	18'	12'	30'			
	B	74'	D	99'	18'	12'	30'			
	B	69'	D or E	87'-93'	18'	8'	26'			
	B	64'	E	85'	18'	4'	22'			
7500 8000 8500 9000	B	60'	E	79'	12'	4'	16'	Use Vertical Rod	12'	
	B	56'	E	72'	12'	4'	16'			
	B or C	53'	E	66'	12'	—	12'			
	B or C	50'	E	61'	12'	—	12'			
9500 10,000 11,000	B or C	48'	E	56'	6'	4'	10'	Use Vertical Rod	8'	
	C	44'	E	48'	6'	—	6'			
	C	41'	E-	42'	6'	—	6'			
12,000 13,000 14,000 15,000 16,000	C	38'	Use Dipole or Vertical Rod		18'	16'	34'	Use Vertical Rod	16'	
	C	35'			18'	12'	30'			
	C	32'			18'	8'	26'			
	C	30'			18'	4'	22'			
	C	28'			12'	4'	16'			

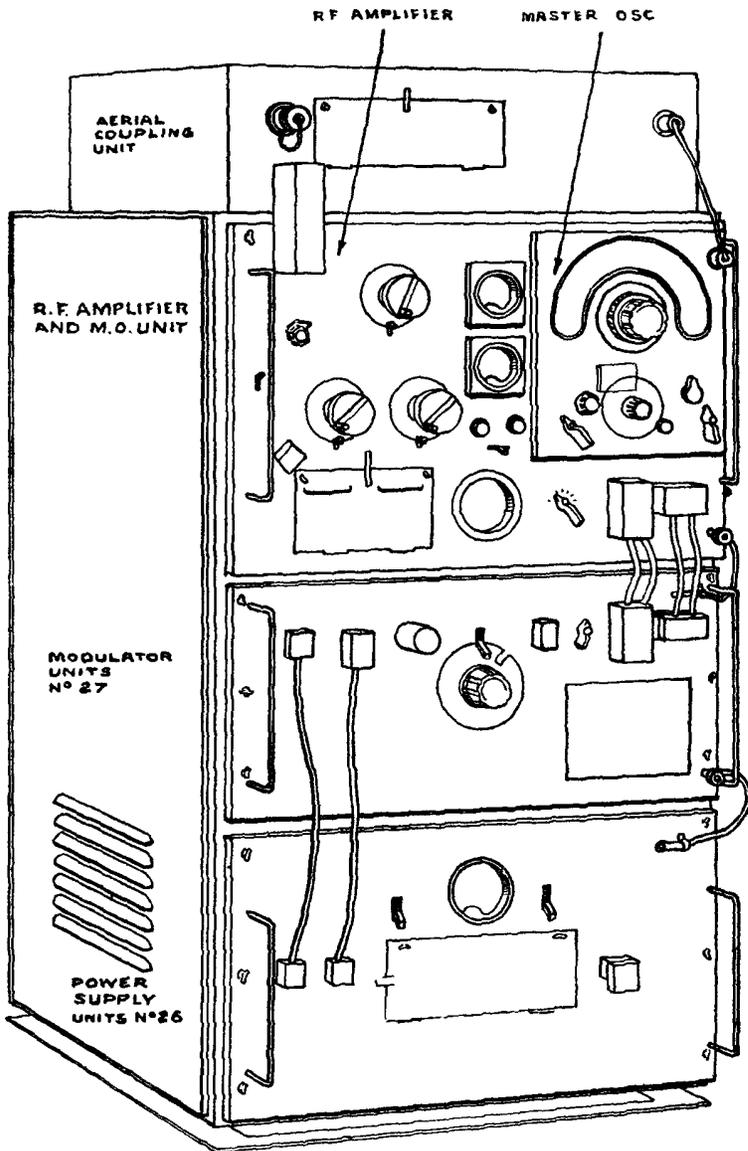
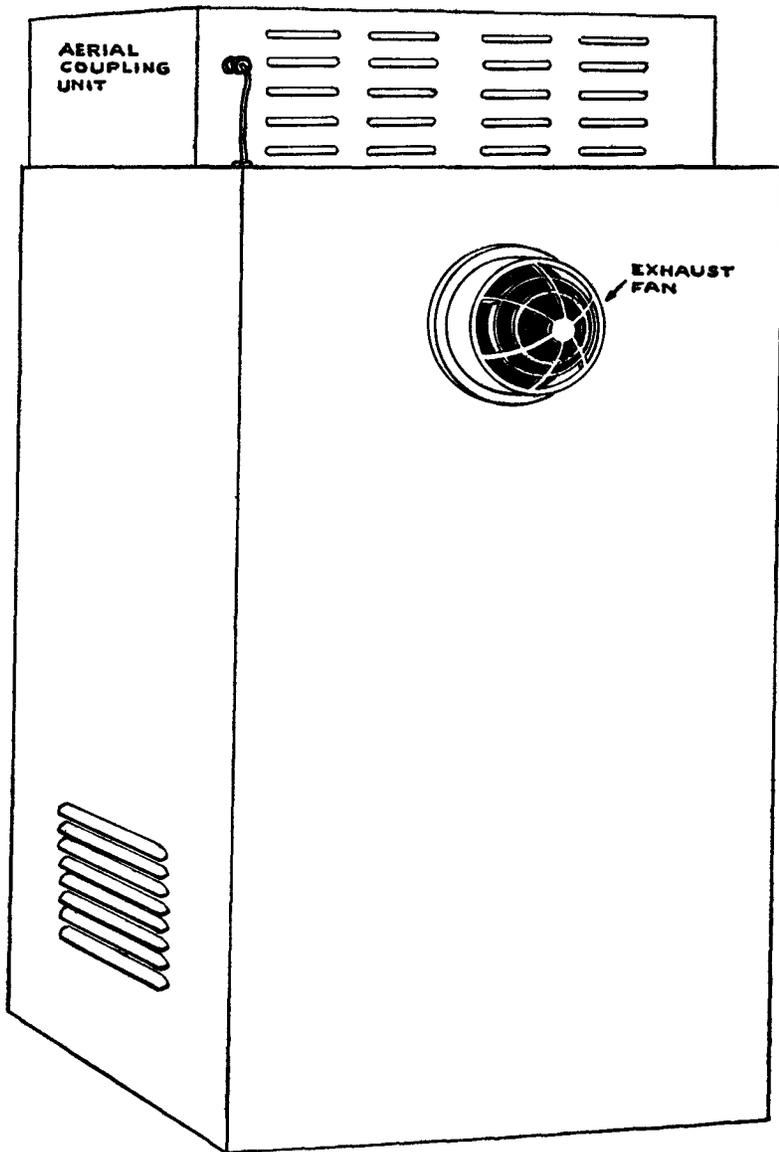


FIG. 1—WIRELESS SENDER No. 53 MOUNTED IN RACKS MOUNTING No. 12. FRONT VIEW.



**FIG. 2—WIRELESS SENDER No. 53 MOUNTED IN RACKS
REAR MOUNTING No. 12. REAR VIEW.**

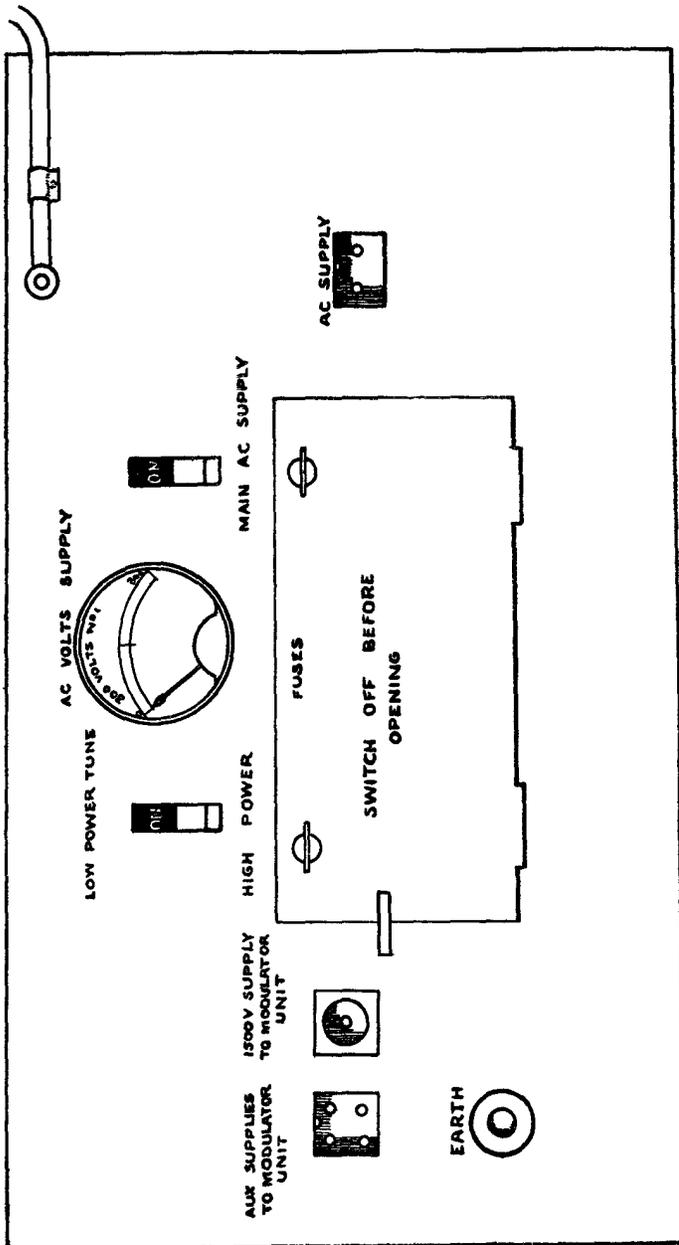


FIG. 3—POWER SUPPLY UNIT No. 26.
FRONT PANEL.

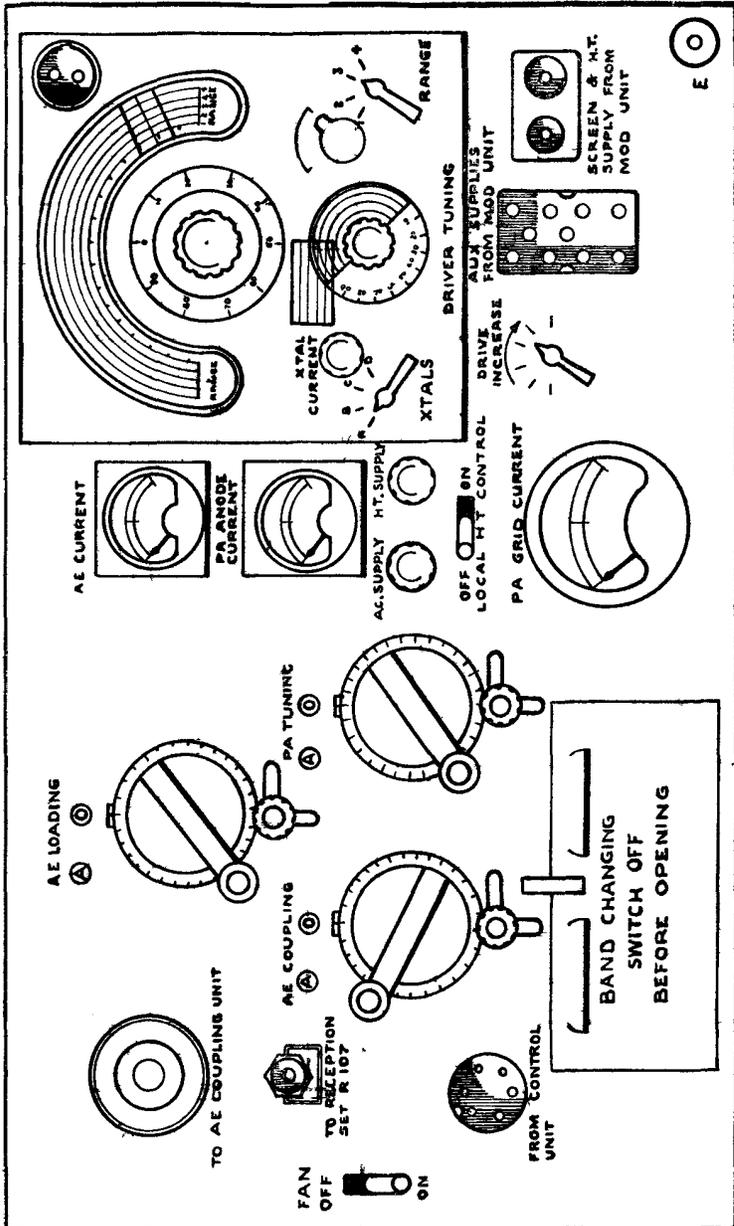


FIG. 5—R.F. AMPLIFIER AND M.O. UNIT No. 2.
FRONT PANELS.

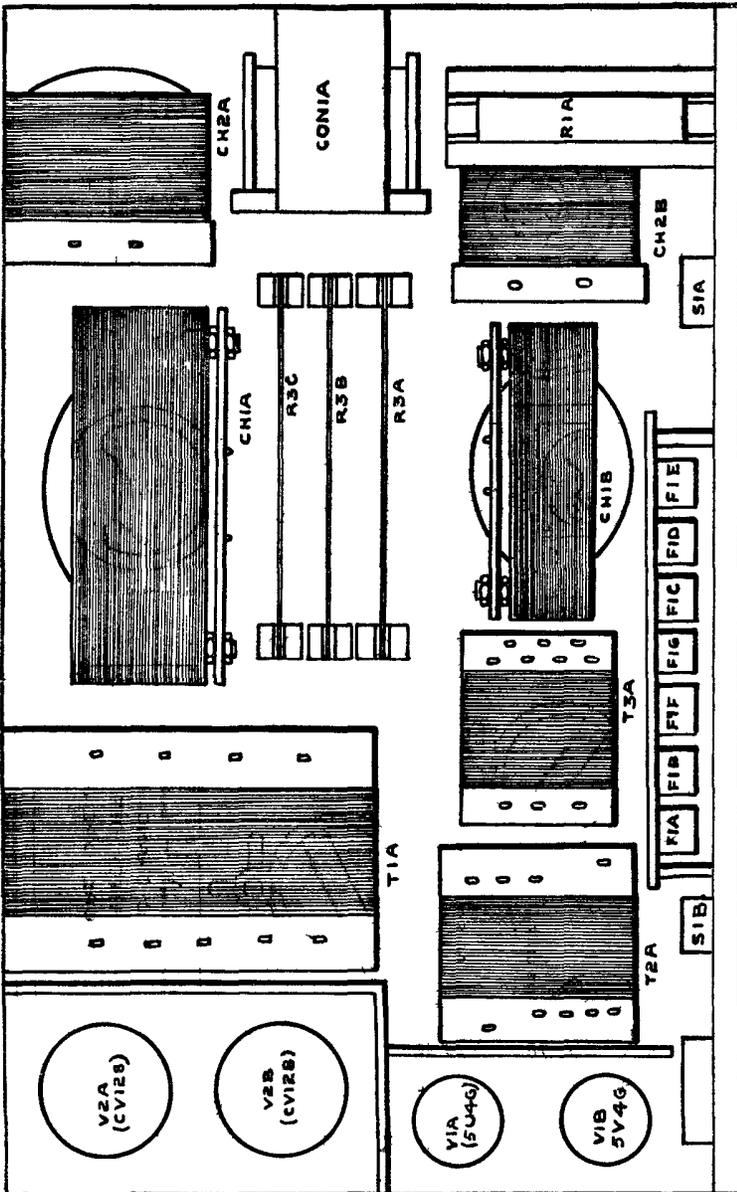


FIG. 6—POWER SUPPLY UNIT No. 26.
PLAN VIEW.

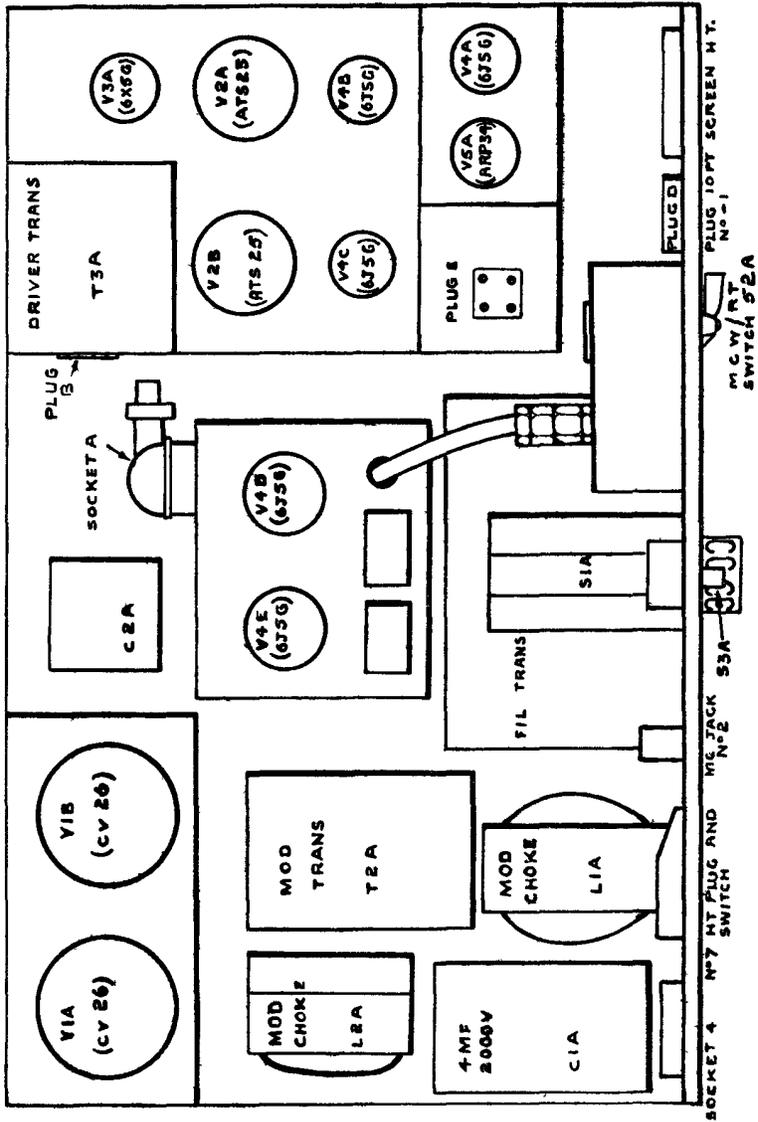
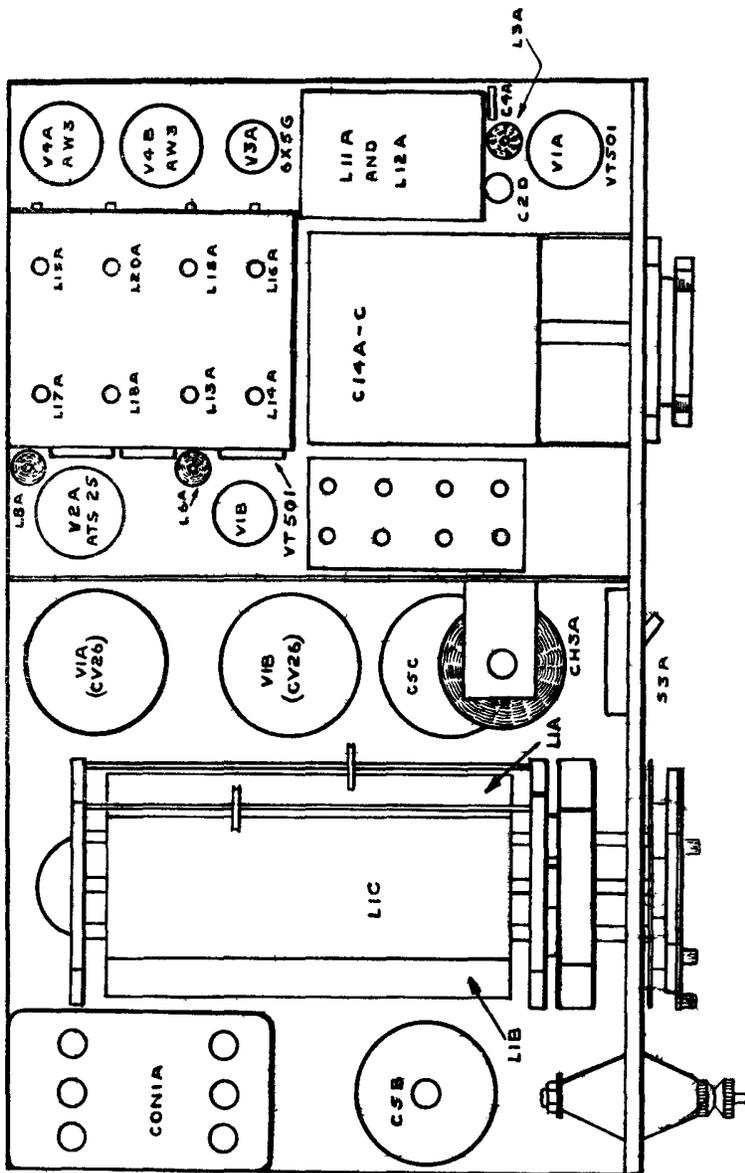


FIG. 7- MODULATOR UNIT No. 27.
PLAN VIEW.



**FIG. 8—R.F. AMPLIFIER AND MASTER OSCILLATOR.
PLAN VIEW.**

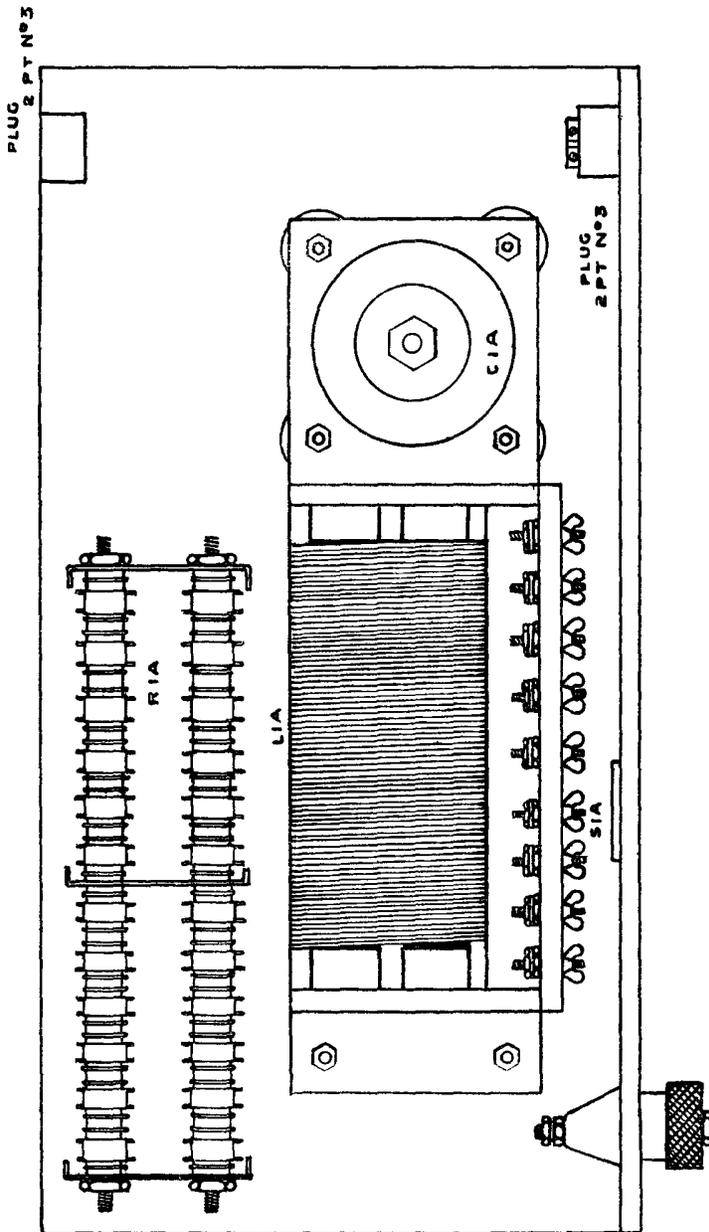


FIG. 9—AERIAL COUPLING UNIT No. 2a.
TOP PLAN VIEW.

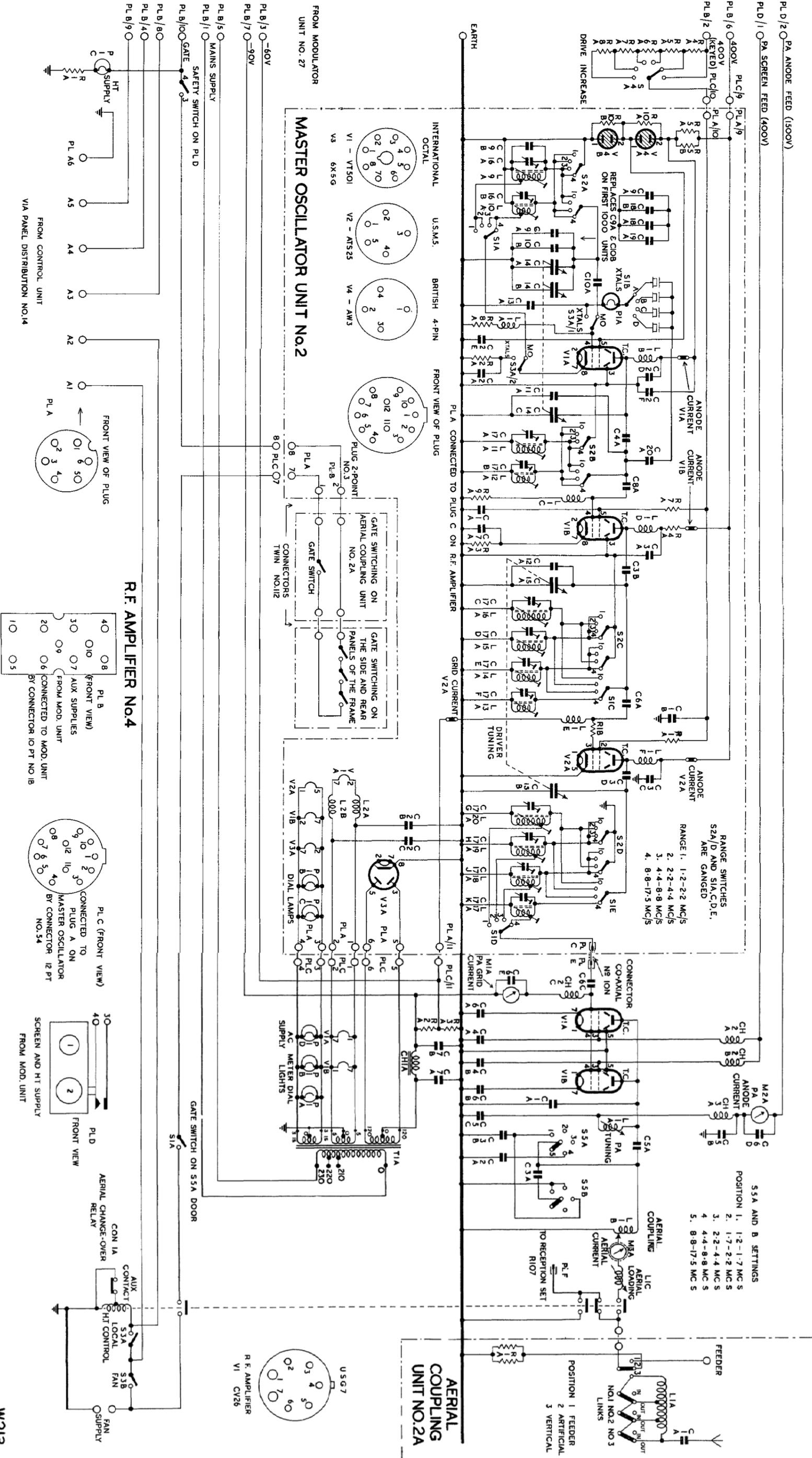


FIG. 11 - WIRELESS SENDER NO. 53

MCS 8/DO/5329
 APPROVED
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