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**WIRELESS SET No. 38**  
**A.F.V.**

*Working Instructions*

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# WIRELESS SET No. 38 A.F.V.

## *Working Instructions*

### CHAPTER I

#### 1. Purpose of Set.

The equipment is designed for installation in Armoured Fighting Vehicles for communication with infantry equipped with No. 38 sets. It is fitted in addition to the Wireless Set No. 19 and is operated by the same Microphone and Headgear. Special Control Units, with extra switch positions, are fitted instead of the normal Control Units No. 1 and No. 2.

#### 2. Description

The Wireless Set No. 38 A.F.V. is similar to the Wireless Set No. 38, in general make up and frequency range. It has a Receive-Send relay in place of the OFF-RECEIVE-SEND switch, and a 12-point plug in place of the 6-point plug.

The Power Supply and L.F. Amplifier Unit No. 1 draws power from the 12 volt battery supplying the 19 set, and gives the necessary H.T. and L.T. supplies to the set. In addition, it contains an L.F. Amplifier, and volume control, to make the received signal loud enough to be heard in a vehicle.

The Control Unit No. 16 replaces the Control Unit No. 2 Mk. II of the 19 set installations.

The Control Unit No. 17 replaces the Control Unit No. 1 of the 19 set installation.

Fig. 1 shows the arrangement of units of the 38 A.F.V. set and the 19 set.

#### 3. Frequency Range

7.3 to 9.0 mc/s.

#### 4. Working Range

$\frac{1}{2}$  mile to 2 miles, depending on terrain and on number of aerial sections used.

#### 5. Weights and Dimensions

	<i>L</i>	<i>B</i>	<i>H</i>	<i>Weight</i>
Wireless Set No. 38 A.F.V.	10 $\frac{1}{2}$ in.	4 in.	6 $\frac{1}{2}$ in.	6 $\frac{1}{2}$ lbs.
Power Supply and L.F. Amplifier Unit No. 1 }	11 $\frac{1}{2}$ in.	4 in.	6 in.	8 lbs.
Control Unit No. 16 } Control Unit No. 17 }	As for C.U. No. 1 and No. 2.			

#### 6. Power Consumption

12 volts 1.5 amps.

## CHAPTER II

### 7. Setting up the Apparatus

- (1) Fit one or two mast sections in the aerial base.
- (2) Plug aerial lead into aerial socket. See IMPORTANT NOTE on "Aerial Matching".
- (3) Plug a headset into the drop lead on Control Unit No. 16, and turn the switch S2 to "38".
- (4) Set the switch on the Power Supply Unit to "ON". The lamp should light. Turn the GAIN knob fully clockwise. Signals should be heard in the operators headset.
- (5) Loosen the locking screw on the dial and adjust to the ordered frequency.

### 8. Netting

(1) **General** :—Sets may be used one-to-one or in a group of several. One is always "control", the remainder being "outstations". All stations in one group or "net" must have their sets tuned to exactly the same frequency, which cannot be done with complete accuracy merely by setting the dials to a given figure. There are two methods of setting up a net. Method 1 is used when outstations are dispersed some distance away from control. This should be the case whenever possible, as a more accurate net is achieved. Method 2 is used for netting when outstations are within a few yards of control.

#### (2) Method 1.

##### CONTROL

- (a) Set TUNING MC/S dial to allotted frequency and lock.
- (b) At a pre-arranged time press pressel switch and send tuning call for one minute. This allows time for the outstations to identify you and tune their sets accurately. Then announce end of call : "Tuning call ends".
- (c) Ask for report of signals from group.

##### OUTSTATIONS

- (a) Set TUNING MC/S dial to ordered frequency.
- (b) At the pre-arranged time, release the pressel switch and rock dial carefully and persistently until signal from control is picked up. Then set for maximum strength as accurately as possible and carefully note dial setting.
- (c) Lock while tuning call is still being given. This may alter the tuning dial slightly. If it does, readjust without unlocking.
- (d) Await call from control to check net.

**(3) Method 2.**

**CONTROL** :—As in Method 1.

**OUTSTATIONS** :—As in Method 1, except that during tuning call, aerial is removed. This makes a more accurate setting possible. As soon as dial is locked and set for maximum strength, replace aerial and await call from control to check net.

Control may also remove aerial to receive the reports of signals, as a further measure to ensure accuracy.

**(4) Notes**

- (a) If sets differ in performance the best set should be allotted to control.
- (b) Never overtighten the dial lock.

**9. Use of Control Units**

It is assumed that the 19 set has been switched on and that the A and B sets have been netted.

**(1) Operator.** The operator's headset is plugged into the drop lead on Control Unit No. 16. He can switch to A, IC, B or 38 by means of the switch S2. (see Fig. 1) and work the corresponding set. Switch S3 and the R positions of S2, are only used for *retransmission*, which is described below.

**(2) Commander.** The Commander's headset is plugged into the left hand drop lead of Control Unit No. 17. He can switch to A, IC, B or 38 by means of switch S1.

**(3) Gunner.** The Gunner's headset is plugged into the right hand drop lead of Control Unit No. 17. His headset is permanently connected to the inter-com. He cannot speak on any radio set, but under certain conditions he hears the received signal. (See para. 9 (5) below).

**(4) Driver.** The arrangement for the driver's headset are the same as on the normal 19 set, and the buzzer alarm works as on the normal installation.

**(5) Feed Through.** The arrangements for ensuring that the sets are not left unattended are as follows :—

**" A " set.** If neither S1 nor S2 is at " A ", then the A set is heard at a reduced level by anyone on the inter-com. If neither S1 nor S2 is at " IC " or " A " the red lamp lights, and the " A " set is heard only by the gunner and the driver.

**" B " set** If neither S1 nor S2 is at " B ", then the B set is heard at reduced level by anyone on the inter-com. (these arrangements are the same as on the normal 19 set).

**" 38 " set** If neither S1 nor S2 is at " 38 ", then the 38 set is heard by the operator, at full strength, if he is on IC. If he is not, it is heard by the commander if *he* is on IC. If neither is on IC, it is heard by the gunner, but not by the driver. Note that in each case it is heard, at full strength, by one person only.

**NOTE :** When the 38 set and the IC are heard simultaneously by any man this is arranged by switching his phones to the 38 set output and switching the IC output to the IC terminal of the 38 A.F.V. set. The IC is then superimposed on the 38 set output. When the 38 set is switched off, the IC terminal is connected straight through to the output terminal.

**(6) Retransmission and Simultaneous Operation**

Condition	Switch Positions	
	S2	S3
Retransmission of :— 19A set by 19B set	R	A—B
19B set by 19A set	R	B—A
Simultaneous operation :— of 19A set and 19B set	R	A & B
Retransmission of :— 19A set by 38 set	R	38—A
38 set by 19 set	R	A—38
Simultaneous Operation :— 19A and 38 set	R	A & 38

Always set S3 *before* moving S2 to the “ R ” position. If you do not you may come on the air without meaning to.

When S2 is turned to the R position the Red lamp lights, thus reducing the chance of sets being left on the air by accidental faulty switch operation.

**10. Standing By.**

The following schemes, which may be varied according to the urgency of the messages expected, will show the capabilities of the system.

**Scheme 1.** Operator (S2) switched to B, Commander (S1) to IC. Operator listens on B net, and switches to IC to report anything of importance to the commander.

Commander listens on A and 38 sets. If he hears a call on the 38 net, he switches to “ 38 ” to reply and the red lamp lights. The operator can then switch to “ IC ” and listen on the A and the B nets.

If commander hears a call on the A set, he switches to “ A ” to reply and the 38 set is heard by the gunner.

**Scheme 2.** Operator (S2) switched to IC, commander (S1) to A.

Operator listens on B and 38 nets. He can speak on IC and tell driver to buzz to commander who would then come on the inter-com.

Commander listens on A net and can reply at once.

**Scheme 3.** Operator (S2) and commander (S1) both switched to IC. Operator listens on all three nets and can speak to commander telling him to switch to a set and reply, or can switch to a set and reply himself. The commander will hear A and B but not 38.

**11. Remote Control**

Junction Remote Control No. 1 (set unit) and Junction Remote Control No. 2 (remote unit) can be used for controlling the 38 set in the same way as for controlling the 19A and B sets.



## CHAPTER III

### DAILY MAINTENANCE

The normal daily maintenance on the 19 set should first be carried out.

#### 12. Power Supply

Set the switch on the power supply unit to ON. The White lamp should light. If it does not, check L.T. leads and bulb.

#### 13. Receiver

Listen on the operator's headset and switch to "38". Vary the GAIN and note that "mush" is heard on the phones, loudest when knob is fully clockwise. If nothing is heard, try :—

- (a) Using another headset
- (b) Using headset on Commander's position.
- (c) Check that all connectors are firmly in place, including aerial lead and pigtail.

If still nothing is heard, report.

#### 14. Sender

Do NOT test during WIRELESS SILENCE

Press the pressel switch. The aerial relay on the set should click over (listen to it). Whistle into the microphone—whistle should be heard in phones.

For the remaining tests, switch on the 19 set and turn all GAIN knobs fully anti-clockwise. To test whether a set can be heard, turn the GAIN of that set up, and listen for the mush. To test whether IC can be heard, press the pressel switch and whistle into the microphone—whistle should be heard in phones.

#### 15. Control Unit No. 16. (Operator's)

Listen on the operator's headset.

Set the switch S2 to "A", "IC," "B" and "38" in turn, and check that each can be heard.

The following test must NOT be made during WIRELESS SILENCE : Set the switch S2 to A. Press the pressel switch—AVC current falls to zero. Whistle into microphone—whistle is heard in phones.

Put S2 to B. Press the pressel switch—relay clicks in 19 set. Whistle into microphone—whistle is heard in phones. Switch OFF—ON B switch to OFF—whistling is no longer heard.

Put S2 to 38. Press the pressel switch—relay clicks in 38 set. Whistle into microphone—whistle is heard in phones. Switch OFF Power Supply and L.F. Amp. unit—whistling is no longer heard.

#### 16. Control Unit No. 17 (Commander's)

Listen on the Commander's headset (left hand drop lead). Repeat tests as in para. 5, using the switch S1.

#### 17. Feed Through

Set the switches as shown in the table and listen in each headset in turn. Be careful to test inter-com *only* when switch is in the IC position ; otherwise you may come on the air without meaning to.

CHAPTER III—Section 17.

Set switches (Fig. 1)			Heard on Commander's Headset.	Heard on Gunner's Headset.	Heard on Operator's Headset.
S1	S2	S3			
IC	A	—	IC B 38	IC	A
IC	IC	—	A & B IC	A & B IC	A & B 38 IC
IC	B	—	IC A 38	IC A	B
IC	38	—	IC A & B	IC A & B	38
A	IC	—	A	IC B	B 38 IC
B	IC	—	B	IC A	A 38 IC
38	IC	—	38	IC A & B	A & B IC
B	A	—	B	IC 38	A
A	B	—	A	38	B
A	R	A & B	A & B	IC 38	A & B
IC	R	A & B	IC 38	IC	A & B
38	R	A & B	38	IC	A & B
A	R	A & 38	A & 38	IC B	A & 38
IC	R	A & 38	IC B	IC B	A & 38
38	R	A & 38.	A & 38	IC B	A & 38
38	38	—	—	Lamp lights	
Any	R	—	—	Lamp lights	

**18. Retransmission**

This test must not be carried out during wireless silence.

Switch on all sets and turn all GAIN knobs fully anti-clockwise. To test whether a set is heard, turn the GAIN of that set up, and listen for the "mush".

Set the switches S2 and S3 as in the table and listen in the operator's headset :—

S2	S3	Result
R	B—A	A set goes to " Send " (AVC current zero) B set heard (via A set side tone).
R	A & B	A and B sets heard A and B sets go to send when pressel is pressed.
R	A—B	B set goes to send A set is heard (via B set side tone).
R	38—A	A set goes to " Send " (AVC current to zero) 38 set heard (via A set side tone).
R	A & 38	A and 38 sets heard A and 38 sets go to " send " when pressel is pressed (listen for relay click on 38 set).
R	A—38	38 set goes to " send ". A set is heard (via 38 side tone).

**IMPORTANT NOTE**

**Aerial Matching.** When setting up the apparatus in a vehicle for the first time, OR after making any change in the length of the aerial, it is essential to see that the aerial and the set are correctly matched. To check this, adopt the following procedure :—

- (a) Unplug " A " Set-aerial.
- (b) Adjust " A " set to 8 Mc/s.
- (c) Turn " A " Set meter to " A.V.C."
- (d) Adjust No. 38 set to 8 Mc/s and switch to SEND
- (e) Tune in 38 Set on the " A " set for maximum signal which will be shown on the meter.
- (f) Adjust *A/E TRIMMER* on No. 38 Set (See Fig. 1) for minimum reading on the " A " Set meter.

This procedure must be repeated whenever a different length of aerial is used, but not when the frequency is altered.

# APPENDIX 1.

## LIST OF MAIN COMPONENTS

Code	Value	Tol.	DC. Wkg. V	Type
<b>CONDENSERS</b>				
C1	5-50 pF			Air
C2	.01 uF	20%		M.M.
C3	15 pF	10%		P.S.M.
C4	5-35 pF			Gang
C5	100 pF	10%		P.S.M.
C6	4.7 pF	10%		Ceramic
C7	180 pF	10%		P.S.M.
C8	.01 uF	25%	350	Tube
C9	.01 uF	25%	350	Tube
C10	3-25 pF			Air
C11	5-50 pF			Gang
C12	180 pF	10%		P.S.M.
C13	100 pF	10%		P.S.M.
C14	47 pF	10%		P.S.M.
C15	47 pF	10%		P.S.M.
C16	.01 uF	25%	350	Tube
C17	39 pF	10%		P.S.M.
C18	15 pF	10%		Ceramic
C19	3-25 pF			Air
C20	5-50 pF			Gang
C21	680 pF	10%		P.S.M.
C22	18 pF	10%		P.S.M.
C23	3-30 pF			Philips
C24	47 pF	10%		P.S.M.
C25	180 pF	10%		P.S.M.
C26	180 pF	10%		P.S.M.
C27	.01 uF	25%	350	Tube
C28	180 pF	10%		P.S.M.
C29	.1 uF	25%		Tube
C30	100 pF	10%		P.S.M.
C31	100 pF	10%		P.S.M.
C32	.1 uF	25%	350	Tube
C33	4 uF		200	Elect.
C34	50 uF		12	Elect.
C35	.1 uF	25%	350	Tube
C36	.1 uF	25%	350	Tube
C37	.1 uF	25%	350	Tube
C38	.1 uF	25%	350	Tube
C39	.1 uF	25%	350	Tube
C40	.1 uF	25%	350	Tube
C41	.1 uF	25%	350	Tube
C42	.1 uF	25%	350	Tube
C43	.1 uF	25%	350	Tube
C44	4 uF		200	Elect.
C45	50 uF		12	Elect.
C46	.1 uF	25%	350	Tube
C47	.001 uF	25%	350	Tube

**List of Main Components—continued**

Code	Value	Tol.	D.C. Wkg. V.	Type
<b>RESISTORS</b>				
			<b>Rating</b>	
R 1	470 ohms	20%	$\frac{1}{2}$ W	Y9
R2	1.0 M ohms	20%	$\frac{1}{2}$ W	Y9
R3	190 ohms	2%	$\frac{1}{2}$ W	WW
R4	0.15 M ohms	20%	$\frac{1}{2}$ W	Y9
R5	1.0 M ohms	20%	$\frac{1}{2}$ W	Y9
R6	0.15 M ohms	20%	$\frac{1}{2}$ W	Y9
R7	0.1 M ohms	20%	$\frac{1}{2}$ W	Y9
R8	47 K ohms	20%	$\frac{1}{2}$ W	Y9
R 9	190 ohms	2%	$\frac{1}{2}$ W	WW
R10	0.47 M ohms	20%	$\frac{1}{2}$ W	Y9
R11	190 ohms	2%	$\frac{1}{2}$ W	WW
R12	0.15 M ohms	20%	$\frac{1}{2}$ W	Y9
R13	33 K ohms	20%	$\frac{1}{2}$ W	Y9
R14	190 ohms	2%	$\frac{1}{2}$ W	WW
R15	47 K ohms	20%	$\frac{1}{2}$ W	Y9
R16	47 K ohms	20%	$\frac{1}{2}$ W	Y9
R17	1.0 M ohms	20%	$\frac{1}{2}$ W	Y9
R18	0.22 M ohms	20%	$\frac{1}{2}$ W	Y9
R19	0.22 M ohms	20%	$\frac{1}{2}$ W	Y9
R20	47 K ohms	20%	$\frac{1}{2}$ W	Y9
R21	390 ohms	10%	$\frac{1}{2}$ W	Y9
R22	47 K ohms	20%	$\frac{1}{2}$ W	Y9
R23	1.0 M ohms			Log
R24	470 ohms	20%	$\frac{1}{2}$ W	Y8
R25	470 ohms	20%	$\frac{1}{2}$ W	Y8
R26	24 ohms	2%	$\frac{3}{4}$ W	WW
R27	33 K ohms	20%	$\frac{1}{2}$ W	Y9
R28	150 ohms	10%	$\frac{1}{2}$ W	Y8

Code	Value	Tol.	Rating	Type
<b>VALVES</b>				
Code	Description	Type		
V 1	Power Amp.	ATP 4		
V 2	R.F. Amp	ARP 12		
V 3	OSC	ARP 12		
V 4	Mixer	ARP 12		
V 5	IF & LF Amp	ARP 12		
V 6	LF Amp.	ATP 4		

**List of Main Components—continued**

Code	Description	Value
<b>INDUCTANCES</b>		
L 1	Aerial	6.3 uH
L 2	R.F. Anode	4 uH
L 3	P.A. R.F.C.	100 uH
L 4	Osc.	14 uH
L 5	Shunt	9 uH
L 6	1st IF Prim	5 mH
L 7	1st IF Sec.	5 mH
L 8	2nd IF Prim	5 mH
L 9	Coupling	21 uH
L10	2nd IF Sec.	1.7mH
L11	Vib. R.F.C.	11 uH
L12	Viv. R.F.C.	11 uH
L13	Vib. R.F.C.	11 uH
L14	L.T. L.F.C.	6 mH
L15	H.T. L.F.C.	5 H
T 1	Mic. Prim.	80 mH
T 1	Mic. Sec.	80 H
T 2	I.C. Prim.	.9 H
T 2	I.C. Sec.	.2 H
T 3	Power Prim.	130 mH
T 3	Power Sec.	7 H
T 4	O.P.T. Prim.	2.5 H
T 4	O.P.T. Sec.	58 uH
<b>MISCELLANEOUS</b>		
A 1-7	Relay Contacts	
A/7	Relay Winding	
B 1	Pilot Lamp	6V,06A
F 1	Fuse	2A
S 1	ON/OFF I.C.	Spot
V 1B	Vibrator	12 V
W 1	Limiter	WX6
W 2	2nd Det.	WX6
W 3	Power Rect.	







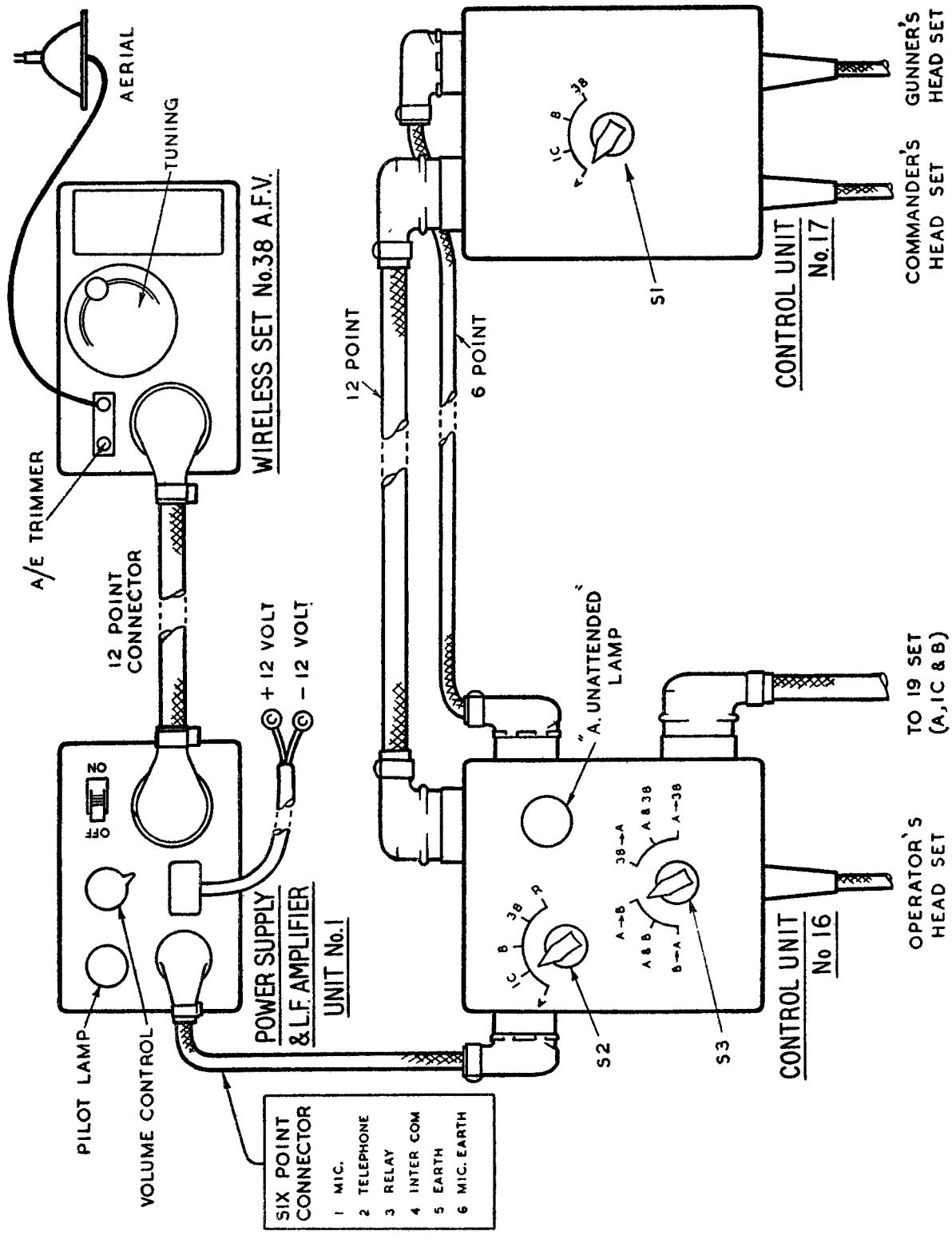


Fig. 1. Arrangement of Units of Wireless Sets No. 19 and No. 38 A.F.V.



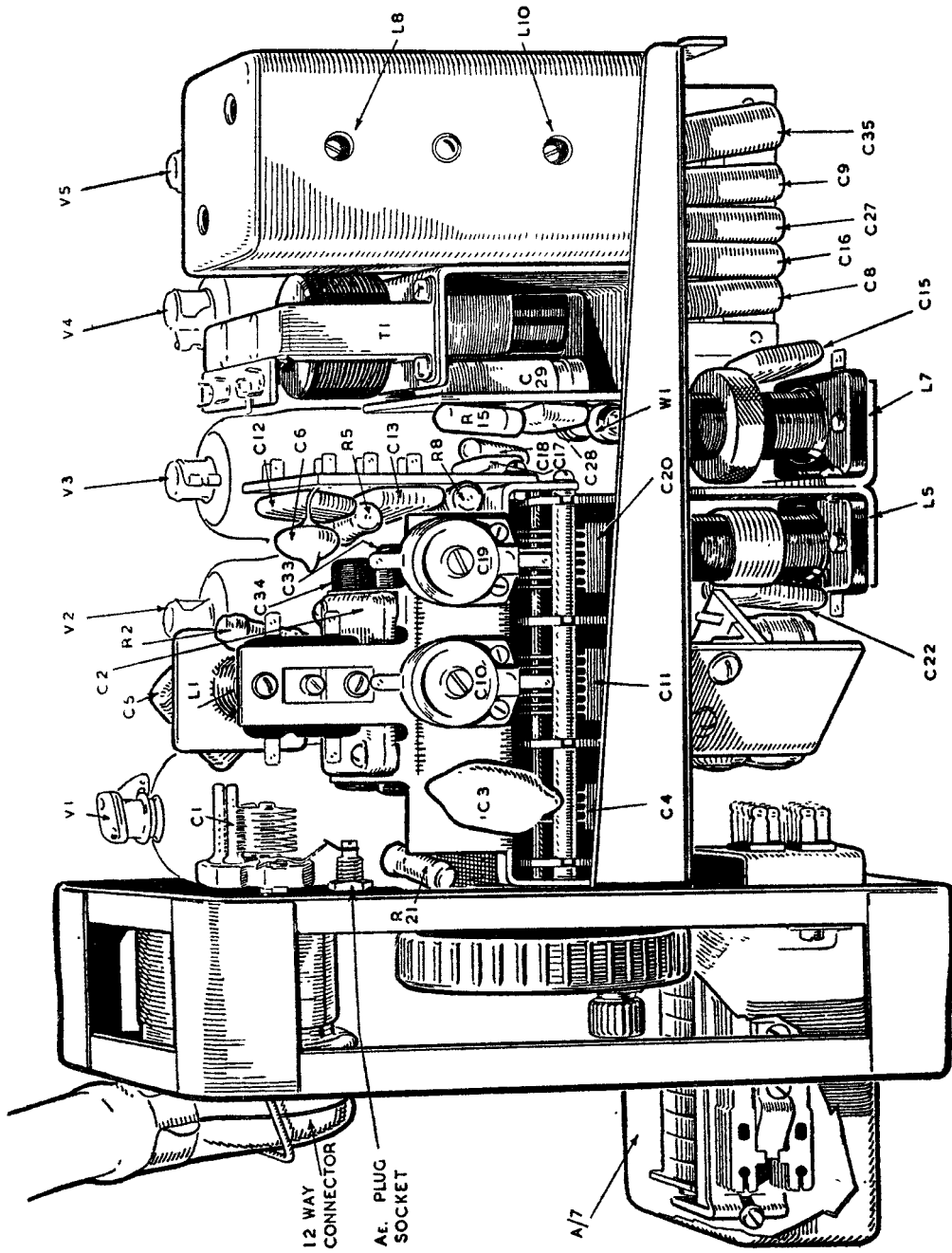


Fig. 2. Wireless Set No. 38 A.F.V. Component Layout. (Side View.)



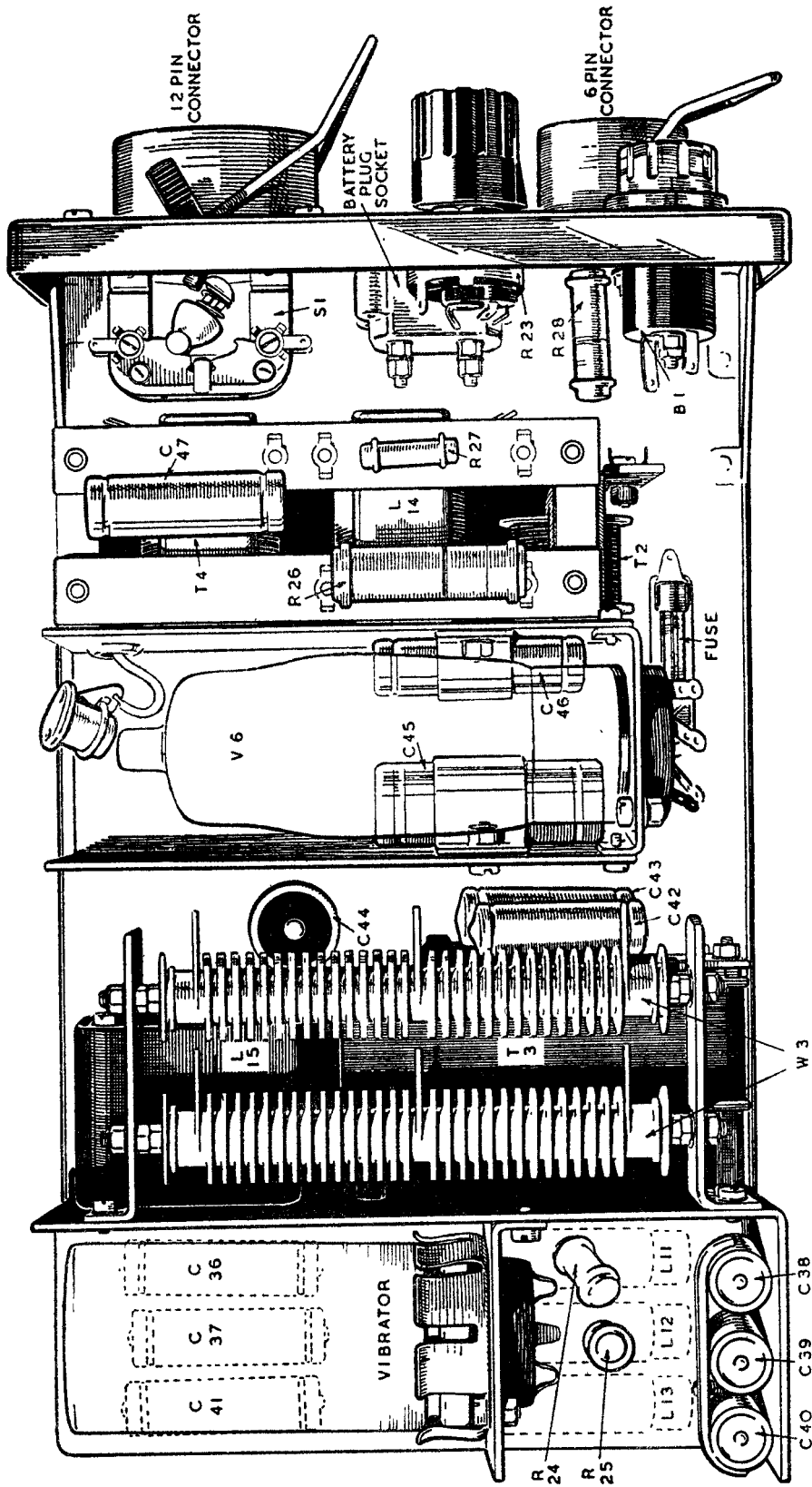


Fig. 3. Power Supply and L.F. Amplifier Unit No. 1. (Component Layout.)



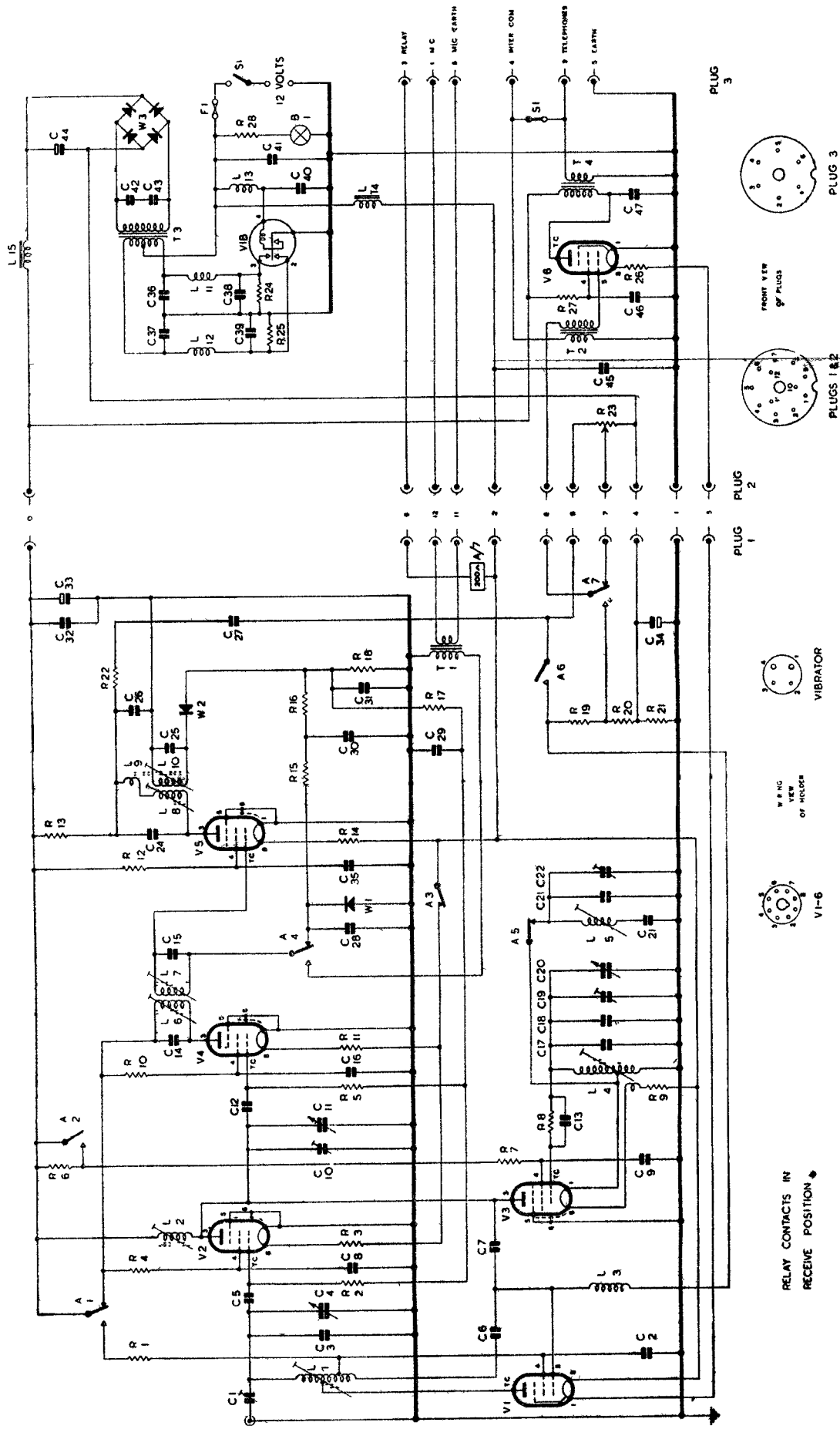


Fig. 4. Circuit Diagram for WS 38 A.F.V.





CONTROL UNIT No. 16.

CONTROL UNIT No 17

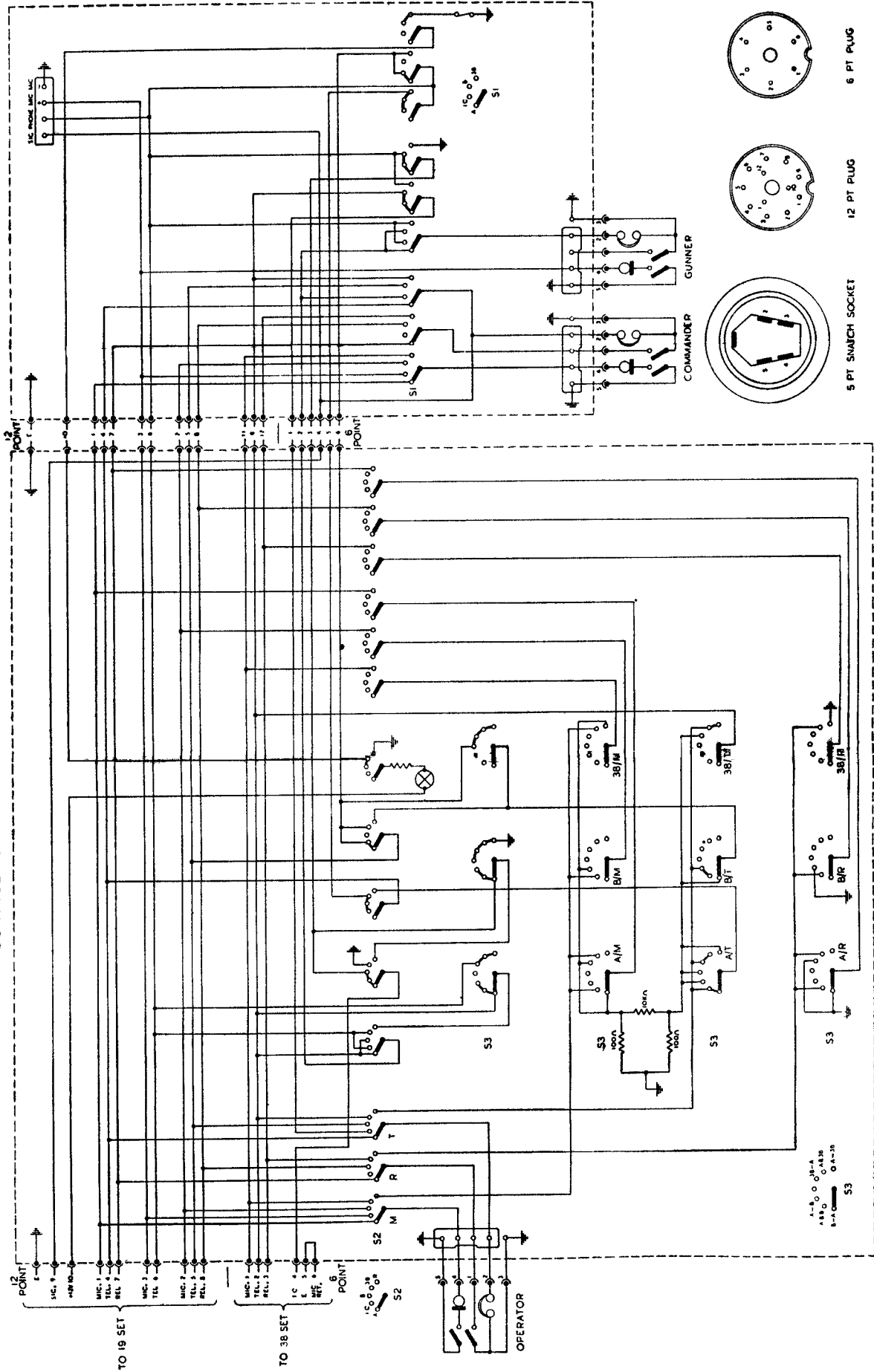


Fig. 5. W.S. 38 A.F.V. Control Units No. 16 and 17. Circuit Diagrams.