DESCRIPTION & OPERATING INSTRUCTIONS.

S-PHONE - TYPE 13/MK IV

EQUIPMENT:

1. 1 S-Phone.

2. 1 Battery Belt with Nickel-Cadmium cells (1.2 volt each) in protective sheaths, a vibrator pack H.T. generator, charging and power sockets.

3. 2 Folding Aerials (one spare)

4. 1 Headset consisting of microphone, earphones and connecting plug.

5. 1 Battery Charging Unit.

6. 1 Aerial Power Indicator.

7. 10 Battery Vents (in sample bag) to replace solid stoppers.

8. 1 3BA Box Spanner in sample bag.

SIZE PACKED: 18" x 16" x 8" (including handle) WEIGHT: 28 lbs.

GENERAL:

The S-Phone is a midget, lightweight radio-telephone set, designed to provide speech communication between the operator and an aircraft or ship fitted with the complimentary equipment. The apparatus transmits and receives ultra-high frequency signals. The transmitter power is quite small, and is chiefly radiated in a direction inclined upwards from the ground. A considerable degree of security against interception and location of the transmitter is, therefore, inherent since it can only be received on the ground at quite short distances. Conditions are much more favourable for communicating with an aircraft or ship.

The apparatus, as provided, is complete and self-contained, and should have a long operating life as re-chargeable batteries and the means for re-charging them are included.

The operating time available from a fully-charged set of batteries is 4½ to 5 hours, either in one period, or in a series of short periods.

I. PREPARATION FOR SERVICE.

1. Inspect the battery belt and before attempting to use it, remove the solid stoppers from the 10 cells, and replace them by the vents provided with the equipment. Do not get electrolyte on the hands.

2. Inspect for any sign of spilled electrolyte. Clean and dry thoroughly the belt, wires and protective battery covers.

3. Ensure that all the battery terminals are tight by pulling the connections sideways. If there is any movement tighten the nuts.

4. Clean off any deposits which may be on the terminals.

5. Switch on the vibrator pack when a small vibration may be heard and felt on touching the pack. Switch off.

6. The S-Phone may have its plug inserted into the socket near the Tuning Control. Withdraw it and insert it into the socket hanging from the Vibrator Pack.

7. Unfold the aerial and plug it into the front of the set - See illustration.

8. Plug the headset jack into the S-Phone socket to be found near the Tuning Control.

9. Switch on again.

   Note: Never switch on unless the aerial is in place.

10. After about 40 seconds a loud rushing noise should be heard in the telephones.

11. Hold the Aerial Power Indicator on to the ends of the aerial, as illustrated. If the set is in order a glowing filament should be observed through the hole in the end. This may be brighter on one arm of the aerial than the other, but in bright sunshine it may be difficult to see

it at all. If uncertain, shade the indicator or repeat this test in less bright surroundings.
Note:- To test that the bulb inside the indicator is in order connect it across the terminals of one cell of the battery belt, when it should light.

12. Speak into the microphone, at the same time running the finger of one hand along the aerial, preferably the bottom half of the upright part. At one position of the finger the speech will be heard quite loudly in the telephone.

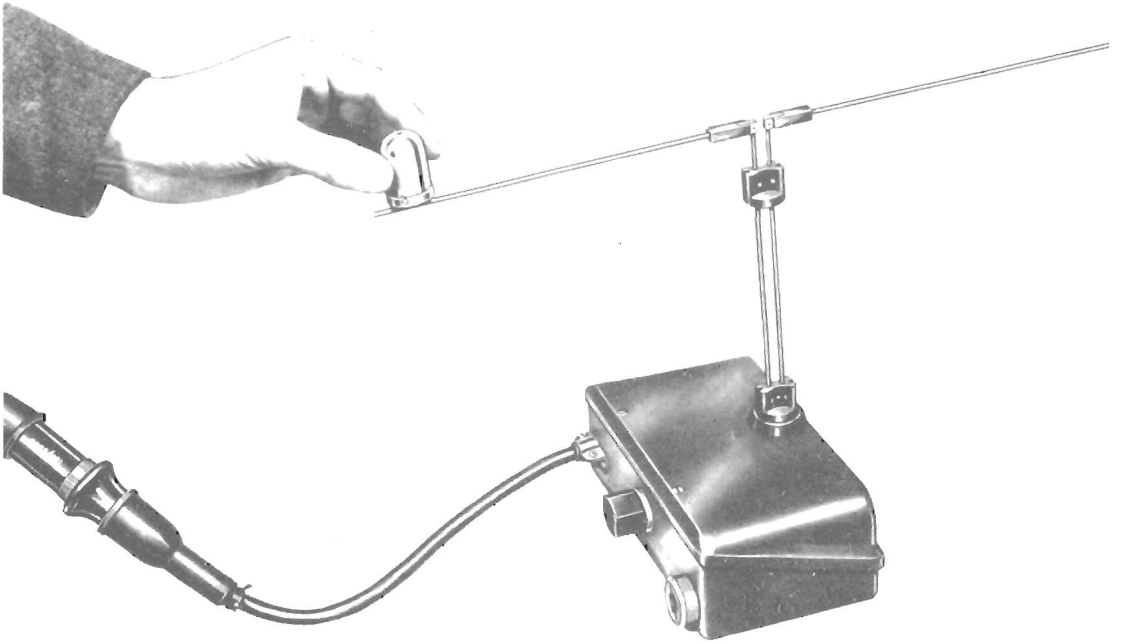
If this test is satisfactory everything is in order - Switch off.

II. WEARING THE S-PHONE.

1. Put the arms through the shoulder straps so that the webbing is crossed at the back; the straps rest comfortably on the shoulders and the belt of pouches can be drawn round the waist and buckled there.

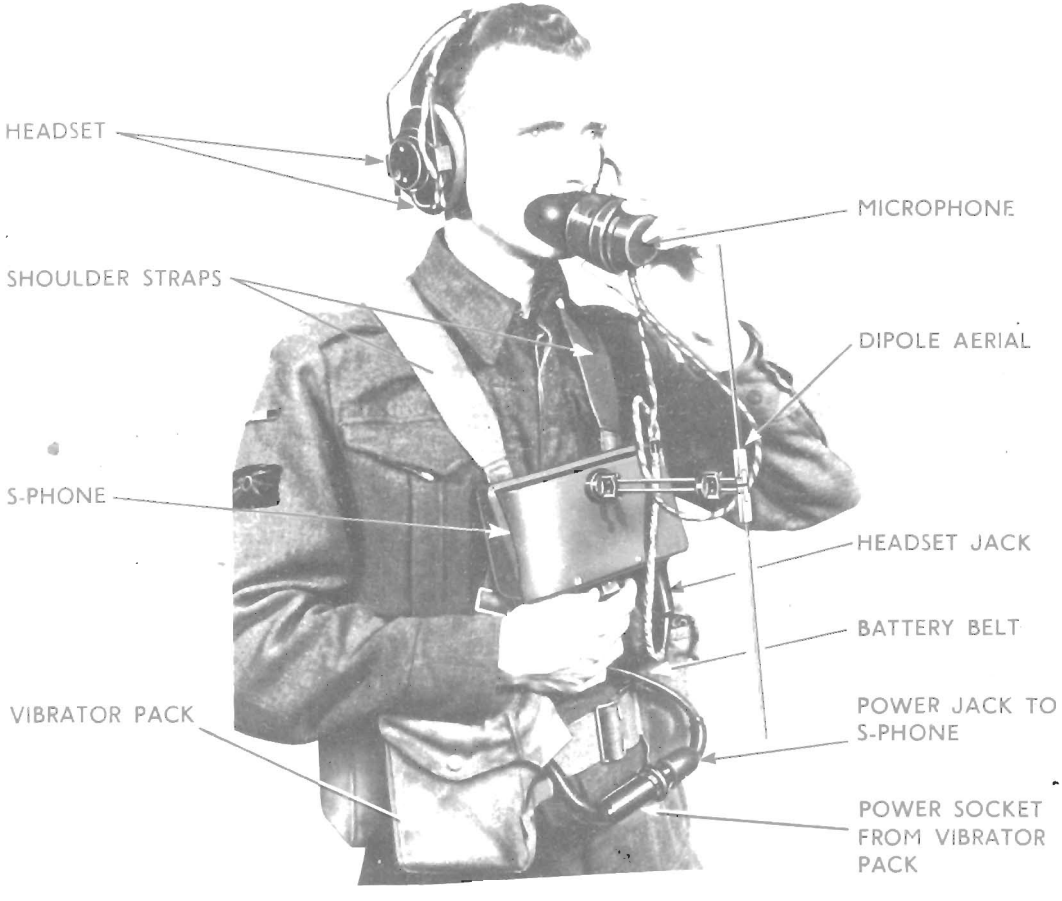
2. Clip the S-Phone on to the two rings on the front and adjust the harness to allow the S-Phone to be low on the chest.

3. Unfold the aerial and plug it into the front of the S-Phone. It should be vertical and approximately parallel to the operator's body.



FIG

FIG.2


HEADSET
MICROPHONE
SHOULDER STRAPS
DIPOLE AERIAL
S-PHONE
HEADSET JACK
BATTERY BELT
VIBRATOR PACK
POWER JACK TO S-PHONE
POWER SOCKET FROM VIBRATOR PACK

4. Put on the headset and plug the jack into the socket underneath the S-Phone. The satchel containing the headset may be clipped on to the battery in one of 3 places. (See illustration)

5. Plug the jack hanging from the S-Phone into the socket hanging from the right-hand side, or Vibrator Pack end of the belt.

6. When the Switch on the Vibrator Pack is set to "ON", after about 40 seconds operation may commence.

7. The set should be taken off in the following order:

(i) Switch off.
(ii) Take out headset plug and remove headset.
(iii) Remove S-Phone plug from the belt.
(iv) Take out the aerial.
(v) Take off the set.
(vi) Unbuckle and take off the belt.

It is advised that the operator should repeat the tests and the putting on and taking off of the equipment until it becomes automatic.

8. Re-charge the batteries (Section IVA)

Note 1: This set will not give any electric shocks, but hands and telephone leads MUST be kept CLEAR OF THE AERIAL, except when testing the transmitter.

Note 2: DO NOT SWITCH ON UNTIL EVERYTHING INCLUDING THE AERIAL IS IN PLACE.

III. WORKING THE S-PHONE IN THE FIELD

1. Before an operation, it is advisable to try out the set as described, and to ensure that the batteries are fully charged.

2. Put on the harness and S-Phone, and switch on. Remember:

(i) The Aerial must be completely clear to work properly.

(ii) The Aerial must be tightly in position and the jacks pushed well into their sockets.

THE HEADSET.

3. The ear-pieces should be moved along the rubber covered wire frame so that the weight is taken by the headband and the ear-pieces fit firmly over the ears, so excluding external noise.

4. The Microphone.

The microphone is designed to prevent the operator's speech being heard over any appreciable distance. On an extremely quiet night no sound should be heard more than 100 yards away. It also renders the operator's remarks relatively unintelligible to any bystander.

In order to achieve this it is necessary to hold the rubber mouthpiece firmly against the mouth, and before an operation it is desirable to practise speaking into the microphone until ease and confidence is obtained.

It will be found that moisture tends to accumulate in the container and this should be dried out occasionally, a small piece of rag being carried for this purpose.

The microphone also excludes external noise, - e.g. wind, battle or sea noises which with an ordinary microphone can seriously spoil speech quality.

In cases where there is no danger of being overheard and conditions are quiet the rubber mouthpiece may be removed and the microphone held half an inch from the lips.

It is generally more difficult for the operator in an aircraft to hear than for the ground operator, so remember to speak slowly and clearly and to give the agreed call sign. Do not shout but keep on giving the call sign until acknowledgement is heard and reported. When speaking hold up the head so that the carbon granules in the microphone are not displaced, an occasional shake will prevent the grains from packing.

TUNING

5. When calling, keep on turning the Tuning Control from one end of its traverse to the other, in order to receive the signals from the aircraft or ship. The tuning point is usually at about the middle of the Tuning Control's travel, and is at first indicated by a marked reduction in the volume of the hissing noise heard in the telephones. As soon as signals are heard adjust the tuning to the point which gives the clearest speech. This tuning position will vary very slightly with distance and may require retuning when the other man is very close.

SITING

6. For the best results, the position of the S-Phone operator is very important. The ideal position is on the roof of a tall building, or on a hill top having a clear view in all directions. The radio wave from the S-Phone should be considered as being like a beam of light from a large torch. Thus an obstruction between the S-Phone and the other man, such as a house or trees, would stop signals reaching him. In the same way, the operator's body gets in the way, and signals from the S-Phone are strongest in the direction which the operator is facing.

7. In clear open country to find the exact direction

BATTERY BELT

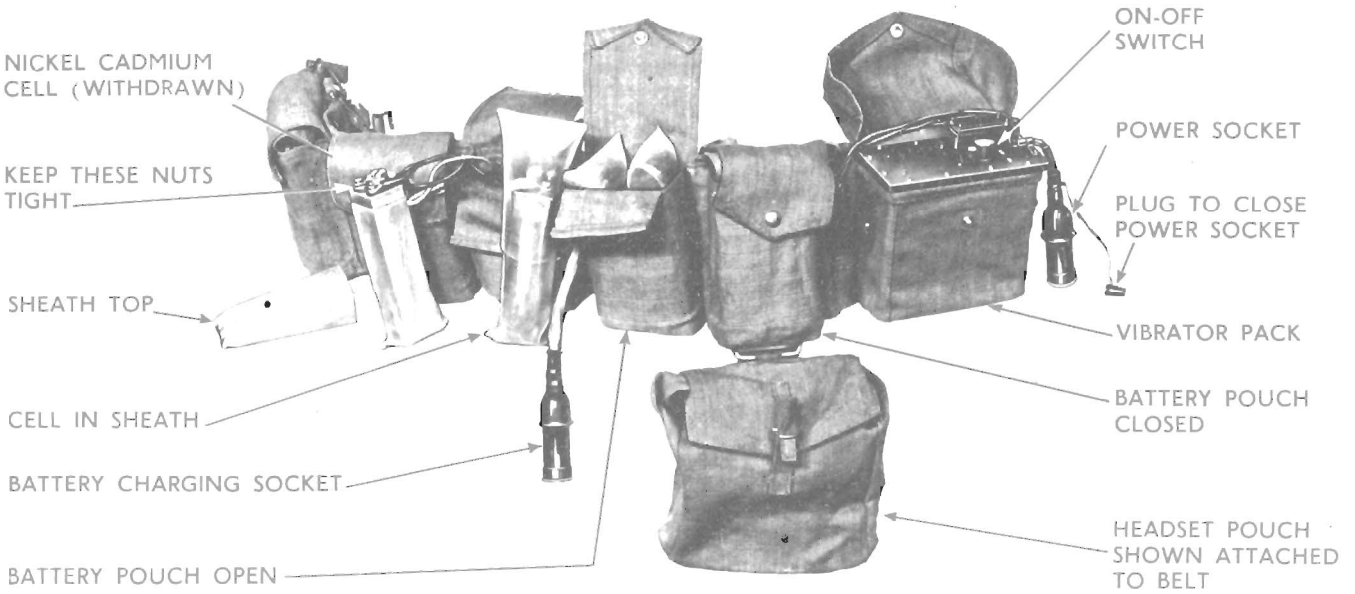


FIG.3

of the other man, ask him to talk, or count, and tune in to the best signal, then turn the body until the loudest signals are heard. A point will be found where signals are very weak. The direction of the other man is exactly opposite the point of weakest signal. Thus, if the signal is weakest when facing North the other man is to the South. If he stops talking the position of maximum signal strength can be found by turning the body to the direction which gives the lowest volume of hiss in the telephones. Whilst he is not talking repeat the agreed call sign every 10 to 15 seconds.

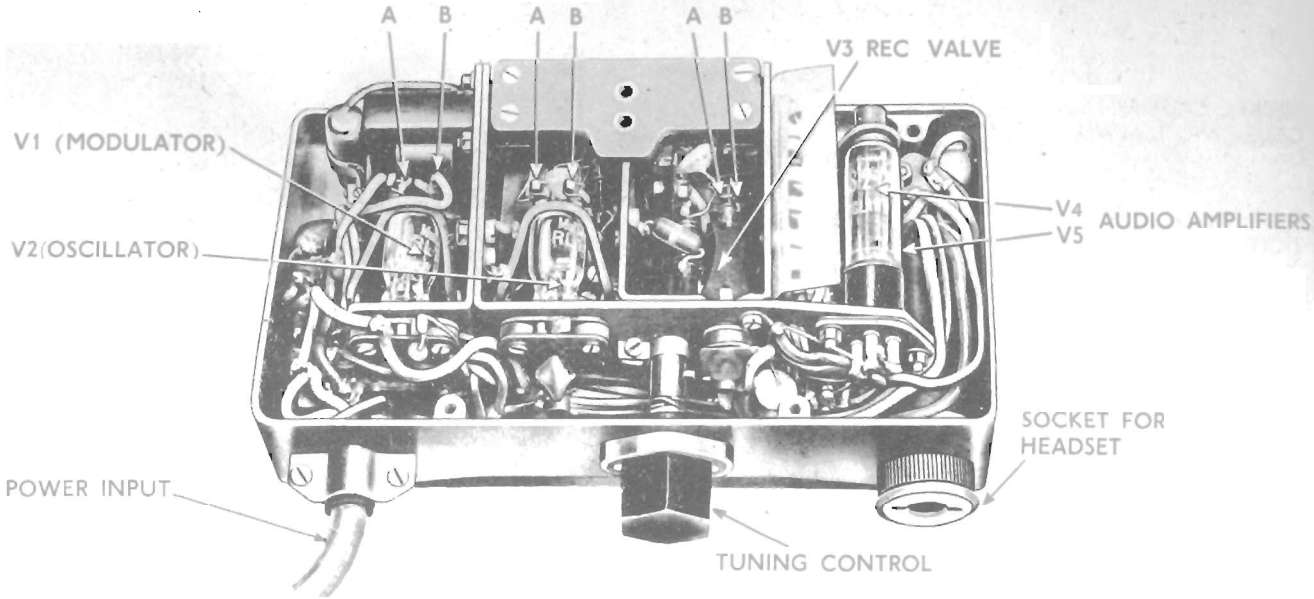
PROCEDURE

8. One of the most important things to remember when operating is to acknowledge all signals received, and to give useful information. Thus, if he says "Where are you?", say "My position is so-and-so", or "I have changed my position 3 kilometres", and if he says "Are you receiving me?", say "Yes, I am receiving you loud and clear", or make some definite reply.

9. Always acknowledge the other man's signals.

10. When the other man is silent repeat the agreed call sign every 10 to 15 seconds.

11. Keep on searching for signals until they are heard clearly, after which DO NOT OPERATE THE TUNING UNNECESSARILY, as it will "hold" good within a few degrees of the Tuning Control for very long periods.


A B
A B
A B
V3 REC VALVE
V1 (MODULATOR)
V2(OSCILLATOR)
V4
V5
AUDIO AMPLIFIERS
SOCKET FOR HEADSET
POWER INPUT
TUNING CONTROL

FIG

12. At very close ranges, e.g., aircraft overhead, the signal may be so strong as to require DETUNING to retain intelligibility, necessitating the return to optimum tuning as the range increases.

13. The S-Phone is simply an adaptation of a normal telephone, and conversation should be of the kind normally carried out over a call of average distance. Do not shout into the microphone.

IV. MAINTENANCE

A) THE BATTERIES:

1. In the Battery Belt are 10 Nickel-Cadmium Alkaline Accomulators, each giving 1.2 volts when fully charged; 5 cells provide the 6 volts L.T. for the S-Phone and 5 drive the Vibrator Pack to provide the H.T. Each cell is covered with a P.V.C. sheath to protect it, to insulate the cells from one another and to prevent the belt being damaged by electrolyte.

2. It must be emphasised that these cells are not the usual lead-acid accumulators, and that they will be completely ruined by the slightest contamination with Sulphuric Acid. It is essential, therefore, never to use measures, funnels, hydrometers etc. which have been used for servicing lead-acid accumulators.

3. The batteries are sent out filled with electrolyte (Caustic Potash) and sealed but may only be partially charged, as in this condition they may be stored almost indefinitely without damage.

4. BEFORE USE remove the solid metal plugs and fit the vents and breathers provided. In some battery belts a vent may be a metal plug with a hole in the top, and in others the holes are in the side and covered by a rubber band.

5. CHARGING THE BATTERIES

The whole success of the S-Phone depends on its batteries being fully charged and in good condition. Batteries must not be neglected.

6. Check the levels of the electrolyte. A clean paper spill may be used satisfactorily for this purpose. If no electrolyte has be spilled and the level is less than ½ inch above the plates, bring it up to this level by adding distilled water, clean rain water, or if this is not available, boiled and filtered fresh water may be used. NEVER USE SEA WATER OR HEAVILY CHLORINATED WATER.

7. If electrolyte has been spilled, as evidenced by finding liquid in P.V.C. covers etc., and the metal battery case is not leaking beyond repair - fill up with fresh electrolyte (Caustic Potash) of Specific Gravity 1.2.

8. These batteries cannot be damaged by overcharging. A full normal charge can always be given irrespective of the previous discharge.

9. The normal charging rate is 1.4 amps. and the time about 10 hours, but lower or higher rates may be given provided that the time of charge is increased or shortened proportionally, and that the temperature inside the cells does not exceed 120 degs.F.

10. The A.D. 25 Trickle Charger provided may be used on either AC or DC supply of voltages 90 to 120 or 200 to 250, and when using the correct lamp, (60 watts. on 90 - 120 volts and 100 watts 200 - 250 volts) will charge the battery at between 0.2 and 0.4 amp. A fully discharged set of batteries should be charged in 70 - 80 hours.

11. The Socket hanging from the centre-back of the Battery Belt is for charging purposes. Firstly, see that the vibrator pack is switched off, the set plug withdrawn from its socket, the solid battery plugs have been changed for vents, then plug the charger jack into the CHARGING SOCKET and switch on.

If mains are not available but a hand or pedal generator is, then the batteries may be charged at 3 to 5 Amps. It may be desirable to remove the charging plug from the trickle charger and connect the positive (+ve) from the generator to the terminal marked MIC on the plug, and the negative (-ve) from the generator to the terminal marked TEL + on the plug. See Fig. 6.

12. Twenty four hours after a charge the solid plugs may be used again if required. When the equipment has to be transported by air it is advisable to use the solid plugs to prevent any leakage.

13. The cells should be kept clean and dry externally.

14. Gassing is no indication that the battery is fully charged, nor does the specific gravity of the electrolyte vary with the state of charge.

15 The level of the electrolyte must never be allowed to fall below the tops of the plates.

16. ELECTROLYTE BURNS

Electrolyte spilt on the skin or clothing should be washed away immediately with a solution of citric or boric acid and plenty of water.

17. For the skin, apply a 10% solution of either citric or boric acid in distilled water. For the eyes use a 1% solution followed by "Home Office" eye drops (Castor Oil and Cocaine) for soothing and healing.

B) THE VIBRATOR PACK

18. If on switching on, no vibration can be felt from the Vibrator Pack:

(i) Ensure that all Battery connections are tight.

(ii) Inspect all leads, particularly near terminals and repair any broken connections.

(iii) If the Pack still will not work remove the screws around the top and withdraw it from its metal case. Make sure that the vibrator is pushed well home into its holder, and that there are no obvious broken connections.

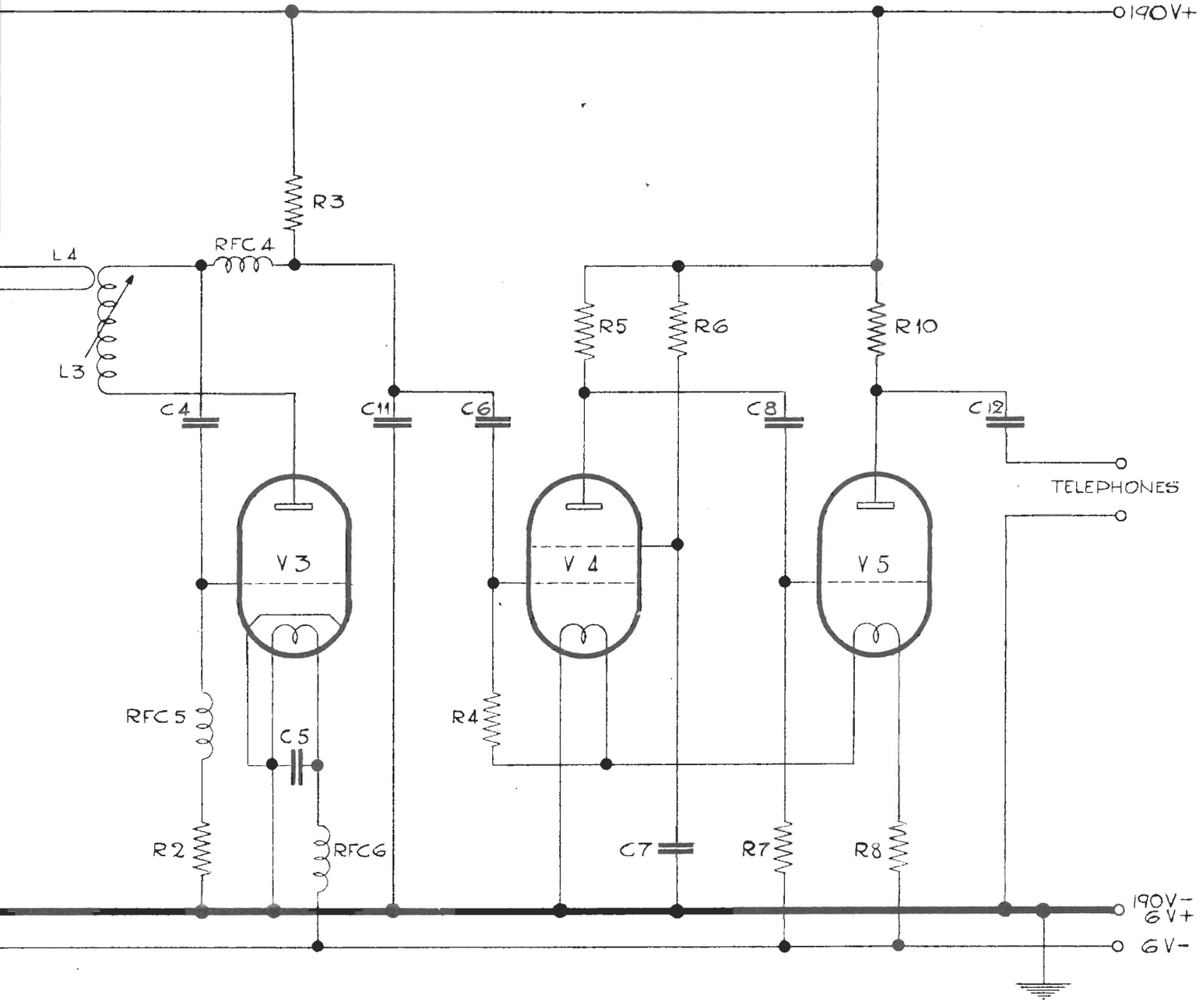
C) THE S-PHONE

19. Before assuming the S-Phone to be at fault, ensure that the batteries are charged. The servicing of an S-Phone is very specialised work and interference should be avoided unless absolutely necessary. The most likely symptoms of trouble are:

(a) No hiss is heard in the telephones. (Sect.I Par.9)

(b) The Aerial Power Indicator does not register (Sect.I.Par.10)

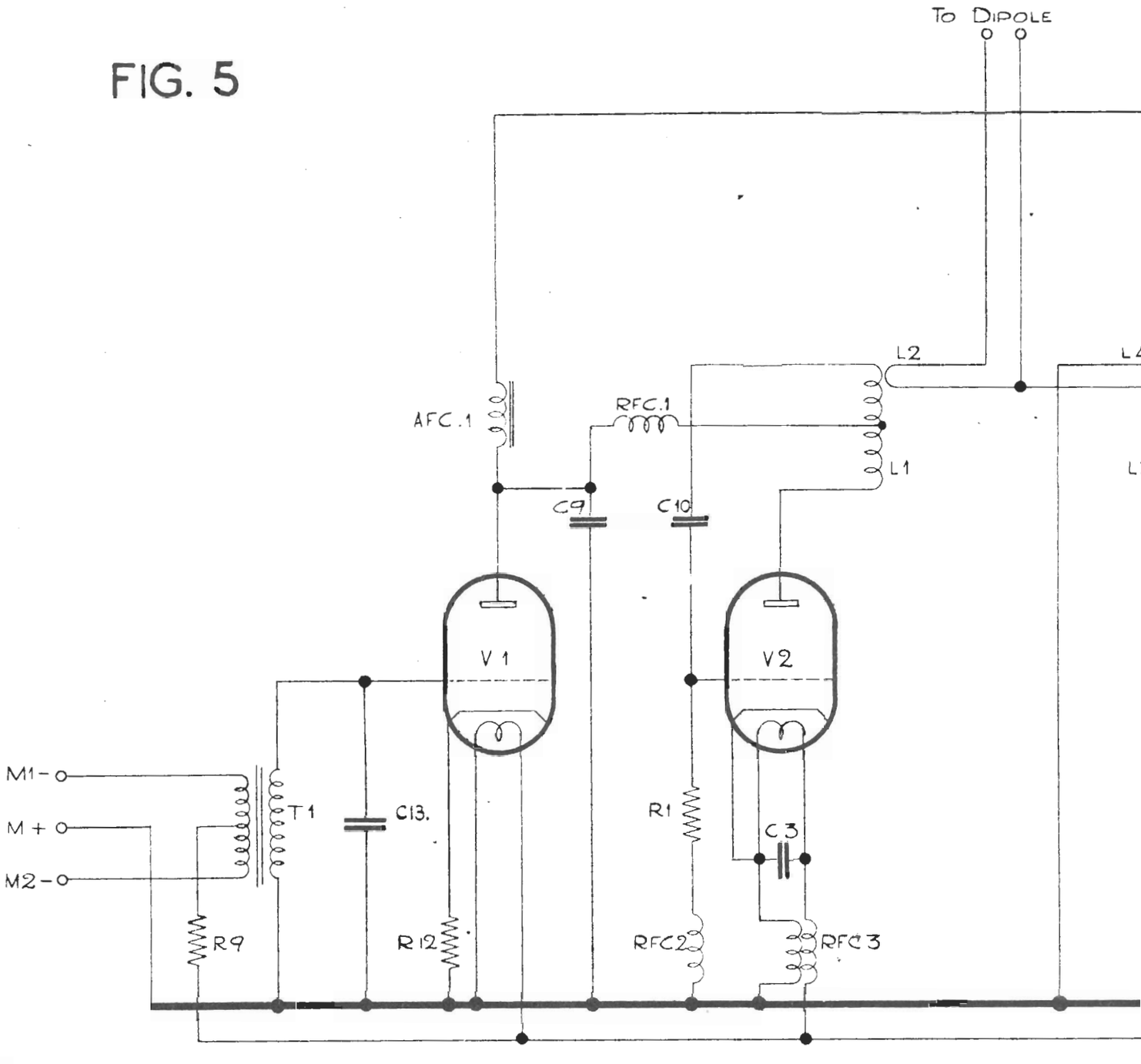
(c) There is no Side Tone (Section I,Par.11)



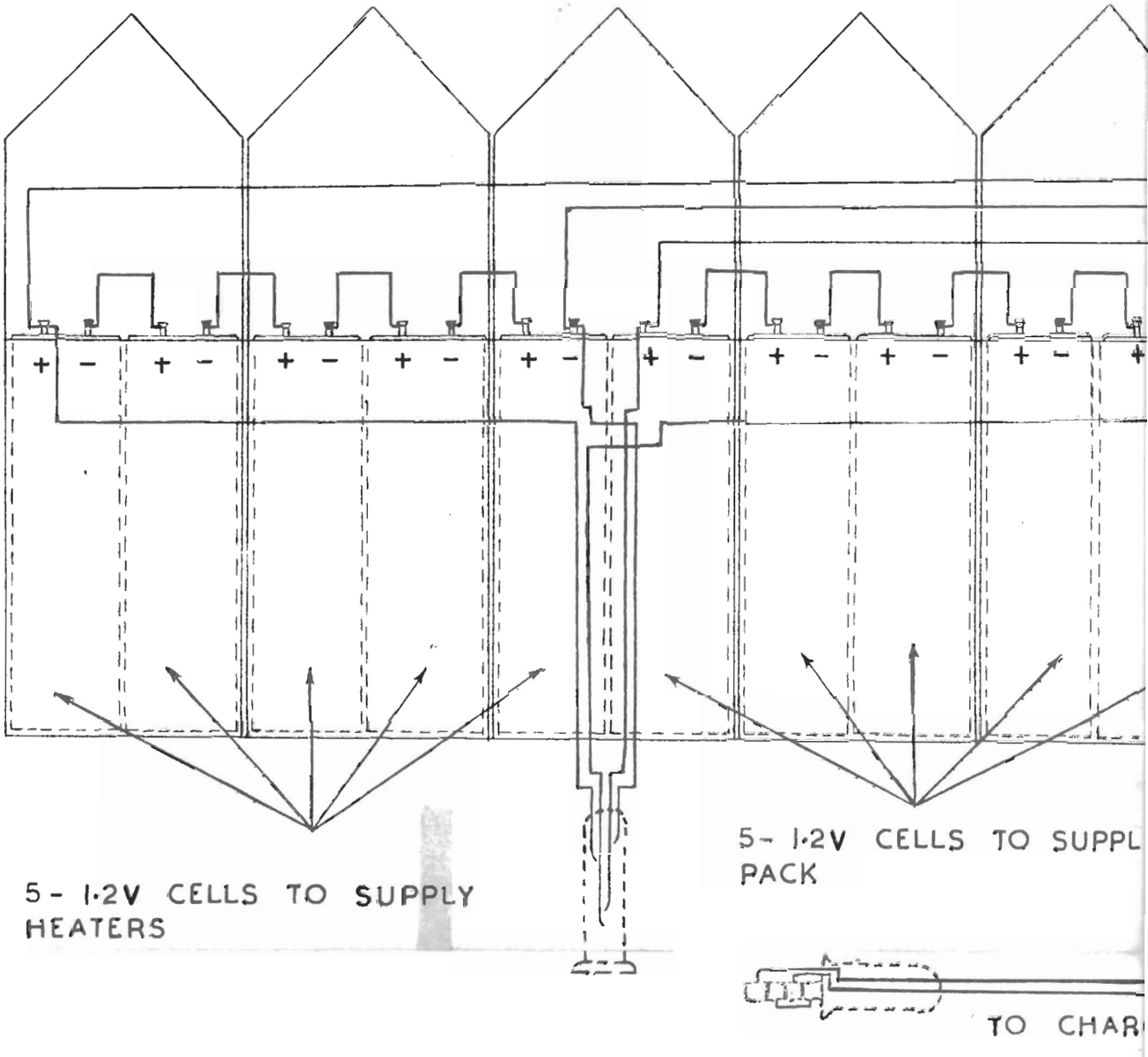
	C 9	50pF ± 20% CERAMIC	RFC 2	Tx GRID CHOKE	V 3	RL 18 (NR 88)
	C 10	10pF ± 20% CERAMIC	RFC 3	Tx FILAMENT CHOKE	V 4	XVS 2v HIVAC
	C 11	·005 µF ±20% MOULDED	RFC 4	Rx HT CHOKE	V 5	XP 2v HIVAC
IC	C 12	·01 µF ±20% TUBULAR	RFC 5	Rx GRID CHOKE		
C	C 13	0·1 µF ±20% TUBULAR	RFC 6	Rx FILAMENT CHOKE	T 1	MIC. TRANSFORMER
C					AFC 1	Tx MOD. CHOKE.
LDED						
AR			V 1	RL 18 M (NR 88)		
ED	RFC 1	Tx. HT CHOKE.	V 2	RL 18 (NR 88)		

DESCRIPTION	DRAWN	APPROVED	SCALE	DATE	DRAWING No
MODEL 13/IV S-PHONE CIRCUIT DIAGRAM	ACG		—	23·12·43	CD 2047

FIG. 5



L1	Tx Osc. Coil		R4	2·2 MΩ	± 20%		
L2	} Aerial Coupling		R5	470 KΩ	± 10%		
L4	} Coil Assembly		R6	1 MΩ	± 20%		
L3	Rx Osc. Coil		R7	2·2 MΩ	± 20%	C3	50pF ± 20% Ceramic
			R8	22 Ω	± 20%	C4	25pF ± 20% Ceramic
			R9	15 Ω	± 20%	C5	50pF ± 20% Ceramic
R1	8,200 Ω ± 10%		R10	150 KΩ	± 20%	C6	·0005 µF ± 20% Moulded
R2	150 KΩ ± 20%		R11			C7	·01 µF ± 20% Tubular
R3	10 KΩ ± 20%		R12	1000 Ω	± 20%	C8	·0005µF ± 20% Moulded



BATTERY BELT S-PHONE MODEL

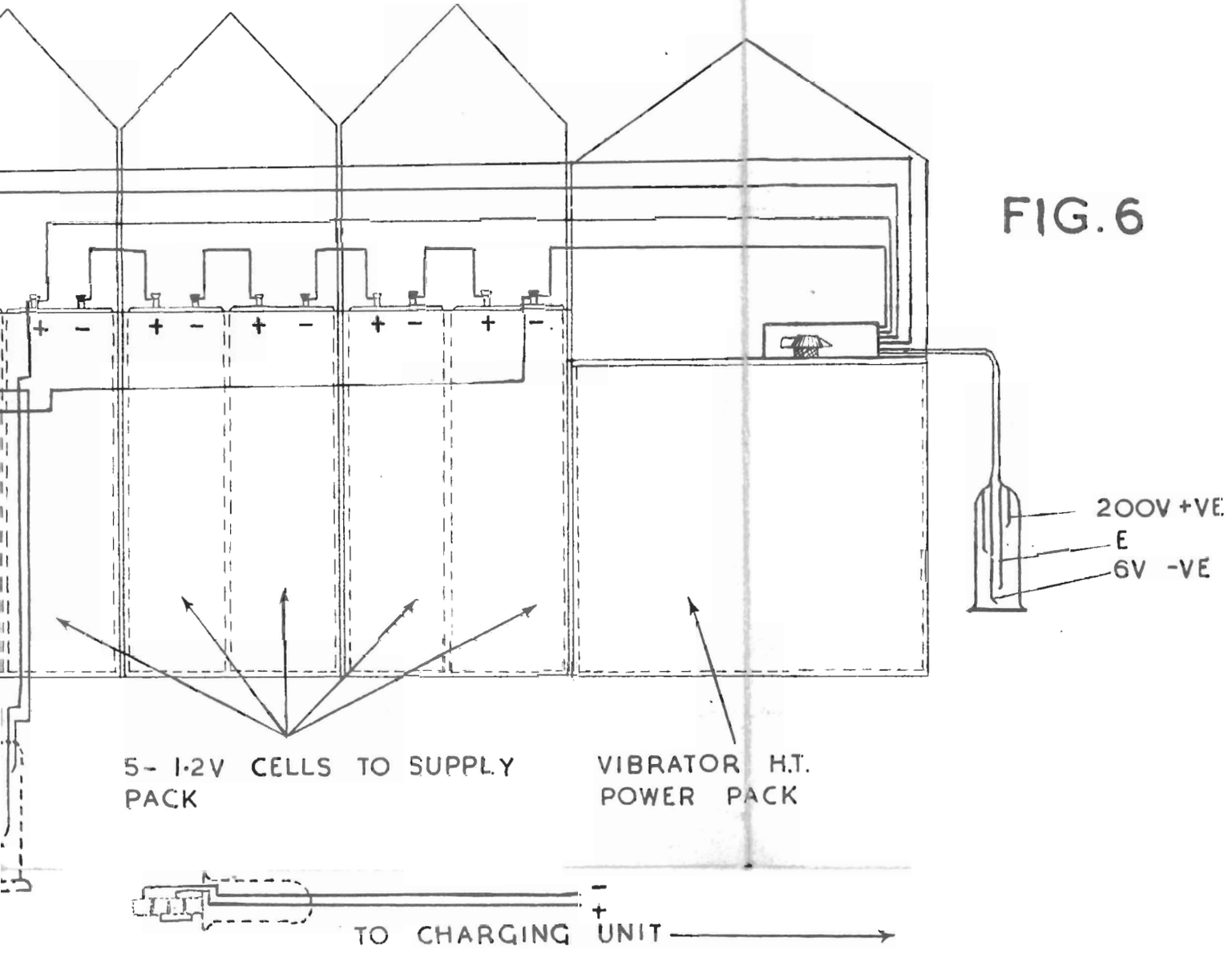


FIG. 6

5-PHONE MODEL 13/IV WIRING DIAGRAM

20. If trouble does arise remove the S-Phone cover by withdrawing the 2 screws in the bottom front, and 2 on the top back of the set.

21. With the set lying open - switch ON. Observe that the 3 valves, V1, V2 and V3 (Fig.4) light. The glow from V4 and V5 cannot always be seen. See that all the valves are pushed firmly down in their sockets.

22. If there is no "hiss"(Sect.1, Par.9)

(i) Valves V2, V4 or V5 may have worked forward - in this case push them firmly into their holders.

(ii) A clip A or B on V3 (Fig.4) may have come off. Nip the spring and replace it.

23. If the Aerial Power Indicator bulb does not glow - Section I, Par.10, then:

(i) Valve V2 may have worked forward.

(ii) A clip A or B on V2 may have come off.

24. If there is no Side Tone, Sect.I.Par 11, then:

(i) V1 may have worked forward.

(ii) A clip A or B on V1 may have come off.