NO. 10 COPY.

MILITARY WIRELESS

EQUIPMENT

BY

AMALGAMATED WIRELESS (AUSTRALASIA) LIMITED

"Wireless House,"
167 Queen Street,
Melbourne.

47 YORK STREET,
SYDNEY, N.S.W.

Customs House Quay,
Wellington,
New Zealand.

MILITARY WIRELESS

EQUIPMENT

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BOOKLET 1063

MILITARY SET TYPE 101

A.W.A. INSTALLATION 1J5407.

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Amalgamated Wireless (Australasia) Limited,
"Wireless House",
47 York Street,
SYDNEY.

MILITARY SET TYPE 101

A.W.A. INSTALLATION 1J5407.

1. GENERAL PURPOSE AND MILITARY APPLICATION

The 101 Military Set is a light portable transmitter-receiver installation suitable for supplying such essential military services as firing orders between battery headquarters and artillery batteries, between battalion headquarters and infantry detachments, or between frontier guards and supporting garrisons.

For portability the 101 military set is essentially a two-man station: one carrying the transmitter-receiver unit and accumulator, the other carrying vibrator unit and aerial gear.

Provision of two headphone outlets enables both men to be conversant with all messages, so that either can take over the operation of the station, should the need arise.

The flexibility and simplicity of operation of the 101 is such that in emergency the complete station can be assembled and operating within two minutes.

2. FEATURES AND FACILITIES

Transmission can be effected on either W.T. (CW telegraphy) or R.T. (radio telephony) and provision is made for remote operation.

An important facility is the incorporation of a "netting" switch, by means of which the master oscillator of the transmitter may be tuned to the same frequency as a received signal. This allows the establishment of a number of "nets" controlled from a central point (generally brigade headquarters) each "net" operating on a separate frequency, thus obviating the necessity for constant change in frequency and enabling greater speed and flexibility in handling messages.

A useful facility, important for efficient operation is the inclusion of a watch case to mount a non-magnetic watch.

3. FREQUENCY RANGE

In order to provide communication over varying distances, to allow the selection of interference and static-

free operating wavelengths, and to combat any possibility of jamming, a wide band of frequencies is incorporated, providing operation within the range 4.2 to 6.8 megacycles, with a slight overlap at each end.

4. DISTANCE RANGE

With the normal counterpoise and three sections of antenna rod "A", as illustrated in photograph No. 1433, the range to be expected between two sets of these equipments over average terrain, utilising a frequency in the vicinity of 4 to 5 megacycles, is approximately:-

W.T. - 12 to 16 miles
R.T. - 6 to 8 miles

Ranges considerably in excess of these figures have been repeatedly obtained, and by use of larger aerials such as horizontal half-wave dipoles or higher frequencies, communication over hundreds and even thousands of miles has been obtained. Under such conditions communication has been carried out between Sydney N.S.W. and Port Moresby, Papua, and between Sydney N.S.W. and Suva, Fiji.

It is pointed out that the ranges for military purposes vary greatly under different conditions. For instance, the range between an infantry battalion headquarters and a brigade headquarters may be 3 miles in attack, 10 miles in defence and 20 miles or more under garrison conditions. Further, the judicious choice of frequency and aerial enable improved transmission to be effected over the required distances, due consideration being given to the nature of intervening country and background noise level.

5. ANTENNAE

Two types of antennae are available for the 101 set: one for normal use in the field, and the other for operating under mobile conditions. The first, or Antenna Rod "A", as it is known, consists of five brass sections each 3 feet long, of which three or four are normally used (dependent upon range required). In conjunction with these main sections the following completes Antenna Rod "A" :-

(a) 4 spokes for mounting horizontally on a clamp at the top of the mast section.
(b) 1 base with spike
(c) 3 cord guys
(d) 3 metal guy anchor pegs
(e) 1 aerial lead
(f) 1 kit bag to house aerial gear

The second aerial, known as flexible aerial type 1R3715, is a collapsible cadmium plated "fish rod" type, capable of erection to an approximate height of 9 ft. This is mounted on an insulated base through a flexible spring and is depicted in photograph No. 1391.

6. POWER RATING

The output from the power amplifier is:-

W.T. - 1.2 watts
R.T. - 0.75 watts

7. SOURCE OF POWER SUPPLY

Primary power for the operation of the installation is obtained from a 6 volt accumulator made up of three 2 volt 25 a.hr. cells mounted within a wooden carrying case fitted with plug for interconnecting with the vibrator unit and transmitter-receiver.

The load on the accumulator is 1.6 amps whilst receiving and 1.9 amps whilst transmitting under W/T conditions.

High tension supplies are derived from a vibrator transformer filter combination, the output of which delivers 235 volts for the transmitter and 135 volts for the receiver.

The voltage variation of the vibrator unit output is 235 volts to 220 volts with key up or down respectively.

Under R.T. conditions no undue noise is noticeable on the carrier with the microphone in circuit and no speech input.

8. TECHNICAL DESCRIPTION

(a) Transmitter: The transmitter employs a Radiotron 1K5G triode connected as a master oscillator in a conventional circuit. Provision is made for adjusting the inductance of the oscillator coil and the shunt minimum circuit capacity.

The power amplifier consists of two Radiotron 1K5G valves connected as pentodes and used in parallel. When operating W.T. grid bias is obtained by grid current in a grid resistor. With key up, maximum high tension is applied between control grid and plate and screen, thus effectively cutting off plate current. The oscillator grid resistance return is keyed in a similar manner.

The power amplifier is neutralised by means of a small semi-fixed capacity from the power amplifier plates to the grid end of the oscillator coil. This is normally carried out during the first test after manufacture, and once adjusted should need no further attention.

Whilst "netting" the power amplifier screen supply is cut off, thus leaving the oscillator stage only in operation.

A Neophone Microphone modulates the power amplifier valves in the grid circuit, modulation being effected by feeding 18 volts negative bias to the power amplifier grids, which voltage is modulated by speech voltages.

(b) Receiver: A Radiotron 1C7G mixer oscillator converts the frequency range of 4.2 megacycles - 6.8 megacycles to the I.F. frequency of 460 kilocycles. The conversion efficiency is approximately 70% for the entire range and is measured on the 1C7G converter grid as the ratio between signal and I.F. sensitivity.

This stage is followed by a 1K5G conventional I.F. section operating at 460 kilocycles.

Following this is a reflex stage employing a Radiotron 1K7G, which rectifies the signal, supplies A.V.C.,amplifies at 460 Kcs. and reflexes back through the valve the rectified A.F. component.

A Radiotron 1K7G triode connected output stage and a 1C7G beat frequency oscillator complete the receiver.

The following characteristics are indicative of the normal performance of this receiver:-

I.F. Sensitivity

Input	Frequency	Stage	O.P.
20 m.v.	460	F.C.	1 m.w.
900 m.v.	460	I.F.	1 m.w.

I.F. Selectivity

Band Widths	8 kcs.	2 X	off resonance	6 dB
	15 "	10 X	" "	20 dB
	27 "	100 X	" "	40 dB

Maximum Output

20 mw. with a maximum distortion not exceeding 5% into 300 ohm load.

Image Ratio

With a dummy aerial consisting of 50 mmf. in series with 16.6 ohms and circuits adjusted for maximum sensitivity at 6.8 megacycles, the image ratio is 26dB.

It is pointed out that under normal conditions the receiver output is satisfactorily free from "hash" interference from the vibrator unit.

For interconnecting transmitter-receiver accumulator and vibrator unit appropriate rubber covered cable of either 6 ft. or 3 ft. lengths are supplied terminated with non-reversible plugs.

9 VALVE SUMMARY

All valves are Australian made Radiotrons and are employed as follows:-

Transmitter	1	type 1K5G	as oscillator
	2	" 1K5G	" power amplifier
Receiver	1	type 1C7G	as frequency converter
	1	" 1K5G	" I.F. amplifier
	1	" 1K7G	" reflex amplifier and A.V.C.
	1	" 1K7G	" Output
	1	" 1C7G	" Beat frequency oscillator

10. DIMENSIONS AND WEIGHT

	Length	Width	Height	Weight
Transmitter	$21\frac{1}{8}$"	$8\frac{1}{2}$"	12"	37 lbs.
Vibrator Unit	$16\frac{3}{8}$"	$4\frac{1}{8}$"	$9\frac{15}{16}$"	23 lbs.
6 volt Accumulator in box	$6\frac{3}{4}$"	$5\frac{3}{4}$"	$9\frac{1}{2}$"	29 lbs.
Cables	6 ft. or 3 ft.			2 lbs. or $1\frac{1}{2}$ lbs.

11. SCHEDULE OF EQUIPMENT (Supplied)

One Military Set type 101 comprising:-

(a) Transmitter type 1J4616 and receiver type C5406 in case J5405

(b) Vibrator power supply unit type H5781 including One 6 volt vibrator type V5211 (with socket for spare vibrator).
(c) Two low tension connectors } interconnecting cables
(d) One high tension connector }
(e) Two counterpoise leads
(f) One working set of valves
(g) One instruction book

ADDITIONAL EQUIPMENT REQUIRED TO COMPLETE STATION

(h) One 6 volt accumulator in wooden carrying case
(i) One hand microphone
(j) Two pairs low resistance headphones
(k) One W/T manipulating key
(l) One Flexible aerial type 1R3715

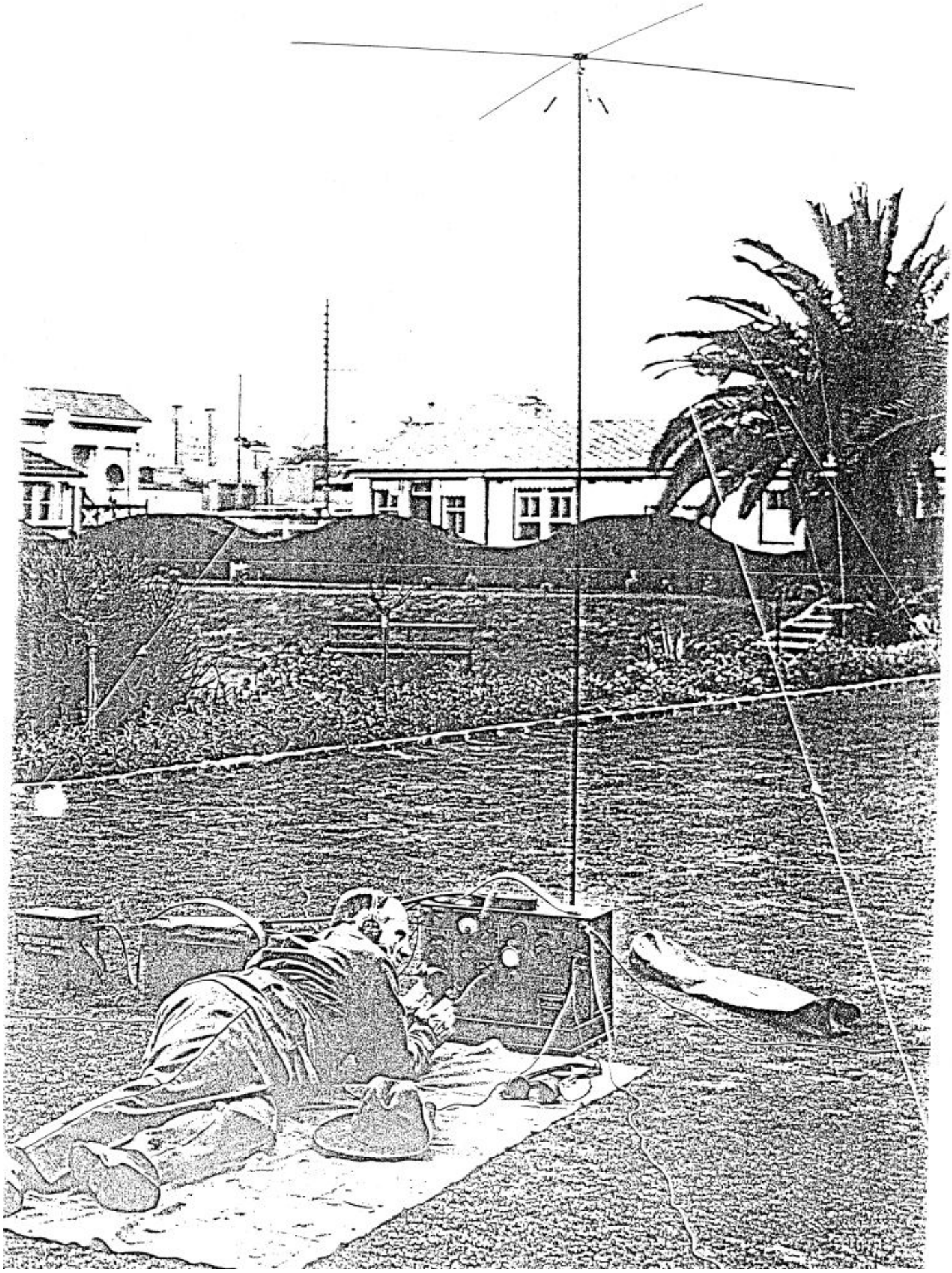
or

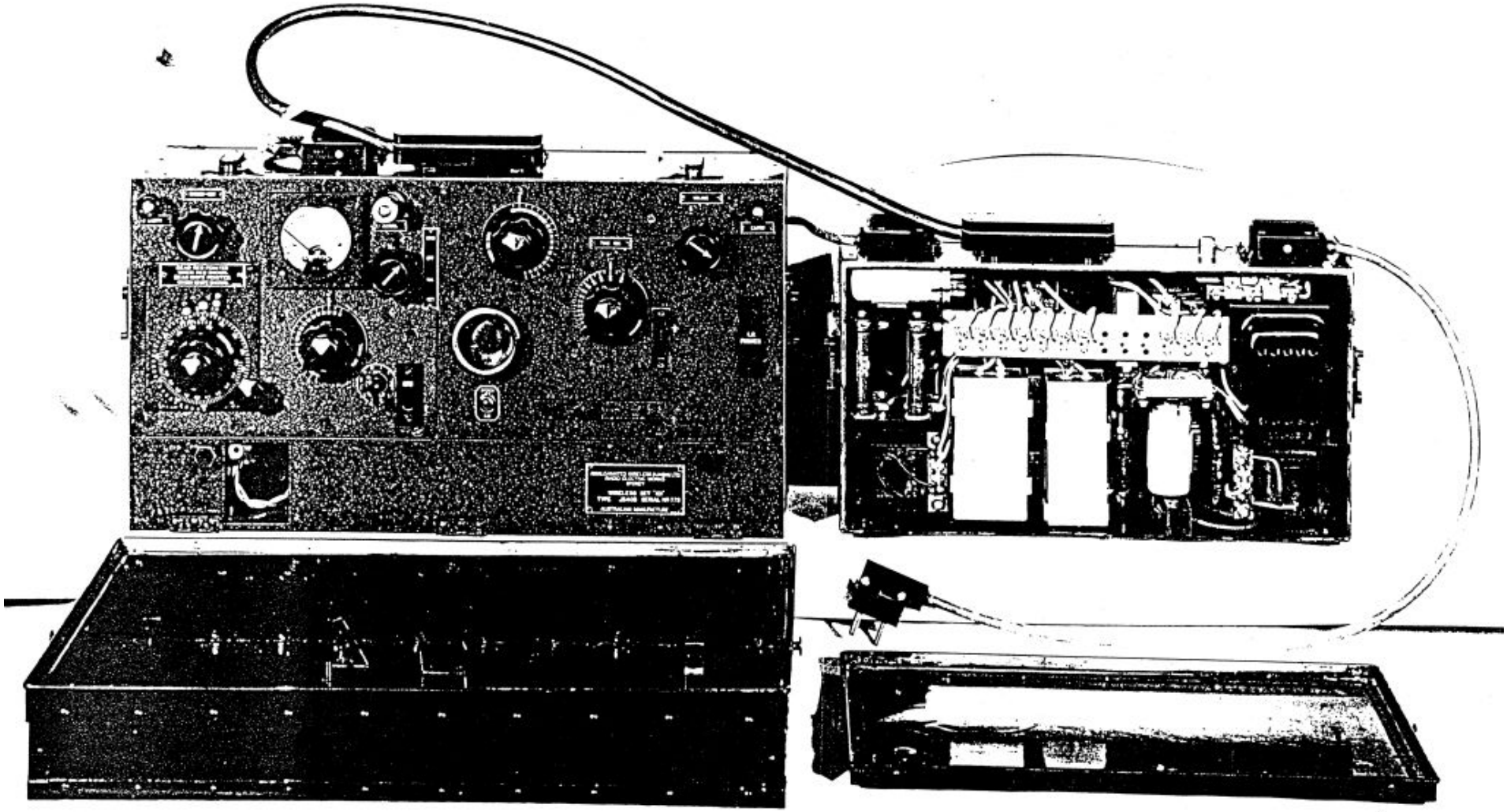
One set Aerial Gear comprising:-

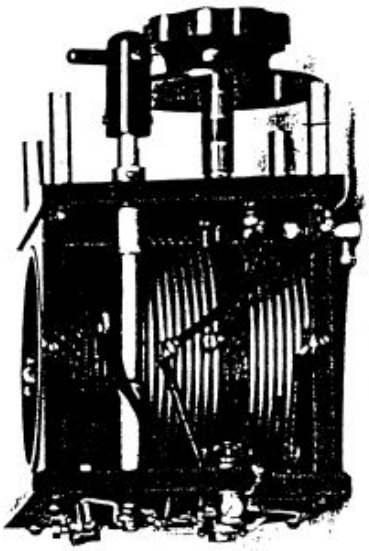
(a) 5 Brass mast sections each 3 feet long
(b) 4 spokes for mounting horizontally on a clamp at the top of the mast sections
(c) 1 base with spike
(d) 3 cord guys
(e) 3 metal guy anchor pegs
(f) 1 aerial lead
(g) 1 kit bag to house aerial gear

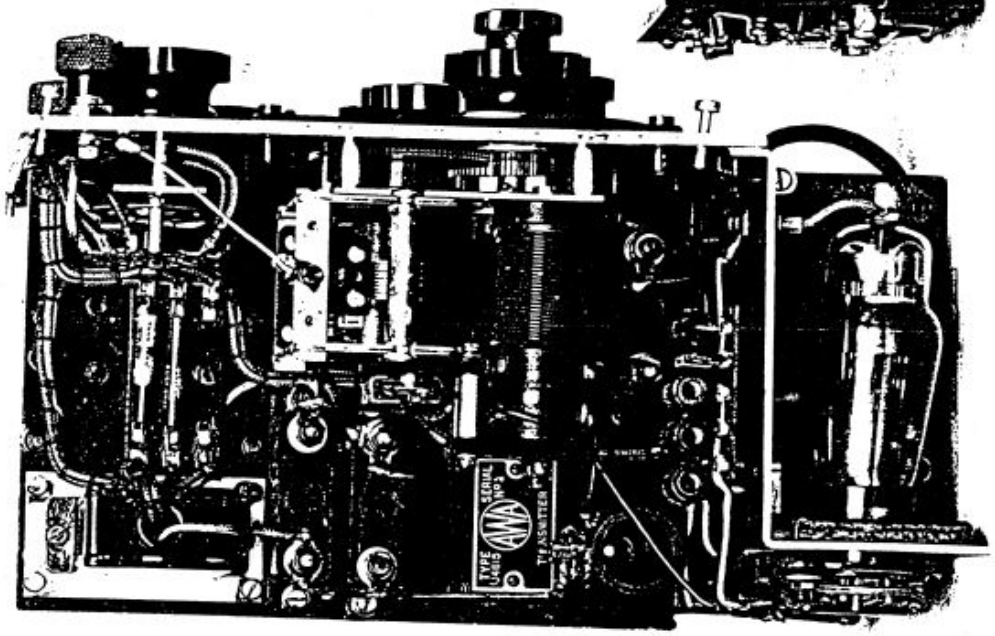
12. PHOTOGRAPHS

Numbers 1433, 1434, 1227 and 1229.





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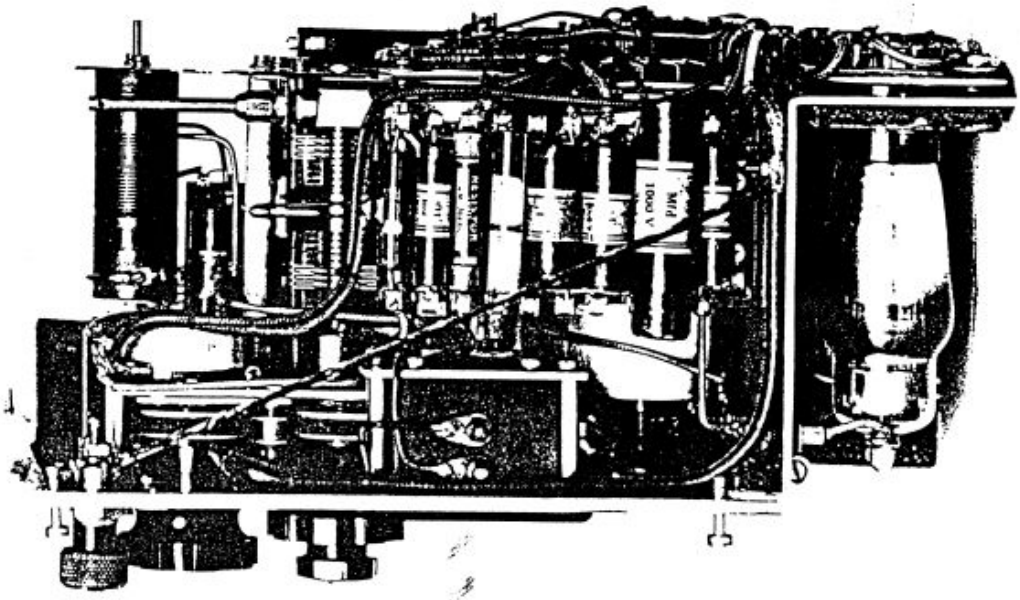

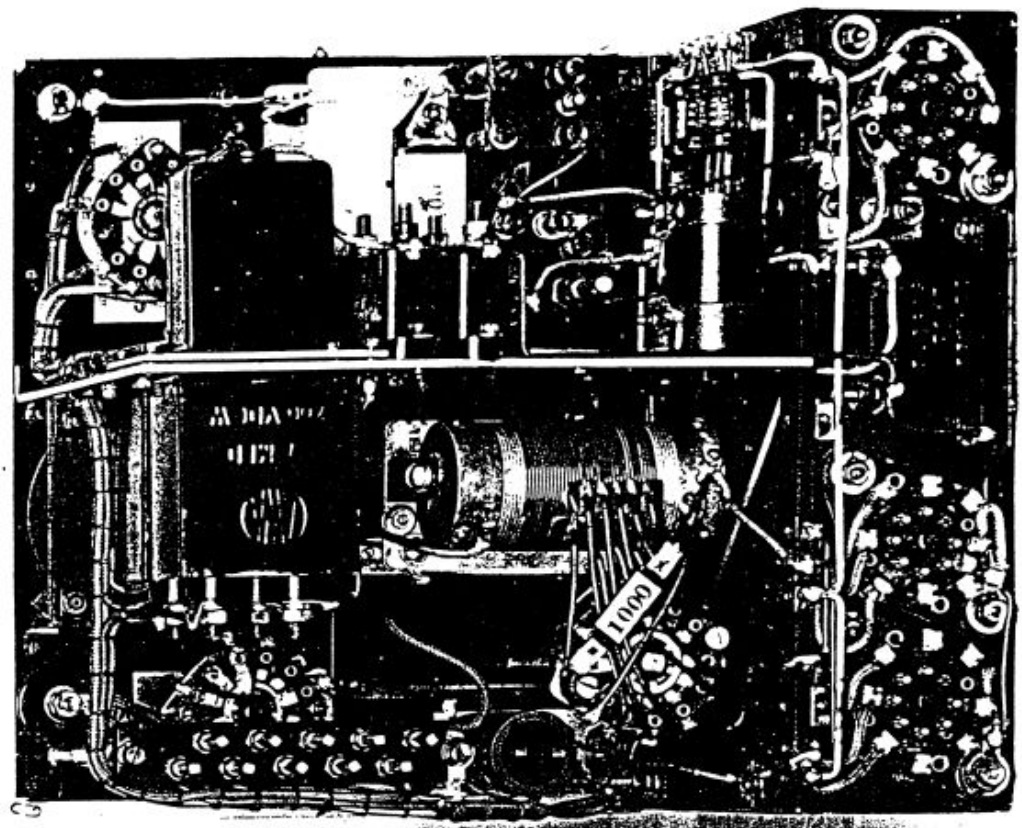

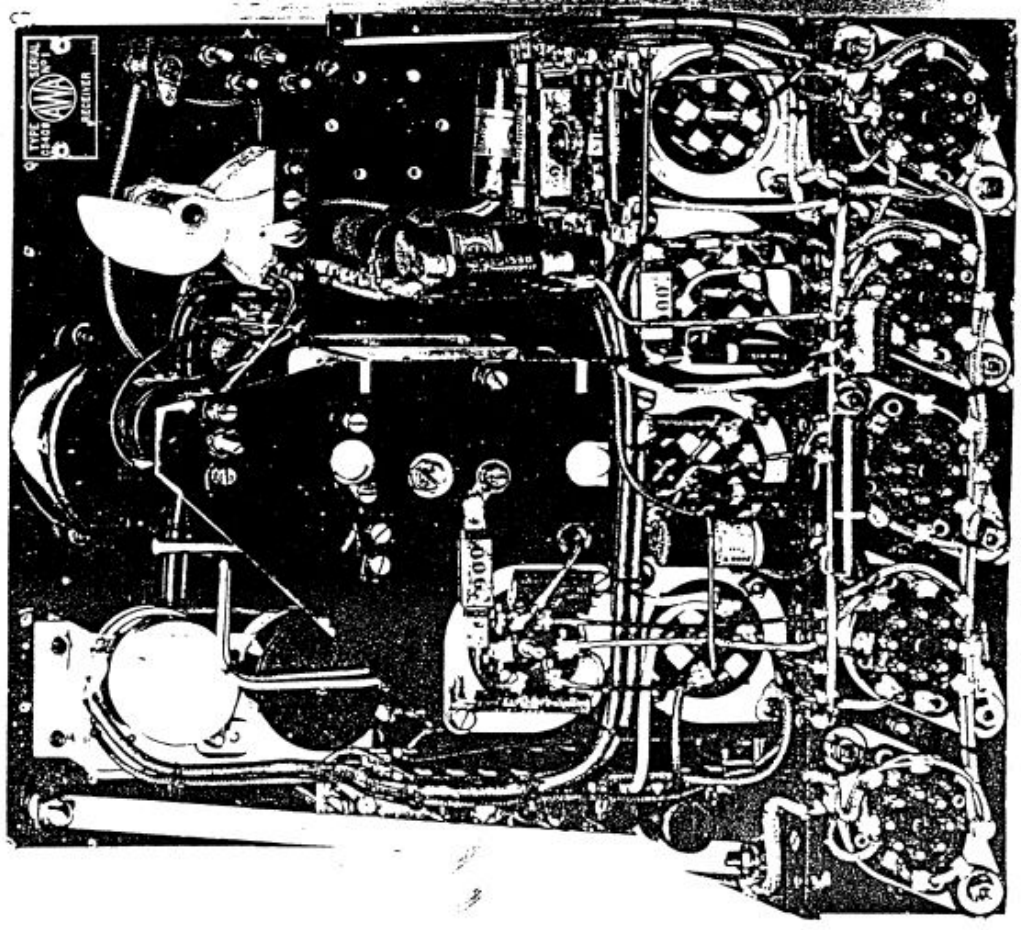

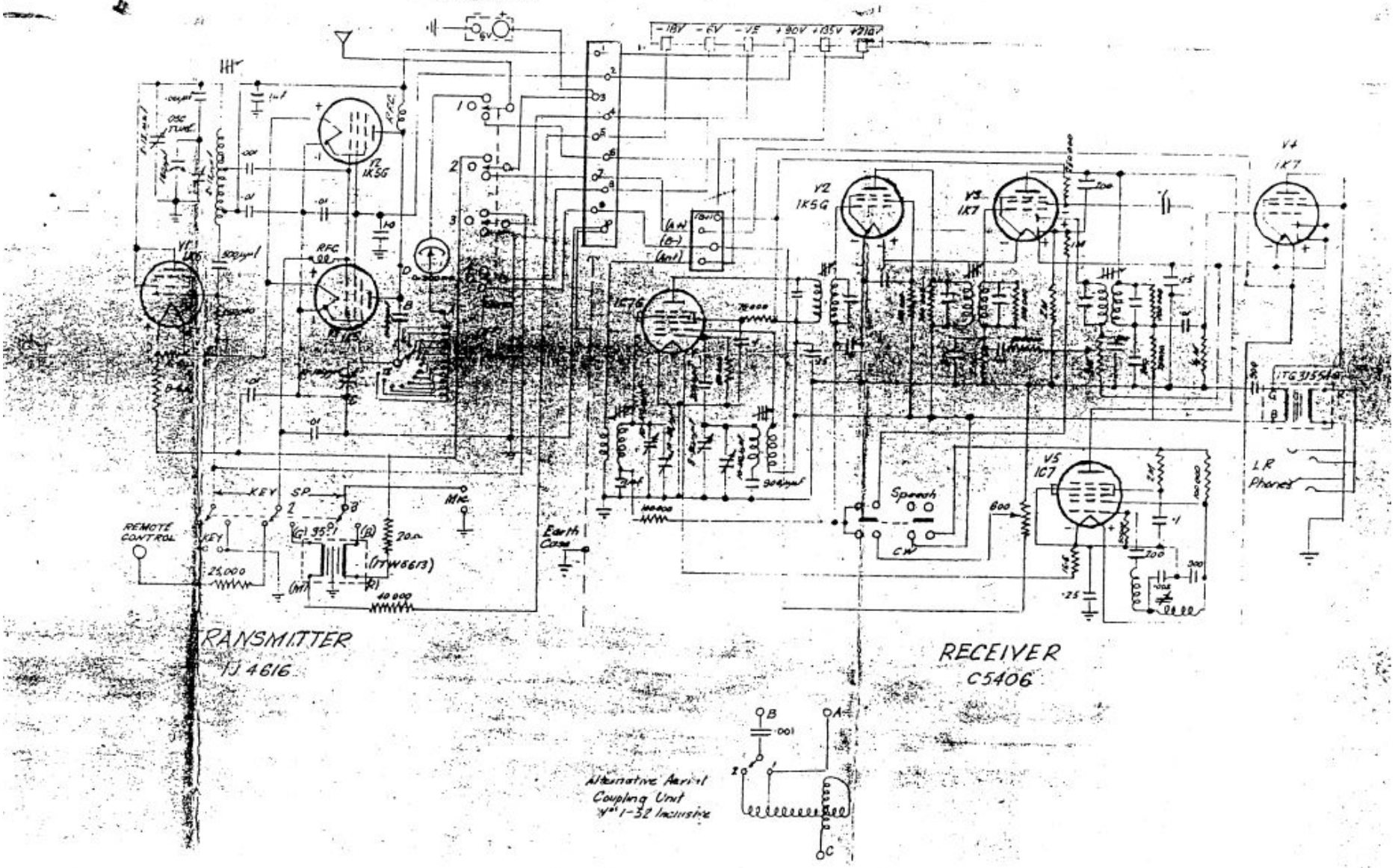
RANSMITTER
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RECEIVER
C5406
Alternative Aerial
Coupling Unit
No 1-32 Inclusive
REMOTE CONTROL
KEY
SP
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Earth Case
Speech
CW
L.R Phones
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V5 1C7
V6 1C7G
RFC
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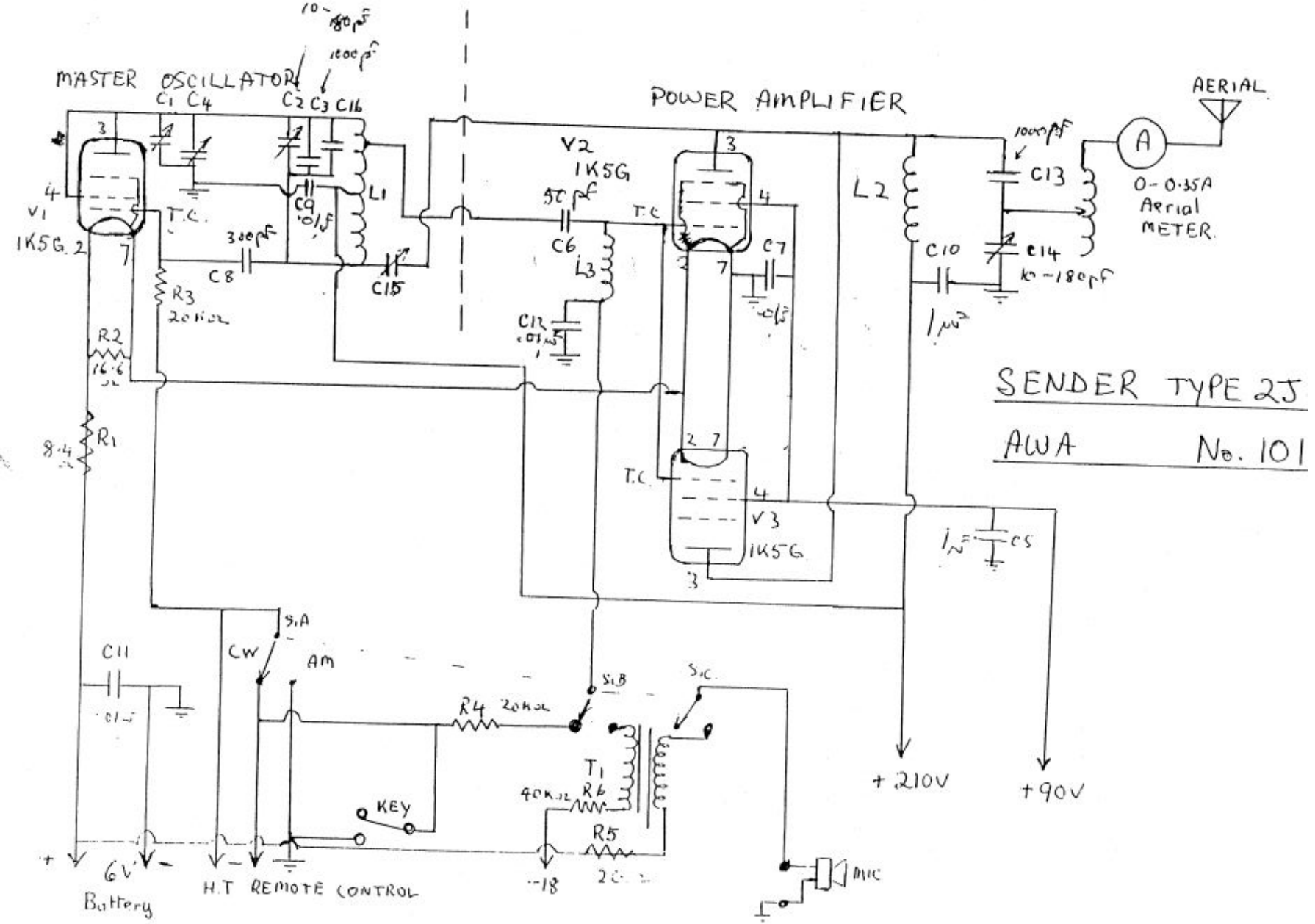
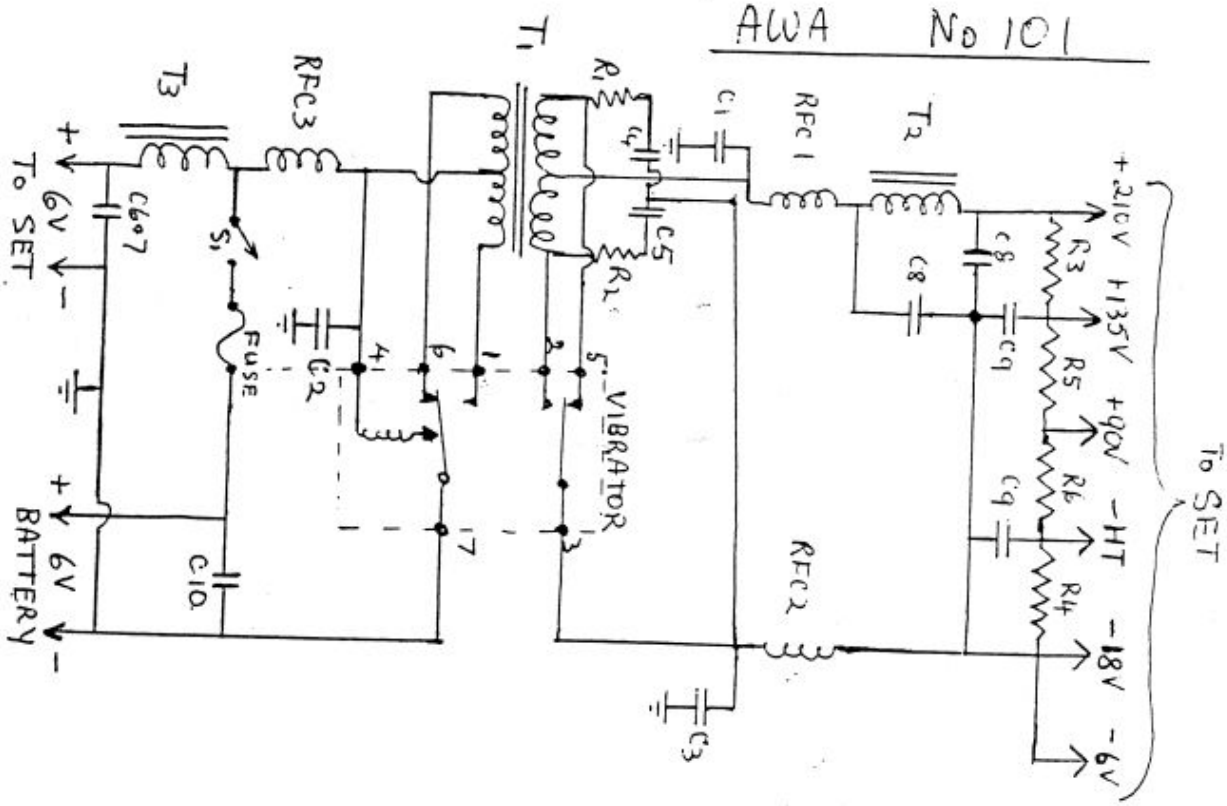


SENDER TYPE 2J

AWA No. 101

VIBRATOR POWER SUPPLY TYPE H5781

AWA No 101



BOOKLET NUMBER 1082

MILITARY SET TYPE FS2

A.W.A. INSTALLATION TYPE 1J4935

PAGES: 6

Amalgamated Wireless (Australasia) Limited,
"Wireless House",
47 York Street,
Sydney.

MILITARY SET TYPE FS2

A.W.A. INSTALLATION TYPE 1J4935

1. GENERAL PURPOSE AND MILITARY APPLICATION

The FS2 military set is an extremely light portable transmitter-receiver installation, assembled as a complete unit and carried within a canvas rucksack.

It is specially suited for inter-communication between forward units under active service conditions, for use by despatch riders and other applications requiring equipment of utmost portability.

2. FEATURES AND FACILITIES

(i) R/T operation only.
(ii) Minimum valve types consistent with efficient operation.
(iii) Australian made valves.
(iv) Simplicity of operation under active service conditions.
(v) Extreme portability.

3. FREQUENCY RANGE

Both transmitter and receiver are normally crystal locked upon a frequency of approximately 3000 Kc/s (100 metres). Higher frequencies may be substituted as required.

4. DISTANCE RANGE

The actual range over which communication may be effected between two FS2 equipments is restricted by a number of variable factors, such as frequency employed, type of aerial, nature of country intervening the points of communication, time of day, season etc.

With the rod aerial supplied with the FS2 reliable speech communication over distances up to 5 miles may be effected. For increased ranges, a 30 ft. wire aerial with associated guy cord and weight is included for hooking over the limb of a tree. This aerial enables communication up to a distance of 10 to 15 miles. Naturally, with higher frequencies and horizontal half-wave aerial arrays communication may be effected over greater distances.

It should be noted that, under certain conditions, it will be highly desirable to limit the transmission range, particularly where interception of messages by the enemy is

possible, and such limitation is accomplished by employing only the particular aerial enabling communication to be effected.

5. ANTENNAE

Two types of Antennae are provided with the FS2:-

(a) An 8 ft. collapsible "fish rod" vertical aerial.

(b) A 30 ft. wire flexible aerial.

The former is provided for work over short distances and as experience in the particular location dictates. This rod plugs directly into the aerial socket mounted at the top of the transmitter case, and should always be employed before erecting the 30 ft. wire aerial, to see if communication is satisfactory without going to further trouble. A rubber umbrella is attached to the base of this aerial to prevent the intrusion of water into the set itself.

The other aerial, which is normally wound on four hooks fitted to the lid of the unit, consists of 30 feet of highly flexible wire, a 30 ft. length of shark line, insulator and aerial plug. By means of a lead weight the guy cord can be thrown over the limb of a tree, enabling the aerial to be pulled up to its maximum height and as near vertical as possible. The method of rigging depends upon local conditions and nothing can be laid down specifically, except to state that it must be erected clear of obstructions all along the length of the wire to where it plugs into the set.

6 POWER RATING

The unmodulated power output of the transmitter is approximately 100 m.w. into a quarter wave antenna and this carrier can be modulated up to 100% by speaking into the microphone at normal conversation level.

7. SOURCES OF POWER SUPPLY

The FS2 has been designed to operate from dry batteries and every effort has been made to reduce battery drain to a minimum, the low tension voltage for the valve filaments being supplied normally by two 3 volt torch batteries in parallel and the high tension and grid bias supplies are obtained from a special battery of fairly low capacity. This complement should last at least a fortnight when operated intermittently each day.

These batteries are fitted inside the metal case itself and are readily accessible for renewing when run down.

For continuous operation, the life of the batteries is as follows:

High tension battery - approximately 36 hours
Low tension battery - approximately 12 hours

When located in a more or less semi-permanent position heavy duty batteries or a vibrator pack can be supplied, the former mounting within a wooden battery box.

The filament current drain for both transmitter and receiver is .48 amp. The microphone is energised by the 3 volt supply and draws on an average about 60 m.a. in transmitting position only.

High tension power requirements obtained from the special battery is 135 volts, the current being 17 m.a. for the transmitter and 10 m.a. for the receiver. Grid bias voltages of 1.5 and 4.5 volts negative polarity, are also supplied from this special battery.

8. TECHNICAL DESCRIPTION

(a) Transmitter: A simple three valve crystal controlled circuit is used for the transmitter. The components are fitted to an aluminium front panel and sub-chassis and this assembly fits into the aluminium carrying case. Three Radiotron valves are employed as follows:

Crystal Oscillator, type 1K5G
Power Amplifier Doubler, type 1K5G
Speech Modulator, type 1L5G

The crystal oscillator stage is fitted with a low temperature coefficient quartz crystal which is correct to frequency within 0.03% and over a temperature range of 10° to 60° Centigrade.

The circuit is adjusted by means of a variable iron dust cored coil which once set requires no further attention. The Power Amplifier Doubler stage operates at twice the crystal frequency and is coupled directly to the aerial circuit. The aerial circuit is used for both transmitter and receiver, being connected at will by means of the "RECEIVE-TRANSMIT, PRESS TO TALK" switch. This switch in the "TRANSMIT" position supplies power to the transmitter filaments and neophone handset microphone, and as mentioned, connects the P.A. stage to the aerial circuit. The speech modulator stage is operated from the handset microphone and modulates the P.A. stage in the anode circuit. This modulator is designed to operate over the specific band of frequencies of 300 - 3000 cycles, which band is found adequate for faithful voice

reproduction. The carrier spread under modulation is not much greater than 6 Kc/s.

A dual purpose meter is installed on the front panel to read either filament voltage or power amplifier anode current. The filament voltage is set always to 2 volts by a rheostat on the front panel, and then the Power Amplifier current is adjusted to its correct value by the transmitter aerial tuning condenser.

This condenser is the only variable tuning control on the unit under the supervision of the operator, and once set for a particular location, it requires no further attention.

(b) Receiver: A four valve reflex superheterodyne circuit is used for reception and the components are fitted to the same front panel and sub-chassis as used for the transmitter section. Four Radiotron valves are used as follows:

Frequency Changer, 1C7G
Intermediate Frequency Amplifier, 1K5G
Reflexed Amplifier and Detector, 1K7G
Output Amplifier, 1K7G

The oscillator frequency in the frequency changer is controlled by a quartz crystal having the same characteristics as that used in the transmitter. To obtain the highest possible degree of stability the circuit is arranged to be independent to any variable tuning device, the only controlling element being the crystal itself. The signal grid of the frequency changer is switched to the aerial circuit by the "RECEIVE - TRANSMIT" switch. The aerial circuit is always tuned to the operating frequency as it is adjusted during the transmitter tuning operations and so does not require further alteration.

The intermediate frequency transformer coils have variable iron dust cores and are shunted with fixed mica tuning condensers. The assembly is extremely stable and after the circuits have been aligned at the factory to the operating frequency, the adjustments will stay set over an indefinite period.

The first intermediate amplifier operates at 460 Kcs. and drives the reflexed amplifier and detector. This valve operates first at 460 Kc/s. and then the signal is rectified by one of the diode elements and the modulation frequencies are amplified by the same valve by feeding them back into the control grid via the volume control and suitable filters. The audible frequencies are amplified again in the output valve and are heard in the handset receiver. The reflexed

amplifier also provides automatic volume control voltage by rectifying some of the signal in another of its diode elements.

The overall sensitivity of the receiver to a standard signal is always better than 5 microvolts per metre for 5 milliwatts output in the receiver handset. This level in the earpiece is very loud and is more than ample for a commercial circuit.

The maximum undistorted power output is approximately 30 milliwatts.

9. VALVE SUMMARY

All valves employed are of Radiotron type, manufactured in Australia, thus ensuring continuity of supplies.

Transmitter:	1 type	1K5G-Crystal oscillator
	1 "	1K5G-Power Amplifier doubler
	1 "	1L5G-Speech Amplifier and Modulator
Receiver:	1 "	1C7G-Frequency Changer
	1 "	1K5G-Intermediate Frequency Amplifier
	1 "	1K7G-Reflexing Amplifier and detector
	1 "	1K7G-Output Amplifier

10. DIMENSIONS AND WEIGHT

	Length	Height	Depth	Weight
Transmitter-receiver unit complete (not including canvas rucksack)	11"	10½"	8¼"	22 lbs.

11. SCHEDULE OF EQUIPMENT (Supplied)

One military set type FS2 comprising:

(a) Radio telephone unit type 1J4933
(b) One working set of valves
(c) Two crystals (for transmitter and receiver respectively)
(d) Batteries, comprising:
2 Eveready 1547 cells
1 Eveready Q208 high tension block
(e) Aerial equipment, as follows:

1 Collapsible rod antenna
1 30 ft. flexible wire aerial
1 Insulator
1 30 ft. Guy cord
1 Aerial plug
1 Counterpoise wire

(f) One neophone hand set with cord
(g) Canvas Rucksack
(h) One instruction book No. 1/4935R

12. PHOTOGRAPHS

Numbers 1372, 1373, 1373A.

BOOKLET 1064.

MILITARY SET TYPE FS6

A.W.A. INSTALLATION 1J5780.

PAGES: 6

Amalgamated Wireless (Australasia) Limited,
"Wireless House",
47 York Street,
SYDNEY.

sibility of jamming, a wide band of frequencies is incorporated, providing operation within the range 4.2 - 6.8 megacycles, with a slight overlap at each end. Other frequency ranges may be substituted if necessary, such as 3.1 - 5.1 megacycles or 4.8 - 7.5 megacycles.

4. DISTANCE RANGE

With the normal counterpoise and three sections of antenna rod "A", the range to be expected between two sets of this equipment over average terrain, utilising a frequency in the vicinity of 4 - 5 megacycles, is approximately:

W/T - 25 to 30 miles
R/T - 12 to 16 miles

Ranges considerably in excess of these figures have been repeatedly obtained, and by employing larger aerials such as the horizontal half wave dipole or higher frequencies, communication over hundreds and even thousands of miles has been obtained.

It is pointed out that the ranges for military purposes vary greatly under different conditions. For instance, the range between an infantry battalion headquarters and a brigade headquarters may be 3 miles in attack, 10 miles in defence and 20 miles or more under garrison conditions. Further, the judicious choice of frequency and aerial enable improved transmission to be effected over the required distances, due consideration being given to the nature of intervening country and background noise level.

5 ANTENNAE

Two types of antennae are available for use with the FS6 set; one for normal use in the field and the other for operating under mobile conditions. The first is antenna rod "A" consisting of five brass sections each 3' long, in conjunction with horizontal spokes to form a capacity top and associated guys and pegs. The second is a flexible aerial type 1R3175, being a collapsible cadmium plated "fish rod" type, capable of erection to an approximate height of 9 feet. This is mounted on an insulated base through a flexible spring and is depicted in photograph number 1391.

6. POWER RATING

The output power from the power amplifier is:

W/T - 8 watts
R/T - 4 watts

7. SOURCE OF POWER SUPPLY

Primary power for the operation of the installation is obtained from a 6 volt 120 ampere hour accumulator mounted within a wooden carrying case, fitted with a connecting socket into which plugs the interconnecting cable from the vibrator unit. The load on the accumulator is 3.2 amps whilst receiving and 6 amps whilst transmitting under W/T conditions.

High tension supplies are derived from a vibrator transformer filter combination, the vibrator being highly efficient and of the gas filled type. Two vibrators are fitted within the vibrator unit, one acting as a spare. Operation of the vibrator unit is such that, under R/T conditions no undue noise is noticeable on the carrier with the microphone in circuit and no speech input.

8. TECHNICAL DESCRIPTION

(a) Transmitter: The transmitter employs a Radiotron 1L5G connected as a pentode and used in a conventional oscillator circuit. Provision is made for adjusting the inductance of the oscillator coil and the shunt minimum circuit capacity.

On W/T the oscillator and power amplifier grid resistance returns are keyed and with key up the full negative bias available is applied to the grids through this resistance, thus effectively cutting the valves off. The power amplifier switch employs a Radiotron 807 which is modulated by a Radiotron 1L5G: the power amplifier is neutralised by means of a small semi-fixed capacity connected from a power amplifier plate to the grid end of the oscillator coil. This is normally carried out during the first test after manufacture and, once adjusted, should need no further attention.

With the send/receive switch in the "net" position, the power amplifier screen supply is cut off, thus leaving the oscillator stage only in operation for "netting" purposes.

(b) Receiver: The FS6 employs a standard superheterodyne receiver with provision for the substitution of different wave ranges, as mentioned previously.

A Radiotron 1C7G mixer oscillator converts the frequency range of 4.2 megacycles - 6.8 megacycles to the I.F. frequency of 460 kilocycles. The conversion efficiency is approximately 70% for the entire range and is measured on the 1C7G converter grid as the ratio between signal and I.F. sensitivity.

This stage is followed by a 1K5G conventional I.F. section operation at 460 Kc/s. Following this is a reflex stage employing a Radiotron 1K7G, which rectifies the signal, supplies A.V.C., amplifies at 460 Kc/s and reflexes back through the valve the rectified A.F. component. A Radiotron 1K7G triode connected output stage and a 1C7G beat frequency oscillator complete the receiver.

The following characteristics are indicative of the normal performance of this receiver:

I.F. Sensitivity

Input	Frequency	Stage	O.P.
20 m.v.	460	F.C	1 m.w.
900 m.v.	460	I.F.	1 m.w.

I.F. Selectivity

Band Widths	8 Kc/s	2 X	off resonance		6 dB
	15 "	10 X	"	"	20 dB
	27 "	100 X	"	"	40 dB

Maximum Output

20 mw. with a maximum distortion not exceeding 5% into 300 ohm load.

Image Ratio

With dummy aerial consisting of 50 mmf. in series with 16.6 ohms and circuits adjusted for maximum sensitivity at 6.8 megacycles, the image ratio is 26 dB.

It is pointed out that under normal conditions the receiver output is satisfactorily free from "hash" interference from the vibrator unit.

For interconnecting transmitter-receiver accumulator and vibrator unit appropriate rubber covered cable of either 6 ft. or 3 ft. lengths are supplied terminated with non-reversible plugs.

9. VALVE SUMMARY

All valves employed in the FS6 are of the Radiotron type manufactured in Australia.

Transmitter

1 Radiotron type 1L5G - oscillator
1 " " 807 - power amplifier
1 " " 1L5G - modulator

Receiver.

1 Radiotron type 1C7G - frequency convertor
1 " " 1K5G - I.F. amplifier
1 " " 1K7G - reflex amplifier and A.V.C.
1 " " 1K7G - output amplifier
1 " " 1C7G - beat frequency oscillator

10. DIMENSIONS AND WEIGHT

	Length	Width	Height	Weight
Transmitter	21⅛"	8½"	12"	38½ lbs.
Vibrator Unit	16¼"	4⅝"	10¾"	28 lbs.
6 volt accumulator (in box) approx.	12"	8"	9"	56 lbs.
Cables	6 ft. or 3 ft.			3 lbs. or 2½ lbs.

11. SCHEDULE OF EQUIPMENT (Supplied)

One military set type FS6 comprising:

(a) Transmitter type 1J5277 and receiver type 1C5406 in case type 1J5775.
(b) Vibrator power supply unit type H6439 including one 6 volt vibrator, gas filled, (socket for spare vibrator).
(c) Two low tension connectors (interconnecting cables)
(d) One high tension connector
(e) Two counterpoise leads
(f) One working set of valves
(g) One instruction book

ADDITIONAL EQUIPMENT REQUIRED TO COMPLETE STATION

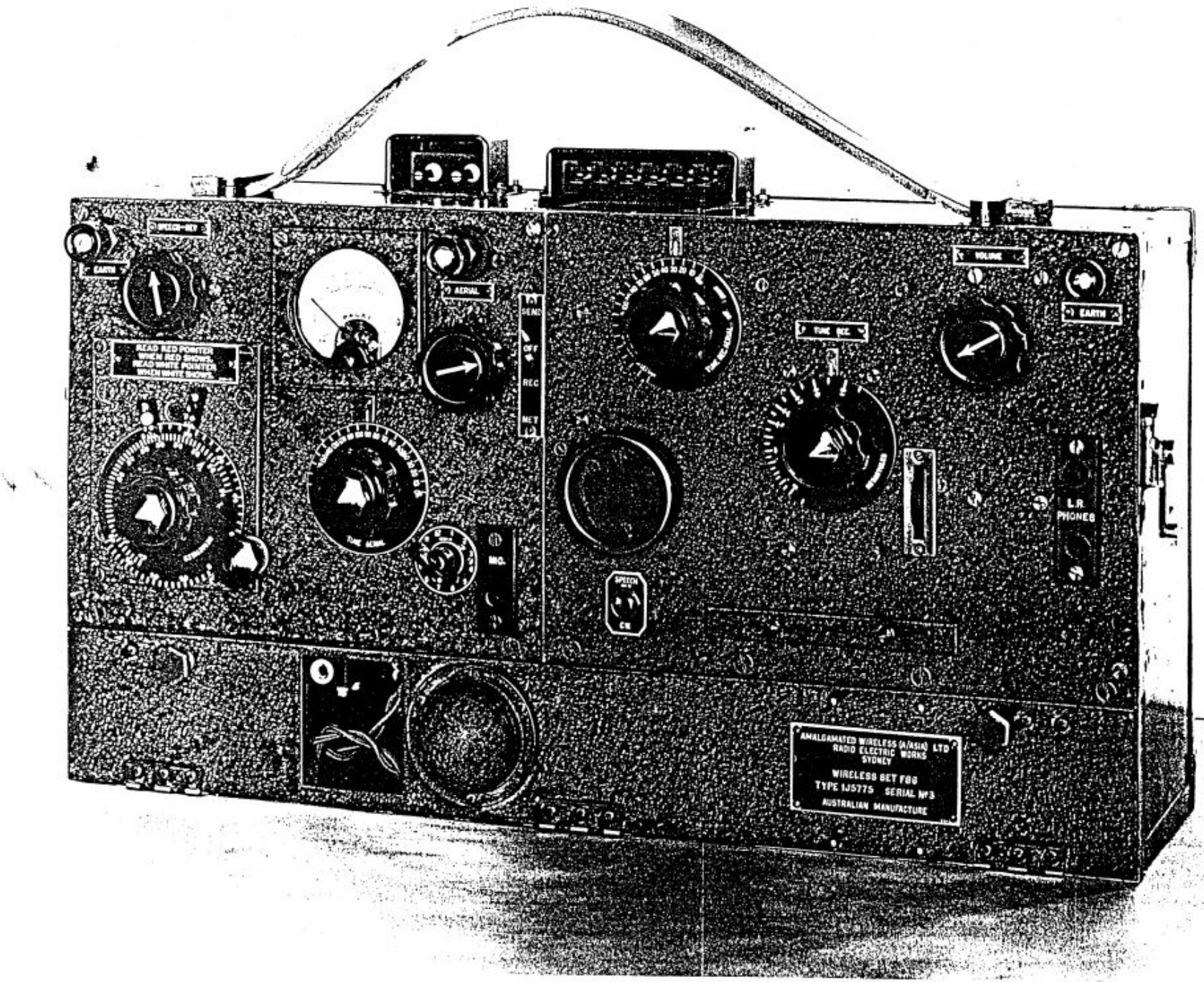
(h) One 6 volt accumulator in wooden carrying case
(i) One hand microphone
(j) Two pairs low resistance headphones
(k) One W/T manipulating key
(l) One flexible aerial type 1R3715

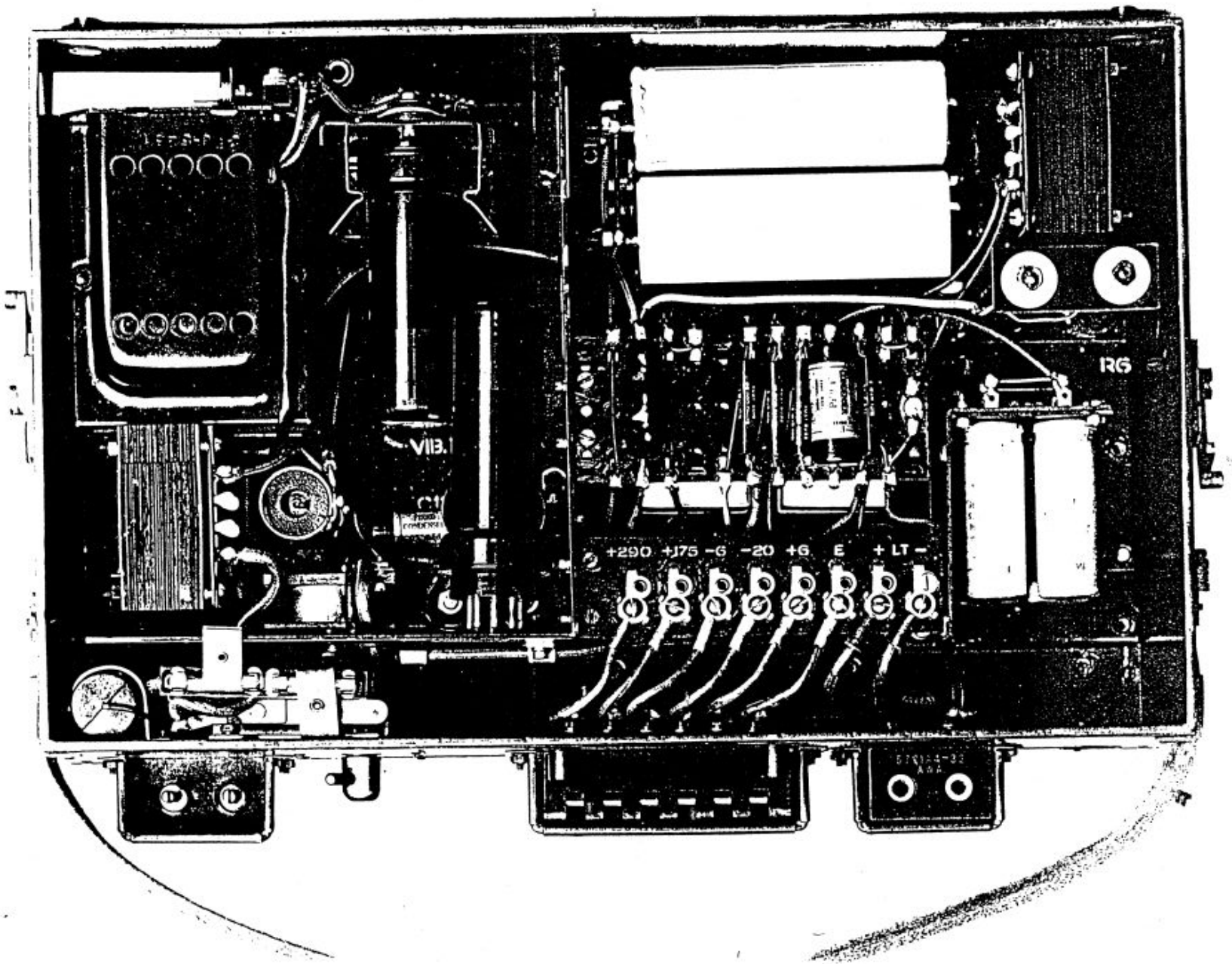
One set aerial gear comprising:

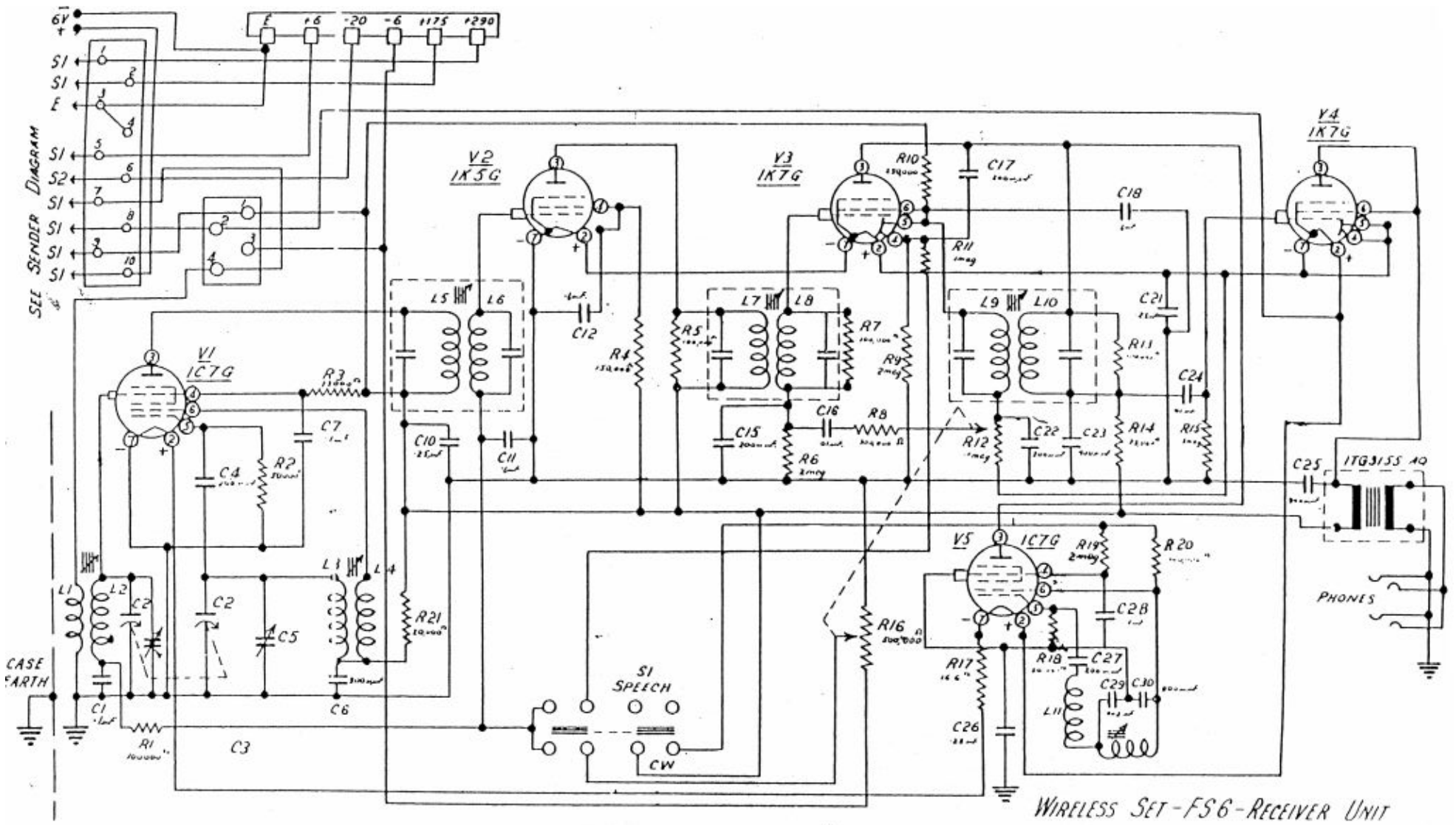
(a) 5 Brass mast sections each 3 feet long
(b) 4 spokes for mounting horizontally on a clamp at the top of the mast section
(c) 1 base with spike
(d) 3 cord guys
(e) 3 metal guy anchor pegs
(f) 1 aerial lead
(g) 1 kit bag to house aerial gear

12. PHOTOGRAPHS

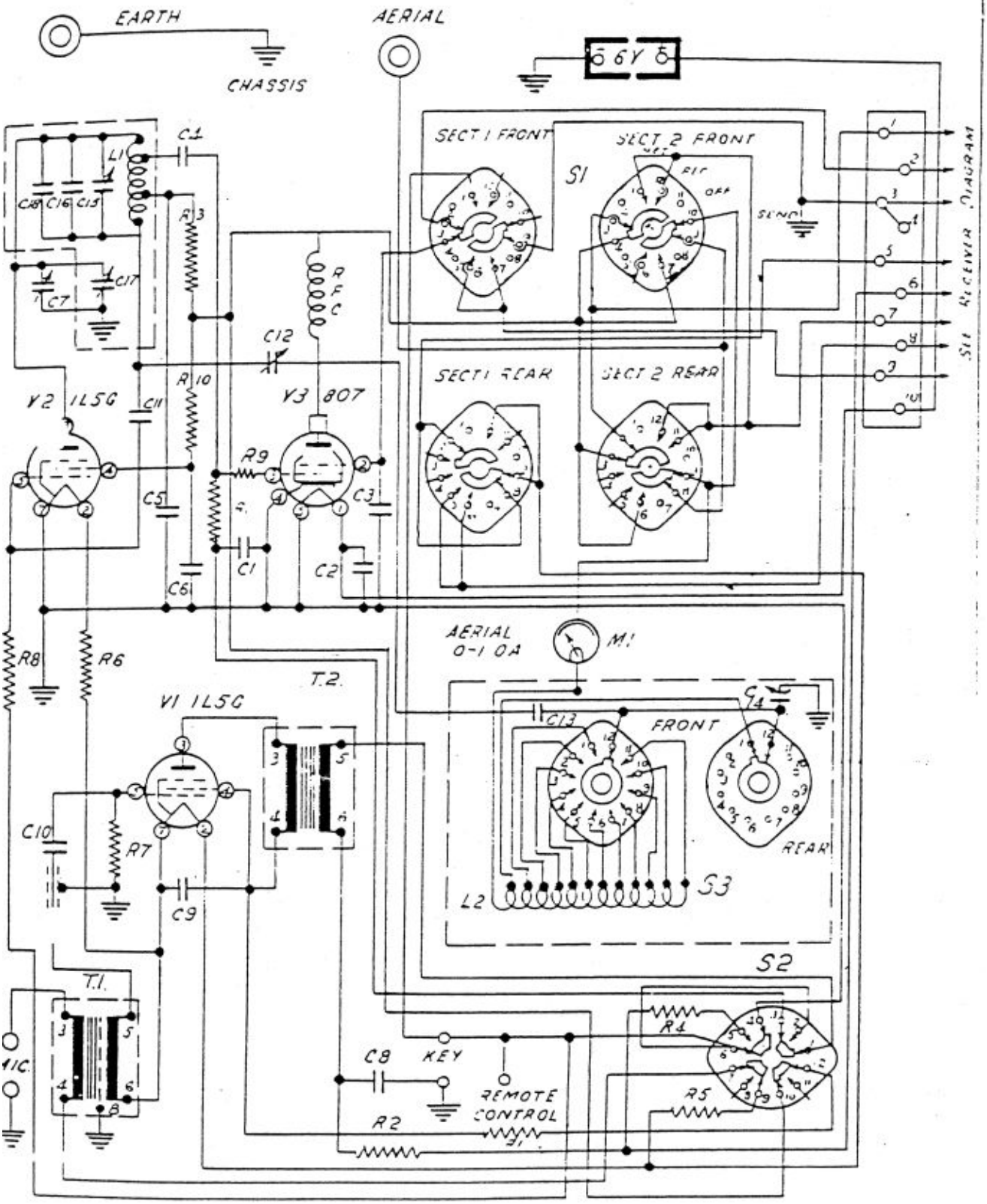
1280, 1511.


EARTH
AERIAL
SEND
OFF
REC
MET
READ RED POINTER WHEN RED SHOWN
READ WHITE POINTER WHEN WHITE SHOWN
MIC.
VOLUME
EARTH
L.R. PHONES
AMALGAMATED WIRELESS (A'ASIA) LTD
RADIO ELECTRIC WORKS
SYDNEY
WIRELESS SET F88
TYPE 1J/5775 SERIAL N°3
AUSTRALIAN MANUFACTURE

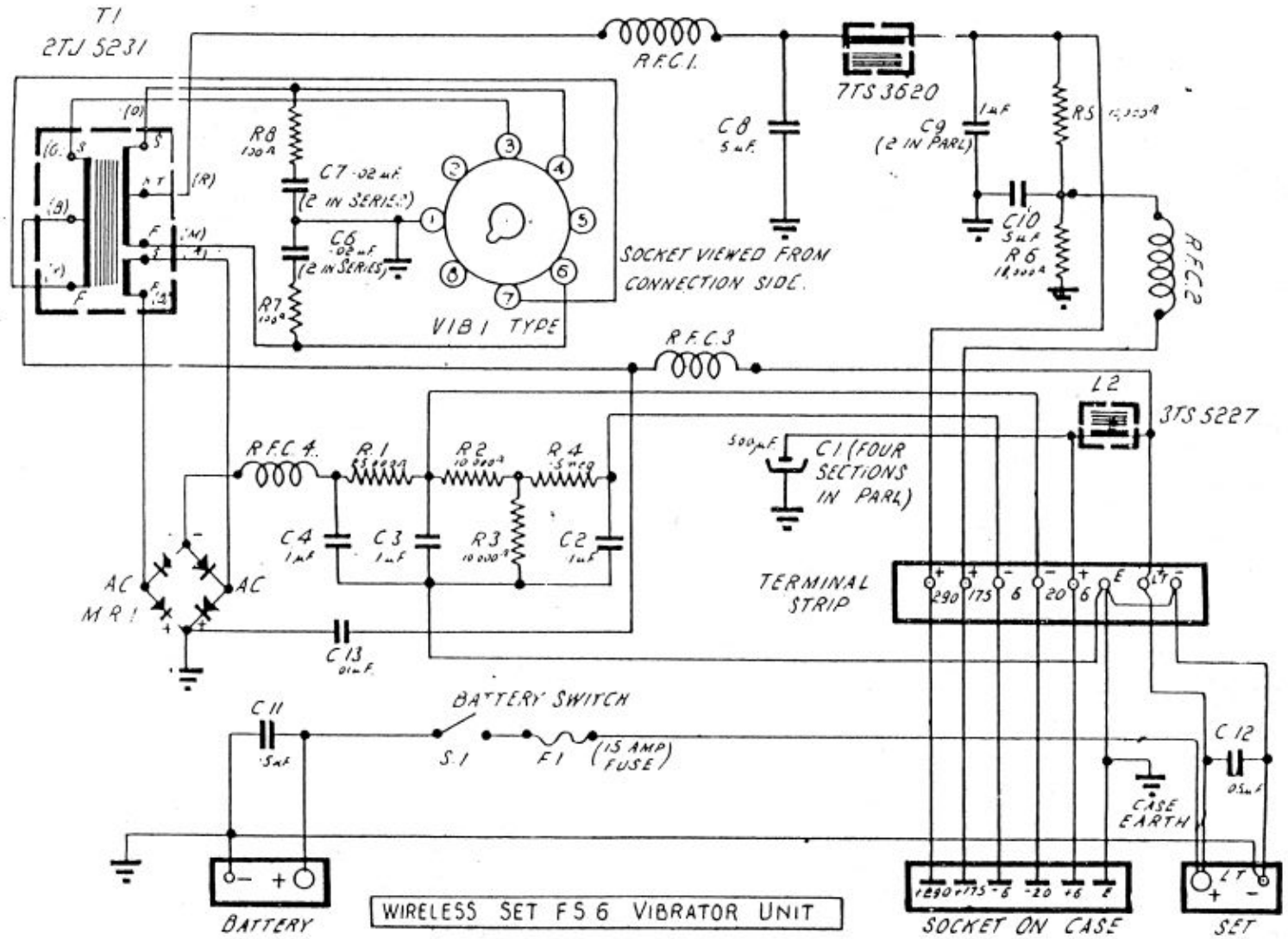

R6
VIB.1
+290 +175 -G -20 +G E + LT -



WIRELESS SET - FS6 - RECEIVER UNIT



WIRELESS SET - F S 6 - SENDER UNIT


T1
2TJ 5231
R.F.C.1.
7TS 3620
C8
5 μF.
C9
(2 IN PARL)
1 μF
R5
C10
5 μF
R6
R.F.C.2
R8
130Ω
C7 ·02 μF
(2 IN SERIES)
C6
·02 μF
(2 IN SERIES)
R7
130Ω
VIB 1 TYPE
SOCKET VIEWED FROM
CONNECTION SIDE.
R.F.C.3
L2
3TS 5227
R.F.C.4.
R1
R2
10 000Ω
R4
·5 MEG
500 μF
C1 (FOUR
SECTIONS
IN PARL)
C4
1 μF
C3
1 μF
R3
10 000Ω
C2
1 μF
AC
AC
M.R.1
C13
·01 μF
TERMINAL
STRIP
290
175
6
20
6
E
LT
C11
·5 μF
BATTERY SWITCH
S.1
F1
(15 AMP
FUSE)
C12
0.5 μF
CASE
EARTH
BATTERY
WIRELESS SET F.S.6 VIBRATOR UNIT
SOCKET ON CASE
SET

BOOKLET NUMBER 1065

MILITARY SET TYPE FS8.

A.W.A. INSTALLATION TYPE J6599

Pages 9

AMALGAMATED WIRELESS (AUSTRALASIA) LIMITED
"Wireless House",
47 York Street,
SYDNEY.

MILITARY SET TYPE FS8

A.W.A. INSTALLATION TYPE J6599

1. GENERAL PURPOSE AND MILITARY APPLICATION

The FS8 military set is a compact self-contained transmitter-receiver installation essentially designed and suited to the exacting requirements of mobile military communication; in particular it is intended for mounting in armoured cars, trucks or tanks, but its flexibility is such that it is admirably suited for a ground station for either point to point or aircraft control working.

Its construction and method of mounting upon a shock absorbing steel framework is such that it can conveniently be installed immediately behind the driving position on the bulkhead of armoured reconnaissance cars.

Photograph No. 1393 shows the general method of mounting within a special angle steel framework made to accommodate both transmitter-receiver unit and power supply unit in their shock mounted form. These steel frameworks are not an essential part of the shock-mounting system, but were provided to simplify the problem of temporary mounting for test purposes in vehicles not specially fitted to receive them.

2. FEATURES AND FACILITIES

The following features of design are incorporated in the FS8 set:-

(i) Tuning controls are few in number and simple to operate.

(ii) Provision is made for remote control working.

(iii) The equipment consists of only two units (excepting battery).

(iv) All circuits are readily accessible and easily assembled for maintenance, testing and servicing purposes.

(v) Provision is made for the fitting of shock absorbers of the "Lord" type on both transmitter-receiver unit and power supply unit.

(vi) All switching circuits are instantaneous.

(vii) Provision is made for two pairs of headphones to enable two operators to utilise the equipment simultaneously if necessary.

(viii) A minimum number of valve types are employed consistent with efficient performance of the service intended.

(ix) All valves are of Australian manufacture and of types in common commercial use.

(x) A position is provided on the main send-receive switch allowing netting to be carried out.

(xi) A meter and suitable switch circuits are provided so that the cathode currents of all valves may be checked during operation.

(xii) Provision has been made for illumination of tuning control by means of a small lamp on an adjustable arm.

(xiii) The design, workmanship, material and finish of all apparatus are of the highest quality in their respective classes and capable of withstanding the rigours of long service. The equipment embodies the latest improvements and best features of electrical communication practice. The equipment conforms to Australian Standard Specifications where such exist or to the appropriate British Standard Specifications.

3. FREQUENCY RANGE

Both transmitter and receiver cover the range 5.0 to 1.875 megacycles, with a slight overlap at each end to ensure correct tuning adjustments when operating near the limits of the band.

4. DISTANCE RANGE

The range performance cannot be accurately expressed, as the number of miles over which communication may be obtained between two of these sets installed in vehicles depends largely upon a number of variable factors, such as terrain, soil conductivity, frequency, atmospheric conditions, time of day etc. Nevertheless, under normal conditions 100 miles W/T and 40 miles R.T. have been obtained in tests, with both vehicles stationary, whilst 60 and 25 miles respectively have been obtained with both vehicles in motion.

5. ANTENNA

A vertical flexible rod aerial type 1R3715 cadmium plated and mounted on a porcelain insulator usually forms part of this installation.

The aerial is capable of extension to a height of 9 ft. and is so constructed as to allow the vehicle to pass under low obstructions with a minimum of clearance. This aerial is depicted in photograph No. 1391.

6. POWER RATING

With 12.6 volt input to the power supply unit, the D.C. power input to the anode circuit of the power amplifier with the transmitter fully loaded under W/T conditions is approximately 90 watts. This provides approximately 60 watts of radio frequency energy to the power amplifier anodes which is available for transfer to the aerial circuit.

On R/T the power is reduced to approximately 25 watts of radio frequency energy at the power amplifier anodes.

SOURCES OF POWER SUPPLY

Primary power supply is obtained from a 12 volt accumulator operating in conjunction with a genemotor power supply unit. This power supply unit consists of a genemotor for high tension supply to the transmitter, a genemotor for high tension supply to the receiver and suitable filtering circuits.

All components are mounted on a chassis which can be removed easily from the base, the latter serving as a cover for wiring. The finish of the power unit is the same as that of the transmitter-receiver assembly.

High tension and low tension commutators of the machines are readily accessible for maintenance purposes.

Output circuits of the genemotor are protected with fuses which are accessibly mounted on top of the unit. The input circuit of the transmitter genemotor is protected with a thermal overload relay which stops the machine if it is overloaded. The input of the receiver genemotor is protected with a fuse.

The current drawn from the battery under different conditions is as shown hereunder:-

(a) Battery terminal voltage 12.6 volts

(i)	Transmit	21 amps
(ii)	Receive	5.6 amps
(iii)	Receive (with transmitter on standby)	7 amps
(iv)	Net	16 amps
(v)	Standby (heaters on in transmitter and receiver)	2.6 amps

(b) Battery terminal voltage 11 volts

(i)	Transmit	17.5 amps
(ii)	Receive	5.2 amps
(iii)	Receive (with transmitter on standby)	6.5 amps
(iv)	Net	15 amps
(v)	Standby	2.4 amps

For connecting the power unit to the L.T. battery, a twin-core cable is supplied, fitted with terminal lugs and battery post clamps.

A multi-core cable is supplied for connecting the power unit to the transmitter-receiver unit. This is fitted at either end with polarised multi-pin connector plugs with locking rings.

TECHNICAL DESCRIPTION

The case, front panels and sub-panels of the FS8 are made of folded sheet steel providing strong construction. All such panels and other steel parts are cadmium nickel plated, all exposed surfaces being finished with baked enamel. The case is provided with a front cover which fits over and protects the controls.

Provision is made for carrying a microphone and two pairs of headphones which are held by clips fitted to the inside of the cover.

A special compartment in the receiver normally houses a W/T key which may be withdrawn partially or completely during operation.

Care is taken in the construction and fitting of the assembly to prevent the intrusion of dust.

Suitable interconnecting cables are provided to link low tension accumulator power unit and transmitter-receiver. These are fitted with non-reversible multi-pin connector plugs with locking rings.

Access to valves and internal components is accomplished by undoing four knurled hand screws on the unit concerned and withdrawing on runners fitted within the case. The whole unit is then exposed in such a manner as to permit easy replacement of valves, which are mounted vertically on top of the sub-panel.

Maintenance of the transmitter is facilitated by the unit type construction of master oscillator, power amplifier sections and main switch assembly.

The transmitter and receiver are separate units which can be removed from the case quickly and easily. Necessary interconnections between the transmitter and the receiver are effected by means of plug-and-socket connectors which break connection as a unit is withdrawn from the case.

With each equipment is supplied a book giving comprehensive and detailed instructions for its installation and operation. Circuit diagrams are included to facilitate maintenance and service work. Values of resistances and capacitances are shown on the circuit diagrams.

Transmitter:

The transmitter is designed to provide either R/T or W/T transmission, either of which may be selected by means of a single changeover switch.

The circuit of the transmitter consists of the following sections, each in duplicate as regards tuning means in order to provide the most satisfactory rapid switching facility:-

(a) Master oscillator, which operates either as a crystal controlled oscillator or as a self-excited oscillator, tunable over the whole frequency range previously mentioned.

This range is covered in two steps, each step being spread over more than threequarters of the tuning dial, giving a good open scale. The dial, which has a vernier movement of the type standard with other field sets, is directly calibrated in megacycles per second.

Two crystals are normally included ground to an accuracy of .03% of any particular frequency within the range, but in order to permit appreciation of all facilities, four crystals are recommended.

The circuit of the self-excited master oscillator is thermally compensated to minimise frequency drift under severe conditions of variation of ambient temperature to be expected in armoured vehicle service.

(b) The output of each of the alternative power amplifier circuits is coupled to the aerial by means of a

continuously variable impedance matching network, permitting accurate matching current rating for modulation and ensuring efficient transfers of energy to the aerial system on all frequencies in the operating range.

(c) Modulation is effected in the grid circuit of the power amplifier, this method being efficient and simple.

The provision of two complete tuning channels enables two operating frequencies to be selected anywhere within the range of the transmitter, and with one channel tuned to each frequency it is then possible to switch instantaneously from one pre-set frequency to the other by the simple operation of a single knob control.

The pre-set frequencies mentioned above may be set up using the self-excited master oscillator for each channel, using crystal control for each channel, or using self-excitation on one channel and crystal on the other.

Positions for four crystals are provided, two for each channel, the alternative crystal in each channel being immediately selectable.

The time required to change either channel from one crystal frequency to the alternative would not exceed 30 seconds, so making quickly available four crystal controlled frequencies.

A dummy aerial is built into the transmitter suitable for the frequency range. The dummy aerial approximately represents a 9 ft. vertical rod aerial with short connecting lead, and it may be used for tuning the transmitter circuits without connection to the radiating aerial.

It will be appreciated that any considerable variation in length and the disposition of the connecting lead between transmitter and aerial must necessarily alter the electric characteristics of the aerial system and prevent exact agreement between dummy and radiating aerial. Tests have shown that the dummy provided will give good agreement with the type 1R3715 aerial connected to the transmitter by 3 ft. of wire run within the vehicle.

A position is provided on the main send-receive switch allowing the power amplifier stage to be rendered inoperative and permitting the operator to adjust the master oscillator frequency to coincide with the frequency of a received signal, using a zero beat method of adjustment.

Receiver:

A superheterodyne circuit is used for the receiver, which is also provided with two complete tuning channels so that once two operating frequencies anywhere within the range of the receiver have been selected and one channel tuned to each frequency, it is possible to switch instantaneously from one frequency to the other by the simple operation of a single knob control.

An important feature of this receiver is the use of thermal compensation of the heterodyne oscillator circuit to minimise frequency drift.

A single knob control calibrated directly in megacycles is provided for the tuning of each individual channel; each tuning control is provided with standard vernier movement and locking device. Both manual and automatic volume control are incorporated in the design of the receiver, performing the following functions:

(i) On R/T automatic control of R.F. gain is provided and a manual control operates on the audio frequency stage gain.

The characteristic of the automatic gain control system is such that the output level will remain constant within ±5 dB for carrier inputs modulated 30% at 400 cycles between 20 microvolts and 500,000 microvolts over the entire wave range.

(ii) For W/T, automatic gain control is removed, the audio frequency gain is switched to maximum and volume is entirely controlled by varying the R.F. sensitivity. The shift in beat note to different settings of the volume control is negligible.

For W/T reception a second heterodyne oscillator is switched into circuit with provision for beat note adjustment over a range approximately ± 2000 cycles. The receiver is stable with 25% increase above normal in high tension voltage.

Sensitivity:

The absolute sensitivity of the receiver is better than 3 microvolts at all frequencies. The absolute sensitivity is defined as the lowest intensity (in microvolts) of a radio frequency carrier modulated at 400 c/s to a depth of 30%, applied through a dummy aerial of 75 micro-microfarads capacity to the aerial terminal, such that the total R.M.S. output power, delivered into a resistive load of 300 ohms connected to the output terminals of the receiver, falls from 6 milliwatts to 3 milliwatts when the modulation is removed from the carrier.

Selectivity:

Selectivity of the receiver is given by the figures listed hereunder. These figures are for the selectivity of the intermediate frequency channel of the receiver and are obtained by the standard method of measurement, with the A.V.C. inoperative. Actual selectivity is slightly better than indicated because of the effect of the tuned signal-frequency circuits.

Kc/s off resonance		Input signal ratio for constant output
5 Kc/s	...	6 dB.
8 "	...	20 dB.
12 "	...	40 dB.
20 "	...	60 dB.

9. VALVE SUMMARY

Transmitter:	2	Radiotron type 807	in parallel - power amplifier
	1	" " 6V6G	- oscillator
	1	" " 6V6G	- modulator
Receiver	1	" " 6U7G	- R.F. amplifier
	1	" " 6J8G	- Frequency convertor
	2	" " 6U7G	- I.F. amplifiers
	1	" " 6B8G	- Second detector and audio amplifier
	1	" " 6B8G	- Audio output
	1	" " 6J8G	- Beat frequency Oscillator

10. DIMENSIONS AND WEIGHT

	Height	Length	Depth	Weight
Transmitter-receiver unit complete with valves and front cover	17"	27"	10"	77 lbs.

N.B. Shock mounting brackets when used increase the length dimensions to 29¾".

	Height	Length	Depth	Weight
Power Supply Unit with cables	11"	19¼"	9"	59 lbs.

N.B. Shock mounting brackets when used increase the length dimensions to 26½".

11. SCHEDULE OF EQUIPMENT (Supplied)

One military set type FS8 comprising:-

(a) Transmitter Type J6596 and Receiver type C6597

(b) Genemotor power supply unit type H6598

(c) Interconnecting cables

(d) One working set of valves

(e) Two crystals ground to a specified frequency (.03% accuracy)

(f) One instruction book

ADDITIONAL EQUIPMENT REQUIRED TO COMPLETE STATION

(g) One 12 volt accumulator

(h) One flexible aerial type 1R3715

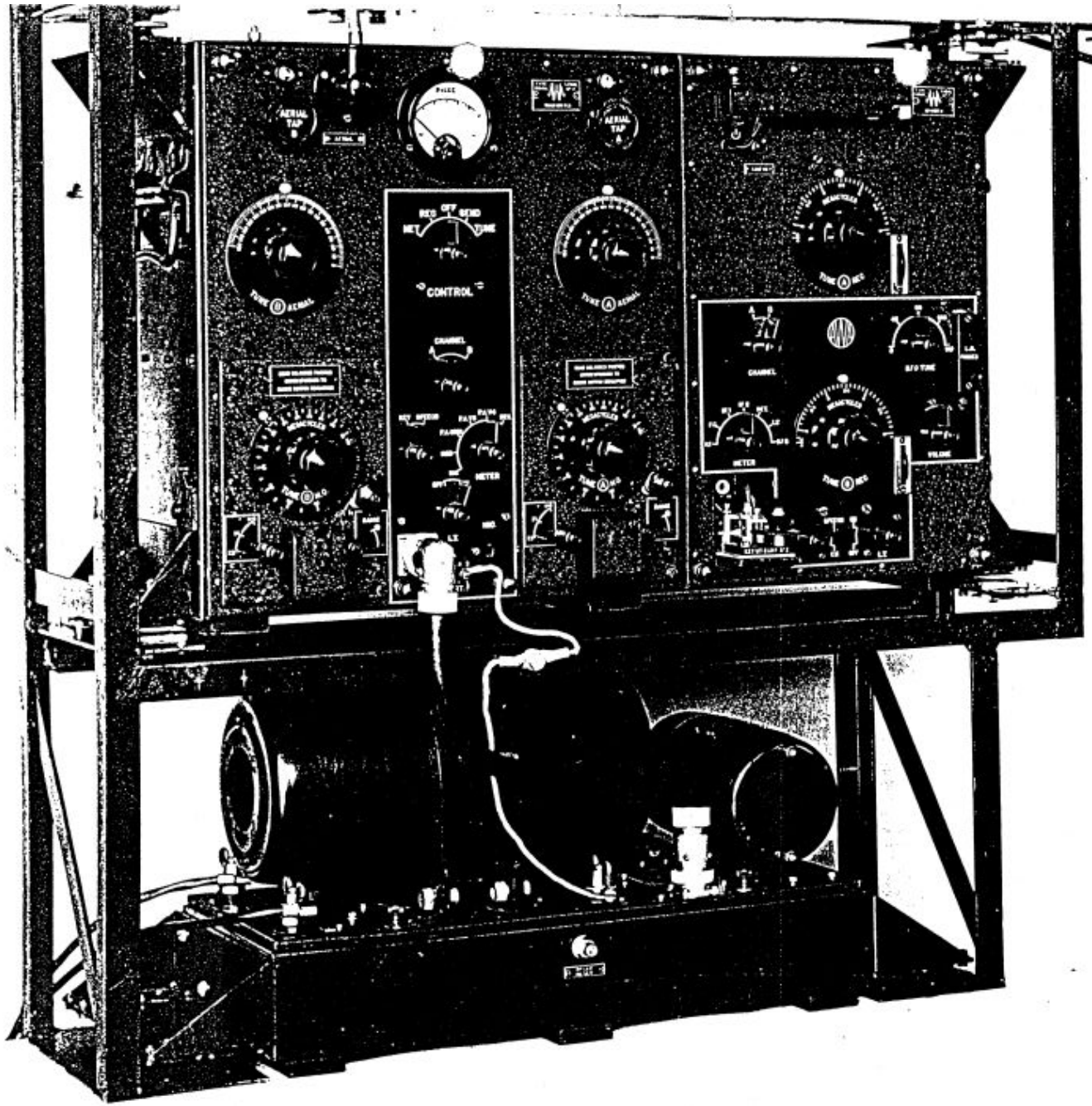
(i) One hand microphone

(j) One W/T manipulating key

(k) Two pairs low resistance headphones

12. PHOTOGRAPHS

Numbers 1391, 1392, 1393.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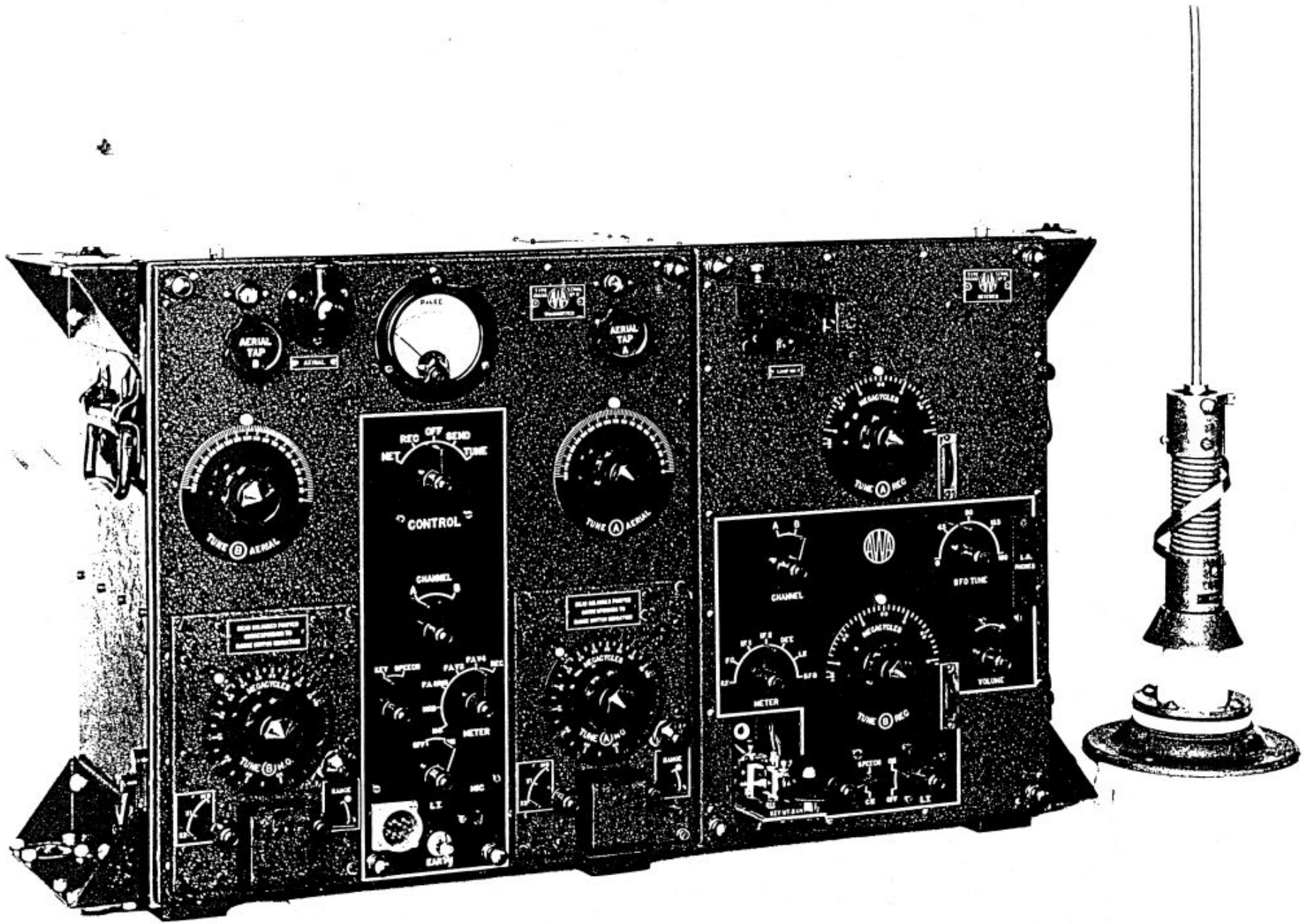
CONTROL
CHANNEL
METER
TUNE AERIAL
TUNE REC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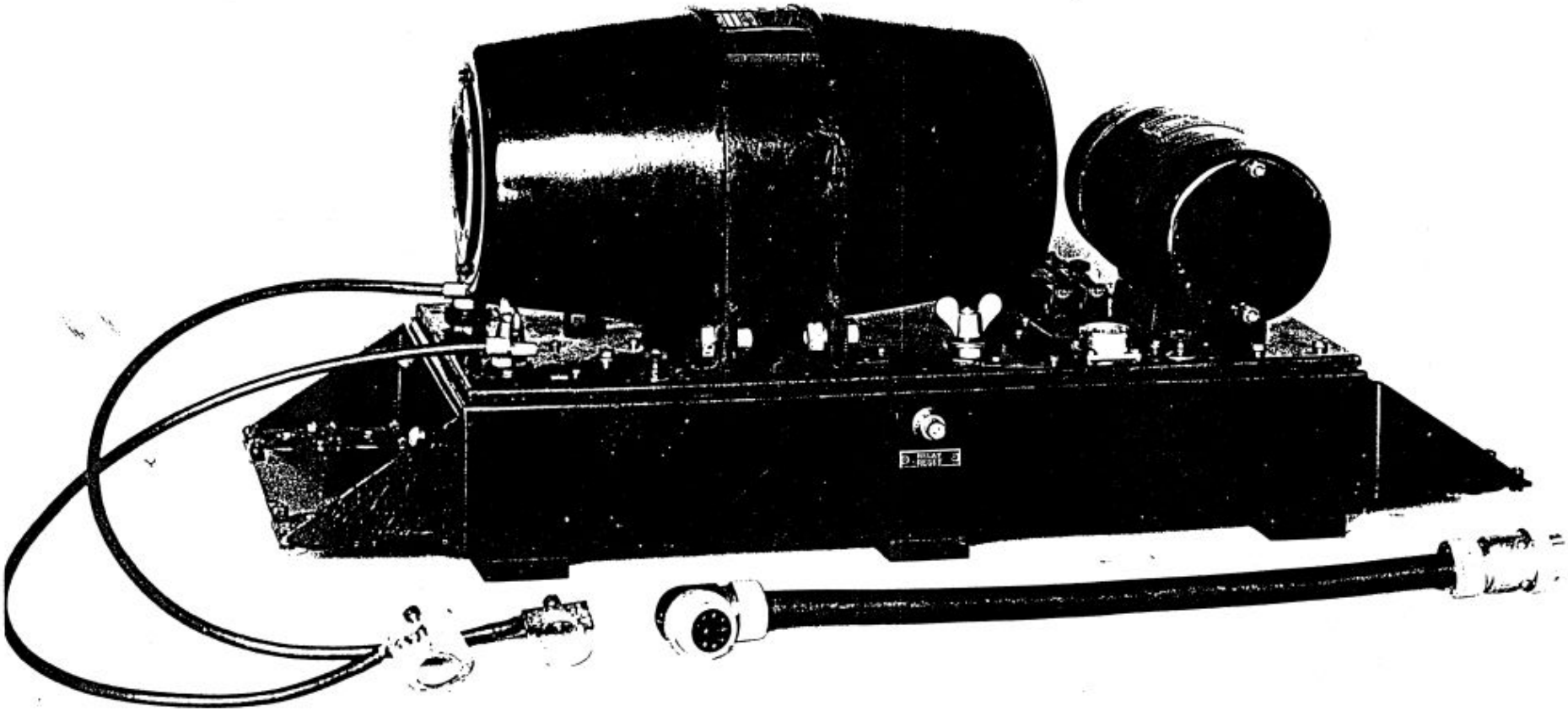
REC OFF SEND
NET TUNE
CONTROL
CHANNEL
TUNE (B) AERIAL
TUNE (A) AERIAL
TUNE (B) H.O.
TUNE (A) H.O.
METER
MEGACYCLES
TUNE (A) REC
TUNE (B) REC
BFO TUNE
VOLUME
CHANNEL
METER



BOOKLET NUMBER 1066

MILITARY SET TYPE FS9A

A.W.A. INSTALLATION TYPE J6563

PAGES: 3

Amalgamated Wireless (Australasia) Limited,
"Wireless House",
47 York Street,
Sydney.

MILITARY SET TYPE FS9A

A.W.A. INSTALLATION TYPE J6563

1. GENERAL PURPOSE AND MILITARY APPLICATION

The FS9A is an extremely light, portable transmitter-receiver installation, compactly assembled as a unit, fitted with webbing shoulder straps for ease of portability. The flexibility of the FS9A is such that it is suitable for intercommunication between forward units, or between forward units and battalion headquarters, between patrols and companies or for artillery observation. Actually, its scope is unlimited, being essentially a short range military set for use under active service conditions.

2. FEATURES AND FACILITIES

(i) R.T. operation only.
(ii) Minimum valve types consistent with efficient operation.
(iii) Australian made valves.
(iv) Extreme portability and ruggedness to meet exacting conditions.
(v) Where possible, standard components as used in larger military sets are employed to facilitate servicing.

3. FREQUENCY RANGE

Both transmitter and receiver cover the range 8.3 - 9 megacycles (36.14 - 33.33 metres).

4. DISTANCE RANGE

Depending upon the nature of the country intervening the points of communication, the distance capable of being covered by two such sets should be 3 - 4 miles.

Under certain conditions it will be highly desirable to limit the transmission range, particularly where interception of messages by the enemy is possible, and such limitation is accomplished by removing aerial sections until operation is being effected with only the length of aerial sufficient to establish communication with the reciprocal station.

5. ANTENNA

The antenna consists of eight aluminium tubular sections each 9" long, which fit together to a total height of

6', as depicted in photograph 1471. This aerial plugs into the top of the transmitter-receiver unit with a rubber collar to prevent moisture from entering the set; when not in use, the aerial sections are carried inside the lid by means of a clip.

6. POWER RATING

The output from the power amplifier is approximately .3 of a watt.

7. SOURCE OF POWER SUPPLY

Dry batteries contained within a special compartment of the unit supply both low tension and high tension voltages. The normal battery complement consists of:

1 Eveready Q288 H.T. Battery
1 Eveready Q18 L.T. Battery
1 Eveready W9S Bias Battery

8. TECHNICAL DESCRIPTION

The equipment consists of a pack unit fitted with webbing shoulder straps to enable transportation by one man. As depicted in photograph 1471, the pack unit consists of a transmitter-receiver in the upper portion with a hinged door immediately below to provide access to valves, which are mounted horizontally, and batteries.

The transmitter employs a Radiotron 1D8GT, connected in such a manner that the triode section operates as a master oscillator whilst the pentode section operates as a power amplifier. Modulation is impressed upon the grid circuit of the power amplifier, portion of the output valve of the receiver being employed as modulator. A general purpose meter facilitates tuning.

When used under active service conditions change of operation from send to receive is accomplished by pulling upon two cords which connect with the send-receive switch on the front panel and pass through the unit, being brought out at the back of the case. Pulling upon the left hand cord to its fullest extent places the set in the send condition and pulling upon the right hand cord to its fullest extent will complete the change over to receive. A small roller minimises cord wear.

In addition, a flexible drive cable is provided consisting of a short length of "Bowden" cable, upon one end of which is mounted a small gear box containing a pair of

helical gears to provide a right-angle turn which is necessary to bring the cable to a convenient position for the operator to handle. On the other end is mounted a small bakelite knob for tuning purposes. This cable is of sufficient length for the operator to fasten it to his belt and is provided to allow the operator to vary the tuning of the receiver by means of the vernier drive in order to overcome any frequency shift which might occur in the local receiver or in the distant transmitter, due to jolting.

The receiver is a superheterodyne of conventional design employing a Radiotron 1A7GT as frequency convertor, followed by a Radiotron 1N5GT I.F. amplifier. A further 1N5GT acts as reflex amplifier and A.V.C. whilst the final valve, a Radiotron 1D8GT, provides triode amplification, diode rectification and output. The pentode section also performs the function of modulating the transmitter.

9. VALVE SUMMARY

Transmitter:	1 Radiotron	1D8GT	- master oscillator and power amplifier
Receiver:	1 "	1A7GT	- frequency convertor
	1 "	1N5GT	- I.F. stage
	1 "	1N5GT	- Reflex stage
	1 "	1D8GT	- Diode detector, A.V.C. audio amplifier output stage and modulator

10. DIMENSIONS AND WEIGHT

	Height	Width	Depth	Weight
Pack Unit, not including webbing straps	13"	10"	8"	22 lb.13 oz.

11. SCHEDULE OF EQUIPMENT (Supplied)

One Military Set type FS9A comprising:

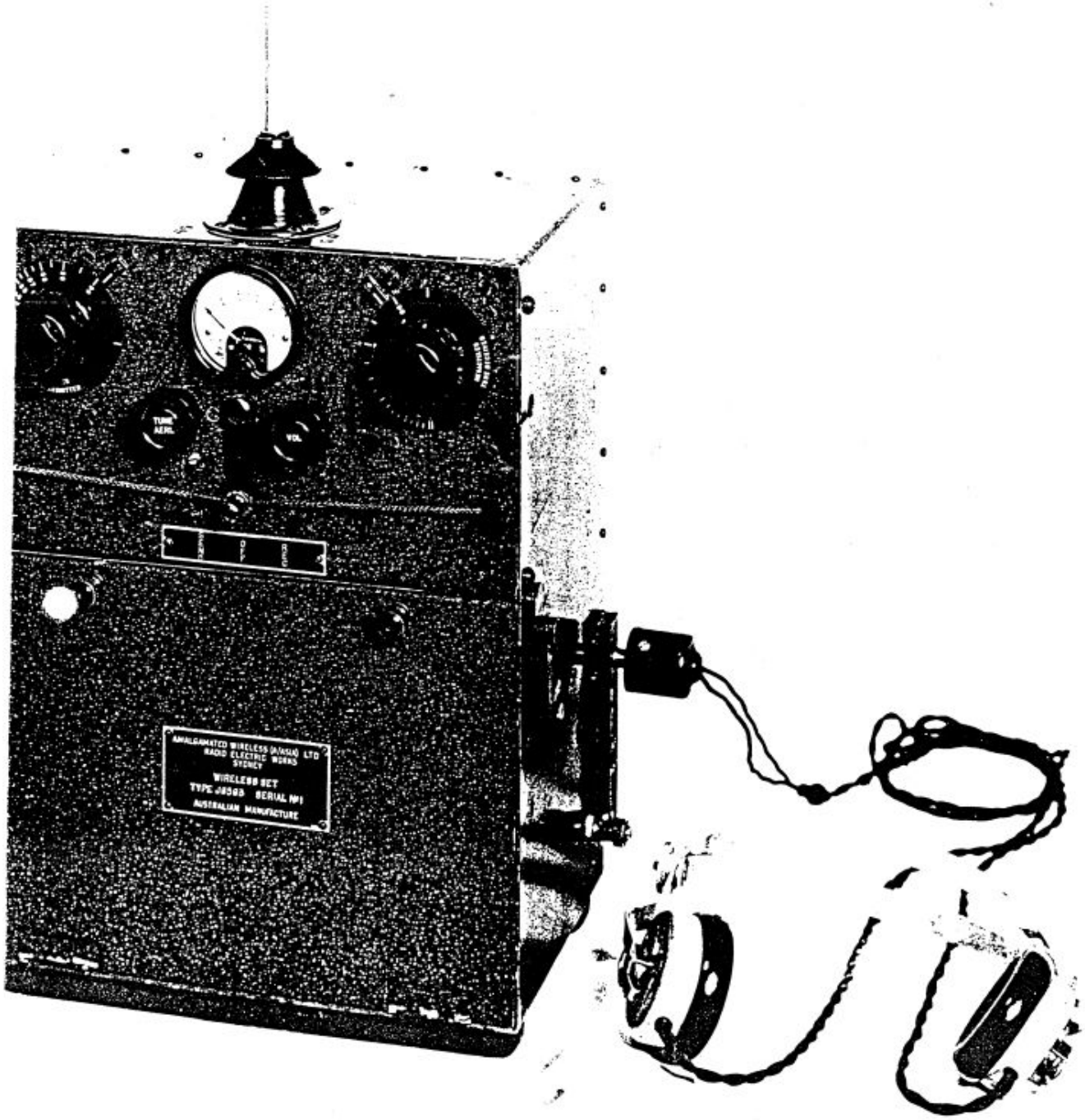
(a) Transmitter-receiver unit type J6563 in aluminium carrying case
(b) Low Tension and High Tension batteries
(c) One working set of valves
(d) One instruction book
(e) Eight aluminium aerial sections
(f) One Bowden flexible cable
(g) One rubber umbrella to fit over bottom aerial section

ADDITIONAL EQUIPMENT REQUIRED TO COMPLETE STATION

(h) One hand microphone
(i) One pair low resistance headphones

12. PHOTOGRAPH

1471 - Protection lid removed.


TUNE
AERIL
VOL
AMALGAMATED WIRELESS (A'SIA) LTD
RADIO ELECTRIC WORKS
SYDNEY
WIRELESS SET
TYPE WS9B SERIAL No1
AUSTRALIAN MANUFACTURE

BOOKLET NUMBER 1067

MILITARY SET TYPE FS9B.

A.W.A. INSTALLATION TYPE J6564

PAGES: 3

Amalgamated Wireless (Australasia) Limited
"Wireless House",
47 York Street,
Sydney.

MILITARY SET TYPE FS9B

A.W.A. INSTALLATION TYPE J6564

1. GENERAL PURPOSE AND MILITARY APPLICATION

The FS9B is a light weight portable transmitter-receiver equipment compactly assembled within an aluminium case, and fitted with webbing straps for ease of portability. It is primarily intended for use under active service conditions and has unlimited scope. It is admirably suitable for inter-communication between forward units or between forward units and battalion headquarters, between patrols and pickets, or for artillery observation.

2. FEATURES AND FACILITIES

(i) R. T. operation only.
(ii) Minimum valve types consistent with efficient operation.
(iii) Australian made valves.
(iv) Extreme portability and ease of operation under active service conditions.
(v) A press button switch is provided to allow netting to be carried out permitting a number of these equipments to operate as a net on a specific frequency.

3. FREQUENCY RANGE

Tuning range of both transmitter and receiver is from 8.3 to 9 Megacycles.

4 DISTANCE RANGE

The nature of country intervening the points of communication is an important factor to which due consideration must be given when operating low power apparatus. However, a conservative rating for communication between two FS9B military sets is 3 to 4 miles.

Under certain conditions, it will be highly desirable to limit the transmission range, particularly where interception of messages by the enemy is possible, and such limitation is accomplished by removing aerial sections. It is recommended that the smallest number of aerial sections sufficient to establish communication, be employed at all times.

5. ANTENNA

A collapsible aluminium aerial consisting of eight 9" tubular sections, fits into a recessed socket at the top

of the transmitter-receiver case. When not in use the aerial sections are carried inside the lid by means of a clip.

6. POWER RATING

The output from the power amplifier is approximately .3 of a watt.

7. SOURCE OF POWER SUPPLY

Dry batteries contained within a special compartment of the unit, supply both low tension and high tension voltages. The battery complement is as follows:

1 Eveready Q288 - high tension battery
2 Eveready Q18 - low tension batteries
1 Eveready W9S - grid bias battery

8. TECHNICAL DESCRIPTION

The equipment consists of a pack unit fitted with webbing straps for transportation. As depicted in photograph No. 1473, the unit contains transmitter-receiver in the upper portion, and batteries in the lower portion. A hinged door covering the battery compartment also provides access to valves, which are mounted horizontally.

(a) Transmitter: The transmitter employs a Radiotron 1L5G valve as a master oscillator, followed by a further 1L5G as power amplifier. A general purpose meter is included to facilitate tuning.

Two cords are fixed to the main send-receive switch, which pass over rubber rollers and through the unit to protrude from the back of the case providing control under active service conditions. A flexible cable upon one end of which is mounted a small gear box, and at the other a small bakelite knob, is provided for tuning purposes. This cable is sufficiently long for the operator to fasten to his belt, and enables the receiver tuning to be varied in order to compensate for any frequency shift due to vibration.

(b) Receiver: The receiver is a superheterodyne of a conventional design, employing a Radiotron 1C7G mixer oscillator, followed by a standard I.F. circuit using a 1K5G. This in turn drives a 1K7G reflexed amplifier, which also provides A.V.C. The final valve is a 1K7G providing audio amplification.

9. VALVE SUMMARY

(a) Transmitter: 1 Radiotron 1L5G - master oscillator
1 " 1L5G - power amplifier

(b) Receiver: 1 Radiotron 1C7G - mixer oscillator
1 " 1K5G - I.F. amplifier
1 " 1K7G - reflex amplifier and A.V.C.
1 " 1K7G - triode audio output

10. DIMENSIONS AND WEIGHT

	Height	Width	Depth	Weight
Pack unit not including webbing straps	12¾"	13"	9¼"	26 lbs. 10 ozs.

11. SCHEDULE OF EQUIPMENT (Supplied)

One Military Set type FS9B comprising:

(a) Transmitter-receiver pack set type J6564, in aluminium carrying case.

(b) Low tension and high tension batteries.

(c) One working set of valves.

(d) One Instruction Book.

(e) Eight aluminium aerial sections.

(f) One Bowden flexible cable.

(g) Two rubber umbrellas.

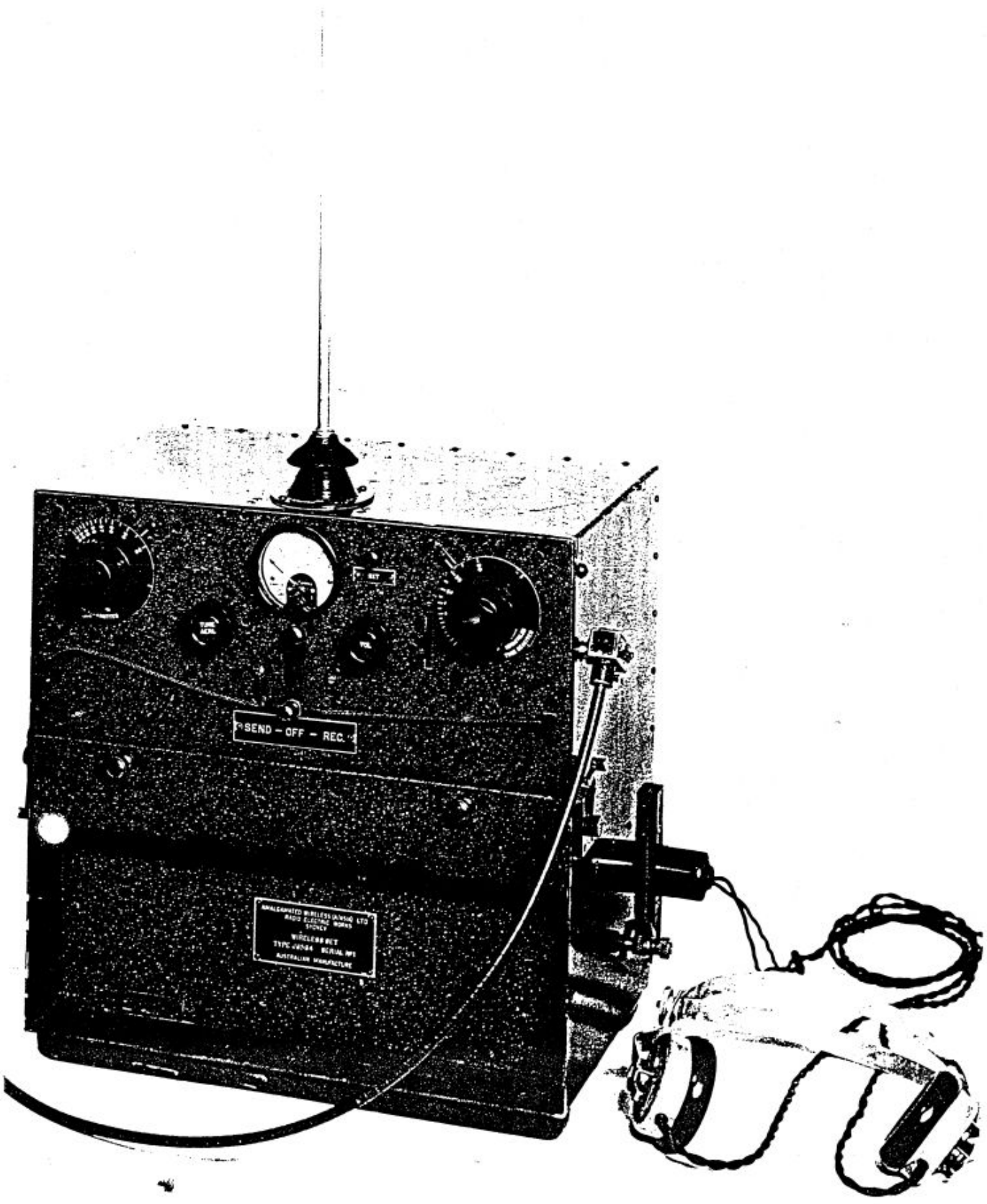
ADDITIONAL EQUIPMENT REQUIRED TO COMPLETE STATION

(h) One hand microphone.

(i) One pair low resistance headphones.

12. PHOTOGRAPH

1473.


SEND – OFF – REC.

BOOKLET NO. 1068

MILITARY SET TYPE FS9C

A.W.A. INSTALLATION 1J~~5407.~~
J6668

PAGES: 4.

Amalgamated Wireless (Australasia) Limited,
"Wireless House",
47 York Street,
SYDNEY.

MILITARY SET TYPE FS9C.

A.W.A. INSTALLATION 1J~~5407~~ 36668

1. GENERAL PURPOSE AND MILITARY APPLICATION

The FS9C is an extremely light portable transmitter-receiver installation compactly assembled as a unit fitted with a metal rucksack framework.

The flexibility of the FS9C is such that it is suitable for inter-communication between forward units, or between forward units and battalion headquarters, between patrols and picquets, or for artillery observation. Actually, its scope is unlimited, being essentially a short range military set for use under active service conditions.

2. FEATURES AND FACILITIES

(i) R/T operation only.
(ii) Minimum valve types consistent with efficient operation.
(iii) Australian-made valves.
(iv) Extreme portability and ease of operation under active service conditions.
(v) Provision for pre-setting four frequencies within the range.

3. FREQUENCY RANGE

Both transmitter and receiver cover the range 8.5 - 8.9 megacycles (35.29 - 35.05 metres).

4. DISTANCE RANGE

The nature of country intervening the points of communication is an important factor to which due consideration must be given when operating low power apparatus. However, a conservative rating for communication between two FS9C military sets is 4 - 5 miles.

Under certain conditions it will be highly desirable to limit the transmission range, particularly where interception of messages by the enemy is possible, and such limitation is accomplished by removing aerial sections.

It is recommended that the smallest number of aerial sections sufficient to establish communication with a reciprocal station be employed at all times.

6. ANTENNA

The antenna consists of eight aluminium tubular sections each 9" long, which screw together and fit into a recessed socket at the top of the transmitter-receiver case. When not in use the aerial sections are carried inside the lid by means of a clip.

5. POWER RATING

The output from the power amplifier is approximately .5 watt.

7. SOURCE OF POWER SUPPLY

Dry batteries contained within the special compartment of the unit supply both low tension and high tension voltages.

Three different battery complements are available, depending on the life required.

Complement (a)

One Eveready PR8 1.4 V. dry battery
Two Eveready PR45 45 V. dry battery
One Eveready Q365 45 and 31.5 Volt bias battery

Complement (b)

One Eveready Q18 1.4 V. light duty dry battery
Two Eveready PR45 45 V. dry battery
One Eveready Q365 45 and 31.5 V. bias battery

Complement (c)

One Eveready Q18 1.4 V. light duty dry battery
One Eveready Q371 90 V. light duty dry battery
One Eveready Q365 45 and 31.5 V. bias battery

8. TECHNICAL DESCRIPTION

The equipment consists of a pack unit fitted with leather straps, rucksack framework and sponge rubber padding for ease of portability. As depicted in photograph 1472, the pack unit contains transmitter-receiver in the upper portion, with a hinged door immediately below providing access to valves, which are mounted horizontally.

The battery compartment is located at the bottom, whilst the vacant centre portion may be utilised to carry

spare valves, headphones, microphones, remote control cable, etc.

(a) Transmitter: The transmitter employs two Radiotron 1D8GT valves connected in such a manner that the triode sections operate as a push-pull master oscillator, whilst the pentode sections are triode connected in parallel, operating as a power amplifier doubler.

Four small pre-set indicators may be fixed by means of set screws to any frequency within the range, so that quick change can be accomplished by rotating the knob control and allowing the dial pointer to "click" into the appropriate pre-set frequency.

Provision is made for locking the dial.

A general purpose meter, with associated rotary switch, allows high tension and low tension voltage to be checked and facilitates tuning.

After all initial tuning adjustments have been made, the FS9C may be operated under active service conditions merely by pressing a control button at the end of the remote control cable. Operation is press to talk, release to listen.

(b) Receiver: The receiver is a superheterodyne of conventional design employing a Radiotron 1A7GT as frequency converter, followed by an I.F. circuit employing a Radiotron 1N5GT; a Radiotron 1D8GT, second detector, A.V.C., audio amplifier and output stage completes the receiver.

9. VALVE SUMMARY

Transmitter:

2 Radiotron 1D8GT - Push-pull triode, master oscillator, parallel triode, power amplifier doubler.

Receiver:

1 Radiotron 1A7GT - Mixer, oscillator
1 " 1N5GT - I.F. amplifier
1 " 1D8GT - Diode detector, A.V.C., audio amplifier and pentode audio output.

10. DIMENSIONS AND WEIGHT

	Height	Width	Depth	Weight
Pack unit, not including rucksack framework	14"	$12\frac{1}{4}$"	$7\frac{3}{4}$"	26 lbs. 7 ozs. for battery complement (a) 24 lbs. 13 ozs. for battery complement (b) 22 lbs. 9 ozs. for battery complement (c)

11 SCHEDULE OF EQUIPMENT (Supplied)

One Military Set type FS9C comprising:-

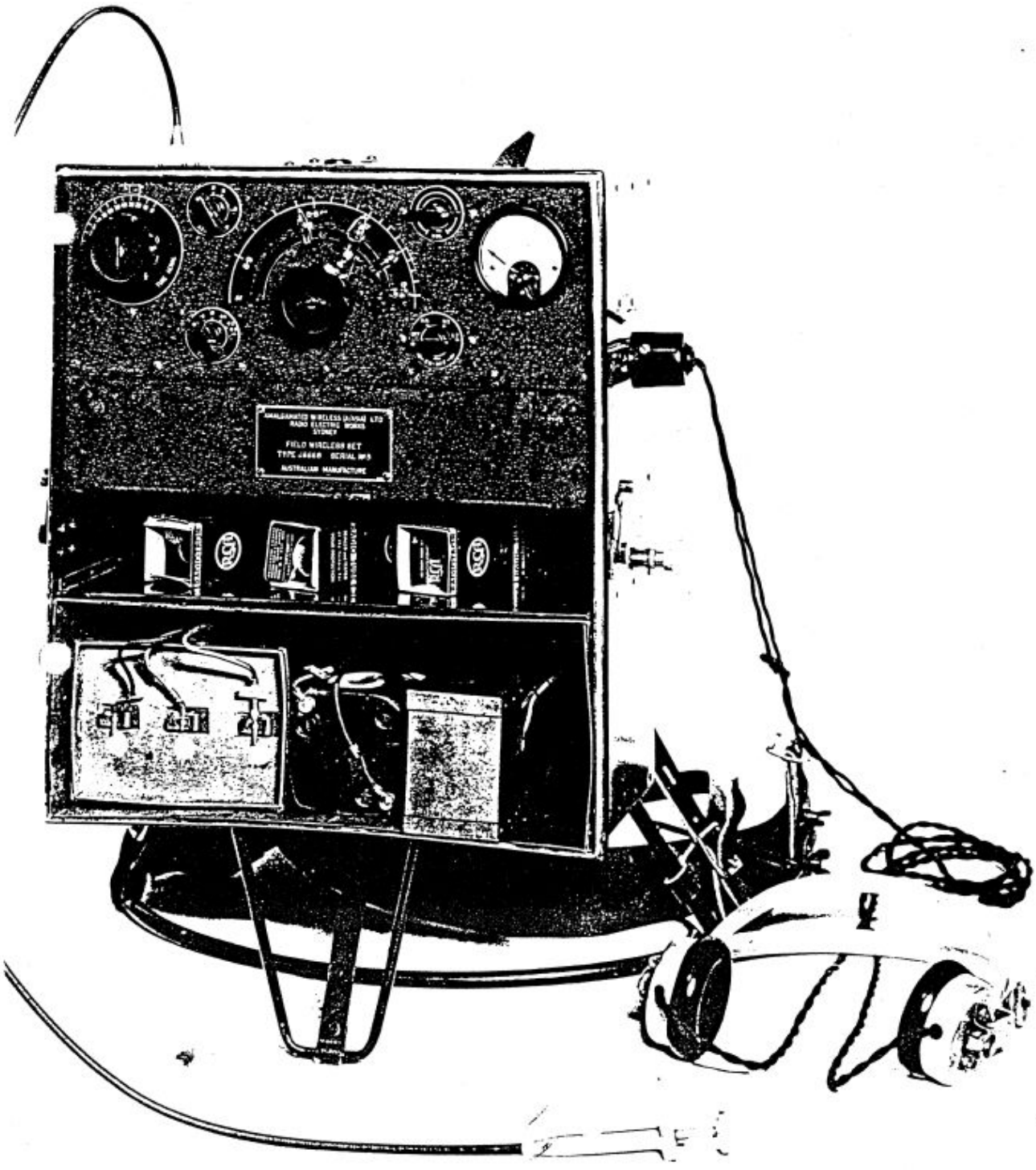
(a) Transmitter-receiver pack set type J6668 in aluminium carrying case.
(b) Low tension and high tension batteries (complement as selected).
(c) One working set of valves.
(d) One instruction book.
(e) Eight aluminium aerial sections.
(f) One Bowden flexible cable fitted with "press to talk" push button.
(g) One leatheroid box to fit in battery compartment.
(h) One leatheroid cover for "C" battery Type Q365.
(i) Two rubber umbrellas to fit over bottom aerial section and socket end of Bowden cable.

ADDITIONAL EQUIPMENT REQUIRED TO COMPLETE STATION

(j) One pair low resistance headphones
(k) One hand microphone

12. PHOTOGRAPHS

Numbers 1472 and 1474.


AMALGAMATED WIRELESS (AUSNIA) LTD
RADIO ELECTRIC WORKS
SYDNEY
FIELD WIRELESS SET
TYPE A4468 SERIAL No 3
AUSTRALIAN MANUFACTURE

BOOKLET NUMBER 1083

MILITARY SET TYPE FS11

A.W.A. INSTALLATION TYPE J6702

PAGES: 5

Amalgamated Wireless (Australasia) Limited
"Wireless House",
47 York Street,
Sydney.

MILITARY SET TYPE FS11

A.W.A. INSTALLATION TYPE J6702

1. GENERAL PURPOSE AND MILITARY APPLICATION

The FS11 military set is an extremely light portable transmitter-receiver installation, assembled as a complete unit and carried within a canvas satchell.

It has been primarily developed for carrying within fighter aircraft or bombers, to provide emergency communication should the main radio be damaged. In the event of serious damage to a plane causing the crew to bail out, the FS11 set, by reason of its extreme compactness and portability may be carried by one of the crew and employed upon alighting to communicate any vital information. Similarly, the FS11 ensures communication should a forced landing be necessary in an isolated area, such landing causing damage to the main radio equipment.

Further services requiring a compact portable transmitter-receiver may conveniently employ the FS11.

2. FEATURES AND FACILITIES

(i) W/T operation only (C/W telegraphy).
(ii) Minimum valve types consistent with efficient operation.
(iii) Australian made valves.
(iv) Simplicity of operation under active service conditions.
(v) Extreme portability.
(vi) Shock absorbing sponge rubber-lined canvas satchell for housing.

3. FREQUENCY RANGE

The transmitter is crystal controlled by means of a precision A.T. cut low temperature coefficient quartz crystal normally operating upon a frequency in the vicinity of 7 mc/s. The receiver, however, has a tuning range of 6.5 to 8.5 mc/s (46.01 to 35.15 metres).

4. DISTANCE RANGE

No guaranteed range over which communication may be carried out with a FS11 set can be stipulated, but tests have shown that when operating on a frequency in the vicinity of 7 mc/s a conservative rating is 100 to 200 miles. However, due consideration must be given to the type of aerial, frequency employed, topography of intervening country, season, time of day, etc.

5. ANTENNA

An aerial, consisting of 30 feet of highly flexible wire, connected by means of an insulator to 30 feet of weighted shark line, is supplied.

By means of a lead weight affixed to this aerial, the guy cord can be thrown over the limb of a tree, enabling the aerial to be pulled up to its maximum height and as near vertical as possible. The method of rigging depends upon local conditions and nothing can be laid down specifically, except to state that the aerial must be erected clear of obstruction all along the length of wire to where it plugs into the set. A rubber umbrella is attached to the aerial plug which fits into the recessed socket at the top of the unit to prevent the intrusion of water into the set itself.

6. POWER RATING

The unmodulated power output of the transmitter is approximately 500 milliwatts into a quarter wave antenna.

7. SOURCES OF POWER SUPPLY

The FS11 has been designed to operate from dry batteries and every effort has been made to reduce battery drain to a minimum. The low tension voltage for the valve filaments is supplied normally by two 3 volt torch batteries in parallel and the high tension and grid bias supplies are obtained from a special battery of fairly low capacity. This complement should last at least a fortnight when operated intermittently each day.

These batteries are fitted inside the metal case itself and are readily accessible for renewing when run down. For continuous operation the life of the batteries is as follows:

High tension battery - approximately 36 hours
Low tension battery - approximately 12 hours

When located in a more or less semi-permanent position, heavy duty batteries or a vibrator pack can be supplied, the former mounting within a wooden battery box.

The filament current drain for both transmitter and receiver is .48 amps (approximately).

High tension power requirements obtained from the special battery is 135 volts, the current being 17 m.a. for the transmitter and 19 m.a. for the receiver. Grid bias voltage of 6 volts negative polarity is also supplied from this special battery.

8. TECHNICAL DESCRIPTION

(a) Transmitter: A simple two valve crystal controlled circuit is used for the transmitter. The components are fitted to an aluminium front panel and sub-chassis and this assembly fits into the aluminium carrying case. Two Radiotrons are employed as follows:

Crystal Oscillator, type 1K5G
Power Amplifier Doubler, type 1L5G

The crystal oscillator stage is fitted with a low temperature coefficient quartz crystal which is correct to frequency within 0.03% and over a temperature range of 10° to 60° Centigrade.

The circuit is adjusted by means of a variable iron dust cored coil which once set requires no further attention. The Power Amplifier Doubler stage operates at twice the crystal frequency and is coupled directly to the aerial circuit. The aerial circuit is used for both transmitter and receiver.

A dual purpose meter is installed on the front panel to read either filament voltage or power amplifier anode current. The filament voltage is set always to 2 volts by a rheostat on the front panel, and then the Power Amplifier current is adjusted to its correct value by the transmitter aerial tuning condenser.

(b) Receiver: A five valve reflex superheterodyne circuit is used for reception and the components are fitted to the same front panel and sub-chassis as used for the transmitter section. The five Radiotron valves are used as follows:

Frequency Changer	... 1C7G
Intermediate Frequency Amplifier	... 1K5G
Reflexed Amplifier and Detector	... 1K7G
Output Amplifier	... 1K7G
Beat Frequency Oscillator	... 1C7G

The selective circuits of the receiver cover the range 6.5 to 8.5 mc/s (46.01 to 35.15 metres).

The intermediate frequency transformer coils have variable iron dust cores and are shunted with fixed mica tuning condensers. The assembly is extremely stable and after the circuits have been aligned at the factory to the operating frequency, the adjustments will stay set over an indefinite period.

The first intermediate amplifier operates at 460 Kc/s and drives the reflexed amplifier and detector. This valve operates first at 460 Kc/s and then the signal is rectified by one of the diode elements and the modulation frequencies are amplified by the same valve by feeding them back into the control grid via the volume control and suitable filters. The audio frequencies are amplified again in the output valve and are heard in the handset receiver. The reflexed amplifier also provides automatic volume control voltage by rectifying some of the signal in another of its diode elements.

The overall sensitivity of the receiver to a standard signal is always better than 5 microvolts per metre for 5 milliwatts output in the receiver handset. This level in the earpiece is very loud and is more than ample for a commercial circuit.

A Radiotron 1C7G valve operates as beat frequency oscillator to enable the reception of C.W. Signals.

The maximum undistorted power output is approximately 30 milliwatts.

9. VALVE SUMMARY

All valves employed are of the Radiotron type, manufactured in Australia, thus ensuring continuity of supplies.

Transmitter	1 type	1K5G - Crystal oscillator
	1 "	1L5G - Power Amplifier
Receiver	1 "	1C7G - Frequency Changer
	1 "	1K5G - Intermediate Frequency Amplifier
	1 "	1K7G - Reflexing amplifier, detector and A.V.C.
	1 "	1K7G - Triode connected output amplifier
	1 "	1C7G - Beat frequency oscillator.

10. DIMENSIONS AND WEIGHT

	Length	Height	Depth	Weight
Transmitter-receiver unit complete (not including canvas satchell)	11"	10½"	8½"	20¾ lbs.
Canvas Satchell, rubber lined	12"	11½"	10"	8½ lbs.

11. SCHEDULE OF EQUIPMENT (Supplied)

One Military Set type FS11, comprising:-

(a) Radio telephone unit type J6702

(b) Rubber lined carrying satchell, type 4933A4

(c) 1 pair high resistance headphones

(d) 1 hand manipulating key type R3050

(e) Batteries, comprising:

2 Eveready 1547 cells
1 Eveready Q208 high tension block

(f) Aerial equipment as follows:-

1 30 ft. aerial wire
1 Insulator
1 30 ft. guy cord
1 Aerial plug
1 Counterpoise wire

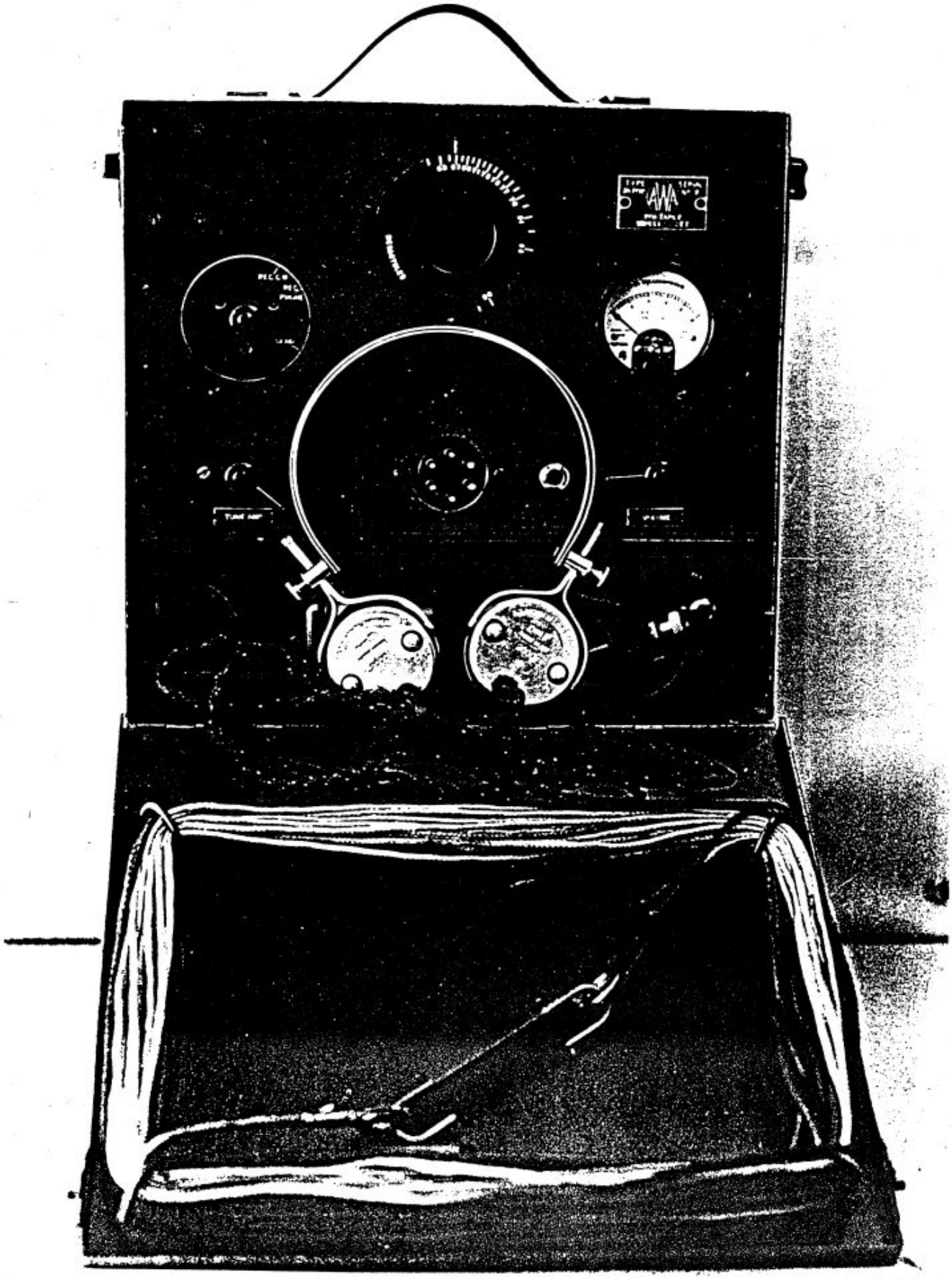
(g) 1 working set of valves

(h) 1 crystal ground to appropriate frequency

(i) 1 Instruction Book No. 6702R

12. PHOTOGRAPH

Number 1455.



1455