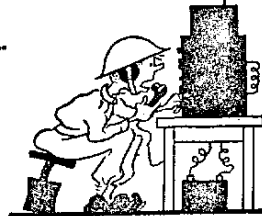
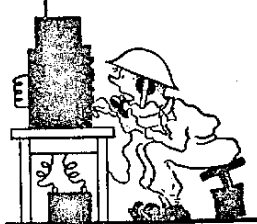


# WIRELESS SET, CANADIAN, No 52 VEHICLE & GROUND STATION



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## CHAPTER I INTRODUCTION

### 1.1 GENERAL

Wireless Set Canadian No. 52 is an Army Communication equipment designed for use in vehicles when on the move or when stationary and as a ground station.

It provides two-way communication on R.T., M.C.W., and C.W. plus break-in operation on M.C.W. and C.W. Duplex operation on R.T. is provided when the Set is used with its Remote Receiver.

A variety of equipment—such as headphones, batteries, leads, aerials,—is required to operate the Set and to make complete use of its facilities. All this associated equipment which is required for operation either in a Vehicle or as a Ground Station is supplied with the Set. The complete equipment is called "Wireless Sets, Canadian, No. 52, Vehicle and Ground Stations". The only additional stores that are required are Charging Sets 300 Watt Mk. I Canadian. These must be drawn from Ordnance Stores, where two are stocked for every 52 Station.

The Station comprises twelve kits, each of which is packed in a separate crate. The list of kits is shown in Table I and the detailed list of the contents, the Station List, is shown in Table XIX.

TABLE I  
KIT LIST

Kit No.	DESIGNATION	Dwg. No.
1	Set Kit .....	CMC 119021
2	Operating Kit .....	CMC 119022
3	Remote Control & Ground Station Kit.....	CMC 119023
4	Vertical Aerial Kit .....	CMC 119024
5	Remote Receiver Kit .....	CMC 119025
6	Tent Kit .....	CMC 119026
7	Set Battery Kit .....	CMC 119027
8	Set Battery Kit .....	CMC 119027
9	Set Battery Kit .....	CMC 119027
10	Set Battery Kit .....	CMC 119027
11	Remote Receiver Battery Kit .....	CMC 119029
12	Remote Receiver Battery Kit .....	CMC 119029

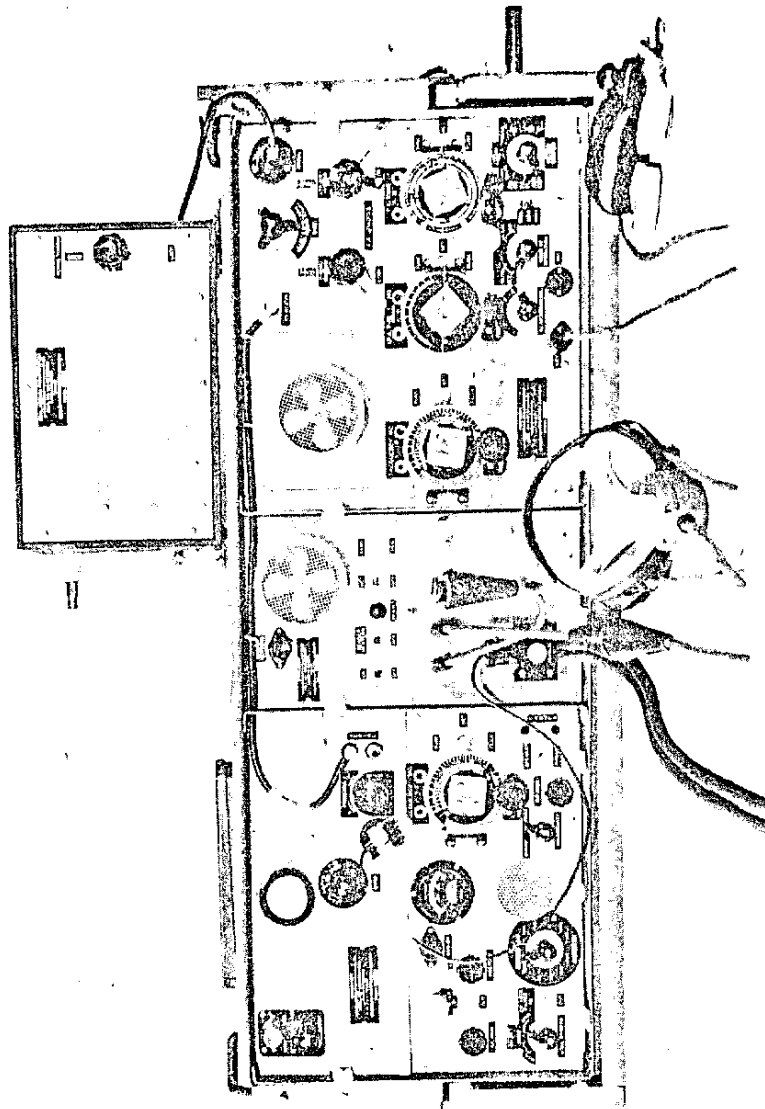


Fig. 1—Frontispiece—Wireless Set—Front View

## 1.2 INTERCHANGEABILITY

The 52 Set grew out of the design of W.S. Cdn. No. 9 Mk. I. It is so different in frequency range, power output and performance that the equipments must not be considered similar. A 52 Station can of course always replace a No. 9 Mk. I station with greatly improved performance. The overall dimensions and the positions of the carrier mounting holes are the same for both sets except that there is a projection at the back of the 52 Set which increases the depth by 11/16".

## 1.3 SUMMARY OF FACILITIES

A brief summary of the capabilities of the Set is given in Table II. Most of these topics are amplified in Chapter II under the sections that are listed in the table.

TABLE II  
SUMMARY OF FACILITIES

		See Section
Frequency Range:	1.75-16 MC covered in three bands .....	2.2
Modulation:	Amplitude	
Power Output:	45-75 watts MCW and 70-100 watts CW. ....	2.3
Power Input:	12 v.d.c. at about 3.5 amp. for Receiver .....	2.4
	and 40 amp. for sender on MCW H.P.	
Communication Range:	About { 40 miles R.T. ....	2.5
	{ 100 miles C.W. ....	
Receiver Sensitivity:	About 2.5 UV on R.T. ....	2.6
	About 1 UV on C.W.	
Send-Receive Switching:	By Microphone Pressel Switch or panel toggle Switch ....	2.7
Types of Transmission:	R.T., M.C.W., C.W. ....	2.8
	M.C.W. & C.W. break-in	
	R.T. duplex with Remote Receiver.	
Tuning:	Sender and Receiver controls are independent. Two mechanical flick positions .....	2.11
Freq. Control of Sender:	M.O. or crystal .....	2.9 (all)
Callibrator:	1000, 100, and 10 KC accurate frequency markers .....	2.9.1
Netting:	Sender can be tuned exactly to Receiver frequency and vice versa .....	2.9

TABLE II—Contd.

## SUMMARY OF FACILITIES—Contd.

Noise Limiter:	Toggle switch can be switched in or out .....	4.4&7.4	See Section
Remote Control:	Up to about 3 miles R.T.; more on C.W. ....	5.2	
CW Note Filter:	Can be switched in or out ...	4.4&7.4	
Sidetone:	On all modes of Operation		
Loudspeaker:	On Receiver with "ON—OFF" Switch.		
Aerials:	Whip, Vertical, and Horizontal	4.11	
Headphones and Mic:	Moving Coil Type.		
Wireless Set Controls:	Chapter IV.		
Weights and Dimensions:	See Tables XV, XVI, XVII, XVIII.		

## CHAPTER II DESCRIPTION

### 2.1 GENERAL CONSTRUCTION

The Wireless Set comprises five major units which are physically distinct. They are the following:

- Supply Unit
- Receiver
- Sender
- Coil, Aerial Tuning No. 2A
- Carrier No. 4

The first three units are complete chassis which are contained in the carrier.

The Aerial Tuning Coil fastens onto the outside of the Carrier on either the top or the right hand side.

#### 2.1.1 The Carrier

The carrier consists of two parts. One of these is a large metal box sub-divided into three compartments which contain the first three units mentioned above; the other is a "cradle" frame in which the whole equipment is supported through six rubber shockmounts. On top of the carrier is a metal "glove compartment" for this book. A waterproof curtain which is fastened to the top edge of the carrier can be lowered for protection during rain or snow. Carrying handles at each end drop out of the way when not in use.

#### 2.1.2 Interconnections

Many connections among the three major units are made through plugs attached to the carrier and corresponding sockets on the back of each unit. Connections are automatically made when the units are pushed into place in the carrier. The carrier plugs are built into one assembly complete with inter-wiring. It is protected by a metal cover which projects from the rear of the carrier.

The one connection which is not made through the connector block is the aerial lead from the Sender to the Receiver. The Receiver aerial terminal is connected by Leads Aerial No. C7 directly across the front of the Set

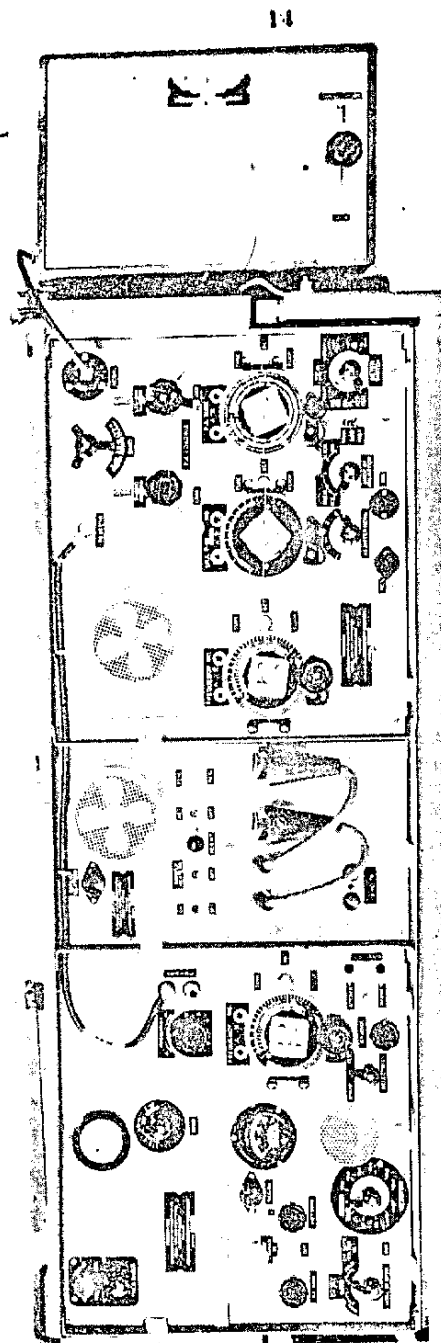


Fig. 2—Wireless Set—Front View, Coil at Right

TABLE IV  
RECEIVER VALVE LIST

FUNCTION	SYMBOL	TYPE
R.F. Amplifier	V1A	ARP3
Mixer	V1C	ARP3
Conversion Oscillator	V1B	ARP3
1st I.F. Amplifier	V1D	ARP3
2nd I.F. Amplifier	V1E	ARP3
Detector and A.V.C.	V2A	12Y4G (ARDD1)
Noise Limiter	V2B	12Y4G (ARDD1)
Heterodyne Oscillator	V1F	ARP3
1st A.F. Amplifier	V1G	ARP3
2nd A.F. Amplifier	V1H	ARP3
Crystal Calibrator: Oscillator	V3A	12SC7
Multivibrator	V3B	12SC7
Harmonic Exaggerator	V3C	12SC7

### 2.1.5 The Supply Unit

The Supply Unit which is sandwiched between the Sender and the Receiver converts energy from the battery at 12V to energy at the proper voltages for both the Sender and the Receiver. It contains also some odd parts such as relays and drop cords which could not be placed conveniently anywhere else.

Power for the Sender is obtained from two dynamotors which operate only on Send, except on break-in when they run all the time.

Both dynamotors contain "protectors" which automatically open the input circuits if the temperature becomes too high from any cause, such as excessive periods of operation on Send in very hot weather, or overloading by improper tuning, or failure of some other component.

The Vibrator Section which supplies power to the Receiver is a complete removable unit which can be withdrawn easily. It contains the following plug-in-parts:

TABLE V  
VIBRATOR PLUG IN PARTS

FUNCTION	SYMBOL	TYPE
Rectifier Valve	V4A	OZ4A
Rectifier Vibrator	VIBR1B	4 prong Interrupter

A fuse connected in the vibrator input circuit is mounted on the Supply Unit panel.

### 2.2 FREQUENCY RANGE

The frequency range of both the Sender and the Receiver is 1.75 - 16 MC., covered in the following three bands:

BAND	FREQ. RANGE
1	1.75 - 4 M.C.
2	3.5 - 8 M.C.
3	7 - 16 M.C.

The 52 Set can communicate with any other **amplitude modulated** Wireless Set whose frequency coverage includes part of the band 1.75 - 16 M.C. (1,750 - 16,000 KC), provided of course that the sets are within range.

Some such sets are listed below:

Wireless Sets No. 5, 9, 9 Cdn., 9 Mk. 1 Cdn., 12, 19, 21, 22, 32, 33, 43, Marconi AD67 Sender AVC and LCV high power mobile stations employing transmitters such as No. 12HP, 19HP, BC 610 and RCA ET 4332A.

Also the following U.S. equipments: SCR. Nos. 177, 178, 179, 187, 188, 197, 237, 245, 284, 287, 299, 399, 499, 506, 543, 583, 694, AN/TRC-2.

### 2.3 POWER OUTPUT

The Sender is designed to operate at low, medium, or high power. The choice is made by a switch on the front panel.

The power output depends partly upon the frequency and type of aerial. (It is not always in the same direction for high and low power.) In general when comparing the whip and vertical aerials, the longer the aerial, the greater the power. The total variation is not large however.

The ratio between MP and LP changes with frequency. It is about 5:1 on MCW, and 15:1 on CW. Between HP and LP it is about 20:1 on MCW and about 50:1 on C.W. It will be found that it is necessary to change directly from LP to HP to make appreciable increase in range and intelligibility.

Typical approximate values of power output are given in Table VI.

TABLE VI  
APPROXIMATE POWER OUTPUT IN WATTS

CONDITION	MCW OR R.T. 100% mod.	
		CW
H.P.	45-75	70-110
M.P.	15-20	18- 30
L.P.	2-4	2

#### 2.4 POWER INPUT AND BATTERY CONSUMPTION

The Wireless Set operates from a power source of 12 v.d.c. which is obtained from two 6V storage batteries connected in series. The energy of these cells is maintained by a small gasoline driven D.C. generator, (Charging Sets 300 watt) which is frequently used to float-charge the batteries while power is being supplied to the Set.

The current drain of the Sender depends upon the mode of operation. Typical current drains are shown in Table VII. The values for normal sets may differ from these by 10%.

TABLE VII  
CURRENT DRAINS  
Potential at Supply Unit : 12.5 Volts

MODE OF OPERATION	DRAIN IN AMPERES			
	REC.	H.P.	M.P.	L.P.
Receive (Sender heaters off) . . . . .	3.3			
Receive (Sender heaters and fans on)	6.5			
Send M.C.W. (Fans on) . . . . .		45	33	31
Send C.W. (Fans on) . . . . .		57	35	31
Send C.W. (Fans on) Key up . . . . .		24	24	24
Remote Receiver with ZE-12				
Supply Unit . . . . .	3			

Since the current drain is much greater on Send than on Receive, battery consumption depends upon the ratio of the periods of operation on Receive and on Send. For example, over a period of 160 hours, which is equivalent to continuous day and night operation for about one week, the ampere-hour consumption on R.T. H.P. is 1100 for a

receive to send ratio of 15:1, and 4000 for a ratio of 1:1. R.T. H.P. is the condition of heaviest drain.

#### 2.5 COMMUNICATION RANGE

There are many factors which determine the distance over which communication is possible with this type of equipment. The principal ones are listed below:

- 1—Ground Conductivity
- 2—Type of Aerial
- 3—Topography
- 4—Sender Power
- 5—Frequency
- 6—Level of Background Noise at the Receiver.
- 7—Type of Transmission
- 8—Time of Day

Several of these factors depend upon location and since the operator cannot always choose his scene of battle they may be outside his control.

When two Wireless Sets Canadian No. 52 are operated in vehicles with 16' aerials, reliable communication can be expected over about 40 miles on R.T. and 100 miles on C.W. These figures are given in order that some estimate of range can be made after consideration of all the factors listed above. It will not be possible always to achieve these ranges. For example when the background noise is high the ranges will be much less; when several favorable conditions coincide greater ranges will be possible.

When the background noise is not excessive, range will usually improve as the frequency is lowered, and will be greater at night than during the day. When the 34' aerial or the horizontal aerials, and the counterpoises are used, the range is greatest.

Great distances can be covered by sky wave. The frequency must be chosen to suit the distance and the time of day. The horizontal aerial is particularly suited to this type of communication.

#### 2.6 RECEIVER SENSITIVITY

When the Wireless Set is in the Carrier the aerial is connected to the Receiver through the Sender output circuits. They increase the Receiver image rejection con-



siderably and the sensitivity slightly, when the Sender output circuits and the Receiver are tuned to the same frequency. That will usually be the case and the sensitivity will be high.

When the Sender output circuits are not tuned to the Receiver frequency the sensitivity will be low. In such circumstances the aerial should be connected directly to the Receiver aerial terminal and the sensitivity will be almost as high as it is in the Carrier with Sender and Receiver circuits tuned to the same frequency. Typical figures for both conditions are shown in Table VIII. Of course, the Sender cannot be used when the aerial is connected directly to the Receiver.

The actual ability of the Receiver to reproduce signals intelligibly will be governed by the background noise at the location. On R.T. it is very important to locate the Receiver where the noise heard in the phones is low. On C.W. an effective note filter is very helpful in noisy locations.

TABLE VIII  
RECEIVER SENSITIVITY

SIGNAL TO NOISE RATIO 10:1		
CONDITION	SENSITIVITY IN UV	
	R.T.	C.W.
Receiver In Carrier; Sender output circuits tuned to same frequency as Receiver . . . .	2.5	0.7
Aerial Connected directly to Rec. . .	2.5-7	0.7-2
Remote Receiver . . . . .	2.5-7	0.7-2

### 2.7 SEND-RECEIVE SWITCHING

You can send or receive messages over the 52 Set, but you cannot do both at once. A device is necessary, therefore, to enable the operator to switch at will from Receive to Send or from Send to Receive. No noticeable delay occurs during the operation.

On R.T. this switching is performed automatically when the pressel switch is squeezed or released.

On M.C.W. and C.W. it is performed when a toggle switch on the panel is pushed up or down.

### 2.8 TYPES OF TRANSMISSION

Both the Sender and Receiver operate on R.T., M.C.W. and C.W.

On R.T. the Sender can be modulated by speech from the Set microphone, or from a Remote Control Unit at a distant location, or from a telephone connected to a field exchange.

On M.C.W. when the key is down, a 1000 cycle note is transmitted at slightly more than 100% modulation. When the key is up there is no output. M.C.W. signals have slightly greater range than R.T. signals and are very stable even when the vehicle is on the move over rough ground. They can be received by a Receiver capable of reproducing amplitude modulated R.T. signals.

On C.W. a pure carrier is transmitted when the key is depressed; the output is zero when the key is up. These signals can only be received on Sets such as the 52 which have some device for C.W. reception, such as a het oscillator. The communication range is appreciably greater for C.W. Signals than for M.C.W. or R.T., and is particularly superior when signals must be received through noise and interference.

Break-in operation is available on M.C.W. and C.W. for keying speeds up to about 20 w.p.m. This means that send-receive switching is performed automatically for the operator: When the key is depressed the Set is on Send; when the key is released the Set is on Receive. Break-in operation achieves great traffic speed at medium keying speed, for when one operator misses a word he can interrupt the sending operator for correction immediately by sending a few dots or a long dash with his key.

Remember that as you send faster you allow less opportunity for interruption by the other operator, particularly if his signal is weak. When sending at about 20 w.p.m. either be alert for his interruptions, or pause an instant at the ends of sentences.

An additional feature, "Duplex Operation" is available by using the Remote Receiver. The Sender and Receiver are operated on different frequencies, and the Receiver in the carrier is not used.

e.g. At Station 1

Sender Frequency: A

Remote Receiver Frequency: B

At Station 2

Sender Frequency: B

Remote Receiver Frequency: A

Both Senders are left on Send and both Remote Receivers are of course always on Receive. Communication is available then without Send-Receive switching, very much like communication over a telephone system where each operator can always hear the other. Duplex operation has the greatest advantage on R.T. The battery consumption and heating of the equipment are both high, but in convenience of operation it leaves nothing to be desired.

On C.W., in comparison with Break-in, Duplex operation requires an additional frequency channel and also the Remote Receivers. The only gain is that the same performance is obtained at high keying speeds.

## 2.9 FREQUENCY CONTROL AND NETTING

The numbers and lines which are marked on the "Frequency" dials of the Sender and Receiver indicate approximately the frequency at any dial setting. The error may be about 1% which is too large to enable several sets to establish communication by just turning the dials to the same frequency marks.

Provision has been made separately in the Receiver and the Sender to tune exactly to any frequency. In addition there is a "Netting" arrangement which makes possible tuning of the Receiver to the Sender frequency, or tuning of the Sender to the Receiver frequency. Thus if the Receiver frequency is correct (having been tuned to the calibrator or to a signal), the Sender can be tuned quickly to the same frequency; or if the Sender frequency is correct (using crystal control) the Receiver can be tuned to its frequency.

### 2.9.1 The Receiver Crystal Calibrator

The Crystal Calibrator, which is part of the Receiver, enables an operator to tune the Receiver accurately to any

frequency within its range. Thus, if a certain frequency is assigned to several Wireless Sets, each operator can tune independently to that frequency with sufficient accuracy to establish communication immediately among all the Sets. After communication has been established, it may be necessary for some Sets to make a small tuning correction to be exactly on the frequency of the control station.

When the Calibrator is switched off it is completely disconnected from the Set and does not consume power.

After the Receiver has been accurately tuned to an assigned frequency, the Sender can be tuned to the same frequency by using the NET switch as mentioned in section 2.9 above. In this way a net can be established quickly without hunting for the "control" station, and without having a station on the air sending long tuning and netting calls.

The Calibrator can be used also for determining accurately the frequency of any wireless station which can be heard on the Receiver.

It is a miniature sender which generates radio frequency signals at equally spaced frequency intervals throughout the range of the Receiver. It can be heard only in the receiver to which it is connected. These signals are accurate frequency markers heard across the dial every 1000 kc., every 100 kc., or every 10 kc., according to the position of a switch.

When the receiver has been set for C.W. operation and is tuned to a signal from the Calibrator, an audio note is heard. As the dial is turned, the pitch of the note changes. Actually two notes can be heard, one on each side of a quiet position. This pair of notes comprises one signal or "pip" from the Calibrator. The Receiver is tuned accurately to the pip when it is at the quiet, or "zero beat", position.

When the Calibrator switch is at 1000, a signal is heard when the Receiver is tuned near those divisions on the FREQUENCY dial which are multiples of 1 mc. (e.g. at 2, 3, 13, 14 mc. etc.). These signals are frequency markers which are much more accurate than the divisions on the Wireless Set dial.

When the Calibrator Switch is at 100, a signal is heard at every 100 kc. interval. Every tenth 100 kc. pip coincides with a 1000 kc. pip. The 100 kc. signals are identified by counting the number of them from the nearest 1000 kc. pip.

When the switch is at 10, pips are heard at 10 kc. intervals. Every tenth one of these coincides with a 100 kc. pip. The 10 kc. pips are always identified by counting the number from the nearest 100 kc. pip. For example 1.93 mc. is at the third pip higher in frequency than 1.90 mc. and 1.96 mc. is at the fourth pip lower in frequency than 2.00 mc. Thus the Receiver can be tuned accurately to any frequency which ends with a zero, (e.g. 12,010 kc. or 14,270 kc.). The location of other frequencies can be estimated, e.g. 4275 is half way between 4270 and 4280.

### 2.9.2 Sender Frequency Control

The Sender can be operated with either Master Oscillator or Crystal control of frequency. Two sockets which accommodate plug-in crystals are located on the chassis at the rear left hand side. They are just to the right of a three position switch which selects M.O. operation or either of the two crystals. XTAL 1 is the rear crystal; XTAL 2 is directly in front of it. The right hand terminal of each socket is the grounded one. It is just possible to reach through the panel door and insert the crystals without removing the Sender from the Carrier. Each crystal provides control on three frequencies, one in each band. The crystal frequency is chosen as follows:

BAND	FREQ. IN MC.	CRYSTAL FREQ.
1	1.75-4	Desired freq.
2	3.5-8	$\frac{1}{2}$ desired freq.
3	7-16	$\frac{1}{4}$ desired freq.

Thus a 2.5 mc. crystal can be used at 2.5 mc. on band 1, 5.0 mc. on band 2 and 10 mc. on band 3. The crystal frequency is always between 1.75 and 4 mc.

Crystals are not included in the station. The type of crystal holder which can be used is the widely used flat plug-in type with tube base prongs  $\frac{3}{4}$ " apart.

### 2.10 PANEL COLOURING

All the controls whose settings are dependent upon frequency are coloured to help identify the proper positions. Different colours have been chosen for each band, and controls which affect all three bands such as the Frequency dials and the BAND switch, are marked in three colours. The neutral colour for all other controls is white in daylight. In addition the two flick positions are coloured. If faint ultra violet light is shone on the panel in the dark, all the markings will glow in colour so that the set can be operated with ease. After the light is removed the glow dies away rapidly.

The colours are listed in Table IX.

TABLE IX  
COLOURS OF PANEL MARKINGS

	DAYLIGHT	ULTRA VIOLET LIGHT
Neutral Controls	White	Green
Band 1	Green	Green
Band 2	Yellow	Yellow
Band 3	Orange	Orange
Flick A	Red	Pink
Flick B	Blue	Green

### 2.11 THE FLICK MECHANISMS

The tuning control of the Receiver and the three tuning controls of the Sender are all the same type of two position "flick" mechanism.

A "flick" is a type of mechanical dial lock which can be set at any frequency. By a forceful rotation the control can be turned free from the flick position to any other frequency. When the control is returned close to the original setting it moves slightly under pressure of a spring and locks at the original frequency. There are two such flicks positions which can be set quickly to any two frequencies, A, red and B, blue. When this has been done the dial can be flicked quickly and accurately from one frequency to the other. Setting the flicks does not preclude normal tuning across the band.

The small flick lever at the right of the dial selects any one of three functions:

- (i) Be sure that the screws are tight. Put the lever to **FLICK** then turn the dial until the flick engages. A white disk will appear behind the coloured ring.
- (ii) Loosen half a turn only, the two screws which are coloured the same as the flick ring.
- (iii) Put lever to **SET**, then net by turning the very slow motion knob.
- (iv) Tighten the two flick screws by hand.
- (v) Turn the lever to **FLICK** to turn to the frequency just chosen, or to **TUNE** for other tuning.
- (vi) The other flick can be set to another frequency in the same manner.

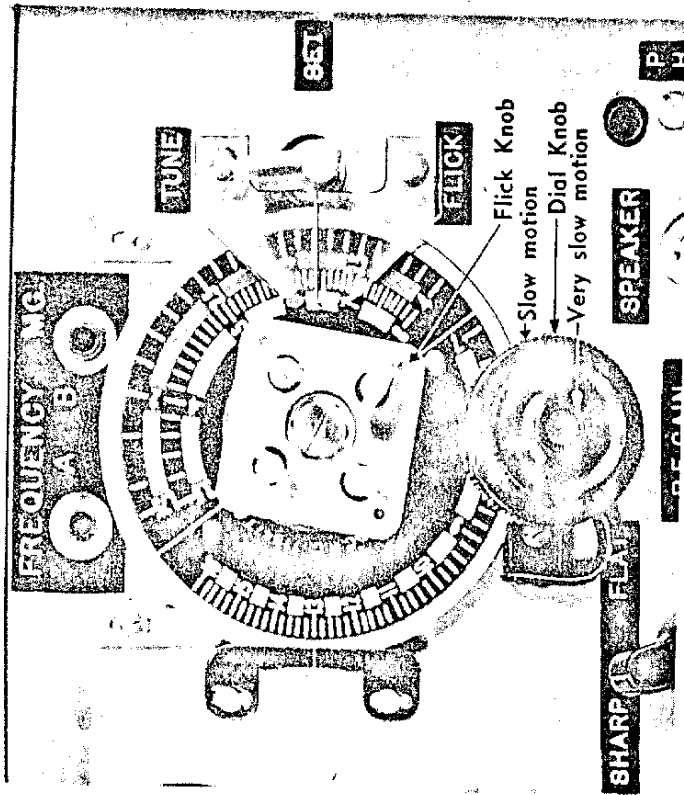


Fig. 4—Flick Mechanism

- (i) **TUNE**: The dial can be turned freely by the dial knob independently of the flick device. Nothing shows in the two holes above the dial.
- (ii) **FLICK**: If the four center screws are tight the dial can be turned by the flick knob and will lock at either flick frequency; at the same time a white flag appears behind one of the two holes showing which flick is engaged. When this position is used, the dial knob is disconnected.
- (iii) **SET**: For choosing and setting the Flick frequency. With the lever first at **FLICK**, turn the knob until one flick engages. Turn the lever to **SET**, loosen the two screws of whichever flick is engaged (red or blue)  $\frac{1}{2}$  turn and tune by the dial knob to any frequency. Tighten the two screws by hand. When the lever is turned to **FLICK** the dial can be flicked in and out of the new position.

#### 2.12 SIDETONE

Under all conditions of operation R.T., M.C.W., C.W., break-in, duplex, and remote control, sidetone is heard in the phones which are connected to the drop cords. It will not be heard in phones which may be plugged into the Receiver jacks, nor over the loudspeaker, nor at the distant Remote Control Unit.

#### 2.13 THE METER

A single D.C. Meter mounted on the Receiver panel is used for three purposes. These are:

- (i) Receiver Valve and Voltage Test and Tuning Meter.
- (ii) Sender Valve and Voltage Test.
- (iii) Aerial Tuning Meter.

There is a meter switch on the Receiver, and one on the Sender. The Receiver switch has contacts for all the functions of (i) plus an additional contact marked **SENDER** which connects the meter to the Sender switch. The Sender switch has contacts for all the functions of (ii) and (iii). In position (iii) **AER CUR**, the meter is used to measure the RF aerial current as described in Section 4.6.

#### 2.14 PILOT LIGHTS

There are three pilot lights which show whether the Receiver, Sender and Crystal Calibrator are turned "on"

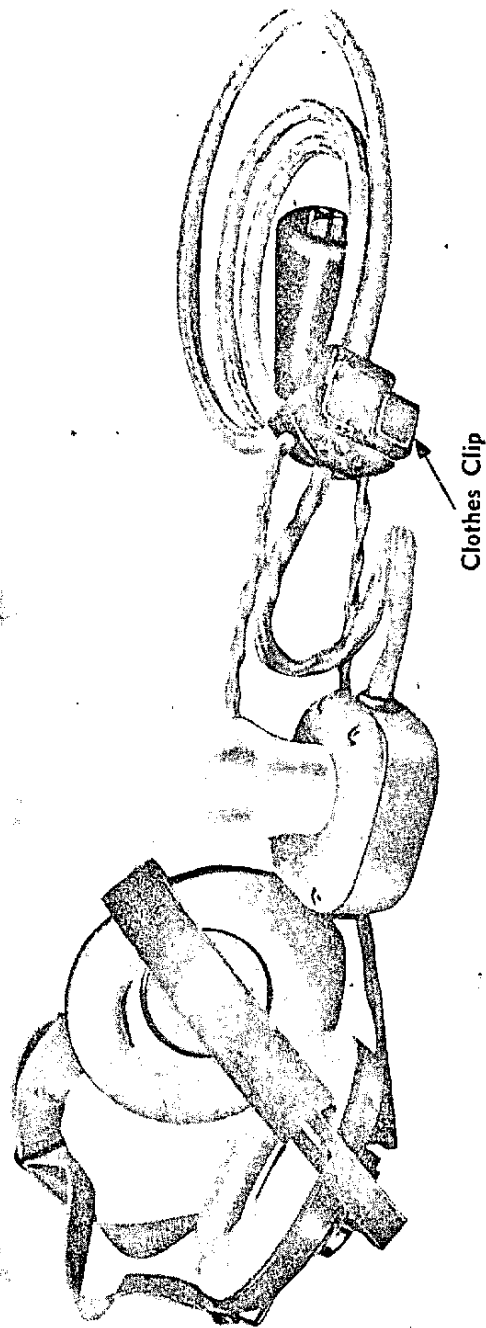


Fig. 5—Microphone and Receiver Headgear Assemblies No. 1 Canadian.

or "off". The Receiver light is mounted adjacent to the meter so that it provides some illumination for the meter needle. Lamps Operator No. C6 is designed to be moistened and then stuck to the panel where most convenient. The end plugs into the top of the block on Connectors, Twin No. 17 which conduct power to the supply unit. It is very helpful when tuning in the dark, but should be used sparingly when the batteries are being charged and the voltage exceeds 12V, or the bulb will burn out.

If the pilot lights cause eyestrain or fatigue, they can be turned off easily by removing the plastic cover and loosening the bulbs.

### 2.15 STATION EQUIPMENT

The complete list of equipment which comprises the Station is shown in table XIX, page 155. The purpose of each item is mentioned wherever it is not obvious.

Separate instruction books for the Antennae Vertical 34' Steel Mk. I and Wireless Remote Control Unit No. 1 Canadian are packed with those items in Kit 3. An instruction book is also packed with each Charging Set, 300 watt. Study these books, they will help you to use the equipment intelligently.

Most of the 52 Set station items are similar to those supplied with W.S. Cdn. No. 9 Mk. I, although many improvements have been made. All 52 Set items can be used to replace No. 9 Mk. 1 Set items, resulting in many cases in superior performance (such as the Aerial Base, the Aerial Tuning Coil, the Counterpoises, the Headgear, the Batteries, the Vertical Aerial Kit).

Many—but not all—of W.S. Cdn. No. 9 Mk. I Station items, and a few W.S. No. 19 Truck Ground station items can be used as replacements for 52 Set use when spares are not available, even though performance will not always be as high.

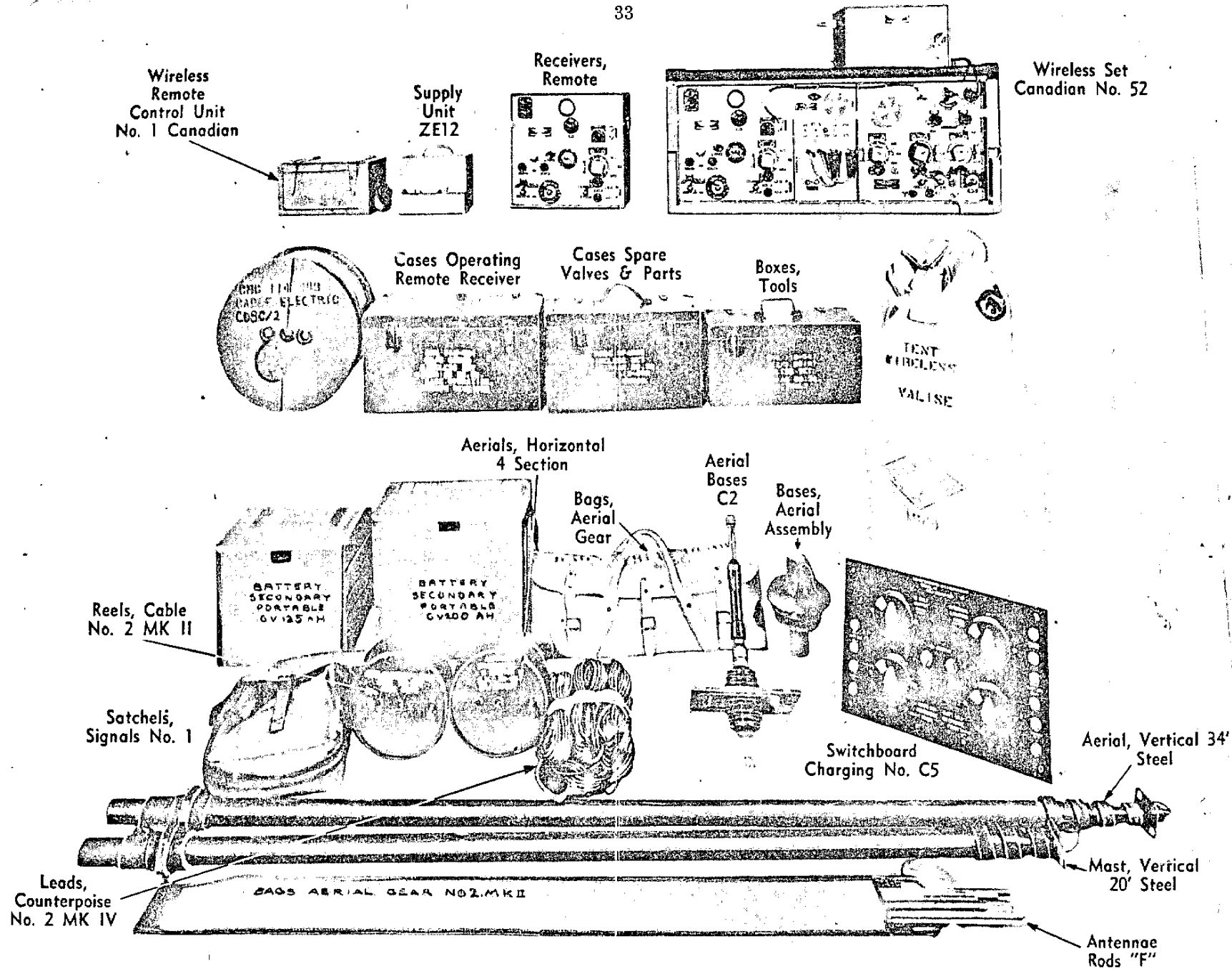


Fig. 6—Major Items of Complete Station

# DANGER

## ELECTROCUTION

You can be killed instantly by touching certain live parts inside this equipment. Before changing any valves, opening the Sender door, or attempting any repair, TURN THE SET "OFF".

### In Case of Electric Shock:

- A—Don't touch the victim with your bare hands until the circuit is broken.
- B—Break the circuit by turning the power switch OFF.
- C—Administer artificial resuscitation to the victim as you would in the case of drowning.

## EXPLOSION

DO NOT ADD PETROL to the vehicle tanks or to the Charging Sets when the equipment is on "SEND". An R.F. potential difference may cause an arc resulting in an explosion.

## GAS POISONING

Never operate the Charging Set unless the outer compartment doors of the vehicle are OPEN. When the regulator has been adjusted, close the inner compartment door. This simple precaution will avoid an inglorious death from carbon-monoxide poisoning.

## BURNS

To avoid burns, avoid touching the aerial, the aerial base, and the aerial lead when the Set is on "SEND".

Otherwise the equipment is quite harmless and will give you many years of satisfactory service.

## CHAPTER III

### INSTALLATION INSTRUCTIONS

#### 3.1 STATION ARRANGEMENT AND KIT REQUIREMENTS

Two 52 Set installations are possible—a Vehicle Station, or a Ground Station. The components of the Vehicle installation provide for every operational facility of the equipment and enable rapid change of location. Nothing is gained in communication by removing the equipment to a tent and establishing a Ground Station. The Ground Station provides the same operating facilities but lacks the conveniences for W.S. operation, and the provisions for stowage and shelter that are provided by the vehicle. It has the advantage of releasing a vehicle for other use when movement of the station is unnecessary.

Kits Nos. 1,2,3,4,7,8,9,10, contain all the equipment that is necessary to establish a Vehicle Station or, with the addition of Kit No. 6, a Ground Station. Two charging Sets, 300 watt, and two Boxes, Spare Parts which are not part of the station are required, and must be drawn from Ordnance Stores where two are stocked for every 52 Set.

Kits Nos. 5, 11, 12 comprise the Remote Receiver Station. They may be carried in the Wireless Vehicle or in other transport.

When the Ground Station is not set up, the Tent may be used with either the Vehicle Station or the Remote Receiver.

#### 3.2 BATTERIES, (FOR ALL INSTALLATIONS)

Four heavy duty batteries for the Wireless Set are packed in Kits 7, 8, 9, 10 and four light duty batteries for the Remote Receiver are packed in Kits 11 & 12. They are all shipped dry and must be filled with electrode first and then charged. Complete instructions are given here; they are also on tags attached to the battery connectors.

The following instructions are for filling and initial charge only.

Prepare the Battery for service as follows:

- i. Remove the tape and unscrew the vent plugs.

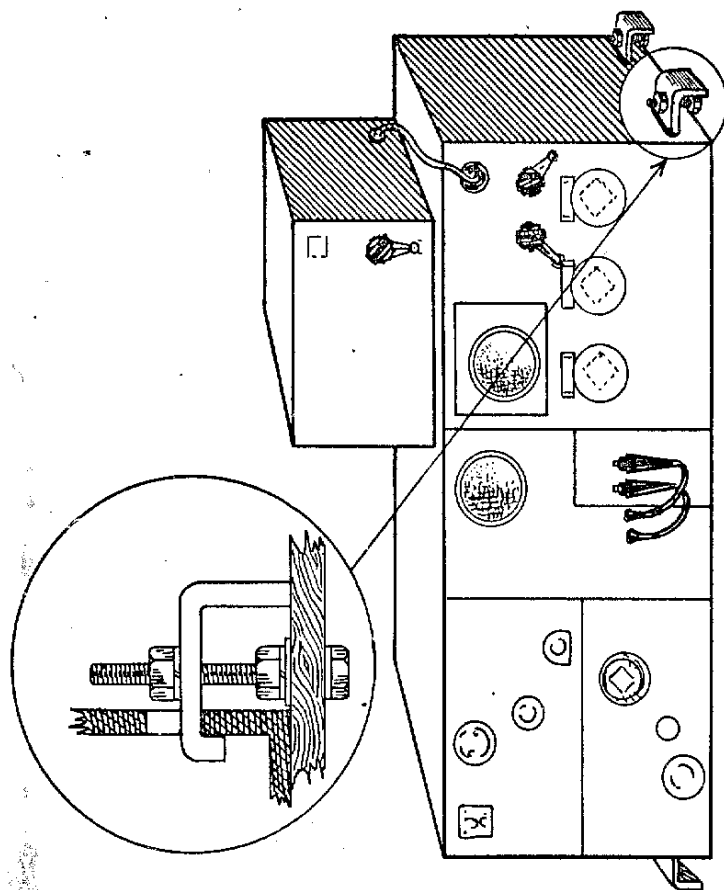


Fig. 7—Carrier Mounting Clamps.

- ii. Fill each cell with electrolyte of the proper specific gravity (see table) to within  $\frac{3}{8}$  inch above the top of the separators. The temperature of the filling electrolyte should not exceed  $90^{\circ}\text{F}$ , or air temperature.
- iii. Allow the battery to cool by standing not less than four hours or until it reaches  $90^{\circ}\text{F}$ , or air temperature.
- iv. Restore level to  $\frac{3}{8}$  inch by adding electrolyte of same specific gravity as used in filling.
- v. Replace vent plugs.
- vi. Charge the battery at the rate shown below. Use series charging (never constant potential) for this initial charge. If the charge rate is maintained, it should be continued until the specific gravity stops rising. This will require 40-60 hours.
- vii. If the temperature exceeds  $125^{\circ}\text{F}$ . in Tropical climate or  $110^{\circ}\text{F}$ . in Temperate climate, reduce the charging rate and lengthen the time accordingly.
- viii. If it is necessary to restore the level during charge use only approved water (distilled).
- ix. After completion of the charge, the specific gravity should be between the limits shown in the table. If not, adjust by removing some solution and adding approved water or electrolyte of 1.400 specific gravity as required. Charge for an hour to mix solution before testing again.
- x. Before placing in service, wash off any electrolyte that may have spilled.

#### Initial Filling and Charging

AIR TEMPERATURE:	125AH AND 200AH BATTERIES		TYPE	
	UP TO $110^{\circ}\text{F}$	$110^{\circ}\text{F}$ — $125^{\circ}\text{F}$	125AH	200AH
Filling Sp. Gravity:	1.280	1.215		
Final sp. Gravity:	1.280-1.300	1.230-1.250		
Volume of electrolyte in pints per battery:			5.5	9.3
Initial charging rate in amps:			5	10
Emergency charging rate in amps:			8	16

In emergency for rapid charging, the higher rates may be used, but only until gassing occurs.



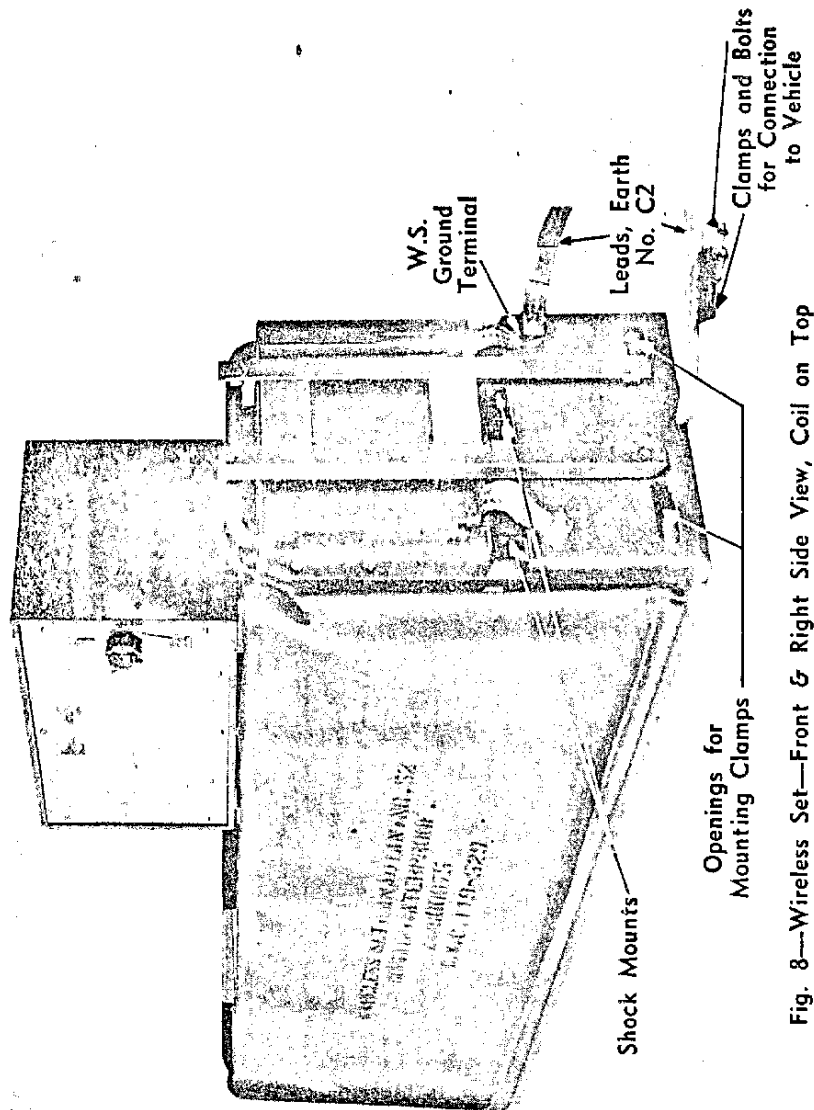


Fig. 8—Wireless Set—Front & Right Side View, Coil on Top

### 3.3 VEHICLE INSTALLATION

#### 3.3.1 The Wireless Set

The Set will be fastened to the table by four  $\square$  shaped clamps. Accompanied by mounting hardware, they are packed in a bag which is tied to the carrier.

If for any reason the clamps are not used, the Set can be bolted directly to the table. To mount the Set in this manner is a much longer task which involves unbolting the rubber shock mounts and removing the Set from the cradle. Nuts and bolts are included in the bag of hardware.

- (a) The vehicle table probably will be drilled for mounting the Set: The hole requirements are the same as for W.S. Cdn. No. 9 Mk. I and W.S. No. 9. The exact hole positions are shown in Fig. 59.

Lift the Set onto the table before attaching the clamps and locate it so that all four clamps can be placed squarely in the slots in the sides of the carrier. See Fig. 8. The method of attaching the clamps is shown in Fig. 7. Before tightening the bolts read (b).

- (b) Leads, earth No. C2 must be connected from the ground terminal on the rear, right hand side of the carrier to the vehicle. This lead must be short and the connection to the vehicle must be positive and secure.

Find a spot on the metal bulkhead of the vehicle as near the Set terminal as possible. Drill two  $\frac{1}{4}$ " holes  $1''$  between centres in the metal at that spot and clean the paint off with sand paper until both sides of the metal are bright. Cut the ground lead so that it will reach with just a little slack and then clamp it to the vehicle with the hardware which is provided. Paint over the exposed metal of the vehicle to prevent rusting.

Be sure to make the ground connection directly to the vehicle body—not to the table.

#### 3.3.2 The P.A. Valve

The P.A. Valve V7A type 813, is packed separately in the Case, spare valves and parts, in Kit 2, and must be placed in the empty socket in the Sender.

Be sure that the Set is turned OFF before the fan door is opened.

- (a) Loosen the wing nuts half a turn and open the door.
- (b) The valve socket is at the center of the chassis, and above it is a bar and cap connector. Lift the bar and turn it to the left.
- (c) Hold the valve so that the pins are in the position shown in Fig. 36, (V7A) and insert it carefully into the socket.
- (d) Lift the cap bar and place it on the valve cap.
- (e) Close the door.
- (f) Mark the top of the valve carton **EMPTY** and replace it in the Case, spare valves and parts.

### 3.3.3 The Aerial Base C-2

The Aerial Base may be mounted on the center or right hand side of the vehicle roof near the bulkhead. The side position results in shorter aerial leads and easier whip aerial erection. The choice of position will depend upon the type of vehicle. If the Aerial Base is to be used at the right hand side, there must be space at the side of the Wireless Set for the Aerial Tuning Coil. See Fig. 2. When the Aerial Base is mounted in the center of the vehicle the coil must be mounted on top of the Set.

The mounting hole dimensions for the Base are shown in Fig. 60. In some vehicles, provision has been made for installation of the Base, in others the roof must be drilled and cut. Mounting bolts and nuts and a gasket are supplied with the base. Be careful not to damage the gaskets; they can be ripped quite easily.

Before the Aerial Base is mounted on the roof it must be assembled from the component parts which are shipped in two packages. The detailed instructions are shown on the right hand side of the assembly diagram Fig. 10, a copy of which is included with the base. The instructions on the left hand side of the sheet are for assembly of the Base from maintenance spare parts.

When the base is mounted on a flat roof the threaded rod should be terminated with two washers, a wing nut and a "D" ring just as it is supplied. When the base is

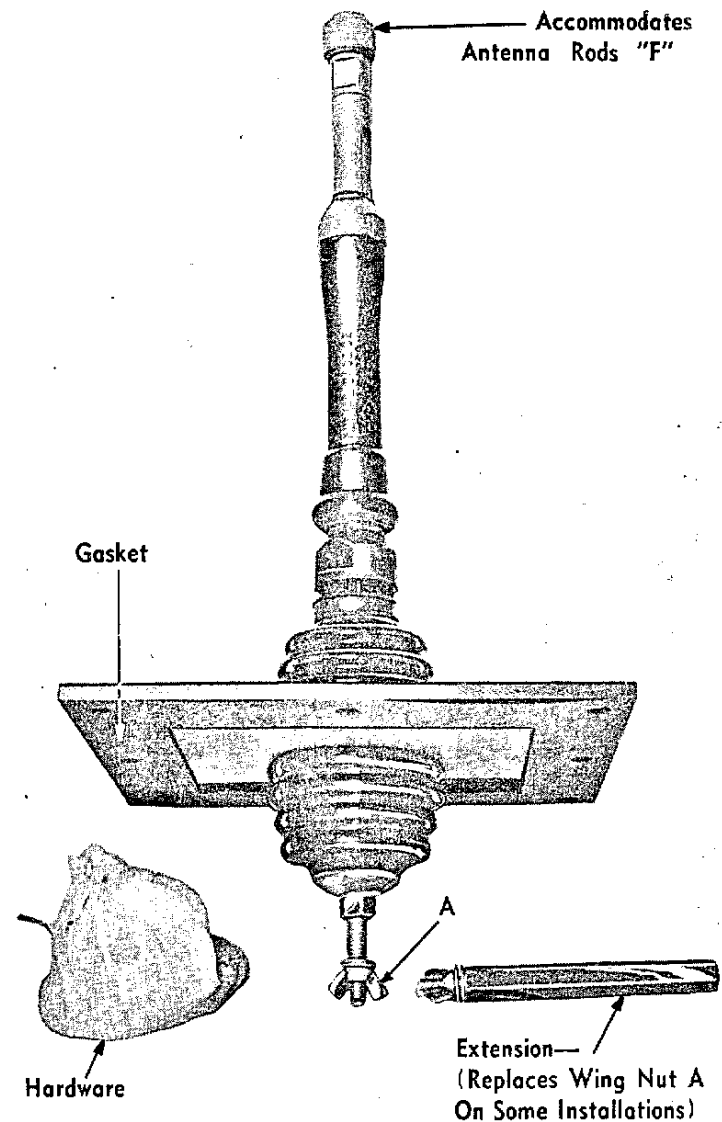


Fig. 9—Aerial Base C2

FROM MAINTENANCE SPARE  
Maintenance Spares consists of 1 Case

FROM SET KIT  
Set Kit Consists of Packages 1 & 2 of 2

1. Colllet Assembly CMC 114-075 to Casing Assembly CMC 114-074.  
(a) Tighten in Assembly.

2. Vertical Wax Cartridge CMC 114-073 to Casing Assembly CMC 114-074.  
(a) Put Anti-freeze grease in Casing.  
(b) Push Cartridge to limit.

3. Assemble Casing CMC 114-074 to Drawbolt Assembly CMC 114-072.  
(a) Check that Casing Gasket CMC 114-070 is on top face of Drawbolt.  
(b) Tighten Locking Nut of Casing Assembly to head of Drawbolt Assembly.

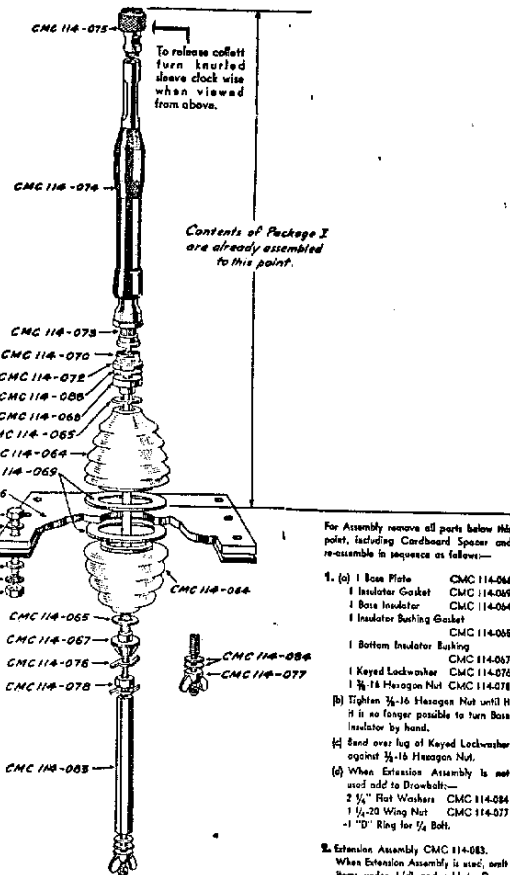
4. Base Plate Assembly.

(a) Add parts in sequence as shown—  
1 Drawbolt Gasket CMC 114-068  
1 Upper Insulator Bushing CMC 114-068  
1 Insulator Bushing Gasket CMC 114-065  
1 Base Insulator CMC 114-064  
1 Insulator Gasket CMC 114-069  
1 Base Plate CMC 114-066  
1 Insulator Gasket CMC 114-069  
1 Base Insulator CMC 114-064  
1 Insulator Bushing Gasket CMC 114-065  
1 Bottom Insulator Bushing CMC 114-067  
1 Keyed Lockwasher CMC 114-076  
1 3/8-16 Hexagon Nut CMC 114-078

(b) Tighten 3/8-16 Hexagon Nut until it is no longer possible to turn Base Insulator CMC 114-064 by hand.  
(c) Bend over leg of Keyed Lockwasher against 3/8-16 Hexagon Nut.  
(d) When Extension Assembly CMC 114-083 is not used add to Drawbolt—  
2 1/2" Flat Washers CMC 114-084  
1 1/2-20 Wing Nut CMC 114-077  
1 "D" Ring for 1/2 Bolt.

5. Extension Assembly CMC 114-083.  
When Extension Assembly is used, omit items under 4 (d) and add to Drawbolt—  
1 Keyed Lockwasher.  
1 Extension Assembly.

Bend over Keyed Lockwasher.



For Assembly remove all parts below this point, including Cardboard Spacer and re-assemble in sequence as follows—

1. (a) 1 Base Plate CMC 114-066  
1 Insulator Gasket CMC 114-069  
1 Base Insulator CMC 114-064  
1 Insulator Bushing Gasket CMC 114-065

1 Bottom Insulator Bushing CMC 114-067  
1 Keyed Lockwasher CMC 114-076  
1 3/8-16 Hexagon Nut CMC 114-078

(b) Tighten 3/8-16 Hexagon Nut until it is no longer possible to turn Base Insulator by hand.  
(c) Bend over leg of Keyed Lockwasher against 3/8-16 Hexagon Nut.

(d) When Extension Assembly is not used add to Drawbolt—  
2 1/2" Flat Washers CMC 114-084  
1 1/2-20 Wing Nut CMC 114-077  
1 "D" Ring for 1/2 Bolt.

2. Extension Assembly CMC 114-083.  
When Extension Assembly is used, omit items under 1 (d) and add to Drawbolt—  
1 Keyed Lockwasher.  
1 Extension Assembly.  
Bend over Keyed Lockwasher.

mounted on a "chimney" the extension assembly CMC 114-083 must be attached instead.

### 3.3.4 The Base Plate, Vehicle Roof

Attach the base plate to the roof with the three bolts, nuts and washers which accompany it. The drilling hole dimensions are shown in Fig. 61. Place the plate so that its center is not more than 10" from the center of Aerial Base C-2. Lead, aerial No. C6 must reach without strain from the Vertical Aerial to the C2 base.

### 3.3.5 The Coil Aerial Tuning and Lead Aerial No. C6

When the Aerial Base is at the center of the roof, fasten the coil on top of the Set; when the base is at the right hand side, fasten the coil to the side of the Set.

Hold the coil in position so that the four fasteners can be turned by hand part way into the sockets, then turn the wing heads a half turn using pliers.

Connect Leads, aerial, No. C6 (which is supplied with the coil) from the Sender Aerial socket to the nearer of the two wing nuts on the coil. Insert the lug between the washers.

### 3.3.6 The Charging Sets 300 Watt Mk. I Canadian

The charger must be fastened to a flat plate before it is placed in the charger compartment. Most vehicles are provided with this plate and with nuts, bolts, washers and lockwashers.

- Bolt the Charging Set to the plate, and be sure to use the lockwashers, otherwise the charger will be shaken from the mountings.
- Slide the Charging Set into its compartment and lock it in place.
- Join the exhaust coupling to the end of the flexible pipe which leads from the compartment to the exterior of the vehicle. The exhaust pipe which is supplied with the Charging Set is not required when one is built into the vehicle. It is intended mostly for non-vehicular use.
- A metal braid attached to the Charging Set is intended for electrical bonding to reduce ignition interference in the Receiver. Fasten the braid

Fig. 10—Assembly Diagram for Aerial Base C2.

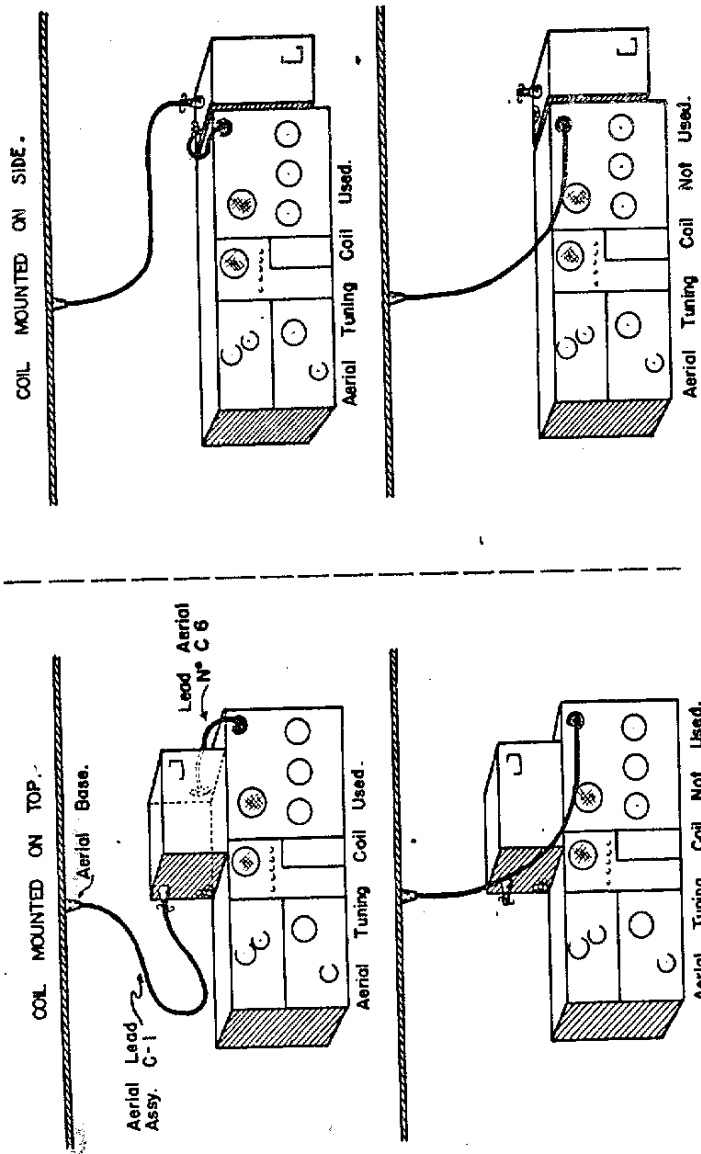


Fig. 11—Connections to Aerial Tuning Coil &amp; Aerial Base.

to the most convenient place in the compartment, so that good electrical connection is made.

### 3.3.7 The Switchboards Charging No. C5

If the vehicle is not equipped with a switchboard which provides all the facilities described in paragraph 4.12.1, Switchboard, charging No. C5 must be installed. It is essential to be able to float charge the batteries—and that is not always possible with vehicle switchboards. The location will depend upon the type of vehicle. If no better mounting can be devised, the Switchboard can be screwed to the underside of the table.

### 3.3.8 Connections

Before making any connections, turn the Set OFF.

- (a) Aerial Lead Assembly C-1, which is used to connect either the Aerial Tuning Coil or the Sender to the Aerial Base, must be cut to the proper length. Hold the lead temporarily in place to determine its length. It must reach from the Aerial Base to either the socket on the Aerial Tuning Coil, or the socket on the Sender, and should have just sufficient slack to avoid strain when the Set moves on its shock-mounts. See Fig. 8. Cut the lead to the correct length (better slightly too long than too short at first) and solder on the lug which is attached to the lead.

Fasten the lug end of the lead between the washers under the wing nut of the Aerial Base, and push the plug into the socket on the Aerial Tuning Coil.

- (b) Leads, Earth, No. C-2 should be already in place. See section 3.3.1.
- (c) If the vehicle charging switchboard and wiring are adequate, connect the two sets of batteries to the vehicle wiring leads. The positive (+) terminal must NOT be connected to a ground lead. If battery jumpers are not provided, connectors Single No. C-3 may be used to connect each pair in series.

Fasten the lug ends of Connectors, Twin, No. 17 to the vehicle wireless terminals; the red lead

to the positive (+) terminal, and the black lead to the negative (-) terminal. Connect the Twin 17 socket to the 12V plugs on the Supply Unit and tighten the large screw. Be sure that the plug is attached as shown in Fig. 1 and not upside down.

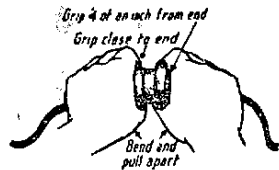
Connect the two terminals of the Charging set to the vehicle charger terminals. Be sure to connect the charger (+) to the wiring (+) terminal and the charger (-) to the wiring (-) terminal. The charger polarity is shown in Fig. 25. When the start button is first pressed the meter should show discharge; when the charger is running and the OUTPUT control is turned clockwise the meter should show charge.

- (d) Join a Microphone and Receiver Headgear assembly No. 1 Canadian to one of the drop cord sockets. Join these connectors carefully. They only fit one way so do not abuse them by trying to force them together the wrong way. See Fig. 12. For C.W. sending connect the Key and Plug assembly to the Key jack on the Sender. Before turning the Set ON examine the fuses in the vehicle wireless battery circuit. They should be between 75 or 100 AMPS. capacity. Fuses are not necessary to protect the Wireless Set so the fuse holders may be jumpered temporarily if the fuses are too small. However be sure to make solid low resistance connections. When an aerial

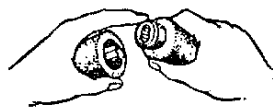
has been added, the Set is ready for operation according to the instructions in Chap. IV.

CONNECTING HEADSET-LEADS TO  
DROP LEADS

1. Undoing



2. Moisten brass ring before plugging in again



3. Plugging in

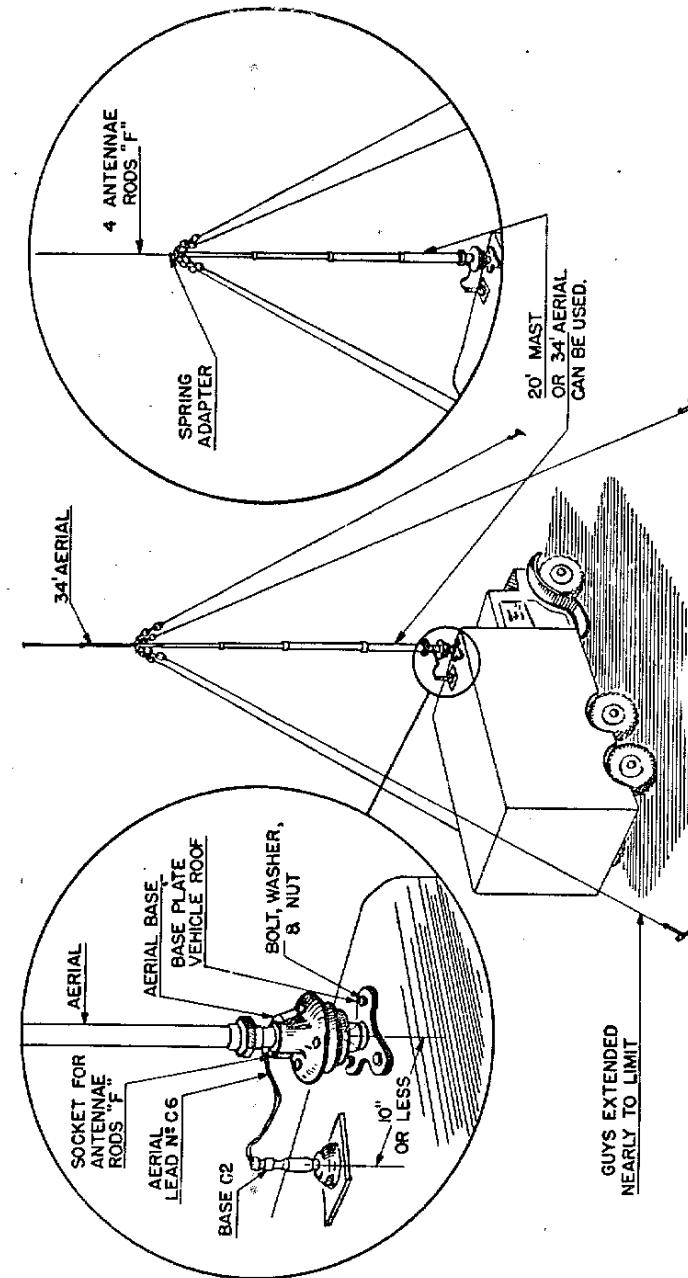


Fig. 13—Vertical Radiator on Roof of Vehicle.

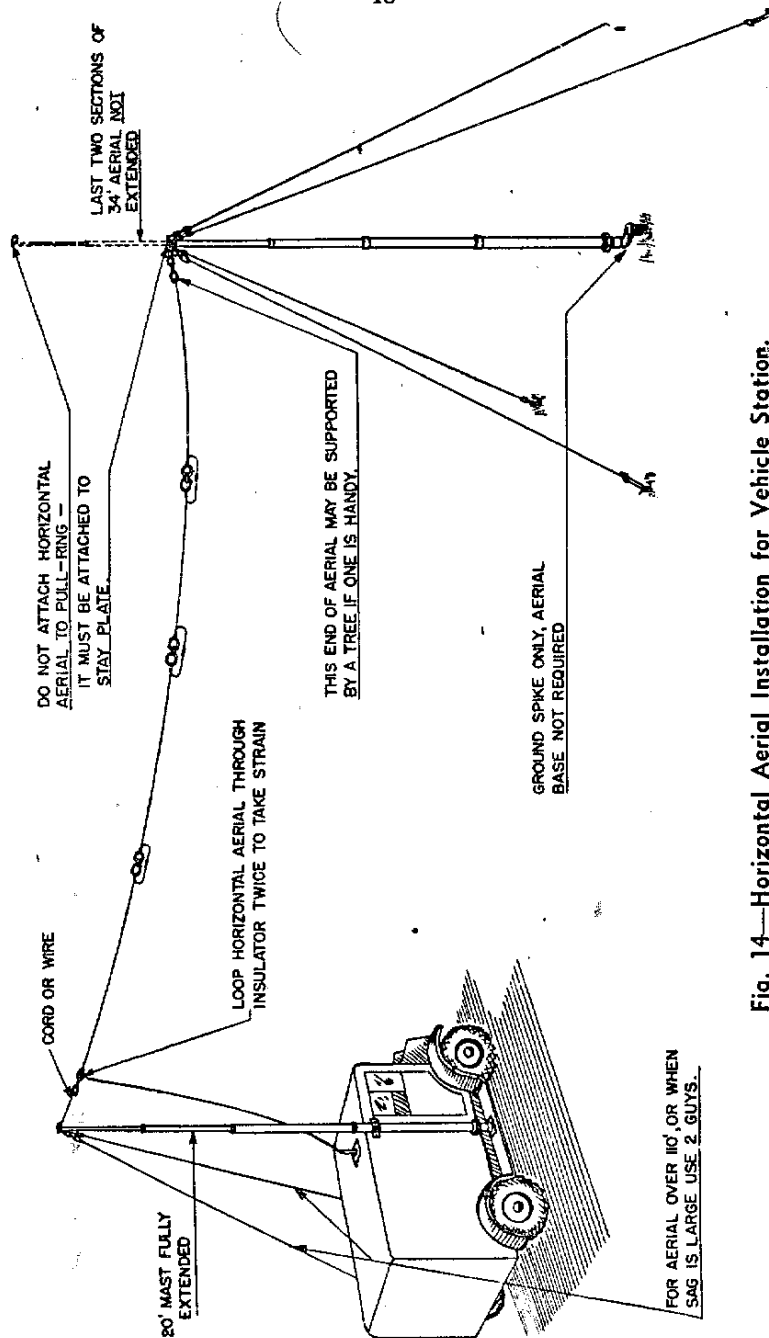


Fig. 14—Horizontal Aerial Installation for Vehicle Station.

If the vehicle switchboard or wiring are inadequate omit the instructions in (c) above and follow the wiring instructions in Section 3.4.7. b. to d.

Fasten the leads in place so that they will be off the floor of the vehicle and cannot be stepped on, otherwise the insulation will be worn off rapidly.

### 3.3.9 Vertical and Horizontal Aerials

Read the complete information in the Working Instructions in the Bag Aerial Gear.

The Vertical Aerial or the Mast with 4 type "F" rods, can be supported on the vehicle roof as described below.

Before extending any section attach the guys to the stayplate, and insert antennae rods type F if used.

One man stands on the ground holding section 1 while another man on the vehicle roof extends the sections, starting with the smallest one, and tightens the collars. When the aerial is fully extended, the man on the roof lifts the aerial up to the roof while two other men guide it with the guys. The aerial is rested on the base plate vehicle roof, until the guys are in place. The aerial is then raised, the aerial base inserted, and the guys are finally adjusted. Connect the terminal on the bottom aerial section to the vehicle whip aerial base with Aerial lead No. C6. See Fig. 13.

The horizontal aerial can be supported at one end from the 20' Mast attached to the vehicle, and at the other end from a tree. A couple of guys should be used with the 20' mast to support the horizontal aerial. The aerial can be lowered by lowering sections of the mast.

## 3.4 GROUND STATION INSTALLATION

See: Block diagram fig. 16 and fig. 14.

### 3.4.1 The Tents, Wireless Station

Choose as flat a patch of ground as possible, and remember that a spike for the vertical aerial and pegs for guy ropes must be driven into the ground. Also remember section 4.10 on location. If the position is to be at all permanent, floor boards are well worth while. The

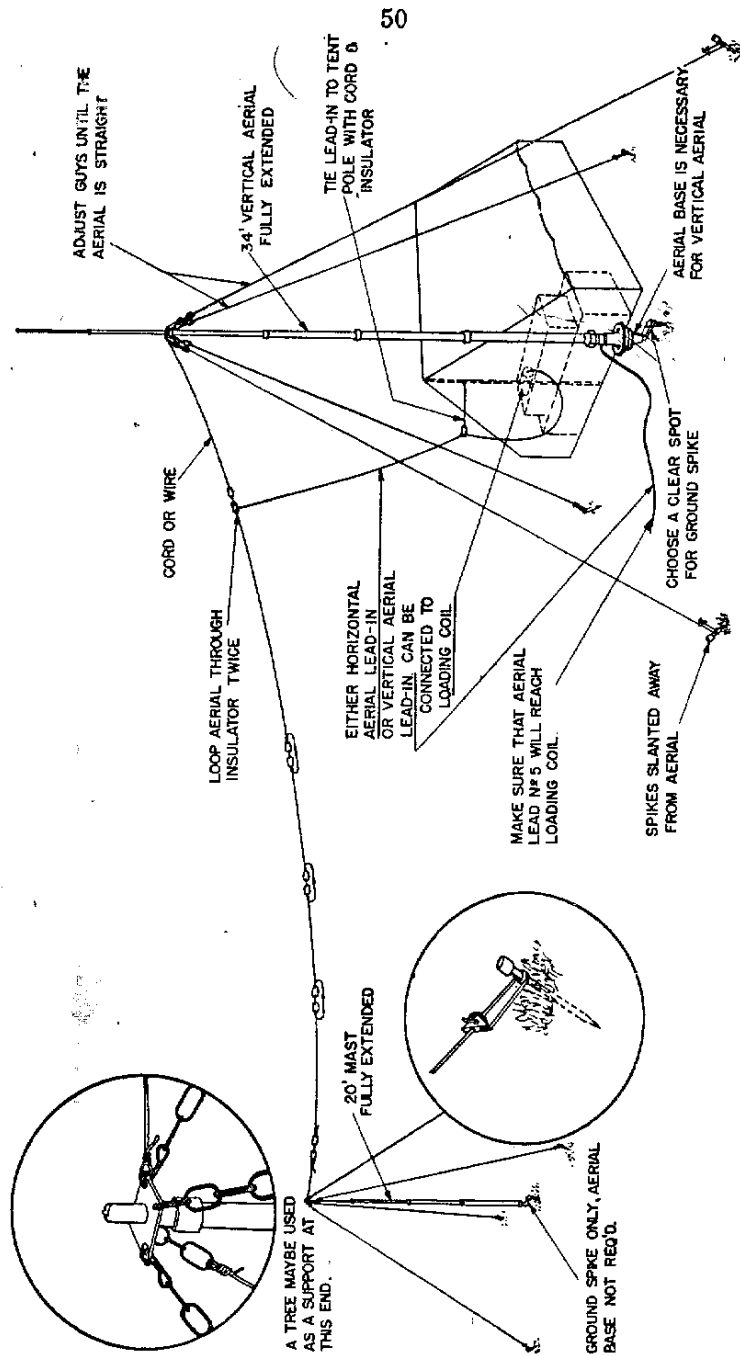


Fig. 15—Horizontal and Vertical Aerial Installation for Ground Station.

dimensions of the tent are given in Table XXI.

When the station must be moved, remember that the tent should not be packed when wet. If you must do so, unpack it as soon as you can, to allow it to dry out quickly.

### 3.4.2 The Wireless Set and Aerial Tuning Coil

A table strong enough to support the Wireless Set (270 lbs.) is required; the table in the Wireless Vehicle is suitable and is removable. Place it at one end so that the Wireless Set will be parallel to the flaps, preferably facing into the tent.

Carrying handles have been provided at the two ends of the carrier. Lift the Set onto the table. If it seems that something more than gravity is working on the Set, have courage; it weighs 255 lbs. Do not push the Set or the table against the canvas. Since the Remote Control Unit will probably be used, leave space at the right hand end of the table for it.

Fasten the Aerial Tuning Coil on top of the Set. Hold the coil so that the fasteners can be turned part way into their sockets by hand, then turn the wing heads half a turn using pliers.

Connect Leads Aerial No. C6 (which is supplied with the coil) from the Sender aerial socket to the nearer of the two wing nuts on the Coil.

### 3.4.3 The P.A. Valve

When the Wireless Set is installed for the first time, the P.A. Valve must be inserted. Follow the instructions in section 3.3.2.

### 3.4.4 Batteries and Switchboard

Place the four Batteries Secondary Portable 6 volt 200 A.H. and the Switchboard underneath the table. If at all possible put them on boards, not on the ground. Turn all the knobs on the Switchboard to OFF.

### 3.4.5 Vertical and Horizontal Aerials

Read the complete information in the Working Instruction in the Bags, Aerial Gear

Erect the Vertical Aerial close to the Wireless Set end of the tent. Leads, Aerial No. 5 must reach from the Coil, Aerial tuning No. 2A to the terminal on the Aerial. (Use

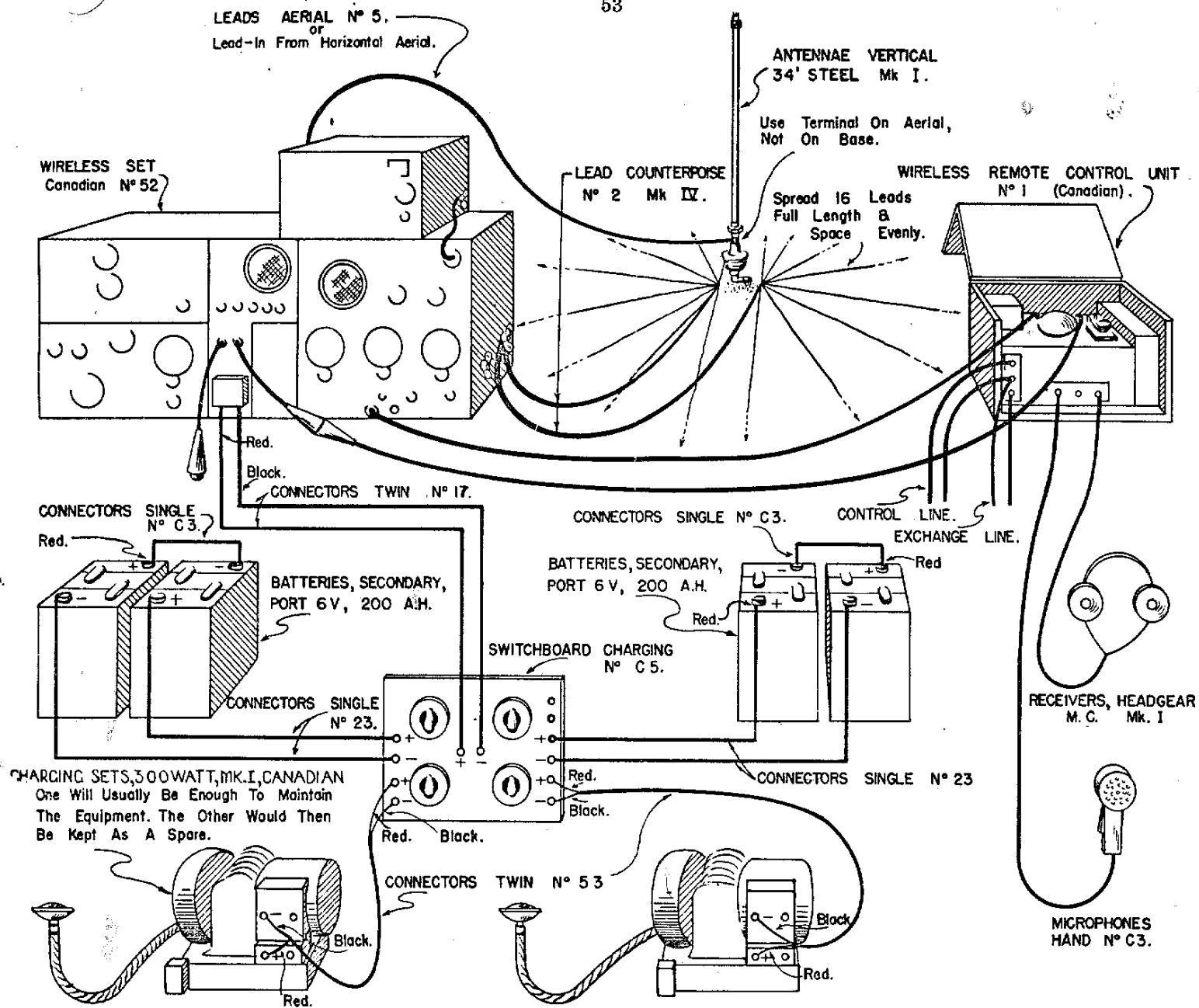


Fig. 16—Ground Installation Block Diagram.



the terminal on the Aerial, not the one on the Base.) Clear a space for the Spike and Base so that grass or snow will not foul the aerial base. Keep the Base clean and dry. Drive the spike in straight—don't try to pull the Aerial straight with the guys when the spike is at a jaunty angle. The Aerial can be erected by one man if the ground is not unusually soft. Place the Base on the Spike and the collapsed Aerial on the Base. Attach the guy snaps to the stay plate. Raise each section of the Aerial starting with the smallest and tighten the collars. Be sure to extend each section fully. When the Aerial has been extended, anchor the guys.

The Horizontal Aerial can be supported at one end from the stay plate on the Vertical Aerial, and at the other end from the 20' Mast or from a tree. In order to change frequency it will be necessary occasionally to lower the Aerial and open or close the jumpers. When the Mast is used, it is easy to lower a couple of sections. When the support is a tree, a rope or wire attached to the insulator can be anchored on the tree a few feet above the ground. See Fig. 15.

#### 3.4.6 The Charging Sets 300 watt Mk. I Canadian

Join the exhaust pipe to the Charging Set and put both outside the tent where the exhaust fumes can do no harm and where the noise will be less objectionable. When the Charging Set is not being operated, and particularly at night, put the canvas cover over it and bring it into the tent to reduce moisture condensation.

#### 3.4.7 The counterpoises and connections

- (a) Two Leads counterpoise No. 2 Mk. IV are provided and both must be used. Spread them out equally spaced, flat on the ground, so that the sixteen leads radiate from the Vertical Aerial like spokes from the hub of a wheel. Extend each lead to its full length and then tramp the bakelite cup into the ground or snow. When the snow is deep and soft the leads should be tramped down into it as deep as possible. Connect the lug ends of both Counterpoises to the ground terminal on the right hand side of the Carrier.

(b) Charging Set—Attach one end of Connectors, Twin No. 53 to the terminals of the Charging Set. Connect the red lead to the (+) terminal and black lead to the (—) terminal. Attach the other end of the Connectors to the two switchboard terminals marked CHARGER NO. 1. Connect the red lead to the (+) terminal and the black to the (—) terminal.

(c) Battery—Attach the four Connectors, Single No. 23 to the two pairs of terminals on the Switchboard marked BATT. NO. 1 and BATT. NO. 2. Turn all the switches OFF.

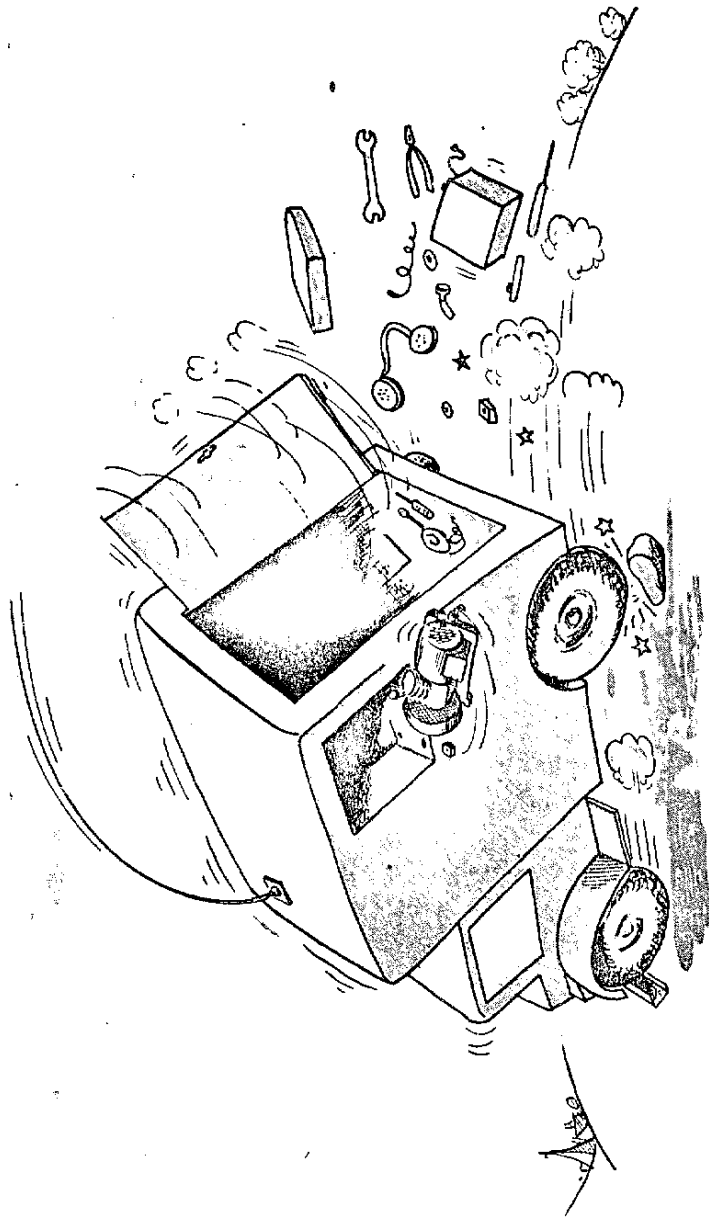
Separate the four batteries into two pairs. One pair is Battery No. 1, the other pair is Battery No. 2. Connect the two Batteries No. 1 in series with a Connector, Single No. 3 and the two Batteries No. 2 in series with the other Connectors, Single, No. 3.

Join the two leads from the BATT. NO. 1 terminals of the Switchboard to the terminals of Battery No. 1. Join the two leads from the BATT. NO. 2 terminals of the Switchboard to the terminals of Battery No. 2. Be careful to join the lead from the (+) terminal of the Switchboard to the (+) terminal of the battery, and the lead from the (—) terminal of the Switchboard to the (—) negative terminal of the battery in each case. These leads are heavy and not easy to handle. It is important to make the connections to the battery terminals secure and positive.

Tighten with pliers all the Switchboard connections.

(d) Wireless Set—Attach the lugs of Connectors, Twin, No. 17 to the 12V OUTPUT terminals of the Switchboard. Connect the red lead to the (+) terminal and the black lead to the (—) terminal. Attach the socket of Connectors, Twin, No. 17 to the 12 VOLTS plugs on the Wireless Set and tighten the bolt.

(e) Aerial Lead—Connect the lead from either the Vertical Aerial or the Horizontal Aerial to the

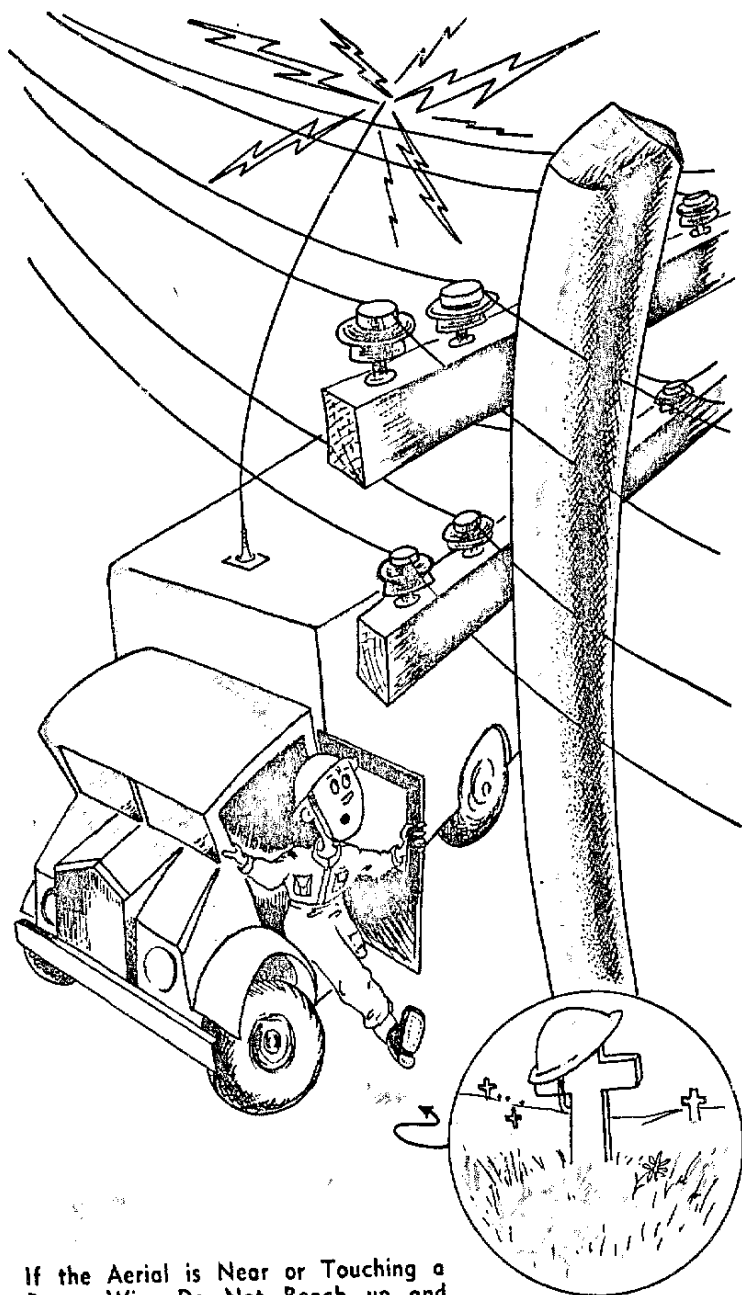


and be sure to replace the lockwashers.

- socket on the Coil Aerial Tuning No. 2A.
- (f) Accessories—Join a Microphone and Receivers Headgear Assembly No. 1 Canadian to one of the drop cord sockets, and for C.W. sending, connect the Key and Plug Assembly No. C9 to the KEY jack on the Sender.

The Set is now ready for operation according to the instructions in Chapter IV.

Reference is not made here to connections for the Remote Control Unit because complete instructions for remote operation are combined in Chapter V.



If the Aerial is Near or Touching a Power Wire Do Not Reach up and Remove it or Step Out of the Vehicle.

## CHAPTER IV OPERATING INSTRUCTIONS

### 4.1 TO THE OPERATOR

This is your equipment. Know it. Read Chapters I and II thoroughly, and study this one. Practice the operation of each control, reading the instructions, until you know both perfectly. Learn to operate the Set quickly and confidently, to obtain the best performance that it is capable of, without reference to this book. That is your part in the war while you are the Wireless Operator.

This whole equipment is well designed and well built. Don't abuse it. Maintain it in faultless condition and report any trouble when it occurs. Upon its performance may depend your life and the lives of many others.

### 4.2 PRELIMINARY

Before turning the Set ON check over the complete equipment. If time is short do it briefly,—but do it. Check the aerial, the connections to the aerial and to the Wireless Set, (Receiver aerial lead, ground lead, headphones, key, aerial tuning coil), the connections to the batteries, to the charging panel, and the charger. Make sure that all these are properly connected and are secure. After the Set has been turned on, check the Receiver meter readings, and the Crystal Calibrator (section 4.5.2) and after the Sender has been tuned and loaded, check the Sender meter readings.

You should know at all times:

- (a) that all connections are correct and secure. (Check with Chapter III)
- (b) The condition of the batteries. (Section 4.12).
- (c) The amount of petrol and oil in the Charging Set and the amount available. (Section 4.12.2).
- (d) The length of aerial in use.
- (e) That Receiver and Sender meter readings are right. (Section 6.4). You need check the Sender readings at one frequency only.
- (f) The frequencies at which the red and blue flicks are set.

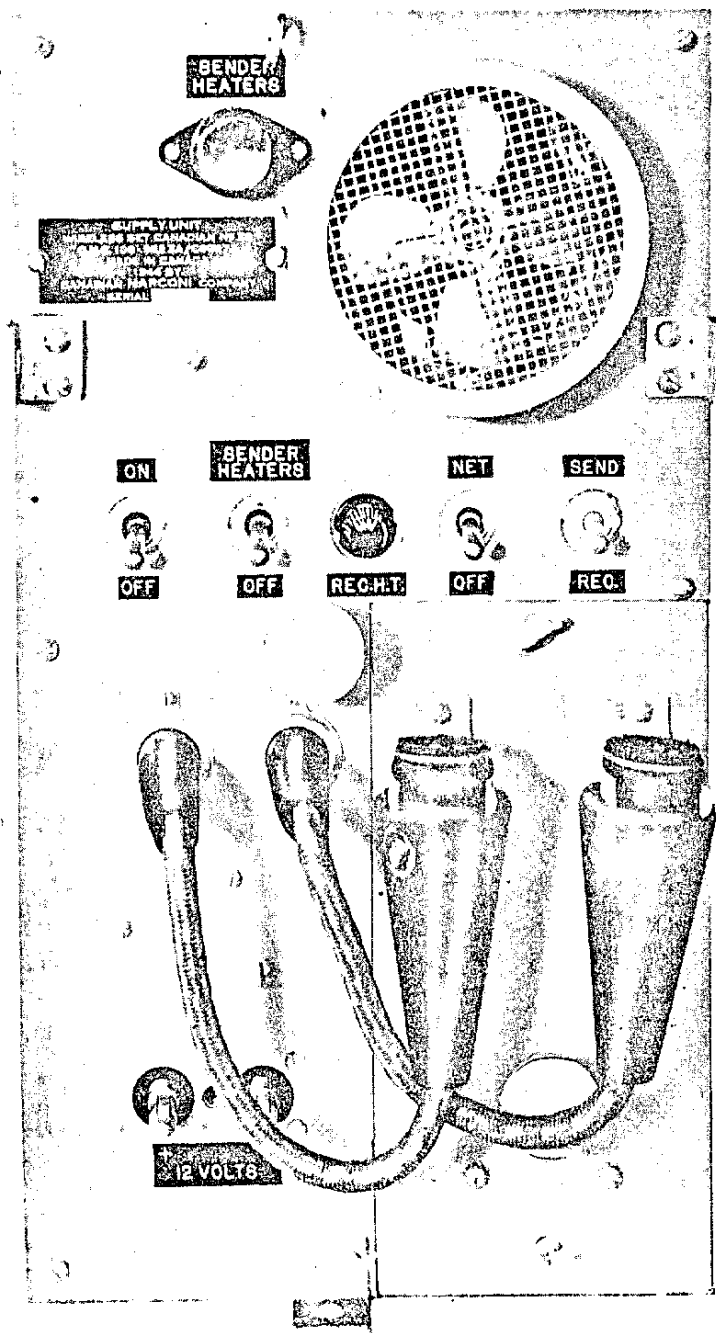


Fig. 17 Supply Unit—Front View

(g) The Calibrator test is satisfactory. (Section 4.5.2).

#### 4.3 THE SUPPLY UNIT CONTROLS

**ON-OFF:** This is the Master Switch which turns the complete Wireless Set on and off. Before putting it to ON, put the NET switch OFF and SEND-RECEIVE switch to REC. When it is ON the Receiver Pilot light is bright.

**SENDER-HEATERS:** When the ON-OFF Switch is ON, this switch controls the Sender voltage supply. The valve heaters, fans, relays, and dynamotors cannot operate when this switch is OFF—only the Receiver and its Vibrator Unit. When this switch is ON, voltage is applied to the Sender, and the pilot light marked SENDER HEATERS is bright. Power is also available then for the dynamotors, fans, and relays which are controlled by other switches.

**SEND-REC:** This switch puts either the Sender or the Receiver into operation; when one is operating the other is not. It is used for M.C.W. and C.W. On R.T., Send-Receive switching is performed automatically by the Microphone pressel switch, the SEND-REC. switch being left at REC. Keep this switch at REC. until you understand section 4.8.

**NET-OFF:** The Sender and the Receiver cannot be operated at the same time. In the NET position this switch turns on the Sender M.O. while the Set is on Receive, and makes possible tuning the Sender M.O. exactly to the Receiver frequency. When the Sender FREQUENCY dial is tuned close to the Receiver frequency, an audio output is heard in the Receiver. They are on the same frequency when the M.O. is tuned to zero beat. Similarly the Receiver can be netted to the Sender by turning the Receiver FREQUENCY dial until a note is heard and zero beat is reached.

**REC. H.T.** This is a fuse in the input circuit of the Receiver Vibrator unit. If it burns out the Receiver will be dead.

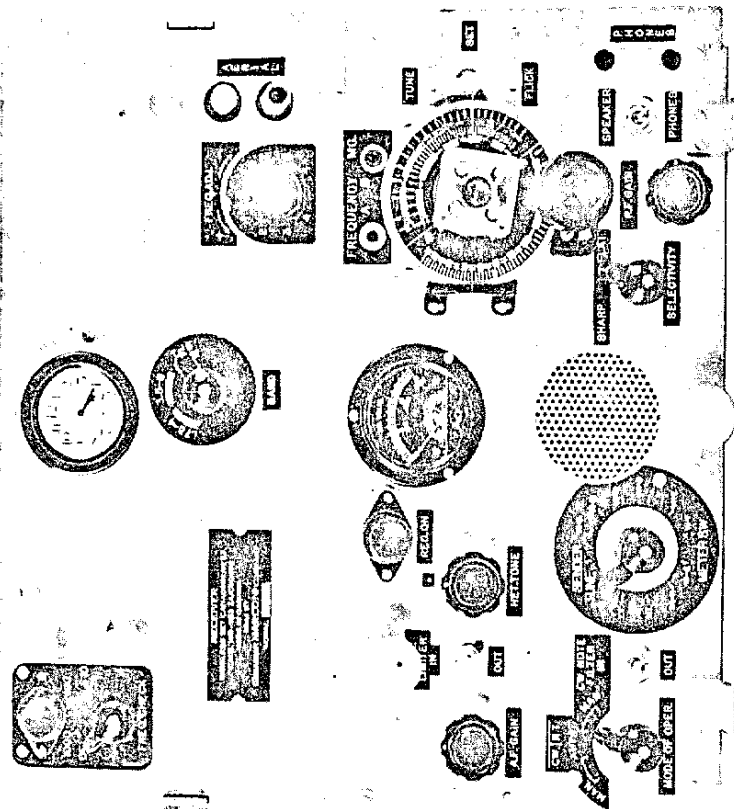


Fig. 18 Receiver—Front View

**WARNING:** Keep the SEND-REC. switch at REC. until you have studied the Sender Tuning and Loading in Sections 4.7 and 4.8.

**DROP CORDS:** These sockets are for connection to Microphone and Headgear Assembly No. 1 Canadian which are supplied with the Set. Two headgear assemblies may be plugged in at the same time with only a slight reduction in volume. The clip on the headgear cord should be fastened to your tunic. It will remove the weight of the microphone and cord from your head.

Microphone and Receivers Headgear Assemblies No. 1 can also be attached to these sockets.

#### 4.4 THE RECEIVER CONTROLS

**BAND:** This switch selects the frequency band on which the Receiver will operate. The range at each position is marked on the panel.

**MODE OF OPER:** This switch provides the choice of reception of R.T., M.C.W., or C.W. Signals.

There are two R.T. and two C.W. positions. The former are used for both R.T. and M.C.W. reception. The latter only for C.W. All types of signal can often be located more easily on C.W. than on R.T.

The AUTO position will normally be used on R.T. There is little fading of signals and most stations appear to have about the same strength. It is particularly useful when communicating with several stations, (either on R.T. or C.W.) because the GAIN controls will not require much readjustment. Set the R.F. GAIN at maximum and use the A.F. GAIN for volume control whenever the AUTO position is used.

The MAN. position provides greater volume and slightly more sensitivity than the AUTO position. Signals from various stations will have widely different strengths and some will fade. However C.W. signals may be more stable. The MAN. position must be used for break-in operation. Whenever the MAN. position is used, set

the A.F. GAIN control at maximum and use the R.F. GAIN for volume control. You must be careful when using the MAN. position not to set the R.F. GAIN too high, or the signal will be distorted. You are least likely to do so when the A.F. GAIN is at maximum.

**FREQUENCY:** This is the tuning dial on which all three bands are calibrated. It is equipped with the flick mechanism described in Section 2.11 and a two speed slow motion drive. There are two knobs, the larger for coarse movements, the smaller for accurate tuning. They provide tuning at two speeds, slow and very slow.

**FREQUENCY ADJ.:** This knob is also a tuning control. It has a range of only a few Kc above and below whatever frequency the main tuning dial has selected. The  $\pm$  signs show the directions of rotation to raise or lower the frequency. If any drift of carrier frequency or of the Receiver occurs, it can be corrected with the **FREQ. ADJ.** knob without altering the flick position. It is particularly useful when several stations on a net differ slightly in frequency. Each can be tuned in accurately by a twist of the **FREQ. ADJ.** knob. It is also useful when searching near the Receiver frequency at high frequencies, because it provides finer tuning than the main dial. The range of the **FREQ. ADJ.** increases with frequency. There is a detent at the zero position and the knob should be at this position when the **FREQUENCY** dial is being used—particularly when netting, or when on **SHARP** selectivity.

**HET. TONE:** This control is used to vary the pitch of the audio note which is heard when listening to C.W. signals. When a signal has been tuned in properly the dot (•) on the panel indicates approximately the zero beat position. The same note can be obtained by turning the control in either direction from the centre position, but an interfering signal may be much weaker on one side than on the other. Often the pitch of the

desired signal can be adjusted to a value at which the note of an interfering signal is either very low or very high and therefore less objectionable.

When netting or when tuning to a C.W. signal this control must be at the centre position.

**A.F. GAIN:** This Control is used to adjust the volume of the Receiver when operating on **AUTO**. For **MAN.** operation it should be left at maximum.

**H.F. GAIN:** This control is used to adjust the gain of the Receiver. For **AUTO** operation it should be left at maximum unless the distance between stations is so small that the quality is poor. For **MAN.** operation it should be used as a volume control with the **A.F. GAIN** at maximum.

**SELECTIVITY:** This switch will normally be used at **FLAT** on **R.T.** and **SHARP** on **C.W.** An interfering signal a few Kc away from the desired signal will be much weaker when the switch is at **SHARP** than at **FLAT**, and the background noise is lower. However on **R.T.** the reduction in quality offsets most of this gain, so that it will be used mostly on **C.W.** The sensitivity is slightly higher on **FLAT**. Always use the **SHARP** position when operating the Calibrator, using the tuning meter, or netting; use the **FLAT** position when searching for signals, or listening to **R.T. Signals**.

**METER SW.:** By means of this switch the Receiver meter is used for several purposes.

At **L.T.** and **H.T.** it measures the Receiver Supply voltages; at the eight positions from **V1A** to **V1H** it tests Receiver valves (Table XIII); and at the **TUNE** position it is used as a tuning meter. In the latter position correct tuning is indicated by a dip of the needle to a low value. This must be done with the **R.F. GAIN** turned well up, with the **SELECTIVITY** switch at **SHARP**, and with the Mode of Operation Switch at **AUTO**. It is required principally on very strong signals, and will be used to tune the Receiver accurately when the sets are close. When the Remote Receiver is

operated from an A.C. power source, the LT position is inoperative.

When the switch is at SENDER the meter indicates that function which is chosen by the Sender meter switch.

**C.W. NOTE FILTER:** This filter is used on C.W. only, to reduce noise and interference. It is very effective and the operating skill that it requires is abundantly repaid. When it is switched in, all audio notes above and below 1000 cycles are greatly reduced in volume. To use it turn the HET. TONE to the dot, tune to the zero beat of the desired signal, and switch the C.W. NOTE FILTER to IN. The noise will become much weaker. Now turn the HET. TONE slowly in either direction until a pitch is reached at which the signal can be heard clearly above the noise or interference. With a little practice the pitch at which this occurs can be recognized by its rather unusual note. When two stations interfere badly, often the desired signal can be received fairly clearly with the filter in by carefully adjusting the HET. TONE Control until the one signal is loud and the other is faint. The signal will probably be better on one side of the HET. TONE dot than on the other.

**NOISE LIMITER:** This is a simple in and out device which reduces the interference caused by some types of noise. When there is noise of the "click" type, such as interference from gasoline engines or Charging Sets, the signal will be much clearer with the switch at IN. Since the gain of the set is lower when the switch is IN, it will be most effective on fairly strong signals. It can be used on R.T. and C.W. but, unlike the C.W. NOTE FILTER, is effective only on certain types of noise.

**SPEAKER-PHONES:** This switch feeds the Receiver output to either the phones jacks or to the loud-speaker. In both cases when the Set is on Receive, the output is also connected to the phones which are joined to the drop cords. On Send the

sidetone signal is connected to these phones. Use the phones when you are listening to weak signals.

**PHONES:** This jack is provided so that Headphones MC MK. I or any other low impedance phones can be used with the Receiver. This is essential for the Remote Receiver operation, or in case the Set Receiver is operated out of the Carrier. No sidetone is heard in these phones.

**FREQ. CHECK:** This switch is used to turn the calibrator on and to select the interval between frequency markers to be 1000, 100, or 10 kc. Its use is described fully in Section 4.5.1.

#### 4.5 RECEIVER TUNING

**WARNING:** Before turning the Set ON, put the NET Switch OFF, and the SEND-REC. switch to REC.

First, turn the main switch ON. If you intend to use the Sender, put the SENDER HEATERS switch up. Now wait calmly for 30 seconds while the valves become warm. (See WATCH on Receiver.)

When hunting for a station choose initially the following control positions:

- (i) MAN. on R.T. or C.W.
- (ii) FREQ. ADJ.: Zero
- (iii) HET. TONE: dot
- (iv) A.F. GAIN: maximum
- (v) SELECTIVITY: FLAT for R.T.  
SHARP for C.W.
- (vi) METER SW.: TUNE
- (vii) NOISE LIMITER: OUT
- (viii) NOTE FILTER: OUT
- (ix) PHONES
  - (a) Turn the BAND switch to the position which includes the frequency you want.
  - (b) Use the R.F. GAIN for volume control.
  - (c) If you know roughly the frequency of the signal that you seek, search on each side of the corresponding dial mark and tune slowly. Tune very slowly at the high frequencies.

If you know the exact frequency of the signal you want, use the Calibrator.

- (d) When the signal has been found readjust the controls as described above in Section 4.4.

#### 4.5.1 To use the Crystal Calibrator (Black gadget upper left hand corner)

You can tune the Receiver accurately to any frequency by using the Calibrator. It is a very clever device so you should practice using it until you are expert. When properly used it will give you the correct frequency, speedily and absolutely reliably.

The operation is described by giving an example at 4.43 mc. It is assumed that you want to set the flick. If not, just leave the lever at TUNE.

How to do it at 4.43 Mc.

- (a) Remove the lead from the Receiver AERIAL terminal.
- (b) Turn the **FREQ. CHECK** to 1000. (The light should come on) Allow about one minute for the valves to become warm.  
**MODE OF OPER.** to C.W. AUTO  
**FREQ. ADJ.** to ZERO  
**HET. TONE** to DOT  
**A.F. GAIN** to maximum  
**SELECTIVITY** to SHARP  
**BAND** switch to proper frequency band.  
 (Band 2, 3.5-8 M.C. in this example)  
**NOISE LIMITER** and **NOTE FILTER**  
 switches OUT  
**SPEAKER-PHONES** to PHONES
- (c) Engage the flick; turn the lever to SET; loosen the corresponding two screws  $\frac{1}{2}$  turn.
- (d) Turn the **FREQUENCY** dial (hereafter called "the dial") across the band; pips will be heard at the 4, 5, 6 marks etc. Tune to zero beat at the 4 Mc. pip.
- (e) Turn the **FREQ. CHECK** switch to 100. The pip will still be heard but will not be at zero beat. Tune to zero beat.
- (f) Turn the dial slowly toward the 4.4 mc. mark. A pip will be heard near every dial mark. (Also between marks on band 3). Count the zero beat

- points omitting the one at 4.00 Mc. They occur exactly at 4.10, 4.20, 4.30 Mc. etc. Tune to the 4th one.
- (g) Turn the **FREQ. CHECK** to 10. You will still be at zero beat of the 4.40 mc. pip. Turn the dial by the smaller knob toward the 4.45 mc. mark. As it is turned, pips will be heard at 4.41; 4.42 mc. etc. Count the zero beat positions omitting the one at 4.40 mc. and tune the third one. Turn the **R.F. GAIN** until the volume is low and re-adjust the dial if necessary.
  - (h) The Receiver is now tuned to 4.43 mc. and the flick screws may be tightened. (By Hand)
  - (i) Rotate the dial out of the flick and then back. The signal should be near zero beat. If necessary a small correction can be made with the **FREQ. ADJ.** knob. Correction should not usually be necessary except at the highest frequencies.

If the frequency had been 4.46, you would have tuned to the 5th zero beat, 4.50 mc. at step (f), and then would have counted back four zero beat points to 4.46 mc. in step (g).

- (j) Turn the Calibrator OFF, replace the aerial lead, and adjust the controls for Receiver operation.

#### NOTES:

- (i) When counting pips you actually count the zero beat positions.
- (ii) The pip from which you start is always the "zero" pip and is not counted; the next pip is the first. e.g. start at 2.30, the next is 2.31; or start at 14.00 the next is 14.10 or start at 14.30 the next is 14.31 etc.
- (iii) The pips are close together and are sharp on band 3. Tune carefully.
- (iv) It is very unlikely that any interfering signal will be heard and be mistaken for a pip unless the aerial lead is left connected to the Receiver. However by switching the Calibrator OFF momentarily you can identify a note as a calibrator pip or a signal.

#### 4.5.2 Calibrator Test for Proper Operation

The following test should be performed before opera-



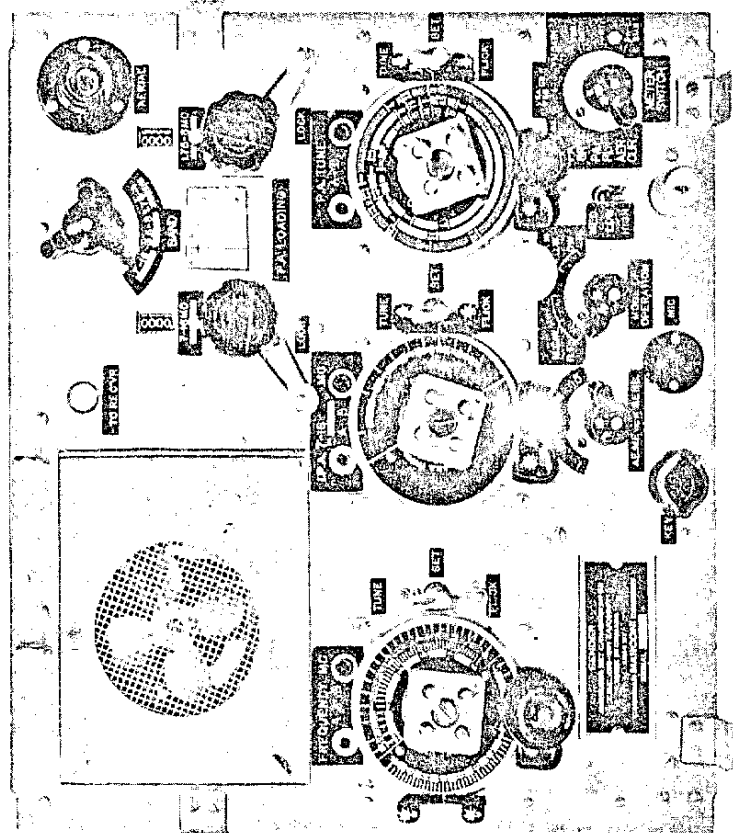


Fig. 19 Sender—Front View

tions, during weekly maintenance, and after a Calibrator valve has been changed. It will show definitely whether the frequency interval between 10 Kc. pips is exactly 10 Kc. The intervals between 100 Kc. or 1000 kc. pips will always be correct and need not be checked.

**Proceed as follows:**

- (a) Same as 4.5.1 (a)
- (b) Same as 4.5.1 (b)
- (c) Tune the dial to the zero beat at the 2 mc. pip. It will be found near the 2 mc. mark on the dial.
- (d) Turn the **FREQ. CHECK** switch to 100. The pip will still be heard although not at zero beat. Tune to zero beat.
- (e) Turn the switch to 10. You will still be tuned to the zero beat of the 2.00 mc. pip.
- (f) Turn the dial slowly toward 2.1 mc. counting the zero beat points. The one at 2.00 mc. is not counted of course. Stop at the tenth pip, just off the zero beat point so that a note can be heard.
- (f) Turn the switch to 100. If the pip is still heard the Calibrator is operating properly and the frequency interval between any two adjacent 10 kc pips is exactly 10 kc. If the 100 kc. pip can be heard only when the dial is stopped at the ninth or eleventh pip, an adjustment must be made. See Section 6.2.1.

#### 4.6 THE SENDER CONTROLS

First, be sure that the **NET** switch is **OFF** and that **SEND-REC.** switch is at **REC.**

Put the main switch **ON** and the **SENDER HEATERS** switch up. While it warms up we can chat about the controls.

The **BAND** switch, and the **FREQUENCY** dial "tune" the Sender. The settings of these two controls determine the frequency of your signals. The dial is marked with three scales, one for each band, and has the flick device. The markings are a guide only; accurate tuning must be done according to the procedure described in 4.7. The dial has two knobs, the larger one for coarse rapid movements, the smaller for accurate slow tuning.

The P.A. TUNE, the I.P.A. on band 3, the P.A. LOADING, and at some frequencies the AERIAL TUNING must be adjusted so that the Sender delivers maximum power to the aerial. This is called "loading" the Sender. The I.P.A. and the P.A. TUNE dials have flicks and are calibrated to show the starting positions for tuning. The I.P.A. is used only on band 3.

The P.A. LOADING and the AERIAL TUNING knobs are not calibrated. They have counters so that their positions can be noted and jotted down on the little log tablets; small cranks are built into the knobs for quick tuning and there are locks to prevent them from turning during vibration.

**MODE OF OPER.:** This switch is used to select any one of the types of Transmission, namely R.T., M.C.W., C.W., M.C.W. break-in, or C.W. break-in. Netting will be done on R.T., output loading on MCW for H.P. and C.W. for M.P., regardless of the type of transmission which you intend to use. Tuning and loading are the same for all modes of operation; when output loading is completed the switch is turned to the type of transmission that is desired.

**HIGH-LOW-MED.:** This switch controls the level of power output. Having chosen HIGH or MED. depending on the range, tuning will be done in that position—never in LOW. When communication is good the switch can be put at LOW to reduce battery drain and to reduce the area over which signals from the Set can be heard—but do not alter the settings of the tuning or loading controls.

The HIGH and LOW positions will probably be used most frequently. If you switch from MED. to HIGH or from HIGH to MED. you must reload. That is not true from HIGH to LOW, or from MED. to LOW.

A lock below the switch can be used to prevent the use of HIGH power. Keys are provided with the sets; all locks and keys are the same.

**METER SWITCH:** This switch connects the meter to various parts of the Sender circuit for testing voltages and valves (Table XII) and for tuning guidance. It is

connected to the meter only when the Receiver switch is at SENDER.

In order to load the Sender, some indication of power in the aerial is necessary. This function is fulfilled by the meter when the Sender switch is at AER CUR.

The reading depends upon the Aerial Current, but since the sensitivity changes with frequency, and the current changes with type of aerial and frequency, the readings for different aeriels and frequencies are not in proportion to the power output. For example, the readings are very low when using horizontal aeriels, which radiate most efficiently. Over part of the frequency range the readings are so small that the P.A. Plate current must be used as the tuning indicator. These frequency ranges are listed in the tuning chart Fig. 21. If the temperature drops below 15°F the rectifier unit fails and the AER CUR readings will be very low. Then the P.A. plate current must be the tuning guide.

**A.E. METER SENS.** This switch controls the sensitivity of the meter and is used during loading to keep the needle on scale. The most sensitive position is 5 and the least sensitive is 1. Loading will always be started with the switch at 5.

The switch should be at 1 or 2 when sending MCW or CW to reduce the rapid shock to the meter movement which occurs during keying.

**XTAL1-MO-XTAL2:** This switch is on the Sender Chassis and can be reached through the panel door. It selects MO or crystal control of frequency. XTAL1 is the rear position, MO the center, and XTAL2 the front position.

**KEY:** This jack with the identifying bakelite guard is for the W.T. key. (Key and Plug Assembly No. C9)

**MIC:** A microphone Hand No. C3 or No. 3 can be used if necessary, by simply plugging it into this jack. Send-Receive switching must be performed then by the panel switch as well as pressing the microphone pressel switch. The Sender output is the same but the quality is poorer than it is when the proper microphone is used. This microphone should be held in a vertical or nearly

vertical position. When it is horizontal the output is very low.

#### 4.7 SENDER TUNING

The frequency chosen for the Sender will usually be the same as the Receiver frequency. Then this Set and the set with which it is communicating will occupy only one channel.

When the Sender is operated with M.O. frequency control, the following netting procedure will be followed:

- (a) Tune the Receiver accurately to a given frequency by Crystal Calibrator.
- (b) Net the Sender to the Receiver so that both the Sender and the Receiver are tuned to the assigned frequency.

This process can be used to fix the Sender frequency even when the Receiver is going to be used at another frequency for duplex operation. In that case the Receiver and Sender are tuned to the Sender frequency as just described, and then the Receiver is tuned to the second frequency by the Crystal Calibrator.

Of course when it is necessary to tune the Receiver and the Sender to the frequency of some other set which is on the air and can be heard, the Receiver can be tuned to that signal instead of to the Calibrator in para. (a). If the Sets are close so that the signal is very strong tune the Receiver by meter.

When the Sender is operated with Crystal Control the following tuning procedure will be followed.

- (a) Tune the Sender as described for crystal operation.
- (b) Net the Receiver to the Sender frequency.

or

For duplex operation, tune the Receiver to the other frequency by Crystal Calibrator, or directly to the other station.

##### 4.7.1 Netting The Sender to the Receiver (MO)

- (i) Set the controls as follows:

- Supply Unit: SEND-REC. .... REC.  
ON-OFF: ..... ON  
SENDER HEATERS—} SENDER  
OFF: ..... } HEATERS  
NET—OFF ..... NET
- Receiver: REC. MODE OF OPER. C.W. AUTO  
HET. TONE ..... DOT  
FREQ. ADJ. .... Exactly where  
it was when  
you finished  
tuning the Re-  
ceiver.  
A.F. GAIN ..... Maximum  
SELECTIVITY ..... SHARP  
LEAD AERIAL NO. C7 Remove from  
Receiver Ter-  
minal.
- Sender: BAND ..... To include  
required fre-  
quency.  
Same as Re-  
ceiver Band.
- MODE OF OPER. .... R.T.
- (ii) Turn the Sender Frequency dial until the A or B flick engages; turn the lever to SET; loosen the A or B flick screws  $\frac{1}{2}$  turn.
  - (iii) Tune the Sender FREQUENCY through the region about the dial mark which corresponds to the Receiver frequency until a loud C.W. note is heard.
  - (iv) Turn the R.F. GAIN down until the volume is low and tune to zero beat. Do not secure the flick screws until the Sender has been loaded. (Section 4.8)
  - (v) After the Sender has been loaded, check the netting and tune exactly to zero beat. Tighten the flick screws and put the lever to FLICK.
  - (vi) Turn the dial out of the flick and return to be sure that the MO is still close to zero beat.

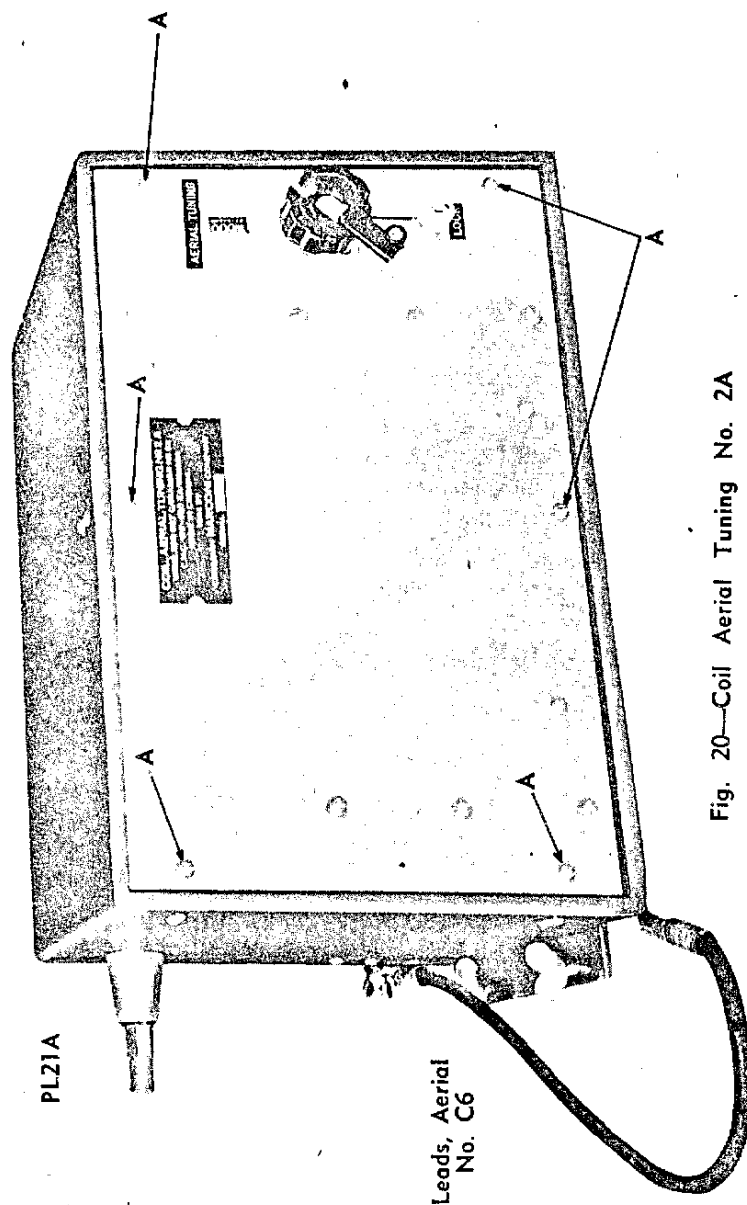


Fig. 20—Coil Aerial Tuning No. 2A

#### 4.7.2 Sender Crystal Control

- (i) Put the SEND-REC. switch to REC. and the ON-OFF switch OFF.
- (ii) Open the fan door and turn the crystal to XTAL1 or XTAL2 as required. This is a good time to see if there really is a crystal in the socket which you have chosen.
- (iii) On bands 1 and 2 turn the METER SWITCH to PA GR; on band 3 to V5C GR.
- (iv) Turn the BAND switch to the position which includes the required frequency.
- (v) Put the MODE OF OPERATION switch to R.T.
- (vi) Put the SEND-REC. switch to SEND.
- (vii) Tune the FREQUENCY dial, in the region of the desired frequency, for maximum meter reading and tighten the flick screws. This is not as critical an adjustment as the Receiver tuning.

#### 4.7.3 Netting the Receiver to the Sender (XTAL or M.O.)

Exactly as 4.7.1, except that:

- (i) The Receiver BAND switch is turned to the same position as the Sender BAND switch.
- (ii) FREQ. ADJ. turned to ZERO.
- (iii) The Receiver FREQUENCY dial is tuned instead of the Sender dial.

#### 4.8 SENDER LOADING

There are two loading procedures, one performed when the Aerial Tuning Coil is used, the other when it is not. The frequencies at which the coil should or should not be used are all listed in Fig. 21 and on the tuning chart.

##### 4.8.1 With the Coil Aerial Tuning No. 2A

(i) Set the Controls initially as follows:

SEND-REC. ....	: REC.
ON-OFF .....	: ON
SENDER HEATERS-	
OFF .....	: SENDER HEATERS
I.P.A. ....	: ON band 3 only, to same dial mark as FREQUENCY.

P.A. TUNE .....: Same dial mark as FRE-  
QUENCY.  
P.A. LOADING .....: Zero (Right hand knob for  
bands 1 & 2; left hand knob  
for band 3.)  
AERIAL TUNING .....: Near 0000  
MED-LOW-HIGH .....: HIGH or MED.  
MODE OF OPERATION: M.C.W. on High; C.W. on  
MED.  
Receiver METER SW...: SENDER  
AE, METER SENS ....: 5  
KEY .....: Plugged into jack and held  
down.  
SEND-REC. ....: SEND

WARNING: The P.A. Plate Current (PA PL) must  
never exceed 200 MA. There is a red line on the  
scale at this point. If the needle is past it when  
you start tuning, turn the P.A. TUNE quickly  
until the needle dips.

On MED. power tune on C.W. On HIGH power  
tune on MCW.

- (ii) On band 3 only, put METER SWITCH to PA  
GR and tune I.P.A. for maximum meter reading.  
Tighten the flick screws and turn the lever to  
flick.
- (iii) Put METER SWITCH to PA PL and tune the  
PA TUNE for minimum meter reading.
- (iv) Turn the PA LOADING to the following starting  
figure:

When using the low frequency half of the PA  
TUNE dial:

40 on band 1  
20 " " 2  
0 " " 3

When using the high frequency half of the PA  
TUNE dial:

410 on band 1  
390 " " 2  
0 " " 3

- (v) Put METER SWITCH to AER CUR and tune  
the AERIAL TUNING for maximum meter

reading. Turn the AE. METER SENS. lower  
when the meter needle approaches full scale.

- (vi) Turn the P.A. LOADING knob for maximum  
meter reading.
- (vii) Retune if necessary the AERIAL TUNING for  
maximum meter reading.
- (viii) Check for correct loading as follows:

A—METER SWITCH to PA PL: The meter reading  
should be between 90 and 130 on HIGH power MCW, or  
between 45 and 70 on MED. power C.W. The actual value  
will vary slightly with frequency and appreciably with  
voltage. Return the switch to AER. CUR.

B—Turn MODE OF OPERATION switch from M.C.W.  
to R.T. and back. The meter reading should drop to 3/4  
or 2/3 of the M.C.W. value.

C—Rock the PA TUNE dial slightly about its setting.  
It should be set for peak reading on the meter. Tighten  
the flick screws.

D—If you operate the Set on C.W., check the PA PL  
with C.W. key down, it should not be greater than 200.  
(Red Line.) If it is too great reduce the PA LOADING  
slightly and retune the AERIAL TUNING.

If tests, A, B, or C should fail, put the SEND-REC.  
switch to REC. and start over again.

#### 4.8.2 Without the Coil Aerial Tuning No. 2A

**Important** When the coil is not being used it must  
be disconnected, and the aerial must be connected directly  
to the Sender. Do not attempt to leave the coil connected  
even though it is set at zero. See fig. 11.

(i), (ii), (iii) exactly as described 4.8.1.

(iv) Put the METER SWITCH to AER CUR and tune  
as follows:

Notice the meter reading.

Increase the PA LOADING setting until a meter  
reading is obtained; retune the PA TUNE dial for maxi-  
mum meter reading.

This maximum will be greater than the initial reading.

(v) Repeat (iv). This maximum should be greater  
still than the last. Continue this successive adjustment  
of the PA LOADING and PA TUNE until the maximum

reading does not increase further and begins to drop. That is the correctly loaded condition.

(vi) Make tests A, B, C, D, given in 4.8.1 (viii) but in D retune the PA TUNE instead of the AERIAL TUNING.

**NOTE:** The Calibration of the PA TUNE dial for each band is divided into a low frequency section and a high frequency section. When the Sender frequently is near the high end of the lower frequency section, occasionally you will find that the procedure in (v) above leads to the stop on the dial before a peak is reached. In such cases return the PA LOADING to zero and the METER SWITCH to PA PL, rotate the PA TUNE clockwise nearly a complete revolution until the minimum reading is found and continue loading as in (iv) and (v).

(e.g. This may occur between 10 and 11 MC with an 8' V aerial and near 5.5 MC with the 34' vertical.)

When the Sender frequency is near the high frequency end of the high frequency half of the dial, the same difficulty may occur on band 2. In such cases between 7 and 8 MC change to band 3 and start to load again. (e.g.) this may occur with a 16'V aerial and the 75' horizontal aerial.

When using the Horizontal aerial between 3.5 and 4 MC on band 1, the Sender may not be fully loaded although the PA LOADING is at maximum. If so change to band 2. In general where the bands overlap 3.5-4 MC, and 7-8 MC use band 2 from 3.5-4 and band 3 from 7 to 8, if there is difficulty in loading.

#### 4.8.3 Tuning by Plate Current (Without Coil Aerial Tuning No. 2A)

When using the horizontal aerial at certain frequencies, and when using the 34' vertical near 11 M.C. the AER. CUR. reading is too low to be used as a loading indicator. The frequencies at which this occurs are listed in Fig. 21 and the tuning chart; for these cases the following method should be followed:

(i), (ii), (iii) exactly as in 4.8.1

(iv) Leave the switch at PA PL. Increase the setting of the PA LOADING KNOB and then retune the PA TUNE dial for minimum meter reading.

(v) Repeat (iv) in successive steps until the dip in meter reading caused by tuning the PA TUNE is small.

That is the correctly loaded condition. Do not continue until the position of the PA TUNE has no effect on the meter reading, or the Sender will be over loaded. The final reading should be within the values given for test A.

(vi) Make tests A,B,C,D of para. 4.8.1 (vii), but in D retune the PA TUNE instead of the AERIAL TUNING. The notes at the end of section 4.8.2 also apply here.

## 4.9 GUIDANCE, WARNINGS, AND GOOD OPERATING

### 4.9.1 Difficulties and Errors

When operating a complex equipment such as this, the operator is sometimes baffled by the inconsiderate lack of performance of the Set when some step in the procedure has been overlooked. A few of the more prominent possibilities are listed here as suggestions:

(i) **Low value of PA PL:** Can occur on bands 1 and 2 if you are using the high frequency half of the PA TUNE dial but have started the PA LOADING at the 40 or 20 instead of 410 or 390. In that case increase the PA LOADING until a second peak is found and finish loading.

(ii) **Unable to load the Sender:** Aerial lead disconnected. Coil used or not used at a certain frequency. Check with chart.

MED-LOW-HIGH switch at LOW

Wrong PA LOADING dial used

Wrong PA LOADING starting point.

Key up or not plugged in.

IPA not tuned on band 3.

Aerial less than 8' e.g. a 4' single or none at all.

SEND-REC. switch at REC.

(iii) **Sender AER. CUR. readings abnormally low:** This occurs at temperature below 10°F. The current does not decrease, but the meter reading does. If so, tune by Plate Current (4.8.3). The meter circuit will recover.

(iv) **Unable to NET on MO:**

Crystal switch at XTAL

BAND switch at wrong position.

Sender switch at MCW or CW

Receiver switch at CW MAN. or R.T.

- Gain Controls turned to minimum.
- (v) Read the note following section 4.8.2.
  - (vi) **Receiver dead:** Aerial connection open.  
SEND-REC. switch at SEND  
GAIN controls at minimum  
Valve defective  
Supply Unit dead on Receive (No Receive HT reading)
  - (vii) **Supply Unit dead on SEND**  
(i.e. dynamotors do not run and the Sender HT1 and PA BIAS readings are zero).  
SENDER HEATERS switch not ON.  
Loose or dirty battery connections.  
Sender fan door open.  
Dynamotor protectors have operated.
  - (viii) **Supply Unit dead on REC.**  
REC. H.T. fuse blown.  
Fuse and vibrator blown.  
Valve dead (V4A)
  - (ix) **Numerous unmodulated carriers across the band.**  
Crystal calibrator left on. (Note: This also increases the battery drain slightly.)

#### 4.9.2 Operating Temperatures and the Dynamotor Protectors

The Dynamotors can be overheated and burned out from a number of causes, such as the failure of some other component, improper Sender loading, or excessive periods of operation of the sender on high power. Since a dynamotor failure requires workshop repair, each one is provided with an automatic protector which will remove the voltage supply to the dynamotor before it is damaged. When the dynamotor has cooled, the protector will automatically reclose the circuit.

On MED. or LOW power the Set can be operated continuously on Send under all conditions without overheating. High power R.T. operation causes the greatest heating, more than high power C.W. On Receive, the dynamotors do not run; on Key Up break-in they do but the heating is not great.

When the temperature of the air surrounding the Set

is below 75°F, the Sender can be operated continuously on all modes of operation. When the temperature is higher, the Set can be operated on Send R.T. only part of the time. At 110°F, for every 10 or 15 minutes on Send, the Set should be operated for 5 or 10 minutes on Receive, Break-in C.W. operation at 110°F is possible for long periods, but not always continuously.

The Set can be operated quite safely at higher temperatures, but when the temperature is above 110°F, the Send periods must not exceed 4 or 5 minutes, and the Receive periods should be longer.

The above applies particularly to R.T. operation, so that duplex R.T. on high power is impractical when the temperature is much above 75°F. Of course under all conditions the Set can be operated continuously on MED. power.

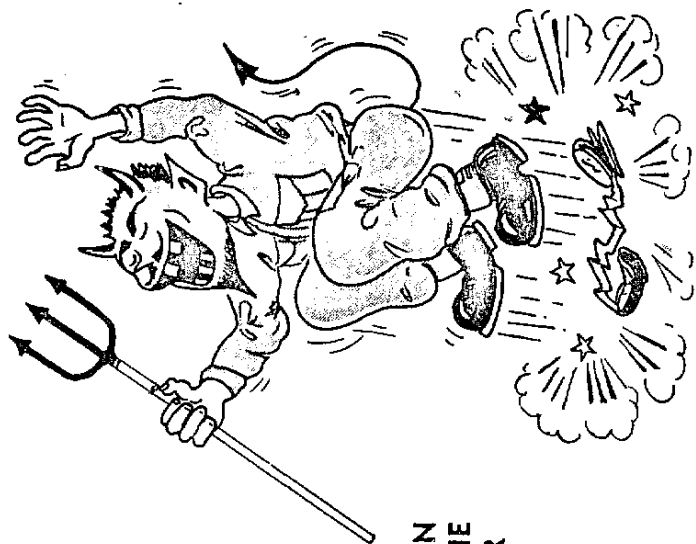
You can tell whether or not a protector is open as follows:

- (i) Turn the NET and SEND-REC. switches off, and the MODE of OPER. switch to R.T.
- (ii) Turn the NET switch ON. You should hear the LP dynamotor running and be able to measure about 300V at HT1. If so, the L.P. protector is not open.
- (iii) Put the SEND-REC. switch to SEND. You should now hear the other (H.P.) dynamotor as well, and be able to measure voltage at P.A. BIAS. (See Table XII). Only the H.P. dynamotor protector will open as a result of high external temperature and long send periods.

If either protector opens **turn the SEND-REC. and NET switches OFF**, but unless you suspect some fault in the Set, leave the ON-OFF and SENDER-HEATERS switches ON so that the fans will continue to run. You will hear the protector reset in a few minutes. If your messages are long, send on MED. or LOW power; if you must use HIGH power, keep the message brief and do not send R.T. for more than a few minutes at a time.

**Important:** (i) The fans will start automatically when the Set is warm. When they are running, the Waterproof cover must be rolled up.

(i) Never operate the Set uncovered in the sun. Put a tent or a vehicle around it or best of all, build a portable



WHEN THEY ARE NOT IN  
USE PUT THEM IN THE  
SATCHEL SIGNALS OR  
IN THE HOLDERS.



lean-to sunward of the set.

(iii) When the temperature is high do not operate the Set (either personally or by remote control) in a tent which is completely closed; open the flaps. If possible pitch the tent in the shade. This also applies to vehicles. Keep the windows open and the vehicle in the shade when the temperature is over 75°F.

#### 4.9.3 Some Healthy Warnings

(i) Sender and Supply Unit voltages are well over 1000 volts. NEVER touch the interior of the Set when it is turned ON. To reach into the Sender when the Set is ON invites death and destruction, demoralizing to the other operators and comforting to the enemy. When Set is on SEND, touch only the controls, the panel, and the case.

(ii) Never pour petrol when the Set is on Send. An R.F. arc may cause an explosion.

(iii) The base of the Aerial and the leads to the Aerial Tuning Coil are at high R.F. potential. You will be burned if you touch them when the Set is on Send. The lead from the Aerial base to the Set must not touch any metal parts—otherwise the insulation will be burned off.

(iv) Never operate the Charging Set unless the outer compartment doors are OPEN. When the regulator has been adjusted, close the inner compartment doors. This simple precaution will avoid an inglorious death from carbon-monoxide poisoning.

(v) When you are operating on the move and are going to travel under power lines, shorten the aerial so that they will clear it by several feet. When the aerial connections are all secure inside the set, the aerial is connected to the vehicle for low frequency current. The tires insulate the vehicle from ground. The greatest danger is a gasoline explosion ignited by an electric discharge.

If the Aerial is near or touching a power wire DO NOT reach up and remove the aerial or step out of the vehicle. Just drive the vehicle clear of the wires. NEVER change aerials when you are near overhead wires.

#### 4.9.4 Good Operating

(i) Always operate the equipment for 15 minutes or longer before finally netting to zero beat and tightening



the flick screws of either FREQUENCY dial.

(ii) When netting keep the H.F. GAIN as low as possible, and re-net after the Sender has been loaded.

(iii) If the fans start after you have been operating for a time, check your netting after they have been running for a few minutes.

(iv) When you change location or when operating on the move the Sender loading will change somewhat. Therefore you must retune the Aerial Tuning Coil occasionally. The other loading controls need not be changed. When the Coil is not being used, check the PA TUNE and PA LOADING instead.

Always watch the AER CUR meter reading. It should rise slightly during speech. The AER CUR reading is the indication that you are actually sending.

(v) Don't operate on HIGH if communication is satisfactory on LOW, but always tune on HIGH, not on LOW.

(vi) Speak distinctly in a loud voice directly into the microphone. Separate your words and pronounce S, C, Z, sounds with particular clarity. Look at the AER CUR occasionally; it should increase when you speak.

(vii) Be kind to the headphones and microphone. Remember that they are important in determining the quality of your transmissions. When they are not in use, put them in the Satchels Signal, or in the holders. If you leave them on the floor there will be broken phones and sprained ankles; if on top of the Aerial Tuning Coil, they will detune it.

(viii) Make your messages brief and distinct. On C.W. use break-in when possible. Listen to weak and short calls, they may be for you. Never hold the key down on C.W. longer than necessary.

(ix) After the Aerial Base has been in use a long time, it may lean backward when supporting an aerial on a stationary vehicle. If so turn the Base around 180° so that it leans forward instead of backward. To check: insert two bottom sections of aerial in the Base. Bend the aerial back about 30° and release it. If the aerial always comes to rest 10° or more from the vertical, the Base should be rotated. Do this on a calm day!

(x) When the vehicle is to be painted, either remove the Aerial Base, or mask it completely.

#### 4.10 LOCATION

The location of the Wireless Set will usually be determined by the requirements of tactics and time. Several geographical factors have a large effect on range. When some choice of location can be made the following facts should be your guide.

(i) Avoid power transmission lines and telephone lines. Even a single telephone pair can pick up and reradiate a great deal of noise interference. Moving the Set 100 yds away from such lines will result in a large improvement in the signal to noise ratio, and may reduce the power absorption of your transmitted signal. When the background noise is high, moving the Set out of a village may restore communication.

(ii) Valleys, gorges, and tunnels are particularly poor locations; level ground and hills are good locations.

(iii) When using trees for concealment, remember that they reduce range. Keep the aerial clear of foliage and branches.

(iv) Communication may be impossible when you are driving across a steel bridge.

(v) Communication over low conductivity ground is very poor, over water it is excellent. (Small islands are recommended for best results.)

#### 4.11 AERIALS

##### 4.11.1 Whip Aerials

The whip aerials are composed of Antennae rods "F", each 4 ft. long and supplied in three diameters. The ends are threaded so that the rods can be screwed together to form various lengths of aerial. The sections are numbered and listed in Table X. Section 4 is the same size as Section 1 but has a plain end which fits more easily into the aerial base. For all combinations of rods, Section 4 is the lowest. However if it is lost, the other bottom section (1) or the second section (2) can be used in the aerial base.



Avoid Dead Spots

TABLE X  
WHIP AERIAL SECTIONS

SECTION	USED AT	END	SIZE	
4	Bottom	Plain	Large	The bottom end of these sections fit Aerial Base C-2.
1	Second	Threaded	Large	
2	Third	Threaded	Med.	
3	Top	Threaded	Small	
Only Section 4 fits Adaptors, V, Laport.				

The threaded rods (RCA part numbers) are interchangeable with the plain rods. (PC part numbers)

To erect a whip aerial, screw together the sections which are recommended in Table X to form the aerial, then turn the knurled collar on the top of the aerial base clockwise and insert the end of the rod into the opening in the top of the base. Release the collar and give it a slight twist to be sure that it is fully closed.

To increase the radiation and range without lengthening the aerial, two whip aeriels can be mounted in a little gadget called Aerial Bases No. 8, Adaptors, V, Laport which fits into the Aerial Base. The two whip aeriels are held at an angle of about 30°.

The shortest aerial into which the Set can be tuned from 16 MC down to 1.75 MC under all circumstances is the 8'V. Usually it is possible to use a single 8' aerial from 16 MC to very nearly 1.75 MC. If the Aerial Tuning Coil reaches its stop when tuning to 1.75 MC with an 8' aerial, a correction can be made by adjusting the P.A. TUNE.

The two most useful whip aeriels are:

8'V when on the move.

16' single when stationary.

A single 16' Aerial can be used on the move in open country, but the Sender loading will require constant checking.

The recommended combinations of rods to form whip aeriels are listed in Table XI.

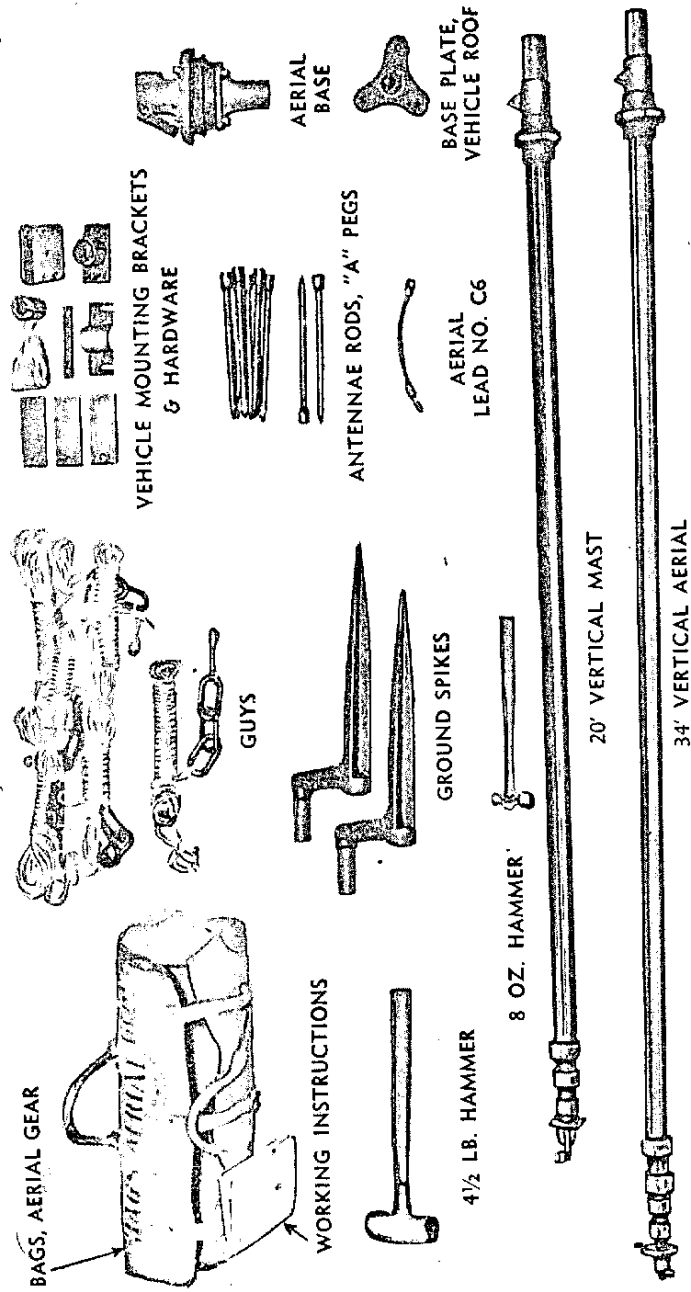


Fig. 22—Antennae, Vertical, 34' Steel Mk I: Complete Kit.

TABLE XI  
COMPARISON OF WHIP AERIALS  
(Listed in order of increasing radiation)

AERIAL	SECTIONS			
	4 BOTTOM	1 SECOND	2 THIRD	3 TOP
Similar radiation	8'	1	1	—
	8'V	2	—	2
	12' single	1	—	1
	16' single	1	1	1

When the rods are not in use keep them in the canvas bag. (Bags, Aerial Gear No. 2 Mk. II.) Before putting them away and before using the rods, be sure that they are clean. A thin film of vaseline should be applied occasionally to the unpainted ends.

#### 4.11.2 Aerial, Vertical 34' Steel

Antennae Vertical, 34' Steel Mk. I is supplied with the 52 Set. It differs in several respects from Antennae Vertical, 34' steel and the latter should **not** be used with the 52 Set.

The most important difference is the Aerial Base. The old type (PC 82495C-285) has low breakdown voltage and poor efficiency. It must not be used with the 52 Set. The base which is supplied with the Mk. I Kit is No. PC 82495C-295, ZA/C 00108. Further, several items in the Mk. I Kit are not included in the old kit.

This aerial, and the 20' mast which accompanies it, are described fully in the Instruction Pamphlet (PC82495C-314) contained in the Bag, Aerial Gear, Canadian. The complete aerial Kit is listed on pages 161-163 of the Station List.

Whenever the maximum range of the Set is required, and when it will be used for a length of time at the same location, mount the 34' aerial on the vehicle roof and connect it to the vehicle Aerial Base C-2. **Don't forget the vertical Aerial Base.** The 20' mast plus four F rods form a 36' Aerial and this combination can also be used on the vehicle roof. See Section 3.3.9 for installation instructions.

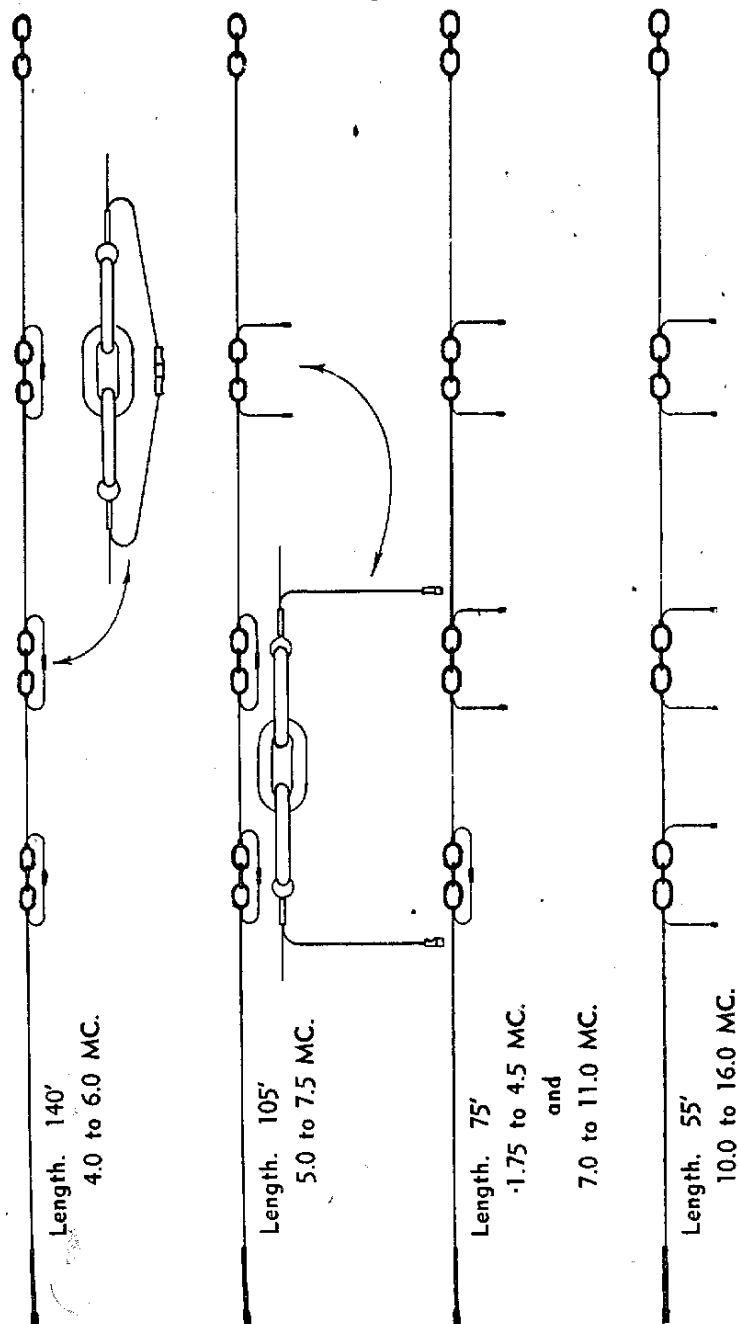


Fig. 23—Frequency Coverage of Horizontal Aerial.

Do not use the 20' mast alone. It is not much better than the 16' whip aerial.

The range can be increased further by spreading out the two Leads, Counterpoise No. 2 Mk. IV, and connecting them securely to the vehicle as near as possible to the W.S. ground point, or direct to the W.S. ground terminal. The exact location will depend upon the type of vehicle. For example in the Heavy Utility Vehicle, the two best places are the ground terminal of the Wireless Set, and the Vehicle wireless ground terminal on the side of the body. See fig. 8. The wires should be evenly spaced about the vehicle and pulled out to their full length.

When the counterpoises are taken up, coil each lead separately about your forearm and wind the lead in **from the vehicle end**. Otherwise the wire will curl and twist. Tie each coiled lead with the cord that is whipped onto the end, and the group of coils with the longest cord.

The 34' aerial can also be used if the Wireless Set is removed from the vehicle and established in a tent.

#### 4.11.3 Aerial, Horizontal, 4 Section

A horizontal aerial radiates more power than the vertical Aerial, but radiates a large part skywards. It should be used therefore whenever sky wave communication is attempted.

The Aerial is divided by insulators into four sections. There are connectors at the ends of each section so that the various lengths can be selected. Each length can be used over the frequency range shown in Figs. 21 and 23. At some frequencies the Sender must be tuned by the Plate Current method. These frequencies are also shown in Fig. 21.

#### 4.12 BATTERY VOLTAGE AND CHARGING PROCEDURE

Change in battery voltage affects Sender output, Receiver sensitivity, meter reading, and ease of Sender loading. For example changing the input voltage from 11.5 to 13.0 volts, increases the PA. PL. current by about 30 ma. Both the Sender and Receiver operate with an input voltage as low as 10 volts, but performance is considerably reduced. Whenever possible the input voltage

Mounting  
wood screws

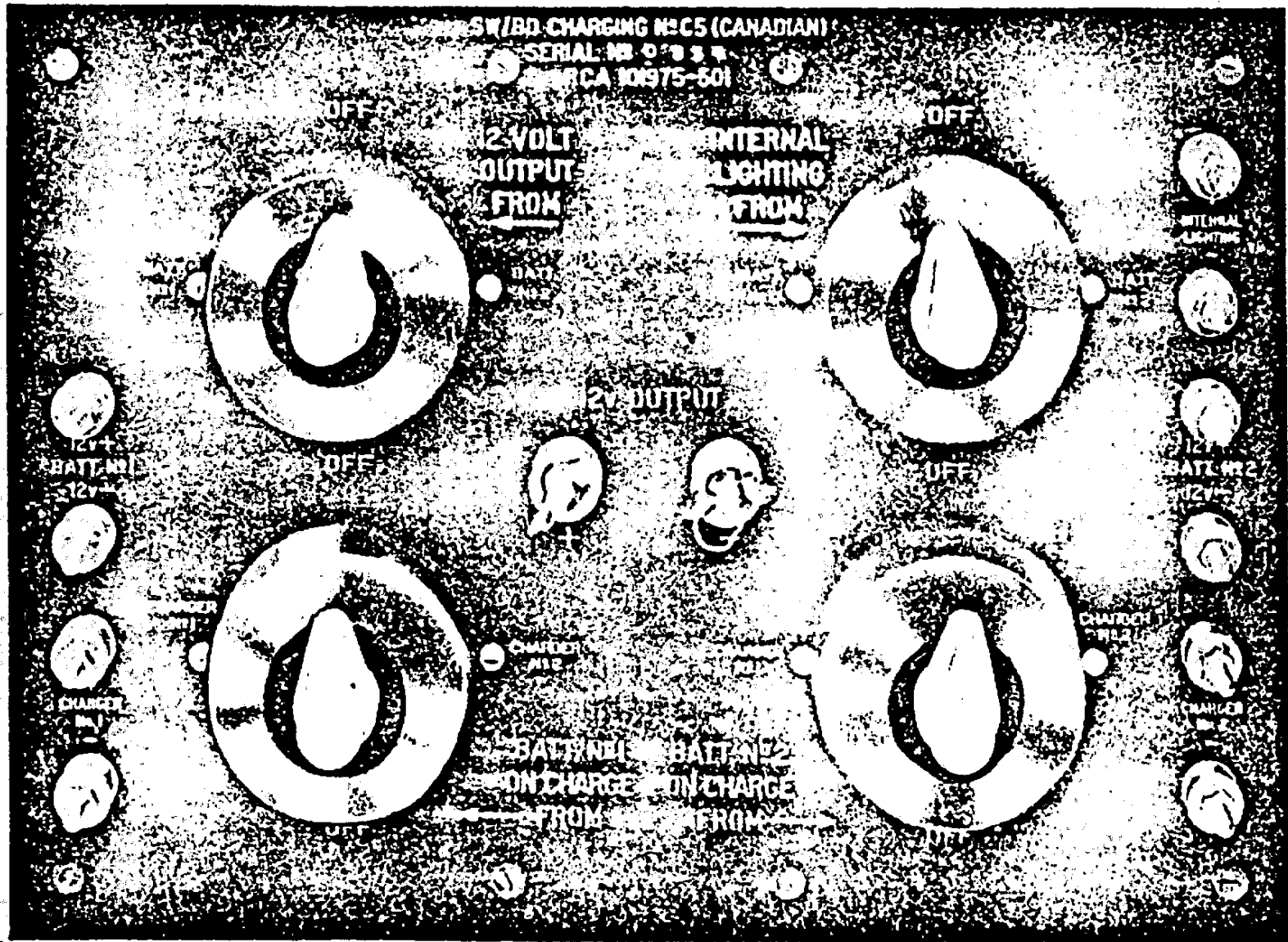
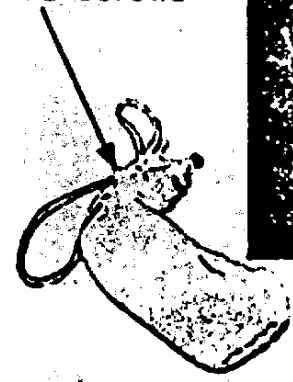


Figure 24—Switchboard, Charging No. C5

should be kept above 11.5V. The best operating voltage is between 12 and 13 volts on Send, measured at the Wireless Set.

The batteries should be float-charged when the Sender is being used. By "float-charging" is meant charging the battery while it is supplying power to the Wireless Set. The current from the Charging Set then divides between the Wireless Set and the battery. When the batteries are not being float charged make the "Send" periods as brief as possible. The voltage on Receive should not be greater than 16V.

When the Set will be used on Receive for a long period, turn the SENDER-HEATERS OFF, but remember that a 30 second warm up interval is required before you can send. For frequency stability you should plan to turn the heaters on 15 minutes before you start to send.

A Battery Hydrometer is included in the Tool Box. The figures FULL, HALF, UNSAFE are only approximate guides, because the condition of the battery depends upon temperature. Use the following chart as your guide instead of the coloured markings.

Specific Gravity of Electrolyte

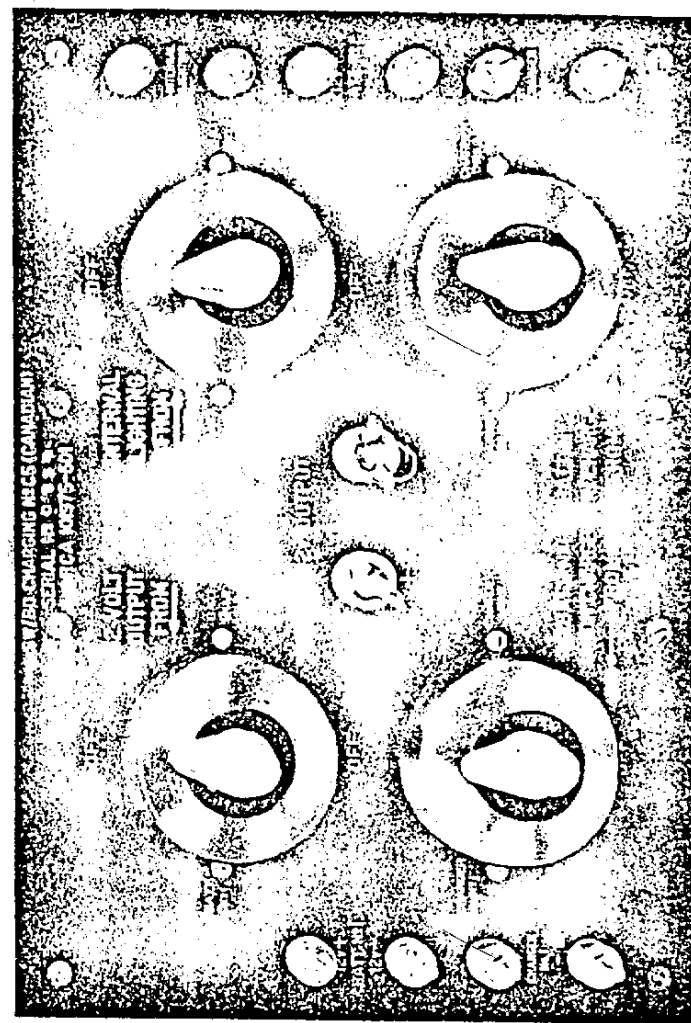
BATTERY CONDITION	BATTERY TEMPERATURE	
	UP TO 110°F.	110°F. TO 125°F.
Full charge	1.280-1.300	1.230-1.250
Half charge	1.220	1.170
Discharged	1.130	1.080

Charge the batteries at the following rates:

	125 AH BATTERY	200 AH BATTERY
Until gassing occurs:	13 amps	25 amps
After gassing occurs:	6.5 "	12.5 "

Remember that the fumes of a gassing battery are explosive. Do not bring any flame near them or create a spark by removing a battery connector.

Do not allow the batteries to remain uncharged. Recharge them whenever they have been idle for 6 weeks in temperate weather or 3 weeks in tropical weather. If



Mounting wood screws

Figure 24—Switchboard, Charging No. C5

the specific gravity drops to 1.100 charge them immediately. During cold weather particularly, be sure that your batteries are fully charged. When the temperature drops to 0°F. the capacity of the batteries is reduced to about half of the normal rating.

Unless the batteries are fully charged they will be damaged when exposed to very low temperatures. If you can't keep the batteries warm, keep them charged. For example:

Specific gravity 1.300—Batteries safe in all weather.  
1.200—Freeze at -15°F. (-25°C.)  
1.100—Freeze at +20°F. (-6.6°C.)

Remember that the electrolyte is an acid which corrodes and destroys materials. Be careful not to tip the batteries over. If any electrolyte is spilled, clean it up immediately and have fresh electrolyte added. Wash the hydrometer off after you have used it. Keep the battery clean and the terminals lightly smeared with vaseline.

#### 4.12.1 The Switchboard Charging No. C5

The use of the four heavy duty batteries is controlled by Switchboard charging No. C5. It enables the operator to change from one pair to the other, to charge, or to float-charge.

The following operations are possible:

- (i) Wireless Set power can be taken from either battery by turning the upper left hand switch.
- (ii) Battery No. 1 can be charged from either Charging Set by turning the lower left hand switch.
- (iii) Battery No. 2 can be charged from either Charging Set by turning the lower right-hand switch. ((ii) and (iii) show that each battery can be charged from a different Charging Set or that both can be charged from the same Set.)
- (iv) Either battery (or both batteries in parallel) can be float charged. e.g. for Batt No. 1: Turn the "12 VOLT OUTPUT FROM" switch to "BATT NO. 1". Turn the "BATT NO. 1 ON CHARGE FROM" switch to either "CHARGER NO. 1" or "CHARGER NO. 2".

- (v) While one Battery is being float charged the other Battery may be idle, or on charge from the other Charging Set, or in parallel with the battery which is on float charge.

A separate pair of terminals and switch marked "EXTERNAL LIGHTING" can be used to supply voltage to any device such as the soldering iron, which operates from 12 v.d.c.

#### 4.12.2 Charging Sets 300 Watt, Mk. I, Canadian

Two 300 watt gasoline driven Charging Sets are required to complete the Station. These are available at Ordnance Stores, where two are stocked for every 52 Set. An Instruction Book is packed with each unit.

Fig. 25 shows the location of the petrol and oil plugs and of the controls. The petrol and oil are not mixed. A vent on the petrol filling plug must be open when the Charging Set is running, and closed when it is stopped.

**Petrol.** If other petrol is available do not use high test petrol.

**Oil.** Fill to overflowing with high grade oil S.A.E. 20 or S.A.E. 30. When the temperature is below zero, mix the oil with kerosene but do not use more than 30% kerosene. Do not open the oil filling plug when the charging set is running.

The Charging Set is started by power drawn from the batteries to which it is connected. The output current is indicated on the ammeter and can be controlled by turning the OUTPUT CONTROL. The ammeter indicates the charging rate only when the Charging Set is connected to the batteries. When float-charging, the meter reading is greater than the charging rate.

**TO START:** Turn the Output Control to HIGH (clockwise as far as it will go).

Pull out the Choke, which is located on top of the flywheel shroud and firmly depress the Starter Button. After the engine has made several revolutions push the choke in slowly until the engine starts to run, then release the Starter Button and slowly push the Choke all the way in, allowing sufficient time for the engine to warm up and run steadily.

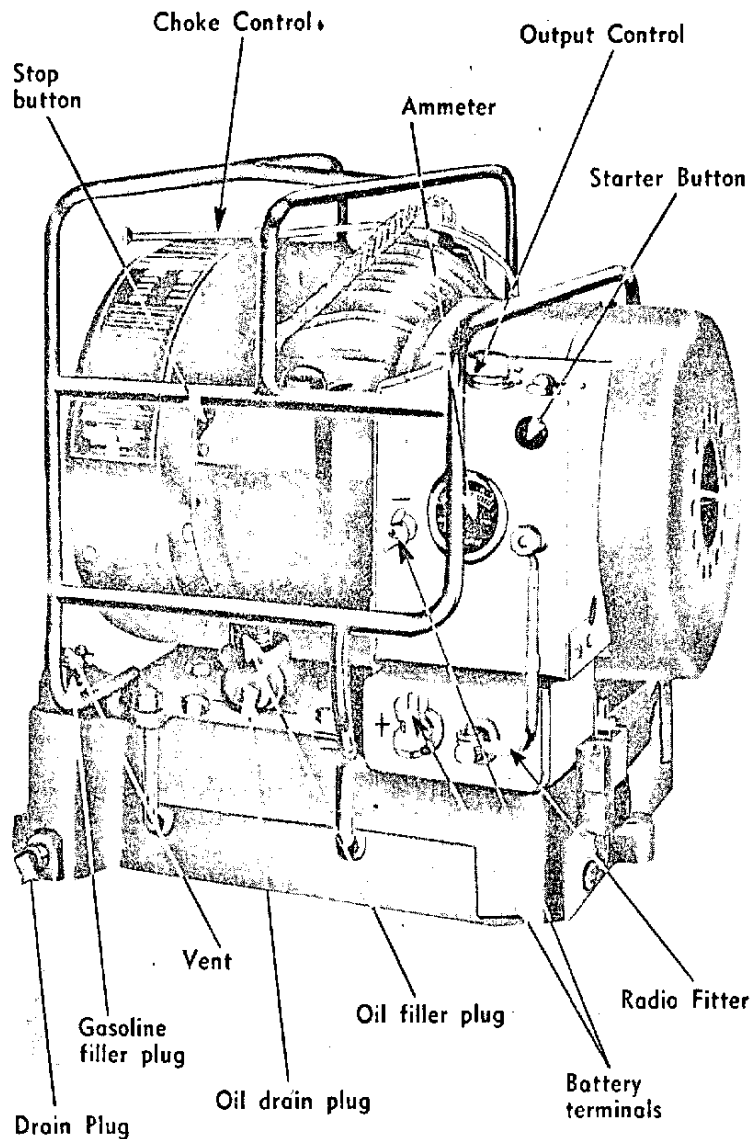


Fig. 25—Charging Sets 300 Watt Mk I Canadian

If the engine does not start readily or runs unevenly, it is possible that the needle valve is not adjusted properly. Turning the needle valve to the **RIGHT LEANS** the fuel mixture and turning it to the left **ENRICHES** the mixture. The approximate setting with the engine warm and under load is  $\frac{1}{2}$  to  $\frac{3}{4}$  turn to the left from the fully closed position. When turned to the right as far as it will go the needle valve is fully closed. **CAUTION**—Do Not turn the needle valve too tightly against its seat as this will damage both the valve and the seat resulting in inability to adjust the carburetor properly.

**TO STOP:** Depress the Stop Button, located on the back of the Magneto plate (See Fig. 25) and hold it down until the engine has completely stopped turning.

**TO START WITH DISCHARGED BATTERIES:** Should the batteries become discharged to the point where they will no longer turn the engine when the starting button is pressed, operate the Choke in the usual manner, wrap the starting rope around the starting pulley with the knot engaged in the slot, and spin the engine with a quick steady pull. **DO NOT JERK.** Repeat as necessary until the engine starts.

**WARNING:**—When operating this Charging Set be sure that the outer doors of the compartment are open and that the inner door is closed. There are two reasons for this:

- (i) To avoid ignition noise in the receiver.
- (ii) You can be poisoned by carbon monoxide gas.



## CHAPTER V

## REMOTE OPERATION

## 5.1 EQUIPMENT

By remote operation is meant the transmission and reception of messages at a location which is some distance from the Wireless Set.

The following equipment is included in the Station for this purpose:

Two Wireless Remote Control Units No. 1 Canadian  
1000 yards of Cable Electric CD8 C/2

One W.S. Cdn. No. 52 Receiver Remote

One Supply Unit ZE 12

Various accessories for the above.

The Remote Control Units and the cable can be used for remote operation of the Set independently of the Remote Receiver and Supply Unit, or all this equipment can be combined to provide duplex operation in addition to the other remote control facilities. The Remote Receiver and Supply Unit can also be used independently as a listening station or in combination with any Sender.

## THE REMOTE CONTROL UNITS

## 5.2 DESCRIPTION

To operate the Wireless Set from a distant location, two Control Units are required, one at the distant location (Remote R.C.U.) and one at the Wireless Set (Nearby R.C.U.). The two Units must be connected by the twisted pair cable which is supplied on two reels.

The Set must be turned ON and tuned by the W.S. operator—this cannot be done by remote control. The W.S. operator normally will monitor all messages. After the W.S. and R.C.U. controls have been adjusted the following operating facilities are available at the Remote R.C.U.:—

R.T.: The remote operator performs SEND/RECEIVE switching himself by a switch on the R.C.U. Side-tone will be heard in the phones.

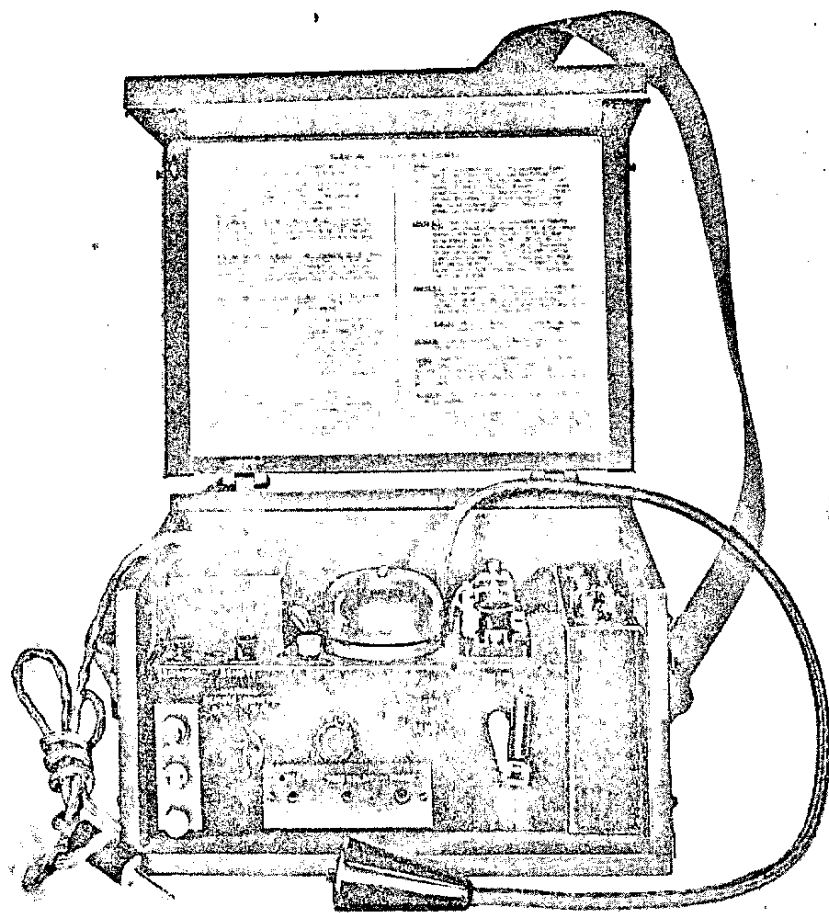


Fig. 26—Wireless Remote Control Unit No. 1 (Canadian)  
Front View

- MCW & CW Break-In: Normal break-in operation is available; when the key is up the operator hears the other station. Keying speed is limited to about 20 W.P.M.; no sidetone is heard.
- MCW & CW: The W.S. operator must perform the SEND-RECEIVE switching. High speed keying is possible; no sidetone is heard.
- Duplex R.T.: When the Remote Receiver is used with the R.C.U. and when two frequency channels are available, normal duplex operation is possible.
- Duplex C.W.: Although duplex C.W. is available similar to duplex R.T., it is not recommended. The only advantage over break-in operation is the greater keying speed, but it requires the Remote Receivers and two frequency channels.

A Field Telephone Exchange can be connected to one of the R.C.U.'s so that any subscriber to the exchange can use the Wireless link for R.T. communication. The W.S. operator performs the SEND/RECEIVE switching.

Intercommunication and calling facilities are provided. These are described in section 5.5.

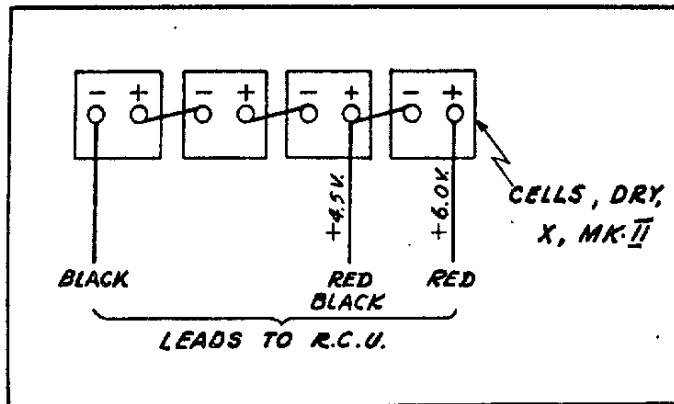
### 5.3 RANGE

On R.T. and W.T. up to three miles of line may be used between R.C.U.'s.

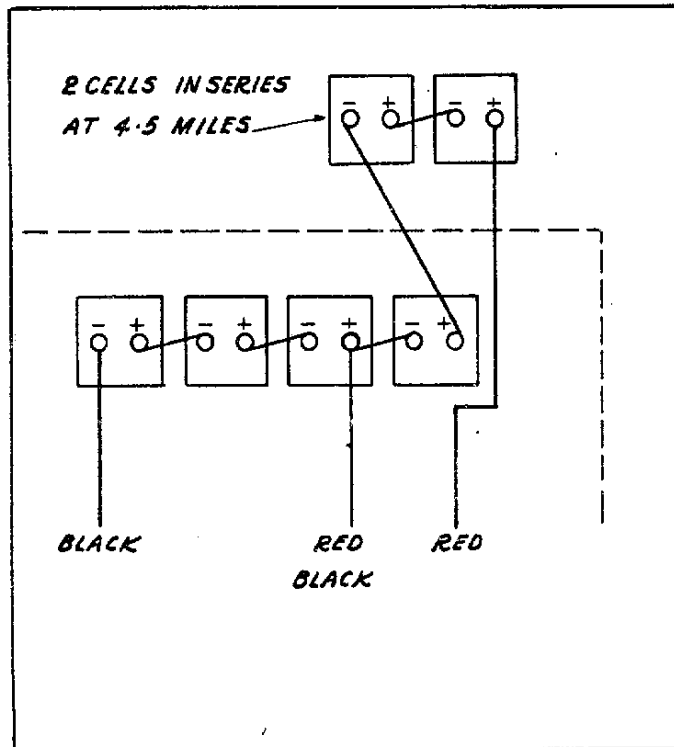
On W.T. this range can be increased by the addition of external cells.

The length of line which may be used to an exchange usually will be less than that which may be used between two Remote Control Units. The decrease depends upon the length and type of line from the subscriber's telephone to the exchange and upon the condition of the telephone equipment.

When using these lengths of line the normal wireless range is obtained. A longer line may be used on R.T. if some decrease in readability of the signal is tolerable. A longer line may also be used on W.T. with no decrease in



(a)—Normal Connections



(b)—Connections to External Cells When Using More Than 3 Miles of Cable.

Fig. 27—Remote Control Unit Battery Connections

readability by the addition of external "X" cells at the Remote R.C.U.

To increase the range on W/T:

The number of external cells that is required depends upon the length and resistance of the line. The following instructions are for Cable, electric CD 8 C/2, twisted, which has a loop resistance of approximately 200 ohms per mile. If other cable having a higher resistance is used, a larger number of external cells will be required. See fig. 27.

For 3 to 4 miles of line add one cell; for 4 to 5 miles add two cells; add one cell per mile thereafter, e.g., for 7½ miles of line add five cells. These additional cells are only required at the Remote R.C.U.

(a) Connect the additional cells in series, leaving one neg. (—) terminal and one pos. (+) terminal.

(b) Remove the RED lead from the R.C.U. battery and connect it to the pos. (+) terminal of the external cell or cells.

(c) Connect the pos. (+) terminal (to which the RED lead was attached) of the battery in the R.C.U. to the neg. (—) terminal of the additional cell or cells. The line should now be tested as follows:

Turn the selector on both units to REMOTE W/T. Plug the R.C.U. key-plug on the Nearby R.C.U. into the TEST RELAY jack. When the key on the Remote R.C.U. is pressed the pilot bulb on the Nearby R.C.U. should light. When a long line is used and external batteries have been added at the Remote R.C.U. this test will not be possible in the reverse direction.

Do not attempt to test the line by using the Ringer. The bell can be rung over a line that has poor connections.

When external batteries have been added to an R.C.U. do not test the relay of that unit; the bulb will be burned out.

#### 5.4 INSTALLATION AND CONNECTIONS

The two R.C.U.'s must be joined by a twisted pair. If more cable than the 1000 yds. which comes with the equipment is required, it can be drawn from stores. If Cable, Electric CD 8 C/2 is not available, any other standard twisted-pair field cable may be used. Cable Electric D3

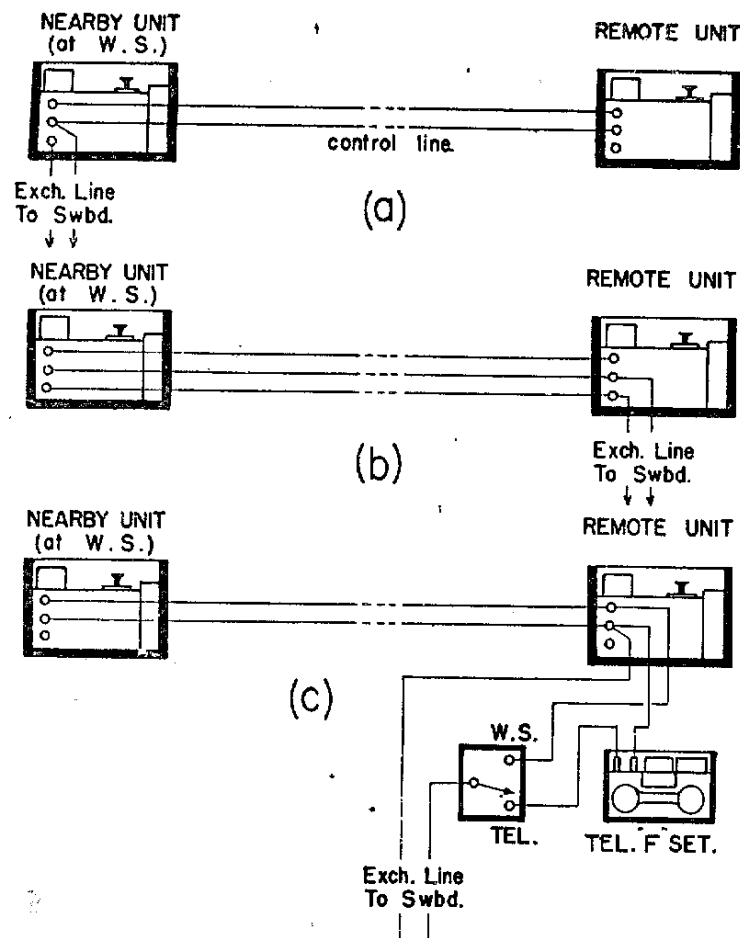


Fig. 28 R.C.U. Line and Exchange Connections

Mk. VI Twisted, and Cable electric 7/27 copperweld have greater loss, but the effect is negligible unless more than a mile or so of cable is used. A ground return must not be used.

The exchange line will be connected to the Nearby R.C.U. also by twisted pair, or it may be connected to the remote R.C.U. if a third wire is run between the exchange terminals of the two R.C.U.'s. See Figs 28 (a) and (b).

If neither of the above arrangements is feasible the exchange may be connected to the control line terminals of the remote R.C.U. with the following disadvantages:

The field exchange will receive false rings.

The exchange cannot talk to either operator when the Wireless Set is being used on R.T.

If a telephone "F" set is used in conjunction with the Remote Unit and a S.P.D.T. switch is inserted, it is possible to connect the exchange line to the Remote Unit and retain all the Remote Control facilities plus several advantages. The connections are shown in Fig. 28 (c.)

The following are the additional advantages:

(i) Separate operators can talk over the line to the exchange and the line to the Wireless Set.

(ii) The Remote Operator can perform Send-Receive switching for an exchange subscriber.

The two switch positions will be used as follows:

TEL.: During standby periods; when calling the exchange; when talking to the exchange.

W.S.: When an exchange subscriber wants to talk over the Wireless Set. Both R.C.U. switches should be at Remote R.T. The operation for exchange messages is the same in this case as for Remote R.C.U. messages.

#### BOTH UNITS (fig. 16)

(a) See that the batteries are connected as shown on the inside of the R.C.U. cover, (or Fig. 27) and that all terminals are clean and tight.

(b) Connect the line which joins the two R.C.U.'s to the upper and centre terminals marked CONTROL LINE.

(c) Connect the line from the exchange to the lower and centre terminals marked EXCHANGE LINE (When used).

(d) Plug the phones and microphone into the corresponding jacks on the R.C.U.

#### Nearby Unit Only

(e) Join the R.C.U. snatch plug to one of the drop cord sockets on the Supply Unit.

(f) Plug the R.C.U. key plug into the KEY jack on the SENDER.

### 5.5 OPERATING INSTRUCTIONS

#### 5.5.1 Intercommunication

The Nearby operator must use the R.C.U. microphone and phones, not those of the Wireless Set.

The two R.C.U.'s can communicate at all positions of the selector switch. When the selector is at NORMAL any one of the three positions, Remote R.C.U., Nearby R.C.U., Exchange, can communicate with the other two.

The nearby and remote operators must only speak to each other, or to the exchange, when the SEND/RECEIVE switch is at RECEIVE. Otherwise the speech is radiated.

If communication between the two units is weak, the level can be raised in an emergency by disconnecting the R.C.U. snatch-plug from the Wireless Set.

The operator of the R.C.U. to which the exchange is connected is able to speak to the exchange at any time by pressing the SPK. EXCH. key (white). This feature is used when the other operator is sending or receiving a message. The message is not interrupted, nor is the communication with the exchange radiated. The key must be released as soon as possible so that the nearby operator can monitor the messages. While the key is down, calls cannot be received.

#### 5.5.2 The Nearby Unit

**IMPORTANT: THE SELECTOR MUST BE AT NORMAL WHENEVER OPERATION FROM THE REMOTE R.C.U. IS NOT IN PROGRESS.**

The Wireless Set is attended by the nearby operator. He must turn it on and off, tune the Sender and Receiver, adjust the gain controls, check the batteries, etc. The

nearby operator must be constantly on watch to receive messages from the Remote R.C.U., and from the exchange. He uses the microphone and phones that are attached to the R.C.U. No other phones or microphones are to be connected to the Wireless Set, unless it is essential that another operator monitor the messages. If a second operator is plugged into the set, he must not speak into the microphone. If he must speak to the Remote R.C.U. he should use the microphone which is connected to the nearby R.C.U.

#### Calling

To call either the Remote R.C.U. or the exchange:

- (i) Press the proper RING key.
- (ii) Turn the RINGER

#### Send-Receive Switching

Send-Receive switching should be performed always by the switch on the R.C.U. This applies to operation on R.T., M.C.W., and C.W. The switch on the Set must be at Receive.

#### Nearby Operation

- (a) Turn the selector to NORMAL.
- (b) Put the HIGH-LOW switch to LOW.
- (c) Operate the Wireless Set normally.

#### Remote Operation

- (a) Put the selector to NORMAL and adjust the Wireless Set controls.
- (b) Put the selector to REMOTE R/T or to REMOTE W/T as required.
- (c) Put the HIGH-LOW switch to LOW or HIGH as required.
- (d) On REMOTE R/T send-receive switching is performed by the remote operator; on REMOTE W/T break-in, send-receive switching is not required, the switch on the nearby unit must be left at SEND; on REMOTE W/T send-receive switching must be performed by the nearby operator. Call the remote operator and tell him where to put the selector and whether or not he should do send-receive switching.

#### Exchange Operation

- (a) Turn the selector to NORMAL and adjust the

Wireless Set controls.

- (b) Put the HIGH-LOW switch to LOW or HIGH as required.
- (c) Monitor the message and perform send-receive switching.

#### High-Low Switch

This switch will always be at LOW for Nearby operation and for Remote operation over short lines. It should be put to HIGH only when the control line is long or when the level received over the exchange line is low. The nearby operator can tell best by the report from the other station. Only the switch on the Nearby Unit is effective.

#### 5.5.3 The Remote Unit

**IMPORTANT:** The selector must be at NORMAL whenever the remote operator is neither sending nor receiving a message.

#### Calling

- (i) Listen
- (ii) If a message is heard, wait until it is ended before speaking.
- (iii) If no message is heard, speak into the microphone—say something to the other operator.
- (iv) If there is no reply press the proper RING button and turn the RINGER.

#### Operation

The remote operator will be told by the nearby operator when to begin the communication and whether or not he should use the SEND-RECEIVE switch. If the remote SEND-RECEIVE switch is not used it must be left at RECEIVE.

When the nearby operator is ready for the transmission:—

- (a) For R/T turn the selector to "REMOTE R/T".
- (b) For W/T turn the selector to "REMOTE W/T".

When W/T is to be transmitted over a line which is longer than 3 miles, external cells must be added at the Remote R.C.U. See RANGE, section 5.3.

**NOTES:** Both the Nearby and Remote operators must refrain from amusing themselves by idly tapping the R.C.U. W/T key. This is particularly important when the

R.C.U.'s are at Remote R.T., because then this innocent playing will operate the Send-Receive circuits of the Wireless Set.

Whenever the W.S. operator performs send-receive switching he must be alert to operate the switch at the word OVER; if the other operator fails to say OVER at the end of a message the W.S. operator must remind him to do so.

Microphone, hand No. C3 should be held in a vertical position; when it is in a horizontal position the output is very low.

The carbon in these microphones can become compressed. Knock the microphone against your hand occasionally before speaking into it.

## THE REMOTE RECEIVER AND SUPPLY UNIT ZE 12

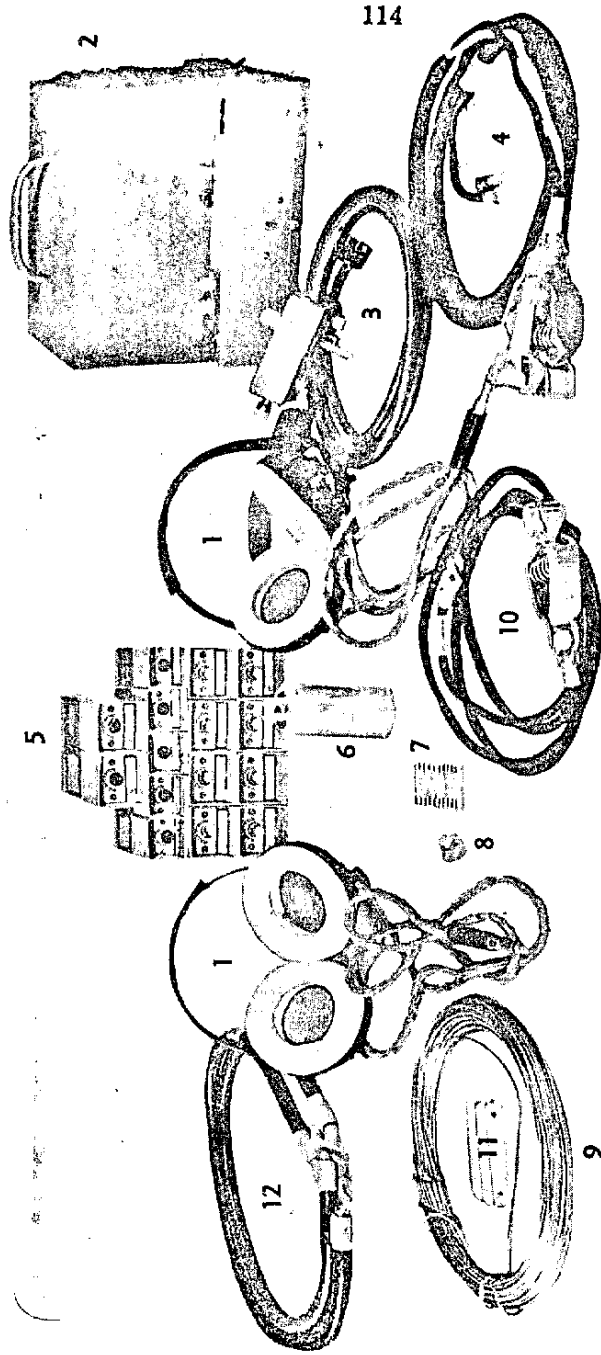
### 5.6 DESCRIPTION

The Remote Receiver is identically the same as the Receiver which is part of Wireless Set, Canadian No. 52 except that it is provided with an individual metal case.

All the accessories such as headphones, leads, aerial and spare valves and parts which are necessary for operation are packed with the Supply Unit ZE 12 in Case, Operating, Remote Receiver. Nothing more is required for AC operation; the batteries in kits 11 and 12 are required for D.C. operation. See fig. 29.

The Remote Receiver is suitable for use wherever a receiver is required for the frequency range 1.75—16 mc. When the Receiver is used in conjunction with a Sender and when CW break-in operation is required it is necessary to silence the Receiver when the Sender key is down, otherwise the recovery is too slow. Provision for this has been made in the Receiver. It is only necessary to apply about +12V when the Sender key is down and zero voltage when the key is up to contact R on the Receiver plug PL 1A. See fig. 45.

A useful location for the Remote Receiver is beside a Remote Control Unit which is connected to a Wireless Set, Canadian No. 52. The operator listens to the Receiver instead of the R.C.U. and has the advantages of being



1. Receivers, Head Gear MC MKI
2. Supply Unit ZE-12
3. Connectors, Plug, No. 1
4. Leads, Battery No. 1

5. Essential Spare Valves
6. Vibrator
7. Fuses, Cartridge, 10 Amp.
8. Bulbs, 12V. "F"

9. Wire, Aerial, 100 Ft.
10. Leads, Earth No. C3
11. Insulators, Stealite X346
12. Connectors, Single No. C3

Fig. 29—Contents of Case, Operating, Remote Receiver

able to make tuning adjustments, of sidetone on M.C.W. and C.W., and of being able to tune to other stations. Duplex operation on R.T. is also available.

Power for the Receiver is obtained from a vibrator Supply Unit ZE12 which operates from 12 v.d.c. or from 115 V. A.C. 25-60 cycles or from 230 V. A.C. 25-60 cycles. The following valve and vibrator are used.

PURPOSE	SYMBOL	TYPE
Rectifier	V4B	OZ4A
Vibrator	VIBR 1A	4 prong interruptor

A 10 amp. fuse which is connected in the D.C. input circuit is mounted on the chassis.

### 5.7 INSTALLATION

Kit No. 5 only is required for A.C. operation.

Kits No's 5, 11 and 12 are required for 12 V.D.C. operation.

The installation of the Remote Receiver consists only of connecting the Supply Unit ZE12 to the Receiver and power source, and making aerial and ground connections. When space must be conserved, the Supply Unit may be used in the Case, Operating.

#### Connections to the Receiver

(i) Connect the end of the aerial to the terminal marked AE on the front panel of the Receiver.

(ii) Leads, earth, No. C3 should be used if possible. Its use may improve the signal to noise ratio of the Receiver. Connect the lead to the terminal on the side of the Receiver, and attach the clip to a water pipe or ground rod.

(iii) Join the Receiver and Supply Units ZE12 by Connectors, Plug No. 1. Attach the smaller plug to the socket on the Supply Unit chassis, pressing the springs into the side of the plug as it is inserted. Attach the larger, metal-enclosed plug to the socket at the rear of the Receiver and tighten the long knurled head screw.

The AE binding post does not connect to the Receiver. It is provided for use with W.S. Canadian No. 9 Mk. I.

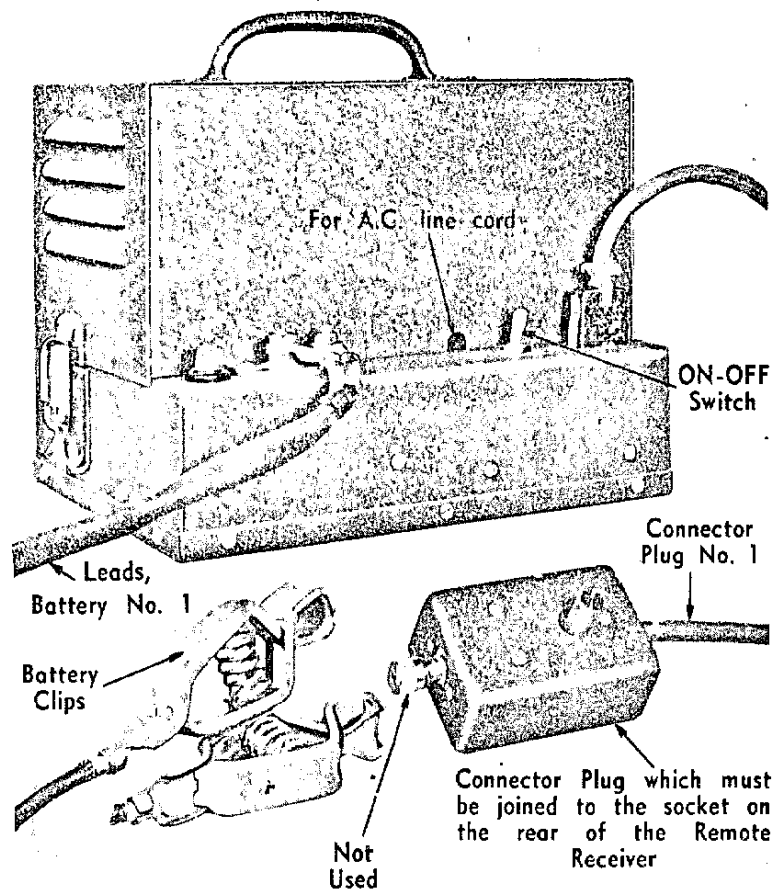


Fig. 30—Supply Unit—ZE12, with  
Cover and Connectors

(iv) Connect Receivers, headgear MC Mk. I or any other low resistance headphones to the jack marked PHONES.

A length of aerial wire and six insulators are provided in the Operating Case. From these a receiving aerial can be erected, using for supports, the most suitable trees, poles, or buildings.

**POWER SUPPLY CONNECTIONS** See figs 30, 31.

(a) 12 V.D.C. Operation.

(i) Remove the ZE12 Cover. Put the removable plug into the socket marked D.C. Wind the A.C. line cord around the clips and insert the plug into the socket on the chassis which is marked with a circle. Make sure that the vibrator and valve are securely seated, and replace the cover.

(ii) Attach the two lug ends of Leads, Battery No. 1 to the 12V terminals of the Supply Unit and tighten the nuts with pliers. Connect the red lead to the (+) terminal and the black lead to the (—) terminal. The two lugs should be placed so that they are not touching.

(iii) Connect two batteries in series with Connector Single No. C3. Attach the battery clip on the red lead to the (+) battery terminal and the battery clip on the black lead to the (—) terminal.

Only two batteries are required during operation and the current drain is so low that float charging is unnecessary. Four batteries are provided so that one pair can be charged while the other pair is in use.

(b) A.C. Operation.

(i) Remove the ZE12 cover. Turn the main switch OFF. Put the removable plug in the A.C. socket.

Do not connect the line cord unless you are certain that:

(a) The Supply current is a.c. NOT d.c.

(b) The toggle switch is in the correct position for the existing line voltage.

There is a toggle switch just behind the A.C.—D.C. sockets. If the switch handle is not already pointing to the correct line voltage (115 or 230V) remove the clamp; put the switch to the correct voltage, and replace the clamp.

If the line voltage is 230V the toggle switch must be in the position marked "230V"; if it is 115V the switch must be in the position marked 115V.



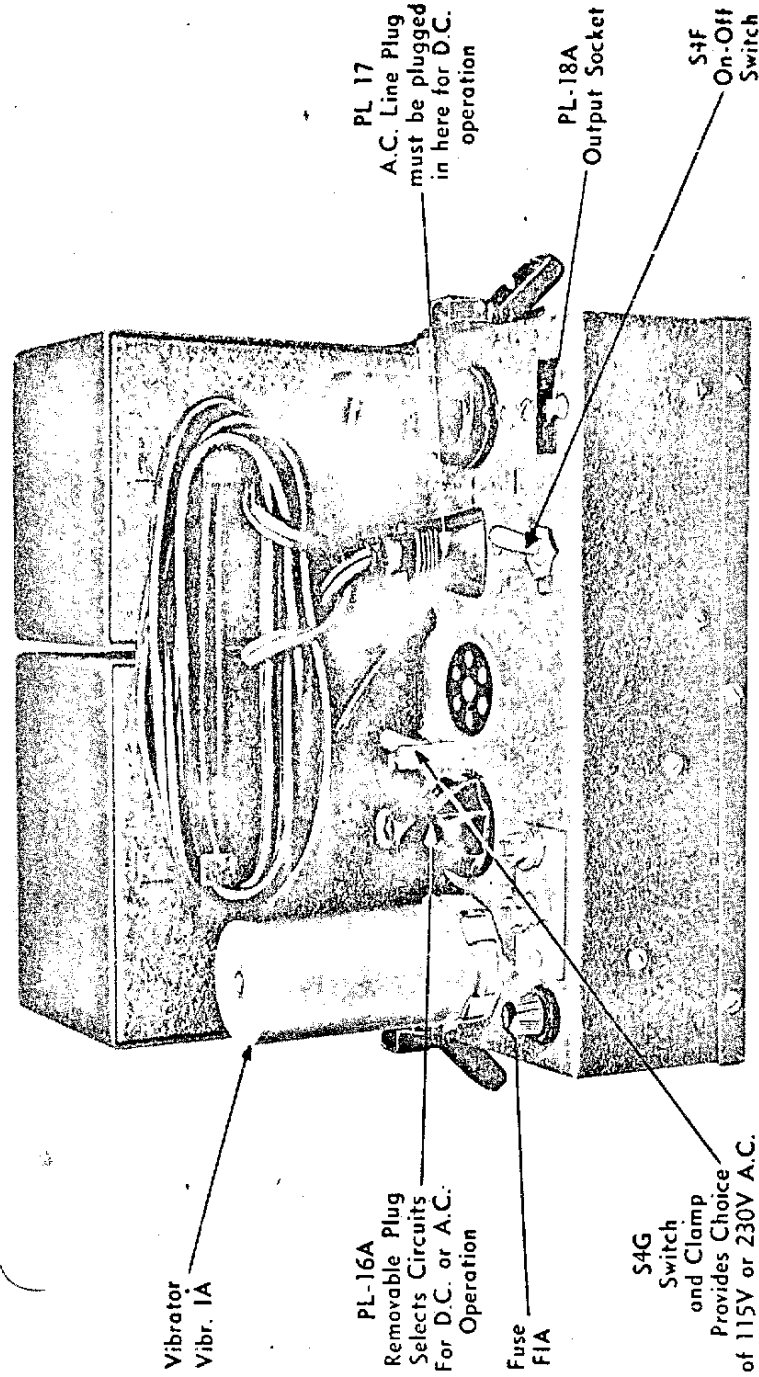


Fig. 31—Supply Unit ZE-12 without Cover

If this switch is in the wrong position the Supply Unit ZE12 and the Remote Receiver may be burned out almost instantly.

If you do not know the line voltage, either measure it or ask.

(ii) Unwind the line cord and replace the cover. There is a small cut-out in the cover to clear the cord. Attach the line plug to the A.C. line socket.

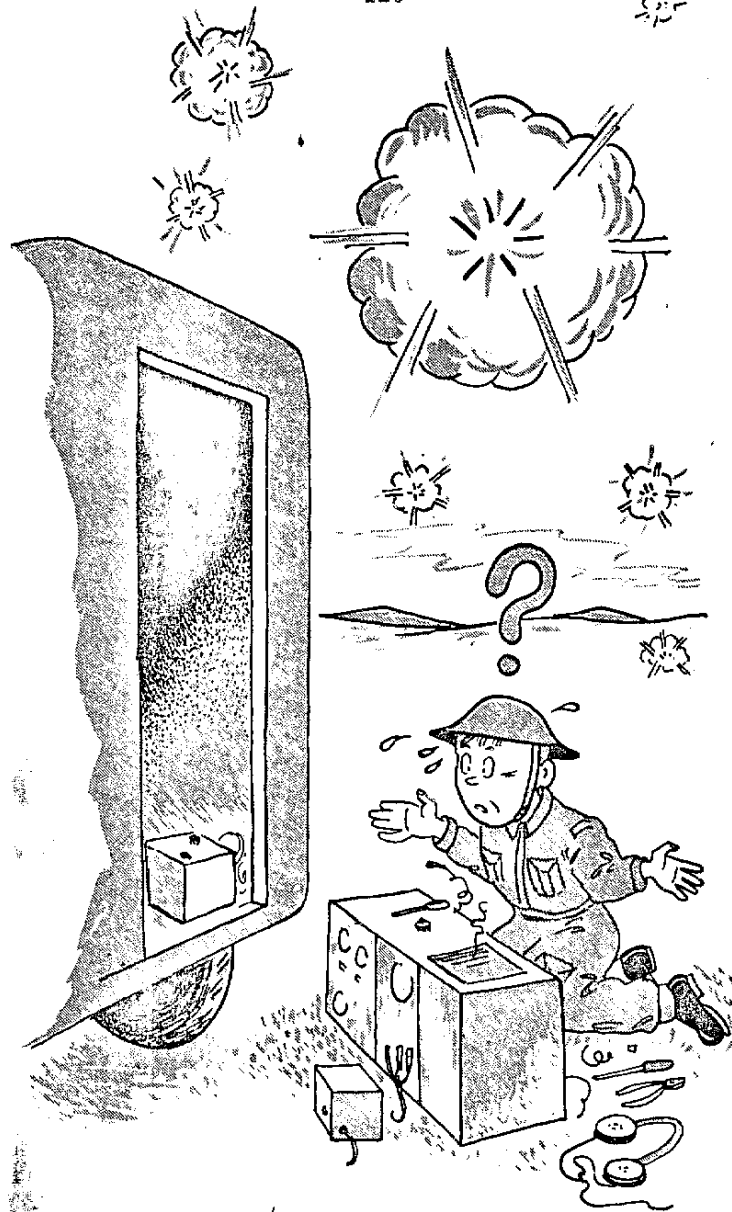
### 5.8 OPERATING INSTRUCTIONS

The ON-OFF switch for both the Receiver and the Supply Unit is the toggle switch on the Supply Unit Chassis.

With two exceptions the operating procedure is the same as for the 52 Set Receiver described in Chapter 4.

The two exceptions are:

- (i) The SPEAKER-PHONES switch must be at PHONES when the headphones are being used.
- (ii) The meter cannot be used to measure L.T. voltage when the power source is A.C.



Read Instructions First

## CHAPTER VI

### REPLACEMENT AND MAINTENANCE

#### 6.1 WARNING

The voltages which exist in this equipment are sufficiently high to cause fatal shock. Do not replace valves or touch any part of the Set, other than the exterior, unless the main switch is OFF, and Connectors, Twin No. 17, actually have been removed from the Set. Remember that a fault in the equipment can result in the presence of high voltage in circuits which are normally safe. Before touching any component short it to ground momentarily. This precaution will discharge condensers through metal instead of through you.

#### 6.2 ADJUSTMENTS

##### 6.2.1 Calibrator Adjustment

After changing any of the valves in the crystal calibrator it is important to check the number of calibrator pips as described in Section 4.5.2.

If in that test nine or eleven pips are heard between 2.00 mc. and 2.10 mc. the following adjustment must be made:

- (a) Remove the upper Receiver panel just as you would to change a valve.
- (b) On the Calibrator chassis is a small control which can be turned with a screwdriver. It has been properly adjusted by the manufacturer and is sealed with wax. **DO NOT TURN THIS CONTROL UNLESS THE NUMBER OF "PIPS" HEARD IN THE TEST (Sect. 4.5.2) IS INCORRECT.**
- (c) Turn the Wireless Set ON. Turn the Calibrator to 10. Allow the valves to become warm for a minute or two. Tune in one of the pips. Choose one which lies between two dial marks, so that no signal is heard when the switch is at 100.
- (d) If nine pips were counted in the test, turn the control slowly counter-clockwise while listening to the note in the receiver. If the number of pips

was eleven, turn the control slowly clockwise. As the control is turned a place will be reached where the note changes pitch. Notice the position at which this occurs, (position A) and continue turning. When the pitch of the note changes again, stop turning. This is position B. Turn the control back until it is half way between positions A and B.

- (e) The Calibrator should now operate properly. Repeat carefully the test described in Section 4.5.2 to be sure that the adjustment has been successful.

### 6.2.2 Meter Adjustment

There is a control on the Receiver chassis near the gang condenser which is used to adjust accurately the meter reading at PA PL. It should be adjusted so that the meter reads correctly when the current is 200 MA. This is mentioned here so that you will not turn the control for amusement. It has been set at the factory; to reset it requires an accurate external meter.

When the Set is turned off the meter needle should be at zero. If it is not, it can be adjusted by turning the small screw on the front of the meter with the "Screw-driver, knob, 2 inches". A slight turn will do it.

### 6.2.3 The Het. Oscillator Frequency

**Test:** Turn the Mode of Operation switch to CW MAN. and turn the GAIN controls up until noise is heard. The noise will have a pitch which varies as the HET. TONE control is turned. The lowest pitch should occur near the dot on the panel.

**Adjustment:** Remove the upper panel of the Receiver. The B.F.O. coil marked L21A is at the extreme left hand side. Loosen the locknut on the top of the coil. Turn the HET. TONE control to the dot (•) on the panel. Adjust the centre screw of L21A until the pitch of the noise which is heard is lowest. Tighten the locknut, check the HET. TONE control, and replace the Receiver panel.

**Warning:** Do not attempt any realignment of this Set. That is a task for an Ordnance Base Workshop.

## 6.3 INSPECTION, CARE, AND CLEANING

The most important maintenance function that an operator can perform is to detect faults in the equipment as soon as they occur. It is much more useful to report a fault immediately than to ignore the trouble or to attempt a makeshift repair.

The **complete equipment** should be thoroughly inspected and tested weekly for every operational function.

### 6.3.1 Mechanical, Generally

Always maintain a careful observation of the mechanical condition of the Set. Tighten loose bolts, terminals, and control knobs as soon as you notice that they are loose. Do not give tight screws a further half turn for sport. Some of these have been dipped in shellac before insertion and your further half turn will break the film. When small screws repeatedly come loose, remove and dip them in shellac before replacing. In the case of larger bolts replace the lockwashers. Examine the valves and shield cans to be sure that they are firmly seated in the sockets, and that the grid leads are in place.

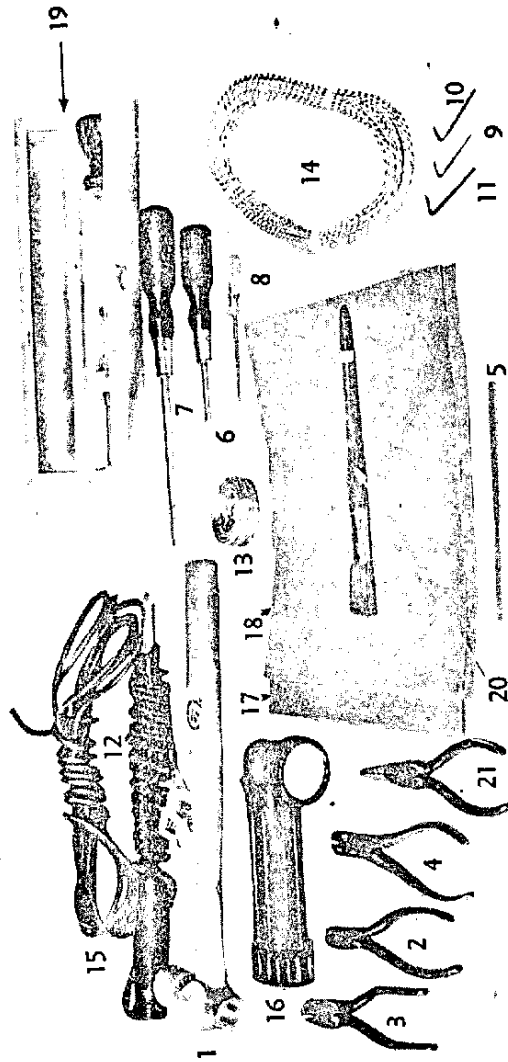
When control knobs become stiff, lubricate sparingly with light oil. You may lubricate with light oil the bearings of the roller coils **if they are stiff**. Do not force any very stiff controls. Never apply oil to switches, contacts, brushes, commutators, or the turns of roller coils.

If there are any spots of rust, sandpaper them and apply a dab of shellac or lacquer.

### 6.3.2 Chassis Generally

Before attempting to work on the chassis for any reason, turn the variable condensers until they are fully closed. This precaution will avoid the upsetting of dial calibration and circuit tracking which will result from the slightest bend of the condenser plates. Whenever you are working on the chassis be most careful not to alter any of the coil or trimmer condenser adjustments. Mistracking caused accidentally will be more harmful than the dirt you are trying to remove.

It is extremely important to keep the chassis dry, clean, and free from fungus. In humid and dusty locations constant attention will be required. Carefully clean away



1. Hammers, Engineers' Ball Peen 1 1/2 lbs.
2. Pliers, Diagonal Cutting, 6"
3. Pliers Square Nose, 6"
4. Pliers, Gas
5. Files, Magneto, 6"
6. Screw Drivers, Small Blade 3"
7. Screw Drivers, Large Blade 6"
8. Screw Drivers, Knob, 2"
9. Keys, Bristo No. 6
10. Keys, Bristo No. 8
11. Keys, Bristo No. 10
12. Irons, Soldering 12V
13. Solder, Rosin Core
14. Wire, 20 ga. flex. wht.
15. Wire, Electric P-13 MKI
16. Torches, Hand, 2-cell
17. Sandpaper 0000
18. Cloth, Luminous Oxide No. 240
19. Hydrometer Secondary Cell, Portable MKI
20. Brushes, Sash, Tool
21. Pliers, longnose, 6"

Fig. 32 Contents of Boxes, Tool

dirt and sand with the Brush, sash, tool. If it is necessary to use an air hose, first blow out any moisture which may have condensed in the air tank and connections, and be careful not to damage small components with too forceful a blast.

Whenever the Sender or Supply Unit has been removed clean the dirt and insects out of the gauze covered air inlets of the Carrier. Examine the chassis for loose nuts or parts, for broken or frayed leads, for fungus growths, insects, moisture, and for any signs of abnormal heating.

### 6.3.3 Contacts and Switches

If switches become noisy when operated, clean them carefully with carbon tetrachloride; if the AER CUR reading is jumpy clean the Sender roller coils or the Aerial Tuning Coil with carbon tetrachloride. Valve sockets and any contacts which are dirty may be cleaned in the same way. Be careful! It is very easy to bend accurately adjusted contacts when cleaning, and cause more harm than the dirt did. This applies particularly to the light contacts on wafer switches. They must not be bent.

### 6.3.4 Relays

There are two relays in the Supply Unit, one in the Sender, one in the Receiver, and one in the Remote Control Unit. These require little attention other than cleaning, if the contacts are dirty. When cleaning is necessary use a toothpick dipped in carbon tetrachloride to loosen the dirt, and another clean toothpick to wipe the sediment away. The contacts should not be filed. It alters the proper shape of the contacts—which should have a wiping action—and will probably result in rapid pitting. If filing is necessary in an emergency be careful to alter the shape as little as possible, to maintain the same contact spacing (particularly S15A), to prevent filings from fouling the armature, and to clean the contacts afterwards as described above. **Report this work.** The relay probably will require expert contact adjustment, or replacement.

### 6.3.5 Dynamotors

Do not oil the dynamotors. The bearings have been packed with grease and should run for many months without attention. If they become noisy, remove the end plates

and add grease until the bearings are about one third full. Use only the grease which is supplied by Ordnance in the Maintenance Spares for Wireless Set, Canadian, No. 52 or No. 9 Mk. I.

The longer a dynamotor runs the better the commutator surfaces become. Unless sand or dirt seep in, or an incorrect grade of brush is used, the commutator surface should not require attention, and will improve throughout the life of the dynamotor. If the commutator is needlessly cleaned with sandpaper, it will be harmed rather than improved. If the commutator does become cut or very dirty and rough, clean as lightly as possible with 0000 grade sandpaper. DO NOT use emery paper. Both commutators should be cleaned by turning the armature by hand, without voltage applied. Finally, clean the end of the machine with the Brush, sash tool. The H.T. ends of both dynamotors are the ends nearer the panel.

Do not apply a surfacer or tool of any type to the H.T. commutator of MG2A when a potential of 6V or more is applied to the input terminals.

#### 6.4 VALVE, VIBRATOR, AND FUSE CHECKING

Evidence of weak or faulty valves can be obtained from the following meter readings without the help of a valve tester. These are not proof of failure. Identical conditions can be produced by a defect in some other component. If the same fault exists after the valve has been changed it is probably that some other component is defective; replace the original valve in its socket, put the spare in its case, and tell Ordnance about it. The readings obtained on normal sets may differ from the values in tables XII and XIII by 15% or so. Deviation of input voltage from the value shown must also be considered. A faulty valve will usually cause a large difference in reading from the values shown.

Generally, if there is a coloured glow within the elements of a valve, it is faulty; a glow on the surface of the bulb is normal. One exception is V6A which normally operates with a coloured glow inside the elements and is faulty if the glow is absent.

TABLE XII  
TYPICAL SENDER METER READINGS

Key down—H.P.—12.5 V. Input  
Mode of Operation Switch at M.C.W.—except for V1J: R.T.

METER SWITCH POSITION	METER RANGE	FREQUENCY IN MC.								
		BAND 1			BAND 2			BAND 3		
		2	3	3.75	4	6	7.5	8	12	15
P.A. Bias	0-300 V	154	164	165	153	159	167	158	153	151
H.T. 1	0-600 V	305	307	310	305	305	310	305	290	290
V5D.Cath.	0-150Ma	30	33	34	31	34	34	32	31	32
V1J Cath.	0-3 Ma	1.6	1.8	1.85	1.6	1.8	1.8	1.7	1.65	1.7
V5A,V5B Gr.	0-15 Ma	7.0	4.0	3.3	5.2	6.8	6.2	5.3	6.0	6.0
V5C Gr.	0-3 Ma							1.6	2.3	2.0
P.A. Gr.	0-30 Ma	6.8	8.8	9.5	6.5	7.7	7.6	7.0	7.4	6.7
PA PL	0-300Ma	approx. 100—120 m.a.								

NOTE: A reading in the "V5C Gr" position on bands 1 and 2 is normal but has no significance.

Failure of V5A or V5B will result in low readings for these positions: { V5A-V5B Gr. reading  
V5C Gr. "  
PA Gr. "  
PAPL. "

Failure of V5C will result in low readings for these positions: { V5C Gr. "  
PA Gr. "  
PAPL. "

Failure of V7A will result in low readings for these positions: { PAPL. "  
PAGR. " (possibly)

Failure of the OSD/VR 150 valve will result in an unusually large reading for V5A-V5B Gr.—probably double the normal value.

TABLE XIII  
TYPICAL RECEIVER METER READINGS

Mode of Operation Switch at R.T. MAN.  
R.F. GAIN at Maximum—Input 12.5V

H.T.	L.T.	TUNE	V1A	V1B	V1C	V1D	V1E	** V1F	V1G	V1H
150	12.5	11	2.3	*	3.0	11	11	3.2	2.3	9.6

{ Band 1 7.0  
\* Band 2 6.5  
Band 3 3.3

\*\* Mode of operation at C.W. MAN.

The above tables exclude the calibrator and diode valves in the Receiver, and the Supply Unit Valves, Vibrators, and Fuses. The methods of checking these follow:

#### The Calibrator Valves

These are tested by using the Receiver to listen to the calibrator output—which can only be done of course if the rest of the Receiver is operating properly.

- (a) No signal when the calibrator switch is at 1000 or 100, and a jumble of signals when the switch is at 10:—Probably V3A, possibly V3C.
- (b) No signal when the calibrator switch is at 1000, but normal signals when the switch is at 100 or 10:—V3A.
- (c) Normal signal when the Calibrator switch is at 1000, no signal when the switch is at 100 and a jumble of signals when the switch is at 10:—V3A, or the crystal is faulty, see below.
- (d) Normal signals when the Calibrator switch is at 1000 and 100, but no signals when the switch is at 10:—V3B.
- (e) No signal when the Calibrator switch is at 1000, or 100 but normal signals at 10:—V3C.

**NOTE:**—When V3B or V3A have been changed, the test described in Section 4.5.2 must be made. In some cases it will be necessary to make the adjustment described in Section 6.2.1 after either of these valves has been changed.

- (f) Symptom (c) can be caused by a broken or dirty crystal. A temporary repair can often be made by opening the crystal holder and cleaning the quartz plate and the electrodes **carefully** with carbon tetrachloride or with soap and water. When you are through, the crystal should be really clean—hold it by the edges so that your fingers will not contaminate the surface. After cleaning the crystal replace it so that the arrows on both sides of the case are parallel to the short sides of the crystal. When the crystal assembly is replaced, these arrows must point vertically upwards when the Calibrator and Receiver are

mounted normally. Since the holder was originally sealed with wax and the seal has now been broken, this repair should only be done in an emergency and must be considered as a temporary repair.

#### Important

All essential and maintenance spare valves for the 52 Set crystal calibrator have been aged and are ready for use. They are identified by a blue paint mark on the locating pin. If any Type 12SC7 valves which have not this mark are used, turn the calibrator to 10 and operate the valves for 12 hours before performing test 4.5.2 and adjustment 6.2.1.

#### The Receiver Diodes (V2A, V2B)

V2A can be tested satisfactorily only by substitution or in a valve tester. If the Receiver has very low output, (distorted) or none at all and shows no meter change on TUNE, the valve may be faulty.

V2B is probably defective if the noise limiter does not work and if the output level does not change when the switch is operated.

#### The Receiver Supply Chassis

This removable unit contains a valve, vibrator, and fuse which can be replaced quickly.

- (a) If the Receiver meter indicates proper L.T. voltage but no H.T. voltage, examine the fuse. If it has blown replace it; if not replace valve V4A. If there is still no H.T. voltage and the second fuse has not blown, it is remotely possible that changing the vibrator will help, but it is more likely that workshop repair is required.
- (b) If the second fuse blows when it is replaced, replace the vibrator and the fuse. If there is still no H.T. voltage, replace V4A. Spare fuses, vibrator and valves are included in Case, Spare Valves and Parts, and in Case, Operating, Remote Receiver.

**NOTE:** If the temperature drops to  $-30^{\circ}\text{F}$  and if the operator still wants to use the Set it may be necessary to warm the OZ4A valve slightly before it will work.

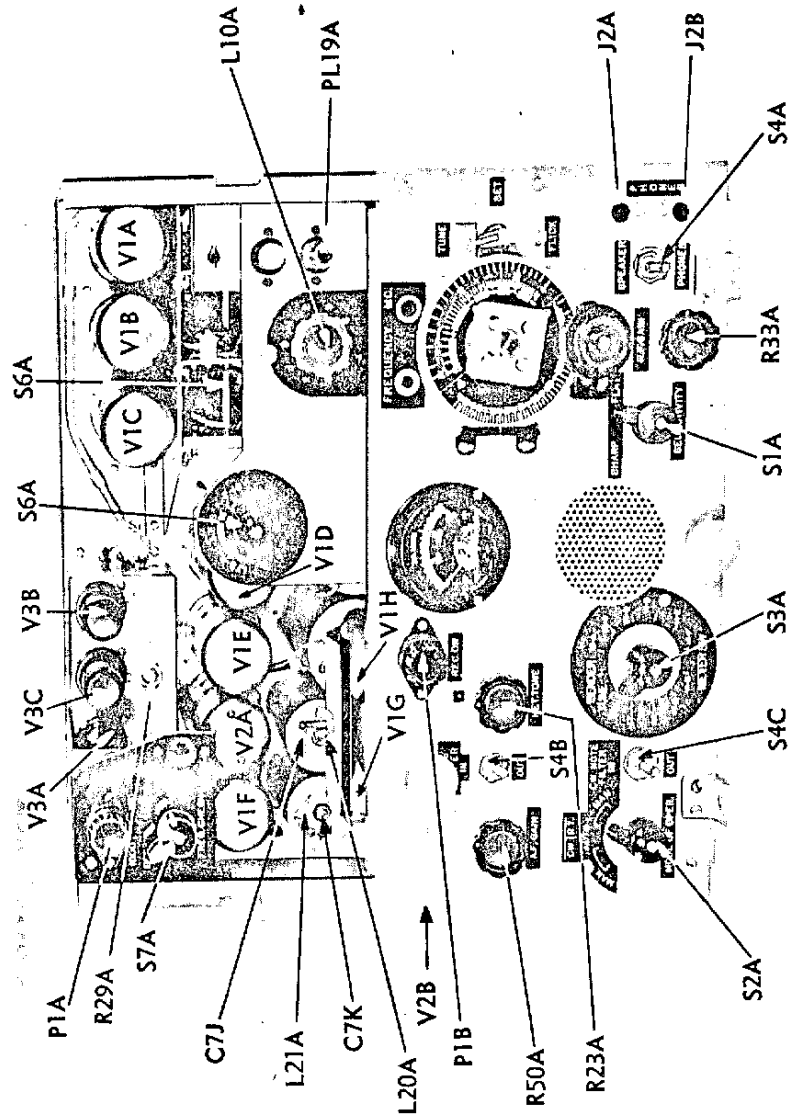


Fig. 33 Receiver—Upper Panel Removed

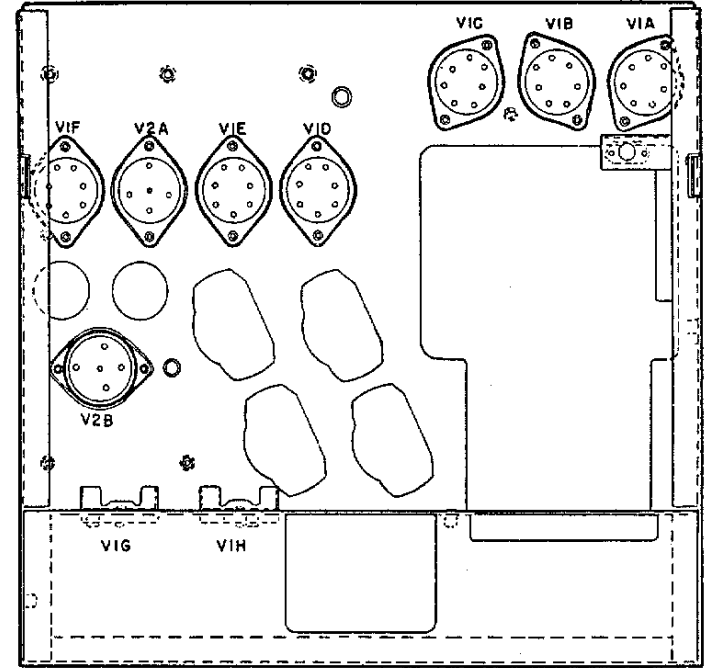


Fig. 34—Operators View of Receiver Valve Sockets.

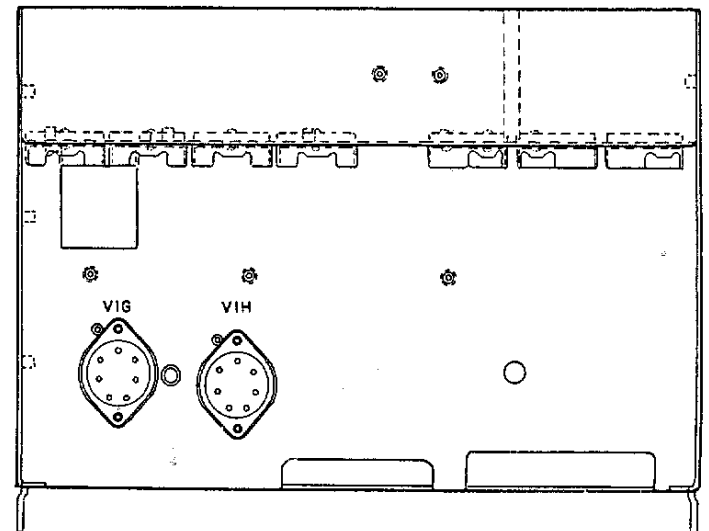


Fig. 35—Top View of Receiver Valve Sockets.

### The Supply Unit ZE 12

- (a) If there is no L.T. or H.T. voltage at the Receiver, check the Battery leads. If they are faultless remove Connectors Plug No. 1 from the Supply Unit and replace the fuse.

If the second fuse blows replace the vibrator and the fuse.

If it does not blow, attach the Connectors. There should now be both L.T. and H.T. voltage. If the fuse blows again when the Connectors are attached, the fault is not in the Supply Unit. Check the leads and plugs for a short, replace any fuses, and attach the Connectors. If there is L.T. now but no H.T. voltage, replace valve V4B. If this does not help you have done your best and should call in a specialist.

- (b) If there is L.T. voltage but no H.T. voltage replace V4B. If that does not help check the connectors. If there is still no H.T. voltage it is remotely possible that changing the vibrator will help, but it is more likely that workshop repair is required.

### 6.5 TO REPLACE A VALVE

If there is no improvement after a valve, vibrator or fuse has been changed, replace the spare in its Case, and the original in its socket.

When a spare has been used, obtain a replacement for your spare case. Do not put the faulty part into the spares case. Mark it to avoid mistake.

#### 6.5.1 Receiver Valves

All the Receiver valves can be reached after the upper front panel has been removed.

The positions of all the valves are shown in Fig. 33, and in addition the actual pin positions are shown in Figs. 34 and 35 so that you can insert the valve in the proper position without fumbling. (They only go in easily one way.)

Remove Leads, Aerial No. C7, loosen the two wing nuts and pull the panel forward. Valve V2B is less accessible than the others; you must first remove V1G. The

shield can for V2B is not removable. Be sure to replace all shield cans and grid leads.

#### 6.5.2 Sender Valves

The Sender Valves are not easy to reach, but with a little skill all of them can be replaced through the fan door. Don't lose your temper and damage the Sender in the scuffle. Before reaching into the Sender turn the Set OFF, and turn the FREQUENCY dial to the low frequency end. Directly behind the fan door at the rear of the Sender— is a choke coil. Be careful not to knock it with a shield can or valve.

The valve positions are shown in Figs. 41, 42 and the socket pin positions are shown in Fig. 36.

For all valves except the V7A, V6A and V5D, loosen the wing nut, turn the spring clip aside, remove the shield can if any, and withdraw the valve.

Do not forget the lead to the Cap of V1J. V5D has a base clamp and will require a steady pull.

To remove V7A, lift the top plate and turn it about 90° to the left. It will drop neatly out of the way. Then lift out the valve.

When you close the fan door, press it closed with one hand, and tighten the wing fasteners with the other.

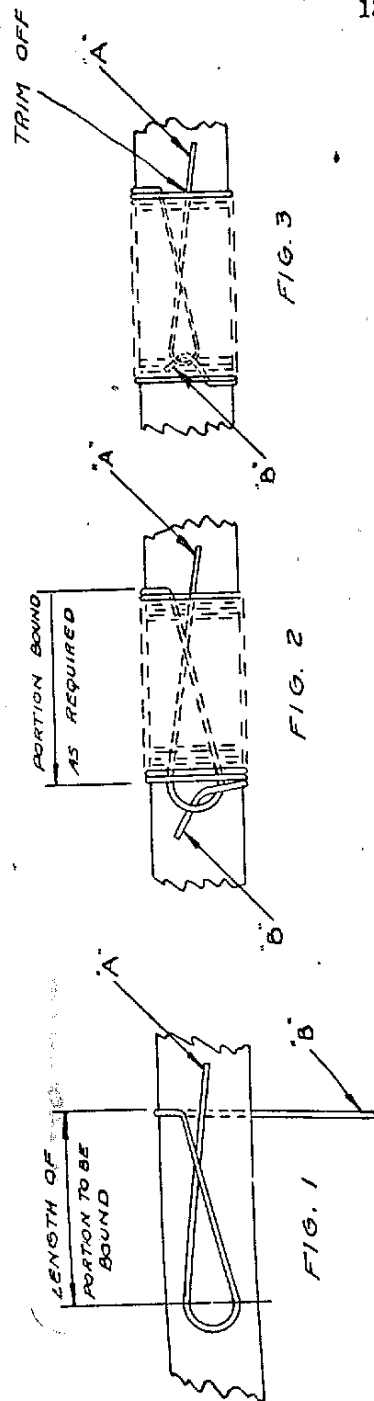
#### 6.5.3 The Supply Unit (Valve or Vibrator)

To change V4A or V1BR1B, loosen the two wing fasteners, pull the Vibrator Supply Unit out, and there you are. Put it back when you are through.

### 6.6 DYNAMOTOR BRUSHES See figs. 49, 50

There are four carbon brushes with springs and pig-tails in each dynamotor. Brushes, H.T. Canadian are used at the front panel ends of both machines, and Brushes L.T. Canadian at the other ends. The surfaces of the brushes must fit the shape of the commutators. This is called "bedding" and is particularly important for low electrical noise. When brushes are removed each must be replaced in the holder from which it was removed and in the same position. Original brushes are marked (+) or (—).





FORM LOOP SLIGHTLY LONGER THAN PORTION TO BE BOUND, AS SHOWN IN FIG. 1.  
 TAKE END "B" OF BINDING AND BIND TO LENGTH REQUIRED, PLACING END THROUGH LOOP AS SHOWN IN FIG. 2.  
 FINALLY, DRAW END OF BINDING "A" SO THAT LOOP AND END "B" ARE SECURE, THEN TRIM OFF END "A" AS SHOWN IN FIGURE 3.

Fig. 37—On Whipping Leads.

the lead and the lug thoroughly before soldering them. Never allow any of the leads to roam about loosely where they will be stepped upon.

### 6.8 HEADGEAR AND MICROPHONES

The quality of your reception and transmission depends upon the headphones and microphones. Don't strain the cords. Don't drop them. Don't jump on them.

There are spare receiver units for the headphones and spare capsules for both types of microphone. They are specially wrapped in waterproof packages. Do not open them until you need them, or they will have no protection against humidity.

### 6.9 AERIAL BASE C-2

The Base will require little attention except cleaning. If after long use it has a permanent bend of more than 15° when supporting an 8' whip rod, rotate it so that the aerial leans forward instead of backward.

If the Base loosens and can be rotated easily by hand, bend up washer CMC 114076 and tighten nut CMC 114078. See Fig. 10.

Spare washers and a wing nut are included in the Case, spare parts and valves.

### 6.10 THE METER

If the Receiver meter fails it will not be possible to load the Sender. There is a spare in the Case which can be installed very easily. Be sure to get the polarity of the leads the same as they were. The Receiver should be sent to a workshop for meter calibration as soon as possible.

### 6.11 REMOVAL OF THE MAIN UNITS

To remove the Sender, Receiver, or Supply Unit, it is only necessary to undo the large bolts and nuts which fasten the units to the Carrier, and to remove Leads, Aerial No. C7.

Withdraw the unit by pulling the metal pull knobs, not the dials or drop cords.

If all three units are removed at once which is an

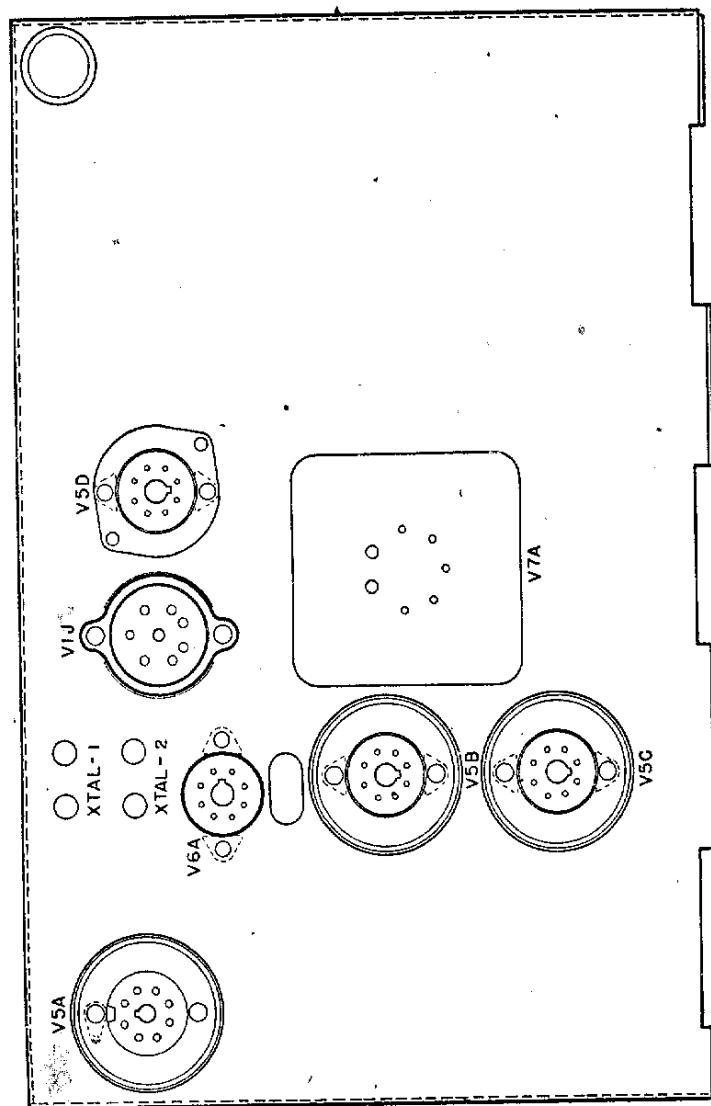


Fig. 36—Top View of Sender Valve and Crystal Sockets.

## Access to Brushes

DYNAMOTOR	BRUSH	INSTRUCTION
MG1A (L.P.) MG2A (H.P.)	L.T.(+) and H.T.(—) L.T.(+) and H.T.(—)	For the following, lay the Supply Unit on its right hand side on a clean place: Can be reached easily. Can be reached easily.
MG1A (L.P.)	L.T.(—)	For the following remove the Vibrator Supply Unit and its case, then lay the Supply Unit on its left side: Reach through the back of the Supply Unit.
MG1A (L.P.)	H.T.(+)	Reach through the hole in the shelf. (It can be done!)
MG2A (H.P.)	L.T.(—) and H.T.(+)	Can be reached easily.

To examine a brush which is accessible, do not remove it. Pull it part way out of the holder. If the carbon is longer than  $\frac{1}{4}$ " it is still useful; if it is shorter, replace it. When the brushes are touching the commutator, the L.T. and H.T. springs should extend at least  $\frac{1}{4}$ " from the holders. If the springs have collapsed, replace the whole brush. Examine the pigtail to be sure that it is not broken or twisted. This applies to new brushes as well as old ones.

After a brush has been replaced the dynamotor should be run without load for several hours to improve the bedding. The Receiver may be noisy on Break-in operation for some time after the brushes have been replaced.

NOTE: The dynamotors can be run without load by operating the Set on Send, C.W., Key-up.

## 6.7 LEADS

Keep the leads in good condition. When the insulation begins to fray, whip it as shown in Fig. 37. If strands of wire have broken at a lug, cut a short piece off the lead and replace the lug.

Spare wire is supplied in the Case, spare parts, for repairing the following leads:—Leads, Aerial Nos. 5, C6, and C7, and Aerial Lead Assembly No. C-1. The two sizes of spare lugs can be used to repair all of the leads in the station. The spare plug is intended for Leads, Aerial No. 5, or No. C6, or Aerial Lead Assembly No. C1. Clean both

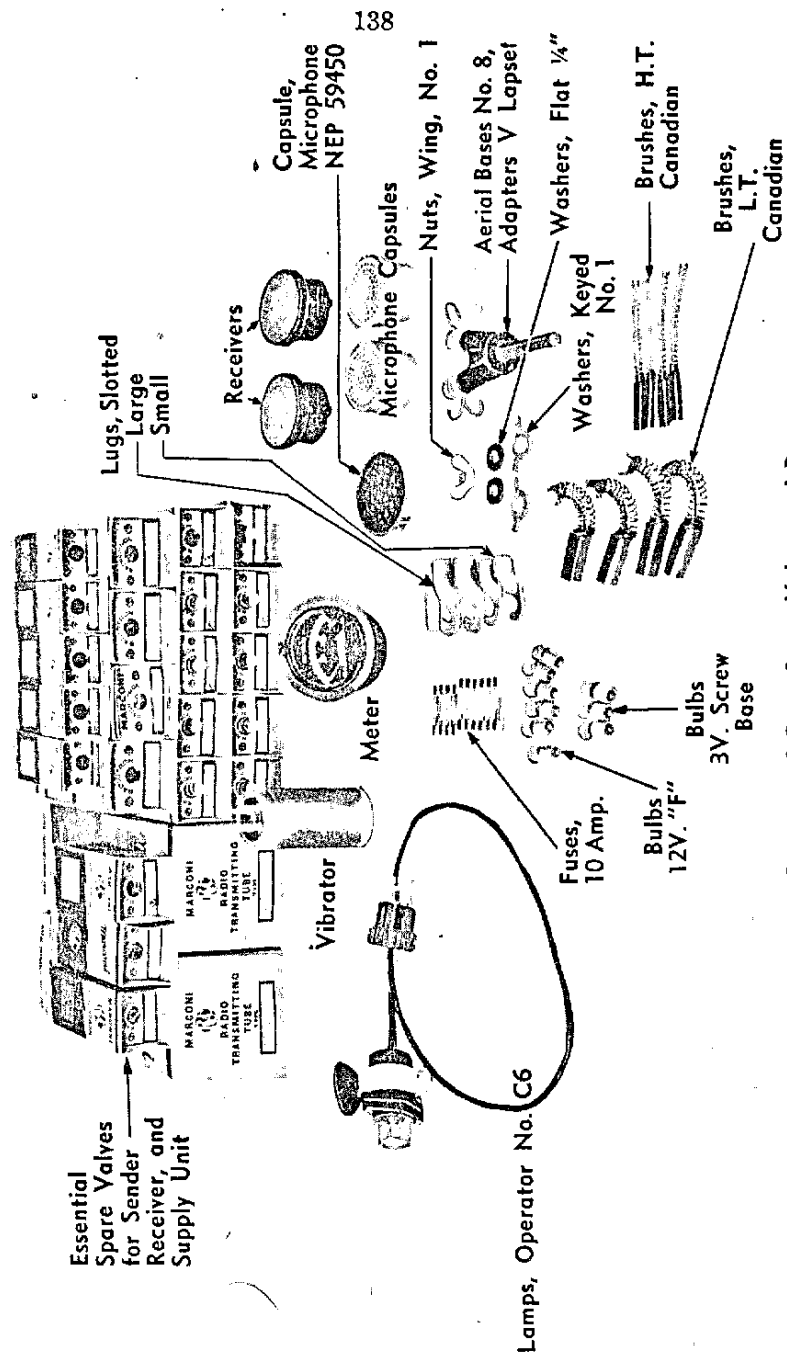


Fig. 38—Contents of Case, Spare Valves and Parts

unpleasant task anyway, the connector block at the rear of the Carrier must be removed before the units are replaced, then when the units have been pushed home, fit the plugs on the board properly in line into the sockets and replace the gasket and cover.

If there is any necessity for working on the Coil, Aerial Tuning No. 2A do not remove all the screws from the front panel, that is the hard way.

Do it this way:

1. Remove the wooden back.
2. There are three leads from the coil to the two wing nut terminals and the lead in terminal. Detach these leads.
3. Remove from the bottom, the three screws which have washers.
4. Remove the six screws from the front panel, which are marked "A" in Fig. 20.

The whole coil assembly attached to the panel can now be withdrawn as a unit. When you replace the Coil, replace all the screws and all the washers.

### 6.12 SPARE PARTS

Very complete stocks of spare parts are available at Ordnance Stores—make use of them when you need them. Always keep your spare parts case completely filled with good parts. If spares are not available, try the spares for W.S. Cdn. No. 9 Mk. I and W.S. No. 19. There are a very large number of interchangeable parts.

For example the following valves, vibrators, and fuses are available:

SPARES FOR W.S. Cdn. No. 9 Mk. I		W.S. Cdn. No. 19
Valves W.T. type:	ARP3 12Y4G OZ4A 6V6G 813 12SC7	6V6G OZ4A
Vibrator: (Mallory G6040C)	Identical unit part CMC 111-131-5 ZA/C 00040.	Interchangeable part RCA 110050-1.
Fuses:	10 amp. CMC 108-054 YBC 00001	Interchangeable Fuses, cartridge 10 amp. RCA 113838-1.

## CHAPTER VII

### TECHNICAL DESCRIPTION

#### 7.1 PREAMBLE

This chapter comprises a brief outline of how the Set works. The operator need not know the following, nor even read it. It is included in order that those operators who have some technical experience may have a fuller appreciation of the equipment they are using.

The block diagrams are self-explanatory and are worth a little study. They illustrate the various functions of each part of the Set and show how they are combined. In the Sender and Receiver diagrams the signal path is drawn in heavy lines. The schematic circuit diagrams will interest those whose curiosity is not satisfied by block diagrams.

#### 7.2 THE SENDER

The Sender employs beam tetrode valves in all the R.F. stages and in the modulator stage. These are all 6.3V indirectly heated type 6V6G valves except the power amplifier which is a 10V, directly heated type 813 valve. Voltage is applied to the 813 filament only on Send.

The arrangement of the R.F. stages is sketched in the following Chart. Band switching accomplishes these changes and selects the proper tank circuits. There is no band switching in the frequency determining circuit.

BAND	SENDER STAGES			
	V5A	V5B	V5C	V7A
1	Oscillator	driver		P.A.
2	Osc-doubler	driver		P.A.
3	Osc-doubler	doubler	driver	P.A.

The Master Oscillator is of the Hartly type on M.O. and Pierce type on Crystal, electron coupled to the next stage.

When using crystal control, feedback occurs through the voltage division across condenser C14A and C28B.

V6A is a gaseous voltage regulator which in conjunction with R37A stabilizes the oscillator screen voltage.

The M.O. tank circuit has been designed with high "C" and includes parallel capacitive temperature compensation. It covers the frequency range of band 1 only and is not switched. On band 1 the plate circuit is not tuned; on bands 2 and 3 it is tuned to the second harmonic of the oscillator frequency.

The plate output of the oscillator is amplified by V5B, a second 6V6G, whose plate circuit is tuned to the input frequency on bands 1 and 2, and which drives the grid of the 813 power amplifier. On band 3, V5B operates as a doubler, its plate circuit being tuned to twice the input frequency, and is not connected to the power amplifier but to the input of V5C, an amplifier stage which is switched into the circuit only on band 3. The plate circuit of V5C is tuned to the input frequency and drives the grid of the power amplifier. Thus on all bands there is a driver stage, operating at output frequency, between the M.O. and the power amplifier.

The tuning condensers for the M.O. grid and plate circuits and for the first driver plate circuit are ganged together; the tuning condenser for the driver stage which is used only on band 3 is operated by a separate control (IPA). Both permeability and capacity trimming are provided in all the tuned circuits which are ganged.

The power amplifier operates as a class C amplifier on C.W. and as a grid modulated class C amplifier on R.T. and M.C.W. A three position switch provides the choice of high, medium, or low power output by successively increasing the P.A. grid bias and simultaneously lowering the plate and screen voltages of the audio valves. The P.A. valve operates most efficiently on high power.

A flexible output coupling circuit provides proper impedance matching into aerials less than  $\frac{3}{8}$  wavelength, and over a range of about plus or minus  $\frac{1}{8}$  of a wavelength at the  $\frac{3}{4}$  wavelength points. The Aerial Tuning Coil is used whenever the reactance of the aerial is appreciably capacitive, that is for aerials less than  $\frac{1}{8}$  wavelength and near but less than  $\frac{3}{4}$  wavelength.

When the coil is used the impedance connected to the

PA tank circuit is approximately pure resistance; when it is not used, the tank circuit must be detuned from its natural resonance setting so that when connected to the aerial impedance, it presents a resistive load to the P.A. valve. By means of the roller contacts on the PA loading coils the impedance transformation ratio is adjusted for maximum power transfer. A part of these coils is short circuited by a switch operated by a cam on the P.A. condenser shaft, so that at the higher frequencies the inductance of the coil is lowered and the Q is raised.

The output tuning indicator comprises a current transformer, a wide band pass filter, and a full wave copper oxide rectifier which rectifies a small amount of induced R.F. Current. The resulting D.C. potential is measured by the moving coil meter. The time constant of the output filter is chosen so that the meter reading is nearly proportional to the peak R.F. current. Therefore the meter reading increases during modulation. The meter sensitivity switch controls the resistance in series with the meter.

The audio section comprises a pentode voltage amplifier V1J, and the 6V6G modulator valve. The two stages are resistance coupled and include inverse feedback. The input level is intended for moving coil microphones; a separate jack is provided for a carbon microphone. The power amplifier is modulated slightly more than 100% on M.C.W. and over 100% on R.T. peaks. The modulator valve is used as a Hartley oscillator at 1000 cycles on M.C.W. and C.W. It modulates the P.A. valve on M.C.W. and provides side-tone on both M.C.W. and C.W.

Bias voltage for the P.A. valve is obtained from the voltage drop across a resistance network caused by the flow of P.A. plate and grid currents. The network and therefore the bias is altered by the MODE OF OPER. switch and the HIGH-LOW-MED. switch. On Send this voltage is also applied to the Receiver to block the 2nd A.F. amplifier valve. On break-in it is applied only when the key is down; otherwise it is applied continuously.

Keying is accomplished by applying a large negative voltage to all the Sender control grids except V1J when the key is up, and removing the voltage when the key is down. The voltage is obtained from across a high resistance

inserted on M.C.W. and C.W. between the P.A. bias network and ground. The key is connected across this resistance. For break-in operation the aerial transfer relay in the Sender and the muting relay in the Receive are keyed. The former also transfers the headphones and keys the Sender; the latter grounds the Receiver input circuit and blocks an audio amplifier valve.

### 7.3 THE COIL AERIAL TUNING No. 2A

Coil Aerial Tuning No. 2A has been improved mechanically and electrically over the Coil Aerial Tuning No. 2 which was supplied with Wireless Set Canadian No. 9 Mk. I. It is still interchangeable with the No. 2 coil.

The mechanical drive ratio has been raised to 1:1 and the whole mechanical support and stops have been made sturdier.

Two roller wheels in tandem comprising one assembly ride on the coil so that two turns are shorted where it makes contact with the coil. These shorted turns reduce the coupling between the portion of the coil which is in use and the remaining short circuited portion.

The wheels are supported and sprung independently by two conical wedges and a coil spring under compression.

### 7.4 THE RECEIVER

The Receiver is a thirteen valve three band super-heterodyne. Twelve volt indirectly heated valves are used in every stage. The crystal calibrator valves are type 12SC7 double triodes; the second detector and AVC stage, and the noise limiter stage use type 12Y4G double diodes; all the amplifying stages and the two oscillators use type ARP3 pentode valves.

When the Receiver is used in the Carrier the input to the tuned R.F. amplifier is taken from the P.A. tank circuit in the Sender. When the Sender tank circuit is tuned to the Receiver frequency its resonance characteristics contribute to the image frequency attenuation and slightly to the sensitivity. A gas filled discharge gap is connected across the input terminals.

The R.F. stage is followed by a pentode mixer which is suppressor-grid modulated by the conversion oscillator.

The oscillator valve is connected as a triode in a Hartley circuit. Its frequency is always 420KC higher than the signal frequency. Parallel capacitive temperature compensation is provided on each band. Part of a small tapped coil L10A is connected in series with the low potential end of each oscillator tank coil. The position of an iron core in L10A can be adjusted by turning the FREQ. ADJ. knob. This narrow range of control of inductance provides a vernier control of frequency. The maximum frequency coverage is not large enough to cause serious mistracking in the R.F. tuned circuits. Permeability and capacitive trimming are both used in all ganged circuits.

Both I.F. stages are coupled by two double-tuned I.F. transformers tuned to 420 k.c. They include small additional coupling coils which are connected in the FLAT position of the Selectivity switch to increase the coupling and therefore the band width.

The heterodyne oscillator valve is connected as a triode in a tuned-grid tuned plate circuit. Parallel capacitive temperature compensation is provided in the plate circuit. The HET. control varies the effective capacitance across the grid circuit. The oscillator frequency is 420KC when the dot on the HET. knob is at the dot on the panel.

Separate diodes of V2A are used for the audio and AVC circuits. Full AVC voltage is applied to the R.F. Mixer and 1st I.F. valves; partial AVC voltage is applied to the 2nd I.F. and 1st AF valves. AVC voltage is applied to these valves when the Mode of Operation switch is at AUTO and is removed when the switch is at MAN. When switching from R.T. to C.W., in the AUTO positions, the time delay is increased so that the AVC voltage does not follow the large signal input changes between key up and key down conditions of the sending station. In the two C.W. positions plate voltage is applied to the Het. oscillator.

The A.F. amplifier comprises two resistance coupled pentode stages; the output valve is transformer coupled to match low resistance phones and the permanent magnet dynamic speaker.

There are two noise limiting devices. One is a combination series and parallel limiter which uses both diodes of V2B. Diode 3 is connected in series with the audio lead

from the diode load resistors to the 1st A.F. grid. When a noise pulse occurs, the cathode potential does not change, but the plate potential becomes more negative; the result is that instantaneously the diode does not conduct and does not transmit the pulse. Diode 5 which normally is not conducting is connected through the conducting diode 3, to the audio load resistor. When the pulse occurs the cathode becomes sufficiently negative for the diode to conduct and condenser C3Z is shunted across the audio load. It's really amazing, but it works. This limiter is very useful on short duration pulses of large amplitude such as ignition noise from charging sets or vehicles.

The other gadget is an audio resonant network which is connected as a feed-back path between plate and grid of the 1st A.F. valve V1G. The network peaks symmetrically the response of the audio amplifier at about 1000 cycles and sharply attenuates all audio notes above and below that frequency. It provides a great gain in signal-to-noise ratio on C.W. with all types of noise. Since it cannot be used on R.T. an IN-OUT switch is provided on the panel.

The Crystal Calibrator is a miniature sender which includes three separate oscillators. The frequencies of these are 1000 kc., 100 kc., and 10 kc. Each oscillator generates harmonics which are heard in the Wireless Set. For example when the 1000 kc. oscillator is used, although 1000 kc. is not within the range of the Set, signals can be heard at 2000 kc., 3000 kc., 4000 kc. and so forth, up to 16000 kc.

Similarly when the 100 kc. oscillator is switched on harmonics of 100 kc. are heard in the Set. When the 10 kc. oscillator is turned on harmonics of 10 kc. can be heard from 1.75 mc to 16000 kc. The lowest in frequency is the 175th harmonic and the highest is the 1,600th harmonic.

The three valves of the crystal calibrator are double triodes.

Separate triodes of V3A are used for the 1000 kc. and 100 kc. oscillators. The frequencies are controlled by a dual frequency crystal which vibrates at 1000 kc. in one direction and 100 kc. in another direction. The 100 kc. is more accurate in frequency than the 1000 kc. signal.

It is provided with a frequency adjustment C49A which is set at the factory. Do not touch this adjustment.

The 10 kc. oscillator uses both triodes of V3B in a multivibrator circuit. The output voltage of the 100 kc. oscillator is applied to one multivibrator plate and controls the frequency of the multivibrator circuit so that its frequency and the frequency of all its harmonics are as accurate as the frequency of the 100 kc. oscillator.

The frequency at which the multivibrator is controlled depends upon the magnitude of the 100 kc. voltage which is applied to it. At low voltages the multivibrator oscillates at 9.09 kc. As the control voltage (100 kc.) is increased, a value is attained at which the multivibrator frequency suddenly alters to 10 kc. As the control voltage is further increased, a value is attained at which the frequency suddenly changes to 11.1 kc. This control voltage can be adjusted by a potentiometer, R29A. The potentiometer is properly set at the factory so that the frequency of the multivibrator is 10 kc. This adjustment must not be altered unless the frequency of the multivibrator has changed (Section 4.5.2). This is not likely to occur. It is possible however, to find that the multivibrator has changed frequency after a valve has been changed or after an extreme change of temperature. The potentiometer must then be reset as described in Section 6.2.1.

V3C is an output valve which separates the 1000 kc. and 100 kc. oscillator from their load and, because it is connected as a diode rectifier, exaggerates the harmonic content of the signals.

When the calibrator is switched OFF it is severed from all voltage supply so that it does not draw power when idle.

## 7.5 THE SUPPLY UNIT

The Supply Unit comprises two distinct units: a dynamotor supply unit for the Sender and the removable vibrator supply unit for the Receiver.

The former consists of the LP and HP dynamotors, the starting and send receive relays, the filters, an exhaust fan, and the switches and leads necessary for voltage distribution. The LP dynamotor, MG1A, supplies 285V D.C. for all purposes in the Sender except the PA plate and grid

voltages. The HP Dynamotor, MG-2A, supplies 1300V D.C. for the PA plate and grid.

A thermostat mounted above the LP dynamotor closes when the temperature there reaches 100°F. and starts the fans in the Supply Unit and Sender. Below 100°F. forced circulation is not necessary.

The NET switch starts the LP dynamotor and applies voltage to all stages of the Sender except the power amplifier. The SEND-RECEIVE switch operates a light duty relay which closes the 285v supply line to the Sender and applies voltage to two keying relays, the heavy duty relay which starts both dynamotors and the P.A. filament. The SENDER-HEATER switch controls the supply of voltage to all Sender circuits. When it is OFF only the Receiver can operate.

The Receiver supply unit contains an interrupter type vibrator, a step-up transformer, full wave cold cathode rectifier, and various input and output filters. F1B the fuse in the input circuit which protects the transformer and battery, is mounted on the main panel. The valve and vibrator are the same as those used in the Supply Unit ZE12.

#### 7.6 THE SUPPLY UNIT ZE12

The Supply Unit ZE12 can be operated from several sources of supply. These are listed below with the corresponding output voltages.

TABLE XIV  
SUPPLY UNIT ZE12 VOLTAGES

INPUT	OUTPUT
12V D.C.	12V D.C. 150V D.C.
115V A.C. 25 to 60 Cycles	12V A.C. 150V D.C.
230V A.C. 25 to 60 Cycles	12V A.C. 150V D.C.

The Supply Unit comprises a voltage step-up transformer, a full wave cold cathode rectifier valve, and smoothing filters consisting of chokes and condensers. The input power to the transformer is obtained from an inter-

rupter type vibrator when the input is 12V D.C., and directly from the line when the input is 115V or 230V A.C. Two primaries are connected in series for 230V A.C. and in parallel for 115V A.C. The circuit change is performed by a toggle switch on the chassis. The 12V A.C. output for the Receiver filaments is obtained from a separate secondary winding.

A plug is inserted in either an AC or a DC socket to perform the necessary circuit changes for AC or DC operation. The circuit has been arranged so that if the plug is in the wrong socket no damage will occur. As a further precaution there is a socket on the chassis to hold the A.C. line plug during D.C. operation. The Supply Unit will not operate on D.C. unless the line plug is in place.

A fuse F1A protects the transformer, the Receiver, and the battery, when on 12V operation.

APPENDIX  
TABLE XV  
WEIGHTS AND DIMENSIONS  
Wireless Set, Canadian, No. 52

	OVERALL DIMENSIONS IN INCHES			WEIGHT IN LBS.
	HEIGHT	WIDTH	DEPTH	
Complete Equipment in the Carrier (excluding Aerial Tuning Coil)	17 $\frac{1}{4}$	43 $\frac{3}{8}$	13 $\frac{1}{8}$	255
Aerial Tuning Coil	8 $\frac{1}{8}$	16 $\frac{1}{8}$	10 $\frac{3}{8}$	15
Sender	14 $\frac{1}{2}$	15 $\frac{1}{2}$	13	52
Receiver	14 $\frac{1}{2}$	15	13	41
Supply Unit	14 $\frac{1}{2}$	7 $\frac{3}{8}$	12 $\frac{1}{2}$	53
Supply Unit ZE12	8 $\frac{1}{2}$	10 $\frac{1}{8}$	8	26

TABLE XVI  
WEIGHTS OF CONTENTS OF EACH KIT

Kit No.	NET WEIGHT IN LBS.	Kit No.	NET WEIGHT IN LBS.
1	266	7	90
2	108	8	90
3	220	9	90
4	40	10	90
5	102	11	107
6	57	12	107



TABLE XVII  
WEIGHTS AND DIMENSIONS  
COMPLETELY PACKED KITS

Kit No.	OUTSIDE DIMENSIONS IN INCHES	WEIGHT IN LBS.
1	51½ x 22½ x 24¾	410
2	53¾ x 25 x 18½	175
3	56¼ x 24¾ x 21½	333
4	82¾ x 7½ x 5	63
5	41¼ x 30½ x 23½	235
6	40 x 20 x 13	95
7	24¼ x 13½ x 18	125
8	24¼ x 13½ x 18	125
9	24¼ x 13½ x 18	125
10	24¼ x 13½ x 18	125
11	26¼ x 18¾ x 17	154
12	26¼ x 18¾ x 17	154

TABLE XVIII  
TENT DIMENSIONS

Length .....	7 ft.
Width .....	9 ft. 6 in.
Height, ridge to floor .....	6 ft. 6 in.
Height of wall .....	3 ft. 4 in.

TABLE XIX  
STATION LIST - WIRELESS SETS CANADIAN NO. 52  
VEHICLE AND GROUND STATION

Kit No. 1  
Set Kit  
CMC 119-021

KIT ITEM NO.	V.A.O.S. NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCIL- LARIES	UNIT SPARES	REMARKS
1	ZA/C 00071	CMC 108-951	WIRELESS SETS CANADIAN NO. 52 SENDERS RECEIVERS SUPPLY UNITS	1		{ VALVES, FUSES, BULBS CON- { TAINED IN THESE ITEMS { HELD ON CHARGE { SEPARATELY. ALL OTHER ITEMS IN KIT CONTAINED IN THIS ITEM. HARDWARE ATTACHED.
2	ZA/C 00072	CMC 108-953		1		
3	ZA/C 00073	CMC 108-952		1		
4	ZA/C 00074	CMC 108-954	CARRIERS NO. 4	1		CONNECTS RECEIVER TO SENDER
5	ZA/C 00075	CMC 119-529	COVER WATERPROOF LEADS AERIAL C7	1		FOR HIGH POWER-LOCK
6	ZA/C 00105	CMC 119-319			1	
7	ZA/C 00076	CMC 114-033	WIRELESS SETS CANADIAN NO. 52 KEYS, POWER-LOCK INSTRUCTIONS, WORKING AND INSTALLATION CHART TUNING WATCHES NON MAGNETIC W.T.	1		MOUNTED IN CASE ON RECEIVER PANEL. CONTAINED IN RECEIVER EIGHT IN RECEIVER; ONE IN SENDER.
8	ZA/C 00077	CMC 114-032			1	
9	ZA/C 00078	CMC 113-248	VALVES, W.T. TYPE 12Y4G ARP3	1	1	
10	VC 7563	CMC 108-012			1	
11	ZA/C 7101	CMC 108-015		2		
12	ZA/C 7103	CMC 108-016		9		

TABLE XIX (Cont'd)  
Kit No. 1 (Cont'd) CMC 119-021

KIT ITEM NO.	V.A.O.S.NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCIL-LARIES	UNIT SPARES	REMARKS
13	ZA/C 00094	CMC 114-036	VALVES, W.T. TYPE OSD/VR150	1		CONTAINED IN SENDER.
14	ZA/C 00017	CMC 108-017	12SC7	2		CONTAINED IN RECEIVER.
15	ZA/C 00095	CMC 114-037	OZ4A	1		CONTAINED IN SUPPLY UNIT
16	ZA/C 5306	PC 86185-C	6V6G	4		CONTAINED IN SENDER
17	ZA/C 00040	CMC 111-131-5	VIBRATOR	1		CONTAINED IN SUPPLY UNIT.
18	WB/C 1490	PC 90615-C	BULBS 12 V. "F"	3		2 CONTAINED IN RECEIVER 1 CONTAINED IN SUPPLY UNIT
19	XB/C 00001	CMC 108-054	FUSES, 10 AMP. LITTELFUSE TYPE 1081	1		CONTAINED IN SUPPLY UNIT ANCILLARY VALVE 813 PACKED IN OPERATING KIT.

TABLE XIX  
Kit No. 2  
Operating Kit CMC 119-022

KIT ITEM NO.	V.A.O.S.NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCIL-LARIES	UNIT SPARES	REMARKS
1	ZA/C 00080	RCA 107521	MICROPHONE & RECEIVERS HEADGEAR ASSEMBLIES NO.1 CANADIAN RECEIVERS	2	1	SPARES FOR ALL RECEIVER HEADGEAR IN STATION.
2	ZA/C 00081	RCA 113-993-501	RECEIVERS		2	SPARES FOR ITEM 1.
3	ZA/C 00082	PC 90617C	MICROPHONE CAPSULES		2	USED WITH WIRELESS SET OR AS
4	ZA/C 00083	RCA 10763A	RECEIVERS, HEADGEAR M.C. MK. 1		1	SPARES FOR REMOTE CONTROL UNIT
5	ZA/C 00084	CMC 114-648	MICROPHONE'S HAND NO. C7		1	
6	ZA/C 00085	RCA 118-252-1	CAPSULE MICROPHONE NEPP 59450		1	
7	ZA/C 00086	RCA 110072-1	KEY AND PLUG ASSEMBLIES NO. C9		1	
8	ZA/C 00088	CMC/114059	AERIAL BASES C2	1		
9	ZA/C 0477	CMC 108-715	BAGS AERIAL GEAR NO.2 MK. 11			WITH EXTENSION ZA/C 00086
10	ZA/C 0894	RCA 110074-1	ANTENNAE RODS "F" SECTIONS NO.1	1		AND NUTS AND BOLTS
11	ZA/C 0895	RCA 110074-2	NO.2	2		CONTAINS ITEMS 10, 11, 12, 13.
12	ZA/C 0895	RCA 110074-3	NO.3	2		BOTTOM
13	ZA/C 00090	RCA 110107-1	NO.4	2		3RD.
14	ZA/C 00087	CMC 119-611	AERIALS HORIZONTAL 4 SECTION	2		4TH. (TOP)
15	ZA/C 1949	PC 6447B	CONNECTORS: SINGLE NO. 23	1		2ND.
16	ZA/C 2794	PC 64484	TWIN NO. 53	4		TO CONNECT SWITCHBOARD TO BATTERIES.
17	ZA/C 00013	CMC 110-313	AERIAL LEAD ASSY. C-1	2		TO CONNECT CHARGING SETS TO SWITCHBOARD.
18	ZA/C 00091	CMC 119-366	LEADS, EARTH NO. C-2	1		CONNECTS AERIAL TUNING COIL NO.2A TO AERIAL BASE AND MUST BE CUT TO PROPER LENGTH. CONNECTS CARRIER TO VEHICLE AND MUST BE CUT TO PROPER LENGTH.

TABLE XIX (Cont'd)  
Kit No. 2 (Cont'd)

KIT ITEM NO.	V. A. O. S. NO.	MFG. OR PART DWG. NO.	DESCRIPTION	ANCI- LARIES	UNIT SPARES	REMARKS
19	ZA/C 2749	CMC 110-567	CONNECTORS, TWIN NO. 17	1		CONNECTS W.S. TO POWER SOURCE. COMPLETE WITH LEADS AERIAL NO. C6 CONTAINING ITEMS 2, 3, 6 AND 23 TO 44  ANCILLARY VALVE FITS IN SENDER FOR OPERATION.  SPARES FOR WIRELESS SET AND LAMPS OPERATOR NO. C 6  SPARES FOR TORCHES HAND 2 CELL, EVEREADY NO. 9250 SPARES FOR TORCHES HAND 2 CELL TYPE OF BULB COINCIDES WITH ITEM 62 OR 62A. FOR BOTH DYNAMOTORS IN SUPPLY UNIT  PACKED IN CARTON
20	ZA/C 6282	PC 90107C	SATCHELS, SIGNALS NO. 1	2		
21	ZA/C 00092	CMC 119-920	COILS, AERIAL TUNING NO. 2A	1		
22	ZA/C 00093	CMC 113-500	WIRELESS SETS CANADIAN NO. 52 CASES, SPARE VALVES AND-PARTS	1		
23	ZA/C 7101	CMC 108-015	VALVES W.T. TYPE 12 Y4G	2		
24	ZA/C 7103	CMC 108-016	ARP 3	2		
25	ZA/C 00094	CMC 114-036	O50/VR 150	2		
26	ZA/C 00017	CMC 108-017	12 SC7	2		
27	ZA/C 00095	CMC 114-037	074A	2		
28	ZA/C 5306	PC 86186C	6V6G	2		
29	ZA/C 00018	CMC 108-018	813	2		
30	ZA/C 00040	CMC 111-131-5	VIBRATOR	1		
31	WB/C 1490	PC 90615C	BULBS, 12 V. "F"	6		
32	WB/C 00004	CMC 108-025	BULBS, 3 VOLT, SCREW BASE, EVEREADY NO. 1151	3		
32A		CMC 119-050	BULBS, 2.5 VOLT BAYONET BASE	3		
33	ZA/C 00089	CMC 108-021	BRUSHES H. T. CANADIAN	3		
34	XB/C 00096	CMC 114-039	BRUSHES L. T. CANADIAN	3		
35	XB/C 00001	CMC 108-054	FUSES, 10 AMP. LITTELFUSE TYPE 1081	4		
36	ZA/C 00097	CMC 105-317	METERS, 0-500 MICRO AMPERE	4		

TABLE XIX (Cont'd)  
Kit No. 2 (Cont'd)

KIT ITEM NO.	V. A. O. S. NO.	MFG. OR PART DWG. NO.	DESCRIPTION	ANCI- LARIES	UNIT SPARES	REMARKS
37		CMC 121-106	LUGS SLOTTED LARGE		2	SPARE HARDWARE  CONTAINING 1 BULB PC 90615C  CONTAINING ITEMS 46 TO 65  EITHER OF TWO TYPES OF PLIERS BUT NOT BOTH MAY BE SHIPPED
38		CMC 113-393	LUGS SLOTTED SMALL		2	
39		CMC 113-396	PLUGS, CONNECTING NO. 2		1	
40		CMC 114-076	WASHERS, KEYS NO. 1		2	
41		CMC 114-077	NUTS, WING NO. 1		1	
42		CMC 114-084	WASHERS FLAT 1/4"		2	
43	ZA/C 00065	CMC 108-121	LAMPS, OPERATOR NO. C 6	1	1	
44	ZA/C 00001	PC32105C-191	AERIAL BASES NO.8 ADAPTERS V. LAPORTE	1	1	
45		CMC 113-547	WIRELESS SETS CON. NO. 52	1	1	
46		CMC 108-027	BOXES TOOL	1	1	
47		CMC 108-028	HAMMERS, ENGINEERS BALL PEIN 1-1/2 LBS.	1	1	
48		CMC 108-029	PLIERS, DIAGONAL, CUTTING 6"	1	1	
49		CMC 108-030	PLIERS, LONGNOSE 6"	1	1	
50		CMC 114-001	PLIERS, SQUARE NOSE 6" WITH SIDE CUTTERS	1	1	
50A		OR	PLIERS, GAS 7"	1	OR	
51		CMC 108-031	PLIERS, GAS 6"	1	1	
52		CMC 108-032	FILES, MAGNETO 6"	1	1	
53		CMC 108-033	SCREWDRIVERS: SMALL BLADE 3"	1	1	
54		CMC 108-034	SCREWDRIVERS: LARGE BLADE 6"	1	1	
55		CMC 113-024	KEYS: BRISTO NO. 6	1	1	
56		CMC 108-035	KEYS: BRISTO NO. 8	1	1	
57		CMC 108-036	KEYS: BRISTO NO. 10	1	1	
58		CMC 115-194	IRONS SOLDERING 12 VOLT	1	1	
59		CMC 108-036	SOLDER, RESIN CORE (1/4 LB. ROLLS)	1	1	

TABLE XIX (Cont'd)  
Kit No. 2 (Cont'd)

KIT ITEM NO.	V.A.O.S. NO.	MFG. OR PART DWG. NO.	DESCRIPTION	ANCI- LARIES	UNIT SPARES	REMARKS
50	WB/C 00005	CMC 108-039	WIRE, 20 GAUGE FLEXIBLE WHITE, FT.	10		
51	WB/C 1043	CMC 108-042	ELECTRIC P13 MK. I. YDS.	8		COMPLETE WITH BULB } EITHER TORCHES OF TWO " } BUT NOT BOTH ARE IS- SUED.
52	WB/C 00006	CMC 108-040	TORCHES HAND 2 CELL, EVEREADY NO. 9250	1		
52A		CMC 104-062	TORCHES HAND 2 CELL	1		
53		CMC 114-041	SANDPAPER, 0000, SHEETS	2		
54		CMC 108-041	CLOTH, ALUMINOUS OXIDE NO. 240 (FINE) SHEETS	4		
55	ZB/C 4268	CMC 108-097	HYDROMETER SECONDARY CELL PORTABLE MK. I.	1		
56		CMC 108-026	BRUSHES, SASH, TOOL	1		
57	ZB/C 00002	RCA 101975-501	SWITCHBOARDS, CHARGING NO. C5	1		TO CONNECT THE BATTERIES IN SERIES.
58	ZA/C 2270	CMC 110-317	CONNECTORS SINGLE NO. C 3	2		

TABLE XIX (Cont'd)

Kit No. 3  
Remote Control and Ground Station Kit

CHC 119-023

KIT ITEM NO.	V.A.O.S. NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCI- LARIES	UNIT SPARES	REMARKS
1	ZA/C 00043	PC 82506C-190	WIRELESS REMOTE CONTROL UNIT NO. 1 (CDN.)			
2	ZA/C 00044	RCA 113894	WORKING INSTRUCTIONS	2		CONTAINS ITEMS, 2, 3, & 4. ESSENTIAL SPARES IN OPERATING KIT
3	ZA/C 00083	RCA 107634	RECEIVERS, HEADGEAR M.C. MK. I	2		
4	ZA/C 00084	CMC 114-548	MICROPHONE HAND NO. C3	2		
5	WB/C 0815	CMC 110-562	REELS, CABLE NO. 2 MK. 11	1		WITHOUT WIRE ON TWO WOODEN REELS EITHER CABLE MAY BE SUPPLIED BUT NOT BOTH.
6	WB/C 00002	CMC 114-069	CABLE, ELECTRIC, C58 C/2 YDS.	1000		
6A		CMC 108-045	CABLE, ELECTRIC, 7/27 TWISTED COPPERWELD	1000		
7	ZA/C 10318	PC 82524C	LEADS AERIAL NO. 5	1		
8	ZA/C 00104	CMC 114-843	LEADS, COUNTERPOISE NO. 2 MK. 1V	2		
9	ZA/C 2349	CMC 110-567	CONNECTORS TWIN NO. 17	1		
10	ZA/C 00077	CMC 114032	WIRELESS SETS CANADIAN NO. 52 WORKING AND INSTALLATION INSTRUCTIONS	1		
11	ZA/C 00025	PC 82495C-260	ANTENNAE VERTICAL, 34 FT. STEEL (CAN. TEL.)			
12	ZA/C 00026	PC 82495C-261	MASTS, VERTICAL, 20 FT. STEEL (CAN. TEL.)			
13	ZA/C 00027	PC 82495C-262	BRACKETS, MOUNTING, VEHICLE: SETS (CONSISTING OF)			
14	ZA/C 00028	PC 82495C-263	BRACKETS, ANGLE, STAND-OFF NO. 7-157 1-A			
15	ZA/C 00029	PC 82495C-264	RUSHINGS, SLOTTED WOOD CLAMPS, MAST MOUNTING HOLDERS, ASSEMBLY MAST PLATES, BOLT RETAINING NO. 7-157 1-A			

TABLE XIX (Cont'd)  
Kit No. 3 (Cont'd)

KIT ITEM NO.	V.A.O.S.NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCI LARIES	UNIT SPARES	REMARKS
16	ZA/C 00030	PC 82495C-265	PLATES, MAST MOUNTING SPACERS, GROOVED, WOOD, NO. 7-1667-A SPACERS, TAPERED, WOOD ANTENNAE, VERTICAL, 34 FT. STEEL, MK. 1.- BASE, PLATE VEHICLE ROOF PAMPHLETS INSTRUCTION BASES, AERIAL ASSEMBLY BAGS, AERIAL GEAR CANADIAN GUYS, ASSEMBLY HAMMERS, 4-1/2 LB. STRIKING HAMMERS, ENGINEERS, BALL PEIN 8 OZ. LEADS, AERIAL NO. C6 PEGS, ANTENNAE RODS, "A" SPIKES, GROUND BOLTS, STEEL.- HEX HEAD:- 1/4-20 X 1" HOLED 1/4-20 X 1-3/4" 1/4-20 X 3-3/4" NUTS, STEEL HEX, HEAD:- 1/4"-20 WING 3/4"-20 PINS, STEEL, COTTER 1/16" X 7/16" WASHERS, STEEL, SPRING, SPLIT 1/4"	1		PACKED IN BAGS, AERIAL GEAR, CANADIAN
17	ZA/C 00031	PC 82495C-262		1		
18	ZA/C 00032	PC 82495C-268		1		
19	ZA/C 00103	PC 82495C-269		1		
20	ZA/C 00070	PC 82495C-214	1		PACKED IN BAGS, AERIAL GEAR, CANADIAN	
21	ZA/C 00108	PC 82495C-205	1			
22	ZA/C 00019	PC 82495C-272	8		PACKED IN BAGS, AERIAL GEAR, CANADIAN	
23	ZA/C 00022	PC 82495C-260	1			
24	ZA/C 00022	PC 82495C-274	1		PACKED IN BAGS, AERIAL GEAR, CANADIAN	
25	ZA/C 00022	PC 82495C-275	1			
26	ZA/C 00102	CMC 119-549	1		PACKED IN BAGS, VEHICLE, HARDWARE, MOUNTING KIT	
27	ZA 0374	PC 82495C-271	8	2		
28	ZA/C 00024	PC 82495C-272	2			
29			8			
30			2			
31			2			
32			8			
33			2			
34			2			
35			10			

TABLE XIX (Cont'd)

Kit No. 4  
Vertical Aerial Kit

CMC 119-024

KIT ITEM NO.	V.A.O.S.NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCI LARIES	UNIT SPARES	REMARKS
1	ZA/C 00033	PC 82495C-191	ANTENNAE VERTICAL, 34 FT. STEEL (CAN. TEL.)			
2	ZA/C 00034	PC 82495C-230	AERIAL VERTICAL 34 FT. STEEL (CAN. TEL.) MAST VERTICAL 20 FT. STEEL (CAN. TEL.)	1		
				1		

TABLE XIX (Cont'd)

Kit No. 5  
Remote Receiver Kit

CMC 119-025

164

KIT ITEM NO.	V.A.O.S.NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCI- LARIES	UNIT SPARES	REMARKS
1	ZA/C 00098	CMC 108-803	WIRELESS SETS CANADIAN NO. 52 RECEIVERS REMOTE	1		VALVES AND PILOT CONTAINED IN THIS SET HELD ON CHARGE SEPARATELY.
2	ZA/C 00099	CMC 113-501	CASES, OPERATING, REMOTE RECEIVER (FILLED)	1		CONTAINING ITEMS NO.3 TO 17 INCL.
3	ZA/C 00083	RCA 107634	RECEIVERS HEADGEAR M.C. MK.1	2		VALVES, VIBRATOR, FUSE CON- TAINED IN SUPPLY UNIT HELD ON CHARGE SEPARATELY.
4	ZA/C 00064	CMC 108-960	WIRELESS SETS CANADIAN NO. 52 SUPPLY UNIT ZE-12	1		CONNECTS SUPPLY UNIT TO RECEIVER.
5	ZA/C 00037	CMC 106-560	CONNECTORS, PLUG, NO. 1	1		CONNECTS BATTERY TO SUPPLY UNIT. ANCILLARY ITEMS IN RECEIVER.
6	ZA/C 00038	CMC 111-245	LEADS, BATTERY NO. 1	1	2	ANCILLARY ITEMS IN SUPPLY UNIT
7	ZA/C 7101	CMC 108-016	VALVES W.T. TYPE 1274G	8	8	
8	ZA/C 7103	CMC 108-016	ARP3	3	3	ANCILLARY ITEMS IN RECEIVER
9	ZA/C 00017	CMC 108-017	125C7	1	1	
10	ZA/C 00095	CMC 114-037	OZ4A	1	1	ANCILLARY ITEMS IN SUPPLY UNIT
11	ZA/C 00040	CMC 111-121-5	VIBRATOR	1	1	
12	XB/C 00001	CMC 108-034	FUSES, CARTRIDGE, 10 AMP. LITTEL FUSE TYPE 1081	1	2	ANCILLARY ITEMS IN RECEIVER
13	WB/C 1490	PC 90615C	BULBS, 12 VOLT "R"	1	1	
14	WB/C 00003	CMC 108-055	WIRE, AERIAL, 100 FT.	1	1	USED WITH ITEM 14. TO CONNECT BATTERIES IN SERIES.
15	ZA/C 00100	CMC 115-415	LEADS, EARTH, NO. C3	1	1	
16	ZA/C 00109	CMC 114-060	INSULATORS, STEATITE x 345	1	1	USED WITH ITEM 14. TO CONNECT BATTERIES IN SERIES.
17	ZA/C 2270	CMC 110-317	CONNECTORS' SINGLE NO. C3	2	2	

TABLE XIX (Cont'd)

Kit No. 6  
Tent Kit

CMC 119-026

165

KIT ITEM NO.	V.A.O.S.NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCI- LARIES	UNIT SPARES	REMARKS
1		CMC 108-050	MALLETS, TENT, SMALL	1		CMC 119-027
2		CMC 108-020	PINS TENT, WOOD, MEDIUM	6		
3		CMC 108-061	PINS TENT, WOOD, SMALL	30		
4		CMC 108-062	TENTS, WIRELESS STATION	1		
5		CMC 108-063	HOLDALLS	1		
6		CMC 108-064	POLES, WEATHER	1		
7		CMC 108-065	POLES, RIDGE	1		
8		CMC 108-066	POLES, UPRIGHT	1		
9		CMC 108-067	VALISES	1		
1	ZB/C 00040	CMC 114-048	Kit No. 7 Set Battery Kit BATTERIES SECONDARY, PORTABLE 6V. 200 A.H.	1		CMC 119-027
1	ZB/C 00040	CMC 114-048	Kit No. 8 Set Battery Kit BATTERIES SECONDARY PORTABLE 6V. 200 A.H.	1		CMC 119-027

TABLE XIX (Cont'd)

CMC 119-027

KIT UNIT NO.	V. A. O. S. NO.	MFG. OR PART DWG. NO.	DESIGNATION	ANCIL- LARIES	UNIT SPARES	REMARKS
1	ZB/C 00040	CMC 114-048	Kit No. 9 Set Battery Kit BATTERIES SECONDARY PORTABLE 6V. 200 A.H.	1		
1	ZB/C 00040	CMC 114-048	Kit No. 10 Set Battery Kit BATTERIES SECONDARY PORTABLE 6V. 200 A.H.	1		CMC 119-027
1	ZB/C 00001	CMC 108-048	Kit No. 11 Remote Receiver Battery Kit BATTERIES SECONDARY PORTABLE 6V. 125 A.H.	2		CMC 119-029
1	ZB/C 00001	CMC 108-048	Kit No. 12 Remote Receiver Battery Kit BATTERIES SECONDARY PORTABLE 6V. 125 A.H.	2		CMC 119-029

TABLE XX

## LIST OF ELECTRICAL COMPONENTS

ALL THE COMPONENTS LISTED BELOW ARE AVAILABLE AT ORDNANCE STORES IN THE MAINTENANCE SPARES FOR WIRELESS SETS, CANADIAN NO. 52.

SOME OF THE COMPONENTS ARE ALSO AVAILABLE IN THE MAINTENANCE SPARES FOR WIRELESS SET CANADIAN NO. 9 MK. I. COMPONENTS WITH PC PREFIXING THE PART NUMBER ARE ALSO AVAILABLE IN THE MAINTENANCE SPARES FOR WIRELESS SET NO. 19.

COMPONENTS WHICH HAVE THE SAME CIRCUIT REFERENCE NUMBER ARE IDENTICAL (E.G., CIA, C1B). THE DIFFERENT LETTERS INDICATE DIFFERENT CIRCUIT LOCATIONS.

## - CONDENSERS -

(A) IF A DUPLICATE REPLACEMENT PART CANNOT BE OBTAINED IT MAY BE POSSIBLE TO USE A CONDENSER WHICH WAS INTENDED FOR SOME OTHER EQUIPMENT. OF COURSE THE CAPACITANCE MUST BE THAT SHOWN IN THIS LIST AND IT MUST FIT THE AVAILABLE SPACE.

(B) COLUMN 6 SHOWS THE VOLTAGE RATING OF THE ORIGINAL CONDENSER. IN SOME LOCATIONS ONE WITH A SMALLER VOLTAGE RATING MAY BE USED. COLUMN 7 SHOWS THE MINIMUM VOLTAGE RATING WHICH MAY BE USED SAFELY. CONDENSERS WITH ANY HIGHER VOLTAGE RATING MAY BE USED.

(C) CAPACITANCE TOLERANCES ARE MAXIMUM. SMALLER TOLERANCES MAY BE USED, WIDER TOLERANCE MAY BE TRIED.

(D) UNLESS OTHERWISE SHOWN, TOLERANCES ARE  $\pm$ .

(E) N.S. IN COLUMN 7 MEANS "NO SUBSTITUTE".

(F) VARIABLE CONDENSERS ARE INDICATED BY (VAR) IN COLUMN 5 OR 6.

TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C1A	CMC119-041		20 UUF	10	500	200	R	1.75-4 MC OSCIL- LATOR	TEMP. COMPENSATOR
C1B	CMC119-041		20 UUF	10	500	200	R	1.75-4 MC ANTENNA	TEMP. COMPENSATOR
C1C	CMC119-041		20 UUF	10	500	200	R	1.75-4 MC DETEC- TOR	TEMP. COMPENSATOR
C1D	CMC119-041		20 UUF	10	500	200	R	3.8-8 MC OSC.	TEMP. COMPENSATOR
C1E	CMC119-041		20 UUF	10	500	200	R	3.8-8 MC ANTENNA	TEMP. COMPENSATOR
C1F	CMC119-041		20 UUF	10	500	200	R	2.6-8 MC DETECTOR	TEMP. COMPENSATOR
C1G	CMC119-041		20 UUF	10	500	200	R	1.16 MC ANTENNA	TEMP. COMPENSATOR
C1H	CMC119-041		20 UUF	10	500	200	R	7-16 MC DETECTOR	TEMP. COMPENSATOR
C1J	CMC119-041		20 UUF	10	500	200	R	7-16 MC OSC.	TEMP. COMPENSATOR
C1K	CMC119-041		20 UUF	10	500	200	R	7-16 MC OSC.	TEMP. COMPENSATOR
C2A	PC80174-C		20 UUF	10	500	200	CC	7-16 MC OSC.	100 KC COUPLER
C2B	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	3.5-8 MC OSC.	TRIMMER
C2C	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	1.75-4 MC OSC.	TRIMMER
C2D	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	1.75-4 MC OSC.	TRIMMER
C2E	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	7-16 MC ANTENNA	TRIMMER
C2F	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	3.5-8 MC ANTENNA	TRIMMER
C2G	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	1.75-4 MC ANTENNA	TRIMMER
C2H	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	1.75-4 MC DETECTOR	TRIMMER
C2J	PC80174-C		4-30 UUF	(VAR)	500	N.S.	R	3.5-8 MC DETECTOR	TRIMMER
C3A	PC 68182-C		.1 UF	20	500	300	R	VIA SCREEN	TRIMMER
C3B	PC 68182-C		.1 UF	20	500	300	R	VIA CATHODE	DECOUPLING
C3C	PC 68182-C		.1 UF	20	500	300	R	VIA PLATE	DECOUPLING
C3D	PC 68182-C		.1 UF	20	500	300	R	V1G SCREEN	DECOUPLING
C3E	PC 68182-C		.1 UF	20	500	300	R	V1C CATHODE	DECOUPLING
C3F	PC 68182-C		.1 UF	20	500	300	R	V1C SCREEN	DECOUPLING
C3G	PC 68182-C		.1 UF	20	500	300	R	VID A.V.C.	DECOUPLING



TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C3H	PC 681B2-C		.1 UF	20	500	200	R	V1D CATHODE	DECOUPLING
C3J	PC 681B2-C		.1 UF	20	500	300	R	V1D SCREEN	DECOUPLING
C3K	PC 681B2-C		.1 UF	20	500	200	R	V1E A.V.C.	DECOUPLING
C3L	PC 681B2-C		.1 UF	20	500	200	R	V1E CATHODE	DECOUPLING
C3M	PC 681B2-C		.1 UF	20	500	300	R	V1E SCREEN	DECOUPLING
C3N	PC 681B2-C		.1 UF	20	500	300	R	V1G NOTE FILTER	PLATE COUPLING
C3O	PC 681B2-C		.1 UF	20	500	300	R	V1G PLATE	DECOUPLING
C3P	PC 681B2-C		.1 UF	20	500	300	R	V1H SCREEN	DECOUPLING
C3Q	PC 681B2-C		.1 UF	20	500	300	R	V1H GRID RETURN	BYPASS
C3R	PC 681B2-C		.1 UF	20	500	200	R	V1H GRID	DECOUPLING
C3S	PC 681B2-C		.1 UF	20	500	200	R	V2A A.V.C.	DECOUPLING
C3T	PC 681B2-C		.1 UF	20	500	200	R	H.T. (POS)	DECOUPLING
C3U	PC 681B2-C		.1 UF	20	500	300	R	V1F PLATE	DECOUPLING
C3V	PC 681B2-C		.1 UF	20	500	200	R	V1F CATHODE	DECOUPLING
C3W	PC 681B2-C		.1 UF	20	500	300	R	CRYSTAL	DECOUPLING
C3X	PC 681B2-C		.1 UF	20	500	300	CC	CALIBRATOR	DECOUPLING
C3Y	PC 681B2-C		.1 UF	20	500	200	R	V2A CATHODE	BYPASS
C3Z	PC 681B2-C		.1 UF	20	500	200	R	V2B NOISE SUPPRESSOR	RF BYPASS
C3AA	PC 681B2-C		.1 UF	20	500	N.S.	S	V5A PLATE	RF BYPASS
C3AB	PC 681B2-C		.1 UF	20	500	200	S	V7A FILAMENT	MCW TUNING COND'R.
C3AC	PC 681B2-C		.1 UF	20	500	200	S	V5D GRID	BYPASS
C3AD	PC 681B2-C		.1 UF	20	500	200	S	V5D SCREEN	BYPASS
C3AE	PC 681B2-C		.1 UF	20	500	N.S.	S	V7J SCREEN	HASH SUPPRESSOR
C3AF	PC 681B2-C		.1 UF	20	500	200	S	FAN	HASH SUPPRESSOR
C3AG	PC 681B2-C		.1 UF	20	500	200	SU	MG1A PRIMARY	HASH SUPPRESSOR
C3AH	PC 681B2-C		.1 UF	20	500	200	SU	MG2A PRIMARY	HASH SUPPRESSOR
C3AJ	PC 681B2-C		.1 UF	20	500	200	SU	FAN	HASH SUPPRESSOR

TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C3AK	PC 681B2-C		.1 UF	20	500	300	SU	V4A FILTER	BYPASS
C3AL	PC 681B2-C		.1 UF	20	500	200	R	V4H GRID RETURN	BYPASS
C3A	CNC108-850		441 UUF	(VAR)		N.S.	R	ANTENNA	THREE
C3C	CNC108-850		441 UUF	(VAR)		N.S.	R	OSCILLATOR	GANG
C3D	CNC116-100		.5 UF	20	100	N.S.	R	DETECTOR	TUNING
C3E	CNC116-100		.5 UF	20	100	N.S.	R	BATTERY INPUT	L.T.R.F. BYPASS
C3F	CNC116-100		.5 UF	20	100	N.S.	R	V1B-1A	R.F. BYPASS
C3G	CNC116-100		.5 UF	20	100	N.S.	R	L.T. OUTPUT	R.F. BYPASS
C3H	PC80127-C/A		7-45 UUF	(VAR)	500	N.S.	SU	MG1A PRIMARY	HASH SUPPRESSOR
C3I	PC80127-C/A		7-45 UUF	(VAR)	500	N.S.	SU	MG2A PRIMARY	HASH SUPPRESSOR
C3C	CNC108-242		100 UUF	10	500	N.S.	S	V5A GRID	R.F. BYPASS
C3A	CNC108-242		100 UUF	10	500	N.S.	S	V5A PLATE	TRIMMER
C3B	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L116A	TRIMMER
C3C	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L116A	TRIMMER
C3D	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L117A	TRIMMER
C3E	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L117A	TRIMMER
C3F	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L118A	TRIMMER
C3G	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L118A	TRIMMER
C3H	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L119A	TRIMMER
C3I	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L119A	TRIMMER
C3J	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L20A	TRIMMER
C3K	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L20A	TRIMMER
C3L	CNC108-242		100 UUF	10	500	N.S.	S	I.F. TRANSF.L21A	TRIMMER
C3M	CNC108-242		100 UUF	10	(VAR)	N.S.	S	V5B MC PLATE 1.75 TO 3.5 MC	TRIMMER
C3N	CNC108-242		100 UUF	10	(VAR)	N.S.	S	V5B MC PLATE 3.5 TO 8 MC	TRIMMER

TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C7N	CMC108-242		100 UUF	10	(VAR)	N.S.	S	V5B PLATE 7 TO 16 MC	TRIMMER AVC DIODE COUPL'G BALANCING OSC. COUPL'G. COUPLING COUPLING 4-GANG TUNING 4-GANG TUNING 4-GANG TUNING
C8A	CMC113-027		50 UUF	20	500	200	R	V2A A.V.C.	
C8B	CMC113-027		50 UUF	20	500	200	R	I.F. TRANSF.L15A	
C8C	CMC113-027		50 UUF	20	500	200	R	V7A GRID	
C8D	CMC113-027		50 UUF	20	500	N.S.	S	V7C GRID	
C8E	CMC113-027		50 UUF	20	500	N.S.	S	V5A GRID OSC.	
C9A	CMC119-608		540 UUF	(VAR)	(VAR)	N.S.	S	V7A GRID OSC.	
C9B	CMC119-608		540 UUF	(VAR)	(VAR)	N.S.	S	V5A PLATE, DOUBLER	
C9C	119-608		540 UUF	(VAR)	(VAR)	N.S.	S	DOUBLER, DRIV.	
C9D	119-608		540 UUF	(VAR)	(VAR)	N.S.	S	DOUBLER	
C10A	PC 67136-C		12 UF	+100 -0	50	20	R	V1H CATHODE	
C10B	PC 67136-C		12 UF	+100 -0	50	20	R	V5D CATHODE	
C11A	CMC119-043		100 UUF	15	500	200	R	V1B GRID	
C11B	CMC119-043		100 UUF	15	500	200	R	V1C SUPPRESSOR	
C11C	CMC119-043		100 UUF	15	500	200	R	V5B GRID	
C12A	CMC119-044		180 UUF	2	500	N.S.	S	V5A PRIMARY	
C12B	CMC119-045		150 UUF	5	500	200	S	V5A CATHODE	
C12C	CMC119-045		150 UUF	10	500	200	S	V7A PLATE	
C12D	CMC119-046		500 UUF	(VAR)	(VAR)	N.S.	S	V7A PLATE	
C12E	CMC119-047		215 UUF	(VAR)	(VAR)	N.S.	S	V7C PLATE	
C12F	CMC108-612		215 UUF	(VAR)	(VAR)	N.S.	S	V7A PLATE	
C12G	CMC108-610		330 UUF	(VAR)	(VAR)	N.S.	S	MG2A SECONDARY	
C17A	CMC111-228		.005 UF	+30 -20	2500	N.S.	SU	12 VOLT INPUT	
C18A	CMC111-228		.005 UF	+30 -20	2500	N.S.	SU	12 VOLT INPUT	
C18B	CMC111-228		.005 UF	+50 -10	15	N.S.	SU	12 VOLT INPUT	
C19A	CMC111-228		100 UF	+50 -10	15	N.S.	SU	12 VOLT INPUT	
C19B	CMC111-225		100 UF	+50 -10	15	N.S.	SU	12 VOLT INPUT	

TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C19C	CMC111-225		100 UF	+50 -10	15	N.S.	S	V1J GRID	A.F. BYPASS
C19D	CMC111-225		100 UF	+50 -10	15	N.S.	S	KEYING	SPARK SUPPRESSION
C20A	CMC111-207		.01 UF	20	500	200	R	V1G GRID	AUDIO COUPLING
C20B	CMC111-207		.01 UF	20	500	200	R	V1H GRID	AUDIO COUPLING
C20C	CMC111-207		.01 UF	20	500	200	R	V1J GRID	AUDIO COUPLING
C20D	CMC111-207		.01 UF	20	500	200	R	MG1A SECONDARY	HASH SUPPRESSOR
C20E	CMC111-207		.01 UF	20	500	200	SU	MG2A SECONDARY	HASH SUPPRESSOR
C20F	CMC111-207		.01 UF	20	500	200	SU	MG2A SECONDARY	HASH SUPPRESSOR
C21A	CMC113-033		.1 UF	20	400	N.S.	SU	V4E CATHODE	H.T. R.F. BYPASS
C22A	CMC113-034		.02 UF	20	240	N.S.	ZE12	AC PRIMARY	R.F. BYPASS
C23A	CMC113-035		.004 UF	20	1600	N.S.	ZE12	T6A SECONDARY	SECONDARY TIMING
C23B	CMC113-035		.004 UF	20	1600	N.S.	ZE12	T7A SECONDARY	SECONDARY TIMING
C24A	CMC113-032		.0075 UF	20	1600	N.S.	SU	V4B PLATE	SECONDARY TIMING
C24B	CMC113-032		.0075 UF	20	1600	N.S.	SU	T7A SECONDARY	SECONDARY TIMING
C25A	CMC113-032		.0075 UF	20	1600	N.S.	SU	V4B CATHODE	AUDIO FILTER
C25B	CMC113-032		.0075 UF	20	1600	N.S.	SU	V4B CATHODE	AUDIO FILTER
C25C	CMC113-028		.002 UF	+50 -10	300	300	ZE12	H.T. OUTPUT	R.F. BYPASS
C25D	CMC113-028		.002 UF	20	500	200	R	V1F PLATE	COUPLING
C25E	CMC113-028		.002 UF	20	500	200	R	V5A GRID	DECOUPLING
C25F	CMC113-028		.002 UF	20	500	200	R	V5A PLATE	COUPLING
C25G	CMC113-028		.002 UF	20	500	200	R	V5B SCREEN	R.F. BYPASS
C25H	CMC113-028		.002 UF	20	500	200	R	V5B PLATE	R.F. BYPASS
C25J	CMC113-028		.002 UF	20	500	300	S	V7A GRID	R.F. BYPASS
C25K	CMC113-028		.002 UF	20	500	300	S	V7A SCREEN	R.F. BYPASS
C25L	CMC113-028		.002 UF	20	500	300	S	METER SWITCH	R.F. BYPASS
C25M	CMC113-028		.002 UF	20	500	300	S	VFC SCREEN	R.F. BYPASS
C25N	CMC113-028		.002 UF	20	500	300	S	VFC PLATE	R.F. BYPASS
C25O	CMC113-028		.002 UF	20	500	300	S	P.A. BIAS	R.F. BYPASS

TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C26N	CMC113-028		.002 UF	20	500	200	SU	12 VOLT INPUT	R.F. BYPASS
C27A	CMC119-048		500 UUF	10	500	200	R	V12 NOTE FILTER	COUPLING
C27B	CMC119-048		500 UUF	10	500	200	R	V1H PLATE	R.F. BYPASS
C27C	CMC119-048		500 UUF	10	500	200	R	V1A GRID	COUPLING
C27D	CMC119-048		500 UUF	10	500	N.S.	S	V2A PLATE	COUPLING
C27E	CMC119-048		500 UUF	10	500	N.S.	S	V5B PLATE	COUPLING
C27F	CMC119-048		500 UUF	10	500	200	S	V5C PLATE	R.F. BYPASS
C27G	CMC119-048		500 UUF	10	500	200	S	V5D PLATE	PADDER
C28A	CMC119-049		20 UUF	5	200	200	R	V5A PLATE	CRYSTAL FEEDBACK
C28B	CMC119-049		20 UUF	5	200	200	R	V1F GRID	HET. TONE CONTROL
C29A	CMC113-048		250 UUF	20	500	200	R	V1A SIGNAL DIODE	1.F. TUNING
C29B	CMC113-048		150 UUF	10	500	200	CC	V2A GRID	MULTIPLIER
C30A	CMC113-049		.01 UF	10	500	200	CC	V3B PLATE	CONTROL
C31A	CMC119-052		.01 UF	10	500	200	R	V1C GRID	AVC DECOUPLING
C31B	CMC119-052		.01 UF	10	500	200	R	V5A SCREEN	R.F. BYPASS
C32A	CMC119-052		.01 UF	20	500	200	SU	12 VOLT INPUT	R.F. BYPASS
C32B	CMC119-052		.01 UF	20	500	200	CC	V7A PLATE	100 KC COUPLING
C33A	CMC119-007		2 UUF	25	500	200	CC	V3C CATHODE	100 KC OUTPUT
C33B	CMC119-007		2 UUF	25	500	200	CC	V3B PLATE	MULTIPLIER
C34A	CMC119-006		80 UUF	2	500	200	CC	V3B PLATE	COUPLING
C34B	CMC119-006		80 UUF	2	500	200	CC	V3B PLATE	MULTIPLIER
C35A	CMC119-054		.001 UF	20	500	200	S	T5A SECONDARY	R.F. BYPASS
C36A	CMC111-271		1.75 UF	20	25	15	S	R.F. INDICATOR	PEAK VOLTMETER
C37A	CMC111-272		.02 UF	20	1000	600	S	V5D PLATE	COND'R.
C38A	PC 67193-2		2 UF	+100 -0	400	N.S.	S	V1J PLATE	A.F. COUPLING

TABLE XX (Cont'd)  
CONDENSERS (Cont'd)

1 CIRCUIT REF.	2 PART NO.	3 CAT. NO.	4 CAPACITY	5 TOL. %	6 VOLTAGE RATING	7 SEE SPECIAL NOTE (B)	8 USED ON	9 ASSOCIATED WITH CIRCUIT OR VALVE	10 FUNCTION
C39A	CMC111-269		5 UF	+50 -10	300	N.S.	S	P.A. BIAS	A.F. BYPASS
C40A	CMC111-272		2 UF	20	600	N.S.	SU	M61A SECONDARY	SMOOTHING FILTER
C41A	CMC111-270		.5 UF	20	2500	2000	SU	M52A SECONDARY	SMOOTHING FILTER
C42B	CMC111-142		20 UF	+50 -10	200	N.S.	SU	V4A FILTER	SMOOTHING FILTER
C43A	CMC119-055		250 UUF	10	500	200	R	V1G NOTE FILTER	COUPLING
C43B	CMC119-055		250 UUF	10	500	200	R	V1G NOTE FILTER	COUPLING
C43C	CMC119-055		250 UUF	10	500	200	R	V2A DIODE LOAD	BYPASS
C44A	CMC119-056		1004 UUF	2	500	N.S.	R	V1B 1.75-4 MC	TRACKER
C45A	CMC119-057		1349 UUF	2	500	N.S.	R	V1B 3.5-8 MC	TRACKER
C46A	CMC119-058		7 UUF	2	500	N.S.	R	V1A 7-16 MC	7-16 MC COUPLING
C47A	CMC119-029		.002 UF	5	500	200	CC	V1A GRID	R.F. TRACKING
C48A	CMC119-060		25 UUF	5	500	200	CC	V3A GRID	CRYSTAL FREQ. ADJUST.
C49A	CMC115-410		150 UUF	(VAR)	500	N.S.	R	V1F - L21A	HET. OSC. TEMP.
C50A	CMC119-061		1 UUF	2	500	N.S.	R	V3B GRID	COMP.
C51A	CMC115-461		1 UUF			N.S.	CC	V3B GRID	MULTIPLIER OUTPUT

TABLE XX (Cont'd)  
INDUCTANCES AND R.F. TRANSFORMERS

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 USED ON	5 DESCRIPTION	6 ASSOCIATED WITH CIRCUIT OR VALVE	7 FUNCTION
L1A	CMC115-624		R	ANT. COIL, 1.75-4.0 MC	AERIAL CIRCUIT	AERIAL COUPL'G 1.75-4 MC
L2A	CMC115-627		R	ANT. COIL, 2.5-8.0 MC	AERIAL CIRCUIT	AERIAL COUPL'G 3.5-8 MC
L3A	CMC115-630		R	ANT. COIL, 7.0-15.0 MC	AERIAL CIRCUIT	AERIAL COUPL'G 7.0-15 MC
L4A	CMC115-628		R	DET. COIL, 1.75-4.0 MC	R.F. AMP., V1A	COUPL'G VIA TO VIC, 1.75-4 MC
L5A	CMC115-631		R	DET. COIL, 2.5-8.0 MC	R.F. AMP., V1A	COUPL'G VIA-VIC 3.5-8 MC
L7A	CMC115-626		R	OSC. COIL, 1.75-4 MC	CONV. OSC. V1B	COUPL'G VIA-VIC 3.5-8 MC
L8A	CMC115-629		R	OSC. COIL, 2.5-4 MC	CONV. OSC. V1B	R.F. OSC. 1.75-4 MC
L9A	CMC115-632		R	OSC. FREQUENCY VERNIER	CONV. OSC. V1B	R.F. OSC. 2.5-8 MC
L10A	CMC115-702		ZE12	FILTER FOR HASH	FILAMENT LINE	R.F. OSC. 7-15 MC
L11A	CMC111-150		SU	CHOKE	VIBRATOR INPUT	VERNIER FREQ. ADJUSTMENT
L11B	CMC111-156		SU	CHOKE	VIBRATOR INPUT	HASH SUPPRESSION
L12A	CMC097683		SU	R.F. FILTER	RECTIFIER, V4B	HASH SUPPRESSION
L13A	CMC111-226		ZE12	R.F. FILTER	RECTIFIER, V4B	H.T. R.F. FILTER
L13B	CMC111-228		ZE12	R.F. FILTER	RECTIFIER, V4B	H.T. R.F. FILTER
L14A	CMC111-238		SU	R.F. FILTER	RECTIFIER, V4B	H.T. R.F. FILTER
L14B	CMC111-238		SU	R.F. FILTER	RECTIFIER, V4B	H.T. R.F. FILTER
L15A	CMC09769		ZE12	AUDIO FILTER	H.T. OUTPUT	H.T. R.F. FILTER
L15A	CMC115-602		R	1ST I.F. TRANS. INPUT	MIXER VIC	AUDIO FILTER
L17A	CMC115-603		R	1ST I.F. TRANS. OUTPUT	1ST I.F. AMP. V1D	OUTPUT OF VIC
L18A	CMC115-604		R	2ND I.F. TRANS. INPUT	2ND I.F. AMP. V1E	OUTPUT OF V1D
L18A	CMC115-604		R	2ND I.F. TRANS. OUTPUT	2ND I.F. AMP. V1E	INPUT OF V1E
L20A	CMC105-205		R	I.F. DIODE TRANSFORMER	2ND I.F. AMP. V1E	COUPL'G V1E TO V2A
L20A	CMC115-606		R	B.F.O. COIL	HET. OSC. V1F	HET. OSCILLATOR
L22A	CMC115-45F		CC	CALIBRATOR TANK COIL	CRYSTAL OSC. V3A	1000/100 KC TANK COIL
L22A	CMC115-45F		CC	CALIBRATOR OUTPUT CHOKE	CALIBRATOR OUTPUT V3C	DIODE LOAD INDUCTANCE
L23A	CMC115-317		SU	R.F. CHOKE	MG1A PRIMARY	HASH SUPPRESSION
L24A	CMC115-317		SU	R.F. CHOKE	MG2A PRIMARY	HASH SUPPRESSION
L25A	CMC115-214		SU	R.F. CHOKE	MG1A PRIMARY	HASH SUPPRESSION
L26A	PC78439-C		SU	R.F. CHOKE	MG2A SECONDARY	HASH SUPPRESSION
L26B	PC78439-C		SU	R.F. CHOKE	MG2A SECONDARY	HASH SUPPRESSION

TABLE XX (Cont'd)  
INDUCTANCES AND R.F. TRANSFORMERS (Cont'd)

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 USED ON	5 DESCRIPTION	6 ASSOCIATED WITH CIRCUIT OR VALVE	7 FUNCTION
L27A	CMC119-312		SU	R.F. CHOKE	MG2A SECONDARY	HASH SUPPRESSION
L28A	CMC09761		SU	A.F. CHOKE	MG1A SECONDARY	SMOOTHING FILTER
L30A	CMC097702		SU	A.F. CHOKE	RECTIFIER V4A	SMOOTHING FILTER
L30B	CMC119-134		S	R.F. CHOKE	FAN	HASH SUPPRESSION
L31A	CMC119-107		S	OSCILLATOR TANK COIL	FAN	TUNING
L32A	PC79115C-191		S	CHOKE	V5A GRID	HASH SUPPRESSION
L33A	PC79115C-191		S	TANK COIL	V5A GRID	TUNING
L33B	CMC119-108		S	TANK COIL	V5B GRID	R.F.F. CHOKE
L34A	CMC105-200		S	CHOKE	V5A PLATE	3.5-8 MC TANK COIL
L34B	CMC105-200		S	CHOKE	V5B PLATE	3.5-8 MC TANK COIL
L34C	CMC105-200		S	CHOKE	V5B PLATE	R.F.F. CHOKE
L34D	CMC105-200		S	CHOKE	V5A GRID	R.F.F. CHOKE
L34E	CMC105-200		S	CHOKE	V5A GRID	R.F.F. CHOKE
L35A	CMC119-109		S	TANK COIL	V5A CATHODE	R.F.F. CHOKE
L35A	CMC119-110		S	TANK COIL	V5B PLATE	1.75-4 MC TANK COIL
L36A	CMC119-111		S	CHOKE	V5B PLATE	1.75-4 MC TANK COIL
L36A	CMC119-501		S	TANK COIL	V7A PLATE	1.75-4 MC TANK COIL
L37A	CMC119-502		S	TANK COIL	V7A PLATE	1.75-4 MC TANK COIL
L38A	CMC119-502		S	TANK COIL	V7A PLATE	1.75-4 MC TANK COIL
L41A	PC70135C		S	CHOKE	AERIAL CURRENT IND IR	R.F.F. CHOKE
L42A	CMC097653		S	AUTO TRANSFORMER	V5C GRID	MCW OSCILLATOR INDUCTANCE
L43A	CMC119-112		S	TANK COIL	V5C GRID	7-15 MC TANK COIL
L43A	CMC097759		S	CHOKE	TELEPHONE LINE	A.F. CHOKE
L45A	CMC119-920		S	AERIAL TUNING COIL	AERIAL UNIT	AERIAL TUNING

TABLE XX (Cont'd)  
PLUGS

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 USED ON	5 ASSOCIATED WITH CIRCUIT OR VALVE	6 FUNCTION
PL1A	CMC115-622		R	RECEIVER	CONNECTS REC. TO INTER-UNIT CONN'S. IN CARRIER
PL2A	CMC119-180		S	SENDER	CONNECTS SENDER TO INTER-UNIT CONN'S. IN CARRIER
PL3A	CMC119-189		S	SENDER	CONNECTS SENDER TO INTER-UNIT CONN'S. IN CARRIER
PL4A	CMC119-323		SU	12 VOLT INPUT	CONNECTS 12 V. BATTERY TO SUPPLY UNIT
PL5A	CMC119-320		SU	VIBRATOR UNIT	CONNECTS VIBRATOR UNIT TO SUPPLY UNIT
PL6A	P078340-C		SU	CONTROL CIRCUITS	CONNECTS HEADGEAR NO.1 TO SUPPLY UNIT
PL6B	P078340-C		SU	CONTROL CIRCUITS	CONNECTS HEADGEAR NO.1 TO SUPPLY UNIT
PL7A	CMC119-603		SU	SUPPLY UNIT	CONNECTS S.U. TO INTER-UNIT CONN'S. IN CARRIER
PL8A	CMC119-604		SU	SUPPLY UNIT	CONNECTS S.U. TO INTER-UNIT CONN'S. IN CARRIER
PL9A	CMC119-304		SU	VIBRATOR UNIT	CONNECTS VIBRATOR UNIT TO SUPPLY UNIT
PL10A	CMC119-477		C	CARRIER	INTER-UNIT CONNECTIONS
PL11A	CMC119-481		C	CARRIER	INTER-UNIT CONNECTIONS
PL12A	CMC119-479		C	CARRIER	INTER-UNIT CONNECTIONS
PL13A	CMC119-478		C	CARRIER	INTER-UNIT CONNECTIONS
PL14A	CMC119-480		C	CARRIER	INTER-UNIT CONNECTIONS
PL15A	CMC113-095		ZE12	D.C. INPUT	12 V. BATTERY LEADS TO ZE12
PL16A	CMC108-088		ZE12	AC & DC SWITCHING	CHANGES INTERNAL CONN'S. FOR AC OR DC OPERATION
PL17A	CMC63479		ZE12	AC INPUT	AC LINE CONNECTION
PL18A	CMC13-006		ZE12	OUTPUT	POWER OUTPUT
PL19A	CMC10-214		R	AERIAL	CONNECTS AERIAL TO RECEIVER
PL20A	CMC119-178		S	AERIAL	AERIAL SOCKET
PL21A	CMC108-444		A.T.C.	AERIAL TUNING COIL	AERIAL CONNECTION

TABLE XX (Cont'd)  
RESISTORS

- (A) IF A DUPLICATE REPLACEMENT PART CANNOT BE OBTAINED IT MAY BE POSSIBLE TO USE A RESISTOR WHICH WAS INTENDED FOR SOME OTHER EQUIPMENT. OF COURSE THE RESISTANCE MUST BE THAT SHOWN IN THIS LIST AND IT MUST FIT THE AVAILABLE SPACE.
- (B) POWER RATINGS SHOWN ARE MINIMUM. LARGER VALUES MAY BE USED IF SPACE PERMITS.
- (C) TOLERANCES ARE MAXIMUM AND ARE  $\pm$ . SMALLER TOLERANCES MAY BE USED. WIDER TOLERANCES MAY BE TRIED.
- (D) SOME RESISTORS ARE CODED AS FOLLOWS TO INDICATE POWER RATING:  
 BTS 1/4 W. BT 1/2 W. BT1 & BW1 1W. BT2 & BW2 2W.  
 BT3 1/2 W. BW 1/2 & BW 1/2 1/2 W.
- (E) VARIABLE RESISTORS ARE INDICATED BY (VAR) IN COLUMN 6.

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 RESISTANCE OHMS	5 TOL %	6 RATING WATTS	7 USED ON	8 ASSOCIATED WITH CIRCUIT OR VALVE	9 FUNCTION
R1A	CMC113-112		0.4	F	40	S	V7A FILAMENT	VOLTAGE DROPPING
R2A	CMC119-062		0.84	2	1/2	S	H.T. SUPPLY	METERING
R3A	CMC119-063		1.67	5	1/2	S	V5D CATHODE	METERING
R4B	CMC119-064		8	10	5	R	P1B	P1B PROTECTIVE
R4C	CMC119-064		8	10	5	CC	P1A	P1A PROTECTIVE
R7A	CMC119-064		8.5	10	1/2	SU	P1C	P1C PROTECTIVE
R6A	CMC119-065		17	5	1/2	S	V7A GRID	METERING
R7A	CMC119-067		50	20	1/2	S	V7A AND V5B GRIDS	PARASITIC SUPPRESSOR
R7B	CMC119-067		50	20	1/2	S	V7A AND V5B GRIDS	BIAS
R7C	CMC119-067		50	20	1/2	S	V7A AND V5B GRIDS	PARASITIC SUPPRESSOR
R7D	CMC119-067		50	20	1/2	S	V7A AND V5B GRIDS	CATHODE BIAS
R7E	CMC119-067		50	20	1/2	S	V7A AND V5B GRIDS	PARASITIC SUPPRESSOR
R8A	CMC119-068		50	20	1/2	S	V7A GRID	PARASITIC SUPPRESSOR

TABLE XX (Cont'd)  
RESISTORS (Cont'd)

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 RESISTANCE OHMS	5 TOL %	6 RATING WATTS	7 USED ON	8 ASSOCIATED WITH CIRCUIT OR VALVE	9 FUNCTION
R9A	CMC119-069		100	5	1/2	S	V1J CATHODE	METERING
R9B	CMC119-060		100	5	1/2	S	V5C GRID	PARASITIC SUPPRESSOR
R10A	CMC119-070		150	20	1/2	S	V6C GRID	PARASITIC SUPPRESSOR
R10B	CMC119-071		150	20	1/2	S	V7A SECONDARY	DAMPING
R11A	CMC119-071		200	10	1/2	S	T2A SECONDARY	DAMPING
R11B	CMC119-071		200	10	1/2	S	T2A PRIMARY	FEEDBACK VOLTAGE DIVIDER
R12A	CMC119-072		250	10	1/2	S	R.F. AMP. V1A	CATHODE BIAS
R12B	CMC119-074		200	10	1/2	R	I.F. AMP. V1D	CATHODE BIAS
R12C	CMC119-074		200	10	1/2	R	I.F. AMP. V1E	CATHODE BIAS
R12D	CMC119-074		200	10	1/2	R	VIBRATOR INPUT	STARTING RESISTOR
R13E	CMC119-074		200	10	1/2	SU	METER M1A	METER ADJUSTMENT
R14A	CMC119-074		200	20	(VAR)	R	P.A. V7A	GRID BIAS
R15A	CMC119-074		350	10	50	S	V5D CATHODE	CATHODE BIAS
R16A	CMC119-074		400	10	1/4	S	HET. OSC. V1F	BEAT NOTE CONTROL
R17A	CMC119-081		500	10	1/4	S	AERIAL CURRENT IND.	SENSITIVITY CONTROL
R17B	CMC119-081		500	10	1/2	S	V5A GRID	PARASITIC SUPPRESSOR
R18A	CMC119-075		500	10	1/2	S	A.F. AMP. V1H	CATHODE BIAS
R18B	CMC119-075		500	10	1/4	R	MIXER V1C	CATHODE BIAS
R20A	CMC119-076		1000	10	1/4	R	HET. OSC. V1F	CATHODE BIAS
R20B	CMC119-076		1000	10	1/4	R	A.F. AMP. V1G	CATHODE BIAS
R20C	CMC119-076		1000	10	1/4	R	CONVERSION OSC. V1B	METERING
R20D	CMC119-076		1000	10	1/4	CC	CAL. OUTPUT V3C	DIODE LOAD
R20E	CMC119-076		1000	10	1/4	CC	I.F. AMP. V1D	PLATE & SCREEN DECOUPLING
R20F	CMC119-076		1000	10	1/4	R	I.F. AMP. V1E	PLATE & SCREEN DECOUPLING
R20G	CMC119-076		1000	10	1/4	R	V5A GRID	DECOUPLING
R20H	CMC119-076		1000	10	1/4	S	AERIAL CURRENT IND.	SENSITIVITY CONTROL
R20J	CMC119-076		1000	10	1/4	S	P.A. V7A	GRID BIAS
R21A	CMC119-076		1500	10	50	S	AERIAL CURRENT IND.	SENSITIVITY CONTROL
R22A	CMC119-077		2000	10	1/4	S	AERIAL CURRENT IND.	SENSITIVITY CONTROL

TABLE XX (Cont'd)  
RESISTORS (Cont'd)

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 RESISTANCE OHMS	5 TOL %	6 RATING WATTS	7 USED ON	8 ASSOCIATED WITH CIRCUIT OR VALVE	9 FUNCTION
R23A	CMC108-244			20	2 (VAR)	R	HET. OSC. V1F	BEAT NOTE CONTROL
R24A	CMC119-078		2000	10	1/2	S	T3A SECONDARY	MODULATOR LOAD
R25A	CMC119-079		2500	10	1/2	S	R.F. AMP. V1A	PLATE DECOUPLING
R26A	CMC119-080		3000	10	25	S	P.A. V7A	GRID BIAS
R27A	CMC119-081		4000	10	1/4	R	CONVERSION OSC. V1B	ANODE FEED
R27B	CMC119-081		5000	20	1/4	R	A.F. AMP. V1G	PLATE & SCREEN DECOUPLING
R27C	CMC119-081		5000	20	1/4	R	AERIAL TUNING IND.	SENSITIVITY CONTROL
R27D	CMC119-081		5000	20	1/4	S	V1J CATHODE	CATHODE BIAS
R28A	CMC119-082		5000	20	1/4	CC	MULTI VIBRATOR V3B	PLATE FEED
R29A	CMC119-121		5000	5	1/4	CC	MULTI VIBRATOR V3B	CONTROL POTENTIOMETER
R30A	CMC119-082		7500	10	10	S	V5D & V1J H.T.-1 SUPP.	VOLTAGE DROPPING
R30B	CMC119-082		7500	10	10	S	V5D & V1J H.T.-1 SUPP.	VOLTAGE DROPPING
R31A	CMC119-083		10,000	10	1/4	S	HET. OSC. V1F	ANODE DECOUPLING
R31B	CMC119-083		10,000	10	1/4	S	V6B GRID	GRID LEAK
R31C	CMC119-083		10,000	10	1/4	S	AERIAL CURRENT IND.	SENSITIVITY CONTROL
R32A	CMC119-082		10,000	20	1/4	S	T3A TERTIARY	FEEDBACK VOLTAGE DIVIDER
R32B	CMC119-008		10,000	5	1/4	CC	MULTI VIBRATOR V3B	PLATE FEED
R32C	CMC119-008		10,000	5	1/4	CC	METER M1A	CATH. BIAS
R32A	CMC108-245		10,000	5	1/4	R	METER M1A	METER MULTIPLIER
R33A	CMC119-084		10,000	5	10	R	RF & IF AMP. V1A&V1D	CATH. BIAS
R33A	CMC119-084		10,000	5	10	S	P.A. V7A	R.F. GAIN CONTROL
R33B	CMC119-084		10,000	5	1/2	S	VIBRATOR 1A	GRID BIAS
R33C	CMC119-084		10,000	5	1/2	S	VIBRATOR 1A	PRIMARY STARTING RESISTANCE
R33A	CMC119-085		10,000	5	10	S	H.T. OUTPUT	RESISTANCE
R33B	CMC119-085		10,000	5	10	S	V5A SCREEN	BLEEDER
R33A	CMC119-085		10,000	5	20	S	RECTIFIER V4A	VOLTAGE DROPPING
R33B	CMC119-085		10,000	5	20	S	V5B SCREEN	VOLTAGE DROPPING
R33C	CMC119-087		15,000	20	2	S	V5D PLATE	FEEDBACK LIMITER
R33C	CMC119-087		15,000	20	2	S	V5C SCREEN	VOLTAGE DROPPING

TABLE XX (Cont'd)  
RESISTORS (Cont'd)

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 RESISTANCE OHMS	5 TOL. %	6 RATING WATTS	7 USED ON	8 ASSOCIATED WITH CIRCUIT OR VALVE	9 FUNCTION
R40A	CMC119-088		15,000	10	1/2	S	P. A. V7A	GRID BIAS
R41A	CMC119-089		20,000	20	1/2	S	V5A GRID	GRID LEAK
R41B	CMC119-089		20,000	20	1/2	S	V1J PLATE	DECOUPLING
R42A	CMC119-090		20,000	20	1/4	R	V5C GRID	GRID LEAK
R43A	CMC119-091		25,000	20	1/4	R	R.F. AMP. V1G	BREAK-IN TIME CONSTANT
R44A	CMC119-092		30,000	15	1/4	R	METER M1A	R.F. GAIN MULTIPLIER
R45A	CMC119-093		40,000	15	1/4	R	VFD SCREEN	L.T. METER MULTIPLIER
R46A	CMC119-094		50,000	20	1/4	S	P. A. V7A	VOLTAGE DROPPING
R47A	CMC119-094		50,000	20	1/4	S	P. A. V7A	KEYING BIAS
R47C	CMC119-094		50,000	20	1/4	S	P. A. V7A	SCREEN DECOUPLING
R48A	CMC119-010		100,000	20	1/4	R	A.F. AMP. V1H	GRID LEAK
R48B	CMC119-010		100,000	20	1/4	R	CONVERSION OSC. V1B	VOLTAGE DROPPING
R48C	CMC119-010		100,000	10	1/4	CC	V1J GRID	100 KC COUPLING
R48D	CMC119-010		100,000	10	1/4	R	MULTIVIBRATOR V3B	AVC DECOUPLING
R48E	CMC119-010		100,000	10	1/4	R	MIXER V1C	A.V.C. DECOUPLING
R48F	CMC119-010		100,000	10	1/4	R	I.F. AMP. V1D	A.V.C. DECOUPLING
R48G	CMC119-010		100,000	10	1/4	R	A.V.C. V2A	PLATE LOAD
R48H	CMC119-010		100,000	10	1/4	R	A.V.C. V2A	PLATE AND SCREEN DECOUPLING
R48J	CMC119-010		100,000	10	1/4	R	HET. OSC. V1F	DET. DIODE LOAD
R48K	CMC119-010		100,000	10	1/4	R	A.F. AMP. V1G	METERING
R48L	CMC119-010		100,000	10	1/4	R	DETECTOR V2A	MIXER V1C
R48M	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	PLATE LOAD
R48N	CMC119-010		100,000	10	1/4	R	P. A. BIAS	PLATE AND SCREEN DECOUPLING
R48P	CMC119-010		100,000	10	1/4	R	V1J PLATE	METERING
R48Q	CMC119-010		100,000	10	1/4	R	A.F. AMP. V1H	PLATE LEAK
R48R	CMC119-010		100,000	10	1/4	R	A.F. AMP. V1G	A.F. GAIN CONTROL
R48S	CMC119-010		100,000	10	1/4	R	MULTIVIBRATOR V3B	NOTE FEED
R48T	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R48U	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R48V	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R48W	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R48X	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R48Y	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R48Z	CMC119-010		100,000	10	1/4	R	H.T. 1 SUPPLY	BLEEDER
R49A	PC8127-C		150,000	10	1/2 (AR)	CC		
R49B	CMC119-096		200,000	10	1/4	CC		
R49C	CMC119-096		200,000	10	1/4	CC		
R49D	CMC119-097		250,000	20	1/4	S		
R49E	CMC119-097		250,000	20	1/4	S		
R49F	CMC119-097		250,000	20	1/4	S		
R49G	CMC119-097		250,000	20	1/4	S		
R49H	CMC119-097		250,000	20	1/4	S		
R49I	CMC119-097		250,000	20	1/4	S		
R49J	CMC119-097		250,000	20	1/4	S		
R49K	CMC119-097		250,000	20	1/4	S		
R49L	CMC119-097		250,000	20	1/4	S		
R49M	CMC119-097		250,000	20	1/4	S		
R49N	CMC119-097		250,000	20	1/4	S		
R49O	CMC119-097		250,000	20	1/4	S		
R49P	CMC119-097		250,000	20	1/4	S		
R49Q	CMC119-097		250,000	20	1/4	S		
R49R	CMC119-097		250,000	20	1/4	S		
R49S	CMC119-097		250,000	20	1/4	S		
R49T	CMC119-097		250,000	20	1/4	S		
R49U	CMC119-097		250,000	20	1/4	S		
R49V	CMC119-097		250,000	20	1/4	S		
R49W	CMC119-097		250,000	20	1/4	S		
R49X	CMC119-097		250,000	20	1/4	S		
R49Y	CMC119-097		250,000	20	1/4	S		
R49Z	CMC119-097		250,000	20	1/4	S		

TABLE XX (Cont'd)  
RESISTORS (Cont'd)

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 RESISTANCE OHMS	5 TOL. %	6 RATING WATTS	7 USED ON	8 ASSOCIATED WITH CIRCUIT OR VALVE	9 FUNCTION
R50D	CMC119-097		250,000	20	1/4	S	H.T. SUPPLY	BLEEDER
R51A	CMC119-098		250,000	20	1/4	R	A.V.C. V2A	A.V.C. DIODE LOAD
R51B	CMC119-098		250,000	20	1/4	R	MIXER V1C	GRID LEAK
R51C	CMC119-098		250,000	20	1/4	R	R.F. AMP. V1A	SCREEN DECOUPLING
R51D	CMC119-098		250,000	20	1/4	R	DETECTOR V2A	DET. DIODE LOAD
R51E	CMC119-011		300,000	5	1/4	CC	MULTIVIBRATOR V3B	GRID LEAK
R51F	CMC119-011		300,000	5	1/4	CC	MULTIVIBRATOR V3B	GRID LEAK
R51G	CMC119-099		500,000	12	1/4	R	A.V.C. V2A	A.V.C. DIODE LOAD
R51H	CMC119-099		500,000	12	1/4	R	A.V.C. V2A	A.V.C. DECOUPLING
R51I	CMC119-099		500,000	15	1/4	CC	CAL. OUTPUT V3C	DIODE LOAD
R51J	CMC119-099		500,000	15	1/4	CC	NOISE LIMITER V2B	LIMITER DIODE LOAD
R51K	CMC119-099		500,000	15	1/4	R	V1J SCREEN	SCREEN DECOUPLING
R51L	CMC119-014		600,000	10	1/2	S	H.T. 1 SUPPLY	METERING
R51M	CMC119-014		600,000	10	1/2	S	H.T. 1 SUPPLY	METERING
R51N	CMC119-014		600,000	10	1/2	S	P. A. BIAS	METERING
R51O	CMC119-091		600,000	10	1/4	R	METER M1A	H.T. METER MULTIPLIER
R51P	CMC119-016		1,000,000	10	1/4	R	A.F. AMP. V1G	GRID DECOUPLING
R51Q	CMC119-016		1,000,000	10	1/4	R	A.F. AMP. V1G	SCREEN DECOUPLING
R51R	CMC119-015		1,000,000	10	1/4	R	A.F. AMP. V1G	NOTE FILTER
R51S	CMC119-016		1,000,000	10	1/4	R	R.F. AMP. V1A	GRID LEAK
R51T	CMC119-016		1,000,000	10	1/4	R	NOISE LIMITER V2B	TIME CONSTANT
R51U	CMC119-016		1,000,000	10	1/4	R	A.F. AMP. V1G	GRID LEAK
R51V	CMC119-016		1,000,000	10	1/4	R	A.F. AMP. V1G	GRID LEAK
R51W	CMC119-017		4,000,000	20	1/4	R	CRYSTAL OSC. V3A	TIME CONSTANT INCREASE
R51X	CMC119-017		4,000,000	20	1/4	R	A.V.C.	TIME CONSTANT INCREASE
R51Y	CMC119-017		4,000,000	20	1/4	R	A.V.C.	GRID LEAK
R51Z	CMC119-017		4,000,000	20	1/4	R	V5D GRID	GRID LEAK

TABLE XX (Cont'd)  
SWITCHES

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 USED ON	5 ASSOCIATED WITH CIRCUIT OR VALVE	6 FUNCTION
S1A	CMC111-911		R	I.F. TRANSFORMER	FLAT, SHARP SELECTIVITY
S2A	CMC111-909		R	B.F.O., A.V.C.	MODE OF OPERATION
S3A	CMC111-910		R	METER, MIA	METER CIRCUIT SELECTION
S4A	CMC108-223		R	2ND A.F. AMPLIFIER V1H	PHONE-LOUDSPEAKER
S4B	CMC108-224		R	NOISE LIMITER, V2B	NOISE LIMITER, IN-OUT
S4C	CMC108-222		R	1ST A.F. AMP.	NOISE FILTER, IN-OUT
S4F	CMC108-222		ZE12	DC OR AC INPUT	POWER OFF-ON 115 V. OR 230 V. AC
S4G	CMC108-222		ZE12	TRANSFORMER T6A	RECEIVER MUTING ON "SEND" AND "BREAK-IN"
S5A	CMC108-312		R	AERIAL AND 1ST A.F. AMP. V1G	SELECTION OF 115 V. OR 230 V. AC
S5A	CMC111-913		R	R.F. AMP. CONV.-OSC. & MIXER	BAND CHANGE
S7A	CMC111-914		CC	CRYSTAL OSC. & MULTIVIBRATOR	FREQUENCY SELECTOR
S8A	CMC119-018		SU	V2A, V3B	ON-OFF
S8B	CMC119-018		SU	12 VOLT INPUT	SENDER-HEATERS OFF
S8C	CMC119-018		SU	RELAY S12A	SEND-RECEIVE
S9A	CMC119-019		SU	SENDER H.T.-1 SUPPLY	NET-OFF
S10A	CMC119-130		SU	FAN INPUT	FANS ON-OFF
S11A	CMC113-098		SU	DYNAMOTOR INPUT	DYNAMOTORS ON-OFF
S12A	PC90611-C		SU	SEND-RECEIVE	SEND-RECEIVE
S12A	CMC119-105		S	R.F. DRIVER	BAND CHANGE
S12A	CMC111-136		S	C19A, V1B, V1C.	SAFETY
S12A	CMC111-104		ZE12	V7A PLATE	BAND CHANGE
S12A	CMC119-600		S	V7A PLATE	MODE OF OPERATION
S12A	CMC119-113		S	V7A PLATE	AERIAL SWITCH AND KEYING RELAY
S12A	CMC119-113		S	V7A PLATE	L.C. RATIO
S17A	CMC119-603		S	AERIAL TUNING INDICATOR	AERIAL METER SENSITIVITY
S18A	CMC119-109		S	METERING	METER SWITCH
S19A	CMC119-105		S	V7A 81AS	HIGH-MEDIUM-LOW
S20A	RC4110063-1		S	RELAY S12A	SAFETY SWITCH
S21A	CMC119-127		S	V5A	M.O.-CRYSTAL
S22A	CMC119-127		S		
S22A	CMC119-299		S		

TABLE XX (Cont'd)  
TRANSFORMERS

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 USED ON	5 ASSOCIATED WITH CIRCUIT OR VALVE	6 FUNCTION
T1A	CMC97720		R	2ND A.F. AMPLIFIER V1H	A.F. OUTPUT
T2A	CMC119-278		S	V1J GRID	MICROPHONE
T3A	CMC97762		S	V5D PLATE	MODULATION
T4A	CMC119-101		S	AERIAL TUNING INDICATOR	COUPLING TRANS.
T5A	CMC119-102		S	AERIAL TUNING INDICATOR	BAND PASS TRANS.
T6A	CMC97764		ZE12	POWER SUPPLY	DUAL PURPOSE POWER TRANSFORMER
T7A	CMC97703		SU	VIBRATOR UNIT	POWER TRANSFORMER



TABLE XX (Cont'd)  
VALVES

1 CIRC. REF.	2 PART NO.	3 TYPE NO.	4 USED ON	5 ASSOCIATED WITH CIRCUIT OR VALVE	6 FUNCTION
V1A	CMC108-016	ARP-3	R		R.F. AMPLIFIER
V1B	CMC108-016	ARP-3	R		CONVERSION OSCILLATOR
V1C	CMC108-016	ARP-3	R		MIXER
V1D	CMC108-016	ARP-3	R		1ST I.F. AMPLIFIER
V1E	CMC108-016	ARP-3	R		2ND I.F. AMPLIFIER
V1F	CMC108-016	ARP-3	R		HET. OSCILLATOR
V1G	CMC108-016	ARP-3	R		1ST A.F. AMPLIFIER
V1H	CMC108-016	ARP-3	R		2ND A.F. AMPLIFIER
V1J	CMC108-016	ARP-3	S		VOLTAGE AMPLIFIER
V2A	CMC108-016	12X4G	R		DETECTOR AND A.V.C.
V2B	CMC108-016	12X4G	R		NOISE LIMITER
V3A	CMC108-017	12SC7	CC		CRYSTAL OSCILLATOR
V3B	CMC108-017	12SC7	CC		MULTIVIBRATOR
V3C	CMC108-017	12SC7	CC		CALIBRATOR OUTPUT (HARMONIC EXAGGERATOR)
V4A	CMC108-053	074A	SU		RECTIFIER
V4B	CMC108-053	074A	S		RECTIFIER
V5A	PC85185-C	6V6G	S		OSCILLATOR DOUBLER
V5B	PC85185-C	6V6G	S		DRIVER DOUBLER
V5C	PC85185-C	6V6G	S		DRIVER
V5D	PC85185-C	6V6G	S		MODULATOR
V6A	CMC114-096	0SD/VR150	S		VOLTAGE REGULATOR
V7A	CMC108-018	813	S		POWER AMPLIFIER

TABLE XX (Cont'd)  
MISCELLANEOUS

1 CIRC. REF.	2 PART NO.	3 CAT. NO.	4 VALUE	5 DESCRIPTION	6 USED ON	7 ASSOCIATED WITH CIRCUIT OR VALVE	8 FUNCTION
F1A	CMC108-087		10 AMP.	FUSE	ZE12	DC INPUT	PROTECTS 12 V. CIRC. AND BATTERY
F1B	CMC108-087		10 AMP.	FUSE	SU	DC INPUT	PROTECTS 12 V. CIRC. AND BATTERY
F1C	CMC108-515		12 V.D.C.	FAN	S		SENDER COOLING
F1D	CMC108-515		12 V.D.C.	FAN	S		SUPPLY UNIT COOLING
J1A	RC1111820			KEY JACK	S	SWITCH S16A	KEYING
J1B	CMC108-249			MICROPHONE JACK	S	TRANS. T2A	CONNECTS CARBON MIC TO MIC TRANS.
J1C	CMC108-249			HEADPHONE JACK	S	2ND A.F. AMP V1H	CONNECTS HEADPHONES TO PH-SPKR SW.
J2A	CMC108-249			HEADPHONE JACK	R	2ND A.F. AMP V1H	CONNECTS HEADPHONES TO PH-SPKR SW.
J2B	CMC108-249			METER	R	TEST AND TUNING	MEASURES CIRCUIT VOLTAGES & CURRENTS
M1A	CMC108-247			DYNAMOTOR	SU	H.T. 1 SUPPLY	SUPPLIES VOLTAGE TO SENDER
M2A	CMC108-609		500 UA	DYNAMOTOR	SU	H.T. 1 SUPPLY	SUPPLIES VOLTAGE TO SENDER
P1A	PC90615-C		1200 V.	LAMP	CC	CRYSTAL CALIBRATOR	INDICATES VOLTAGE TO SENDER
P1B	PC90615-C		12 VOLT	LAMP	R	TUNER UNIT	FREQ. CHECK "ON"
P1C	PC90615-C		12 VOLT	LAMP	R	SENDER HEATERS	INDICATES RECEIVER "ON"
SPKR1A	CMC108-500		3" P.M.	SPEAKER	SU	POWER TRANS. INPUT	INDICATES SENDER HEATERS "ON"
VIBR1A	CMC111-121			INTERRUPTER VIBR	R	2ND AF AMP. V1H	LOUD SPEAKER
V1A	CMC111-121			INTERRUPTER VIBR	SU	POWER TRANS. INPUT	VIBRATOR
W1A	CMC111-128			CU OXIDE RECT.	S	AERIAL TUN. IND.	RECTIFIER
XTAL1A	CMC111-123		1000/100 KC	CRYSTAL	CC	CRYSTAL OSC. V3A	FREQUENCY CONTROL

TABLE XXI  
ABBREVIATIONS

The following list comprises the definitions of the abbreviations which are most frequently used in the text.

Abbreviation	Definition
A.	Ampere(s)
A.C.	Alternating Current
AE.	Aerial
AER. CUR.	Aerial Current
A.F.	Audio Frequency
AUTO	Automatic Gain Control
BAT.	Battery
C.	Centigrade
Cath.	Cathode
C.W.	Continuous Wave
Cycles	Cycles per second
GR.	Grid
HET.	Heterodyne
H.F.	High Frequency
H.P.	High Power
H.T.	High Tension
I.P.A.	Intermediate Power Amplifier
Kc.	Kilocycles per second
L.P.	Low Power
L.T.	Low Tension
Ma.	Milliampere(s)
MAN.	Manual
Meg.	Megohm(s)
Mc.	Megacycle(s) per second
MIC.	Microphone
Mk.	Mark
Mw.	Milliwatt(s)
M.O.	Master Oscillator
MOD.	Modulator
P.A.	Power Amplifier
PL.	Plate
R.C.U.	Remote Control Unit
R.F.	Radio Frequency
R.T.	Radio Telephony
ufd	Microfarad(s)
uuf.	Micro-microfarad(s)
uv	Microvolts
V.	Volt(s)
W.	Watt(s)
W.P.M.	Words per Minute
W.S.	Wireless Set
W.T.	Wireless Telegraphy

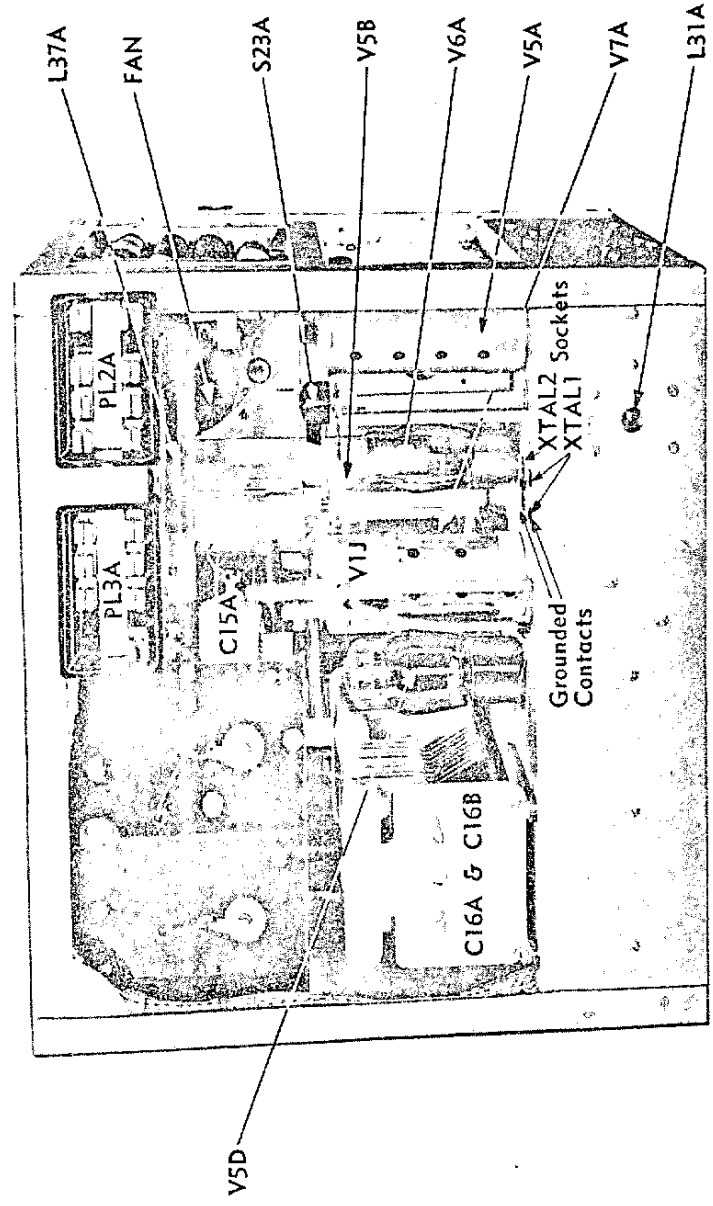
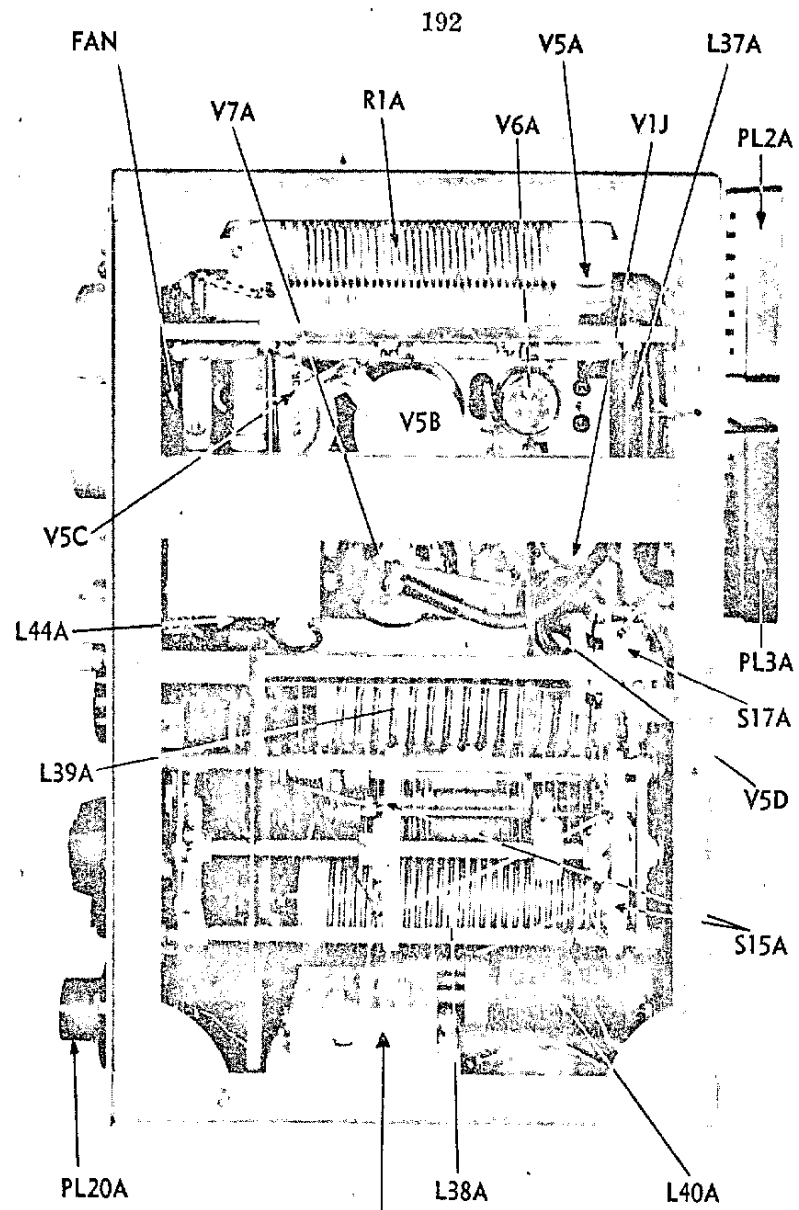


Fig. 41 Sender—Rear View



Aerial Current Rectifier and Transformer Assembly

Fig. 42 Sender—Top View

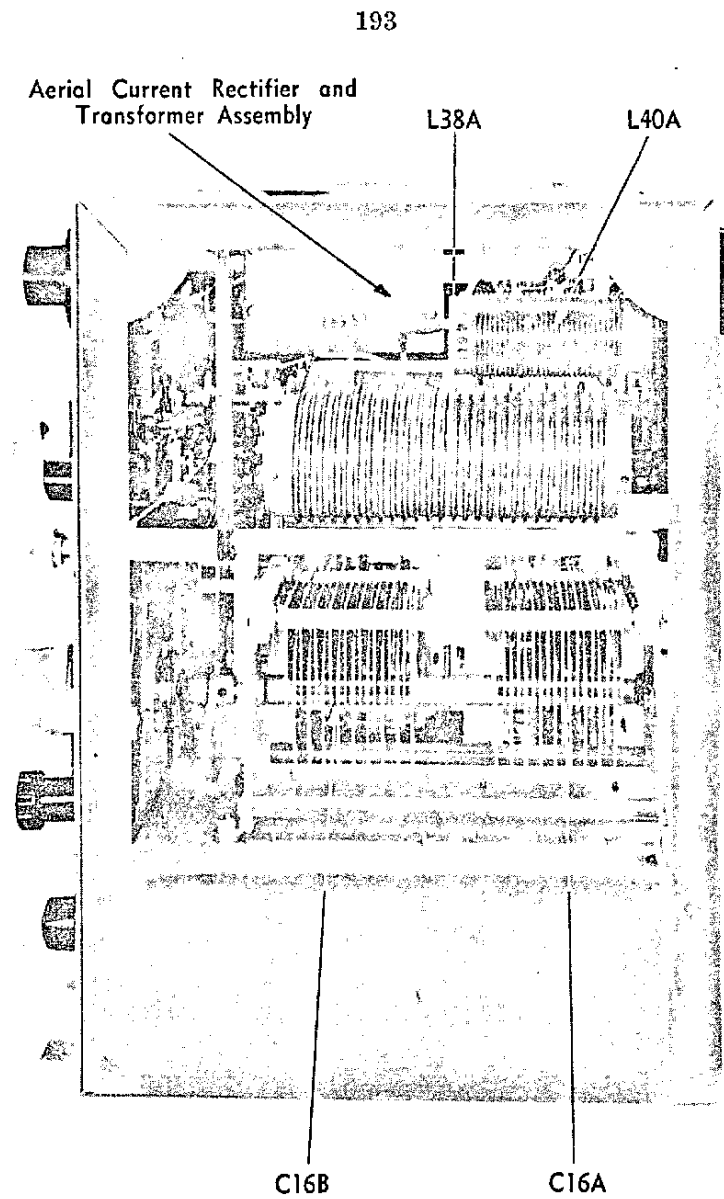


Fig. 43 Sender—Right Side View

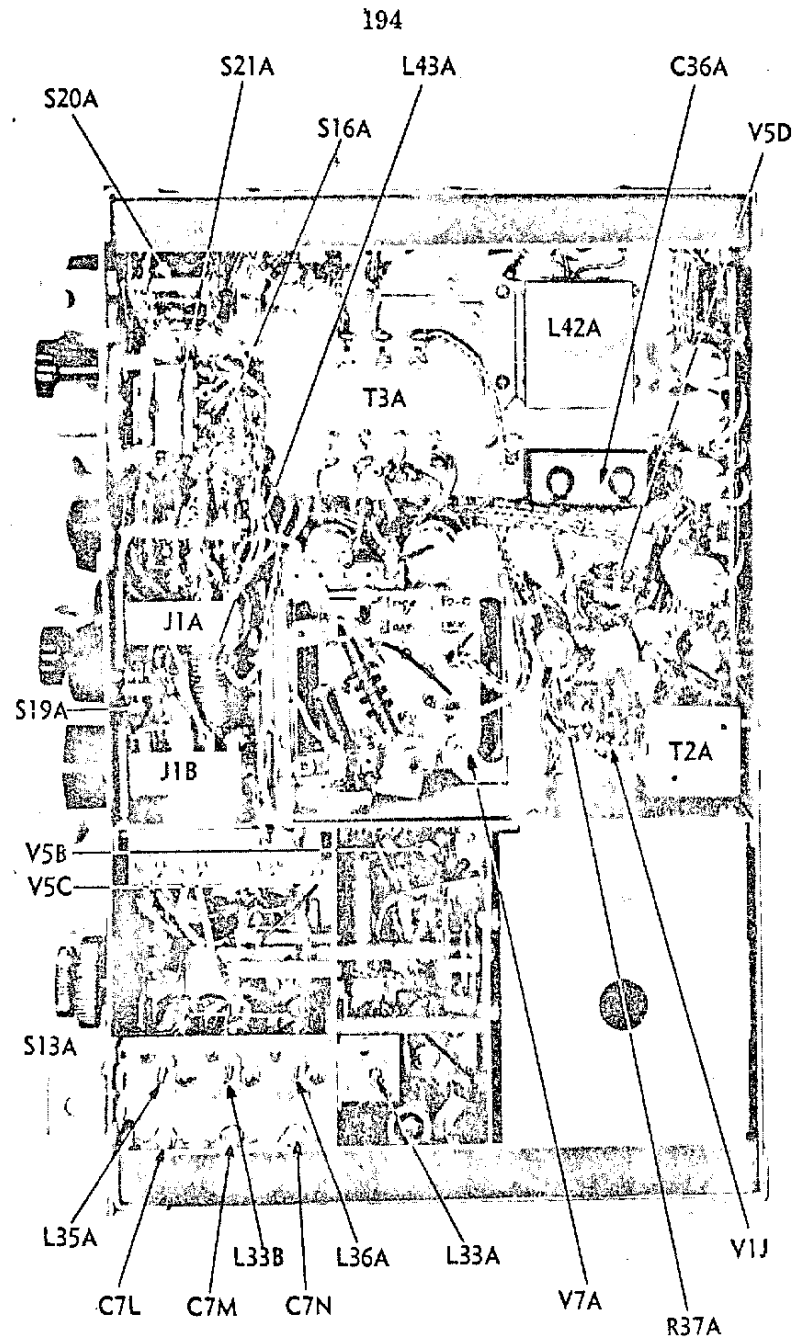


Fig. 44 Sender—Bottom View

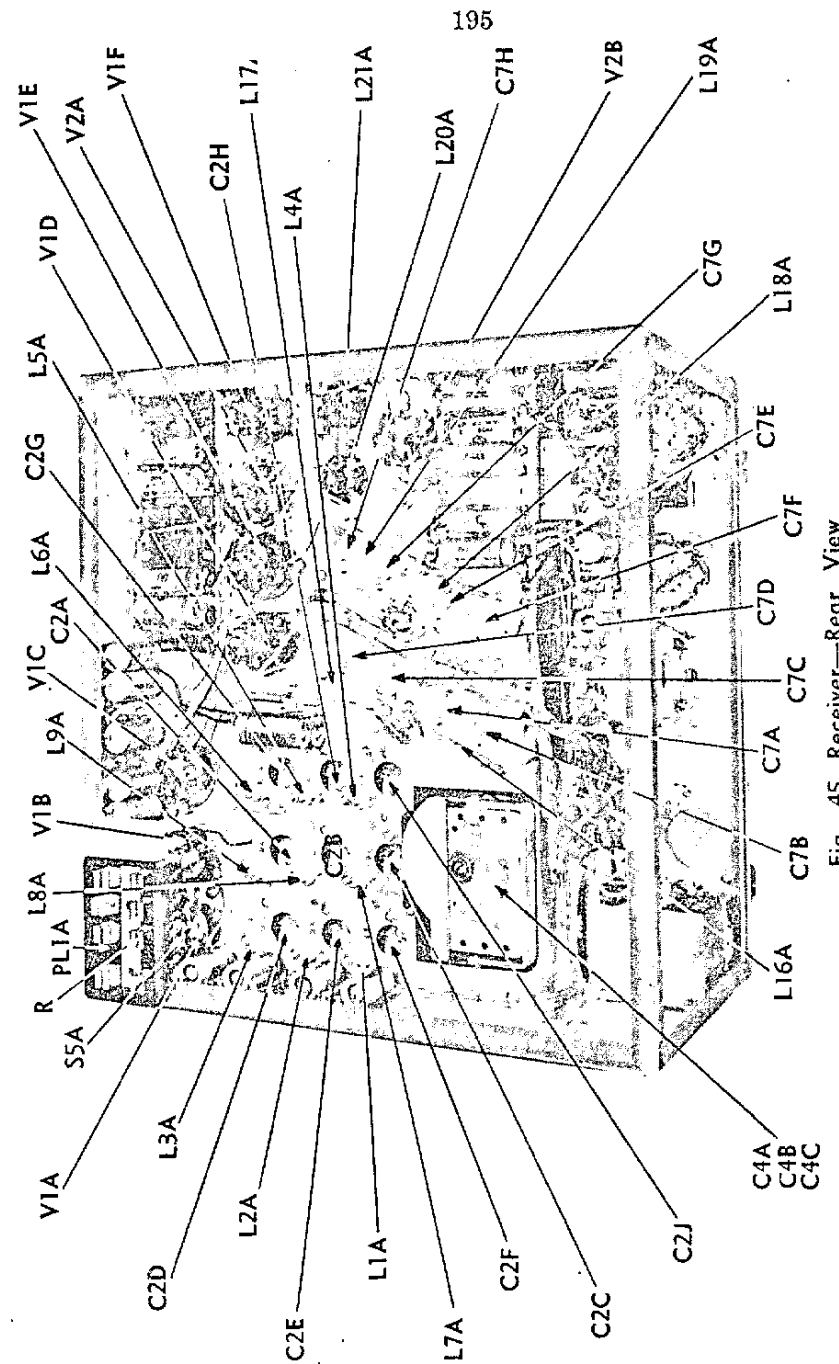
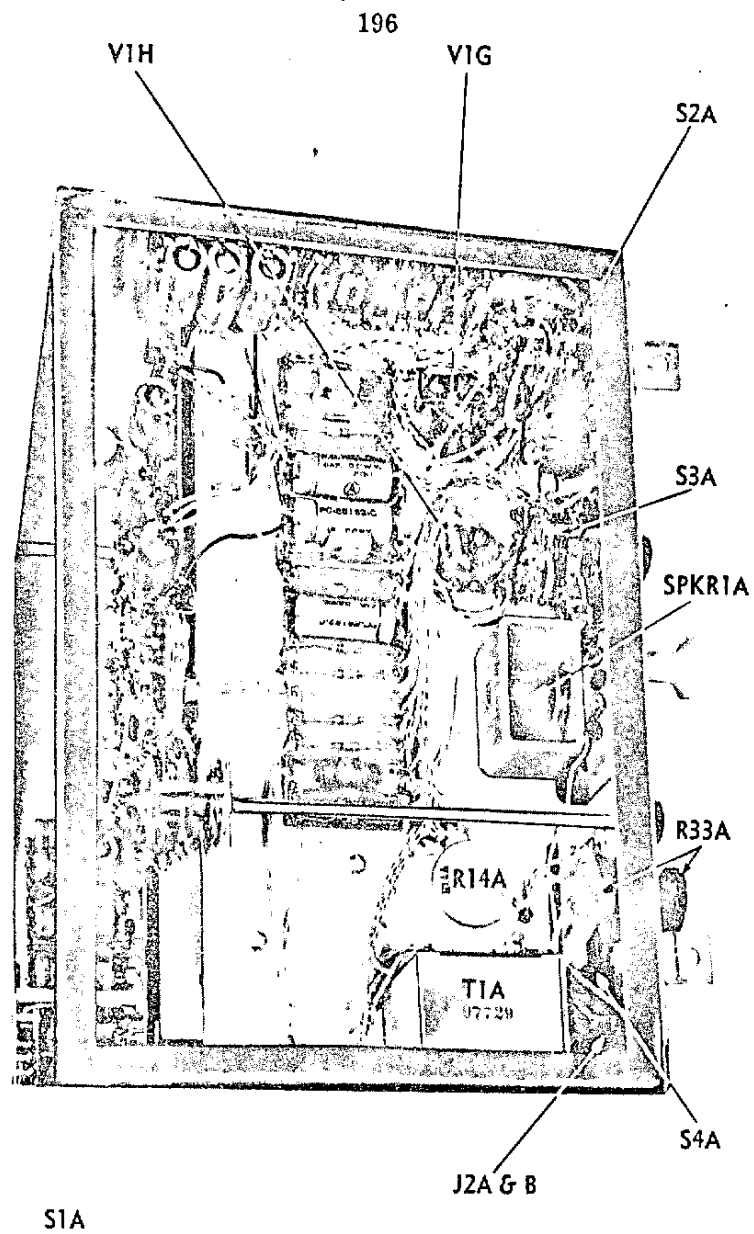


Fig. 45 Receiver—Rear View



S1A

Fig. 46 Receiver—Bottom View

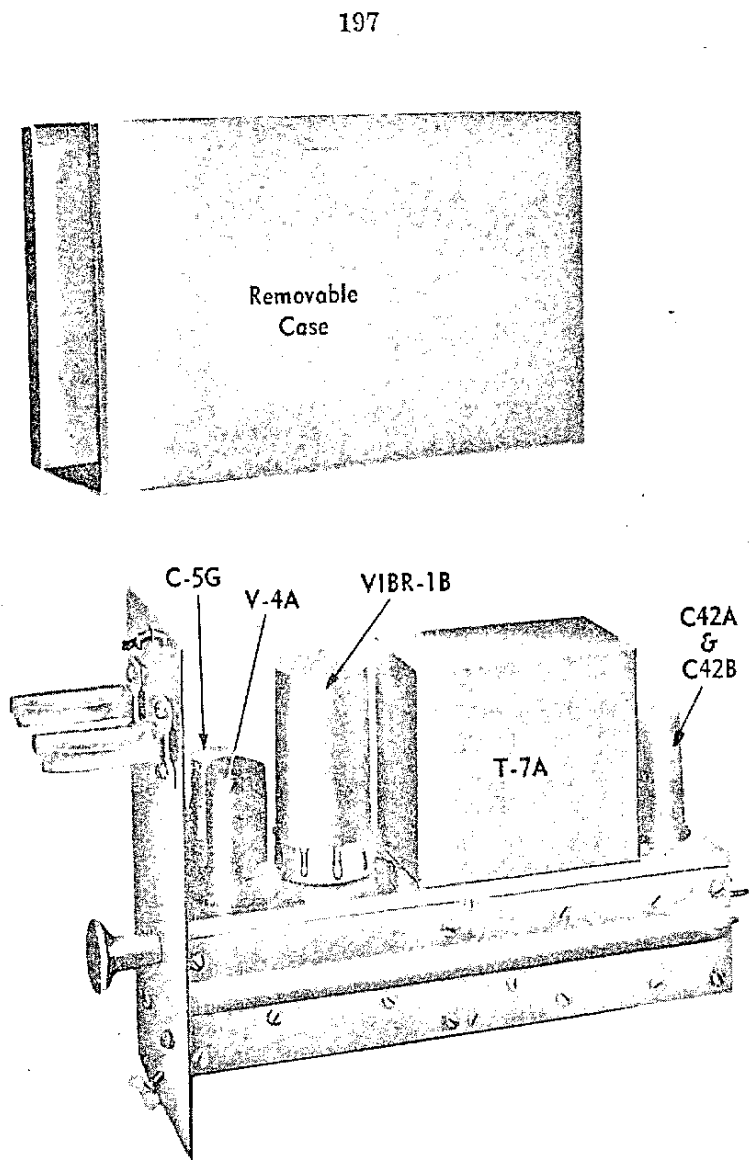


Fig. 47—Receiver Supply Chassis—Top & Right Side View

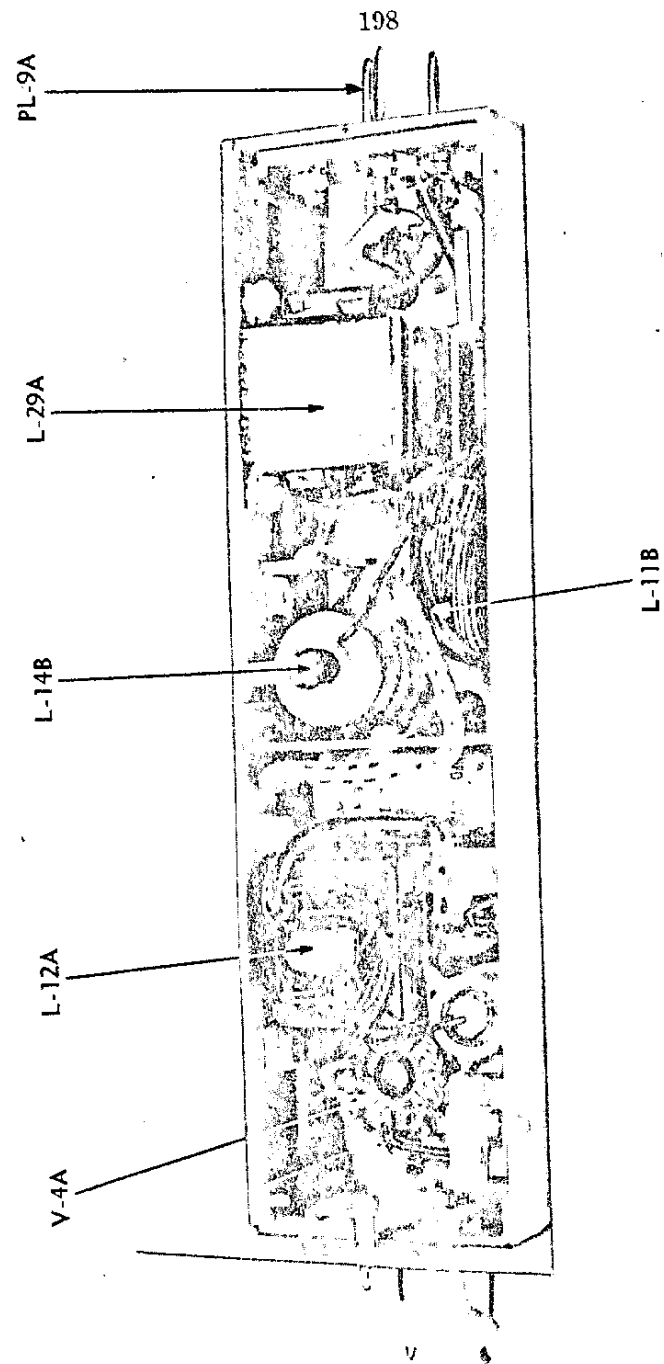


Fig. 48—Receiver Supply Chassis—Bottom View

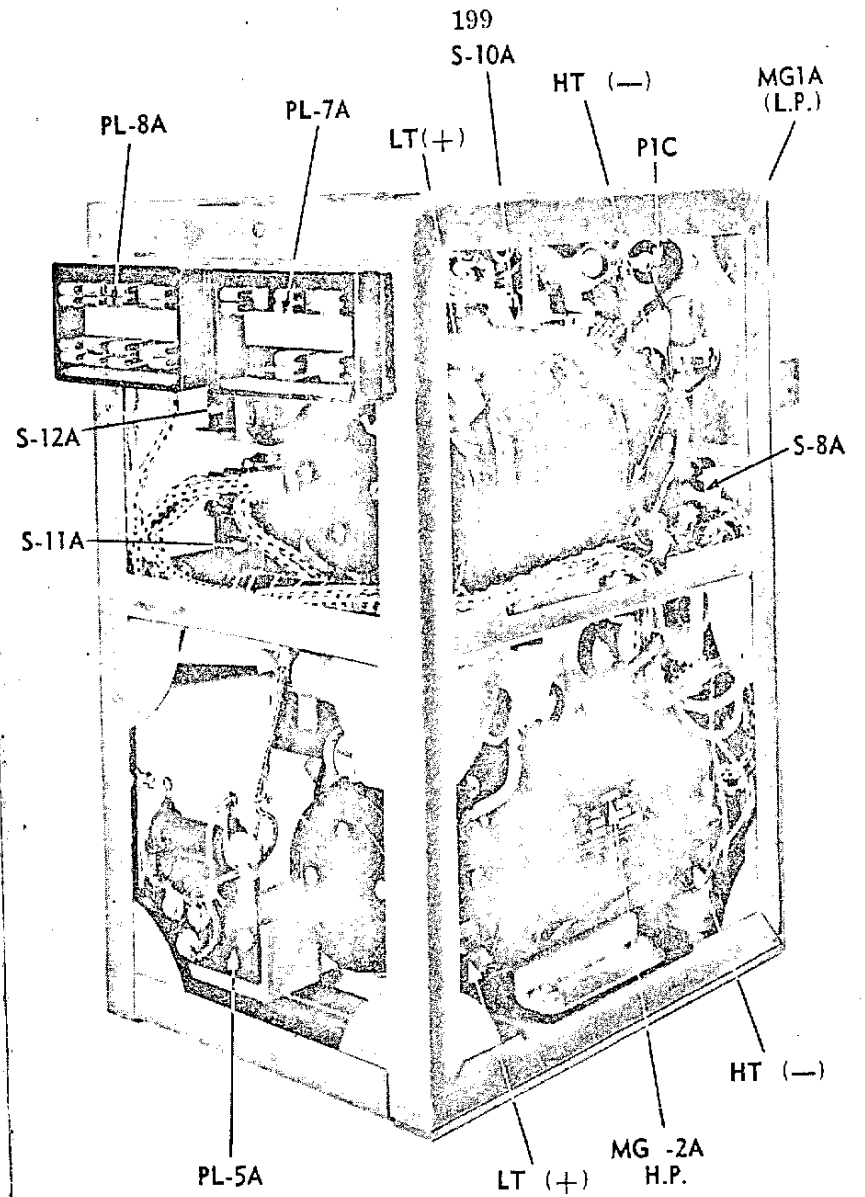


Fig. 49 Supply Unit—Rear and Left Side View

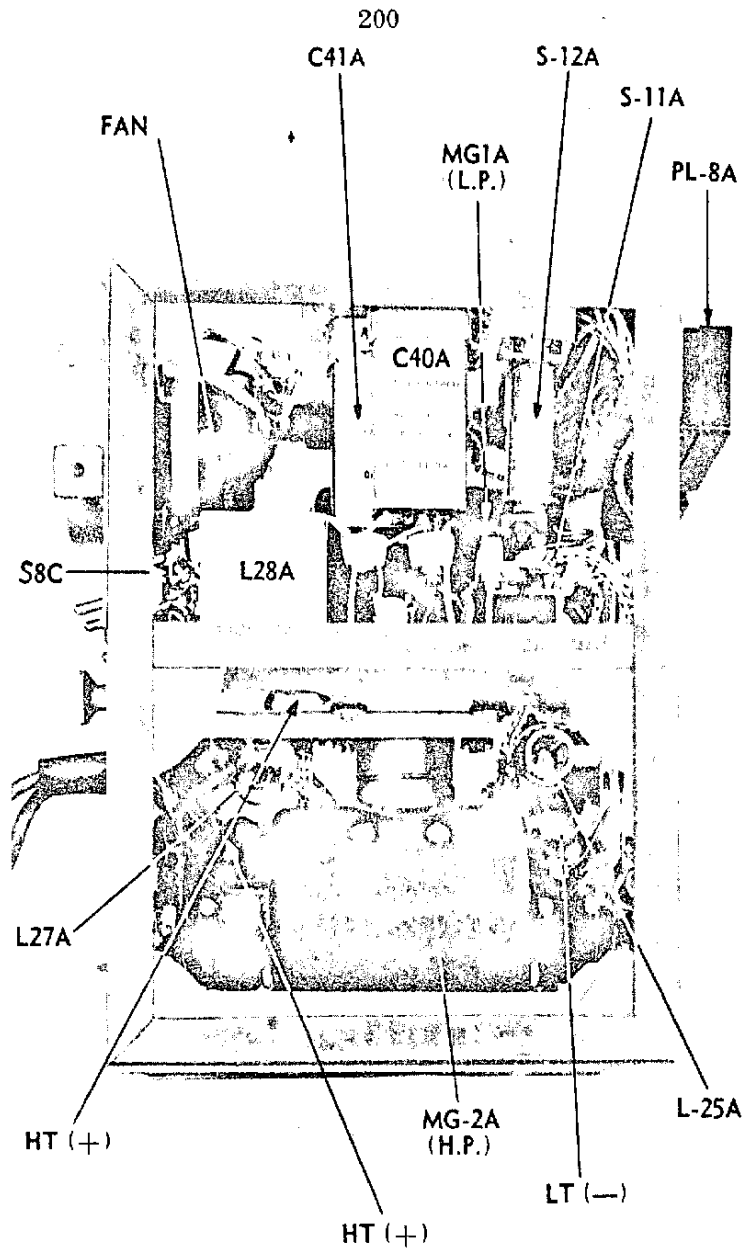


Fig. 50 Supply Unit—Right Side View

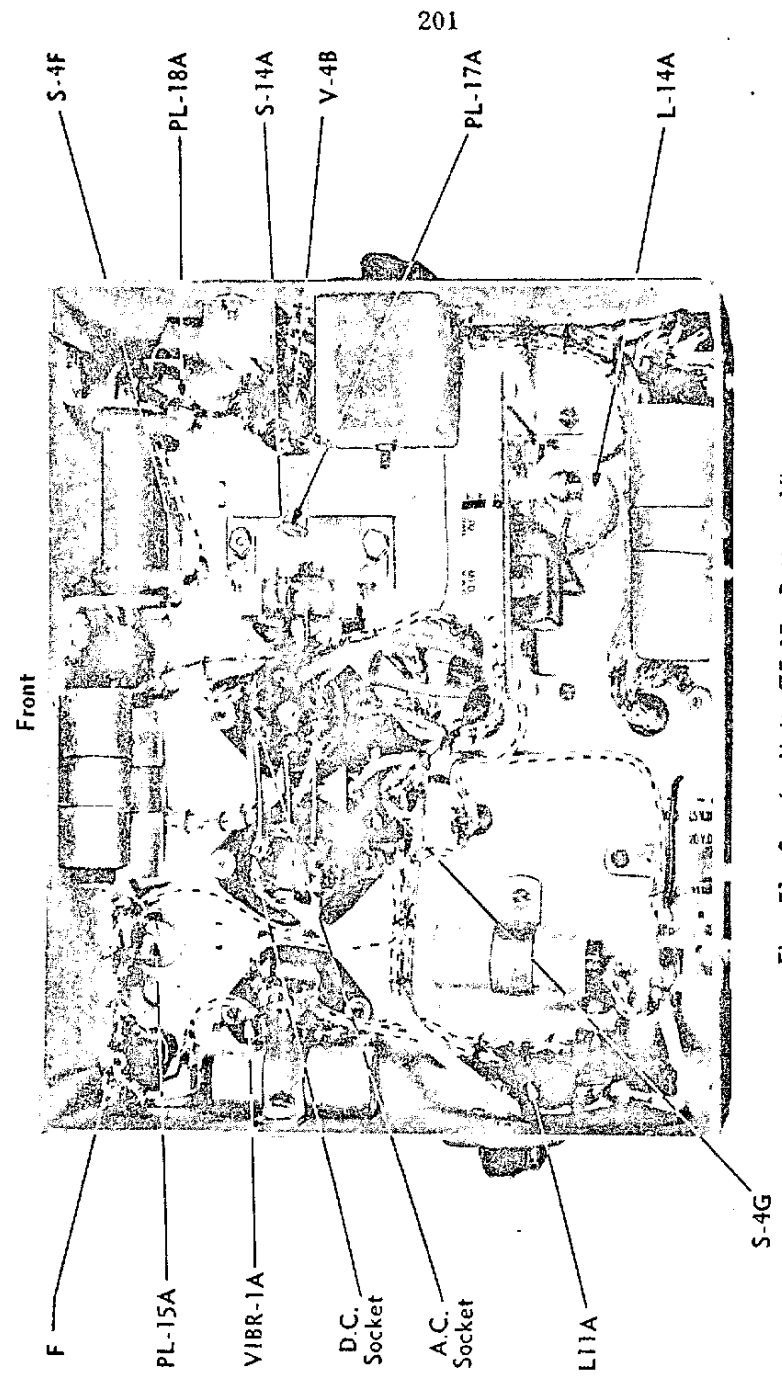


Fig. 51—Supply Unit ZE-12—Bottom View



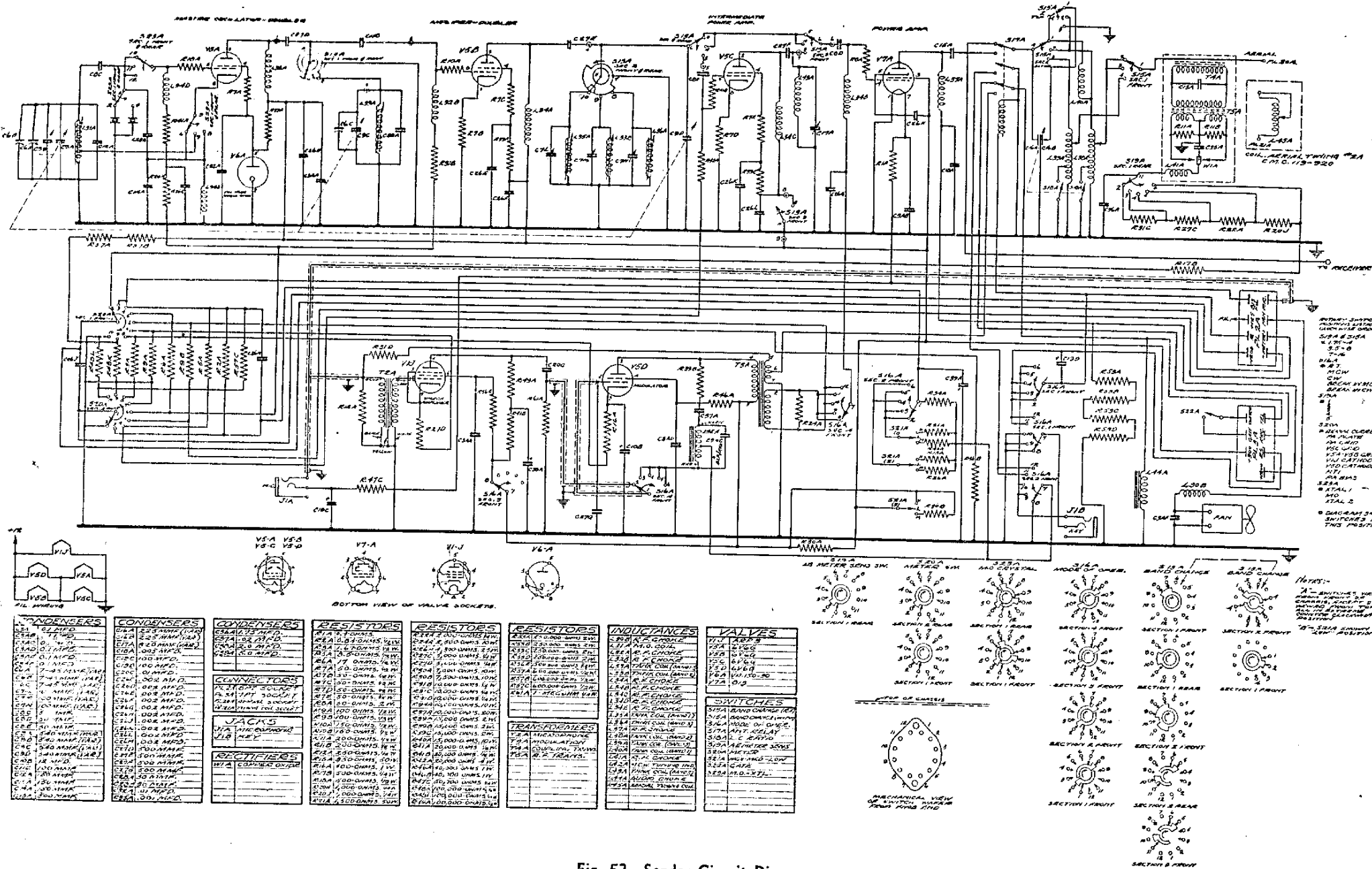
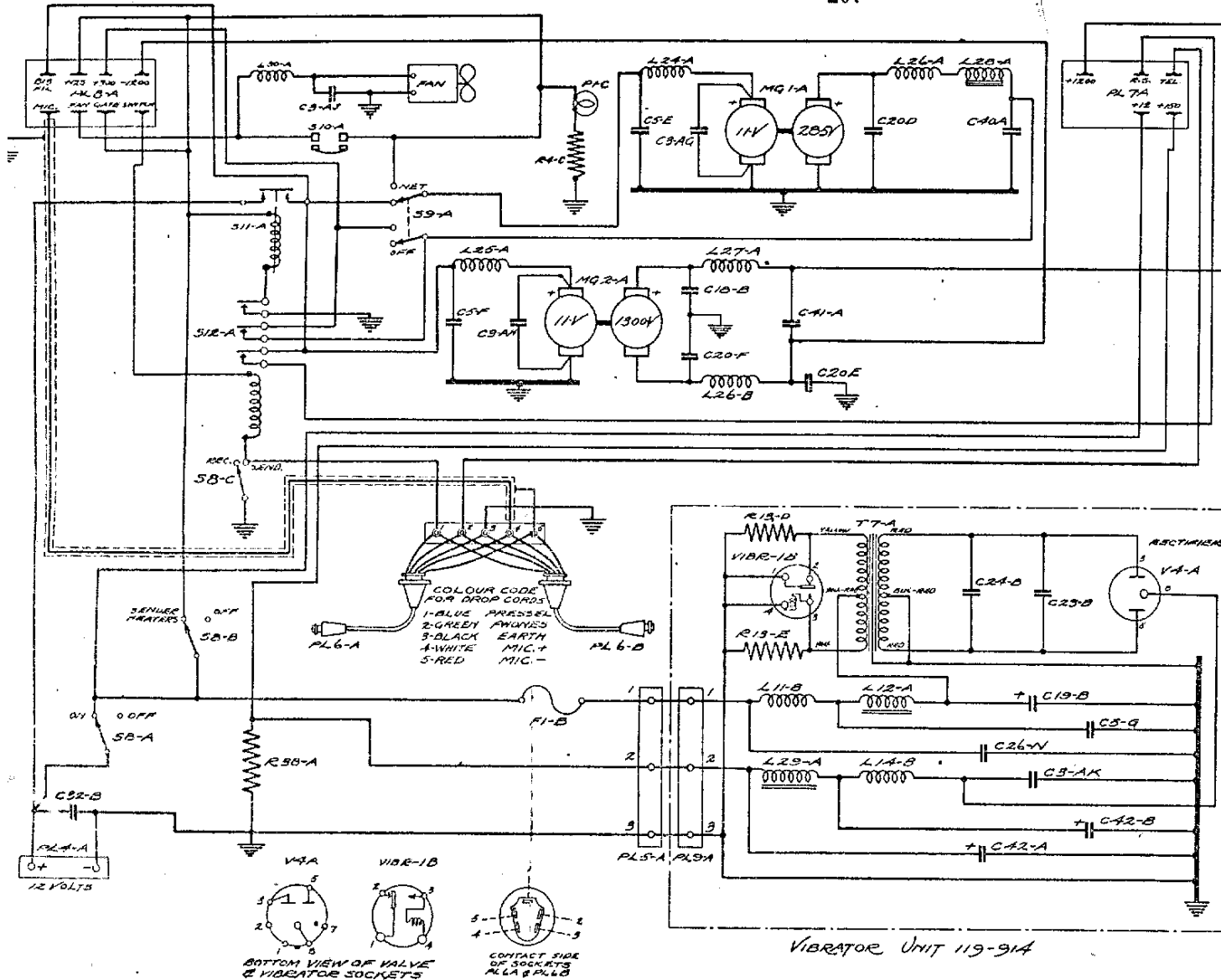


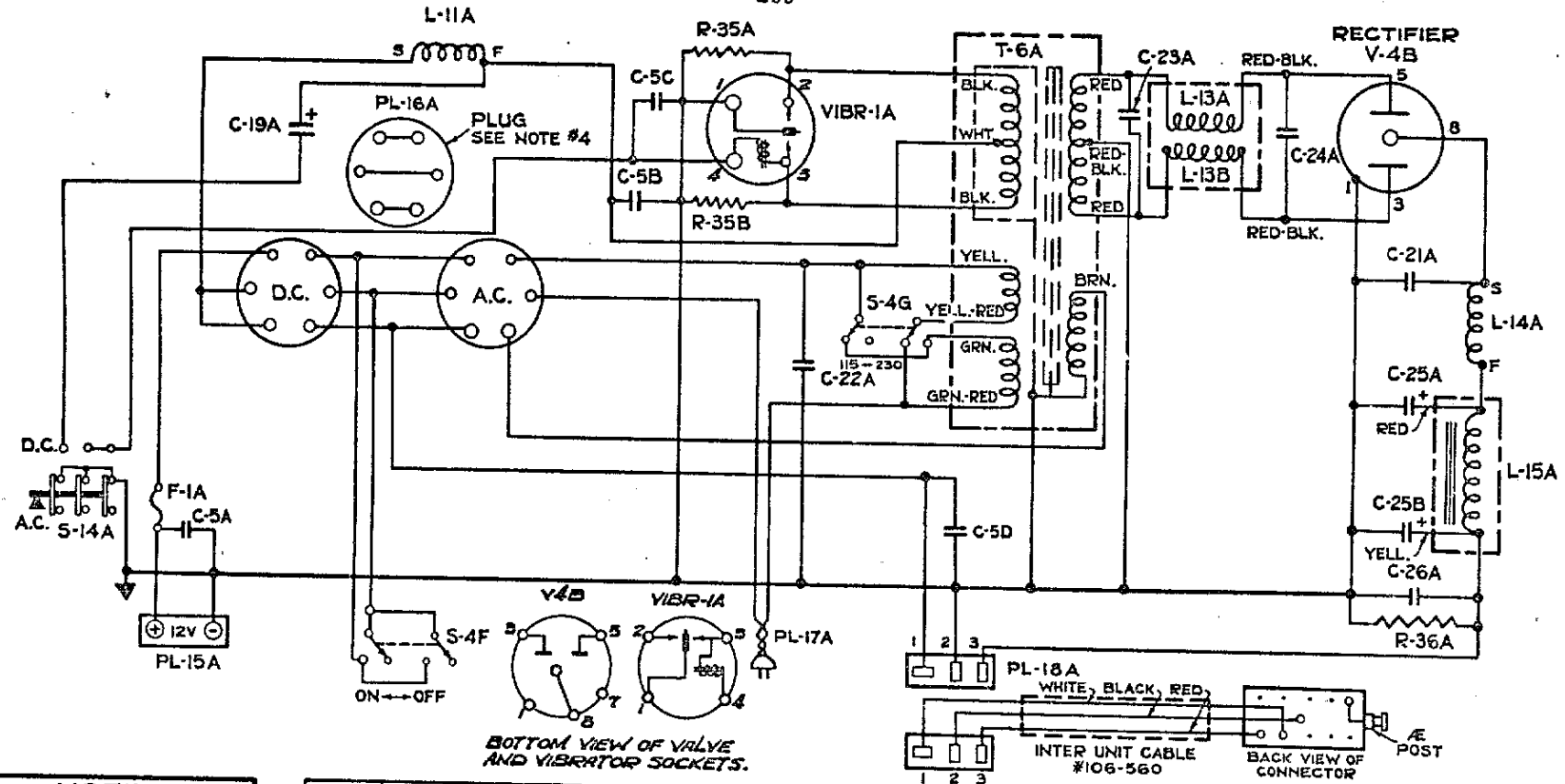
Fig. 52—Sender Circuit Diagram.



CONDENSERS		SWITCHES	
C3-AG	.1 MFD	S3-A	OFF-ON
C3-AH	.1 MFD	S3-B	SEND-RECORDS-OFF
C3-AJ	.1 MFD	S3-C	SEND-REC.
C3-AK	.1 MFD	S3-A	NET-OFF
C3-AL	.5 MFD	S10-A	FAN
C3-AM	.5 MFD	S11-A	SEND-REC. RELAY
C3-AN	.5 MFD	S12-A	SEND-REC. PH. REL.
C3-AO	.005 MFD		
C3-AP	.100 MFD		
C3-AQ	.01 MFD		
C3-AR	.01 MFD		
C3-AS	.01 MFD		
C3-AT	.004 MFD		
C3-AU	.0075 MFD		
C3-AV	.002 MFD		
C3-AW	.01 MFD		
C3-AX	.2 MFD		
C3-AY	0.5 MFD		
C3-AZ	20.0 MFD		
C3-B	20.0 MFD		
RESISTORS		PILOT LAMPS	
R34-C	2 OHMS	PL6-A	5 PT. SOCKET
R34-D	300 OHMS	PL6-B	5 PT. SOCKET
R34-E	500 OHMS	PL7A	5 PT. CONNECTOR
R34-F	10,000 OHMS	PL8A	5 PT. CONNECTOR
		PL9A	5 PT. SOCKET
INDUCTANCES		VALVES	
L11-B	R.F. CHOKER	V4-A	6Z4A
L11-A	R.F. CHOKER		
L11-C	R.F. CHOKER		
L11-D	R.F. CHOKER		
L11-E	R.F. CHOKER		
L11-F	R.F. CHOKER		
L11-G	R.F. CHOKER		
L11-H	R.F. CHOKER		
L11-I	R.F. CHOKER		
L11-J	R.F. CHOKER		
L11-K	R.F. CHOKER		
L11-L	R.F. CHOKER		
L11-M	R.F. CHOKER		
L11-N	R.F. CHOKER		
L11-O	R.F. CHOKER		
L11-P	R.F. CHOKER		
L11-Q	R.F. CHOKER		
L11-R	R.F. CHOKER		
L11-S	R.F. CHOKER		
L11-T	R.F. CHOKER		
L11-U	R.F. CHOKER		
L11-V	R.F. CHOKER		
L11-W	R.F. CHOKER		
L11-X	R.F. CHOKER		
L11-Y	R.F. CHOKER		
L11-Z	R.F. CHOKER		
MACHINES			
MG1-A	L.P. DYNAMOTOR		
MG2-A	H.P. DYNAMOTOR		

NOTE: - ALL LEAD CONNECTIONS TO DYNAMOTORS NOT TO BE TIGHT, LEAVE FREE MOVEMENT FOR DYNAMOTORS IN RUBBER MOUNTINGS.

Fig. 54—Supply Unit Circuit Diagram.



- NOTES**
1. PL-18A CONNECTIONS  
TERM. #1 :- +12V. D.C. OR A.C.  
TERM. #2 :- EARTH  
TERM. #3 :- +150V. D.C.
  2. LETTERS ON INDUCTANCES  
INDICATE START AND FINISH  
OF WINDINGS.
  3. S-14A SHOWN IN NORMAL  
OR 'A.C.' POSITION.
  4. PL-16A PLUGS INTO SOCKET  
MARKED 'D.C.' FOR 12 V. D.C.  
OPERATION OR IN SOCKET  
MARKED 'A.C.' FOR A.C. OPERAT-  
ION.
  5. S-4G SHOWN IN 115 VOLT  
POSITION.

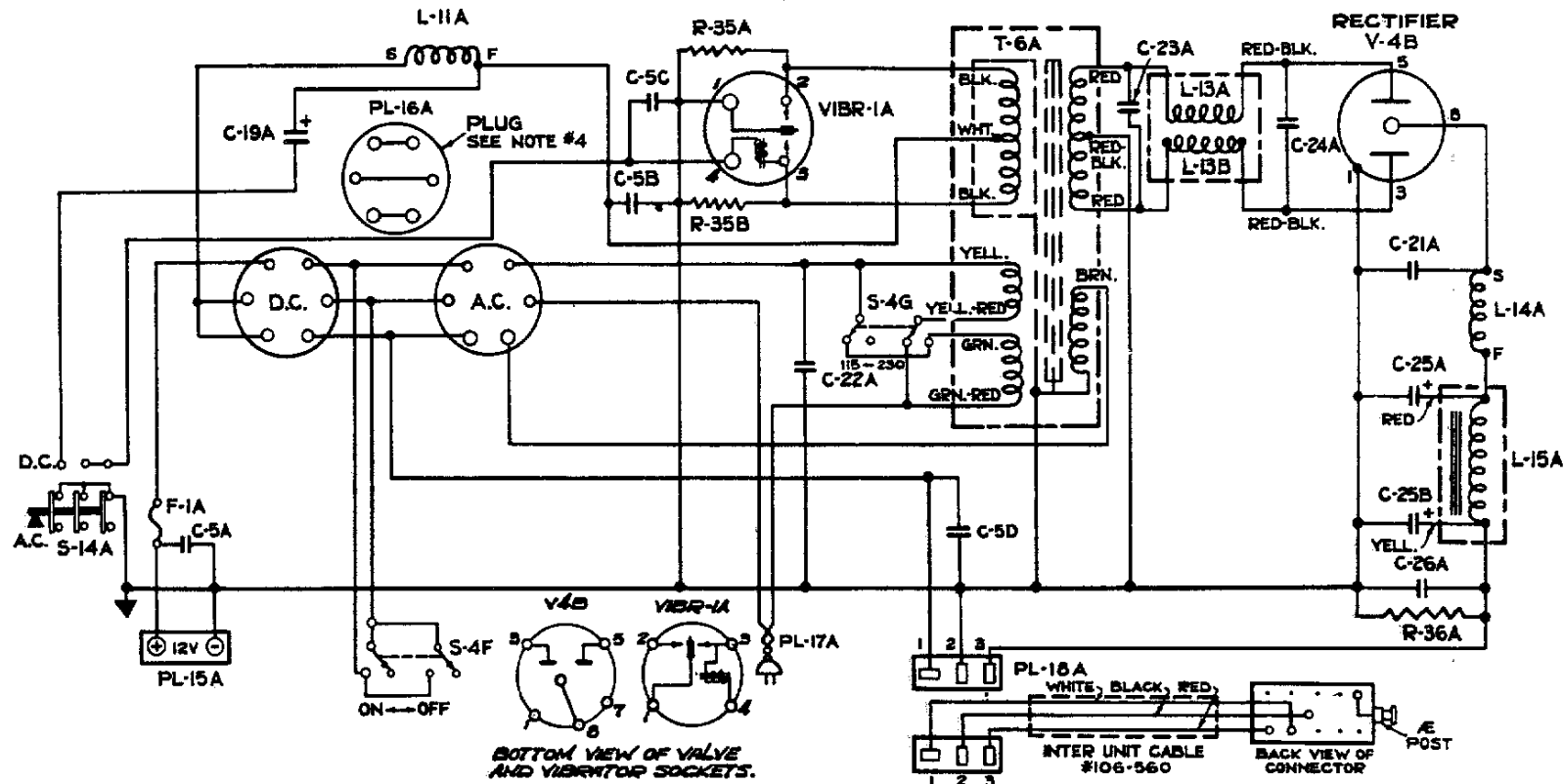
T-6A	POWER TRANSFORMER
F-1A	10AMPS FUSES
PL-18A	OUTPUT
PL-17A	A.C. LINE
PL-16A	A.C./D.C. SWITCHING
PL-15A	D.C. INPUT
	PLUGS

VIBR-1A	4 AMP NON-SYNG. VIBRATOR
S-14A	T.P.D.T. SAFETY
S-4G	115/230 VOLTS
S-4F	OFF-ON
	SWITCHES
R-36A	10,000 OHMS 10WATTS
R-35B	300 OHMS 1/2 WATT
R-35A	300 OHMS 1/2 WATT
	RESISTORS

V-4B	OZ4 OR OZ4A VALVES
L-15A	13 H
L-14A	1000 μH
L-13B	850 μH
L-13A	850 μH
L-11A	50 μH
	INDUCTANCES

C-26A	0.002 MFD
C-25B	20.0 MFD
C-25A	20.0 MFD
C-24A	0.0075 MFD
C-23A	0.004 MFD
C-22A	0.02 MFD
C-21A	0.1 MFD
C-19A	100.0 MFD
C-5D	0.5 MFD
C-5C	0.5 MFD
C-5B	0.5 MFD
C-5A	0.5 MFD
	CONDENSERS

Fig. 55—Supply Unit ZE-12 Circuit Diagram.



BOTTOM VIEW OF VALVE AND VIBRATOR SOCKETS.

- NOTES**
1. PL-16A CONNECTIONS TERM. #1 :- +12 V. D.C. OR A.C. TERM. #2 :- EARTH TERM. #3 :- +150V. D.C.
  2. LETTERS ON INDUCTANCES INDICATE START AND FINISH OF WINDINGS.
  3. S-14A SHOWN IN NORMAL OR "A.C." POSITION.
  4. PL-16A PLUGS INTO SOCKET MARKED "D.C." FOR 12 V. D.C. OPERATION OR IN SOCKET MARKED "A.C." FOR A.C. OPERATION.
  5. S-4G SHOWN IN 115 VOLT POSITION.

T-6A	POWER TRANSFORMER
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VIBR-1A	4 AMP NON-SYNG. VIBRATOR
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V-4B	OZ4 OR OZ4A VALVES
------	--------------------

C-26A	0.002 MFD
C-25B	20.0 MFD
C-25A	20.0 MFD
C-24A	0.0075 MFD
C-23A	0.004 MFD
C-22A	0.02 MFD
C-21A	0.1 MFD
C-19A	100.0 MFD
C-5D	0.5 MFD
C-5B	0.5 MFD
C-5A	0.5 MFD

F-1A	10AMPS FUSES
------	--------------

S-14A	T.P.D.T. SAFETY
S-4G	115/230 VOLTS
S-4F	OFF-ON

L-15A	13 H
L-14A	1000 μH
L-13B	850 μH
L-13A	850 μH
L-11A	50 μH

PL-15A	OUTPUT
PL-17A	A.C. LINE
PL-16A	A.C./D.C. SWITCHING
PL-15A	D.C. INPUT

R-36A	10,000 OHMS 10WATTS
R-35B	300 OHMS ½ WATT
R-35A	300 OHMS ½ WATT

INDUCTANCES
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Fig. 55—Supply Unit ZE-12 Circuit Diagram.

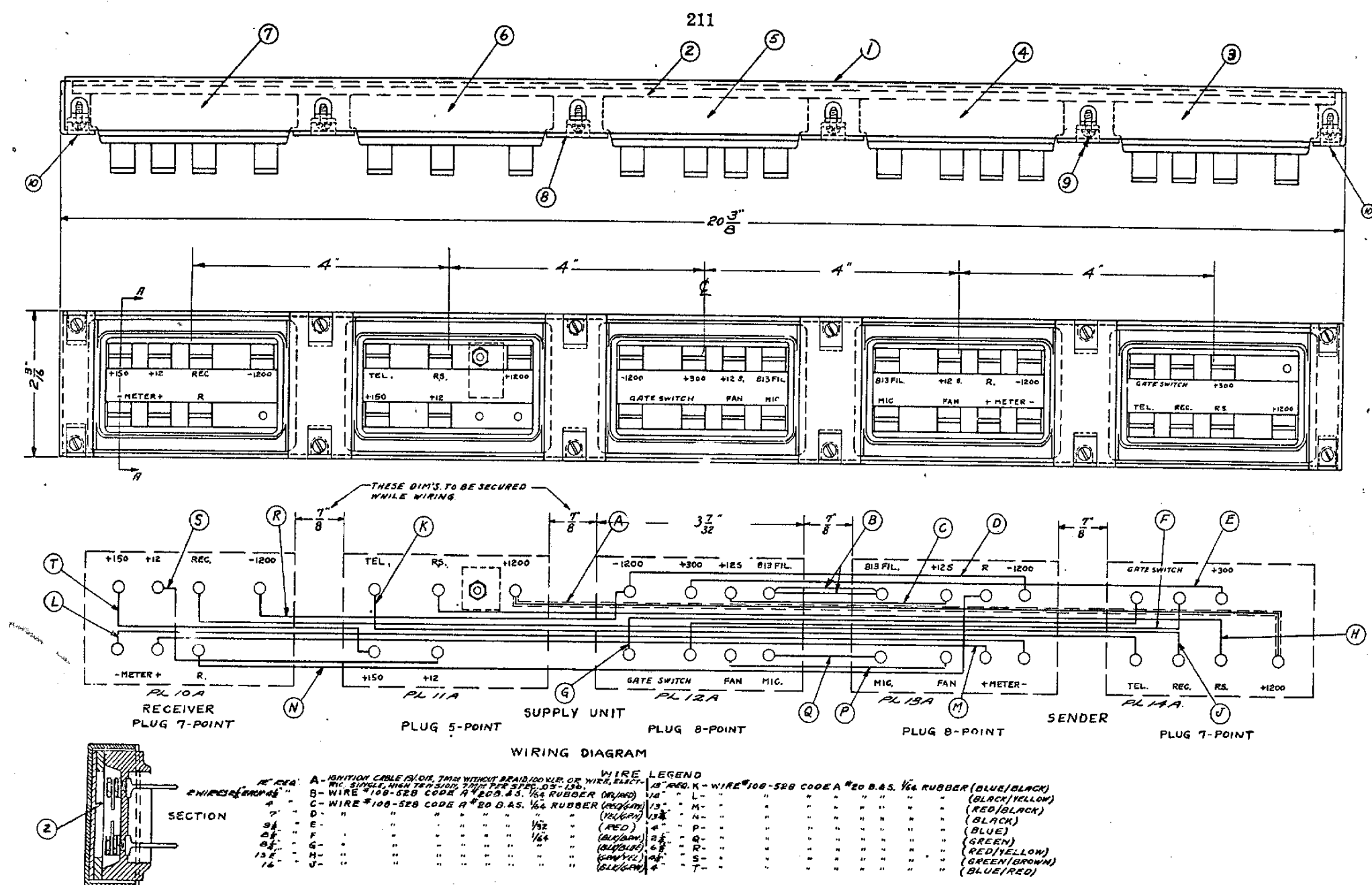


Fig. 56—Plug Board Circuit Diagram.

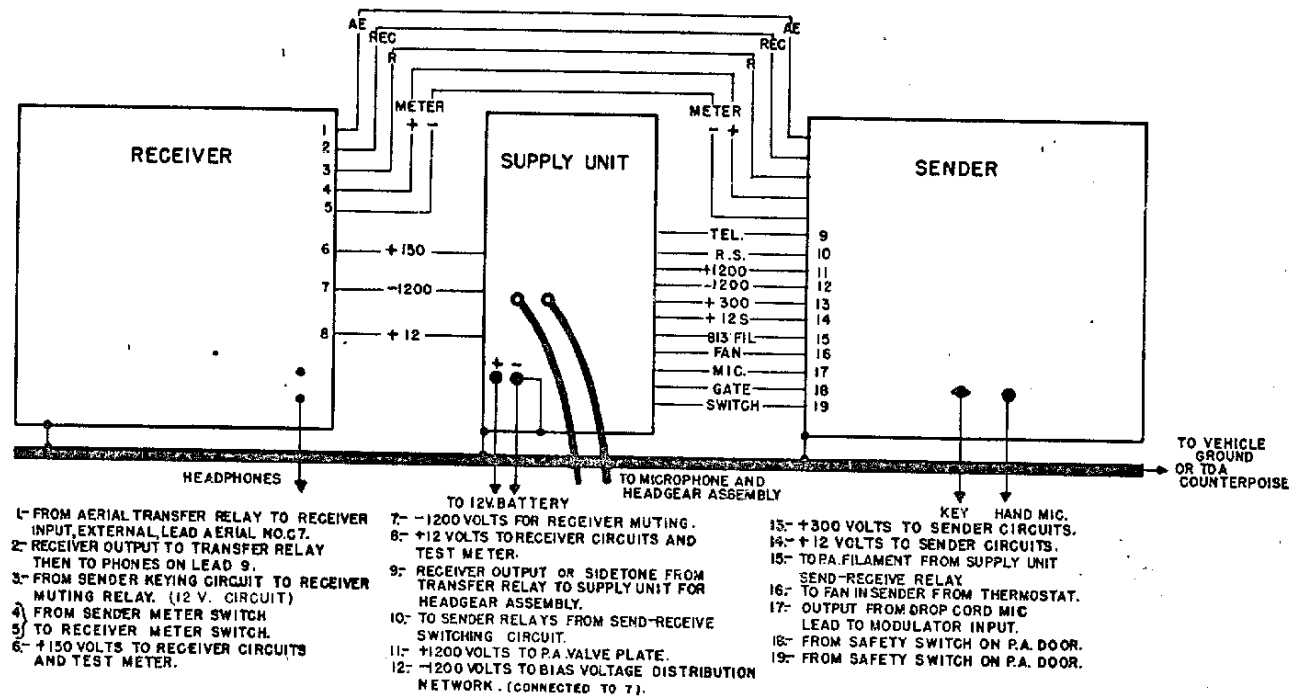


Fig. 57—Interconnection Block Diagram.

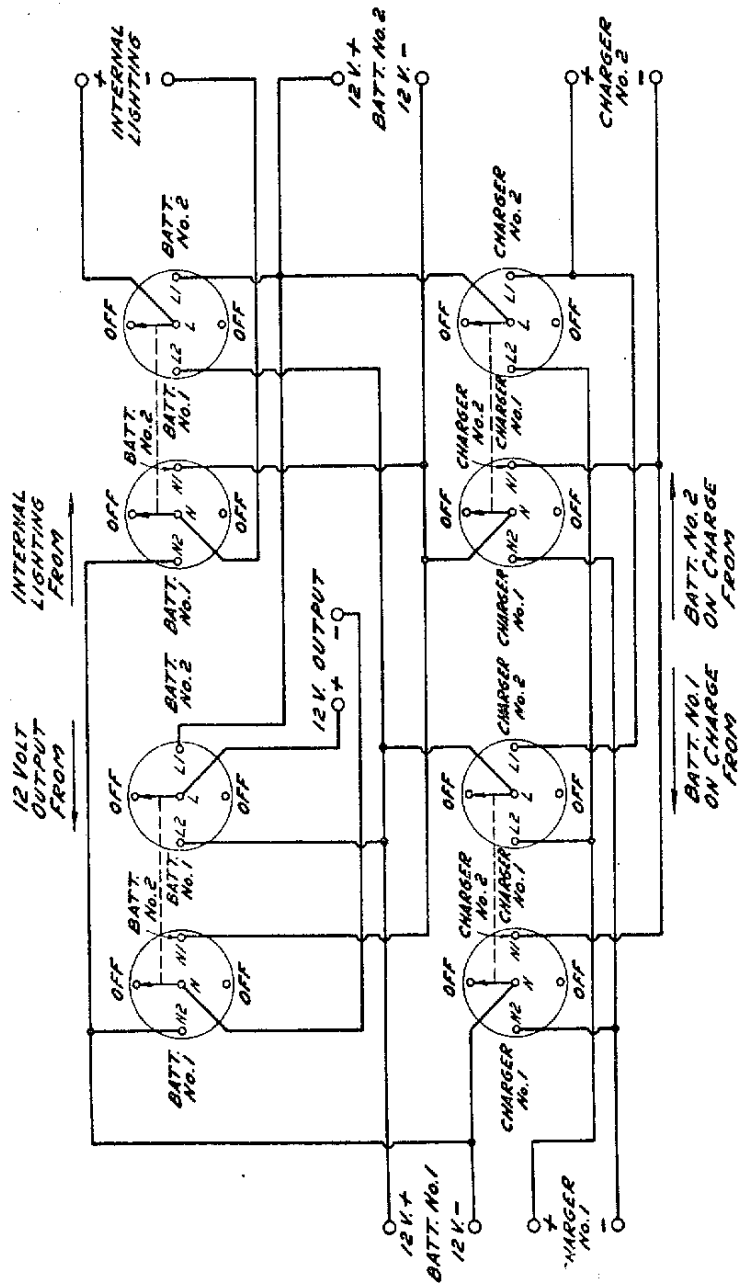
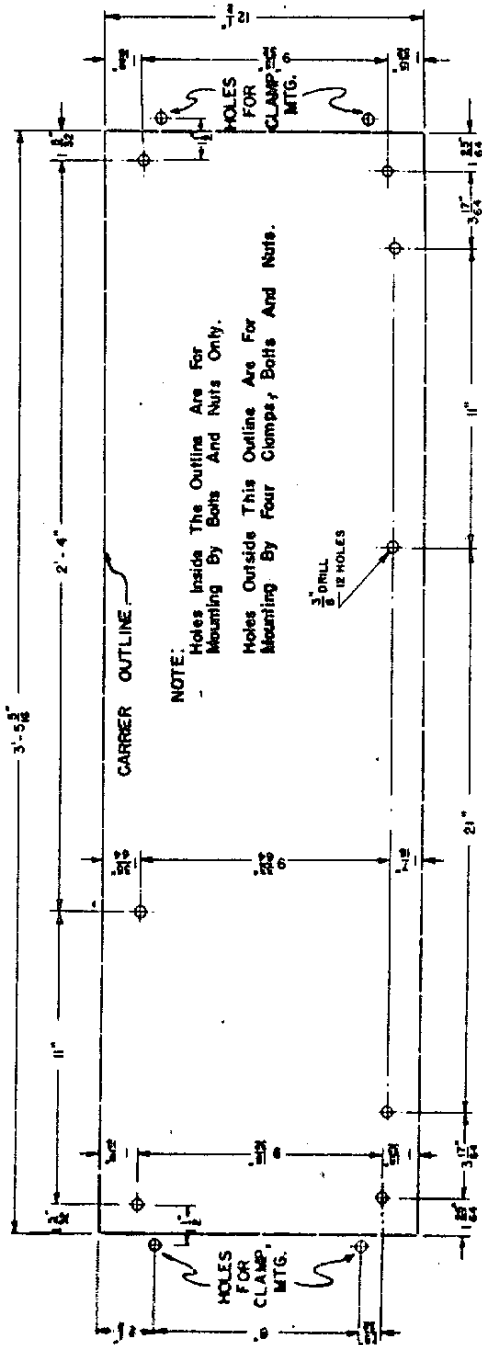


Fig. 58—Switchboard Charging No. C5 Circuit Diagram.



FRONT

Fig. 59—Position of Mounting Holes in Table for Carrier No. 4.

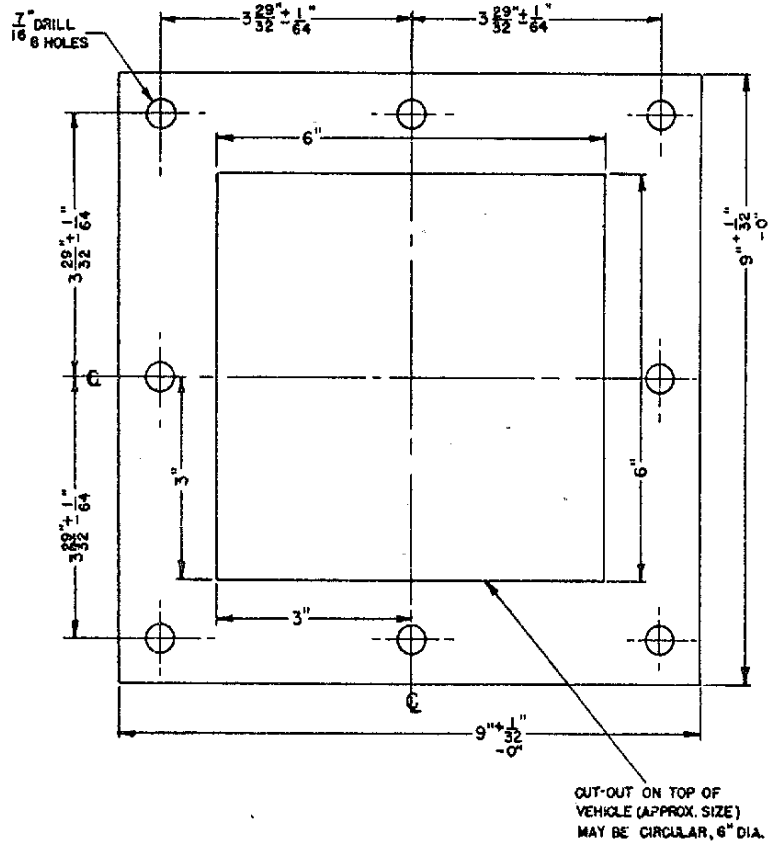


Fig. 60—Positions of Aerial Base C2 Mounting Holes.

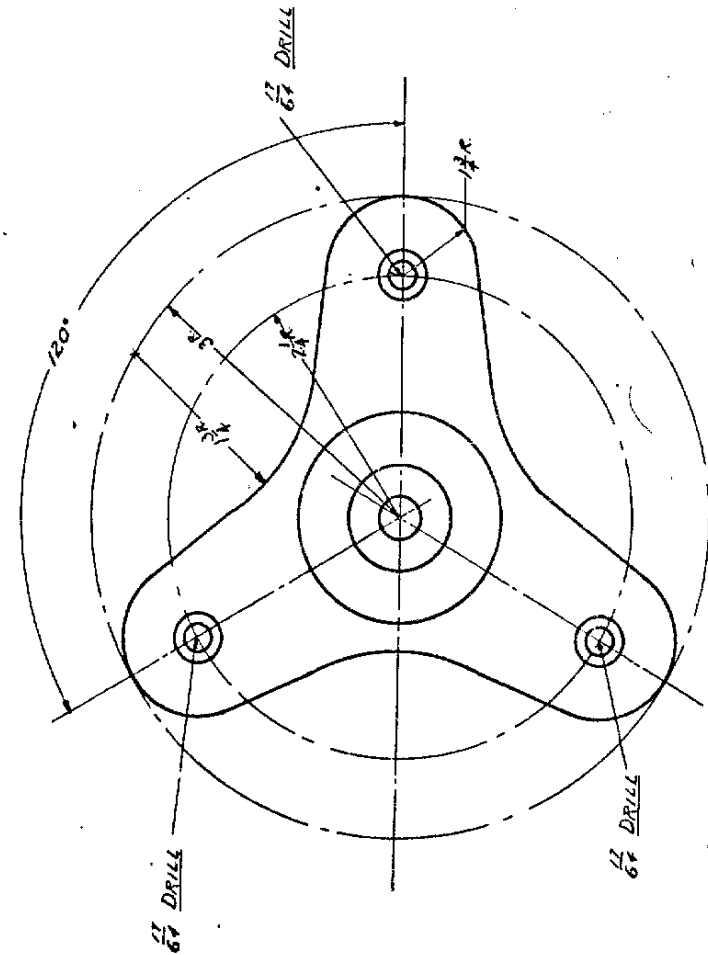


Fig. 61—Positions of Holes for Mounting the Base Plate, Vehicle Roof.