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# **PROVISIONAL USER HANDBOOK**

**RADIO SET PRC-F1**

**RADIO SET GRC-F2**

**INSTALLATION KIT ELECTRONIC EQUIPMENT**

**MK-F8**

**1968**

## AMENDMENT RECORD

Amendment No.	By whom amended	Date of insertion

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**RADIO SET GRC-F2**

**INSTALLATION KIT ELECTRONIC EQUIPMENT**

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NOTE

1. Since the printing of this Handbook, the nomenclature of the following two items has been changed.

- a. Installation Kit, Electronic Equipment, General Purpose, Radio Set GRC - F2.

Amended to :-

Installation Kit, Electronic Equipment MK - F8

- b. Conversion Kit, Radio Set PRC - F1,  
to GRC - F2.

Amended to :-

Conversion Kit, MK - F7

2. Corrections to the nomenclature have only been made on the cover and fly - leaf of the Handbook.

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**POWER SUPPLY, PP-F1, USED ON GP INSTALLATION, RADIO SET GRC-F2**

Data Summary EMEI  
Technical Description EMEI  
Unit Repairs EMEI  
Field and Base Repairs EMEI  
Inspection Standards EMEI

Telecommunications K570  
Telecommunications K572  
Telecommunications K573  
Telecommunications K574  
Telecommunications K578

**REGULATOR, BATTERY CHARGER FI, USED WITH RADIO SET PRC-F1**

Data Summary EMEI  
Technical Description EMEI  
Unit Repairs EMEI  
Field and Base Repairs EMEI  
Inspection Standards EMEI

Telecommunications K560  
Telecommunications K562  
Telecommunications K563  
Telecommunications K564  
Telecommunications K568

User Handbook, REGULATOR SET MX-F1 used with RADIO SET PRC-F1

7610 - 66 - 029 - 5014

Notes for Operators - Regimental Radio Equipment

A Field Guide to Simple HF Dipoles - Stanford Research Institute

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## ASSOCIATED PUBLICATIONS

### RECEIVER-TRANSMITTER, RADIO R T-F1/PRC

Data Summary EMEI	Telecommunications F570
Technical Description EMEI	Telecommunications F572
Unit Repairs EMEI	Telecommunications F573
Field and Base Repairs EMEI	Telecommunications F574
Inspection Standards EMEI	Telecommunications F578

### COUPLER, ANTENNA, CU-F2, USED ON RADIO SET GRC-F2

Data Summary EMEI	Telecommunications L130
Technical Description EMEI	Telecommunications L132
Unit Repairs EMEI	Telecommunications L133
Field and Base Repairs EMEI	Telecommunications L134
Inspection Standards EMEI	Telecommunications L138



# CHAPTER ONE – INTRODUCTION

## SECTION 1 – GENERAL

### SCOPE

1. This manual describes the Radio Set PRC-F1, Radio Set GRC-F2 and Installation Kit, Electronic Equipment, General Purpose, Radio Set GRC-F2, and covers their installation, operation, and operator's maintenance. It includes operating instructions for the manpack, ground station, and general purpose roles, the use of the various types of antenna supplied, and care and inspection of the equipment.
2. Throughout the manual, the Receiver-Transmitter, Radio RT-F1/PRC, which is common to all installations, will be referred to as the R/T unit. The Coupler, Antenna, CU-F2, used in the GRC-F2 role will be referred to as Coupler CU-F2. The Power Supply PP-F1 will be referred to as the Power Supply.

## SECTION 2 – DESCRIPTION AND DATA, RADIO SET PRC-F1

### PURPOSE AND USE

3. The Radio Set PRC-F1 is a short range, simplex transceiver for communication by speech, using single sideband and amplitude modulation, or by morse code. It is compatible with other types of equipment provided with similar facilities and of comparable frequency accuracy. It is intended primarily as a manpack transceiver, using an 8 ft flexible antenna and an internal rechargeable secondary battery. A dipole antenna of adjustable length is supplied for extended range by skywave, when circumstances permit the radio set to be used as a temporary ground station.

### TECHNICAL CHARACTERISTICS

4. 

Frequency:	2,000 to 11,999 kHz in steps of 1 kHz
Number of Channels:	10,000
Frequency Stability:	$\pm 25$ Hz between $-21^{\circ}\text{C}$ and $+71^{\circ}\text{C}$ for a period of 90 days.
Mode of Operation:	SSB: Upper sideband only. CW1: Equivalent to 2 kHz tone telegraphy over SSB channel. CWN: 425 Hz bandwidth on receive with the receiver output a fixed beat note of 2 kHz. CW2: 6 kHz receiver bandwidth and variable frequency BFO. AM: 6 kHz bandwidth. Compatible AM transmission, normal AM reception.
Transmitter Power Output:	High Power: 10W pep on SSB or compatible AM, 5W pep on CW. Low Power: 1W pep on all modes.
Receiver Sensitivity:	SSB and CW: 0.5 $\mu\text{V}$ in series with 50 Ohms for 1 mW audio output in 100 Ohms. AM: 2 $\mu\text{V}$ in series with 50 Ohms 30% modulated for 1 mW audio output in 100 Ohms.
Power Requirements:	28V dc supplied by internal rechargeable nickel-cadmium battery. (BATTERY, STORAGE, BB-F1, 6140-66-026-0969)
Endurance on Internal Battery for Rec/Trans Ratio of 10 to 1:	High Power, 6 hours Low Power, 24 hours.

## COMPONENTS

5. Table 1 lists the components of a Radio Set PRC-F1

TABLE 1 - RADIO SET PRC-F1 COMPONENTS

Item	Description	Dimensions (in)	Weight	Qty
1	Receiver-Transmitter, Radio RT-F1/PRC c/w battery	13 x 4.3/4 x 12	17 lb	1
2	Headset H-F1	2.1/2 x 2.1/2 x 3/4	1 oz	1
3	Microphone, dynamic, M-F1	4.1/2 x 2.1/2 x 1.1/4	10 oz	1
4	Handset H-F2	8 x 2.1/8 x 2.1/2	11 oz	1
5	Key, telegraph, lightweight (Aust) No. 1 (modified) with connector U-182/U	2.1/2 x 1.5/8 x 1	2.1/2 oz	1
6	Antenna AS-F1	14 x 7/8 x 7/8	5 oz	2
7	Coupler, Antenna, CU-F1	14.5/8 x 1.5/8 x 2.3/4	14 oz	1
8	Antenna AS-F2	6 x 4.1/2 x 1	12.1/2 oz	2
9	Cable Assembly, RF, CG-F4	5 x 2.1/2 x 1	8 oz	1
10	Battery, Storage, BB-F1	8.1/2 x 4 x 1.1/16	2 lb 6 oz	6
11	Card, Instruction, Operator's			1
12	Provisional User Handbook	11 x 8 1/2		1
13	Bag, Cotton Duck, CW-F1, Olive drab	21 x 14 x 7		1
14	Case, Assembly, Transit, CY-F1 (to hold items 1 to 13)	23 3/4 x 18 1/4 x 13	45 Lb.	1

## GENERAL DESCRIPTION

6. The Radio Set PRC-F1 is a complete manpack receiver-transmitter station, powered by an internal battery. An 8 ft whip antenna (Antenna AS-F1) is connected to the set by the Coupler, Antenna, CU-F1 which includes a tunable loading inductor. Accessories are provided for speech or morse code communication. One spare whip antenna and five spare batteries are supplied. The dipole antenna, consisting of two dipole halves (Antenna AS-F2, 2 off) and a dipole feeder assembly, (Cable Assembly RF, CG-F4), will provide long range sky wave communication under suitable propagation conditions.

### RECEIVER-TRANSMITTER RADIO RT-F1/PRC

7. The receiver-transmitter (R/T) unit is a compact, light weight unit housed in a case of magnesium alloy, pancrimatically sealed by a synthetic rubber ring between the front panel and the main body. The two assemblies are held together by four 1/4 - 28 UNF captive screws at the corners.

#### WARNING

THE R/T UNIT MUST NOT BE OPENED, BY UNDOING THE CAPTIVE SCREWS, UNLESS DESICCATING AND RESEALING EQUIPMENT IS AVAILABLE.

8. The battery is carried in a separate compartment on the rear of the case, the lid of which is secured by four spring catches. The battery may be replaced in the field, as described in para 58.

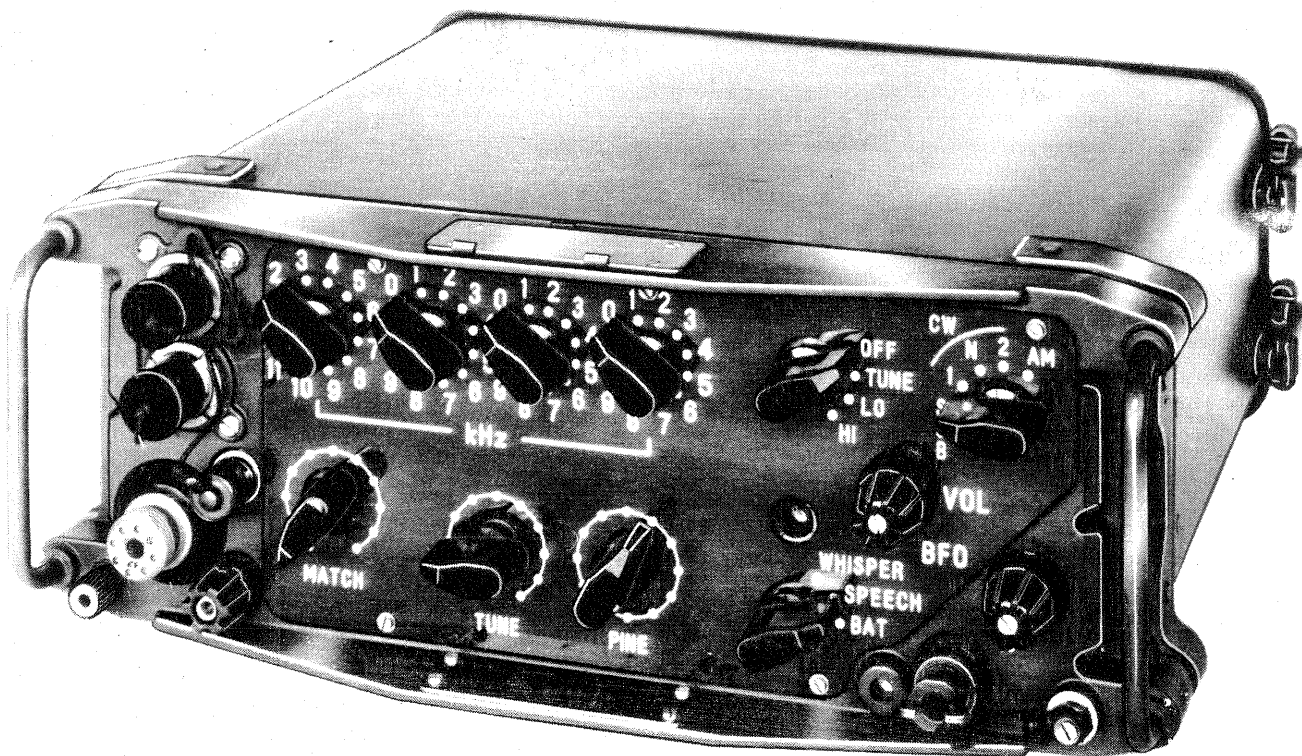


FIG 1 - RECEIVER-TRANSMITTER, RADIO RT-F1/PRC

#### MINOR COMPONENTS

9. The minor components, as listed in Table 1, are shown in Fig 2.

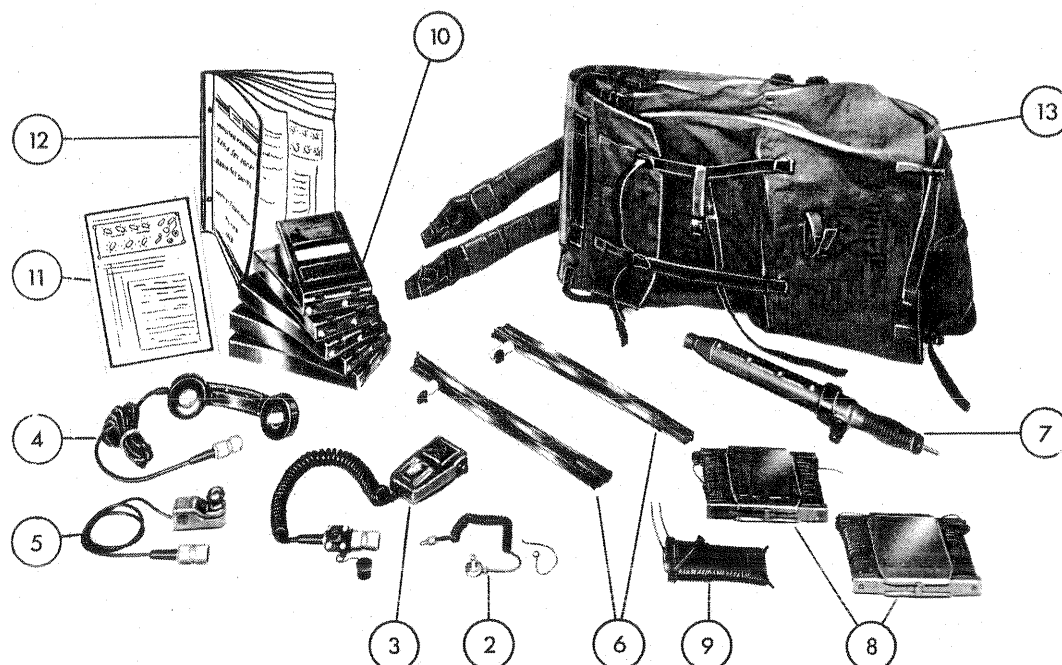


FIG 2 - MINOR COMPONENTS, RADIO SET PRC-F1

- (a) Antenna AS-F1 The 8 ft whip antenna consists of 8 sections of steel tubing, each section fitting into the flared end of the next section. A nylon cord passes through the 8 sections to assist in assembling and to keep the sections together when dismantled.
- (b) Coupler, Antenna, CU-F1 This coupler connects the 8 ft whip to the R/T unit. It consists of a cylindrical case housing a loading inductor which is tuned by a small knob, accessible to the user during manpack operation. It has a screwed collet at the top to hold the whip antenna, a barrel spring at the bottom to provide flexibility and a screwed plug which fits into the output socket of the R/T unit.
- (c) Headset, H-F1, Single Earpiece This is a light weight, plastic encapsulated unit which fits into the ear of the user. It is complete with cable and connector which plugs into an adaptor on the microphone connector.
- (d) Microphone, Dynamic, M-F1 This is a hand held microphone with a pressel switch at the side. It is complete with cable and 5-pin connector with adaptor for earpiece connector.
- (e) Handset, H-F2 This is a light weight handset with dynamic microphone and pressel switch on handle, with cable and 5-pin connector.
- (f) Key, Telegraph, Lightweight (Aust) No 1 (Modified) This is of sealed construction and has a key travel of 0.013 in, and an operating pressure of 10 oz.
- (g) Antenna, AS-F2 (Dipole Half) The item consists of a light metal frame with 2 flaps secured by a spring catch. One flap depicts method of erection, the other shows a table of length vs frequency. The wire is marked in 1 ft lengths by red marker beads. Two captive insulators slide into the top of the frame.
- (h) Cable Assembly, RF, CG-F4 This is wound on a wire frame with an insulating top carrying 2 terminals for the ends of the dipole wires. A twin down lead is also wound on the wire frame.
- (j) Battery, Storage, BB-F1 This consists of 22 nickel-cadmium cells connected in series and enclosed in a dark brown plastic insulating case. The terminals are 2 studs at one end, asymmetrically placed. The shape of the case prevents the battery from being inserted with incorrect polarity.

### SECTION 3 - DESCRIPTION AND DATA, RADIO SET GRC-F2

#### PURPOSE AND USE

10. The Radio Set GRC-F2 consists of a Radio Set PRC-F1 as described in Section 2 together with the Conversion Kit, Radio Set PRC-F1 to GRC-F2. The latter includes a Coupler, Antenna CU-F2 and two end fed wire antennas. The Radio Set PRC-F1 itself may be used as a ground station with a limited range of antennas but the Coupler CU-F2 provides greater flexibility by allowing the choice of a wider range of antennas and provides efficient coupling between these antennas and the R/T unit. The Radio Set GRC-F2 may be used as a fixed base station for interworking with patrols using PRC-F1 manpack stations.

#### TECHNICAL CHARACTERISTICS

11. The technical characteristics are the same as those listed above for the Radio Set PRC-F1 in para 4, except for the addition of those of Coupler, CU-F2.

Coupler, CU-F2.	Connection to R/T unit:	50 Ohms unbalanced.
	Connection to Antenna:	Balanced or unbalanced.
	Matching:	Will match the R/T unit 50 Ohms output to antennas with impedances between 5 and 7000 Ohms.

#### COMPONENTS

12. Table 2 lists the components of a Radio Set GRC-F2.

TABLE 2 – RADIO SET GRC-F2 COMPONENTS

Item	Description	Dimensions (in)	Weight	Qty
1	Radio Set PRC-F1, c/w battery and accessory items	13 x 4. 3/4 x 12	20 lb	1
2	Coupler, Antenna, CU-F2	8 x 6. 3/4 x 4. 1/8	5 lb	1
3	Cable Assembly, RF, CG-F1, 2 ft, (Radio Set PRC-F1 to Coupler CU-F2)	6 dia x 1/2 (coiled)	2 oz	1
4	Cable Assembly, RF, CG-F2, 50 ft, (Radio Set PRC-F1 to Coupler CU-F2)	9 dia x 1. 1/2 (coiled)	28 oz	1
5	Antenna, AS-F3	7. 1/4 x 4 x 1. 1/2	15 oz	1
6	Antenna, AS-F4	7. 1/4 x 4 x 3/4	7. 1/2 oz	1
7	Cord, antenna, weighted	6 x 1. 1/4 x 1. 1/4	7. 1/2 oz	2
8	Counterpoise Assembly	7. 1/8 x 1. 3/8 x 1	4 oz	1
9	Field Pack, canvas, Olive drab	16 x 14 x 7		1
10	Case Assembly, Transit, CY-F2 (Conversion Kit, Radio Set PRC-F1 to GRC-F2)	18 1/4 x 15 1/4 x 10	26lb	1

## GENERAL DESCRIPTION

13. The Radio Set GRC-F2 is essentially a Radio Set PRC-F1 converted to a ground station by the addition of an external coupler and end fed wire antennas. The R/T unit may be located at any distance up to 50 ft from the coupler and the antenna down lead, by using the 2 ft or 50 ft RF cable supplied.

## COUPLER, ANTENNA, CU-F2

14. The Coupler is a light weight, compact unit housed in a case of cast aluminium, panclimatically sealed by means of a synthetic rubber ring between the front panel and the body. The two assemblies are secured together by means of 6 captive 2 BA screws.

## WARNING

THIS SEAL MUST NOT BE BROKEN, BY UNDOING THE CAPTIVE SCREWS, UNLESS DESICCATING AND RESEALING EQUIPMENT IS AVAILABLE.

15. The coupler is used to match the 50 Ohms output of the R/T unit to the impedance of the various types of antenna supplied. Correct matching enables the best use to be made of the transmitter power output and receiver sensitivity.

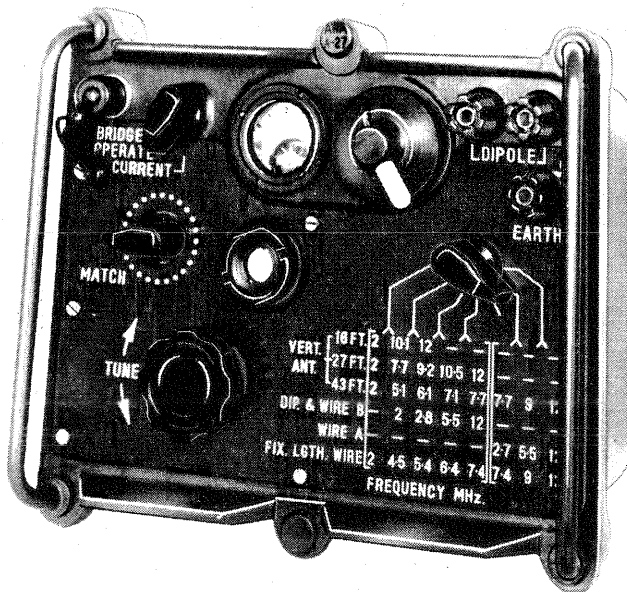


FIG 3 – COUPLER, ANTENNA, CU-F2

## MINOR COMPONENTS

16. The minor components, as listed in Table 2, are shown in Fig 4

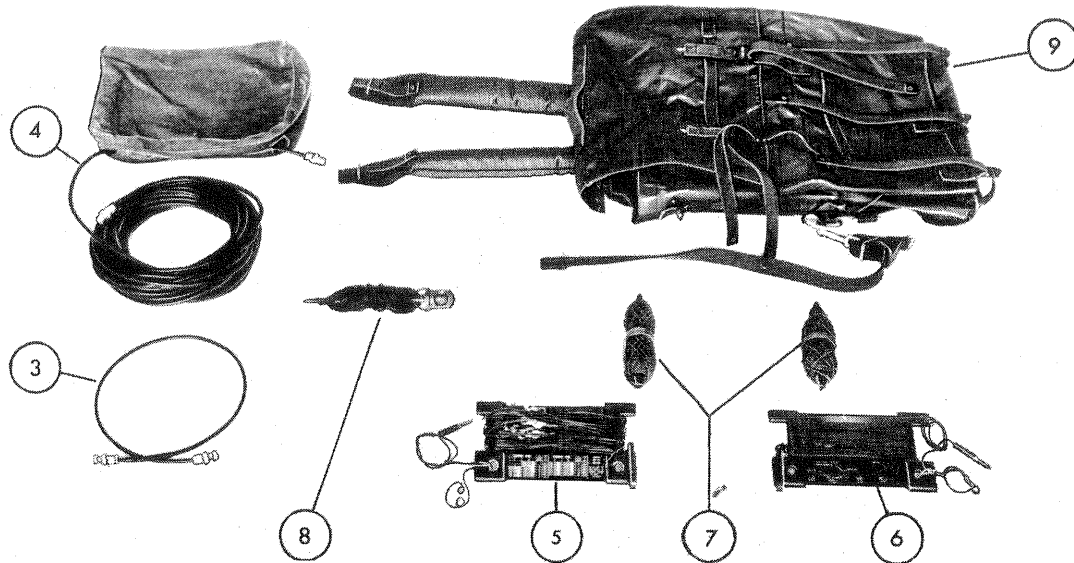


FIG 4 – MINOR COMPONENTS, CONVERSION KIT RADIO SET PRC-F1 TO GRC-F2

- (a) Cable Assembly, RF, CG-F1, 2 ft. Coaxial cable RG58C/U, 2 ft length, terminated in BNC connector at each end.
- (b) Cable Assembly, RF, CG-F2, 50 ft. Coaxial cable RG58C/U, 50 ft length, terminated in BNC connector at each end and attached to a zippered container bag.
- (c) Antenna AS-F3, (End Fed, Adjustable Length) Consists of a light metal frame with insulated ends, with 11 sections of wire of different lengths wound on it. The wire sections are terminated by hooks and eyes which make electrical contact when joined. Short lengths of nylon cord are used to mechanically join adjacent sections and to keep them in their correct order. The open end of the first section is attached to an insulator. An illustration on the frame depicts the method of erection and also shows the number of links required for particular frequencies.
- (d) Antenna AS-F4 (End Fed, Fixed Length) This antenna is similar to the adjustable length antenna, except for the absence of hooks and eyes. The wire is a continuous length of 43 ft.
- (e) Cord, Antenna, Weighted A metal bobbin with 100 ft of nylon cord wound on it, the inner end being attached to the bobbin.
- (f) Counterpoise Assembly Consists of a metal spike to which are connected four 10 ft black wires and one 2 ft green wire. In use the 4 black wires are laid out in the form of a cross and the green wire connected to the earth terminal of the R/T unit or the Coupler CU-F2.

## SECTION 4 – DESCRIPTION AND DATA, INSTALLATION KIT ELECTRONIC EQUIPMENT, GENERAL PURPOSE, RADIO SET GRC-F2

### PURPOSE AND USE

17. The Installation Kit includes a Power Supply, vertical whip antennas, mounting hardware and the necessary cables to allow the Radio Set GRC-F2 to be installed in any vehicle, watercraft or as a ground station equipped with a suitable power source as defined in para 18. The complete equipment – the Radio Set GRC-F2 and the Installation Kit – can be used as a fixed ground station or as a mobile installation.

### TECHNICAL CHARACTERISTICS

18. The technical characteristics are the same as those listed above for the Radio Set PRC-F1, para 4, except for the addition of those of the Power Supply PP-F1.

#### Power Supply PP-F1

- Input:
- (a) 20V to 40V dc with no superimposed ripple on the input
  - (b) 20V to 40V mean input with 2V p-p of superimposed ripple at a frequency of 500 Hz to 5 kHz

Transients of 110V peak and 5 mS duration can be tolerated.

- Output:
- (a) A regulated output of  $+27.5V \pm 0.5V$ , with ripple less than 0.25V p-p, to power the R/T unit.
  - (b) A regulated current of 100 mA or 20 mA as selected by a switch. The current is regulated to better than  $\pm 5\%$  and is used to charge the PRC-F1 battery when mounted in situ in the R/T unit.

- Power Consumption:
- (a) 0.9A at 40V input on full load.
  - (b) 1.8A at 20V input on full load.

Power Source: The following power sources are suitable:-

- (a) A nominally 24V dc battery bank or vehicle battery with negative earth.
- (b) A nominally 24V dc vehicle generator with negative earth.

## COMPONENTS

19. Table 3 lists the components of the Installation Kit

**TABLE 3 – COMPONENTS FOR INSTALLATION KIT, ELECTRONIC EQUIPMENT,  
GENERAL PURPOSE, RADIO SET GRC-F2**

Item	Description	Dimensions (in)	Weight	Qty
1	Power Supply, PP-F1	6.3/4 x 5 x 5.1/4	5.1/4 lb	1
2	Mast Base, AB-652/GRC			1
3	Mast Element, MS-116-A			5
4	Mast Element, MS-117-A			2
5	Mast Element, MS-118-A			2
6	Cover, antenna			1
7	Clamp, antenna sheath, brass			1
8	Base, Shock Mount, electrical equipment, MT-F2 (receiver-transmitter, radio)	14.5/8 x 11.1/4 x 7.1/4	7 lb 6 oz	1
9	Base, Shock Mount, electrical equipment, MT-F3 (power supply)	6 x 5.3/4 x 1.3/8	8 oz	1
10	Base, Shock Mount, electrical equipment, MT-F4 (coupler, antenna)	5 x 8.1/8 x 1.3/8	10.1/2 oz	1
11	Base, Antenna, mounting, AB-243/GRC	Details of these kits are included in Section 8, INSTALLATION USING INSTALLATION KIT, ELECTRONIC EQUIPMENT, GENERAL PURPOSE, RADIO SET GRC-F2		1
12	Cable Assembly, Special Purpose, electrical, branched, CX-F8 (battery to power supply), 15 ft, c/w 1 connector			1
13	Cable Assembly, Special Purpose, electrical, CX-F5 (power supply to R/T unit), 18 in, c/w 2 connectors			1
14	Cable, RF, 10 ft long, (coupler to antenna)			1
15	Hardware Kit, Electronic Equipment, MK-F1			1
16	Hardware Kit, Electronic Equipment, MK-F2			1
17	Earthing Kit, MK-F3			1
18	Cable Support Kit, MK-F4			1
19	Lead in Support Kit, MK-F5			1
20	Audio Accessory Mounting Kit, MK-F6			1
21	GP Installation Instruction for Radio Set GRC-F2			1
22	Case, wood, nailed (disposable container)			1



## GENERAL DESCRIPTION

20. The Installation Kit provides shock mounting arrangements for one R/T unit, one Coupler CU-F2 and one Power Supply, so that the complete installation can be mounted in a vehicle or watercraft. The same mounting arrangement can also be used at a fixed ground station.

## POWER SUPPLY

21. The Power Supply PP-F1 will provide the power requirements for one R/T unit of the Radio Set PRC-F1 and simultaneously charge the internal battery at either a FULL charge rate of 100 mA or a TRICKLE charge rate of 20 mA, when supplied with input power from a suitable source as defined in para 18.

22. The Power Supply is a robust and compact unit, housed in a case of cast aluminium alloy, pancrimatically sealed by a synthetic rubber ring between the front panel and the body. The two assemblies are held together by 4 captive 2 BA screws at the corners.

### WARNING

1. THIS SEAL MUST NOT BE BROKEN, BY UNDOING THE CAPTIVE SCREWS, UNLESS DESICCATING AND RESEALING EQUIPMENT IS AVAILABLE
2. DO NOT attempt to power the Receiver — Transmitter, Radio, RT — F1/PRC by any means other than:
  - (1) the internal battery OR (2) a Power Supply PP — F1 whose input is connected to a 20 to 40 V dc source OR (3) a Hand Generator especially provided to power this set.

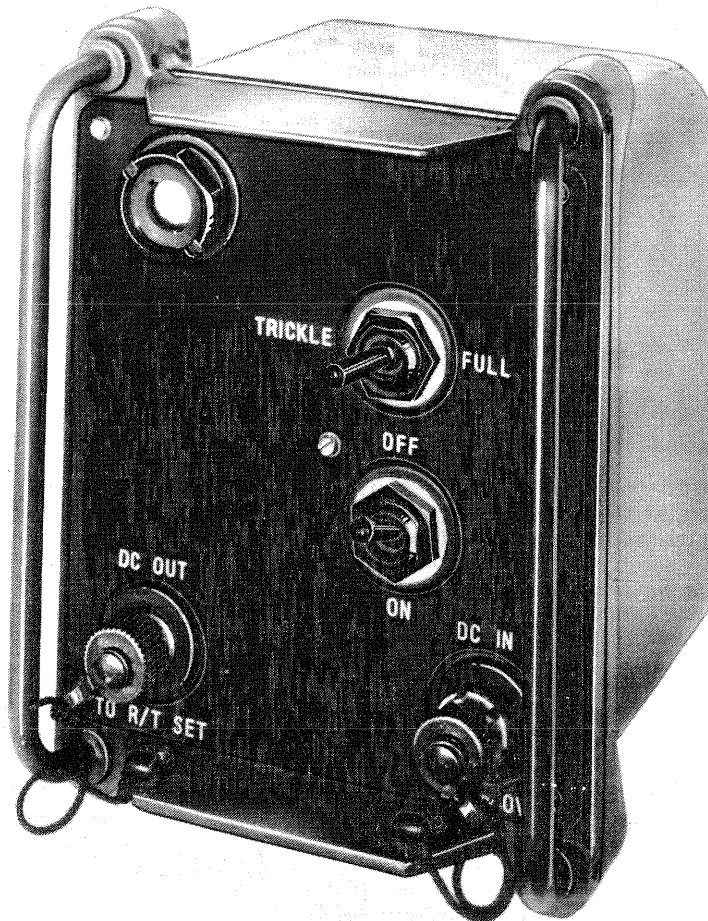


FIG 5 — POWER SUPPLY PP-F1

## MINOR COMPONENTS

23. The minor components, as listed in Table 3, are shown in Fig 6.



FIG 6 - MINOR COMPONENTS, INSTALLATION KIT, ELECTRONIC EQUIPMENT,  
GENERAL PURPOSE, RADIO SET GRC-F2

- (a) Mast Base, AB-652/GRC. This item comprises two hard insulating plastic pieces which screw together to clamp to the Base, Antenna Mounting AB-243/GRC. The antenna mast is screwed into the upper (longer) piece and a terminal providing connection to the antenna mast is underneath the lower piece.
- (b) Mast Elements MS-116-A, MS-117-A and MS-118-A. These antenna mast elements are hollow, threaded metal tubes which are screwed together (MS-116-A, 2 off, MS-117-A and MS-118-A, 1 off each) to make the required total length.
- (c) Cover, Antenna. This is a flexible plastic safety cover for the lower antenna mast section and the upper piece of the Mast Base AB-652/GRC.
- (d) Clamp, Antenna Sheath, Brass. This clamp fits over the cover, antenna, and fixes it firmly in position.
- (e) Base, Shock Mount, Electrical Equipment MT-F2. This is a rectangular sheet metal case with an open front, into which the R/T unit is fitted and secured by 2 screw clamps. The case is attached by shock mounts to a base plate for mounting on a horizontal surface.
- (f) Base, Shock Mount, Electrical Equipment MT-F3. The shock mount for the Power Supply PP-F1 is a rectangular sheet metal base with flanges turned up at the sides and rear. It is screwed to the top of the Base, Shock Mount, MT-F2, and the power supply is held to the base by a spigot at the rear and a screw clamp at the front.
- (g) Base, Shock Mount, Electrical Equipment MT-F4. The shock mount for the Coupler CU-F2 is a rectangular sheet metal base with flanges turned up at the sides and rear. It is screwed to the top of the Base, Shock Mount, MT-F2, and the Coupler CU-F2 is held to the base by a spigot at the rear and 2 screw clamps at the front.
- (h) Base, Antenna Mounting, AB-243/GRC. This is a mild steel bracket for bolting to a vertical surface in the vehicle or watercraft in which the GP installation is made. The large hole is provided to enable the Mast Base AB-652/GRC to be clamped to this mounting.

## CHAPTER TWO – INSTALLATION

### SECTION 5 – GENERAL

#### UNPACKING

24. The Radio Set, PRC-F1 and the Conversion Kit, Radio Set PRC-F1 to GRC-F2 are each packed in separate transit cases. The Installation Kit, Electronic Equipment, General Purpose, Radio Set GRC-F2, is packed in a wooden shipping case. The contents should first be checked against the list of components given in Tables 1, 2 or 3 respectively, to ensure that all of the components are present.

#### CHOICE AND ERECTION OF ANTENNAS

25. The type of antenna to be used will depend on the operating range required, the site of the installation, the frequency and propagation conditions. Vertical rod antennas may be used for short range ground wave working. For longer ground wave ranges one of the end fed wire antennas should be used, erected as near vertical as possible. Note that the dipole is not an efficient type of antenna for ground wave propagation. For sky wave working the end fed wire should be erected in a horizontal or inclined manner. The dipole is the most efficient type for sky wave propagation and should also be erected as high as possible. For further information on the use and installation of wire antennas refer to AHQ GS Publication, "A Field Guide to Simple HF Dipoles" (GS,855-R1-98) by Stanford Research Institute.

### SECTION 6 – INSTALLATION, RADIO SET PRC-F1

#### MANPACK ROLE

26. For this role the R/T unit and a range of accessories selected as required from the complete Radio Set PRC-F1 are carried in the Bag, Cotton Duck, CW-F1. Carriage of all items when the equipment is not to be operated during carriage is described in (a) below. The procedure to change to operation during carriage is detailed in (b) below.

##### (a) Carriage, Set not Operating

- (i) Fold back the top flap of the bag CW-F1 and unclip the flap over the large back pocket.
- (ii) In the R/T unit, ensure that a fully charged battery is in position (check that light on front panel of R/T unit operates when switch is turned to BAT) and that the battery cover clamps are secure.
- (iii) Slide the R/T unit into the top compartment, ensuring that the two 5 pin audio connectors will be on the operator's left side.
- (iv) On both sides of the R/T unit pass the short retaining straps (sewn to the sides of the bag) around the R/T unit handles and fasten securely.
- (v) Select the required accessories to be used with the R/T unit. If time permits, fit these to the R/T unit as a check that none have been omitted. Remove each accessory from the R/T unit and pack in the large back pocket before proceeding to the next one.
- (vi) Clip the flap over the large back pocket and strap the top flap into position.

##### (b) Carriage, Set in Operation

(It is assumed that the R/T unit and accessories are being carried as described in 26(a), and that it is then required to erect the antenna and connect the handset or microphone).

- (i) Insert the base of the Coupler CU-F1 into the socket on the R/T unit and tighten the retaining ring securely. Ensure that the knob on the Coupler will be pointing toward the operator's head when the set is on his back.
- (ii) Fit the eight sections of the whip antenna together, easing the nylon cord through the sections so that it does not foul or kink.
- (iii) Push each section well home on the adjacent section, then pull the nylon cord through the hole in the lower section, wind it around the end of the lower section and then push the plastic keeper over it.
- (iv) Fit the lower section into the top of the Coupler and secure it by screwing the collet nut tight.
- (v) If it is desired to use the handset, fit the 5 pin connector of the Handset H-F2 into one of the two 5 pin sockets on the front panel of the R/T unit.
- (vi) If it is desired to use the microphone and earpiece, fit the 5 pin connector assembly of the Microphone, Dynamic, M-F1 into one of the 5 pin sockets on the front panel of the R/T unit and fit the telephone jack of the Headset, H-F1 into the adaptor on the 5 pin connector assembly.

## GROUND STATION ROLE

27. The Radio Set PRC-F1 may be used as a temporary ground station in one of two ways.
- With the 8 ft whip antenna for short range ground wave communication. The efficiency of this installation can be increased by the use of a good earth connection or the counterpoise assembly, if available.
  - With the dipole antenna, for long range communication using sky wave. When using the dipole, do not use an earth wire or counterpoise.

## ERECTION OF DIPOLE ANTENNAS

28. For best results the dipole should be erected with the radiating wires horizontal and at a height equal to one half of the total length. The length to be used depends on the assigned frequency, as shown in Table 4. The wire is marked in 1 ft lengths by red marker beads.

TABLE 4 - DIPOLE LENGTH vs FREQUENCY (EACH WIRE)

Frequency (MHz)	Length of Wire (ft)	Frequency (MHz)	Length of Wire (ft)
2.0	113	5.4	39
2.1	107	5.6	37 1/2
2.2	102	5.8	36
2.3	97	6.0	35
2.4	93	6.2	33 1/2
2.5	89	6.4	32 1/2
2.6	85	6.6	31 1/2
2.7	82	6.8	30 1/2
2.8	79	7.0	29 1/2
2.9	76	7.3	28
3.0	73	7.6	27
3.1	71 1/2	7.9	26
3.2	68	8.2	25
3.4	64	8.5	24
3.6	60	8.8	23
3.8	57	9.2	22
4.0	54	9.6	21
4.2	51 1/2	10.0	20
4.4	48 1/2	10.4	19
4.6	46	11.0	18
4.8	44	11.6	17
5.0	42 1/2	12.2	16
5.2	41		

It is advisable to interpolate between the tabulated lengths as necessary.

29. Erect the dipole as follows, remembering that the wire should preferably be as high as possible and oriented as in sub para (h) below.
- Set up masts, or locate suitable trees or other supports.
  - Unwind both bobbins until the correct length of wire for the assigned frequency has been wound off. The length must include the width of the dipole case (6 inches).
  - Close the flaps of the cases and secure the wires by passing a loop of wire through the insulator, over the case and back around the insulator.
  - Pass the free ends of the dipole wires through the holes in the dipole feeder frame and screw them under the terminals.
  - Attach the cord to the free insulators and hoist the antenna into position, with the dipole cases hanging at the outer ends of the installation.
  - Connect one feeder wire to the antenna terminal of the R/T unit and the other to the earth terminal. Ensure that the case of the R/T unit is isolated from ground.
  - If only one support is used, keep the lower dipole case clear of the ground.

- (h) In non-equatorial regions the antenna can be erected by using the most convenient supports available without regard to the direction of its axis. However, in one situation the orientation of a horizontal dipole does matter; this is when the radios are operated in an area where the earth's magnetic field is horizontal. This is between 20 degrees North and 20 degrees South Magnetic Latitude. In this case some advantage is gained by aligning all antennas on magnetic north-south lines, regardless of the direction from one station to another.

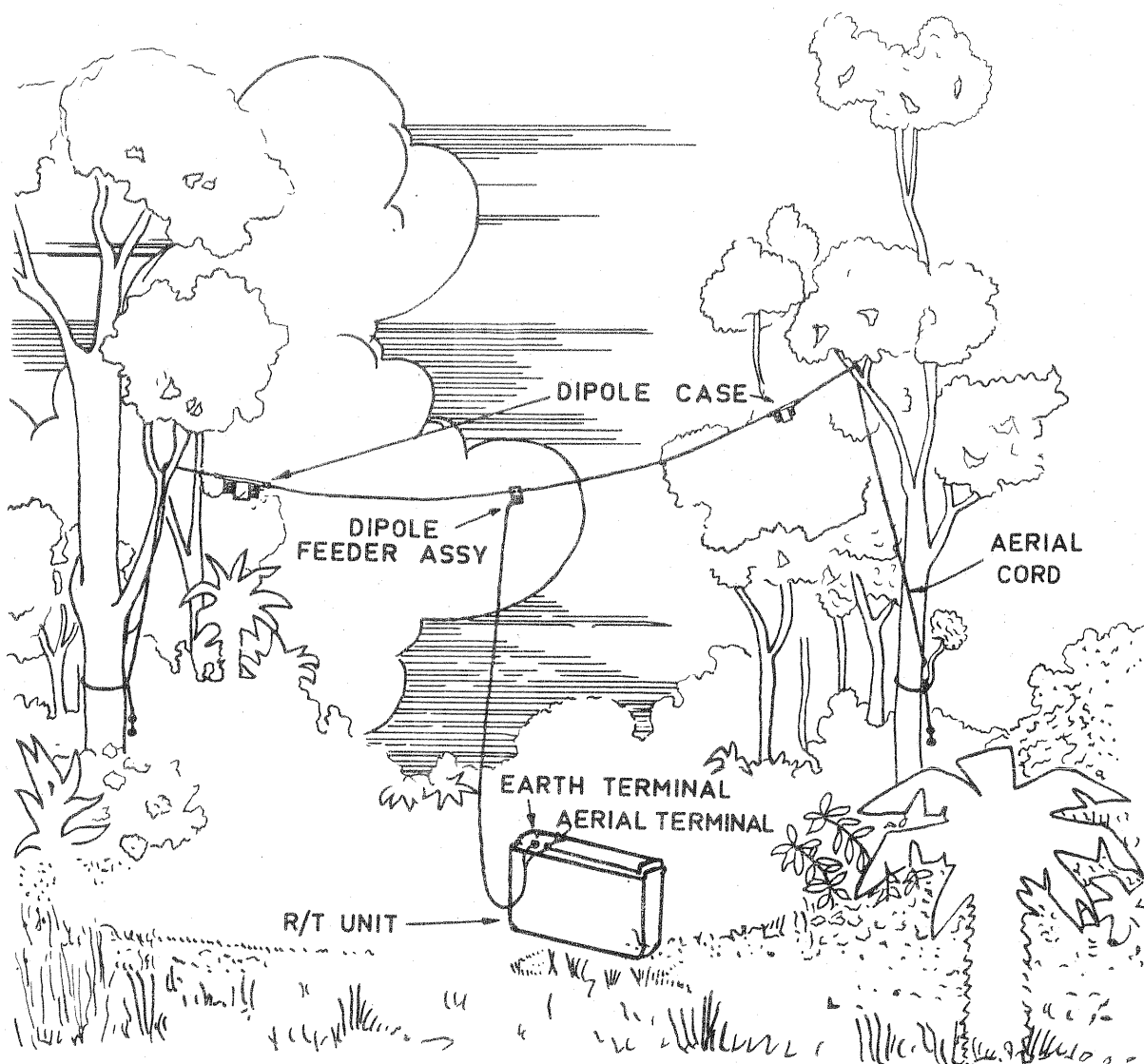


FIG 7 - ERECTION OF DIPOLE ANTENNA

## SECTION 7 - INSTALLATION, RADIO SET GRC-F2

### GROUND STATION ROLE

30. The Radio Set GRC-F2 comprises a Radio Set PRC-F1 and a Coupler, Antenna, CU-F2 together with end fed wire antennas. The R/T unit of the PRC-F1 is connected to the Coupler CU-F2 by either a 2 ft or a 50 ft cable according to location. For ground wave working, either of the end fed wire antennas (adjustable, AS-F3 or 43 ft fixed length, AS-F4) should be erected as nearly vertical as possible. For sky wave working the dipole or one of the end fed wires should be erected in a horizontal manner; if this is not practicable, the antenna may be erected in an inclined manner. The erection of the dipole has been described in para 29. Erection of the end fed wire is described in para 31.

## ERECTION OF ADJUSTABLE LENGTH END FED WIRE ANTENNA, AS-F3

31. The end fed wire antenna, adjustable length, consists of 11 sections of wire (links), each terminated in a hook and all except the first in a numbered eye, the whole assembly being wound on an insulating bobbin. Adjacent lengths of wire are permanently connected by short lengths of nylon cord so that the complete antenna is kept together as one unit. On the bobbin is a sketch showing the method of erection and a table setting out the method of making up the antenna for an assigned frequency. The end fed antenna may be used with the R/T unit, in which case Range B of the table is used, or with the Coupler CU-F2, in which case either range may be used, but preferably Range A.

### WARNING

DO NOT operate the Receiver — Transmitter, Radio, RT — F1/PRC in close proximity to other transmitters operating in the same frequency range. If this is unavoidable the distance separating the antennas should be made as great as possible, but should never be less than tabulated below.

Nearby Transmitter Type	Possible Power Output (watts)	Minimum antenna spacing for 8 ft and 16 ft vertical antennas
PRC — F1	10	) 15 ft 36 ft
PRC — 47	100	
GRC — 106	400	

TABLE 5 — WIRE ANTENNA, LENGTH vs FREQUENCY

Frequency Range A	B	No of Links Made	Link to set	Section Length (ft)	Total Length (ft)
—	10.5 to 12	—	1st	17.5	17.5
—	9.1 to 10.5	1	2nd	6	23.5
11.4 to 12	7.4 to 9.1	2	3rd	5	28.5
9.7 to 11.4	6.6 to 7.4	3	4th	6	34.5
8.0 to 9.7	5.3 to 6.6	4	5th	8	42.5
6.7 to 8.0	4.2 to 5.3	5	6th	12	54.5
5.5 to 6.7	3.7 to 4.2	6	7th	14	68.5
4.5 to 5.5	3.2 to 3.7	7	8th	9	77.5
3.7 to 4.5	2.7 to 3.2	8	9th	16	93.5
3.2 to 3.7	2.3 to 2.7	9	10th	21	114.5
2.7 to 3.2	2.0 to 2.3	10	11th	23	137.5

The section lengths are included to assist in reassembling the antenna if the sections should become separated.

32. The adjustable length end fed wire antenna is erected as follows:—

- From Table 5 select the required number of links for the assigned frequency and unwind them from the antenna bobbin.
- Disconnect the last eye and connect it to the hook on the orange lead-in wire.
- Unwind sufficient cord from the throwing bobbin and attach the end to the insulator on the first link.
- Throw the bobbin over a suitable tree or support and hoist the antenna into position, ensuring that each hook and eye in the used portion of the antenna are joined. Do not overstrain the cord; its breaking strain is approximately 60 pounds.
- Install the counterpoise assembly. The spike can be used to hold the antenna bobbin in position. Spread out the 4 black wires in the form of a cross and connect the green lead to the EARTH terminal of the Coupler CU-F2.
- Connect the orange lead-in wire to the large spring loaded terminal of the Coupler, keeping the wire clear of the ground.

TABLE 14

Item	Description	Qty	Purpose
1.	CRADLE	2	Fixture from which to hang <u>HANDSET</u> H-F 2 and <u>MICROPHONE</u> <u>DYNAMIC</u> , M-F 1.
2.	SCREWS, CH HD, MS, Cad P1, 4 BA x 1/2 in long.	8	To secure Item 1 where necessary.
3.	NUTS, Hex, MS, Cad P1, 4 BA	8	
4.	WASHERS, Lock, Steel, Cad P1, 4 BA	8	
5.	SCREWS, Self-tapping, Cad P1, 8 gauge x 1/2 in long.	8	

36. The following drawings are applicable:

- (a) BASE, Shock Mount – Assembly Detail (Fig 9)
- (b) RADIO SET, GRC-F2, Mobile Installation – General Arrangement (Fig 10)

37. The installation should be carried out as follows:

- (a) When deciding the best location for the equipment, adhere to the following general rules:
  - (i) Locate the radio set as near to the antenna base as practicable.
  - (ii) Mount the antenna base as high as possible and where there is no likelihood of the antenna rod contacting the vehicle chassis.
  - (iii) Mount the radio set on a firm, level surface within reach of the 24 Volt DC power source. The power lead supplied is 15 ft long.
  - (iv) Check the vehicle for maximum vibration areas. Avoid these areas as mounting positions for the radio set.
  - (v) Make every effort to cater for "User Requirements", (i.e. convenience and accessibility) but not at the expense of technical efficiency.

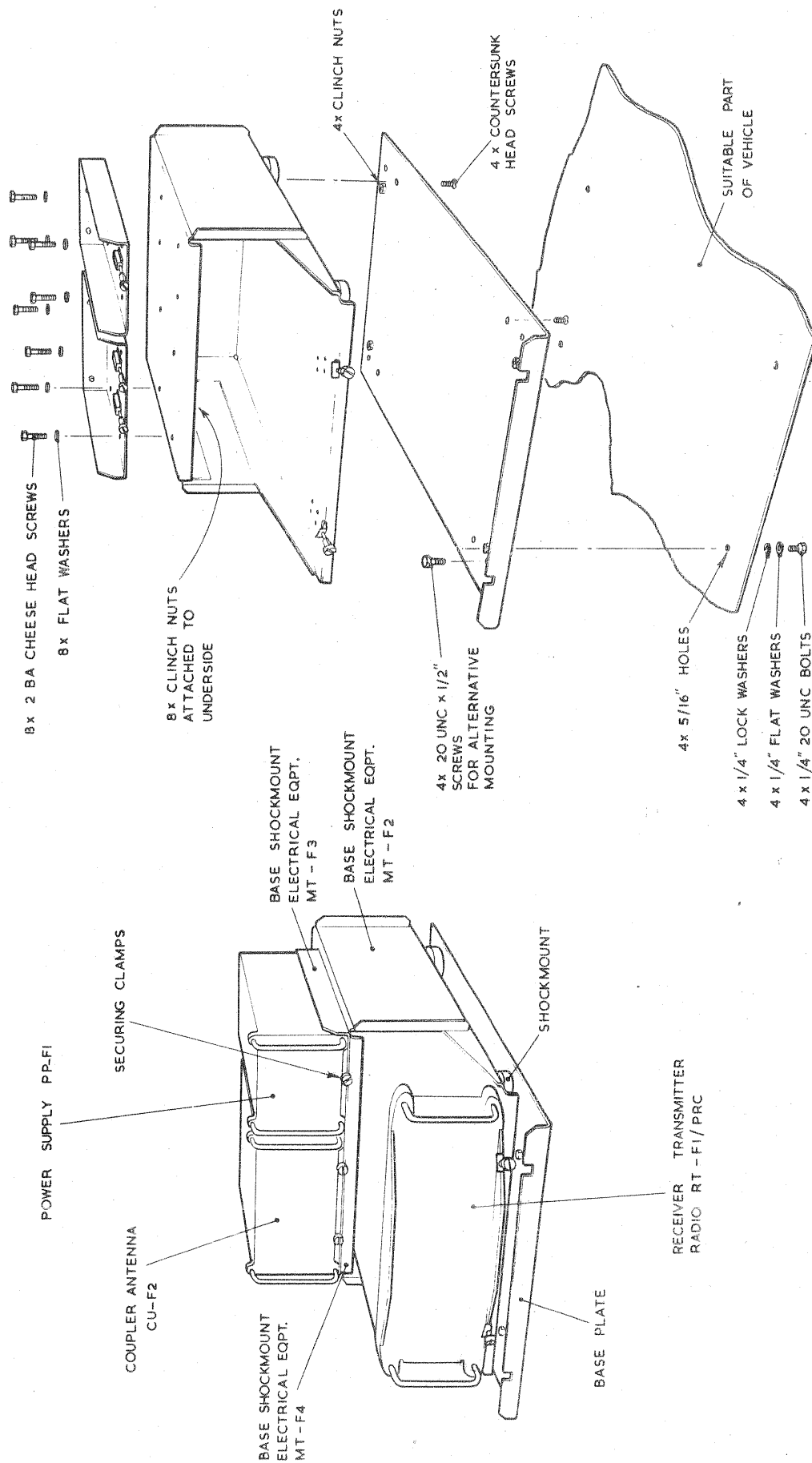


FIG 9 - BASE, SHOCK MOUNT - ASSEMBLY DETAIL



(b) Main Electronic Assembly (Refer to Fig 9)

The procedure (i) to (vii) inclusive should be followed if the Main Electronic Assembly is to be mounted on a surface UP through which it is possible to insert the mounting screws into the Nyloc clinch nuts mounted on the base plate.

If this is not possible, and it is required to fit the mounting screws DOWN into tapped holes in the mounting surface, the procedure to be followed is given in (viii) to (xiii) inclusive.

- (i) Remove the base plate from the BASE, Shock Mount, Electrical Equipment, MT-F2 by unscrewing the four countersunk head screws from the underside.
- (ii) Place the base plate in the position selected for the radio set and mark the position of the mounting holes.
- (iii) Drill four 5/16 in holes in the positions marked in step (ii) above.
- (iv) Re-assemble the base plate and BASE, Shock Mount.
- (v) Attach the BASE, Shock Mount, Electrical Equipment, MT-F4 and the BASE, Shock Mount, Electrical Equipment, MT-F3 to the BASE, Shock Mount, Electrical Equipment, MT-F2. Use the 2 BA screws and washers (Items 6 and 7) of the HARDWARE KIT, ELECTRONIC EQUIPMENT (Table 9) MK-F1. Screw through the "minor" bases into clinch nuts provided on the BASE, Shock Mount, Electrical Equipment, MT-F2.
- (vi) Place this 'composite bases assembly' in position over the mounting holes, and secure in position by screwing UP through the mounting surface, into clinch nuts on the base plate. Depending on the thickness of the mounting surface use either Item 1 or 2 (3/4 in or 1.3/4 in bolts) together with Items 4 and 5 (flat and lock washers), from the HARDWARE KIT, (MK-F1) (Table 9)
- (vii) Insert the following equipments into their respective BASE, Shock Mount, and tighten the screwed clamps provided, to hold them firmly in position.

RECEIVER-TRANSMITTER, Radio RT-F1/PRC.

COUPLER, ANTENNA, CU-F2

POWER SUPPLY, PP-F1.

- (viii) As for (i) above.
- (ix) As for (ii) using the plain holes next to the Nyloc clinch nuts.
- (x) Drill and tap 4 holes for 1/4 in 20 UNC. The holes should be drilled and tapped to give at least 3/8 in of effective thread length.
- (xi) As for (iv) above. Place this assembly over the tapped mounting holes and screw the 1/4 in 20 UNC x 1/2 in long slotted set screws provided DOWN into the tapped mounting holes.
- (xii) As for (v) above.
- (xiii) As for (vii) above.

(c) Earthing

- (i) Clamp the spade end of the 22 1/2 in earth strap (Item 1 in the EARTHING KIT) beneath the EARTH terminal of the COUPLER, antenna, CU-F2.
- (ii) Select a suitable earthing point. This will be the nearest convenient grounded portion of the vehicle frame. Drill a 5/16 in hole here and thoroughly clean away rust, paint or any impediment to a good electrical connection, from the surrounding area.
- (iii) If necessary, the 22.1/2 in earthing strap may be extended using the 12 in and/or 24 in earth straps from the EARTHING KIT (Items 2 and 3.) (Table 11)
- (iv) Items 4 to 8 of the EARTHING KIT should be used as necessary, to bolt the earth straps together and to the vehicle earth point.

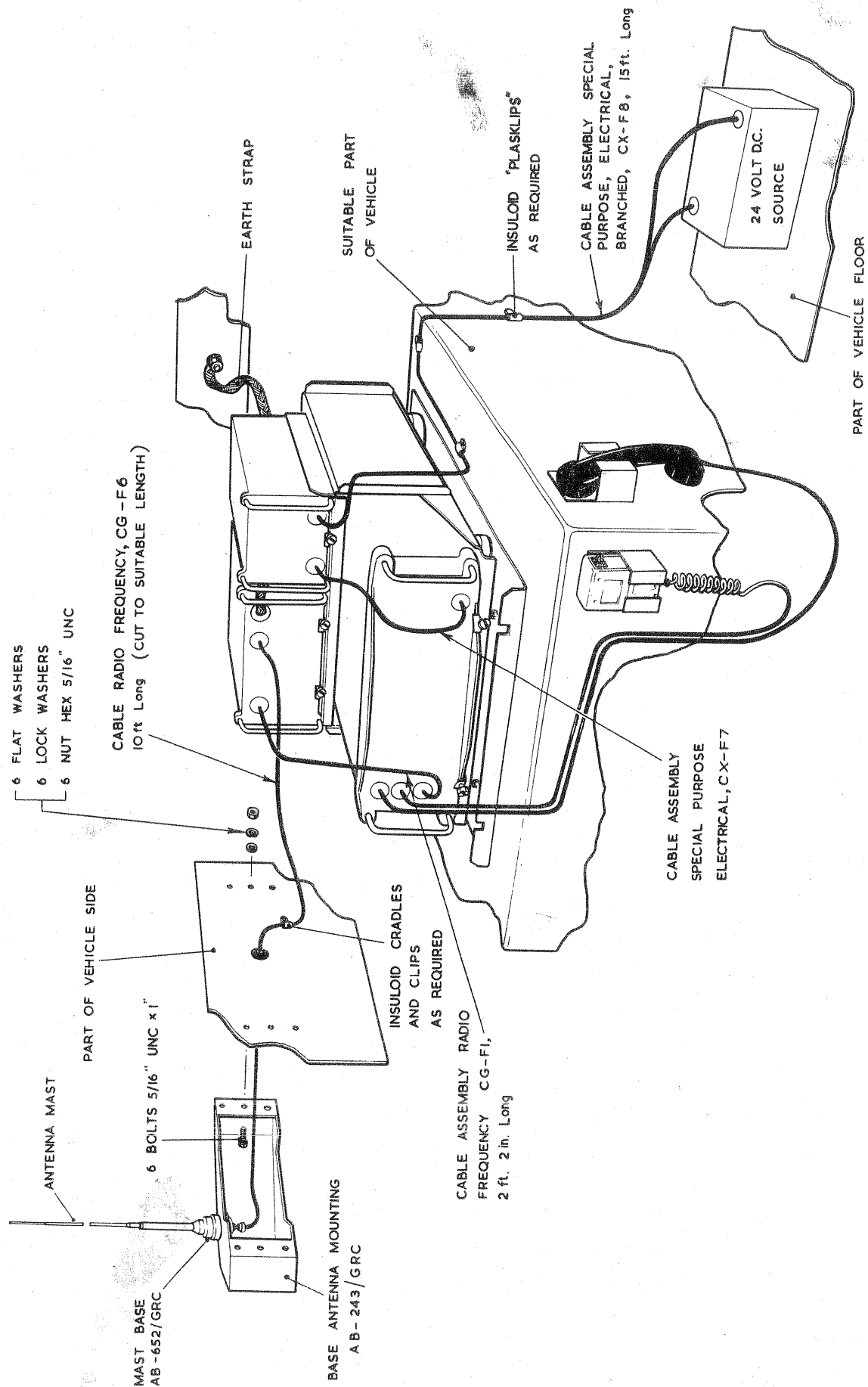


FIG 10 - RADIO SET GRC-F2 MOBILE INSTALLATION - GENERAL ARRANGEMENT

(d) Power Connections (Refer to Figure 10)

- (i) Connect the CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL from the three pin connector, on the lower right hand corner of the RECEIVER-TRANSMITTER front panel, to the connector marked "DC OUT TO R/T UNIT" which is situated on the POWER SUPPLY front panel.
- (ii) Connect the CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, CX-F8 15 ft long to the power supply via the connector marked "DC IN 20-40V".
- (iii) Run the CABLE ASSEMBLY to the 24 volt battery and secure it to the vehicle where necessary, using Items 1 to 5 from the CABLE Support Kit. (Table 12)
- (iv) Where it is necessary to pass through a partition, use a suitable grommet from the CABLE Support Kit to protect the cable from damage.

(e) Antenna Assembly (Refer to Figure 10)

- (i) Select the highest suitable point on which to mount the BASE, Antenna Mounting, AB-243/GRC.
- (ii) Using the BASE, Antenna mounting as a template mark the position of the mounting holes.
- (iii) Drill 5/16 in holes in the positions marked in step (ii) above.
- (iv) Bolt the BASE, Antenna mounting in position using Items 1 to 4 from the HARDWARE KIT, ELECTRONIC EQUIPMENT, MK-F2. (Table 10)
- (v) Drill an entry hole for the CABLE, RF, 10 ft (coupler to antenna base). (It may be more convenient to drill this hole before step (iv) above).
- (vi) Fit the most suitable grommet (Items 5-7 of the HARDWARE KIT MK-F2), and run the CABLE, RF, 10 ft by the shortest possible route, between the BASE, Antenna mounting, AB-243/GRC and the ANTENNA terminal on the COUPLER, Antenna, CU-F2.
- (vii) Cut the CABLE, RF, 10 ft to the length required in step (vi) above.
- (viii) If the CABLE, RF (now cut to length) needs support, use the cradles and clips provided in the LEAD-IN Support Kit. (Table 13)
- (ix) Fit together the five mast elements which comprise the 16 ft mast. From the bottom, these are: three type MS-116-A, one type MS-117-A and one type MS-118-A.
- (x) Fit the COVER, Antenna over the bottom section of the mast and clamp it in position using the CLAMP, Antenna sheath, brass.
- (xi) Screw the assembled mast into the MAST BASE, AB-652/GRC.
- (xii) Connect the CABLE ASSEMBLY, RF, CG-F1, 2 ft 2 in long between the BNC connectors on the front panel of the RECEIVER-TRANSMITTER, Radio RT-F1/PRC (centre left) and the front panel of the COUPLER, Antenna, CU-F2 (top left)

(f) Audio Accessories Mounting

Mount the two handset hooks and the microphone clip in a convenient position adjacent to the RECEIVER-TRANSMITTER Unit. These accessories together with suitable mounting screws are provided in the AUDIO ACCESSORY Mounting Kit MK-F6. (Table 14)

## INSTALLATION IN WATERCRAFT

38. This type of installation will normally be similar to installation in a vehicle. The highest part of the craft should be selected for mounting the mast base, and the coupler EARTH terminal should be connected to the metal hull or to the best available metal earthing point, if the hull is non-metallic.

39. If the available space will not permit the three units to be mounted together, the R/T unit and power supply may be mounted in one part of the craft, and the 50 ft RF cable used to connect R/T unit to the coupler, which must be close enough to the mast base to allow the 10 ft RF cable to be used for interconnection.

## INSTALLATION AS A GROUND STATION

40. At a ground station it will usually be more convenient to mount the three major units together on the shock mounting base, as for a vehicle installation. The antenna or antennas can then be erected and the counterpoise assembly or a good permanent earth system installed, according to the anticipated length of operation at the site.

## CHAPTER THREE – OPERATION

### SECTION 3 – TUNING

#### RADIO SET PRC-F1, MANPACK ROLE

41. After installation of the 8ft whip antenna as described in para 26 (b), the radio set may first be set up for the required operating mode and tuned to the assigned frequency while on the ground or in position on the back of the user. The final adjustments to the loading inductor must be made with the radio set in position on the back of the user.

#### WARNING

DO NOT drop the set to the ground by using the quick releases on the harness shoulder straps. Use special care when lowering the set and less maintenance will be required.

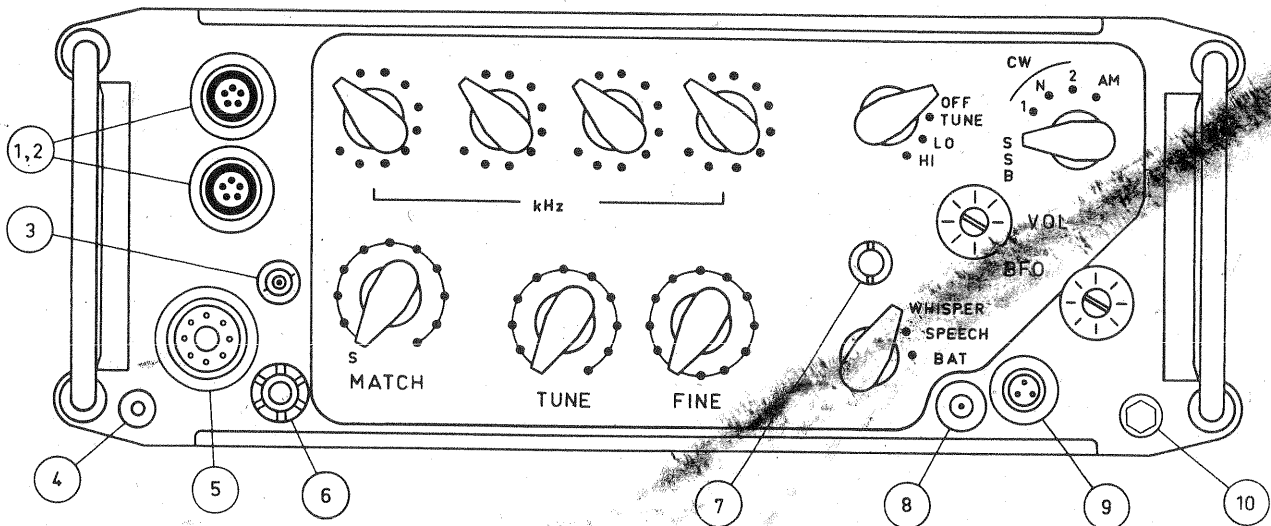


FIG 11 – RADIO SET PRC-F1 FRONT PANEL CONTROLS

TABLE 15 – FUNCTIONS OF RADIO SET PRC-F1 FRONT PANEL CONTROLS

Control or Connector	Function
kHz	Four switches for setting the assigned frequency in kHz, reading from left to right.
POWER	<p>OFF: Disconnects the battery supply from the R/T unit.</p> <p>TUNE: Energises a tone oscillator to provide an audible indication of correct tuning.</p> <p>LO: Adjusts the transmitter for low power output.</p> <p>HI: Adjusts the transmitter for high power output.</p>
SSB – CW(N – AM (1) (2)	<p>SSB: Upper sideband speech communication.</p> <p>CW1: Equivalent to 2 kHz tone telegraphy over SSB channel.</p> <p>CWN: 425 Hz bandwidth on receive with fixed beat note of 2 kHz.</p> <p>CW2: 6 kHz receiver bandwidth and BFO.</p> <p>AM: 6 kHz bandwidth. Compatible AM transmission, normal AM reception.</p>
VOL	Volume control for reception.
BFO	Beat oscillator frequency control, effective with CW2 reception only.

Control or Connector	Function
WHISPER – SPEECH – BAT	<p>WHISPER: Allows low level speech to fully modulate the transmitter.</p> <p>SPEECH: Requires normal level speech to fully modulate the transmitter.</p> <p>BAT: Checks condition of internal battery by lighting a pilot lamp when battery has some residual charge.</p>
MATCH	<p>Adjusts output matching to dipole or end fed wire antennas.</p> <p>NOTE: Set to S when using 8 ft rod antenna.</p>
TUNE	<p>Tunes reactive component of antenna circuit.</p> <p>NOTE: Not used with 8 ft rod antenna.</p>
FINE	Fine control for TUNE circuit.
(1) and (2)	Parallel connectors for handset, microphone and telegraph key.
(3)	RF connector. Only used with Coupler, Antenna, CU-F2.
(4)	Earth terminal, for counterpoise or one end of dipole feeder.
(5)	Connector for 8 ft rod antenna.
(6)	Connector for end fed wire antenna or one end of dipole feeder.
(7)	Humidity indicator.
(8)	Battery indicator lamp.
(9)	<p>Connector for Power Supply PP-F1.</p> <p>NOTE: The dummy plug <u>must</u> be inserted when external power supply is not used.</p>
(10)	Plug for seal testing.

42. Set up the Radio Set PRC-F1 as follows:

- NOTE:
- (a) Set the MODE switch to SSB, CW1, CWN, CW2 or AM as required.
  - (b) Convert the assigned frequency to kilohertz; e.g., 7.832 MHz = 7832 kHz. Set this number on the four kHz switches, reading from left to right.  
If the assigned frequency has five digits, set the first two on the left hand switch, at 10 or 11 as appropriate, and the remaining three digits on the other three switches.
  - (c) Connect the handset, or the microphone and single head receiver, as required.
  - (d) Turn the switch to WHISPER or SPEECH as required.
  - (e) Check that the Coupler, Antenna, CU-F1 is firmly screwed into its socket and that the rod is securely held in the top of the coupler. Set the indicator approximately to the assigned frequency.
  - (f) Set the antenna MATCH control to position S (fully anticlockwise). This control must remain in this position while the rod antenna is used.
  - (g) Set the POWER switch to TUNE.
  - (h) If the CW2 mode is being used, adjust the BFO control to produce a suitable tone. It will be noted that, even in the absence of a received signal, the quality of the receiver noise will vary as the BFO control is adjusted.
  - (j) Press the handset or microphone pressel, or key, to bring the set into the transmit condition. A tone, whose purpose is to allow tuning of the equipment, will be heard.
  - (k) Rotate the knob on the antenna coupler until the pitch of the tuning tone is reduced to a low frequency. It must be noted that the zero beat method of tuning is not used, and tuning has been carried out correctly when the lowest possible tone, not an absence of tone, is achieved. Release the pressel switch or key.
  - (l) If the tone does not vary with tuning, check the battery by setting the WHISPER-SPEECH-BAT switch to the BAT position. The lamp adjacent to the switch will light if the battery is adequately charged. If not, replace the battery (para 58).

- (m) Place the unit in position in the harness on the back of the user and readjust the loading inductor on the coupler until the lowest possible tuning tone is heard.

#### NOTE

THIS FINAL TUNING ADJUSTMENT IS MOST IMPORTANT. ADJUSTMENT MADE WITH THE UNIT ON THE GROUND WILL NOT BE CORRECT FOR OPERATION ON THE USER'S BACK.

This adjustment should be checked from time to time, as detuning can be caused by proximity to metallic objects or large bodies such as trees or buildings.

- (n) Set the POWER switch to LO or HI as required. The equipment is now ready for operation.

#### RADIO SET PRC-F1, GROUND STATION ROLE

43. If the dipole is to be used with PRC-F1, remove the 8 ft whip antenna. Erect the dipole antenna as described in para 29, then proceed as follows.:-

- Carry out steps (a) to (j) of para 42 (PRC-F1 manpack), omitting step (e).
- Set the antenna MATCH control to position S.
- Adjust the TUNE control, followed by the FINE control, until the lowest tuning tone has been achieved. Repeat the adjustments to the TUNE and FINE controls, using the FINE control only for final adjustment. If the initial adjustment of the TUNE control does not noticeably change the tone, adjust the MATCH switch for lowest tone, and then readjust the TUNE control.

Make final adjustments with the FINE and MATCH controls.

- (d) Set the POWER switch to LO or HI as required. The set is now ready for operation.

#### RADIO SET GRC-F2, GROUND STATION ROLE

44. When the GRC-F2 is used in conjunction with the Coupler, Antenna, CU-F2 the 8 ft whip antenna must be removed from the R/T unit and the MATCH control set to position S. The TUNE and FINE controls on the R/T unit are not used, and the controls on Coupler CU-F2 only are used for antenna matching. These controls are shown in Fig 12, and their functions are described in Table 16.

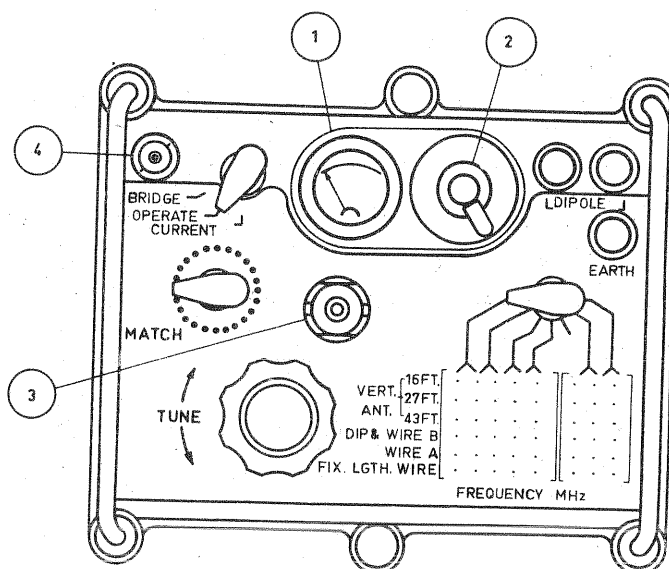


FIG 12 - COUPLER, ANTENNA, CU-F2, FRONT PANEL CONTROLS

TABLE 16 – FUNCTIONS OF FRONT PANEL CONTROLS, COUPLER CU-F2

Control or Connector	Function
BRIDGE – OPERATE – CURRENT (Spring Loaded to OPERATE position)	BRIDGE: Used to match the antenna to 50 Ohms. OPERATE: Normal condition; metering out of circuit. CURRENT: Monitors antenna current on meter.
MATCH	Matches impedance of antenna to 50 Ohms.
TUNE	Tunes reactive component of antenna impedance.
FREQUENCY MHz	Sets up correct circuit and components for antenna in use at the assigned frequency.
DIPOLE	Connectors for twin dipole down leads.
EARTH	Earth terminal for end fed antennas.
(1)	Meter for bridge indication or antenna current monitoring.
(2)	Spring loaded connector for end fed antenna.
(3)	Humidity indicator.
(4)	Connector for RF cable to R/T unit.

45. Erect the antenna (dipole or end fed wire) as described in para 29, 32 or 33, and connect and tune as follows:–

- (a) Connect the antenna to the Coupler CU-F2.
  - (i) Dipole: Connect the two down leads to the red DIPOLE terminals.
  - (ii) End Fed Wire: Connect the down lead to the spring loaded terminal.  
Install the counterpoise assembly and connect the green lead to the black EARTH terminal.
- (b) Carry out steps (a) to (j) of para 42 (Manpack Role), omitting step (e).
- (c) An antenna current meter is provided on the Coupler CU-F2 and tuning is carried out by adjusting the controls for maximum meter reading. The tuning tone is not used, but it will be necessary to maintain pressure on the microphone or handset pressel to keep the R/T unit in the transmit condition.
- (d) Make sure that the MATCH control on the R/T unit is set to position S, and the 8 ft whip antenna and Coupler CU-F1 are removed. The following procedure is then carried out on the Coupler CU-F2 only.
- (e) Set the FREQUENCY MHz selector switch on Coupler CU-F2 to the proper position for the antenna in use and the assigned frequency.
- (f) Set the MATCH control to the maximum anticlockwise position.
- (g) Set the TUNE control also to the maximum anticlockwise position.
- (h) Set the BRIDGE-OPERATE-CURRENT switch to BRIDGE and hold it in this position against the return spring while making adjustments.
- (j) Adjust the TUNE control for maximum meter reading.
- (k) Adjust the MATCH control for maximum meter reading.
- (l) Repeat steps (j) and (k) as required until maximum meter reading is obtained.
- (m) Hold the BRIDGE-OPERATE-CURRENT switch to the CURRENT position and again make successive adjustments to the TUNE and MATCH controls until maximum meter reading is obtained.
- (n) Release the pressel and set the BRIDGE-OPERATE-CURRENT switch to OPERATE. The Coupler CU-F2 is now tuned and ready for operation.

NOTE: The maximum meter reading depends on the antenna installation and the assigned frequency and will vary with different operating conditions. Tuning may appear to be obtained on settings of the FREQUENCY MHz switch other than those specified in the table. However, such settings are almost invariably accompanied by unnecessary losses and overloading in the tuning circuits and should be avoided.

## VEHICLE OR GROUND ROLE USING INSTALLATION KIT, ELECTRONIC EQUIPMENT, GENERAL PURPOSE RADIO SET GRC-F2

46. The installation kit includes a Power Supply PP-F1 which must be powered by a battery or generator. Set the ON/OFF switch of the Power Supply to OFF and the charging rate switch to FULL or to TRICKLE as required by the condition of the internal battery of the R/T unit. Refer para 51 for correct charging procedure. After completing the installation, as described in Section 8, set the ON/OFF switch on the Power Supply to ON and carry out the tuning procedure as for a ground station, para 45. Fig 13 shows the front panel controls of the Power Supply, and Table 17 describes their functions.

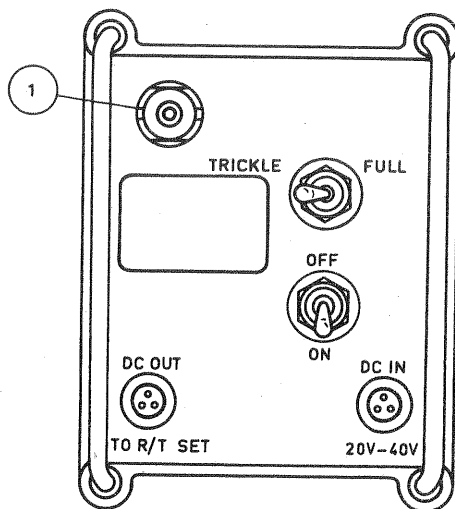


FIG 13 – POWER SUPPLY PP-F1 FRONT PANEL CONTROLS

TABLE 17 – FUNCTIONS OF FRONT PANEL CONTROLS, POWER SUPPLY PP-F1

Control or Connector	Function
TRICKLE – FULL	Charging rate switch. TRICKLE rate = 20 mA; FULL rate = 100 mA.
ON – OFF	Switches input to power supply on or off.
DC IN 20V – 40V	Connector for input from power source.
DC OUT TO R/T SET	Connector for output to R/T unit.
(1)	Humidity indicator.

## SECTION 10 – OPERATING

### MODE SELECTION

47. Selection of the mode of operation is made by a 5 position switch, the positions being designated SSB, CW1, CWN, CW2 and AM.

- SSB. While either SSB or AM may be used for speech, the SSB mode is preferred when working with other PRC-F1 units or other equipment capable of using SSB. The AM mode is included for working with other types of equipment having an AM facility only.
- CW1. Used for transmitting and receiving Morse signals using a 2 kHz tone. In this mode SSB speech will be received but not transmitted.



- CWN. This mode is similar to CW1, but the received signal is passed through a narrow bandpass filter, thus reducing interference. Owing to its extreme selectivity, this mode is only practicable when working with other PRC-F1 radio sets or with other equipment of comparable frequency accuracy and stability.
- CW2. In this mode the receiver output tone is produced by an internal adjustable beat frequency oscillator (BFO). It is useful when the received signal is not precisely on the assigned frequency.
- AM. Used for intercommunication with other equipment using AM. As stated above, the SSB mode is preferable for speech when working with compatible equipment.

#### LO-HI POWER

48. The R/T unit transmitter may be operated on reduced power for working at close range. This conserves the battery and reduces the possibility of interference with other radio sets. On high power the transmitter output is approximately 10 watts on SSB or AM and 5 watts on CW. On low power the output is approximately 1 watt on all modes. The power output is controlled by the POWER switch, whose OFF position serves as an ON/OFF control for the R/T unit while the TUNE position is used in the tuning procedures, as described in para 42 and 43.

#### WHISPER-SPEECH

49. This facility has been incorporated so that the radio set may be used when it is desirable that sound should be kept to a minimum. Whisper means low level speech rather than actual whispering. Low level speech will fully modulate the transmitter when the switch is set to WHISPER, but the SPEECH position should always be used where possible, since background noise is thereby reduced.

#### SIDETONE

50. Sidetone is present in the R/T unit audio output on all modes of transmission, for monitoring purposes. On the CW modes, a 2 kHz sidetone is heard. On SSB and AM, the speech is heard. In either case the sidetone is only present when the transmitter is actually radiating.

#### BATTERY CHARGING

51. When using the Installation Kit, General Purpose, Electronic Equipment, Radio Set GRC-F2, the battery of the R/T unit should be charged as follows:-

- (a) Set the charge rate switch on the Power Supply PP-F1 to FULL for a period equal to 1.1/2 times the period of use since the last charge. For example, if the R/T unit has been used for 4 hours, charge at FULL rate for 6 hours.
- (b) At the end of this period, set the charge rate switch to TRICKLE and leave it in this position.

#### WARNING

DO NOT LEAVE THE BATTERY ON FULL CHARGE FOR LONGER THAN SPECIFIED  
ON THE BATTERY CASE

## CHAPTER FOUR – OPERATOR'S MAINTENANCE INSTRUCTIONS

### SCOPE OF OPERATOR'S MAINTENANCE

52. The maintenance duties to be performed by the operator are listed below. No special tools or test equipment are required. The major items are sealed units and must not be opened by the user, except for the replacement of the internal battery of the R/T unit as described in para 58.

- (a) Preventive maintenance (para 53).
- (b) Visual inspection (para 54).
- (c) Operational checklist (para 55 to para 57).
- (d) Replacement of battery (para 58).
- (e) Recharging of battery (para 59).

### \* PREVENTIVE MAINTENANCE

53. Carry out the following preventive maintenance daily.

- (a) Check that all items of equipment are present. (Refer to Tables 1, 2 or 3 as required).
- (b) Clean all equipment of dust or mud accumulation. Take particular care with connectors, and the joints on rod antenna.
- (c) Clean the insides of all dust caps and check that the synthetic rubber discs are present inside the caps. Keep the dust caps on the connectors when not in use.
- (d) Check that all controls work smoothly and that all knobs are tight on the spindles.
- (e) Inspect the dipole and end fed wire antennas for frayed insulation or damaged wires. Check that they are correctly wound on their bobbins after use.
- (f) Check the RF cables and the electrical cables for damaged wiring, frayed insulation or damaged connectors.
- (g) Keep all equipment free from grease or oil. Clean with gasoline or cleaning compound if necessary.
- (h) Check the internal battery of the R/T unit, using the BAT switch facility.
- (j) Inspect the humidity indicator on each of the major units. If it has turned pink, moisture is present inside the unit. It should be returned as soon as practicable to a RAEME workshop or ordnance depot for drying and resealing.

### \* VISUAL INSPECTION

54. If the equipment fails to operate properly, switch off the power and check for the following:--

- (a) Incorrect setting of switches and controls. Refer to tuning instructions para 42 (Radio Set PRC-F1 Manpack Role), para 43 (Radio Set PRC-F1 Ground Station Role), para 45 (Radio Set GRC-F2 Ground Station Role), para 46 (Vehicle or Ground Role using Installation Kit).
- (b) Disconnected or improperly connected cables. Refer to installation instructions para 26 (Manpack Role, Radio Set PRC-F1), para 27 to 29 (Ground Station Role, Radio Set PRC-F1), para 30 to 33 (Ground Station Role, Radio Set GRC-F2), para 35 to 40 (Vehicle, Ground or Watercraft Role using Installation Kit).
- (c) Broken or frayed cables.
- (d) Broken or grounded antenna wire or down lead.
- (e) Handset or headset disconnected or improperly connected.
- (f) Battery discharged. Use BAT switch test, para 42, step (1)

If the visual inspection does not reveal the cause of the fault, proceed to the relevant operational checklist below, para 55, 56 or 57.

# OPERATIONAL CHECKLIST, RADIO SET PRC-F1

55. The operational checklists will help the operator to locate simple faults. If the suggested corrective action does not restore normal operation, repair work is required. Note on the proper form what corrective measures were taken and how the equipment performed at the time of failure.

TABLE 18 – OPERATIONAL CHECKLIST, RADIO SET PRC-F1 USING WHIP ANTENNA

Step	Action	Normal Indication	Corrective Measure
1	Connect rod antenna and coupler. Set POWER switch to TUNE. Set MATCH to S. Connect handset or mic and earpiece.	Noise heard in receiver.	Adjust VOLUME. Check that dummy plug is on power connector.
2	Press pressel switch on handset or mic.	Tuning tone heard in receiver.	Check controls and connections.
3	Set kHz switches to assigned frequency. Hold in pressel and adjust knob on coupler.	Tuning tone dips to low pitch at correct tuning.	Check cables and connectors. Recheck tuning of coupler.
4	Set POWER switch to LO. Set MODE switch to SSB or AM. Hold in pressel and speak into mic.	Sidetone (speech) heard in receiver.	Check mic or handset cable and connector.
5	Connect key. Set MODE switch to CW1. Operate key.	Sidetone (2kHz) heard in receiver.	Check key, cable and connector.
6	Test with another station on SSB or CW.	Speech or morse heard in receiver.	Adjust VOLUME. Check tuning controls and connections.
7	Set MODE to CW2 and use BFO.	Morse reception varies in pitch with BFO setting.	Check tuning controls.

TABLE 19 – OPERATIONAL CHECKLIST, RADIO SET PRC-F1 USING DIPOLE ANTENNA

Step	Action	Normal Indication	Corrective Measure
1	Remove rod antenna and coupler. Connect dipole. Set POWER switch to TUNE. Set MATCH to S. Connect handset or mic and earpiece.	Noise heard in receiver.	Adjust VOLUME. Check that dummy plug is on power connector.
2	Press pressel switch on handset or mic.	Tuning tone heard in receiver.	Check controls and connections.
3	Set kHz switches to assigned frequency. Hold in pressel and adjust TUNE, FINE and MATCH (para 43).	Tuning tone dips to low pitch at correct tuning.	Check all connections. Recheck tuning of TUNE, FINE and MATCH controls. Check antenna for short circuit to earth. Check that R/T unit is isolated from earth.
4	Carry out steps 4 to 7 of Table 18.	As Table 18.	As Table 18.

# OPERATIONAL CHECKLIST, RADIO SET GRC-F2

56. First check that the antenna is correctly installed and connected (Dipole, para 28, end fed wire, para 31) and that Coupler CU-F2 is connected to the R/T unit by the RF cable 2 ft or 50 ft.

TABLE 20 - OPERATIONAL CHECKLIST, RADIO SET GRC-F2

Step	Action	Normal Indication	Corrective Measure
1	R/T UNIT. Set POWER switch to TUNE. Set MATCH to S. Connect handset or mic and earpiece.	Noise heard in receiver.	Adjust VOLUME. Check that dummy plug is on power connector.
2	Press pressel switch on handset or mic.	Tuning tone heard in receiver.	Check controls and connections.
3	COUPLER CU-F2 Set FREQUENCY MHz switch to assigned frequency and antenna type. Hold meter switch to BRIDGE. Hold pressel or key and adjust MATCH and TUNE for maximum current.	Meter reading rises at correct tuning.(Definite peak, but not necessarily FSD)	Check that R/T MATCH switch is at S. Check for correct setting of FREQUENCY MHz switches on Coupler CU-F2. Check RF cable from R/T unit to Coupler CU-F2. Check controls and connections. Recheck tuning of MATCH and FINE controls on coupler.
4	Hold meter switch to CURRENT and readjust MATCH and FINE controls.	Definite peak in meter reading.	Check antenna and downleads for short circuit to earth.
5	Release meter switch and carry out steps 4 to 7 of Table 18.	As Table 18.	As Table 18.

# OPERATIONAL CHECKLIST, RADIO SET GRC - F2, IN MOBILE INSTALLATION

57. First check that the antenna is correctly installed and connected (dipole, para 28, end fed wire, para 31), that Coupler CU-F2 is connected to the R/T unit by the RF cable 2 ft or 50 ft and that the Power Supply PP-F1 is connected to the R/T unit by the cable, electrical, and the power supply is connected to the power source (para 37 (d) ).

TABLE 21 - OPERATIONAL CHECKLIST, RADIO SET GRC - F2, IN MOBILE INSTALLATION

Step	Action	Normal Indication	Corrective Measure
1	POWER SUPPLY Set charge switch to FULL or TRICKLE as required (para 51). Set ON-OFF to ON.	None	None
2	R/T UNIT Set POWER switch to TUNE. Set MATCH to S. Connect handset or mic and earpiece.	Noise heard in receiver.	Adjust VOLUME. Check power supply connections.
3	Carry out steps 2 to 5 of Table 20.	As Table 20.	As Table 20.



## REPLACEMENT OF BATTERY

- 58.
- (a) Place the R/T unit face downwards on a clean level surface.
  - (b) Release the four spring clips at the rear of the unit and remove the rear cover.
  - (c) Remove the battery by pressing it against the spring contacts and lifting the other end.
  - (d) Insert the new battery with the terminal studs against the spring contacts.
  - (e) Press the battery against the spring contacts and then lower the other end.
  - (f) Replace the rear cover.

## RECHARGING OF BATTERY

59. When the R/T unit is used with the Installation Kit, the internal battery of the R/T unit is charged by the Power Supply PP-F1, as described in para 21. However, this power supply will only charge one battery at a time. Whenever possible, use should be made of the Regulator Set MX-F1, which includes Regulator, Battery Charger F1. This equipment will charge up to 10 batteries simultaneously. A description of this equipment, and the precautions to be observed when charging nickel-cadmium batteries, will be found in the associated publication User Handbook for Regulator Set MX-F1.

### WARNING

THE BATTERIES MUST NOT BE CHARGED BY ANY MEANS OTHER THAN EITHER THE  
POWER SUPPLY PP-F1 OR THE REGULATOR SET MX-F1

## CHAPTER FIVE—DESTRUCTION TO PREVENT ENEMY USE

### METHODS OF DESTRUCTION

60. Any of the methods of destruction given below may be used upon the order of the officer in charge. The time available and the tactical situation will determine the method to be used.

- (a) Smash Smash the control panel and interior with the heaviest tool available if time does not permit dismantling of the equipment. Use sledges, axes, handaxes, pickaxes, hammers, crowbars or heavy tools.
- (b) Cut Cut the input cables in a number of places; use axes, knives, machetes and similar tools. If time permits, slash the interior wiring.
- (c) Burn Burn the instruction literature first, and as much of the equipment and spare parts as are flammable; use gasoline, oil or a flamethrower.
- (d) Explode Use explosives when time does not permit destruction by other means. HE Charges or fragmentation grenades should be placed against the control panel.
- (e) Dispose Bury the destroyed parts in trenches or holes.

## NOTES