Rockwell International

operator's manual

Collins Canada Division/Toronto, Ontario

Introduction

The MP-20 Radio Set (figure 1 is a lightweight HF portable receiver – transmitter which offer many desirable features.

Figure 1. MP-20 Radio Set.

■ 20 watts of RF power output (pep or average)

■ 280,000 communications channels in the 2- to 30-MHz band at 100-Hz increments

■ SSB and AM operation

■ Voice, CW and data modulation

■ Rugged construction

■ Much smaller size and lighter weight then older systems

■ Fully waterproof

■ Low power consumption

■ An integrated, automatic antenna tuner with constant VSWR surveillance for greater efficiency.

MP-20 radio set components

The MP-20 Radio Set, shown in figure 2, consists of the 719D-2A Receiver Transmitter Group, 612A-1 Battery, 963A-l Radio Set Harness, H-189/GR Handset, and 938A-2 Antenna.

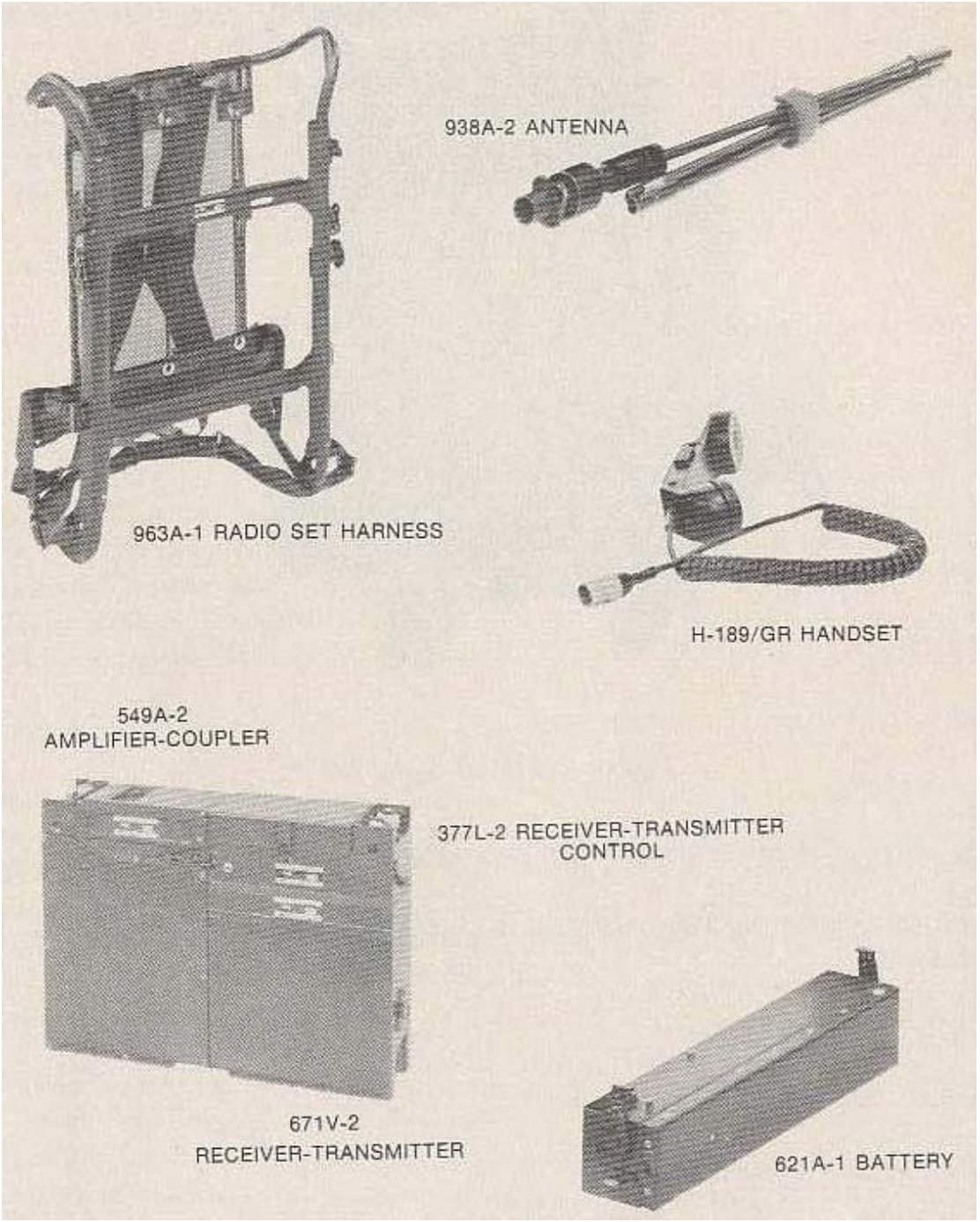

Figure 2. MP-20 Radio Set Components

7191D-2A receiver-transmitter group

A compact lightweight receiver - transmitter consisting of three units: 377L-2 Receiver – Transmitter Control, 671V-2 Receiver – Transmitter, and a 549A-2 Amplifier-Coupler. When mechanically latched together, these units are electrically connected through mating connectors. All operating controls for the receiver-transmitter are located beneath a hinged cover on the 377L-2.

612A-1 battery

A Nickel cadmium, 1.8 Ah, battery that latches beneath the 719D-2A Transmitter – Receiver Group. It supplies DC power to the receiver – transmitter for 12 hours of operation at a 1:9 transmits voice/receive duty cycle.

963A-1 radio set harness

A Lightweight, rugged pack frame with adjustable straps. It can hold, simultaneously, a 719D-1A Receiver-Transmitter Group, 612A-1 Battery, and either an 886B-I Generator or a spare 612A-1 Battery. The field pack attaches to the rear of the pack frame, and has compartments to store all the accessory components except the 412Y-2 Battery Charger.

H-189/GR handset.

A Handset with an earpiece, microphone, and push-to-talk (ptt) switch in one assembly. It is connected to the receiver-transmitter through a coiled cord and plug.

938A-2 antenna

A 2.4 meters (8-foot) whip antenna that can be easily folded for storage. It has a shock absorbing mount and detent positioning device capable of ±90" front-to-back movement in 45^{o} increments.

MP-20 accessory components

Accessory components, shown in figure 3. that may be used with the MP-20 include headset, telegraph key, 540L-1 Battery Cable, 938A-1 Antenna, antenna counterpoise, 540K-1 Control Extender, 412Y-2 Battery Charger, 886B-1 Generator, and nonrechargeable battery.

Figure 3. Accessories Components (Sheet 1).

Headset

A headset consisting of two earpieces, a boom microphone, a push to talk (ptt) switch, a headband, and a coiled cord and plug.

Telegraph key

The telegraph key is adjustable in tension and gap, and has a 0.9-metre (3-foot) flexible cord and plug. The key can be attached to the operator's thigh with a strap.

540L-1 battery cable

A 1.5-metre (5-foot) cable and a canvas bag, with an adjustable shoulder strap, that allows the 612A-1 Battery to be carried under the operator's outer clothing during very cold weather.

938A-1 antenna

A dipole antenna that consists of two 35.67-metre (117-foot) braided wires wrapped on individual plastic bobbins, that allow long-range communication. Each wire has a 15.25-metre (50-foot) throwing line attached. The two wires are connected to a center junction, which is connected to the receiver - transmitter with a 15.25-metre (50-foot) antenna feeder cable.

Antenna counterpoise

Four 10-metre (32.8-foot) braided wires, wrapped on a plastic bobbin, are used to provide a ground plane in low electrical conductivity areas. The four wires are connected together at a center junction, which is connected to the receiver-transmitter with a 1.8-metre (6-foot) cable.

510K-1 control extender

A 2-piece unit that allows the 377L-2 Receiver-Transmitter Control to be extended for one-man operation of the receiver-transmitter while it is mounted on the operator's back. The 377L-2 plugs into the part that clips onto the operator's belt. The other part, connected through a cable, secures to the 671V-2 Receiver-Transmitter.

Figure 3. Accessories (Sheet 2).

412Y-2 battery charger

A portable battery charger, with a cover, that allows up to six 612A-1 Batteries to be charged or discharged simultaneously. It operates with either +28 volts dc power or 110 volts ac power. A simple internal wiring change permits Operation on 220-V ac power.

886B-1 generator

A hand-operated generator that can be latched between the receiver-transmitter and the battery to extend the operating time indefinitely. The charging current is about 125 mA at cranking speeds that can be maintained by the operator for 15 minutes.

Nonrechargeable battery

The nonreehargeable battery is a dry expendable battery that can directly replace the 612A-1 Battery.

Operating configurations and options

The accessory components may be used with the 719D-2A Receiver-Transmitter Group to produce operating configurations for various missions. Options that must be considered in selecting the proper configuration include: type of input power, mission duration, transmission range, stationary or mobile use, one or two man operation and weather conditions.

Standard two-person configuration

The standard configuration consists of the 719D-2A Receiver-Transmitter Group and 612A-1 Battery installed in the 963A-l Radio Set Harness. The 938A-2 Antenna is connected to the antenna connector and the H-189/GR Handset is connected to an audio connector. This configuration may be used during mobile missions of up to 12 hours operating time and distances up to 25 kilometers (15.5 miles). Normally, two persons are required; one to carry the unit, the other to operate the controls from the rear.

Single operator configuration

The 377L-2 Receiver-Transmitter Control can he clipped onto the operator's belt using the 540K-1 Control Extender. This makes it possible for one person to operate the 719D-2A Receiver-Transmitter Group while carrying it.

Cold weather configuration

During very cold weather, the 612A-1 Battery must be kept warm to obtain sufficient mission time. The 540L-1 Battery Cable allows the 612A-1 Battery to be removed from the 963A-1 Radio Set Harness and to be carried in a battery bag under the operator's outer clothing.

Audio/keying option

The 719D-2A Receiver-Transmitter Group can be keyed by the H-189/GR Handset, the headset, the telegraph key, or by a modem. All connections are made to one of the two audio connectors on the 377L-2 Receiver-Transmitter Control.

Input power option

The 963A-1 Radio Set Harness is made to accept a second 612A-1 Battery, which is latched beneath the operating 612A-l Battery. When the operating G12A-1 Battery becomes discharged, it can be interchanged with the spare 612A-l Battery to provide a total of 24 hours of operation.

For cases of isolated or extended missions, when recharged 612A-1 Batteries are not available, the 886B-1 Generator is used to replenish the battery charge. It may be used either when the 719D-2A Receiver-Transmitter Group is not being used or when it is in operation. The 886B-1 Generator connects directly between the 719D-2A Receiver-Transmitter Group and 612A-1 Battery on the 963A-l Radio Set Harness, without the need for additional cables.

Antenna option

In dry or rocky terrain of low electrical conductivity, a counterpoise Is provided for use with the whip antenna. The simple 4-wire counterpoise is laid out on the ground and its center connected to the shell of the BNC connector on the 719D-2A Receiver-Transmitter Group.

To accomplish extended range communications, a simple portable 93SA-1 Antenna (dipole) is provided for use in place of the 2.4-metre (8-foot) whip antenna. Each leg of the dipole has a nylon throw line for stringing the dipole between convenient trees or other structures. The center of the dipole has a coaxial feed cable, which is connected to the BNC connector on the 719D-2A Receiver-Transmitter Group. The dipole may be erected either vertically or horizontally; horizontal erection providing, the greater range.

A 637K-1 Antenna can be used with the 719D-2A Receiver-Transmitter Group. This high-angle radiation antenna requires a base adapter.

Preparation for use

Make sure the contents of Operating Configurations and Options is understood before proceeding with the Preparation for Use procedures.

963A-1 radio set harness

A. Remove pack frame, field pack, and straps from shipping container
B. Place nylon backrest over top and bottom horizontal tubular parts of pack frame. Refer to figure 4. The 3-tab end of backrest goes on top. Lace nylon string between eyelets on top and bottom of backrest and tie securely. Strings should be on the inward side of the pack frame

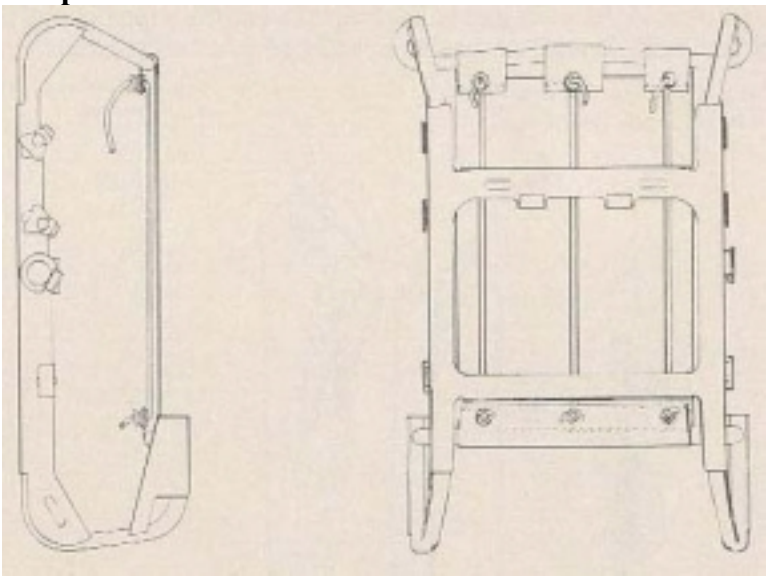

Figure 4. Attaching Backrest to Pack Frame

C. Slide lower backstrap through slots on pack frame and connect turnbuckle to both ends of lower backstrap. Refer to figure 5. Tighten turnbuckle. This adjustable lower backstrap keeps the load away from the carrier's back and allows air circulation between the back and the load. When the turnbuckle is screwed tight, the strap is almost flat. If the carrier's waist is small, the turnbuckle should be loosened enough to allow the backstrap to curve in and fit against the lower back.

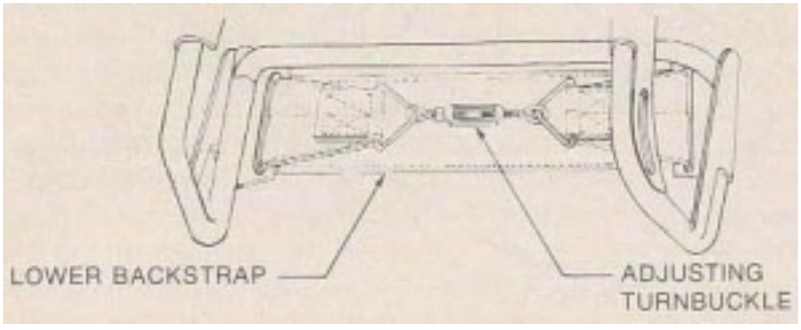

Figure 5. Attaching Lower Backstrap to Pack Frame

D. The two padded shoulder straps are attached to the pack frame at the top and bottom. Refer to figure 6. The shoulder strap with the quick release assembly is for the left shoulder. Insert the looped (lower) end of the shoulder strap from the inside of the pack frame through the opening at the bottom side (just below the slot that accepts the lower backstrap). Thread the strap trough the loop and pull tight. Route the webbing at the top of the strap around the top of the frame (between the tabs of the nylon backrest) trough the buckle and pull tight. Repeat the procedure with the other shoulder strap.

E. The waist strap has a quick release assembly like the left shoulder strap. The part of the waist strap with the pull-tab should be attached on the left or right of frame, depending on which hand is used to pull it open. Insert the looped end of the strap from the outside of the pack frame trough the opening on the lower part of the frame. Thread the strap trough the loop and pull tight. Repeat the procedure with the other waist strap.

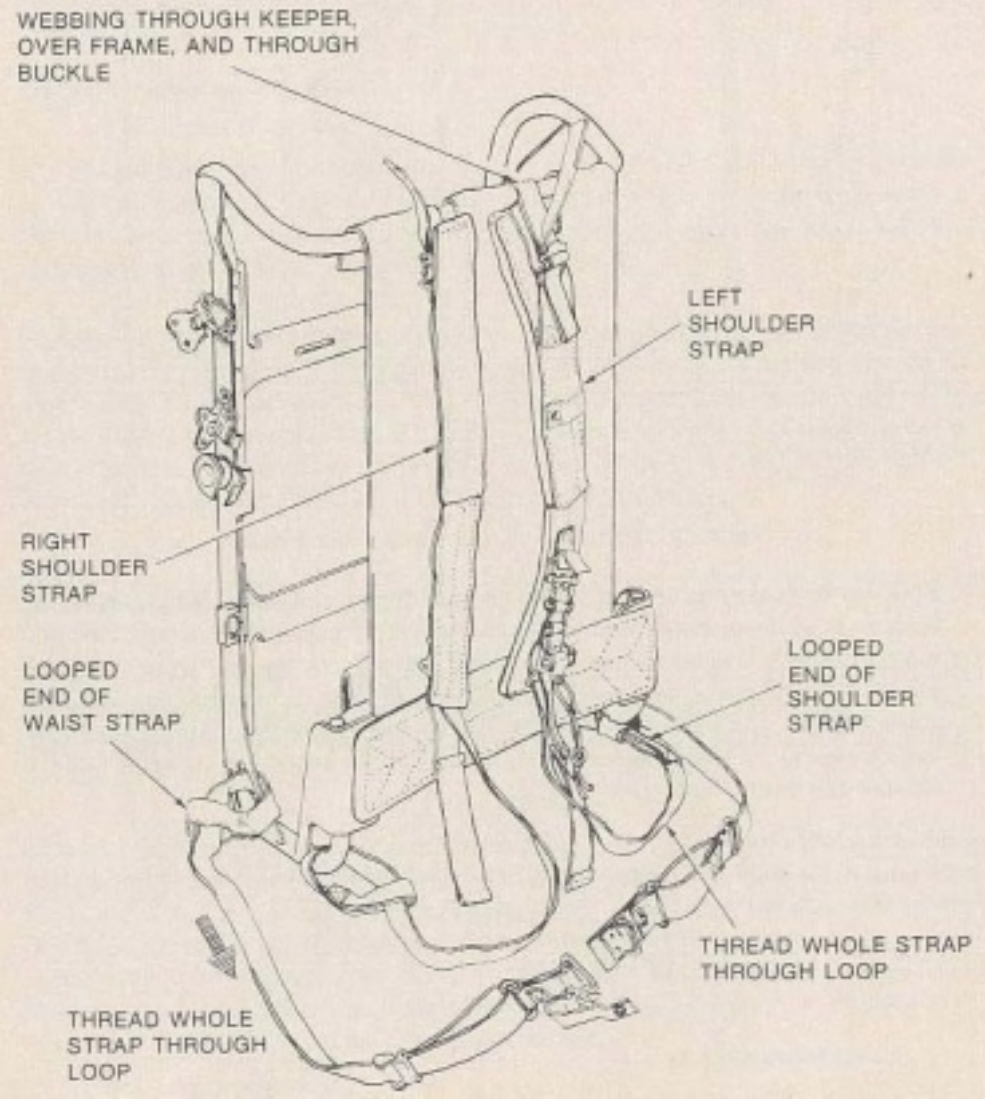

Figure 6. Attaching Shoulder and Waist Straps to Pack Frame

F. The field pack is attained to the rear and bottom of the pack frame. Refer to Figure 7. Place the metal rings, on rear of field pack, over the two hooks on the rear of the pack frame. Insert the webbing straps, on the field pack, through the openings near the hooks, through the buckles, and pull tight. Secure the bottom straps on the field pack through the openings on the bottom of the frame, and pull tight.

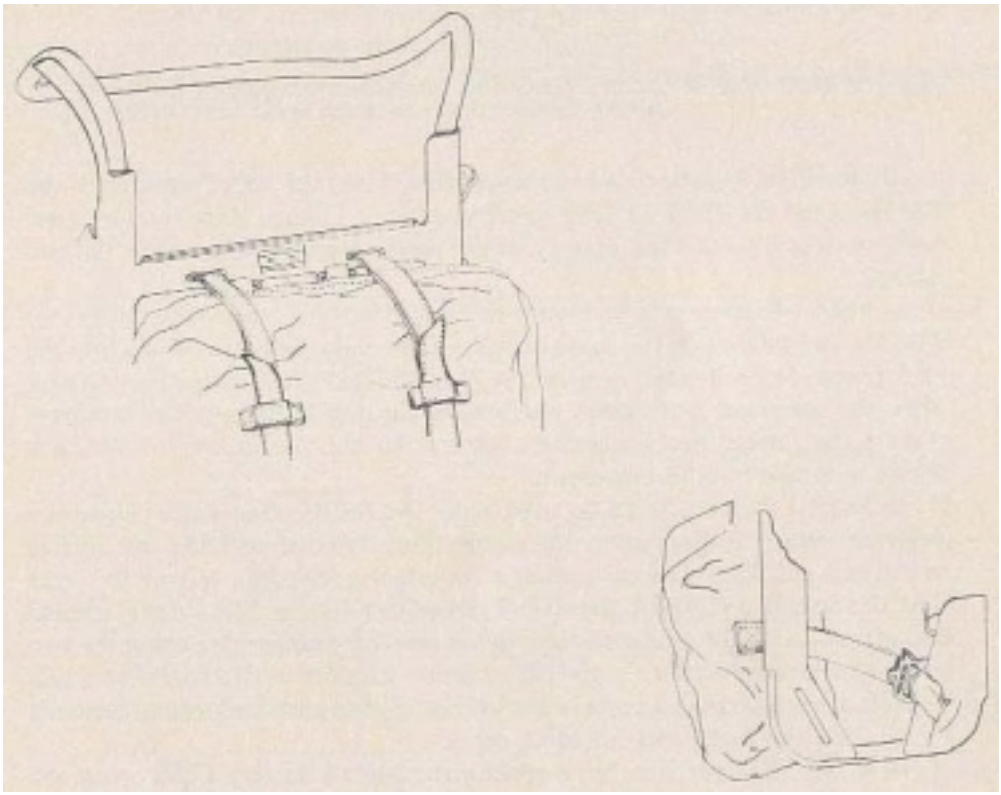

Figure 7. Attaching Field Pack to Pack Frame

719D-2A receiver-transmitter group

To prepare Receiver – Transmitter for operation, proceed as follows.

A. Secure either the 377L-2 Receiver-Transmitter Control or the 540K-1 Control Extender to the 671V-2 Receiver-Transmitter using four screws. Ensure that their mating connectors are aligned and mated before tightening the screws.

B. Secure the 548A-2 Amplifier-Coupler to the 671 V-2 Receiver Transmitter using the four latches: two on the bottom, an adjustable one in front, and an adjustable one in rear. Ensure that their mating connectors are aligned and mated before engaging the latches.

C. Slide assembled 719D-2A Receiver-Transmitter Group into the 963A-1 Radio Set Harness from the top. Secure receiver-transmitter to pack frame by engaging and tightening the four spring-1oaded cam latches, two on each side.

Power pack

The power pack for the 719D-2A Receiver – Transmitter Group is the 612A-1 Battery; either by itself, or with a spare battery, or with an extender cable or with a hand crank generator.

CAUTION

Do not short circuit battery as permanent damage can occur.

A. If only the 612A-1 Battery is to be used, slide it into the pack frame, from the side, beneath the 719D-2A Receiver-Transmitter Group. Mate the electrical connectors and secure the battery to the Receiver – Transmitter using the two latches.
B. If the 612A-1 Battery is to be used with a spare battery, secure them together with the two latches on the spare battery. Then slide the combination into the pack frame, from the side, beneath the 719D-2A Receiver-Transmitter Group. Male the electrical connectors and secure the top battery to the receiver-transmitter using the two latches. Secure the bottom battery to the pack frame with two thumbscrews.
C. If the 612A-1 Battery is to be used with the 886B-1 Generator, place the generator on top of the battery and secure them together with the two latches on the battery. Then slide the combination into the pack frame from the right side, beneath the 719D-2A Receiver – Transmitter group. Mate the electrical connectors and secure the generator to the receiver – transmitter using the two latches. Secure the battery to the pack frame with two thumbscrews. Position hand crank so that it rests in the bracket on the pack frame; and secure by rotating the hand crank holding catch.
D. If the G12A-1 Battery is to be used with the 540L-1 Battery Cable, plug one end of the cable into the bottom connector of the 712D-2A Receiver - Transmitter Group, or 886B-1 Generator if used and tighten the thumbscrews. Place battery into battery bag.

Headset, handset and telegraph key

Plug the connector(s) of the handset, or headset, or telegraph key, or a combination of them into the audio connector(s) on the 377L-2 Receiver – Transmitter Control.

938A-2 antenna

A. Unfold the sectional whip antenna, and engage each section to its adjacent section
B. Fit the plug of the antenna mount onto the whip antenna connector on the 549A-2 Amplifier-Coupler, tighten holding nut firmly to ensure antenna switch operation.

Antenna counterpoise

A. Unwind the four 10-metre (32.8 foot) braided wires of the counterpoise of the plastic bobbin.
B. Stretch four wires in four directions and secure looped ends over stakes pounded in the ground. Refer to figure 8.
C. Place receiver – transmitter with whip antenna near center of counterpoise.
D. Connect the 1.8-metre (6-foot) cable from the counterpoise center junction to the BNC connector on the 549A-2 Amplifier-Coupler.
E. Position whip antenna in a vertical position by pulling up handle on antenna mount and then releasing into correct detent.

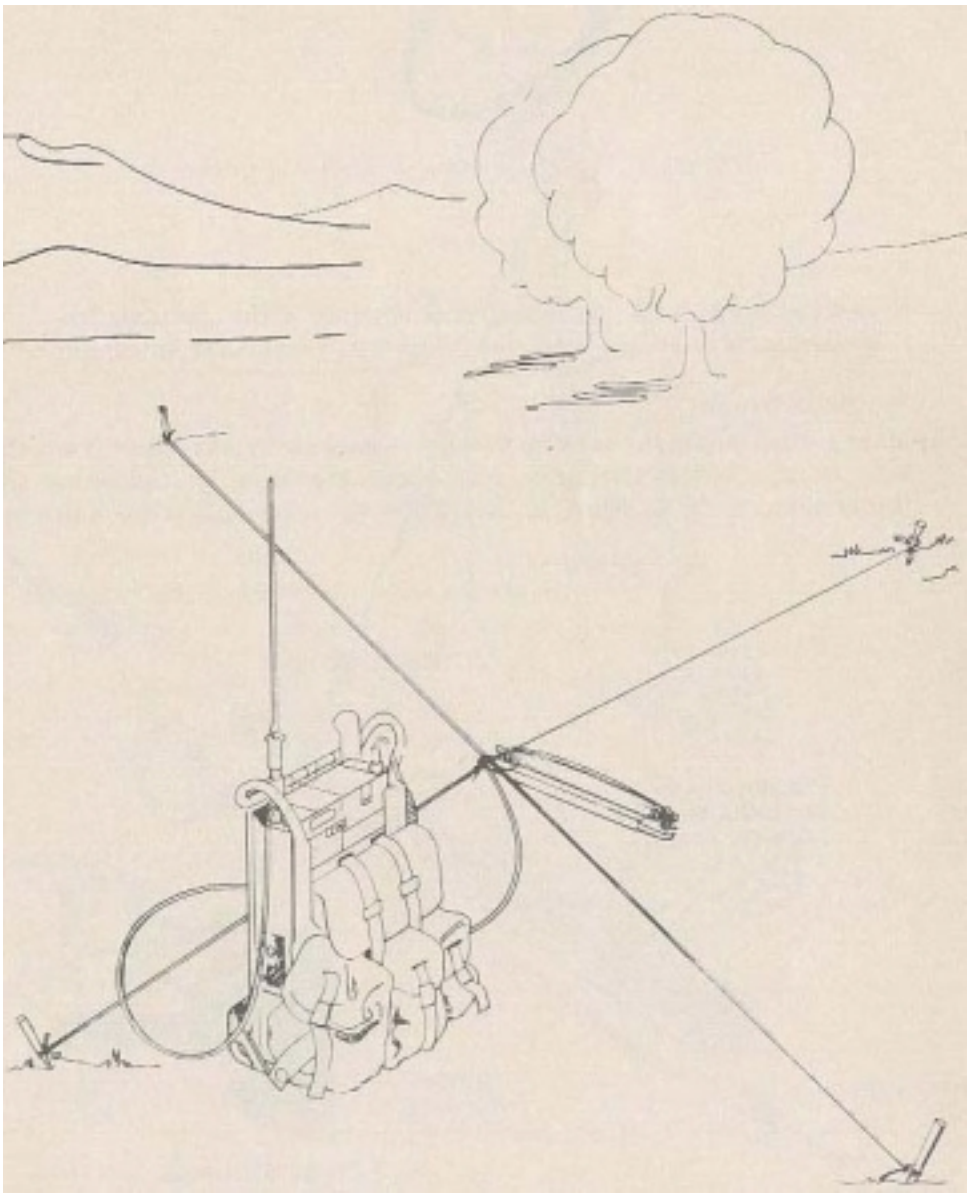

Figure 8. Counterpoise Placement.

938A-1 antenna-vertical orientation

A. Unwind the support throw lines and enough antenna wire from each bobbin, for the frequency in use. Markings on the antenna wire are provided to simplify this operation. Connect the ends to the dipole center junction terminals as shown in figure 9. Connect snap fasteners to provide strain relief.

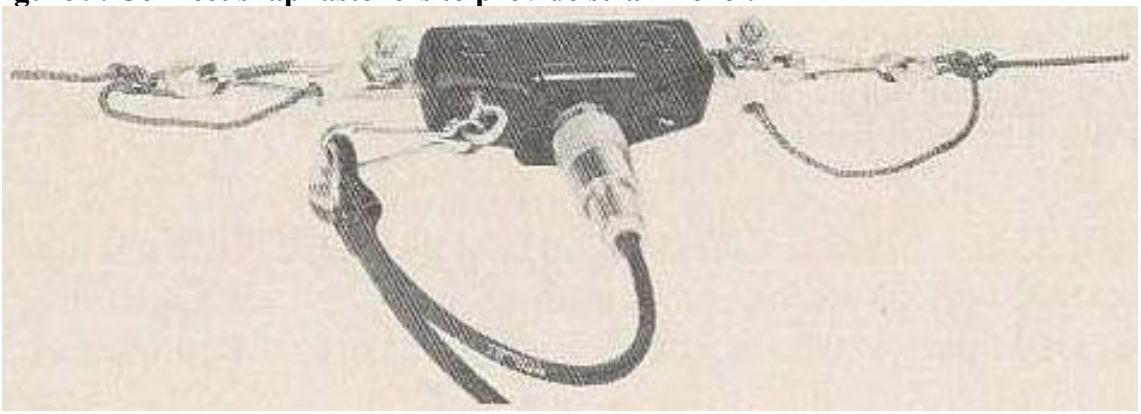

Figure 9. Center Junction of 938A-1 Antenna

NOTE:

In some cases, better transmission is obtained if the operating frequency is three or five times the frequency at which the antenna is set.

B. Make a small loop in the antenna wire at the measured point. Insert it into the hole on the bobbin terminal and secure the wire by tightening the thumbscrew, Refer to figure 10, Repeat for the other half of the antenna.

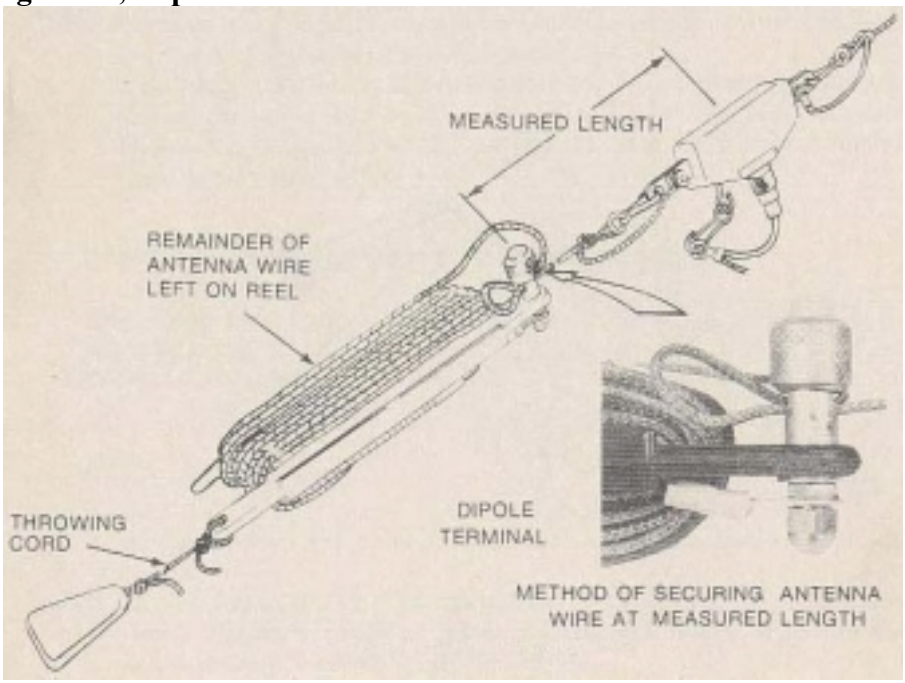

Figure 10. 938A-1 Antenna Securing

C. Connect the plug on the 15.25-metre (50-foot) antenna feeder cable to the socket

of the dipole center junction and connect the snap fastener to the anchor ring. Connect the other end of the feeder cable to the BNC connector on the 549A-2 Amplifier-Coupler.

D. Erect the antenna with the wire as close as possible to the vertical position as conditions allow. Refer to figure 11.

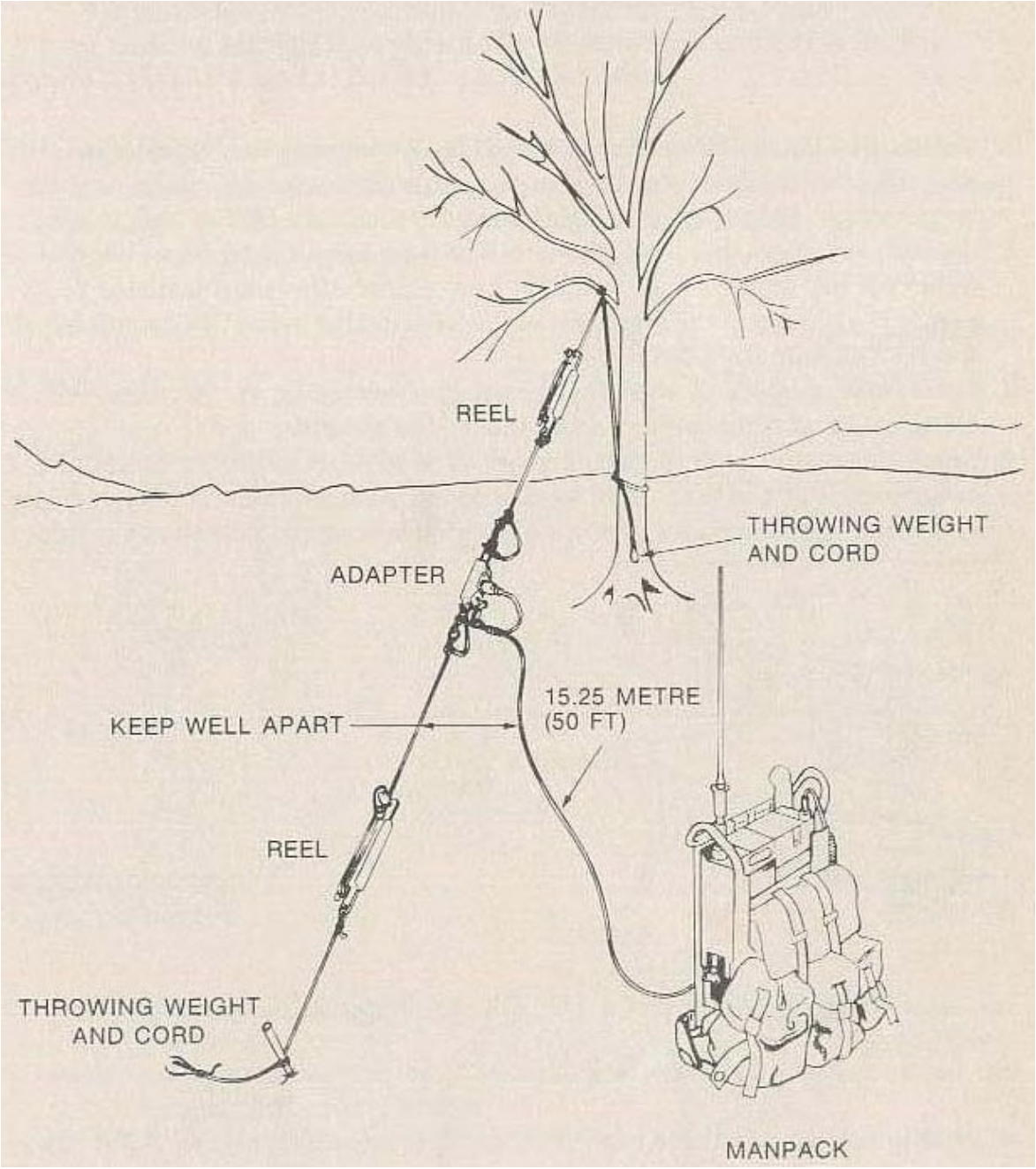

Figure 11. Vertical Orientation of 938A-1 Antenna

E. Ensure that the antenna feeder cable is well separated from the antenna wire and, ideally, should be positioned at right angles to the wire.

938A-1 antenna - horizontal orientation

A. Unwind the support throw lines and enough antenna wire from, each bobbin for the frequency in use. Markings on the antenna wire are provided to simplify this operation. Connect the ends to the dipole center junction terminals as shown in figure 9. Connect snap fasteners to provide strain relif.

NOTE:

In some cases, better transmission is obtained if the operating frequency is three or five times the frequency at which the antenna is set.

B. Make a small loop in the antenna wire at the measured point. Insert it into the hole on the bobbin terminal and secure the wire by tightening the thumbscrew. Refer to figure 10. Repeat for the other half of the antenna.
C. Connect the plug on the 15.25-metre (50-foot) antenna feeder cable to the socket of the dipole center junction and connect the snap fastener to the anchor ring. Connect the other end of the feeder cable to the BNC connector on the 549A-2 Amplifier-Coupler.
D. Orient t.ho antenna so that the direction of reception and transmission is along a line at right angles to the line of the antenna.
E. Erect the antenna with the wire as high as possible. A minimum height of 1/4 λ (λ is wavelength in meters) is recommended. Also, erect the antenna as close as possible to the horizontal position between two supports as shown in figure 12.

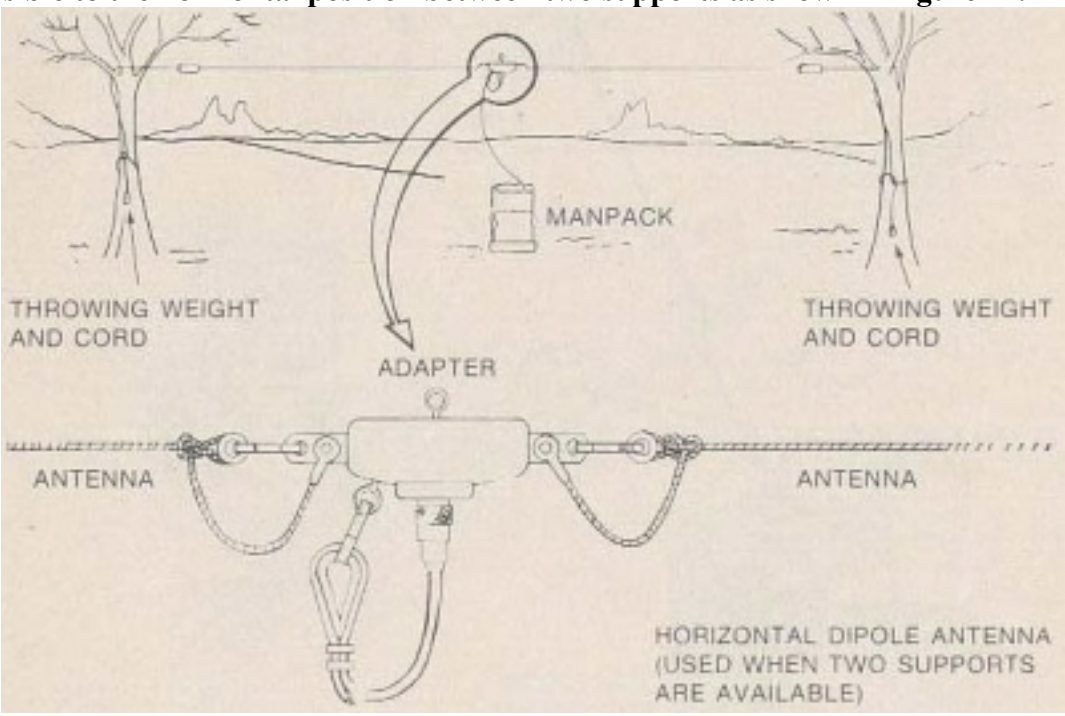

Figure 12. Horizontal Orientation of 938A-1 Antenna

F. Ensure that the antenna feeder cable is well separated from the antenna wire and, ideally, should be positioned at right angles to the wire.

Operation

Perform the procedures described in Preparation for Use before proceeding with either of the following preliminary setup procedures.

CAUTION

Do not operate the radio set without a suitable antenna. Make sure the antenna is properly connected before tuning the radio set.

Preliminary setup for mobile use

A. Using shoulder straps and waist strap, secure assembled radio set to back of carrier. Both the left shoulder strap and the waist strap have quick release assemblies, which should be secure as shown in figure 13. Adjust shoulder straps, waist strap, and lower backstrap for maximum comfort.

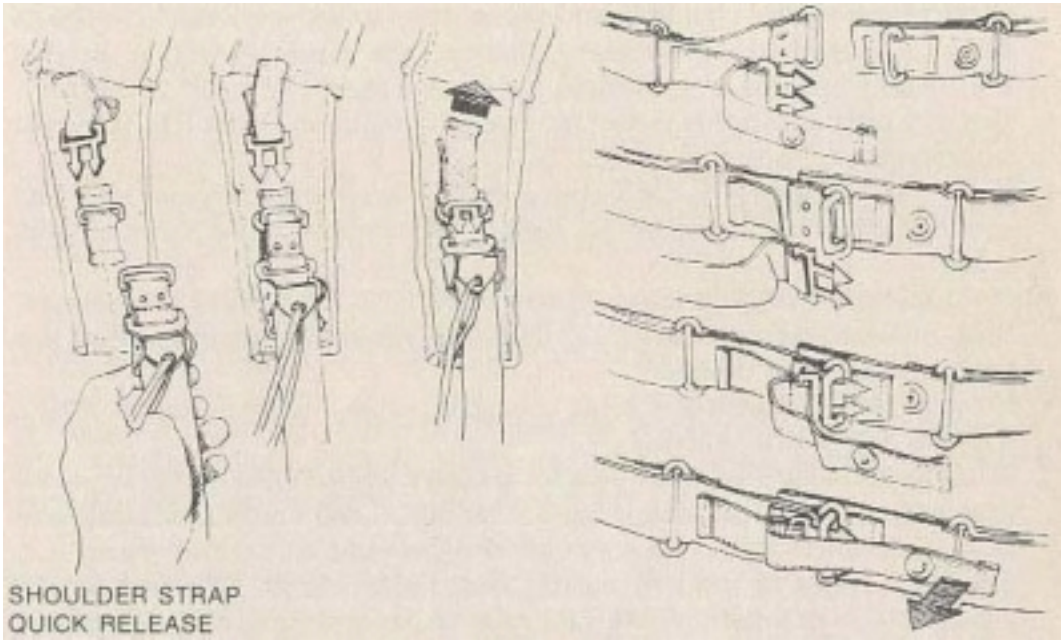

Figure 13. Shoulder Strap and Waist Strap Quick Releases

B. Position whip antenna in a vertical position by pulling up antenna mount and then releasing in correct detent.
C. If the 540K-1 Control Extender is being used, loop over the shoulder and clip it onto the belt of the operator.
D. If the 540L-1 Battery Cable is being used, place the battery bag over the shoulder and strap it around the thigh of the operator, under the outer garments. Plug the battery end of the cable into the battery connector and tighten the thumbscrew.
E. If the telegraph key is being used, strap the key to the thigh. Plug cable into connector on 377L-2 Receiver-Transmitter Control. Adjust key gap and tension as desired

F. If the H-1S9/GR Handset is being used, plug cable into connector un 377L-2 Receiver-Transmitter Control. Hook handset onto hook on right shoulder strap.
G. If headset is being used, place headset around operator's head with earphones over ears and metal connecting bar behind neck. Loop Velcro head strap over head and connect together. Loosen knurled knob and adjust microphone to a position directly in front of mouth; then tighten knob. Clip psah-to-talk switch (ptt) to clothing on chest. Plug cable into connector on 377L-2 Receiver – Transmitter Control

Preliminary setup for stationary use

A. Lay assembled radio set on ground, either on its front or rear.
B. The radio set is normally operated with the standard whip antenna, which is generally satisfactory for distances up to 25 kilometres (15.5 miles). In dry or rocky terrain of low electrical conductivity, use the counterpoise with the whip antenna. Where greater distances are required, the dipole antenna should be used, and should be erected as close to the vertical as conditions allow. For considerably greater distances, the dipole should be erected horizontally between two supports, and its line should be at 90^0 to the direction of the distant station. Select the desired antenna and install it as directed in preparation for use.
C. If the 540L-1 Battery Cable is being used, place the battery bag over the shoulder and strap it around the thigh of the operator, under the outer garments.
D. If the telegraph key is being used, strap the key to the thigh of the operator. Plug cable into connector on 377L-2 Receiver - Transmitter Control. Adjust key gap and tension as desired.
E. If the H-189/GH Handset is being used, plug cable into connector on 377L-2 Receiver - Transmitter Control.
F. If headset is being used, place headset around operator's head with earphones over ears and metal connecting bar behind neck. Loop Velcro head strap overhead and connect together. Loosen knurled knob and adjust microphone to a position directly in front of mouth, then tighten knob. Clip push-to-talk switch (pit) to clothing on chest. Plug cable into connector on 377L-2 Receiver – Transmitter Control.

886B-1 generator operation

When the charge on a battery is too low to provide adequate power for receiver-transmitter operation, a clicking sound will be heard on the headset or handset earpiece. The battery charge can be replenished in the field using the hand-crank generator.

Recharging the battery can be accomplished with the receiver-transmitter turned off or while it is being operated. To recharge the battery, rotate the hand crank clockwise. Adequate charging current is generated when the green light on the hand-crank generator is lit. During normal operation, the red light should remain off. In normal operation, the operator will not become prematurely fatigued.

However, if the battery must be charged in a shorter period of time, operate the hand-crank generator at a speed that will keep the red light on. In tactical situations, the hand-crank generator should be operated with the green light on (reduced generator noise) and the lights should be dimmed, by rotating outer housing.

Spare battery use

When the charge on a battery is too low to provide adequate power for receiver-transmitter operation, a clicking sound will be heard on the headset or handset earpiece. Release the two latches and loosen the two thumbscrews that secure the two batteries to the 719D-2A Receiver-Transmitter Group. Slide the two batteries out of the pack frame. Interchange the batteries, and slide back into pack frame. Secure the batteries to the receiver-transmitter using the two latches and two thumbscrews.

719D-2A receiver-transmitter group operating controls

The receiver-transmitter is operated from the front, panel of the 377L-2 Receiver – Transmitter Control. Three versions of the 377L-2 Receiver – Transmitter Control are shown in figure 14. A headset, handset or telegraph key is connected directly to its front panel for keying and audio control.

Frequency display and selectors

The receiver-transmitter operating frequency is selected by actuating the 10-MHz, 1-MHz. 100-kHz, 10-kHz, 1-kHz, and 0,1-kHz selectors until the desired operating frequency is indicated by the display.

Mode selector

The desired operating mode is selected by setting the mode selector to one of the following positions: AM (amplitude modulation). USB (upper sideband) and, if available, LSB (lower sideband). CW (continuous wave) may be used in any of selector positions.

Function selector

The receiver-transmitter operating function is selected by setting the function selector to one of the following positions:
A. On part no 622-2553-001: OFF, RCV (receiver), and TR (transmit),
B. On part no (i22-2553-002: OFF, H PWR (high power/20 watts pep), and L PWR 2 W (low power/2 watts pep).
C. On part no 622-2553-003: LO PWR (low power/2 watts pep) and HI PWR (high power/20 watts).

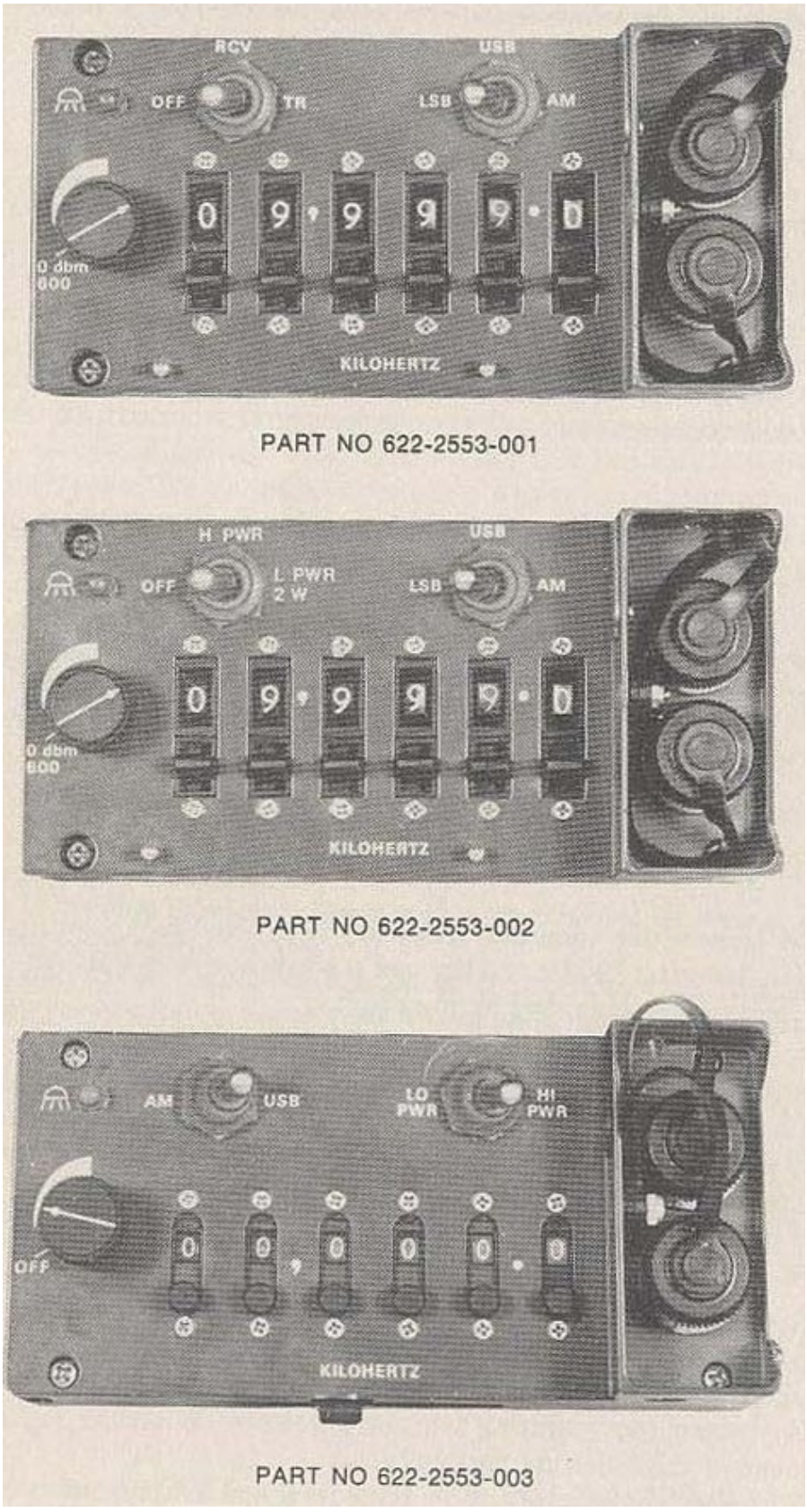

Figure 14. 377L-2 Receiver – Transmitter Control

Gain control

The gain control is adjusted for the most desirable listening level. The extreme CCW (counterclockwise) position is OFF on part no 622-2S3S-003 and 0 dBm 600 (constant gain for data levels into a 660-ohm load) on part no 622-2553-001 and 622-2553-002.

Panel lighting

The light pushbutton controls the panel lights that illuminate the frequency display.

Operating indicators

Tune lone - A constant 1-kHz (2-kHz on some models) tone heard in the earpiece during transmitter tuning (7 seconds maximum). If transmitter will not tune, tone will persist for 15 seconds before entering tune-incomplete condition.

Tune - Incomplete Tone - An interrupted 1-kHz (2-kHz on some models) tone (beeping) heard in the earpiece if the tuning process cannot be completed.

Sidetone - A low - level sampling of the modulation signal used during transmission that is heard in the earpiece. It is gated on by the transmitter and Indicates proper transmitter operation.

Low Voltage Tone — A clicking sound heard in the earpiece when the battery is low and needs recharging.

Operating time

The 719D-2A Receiver-Transmitter Group can operate continuously for a 12-hour period at a 1:9 transmit voice/receive duty cycle, using a single 612A-1 Battery. Cold weather reduces the operating life of the battery.

Warnings

Antenna — High-voltage is present on the antenna when transmitting. Avoid contact with antenna when transmitting, as rf burns can occur especially at low operating frequencies.

Heat Sink — The heat sink on top of the 549A-2 Amplifier-Coupler becomes very hot during long periods of transmitting. Avoid contact with heat sink, as burns can occur.

Battery – Permanent damage can occur to the 612A-1 Battery if its output terminals become shorted.

Voice communications

A. Set the mode selector to AM, USB, or LSB (if available).
B. Set the frequency selectors to the desired operating frequency.
C. Turn receiver - transmitter on. This is done on part no 622-2553-001 by setting the function selector to TR, on part no 622-2553-002 by setting the function selector to H PWR or L PWR, and on part no 622-2553-003 by rotating the gain control clockwise and setting function selector to HI PWR or LO PWR.
D. Tune the receiver - transmitter by momentarily depressing the ptt key on the handset or headset. A constant tone will be heard in the handset earpiece during tuning (7 seconds maximum). After completion of tuning, the tone will cease and receiver noise will be heard.

NOTE

If the tuning process cannot be completed, an interrupted tone (beeping) will be heard in the handset.

E. Adjust the gain control to the desired level of audio. If a clicking sound is heard, the battery is low and needs recharging.
F. If the preceding steps are completed with no tune-incomplete indication, voice transmission may be made. Depress the ptt key on the handset or headset and proceed. The presence of sidetone is an indication of transmitter output.

CAUTION

Rf burns can result from contact with antenna when transmitting.

NOTE
The lack of sidetone during transmission is an indication that the transmitter is not functioning properly.

G. If a new frequency is desired, repeat steps b and d through f.
H. The 377L-2, part no 622-2553-001 has transmit inhibit capability if receive only operation is desired. To operate in this mode perform steps a through e above to tune the antenna, then set the function selector to RCV.

Cw communications

Perform the procedure for voice communications except use the telegraph key instead of the handset or headset ptt key.

Data communications

Data communication is possible on 377L-2 part no 622-2558-001 and 622-2553-002. For this method of operation, connect the modem to one of the audio connectors on the 377L-2 Receiver - Transmitter Control, set the gain control to 0 dBm 600 (ccw position), and perform the procedure for voice communications except key the receiver-transmitter via the modem.

Operation maintenance

Clearing tune-incomplete condition

After the tune cycle has been completed, the normal tune tone should cease in the headset or handset earpiece. Should a tune-incomplete condition occur, an interrupted tone (beeping) will begin approximately 15 seconds after the tune cycle was initiated, and the unit will revert to the receive mode.

To clear the tune-incomplete condition, initiate a new tune cycle by either turning the receiver – transmitter off and then back on; or, move one of the frequency digits on the receiver-transmitter control off frequency and then back to the desired frequency. Momentarily depress the ptt switch (or telegraph key). Tune tone will again begin in the headset or handset earpiece and will cease if the tuning sequence is completed. If the interrupted tone is still present, the clearing procedure should be tried a second time. If this fails to clear the tune-incomplete condition, a unit or antenna failure is probable.

Reenergizing the 612A-1 batLery

The 412Y-2 Battery Charger (figure 15) is capable of charging or discharging up to six batteries simultaneously.

Figure 15. 412Y-2 Battery Charger

Normally, batteries will be returned from the field in an unknown state-of-charge. To ensure a full charge of each battery, while avoiding an overcharge (which reduce battery life), all returned batteries should be discharged to a preset lower limit (21 V dc) before beginning the charge cycle.

To discharge batteries, proceed as follows;

A. Set AC-OFF-DC switch on side of battery charger to OFF. Connect the battery charger to a suitable source of input power (28 V dc or 110/220 V ac, 50/400 Hz) using the cables provided with the battery charger. Refer to 412Y-2 Battery Charger manual for strapping information if 220 V ac power is to be used.
B. Set all DISCHG-OFF-CHG switches to OFF,
C. Install from one to six batteries on the battery charger and secure them with the latches,
D. On side of battery charger, set AC-OFF-DC switch to applicable position for type of input power used. PWR ON lamp will be turned on.
E. For each battery, set the respective DISCHG-OFF-CHG switch to D1SCHG. Discharging will be indicated by the associated green lamp turning on. The lamp will remain on until the discharge cycle is complete. Complete discharging of a battery takes less than two hours. When the green lamp goes off, set the associated DISCHG-OFF-CHG switch to OFF.

To charge batteries, proceed as follows:

A. Set AC-OFF-DC switch on side of the battery charger to OFF. Connect the battery charger to a suitable source of input power (28 V dc or 110/220 V ac. 50/400 Hz) using the cables provided with the battery charger. Refer to 412Y-2 Battery Charger manual for strapping information if 220 V ac power is to be used.
B. Set all DTSCHG-OFF-CHG switches to OFF.
C. Install from one to six batteries on the battery charger and secure them with the latches,
D. On side of battery charger, set AC-OFF-DC switch to applicable position for type of input power used. PWR ON lamp will be turned on.
E. For each battery, set the respective DISCHG-OFF-CHG switch to CHG. Charging will be indicated by the associated green lamp being on. To avoid overcharging the battery, the charging period should be limited to eight hours. At the end of the charging period, remove the battery and/or set the associated DISCHG-OFF-CHG switch to OFF.