T.O. 31R2-2URC-91

TECHNICAL MANUAL

OPERATIONAL AND MAINTENANCE INSTRUCTIONS WITH ILLUSTRATED BREAKDOWN (ORGANIZATIONAL/INTERMEDIATE)

REMOTE CONTROL UNIT, C-11329/URC, P/N 10088-0000

(ATOS)

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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components with the power supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position, due to charges retained by capacitors. To avoid casualties, always remove power and discharge circuits to ground before touching any circuit components. Remove watches and rings before performing any maintenance procedures.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Cardiopulmonary resuscitation procedures are outlined in T.O. 31-1-141-1, and annual refresher training requirements are outlined in AFOSH STD 127-50.

The following warnings appear in the text in this volume, and are repeated here for emphasis.

WARNING

Dangerous voltages exist in this radio equipment. Before removing any covers, disconnect the primary power.

WARNING

Avoid breathing fumes generated by soldering. Eye protection is required.

WARNING

Improper grounding of the Remote Control Unit can cause dangerous voltage to be present on the equipment chassis in the event of a malfunction.

HANDLING OF ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (ESDS)

Electrostatic Discharge Sensitive Devices (ESDS) must be handled with certain precautions that must be followed to minimize the effect of static build-up. Consult T.O. 00-25-234, DOD Std-1686, and DOD HDBK 263. ESDS Devices are identified in this technical order by the following symbol:

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GLOSSARY

A	Ampere(s)
A/D	Analog-to-Digital (Converter)
AFSK	Audio frequency shift keying; a baseband modulation scheme in which two audio frequencies are used to represent binary coded data; the frequency is shifted to one frequency to represent a 1 (mark) and to the other to represent a 0 (space)
AGC	Automatic gain control
ALE	Address latch enable
AM	Amplitude modulation; a modulation scheme in which the carrier is made to vary in amplitude in accordance with the modulating signal
AME	Amplitude modulation equivalent
ANTIVOX	Prevents false VOX operation; see VOX
BFO	Beat Frequency Oscillator, used in SSB detection circuits
BIT	Built-in Test
BIU	Bus interface unit
BW	Bandwidth
CPU	Central processing unit
CREV	Converter reverse
CW	Continuous wave; a wave that does not vary in amplitude or frequency and is turned on and off to carry intelligence, e.g., Morse Code
D/A	Digital-to-Analog (Converter)
dB	Decibel(s)
dBm	Decibel(s) relative to one milliwatt
EMI	Electromagnetic interference
EPROM	Erasable programmable read-only memory
EU	Execution unit
HF	High frequency; a radio frequency band extending from about 3 MHz to 30 MHz; in this manual, HF includes 1.6 to 30 MHz
HV	High voltage
IF	Intermediate frequency
IM	Intermodulation (distortion)
I/O	Input/Output
KREV	Keyer reverse
LCD	Liquid crystal display
LED	Light emitting diode
LPA	Linear power amplifier
LSB	Lower sideband; a modulation scheme in which the intelligence is carried on the first sideband below the carrier frequency; see SSB
MIC	Microphone
mA	Milliampere(s)
mV	Millivolt(s)
NBSV	Narrow band secure voice
PEP	Peak envelope power
PPC	Peak power control
PWB	Printed wiring board
RAM	Random access memory
rms	Root mean square
RTC	Real time clock
RX	Receive

GLOSSARY (Cont.d)

S TONE	Sidetone
SSB	Single sideband; a modulation scheme in which the intelligence is carried by one of the carrier sidebands, the other sideband and the carrier center frequency being suppressed
TGC	Transmitter gain control
TX	Transmit
uA	Microampere(s)
uP	Microprocessor
USB	Upper sideband; a modulation scheme in which the intelligence is carried on the first sideband above the carrier frequency; see SSB
uV	Microvolt(s)
Vac	Volts, alternating current
VCO	Voltage controlled oscillator
Vdc	Volts, direct current
VOX	Voice operated transmission
VSWR	Voltage standing wave ratio; the ratio of the maximum to the minimum voltage of a standing wave on a radio frequency transmission line
W	Watt(s)

INTRODUCTION

The purpose of this on-equipment level manual is to provide all information necessary for the installation, operation and on-equipment maintenance of Remote Control Unit, C-11329/URC, manufactured by the RF Communications Group of Harris Corporation, Rochester, New York. The manual is divided into eight chapters. The contents of each chapter are briefly described in the following paragraphs.

Chapter 1 provides a general description and a list of capabilities and limitations of the Remote Control Unit, C-11329/URC. A list of companion equipment references are included along with the components that form the C-11329/URC.

Chapter 2 provides the information necessary for planning and carrying out the installation of the Remote Control Unit, C-11329/URC. A dimensional outline drawing is provided to show dimensions and other information required for proper installation.

Chapter 3 provides instructions for preparing the Remote Control Unit, C-11329/URC for use, including the initial application of power and checkout. Instructions for repacking the equipment for reshipment are also included in Chapter 3.

Chapter 4 provides complete operating instructions for the Remote Control Unit, C-11329/URC in all modes and contains a list of operating controls and indicators.

Chapter 5 provides a complete theory of operation for the Remote Control Unit, C-11329/URC. An overall theory and detailed theory of individual functional circuits are provided.

Chapter 6 describes the on-equipment location maintenance procedures. On-equipment location maintenance is based on the use of built-in test (BIT) features of the equipment to isolate problems to the replaceable subassembly or printed wiring board (PWB) level. Depot maintenance is supplied in a separate publication, T.O. 35C1-2-892-3. The Depot Manual is based on performance testing and trouble analysis of the subassembly or PWB to locate and replace faulty parts at the lowest replaceable unit level (LRU).

Chapter 7 contains the Illustrated Parts Breakdown (IPB) information at the on-equipment level. This includes assemblies and parts that may be replaced at the on-equipment location.

Chapter 8 contains all fold-out (FO) drawings. A cross reference list is provided as well as the individual drawings referenced throughout chapters 1 to 7. The diagrams are numbered FO-1, FO-2, etc. They are printed on sheets with page-size blank aprons to permit viewing the diagram with the rest of the book closed or opened to another page.

APPLICABLE SPECIFICATIONS

The following specifications, standards, and publications were used in the preparation of this manual.

SPECIFICATION	NAME
MIL-M-38798B, para. 3.4	Combined Operation and Maintenance Instructions Manual (Equipment).
MIL-M-38807, Amend. 4	Preparation of Illustrated Parts Breakdown.
MIL-M-38790 and MIL-M-38784A	General Requirements for Preparation of Technical Manuals.

APPLICABLE STANDARDS

STANDARD	NAME
MIL-STD-12	Abbreviations for use on Drawings and in Technical Type Publications.
MIL-STD-15-1A	Graphic Symbols for Electrical Components.
MIL-STD-17-1	Mechanical Symbols.
MIL-STD-806	Graphic Symbols for Logic Diagrams.

APPLICABLE PUBLICATIONS

PUBLICATION	NAME
DOD 5200.20	Distribution Statements on Technical Documents.
USAS Y14.15-1966	Electrical and Electronic Diagrams.
USAS Y32.16-1968	Electrical and Electronic Reference Designations.
T.O. 31-1-141 (Series)	Technical Manual-Basic Electronic Technology and Testing Practices.

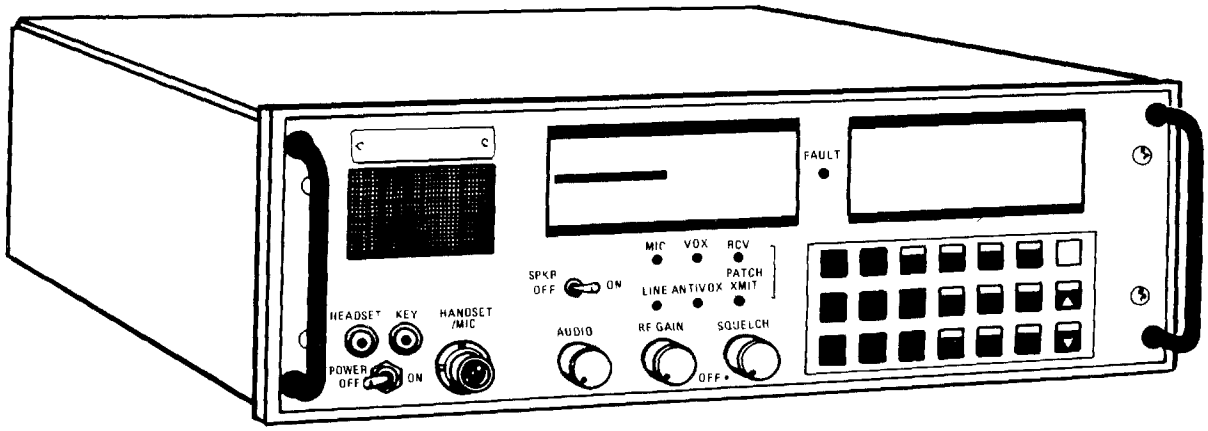

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Figure 1-1. Remote Control C-11329/URC

CHAPTER 1

GENERAL INFORMATION

1-1. GENERAL DESCRIPTION AND USE. Remote Control C-11329/URC (hereafter called Remote Control) provides remote control capability for Radio Receiver-Transmitter RT-1446/URC (100 Watt Transceiver) identical to that available at the front panel keyboard of the 100 Watt Transceiver. The interface between the Remote Control and the 100 Watt Transceiver can be FSK Modem, RS-232C, or RS-422. For remote operation, the Remote Control Interface PWB Assembly, A1A19, must be installed in the 100 Watt Transceiver. This is a hard-wire or telephone line remote system. Control distances are limited by the characteristics of the interconnecting cable path.

1-2. COMMONALITY TO 100 WATT TRANSCEIVER. Operation at the Remote Control is almost identical to operation at the 100 Watt Transceiver. This similarity results from exact front panel commonality. Additionally, two component sub-assemblies of the Remote Control are identical to their counterparts in the 100 Watt Transceiver. They are: Multivoltage Supply Assembly A3, and Audio Interface PWB Assembly A4. The Front Panel Assembly A1 and the Audio/Microprocessor PWB Assembly A2 are unique to the Remote Control. The Remote Control is shown in figure 1-1. Figure 1-2 is a simplified block diagram of the Remote Control.

1-3. SOFTWARE FUNCTIONAL SUMMARY. The interface between the Remote Control and the 100 Watt Transceiver uses the HARRIS ASCII Remote Protocol (HARP). The Remote Control software is used to accept, interpret, and send commands from its front panel to the 100 Watt Transceiver. The software also accepts commands back from the 100 Watt Transceiver and performs localized control functions.

1-4. REMOTE INPUT/OUTPUT CAPABILITY. The Remote Control will accept keyline and audio inputs from a CW key, handset/microphone, narrow band secure voice (NBSV) equipment, a telephone line, or other source. A self-contained speaker and an externally connected headset provide audible outputs of received voice and CW signals. Audio input and output connections are also available at the rear panel.

1-5. BIT CAPABILITY. A BIT (built-in test) procedure is executed whenever a self-test command is requested at the front panel. Upon command, the Remote Control performs a self-test and then commands the 100 Watt Transceiver to execute its own BIT procedure. The Remote Control test consists of turning on all LCD segments for visual inspection, the injection of a BIT oscillator signal into the main audio path of the Remote Control, and subsequent readback into the analog-to-digital converter. If the Remote Control passes its self-test, a test command is transmitted to the 100 Watt Transceiver. Reports of test results passed or failed with module identifiers are displayed at the Remote Control front panel.

1-6. OPERATIONAL FEATURES. In remote control operation, the 100 Watt Transceiver is controlled using the front panel keypad on the Remote Control. The operator can make frequency, channel, and mode selections from the keypad. The Remote Control can access 100 Watt Transceiver memory, which can store up to 100 channels of frequencies and operating modes. The operator may also adjust analog controls on the Remote Control front panel to set the audio and RF gain levels, the audio squelch level, and the audio input level of the 100 Watt Transceiver. Equipment status, selected frequency, mode selections, and BIT test results (for the Remote Control as well as for the rest of the system) are displayed on front panel LCD displays.

1-7. POWER REQUIREMENTS. Power is supplied by an internal power supply that operates from 115/230 Vac or 12/28 Vdc and provides power to the Audio/Microprocessor Assembly at +5 Vdc and ±15 Vdc. The power cable supplied provides AC operation only. If DC operation is desired, use a connection cable Harris Part Number 10085-0064. Internal strapping is required for selecting 115/230 Vac or 12/28 Vdc operation.

1-8. MECHANICAL DESIGN. The mechanical construction of the Remote Control is shown in figure

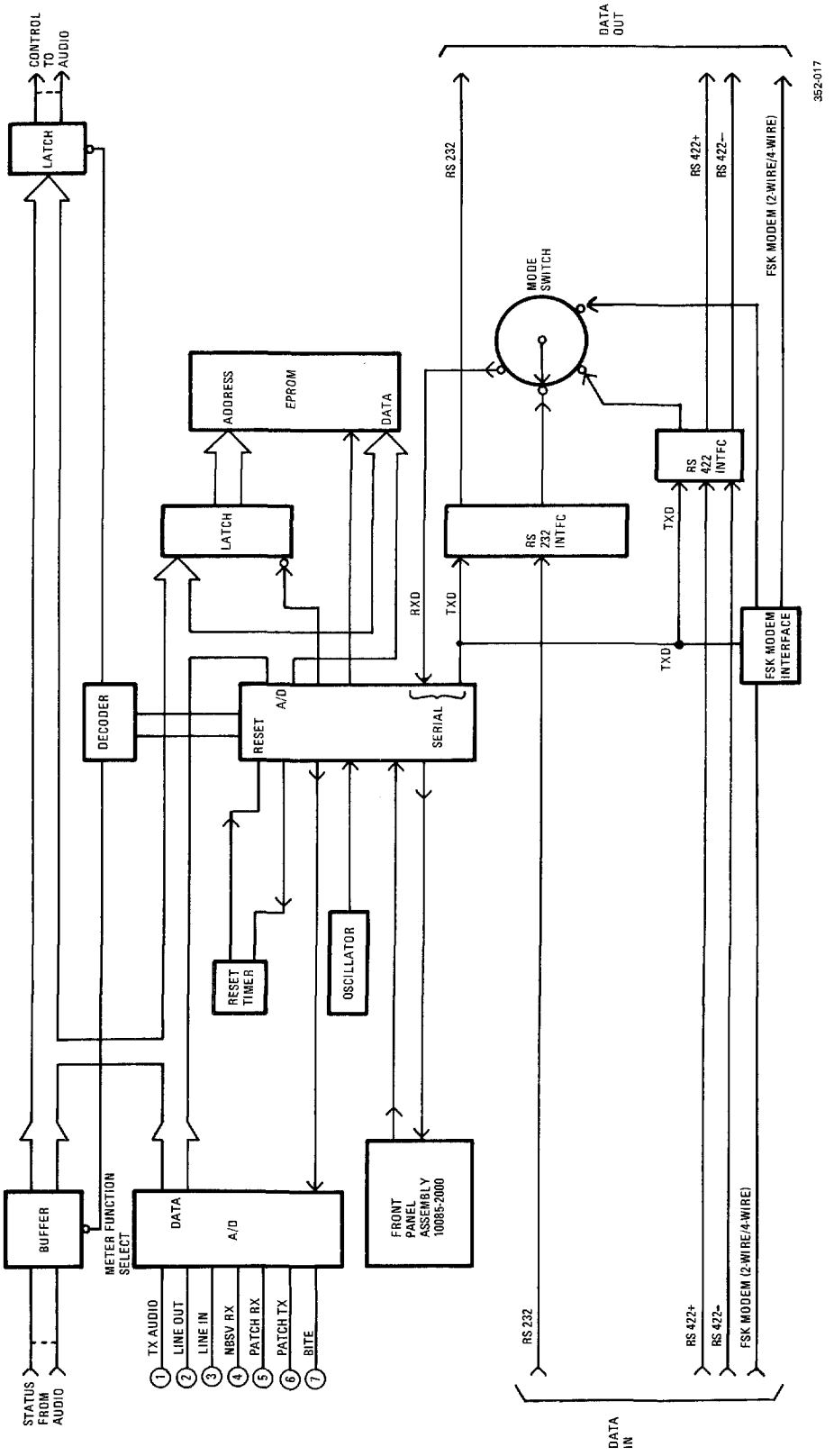


Figure 1-2. Simplified Block Diagram

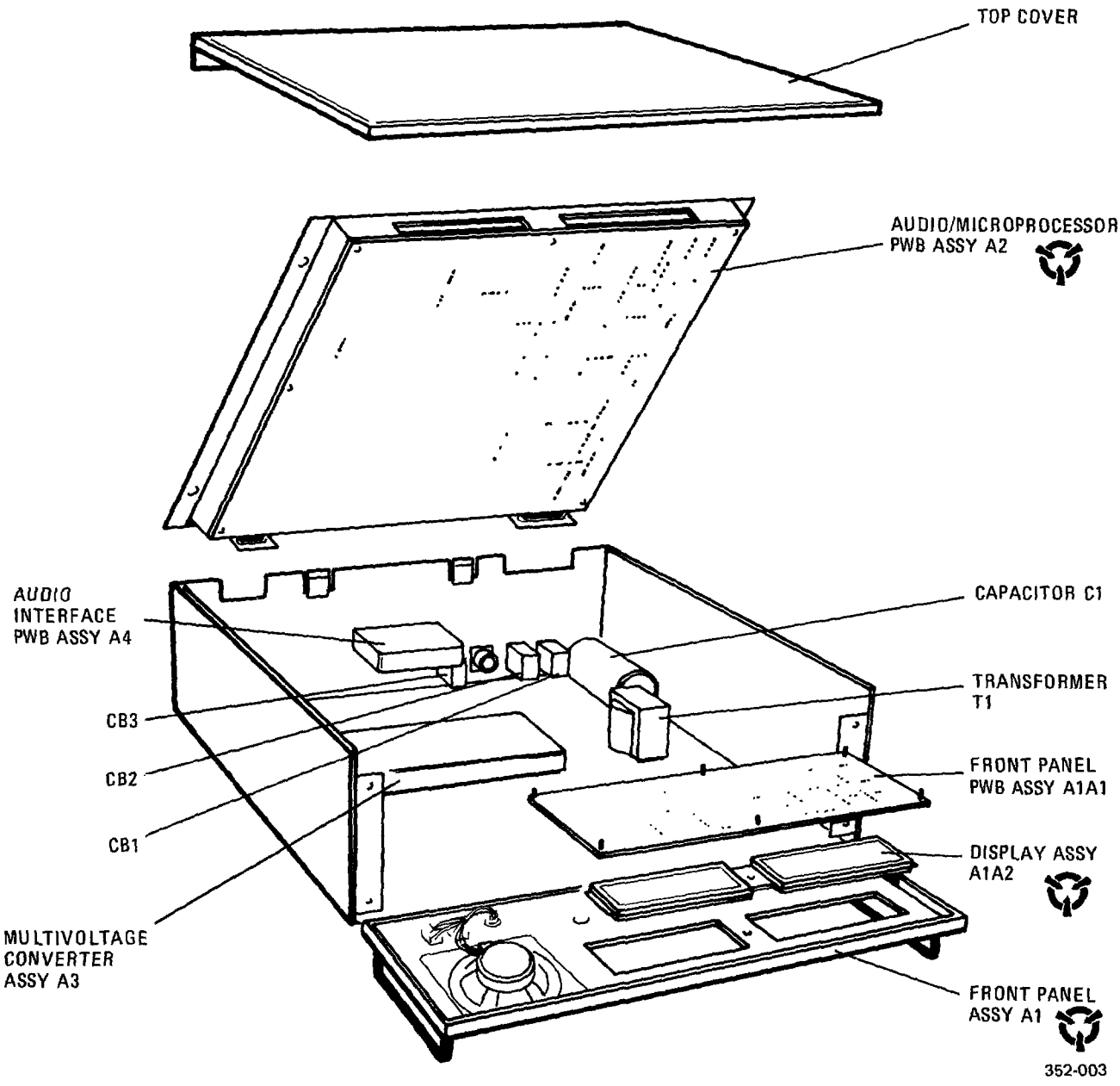


Figure 1-3. Identification of Subassemblies

1-3. The Multivoltage Supply Assembly is mounted inside the Remote Control chassis at the bottom. A transformer, 4600 uF capacitor, and diode bridge are also mounted on the chassis. Circuit breakers and the Audio Interface PWB Assembly are mounted to the inside of the chassis rear panel. The Audio/Microprocessor PWB Assembly includes a frame that is mounted on the PWB. This frame attaches to the Remote Control chassis at the top of the chassis frame.

1-9. LEADING PARTICULARS. General characteristics of the Remote Control are summarized in table 1-1, Leading Particulars. This table includes all physical data and operating/storage environment data. Functional characteristics of the equipment are listed in table 1-2 in this manual.

1-10. CAPABILITIES AND LIMITATIONS. The functional and operational characteristics of the Remote Control (in conjunction with the 100 Watt Transceiver) are described in table 1-2, Capabilities and Limitations.

1-11. EQUIPMENT AND ACCESSORIES SUPPLIED. Table 1-3 lists the assemblies, components, units, cables, and accessory kit supplied with the Remote Control.

1-12. EQUIPMENT REQUIRED BUT NOT SUPPLIED. The Remote Control Unit is designed to operate in conjunction with a single equipment, the 100 Watt Transceiver, RT-1446/URC. Refer to the 100 Watt Transceiver manual, T.O. 31R2-2URC-81 for further application information.

1-13. SPECIAL TOOLS AND TEST EQUIPMENT. The servicing and maintenance of the Remote Control does not require any special tools, test jigs, or fixtures at the on-equipment level. Refer to the Depot Manual, T.O. 31R2-2URC-93 for detailed information relating to Remote Control Unit test equipment.

1-14. RELATED PUBLICATIONS. The Remote Control is described fully in this manual and in the related publications listed in table 1-5. This table does not list related publications that may apply for accessory equipment and other equipment listed in table 1-4.

Table 1-1. Leading Particulars

Item	Characteristic or Value
Dimensions: Height Width Depth	 05.25 Inches (13.3 cm) 16.75 Inches (42.5 cm) 12.50 Inches (31.8 cm)
Weight	20 Pounds (Crated Weight is 25 Pounds)
Power Requirements	AC Power: 115 Vac or 230 Vac, ±10%, Selectable Single Phase 50-400 Hz 40 VA (Maximum) 36 Watts (Maximum) DC Power: 28 Vdc, 2 Amps 12 Vdc, 3.6 Amps
Operating Environment	-30 to +50 Degrees C. 95% Humidity
Storage Environment	-35 to +70 Degrees C. 95% Humidity
Operating Altitude	10,000 Feet
Transport Altitude	40,000 Feet
Shock/Vibration	MIL-STD-810C
Cooling	Convection
Cabling Requirements	Rear Panel Connections - Remote Control Unit J1 - Input Power J2 - Transceiver Control J3 - Audio2 TB1 - Audio Terminal Board
Transportability	Manual Methods Apply
Set-up Time	Less than 1 hour

Table 1-2. Capabilities and Limitations

Description of Characteristic	
Frequency Control Range:	1.600,000 MHz to 29.999,990 MHz
Frequency Tuning Resolution:	10 Hz Increments
Tuning:	Continuous and automatic
Channel Memory Control:	100-channel capacity; capable of loading frequency and mode of operation. Retention of operational parameters without primary power is provided at the 100 Watt Transceiver with an internal lithium battery located in the 100 Watt Transceiver
Readout/Display:	FREQUENCY, CHANNEL, BFO, MODE, AGC, LPA, VOX, AUDIO, POWER, VSWR, BIT, SIGNAL STRENGTH
BFO:	Variable: ±1 kHz, selectable in 10 Hz steps
Modes of Operation:	USB, LSB, AME, or CW

Table 1-3. Equipment and Accessories Supplied

Qty	Item	Description/Use
1	Control Unit, Remote C11329/URC	Remote Control (equipment only)

Table 1-4. Equipment Required but not Supplied

Qty	Item	Description/Use
1	Ancillary Kit, 10088-0060, consisting of the items listed below:	
1	Power Cable Assy, 10085-0065	Connects Remote Control to 115/208/230 Vac source
1	R/C Interface PWB Assy, 10088-6000	Installed in 100 Watt Transceiver for interface to Remote Control
2	Connector/Receptacle, 25 Pin, DB25S	Mates with J2 on back of Remote Control and J9 on back of 100 Watt Transceiver
1	Connector/Receptacle 9 Pin, DEM9S	Mates with J3 on back of Remote Control
2	Hood, Connector 25 Pin, DB24659	Used with DB25S
1	Hood, Connector 9 Pin, DE24657	Used with DEM9S
6	Screw Lock Assy, D20419-16	Used with DE24657 and DB24659

Table 1-5. Optional Equipment

Qty	Item	Description
1	Antenna Coupler (100/ 500 watt) (RF-351) CU-2310/URC	Companion equipment to antenna as required. Connects between the 100 Watt Transceiver and antenna to effect an impedance match between the two. Power handling is 500 watts PEP, 250 watts AVG maximum, and is compatible with the 100 Watt transceiver.
1	Antenna Coupler (1000 watts) (RF-601A) AN/ URA-38( )	Companion equipment to antenna as required. Connects between the 1 KW LPA and the antenna to effect an impedance match between the two. Power handling is 1000 watts PEP/AVG maximum, and is compatible with the 100 Watt Transceiver/1 KW LPA configuration (see 1 KW LPA below).
1	Radio Frequency Linear Power Amplifier (LPA) (500 watts)(RF-355) AM-7223/URC	Companion equipment used only when it is desired to increase the output transmission level of the 100 Watt Transceiver from 100 watts to 500 watts. Unit is compatible with the 100 Watt Transceiver and the 100/500 Watt Antenna Coupler.
1	Radio Frequency Amplifier (1000 watts) (RF-353) AM-7224/URC	Companion equipment used only when it is desired to increase the output transmission level of the 100 Watt Transceiver from 100 watts to 1000 watts. Unit is compatible with the 100 Watt Transceiver and the 1000 watt antenna coupler.
1	Power Supply (RF-354) PP-7913/URC	Supplied with 1 KW LPA.
1	Transport Case CY-8359/ URC	Allows convenient packing method for movement of equipment.
1	Power Cable, DC 10085-0064	For connection to a DC primary power source.
1	Control Cable (50 ft.) 10088-0066	For connection to the transceiver.
1	Telephone Interface PN: 7480-03 (CAGE: 25426)	The 7480-03 is a self-contained module complete with mounting case used to interface between 2-wire voiceband data station equipment and a 2 wire private line service or polled network service.

Table 1-6. Related Publications

Title	Publication No.
100/500 Watt Antenna Coupler, CU-2310/URC	
On-Equipment Manual	TO 31R2-2URC-111
Depot Manual	TO 31R2-2URC-113
Work Cards	TO 31R2-2URC-116WC-1
Receiver-Transmitter, Radio, RT-1446/URC	
On-Equipment Manual	TO 31R2-2URC-81
Depot Manual	TO 31R2-2URC-83
Work Cards	TO 31R2-2URC-86WC-1
Amplifier, Radio Frequency, AM-7223/URC	
On-Equipment Manual	TO 31R2-2URC-101
Depot Manual	TO 31R2-2URC-103
Work Cards	TO 31R2-2URC-106WC-1
Power Supply, PP-7913/URC	
On-Equipment Manual	TO-35C1-2-892-1
Depot Manual	TO 35C1-2-892-3
Work Cards	TO 35C1-2-892-6WC-1
Amplifier, Radio Frequency, AM-7224/URC	
On-Equipment Manual	TO 31R2-2URC-121
Depot Manual	TO 31R2-2URC-123
Work Cards	TO 35C1-2-892-6WC-1
Remote Control Unit, C-11329/URC	
On-Equipment Manual	TO 31R2-2URC-91
Depot Manual	TO 31R2-2URC-93
Work Cards	TO 31R2-2URC-96WC-1
1 KW Antenna Coupler Group, AN/URA-38A	TO 31R2-2URA38-1
RF601	TO 31R2-2TSC38-82
DR-525	TO 31S1-4-228-1

CHAPTER 2

INSTALLATION

WARNING

Dangerous voltages exist in this radio equipment. Before removing any covers, disconnect the primary power.

Section I. INSTALLATION LOGISTICS

2-1. EQUIPMENT UNPACKING PROCEDURE. The Remote Control is packed in a corrugated cardboard box for shipment as illustrated in figure 2-1. A two-piece foam enclosure protects the equipment against corrosion and rough handling.

a. When the unit is received, carefully inspect the exterior of the box. Look for any damage, signs of rough handling or weather exposure (e.g., water damage) or signs that the box may have been tampered with. If any of these conditions are present, carefully note and report them to the proper authority (refer to T.O. 00-35D-54). An external sticker on the shipping box provides additional instructions concerning inspection of the package.

b. Refer to figure 2-1 for instructions concerning unpacking the box. Since the box consists of double-walled cardboard with reinforced strapping tape, the tool required to open the box is a knife or similar instrument. Use the tool in a careful, safe manner. Keep the packing box in a secure place for possible future use.

c. After removing the equipment from the box, check that the shipment is complete by verifying each item with the packing list. Any shortages of items should be reported to the proper authority (refer to T.O. 00-35D-54).

d. The boxed equipment weighs a total of 25 pounds. Use normal care to move the boxed equipment into the general location where it is to be installed. Once unpacked, the Remote Control weighs a total of 20 pounds and may be handled by one individual.

2-2. PREPARATION FOR INSTALLATION. Preparations for installation include: site selection, method of equipment mounting, and operator/equipment environmental considerations. Each of these are discussed below.

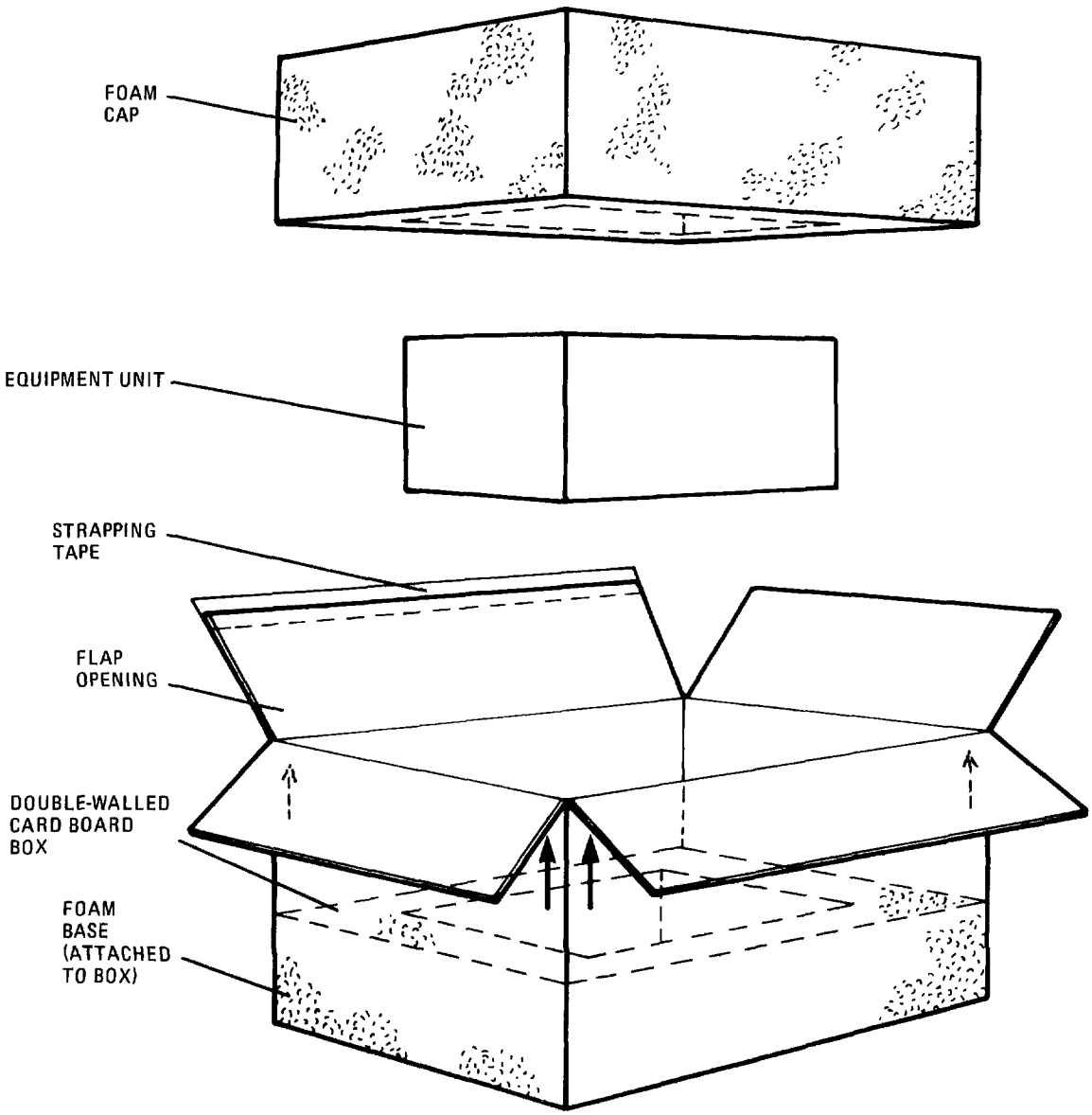
2-3. SITE CONSIDERATIONS AND EQUIPMENT STRAPPING.

a. Site Selection. Site selection is an important consideration in preparing for installation of the equipment. Details for site selection will vary depending on the configuration and usage of the Remote Control. Many factors must be considered, from security to operational requirements, and it is the responsibility of the user to determine which has precedence. Each of the following items should be considered in site selection:

(1) Power Source. Power requirements identified in table 1-1 should be observed (see Chapter 1 of this manual). The AC power cable supplied is nominally ten feet in length.

(2) Loading. Depending on the installation method, be sure the selected space has adequate strength to support the weight of the equipment, which is 20 pounds.

(3) Accessibility. Consider the space needed for access to the equipment for servicing, operating, maintenance, room to maneuver, ventilation, etc.



UNPACKING PROCEDURE

1. PLACE BOX ON FLOOR WITH ARROWS MARKED ON EACH SIDE POINTING UP.
2. CUT TAPE ON TOP OF BOX AND REMOVE FOAM CAP FROM BOX.
3. LIFT EQUIPMENT UNIT OUT OF BOX.
4. SAVE BOX AND FOAM CAP FOR RESHIPMENT.

350-003

Figure 2-1. Unpacking the Equipment

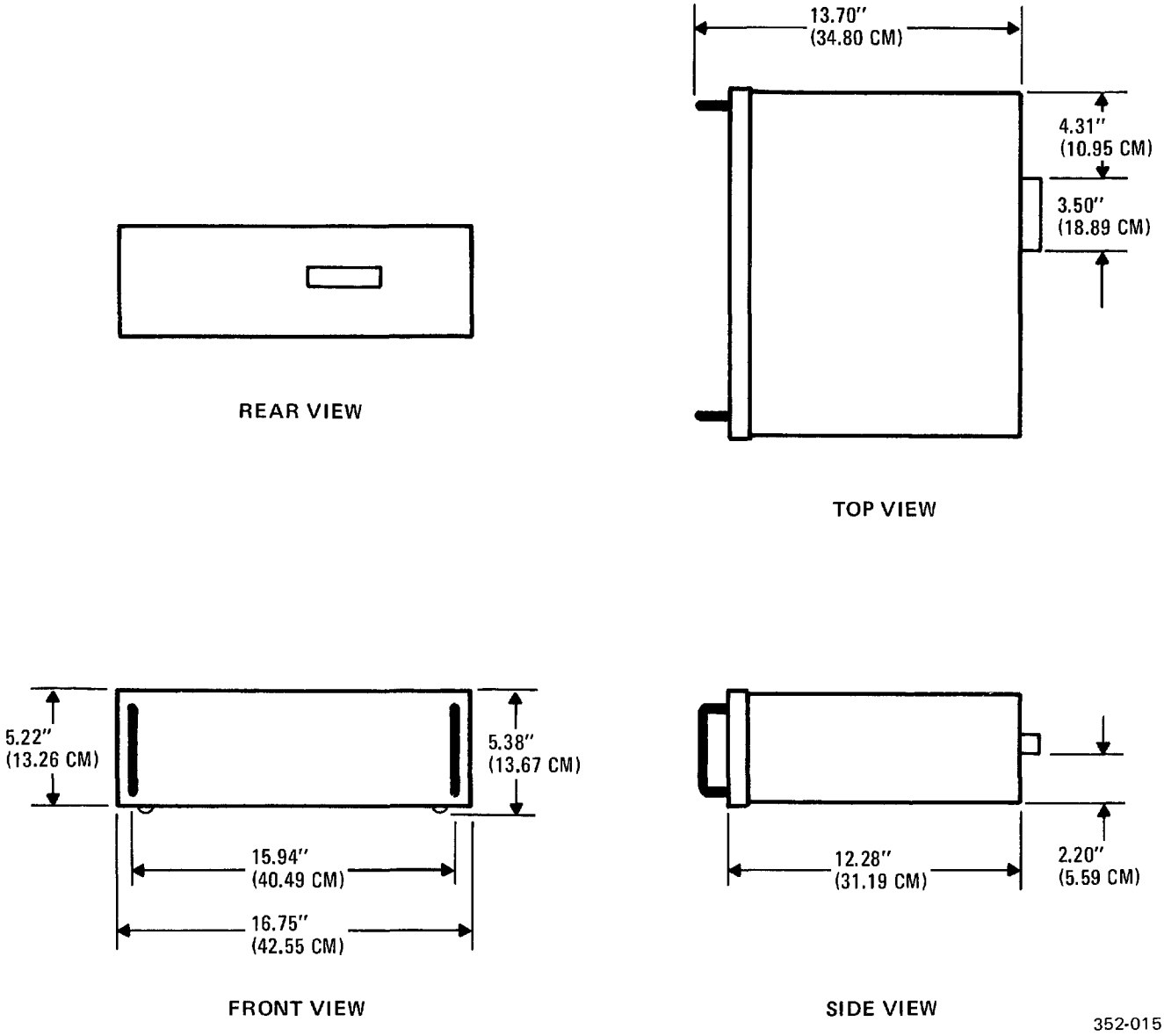


Figure 2-2. Dimensions

(4) Make sure the system is properly grounded for safety (e.g. lightning hazard).

(5) Environment. For operator comfort, ambient temperature should not exceed 25 degrees C. The Remote Control should be installed in a sheltered environment and never exposed to direct weather.

(6) Interaction. Always consider the effect that surrounding equipment may have on the Remote Control.

(7) Heat Dissipation. Heat generation within the Remote Control is minimal, and this should not be a problem.

(8) Servicing. Allow for space to store replacement assemblies. Convenience outlets should be nearby to power service test equipment.

(9) Proper grounding of the Remote Control is recommended to prevent possible serious personnel hazards in the event of equipment malfunction.

WARNING

Improper grounding of the Remote Control Unit can cause dangerous voltage to be present on the equipment chassis in the event of a malfunction.

b. Equipment Mounting. Once the site has been selected, the method of mounting the equipment should be considered. The Remote Control Unit is designed to be surface mounted. Figure 2-3 shows the Remote Control placed on a table top. The only requirement is that the surface can support the weight of the equipment with a nominal safety factor. The equipment may be fastened to the mounting surface to assure it will not move due to vibration or accidental contact. If fixed mounting is desired, the holes provided for the feet on the bottom of the unit may be used for this purpose. Allow sufficient room at the rear of the unit for the connection of cables.

c. Equipment Strapping.

(1) AC Operation Strapping. When operating the Remote Control Unit from an AC source, it is not generally necessary to strap the unit for 115 Vac or 230 Vac operation. Therefore, the AC power cord can be connected to either source without regard to strapping. If, however, it is found that when operating from a 230 Vac source the Remote Control periodically switches off, or will not turn on, this is an indication that the 230 Vac source is supplying an excessively high voltage. To compensate for such an occurance, it is possible to select a different voltage tap at the primary of transformer, T1. To accomplish this, disconnect the primary power cord, remove the Remote Control top cover, and raise the A2 Audio/Microprocessor PWB Assembly. Locate the power transformer T1 and change the fast-on terminal from the normal position T1-5, to position T1-9. Alternately, it may be found that when operating from a 115 Vac source that the Remote Control periodically switches off, or will not turn on. This is an indication that the 115 Vac source is supplying an excessively low voltage. In this case, verify that the T1 voltage tap described above is configured for the T1-5 position. When T1 is properly configured, reassemble the Remote Control Unit by reversing the steps described above.

(2) DC Operation Strapping. Initial strapping is required to operate the Remote Control Unit from a DC voltage source of 12 Vdc or 28 Vdc. Disconnect the unit from the input power source, remove the top cover, and raise the A2 Audio/Microprocessor PWB Assembly. Observe the power jumper plug at the rear of the chassis. Insert the power jumper plug in either the 12 Vdc or 28 Vdc position, as desired. Reassemble the Remote Control Unit by reversing the steps described above.

NOTE

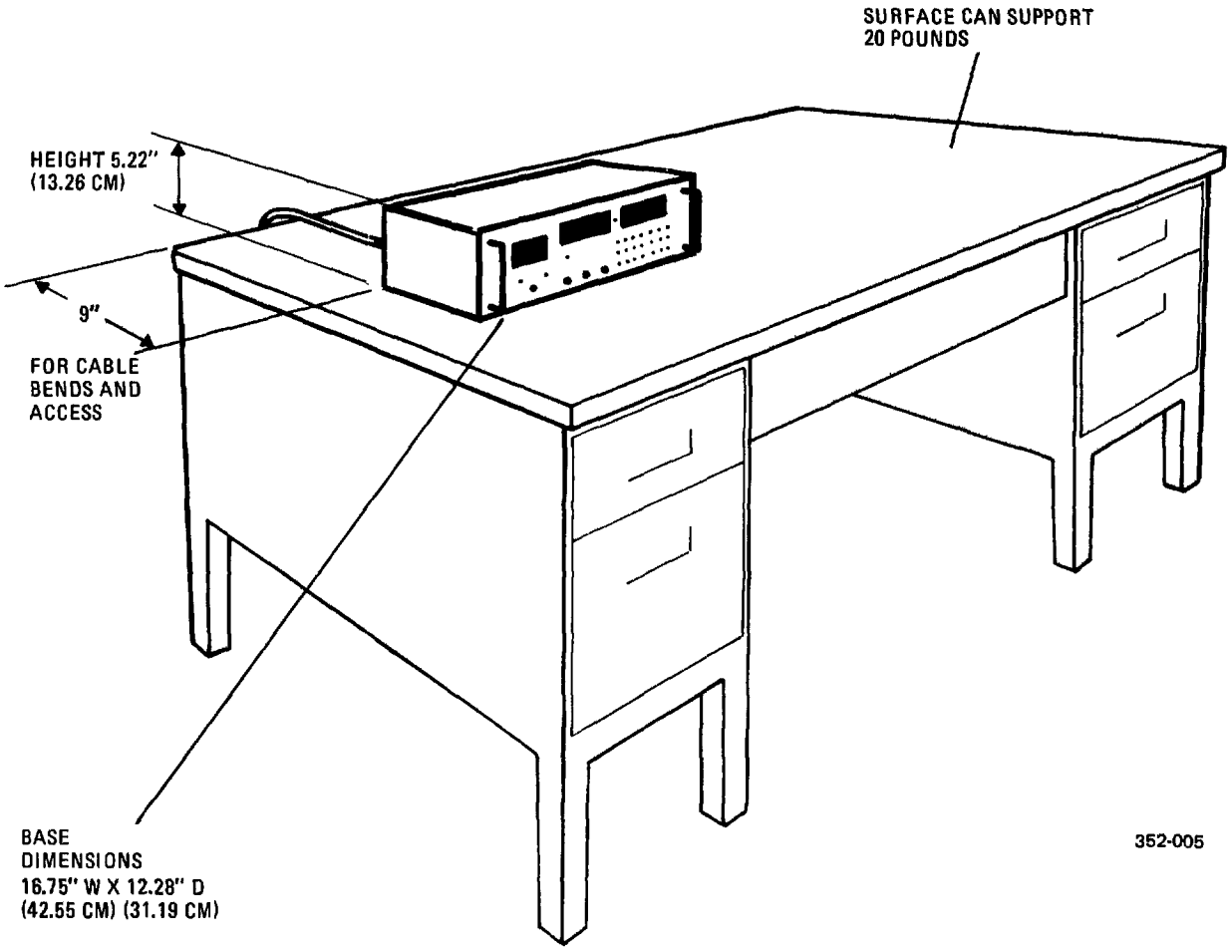
For Control Mode, Audio Interface and Modem Interface selections, the Transceiver/Remote Control cable wiring must agree. See Table 2-1.

(3) Control Mode Choices. Three remote control modes of operation are possible:

(a) RS-232 - An unbalanced control line in a digital format useful for direct wire control at ranges up to 100 feet.

(b) RS-422 - A balanced control line in a digital format useful for direct wired control at ranges up to 1 mile.

(c) Modem - An analog FSK format capable of being sent over standard telephone lines/network at unlimited distance.



SURFACE MOUNT INSTALLATION DETAIL

(DESK TOP SHOWN)

Figure 2-3. Installation Diagram

(4) Control Mode Selection. The selected control mode is accomplished via switch S4 located on the Audio/Microprocessor PWB A2 Assembly in the Remote Control, and at the other end, by using switch S2 located on the A1A19 Remote Control Interface PWB installed in the 100 Watt Transceiver. These two switch positions must match for the unit to operate correctly. Note that the status of these switches is only read at power-up, therefore, changes of switch positions while the equipment is running will not be recognized. Therefore, the units must be turned off during switch selection.

(5) Baud Rate Choices. Control is possible at a variety of baud or data rates ranging from 300 to 9600 baud. The 300 baud rate must be used in the modem mode. In other modes, the 9600 baud rate is generally selected since the higher data rates provide a more rapid response to remote commands. If control problems are experienced at long ranges, however, reducing the baud rate may correct the problem.

(6) Baud Rate Selection. Baud rate selection is made via two switches. The first switch, S3, is located on the Audio/Microprocessor PWB A2 Assembly in the Remote Control. The second switch, S1, is located on the A1A19 Remote Control Interface PWB installed in the 100 Watt Transceiver. The baud rate settings must be the same on both assemblies for proper operation. Note that the status of these switches is only read during the power-up sequence. Therefore, changes made in switch positions while the equipment is running will not be recognized by the microprocessor control circuitry until after the equipments are powered down and back up.

(7) Audio Interface Choices. The audio interface may be either a 2-wire or 4-wire. The 2-wire configuration is used when interfacing with standard telephone lines/networks, or when it is desired to minimize the number of wires between the Remote Control Unit and the 100 Watt Transceiver. Otherwise, the 4-wire configuration may be used.

(8) Audio Interface Selection. The audio interface is selected via two switches. The first, switch S2, is located on the Audio Interface PWB A4 Assembly in the Remote Control. The second switch, S2, is on the Audio Interface PWB A1A16 Assembly in the 100 Watt Transceiver. The switch settings must match for correct equipment operation.

(9) Modem Interface Choices. The modem interface may be either 2-wire or 4-wire. The 2-wire configuration is used when interfacing with standard telephone lines/networks, or when it is desired to minimize the number of wires between the Remote Control Unit and the 100 Watt Transceiver. Otherwise, the 4-wire configuration may be used.

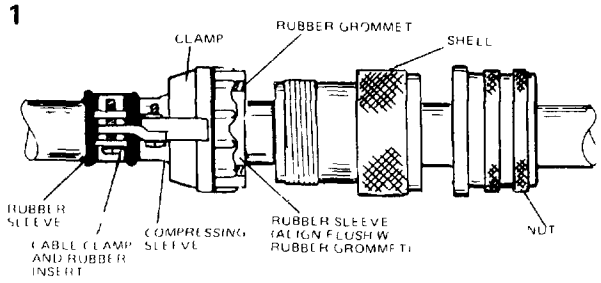
(10) Modem Interface Selection. The modem interface is selected via two switches. The first, switch S5, is located on the Audio Microprocessor PWB A2 Assembly in the Remote Control. At the 100 Watt Transceiver end, via switch S5 located on the Remote Control Interface PWB A1A19 Assembly. The switch settings must match for correct equipment operation.

(11) Audio Level Adjustment. The Remote Control unit and the 100 Watt Transceiver are internally adjusted to accept -10dBm remote audio levels. This is also the recommended level for the LINE outputs from both equipments. In cases where significant losses are incurred, the LINE output levels may be increased, as required, up to the maximum of +10 dBm to compensate. If this first attempt to compensate for line loss is not practical, the input sensitivity of either unit may be increased slightly. This may be done by adjusting R244 on the Audio/Microprocessor PWB A2 Assembly in the Remote Control, and R27 on the Exciter A1A1 Assembly in the 100 Watt Transceiver. The correct settings are those which give 0 dBm on the AUDIO meter on the 100 Watt Transceiver while speaking into the microphone at the Remote Control Unit, while in transmit, and provides adequate received audio speaker or headphone level at the Remote Control Unit.

(12) Telephone Line Interfacing. When interfacing with a commercial telephone line, use data coupler units approved by the applicable regulatory agency (e.g., the Federal Communications Commission in the United States). One coupler unit is required at each end of the circuit for each pair of connections. Information on a typical data coupler unit may be obtained from the local telephone company.

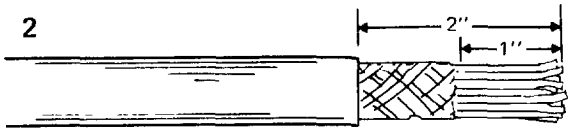
STEP

1



Install cable clamp and rubber insert, rubber sleeve clamp, compressing sleeve, rubber grommet, shell, and nut over cable. Assemble as shown. Leave cable clamp loose. Align rubber sleeve flush with rubber grommet inside clamp. Push assembly back out of the way to perform the steps shown below.

2

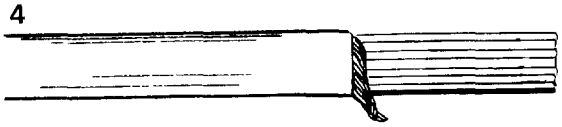


Remove 2" of vinyl jacket from cable as shown Do not cut into shielding. Remove 1" of shielding as shown. Take care not to damage insulation on wires in cable bundle.

3

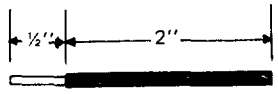
Carefully comb out shield wires as shown.

4



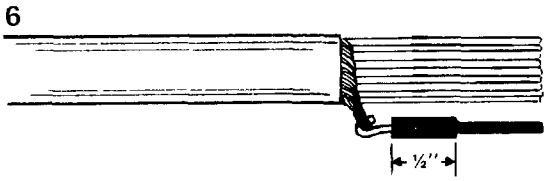
Make a part in the combed shield wires opposite the black wire in the cable. Pull the shield wires around both sides of the cable and twist together to make a pigtail as shown.

5



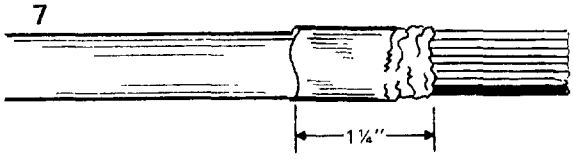
Remove 1/2" of insulation from a 2-1/2" length of No. 22 black stranded wire and tin.

6



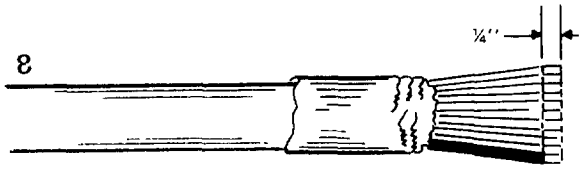
Twist the stripped end of black wire with the pigtail and solder. Cut 1/2" black shrink sleeving and install over soldered connection. Use a heat gun (an alternative is an open flame) to shrink sleeving exercising caution to avoid getting heat onto cable jacked.

7



Install shrink sleeving over cable as shown – apply heat and "shrink" in place. Use heat gun. If no heat gun is available use open flame. Avoid getting heat on cable jacket. Rotate cable for an even shrinkage.

8



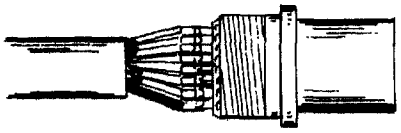
Remove ¼" insulation from wires to be used.

350-007

Figure 2-4. Interface Cables and Connections (Sheet 1 of 3)

STEP

9.



Refer to Table 2-1 for interface connections. Twist and tin stripped wires together to form pairs as shown for cable lengths over 100 feet (30 meters). Twist and tin remaining stripped wires. Cut sleeving supplied in connector kits into ½ inch (1¼ cm) lengths and slide over each wire. Keep wires parallel as they come out of the cable bundle to the connector pins. Ensure the black wire installed in step 6 and the black wire in the cable are lined up with and soldered to pin D. Solder wires to the solder cups using Table 2-1. Slide sleeving over solder cups. Write down wire colors assigned to each pin number for reference when assembling the connector on the other end of the cable.

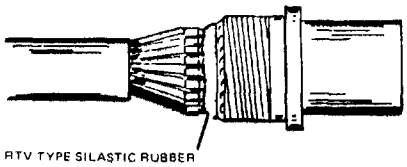
10.

Repeat assembly and soldering procedures for the other end of the cable.

11.

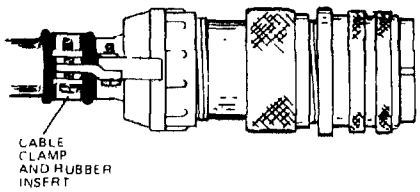
Check both ends of the cable for continuity, shorts between wires and shorts to the connector shell.

12.



Apply RTV type silastic rubber (supplied in RF-281 Accessory Kit) to a thickness of approximately 1/8 inch. Use small opening of nozzle to insure getting rubber between all solder cups. Use small, slender object such as a piece of wire or toothpick to insure a smooth, continuous waterseal.

13.

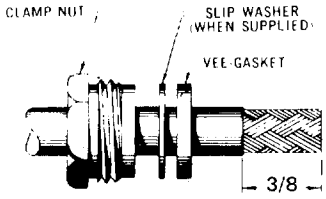
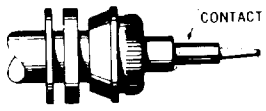
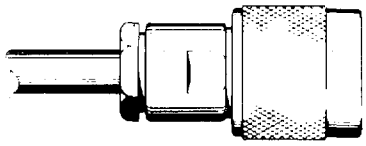


Assemble the plug as shown. Assemble clamp as tightly as possible onto the shell to assure a watertight connection around the cable. Repeat watersealing and assembling of connector on other end of cable. After connector has been threaded onto Antenna Coupler case connector J2, wrap both connectors with several layers of plastic electrical tape as close to the Antenna Coupler case as possible. (For protection against corrosion of mating threads in wet or humid environments.)

NOTE: To convert inches to centimeters, multiply by 2.540.

350-008

Figure 2-4. Interface Cables and Connections (Sheet 2 of 3)

STEP		
1		Cut cable end square, place clamp-nut, slip washer (when supplied), and gasket over jacket. Remove 3/8" of vinyl jacket.
2		Place braid clamp over braid against jacket cut. Comb out copper braid as shown.
3		Fold braid back over braid clamp and trim as shown Cut off dielectric 3/16" from end. Tin center conductor.
4		Solder contact to center conductor. Avoid use of excessive heat. See that end of dielectric is clean. Contact must be flush against dielectric Outside of contact must be free of solder.
5		Thread assembly into connector, and lock securely. Vee gasket must be split by braid clamp

350-009

Figure 2-4. Interface Cables and Connections (Sheet 3 of 3)

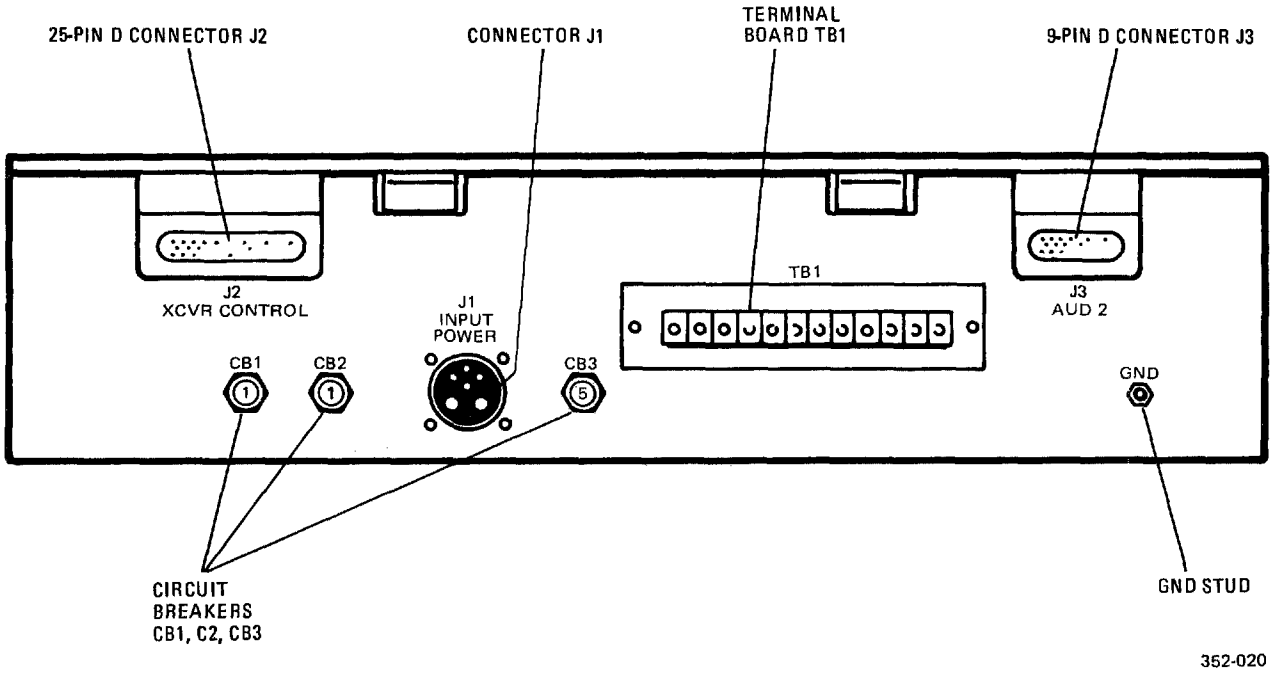


Figure 2-5. Rear Panel View, Connectors and Terminal Strip

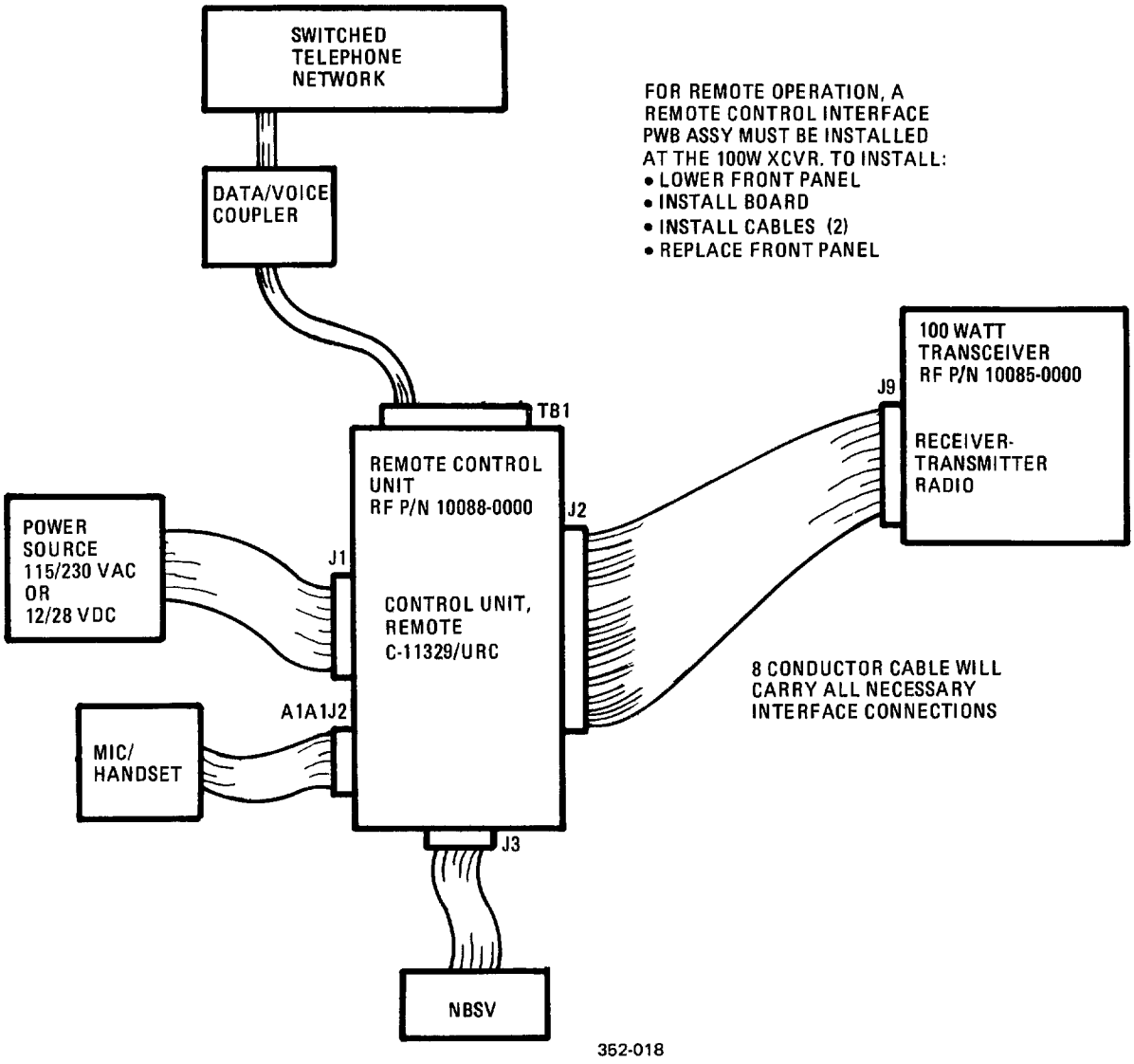


Figure 2-6. Typical Remote Control Unit Cables

Section II. INSTALLATION PROCEDURE

2-4. INSTALLATION MANPOWER AND MAN-HOUR REQUIREMENTS

a. Manpower Requirement Equipment positioning requires only one individual. Once the equipment is positioned and secured, one person can complete the installation in approximately 4-10 hours, depending on the number of interface cables required.

b. Manhour Requirements. Most installations can be completed in 10 manhours or less. This figure is based on Remote Control installation, and does not include the time necessary to install companion equipment, etc. Installation is accomplished with common hand tools, e.g., socket wrenchs, screwdrivers, pliers, etc.

2-5. INSTALLATION SEQUENCE. The sequence of installation can be described in discrete steps as listed below:

a. Positioning. Be sure equipment is properly secured to prevent it from being upset, and is conveniently located for operation.

b. Interconnection and Interface. Fabricate interconnection cabling as required, and connect to equipment. Required cabling includes: the power cable, and input/output lines to the 100 Watt Transceiver, audio devices, microphones, telephone lines and any external monitoring equipment. See table 2-1 and figure 2-4 for typical cable information. Figure 2-5 illustrates the rear panel view and connector locations for the Remote Control. Figure 2-6 illustrates typical system cable interconnections. You must also install the Remote Control Interface PWB Assy in the 100 Watt Transceiver. This board mounts to the nine standoffs on the back of the transceiver front panel.

c. Checking the Installation. Before applying power to the equipment, the installation should be checked for proper connections, including any jumpering or strapping required. Perform as discussed in paragraph 2-3.

d. Preparation for Use. This section details the sequence of operations for the very first application of power. The indications that may be expected, while verifying that the equipment is operational, will be found in chapter 3.

2-6. CABLING CONNECTIONS. After the equipment has been positioned and secured, fabricate and connect all cables to and from the Remote Control. Cabling information is provided below in table 2-1. If the use of the Remote Control involves only a CW key, Handset/Microphone, or Headset, then the only cabling connections required are for the primary power and the interface cable to the 100 Watt Transceiver. An AC power cord is supplied for the power connection. Connectors are supplied for all other connections. Cables must be fabricated using the supplied connectors and the proper lengths of bulk cable. Information on cable fabrication methods is provided in figure 2-4. Observe safety precautions in cable fabrication as detailed in figure 2-7. Ensure that control mode, audio interface, and modem interface selections per paragraph 2-3 agree with the J2 control cabling for proper operation.

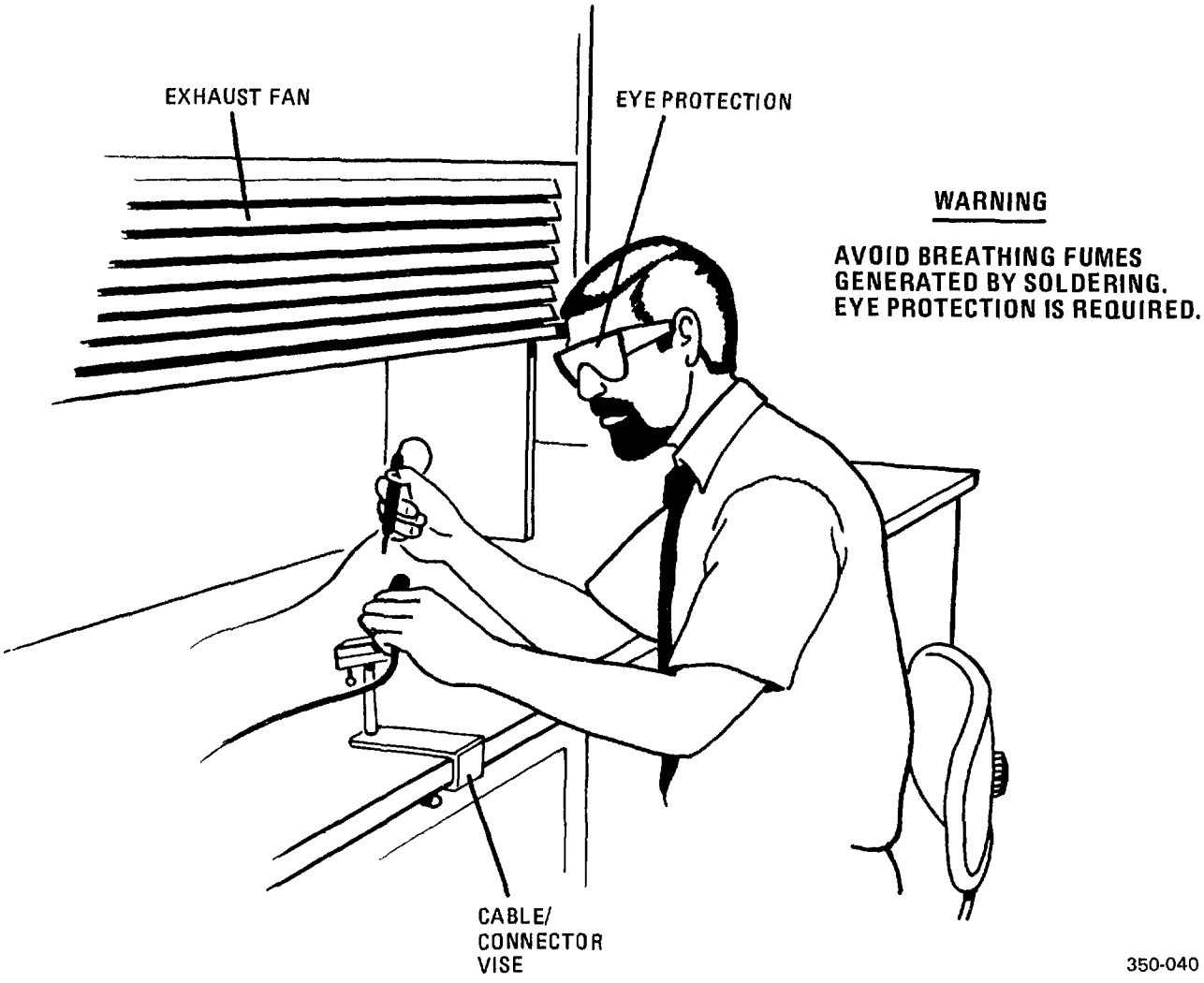


Figure 2-7. Safety Precautions for Fabrication of Cables

Table 2-1. Remote Control Cabling Connections

J1 Power

J1-A	12/28 VDC
J1-B	115/230 VAC - Line 1
J1-C	N/C
J1-D	12/28 VDC Ground
J1-E	115/230 VAC - Line 2 (Neutral)
J1-F	Ground

J2 Control (Remote Control Unit) Mating connector J22-0001-002 (female)		J9 Control (Transceiver) Mating Connector J22-0001-002 (female)	
	RS-232 Interconnection		
J2-2	RS-232 Out	RS232 In	J9-2
J2-3	RS232 In	RS232 Out	J9-3
J2-7	Ground	Ground	J9-7
	RS-422 Inteconnection		
J2-4	RS422 (+) Out	RS422 (+) In	J9-4
J2-7	Ground	Ground	J9-7
J2-9	RS422 (+) In	RS422 (+) Out	J9-9
J2-16	RS422 (-) Out	RS422 (-) In	J9-16
J2-20	RS422 (-) In	RS422 (-) Out	J9-20
	Modem Interconnection		
	2-Wire		
J2-22	Modem T/R (-)	Modem T/R -	J9-22
J2-23	Modem T/R (+)	Modem T/R +	J9-23
J2-7	Ground	Ground	J9-7
	4-Wire		
J2-7	Ground	Ground	J9-7
J2-11	Modem R (+)	Modem T/R +	J9-23
J2-21	Modem R (-)	Modem T/R -	J9-22
J2-22	Modem T/R (-)	Modem R-	J9-21
J2-23	Modem T/R (+)	Modem R+	J9-11
	Audio Interconnection		
	2-Wire		
J2-13	Line 2W/Line In	2W Line Out	J9-13
J2-24	Line 2W/Line Out	2W Line In	J9-24
	4-Wire		
J2-12	Line In	Line Out	J9-12
J2-13	Line 2W/Line In	2W Line Out	J9-13
J2-24	Line 2W/Line Out	2W Line In	J9-24
J2-25	Line Out	Line In	J9-25

Table 2-1. Remote Control Cabling Connections (Continued)

J3 Audio 2

J3-1	AUD2 PTT (0V=Keyed)	
J3-2	AUD2 RX Audio	(0 dBm @ 600 Ohm)
J3-3	AUD2 RX Audio	
J3-4	AUD2 TX Audio	(0 dBm @ 600 Ohm)
J3-5	AUD2 TX Audio	
J3-6	Ground	
J3-7	Not Used	
J3-8	Not Used	
J3-9	Not Used	

TB1 Audio

TB1-1	4-Wire Patch In	(-20 to 0 dBm @ 600 Ohm)
TB1-2	4-Wire Patch In/2-Wire Patch In-Out	
TB1-3	4-Wire Patch Out/2-Wire Patch In/Out	(-20 to 0 dBm @ 600 Ohm)
TB1-4	4-Wire Patch Out	
TB1-5	4-Wire Line In	(-10 dBm @ 600 Ohm)
TB1-6	4-Wire Line In/2-Wire Line In-Out	
TB1-7	4-Wire Line Out/2-Wire Line In-Out	(-10 dBm @ 600 Ohm)
TB1-8	4-Wire Line Out	
TB1-9	Not Used	
TB1-10	Not Used	
TB1-11	External PTT (0V=Keyed)	
TB1-12	Ground	

A1J1 Headphones

A1J1-T	Output Audio
A1J1-R	Ground

A1J2 MIC/Handset

A1J2-A	Ground
A1J2-B	Headphone Audio
A1J2-C	PTT Key (0V=Keyed)
A1J2-D	Mic TX Audio
A1J2-E	Handset Sense (0V=Connected)
A1J2-F	Not Used

A1J3 Key

A1J3-T	CW Keyline Input (0V=Keyed)
A1J3-R	Ground

2-7. INSTALLATION COMPLETE CHECK.

a. Installation Verification. When the Remote Control has been installed with all connection cables attached, especially the interface connection with J9 at the 100 Watt Transceiver, the Remote Control is ready for the application of power. Verify that each item in the list below has been completed.

(1) All connectors are attached and associated hardware is tight.

(2) Ground wires are connected between the Remote Control and a known good ground. An example of a good ground is a cold water pipe, a long copper stake pounded into solid earth, or a system ground bus at an existing site. Refer to T.O. 31-10-24. A good ground has 10 ohms or less resistance.

(3) Check securing hardware (if required); be sure the equipment cannot be tipped over or moved.

b. Verification Testing. After each item on the list above has been checked, the equipment is ready for the application of power. Equipment testing sequences for the very first application of power are discussed in chapter 3. If the equipment does not require this sequence, proceed to chapter 4.

CHAPTER 3

PREPARATION FOR USE AND RESHIPMENT

SECTION I. PREPARATION FOR USE

3-1. INITIAL CONTROL SETTINGS. This section details the initial control settings prior to the application of power to the 100 Watt Transceiver and the Remote Control. Use this procedure to verify the Remote Control and 100 Watt Transceiver setup, if necessary, before attempting remote operation as described in chapter 4. The control settings are listed in table 3-1. Note that all controls are on the front panel of the Remote Control; companion equipment controls will not be discussed. It is assumed that the Remote Control is fully installed and correctly connected as described in chapter 2 of this manual and that the 100 Watt Transceiver is fully installed and correctly connected as described in chapter 2 of the 100 Watt Transceiver Manual, T.O. 31R2-2URC-81.

3-3. SEQUENCE FOR POWER-UP. The step by-step power-up sequence provided below assumes a general application configuration that does not include the use of ancillary equipment and concentrates only on the readiness of the 100 Watt Transceiver and Remote Control.

Table 3-1. Initial Control Settings

Control	Initial Setting
1. Power (POWER)	Select OFF position.
2. Speaker (SPKR)	Select ON position.
3. Squelch (SQUELCH)	Select OFF (fully counterclockwise into the detent position).
4. Audio (AUDIO)	Select minimum gain (fully counterclockwise position).
5. RF Gain (RF GAIN)	Select maximum gain (fully clockwise position).

3-2. INITIAL POWER APPLICATION. This portion of the manual provides a step-by-step sequence for the initial application of power to the 100 Watt Transceiver and the Remote Control. Upon completion of the listed steps, the operator will have confirmed that the Remote Control and 100 Watt Transceiver are ready for a checkout test procedure that will be found in paragraph 3-4. The selection of a keypad push button is shown in brackets. For example, selection of the MODE key is shown as [MODE]. Two sequential keystrokes are shown as, for example, [2ND][VOX], where [2ND] is pressed, and then [VOX] is pressed.

a. Step-by-Step Sequence for Initial Power Application.

(1) Remove all connections at rear of the Remote Control except for power connection at J1 and control connector at J2.

(2) The Remote Control can operate only from the voltages listed in table 1-1 (chapter 1). Be sure the power source and Power Supply are correctly matched. Refer to paragraph 2.2 for strapping information.

(3) Press [2ND][REMOTE] at the 100 Watt Transceiver front panel.

(4) Place Remote Control POWER switch into the POWER ON position.

NOTE

All further references to front panel controls and display are in reference to those of the Remote Control.

(5) Observe the following frequency and mode status at the front panel LCD displays:

Frequency:	10,000.00 KHz
Mode:	MODE: USB
AGC:	AGC: SLOW
Audio Input:	AUD10: MIC
Meter:	FWD("S"Scale-SignalStrength)
Local/Remote:	REMOTE

NOTE

If the equipment has been operated previously, the display will show the last frequency, mode, etc. that was in use by the 100 Watt Transceiver at power off. The display status listed above represents the "default" configuration, which occurs if the equipment has not been operated previously. The "default" display indicates that the memory feature has no stored information. The memory feature is powered by an internal lithium battery in the 100 Watt Transceiver during periods when no primary power is applied to the equipment. The battery has a projected life of 10 years.

If a FAULT condition or no display is observed, the equipment may be inoperable. In such case, refer to the corrective maintenance information in chapter 6.

(6) Press [2ND] [TEST]. Observe all front panel LCD segments are turned on, followed by a readout in the frequency field indicating PASSEd.

NOTE

To confirm that all the LCD segments are illuminated, refer to chapter 4 for a description of the display.

Pressing [2ND] [TEST] invokes the BIT (Built In Test) feature. The Remote Control is tested followed by all modules in the receive path of the 100 Watt Transceiver. If no faults are discovered, the PASSEd display is indicated. If a fault is discovered, the reference designator of the assembly causing the fault will be displayed in the frequency field. Any fault indication should be analyzed before proceeding. Refer to chapter 6, Maintenance, if a fault indication occurs.

(7) Press [2ND] [TX KEY] [2ND] [TEST]. After a nominal 10 seconds, observe a readout in the frequency display PASSEd. Press [2ND] [TX KEY] to unkey the 100 Watt Transceiver.

CAUTION

This sequence automatically keys the 100 Watt Transceiver. Be sure an antenna load is connected and transmissions will not pose a danger to personnel.

Now, all modules in the transmit path are also functionally tested, and if no faults are discovered, the PASSEd display is indicated. If a fault is discovered, the reference designator of the assembly causing the fault will be displayed in the frequency field. Any fault indication should be analyzed before proceeding. Refer to chapter 6, Maintenance, if a fault indication occurs.

b. When Indications are Normal. The above completes the initial power application procedure. If all indications are normal, proceed to paragraph 3-4.

3-4. INITIAL CHECKOUT. In the initial checkout sequence, the Remote Control and the 100 Watt Transceiver are checked for readiness through the use of the normal front panel controls. Do not change the configuration of the 100 Watt Transceiver that was

used in paragraph 3-3, i.e., the antenna load should remain connected, the interface cables (other than those to the Remote Control) should remain disconnected, etc. The checkout procedure is organized in step-by-step sequence as provided below and should be conducted immediately after performing the initial power application in paragraph 3-3.

NOTE 1

This sequence does not cover each feature or function of the Remote Control Unit. Refer to the chapter 4, Operation, for detailed operation information. In addition, the features related to the use of companion equipment are not discussed.

NOTE 2

This sequence assumes the 100 Watt Transceiver is being powered for the first time. If this is not the case, some indications in this sequence will reflect information previously stored in the 100 Watt Transceiver memory. It is possible to erase the entire memory by activation of the MEMORY ERASE button at the rear panel of the 100 Watt Transceiver. The 100 Watt Transceiver will then respond as if it were powered for the first time. However, erasing the memory should be done only with a clear understanding of the consequences, i.e., all channel information is erased, and all last parameters information is erased. It is not possible to erase the 100 Watt Transceiver memory from the Remote Control Unit.

a. Prepare Display for Initial Checkout.

(1) If the BIT test of paragraph 3-2 has been completed successfully, the display will indicate PASSEd.

(2) Continue to step b.

b. Check FREQUENCY Function - Numeric Key Method.

(1) Press [FREQ]. Observe the word FREQ displayed in the LCD frequency field, and that the 10 MHz digit is blinking.

(2) Load 12,345.67 KHz in display with keypad. Note that following the keying of each number, the next digit position blinks.

(3) Press [ENTER].

(4) Observe 12,345.67 is displayed in LCD frequency field, no digits are blinking, and the word FREQ is no longer displayed.

c. Check FREQUENCY Function - Up/Down Increment Method.

(1) Press [FREQ]. Observe the word FREQ displayed in the LCD frequency field.

(2) Push [SCROLL UP] and observe the frequency changes upward in 10 Hz steps for a brief period, and then switches to 1 kHz steps.

(3) Release [SCROLL UP]. Observe frequency display is fixed at some higher frequency.

(4) Press [SCROLL DOWN]. Observe the frequency changes downward in a similar manner.

(5) Release [SCROLL DOWN]. Observe the frequency display is fixed at some lower frequency.

(6) Use [SCROLL UP][SCROLL DOWN] to select a frequency 12,345.67 KHz.

(7) Press [ENTER] to clear the up/down increment method of frequency selection.

d. Check MODE Function.

(1) Press [MODE] and observe the MODE indicator scrolls through the modes, USB, LSB, AME, and CW. It is not possible to select the AFSK mode of operation, even if the option is installed in the 100 Watt Transceiver.

NOTE

When a MODE is selected, an AGC speed is automatically selected. In USB, LSB, or CW modes, AGC: SLOW is automatically selected. In AME mode, AGC: FAST is

automatically selected. The AGC speed can still be changed, as described in Step i. of this procedure.

(2) Scroll [MODE] to USB.

e. Check CHANNEL Function - Numeric Key Method.

(1) Press [CHAN] and observe the word CHAN displayed in the LCD channel field.

(2) Load "50" in display with keypad.

NOTE

Additional digits will re-enter in display allowing correction or re-entry.

(3) Press [ENTER] when the display is correct.

(4) Observe "50" is displayed in LCD channel field.

(5) Press [FREQ][ENTER] and observe the channel feature is cleared.

f. Check CHANNEL Function - Up/Down Increment Method.

(1) Press [CHAN] and observe the word CHAN displayed in the LCD channel field.

(2) Press [SCROLL UP] and observe the channel number increments at one second intervals.

(3) Release [SCROLL UP]. Observe channel display is fixed at some higher channel.

(4) Press [SCROLL DOWN] and observe the channel number decrements at one second intervals.

(5) Release [SCROLL DOWN]. Observe channel display is fixed at some lower channel.

(6) Press [FREQ] [ENTER] and observe that the channel feature is cleared.

g. Check CHANNEL Function - Test Program a Channel.

(1) To test program a channel, press [2ND] [PROG] and observe the CHAN indicator illuminates, and all front panel indicators except FREQ and MODE are turned off.

(2) Using step e. above (up to step 3), select a known unused channel. The FREQ and MODE indicators will now turn on and the default frequency and mode of the channel will appear in the respective FREQ and MODE indicator fields, per paragraph 3-3.a.5.

(3) Load the frequency information 23,456.78 KHz into the FREQ display, via the numeric keys, then scroll [MODE] to CW. Press [2ND] [LOAD].

(4) Observe the channel program process is terminated and the display returns to the operating conditions that were set before programming started, i.e., frequency 12,345.67 KHz and mode USB.

(5) Verify the channel memory feature by calling up the above channel by following step e. above. When the channel is verified (23,456.78 MHz, CW mode), press [FREQ] [ENTER] to exit the channel feature.

h. Check BFO Function.

(1) Press [BFO] and observe the word BFO displayed in the LCD frequency field, along with the BFO above (+) or below (-) indicator (if applicable).

(2) Press [SCROLL UP] and observe the BFO center frequency increases above center frequency as shown by the above (+) indicator.

NOTE

The BFO frequency (0 to ±1 KHz) changes in 10 Hz steps but the BFO frequency is not displayed. Only an above (+), or below (-) symbol is indicated.

(3) Push [SCROLL DOWN] until the BFO frequency is centered again. Then continue until the below (-) indicator is observed.

(4) Press [BFO] [BFO]. This will turn off the BFO indicator.

i. Check AGC Function.

(1) Press [AGC] and observe the AGC scrolls through the three AGC speeds, SLOW, MED, and FAST. Scroll to AGC FAST.

(2) Press [2ND] [AGC OFF] and observe AGC OFF is displayed and AGC FAST is no longer displayed.

(3) Press [AGC] and observe AGC OFF is no longer displayed and AGC FAST illuminates.

NOTE

When going from AGC OFF to AGC, the readout is always AGC: SLOW when in the USB, LSB and CW modes, and AGC: FAST in the AME mode.

j. Check Audio Source Function.

(1) Select a voice mode of operation (USB, LSB, or AME). Press [AUDIO SOURCE] and observe the AUDIO SOURCE indicator changes from MIC to AUD2 (Audio 2). Press [AUDIO SOURCE] again and observe a change from AUD2 to PATCH (telephone patch).

(2) Continue to press [AUDIO SOURCE] and observe it scrolls through the three audio source positions. Stop at AUDIO: MIC.

k. Check Meter Input Function.

(1) Press [METER] and observe the METER scale changes from Forward Power (FWD) ("S" scale) to Reflected Power (REF).

(2) Continue to press [METER] and observe that the meter scale scrolls through the following positions:

(a) AUDIO - Transmit audio level

(b) LINE - Audio Line Output

(c) PATCH - Patch Audio

(d) FWD - Forward Power

(e) REF - Reflected Power

(f) VSWR - Voltage Standing Wave Ratio

(3) Scroll to the FWD meter indication.

l. Check VOX Function.

(1) Press [2ND] [VOX] and observe the VOX: VOICE indicator illuminates.

(2) Press [2ND] [VOX] again and observe the display VOX: DATA.

(3) Press [2ND] [VOX] again and observe the VOX display is not lit (VOX disabled).

m. Check CLIP Function.

(1) Press [2ND] [CLIP]. Observe the CLIP indicator illuminates. (Not available in AUD2 Audio Source.)

(2) Press [2ND] [CLIP] again, and observe that the CLIP indicator extinguishes.

n. Check Transmit Operation.

CAUTION

Verify before proceeding that the J1 RF INPUT/OUTPUT jack of the 100 Watt Transceiver is connected to a load (minimum 100 watt capacity).

(1) Select frequency 12,345.67 KHz (see step b.).

(2) Select CW mode (see step d.) and connect a CW key.

(3) Select Meter input FWD (Forward Power) (see step k.).

(4) Close the CW Key. Observe the transmitter has an output by observing that the Meter

Scale reading is 100 watts (nominal) and that the XMIT indicator illuminates.

(5) Observe a steady tone from the front panel speaker.

(6) Press [2ND] [S TONE] and observe that the steady tone stops.

(7) Release the CW Key and observe that the meter indication drops to zero and XMIT indicator is no longer illuminated.

(8) Connect the Handset/Mic to the front panel connector.

(9) Select USB mode (see step d.).

(10) Select Audio Source MIC (see step j.).

(11) Key the Transmitter by pressing the push-to-talk button on the Handset/Mic. During the key down condition, observe that the XMIT indicator is illuminated. While keying, talk normally into the microphone and observe that on voice peaks, the FWD meter scale reads approximately 100 watts.

(12) Repeat steps (9), (10), and (11) above for the LSB and AME modes. Remove the Handset/Mic.

NOTES

(a) At any time during the above step, the internal 100 Watt Transceiver cooling fan may automatically switch to high speed.

(b) In AME mode testing, RF power output is 25 watts without modulation.

o. Check Receive Operation.

(1) Verify the XMIT indicator is not illuminated.

(2) Adjust the frequency (see step b.) and mode (see step c.) controls for reception of a known currently active communications channel. Adjust the AUDIO for a comfortable listening level.

(3) Select the SPKR switch OFF position and observe the Remote Control audio is turned off. Connect a Headset to front panel jack and observe audio can be monitored.

(4) Select the SPKR switch ON position and observe the Remote Control audio is turned on. Remove Headset from front panel jack.

(5) Turn the RF GAIN control slowly counterclockwise and observe the gradual desensitizing of the receiver. Return the RF GAIN control to the full clockwise position.

(6) Turn the SQUELCH control slowly clockwise (out of the detent position) and observe at some point the received audio is squelched. Return the SQUELCH control to the full counterclockwise position (into detent). Note that when in squelch, some residual audio is still heard in the speaker.

(7) Select the CW mode. Tune in a station operating in the CW mode or that is known to have at least some carrier in its transmission. Remember, that in the CW mode, the 100 Watt Transceiver automatically offsets 1KHz from the displayed frequency resulting in a 1KHz tone in the front panel speaker, i.e., BFO is not required. To change tone of received audio, press the BFO control and follow step h. to scroll the BFO higher and lower. When completed, center the BFO.

(8) Turn the front panel power switch to the POWER OFF position.

(9) Reconnect any cables removed as referenced in paragraph 3-3.

p. End of Test. This completes the initial checkout procedure. If any difficulties were encountered, refer to Chapter 6, Maintenance. Minor adjustments and adjustments to bring performance into the normal range of values are included in the procedures in chapter 4, Operation.

SECTION II. PREPARATION FOR RESHIPMENT

3-5. PREPARATION FOR RESHIPMENT. Reshipment of the Remote Control is accomplished by reversing the sequence described in paragraph 2-1 and illustrated in figure 2-1. There are no special dismantling or disassembly requirements. It is assumed that the original shipping container was retained. Remove the Remote Control from the rack, desk, etc., and place into the container. Also, remove the Remote Control Interface PWB Assy from the 100 Watt Transceiver and pack it with the Remote Control Unit. It is not necessary to remove any Remote Control special plug-in-units or assemblies. The container packing surrounds the equipment for shock protection. The packed carton should be securely bound with reinforced tape or metal bands for reshipment.