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**HARRIS**

**RF COMMUNICATIONS**

**RF-5200  
FALCON™ SERIES  
MANPACK TACTICAL  
COMMUNICATION  
SYSTEMS  
OPERATIONS  
MANUAL**

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FALCON™ SERIES  
MANPACK TACTICAL  
COMMUNICATION  
SYSTEMS  
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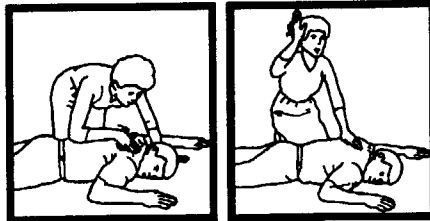
# When an Adult Stops Breathing

## WARNING

DO NOT attempt to perform the rescue breathing techniques provided on this page, unless certified. Performance of these techniques by uncertified personnel could result in further injury or death to the victim.

### 1 Does the Person Respond?

- Tap or gently shake victim.
- Shout, "Are you OK?"

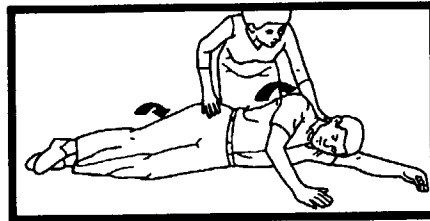


### 2 Shout, "Help!"

- Call people who can phone for help.

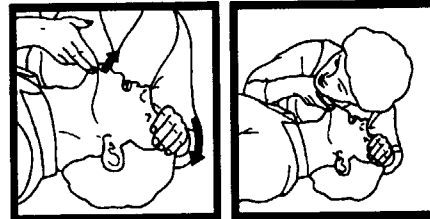
### 3 Roll Person Onto Back

- Roll victim toward you by pulling slowly.



### 4 Open Airway

- Tilt head back and lift chin.



### 5 Check for Breathing

- Look, listen, and feel for breathing for 3 to 5 seconds.

### 6 Give 2 Full Breaths

- Keep head tilted back.
- Pinch nose shut.
- Seal your lips tight around victim's mouth.
- Give 2 full breaths for 1 to 1-1/2 seconds each.



### 7 Check for Pulse at Side of Neck

- Feel for pulse for 5 to 10 seconds.



### 8 Phone for Help

- Send someone to call an ambulance.

### 9 Begin Rescue Breathing

- Keep head tilted back.
- Lift chin.
- Pinch nose shut.
- Give 1 full breath every 5 seconds.
- Look, listen, and feel for breathing between breaths.



### 10 Recheck Pulse Every Minute

- Keep head tilted back.
- Feel for pulse for 5 to 10 seconds.
- If victim has pulse but is not breathing, continue rescue breathing. If no pulse, begin CPR.

For more information about these and other life-saving techniques, contact your Red Cross chapter for training.  
"When Breathing Stops" reproduced with permission from an American Red Cross Poster.

**List of Abbreviations and Acronyms**

Abbreviation	Term
A, AMP	Ampere(s)
ac, AC	Alternating Current
ACE	Advanced Crypto Engine
A/D	Analog-to-Digital Converter
ADC	Analog-to-Digital Converter
ADDR	Address
ADP	Automated Data Processing
ADT	Administrative Delay Time, Automated Data Terminal
ADU	Automatic Dialing Unit
AF	Audio Frequency
AFC	Automatic Frequency Control
AFSK	Audio Frequency Shift Keying
A-G, A/G	Air-to-Ground
AGC	Automatic Gain Control
AIC	Analog Interface Chip
ALC	Automatic Level Control
ALE	Automatic Link Establishment
AMD	Automatic Message Display
AME	Amplitude Modulation Equivalent
ANT	Antenna
ANTIVOX	Voice-Operated Transmitter Key Inhibitor
API	Analog Phase Interpolation
ARQ	Automatic Repeat on Request
ASI	Analog Signal Interface
ASK	Amplitude Shift Keying
ATE	Automatic Test Equipment
AUD	Audio
AUX	Auxiliary
AVS	Analog Voice Security
AWG	American Wire Gauge
B/A	Buffer Amplifier

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
BC	Broadcast, Binary Counter
BCD	Binary-Coded Decimal
BD	Baud, Binary Decoder
BER	Bit Error Rate
BFO	Beat-Frequency Oscillator
BIT	Built-In Test
BITE	Built-In Test Equipment
BPI	Bits Per Inch
bps	Bits Per Second
BPSK	Binary Phase Shift Keying
Btu	British Thermal Unit
BW	Bandwidth
CARC	Chemical Agent Resistive Coating
CB	Circuit Breaker
CCW	Counterclockwise
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CFE	Contractor-Furnished Equipment
CH, CHAN	Channel
CI	Configuration Item
CKT	Circuit
cm	Centimeter
CMOS	Complimentary-Metal-Oxide-Semiconductor
CNTL	Control
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CRT	Cathode Ray Tube
CSM	Crypto Synch Message
CTRL	Control
CTS	Clear to Send
CW	Continuous Wave, Clockwise
D/A	Digital-to-Analog Converter

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
DAC	Digital-to-Analog Converter
DAM	Direct Access Memory
dB	Decibel(s)
dBm	Decibels referenced to 1 milliwatt
dc, DC	Direct Current
DCD	Data Carrier Detect
DE	Data Encryption
Demod	Demodulated
Diff	Differential
Dip, DIP	Dual In-Line Package
DMM	Digital Multimeter
DP	Double Pole
DPDT	Double Pole, Double Throw
DPRAM	Dual-Port RAM
DPST	Double Pole, Single Throw
DSP	Digital Signal Processor
DSR	Data Set Ready
DTL	Diode Transistor Logic
DTM	Data Text Message
DV	Digitized Voice
DTMF	Dual Tone Multi-Frequency
DTR	Data Terminal Ready
DUART	Dual Universal Asynchronous Receiver-Transmitter
DUSART	Dual Universal Synchronous/Asynchronous Receiver-Transmitter
DVM	Digital Voltmeter
DVOM	Digital Volt-Ohm Meter
EAM	Embedded Adaptive Module
EAROM	Electronically Alterable Read Only Memory
ECM	Electronic Counter Measure
ECCM	Electronic Counter-Counter Measure
EEPROM, E <sup>2</sup> PROM	Electrically Erasable Programmable Read Only Memory

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
<b>EMI</b>	Electromagnetic Interference
<b>EOM</b>	End of Message
<b>EPROM</b>	Erasable Programmable Read-Only Memory
<b>FCC</b>	Federal Communications Commission
<b>FD</b>	Full Duplex
<b>FEC</b>	Forward Error Correction
<b>FET</b>	Field-Effect Transistor
<b>F/F</b>	Flip-Flop
<b>FFT</b>	Fast Fourier Transform
<b>FH</b>	Frequency Hopping
<b>FSK</b>	Frequency Shift Keying
<b>F/W, FW</b>	Firmware
<b>G-A, G/A</b>	Ground-to-Air
<b>GF</b>	Government (or customer) Furnished
<b>GFE</b>	Government-Furnished Equipment
<b>Gnd, GND</b>	Ground
<b>GPIB</b>	General Purpose Interface Bus
<b>HD</b>	Half Duplex
<b>HDCP</b>	Harris Data Communications Protocol
<b>HF</b>	High Frequency
<b>HSS</b>	High-Speed Synchronizer
<b>HSSB</b>	High-Speed Serial Bus
<b>HWCI</b>	Hardware Configuration Item
<b>Hz</b>	Hertz
<b>IC</b>	Integrated Circuit
<b>ID</b>	Identification
<b>IDF</b>	Intermediate Distribution Frame
<b>IF</b>	Intermediate Frequency
<b>INT</b>	Interrupt
<b>INTLK</b>	Interlock
<b>INTR</b>	Interrupt

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
<b>I/O</b>	Input/Output
<b>ISB</b>	Independent Sideband
<b>J</b>	Joules
<b>k</b>	Kilo (thousand)
<b>kbyte</b>	Kilobyte
<b>kHz</b>	Kilohertz
<b>km</b>	Kilometer(s)
<b>kV</b>	Kilovolt(s)
<b>kVA</b>	Kilovolt Ampere(s)
<b>KVD</b>	Keyboard Visual Display
<b>KVDU</b>	Keyboard Visual Display Unit
<b>kW</b>	Kilowatt(s)
<b>LBT</b>	Listen Before Transmit
<b>LC</b>	Inductive Capacitive
<b>LCD</b>	Liquid Crystal Display
<b>LD</b>	Lock Detect
<b>LED</b>	Light-Emitting Diode
<b>LF</b>	Low Frequency
<b>LLSB</b>	Lower Lower Sideband
<b>LOS</b>	Line of Sight
<b>LP</b>	Low Pass
<b>LPC</b>	Linear Predictive Coding
<b>LQA</b>	Link Quality Analysis
<b>LRU</b>	Line Replaceable Unit
<b>LSB</b>	Lower Sideband
<b>LSD</b>	Least Significant Digit
<b>M</b>	Meter, Mega (one million)
<b>m</b>	Milli, one-one thousandth
<b>mA</b>	Milliamper(e)s
<b>Mbyte</b>	Megabyte
<b>MDM</b>	MODEM



**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
MHz	Megahertz
MIC	Microphone
MIL-STD	Military Standard
mm	Millimeter(s)
Mod	Modification, Modulated
Mod/Demod	Modulator/Demodulator
Modem	Modulator/Demodulator
MOS	Metal Oxide Semiconductor
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
ms, msec	Millisecond
MTBCF	Mean Time Between Critical Failure
MTBF	Mean Time Between Failure
MTBM	Mean Time Between Maintenance
MTBR	Mean Time Between Replacement
MUF	Maximum Usable Frequency
Mux	Multiplex, Multiplexer
mVac	Millivolts Alternating Current
mVdc	Millivolts Direct Current
n	Nano ( $1 \times 10^{-9}$ )
NB	Narrowband
NC, N.C.	Normally Closed
N/C	Not Connected
NMOS	N-channel Metal-Oxide-Semiconductor
NO, N.O.	Normally Open
No.	Number
NPN	N-type, P-type, N-type (transistor)
nsec	Nanoseconds
NVG	Night Vision Goggles
$\Omega$	Ohms, a unit of resistance measurement
O&M	Operation and Maintenance

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
O&R	Operation and Repair
O.C.	Open Circuit or Open Collector
OEM	Original Equipment Manufacturer
Op Amp	Operational Amplifier
OCXO	Oven Controlled Crystal Oscillator
p	Pico
PA	Power Amplifier
PABX	Private Automatic Branch Exchange
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PEP	Peak Envelope Power
pF	Picofarad (1 x 10 <sup>-12</sup> Farads)
PIV	Peak Inverse Voltage
PLL	Phase-Locked Loop
PNP	P-type, N-type, P-type (transistor)
P-P	Peak-to-Peak
PROM	Programmable Read Only Memory
PS	Power Supply
Pt Pt, Pt-Pt	Point-to-Point
PTT	Push-to-Talk
PWB	Printed Wiring Board
QTY	Quantity
R, RG	Receiver Circuit: Receive, Receive Ground (from teletype)
RAD	Random Access Data
RAM	Random Access Memory
RC	Resistive Capacitive
RCU	Remote Control Unit
RCV/RX	Receive
RCVR	Receiver
RD	Read
RDY	Ready

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
<b>REC</b>	Receptacle
<b>RETX</b>	Retransmit
<b>RF</b>	Radio Frequency
<b>RFI</b>	Radio-Frequency Interference
<b>RLPA</b>	Rotatable Log Periodic Antenna
<b>RLSD</b>	Receive Level Sense Detect
<b>RMS</b>	Root Mean Squared
<b>ROM</b>	Read-Only Memory
<b>RST</b>	Reset
<b>RTC</b>	Real Time Clock
<b>RTN</b>	Return
<b>RTS</b>	Request to Send
<b>RTTY</b>	Radio Teletype
<b>RTU</b>	Remote Terminal Unit
<b>S, SG</b>	Send Circuit, Send Ground (to teletype)
<b>SA</b>	Spectrum Analyzer
<b>SB</b>	Sideband
<b>SCR</b>	Silicon Controlled Rectifier
<b>SHLD</b>	Shield
<b>SINAD</b>	A ratio of (signal + noise + distortion) to (noise + distortion) used to measure the signal quality of a communication channel. SINAD is commonly used to evaluate the ability of a channel to pass voice traffic.
<b>Sip, SIP</b>	Single In-Line Package
<b>SMD</b>	Surface-Mount Device
<b>SNR</b>	Signal-to-Noise Ratio
<b>SOM</b>	Start of Message
<b>SP</b>	Single Pole
<b>SPDT</b>	Single-Pole, Double-Throw
<b>SSB</b>	Single Sideband
<b>ST</b>	Single Throw
<b>SWR</b>	Standing Wave Ratio
<b>SYNC</b>	Synchronous

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
TB	Terminal Board
TCXO	Temperature Controlled Crystal Oscillator
TDQPSK	Time Differential Quaternary Phase Shift Keying
TGC	Transmitter Gain Control
T/R	Transmit/Receive
TT	Teletype
TTL	Transistor-Transistor Logic
TT VFT	Teletype Voice Frequency Tone
TTY	Teletype
TX	Transmit
u	Micro ( $1 \times 10^{-6}$ )
UART	Universal Asynchronous Receiver-Transmitter
uF	Microfarad ( $1 \times 10^{-6}$ Farads)
UHF	Ultra High Frequency
USART	Universal Synchronous/Asynchronous Receiver-Transmitter
USB	Upper Sideband
usec	Microseconds
UUSB	Upper Upper Sideband
UUT	Unit Under Test
uW	Microwave
V	Volt
VA	Volt-Ampere
Vac	Volts, Alternating Current
VCA	Voltage Controlled Attenuator
VCO	Voltage Controlled Oscillator
VDC, Vdc	Volts, Direct Current
VDU	Video Display Unit
VECT	Vector
VF	Voice Frequency
VFO	Variable Frequency Oscillator
VFR	Voice Frequency Repeater

**List of Abbreviations and Acronyms – Continued**

Abbreviation	Term
VHF	Very High Frequency
VLF	Very Low Frequency
VMOS	V-groove Metal-Oxide-Semiconductor
VOM	Volt-Ohm-Meter
VOX	Voice Operated Transmitter
V <sub>pp</sub>	Volts peak-to-peak
VSWR	Voltage Standing Wave Ratio
W	Watt(s)
WRL	Wire Run List
XCVR	Transceiver
XMT	Transmit
XMTR	Transmitter

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## **SAFETY SUMMARY**

### **1. INTRODUCTION**

All operators and maintenance personnel must observe the following safety precautions during operation and maintenance of this equipment. Specific warnings and cautions are provided in the manual and at the end of this Safety Summary. Warnings, Cautions, and Notes appear before various steps in the manual and will be used as follows:

- **WARNING** – Used when injury or death to personnel and damage to equipment is possible
- **CAUTION** – Used when there is a possibility of damage to equipment
- **NOTE** – Used to alert personnel to a condition that requires emphasis

### **2. PERSONNEL AND EQUIPMENT SAFETY**

Basic safety precautions consider factors involved in protecting personnel from injury or death. Electrical, mechanical, electromagnetic radiation (EMR), material, or chemical hazards are the most common types of hazards found in electronic equipment. The following are types of hazards that may exist:

- ELECTRICAL** – Hazardous voltage and current levels may exist throughout the equipment. Contact with these hazards could cause electrocution, electrical shock, burns, or injury due to involuntary reflexes of the body.
- MECHANICAL** – Mechanical hazards are created when heavy assemblies and components must be removed and replaced. Moving parts (such as fan blades) and hot surfaces are potential mechanical hazards.
- THERMAL** – Burn hazards may exist in the equipment that could cause personal injuries and/or serious equipment damage. Internal surfaces of the equipment may be in excess of 65°C, the point at which personnel could be burned. Extreme caution should be used when working with any hot assemblies (for example, power supply or power amplifier assemblies). Physical injury or damage may result to personnel and/or equipment as a result of a reflex action to a burn.
- CHEMICAL** – Chemicals or materials used for servicing the equipment may present potential hazards. Many chemical agents, such as cleaners and solvents, may be toxic, volatile, or flammable. If used incorrectly, these agents can cause injury or death.
- EMR** – Overexposure to electromagnetic radiation results from amplified radio frequencies may produce a health hazard.

### **3. OPERATIONAL AND MAINTENANCE SAFETY GUIDELINES**

Good safety discipline is critical to prevent injury to personnel. All other safety measures are useless if personnel do not observe the safety precautions and do not follow safety disciplines. Once aware of a hazard, personnel should ensure that all other personnel are aware of the hazard. The following basic safety disciplines are stressed:

- a. Read a procedure entirely before performing it. Personnel must always perform each assigned task in a safe manner.
- b. Prior to applying equipment power after maintenance, personnel must ensure that all unsecured hand tools and test equipment are disconnected from the serviced/maintained equipment and properly stored.

- c. Power to the equipment must be removed before a piece of equipment is removed.
- d. Extreme care must be used when adjusting or working on operating equipment. Voltages in excess of 70 V or current sources in excess of 25 A are covered with barriers. Barriers include warning information about the hazard encountered upon barrier removal.
- e. Personnel must react when someone is being electrically shocked. Perform the following steps:
  - 1. Shut off power.
  - 2. Call for help.
  - 3. Administer first aid if qualified.

Under no circumstances should a person come directly in contact with the body unless the power has been removed. When immediate removal of the power is not possible, personnel must use a non-conductive material to try to jolt or pry the body away from the point of shock.

- f. Personnel should work with one hand whenever possible to prevent electrical current from passing through vital organs of the body. In addition, personnel must never work alone. Someone must be available in the immediate area to render emergency first aid, if necessary.
- g. Lifting can cause injury. Items weighing more than 37 pounds must be lifted by two or more people.
- h. Some electrolytic capacitors contain aluminum oxide or tantalum. If connected incorrectly, the capacitor will explode when power is applied. Extreme care must be used when replacing and connecting these capacitors. The capacitor terminals must always be connected using the correct polarity: positive to positive and negative to negative.

The next section contains general safety precautions not directly related to specific procedures or equipment. These precautions are oriented toward the maintenance technician. However, all personnel must understand and apply these precautions during the many phases of operation and maintenance of the equipment. The following precautions must be observed:

### ***DO NOT SERVICE EQUIPMENT ALONE***

Never work on electrical equipment unless another person familiar with the operation and hazards of the equipment is near. When the maintenance technician is aided by operators, ensure that operators are aware of the hazards.

### ***GROUNDING***

Always ensure that all equipment and assemblies are properly grounded when operating or servicing.

### ***TURN OFF POWER AND GROUND CAPACITORS***

Whenever possible, power to equipment should be turned off before beginning work on the equipment. Be sure to ground all capacitors that are potentially dangerous.

### ***KEEP AWAY FROM LIVE CIRCUITS***

Operators and maintainers must observe all safety regulations at all times. Do not change components or make adjustments inside equipment with a high voltage supply on unless required by the procedure. Under certain conditions, dangerous potentials may exist in circuits with power controls off, due to charges retained by capacitors.

### ***DO NOT BYPASS INTERLOCKS***

Do not bypass any interlocks unnecessarily. If it is necessary to employ an interlock bypass for equipment servicing, use extreme care not to come in contact with hazardous voltages.

### ***USE CARE HANDLING HEAVY EQUIPMENT***

Never attempt to lift large assemblies or equipment without knowing their weight. Use enough personnel or a mechanical lifting device to properly handle the item without causing personal injury.

### ***HEED WARNINGS AND CAUTIONS***

Specific warnings and cautions are provided to ensure the safety and protection of personnel and equipment. Be familiar with and strictly follow all warnings and cautions on the equipment and in technical manuals.

### ***PROTECTIVE EYEWEAR***

All personnel must wear protective eyewear when servicing or maintaining equipment. Protective eyewear must be worn at all times when using tools.

## **4. PROTECTION OF STATIC-SENSITIVE DEVICES**



Diode input-protection is provided on all CMOS devices. This protection is designed to guard against adverse electrical conditions such as electrostatic discharge. Although most static-sensitive devices contain protective circuitry, several precautionary steps should be taken to avoid the application of potentially damaging voltages to the inputs of the device.

To protect static-sensitive devices from damage, the following precautions should be observed.

- a. Keep all static-sensitive devices in their protective packaging until needed. This packaging is conductive and should provide adequate protection for the device. Storing or transporting these devices in conventional plastic containers could be destructive to the device.
- b. Disconnect power prior to insertion or extraction of these devices. This also applies to PWBs containing such devices.
- c. Double check test equipment voltages and polarities prior to conducting any tests.
- d. Avoid contact with the leads of the device. The component should always be handled carefully by the ends or side opposite the leads.
- e. Avoid contact between PWB circuits or component leads and synthetic clothing.
- f. Use only soldering irons and tools that are properly grounded. Ungrounded soldering tips or tools can destroy these devices. **SOLDERING GUNS MUST NEVER BE USED.**



## 5. EXPLANATION OF HAZARD SYMBOLS



The symbol of drops of a liquid onto a hand shows that the material will cause burns or irritation of human skin or tissue.



The symbol of a person wearing goggles shows that the material will injure your eyes.



The symbol of a flame shows that a material can ignite and burn you.



The symbol of a skull and crossbones shows that a material is poisonous or a danger to life.

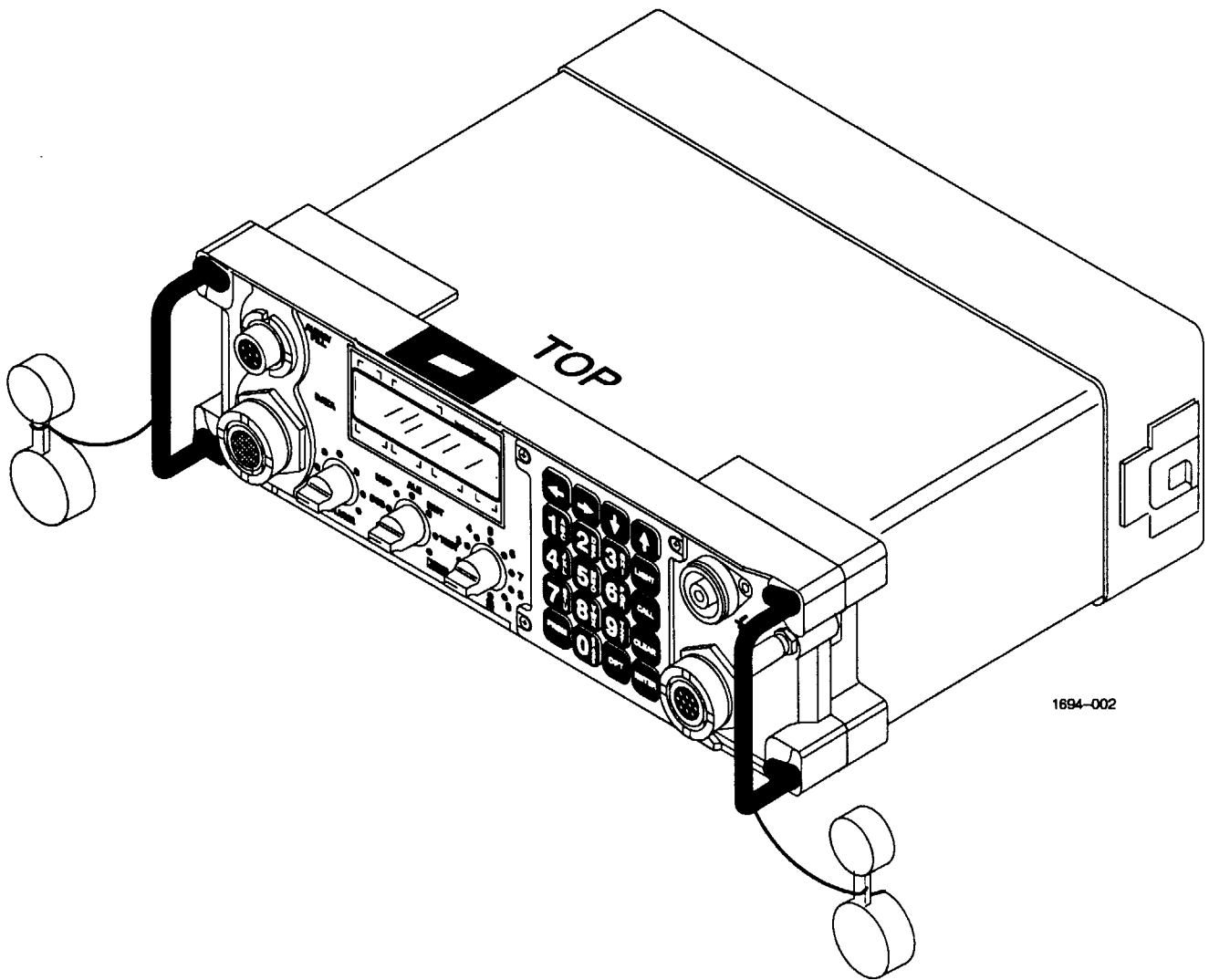


The symbol of a human figure in a cloud shows that vapors of a material present danger to your life or health.

### **ABOUT THIS MANUAL**

This manual contains information necessary to install, operate, program, and maintain the RF-5200 FALCON™ Series Manpack Tactical Communications Systems.

**RF-5200  
FALCON™ SERIES  
MANPACK TACTICAL  
COMMUNICATION  
SYSTEMS  
OPERATIONS  
MANUAL**



**Figure 1-1. RT-1694 Manpack Receiver-Transmitter**

**CHAPTER 1****GENERAL INFORMATION****1.1 SAFETY PRECAUTIONS****1.1.1 General**

All safety precautions necessary for the protection of personnel and the equipment are cross-referenced here. The WARNING or CAUTION is referenced to the paragraph number where it is used in the manual, and a brief subject phrase indicating the content is provided. It is recommended that these items be read in their entirety before performing the referenced procedure. References are as follows:

- WARNING – Paragraph 6.3.1: High voltages present inside equipment
- CAUTION – Paragraph 6.3.3: Do not bend or force cables.
- WARNING – Paragraph 6.4.2.1: High voltages present inside equipment
- WARNING – Paragraph 6.4.2.2: High voltages present inside equipment
- WARNING – Paragraph 8.2.3: Inadequate or defective grounding could cause injury or death
- CAUTION – Paragraph 8.2.3: Inadequate or defective grounding could damage equipment.
- CAUTION – Paragraph 8.5.7: Do not damage or kink coaxial feedline.
- CAUTION – Paragraph 8.5.7.3.4: Guy antenna if winds exceed 50 miles/hour or if antenna is to be installed for extended period of time.
- WARNING – Paragraph 8.5.9: Operating an ungrounded manpack radio could result in minor shocks.
- WARNING – Paragraph 8.5.9.1.2: Do not ship or store batteries in battery case.
- WARNING – Paragraph 8.5.9.1.3: Do not use solar battery charger to charge lithium-sodium dioxide batteries.
- WARNING – Paragraph 8.5.9.1.4: Do not store lithium-sulfur dioxide batteries with other hazardous materials.
- WARNING – Paragraph 8.5.9.1.5: Do not charge, short circuit, incinerate, disassemble, or mutilate the lithium-sulfur dioxide battery.
- WARNING – Paragraph 8.5.9.1.5: Do not use lithium-sulfur dioxide battery built before 1980.
- WARNING – Paragraph 8.5.9.1.5: Do not use halon-type fire extinguisher on a lithium-sulfur diode battery fire.
- WARNING – Paragraph 8.5.9.1.6: A partially discharged lithium-sulfur dioxide battery is considered hazardous waste.
- CAUTION – Paragraph 8.5.9.1.6: Do not dispose lithium-sulfur dioxide batteries in ordinary trash.
- WARNING – Paragraph 8.5.9.1.6: Keep lithium-sulfur dioxide batteries away from open flame or heat.
- WARNING – Paragraph 8.5.9.2: Operating an ungrounded manpack radio could result in minor shocks.
- CAUTION – Paragraph 8.5.10: Interface cables can be damaged by static discharge.

## 1.2 INTRODUCTION

### 1.2.1 Maintenance Levels

Harris/RF Communications designs its products and systems to be supported by up to four maintenance levels. See Figure 1-2. Each maintenance level relies on a defined set of support documentation and equipment in order to fulfill its maintenance tasks. The tasks performed at each level grow in complexity as fault isolation is narrowed to the component causing the fault. This concept assists the maintainer by supplying only the information and materials required for that maintenance level. These levels may be combined to sustain any particular user maintenance philosophy. The four maintenance levels are:

#### 1.2.1.1 Level I

This level is restricted to fault recognition and detection. Fault isolation is not usually performed at this level. An operator who detects a faulty condition alerts Maintenance Level II for repair.

#### 1.2.1.2 Level II

The maintenance technician repairs the radio system by utilizing a System (Level II) manual to fault isolate to the faulty unit (for example, receiver-transmitter, power amplifier, antenna coupler, etc.). The faulty Line Replaceable Unit (LRU) is replaced with a spare and sent to Maintenance Level III.

#### 1.2.1.3 Level III

The faulty unit is serviced at a facility that has support equipment available, typically a hot test bed radio system. The suspected faulty unit is inserted into the hot test bed radio system and troubleshot down to the faulty assembly using a Maintenance (Level III) manual. The faulty Shop Replaceable Unit (SRU) is replaced with a spare and passed to Maintenance Level IV.

#### 1.2.1.4 Level IV

The faulty SRU is returned to Harris/RF Communications for repair. If Level IV maintenance capabilities are available on-site, the maintenance technician can identify the faulty component on the SRU using a Depot Maintenance (Level IV) manual that outlines the electronic maintenance techniques and test fixtures necessary to repair the SRU.

### 1.2.2 Purpose of this Manual

This manual provides the user radio system operation instructions, as well as all technical information required to support Level II maintenance as described in Paragraph 1.2.1.2.

The overall intent of this manual is to help the operator effectively use the radio system, and to help the maintainer expedite repair of the system in a reasonable amount of time, resulting in reduced down-time and increased system availability. Detailed information that will be useful to the maintainer, such as system configuration, equipment specifications, fault isolation and repair techniques, required tools and test equipment, and functional descriptions of assemblies, is provided.

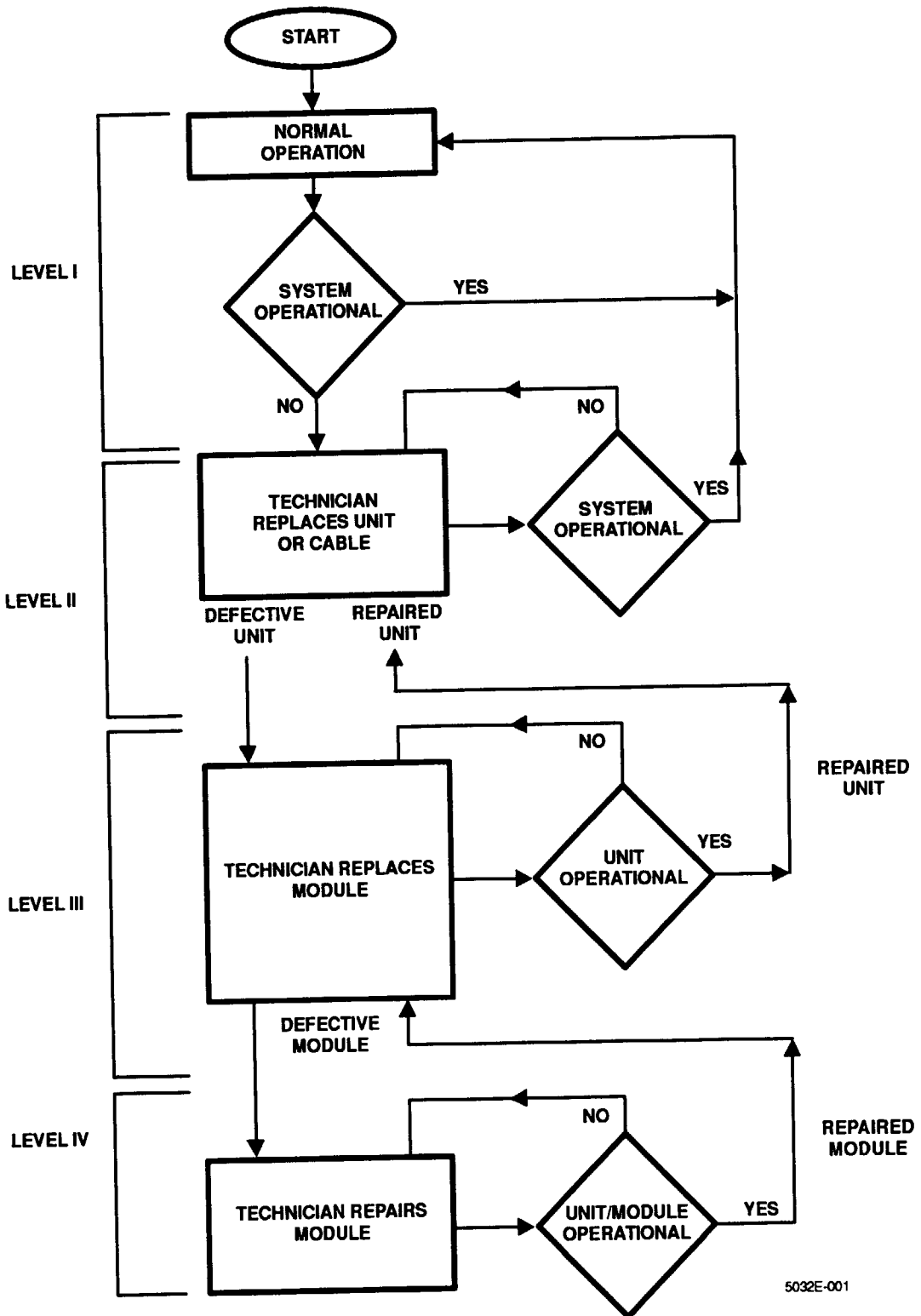


Figure 1-2. Maintenance Flow Chart

### **1.2.3 Maintenance Support Packages**

Harris/RF Communications designs maintenance packages that support these levels. Packages include the necessary spare parts, training, technical manuals, tools, test equipment, and maintenance aids such as interface cables, extender cards, and test fixtures.

Refer to Chapter 9, Accessories, for more information on support packages designed to enhance the effectiveness of this system.

### **1.2.4 Scope**

This manual contains operation information, functional description, scheduled maintenance, troubleshooting, corrective maintenance, parts lists, and installation information for the RF-5200 FALCON™ Series Manpack Tactical Communications Systems. This publication does not supersede any previous manual or technical documentation.

### **1.2.5 Warranty**

Harris Corporation guarantees that if the units that make up the RF-5200 FALCON™ Series Manpack Tactical Communications Systems fail from normal use within one year from the date of shipment due to a defect in workmanship or materials, Harris will repair or replace the unit at no charge. Repairs made by Harris to the unit under this warranty are warranted to be free from defects in material and workmanship for 60 days from the date of repair.

For information on how to process a claim under this warranty, and on what is not covered by this warranty, refer to the warranty information printed on the inside front cover of each unit's Level III maintenance manual.



## **1.3 SYSTEM DESCRIPTION**

### **1.3.1 General**

The RF-5200 FALCON™ Series Manpack Tactical Communications Systems are advanced, integrated, high-performance communication systems that operate over the 1.6 MHz to 59.9999 MHz frequency range. Because of its modular design, optional modules can be installed to expand the system's capabilities.

The RF-5200 FALCON™ Series Manpack Receiver-Transmitter (R/T), power amplifiers, antenna couplers, power supplies, antennas, and options have been carefully integrated to create a family of ultra-reliable, full-featured, and user-friendly communication products.

The RF-5200 FALCON™ Series Manpack Tactical Communications Systems consist of an RT-1694 Receiver-Transmitter and one of the following groups of equipment:

- a. AN/PRC-138 Manpack System
  1. Battery case
  2. Whip antenna kit
  3. Manpack radio bag
  4. Ancillary kit with handset
  5. Operator guide and manuals
- b. AN/PRC-138(V)2 Manpack System
  1. Battery case
  2. Ancillary kit with handset
  3. Whip antenna kit
  4. Manpack radio bag
  5. Ground stake kit
  6. CW key with knee clip
  7. Cables
  8. Operator guide and manuals
- c. 20 Watt System
  1. RF-5030PA-20E 20 Watt Power Amplifier/Coupler
  2. 24 Vdc Filter Adapter Assembly (optional)
- d. 125 Watt System
  1. RF-5032PA-125E 125 Watt Power Amplifier
  2. RF-5055PS AC/DC Power Supply
  3. RF-5056PS DC/DC Power Converter
  4. RF-382 Antenna Coupler
  5. 24 Vdc Filter Adapter Assembly (optional)

- e. 150 Watt System
  - 1. RF-5033PA-150 150 Watt Power Amplifier
  - 2. RF-382 Antenna Coupler

### 1.3.2 Configuration Information

Two plug-in modules are available for the RT-1694(P) Receiver-Transmitter to provide the exact radio features desired:

- RF-5161-01 Performance Option (A3 Linear Predictive Coding [LPC] Vocoder Printed Wiring Board [PWB] Assembly)
- RF-5170 Security Option (A1A2 Encryption PWB Assembly)

For more information on these options, refer to Chapter 2, Operation.

### 1.3.3 Features

The RT-1694 Receiver-Transmitter is a self-contained, portable unit with built-in antenna coupler and power amplifier assemblies. The R/T can also serve as a common exciter for use with an external power amplifier and antenna coupler. All radio system commands are entered through the RT-1694 Receiver-Transmitter front panel.

This modular approach provides commonalty for ease of training, service, and maintenance, and reduces requirements for logistical support. Advanced features of the RT-1694 Receiver-Transmitter are described in the following paragraphs.

#### 1.3.3.1 Remote Control Operation

Full remote-control operation is standard with the RT-1694 Receiver-Transmitter. The serial asynchronous data interface allows control using simple text-like commands. Built-in status and help menus allow operation with laptop computers and data terminals.

#### 1.3.3.2 Built-In Self-Test Capability

The RT-1694 Receiver-Transmitter is designed with built-in self-test features to permit operators or maintenance personnel to fully check the R/T's and external power amplifier's (if connected) performance down to the module level. Fault conditions are displayed on the RT-1694 Receiver-Transmitter front panel display.

#### 1.3.3.3 Adjustable High-Contrast Display and Back-Lit Keypad

The RT-1694 Receiver-Transmitter has adjustable backlighting in the display area. This greatly improves operation in dark environments. Additionally, an adjustable contrast feature makes the display easy to read in daylight.

The Night Vision Goggle (NVG) filter installed in the RT-1694B(P)/U Receiver-Transmitter allows the display and keypad to emit low-intensity light at a specific wavelength. This makes the R/T undetectable by enemy troops wearing night vision goggles, unless the enemy is at close range. Also, the R/T operator who is wearing night vision goggles can comfortably look at an NVG-compatible R/T without "blooming" the goggle viewfinder.

### **1.3.3.4 Active Squelch (RWAS)**

Active Squelch sends key, unkey, and keep-alive bursts with a robust serial burst waveform. Using these signals, a receiver can accurately determine the key state of the transmitter and mute audio accordingly. This traffic detection can also be used to provide a reliable retransmit keyline.

### **1.3.3.5 Programming Lockout**

The RT-1694 Receiver-Transmitter has a programming lockout feature that requires the use of a password to change operational and channel programming. This prevents operators from accidentally changing or corrupting any preprogrammed parameters, thereby improving operational reliability. The default password is supplied on a card which is included with this manual.

### **1.3.3.6 Configurability**

The RT-1694 Receiver-Transmitter is configured as part of the programming process. A user with a password determines which parameters are programmed and which are selectable by the operator. Those parameters which an operator may not select for programming are not displayed on the front panel display. This configurability feature allows the R/T to be configured to match mission requirements and operator skill.

### **1.3.3.7 Simplified Operation**

The RT-1694 Receiver-Transmitter simplifies operation and programming. One pair of arrow keys (right, left) located on the keypad are used to scroll from parameter to parameter. A second pair of arrow keys (up, down) are used to change the setting of the selected parameter. Numeric information (channel and frequency) is entered with the keypad.

Operation is further simplified by grouping together data transmission characteristics (data speed, modem type, interleaving, etc.) into one of seven preprogrammed data presets. One of six preprogrammed encryption keys is also operator selectable.

### **1.3.3.8 Flexible Data Interface**

A selectable synchronous/asynchronous data interface coupled with a dedicated remote control interface allows flexibility in applications using data devices. This makes the interface to certain encryption devices simpler and more direct. In addition, 24 volt power is available at the DATA connector to power accessories and intercommunication systems.

## **1.3.4 Optional Plug-In Modules**

Two optional plug-in modules are available for the RT-1694(P) Receiver-Transmitter to provide the exact radio features desired. These modules are described in the following paragraphs. (The RF-5161-01 is standard in the RT-1694A(P) and RT-1694B(P)/U configurations.)

### **1.3.4.1 RF-5161-01 Performance Option (A3 LPC Vocoder Assembly)**

The A3 LPC Vocoder Assembly can be factory configured to provide either Digital Voice or Analog Voice Security (AVS). When configured for digital voice, this assembly provides secure voice communications using Forward Error Correction (FEC) with a similarly equipped R/T. When used with the RF-5170 Security Option (A1A2 Encryption PWB Assembly), encrypted digital voice provides an extremely high level of security.

When configured for AVS, this assembly provides secure voice by scrambling the transmitted audio signal.

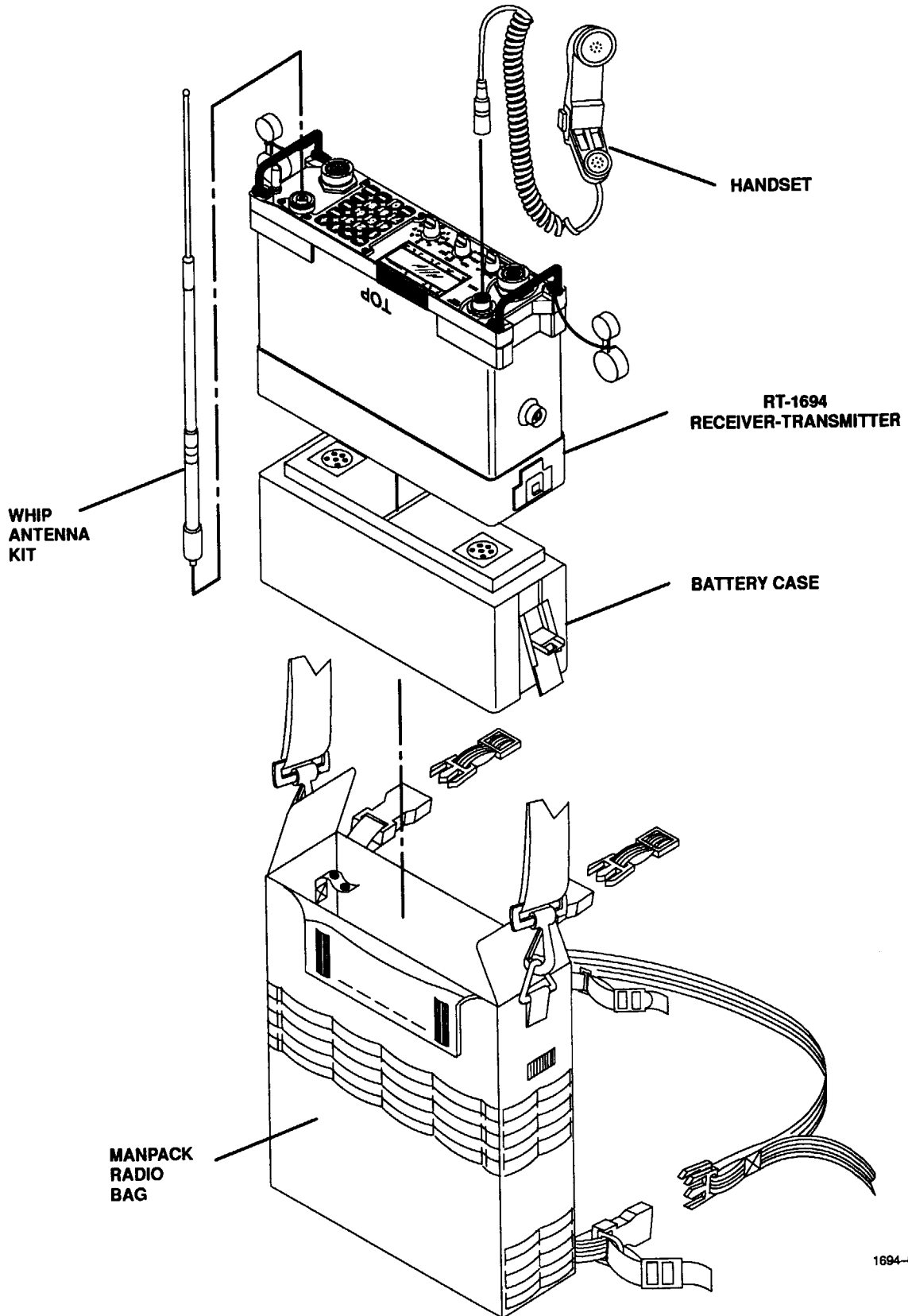
#### **1.3.4.2 RF-5170 Security Option (A1A2 Encryption PWB Assembly)**

This assembly provides the R/T with the ability to encrypt and decrypt digital data. If the A3 LPC Vocoder Assembly (RF-5161-01 Performance Option) is also installed, the A1A2 Encryption PWB Assembly provides digital voice capabilities.

#### **1.3.5 General System Relationship**

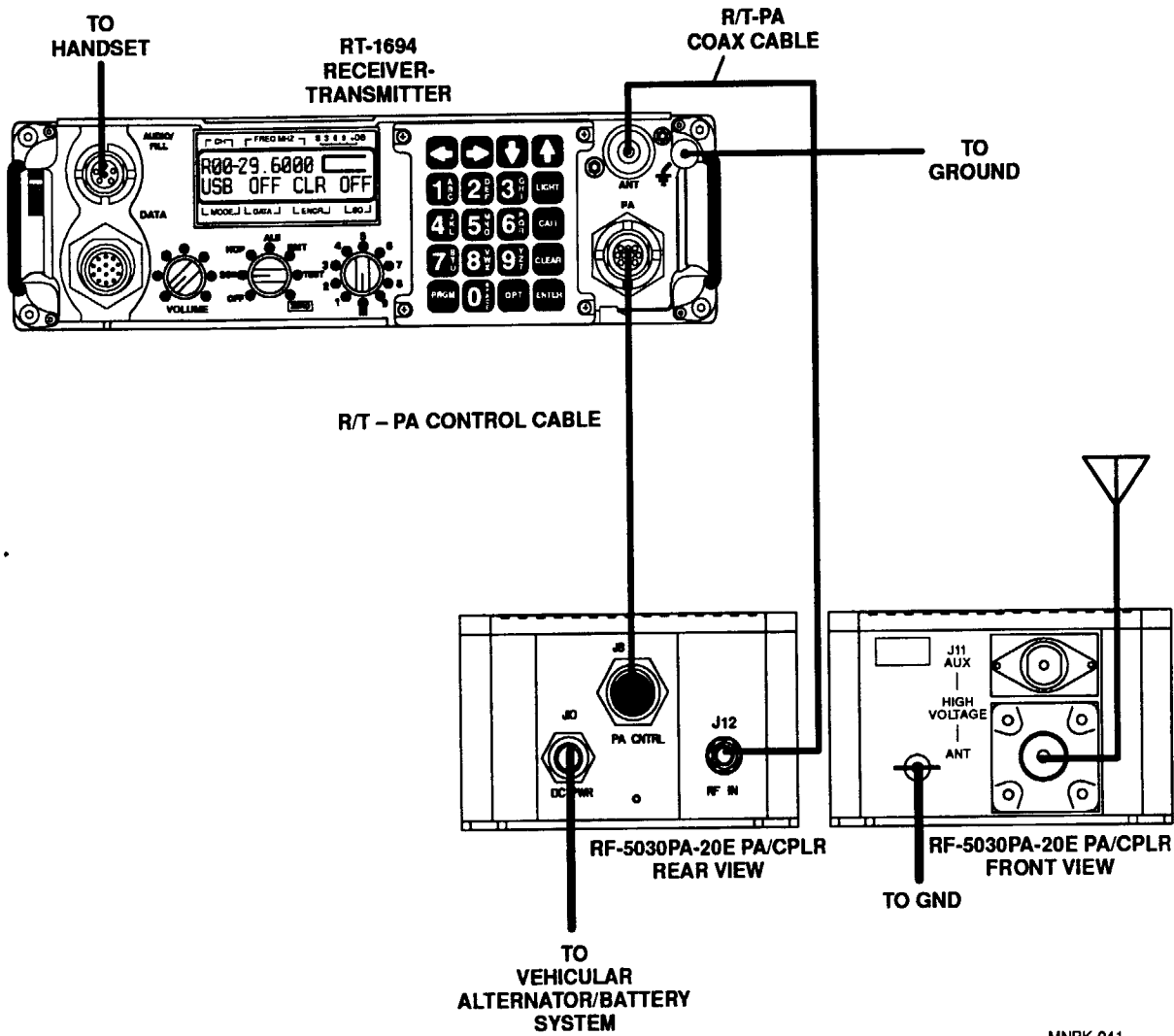
Figure 1-3 shows the typical relationship of units in the RF-5200 FALCON™ Series Manpack System when used in the AN/PRC-138 Manpack configuration. Figure 1-4 shows the typical relationship of units in the RF-5200 FALCON™ Series Manpack System when used in the 20 watt vehicular configuration. Figure 1-5 shows the typical relationship of units in the RF-5200 FALCON™ Series Manpack System when used in the 150 watt vehicular configuration. Figure 1-6 shows the typical relationship of units in the RF-5200 FALCON™ Series Manpack System when used in the 125 watt vehicular configuration. For more information on how to install these different system configurations, refer to Chapter 8, Installation.

When operated in the AN/PRC-138 Manpack configuration, the RT-1694 Receiver-Transmitter utilizes its internal 20 watt power amplifier assembly and antenna coupler assembly. Direct Current (DC) power is provided via the attached battery case and batteries. When operated in the vehicular configurations, the RT-1694 Receiver-Transmitter is the exciter and controller for the external power amplifier and antenna coupler. A power supply or alternator/battery system provides +26.4 Vdc to the external power amplifier. The Radio Frequency (RF) output of the power amplifier is sent to the antenna coupler. The RT-1694 Receiver-Transmitter communicates with the antenna coupler via the coupler control interface provided on the power amplifier.



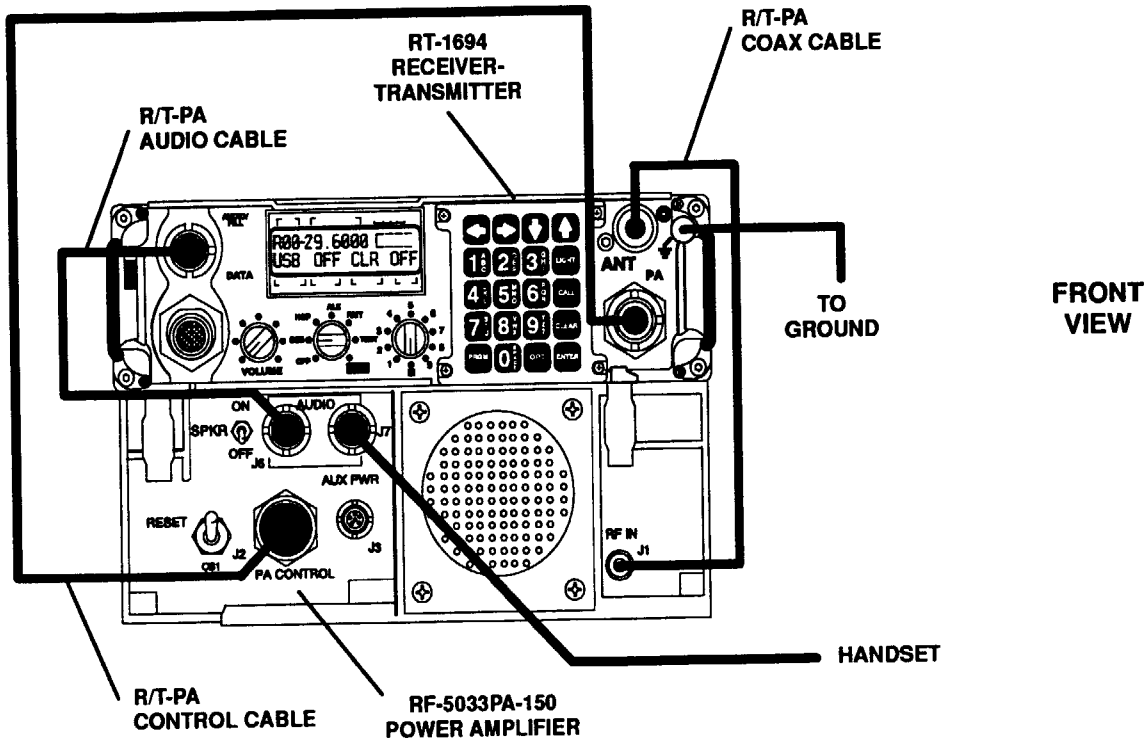
1694-003A

**Figure 1-3. Typical Relationship of Units in RF-5200 FALCON™ Series Manpack System (AN/PRC-138 Manpack Configuration)**



MNPK-041

Figure 1-4. Typical Relationship of Units in RF-5200 FALCON™ Series Manpack System (20 Watt Vehicular Configuration)



\*NOTE: ANTENNA IS CONNECTED TO OPPOSITE SIDE OF RF-382 ANTENNA COUPLER.

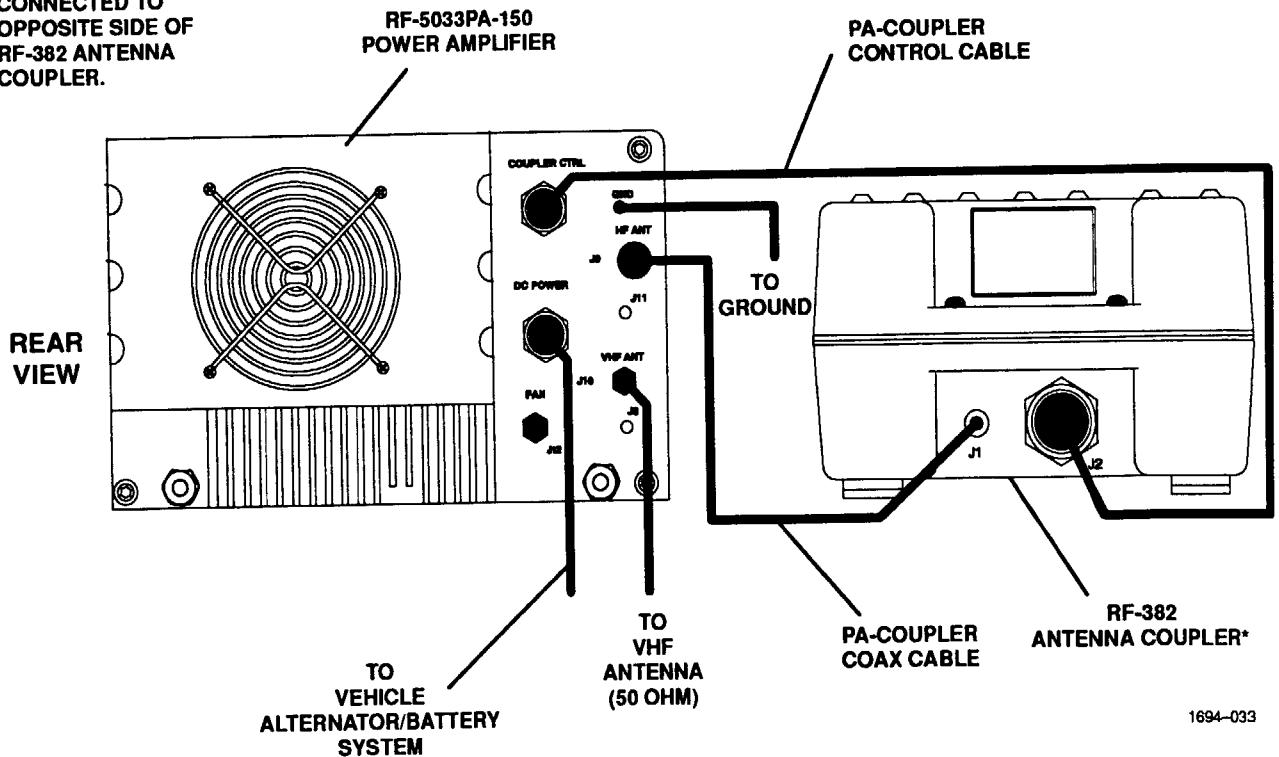
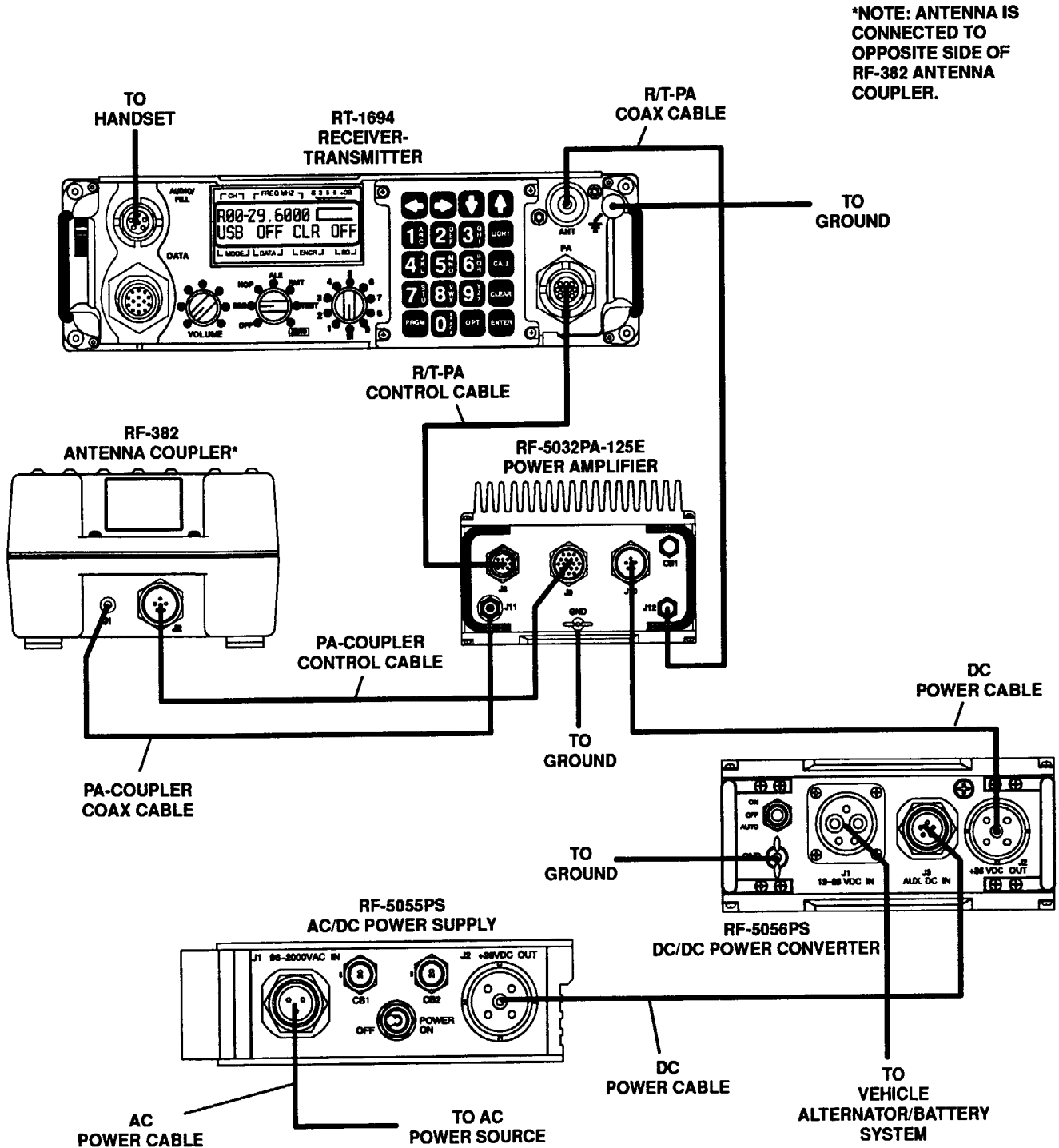


Figure 1-5. Typical Relationship of Units in RF-5200 FALCON™ Series Manpack System (150 Watt Vehicular Configuration)

1694-033



MNPK-001A

Figure 1-6. Typical Relationship of Units in RF-5200 FALCON™ Series Manpack System (125 Watt Vehicular Configuration)



### **1.3.6 Specifications**

The following tables provide information covering the specifications of the RT-1694 Receiver-Transmitter, the RF-5161-01 Performance Option, the RF-5170 Security Option, the external power amplifiers, the external antenna coupler, and the external power supplies. Refer to the following tables for specifications:

- Table 1-1 – RT-1694 Receiver-Transmitter Specifications
- Table 1-2 – High-Speed Data Modem Specifications
- Table 1-3 – Automatic Link Establishment (ALE) Specifications
- Table 1-4 – Voice Processor Specifications
- Table 1-5 – Frequency Hopping Specifications
- Table 1-6 – Digital Encryption Specifications
- Table 1-7 – RF-5030PA-20E 20 Watt Power Amplifier/Coupler Specifications
- Table 1-8 – RF-5032PA-125E 125 Watt Power Amplifier Specifications
- Table 1-9 – RF-5033PA-150 150 Watt Power Amplifier Specifications
- Table 1-10 – RF-382 Antenna Coupler Specifications
- Table 1-11 – RF-5055PS AC/DC Power Supply Specifications
- Table 1-12 – RF-5056PS DC/DC Power Converter Specifications
- Table 1-13 – RF-5051PS-125 Power Supply Specifications

Table 1-1. RT-1694 Receiver-Transmitter Specifications

Function	Specification
<b>GENERAL</b>	
Frequency Range	1.6 to 59.9999 MHz
Preset Channels	100
Frequency Stability	$\pm 1 \times 10^{-6}$
Modes of Operation	J3E (single sideband, upper or lower, suppressed carrier telephony) H3E (compatible Amplitude Modulation [AM] single sideband plus full carrier) J2A (Continuous Wave [CW] single sideband suppressed carrier) F3E (Frequency Modulation [FM] telephony)
RF Input/Output Impedance	50 ohms nominal, unbalanced
Power Input	+24 Vdc
Antenna Tuning Capability	50 ohm output: 1.6 to 60 MHz 8, 10, 16 ft. whips: 1.6 to 60 MHz AS-2259/GR (RF-1936): 3.5 to 30 MHz RF-1940 Tactical Dipole: 3 to 30 MHz
Data Interfaces	Synchronous and Asynchronous RS-232C and MIL-STD-188-114A
Temperature Range	-40° C to +70° C (-112° F to +284° F)
Environmental	MIL-STD-810E
Size	RT-1694 only: 26.4W x 21.6D x 7.8H cm (10.4W x 8.5D x 3.1H in.) With battery case: 26.4W x 33.8D x 7.8H cm (10.4W x 13.3D x 3.1H in.)
Weight	RT-1694(P): 3.86 kg (8.5 lbs.) without battery 7.71 kg (17 lbs.) with case and two Nickel-Cadmium (Ni-Cd) batteries  RT-1694B(P)/U: 3.38 kg (7.45 lbs.) without battery case 5.91 kg (13.02 lbs.) with case and two lithium batteries
Optional Modules [RT-1694(P)]	RF-5161-01 Performance Option (A3 LPC Vocoder Assembly); RF-5170 Security Option (A1A2 Encryption PWB Assembly)
<b>NOTE</b> For the RT-1694A(P) and RT-1694B(P)/U configurations, the RF-5161-01 is standard equipment.	

**Table 1-1. RT-1694 Receiver-Transmitter Specifications – Continued**

Function	Specification
<b>RECEIVER</b>	
Sensitivity (without preamplifier)	Single Sideband (SSB): $-110$ dBm (0.7 uV) for 10 dB SINAD (2.7 kHz bandwidth) AM: $-98$ dBm (2.8 uV) for 10 dB SINAD (6 kHz bandwidth 30% modulation) CW: $-117$ dBm (0.3 uV) for 10 dB (S+N)/N (0.35 kHz bandwidth) FM: $-107$ dBm (1.0 uV) for 10 dB SINAD
Audio Output	15 mW at 1000 ohms into external handset
Squelch	Front panel selectable, noise or 150 Hz tone (FM) or RWAS (High Frequency [HF] SSB)
Image and IF Rejection	Greater than 80 dB
Spurious Responses	RT-1694(P): Less than 10 spurs greater than $-90$ dBm equivalent input; fewer than 500 spurs are greater than $-120$ dBm equivalent input  RT-1694B(P)/U: Less than $-112$ dBm for 99% of available 3 kHz channels. Less than $-100$ dBm for 0.8%. For 0.2%, may exceed the above specifications.
AGC Characteristics	Mode dependent, selectable from front panel
Intermodulation Distortion	RT-1694(P): In band: $-45$ dB or better for two $-20$ dBm signals within the IF passband Out of band: $-80$ dB or better for two $-35$ dBm signals separated 100 kHz or more  RT-1694B(P)/U: In band: $-35$ dB or better for two $-6$ dBm (0 dBm/Peak Envelope Power [PEP]) signals at rated audio output Out of band: Third order intercept point shall be $+10$ dBm or greater
Overload Protection	Receiver protected to 70 Vrms

Table 1-1. RT-1694 Receiver-Transmitter Specifications – Continued

Function	Specification
<b>TRANSMITTER</b>	
Power Output	SSB, CW, AME: 1, 5, 20 watts PEP/Average FM: 1, 5, 10 watts
Carrier Suppression	Greater than 60 dB below PEP output (J3E mode)
Undesired Sideband Rejection	Greater than 60 dB below PEP output
Intermodulation Distortion	1.6 – 29.9999 MHz: –24 dBc minimum 30.0 – 59.9999 MHz: –18 dBc minimum
Audio Input	Handset: 1.5 mVrms into 150 ohms Fixed Level: 0.774 Vrms into 600 ohms

**NOTE**

Because Harris engineers continuously strive to improve all aspects of Harris equipment, specifications are subject to change without notice.

**Table 1-2. High-Speed Data Modem Specifications**

Function	Specification
<b>39-TONE MODE</b>	
Data Rates	2400, 1200, 600, 300, 150, 75 bits per second (bps)
Transmission Mode	Half duplex
FEC Coding	(14, 10, 2) Reed-Solomon Code at 2400 bps (7, 3, 2) Reed-Solomon Code at lower bps rates
Interleaving	Four levels (short, long, alternate short, alternate long)
Tone Library	39 Tones, 675 to 2812.5 Hz, 56.25-Hz tone spacing; Doppler tracking tone: 393.75 Hz
Modulation	Time Differential Quaternary Phase Shift Keying (TDQPSK) (four phase)
Demodulation	128-point Fast Fourier Transform (FFT)
Doppler Correction	75 Hz, tracking up to 3.5 Hz per second
Channel Bandwidth	3000 Hz
<b>SERIAL (SINGLE TONE) MODE (RT-1694B(P)/U ONLY)</b>	
Data Rates	75 bps (Receive [RX] and Transmit [TX]) 150, 300, 600, 1200, 2400 bps (TX only)
FEC Coding	Convolutional with Viterbi soft decision decoding
Interleaving Delay	0, 1.2, or 9.6 seconds
Modulation	8-ary PSK, 2400 symbols/second
Multipath Tolerance	6.5 milliseconds
Bandwidth	3000 Hz (300 – 3300 Hz)
Doppler Sync	± 75 Hz
Equalization	Data Directed Equalization
Synchronization	Sync on preamble
Adaptive Filtering	Suppression of certain classes of in-band interference
<b>BINARY FSK MODE</b>	
Data Rate	300, 150, 75 bps
Transmission Mode	Half duplex
Signaling	Phase Continuous Binary FSK
Frequency Shift Keying (FSK) Modes	Front-Panel Selectable Wide Shift: 2000 Hz ± 425 Hz (75, 150, 300 bps) Narrow Shift: 2805 Hz ± 42.5 Hz (75 bps) Alternate: 2000 Hz ± 85 Hz (75, 150 bps) Variable: Programmable mark/space: 350 Hz - 3000 Hz (75, 150, 300 bps)

**Table 1-2. High-Speed Data Modem Specifications – Continued**

Function	Specification
<b>DATA INTERFACES</b>	
Data	Asynchronous (4800, 2400, 1200, 600, 300, 150, 75 bps), ASCII
Control	Synchronous (2400, 1200, 600, 300, 150, 75 bps; internal or external clock)
Electrical	Request To Send (RTS), Clear To Send (CTS), XON-XOFF, CTRL-B (key), CTRL-C (unkey)
Remote Control	RS-232C, MIL-STD-188-114A Full function

**Table 1-3. ALE Specifications**

Function	Specification
<b>PROGRAMMING</b>	
Parameters	Radio channel groups, local addresses, individual (remote) addresses, network addresses, time of day, Link Quality Analysis (LQA) start time and repeat interval, antenna coupler tune time, link timeout
Retention	1 year minimum
<b>CHANNELS</b>	
Number	100 simplex and/or half duplex
Frequency Range	Operating: 1.6 to 59.9999 MHz Full Performance: 1.6 to 30 MHz
Modes	Upper Sideband (USB), Lower Sideband (LSB), Amplitude Modulated Envelope (AME), FSK, CW, data, digital voice
Channel Scan Groups	10
<b>SCAN</b>	
Rate	Five (5) channels per second
Scanned Channels	100 channels maximum
Channel Scan Groups	Ten (10)
<b>SELECTIVE CALLING</b>	
Types	Individual, net, all call, selective all call may be placed from front panel or remote. Any calls, selective any calls, and wildcard calls may be placed from remote only. Group calls can be received, but not placed.
Channel Selection	Automatic or manual
Handshake	Three-way for individual, net, group, any, wildcard; One-way for allcalls
Other	Digital squelch, listen before transmit (ALE traffic only), key-to-call
<b>ADDRESSES</b>	
Format	1 to 15 character, alphanumeric
Local Addresses	20 maximum
Network Addresses	20 maximum
Individual Addresses	200 maximum

**Table 1-3. ALE Specifications – Continued**

Function	Specification
<b>LINK QUALITY ANALYSIS</b>	
Types	Sounding (One way) and exchange (Three way handshake)
Measurement	Weighted average based on SINAD and Pseudo Bit Error Rate (PBER) as per MIL-STD-188-141A.
Start Time	Immediate, or programmed time-of-day
Repeat Interval	One time, or interval (hours/minutes)
Addresses Queued	Ten (10) maximum
LQA Score Storage	100 channels x 200 addresses x 2 directions
<b>SIGNALING</b>	
Modulation	Phase continuous 8-ary FSK
Symbol Rate	125 baud
Bit Rate	375 bps
Coding	Golay FEC, 2/3 majority vote, interleaving
Calling Cycle	1 to 79 seconds (depending on call type, channels scanned, and call sign length)
<b>BUILT-IN TEST</b>	
Functions Tested	ALE, radio, power amplifier, antenna coupler
<b>REMOTE CONTROL</b>	
Interface	RS-232C
Rate	300 to 9600 baud asynchronous
Other	Two stop bits, Eight data bits, no parity American National Standard Code for Information Exchange (ASCII) character based (compatible with existing RF-5000 remote control)



**Table 1-4. Voice Processor Specifications**

Function	Specification
<b>GENERAL</b>	
Audio Input	Handset connector: 1.5 mVrms into 150 ohms; 600 ohm auxiliary connector: 0/-10 dBm
<b>VOICE DIGITIZATION</b>	
Algorithm	LPC-10-52E
Bit Rates	2400 (single channel) or 800 bps (frequency hopping)
Bit Error Tolerance	2 x 10 <sup>-2</sup> random Bit Error Rate (BER) for Data Rate Transmission (DRT) greater than 80
Synchronization	Frame synchronization at beginning of message
Tracking	Continuous synchronization during message
End of Message	End of message data or loss of tracking data for two seconds
<b>AVS</b>	
Encryption Algorithm	Split band inversion with time diversity scrambling
Bands	24
Maximum Transmit Delay	0.5 second
Number of Codes	10 <sup>+8</sup>

**Table 1-5. Frequency Hopping Specifications**

Function	Specification
Frequency Range	2.0 MHz to 29.9950 MHz
Hopping Restrictions	Wide Band and List modes not available when internal antenna coupler is enabled or external antenna coupler is attached.
Hop Rate	20 hops/second
Data Rate	75, 150, 300 bps
Forward Error Correction	Frequency diversity (all rates); 14, 10, 2 Reed-Solomon (75, 150, 300 bps)
Hop Nets	Ten (10) (synchronization on only one of the ten nets at a time)
Hopping Bandwidths	<p>Wide Band: Programmable bandwidth: 70 kHz to 2 MHz Minimum lower frequency: 2.0 MHz Maximum upper frequency: 29.995 MHz</p> <p>Narrow Band: Center frequency: <math>15 \text{ MHz} \leq F_c \leq 29.995 \text{ MHz}</math> Bandwidth: 300 kHz Narrowband (NB) spacing: 5 kHz</p> <p>Center frequency: <math>5 \text{ MHz} \leq F_c \leq 15 \text{ MHz}</math> Bandwidth: 100 kHz NB spacing: 2.5 kHz</p> <p>Center frequency: <math>3.5 \text{ MHz} \leq F_c \leq 5 \text{ MHz}</math> Bandwidth: 50 kHz NB spacing: 2.5 kHz</p> <p>Center frequency: <math>1.6 \text{ MHz} \leq F_c \leq 3.5 \text{ MHz}</math> Bandwidth: 17.5 kHz (7.5 kHz – low; 10 kHz – high)</p> <p>Frequency List: Programmable bandwidth: 70 kHz to 2 MHz Minimum lower frequency: 2.0 MHz Maximum upper frequency: 29.995 MHz</p>
Frequency Spacing	Wide Band Mode: 5 kHz Narrow Band Mode: 2.5 kHz, 5 kHz center frequency dependent Frequency List Mode: 5 kHz
Frequency List	15 to 100 frequencies
Hopset Exclusions	Sub-bands (Ten [10] total) – wideband hopping only
PN Generator	Non-linear, repeat cycle > Five years
Initial Sync Time	29 seconds – required once per eight-hour period
Late Net Entry Time	29 seconds
In-Net Message Sync	Coarse Synchronization: continuous for up to eight hours Fine Synchronization: 300 millisecond typical after key-down
Excision Filtering	Excision of up to two single frequency interfering signals within the audio passband (typically provides greater than 25 dB equivalent filtering)

**Table 1-6. Digital Encryption Specifications**

Function	Specification
<b>GENERAL</b>	
Frequency Range	The radio is capable of operating in digital voice mode from 1.6 MHz to 59.9999 MHz and meets full performance specifications in this mode from 1.6 MHz to 29.9999 MHz.
Algorithm	LPC-10-52E
Bit Rates	2400 bps in single channel or 800 bps in frequency hopping
Synchronization	Frame synchronization at beginning of message
Tracking	Continuous synchronization during message
End of Message	End of message data or loss of tracking data for two seconds
<b>PROGRAMMERS</b>	
RF-5960 Master Code Programmer	The RF-5960 Master Code Programmer provides programming of the Data Encryption Option with six key codes with up to $1 \times 10^{52}$ possible combinations in a portable configuration. Operates from 115/230 Vac, 50/60 Hz, or as a portable unit on an internal BB-590/U rechargeable Ni-Cd battery. The internal battery is automatically recharged when operated on Alternating Current (AC).
Available Codes	$1 \times 10^{52}$ possible settings
Power	115/230 Vac, 50/60 Hz, internal BB-590/U rechargeable Ni-Cd battery
Size	5.38 H x 7.5 W x 8.5 D in. (11.8 H x 16.5 W x 18.7 D cm)
Weight	11.5 lbs. (29 kg)
RF-5961 Field Code Programmer	The RF-5961 Field Code Programmer is a pocket-sized unit that permits programming of the Digital Encryption Unit option (each with six key codes having up to $10^{52}$ combinations). A self-contained lithium battery retains codes and has an emergency code dump feature. The RF-5960 Master Code Programmer is required to insert codes.
Key Codes	Stores six of the available $1 \times 10^{52}$ codes for loading.
Power	Internal lithium battery
Size	1.25 H x 1.93 W x 5.6 D inches (2.8 H x 4.2 W x 12.3 D cm)
Weight	0.5 lbs. (1.3 kg)

**Table 1-7. RF-5030PA-20E 20 Watt Power Amplifier Specifications**

Function	Specification
<b>GENERAL</b>	
Frequency Range	1.6 to 59.99999 MHz
Modes of Operation	J3E (single sideband, upper or lower, suppressed carrier telephony); H3E (compatible AM single sideband plus full carrier telephony); J2A MCW (single sideband suppressed carrier keyed tone); F2B (FSK); F3E (FM); 39-Tone DQPSK.
RF Input/Output Impedance	50 ohms nominal, unbalanced
Power Input	+26.4 Vdc (per MIL-STD-1275) at 3.0 amperes, maximum
Temperature Range	-40° C to +70° C (-112° F to +284° F)
Leakage	MIL-STD-810E (1 meter depth)
Shock/Vibration	MIL-STD-810E
Humidity	MIL-STD-810E (0 to 95%)
Mean Time To Repair (MTTR)	Less than 15 minutes to the module level
Size	5.75 W x 8.13 D x 3.45 H inches (14.6 W x 20.6 D x 8.8 H cm)
Weight	5.5 lbs. (2.5 kg)
<b>POWER AMPLIFIER</b>	
Power Output	20 watts PEP/average into 50 ohms, 1.6 to 30 MHz; 10 watts average FM, into 50 ohms, 20 to 60 MHz
RF Drive Requirements	+20 dBm (100 mW)
<b>ANTENNA TUNER</b>	
Antenna Tuning Capability	Standard 8-, 10-, 16-, and 35-foot whips. AS-2259/GR (RF-1936): 3.5 to 10 MHz
Tuning Time	Learn Tune: <two seconds; Memory Tune: <ten milliseconds

**NOTE**

The RF-5142FH Frequency Hopping option is limited to narrowband operation when used with the RF-5030PA-20E 20 Watt Power Amplifier.

**Table 1-8. RF-5032PA-125E 125 Watt Power Amplifier Specifications**

Function	Specification
<b>GENERAL</b>	
Frequency Range	1.6 to 29.99999 MHz
RF Input/Output Impedance	50 ohm nominal, unbalanced
Power Input	+26.4 Vdc (Per MIL-STD-1275) at 15 amperes, maximum
Temperature Range	-40° C to +70° C (-112° F to +284° F)
Environmental	MIL-STD-810E
Leakage	MIL-STD-810E (1 meter depth)
Size	7.5 W x 10.0 D x 5.5 H in. (19.0 W x 25.5 D x 14.0 H cm)
Weight	12.8 lbs. (5.8 kg)
<b>POWER AMPLIFIER</b>	
Power Output	125 Watts PEP/average into 50 Ohms
RF Drive Requirements	+20 dBm (100 mW)
Intermodulation Distortion	-30 dB below PEP
Harmonic Output	-40 dB

**Table 1-9. RF-5033PA-150 150 Watt Power Amplifier Specifications**

Function	Specification
<b>GENERAL</b>	
Frequency Range	1.6 to 59.99999 MHz
RF Input/Output Impedance	50 ohm nominal, unbalanced
Power Input	+28.0 Vdc (per MIL-STD-1275) at 20 A maximum
Temperature Range	-40° C to +70° C (-112° F to +284° F)
Environmental	MIL-STD-810E
Leakage	MIL-STD-810E (1 meter depth)
Size	11.0 W x 15.5 D x 7.0 H inches (27.9 W x 39.4 D x 17.8 H cm)
Weight	33.0 lbs. (15.0 kg)
<b>POWER AMPLIFIER</b>	
Power Output	150 watts PEP/Average into a 50 ohm load (1.6 MHz to 29.99999 MHz) 60 watts PEP/Average into a 50 ohm load (30.0 MHz to 59.99999 MHz)
RF Drive Requirements	+20 dBm (100 mW)
Intermodulation Distortion	25 dB below 150 watt PEP (1.6 MHz to 29.99999 MHz) 25 dB below 60 watt PEP (30.0 MHz to 59.99999 MHz)
Harmonic Output	45 dB below 150 watt PEP (1.6 MHz to 29.99999 MHz) 45 dB below 60 watt PEP (30.0 MHz to 59.99999 MHz)

**Table 1-10. RF-382 Antenna Coupler Specifications**

Function	Specification
<b>GENERAL</b>	
Rated RF Input Power, Frequency Range, and Tuning Capability	Up to 500 watts PEP 1.5 to 30 MHz: 75- to 150-ft. long-wires (long-wires longer than 75 ft. require 1960-3006 Long-Wire Adapter), 40 to 100 feet dipoles (including RF-1912 and AS-2259/GR) 2.5 to 30 MHz: 35 ft. whips 4 to 30 MHz: 24 ft. whips 6 to 30 MHz: 15 ft. whips
Tuning Accuracy	Automatically tunes to 50 ohms to within a Voltage Standing Wave Ratio (VSWR) of 1.5:1.
Tuning Time	25 milliseconds tuning from memory based on prior tuneup of typically less than one second (four seconds maximum).
Efficiency	Whips: 1.5 to 4 MHz, 15 to 85%; 4 to 30 MHz, 50 to 95% Dipoles: 1.5 to 30 MHz, 60 to 95%
Features	Protection from high VSWR, high temperature, RF overvoltage and overcurrent; Built-In Test (BIT); automatic and manually-controlled receive bypass; 25 ms tune time; 10 to 32 Vdc primary power; lightning surge protection on all control lines; 512-channel memory
Tune Power Requirements	10 to 50 watts forward power throughout tuning cycle
Primary Power Requirements	10 to 32 Vdc at 2.5 A maximum during tuning; 1.5 A maximum after tuning
Remote Capability	Up to 250 ft. separation between transmitter and coupler
Enclosure Design	Submersible to 3 ft. (.9 m) of water, designed for exposed installations.
Weight	29 lbs. (13.2 kg)
Size	7.5 x 11.1 x 18.5 inches (19.1 x 28.2 x 47.0 cm), including projections 6.6 x 11.1 x 15.1 inches (16.8 x 28.2 x 38.4 cm), excluding projections Four mounting holes dimensions: 7.25 x 14.85 inches (18.4 x 37.7 cm)
Operating Temperature Range	-28° C to +65° C (-18° F to +150° F)
Control Lines	Keyline, Key Disable, Tune Power Request, Fault and Thermal Fault (RF-382-02 Antenna Coupler only), Retune Pulse, and Bypass
Accessories Supplied	Type N RF coaxial mating connector, control cable mating connector, cable installation material, coupler mounting hardware, installation material, and instruction manual
<b>VIBRATION</b>	
MIL-STD-810E	Method 514.3, category 8, test procedure 1-3.2.10 (random vibration) for ground mobile equipment
MIL-STD-810B	Method 514, procedure VIII, curve Y, except 5 to 55 Hz and .15 inches D.A. or 3.5 G (whichever is less)
MIL-STD-167-1	Type I (sinusoidal resonance search) for shipboard equipment

**Table 1-10. RF-382 Antenna Coupler Specifications – Continued**

Function	Specification
<b>SHOCK</b>	
MIL-STD-810E	Method 516.3, procedure I (functional shock) for ground mobile equipment (40 G, 11 ms sawtooth); procedure VI (bench handling shock) for equipment experiencing bench-type maintenance
Temperature	MIL-STD-810E, Method 501.2, procedures I and II (storage at 70° C and operation at 65° C); Method 502.2, procedures I and II (storage and operation at -40C)
Humidity	MIL-STD-810E; Method 507.2, procedure II (0 to 100% relative humidity at 65° C)
Altitude	MIL-STD-810E; Method 500.2, procedures I and II (storage and operating to 15,000 ft.)
Salt Fog	MIL-STD-810E; Method 509.2, procedure I (5% salt solution)
Dust	MIL-STD-810E; Method 510.2, procedures I and II (blowing dust and sand)
Rain	MIL-STD-810E; Method 506.2, procedure I (blowing rain)
Leakage	MIL-STD-810E; Method 512.2, procedure I (basic leakage-immersion)
Options	Navy gray or olive drab exterior finish Voltage Pre-Regulator (10208-5017) for use with RF-280 and RF-230/RF-236 Transceivers 1960-3006 Long-wire Adapter
Accessories	RF-2066 Antenna Base Plate Kit RF-285-04 Mounting Tray RF-382/SSK Site Spares Kit RF-382/ARK Assembly Repair Kit RF-382/MRK Maintenance Repair Kit RF-636 Dry Air Pump RF-628 Dry Nitrogen Kit



**Table 1-11. RF-5055PS AC/DC Power Supply Specifications**

Function	Specification
Input Voltage	110 to 240 Vac at 47 to 62 Hz nominal
Output	26.4 Vdc at 23 A
Efficiency	85% minimum
Load Regulation	300 mV
Line Regulation	50 mV
Output Current Duty Cycle	4:1 RX/TX
Size	7.5 W x 11.4 D x 2.5 H in. (19.1 W x 29.0 D x 6.35 H cm)
Weight	7.6 lbs. (3.45 kg)
Temperature Range	-55° C to +70° C (-67° F to +158° F)
Environmental	MIL-STD-810E

**Table 1-12. RF-5056PS DC/DC Power Converter Specifications**

Function	Specification
Input Voltage	12 to 28 Vdc nominal
Output	26.4 Vdc at 22 A
Efficiency	75% minimum at full load with an input voltage of 25 to 30 Vdc
Load Regulation	300 mV
Line Regulation	50 mV
Output Current Duty Cycle	4:1 RX/TX
Size	7.5 W x 12.75 D x 3.3 H inches (19.1 W x 32.4 D x 8.38 H cm)
Weight	11 lbs. (5.0 kg)
Temperature Range	-55° C to +70° C (-67° F to +158° F)
Environmental	MIL-STD-810E

**Table 1-13. RF-5051PS-125 Power Supply Specifications**

Function	Specification
Input Voltage	150 – 230 AC Single Phase (240 V nominal tap selected) Note: Tap selection is automatic.
Line Frequency	47 – 440 Hz
Power Consumption	(RF-5051PS-125) 1010 Watts/1450 VA at full load
Output	(RF-5051PS-125) 28 Vdc at 30 A (+26.4 Vdc nominal)
Load Regulation	-10 mV/ampere
Line Regulation	30 mV maximum output variation for 120/240 V ± 20% input variation
Size	7.5 W x 13.5 D x 5.5 H in. (19.0 W x 34.3 D x 14.0 H cm)
Weight	17.3 lbs. (7.86 kg)
Temperature Range	-40° C to +70° C (-112° F to +284° F)
Shock/Vibration	MIL-STD-810E

## 1.4 GENERAL DESCRIPTION OF MAJOR SYSTEM UNITS

### 1.4.1 General

The following paragraphs describe the major units of the RF-5200 FALCON™ Series Manpack Systems.

### 1.4.2 RT-1694 Receiver-Transmitter

The RT-1694 Receiver-Transmitter covers the 1.6 MHz to 59.9999 MHz frequency range. All normal RF-5200 FALCON™ Series manpack functions are controlled from the front panel. A 32-character, alphanumeric display provides system status and data entry to simplify operation and programming. All RF-5200 FALCON™ Series Manpack System optional assemblies are installed in the chassis, eliminating the need for exterior accessories. Figure 1-7 shows the RT-1694 Receiver-Transmitter.

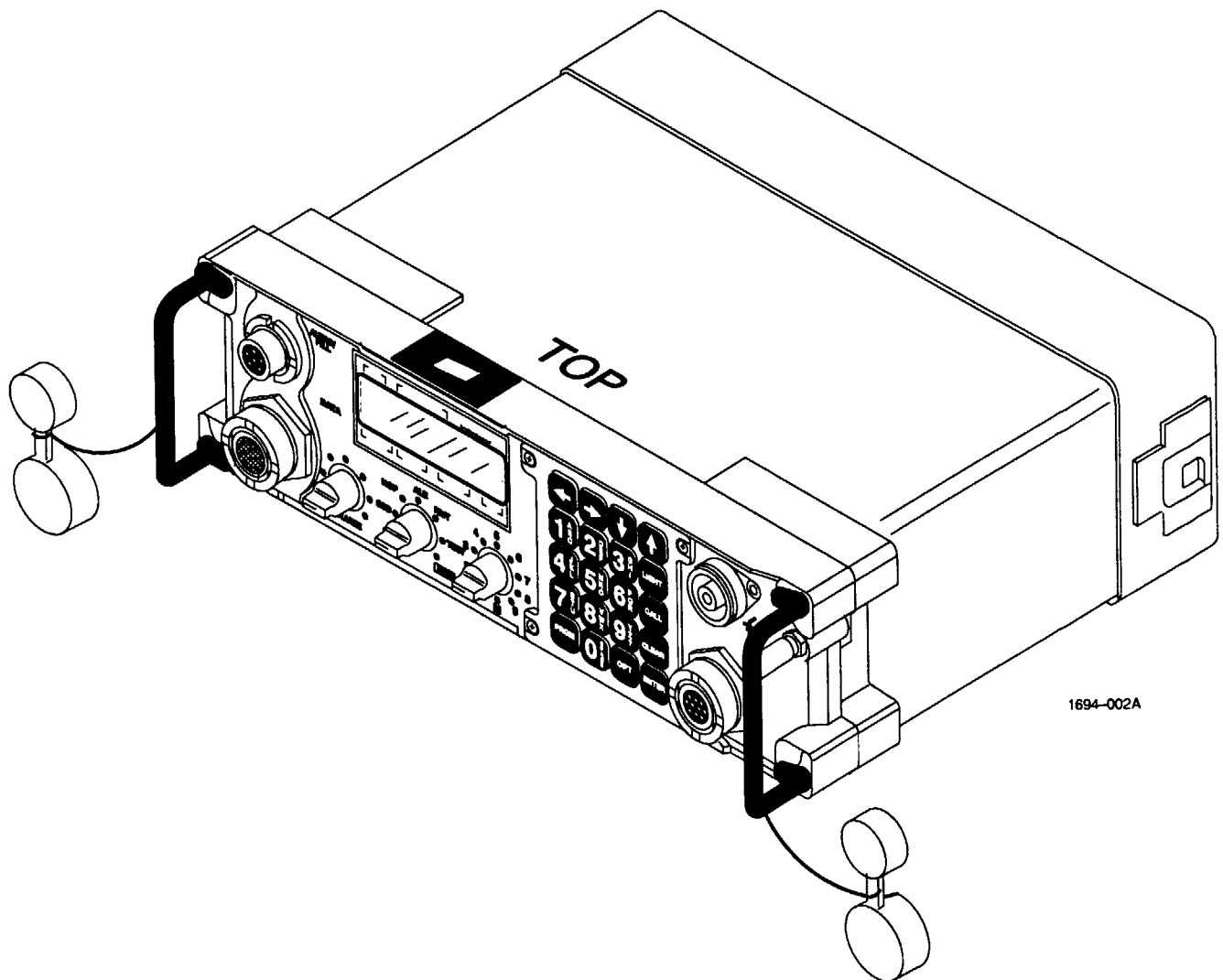
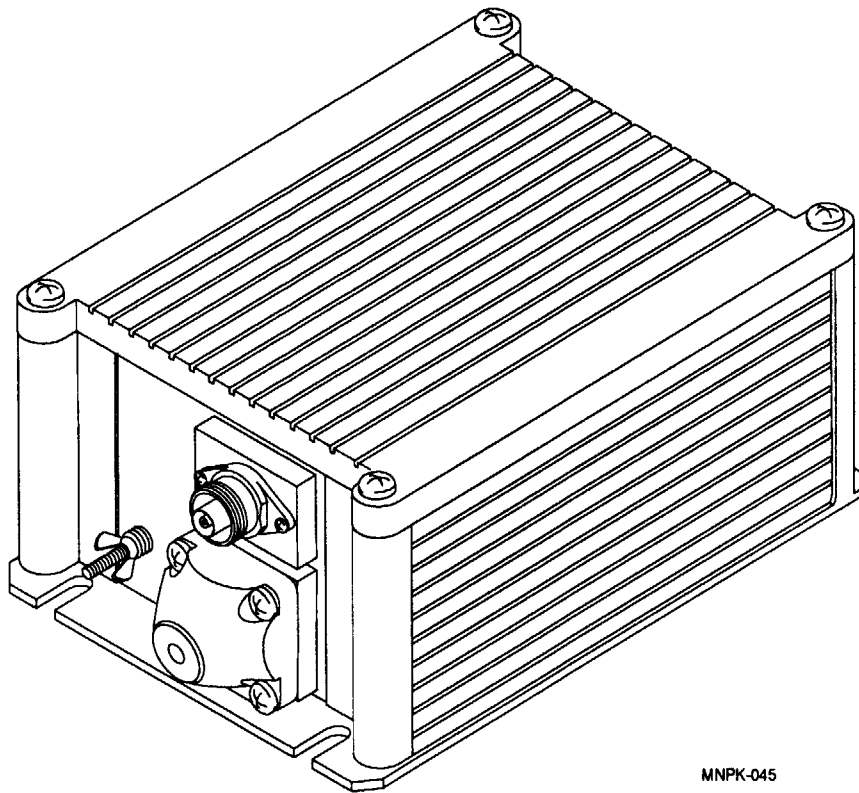


Figure 1-7. RT-1694 Receiver-Transmitter

### 1.4.3 RF-5030PA-20E 20 Watt Power Amplifier/Coupler

This unit provides remote power amplifier and antenna tuning capability. Its small size and 20 watt rating make the RF-5030PA-20E 20 Watt Power Amplifier/Coupler ideal for vehicular applications where the combination of the RF-382 Antenna Coupler and an RF-5032PA-125E 125 Watt Power Amplifier are too large and the 125 watts of power are not needed.

The RF-5030PA-20E 20 Watt Power Amplifier/Coupler provides input power conditioning and receiver protection to the transceiver, as well as transmitter amplification, harmonic filtering, and antenna matching. The RF-5030PA-20E 20 Watt Power Amplifier/Coupler is fully controlled by the transceiver and matches its frequency range from 1.6 MHz up to 59.9999 MHz. The RF-5030PA-20E 20 Watt Power Amplifier/Coupler is shown in Figure 1-8.



MNPK-045

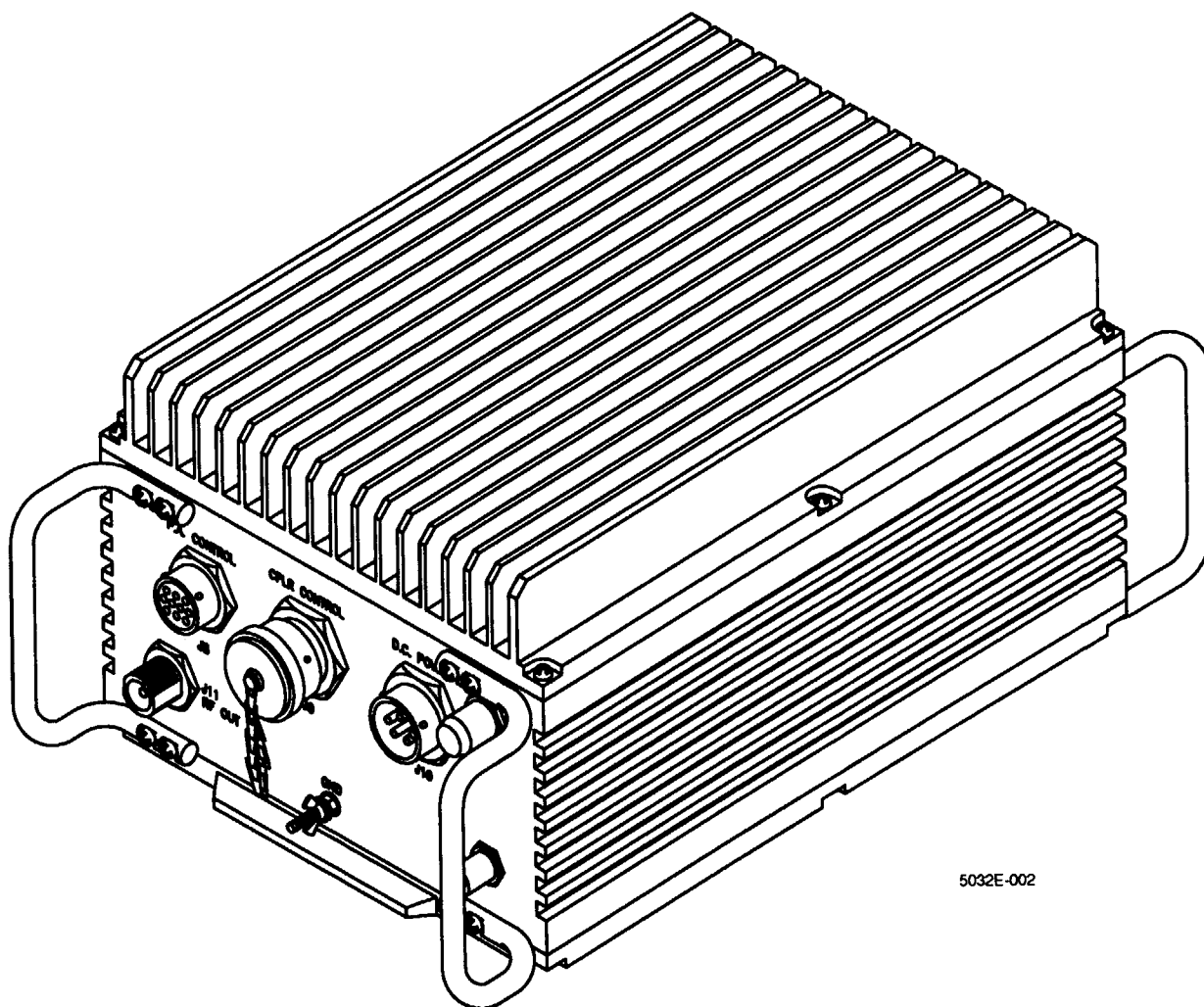
Figure 1-8. RF-5030PA-20E 20 Watt Power Amplifier/Coupler

#### 1.4.4 RF-5032PA-125E 125 Watt Power Amplifier

The RF-5032PA-125E 125 Watt Power Amplifier automatically responds to control inputs from the RT-1694 Receiver-Transmitter. It contains an integral power supply, control circuits, and harmonic filters, and also provides power supply overload protection for the R/T. Primary DC power for the R/T is routed from the source, through protection circuits in the power amplifier, and through the control cable to the R/T. Encrypted digital voice or modem data may be sent in either single-channel or frequency-hopping modes. The R/T also monitors the presence and operational status of both the power amplifier and the coupler, via the power amplifier to R/T control cable.

Although the power amplifier is typically located near the R/T, it can be separated by up to 150 feet (46 meters). The power amplifier can be mounted on the RF-5071 VSM Single Shock Mount.

There are no controls or indicators on the RF-5032PA-125E 125 Watt Power Amplifier, except a resettable circuit breaker which provides overload protection to the system. The RF-5032PA-125E 125 Watt Power Amplifier is shown in Figure 1-9.

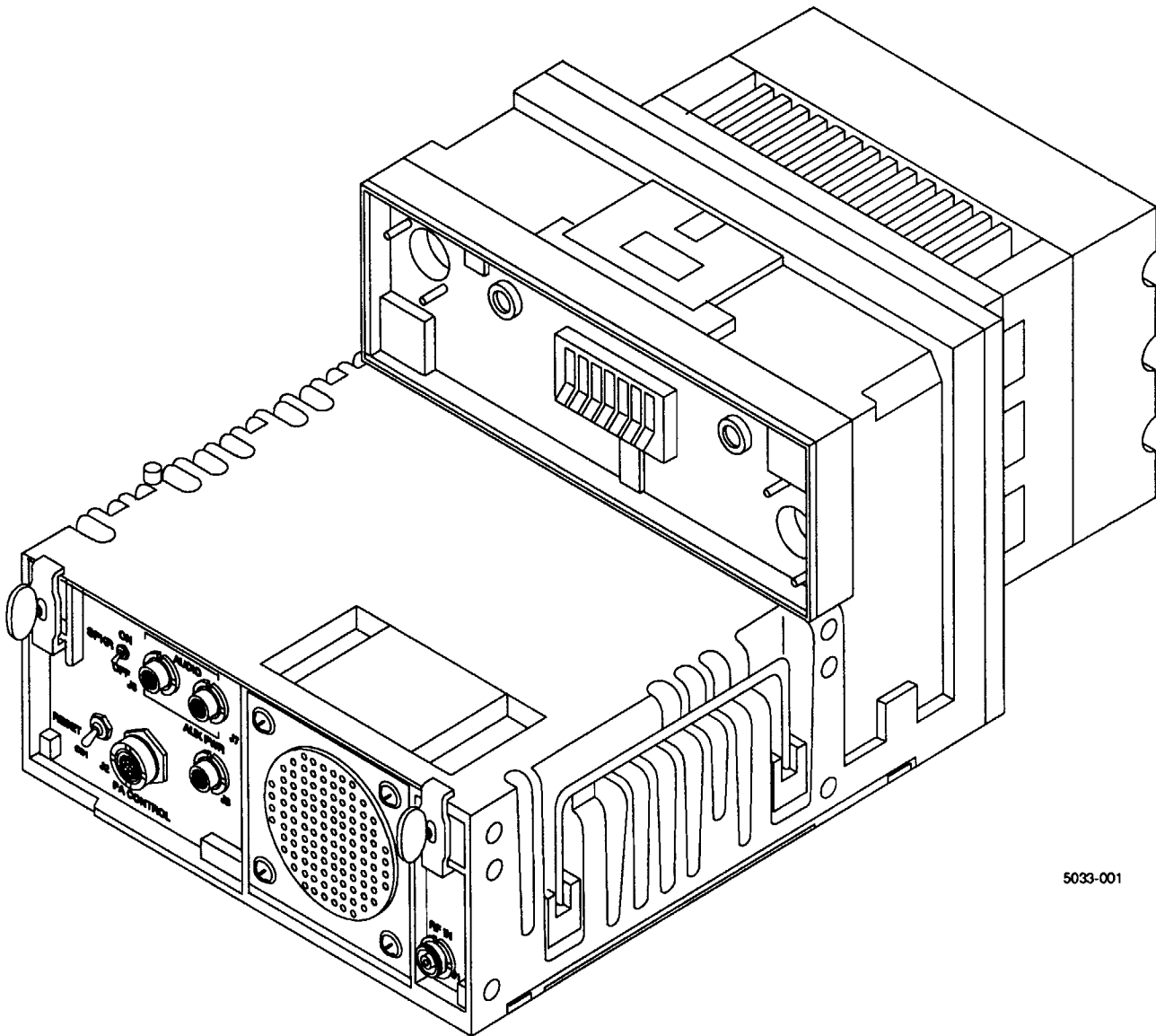


5032E-002

Figure 1-9. RF-5032PA-125E 125 Watt Power Amplifier

#### 1.4.5 RF-5033PA-150 150 Watt Power Amplifier

The RF-5033PA-150 150 Watt Power Amplifier is mounted on the RF-5073 Vehicular Shock Mount, connected to an RT-1694 Receiver-Transmitter. Like the RF-5032PA-125E 125 Watt Power Amplifier, the RF-5033PA-150 150 Watt Power Amplifier is operator transparent. It requires either a separate antenna coupler or operation into a broadband antenna system that appears to the power amplifier as a 50 ohm load (within the VSWR specifications). An audio loudspeaker is built into the RF-5033PA-150 150 Watt Power Amplifier. Speaker volume is controlled from the R/T front panel. The RF-5033PA-150 150 Watt Power Amplifier is shown in Figure 1-10.



5033-001

Figure 1-10. RF-5033PA-150 150 Watt Power Amplifier

#### 1.4.6 RF-382 Automatic Antenna Coupler

The RF-382 Antenna Coupler is a 500 Watt PEP/250 watt average fast tune automatic antenna coupler. This unit automatically matches the output of the RF-5032PA-125E 125 Watt Power Amplifier to a wide range of whip, dipole, and long-wire antennas over the full operating range of the system. After an initial tuning cycle, the tune time of the RF-382 Antenna Coupler is 25 milliseconds. The initial tune cycle time is typically less than one second.

All RF-382 Antenna Coupler operation is automatic in response to control signals from the R/T (via the power amplifier). Coupler status is reported back to the R/T through the power amplifier control cable. There are no operator controls on the coupler. The RF-382 Antenna Coupler is shown in Figure 1-11.

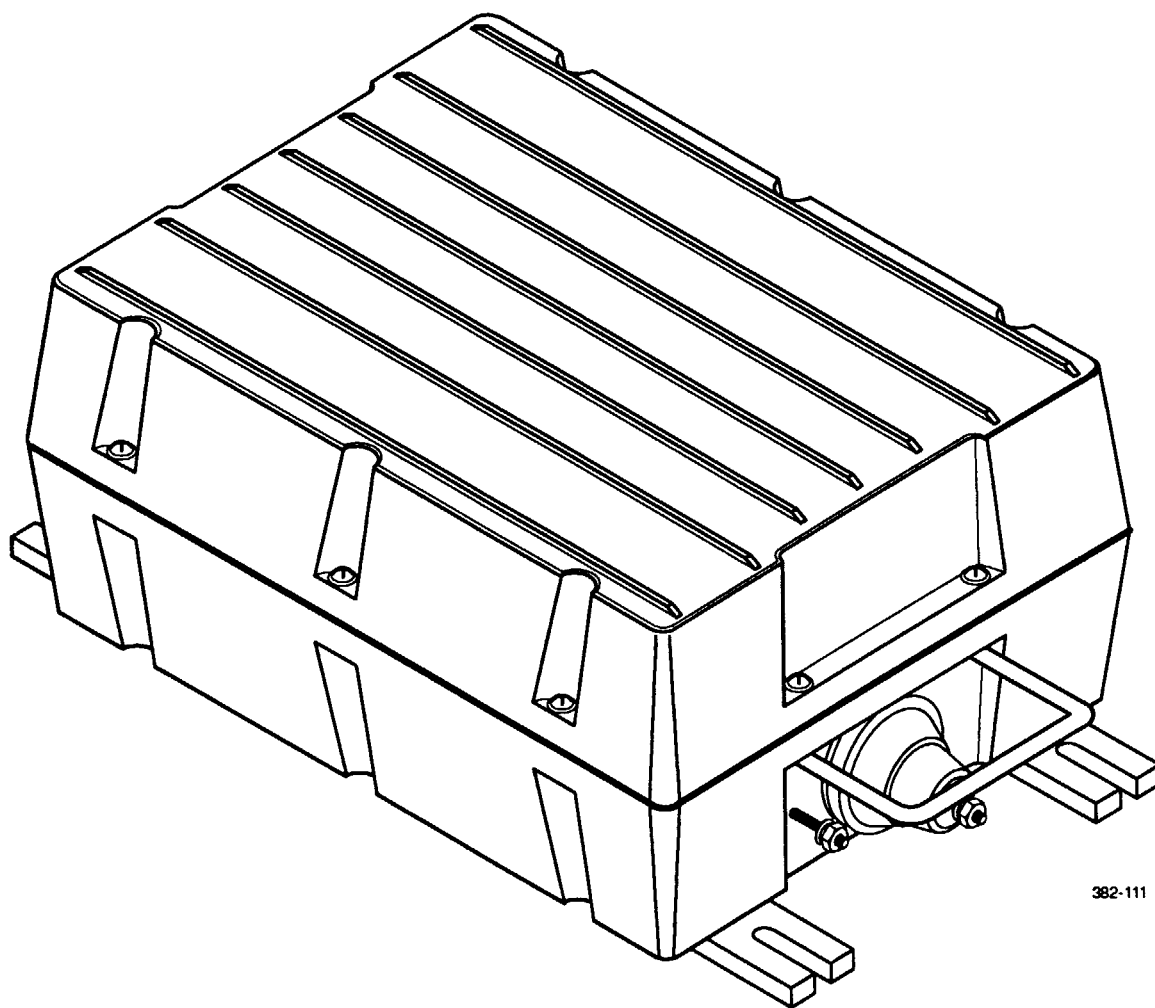
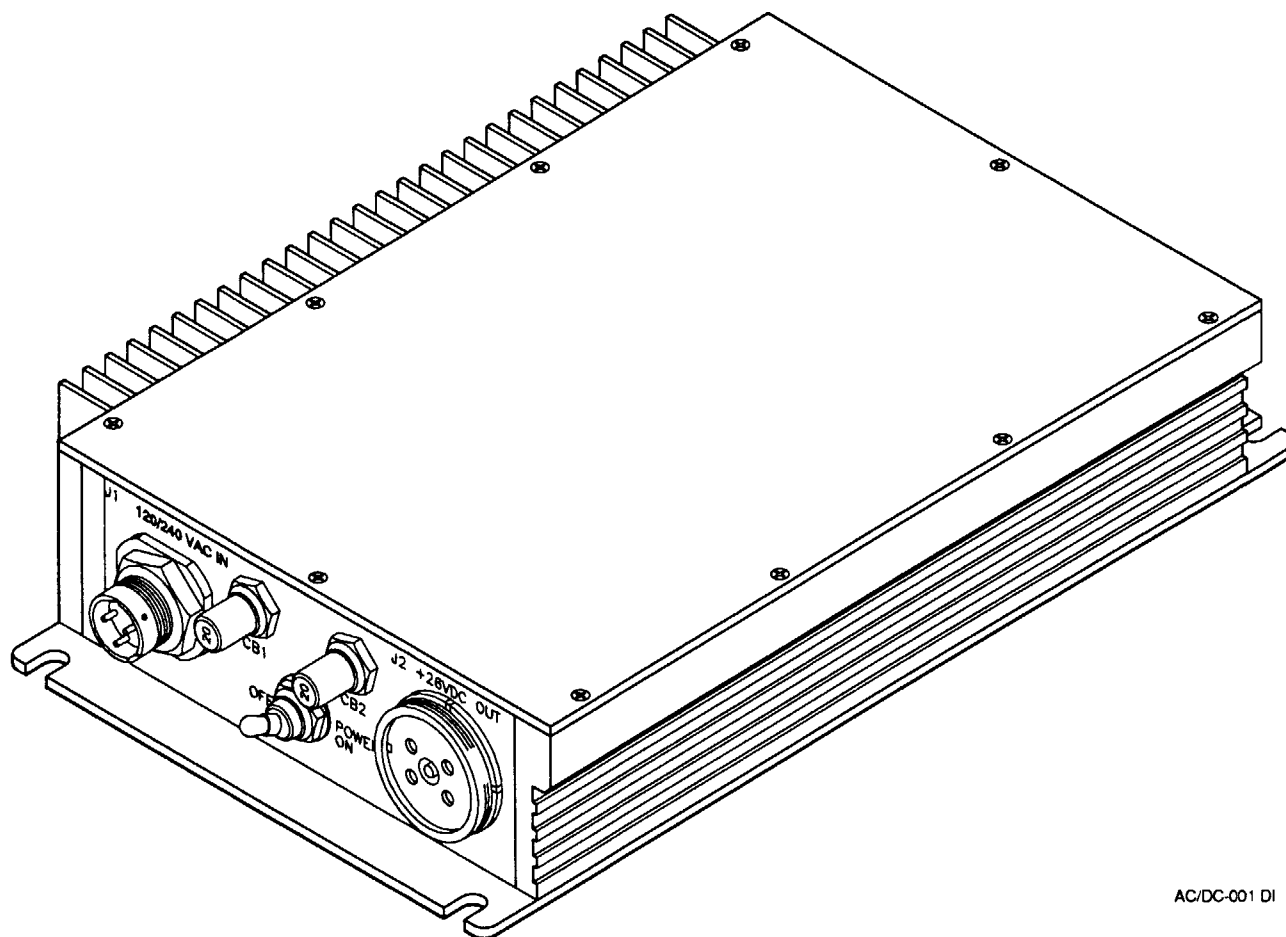


Figure 1-11. RF-382 Automatic Antenna Coupler

### 1.4.7 RF-5055PS AC/DC Power Supply

The RF-5055PS AC/DC Power Supply mounts directly to the vehicle, and provides power to the RF-5056PS DC/DC Power Converter. The RF-5055PS AC/DC Power Supply accepts AC input from commercial 110 Vac to 240 Vac at 47 Hz to 62 Hz. The RF-5056PS DC/DC Power Converter routes the RF-5055PS AC/DC Power Supply's output to the external power amplifier. The RF-5055PS AC/DC Power Supply is shown in Figure 1-12.



AC/DC-001 DI

Figure 1-12. RF-5055PS AC/DC Power Supply

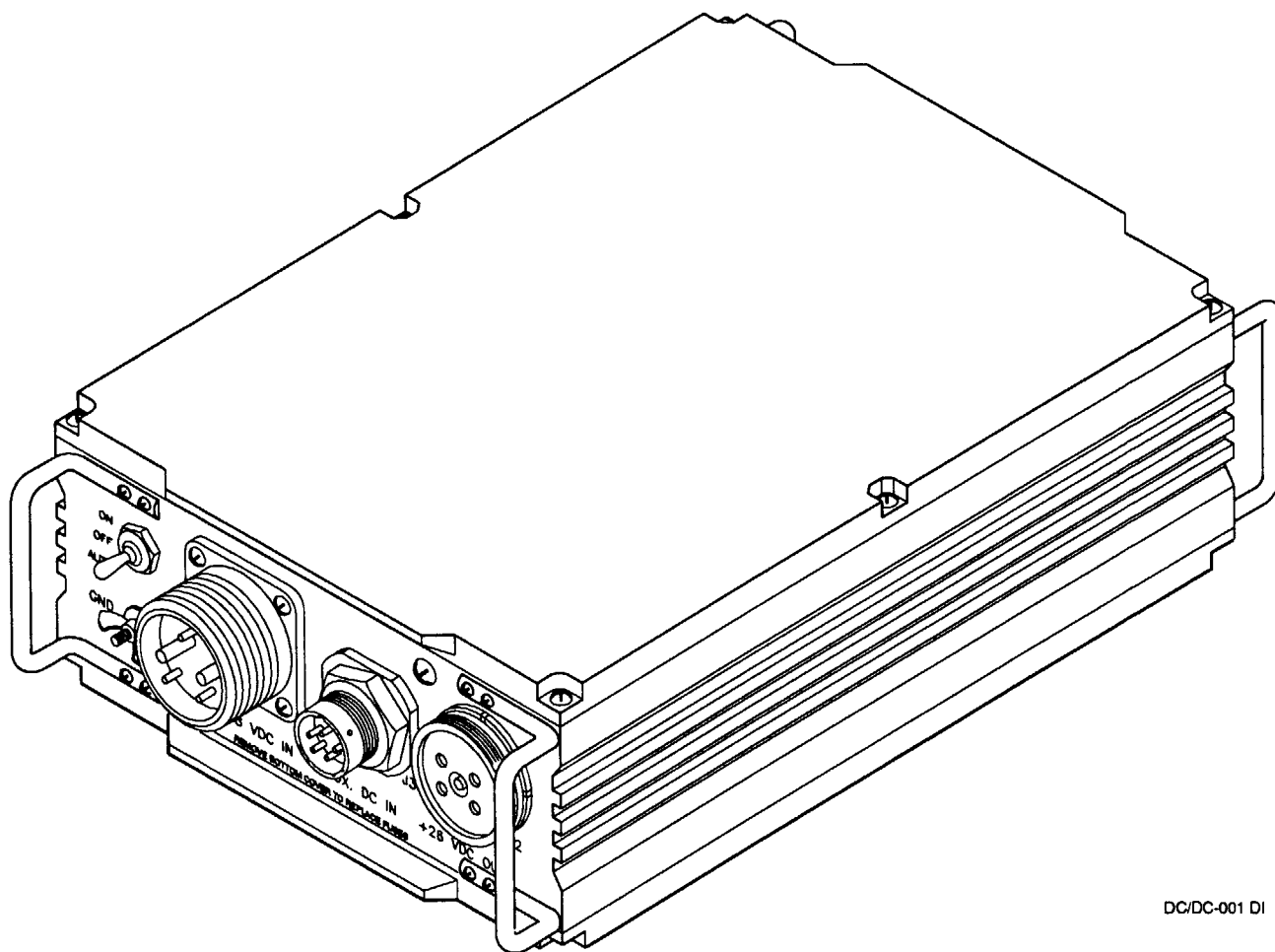


#### 1.4.8 RF-5056PS DC/DC Power Converter

The RF-5056PS DC/DC Power Converter will be mounted under the RF-5032PA-125E 125 Watt Power Amplifier, and share the same shock mount. The RF-5056PS DC/DC Power Converter provides a regulated 26.4 Vdc output, and will accept the following DC input sources:

- Vehicle 12 volt DC electrical system
- Vehicle 24 volt DC electrical system
- Tactical vehicle 28 volt DC electrical system
- 26.4 volt DC from the RF-5055PS AC/DC Power Supply

When power from the RF-5055PS AC/DC Power Supply is present at the AUX DC INPUT connector on the RF-5056PS DC/DC Power Converter, the RF-5056PS DC/DC Power Converter powers down its internal regulator to conserve vehicle battery life. The auxiliary DC input passes directly to the 26 VDC OUTPUT connector. The RF-5056PS DC/DC Power Converter is shown in Figure 1-13.

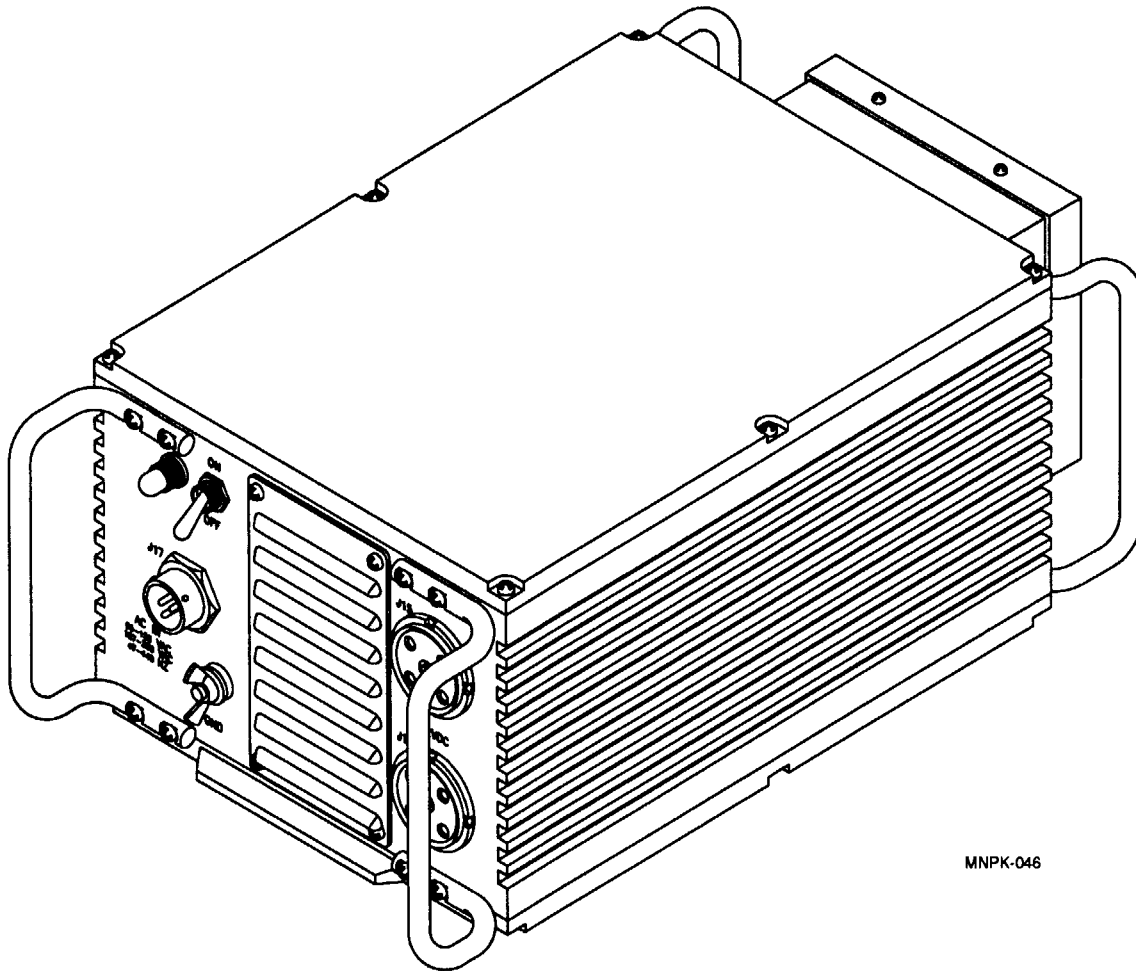


DC/DC-001 DI

Figure 1-13. RF-5056PS DC/DC Power Converter

#### 1.4.9 RF-5051PS-125 Power Supply

The RF-5051PS-125 Power Supply provides 24 Vdc at 30 amperes from 90 Vac to 300 Vac, 47 Hz to 400 Hz sources. It is typically used for fixed station operation of RF-5200 FALCON™ 125 Watt transceiver systems. The RF-5051PS-125 Power Supply can be mounted in an RF-5071VSM Shock Mount. The RF-5051PS-125 Power Supply is shown in Figure 1-14.



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Figure 1-14. RF-5051PS-125 Power Supply

**1.5 PARTS LISTS OF ITEMS SHIPPED WITH UNITS**

Table 1-14 through Table 1-19 list the ancillary parts kits for the radio system units. Table 1-20 provides the manufacturers of the items listed in this manual.

**Table 1-14. AN/PRC-138 Ancillary Parts Kit (10372-0900-01)**

Qty	Description	Part Number	Cage Code
1	Connector	U-316/U	80058
6	Fuse 7A, 125V	F15-0001-015	14304
4	Fuse 2.0A QA 125V PIC	F15-0001-009	14304
1	Straight Plug, 10 Pin	MS3116J12-10S	96906
1	Audio Plug, 6 Contact	J69-0001-623	14304
1	BNC Connector Cable Plug	UG-88C/U	80058
1	Handset, H-250/U	10075-1344-01	14304
1	UHF-F/BNC-M Connector Adaptor	UG-255/U	80058

**Table 1-15. RF-5030PA-20E 20 Watt Power Amplifier Ancillary Parts Kit (10225-9600-01)**

Qty	Description	Part Number	Cage Code
1	Ground Strap	10208-0009	14304
2	High Voltage Wire Assembly Kit	10251-0042	14304
2	Flatwasher #5/16 SS .063	AN960C516	88044
1	Lockwasher .375 X.500X.022	H-3370	14304
1	Hex Head Bolt 5/16-24X1/2	H-6302	14304
10	Flatwasher .281X.625X.065	MS15795-810	96906
1	Connector, Straight 10 Pin	MS3116J12-10P	96906
1	Cable Assembly, 20W PA/CU DC	10181-9827	14304
4	Hex Head Bolt 1/4-20X7/8	MS35307-307	96906
5	Lockwasher 1/4	MS35338-139	96906
5	Nut 1/4-20	MS35649-2254	96906
2	Connector BNC Cable Plug	UG-88C/U	80058
1	Wing Nut	MS35425-71	96906
1	Template, RF-5030PA-20E	10225-9602-01	14304
2	Configuration Label, RF-5030PA-20E	10225-6019-01	14304

**Table 1-16. RF-5032PA-125E 125 Watt Power Amplifier Ancillary Parts Kit (10225-9000)**

<b>Qty</b>	<b>Description</b>	<b>Part Number</b>	<b>Cage Code</b>
1	Plug, Straight	MS3116J14-5S	96906
1	Connector, Straight 10 Pin	MS3116J12-10P	96906
1	Connector N Cable Plug	M39012/01-0005	81349
1	Connector BNC Cable Plug	UG-88C/U	80058
1	Connector, Modified	10181-2640	14304
1	Ground Strap	7147-1167-3	14304
3	Fuse 25A 32V PIC	F15-0001-018	14304

**Table 1-17. RF-5033PA-150 150 Watt Power Amplifier Ancillary Parts Kit (10497-0300-01)**

<b>Qty</b>	<b>Description</b>	<b>Part Number</b>	<b>Cage Code</b>
1	5-Position Straight Plug Socket Connector	MS3116J14-5S	81349
1	19-Pin Straight Plug Connector	MS3116J14-19P	81349
1	Circular Plug Connector	MS3116J8-33P	81349
1	Straight N Plug Connector	M39012/01-0005	81349
1	Braided Ground Strap	7147-1167-3	14304

**Table 1-18. RF-382 Antenna Coupler Ancillary Parts Kit (10208-0002)**

Qty	Description	Part Number	Cage Code
1	Connector, 14 Pin Socket	10075-1041	14304
1	Sleeve For P2	MS3420-12A	96906
1	Connector N Cable Plug	M39012/01-0005	81349
1	Shrink Sleeving 1/2" Black	E50-0002-008	14304
8	Flat Washer .344X.688X.065	MS15795-812	96906
4	Hex Head Bolt 5/16-18X7/8	MS35307-333	96906
4	Lock Washer 5/16	MS35338-140	96906
4	Nut 5/16-18	MS35649-2314	96906
3	Fuse 6.0A QA 250V 3AG	F-0016	14304
2	Wire #18 Red PVC	W10-0008-222	14304
2	Faston 1/4 22-18AWG	J03-0001-026	14304
1	Wire #22 Black PVC	W10-0006-000	14304
1	Shrink Sleeving 3/16" BLK	E50-0002-005	14304
1	Ground Strap	10208-0009	14304
1	Warning Label	10208-1006	14304
2	Lug Ring #1/4 12-10GA Plain	E59-0003-020	14304
1	High Voltage Wire Assembly Kit	10251-0042	14304

**Table 1-19. RF-5051PS-125 Power Supply Ancillary Parts Kit (10181-9010)**

Qty	Description	Part Number	Cage Code
1	AC Power Cable Assembly	10181-9831	14304
1	Connector Plug, 4 Pin Male	M55181/3-03	81349
5	FUSE 20A Ceramic Slow Blow 250V 3AG	F03-0003-022	14304
5	FUSE 1/8A QA 250V 3AG	F-0001	14304
1	Ground Strap	7147-1167-3	14304

**Table 1-20. List of Manufacturers**

<b>Cage Code</b>	<b>Manufacturer Name and Address</b>
11083	Caterpillar Incorporated 100 Northeast Adams Street Peoria, IL 61629-8000
14304	Harris Corporation RF Communications Division 1680 University Avenue Rochester, NY 14610-1887
37695	MESAC Electronics Systems, Inc. 1313 Production Road Fort Wayne, IN 46808-1164
80058	Joint Electronics Type Designation System Formerly Communication Electronics Subpanel of Standardization Panel Joint Communications Electronics Committee
81349	Military Specifications Promulgated by Military Departments/Agencies Under Authority of Defense Standardization Manual 4120 3-M
88044	Aeronautical Standards Group Department of the Navy and Air Force
89536	Fluke Corporation 6920 Seaway Boulevard P.O. Box 9090 Everett, WA 98206-9090
96906	Military Standards Promulgated by Military Departments Under Authority of Defense Standardization Manual 4120 3-M

**1.6 LIST OF ITEMS REQUIRED BUT NOT SUPPLIED**

Table 1-21 lists the test equipment required for troubleshooting and repairing the radio system, and Table 1-22 lists the tools and materials required for removing and replacing radio system units.

**Table 1-21. Test Equipment Required**

Description	Part Number	Cage Code
Digital Multimeter	77/BN	89536

**Table 1-22. Required Tools and Materials**

Description	Part Number	Cage Code
Wrench, Adjustable	1B7536	11083

**1.7 DESTROYING THE RT-1694 RECEIVER-TRANSMITTER**

If the RT-1694 Receiver-Transmitter will be compromised, discharge a firearm directly into the front panel of the R/T. The firearm should be aimed directly at the Liquid Crystal Display (LCD) and at the keypad. This will render the R/T inoperative.

If time permits, place and detonate a small explosive charge in close proximity to the R/T front panel display. This will also render the R/T inoperative.

**CHAPTER 2**  
**OPERATION**

**2.1 INTRODUCTION**

This chapter contains all information necessary for operation of the RF-5200 FALCON™ Series Manpack Systems. This information consists of operator controls and indicators, and operating instructions.

**2.2 OPERATOR CONTROLS AND INDICATORS**

**2.2.1 General**

Table 2-1 lists the functions, and Figure 2-1 shows the locations of the controls and indicators for the RT-1694 Receiver-Transmitter. Table 2-2 lists the functions, and Figure 2-2 shows the locations of the controls and indicators for the RF-5032PA-125E 125 Watt Power Amplifier. Table 2-3 lists the functions, and Figure 2-3 shows the locations of the controls and indicators for the RF-5033PA-150 150 Watt Power Amplifier. Table 2-4 lists the functions, and Figure 2-4 shows the locations of the controls and indicators for the RF-5055PS AC/DC Power Supply. Table 2-5 lists the functions, and Figure 2-5 shows the locations of the controls and indicators for the RF-5056PS DC/DC Power Converter. Table 2-6 lists the functions, and Figure 2-6 shows the locations of controls and indicators for the RF-5051PS-125 Power Supply. Table 2-7 lists the functions, and Figure 2-7 shows the locations of controls and indicators for the RF-382 Antenna Coupler. The RF-5030PA-20E 20 Watt Power Amplifier/Coupler has no operator controls and indicators.

**Table 2-1. RT-1694 Receiver-Transmitter Operating Controls and Indicators**

Key (Figure 2-1)	Control/Indicator	Function
1	Liquid Crystal Display	Display of current operational and/or programmed information
2	←	Selects item to change.
3	→	Selects item to change.
4	↓	Scrolls through menu selections.
5	↑	Scrolls through menu selections.
6	LIGHT	Controls backlight intensity and contrast of the display.
7	CALL	Initiates Forced Wakeup feature in Single Sideband (SSB); initiates a SYNC sequence in HOP and initiates a call sequence in Automatic Link Establishment (ALE) mode.
8	CLEAR	Clears programming entries and is used to control ALE sequences, scan/stop in ALE, and (RT-1694B(P)/U configuration only) SSB scan mode. Generates hopset, and halts a sync request in hopping.
9	ENTER	Enters a program parameter change.
10	OPT	Adjusts Transmit (TX) power, Beat Frequency Oscillator (BFO), views Link Quality Analysis (LQA) scores, retunes antenna coupler, views time, selects Engineering Order Wire (EOW) destination, and enters/exits scan mode.
11	Alphanumeric Keypad	Used to enter numeric and alphabetic data.
12	PRGM	Allows operator to program channel, interface, and option parameters from a sequence of menus.
13	Channel Switch	Selects operating channel (1 through 9, and M) for SSB or net HOP operation.



**Table 2-1. RT-1694 Receiver-Transmitter Operating Controls and Indicators – Continued**

Key (Figure 2-1)	Control/Indicator	Function
14	Function Switch OFF SSB  HOP  ALE RMT TEST  ZERO	Turns system ON/OFF. Single channel operation (Upper Sideband [USB], Lower Sideband [LSB], Amplitude Modulated Envelope [AME], Continuous Wave [CW], Frequency Modulation [FM]) Frequency-hopping/Electronic Counter-Counter Measure (ECCM) operation Automatic link establishment operation Remote control mode via remote data port (J5) Allows operator access to System Test, Version Display, Voltage Standing Wave Ratio (VSWR), and Battery Test options. Allows operator to zeroize (erase) all channel settings and programmable parameters and return unit to default status. (Operator must pull switch out to reach the ZERO position.)
15	Volume Control Knob	When rotated, the knob controls the volume of the audio signal from the handset or the RF-5033PA-150 150 Watt Power Amplifier loudspeaker.

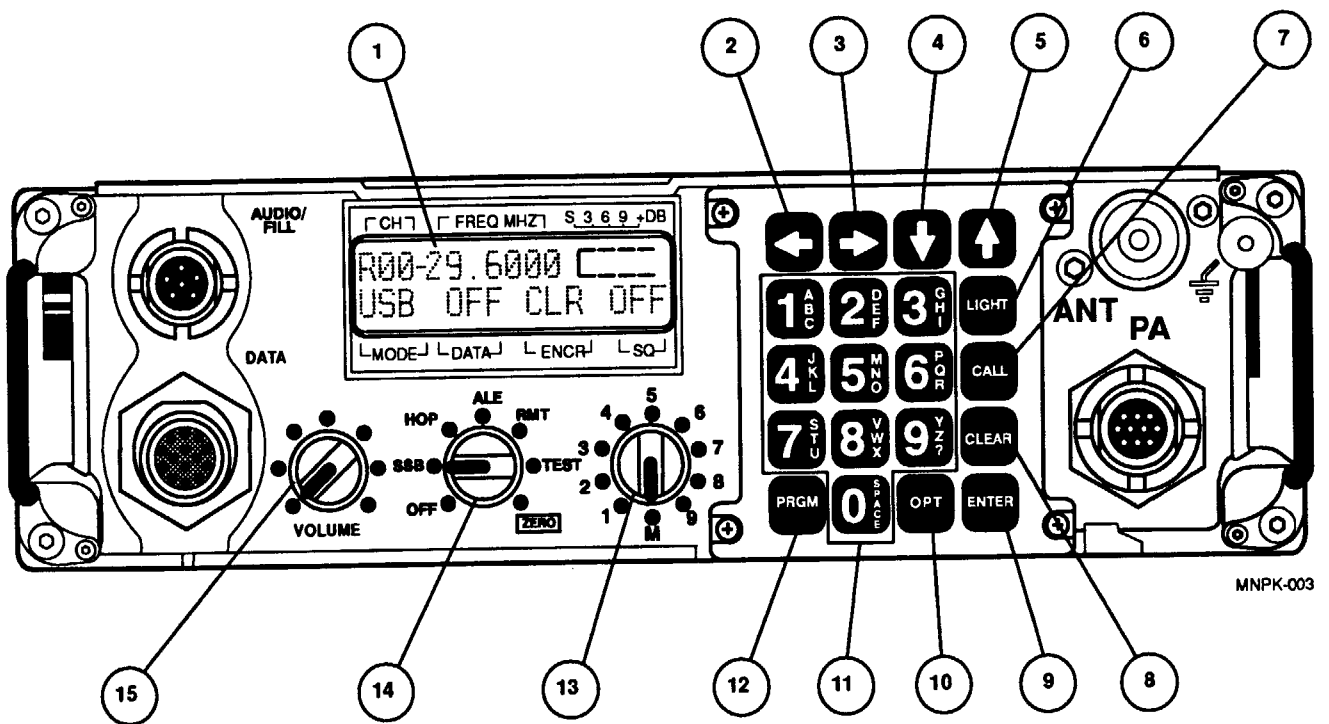
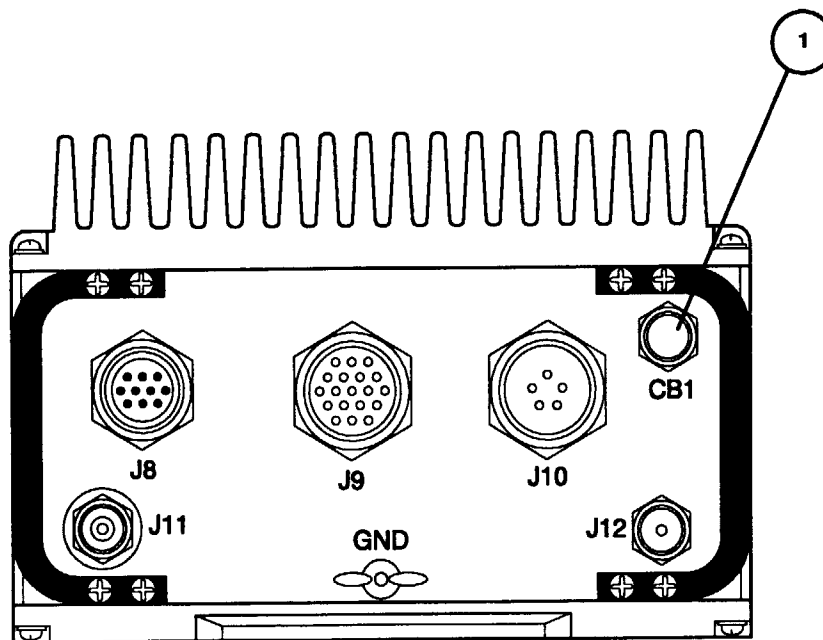


Figure 2-1. RT-1694 Receiver-Transmitter Operating Controls and Indicators

Table 2-2. RF-5032PA-125E 125 Watt Power Amplifier Operating Controls and Indicators

Key (Figure 2-2)	Control/Indicator	Function
1	CB1	Resets CB1 Circuit Breaker.

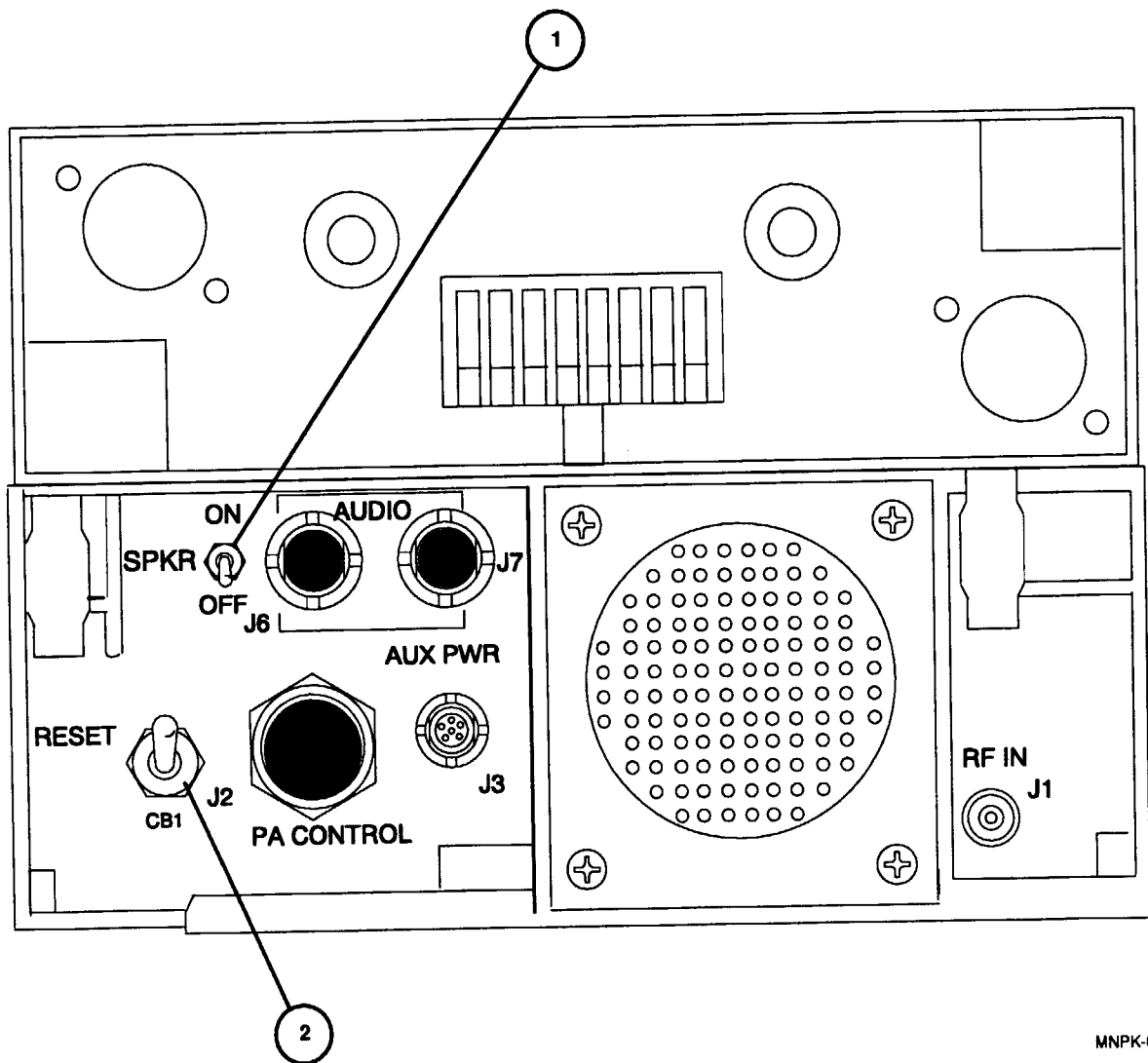


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Figure 2-2. RF-5032PA-125E 125 Watt Power Amplifier Operating Controls and Indicators

Table 2-3. RF-5033PA-150 150 Watt Power Amplifier Operating Controls and Indicators

Key (Figure 2-3)	Control/Indicator	Function
1	SPKR ON/OFF	Turns the internal loudspeaker on or off.
2	CB1 RESET	Resets CB1 Circuit Breaker.

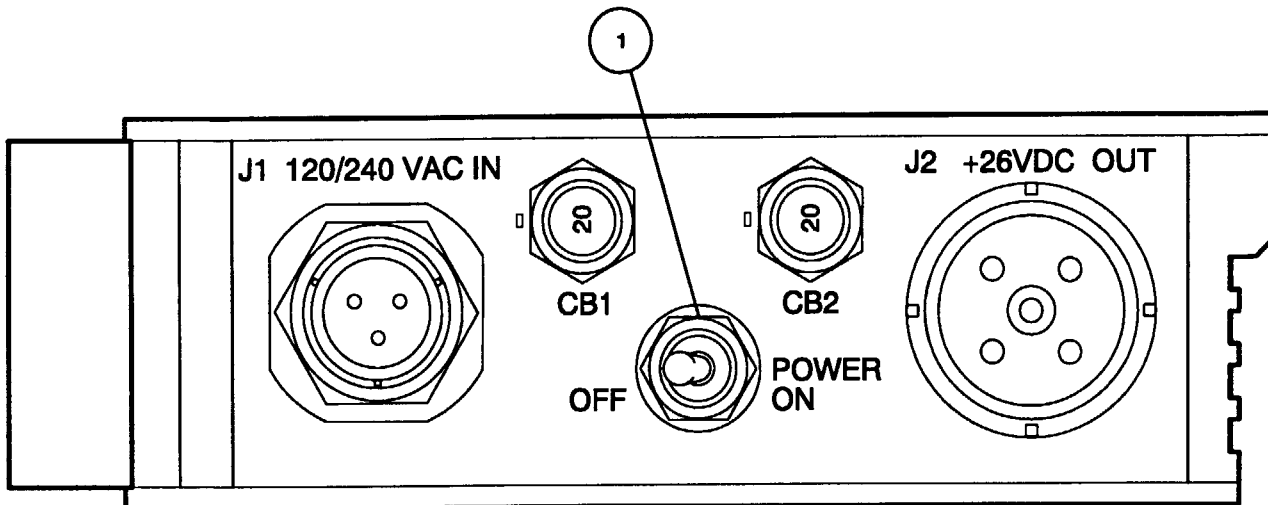


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Figure 2-3. RF-5033PA-150 150 Watt Power Amplifier Operating Controls and Indicators

**Table 2-4. RF-5055PS AC/DC Power Supply Operating Controls and Indicators**

Key (Figure 2-4)	Control/Indicator	Function
1	POWER ON/OFF	Turns the power supply on or off.



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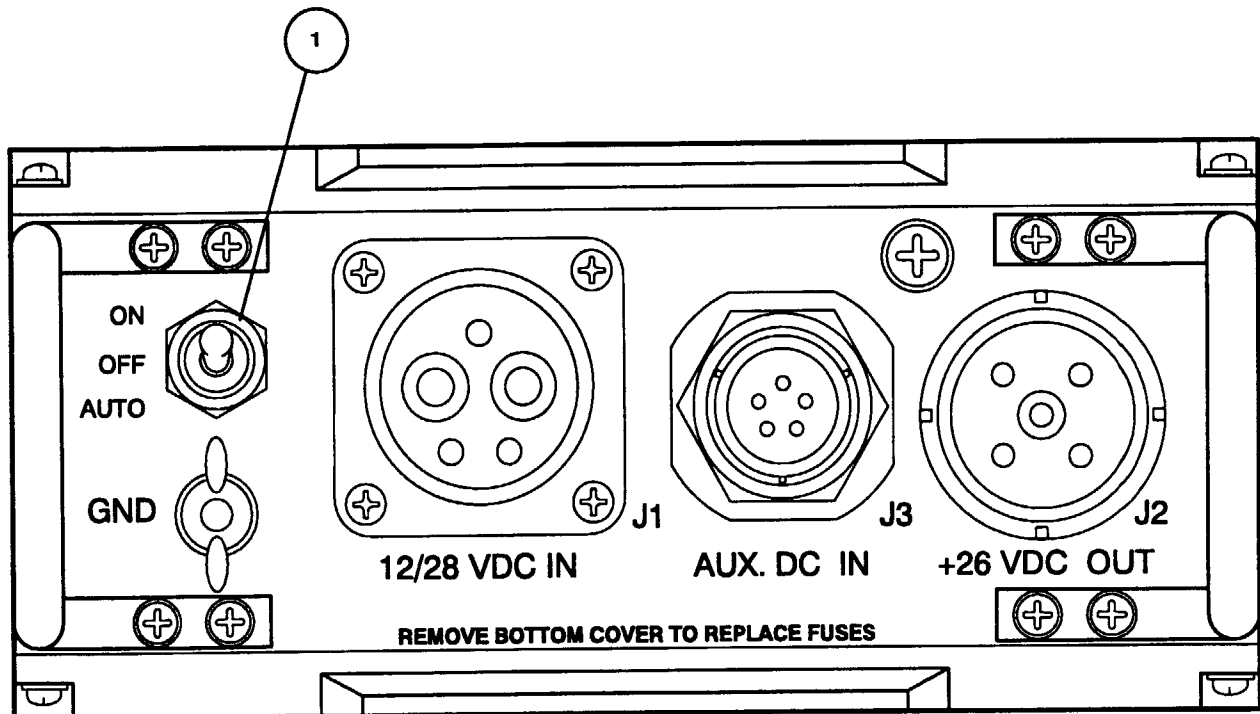
**Figure 2-4. RF-5055PS AC/DC Power Supply Operating Controls and Indicators**

**Table 2-5. RF-5056PS DC/DC Power Converter Operating Controls and Indicators**

Key (Figure 2-5)	Control/Indicator	Function
1	ON/OFF	Turns the power converter on or off or sets it to be controlled by an external ignition switch.

**NOTE**

The RF-5056PS DC/DC Power Converter detects Direct Current (DC) power on the AUX DC INPUT connector, and automatically passes that power to the 26 VDC OUTPUT connector.

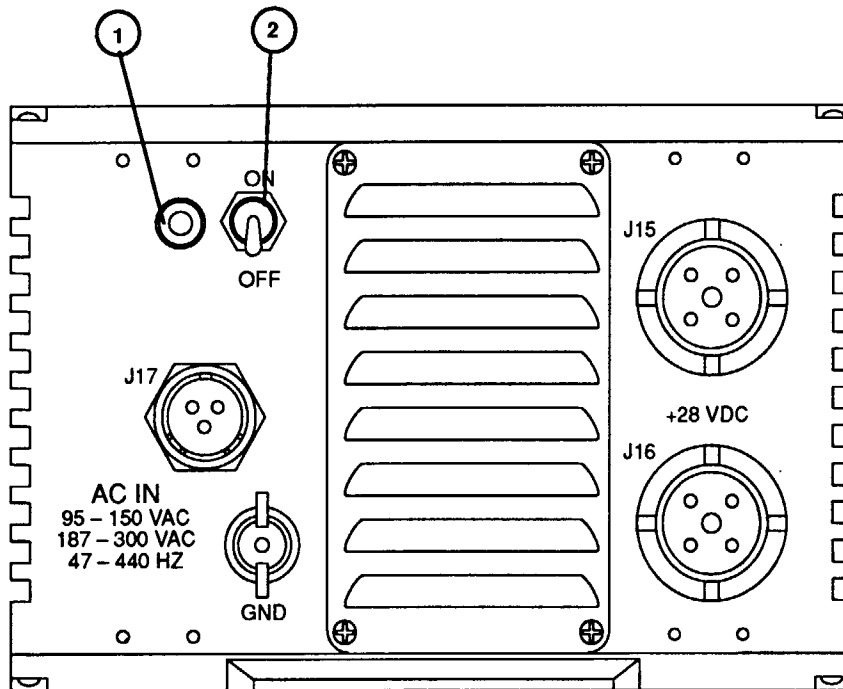


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**Figure 2-5. RF-5056PS DC/DC Power Converter Operating Controls and Indicators**

Table 2-6. RF-5051PS-125 Power Supply Operating Controls and Indicators

Key (Figure 2-6)	Control/Indicator	Function
1	Power Indicator	Indicates when the unit is turned on.
2	On/Off Switch	Turns the power supply on or off.



5000E - 037

Figure 2-6. RF-5051PS-125 Power Supply Operating Controls and Indicators

Table 2-7. RF-382 Antenna Coupler Operating Controls and Indicators

Key (Figure 2-7)	Control/Indicator	Function
1	50 Ohm N-Connector Switch Lever Arm	Switches between E1 High Voltage Insulator antenna port and J3 50 Ohm N-connector antenna port.

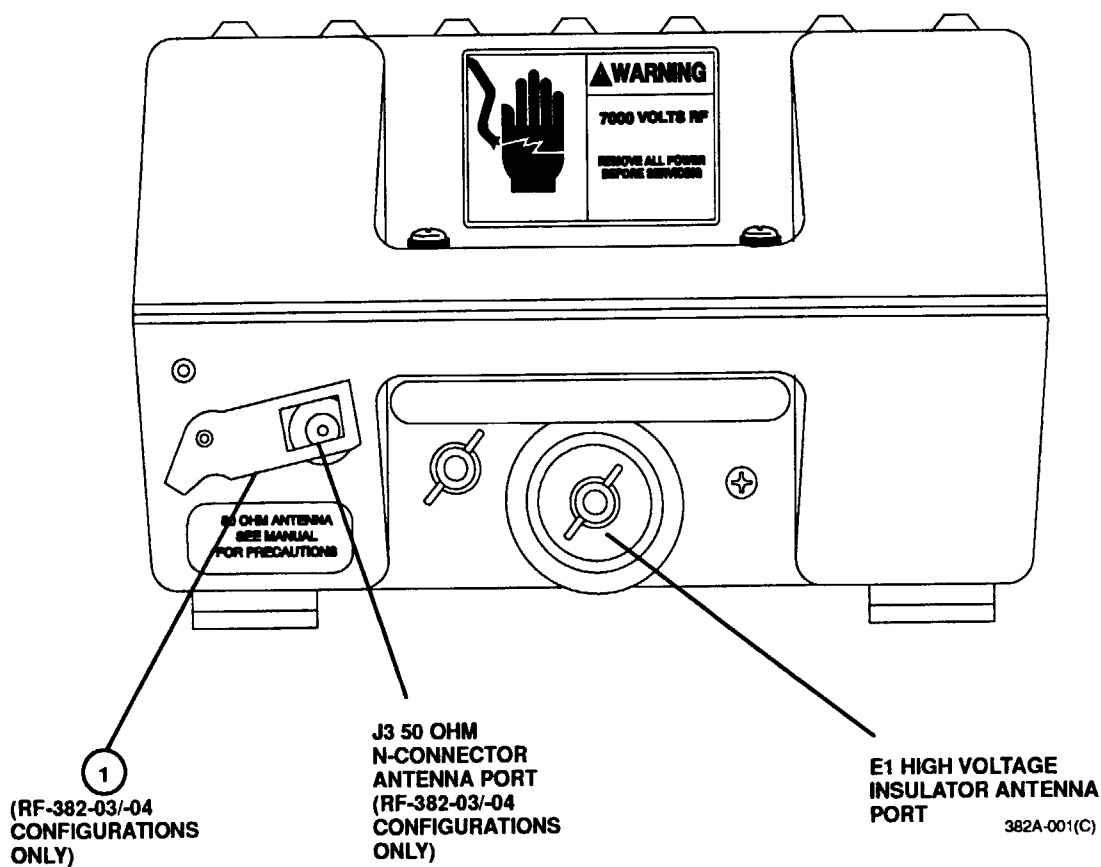


Figure 2-7. RF-382 Antenna Coupler Operating Controls and Indicators



### 2.3 INITIAL SETTINGS AND TURN-ON

Initial settings and turn-on consists of powering up the units, running Built-In Test (BIT), and placing the units into the desired mode of operation. Table 2-8 provides the initial settings and turn-on procedure.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-8. Initial Settings and Turn-On Procedure**

Step	Control	Action	Observe
1	ON/OFF Switch on power supply (if applicable)	Place switch in the ON position.	Power supply turns on and the power on indicator on the power supply (if applicable) lights.
2	FUNCTION knob on Receiver-Transmitter (R/T)	Turn clockwise from OFF position to SSB position.	<p>The R/T displays the following screen:</p> <pre> ██████████ ██████████ </pre> <p>followed by:</p> <pre> *INITIALIZING* ***WAIT*** </pre> <p>When initializing is complete, the R/T displays the following screen:</p> <pre> R05-04.1600  == USB OFF CLR ON </pre> <p>Refer to Paragraph 2.5.1.1 for complete front panel indicator descriptions.</p>
3	FUNCTION knob on R/T	Turn clockwise from SSB position to TEST position.	<p>The R/T displays an initialization screen:</p> <pre> *INITIALIZING* ***WAIT*** </pre> <p>followed by:</p> <pre> TEST VERSION VSWR BATTERY </pre> <p>with TEST flashing.</p>

**Table 2-8. Initial Settings and Turn-On Procedure – Continued**

Step	Control	Action	Observe
4	ENTER key	Press and release.	<p>The R/T displays the following screen:</p> <pre> ██████████ ██████████ </pre> <p>followed by:</p> <pre> ** SELF TEST ** * IN PROGRESS </pre> <p>If no errors occur during BIT, the R/T displays the following screen<sup>†</sup>:</p> <pre> SELF TEST DONE ** NO ERRORS ** </pre>
5	FUNCTION knob on R/T	Turn counterclockwise from TEST position to desired mode of operation.	The R/T displays main screen of the desired mode, and is now ready for normal operation.

<sup>†</sup> If BIT fails during initial power-up, refer to Chapter 5 for troubleshooting procedures.

### 2.3.1 System Self-Test

System self-test consists of the following tests:

- a. Executing BIT to verify that all modules of the RF-5200 FALCON™ Series Manpack System are operating properly.
- b. Verifying firmware revision level of each module within the RF-5200 FALCON™ Series Manpack System.
- c. Measuring the VSWR using the default frequency of the currently selected SSB channel. The VSWR measurement displays VSWR as calculated from the forward and reflected power at the output of the power amplifier. This display also indicates the transmit power.
- d. Measuring the battery voltage and charge levels

#### NOTE

If the FUNCTION or CHANNEL control is changed during a self-test, a fault condition will probably be displayed (because the test routine was not allowed to sequence through all of the tests). A test sequence should be allowed to finish before any new control, keyboard, or remote control command is issued.

Table 2-9 provides the system self-test procedure, Table 2-10 provides the firmware version display procedure, Table 2-11 provides the VSWR test procedure, and Table 2-12 provides the battery test procedure.

#### NOTE

Sample screen displays are shown for the following procedures.  
Actual screen displays may vary based on radio programming.

**Table 2-9. Self-Test Procedure**



Step	Control	Action	Observe
1	FUNCTION knob on R/T	Turn clockwise to TEST position.	The R/T displays an initialization screen:  <div style="text-align: center;">  </div> followed by:  TEST VERSION VSWR BATTERY  TEST is flashing.


Table 2-9. Self-Test Procedure – Continued

Step	Control	Action	Observe
2	ENTER key	Press and release.	<p>The R/T displays the following screen:</p> <pre> ██████████ ██████████ </pre> <p>followed by:</p> <p><b>** SELF TEST **</b> <b>* IN PROGRESS *</b></p> <p>If no errors occur during BIT, the R/T displays the following screen:</p> <p><b>SELF TEST DONE</b> <b>** NO ERRORS **</b></p> <p>If an error occurs during BIT, the R/T displays the following screen:</p> <p>MODULE #: A## FAULT #: F##</p> <p>Refer to Chapter 5 for recommended troubleshooting procedures.</p> <p>After passing BIT, the display returns to the following screen:</p> <p>TEST VERSION VSWR BATTERY</p> <p>TEST is flashing.</p>
3	ENTER key	Press and release.	<p>The display returns to the following screen:</p> <p>TEST VERSION VSWR BATTERY</p> <p>TEST is flashing.</p>

**Table 2-10. Firmware Version Display Procedure**


Step	Control	Action	Observe
1	FUNCTION knob on R/T	Turn clockwise to TEST position.	The R/T displays an initialization screen:  <div style="text-align: center;">  </div> followed by:  TEST VERSION VSWR BATTERY  TEST is flashing.
2	→	Press repeatedly to select VERSION.	The R/T displays the following screen:  TEST VERSION VSWR BATTERY  VERSION is flashing.
3	ENTER	Press and release.	The firmware version for module A1A1 will be displayed:  MODULE: 01A REVISION: 8211
4	↑ and ↓	Press and release.	Scroll through all firmware versions for all installed modules.
5	CLEAR or ENTER	Press and release.	The R/T displays the following screen:  TEST VERSION VSWR BATTERY  VERSION is flashing.

**Table 2-11. VSWR Test Procedure**

Step	Control	Action	Observe
1	FUNCTION knob on R/T	Turn clockwise to TEST position.	The R/T displays an initialization screen:  <div style="text-align: center;">  </div> followed by:  TEST VERSION VSWR BATTERY  TEST is flashing.
2	→	Press repeatedly to select VSWR.	The R/T displays the following screen:  TEST VERSION VSWR BATTERY  VSWR is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  VSWR FREQUENCY? 25.0000 MHZ  25.000 is flashing.
4	↑ and ↓, or numeric keypad	Enter the desired frequency if different from default value.	The R/T will display the new frequency value as it is entered. The value entered will be flashing.
5	ENTER	Press and release.	The R/T displays the following screen <sup>†</sup> :  POWER: 20 WATT VSWR: 1.1:1

<sup>†</sup> If VSWR measures greater than 3.0:1, refer to Chapter 5 for recommended troubleshooting procedures.

**Table 2-12. Battery Test Procedure**

Step	Control	Action	Observe
1	FUNCTION knob on R/T	Turn clockwise to TEST position.	The R/T displays an initialization screen:  <div style="text-align: center;">  </div> followed by:  TEST VERSION VSWR BATTERY  TEST is flashing.
2	CLEAR or ENTER	Press and release.	The R/T displays the following screen:  TEST VERSION VSWR BATTERY  VSWR is flashing.
3	→	Press repeatedly to select BATTERY.	The R/T displays the following screen:  TEST VERSION VSWR BATTERY  BATTERY is flashing.
4	ENTER	Press and release.	The R/T displays the following screen*:  BATTERY: 28.4 V FULL CHARGE
5	CLEAR or ENTER	Press and release.	The R/T displays the following screen:  TEST VERSION VSWR BATTERY  BATTERY is flashing.
6	Function Switch	Rotate counterclockwise to desired mode of operation.	The R/T displays the screen from the last time it was placed in the desired mode.

\*The battery voltage range is 28.0 to 20.0 volts. The charge levels are FULL, MEDIUM, or LOW.

### 2.3.2 Zeroizing the System

Zeroize erases all programmed parameters and option settings and returns to default status. Table 2-13 provides the zeroizing procedure.

#### NOTE

ZEROIZE should be used with caution. Settings cannot be recovered and must be programmed. A PASSWORD protection system prevents unauthorized personnel from selecting or changing the programmed parameters.

Sample screen displays are shown for the following procedure. Actual screen displays may vary based on radio programming.

**Table 2-13. Zeroize Procedure**

Step	Control	Action	Observe
1	FUNCTION switch	Rotate clockwise to ZERO. The switch's knob must be pulled out past end stop to rotate it to the ZERO position.	The R/T displays the following screen:  ZEROIZE THE RADIO: NO  NO is flashing.
2	↑ and ↓	Press and release. YES is displayed.	The R/T displays the following screen:  ZEROIZE THE RADIO: YES  YES is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  ZEROIZING . . . PLEASE WAIT  When zeroizing is complete, the R/T displays the following screen:  ZEROIZE THE RADIO: NO  NO is flashing.
4	FUNCTION Switch	Rotate counterclockwise to desired mode of operation. The switch's knob must be pulled out slightly to rotate it.	The R/T displays the main screen of the desired mode.



## 2.4 SPECIAL KEY OPERATION

Many of the keys found on the RT-1694 Receiver-Transmitter front panel keypad have specialized functions or menus. The following paragraphs provide information on the operation of these keys.

### 2.4.1 LIGHT Key Operation

The LIGHT key allows control of backlight intensity, display contrast, backlight operation, and keypad backlighting. The NV\_MOMENTARY configuration results in the keypad backlight being turned off and the display backlight being on momentarily. Table 2-14 provides the LIGHT key operation procedures.

#### NOTE

Sample screen displays are shown for the following procedures.  
Actual screen displays may vary based on radio programming.

**Table 2-14. Light Key Operation**

Step	Control	Action	Observe
1	LIGHT	Press and release.	The R/T displays the following screen:  LIGHT      CONTRAST [MAX]      ■■■■■  [MAX] is flashing.
2	↑ and ↓	Press and release repeatedly to select backlight level.	[MAX] changes to ■■■■■ and finally to [MIN] (or vice versa) indicating the relative level of display backlighting.
3	← and →	Press and release.	Selects CONTRAST.
4	↑ and ↓	Press and release repeatedly to select contrast level.	■■■■■ changes to [MAX] or [MIN] indicating the relative level of display contrast.
5	ENTER	Press and release.	The R/T displays the following screen:  LIGHT OPERATION MOMENTARY
6	↑ and ↓	Press and release repeatedly.	The R/T display scrolls through the light operation choices. Available choices are ON, MOMENTARY, or OFF. NOTE: ON is only available when powered via the front panel. This is to prevent excessive battery drain.
7	LIGHT or ENTER	Press and release.	The R/T returns to normal SSB, ALE, HOP, or TEST operation.

**2.4.2 OPTion Key Operation**

The OPTion key allows the operator to perform the following procedures:

- a. Retune the antenna coupler independent of current status.
- b. Adjust transmit power. When the RT-1694 Receiver-Transmitter is keyed, the bar graph indicates the transmit power level. The selected power setting is indicated by the length and width of the bars.
- c. Display the current time.
- d. Enable or disable SSB Scan.
- e. Adjust the BFO, if enabled.

**NOTE**

BFO operation must be enabled through the SSB configuration menu when the radio is being programmed. BFO support is only for USB voice, LSB voice, and CW operation. The data field must be set to OFF.

Table 2-15 provides the coupler retune procedure, Table 2-16 provides the transmit power adjustment procedure, Table 2-17 provides the time setting procedure, Table 2-18 provides the SSB Scan enable/disable procedure, and Table 2-19 provides the BFO adjustment procedure.

**NOTE**

Sample screen displays are shown for the following procedure. Actual screen displays may vary based on radio programming.

**Table 2-15. Coupler Retune Procedure**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  RETUNE      POWER TIME        SCAN→  RETUNE is flashing.
2	ENTER	Press and release.	The R/T displays:  R05-04.1600    ==== TUNING COUPLER  After the retuning is completed, the R/T displays:  R05-04.1600    ==== TUNE COMPLETE  and returns to the following screen:  R05-04.1600    ==== USB OFF CLR ON

**Table 2-16. Transmit Power Adjustment Procedure**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  RETUNE    POWER TIME      SCAN→  RETUNE is flashing.
2	← and →	Press and release repeatedly to select POWER.	The R/T displays the following screen:  RETUNE    POWER TIME      SCAN→  POWER is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  TX POWER MED  The current power level is flashing.
4	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the power settings. Available choices are LOW, MED, and HIGH. When the desired power setting is displayed, stop scrolling.
5	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  R05-04.1600    ≡≡≡ USB OFF CLR ON

Table 2-17. Time Setting Procedure

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  RETUNE      POWER TIME        SCAN→  RETUNE is flashing.
2	← and →	Press and release repeatedly to select TIME.	The R/T displays the following screen:  RETUNE      POWER TIME        SCAN→  TIME is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  RADIO TIME 11:51:00
4	ENTER	Press and release.	The R/T displays the following screen:  R05-04.1600    ≡≡≡ USB OFF CLR ON

**Table 2-18. SSB Scan Enable/Disable Procedure**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  RETUNE      POWER TIME        SCAN→  RETUNE is flashing.
2	← and →	Press and release repeatedly to select SCAN.	The R/T displays the following screen:  RETUNE      POWER TIME        SCAN→  SCAN is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  SSB SCAN MODE: DISABLED
4	↑ and ↓	Press and release.	The R/T displays the following screen:  SSB SCAN MODE: ENABLED
5	ENTER	Press and release.	The R/T displays the following screen:  R05-04.1600    ≡≡≡ USB OFF CLR ON

**NOTE**

If the R/T is powered off after SSB Scan has been enabled, the R/T will default back to SSB Scan disabled when it is powered on.

**Table 2-19. BFO Adjustment Procedure**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  RETUNE      POWER TIME            SCAN→  RETUNE is flashing.
2	← and →	Press and release repeatedly to select BFO.	The R/T displays the following screen:  ←BFO  BFO is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  BFO      +0000 HZ FREQ:      01.600
4	↑ and ↓	Press and release.	Adjusts the BFO offset in 10 Hz increments. A + or - is displayed after the receive frequency to indicate a BFO offset. If a new channel is selected, this BFO offset value is lost. The programmed receive frequency appears if the channel is selected again.
5	ENTER	Press and release.	The R/T displays the following screen:  R05-04.1600      ≡≡≡ USB OFF CLR ON

## 2.5 SYSTEM OPERATION AND PROGRAMMING

The following paragraphs provide instructions for the normal operation and programming of the RF-5200 FALCON™ Series Manpack System. The RF-5200 FALCON™ Series Manpack System is able to operate in three distinct modes:

- SSB
- ALE
- Frequency Hopping

### NOTE

SSB mode is actually single channel mode, not Single Sideband. USB, LSB, Amplitude Modulation (AM), CW, and FM can all be accessed when the R/T is in SSB mode.

ALE and Frequency Hopping modes require specific hardware to be installed in the RT-1694 Receiver-Transmitter. Refer to Chapter 1, Paragraph 1.3.2 for system hardware configuration information.

Table 2-20 provides an index to the paragraphs for complete operation and programming information for each of the available operating modes.

For advanced system programming information, refer to Paragraph 2.6.

**Table 2-20. RF-5200 FALCON™ Manpack System Normal Operation Index**

Operating Mode	Paragraph
SSB	2.5.1
ALE	2.5.2
Frequency Hopping	2.5.3

### NOTE

Some areas of operation may not be available for modification depending on system security programming. Refer to Paragraph 2.6.3.7.1 for the procedure on entering a password.

### 2.5.1 SSB Operation

The following paragraphs describe the normal operation of a RF-5200 FALCON™ Series Manpack System operating in SSB mode.

#### 2.5.1.1 Front Panel Display Indicators

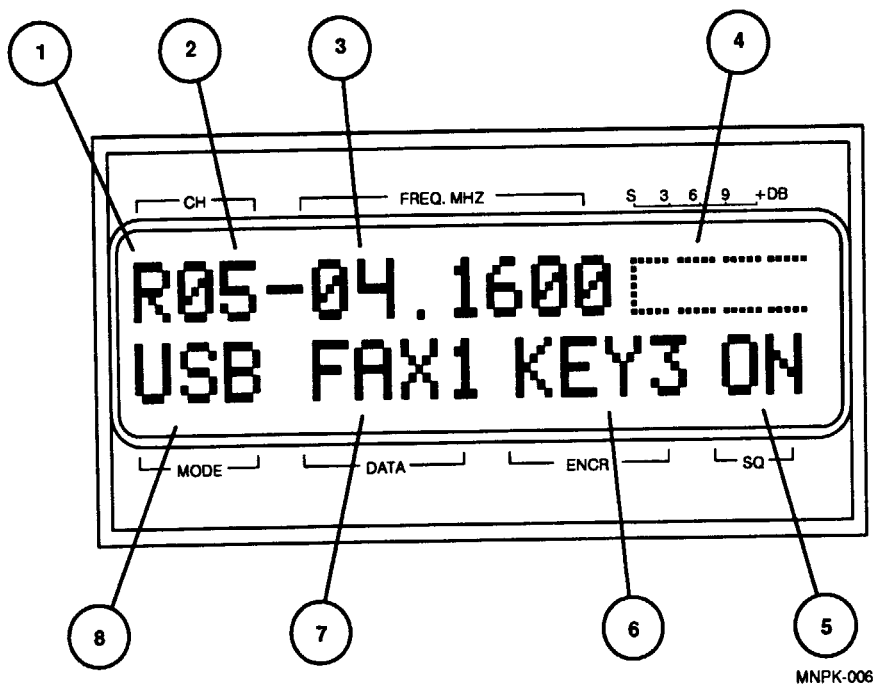
Table 2-21 lists the functions, and Figure 2-8 shows the locations of the front panel indicators when the RT-1694 Receiver-Transmitter is in receive mode.

Table 2-22 lists the functions, and Figure 2-9 shows the locations of the front panel indicators when the RT-1694 Receiver-Transmitter is in transmit mode.

Table 2-23 lists the functions, and Figure 2-10 shows the locations of the front panel indicators when the RT-1694 Receiver-Transmitter is in remote mode.

**Table 2-21. Front Panel Display – Receive Mode Indicators**

Key (Figure 2-8)	Indicator	Function
1	R/T Status	An "R" in this position indicates that the R/T is in receive mode.
2	Channel	Indicates on which channel the R/T is receiving.
3	RX Frequency	Indicates the frequency (in MHz) to which the R/T is tuned.
4	Signal Strength (S-Meter)	Indicates the strength of the receive signal.
5	Squelch	Indicates the status of squelch (ON/OFF).
6	Encryption	Indicates the encryption key used to decrypt the receive signal.
7	Data	Indicates the type of preset being used. Up to seven data presets are selectable, plus OFF, Analog Voice Security (AVS), and Digital Voice (DV) (three additional presets are available in hopping).
8	Mode	Indicates the operating mode of the R/T (USB, LSB, AME, CW, FM).



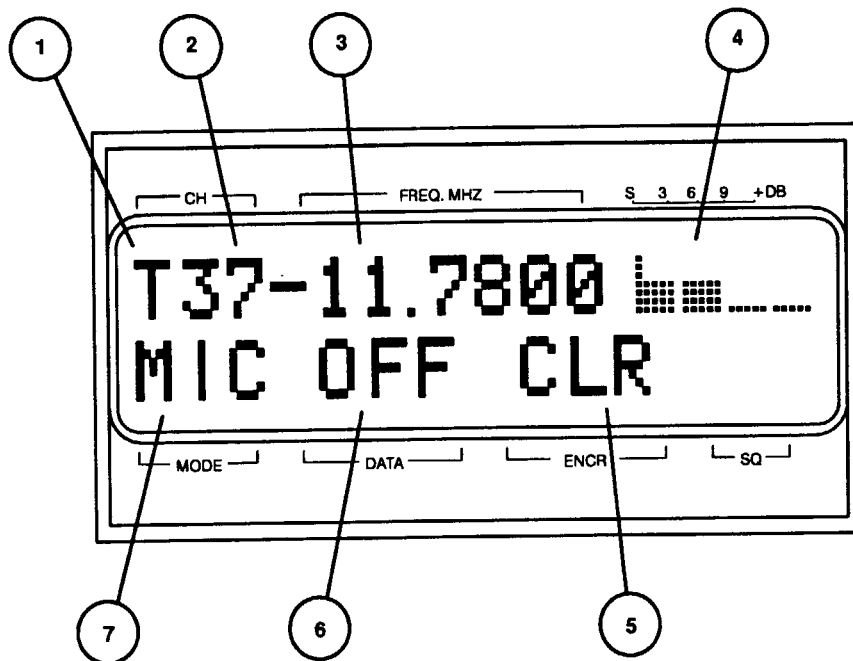
MNPK-006

**Figure 2-8. Front Panel Display – Receive Mode Indicators**



**Table 2-22. Front Panel Display – Transmit Mode Indicators**

Key (Figure 2-9)	Indicator	Function
1	R/T Status	A "T" in this position indicates that the R/T is in transmit mode.
2	Channel	Indicates on which channel the R/T is transmitting.
3	TX Frequency	Indicates the frequency on which the R/T is transmitting.
4	Power Meter	Indicates the strength of the transmitted signal.
5	Encryption	Indicates the encryption key used to encrypt the transmitted signal.
6	Data	Indicates the type of data preset being used. Up to seven data presets are selectable, plus OFF, AVS, and DV (three additional presets are available in hopping).
7	Key Source	Indicates the source of keying action (MIC, DAT, AUX).

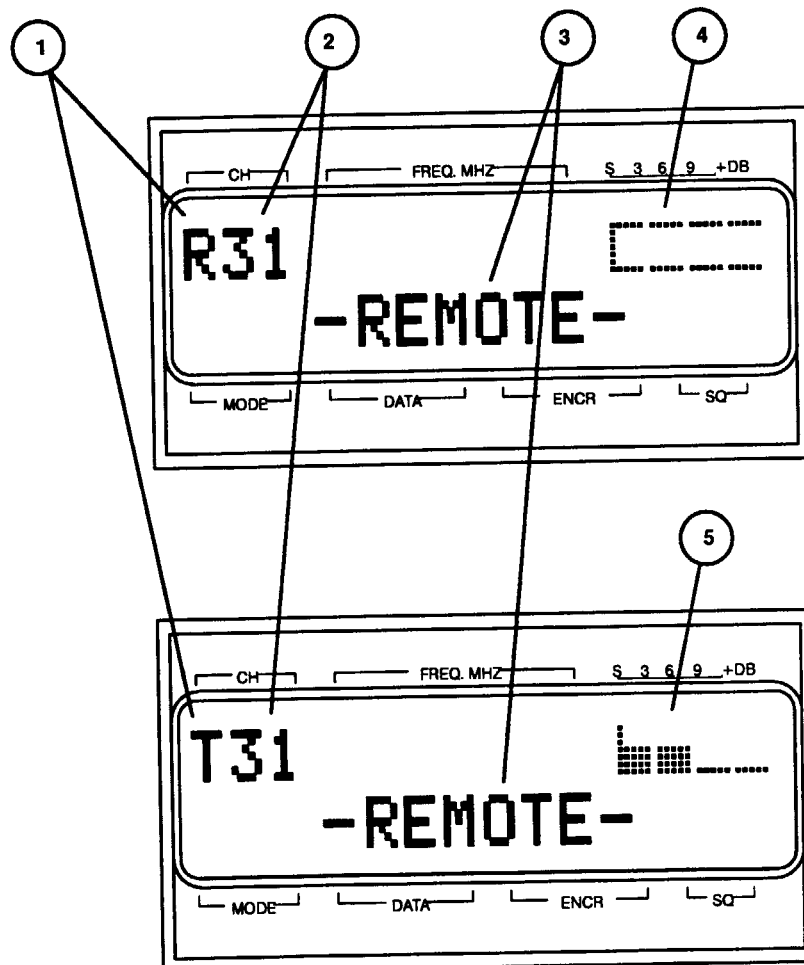


MNPK-007

**Figure 2-9. Front Panel Display – Transmit Indicators**

**Table 2-23. Front Panel Display – Remote Mode Indicators**

Key (Figure 2-10)	Indicator	Function
1	R/T Status	A "T" in this position indicates that the R/T is in transmit mode; an "R" in this position indicates that the R/T is in receive mode.
2	Channel	Indicates the channel to which the R/T is tuned.
3	Remote	Indicates that the R/T is operating in remote mode.
4	Signal Strength (S-Meter)	Indicates the strength of the receive signal (receive mode only).
5	Power Meter	Indicates the strength of the transmit signal (transmit mode only).



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**Figure 2-10. Front Panel Display – Remote Indicators**

**2.5.1.2 Placing the RF-5200 FALCON™ Series Manpack System in SSB Operation**

Table 2-24 provides the procedure to set the RF-5200 FALCON™ Series Manpack System to SSB mode.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-24. Procedure to Configure the RF-5200 FALCON™ Series Manpack System to SSB Mode**

Step	Control	Action	Observe
1	Function Switch	Rotate clockwise or counterclockwise to the SSB position.	The R/T displays the following screen:  *INITIALIZING* ***WAIT***  followed by:  R05-04.1600   ≡≡≡ USB OFF CLR ON  Refer to Paragraph 2.5.1.1 and see Figures 2-8 through 2-10 for a detailed description of the front panel indicators.

**2.5.1.3 Selecting a Channel**

Table 2-25 provides the procedure to select a channel in SSB mode.

**Table 2-25. Procedure to Select A Channel in SSB Mode**

Step	Control	Action	Observe
1	Channel Switch	Rotate to desired channel number (1 through 9).	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR ON
2	Channel Switch	Rotate to M position.	The R/T displays the following screen:  R12-21.2250   ≡≡≡ LSB OFF CLR ON
3	↑ and ↓, or numeric keypad plus ENTER	Press and release.	The radio will begin receiving on the new channel (0 through 99), and the TX mode and frequency is updated.

### 2.5.1.4 Receive Only Channels

Any channel may be programmed as receive only.

Receive Only allows the operator to monitor communications on a frequency, but does not allow transmission on that frequency. If the radio is keyed on a receive-only channel, the radio sounds a warning tone.

Receive Only is for SSB operation only.

### 2.5.1.5 Scratchpad Channel

#### NOTE

If the scratchpad channel has not been enabled, the password must be entered to use the scratchpad channel.

If the RT-1694 Receiver-Transmitter has been programmed to enable a scratchpad channel, Channel 00 can be selected as a scratchpad channel. A scratchpad channel can be configured for operating mode, data preset, and encryption key. It also allows the operator to select a receive and transmit frequency without going into the program menus. Table 2-26 provides the procedure to select a scratchpad channel, and program the receive and transmit frequency.

#### NOTE

Sample screen displays are shown for the following procedure. Actual screen displays may vary based on radio programming.

**Table 2-26. Procedure to Select a Scratchpad Channel**

Step	Control	Action	Observe
1	Channel Switch	Rotate to M position.	The R/T displays the following screen:  R12-21.2250   ≡≡≡ LSB OFF CLR ON
2	Numeric Keypad	Press 00.	The R/T displays the following screen:  R00-21.2250   ≡≡≡ LSB OFF CLR ON
3	ENTER	Press and release.	The radio will begin receiving on the listed frequency (the desired frequency has not been programmed yet).
4	← and →	Press and release repeatedly to select the frequency indicator.	The R/T displays the following screen:  R00-21.2250   ≡≡≡ LSB OFF CLR ON  The frequency indicator is flashing.

**Table 2-26. Procedure to Select a Scratchpad Channel – Continued**

Step	Control	Action	Observe
5	↑ and ↓, or numeric keypad plus ENTER  ← and →	Press and release repeatedly, or enter the desired receive frequency on the numeric keypad. Enter the leading zero for frequencies below 10 MHz (that is, 08.990 MHz).  Selects which digit will be modified.	The desired RX frequency is displayed.
6	ENTER	Press and release.	The R/T displays the following screen:  RX: 21.2250 MHZ TX: 21.2250 MHZ  The transmit frequency is flashing.
7	↑ and ↓, or numeric keypad plus ENTER  ← and →	Press and release repeatedly, or enter the desired transmit frequency on the numeric keypad. Enter the leading zero for frequencies below 10 MHz (that is, 08.990 MHz). The transmit frequency does not have to be the same as the receive frequency.  Selects which digit will be modified.	The R/T displays the following screen:  RX: 21.2250 MHZ TX: 21.2250 MHZ

### 2.5.1.6 Selecting a Temporary Operating Mode

If the RT-1694 Receiver-Transmitter has been programmed to allow temporary operating modes, the mode of operation for any channel may be temporarily changed without affecting overall programming. Place the radio in SSB mode per Paragraph 2.5.1. Table 2-27 provides the procedure for selecting a temporary operating mode for the RF-5200 FALCON™ Series Manpack System.

**NOTE**

If the temporary operating mode feature has not been enabled, the password must be entered to select a temporary operating mode.

**NOTE**

Sample screen displays are shown for the following procedure. Actual screen displays may vary based on radio programming.

**Table 2-27. Procedure for Selecting a Temporary Operating Mode**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select the mode indicator.	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR ON  Mode indicator is flashing.
2	↑ and ↓	Press and release repeatedly until the desired operating mode is displayed.	The R/T scrolls through the mode selections. Allowable selections are USB, LSB, AME, FM, and CW. When the desired mode of operation is displayed, stop scrolling.†
3	ENTER	Press and release.	The R/T begins operating in the desired mode.

† When AME, FM, or CW mode is selected, the data preset and encryption key fields change to OFF because these configurations are not valid for these modes.

### 2.5.1.7 Selecting a Data Preset

Data presets consist of preselected sets of modem parameters, selected and named during programming. If permitted, the operator may select any one of up to seven presets or DV, AVS, or OFF.

If a data preset is selected, the radio can still be keyed with the front panel microphone or the accessory key line.

If an option is not installed, the corresponding preset name will not be available for selection.

When CW, FM, or AME modes are selected, the data preset value defaults to OFF.

Place the radio in SSB mode per Paragraph 2.5.1. Table 2-28 provides the procedure for selecting a data preset.

#### NOTE

If the data preset has not been enabled, the password must be entered to use the data preset.

#### NOTE

Sample screen displays are shown for the following procedure. Actual screen displays may vary based on radio programming.

**Table 2-28. Procedure for Selecting a Data Preset**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select the data indicator.	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB FAX1 CLR ON  The data indicator is flashing.
2	↑ and ↓	Press and release repeatedly until the desired data preset is displayed.	The R/T scrolls through the available data preset options, including DV and AVS.
3	ENTER	Press and release.	The R/T is programmed for the desired data preset.

### 2.5.1.8 Selecting an Encryption Key

The encryption indicator on the front panel can be configured to CLR, or KEY1 through KEY6. The encryption key can be selected for use with DV, AVS, or a data preset. When the system is configured for CW, FM, or AME operation, the encryption key automatically defaults to CLR. When no key is selected, voice communications is CLR. When a modem preset is selected, voice communications is CLR or AVS, depending on the setting in the OP\_LOCK programming menu located in the SECUR selections.

#### NOTE

While keyed, if KEYX appears in the encryption field, the radio is sending encrypted messages. While keyed, if CLR appears in the encryption field, the radio is not sending encrypted data or voice.

Place the radio in SSB mode per Paragraph 2.5.1. Table 2-29 provides the procedure for selecting an encryption key.

**Table 2-29. Procedure for Selecting an Encryption Key**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select the encryption display indicator.	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR ON  The encryption indicator is flashing.
2	↑ and ↓	Press and release repeatedly until the desired encryption key is displayed.	The encryption display indicator will scroll through the available encryption keys and CLR.
3	ENTER	Press and release.	The R/T displays the following screen <sup>†</sup> :  R05-04.1600   ≡≡≡ USB OFF KEY3 ON

<sup>†</sup> If AVS operation has been programmed for the system and no encryption key has been selected, the error message NO ENCRYPTION KEYS PROGRAMMED will be displayed on the R/T. Program the R/T with an encryption key, or use clear voice.



### 2.5.1.9 Selecting Squelch

Although the specific squelch threshold (LOW, MED, or HIGH) is determined during programming, squelch is turned on or off during system operation. Place the radio in SSB mode per Paragraph 2.5.1. Table 2-30 provides the procedure for turning squelch on or off.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-30. Procedure for Selecting Squelch**

Step	Control	Action	Observe
1	← and →	Press and release to select the squelch display indicator.	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR OFF  The squelch indicator is flashing.
2	↑ and ↓	Press and release until the desired squelch setting is displayed.	The squelch display indicator toggles between OFF and ON.
3	ENTER	Press and release.	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR ON

**2.5.1.10 Selecting SSB Scan**

SSB Scan operation is based on standard squelch operation in USB mode. Channels 0 through 9 are always scanned in ascending order. SSB Scan will scan through all 10 channels in 5 seconds when no signals are present. If a signal is detected on a channel by means of a squelch break, the receiver-transmitter will remain on that channel until two seconds after the signal is no longer present. If another signal is detected within that time, the receiver-transmitter will remain on the channel. If no signal is detected, the receiver-transmitter resumes SSB Scan operation.

Table 2-18 provides the procedure for enabling and disabling SSB Scan operation. Table 2-31 provides the procedure for initiating and pausing SSB Scan operation.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-31. Procedure for Initiating and Pausing SSB Scan Operation**

Step	Control	Action	Observe
1	CLEAR	Press and release.	The R/T displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR   OFF  The channel and frequency indicators are sequencing through the programmed channels.
2	None	None.	If the R/T detects a signal on one of the programmed channels, the R/T remains on that channel until two seconds after a signal is no longer present.
3	CLEAR, or the Push-To-Talk button on the handset	Press and release.	The R/T stops sequencing through the programmed channels, and displays the following screen:  R05-04.1600   ≡≡≡ USB OFF CLR   OFF

## 2.5.2 ALE Operation (MIL-STD-188-141A)

ALE operation automatically sets up a link with another station or group of stations on the best available channel. This is done by assigning each station in a network an individual call sign (self address) and by programming groups of channels on which each station may be called.

### NOTE

Each station in a network must be programmed exactly the same in order for proper ALE operation.

ALE depends on a process called LQA. An LQA may be performed automatically at predetermined intervals, or as needed by the operator. During an LQA, a station contacts other stations, either as individuals or as a network, on each channel available for communication, and makes a measurement (score) of signal quality for each. The scores are ranked and stored for future use.

Each station scans its assigned channels when it is not linked in communication. When a call is initiated, the calling station checks the scores associated with the target station to determine the best channel and calls the station on that channel. If communication is not established on that channel, the calling station tries the two next best channels. If communication is still not established, the calling station will use the highest available frequency and progress downward through the list until a link is established or all channels fail. The two stations automatically link when an acceptable channel is found and both operators are alerted both audibly and visually. A similar procedure is used to link networks of individual stations.

To form an ALE network, each station must be programmed with certain network information. This information includes the call sign by which each station will be called (self address), the group of channels that each station will use, and the call sign or individual address of each other station in the network, along with the group or groups of channels that each will use. Up to ten channel groups may be programmed with ALE.

Three types of addresses (or call signs) are possible with MIL-STD-188-141A ALE, each consisting of an alphanumeric name up to 15 characters long:

- **SELF ADDRESS:** Identifies each unit. Each unit may have up to 20 self addresses.
- **INDIVIDUAL ADDRESS:** Identifies an individual station to be called. Up to 200 individual addresses may be stored.
- **NET ADDRESS:** Identifies a number of individual stations which can be called together. Up to 20 net addresses may be stored.

Each address is assigned a channel group which contains a list of channels on which a unit will scan. This also determines the possible channels on which communication with that address is possible. Up to 100 channels in ten possible channel groups may be stored.

ALE allows a variety of calls to be made. Individual calls are made to a specific station using the appropriate individual address. Calls are made to nets by using the appropriate net address. If programming allows, the following calls may also be made directly from the RT-1694 Receiver-Transmitter front panel:

- **ALL CALL:** An ALL CALL uses the address ALL to call all ALE stations using a broadcast format. An ALL CALL does not request a response and does not designate a specific address. The ALL CALL message is a unidirectional type that contains the ALL CALL identifier and the initiating (calling) station's address. When an ALL CALL message is successfully received, the receiving station or stations will change to linked state and be ready for voice or data communications.
- **ANY CALL:** An ANY CALL uses the address ANY to call all ALE stations in the same manner as with the ALL CALL, except the individual stations respond at one of 16 random intervals for linking purposes.

From the RT-1694 Receiver-Transmitter front panel, ALL CALLs and ANY CALLs are made by entering the three appropriate letters as if they were a calling address. This means that no station should program a self or individual address of ALL or ANY as these are considered to be "reserved addresses".

The RT-1694 Receiver-Transmitter utilizes a MIL-STD-188-141A compatible ALE algorithm. Other MIL-STD-188-141A ALE compatible call types that can be received by the RT-1694 Receiver-Transmitter, but not sent, include the following:

- **SELECTIVE ANY:** Any station ending in a certain character
- **DOUBLE SELECTIVE ANY:** Any station ending in two specific characters
- **GROUP:** Random replying stations that are not programmed with the sender
- **WILDCARD:** Calls that use the "?" to represent any character

Many of these call types may be used from a remote terminal. Operation using them is described in Paragraph 2.7.

ALE allows the transmission of short text messages called Automatic Message Displays (AMD). The AMD function enables the stations to communicate short messages or prearranged codes to any selected station or net. The AMD functions can be performed from the front panel of the radio or the remote terminal. Up to ten messages (in buffers 0 through 9), each containing up to 87 characters, may be programmed.

ALE also allows the transmission of EOW using an external terminal device. An EOW is a message typed from the remote port, while linked with the modem off, to another station. Unlike a typical data transfer, an EOW has forward error correction and an acknowledgement sent back. When the EOW exceeds 300 characters, the radio sends the message in blocks of 300 characters each, until the last block, which is usually shorter. Radio terminal echo stops when the buffer is full, which would normally only occur for a file transfer.

### 2.5.2.1 Front Panel Display Indicators

During ALE operation, the radio can be in a linked or unlinked state. When the radio is unlinked, it can be in either the scan mode or stop mode.

Table 2-32 lists the functions, and Figure 2-11 shows a typical R/T display when the radio is unlinked and scanning in ALE mode.

#### NOTE

When operating a manpack configuration radio system in ALE mode, the R/T automatically enters Sleep Mode. This is indicated by the Liquid Crystal Display (LCD) display remaining unchanged for a period of time, then quickly scanning through the programmed channel group before pausing again. The duration of these pauses is directly proportional to the MAX CHANNELS TO SCAN parameter, and the actual length of time required to scan through the channel group.

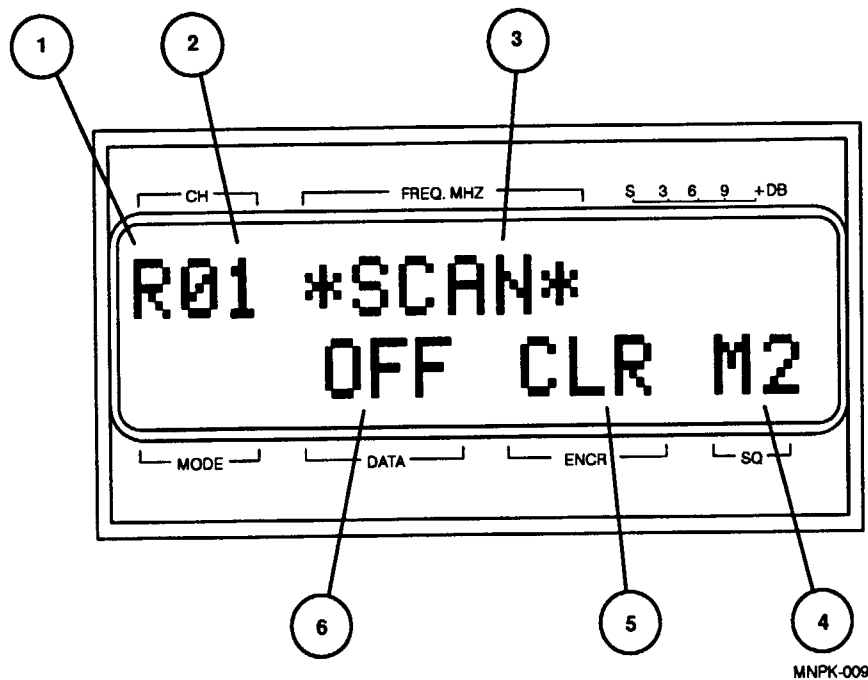
Table 2-33 lists the functions, and Figure 2-12 shows a typical R/T display when the radio is linked in ALE mode, and is unkeyed.

Table 2-34 lists the functions, and Figure 2-13 shows a typical R/T display when the radio is linked in ALE mode and after the radio has been keyed.

Table 2-35 lists the functions, and Figure 2-14 shows a typical R/T display when the radio is unlinked and stopped in ALE mode.

**Table 2-32. Front Panel Display – ALE Unlinked/Scanning Mode Indicators**

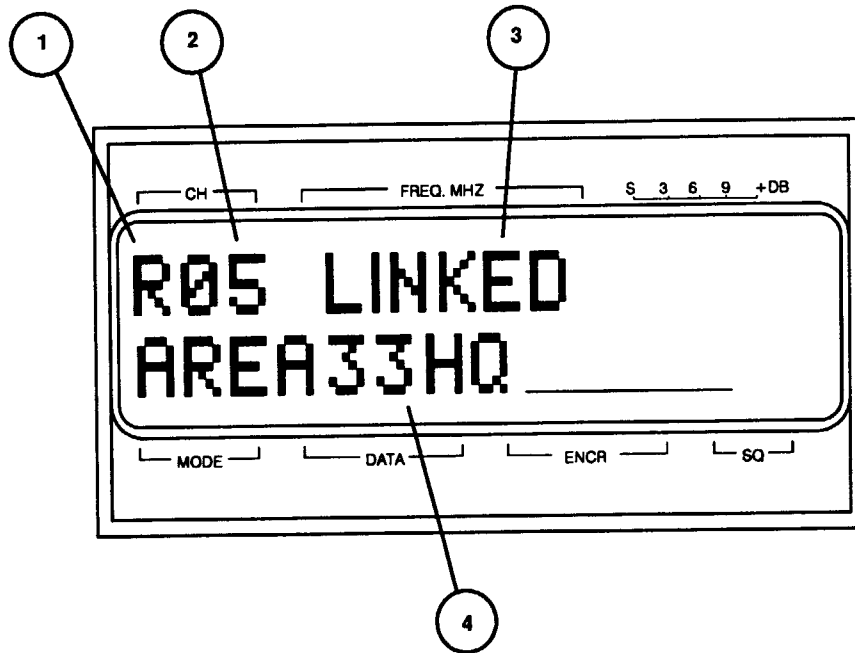
Key (Figure 2-11)	Indicator	Function
1	R/T Status	An "R" in this position indicates that the R/T is in receive mode.
2	Channel	Indicates which channel the R/T is scanning.
3	Scan Indicator	Indicates the R/T is currently in scan operation.
4	RX AMD Messages	Indicates the number of unread receive AMD messages.
5	Encryption	Indicates the encryption key used to encrypt the received signal.
6	Data	Indicates the type of data transmission being received. Up to seven data presets are selectable, plus OFF, AVS, and DV.



**Figure 2-11. Typical R/T Display when Unlinked and Scanning During ALE Operation**

**Table 2-33. Front Panel Display – ALE Linked Mode Indicators Before Keying**

Key (Figure 2-12)	Indicator	Function
1	R/T Status	An "R" in this position indicates that the R/T is in receive mode.
2	Channel	Indicates which channel the R/T is using.
3	Status	Indicates that the R/T is in linked mode.
4	Address	The address of the station to which the R/T is linked.

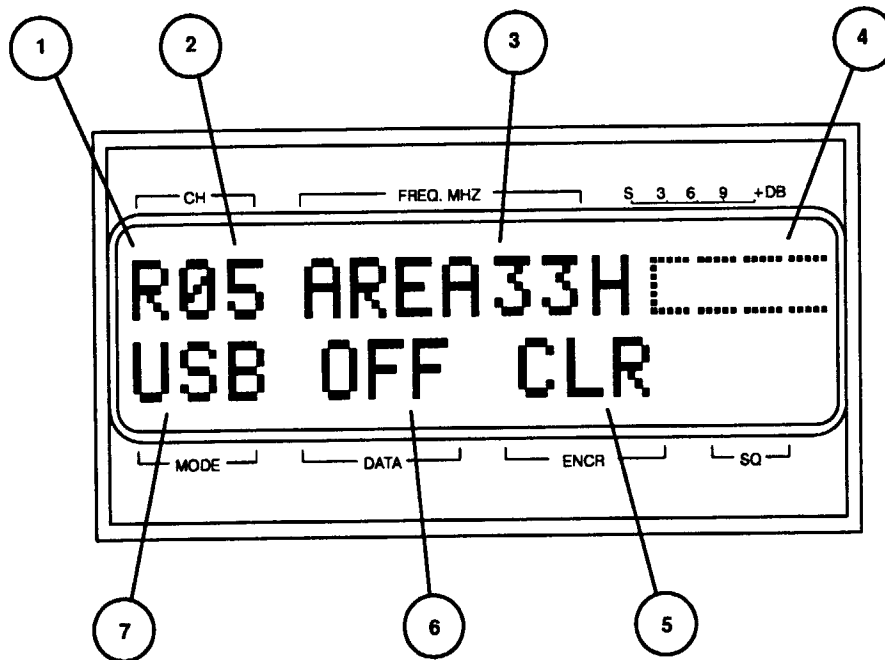


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**Figure 2-12. Typical R/T Display when Linked during ALE Operation (Unkeyed)**

**Table 2-34. Front Panel Display – ALE Linked Mode Indicators (After Keying)**

Key (Figure 2-13)	Indicator	Function
1	R/T Status	An “R” in this position indicates that the R/T is in receive mode.
2	Channel	Indicates to which channel the R/T is tuned.
3	Address	The address of the station to which the R/T is linked. The first seven characters of the address are displayed.
4	Signal Strength (S-Meter)	Indicates how strong the received signal is.
5	Encryption	Indicates the encryption key used to encrypt the received signal.
6	Data	Indicates the type of data transmission being used. Up to seven data presets are selectable, plus OFF, AVS, and DV.
7	Mode	Indicates the operating mode of the R/T (USB, LSB, AME, FM, CW).

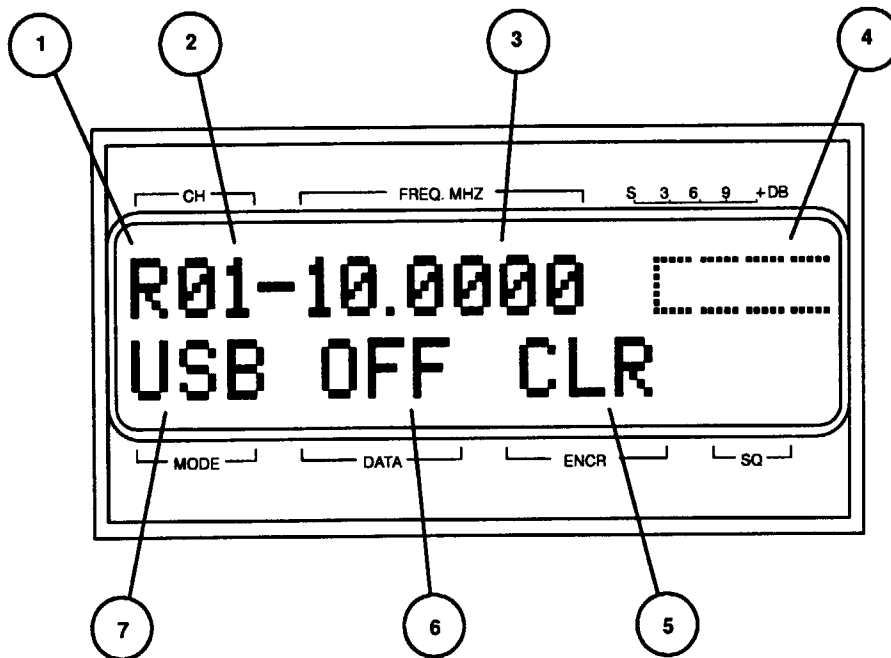


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**Figure 2-13. Typical R/T Display when Linked During ALE Operation (After Keying)**

**Table 2-35. Front Panel Display – ALE Unlinked/Stopped Mode Indicators**

Key (Figure 2-14)	Indicator	Function
1	R/T Status	An “R” in this position indicates that the R/T is in receive mode.
2	Channel	Indicates to which channel the R/T is tuned.
3	RX Frequency	Indicates the frequency (in MHz) to which the R/T is tuned.
4	Signal Strength (S-Meter)	Indicates the strength of the receive signal.
5	Encryption	Indicates the encryption key used to encrypt the received signal.
6	Data	Indicates the type of data transmission being used.
7	Mode	Indicates the operating mode of the R/T (USB, LSB, AME, FM, CW).



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**Figure 2-14. Typical R/T Display when Unlinked and Stopped During ALE Operation**




**2.5.2.2 Placing the RF-5200 FALCON™ Series Manpack System in ALE Operation**

Table 2-36 provides the procedure for placing the RF-5200 FALCON™ Series Manpack System in ALE mode.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-36. Procedure to Place the FALCON™ Manpack System in ALE Mode**

Step	Control	Action	Observe
1	Function Switch	Rotate clockwise or counterclockwise to the ALE position.	The R/T displays the following screen:  *INITIALIZING* ***WAIT***  followed by:  R05 *SCAN* OFF CLR  The channel number is changing.
2	CLEAR	Press and release.	The R/T is placed in stop mode and displays the following screen:  R01-10.0000  USB OFF CLR
3	↑ and ↓	Press and release repeatedly.	The current channel display indicator scrolls through the list of channels programmed into the self-address channel group.
4	CLEAR	Press and release.	The radio resumes scanning and displays the following screen:  R01 *SCAN* OFF CLR

### **2.5.2.3 Placing an Automatic Call**

An automatic call is one in which the best available channel is selected by ALE. When an AUTO call is initiated, the calling station checks the scores associated with the target station (if available) to determine the best channel and calls the station on that channel. If communication is not established on that channel, the calling station tries the two next best channels. If communication is still not established, the calling station will use the highest available frequency and progress downward through the list until a link is established or all channels fail. The two stations automatically link when an acceptable channel is found, and both operators are alerted both audibly and visually.

If the call does not succeed on one of these channels, or if no scores are available, ALE attempts to place the call using all of the target address' channel lists, starting with the highest frequency channel and advancing through the list to the lowest frequency channel. This procedure is continued until the call is successfully placed.

Only addresses programmed into the calling radio can be called during an AUTO call. If a call is attempted to an unknown address, an error message is displayed. Refer to Table 2-37.

The following paragraphs provide instructions for placing automatic individual/net calls, ALL CALLS, and ANY CALLS.

#### **2.5.2.3.1 Placing an Automatic Individual/Net Call**

Place the R/T into ALE mode per Paragraph 2.5.2.2. Table 2-37 provides the procedure to place an automatic individual/net call.

#### **NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-37. Procedure to Place an Automatic Individual/Net Call**

Step	Control	Action	Observe
1	CALL	Press and release.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
2	↑ and ↓	Press and release repeatedly until AUTO is displayed (if necessary).	The R/T toggles between AUTO and MANUAL, and displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
3	← and →	Press and release until INDIVIDUAL/NET is displayed (if necessary).	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.
4	↑ and ↓	Press and release repeatedly until INDIVIDUAL/NET is displayed (if necessary).	The R/T scrolls through the list of call types (INDIVIDUAL/NET, ALL, AND ANY), and displays the following screen:  CALL: AUTO INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  CALL ADDRESS? AREA33HQ _ _ _ _ _  AREA33HQ is flashing.

**Table 2-37. Procedure to Place an Automatic Individual/Net Call – Continued**

Step	Control	Action	Observe
6	↑ and ↓, or numeric keypad	Press and release repeatedly until the desired station address or net is displayed (if different from that displayed).	<p>The R/T displays the following screen:</p> <p>CALL ADDRESS? AREA33HQ _ _ _ _ _</p> <p>AREA33HQ is flashing.</p>
7	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p>T05 CALLING AREA33HQ _ _ _ _ _</p> <p>followed by:</p> <p>R05 CALLING AREA33HQ _ _ _ _ _</p> <p>The two screens toggle back and forth several times.</p> <p>If the call is successful, the R/T displays the following screen:</p> <p>R05 LINKED: AREA33HQ _ _ _ _ _</p> <p>followed by:</p> <p>R05 AREA33HQ   ≡≡≡ USB OFF CLR</p> <p>If this is a net call:</p> <p>RESP REV from _ _ _ _ _ will appear for each net member responding. Refer to Table 2-39.</p> <p>The radios are ready for communications.</p>

**Table 2-37. Procedure to Place an Automatic Individual/Net Call – Continued**

Step	Control	Action	Observe
7 (Cont.)			If the call failed, error tones are heard, and the R/T displays the following screen:  R05 *SCAN* NO RESPONSE  followed by  R05 *SCAN* OFF CLR

**2.5.2.3.2 Placing an Automatic ALL CALL**

An automatic ALL CALL is initiated from the scan mode. Place the R/T into ALE scan mode per Paragraph 2.5.2.2. Table 2-38 provides the procedure to place an automatic ALL CALL.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-38. Procedure to Place an Automatic ALL CALL**

Step	Control	Action	Observe
1	CALL	Press and release.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
2	↑ and ↓	Press and release until AUTO is displayed (if necessary).	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
3	← and →	Press and release until INDIVIDUAL/NET is selected (if necessary).	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.

**Table 2-38. Procedure to Place an Automatic ALL CALL – Continued**

Step	Control	Action	Observe
4	↑ and ↓	Press and release repeatedly until ALL is displayed (if necessary).	The R/T scrolls through the list of call types, and displays the following screen:  CALL:    AUTO ALL  ALL is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  T05 CALLING: ALL _____  followed by:  R05 CALLING: ALL _____  The R/T displays the following screen:  R05 LINKED: ALL _____

**2.5.2.3.3 Placing an Automatic ANY CALL**

An automatic ANY CALL is initiated from the scan mode. The call is made to all stations scanning on a given channel. Stations then respond at one of 16 random intervals for the purpose of linking. Place the R/T into ALE scan mode per Paragraph 2.5.2.2. Table 2-39 provides the procedure to place an automatic ANY CALL.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-39. Procedure to Place an Automatic ANY CALL**

Step	Control	Action	Observe
1	CALL	Press and release.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
2	↑ and ↓	Press and release until AUTO is displayed (if necessary).	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
3	← and →	Press and release until INDIVIDUAL/NET is flashing.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.
4	↑ and ↓	Press and release repeatedly until ANY is displayed (if necessary).	The R/T scrolls through the list of call types, and displays the following screen:  CALL: AUTO ANY  ANY is flashing.



Table 2-39. Procedure to Place an Automatic ANY CALL – Continued

Step	Control	Action	Observe
5	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p>T05 CALLING: ANY _____</p> <p>followed by:</p> <p>R05 CALLING ANY _____</p> <p>The two screens toggle back and forth several times.</p> <p>As units respond, the R/T momentarily displays the following screen:</p> <p>RSP FROM: AREA3 _____</p> <p>The R/T then displays the following screen:</p> <p>R05 LINKED: ANY _____</p>

**2.5.2.4 Placing a Manual Call**

A manual call is one in which the channel is selected by the operator. The following paragraphs provide instructions for placing manual individual/net calls, ALL CALLS, and ANY CALLS.

**2.5.2.4.1 Placing a Manual Individual/Net Call**

Place the R/T into ALE mode per Paragraph 2.5.2.2. Table 2-40 provides the procedure to place a manual individual/net call.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-40. Procedure to Place a Manual Individual/Net Call**

Step	Control	Action	Observe
1	CALL	Press and release.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
2	↑ and ↓	Press and release repeatedly until MANUAL is displayed (if necessary).	The R/T toggles between AUTO and MANUAL, and displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  MANUAL is flashing.
3	← and →	Press and release until INDIVIDUAL/NET is flashing.	The R/T displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.
4	↑ and ↓	Press and release repeatedly until INDIVIDUAL/NET is displayed (if necessary).	The R/T scrolls through the list of call types, and displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.

**Table 2-40. Procedure to Place a Manual Individual/Net Call – Continued**

Step	Control	Action	Observe
5	ENTER	Press and release.	The R/T displays the following screen:  CALL ADDRESS? ----- The first underscore (cursor) is flashing.
6	↑ and ↓, or numeric keypad	Press and release repeatedly until the desired station address or net is displayed (if different from that displayed).	The R/T displays the following screen:  CALL ADDRESS? AREA33HQ ----- The target address is flashing.
7	ENTER	Press and release.	The R/T displays the following screen:  AREA33HQ ----- CALL ON CHAN? 00 The channel number is flashing.
8	↑ and ↓, or numeric keypad	Press and release repeatedly until the desired channel is displayed (if different from that displayed).	The R/T displays the following screen:  AREA33HQ ----- CALL ON CHAN? 23 The channel number is flashing.

**Table 2-40. Procedure to Place a Manual Individual/Net Call – Continued**

Step	Control	Action	Observe
9	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p>T23 CALLING: AREA33HQ _____</p> <p>followed by:</p> <p>R23 CALLING: AREA33HQ _____</p> <p>If the call is successful, the R/T displays the following screen:</p> <p>R23 LINKED: AREA33HQ _____</p> <p>If the call failed, error tones are heard, and the R/T displays the following screen:</p> <p>R23 *SCAN* NO RESPONSE</p> <p>followed by</p> <p>R04 *SCAN* OFF CLR</p> <p>The channel number scrolls through programmed channels.</p>

**2.5.2.4.2 Placing a Manual ALL CALL**

An ALL CALL is initiated from scan mode. Place the R/T into ALE scan mode per Paragraph 2.5.2.2. Table 2-41 provides the procedure to place a manual ALL CALL.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-41. Procedure to Place a Manual ALL CALL**

Step	Control	Action	Observe
1	CALL	Press and release.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
2	↑ and ↓	Press and release repeatedly until MANUAL is displayed (if necessary).	The R/T toggles between AUTO and MANUAL, and displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  MANUAL is flashing.
3	← and →	Press and release until INDIVIDUAL/NET is flashing.	The R/T displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.
4	↑ and ↓	Press and release repeatedly until ALL is displayed (if necessary).	The R/T scrolls through the list of call types, and displays the following screen:  CALL: MANUAL ALL  ALL is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  ALL _____ CALL ON CHAN? 00  The channel number is flashing.

Table 2-41. Procedure to Place a Manual ALL CALL – Continued

Step	Control	Action	Observe
6	↑ and ↓, or numeric keypad	Press and release repeatedly until the desired channel is displayed (if different from that displayed).	<p>The R/T displays the following screen:</p> <p>ALL _____ CALL ON CHAN? 23</p> <p>The channel number is flashing.</p>
7	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p>T23 CALLING: ALL _____</p> <p>followed by:</p> <p>R23 CALLING: ALL _____</p> <p>The R/T displays the following screen:</p> <p>R23 LINKED: ALL _____</p>

### 2.5.2.4.3 Placing a Manual ANY CALL

An ANY CALL is initiated from scan mode. Place the R/T into ALE scan mode per Paragraph 2.5.2.2. Table 2-42 provides the procedure to place a manual ANY CALL.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-42. Procedure to Place a Manual ANY CALL**

Step	Control	Action	Observe
1	CALL	Press and release.	The R/T displays the following screen:  CALL: AUTO INDIVIDUAL/NET  AUTO is flashing.
2	↑ and ↓	Press and release repeatedly until MANUAL is displayed (if necessary).	The R/T toggles between AUTO and MANUAL, and displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  MANUAL is flashing.
3	← and →	Press and release until INDIVIDUAL/NET is flashing.	The R/T displays the following screen:  CALL: MANUAL INDIVIDUAL/NET  INDIVIDUAL/NET is flashing.
4	↑ and ↓	Press and release repeatedly until ANY is displayed (if necessary).	The R/T scrolls through the list of call types, and displays the following screen:  CALL: MANUAL ANY  ANY is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  ANY _ _ _ _ _ CALL ON CHAN? 00  The channel number is flashing.

Table 2-42. Procedure to Place a Manual ANY CALL – Continued

Step	Control	Action	Observe
6	↑ and ↓, or numeric keypad	Press and release repeatedly until the desired station address is displayed (if different from that displayed).	<p>The R/T displays the following screen:</p> <p>ANY _____ CALL ON CHAN? 23</p> <p>The channel number is flashing.</p>
7	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p>T05 CALLING: ANY _____</p> <p>followed by:</p> <p>R05 CALLING: ANY _____</p> <p>As units respond, the R/T momentarily displays the following screen:</p> <p>R05 CALLING: RSP FROM AREA3</p> <p>The R/T then displays the following screen:</p> <p>R05 LINKED: ANY _____</p>



**2.5.2.5 Receiving a Call**

Table 2-43 provides the procedure for receiving a call.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-43. Procedure for Receiving a Call**

Step	Control	Action	Observe
1	None	None	When an incoming call or LQA request is received, the R/T displays the following screen:  R01-11.7800   ===== SIGNAL RECEIVED
2	None	None	If the incoming call is not addressed to the unit, the R/T resumes scanning operation and displays the following screen:  R01 *SCAN* OFF CLR
3	None	None	If the preamble message indicates an incoming call is addressed to the receiving unit, then receipt of the call is acknowledged to the originating unit and both units prompt their operators with an audible beep, and the R/T displays the following screen:  R05 LINKED AREA33HQ _ _ _ _ _  which remains on the display until the radio is keyed.

**2.5.2.6 Terminating a Call**

Table 2-44 provides the procedure for terminating a call.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-44. Procedure for Terminating a Call**

Step	Control	Action	Observe
1	CLEAR	Press and release.	The R/T displays the following screen:  TERMINATE LINK YES  YES is flashing.
2	ENTER	Press and release.	Link termination tones are transmitted and the link is terminated; the R/T resumes scanning and displays the following screen:  R01 *SCAN* OFF CLR
<b>TO RETURN TO THE CALL</b>			
3	CLEAR	Press and release.	The R/T operates with its current link and displays the following screen:  R01 LINKED AREA33HQ _ _ _ _ _
	-OR-		
	↑ and ↓	Press and release.	The YES field toggles to NO.
4	ENTER	Press and release.	The R/T operates with its current link and displays the following screen:  R01 LINKED AREA33HQ _ _ _ _ _

### 2.5.2.7 OPTION Key Functions

The following paragraphs describe the OPTION key functions available when in ALE mode.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

- a. LQA – Two types of LQA are available:
  1. EXCHANGE LQA – Provides a more accurate two-way channel evaluation, but takes longer to complete. Table 2-45 provides the procedure to execute an Exchange LQA.
  2. SOUND LQA – Provides only a one-way channel evaluation, but is completed in a shorter period of time. Table 2-46 provides the procedure to execute a Sound LQA.

LQAs initiated from the OPT key are executed immediately and are one-time LQAs only.

- b. SCORES – The LQA score indicates the relative quality of the channel. A score of “---” represents a channel where no valid measurement has been made. If a measurement was made, scores can range from 0 (poorest channel) to 100 (best channel). Table 2-47 provides the procedure to view LQA scores.
- c. TIME – Allows the viewing of radio time. Table 2-48 provides the procedure for viewing radio time.
- d. POWER – Allows the selection of transmitter output power. Table 2-49 provides the procedure to select transmitter output power.
- e. RETUNE – Retunes the antenna coupler. Table 2-50 provides the procedure for retuning the antenna coupler.
- f. EOW\_TO – EOW Destination allows the operator to select the distant station that is to receive the EOW data from a remote terminal. Table 2-51 provides the procedure to send an EOW.

#### NOTE

The operator can only set the EOW destination after the radio has been linked.

- g. TX\_MSG – A transmit AMD is a text message that is sent to another individual or net. A transmit AMD message may be sent when the R/T is either linked or scanning. Upon completion of the AMD transmission, the R/T returns to its previous state. The TX\_MSG menu selection allows the operator to:
  1. Send a Transmit AMD message. Table 2-53 provides the procedure to send a Transmit AMD message.
  2. Edit/Create a Transmit AMD Message. When editing a transmit AMD message, the cursor appears on the first character of the message buffer.
    - If no message has been previously entered into the buffer (that is, the buffer is empty), underscores appear in the display. Use the numeric keypad to enter a new message into the buffer. Refer to Paragraph 2.6.2 for complete instructions.
    - If the cursor is on the first character of an existing message when a key on the keypad is pressed, all characters in the message are deleted and the entire message line on the display appears as flashing underscore characters. Use the numeric keypad to enter a new message into the buffer. Refer to Paragraph 2.6.2 for complete instructions.

- Repeatedly pressing the zero key (0) accesses a series of special characters in addition to a zero. These characters are (in order):  
0 [SPACE] , ' . " / \ \_ : ; \* & ! ? @ # \$ % + - = < > ^ ( ) [
- The left arrow (←) and right arrow (→) move the cursor around the message buffer.
- CLEAR deletes the character under the cursor as well as all characters to the right of the cursor.

Table 2-52 provides the procedure to edit a Transmit AMD message.

- h. RX\_MSG – A Receive AMD is a message sent by another individual. Receive AMDs may be reviewed or deleted. The R/T saves the ten most recently received AMDs (ten is the maximum number of AMDs that can be saved). When enabled, the AUTO MESSAGE DISPLAY feature scrolls the RX AMD across the display as it is received. Refer to Paragraph 2.6.4.5 for programming information.

When reviewing a Receive AMD message, the top line of the display shows the date and time of receipt for the message. Up to the first ten characters of the sending address are displayed and are blinking. When a message is received by the R/T, an M# notification is displayed in the SQUELCH area of the standard ALE display, where # is the number of unread messages.

When AUTO MESSAGE DISPLAY is disabled, there are two ways of reviewing Receive AMD messages:

1. This procedure is used for reviewing unread messages only. Table 2-54 provides the procedure to review unread Receive AMD messages from the standard ALE display screen.
2. This is used to review any stored Receive AMD message. Table 2-55 provides the procedure to review any Receive AMD message.

When AUTO MESSAGE DISPLAY is enabled, the Receive Message automatically scrolls across the display as it is received. To automatically receive and display a received message, the radio may be any of the following:

- Scanning
- Stop scan
- Linked

If an RX message is received while in the LIGHT, CALL, or OPTion key menus, the automatic display and scrolling of the incoming message is inhibited. Only alert tones are heard.

Figure 2-15 shows the typical progression of front panel displays as an RX AMD message is received by the R/T. No action is necessary by the operator.

After a message has been automatically displayed, the unread message indicator increments by one. After the messages have been reviewed, the indicator is no longer displayed on the front panel.

**Table 2-45. Procedure to Execute an Exchange LQA**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select LQA (if necessary).	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  IMMEDIATE LQA EXCHANGE  EXCHANGE is flashing.
4	↑ and ↓	Press and release repeatedly until EXCHANGE is displayed (if necessary).	The R/T displays the following screen:  IMMEDIATE LQA EXCHANGE  EXCHANGE is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  EXCHANGE WITH? AREA33HQ _____  The target address is flashing.

**Table 2-45. Procedure to Execute an Exchange LQA – Continued**

Step	Control	Action	Observe
6	↑ and ↓, or numeric keypad	Press and release repeatedly to enter the address of the station or net with which the LQA is to be exchanged (if different from that displayed).	<p>The R/T displays the following screen:</p> <p>EXCHANGE WITH? AREA33HQ _____</p> <p>The target address is flashing.</p>
7	ENTER	Press and release.	<p>While the LQA is active, the R/T displays the following screen:</p> <p>T06 EXCHANGING: AREA33HQ _____</p> <p>followed by:</p> <p>R06 EXCHANGING: AREA33HQ _____</p> <p>followed by:</p> <p>RESP FROM: AREA33HQ _____</p> <p>The target address is flashing.</p> <p>These three screens repeat until all frequencies have been evaluated.</p> <p>Upon completion of the LQA, the R/T returns to scan mode and displays the following screen:</p> <p>R05 *SCAN* OFF CLR</p>

**Table 2-46. Procedure to Execute a Sound LQA**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select LQA (if necessary).	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  IMMEDIATE LQA EXCHANGE  EXCHANGE is flashing.
4	↑ and ↓	Press and release repeatedly until the desired SOUND is displayed (if necessary).	The R/T displays the following screen:  IMMEDIATE LQA SOUND  SOUND is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  SOUND USING? STATION3 _ _ _ _ _  The target address is flashing.

**Table 2-46. Procedure to Execute a Sound LQA – Continued**

Step	Control	Action	Observe
6	↑ and ↓, or numeric keypad	Press and release repeatedly to enter the address of the station or net with which the LQA is to be exchanged (if different from that displayed).	The R/T displays the following screen:  SOUND USING? STATION4 _ _ _ _ _  The target address is flashing.
7	ENTER	Press and release.	While the LQA is active, the R/T displays the following screen:  T06 SOUNDING: STATION4 _ _ _ _ _  The unit continues until all frequencies have been evaluated.  Upon completion of the LQA, the R/T returns to scan mode and displays the following screen:  R05 *SCAN* OFF CLR

**Table 2-47. Procedure to View LQA Scores**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select SCORES (if necessary).	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  SCORES is flashing.



Table 2-47. Procedure to View LQA Scores – Continued

Step	Control	Action	Observe
3	ENTER	Press and release.	The R/T displays the following screen:  SELECT ADDRESS AREA33HQ _____  The target address is flashing.
4	↑ and ↓, or numeric keypad	Press and release repeatedly until the desired target address is displayed (if different from that displayed).	The R/T displays the following screen:  SELECT ADDRESS AREA33HQ _____  The target address is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  AREA33HQ _____ CHAN: 12      SC: 090
6	↑ and ↓	Press and release repeatedly until the desired channels are displayed.	The R/T displays the following screen:  AREA33HQ _____ CHAN: 12      SC: 090
7	OPT or ENTER	Press and release.	The R/T returns to normal ALE operation and displays the following screen:  R05 *SCAN* OFF CLR

Table 2-48. Procedure to View Radio Time

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select TIME (if necessary).	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  TIME is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  RADIO TIME 11:23:32  The current time is flashing.
4	OPT or ENTER	Press and release.	The R/T returns to normal ALE operation and displays the following screen:  R05 *SCAN* OFF CLR

**Table 2-49. Procedure to Select Transmitter Output Power**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select POWER (if necessary).	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  POWER is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  TX POWER HIGH  The current transmit power level is flashing.
4	↑ and ↓	Press and release repeatedly until the desired power setting is displayed.	The R/T scrolls through the list of available power settings. Acceptable transmit power choices are HIGH, MED and LOW. The R/T displays the following screen:  TX POWER HIGH  The desired transmit power level is flashing.
5	ENTER	Press and release.	The R/T returns to normal ALE operation and displays the following screen:  R05 *SCAN* OFF CLR

**Table 2-50. Procedure to Retune the Antenna Coupler**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select RETUNE (if necessary).	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  RETUNE is flashing.
3	ENTER	Press and release.	The R/T returns to normal ALE operation and displays the following screen:  R05 *SCAN* OFF CLR  The antenna coupler will retune during the next call or LQA.

**Table 2-51. Procedure to Send an EOW\***

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	→	Press and release to select EOW_TO (if necessary).	The R/T displays the following screen:  ← EOW_TO TX_MSG RX_MSG  EOW_TO is flashing.

\* EOWs are sent using a remote terminal after the radio is linked to the destination station. The data preset must be either OFF, AOS, or DV.

Table 2-51. Procedure to Send an EOW – Continued

Step	Control	Action	Observe
3	ENTER	Press and release.	The R/T displays the following screen:  SEND EOW TO? -----  The target address is flashing.
4	↑ and ↓ or numeric keypad	Press and release repeatedly to enter the address of the desired station.	The R/T displays the following screen:  SEND EOW TO? AREA33HQ_-----  The target address is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  ← EOW_TO TX_MSG RX_MSG  EOW_TO is flashing.
6	CTRL plus B on the remote terminal keypad	Press and release the two keys simultaneously.	The remote terminal display shows the following screen:  EOW TO (AREA33HQ)
7	Remote terminal keypad	Press and release repeatedly to compose the EOW message.	The desired EOW message will be displayed on the remote terminal display.
8	CTRL plus C on the remote terminal keypad	Press and release the two keys simultaneously.	The remote terminal indicates that the EOW message is being transmitted. Upon completion of the transmission, the R/T returns to link mode.

**Table 2-52. Procedure to Edit an AMD Message**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select TX_MSG.	The R/T displays the following screen:  ← EOW_TO TX_MSG RX_MSG  TX_MSG is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  TX MESSAGE: SEND EDIT  SEND is flashing.
4	← and →	Press and release repeatedly to select EDIT.	The R/T displays the following screen:  TX MESSAGE: SEND EDIT  EDIT is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  SELECT TX MSG: ... MESSAGE ...→  AMD message to be edited is flashing. New messages are indicated by:  -----  in the MESSAGE area.

**Table 2-52. Procedure to Edit an AMD Message – Continued**

Step	Control	Action	Observe
6	↑ and ↓	Press and release repeatedly until the desired message is displayed.	The R/T scrolls through the list of stored messages and displays the following screen:  SELECT TX MSG: ... MESSAGE ...→  AMD message to be edited is flashing.
7	ENTER	Press and release.	The R/T displays the following screen:  EDIT TX MESSAGE: NOW IS THE TIME→  The first character of the message is flashing.
8	← and →	Press and release repeatedly to access the portion of the existing message to edit.	The R/T displays the following screen:  EDIT TX MESSAGE: ALL GOOD MEN TO→  D is flashing.
	–OR–  Numeric Keypad	Press and release repeatedly to enter a new message.  Refer to Paragraph 2.6.2 for complete procedures for entering alphanumeric characters.	The R/T displays the following screen:  EDIT TX MESSAGE: -----  is flashing.
9	ENTER	Press and release to exit edit mode and save message.	The R/T displays the following screen:  SEND MESSAGE? NO  NO is flashing.

**Table 2-52. Procedure to Edit an AMD Message – Continued**

Step	Control	Action	Observe
10	↑ and ↓	Press and release repeatedly to select NO.	The R/T displays the following screen:  SEND MESSAGE? NO  NO is flashing.
	-OR-		
	↑ and ↓	Press and release repeatedly to select YES.	The R/T displays the following screen:  SEND MESSAGE? YES  YES is flashing.
11	ENTER	Press and release.	If NO is selected at the SEND MESSAGE prompt, the R/T displays the following screen:  TX MESSAGE: SEND EDIT  EDIT is flashing.  If YES is selected at the SEND MESSAGE prompt, the call sequence begins and the R/T displays the appropriate screens.



**Table 2-53. Procedure to Transmit an AMD Message**

Step	Control	Action	Observe
1	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
2	← or →	Press and release to select TX_MSG.	The R/T displays the following screen:  ← EOW_TO TX_MSG RX_MSG  TX_MSG is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  TX MESSAGE: SEND EDIT  SEND is flashing.
4	← and →	Press and release repeatedly to select SEND (if necessary).	The R/T displays the following screen:  TX MESSAGE: SEND EDIT  SEND is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  SELECT TX MSG: ... MESSAGE ...→  AMD message to be sent is flashing.

**Table 2-53. Procedure to Transmit an AMD Message – Continued**

Step	Control	Action	Observe
6	↑ and ↓	Press and release repeatedly until the desired message is displayed.	<p>The R/T scrolls through the list of stored messages and displays the following screen:</p> <p>SELECT TX MSG: ... MESSAGE ...→</p> <p>AMD message to be sent is flashing.</p>
7	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p>SEND: AUTO INDIVIDUAL/NET</p> <p>AUTO is flashing.</p>
8		<p>For complete information and procedures to complete an automatic call, refer to Paragraph 2.5.2.3.</p> <p>For complete information and procedures to complete a manual call, refer to Paragraph 2.5.2.4.</p>	

**Table 2-54. Procedure to Review an Unread Receive AMD Message from the ALE Display**

Step	Control	Action	Observe
1	Function knob	Rotate to ALE position.	The R/T displays the following screen:  R05 *SCAN* OFF CLR M3
2	← and →	Press and release repeatedly until M3 is selected.	The R/T displays the following screen:  R05 *SCAN* OFF CLR M3  M and the number of messages are flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  12/24/92 16:42 FROM: AREA33HQ →
4	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the list of unread messages and displays the following screen:  12/24/92 16:42 FROM: AREA33HQ →
5	← and →	Press and release repeatedly to scroll through the entire AMD message.	The R/T displays the following screen:  ... MESSAGE ... →
6	ENTER	Press and release.	After the last message has been read, the R/T displays the following screen:  ← EOW_TO TX_MSG RX_MSG  RX_MSG is flashing.
7	OPT	Press and release.	The R/T displays the following screen:  R05 *SCAN* OFF CLR

**Table 2-55. Procedure to Review Any Receive AMD Message**

Step	Control	Action	Observe
1	Function knob	Rotate to ALE position.	The R/T displays the following screen:  R05 *SCAN* OFF CLR
2	OPT	Press and release.	The R/T displays the following screen:  LQA SCORES TIME POWER RETUNE →  LQA is flashing.
3	← or →	Press and release to select RX_MSG (if necessary).	The R/T displays the following screen:  ← EOW_TO TX_MSG RX_MSG  TX_MSG is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  RX MESSAGE: REVIEW DELETE  REVIEW is flashing.
5	← and →	Press and release repeatedly to select REVIEW (if necessary).	The R/T displays the following screen:  RX MESSAGE: REVIEW DELETE  REVIEW is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  12/24/92 16:42 FROM: AREA33HQ →

**Table 2-55. Procedure to Review Any Receive AMD Message – Continued**

Step	Control	Action	Observe
7	↑ and ↓	Press and release repeatedly until the desired message is displayed.	The R/T scrolls through the list of stored messages and displays the following screen:  12/24/92                      16:42 FROM: AREA33HQ →
8	← and →	Press and release repeatedly to scroll through entire message.	The R/T displays the following screen:  ... MESSAGE ...
9	OPT	Press and release.	The R/T displays the following screen:  R05 *SCAN* OFF CLR



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Figure 2-15. Typical Front Panel Displays During RX AMD Receipt  
AUTO MESSAGE DISPLAY Enabled

### 2.5.3 Frequency Hopping

For two or more units to communicate in frequency hopping mode, each unit must be programmed with identical net parameters.

In all procedures discussed in the following paragraphs, *Radio 1* refers to any radio in the network, while *Radio 2* refers to any other radio in the network.

#### 2.5.3.1 Front Panel Display Indicators

The front panel display in frequency hopping mode is similar to that of SSB mode (refer to Paragraph 2.5.1.1). The difference between the displays is that the frequency field of the SSB display is replaced with a SYNC message, and the mode and squelch fields are blank.

#### 2.5.3.2 Placing the RF-5200 FALCON™ Series Manpack System Into Frequency Hopping Mode

Table 2-56 provides the procedure for placing the RF-5200 FALCON™ Series Manpack System into frequency hopping mode.

When the system is initially placed in frequency hopping mode, or when the CHANNEL switch is moved to a new position, the front panel will display a NO SYNC message. The unit must perform an initial synchronization before it is able to communicate with other units. Refer to Paragraph 2.5.3.3 for instructions on performing an initial synchronization.

If an antenna coupler is used in the system, it will automatically tune to the center frequency of the net and will be limited to narrow band hopping.

**Table 2-56. Procedure to Place the RF-5200 FALCON™ Series Manpack System Into Frequency Hopping Mode**

Step	Control	Action	Observe
1	Function Switch	Rotate clockwise or counterclockwise to the HOP position.	The R/T displays the following screen:  *INITIALIZING* * * * * WAIT * * * *  followed by:  R05-NO SYNC WAIT . . .

**2.5.3.3 Initial Synchronization**

Initial synchronization is the process by which two or more units are synchronized and form a net. It is also the process by which a unit is synchronized with other units which are part of an existing net, which is referred to as Late Net Entry. Refer to Paragraph 2.5.3.5.

**NOTE**

An Initial Synchronization must be performed at least every eight (8) hours.

Place Radio 1 and Radio 2 in frequency hopping mode as described in Paragraph 2.5.3.2, or rotate the channel switches to a different net. Radio 1 sends a Sync Request as described in Table 2-57. The Sync Request message is then received by all units in hop mode with identical net parameters as Radio 1. When the Sync Request is received by a unit, an audible beep alerts the operator and a message appears on the display. Radio 2 then sends a Sync Response within five seconds as described in Table 2-58.

During the initial synchronization process, any additional units in hop mode with the same net parameters acquire synchronization and enter the net if they receive the Sync Request sent by Radio 1 as well as the Sync Response sent by Radio 2. There are no actions required by the operators of these units, referred to as Passive Units.

**Table 2-57. Procedure to Send a Sync Request – Radio 1**

Step	Control	Action	Observe
1	CALL	Press and release.	Radio 1 sends a Sync Request message and the R/T displays the following screen:  R05-NO SYNC AWAITING SYNC→30



**Table 2-58. Procedure to Perform Initial Synchronization – Radio 2**

Step	Control	Action	Observe
1	None	None	<p>An audible beep is heard, and the R/T displays the following screen:</p> <p>R05-NO SYNC SYNC REQ RCV→02</p>
2	CALL	Press and release within five seconds of the receipt of a Sync Request.	<p>The synchronization process begins and the R/T displays the following screen:</p> <p>T05-NO SYNC RESP TO SYNC→18</p> <p>Approximately 30 seconds are required to complete the synchronization process.</p> <p>If the synchronization process is successful, all R/Ts in the net display the following screen:</p> <p>R05-IN SYNC OFF CLR</p> <p>If the synchronization process fails, Radio 1 displays the following screen:</p> <p>R05-NO SYNC SYNC FAILED</p>

#### 2.5.3.4 Loss of Net Synchronization

If a unit displays an IN SYNC message on its front panel, but communication with other units is failing, the unit may no longer be in synchronization. To reform the Net, the Channel switch must be rotated out of its current position, then returned to the desired net position. The Initial Synchronization process must then be performed. Refer to Paragraph 2.5.3.3.

#### 2.5.3.5 Late Net Entry

When two or more units have acquired synchronization and have formed a net, additional units can enter the net by executing the identical Initial Synchronization sequence. Refer to Paragraph 2.5.3.3.

#### 2.5.3.6 Exiting From, or Dissolving the Net

When a unit is in a net (displaying IN SYNC), there are four ways to exit from the net:

- a. Eight hours after a unit has entered a net, the unit automatically exits from the net. Since different units may enter the net at various times, it is possible for remaining units to remain synchronized. However, these remaining units are not able to communicate with the unit displaying NO SYNC.
- b. Rotate the Channel knob to a different setting.
- c. Rotate the Function knob to a different mode of operation.
- d. Rotate the Function knob to the OFF position, powering down the unit.

#### 2.5.3.7 Sending and Receiving Data Messages

When two or more units have formed a net, data messages are sent using the same method used in SSB operation. When the request to send input to the unit is activated, the transmitter is keyed and accepts data from the data terminal for transmission. At the receive end, the unit automatically determines that the message is a data message and detects the data rate. The receive unit outputs the demodulated data to the data terminal. There are no long preamble or synchronization delays associated with these messages.

Three data presets and DV are selectable in frequency hopping mode. These presets are different from the six available in SSB and ALE modes.

#### 2.5.3.8 Sending and Receiving Voice Messages

When two or more units have formed a net, voice messages can be sent and received if the units are equipped with Linear Predictive Coding (LPC).

At the transmit end, when the microphone keyline or the audio keyline is activated, the unit assumes that a digitized voice message is being sent. The microphone or audio input is digitized and transmitted.

At the receive end, the unit automatically determines that the message is a digitized voice message and demodulates it accordingly. There are no long preamble or synchronization delays associated with these messages.

The transmitted message may be clear digitized voice (select CLR in the encryption field) or encrypted digitized voice (if Digital Encryption is installed) by selecting one of the six programmable keys.

Analog clear voice and AVS modes are not available when frequency hopping.

## 2.6 ADVANCED OPERATION AND PROGRAMMING

### 2.6.1 General

The RT-1694 Receiver-Transmitter is programmed from the front panel or by remote control. This section covers front-panel programming only. Remote programming is discussed in Paragraph 2.8.

#### NOTE

A password protection system prevents unauthorized personnel from selecting or changing programming parameters.

Programming may be done from the front panel keypad. A programming menu appears on the front panel display. If any program items on the menu are locked out by the lockout feature, they will not appear on the display and cannot be selected for change. Program items may also be missing if certain options have not been installed in the R/T. In order to unlock program items, the radio operator needs to know the password programmed into the radio. Selecting the appropriate menu item and entering the correct password allows qualified personnel access to all program items.

When a programming menu is displayed, the ← and → keys, as well as the CLEAR and ENTER keys, are active. In general, the ← and → keys are used to select the program headings and the ENTER key is used to access or view the program parameters. If the operator makes a mistake in the program process, pressing CLEAR returns the previous entry to the display or erases a character when using the alphanumeric keys.

When changing the value of a programming parameter, the ↑ and ↓ keys, as well as CLEAR and ENTER, are active. The alphanumeric keys are also active if they can be used to enter a value for an item.

A selected programming item or its current value is always flashing. At this point, the operator has three choices:

- a. Press CLEAR to return to the previous display (or to erase a character when using alphanumeric keys).
- b. Press ENTER to accept the current value of the item.

#### NOTE

When the ENTER key is pressed at the end of a list of items that program a parameter, the RT-1694 Receiver-Transmitter returns to the top entry of the list or to the main programming menu.

- c. Enter a new value using the ↑ and ↓ keys or the alphanumeric keys to select the value, then press ENTER.

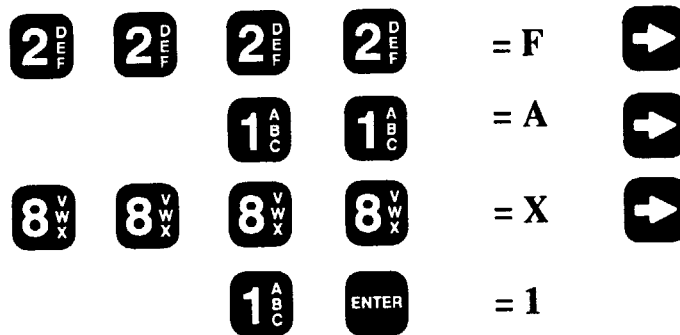
To exit the programming mode at any time, press the PRGM key.

The following paragraphs provide programming instructions for the radio.

### 2.6.2 Entering Alphanumeric Names

Whenever the front-panel operation calls for an alphanumeric name to be used, enter the name by one of two methods:

- Use the ↑ and ↓ keys to scroll through programmed names; press ENTER to enter the data.
- Use the alphanumeric keypad. Each of the number keys (except 0 and 9) has one number and three letters. The 9 key has two letters and a question mark (only used as a wildcard during ALE operation). To enter an alphanumeric name, repeatedly press the appropriate number/letter key until the desired alphanumeric character appears. Each time the key is pressed, the next character shown on the key is displayed. When the desired number or letter appears, press either the → key or the next number/letter to be entered. The → key is required when the next character is on the same key as the current character. This enters the selected letter or number and advances the cursor to the next cursor position. See Figure 2-16 for an example of entering an alphanumeric name.



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Figure 2-16. Example of Entering an Alphanumeric Name (FAX1)

### 2.6.3 SSB Programming

Table 2-59 provides an index to the programming instructions for SSB operation. Figure 2-17 shows how SSB programming relates to the LCD display. Figure 2-18 is a summary of all SSB programming parameters.

**Table 2-59. SSB Programming Index**

Menu Selection	Radio Parameter to Be Programmed	Reference Paragraph
CHAN	Channel configuration parameters	2.6.3.2
FILL	Load encryption keys using a fill gun	2.6.3.3
DATA	Data presets	2.6.3.4
CFIG	General radio configuration	2.6.3.5
KEYS	Encryption keys	2.6.3.6
SECUR	Password operations	2.6.3.7

#### 2.6.3.1 Accessing SSB Programming Menu

Table 2-60 provides the procedure to access the SSB programming menu.

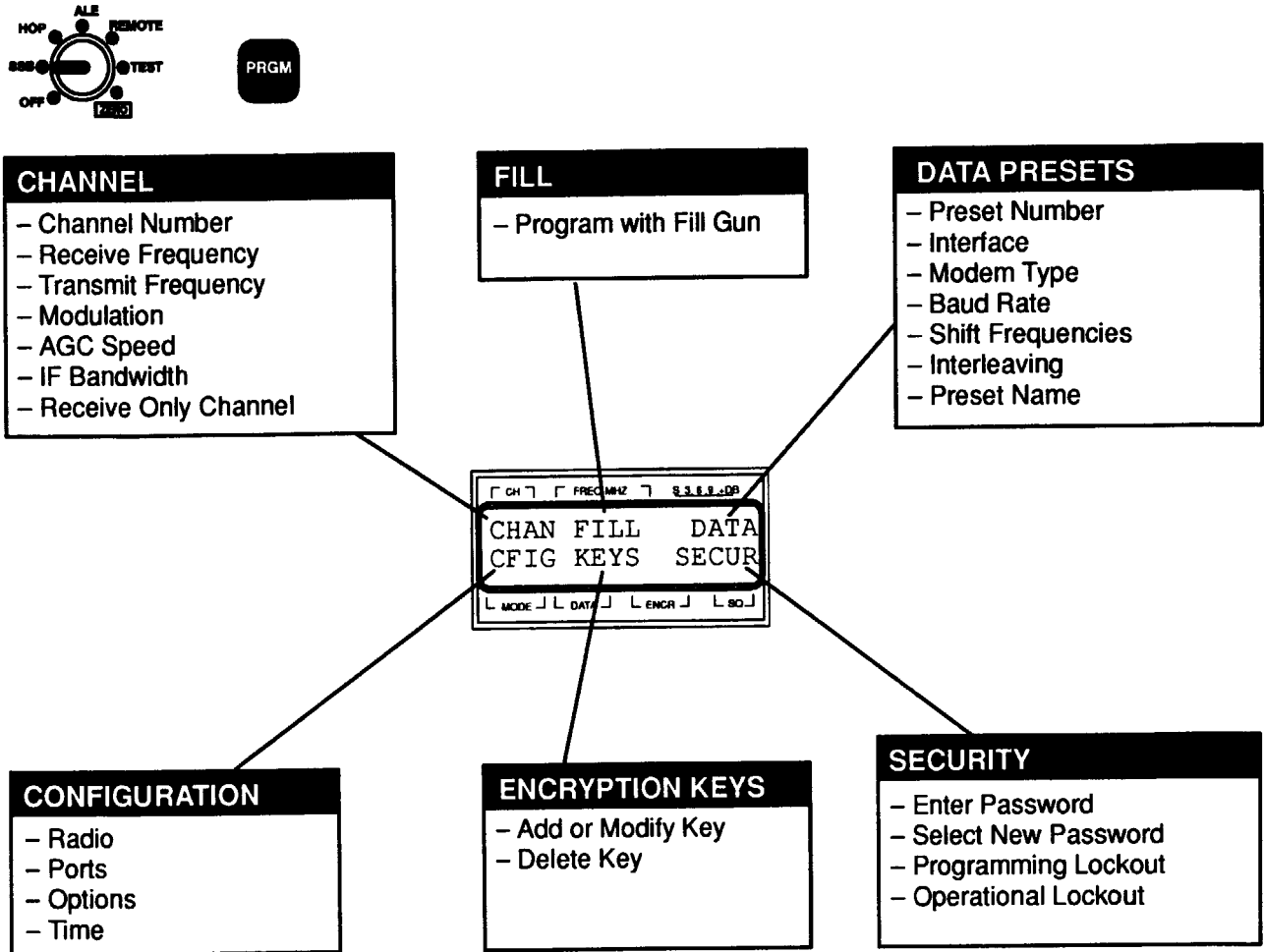
**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-60. Procedure to Access the SSB Programming Menu**

Step	Control	Action	Observe
1	Function Switch	Rotate clockwise or counterclockwise to the SSB position.	The R/T displays the following screen:  R05-04.1600 <u>    </u> USB OFF CLR ON
2	PRGM	Press and release.	The R/T displays the following screen:  CHAN    FILL    DATA CFIG    KEYS    SECUR CHAN is flashing.  If the R/T displays any programming screen other than shown here, refer to Paragraph 2.6.3.7.1 for instructions on entering a password.

NOTE: The keys menu choice will not be displayed if the encryption option is not installed.



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Figure 2-17. SSB Programming Selections

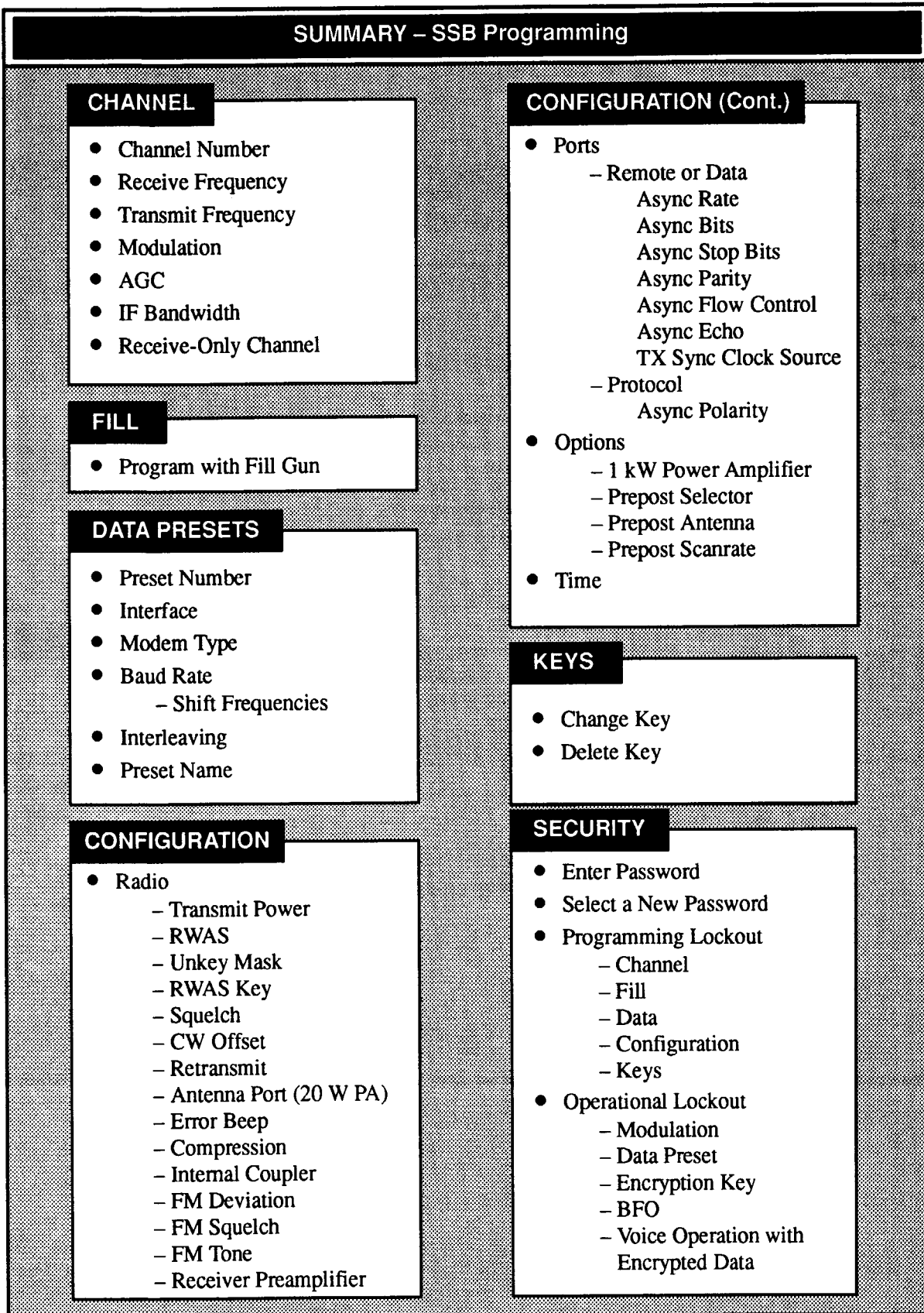


Figure 2-18. SSB Programming Summary

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### 2.6.3.2 Channel Configuration Programming

Channel configuration programming allows the operator to change channel information. A summary of each programmable parameter is provided:

- a. Channel Number – Selects the channel number for which the remaining configuration parameters will be programmed.
- b. Receive Frequency – Programs the receive frequency for the selected channel.
- c. Transmit Frequency – Programs the transmit frequency for the selected channel. If simplex mode is desired, the transmit frequency is the same as the receive frequency.
- d. Modulation – Programs the modulation mode for the selected channel. May select from USB, LSB, AME, and CW.
- e. Automatic Gain Control (AGC) – Programs AGC speed for the selected channel. May select from SLOW or MED (for use with internal modem), MED or FAST (for CW operation or if static present), and DATA (for use with external data modems).
- f. Intermediate Frequency (IF) Bandwidth – Programs the IF bandwidth for the selected channel. Select IF bandwidth for each channel based on the radio mode and option selected. Normal bandwidth settings are 2.7 kHz (USB, LSB), 1.0 kHz (CW), 3.0 kHz (MODEM, AME, DV). When modem, digital voice, or AVS is selected, the 3 kHz bandwidth is automatically set. For voice and CW, select the narrowest IF bandwidth that provides acceptable operational performance. When using external voice or data equipment connected through the DATA connector, consult the equipment manual for proper bandwidth selection.
- g. Receive Only Channel – Programs a channel so that transmissions on the programmed frequency can be received, but prevents the operator from transmitting on that channel.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-61 provides the procedure to access channel configuration parameters.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.



**Table 2-61. Procedure to Access Channel Configuration Parameters**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CHAN (if necessary).	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  CHAN is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  CHANNEL NUMBER TO CHANGE: 06  The channel number is flashing.
3	↑ and ↓, or numeric keypad	Press and release until desired channel number is displayed.	Desired channel number is flashing.
4	ENTER	Press and release.	The R/T displays the following screen for the selected channel:  RX FREQ CH 06 14.5784 MHZ  The receive frequency is flashing.
5	Numeric keypad	Enter in desired frequency in MHz (no decimal point is necessary). Must be in the range of 1.6 MHz to 59.9999 MHz.  If the desired frequency is less than 10 MHz, the frequency must be entered using a leading zero.	The R/T displays the new frequency information as it is typed in.
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen for the selected channel:  TX FREQ CH 06 14.6784 MHZ  The transmit frequency is flashing. The receive frequency is used as the default value.

**Table 2-61. Procedure to Access Channel Configuration Parameters – Continued**

Step	Control	Action	Observe
7	Numeric keypad  None  CLEAR	Enter in desired frequency (if different from receive frequency) in MHz (no decimal point is necessary). Must be in the range of 1.6 MHz to 59.9999 MHz.  If transmit frequency is the same as receive frequency (simplex operation)  Press and release.	The R/T displays the new frequency information as it is typed in.    Resets to original transmit frequency.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  MODULATION CH 06 USB  The modulation mode is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available modulation modes. When the desired mode of modulation is displayed, stop scrolling.
10	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  AGC SPEED CH 06 MED  The AGC speed is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available AGC speeds (SLOW, MED, FAST, and DATA). When the desired AGC speed is displayed, stop scrolling.

**Table 2-61. Procedure to Access Channel Configuration Parameters – Continued**

Step	Control	Action	Observe
12	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  IF BANDWIDTH CH06 2.7 KHZ  The IF bandwidth is flashing.
13	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available IF bandwidths (1.5, 2.0, 2.4, 2.7, 3.0 kHz). When the desired bandwidth is displayed, stop scrolling.
14	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RX ONLY CH06 NO  NO is flashing.
15	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired receive only setting is displayed, stop toggling.
16	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL NUMBER TO CHANGE: 06  The channel number is flashing.
17	↑ and ↓, or numeric keypad	Press and release.	Select a new channel number to program.
18	PRGM	Press and release.	The R/T exits programming mode and displays the standard SSB display.

### **2.6.3.3 Programming the R/T Encryption Keys Using the Fill Gun**

The RT-1694 Receiver-Transmitter can be loaded with encryption data using the RF-5961 Field Code Programmer (also referred to as the fill gun). The fill gun is loaded by an RF-5960 Master Code Programmer. Refer to the RF-5960/RF-5961 Operations Manual for details on these units. When prompted to do so by the R/T, attach the RF-5961 Fill Gun to the AUDIO/FILL connector on the front panel of the RT-1694 Receiver-Transmitter.

#### **NOTE**

If the RF-5961 Field Code Programmer red low battery Light Emitting Diode (LED) lights during loading or filling, the data transfer may be invalid. Replace the internal 9-volt battery as soon as possible to avoid faulty encryption variables. Refer to the RF-5960/RF-5961 Operations Manual for battery replacement procedure.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-62 provides the procedure for programming the R/T using the fill gun.

**Table 2-62. Procedure to Program R/T Using the Fill Gun**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select FILL.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  FILL is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  CONNECT FILL GUN THEN PRESS ENTER  ENTER is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  DESTROY EXISTING KEYS? NO  NO is flashing.
4	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When YES is displayed, stop toggling.
5	ENTER	Press and release.	The R/T is loaded with the encryption keys from the fill gun. Upon completion of the fill, the R/T displays the following screen:  RADIO FILLED
6	ENTER or CLEAR	Press and release.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR

### 2.6.3.4 Programming Data Presets

Data presets configure the internal modem for operation at a specific data rate, with a specific data device. If the modem is not installed, DATA will not appear on the programming display. Seven data presets are available (0-6), and each data preset defines the following five parameters:

- a. **Interface Type** – Programs the R/T for either synchronous or asynchronous operation on either the data port or the remote port. The three available choices are asynchronous remote port (ASYNC RMT PORT), asynchronous data port (ASYNC DATA PORT), and synchronous data port (SYNC DATA PORT). Be sure the RT-1694 Receiver-Transmitter data port parameters agree and are compatible with the data device interface.
- b. **Modem Type** – selects the desired waveform. The following are the available choices:
  1. FSKNS – Center Frequency 2805 Hz  $\pm$  42.5 Hz
  2. FSKWS – Center Frequency 2000 Hz  $\pm$  425 Hz
  3. FSK-A – Center Frequency 2000 Hz  $\pm$  85 Hz
  4. FSK-V – Mark/space frequencies. Default value is 1070 Hz  $\pm$  100 Hz for mark, and 1275 Hz for space. Mark and space range is 350 Hz to 3250 Hz.
  5. 39-Tone – QPSK to 2400 bits per second (bps)
  6. Serial-Tone – MIL-STD-188-110A to 2400 bps
- c. **Baud Rate** – Baud rate is a function of modem type. When the modem is enabled for synchronous data transmission, the over-the-air baud rate command also controls the synchronous port data rate. The following are the available baud rate selections by modem type:
  1. FSKNS: 75
  2. FSKWS: 75, 150, 300
  3. FSKA: 75, 150
  4. FSK-V: 75, 150, 300
  5. 39-Tone: 75, 150, 300, 600, 1200, 2400
  6. Serial-Tone: RX 75; TX 75, 150, 300, 600, 1200, 2400
- d. **Interleaving** – Used only with the 39-tone and serial-tone waveforms to minimize data errors due to fading and burst noise interference. The following are the interleaving selections:
  1. Long: both 39- and serial-tone
  2. Short: both 39- and serial-tone
  3. Zero: serial-tone only
  4. Alternate Long: 39-tone only
  5. Alternate Short: 39-tone only
- e. **Preset Name** – After selecting the values for a data preset, any four-digit alphanumeric name can be chosen. The programmer can select names such as FAX1, PC2, etc. If a preset name is not defined for a data preset, the preset will be called DATx, where x is number 0 through 6.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-63 provides the procedure for programming the data presets.

**Table 2-63. Procedure for Programming Data Presets**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select DATA.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  DATA is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  DATA PRESET TO CHANGE: 4 [DAT4]  The data preset is flashing.
3	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T displays the following screen: data preset to be changed (from 0 to 6).  DATA PRESET TO CHANGE: 4 [DAT4]
4	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  INTERFACE [DAT4] ASYNC DATA PORT  The interface data port is flashing.
5	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the three available choices for interface configuration. When the desired interface configuration is displayed, stop scrolling.
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  MODEM TYPE 39 TONE [DAT4]  The modem waveform type is flashing.

**Table 2-63. Procedure for Programming Data Presets – Continued**

Step	Control	Action	Observe
7	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available choices for modem waveform. When the desired waveform is displayed, stop scrolling.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  MODEM BAUD RATE 2400 [DAT4]  The baud rate is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available choices for baud rate based on the selected modem type. When the desired baud rate is displayed, stop scrolling. If the modem type is not FSK-V, proceed to step 14.
10	ENTER	Press and release.	The R/T accepts the programmed value and, if FSK-V modem type is selected, the R/T displays the following screen:  FSK-V MARK FREQ 1070 HZ [DAT4]  The mark frequency is flashing.  If any other screen is displayed, proceed to step 14.
11	Numeric Keypad	Enter in desired mark frequency. Must be in the range of 350 Hz to 3250 Hz.	The R/T displays the new mark frequency as it is typed in.



**Table 2-63. Procedure for Programming Data Presets – Continued**

Step	Control	Action	Observe
12	ENTER	Press and release.	The R/T accepts the programmed value and, displays the following screen:  FSK-V SPACE FREQ 1200 HZ [DAT4]  The space frequency is flashing.
13	Numeric Keypad	Enter in desired space frequency. Must be in the range of 350 Hz to 3250 Hz.	The R/T displays the new space frequency as it is typed in.
14	ENTER	Press and release.	The R/T accepts the programmed value and, displays the following screen:  INTERLEAVING SHORT [DAT4]  The current interleave selection is flashing.
15	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available choices for interleaving. When the desired interleaving is displayed, stop scrolling.
16	ENTER	Press and release.	The R/T accepts the programmed value and, displays the following screen:  NEW PRESET NAME FAX1 [DAT4]  The preset name is flashing.
17	Alphanumeric Keypad	Enter in desired preset name (if desired). Refer to Paragraph 2.6.2 for detailed instructions.	The R/T displays the following screen:  NEW PRESET NAME FAX1 [DAT4]  The preset name is flashing.

**Table 2-63. Procedure for Programming Data Presets – Continued**

Step	Control	Action	Observe
18	ENTER	Press and release.	The R/T displays the following screen:  ACTIVATE PRESET? YES [FAX1]  YES is flashing.
19	↑ and ↓	Press and release repeatedly until YES is displayed (if necessary).	The R/T toggles between YES and NO, and displays the following screen:  ACTIVATE PRESET? YES [FAX1]  YES is flashing.
20	ENTER	Press and release.	The R/T activates the new preset and displays the following screen:  DATA PRESET TO CHANGE: 4 [FAX1]  The data preset is flashing.
21	CLEAR	Press and release.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  DATA is flashing.

### 2.6.3.5 Programming Configuration Parameters

The Configuration Parameters (CFIG) define radio and data port configuration, determine the options installed in the system, and set the time of day. The following are configuration parameters which may be programmed:

- a. RADIO – Programs radio configuration.
- b. PORTS – Programs port configuration.
- c. OPTIONS – Defines which options are being used.
- d. TIME – Programs the time of day.

The following paragraphs provide information on programming the configuration parameters.

#### NOTE

In order for net operation to perform properly, many of the radio configuration parameters must be programmed identically across the net.

#### 2.6.3.5.1 Programming the Radio Configuration

The following are radio configuration parameters which may be programmed:

- a. Transmit Power – Available transmit power levels are LOW, MED, and HIGH.
- b. Active Squelch – enables or disables the RWAS active squelch feature. Default setting is DISABLE.
- c. Unkey Mask – When unkey mask is enables, the receiving radio will not squelch on end of message transmission signal.
- d. Change RWAS Key – Modifies the two digit numeric RWAS key.
- e. Squelch Level – When squelch is turned on during operation, it goes to the level set during programming. Available squelch levels are LOW, MED, and HIGH.
- f. CW Offset – Selects offset or CW tone from the displayed carrier frequency. Available offset values are 0 Hz and 1000 Hz.
- g. Antenna Port for 20 W Amp – Selects antenna port to be used by a 20 watt power amplifier. The following are choices:
  1. AUTOMatic
  2. TUNE
  3. BNC
- h. Error Beeps – Allows activation or suppression of audio beeps in response to invalid key entries.
- i. Compression – Turns audio compression on or off.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-64 provides the procedure for programming the radio configuration.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-64. Procedure to Program Radio Configuration Parameters**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFG.	The R/T displays the following screen:  CHAN    FILL    DATA CFG    KEYS    SECUR  CFG is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  RADIO            PORTS OPTIONS            TIME  RADIO is flashing.
3	← and →	Press and release repeatedly to select RADIO (if necessary).	The R/T displays the following screen:  RADIO            PORTS OPTIONS            TIME  RADIO is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  TX POWER HIGH  The transmit power level is flashing.
5	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the three available power settings. Available power settings are LOW, MED, and HIGH. When the desired power setting is displayed, stop scrolling.

**Table 2-64. Procedure to Program Radio Configuration Parameters – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RWAS DISABLE  The current RWAS setting is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between ENABLE and DISABLE. When the desired RWAS setting is displayed, stop toggling.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  UNKEY MASK ENABLE  The current unkey mask setting is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T toggles between ENABLE and DISABLE. When the desired UNKEY MASK setting is displayed, stop toggling.
10	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANGE RWAS KEY YES  YES is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When YES is displayed, stop toggling.
12	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RWAS KEY --

**Table 2-64. Procedure to Program Radio Configuration Parameters – Continued**

Step	Control	Action	Observe
13	Numeric Keypad	Press and release repeatedly to enter a new RWAS key.	The R/T accepts the programmed value and displays the following screen:  RWAS KEY -- For Active Squelch compatibility, radios within a network must be set to the same RWAS key.
14	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  SQUELCH LEVEL HIGH  The current squelch level is flashing.
15	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the three available squelch settings. Acceptable squelch levels are HIGH, MED, and LOW. When the desired squelch setting is displayed, stop scrolling.
16	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CW OFFSET 0 HZ  0 HZ is flashing.
17	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T toggles between 0 Hz and 1000 Hz. When the desired offset setting is displayed, stop toggling.
18	ENTER	Press and release.	The R/T displays the following screen:  ANTENNA PORT FOR 20W AMP: AUTO  The current antenna port selection is flashing.

Table 2-64. Procedure to Program Radio Configuration Parameters – Continued

Step	Control	Action	Observe
19	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available antenna port selections. Available selections are AUTO, TUNE, and BNC. When the desired antenna port selection is displayed, stop toggling.
20	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  SILENCE ERROR BEEPS? NO  The current selection is flashing.
21	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired error beep setting is displayed, stop toggling.
22	ENTER	Press and release.	The R/T displays the following screen:  INTERNAL COUPLER ENABLED  The current selection is flashing.
23	↑ and ↓	Press and release repeatedly.	The R/T toggles between ENABLED and BYPASSED. When the desired compression setting is displayed, stop toggling.
24	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  FM DEVIATION 8.0 KHZ  The current selection is flashing.
25	↑ and ↓	Press and release.	The R/T scrolls through the available choices for FM Deviation: 5, 6.5, and 8.0.

**Table 2-64. Procedure to Program Radio Configuration Parameters – Continued**

Step	Control	Action	Observe
26	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  FM SQUELCH TONE  The current selection is flashing.
27	↑ and ↓	Press and release.	The R/T toggles between NOISE and TONE. When the desired error beep setting is displayed, stop toggling.
28	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  FM TRANSMIT TONE: ON  The current selection is flashing.
29	↑ and ↓	Press and release.	The R/T toggles between ON and OFF. When the desired error beep setting is displayed, stop toggling.
30	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RECEIVER PREAMP ENABLED  The current selection is flashing.
31	↑ and ↓	Press and release.	The R/T toggles between ENABLED and BYPASS. When the desired error beep setting is displayed, stop toggling.



**Table 2-64. Procedure to Program Radio Configuration Parameters – Continued**

Step	Control	Action	Observe
32	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RADIO            PORTS OPTIONS        TIME  RADIO is flashing.
33	CLEAR	Press and release.	The R/T displays the following screen:  CHAN   FILL   DATA CFG    KEYS   SECUR  CFG is flashing.

### 2.6.3.5.2 Programming Port Configuration

The remote port, the data port, and port communication protocol may be programmed.

The configuration parameters to be programmed for each port are identical (except where noted). The following are port parameters which may be programmed:

- a. **ASYNC RATE** – The ASYNC RATE defines the baud rate used to communicate with an external data device via the asynchronous data port. The interface baud rate can be different than the over-the-air baud rate, as defined by the MODEM BAUD RATE command. This allows a data terminal or personal computer to be used as both the remote control unit and as a data message device.

#### NOTE

It is recommended that the 2400 bps setting be used for the asynchronous interface. Long remote control cables (beyond 10 meters) limit the maximum speed of operation.

Available asynchronous rate selections in bits per second are 75, 150, 300, 600, 1200, 2400, 4800, and 9600.

- b. **ASYNC BITS** – Defines the number of bits per character. The options are 7 or 8 bits.
- c. **ASYNC STOP BIT** – The stop bits options are 1 or 2.
- d. **ASYNC PARITY** – Available parity settings are ODD, EVEN, and NONE.
- e. **ASYNC FLOW CONTROL (XON/XOFF)** – The flow control commands are DISABLE or ENABLE.
- f. **ASYNC ECHO** – The ASYNC ECHO commands are ON and OFF.
- g. **TX SYNC CLOCK SOURCE (for data port only)** – Defines the source of the synchronous clock signal for the data port only. The selection is INTERNAL or EXTERNAL.

Use **PROTOCOL** to select the asynchronous port signal levels. This defines asynchronous interface type. The selections are RS-232 and MIL-188.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-65 provides the procedure for programming the remote port configuration. Table 2-66 provides the procedure for programming the data port configuration. Table 2-67 provides the procedure to define protocol.

#### NOTE

Sample screen displays are shown for the following procedure. Actual screen displays may vary based on radio programming.

**Table 2-65. Procedure to Program Port Configuration Parameters**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFGI.	The R/T displays the following screen:  CHAN FILL DATA CFG I KEYS SECUR  CFG I is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  RADIO PORTS OPTIONS TIME  RADIO is flashing.
3	← and →	Press and release repeatedly to select PORTS.	The R/T displays the following screen:  RADIO PORTS OPTIONS TIME  PORTS is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  REMOTE DATA PROTOCOL  REMOTE is flashing.
5	ENTER	Press and release.	The R/T displays the following screen:  REM ASYNC RATE 2400  The current rate is flashing.
6	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available rates. Available rates are 75, 150, 300, 600, 1200, 2400, 4800, and 9600. When the desired rate is displayed, stop scrolling.

**Table 2-65. Procedure to Program Port Configuration Parameters – Continued**

Step	Control	Action	Observe
7	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  REM DATA BITS 8  The current number of data bits is flashing.
8	↑ and ↓	Press and release repeatedly.	The R/T toggles between 7 and 8. When the desired data bit value is displayed, stop scrolling.
9	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RMT STOP BITS 1  The current number of stop bits is flashing.
10	↑ and ↓	Press and release repeatedly.	The R/T toggles between 1 and 2. When the desired stop bit value is displayed, stop toggling.
11	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  RMT PARITY NONE  The current parity selection is flashing.
12	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the available parity settings. Available settings are ODD, EVEN, and NONE. When the desired parity setting is displayed, stop scrolling.

**Table 2-65. Procedure to Program Port Configuration Parameters – Continued**

Step	Control	Action	Observe
13	ENTER	Press and release.	<p>The R/T accepts the programmed value and displays the following screen:</p> <p>RMT XON/XOFF DISABLE</p> <p>The current selection is flashing.</p>
14	↑ and ↓	Press and release repeatedly.	<p>The R/T toggles between ENABLE and DISABLE. When the desired control setting is displayed, stop toggling.</p>
15	ENTER	Press and release.	<p>The R/T accepts the programmed value and displays the following screen:</p> <p>RMT ASYNC ECHO ON</p> <p>The current selection is flashing.</p>
16	↑ and ↓	Press and release repeatedly.	<p>The R/T toggles between ON and OFF. When the desired echo setting is displayed, stop toggling.</p>
17	ENTER	Press and release.	<p>The R/T accepts the programmed value and displays the following screen:</p> <p>REMOTE DATA PROTOCOL</p> <p>REMOTE is flashing.</p>

**Table 2-66. Procedure to Program Data Configuration Parameters**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFGI.	The R/T displays the following screen:  CHAN FILL DATA CFGI KEYS SECUR  CFGI is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  RADIO PORTS OPTIONS TIME  RADIO is flashing.
3	← and →	Press and release repeatedly to select PORTS.	The R/T displays the following screen:  RADIO PORTS OPTIONS TIME  PORTS is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  REMOTE DATA PROTOCOL  REMOTE is flashing.
5	← and →	Press and release repeatedly to select DATA.	The R/T displays the following screen:  REMOTE DATA PROTOCOL  DATA is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  DAT ASYNC RATE 2400  The current asynchronous baud rate is flashing.

**Table 2-66. Procedure to Program Data Configuration Parameters – Continued**

Step	Control	Action	Observe
7	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available rates. Available rates are 75, 150, 300, 600, 1200, 2400, 4800, and 9600. When the desired rate is displayed, stop scrolling.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  DAT DATA BITS 8  The current number of asynchronous data bits is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available data bit values. Available values are 5, 6, 7, and 8. When the desired data bit value is displayed, stop scrolling.
10	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  DAT STOP BITS 1  The current number of asynchronous stop bits is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between 1 and 2. When the desired stop bit value is displayed, stop toggling.
12	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  DAT PARITY NONE  The current asynchronous parity setting is flashing.

**Table 2-66. Procedure to Program Data Configuration Parameters – Continued**

Step	Control	Action	Observe
13	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available parity settings. Available choices are ODD, EVEN, and NONE. When the desired parity setting is displayed, stop scrolling.
14	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  DATA XON/XOFF DISABLE  The current selection is flashing.
15	↑ and ↓	Press and release repeatedly.	The R/T toggles between ENABLE and DISABLE. When the desired control setting is displayed, stop toggling.
16	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  DAT ASYNC ECHO ON  The current selection is flashing.
17	↑ and ↓	Press and release repeatedly.	The R/T toggles between ON and OFF. When the desired echo setting is displayed, stop toggling.
18	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  TX DATA CLOCK SOURCE INTERNAL  The current Data Clock Synchronous Source is flashing.



**Table 2-66. Procedure to Program Data Configuration Parameters – Continued**

Step	Control	Action	Observe
19	↑ and ↓	Press and release repeatedly.	The R/T toggles between INTERNAL and EXTERNAL. When the desired echo setting is displayed, stop toggling.
20	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  REMOTE DATA PROTOCOL  DATA is flashing.

**Table 2-67. Procedure to Define Protocol**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFGI.	The R/T displays the following screen:  CHAN FILL DATA CFG I KEYS SECUR  CFG I is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  RADIO PORTS OPTIONS TIME  RADIO is flashing.
3	← and →	Press and release repeatedly to select PORTS.	The R/T displays the following screen:  RADIO PORTS OPTIONS TIME  PORTS is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  REMOTE DATA PROTOCOL  REMOTE is flashing.

**Table 2-67. Procedure to Define Protocol – Continued**

Step	Control	Action	Observe
5	← and →	Press and release repeatedly to select PROTOCOL.	The R/T displays the following screen:  REMOTE DATA PROTOCOL  PROTOCOL is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  ASYNC PORT LEVEL RS-232  The current asynchronous port voltage level is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between MIL-188 and RS-232. When the desired protocol is displayed, stop toggling.
8	ENTER	Press and release.	The R/T displays the following screen:  REMOTE DATA PROTOCOL  PROTOCOL is flashing.
9	CLEAR	Press and release.	The R/T displays the following screen:  RADIO            PORTS OPTIONS        TIME  PORTS is flashing.

### 2.6.3.5.3 Programming Options Configuration

OPTIONS configuration is necessary to determine which options are used with the system.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-68 provides the procedure for options configuration.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-68. Procedure to Define Radio Options Configuration**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFGI.	The R/T displays the following screen:  CHAN    FILL    DATA CFGI    KEYS    SECUR  CFGI is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  RADIO            PORTS OPTIONS           TIME  RADIO is flashing.
3	← and →	Press and release repeatedly to select OPTIONS.	The R/T displays the following screen:  RADIO            PORTS OPTIONS           TIME  OPTIONS is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  RF-3230 1 KW PA INSTALLED    NO  The current selection is flashing.
5	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. Select NO.

**Table 2-68. Procedure to Define Radio Options Configuration – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  PREPOST SELECTOR DISABLE  The current selection is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available choices. Available choices are ENABLE, PRESELECT ONLY, POSTSELECT ONLY, and DISABLE. Select DISABLE.
8	ENTER	Press and release.	The R/T displays the following screen:  PREPOST ANTENNA SINGLE RX/TX  The current selection is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T toggles between SINGLE RX/TX and SEPARATE TX & RX. Select SINGLE RX/TX.
10	ENTER	Press and release.	The R/T displays the following screen:  PREPOST SCANRATE SLOW  The current scanrate is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the available choices. Available choices are SLOW, FAST, and BYPASS/FAST. Select BYPASS/FAST.
12	ENTER	Press and release.	The R/T displays the following screen:  RADIO            PORTS OPTIONS        TIME  OPTIONS is flashing.

### 2.6.3.5.4 Programming System Time

The TIME configuration sets the internal RT-1694 Receiver-Transmitter real-time clock. The clock uses the 24-hour time format (for example, 1:00 p.m. equals 13:00).

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-69 provides the procedure to program system time.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-69. Procedure to Program System Time**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFIG.	The R/T displays the following screen:  CHAN    FILL    DATA CFIG    KEYS    SECUR  CFIG is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  RADIO            PORTS OPTIONS           TIME  RADIO is flashing.
3	← and →	Press and release repeatedly to select TIME.	The R/T determines which options are currently being used, and displays the following screen:  RADIO            PORTS OPTIONS           TIME  TIME is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  TIME            10:13:52 NEW             10:13:52  The new time field is flashing.

**Table 2-69. Procedure to Program System Time – Continued**

Step	Control	Action	Observe
5	Numeric Keypad	Enter desired time.	The R/T displays the following screen:  TIME      10:13:52 NEW        12:05:00  12:05:00 is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  RADIO        PORTS OPTIONS      TIME  TIME is flashing.
7	CLEAR	Press and release.	The R/T displays the following screen:  CHAN    FILL    DATA CFGI    KEYS    SECUR  CFGI is flashing.

### 2.6.3.6 Programming Encryption Keys

The KEYS configuration selection only appears on the display if the RF-5161-01 Performance Option and RF-5170 Security Option are installed in the RT-1694 Receiver-Transmitter.

Up to six encryption key variables may be stored in the transceiver at any given time (KEY 1 through KEY6). An encryption key variable is a 12-digit numeric string. Once an encryption key has been entered into the radio, the key may not be viewed.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-70 provides the procedure to add or modify an encryption key. Table 2-71 provides the procedure to delete an encryption key.

**Table 2-70. Procedure to Add or Modify an Encryption Key**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select KEYS.	The R/T displays the following screen:  CHAN    FILL    DATA CFIG    KEYS    SECUR  KEYS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENCRYPTION KEY TO CHANGE: KEY4  The encryption key to be changed is flashing.
3	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the encryption key names. When the desired encryption key is displayed, stop scrolling.
4	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANGE    DELETE [KEY4]  CHANGE is flashing.
5	← and →	Press and release repeatedly to select CHANGE (if necessary).	The R/T accepts the programmed value and displays the following screen:  CHANGE    DELETE [KEY4]  CHANGE is flashing.

**Table 2-70. Procedure to Add or Modify an Encryption Key – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  ENTER NEW [KEY4] 000005022000  000005022000 is flashing.
7	Numeric Keypad	Enter 1 to 12 digits for a key variable †.	The R/T accepts the programmed value and displays the following screen:  ENTER NEW [KEY4] 000005024000  000005024000 is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  ENCRYPTION KEY TO CHANGE: KEY4  The encryption key which has just been modified is flashing.
9	CLEAR	Press and release.	The R/T displays the following screen:  CHAN    FILL    DATA CFIG    KEYS    SECUR  KEYS is flashing.

† If an error is made during entry, press the CLEAR key to back space the cursor as necessary, and reenter the number(s).



**Table 2-71. Procedure to Delete an Encryption Key**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select KEYS.	The R/T displays the following screen:  CHAN    FILL    DATA CFIG    KEYS    SECUR  KEYS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENCRYPTION KEY TO CHANGE: KEY4  KEY4 is flashing.
3	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the encryption key names. When the desired encryption key is displayed, stop scrolling.
4	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANGE    DELETE [KEY4]  CHANGE is flashing.
5	← and →	Press and release repeatedly to select DELETE.	The R/T accepts the programmed value and displays the following screen:  CHANGE    DELETE [KEY4]  DELETE is flashing.
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  DELETE [KEY4] NO  NO is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When YES is displayed, stop toggling.

**Table 2-71. Procedure to Delete an Encryption Key – Continued**

Step	Control	Action	Observe
8	ENTER	Press and release.	<p>The R/T deletes the selected encryption key and displays the following screen:</p> <p>ENCRYPTION KEY TO CHANGE: KEY4</p> <p>The current key that has just been deleted is flashing.</p>
9	CLEAR	Press and release.	<p>The R/T displays the following screen:</p> <p>CHAN    FILL    DATA CFIG    KEYS    SECUR</p> <p>KEYS is flashing.</p>

### 2.6.3.7 Programming Security

SECUR programming prevents accidental alteration of RT-1694 Receiver-Transmitter operation and program information. It also allows an experienced radio operator to override the lockout feature and access all the radio capabilities. After the radio is zeroized, or before it has been programmed, only the SECUR parameter appears on the display.

Since locked-out items do not appear, they cannot be selected for change. This lockout method is invisible to the operator. In order to alter program items that have been locked out, the radio operator needs to know the password that was programmed into the radio.

#### 2.6.3.7.1 Password Programming

#### NOTE

The default password is found on a card which is included with this manual.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-72 provides the procedure to enter a password. Table 2-73 provides the procedure to select a new password.

**Table 2-72. Procedure to Enter A Password**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR.	The R/T displays the following screen:  CHAN    FILL    DATA CFIG    KEYS    SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER PASSWORD 00000000  00000000 is flashing.
3	Numeric Keypad	Enter password.	The R/T displays the following screen <sup>†</sup> :  ENTER PASSWORD 27660094

<sup>†</sup> Pressing the PRGM key returns the display to the standard SSB screen. This allows an operator who accidentally accesses this menu to return to normal operation.

**Table 2-72. Procedure to Enter A Password – Continued**

Step	Control	Action	Observe
4	ENTER	Press and release.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  PASSWORD is flashing.
5	CLEAR	Press and release.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  SECUR is flashing.

† Pressing the PRGM key returns the display to the standard SSB screen. This allows an operator who accidentally accesses this menu to return to normal operation.

**Table 2-73. Procedure to Select A New Password**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  PASSWORD is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  SET NEW PASSWORD 0000000  00000000 is flashing.

**Table 2-73. Procedure to Select A New Password – Continued**

Step	Control	Action	Observe
4	Numeric Keypad	Enter desired password.	The R/T displays the following screen:  ENTER PASSWORD 27660094  27660094 is flashing.
5	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  27660094 PASSWORD OK? NO  NO is flashing.
6	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
7	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  PASSWORD LOCKOUT OP_LOCK  PASSWORD is flashing.
8	CLEAR	Press and release.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  SECUR is flashing.

**2.6.3.7.2 Lockout Programming**

Programming the lockout prevents programming of any (or all) of the main programming items (CHAN, FILL, DATA, CFGI, and KEYS). If programming is not to be allowed for a menu item, it must be programmed for NO. If programming is to be allowed for a menu item, it must be programmed for YES.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-74 provides the procedure to program lockout.

**Table 2-74. Procedure to Program Lockout**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR.	The R/T displays the following screen:  CHAN FILL DATA CFGI KEYS SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  PASSWORD is flashing.
3	← and →	Press and release repeatedly to select LOCKOUT.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  LOCKOUT is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  "CHAN" PROGRAM ALLOWED ? YES  The current selection is flashing.
5	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.

Table 2-74. Procedure to Program Lockout – Continued

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  "FILL" PROGRAM ALLOWED ? YES  The current selection is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
8	ENTER	Press and release.	The R/T displays the following screen:  "DATA" PROGRAM ALLOWED ? YES  The current selection is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
10	ENTER	Press and release.	The R/T displays the following screen:  "CFIG" PROGRAM ALLOWED ? YES  The current selection is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
12	ENTER	Press and release.	The R/T displays the following screen:  "KEYS" PROGRAM ALLOWED ? YES  The current selection is flashing.

**Table 2-74. Procedure to Program Lockout – Continued**

Step	Control	Action	Observe
13	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
14	ENTER	Press and release.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  LOCKOUT is flashing.

### 2.6.3.7.3 Programming Operational Lockout

Programming operational lockout prevents an operator from selecting or changing an operational function. Each operator-controllable parameter is reviewed.

When YES is selected, an operator may change that parameter. When NO is selected, the item does appear on the front panel display, but is locked out; therefore, it is not available for change. A default selection can be made for the data preset and encryption key.

Access the SSB programming menu per Paragraph 2.6.3.1. Table 2-75 provides the procedure to program operational lockout.

**Table 2-75. Procedure to Program Operational Lockout**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  PASSWORD is flashing.
3	← and →	Press and release repeatedly to select OP_LOCK.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  OP_LOCK is flashing.



**Table 2-75. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
4	ENTER	Press and release.	The R/T displays the following screen:  ALLOW MODULATION CHANGE ? YES  The current selection is flashing.
5	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
6	ENTER	Press and release.	The R/T displays the following screen:  ALLOW DAT PRESET CHANGE ? YES  The current selection is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.  If NO is selected, proceed to step 10.
8	ENTER	Press and release.	The R/T displays the following screen:  DEFAULT DATA PRESET: [DAT4]  The current default data preset is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the data preset names. When the desired default data preset is displayed, stop toggling.

**Table 2-75. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
10	ENTER	Press and release.	The R/T displays the following screen:  ALLOW ENCR KEY CHANGE ? YES  The current selection is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.  If YES is selected, proceed to step 14.
12	ENTER	Press and release.	The R/T displays the following screen:  DEFAULT ENCR KEY: [KEY1]  The current default encryption key is flashing.
13	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the encryption keys. When the desired default encryption key is displayed, stop toggling.
14	ENTER	Press and release.	The R/T displays the following screen:  ALLOW CHANNEL 0 CHANGE ? YES  YES is flashing.
15	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When the desired selection is displayed, stop toggling.
16	ENTER	Press and release.	The R/T displays the following screen:  ALLOW BFO OPERATION ? YES  The current selection is flashing.

**Table 2-75. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
17	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO. When desired selection is displayed, stop toggling.
18	ENTER	Press and release.	The R/T displays the following screen:  VOICE OPER WITH ENCR DATA ? CLR  The current selection is flashing.
19	↑ and ↓	Press and release repeatedly.	The R/T toggles between CLR and AVS. When the desired voice operation mode is displayed, stop toggling.
20	ENTER	Press and release.	The R/T displays the following screen:  PASSWORD LOCKOUT OP_LOCK  LOCKOUT is flashing.
21	CLEAR	Press and release.	The R/T displays the following screen:  CHAN FILL DATA CFIG KEYS SECUR  SECUR is flashing.

**2.6.4 ALE Programming**

The following parameters must be programmed before operation in coordination with the other sites in the net. If the parameters are not coordinated, the system may function, but overall reliability is reduced.

- Channel Groups
- Self Addresses
- Individual Addresses
- Net Addresses
- Maximum Channels Scanned
- Maximum System Tune Time

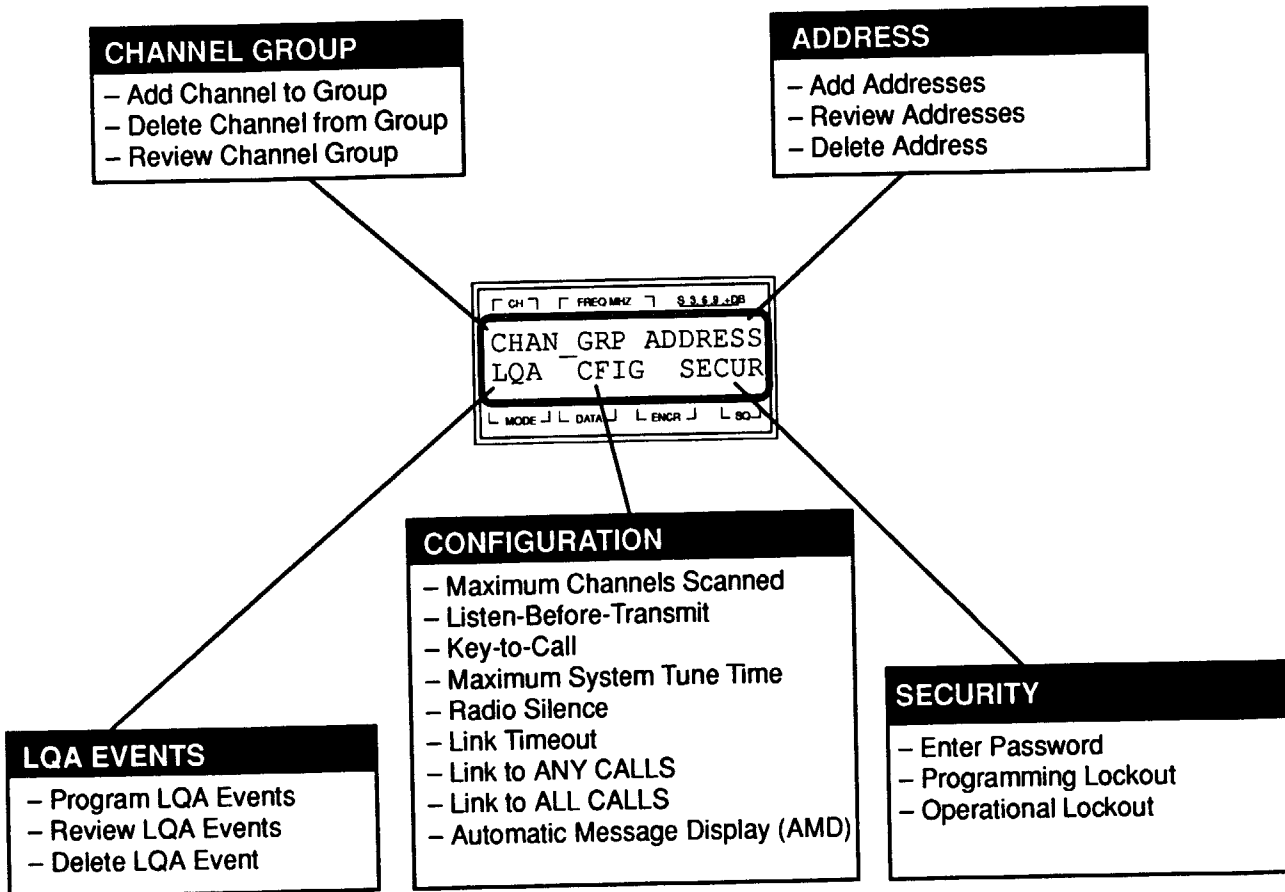
For optimum performance, the following parameters should also be programmed:

- Radio Silence
- Listen Before Transmit
- Key To Call
- Link Timeout

Table 2-76 provides an index to the programming instructions for ALE operation. Figure 2-19 shows how ALE programming relates to the LCD display. Figure 2-20 provides a summary of ALE programming.

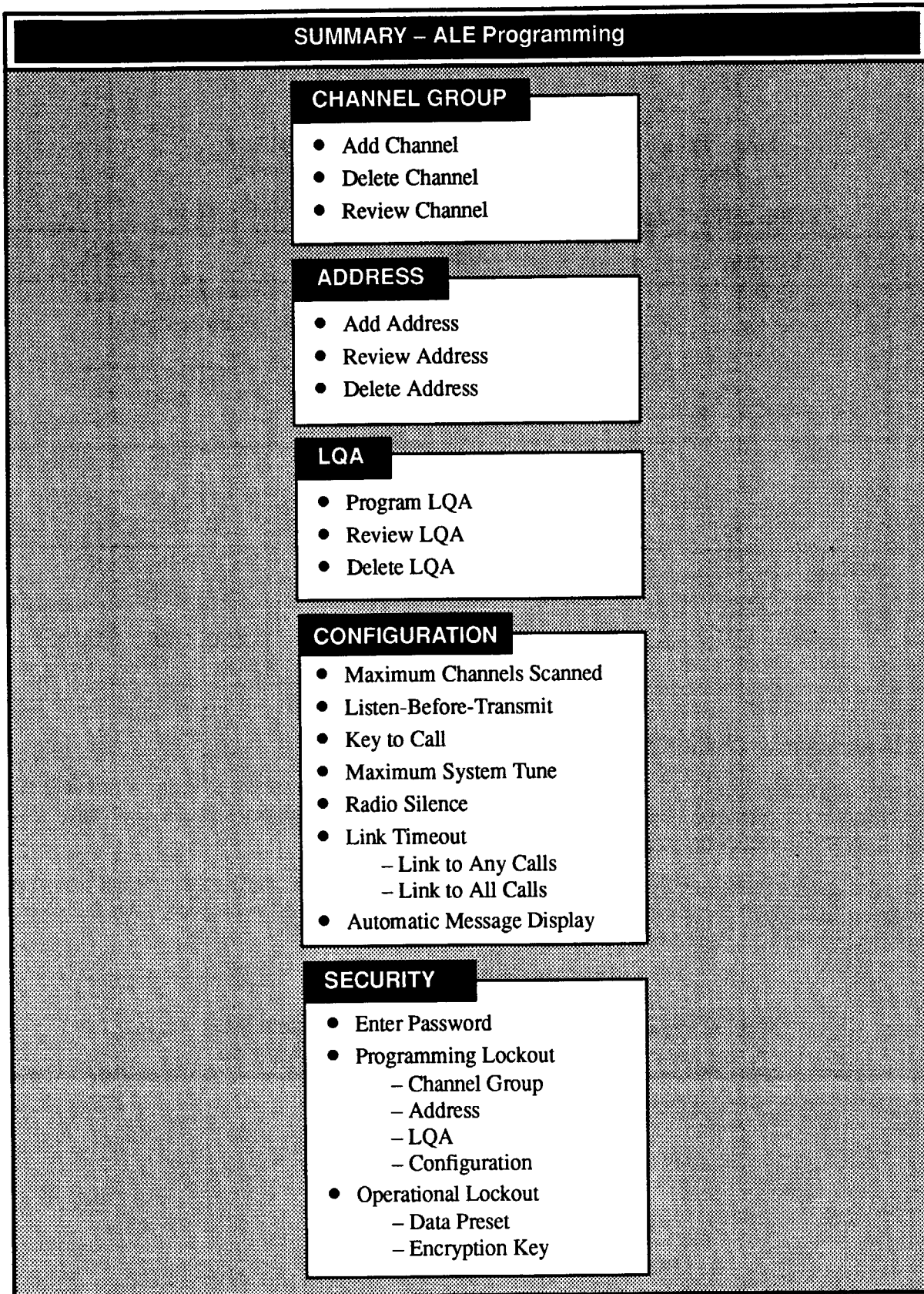
**Table 2-76. SSB/ALE Programming Index**

<b>Menu Selection</b>	<b>Radio Parameter to Be Programmed</b>	<b>Reference Paragraph</b>
CHAN_GRP	Channel Group Parameters	2.6.4.2
ADDRESS	Station Addresses	2.6.4.3
LQA	LQA Frequency	2.6.4.4
CFIG	ALE Parameters	2.6.4.5
SECUR	Security	2.6.4.6



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Figure 2-19. ALE Programming Selections



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Figure 2-20. ALE Programming Summary

**2.6.4.1 Accessing ALE Programming Menu**

Table 2-77 provides the procedure to access the ALE Programming Menu.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-77. Procedure to Access the ALE Programming Menu**

Step	Control	Action	Observe
1	Function Switch	Rotate clockwise or counterclockwise to the ALE position.	The R/T displays the following screen:  * INITIALIZING * * * * * * WAIT * * * * *  followed by:  R10 *SCAN* DAT5 KEY3
2	PRGM	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR

**2.6.4.2 Programming Channel Group**

This parameter allows channels to be assigned to channel groups. This is done by first selecting a channel group. Individual channels can then be added to or deleted from the group. Up to ten channel groups (0 through 9), each containing up to 20 channels, may be programmed.

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-78 provides the procedure to add a channel to a channel group. Table 2-79 provides the procedure to delete a channel from a channel group. Table 2-80 provides the procedure to review a channel group.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-78. Procedure to Add a Channel to a Channel Group**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CHAN_GRP.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER CHANNEL GROUP? 8  The current channel group is flashing.
3	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the available channel groups. When the desired channel group is displayed, stop scrolling.
4	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8: ADD CHANNEL  ADD is flashing.
5	↑ and ↓	Press and release repeatedly to select ADD.	The R/T scrolls through the available selections. Available selections are ADD, REVIEW, and DELETE. When the desired selection is displayed, stop scrolling.
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 ADD CHANNEL? --  -- is flashing.



Table 2-78. Procedure to Add a Channel to a Channel Group – Continued

Step	Control	Action	Observe
7	↑ and ↓, or numeric keypad	Enter desired channel. Channel numbers less than ten should be entered with a leading zero.	The R/T displays the following screen:  CHANNEL GROUP 8: ADD CHANNEL? 45  45 is flashing.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 ADD CHANNEL? --  -- is flashing.  To enter an additional channel, return to step 7.  To exit the menu, proceed to step 10.
9	CLEAR	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8: ADD CHANNEL  ADD is flashing.
10	CLEAR	Press and release.	The R/T displays the following screen:  ENTER CHANNEL GROUP? 8  8 is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.

**Table 2-79. Procedure to Delete a Channel From a Channel Group**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CHAN_GRP.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER CHANNEL GROUP: 8  The current channel group is flashing.
3	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the available channel groups. When the desired channel group is displayed, stop scrolling.
4	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 ADD CHANNEL  ADD is flashing.
5	↑ and ↓	Press and release repeatedly to select DELETE.	The R/T scrolls through ADD, DELETE, and REVIEW. When DELETE is displayed, stop scrolling.
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 DEL CHANNEL: 03  The current selection is flashing.

**Table 2-79. Procedure to Delete a Channel From a Channel Group – Continued**

Step	Control	Action	Observe
7	↑ and ↓, Numeric Keypad	Enter desired channel group.	The R/T displays the following screen:  CHANNEL GROUP 8 DEL CHANNEL: 45  45 is flashing.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 DEL CHANNEL? 04  The channel number to be deleted is flashing.
9	CLEAR	Press and release.	The R/T displays the following screen:  CHANNEL GROUP 0: DELETE CHANNEL  DELETE is flashing.
10	CLEAR	Press and release.	The R/T displays the following screen:  ENTER CHANNEL GROUP: 8  The current channel group is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.

**Table 2-80. Procedure to Review a Channel Group**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CHAN_GRP.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFGI SECUR  CHAN_GRP is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER CHANNEL GROUP: 8  The current channel group is flashing.
3	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T scrolls through the available channel groups. When the desired channel group is displayed, stop scrolling.
4	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 ADD CHANNEL  ADD is flashing.
5	↑ and ↓	Press and release repeatedly to select REVIEW.	The R/T scrolls through ADD, DELETE, and REVIEW. When REVIEW is displayed, stop scrolling.
6	ENTER	Press and release.	The R/T accepts the programmed value and displays the following screen:  CHANNEL GROUP 8 CHANNEL LIST: 00

**Table 2-80. Procedure to Review a Channel Group – Continued**

Step	Control	Action	Observe
7	↑ and ↓,	Press and release repeatedly.	The R/T scrolls through the channel list.
8	CLEAR	Press and release.	The R/T displays the following screen:  CHANNEL GROUP 8 REVIEW CHANNEL
9	CLEAR	Press and release.	The R/T displays the following screen:  ENTER CHANNEL GROUP: 8
10	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.

### 2.6.4.3 Programming Addresses

Address parameters allow the user to add, review, or delete self, individual, and net addresses. ALE allows up to 20 self addresses, 200 individual addresses, and 20 net addresses. Table 2-81 provides the procedure to add a self address. Table 2-82 provides the procedure to add an individual address. Table 2-83 provides the procedure to add a net address.

**NOTE**

A default self address of one to three characters must be programmed before ALE can operate.

#### 2.6.4.3.1 Add a Self Address

The self address consists of the name of the address and channel group. Up to 20 self addresses can be programmed into the radio.

Access the ALE programming menu per Paragraph 2.6.4.1.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-81. Procedure to Add a Self Address**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  ADDRESS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
3	← and →	Press and release repeatedly to select ADD (if necessary).	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  SELF INDIVIDUAL NET  SELF is flashing.

Table 2-81. Procedure to Add a Self Address – Continued

Step	Control	Action	Observe
5	← and →	Press and release repeatedly to select SELF (if necessary).	The R/T displays the following screen:  SELF INDIVIDUAL NET  SELF is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  SELF ADDRESS? -----  ----- is flashing.  When displaying an ALE address, any unused character positions will be filled in with an underscore.
7	Numeric Keypad	Enter desired address.	The R/T displays the following screen:  SELF ADDRESS? SELF1_____  The current selection is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  SELF1_____ CHANNEL GROUP?  The current selection is flashing.

**Table 2-81. Procedure to Add a Self Address – Continued**

Step	Control	Action	Observe
9	↑ and ↓, or numeric keypad	Enter desired channel group. If a mistake is made during address programming, the address must be deleted, then re-entered.	The R/T displays the following screen:  SELF1 _ _ _ _ CHANNEL GROUP? 9  9 is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  SELF INDIVIDUAL NET  SELF is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE
12	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR



2.6.4.3.2 Add an Individual Address

The INDIVIDUAL display prompts entry of up to 200 individual addresses (limited to 15 alphanumeric characters). An individual address consists of the name of the station address, a channel group, and a previously programmed self address called the associated self.

Access the ALE programming menu per Paragraph 2.6.4.1.

Table 2-82. Procedure to Program an Individual Address

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  SELF INDIVIDUAL NET  SELF is flashing.
3	← and →	Press and release repeatedly to select INDIVIDUAL.	The R/T displays the following screen:  SELF INDIVIDUAL NET  INDIVIDUAL is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  INDIVIDUAL ADDR? -----  ----- is flashing.
5	Numeric Keypad	Enter desired address.	The R/T displays the following screen:  INDIVIDUAL ADDR? BASE ____  The new address (BASE) is flashing.

**Table 2-82. Procedure to Program an Individual Address – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  BASE _ _ _ _ CHANNEL GROUP? -  - is flashing.
7	↑ and ↓, or numeric keypad	Enter desired channel group.	The R/T displays the following screen:  BASE _ _ _ _ _ _ _ _ CHANNEL GROUP? 9  The desired channel group is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  ASSOCIATED SELF? -----  ----- is flashing.
9	↑ and ↓, or numeric keypad	Enter desired associated self address.	The R/T displays the following screen:  ASSOCIATED SELF? SELF2 _ _ _ _ _ _ _ _  The desired associated self address is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  SELF INDIVIDUAL NET  INDIVIDUAL is flashing.

**2.6.4.3.3 Add a Net Address**

The NET display allows entry of up to 20 NET addresses (limited to 15 alphanumeric characters) that consist of the name of the text address, a previously programmed self address called the associated self, and a list of up to 30 net members.

Net members are previously programmed addresses. The addresses can be self or individual addresses; however, the only self address that can be a member of a net must be the associated self address of the net.

Access the ALE programming menu per Paragraph 2.6.4.1.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-83. Procedure to Add a Net Address**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS (if necessary).	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  ADDRESS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
3	← and →	Press and release repeatedly to select ADD (if necessary).	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  SELF INDIVIDUAL NET  SELF is flashing.

Table 2-83. Procedure to Add a Net Address – Continued

Step	Control	Action	Observe
5	← and →	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  SELF INDIVIDUAL NET  NET is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  NET ADDRESS? -----  The row of underscores is flashing. When displaying an ALE address, any unused character positions will be filled in with an underscore.
7	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T displays the following screen:  NET ADDRESS? NET1 -----  The desired net address is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  NET1----- CHANNEL GROUP? -  The current channel group is flashing.
9	↑ and ↓, or numeric keypad	Press and release repeatedly.	The R/T displays the following screen:  NET1----- CHANNEL GROUP? 5  The current channel group is flashing.

**Table 2-83. Procedure to Add a Net Address – Continued**

Step	Control	Action	Observe
10	ENTER	Press and release.	The R/T displays the following screen:  ASSOCIATED SELF? -----  The current associated self address is flashing.
11	↑ and ↓, or numeric keypad	Press and release repeatedly.  Use an existing self address as programmed in Paragraph 2.6.4.3.1.	The R/T displays the following screen:  ASSOCIATED SELF? SELF3  The desired associated self address is displayed.
12	ENTER	Press and release.	The R/T displays the following screen:  ADD MEMBER 01 -----  The row of underscores is flashing.

**Table 2-83. Procedure to Add a Net Address – Continued**

Step	Control	Action	Observe
13	↑ and ↓, or numeric keypad	<p>Press and release repeatedly.</p> <p>Use an existing individual address or self address as programmed in Paragraph 2.6.4.3.2.</p> <p>Net member order must be the same for all stations in a net; i.e. the same number of members must be programmed into each R/T in exactly the same order and with the same number of characters in each net member station address (call sign). The associated self address is also a member of the net. Failure to maintain this order among net members results in net call linking failures.</p>	<p>The R/T displays the following screen:</p> <pre>ADD MEMBER  01 TAC1_-----</pre> <p>The desired selection is flashing.</p>
14	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <pre>SELF  INDIVIDUAL NET</pre> <p>NET is flashing.</p>

**2.6.4.3.4 Reviewing a Self Address**

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-84 provides the procedure to review a self address.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-84. Procedure to Review a Self Address**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  ADDRESS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
3	← and →	Press and release repeatedly to select REVIEW.	The R/T displays the following screen:  ADD REVIEW DELETE  REVIEW is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  REVIEW ADDRESS TYPE? SELF  SELF is flashing.

**Table 2-84. Procedure to Review a Self Address – Continued**

Step	Control	Action	Observe
5	↑ and ↓	Press and release repeatedly until SELF is displayed (if necessary).	The R/T scrolls through the list of address types. Available choices are SELF, INDIVIDUAL, and NET.
6	ENTER	Press and release.	The R/T displays the following screen:  SELF ADDRESS? -----  The row of underscores is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the list of programmed self addresses, and displays the following screen:  SELF ADDRESS? SELF1 -----  A self address is flashing.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the programmed channel group for the self address entered.  SELF1 ----- CHANNEL GROUP: 7  The current channel group is flashing.
9	ENTER	Press and release.	The R/T returns to the following screen:  REVIEW ADDRESS TYPE? SELF  SELF is flashing.



**Table 2-84. Procedure to Review a Self Address – Continued**

Step	Control	Action	Observe
10	CLEAR	Press and release.	The R/T displays the following screen:  ADD      REVIEW DELETE  REVIEW is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP    ADDRESS LQA      CFG    SECUR  ADDRESS is flashing.

**2.6.4.3.5 Reviewing an Individual Address**

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-85 provides the procedure to review an individual address.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-85. Procedure to Review an Individual Address**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  ADDRESS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
3	← and →	Press and release repeatedly to select REVIEW.	The R/T displays the following screen:  ADD REVIEW DELETE  REVIEW is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  REVIEW ADDRESS TYPE? SELF  SELF is flashing.
5	↑ and ↓	Press and release repeatedly until INDIVIDUAL is displayed (if necessary).	The R/T scrolls through the list of address types. Available address types are SELF, INDIVIDUAL, and NET.

Table 2-85. Procedure to Review an Individual Address – Continued

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  INDIVIDUAL ADDRESS? -----  The row of underscores is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the list of individual addresses, and displays the following screen:  INDIVIDUAL ADDRESS? 1136 -----  An individual address is flashing.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the programmed channel group for the individual address entered.  1136 ----- CHANNEL GROUP: 7  The current channel group is flashing.
9	ENTER	Press and release.	The R/T displays the associated self address for the individual address just entered.  ASSOCIATED SELF: SELF1 -----  The current associated self address is flashing.

**Table 2-85. Procedure to Review an Individual Address – Continued**

Step	Control	Action	Observe
10	ENTER	Press and release.	The R/T returns to the following screen:  REVIEW ADDRESS TYPE? INDIVIDUAL  INDIVIDUAL is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  ADD      REVIEW DELETE  REVIEW is flashing.
12	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP    ADDRESS LQA      CFG    SECUR  ADDRESS is flashing.

**2.6.4.3.6 Reviewing a Net Address**

The NET display flashes to prompt viewing of NET addresses. The net address consists of the name of the address, a channel group, a previously programmed self address called the associated self, and a list of up to 30 net members.

Net member order must be the same for all stations in a net. That is, the same number of members must be programmed into each R/T in exactly the same order and with the same number of characters in each net member station address (call sign). Failure to maintain this order among net members results in net call linking failures.

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-86 provides the procedure to review a net address.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-86. Procedure to Review a Net Address**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  ADDRESS is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE  ADD is flashing.
3	← and →	Press and release repeatedly to select REVIEW.	The R/T displays the following screen:  ADD REVIEW DELETE  REVIEW is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  REVIEW ADDRESS TYPE? SELF  SELF is flashing.
5	↑ and ↓	Press and release repeatedly until NET is displayed (if necessary).	The R/T scrolls through the list of address types. Available choices are SELF, INDIVIDUAL, and NET.

Table 2-86. Procedure to Review a Net Address – Continued

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  NET ADDRESS? -----  The row of underscores is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the list of net addresses, and displays the following screen:  NET ADDRESS? 1746 -----  A net address is flashing.
8	ENTER	Press and release.	The R/T accepts the programmed value and displays the programmed channel group for the net address entered.  1746 ----- CHANNEL GROUP: 7  The current channel group is flashing.
9	ENTER	Press and release.	The R/T displays the associated self address for the net address just entered.  ASSOCIATED SELF: SELF1 -----  SELF1 is flashing.
10	ENTER	Press and release.	The R/T displays the net members, displaying the following screen:  NET MEMBER 01 UNIT1 -----  UNIT1 is flashing.

**Table 2-86. Procedure to Review a Net Address – Continued**

Step	Control	Action	Observe
11	↑ and ↓	Press and release repeatedly.	<p>The R/T scrolls through the list of net members, displaying the following screen:</p> <pre>NET MEMBER    01 UNIT1  _____</pre> <p>An individual or self address is flashing.</p>
12	ENTER	Press and release.	<p>The R/T returns to the following screen:</p> <pre>REVIEW ADDRESS TYPE?          NET</pre> <p>NET is flashing.</p>
13	CLEAR	Press and release.	<p>The R/T returns to the following screen:</p> <pre>ADD          REVIEW DELETE</pre> <p>REVIEW is flashing.</p>
14	CLEAR	Press and release.	<p>The R/T displays the following screen:</p> <pre>CHAN_GRP  ADDRESS LQA      CFG  SECUR</pre> <p>ADDRESS is flashing.</p>

**2.6.4.3.7 Deleting an Address**

Exercise caution when removing addresses. At least one self address (one to three characters) and one individual address must be programmed for ALE operation.

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-87 provides the procedure to delete an address.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-87. Procedure to Delete An Address**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select ADDRESS.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CHAN_GRP is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD REVIEW DELETE  SELF is flashing.
3	← and →	Press and release repeatedly to select DELETE.	The R/T displays the following screen:  ADD REVIEW DELETE  DELETE is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  DELETE ADDRESS? -----  The row of underscores is flashing.
5	↑ and ↓, or numeric keypad	Enter desired address if different from that displayed.	The R/T displays the following screen:  DELETE ADDRESS? 1136 -----  1136 is flashing.



**Table 2-87. Procedure to Delete An Address – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T deletes the desired address and displays the following screen:  ADD      REVIEW DELETE  DELETE is flashing.
7	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP    ADDRESS LQA      CFG    SECUR  ADDRESS is flashing.

#### 2.6.4.4 Programming LQA Events

When programming LQA events, an event may be PROGRAMmed, REVIEWed, or DELETED. Two types of LQAs are available:

- a. **EXCHANGE** – An exchange LQA is one where there is two-way communication between the radio executing and the radio receiving the LQA. After the receiving radio gets information about the sending radio's signal, the receiving radio keys so that the initiating radio can get signal information about the receiving radio. Only net and individual addresses are used in exchange LQAs. The following are parameters which may be programmed for an Exchange LQA:
  1. **Repeat Interval** – Enter the repeat interval in 24-hour format. Enter 00:00 to send the LQA only once or press ENTER without entering an interval time.
  2. **Start Time** – Enter the start time in 24-hour format. Press ENTER without changing current time to execute the LQA immediately. Current time is displayed in brackets.

After leaving program operation, Timed LQA (TLQA) displays in the upper right corner of the operation screen while scanning if an LQA is programmed to execute later.

- b. **SOUND** – A sound LQA is a one-way transmission. The radio executing the sound sends out its signal for all other radios to gather score information about how well they are receiving the signal. The receiving radios do not return any information. Only self-addresses are used during sound LQAs. The following are parameters which may be programmed for a sound LQA:
  1. **Repeat Interval** – Enter the repeat interval in 24-hour format. Enter 00:00 to send the LQA only once or press ENTER without entering an interval time.
  2. **Start Time** – Enter the start time in 24-hour format. Press ENTER without changing current time to execute the LQA immediately. Current time is displayed in brackets.

##### 2.6.4.4.1 Programming Exchange LQA Events

Table 2-88 provides instructions for programming Exchange LQA events.

Access the ALE programming menu per Paragraph 2.6.4.1.

#### **NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-88. Procedure to Program an Exchange LQA**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select LQA.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  LQA is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
3	← and →	Press and release repeatedly to select PROGRAM (if necessary).	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  LQA TYPE? EXCHANGE SOUND  EXCHANGE is flashing.
5	← and →	Press and release repeatedly to select EXCHANGE (if necessary).	The R/T displays the following screen:  LQA TYPE? EXCHANGE SOUND  EXCHANGE is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  EXCHANGE WITH? -----  The row of underscores is flashing.

**Table 2-88. Procedure to Program an Exchange LQA – Continued**

Step	Control	Action	Observe
7	↑ and ↓, or numeric keypad	Enter desired address if different from that displayed.	The R/T displays the following screen:  EXCHANGE WITH? 1NET1 -----  1NET1 is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  EXCHANGE REPEAT INTERVAL? --:--  --:-- is flashing.
9	Numeric Keypad	Press and release repeatedly.	The R/T displays the following screen:  EXCHANGE REPEAT INTERVAL? 02:00  The desired exchange repeat interval is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  EXCHANGE START TIME? 07:19  The current radio time is flashing.
11	Numeric Keypad	Press and release repeatedly.	The R/T displays the following screen:  EXCHANGE START TIME? 12:30  The desired exchange start time is flashing.

**Table 2-88. Procedure to Program an Exchange LQA – Continued**

Step	Control	Action	Observe
12	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
13	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  LQA is flashing.

**2.6.4.4.2 Programming Sound LQA Events**

Table 2-89 provides instructions for programming Sound LQA events.

Access the ALE programming menu per Paragraph 2.6.4.1.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-89. Procedure to Program a Sound LQA Event**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select LQA.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  LQA is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
3	← and →	Press and release repeatedly to select PROGRAM (if necessary).	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  LQA TYPE? EXCHANGE SOUND  EXCHANGE is flashing.
5	← and →	Press and release repeatedly to select SOUND (if necessary).	The R/T displays the following screen:  LQA TYPE? EXCHANGE SOUND  SOUND is flashing.

**Table 2-89. Procedure to Program a Sound LQA Event – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  SOUND USING? ----- The row of underscores is flashing.
7	↑ and ↓, or numeric keypad	Enter desired self address if different from that displayed.	The R/T displays the following screen:  SOUND USING? SELF1 ----- The desired self address is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  SOUND REPEAT INTERVAL? --:--  --:-- is flashing.
9	Numeric Keypad	Press and release repeatedly.	The R/T displays the following screen:  SOUND REPEAT INTERVAL? 01:30 The desired repeat interval time is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  SOUND START TIME? 07:19 The current radio time is flashing.

**Table 2-89. Procedure to Program a Sound LQA Event – Continued**

Step	Control	Action	Observe
11	Numeric Keypad	Press and release repeatedly.	The R/T displays the following screen:  SOUND      START TIME?          12:30  The desired start time is flashing.
12	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM   REVIEW DELETE  PROGRAM is flashing.
13	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP   ADDRESS LQA      CFG    SECUR  LQA is flashing.



### 2.6.4.4.3 Reviewing LQA Events

Table 2-90 provides instructions for reviewing LQA events.

Access the ALE programming menu per Paragraph 2.6.4.1.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-90. Procedure to Review LQA Events**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select LQA.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  LQA is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
3	← and →	Press and release repeatedly to select REVIEW (if necessary).	The R/T displays the following screen:  PROGRAM REVIEW DELETE  REVIEW is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  VIEW LQA? -----  The row of underscores is flashing.

**Table 2-90. Procedure to Review LQA Events – Continued**

Step	Control	Action	Observe
5	↑ and ↓, or numeric keypad	Enter desired address if different from that displayed.	The R/T displays the following screen:  VIEW LQA? 1136 _____  The desired target address is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  EXCHANGE REPEAT INTERVAL: 01:30  The exchange or sound repeat interval is flashing.
7	ENTER	Press and release.	The R/T displays the following screen:  EXCHANGE START TIME: 20:00  The scheduled start time for the next LQA event is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
9	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  LQA is flashing.

**2.6.4.4.4 Deleting an LQA Event**

Table 2-91 provides the procedure to delete an LQA Event.

Access the ALE programming menu per Paragraph 2.6.4.1.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-91. Procedure to Delete An LQA Event**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select LQA.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  LQA is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  PROGRAM REVIEW DELETE  PROGRAM is flashing.
3	← and →	Press and release repeatedly to select DELETE (if necessary).	The R/T displays the following screen:  PROGRAM REVIEW DELETE  DELETE is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  DELETE LQA? -----  The row of underscores is flashing.

**Table 2-91. Procedure to Delete An LQA Event – Continued**

Step	Control	Action	Observe
5	↑ and ↓, or numeric keypad	Enter desired address if different from that displayed.	<p>The R/T displays the following screen:</p> <p style="text-align: center;">DELETE LQA? 1121 _ _ _ _ _</p> <p>The target address whose LQA is to be deleted is flashing.</p>
6	ENTER	Press and release.	<p>The R/T displays the following screen:</p> <p style="text-align: center;">PROGRAM REVIEW DELETE</p> <p>DELETE is flashing.</p>
7	CLEAR	Press and release.	<p>The R/T displays the following screen:</p> <p style="text-align: center;">CHAN_GRP ADDRESS LQA CFG SECUR</p> <p>LQA is flashing.</p>

### 2.6.4.5 Programming Configuration

Configuration parameters consist of the following:

- a. **Maximum Channels To Scan** – The MAX CHANNELS TO SCAN feature tells the calling station how long to call so that the receiving stations have a chance to complete a scan cycle and still receive the signal. The larger the number of channels scanned, the longer it takes to perform calls and LQAs. Setting the number smaller than the number of channels scanned by the target stations decreases the probability of linking with called stations. From 1 to 100 channels can be scanned.
- b. **Listen-Before-Transmit** – This feature listens for ALE signals on a channel before using that channel for an LQA or call. If ALE signals are on the channel, the radio advances to the next best channel and listens again, continuing until it finds a channel where no ALE signals are present.
- c. **Key to Call** – KEY TO CALL allows a call to be made by keying the microphone. In key-to-call operation, the R/T repeats a call to the last address called. Key-to-call operation is available only when the radio is scanning.
- d. **Maximum System Tune Time** – The MAX SYSTEM TUNE TIME feature sets the length of time the calling station waits for the target station to tune its antenna coupler, power amplifier, radio, and other tunable items, and respond to the call. The allowable range is from 01 to 60 seconds.
- e. **Radio Silence** – RADIO SILENCE prevents ALE from transmitting in response to an incoming call or LQA request. Automatic LQA initiation is also inhibited. Radio silence avoids unnecessary interference or detection.
- f. **Link Timeout** – LINK TIMEOUT is a feature that does either of the following:
  - Returns the R/T from the linked mode to scan if it has not been keyed or has not received ALE signals for a period of time (from 1 to 60 minutes).
  - Allows the R/T to remain linked indefinitely.
- g. **Link to ANY CALLS** – LINK TO ANY CALLS enables or disables the R/T from responding to ANY CALLS. If NO is selected, the R/T does not respond to an ANY CALL.
- h. **Link to ALL CALLS** – LINK TO ALL CALLS enables or disables the R/T from responding to ALL CALLS. If NO is selected, the R/T does not stop scanning to respond to an ALL CALL.
- i. **Automatic Message Display** – Allows the operator to send and receive AMDs.

Table 2-92 provides the procedure to program ALE configuration.

Access the ALE programming menu per Paragraph 2.6.4.1.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-92. Procedure to Program ALE Configuration**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select CFGI.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFGI SECUR  CFGI is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  MAX CHANNELS TO SCAN? 012  The current value is flashing.
3	↑ and ↓, or numeric keypad	Enter desired maximum number of channels if different from that displayed.	The R/T displays the following screen:  MAX CHANNELS TO SCAN? 025  The desired maximum number of channels to scan is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  LISTEN BEFORE TRANSMIT: ON  The current setting is flashing.
5	↑ and ↓	Press and release repeatedly.	The R/T toggles between ON and OFF and displays the following screen:  LISTEN BEFORE TRANSMIT: ON  The desired setting is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  KEY TO CALL OFF  The current setting is flashing.

**Table 2-92. Procedure to Program ALE Configuration – Continued**

Step	Control	Action	Observe
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between ON and OFF and displays the following screen:  KEY TO CALL OFF  The desired setting is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  MAX SYSTEM TUNE TIME: 3 SECONDS  The current maximum tune time of the target station is flashing.
9	↑ and ↓, or numeric keypad	Enter desired maximum tune time for the target station if different from that displayed.	The R/T displays the following screen:  MAX SYSTEM TUNE TIME: 3 SECONDS  The desired maximum tune time of the target station is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  RADIO SILENCE OFF  The current setting is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between OFF and ON and displays the following screen:  RADIO SILENCE OFF  The current setting is flashing.

**Table 2-92. Procedure to Program ALE Configuration – Continued**

Step	Control	Action	Observe
12	ENTER	Press and release.	The R/T displays the following screen:  LINK TIMEOUT OFF  The current setting is flashing.
13	↑ and ↓	Press and release repeatedly.	The R/T toggles between ON and OFF, and displays the following screen:  LINK TIMEOUT OFF  The desired setting is flashing. If OFF is selected, skip to step 16.
14	ENTER	Press and release.	The R/T displays the following screen:  LINK TIMEOUT 05 MINUTES  The current link timeout time is flashing.
15	↑ and ↓, or numeric keypad	Enter desired timeout value if different from that displayed.	The R/T displays the following screen:  LINK TIMEOUT 05 MINUTES  The desired link timeout time is flashing.
16	ENTER	Press and release.	The R/T displays the following screen:  LINK TO “ANY CALLS”? YES  The current setting is flashing.



**Table 2-92. Procedure to Program ALE Configuration – Continued**

Step	Control	Action	Observe
17	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  LINK TO “ANY CALLS”? YES  The desired setting is flashing.
18	ENTER	Press and release.	The R/T displays the following screen:  LINK TO “ALL CALLS”? YES  The current setting is flashing.
19	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  LINK TO “ALL CALLS”? YES  The desired setting is flashing.
20	ENTER	Press and release.	The R/T displays the following screen:  AUTO DISPLAY MESSAGES? YES  The current setting is displayed.
21	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  AUTO DISPLAY MESSAGES? YES  The desired setting is flashing.
22	ENTER	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  CFG is flashing.

### 2.6.4.6 Programming Security

The SECUR configuration prevents accidental alteration of ALE operation and program information. At the same time, it allows an experienced radio operator to override the lockout feature and access all the program items. If any of the items are locked-out, they will not appear on the display. From the ALE programming menu, the operator is able to enter a password, program lockout, and program operational lockout.

#### 2.6.4.6.1 Entering a Password

The password programmed into the radio must first be entered in order to access the security function and change the programming structure. A password can only be programmed into the R/T in SSB mode (refer to Paragraph 2.6.3.7.1). That password is effective in allowing or disallowing operation and programming in all modes of operation. If the password has been successfully entered in SSB mode by the operator (and the R/T has not been turned off), it is not required a second time when entering security programming in ALE mode.

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-93 provides the procedure to enter a password in ALE mode.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-93. Procedure to Enter a Password**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR (if necessary).	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER PASSWORD 00000000  The row of zeros is flashing.
3	Numeric Keypad	Enter password.	The R/T displays the following screen:  ENTER PASSWORD 27660094  The password is flashing.†

**Table 2-93. Procedure to Enter a Password – Continued**

Step	Control	Action	Observe
4	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
5	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  SECUR is flashing.

† Pressing the PRGM key returns the display to the standard SSB screen. This allows an operator who accidentally accesses this menu to return to normal operation.

**2.6.4.6.2 Lockout Programming**

Programming the lockout prevents programming of any (or all) of the main programming items (ADDRESS, CHAN\_GRP, DLQA, and CFG). If programming is not to be allowed for a menu item, it must be programmed for NO. If programming is to be allowed for a menu item, it must be programmed for YES.

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-94 provides the procedure to program lockout.

**Table 2-94. Procedure to Program Lockout**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR (if necessary).	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
3	ENTER	Press and release.	The R/T displays the following screen:  "CHAN_GRP" PROG ALLOWED? YES  The current setting is flashing.
4	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  "CHAN_GRP" PROG ALLOWED? YES  The desired setting is flashing.

Table 2-94. Procedure to Program Lockout – Continued

Step	Control	Action	Observe
5	ENTER	Press and release.	The R/T displays the following screen:  “ADDRESS” PROG ALLOWED ? YES  The current setting is flashing.
6	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  “ADDRESS” PROG ALLOWED ? YES  The desired setting is flashing.
7	ENTER	Press and release.	The R/T displays the following screen:  “LQA” PROG ALLOWED ? NO  The current setting is flashing.
8	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  “LQA” PROG ALLOWED ? NO  The desired setting is flashing.
9	ENTER	Press and release.	The R/T displays the following screen:  “CFIG” PROG ALLOWED ? YES  The current setting is flashing.

Table 2-94. Procedure to Program Lockout – Continued

Step	Control	Action	Observe
10	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  “CFIG” PROG ALLOWED ? YES  The desired setting is flashing.
11	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
12	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  SECUR is flashing.

### 2.6.4.6.3 Programming Operational Lockout

Programming operational lockout prevents an operator from selecting or changing an operational function. Each operator-controllable parameter is reviewed.

When YES is selected, an operator may change that parameter. When NO is selected, the item does appear on the front panel display, but is locked out; therefore, it is not available for change. A default selection can be made for the data preset and encryption key.

Access the ALE programming menu per Paragraph 2.6.4.1. Table 2-95 provides the procedure to program operational lockout.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-95. Procedure to Program Operational Lockout**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
3	← and →	Press and release repeatedly to select OP_LOCK.	The R/T displays the following screen:  LOCKOUT OP_LOCK  OP_LOCK is flashing.

**Table 2-95. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
4	ENTER	Press and release.	The R/T displays the following screen:  ALLOW DAT PRESET CHANGE ?      NO  The current setting is flashing.
5	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  ALLOW DAT PRESET CHANGE ?      NO  The desired setting is flashing.  If YES is selected, proceed to step 8.
6	ENTER	Press and release.	The R/T displays the following screen:  DEFAULT DATA PRESET: 9 [OFF]  The current default data preset is flashing.
7	↑ and ↓ or numeric keypad	Press and release repeatedly.	The R/T scrolls through the programmed data preset names, and displays the following screen:  DEFAULT DATA PRESET: 9 [OFF]  The desired default data preset is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  ALLOW ENC PRESET CHANGE ?      NO  The current setting is flashing.



**Table 2-95. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
9	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO, and displays the following screen:  ALLOW ENC PRESET CHANGE ? NO  The desired setting is flashing.  If YES is selected, proceed to step 12.
10	ENTER	Press and release.	The R/T displays the following screen:  DEFAULT ENCR KEY: KEY1  The current default encryption key is flashing.
11	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the programmed encryption keys and displays the following screen:  DEFAULT ENCR KEY: KEY1  The desired default encryption key is flashing.
12	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  OP_LOCK is flashing.
13	CLEAR	Press and release.	The R/T displays the following screen:  CHAN_GRP ADDRESS LQA CFG SECUR  SECUR is flashing.

### 2.6.5 Frequency Hopping Programming

The frequency hopping option provides frequency hopping in bands up to 2 MHz wide. The hopping bandwidth is using a predetermined List of Frequencies (LIST), a center frequency (narrowband), or a frequency range (wideband). In the ECCM mode, transmission of digital voice data up to 300 bps with error correction is supported.

#### NOTE

Before programming frequency hopping parameters, verify that the bandwidth of all antenna systems within a net are able to support the programmed net bandwidth.

The following parameters may be programmed:

- Net
- Exclusion Bands
- Data Presets
- Transmit Power
- Security

Table 2-96 provides an index to the programming instructions for frequency hopping. Figure 2-21 shows how frequency hopping programming relates to the LCD display. Figure 2-22 provides a summary of frequency hopping programming.

**Table 2-96. Frequency Hopping Programming Index**

<b>Menu Selection</b>	<b>Radio Parameter to Be Programmed</b>	<b>Reference Paragraph</b>
NET	Net Parameters	2.6.5.2
EXCLUDE	Exclusion Bands	2.6.5.3
DATA	Data Presets	2.6.5.4
POWER	Transmit Power	2.6.5.5
SECUR	Security	2.6.5.6

**2.6.5.1 Accessing Frequency Hopping Menu**

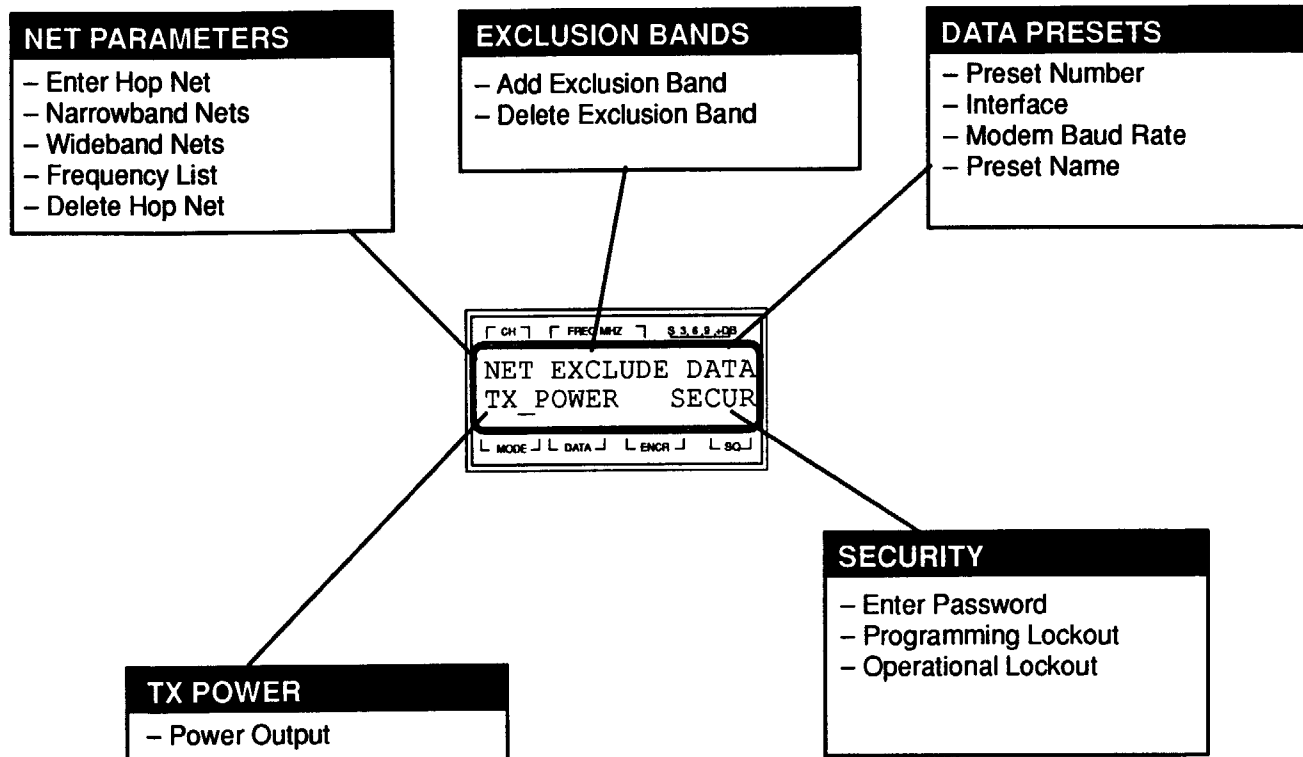
Table 2-97 provides the procedure to access the Frequency Hopping Programming Menu.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-97. Procedure to Access the Frequency Hopping Programming Menu**

Step	Control	Action	Observe
1	Function Switch	Rotate clockwise or counterclockwise to the HOP position.	The R/T displays the following screen:  R22 – NO SYNC FAX1 KEY2
2	PRGM	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.



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Figure 2-21. Frequency Hopping Programming Selections

## SUMMARY – Frequency Hopping Programming

### NET

- Enter Hop Net
  - Net ID
- Narrowband Nets
  - Net ID
- Wideband Nets
  - Net ID
- Frequency List
  - Net ID
  - Add/Delete Frequency
- Delete Hop Net

### EXCLUSION BANDS

- Add
- Delete

### DATA PRESETS

- Preset Number
- Interface
- Modem Baud Rate
- Preset Name

### TRANSMIT POWER

- Power Output

### SECURITY

- Enter Password
- Programming Lockout
  - Channel
  - Exclude
  - Data
  - Transmit Power
- Operational Lockout
  - Data Preset
  - Encryption Key

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Figure 2-22. Frequency Hopping Programming Summary

### 2.6.5.2 Programming Net Parameters

Nets are numbered 0, 1, 2 . . . 9, with Net 0 referring to the M position on the CHANNEL switch. It is important to remember that all radios in a net must have the same:

- Net Identification Number
- Frequency Hop Type
- Frequency Range
- Exclusion Bands

The following Net parameters may be programmed:

- a. **Narrowband** – When an antenna coupler is in use, only narrowband frequency hopping nets may be used. The selection of the center frequency must always be in multiples of 5 kHz, with the minimum allowable frequency of 1.650 MHz and a maximum allowable frequency of 29.995 MHz.
- b. **Wideband** – The hopping bandwidth must be at least 140 kHz wide. If exclusion bands affect any part of the hopping bandwidth, it may be necessary to make the hopping bandwidth wider since the usable frequency range must be adequate to allow for 15 frequencies at 10 kHz spacing.
- c. **List** – Provides a specific list of frequencies to be used during frequency hopping. List frequencies must be in multiples of 5 kHz. No frequency may be less than 1.650 MHz or greater than 29.995 MHz. The difference between the lowest and highest frequencies cannot be more than 2.0 MHz.

Frequencies may be added to, or removed from, the list of frequencies. The order in which frequencies are entered is not important since they are sorted when they are stored. Duplicate frequencies are automatically removed from the list. The minimum number of frequencies that can be added is 15, while the maximum number is 99.

- d. **Net Identification Numbers** – NET ID is an eight-digit numeric code that determines the pseudorandom frequency hopping patterns for the net. All radios on a net must have the same NET ID number.

#### 2.6.5.2.1 Programming Narrowband Operation

Access the Frequency Hopping programming menu per Paragraph 2.6.5.1. Table 2-98 provides the procedure to program a Net for narrowband operation.

**Table 2-98. Procedure to Program a Net for Narrowband Operation**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current selection is flashing.
3	↑ and ↓	Press and release repeatedly.	The R/T scrolls through the programmed hop nets, and displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The desired hop net to view/change is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  The current selection is flashing.
5	← and →	Press and release repeatedly to select NARROW (if necessary).	The R/T displays the following screen:  NARROW WIDE LIST DELETE  NARROW is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  NARROW BND NET 2 NET ID? 8 7 6 5 4 3 2 1  The current net ID is flashing.

**Table 2-98. Procedure to Program a Net for Narrowband Operation – Continued**

Step	Control	Action	Observe
7	Numeric Keypad	Enter desired Net ID if different from that displayed.	The R/T displays the following screen:  NARROW BND NET 2 NET ID? 8 7 6 5 4 3 2 1  The desired net ID is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  NARROW BND NET 2 HOP FREQ= ---.---  ---.--- is flashing.
9	↑ and ↓, or numeric keypad	Enter desired center frequency if different from that displayed.	The R/T displays the following screen:  NARROW BND NET 2 HOP FREQ=02.000  The desired hop frequency is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current selection is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  NARROW is flashing.
12	CLEAR	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.



**2.6.5.2.2 Programming Wideband Operation**

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-99 provides the procedure to program a Net for wideband operation.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-99. Procedure to Program a Net for Wideband Operation**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER           SECUR  NET is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current selection is flashing.
3	↑ and ↓, or numeric keypad	Enter desired hop net number if different from that displayed.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The desired hop net to view/change is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  The current selection is flashing.
5	← and →	Press and release repeatedly to select WIDE (if necessary).	The R/T displays the following screen:  NARROW WIDE LIST DELETE  WIDE is flashing.

**Table 2-99. Procedure to Program a Net for Wideband Operation – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  WIDE BAND NET 2 NET ID? 8 7 6 5 3 0 9 3  The current net ID is flashing.
7	Numeric Keypad	Enter desired Net ID if different from that displayed.	The R/T displays the following screen:  WIDE BAND NET 2 NET ID? 8 7 6 5 3 0 9 3  The desired net ID is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  WIDE BAND NET 2 LO LIMIT=12.000  The current lower frequency limit is flashing.
9	Numeric Keypad	Enter desired low end frequency (must be a multiple of 5 kHz) if different from that displayed.	The R/T displays the following screen:  WIDE BAND NET 2 LO LIMIT=12.000  The desired lower frequency limit is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  WIDE BAND NET 2 HI LIMIT=13.000  The current upper frequency limit is flashing.
11	Numeric Keypad	Enter desired high end frequency (must be a multiple of 5 kHz) if different from that displayed. The maximum bandwidth is 2 MHz.	The R/T displays the following screen:  WIDE BAND NET 2 HI LIMIT=13.000  The desired upper frequency limit is flashing.

**Table 2-99. Procedure to Program a Net for Wideband Operation – Continued**

Step	Control	Action	Observe
12	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current hop net selection is flashing.
13	CLEAR	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.

**2.6.5.2.3 Programming Frequency Lists**

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-100 provides the procedure to add frequencies to a frequency list (the minimum number of frequencies that can be added is 15, and the maximum is 99). Table 2-101 provides the procedure to delete frequencies from a frequency list.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-100. Procedure to Add Frequencies to a Frequency List**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current hop net selection is flashing.
3	↑ and ↓, or numeric keypad	Enter desired hop net number if different from that displayed.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The desired hop net selection is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  The current selection is flashing.

Table 2-100. Procedure to Add Frequencies to a Frequency List – Continued

Step	Control	Action	Observe
5	← and →	Press and release repeatedly to select LIST (if necessary).	The R/T displays the following screen:  NARROW WIDE LIST DELETE  LIST is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  LIST HOP NET 2 NET ID? 1 8 9 2 6 7 6 4  The current net ID is flashing.
7	Numeric Keypad	Enter desired Net ID if different from that displayed.	The R/T displays the following screen:  LIST HOP NET 2 NET ID? 1 8 9 2 6 7 6 4  The desired net ID is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  ADD_FREQ NET 2 DELETE_FREQ  ADD_FREQ is flashing.
9	← and →	Press and release repeatedly to select ADD_FREQ (if necessary).	The R/T displays the following screen:  ADD_FREQ NET 2 DELETE_FREQ  ADD_FREQ is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  LIST NET 2 ADD_FREQ=24.600  The current selection is flashing.

**Table 2-100. Procedure to Add Frequencies to a Frequency List – Continued**

Step	Control	Action	Observe
11	Numeric Keypad	Enter desired frequency (must be a multiple of 5 kHz) if different from that displayed. The difference between the lowest and highest frequencies must be less than 2 MHz.	The R/T displays the following screen:  LIST NET 2 ADD_FREQ=24.600  The desired frequency to add is flashing.
12		Repeat steps 10 and 11 until all frequencies have been added to the desired list.	
13	CLEAR	Press and release.	The R/T displays the following screen:  ADD_FREQ NET 2 DELETE_FREQ  ADD_FREQ is flashing.
14	CLEAR	Press and release.	The R/T displays the following screen:  LIST HOP NET 2 NET ID 1 8 9 2 6 7 6 4  The current net ID is flashing.
15	CLEAR	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  LIST is flashing.
16	CLEAR	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  2 is flashing.
17	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER SECUR  NET is flashing.

**Table 2-101. Procedure to Delete Frequencies From a Frequency List**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current selection is flashing.
3	↑ and ↓, or numeric keypad	Enter desired hop net number if different from that displayed.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current selection is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  The current selection is flashing.
5	← and →	Press and release repeatedly to select LIST (if necessary).	The R/T displays the following screen:  NARROW WIDE LIST DELETE  The current selection is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  ADD_FREQ NET 2 DELETE_FREQ  ADD_FREQ is flashing.

**Table 2-101. Procedure to Delete Frequencies From a Frequency List – Continued**

Step	Control	Action	Observe
7	← and →	Press and release repeatedly to select DELETE_FREQ (if necessary).	The R/T displays the following screen:  ADD_FREQ NET 2 DELETE_FREQ  DELETE_FREQ is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  LIST NET 2 DEL_FREQ ---.---  ---.--- is flashing.
9	↑ and ↓	Press and release repeatedly until desired frequency to delete is displayed.	The R/T scrolls through the list of programmed frequencies and displays the following screen:  LIST NET 2 DEL_FREQ 24.500  The desired frequency to be deleted is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  LIST NET 2 DEL_FREQ ---.---  ---.--- is flashing.
11		Repeat steps 9 and 10 until all desired frequencies have been deleted from the desired list.	
12	CLEAR	Press and release.	The R/T displays the following screen:  ADD_FREQ NET 2 DELETE_FREQ  DELETE_FREQ is flashing.



**Table 2-101. Procedure to Delete Frequencies From a Frequency List – Continued**

Step	Control	Action	Observe
13	CLEAR	Press and release.	The R/T displays the following screen:  NET HOP    NET 2 NET ID 1 8 9 2 6 7 6 4  The current net ID is flashing.
14	CLEAR	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  LIST is flashing.
15	CLEAR	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current hop net selection is flashing.
16	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.

**2.6.5.2.4 Deleting a Hop Net**

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-102 provides the procedure to delete an entire Hop Net.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-102. Procedure to Delete a Hop Net**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select NET (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current hop net selection is flashing.
3	↑ and ↓, or numeric keypad	Enter desired hop net number if different from that displayed.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The desired hop net selection is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  NARROW WIDE LIST DELETE  The current selection is flashing.
5	← and →	Press and release repeatedly to select DELETE (if necessary).	The R/T displays the following screen:  NARROW WIDE LIST DELETE  DELETE is flashing.

Table 2-102. Procedure to Delete a Hop Net – Continued

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  DELETE HOP NET 2? NO  NO is flashing.
7	↑ and ↓	Press and release repeatedly to select YES (if necessary).	The R/T displays the following screen:  DELETE HOP NET 2? YES  YES is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  ENTER HOP NET TO VIEW/CHANGE? 2  The current selection is flashing.
9	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  NET is flashing.

### 2.6.5.3 Programming Exclusion Bands

An exclusion band specifies a range of frequencies that cannot be used during frequency hopping. Each exclusion band affects all wideband nets, but does not affect narrowband or list nets. A maximum of ten exclusion bands (0, 1, 2, . . . , 9) can be programmed.

#### 2.6.5.3.1 Adding an Exclusion Band

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-103 provides the procedure to add an exclusion band.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-103. Procedure to Add an Exclusion Band**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select EXCLUDE (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER SECUR  EXCLUDE is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD/DELETE EXCL BAND: 3  The current exclusion band is flashing.
3	↑ and ↓, or numeric keypad	Enter desired exclusion band number if different from that displayed.	The R/T displays the following screen:  ADD/DELETE EXCL BAND: 3  The desired exclusion band is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  ADD_EXCL_BAND DELETE_EXCL_BAND  ADD_EXCL_BAND is flashing.

**Table 2-103. Procedure to Add an Exclusion Band – Continued**

Step	Control	Action	Observe
5	← and →	Press and release repeatedly to select ADD_EXCL_BAND (if necessary).	The R/T displays the following screen:  ADD_EXCL_BAND DELETE_EXCL_BAND  ADD_EXCL_BAND is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  EXCLUSION BAND 3 LO LIMIT= 00.000  The current lower frequency limit is flashing.
7	Numeric Keypad	Enter desired frequency (must be a multiple of 5 kHz) if different from that displayed.	The R/T displays the following screen:  EXCLUSION BAND 3 LO LIMIT= 15.785  The desired lower frequency limit is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  EXCLUSION BAND 3 HI LIMIT= 20.785  The current upper frequency limit is flashing.
9	Numeric Keypad	Enter desired frequency (must be a multiple of 5 kHz) if different from that displayed.	The R/T displays the following screen:  EXCLUSION BAND 3 HI LIMIT= 20.785  The desired upper frequency limit is flashing.

**Table 2-103. Procedure to Add an Exclusion Band – Continued**

Step	Control	Action	Observe
10	ENTER	Press and release.	The R/T displays the following screen:  ADD/DELETE EXCL BAND: 3  The desired exclusion band is flashing.
11	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  EXCLUDE is flashing.

**2.6.5.3.2 Deleting an Exclusion Band**

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-104 provides the procedure to delete an exclusion band.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-104. Procedure to Delete an Exclusion Band**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select EXCLUDE (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER           SECUR  EXCLUDE is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ADD/DELETE EXCL BAND?           3  3 is flashing.
3	↑ and ↓, or numeric keypad	Enter desired exclusion band number if different from that displayed.	The R/T displays the following screen:  ADD/DELETE EXCL BAND?           3  3 is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  ADD_EXCL_BAND DELETE_EXCL_BAND  ADD_EXCL_BAND is flashing.
5	← and →	Press and release repeatedly to select DELETE_EXCL_BAND.	The R/T displays the following screen:  ADD_EXCL_BAND DELETE_EXCL_BAND  DELETE_EXCL_BAND is flashing.

**Table 2-104. Procedure to Delete an Exclusion Band – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  DELETE EXCLUSION BAND 3?        NO  NO is flashing.
7	↑ and ↓	Press and release repeatedly to select YES.	The R/T displays the following screen:  DELETE EXCLUSION BAND 3?        YES  YES is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  ADD/DELETE EXCL BAND:        4  The current selection is flashing.
9	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER        SECUR  EXCLUDE is flashing.



### 2.6.5.4 Programming Data Presets

Programming data presets allows a specific data device to be programmed for a specific data rate. A data preset is then assigned to the configuration. Three data presets are available which are different from, and in addition to, those programmable for SSB or ALE operation. For each of these three presets, the following parameters are programmable:

- a. Preset Number – Each data preset defines the interface type and baud rate. The preset number is either 7, 8, or 9.
- b. Interface – Describes the characteristics of the interface port. The interface type may be:
  - 1. ASYNC RMT PORT
  - 2. ASYNC DATA PORT
  - 3. SYNC DATA PORT
- c. Modem Baud Rate – The following are modem baud rate selections:
  - 1. 75
  - 2. 150
  - 3. 300
- d. Preset Name – The programmer can select names for a data preset. If a preset name is not defined, the preset will be called DATx, where x is 7, 8, or 9.

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-105 provides the procedure to program data presets.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-105. Procedure to Program Hopping Data Presets**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select DATA (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER           SECUR  DATA is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  DATA PRESET TO CHANGE: 8[DAT8]  The current data preset is flashing.

**Table 2-105. Procedure to Program Hopping Data Presets – Continued**

Step	Control	Action	Observe
3	↑ and ↓, or numeric keypad	Enter desired data preset if different from that displayed.	The R/T displays the following screen:  DATA PRESET TO CHANGE: 8[DAT8]  The desired data preset is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  INTERFACE [DAT8] ASYNC RMT PORT  The current data interface is flashing.
5	↑ and ↓	Press and release repeatedly until the desired interface selection is displayed.	The R/T scrolls through the three interface selections (ASYNC RMT PORT, ASYNC DATA PORT, and SYNC DATA PORT) and displays the following screen:  INTERFACE [DAT8] ASYNC RMT PORT  The desired data interface is flashing.
6	ENTER	Press and release.	The R/T displays the following screen:  MODEM BAUD RATE 300 [DAT8]  The current baud rate is flashing.
7	↑ and ↓	Press and release repeatedly until the desired baud rate is displayed.	The R/T scrolls through the three baud rate selections (75, 150, and 300) and displays the following screen:  MODEM BAUD RATE 300 [DAT8]  The desired baud rate is flashing.

**Table 2-105. Procedure to Program Hopping Data Presets – Continued**

Step	Control	Action	Observe
8	ENTER	Press and release.	The R/T displays the following screen:  NEW PRESET NAME DAT 8 [DAT8]  The current preset name is flashing.
9	Alphanumeric Keypad	Press and release repeatedly until the desired preset name is displayed. Refer to Paragraph 2.6.2 for detailed instructions.	The R/T displays the following screen:  NEW PRESET NAME PC1 [DAT8]  The desired preset name is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  ACTIVATE PRESET? YES [PC1]  YES is flashing.
11	↑ and ↓	Press and release repeatedly until YES is displayed (if necessary).	The R/T displays the following screen:  ACTIVATE PRESET? YES [PC1]  YES is flashing.
12	ENTER	Press and release.	The R/T displays the following screen:  DATA PRESET TO CHANGE: 8[PC1]  The current preset selection is flashing.
13	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER SECUR  DATA is flashing.

**2.6.5.5 Programming Frequency Hopping Transmit Power**

The transmit power level can be programmed for frequency hopping operation to either Low, Medium, or High.

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-106 provides the procedure to program transmit power.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-106. Procedure to Program Hopping Transmit Power**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select TX_POWER (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  POWER is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  TX POWER HIGH  The current setting is flashing.
3	↑ and ↓	Press and release repeatedly until desired transmit power is displayed.	The R/T scrolls through the three power levels (LOW, MED, and HIGH) and displays the following screen:  TX POWER HIGH  The desired setting is flashing.
4	ENTER	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  POWER is flashing.

### 2.6.5.6 Programming Security

SECUR programming prevents accidental alteration of RT-1694 Receiver-Transmitter operation and program information. It also allows an experienced radio operator to override the lockout feature and access all frequency hopping configuration parameters.

After making the lockout selections, the R/T must be turned off, then turned back on, in order for the lockout programming to take effect.

#### 2.6.5.6.1 Programming Lockout

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-107 provides the procedure to program lockout.

#### NOTE

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-107. Procedure to Program Lockout**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER PASSWORD -----
3	Numeric Keypad	Enter password.	The R/T displays the following screen:  ENTER PASSWORD 27660094
4	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
5	← and →	Press and release repeatedly to select LOCKOUT (if necessary).	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.

**Table 2-107. Procedure to Program Lockout – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  “NET” PROGRAM ALLOWED? YES  The current selection is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO and displays the following screen:  “NET” PROGRAM ALLOWED? YES  The desired selection is flashing.
8	ENTER	Press and release.	The R/T displays the following screen:  “EXCLUDE” PROGRAM ALLOWED? YES  The current selection is flashing.
9	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO and displays the following screen:  “EXCLUDE” PROG ALLOWED? YES  The desired selection is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  “DATA” PROGRAM ALLOWED? YES  The current selection is flashing.

**Table 2-107. Procedure to Program Lockout – Continued**

Step	Control	Action	Observe
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO and displays the following screen:  "DATA" PROGRAM ALLOWED ? YES  The desired selection is flashing.
12	ENTER	Press and release.	The R/T displays the following screen:  "TX_POWER" PROG ALLOWED ? YES  The current selection is flashing.
13	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO and displays the following screen:  "TX_POWER" PROG ALLOWED ? YES  The desired selection is flashing.
14	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
15	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  SECUR is flashing.

**2.6.5.6.2 Programming Operational Lockout**

Programming operational lockout prevents an operator from selecting or changing an operational function. Each operator-controllable parameter is reviewed.

When YES is selected an operator may change that parameter. When NO is selected, the item does appear on the front panel display, but is locked out; therefore, it is not available for change. A default selection can be made for the data preset and encryption key.

Access the frequency hopping programming menu per Paragraph 2.6.5.1. Table 2-108 provides the procedure to program operational lockout.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-108. Procedure to Program Operational Lockout**

Step	Control	Action	Observe
1	← and →	Press and release repeatedly to select SECUR (if necessary).	The R/T displays the following screen:  NET EXCLUDE DATA POWER            SECUR  SECUR is flashing.
2	ENTER	Press and release.	The R/T displays the following screen:  ENTER PASSWORD -----
3	Numeric Keypad	Enter password.	The R/T displays the following screen:  ENTER PASSWORD 27660094
4	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  LOCKOUT is flashing.
5	← and →	Press and release repeatedly to select OP_LOCK (if necessary).	The R/T displays the following screen:  LOCKOUT OP_LOCK  OP_LOCK is flashing.



**Table 2-108. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
6	ENTER	Press and release.	The R/T displays the following screen:  ALLOW DAT PRESET CHANGE ? NO  The current selection is flashing.
7	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO and displays the following screen:  ALLOW DAT PRESET CHANGE ? NO  The desired selection is flashing.  If YES is selected, proceed to step 10.
8	ENTER	Press and release.	The R/T displays the following screen:  DEFAULT DATA PRESET 8 [PC1]  The current default data preset is flashing.
9	↑ and ↓, or numeric keypad	Press and release repeatedly until desired default data preset is displayed.	The R/T displays the following screen:  DEFAULT DATA PRESET 8 [PC1]  The desired default data preset is flashing.
10	ENTER	Press and release.	The R/T displays the following screen:  ALLOW ENC PRESET CHANGE ? NO  The current selection is flashing.

**Table 2-108. Procedure to Program Operational Lockout – Continued**

Step	Control	Action	Observe
11	↑ and ↓	Press and release repeatedly.	The R/T toggles between YES and NO and displays the following screen:  ALLOW ENC PRESET CHANGE ? NO  The desired selection is flashing.  If YES is selected, proceed to step 14.
12	ENTER	Press and release.	The R/T displays the following screen:  DEFAULT ENCR KEY: KEY1  The current default encryption key is flashing.
13	↑ and ↓	Press and release repeatedly until desired default encryption key is displayed.	The R/T displays the following screen:  DEFAULT ENCR KEY: KEY1  The desired default encryption key is flashing.
14	ENTER	Press and release.	The R/T displays the following screen:  LOCKOUT OP_LOCK  OP_LOCK is flashing.
15	CLEAR	Press and release.	The R/T displays the following screen:  NET EXCLUDE DATA POWER SECUR  SECUR is flashing.

## 2.7 DATA INTERFACE

The RT-1694 Receiver-Transmitter may be programmed for either synchronous or asynchronous operation on either the data port or the remote port. The three available choices are asynchronous remote port (ASYNC RMT PORT), asynchronous data port (ASYNC DATA PORT), and synchronous data port (SYNC DATA PORT). Be sure the RT-1694 Receiver-Transmitter data port parameters agree and are compatible with the data device interface.

### 2.7.1 Asynchronous Data Interface

When using DATA PRESET with the ASYNC DATA PORT, there are two ways of initiating a digital transmission. The first way is by an ASCII Control-B (^B). This causes the radio to transmit all data following the Control-B (^B) up to but not including a Control-C (^C), which unkeys the radio. Additionally, if there is no data activity for a period of 30 seconds, the radio automatically unkeys.

The second way of keying the data port when it is configured for asynchronous operation is by raising Request To Send (RTS) (J2-P). The only way of unkeying the radio with this method is by dropping RTS. There is no data activity time out.

It is necessary that the asynchronous data port transmission parameters are compatible with those of the data device or terminal in use. These parameters include:

- a. Asynchronous Data Rate (75, 150, 300, 600, 1200, 2400, 4800, 9600 bps)  
This rate must be the same for both the port and data device, and at least as fast as the anticipated maximum modem baud rate (2400 bps is a usual setting).
- b. Bits (5, 6, 7, 8)  
This setting must be the same as the bit setting for the data device. Both ends of the radio transmission link must have the same settings.
- c. Stop Bits (1 or 2)  
This must be the same as the stop bit setting for the data device. Both ends of the radio transmission link must have the same settings.
- d. Parity (ODD, EVEN, NONE)  
The parity setting must be the same as the parity setting for the data device. Both ends of the radio transmission link must have the same settings.
- e. FLOW CONTROL XON/XOFF (ON/OFF)  
This must be the same as the flow control XON/XOFF setting for the connected data device.
- f. ECHO (ON/OFF)  
This should be set to OFF if characters appear duplicated on the terminal screen.
- g. PORT POLARITY (RS-232, MIL-188)  
This should be set to match the polarity in use by the data device.

Refer to Paragraph 2.6.3.5.2 for programming procedures.

### 2.7.2 Synchronous Data Interface

When using DATA PRESET with the SYNC DATA PORT, the only way to initiate a digital transmission is by raising RTS (J2-P), and the only way to unkey the radio is by lowering this line.

The RT-1694 Receiver-Transmitter provides a clock signal at the synchronous interface during receive operation. During transmit, either the RT-1694 Receiver-Transmitter or the data device can provide this clock signal. Normally, this parameter should be set to EXTERNAL (refer to Paragraph 2.6.3.5.2) to accept an external clock. Should the data device require a clock during transmit, set this to INTERNAL.

### 2.7.3 Data Transmission with the Asynchronous Remote Port

Normally the asynchronous remote port is used for remote control of the R/T. Data transmission is also possible from this port, should this port be selected (refer to Paragraph 2.6.3.5.2). Received data will appear at this port. Transmission is initiated by an ASCII Control-B (^B) character which keys the transmitter and is terminated by an ASCII Control-C (^C) character which unkeys the transmitter.

## 2.8 REMOTE CONTROL INTERFACE

Detailed remote control information and communications software are on a diskette which is included as part of this manual. Remote control interface is through the RS-232C asynchronous port, available at the DATA connector on the front panel of the R/T. A text-like ASCII protocol is used for remote control, allowing computer terminals, laptop computers, or personal computers to control and monitor RF-5200 FALCON Series Manpack System functions without custom software.

The remote control data device must appear to the RT-1694 Receiver-Transmitter as a computer terminal. Computers can use one of several communication terminal emulation programs, including the one provided with this manual.

The asynchronous data interface for both the RT-1694 Receiver-Transmitter and the remote control data terminal should be programmed as follows:

Character Bits:	8
Stop Bits:	1
Parity:	NONE
XON/XOFF:	ON
Echo:	ON

The remote control data device should be set to the following:

Duplex:	FULL
Flow Control:	XON/XOFF

Remote control menus are included in the following paragraphs to illustrate the menus that are displayed by the internal remote control software of the RT-1694 Receiver-Transmitter. Remote control operation is enabled in the following ways: when the RT-1694 Receiver-Transmitter front panel FUNCTION control is placed in the REMOTE position, or when the R/T DATA connector J2 pin E is pulled low with the FUNCTION control in the OFF or REMOTE position.

### **2.8.1 Asynchronous Remote Control Port Programming**

Before attempting remote control operation, both the asynchronous remote port program parameters and the external remote control data device must be programmed to the appropriate settings. Refer to Paragraph 2.6.3.5.2 for port programming procedures.

### **2.8.2 Terminal/Remote Control Software**

FALCOM System operating software provides information and programs useful for data transmission and remote control applications. The files supplied include:

- a. **README.DOC** – A short ASCII document describing the function and operation of the other files contained on the diskette. The user should read this file before attempting to work with the other files.
- b. **FALCOM.EXE** – A simple, executable terminal program which facilitates file transfer and management for data communications applications.
- c. **FALCOM.HLP** – Contains help messages accessed by the FALCOM.EXE data communications program.
- d. **PROTOCOL.DOC** – An ASCII document file which describes the FALCON Series remote control protocol in detail, including complete command listings and descriptions. Any user who wants to operate the RF-5200 FALCON Series Manpack System by remote control should print this file.
- e. **DEMOSSB.PRG, DEMOAFK.PRG, DEMOALE.PRG, DEMOFH.PRG, and DEMODE.PRG** – Contain ASCII program files containing program parameters which can be used to program an RF-5200 FALCON Series Manpack System. Instructions for this are in the README.DOC file. The purpose of these files is to set up RF-5200 FALCON Series Manpack Systems for demonstration, to demonstrate the program process, and to provide templates or sample program files from which the users may construct their own. These files may be used individually or linked together to program the SSB, ALE, and digital encryption functions.

### 2.8.3 SSB Remote Control Operation

Once the RT-1694 Receiver-Transmitter is properly programmed and the FUNCTION control is placed in the REMOTE position, the SSB prompt and status listing appear on the remote control terminal. Commands are entered after the > prompt character.

#### NOTE

If the prompt is not shown before the display cursor, pressing the carriage return or ENTER key on the data device restores the prompt.

Remote control operation is similar to front-panel operation. The display prompt SSB> or ALE> is equivalent to the FUNCTION control and indicates the selected mode of operation. The FUNCTION operating mode can be changed by entering:

- a. SSB (Single Channel mode)
- b. ALE (Automatic Link Establishment mode)
- c. HOP (Frequency Hopping mode)

The RT-1694 Receiver-Transmitter is placed in the designated mode if the R/T is configured to support automatic link establishment operation.

Typing a command and parameter controls the R/T. For example:

- a. Channel 02 – Switches radio to Channel 02.
- b. FR 0160000 – Programs the operating frequency to 1.600 MHz.

To program a channel by remote control, a simple text string is used. For example:

- a. Channel 07
- b. Freq 1642370
- c. Mode USB
- d. AGC Slow

Alternately, program information can be stored in ASCII format and transferred into the RT-1694 Receiver-Transmitter as a complete file. A sample SSB file is DEMOSSB.PRG on the included diskette. A program file is loaded using the FALCOM terminal program by pressing the function key labeled FILL on the terminal, selecting the appropriate file when it is displayed, and pressing ENTER on the terminal.

The remote control SHOW and HELP commands are provided to assist in remote control operation.

### 2.8.3.1 SSB Show Menus

Entering SHOW on the remote control data device provides a listing of the current status and settings for the R/T for the FUNCTION mode selected. The SHOW command displays the current settings and status of the R/T. See Figure 2-23.

The SSB MODEM SHOW command displays the current settings and status of the modem. See Figure 2-24.

SSB Show Menu	Comments
SSB > show	Command to show currently programmed parameters
CHAN 00	Channel selected is 00
KEY OFF	Radio is unkeyed (receive)
RxFr 01600000	Receive frequency is 1.6 MHz
TxFr 01600000	Transmit frequency is 1.6 MHz
MODE USB	Modulation is USB
AGC MED	Medium AGC is selected
BAND 3.0	Bandwidth is 3.0 kHz
RXONLY NO	Channel is set for receive and transmit
BFO +0000	BFO offset is 0
MODEM 0 DAT0	Dat0 data preset is selected
DV OFF	Digital voice is off
DGT_SQUELCH OFF	Digital squelch is off
AVS OFF	Analog Voice Security is off
CUR_KEY 01	Encryption key 01 is selected
ENCRYPT ON	Encryption is on
SQ_LEVEL LOW	Squelch threshold is set to low
SQUELCH OFF	Audio squelch is off
ANTENNA_bnc	20 W PA coupler output switched to BNC
POWER hi	RF power output is high (maximum)
RWAS ENABLED	Active squelch is enabled
RETRANS ENABLED	Retransmit Key is enabled
CWOFFSET 0000	No CW transmit offset is programmed
SSB>	SSB prompt indicates single channel (SSB) mode

Figure 2-23. Typical Output Of A "Show" Command for SSB Operation

```
SSB > modem show

MODEM PRESET 0 DAT0 TYPE 39tone ASYNC REMOTE BAUD 2400 INTER long

SSB>
```

Figure 2-24. Typical Output of A "Modem Show" Command

**2.8.3.2 SSB Help Menus**

Entering HELP on the remote control data device provides a listing of the general commands used to control basic operation of the system for the FUNCTION mode selected. The MODEM HELP command displays a list of modem commands for the modem. These commands must be prefixed with the word MODEM to be recognized by the RT-1694 Receiver-Transmitter. See Figure 2-25 for the SSB Help menu. See Figure 2-26 for SSB Help More menu. See Figure 2-27 for the SSB Help Modem menu. See Figure 2-28 for the SSB Help RWAS screen. See Figure 2-29 for the SSB Help Port Remote menu. See Figure 2-30 for the SSB Help Port Data menu. See Figure 2-31 for the SSB Help Security menu. The general commands are structured similarly to the front-panel commands.

**NOTE**

Only the capital letters of the commands are entered. For example, AG SL programs AGC to slow setting.

Using the ZERO command erases all memory.

SSB > help					
AGc	-	(OFF, SLOW, MEd, FAsT, DAta)	MODE	-	(USb, LSb, AMe, CW)
ALE	-	ALE Mode	MODEM	-	see HELp MODEM
BAndwidth	-	Depends on Mode:	POWer	-	(LOW/MEd/High
= USB/LSB	-	(1.0/1.5/2.0/2.4/2.7/3.0/4.0/5.0)	PORT_Re	-	See HELp PORT_Re
= AME	-	(3.0/4.0/5.0/6.0/8.0)	PORT_Da	-	See HELp PORT_Da
= CW	-	(0.35/0.68/1.0/1.5/2.0)	RXFreq	-	Receive Frequency
BFo	-	(±xxxx) BFO Offset	SHoW	-	Show Status
CHan	-	(00...99)	SQuelch	-	(ON/OFF)
DGT_sq	-	(ON/OFF) digital squelch	SQ_Level	-	(LO, MEdium, HIgh)
DISplay	-	(Chan from, Chan to)	TESt	-	Perform Self Test
DV	-	(ON/OFF) digital voice	TESt 3	-	Firmware Versions
ENCRypt		(ON/OFF) encryption	TESt 4	-	VSWR Test
ENC_Key		(0..6) (12 digit key)	Time	-	(hh: mm: ss)
FReq	-	Select Frequency	TXFreq	-	Transmit freq
HOp	-	Hopping Mode	USE_KEY	-	(1..6) encryption key
Keyline	-	(ON/OFF)	ZERO	-	Clears Radio Memory
**HELp MORE gives additional commands**					
SSB>					

**Figure 2-25. SSB Help Menu**



SSB > help more			
ANTENNA	-	(BNc/AUto/TUned) antenna port for RF-5030PA	
AUDio	-	(0dbm/-10dbm)	
AVS	-	(ON/OFF)	
BATtery	-	(STatus) battery voltage	
COMpression	-	(ON/OFF)	
CONTrast	-	(0-8) contrast level	
CWOffset	-	(0/1000 Hz)	
DATE	-	(mm/dd/yy)	
DAY	-	(SUN..SAT)	
		INTensity	- (0-8) backlight intensity
		KWATt	- (YES/NO) 1KW installed?
		PASSWord	- (8 digits)
		PREamp	- (BYpass/ENable)
		PREPost	- shows parameters
		PROGram	- see HElp SECurity
		SElect	- see HElp SECurity
		RETRansmit	- (ENable/DISable)
		RETUne	- retunes antenna coupler
		RFgain	- (0...100)
		RXONly	- (ON/OFF) receive only
SSB>			

Figure 2-26. SSB Help More Menu

### 2.8.3.3 SSB Help Modem Menu

The HELP MODEM command displays a list of modem commands for the modem option. These commands must be prefixed with the word MODEM to be recognized by the radio. The following is a typical remote control Help Modem menu.

```

SSB > help modem
-----
Prefixed by MODEM:
Off          -  disable modem          PRSet      -  show all modem presets
SHow        -  show current modem info  xxxx      -  set modem to preset xxxx

Prefixed by MODEM PRESET n: where n = data preset number
ASync       -  (REMOte/DATa), async mode
DISable     -  lockout the given preset  NAME      -  (xxxx) new preset name
ENable      -  enable the given preset   SPace     -  space frequency
INTerleav   -  (LONg/SHort/ALTS/ALTL/ZERo) SYnc    -  sync mode
MARk        -  mark frequency
BAUD        -  (75/150/300/600/1200/2400/VOIce)
TYpe        -  (39tone/FSKWs/FSKNs/FSK-A/FSK-V/SERial)
-----

*** capital letters denote acceptable abbreviation
SSB>

```

Figure 2-27. SSB Help Modem Menu

### 2.8.3.4 SSB RWAS Help Menu

The RWAS HELP command displays a list of commands for the Active Squelch (RWAS) option. Figure 2-28 shows a typical remote control Help RWAS menu.

```

SSB > help rwas
-----
SSB RWAS Commands:
-----
FORCE_Wakeup - (ENable/DISable) force wakeup burst on key
RWAS         - (ENable/DISable) Robust Wakeup Active Squelch
RWAS_KEY     - (2 digit key) (default 00)
UNKEY_Mask   - (ENable/DISable) ignore unkey postamble

SSB>
-----

```

Figure 2-28. SSB Help RWAS Screen

### 2.8.3.4.1 SSB Remote and Data Port Configuration Help Menus

All remote and data port parameters may be set or programmed through remote control commands. See Figure 2-29 for the SSB Help Port\_Remote Menu. See Figure 2-30 for the SSB Help Port\_Data Menu.

```
SSB > help port_re

Port commands preceded by PORT_Remote or PORT_Data:
-----
BAud      - 75/150/300/600/1200/2400/4800, 9600
BIts      - 7/8 (char bits)
ECho      - ON/OFF
PArity    - NOne/ODd/EVen
STop      - 1/2 (stop bits)
XOn/xoff  - ENable/DISable
-----
SSB>
```

Figure 2-29. SSB Help Port\_Remote Menu

```
SSB > help port_da

Port commands preceded by PORT_Remote or PORT_Data:
-----
BAud      - 75/150/300/600/1200/2400/4800,9600
BIts      - 5/6/7/8 (char bits)
ECho      - ON/OFF
PArity    - NOne/ODd/EVen
STop      - 1/2 (stop bits)
XOn/xoff  - ENable/DISable
CLock     - Internal/External sync clock (Data Port only)
-----
SSB>
```

Figure 2-30. SSB Help Port\_Data Help Menu

### 2.8.3.3 SSB Help Modem Menu

The HELP MODEM command displays a list of modem commands for the modem option. These commands must be prefixed with the word MODEM to be recognized by the radio. The following is a typical remote control Help Modem menu.

```

SSB > help modem
-----
Prefixed by MODEM:
OFF          -  disable modem          PREset      -  show all modem presets
SHow        -  show current modem info  xxxx       -  set modem to preset xxxx

Prefixed by MODEM PRESET n: where n = data preset number
ASync       -  (REMOte/DATa), async mode
DISable     -  lockout the given preset  NAME       -  (xxxx) new preset name
ENable      -  enable the given preset   SPace     -  space frequency
INTerleav   -  (LONg/SHort/ALTS/ALTL/ZERo) SYnc      -  sync mode
MARK        -  mark frequency
BAUD        -  (75/150/300/600/1200/2400/VOIce)
TYpe       -  (39tone/FSKWs/FSKNs/FSK-A/FSK-V/SERial)
-----
*** capital letters denote acceptable abbreviation
SSB>
    
```

Figure 2-27. SSB Help Modem Menu

### 2.8.3.4 SSB RWAS Help Menu

The RWAS HELP command displays a list of commands for the Active Squelch (RWAS) option. Figure 2-28 shows a typical remote control Help RWAS menu.

```

SSB > help rwas
-----
SSB RWAS Commands:
-----
FORCE_Wakeup - (ENable/DISable) force wakeup burst on key
RWAS         - (ENable/DISable) Robust Wakeup Active Squelch
RWAS_KEY     - (2 digit key) (default 00)
UNKEY_Mask   - (ENable/DISable) ignore unkey postamble

SSB>
-----
    
```

Figure 2-28. SSB Help RWAS Screen

### 2.8.3.4.1 SSB Remote and Data Port Configuration Help Menus

All remote and data port parameters may be set or programmed through remote control commands. See Figure 2-29 for the SSB Help Port\_Remote Menu. See Figure 2-30 for the SSB Help Port\_Data Menu.

```
SSB > help port_re

Port commands preceded by PORT_Remote or PORT_Data:
-----
BAud      - 75/150/300/600/1200/2400/4800, 9600
Bits      - 7/8 (char bits)
ECho      - ON/OFF
PARity    - NOne/ODd/EVen
STop      - 1/2 (stop bits)
XOn/xoff  - ENable/DIisable
-----
SSB>
```

Figure 2-29. SSB Help Port\_Remote Menu

```
SSB > help port_da

Port commands preceded by PORT_Remote or PORT_Data:
-----
BAud      - 75/150/300/600/1200/2400/4800,9600
Bits      - 5/6/7/8 (char bits)
ECho      - ON/OFF
PARity    - NOne/ODd/EVen
STop      - 1/2 (stop bits)
XOn/xoff  - ENable/DIisable
CLock     - Internal/External sync clock (Data Port only)
-----
SSB>
```

Figure 2-30. SSB Help Port\_Data Help Menu

### 2.8.3.5 SSB Security Help Menus

Security commands prevent or allow changes to the parameter type. The SElect commands control selecting or changing operational functions, and the PROGram commands control the availability of program menus. See Figure 2-31 for SSB Security Help menu.

#### SSB HELP SECURITY MENU

SSB > help security  
SSB Security Commands:

---

LOCK prevents changes to the parameter type and UNLock allows changes.

The 'SElect' commands control selecting or changing operational functions.

- SElect ALL - (LOCK/UNLock) all parameters
- SElect BFO - (LOCK/UNLock) BFO operation
- SElect DATA - (LOCK/UNLock) data presets
- SElect KEY - (LOCK/UNLock) encryption keys
- SElect MODE - (LOCK/UNLock) modulation type
- SElect TMP\_CHAN - (LOCK/UNLock) channel 00 parameters

The 'PROGram' commands control programming menu availability.

- PROGram ALL - (LOCK/UNLock) all parameters
- PROGram CHAN - (LOCK/UNLock) channel parameters
- PROGram CFG - (LOCK/UNLock) configuration items
- PROGram DATA - (LOCK/UNLock) data presets
- PROGram FILL - (LOCK/UNLock) fill gun programming
- PROGram KEYS - (LOCK/UNLock) encryption keys

---

NOTE: These are front-panel commands that take effect after cycling power!

Figure 2-31. SSB Help Security Menu

## 2.8.4 ALE Remote Control Operation

Full remote control operation and programming of ALE is supported by the RT-1694 Receiver-Transmitter. Commands are entered one at a time from a terminal. Operational parameters can also be downloaded over the remote control interface. A text file on a personal computer can be generated containing the complete programming information for each channel group, address (self, individual, or net), configuration parameter, etc. of the system. The file can then be transferred to the radio through the remote control interface.

### 2.8.4.1 Entering ALE Mode

The FUNCTION control is used to enable ALE. At the SSB> prompt, enter ALE:

```
SSB> ALE
```

The operating mode switches to ALE and the current ALE status is displayed. Figure 2-32 is a typical display when first entering ALE mode.

Menu	Comments
SSB > ALE	Command to enter ALE operating mode
ALE_INST	Indicates ALE is installed
ALE> IN_PROG	ALE is in program mode
ALE>	
ALE> SCANNING	ALE is scanning the channel group(s)
ALE> KEY OFF	

Figure 2-32. Typical ALE Status Display

### 2.8.4.2 ALE Show Menu

Entering ALE> SHOW provides an ALE status listing. The command can be used to monitor ALE operation and to confirm configuration setting. The channel, frequency, and mode displayed is the current information of the channel being scanned or used when the command is issued. Figure 2-33 displays a typical SHOW menu.

Show Menu	Comments
ALE > show	Show status command
SCANNING	ALE is scanning the channel group(s)
LSTN OFF	Listen Before Transmit is off
KEY_TO_CALL OFF	Key-to-Call is off
RAD_SIL OFF	Radio Silence is off
ALL_CALL ON	Reception of ALL calls is enabled
ANY_CALL ON	Reception of ANY calls is enabled
MAXCH 010	Maximum Number of Channels Scanned is 10
TUNETIME 002	Maximum System Tune Time is 2 seconds
TIME_OUT 005	Link Timeout is 2 minutes
AMD_DISPLAY ON	Display of received AMDs is enabled
CHAN 04	Current channel is channel 04
MODE USB	Operating mode is USB for indicated channel
RxFr 14444000	Receive frequency is 14.4440 MHz
TxFr 14444000	Transmit frequency is 14.4440 MHz
KEY OFF	Encryption is off
MODEM OFF	Modem is off
DV OFF	Digital Voice is off
DGT_SQUELCH OFF	Digital Squelch is off
AVS OFF	Analog Voice Security is off
ENCRYPT OFF	Encryption is off
RWAS ENABLED	Active squelch is on
ALE>	

Figure 2-33. Typical ALE Show Menu



### 2.8.4.3 ALE Help Menus

Entering ALE> HELP on the remote control data device provides a listing and structure of ALE remote control commands. In addition to the HELP/HELP PROGRAM menu, ALE provides help menus for operation and security commands. See Figures 2-34 through 2-36 for ALE Help menus.

```
ALE > help

Embedded Adaptive commands consist of:
HElp or ? - This Menu
HElp PRog - Embedded Adaptive PROGRAM Help Menu
HElp OPer - Embedded Adaptive OPERATIONAL Help Menu
HElp SEcURity - Embedded Adaptive SECURITY Help Menu

ALE> help prog

Embedded Adaptive PROGRAM commands consist of:
ADDCh, DELCh, or CHGroup - (Chan Group <0 - 9>) (chan)
ADDMemB - (Net Name) (Member Address)
ALL_Call, ANY_Call - (ON/OFF)
AMD_Display - (ON/OFF)
DELADdr - (Address)
ERASE - Clear ALE Addresses
HElp or ? - (none/PRog/OPer/MODEM/SECURity) Embedded Adaptive Help
INDADdr, NETADdr - (Address) (Chan Group <0-9>) (Associated Self)
KEY To call - (ON, OFF)
LSTNbeforetx - (ON, OFF)
MAXCH - (0 - 100)
RXMsg - (none/DELeTe) (Message Number <0 - 9>)
(LASt)
RAD_silence - (ON, OFF)
SLFADdr - (Address) (Chan Group <0-9>)
TIME_OUt - (1 - 60) Minutes
TUNetime - (1 - 60) Seconds
TXMsg - (Message Number <0 - 9>) (Up to 90 characters)
(DELeTe) (Message Number <0 - 9>)
ZERO - Clear radio memory

ALE>
```

Figure 2-34. ALE Help/Help Program Menu

```

ALE> help oper

Embedded Adaptive OPERATIONAL commands consist of:
SCAN      - start scanning
STop      - stop scan
CALI      - (Address) (Chan)
INC       - up through the scan list
DEC       - down through the scan list
EOWDest   - (Individual Linked Address)
RANk      - (Individual Address)
SEnd      - (Message Number <0 - 9> ) (Address) (Chan)
EXCHange  - (STArt, STOp) (Address) (interval hh:mm) (start hh:mm)
SOUNd     - (STArt, STOp) (Self Address) (interval hh:mm) (start hh:mm)
SSB       - Exit ALE and return to SSB
HElp or ? - (none/PRog/OPer/SECurity) Embedded Adaptive Help

ALE>

```

**Figure 2-35. ALE Help Operational Menu**

```

ALE> help security
ALE Security Commands:
-----
LOCK prevents changes to the parameter type and UNLOCK allows changes.

The "SElect" commands control selecting or changing operational functions.
SElect ALL      - (LOCK/UNLOCK) all parameters
SElect DATA    - (LOCK/UNLOCK) data presets
SElect KEY      - (LOCK/UNLOCK) encryption keys

The "PROGram" commands control programming menu availability.
PROgram ALL     - (LOCK/UNLOCK) all parameters
PROgram ADDRess - (LOCK/UNLOCK) address programming
PROgram CFIg    - (LOCK/UNLOCK) configuration items
PROgram CHGroup - (LOCK/UNLOCK) channel groups
PROgram LQA     - (LOCK/UNLOCK) LQA programming
-----
NOTE: These are front-panel commands that take effect after cycling power!

```

**Figure 2-36. ALE Help Security Menu**

#### 2.8.4.4 ALE Remote Control Programming

ALE stations require programming of the following parameters before operation (in coordination with the other net sites):

- Channel groups
- Self addresses (name of the address and channel group)
- Individual addresses (name of the station address, a channel group, and a previously programmed self address called the associated self)
- Net addresses (optional) (name of the address, a channel group, a previously programmed self address called the associated self, and a list of up to 30 net members)
- Maximum channels scanned
- Maximum system tune time

For optimum performance, the following parameters should also be programmed:

- Radio silence
- Listen before transmit
- Key to call
- Link timeout

##### 2.8.4.4.1 Channel Group Programming

The channels programmed in the SSB mode must be assigned to channel groups for ALE operation. There are ten channel groups available (0 to 9), and each channel group may contain up to 100 channels. The programming of channel groups is accomplished by using the CHGroup and ADDCh commands.

- To assign channels to a group, enter the CHGroup command, followed by the channel group number (0-9) and the channels assigned to the group:

```
ALE> CHG 1 01 02 03 04 05
```

- To add a channel to an already programmed group, enter the ADDCh command, followed by the channel group number (0-9) and the channel to add to the group:

```
ALE> ADDC 1 06
```

#### 2.8.4.4.2 Programming Addresses

The following paragraphs describe how to program ALE addresses via the remote control.

a. Self Addresses

ALE self addresses are programmed using the SLFAD command. The SLFAD command requires an alphanumeric address and the associated channel group to be used by this unit.

**NOTE**

Self addresses are limited to 15 alphanumeric characters; however, a default self address of one to three characters must be programmed before ALE can operate.

- To program a self address, enter the SLFAD command, followed by the alphanumeric address and the associated channel group (0-9):

ALE> SLFAD BEN 1

b. Programming Individual Addresses

The addresses of individual outstations are programmed using the INDAD command. The INDAD command requires an alphanumeric address, the associated channel group, and a programmed associated self address.

- To program an individual address, enter the INDAD command, followed by the alphanumeric address, the associated channel group (0-9), and the associated self:

ALE> INDAD UNIT5 1 BEN

c. Programming Net Addresses

Net addresses are programmed using the NETAD and ADDMemb commands. First the net address must be programmed using the NETAD command. The NETAD command requires the alphanumeric address, the associated channel group, and the associated self.

- To program a net address, enter the NETAD command, followed by the alphanumeric address, the associated channel group (0-9), and the associated self:

ALE> NETAD 1NET 2 BEN

Next, the members are programmed into the net by using the ADDMemb command. The ADDMemb command requires the programmed net address (as described in the NETAD command) and the programmed individual or self address.

- To program the net members into the net address, enter the ADDMemb command, followed by the programmed net address and the programmed individual or self address:

ALE> ADDM 1NET UNIT5

ALE> ADDM 1NET BEN

The above commands programmed the net address 1NET with members UNIT5 and BEN.

### 2.8.4.5 ALE Remote Control Operation

After the radio has been programmed, a terminal or computer can command the system to scan, place or receive ALE calls, perform LQAs, and send EOWs or AMDs. The following sections give examples of these types of operation.

#### 2.8.4.5.1 Scan Operation

To enter the SCAN mode, type SCAN:

```
ALE> SCAN
SCANNING
```

To stop scanning, type STOP.

#### 2.8.4.5.2 Placing a Call

ALE allows a variety of calls to be made. Individual calls are made to a specific station; net calls are made to a net address. These calls are made automatically or manually. In addition, ALL calls or ANY calls can be made by entering the three appropriate letters (ALL or ANY) for a calling address.

A variety of other call types such as Selective All, Selective Any, Double Selective Any, Group, and Wildcard calls can all be received with ALE installed.

a. Automatic Calls to an Individual or Net

To place an automatic call, enter the address.

```
ALE > CALL UT5
          CALLING UT5          CHANNEL: 10
          LINKED UT5
```

If a link cannot be established, a NO RESPONSE message is displayed.

b. Manual Calls to an Individual or Net

To place a manual call, enter the address followed by the channel number.

```
ALE > CALL UT5          10
          CALLING UT5          CHANNEL: 10
          LINKED UT5
```

If a link cannot be established, a NO RESPONSE message is displayed.

c. ALL/ANY Calls

If a call is placed to ALL or ANY, the radio responds as it would if the call were placed from the front panel.

- To place an ALL call, type CALL ALL. Any station receiving the transmission links. No response is transmitted during an ALL call, but a link is established.
- To place a SELECTIVE ALL call, type CALL ALL G (where G is any alphanumeric character). Any station with a self address ending in the specified character, i.e., G, links. No response is transmitted during an ALL call, but a link is established.

- To place an ANY call, type CALL ANY. Any station recognizing the transmission responds in 1 of 16 randomly-selected time slots.
- To place a SELECTIVE ANY call, type CALL ANY G (where G is any alphanumeric character). Any station with a self address ending in G responds in one of 16 randomly selected time slots.
- To place a DOUBLE SELECTIVE ANY call, type CALL ANY GH (where GH represents any two alphanumeric characters). Any station with a self address ending in those two characters responds with an acknowledgement.

With ANY calls of any variety (non-selective, single character selective, or double character selective), the receiving stations respond and the initiating station's radio displays each responding station, followed by a transmission naming each receiving station that the initiating station heard.

If some of the ANY receiving stations respond, but their radio signals collide and the initiating station does not detect them, these receiving stations do not become part of the group. Since the initiating station's second transmission does not name them, they are not linked to the initiating station.

d. Wildcards

Wildcards are only possible from a terminal or computer connected at the radio's remote port. The question mark (?) represents any alphanumeric character of an address. For example, CALL B3?6 calls B376, B3Q6, and many more possible stations.

**NOTE**

For both ANY calls and wildcard calls, due to the response duration required, addresses should not exceed nine characters. An ANY call or wildcard call with over nine characters (including the question mark) is rejected with the front panel display of INV CALL TARGET signifying an invalid address.

**2.8.4.5.3 Receiving a Call**

The following display occurs when an incoming call or LQA request is received:

```
ALE > SIGNAL RECEIVED
RECEIVING CALL
KEY OFF
LINKED UT5           CHANNEL: 10
```

#### 2.8.4.5.4 Initiating an LQA

The following paragraphs describe how to initiate scheduled LQAs and immediate LQAs using remote control.

a. Scheduled LQA

To initiate a scheduled EXCHANGE (two-way transmission) LQA between this station and either an individual or net, the EXCHange STArt command is used.

- To schedule an EXCHANGE LQA, enter the EXCHange STArt command, followed by the destination (individual or net) address, the interval time between exchanges (hours, minutes in 24-hour format), and the start time (hours, minutes in 24-hour format):

```
ALE> EXCH STA UNIT5 01:00 11:15
```

The above example schedules an EXCHANGE LQA to station UNIT5 starting at 11:15 and occurring at one-hour intervals from the start time (that is, 12:15, 13:15, etc.).

To initiate a scheduled SOUND (one-way transmission) LQA, the SOUnd STArt command is used.

- To schedule a SOUND LQA, enter the SOUnd STArt command, followed by a self address, the interval time between transmissions (hours, minutes in 24-hour format), and the start time (hours, minutes in 24-hour format):

```
ALE> SOU STA BEN 00:30 13:25
```

The above example schedules a SOUND LQA using the self address BEN starting at 13:25 and occurring at 30-minute intervals from the start time (that is, 13:55, 14:25, etc.).

To remove a scheduled LQA, use the EXCHange STOP or SOUnd STOP commands and the address scheduled with the appropriate LQA.

- To remove a scheduled EXCHANGE LQA, enter the EXCHange STOP command, followed by the scheduled address (individual or net):

```
ALE> EXCH STOP UNIT5
```

- To remove a scheduled SOUND LQA, enter the SOUnd STOP command, followed by the scheduled self address:

```
ALE> SOU STOP UNIT5
```

To immediately stop a currently transmitting LQA, type the SCAN command:

```
ALE> SCAN
```

The radio stops the current LQA and returns to scan operation.

b. Immediate LQA

Immediate one time EXCHANGE (two-way channel evaluation) and SOUND (one-way channel evaluation) LQAs are possible using the same commands as described in the previous Scheduled LQA paragraph, without entering the interval and start times.

- To start an immediate EXCHANGE LQA measurement:

ALE > EXCH STA UNIT5

- To start an immediate SOUND LQA measurement:

ALE> SOU STA UNIT5

- To stop a SOUND or EXCHANGE LQA, enter SCAN:

ALE> SCAN

The radio stops the current LQA and returns to scan operation.

- To view the LQA scores:

ALE > RANK UT5  
RANK UT5

CHAN: 10	SCORE: 100	MEASURED SNR 30	RECEIVED SNR 30
CHAN: 03	SCORE: 100	MEASURED SNR 30	RECEIVED SNR 30
CHAN: 02	SCORE: 057	MEASURED SNR 14	RECEIVED SNR 12
CHAN: 07	SCORE: 056	MEASURED SNR 13	RECEIVED SNR 12
CHAN: 04	SCORE: 055	MEASURED SNR 13	RECEIVED SNR 11
CHAN: 08	SCORE: 052	MEASURED SNR 13	RECEIVED SNR 09
CHAN: 06	SCORE: 048	MEASURED SNR 13	RECEIVED SNR 07
CHAN: 05	SCORE: 045	MEASURED SNR 13	RECEIVED SNR 06
CHAN: 09	SCORE: ---	MEASURED SNR --	RECEIVED SNR --
CHAN: 01	SCORE: ---	MEASURED SNR --	RECEIVED SNR --

The LQA score indicates the relative quality of the channel with “---” representing a channel where no valid measurement could be made and 100 representing the highest score. The Signal-to-Noise Ratio (SNR) range is from “—” to 30 dB, with “—” representing a channel where no measure could be made and 30 dB representing the highest SNR.



#### 2.8.4.5.5 EOW

An EOW is a message typed from the remote port, while linked to another station. Unlike a typical data transfer, an EOW has an acknowledgement sent back. The EOW function uses the data capability built into the ALE controller.

To send an EOW, the following conditions must be met:

- The two stations are linked.
- An EOW can only be sent to one individual address (refer to Chapter 3, Paragraph 3.3.5, EOW Destination).
- If a modem option is installed, the modem must be turned off.

To start/stop an EOW:

- The EOW is started by typing a Control-B (^B) data control character.
- The EOW is stopped by typing a Control-C (^C) data control character.

The radio sends the EOW message in blocks of 300 characters each, until the last block is sent. Radio terminal echo stops when the buffer is full, which would normally only occur for a file transfer.

Because of the error detection and ARQ, the message sender can be assured of the message transfer to the distant station. The message transferred to the distant station is displayed on the terminal attached to the remote port. Note that the received station does not store the message.

#### 2.8.4.5.6 AMD

The AMD function enables stations to communicate short messages or prearranged codes to any selected station or stations. Up to ten messages (in buffers 0 to 9), each containing up to 87 characters, may be programmed. The following commands entered from a terminal connected to the remote port are used for programming and sending AMD messages.

##### a. Transmit AMD Messages

- To program a message that can be sent, enter the TXMsg command, followed by the message buffer number (0-9), and the message characters (up to 87 characters):

```
ALE> TXM 2 THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
```

- To display all programmed transmit message buffers, enter the TXMsg command:

```
ALE> TXM
```

This displays all programmed transmit message buffers.

- To display a specific transmit message buffer, enter TXMsg and the message buffer number (0-9):

```
ALE> TXM 6
```

This displays transmit message buffer six (6).

- To send a specific transmit message, enter the SEnd command, followed by the desired message number, the destination address, and optional channel number. If channel number is not entered, the radio determines the best channel to send the message:

ALE> SE 2 UNIT5

This sends transmit message buffer 2 to station UNIT5 – the radio determines the best channel to send the message.

ALE> SE 1 TIM 6

This sends transmit message buffer 1 to station TIM on channel 6.

b. Receive AMD Messages

When the AMD message is received, the receiving units display the message. The receiving station stores the ten most recently received AMD messages and marks the messages with the time and date.

- To display all received message buffers, enter RXMsg.

ALE> RXM

- To display the most recently received AMD message, enter the RXMsg LAsT command.

ALE> RXM LAs

- To display a specific receive message buffer, enter RXMsg and the message buffer number (0-9).

ALE> RXM 6

This displays receive message buffer six.

### 2.8.4.6 ALE Example

Figure 2-37 is an example of remote programming and operation of ALE. This example indicates the minimum steps necessary to program ALE to enable the system to start scanning. In the example, the commands are in lower case and the ALE status/response is in upper case.

Show Menu	Comments
SSB > ale	Command to enter ALE operating mode
ALE_INST	Indicates ALE is installed
ALE> IN_PROG	ALE is in program mode
ALE> SHOW	Command to display currently programmed ALE parameters
LSTN OFF	Listen Before Transmit is off
KEY_TO_CALL OFF	Key To Call is off
RAD_SIL OFF	Radio Silence is off
ALL_CALL ON	Reception of ALL calls is enabled
ANY_CALL ON	Reception of ANY calls is enabled
MAXCH 100	Maximum Channels Scanned is 100
TUNETIME 060	Maximum System Tune Time is 60 seconds
TIME_OUT 000	Link timeout is disabled
AMD_DISPLAY ON	Display of Received AMDs is enabled
ALE> PRG 1-3 CHAR SLF	Warning: ALE requires 1-3 character self address before ALE operation can begin
ALE> SLFAD ABC 0	Program a self address of ABC and channel group 0
IND NOT PROGRMD	Warning: ALE requires an individual address before ALE operation can begin
ALE> INDAD XYZ 0 ABC	Program an individual address of XYZ, channel group 0, and associated self address of ABC
NO CHANS TO SCAN	Warning: ALE requires a channel group programmed with the channels to scan
ALE> CHG 0 1 2 3 4 5 6 7 8 9 10	Program channel group 0 with channels 1-10
ALE> SCANNING	ALE is scanning the channel group(s)

Figure 2-37. Sample ALE Remote Programming and Operation Screen

### 2.8.5 Frequency Hopping Remote Control Operation

Full remote control operation and programming of the frequency hopping option is supported by the RT-1694 Receiver-Transmitter. The remote control commands, menus, status, and HELP screens are similar to those used in SSB operation.

Commands may be entered individually from a terminal or downloaded from an ASCII text file.

#### 2.8.5.1 Hop Show Menu

Entering SHOW provides a status listing of the frequency hopping option. The command is used to monitor frequency-hopping operation and to confirm system configuration. Figure 2-38 shows a typical Show menu.

Show Menu	Comments
HOP > show	Command to display currently programmed HOP parameters
NET 00	Channel 00
KEY OFF	Transceiver is unkeyed (receiving)
NETID 00 55555555	Network ID for 00 is 55555555
HOPTYPE 00 NB	Network 00 is in a narrowband net
CENTER 00 100000	Network 00 center frequency is 10 MHz
HOPNUM 0041	Unit hops on 41 frequencies
MODEM 7 DAT7	The modem is on
ENCRYPT ON	Encryption is on
CUR_KEY 01	Encryption key selected is 01
POWER HI	RF power output is set to maximum
NO_SYNC	The unit is not currently synchronized with net
HOP>	HOP mode prompt

**Figure 2-38. Typical Frequency Hopping (with Hopset) Show Menu**

### 2.8.5.2 Hop Help Menus

Entering HOP> HELP on the remote control data device provides a listing and structure of the frequency hopping remote control commands. In addition to the Help menu, HOP provides help menus for modem and security commands.

Entering ALE> HELP on the remote control data device provides a listing and structure of ALE remote control commands. Figure 2-39 shows a typical Hop Help menu. Figure 2-40 shows a typical Hop Help Modem menu. Figure 2-41 shows a typical Hop Help Security menu.

```

HOP > help
HOP Commands:
-----
ALE      -      ALE Mode          MODEM    -      see Help MODEM
DISplay  -      all nets, (0..9) one net  NET      -      (0..9)
ENCRypt  -      (ON/OFF) encryption  NETId    -      (0..9) (8-digit code)
ENC_KEY  -      (1..6) (12 digit key)  POWER    -      (LOW/MED/HI)
EXClude  -      (0..9) (low freq) (hi freq)  PROGRAM  -      see HELp SECurity
EXClude  -      (0..9) DEL, remove excl band  SElect   -      see HELp SECurity
EXClude  -      DEL, remove all excl bands  SHow     -      show status
HOPList  -      (0..9) (ADD) (freq) ...  SSb      -      single channel mode
HOPList  -      (0..9) (DELete) (freq) ...  SYnc     -      sync request or response
HOPSet   -      (0..9) (low freq) (hi freq)  TIme     -      (hh:mm:ss)
HOPSet   -      (0..9) (center freq)  USE_KEY  -      (1..6) encryption key
HOPSet   -      (0..9) DELete          ZEROize  -      clear radio memory
HOPType  -      (0..9) (WB/NB/LIst)
-----
HOP>
    
```

Figure 2-39. Typical Hop Help Menu

```

HOP > help modem
Modem Commands:
-----
Prefixed by MODEM:
Off          -  disable modem          PREset      -  show all modem presets
SHow        -  show current modem info  xxxx       -  set modem to preset xxxx

Prefixed by MODEM PRESET n: where n = data preset number
ASync       -  (REMOte/DATa), async mode
DISable     -  lockout the given preset
ENable      -  enable the given preset
NAME        -  (xxxx) new preset name
SYnc        -  sync mode
BAUd        -  (75/150/300)
-----
***capital letters denote acceptable abbreviation
HOP>

```

**Figure 2-40. Typical Hop Help Modem Menu**

```

HOP > help security
HOP Security Commands:
-----
LOCK prevents changes to the parameter type and UNLOCK allows changes.

The "SElect" commands control selecting or changing operational functions.
SElect ALL      -  (LOCK/UNLOCK) all parameters
SElect DATa    -  (LOCK/UNLOCK) data presets
SElect KEY     -  (LOCK/UNLOCK) encryption keys

The "PROGram" commands control programming menu availability.
PROGram ALL    -  (LOCK/UNLOCK) all parameters
PROGram DATa  -  (LOCK/UNLOCK) data presets
PROGram EXClude -  (LOCK/UNLOCK) exclusion bands
PROGram NET    -  (LOCK/UNLOCK) hopnet parameters
PROGram TX_Power -  (LOCK/UNLOCK) transmit power output
-----
NOTE: These are front-panel commands that take effect after cycling power.

```

**Figure 2-41. Typical Hop Help Security Menu**

### 2.8.5.3 Synchronization Sequence

After programming frequency hopping operation, the synchronization sequence should be initiated. To initiate the synchronization sequence, the operator types SYNC at the HOP> prompt. SENDING\_SYNC\_REQ is then displayed at the remote control terminal. After sending the message, AWAITING SYNC is displayed.

When a synchronization request is received, SYNC REQ RCV is displayed at the remote control terminals of all receiving units. The net coordinator then has five (5) seconds to type the SYNC command, causing the radio to send a Sync Response message. While the message is sent, RESP TO SYNC is displayed at the net coordinator's terminal. After the message transmission is completed, IN SYNC is displayed at the net coordinator's terminal.

If the Sync Response is received correctly by the slave unit, IN SYNC is displayed. Otherwise, SYNC FAILED is displayed.

### 2.8.5.4 Keying

The following paragraphs describe remote control keying operation.

#### 2.8.5.4.1 Data Transmission

When the synchronous or asynchronous data interface is selected, the system is keyed/unkeyed for data transmission by activating/deactivating the RTS signal. The system must be IN SYNC to be keyed. Data interface is selected as part of DATA PRESET programming.

Data may also be transmitted using the asynchronous remote interface. The system accepts data from the remote control terminal for transmission only when the system is IN SYNC. An ASCII Control-B (^B) character initiates a transmission. All characters received from the terminal following a Control-B (^B) are interpreted as data for transmission until Control-C (^C) is typed. When the Control-C (^C) is received, the transmission is completed and then the system is unkeyed.

#### 2.8.5.4.2 Voice Transmission

For voice transmission, the system can be keyed and unkeyed via the audio keyline, or the MIC (microphone push-to-talk button) keyline.

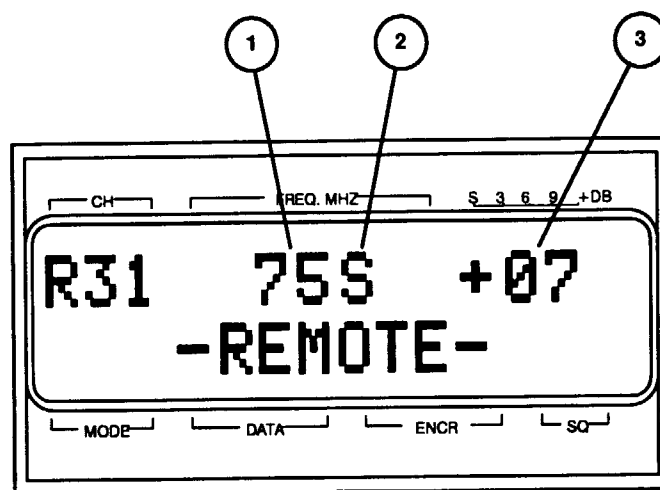
The system can also be keyed or unkeyed by entering the KEY ON or KEY OFF command from the remote terminal (these can be abbreviated K ON and K OF). In this case, the system accepts voice audio for transmission from the front panel audio input.

### 2.8.5.5 Remote Serial Tone Modem Operation

When the serial tone modem acquires a signal, the baud rate, receive interleaving state, and SNR are automatically displayed on the R/T front panel. Refer to Table 2-109 and see Figure 2-42.

**Table 2-109. Front Panel Display – Serial Tone Modem Indicators**

Key (Figure 2-42)	Indicator	Function
1	Baud Rate	Indicates the receive baud rate.
2	Interleaving State	Indicates the receive interleaving state (short or long)
3	S/N Ratio	Indicates the signal-to-noise ratio.



MNPK-047

**Figure 2-42. R/T Display When Serial Tone Modem Acquires a Signal**



### 2.8.5.5.1 Remote Modem SNR Command (Signal-To-Noise Ratio)

Table 2-110 provides the procedure to remotely determine the serial tone modem's SNR.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-110. Procedure to Determine Serial Tone Modem S/N Ratio**

Step	Control	Action	Observe
1	Remote terminal	Enter the command:  SSB> modem snr	The remote terminal displays the serial tone modem's SNR:  Modem SNR +07

### 2.8.5.5.2 Remote Modem SER Command (Serial Tone Information)

Table 2-111 provides the procedure to remotely determine information about the serial tone modem.

**NOTE**

Sample screen displays are shown for the following procedure.  
Actual screen displays may vary based on radio programming.

**Table 2-111. Procedure to Determine Serial Tone Modem Information**

Step	Control	Action	Observe
1	Remote terminal	Enter the command:  SSB> modem ser	The remote terminal displays the serial tone modem's information:  TY = Modem type ST = Active modem state TX = Transmit baud rate and interleave state RX = Receive baud rate and interleave state SNR = Signal-to-noise ratio

**NOTE**

This command is only valid when a serial tone preset is active.

## **CHAPTER 3**

### **FUNCTIONAL DESCRIPTION**

#### **3.1 INTRODUCTION**

##### **3.1.1 General**

This chapter covers the functional description of the RF-5200 FALCON™ Series Manpack System. Paragraph 3.2 gives the major level functional description, which covers the Line Replaceable Units (LRUs) that make up the radio system. Refer to Chapter 5 for Built-In Test (BIT) and system troubleshooting information.

#### **3.2 MAJOR FUNCTION LEVEL DESCRIPTION**

##### **3.2.1 General**

For detailed interconnections, refer to Chapter 5 for the following:

- Figure 5-3 – BIT Signal Path Diagram
- Figure 5-4 – RF/IF/Audio Signal Path Diagram
- Figure 5-5 – Control Path Diagram
- Figure 5-6 – Power Distribution Diagram

The major function level description is divided into the following three signal paths:

- Radio Frequency (RF)/Intermediate Frequency (IF)/Audio Signal Path
- Control Path
- Power Distribution

The description of each signal type is further divided as each LRU relates to the signal path. Each signal type is not present on every LRU, which will be apparent in the following paragraphs. Refer to Chapter 5, Paragraph 5.6, for the BIT description.

##### **3.2.2 RF/IF/Audio Signal Path**

Refer to Chapter 5, Figure 5-4. The following paragraphs describe the functions of each LRU as they relate to the transmit and receive signal paths in the RF-5200 FALCON™ Series Manpack Systems.

###### **3.2.2.1 RT-1694 Receiver-Transmitter**

The following paragraphs describe the RF/IF/audio signal path through the RT-1694 Receiver-Transmitter.

#### **NOTE**

The following paragraphs describe a Receiver-Transmitter (R/T) using analog clear voice. The signal paths may change when operating in other modes.

### 3.2.2.1.1 Transmitter Functional Level Description

Audio enters the radio at the handset when it is keyed and spoken into. The audio signal is routed from the Front Panel Module to the Analog-to-Digital (A/D) converter on the Signal Processor Module for digitizing. The digitized audio is passed to the IF Digital Signal Processor (DSP), which generates the digital representation of an IF. This signal then passes through a Digital-to-Analog (D/A) converter, where the digitized IF is converted into an analog IF signal. This signal is passed to the Receiver/Exciter Module for conversion to an RF signal.

Mixing circuitry on the Receiver/Exciter Module mixes the IF signal with signals from the local oscillators on the Synthesizer Module. The resulting RF signal is in the frequency range of 1.6 MHz to 59.9999 MHz. This RF signal is amplified to approximately 100 mW before being output to the Power Amplifier/Battery Charger Module.

When the R/T is in the manpack configuration, the Amplifier/Battery Charger Module amplifies the 100 mW RF signal to 20 watts. The 20 watt signal then passes through one of eight harmonic filters to reduce the level of unwanted harmonics. The 20 watt RF signal then passes through a tuning circuit on the Antenna Coupler Module before leaving the R/T through the ANT connector. The RF signal is then transmitted through the whip antenna.

When the R/T is in a vehicular configuration, the 100 mW RF signal follows the Receive (RX)/Power Amplifier Bypass path through the Power Amplifier/Battery Charger Module, then follows the coupler bypass path through the Antenna Coupler Module, before leaving the R/T through the ANT connector and being passed to the external power amplifier.

### 3.2.2.1.2 Receiver Functional Level Description

When the R/T is in the manpack configuration, RF signals in the frequency range of 1.6 MHz to 59.9999 MHz are passed to the RT-1694 Receiver-Transmitter from the whip antenna. These signals pass through the tuning circuit of the Antenna Coupler Module and one of the harmonic filters on the Power Amplifier/Battery Charger Module. The RF signal then follows the RX/Power Amplifier Bypass path through the receiver protection circuit on the Power Amplifier/Battery Charger Module before being routed to the Receiver/Exciter Module.

When the R/T is in a vehicular configuration, RF signals in the frequency range of 1.6 MHz to 59.9999 MHz are passed to the RT-1694 Receiver-Transmitter from the external power amplifier. These signals follow the coupler bypass path through the Antenna Coupler Module. The receive signal then passes through one of the harmonic filters on the Power Amplifier/Battery Charger Module. The RF signal then follows the RX/Power Amplifier Bypass path through the receiver protection circuit on the Power Amplifier/Battery Charger Module before being routed to the Receiver/Exciter Module.

The RF signal follows the RX path before being mixed with signals from the local oscillators on the Synthesizer Assembly. The result is an IF signal. The IF signal is then converted to a digital representation of the IF signal by the A/D converter on the Signal Processor Module. The A/D converter passes this signal to the IF DSP, which removes the IF components of the signal. The digital signal is then processed by the D/A converter, which creates an analog audio signal. The analog audio then passes through the Front Panel Assembly, where it is routed to the handset.

### 3.2.2.2 RF-5030PA-20E 20 Watt Power Amplifier/Coupler, RF-5032PA-125E 125 Watt Power Amplifier, and RF-5033PA-150 150 Watt Power Amplifier

When transmitting, low-power RF signals from the R/T's exciter enter the RF-5030PA-20E 20 Watt Power Amplifier or the RF-5032PA-125E 125 Watt Power Amplifier through its J12 connector, or the RF-5033PA-150 150 Watt Power Amplifier through its J1 connector.

RF amplification takes place on the Power Amplification module, which is capable of accepting the low-power signal from the RT-1694 Receiver-Transmitter and producing a high-power signal that is sent to the Harmonic Filter module.

The Harmonic Filter module filters harmonic signals from the transmitted signal. This module consists of seven filters (125 watt power amplifier), eight filters (20 watt power amplifier), or nine filters (150 watt power amplifier), one of which is switched into the signal path depending on the frequency selected. The high-power transmitted signal then passes through a bandpass filter. The transmit RF exits the power amplifier through the J11 connector (125 watt power amplifier and 150 watt power amplifier) or the ANT connector (20 watt power amplifier) before being passed to the antenna coupler (High Frequency [HF] frequencies), or exits the power amplifier through the J8 connector to a broadband Very High Frequency (VHF) antenna (VHF frequencies – 150 watt power amplifier only).

When receiving HF frequencies, RF signals are passed to the power amplifier via the antenna coupler. These signals enter the power amplifier through its J11 connector (125 watt power amplifier and 150 watt power amplifier) or the ANT connector (20 watt power amplifier). The receiver protection circuitry on the Receiver Protection Module senses and reacts to high RF signals during receive operation. It disconnects the signal path if an abnormally high level is sensed in the receive path. When receiving VHF frequencies (150 watt configuration only), the RF signals from the VHF broadband antenna are passed to the power amplifier directly from the antenna. These VHF signals enter the power amplifier through its J8 connector (150 watt power amplifier only). The RF signals follow the RX bypass path around the Transmit (TX) amplifier, then pass through one of the harmonic filters. These RF receive signals then leave the power amplifier through its J12 connector (RF-5030PA-20E 20 Watt Power Amplifier and RF-5032PA-125E 125 Watt Power Amplifier) or J1 connector (RF-5033PA-150 150 Watt Power Amplifier) and are passed to the R/T.

### **3.2.2.3 RF-382 Antenna Coupler**

When transmitting, high-power RF signals from the RF-5032PA-125E 125 Watt Power Amplifier or the RF-5033PA-150 150 Watt Power Amplifier enter the RF-382 Antenna Coupler through its J1 connector.

The RF signals to be transmitted are passed to the Discriminator Module, where the following information is generated and sent to the Control Module:

- Forward and reflected power
- Frequency
- Phase
- Conductance

The RF signal is then sent to the RF/Coil Pack Module, which incorporates all the inductors and capacitors necessary to tune the antenna coupler. Tuning is accomplished by selectively shorting and unshorting coils and capacitors in the signal path. The RF signals to be transmitted leave the antenna coupler through its E1 connector and are passed to the antenna.

When receiving, RF signals from the antenna enter the antenna coupler through its E1 connector. These signals leave the antenna coupler through its J1 connector and are passed to the power amplifier.

### **3.2.3 Control Paths**

Refer to Chapter 5, Figure 5-5. This figure illustrates the control paths that exist between the R/T, the power amplifier, and the antenna coupler. The control paths are where the RT-1694 Receiver-Transmitter interacts with an external power amplifier and antenna coupler.

### **3.2.3.1 RT-1694 Receiver-Transmitter to Power Amplifier Control Lines**

The RF-5030PA-20E, RF-5032PA-125E, and RF-5033PA-150 Power Amplifiers automatically respond to control inputs from the R/T. The R/T also monitors the presence and operational status of the power amplifier.

### **3.2.3.2 Power Amplifier to RF-382 Antenna Coupler Control Lines**

Control information is passed from the R/T to the antenna coupler via the power amplifier. Coupler status and fault information is relayed back to the R/T.

## **3.2.4 Power Distribution Paths**

### **3.2.4.1 General**

Refer to Chapter 5, Figure 5-6. Power distribution consists of distributing +26.4 Vdc to the radio system LRUs.

### **3.2.4.2 Direct Current (DC) Voltage Distribution**

+26.4 Vdc from the external power supply or the vehicular alternator/battery system enters the power amplifier through its J10 connector, where it is distributed to the R/T and the antenna coupler. The power amplifier and antenna coupler are automatically powered ON and OFF by the R/T.

**CHAPTER 4**

**SCHEDULED MAINTENANCE**

**4.1 PREVENTIVE MAINTENANCE**

Preventive maintenance is the systematic, daily care and inspection of equipment to prevent equipment failure and reduce downtime.

Table 4-1 contains the checks and services that should be performed either on a daily basis when the equipment is in use or on a weekly basis when the equipment is in a standby condition. Table 4-2 contains the checks and services that should be performed on a weekly basis.

**Table 4-1. Daily Preventive Maintenance Checks and Services**

Check No.	Item to be Inspected	Procedure
1	Completeness	Check to see that the equipment is complete.
2	Exterior Surfaces	Remove dust, dirt, and moisture from all surfaces and clean front panel display window with a soft cloth.
3	Controls	Check all controls for looseness or damage; check mechanical action of each control for smooth operation.
4	Batteries	Inspect batteries for leakiness or corrosion.
5	Operation	Perform self-test.

**Table 4-2. Weekly Preventive Maintenance Checks and Services**

Check No.	Item to be Inspected	Procedure
1	Battery Condition	Remove battery case from Receiver-Transmitter (R/T) and check batteries for corrosion or leakage. Clean or replace as required.
2	Connectors	Check all connectors for debris, damage, or corrosion. Elevate to a higher level of maintenance if required.
3	Antenna	Check for breaks or strains; repair or replace as required.

**CHAPTER 5**  
**TROUBLESHOOTING**

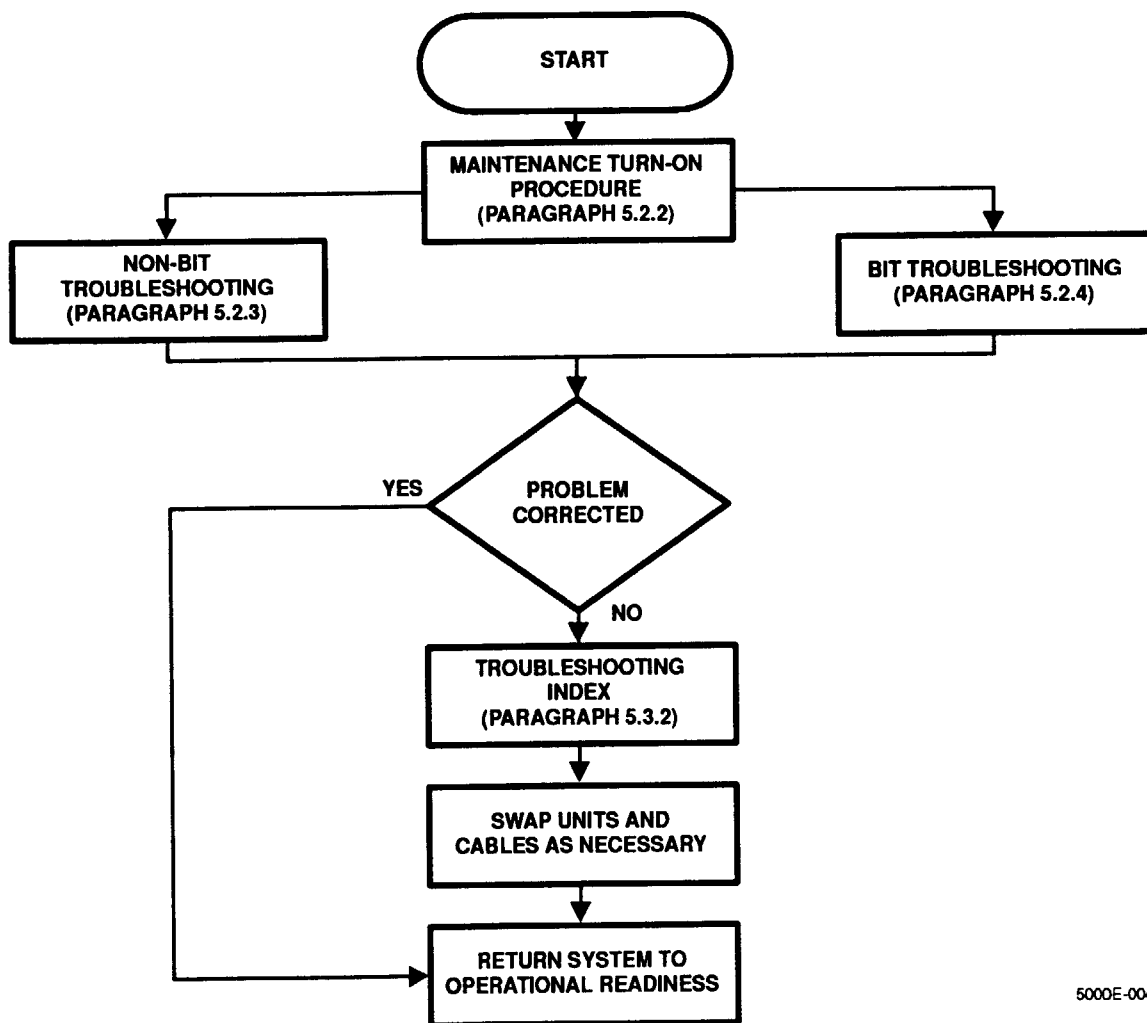
**5.1 INTRODUCTION**

**5.1.1 General**

This chapter provides troubleshooting data necessary for fault isolation to the Line Replaceable Unit (LRU) level.

**5.1.2 Scope of this Chapter**

See Figure 5-1. The procedures presented in this chapter assume that a Level I fault has led the maintainer to suspect a fault with the radio system. The maintainer begins the troubleshooting process by using the maintenance turn-on procedure to find a Receiver-Transmitter (R/T) fault indication that identifies the faulty LRU. If there is a non-Built-In Test (non-BIT) fault, the maintainer will use the non-BIT troubleshooting procedures. If there is a BIT fault, the maintainer will use the BIT troubleshooting procedures. When the problem is found and corrected, the radio system is returned to operational readiness.



5000E-004

**Figure 5-1. Troubleshooting Process Used in this Chapter**

## 5.2 TROUBLESHOOTING PROCEDURES

### 5.2.1 General

Troubleshooting begins with performing the maintenance turn-on procedure. The maintenance turn-on procedure references the non-BIT and BIT troubleshooting procedures.

### 5.2.2 Maintenance Turn-On Procedure

Table 5-1 provides the maintenance turn-on procedure for the radio system. The maintenance turn-on procedure is used to guide the maintainer through the proper R/T front panel settings to power up the radio system from a de-energized state to a fully operational state. In each step the maintainer is to observe the radio system for normal operating conditions. Faults may be observed by BIT or a visual observation. BIT faults for all units are displayed on the R/T's front panel. The first column in Table 5-1 gives the step-by-step procedure. The second column gives the expected normal observation, and the third column references the procedure to follow if the expected normal observation is not found. These references include BIT troubleshooting and non-BIT troubleshooting.

**Table 5-1. Maintenance Turn-On Procedure**

Step	Observe	Reference
a. If installed in the 20 watt or 125 watt vehicular configuration, toggle ON/OFF switch on power converter (if installed) and power supply (if installed) to ON position. If installed in the 150 watt configuration, power on the Power Amplifier (PA).		
b. Turn the R/T FUNCTION knob clockwise from OFF position to Single Sideband (SSB) position.	The R/T displays an initialization screen, followed by the same display as when it was last used in SSB mode.	Refer to the non-BIT troubleshooting procedures in Paragraph 5.2.3.
c. Turn the R/T FUNCTION knob clockwise from SSB position to TEST position.	The R/T displays an initialization screen, followed by the following screen:  TEST VERSION VSWR BATTERY	Refer to Chapter 2, Operation.
d. Press and release the ENTER key.	The R/T displays the following screen:  ** SELF TEST ** * IN PROGRESS *	Refer to Chapter 2, Operation.



**Table 5-1. Maintenance Turn-On Procedure – Continued**

Step	Observe	Reference
	<p>If a BIT fault is generated on the R/T front panel, write down the fault code.</p> <p>If no errors occur during BIT, the R/T displays the following screen:</p> <p><b>SELF TEST DONE</b> <b>** NO ERRORS **</b></p> <p>Continue operating the radio system in an attempt to generate a run-time fault.</p>	<p>Refer to the BIT troubleshooting procedures in Paragraph 5.2.4.</p> <p>If a run-time fault is generated, refer to the non-BIT troubleshooting procedures in Paragraph 5.2.3.</p> <p>If no run-time fault is generated, return radio system to operational readiness.</p>

### 5.2.3 Troubleshooting with Non-BIT Fault Isolation

Table 5-2 is a list of the non-BIT fault symptoms. Next to the symptom is a reference to the recommended action that should be taken. When the action is to see a specific figure and sheet, follow the top of the figure from left to right to find the symptom observed. Once the symptom is found on the figure, follow from top to bottom for the checks and corrective action. If the actions do not correct the problem, proceed to the troubleshooting index in Paragraph 5.3.2.

**Table 5-2. Non-BIT Fault Symptoms**

Symptom Observed	Action
<b>Faults that Generate a Message on R/T Front Panel Liquid Crystal Display (LCD)</b>	
<p>ALE NOT INSTALLED CHANNEL BUSY CHANNEL DATA STORAGE FAILURE COUPLER BYPASS</p> <p>COUPLER COMM FAULT COUPLER FAULT COUPLER OVERTEMP COUPLER WARNING EOW DESTINATION ONLY WHEN LINKED</p> <p>EOW NOT ALLOWED</p> <p><b>**ERROR**</b></p> <p>HIGH DC INPUT HIGH VSWR INCORRECT PASSWORD ENTERED IND NOT PROGRMD INTERNAL COMM FAULT INTRVAL TIME ERR</p> <p>INV CALL TARGET INV CHAN GROUP</p> <p>INV CHAN NUMBER</p>	<p>Remove and replace R/T. Change channels. Remove and replace R/T. This indicates that the BNC Radio Frequency (RF) output connector (J11 AUX) has been selected as the RF OUTPUT during the auto tune sequence. No action required. See Figure 5-2, sheet 1. See Figure 5-2, sheet 1. See Figure 5-2, sheet 1. See Figure 5-2, sheet 2. Establish link with target station before transmitting Engineering Order Wire (EOW) message. Establish link with target station before entering EOW destination address. Check syntax of command entered at remote terminal and re-enter command. See Figure 5-2, sheet 2. See Figure 5-2, sheet 2. Check password and re-enter. Program at least one individual address. Remove and replace R/T. Enter a valid Automatic Link Establishment (ALE) time interval. Program at least one individual address. Program a new channel group, or use a pre-programmed channel group. Make sure channel number entered is no higher than 99.</p>

**Table 5-2. Non-BIT Fault Symptoms – Continued**

Symptom Observed	Action
INV IND ADDRESS	Make sure individual address entered is no more than 15 characters long, and has only alphanumeric characters.
INV MAX SCAN	Make sure number of scan channels is no higher than 99.
INV MEMBER ADDR	Make sure addresses being added to net are programmed self or individual addresses.
INV NET ADDRESS	Make sure net address entered is no more than 15 characters long, and has only alphanumeric characters.
INV RANK REQUEST	Make sure address being ranked is a net address, not an individual address.
INV SELF ADDRESS	Make sure self address entered is no more than 15 characters long, and has only alphanumeric characters.
INV TIME OF DAY	Make sure time of day being programmed is no higher than 23:59.
INV TIME OUT	Make sure link timeout being programmed is no higher than 60 minutes.
INV TUNE TIME	Make sure tune time entered is no less than 1 and no greater than 60.
LOW BATTERY	See Figure 5-2, sheet 3.
LOW DC INPUT	See Figure 5-2, sheet 3.
NET TABLE FULL	Make sure no more than 20 net addresses are programmed into the R/T.
NO CHANS IN GRP	Program a channel group.
NO CHANS TO SCAN	Program a channel group.
NO ENCRYPTION KEYS PROGRAMMED	Program encryption keys, or use analog clear voice.
NO PA	See Figure 5-2, sheet 3.
NO SYNC *BAD HOPSET*	Make sure frequency parameters programmed for the currently selected channel are valid. For wideband nets, make sure the difference between the upper and lower boundary frequencies is no more than 2 MHz.
NO SYNC *INVALID HOPSET*	Make sure the frequency list for the list net contains at least 15 frequencies. Also make sure the difference between the upper and lower boundary frequencies is no more than 2 MHz.
NO SYNC LIST INVALID	Reprogram the frequency hopping parameters, or select a non-list net.

**Table 5-2. Non-BIT Fault Symptoms – Continued**

Symptom Observed	Action
NO SYNC *NO HOPSET*	Reprogram the frequency hopping parameters.
NO SYNC *NO NET ID*	Reprogram the Net Identification (ID) parameters, or the frequency hopping parameters.
NO SYNC WIDE BAND INVAL	Select a narrowband net, or reprogram the frequency hopping parameters.
OUT OF LOCK	See Figure 5-2, sheet 3.
PA BAD FILTER	See Figure 5-2, sheet 4.
PA COMM FAULT	See Figure 5-2, sheet 4.
PA OVERCURRENT	See Figure 5-2, sheet 4.
PA OVERTEMP	See Figure 5-2, sheet 4.
PA WARNING	See Figure 5-2, sheet 4.
POWER CUTBACK	Self-correcting warning. No action required.
PREPOST OPEN RF SWITCH OVLD	An input signal has exceeded the overload threshold of the Pre/Postselector. Tune the Pre/Postselector to another frequency. Check for cabling errors to the Pre/Postselector. Check for large, out-of-band signals.
PRG 1-3 CHAR SLF	Program the default self address with one to three characters.
PROG NOT ALLOWED	Make sure R/T is not in a linked state.
PROGRAM REVIEW ADR ALREADY QUED	Address is already queued. No action required.
PROGRAM REVIEW NO LQA IN SILENT	R/T cannot be programmed when in silence mode. No action required.
RECEIVING AMD	R/T is currently receiving an automatic message display. No action required.
RECEIVING CALL	R/T is currently receiving a call. No action required.
REPLACE BATTERY	See Figure 5-2, sheet 5.
SELF INDIVIDUAL IND TABLE FULL	Delete unused individual addresses.
SELF INDIVIDUAL INV ASSOC SELF	Program a new self address.
SELF INDIVIDUAL RESERVED ADDRESS	Make sure the self or individual address does not contain the words ALL or ANY.
SELF INDIVIDUAL SELF TABLE FULL	Make sure no more than 20 self addresses are programmed into the R/T.
SIGNAL RECEIVED	R/T has received an incoming call or Link Quality Analysis (LQA) request. No action required.

**Table 5-2. Non-BIT Fault Symptoms – Continued**

<b>Symptom Observed</b>	<b>Action</b>
START TIME ERROR TEMP FAULT TERMINATING LINK  TUNE FAULT TUNE MARGINAL	Verify correct time and reprogram. See Figure 5-2, sheet 5. Station is terminating ALE link. No action required.  See Figure 5-2, sheet 5. See Figure 5-2, sheet 5.
<b>Miscellaneous Fault Symptoms</b>	
No power Poor receive sensitivity Transmitted signal not received Continuous tone in handset	See Figure 5-2, sheet 6. See Figure 5-2, sheet 7. See Figure 5-2, sheet 7. See Figure 5-2, sheet 8.

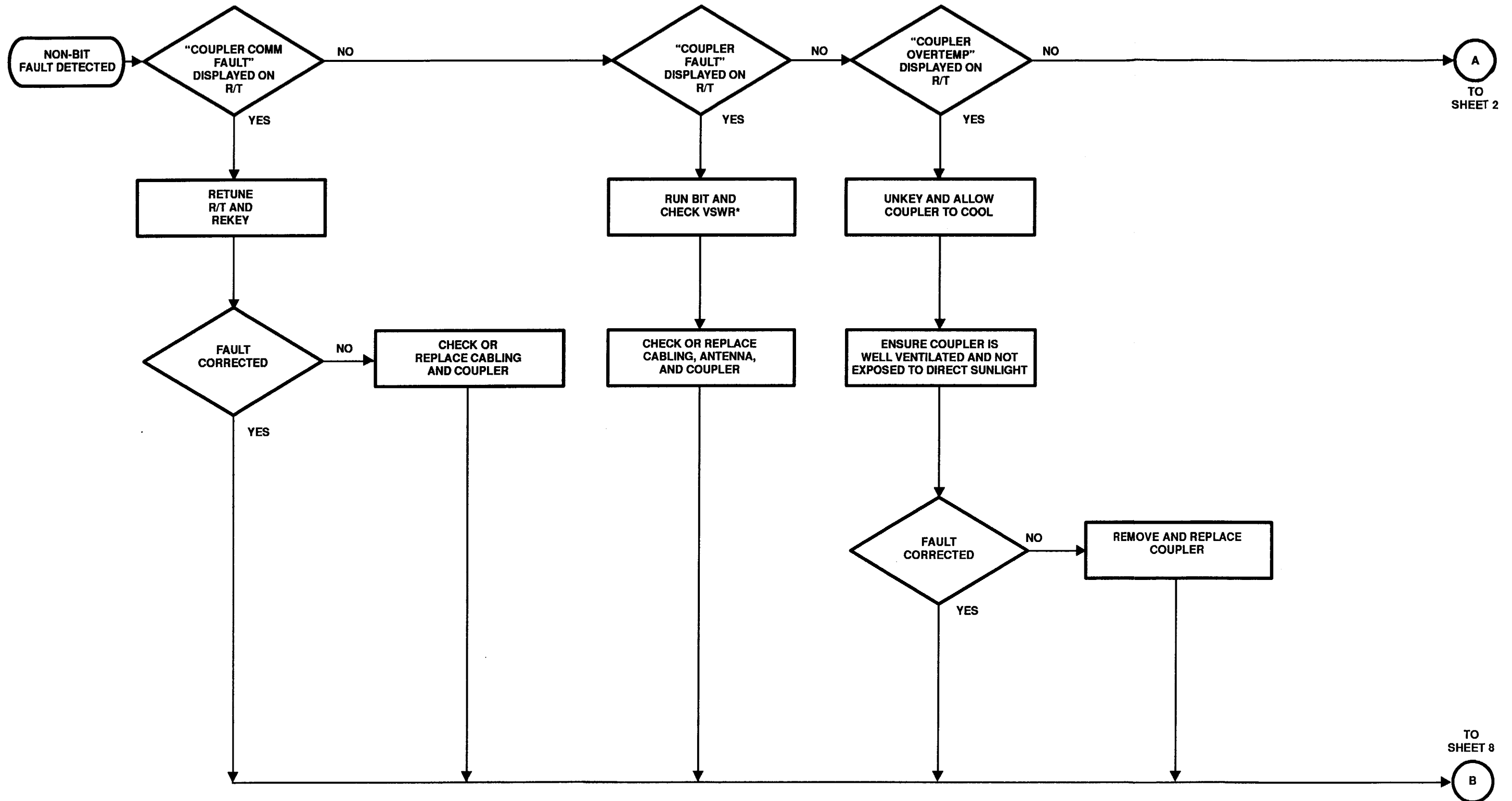
### 5.2.4 Troubleshooting with BIT

Table 5-3 lists the BIT faulted module codes and the suspected faulty unit and module. Even though faults A01 through A10 identify a specific module within the R/T, replace the entire R/T as a unit. After each unit replacement, execute BIT to see whether the original fault has been eliminated. If the actions do not correct the problem, proceed to the troubleshooting index in Paragraph 5.3.2.

**Table 5-3. Radio System Fault Codes**

Module Number	Suspected Unit/Module
A01	RT-1694 Receiver-Transmitter/ Interface or Encryption Module
A03	RT-1694 Receiver-Transmitter/ Linear Predictive Coding (LPC) Vocoder Module
A04	RT-1694 Receiver-Transmitter/ Signal Processor Module
A05	RT-1694 Receiver-Transmitter/ Receiver/Exciter Module
A06	RT-1694 Receiver-Transmitter/ Reference Generator/Synthesizer Module
A08	RT-1694 Receiver-Transmitter/ Power Amplifier/Harmonic Filter Module
A09	RT-1694 Receiver-Transmitter/ Coupler Module
A10	RT-1694 Receiver-Transmitter/ Front Panel Module
A30*	Attached Power Amplifier*

\* Before replacing the power amplifier due to an A30 F05 fault, ensure that power amplifier input voltage is 23 Vdc to 30 Vdc. If input voltage is not within this range, correct the problem with the power supply, power converter, or alternator/battery system (vehicular station). For information regarding test equipment, refer to Chapter 1, Table 1-21.



\*NOTE: IF BIT FAULT IS GENERATED, PROCEED TO BIT TROUBLESHOOTING (PARAGRAPH 5.2.4).

MNPK-022  
SHEET 1 OF 8

Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 1 of 8)

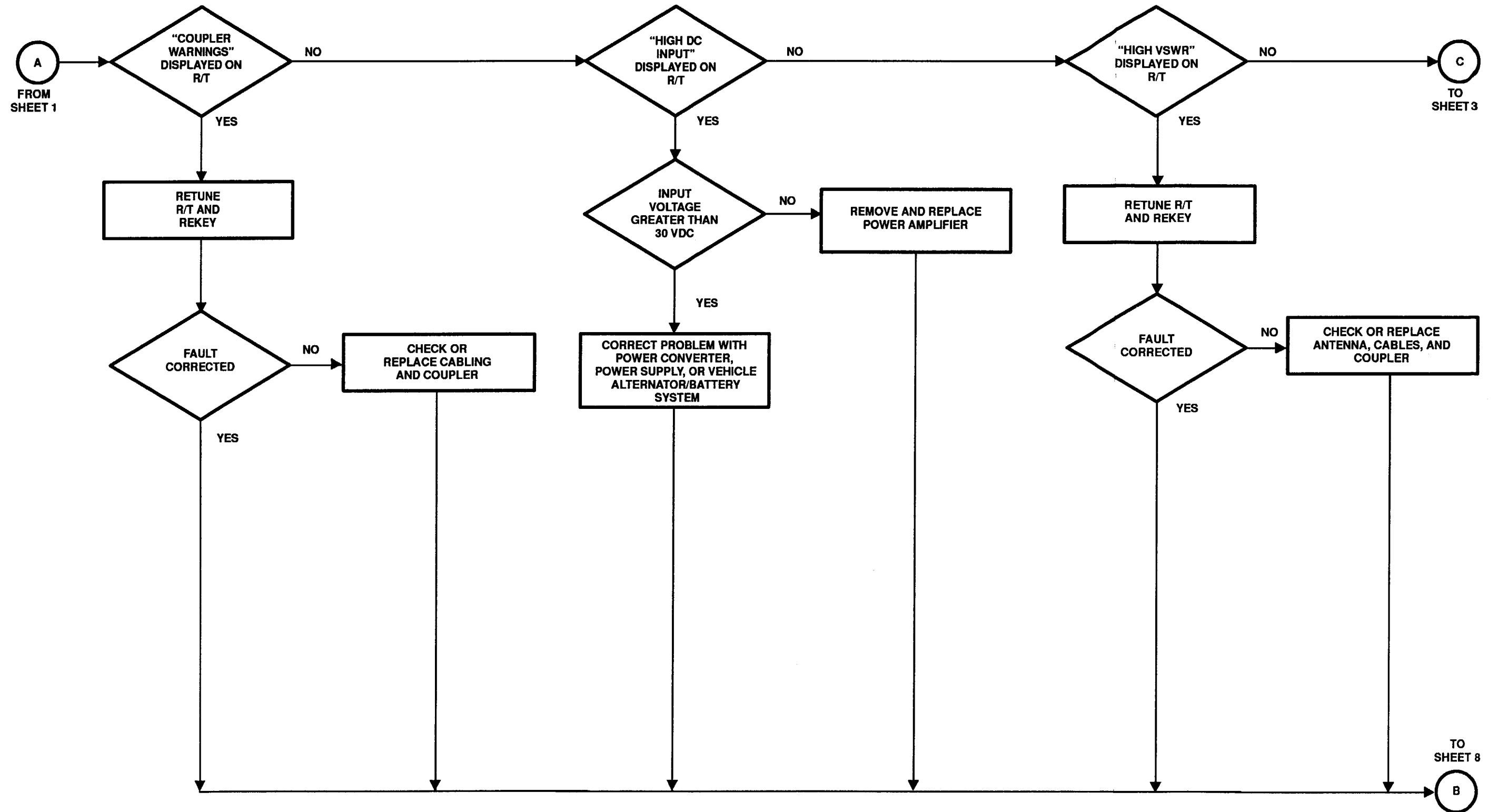
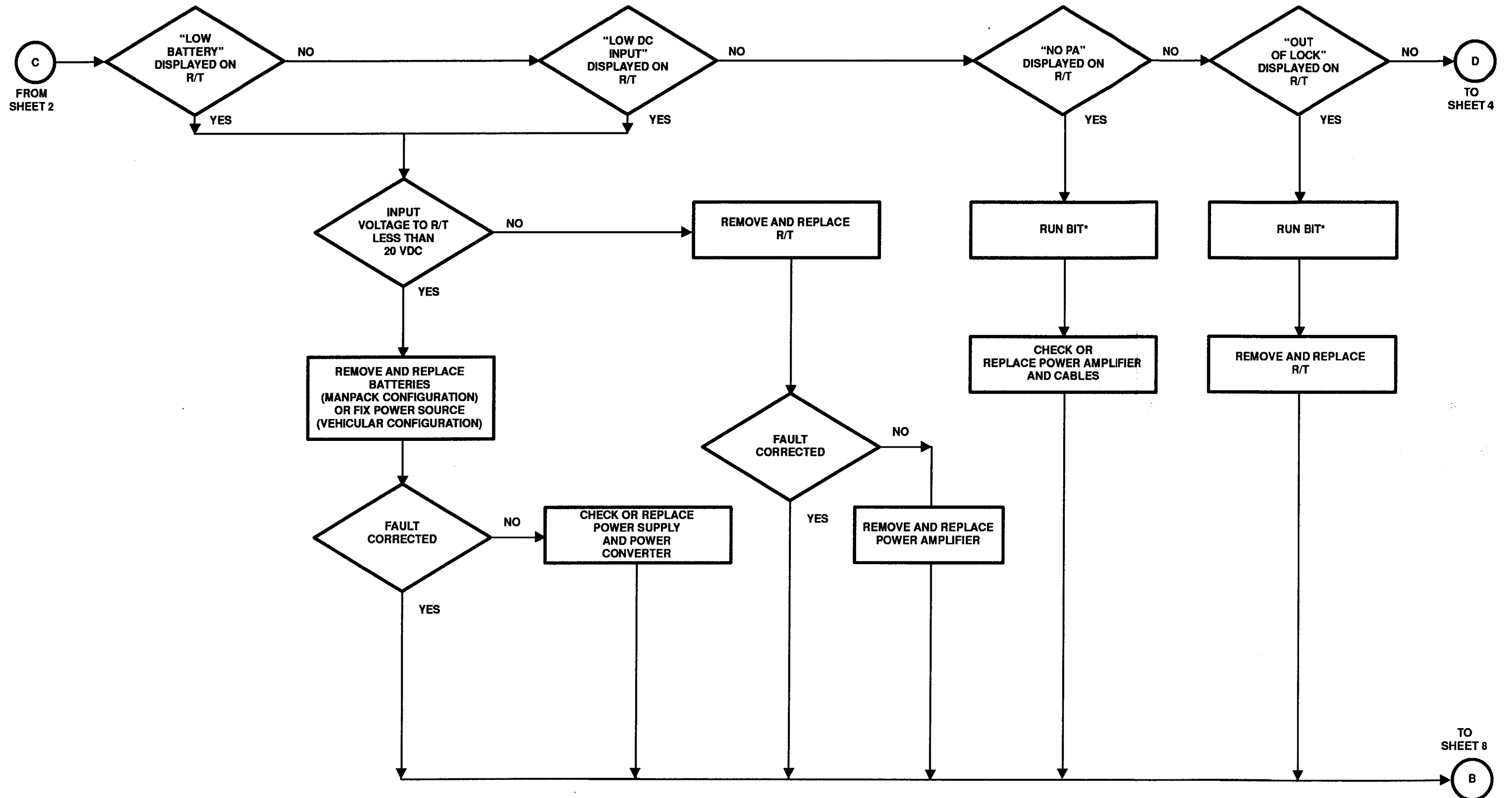


Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 2 of 8)

MNPK-022  
SHEET 2 OF 8

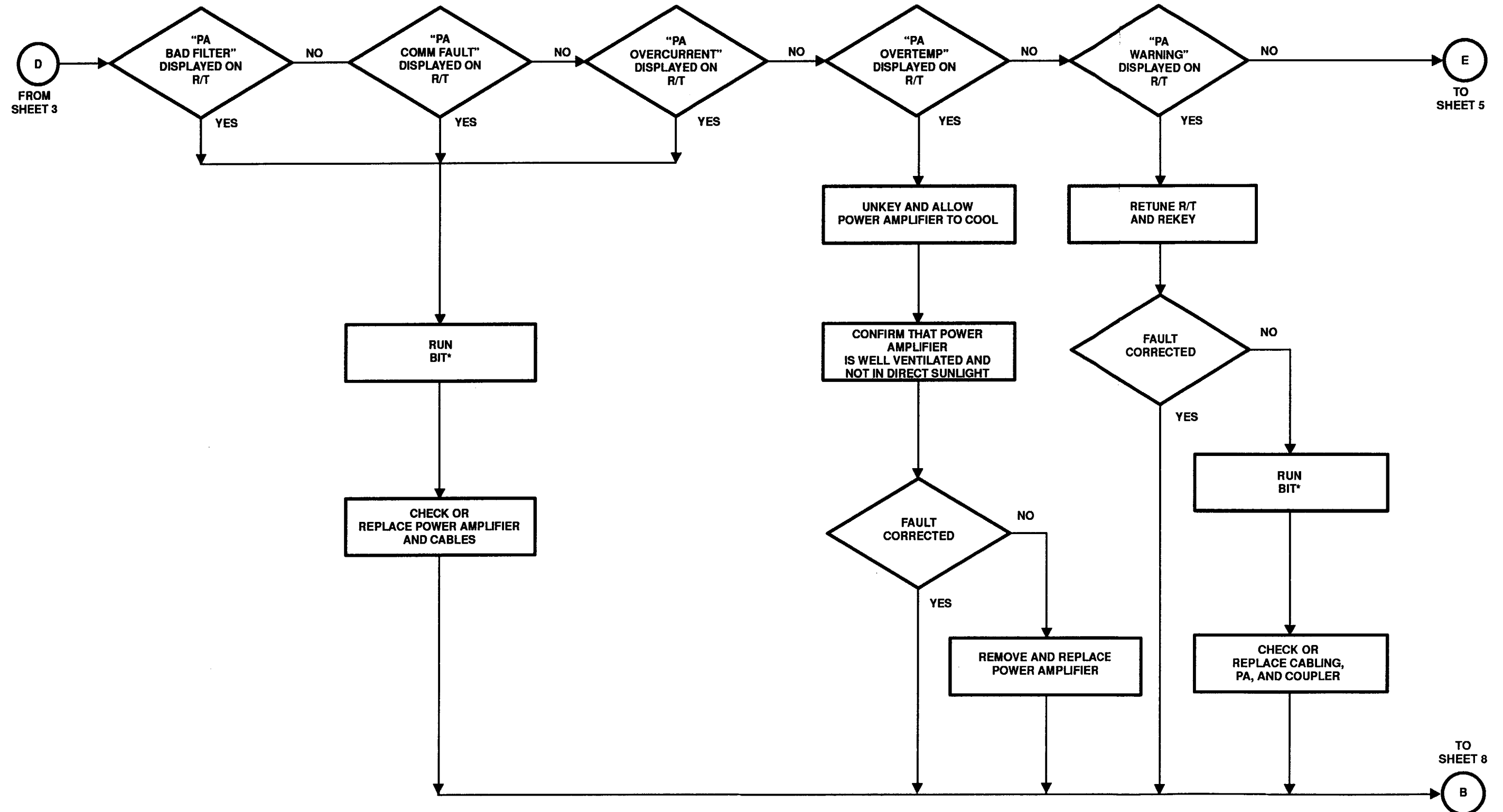




\*NOTE: IF BIT FAULT IS GENERATED, PROCEED TO BIT TROUBLESHOOTING (PARAGRAPH 5.2.4).

MNPK-022  
SHEET 3 OF 8

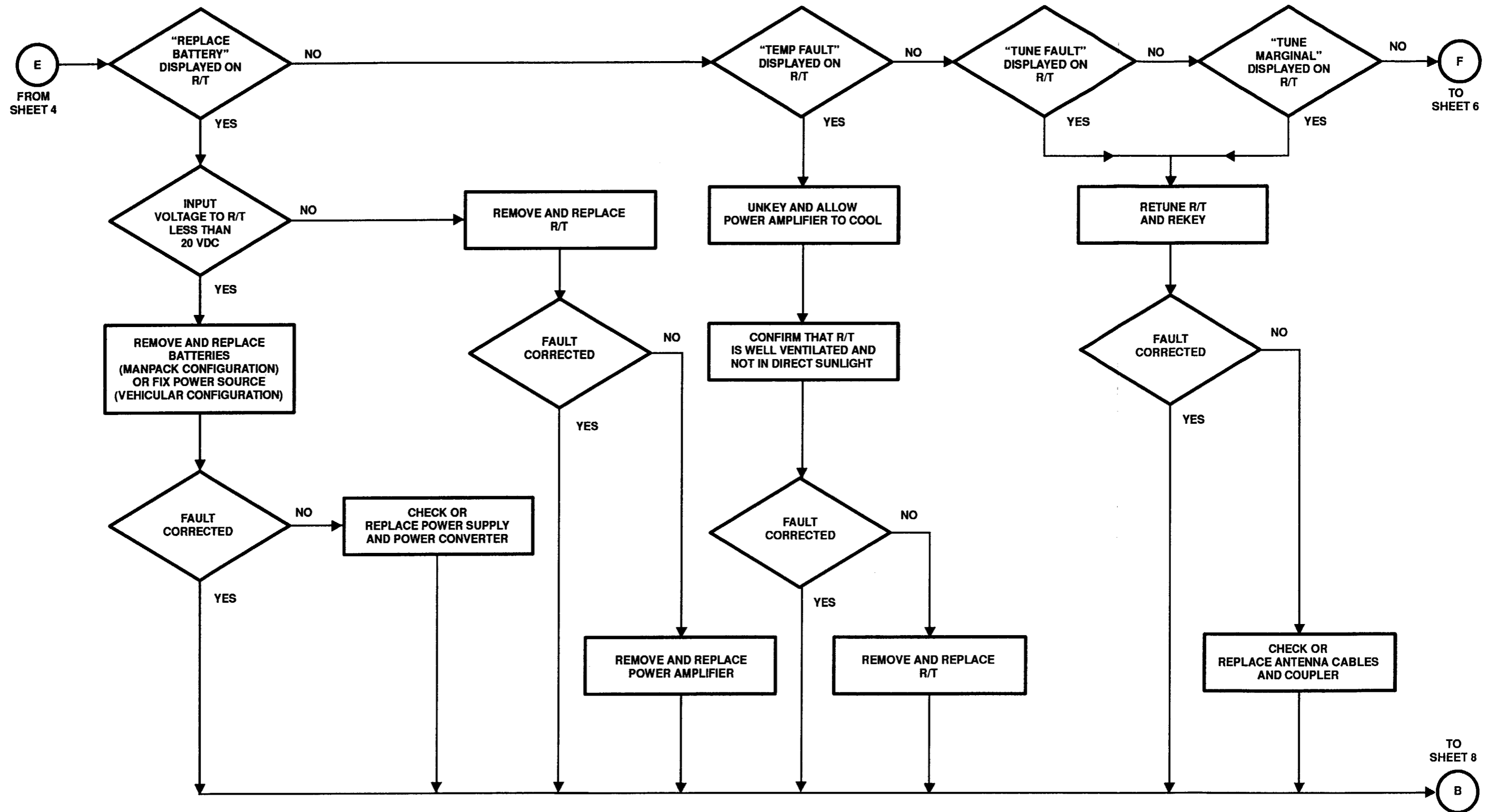
Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 3 of 8)



\*NOTE: IF BIT FAULT IS GENERATED, PROCEED TO BIT TROUBLESHOOTING (PARAGRAPH 5.2.4).

Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 4 of 8)

MNPK-022  
SHEET 4 OF 8



MNPK-022  
SHEET 5 OF 8

Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 5 of 8)

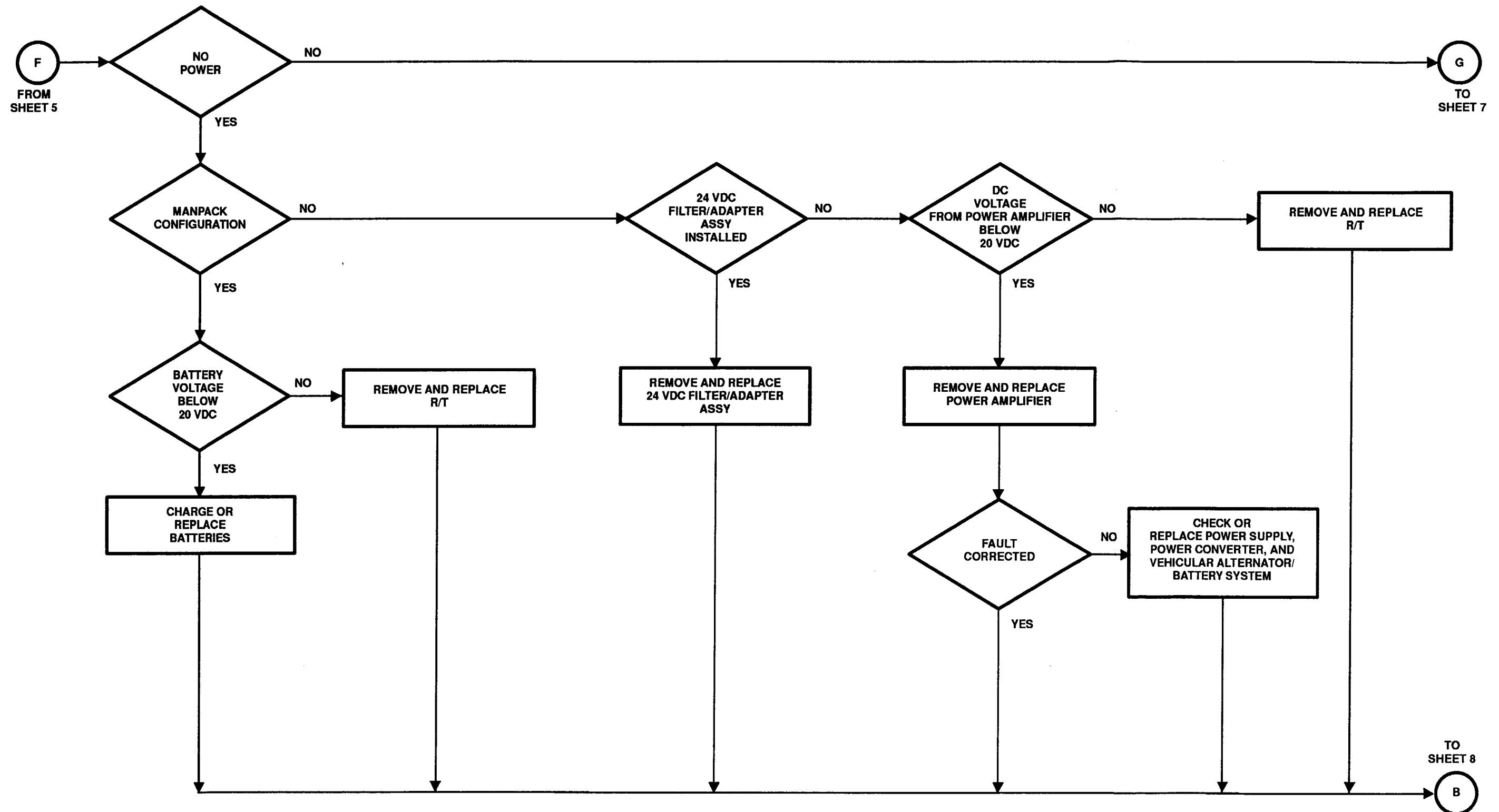


Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 6 of 8)

MNPK-022  
SHEET 6 OF 8

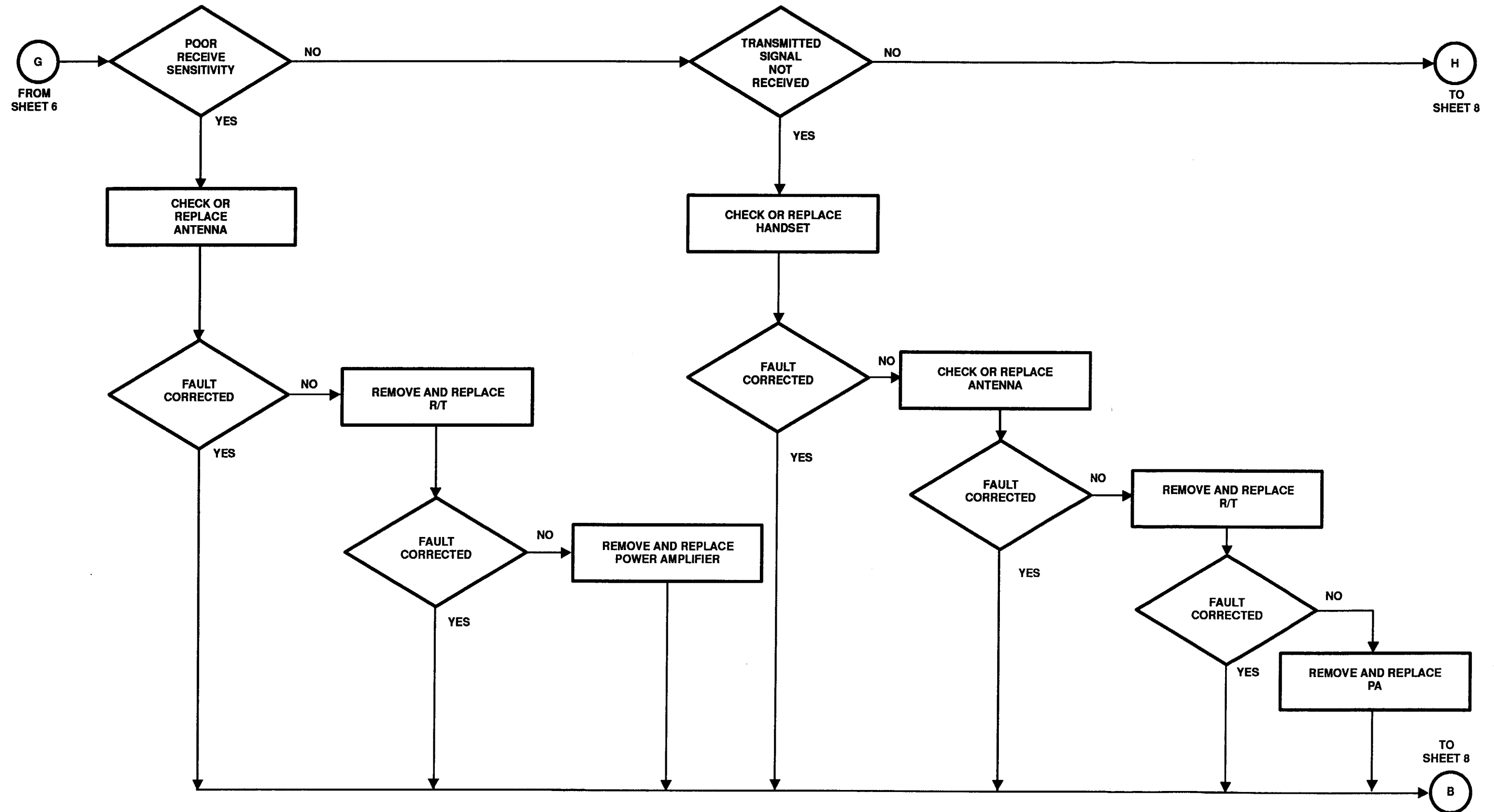


Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 7 of 8)

MNPK-022  
SHEET 7 OF 8

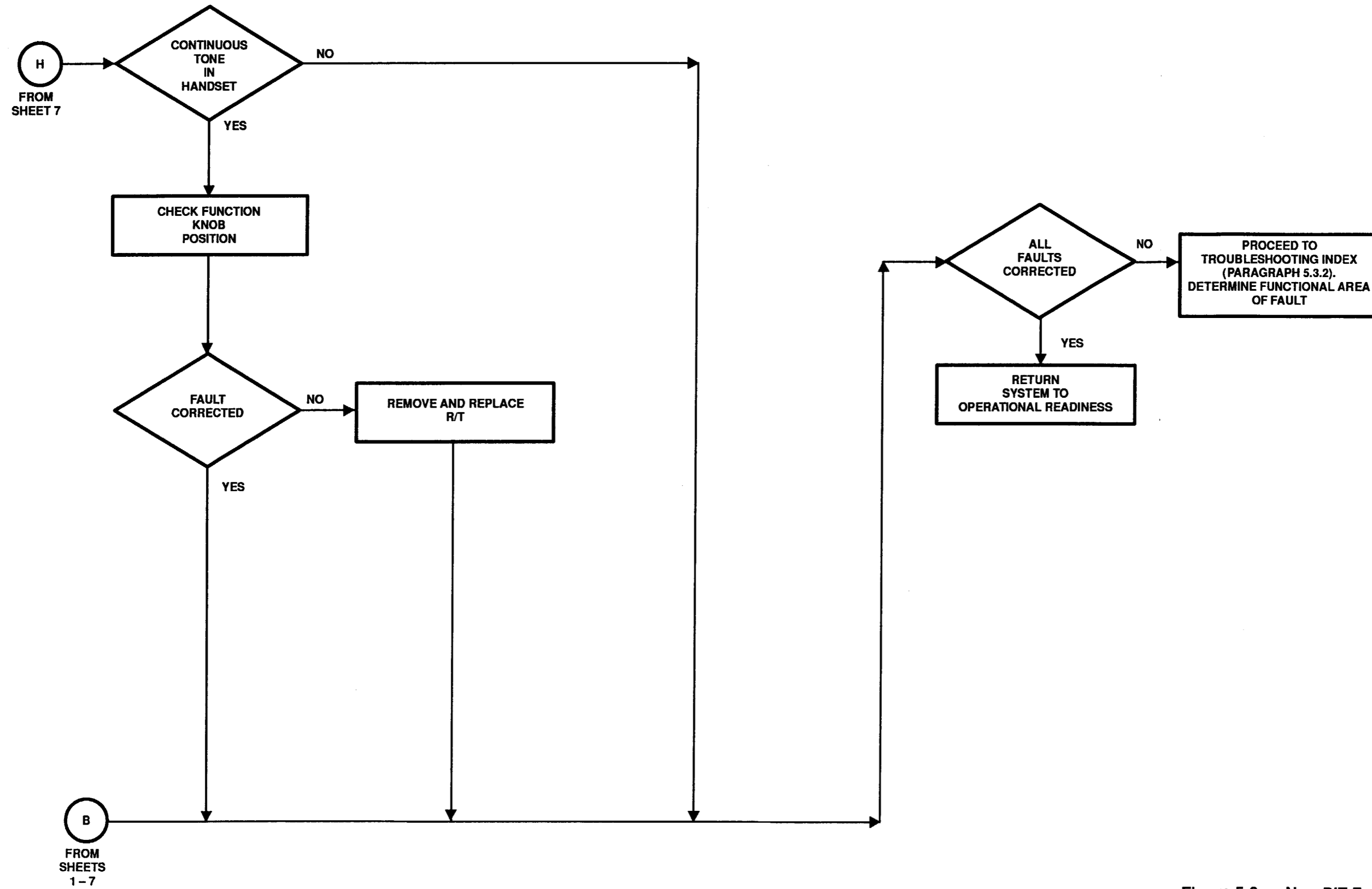


Figure 5-2. Non-BIT Fault Logic Diagram (Sheet 8 of 8)

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SHEET 8 OF 8

**5.3 TROUBLESHOOTING SUPPORT DATA**

**5.3.1 Protective Device Index**

Refer to Table 5-4 for the unit-level the protective device index.

**Table 5-4. Protective Device Index**

Unit	Reference Designation	Panel Marking or ID	Circuit Protected
RT-1694 Receiver-Transmitter	None accessible at this level	—	—
RF-5030PA-20E 20 Watt Power Amplifier	None accessible at this level	—	—
RF-5032PA-125E 125 Watt Power Amplifier	CB 1	CB1	Entire Unit
RF-5033PA-150 150 Watt Power Amplifier	CB 1	CB1	Entire Unit
24 Vdc Filter/Adapter Assembly	CB 1 CB2	CB1 CB2	Entire Unit Entire Unit
RF-382 Antenna Coupler	None accessible at this level	—	—
RF-5055PS AC/DC Power Supply	CB 1 CB2	CB1 CB2	Entire Unit Entire Unit
RF-5056PS DC/DC Power Converter	None accessible at this level	—	—
RF-5051PS-125 Power Supply	None accessible at this level	—	—

**5.3.2 Troubleshooting Index**

Table 5-5 is the troubleshooting index for the RF-5200 FALCON™ Series Manpack Systems. Use the troubleshooting index if the actions in the non-BIT troubleshooting (Paragraph 5.2.3) or the BIT troubleshooting (Paragraph 5.2.4) procedures do not correct the problem. The functional areas are listed in the left column of Table 5-5. The second column references the functional block diagrams for each functional area. A reference for the text description for each functional area is provided in column three. Analyze the information for each functional area, and determine which units and cables affect each functional area in an attempt to isolate the problem to an LRU.

The information contained in this manual complies with the requirements specified for Level II maintenance.

**Table 5-5. Troubleshooting Index**

Functional Area	Signal Path Diagram	Functional Description Paragraph
BIT Signal Path	5-3	5.6
RF Signal Path	5-4	3.2.2
Control Path	5-5	3.2.3
Power Distribution	5-6	3.2.4

## 5.4 TROUBLESHOOTING DIAGRAMS

### 5.4.1 General

Troubleshooting diagrams include the following:

- BIT Signal Path Diagram
- RF Signal Path Diagram
- Control Path Diagram
- Power Distribution Diagram

### 5.4.2 BIT Signal Path Diagram

Figure 5-3 is the BIT signal path diagram. This diagram shows units that are tested, and the BIT faults that identify those units.

### 5.4.3 RF Path Diagram

Figure 5-4 is the RF signal path diagram. This diagram shows units that interact with RF signals.

#### NOTE

In the manpack system configuration, a whip antenna is connected directly to the R/T's ANT connector. There is no external power amplifier or external antenna coupler in the manpack configuration.



#### **5.4.4 Control Path Diagram**

Figure 5-5 is the control path diagram. This diagram shows the flow of control and data signals between the R/T, the power amplifier, and the antenna coupler.

#### **NOTE**

In the manpack system configuration, a whip antenna is connected directly to the R/T's ANT connector. There is no external power amplifier or external antenna coupler in the manpack configuration.

#### **NOTE**

For control path information for vehicular configurations utilizing the 24 Vdc Filter/Adapter Assembly, refer to Chapter 8, Figures 8-24 and 8-25.

#### **5.4.5 Power Distribution Diagram**

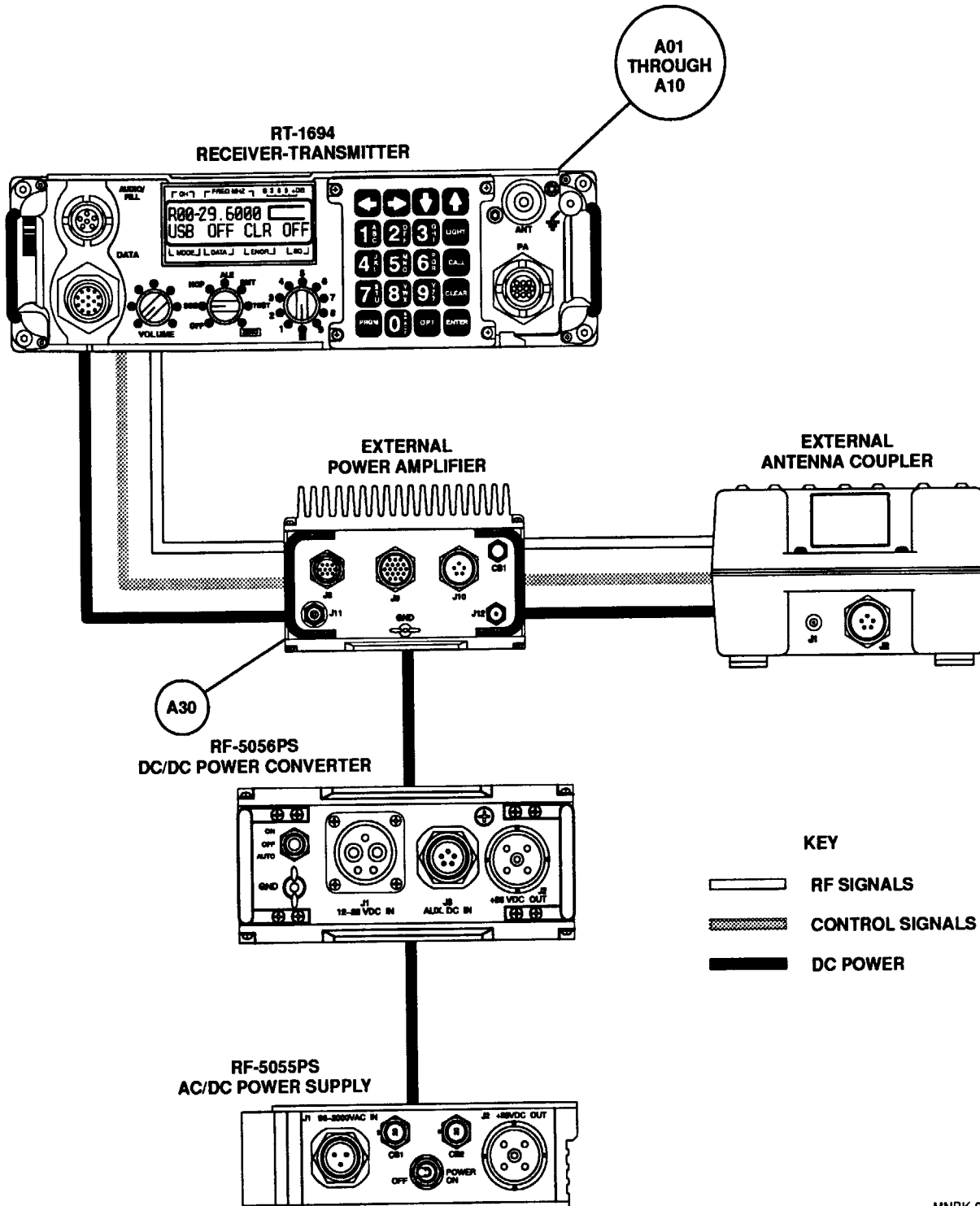
Figure 5-6 is the power distribution diagram. This diagram shows the paths of the power supply Direct Current (DC) voltages to the radio system units.

#### **NOTE**

In the manpack system configuration, a whip antenna is connected directly to the R/T's ANT connector. There is no external power amplifier or external antenna coupler in the manpack configuration.

#### **NOTE**

For power distribution information for vehicular configurations utilizing the 24 Vdc Filter/Adapter Assembly, refer to Chapter 8, Figures 8-24 and 8-25.



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Figure 5-3. BIT Signal Path Diagram

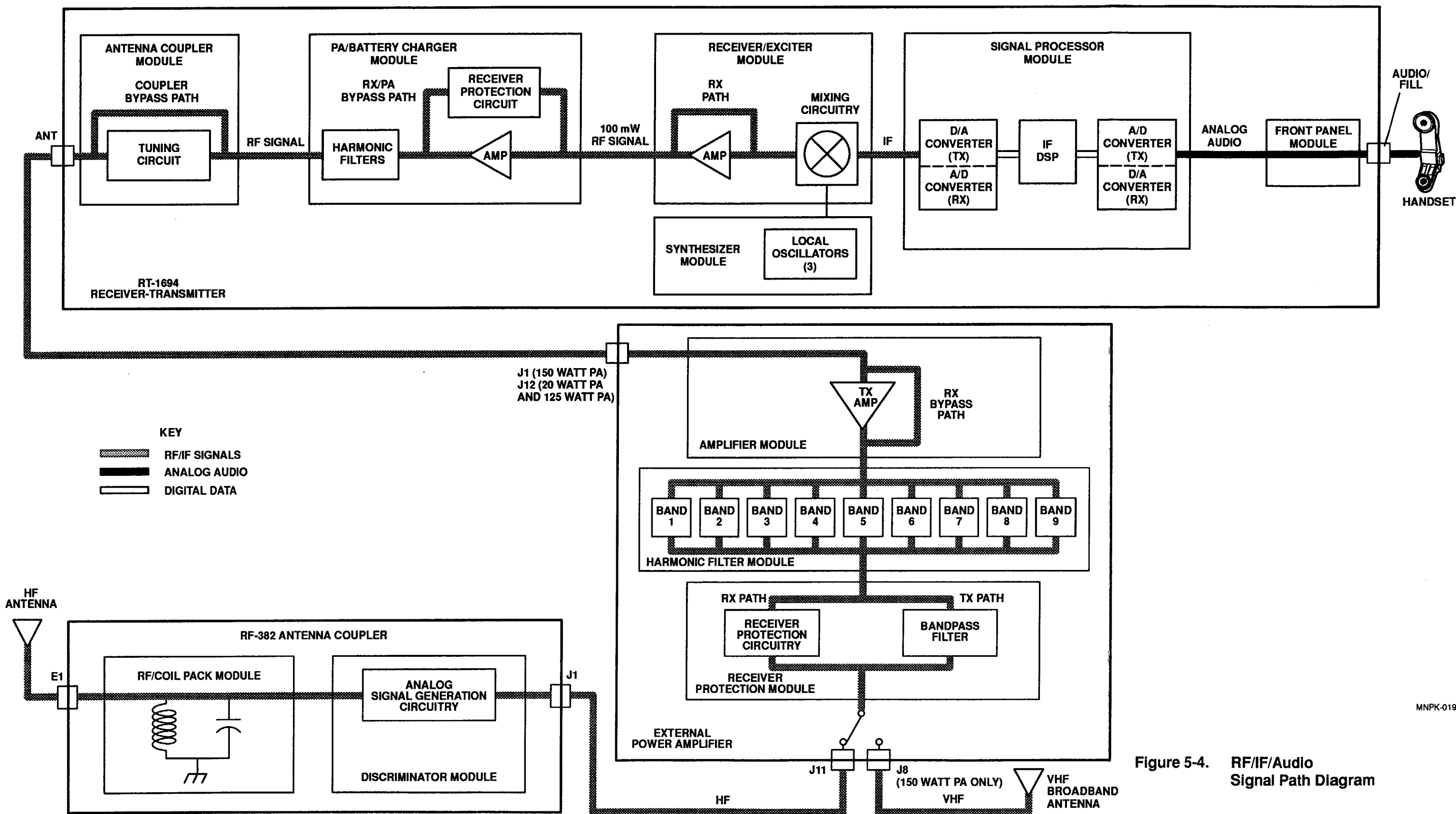
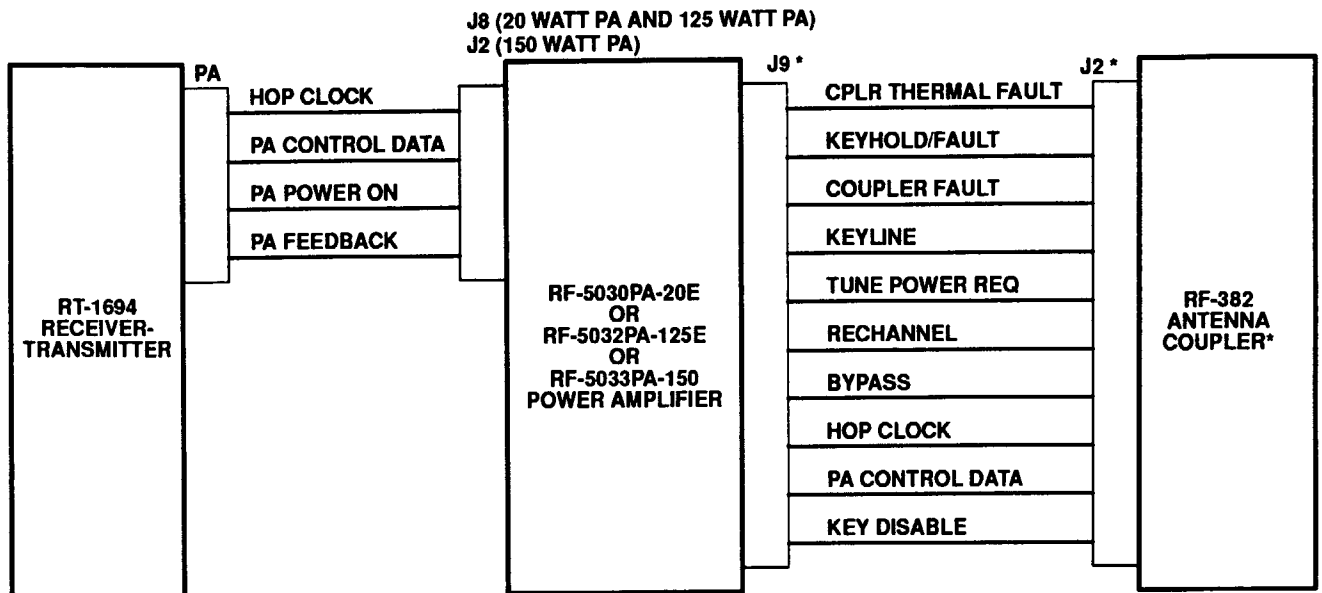


Figure 5-4. RF/IF/Audio Signal Path Diagram

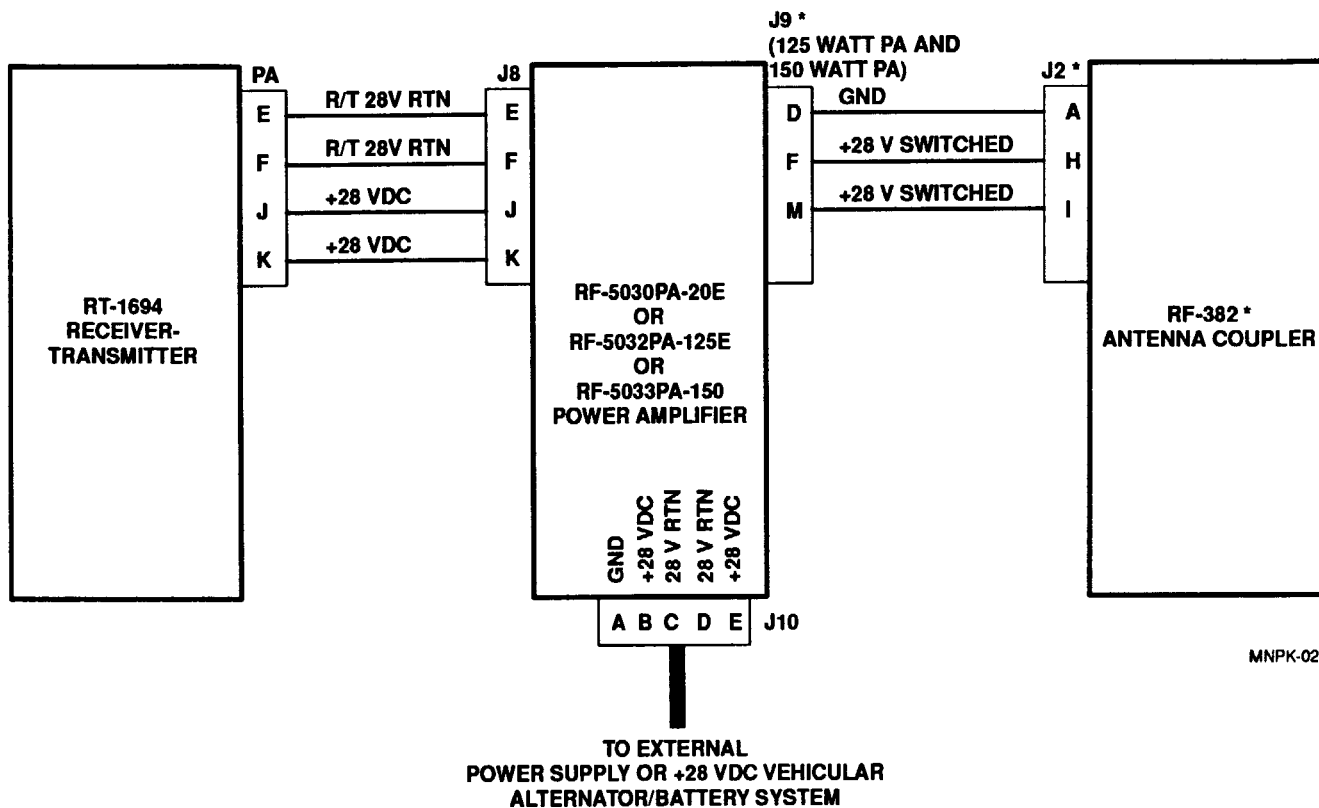
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\* THESE ITEMS DO NOT APPLY TO SYSTEMS WITH THE RF-5030PA-20E POWER AMPLIFIER/COUPLER.

Figure 5-5. Control Path Diagram



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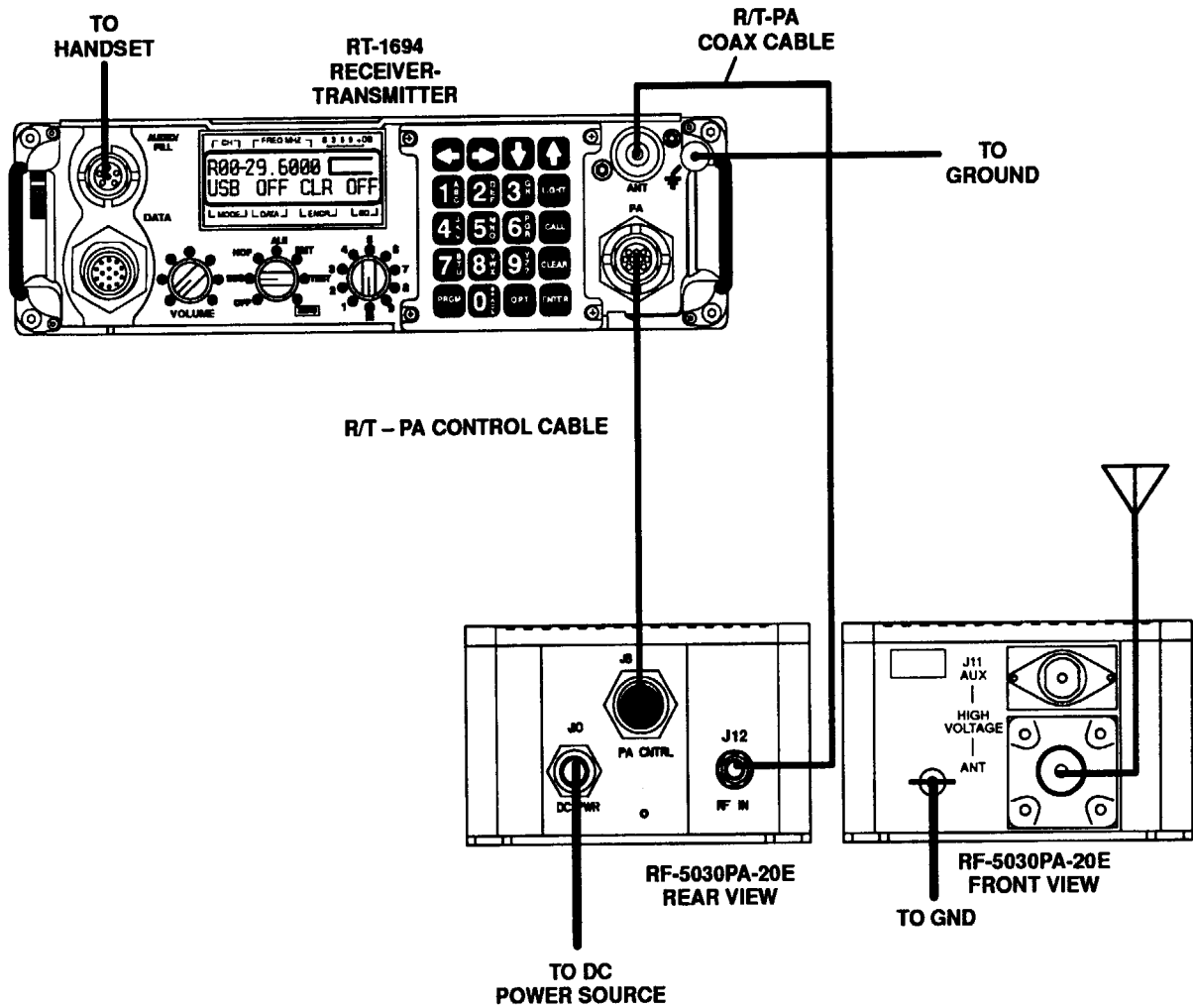
\* THESE ITEMS DO NOT APPLY TO SYSTEMS WITH THE RF-5030PA-20E POWER AMPLIFIER/COUPLER.

Figure 5-6. Power Distribution Diagram

**5.5 INTERCONNECT SCHEMATIC DIAGRAM**

**5.5.1 General**

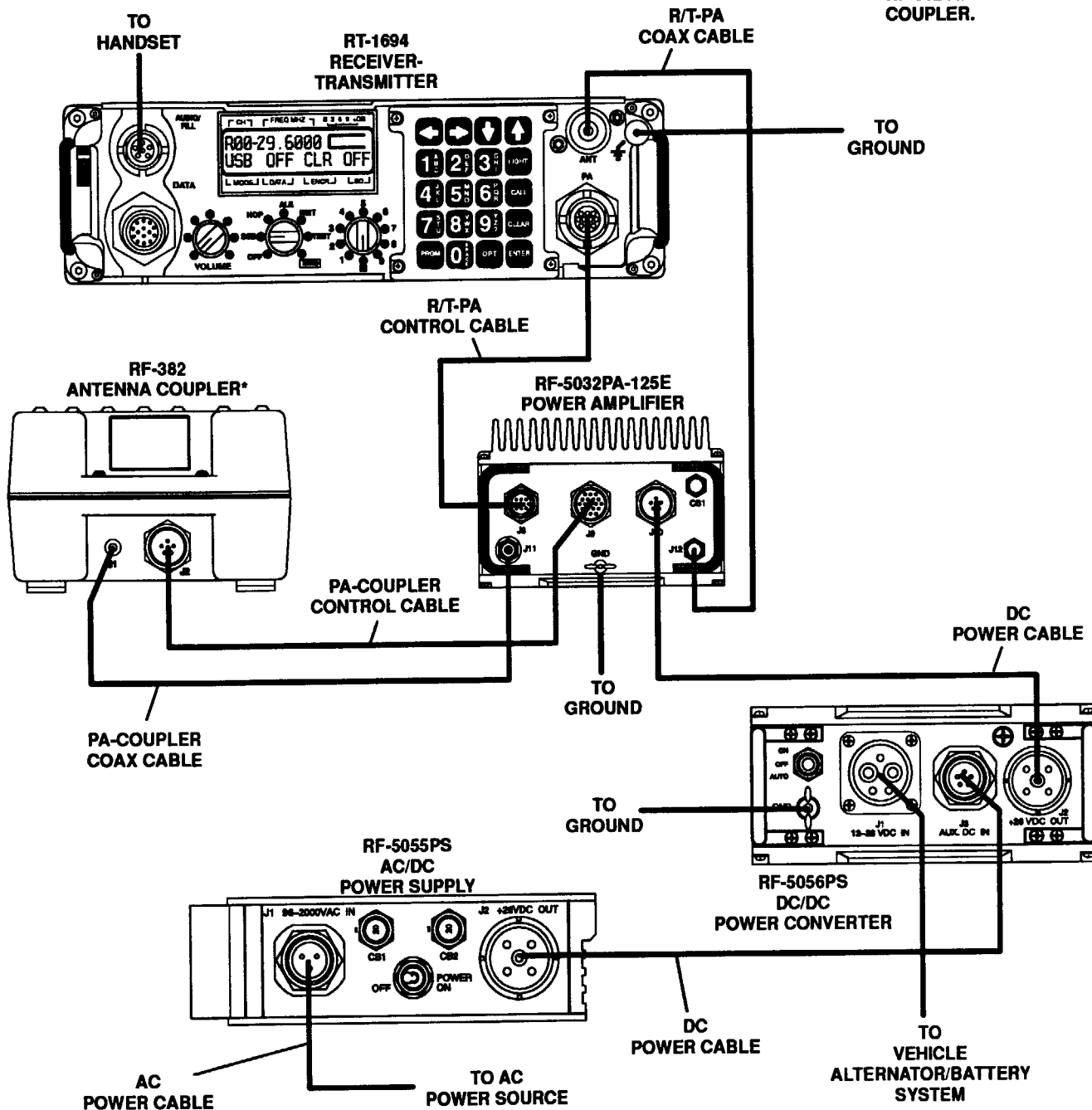
Figure 5-7 is the interconnect schematic diagram for a typical 20 watt vehicular radio system configuration. Figure 5-8 is the interconnect schematic diagram for a typical 125 watt vehicular radio system configuration. Figure 5-9 is the interconnect schematic diagram for a typical 150 watt vehicular radio system configuration. Because the manpack configuration is self-contained, there is no interconnect schematic diagram for the manpack configuration.



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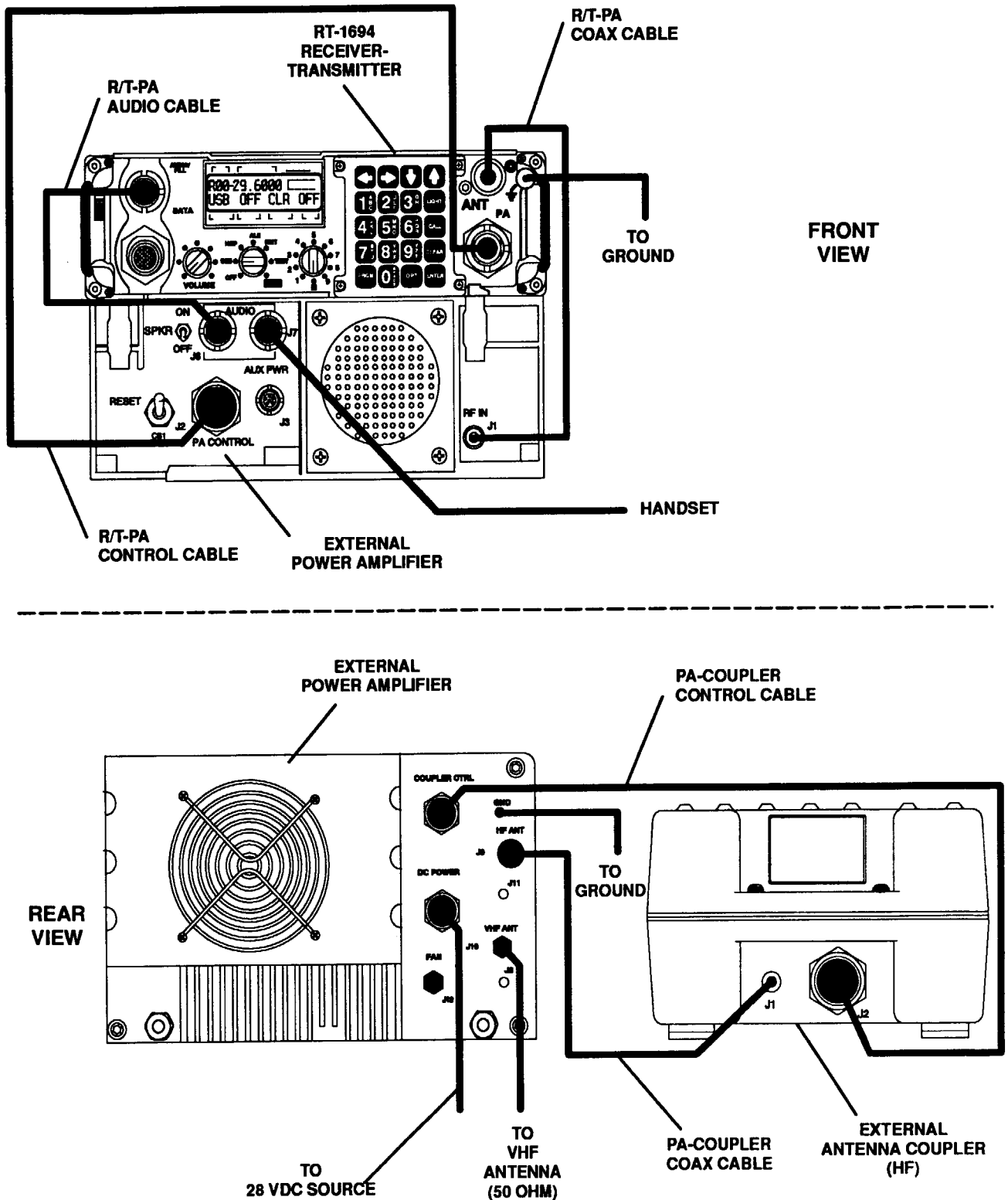
**Figure 5-7. 20 Watt Vehicular System Interconnect Schematic Diagram**

\*NOTE: ANTENNA IS CONNECTED TO OPPOSITE SIDE OF RF-382 ANTENNA COUPLER.



MNPK-001A

Figure 5-8. 125 Watt Vehicular System Interconnect Schematic Diagram



1694-033

Figure 5-9. 150 Watt Vehicular Radio System Interconnect Schematic Diagram



## 5.6 BIT DESCRIPTION

### 5.6.1 General

Running BIT on the RT-1694 Receiver-Transmitter also tests the attached power amplifier and antenna coupler. The general types of tests, and the units affected by those tests, are described in the following paragraphs.

### 5.6.2 BIT Routine

See Figure 5-3. These tests can be automatically performed by rotating the function switch on the R/T to the TEST position, followed by pressing the ENTER key. During execution of self-test, the front panel message SELF TEST IN PROGRESS is displayed. Module faults A01 through A10 indicate a problem with the R/T. Module fault A30 indicates a problem with the attached power amplifier. Table 5-3 identifies the units and modules associated with each fault code.

If initiating the self-test function generates no faults, the front panel message SELF TEST DONE NO ERRORS is displayed.

### 5.6.3 Continuous Self-Test Monitoring (Run-Time Faults)

Certain critical circuits that may adversely affect radio system operation, or even cause damage if they malfunction, are continuously monitored by self diagnostics. The radio system inhibits normal operation until the condition is rectified, and displays a fault on the front panel of the R/T. These circuits are described in the following paragraphs.

#### 5.6.3.1 COUPLER COMM FAULT

The power amplifier has lost communication with the antenna coupler. This is usually caused by a control cable problem, a power amplifier problem, or an antenna coupler problem.

#### 5.6.3.2 COUPLER FAULT

The antenna coupler has reported a fault condition to the power amplifier and is inhibiting transmission. This is usually caused by an overvoltage, overcurrent, or overtemperature condition in the antenna coupler.

#### 5.6.3.3 COUPLER OVERTEMP

The antenna coupler temperature has exceeded the warning limit. Continued transmission may result in a COUPLER FAULT shutdown.

#### 5.6.3.4 COUPLER WARNING Fault

This fault indicates a general problem with the antenna coupler.

#### 5.6.3.5 HIGH DC INPUT Fault

This fault indicates high primary DC supply voltage. This indicates a problem with the power supply or the vehicle battery/alternator system.

#### 5.6.3.6 High Voltage Standing Wave Ratio (VSWR) Fault

The VSWR is high. This could indicate a problem with the antenna system, the radio system cables, or the antenna coupler.

#### 5.6.3.7 INTERNAL COMM FAULT

This indicates a general communication failure between the R/T's front panel module and the other R/T modules.

#### 5.6.3.8 NO PA Fault

The R/T has lost communications with the power amplifier. This could indicate a cabling problem, or a problem with the power amplifier.

#### **5.6.3.9 OUT OF LOCK Fault**

The R/T's synthesizer module is out of lock. The R/T is not operational.

#### **5.6.3.10 PA BAD FILTER Fault**

The power amplifier senses a loss of harmonic filter operation or transmitter level control. This indicates a problem with the power amplifier.

#### **5.6.3.11 PA COMM FAULT**

The R/T has lost communications with the power amplifier. This could indicate a cabling problem, or a problem with power amplifier.

#### **5.6.3.12 PA LOW DC INPUT Fault**

This fault indicates low primary DC supply voltage. This could indicate a cabling problem, or a problem with the power supply.

#### **5.6.3.13 PA OVER CURRENT Fault**

The power amplifier senses that it is drawing too much current. This indicates a problem with the power amplifier.

#### **5.6.3.14 PA OVER TEMP Fault**

Power amplifier high-temperature warning. The power amplifier may shut down if transmission is continued at this power level.

#### **5.6.3.15 PA WARNING Fault**

A general warning that the power amplifier senses a condition that is preventing normal operations.

#### **5.6.3.16 TUNE FAULT**

The power amplifier has lost communication with the antenna coupler. This could indicate a control cable problem, a problem with the coupler, or a problem with the antenna.

## **CHAPTER 6**

### **CORRECTIVE MAINTENANCE**

#### **6.1 INTRODUCTION**

Paragraph 6.2 provides the alignment and adjustment procedures for each Line Replaceable Unit (LRU) in the RF-5200 FALCON™ Series Manpack System. Paragraph 6.3 provides the procedures for removing and replacing the LRUs. Tables 7-1 through 7-4 list the LRUs for each RF-5200 FALCON™ Series Manpack System configuration.

##### **6.1.1 Master Tools and Materials List**

The only tool required to perform the procedures in this chapter is an adjustable wrench (part number 1B7536, cage code 11083). This wrench is required to disconnect the antenna from E1 of the antenna coupler, and to remove the RF-5055PS AC/DC Power Supply, the RF-5030PA-20E 20 Watt Power Amplifier, and the RF-382 Antenna Coupler from the vehicle.

#### **6.2 ADJUSTMENTS AND ALIGNMENTS**

All adjustments and alignments are set at the factory. Adjustments and alignment procedures are not required when replacing each LRU in the RF-5200 FALCON™ Series Manpack System.

#### **6.3 REMOVAL AND REPLACEMENT PROCEDURES**

This section contains the repair procedures which consist of removing and replacing all LRUs authorized for Level II maintenance. LRUs consist of units and cables.

##### **6.3.1 Safety**

Remove power from the radio system before starting any repairs.

### **WARNING**

Hazardous voltages are present if power is not removed from the radio system. Failure to remove power from radio system can cause injury or death to personnel.

##### **6.3.2 Level II Repair**

Repairs are made by removing and replacing the units listed in Tables 7-1 through 7-4. Repairs are also made by removing and replacing damaged cables (listed in Tables 6-1 through 6-3).

### 6.3.3 Wires, Cables, and Connectors

Use the unit replacement illustrations to locate the cable connections, if necessary. Table 6-1 describes the cables by part number, description, and unit connection points for the 20 watt vehicular configuration. Table 6-2 describes the cables by part number, description, and unit connection points for the 125 watt vehicular configuration. Table 6-3 describes the cables for the 150 watt vehicular configuration. There are no cables in the manpack configuration.



When removing or replacing cables or connectors, avoid sharp bends in any cable. Do not allow the cable to be pinched when reinstalling a unit. Do not remove a connection by grabbing the cable; grab the connector instead. Do not force the cable when reinstalling it; this could damage the connector pins.

**Table 6-1. Radio System Cable Information – 20 Watt Vehicular Configuration**

Part Number	Description	Connections
10181-9821	Receiver-Transmitter (R/T) – Power Amplifier (PA) Coaxial Cable Assembly	ANT (R/T) J12 (PA)
10181-9822	R/T – PA Control Cable Assembly	PA (R/T) J8 (PA)
10181-9827	20 Watt PA/Coupler Direct Current (DC) Cable Assembly	J10 (PA) DC Power Source

**Table 6-2. Radio System Cable Information – 125 Watt Vehicular Configuration**

Part Number	Description	Connections
10181-9821	R/T – PA Coaxial Cable Assembly	ANT (R/T) J12 (PA)
10181-9822	R/T – PA Control Cable Assembly	PA (R/T) J8 (PA)
10181-9823	PA – Coupler Control Cable Assembly	J9 (PA) J2 (CPLR)
10181-9824	PA – Coupler Coaxial Cable Assembly	J11 (PA) J1 (CPLR)
10181-9833	RF-5055PS AC/DC Power Supply – RF-5056PS DC/DC Power Converter Cable Assembly	DC OUT (PS) AUX DC INPUT (PC)
10181-9826	DC Power Cable Assembly	PRIMARY DC INPUT (PC) Alternator/Battery System
10181-9831	AC Power Cable Assembly	AC IN (PS)
10181-9833	PA – RF-5056PS DC/DC Power Converter Cable Assembly	J10 (PA) 26 VDC OUT (PC)
10251-0042	High-Voltage Cable Assembly	E1 (CPLR) Antenna

**Table 6-3. Radio System Cable Information – 150 Watt Vehicular Configuration**

Part Number	Description	Connections
10251-0042	High-Voltage Cable Assembly	E1 (CPLR) Antenna
10497-0505-01	DC Power Cable Assembly	J10 (PA) Alternator/Battery System
10497-5015-01	R/T – PA Coaxial Cable Assembly	ANT (R/T) J1 (PA)
10497-0520-01	PA – Coupler Control Cable Assembly	J9 (PA) J2 (CPLR)
10497-5025-01	R/T – PA Control Cable Assembly	PA (R/T) J2 (PA)
10497-5035-01	R/T – PA Audio Cable Assembly	AUDIO FILL (R/T) J6 (PA)

## 6.4 UNIT REMOVAL AND REPLACEMENT PROCEDURES

### 6.4.1 General

This section contains information needed to remove and replace the LRUs from the radio system. The following procedures apply to all LRUs in the RF-5200 FALCON™ Series Manpack System.

### 6.4.2 Removing and Installing AC Input Power

If connected, AC input power must be removed before replacing any LRU.

#### 6.4.2.1 Removing AC Input Power

Perform the following procedure to remove AC input power:

**WARNING**

Hazardous voltages are present if power is not removed from the radio system. Failure to remove power from the radio system can cause injury or death to personnel.

- a. Turn the power switches on the individual units making up the RF-5200 Falcon™ Series Manpack System to the OFF position.
- b. Unplug the AC power cable assembly from the power source.

#### 6.4.2.2 Installing AC Input Power

This procedure assumes the AC power was removed per Paragraph 6.4.2.1. Perform the following procedure to apply AC input power:

**WARNING**

Hazardous voltages are present when power is applied to the radio system. This power can cause injury or death to personnel.

- a. Plug the AC power cable assembly into the power source.
- b. Turn the power switches on the individual units making up the radio system to the ON position.

## **6.5 LRU REMOVAL AND REPLACEMENT PROCEDURES**

The following procedures contain information needed to remove and replace LRUs in the radio system.

### **6.5.1 LRU Removal**

Perform the following procedure to remove any LRU from a vehicular RF-5200 FALCON™ Series Manpack System. Refer to Tables 6-2 and 6-3 and see Figures 6-1 and 6-2.

#### **NOTE**

Most vehicular station LRUs are removed and replaced by using wing nuts as shown in Figure 6-1. The RF-5055PS AC/DC Power Supply, the RF-5030PA-20E 20 Watt Power Amplifier/Coupler, and the RF-382 Antenna Coupler are bolted directly to the vehicle. These LRUs require an adjustable wrench (part number 1B7536, cage code 11083) to remove and replace.

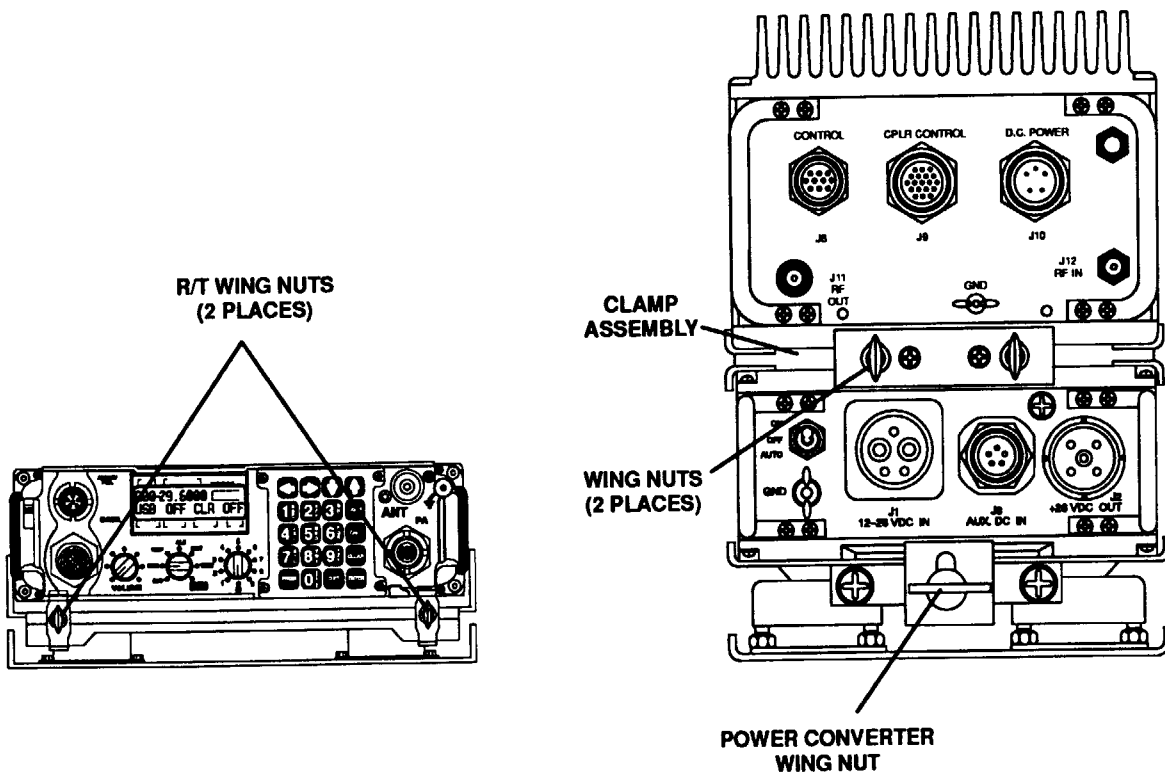
For specific mounting information and options, refer to Chapter 8, Installation.

- a. Remove power from the radio system per Paragraph 6.4.2.1.
- b. Disconnect all cables (Radio Frequency [RF], control, power, grounding) from the LRU being replaced.
- c. Loosen wing nuts that secure LRU to its mounting location.
- d. Remove LRU from radio system.

### **6.5.2 LRU Replacement**

Perform the following procedure to replace any LRU into a vehicular RF-5200 FALCON™ Series Manpack System. Refer to Tables 6-2 and 6-3, and see Figures 6-1 and 6-2.

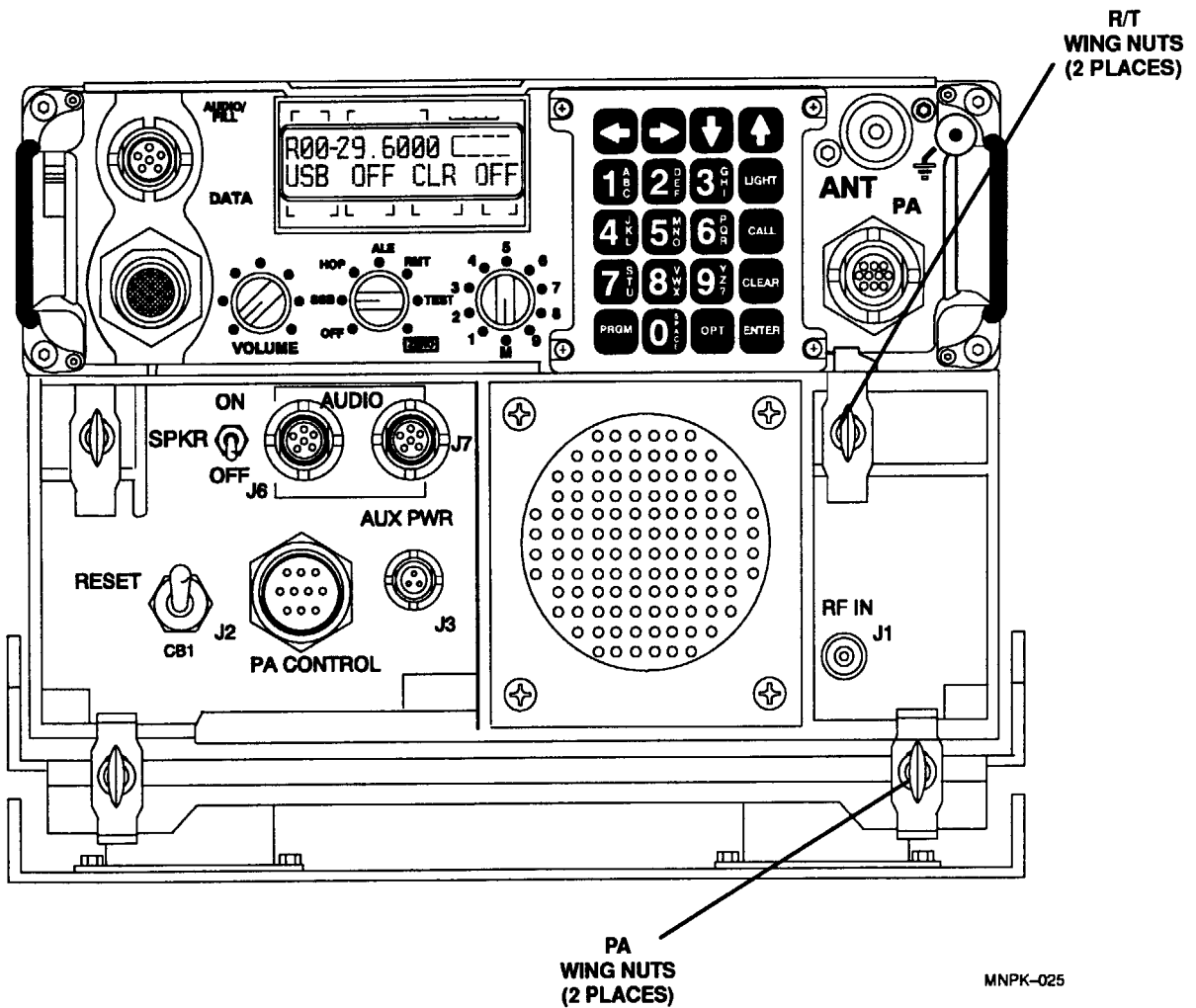
- a. Slide LRU into its mounting position in the radio system.
- b. Tighten wing nuts that secure LRU to its mounting location.
- c. Connect all cables (RF, control, power, grounding) to the LRU being replaced.
- d. Install power to radio system per Paragraph 6.4.2.2.



MNPK-024

Figure 6-1. LRU Removal and Replacement – 125 Watt Vehicular Configuration





**Figure 6-2. LRU Removal and Replacement – 150 Watt Vehicular Configuration**

**CHAPTER 7**

**PARTS LIST**

**7.1 INTRODUCTION**

This chapter contains radio system parts list information. This information can be used to identify units within each radio system configuration, and to place orders for those units. This chapter is organized as follows:

- Paragraph 7.2 – Line Replaceable Units (LRUs)
- Paragraph 7.3 – LRU Diagrams

**7.2 LINE REPLACEABLE UNITS (LRUS)**

Tables 7-1 through 7-4 list the LRUs that the comprise manpack, 20 watt vehicular, 125 watt vehicular, and 150 watt vehicular radio systems. Quantity, part number, figure number references are also provided.

**Table 7-1. LRUs for Manpack System**

Quantity	Name of Unit	Part Number	Figure Number
1	RT-1694(P) Receiver-Transmitter or RT-1694B(P)/U Receiver-Transmitter	10372-1000-01 10530-1000-01	1-3 and 7-1
1	Battery Case (aluminum) or Battery Case (plastic)	10372-0300 10530-1300-02	1-3
1	Manpack Radio Bag	10372-0460-01, or 10530-0460-01	1-3
2	Nickel-Cadmium (Ni-Cd) Battery or Lithium Battery	BB-590/U BA-5590/U	1-3
1	Handset	H-250/U	1-3
1	OE-505 Manpack Whip Antenna Kit or OE-505A/PRC Whip Antenna Kit	10372-0240-01 10530-0240-01	1-3

**Table 7-2. LRUs for 20 Watt Vehicular System**

Quantity	Name of Unit	Part Number	Figure Number
1	RT-1694(P) Receiver-Transmitter or RT-1694B(P)/U Receiver-Transmitter	10372-1000-01 10530-1000-01	7-1
1	RF-5030PA-20E 20 Watt Power Amplifier/Coupler	10225-6000-01	7-2
1	24 Vdc Filter Adapter Assembly (optional)	10372-0850	7-8

**Table 7-3. LRUs for 125 Watt Vehicular System**

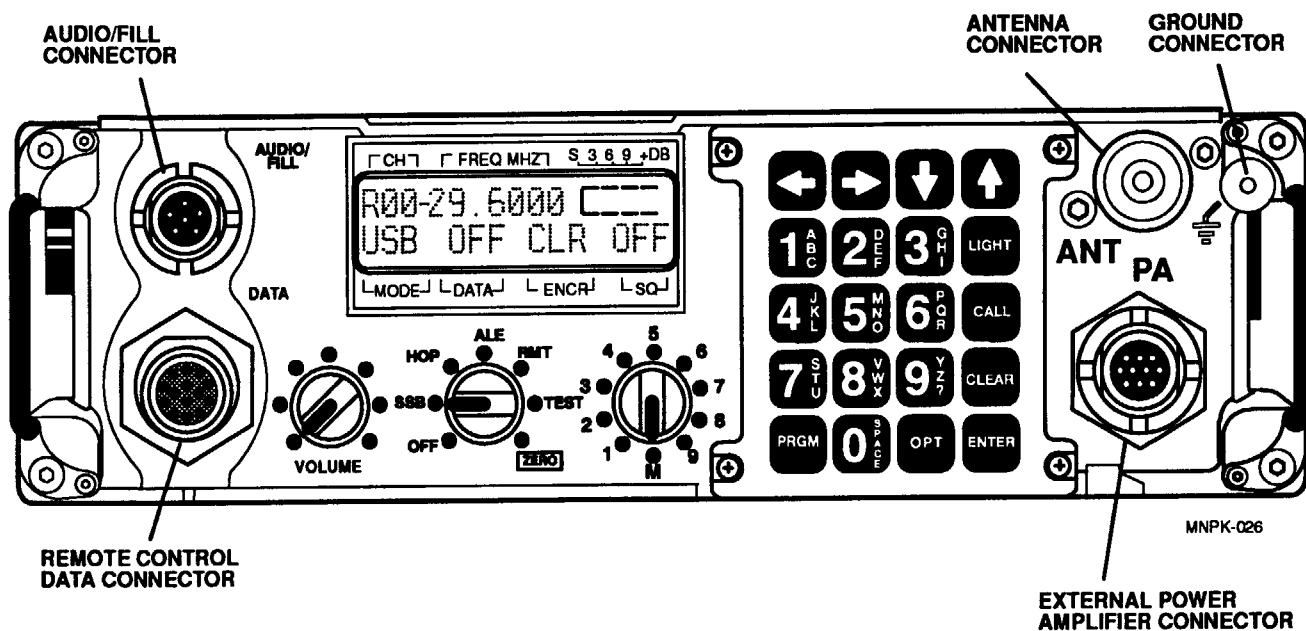
Quantity	Name of Unit	Part Number	Figure Number
1	RT-1694(P) Receiver-Transmitter or RT-1694B(P)/U Receiver-Transmitter	10372-1000-01 10530-1000-01	7-1
1	RF-5032PA-125E 125 Watt Power Amplifier	10225-1550-01	7-3
1	RF-5055PS AC/DC Power Supply	10520-0100-01	7-5
1	RF-5056PS DC/DC Power Converter	10521-0100-01	7-6
1	RF-382-02 Antenna Coupler or RF-382-03 Antenna Coupler or RF-382-04 Antenna Coupler	10208-5120 10208-5120-06 10208-5125	7-9
1	24 Vdc Filter Adapter Assembly (optional)	10372-0850	7-8

**Table 7-4. LRUs for 150 Watt Vehicular System**

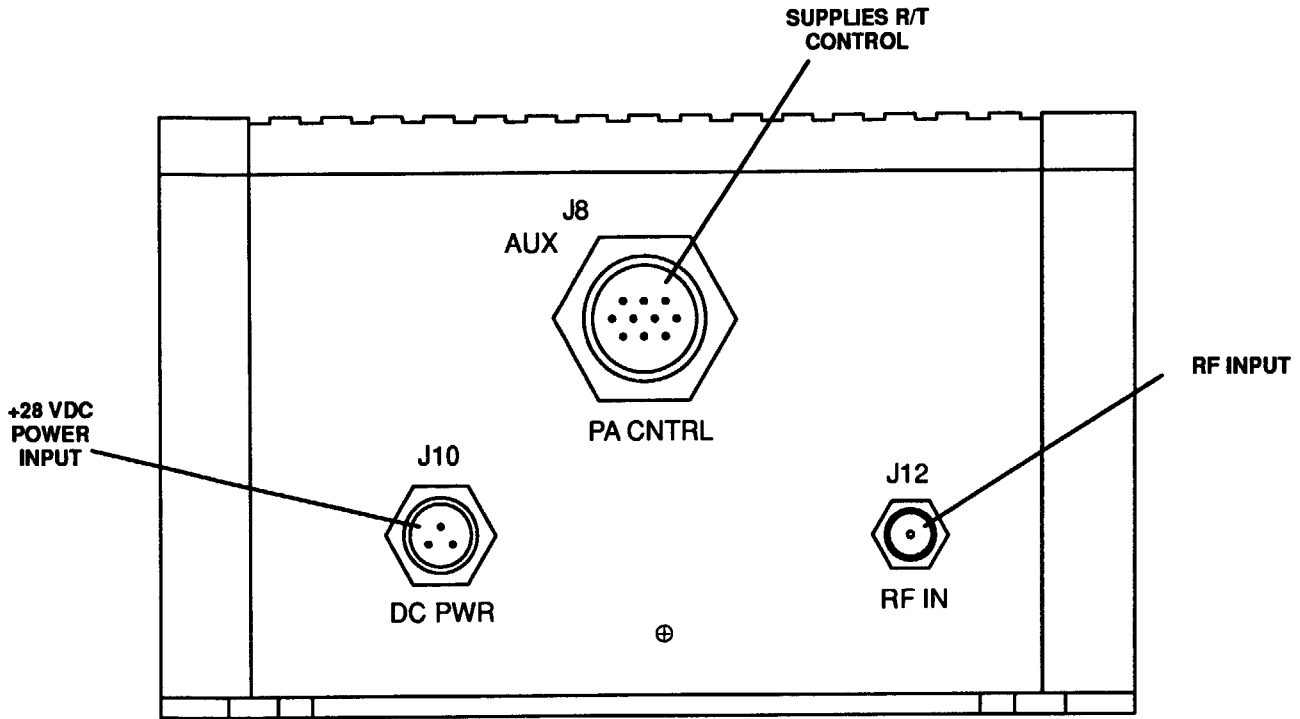
Quantity	Name of Unit	Part Number	Figure Number
1	RT-1694(P) Receiver-Transmitter or RT-1694B(P)/U Receiver-Transmitter	10372-1000-01 10530-1000-01	7-1
1	RF-5033PA-150 150 Watt Power Amplifier	10497-1100-01	7-4
1	RF-382-02 Antenna Coupler or RF-382-03 Antenna Coupler or RF-382-04 Antenna Coupler	10208-5120 10208-5120-06 10208-5125	7-9

**7.3 LRU DIAGRAMS**

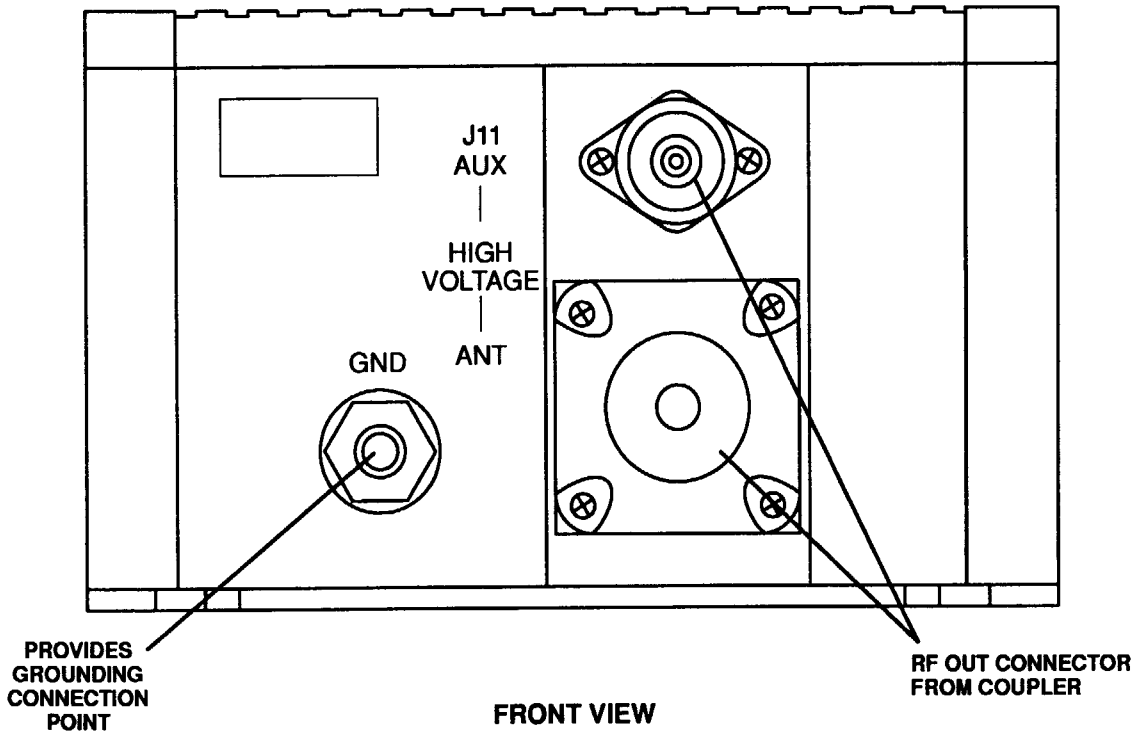
Figures 7-1 through 7-25 show the LRUs and the connector locations for those LRUs.



**Figure 7-1. RT-1694 Receiver-Transmitter Connector Location Diagram**



REAR VIEW



FRONT VIEW

5030E-006

Figure 7-2. RF-5030PA-20E 20 Watt Power Amplifier/Coupler Connector Location Diagram

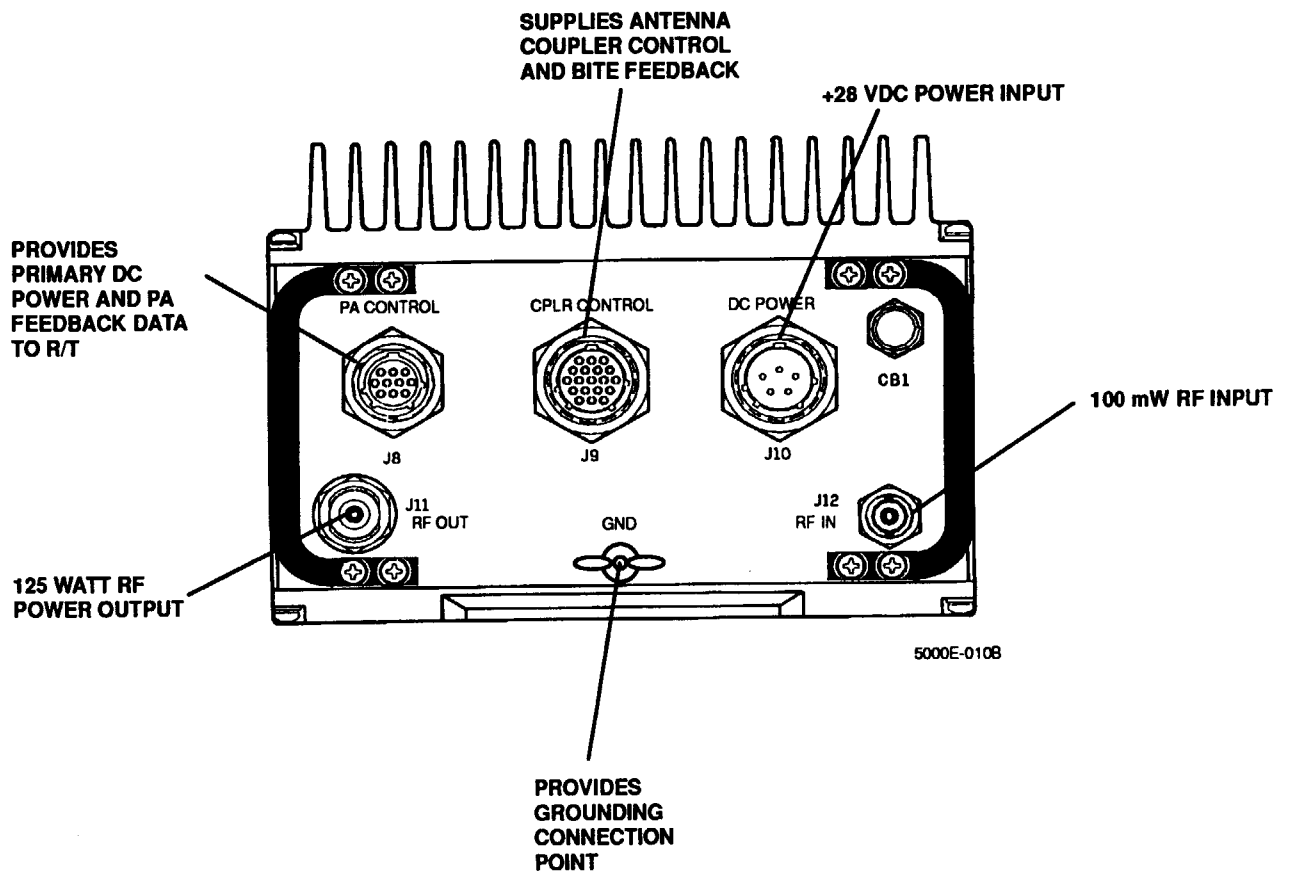


Figure 7-3. RF-5032PA-125E 125 Watt Power Amplifier Connector Location Diagram

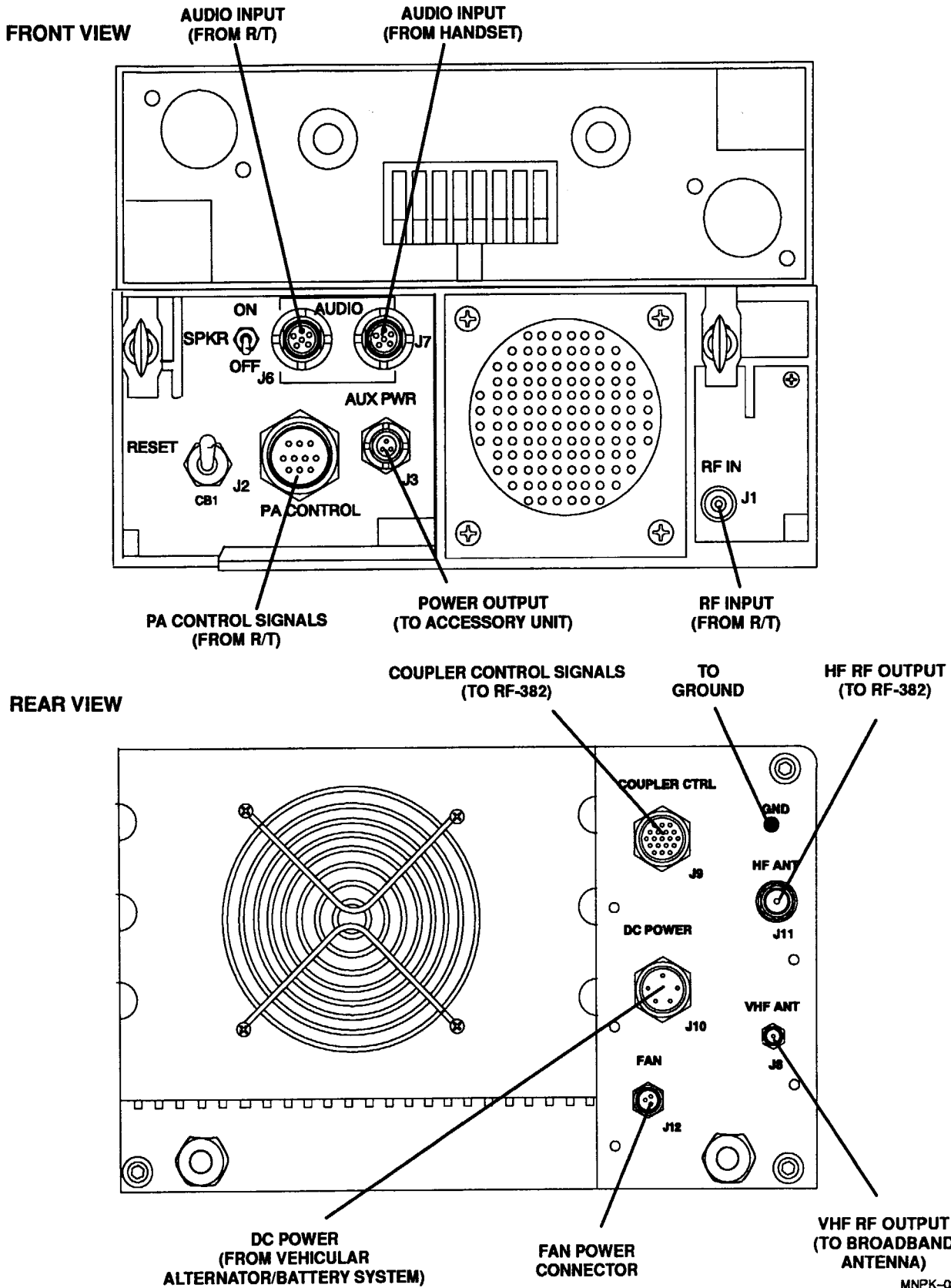
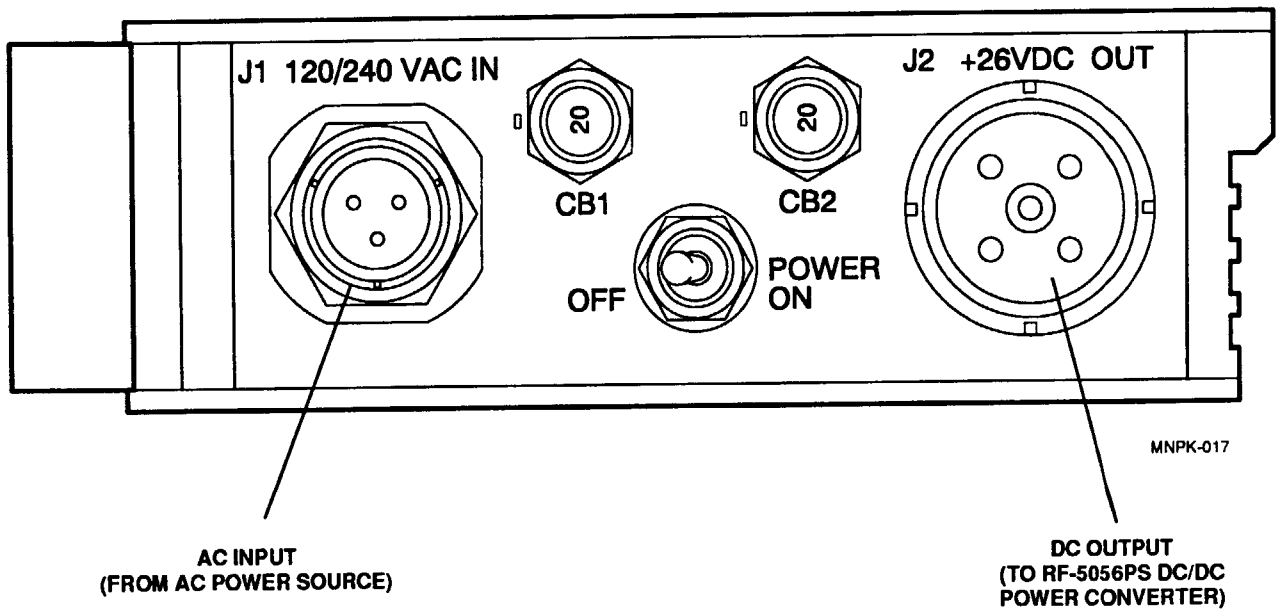


Figure 7-4. RF-5033PA-150 150 Watt Power Amplifier Connector Location Diagram



MNPK-028

Figure 7-5. RF-5055PS AC/DC Power Supply Connector Location Diagram



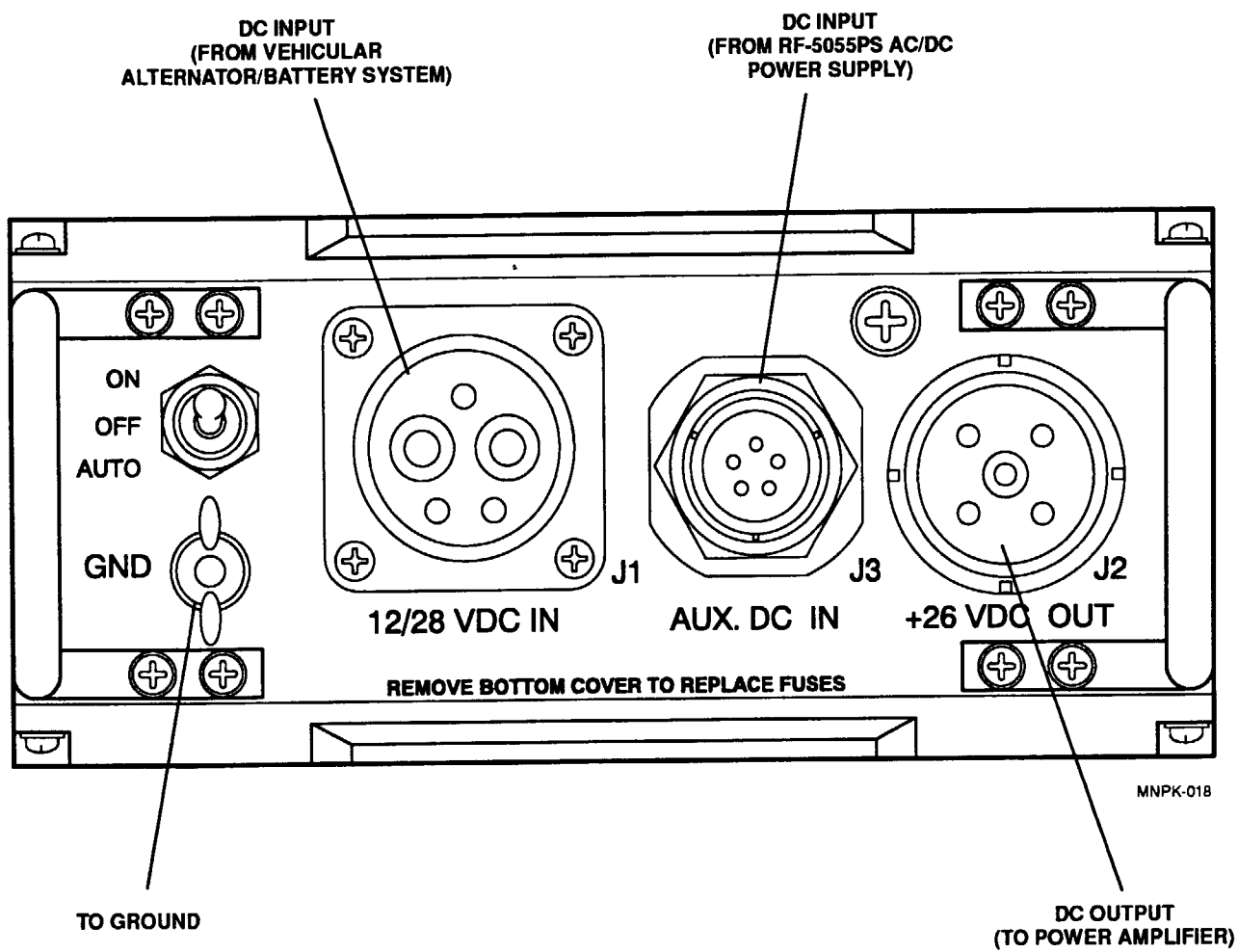
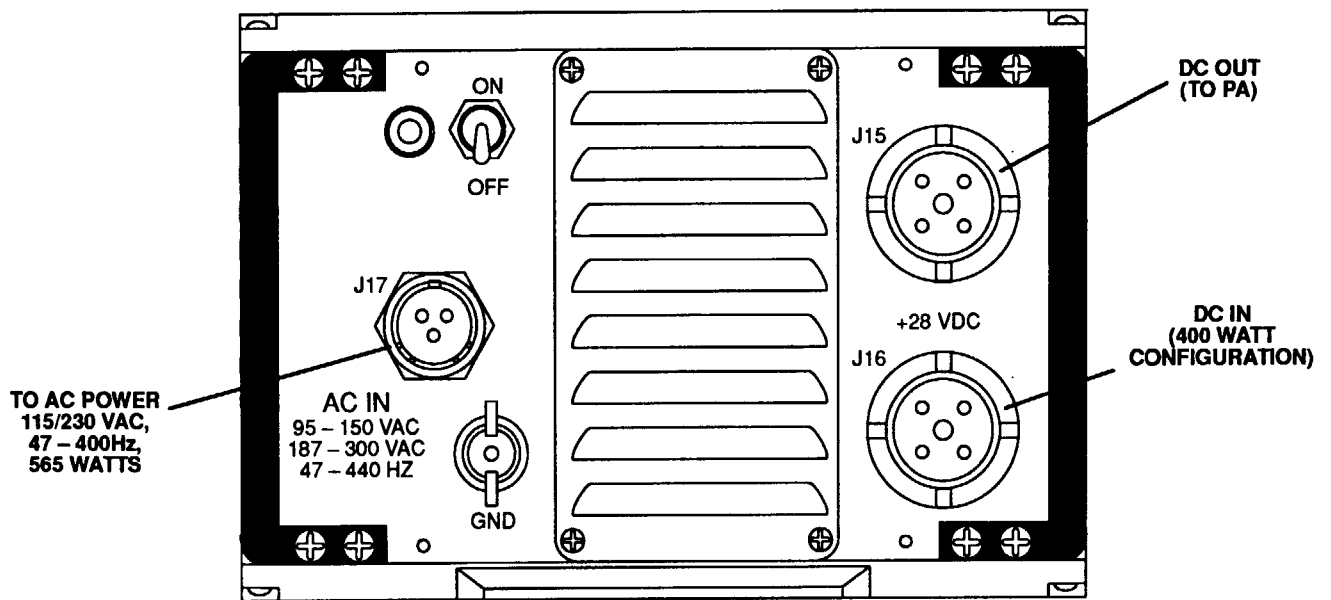
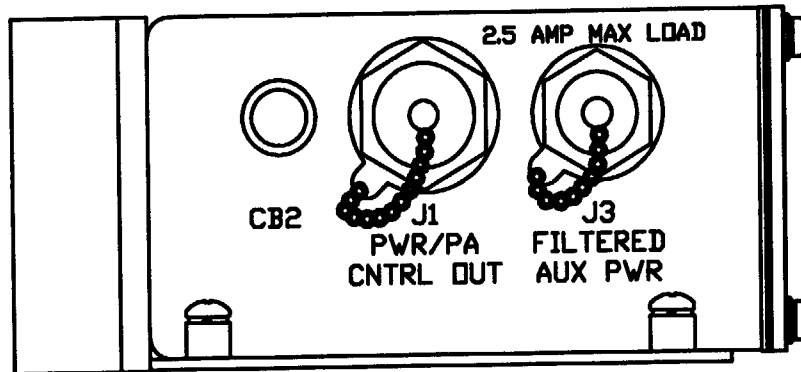


Figure 7-6. RF-5056PS DC/DC Power Converter Connector Location Diagram

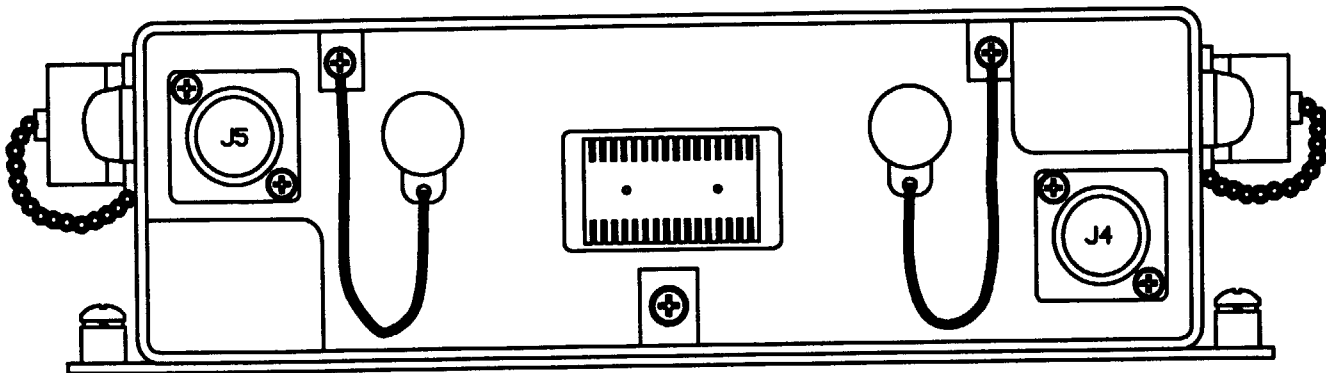


5000E-012A

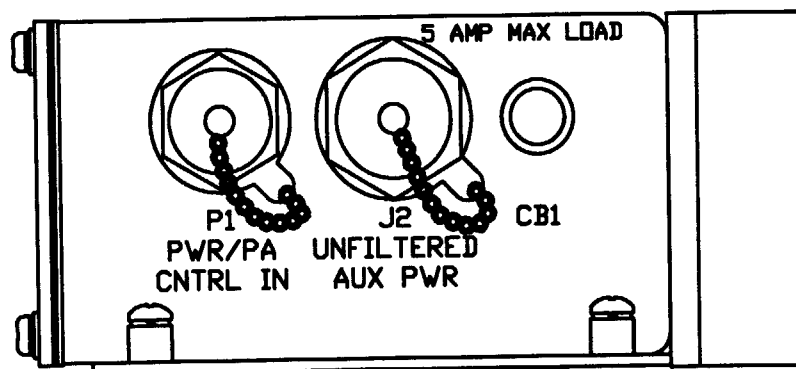
Figure 7-7. RF-5051PS-125 Power Supply Connector Location Diagram



RIGHT SIDE VIEW



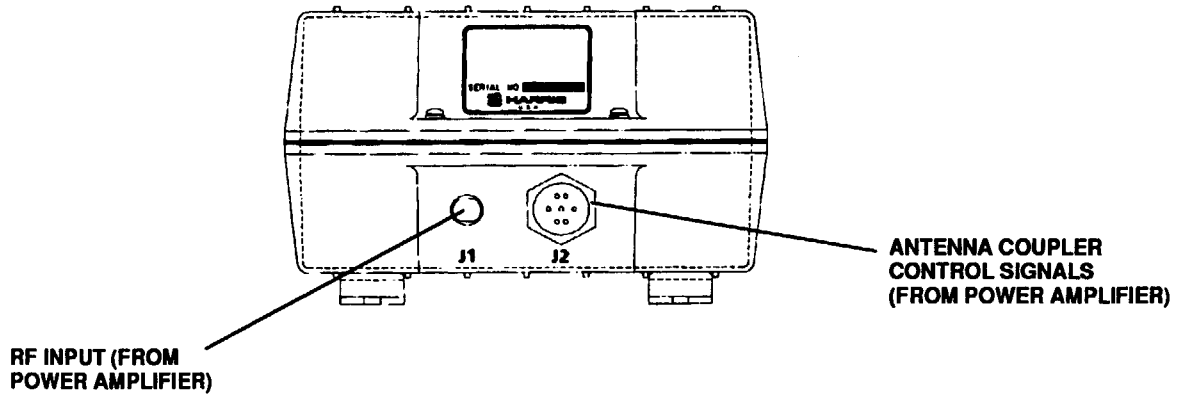
FRONT VIEW



LEFT SIDE VIEW

MNPK-051

Figure 7-8. 24 Vdc Filter/Adapter Assembly (Optional) Connector Location Diagram



5000E-013

Figure 7-9. RF-382 Antenna Coupler Connector Location Diagram

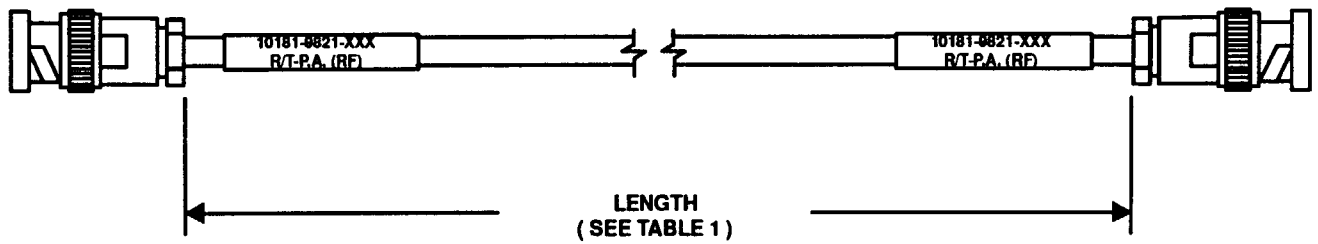


TABLE 1

PART NO.	LENGTH
10181-9821-002	2 FEET
10181-9821-006	6 FEET
10181-9821-020	20 FEET
10181-9821-050	50 FEET

5000E-014

Figure 7-10. Receiver-Transmitter (R/T) to PA Coaxial Cable Assembly (10181-9821)

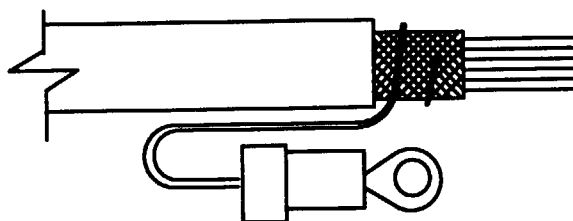
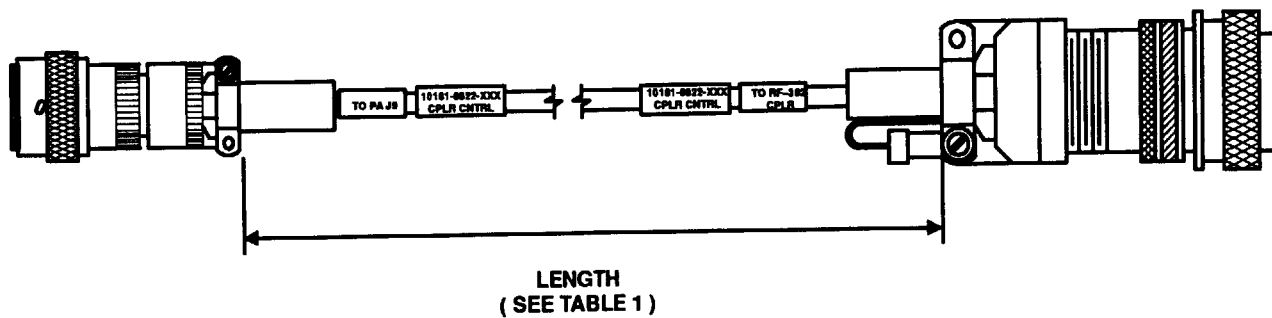


TABLE 1

PART NO.	LENGTH
10181-9822-002	2 FEET
10181-9822-006	6 FEET
10181-9822-020	20 FEET
10181-9822-050	50 FEET

5000E-015

Figure 7-11. R/T to PA Control Cable Assembly (10181-9822)

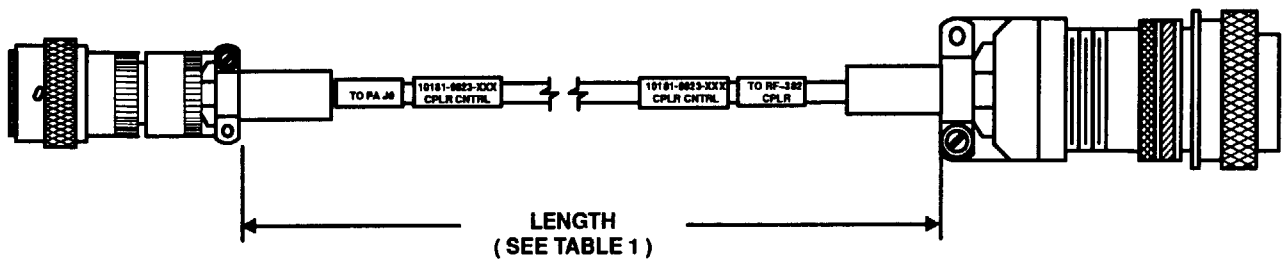


TABLE 1

PART NO.	LENGTH
10181-9823-006	6 FEET
10181-9823-010	10 FEET
10181-9823-020	20 FEET
10181-9823-050	50 FEET
10181-9823-100	100 FEET
10181-9823-150	150 FEET

5000E-016

Figure 7-12. PA to Coupler Control Cable Assembly (10181-9823)

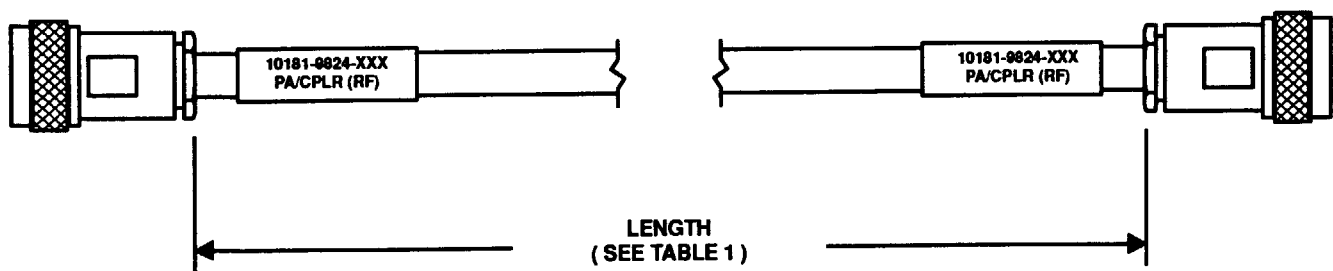


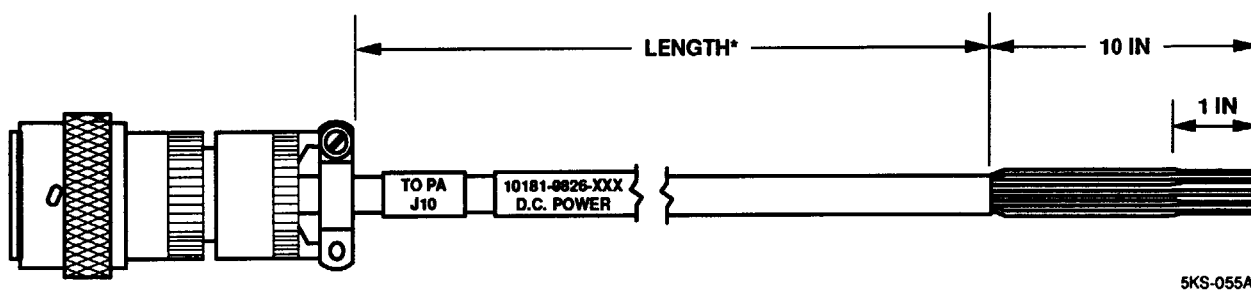
TABLE 1

PART NO.	LENGTH
10181-9824-010	10 FEET
10181-9824-020	20 FEET
10181-9824-050	50 FEET
10181-9824-100	100 FEET
10181-9824-150	150 FEET

5000E-017

Figure 7-13. PA to Coupler Coaxial Cable Assembly (10181-9824)

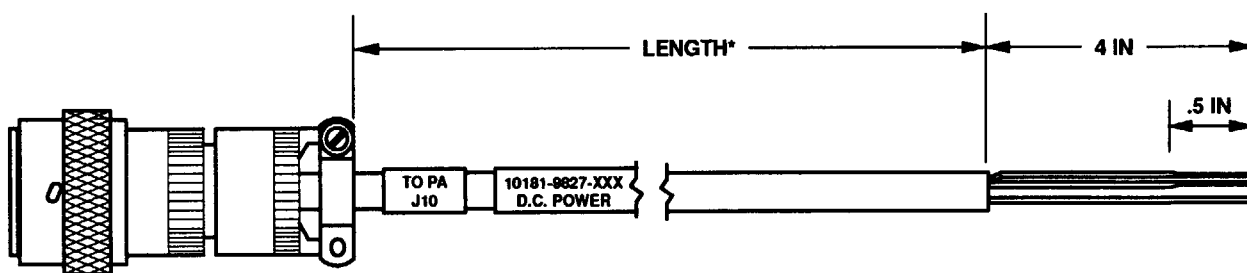
\* NOTE:  
LENGTH TO BE SPECIFIED ON SALES ORDER.



5KS-055A

Figure 7-14. RF-5032PA-125E 125 Watt Power Amplifier Primary Power Cable (10181-9826)

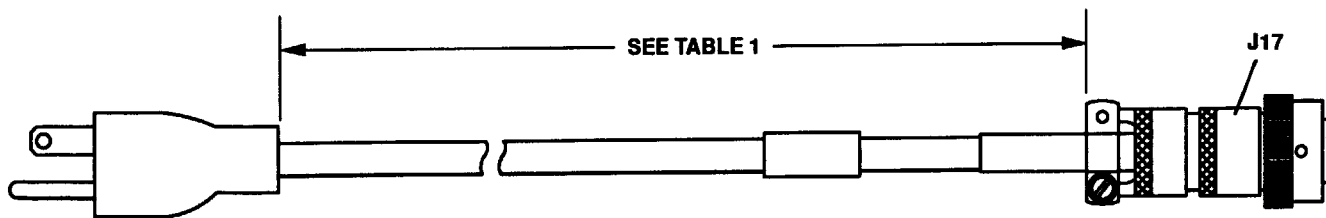
\* NOTE:  
LENGTH TO BE SPECIFIED ON SALES ORDER.



5KS-054A

Figure 7-15. 20 Watt Power Amplifier to Antenna Coupler Primary Power Cable Assembly (10181-9827)





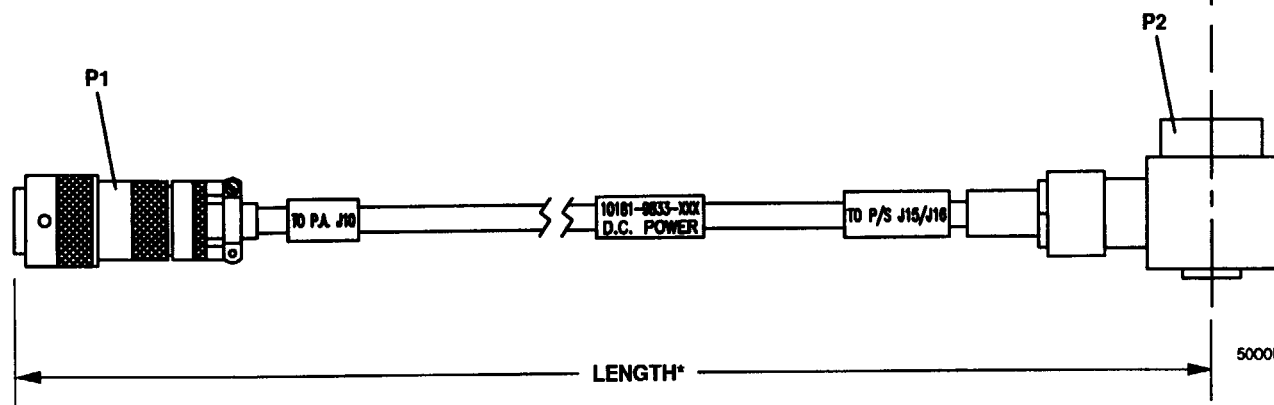
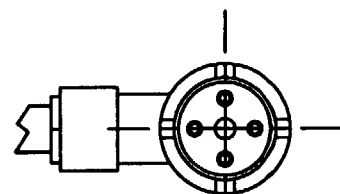
**TABLE 1**

DASH NUMBER	LENGTH	PARTS LIST NUMBER
NONE	104 IN	10181-9831
-008	96 IN	10181-9831-008
-015	180 IN	10181-9831-015

5000E-020

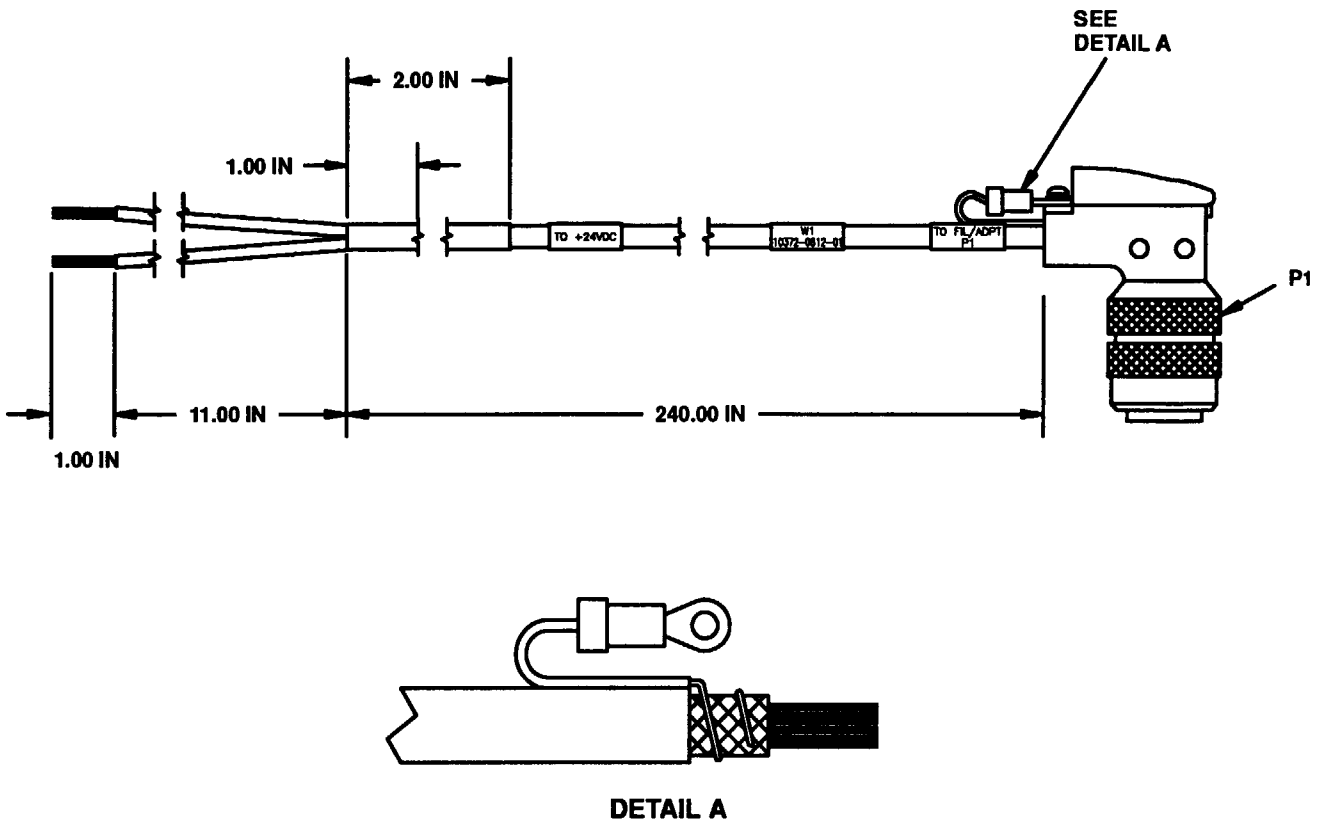
**Figure 7-16. AC Power Cable Assembly (10181-9831)**

\* NOTE:  
LENGTH TO BE SPECIFIED ON SALES ORDER.



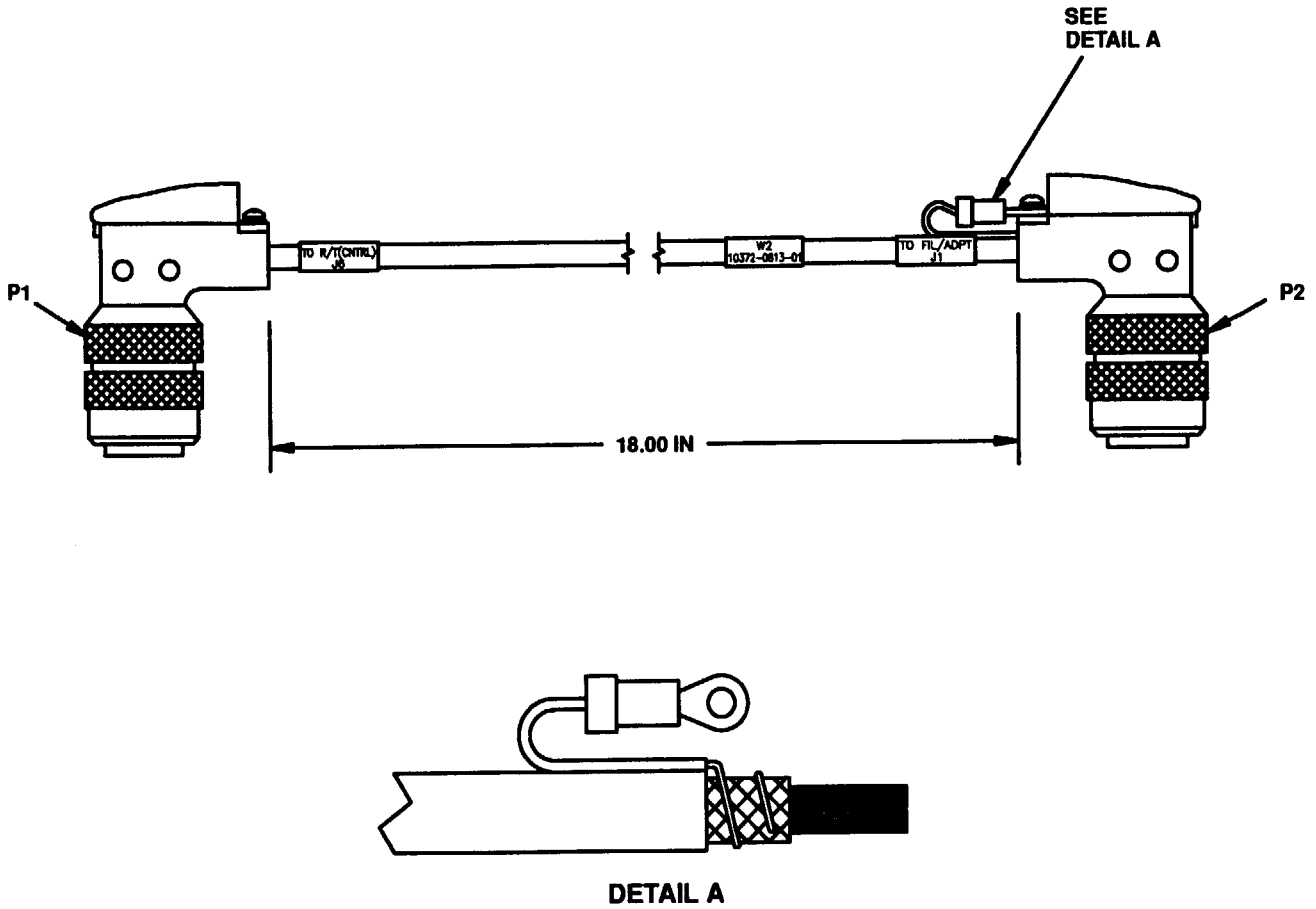
5000E-021

**Figure 7-17. 125 Watt Power Amplifier DC Power Cable Assembly (10181-9833)**



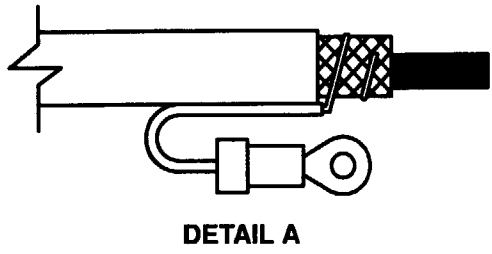
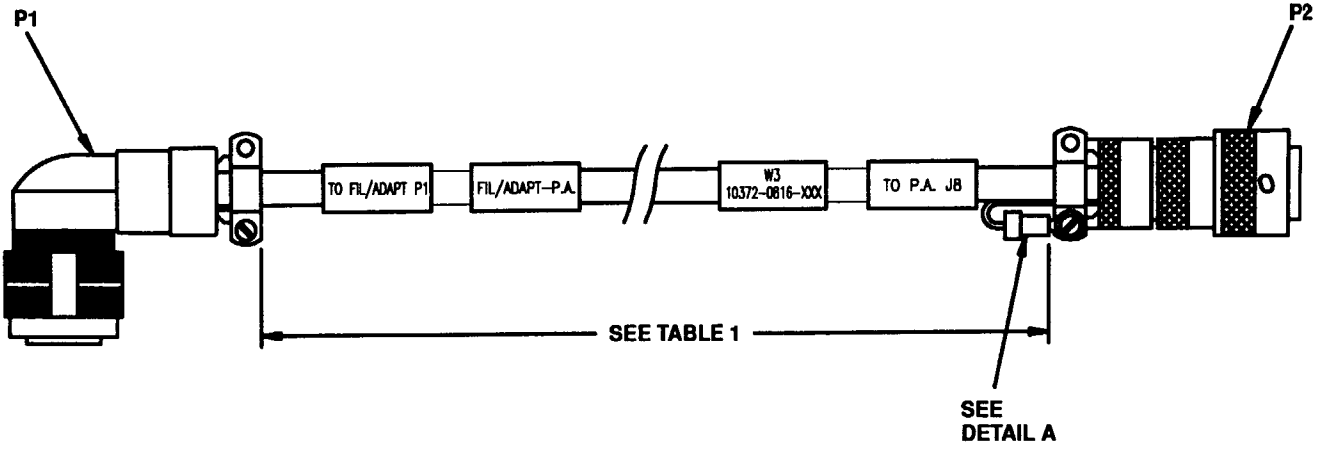
MNPK-048

Figure 7-18. 24 V Power Cable Assembly (10372-0812)



MNPK-049

Figure 7-19. 24 V Power/Control Cable Assembly (10372-0813)

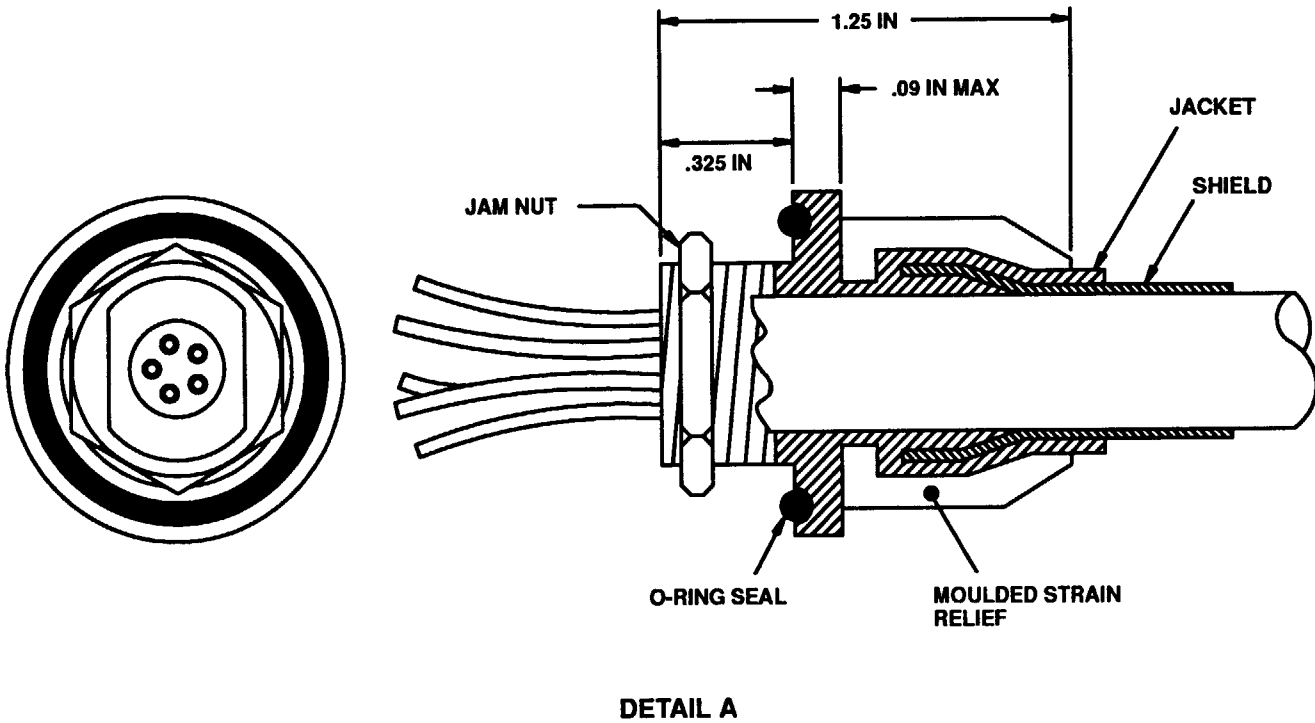
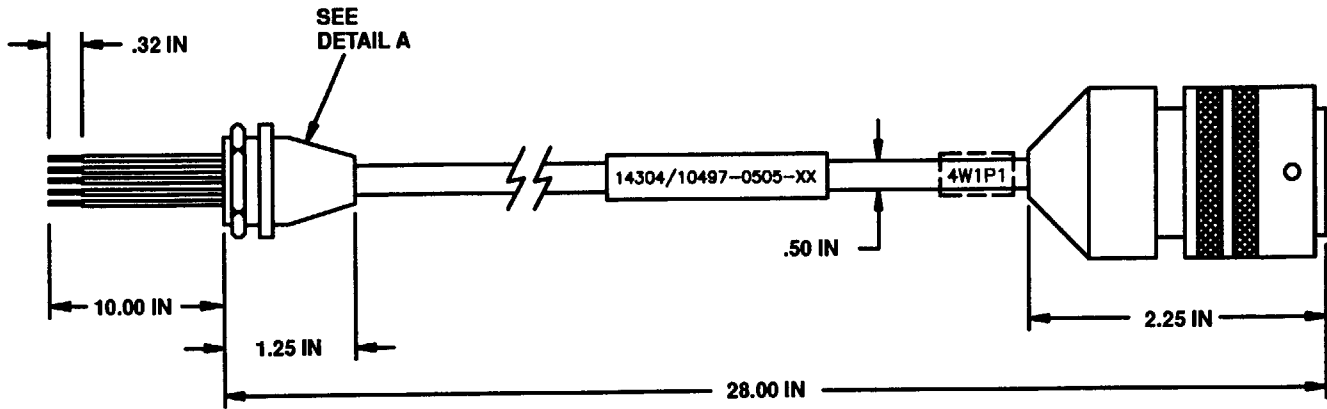


MNPK-050

**TABLE 1**

PART NO.	LENGTH
10372-0816-050	50 FEET
10372-0816-020	20 FEET
10372-0816-006	6 FEET
10372-0816-002	2 FEET

**Figure 7-20. External PA Power/Control Cable Assembly (10372-0816)**



MNPK-033

Figure 7-21. 150 Watt DC Power Cable Assembly (10497-0505)

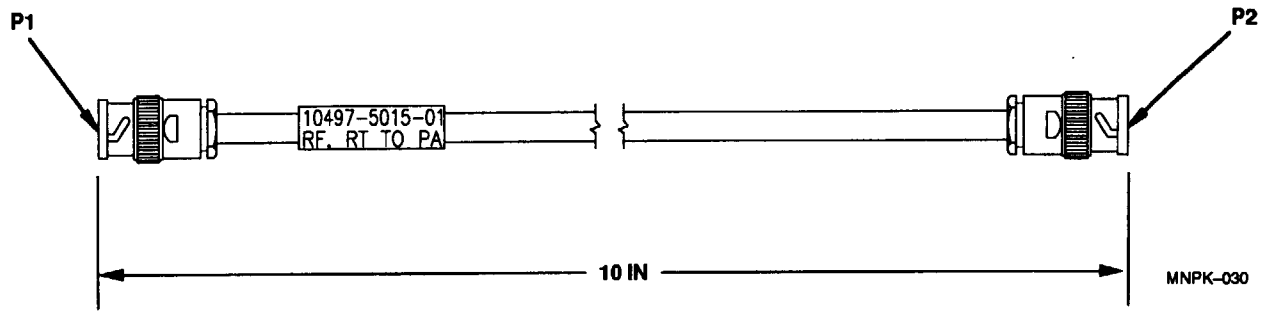


Figure 7-22. 150 Watt R/T – Power Amplifier Coaxial Cable Assembly (10497-5015)

\* NOTE:  
LENGTH TO BE SPECIFIED ON SALES ORDER.

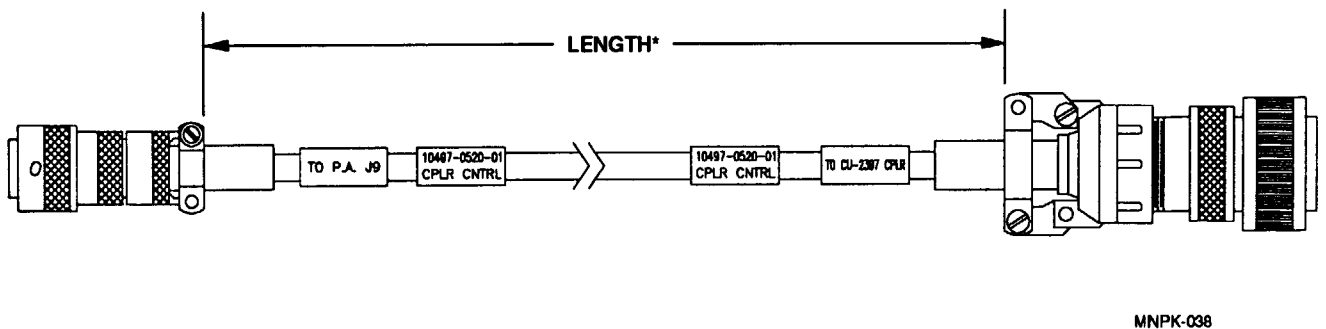


Figure 7-23. 150 Watt Power Amplifier – Coupler Control Cable Assembly (10497-5020)

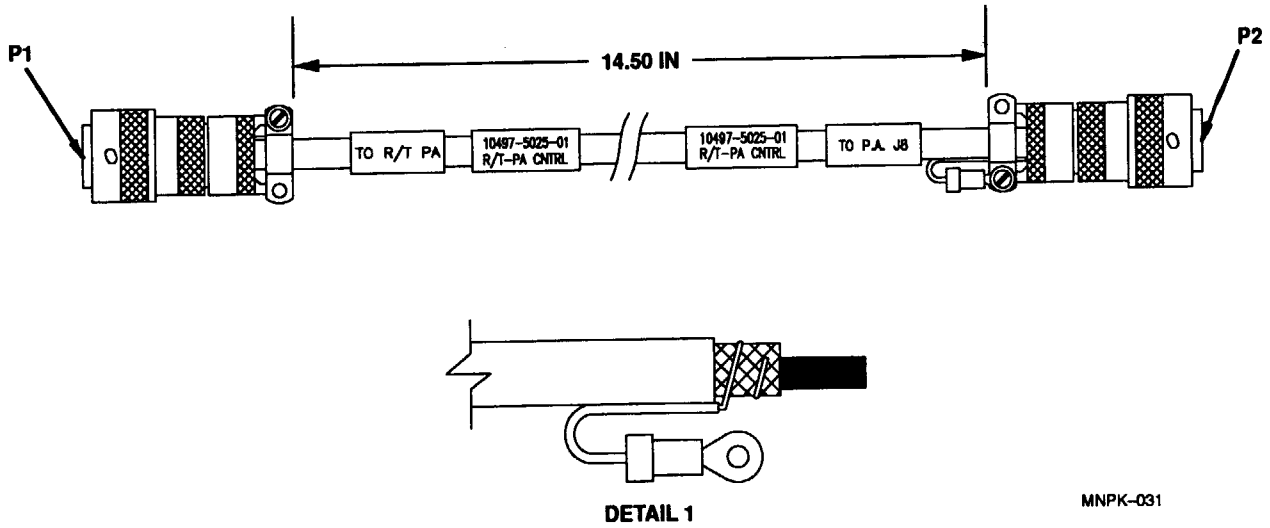


Figure 7-24. 150 Watt R/T – Power Amplifier Control Cable Assembly (10497-5025)

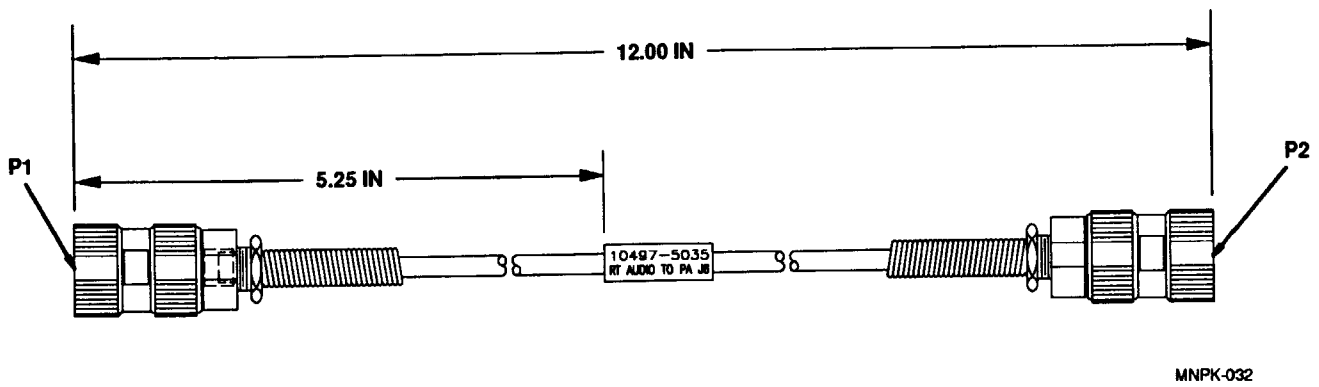
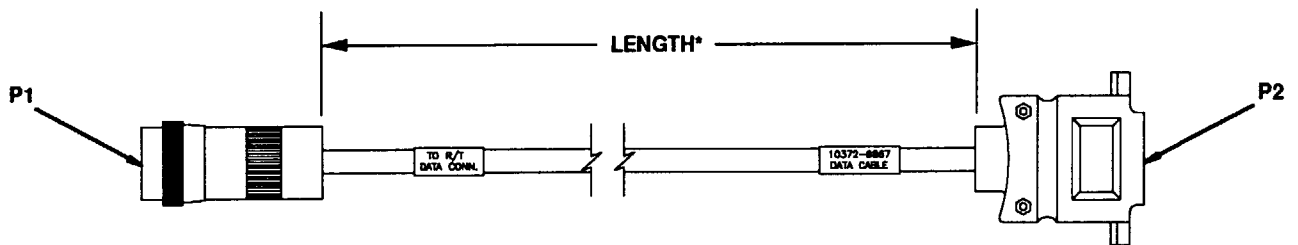


Figure 7-25. 150 Watt R/T – Power Amplifier Audio Cable Assembly (10497-5035)

### 7.3.1 RS-232 Auxillary Cables/Auxillary Connector J5 (Optional)

Figure 7-26 identifies the RS-232 Data Cable (10372-9867) and Figure 7-27 identifies the RS-232 Synchronous/Asynchronous Remote Cable (10372-9868). These cables connect at the DATA connector on the RT-1694 Receiver-Transmitter Front Panel. The DATA connector provides audio and control interface, remote control, and synchronous and asynchronous data interface. Table 8-21 lists the pin assignments for the DATA connector.

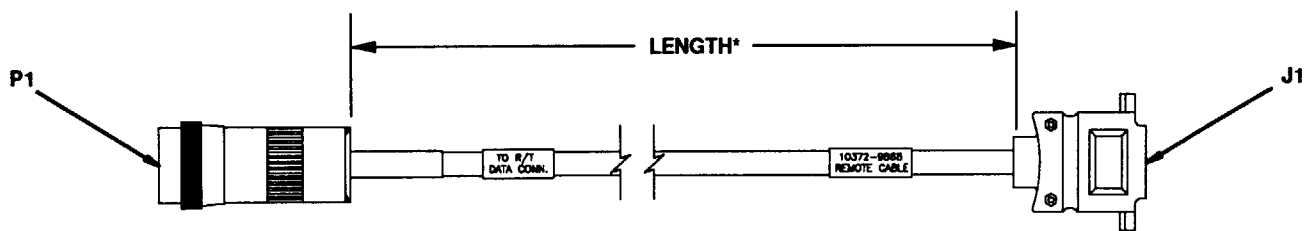
\* NOTE:  
LENGTH TO BE SPECIFIED ON SALES ORDER.



MNPK-034

Figure 7-26. RS-232 Data Cable (10372-9867)

\* NOTE:  
LENGTH TO BE SPECIFIED ON SALES ORDER.



MNPK-035

Figure 7-27. RS-232 Sync/Async Remote Cable (10372-9868)



## **CHAPTER 8**

### **INSTALLATION**

#### **8.1 INTRODUCTION**

This chapter describes the following:

- Site information – Paragraph 8.2
- Tools and materials required – Paragraph 8.3
- Unpacking and repacking – Paragraph 8.4
- Site installation – Paragraph 8.5
- Installation checkout – Paragraph 8.6

#### **8.2 SITE INFORMATION**

##### **8.2.1 General**

The information contained here provides general guidelines for setting up the various configurations of the RF-5200 FALCON™ Series Manpack Systems. In general, select a ventilated, well-lighted location. Avoid placing the system in a busy or congested area, or where there is excessive noise. The following are general site considerations:

- Availability of power source, earth ground, antenna, etc.
- Ease of operation, maintenance, or removal and replacement
- Ventilation
- Clearance of connection cables to the back of the radio, antenna coupler, etc.

##### **8.2.2 General Guidelines**

The information contained in the following paragraphs provides general site guidelines. Before choosing a site, become familiar with the dimensions of the equipment, and make sure there is plenty of room for maintenance when the radio system is installed.

##### **8.2.3 Grounding**

The following paragraphs suggest grounding guidelines that should be followed when performing manpack, vehicular, or base station installations.

### **WARNING**

Inadequate or defective grounding presents a personnel hazard that could result in injury or death.

### **CAUTION**

Inadequate or defective grounding could damage the equipment.

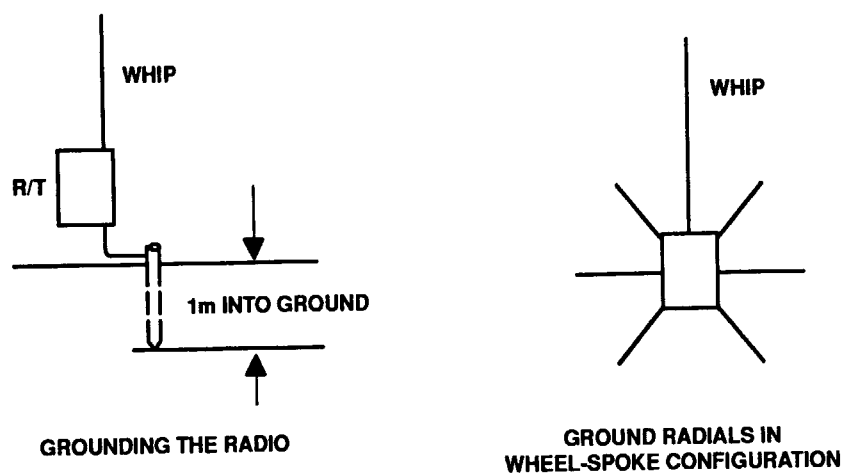
### 8.2.3.1 Manpack Configuration Grounding

The following are guidelines for manpack configuration grounding:

- All ground cables should be as short as possible (ideally less than 12 inches [30 cm]).
- Paint, grease, rust, etc. must be removed so only bare metal is visible at grounding points. Use the chassis frame or a welded steel body panel for the grounding point.
- Ground cables should be fabricated from tinned, braided copper of the correct length. A ground terminal is provided on the Receiver-Transmitter (R/T), and should be used for this purpose.

See Figure 8-1. The R/T ground terminal should be connected to a grounded pipe (such as a cold water pipe), preferably where the pipe enters the ground, or a steel or copper rod driven at least one meter into the soil. In situations where the water table is far below the surface (such as desert or mountainous terrain), it may be necessary to create an artificial ground (counterpoise) by using radials.

A counterpoise system improves performance and can be created by using as many radial wires as possible (1/4 wavelength long) spread out like the spokes of a wheel. A direct connection to a vehicle body provides another effective counterpoise system. Even a single wire laid on the ground or a connection to any mass of metal, such as a wire fence, improves radio system performance.



5000P-007A

Figure 8-1. Ground Systems for Manpack Configuration

### **8.2.3.2 Vehicular Configuration Grounding**

The following are guidelines for vehicular grounding:

- All ground cables should be as short as possible (ideally less than 12 inches [30 cm]).
- Paint, grease, rust, etc. must be removed so only bare metal is visible at grounding points. Use the chassis frame or a welded steel body panel for the grounding point.
- Never ground to trim or hinged panels (door, hood, etc.) or to surfaces which are removed from the chassis (dashboard, seats, etc.).
- Ground cables should be fabricated from tinned, braided copper of the correct length. Ground terminals are provided on the vehicular system units, and should be used for this purpose.
- Position the ground strap to the R/T so the shock mount action is not inhibited. If the RF-382 Antenna Coupler is used, refer to its manual for antenna grounding procedures.

### **8.2.3.3 Base Station Configuration Grounding**

There are currently no base-station RF-5200 FALCON™ Series Manpack System configurations.

### **8.2.4 Environmental**

The radio system will function normally in the environments listed in Chapter 1, Paragraph 1.3.6.

## **8.3 TOOLS AND MATERIALS REQUIRED**

A typical vehicular installation requires wrenches, hammer, punch, pliers, and power drill.

## **8.4 UNPACKING AND REPACKING**

Equipment is packed in corrugated boxes. A two-piece foam enclosure protects the equipment against corrosion and rough handling. The boxes and packing materials should be retained in case the equipment is reshipped.

The following paragraphs describe how to unpack and repack the radio system units.

### **8.4.1 Unpacking**

Perform the following procedure to unpack the equipment:

- a. Inspect the exterior of the box for signs of damage during shipment. Note any problems and report them to the proper authority. An external sticker on the shipping box provides additional instructions concerning inspection of the package.
- b. Use normal care to move the boxed equipment into the general location where it is to be installed. Certain boxes, depending on system configuration, may be heavy. Exercise care when moving boxed assemblies to and from locations.
- c. After removing the equipment from the box, check the contents against the packing slip to see that the shipment is complete. Report discrepancies to Harris/RF Communications' customer service department (tel: 716-244-5830).

## **8.4.2 Repacking**

Perform the following procedure to repack the equipment:

- a. Use the original box if it was retained. If not, use a box that allows three inches of clearance on all sides of the unit.
- b. Use the original packing material if it was retained. If not, use foam packing material to fill the space between the unit and the box. Surround the entire unit with three inches of foam packing material.
- c. Use a good quality packing tape (or straps) to seal the box after closing.

## **8.5 SITE INSTALLATION**

The following paragraphs describe the power requirements and ancillary items kit required for properly installing the radio system. Cabling, jumper and Dual In-Line Position (DIP) switch settings, unit removal and installation procedures, clearance and ventilation requirements, and mounting information is also included.

### **8.5.1 Power Requirements**

The following paragraphs describe the power requirements for the 20 watt, 125 watt, and 150 watt vehicular radio systems.

#### **8.5.1.1 20 Watt Radio System**

The required voltage at the RF-5030PA-20E 20 Watt Power Amplifier is 26.4 Vdc at 3 amperes.

The 20 watt RF-5200 FALCON™ Series Manpack System is designed to operate from a standard 26 V vehicular battery-alternator system, typical of a military vehicles. Power hookup must use a negative ground.

#### **8.5.1.2 125 Watt Radio System**

The required voltage at the RF-5032PA-125E 125 Watt Power Amplifier is 26.4 Vdc at 15 amperes.

The 125 watt RF-5200 FALCON™ Series Manpack System is designed to operate from a standard 26 V vehicular battery-alternator system, typical of a military vehicles. Power hookup must use a negative ground.

#### **8.5.1.3 150 Watt Radio System**

The required voltage at the RF-5033PA-150 150 Watt Power Amplifier is 26.4 Vdc at 20 amperes.

The 150 watt RF-5200 FALCON™ Series Manpack System is designed to operate from a standard 26 V vehicular battery-alternator system, typical of military vehicles. Power hookup must use a negative ground.

### **8.5.2 Ancillary Items Kit**

Each unit that makes up the radio system is supplied with an ancillary items kit that contains items required for proper installation. For more information regarding the contents of these kits, refer to Chapter 1, Paragraph 1.5.

### **8.5.3 Jumper/DIP Switch Settings**

The following paragraphs describe the jumper/DIP switch settings for the RF-5030PA-20E 20 Watt Power Amplifier/Coupler and the RF-382 Antenna Coupler.

#### **8.5.3.1 RF-5030PA-20E 20 Watt Power Amplifier/Coupler Jumper/DIP Switch Settings**

For access to the RT-1694 Receiver-Transmitter's entire 1.6 to 60 MHz frequency range, jumper A5JMP1 on the RF-5030PA-20E's A5 Interconnect Printed Wiring Board (PWB) Assembly must be positioned across pins 2 and 3. See Figure 8-2.

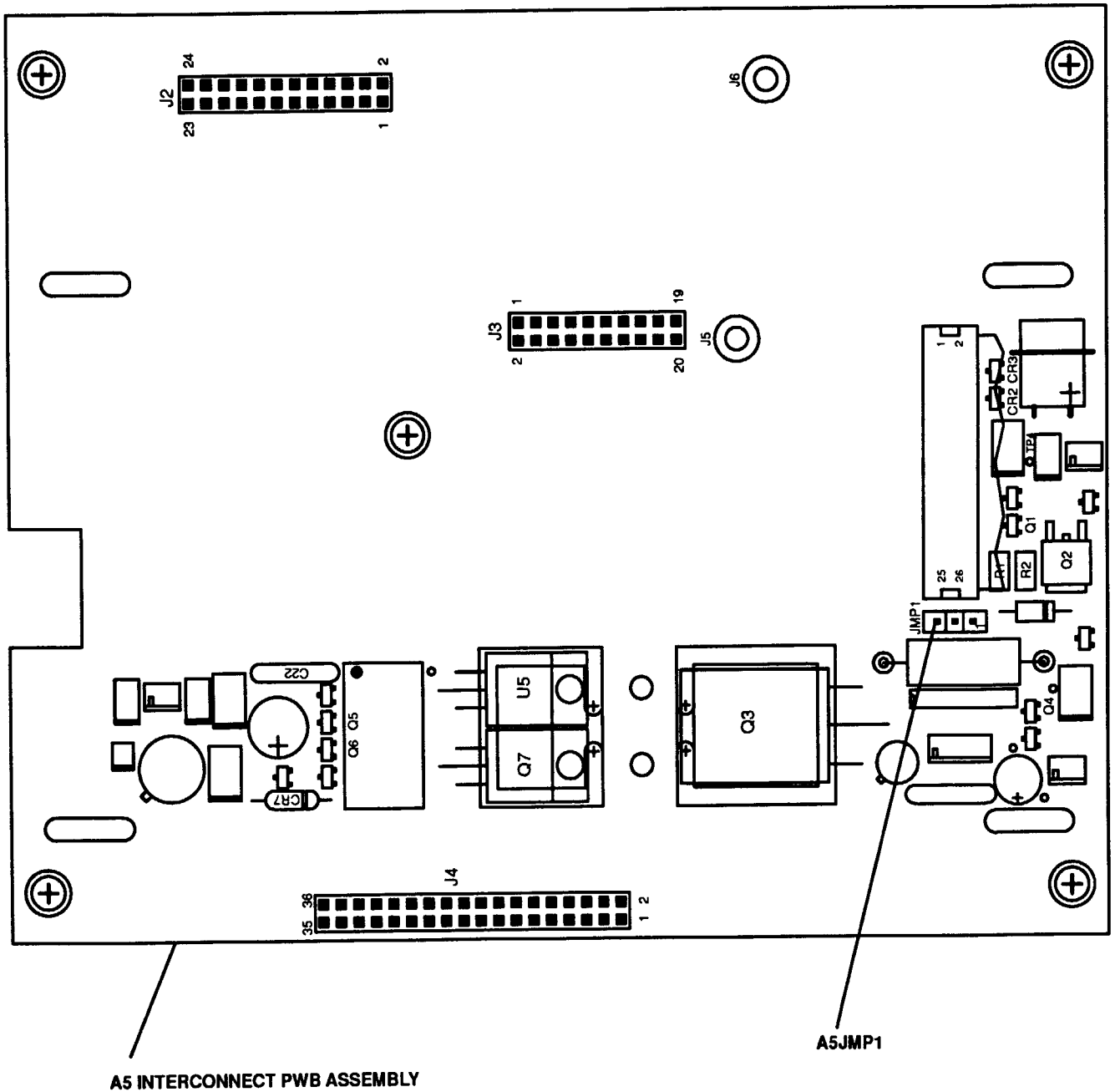


Figure 8-2. A5JMP1 Location – RF-5030PA-20E 20 Watt Power Amplifier/Coupler

5030E-033

### 8.5.3.2 RF-382 Antenna Coupler Jumper/DIP Switch Settings

When using an RF-382 Antenna Coupler in a RF-5200 FALCON™ Series Manpack System, the S2 DIP switch on the antenna coupler's A3 Assembly must be set as shown in Figure 8-3. This is done at the factory. Setting this switch to the specified positions ensures proper operation of the RF-382 Antenna Coupler when used with 125 watt or 150 watt power amplifiers.

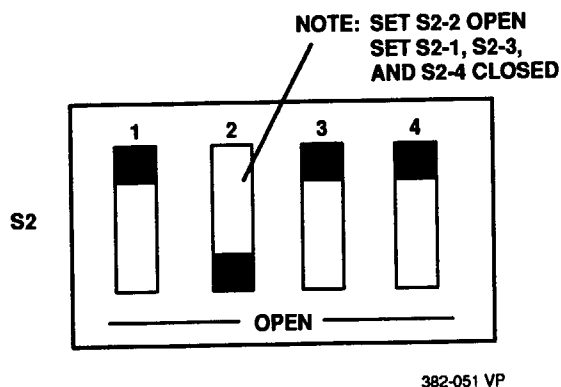


Figure 8-3. RF-382 A3 Control PWB, S2 Switch Settings

### 8.5.4 Interconnect Diagrams

See Figures 8-4 through 8-6 for interconnect diagrams of the various RF-5200 FALCON™ Series Manpack System configurations.

### 8.5.5 Unit Removal and Installation Procedures

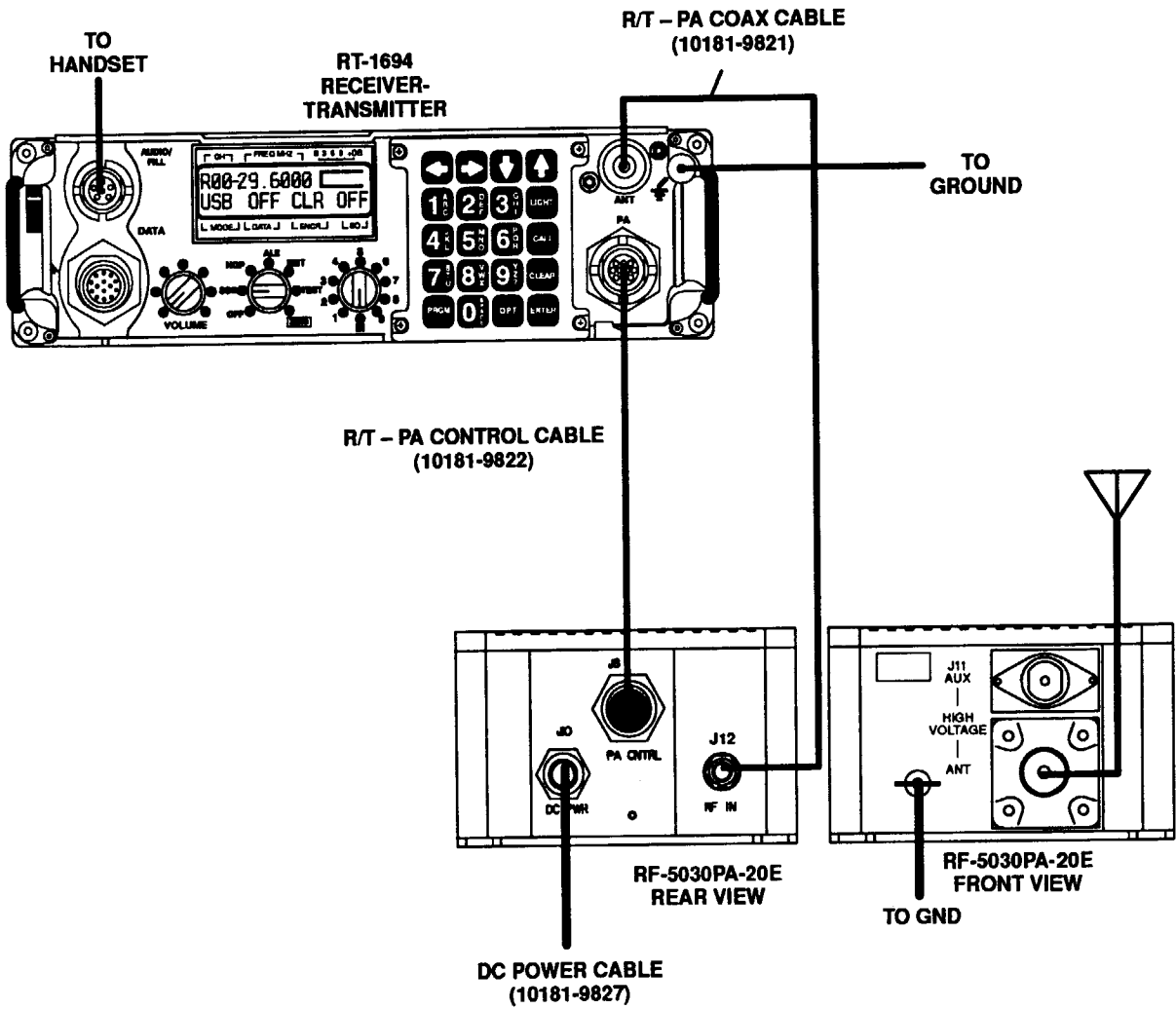
Refer to Chapter 6, Paragraph 6.4, for instructions on removing units from the RF-5200 FALCON™ Series Manpack Systems.

### 8.5.6 Access Clearance and Ventilation Requirements

Consider the following access clearance and ventilation requirements when possible:

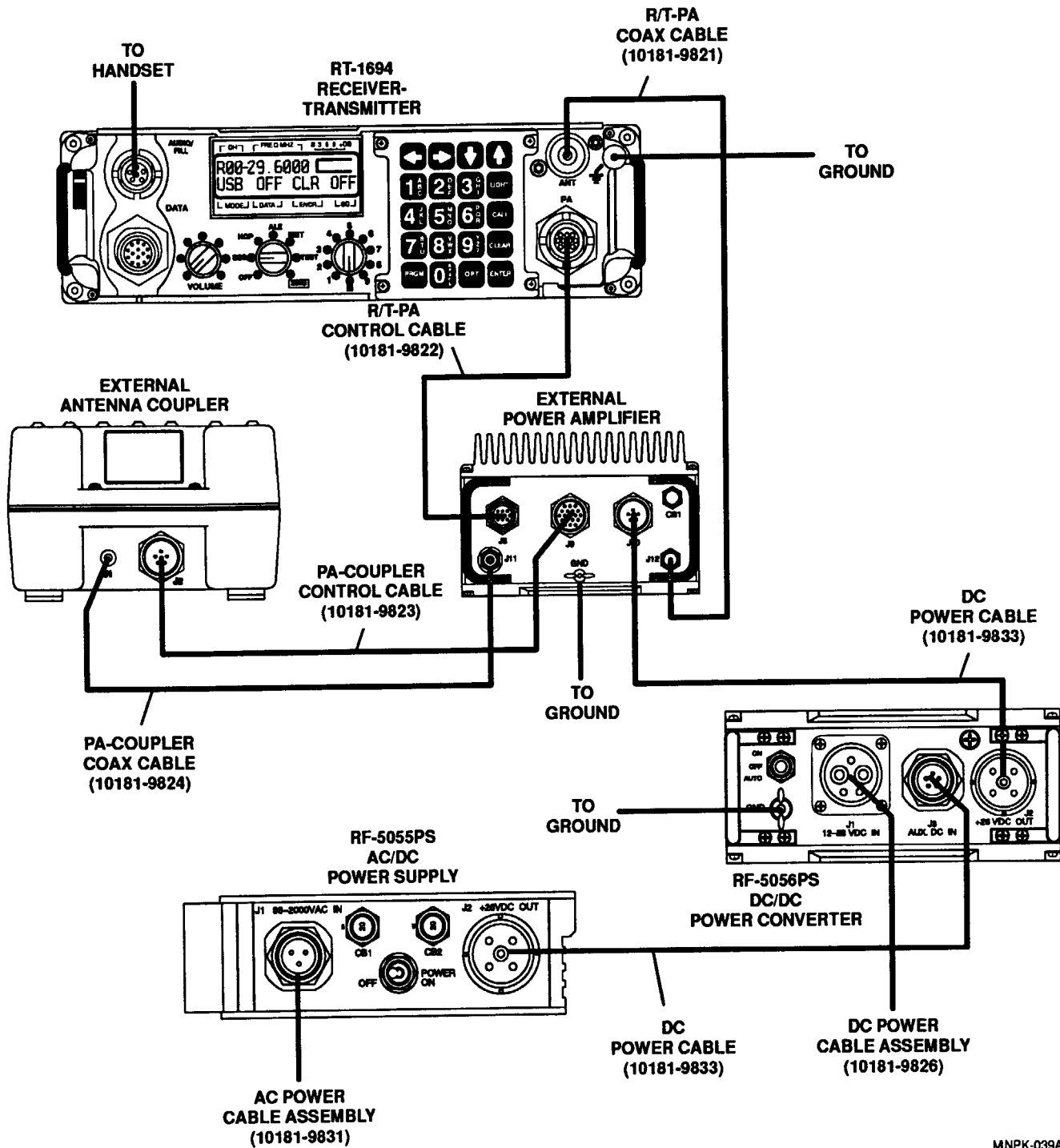
- Clearance in front of the radio system for maintenance personnel is at least 41 inches.
- There is at least 1.5 inches (3.81 centimeters) clearance above the power amplifiers.

When adequate space is provided as described above, special ventilation requirements are not necessary.



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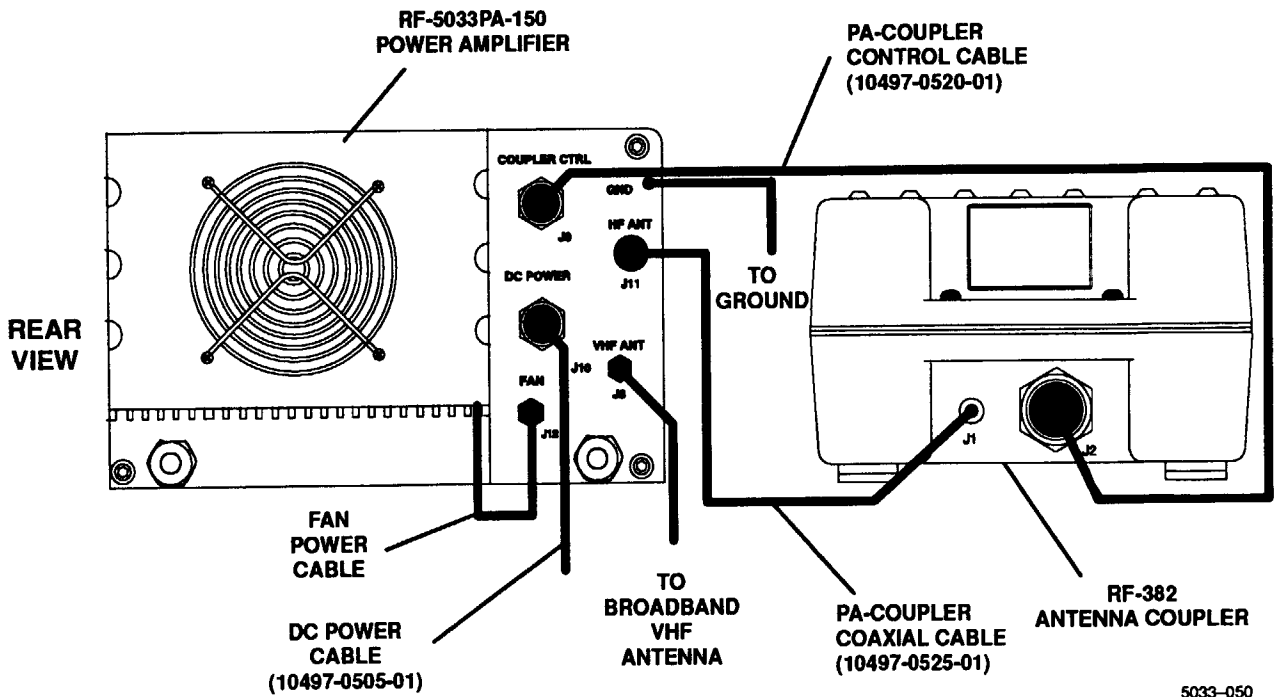
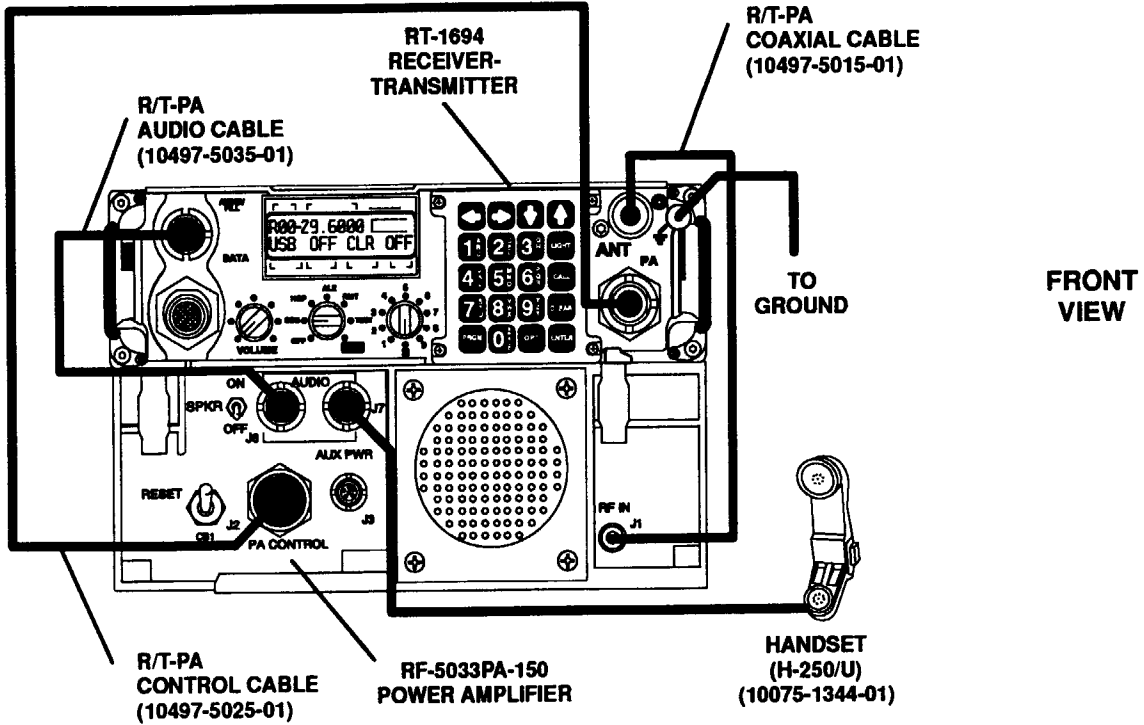
**Figure 8-4. 20 Watt Vehicular Configuration Interconnect Diagram**



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**Figure 8-5. 125 Watt Vehicular Configuration Interconnect Diagram**





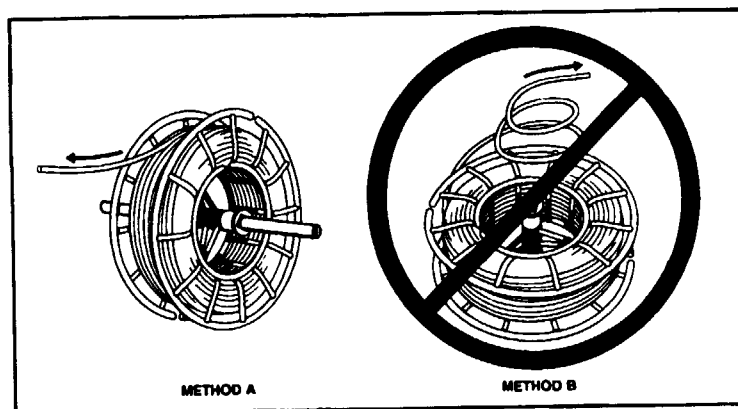
5033-050

Figure 8-6. 150 Watt Vehicular Configuration Interconnect Diagram

### 8.5.7 Antenna Considerations

Harris Corporation, RF Communications Division, recommends using the RF-382 Fast Tune Antenna Coupler with the 125 watt and 150 watt vehicular configurations. The RF-382 Antenna Coupler is fully compliant with the timing and interface requirements of these radio system configurations.

A number of factors should be considered before erecting an antenna. Radio signals are absorbed and reflected by nearby obstructions such as hills, trees, buildings, and power lines. Avoid these if possible, especially when they are in a direct line with the Radio Frequency (RF) signal path. Signal strength is usually greatest from the top of a hill, over level terrain, or over water. Mountainous or hilly terrain may present unpredictable transmission or reception problems. Some antennas are more directional than others, and must be correctly oriented for maximum signal gain. A good earth ground connection and radial grounding system improves antenna performance and protects the equipment and personnel from lightning and electrical shock.



387 600

To avoid damaging or kinking coaxial feedline cable when removing cable from cable reels, support the reel by the center axis and unree the cable as indicated in Method A.

#### 8.5.7.1 Antenna Configurations

This section describes the possible approaches to configuring the two antenna systems for optimum performance. The decision of which antenna to employ is primarily based on the distance over which communication is to occur. Other factors such as available supports, area, and erection time need to be weighted before a decision can be made.

For discussion purposes, the scenarios are divided into three classes: ground wave, short sky wave, and long sky wave. Ground wave is primarily line of sight. Short sky wave paths are those under 500 miles and generally involve a single hop. Long sky wave paths are greater than 500 miles and involve multiple hops.

##### 8.5.7.1.1 Ground Wave

Ground wave propagation involves the transmission of a radio wave signal along or near the surface of the earth. This requires the antenna to aim the radio wave at the horizon (low take-off angle). Primarily, only line-of-sight communication is possible; however, reflections of the radio wave off a tall building, mountain, etc. sometimes allows additional range.

When using the whip antenna, keeping the antenna vertical and using a good RF ground improves the efficiency of the antenna. Use of the RF-1940 Antenna is possible, but the simple dipole configuration should be avoided. The preferred setup is to use a single support and to deploy an inverted vee, sloping dipole, or vertical dipole. All of these antennas have radiation characteristics necessary for this type of path. Figure 8-7 provides examples of these types of antennas.

Regardless of which antenna or configuration is used, the height of the antenna is important to successful communication. Increased height equates to increased range.

#### **8.5.7.1.2 Short Sky Wave**

Short sky wave paths require that the radio wave be directed straight up. This all but eliminates the vertical whip as an option. The RF-1940 Antenna, configured as a dipole, is the best choice for this path. The antenna should be rolled out to the lowest frequency to be used and erected at a height equal to one half of its overall length (1/4 wavelength) for the short paths.

When erected at this height, the bearing is not critical, as the antenna is essentially omnidirectional in this configuration. For this type of path, excessive height is not recommended as it tends to lower the take-off angle below that which is required. Figure 8-8 shows the dipole configuration.

#### **8.5.7.1.3 Long Sky Wave**

Long sky wave paths require that the take-off angle of the radio wave be directed at a low angle like ground wave. Use of the whip antenna is not recommended; however, if the whip must be used, it is preferable that it be removed from the radio and remotely located with a ground radial system previously described.

The RF-1940 Antenna can be used in the dipole configuration if a height of one-half wavelength can be achieved. Orient the antenna such that the desired station is perpendicular to the antenna. Alternately, a vertical dipole can be erected if only one support exists.

If the communication is to a specific direction, two types of directional antennas can be made from the RF-1940 Antenna; these are the sloping vee and long wire. The sloping vee is made similarly to a dipole, except a single support is used and the two ends are swung around to form a vee, the apex of which points in the favored direction. A long wire is formed by joining the two wire elements and laying out the 45 meters of wire in a straight line. This antenna is directional, and the wire should be pointed about 20° away from the desired direction. Figure 8-8 shows both of these options.

#### **8.5.7.2 Very High Frequency (VHF) Antennas**

Primarily, VHF frequencies (30 to 60 MHz) are used for ground wave paths previously described. The whip is the preferred antenna for these frequencies. Performance is greatly enhanced by getting the antenna as high as possible. The whip may be removed and located in a higher position with a suitable ground. Note that at High Frequency (HF), the ground radials are placed on the ground, whereas at VHF, they must be suspended in the air. The radials need to be only 2.5 meter to 1 meter long, and four are required.

#### **8.5.7.3 Antenna Options**

Paragraphs 8.5.7.3.1 through 8.5.7.3.4 discuss some of the antennas available for the manpack system configurations.

##### **8.5.7.3.1 OE-505 Manpack Whip Antenna Kit**

The OE-505 Manpack Whip Antenna Kit is supplied with the AN/PRC-138 Manpack, and consists of a 10012-0241 whip antenna, a 10372-0277 antenna base, and a 10372-1215-01 adapter assembly. See Figure 8-9.

The 10012-0241 HF whip antenna (AT-271A/PRC-25) is a 3.1 meter, collapsible antenna composed of six sections. A braided plastic cord, under spring tension, is threaded through the sections to keep them together in

the operating condition. The top section must be folded first. When the sections are folded, the cable keeps them together as a group and prevents the loss of individual sections. Spring tension is provided by a spiral spring in the base of the antenna.

The 10372-0277 antenna base is used as the main support for the 10012-0241 antenna. The 10372-1215-01 adapter assembly is also supplied with this kit.

### **8.5.7.3.2 OE-505A/PRC Manpack Whip Antenna Kit**

The OE-505A/PRC Manpack Whip Antenna Kit is supplied with the AN/PRC-138(V)2 Manpack, and consists of a 10012-0241 whip antenna, a 10530-1250-02 antenna base, and a 10530-1215-01 adapter assembly. See Figure 8-9.

The 10012-0241 HF whip antenna (AT-271A/PRC-25) is a 3.1 meter, collapsible antenna composed of six sections. A braided plastic cord, under spring tension, is threaded through the sections to keep them together in the operating condition. The top section must be folded first. When the sections are folded, the cable keeps them together as a group and prevents the loss of individual sections. Spring tension is provided by a spiral spring in the base of the antenna.

The 10530-1250-02 antenna base is used as the main support for the 10012-0241 antenna. The 10530-1215-01 adapter assembly is also supplied with this kit.

### **8.5.7.3.3 RF-1940 Dipole Antenna**

The RF-1940 Portable Dipole is an antenna which is fully field deployable by one person, and no additional mounting hardware is needed. The antenna characteristics vary depending on whether the antenna is mounted as a half-wave dipole, sloping-vee, or inverted-vee.

The antenna consists of two spools that contain both rope and wire, a center insulator, and a feedline. General procedural steps for erecting a dipole antenna follow:

- a. Unroll an equal amount of wire from the spools to the lowest desired frequency that is being used. The wire has markers attached so the correct length can be easily determined. The length of each element can also be determined by using Table 8-1.
- b. Attach the strain relief hook to the insulator, and attach the spade lug at the end of the wire to the insulator via the wing nut.
- c. Connect the coax feedline BNC connector to the insulator, and attach the strain relief to the loop provided on the insulator.
- d. Unwind as much rope as required, and secure both ends of the antenna to the supports. Note that a throwing weight is attached to the free end of the rope for convenience.

**Table 8-1. RF-1940 Antenna Length Reference Chart**

Frequency (MHz)	Quarter-Wavelength		Half-Wavelength	
	Feet	Meters	Feet	Meters
1.8	130.0	39.7	260.0	79.25
2.0	117.0	35.7	234.0	71.32
2.5	93.6	28.5	187.2	57.06
3.0	78.0	23.8	156.0	47.55
4.0	58.5	17.8	117.0	35.66
5.0	46.0	14.0	93.6	28.53
6.0	39.0	11.9	78.0	23.77
7.0	33.4	10.2	66.8	20.36
8.0	29.2	8.9	58.5	17.83
9.0	26.0	7.93	52.0	15.85
10.0	23.4	7.13	46.8	14.27
12.0	19.5	5.94	39.0	11.89
14.0	16.7	5.09	33.4	10.18
16.0	14.6	4.46	29.3	8.93
18.0	13.0	3.96	26.0	7.93
20.0	11.7	3.57	23.4	7.13
25.0	9.4	2.87	18.7	5.70
30.0	7.8	2.38	15.6	4.76
40.0	5.9	1.80	11.7	3.57
50.0	4.7	1.43	9.4	2.87
60.0	3.9	1.19	7.8	2.38

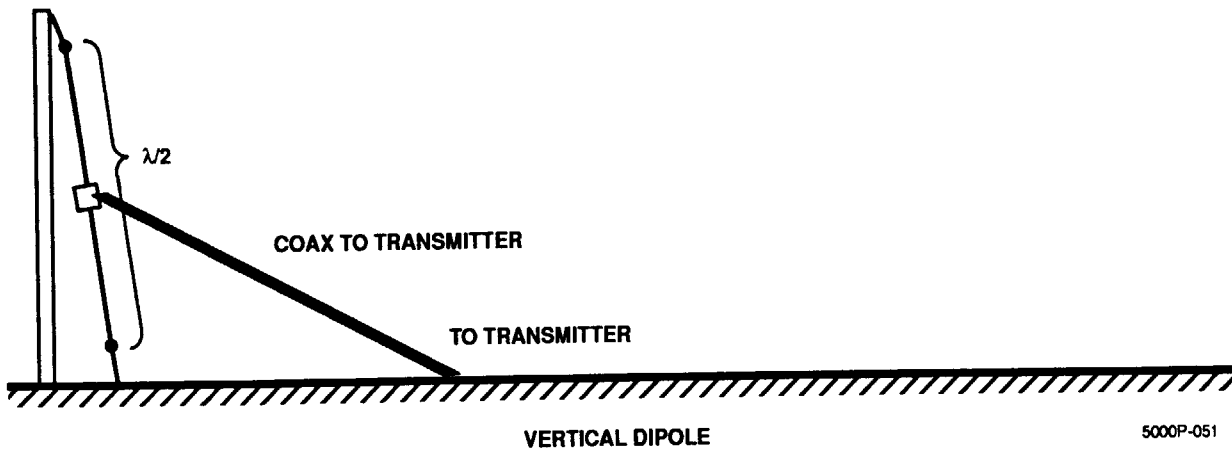
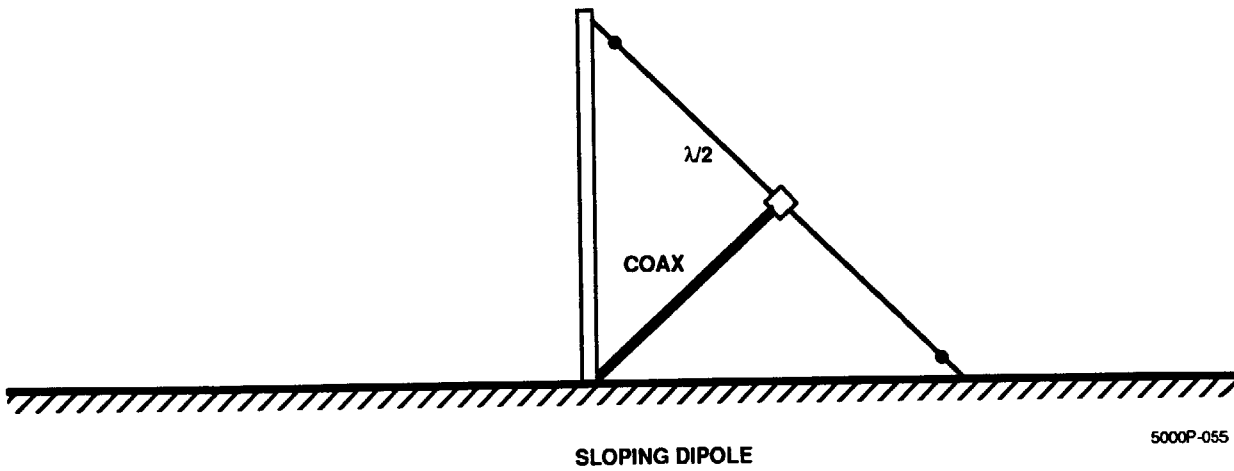
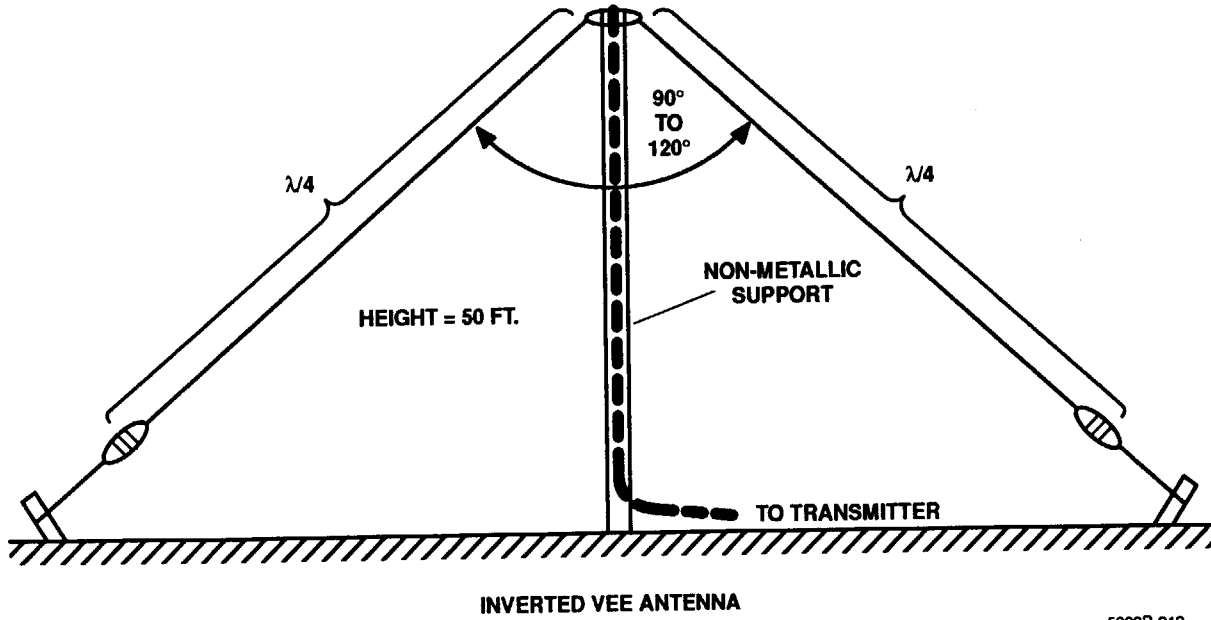
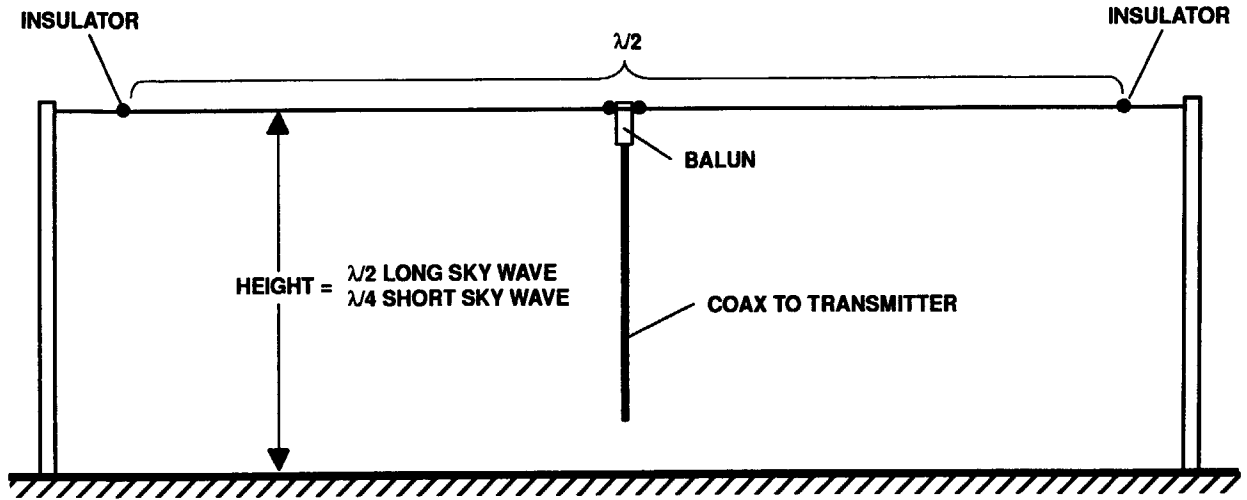
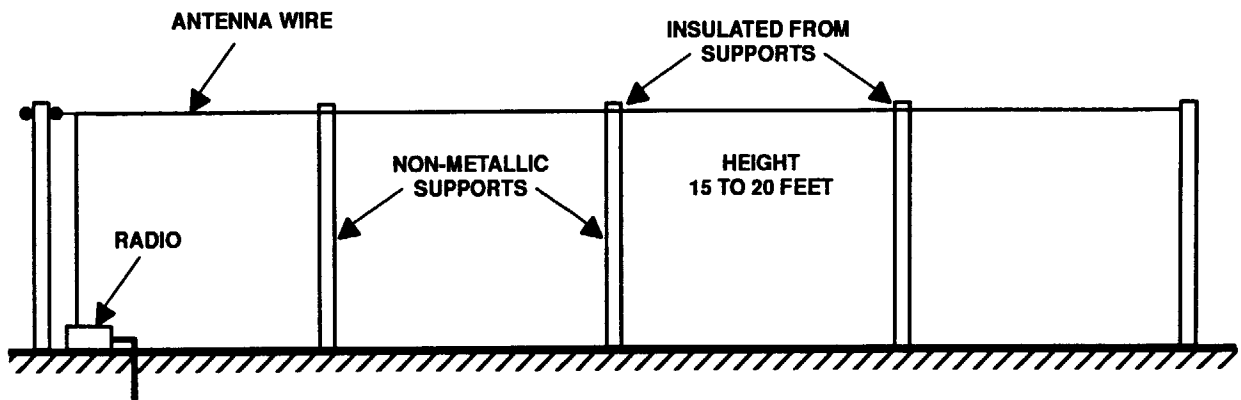


Figure 8-7. RF-1940 Antenna Ground Wave Configurations



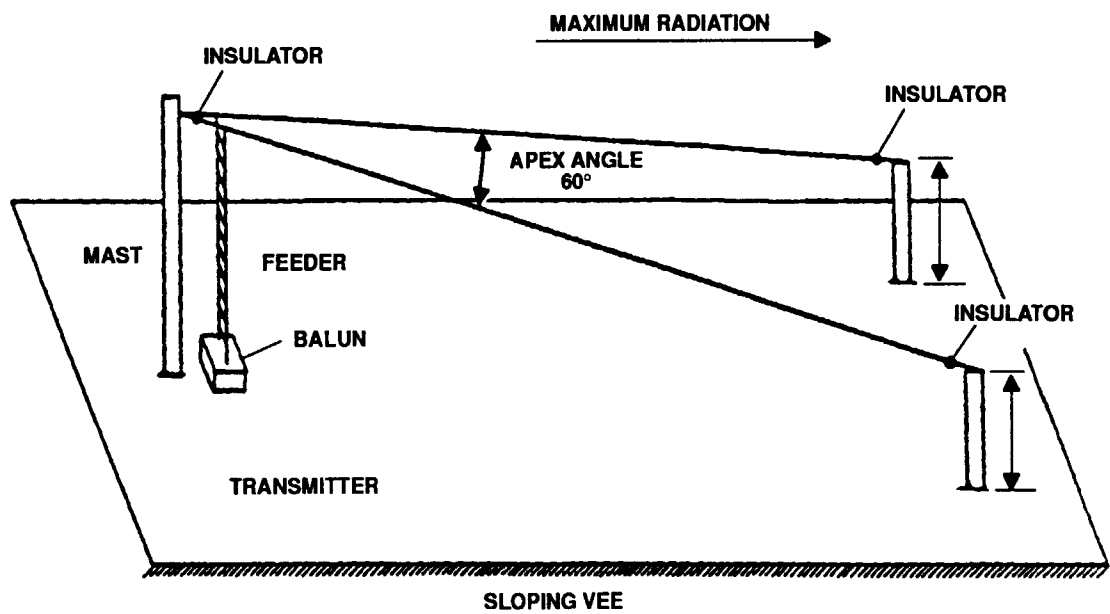
DIPOLE

5000P-010A



LONG WIRE ANTENNA

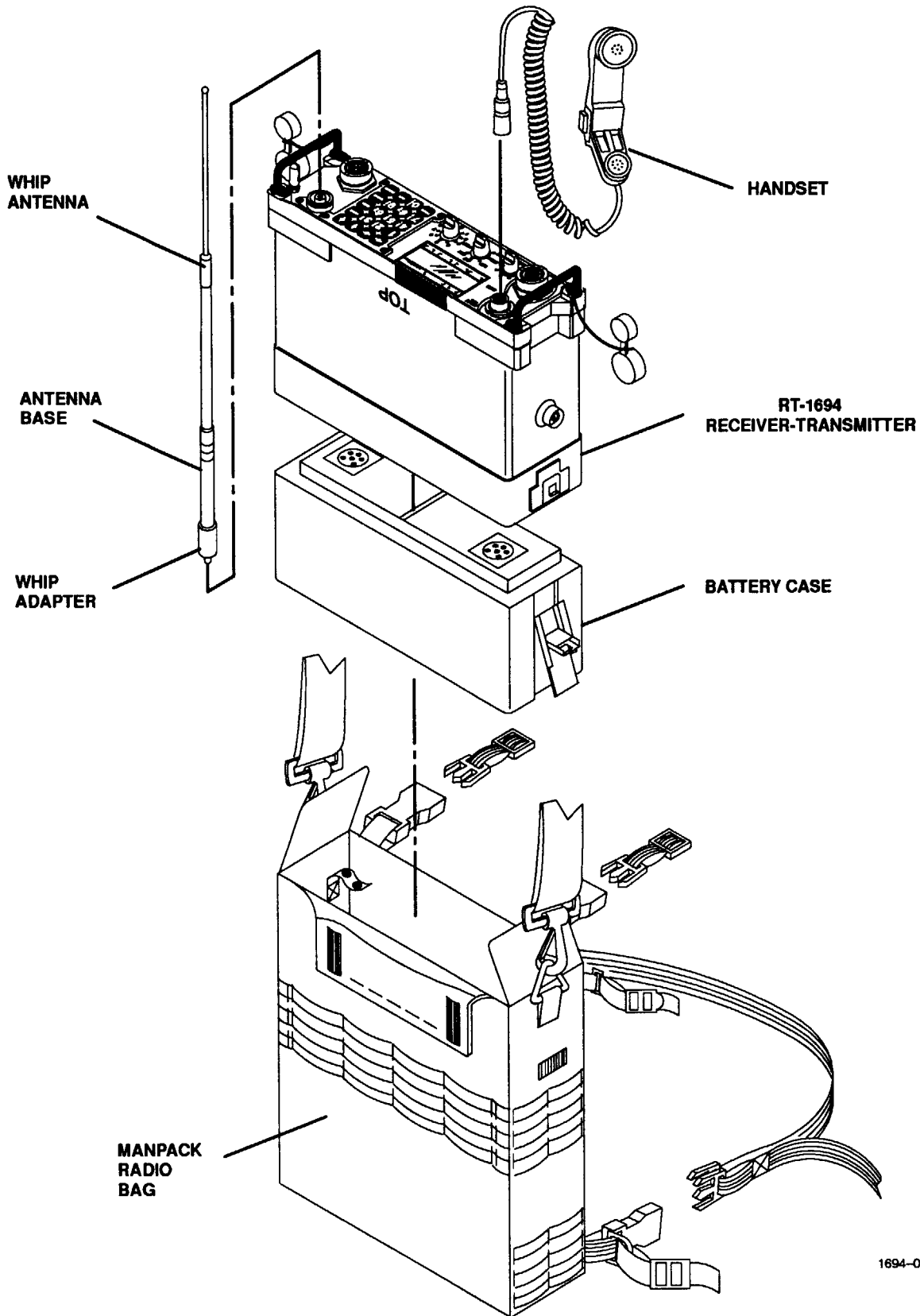
5000P-053



SLOPING VEE

5000P-052

Figure 8-8. Sky Wave Antenna Configuration



1694-003A

Figure 8-9. AN/PRC-138 Manpack Configuration Parts



#### **8.5.7.3.4 SB-V16/V35 Series HF Whip Antennas**

The SB-V16 Whip Antenna is a series of self-supported, vertical, 16-foot (4.9-m), fiberglass, whip antennas. The suffixes -B, -C, or -F define the base style for the antenna.

The SB-V16B Antenna incorporates a feed-through base style and is used in conjunction with the RF-292 Antenna Mount. It may be used at power levels up to 1000 watts in the 1.5 to 30 MHz band.

The SB-V16C Antenna employs a stand-off base style which allows it to be mounted directly to an appropriate surface. It is also rated for operation at power levels up to 400 watts in the 1.5 to 30 MHz band.

The SB-V16F Antenna has a spring base and is used in conjunction with the RF-292 Antenna Mount. It may be used at power levels up to 1000 watts in the 1.5 to 30 MHz band.

The SB-V16FHD HF Whip Antenna is a self-supported, vertical, 16-foot (4.9-m), fiberglass, whip antenna. The suffix Flexible, Heavy Duty (FHD) defines the base style of the antenna. This antenna has a heavy-duty spring base that features a high-voltage protection device should the antenna come in contact with power lines. A flexible rubber boot covers the spring base and the lower portion of the mating antenna section, providing RF burn protection. A vinyl coated plastic ball for the tip of the antenna provides eye protection. An antenna tie-down kit is also included. The SB-V16FHD may be used in conjunction with the RF-292 Antenna Mount. It is rated for operation at power levels up to 1000 watts in the 1.5 to 30 MHz band.

The SB-V35 series of antennas is essentially the same as the SB-V16 series, but it includes four additional four-foot sections. These can be added individually to achieve antenna lengths from 20 feet (6.1 m) to 32 feet (9.8 m). The SB-V35B and the SB-V35C make use of the same base mounts as their 16-foot counterparts. The SB-V35F Antenna, however, incorporates a rigidized spring base. This base allows for greater operational versatility, since it can be set for flexible operation to accommodate operation as a 16-foot antenna, or for rigid operation for antenna lengths greater than 16 feet. Identical base mounts, designated by the same suffixes -B and -C. The operating frequency range is 1.5 to 30 MHz. The rated power level is 400 watts for the -B version and 1000 watts for the -C and -F versions.



When using eight sections (32 feet), it is recommended that the antenna be guyed if prevailing winds exceed 50 miles/hour (80.7 km/hour), or if the antenna is to be installed for an extended period of time.

##### **8.5.7.3.4.1 SB-V16 Series Parts Lists**

Tables 8-2 through 8-5 are the parts lists for the four-section SB-V16B, SB-V16C, SB-V16F, and SB-V16FHD Antennas.

Tables 8-6 through 8-8 are the parts lists for the eight-section SB-V35B, SB-V35C, and SB-V35F Antennas.

**Table 8-2. SB-V16B Antenna Parts List (100-5003)**

Part No.	Military Nomenclature	NSN	Description	Weight
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lbs. 2 ozs.
E-0150		5820-00-931-9106	Feed-through base, 400 watts	2 lbs. 9 ozs.
100-00101			Instruction Manual	

**Table 8-3. SB-V16C Antenna Parts List (100-5004)**

Part No.	Military Nomenclature	NSN	Description	Weight
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lb. 2 ozs.
E-0156	MT-2525/U	5985-00-733-6047	Stand-off base	11 lbs.
MP-0080			Clamp	

**Table 8-4. SB-V16F Antenna Parts List (100-5009)**

Part No.	Military Nomenclature	NSN	Description	Weight
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lb. 2 ozs.
100-5055			Spring Mount	6 lbs. 1 oz.

**Table 8-5. SB-V16FHD Antenna Parts List (100-5109)**

<b>Part No.</b>	<b>Military Nomenclature</b>	<b>NSN</b>	<b>Description</b>	<b>Weight</b>
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lb. 2 ozs.
E76-0006-001			16 foot spring base with high voltage protection	8 lbs. 6 ozs.
E76-0004-001			Insulating boot	2 lbs. 15 ozs.
E76-0005-001		5820-00-908-6416	Antenna tie down kit	3 ozs.
E76-0003-001	AT-1011/U		Whip end protector	.6 ozs.
10515-0011-4300			Instruction manual	

**Table 8-6. SB-V35B Antenna Parts List (100-5006)**

<b>Part No.</b>	<b>Military Nomenclature</b>	<b>NSN</b>	<b>Description</b>	<b>Weight</b>
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lb. 2 ozs.
E-0157	AT-1043/U	5985-00-733-6046	Antenna element, extension section	1 lb. 8 ozs. (4 ea.)
E-0150		5820-00-931-9106	Feed-through base, 400 watts	2 lbs. 9 ozs.
100-0010			Instruction Manual	

**Table 8-7. SB-V35C Antenna Parts List (100-5007)**

Part No.	Military Nomenclature	NSN	Description	Weight
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lb. 2 ozs.
E-0157	AT-1043/U	5985-00-733-6046	Antenna element, extension section	1 lb. 8 ozs. (4 ea.)
E-0156	MT-2525/U	5985-00-733-6047	Stand-off base	11 lbs.
MP-0080			Clamp	

**Table 8-8. SB-V35F Antenna Parts List (100-5013)**

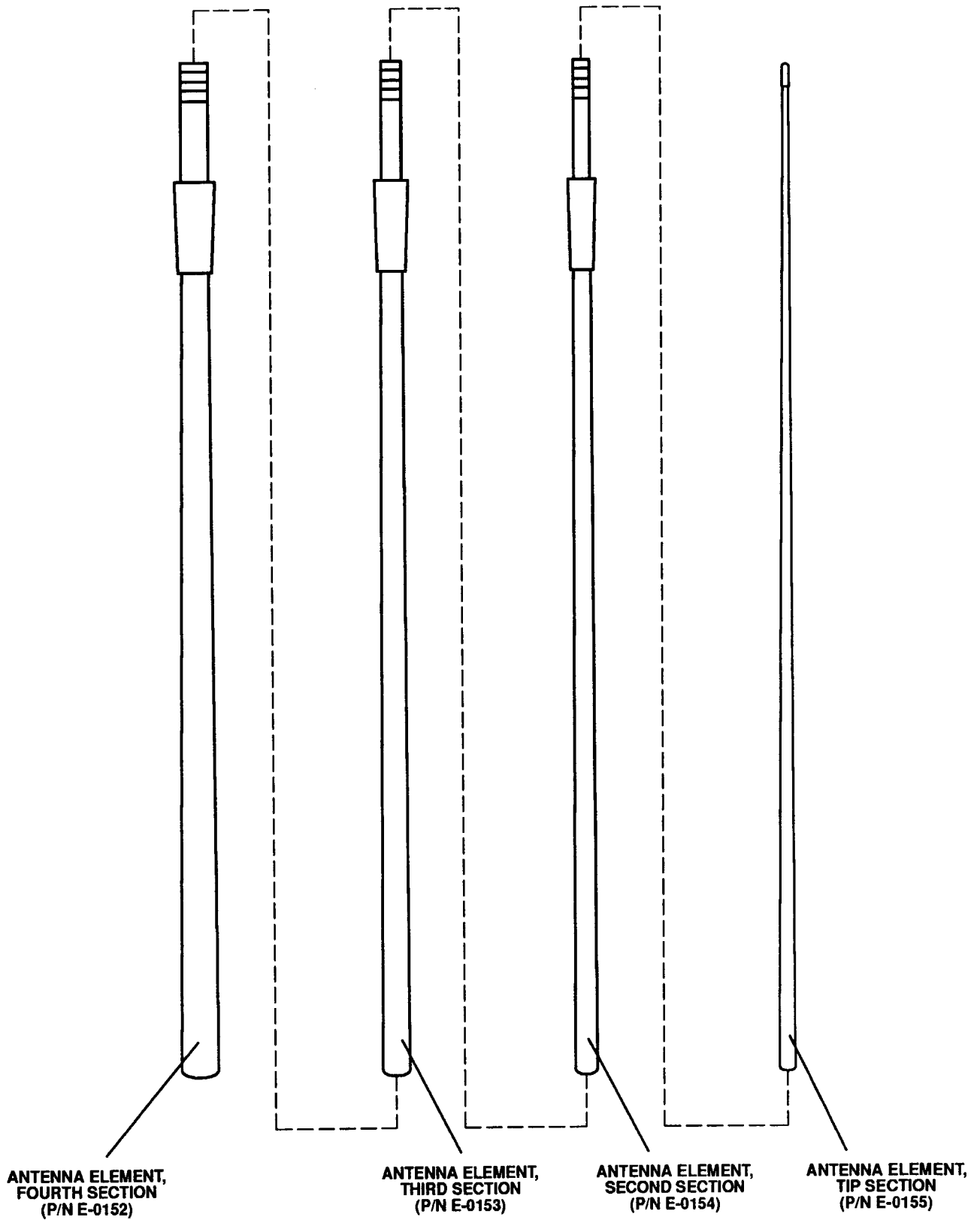
Part No.	Military Nomenclature	NSN	Description	Weight
E-0155	AT-1039/U	5985-00-733-6042	Antenna element, tip section	4 ozs.
E-0154	AT-1040/U	5985-00-733-6043	Antenna element, second section	7 ozs.
E-0153	AT-1041/U	5985-00-733-6044	Antenna element, third section	10 ozs.
E-0152	AT-1042/U	5985-00-733-6045	Antenna element, fourth section	1 lb. 2 ozs.
E-0157	AT-1043/U	5985-00-733-6046	Antenna element, extension section	1 lb. 8 ozs. (4 ea.)
100-5054			Rigidized spring base	13 lbs. 12 ozs.

#### 8.5.7.3.4.2 Antenna Sections

Each antenna section consists of an electrical conductor imbedded in a fiberglass sheath. When assembled, there are no exposed metal parts. The sections are threaded and can be screwed together by hand, without the use of tools. See Figure 8-10.

#### 8.5.7.3.4.3 Feed-Through Antenna Base

The SB-V16B/SB-V35B Antennas are supplied with a feed-through base. The base is made of stainless steel, 15 inches high, and adds approximately 12 inches to the length of the antenna. It is supplied with one 2 1/2 inch nut and one lockwasher. To insure a stable installation, tighten the nut using 80 lb-ft of torque. The feed-through base has a shunt capacitance of 8 pF at 1 MHz. It requires a 2 inch (5.08 cm) mounting hole. The conductor feed point is a male, 1/4 inch x 20, UNC-threaded brass rod. The RF-292 Antenna mount may be used to install the SB-V16/SB-V35B Antennas. Refer to Paragraph 8.5.7.3.4.9.



5109-003

Figure 8-10. Green Vertical Antenna (100-5029)

#### 8.5.7.3.4.4 Stand-Off Antenna Base

The SB-V16C/SB-V35C Antennas are supplied with a stand-off base. The base is a painted steel casting 20.5 inches high with an 8.5 inch diameter. It comes with a termination band and terminal lug. It has six, 13/32 inch diameter holes, equally spaced on a 7.75 inch diameter circle in its base.

#### 8.5.7.3.4.5 Spring Base

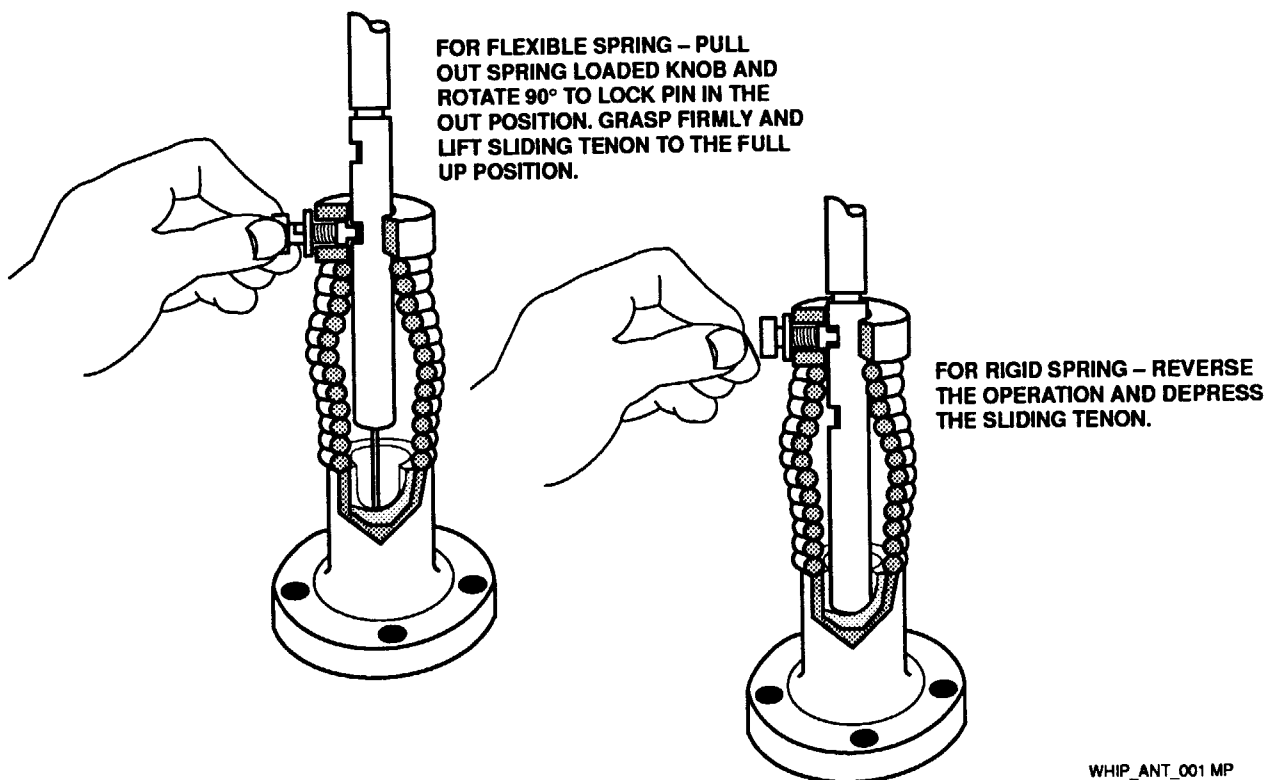
The SB-V16F Antenna is supplied with a spring base. The design of the base permits the spring to be locked in a rigid position or in a flexible mode. See Figure 8-11.

The flexible mode should be used for the SB-V16F Antenna or to tie the antenna in the down position. The spring should be locked in its rigid position for stationary operation if extension sections are added to increase the length of the antenna beyond 16 feet.

The RF-292 Antenna mount may be used to install the SB-V16F Antennas. Refer to Paragraph 8.5.7.3.4.9.

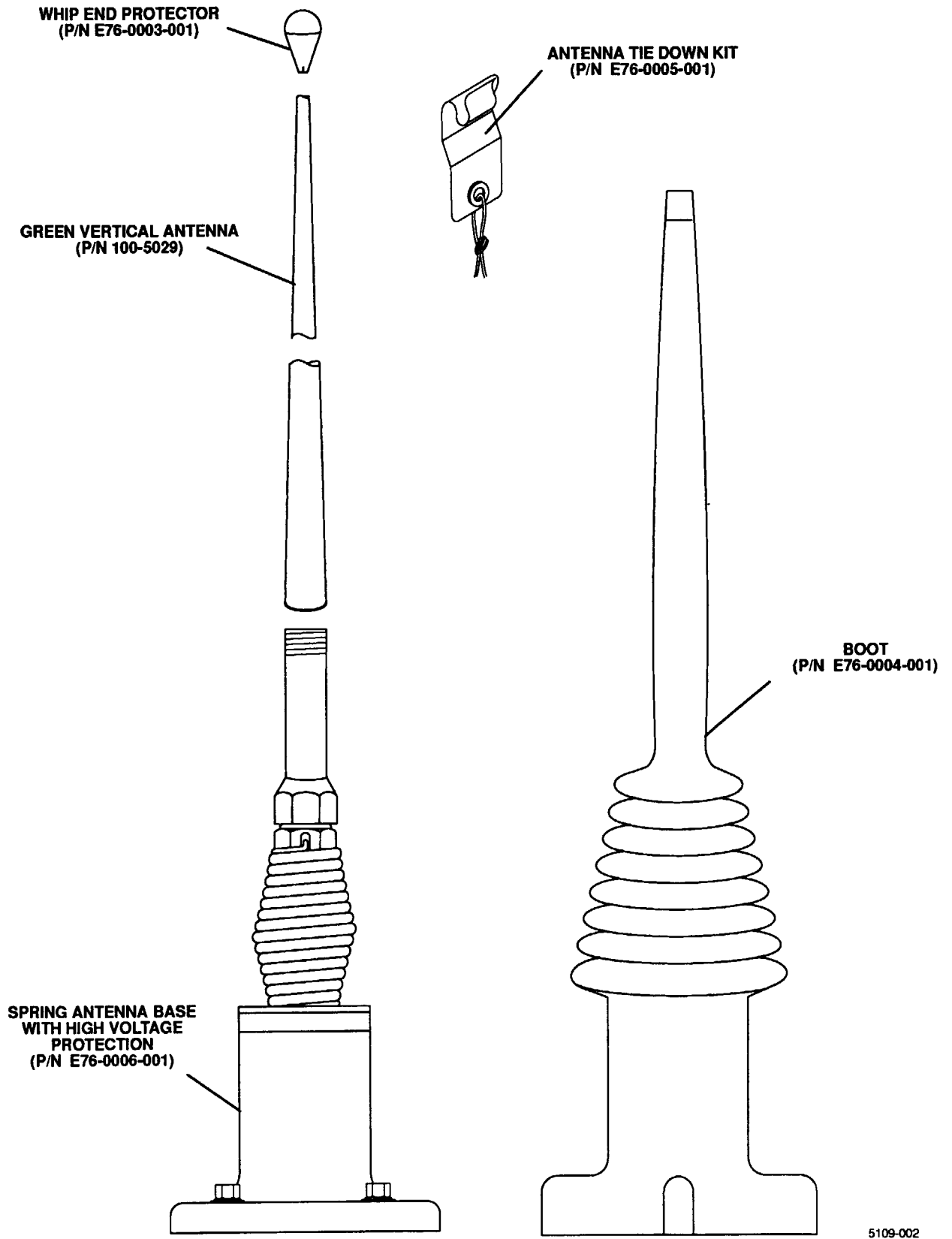
#### 8.5.7.3.4.6 Spring Base with High Voltage Protection Device

The antenna is supplied with a spring base. The high voltage protection device (imbedded in the spring base) provides protection up to 20 kV rms in case of high-voltage wire contact. A rubber boot is assembled over the base and lower portion of the fourth antenna element (E-0152). See Figure 8-12.



WHIP\_ANT\_001 MP

Figure 8-11. Operation of Rigidized Spring Base



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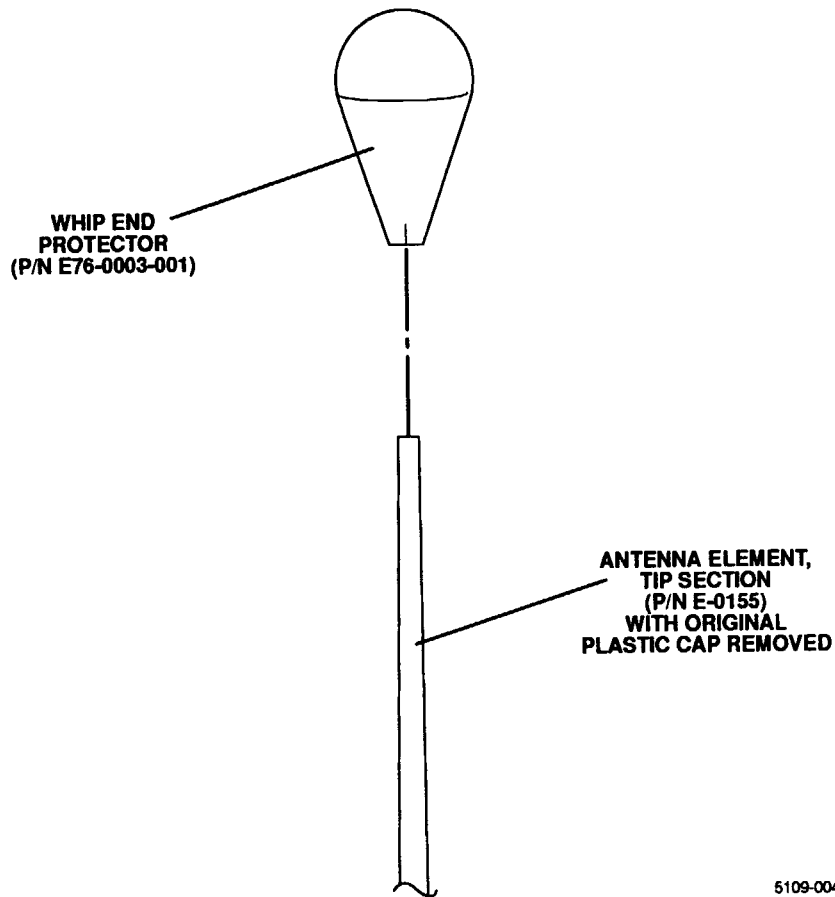
Figure 8-12. SB-V16FHD HF Whip Antenna (100-5109)

### 8.5.7.3.4.7 Whip End Protector

The whip end protector included with the SB-V16FHD Antenna attaches to the tip antenna element (E-0155). The whip antenna protector slides over the antenna tip and self locks in place. See Figure 8-13.

#### NOTE

If the tip antenna element's original plastic cap is still in place, remove original plastic cap with a pocket knife before installing the whip end protector.



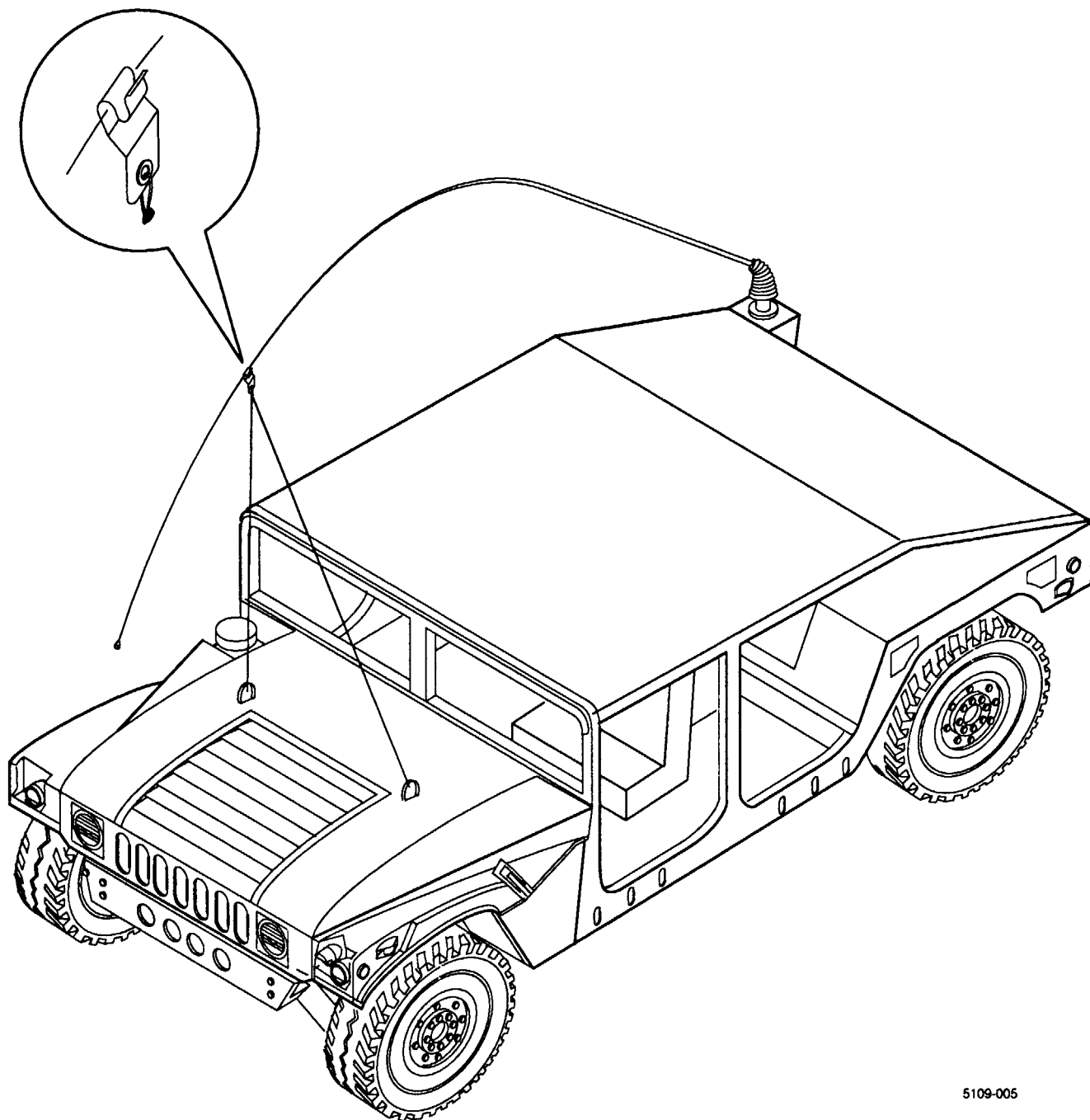
5109-004

Figure 8-13. Whip End Protector



#### 8.5.7.3.4.8 Antenna Tie Down Kit

The antenna tie down kit included with the SB-V16FHD Antenna consists of a clamp and rope. Use the clamp and rope for tying down the antenna. Tie the clamp into the middle of the rope, then slide the clamp to the middle of the upper whip section. Pull down the antenna and tie one end of the rope securely to an appropriate point on the vehicle. Then tie the other end of the rope in a triangular arrangement, as shown in Figure 8-14. This arrangement keeps the antenna from swaying beyond the limits of the vehicle.



5109-005

Figure 8-14. Antenna Tie Down Kit

### 8.5.7.3.4.9 Installation

Figure 8-15 shows a typical installation of the RF-292 Antenna Mount with a standard HF feed-thru antenna base. An adapter plate (RF part number 919-6227, supplied) is required for this installation.

Figure 8-16 shows the RF-292 Antenna Mount with a RF-288 VHF Antenna Base and Coupler installed. The RF-288 base should be located, as shown in Figure 8-16, with the control connector toward the mounting bulkhead.

Figure 8-17 shows the SB-V16FHD Antenna installed on an RF-292 Antenna Mount.

Generally, installation of the RF-292 Antenna Mount consists of drilling five mounting holes through the supporting wall or bulkhead, installing two reinforcement plates (supplied) on the opposite side of the mounting surface, and securing the mount with standard hardware. A hole in the bottom of the mount is provided for routing the antenna lead outside of the mount. Snap bushings have been supplied to prevent cable damage if the antenna leads are routed through the bulkhead. To prevent possible cable damage, it is recommended that the leads be routed through the mounting surface that is located inside the mount. See Figure 8-15.

Perform the following procedure to install the RF-292 Antenna:

- a. Remove the protective cover from the RF-292 Antenna.
- b. Temporarily locate RF-292 Antenna on the mounting surface. Mark the five mounting holes using the mount as a template.
- c. Remove the mount and check each proposed mounting hole for possible interference. Also check for the clearance needed for the two reinforcement plates.

#### NOTE

As shown in Figure 8-18, the symmetrical hole placement on the reinforcement plates allows for a number of variations in positioning.

- d. Center punch and drill each hole with a 1/4-inch drill.
- e. If necessary, drill the hole through the bulkhead for routing the cables. Insert the snap-in bushing.

<u>Hole Size</u>	<u>Bushing Size</u>
1-1/2"	7/8"
1-1/2"	1-5/16"

- f. Secure the RF-292 Antenna to the mounting surface. See Figure 8-15.
- g. Route the antenna leads through the bulkhead into the mount.
- h. Install the whip antenna base with the supplied hardware as shown in Figures 8-15 and 8-16. Secure the antenna lead and, if necessary, control cable.
- i. Replace the protective cover.

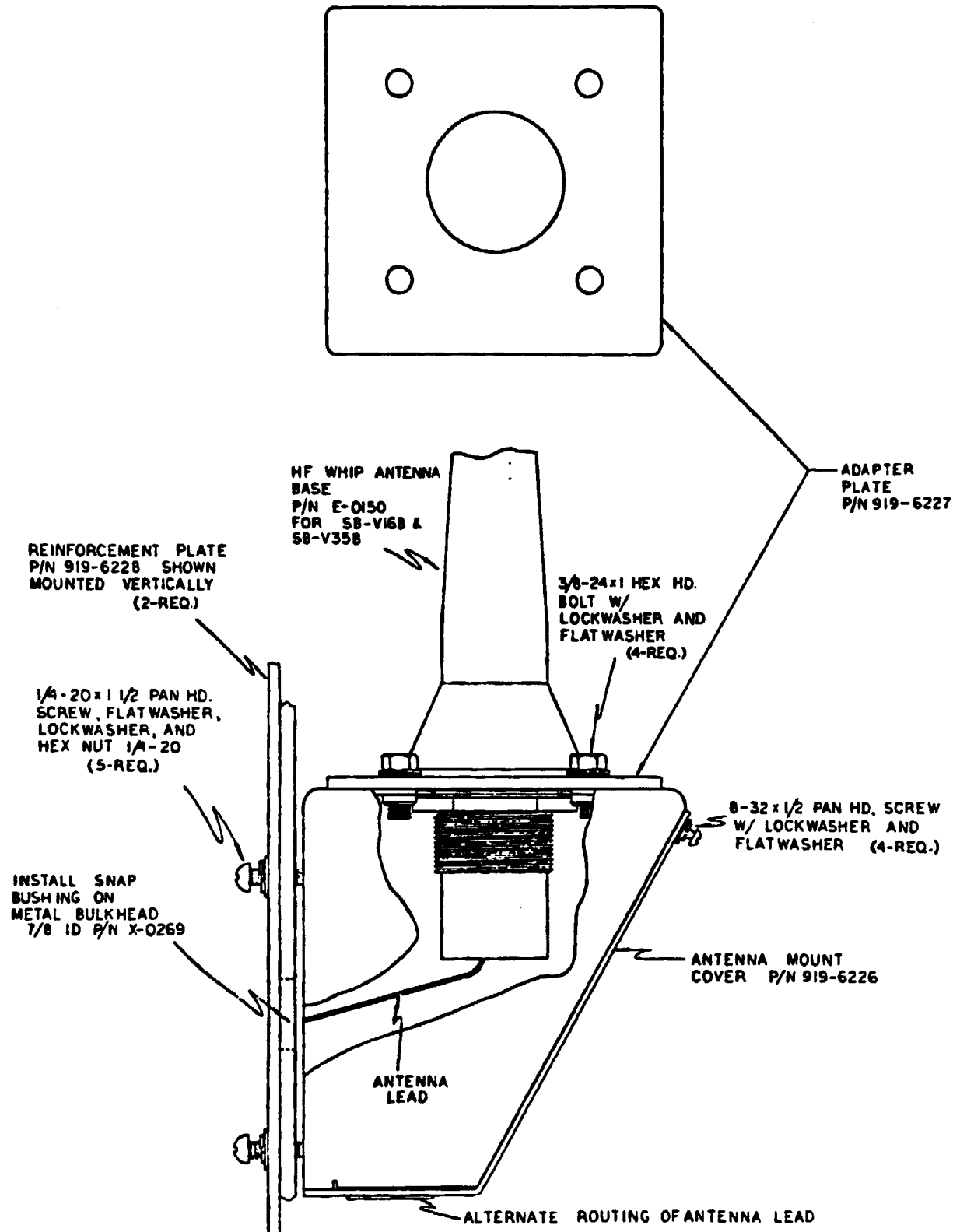


Figure 8-15. HF Antenna Base Mounting

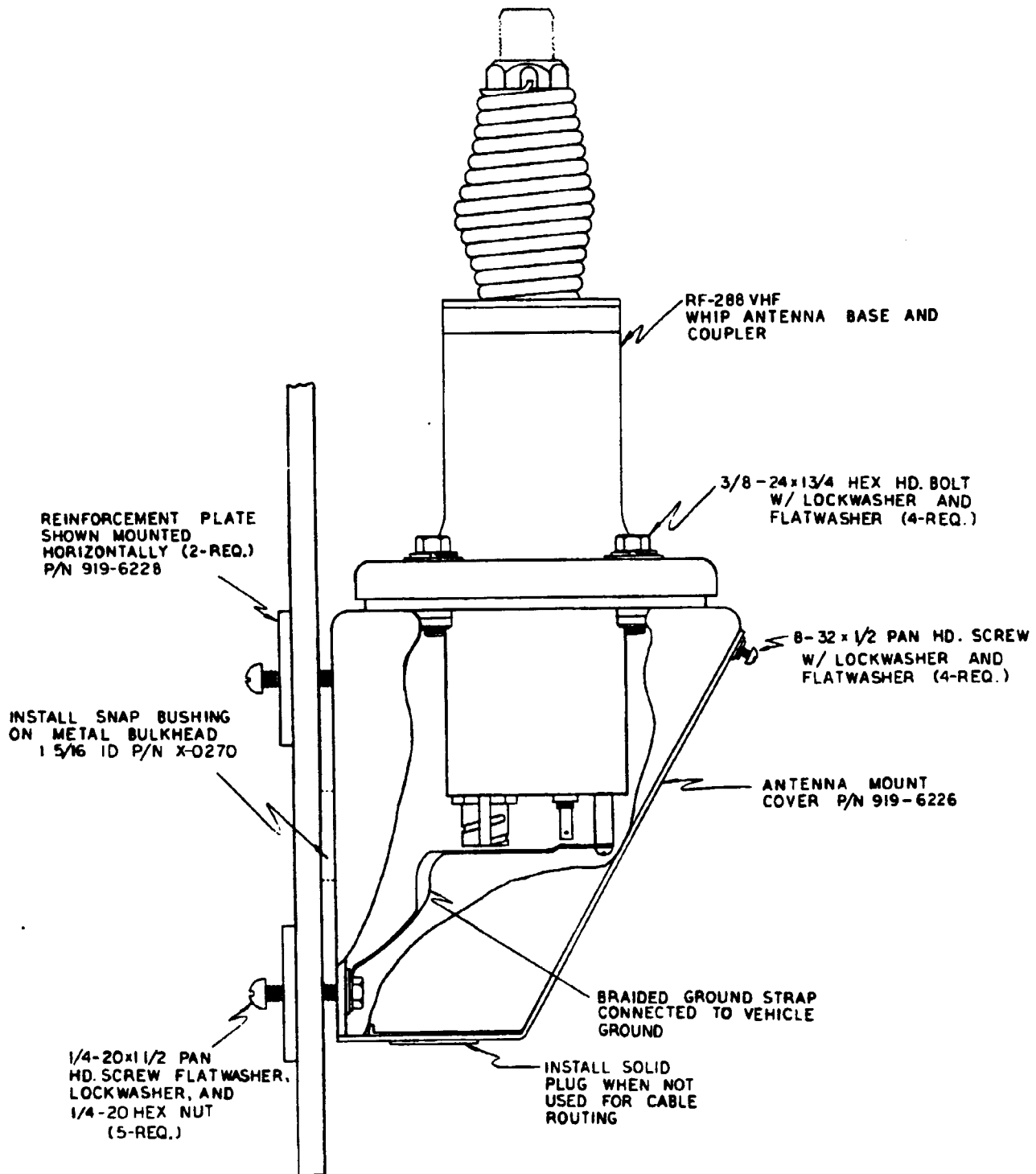
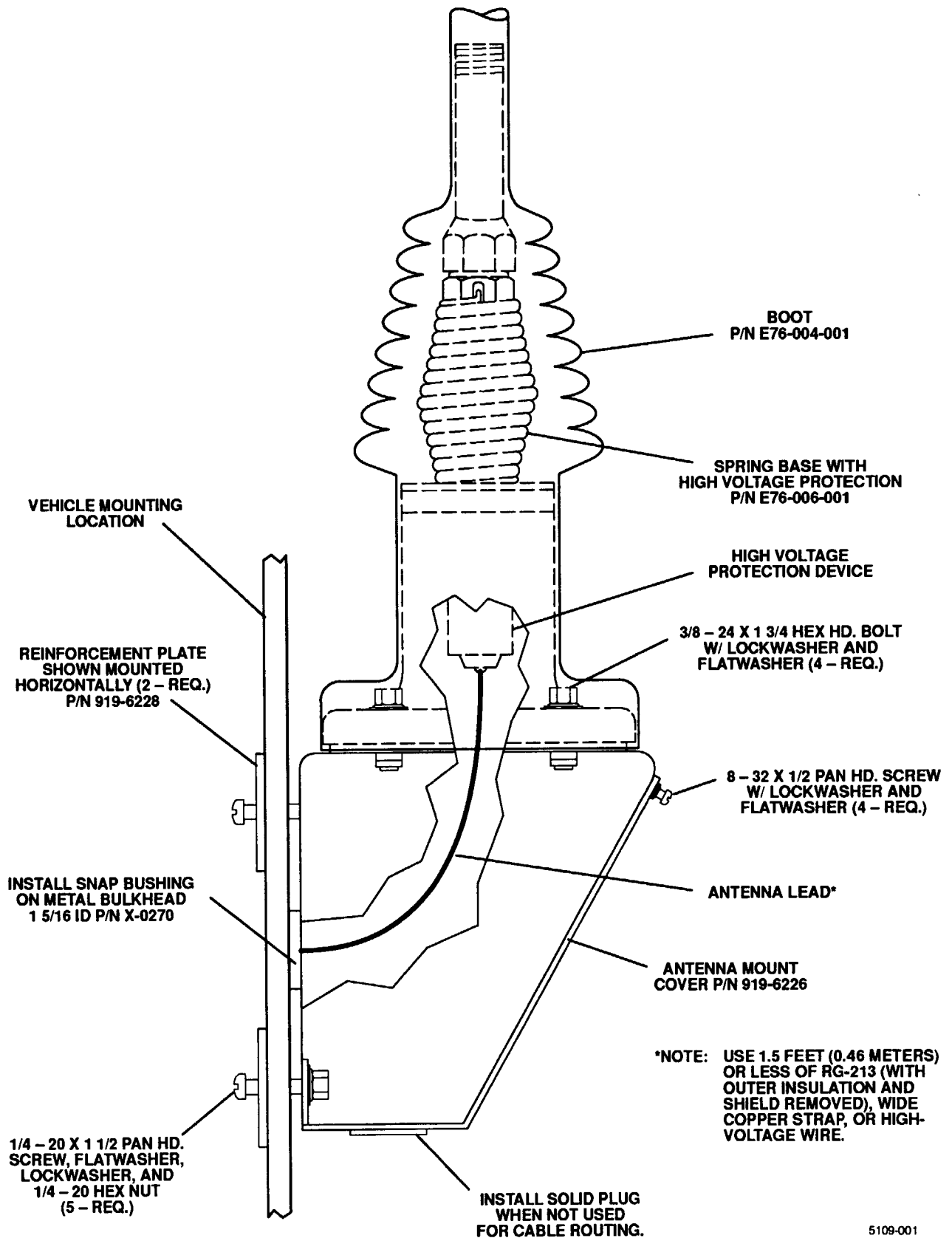
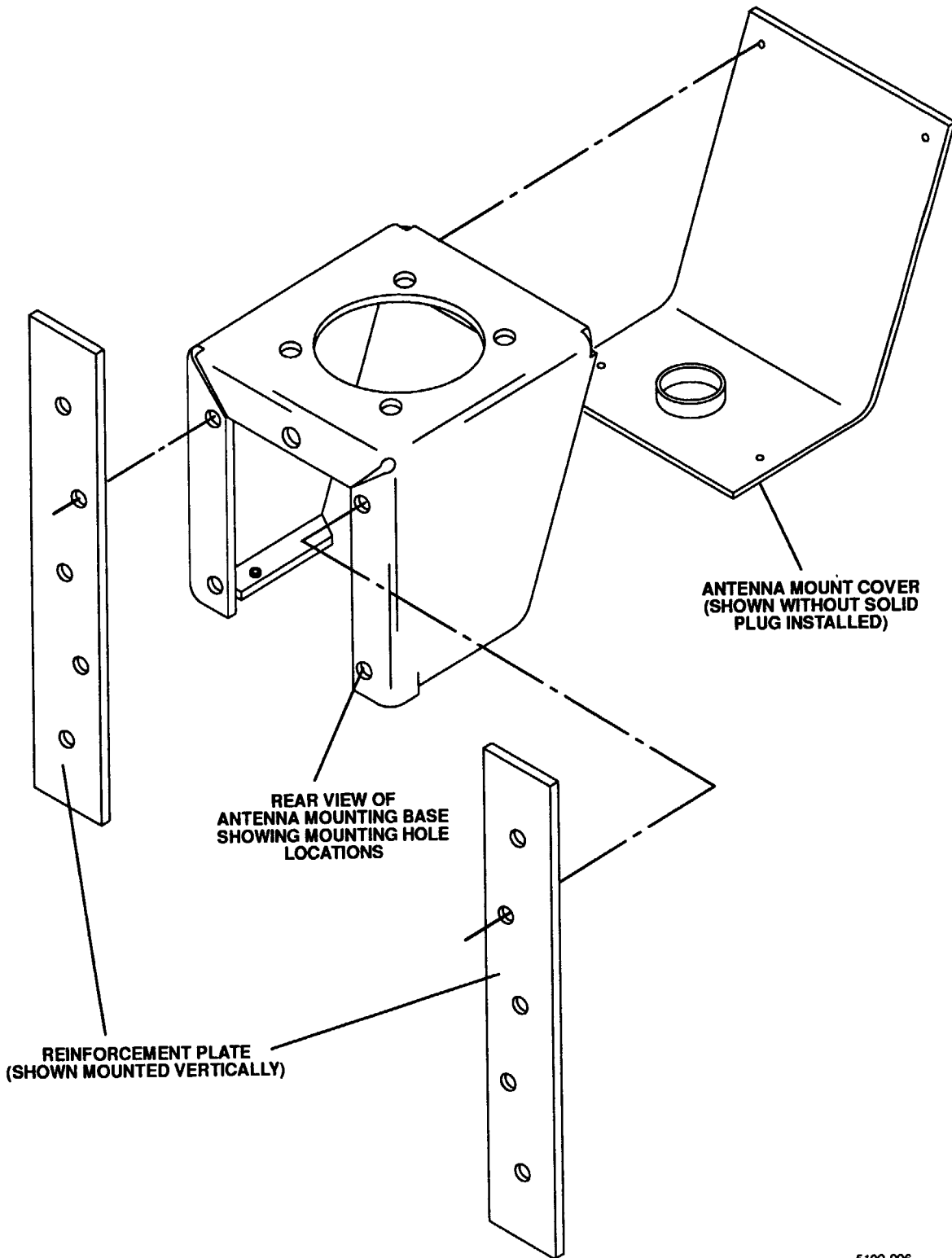


Figure 8-16. VHF Antenna Base Mounting



5109-001

Figure 8-17. SB-V16FHD Antenna Installed on RF-292 Antenna Mount



5109-006

Figure 8-18. RF-292 Antenna Mount Hole Placement

#### **8.5.7.4 RF-382 Fast Tune Automatic Antenna Coupler**

The RF-382 Fast Tune Automatic Antenna Coupler uses fast-tune microprocessor-based circuitry. Timing of the coupler operations are designed to be compatible with Automatic Link Establishment (ALE) operation. The RF-382 Antenna Coupler is recommended for installations that require the use of an antenna coupler.

When using an RF-382 Antenna Coupler in an RF-5200 FALCON™ Series Manpack System, the S2 DIP switch on the antenna coupler's A3 Assembly must be set as shown in Figure 8-3. This is done at the factory. Setting this switch to the specified positions ensures proper operation of the RF-382 Antenna Coupler when used with 125 watt or 150 watt power amplifiers.

#### **8.5.8 Mounting**

Shock mounts are available for vehicular installations. These mounts are described in Paragraphs 8.5.8.1 through 8.5.8.6.

##### **8.5.8.1 RF-5071VSM Single-Unit Vehicular Shock Mount**

The RF-5071VSM is a single-unit vehicular shock mount used with the RF-5032PA-125E 125 Watt Power Amplifier in the 125 watt vehicular configuration. Figure 8-19 shows the RF-5071VSM as a single-unit shock mount with the RF-5032PA-125E 125 Watt Power Amplifier.

##### **8.5.8.2 Power Converter to Power Amplifier Clamp Assembly**

In the 125 watt vehicular configuration, the Power Converter to Power Amplifier Clamp Assembly (10521-0120) secures the RF-5032PA-125E 125 Watt Power Amplifier to a RF-5056PS DC/DC Power Converter that is mounted in the RF-5071VSM Shock Mount. The power amplifier is removed from the power converter by loosening the two clamp assembly wing nuts. See Figure 8-20.

##### **8.5.8.3 RF-5073 System Shock Mount for RF-5033PA-150 150 Watt Power Amplifier and RT-1694 Receiver-Transmitter**

The RF-5073 System Shock Mount includes a rugged shock mount for the 150 watt vehicular configuration. Figure 8-21 shows the RT-1694 Receiver-Transmitter and the RF-5033PA-150 150 Watt Power Amplifier mounted on the RF-5073 System Shock Mount.

#### **8.5.8.4 24 Vdc Filter/Adapter Unit and Vehicular Shock Mount**

The 24 Vdc Filter/Adapter Unit, 10372-0850-01, is a vehicular accessory for the AN/PRC-138 Manpack System that allows an RT-1694 Receiver-Transmitter to receive power from a vehicle's 24 volt Direct Current (DC) power system.

The 24 Vdc Filter/Adapter Unit provides Electromagnetic Interference (EMI) filtering, spike and surge protection, overvoltage and overcurrent protection. A connector on the 24 Vdc Filter/Adapter Unit allows an external power amplifier to be connected. The external power amplifiers that can be used in this system configuration are as follows:

- RF-5030PA-20E 20 Watt Power Amplifier
- RF-5032PA-125E 125 Watt Power Amplifier
- RF-5033PA-150 150 Watt Power Amplifier

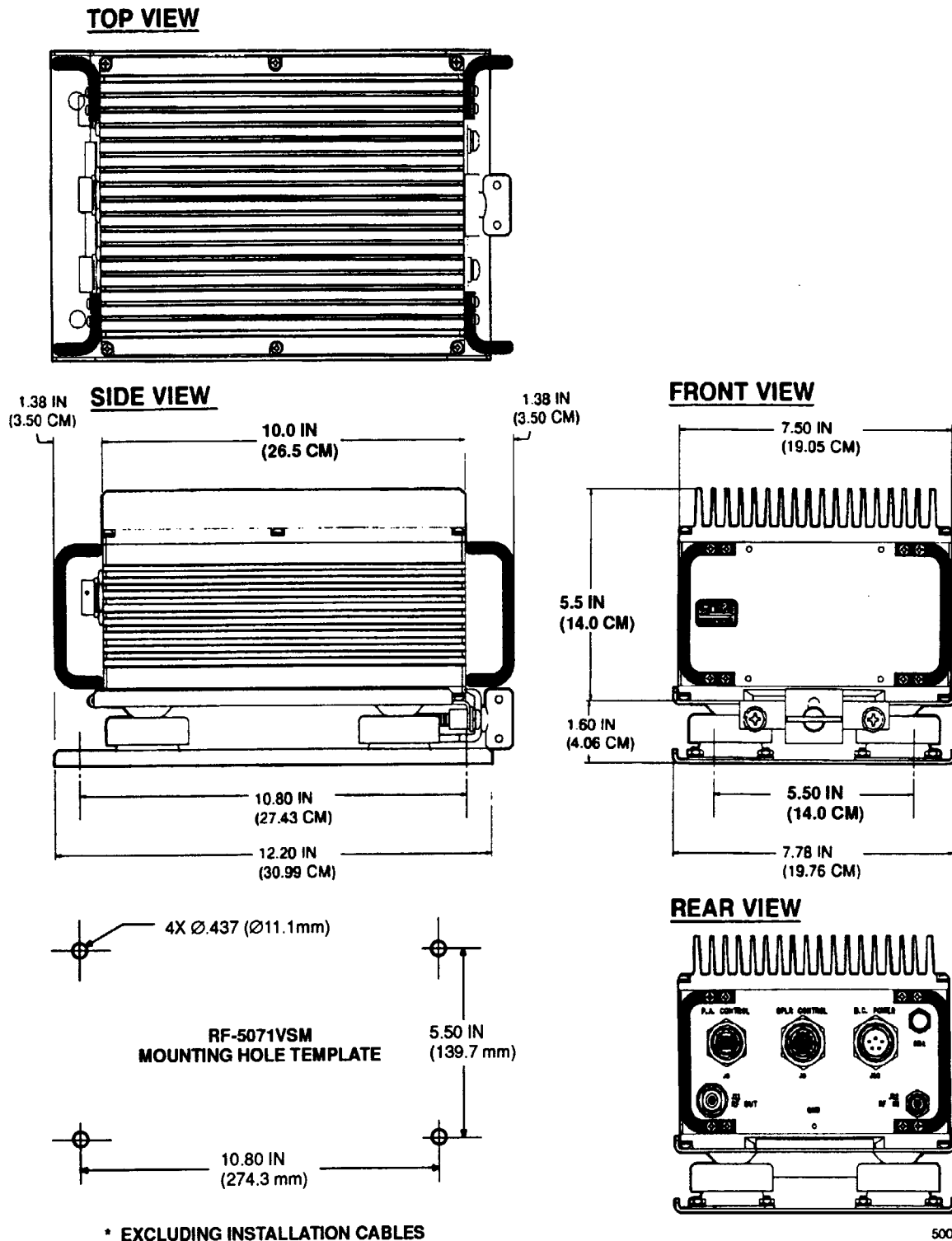
When the 24 Vdc Filter/Adapter is used with an external power amplifier, cable assembly 10372-0813 is required.

A vehicular shock mount, 10372-0800-01, provides isolation from high-impact shock and vibration in vehicular installations.

The vehicular shock mount can accommodate either an RT-1694 Receiver-Transmitter and a 24 Vdc Filter Adapter or an RT-1694 Receiver-Transmitter and battery case. When the 24 Vdc Filter/Adapter is removed from the shock mount, an RT-1694 Receiver-Transmitter and battery case are mounted on the vehicular shock mount. If Nickel-Cadmium (Ni-Cd) batteries are used, they are charged through the internal battery charger of the RT-1694 Receiver-Transmitter when the radio power is turned off.

The 24 Vdc Filter/Adapter Unit mounted on the shock mount is shown in Figure 8-22.





**Figure 8-19. RF-5032PA-125E 125 Watt Power Amplifier in RF-5071VSM Single-Unit Shock Mount**

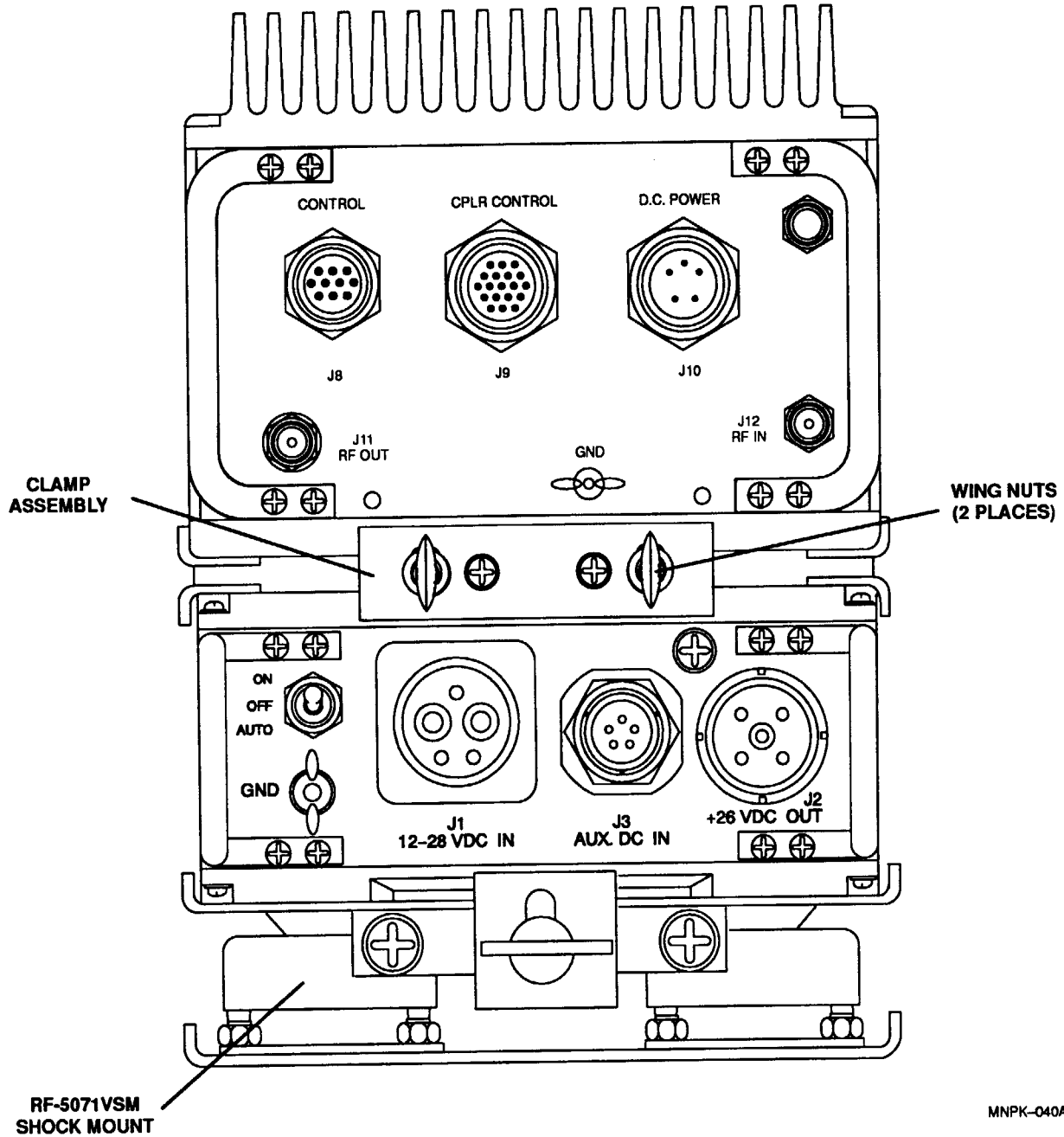
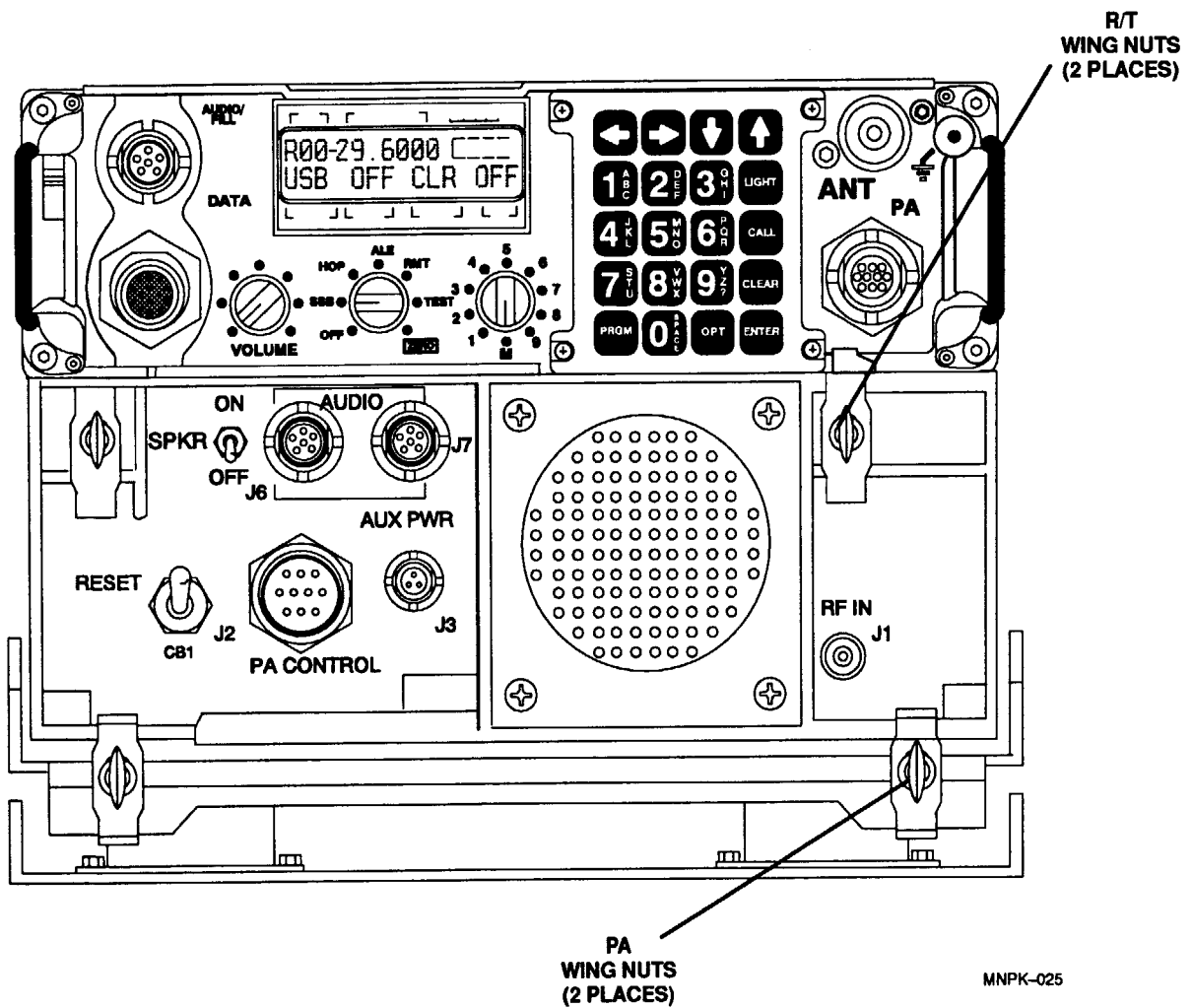
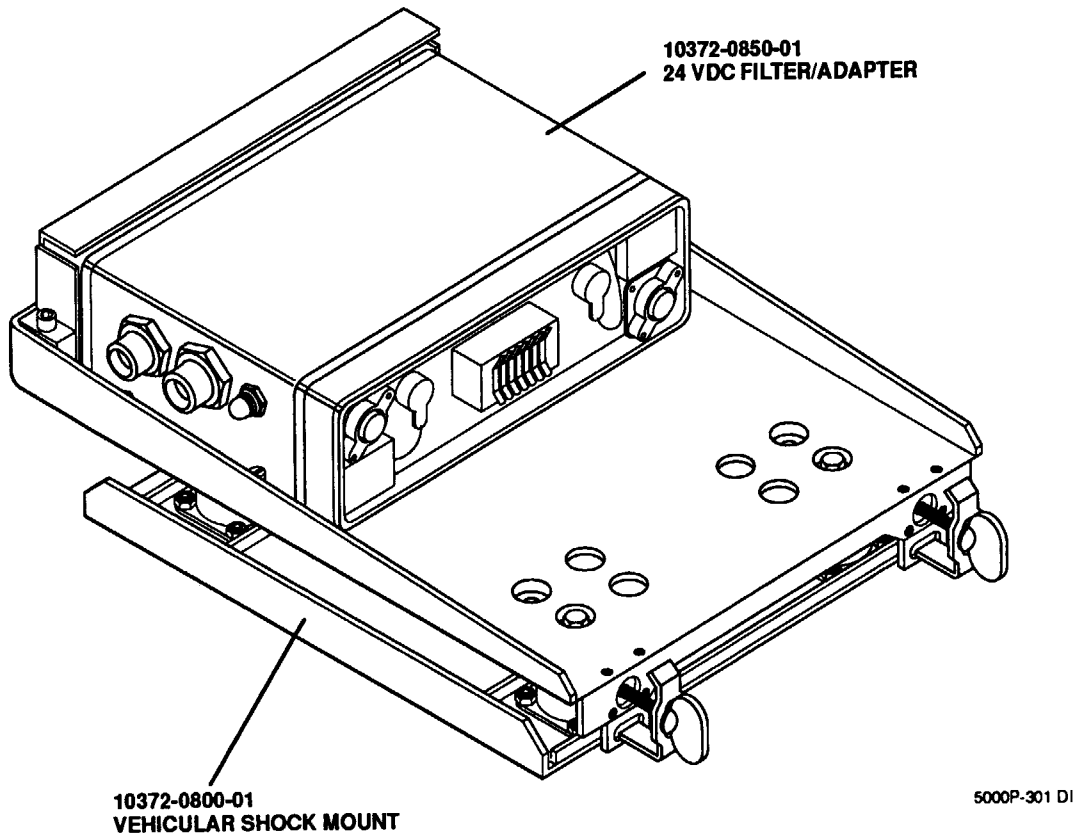


Figure 8-20. RF-5032PA-125E 125 Watt Power Amplifier and RF-5056PS DC/DC Power Converter in RF-5071VSM Shock Mount



**Figure 8-21. RT-1694 Receiver-Transmitter and RF-5033PA-150 150 Watt Power Amplifier Mounted on RF-5073 System Shock Mount**



**Figure 8-22. 24 Vdc Filter/Adapter in Vehicular Shock Mount**

#### **8.5.8.4.1 24 Vdc Filter/Adapter Unit**

This section describes mounting instructions, system configuration, interface definitions, and theory of operation for the Filter/Adapter Unit and RT-1694 Receiver-Transmitter.

##### **8.5.8.4.1.1 Mounting the 24 Vdc Filter/Adapter Unit**

The adapter mounts on the shock mount by seating the unit firmly against the rear of the shock mount and tightening the four captive screws on the side of the 24 Vdc Filter/Adapter Unit.

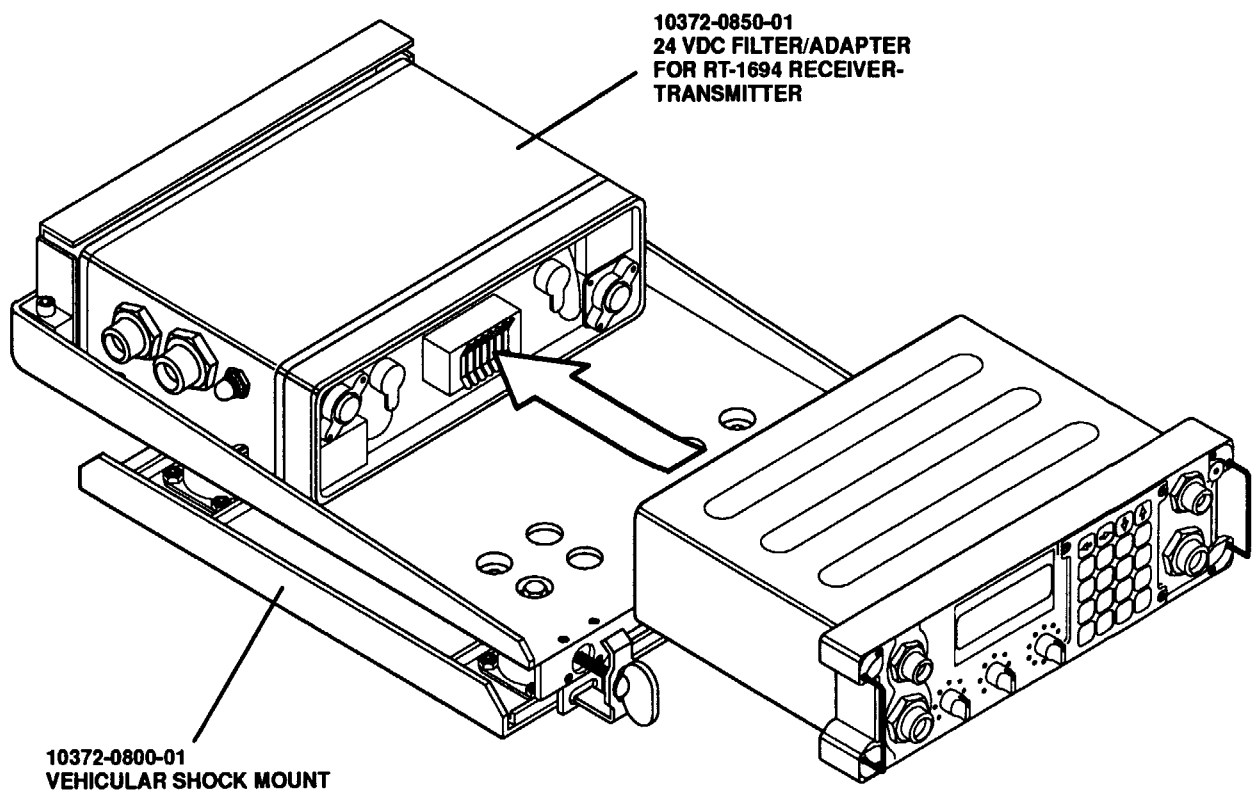
##### **8.5.8.4.1.2 Mounting the RT-1694 Receiver-Transmitter to the 24 Vdc Filter/Adapter Unit**

Fasten the RT-1694 Receiver-Transmitter in place on the 24 Vdc Filter/Adapter Unit as shown in Figure 8-23. When it is properly aligned, the RT-1694 Receiver-Transmitter fits snugly into the connector on the 24 Vdc Filter/Adapter Unit. Finally, position the retaining clips on the front of the shock mount to hold the radio at its front panel. Tighten the shock mount thumbscrews to hold the 24 Vdc Filter/Adapter Unit and RT-1694 Receiver-Transmitter securely in place.

Figure 8-24 shows the system configuration when it is used with an external power amplifier. In this configuration, power and control signals are supplied to the 24 Vdc Filter/Adapter Unit on the P1 connector by cable assembly 10372-0816. This cable interfaces with all RF-5200 FALCON™ series power amplifiers. DC power and control signals leave the Filter/Adapter on the J1 connector by cable assembly 10372-0813-01. This connects to J6 on the front panel of the RT-1694 Receiver-Transmitter. The J2 and J3 connectors provide accessory power, if required. J2 can supply 5 A (maximum) of unfiltered power and J3 can supply 2.5A (maximum) of filtered power. The DC power input is limited to 15 Amps by circuit breaker CB1.

Figure 8-25 shows the system configuration without an external power amplifier. In this configuration, power is supplied to the 24 Vdc Filter/Adapter on the P1 connector by cable assembly 10372-0812-01. This cable interfaces to a +21.5 Vdc through +32.0 Vdc power supply such as an automotive lead acid battery or an RF-5052PS 12/24 Vdc converter. DC power leaves the Filter/Adapter on the J4 and J5 connectors which plug into the rear of the RT-1694 Receiver-Transmitter. The J2 and J3 connectors provide accessory power, if required. J2 can supply 5 Amps (maximum) of unfiltered current and J3 can supply 2.5 Amps (maximum) of filtered current.

Tables 8-9 through 8-13 contain interface definitions for the external connectors on the 24 Vdc Filter/Adapter Assembly.



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**Figure 8-23. Mounting the RT-1694 Receiver-Transmitter to the Filter/Adapter Unit**

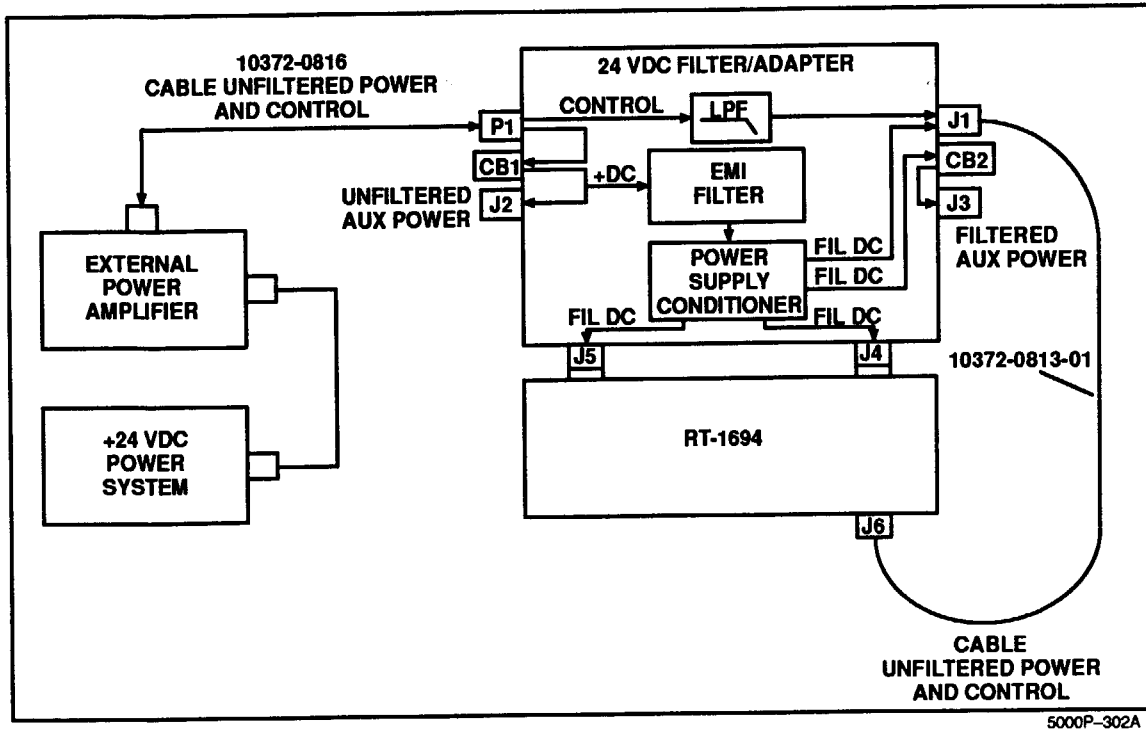


Figure 8-24. System Configuration with an External Power Amplifier

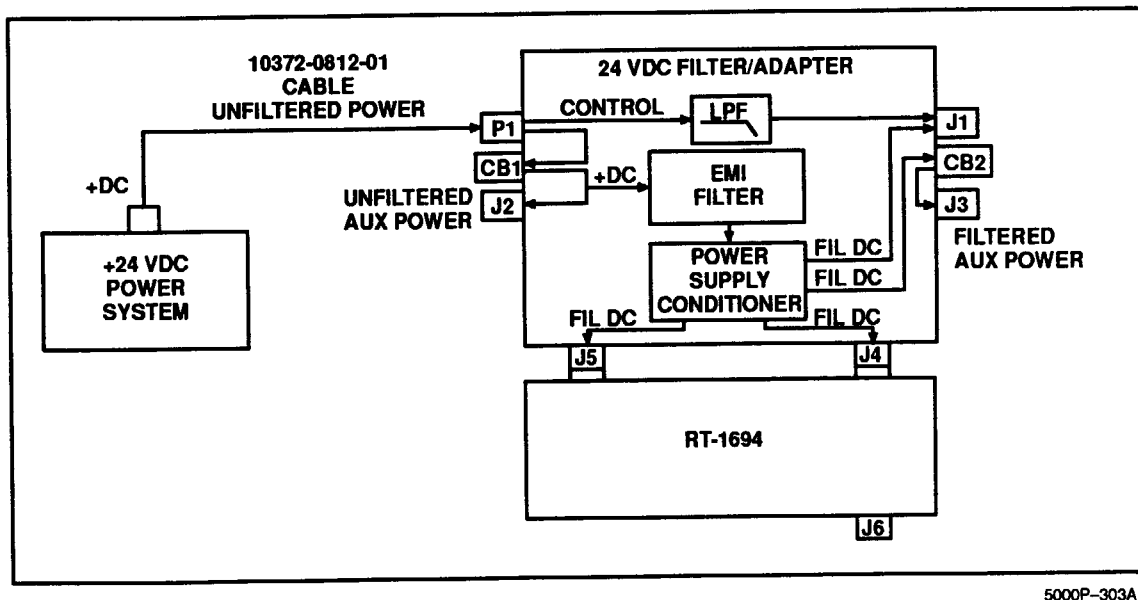


Figure 8-25. System Configuration Without an External Power Amplifier

**Table 8-9. J4 and J5 Battery Connectors**

Pin	Definition	Signal Characteristics
1	DC Return	DC ground return
2	No connection	No connection
3	DC return	DC ground return
4	No connection	No connection
5	Fil + DC	Filtered + 21.5 to 32.0 Vdc 4 Amps maximum
6	No connection	No connection

**Table 8-10. P1 DC/Control In Connector**

Pin	Definition	Signal Characteristics
A	HOP Clock Out	* 0 V, + 5 V Complimentary Metal Oxide Semiconductor (CMOS) levels
B	PA Control Data –	* 0 V, + 5 V differential asynchronous control data, 150 k baud
C	PA Control Data +	* 0 V, + 5 V differential asynchronous control data, 150 k baud
D	PA ON/OFF	* 0 V, 35 V maximum, open collector
E	DC Return	DC ground return
F	DC Return	DC ground return
G	PA Feedback –	* PA feedback ground return
H	PA Feedback +	* PA analog feedback sense Minimum + 0.5 V Typical + 4.3 V Maximum + 7.0 V
J	+ DC Input	+ 21.5 V to 32.0 V, 12.5 A maximum
K	+ DC Input	+ 21.5 V to 32.0 V, 12.5 A maximum

\* = PA/RT Control Signal

Mating Connector Vendor Part Number 851-08EC12-10S50

Mating Connector Part Number J05-0007-001

**Table 8-11. J1 DC/Control Out Connector**

Pin	Definition	Signal Characteristics
A	HOP Clock Output	* 0 V, + 5 V CMOS levels
B	External PA Data –	* 0 V, + 5 V differential asynchronous control data, 150 k baud
C	External PA Data +	* 0 V, + 5 V differential asynchronous control data, 150 k baud
D	PA Power ON/OFF Output	* 0 V, + 5 V CMOS levels, active low
E	DC Return	DC ground return
F	DC Return	DC ground return
G	External PA Feedback–	* PA Feedback ground return
H	External PA Feedback + Input	* PA Analog Feedback sense, Minimum + 0.5 V Typical + 4.3 V Maximum + 7.0 V
J	Fil + DC	Filtered + 21.5 V to 32.0 V, 12.5 A maximum
K	Fil + DC	Filtered + 21.5 V to 32.0 V, 12.5 A maximum

\* = PA/RT Control Signal

Mating Connector Vendor Part Number 851-08EC12-10P50

Mating Connector Part Number J05-0005-002

**Table 8-12. J3 Filtered Auxillary Power Connector**

Pin	Definition	Signal Characteristics
A	Shield	DC ground return
B	DC Return	DC ground return
C	No Connection	No connection
D	No Connection	No connection
E	No Connection	No connection
F	Fil + DC	Filtered + 21.5 V to 32.0 V, 2.5 A maximum

Mating Connector Vendor Part Number 851-08EC10-6P50

Mating Connector Part Number J05-0005-009



**Table 8-13. J2 Unfiltered Auxillary Power Connector**

Pin	Definition	Signal Characteristics
A	Shield	DC ground
B	+ DC	Unfiltered + 21.5 V to 32.0 V, 5 A maximum
C	DC Return	DC ground return
D	DC Return	DC ground return
E	+ DC	Unfiltered + 21.5 V to 32.0 V, 5 A maximum

Mating Connector Vendor Part Number 851-08EC14-5P50

Mating Connector Part Number J05-0005-008

### 8.5.8.5 Universal Vehicular Shock Mount

An exploded view of the universal vehicular shock mount is shown in Figure 8-26. The universal vehicular shock mount provides isolation from high-impact shock and vibration in vehicular installations.

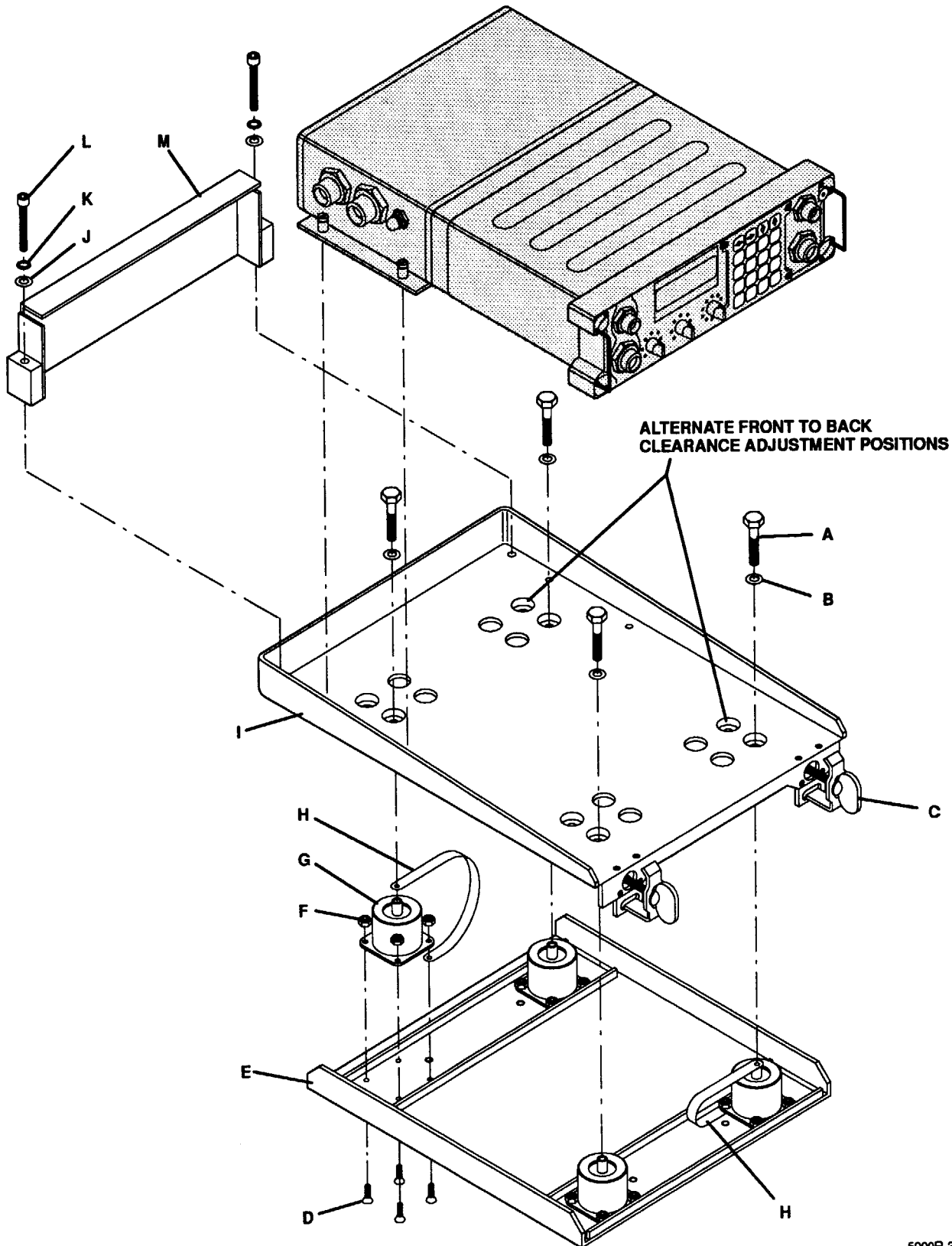
This shock mount can be used to mount an RT-1694 Receiver-Transmitter with the Filter/Adapter Unit, or it can also be used to mount an RT-1694 Receiver-Transmitter connected to its battery case. To adapt for these two variations, the bracket (item M on Figure 8-26) located on the top tray can be moved to a backward or forward position to hold either combination of radio and Filter/Adapter Unit or radio and battery.

Figure 8-27 shows that the bottom tray of the shock mount is not symmetrical with relation to the tray edge to mounting hole dimension, front to back. If necessary, this bottom tray can be turned around relative to the top tray in order to fit in a tight space.

The dimensions for the shock mount are as follows:

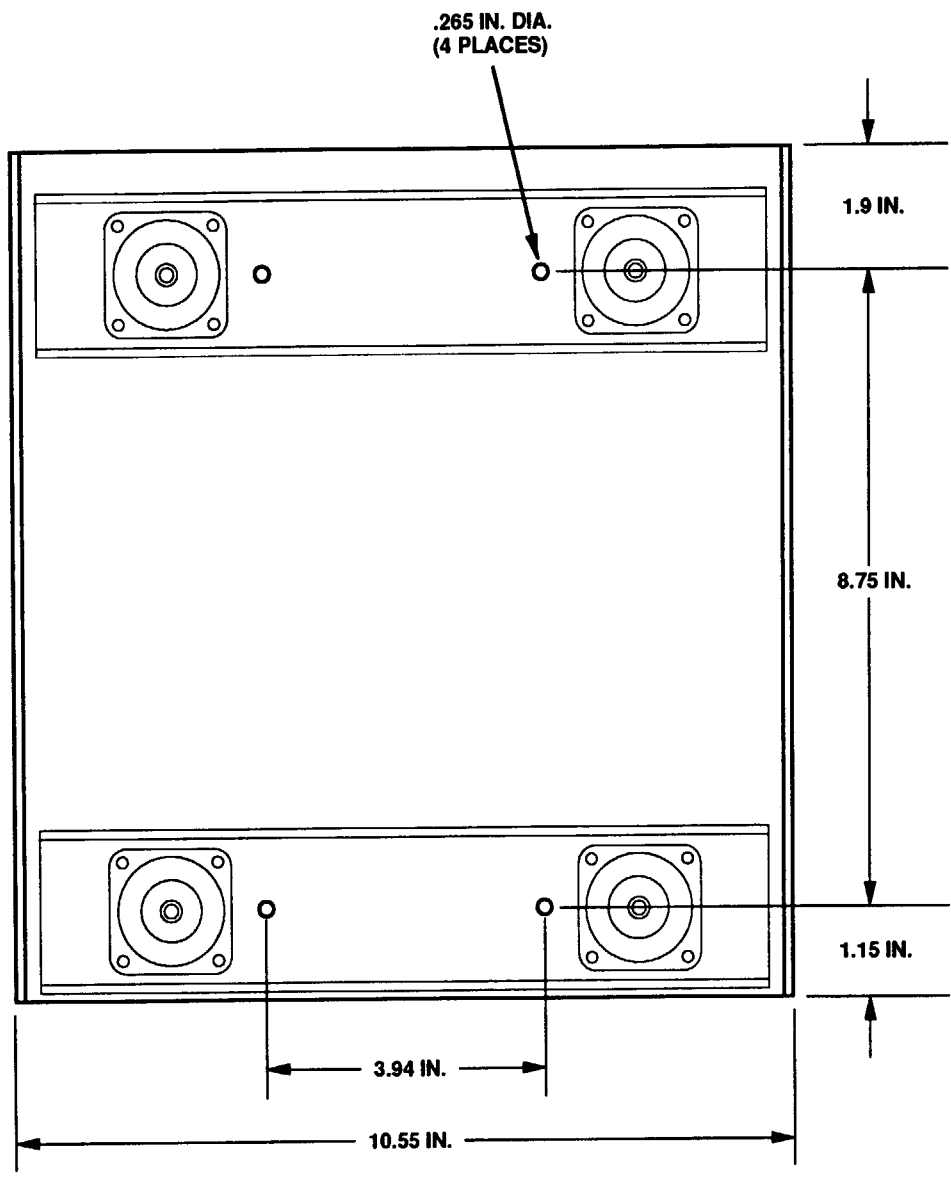
- Shock Mount Size – 14.6 L x 10.8 W x 3.2 H inches
- System Size with RT-1694 – 15.6 L x 10.8 W x 5.0 H inches

Table 8-14 lists the hardware for the universal shock mount.



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Figure 8-26. Vehicular Shock Mount (10372-0800-01)



5000P-306 DI

Figure 8-27. Hole Position of Bottom Mounting Tray

**Table 8-14. Universal Shock Mount Parts List**

Letter Code	Name	Dimensions	Part Number	Cage Code
A	BOLT HEX HEAD	—	MS35308-302B	96906
B	LOCKWASHER, SPLIT	SS 1/4	MS35338-139B	96906
C	CLAMP ASSEMBLY	—	812426-801	37695
D	FLAT HEAD SCREW	10-32X5/8	MS24693-C273B	96906
E	MOUNTING TRAY	—	10372-0896-01	14304
F	NUT	10-32	MS21044C3	96906
G	RESILIENT MOUNT	—	435653-4	37695
H	GROUND STRAP	—	938770-1	37695
I	TRAY	—	10372-0897-01	96906
J	FLATWASHER	.188X.375	MS15795-807B	96906
K	LOCKWASHER, SPLIT	SS #10	MS35338-138B	96906
L	SCREW	10-32	10372-1051-01	14304
M	BRACKET	—	10372-0891-01	14304

#### 8.5.8.6 RT-1694 Receiver-Transmitter Short Shock Mount

The RT-1694 Receiver-Transmitter Short Shock Mount (10372-0880) is a vehicular accessory for the RT-1694 Receiver-Transmitter. This shock mount secures the R/T, without a battery pack, to the vehicle. The short shock mount provides isolation from high-impact shock and vibration in vehicular installations. When installed in the short shock mount, the R/T receives 24 Vdc power from an external power amplifier via the front panel power amplifier connector.

The dimensions for the short shock mount, including the thumbscrews, are 9.78 L x 10.75 W x 5.35 H inches (24.84 L x 27.31 W x 13.59 H cm).

The short shock mount is shown in Figure 8-28. Table 8-15 lists the hardware for the short shock mount.

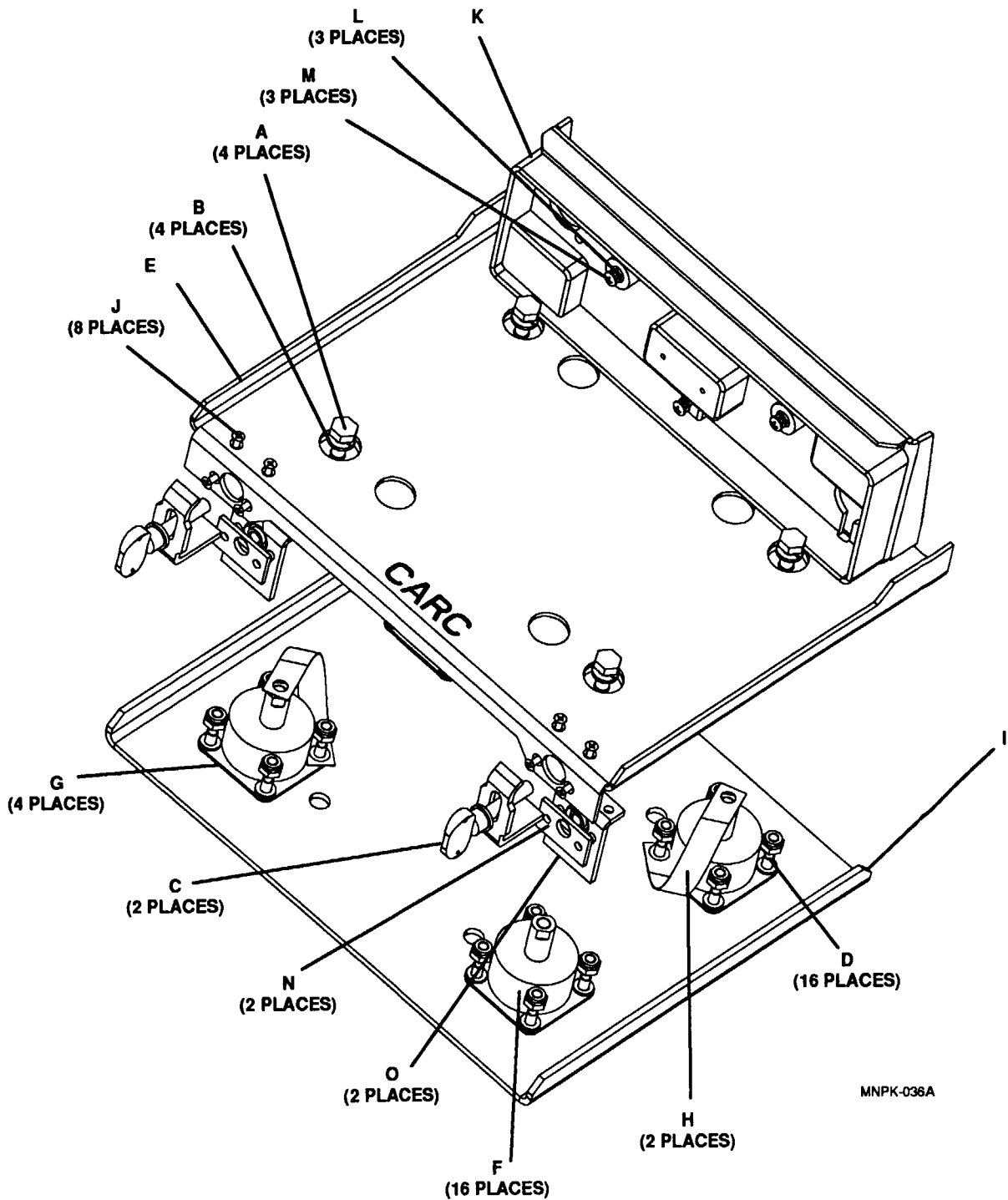


Figure 8-28. Short Shock Mount (10372-0880)

**Table 8-15. Short Shock Mount Parts List**

Letter Code	Name	Dimensions	Part Number	Cage Code
A	BOLT HEX HEAD	—	MS35308-303	96906
B	LOCKWASHER, SPLIT	SS 1/4	MS35338-139	96906
C	CLAMP ASSEMBLY	—	812426-801	37695
D	FLAT HEAD SCREW	10-24X1/2	MS24693-C72	96906
E	MOUNTING TRAY	—	10372-0887-01	14304
F	NUT	10-32	H34-0034-005	14304
G	RESILIENT MOUNT	—	435653-4	37695
H	GROUND STRAP	—	938770-1	37695
I	TRAY	—	10372-0886-01	14304
J	FLAT HEAD SCREW	4-40X1/4	MS24693-C2	96906
K	HOUSING, R/T INTERFACE	—	660146-801	37695
L	LOCKWASHER, SPLIT	SS #6	MS35338-136	96906
M	PAN HEAD SCREW	SS 6-32X5/16	MS51957-27	96906
N	LATCH, TERMINATION	—	10372-0893-01	14304
O	LATCH, BLOCK	—	10372-0895-01	14304

#### 8.5.8.7 Mounting the RF-5030PA-20E 20 Watt Power Amplifier/Coupler

The RF-5033PA-20E 20 Watt Power Amplifier can be mounted directly to a ship's bulkhead, a vehicle frame, or to any other mechanically and electrically convenient surface. Figure 8-29 shows the spacing for the RF-5030PA-20E mounting holes.

#### 8.5.8.8 Mounting the RF-382 Antenna Coupler

The coupler can be mounted directly to a ship's bulkhead, an antenna mast, a vehicle frame, or to any other mechanically and electrically convenient surface. The RF-382 Antenna Coupler may also be installed on the RF-285-04 Rack Mount (optional) for increased mounting stability and ease of removal, as shown in Figure 8-30.

#### 8.5.8.9 Mounting the RF-5055PS AC/DC Power Supply

The RF-5055PS AC/DC Power Supply can be mounted directly to a ship's bulkhead, a vehicle frame, or to any other mechanically and electrically convenient surface. Figure 8-31 shows the spacing for the power supply mounting holes. Use 1/4-20 bolts, lockwashers, and flatwashers to secure the power supply to the mounting surface.

1. PLACE TEMPLATE AT DESIRED LOCATION.
2. CENTER PUNCH THE TEMPLATE AT THE LOCATIONS SHOWN. MAKE CERTAIN THAT THE BASE MATERIAL HAS BEEN MARKED.
3. DRILL 4 HOLES USING A  $17/64$ " OR 6.70 mm TWIST DRILL.

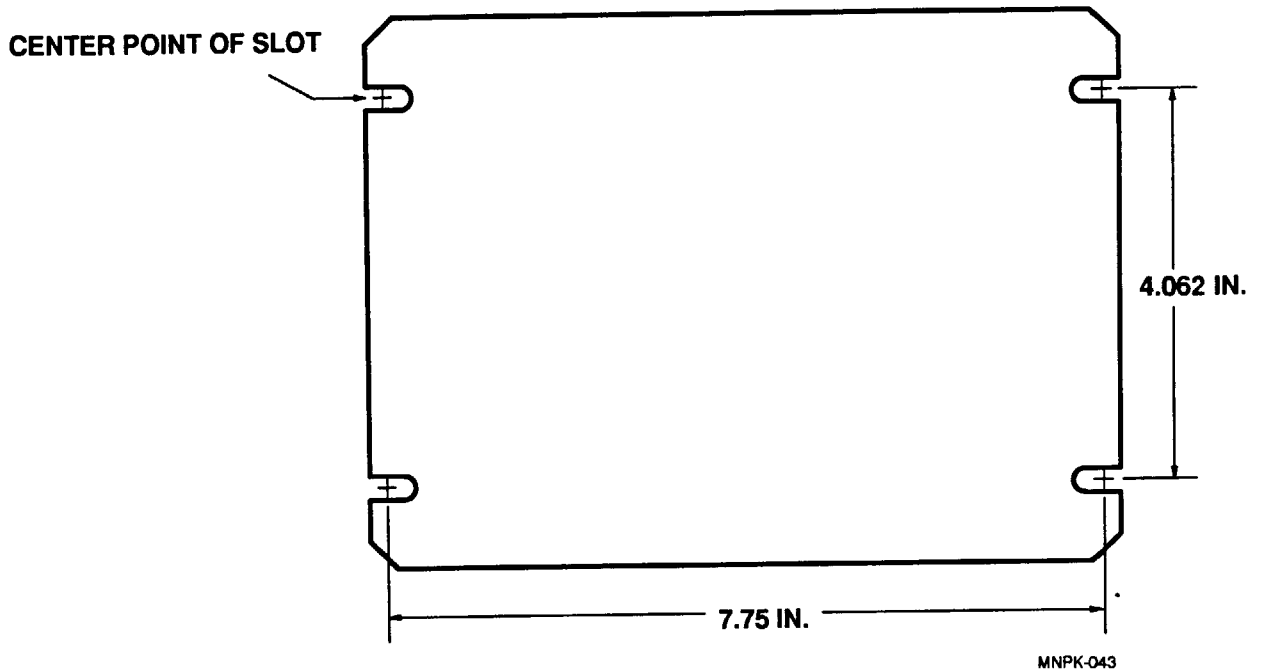


Figure 8-29. Mounting Hole Spacing for the RF-5030PA-20E 20 Watt Power Amplifier/Coupler

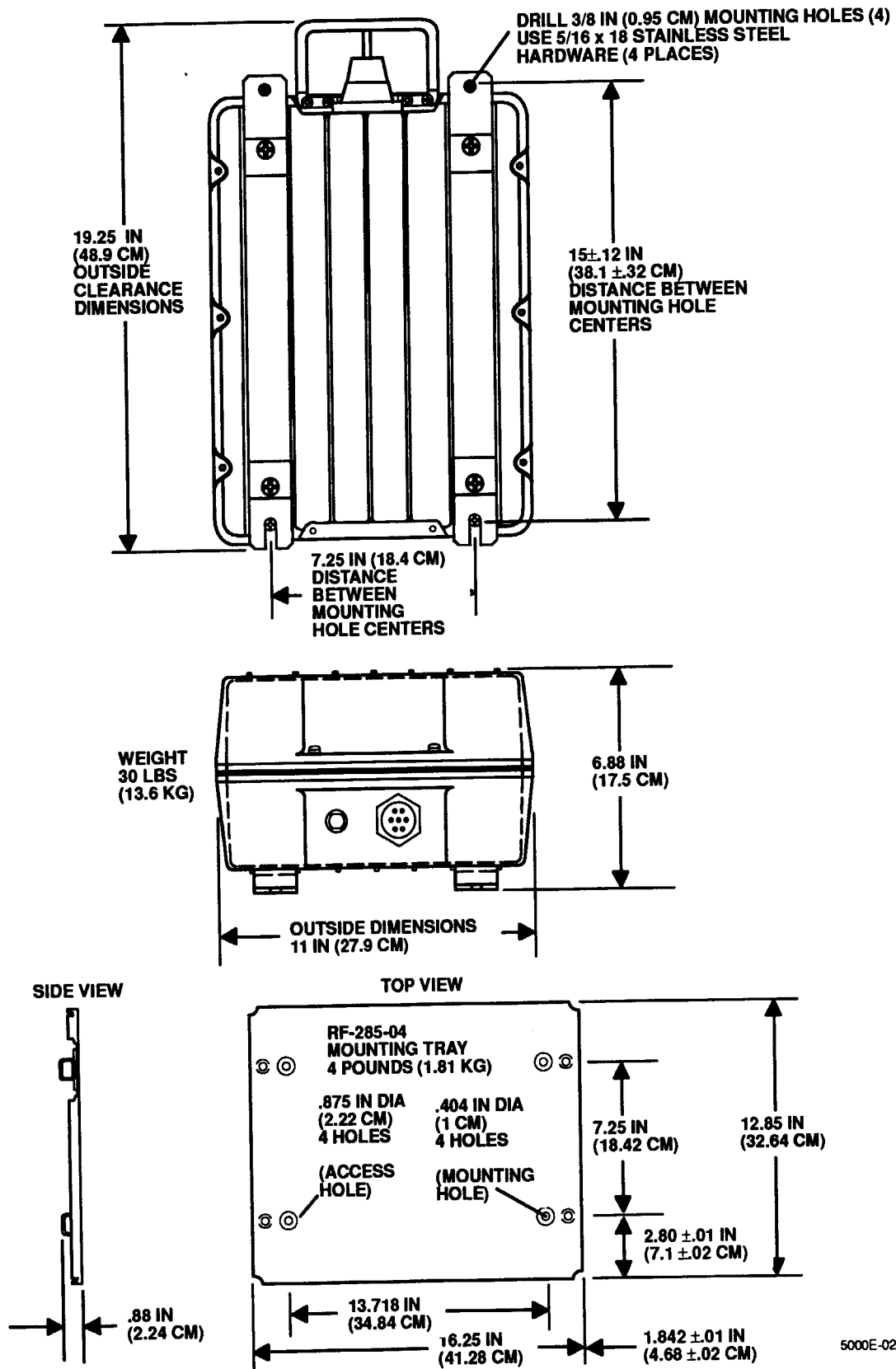
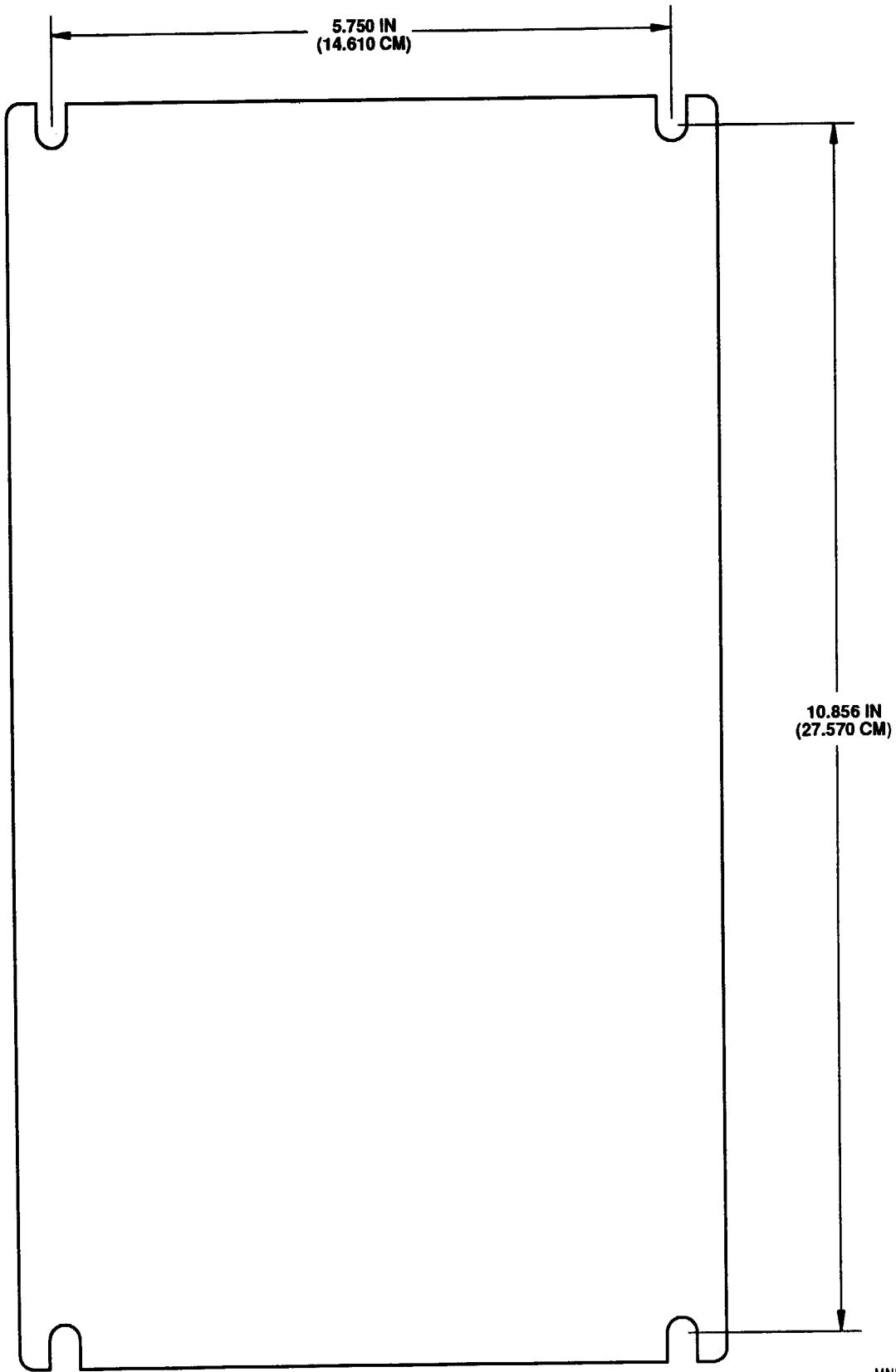


Figure 8-30. RF-382 Antenna Coupler Dimensions and Weight





MNPK-037

Figure 8-31. RF-5055PS AC/DC Power Supply Mounting Hole Spacing

## 8.5.9 Manpack Configuration Instructions

Figure 8-9 shows the parts of the manpack transceiver, and Figures 8-32 and 8-33 show the recommended sequence for assembly.

Figure 8-32 recommends performing a self-test to test battery voltage as soon as the battery case is attached. Refer to Chapter 2, Paragraph 2.3.1. A charged battery gives a reading above +25.0 volts. A voltage reading below +24.0 volts generally indicates that the battery requires charging (Ni-Cd batteries) or replacing (lithium batteries).

Figure 8-33 shows and describes how to connect the handset and the antenna to the radio.

### WARNING

When the manpack configuration is not grounded, it is possible that the operator will experience minor shocks while transmitting.

#### 8.5.9.1 Battery Information

The manpack transceiver is supplied with a Battery Case, 10372-1300 or 10530-1300-02, which holds two Ni-Cd (rechargeable) or two lithium-sulfur dioxide (disposable) batteries. The batteries provide +24 Vdc (nominal) to the manpack transceiver.

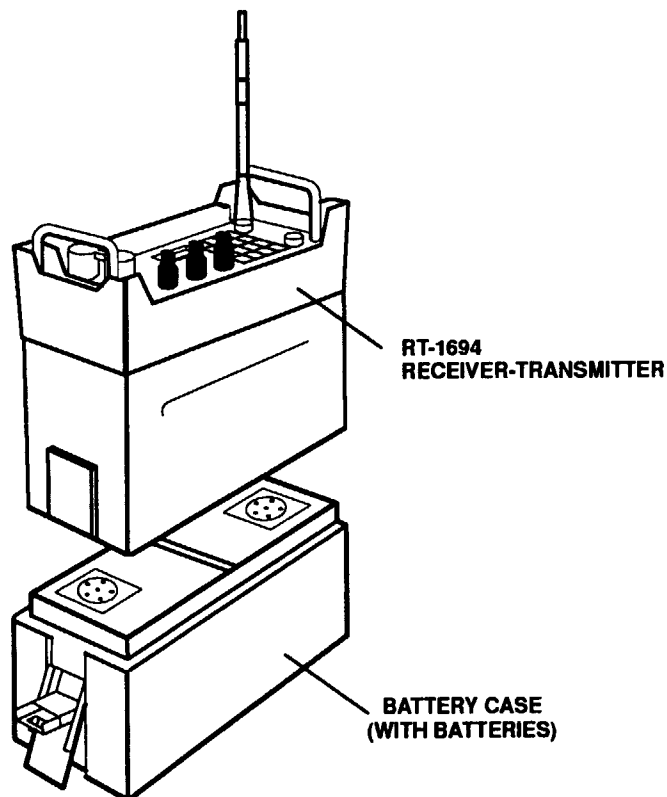
##### 8.5.9.1.1 Battery Voltage

The manpack transceiver continuously monitors battery voltage for acceptable levels. It displays the voltage during battery self-test.

The BB-590/U Ni-Cd Battery (10075-1345-01) is rated for use at temperatures between  $-20^{\circ}\text{C}$  and  $+70^{\circ}\text{C}$ . These batteries are more effective at moderate to cooler temperatures; excessive heat or cold temperatures reduce battery life and degrade battery performance.

The BA-5590/U Lithium-Sulfur Dioxide ( $\text{Li-SO}_2$ ) Battery is a high-energy battery with a longer operational life than the Ni-Cd battery. The  $\text{Li-SO}_2$  battery performs effectively at temperatures between  $-20^{\circ}\text{C}$  and  $+70^{\circ}\text{C}$ , but voltage drops rapidly in high-power situations and during temperature extremes.

During self-test, battery voltage and charge levels display on the front panel display. If the battery voltage is below +24.0 V, or if LOW BATTERY or REPLACE BATTERY appears on the front panel display, replace the batteries in the battery case.



### ATTACH BATTERY CASE

THE BATTERY CASE FITS ON THE BACK OF THE RECEIVER-TRANSMITTER ASSEMBLY. SET THE BATTERY CASE ON A FLAT SURFACE, FACE UP, AND FOLLOW THESE STEPS:

- 1 LINE UP THE CONNECTORS ON THE REAR OF THE RECEIVER-TRANSMITTER WITH THE MATING CONNECTORS OF THE BATTERY CASE.
- 2 PRESS THE BATTERY CASE FIRMLY AGAINST THE RECEIVER-TRANSMITTER. THE BATTERY CASE FITS EASILY WHEN CORRECTLY LINED UP.
- 3 FASTEN BOTH SIDE-CLASPS TO ATTACH THE CASE.
- 4 TURN THE FUNCTION CONTROL TO AN OPERATING MODE. IF LOW BATTERY OR REPLACE BATTERY APPEARS ON THE LED DISPLAY, REPLACE THE BATTERIES IN THE BATTERY CASE. RUN BATTERY TEST AS INSTRUCTED IN PARAGRAPH 2.3.1.

5000P-002A-VP

Figure 8-32. Attach Battery Case

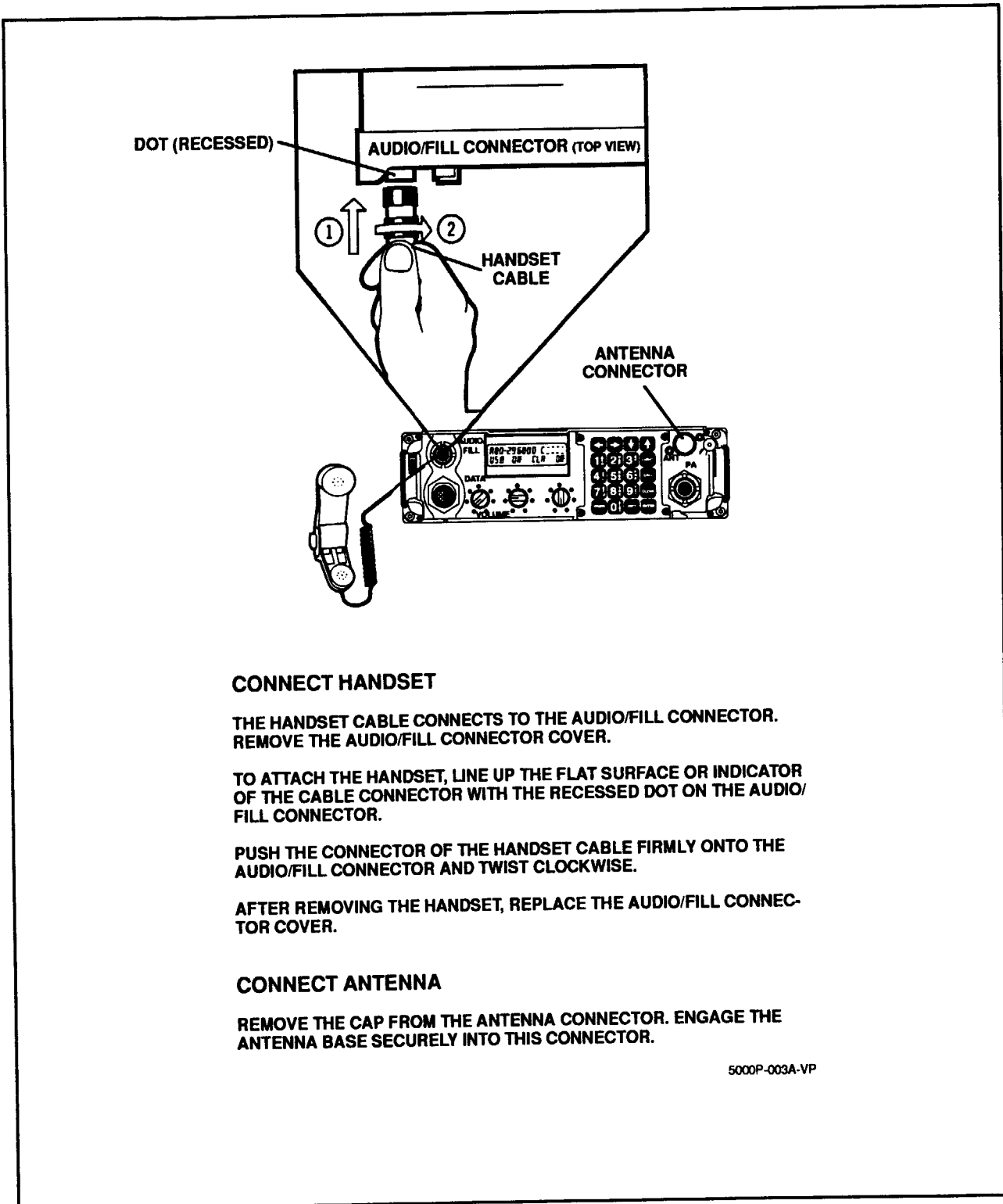


Figure 8-33. Connect Handset and Antenna

### 8.5.9.1.2 Installing the Batteries in the Battery Case

Optimal performance requires using two Ni-Cd or two Li-SO<sub>2</sub> batteries in the battery case, but the manpack will operate from either a single BB-590/U Ni-Cd or BA-5590/U Lithium-Sulfur Dioxide battery.

#### **NOTE**

Operating the RT-1694(P) Receiver-Transmitter from a single BA-5590/U Lithium-Sulfur Dioxide battery results in reduced power output. Operating the RT-1694B(P)/U Receiver-Transmitter from a single BA-5590/U Lithium-Sulfur Dioxide battery does not result in reduced power output.

The batteries slide into the top section of the case and rest on the rubber pad on the bottom of the case. The connectors are in the outside corners.

#### **WARNING**

Never ship the battery case with batteries in it. Never store batteries in the battery case for over 30 days.

### 8.5.9.1.3 Charging Ni-Cd Batteries

The Solar Battery Charger (10372-0750-01) is a lightweight photovoltaic power supply designed to recharge the BB-590/U Ni-Cd batteries.

The solar panel consists of five interconnected panels that fold together for easy carrying in a canvas carry case. Three metal pins are provided with the battery charger. When these pins are placed through loops at the back of each segment, the panels are aligned in a straight line.

When the connector, provided as part of the panel, is attached to the connector on the BB-590/U Ni-Cd Battery, the battery is recharged in approximately six to 12 hours (depending on weather conditions and the condition of the battery). Refer to the Accessory section of this manual for complete details and an illustration of the solar battery charger.

#### **WARNING**

Do not use the Solar Battery Charger (or any other device) to charge lithium-sodium dioxide batteries.

The RF-5055PS AC/DC Power Supply (10372-5700-01) uses a standard, three-conductor line cord with a three-prong grounding plug to provide Alternating Current (AC) input. An input switch on the converter plate selects 115 or 230 Vac.

When the standard, military-style connector (part number MS3116J12-10S) is attached to the power amplifier connector on the radio's front panel, one or two BB-590/U Ni-Cd battery(ies) can be recharged in approximately 14 hours while they remain in the battery case, depending on the condition of the battery(ies). Refer to the Accessory section for complete details and an illustration of the RF-5055PS AC/DC Power Supply.

#### 8.5.9.1.4 Storing Lithium-Sulfur Dioxide (Li-SO<sub>2</sub>) Batteries

Store the lithium-sulfur dioxide battery in its original shipping container. Recommended storage is in a cool, sprinkler protected, ventilated area where the temperature is maintained below 160° F (70° C).

### WARNING

DO NOT store lithium-sulfur dioxide batteries with other hazardous materials.

#### 8.5.9.1.5 Handling Li-SO<sub>2</sub> Batteries

Many safety features are built into the lithium-sulfur dioxide battery to ensure stability under combat conditions; however, anyone who handles Li-SO<sub>2</sub> should observe the following warning.

### WARNING

Do not charge, short circuit, incinerate, disassemble, or mutilate the BA-5590/U Lithium-Sulfur Dioxide Battery. Do not expose to fire or temperatures above 160° F (70° C); otherwise battery may rupture, releasing toxic material.

### WARNING

Do not use any BA-5590/U Lithium-Sulfur Dioxide Battery built before 1980.

If a LiSO<sub>2</sub> battery accidentally ruptures, ventilate the area and wash away any spilled residue with water.

### WARNING

Do not use a halon-type fire extinguisher on a lithium-sulfur dioxide battery fire. In the event of a fire near a Li-SO<sub>2</sub> battery, rapid cooling is important. Use a Carbon Dioxide (CO<sub>2</sub>) extinguisher. Control of the equipment fire and cooling may prevent the battery from venting and potentially exposing lithium metal. In the event that lithium metal becomes involved in the fire, the use of a graphite-based, Class-D fire extinguisher is recommended.

### NOTE

Be sure to follow all of the battery manufacturer's safety precautions.

#### 8.5.9.1.6 Disposing of Lithium-Sulfur Dioxide Batteries

**WARNING**

A partially discharged lithium-sulfur dioxide battery is considered to be hazardous waste.

**CAUTION**

DO NOT dispose of lithium-sulfur dioxide batteries with ordinary trash/refuse.

Completely discharged batteries are not considered hazardous or reactive. The BA-5590/U Lithium-Sulfur Dioxide Battery includes an internal discharge switch. To discharge the battery, activate this switch per the battery manufacturer's instructions.

**WARNING**

Keep lithium-sulfur dioxide batteries away from open flame or heat.

### 8.5.9.2 Carrying the Manpack

The following pack/frame instructions provide information on securing the manpack radio and using the pack/frame assembly (including using H-style suspenders). Recommendations are also provided for carrying methods.

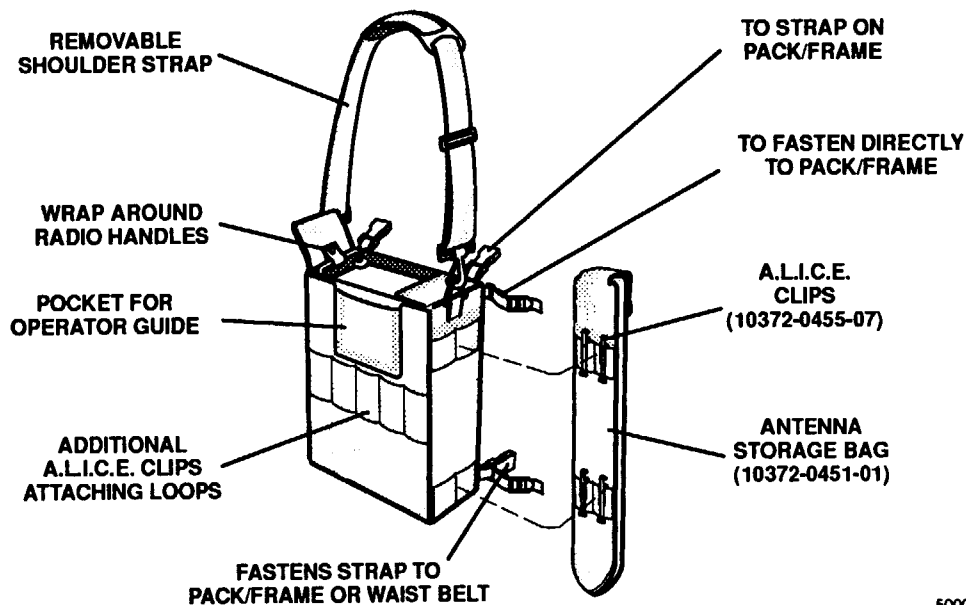
#### **WARNING**

When the manpack configuration is not grounded, it is possible that the operator will experience minor shocks while transmitting.

#### 8.5.9.2.1 Instructions for Canvas Carry Bag

The canvas carry bag (10372-0460-01) is used to carry and protect the manpack transceiver. To secure the manpack in the canvas carry bag shown in Figure 8-34, perform the following procedure:

- a. Secure the radio in the canvas carry bag.
- b. Fasten the snap tabs around the radio handles.



5000P-060(A) DI

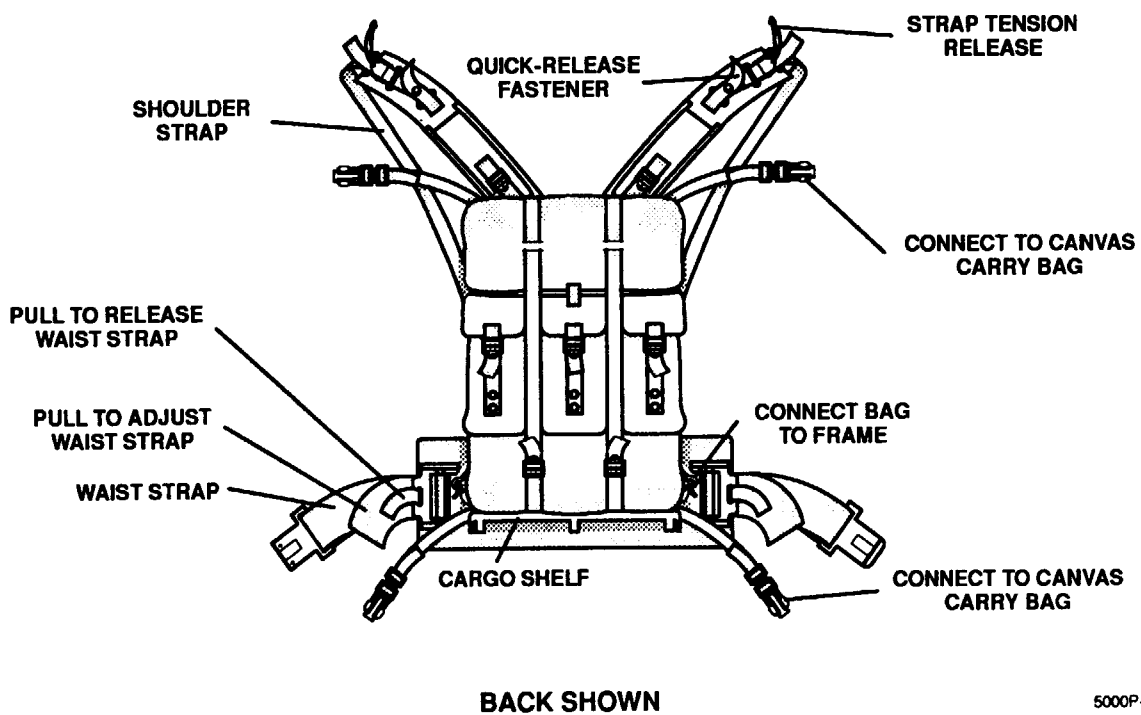
Figure 8-34. Canvas Carry Bag (10372-0460-01)



### 8.5.9.2.2 Instructions for Pack/Frame Assembly

The Pack/Frame Assembly (10372-0450-01) provides a convenient method for carrying the radio operator's gear, including the manpack. The pack/frame, shown in Figure 8-35, is secured to the radio operator by performing the following procedure:

- a. Place the shoulder straps over the operator's shoulders. Adjust the straps to fit.
- b. Fasten the waist strap, and adjust it to fit.
- c. Fasten the canvas carry bag to the pack/frame straps (four places).



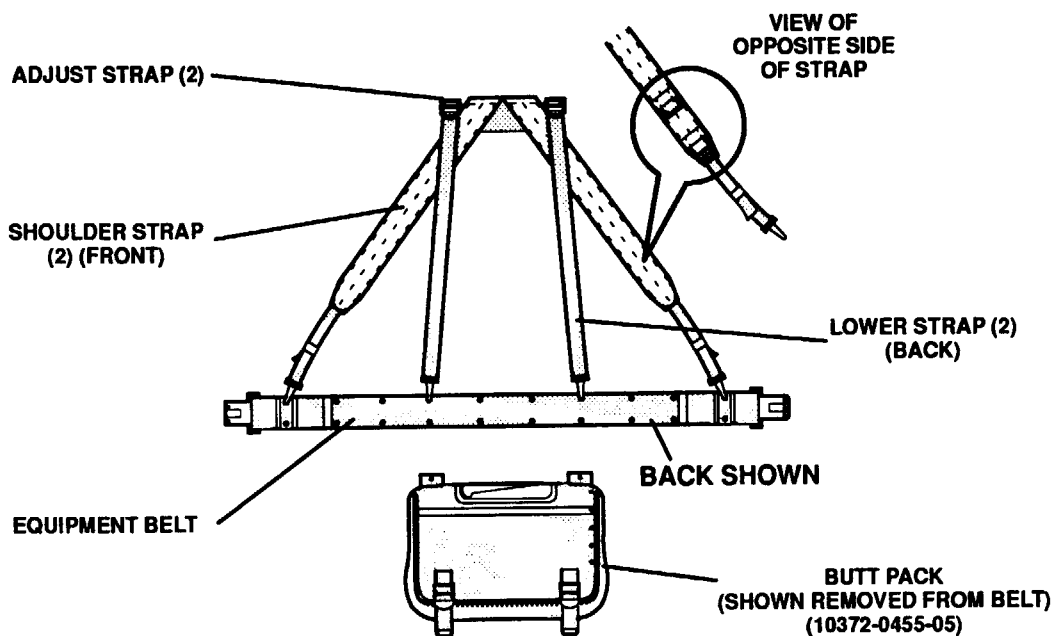
5000P-061A DI

Figure 8-35. Pack/Frame Assembly (10372-0450-01)

### 8.5.9.2.3 Instructions for H-Style Suspenders

H-Style Suspenders (10372-0455-04) also provide a means of carrying lightweight gear. To wear the H-Style Suspenders, shown in Figure 8-36, perform the following procedure:

- a. Place the shoulder strap over the operator's shoulders.
- b. Adjust the strap to fit.
- c. Fasten the equipment belt, and adjust it to fit.



5000P-063 DI

Figure 8-36. H-Style Suspenders (10372-0455-04)

#### 8.5.9.2.4 Alternative Carrying Methods

The manpack transceiver can be transported in many ways. The suggestions listed below are recommendations of carrying methods, and they are shown in Figure 8-37:

- Place the radio in the canvas carry bag. Wear the canvas carry bag on the chest attached to the pack/frame strap.
- Remove the pack from the pack/frame. Mount the canvas carry bag (with radio) on the cargo shelf on the frame.
- Place the canvas carry bag (with radio) in the pack on the frame (on operator's back).
- Carry the canvas carry bag on the shoulder (with or without antenna bag and/or butt pack).

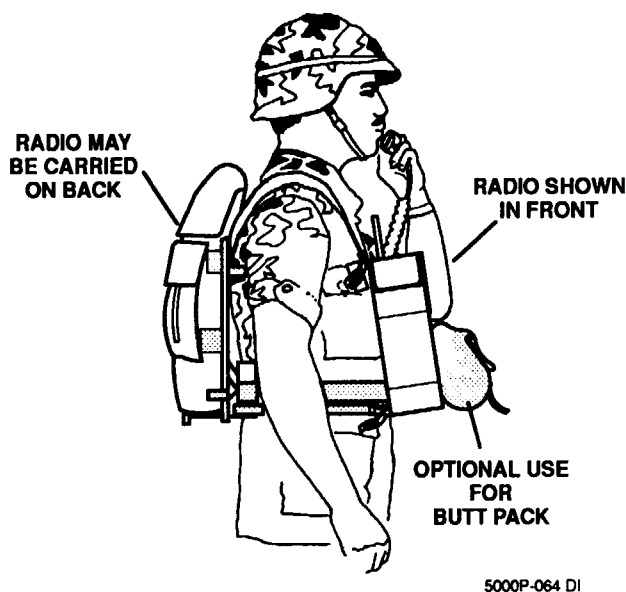


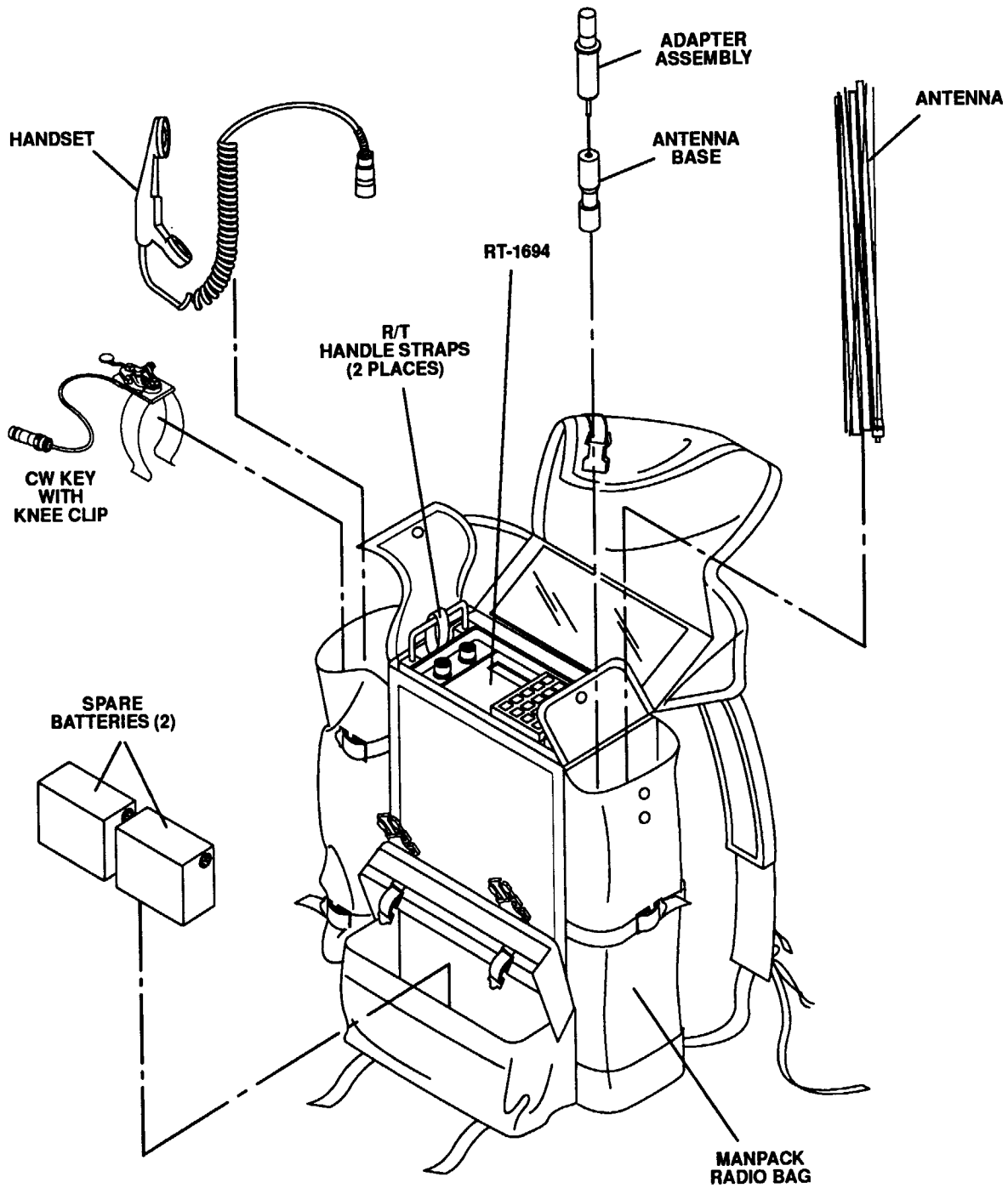
Figure 8-37. Examples of Carrying Methods

#### 8.5.9.2.5 Using the Manpack Radio Bag (10530-0460-01)

The Manpack Radio Bag (10530-0460-01) provides the ability to store and carry all items that make up the manpack radio system, plus two extra batteries. Figure 8-38 shows the suggested locations for storing all manpack items. Figure 8-39 shows an R/T in the Manpack Radio Bag with the handset and antenna attached, ready for operation.

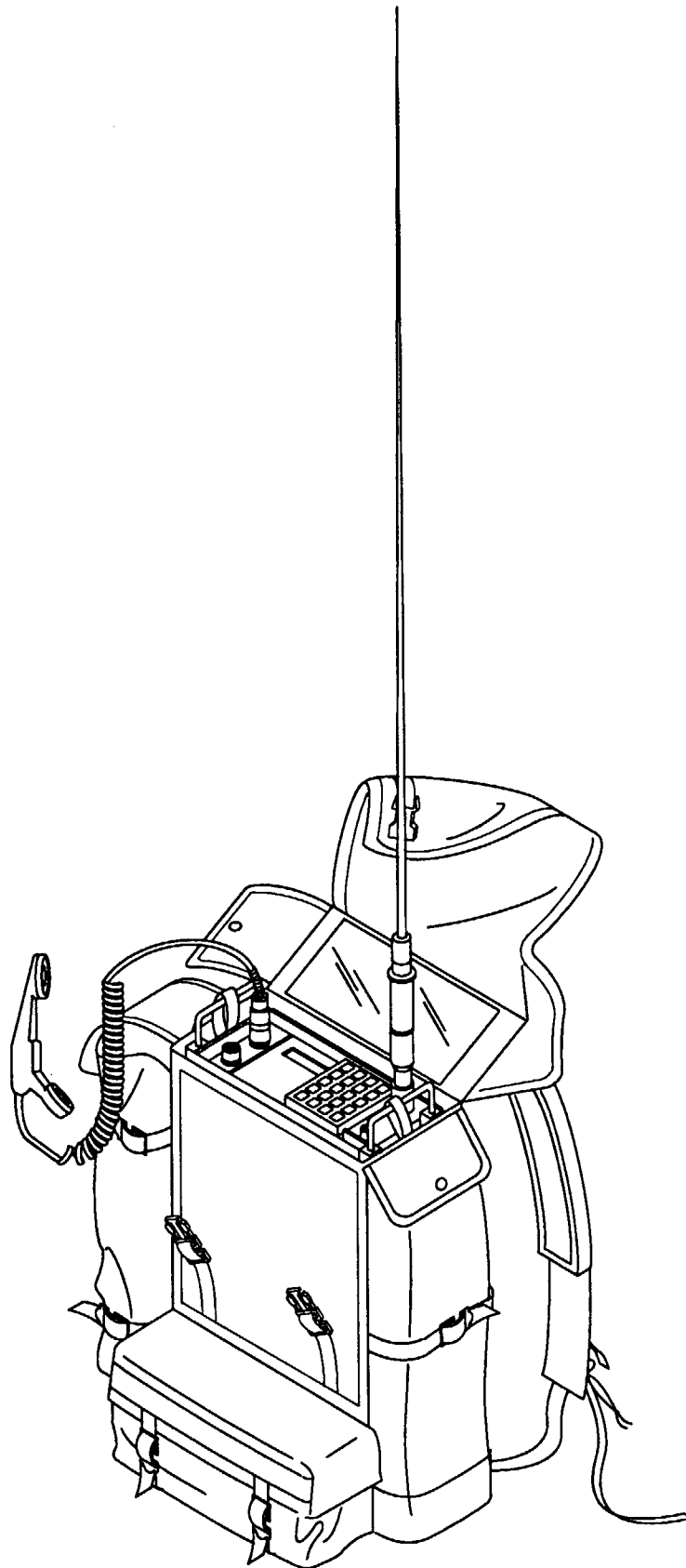
#### NOTE

The R/T is secured in the Manpack Radio Bag with two R/T Handle Straps. See Figure 8-38.



MNPK-057

**Figure 8-38. Storing Manpack Radio System Items In the Manpack Radio Bag**



MNPK-058

**Figure 8-39. Manpack Radio System Ready for Operation**

**8.5.10 Interfacing the RT-1694 to Non-Harris Equipment**

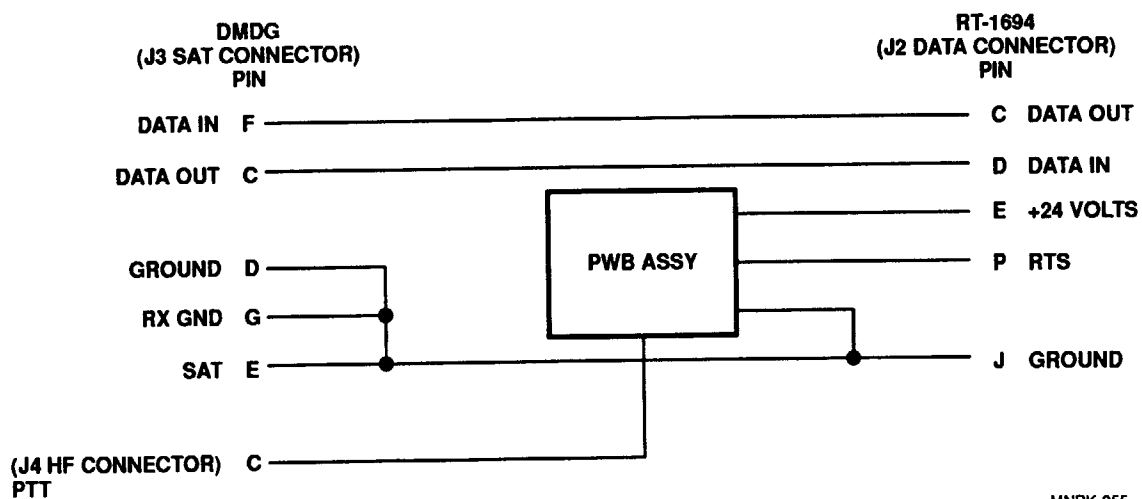
In general, refer to the documentation provided with the non-Harris equipment for interface information. See Figure 8-40 for RT-1694 to DMDG (OA-8990/P) interface information. See Figure 8-41 for RT-1694 to KL43-C interface information. See Figure 8-42 for RT-1694 to KY-99 interface information. Tables 8-16, 8-17, and 8-18 provide the pin assignments for the AUDIO/FILL, DATA, and PA connectors on the RT-1694 Receiver-Transmitter front panel.



The cable assemblies shown in Figures 8-40, 8-41, and 8-42 can be damaged by static discharge. Failure to take the proper precautions may damage these assemblies. For more information, refer to the Safety Summary at the beginning of this manual.

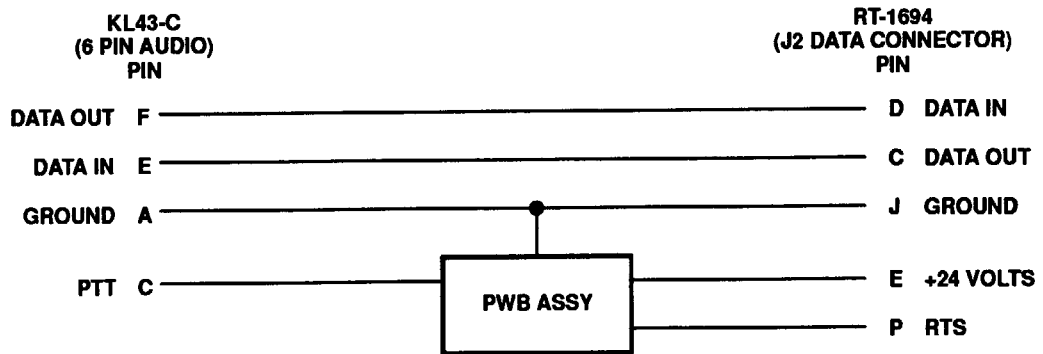
**NOTE**

The cable assemblies shown in Figures 8-40, 8-41, and 8-42 are required when using the modem internal to the RT-1694 Receiver-Transmitter.



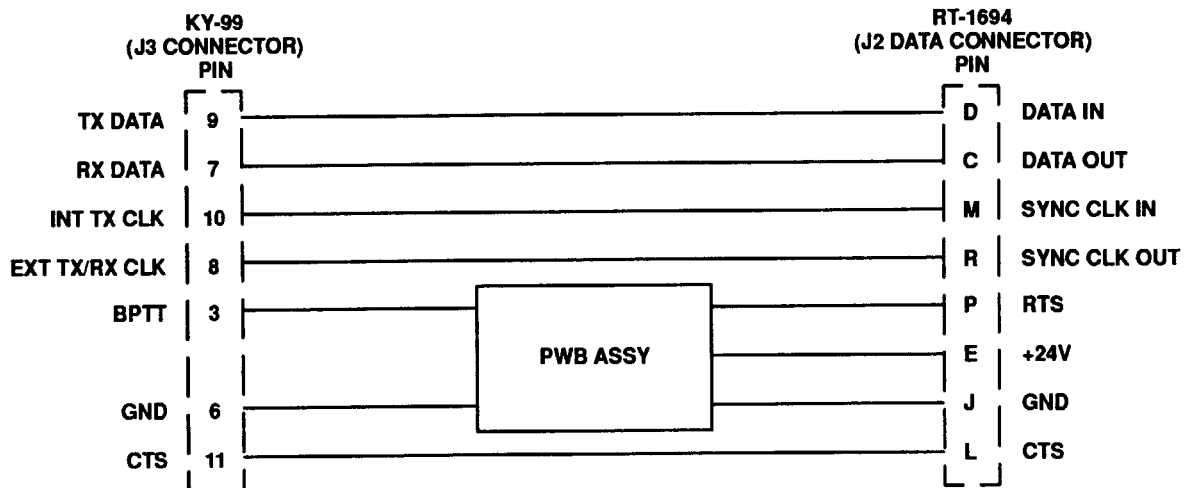
MNPK-055

**Figure 8-40. RT-1694 to DMDG (OA-8990/P) Interface Cable Diagram (10530-9870-01)**



MNPK-056

Figure 8-41. RT-1694 to KL43-C Interface Cable Diagram  
(10530-9860-01)



MNPK-059

Figure 8-42. RT-1694 to KY-99 Interface Cable Diagram  
(10530-9880-01)

**Table 8-16. Front Panel AUDIO/FILL Connector Pin Assignments**

Connector and Pin	Signal	Signal Characteristics
J1-A	Ground analog	Ground
J1-B	Receiver audio output	≥3.87 volts rms audio into 1 K ohm load, variable vol.
J1-C	Push-To-Talk (PTT) keyline input or fill Request-To-Send (RTS) input	PTT active low pull down to ground/or 0 V, +5 V CMOS levels
J1-D	Transmit microphone audio input	1.5 mV rms ±10%, Z <sub>in</sub> = 150 ohms ± 10%
J1-E	Retransmit keyline output or fill clock output	0 V, +5 V CMOS levels
J1-F	Fill data Input/Output (I/O)	0 V, +5 V CMOS levels

**Table 8-17. Front Panel DATA Connector Pin Assignments**

Connector and Pin	Signal	Signal Characteristics
J2-A	Fixed level Receive (RX) audio out	2.2 V <sub>p-p</sub> , 10 Hz – 10 kHz, R <sub>out</sub> = 600 ohms
J2-B	Fixed level Transmit (TX) audio in	2.2 V <sub>p-p</sub> , 10 Hz – 10 kHz, R <sub>in</sub> = 100 K
J2-C	Data out	RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-D	Data in	RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
*J2-E	+ Battery output /or remote power on input	+19.5 V to +32 V, 0.1A max/or active low pull down to ground (internal jumper selectable)
J2-F	TX keyline	+5 V CMOS input, active low pull down to ground
J2-H	RLSD	Output, RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-J	Ground	Ground
J2-K	Remote async data in	RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-L	Clear-To-Send (CTS)	Output, RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-M	Sync clock in	RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-N	Remote async data out	RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-P	RTS	Input, RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level
J2-R	Sync clock out	RS-232C ±12 V levels or MIL-STD-188-114A ±6 V level

\*Normal Jumper E1 to E2



**Table 8-18. Front Panel PA Connector Pin Assignments**

Connector and Pin	Signal	Signal Characteristics
J6-A	Hop clock	0 V, +5 V CMOS levels
J6-B	PA control data -	0 V, +5 V differential asynch control data, 150 K baud
J6-C	PA control data +	0 V, +5 V differential asynch control data, 150 K baud
J6-D	/PA POWER ON	0 V, +5 V CMOS levels, active low
J6-E	Ground return battery charger	DC ground return
J6-F	Ext R/T DC-	DC ground return
J6-G	PA feedback -	PA feedback ground return
J6-H	PA feedback +	PA analog feedback sense, minimum - +0.5 V, typical - +4.3 V, maximum - +7.0 V
J6-J	Ext Charger DC +	+10 V to +32 V, 4.0A maximum
J6-K	Ext R/T DC +	+19.5 V to +32.0 V, 1.0A maximum, (100 mW exciter mode only)

## **8.6 INSTALLATION CHECKOUT**

Installation checkout has three phases. Phase 1 is a pre-energizing check to make sure the system is installed correctly, and that all support items are available. Phase 2 covers the radio system's power up and preliminary tests. Phase 3 tests the functions of the radio system.

### **8.6.1 Phase 1 – Inspection and Pre-Power Up Procedures**

When the radio system is installed and all connector cables are attached, verify that the following items are completed:

- All connectors are attached and associated hardware is secure.
- Check that system units are connected to ground, preferably at a single point.
- Check that ground wires are connected between the radio system units and a known good ground.
- Check securing hardware to be sure the equipment cannot be tipped over or moved.
- Check that area cooling is adequate for removing heat that may develop during equipment operation.
- Verify that the power source is of adequate capability and adequately protected for the radio system's load, and that installation of the power cable is correct.
- Verify that the antenna is in place, correctly connected, and protected against accidental contact.
- Check any companion equipment, such as the power supply, or remote control, for operational readiness.

### **8.6.2 Phase 2 – Initial Settings and Power Up**

To turn the radio system on, refer to Chapter 2, Paragraph 2.3.

### **8.6.3 Phase 3 – Installation Verification/Unit Checkout**

To verify power amplifier performance, run Built-In Test (BIT) from the R/T. Refer to Chapter 2, Paragraph 2.3.1. If the radio system passes all tests, return the radio system to operational readiness.

## **CHAPTER 9**

### **ACCESSORIES**

#### **9.1 INTRODUCTION**

This chapter contains accessory information describing support packages and equipment accessories that are available for the RF-5200 FALCON™ Series Manpack Systems. These items add capabilities, provide supplemental instruction in operations and maintenance, recommend spares and tools for product preservation and repair, and list associated documentation to enhance the overall mission effectiveness of the radio systems.

These items may be ordered directly from Harris/RF Communications using the order number provided with each description.

##### **9.1.1 Support Packages**

Support packages are items that are not required to utilize the radio system, but give the user a source of instruction and a means of maintaining equipment integrity. Support packages are considered and generated for each maintenance level. For information regarding maintenance levels, refer to Chapter 1, Paragraph 1.2.1. A summary of support packages and order numbers is provided in Table 9-1. Refer to the following paragraphs:

- Extended Warranties and Service Contracts – Paragraph 9.1.1.1
- Training – Paragraph 9.1.1.2
- Tools – Paragraph 9.1.1.3
- Test Equipment – Paragraph 9.1.1.4
- Maintenance Aids – Paragraph 9.1.1.5
- Manuals – Paragraph 9.1.1.6
- Spares Kits – Paragraph 9.1.1.7
- Hot Test Bed Kits – Paragraph 9.1.1.8

**Table 9-1. Radio System Support Packages**

Support Package	Maintenance Concept Supported	Order Number
Training Courses	Level I and II Level III          Level I, II, and III	10515-0006-0100 10515-0007-0300 (RT-1694) 10515-0002-0300 (RF-5032PA-125E) 10515-0005-0300 (RF-5033PA-150) 10515-0004-0300 (RF-5030PA-20E) 10515-0008-0300 (RF-382) 10515-0009-0300 (RF-5055PS) 10515-0010-0300 (RF-5056PS) 10515-0018-0300 (RF-5051PS-125) 10515-0006-0600
Tool Kits	Level I Level II Level III       Level II and III (system)	Not required 10515-0006-1200 10515-0007-1300 (RT-1694) 10515-0002-1300 (RF-5032PA-125E) 10515-0005-1300 (RF-5033PA-150) 10515-0004-1300 (RF-5030PA-20E) 10515-0008-1300 (RF-382) 10515-0009-1300 (RF-5055PS) 10515-0010-1300 (RF-5056PS) 10515-0018-1300 (RF-5051PS-125) Available on request*
Test Equipment Kits	Level I Level II Level III       Level III (system)	Not required Not required 10515-0007-2300 (RT-1694) 10515-0002-2300 (RF-5032PA-125E) 10515-0005-2300 (RF-5033PA-150) 10515-0004-2300 (RF-5030PA-20E) 10515-0008-2300 (RF-382) 10515-0009-2300 (RF-5055PS) 10515-0010-2300 (RF-5056PS) 10515-0018-2300 (RF-5051PS-125) Available on request*
Maintenance Aids	Level I Level II Level III	Not required Not required Not required

**Table 9-1. Radio System Support Packages – Continued**

Support Package	Maintenance Concept Supported	Order Number
Manuals	Level I (operator guide) Level II Level III	10372-0004 10515-0006-4200 10515-0007-4300 (RT-1694) 10225-0086-01 (RF-5032PA-125E) 10515-0005-4300 (RF-5033PA-150) 10181-0034-01 (RF-5030PA-20E) 10515-0008-4300 (RF-382) 10515-0009-4300 (RF-5055PS) 10515-0010-4300 (RF-5056PS) 10299-0349-01A (RF-5051PS-125)
Spares Kits	Level I Level II Level III	Not required Not required 10515-0007-5300 (RT-1694) 10515-0002-5300 (RF-5032PA-125E) 10515-0005-5300 (RF-5033PA-150) 10515-0004-5300 (RF-5030PA-20E) 10515-0008-5300 (RF-382) 10515-0009-5300 (RF-5055PS) 10515-0010-5300 (RF-5056PS) 10515-0018-5300 (RF-5051PS-125)

\* Due to the number of possible radio systems that are available, a customized tools or equipment list will be generated at no charge.

### **9.1.1.1 Extended Warranties and Service Contracts**

Harris/RF Communications offers extended warranties and service contracts. An extended warranty lengthens the original warranty provided with Harris/RF Communications equipment and systems. Customers who want factory-trained field service personnel to assist in the installation, operation, maintenance, and service of their communications equipment can order a service contract. For more information, call the Harris/RF Communications marketing office (tel: 716-244-5830).

### **9.1.1.2 Training**

Training provides the user with valuable operation and maintenance knowledge gained through instruction and hands-on experience.

When ordering non-English training, please specify at time of order.

- **Level I Training** provides thorough understanding of basic operating functions, equipment inspection procedures, and the use of operator cards.
- **Level II Training** provides the skills for performing corrective maintenance, localizing faults to a unit, performance of general scheduled maintenance procedures, use of basic test equipment, and the use of the System (Level II) Manual.
- **Level III Training** equips maintenance personnel with the skills needed to perform corrective maintenance, localize faults to modules, assemblies, and chassis-mounted components, to conduct necessary alignment and adjustments, detailed scheduled maintenance, and use of test equipment, maintenance aids, and the Maintenance (Level III) Manual.
- **Radio System Training** includes a complete training package that supports all major radio system units for Levels I, II, and III.

### **9.1.1.3 Tools**

Tool kits for Maintenance Levels II, III, and IV are available to ensure that common items required to install, maintain, and disassemble/reassemble the unit are available to the maintainer.

- **Level I Tools** are not required.
- **Level II Tools** include items needed to install or remove the unit from the radio system, and to perform general scheduled maintenance.
- **Level III Tools** include items required to perform corrective and scheduled maintenance down to the module or chassis-mounted component.
- **Level II and III Radio System Tools** include all items required to perform Level II and III maintenance on all major units of the radio system, without duplicating items.

#### **9.1.1.4 Test Measurement Equipment**

- **Level I Test Measurement Equipment** is not required.
- **Level II Test Measurement Equipment** includes measurement items needed to perform corrective maintenance, scheduled maintenance, and fault localization to the unit.
- **Level III Test Measurement Equipment** includes measurement items required to perform corrective and scheduled maintenance down to the module or chassis-mounted component, such as a multimeter, power meter, and oscilloscope.
- **Level II and III Radio System Test Measurement Equipment** includes all measurement items required to perform Level II and III maintenance on all major units of the radio system, without duplicating items.

#### **9.1.1.5 Maintenance Aids**

Maintenance aids are special or non-standard tools and test equipment required to perform corrective and scheduled maintenance as specified in the applicable maintenance manual procedures. Special/non-standard tools and test equipment includes items that can only be procured from Harris/RF Communications, such as extender cards, test fixtures, and modified tools.

- **Level I Maintenance Aids** are not required.
- **Level II Maintenance Aids** are not required.
- **Level III Maintenance Aids** include items that support corrective and scheduled maintenance tasks associated with Level III maintenance, such as extender cards, performance fixtures, pressurization kits, and breakout boxes.

#### 9.1.1.6 Manuals

Manuals are an invaluable, comprehensive resource for the installation, operation, and maintenance of the power amplifier. Manuals also provide a listing of the support equipment recommended to optimize the unit's capabilities and minimize equipment down time.

When ordering non-English manuals, please specify at time of order.

The following is a description of the manuals:

- **Level I Manual** is in the form of operator cards that guide the user in the installation and basic operation of the unit. The cards are an abbreviated form of the information provided in the Level II manual, and are used to facilitate usage in the field.
- **Level II Manual** contains system level information regarding installation and operation of each significant piece of equipment in the radio system. It also includes procedures for performing corrective maintenance and fault localization to the unit, as well as general scheduled maintenance.
- **Level III Manuals** provide information required to perform corrective and scheduled maintenance down to the module or chassis-mounted component.

#### 9.1.1.7 Spares Kits

The maintainer uses spare parts kits to return equipment which has malfunctioned to operational readiness in as short a period of time as possible. The kit may include those items that are consumed during corrective and scheduled maintenance tasks, such as solder, tape, tie wraps, grease, etc.

- **Level I Spares Kit** is not required.
- **Level II Spares Kit**, other than complete units, contains items that may be externally accessed from the equipment, and are usually consumable in nature, such as fuses, filters or lamps.
- **Level III Spares Kit** includes those items used to repair the unit by replacing a faulty module, Printed Wiring Board (PWB), or chassis mounted component. Both corrective and scheduled maintenance scenarios are considered. Spares kits contain items sufficient in quantity to provide a basic level of coverage for a minimal number of units, typically five or less. For spares support of more than five units, contact Harris/RF Communications directly.

#### 9.1.1.8 Hot Test Bed Kits

Hot Test Bed Kits are available to ensure that equipment necessary to set up a test bed is available to the maintainer. The test bed is a classification of test equipment from which radio equipment characteristics can be measured. Hot Test Bed Kits consist of power supplies, signal generators, radio Receiver-Transmitters (R/Ts), and cables.

- **Level I Hot Test Bed Kit** is not required.
- **Level II Hot Test Bed Kit** is not required.
- **Level III Hot Test Bed Kit for the radio system** includes system setup items necessary to test the radio system at Level III maintenance, without duplicating items.



**9.1.2 Equipment Accessories**

Equipment accessories are items that are not provided with the radio system, but can be procured to increase the application and capabilities of the system. Table 9-2 lists the accessories available for the RF-5200 FALCON™ Series Manpack System.

**Table 9-2. Receiver-Transmitter Accessories**

Item Name	Description	Part Number
Rechargeable Nickel-Cadmium Battery	The BB590/U consists of a pair of rechargeable Nickel-Cadmium (Ni-Cd) batteries for the AN/PRC-138 Manpack battery case. The average life of the battery in a high usage/medium power environment is four – six hours.	BB-590/U
Lightweight Lithium Battery	The BA-5590/U is a lightweight, long-life battery for the AN/PRC-138 Manpack Radio Set. A 10372-0300 Battery Case is used to hold one or two BA-5590/U batteries. <i>The BA-5590/U cannot be recharged.</i>	BA-5590/U
Rechargeable Lead-Acid Battery	The BB-490/U consists of a pair of rechargeable lead-acid batteries for the AN/PRC-138 Manpack battery case. The average life of this battery in a high usage/medium power environment is six – eight hours.	BB-490/U
Lightweight Battery Case	The 10530-1300 is a XENOY 6240™ hi-grade, hi-impact plastic battery case with a 25% reduction in weight from the standard aluminum battery case. It holds two standard Ni-Cd or Lithium battery units.	10530-1300
Battery Case	The 10372-0300 is a standard aluminum battery case which snaps onto the RT-1694 Receiver-Transmitter back panel and holds two BB-590/U Ni-Cd, two BB-490/U lead-acid, or two BA-5590/U Lithium Battery units. An extra case would allow the user to easily detach a spent battery and case and install new batteries and a case onto the back panel of the R/T.	10372-0300
Battery Charger – Trickle	The 10309-0550 provides simultaneous trickle charging of up to six BB-590/U Ni-Cd batteries. Charging time of a fully discharged battery is 14 hours. This battery charger operates on 115 to 230 Vac at 50/60 MHz. Specify voltage when ordering. This charger is not suitable for lead-acid batteries.	10309-0550

**Table 9-2. Receiver-Transmitter Accessories – Continued**

Item Name	Description	Part Number
Fast Charger	The 10372-0304 is a fast charger for up to four Ni-Cd batteries. This microprocessor- controlled unit incorporates fast-charge, balancing charge, maintenance charge, and recovery charge programs to properly charge and maintain the BB-590/U and other Ni-Cad battery types. It operates on 100 to 265 Vac at 50 to 60 Hz. The typical charge time for one fully discharged BB-590/U is approximately 30 minutes.	10372-0304
Solar Charger	This solar panel operates at 24 Vdc to charge one nickel-cadmium battery. Charge time depends on weather conditions. Cables are included.	10372-0950-01
OE-505A/PRC Manpack Whip Antenna Kit	The OE-505A/PRC is the standard antenna kit for the AN/PRC-138(V)2 Manpack System. The kit includes an AT-271A/PRC-25 10-foot (3.1 m) Collapsible Whip Antenna (10012-0241), a 10530-1215-01 Base and Adapter Assembly, a 10530-1250-01 Whip Adapter Assembly, and a 10372-0249-01 Antenna Bag. One OE-505A/PRC Whip Antenna Kit is supplied with each AN/PRC-138(V)2 Transceiver.	10530-0240-01
Very High Frequency (VHF) Log-Periodic Transportable Antenna	The RF-289A is a tactical, portable log-periodic antenna system for operation in the 30 to 90 MHz range with a gain of 4 dBi in 30 to 35 MHz, 4.5 dBi in 35 to 76 MHz, and 6 dBi forward gain over average soil. The RF-289A can be configured for vertical or horizontal polarization and can be manually rotated. The package includes a 20-foot (6.1 m) mast, 35 feet (11 m) of RG-58A/U Coax Cable, ground stakes, a mounting base, guy ropes, and a hammer.	RF-289A
VHF Omnidirectional, Transportable Antenna	The RF-290 is a tactical, portable, omnidirectional VHF 30 MHz to 90 MHz antenna. It is easily erected and designed for broadband operations. The system comes complete with a 33-foot (10 m) mast, an 80-foot coax cable with connectors, ground stakes, a base plate, a guy assembly, and a hammer.	RF-290

**Table 9-2. Receiver-Transmitter Accessories – Continued**

Item Name	Description	Part Number
Antenna – Portable Near Vertical Incidence Skywave (NVIS)	The RF-1936P is a NVIS antenna system. It is rapidly deployable for short- to medium-range communications. The RF-1936P covers the High Frequency (HF) and lo-VHF spectrums. It can be erected in five minutes by two people. The system requires use of an antenna coupler. The package includes a mast assembly and sections, a base plate, a hammer, and ground stakes.	RF-1936P
Antenna – Portable Dipole	The RF-1940 is a lightweight, portable dipole antenna operating in the 3 MHz to 30 MHz range. Its maximum input power is 500 watts. The unit is self-contained, using flat spools lengthened according to the frequency used. An additional throw line attaches to trees and masts. The RF connector is BNC for direct connection to a Manpack.	RF-1940
Vehicular Whip Antenna	The SB-V16B is a vehicular, 16-foot (4.9 m), fiberglass whip antenna which covers the full operating range of the AN-PRC/138 Manpack with a maximum power output of up to 400 watts. This antenna is self-supporting with a feed-through base and mounting hardware.	SB-V16B
Vehicular Metallic “V” Antenna	The SB-V216B is a vehicular antenna configured to enhance short-range HF communications by improving NVIS propagation performance. The antenna is an adjustable “V” configuration consisting of two metallic radiators: one 16 feet (4.9 m) in length and the other 9 feet (2.7 m). The angle of each radiator is mechanically adjustable to provide optimum NVIS performance. The SB-V216B may be configured as a single radiation element for longer range communications. This antenna will mount directly to the RF-292 Universal Antenna Mount.	SB-V216B
Manpack Radio Carrying Bag	The 10372-0460-01 is a radio carrying bag with an adjustable shoulder strap for forward or side sling access. The bag attaches to the Backpack Harness 10372-0450-01 for backpack configuration.	10372-0460-01
Backpack Harness for AN/PRC-138 Manpack	The 10372-0450-01 consists of a rugged, lightweight ruck pack harness and frame. It holds the AN/PRC-138 Manpack in a dorsal access configuration. The 10372-0460-01 Radio Carrying Bag fits inside a ruck pack to the harness. It contains pouches for carrying accessories.	10372-0450-01

**Table 9-2. Receiver-Transmitter Accessories – Continued**

Item Name	Description	Part Number
Manpack Radio Backpack	The 10372-0470-01 is designed for use by U.S. Army Rangers and consists of a rugged, lightweight backpack design to fit a variety of different manpack radios. The backpack has side pockets for an antenna kit and back pouch for extra batteries. The backpack contains internal flaps for kevlar inserts. The 10530-0460-01 provides the ability to store and carry all items that make up the manpack radio system, plus two extra batteries.	10530-0460-01
H-250/U Lightweight Handset	The 10075-1344-01 is a high-grade, lightweight MIL handset for use with the RT-1694 Receiver-Transmitter. One Handset is supplied with each RF-5200 FALCON™ Series Transceiver System. It is recommended for use with the Linear Predictive Coding (LPC) Digitized Voice Option.	10075-1344-01
Headset with Boom Microphone – Dynamic Mic Element – Single Earpiece	The RF-3014-01 is a high-grade MIL headset with an adjustable boom microphone and a single earpiece for use with the RT-1694 Receiver-Transmitter.	RF-3014-01
Headset with Boom Microphone – Dynamic Mic Element – Dual Earpiece	The RF-3014-02 is a high-grade MIL headset with an adjustable boom microphone and a dual earpiece for use with the RT-1694 Receiver-Transmitter.	RF-3014-02
CW Key with Knee Clip	The RF-5016-01 is a MIL-grade telegraph key mounted on a clip that may be fitted over an operator's knee. It is useful for vehicular CW operation, and is used with the RT-1694 Receiver-Transmitter.	RF-5016-01
CW Base-Station Key	The RF-3016-04 is a MIL-grade telegraph key for use with the RT-1694 Receiver-Transmitter in base station applications. The unit includes key, cable, and plug.	RF-3016-04
Palm Microphone	The noise-canceling microphone in this palm-held unit includes a built-in, Push-to-Talk (PTT) switch and a coiled cable that terminates in a standard (U-229/U) five-contact connector. The RF-294-07 is intended for use with the RT-1694 Receiver-Transmitter.	RF-294-07
Headset – Dual Earpiece	The RF-294-08 is a high-grade, MIL, two-earpiece headset unit with a flexible headband, a coiled cable with a clip to attach to the user's clothing, and a standard (U-229/U) five-contact connector. The RF-294-08 is intended for use with the RT-1694 Receiver-Transmitter.	RF-294-08

**Table 9-2. Receiver-Transmitter Accessories – Continued**

Item Name	Description	Part Number
24 Vdc Filter/Adapter Unit	The 10372-0850-01 is a vehicular accessory that allows an RT-1694 Receiver-Transmitter to receive power from a vehicle's 24 Vdc power system. The Filter/Adapter Unit provides Electromagnetic Interference (EMI) filtering, as well as spike, surge, overvoltage, and overcurrent protection. The Filter/Adapter Unit, along with an RT-1694 Receiver-Transmitter, can be mounted on a 10372-0800-01 Universal Vehicular Shock Mount.	10372-0850-01
Universal Vehicular Shock Mount	The 10372-0800-01 can be used to mount an RT-1694 Receiver-Transmitter and a 10372-0850-01 24 Vdc Filter/Adapter Unit into a vehicular installation. The 10372-0800-01 can also be adapted to mount the receiver-transmitter connected to its battery case.	10372-0800-01
Vehicular Short Shock Mount	The 10372-0880 can be used to mount an RT-1694 Receiver-Transmitter, without its battery case removed, into a vehicular installation. When installed in the short shock mount, the receiver-transmitter receives 24 Vdc power from an external power amplifier via the front panel Power Amplifier (PA) connector.	10372-0880



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