RT7000-MSOP

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RT7000

HF SSB Transceiver

Operator Manual

Datron World Communications Inc.
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Date of Revision	Revision Letter	Description of Changes	Pages Affected
6/2007	F	Reformatted and updated with inclusion of addendum 966001 (LQA Scoring) and the FALC option.	1-4, 3-13, 3-16

Datron World Communications, Inc.

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Limitations of Warranty: This warranty does not cover:

Physical damage to the equipment or its parts that does not involve defects in design, material, or workmanship, including damage by impact, liquids, temperature, or gases.

Damage to the equipment or its parts caused by lightning, static discharge, voltage transients, or application of incorrect supply voltages.

Defects or failures caused by unauthorized attempts to repair or modify the equipment.

Defects or failures caused by Buyer abuse or misuse.

Return of Equipment - Domestic: To obtain performance of any obligation under this warranty, the equipment must be returned freight prepaid to the Technical Support Services. Datron World Communications Inc., 3030 Enterprise Court, Vista, California 92081. The equipment must be packed securely. Datron shall not be responsible for any damage incurred in transit. A letter containing the following information must be included with the equipment.

a. Model, serial number, and date of installation.

b. Name of dealer or supplier of the equipment.

c. Detailed explanation of problem.

d. Return shipping instructions.

e. Telephone or fax number where Buyer may be contacted.

Datron will return the equipment prepaid by United Parcel Service, Parcel Post, or truck. If alternate shipping is specified by Buyer, freight charges will be made collect.

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Parts Replacement: The following instructions for the supply of replacement parts must be followed:

a. Return the parts prepaid to “Parts Replacement” Datron World Communications Inc., 3030 Enterprise Court, Vista, California 92081; and

b. Include a letter with the following information:

1. Part number
2. Serial number and model of equipment
3. Date of installation

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Remedies: Buyer’s sole remedies and the entire liability of Datron are set forth above. In no event will Datron be liable to Buyer or any other person for any damages, including any incidental or consequential damages, expenses, lost profits, lost savings, or other damages arising out of use of or inability to use the equipment.

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Safety Considerations

This product and manual must be thoroughly understood before attempting installation and operation. To do so without proper knowledge can result in equipment failure and bodily injury.

Caution: Before applying ac power, be sure that the equipment has be properly configured for the available line voltage. Attempted operation at the wrong voltage can result in damage and voids the warranty. See the manuals section on installation. DO NOT operate equipment with cover removed.

Earth Ground: All Datron products are supplied with a standard, 3-wire, grounded ac plug. DO NOT attempt to disable the ground terminal by using 2-wire adapters of any type. Any disconnection of the equipment ground causes a potential shock hazard that could result in personal injury. DO NOT operate any equipment until a suitable ground has been established. Consult the manual section on grounding.

Servicing: Trained personnel should only carry out servicing. To avoid electric shock, DO NOT open the case unless qualified to do so.

Various measurements and adjustments described in this manual are performed in ac power applied and the protective covers removed. Capacitors (particularly the large power supply electrolytics) can remain charged for a considerable time after the unit has been shut off. Use particular care when working around them, as a short circuit can release sufficient energy to cause damage to the equipment and possible injury.

To protect against fire hazard, always replace line fuses with ones of the same current rating and type (normal delay, slow-blow, etc.). DO NOT use higher value replacements in an attempt to prevent fuse failure. If fuses are failing repeatedly this indicates a probable defect in the equipment that needs attention.

Use only genuine Datron factory parts for full performance and safety of this product.

Made in the USA

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CHAPTER 1
INTRODUCTION

The RT7000

The RT7000 transceiver provides a complete range of voice and data operation over the entire 1.6 to 30 MHz HF spectrum. The RT7000 is microprocessor-controlled and features a state-of-the-art DDS-based synthesizer. An LCD provides channel and frequency data, feedback on other front panel control functions, BITE information and order-wire text messages.

The RT7000 has continuous tuning and up to 1000 memory channels that can be arranged in multiple scan groups. It has simplex and half-duplex capability and a full alphanumeric keypad for frequency or text entry. The RT7000 is packaged in a rugged, waterproof housing designed to withstand harsh environments.

This manual describes the RT7000 including its installation, operation and organizational maintenance features. For complete technical information, refer to the RT7000 HF Transceiver technical manual (RT7000-MS).

Description of Equipment

The two basic models of the RT7000 are the RT7000-12 (+12 Vdc primary power) and the RT7000-28 (+28 Vdc primary power). Both models include the basic receiver/transmitter and an accessory kit. The accessory kit contains a DC power cable (C991556), spare DC fuses (550012 for +12 Vdc and 550022 for +28 Vdc) and this manual.

The RT7000-12 is powered from any DC source providing +13.8V at a maximum of 25A. Good performance is achieved when the input voltage is in the range of 11 to 15.5V. The RT7000-28 is powered from any DC source providing +28 Vdc at a maximum of 15A (a range of 22 to 30 Vdc).

The RT7000 is used with broadband 50 ohm antennas or narrowband antennas in conjunction with an automatic antenna tuner.

The RT7000 can be programmed and operated from its front panel or from an external computer (if the ALE option is installed) utilizing a wide variety of interface standards including RS232, 422 and 485.

Audio accessories available for use with the RT7000 include a heavy-duty hand microphone, dynamic desk microphone, Morse key and headphones.

Technical Specifications

Note: *Specifications are subject to change without notice or obligation.*

Characteristic	Specification
General	
Frequency range	1.6 to 30 MHz (TX); 100 Hz to 30 MHz (RX); 10 Hz channel spacing
Preset channels	256 standard, 1000 optional
Scanning	Multiple scan groups, operator-selectable scan rates
Channel programming	From front panel or remotely via computer or dedicated remote control console
Frequency stability	0.5 ppm
Modes	USB, LSB, CW, AME; simplex or half-duplex
Input power requirements	11 to 16 Vdc (+12 Vdc models); 20 to 32 Vdc (+28 Vdc models)
Input power protection	Reverse polarity, transient and under/over-voltage
Antenna port	50 ohms, type N connector
Antennas	50 ohms or automatic antenna tuner (RAT7000B, RAT1000C) for narrowband antennas
Interface	Control: two RS32 COM ports; compatible with EIA RS422/423/485 with option. Audio: 600 ohms, balanced and isolated
Mechanical, Environmental	
Size (H x W x D)	6 in. x 14 in. x 18 in. (15.2 cm x 35.6 cm x 45.7 cm)
Weight	35 lbs. (15.9 kg)

Characteristic	Specification
Cooling	Rear panel heatsink; RT7000FAN-1 fan kit (optional)
Temperature	-30°C to +60°C, operating
Shock, vibration, humidly, fungus, sand, dirt	Per MIL-STD-810D, MIL-STD-810E and MIL-STD-810F
Transmitter	
RF Power output	125W PEP, 100W average
Duty cycle	Continuous service, all modes; programmable - 3 levels
Harmonics	-60 dB (2 to 30 MHz) nominally
Receiver	
Sensitivity	10 dB SINAD for 0.5µV input (2 to 30 MHz)
Attenuator	+20 dB, operator switchable
Audio	5W into 4 ohm; 0 dBm into 600 ohms

RT7000 Variations

This manual provides information necessary to operate any variation of the RT7000. Options described here may not be available on your transceiver. For more information about these variations, contact Datron.

RT7000C — Designed for computer control. A blank front panel replaces the standard front panel.

RT7000E — Designed for extended control use. A line driver panel replaces the standard front panel. It is used with the RT7201E control head for remote operation up to 15m (50 ft.).

RT7000PP — Allows the addition of the RT5830 Pre/Postselector and RT5830INST installation kit for co-sited operation.

Note: *The RT5830 requires the RT7000 to have both the RT7000PP and the RT5830INST. The RT7000 is not field upgradeable to an RT7000PP.*

RT7000RF — Designed for long distance remote-only use beyond 2 km. A blank front panel replaces the standard front panel. An internal modem card (7000RF) is installed. For full function FSK remote control, use with the RT7201F.

RT7000RI	Designed for remote-only use up to 2 km. The standard front panel is replaced with a blank front panel. An internal modem card (7000RI) is installed. For full function, real time, ISDN remote control, use with the RT7201I.
RT7000RX	Receiver only. It includes the full receiver functions of the RT7000, excluding transmit features.
RT7000TX	Transmitter only. It includes the full transmitter functions of the RT7000, excluding receiver features.

Internal Options

Several internal options are available for the RT7000.

7000ACH	Additional channels. Increases operational channel capacity to 1000.
7000ALE	FED-STD-1045 compatible adaptive system. Provides complete 1045 capability, including link quality analysis, auto-linking, sounding, and orderwire message transmission and reception.
7000CLK	Internal clock keeps and displays the time and includes alarm features.
7000CW	Narrowband filter with 500 Hz bandwidth for CW operation.
7000ENCR	High-level voice encryptor uses enhanced domain transform (EDT) ciphering techniques providing long-term security.
7000FALC	Fast ALC loop for use with linear amplifiers that utilize peak detecting ALC like the TW1000D.
7000HS	High stability reference oscillator allows 0.1 parts per million frequency stability.
7000HS-FALC	High stability reference oscillator and fast ALC loop operation.
7000NB	Impulse-type noise blanker used in high-noise environments.
7000RCDR	Combines receive and transmit audio and routes them to Accessory 2.
7000RF	Internal modem allows remote contact from the TW7201F FSK controller.

7000RI	Internal modem allows remote contact from the TW7201I ISDN controller.
7000RS	Modem interface board configures a second serial port (RS422/485) to provide data protocol for external control of the radio through a computer. This is in addition to the standard RS232 interface.
7000TC	Digital selective calling system plus automatic path evaluation. Combines all functions of Transcall, Selcall, and TransAdapt.
7000VEM	DSP-based voice enhancement provides superior voice recognition and signal-quality improvement in noisy environments.
7000WB1	Wideband data filter providing 300 to 3300 Hz with tailored group delay characteristics for data operation.
RT7000AIRSELCALL	Operating with N-1304A (or equivalent) SELCAL devices and Datron power amplifiers, it adds a secondary control line to the radio and allows use of the ICAO-mandated ground-to-air SELCAL 3-tone system.

Conventions

Bold type is used to denote all items that appear in the display area and for any button, knob or connector used on the front or rear panel. For example:

- Press **C** and **041** and **E**.

  Display: **CH FREQ**
  041 13.330,000 MHz
  Rx

- Press **ALPHA** and **17**.
- Press **STATUS**.

Referenced Manuals

- RT7000-MS Transceiver technical manual
- 7000ALE-MSOP ALE Radio Control operator manual
- 7000ENCR-MSOP High-Level Encryption operator manual
- RT7201I-MS ISDN Remote Control operator/technical manual
- RT7201F-MS FSK Remote Control operator/technical manual
- RC2-MSOP Radio Control 2 Software operator manual

CHAPTER 2
INSTALLATION

This section contains information necessary to install the RT7000 in its operating environment. Power, antenna, and accessory connections are discussed. System diagrams are provided to show the proper connections to a variety of accessories.

Unpacking and Inspection

When unpacking the RT7000, carefully remove the equipment from its container and inspect it for any possible damage. If anything is damaged, notify Datron. Check the equipment against the packing list. Save the original container and packing materials for storage or reshipping purposes.

Location Considerations

The RT7000 can be deployed successfully in various locations, in a number of different configurations, depending on whether remote or extended control is used. Information in this section pertains to the main body of the RT7000, whether it is controlled locally or from a remote site.

Fixed Station

Unless otherwise specified when ordered, the RT7000 is shipped ready for operation. It is also available for mounting in a rack, provided the appropriate rack kit is ordered.

Make sure the temperature at the location is within the specified range, and that there is adequate ventilation around the rear of the RT7000 to allow for air flow. The RT7000 has a rear panel heat sink to dissipate heat that is generated from the power amplifier during transmission. The RT7000FAN-1 external option provides continuous cooling when conditions require heavy use.

To prevent unwanted noise, locate the RT7000 as far away as possible from electrostatic and magnetic field-generating equipment.

When attaching external cables to the RT7000, allow for sufficient slack in the cables. This prevents damage from sharp bends and ensures easy disconnection.

Vehicular or Marine

Use the mobile mount to mount the RT7000. It may be necessary to fabricate special supplementary brackets to complement a particular vehicle or shipboard location. Datron offers rack, mobile, and shock mount kits for the RT7000, suitable for most installations.

Front Panel Connections

Two 6-pin microphone connectors on the front panel are wired in parallel and suitable for use by various audio accessories.

Figure 2-1. Front Panel Connections

Low-level audio accessories for use with the RT7000 include the following:

Part	Description
MRR	Heavy duty hand microphone
MHS	U.S. MIL-STYLE H-189/U handset
KYR	Morse key
HPR	Headphones
H3M	Headphones with boom microphone
H-250/U	Non-repairable version of MHS

The input impedance is a nominal 150 ohm. Most dynamic, ceramic or magnetic microphones operate satisfactorily with the RT7000. All Datron-supplied audio accessories have the correct mating connector on them. To use other low-level audio accessories, obtain the correct mating connector from Datron.

Rear Panel Connections

The rear panel of the RT7000 is made of die cast aluminum and is attached to the rear side panels by 4 hex head bolts. The heat sink maintains the temperature within operational specifications eliminating the need for an internal cooling fan. It fills most of the rear panel area leaving room for the fan power connector and optional pre/postselector RF connections.

The accessory, remote control and RF connections are wired to the Interface/ Power supply board.

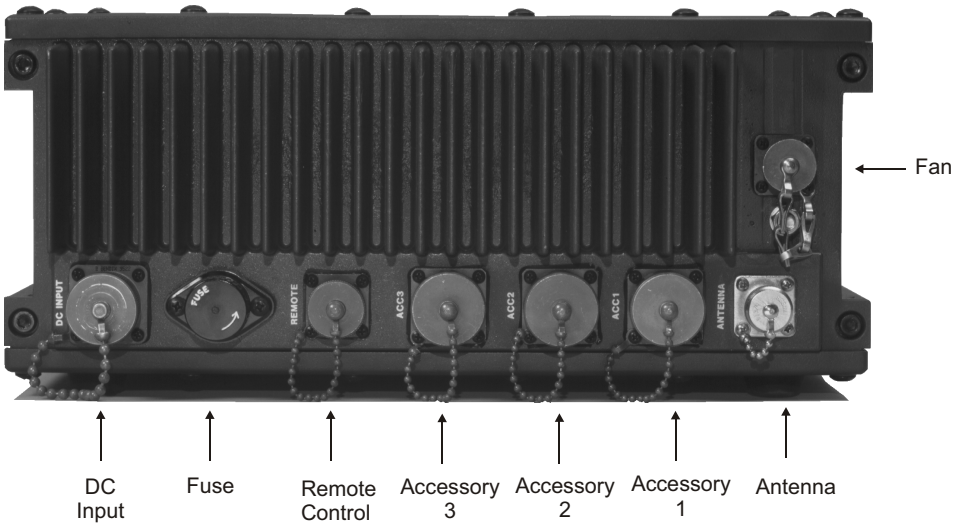


Figure 2-2. Rear Panel Connections

Power to the RT7000

Input power for the RT7000-12 is nominally 13.8 Vdc, with a maximum current requirement of 25A. The recommended operational voltage range of the transceiver is 11 to 15.5 Vdc. The RT7000-28 requires +28 Vdc at a maximum of 15A (range of 22-30 Vdc). The DC input connector on the rear panel is a 2 pin, 30A circular receptacle that has a square mounting flange with 2 male pins. The mating plug is attached to the input DC power cable (C991556). This cable, supplied with the RT7000, has a convenient connection to a variety of DC power sources. For specific connections, refer to the "Power Cabling Accessories" figure on page 2-6.

The DC power connection between the RT7000 and its power source should be as short as possible. If a Datron power cable is not available, use a 14 AWG cable for runs up to 3 feet, a 12 AWG cable for runs to 9 feet, or a 10 AWG cable for longer runs.

Two DC power supplies are available from Datron when a +12 or +28 Vdc primary power source is not available:

UPF7000A-12	Heavy duty power supply permits continuous duty operation. Runs off 84-240 VAC, 50/60 Hz and requires a C991511 cable.
UPF7000A-28	Heavy duty power supply permits continuous duty operation. Runs off 84-240 VAC, 50/60 Hz and requires a C991511 cable.

The waterproof fuse holder (pin 630005) on the rear panel contains either a 25A (12V), 3-AG fuse or 15A (28V), 3-AG fuse.

Antenna Connection

The RT7000 is designed to work into a 50 ohm RF impedance. The output RF antenna connector is a type N connector. Broadband antennas and dipoles can be connected directly to this output, while high-power amplifiers and antenna tuners use specially-designed Datron cables. For specific connections, refer to the "RF Cabling Accessories" figure on page 2-7.

External Fan Connection

The external fan cooling kit (RT7000FAN-1) mounts on the back of the heatsink and is mandatory for light duty cycle HF data applications.

Accessory Connections

A variety of external accessories are available from Datron for use with the RT7000. For some of these accessories and their control cabling, refer to the "Control Cabling Accessories" figure on page 2-8. For more information on any individual accessory, refer to the manual for that piece of equipment.

There are three accessory connectors on the rear panel, each with different pin assignments. If multiple accessories are required that share one or more of the accessory connectors, an external accessory combiner box (RT7000IOX) can be attached to any of these connectors. Each of the three connectors on the rear panel is a circular MIL-C with 26 pins. For the location of these connectors, refer to the "Rear Panel Connections" figure on page 2-3.

External Encryption

Using the 7000ENCR option, the RT7000 allows provision for an embedded encryption board. External encryption can also be used with the RT7000 and connected to Accessory 1 or Accessory 2.

Telephone Couplers

Telephone couplers like the RT5810 or RT5850 use either Accessory 1 or Accessory 2.

EIA Data Interface Standards

The RT7000 interfaces with a variety of data communications equipment (DCE) or data terminal equipment (DTE) using EIA standards RS232, RS422 or RS485. Accessory 1 is configured to provide the standard I/O port (COM1) for these interfaces. The RS232 protocol is standard; all others are optional. It is necessary to order the 7000RS option and to specify the required protocol so the appropriate interface chip is inserted into the processor.

	If the 7000RS option is installed, the COM1TXD and COM2RXD becomes a 2-wire bidirectional RS422/485 interface. A 3-wire RS232 interface is also available on Accessory 2.
Automatic Antenna Tuners	The RT7000 interfaces with the complete line of Datron automatic antenna tuners. This includes the older AT/RAT100 and RAT1000 as well as the newer AT/RAT7000B and RAT1000B. The AT/RAT100 and RAT1000A and RAT1000C connect to Accessory 2. The AT/RAT7000 uses Accessory 3.
Data Terminal Interface	The RT7000 interfaces with its own line of data terminals or to other external units using Accessories 1 and 2.
External Printers	A standard parallel printer connects to Accessory 1 to obtain a hard copy of text messages stored in the RT7000.
ALE/Transcall/ Selcall Alarm	The external ALE/Transcall/Selcall alarm driver is available on Accessory 2.
External Speaker	An external speaker attaches to the RT7000 at Accessory 2.
External High-Power Amplifiers	The RT7000 interfaces with all existing Datron high-power RF booster amplifiers using Accessory 3.

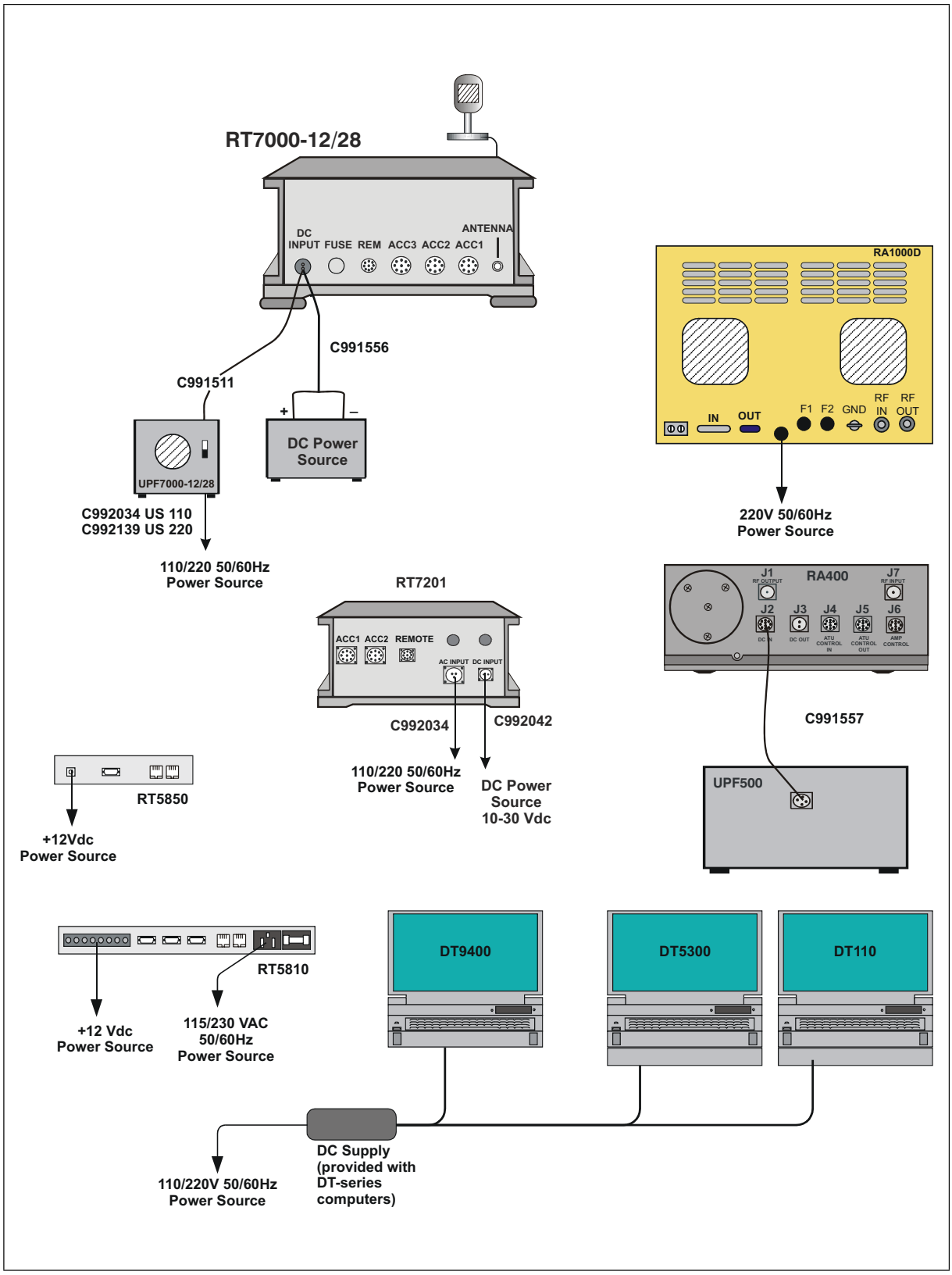


Figure 2-3. Power Cabling Accessories

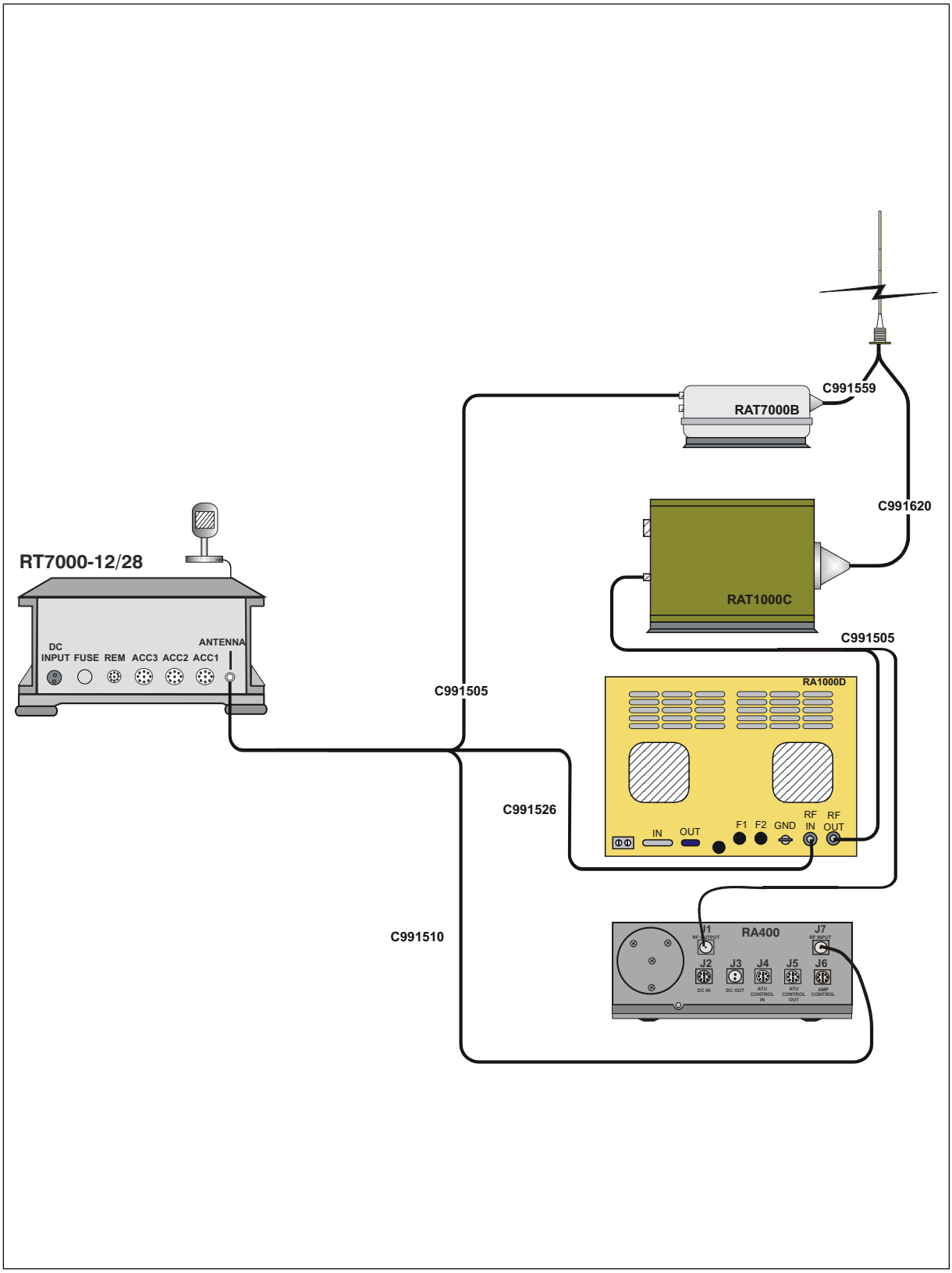
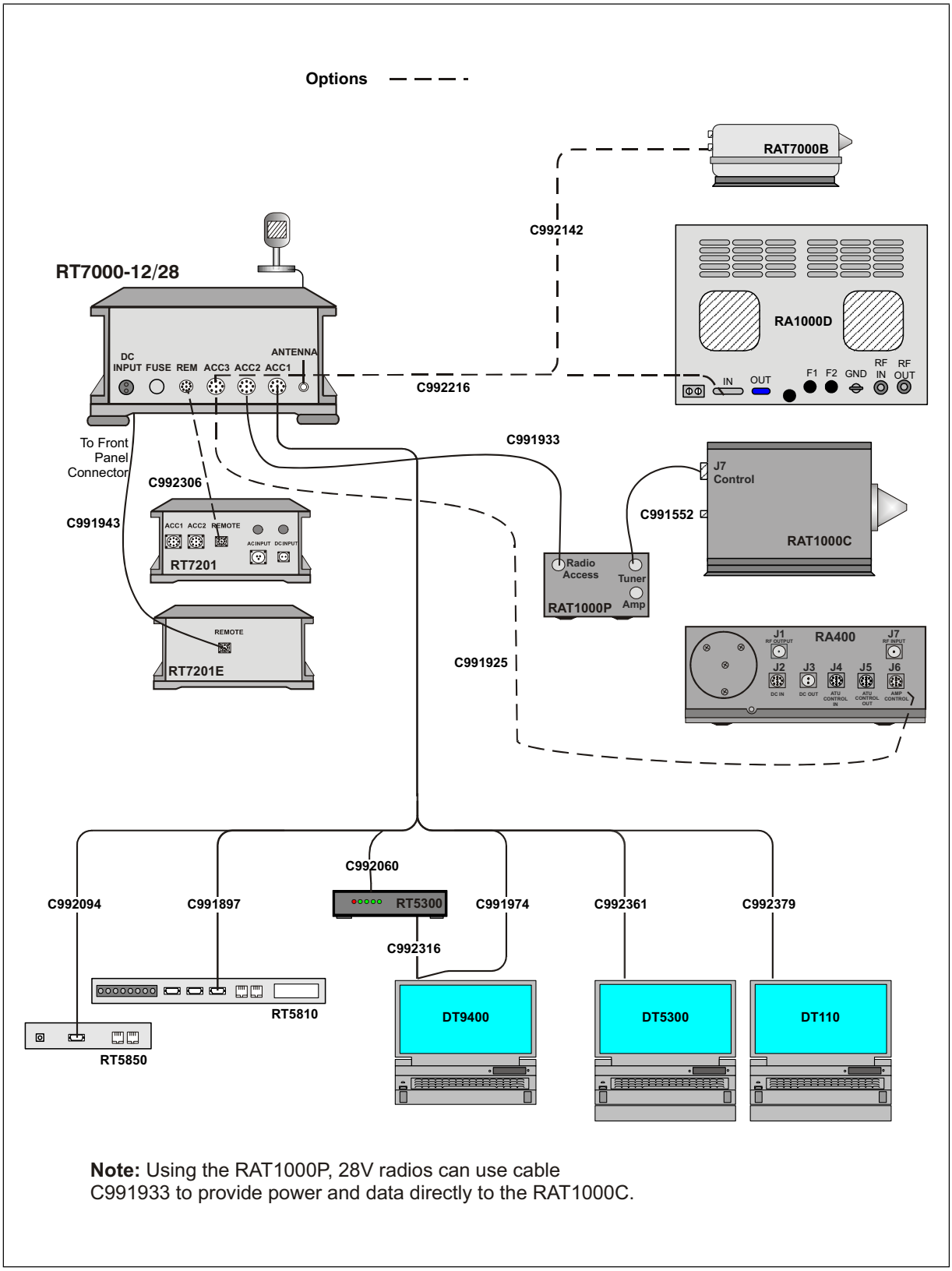


Figure 2-4. RF Cabling Accessories



Note: Using the RAT1000P, 28V radios can use cable C991933 to provide power and data directly to the RAT1000C.

Figure 2-5. Control Cabling Accessories

Remote Control The RT7000 can be controlled remotely using a computer, an extended front panel or a remote control head.

Computer Control — The RT7000 can be remotely controlled from a standard computer using Accessory connectors 1 or 2 on the rear panel. A custom software program is available from Datron that runs on any PC using Windows™. For the connections to use, refer to the EIA Data Interface Standards on page 2-4.

Extended Front Panel Control — Remove the front panel of the RT7000 and replace it with a line driver panel (RT7000E) to control it remotely. This special version of the radio is used to control operations from distances up to 50 feet.

FSK and ISDN Remote Control — The RT7000 is controlled remotely from longer distances using the RT7201F and the RT7201I remote control heads. Both control heads require that you install modem interface boards (7000RF or 7000RI) inside the RT7000. The RT7201F uses FSK and is for long-range remote requirements, while the RT7201I uses ISDN and is for real-time control up to 2 km.

These modem-based remote control units connect to the RT7000 via the remote connector on the rear panel. This connector is a circular MIL-C 10 with 9 pins.

For a complete description of these pins, refer to the RT7201F FSK Remote Control Head (RT7201F-MS) operator/technical manual or the RT7201I ISDN Remote Control Head (RT7201I-MS) operator/technical manual.

Operations Check

The RT7000 is completely aligned and tested prior to shipment. However, to insure proper functioning, perform an operations check. This information is provided in the maintenance chapter of the RT7000 technical manual (RT7000-MS).

CHAPTER 3
OPERATION

These procedures discuss using the front panel to program the radio. To program the radio from a computer, refer to the Radio Control 2 operator manual (RC2-MSOP); the 7000ALE option must be installed in the radio.

Powering the RT7000

Use the **PWR ON** knob to turn on the RT7000. The version level of the installed software is displayed.

Display: **RT7000**
VER 701xx (where xx is the version level)

The BITE system runs automatically and indicates that everything is functional.

Display: **RT7000**
MODULES OK

The BITE system searches for any installed options. These options are displayed with the current channel number (upper left corner), channel frequency (upper center) and clarifier offset (if any, below the frequency).

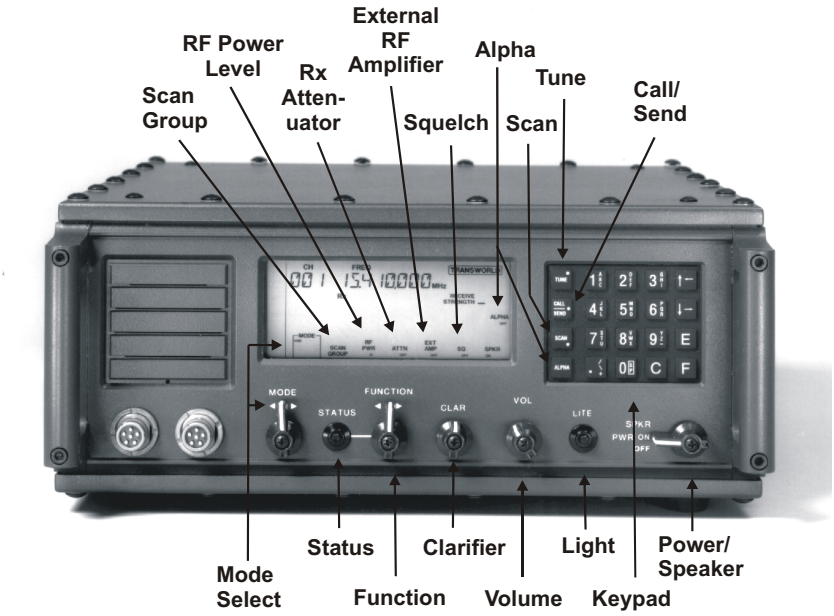


Figure 3-1. Front Panel Features

Using Knobs, Buttons and Indicators

The front panel of the RT7000 is designed for easy use. Knobs, buttons and displayed indicators guide the operation of the RT7000 including access to advanced features from menus. For placement of these knobs, buttons, and indicators, refer to "Front Panel Features" on page 3-1.

Power/Speaker

The **PWR ON** knob is a three-position switch that provides DC power to the RT7000. It is also used to turn the speaker on or off. The positions are:

OFF	Power off
PWR ON	Power on, internal speaker off
SPKR	Power on, internal speaker on

Light

Turn the LCD light on or off by pressing and releasing the **LITE** button.

Volume

Increase the speaker volume by turning the **VOL** knob in a clockwise direction.

Clarifier

Clarifier offset for the RT7000 is achieved by turning the **CLAR** knob counterclockwise for negative offset and clockwise for positive offset (USB mode). The knob has continuous rotation and provides a maximum of -600 Hz and +600 Hz offset in 10 Hz steps. This offset is shown beneath the frequency. It can be nulled manually by turning the knob until the offset reads +000 Hz.

Note: *You can also toggle the clarifier between on and off using the Alpha menu.* Refer to "Alpha Menu Described" on page 3-8.

Internal Options

The spring-loaded **FUNCTION** knob and the **STATUS** button change the status of certain installed options. These options are:

Option	Displayed Icon
FED-1045 ALE	ALE
TransAdapt	TA
Transcall/Selcall	TC/SC
Noise Blanker	NB
Voice Enhancement	OPT
Encryption	ENCR

When an option is installed in the RT7000, a corresponding icon is shown on the outer edge of the display area. The icon and option's current status (**ON** or **OFF**) is displayed.

To change the status of an installed option:

1. Turn the **FUNCTION** knob left or right until the desired option icon flashes.
2. Press the **STATUS** button to set the flashing icon to an **ON** or **OFF** status.

If you use any knob or button other than **FUNCTION** and **STATUS**, the icon stops flashing. The icon also stops flashing if no changes are entered after a time-out of 10 seconds.

Mode Select

Select an operational mode by turning the **MODE** knob left or right. Possible operating modes for the RT7000 are:

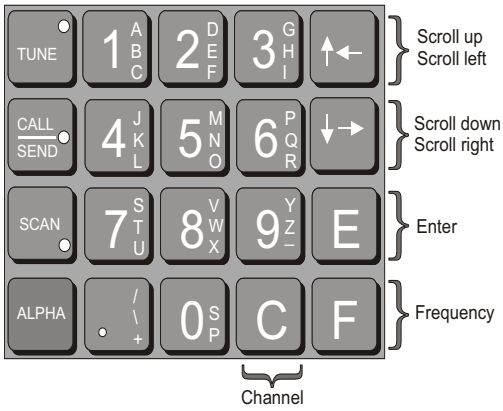
Mode	Description
USB	Upper sideband voice, standard voice grade IF filter and voice AGC time constants
LSB	Lower sideband voice, standard voice grade IF filter and voice AGC time constants
USB/LSB DATA	FSK AGC time constants, optional USB/LSB wideband data filter, 300-3300 Hz bandwidth
USB/LSB AME	Same as USB/LSB mode with addition of carrier in transmit mode at a level of -6 dB relative to PEP
USB PCS	Same as USB mode with addition of carrier in transmit mode at a level of -16 dB relative to PEP
USB/LSB CW	Optional narrowband filter with 500 Hz bandwidth

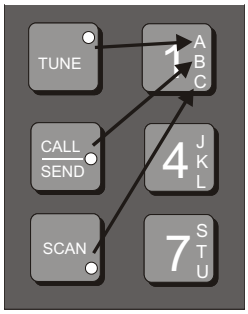
These modes are displayed only if the mode option is installed (7000WB1 or 7000CW). The mode knob is disabled if the Lockout or Frequency Blank functions are on. For information on these functions, refer to "Using Menus to Change Settings" on page 3-6.

Keypad Data Entry

The keypad is for entering numeric or alpha characters, saving data once entered, selecting channels and frequencies, and scrolling within menus.

- To enter numbers, press the desired keypad number. The display has a permanent decimal and comma in the frequency field. If a value is entered that is below 10.000000 MHz, press the decimal button.





- When composing messages or entering address names, alpha characters are entered from the keypad using a combination of two buttons. The three buttons with a yellow dot correspond to the top, middle, and bottom alpha characters located on the numbered buttons. To enter alpha characters, press the corresponding yellow-dotted button, followed by the button containing that character. Examples:

  Press the top yellow-dotted button and **1** to get character **A**.

  Press the middle yellow-dotted button and **1** to get character **B**.

  Press the bottom yellow-dotted button and **1** to get character **C**.

- To enter a space, press any yellow-dotted button and then press **0**.
- To delete a character, use the left and right arrows to position the cursor and press the **C** button. All trailing characters move to the left.
- To scroll through menu selections, use the up and down arrow buttons. Arrows convert to left and right scrolling when editing in the text message mode. The scrolling rate remains constant for the duration of time an arrow button is held down. The arrows remain active until another control function is used.
- To select a channel, press **C**.
- To select a frequency, press **F**.
- To save entered data, press **E**.

Tune If the AT/RAT7000B or RAT1000C antenna tuner is connected to the RT7000, pressing the **TUNE** button activates the tune cycle.

Call/Send Turn the **FUNCTION** knob until the **ALE**, **TCSC**, or **TA** icon is flashing. Press **CALL/SEND** to initiate a call sequence in the ALE, Transcall, Selcall, or TransAdapt options. If these options are not installed or if they are turned off, this button is disabled. For information on placing ALE calls, refer to "Placing an ALE Call" on page 3-21. For information on placing Transcall, Selcall, or TransAdapt calls, refer to "Placing a TransAdapt, Transcall or Selcall" on page 3-22.

Scan Press the **SCAN** button to begin scanning the channels in the selected scan group. Pressing **SCAN** a second time terminates the scan sequence and the RT7000 reverts to the last channel scanned. For more information, refer to "Scanning (for TA/TC only)" on page 3-19.

Alpha

Pressing **ALPHA** allows access to the Alpha menu. To exit the menu, press **ALPHA** again. For information on this menu, refer to "Alpha Menu Described" on page 3-8.

Scan Group

A scan group is a collection of channels grouped together. Turn the **FUNCTION** knob until the **SCAN GROUP** icon flashes. Press **STATUS** to select a scan group. For more information on selecting scan groups, refer to "Selecting a Scan Group" on page 3-19.

RF Power Level

Turn the **FUNCTION** knob until the **RF PWR** icon flashes. Press **STATUS** to scroll through the **L** (low), **M** (medium), and **H** (high) power settings. Default settings for the three RF power levels are as follows:

RF Power Level	Factory Preset	ALPHA 5 Setting
L (Low)	10W (average power)	10
M (Medium)	25W (average power)	30
H (High)	100W (average power)	200

To change these values, refer to "Using Menus to Change Settings" on page 3-6.

RX Attenuator

Turn the **FUNCTION** knob until the **ATTN** icon flashes. Press **STATUS** to change the status of the input receiver attenuator from **ON** (+20 dB input RX pad) to **OFF** or vice versa.

External RF Amplifier

Turn the **FUNCTION** knob until the **EXT AMP** icon flashes. Press **STATUS** to provide PTT control from accessory 3 of the RT7000 to an external amplifier. To automatically set and lock RF power in the **H** (high power) position, set it to **ON**. To restore control, set it to **OFF** and the RT7000 no longer requires an external amplifier.

Squelch

Turn the **FUNCTION** knob until the **SQ** icon flashes. Press **STATUS** to change the status of the transceiver squelch circuit from **ON** to **OFF** or vice versa. In the **ON** setting, background noise is muted.

Using Menus to Change Settings

The RT7000 provides menus for adjusting settings. The Alpha menu is for changing settings specific to the 7000TC option (Transcall, Selcall, and TransAdapt). The Alpha menu also allows you to access the ALE submenu which provides its own set of functions for changing settings specific to the ALE option.

To access the Alpha menu:

1. Press the **ALPHA** button to display the first function on the menu.
2. Press the desired function number and then **E**, or press the arrow buttons to scroll through the menu to the function and press **E**.
3. Once you select and enter a function, use the arrow buttons to scroll through further selections within that function. Press **E** to enter or access a selection.

For example, press **ALPHA**, **17**, and **E** to access the ALE submenu.

Alpha Menu

Table 3-1. Alpha Menu

Alpha Function	Description
1	OPTION (not used)
2	SCAN SET CHANNEL (for non ALE)
3	SCAN RATE (for non ALE)
4	PRIORITY CHANNEL
5	RF POWER (TX)
6	FREQ BLANK (blanks LCD frequency, disables mode changes)
7	LOCKOUT (disables frequency and mode changes)
8	RECEIVE SET Rx ONLY (disables TX operation)
9	SET CLOCK (if option installed)
10	ALARM TIMER ON/OFF
11	SET ALARM
12	Time and date display
13	TA/TC/SC Rx ADDR (TransAdapt/Transcall/Selcall receive address)
14	TRANSADAPT BER NUM (TA bit error rate)
15	SCAN GROUP NUMBER (for non ALE)

Table 3-1. Alpha Menu

Alpha Function	Description
16	TA/TC/SC/ Tx ADDR (TransAdapt/Transcall/Selcall transmit address)
17	ALE submenu (access to the ALE functions shown in table 3-2)
18	RECEIVE SET Rx/Tx (activated TX operation)
19	RF POWER ATU SET (tune power set)
20	BITE TEST INITIATED
21	OPTION 1 TYPE (Voice Enhancement Modulation)
22	COM 1 BAUD (comport 1 configuration)
23	COM 2 BAUD (comport 2 configuration)
24	BACKLITE OUT (ON/OFF)
25	FREQ INC HZ (frequency increment from 1 Hz to 10 MHz)
26	TEST REAR PANEL I/O (factory test)
27	ENC PASSWORD (Encryption menu)
28	PTT TIMER (sets maximum PTT time)
29	PRINTER
30	CLONE RADIO
31	GLOBAL POSITION SYSTEM (optional)
32	CW HOLD TIME
33	SPLIT SITE (2 radios: TX and RX)
34	CLARIFIER ON/OFF

Alpha Menu Described

Note: *These functions apply only if the 7000TC option is installed. The exception is function Alpha 17 which allows access to the 7000ALE option.*

(1) OPTION Not available at this writing.

(2) SCAN SET CHANNEL

For customizing the selected scan group (selected using **ALPHA 15**). For more information on how to use this function, refer to "Customizing TA/TC/SC Scan Group" on page 3-20.

(3) SCAN RATE For setting the rate at which channels within a selected scan group are scanned. Enter a speed between 1 and 30 seconds per channel.

(4) PRIORITY CHANNEL

Unavailable in the RT7000.

(5) RF POWER For changing RF power output settings of the RT7000. The factory defaults for the three power output levels are 10, 30 and 200. To change a value:

1. Connect a power meter to the antenna connector on the RT7000. Turn the **FUNCTION** knob until the **RF PWR** icon flashes. Press **STATUS** until the desired level is displayed (**L**, **M**, or **H**).
2. Press **ALPHA 5** and **E**. The current power level is displayed.
3. CW key the RT7000 and scroll to the power level indicated on the power meter. When the desired power level is achieved, press **E**.
4. Adjust the other two levels in the same manner.
5. Press **E** twice to exit this mode.

(6) FREQ BLANK Allows blanking of the display's frequency so that only the channel number is displayed. Each time you press **ALPHA 6** the selection toggles between **ON** and **OFF**.

Note: *Setting to **ON** disables the mode knob.*

(7) LOCKOUT Prohibits changing any of the channel frequencies. Every time you press **ALPHA 7**, the selection toggles between **ON** and **OFF**.

Note: *Setting to **ON** disables the mode knob.*

(8) RECEIVE SET Rx ONLY

For making the displayed channel a receive-only channel by locking out the PTT. The status is automatically set to **ON** whenever you press **ALPHA 8**. **ALPHA 18** (TX) reverses the receive-only state.

(9) SET CLOCK Sets the internal clock (if installed) starting from the year, down to the second. Enter the year, date, hour, minute, and second pressing **E** after each value.

(10) ALARM TIMER

Automatically changes the status of the timer from **OFF** to **ON** whenever you press **ALPHA 10**. In the **ON** position, you can set the alarm using (**ALPHA 11**).

(11) SET ALARM Sets a time for the sounding of the internal alarm. Enter the year, date, hour, and minute pressing **E** after each value.

(12) TIME AND DATE

Automatically displays the setting of the internal clock.

(13) TA/TS/SC Rx ADDR

For selection of a self ID. The current self ID is briefly displayed. Use numbers from 000 to 255. This number is usually the last three digits of a serial number.

(14) TRANSADAPT BER NUM

For setting the bit error rate (BER) to evaluate channel performance. Higher number corresponds to the better performing channel. Factory default is BER of 70.

(15) SCAN GROUP NUMBER

Allows selection of a scan group. This is the scan group when using **ALPHA 2** and **ALPHA 3**. The default is set to scan group 00.

Note: *Also use the **SCAN GROUP** icon on the front panel to select a 7000TC scan group (provided **ALE** is **OFF** or not installed).*

(16) TA/TC/SC Tx ADDR

Allows identification of the address for the station you are calling. Numbers from 000 to 255 are available. This number is usually the last three digits of a serial number.

(17) ALE submenu — Allows you to configure the ALE system. For information about the ALE submenu and how to change system settings, refer to "ALE Submenu Described" on page 3-13.

(18) RECEIVE SET Rx/Tx

Automatically makes the displayed channel an RX and TX channel. Pressing **ALPHA 8** changes the setting back to an RX channel.

(19) RF POWER ATU SET

For entering an RF power to use during the tune cycle for an external automatic antenna tuner. The factory default setting is 12. Enter a level from 0 to 33.

(20) BITE TEST INITIATED

Automatically starts the RT7000 BITE system.

(21) OPTION 1 TYPE

Allows activation of the Voice Enhancement option if the 7000VEM is installed in the option card slot. For more information, refer to "Activating Voice Enhancement" on page 3-25.

(22) COM 1 BAUD — For configuring the RT7000 COM1 port if you are working from a computer. Use the arrow buttons to scroll through and enter the baud rate, data bits, stop bits, and parity.

(23) COM 2 BAUD — Allows you to configure the RT7000 COM2 port if you are working from a computer. Use the arrow buttons to scroll through and enter the baud rate, data bits, stop bits and parity.

(24) BACKLITE — Automatically toggles between **ON** and **OFF**.

(25) FREQ INC HZ — For determining how much a frequency is increased or decreased each time you press an arrow button to change it. The default is set to 100 Hz. Available increments are 1 Hz to 10 MHz.

(26) TEST REAR PANEL I/O

For testing the rear panel accessory connectors. It is for factory use only.

(27) ENC PASSWORD

To access the Encryption menu for configuration, if the 7000ENCR option is installed. For detailed information, refer to the 7000-series high-level encryption operator manual (7000ENCR-MSOP).

(28) PTT TIMER Provides the ability to change the internal PTT time-out. It is set for any length of time from one second to one hour. Entering **0** sets it to **OFF** (no time-out). The default is 300 seconds.

(29) PRINTER Automatically prints complete channel information for the RT7000 if an external printer is connected.

(30) CLONE RADIO

Allows cloning of another transceiver by downloading all frequency and channel settings.

(31) GLOBAL POSITION SYSTEM

For configuring an external GPS device.

(32) CW HOLD TIME

For setting the continuous wave hold time. Enter the number in msec.

(33) SPLIT SITE For configuring two radios: receive only (master) and transmit only (slave). The receive radio controls the transmitter.

- Polling is set to **1** (**OFF**) or **2** (**ON**).
- Alarm timer sets the interval in minutes between system polling from the receiver to the transmitter.
- FP alarm activates the internal alarm when loss of communication occurs. Set to **1** (**OFF**) or **2** (**ON**).
- External alarm activates the external alarm when loss of communication occurs. Set to **1** (**OFF**) or **2** (**ON**).

(34) CLARIFIER For toggling the clarifier between **ON** and **OFF**.

ALE Menu

Table 3-2. ALE Submenu

ALE Function	Description
1	SCAN RATE
2	SCAN GRP (scan group)
3	TUNE GRP (tune group)
4	RX SELCT (tune select)
5	SELF ADRS (self address)
6	SELF NAME
7	OTHR ADRS (other address)
8	OTHR NAME (other name)
9	MOD GRP (modify scan group)
10	SND SELCT (sound select)
11	SND ADRS (sound address)
12	SND LEN (sound length)
13	SND INT (sound interval)
14	CALL LIM (call limit)
15	SLF TMOUT (self time-out)
16	OTR TMOUT (other time-out)
17	AUTO FILL
18	LQA EXCNG (Link Quality Analysis exchange)
19	LQA DECAY (Link Quality Analysis decay)
20	BER THRSD (Bit Error Rate threshold)
21	GOLAY THD (Golay threshold)
22	ERR THRSD (error threshold)
23	MESSG OUT (message out)
24	NEW MESSG (new message)
25	MESSG IN (message in)
26	HANDSHAKE
27	NET ADRS (network address)
28	NET NAME (network name)
29	NET SLOT (network slot)

Table 3-2. ALE Submenu

ALE Function	Description
30	NET OTHER (network other)
31	SET TO
32	GET LQA
33	EXIT MENU

ALE Submenu Described

To access ALE functions enter **ALPHA 17** from the Alpha menu. You can move through the ALE menu in one of two ways:

- By pressing the desired function number and then **E**, or
- By using the arrow buttons to scroll through the menu to the function and pressing **E**

For information on placing an ALE call, refer to "Placing an ALE Call" on page 3-21. For detailed operating instructions, refer to the 7000ALE Radio Control Program operator manual (7000ALE-MSOP).

(1) SCAN RATE For selecting the rate at which scanning proceeds. The arrow buttons toggle between **2** and **5** channels per second. The number to the left of the scan rate refers to option 1 or option 2. Two seconds per channel is option 1 and 5 seconds per channel is option 2.

(2) SCAN GRP For selecting an ALE scan group (from 0 to 9). This becomes the specified scan group when using **(3) TUNE GRP** and **(9) MOD GRP**.

(3) TUNE GRP For automatically tuning an ALE scan group (from 0 to 9). This tunes all the channels in that scan group.

(4) Rx SELCT For selecting a receive type: **1** for normal ALE receive/transmit (**Rx/Tx**); **2** for receive only (**Rx ONLY**); or **3** for channel setup (**CH Rx/Tx**) of the RC2 software.

(5) SELF ADRS For selecting an address number to review, change, or add for this station (from 00 to 19). To enter a new self address, enter the number. To change an existing address, scroll to the number and enter a new one.

(6) SELF NAME For entering a new self address name for the address number selected in **(5) SELF ADRS**. Any existing address name is briefly displayed. Use the alpha characters on the keypad to enter from 3 to 15 characters (no spaces or punctuation). To delete a name enter three periods (**...**).

(7) OTHR ADRS	For selecting an address number to review, change or add for a station where messages are sent (from 00 to 99). To enter a new address, enter the number. To change an existing address number, scroll to the number and enter a new one.
(8) OTHR NAME	For entering a new or different name for the other address selected in **(7) OTHR ADRS**. Any existing other address is briefly displayed. Use the alpha characters on the keypad to enter from 3 to 15 characters (no spaces or punctuation). To delete a name enter three periods (**...**).
(9) MOD GRP	For modifying or defining the channels to include in a scan group for scanning. Scroll to the channel to set. To include a channel in a scan group, enter **1** (**ON**). To remove a channel from a group enter **2** (**OFF**).
(10) SND SELCT	For enabling or disabling sounding. Enter **1** for sound **OFF** and **2** for sound **ON**.
(11) SND ADRS	For setting the sounding feature to the self address selected in **(5) SELF ADRS**.
(12) SND LEN	For setting the length of each sounding transmission. The recommended sounding length is 5 or 10 seconds.
(13) SND INT	For setting the time intervals for sounding. Enter from 1 minute to 24 hours (0001 to 1439 minutes).
(14) CALL LIM	For limiting the number of attempts made on each channel when trying to establish an ALE link (00 to 99).
(15) SLF TMOUT	For setting the length of time this (self) transceiver remains linked after the transmission of all outgoing messages (000 to 600 in 15-second intervals).
(16) OTR TMOUT	For setting the length of time the other radio remains linked when there are no incoming responses (000 to 600 in 15-second intervals).
(17) AUTO FILL	For indicating if you want the radio to automatically add the address of any station ALE hears to the list of approved other addresses. Enter **1** for **OFF** and **2** for **ON**, or use the arrows to toggle between **OFF** and **ON**.

(18) LQA EXCNG For requesting that a calling or called station exchange a measurement of the link quality received on the other end. Enter **1** for **OFF** (no request) and **2** for **ON** (yes request), or use the arrows to toggle between **OFF** and **ON**.

(19) LQA DECAY For entering the time period in which an LQA memory cell linearly decays from a state of perfect (30) to a state of dead (0). Selectable in periods of 0, 1, 2, 4 or 8 hours.

(20) BER THRSD For entering the acceptable bit error rate threshold (00-48) for received ALE words. A threshold of 00 allows for no errors, while a threshold of 48 is the maximum amount of allowable errors. The factory default is set to 48 allowable errors.

(21) GOLAY THD For controlling the error correcting capability threshold (0-4). A value of 0 allows for no corrections while a value of 4 is the maximum amount of corrections allowable. The factory default is set to 3 allowable errors.

(22) ERR THRSD For controlling the number of errors allowed before a word is rejected (0-4). A value of 0 allows for no errors while a value of 4 is the maximum amount of errors allowable. The factory default is set to 3 allowable errors.

(23) MESSG OUT For assigning a number to an outgoing message (from 0 to 9). Enter a new assigned number or an existing number to review or change. To enter a new or different message, use **(24) NEW MESSG**.

(24) NEW MESSG For creating a new outgoing message for the number assigned in **(23) MESSG OUT**. Any existing message is briefly displayed. Use the alpha characters on the keypad to create a new message up to 90 characters.

(25) MESSG IN For selecting an incoming message for review (from 0 to 9). Messages are deleted when a tenth message is received.

(26) HANDSHAKE For setting the message exchange compatibility with other radios. Enter **1** for **NO Tx,** or **2** for **NO Rx**.

(27) NET ADRS	For assigning a number to a network address. Enter a new number or an existing number to review or change. To enter a new or different address name, use **(28) NET NAME**.
(28) NET NAME	For entering a new network address for the number assigned in **(27) NET ADRS**. The last address entered is briefly displayed. Use the alpha characters on the keypad to enter up to 15 characters. To delete a name, enter three periods (**...**).
(29) NET SLOT	For assigning network timing slots to stations for network call responses (01-16). You must first set **(27) NET ADRS** and **(28) NET NAME**.
(30) NET OTHER	For indicating whether a station is part of the network or not. Scroll to find and display the ID number of the station. Enter **1** for **ON** (part of the network) or **2** for **OFF** (not part of the network).
(31) SET TO	For selecting a Other station (address) to determine it's LQA score for each of its channels. This applies to radios with software version 701BD or later. Use the up and down arrow buttons on the keypad to scroll through the Other Addresses until the desired other station is found. Or, enter the number using the keypad. Press **E** to enter the selection (the Other ID and Other Address line goes blank). To view the LQA score for each channel for that address, select **(32) GET LQA**.
(**32) GET LQA**	For viewing the LQA score of the channels for the Other Address you selected using **(31) SET TO**. The radio displays the LQA score for the first channel of the selected address. There are two score positions for each channel. The first score position is an analysis of the Other address by this radio with a range of 1 to 9. The second score position is an analysis of this radio with a possible range of 1 to 9. Scroll through the channels to view their scores.
(33) EXIT MENU	Exits the ALE submenu.

Programming Channels and Frequencies

The RT7000 associates a frequency, mode, clarifier status and offset value (if on) to each channel number. These can be different for each channel and can be viewed whenever you enter that channel number. Once frequencies are set to channels, you can assign those channels to scan groups.

Note: *Scan groups are defined by channel number, not by frequency. Changing the frequency of a channel also changes the frequency of that channel within each scan group.*

Selecting a Channel and Scrolling

1. Press **C**.
2. Enter the desired 3-digit channel number.
3. Press **E**. The channel number, with its frequency and clarifier offset, is displayed.
4. Use the arrows to scroll through the channel numbers.

Entering a Channel Frequency

Acceptable transceiver frequencies range from .100000 MHz to 30.000000 MHz in receive mode and 1.6 MHz to 30.000000 MHz in transmit mode. Simplex operation uses identical RX and TX frequencies and must be in the transmit mode range. Enter semi-duplex (split frequency) as an RX frequency first and then as a TX frequency. If you enter a frequency that is out of range, an error message is displayed and the previous frequency is restored.

When you enter a frequency, always include the decimal point unless there are all zeros after the decimal point. You do not need to enter leading or trailing zeros.

Entering a frequency between .100000 MHz and 1.6 MHz in the simplex mode causes the transceiver to be receiver-only (PTT inhibited).

Entering a Simplex Frequency

The following steps explain how to select the channel and assign a new frequency:

1. Press **C** and enter the 3-digit channel number.
2. Press **E**.
3. Press **F** and enter a frequency (in MHz), including the decimal point.
4. Press **E**. The channel number updates with the new frequency.

Example: To change the frequency of channel 041 from 13.330000 MHz to 8.572000 MHz:

1. Press **C** and **041** and **E**.

   Display: **CH FREQ**
   041 13.330000 MHz
   Rx

2. Press **F** and **8.572** and **E**.

   Display: **CH FREQ**
   041 8.572000 MHz
   Rx

Entering Semi-duplex Frequencies

The following steps explain how to select the channel and assign a new frequency:

1. Press **C** and enter the 3-digit channel number.
2. Press **E** and **F**.

   Display: **xx. xxx, xxx**
   Rx

3. Enter the receive frequency.
4. Press **F** again.

   Display: **xx. xxx, xxx**
   Tx

5. Enter the transmit frequency and press **E**. The new channel frequency is displayed.
6. Press **F** to toggle between the receive and transmit frequencies.

Example: To enter an RX frequency of 21.2 MHz and a TX frequency of 29.3 MHz on channel 41:

1. Press **C** and **41** and **E**.

   Display: **CH FREQ**
   041 xx.xxx,xxx
   (where xx.xxx,xxx is the existing channel frequency)

2. Press **F** and **21.2**.

   Display: **041 21.200000**
   Rx

3. Press **F** and **29.3** and **E**.

   Display: **041 29.300000**
   Tx

Note: *If you enter any number after pressing **F**, the existing frequency changes.*

Assigning RX Only Channels

To automatically limit a channel to a receive-only operation, enter **ALPHA 8**. To convert the channel back to a standard RX/TX channel, enter **ALPHA 18**.

Changing a Frequency

You can change a displayed frequency by pressing **F** and using the up arrow button to increase the frequency and the down arrow button to decrease the frequency. Press **E** to store the new frequency in channel memory.

Note: *The default frequency increment is 100 Hz for scrolling. To change this increment, access **ALPHA 25**.*

Using the Manual Channel

The manual channel allows you to create frequencies without worrying about overwriting a frequency on another channel. This channel is defined as channel 000. Frequency settings on the manual channel can be copied to a fixed channel.

To copy the channel 000 data to another channel:

1. Press **C** and enter the 3-digit channel number to indicate where data is stored.
2. Press **C** and **E**. This copies data from the manual channel to the new channel. Data is retained in the manual channel.

Scanning (for TA/TC only)

Scan groups are arranged in the RT7000 according to number. You can have up to 32 different scan groups in the transceiver at one time, each one having a different scan group number. Each scan group can have up to 64 channels.

Because the RT7000 scans channels not frequencies, you must give all desired frequencies in a particular scan group a channel number. Channel numbers are not exclusive to a particular scan group; the same channel can be used in different scan groups.

Selecting a Scan Group

1. Do one of the following:
   - If ALE is **ON**, press **STATUS** when the **SCAN GROUP** icon is flashing or select **(2) SCAN GRP** from the ALE submenu.
   - If ALE is **OFF**, press **STATUS** when the **SCAN GROUP** icon is flashing or select **ALPHA 15**.

     Display: **SCAN GRP xxx**
2. Use the arrows to scroll to the desired scan group number, or use the keypad to enter the scan group number.
3. Press **E**. The display briefly indicates the new scan group. That group is automatically saved in memory.

   Display: **SCAN GRP xxx**
   (where xxx is the new scan group)

   This becomes the specified scan group when using menu functions.

Customizing TA/ TC/SC Scan Group

Customizing a scan group involves reviewing the contents of a scan group, adding and deleting channels from a scan group, and selecting the channels in that group to scan.

1. Press **ALPHA 2**.
2. Press **E**.

   Display: **SCAN SET CHANNEL x NNN**
   (where x is the channel status and NNN is the 3-digit channel number)

Review channels in a scan group by pressing the arrow buttons to scroll through them. Channels are displayed in numerical order. Change scan group channels by deleting existing channels and adding new ones.

To delete existing channels from the group:

1. Use the arrow buttons to locate the channel to delete.
2. Using the alpha characters on the keypad, press **D** (delete).
3. Press **E**.

To add new channels to the group:

1. Use the up arrow to scroll past the highest numbered channel until **xxx** is displayed.
2. Enter the number of the channel to add and press **E**.
3. Continue adding channels as necessary. Press **E** to exit this mode.

You can delete and enter a different single-digit channel by writing over the contents of an existing channel. This is done by scrolling to the channel, pressing the single-digit number of the channel to add, and pressing **E**.

To Start and Stop Scanning

Press **SCAN** to start scanning within the selected scan group. Scanning begins with the first channel in the selected scan group and continues in numerical order as each channel number is displayed. Press **SCAN** again to stop the scanning process.

Placing an ALE Call

The ALE option automatically selects frequencies that support communications traffic between stations in a network. This section does not cover the ALE option in detail. For detailed instruction on ALE operations, refer to the 7000ALE Radio Control Program operator manual (7000ALE-MSOP).

To initiate an ALE call:

1. Turn the **FUNCTION** knob until the **ALE** icon flashes.
2. Press **STATUS** to turn the option **ON**. When the ALE option is installed and on, the **SEND** and **ALPHA OFF** icons are displayed.
3. Press **ALPHA** to toggle the alpha status from **OFF** to **ON**. Press **CALL/SEND**.
4. Scroll to find the desired calling option:
   THIS IS: Creates a link, exchanges messages, and remains linked.
   THIS WAS: Creates a link, exchanges messages, and terminates the link.
   RE-LINK: Automatically chooses the best possible channel using the information from a prior **THIS IS** call.
   POLLING: Automatically completes a **THIS WAS** call on each of the scan group channels. Link quality information is recorded for each channel.
5. Press **CALL/SEND** to make the selection.
6. Scroll to the type of call you are making: **INDIVIDUAL** or **NET**. Press **CALL/SEND** to make the selection.

   Display: **TO:xx NNN**
   (where xx is the destination address number and NNN is the address name)
7. Scroll to find the destination address. Press **CALL/SEND**.

   Display: **FR-xx** (where xx is the self address number)
8. Scroll to find and display the self address. Press **CALL/SEND**.

   Display: **AMD message** (Automatic Message Display)
9. Scroll to find a previously composed message number, or select **NO AMD MSG** if you are not sending a message.

   Note: *Use function 24 from the ALE menu to create a new message.*
10. Press **CALL/SEND** to attempt the ALE call.

    Display: **ALE LINK xxx** (where xxx is the channel selected)

If you press CALL/SEND immediately after the message is sent, the call terminates and **CALL TERM** is displayed.

11. To initiate an ALE call to the last station with an established link, press **CALL/SEND**.

Before attempting another call, terminate the previous link.

Note: *If the link quality on a **THIS IS** call is poor, press **CALL/SEND** immediately to end it. Press **CALL/SEND** again and select **RE-LINK**. Press **CALL/SEND** a third time and the RT7000 attempts the link again using the second best channel. Repeat this for subsequent channels until the link quality is acceptable.*

Placing a TransAdapt, Transcall or Selcall

The RT7000 is capable of supporting the following selective call systems: TransAdapt (TA), Selcall (SC) and Transcall (TC). Selcall is the basic, single-channel calling system. Transcall is a more advanced system that determines the best channel in a scan group for communications. TransAdapt is a faster system that determines if the selected channel is acceptable for voice-quality communications, not necessarily the best.

Call Setup

Before you initiate a call, turn on the appropriate option as follows:

1. Turn the **FUNCTION** knob until the correct icon flashes (**TCSC** or **TA**).
2. Press **STATUS** to turn the option **ON**.

You can only select one call system at a time; you cannot turn the TCSC option on until the TA option is off.

Before initiating TCSC operations, you must assign the RT7000 a call code (001 to 225). This is the call code that other stations use to contact your transceiver.

1. Press **ALPHA 13**.
2. Press **E**.

   Display: **TA/TC/SC**

   Rx ADDR xxx

3. Enter the receive call code and press **E**. The number must be from 001 to 255 and not assigned to another transceiver.

   Display: **xxx** (briefly shows the new receive code)

Selcall

To start a Selcall, set the RT7000 to a fixed channel (not scanning).

1. Turn the **FUNCTION** knob until the **TCSC** icon flashes.
2. Press **STATUS** to turn the option **ON**.

3. Press **C** and enter the channel from which to call. Select the appropriate channel on the transceiver.
4. Press **CALL/SEND** to initiate the call.

   Display: **Tx ADDR xxx**

5. Enter the Selcall code of the transceiver to call (001-255). A call to all channels (Allcall) is code 000.
6. Press **CALL/SEND** again. The RT7000 begins the call sequence. If the call is successful, a link alarm sounds.

   Display: **SC LINK**

If the call is unsuccessful, calling discontinues and **NO LINK** is briefly displayed.

Transcall

To start a Transcall, place the RT7000 in scan mode.

1. Turn the **FUNCTION** knob until the **TCSC** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **SCAN**.
4. Press **CALL/SEND** to initiate the call.
5. Enter the Transcall code of the transceiver to call (001-255). A call to all channels (Allcall) is code 000.
6. Press **CALL/SEND** again. The RT7000 is now under full control of the Transcall circuit.

   The RT7000 starts transmission on each of the ten channels until it is synchronized with the station to call. When synchronized, both transceivers step through each channel by making a short transmission until the best available channel is reached. Once the best channel is reached, the RT7000 sounds an alarm indicating a successful Transcall connection.

   Display: **TC LINK**

   If the call is unsuccessful, calling discontinues and **NO LINK** is briefly displayed.

7. To break the connection, press **SCAN**.
8. To stop the call before connecting, press **CALL/SEND**.

Note: *When scanning in Transcall, the receiving station also responds to a valid Selcall.*

TransAdapt

The RT7000 can be on a fixed channel or in scan mode. On a fixed channel, TransAdapt operates the same as Selcall. In scan mode, TransAdapt locates the first usable frequency, not the best.

1. Turn the **FUNCTION** knob until the **TA** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **SCAN**.
4. Press **CALL/SEND** to initiate the call.
5. Enter the code of the transceiver to call (001 to 255). A call to all channels (Allcall) is code 000.
6. Press **CALL/SEND** again. The RT7000 is now under full control of the TransAdapt circuit.

   The RT7000 starts transmission on each of the ten channels until it is synchronized with the station called.

   Display: **TA LINK**

   If the call is unsuccessful, calling discontinues and **NO LINK** is briefly displayed.
7. To break the connection, press **SCAN**.
8. To stop the call before connecting, press **CALL/SEND**.

Activating the Noise Blanker

The Noise Blanker option (7000NB) eliminates impulse-type interference in high-noise environments.

1. Turn the **FUNCTION** knob until the **NB** icon flashes.
2. Press **STATUS** to turn the option **ON**.

Activating Encryption

This Encryption option (7000ENCR) provides high-level security.

1. Turn the **FUNCTION** knob until the **ENCR** icon flashes.
2. Press **STATUS** to toggle between **1** and **OFF**. The **1** position turns the 7000ENCR on.

For more detailed information on this security option, refer to the 7000-Series High-Level Encryption operator manual (7000ENCR-MSOP).

Activating Voice Enhancement

The DSP-based Voice Enhancement option (7000VEM) suppresses various types of noise and interference on voice communications.

The 7000VEM has two modes of operation. Mode 1 is for adaptive peaking and reduces atmospheric noise and static normal with HF signals. Mode 2 adds the ability to remove man-made interferences like ignition and power line noises.

1. Turn the **FUNCTION** knob until the **OPT** icon flashes.
2. Press **STATUS** to turn the option **ON**.
3. Press **ALPHA 21** and **E**.

   Display: **OPTION 1**
   TYPE x (briefly displays last mode entered)

4. Enter the mode (**1** or **2**) and press **E**.

Note: *To verify that the 7000VEM option is installed, look for* ***OPT 1 MODULE*** *to be displayed during start-up.*

CHAPTER 4
SERVICING

Detailed servicing information is beyond the scope of this manual. Only experienced personnel should make adjustments or attempt any serious service work. Reference to the RT7000 technical manual (RT7000-MS) is essential.

The RT7000 is of modular construction. If spare boards are available, non-technical personnel are able to repair most faults in the field. It is strongly recommended that non-technical personnel receive instruction from experienced technicians in the replacement of boards.

The RT7000 has a BITE system that aids in troubleshooting down to the individual board level. When a fault occurs, a BITE fault message is displayed indicating the specific board affected. The BITE runs automatically on power up or whenever Alpha 20 is selected.

Routine Maintenance

The RT7000 does not normally require periodic maintenance except to check the calibration of the master oscillator. It is often convenient to program an unused channel to a known frequency standard such as WWV (radiates 10,000W on 5, 10 and 15 MHz). This enables regular checks of the frequency calibration.

Keep the exterior of the RT7000 clean by wiping it with a damp cloth and polishing it with a soft dry cloth. Make sure all knobs are secure and connectors tight. If you open the RT7000, make sure coaxial cables are tight and the board connectors firmly in place. Use compressed air to remove any dirt or dust.

Board Access and Replacement

The top and bottom covers are each retained by 24 screws. After removal of the retaining screws, the covers can be lifted off the RT7000. For board locations, refer to the "Board Locations" figure on page 4-2.

CAUTION: When the transmitter is operating, high RF voltages are present on the power amplifier and filter boards. Use caution as these RF voltages can cause burns.

All boards, with the exception of the power amplifier, filter and front panel, are plug-in board assemblies easily accessible from the top of the radio.

The front panel assembly is attached to the RT7000 with four screws and a single ribbon cable.

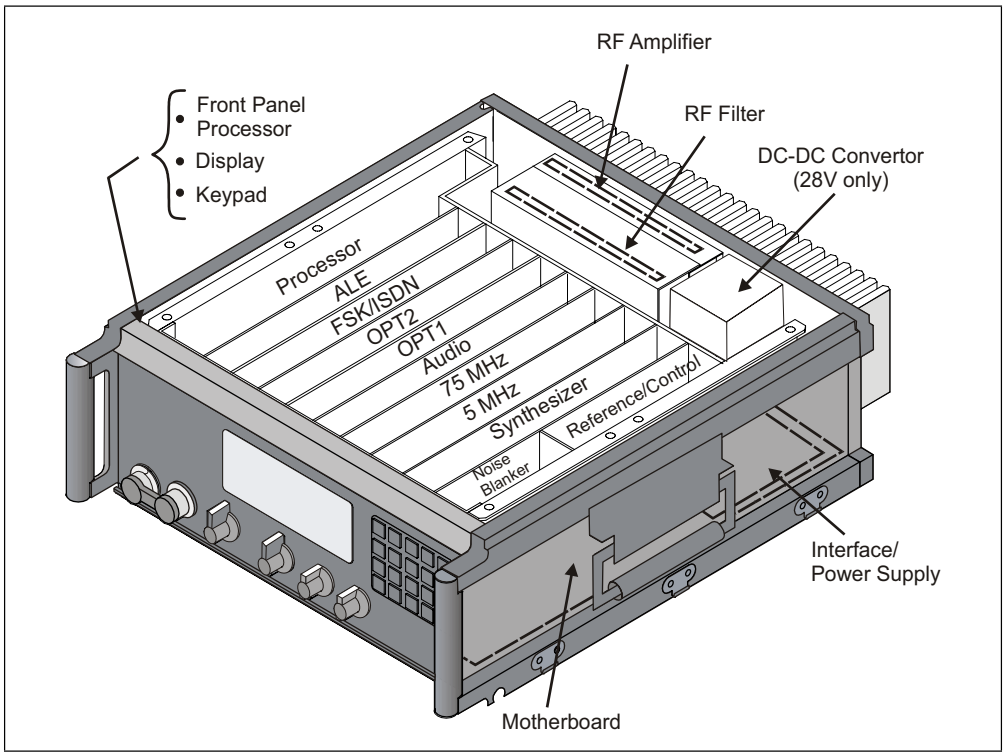


Figure 4-1. Board Locations

Field-Level Servicing

The transceiver BITE system is designed to identify a faulty board. Feedback is presented on the front panel display. In a matter of minutes, the radio can be opened up, the faulty board removed and a new one inserted. For detailed technical information, refer to the RT7000 technical manual (RT7000-MS).

Part Number	Description
004-01110	Front panel processor
001-00206	Reference/control board
004-12260 004-28260	RF Amplifier (12V) RF Amplifier (28V)
001-00320	RF Filter board
004-12401	Interface/power supply
001-00600	Audio board
001-00710	75 MHz IF board
001-00800	5 MHz IF board
001-00901	Synthesizer board

Part Number	Description
001-01101	Processor board
001-01300	ALE board
001-01200	Squelch board
004-28100	DC-DC converter (28V)

Datron offers the following maintenance tools to facilitate servicing the RT7000.

Part Number	Description
RT7000TK	Tool kit with card puller
SMTRK	Surface mount technology tool kit
7000EXT	Extender board kit and card puller
RT7000-MS	Technical manual