

Figure 3-1. Front Panel Controls and Indicators, RA 6790/GM

SECTION III OPERATION

3.1 GENERAL INFORMATION

All front panel controls, displays and indicators (Figures 3-1 and 3-2) are described in Paragraphs 3.2 through 3.2.11. Detailed operating procedures are presented in Paragraphs 3.3 through 3.3.3.2.

The front-panel keypad pushbutton switches are of the push-on type. When a pushbutton is depressed in a functional grouping, the Receiver will remain in that mode until a different selection is made. The front panel displays are of the liquid crystal type (LCD) indicating mode and frequency data.

The detailed operating procedures are presented in a logical sequence. Upon completing satisfactory installation of all required receiver options as described in Section II, Installation. Paragraphs 2.3.3 through 2.3.3.4, a Receiver Options Installation Check (Section III, Paragraph 3.3.1) should be performed. After performing this operating check and upon completion of any required system interface connections (Section II, Paragraph 2.3.4 through 2.3.4.6), a Receiver/System Interface Check (Section III, Paragraph 3.3.2) should be performed which will provide verification of all system connections. Local and Remote operating procedures are then detailed.

3.2 FRONT PANEL CONTROLS, DISPLAYS/INDICATORS

3.2.1 POWER-ON Toggle Switch

Double pole, single-throw toggle switch which provides on-off control for the Receiver by controlling primary power source to the power supply. During initial installation, be sure the line-voltage-select pc wafer on the rear panel matches the available line voltage before energizing the Receiver. Refer to Section II, Paragraph 2.3.4.1 for the voltage selection procedure.

3.2.2 Manual Tuning Knob

Optically coupled to a tuning encoder, the tuning knob provides selection of receiver operating frequency or BFO frequency. (Refer to TUNE RATE and BFO/BFO CENTER pushbutton controls.) The rate of change of the frequency depends on the speed the tuning knob is rotated and the rate of tune selected through the TUNE RATE switch. Clockwise rotation increases frequency, counterclockwise rotation decreases the frequency. Continuing to tune past the end of the range causes the Receiver to step to the opposite end of the band and to continue tuning in the same increasing or decreasing frequency direction.

3.2.3 IF GAIN Potentiometer

This front-panel control is used to establish the receiver gain control when the Receiver is operated in the manual mode, and to set the threshold level when the Receiver is operated in the automatic mode with a manually set threshold. Clockwise rotation increases IF signal level, while counterclockwise rotation decreases IF signal level. This control affects the IF signal level output through IF OUT connector J2.

3.2.4 AF GAIN Potentiometer

This front panel control is used to control the level of the receiver audio outputs. Clockwise rotation of the potentiometer increases loudness of the audio signal to the PHONES jack, while counterclockwise rotation decreases loudness. This control has no effect on audio signal level output through AF OUT connector J3.

3.2.5 MAIN LINE LEVEL Screwdriver-Set Potentiometer

This potentiometer is used to adjust the line level when the Receiver is operated in the AM, FM, CW, or SSB modes. If the Receiver is equipped to operate in the ISB mode (optional A5 circuit card assembly is installed), this control will adjust the line level of the upper sideband.

3.2.6 I-LSB LINE LEVEL Screwdriver-Set Potentiometer

This potentiometer is used to adjust the line level of the lower sideband when the Receiver is operated in the ISB mode (optional A5 assembly installed).

3.2.7 Lefthand Keypad Pushbutton Switches

- a. Detection Mode: AM, CW, USB, LSB, ISB U/L, FM.

These pushbuttons are used to select the operating mode of the Receiver. (Refer to Section I, Figure 1-2.) The ISB U/L will be enabled only if the Receiver is equipped with the ISB option. If the Receiver is equipped with this option, depressing the pushbutton will activate both the USB and LSB channels simultaneously. If the front-panel display indicates I-USB, the PHONES jack will be connected to the upper sideband channel. Depressing ISB U/L a second time will change the display and connect the PHONES jack to the LSB channel. The monitor line and loudspeaker outputs, through rear panel connector J3, will also be switched with the ISB U/L pushbutton switch.

- b. Bandwidth Pushbutton Switches: BW1, BW2, BW3, BW4, BW5

These pushbutton switches are used to select specific bandwidths within the Receiver. The Receiver is capable of accepting up to 7 plug-in IF bandwidth filters, and is usually configured with separate upper and lower sideband filters, leaving a capacity of up to five symmetrical filters. The upper/lower sideband filters will be automatically selected when the USB or the LSB mode is selected. The remaining filters (up to a total of 5) are selected by depressing the appropriate bandwidth selection pushbutton switches. BW1 will select the narrowest bandwidth, BW2 will select the next-wider bandwidth, and so on. Like the detection mode pushbutton switches, these are the push-on type, so that a new bandwidth is selected by depressing a different pushbutton switch.

- c. METER RF/AF Pushbutton Switch

This pushbutton switch is used to change the front panel meter display to either an RF scale or an AF scale. The Receiver will always display either scale. Depressing the pushbutton will cause the display to switch either from RF to AF or AF to RF.

- d. Gain Mode Pushbutton Switches: MAN, SHORT, MED, LONG

The Receiver is designed to operate with three different gain control modes: Manual, Automatic, and Automatic with a selectable threshold. Depressing the MAN pushbutton

switch causes the MAN indication to appear in the display. If an automatic indication (SHORT, MEDIUM, or LONG) is present in the display, it may be deleted by depressing the corresponding pushbutton switch. The Receiver is now in the manual mode with the gain control under the front panel IF GAIN control. When the Receiver is switched out of the manual mode, it will automatically enter the SHORT AGC mode. The medium or long AGC modes may be selected by depressing the corresponding pushbutton switches. The AGC mode with a manually set threshold is enabled by depressing an AGC mode pushbutton switch while in the manual mode. The MAN pushbutton switch is the push-on/push-off type. In the manual mode, the AGC pushbutton switches are push-on/push-off while in the automatic mode they are push-on.

3.2.8 Righthand Keypad Pushbutton Switches

a. TUNE RATE

Provides for fine (1 Hz increments), slow (30 Hz increments) and fast (1 kHz increments) selection of receiver operating frequency through rotation of the Manual Tuning Knob.

b. Numerical Frequency Digit Pushbutton Switches 0 through 9 and ENTER

These are used to set the Receiver to a particular operating frequency. Depressing the ENTER pushbutton switch will enable the numeric keys. The first numeric key depressed will be recognized by the Receiver as the ten's MHz digit. Since the Receiver cannot be tuned above 29.999999 MHz, the Receiver will recognize only 0, 1, or 2 as the first digit entered. The second numeric key depressed will be recognized as the units' MHz digit with the third numeric key depressed as the hundreds' kHz digit.

c. LOCK

This pushbutton switch is the push-on type. When the lock mode is activated, as indicated by the word LOCK in the display, the front panel tuning knob will be disabled. The lock mode is disabled by depressing the TUNE RATE pushbutton switch.

d. BFO, BFO CENTER

These are enabled only if the Receiver is operated in the CW mode. Depressing the BFO will permit selection of the BFO frequency through the front-panel tuning knob. Depressing the BFO CENTER will set the BFO to zero. Depressing BFO CENTER a second time will return the BFO to the previously selected frequency.

e. LOCAL REMOTE

This push-on/push-off type pushbutton switch will set the Receiver to operate either in the LOCAL operating condition (control of the Receiver is through front panel) or the REMOTE operating condition. Note that the Receiver must be equipped with the optional A6A1 Remote Control Interface Circuit Card Assembly to be operated in the remote control condition.

3.2.9 Left (Mode/Meter) Liquid Crystal Display (LCD)

- a. -10 0 +10 AF
0 2 4 6 8 10 12 RF

Located in the upper left corner of the Mode/Meter LCD, the meter display indicates audio level in dBm (when AF selected), and RF in μV (when RF selected). The scale is selected through the METER RF/AF pushbutton switch.

b. BW kHz

Located in the upper right corner of the Mode/Meter LCD, the BW kHz display indicates the IF bandwidth selected through depressing BW1 to BW5 pushbutton switches.

- c. AGC
MAN
SHORT
MEDIUM
LONG

Located in the lower left corner of the Mode/Meter LCD, the word AGC is always present. The word MAN will be present when the Receiver is being operated in the manual gain control mode. Under the word AGC, the words SHORT, MEDIUM or LONG when displayed indicate the type of automatic gain control being used by the Receiver. If both the words MAN and either SHORT, MEDIUM or LONG are present under the word AGC in the display, the Receiver is being operated in an automatic gain control mode with a manually set threshold.

- d. MODE
AM
CW
USB
LSB
I-USB
I-LSB
FM
AUX

Located in the middle of the Mode/Meter LCD, the word MODE is always present. The words AM, CW, USB, LSB, I-USB, I-LSB and FM indicate the detection mode of the Receiver. The word AUX is an operator initiated forced bandwidth set-up which is discussed in greater detail in Section V, Maintenance, of this instruction manual.

NOTE

The I-USB and I-LSB functions can only be activated if the ISB option (A5) is installed.

- e. TUNING
FAST
SLOW
LOCK
BFO
REMOTE

Located in the lower right corner of the Mode/Meter LCD, the word TUNING is always present. The words FAST and SLOW, when displayed, indicate the rate of frequency change per revolution of the manual tuning knob (refer to Paragraph 3.2.8). The word

LOCK, when displayed, indicates that the manual tuning knob is disabled. When the words FAST, SLOW and LOCK are not displayed, the Receiver is in the "fine" tuning mode. If the word BFO is present on the display, the manual tuning knob may be used to vary the BFO frequency but will not change the receiver frequency. The word REMOTE is displayed under two conditions: (1) control of the Receiver is under a remote device (provided the Receiver is equipped with the optional A6A1 circuit assembly) and (2) the Receiver is executing a BITE test routine whether under LOCAL control or initiated remotely.

3.2.10 Right (Frequency Data) Liquid Crystal Display (LCD)

a. FREQUENCY MHz

Indicates the tuned frequency, in MHz, of the Receiver. Additionally, during a BITE test sequence routine, a two-digit numerical error code will be displayed if BITE encounters any failed test. (Refer to Section V, Maintenance.)

b. BFO kHz

Indicates selected BFO frequency in kHz with plus or minus sign to indicate direction of offset from IF frequency. When in the CW mode and BFO CENTER is activated, the display shows a single zero.

3.2.11 FAULT Indicator (LED)

A red Light Emitting Diode (LED) indicator lamp will be illuminated if there is a failure in the first, second or BFO frequency synthesizers.

3.3 OPERATING INSTRUCTIONS

The RA6790/GM HF Receiver is internally controlled by a microcomputer which measures and controls many more functions than previously available Receivers. Actual control of the Receiver's parameters is performed by control software contained in Erasable Programmable Read-Only Memory (EPROMs) within the Receiver. Additionally, a self-diagnostic feature (inclusion of Built-In-Test-Equipment, BITE) allows the Receiver to perform self-test upon command for both local (operator) and remote (computer) control, and report back status data through the addition of data communications capability. While this may increase internal circuit complexity somewhat, actual operating procedures become more simplified.

Additionally, the operator is able to further test the Receiver after BITE has finished its analysis by depressing the appropriate pushbutton switches and observing selected Liquid Crystal Displays (LCDs) on the receiver front panel. The operator can also verify proper operation by performing options and system connections checks, tuning to local AM broadcasts, observing the signal strength meter, and monitoring the audio from the Receiver.

Operation of the remote control module is verified by transmitting and receiving responses with a remote device.

Before attempting to operate the Receiver, it is recommended that: (1) verification of all options and systems connections installation be made in accordance with the procedures detailed in Section II of this manual; (2) the Option Installation Check and System Interface Checks have been performed as presented in Paragraphs 3.3.1 and 3.3.2 of this section; and (3) a thorough review of the front-panel controls and indicators described in Paragraphs 3.1 through 3.2.11 of this section has been accomplished.

3.3.1 RA6790/GM Receiver Options Installation Check

The purpose of the Options Installation Check is to verify proper Receiver operation after options have been installed, and before the Receiver has been physically installed in its operating location. The check is divided into three parts:

- a. IF Bandwidth Filter Installation Check
- b. Remote Interface Option Check
- c. ISB Option Check

Perform the check(s) appropriate to the configuration of the Receiver being tested. Prior to performing these checks, ensure that:

- (1) The Receiver is connected to a suitable power source, and that the pc wafer and fuse match the available line voltage in accordance with Section II, Paragraph 2.3.4.1.
- (2) The Receiver is energized (accomplished by switching the POWER ON switch to the ON position; observing that edgelighting is present; and observing that some data is displayed in the MODE and FREQUENCY LCD's).

NOTE

If the Receiver fails to energize, check the power source, fuse, and/or Section V of this manual.

- (3) The Receiver is in the LOCAL operating condition which is accomplished by observing the MODE LCD to determine if the word REMOTE is present. If the word REMOTE is not present in the display, proceed with the desired checks. If it is present, momentarily depress and then release the LOCAL/REMOTE pushbutton switch on the righthand keypad. This should remove the word REMOTE from the display and place the Receiver in the LOCAL operating condition.

NOTE

If unable to establish the LOCAL operating condition refer to Section V of this manual.

3.3.1.1 IF Bandwidth Filter Installation Check

This check is used to verify that the proper IF Bandwidth (plug-in type) filters have been installed in the Receiver, and that the filters are functioning properly. To perform this check:

- a. Ensure that the preliminary steps listed in Paragraph 3.3.1 have been performed.
- b. Ensure that the IF Bandwidth Filters have been installed in accordance with Section II, Paragraph 2.3.3.1.
- c. Note the number displayed in the Frequency LCD and write them down.
- d. Depress and hold the LOCK pushbutton switch on the righthand keypad.
- e. While depressing the LOCK pushbutton, depress the AM pushbutton switch on the lefthand keypad.

- f. Release both pushbuttons.
- g. Observe the FREQUENCY MHz LCD. Digits in the display should be rapidly changing, and should continue to change for approximately one minute. If, during this period, the display should stop changing and display a two-digit number, there is a problem with either the filters or with the Receiver itself. Should this condition exist, refer to Section V of this manual. If the numbers stop changing after the one-minute period and return to the numbers noted in step c, the IF Bandwidth Filters are installed correctly.
- h. Momentarily depress and then release the AM pushbutton switch on the lefthand keypad. The word AM should be displayed under the word MODE in the Mode LCD.
- i. Momentarily depress and then release the BW1 pushbutton switch on the lefthand keypad. Note the number displayed to the left of the word BW kHz in the upper right center of the MODE LCD. This number should approximate $\pm 25\%$ the bandwidth value of the narrowest filter installed. (NOTE: LSB or USB filters excepted, if installed.) The LSB and USB filters can be recognized by the part number stamped on the top of the filter as follows:

LSB filter, 2700 Hz: part number 08409.
 USB filter, 2700 Hz: part number 08410.

- j. Repeat step i for pushbutton switches BW2 through BW5. The displayed value for BW2 should approximate the bandwidth value of the second narrowest filter; BW3 the third; etc. (NOTE: the number of filters installed dictates the number of active BW switches.) If one or more filter slots (FL1 through FL7 on the A4 module) are empty, one or more BW switches (starting with A5 and working down) will be inactive. The BW switch number (BW1 through BW5) does not necessarily correspond to the FL position number (FL1 through FL7).
- k. If, in steps i and j, the bandwidths displayed nearly match the bandwidth values of the installed filters, the filters are functioning properly. If one or more filters do not match the displayed values, replace the filter(s) in question in accordance with Section II, Paragraph 2.3.3.1, and repeat steps i and j until the values do match.
- l. Record the value of the filter installed in each slot for future reference. This completes the IF Bandwidth Filter Installation Check.

3.3.1.2 Remote Interface Option Check (Serial Asynchronous Interface)

The purpose of the Remote Interface Option Check is to verify the proper operation of the A6A1 assembly. To perform this check:

- a. Ensure that the preliminary procedures outlined in paragraph 3.3.1 have been performed.
- b. Connect a suitable remote controller, with its connector wired in accordance with Section II, Paragraph 2.3.4.6, to the A6A1W1J1 connector on the receiver rear panel.
- c. Energize the remote controller and "ask" the Receiver to send its operating parameters to the controller for display. Refer to Paragraph 3.3.3.2 Remote Control Operation. The ASCII command string for this request is:

\$99GCR

where:

\$99 addresses receiver number 99 (use the number required for addressing the receiver undergoing test),

G is a "GET" command asking for operating parameters,

CR is "Carriage Return."

- d. Note the remote controller display. If any operating parameter information has been displayed at all, the remote interface is working properly. If no data is returned or displayed, refer to Section V of this manual and replace the A6A1 module if required. (Refer to Section II, Paragraph 2.3.3.2 for installation procedure.) This completes the Remote Interface Option Check.

3.3.1.3 ISB Option Check

The purpose of the ISB Option Check is to verify the proper operation of the A5 ISB and the ISB/SSB link on the A4 Main IF module. To perform the ISB Option Check:

- a. Ensure that the preliminary procedures outlined in Paragraph 3.3.1 have been performed.
- b. Refer to Section II, Paragraph 2.3.3.4 step 2 and set the I-LSB line level. If the line level can be set, the IF portion of the A5 module and the ISB/SSB link are functioning properly. If the line level cannot be set (no signal indication or low signal indication), replace the A5 module. (Refer to Section II, Paragraph 2.3.3.3 for installation procedures.)
- c. Connect a headset to the PHONES jack on the receiver front panel and adjust the AF GAIN potentiometer until a signal is heard. If a signal can be heard, the audio portion of the A5 module is operating properly. If no signal is heard, replace the A5 module.
- d. If both steps b and c produce satisfactory results, the A5 ISB option is fully operational. This completes the ISB Option Check.

3.3.2 RA6790/GM Receiver/System Interface Check

The purpose of this check is to verify proper operation of the receiving system once the Receiver is installed in its operating location. Prior to performing this check, ensure that the Receiver Options Installation Check(s) outlined in Paragraph 3.3.1 have been completed. To perform the Receiver/System Interface Check:

- a. Physically install the Receiver in its operating location.
- b. Connect the system RF signal source (antenna; output from multicoupler, etc.) to the RF IN jack J1 on the receiver rear panel.
- c. Connect the system remote control device (if used) to connector A6A1WIJ1 on the receiver rear panel.
- d. Connect the system audio line to the AF OUT connector J3 on the receiver rear panel.

- e. Connect the system external reference frequency source (if used) to REF IN/OUT connector J7 on the receiver rear panel and set the INT/EXT REF switch S2 to EXT.

NOTE

If the Receiver's internal reference is to be used, connector J7 is not used and S2 is set to INT.

- f. If the Receiver IF is to be sampled for system use, connect the sampling cable to IF connector J2 on the receiver panel.

NOTE

If the IF is not to be sampled, connector J2 is not used.

- g. Connect a suitable ground wire to the GROUND terminal on the receiver rear panel.
- h. Connect a headset or plug-in speaker to the PHONES jack on the receiver front panel.
- i. Connect the Receiver to a suitable power source by connecting the power line cord to the A10J1 assembly on the receiver rear panel.

CAUTION

Ensure that the voltage value printed on the pc wafer in the A10J1 assembly matches the available line voltage as outlined in Section II, Paragraph 2.3.4.1. Failure to match the Receiver to the available line voltage may result in blown fuses and/or receiver errors.

- j. Energize the Receiver by switching the POWER ON switch on the receiver front panel to the ON position.
- k. Observe the Mode LCD. The word REMOTE should not be present. If the word REMOTE appears in the display, momentarily depress and then release the LOCAL/REMOTE pushbutton switch on the righthand keypad. The word REMOTE should disappear. If it does not, refer to Section V of this manual.
- l. Initialize the Receiver. (Refer to Paragraph 3.3.1 for initialization procedures.) The Receiver will initialize itself in approximately one minute. If after initialization, only a two digit number is displayed in the frequency LCD, and the word REMOTE remains in the Mode LCD, refer to Section V of this manual.
- m. Energize (as required) the remaining equipment in the system.
- n. Tune the Receiver to a known signal such as a local AM radio station (refer to Paragraph 3.3.3.1 for tuning procedures) and optimize reception so that the signal is clear and intelligible in the headset or speaker. If no signal is heard, try a different signal. If the signal still cannot be heard, check the antenna, multicoupler (if used), antenna cables, RF IN connector, etc. If still no signal is heard, refer to Section V of this manual.
- o. Verify that the AF output from the Receiver is present and is being processed by the system AF analysis equipment.

- p. Verify that the IF output (if used) is present and is being processed by the system IF sampling equipment.

NOTE

If either the IF (if used) or AF signals are not present at the input to the analysis equipment, check the appropriate cables and/or connectors. (Especially verify the wiring of mating connector for J3 AF OUT on the receiver rear panel.

- q. Using the remote controller, manipulate receiver functions. (Refer to Paragraph 3.3.3.2 for remote control operation.) If the Receiver does not respond to commands from the remote controller, check cables and connections, especially the mating connector for A6A1W1J1 on the receiver rear panel.

Once satisfactory results have been obtained in steps j through q, the Receiver System Interface Check is complete and the system is operational.

3.3.3 LOCAL/REMOTE Control Selection

There are two possible control conditions for operation of the RA6790/GM HF Receiver. In the first or LOCAL control condition, the receiver functions are controlled by selecting modes, levels, bandwidths, etc., using controls physically mounted on the Receiver itself. In the second or REMOTE control condition, the functions are selected by using a coded message sent by a remote operating terminal. It should be noted that when the Receiver is placed in the REMOTE condition, the controls on the Receiver itself are non-functional. Determination of which condition the Receiver is in (i.e. LOCAL or REMOTE) can be made simply by checking the lower-right corner of the receiver's mode LCD. If the Receiver is in REMOTE, the word REMOTE will be displayed. If the Receiver is in LOCAL, no word will be displayed. Switching between the two conditions is achieved by pressing and releasing the LOCAL/REMOTE pushbutton switch on the righthand keypad.

3.3.3.1 LOCAL Control Operation

The following procedures are to be used to operate the RA6790/GM HF Receiver in the LOCAL control condition:

- a. Ensure that all desired options have been installed and that the Receiver Options Installation Check has been performed in accordance with Paragraph 3.3.1.
- b. Turn POWER ON switch to ON position. Indications that the Receiver is energized include:
 - (1) Edgelight illuminated.
 - (2) Some data shown in Liquid Crystal Displays (LCD's).
 - (3) Sounds in audio device (headphones or speaker). If Receiver does not energize when POWER switch is toggled, refer to Section V of this manual.
- c. Establish LOCAL control. Momentarily depress the LOCAL/REMOTE pushbutton switch on the righthand keypad while observing the lower-right corner of the mode LCD. Depress the switch again. Note that the display will show the word REMOTE on alternate pressings of the switch, while REMOTE disappears on alternate pressings.

When the Receiver is under LOCAL control, the word REMOTE is not shown in the display. If the word REMOTE cannot be alternately displayed and erased, refer to Section V of this manual.

- d. Initialize the Receiver. The RA6790/GM Receiver has a built-in capability to self-determine the values of the IF bandwidth filters installed, and to assign these filters to particular bandwidth pushbuttons (BW1 through BW5 on the lefthand keypad). These bandwidth assignments normally result in the narrowest bandwidth filter being assigned to the BW1 pushbutton with increasingly wider bandwidths being assigned to BW2, BW3, etc. in ascending order. This assignment process is done as a part of receiver initialization. (The remainder of the initialization process is a series of Built-In-Test-Equipment (BITE) checks which are addressed in Section V. Do not be concerned with BITE at this time.)

To initialize the Receiver:

- (1) Press and hold the LOCK pushbutton switch on the righthand keypad.
- (2) While holding down the LOCK pushbutton, press the AM pushbutton switch on the lefthand keypad.
- (3) Release both the LOCK and AM pushbuttons simultaneously. The normal indications that the Receiver is in the initialization process are:
 - (a) The word REMOTE will appear in the Mode LCD.
 - (b) The frequency LCD will begin displaying a series of rapidly changing digits in both the FREQUENCY and BFO portions of the display.
 - (c) Rapidly changing sounds and tones in the audio device (speaker or headset).
 - (d) Changing modes and levels in the mode LCD.

Indication that the initialization process is complete is obtained by observing the word REMOTE in the mode LCD. When REMOTE is erased and the Receiver returns to the displayed values that were present prior to the initialization process, the process is complete. (NOTE: The Initialization process takes approximately one minute to complete.) If during the process the display stops changing and a two-digit number appears and remains in the FREQUENCY LCD, BITE has detected a problem in the Receiver. Refer to Section V of this manual.

- e. Select Desired Frequency (00.500000 MHz to 29.999999 MHz). There are two methods for selecting any desired frequency. The first of these is to enter the frequency digits directly using the ENTER pushbutton switch and the numeral pushbutton switches on the righthand keypad. The second is to select a tune rate and manually tune to the desired frequency using the manual tuning knob. The procedures for each of these methods are as follows:

(1) Direct Entry:

- (a) Momentarily depress and release the ENTER pushbutton switch on the righthand keypad.

- (b) Starting with the lefthand digit of the desired frequency, momentarily depress then release the corresponding numeral pushbutton switch on the righthand keypad.

NOTE

Frequencies less than 10.0000 MHz require an initial zero (0) digit entry. The decimal point will automatically appear in the display without a decimal point entry from the operator.

EXAMPLE 1:

Desired Frequency: 14.2514 MHz

Keystrokes Required:

ENTER

1

4

2

5

1

4

0

0

Resulting Display in FREQUENCY LCD: 14.251400

EXAMPLE 2:

Desired Frequency: 3.75 MHz

Keystrokes Required:

ENTER

0

3

7

5

0

0

0

0

Resulting Display in FREQUENCY LCD: 03.750000

EXAMPLE 3:

Desired Frequency: 0.57 MHz

Keystrokes Required:

ENTER

0

0

5

7

0

0

0

0

Resulting Display in FREQUENCY LCD: 00.570000.

(2) Manual Tuning:

Ensure that the word LOCK is not present in the mode LCD. If it is present, momentarily depress then release the TUNE RATE pushbutton switch on the righthand keypad. The word LOCK should disappear. If LOCK cannot be removed from the display, refer to Section V of this manual.

- f. Select Tune Rate. This is accomplished by alternate depressions of the TUNE RATE pushbutton switch. Observe the right side of the Mode LCD. One of three displays should be present under the word TUNING: SLOW, FAST, or no display (refer to Paragraph 3.2.9). These three displays correspond to three rates of change of frequency caused by rotation of the Manual Tuning Knob as follows:

No display: Fine tuning, small incremental change as knob is rotated.
SLOW: Slow tuning, faster than fine tuning.
FAST: Fast tuning, largest incremental change per knob rotation.

Rotate Manual Tuning Knob to desired frequency changing tune rates as desired.

EXAMPLE:

Receiver is set at 20.179000 MHz, and the desired frequency is 10.853000 MHz.

- (1) Select FAST tune rate.
 - (2) Tune to approximately 10.8 MHz, using manual tuning knob.
 - (3) Select SLOW tune rate.
 - (4) Tune to approximately 10.85 MHz using Manual Tuning Knob.
 - (5) Select fine tuning rate.
 - (6) Tune to 10.853000 MHz using Manual Tuning Knob.
- g. Select Detection Mode. (AM, CW, USB, LSB, ISB U/L, FM). Detection modes are selected by momentarily depressing and then releasing the appropriate pushbutton switch on the lefthand keypad. A discussion of operation in each mode follows.
- h. AM.
- (1) Depress and release the AM pushbutton switch. Indications that the Receiver is in the AM mode are: the word AM under MODE in the Mode LCD; a one or two digit number next to BW KHZ in the upper right corner of the Mode LCD.

If unable to achieve these indications, refer to Section V of this manual.

- (2) Select desired IF bandwidth (BW1 through BW5). IF bandwidths range from narrowest (BW1) to widest (BW5), with values of the IF bandwidth filters actually installed in the Receiver. To select a bandwidth, depress and release one of the bandwidth selection pushbutton switches (BW1 through BW5). The bandwidth of the filter selected will appear next to the BW KHZ words in the mode LCD. If no number appears for a particular bandwidth then either no filter has been installed for that position or there is a problem with the Receiver.

NOTE

If a full complement of filters (7) has been installed and a no-number bandwidth appears, re-initialize the Receiver. If the condition persists, refer to Section V of this manual. If less than a full complement of filters (less than 7) has been installed, the no-number condition on one or more bandwidths is normal and should be disregarded except to ensure that, for operating, a bandwidth with a number displayed must be selected.

- (3) Select Gain Control (AGC, MAN, SHORT, MED, LONG). There are three choices for IF Gain Control:

- (a) Automatic (AGC)
- (b) Manual
- (c) Automatic with Manual Threshold

A discussion of these choices follows.

- i. Automatic (AGC). AGC automatically establishes and maintains a desirable IF signal level. Through the use of operator selectable response times, it also establishes the time it takes for the AGC circuitry to respond to IF signal level changes. To select AGC:
 - (1) Observe the mode LCD under the word AGC. If the word MAN is displayed, momentarily press and release the MAN pushbutton switch on the lefthand keypad. the word MAN should disappear. In addition, another word (LONG, MED, or SHORT) should be displayed under AGC on the display.
 - (2) Select the response time by depressing and releasing the desired pushbutton switch (LONG, MED, or SHORT) on the lefthand keypad. The Receiver is now under automatic gain control.
- j. Manual. Manual gain control allows the operator to set a desired IF signal level, and disables the automatic response and adjustments to changes in IF signal level. To select manual gain control:
 - (1) If the word MAN is not present under the word AGC on the Mode LCD, momentarily depress and release the MAN pushbutton switch on the lefthand keypad. The word MAN will appear on the display.
 - (2) If under the word MAN another word (LONG, MED, or SHORT) is present, momentarily depress and release the pushbutton switch on the lefthand keypad which corresponds to the displayed word. Once the word MAN is the only displayed word under AGC on the mode LCD, the Receiver is under manual gain control.
 - (3) Observe the level meter display in the upper left corner of the Mode LCD. If the word RF is displayed proceed to (4). If the word AF is displayed, momentarily depress and release the METER RF/AF pushbuttons switch on the lefthand keypad to change the display to RF.

- (4) Once RF is displayed in the mode LCD and the Receiver is under manual gain control, the IF GAIN potentiometer may be adjusted to the desired signal level by rotating the knob while observing the RF level indication on the meter in the mode LCD.
- k. AGC with Manual Threshold. This gain control capability allows the operator to manually set the desired IF signal level which the AGC automatically maintains. Response times are operator selectable through the LONG, MED or SHORT pushbutton switches on the lefthand keypad. To select AGC with manual threshold:

- (1) Select manual IF gain control as directed in j.
- (2) Set desired signal level as desired according to j (4).
- (3) Momentarily depress and release the desired response time pushbutton switch (LONG, MED or SHORT) on the lefthand keypad.

The Receiver is now under AGC with manual threshold control. Indications that the Receiver is in this condition are:

- (a) The word MAN is displayed under the word AGC in the mode LCD.
 - (b) The word LONG, MED or SHORT is displayed under the word MAN in the mode LCD.
- l. CW. Select the CW mode by depressing and releasing the CW pushbutton switch. Indications that the Receiver is in the CW mode are:

- (a) The word CW under MODE in the mode LCD.
- (b) The appearance of digits under BFO KHZ on the FREQUENCY LCD.

Select BFO (Beat Frequency Oscillator) Frequency (-8.0, 0, +8.0 kHz). The BFO may be operated in either of two conditions:

- (a) BFO - adjustable
- (b) BFO CENTER - non-adjustable

NOTE

BFO functions can be controlled by the operator only in the CW mode, and are disconnected from their controls in all other modes.

- m. The BFO condition allows the operator to tune the BFO manually to achieve the desired audio frequency for received CW signals. The BFO CENTER condition allows the operator to zero-beat (fine tune the Receiver to the exact RF) the incoming CW signal. To select BFO Frequency (adjustable):

- (1) Observe the BFO kHz portion of the FREQUENCY LCD. If a three digit number and a "+" or "-" sign is displayed proceed to step 2. If a single zero preceded by a "+" sign is displayed, momentarily depress and release the BFO CENTER

pushbutton switch on the righthand keypad. This should cause the display to show a three digit number preceded by either a “ + ” or “ - ” sign.

- (2) Observe the mode LCD and note the display under the word TUNING. If the word BFO is displayed, proceed to step 3. If there is no word displayed under tuning, or if SLOW, FAST, or LOCK is displayed, momentarily depress and then release the BFO pushbutton switch on the righthand keypad. The word BFO should now be displayed under the word TUNING on the mode LCD.
 - (3) Rotate the manual tuning knob while observing the BFO KHZ portion of the FREQUENCY LCD. The numbers displayed should change as the knob is rotated.
 - (4) Select the desired BFO Frequency (+8.0 kHz to -8.0 kHz) either by watching the BFO KHZ display while rotating the knob until the desired BFO Frequency is attained, or by listening to the audio signal while rotating the knob until the desired audio frequency is heard.
- n. To select BFO CENTER (for zero-beating the incoming signal):
- (1) Observe the BFO KHZ portion of the frequency LCD. If a single zero preceded by a “ + ” sign is displayed, proceed to step (2). If a three digit number preceded by a “ + ” sign is displayed, momentarily press and then release the BFO CENTER pushbutton switch on the righthand keypad. A single zero preceded by a “ + ” sign should now be displayed.
 - (2) Observe the mode LCD and look under the word TUNING. If there is no word displayed under TUNING or if SLOW or FAST are displayed, proceed to step (3). If either the word LOCK or the word BFO is displayed, momentarily depress and then release the TUNE RATE pushbutton switch on the righthand keypad. The word LOCK or BFO should disappear.
 - (3) The incoming signal may now be fine-tuned by slowly rotating the manual tuning knob until the audio tone from the signal is nulled.
 - (4) Momentarily depress and then release the BFO CENTER pushbutton switch and observe that a three digit number preceded by a “ + ” or “ - ” sign appears in the BFO KHZ portion of the FREQUENCY LCD.
 - (5) Momentarily depress and then release the BFO pushbutton switch on the righthand keypad. The word BFO should appear in the mode LCD.
 - (6) Slowly rotate the manual tuning knob until the desired BFO Frequency is obtained.
 - (7) Momentarily depress and then release the LOCK pushbutton switch on the righthand keypad. This disables both the manual tuning and BFO adjustment functions preventing loss of the signal if the manual tuning knob is inadvertently rotated.
 - (8) Select IF bandwidth as outlined in h. (2).
 - (9) Select gain control as outlined in h. (3).

o. USB or LSB

- (1) Select either upper sideband or lower sideband mode by momentarily depressing and then releasing the appropriate (USB or LSB) pushbutton switch on the lefthand keypad. Either USB or LSB should appear under the word MODE on the mode LCD.
- (2) All other functions in USB or LSB are identical to the AM mode (except for IF bandwidth, which is fixed in either the USB or LSB mode).

p. ISB U/L (available only if ISB option A5 assembly is installed).

- (1) Select the independent sideband mode by momentarily depressing and then releasing the ISB U/L pushbutton switch on the lefthand keypad. The word I-USB or I-LSB should appear under the word MODE on the mode LCD. Subsequent depressing and releasing of the ISB U/L pushbutton will alternately display I-USB or I-LSB.

NOTE

If the ISB option is not installed, depressing the ISB U/L pushbutton switch will have no effect on receiver operation.

- (2) Other functions are identical to those of the AM mode.

NOTE

Each sideband is independently controlled in this mode. Therefore separate AGC settings are possible for both I-USB and I-LSB.

q. FM.

- (1) Select the FM mode by momentarily depressing and then releasing the FM pushbutton switch on the lefthand keypad. The word FM will appear under the word MODE in the mode LCD.
- (2) Other functions are identical to those of the AM mode.

r. Forced IF Bandpass Filter Bandwidth Setup

In case BITE results are unsatisfactory, the forced IF bandpass filter bandwidth setup can be initialized by simultaneously depressing the LOCK and ISB U/L pushbutton switches, and observing the AUX indicator displayed in the MODE LCD. This process accesses RAM within the microprocessor circuit card assembly (A6A2) for loading of the IF bandpass filter bandwidth complement. It should be noted, however, that this setup cannot be accomplished during the BITE routine. In addition, the setup can be terminated (if desired) before all seven filter slots FL1-FL7 have been changed, and when all seven filter slots have been loaded, the AUX indicator will go off (disappear) automatically, thus, disabling any further changes and resetting the receiver to normal operation.

(1) Symmetrical Filter Entry

NOTE

Entry of symmetrical filters is accomplished using the 0-9 numeral pushbutton switches, in 100 Hz steps, delimited with the ENTER pushbutton switch. For example, to enter a .4 kHz (400 Hz) filter, the "4" and "ENTER" pushbutton switches would be depressed; to enter 20 kHz, the "2", "0", "0", "ENTER" pushbutton switches would be depressed (200 x 100 Hz = 20 kHz).

- (a) Depress and release the appropriate numeral pushbutton switches (0-9) on the right-hand keypad, then depress and release ENTER pushbutton switch.

NOTE

In the case of blank filter slots, load by depressing the ENTER pushbutton switch only.

(2) USB and LSB Filter Entry

- (a) Depress and release USB and/or LSB pushbutton switch(s) on the left-hand keypad, and observe AUX indicator displayed go off in the MODE LCD.

NOTE

In the case of blank filter slots, load by depressing the ENTER pushbutton switch only.

(3) Terminating Forced IF Bandpass Filter Bandwidth Setup:

- (a) Depress and release ISB U/L pushbutton switch on the left-hand keypad, and observe AUX indicator displayed go off in the MODE LCD.

3.3.3.2 REMOTE Control Operation (Serial Asynchronous Interface)

If the Receiver is equipped with the optional A6A1 remote control interface assembly, the Receiver may be operated by a remote-control device. Before attempting to operate the Receiver in the remote operating condition, it is recommended that the operator be thoroughly familiar with operating the Receiver in the local operating condition (refer to Section III, Paragraphs 3.3.3 and 3.3.3.1). "Hands-on" experience working with the Receiver in the local operating condition provides the operator with a working knowledge of receiver capabilities, signal optimization, and control interaction. Such knowledge is essential to obtaining satisfactory results when controlling the Receiver from a remote location.

The minimum considerations when discussing RA6790/GM HF Receiver remote operation are:

- (1) Remote Control Data Character
- (2) Remote Control Device

- (3) Input/Output Electrical Interface
- (4) Remote Control Commands
- (5) RA6790/GM HF Receiver responses to remote control commands.
- (6) Functions unique to the remote control operating condition.

Each of these considerations is addressed in a following paragraph.

a. Remote Control Data Character.

The data character used for remote control is the standard ASCII asynchronous format which consists of a start bit, seven data bits (one ASCII Character), a parity bit, and two stop bits. Figure 3-1 shows the data character format, and Table 3-1 lists standard ASCII character codes.

b. Remote Control Device.

Any remote-control device (terminal, receiver control panel, etc.) which generates and accepts the standard ASCII asynchronous format may be used to control the Receiver.

NOTE

Due to the wide variety of possible control devices, the discussion on remote control commands addresses ASCII characters rather than on specific control pushbuttons, keys, or switches. Similarly, the discussion on RA6790/GM HF Receiver responses to remote-control commands addresses the ASCII characters sent back to the controller, rather than on specific displays generated by the receipt of those responses.

c. Input/Output Electrical Interface.

The input/output electrical interface consists of the A6A1 serial asynchronous interface assembly which connects to the remote control device through the A6A1W1J1 Connector (type M83723-02R-1626N) on the receiver rear panel. The interface, which provides separate lines for command input and monitor output data, allows up to ten (10) Receivers to be placed on a common, parallel, input/output bus. The command receiver meets the specifications of RS423, RS422 and MIL-STD-188-114, and is also operable with MIL-STD-188C or RS232 compatible remote control devices. The monitor transmitter meets the specifications of RS423 and MIL-STD-188-114, and is operable with MIL-STD-188C or RS232 compatible devices and may be strapped for RS422 unipolar operation. Interface selection, receiver address baud rate selection, and parity odd/even selection wiring instructions are discussed in Section II, Paragraphs 2.3.3.2 and 2.3.4.6.

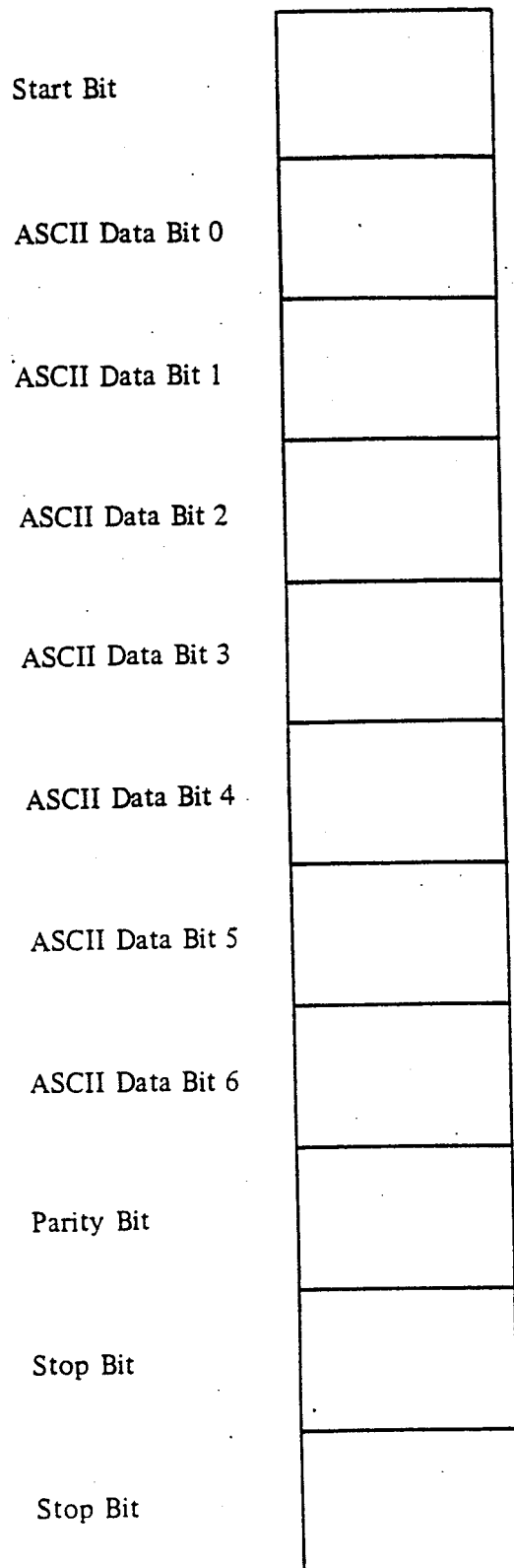


Figure 3-3. Data Character Format

TABLE 3-1. ASCII CHARACTER CODES

ASCII Character	Octal Code	Decimal Code	ASCII Character	Octal Code	Decimal Code
NUL	00	0	SP	40	32
SOH	01	1	!	41	33
STX	02	2	'	42	34
ETX	03	3	#	43	35
ETO	04	4	\$	44	36
ENQ	05	5	%	45	37
ACK	06	6	&	46	38
BEL	07	7	,	47	39
BS	10	8	(50	40
HT	11	9)	51	41
LF	12	10	*	52	42
VT	13	11	+	53	43
FF	14	12	,	54	44
CR	15	13	-	55	45
SO	16	14	.	56	46
SI	17	15	/	57	47
DLE	20	16	∅	60	48
DC1	21	17	1	61	49
DC2	22	18	2	62	50
DC3	23	19	3	63	51
DC4	24	20	4	64	52
NAK	25	21	5	65	53
SYN	26	22	6	66	54
ETB	27	23	7	67	55
CAN	30	24	8	70	56
EM	31	25	9	71	57
SUB	32	26	:	72	58
ESC	33	27	;	73	59
FS	34	28	<	74	60
GS	35	29	=	75	61
RS	36	30	>	76	62
US	37	31	?	77	63

TABLE 3-1. ASCII CHARACTER CODES (Cont.)

ASCII Character	Octal Code	Decimal Code	ASCII Character	Octal Code	Decimal Code
@	100	64	(Apost)	140	96
A	101	65	a	141	97
B	102	66	b	142	98
C	103	67	c	143	99
D	104	68	d	144	100
E	105	69	e	145	101
F	106	70	f	146	102
G	107	71	g	147	103
H	110	72	h	150	104
I	111	73	i	151	105
J	112	74	j	152	106
K	113	75	k	153	107
L	114	76	l	154	108
M	115	77	m	155	109
N	116	78	n	156	110
O	117	79	o	157	111
P	120	80	p	160	112
Q	121	81	q	161	113
R	122	82	r	162	114
S	123	83	s	163	115
T	124	84	t	164	116
U	125	85	u	165	117
V	126	86	v	166	118
W	127	87	w	167	119
X	130	88	x	170	120
Y	131	89	y	171	121
Z	132	90	z	172	122
[133	91	{	173	123
/	134	92	:	174	124
]	135	93	}	175	125
	136	94	~	176	126
-	137	95	DEL	177	127

d. Remote Control Commands.

If, for example, a Receiver has been designated receiver number 99 and the mating connector for A6A1W1J1 has been wired accordingly, then to remotely control receive number 99, the following command string (ASCII format) must be sent from the remote control device to the Receiver:

\$99S2CR

The "\$" character alerts all Receivers on the common bus that an address command is coming. "99" alerts receiver number 99 that all subsequent commands, when they come, will be specifically addressed to it until another "\$" character is received. "S2" is a status command which tells the Receiver to set itself to the remote operating condition, and "CR" is carriage return which is the final character sent to the Receiver in each command string. (CR is interpreted by the Receiver as an "execute" instruction, and causes the Receiver to carry out all commands in the string; in this case "set up for remote control.")

The other status (S) commands which may be used to follow "\$99" are:

- S1 Set Receiver to local control
- S2 Set Receiver to remote control
- S3 Initiate BITE self-test sequence
- S4 Terminate BITE self-test sequence
- S5 Report bandwidth of installed IF filters
- S6 Report BITE results
- S7 Forced bandwidth setup (discussed in Section V)
- S8 Enable remote AGC dump
- S9 Inhibit remote AGC dump

Status commands may be sent to only one Receiver at a time since some of the status commands will result in monitor data being sent back to the remote-control device from the Receiver.

Once the Receiver has been set for remote operation by the "S2" command, the next step normally is to initiate the BITE self-test sequence by sending "S3" (quotation marks are used here for clarity only and are not part of the S3 command). The BITE routine requires approximately one minute to complete. After the BITE routine is complete, the "S6" command will cause the Receiver to report its findings. The "S5" command will then report a list of IF filter bandwidths. These bandwidths should be compared with the Receiver configuration chart to determine if the filters are working properly. If the BITE report displays an error code number, refer to Section V of this manual. Note that once a particular Receiver has been addressed by the "\$NS2" command (N is 99 in this case), subsequent commands (S3 or S6 or S5) to the Receiver need not be prefixed by the "\$N" (Receiver address). A typical command string normally sent to initiate remote control operation is illustrated in Example 1.

EXAMPLE 1:

- 1st entry: \$99S2CR – Sets receiver 99 for remote control
- 2nd entry: S3CR – initiates BITE self-test routine in receiver 99

3rd entry: S6CR - requests BITE routine results from receiver 99

4th entry: S5CR - requests values of IF bandwidth filters found in receiver 99

(Commands "S5" and "S6" will result in data responses from the Receiver to the remote control device.)

5th entry: S7CR - this command is used to force a particular IF bandpass filter bandwidth complement in the receiver. Allowable codes are L for lower sideband (LSB), U for upper sideband (USB), N for none, and bandwidths up to 20 kHz (in kHz) with a resolution of 100 Hz. Symmetrical bandwidths (in kHz) are terminated with a comma. The string may contain all seven IF bandpass filters (FL1-FL7) bandwidths or it may end early with a carriage return (CR). Filter slots not entered will not be altered by the S7 command. A typical command is as follows:

S7LU1.7,.4,N3.2,(LF)

The preceding command sets up the following:

Filter Slot	Filter/Function
FL1	Lower Sideband (LSB)
FL2	Upper Sideband (USB)
FL3	1.7 kHz (Symmetrical)
FL4	400 Hz (Symmetrical)
FL5	None
FL6	3.2 kHz (Symmetrical)
FL7	Unchanged from previous setting

6th entry: S8CR - this command causes all subsequent commands containing receiver data to cause an automatic AGC dump.

7th entry: S9CR - this command causes the AGC dump to be disabled. This would be used when free tuning the receiver by remote control.

Two additional commands will result in data responses from the Receiver to the remote-control device. The commands are called monitor commands and instruct the Receiver to report certain specified data on receipt of the command. The monitor commands are "G" (for "Group") and "T" (for "Talk").

EXAMPLE 2:

The command \$99GCR will result in all of the following data (depending on mode) being sent from receiver 99 to the remote control device in the order indicated.

RF Frequency
Detector Mode
Gain Control Mode
IF Bandwidth
BFO Frequency
IF Attenuation
Status

(The actual information sent by the Receiver and its format is shown in the discussion on RA6790/GM HF Receiver responses to remote control commands.)

"T" commands result in selected data being sent back to the remote control device.

EXAMPLE 3:

The commands \$99 TFCR will result in only frequency and summary status data being sent to the remote control device.

"T" commands include:

TF - requests frequency data only.

TD - requests detector mode data only.

TI - requests IF bandwidth data only (non-functional in ISB mode).

TM - requests IF gain control mode data only.

TB - requests BFO data only (functional only when Receiver is in BFO variable).

TA - requests IF gain control attenuation data only (functional only when Receiver is under manual IF gain control or AGC with manual threshold).

Several "T" commands may be sent to the Receiver at once by listing the desired information characters after only one "T".

EXAMPLE 4:

\$99TFDICR would result in frequency detector mode, bandwidth and summary status information being sent back to the remote control device.

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The following commands cause the Receiver to change operating parameters, but do not result in data responses to the remote control device. Therefore, more than one Receiver may be addressed at once by inserting commas (in ASCII format) between the receiver numbers.

EXAMPLE 5:

The command: \$99,14,27,F5CR would result in receiver number 99, 14, and 27 being set to a frequency of 05.000000 MHz.

NOTE

Once multiple receivers have been addressed as in this example, two things must be remembered: (1) any subsequent parameter change command preceding the next \$ will result in that parameter being changed on all receivers addressed (in the example, receiver numbers 99, 14, and 27); (2) A status or monitor command may not be sent before the next \$, since more than one Receiver cannot respond on the bus at the same time. If a status or monitor command is sent, the command is simply ignored. To change only one receiver's operating parameter(s) or to send a status or monitor command, the desired Receiver must be readdressed individually (\$99 or \$14 or \$27 in Example 5).

Frequency Selection. The command is in the format FN where N is used to select the Receiver(s) operating frequency. The frequency command may specify the desired frequency down to 1 Hz. For example, the command F03.415926 would tune the Receiver(s) to 3.415926 MHz. If an exact frequency is not required, the leading and trailing zeros may be eliminated. The command F3.4 would tune the Receiver(s) to 3.400000 MHz. Note that in both cases a decimal point is required to indicate MHz. If an exact multiple of 1 MHz is desired (as in Example 5), "F" followed by the desired MHz number (as in Example 5) may be sent without a decimal point. This will tune the addressed receiver to the exact whole multiple of 1 MHz specified.

Detector Mode Selection. The desired detector mode is selected by sending the command DN where N is the desired detector mode as follows:

- D1 - AM
- D2 - FM
- D3 - CW with variable BFO
- D4 - CW with BFO CENTER
- D5 - ISB (if ISB option is installed)
- D6 - LSB
- D7 - USB

BFO Offset. The BFO offset frequency may be set by sending the command BN where N indicates the offset frequency in kHz. For example, the command B+1.82 will set the BFO offset 1.82 kHz above the center frequency; B-4.65 will set the offset 4.65 kHz below the center frequency.

Bandwidth Selection. The desired bandwidth is selected by sending the command IN where N indicates the filter bandwidth in kHz. For example, the command I3.24 would

select the 3.24 kHz filter. If a command is received that does not match the filter in the Receiver, the Receiver will automatically select the closest filter. For example, the command I7. will select the 6.8 kHz filter. Note that the decimal point is used to indicate kHz.

Gain Control Mode. The desired gain control mode is selected by sending MN where N is the desired gain control mode as follows:

- M1 Selects short AGC time constant
- M2 Selects medium AGC time constant
- M3 Selects long AGC time constant
- M4 Selects manual gain control
- M5 Selects short AGC with manually set threshold
- M6 Selects medium AGC with manually set threshold
- M7 Selects long AGC with manually set threshold

Manually Set Gain Control. The Receiver will respond to remote commands to set a manual gain. The receiver IF gain is controlled by adding attenuation (from 0 to a maximum of 120 dB) to the amplifier circuit. This feature may also be used in conjunction with the AGC operation to establish a minimum threshold level for the AGC. The command for setting the level is AN where N represents the approximate amount of attenuation ($N \times 0.8$ in dB) to be added to the circuit. For example, the command A3 would add approximately 3 dB of attenuation to the amplifier circuit; A104 would add approximately 80 dB of attenuation.

EXAMPLE 6:

The command: \$99F2.35D3I1.5M5A55B-1.7CR would result in receiver number 99 to be set to the following parameters:

Selected Receiver: 99
Frequency: 02.350000 MHz
Detector Mode: CW with variable BFO
IF Bandwidth: Closest installed IF bandwidth filter to 1.5 kHz
Gain Control: Short AGC with manually set threshold
Attenuation: Threshold of approximately 40 dB
BFO Frequency: 1.70 kHz below center frequency

e. RA6790/GM HF Receiver Responses to Remote Control Commands.

Status commands "S5" and "S6," and monitor commands "G" and "T" request data to be sent from the Receiver to the remote control device. This data is obtained and transmitted when the command (followed by a CR) is sent to any one receiver address. The format of the response depends on the data requested.

"S5" triggers a data stream in the following format:

BW(FL1), BW(FL2), FW(FL3), BW(FL4), BW(FL5), BW(FL6), BW(FL7) where BW is the bandwidth in kilohertz and FL1-FL7 is the filter slot checked.

EXAMPLE 7:

The command \$99S5CR might obtain the following response:

L,U,1.6,.5, ,2.7,16 where

L – Lower sideband filter in filter slot FL1
U – Upper sideband filter in filter slot FL2
1.6 – 1.6 kHz filter in filter slot FL3
.5 – 500 Hz filter in filter slot FL4
,, – No filter in filter slot FL5
2.7 – 2.7 kHz filter in filter slot FL6
16 – 16 kHz filter in filter slot FL7

“S6” triggers a data stream in one of two formats as follows:

:OKNCR, where N is the receiver number and CR is carriage return.

or

:X,Y,Z,ENDNCR, where X, Y, and Z would represent the two digit BITE error codes, N is the receiver number, and CR is carriage return.

EXAMPLE 8:

:OK99 indicates that receiver 99 passed all BITE tests

or

:4,17,33END99 indicates that receiver 99 found BITE error codes 4, 17, and 33. (Refer to Section V for explanation of BITE error codes.)

“G” triggers a data stream in the following format:

F. D. M. I. B. A. S where:

F is receiver frequency in MHz
D is receiver detector mode
M is receiver gain control mode
I is receiver IF bandwidth
B is BFO frequency (only functional in CW variable BFO mode)
A is IF attenuation (only functional with manual gain control or AGC with manual threshold)
S is receiver status

EXAMPLE 9:

The command \$99GCR might result in a response such as: F2.35D3M5I1.5B-1.7A55S2 which indicates the following parameters:

Selected Receiver: 99
Frequency: 2.350000 MHz
Detector Mode: CW with variable BFO
Gain Control: Short AGC with manual threshold
IF Bandwidth: 1.5 kHz
BFO Frequency: 1.70 kHz below center frequency
Attenuation: Threshold of ≈40 dB
Status: Receiver is under remote control

NOTE

Status responses differ from status commands. Refer to next paragraph.

Status Response. The status data is sent as the last item in each monitor response ("G" or "T") from the Receiver. The status data is returned to the remote-control device in the format SN, where N is a one or two digit number representing the following conditions:

- 0 Receiver is operating in local control operating condition.
- 1 Receiver is operating in remote control operating condition.
- 2 Synthesizer is out of lock.
- 4 Receiver is in the override mode (discussed under Functions Unique to the Remote Control Operating Condition).
- 8 Last command sequence had character transmission error.
- 16 Last command sequence had data error.
- 32 Lost data error in last sequence.

If two or more conditions are present, the numbers representing the conditions will be added together and transmitted as one number. For example, 17 (1 + 16) would indicate that the Receiver is in remote control and last command sequence had a data error; 13 (8 + 4 + 1) would indicate remote control, override mode and character transmission error. Note that some numbers are not valid, i.e. 12 since override mode is impossible while in LOCAL control.

The next status response to be considered is "TX" where X is the desired parameter(s) which triggers a data stream in the following format:

XVS where:

- X is the identity letter of the parameter (F, D, M, I, B, or A)
- V is the value of the parameter
- S is the status response

EXAMPLE 10:

The command \$99TFDCR might obtain a response such as: F2.35D3S1 where:

Frequency: 02.350000 MHz
Detector Mode: CW with variable BFO
Status: Receiver is in the remote operating condition

f. Functions Unique to the Remote Operating Condition

Override Mode. The remote control device may be used to command a Receiver to switch to the override mode. In override mode, some of the automatic operating features of the Receiver are disabled. This is, the first local oscillator is always tuned to 40.455 MHz above the entered RF frequency and the IF slot is selected remotely regardless of the type of filter installed. Therefore, the remote controller must decide what the filter should be used for, the type of detection mode to employ, and the BFO offset to receive a signal. For instance, in sideband detection with a symmetrical filter, the first local oscillator and BFO must be properly offset to correctly demodulate the signal. The remote controller also assumes the

responsibility for ensuring that the filter is installed in the selected slot, since an empty slot will cause a dead receiver. The override mode blanks the display. In addition, override signals cannot be handed off to the operator, since the machine has no way of deciding the difference between a sideband signal with virtual carrier offset or a CW signal with a BFO offset. The override mode is invoked when both detector and bandwidth are sent in the same command with the = sign. Sending either without the equals stores = data but removes the Receiver from the override mode and restores it to normal operation. The Receiver will respond to the following override commands (in the format \$ND=XI=Y where N is the receiver number, X is the mode selection number, and Y is the filter slot number):

Mode Selection. The desired mode is selected by sending one of the following commands:

- D=1 Selects envelope detector
- D=2 Selects continuous-wave detector
- D=3 Selects frequency-modulation detector
- D=4 Selects ISB operation

Note that these "D" commands differ from the normal "D" commands and are unique to the override mode.

Filter Selection. In the override mode the filters are selected according to the filter slot number instead of the filter bandwidth. The command is I=N where N corresponds to the filter slot number. For example, the command I=3 will select the filter inserted in filter slot FL-3.

EXAMPLE 11:

The command \$99D=2I=3CR would result in receiver 99 being set to the override mode using the CW detector and the filter installed in filter slot FL-3.

To exit the override mode, an "IN" command is sent where "N" is the desired bandwidth in kHz (not the filter slot number), and the "=" sign is omitted.

NOTE

When the Receiver is in the override Mode, both the MODE LCD and the FREQUENCY LCD are blanked. In addition, status command S1 will be ignored by the Receiver.