851S-1 Receiver

Rockwell International

operation

Collins Defense Communications

Printed in USA

523-0769213-002218
2nd Edition, 1 March 1981

table of contents

NOTICE: This section replaces first edition dated 1 January 1979.

List of Effective Pages

*The asterisk indicates pages changed, added, or deleted by the current change.

Page No	Issue
Title	1 Mar 81
List of Effective Pages	1 Mar 81
1 thru 34	1 Mar 81

Record of Revisions

RETAIN THIS RECORD IN THE FRONT OF MANUAL.
ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.

REV NO	REVISION DATE	INSERTION DATE	INITIALS	REV NO	REVISION DATE	INSERTION DATE	INITIALS
1st Ed	1 Jan 79						
2nd Ed	1 Mar 81						

1. GENERAL

All controls and indicators necessary for operation of a receiver system are located on the front panel of the 851S-1 Receiver.

When a remote-controlled 851S-1 is connected to a receiver control and set for remote operation, the mode, bandwidth, frequency, rf gain, and AGC front panel controls on 851S-1 do not affect the operation of the receiver. Likewise, when set for local operation the mode, bandwidth, frequency, rf gain and AGC front panel controls on the receiver control do not affect the operation of the receiver. Audio controls, signals, and monitors of the receiver and receiver control remain enabled whether being operated remotely or locally.

This section of the instruction book contains instructions for operating the 851S-1. The operator should be aware of several general characteristics of the receiver and receiver control when operating the radio. Refer to paragraph 3.3 for this information.

Note that channel B if and audio circuits are active only in ISB (independent sideband) mode. In ISB operation, channel A output signals are upper-sideband signals and channel B output signals are lower-sideband signals. In all other modes, only channel A circuits are active and provide signal outputs regardless of if filter selected.

2. CONTROLS AND INDICATORS

Controls and indicators of the 851S-1 are shown in figure 1 and are listed in table 1 along with their function. All controls and indicators listed are applicable to all units unless otherwise indicated.

3. OPERATING PROCEDURES

3.1 Line Audio Adjustments

Line audio output levels of the 851S-1 may be adjusted by a qualified operator when his application requires it. The line audio adjustments are shown in figure 2 and listed in table 2.

3.2 Normal (Local) Operating Procedures

3.2.1 General

When power is turned on or restored, it is normal for the RCV fault indicator to light. This is caused by latching the receiver fault circuit when power interruptions are detected. The RCV fault is reset by changing the frequency of the receiver or receiver control (if remotely operated).

Note that channel A and channel B line audio output levels are monitored by the front panel meter; but only the AGC level of the channel A if is monitored, and only when the METER switch is in the RCV SIG position.

Headphones can be used to monitor either channel independent of the speaker switch.

3.2.2 SSB/CW Operation

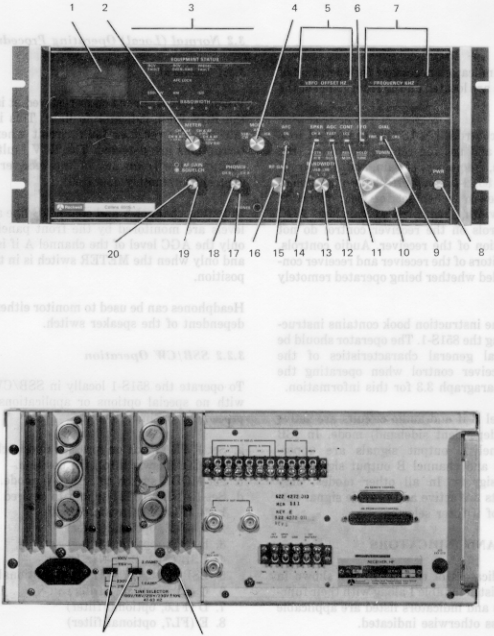
To operate the 851S-1 locally in SSB/CW mode and with no special options or applications, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to LCL position.
c. Set MODE switch to SSB/CW mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad)
   2. A (FL3, optional filter)
   3. B (FL4, optional filter)
   4. USB (FL1, 2.75-kHz USB)
   5. LSB (FL2, 2.75-kHz LSB, optional filter)
   6. C (FL5, optional filter)
   7. D (FL6, optional filter)
   8. E (FL7, optional filter)

e. Using the TUNING knob and DIAL switch set the FREQUENCY KHZ display to the desired operating frequency.

Note

Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.



851S-1 Receiver, Controls and Indicators
Figure 1

Table 1. 851S-1 Receiver, Controls and Indicators.

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter A2M1	Indicates levels as selected by METER switch A2S1.
2	METER switch A2S1	Selects signal levels to be measured by meter A2M1. Selectable positions are as follows: a. CH B AF (+13 FS) position monitors channel B receive line audio output (indicates +13 dB mW full scale). b. CH B AF (+3 FS) position monitors channel B receive line audio output (indicates +3 dB mW full scale). c. CH A AF +3 FS) position monitors channel A receive line audio output (indicates +3 dB mW full scale). d. CH A AF (+13 FS) position monitors channel A receive line audio output (indicates +13 dB mW full scale). e. RCV SIG position monitors (AGC level) receive rf input signal of channel A only (indicates 0 to 100 dB above a 1-μV rf input signal).
3	EQUIPMENT STATUS indicators	
	RCV FAULT A2A1DS5	Indicates power supply low voltage or synthesizer fault. Indicated by power supply fault signal supplied by power supply module A1 or synthesizer fault supplied by synthesizer voltage regulator A14. Synthesizer fault signal is a summary of all synthesizer loss-of-lock signals supplied by A15 through A22.
	RCV OVERLOAD A2A1DS6	Indicates a receive rf overload condition. Indicated by a receive rf overload signal from translator module A9 or from associated preselector caused by excessively high rf inputs from antenna.
	AFC LOCK A2A1DS7	Indicates that AFC (automatic frequency control) is locked, if AFC option is installed.
	AM A2A1DS9	Indicates that the AM operating mode is selected.
	SSB/CW A2A1DS10	Indicates that the SSB/CW operating mode is selected.
	ISB A2A1DS12	Indicates that the ISB operating mode is selected.
	BANDWIDTH -	
	16 A2A1DS14	Indicates that 16-kHz if attenuator pad (FL8) is selected.
(Cont)	A A2A1DS15	Indicates that optional if filter A (FL3) is selected.

Table 1. 851S-1 Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
3 (Cont)	B A2A1DS16	Indicates that optional if filter B (FL4) is selected.
	U A2A1DS17	Indicates that USB (FL1) if filter is selected.
	L A2A1DS18	Indicates that optional LSB (FL2) if filter is selected.
	C A2A1DS19	Indicates that optional if filter C (FL5) is selected.
	D A2A1DS20	Indicates that optional if filter D (FL6) is selected.
	E A2A1DS21	Indicates that optional if filter E (FL7) is selected.
	PRESEL FAULT A2A1DS23	Indicates a preselector fault. Indicated by a preselector fault signal from associated preselector.
4	MODE switch A2S4	Selects receiver operating mode and bandwidth. a. SSB/CW position selects SSB mode and enables BANDWIDTH switch A2S6. b. AM position selects AM mode and enables BANDWIDTH switch A2S6. c. ISB position selects ISB mode and USB and LSB bandpass filters (2.75-kHz USB and 2.75-kHz LSB bandwidth are standard).
5	VBFO OFFSET HZ display A2A5U15 thru A2A5U19	Displays bcd vbfo offset frequency control signal as set by TUNING knob and BFO switch, if BFO option is installed. a. A2A5U15 displays direction of vbfo offset frequency from carrier (+ or -). b. A2A5U16 displays ones kilohertz. c. A2A5U17 displays hundreds hertz. d. A2A5U18 displays tens hertz. e. A2A5U19 displays ones hertz.
6	BFO switch A2S11	Controls the tuning of the bfo offset frequency when used in conjunction with TUNING knob, if BFO option is installed. a. FIX position, selects the fixed 450-kHz injection signal. b. HOLD position, holds the vbfo offset frequency as set and disengages the TUNING knob from adjusting the vbfo offset frequency. c. TUNE position, allows tuning of the vbfo offset frequency (using the TUNING knob).

Table 1. 851S-1 Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
7	FREQUENCY KHZ display A2A5U20 thru A2A5U26	Displays bcd frequency control signal as set by TUNING knob and DIAL switch. a. A2A5U20 displays tens megahertz. b. A2A5U21 displays ones megahertz. c. A2A5U22 displays hundreds kilohertz. d. A2A5U23 displays tens kilohertz. e. A2A5U24 displays ones kilohertz. f. A2A5U25 displays hundreds hertz. g. A2A5U26 displays tens hertz (option).
Not shown (is mounted just right of PRESET switch A2S19)	PRESET-CHANNEL selector A2A6 (used with preset only)	Selects preset channel to be used by supplying a bcd signal to the preset card. The bcd signal correlates directly to the preset channel number indicated on the front panel (0 to 15).
Not shown (is mounted just right of DIAL switch A2S9)	PRESET switch A2S19 (used with preset only)	Selects preset controlling functions when CONT switch is in PSET position. a. OPER position selects the control functions preset on the channel selected by the PRESET-CHANNEL selector A2A6. The preset functions include frequency, mode, and bandwidth. b. STORE position presets the channel selected by the PRESET-CHANNEL selector A2A6 to the control settings of the front panel. The preset functions include frequency, mode, and bandwidth.
8	PWR switch A2S15	Sets power on/off. When pressed and latched (inward position), power is applied to the receiver. When pressed and unlatched (outward position), power is removed from the receiver.
9	DIAL switch A2S9	Controls the tuning of the receiver operating frequency when used in conjunction with TUNING knob. a. FINE position, allows fine tuning of the receiver operating frequency (using the TUNING knob). b. CRS position, allows coarse tuning of the receiver operating frequency (using the TUNING knob). c. LOCK position, locks the receiver operating frequency as set and disengages the TUNING knob from adjusting the receiver operating frequency
10 (Cont)	TUNING knob A2S13	a. Sets the receiver operating frequency (FREQUENCY KHZ) when used in conjunction with the DIAL switch.

Table 1. 851S-1 Receiver, Controls and Indicators (Cont).

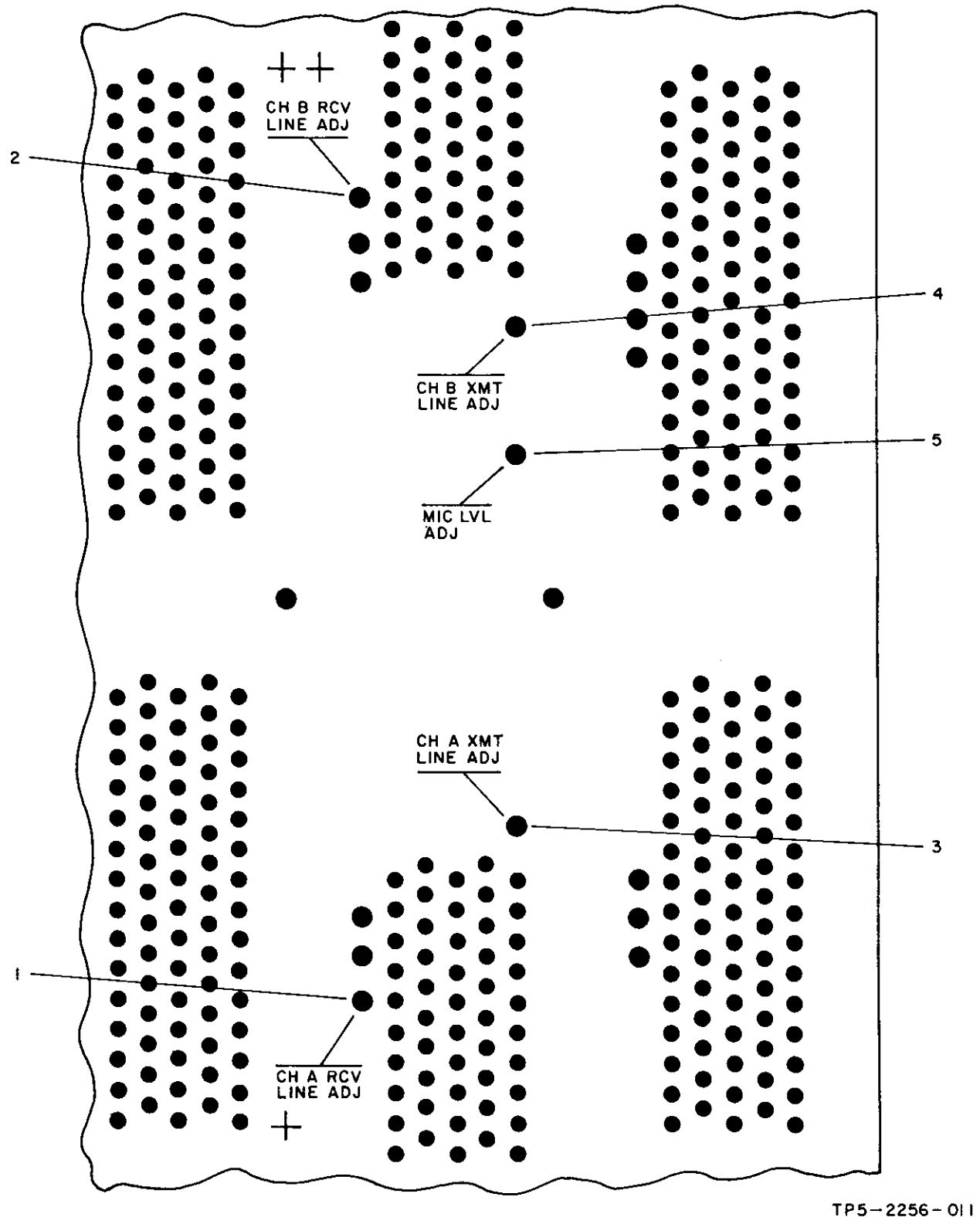
INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
10 (Cont)		b. Sets the BFO offset frequency (VBFO OFFSET HZ) when used in conjunction with the BFO switch, if BFO option is installed.
11	CONT switch A2S8 (preset not installed)	Selects use and method of controlling the remote-controlled 851S-1 Receiver. a. LCL position allows unit to be locally controlled. (851S-1 Receiver with no remote control capabilities must be kept in LCL position for operation.) b. REM position allows unit to be remotely controlled. REM position disables local control of mode, bandwidth, frequency, rf gain, bfo, AFC, and AGC signals. Local audio controls, signals, and monitors remain enabled. c. MON position is a momentary position that enables local controls and sets the monitor bit (word 4, character 5, bit 1) of the receiver control monitor response. This may be used, for example, to command a processor control to modify a stored preset table of operating frequency and mode information to that set on the local controls.
	CONT switch A2S8 (used with preset only)	Selects method of controlling the locally controlled 851S-1 Receiver with preset installed (preset not used in the remotely controlled 851S-1 Receiver). a. NORM position allows unit to be controlled using the front panel controls. b. PSET position allows unit to be controlled using the PRESET switch A2S19 and PRESET-CHANNEL selector A2A6.
12	AGC switch A2S12	Selects AGC decay time. a. In FAST position, channel A and channel B AGC decay time of 0.1 second is enabled. b. In SLOW position, channel A and channel B AGC decay time of 1.0 second is enabled. c. In OFF position, channel A and channel B AGC is disabled.
13 (Cont)	BANDWIDTH switch A2S6	Selects receiver operating bandwidth when MODE switch A2S4 is in SSB/CW or AM. a. 16 position selects if attenuator pad (16-kHz bandwidth). b. A position selects bandpass filter FL3 (optional filter). c. B position selects bandpass filter FL4 (optional filter).

Table 1. 851S-1 Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
13 (Cont)		d. USB position selects bandpass filter FL1 (2.75-kHz USB bandwidth). e. LSB position selects bandpass filter FL2 (2.75-kHz LSB bandwidth, optional filter). f. C position selects bandpass filter FL5 (optional filter). g. D position selects bandpass filter FL6 (optional filter). h. E position selects bandpass filter FL7 (optional filter).
14	SPKR switch A2S10	Switches the selected audio to the speaker amplifier. a. CH A position selects channel A audio input. b. BOTH position selects both channel A and channel B audio inputs. c. CH B position selects channel B audio input.
15	AFC switch A2S14	Sets AFC (automatic frequency control) on or off, if AFC option is installed.
16	RF GAIN control A2R9	Controls rf AGC threshold/level, which in turn controls the gain of the rf circuits in the receiver.
17	PHONES switch A2S3	Selects audio to be monitored at the PHONES jack A2J2 on the receiver front panel. a. CH B position selects channel B receive audio. b. CH A position selects channel A receive audio.
18	PHONES ◉ level control A2R12	Controls headphones volume.
19	○ AF GAIN control A2R10A	Controls speaker volume.
20	◉ SQUELCH control A2R10B and A2R10C	Enables/disables speaker squelch and controls the squelch threshold. In extreme counterclockwise position, speaker squelch is disabled. When control is moved clockwise, speaker squelch is enabled and squelch threshold is adjusted by further clockwise rotation of the SQUELCH control **Note** Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.

Table 1. 851S-1 Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
21	Power selection switch A1S1A and A1S1B (located on rear panel)	Controls input power strapping of power transformer in power supply. a. In 100 position, power transformer strapped for 100-V ac operation. b. In 115 position, power transformer strapped for 115-V ac operation. c. In 215 position, power transformer strapped for 215-V ac operation. d. In 230 position, power transformer strapped for 230-V ac operation.
22	Fuse A1F1 (located on rear panel)	Fuse in power line. 2A used for 100/115-V ac operation, 1 A used for 215/230-V ac operation.



Top Cover Adjustments
Figure 2

Table 2. Line Audio Adjustments.

INDEX NUMBER	ADJUSTMENT	PURPOSE
1	CH A RCV LINE ADJ A6R28 (accessible through top cover)	Controls channel A receive line audio. Normally adjusted for 0-dB mW audio output (as read on front panel meter) for a 3-μV input in SSB modes. Adjustable from -20- to +10-dB mW audio output with a 3-μV input.
2	CH B RCV LINE ADJ A6R65 (accessible through top cover)	Controls channel B receive line audio. Normally adjusted for 0-dB mW audio output (as read on front panel meter) for a 3-μV input in SSB modes. Adjustable from -20- to +10-dB mW audio output with a 3-μV input.

f. If receiver is to receive CW, set BFO switch to TUNE and adjust TUNING knob for a frequency tone that is pleasant to the operator.
g. Set AGC switch to desired AGC decay time.
   1. FAST equals approximately 0.1 second.
   2. SLOW equals approximately 1.0 second.
h. Set RF GAIN to full gain (clockwise).
i. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A and adjust PHONES level control for comfortable listening level.
j. With ◉ SQUELCH control full ccw, set SPKR switch to CH A and adjust ◯ AF GAIN control for a comfortable listening level. With no signal input, adjust ◉ SQUELCH control until noise just squelches.

3.2.3 AM Operation

To operate the 851S-1 locally in AM mode and with no special options or applications, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to LCL position.
c. Set MODE switch to AM mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad)
   2. A (FL3, optional filter)
   3. B (FL4, optional filter)
   4. USB (FL1, 2.75-kHz USB)
   5. LSB (FL2, 2.75-kHz LSB, optional filter)
   6. C (FL5, optional filter)
   7. D (FL6, optional filter)
   8. E (FL7, optional filter)
e. Using the TUNING knob and DIAL switch set the FREQUENCY KHZ display to the desired operating frequency.
f. Set AGC switch to desired AGC decay time.
   1. FAST equals approximately 0.1 second.
   2. SLOW equals approximately 1.0 second.
g. Set RF GAIN control to full gain (clockwise).
h. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A and adjust PHONES level control for comfortable listening level.
i. With ◉ SQUELCH control full ccw, set SPKR switch to CH A and adjust ◯ AF GAIN control for a comfortable listening level. With no signal input, adjust ◉ SQUELCH control until noise just squelches.

3.2.4 ISB Operation (Optional)

To operate the 851S-1 locally in ISB mode and with no special options or applications, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to LCL position.
c. Set MODE switch to ISB mode.

Note

USB bandwidth filter FL1 (2.75-kHz USB) and LSB bandwidth filter FL2 (2.75-kHz LSB) are automatically selected in ISB mode. The BANDWIDTH switch is disabled in ISB mode.

d. Using the TUNING knob and DIAL switch set the FREQUENCY KHZ display to the desired operating frequency.
e. Set AGC switch to desired AGC decay time.
   1. FAST equals approximately 0.1 second.
   2. SLOW equals approximately 1.0 second.

f. Set RF GAIN control to full gain (clockwise).
g. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A or CH B (whichever channel to be monitored by the operator). Adjust PHONES level control for a comfortable listening level.
h. With ◉ SQUELCH control full ccw, set SPKR switch to CH A and adjust ◯ AF GAIN control for comfortable listening level. With no signal input, adjust ◉ SQUELCH control until noise just squelches. The SPKR switch may be set to BOTH to monitor both CH A and CH B (USB and LSB) audio simultaneously.

3.3 Preset Operation

Note

When installed, up to 16 (0 to 15) preset channels can be stored and selected in the 851S-1 Receiver. Stored information can include frequency, mode, and bandwidth.

To use the preset function in the 851S-1 Receiver, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to PSET. (PRESET switch will be in the OPER position.)
c. Set PRESET-CHANNEL selector to desired preset channel.

Note

Normal operating procedures described in paragraph 3.2 can now be followed. Frequency, mode, and bandwidth information are selected (if previously preset), but can be changed with no effect on the stored preset information as long as the PRESET switch is not pressed to the STORE position.

To store preset information:

d. Perform steps a. through c.
e. Change front panel MODE and BANDWIDTH switches to the desired preset mode and bandwidth.
f. Using the TUNING knob and DIAL switch set the FREQUENCY KHZ display to the desired preset frequency.
g. Check that the MODE, BANDWIDTH, and FREQUENCY are those desired for the preset channel selected.
h. Momentarily press the PRESET switch to the STORE position. Record the channel number and preset information for future reference.
i. Repeat steps c. and e. through h. for each PRESET-CHANNEL that is to be stored.

4. REMOTE OPERATION (REMOTE CONTROL RECEIVER ONLY)

4.1 General

To operate the remote controlled 851S-1 Receiver from an HF-8095 Receiver Control or a processor, the CONT switch on the receiver is set to the REM position. This transfers control to the remote control device except for audio monitoring. The local operator is still able to monitor audio levels, audio signals, and set speaker squelch using the receiver front panel meter, controls, and speaker.

The MON position on the receiver CONT switch sets the receiver to local control and sets the monitor bit in the monitor data. This can be used, as an example, to set the receiver front panel data into a preset table in a processor. The MON position has no function when used with the HF-8095 Receiver Control.

4.2 Operating Procedures Using the HF-8095 Receiver Control

With the exception of setting the receiver control CONT switch to the NORM position and the 851S-1 Receiver CONT switch to the REM position, operating procedures for the receiver control are identical to operating the local receiver (paragraph 3.2). When in remote operation, the RCV FAULT is cleared by changing a frequency digit on the HF-8095 Receiver Control Front Panel.

The following paragraphs contain the operating characteristics of the HF-8095 Receiver Control and is given for information only.

4.3 Operating Characteristics

4.3.1 Power Failure and Initialization

When primary power to the HF-8095 Receiver Control is initially applied, or reapplied after a power interruption, the receiver control transmits all command information and requests monitor information from the addressed 851S-1 Receiver. When primary power is applied to a receiver, after power has been applied to the receiver control, the receiver control again transmits all command information from the

front-panel control settings and requests up-dated status from the addressed receiver. When power is applied or restored in a system containing more than one receiver, the receiver control can initialize only the currently addressed unit. The remaining receivers must be initialized manually, one at a time, by selecting the appropriate address and transmitting the desired operating parameters.

4.3.2 CONT Switch Operation

The user must be aware that if front panel controls are changed while the CONT switch is in the TEST mode, their settings may no longer correspond to the receiver operating conditions. Consequently, when the next command to the receiver is initiated (in the NORM mode), some of these settings may be transmitted to the receiver, causing it to change its operating conditions to correspond to the control settings.

The NORM position of the CONT switch is used for normal remote control operation. The TEST position is used to verify that the receiver control is operational and that it can communicate with itself internally. In the TEST mode, the data from the receiver control is transmitted directly to its own display unit. Frequency information displayed will follow the positioning of the frequency thumb-wheel switches, and mode, bandwidth, and channel enable indicators will follow positioning of the front-panel mode, bandwidth, and channel enable controls. When the CONT switch is returned to the NORM position, the receiver control automatically updates to the status information from the receiver without changing the operating conditions of the receiver.

In the TEST mode, the flashing fault indicator (paragraph 4.3.5) is a normal indication, and flashing may become erratic or halt momentarily as front-panel controls are operated.

4.3.3 Address Selection

The receiver control communicates with only one at a time of up to 16 receivers being controlled. The ADDRESS switch contains numbers from 0 through 15 corresponding to binary coding of the four address bits of the data words.

When the ADDRESS switch is rotated to an address, the receiver control automatically requests a complete status update from the addressed receiver. This is done by transmitting an abbreviated 2-character status request only for words 1, 2, 3, and 4. The receiver control status and frequency displays then update with the operating conditions of the newly addressed receiver.

No command transmission is initiated from the receiver control to the newly addressed receiver until changes are made to the front panel control settings of the receiver control. Thus the operating status of the receiver will remain unchanged. This sequence of operation permits an operator to address a receiver solely for the purpose of current status inspection or verification.

4.3.4 BUSY Indicator Operation

The BUSY indicator on the receiver control front panel is lit whenever the addressed receiver CONT switch is placed in the LCL position. When this indicator is lit, the control unit automatically and continuously requests words 1, 2, 3, and 4 monitor data from the receiver. This continuously updates all status information to the receiver control. The operator is thus alerted to the current status of the addressed receiver while it is being locally controlled at the remote site. As long as the BUSY indicator remains lit, commands from the receiver control to the addressed receiver are inhibited.

When the receiver is again returned to remote operation (CONT to REM), the BUSY indicator turns off and the receiver control transmits all current front-panel switch and control settings to the addressed receiver. This causes the receiver operational status to revert to the conditions currently selected on the receiver control front panel.

4.3.5 No Indication of Monitor Response

If for any reason the receiver control fails to receive monitor data transmissions from the addressed receiver (data transmission link inoperative, unit inoperative, unit power disabled, addressed unit does not exist, etc), the receiver fault indicator (RCV FAULT) will flash at approximately a 0.25-Hz rate (2 seconds on, 2 seconds off). Flashing is normal, however, when the front-panel CONT switch is in the TEST position.

4.3.6 Polling Operation

The polling strapping option discussed in the installation section of the receiver control instruction book permits the receiver control to function in a polling mode of operation. This mode of operation is intended for use when an auxiliary system status display is used to display the current status of more than one remote receiver.

In the polling mode of operation the receiver control automatically and sequentially requests status data from all sixteen possible remote addresses. As status data is received from each addressed remote receiver, it is then transmitted by the receiver control, on the common system control bus, to a remote status display for update of the display. The remote status display must be connected to the system control bus to receive the updated display information. If no status response is received from a polled unit, no status data is transmitted to the status display by the receiver control.

Since the status display connects to the common system control bus, it is programmed to recognize its own unique address, and the receiver control is programmed to use this same address (0000 for ADB4 through ADB1) when communicating with the status display. Therefore, when using the polling capability along with a remote status display, only fifteen of the sixteen address combinations are available for remote receiver assignment, since the status display itself requires one of the addresses.

4.3.7 Control and Monitor Data Transmission

Under normal operating conditions, the receiver control transmits control information to the addressed receiver only upon initiation from the front panel controls.

Operation of the frequency thumb-wheel switches initiates transmission of a frequency control word (word 1), along with a request for a frequency status response from the receiver. Likewise, operation of any of the front-panel remote-function switches initiates control transmission, with monitor request, of the corresponding word for which the function is defined. When no control word transmission is pending, the receiver control reverts to its idle state.

In the idle state, the receiver control continuously transmits the 2-character, word 4 monitor request. This keeps the front-panel status indicators up to date on any of the word 4 monitor status information (such as the various fault bits) that may change dynamically during normal operation of the remote unit. Monitor word transmission from a receiver is transmitted only when requested by the receiver control.

The data transmitted and received on the control and monitor buses is serial, asynchronous, and is organized in groups of characters called words. The format is independent of the type of signaling (FSK, RS-232C, or MIL-STD-188C) used. The data formats are user selected by internal strapping. One format uses an 8-bit character code and is described in paragraphs 4.3.7.1 and 4.3.7.2. The other format uses 7-BIT ASCII coded characters and is described in paragraphs 4.3.7.3 and 4.3.7.4. Regardless of the format selected, there are four control words and four monitor data words used by the receiver control.

4.3.7.1 8-Bit Word Format

The control and monitor data word formats are identical with one exception; control word 4 uses only the first two characters of the five characters shown in figure 3. Monitor word 4 contains all five characters. Status request is accomplished by sending only the first two characters of the desired word.

4.3.7.2 8-Bit Character Format

The first character of each word is organized the same; it uses bits b8 and b7 for word synchronization, bits b6 and b5 for word identification, and bits b4 through b1 for unit identification. As many as 16 units can be addressed on one control and monitor bus, using all combinations of the 4-bit addresses. The address of each unit is established by strapping the proper pins to ground in the mating connector for J14. Refer to the installation section. Bits b8 and b7 of the second character in each control word determine whether the control word sent from the control is new control information or a status request only. Bits b8 and b7 of the second character in each monitor word are always the same; bit b8 is always logic 0 and bit b7 is always logic 1.

The following paragraphs give the format and the bit structure that is used for each of the four control words.

a. Word Formats

Control and monitor words consist of a sequence of characters. Except for those monitor bits which have no corresponding control functions (such as fault bits and performance monitoring bits), the control and monitor words have identical data formats. For those monitor bits which have no corresponding control functions, no control bits have been defined.

The control and monitor data word formats are summarized in figure 3. The format is designed to accommodate several options such as vbfo and additional bandwidth filters. These functions are

included in figure 3 but may not be implemented in the receiver or its remote control unit.

Control words (except status request only and word 4 commands) and all monitor words consist of a 5-character sequence as follows:

CHARACTER	FUNCTION
1	Word sync, subaddress, address
2	Command/status request, data
3	Data
4	Data
5	Data

Four different types of words are defined: Word 1, word 2, word 3, and word 4. Word 1 contains frequency information, word 2 contains mode/bandwidth and AGC functions, and word 3 contains vbfo offset frequency and associated functions. Word 4 is a special short format (2-character long) control word used to send tuning rate and direction information. Monitor word 4 is a full five characters long and contains status and monitor bits for which no corresponding control bits exist.

b. Address Character

The first character of any word sequence contains the device address, subaddress (word type), and word sync bits as follows:

B8	B7	B6	B5	B4	B3	B2	B1
1	1	X	X	A4	A3	A2	A1

Word sync

Device address

Subaddress - 00 Word 1
01 Word 2
10 Word 3
11 Word 4

Bits 7 and 8 of this character must be set to 1 for word sync recognition. No other characters may use the one-to-one combination in bits 7 and 8. A 4-bit address field is used permitting 16 devices to be addressed on a common bus.

c. Command/Status Request Character

The second character of a word contains the command/status request bits (bits 8 and 7) with the remaining bits of the character used for data. The command ($\overline{C}$) and status request ($\overline{S}$) bits are coded as follows:

B8	B7	
$\overline{C}$	$\overline{S}$	SIGNIFICANCE
0	0	Command word with status request
0	1	Command word only — no status desired
1	0	Status request only (2-character sequence)
1	1	This combination not allowed

The command with status request is a full 5-character sequence (except word 4, paragraph 4.3.7.2.e.4) followed by a 5-character monitor (status) response transmission from the receiving unit. The type of control word (word 1, 2, 3, or 4) being sent and type of status word returned is specified by the subaddress bits of the address character (paragraph 4.3.7.2.b).

In a monitor response (from a remotely controlled receiver) the $\overline{C}$ and $\overline{S}$ bits are always coded 0 and 1, respectively, to prevent both ends of the control link getting locked into a closed loop situation where each end of the link solicits a response from the other.

The status-request-only command (bit 8=1, bit 7=0), normally issued by a remote control unit or processor, requires transmission only of characters 1 and 2 of the word format, with all data bits (bits 1 through 6) of character 2 being ignored. The subaddress bits of the address character (character 1, paragraph 4.3.7.2.b) specify which of the four status words is being solicited.

d. Data Characters

Characters 3 through 5 of a word contain control or monitor data bits as defined in figure 3. The logic sense of the enable type bits is defined as logic 1 true. A logic 1 enables the function and a logic 0 disables the function. Frequency digits use true bcd coding with only two bits required for the 10-MHz digit. The only data pattern restriction is that bits 7 and 8 of all characters, except the address character, may not both be 1's at the same time.

e. Data Content Definitions

The following paragraphs describe the function of the various control and monitor data bits according to their locations in figure 3. C is used to denote the character number and B to denote the bit number.

WORD	CHAR-ACTER	STOP BIT	PARITY BIT	CHARACTER BIT POSITION B8	B7	B6	B5	B4	B3	B2	B1	START BIT	
1	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	0	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\overline{C}$	$\overline{S}$	FREQ (10 MHz) (2)	(1)	FREQ (1 MHz) (8)	(4)	(2)	(1)	0	①
	3	1	X	FREQ (100 kHz) (8)	(4)	(2)	(1)	FREQ (10 kHz) (8)	(4)	(2)	(1)	0	
	4	1	X	FREQ (1 kHz) (8)	(4)	(2)	(1)	FREQ (100 Hz) (8)	(4)	(2)	(1)	0	
	5	1	X	FREQ (10 Hz) (8)	(4)	(2)	(1)	FREQ (1 Hz) (8)	(4)	(2)	(1)	0	
2	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	1	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\overline{C}$	$\overline{S}$	0	(16)	RF GAIN CONTROL (8)	(4)	(2)	(1)	0	①②
	3	1	X	0	VBFO ENABLE	AFC ENABLE	AGC CROWBAR ENABLE	USB AGC OFF	FAST	LSB AGC OFF	FAST	0	
	4	1	X	BANDWIDTH FILTER ENABLES FL8	FL7	FL6	FL5	FL4	FL3	FL2	FL1	0	③
	5	1	X	MODE ENABLES FM	AM	SSB	CW	ISB		RESERVED		0	
3	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	0	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\overline{C}$	$\overline{S}$	0	VBFO SIGN	VBFO OFFSET FREQ (1 kHz) (8)	(4)	(2)	(1)	0	①
	3	1	X	VBFO OFFSET FREQ (100 Hz) (8)	(4)	(2)	(1)	VBFO OFFSET FREQ (10 Hz) (8)	(4)	(2)	(1)	0	
	4	1	X	RESERVED								0	
	5	1	X	RESERVED				VBFO TUNE	VBFO PRL ENABLE	FINE TUNE	RSVD	0	
4	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	1	ADDRESS A4	A3	A2	A1	0	
	2	1	X	CMD/STATUS RQST $\overline{C}$	$\overline{S}$	UP/$\overline{\text{DOWN}}$	(16)	TUNING RATE CONTROL (8)	(4)	(2)	(1)	0	①④
	3	1	X	AFC LOCK IND	RESERVED		CHAN A AUDIO MON	CHAN A AGC MON	RSVD	CHAN B AUDIO MON	CHAN B AGC MON	0	⑤
	4	1	X	RESERVED				RECEIVE OVLD	SYNTH FAULT	PS FAULT	RCV FAULT	0	⑤
	5	1	X	RESERVED		VBFO SYNTH FAULT	RSVD	PRESEL FAULT	DATA ERROR	LOCAL CONTROL	MONITOR	0	

NOTES:

① THE COMMAND (C) AND STATUS (S) REQUEST BITS ARE CODED AS FOLLOWS:

B8 $\overline{C}$	B7 $\overline{S}$	SIGNFICANCE
0	0	COMMAND WORD WITH STATUS REQUEST
0	1	COMMAND WORD ONLY-NO STATUS DESIRED
1	0	STATUS REQUEST ONLY (2 CHARACTER SEQUENCE)
1	1	THIS COMBINATION NOT ALLOWED

② RF GAIN CONTROL IS FIVE BITS BINARY CODED, APPROXIMATELY 3-dB GAIN REDUCTION PER STEP (PROCESSOR CONTROL APPLICATIONS) OR FOUR BITS (LEAST SIGNIFICANT BIT SET TO ZERO). APPROXIMATELY 6-dB GAIN REDUCTION PER STEP (CONTROL UNIT APPLICATIONS). ALL "ZERO" CODE INDICATES NO GAIN REDUCTION. PROGRESSING IN BINARY STEPS TO THE ALL "ONES" CODE FOR MAXIMUM GAIN REDUCTION.

③ FILTER BANDWIDTH DESIGNATIONS ARE DEFINED AS FOLLOWS:

FL1 -- USB	FL5 -- C
FL2 -- LSB	FL6 -- D
FL3 -- A	FL7 -- E
FL4 -- B	FL8 -- 16 kHz

④ WORD 4 COMMAND OR STATUS REQUEST IS ONLY TWO CHARACTERS LONG.

⑤ CHARACTERS 3,4, AND 5 OF MONITOR WORD 4 CONTAIN FAULT AND PERFORMANCE MONITOR BITS FOR WHICH NO CORRESPONDING CONTROL BITS EXIST. THE "DATA ERROR" BIT IS THE LOGICAL SUM OF THE FOLLOWING CONDITIONS:

A. RECEIVED CHARACTER PARITY ERROR.
B. FRAMING ERROR (NO VALID STOP RECEIVED WITH THE CHARACTER).
C. OVERRUN ERROR (PREVIOUS CHARACTER WAS NOT PROCESSED BEFORE THE CURRENT CHARACTER WAS RECEIVED).
D. INVALID CHARACTER SEQUENCE.

⑥ 1 = LOGIC 1
0 = LOGIC 0
(1) = BIT WEIGHT
X = FUNCTION OF STRAPPING

TPA-3194-014

8-Bit Control and Monitor Word Format
Figure 3

1. Word 1

   Function: Frequency data

   Characters (bits) involved: C2(B6-B1), C3-C5(B8-B1)

   Explanation: Receiver frequency is contained in one bcd digit per decade as shown in figure 3. The 10-MHz decade uses only the last two significant bits of a bcd digit. The receiver is tunable over the range 0.000 00 to 29.999 99 MHz.

   In processor control applications, remote receiver operating frequency is normally controlled by transmission of the complete discrete operating frequency from the processor, using word 1. If the optional 10-Hz and/or 1-Hz (851S-2) tuning digits are not implemented, the bits associated with these digits (C5, B8-B1) should be sent as 0's.

   With remote control unit (HF-8095) operation, discrete word 1 frequency is not normally sent from the control unit. Operating frequency is controlled from the continuously rotatable tuning knob on the control unit, which initiates transmission of the tuning rate/direction bits contained in word 4 (C2, B6-B1); paragraph 4.3.7.2.e.4, as the knob is rotated. Reception of word 4 command by the receiver ($\overline{C}$=0 in word 4) initiates a word 1 status response from the receiver (if vbfo tune, word 3, C5, B4, has previously been set to 0, refer to paragraph 4.3.7.2.e.3) independent of the $\overline{S}$ (status request) bit received in word 4. This is done to continuously update the frequency readback display at the remote control unit as the receiver frequency is varied.

2. Word 2

   Function: Rf gain control

   Characters (bits) involved: C2(B5-B1)

   Explanation: Maximum gain corresponds to all zeros and minimum gain corresponds to all ones. Intermediate gain settings are determined by a 3-dB reduction from maximum gain per binary step from all zeros. For example, the binary number 23 (10111 in B5-B1) causes a receiver gain reduction of 23 x 3 = 69 dB from maximum gain. When using the rf gain control function, receiver AGC (word 2, C3, B4, and B2) is normally turned off and the gain controlled by the rf gain function.

   From a remote control unit (HF-8095), only B5 through B2 of the rf gain control bits are varied, with B1 always a 0. This provides 15 steps of gain reduction in 6-dB steps from a 16-position rf gain switch on the remote control unit.

   Function: Vbfo enable

   Characters (bits) involved: C3(B7)

   Explanation: A one in this bit turns on the vbfo to the last offset frequency entered (see word 3) and allows tuning the vbfo offset. The vbfo enable is inhibited if the receiver mode is set to AM (word 2, C5, B7=1), and should only be used in SSB, CW, or ISB modes. From an HF-8095 control unit, the vbfo enable is also inhibited in AM mode at the control unit.

   Function: AGC crowbar enable

   Characters (bits) involved: C3(B5)

   Explanation: A one in this position enables the AGC crowbar circuit. The AGC crowbar is activated when it is both enabled and the receiver frequency is changed. After the AGC crowbar is enabled, activation occurs each time the receiver frequency is changed. Upon activation, the AGC crowbar circuit decreases AGC decay time to 10 milliseconds nominal for a period of 20 milliseconds after activation of the crowbar circuit. This function is intended primarily for fast frequency hopping/scanning applications with processor control and is not implemented in the HF-8095 control unit.

   Function: USB AGC

   Characters (bits) involved: C3 (B4 and B3)

   Explanation: A one in the off bit turns the AGC off. A zero in the off bit turns the AGC on. A one in the fast bit sets the AGC decay time to 0.1 second nominal. A zero in the fast bit sets the AGC decay time to 1.0 second nominal.

   Function: LSB AGC

   Characters (bits) involved: C3(B2 and B1)

   Explanation: A one in the off bit turns the AGC off. A zero in the off bit turns the AGC on. A one in the fast bit sets the AGC to 0.1 second. A zero in the fast bit sets the AGC to 1.0 second.

Note

From an HF-8095 remote control unit, both USB and LSB AGC functions are controlled simultaneously from a single control switch. Therefore, both USB and LSB AGC will simultaneously be off or on, or in fast or slow decay modes, and may not be controlled independently.

Function: Bandwidth filter enables

Characters (bits) involved: C4(B8-B1)

Explanation: A one enables the corresponding bandwidth filter as shown in figure 3. Only one bandwidth filter may be enabled at a time. Filters FL8 through FL3 are optional and may or may not be implemented in the receiver. Filter bandwidths may also vary depending upon requirements. The standard optional filters (FL8 through FL3) and the standard LSB (FL2) and USB (FL1) filters have the following bandwidth designations:

FL8 - 16 kHz
FL7 - 6 kHz
FL6 - 3 kHz
FL5 - 1 kHz
FL4 - 0.5 kHz
FL3 - 0.2 kHz
} Optional filters
FL2 - LSB - 2.75 kHz
FL1 - USB - 2.75 kHz

Function: Mode enables

Characters (bits) involved: C5(B7-B4)

Explanation: A one enables the corresponding mode of operation as shown in figure 3. SSB must also be set for ISB or CW modes.

3. Word 3

Function: Vbfo sign

Characters (bits) involved: C2(B5)

Explanation: A zero sets a positive vbfo offset. A one sets a negative vbfo offset.

Function: Vbfo frequency

Characters (bits) involved: C2 (B4-B1), C3 (B8-B1)

Explanation: These bits give bcd digits for the vbfo frequency monitoring and control as shown in figure 3. The vbfo is tunable to ±9.99 kHz.

The vbfo sign bit and bcd frequency digits are activated for control only if the vbfo parallel enable (C5, B3) is set to one. In processor control applications, the vbfo offset frequency is normally controlled by transmission of the discrete sign and frequency digits by the processor, using word 3.

With remote control unit (HF-8095) operation, no means is provided to transmit the discrete sign bit and bcd vbfo frequency digits. The vbfo offset frequency is controlled from the continuously rotatable TUNING knob on the control unit, which initiates transmission of the tuning rate direction bits contained in word 4 (paragraph 4.3.7.2.c.4) as the knob is rotated. Reception of word 4 command by the receiver ($\overline{C}$ = 0 in word 4) initiates a word 3 status response from the receiver (if vbfo tune, word 3, C5, B4 has previously been set to one, see next function description) independent of the $\overline{S}$ (status request) bit received in word 4. This is done to continuously update the vbfo frequency offset readback display at the remote control unit as the vbfo frequency is varied.

Function: Vbfo tune

Characters (bits) involved: C5(B4)

Explanation: When this bit is set to one, the vbfo offset frequency may be incrementally tuned in a continuous fashion using the rate/direction bits contained in word 4 (C2, B6-B1, paragraph 4.3.7.2.e.4). This function is specified primarily for remote control unit operation (HF-8095) and is set to one when the BFO switch on the control unit is placed in the tune position. When the vbfo tune bit is set to zero, the tuning rate/direction bits in word 4 are used to incrementally vary the receiver rf operating frequency (paragraphs 4.3.7.2.e.1 and 4.3.7.2.e.4).

Function: Vbfo parallel enable

Characters (bits) involved: C5(B3)

Explanation: When this bit is set to one, the vbfo sign (C2, B5) and bcd frequency offset digits (C2, B4-B1 and C3, B8-B1) of word 3 are enabled to control the vbfo. This is the recommended method of setting the vbfo frequency from a processor. From a remote control unit (HF-8095), no means is provided to set this function to a one, and the bit is always transmitted as a zero. Remote control unit tuning of the vbfo frequency is accomplished via the tuning rate/direction bits contained in word 4 (paragraph 4.3.7.2.e.4).

Function: Fine tune

Characters (bits) involved: C5(B2)

Explanation: When set to one, this bit causes the tuning rate bits in word 4 to tune the receiver operating frequency (if vbfo tune = zero) in fine tune mode from the lowest order frequency digit. When set to a zero, this bit causes the tuning rate bits in word 4 to tune the receiver frequency in coarse tune mode from the 10-kHz to the higher order frequency digits. If the tuning rate bits of word 4 are being used to control the vbfo frequency (vbfo tune = 1, vbfo parallel enable = 0), the fine tune function may be either a one or zero with no effect on the vbfo tuning rate (fine/coarse tuning modes are not applicable to the vbfo tuning). The fine tune function is intended primarily for remote control unit (HF-8095) operation and is not normally used (may be set to either one or zero) in processor control applications.

4. Word 4

Function: Up/$\overline{\text{down}}$ tuning direction

Characters (bits) involved: C2(D6)

Explanation: This function determines the direction of incremental tuning of either the receiver rf frequency or vbfo offset frequency whichever is being controlled by the tuning rate bits in word 4, C2, B5-B1. When the bit is set to one, the direction of tuning is up (increasing frequency). When the bit is zero, tuning direction is down (decreasing frequency). This bit and the remaining bits (B5-B1) of word 4 are intended for control unit (HF-8095) operation of the receiver. From a remote control unit, this bit is set one (up) when the TUNING knob of the control unit is rotated in a clockwise direction, and to zero when the tuning knob is rotated in a counterclockwise direction.

Function: Tuning rate

Characters (bits) involved: C2(B5-B1)

Explanation: These 5 bits are tuning rate bits used to control the incremental receiver tuning rate. Each bit is assigned a weighted binary value from 16 (B5) through 1 (B1). The bits contain a count value representing the current angular velocity of the TUNING knob at the remote control unit (HF-8095), and are intended for remote control unit operation of the receiver. When all bits are zero, no tuning occurs, corresponding to a stationary tuning knob. As the TUNING knob is rotated, a count value is generated in the bits and the receiver tunes incrementally at a rate specified by the count value. The incremental tuning continues at that rate until the bits are changed to a new value or until they are reset to zero, at which time the incremental tuning stops. The incremental tuning rate increases as the bit count value increases from 1 (slowest tuning rate) to 31 (highest tuning rate). The tuning rate does not increase linearly, however, with increasing count value. The increase in tuning rate is somewhat exponential as the count value of the bits increases. The tuning rate corresponding to each count value is not specified here, and varies depending upon whether fine or coarse tune (word 3, C5, B2 is one or zero) is selected, and upon the lowest order tuning digit (100 Hz, 10 Hz, or 1 Hz) implemented in the receiver. For reference purposes, some of the tuning rates corresponding to various count values are represented by the nominal values listed in table 3.

As indicated in paragraph 4.3.7.2.e.3, the vbfo tune function (word 3, C5, B4) is used to specify if the receiver rf frequency (vbfo tune = 0) or the vbfo offset frequency (vbfo tune = 1) is to be incrementally tuned using the tuning rate bits in word 4. When the rf frequency is specified, reception of word 4 command ($\overline{\text{C}}$ = 0 in word 4, C2, B8) initiates a word 1 status response from the receiver; when the vbfo frequency is specified (vbfo tune = 1), reception of word 4

Table 3. Typical Tuning Rates.

APPROXIMATE TUNING	TUNING RATE BITS					APPROXIMATE RF TUNING RATE (Hz/second)				APPROXIMATE VBFO TUNING RATE (Hz/second) FINE OR COARSE
KNOB VELOCITY (REV/SECOND)	B5	B4	B3	B2	B1	RCVR TUNING IMPLEMENTATION			COARSE TUNE	
						100 Hz (fine)	10 Hz (fine)	1 Hz (fine)		
0	0	0	0	0	0	0	0	0	0	0
0.1	0	0	0	0	1	260	26	2.6	20 000	26
0.2	0	0	0	1	0	1 035	103.5	10.35	103 500	103.5
0.4	0	0	1	0	0	2 960	296	29.6	296 000	296
0.8	0	1	0	0	0	6 900	690	69	690 000	690
1.6	1	0	0	0	0	16 560	2 070	207	2 070 000	2 070
3.13	1	1	1	1	1	55 200	20 700	11 040	11 040 000	5 520

command initiates a word 3 status response from the receiver. If the word 4 status request bit is also zero ($\overline{S} = 0$ in word 4, C2, B7), then a word 4 status response is also solicited from the receiver.

The incremental tuning rate bits are intended primarily for remote control operation of the receiver from a remote manual control unit (HF-8095).

Note

Because the command structure of word 4 is only two characters long (characters 1 and 2), the following descriptions of the remaining characters (3, 4, and 5) are applicable only to monitor (status) words from a receiver. Characters 1 and 2 of word 4 are also part of the word 4 status word and contain those functions already described. Characters 3, 4, and 5 of word 4 contain fault and performance monitoring functions not associated with any particular command function.

Function: AFC lock monitor

Character (bits) involved: C3(B8)

Explanation: If the optional automatic frequency control (AFC) is implemented, this bit is a one when the AFC circuits are locked onto the received signal, or a zero when an unlocked condition occurs.

Function: AGC performance monitors

Character (bits) involved: C3(B1, B4)

Explanation: Each of the channel A and channel B if sections has an AGC performance monitor which causes the respective bits as shown in figure 3 to be a one when there is no AGC, or a zero when the AGC level corresponds to a signal input in excess of 20 dB above the AGC threshold.

Function: Audio performance monitors

Character (bits) involved: C3(B2, B5)

Explanation: Each of the channel A and channel B line audio output circuits has a performance monitor which causes the respective bits as shown in figure 3 to be a one when the audio level is 10 dB or more below the nominal AGC controlled output levels and zero otherwise.

Function: Receive overload

Character (bits) involved: C4(B4)

Explanation: This bit is set to one if the rf input to the receiver antenna terminal exceeds

approximately 2 volts or, if operated with an optional external preselector (HF-8060), when the rf input signal to the preselector exceeds its input specifications.

Function: Frequency synthesizer fault

Character (bits) involved: C4(B3)

Explanation: When any of the frequency synthesizer phase locked oscillators indicate a loss-of-lock condition, the frequency synthesizer fault bit is set to one.

Function: Power supply fault

Character (bits) involved: C4(B2)

Explanation: When loss of any of the power supply output voltages occurs (except +5 V dc), the power supply fault bit is set to one. This fault bit is latched and must be cleared by either a change of local frequency or reception of a remote control frequency word.

Function: Receiver fault

Character (bits) involved: C4(B1)

Explanation: A receiver fault is indicated by a one in the receiver fault bit when either a power supply fault, frequency synthesizer fault, or vbfo synthesizer fault occurs. If the receiver fault indication is caused by a power supply fault, it will latch in a fault condition until cleared by either a change of local frequency or reception of a remote control frequency word.

Function: Vbfo synthesizer fault

Character (bits) involved: C5(B6)

Explanation: If the optional vbfo function is implemented, this bit is set to a one to indicate a loss-of-lock condition in the vbfo synthesizer locked oscillator circuits.

Function: Preselector fault

Character (bits) involved: C5(B4)

Explanation: If the receiver is operated with the optional external preselector (HF-8060), this bit will be a one if the external preselector was not able to successfully tune to the current frequency or if its power supply circuits are in a fault condition.

Function: Data error

Character (bits) involved: C5(B3)

Explanation: The data error bit is the logical sum of the following conditions with a one indicating an error:

1. Received character parity error.
2. Framing error (no valid stop bit received with a character).
3. Overrun error (previous character was not processed before the current character was received.)
4. Invalid character sequence.

Note

The data error bit is reset when any monitor word is transmitted from the receiver.

Function: Local control

Character (bits) involved: C5(B2)

Explanation: This bit is set to one whenever the receiver front panel CONT switch is in either the LCL or the MON position, and indicates operation of the receiver from its local front panel controls.

Function: Monitor

Character (bits) involved: C5(B1)

Explanation: This bit is set to one as long as the receiver front panel CONT switch is held in the momentary MON position, and is intended primarily for use as a flag in processor control applications.

f. Interface Strapping Options

The following listed options are strappable on a circuit card internal to the unit. Refer to the installation section.

1. Parity (odd, even, or no parity).

2. Data rate (75, 150, 300, 600, 1200, 2400, 4800, 9600, or 19 200 bauds: Receive and transmit data rates not independently selectable).
3. Data signaling method (FSK or RS-232C logic levels).
4. Data interface polarity (EIA Standard RS-232C or MIL-STD-188C).

g. Address Selection

Four address lines are available at the data interface connector at the rear of the equipment chassis. These lines have internal pullup to +5 V dc and may be strapped to LOGIC 0 as required in the mating interface connector to the receiver. See installation section.

h. Error Processing

The serial interface circuits continually process the incoming command data for errors and ignore the current command sequence if any are detected. The "DATA ERROR" bit (word 4, character 4, bit 2) is reset after transmission of any monitor word from the receiver. This bit is the logical sum of the following listed conditions and is applicable primarily to remote processor control applications.

1. Received character parity error.
2. Framing error (no valid stop bit received with a character).
3. Overrun error (previous character was not processed before the current character was received).
4. Invalid character sequence (other than defined in figure 3).

4.3.7.3 ASCII Word Format

Note

ASCII word format cannot be used when using the HF-8095 Receiver Control.

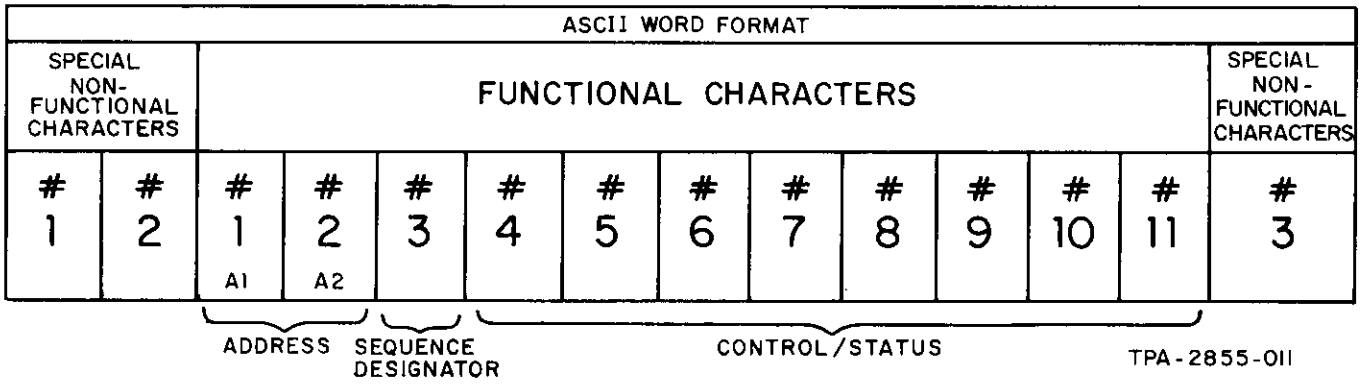
ASCII word format is available only when microprocessor-based remote control cards are being used (Parallel Input A11, Parallel Output A12, and Serial Interface A13).

A word consists of three special nonfunctional characters that are used to establish word boundaries, and eleven functional characters that contain address and front-panel control/status information. Refer to figure 4.

The three special nonfunctional characters are selected from carriage return (CR), line feed (LF), execute (X), hyphen (-) and dollar sign ($). Refer to figures 5 and 6. CR and LF are the first two special nonfunctional characters of each ASCII control word and execute (X) ends each of the ASCII control words. Th hyphen (-) is the first two special nonfunctional characters of each ASCII monitor word, and the dollar sign ($) is used to end each of the monitor words.

The eleven functional characters of the control and monitor words consist of two address, one sequence designator, and eight characters for control/status information.

The control and monitor data word formats are similar with one exception, control word 4 is shortened to seven ASCII characters in order to transmit status information as fast as possible. Monitor word 4 contains all eleven ASCII characters. The first five characters of each word are organized the same: two nonfunctional characters are used to establish synchronization. The first two functional characters establish the address, and the third functional character serves as the sequence designator. As many as 32 units (00 through 31) can be addressed on one control or monitor bus, using bcd coded combinations of the two-address characters. Four binary coded address lines with internal pullup to logic one are



ASCII Word Format
Figure 4

CHARACTER SIGNIFICANCE		ASCII PRINT CHAR'S	FUNCTIONAL BIT CODING			
			WT 8	WT 4	WT 2	WT 1
CR LF A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 X	WORD 1 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	0,1,2	NA	NA	NA	NA
F1	FREQUENCY- 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQUENCY- 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY- 100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY- 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY- 1 Hz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
X	EXECUTE	X	NA	NA	NA	NA
CR LF A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 X	WORD 2 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	4,5,6	NA	NA	NA	NA
M1	RF GAIN CONTROL	0-9, A-F	0	0	0	RF GAIN (16)
M2	RF GAIN CONTROL	0-9, A-F	RF GAIN (8)	RF GAIN (4)	RF GAIN (2)	RF GAIN (1)
M3	VBFO/AFC/AGC CROWBAR ENABLES	0-9, A-F	0	VBFO ENABLE	AFC ENABLE	AGC CROWBAR
M4	AGC TIME CONSTANTS	0-9, A-F	USB AGC OFF	USB AGC FAST	LSB AGC OFF	LSB AGC FAST
M5	BANDWIDTH FILTER ENABLES	0-9, A-F	FL8 (16)	FL7 (E)	FL6 (D)	FL5 (C)
M6	BANDWIDTH FILTER ENABLES	0-9, A-F	FL4 (B)	FL3 (A)	FL2 (LSB)	FL1 (USB)
M7	MODE SELECT ENABLES	0-9, A-F	FM	AM	SSB	CW
M8	ISB ENABLE	0-9, A-F	ISB	0	0	0
X	EXECUTE	X	NA	NA	NA	NA
CR LF A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 X	WORD 3 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	8,9,A	NA	NA	NA	NA
V1	VBFO SIGN (0=+)	0,1	0	0	0	VBFO SIGN
V2	VBFO FREQUENCY, 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
V3	VBFO FREQUENCY, 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
V4	VBFO FREQUENCY, 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
V5	AUXILIARY	0-9,A-F	-	-	-	-
V6	AUXILIARY	0-9, A-F	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	VBFO TUNE, VBFO PAR ENABLE, FINE TUNE	0-9, A-F	VBFO TUNE	VBFO PAR ENBL	FINE TUNE	0
X	EXECUTE	X	NA	NA	NA	NA
CR LF A1 A2 SD K1 X	WORD 4 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	C,D,E	NA	NA	NA	NA
K1	RESERVED	0	0	0	0	0
X	EXECUTE	X	NA	NA	NA	NA

TPA-3204-014

ASCII Character Control Word Format
Figure 5

CHARACTER SIGNIFICANCE		ASCII PRINT CHAR'S	FUNCTIONAL BIT CODING			
			WT 8	WT 4	WT 2	WT 1
-	-	A1	A2	SD	F1	F2	F3	F4	F5	F6	F7	F8	ß	WORD 1 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	1	NA	NA	NA	NA
F1	FREQUENCY- 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQUENCY- 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY-100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY-100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY- 1 kHz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
ß	END DELIMETER	ß	NA	NA	NA	NA
-	-	A1	A2	SD	M1	M2	M3	M4	M5	M6	M7	M8	ß	WORD 2 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	5	NA	NA	NA	NA
M1	RF GAIN CONTROL	0-9, A-F	0	0	0	RF GAIN (16)
M2	RF GAIN CONTROL	0-9, A-F	RF GAIN (8)	RF GAIN (4)	RF GAIN (2)	RF GAIN (1)
M3	VBFO/AFC/AGC CROWBAR ENABLES	0-9, A-F	0	VBFO ENBL	AFC ENBL	AGC CROWBAR
M4	AGC TIME CONSTANTS	0-9, A-F	USB AGC OFF	USB AGC FAST	LSB AGC OFF	LSB AGC FAST
M5	BANDWIDTH FILTER ENABLES	0-9, A-F	FL8 (16)	FL7 (E)	FL6 (D)	FL5 (C)
M6	BANDWIDTH FILTER ENABLES	0-9, A-F	FL4 (8)	FL3 (A)	FL2 (LSB)	FL1 (USB)
M7	MODE SELECT ENABLES	0-9, A-F	FM	AM	SSB	CW
M8	ISB ENABLE	0-9, A-F	ISB	0	0	0
ß	END DELIMITER	ß	NA	NA	NA	NA
-	-	A1	A2	SD	V1	V2	V3	V4	V5	V6	V7	V8	ß	WORD 3 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	9	NA	NA	NA	NA
V1	VBFO SIGN (0=+)	0,1	0	0	0	VBFO SIGN
V2	VBFO FREQUENCY, 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
V3	VBFO FREQUENCY, 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
V4	VBFO FREQUENCY, 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
V5	AUXILIARY	0	-	-	-	-
V6	AUXILIARY	0	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	VBFO TUNE, VBFO PAR ENABLE, FINE TUNE	0-9, A-F	VBFO TUNE	VBFO PAR ENBL	FINE TUNE	0
ß	END DELIMITER	ß	NA	NA	NA	NA
-	-	A1	A2	SD	S1	S2	S3	S4	S5	S6	S7	S8	ß	WORD 4 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1 (2)	A1 (1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2 (8)	A2 (4)	A2 (2)	A2 (1)
SD	SEQUENCE DESIGNATOR	D	NA	NA	NA	NA
S1	UP/DOWN, TUNE RATE (16)	0-3	0	0	UP/DOWN	TUNE RATE (16)
S2	TUNE RATES	0-9, A-F	TUNE RATE (8)	TUNE RATE (4)	TUNE RATE (2)	TUNE RATE (1)
S3	AFC LOCK IND, CHAN A AF MONITOR	0-9, A-F	AFC LOCK	0	0	CHAN A AF
S4	CHAN A AGC/CHAN B AF/CHAN B AGC MONITORS	0-9, A-F	CHAN A AGC	0	CHAN B AF	CHAN B AGC
S5	RESERVED	0-7	0	0	0	0
S6	RF OVLD/SYNTH/PWR SPLY/RCVR FAULTS	0-9, A-F	RF OVLD	SYNTH	PWR SPLY	RCVR
S7	VBFO SYNTH FAULT	0-3	0	0	VBFO SYNTH	0
S8	PRESEL FAULT, DATA ERROR, LOCAL CONTROL, MONITOR	0-9, A-F	PRESEL FAULT	DATA ERROR	LOCAL CONTROL	MONITOR
ß	END DELIMITER	ß	NA	NA	NA	NA

TPA-3203-014

ASCII Character Monitor Word Format
Figure 6

available at the remote control connector of the 851S-1 Receiver and may be strapped to any combination. Table 4 describes the relationship between address line strapping and the corresponding bcd address digits. Only X's require strapping to ground; the dashes remain unstrapped or open address lines.

The third functional ASCII character in each word is the sequence designator. Refer to table 5. The sequence designator is used to define the word number and type (control only, control with status request, or status request only) of the word represented.

Data rates are switchable on the serial interface card A13 from 75 to 19 200 bauds. The levels are strappable for either RS-232C (+6-V dc level defined as a logic 0) or MIL-STD-188C (+6-V dc level defined as a logic 1) compatibility. See the installation section for switching and strapping instructions.

4.3.7.4 ASCII Character Format

The special nonfunctional ASCII characters are used as word boundary delimiters for each of the control and monitor words. The nonfunctional characters are encoded/decoded in terms of a 7-bit code shown in table 6.

The functional characters contain the control and monitor data and are encoded/decoded in terms of a 4-bit code also shown in table 6. A logic 1 selects or enables a function, while a logic 0 disables a function.

Table 4. Address Number, Binary Data Pattern, and Address Recognition Strapping.

ADDRESS NUMBER	TRANSMITTED BINARY ADDRESS DATA				RECEIVER STRAPPING REQUIRED FOR ADDRESS RECOGNITION			
	A4	A3	A2	A1	A4 (ADB4)	A3 (ADB3)	A2 (ADB2)	A1 (ADB1)
0	1	1	1	1	-	-	-	-
1	1	1	1	0	-	-	-	X
2	1	1	0	1	-	-	X	-
3	1	1	0	0	-	-	X	X
4	1	0	1	1	-	X	-	-
5	1	0	1	0	-	X	-	X
6	1	0	0	1	-	X	X	-
7	1	0	0	0	-	X	X	X
8	0	1	1	1	X	-	-	-
9	0	1	1	0	X	-	-	X
10	0	1	0	1	X	-	X	-
11	0	1	0	0	X	-	X	X
12	0	0	1	1	X	X	-	-
13	0	0	1	0	X	X	-	X
14	0	0	0	1	X	X	X	-
15	0	0	0	0	X	X	X	X

Note

- indicates no strapping, X indicates strapping to ground.

Table 5. Control and Monitor Word Sequence Designators.

SEQUENCE DESIGNATORS				SIGNIFICANCE
WORD 1	WORD 2	WORD 3	WORD 4	
0	4	8	C	Control word with request for status followup.
*1	5	9	D	Control word only -- no status followup desired.
**2	6	A	E	No command -- status followup only desired.

*Monitor words 1, 2, 3, and 4 contain sequence designators 1, 5, 9, or D respectively.
**These sequence designators are used to request monitor words 1, 2, 3, or 4 and must be followed immediately by the X (control word terminator), thereby bypassing the data characters in the control word structure.

Table 6. ASCII Character Codes.

4-BIT FUNCTION CODE				ASCII CHARACTER	ASCII CHARACTER 7-BIT CODE						
2^3 (8)	2^2 (4)	2^1 (2)	2^0 (1)		b_7	b_6	b_5	b_4	b_3	b_2	b_1
0	0	0	0	0	0	1	1	0	0	0	0
0	0	0	1	1	0	1	1	0	0	0	1
0	0	1	0	2	0	1	1	0	0	1	0
0	0	1	1	3	0	1	1	0	0	1	1
0	1	0	0	4	0	1	1	0	1	0	0
0	1	0	1	5	0	1	1	0	1	0	1
0	1	1	0	6	0	1	1	0	1	1	0
0	1	1	1	7	0	1	1	0	1	1	1
1	0	0	0	8	0	1	1	1	0	0	0
1	0	0	1	9	0	1	1	1	0	0	1
1	0	1	0	A	1	0	0	0	0	0	1
1	0	1	1	B	1	0	0	0	0	1	0
1	1	0	0	C	1	0	0	0	0	1	1
1	1	0	1	D	1	0	0	0	1	0	0
1	1	1	0	E	1	0	0	0	1	0	1
1	1	1	1	F	1	0	0	0	1	1	0
				*CR	0	0	0	1	1	0	1
				*LF	0	0	0	1	0	1	0
				*X	1	0	1	1	0	0	0
				*-	0	1	0	1	1	0	1
				*$	0	1	0	0	1	0	0

*Denotes special nonfunctional character

4.3.7.4.1 Control Word

In the following paragraphs the bit structure is shown for a typical control word. The control word is being sent to a receiver with an address of 15 and the sequence designator tells the receiver that this is a control word with a request for a status followup. The frequency the receiver will tune to is 27.548 300 MHz.

a. Word 1 (Frequency Control Word)

Note

The following characters are the same for all four control words so the format for these characters will only be shown for word 1:
Nonfunctional: # 1 (CR), #2 (LF), #3 (X)
Functional: #1 (A1), #2 (A2)

Nonfunctional character #1 — Set bits for carriage return (CR).

NONFUNCTIONAL CHARACTER #1						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	0	0	1	1	0	1

Nonfunctional character #2 — Set bits for line feed (LF).

NONFUNCTIONAL CHARACTER #2						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	0	0	1	0	1	0

Functional character #1 — Set bits to select MSD of address.

FUNCTIONAL CHARACTER #1								WILL ACCEPT	EXAMPLE
8		4		2		1			
0		0		A1		A1		0-3	1
									0 0 0 1

Functional character #2 — Set bits to select LSD of address.

FUNCTIONAL CHARACTER #2								WILL ACCEPT	EXAMPLE
8		4		2		1			
A2		A2		A2		A2		0-9	5
									0 1 0 1

Functional character #3 — Set bits for 0 to select sequence designator.

FUNCTIONAL CHARACTER #3								WILL ACCEPT	EXAMPLE
8		4		2		1			
NA		NA		NA		NA		0, 1, 2	1
									0 0 0 0

Functional character #4 — Set bits to select 10-MHz frequency.

FUNCTIONAL CHARACTER #4				WILL ACCEPT	EXAMPLE
8	4	2	1		
0	0	10 MHz	10 MHz	0, 1, 2	2
					0 0 1 0

Functional character #5 — Set bits to select 1-MHz frequency.

FUNCTIONAL CHARACTER #5				WILL ACCEPT	EXAMPLE
8	4	2	1		
1 MHz	1 MHz	1 MHz	1 MHz	0-9	7
					0 1 1 1

Functional character #6 — Set bits to select 100-kHz frequency.

FUNCTIONAL CHARACTER #6				WILL ACCEPT	EXAMPLE
8	4	2	1		
100 kHz	100 kHz	100 kHz	100 kHz	0-9	5
					0 1 0 1

Functional character #7 — Set bits to select 10-kHz frequency.

FUNCTIONAL CHARACTER #7				WILL ACCEPT	EXAMPLE
8	4	2	1		
10 kHz	10 kHz	10 kHz	10 kHz	0-9	4
					0 1 0 0

Functional character #8 — Set bits to select 1-kHz frequency.

FUNCTIONAL CHARACTER #8				WILL ACCEPT	EXAMPLE
8	4	2	1		
1 kHz	1 kHz	1 kHz	1 kHz	0-9	8
					1 0 0 0

Functional character #9 — Set bits to select 100-Hz frequency.

FUNCTIONAL CHARACTER #9				WILL ACCEPT	EXAMPLE
8	4	2	1		
100 Hz	100 Hz	100 Hz	100 Hz	0-9	3
					0 0 1 1

Functional character #10 — Set bits to select 10-Hz frequency. (Only used with receiver that can be tuned to 10 Hz or 1 Hz. Set to zeros for 100-Hz tuning.)

FUNCTIONAL CHARACTER #10				WILL ACCEPT	EXAMPLE
8	4	2	1		
10 Hz	10 Hz	10 Hz	10 Hz	0-9	0
					0 0 0 0

Functional character #11 — Set bits to select 1-Hz frequency. (Only used with receiver that can be tuned to 1 Hz. Set to zeros for 10-Hz and 100-Hz tuning.)

FUNCTIONAL CHARACTER #11								WILL ACCEPT	EXAMPLE
8		4		2		1			
1 Hz		1 Hz		1 Hz		1 Hz		0-9	0 0 0 0

Nonfunctional character #3 — Set bits for execute (X).

NONFUNCTIONAL CHARACTER #3						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
1	0	1	1	0	0	0

b. Word 2 (Mode Control Word)

Functional character #3 — Set bits to 4 to select sequence designator.

FUNCTIONAL CHARACTER #3								WILL ACCEPT	EXAMPLE
8		4		2		1			
NA		NA		NA		NA		4, 5, 6	0 1 0 0

Word 2 functional characters #4 and #5 provide approximately 3-dB gain reduction per step. All zeros code indicates maximum gain (no gain reduction), all ones code indicates minimum gain (maximum gain reduction, approximately 93 dB). From a remote control unit, the least significant bit, rf gain (1), is not controllable and is always zero. Therefore, only up to 16-bit wts (0 through 30, even numbered wts only) are available with approximately 6-dB gain reduction per step (maximum gain reduction, approximately 90 dB).

Functional character #4 — Set bit to enable rf gain bit wt 16 (example: bit wt 16)

FUNCTIONAL CHARACTER #4								WILL ACCEPT	EXAMPLE
8		4		2		RF GAIN 1			
0		0		0		(16)		0, 1	0 0 0 1

Functional character #5 — Set bits to enable rf gain bit wts 8, 4, 2, 1 (example: bit wt 13). When combined with functional character #4, provides up to 32-bit wts (0 through 31) rf gain control.

FUNCTIONAL CHARACTER #5								WILL ACCEPT	EXAMPLE
8		4		2		1			
RF GAIN (8)		RF GAIN (4)		RF GAIN (2)		RF GAIN (1)		0-9, A-F	1 1 0 1

Functional character # 6 — Set bits to enable vbfo, AFC, and AGC crowbar (example: vbfo and AFC are enabled, AGC crowbar is disabled).

FUNCTIONAL CHARACTER #6								WILL ACCEPT	EXAMPLE
8		4		2		1			
0		VBFO EN		AFC EN		AGC CROWBAR EN		0 - 7	6 0 1 1 0

Functional character #7 — Set bits to set AGC decay times of USB and LSB. Bit wts 1 and 2 correspond to LSB AGC fast and off rates, bit wts 4 and 8 correspond to USB AGC fast and off rates. Only one rate, fast or off, or neither rate (slow) can be present at any one time. AGC set as follows:

bcd wt 0 = AGC decay SLOW
1 = AGC decay FAST
2 = AGC OFF
(example: LSB AGC fast, USB AGC fast).

FUNCTIONAL CHARACTER #7								WILL ACCEPT	EXAMPLE
8		4		2		1			
USB AGC OFF		USB AGC FAST		LSB AGC OFF		LSB AGC FAST		0, 1, 2, 4, 5, 6, 8, 9, A	5 0 1 0 1

Word 2 functional characters #8 and #9 (filter enables) are associated with AM and SSB/CW modes. The FL8 bit in character #8 is a standard 16-kHz bandwidth filter, FL3 through FL7 are optional bandwidth filters (selected to suit specific requirements), FL2 is the channel B (or LSB) filter and can be part of the channel B if A7 or optional filter A8A2 (if A7 is not installed), and FL1 is the channel A (or USB) filter and is part of the channel A if A8.

Functional character #8 — Set bits to enable filter 8, 7, 6, 5 or none of these (example: none of these enabled).

FUNCTIONAL CHARACTER #8								WILL ACCEPT	EXAMPLE
8		4		2		1			
FL8 EN		FL7 EN		FL6 EN		FL5 EN		0, 1, 2, 4, 8	0 0 0 0 0

Functional character #9 — Set bits to enable filter 4, 3, 2, 1 or none of these (example: FL4 enabled).

FUNCTIONAL CHARACTER #9								WILL ACCEPT	EXAMPLE
8		4		2		1			
FL4 EN		FL3 EN		FL2 EN		FL1 EN		0, 1, 2, 4, 8	8 1 0 0 0

Functional character #10 — Set bits to select MODE (example: AM mode enabled).

FUNCTIONAL CHARACTER #10								WILL ACCEPT	EXAMPLE
8		4		2		1			
0		AM EN		SSB EN		CW EN		0, 1, 2, 4	4 0 1 0 0

Functional character #11 — Set bits to select ISB mode (example: ISB disabled).

FUNCTIONAL CHARACTER #11					WILL ACCEPT	EXAMPLE
	8	4	2	1		0
ISB EN	0	0	0		0, 8	0 0 0 0

c. Word 3 (VBFO Control Word)

Functional character #3 — Set bits to 8 to select sequence designator.

FUNCTIONAL CHARACTER #3					WILL ACCEPT	EXAMPLE
	8	4	2	1		8
NA	NA	NA	NA		8, 9, A	1 0 0 0

Functional characters #4 through #7 set vbfo offset frequency (example: +4500 Hz).

Functional character #4 — Set bit to set vbfo offset sign (0 = +, 1 = -, example: +)

FUNCTIONAL CHARACTER #4					WILL ACCEPT	EXAMPLE
	8	4	2	VBFO 1		0
0	0	0		SIGN	0, 1	0 0 0 0

Functional character #5 — Set bits to set vbfo offset 1 kHz (example: 4 kHz).

FUNCTIONAL CHARACTER #5					WILL ACCEPT	EXAMPLE
VBFO	8	VBFO 4	VBFO 2	VBFO 1		4
1 kHz		1 kHz	1 kHz	1 kHz	0-9	0 1 0 0

Functional character #6 — Set bits to set vbfo offset 100 Hz (example: 500 Hz).

FUNCTIONAL CHARACTER #6					WILL ACCEPT	EXAMPLE
VBFO	8	VBFO 4	VBFO 2	VBFO 1		5
100 Hz		100 Hz	100 Hz	100 Hz	0-9	0 1 0 1

Functional character #7 — Set bits to set vbfo offset 100 Hz (example: 00 Hz).

FUNCTIONAL CHARACTER #7					WILL ACCEPT	EXAMPLE
VBFO	8	VBFO 4	VBFO 2	VBFO 1		0
10 Hz		10 Hz	10 Hz	10 Hz	0-9	0 0 0 0

Functional characters #8 through #10 are not used and the bits are set to zero.

Functional character #11 — Set bits to enable vbfo tuning (example: vbfo tune enabled and vbfo parallel-tune enabled).

FUNCTIONAL CHARACTER #11								WILL		EXAMPLE			
	8	VBFO	4		2		1	ACCEPT		C			
VBFO TUNE		PAR EN		0		0		0, 4, 8, C		1	1	0	0

d. Word 4 (Key Control Word)

Contains only four functional characters. Functional characters #1 and #2 are identical to words 1, 2, and 3 as explained above.

Functional character #3 — Set bits to C to select sequence designator.

FUNCTIONAL CHARACTER #3								WILL		EXAMPLE			
	8		4		2		1	ACCEPT		C			
NA		NA		NA		NA		C, D, E		1	1	0	0

Functional character #4 contains no functional data and the bits are set to zero.

4.3.7.4.2 Monitor Word

In the following paragraphs the bit structure that differs from that of the control word is shown. The bit structure that is the same for the control and monitor words is noted. The address characters (functional characters #1 and #2) are the same as for the control word and will not be repeated here.

a. Word 1 (Frequency Monitor Word)

Note

The following characters are the same for all four monitor words so the format for these characters will only be shown for word 1:

Nonfunctional: #1 (-), #2 (-), #3 ($)

Nonfunctional character #1 — Set bits for hyphen (-).

NONFUNCTIONAL CHARACTER #1						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	1	1	0	1

Nonfunctional character #2 — Set bits for hyphen (-).

NONFUNCTIONAL CHARACTER #2						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	1	1	0	1

Functional character #3 — Set bits for 1 to select sequence designator.

FUNCTIONAL CHARACTER #3									WILL ACCEPT	EXAMPLE
NA		NA		NA		NA		1	1	1
	8		4		2		1			0 0 0 1

Functional characters #4 through #11 same as for control word 1 (paragraph 4.3.7.4.1.a).

Nonfunctional character #3 — Set bits for dollar sign ($)

NONFUNCTIONAL CHARACTER #3						
b^7	b^6	b^5	b^4	b^3	b^2	b^1
0	1	0	0	1	0	0

b. Word 2 (Mode Monitor Word)

Functional character #3 — Set bits for 5 to select sequence designator.

FUNCTIONAL CHARACTER #3									WILL ACCEPT	EXAMPLE
NA		NA		NA		NA		5	5	5
	8		4		2		1			0 1 0 1

Functional characters #4 through #11 same as for control word 2 (paragraph 4.3.7.4.1.b).

c. Word 3 (VBFO Monitor Word)

Functional character #3 — Set bits for 9 to select sequence designator.

FUNCTIONAL CHARACTER #3									WILL ACCEPT	EXAMPLE
NA		NA		NA		NA		9	9	9
	8		4		2		1			1 0 0 1

Functional characters #4 through #11 same as for control word 3 (paragraph 4.3.7.2.1.c).

d. Word 4 (Performance and Fault Monitor Word)

Word 4 contains performance monitor and fault information that can be used in a processor-controlled system to detect faults in the receiver or units controlled by the receiver, or to detect unsatisfactory performance in the receive signal path.

Functional character #3 — Set bits for D to select sequence designator.

FUNCTIONAL CHARACTER #3								WILL	EXAMPLE
	8		4		2		1	ACCEPT	D
NA		NA		NA		NA		D	1 1 0 1

Functional characters #4 and #5 are reserved and bits must be set to zeros.

Functional character #6 — AFC lock monitor, logic 1 when AFC is enabled and has acquired lock with an input signal; channel A af monitor, logic 0 indicates line audio output exceeds -10 dB of nominal AGC controlled output level (example: AFC lock is not locked and channel A audio output within monitor range).

FUNCTIONAL CHARACTER #6								WILL	EXAMPLE
AFC	8		4		2	CH A	1	ACCEPT	0
LOCK MON		0		0		AF MON		0, 1, 8, 9	0 0 0 0

Functional character #7 — If AGC monitors, logic 0 indicates signal level NLT 20 dB above AGC threshold; channel B af monitor, logic 0 indicates line audio output exceeds -10 dB of nominal AGC controlled output level (example: channel A AGC level less than 20 dB above AGC threshold; channel B audio output within monitor range; and channel B AGC level NLT 20 dB above AGC threshold).

FUNCTIONAL CHARACTER #7								WILL	EXAMPLE
CH A	8		4	CH B	2	CH B	1	ACCEPT	8
AGC MON		0		AF MON		AGC MON		0-3, 8, 9, A	1 0 0 0

Functional character #8 contains no functional data and the bits are set to zeros.

Functional character #9 — Receive overload monitor, logic 1 indicates rf input to the receiver antenna terminal exceeds 2 volts or, if operated with a preselector, the rf input signal exceeds the preselector rf input specifications; synthesizer fault, logic 1 indicates a loss-of-lock in any frequency synthesizer phase-locked oscillator; power supply fault, logic 1 indicates low voltage on any of the receiver power supply output voltages (except +5 V dc). This fault is latched and is cleared by changing the receiver frequency controls; receiver fault, logic 1 indicates a receiver fault (a summary of synthesizer fault, power supply fault, +5 V dc fault, and vbfo synthesizer fault) (example: receive overload, no faults).

FUNCTIONAL CHARACTER #9								WILL	EXAMPLE
RECEIVE	8	SYNTH	4	PWR SPLY	2	RECEIVER	1	ACCEPT	8
OVERLOAD		FAULT		FAULT		FAULT		0-9, A-F	1 0 0 0

Functional character #10 — Vbfo synthesizer fault, logic 1 indicates a loss-of-lock in vbfo synthesizer phase-locked oscillator circuits (example: no fault).

FUNCTIONAL CHARACTER #10								WILL		EXAMPLE
	8		4	VBFO SYNTH	2		1	-- ACCEPT	---	4
0		0		FAULT		0		0, 2		0 0 0 0

Functional character #11 — Preselector fault, logic 1 indicates fault; data error, logic 1 if any of the following errors exist — received character parity, framing error, overrun error, invalid character sequence; local control, logic 1 when CONT switch is LCL or MON position; monitor, logic 1 when CONT switch in MON position (example: no preselector fault, no data error, CONT switch in LCL position).

FUNCTIONAL CHARACTER #11								WILL		EXAMPLE
PRESEL	8	DATA	4	LOCAL	2		1	-- ACCEPT	---	2
FAULT		ERROR		CONTROL		MONITOR		0-9, A-F		0 0 1 0