

SECTION V MAINTENANCE

5.1 GENERAL

This section provides detailed procedures for conducting preventive maintenance, performance testing, fault isolation, and corrective maintenance on the RA6790/GM HF Receiver. The maintenance areas covered by these procedures include: inspection for damage and wear, cleaning and lubrication, performance tests, operational checkout and fault isolation, board level fault isolation, and receiver assembly and disassembly. Performance tests and Built-In Test Equipment (BITE) checkout procedures are presented in sufficient detail to allow fault isolation to the individual module/printed circuit board level. Routine application of preventive maintenance and performance test procedures will provide extended Receiver life, early indications of potential operating problems, and optimum Receiver performance. A recommended Preventive Maintenance Schedule is shown in Table 5-1.

TABLE 5-1. PREVENTIVE MAINTENANCE SCHEDULE

Procedure	Interval	Comments
Inspection for Damage or Wear	60 days	Interval variable depending on operating environment.
Cleaning	30 days	Interval variable depending on equipment use.
Lubrication	None	
Performance Tests	180 days	Interval variable depending on location/application requirements.

5.2 PREVENTIVE MAINTENANCE

The following paragraphs detail the preventive maintenance procedures to be used when servicing the RA6790/GM HF Receiver.

5.2.1 Inspection for Damage or Wear

Many potential or existing faults can be detected by making a visual inspection of the unit. For this reason, a complete visual inspection should be made on a routine basis and whenever the Receiver is inoperative. At a minimum, the following items should be visually inspected.

1. Inspect the equipment covers and front panel for condition of finish and panel marking.
2. Inspect for dents, punctures, or warped areas.
3. Inspect quarter-turn fasteners and receptacles.
4. Inspect the external surfaces for loose or missing screws or washers.
5. Inspect the receptacles for condition of pins, contacts, and mounting.

6. Inspect the internal components for signs of deterioration, discoloration, or charring. Check for melted insulation and damaged, cracked, or broken components.
7. Inspect the printed circuit boards for damaged tracks, loose connections, corrosion, or other signs of deterioration.
8. Inspect the PC connectors, interface connectors, and chassis wiring for excessive wear, looseness, misalignment, corrosion, or other signs of deterioration.

5.2.2 Cleaning and Lubrication

Cleaning

Cleaning should be performed to remove accumulated dust, grease, and other contamination, and to ensure trouble-free operation.

CAUTION

Avoid the use of chemical cleaning agents containing benzene, toluene, xylene, acetone, or similar solvents. These chemicals may damage the plastics used in this Receiver.

1. **Exterior** – Dust the cabinet off with a soft cloth. Dust the front panel controls with a small-bristled paint brush. Dirt clinging to the cabinet may be removed with a clean, lint-free cloth dampened with a mild detergent and water solution. Avoid using abrasive cleaners. They will scratch the front panel.
2. **Interior** – Dust in the interior of the unit should be removed before it builds up enough to cause arcing and short circuits during periods of high humidity. Dust is best removed by dry, low-pressure air. Dirt clinging to surfaces may be removed with a soft-bristled paint brush or a clean, lint-free cloth dampened with a mild detergent and water solution. Use a cotton-tipped applicator for cleaning in narrow spaces and on the circuit boards.
3. **Switch Contacts** – When maintenance is necessary due to accumulated dirt and dust on the contacts, observe the following precautions: Clean the switch contacts with isopropyl alcohol or a mild detergent solution. Avoid cleaning solutions containing benzene, acetone, or similar solvents.

Lubrication

Lubrication is unnecessary in the Receiver. If the main tuning shaft appears to be binding during rotation in either direction, perform the following:

1. Disconnect receiver power source.
2. Loosen and remove the tuning knob.
3. Loosen the six (6) quarter-turn fasteners and remove the receiver top and bottom covers.
4. Remove the receiver front panel as directed in Paragraph 5.7, Assembly and Disassembly.

5. Loosen both tuning-shaft retainer nuts (one located behind tuning knob, the other located behind tuning-shaft encoding wheel).
6. Retighten tuning-shaft retainer nuts finger tight only.

CAUTION

Overtightening tuning-shaft retainer nuts may cause damage to tuning assembly and the A9 module.

7. Reinstall tuning knob and flywheel and retighten screws.
8. Check for smooth, free operation of tuning knob.
9. Reinstall the receiver front panel as directed in Paragraph 5.7, Receiver Assembly and Disassembly.
10. Reinstall receiver top and bottom covers and retighten six (6) quarter-turn fasteners.
11. Reconnect power source.

5.3 MAINTENANCE SUPPORT EQUIPMENT

Certain procedures involved with both performance testing and board-level fault isolation may require the use of external test equipment to supplement BITE. Table 5-2 lists suggested test equipment by type and required operational characteristics. Not all test equipment listed is required for any one procedure. Equipment required for a particular test is specified in the procedure for that test.

TABLE 5-2. MAINTENANCE SUPPORT EQUIPMENT

Instrument	Specifications	Recommended Instrument or Equivalent
Digital Multimeter	Range: 0 to 150 Vac and dc 0 to 1 A ac and dc Display: 3½ digits Accuracy: ±L.S. digit	Fluke 8000A-01
Oscilloscope, Dual Trace	Sensitivity: 5 mV/div. Frequency: dc to 2 MHz	Tektronix 465B
Oscilloscope, Probe	—	Tektronix P6105X10
RF Voltmeter	Range: 300 mV to 3 Vrms Frequency: 100 kHz to 70 MHz Input Impedance: > 1 M ohm with 50 ohm adapter	Boonton 92-B
Distortion Analyzer	Distortion Levels: 0.1 to 100% Frequency: 5 Hz to 600 kHz Voltage Range: 300 uV to 300 Vrms Voltage Accuracy: ±2% up to 300 kHz	Hewlett-Packard 331A

TABLE 5-2. MAINTENANCE SUPPORT EQUIPMENT (Cont.)

Instrument	Specifications	Recommended Instrument or Equivalent
Digital Frequency Counter	Frequency Range: 0 to 50 MHz Sensitivity: 0.1 Vrms, 0.3 V pulse @ 8 ns min. p.w. Impedance: 1 M ohm Accuracy: 1 part in $10^6 \pm 1$ count	Hewlett-Packard 5340A
Signal Generator	Frequency Range: 500 kHz to 100 MHz Accuracy: $\pm 0.5\%$ of dial setting Stability: < 10 parts in 10^6 Output Level Range: -140 dBm to ± 10 dBm Modulation: AM -0 to 100% FM ± 150 kHz @ 30 MHz Output Impedance: 50 ohms	Hewlett-Packard 8640B
RF Probe	-	Boonton 91-12F
50 ohm Adapter	-	Boonton 91-8B
Step Attenuator	-	Kay Electric 432-D
Headphone Set	600 ohm	Racal/Amplivox V31B
Audio Junction Box	-	Racal A08047
W-12 Cable Assembly	-	Racal C08556-2
Adapter	BNC Female to SMB Male	-
RF Test Cables, Standard	BNC Male, both ends, 5' length, quantity 4	-

5.4 RA6790/GM OPERATIONAL CHECKOUT AND FAULT ISOLATION PROCEDURE

Operational checkout of the RA6790/GM HF Receiver must be approached using a symptom/ diagnostic analysis to augment the results of BITE test procedures. Since BITE is not a panacea for all electromechanical problems, a degree of interpretation is necessary by maintenance personnel. The scope of the analysis must include the conditions that preceded the use of BITE in addition to those during and following its use. Interpretation of the results will, with a probability of greater than 90%, verify the operational readiness status of the Receiver or isolate a receiver fault to a specific board. Both verification and fault isolation depend upon careful observation of all symptoms starting with the initial step of energizing the Receiver. Further, for fault isolation, certain assumptions must be made in order to facilitate an intelligent assessment. These assumptions are: (1) the previous configuration of the Receiver is correct, i.e., filter complement installed correctly, system interfaces properly connected; (2) the Receiver was properly installed in an operational position (station); (3) the Receiver was functioning correctly prior to the occurrence of the fault; and (4) all connections, connectors, cables and components had been checked for correct placement, continuity and tightness.

The following procedures detail verification and fault isolation.

5.4.1 Initial Check

1. Verify that the PC wafer in A10 J1 on receiver rear panel matches available line voltage.
2. Energize Receiver by turning POWER ON switch to "ON" position.
3. Observe edge lighting and Liquid Crystal Displays (LCDs). If edge lighting is present and LCD displays contain data, there is a reasonable confidence factor (80%) that the Power Supply (A10) is working properly. Proceed to step 4.

IF: a. Edge lighting is not present, the +15 volts from the A10 is malfunctioning. Check this voltage through to A10 and correct the malfunction.

- b. Edge lighting is present, frequency display contains mostly zeroes, and no mode indication is present, either the wafer does not match available line voltage, or the A6A2 Microcomputer Assembly is faulty and should be replaced.

4. Depress the LOCAL/REMOTE pushbutton switch on the front panel. The LCD display should indicate a change in receiver control from no display to REMOTE or vice versa. Repeated pressing of the LOCAL/REMOTE pushbutton switch should alternate the display between no display and REMOTE indications.

IF: a. The Receiver indicates that it is in the REMOTE mode, and depressing the LOCAL/REMOTE pushbutton does not change the display, either the A6A2 Microcomputer Assembly or the A9 Front Panel Assembly is faulty and must be replaced.

- b. The receiver display does not indicate that it is in REMOTE, further isolation is possible. Depress the METER RF/AF pushbutton switch. The meter display should change correspondingly. If it does change, the REMOTE/LOCAL pushbutton switch is probably bad and the A9 Front Panel Assembly should be replaced. If the meter display does not change, initialize the Receiver by depressing the LOCK and AM pushbuttons simultaneously and allow the Receiver to initialize (approximately one minute). Once again attempt to change from LOCAL to REMOTE and back; and from RF to AF meter indications. If the display still will not change, the fault is probably on the A6A2 Microcomputer Assembly which should be replaced.

NOTE

Once steps 1 through 4 have been successfully accomplished, it can be assumed with 60% confidence that both the A6A2 Microcomputer and the A9 Front Panel Assemblies are functional. To increase the confidence factor, perform step 5.

5. Ensure that the Receiver is under LOCAL control (indicated by absence of REMOTE in LCD display). Depress the ENTER pushbutton switch momentarily, followed by

numerals 12345678. These numerals should appear as 12.345678 on the frequency LCD. If this display is correct, then a confidence factor of 99% can be assumed regarding the total reliability of the A6A2 Assembly and a confidence factor of 60% for the A9 Assembly.

6. Ensure that the Receiver is under LOCAL control. If MAN is not displayed in LCD, momentarily depress the MAN pushbutton on the front panel to achieve Manual IF gain control. Once MAN is visible on the LCD, ensure that SHORT, MED, or LONG are not present in the display. If any of these three indications are present, momentarily depress the corresponding SHORT, MED, or LONG pushbutton on the front panel to remove the indication from the display.

When set up correctly, only the MAN display should be present in the LCD. Also, ensure that the meter indication is set for RF level. Once this condition has been attained, slowly rotate the IF GAIN potentiometer on the front panel from the full clockwise to full counter-clockwise positions and back again while observing the RF level meter display in the LCD. The RF level display should range from zero (no indication) to full scale and back again to zero. If this range is not attainable, then either the A4 Main IF Assembly (60% probability) or the A9 Front Panel Assembly (40% probability) is at fault and should be replaced.

NOTE

Failure to attain the desired range definitely indicates that proceeding with the BITE checks is useless until the problem is corrected. On the other hand, full range indication demonstrates that the A4 Main IF measurement system used by BITE is functional and BITE checks will yield useful results.

Since steps 1 through 6 are prerequisite to successful BITE testing, BITE may now be effectively applied.

5.4.2 BITE Check

1. Ensure that the initial Check Procedures (Paragraph 5.4.1) have been successfully accomplished.
2. Momentarily depress the LOCK and AM pushbuttons on the front panel. The Receiver will enter its BITE check mode as indicated by (1) the appearance of REMOTE in the LCD display; (2) the rapidly changing frequencies, modes, and LCD displays on the front panel, and (3) the presence of rapidly changing AF tones and sounds (if AF is being monitored). BITE performs checkout procedures on the following assemblies:
 - A2 – First Mixer
 - A3 – Second Mixer
 - A4 – Main IF/AF
 - A5 (if installed) – ISB
 - A6A2 (memory portion) – Microcomputer
 - A7 – First and Third LO Synthesizers
 - A8 – Second LO Synthesizer
 - IF Bandwidth Filters

NOTE

By observing the frequency display LCD, it is possible to isolate a fault to the board level by noting BITE error code(s) which appear in that display.

3. If an error code does appear in the frequency LCD (this will consist of a two-digit number) refer to Table 5-3, BITE Error Code Identification. If more than one board is identified as a suspected fault, depress and release the LOCK and CW pushbuttons simultaneously and observe the display. A subsequent number will appear which, when considered along with the number which first appeared should identify the faulty board.
4. Replace the faulty board and repeat steps 1 through 3 until no further faults are indicated by BITE. (This will be indicated by the exit from REMOTE and the return of the Receiver to its pre-BITE status.)

Successful completion of Paragraphs 5.4.1 and 5.4.2 verify the operational readiness status of all boards except:

A1 Low Pass Filter

A6A1 Remote Interface

Audio portions of A4 Main IF/AF and A5 ISB (if installed)

TABLE 5-3. BITE ERROR CODE IDENTIFICATION

Displayed Error	Description	Probable Fault
01	First Local Oscillator synthesizer not locked after 100 milli-second delay from 500 kHz step change.	A7
02	Second Local Oscillator (reference) synthesizer not locked.	A8
03	First Local Oscillator synthesizer does not break lock to enter fast sampling mode on 500 kHz step change.	A7
04	Third Local Oscillator synthesizer not locked after 100 milli-second delay from 500 kHz step change.	A8
05	Third Local Oscillator synthesizer not locked after 100 milli-second delay from 500 kHz and 500 Hz step change, respectively. 03 and 05 indicates A7 fault; 04 & 05 by itself indicates A8 fault.	A8, A7
06	Filter slot one contains a symmetrical filter, but there is/are SSB filter(s) also in the system.	Wrong or bad filter.
07	Filter slot one contains an upper sideband filter. ISB operation, if installed, will be impaired.	Wrong or bad filter.
08	No USB filter has been found in the system, and filter slot one does not contain a symmetrical filter.	Wrong or bad filter.
09	Too many symmetrical filters installed in the system.	Check filters installed.
10	Not used.	

TABLE 5-3. BITE ERROR CODE IDENTIFICATION (Cont.)

Displayed Error	Description	Probable Fault
11	No LSB filter has been found in the system and filter slot one does not contain a symmetrical filter.	Wrong or bad filter.
12	No symmetrical filters have been found in the system.	Wrong or bad filter.
13	Filter slot one does not contain a lower sideband filter, but ISB is installed. If ISB is installed and no 13 error, A5 is functional.	Wrong or bad
14	Random access memory test failure: Data written to memory different from data read back.	A6A2
15	Either no filters are installed in the system, or the synthesizer signal strength is out of range prescribed for BITE.	A2
<p>NOTE</p> <p>If no 15 error, A2, A3, and A4 are fully functional.</p>		
16	Filter slot one contains no filter.	Wrong or bad filter.
17	Two or more LSB filters have been found in the system.	Wrong or bad filters.
18	Two or more USB filters have been found in the system.	Wrong or bad filters.
19	Although a lower sideband filter has been found in this system, it is not installed in filter slot one. ISB operation, if installed, will be impaired.	Wrong or bad
20	Not used.	
21	Filter in filter slot one is skewed from the IF center frequency.	*Wrong or bad filter.
22	Filter in filter slot two is skewed from the IF center frequency.	*Wrong or bad filter.
23	Filter in filter slot three is skewed from the IF center frequency.	*Wrong or bad filter.
24	Filter in filter slot four is skewed from the IF center frequency.	*Wrong or bad filter.
25	Filter in filter slot five is skewed from the IF center frequency.	*Wrong or bad filter.

TABLE 5-3. BITE ERROR CODE IDENTIFICATION (Cont.)

Displayed Error	Description	Probable Fault
26	Filter in filter slot six is skewed from the IF center frequency.	*Wrong or bad filter.
27	Filter in filter slot seven is skewed from the IF center frequency.	*Wrong or bad filter.
28	Not used.	
29	Not used.	
30	Not used.	
<p>NOTE 31 through 37; 80% probability of bad filter. 30% probability A4 board.</p>		
31	BITE frequency sweep underflowed while attempting to measure bandwidth of filter installed in filter slot one.	Bad filter, A4
32	BITE frequency sweep underflowed while attempting to measure bandwidth of filter installed in filter slot two.	Bad filter, A4
33	BITE frequency sweep underflowed while attempting to measure bandwidth of filter in filter slot three.	Bad filter, A4
34	BITE frequency sweep underflowed while attempting to measure bandwidth of filter installed in filter slot four.	Bad filter, A4
35	BITE frequency sweep underflowed while attempting to measure bandwidth of filter installed in filter slot five.	Bad filter, A4
36	BITE frequency sweep underflowed while attempting to measure bandwidth of filter installed in filter slot six.	Bad filter, A4
37	BITE frequency sweep underflowed while attempting to measure bandwidth of filter installed in filter slot seven.	Bad filter, A4

*Synthesizers off frequency or wrong or bad filters.

5.4.3 A1 Low Pass Filter Check

1. Connect a suitable antenna to the RF IN jack, J1 on the receiver rear panel.
2. Tune the Receiver to a known local AM broadcast station.

3. Verify reception of the signal by connecting a suitable speaker or headphones. If the station is not heard (confirm that the station is on the air), observe the RF level meter on the Mode LCD. If the signal strength meter (RF level) has no level indication, the A1 Low Pass Filter Module is defective and should be replaced.

5.4.4 A4 Main IF/AF (AF Section) Check

If the RF level meter indicates a signal is present as specified in Paragraph 5.4.3, adjust the front panel MAIN LINE LEVEL potentiometer (screwdriver - set) to determine if the signal can be observed at Line 1 out (J3). If the signal cannot be found the A4 Main IF/AF board (AF portion) is faulty and the A4 must be replaced.

5.4.5 A5 ISB (AF Section) Check (if installed)

Tune to a known local AM station. Depress the ISB pushbutton and listen for the presence of the signal. If the signal cannot be heard, adjust the ISB LINE LEVEL potentiometer (screwdriver adjust) on the front panel to determine if the signal can be heard or observed at Line 1 or Line 2 out (J3). If not found, the A5 ISB (AF portion) is faulty and A5 must be replaced.

5.4.6 A6A1 Remote Serial Asynchronous Interface Check (if installed)

1. Ensure that all previous paragraphs have been successfully accomplished.
2. Connect a suitably wired remote terminal to the Receiver via connector A6A1W1J1 on the rear panel.
3. Enter \$99GCR on the terminal keyboard and observe the results on the remote display. If data is displayed, A6A1 is functional. If data is not displayed, A6A1 is faulty and must be replaced.

NOTE

99 represents the receiver number. If the receiver number is different, enter the desired number instead of 99.

This completes the Operational Checkout and Fault Isolation Procedures for the RA6790/GM Receiver.

5.5 RA6790/GM PERFORMANCE TESTS

RA6790/GM performance tests can be most effectively carried out if the technician gains some degree of familiarization with the operating instructions and circuit descriptions provided in Sections III and IV, respectively. Parts lists and component location diagrams are located in Section VI.

These performance test procedures may be used for initial inspection, periodic checks and to confirm performance specifications after repairs have been made. These tests determine Synthesizer performance, Audio Power and Distortion, Gain Modes, and Final IF Frequency. The tests should be conducted only by skilled technicians using the equipment listed in Table 5-2.

All tests should be conducted using Figure 5-1 as a standard test set-up. Equipment should be allowed a warm-up period of at least 30 minutes prior to conducting the test. If the Receiver does not satisfactorily pass a test, refer to Paragraph 5.6, Board Level Fault Isolation.

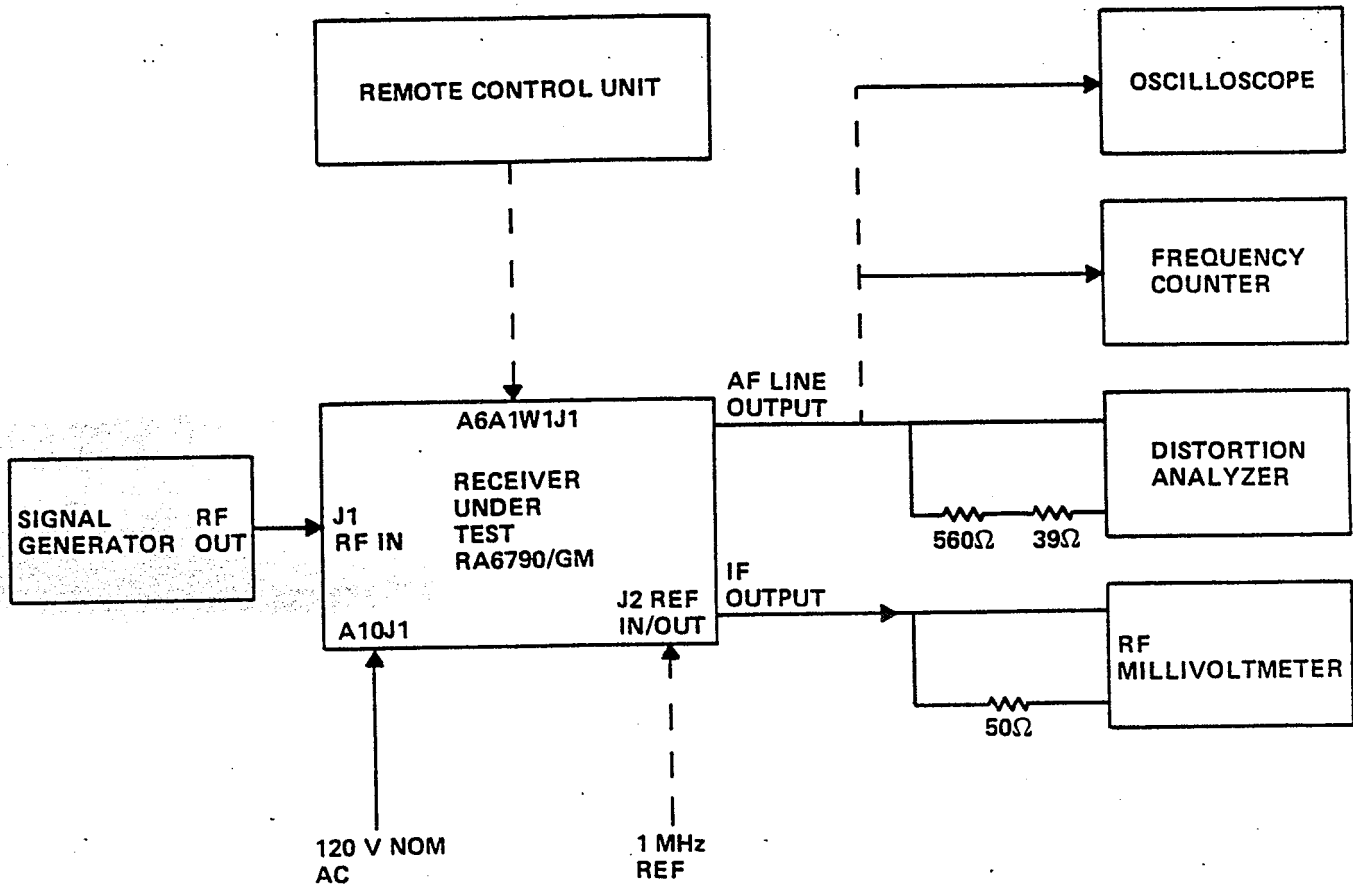


Figure 5-1. Standard Test Equipment Configuration

5.5.1 Frequency Tuning

1. Connect the Receiver and test equipment as shown in Figure 5-1.
2. Set the Receiver as follows:
 - a. Frequency As required in Table 5-4
 - b. Mode CW
 - c. BFO 1000 Hz
 - d. AGC Short
 - e. Bandwidth 5 kHz (or closest bandwidth available)
3. Set the signal generator as follows:
 - a. Frequency As required in Table 5-4
 - b. Level -60 dBm, unmodulated
4. Set the Receiver and generator to the frequencies listed in Table 5-3. Ensure that the output frequency indicated by the counter remains within the limits $1 \text{ kHz} \pm 10 \text{ Hz}$ at each setting.

TABLE 5-4. TUNED FREQUENCIES

Receiver/Generator Tuned Frequency	AF Output
00.500000 MHz	1000 \pm 10 Hz
01.000000	1000 \pm 10 Hz
11.111111	1000 \pm 10 Hz
22.222222	1000 \pm 10 Hz
23.333333	1000 \pm 10 Hz
24.444444	1000 \pm 10 Hz
25.555555	1000 \pm 10 Hz
26.666666	1000 \pm 10 Hz
27.777777	1000 \pm 10 Hz
28.888888	1000 \pm 10 Hz
29.999999	1000 \pm 10 Hz

5.5.2 Frequency Display

1. Set up the equipment as in Figure 5-1.
2. Set the signal generator as follows:
 - a. Frequency 1.5 MHz
 - b. Mode CW
 - c. Level -100 dBm
3. Tune the Receiver to 1.5 MHz using manual gain mode, 3.24 kHz BW; CW; at -1.8 kHz BFO offset.
4. Ensure that frequency readout display is clearly visible from a distance of 3 feet.

5. Ensure that it is possible to tune another frequency in the same frequency band.
6. Select tuning LOCK and ensure that frequency is not changed by further rotation of tuning knob.

5.5.3 Frequency Stability

1. Connect the frequency counter to the output of REF IN/OUT J2.
2. Ensure that the output frequency is $1 \text{ MHz} \pm 1 \text{ Hz}$.

5.5.4 Frequency Calibration Resolution

Connect the frequency counter to internal standard (A8TP10).

Ensure that the internal standard is $5 \text{ MHz} \pm 1 \text{ Hz}$.

5.5.5 RF Gain Control

1. Set up the equipment as in Figure 5-1.
2. Set the Receiver controls as follows:

a. Power	ON
b. Gain Mode	Manual
c. Detection Mode	CW
d. BW	3.24 kHz
3. Set the signal generator for an output of 1.5 MHz at -100 dBm , CW. Connect the signal generator to RF IN connector J1 on rear panel.
4. Using the remote controller, adjust the manual gain control on the Receiver fully clockwise and adjust the line level control for 1 mW output on distortion analyzer.
5. Adjust the manual gain control on the remote control device one step down and check whether or not the AF output falls by $3 \pm 1.5 \text{ dB}$.
6. Increase signal generator level to 1 mW and repeat step 5 until manual gain is at minimum.
7. Restore the 1 mW reference at the minimum manual gain and note the signal generator level. This should be greater than -10 dBm .

5.5.6 Final IF Frequency

1. Set up the equipment as shown in Figure 5-1.
2. Set the Receiver controls as follows:

a. Power	ON
b. Gain Mode	AGC-SHORT
c. BW	3.2 kHz
d. Receiver Tuned Frequency	1.5 MHz
e. Detection Mode	CW

3. Set the signal generator for an output of 1.5 MHz, CW at a level of -100 dBm.
4. Note the IF output level indicated on the RF voltmeter.
5. Remove the 50 ohm load from the IF output and observe that the indicated output voltage increases by 6 dB \pm 1 dB.
6. Connect the frequency counter to IF output jack J2 and measure the IF frequency. This should be 455.000 kHz.

5.5.7 Fixed and Variable BFO Operation

1. Set the receiver controls as follows:
 - a. Power ON
 - b. Gain Mode N/A
 - c. Detection Mode CW
 - d. BW N/A
 - e. BFO ON (word BFO displayed in Mode LCD)
2. Disconnect the A4 module by removing W10P1.
3. Connect the frequency counter to A4J6 to monitor the BFO frequency.
4. Using the receiver front panel controls, select each BFO indication listed in BFO Indicator column of Table 5-5 and verify the frequencies listed in BFO Frequency Column are obtained.
5. Select USB and LSB modes and observe the BFO frequency is 455.000 kHz. (SSB/ISB receivers fitted with 08409 and 08410 option filters only.)
6. Disconnect frequency counter and reconnect W10P1 to A4 module.

TABLE 5-5. BFO Test Values

BFO Indicator	BFO Frequency
0.00 kHz	455.000 kHz
+1.11	453.890
2.22	452.780
3.33	451.670
4.44	450.560
5.55	449.450
6.66	448.340
7.88	447.120
7.99	447.010
-1.11	456.110
-2.22	457.220
-3.33	458.330
-4.44	459.440
-5.55	460.550
-6.66	461.660
-7.77	462.770
-7.88	462.880
-7.99	462.990

5.5.8 Audio Output Power

1. Set up test equipment as shown in Figure 5-1.
2. Set receiver controls as follows:
 - a. Power ON
 - b. Gain Mode AGC-SHORT
 - c. BW 3.24 kHz
 - d. Detection Mode CW
 - e. Receiver Tuned 1.5 MHz
Frequency
3. Set the signal generator for an output of 1.5 MHz at -97 dBm, CW.
4. Tune the signal generator (or receiver) to produce an AF output of 1.8 kHz ± 50 Hz as indicated on the Frequency Counter.
5. Set the AF output level to 1 milliwatt using the LINE LEVEL control on the receiver front panel and phone output.
6. Select receiver bandwidth of 6.8 kHz and AM detector mode. Amplitude modulate the input signal 30% at 1 kHz.
7. Observe that the AF output level is within 5 dB of the reference set in step 5 for both line output and phone output.
8. Slowly rotate the AF gain control through the control range. Observe that the phone output level varies smoothly over the full control range.

5.5.9 Audio Distortion

1. Set up the equipment as shown in Figure 5-1.
2. Set receiver controls as follows:
 - a. Power ON
 - b. Gain Mode Manual Gain
 - c. Detection Mode CW
 - d. BW 3.24 kHz
 - e. BFO -1.00 kHz
 - f. Receiver Tuned 1.5 MHz
Frequency
3. Set the signal generator for an output of 1.5 MHz at -47 dBm, CW.
4. Adjust manual gain control for 1 mW output. Measure distortion. Distortion should be less than 2%.
5. Connect phone output from receiver front panel to distortion analyzer and adjust phone output for 10 mW. Measure distortion. Distortion should be less than 3%.

5.5.10 Operation After Restoration of Power

1. Carefully note the receiver tuned frequency, BW and other displayed functions on receiver front panel and de-energize the Receiver.
2. After $\frac{1}{2}$ hour energize the Receiver and ensure that the Receiver returns to the display noted in step 1.

5.6 BOARD LEVEL FAULT ISOLATION

Figure 5-2 shows signal flow between individual circuit cards, and the jacks and/or test points for measuring signal values. This information, along with the BITE check detailed in Paragraph 5.4.2 and the Performance Tests detailed in Paragraph 5.5 should be used in isolating malfunctions to the board level. Receiver settings, signal generator settings, and connector pin location diagrams are shown as part of Figure 5-2. The following procedures should be used to perform signal level tests:

1. Set signal generator outputs as specified in Figure 5-2.
2. Set receiver front panel controls as specified in Figure 5-2.
3. Measure values indicated at each jack or test point using appropriate test equipment.
4. Tolerances are: ± 3 dBm; ± 0.5 volts.

Once a fault has been isolated, the faulty circuit card should be replaced in accordance with the Receiver Assembly and Disassembly procedures detailed in Paragraph 5.7; and receiver proper operation verified. Verification is accomplished by performing BITE check (Paragraph 5.4.2) and Performance Tests (Paragraph 5.5).

5.7 RECEIVER ASSEMBLY AND DISASSEMBLY PROCEDURES

The following paragraphs outline the procedures for removal and installation of the individual circuit card assemblies used in the RA6790/GM HF Receiver. A complete list of these assemblies is contained in SECTION VI, Replacement Parts List, of this instruction manual.

5.7.1 Preliminary Procedure

Prior to removing or installing any assembly it is necessary to disconnect the Receiver from its power source. It is also necessary to remove the Receiver from the system (except to replace the fuse).

NOTE

Ensure that all system cables are disconnected from the Receiver prior to removing the Receiver from its mounts. Place the Receiver on a suitable work space large enough to allow for positioning the Receiver either horizontally or vertically as required for removal of the desired board. The only tools required for LRU removal or installation are a flat-blade screwdriver and a screw starter. Adequate light should be available for ease in reading internal cable, jack, and connector numbers, and for aligning LRU mounting holes with corresponding mounting fixtures on the receiver chassis.

CAUTION

Do not expose the Receiver to direct ultraviolet light while performing the following steps. Such exposure may cause erasure of data stored in the EPROMS.

5.7.2 Top and Bottom Covers

If boards A2, A3, A7, or A8 are to be removed or installed, only the receiver's bottom cover must be removed for access. If boards A4, A5, A6A1, A6A2 or A10 are to be removed or installed,

only the receiver's top cover must be removed for access. If boards A1 or A9 are to be removed or installed, both the receiver's bottom and top covers must be removed for access. The procedure for removing either cover is as follows:

1. Position the Receiver horizontally so that the cover to be removed is up.
2. Loosen (counterclockwise) the six (6) ¼ turn fasteners located on the cover.
3. Carefully lift the cover by its edges and remove it from the Receiver.

Installation of either cover is as follows:

1. Position the cover on the Receiver so that the six (6) ¼ turn fasteners on the cover align with their mounting holes on the Receiver, and so that the front edge of the cover is inserted into the slot on the rear of the front panel.
2. Apply a small amount of hand pressure to the cover to engage the fastener with its mount.
3. Tighten (clockwise) the six (6) fasteners ¼ turn.

5.7.3 A1 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove both the receiver top and bottom covers as directed in Paragraph 5.7.2.
3. Disconnect SMB connector A1W2P1 from J5 on the receiver frame.
4. Disconnect BNC connector A1W1J1 from J1 (the RF IN jack) on the rear panel.
5. Stand the Receiver on its side.
6. Working from the bottom of the Receiver, loosen and remove the two screws and hardware from the ends of the A1 module.

CAUTION

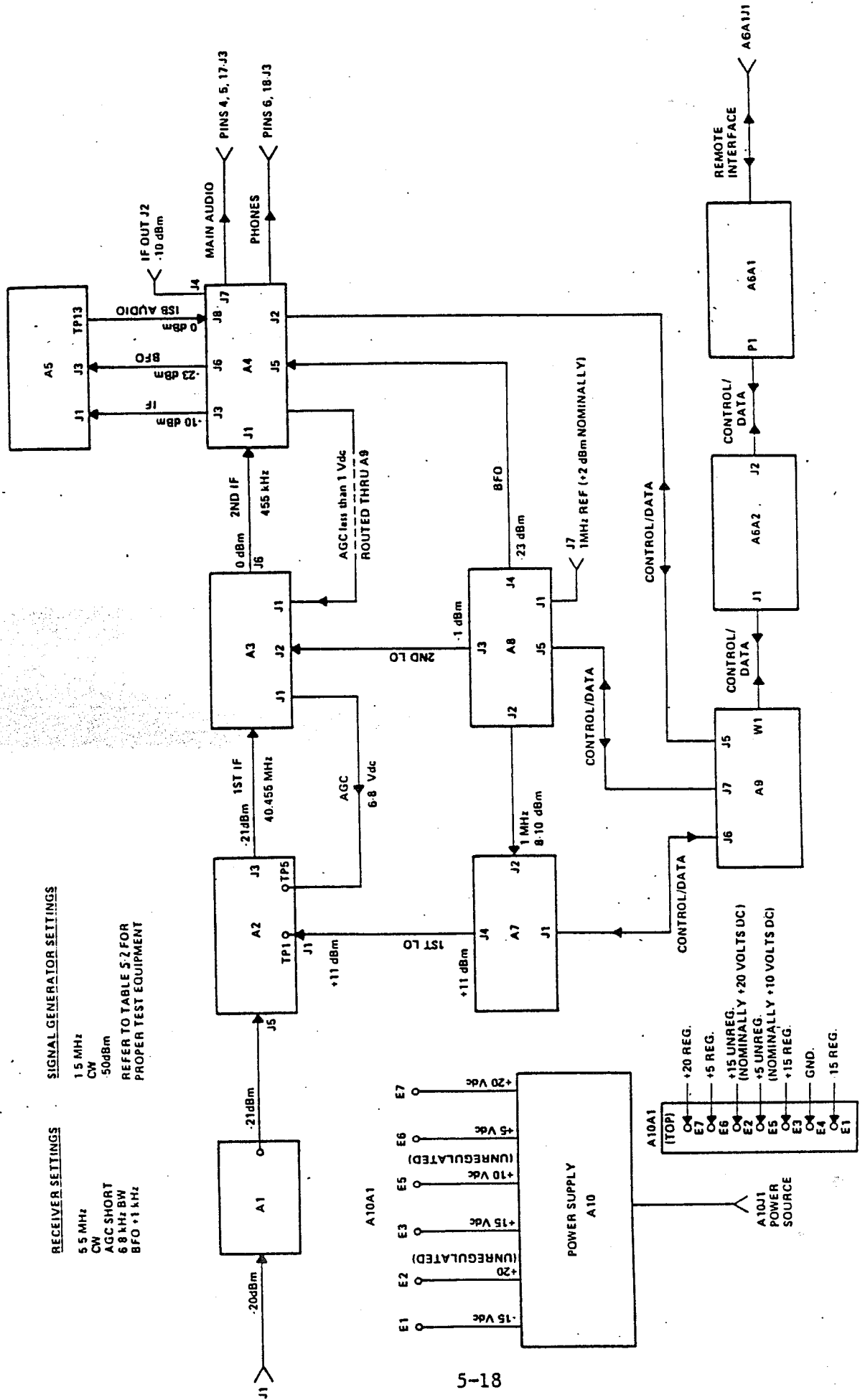
Do not allow the A1 module to drop when the screws are removed. Failure to do so may cause damage to the A1 module or to the Receiver.

7. Carefully lift out the A1 module from the top of the Receiver.

5.7.4 A1 Module Installation

Installation is the reverse of removal with the following notes:

1. The end of the A1 module marked "IN", when positioned correctly, is mounted on the mount nearest S2 (EXT-INT REF switch).
2. When installing the mounting screw at the "IN" end, ensure that the ground lug on the A1W1J1 cable is placed inside the A1 module between the A1 cover and the threaded mount, and that the mounting screw goes through the lug.



NOTE: ALL REGULATED VOLTAGES ARE ±5%

Figure 5-2. Typical Signal Levels, KA6790/GM HF Receiver

5.7.5 A2 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver bottom cover as directed in Paragraph 5.7.2.
3. Remove the six (6) screws and hardware which holds down the A2 module cover.
4. Remove the A2 module cover.
5. Disconnect eight-pin connector W21P1 from A2J2.
6. Disconnect SMB connector W2P1 from A2J1.
7. Disconnect SMB connector W1P1 from J5 on the receiver frame.
8. Disconnect SMB connector A3W1P1 from A2J3.
9. Loosen and remove the six (6) screws and hardware which hold down the A2 module.
10. Lift out the A2 module tipping it slightly to avoid bumping the module against J5 and the four (4) feed-through capacitors located on the side of the receiver frame.

CAUTION

Bumping J5 or the capacitors may cause damage to the A2 module printed circuit track or components.

5.7.6 A2 Module Installation

Installation of the A2 module is the reverse of removal with the following notes:

1. Ensure cable W2P1 is located near the notch in the receiver frame when installing the module.
2. Ensure that the cable connected to W2P1 (coming from the A7 module area) is routed through the notch on the edge of the receiver frame. Failure to do so may result in damage to the cable.

5.7.7 A3 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver bottom cover as directed in Paragraph 5.7.2.
3. Using the pull-tab on the A3 module cover, carefully remove the A3 cover.
4. Disconnect eight-pin connector W22P1 from A3J1.
5. Disconnect SMB connector A3W2P1 from J6 on the receiver frame.
6. Disconnect SMB connector W4P1 from A3J2.
7. Loosen and remove the six (6) screws and hardware which hold down the A2 module cover.

8. Remove the A2 module cover.
9. Disconnect SMB connector A3W1P1 from A2J3 on the A2 module.
10. Loosen and remove the six (6) screws and hardware which hold down the A3 module.
11. Lift out the A3 module tipping it slightly to avoid bumping the module against J2 and the five (5) feed-through capacitors located on the side of the receiver frame.

CAUTION

Bumping J6 or the capacitors may cause damage to the A3 module printed circuit track or components.

5.7.8 A3 Module Installation

Installation of the A3 module is the reverse of removal with the following note:

NOTE

Ensure cable A3W1P1 is located near the notch in the receiver frame when installing the module.

CAUTION

Ensure cable A3W1P1 is routed through the notch in the frame prior to installation of both the A2 and A3 module covers. Failure to do so may result in damage to the cable.

5.7.9 A4 Module Removal

1. Perform the Preliminary Procedures as directed in Paragraph 5.7.1.
2. Remove the receiver top cover as directed in Paragraph 5.7.2.
3. Remove the Bandwidth Filter cover and Bandwidth filters as directed in Paragraph 5.7.25.1.
4. Disconnect SMB connector W1P2 from A4J1.
5. Disconnect SMB connector W11P1 from A4J3.
6. Disconnect SMB connector W12P1 from A4J4.
7. Disconnect SMB connector W6P2 from A4J5.
8. Disconnect SMB connector W10P1 from A4J6.
9. Disconnect ribbon connector A5W1P1 from A4J8.
10. Disconnect ribbon connector W16P1 from A4J7.
11. Disconnect ribbon connector W15P1 from A4J2.
12. Loosen and remove the twelve (12) screws and hardware which hold down the A4 module.

NOTE

The two (2) screws which hold down transformer T1 to the A4 module do not need to be removed to remove the module nor does the screw through U27. Eight (8) hold down screws are located around the A4 module edges, and the two (2) additional screws are located in the middle area of the module.

13. Lift out the A4 module.

5.7.10 A4 Module Installation

Installation of the A4 module is the reverse of removal with the following note:

NOTE

When positioning the A4 module for installation, the Bandwidth Filter slots (labelled FL1-FL7 on the A4 module) are located toward the side of the Receiver nearest the A10 (Power Supply) module.

CAUTION

Ensure that all cables and connectors are clear of the A4 module during installation. Failure to do so may result in having to remove the module again to properly position the cables.

5.7.11 A5 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver top cover as directed in Paragraph 5.7.2.
3. Disconnect ribbon connector A5W1P1 from A4J8.

NOTE

The connector disconnects from the A4 module, not the A5 module, and the ribbon cable is part of the A5 module.

4. Disconnect SMB connector W10P2 from A5J3.
5. Disconnect SMB connector W11P2 from A5J1.
6. Loosen and remove the four (4) mounting screws and hardware from the four corners of the A5 module.
7. Lift out the A5 module.

5.7.12 A5 Module Installation

Installation of the A5 module is the reverse of removal.

5.7.13 A6 Module Removal

1. Perform the Preliminary Procedures as directed in Paragraph 5.7.1.

2. Remove the receiver top cover as directed in Paragraph 5.7.2.
3. Disconnect ribbon connector A9W1P2 from A6J1.
4. From outside the rear panel, loosen and remove the two (2) screws and hardware that hold A6A1W1J1 to the rear panel.
5. Loosen and remove the six (6) screws and hardware that hold the upper edge of the A6 module to the side of the Receiver.

NOTE

On some Receivers, the second screw from the rear of the Receiver should be removed last. Behind this screw, between the A6A1 module and the receiver frame, is a nylon washer (insulator) that must not be lost. Inspect this screw prior to removal to determine if the Receiver has a washer at this location.

CAUTION

If the Receiver has a nylon washer, failure to reinstall it may cause damage to the A6A1 module.

6. Carefully lift out the A6 module.

NOTE

The A6 module is composed of two separate printed circuit boards, A6A1 and A6A2, joined in the middle by A6P1 which is a fifty (50) pin connector. If it is desired to separate the two boards, grasp one board in each hand and carefully pull them straight apart.

CAUTION

Failure to exercise care may result in damage to the connector.

CAUTION

After removing the A6A2 module, do not place it on a conductive surface as this may cause damage to the battery on the A6A2 module.

5.7.14 A6 Module Installation

Installation of the A6 module is the reverse of removal with the following notes:

CAUTION

When joining A6A1 and A6A2 together, ensure that the P1 connector holes and pins are correctly aligned with each other prior to applying pressure. Failure to do so may result in damage to the connector.

1. When installing the A6 module into the Receiver, ensure that A6A1W1J1 is located in the cutout on the rear panel, and the bottom edge of the module is in the nylon track on the receiver frame.

2. For ease of installation, install the second screw from the rear panel with its nylon washer if installed (between the A6A1 module and the mounting post) first.

CAUTION

Failure to install the nylon washer (insulator) may cause electrical damage to the A6 module.

5.7.15 A7 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver bottom cover as directed in Paragraph 5.7.2.
3. Loosen and remove the single screw and hardware that holds down the A7 module cover.
4. Using the pull-tab on the A7 module cover, remove the A7 module cover.
5. Disconnect ribbon connector W13P1 from A7J1.
6. Disconnect SMB connector W3P1 from A7J2.
7. Disconnect SMB connector W2P2 from A7J4.
8. Loosen and remove the eleven (11) screws and hardware, and the nylon mounting post (from which the A7 module cover screw was removed in Step 3 above) which holds down the A7 module.

NOTE

The screw through A7U39 is not a module holddown screw. The screw through regulator A7Q4 is a module holddown screw. When removing the screw through A7Q4, take care not to lose the mica insulator which fits between A7Q4 and the A7 module.

CAUTION

Do not overtighten the screw through A7Q4 voltage regulator. Overtightening the screw may cause failure of the regulator.

9. Lift out the A7 module.

5.7.16 A7 Module Installation

Installation of the A7 module is the reverse of removal with the following notes:

1. When positioning the A7 module for installation, ensure that ribbon connector A751 is located next to the cutout in the receiver frame.
2. When installing the screw through A7Q4, ensure that the mica insulator is present between A7Q4 and the A7 module, and is centered on the mounting hole.

CAUTION

Failure to insulate the screw through A7Q4 from A7Q4's metal pack with the mica insulator may cause electrical damage to the A7 module.

5.7.17 A8 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver bottom cover as directed in Paragraph 5.7.2.
3. Using the pull-tab on the A8 module cover, remove the A8 module cover.
4. Disconnect ribbon connector W14P1 from A8J5.
5. Disconnect SMB connector W7P1 from A8J1.
6. Disconnect SMB connector W6P1 from A8J4.
7. Disconnect SMB connector W3P2 from A8J2.
8. Disconnect SMB connector W4P2 from A8J3.
9. Remove the eight (8) screws and hardware which hold down the A8 module.
10. Lift out the A8 module.

5.7.18 A8 Module Installation

Installation of the A8 module is the reverse of removal with the following note:

NOTE

When positioning the A8 module for installation, ensure that ribbon connector jack J5 is located next to the cutout in the receiver frame.

CAUTION

Before installing the A8 module cover, ensure that all cables entering the A8 area are routed through their cutouts in the receiver frame. Failure to do so may result in damage to the cables.

5.7.19 A9 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove both the receiver top and bottom covers as directed in Paragraph 5.7.2.
3. Disconnect ribbon connector A9W1P2 from A6J1.

NOTE

The disconnection is made at the A6 module and the ribbon cable is part of the A9 module.

4. Disconnect ribbon connector W13P2 from A9J6.
5. Disconnect ribbon connector W15P2 from A9J5.
6. Disconnect ribbon connector W19P1 from A9J4.
7. Disconnect ribbon connector W14P2 from A9J7.
8. Disengage the two friction locks on connector W20P1 and unplug the connector from A10J2 on the A10 module.
9. Stand the Receiver vertically on its rear panel. Loosen and remove the four (4) screws and hardware on the outside of the front panel which hold the front panel to the receiver frame.
10. Using the handles on the front panel, lift the front panel (A9 module) off the Receiver being careful not to snag connector W20P1 or its cable on the Bandwidth Filter cover. Snagging W20P1 may result in damage to the connector, the cable, or the POWER ON/OFF switch. If further disassembly is required, proceed to step 11.
11. Loosen and remove the single screw and hardware which holds down the tuning shaft encoding wheel.
12. Carefully remove the encoding wheel.

CAUTION

Do not pry on the encoding wheel, as the hidden side of the encoding wheel is part of the manual tuning encoder. Damage to the encoding wheel may impair manual tuning.

13. Rest the front panel on the front panel handles.
14. Remove first the lockwasher and then the flatwasher that fit between the encoding wheel and the tuning shaft.
15. Using fingers, loosen and remove the tuning shaft assembly retaining nut, lockwasher, flat washer, and nylon washer (insulator).
16. Loosen and remove the ten (10) screws and hardware which hold the A9 module to mounting posts on the front panel.
17. While gently lifting the A9 module, carefully work the keypad ribbon leads out of connectors A9J2 and A9J3.

NOTE

Connectors A9J2 and A9J3 are soldered to the A9 module. The keypad ribbon leads have no connectors fastened to them. To separate the ribbon leads from the connectors, use fingers to carefully pull the ribbon leads straight out.

18. Carefully fold the A9 module down away from the ribbon leads to expose the wires leading to the front panel controls.

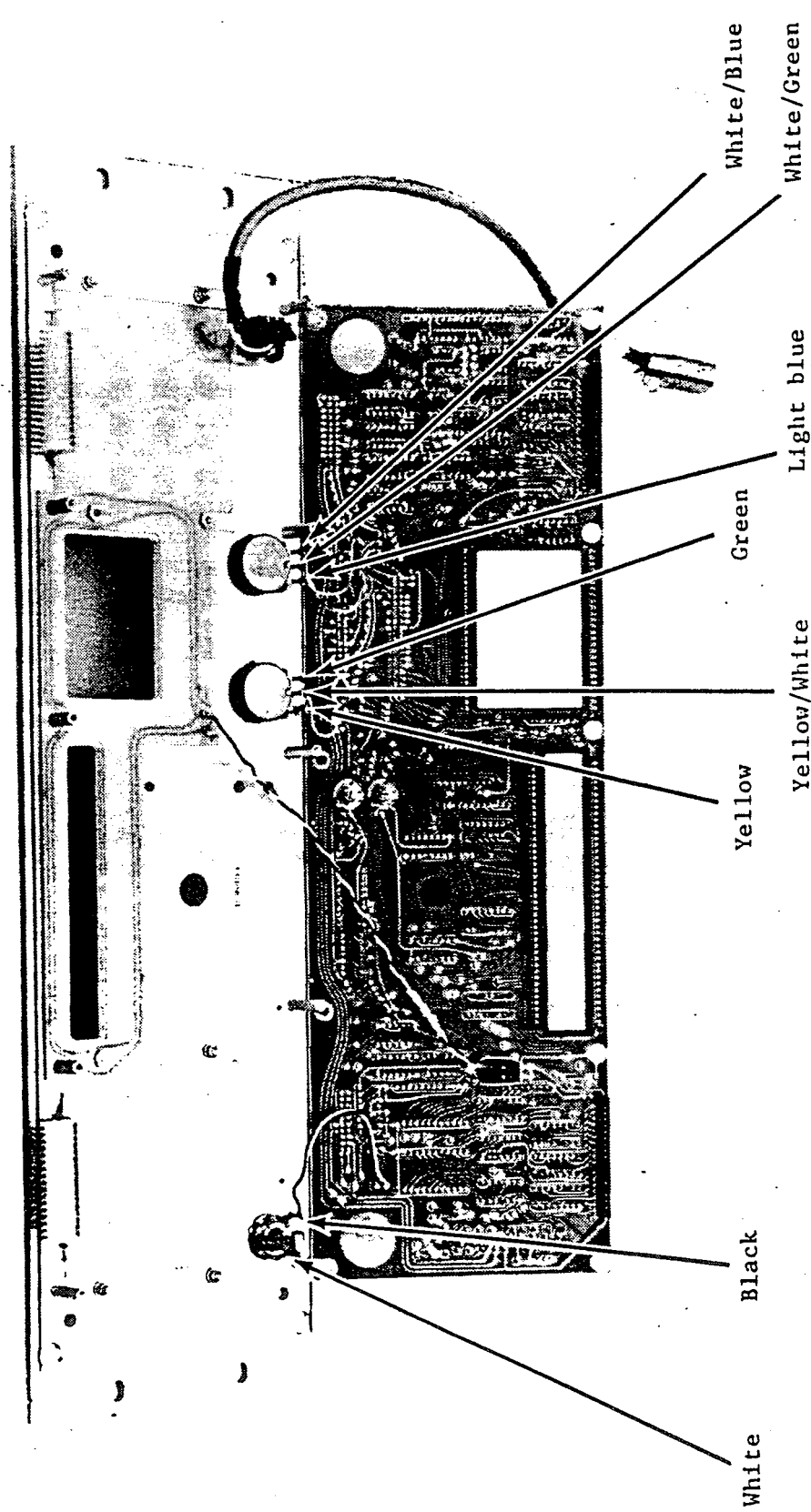


Figure 5-3. Wiring Detail, A9 Circuit Card Assembly

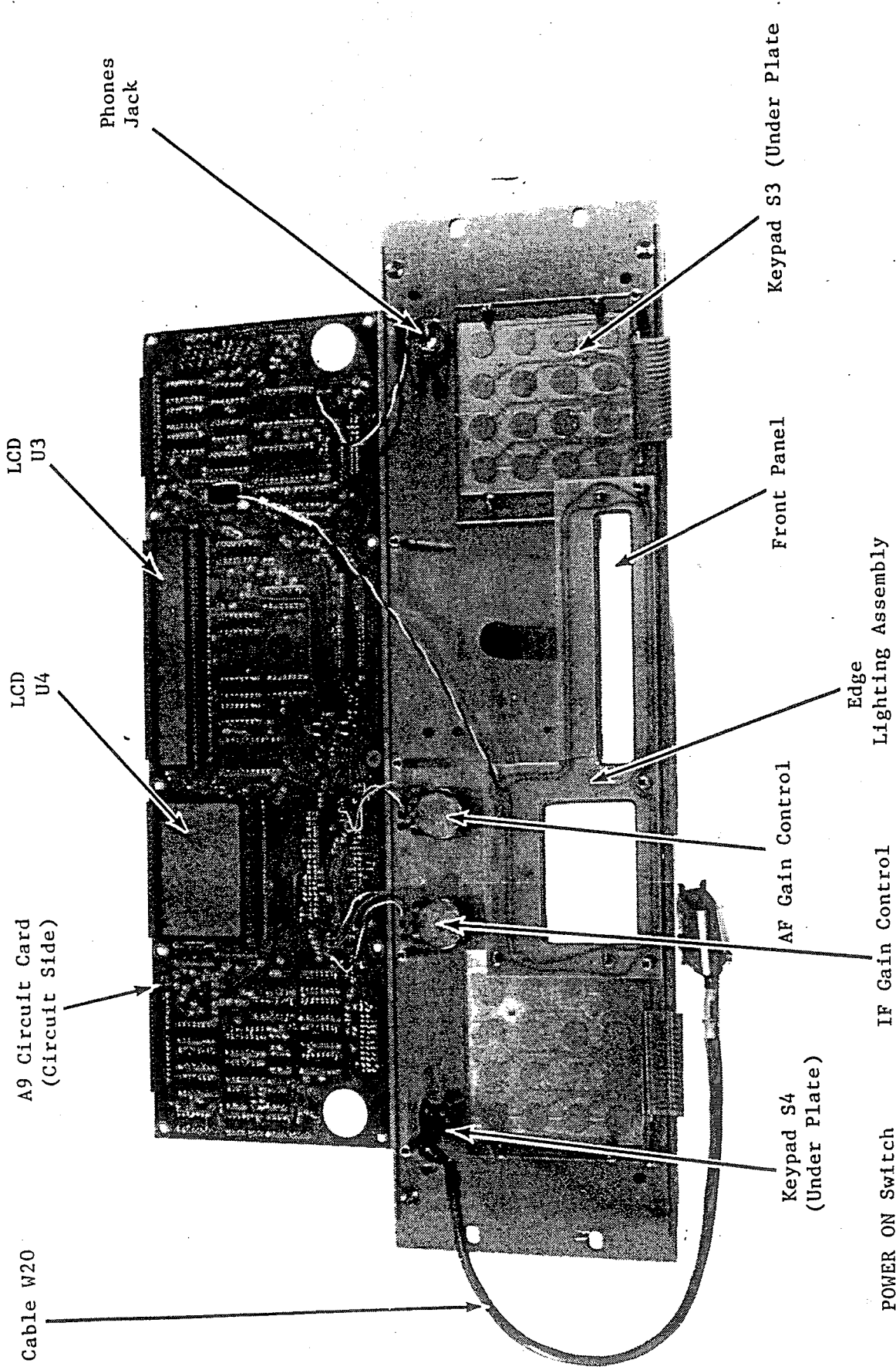


Figure 5-4. Front Panel Assembly, Partially Disassembled

CAUTION

Be careful when folding back the A9 module not to pull out any wires which lead to the controls. Also be careful not to damage the Liquid Crystal Display (LCD) units, or the Fault Indicator Light Emitting Diode (LED).

19. Disconnect three pin connector W1P1 from A9J8 on the A9 module. Refer to Figure 5-3.
20. Working from the top of the A9 module, unsolder the two leads on the A9 module which are connected to the front panel PHONES jack.
21. Unsolder the leads on the A9 module which are connected to the IF Gain Control and to the AF Gain Control.

5.7.20 A9 Module Installation

Installation of the A9 module is the reverse of removal with the following notes:

1. Connect leads from front panel controls as shown in diagram in step 19 of A9 module removal.
2. Ensure ribbon leads from keypads are firmly seated in connectors A9J2 and A9J3 before installing holddown screws and hardware.
3. Tighten tuning shaft assembly retaining nut only finger tight.

CAUTION

Ensure that the nylon washer is in place between the A9 module and the tuning shaft assembly retaining nut. Absence of this washer (insulator) may cause electrical damage to the A9 module.

CAUTION

Do not overtighten the tuning shaft assembly. Use finger pressure only. Overtightening may cause damage to A9 module, and will cause abnormal tightness of the manual tuning shaft.

5.7.21 A10 Module Removal

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver top cover as directed in Paragraph 5.7.2.
3. Loosen (counterclockwise) the four (4) $\frac{1}{4}$ turn fasteners on the A10 module cover.
4. Lift out the A10 module cover.
5. Remove the Bandwidth Filter cover as directed in Paragraph 5.7.25.1.
6. Disengage the locking clips (2 each) on connectors A10J2 and A10J3 located on the outside of the A10 module.
7. Carefully unplug the connectors from A10J2 and A10J3.

8. Loosen and remove the five (5) screws and hardware (located on the outside of the rear panel) which hold the back panel of the A10 module to the rear panel of the Receiver. Loosen the four captive screws at the base of the A10 module.
9. Grasping the sides of the A10 module, slide the module away from the rear panel while lifting the end of the A10 module nearest the Bandwidth Filters and lift out the A10 module.

NOTE

Take care not to crush the A10J2 or A10J3 connectors, the cooling fins on A10U1 or A10U2, or to snag the WP2 wire which connects to A4J1.

5.7.22 A10 Module Installation

Installation of the A10 module is the reverse of removal with the following cautions:

CAUTION

Move ribbon connectors W19P3 and W20P1 out of the way when installing the A10 module. Failure to do so may result in damage to the A4 module or the cooling fins on the rear of the A10 module.

CAUTION

When installing the A10 module cover, ensure that the lower edge of the cover clears the nylon cable clamp on the small ribbon cable joining W19P3. Failure to do so may cause damage to the cable, cable clamp, or A10 module cover.

5.7.23 Edgelight Assembly Removal and Installation

5.7.23.1 Edgelight Removal

1. Perform steps 1 through 19 of the A9 module Removal Procedure in Paragraph 5.7.19.
2. Using a nut driver, loosen and remove the three (3) nuts which hold the edgelight board to the front panel.
3. Carefully lift the edgelight assembly off of the front panel being careful to clear the three (3) mounting posts along the upper edge of the assembly.

5.7.23.2 Edgelight Installation

Installation of the Edgelight assembly is the reverse of removal.

CAUTION

Be careful when installing the edgelight assembly not to bump the edgelights. Bumping them may cause damage to the lights or printed circuit track on the edgelight assembly.

5.7.24 Keypad Removal and Installation

5.7.24.1 Keypad Removal

1. Perform steps 1 through 19 of the A9 Module Removal procedure in Paragraph 5.7.19.
2. Perform the Edgelight Removal procedure in Paragraph 5.7.23.1.
3. Remove the five (5) nuts which hold the plastic keypad protective cover to the front panel.
4. Lift out the keypad protective cover.
5. Grasp the ribbon lead near the keypad and lift out the keypad.

5.7.24.2 Keypad Installation

Installation of the keypads is the reverse of removal.

5.7.25 IF Bandwidth Filter Removal and Installation

5.7.25.1 Bandwidth Filter Removal (Optional Plug-In Crystal Filters Only)

1. Perform the Preliminary Procedure as directed in Paragraph 5.7.1.
2. Remove the receiver top cover as directed in Paragraph 5.7.2.
3. Loosen the two (2) captive screws in the Bandwidth Filter Cover (nearest the receiver frame) which hold the cover to the A4 module.
4. Loosen and remove the one (1) non-captive screw in the Bandwidth Filter Cover (on the side opposite the two captive screws). Be careful not to lose the lockwasher and flatwasher which fit between the Bandwidth Filter cover and the A4 module.
5. Lift off the Bandwidth Filter cover.
6. Grasp the filter to be removed between thumb and forefinger. With a gentle side-to-side rocking motion, carefully work the filter out of its slot in the A4 module.
7. Repeat step 6 for each filter to be removed making note of which filter is installed in each slot.

5.7.25.2 Bandwidth Filter Installation (Optional Plug-In Crystal Filters Only)

Installation of the Bandwidth Filters is the reverse of removal with the following note:

NOTE

If the Receiver is to be operated with the ISB option, both upper and lower sideband filters must be installed in the Receiver. Additionally, the lower sideband filter must be installed in the FL1 position. If the Receiver is not to be operated with the ISB option, either a lower sideband filter or symmetrical sideband filter may be installed in the FL1

position. If a lower sideband filter is installed, the companion upper sideband filter must also be installed in one of the remaining filter positions. If a symmetrical sideband filter is used, the Receiver will use the filter installed in the FL1 position for both sidebands by making the appropriate frequency offsets to the first and second local oscillators.

The remaining filters may be installed in any sequence in filter positions FL2 through FL7. However, in order to simplify system operation and troubleshooting, it is recommended that a format be established and used for all Receivers at a particular site. A typical format would be to insert the USB filter (if used) in position FL2 and insert filters with increasing bandwidths in filter positions 3 through 7.

Once the filter complement and arrangement has been determined, the following procedure should be used to insert the filters into the Receiver:

1. Working from the front of the Receiver, position the filter to be used for LSB operation over filter position FL1 (the filter position closest to the rear of the Receiver). Make certain that the large pins are aligned with the large sockets and the smaller pins are aligned with the smaller sockets.
2. Carefully push down on the filter to insert the pins into the sockets. Relatively light pressure is required to insert the pins into the sockets. If the filter does not easily slide into place, recheck the pin/socket alignments.
3. Insert the appropriate filters into filter positions FL2 through FL7 (as required), using the procedures described in steps 1 and 2.
4. After all filters have been inserted, visually inspect the filters to insure that they are properly seated. The bottom of the filters should be flat against the surface of the A4 board.
5. Replace the RF shield over the filters and secure the shield in place by tightening the three screws.

5.8 OPERATIONAL FAULT SYMPTOM CHART

Table 5-6 contains typical operational fault symptoms and their most probable causes. The table should be used as a guideline only, and should be supplemented with the BITE check detailed in Paragraph 5.4.2 and the Performance Tests detailed in Paragraph 5.5.

TABLE 5-6. OPERATIONALLY BASED FAULT SYMPTOM CHART

FAULT SYMPTOMS	BOARD/MODULE PROBABLY FAULT										COMMENTS & NOTES	
	A1	A2	A3	A4	A5	A6	A6A1	A7	A8	A9		A10
	Check Module Board According to Number Order											
Unable to energize Receiver											1	Check Power Supply
MODE LCDs blank mostly zeros in Frequency LCD						2						PC wafer in wrong position, A6A2
Unable to establish LOCAL operating condition						1				2		A6A2, A9
FAULT LED illuminated								1	2			Synthesizer failure, A7, A8, S2 switch in wrong position
BITE error code display												See BITE error code chart
Unable to exit LOCK Mode						2					1	A9, A6A2
No manual tuning											1	A9
No meter level indication in AF or RF	2			1								A4, A1
No audio output				1								A4
No audio output ISB only					1							A5
Unable to adjust Line Level Out				1								A4

TABLE 5-6. OPERATIONALLY BASED FAULT SYMPTOM CHART (Cont.)

FAULT SYMPTOMS	BOARD/MODULE PROBABLE FAULT											COMMENTS & NOTES	
	A1	A2	A3	A4	A5	A6	A6A1	A7	A8	A9	A10		
	Check Module Board According to Number Order												
No Remote Data entry/return							1						A6A1
No tone from BFO in CW mode									1				A8 - Confirm CW signal present and not in BFO CENTER
Displayed IF bandwidth does not match any installed filter				2									Check filters, A4
Unable to enter frequency from receiver front panel						3				2			Confirm Receiver not in Remote
IF output at J2 not at 455 kHz						3		2	1				A8, A7, A4
Unable to initialize BITE routine						2					1		Confirm Receiver not in Remote
Receiver does not retain frequency data after Power Interrupt						1							Check Battery