DIGITAL NARROWBAND PROJECT 25
VHF HIGH BAND ASTRO QUANTAR STATION

STANDARDIZED SERVICE & ALIGNMENT PROCEDURE

September 21, 2004
Revision-10

The following procedures are to be used for the servicing and alignment of all Digital Narrowband VHF High Band Motorola ASTRO QUANTAR Project 25 Station equipment.

These procedures are to be used in conjunction with the instructions listed in the Radio Service Software (RSS), under the help key, for each test to be performed. However, in the event of a conflict in procedure those specified in this document shall take precedence.

Specialized test equipment required:

R-2670 FDMA Digital Communications System Analyzer with Project 25 CAI option
IBM compatible computer with the following configuration:
80386 CPU or higher
DOS 5.0 or higher (with DOS running in high memory)
4 Megabytes of RAM or greater
Quantar Radio Service Software (RSS)(latest version)
Quantar RSS cable Motorola # 3080369E31
Two (2) double shielded RG-400/RG-142, or RG-214 test cables Four (4) to six (6) feet in length. (One cable Type "N" male to Type "N" male. One cable Type "N" male to "BNC" male.)
One female N-type tee)
Antenna test cable Motorola #3082059x01 or equivalent
SINAD test cable (AMP P/N 558461-1)
HP 4934A TIMS (or equivalent) with test cable (Note: an audio signal generator with 600 ohm impedance may be used.)

Additional equipment required for Quantar station transmit alignment and testing only:

RF Wattmeter (Thruline Model 43 or equivalent with appropriate frequency and power range element.)
RF Coaxial load resistor rated for the appropriate transmit power.
(Minimum 125 W recommended - 500W required for 350 W station)

INITIAL TEST SET-UP; ABBREVIATED

1. Connect the RSS cable to the computer COM1 port and to the Quantar station front panel RSS port located on the control board.
2. Run file Quantar.exe to begin RSS program.
3. From the Main Menu, press **F3** to Get/Save/Program Codeplug data.
4. From the Read/Save Codeplug Menu, Press **F2** to read data from Quantar station. When complete Press **F2** to continue.
5. Press **F10** to return to the Main Menu.
6. Press **F2** to enter the Service Menu.
7. Press **F3** to enter the Alignment Menu.

INITIAL TEST SET-UP; NON-ABBREVIATED

a. Make a copy of the latest generic codeplug templates using a blank floppy disk. The codeplug template will be programmed into the Quantar station using the computer and RSS interface cable.
b. Connect the RSS interface cable (# 3080369E31) between the computer COM1 port and the Quantar station front panel RSS connector (9 pin D-connector).
c. Turn the computer on.
d. Turn the Motorola Communication System Analyzer on. Connect the CSA 50 ohm load (attached to the CSA front panel) to the GEN OUT port. Press the "CAL" button. To begin the CSA calibration press the "start" softkey. When the CSA completes the calibration press the "return" softkey.
e. Turn the Quantar station on. Wait approximately 20 seconds for the Quantar station to complete a self test. Normal operating conditions are indicated when the Quantar displays green LEDs for: Power on, Station on, WL on, and TX Lock. Any other indication will require the technician to investigate the operational status of the Quantar station.
f. To access disable the Quantar station hold down the station front panel "shift" button and press the "access disable" button momentarily. Release the shift button and observe the Intrcm/AccD LED flashes.
g. Connect an appropriate RF Coaxial load resistor to the Quantar station transmit port using a RF coaxial cable.
h. On the computer, from the windows menu select the icon labeled Quantar. Use the latest version. This will start the Quantar radio service software. Press any key to continue. The RSS Main Menu should appear.
i. Press **F3** (Get/Save/Program codeplug data.)
j. Press **F3** (Get codeplug data from archive disk file.)
k. Insert the floppy disk containing the generic codeplugs into the computer a drive.
l. Change computer directory by typing: **A:** in the highlighted area.
m. Press Enter.
n. The generic codeplugs will be displayed. Select the appropriate codeplug for the Quantar station to be tuned using the Tab and arrow keys. (i.e., a 125 watt station would use the codeplug with the file name "125confg.cp"). Press Enter when the correct codeplug is highlighted.
o. When the codeplug has successfully been read, Press **F2** to continue.
p. Press **F10** to return to the Main Menu.
q. Press **F4.** The RSS should display the Change/View Codeplug Menu.
r. Press **F4** to enter the Channel Information.

s. Select and enter the appropriate receive and transmit frequencies for the Quantar station to be aligned. Use the "Tab" key to select the desired field.
t. Press **F10** to exit this menu. If the RSS displays the message "Do You Want The TX Idle Frequency To Be Recalculated?" Press **F2** to continue. The RSS should display the Change/View Codeplug Menu.
u. Press **F3** to enter the Access Code Table.
v. Enter the DPL (DCS) and Astro Access Codes (NID).
w. Press **F10** to exit the Access Code Table Menu.
x. Press **F10** to exit the Change/View Codeplug Menu.
y. Press **F2** to enter the Service Menu.
z. Press **F2** to enter the Hardware Configuration Menu.
aa. Enter the Quantar station Serial Number. This number is found on the rear of the Quantar station on the identifier plate.
bb. Enter the Station Name. Create an exclusive station name.
cc. Enter the Site Number Press **F10** to exit the Hardware Configuration.
dd. Press **F10** to exit the Service Menu.
ee. Press **F3** to enter the Get/Save/Program Codeplug Data Menu.
ff. From the Read/Save Codeplug Menu, Press **F8**, Program data into devices codeplug.
gg. "You Have Requested That The Current Codeplug Be Saved To The Connected Device. Do you wish to proceed?" Press **F2** to continue.
hh. "Do You Wish To Reset The Device?" Press **F2** to continue.
ii. "Device Reset In Progress: When Front Panel Returns To Normal, The Reset Command Is Complete. Check Status Report For New Alarms." Press **F2** to continue.
jj. "Codeplug Has Been Successfully Programmed Into The Device." Press **F2** to continue.
kk. Repeat step f. to access disable the Quantar station.
ll. The RSS should return to the Read/Save/Program menu.
mm. Press **F10**. The RSS should return to the Main Menu.
nn. Press **F2** to enter the Service Menu.
oo. Press **F3** to enter the Alignment Menu.
pp. Proceed to Quantar Receiver Tuning.

QUANTAR RECEIVER TUNING:
(Preset 33)

1. Remove right most cover plate from the front of the Quantar station. With the exception of the top most tuning peg adjust all remaining tuning pegs clockwise until approximately 1/8 inch of the peg is visible.
2. Connect the R-2670 GEN OUT port to the Receiver RF input port located at the rear of the Quantar station.
3. Connect the antenna test cable from the ANT (antenna) port, on the front of the R-2670 to the test jack in the receiver marked H1. Some station configurations may require the use of an extension in conjunction with the antenna test cable. Use an appropriate RF coaxial cable when extending the antenna test cable.
4. Set R-2670 Use Preset 33
   RF control: Duplex
   BW: NB
   Freq: Enter after display is expanded
   Mon: 20dB Attenuation at ANT
   Gen: -5dBm Gen (port)
   Meter: RF Display
   Mode: Standard
   Display: Spectrum Analyzer

NOTE: THERE MUST BE NO MODULATION ON THE RF CARRIER

5. Expand the R-2670 display using the softkey labeled expand.
6. Enter Center Frequency. Same as station receive frequency.
7. Adjust #1 tuning peg for a peak display.
8. With the antenna cable still in H1, adjust #2 tuning peg for the lowest display.
9. Relocate antenna cable to H2 and adjust #3 tuning peg for the lowest display.
10. Relocate antenna cable to H3 and adjust #4 tuning peg for the lowest display.
11. Relocate antenna cable to H4 and adjust #5 tuning peg for the lowest display.
12. When completed, turn #5 tuning peg an additional ¼ turn CCW.
13. Remove antenna cable from the receiver, lock down all tuning peg nuts and replace the receiver cover plate.
14. Press the return softkey on the R-2670.

QUANTAR RX WIRELINE LEVEL SET (MDC 1200 OTAR level):

1. To perform alignment "Tab" to RX WIRELINE.
2. Press **F2** to perform alignment.
3. Set the Rx Wireline level for –8 dBm and press enter. **Be sure to press enter!**
4. Press **F8** to save the setting.
5. Press **F2** to continue.
6. Press **F10** to exit.

QUANTAR TX WIRELINE LEVEL SET (MDC 1200 OTAR level):

1. To perform alignment "Tab" to TX WIRELINE.
2. Connect the TIMMS from the Transmit (TRMT) VF port to the VF wireline input line. Make connections to the station punch block (see note) or to the orange connector (port 61) located on the back of the station. **NOTE: Only use the punch block located on the equipment rack or inside the equipment cabinet. DO NOT USE A DEMARK OR ANY OTHER PUNCHBLOCK**.
3. Set the TIMS for a –33 dBm transmit output at 1004 Hz.
4. Press **F2** to perform alignment.
5. Set the TX Wireline level for –33 dBm and press enter. **(Be sure to press enter!)**
6. Press **F4** to perform and store the calibration.
7. Press **F2** to continue.
8. Press **F10** to exit.
9. Disconnect the TIMMS from the Quantar station punch block.

NOTE: The stored value will not change until you exit the program. This can be verified by pressing F2 again and checking that the correct value has been stored.

QUANTAR RX RSSI CALIBRATION:
(Preset 34)

1. To perform alignment "TAB" to RSSI CALIBRATE.
2. Connect the R-2670 RF I/O port to the Receiver RF input port at the rear of the Quantar station.
3. Set R-2670 Use Preset 34
   RF control: Generate
   Frequency: As shown on RSS
   Gen RF out: RF I/O
   Output level: -105 dBm
   Meter: RF Display
   Mode: Standard

   NOTE: THERE MUST BE NO MODULATION ON THE R-2670

4. Press **F4** to have station access disabled (Note: This can also be accomplished on the station control board, by holding down the shift button and momentarily pressing the Volume Dn/Access Disable button.) Observe, on the Control Board, that the Intrcm/AccD light is blinking.
5. Press **F2** to perform alignment.
6. Set the RSS to –105dBm.
7. Set the R-2670 to the frequency shown on the RSS screen.
8. Press **F8** to perform the RSSI calibration.
9. Press **F2** after successful calibration test.
10. Press **F10** to exit to test menu.

QUANTAR RX SINAD TEST:
(Preset 35)

1. Before connecting any cable or signal to the receiver input toggle the front panel CSQ-PL-OFF until static noise is audible. This is the squelch off position. Increase station volume to full position.
2. Connect the R-2670 RF I/O port to the Receiver RF input port at the rear of the station.
3. Connect the SINAD test cable from the R-2670 Vert/SINAD port to the headset jack located on the Quantar station front panel control board jack.
4. Set R-2670 Use Preset 35
   RF control: Generate
   BW: Narrowband
   Frequency: Set the correct frequency on the R-2670 (Quantar station receive frequency is used)
   Output level: Initially set for approximately –120 dBm
   Disp Meter: SINAD
   Mode: Standard
   Output level: dBm
   Audio: Fixed 1 kHz: @ 3.0 kHz ~ (continuous)
   Format Sel: Tone A
   Frequency: 1000 Hz
   DTMF: 0
   External: 0.0 kHz X (off)
5. Adjust the output level on the R-2670 for 12 dB SINAD (display reads –12dB).
6. Record the CSA output level to be used for the squelch test.
7. Disconnect the SINAD cable from the Quantar station.

QUANTAR RX SQUELCH ALIGNMENT: (Preset 36)

1. To perform alignment "TAB" to SQUELCH ADJUST.
2. Connect the R-2670 RF I/O port to the receiver RF input port, at the rear of the station.
3. Set R-2670 Use Preset 36

RF control: Generate	SA: Normal
Frequency: As shown on RSS	Mkr: Off
Gen RF out: RF I/O	Fixed 1kHz: @ 0.00 kHz Off (x)
Output level: From the SINAD test.	Synth: On
Bandwidth: NB	Format Sel: Tone A
Modulation: FM	Freq: 01000 Hz
Meter: Sinad	DTMF: 0.00kHz
Mode: Standard	Code: ----------
Display: Spectrum Analyzer	External: 0.00kHz X (off)
Disp: 20kHz	

4. Press **F4** to access disable the Quantar Station.
5. Press **F2** to perform alignment.
6. Set the R-2670 to the frequency shown on the RSS screen (receive frequency 1.)
7. Set the R-2670 output level for the output noted in the SINAD test.
8. Press **F4** to fully close the squelch. No audible noise should be heard through the station speaker.
9. Toggle the white pushbutton labeled CSQ-PL-OFF on the front of the Quantar station until audible noise is heard through the station speaker. Press the same toggle button one more time. The station is now set to CSQ mode. Audible noise should not be heard through the station speaker.

CSQ-PL-OFF

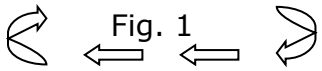

Fig. 1

10. Press **F2** to fully open the squelch. Audible noise should be heard.
11. Press the page up key at 1-second intervals until the noise is squelched, (noise is no longer audible). This is the tight position.
12. Press the page down key, at 5-second intervals, until the squelch opens, (noise is audible again).
13. When completed, press **F8** to save the settings.
14. Press **F2** to continue.
15. Press **F10** to exit the test menu.

DIGITAL BIT ERROR RATE (BER) AND RF SIGNAL LEVEL TEST AND REPORT (Preset 40):

1. To perform alignment "TAB" to PROJECT 25 Rx BER AND RSSI REPORT.
2. Connect the R-2670 RF I/O port to the Receiver RF input port, at the rear of the station
3. Set R-2670 Use Preset 40
   RF control: Generate
   BW: Narrowband
   Frequency: RX frequency as shown on duplexer
   Output level: -105 dBm
   Gen RF Out: RF I/O
   Meter: RF Display
   Mode: Project 25 STD or ASTRO 25 Conv.
   Display: Modulation Scope
   Audio: Project 25 DEV: 2.83 kHz ~ (continuous)
   Code: 1011 Pattern
4. Press **F2** to perform alignment
5. Verify Abs RSSI (dBm) is set for –105 dBm. (If different, repeat RSSI test)
6. Adjust the R-2670 output level for –108 dBm and observe the BER % as indicated on the RSS screen. The BER% should be zero. If the BER % is other than zero repeat the QUANTAR RECEIVER TUNING.
7. Adjust the R-2670 output level for –118 dBm and observe the BER % as indicated on the RSS screen. The BER% should be less than 2 %. If the BER% is greater than 2% repeat the QUANTAR RECEIVER TUNING.
8. Adjust the R-2670 output level until the BER % reaches 5% and observe the output level. This level should be within 1 dB of the level recorded in the SINAD test. If the BER% is not within 1db of the level recorded in the SINAD test repeat the QUANTAR RECEIVER TUNING.
9. Press **F10** to exit to test menu.

(Caution: Before the next test is performed, ensure the R-2670 RF- I/O cable is switched from the receiver input to the transmit output.)

QUANTAR TX REFERENCE OSCILLATOR ALIGNMENT (Preset 37) (25W and 125 W Stations Transmit only):

1. To perform the alignment "TAB" to REFERENCE OSCILLATOR.
2. Connect the R-2670 RF I/O port to the transmit RF output port, at the rear of the station.
3. Set R-2670 Use Preset 37
   RF control: Monitor
   Attenuation: 40 dB
   Mon RF In: RF In/Out
   Meter: RF Scan
   Mode: Standard Display: Spectrum Analyzer
   Dispersion: 20 kHz/div
   SA: Normal
3. Press **F4** to have station access disabled.
4. Press **F2** to perform alignment.

(**Note**: By pressing **F7**, the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save, with **F8**, or press **F9** to dekey and let system cool.)

5. Press **F7** to Key up transmitter, (allow approximately 10-seconds for signal to stabilize.)
6. Observe the transmitted signal frequency displayed on the frequency counter.
7. Adjust the page up / page down buttons, (250 Hz increments), and the up/dn arrows, (25 Hz increments), until the transmit frequency error is as small as possible as indicated by the frequency displayed.
8. When completed, press **F8** to save the settings.
9. Press **F2** to continue.
10. Press **F10** to exit.

WARNING: DO NOT CONNECT THE RF TRANSMIT PORT OF A 350 WATT ASTRO QUANTAR STATION TO THE R-2670.

QUANTAR TX REFERENCE OSCILLATOR ALIGNMENT (Preset 37) (350 W Station Transmit only):

1. To perform the alignment "TAB" to REFERENCE OSCILLATOR.
2. Disconnect the RF cable on the front of the 350 Watt Station Intermediate Power Amplifier (IPA) labeled **input**. Connect a female N-type tee to the RF connector removed from the IPA. Connect a male-to-male N-type RF cable to the female N-type tee and the IPA connector labeled **input**. Connect the R-2670 RF I/O port to the remaining leg of the female N-type tee connector.
3. Set R-2670 Use Preset 37
   RF control: Monitor
   Attenuation: 40 dB
   Mon RF In: RF In/Out
   Meter: RF Scan
   Mode: Standard
   Display: Spectrum Analyzer
   Dispersion: 20 kHz/div
   SA: Normal
4. Press **F4** to have station access disabled.
5. Press **F2** to perform alignment.

(Note: By pressing **F7**, the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save, with **F8**, or press **F9** to dekey and let system cool.)

6. Press **F7** to Key up transmitter, (allow approximately 10-seconds for signal to stabilize.)
7. Observe the transmitted signal frequency displayed on the frequency counter.
8. Adjust the page up/page down buttons, (250 Hz increments), and the up/dn
   arrows, (25 Hz increments), until the transmit frequency error is as small as possible as indicated by the frequency displayed.
9. When completed, press **F8** to save the settings.
10. Press **F2** to continue.
11. Press **F10** to exit.

QUANTAR TX RF POWER OUTPUT SET
(25W, 125 W and 350 W Transmit only)

1. To perform alignment "TAB" to POWER OUTPUT.
2. Connect the transmit RF output port, at the **rear** of the station, to the RF input port of the Wattmeter. (Note: Ensure the proper plug is installed into the Wattmeter).
3. **For 350W stations bypass the circulator located below the 3 cooling fans.**
4. Connect the output of the Wattmeter to a suitable RF Coaxial load resistor.
5. Press **F4** to have the station access disabled.
6. Press **F2** to perform alignment.
7. Press **F6** to key up the transmitter.

(Note: By pressing **F6**, the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save, with **F8**, or press **F9** to dekey and let system cool.)

Station Type	Power Out Setting
25W	25 watts out
125W	125 watts out
350W	175 watts out

8. Read the output power on the Wattmeter and record it on the RSS screen as indicated.
9. Press **F7** to adjust the setting and wait for a station response.
10. Repeat steps 5 through 7 until the station is at the desired power.
11. Press **F8** to save the settings. It will automatically dekey the system.
12. Press **F2** to continue.
13. Disconnect the Wattmeter from the rear of the station. If the station transmit output port is connected to a TX combiner filter continue with steps 14-17. If not, press **F10** to exit the Power Output Set Menu, and record the station output power on the Comprehensive sheet.
14. Connect the Wattmeter input port to the TX combiner output port.
15. Key the station.
16. Dekey the station and disconnect the Wattmeter from the TX combiner filter.
17. Press **F10** to exit the Power Output Set Menu.

QUANTAR TX DEVIATION GAIN ALIGNMENT (Preset 38) (25W and 125W Transmit only):

1. To perform alignment "TAB" to 'TX DEVIATION GAIN ALIGNMENT.
2. Connect the R-2670 RF I/O port to the Transmit RF output port, at the rear of the station.
3. Set R-2670 Use Preset 38
   RF control: Monitor
   B/W: Wideband
   Atten: 20 dB
   Mon RF in: RF I/O
   Meter: RF Display
   Squelch: CCW until LED is on
4. Press **F4** to have the station access disabled.
5. Press **F2** to perform alignment.
6. Press **F2** for first frequency.

(**Note**: By pressing **F2**, **F3, F4** or **F5** the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save, with **F8**, or press **F9** to dekey and let system cool.)

7. Set the R-2670 to the frequency shown on the RSS screen.
8. Record the deviation where indicated on the RSS screen. (If no deviation is detected drop the attenuation to 0dB and then return to 20dB after the measurement is made.)
9. Repeat steps 6 and 7 for the next 3 frequencies.
10. When all four frequency deviations have been recorded, press **F8** to save the settings.
11. Press **F2** to continue.
12. Press **F10** to exit.

WARNING: DO NOT CONNECT THE TRANSMIT PORT OF A 350 WATT ASTRO QUANTAR STATION TO THE R-2670.

QUANTAR TX DEVIATION GAIN ALIGNMENT (Preset 38)(350W Transmit only):

1. To perform alignment "TAB" to TX DEVIATION GAIN ALIGNMENT.
2. Disconnect the RF cable on the front of the 350 Watt Station Intermediate Power Amplifier (IPA) labeled **input**. Connect a female N-type tee to the RF connector removed from the IPA. Connect a male-to-male N-type RF cable to the female N-type tee and the IPA connector labeled **input**. Connect the R-2670 RF I/O port to the remaining leg of the female N-type tee connector.

3. Set R-2670 Use Preset 38
   RF control: Monitor
   B/W: Wideband
   Atten: 20 dB
   Mon RF in: RF I/O
   Meter: RF Display
   Squelch: CCW until LED is on

4. Press **F4** to have the station access disabled.
5. Press **F2** to perform alignment.
6. Press **F2** for first frequency.

(Note: By pressing **F2**, **F3, F4** or **F5** the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save, with **F8**, or press **F9** to dekey and let system cool.)

7. Set the R-2670 to the frequency shown on the RSS screen.
8. Record the deviation where indicated on the RSS screen. (If no deviation is detected, drop the attenuation to 0dB and then return to 20dB.)
9. Repeat steps 6 and 7 for the next 3 frequencies.
10. When all 4 frequency deviations have been recorded, press **F8** to save the settings.
11. Press **F2** to continue.
12. Press **F10** to exit.

QUANTAR TX REFERENCE MODULATION COMPENSATION ALIGNMENT (Preset 39) (25W and 125W Transmit only):

1. To perform alignment "TAB" to TX REFERENCE MODULATION COMPENSATION.
2. Connect the R-2670 RF I/O port to the Transmit RF output port, at the rear of the station.
3. Set R-2670 Use Preset 39
   RF control: Monitor
   Frequency: as indicated on the RSS for Mod 1 & Mod 2
   B/W: Narrowband
   Mon RF in: RF I/O
   Atten: 20 dB
   Meter: RF Display
   Display: Modulation Scope
   Trigger: Auto
   Horizontal: 20 ms/div
   Vertical: 2 kHz/div
4. Press **F4** to have the station access disabled.
5. Press **F2** to perform alignment.

(Note: By pressing **F6**, or **F7**, the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save or press **F9** to dekey and let system cool.)

6. Press **F6** to align for Ref Mod 1. (If no signal is detected on the display, drop the attenuation to 0dB and then return to 20dB.)
7. Adjust the page up/page down buttons, (for coarse adjustments), and the up/dn arrows, (for fine adjustments), for a straight waveform. An angled waveform is okay, but all humps and dips are to be adjusted out.
8. When completed, press **F8** to save settings.
9. Repeat steps 6 and 7 for Ref Mod 2.
10. Press **F2** to continue.
11. Press **F10** to exit.

WARNING: DO NOT CONNECT THE RF OUTPUT PORT OF A 350 WATT ASTRO QUANTAR STATION TO THE R-2670.

QUANTAR TX REFERENCE MODULATION COMPENSATION ALIGNMENT (Preset 39) (350W Transmit only):

1. To perform the alignment "TAB" to REFERENCE MODULATION COMPENSATION.
2. Disconnect the RF cable on the front of the 350 Watt Station Intermediate Power Amplifier (IPA) labeled **input**. Connect a female N-type tee to the RF connector removed from the IPA. Connect a male-to-male N-type RF cable to the female N-type tee and the IPA connector labeled **input**. Connect the R-2670 RF I/O port to the remaining leg of the female N-type tee connector.
3. Set R-2670 Use Preset 39
   RF control: Monitor
   Frequency: as indicated on the RSS for Mod 1 & Mod 2
   B/W: Narrowband
   Mon RF in: RF I/O
   Atten: 20 dB
   Meter: RF Display
   Display: Modulation Scope
   Trigger: Auto
   Horizontal: 20 ms/div
   Vertical: 2 kHz/div
4. Press **F4** to have the station access disabled.
5. Press **F2** to perform alignment.

(**Note**: By pressing **F6**, or **F7**, the system will be keyed. **DO NOT** leave keyed for more than 30 seconds. Either perform test and save or press **F9** to dekey and let system cool.)

6. Press **F6** to align for Ref Mod 1. (If no signal is detected on the display, drop the attenuation to 0dB and then return to 20dB.)
7. Adjust the page up/page down buttons, (for coarse adjustments), and the up/dn arrows, (for fine adjustments), for a straight waveform. An angled waveform is okay, but all humps and dips are to be adjusted out.
8. When completed, press **F8** to save settings.
9. Repeat steps 6 and 7 for Ref Mod 2.
10. Press **F2** to continue.
11. Press **F10** to exit.

Note: When all tests have been completed, save the codeplug file to the laptop, and reset the station by pressing F5.