APX™ Mobile and Portable Automated Test and Alignment
Software Updates

First things first!

- Be sure to check that you are running the latest software versions for the 8800SX and its applications.

- Visit the website [www.aeroflex.com/8800SX](http://www.aeroflex.com/8800SX) and select the Software Tab to download the latest software.

- New radio models are periodically introduced and only the latest 8800 software would have them included.
Operational Requirements

APX Automatic Test and Alignment

• The 8800SX Digital Radio Test Set
  • Option 04 – P25 Conventional Operation
  • Option 103 – Motorola APX Series Auto-Test/Alignment
  • Option 128 – Motorola APX 8000 Series Radios
  • Option 129 – Motorola APX “B” Series Radios
  • AC24011 – 10 AMP Current Shunt 0.01 Ohm (for Mobile PA BIAS Alignment)
• Variable Power Supply (30 Amp rating for High Power mobiles)
  • Battery Eliminator (for portables) – (Motorola 66009254001)
  • Battery Eliminator Interface box (for portables) – (Motorola RLN 4510)
• Test Cable (Double shielded cables are recommended for best accuracy) BNC (M) – BNC (M)
• Reference Cable BNC (M) – BNC (M)
• Connector Adapters
  • BNC (F) – BNC (F)
  • BNC (F) – SMA (F)
  • BNC (F) – UHF Mini (M)
  • TNC (M) – BNC (F)
  • N (M) – BNC (F)
  • 10 dB attenuator for cable calibration (BNC type)
• For best accuracy, the 8800SX should be connected and configured to use an external 10 MHz Standard. The Stanford Research Systems FS725 is recommended for a portable Rubidium Frequency Standard.
APX Portable Interconnect

- Connect a 12 VDC power supply to the RLN-4510.
- Connect Radio ANT to the 8800 TR Port.
- Connect Radio Programming cable to the 8800 USB port.
APX Mobile Interconnect

- Connect Mobile TX Out to the 8800 TR port.
- Connect Mobile Programming cable to the 8800 USB port.
- Connect Power supply to Mobile with Positive lead through the AC 24011 Current shunt if PA BIAS alignment is to be performed.

13.6 VDC

DC POWER SUPPLY

Motorola Programming Cable HKN6184C

Current Shunt AC 24011

The 8800 Service Monitor

TR

USB

External 10 MHz Reference

Neither AC24011 shunt nor 13.6V power is needed for PA BIAS.
Auto-Test Menu

Access to the Application and System through Auto-Test

The Auto-Test Menu can be accessed by:

- Select the Utilities dropdown menu, then select Auto-Test.
- Select Motorola APX Series from the Radio OEM menu.
APX Primary Test Screen

Function Keys

After selecting the Radio OEM, use the Read Radio button to query the radio. This will determine the model of the radio under test then display this information in the “Model-Band” field.

This key will execute the selected test or alignment process.

By Selecting this key, the test results of the last radio tested will be displayed.

Allows access to all previous results for all past radio tests.

Store and Recall of user defined specification tables.

Allows access to the Cable Loss table so the user can enter cable loss factors for separate frequency bands.

Selects all tests available for the radio under test.

Deselects all available tests.

Note: All menu selections are maintained separately for each model as well as for the Align & Test and Test selection. It is important to either perform the Read Radio or select your model from the Model-Band menu prior to making test selections.
APX Primary Test Screen

Test Selections

- The Summary tab will display the Test Summary window showing current test conditions (Pass (P)ass (F)ail (S)kip (A)bort (R)unning.

- The Tests tab will display the Test Configuration window allowing separate tests to be selected and configuration. Some tests allow entry of test parameters. Available configurations may change between Test and Align & Test menu selections.

- Configure buttons allow access to specifications or other user entries.

- Configure for Radio Information allows three lines of user information to be entered that will be visible at the beginning of the printout in the Test Results file. These could be used to identify a Technician ID, Company Name or anything that might be useful at the beginning of the printout.
The Options Tab will display the Options window allowing the user to configure various items. Along with selecting the frequency bands to be tested or aligned.

- **EOT Beep**
  The 8800 will produce an audible beep at the completion of the test to draw attention to the operator that the test or alignment is done.

- **Message Beep**
  When testing dual band mobiles, you will be prompted to move the test cable when moving from one band connector to the other. This option will produce an audible beep for the operator to change the cable connection. Note: The highest frequency band that is selected is always tested first.

- **Extended Logging**
  Diagnostic mode that shows all adjustments to soft pot values.

- **Reset Skip**
  Reserved for other applications.

- **OEM Options**
  Allows testing of a single band or both bands for a dual band radio.
Pre-Configured Motorola Test Parameters

- All specifications are set to Motorola recommended default values.

- Power tests are performed at MIN and MAX values if viewed with APX CPS software. The radio is tested at these known power values. The default settings should be correct for all radios except for Motorcycle Mobiles.

- When the radio is in standard operating mode, it will transmit at the user programmed power levels. During an Auto-Test, the radio is placed into a Service mode so the transmit power levels are set to MIN and MAX values to ensure that any programmed power level will work.

- The Configure buttons if available, allow changing of these values but caution should be used when changing from these default values. Note: Most Configure buttons are available only when the Menu is set to “Test”.

- When an alignment is made, the adjustment process will attempt to align to minimum error then test to see that it is within the limit that is specified in the configuration.

- Setting tighter limits will not improve the alignment.
Cable Loss Basics

- Every coaxial cable has a loss associated with it. If extremely short, the loss may be negligible. However, any loss that is not compensated will have an effect on radio measurements. For example, a 4’ length of RG-58, used to test a 50 watt mobile radio at 800 MHz could impart an error of approximately 0.7 dB. While this seems insignificant, when converted to a percentage, its importance becomes clear. A compensation factor of 0.4 dB is equivalent to a 10% error in power measurement.

- To eliminate this error, compensation must take place.
- The following pages show how to measure the cable loss for a coaxial cable used to test a radio, but the same procedure can be used for measuring insertion loss of attenuators and other devices, as well.
Interconnect

- Connect Type N adapters
- Connect 1 of the adapters to the 8800SX GEN port.
- Connect the other adapter to the 8800SX ANT port.
- Connect the 10 dB Attenuator
- Connect the 10 dB Attenuator to the N adapter on the 8800SX ANT port.
8800SX Initialization

- From the System Menu, select the “Sys Reset” button.

- Select the Yes button when you receive the prompt: “Do you want to restore factory defaults?”
8800SX Initialization

- From the Utilities Menu, select Presets>Clear Display.
  - Note: Touch the grey bar at the top to access the menu bar.

- This will remove any tiles that may have been previously displayed.
8800SX Initialization

• Select the following tiles to be displayed:
  – Generators – Generator
  – Receivers – Receiver
  – Meters – RSSI
8800SX Initialization

- Maximize the Generator and Receiver Tiles.
8800SX Initialization

- Configure the RF Generator Tile.
  - Port: GEN
  - Enable: ON
  - Level: -12 dBm

- Configure the RF Receiver Tile.
  - Frequency: 136.125 MHz
  - Lock: ON
  - IF BW: 10 kHz
  - Port: ANT
  - AGC: Auto
Procedure

1. Connect the Reference cable.
   - Connect the Reference cable from the 8800SX GEN port to the attenuator on the 8800SX ANT port.
2. Set the Receiver AGC.
   • Note the level displayed on the RSSI Meter. Example: -22.3 dBm

3. Change the Receiver Tile AGC setting from auto to manual -20 dBm.
   This value is set to be the next higher value than what is indicated by the RSSI meter. Setting the AGC to a fixed range prevents automatic ranging from choosing a different setting.
4. Establish a zero dB Reference (dBr).
   - Change the RSSI Meter units control from dBm to dBr.
   - Note that the meter now reads 0.00 dBr.
Procedure

5. Add the Test cable in-line with the Reference cable.
   • Disconnect the Reference cable from the 10 dB Attenuator on the 8800SX ANT port. (Leave the attenuator on the 8800SX ANT port.)
   • Using a BNC barrel connector, connect the Test cable to the Reference cable as shown.
   • Connect the other end of the Test cable to the 10 dB Attenuator on the 8800SX ANT port.
6. Record the measured Cable Loss of the Test Cable.
   • The RSSI meter now indicates the amount of insertion loss of the Test cable at this frequency.
   • Record the Loss factor for this frequency.
   • Set the RSSI Meter Units back to dBm.

7. Repeat Section 1 procedure for the following frequencies:
   • 440.125 MHz
   • 810.125 MHz
Configure Auto-Test

1. From the Utilities menu, choose Auto-Test.
Configure Auto-Test

1. Select the Cable Loss function button.
2. Enter the recorded Loss values into the appropriate frequency band areas on the Cable Loss screen.
3. Press the Home button when complete.
Procedure is Complete

The cable calibration is now complete. The Auto-Test application will use the entered values to correct the measured power meter readings by the amount of the cable loss.
APX Radio Interconnect Diagrams

Radio Connections to the 8800

- **Interconnect for Portable Radio**
  1. The Portable radio requires a USB connection from the radio to one of the Cobham 8800 USB ports.
  2. Requires an RF Cable connection from the 8800 TR port to the radio ANT port.
  3. Recommended connection to a battery eliminator and power supply.
**APX Radio Interconnect Diagrams**

**Radio Connections to the 8800**

- **Interconnect for Mobile Radio**
  1. The Mobile radio requires a USB connection from the radio to one of the Cobham 8800 USB ports. The radio may be connected through the connector on the radios rear section or to the radios control head.
  2. The AC24011 current shunt must be used and connected as the diagram indicates only for Power alignment. The current shunt is not required for power testing.
  3. The power supply should be capable of supplying the required amount of current and the current limiting should not be set too low. Proper gauge wires should also be used.
  4. For connection to the current shunt, the positive wire must be connected from the power supply to the radio through the current shunt as indicated in the drawing. The current shunt is connected to the 8800 V/ohm and COM connectors on the DMM.
APX Test and Align and Test Functions

Radio Connections to the 8800

• Test Function
  • When selected, the menu will change to show only Test Items.
  • Provides a Test ONLY on selected items and will not attempt to align anything.

• Align and Test Function
  • When selected the menu will change to show all items that can be aligned and tested.
  • Only selected items will be included in the Align and Test run.
  • Each item that can be aligned will be aligned then tested to see that the alignment meets the configured specifications for that test.
  • If a successful alignment is not achieved, the softpot will be reset to where it was prior to the alignment.
  • Alignments are adjusted as close as possible then tested to be with the specified limits.
  • Some items like TX Parametrics are Test Only so no alignment will occur.
Step by Step Procedure

1. Select the Auto-Test system.
2. Connect the Portable or Mobile radio to be tested.
3. Select the APX from the OEM list and then Select “Read Radio”
4. Select Test or Align & Test from the menu.
5. Options Screen
   • Select both bands or only a single band if only one band is to be tested.
6. From the Test Tab, choose all individual tests to be performed.
APX Last Results

Test Results

- Selecting the Last Results button allows viewing of all of the test results with a summary at the end.
- Select the Home button to return to the main menu screen.
- Press the icon to exit the Auto-Test screen.

- Note: During an Auto-Test, you may exit Auto-Test and the test or alignment will continue. This can be useful to monitor the 8800 instrumentation while a test or alignment is being performed. To return, select Auto-Test from the Utilities menu again.
APX Browse Results

Copy Results to USB

- Selecting the Browse Results button allows selection of a specific test result file for viewing.
  - Highlight the file of interest and press the Select button.
- Copy to USB
  - Copies ALL APX test result files to a USB Memory stick.
  - After inserting the memory stick, wait until the light stops flickering on the memory stick before selecting Copy to USB.
  - Be sure to leave the memory stick in long enough for the file copy to complete. (Give it extra time).
  - Removing the memory stick too soon may result in files not being copied to the memory stick successfully.
- Delete All
  - Removes ALL APX test result files from the 8800 file system.
# 8800 Options and Accessories

## 8800SX Options and Accessories

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## Standard Accessories

- Fuse, 3 A, 32 V, Mini Blade
- AC Power Cord - USA
- AC Power Cord - China
- AC Power Cord - Europe
- AC Power Cord - UK
- Adapter, Nm to BNC(f), Qty 3
- Front Cover

## Accessories

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## Extended Warranties

- 114481 Extended Standard Warranty 36 Months
- 114482 Extended Standard Warranty 60 Months
- 114483 Extended Standard Warranty 36 Months with Scheduled Calibration
- 114484 Extended Standard Warranty 60 Months with Scheduled Calibration

## Languages

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<td>113351</td>
<td>8800OPT301 Traditional Chinese</td>
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**Select 8800SX Accessories Overview**

- **Soft Case**
  - 114478
  - The soft case allows full operation of the 8800SX while inside the case. The laptop style design is lightweight and provides extra protection during field operation. Storage pockets provide extra space for spare batteries, test cables, etc.

- **Hard Transit Case**
  - 114477
  - The hard transit case features form-fitted slots for the 8800SX protective cover, precision VSWR/DTF kit, power supply, 150 W attenuators, spare battery, and more.

- **Precision DTF/VSWR Accessory Kit**
  - 114348
  - This accessory kit provides all items necessary for accurate and VSWR, Return Loss, and Distance-to-Fault measurement. The kit includes a case, return loss bridge power divider, 50 Ohm calibrator, and two N-type test cables specifically designed for the 8800SX.

- **Bird 5017D Thru-Line Power Sensor**
  - 92793
  - The 8800SX also supports the Bird 5017D Thru-Line Power Sensor as an external power meter for users that already have the 5017D. This capability requires 8800OPT13 and provides simultaneous forward and reverse power measurements up to 500 W and VSWR measurements that are displayed on the 8800SX screen.
Questions or Comments?

Contact Information

For information about pricing for our products, contact the sales office by calling VIAVI Solutions at (800) 835-2352 or emailing AvComm.Sales@viavisolutions.com.

For technical/product support, calibration, maintenance and general customer service inquiries, you can contact our help desk by clicking here, calling (800) 835-2350, or emailing Service.Americas@aeroflex.com.

Click here for more information on the 8800SX and latest software versions and training materials.