

QUICK CARD

Measuring the Time Delay of a Satellite Antenna and Cable System

This quick card outlines how to approximate the time delay from a satellite antenna and cable system to an Edge Grand Master (EGM) or router operating as an EGM.






EQUIPMENT REQUIREMENTS

- OneAdvisor 800 equipped with the following:
 - RAXxMA-O Radio Analysis Module or SPA06MA-O Spectrum Analyzer Module.
 - Transport software release V5.1.0 or greater
- Timing Expansion Module V2 (TEM V2)
- GNSS Antenna (Taoglas A.171, Taoglas AA.162, Tallysman TW7882, or Maxtena M9706CWT recommended)
- SMA Male Adapter to adapt to the connector type on the antenna system under test.



Figure 1: Equipment Requirements

CONNECT GNSS ANTENNA AND ACTIVATE TEM V2

1. Press the Power button  to turn on the OneAdvisor.
2. Connect the antenna cable system under test to the female SMA connector on the TEM V2 (labeled Antenna).
3. Tighten the connector until the antenna is securely attached.
4. Tap  Home to display the Home Screen.
5. Tap  Tests to display the Tests menu.
6. Tap  Timing Module >.
7. Tap the **Timing** icon  to activate the TEM V2 Timing Module.

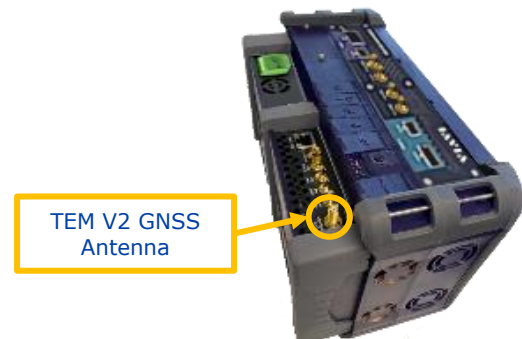


Figure 2: TEM V2

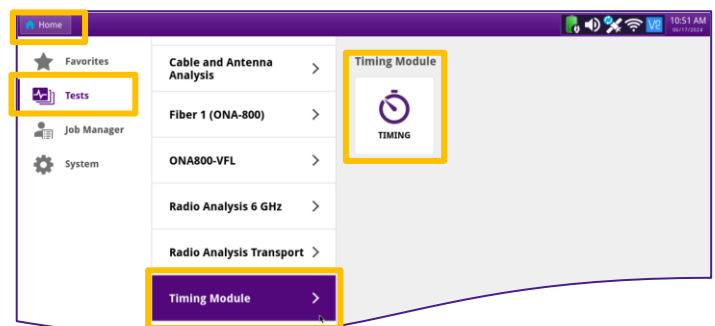


Figure 3: Home Screen

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SETUP GNSS RECEIVER AND START SURVEY

1. Tap the **Setup** soft key on the upper right-hand corner of the screen.
2. Configure **GNSS** settings as follows:
 - **GNSS System:** Select **GPS** for use in North America. Other constellations or combination of constellations can also be used:
 - **Galileo:** European system
 - **GLONASS:** Russian System
 - **BeiDou:** Chinese system
 - **QZSS:** Japanese system
 - **SBAS:** Satellite Based Augmentation System
 - **Too few Satellites Alarm:** 3
 - **Time Reference:** GPS
 - **Time Format:** 12-hour
 - **Elevation Limit:** 5 to 15 deg recommended, Using satellites near the horizon may degrade performance but may be needed in “urban canyons”.
 - **Minimum C/No:** 9 dB-Hz recommended, 30 dB-Hz maximum. Using satellites with a weak carrier to noise ratio may degrade performance but may be needed in “urban canyons”.
 - **Antenna Power:** 5 volts for VIAVI supplied magnetic mount antennas. If you are using a different antenna, enter the antenna power, or select 0V if the site powers the GPS antenna.
 - **Antenna Time Bias:** Select Antenna Type for VIAVI supplied antennas; otherwise, Select “User Defined” and enter the cumulative delay introduced by the reference antenna, cables, and any in-line splitters or amplifiers.
 - **Jamming Detection Mode:** Off
3. Tap the **Location** settings tab and configure location settings as follows:
 - **Survey mode:** **Typical** (3 hours) is recommended, **Fast** (15 minutes) may be used with reduced position accuracy, **Quick** should not be used.
4. Tap the **Start Survey** button to start a survey. If prompted, tap **OK** to continue.
5. Tap the **Results** soft key on the upper right corner of the screen.

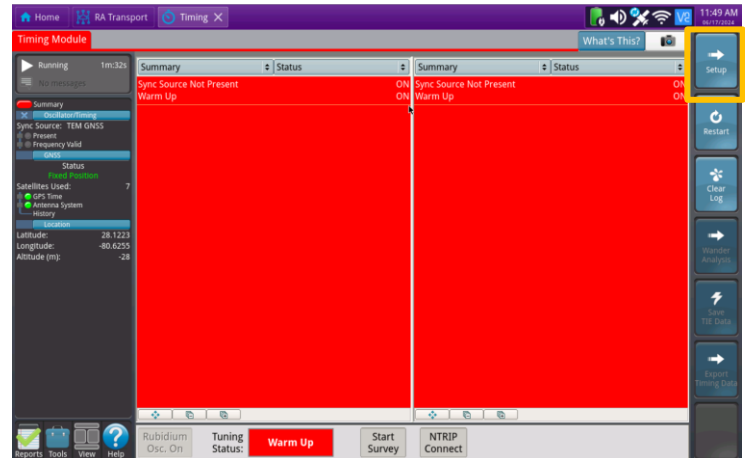


Figure 4: Timing Module Results

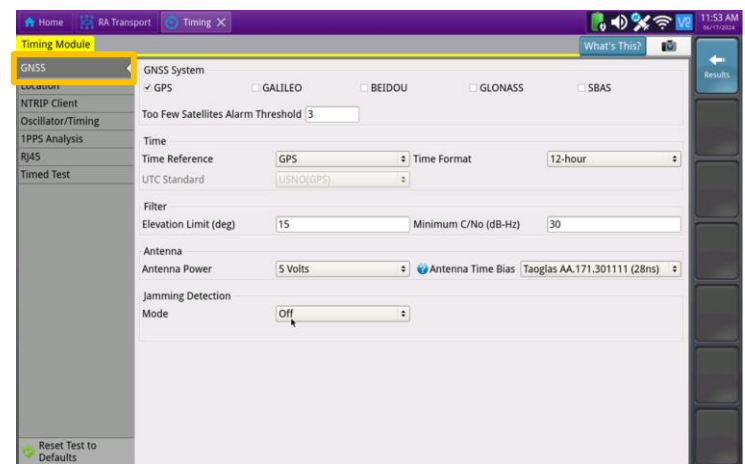


Figure 5: GNSS Settings

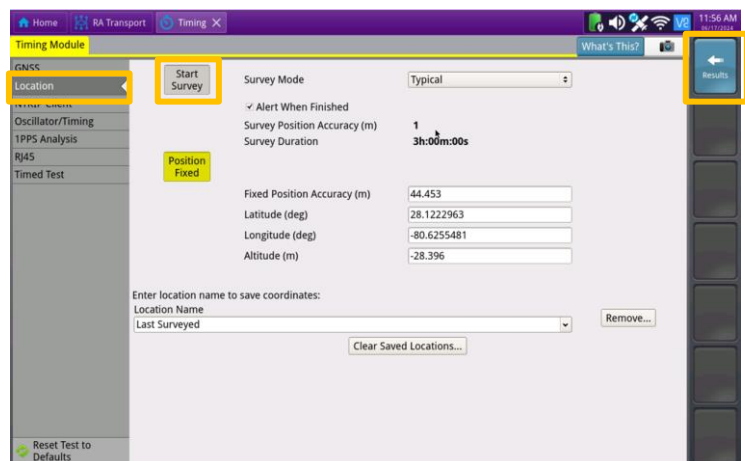


Figure 6: Location Settings

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VERIFY GNSS RECEPTION

- Tuning Status** will be displayed at the bottom of the screen. The Oscillator will cycle through these stages: Warming Up, Initializing, Wait for 1PPD, Course Tune, Intermediate Tune, Fine Tune. At least **Intermediate Tune** is required.
- Using the results group and category drop-down menus, change the right results display to the following:

 - ▶ **Satellites/Sky Plot:** Displays the satellites detected by the GNSS receiver.
 - ▶ **Satellites/Signal Strength:** Uses a bar graph to display the signal strength for each identified satellite. Ensure at least 4 satellites are used (green) and that signal strength of used satellites exceeds Minimum C/No setting (bar will be green). Otherwise, relocate antenna to a less obstructed location or reduce the Minimum C/No setting.
 - ▶ **GNSS/Location:** Displays general information concerning the location and position accuracy. A Mean Position Dilution of Precision (PDOP) value below 4.0 is desired.
 - ▶ **GNSS/Status:** Displays general information concerning the GNSS Satellites. Ensure that Status progresses from “No Lock” to “Locked” to “Fixed Position” during the survey. Ensure that Timing Mode Status progresses from “Survey” to “Survey Done”.

- A “Typical” survey will run for 3 hours and stop if it has reached a 1-meter position accuracy. **If, after 3 hours, the survey still shows “Survey Active”,** the Timing Module was not able to attain a 1-meter or better position accuracy. Tap the **Setup** soft key, set **Survey Mode to Fast**, and tap the **Results** soft key. Repeat steps 1 and 2 above to conduct a 15-minute survey with 45-meter position accuracy.

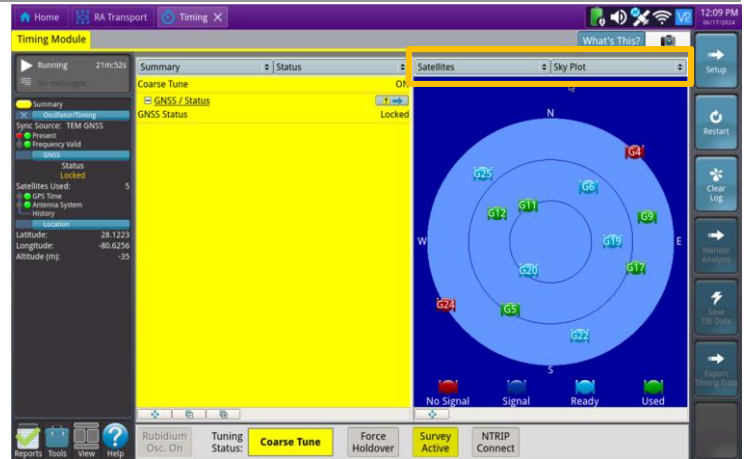


Figure 7: Satellites/Sky Plot Results

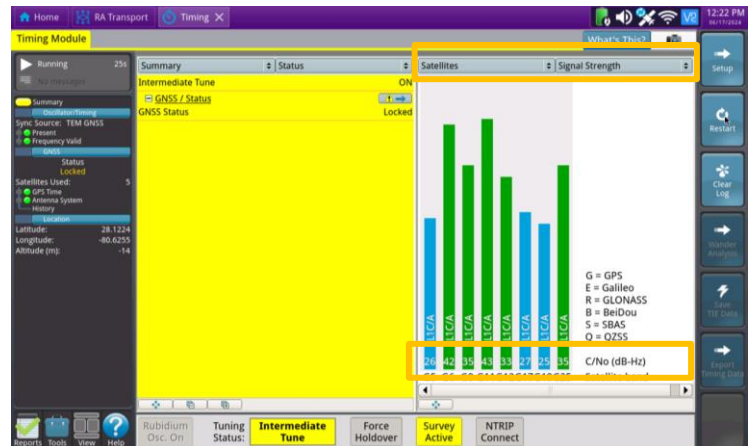


Figure 8: Satellites/Signal Strength Results

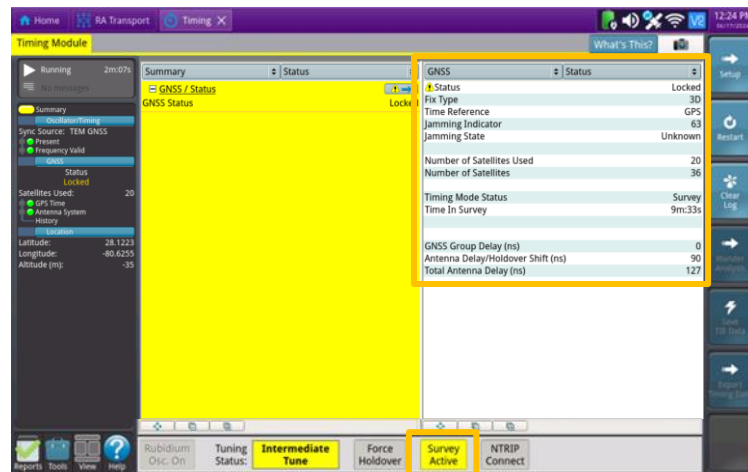






Figure 9: GNSS/Status Results

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CONNECT REFERENCE ANTENNA AND COMPLETE SURVEY

1. Tap the **Force Holdover** button  at the bottom on the screen. The button will turn yellow and be relabeled **Release Holdover** .
2. Disconnect the antenna cable system under test from the TEM V2 timing module.
3. Connect the Viavi-provided magnetic mount antenna to the TEM V2 Antenna and place the puck of the antenna in a location with clear-sky view. If you have to move the OneAdvisor 800 to a different location, the ambient temperature should be close to that of the original location. If moving from indoors to outdoors, place the OneAdvisor in cooled or heated vehicle.
4. Press the **Start Survey** button  at the bottom of the screen.
5. In pop-up window, select **Fast-15 minutes or more** and tap **OK**.
6. Wait for the 15 minutes survey to complete.
7. After the survey finishes, press the **Release Holdover** button  at the bottom of the screen.
8. The **Total Antenna Delay/Holdover Shift (ns)** value will populate in approximately 10 seconds. This is the Total Delay of the Satellite antenna system.

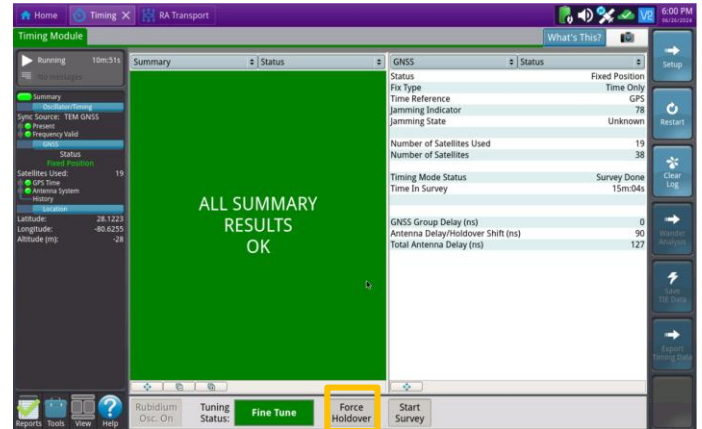


Figure 4: Timing Module GNSS Status Results

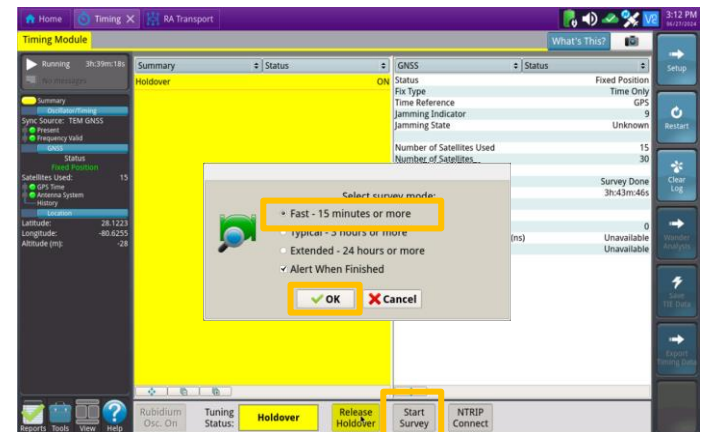


Figure 5: Start Survey pop-up window

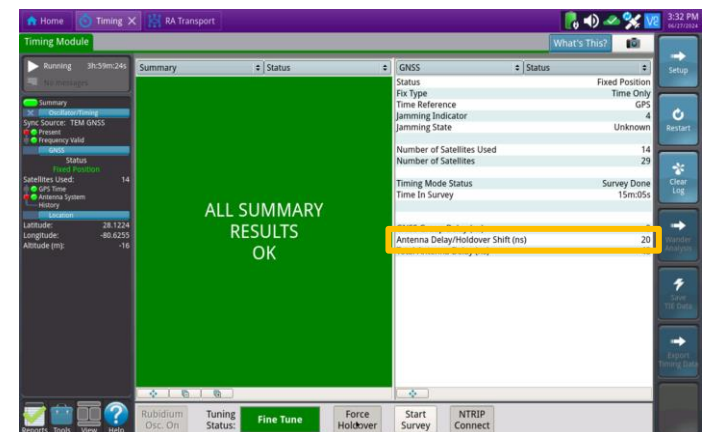


Figure 6: GNSS Status, Total Antenna Delay/Holdover Shift