



SUNSIGHT MICROWAVE PATH
ALIGNMENT SYSTEM

Models MW15 & MW08



Document Change History

Issue	Date	Description
1	02/05/2016	Original Issue
2	02/08/2016	RF Panel Alignment instructions added
3	02/15/2016	Report generation instructions added
4	04/28/2016	Microwave Path Alignment App for tablets added Photographs reformatted
5	05/31/2016	End-to-End Microwave Alignment instructions updated Ability to add photographs to End-to-End Microwave Reports added
6	07/25/2017	MW Menu options defined Glossary added MW antenna tilt calibration revised MW tilt/roll calibration added Photo capture instructions added for all reporting methods
7	08/02/2019	Update for generic use of any Android device using Sunsight Android App. Added Retrieve Reports from Anywhere. Removed RF panel alignment instructions in favor of referencing existing instructions.
8	07/17/2020	Language and Kit contents updated to reflect new Android device. MWxx updated to MW unit when referring either MW15 or MW08 unit.

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Safety

The MW unit should be handled with the following considerations:


 Avoid impacting, dropping or rough handling of the MW unit, as it contains sensitive electronic components. Rough handling may result in internal component damage.

 Care should be taken to avoid impact to the black GPS antennas on the top of the MW unit.

 The MW unit is water resistant, but not waterproof. Do not submerge. All sealing caps and doors must be secured while in use, particularly during inclement weather.

 Use only the Sunsight supplied smart charger to recharge the LiFePO4 battery pack. Use of a non-approved battery charger will void the battery warranty and may damage the battery pack.

 Never attempt to recharge the batteries outdoors in inclement conditions.

 Never short the battery terminals and never attempt to disassemble the battery pack or dispose of the pack in a fire. Any exhausted battery packs must be disposed of properly. CONTACT SUNSIGHT INSTRUMENTS IF YOU ARE UNSURE OF HOW TO PROPERLY DISPOSE OF THE BATTERY.

 All internal repairs must be performed by Sunsight Instruments. Unauthorized disassembly of the MW unit may result in warranty termination.

If you suspect the MW unit is operating incorrectly, contact Sunsight Technical Support via +1-321-244-9443, www.sunsight.com, or an authorized Sunsight Instruments distributor for support.

The Sunsight Microwave Path Alignment System

The Sunsight Microwave Path Alignment System is a product used to precisely mechanically align devices in azimuth, elevation angle (tilt) and height. Because the system physically aligns the antennas to calculated azimuth and elevation based on GPS location, it is frequency and distance independent. It is commonly used to align point-to-point communication links. The system consists of a measurement unit mounted on the antenna at each end of the link to be aligned. Using Sunsight's patented End-to-End Alignment* technology, the two measurement systems communicate with each other to determine the required target alignment parameters, which are azimuth and elevation. The users at both ends are displayed this target data as well as the actual current alignment measurements of the antennas. The user then adjusts the antenna position to match the target data and secures the antenna in the correctly aligned position. The devices (microwave antennas) can be aligned independently once the data is transmitted and the target values are obtained. The system requires no external power or disconnection of the antenna from RF sources (coax, waveguides, or radio/ODU). The alignment results are captured in a comprehensive report.

A complete link can be measured and captured in a single comprehensive report.

Important

Each MW15 included in the Sunsight MW15 Microwave Path Alignment System may also be used independently to align single microwave antennas or cellular RF panel sites. In this way, each Sunsight MW15 Microwave Path Alignment Kit may be employed as an End-to-End alignment system, two individual microwave antenna aligners, or two complete cellular RF panel alignment systems. Instructions for use as an RF Panel alignment tool can be found on the www.sunsight.com support page.



**End-to-End Alignment technology is a patented design belonging to Sunsight.*

Definitions

MW15 or MW08 Kit – each Kit comprises two MW units, along with two sets of microwave antenna mounts, two Android devices used to connect to and operate the MW unit(s) and two RF Panel alignment mounts (MW15 only). For the remainder of this document the term MW unit will mean the MW15 or MW08 unit.

MW15 or MW08 Single Unit -- each MW Single unit comprises one MW unit, along with one set of microwave antenna mounts, one Android device used to connect to and operate the MW unit and one RF Panel alignment mount (MW15 only). A Single Unit is used to align each end of a microwave link independently (one at a time). The MW15 Single Unit can also be used to align a cellular RF panel antennas. For the remainder of this document the term MW unit will mean the MW15 or MW08 unit.

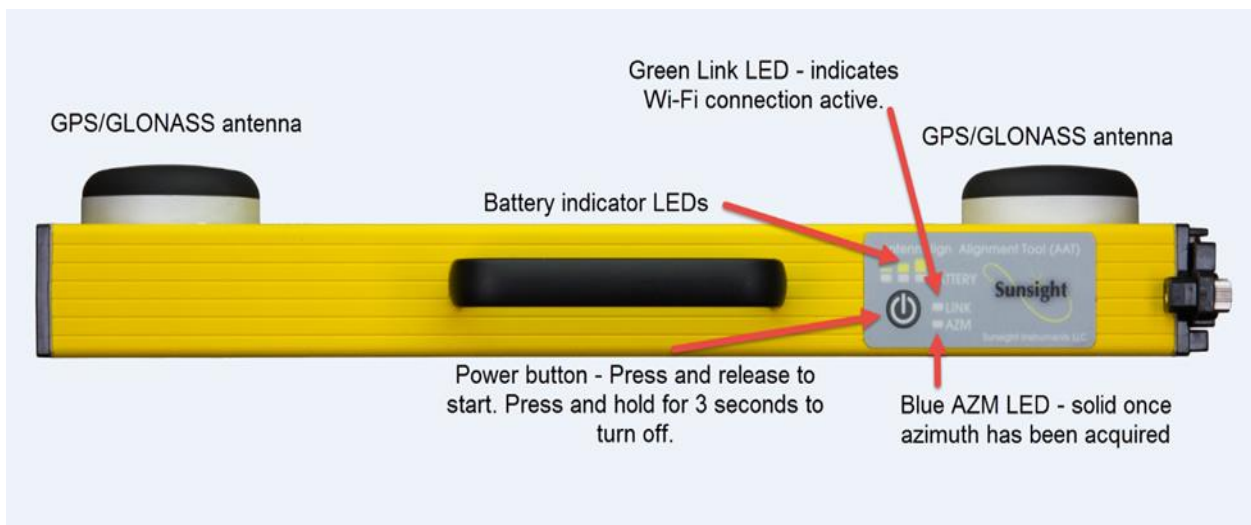
Android Device – the MW products come with 4G Android devices that use the Sunsight Android app to connect to and operate the Sunsight products. Note that any Android device (tablet or Smartphone) with Android Operating System greater than 6.0 can also be used in place of the provided Android device. The Sunsight Android app would need to be installed on the Android device. For the remainder of this document the term Android device will mean the Android device supplied with the MW products or any other Android device running the Sunsight Android app.

Case contents – 2 cases per kit

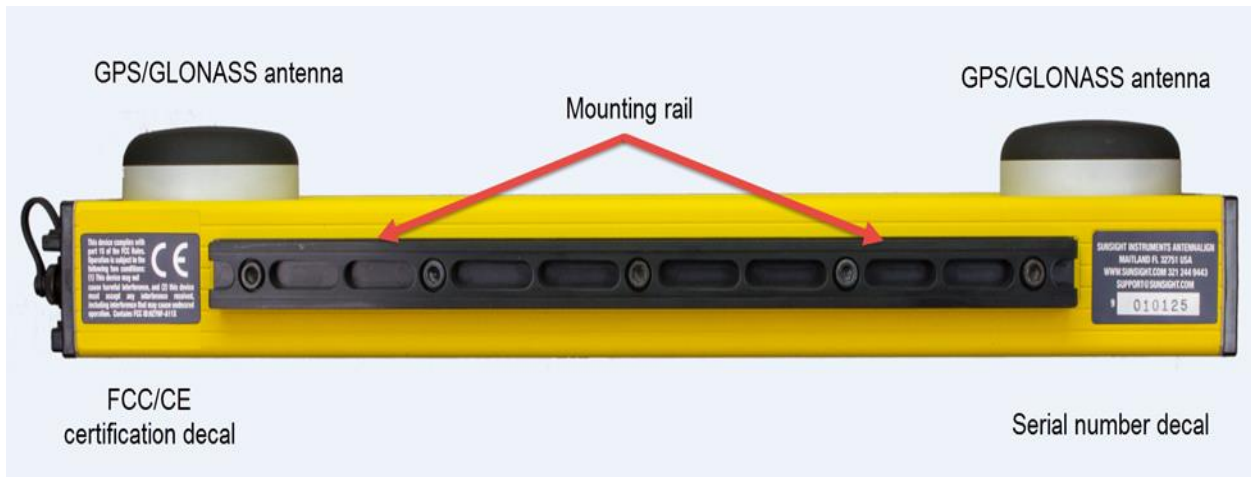
1. MW15 or MW08 Microwave Aligner hard case
2. MW15 or MW08 Microwave Aligner
3. Panel mount with strap – for use on standard RF panel antenna (MW15 only)
4. Microwave mount main
5. Adjustable mount straps (3 pieces)
6. Parabolic(funnel) style adapter bracket
7. Adapter plate (3 pieces)
 - a. 4' – 12' (1.3m – 3.7m) diameter antenna adapter
 - b. 18" – 4' (0.5m – 1.3m) diameter antenna adapter
 - c. 12" – 18" (0.3m – 0.5m) diameter antenna adapter
8. Safety lanyard
9. Push/pull stick – option/discontinued
10. Electronic digital level w/soft case
11. LiFePO4 battery charger
12. Android Device
13. Android Device accessories



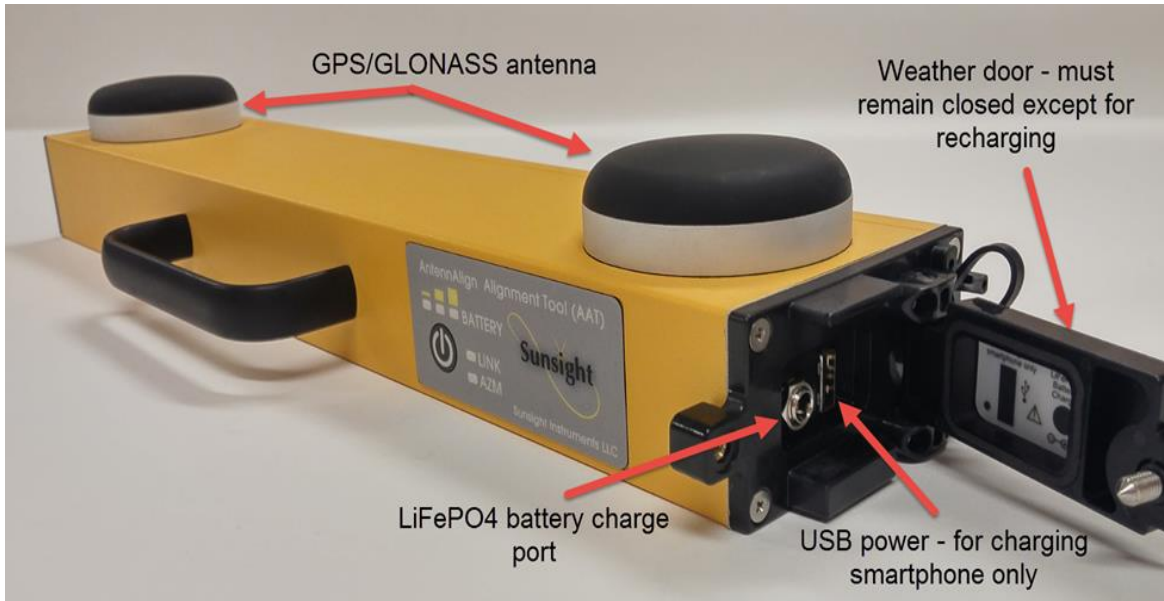
SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08



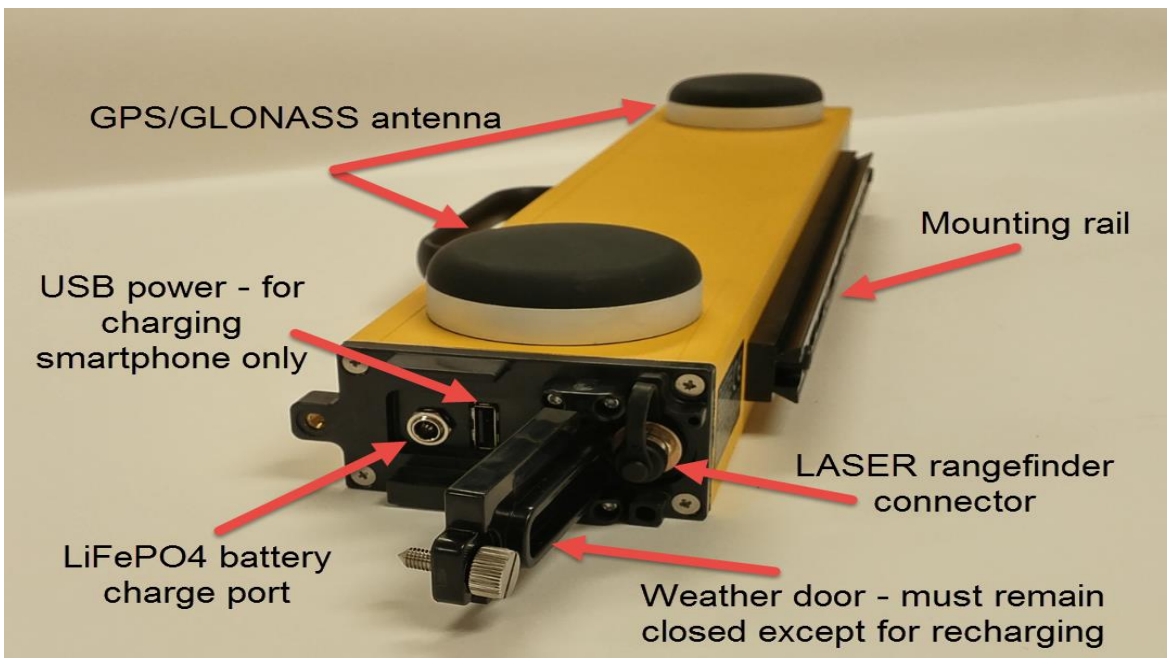
MW15/MW08 front view



MW15/MW08 back view



MW15/MW08 charge ports



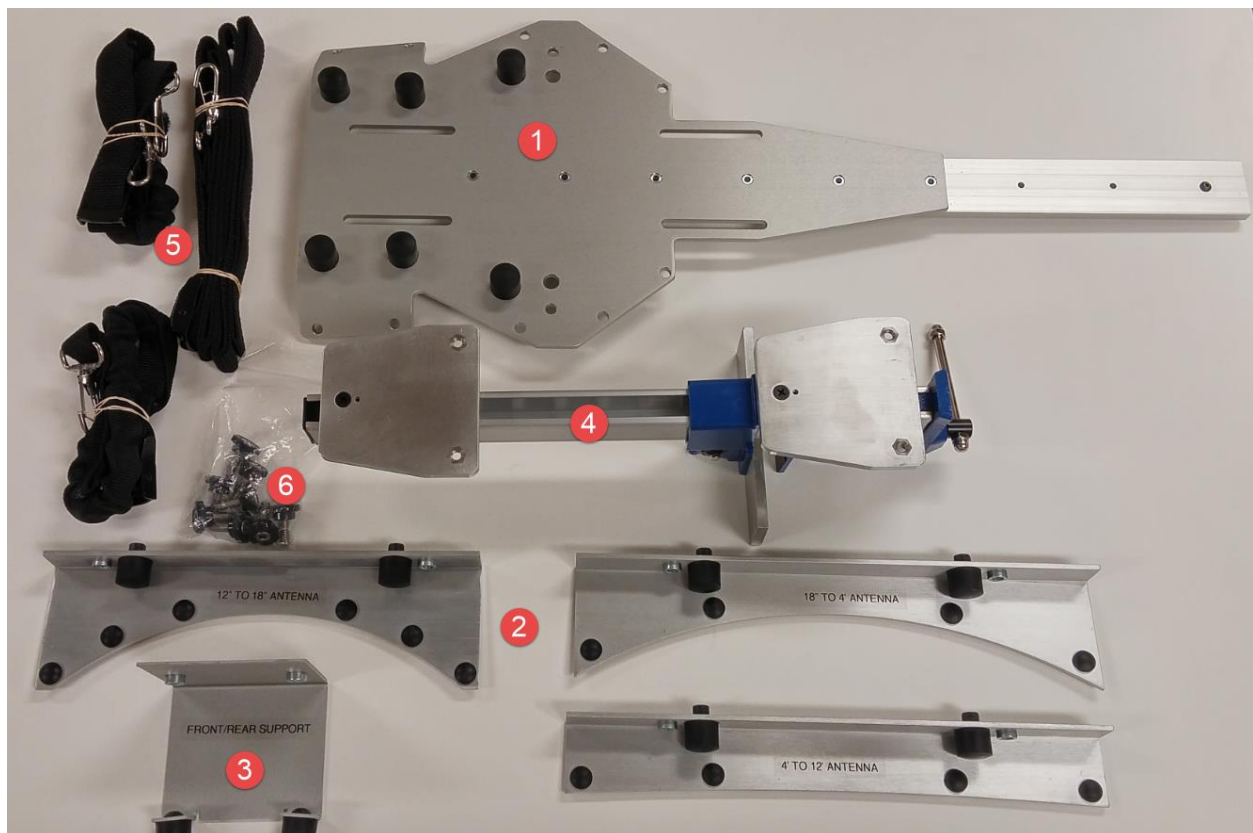
MW15/MW08 charge ports and LASER rangefinder connector

Please take time to review the following pictures, examine and assemble the mount to ensure its use is fully understood before attempting to use the mounting system in the field.

Using the Microwave Mount

There are many shapes and sizes of microwave antennas as shown on the following pages. The included microwave antenna mount is designed to be very flexible in this regard, allowing a broad range of fitment. The microwave mount consists of the following:

1. Mount main body
2. Curved front adapter bracket – 3 sizes
3. Front/Rear support bracket
4. Clamp assembly
5. Straps (x3) to secure mount to antenna
6. Thumbscrews (x8) to secure adapters to main body



*****Do not attempt to remove the rubber bumpers secured to the mount main body or adapters. Attempted removal may damage the bumpers or mount*****

Common Microwave Antenna Styles



Shielded or "Drum Style"



Convex – rounded back



Convex – round front



Parabolic



Flat Panel "Pizza Box" Antenna

Flat Panel

Assembling the Microwave Mount - General Assembly

Note: Adapter brackets may be reversed to accommodate a wide variety of antennas. Photographs below represent basic assembly procedures. Always use the proper adapter brackets to ensure the mount is sufficiently and safely supported on the antenna. Regardless of the antenna type, always secure the mount to the microwave antenna using the included elastic straps and adjustable end straps.

- 1) The elastic straps typically loop under the center of the antenna and back up to the mount. On some shielded “drum” style antennas, the strap can be wrapped around the circumference of the drum. See [Figure 1 & 2](#)

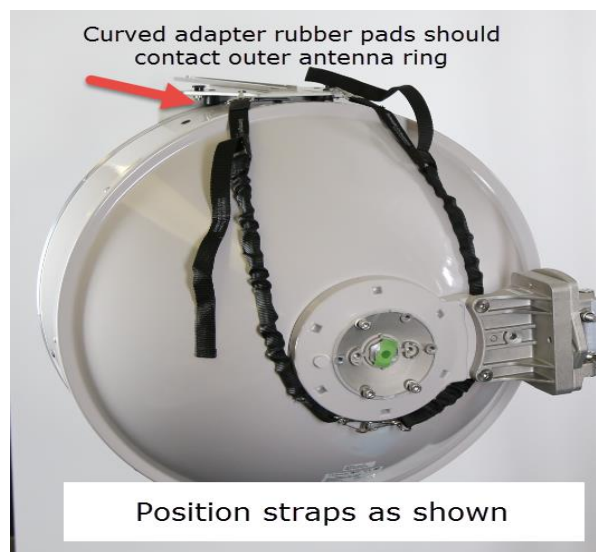


Figure 1



Figure 2

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

- 2) Use the correct straps based on the antenna's diameter. The three mount straps supplied with the microwave alignment kit can be attached end-to-end, allowing a large range of adjustment for various antenna diameters. **Always start with an elastic strap.**
- 3) Ensure the mount is secured to the antenna, adjust the straps, and ensure the sliding rail is approximately level as it is extended in front of the antenna (not drooping or pointing to the sky). The mount should be very stable. See [Figure 3](#), [Figure 6](#) & [Figure 7](#)

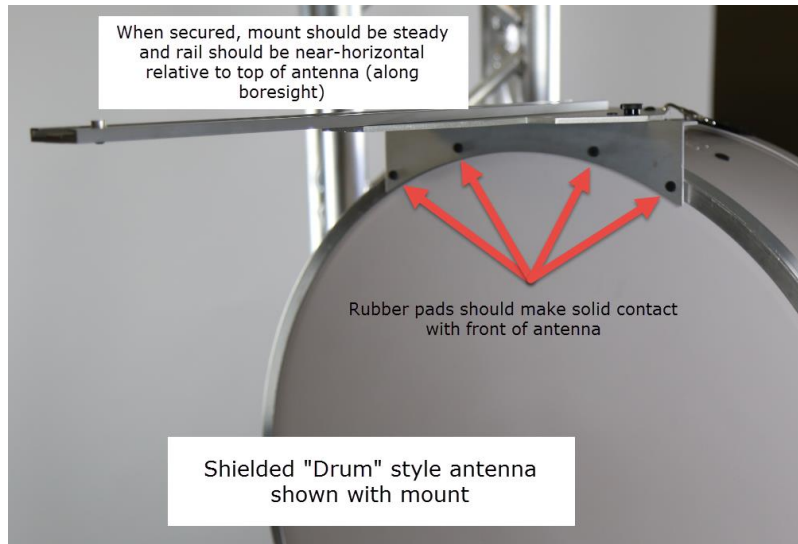


Figure 3

Shielded (“drum”) Antenna Mount Instructions

- 1) For shielded (“drum” style) antennas, configure the mount as shown below, using only the appropriate curved front adapter bracket. See [Figure 5](#). Attach the curved adapter to match the antenna diameter – three curved adapters to fit antenna diameters from 1 – 12’ are included with each unit. See [Figure 4](#)



Figure 4



Figure 5

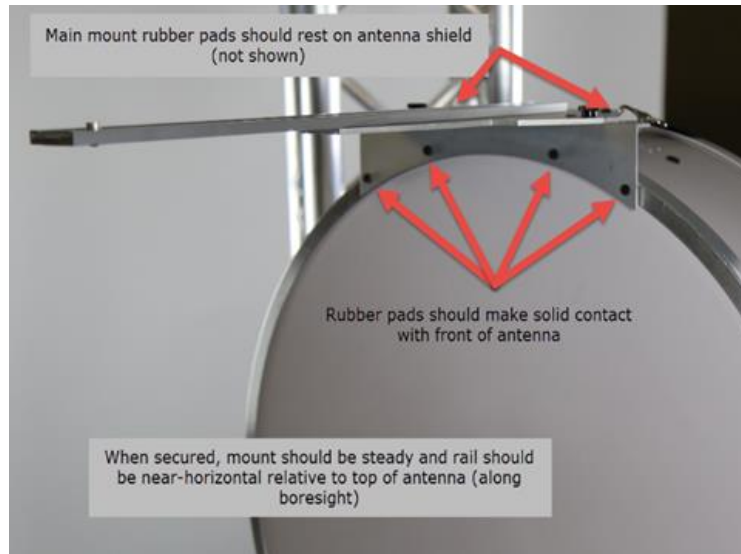
- 2) Place the mount on top of the antenna shield, making sure the rubber pads on the bottom of the mount main body make contact with the antenna and provide a good base.
- 3) Ensure that the four (or six) rubber pads in the curved adapter are tight against the face of the antenna. All curved adapter pads must be in solid contact with the antenna face. This is critical for accurate azimuth alignment of the antenna.
- 4) Clip one of the elastic antenna straps to the mount and pass the strap under the rear center section of the antenna (under the radio mounting area) and bring it back up and clip to the mount. When secured, the straps should form a "U" shape. *See [Figure 6](#)*. The three mount straps supplied with the microwave alignment kit can be attached end-to-end, allowing a large range of adjustment for various antenna diameters.
 - a. NOTE: On some shielded "drum" style antennas, the user may wrap the mount straps around the circumference of the antenna.



Figure 6

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

- 5) Adjust the retaining strap tension and ensure mount is steady. Check that rubber pads are touching on front, top and/or back of antenna correctly.
- 6) Make sure mount is more or less horizontal in reference to the antenna. *See [Figure 7](#)*

**Figure 7**

- 7) The mount must be positioned directly on top of the antenna with minimal side-to-side error, or “roll” error. Place the included digital level across the mount, perpendicular to sliding rail, to measure the “roll” of the mount. Adjust the mount to achieve a roll of $\pm 0.5^\circ$. *See [Figure 8](#)*

**Figure 8**

*****ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW UNIT FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to secure the mount to the antenna*****

Convex Back and Unshielded Parabolic Antenna Style Mount Instructions

- 1) For convex back and unshielded parabolic antennas, configure the mount, including the front/rear support bracket as shown in [Figure 9](#)

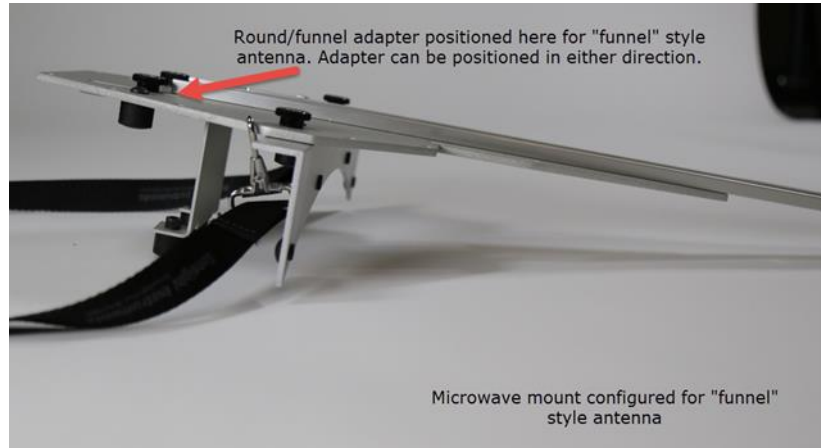


Figure 9

- 2) Place the mount on top of the antenna shield, making sure the rubber pads are in contact with the edge of antenna. Slide the adjustable support bracket forward or back to bring the rubber pads in contact with the back of the antenna and in such a way that the mount is approximately horizontal relative to the antenna. Tighten thumbscrews. [See Figure 10](#).

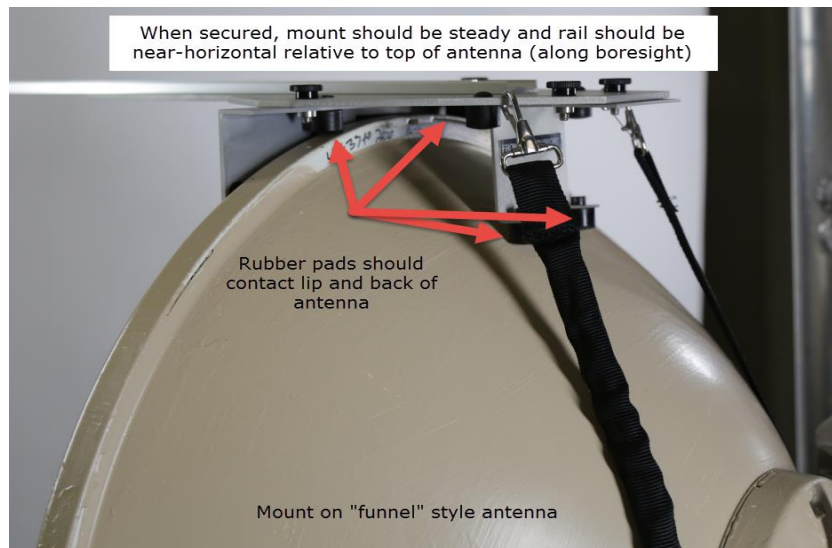


Figure 10

- 3) Clip one of the elastic antenna straps to the mount and pass the strap under the rear center section of the antenna (under the radio mounting area) and bring it back up and clip to the mount. When secured, the straps should form a "U" shape. [See Figure 6](#). The three mount straps supplied with the microwave alignment kit can be attached end-to-end, allowing a large range of adjustment for various antenna diameters.

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

- 4) Adjust the mounting straps for tension and ensure mount is steady.
- 5) Again make sure mount is approximately horizontal relative to the antenna.
- 6) The mount must be positioned directly on top of the antenna with minimal side-to-side error, or “roll” error. Place the included digital level across the mount (perpendicular to sliding rail) to measure the “roll” of the mount. Adjust the mount to reduce roll error to within +/-0.5 degrees.
See [Figure 8](#)

*****ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MWUNIT FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to secure the mount to the antenna*****

Convex Front Antenna Mount Instructions

- 1) For convex front antennas (shielded and unshielded), configure the mount, including the front/rear support bracket - the front/rear support bracket is secured to the mount’s forward slides, which will allow the rubber pads to contact the antenna face. **See [Figure 11](#)**
- 2) Place the mount on top of the antenna shield ensuring that the rubber pads are in contact with the edge of antenna. Slide the support bracket forward or back to bring the rubber pads in contact with the front of the antenna and in such a way that the mount is more or less horizontal to the antenna. Secure the bracket thumbscrews.



Figure 11

- 3) Clip one of the elastic antenna straps to the mount and pass the strap under the rear center section of the antenna (under the radio mounting area) and bring it back up and clip to the mount. When secured, the straps should form a “U” shape. **See [Figure 6](#)**. Straps may be clipped together end-to-end to create a longer strap for larger antennas.
- 4) Adjust the mounting strap tension and ensure mount is steady. Adjust mounting bracket, strap attachment points or strap tension as necessary.
- 5) Verify mount is more or less horizontal to the antenna. **See [Figure 7, 8 & 10](#)**
- 6) The mount must be positioned directly on top of the antenna with minimal side-to-side error, or “roll” error. Place the included digital level across the mount (perpendicular to sliding rail) to measure the “roll” of the mount. Adjust the mount to reduce roll error to within +/-0.5 degrees.
See [Figure 8](#)

*****ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MWUNIT FROM ACCIDENTAL FALLS**
Note: The safety lanyard is NOT the same as the black elastic straps used to secure the mount to the antenna***

Using the Clamping Mount Adapter

For microwave antennas including a lip around all or the top of the antenna, the clamping mount adapter may be used in place of the front and rear adjustable mount brackets. The clamping adapter may be adjusted from 1" - 9" width.

- 1) Secure the clamping adapter to the microwave mount main body front and rear slides using 4 included thumbscrews. The clamp fine adjustment lever should point to the rear of the mount. **See [Figure 12](#)**

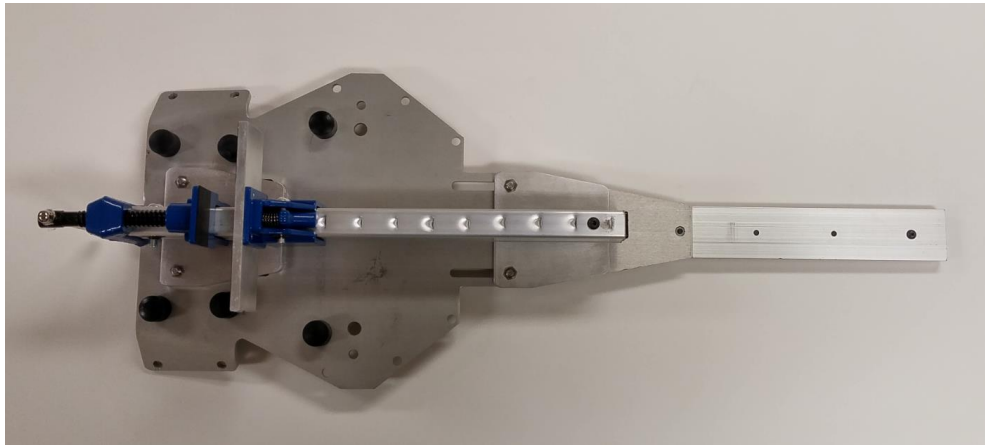


Figure 12

- 2) Adjust the clamping adapter to the width of the antenna lip. Use the coarse width adjustment lever first, then use the fine adjustment lever to secure the mount to the antenna. **See [Figure 13](#)**



Figure 13

- 3) Clip one of the elastic antenna straps to the mount and pass the strap under the rear center section of the antenna (under the radio mounting area) and bring it back up and clip to the mount. When secured, the straps should form a "U" shape. **See [Figure 6](#)**. Straps may be clipped together end-to-end to create a longer strap for larger antennas.

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

- 4) Adjust the mounting strap tension and ensure mount is steady. Adjust mounting bracket, strap attachment points or strap tension as necessary.
- 5) Verify mount is more or less horizontal to the antenna. *See [Figure 7, 8 & 10](#)*
- 6) The mount must be positioned directly on top of the antenna with minimal side-to-side error, or “roll” error. Place the included digital level across the mount (perpendicular to sliding rail) to measure the “roll” of the mount. Adjust the mount to reduce roll error to within +/-0.5 degrees. *See [Figure 8](#)*

*****ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW UNIT FROM ACCIDENTAL FALLS**
 Note: The safety lanyard is NOT the same as the black elastic straps used to secure the mount to the antenna***

Using the Microwave Alignment System in the Field

Preparation before going to field

- 1) Ensure that the main MW unit(s) and Android device(s) batteries are charged. If using optional LASER rangefinder, ensure that the LASER rangefinder has good AA batteries (2 required).
- 2) If performing a **Single-Ended** alignment (aligning only one end of link at a time), proceed to the [Single-Ended Alignment](#) section on [Page 19](#). Be sure to have the latitude, longitude and height of the remote antenna’s location.
- 3) If performing an **End-to-End** alignment (teams at both ends of the link and using paired MW units simultaneously), proceed to [End-to-End Alignment](#) section on [Page 23](#).

Single-Ended Microwave Alignment	End-to-End Microwave Alignment
MW unit and Android device are charged	Both MW units and Android devices are charged
One crew at one end of a microwave link	Crews at both ends of a microwave link
One microwave alignment kit case and contents	Both microwave alignment kit cases and contents
No SIM cards required	SIM cards must be installed and activated in Android devices
Targets determined by manual input	Targets determined by location of MW units
Remote (other) antenna latitude, longitude and MSL height required for targeting	No remote (other) antenna location information required
See Page 19 for Single-Ended Alignment	See Page 23 for End-to-End Alignment

Single-ended Alignment

Aligning only one end of the link - i.e. no team member at remote site

*****NOTE:** The latitude, longitude and MSL height of the remote antenna must be available in order to calculate accurate target alignment data***

At the site

- 1) Perform Steps 1 – 2 under [Preparation before going to the field - Page 18](#)
- 2) Configure mount for the antenna:
 - a) Shielded (drum style) antenna - [See Pages 12 – 13](#)
 - b) Parabolic or convex back antenna - [See Pages 15 – 16](#)
 - c) Convex front antenna – [See Page 16](#)
 - d) Clamp mount – [See Page 17](#)
 - e) Flat panel or “pizza box” antenna [See Page 31](#)

*****ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW UNIT FROM ACCIDENTAL FALLS** Note: The safety lanyard is NOT the same as the black elastic straps used to secure the mount to the antenna***

- 3) Slide the MW unit into the mount rail, but do not extend to end of rail. The MW unit carry handle and power button should face the back of the antenna – except for flat panel antennas.
 - a. Flat panel antenna orientation will depend on selection and location of mount.
- 4) Power on the Android device and allow to run for approximately 90 seconds.
- 5) Power on the MW unit and allow boot sequence to complete. Completed boot sequence is denoted by the battery LED illuminating and a flashing blue AZM light.
- 6) Click the Sunsight **Microwave Path Alignment App** icon on the Android device
- 7) Click “Scan for AATs”
 - a. Available MW unit connections will be displayed upon completion of scan.

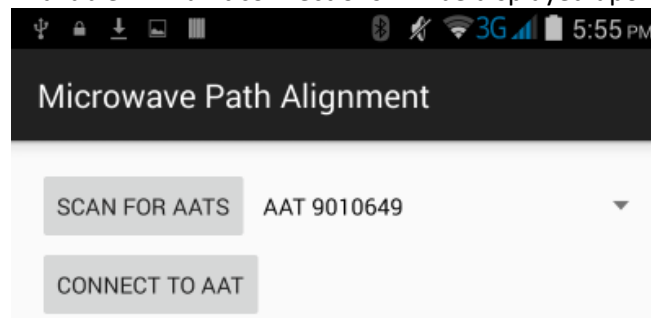


Figure 14

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

- 8) Using the drop-down menu, locate the MW unit connection matching the serial number of the MW unit being used and click “CONNECT TO AAT.” See [Figure 14](#)
 - a. MW unit serial number decal is located on the back of the unit and is formatted 90xxxxx
- 9) The app will open the MW unit’s website in an embedded browser. Use the app, not the Android device’s browser, to navigate the MW’s website.
- 10) Once logged in, tap the “**Start a Single-Ended Mode alignment session**” button.
- 11) Enter Session Info data, including the antenna diameter.
 - a. Data input is optional, excluding antenna diameter. Any information stored will be displayed on the alignment report.
- 12) Tap “Begin Session” at the bottom of the page to begin alignment.
- 13) Place the included digital level on the flat frame of the antenna (typically near the radio mount in the back/center of the antenna) and adjust the antenna so that the level indicates 90° (this will equal 0° tilt (elevation angle)). See [Figure 15](#)



Figure 15

- 14) Tap “**Calibrate**” at the bottom of the page, then **OK** at the prompt to save results.
 - a. NOTE: If the microwave mount is removed or repositioned, the calibration must be performed again using the “**Recalibrate Tilt**” button.
- 15) Enter the Latitude, Longitude, and MSL Height of the remote end (the other antenna) of the microwave link, then tap “**Begin Alignment**”

*** If capturing Above Ground Level (AGL) height, please see [Using the Rangefinder... \(Page 42\)](#).
Otherwise, continue with Step 16 below. ***

- 16) Extend the MW unit out on the mount rail until it clears any overhead obstructions.
- 17) Make sure the blue Azimuth LED is solid and not flashing. A solid blue LED indicates that the MW unit has calculated azimuth.
- 18) Adjust the antenna to closely match the target azimuth and tilt.

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

- a. Note that one or two tenths of a degree in azimuth is not critical.
 - b. Be sure to give the MW unit adequate time - up to a minute - to “settle” on an azimuth after making minor adjustments.
- 19) Once the antenna is adjusted, secure the antenna in position.
- 20) With alignment complete, the user may select one of the following:
- a. Tap “**Save Report**” to save the results. The alignment report is saved to the MW unit *only*. Reports may be generated later.
 - b. Tap “**Save Report & End Alignment**” to save the results to the MW unit and end the alignment session. Reports may be generated later.
 - c. Tap “**End Alignment**” to end the alignment session without saving a report to the MW unit. No report will be available if this option has been selected.

NOTE: Single-Ended Microwave Alignment reports may be collected from the MW unit at any time. All reports remain on the MW unit until the user manually deletes an individual report, or clears the MW unit internal memory. See [Notes regarding MW unit report generation and retrieval - Page 44](#)

- 21) The Single-Ended alignment is now complete.
- 22) Power down MW unit and Android device and secure for transport.

****See sample Single-Ended Microwave Report with Photos on Page 22 – 24****

After returning from the field

- 1) Retrieve reports from Android device/MW unit.
- 2) Charge the MW unit and Android device prior to long term storage.
- 3) Be sure to turn off data/phone plan to conserve costs. This can also be accomplished by turning off the Android device(s).

END OF SINGLE-ENDED ALIGNMENT PROCEDURE

	Manual Microwave Alignment Report Sunsight Test	Sunsight Instruments 125 Candace Drive Maitland FL 32751 321-244-9443
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AAT 9010711			
Site Description	South Yard		
Link Name	Test Link		
Call Sign	Epsilon		
Emission Designator	12345		
Licensee Code	54321		
Antenna Make	Ubiquiti		
Antenna Model	AF5		
Antenna Diameter	0.56 m		
Radio Make	Ubiquiti		
Radio Model	AF5		
Azimuth Target / Actual	12.9	/	12.8
Downtilt Target / Actual	0.0	/	-0.1
Target Lat/Long Dec. / DMS	28.856000, 86.099000	/	28° 51' 21.6000" N, 86° 5' 56.4000" E
Lat/Long Dec. / DMS	28.644977, -81.355710	/	28° 38' 41.9180" N, 81° 21' 20.5554" W
Target MSL Height ft / m	104.99 ft	/	32.00 m
MSL Height ft / m	103.05 ft	/	31.41 m
AGL Height ft / m	-	/	-
Distance mi / km	8372.68 mi	/	13474.49 km
Orientation	Back		
Notes	Single end test		
Timestamp (UTC)	2017-07-24 15:47:20		

Note: this report was generated using Manual Alignment Mode, which means the target latitude, longitude and MSL height values were manually entered and not automatically obtained from another AAT.

Capture Timestamp: 2017-7-24 15:47:20 (UTC)
Site: Sunsight Test
Link Name: Test Link
Azimuth: 12.8
Downtilt: -0.1
Latitude: 28.644977 / 28° 38' 41.9180" N
Longitude: -81.35571 / 81° 21' 20.5554" W
AGL Height: Not Captured
MSL Height: 103.05 ft



Capture Timestamp: 2017-7-24 15:47:20 (UTC)
Site: SunSight Test
Link Name: Test Link
Azimuth: 12.8
Downtilt: -0.1
Latitude: 28.644977 / 28° 38' 41.9180" N
Longitude: -81.355571 / 81° 21' 20.5554" W
AGL Height: Not Captured
MSL Height: 103.05 ft



Example Single-Ended Microwave Alignment report

End-to-End Alignment*

Aligning both ends of the link simultaneously – crews at each end of the link with paired MW units

NOTE: End-to-End Alignment requires both Android devices to have network access. SIM cards must be installed and activated in both Android devices. Cellular network coverage is required.

Once both teams have completed **Steps 1 – 3** under [Preparation before going to field...](#) ([Page 18](#)), they are ready for an End-to-End alignment session.

At the site

- 1) Determine mount configuration required for antenna:
 - a. Shielded (drum style) antenna – [See Pages 12 – 13](#)
 - b. Parabolic or convex back antenna – [See Pages 15 – 16](#)
 - c. Convex front antenna – [See Page 16](#)
 - d. Clamp mount – [See Page 17](#)
 - e. Flat panel or “pizza box” antenna [See Page 31](#)
- 2) Power on MW unit and allow to boot up. Completed boot sequence is denoted by the battery LED illuminating and a flashing blue AZM light.
- 3) Slide the MW unit into the mount rail, but do not extend to end of rail. The MW unit carry handle and power button should face the back of the antenna.
- 4) Power on and enable Wi-Fi on the Android device, if disabled:
 - a. Click “**Settings**”
 - b. Click “**Wi-Fi**”
- 5) Click the Sunsight **Microwave Path Alignment App** icon on the Android device’s homepage
- 6) Click “Scan for AATs”
 - a. Available MW unit connections will be displayed upon completion of scan.
- 7) Locate the MW unit connection matching the serial number of the MW unit to be used and click “CONNECT TO AAT.” [See Figure 14](#)
 - a. MW unit serial number decal is located on the back of the unit and is formatted 901xxxx
- 8) The app will open the MW unit’s website in an embedded browser. Use the app, not the Android device’s browser, to navigate the MW unit’s website.
- 9) When both teams are ready, enter the user’s Log In information on the Microwave Alignment page on each Android device. Once logged in, site data for the session can be entered and submitted (optional), then the user will advance to the calibrate offset page.

***** If you do not have a username and password, register for a free account at:**

<https://sunsightuwave1.azurewebsites.net/>

The same account credentials may be used for both Android devices. ***

***** If capturing the antenna Above Ground Level (AGL) height, please see [Using the Rangefinder...](#) ([Page 42](#)). Otherwise, continue with Step 10 below. *****

- 10) Extend MW unit out on rail until it clears any overhead obstructions.

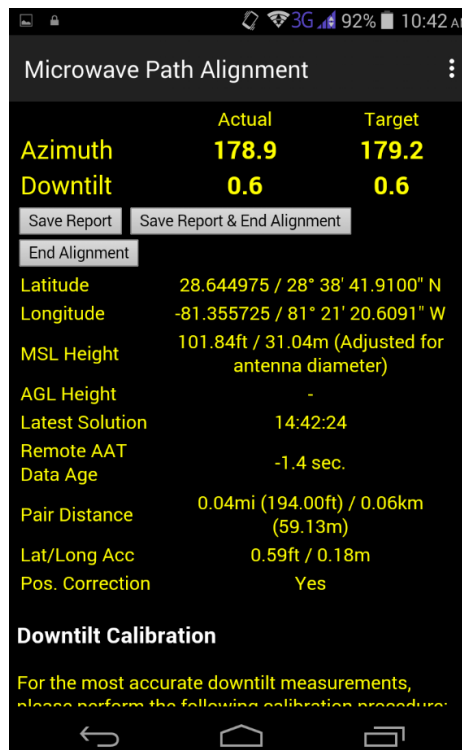


Figure 16

- 11) Place the included digital level on the flat frame of the antenna (typically near the radio mount in the back/center of the antenna) and adjust the antenna so that the level indicates 90° (this will equal 0° tilt (elevation angle)). *See Figure 15*
- 12) Tap **“Calibrate”** at the bottom of the page, then **OK** at the prompt to save results.
 - a. NOTE: If the microwave mount is removed or repositioned, the calibration must be performed again using the **“Recalibrate Tilt”** button.
- 13) Once both MW units have successfully logged in and are on the measuring page, target data will be populated for azimuth and downtilt for the link. *See Figure 16*
- 14) Ensure that the blue Azimuth LED on the MW unit is solid and not flashing. A solid blue LED indicates that the MW unit has calculated azimuth.
- 15) Adjust the antenna to closely match the target azimuth and tilt. Note that one or two tenths of a degree in azimuth is not critical. Be sure to give the MW unit adequate time to “settle” on an azimuth after making small adjustments (up to a minute). The user may click the “Remote MW unit” tab to see the alignment status of the remote MW unit.
- 16) Once the antenna is adjusted, lock the antenna in position and click the “Save Report” button to save the results.
 - a. The “Save Report & End Alignment” button may selected if alignment is complete.
- 17) The user will be prompted to take photographs of the jobsite. Select “Yes” to add photos or “No” to save the site report without photos. *See Figure 17*

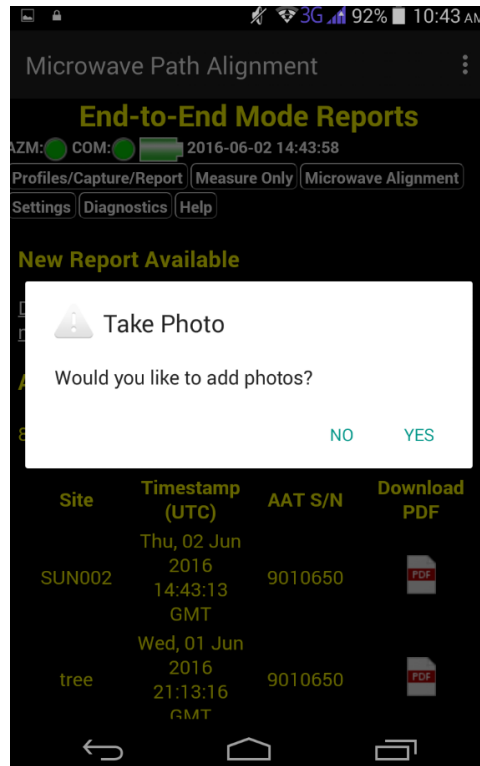


Figure 17

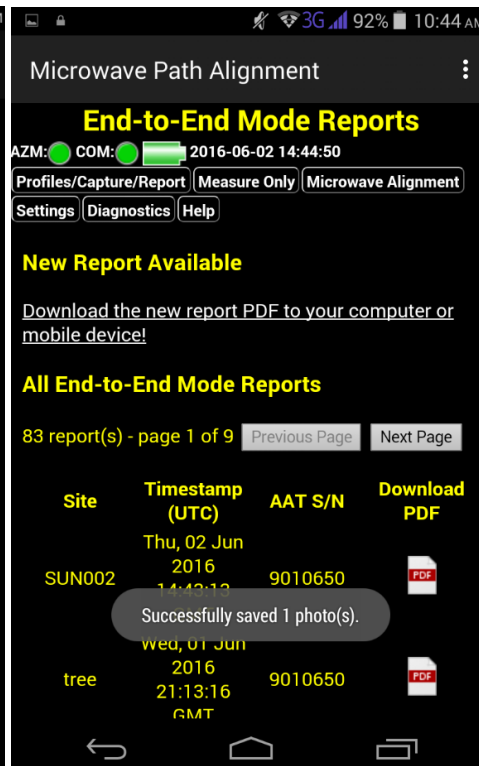


Figure 18

- 18) The PDF alignment report, including any site photos taken in Step 16, is saved to the cloud on the internet, ***not on the MW unit***. The user may save a copy of the report to the Android device by clicking the “Download PDF” link. *See Figure 18,*

See Page 28 - 30 for example End-to-End Microwave Alignment report

Completed End-to-End Microwave Alignment reports may be retrieved at any time using any device with internet access by logging in to the user’s account at: <https://sunsightuwave1.azurewebsites.net/>

- 19) Power down Android device and MW unit and secure for transport.
- 20) The end-to-end alignment is now complete.

After returning from the field

- 1) Retrieve reports from Android device or from the cloud account. Charge the MW unit and Android devices prior to long term storage.
- 2) Be sure to turn off data/phone plan to conserve costs by disabling the cellular data or

END OF END-TO-END ALIGNMENT PROCEDURE

**End-to-End Alignment technology is a patented design belonging to Sunsight.*

Microwave Path Alignment Report

	AAT 9010711		AAT 9999999	
Site	Demo		FL-SUN001	
Site Description	South yard		Rooftop	
Link Name	E2E demo		Sunsight	
Call Sign	Alpha		W4SUN	
Emission Designator	12345		11G7N0N	
License Code	54321		SUNSI1	
Antenna Make	Ubiquiti		CommScope	
Antenna Model	AF5		SHP3-11W	
Antenna Diameter	0.6 m		3.0 ft	
Radio Make	Ubiquiti		DragonWave	
Radio Model	AF5		Horizon Compact+	
Azimuth Target / Actual	180.6	180.7	0.6	125.0
Downtilt Target / Actual	0.9	0.9	-0.9	0.0
Lat/Long (Decimal)	28.644962, -81.355710		28.644443, -81.355716	
Lat/Long (DMS)	28° 38' 41.8636" N, 81° 21' 20.5547" W		28° 38' 39.9948" N, 81° 21' 20.5776" W	
MSL Height Feet / Meters	102.9 ft	31.4 m	100.0 ft	30.5 m
AGL Height Feet / Meters				
Distance Miles / Kilometers	0.04 mi	0.06 km	0.04 mi	0.06 km
Orientation	Back		Demo	
Notes	E2E demo mode		*** Demonstration Mode ***	
Timestamp (UTC)	2017-07-24T16:01:43		2017-07-24T16:01:43	

SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM INSTRUCTIONS – MODELS MW15, MW08

Capture Timestamp: 2017-07-24 16:01:45 (UTC)
Site: Demo
Link Name: E2E demo
Azimuth: 180.7
Downtilt: 0.9
Latitude: 28.644962 / 28° 38' 41.8636" N
Longitude: -81.355710 / 81° 21' 20.5547" W
AGL Height: Not Captured
MSL Height: 102.9 ft / 31.4 m



Capture Timestamp: 2017-07-24 16:01:45 (UTC)
Site: Demo
Link Name: E2E demo
Azimuth: 180.7
Downtilt: 0.9
Latitude: 28.644962 / 28° 38' 41.8636" N
Longitude: -81.355710 / 81° 21' 20.5547" W
AGL Height: Not Captured
MSL Height: 102.9 ft / 31.4 m



Example End-to-End Microwave Alignment Report with photograph attached

Retrieving End-to-End Reports from anywhere

End-to-End alignment results saved during alignment sessions can be retrieved from the following website using the same credentials used to login to the end-to-end function during end-to-end MW alignment.

<https://sunsightuwave1.azurewebsites.net/login>

Aligning RF Cellular Panel Antennas

Using the Microwave Path Alignment Kit to align RF cellular panel antennas

Each half of the MW15 Microwave Path Alignment Kit may also be used independently for RF Cellular Panel Alignment with the included RF panel antenna mount. In this mode, the MW15 acts as a standard AAT15. Instructions for use as an RF Panel alignment tool can be found on the www.sunsight.com support page.

Checking tilt and roll calibration

Sunsight strongly recommends that users periodically check the tilt and roll calibration of the MW unit's internal sensors. The frequency with which these checks should be performed will depend on how often the MW unit is used and how it is cared for, but calibration checks should be performed monthly, at a minimum. ***The MW unit does not require return to Sunsight for calibration.***

NOTE: For MW15 and MW08 units, remove the adapter plate on the bottom of the unit prior to checking calibration or recalibrating the unit. Note orientation of adapter plate for reinstallation after calibration checks/recalibration.

- To check calibration, place the MW unit on a **flat** surface.
- Power on and log in to the MW unit.
- On the Measure Only/Quick Capture page, set the Orientation to "Back."
- Note the tilt and roll measurements displayed - it may help to write them down.
- Turn the MW unit to face the opposite direction and note the tilt and roll measurements displayed.
- Compare the two sets of values – the numbers should be the same, but with opposite signs – I.E. if tilt displays 0.2°, it should display -0.2° when facing the opposite direction.
- If the measurements are as described above, within +/- 0.1°, the MW unit is calibrated
- If measurements are not as described above, within +/- 0.1°, calibrate the MW unit's tilt and roll sensors by following the prompts on the Tilt/Roll Calibration page.

Troubleshooting

- Checking current firmware version
 - ✓ Log in to the MW unit ([See Pages 29 & 30](#)). Scroll to the bottom of any MW unit webpage, where the user can find the MW unit serial number and firmware version currently installed.
- The MW unit will not power on
 - ✓ Ensure that the onboard LiFePO4 battery is charged using only the approved charger. Use of any other charger or power supply may cause insufficient charge, overcharge, or electrical damage to the unit.
- Webpages not available
 - ✓ Ensure Wi-Fi is enabled on your Android device. Power on the MW. Use the Sunsight app to connect to your MW. Note that the app indicates the connection is made successfully and the MW unit can be operated normally.
- The MW unit will not display azimuth
 - ✓ GPS is line-of-sight technology and, as such, both GPS antennas at the top of the MW unit must have as clear a view of the sky as possible.
 - ✓ The MW unit should always be mounted as high on the antenna to be measured as possible.
 - ✓ Use the indicators on the MW unit's **Diagnostic** page to help determine optimal placement.

Use and care of the Sunsight MW unit

- The MW unit utilizes state-of-the-art GPS/GLONASS technology in order to provide highly accurate azimuth calculations. GPS and GLONASS are line-of-sight technologies. For optimal results, the GPS/GLONASS antennas at the top of the MW unit should be offered the best “view” of the sky possible. Physical obstructions over either antenna may result in difficult or no-azimuth conditions. Position the MW unit so as to eliminate or minimize physical obstructions.
- The MW unit and its accessories are weather resistant, not water-proof! Do not immerse or submerge the MW unit in liquid of any type. All access doors and caps must be in good working order and secured while the MW unit and its accessories are in use, especially in inclement weather.
- Do not store the MW unit or its accessories in a wet case. Allow the case(s) to air dry prior to storing the MW unit and its accessories.
- The MW unit housing is fabricated of aluminum for durability, but still contains highly sensitive electronic components. Avoid sharp impacts and drops.
- The MW unit and its accessories contain no user-serviceable components. Do not attempt to disassemble the MW unit for any reason. Unauthorized disassembly may result in component damage and warranty termination.

- Sunsight strives to provide the best user experience possible with our products. To that end, we continue to develop hardware and software solutions to meet the needs of our customers. Sunsight will periodically issue firmware updates to enhance performance and function of our products. To receive update notifications, please register your MW unit at: <https://www.sunsight.com/index.php/register-AAT>. Your information is never shared or sold and is used only by Sunsight to notify users of product updates.

For questions regarding use or care of the MW unit and its accessories, please contact Sunsight Instruments Technical Support. Live technical support is available Monday – Friday from 9:00am to 6:00pm Eastern via support@sunsight.com or 1-321-244-9443 x2

Glossary

- **Azimuth** – compass heading or bearing. All Sunsight products show azimuth referenced to **true north**, not magnetic north
- **Capture** – A capture is the action of recording measurements to the MW unit. Typically, the tower technician will adjust the antenna to the required alignment values and capture (record) the results. The captured data is then used to generate reports.
- **Elevation (aka Tilt)** – Measured in degrees and refers to antenna alignment in the vertical plane. A positive tilt value indicates the face of the antenna is pointed toward the ground.
- **GPS and GLONASS** – GPS and GLONASS, also referred to as GNSS, are both satellite-based positioning systems that are used by the MW unit to determine exact latitude and longitude of the MW unit. Also, and most importantly, the satellites are used to determine the azimuth for the MW unit.
- **MW15 or MW08 kit** - each kit comprises two MW units, along with two sets of microwave antenna mounts, two rugged Android devices and two RF Panel alignment mounts (MW15 only)
- **MW15 or MW08 Single Unit** - each MW Single unit comprises one MW unit, along with one set of microwave antenna mounts, one rugged Android device and one RF Panel alignment mount (MW15 only). A Single Unit is used to align each end of a microwave link independently (one at a time). The MW15 Single Unit can also be used to align a cellular RF panel antennas.
- **Report** - Reports are formatted alignment results that can be created in PDF or CSV formats. Reports can be created for one individual set of measurements (ex. one antenna) or can be created for an entire site's worth of data (several antennas on one report).
- **RF Panel Antenna** - An RF panel antenna is an antenna used for broadcasting cellular signals to handsets. They are typically mounted on towers or rooftops in a tri-sector configuration.
- **Roll** – Sometimes referred to as “plumb” and measured in degrees. Refers to antenna alignment in the horizontal plane. A positive or negative roll value indicates the top of the antenna is not level.
- **Android Device** – the MW products come with 4G Android tablets that use the Sunsight Android app to operate the Sunsight products. Note that any Android device (tablet or Smartphone) with Android Operating System greater than 6.0 can also be used in place of the provided devices. The Sunsight Android app would need to be installed on the Android device.