SUNSIGHT MICROWAVE PATH ALIGNMENT SYSTEM

AAT 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	MW15/MW08 Menu options defined Glossary added MW antenna tilt calibration revised MW15/MW08 tilt/roll calibration added Photo capture instructions added for all reporting methods
7	07/20/2018	Updated SIM card requirements Update panel antenna alignment requirements

Table of Contents

Safety

The MW15/MW08 should be handled with the following considerations:

⚠ Avoid impacting, dropping or rough handling of the MW15/MW08 and its accessories, as they contain 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 MW15/MW08.

⚠ The MW15/MW08 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 MW15/MW08 may result in warranty termination.

If you suspect the MW15/MW08 is operating incorrectly, contact Sunsight Instruments @ +1-321-244-9443, www.sunsight.com, or an authorized Sunsight Instruments distributor for support.

The Sunsight Microwave Path Alignment System

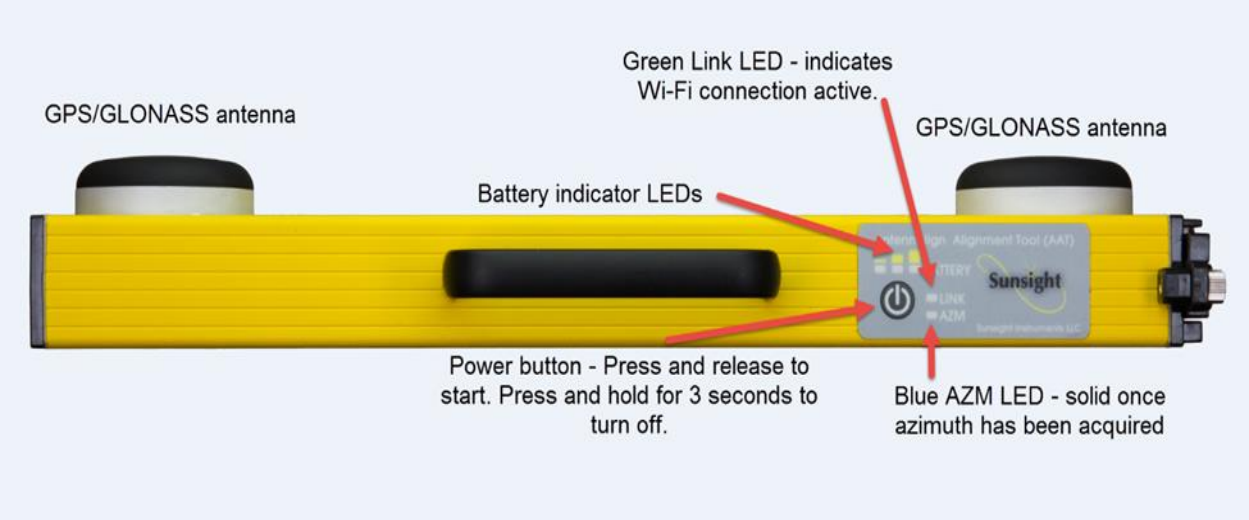
The Sunsight Microwave Path Alignment System is a product used to precisely mechanically align devices in azimuth, tilt (or elevation angle) and height. It is commonly used to align point-to-point communication links. The system consists of a measurement unit mounted on the antenna at each end of the 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 – azimuth and tilt – also referred to as elevation angle. Target data is displayed to users at both ends in addition to the actual current alignment of the antennas. The user then adjusts the antenna position to match the target data and secures the antenna in the correctly aligned position. Each antenna can be aligned independently once the data is transmitted and the target values are obtained. The Microwave Path Alignment System requires no external power or disconnect of the antenna from RF sources (coax, waveguides, or radio/ODU). All alignment results are captured in a comprehensive report.

Each MW15/MW08 included in the Sunsight Microwave Path Alignment System may also be used independently to align single microwave antennas or cellular RF panel (MW15 only) sites. Each complete job site can be measured and captured in a single comprehensive report. In this way, each Sunsight Microwave Path Alignment System may be employed as a Point-to-Point alignment system, two individual microwave antenna aligners, or two complete cellular RF panel alignment systems (MW15 only).

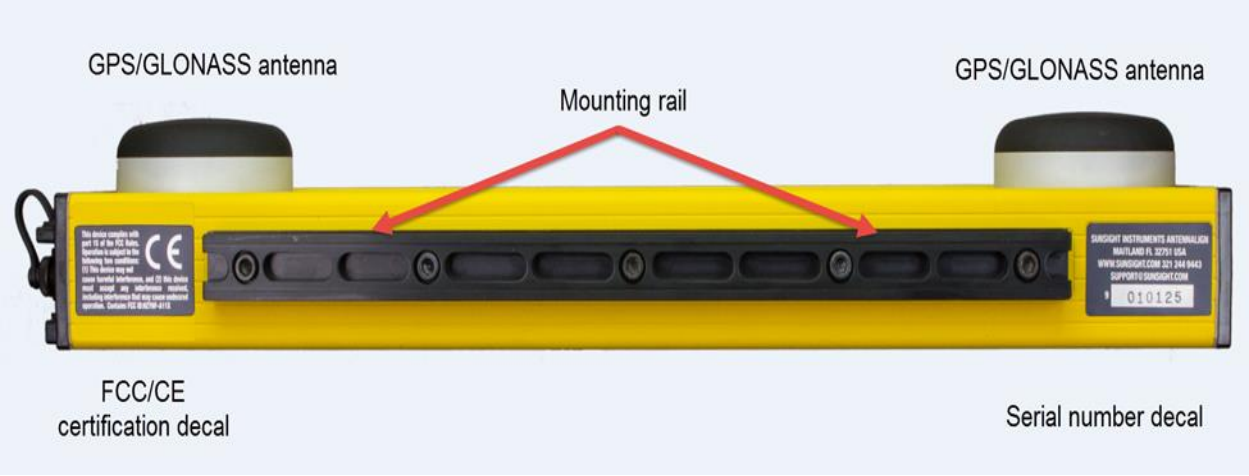
**US Patent 9,781,233, other patents pending*

Case contents

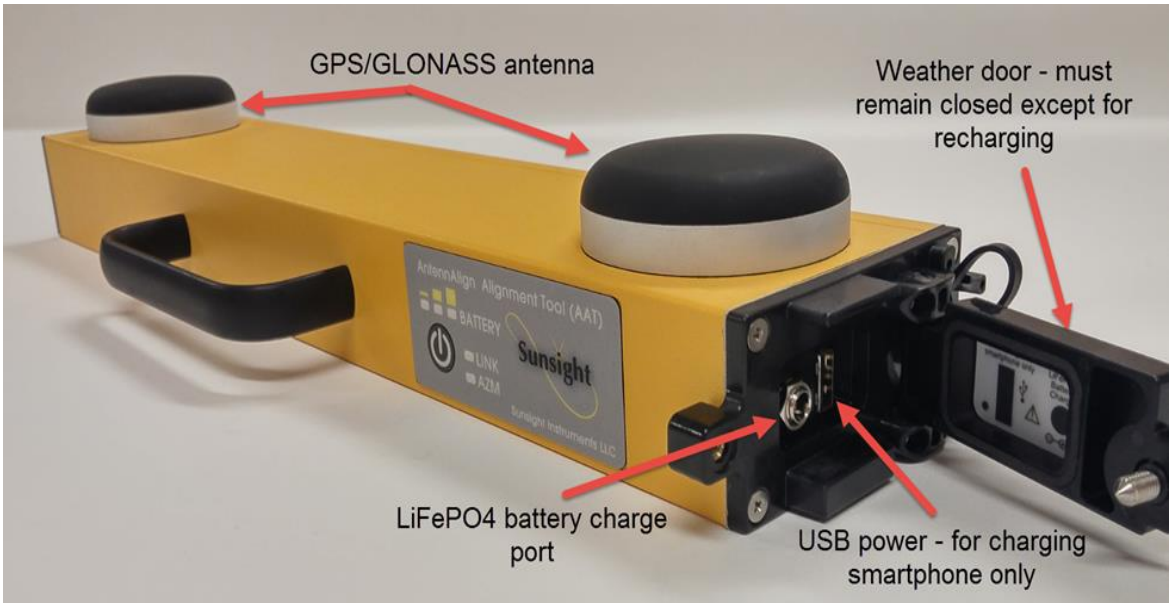
1. MW15 or MW08 Microwave Aligner hard case
2. MW15 or MW08 Microwave Aligner
3. Panel mount with strap – for use on standard RF panel antenna (MW15 only)
4. Microwave mount main
5. Adjustable mount straps (3 pieces)
6. Round and funnel style adapter bracket
7. Adapter plate (3 pieces)
    a. 4’ – 12’ (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. Ruggedized Android tablet
13. Android tablet accessories



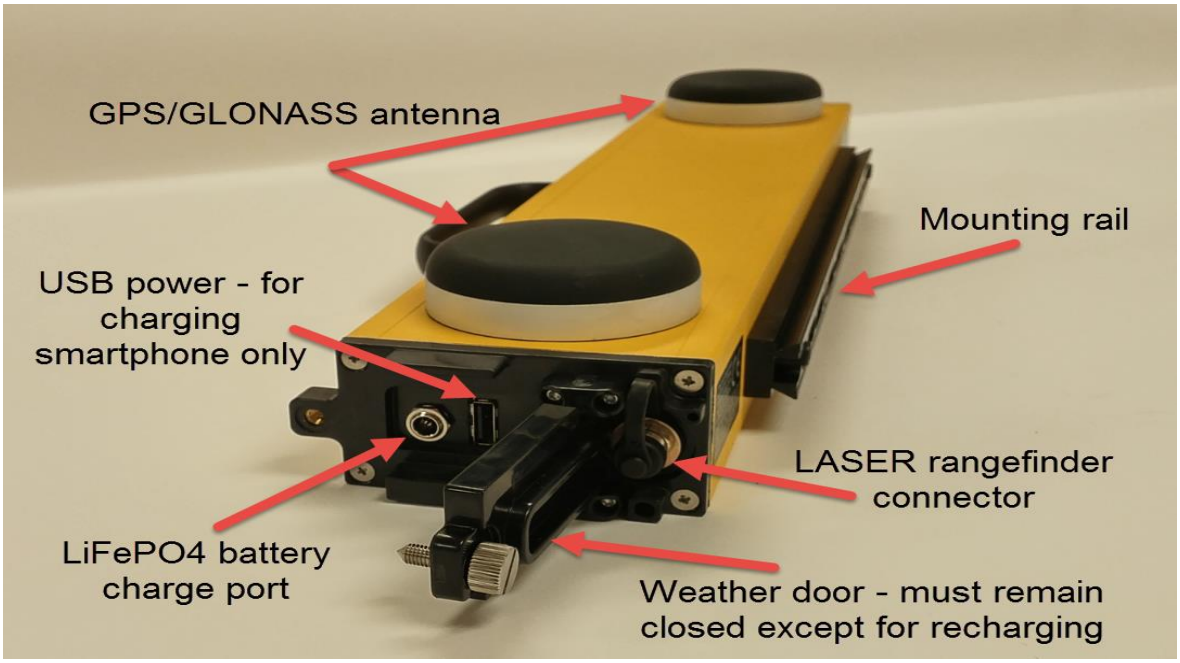
MW15/MW08 front view



MW15/MW08 back view



MW15/MW08 charge ports



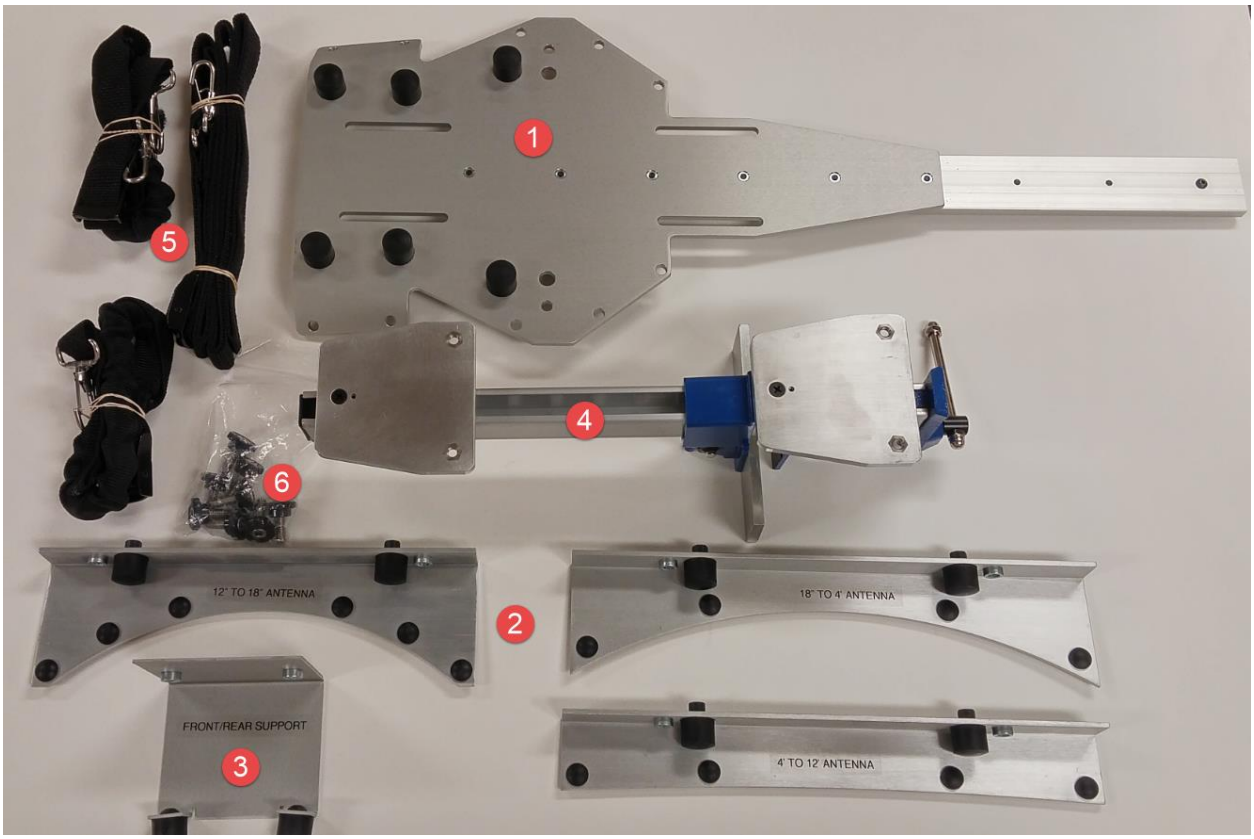
MW15/MW08 charge ports and LASER rangefinder connector

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

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***

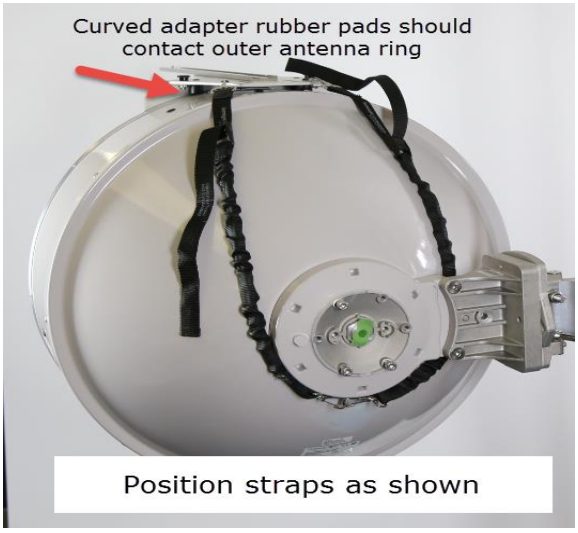


Figure 1

Figure 2

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 for a wide 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 once secured. ***See Figure 3, Figure 6 & Figure 7***

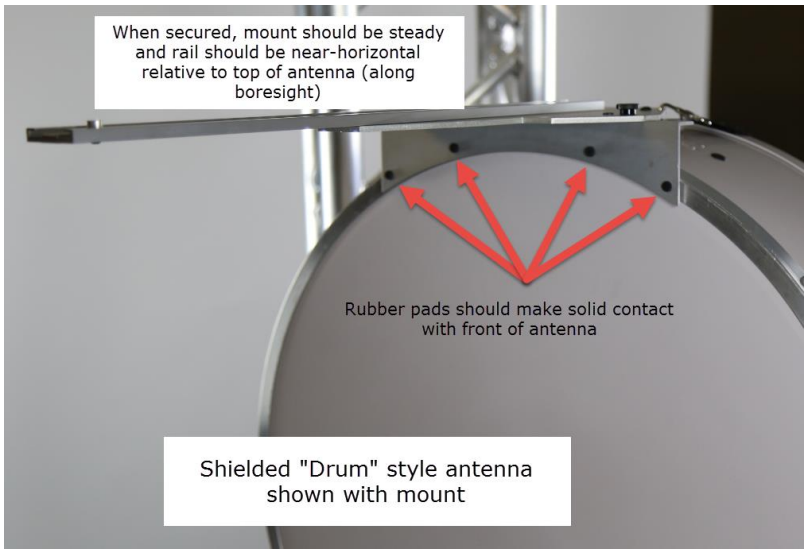


Figure 3

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***

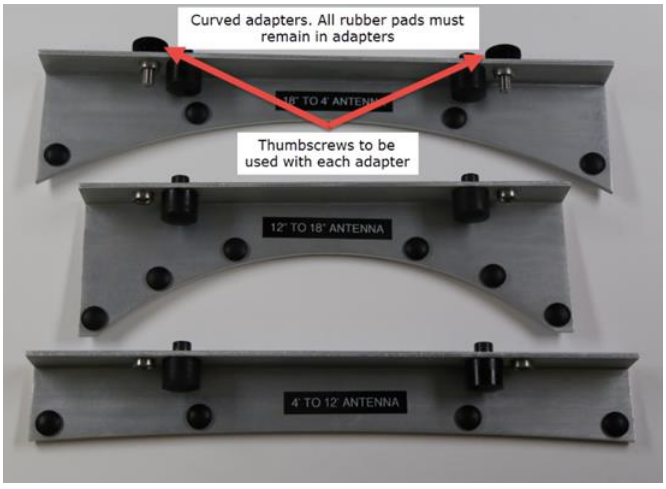


Figure 4

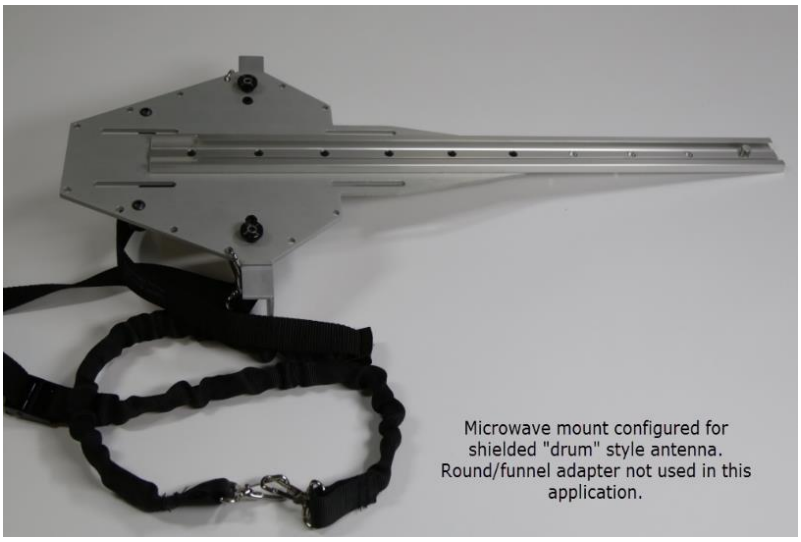


Figure 5

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 opposite side of 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

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 approximately horizontal in reference to the antenna. ***See Figure 7***

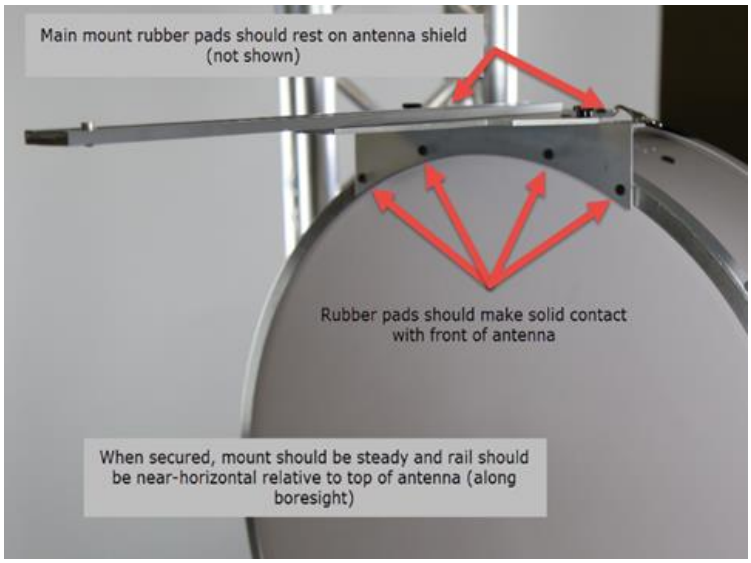


Figure 7

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 mount "roll". Adjust the mount to achieve a roll of +/-0.5°. ***See Figure 8***

Figure 8

ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW15/MW08 FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to the 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***

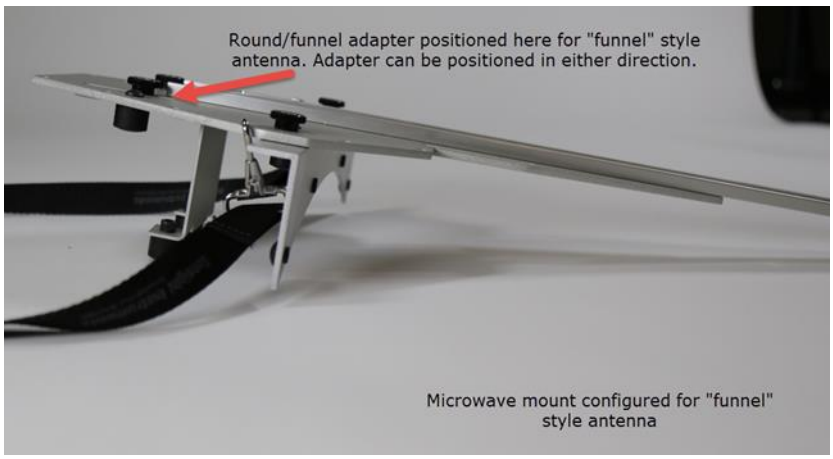


Figure 9

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 rail is approximately perpendicular relative to the antenna face. Tighten thumbscrews. ***See Figure 10.***

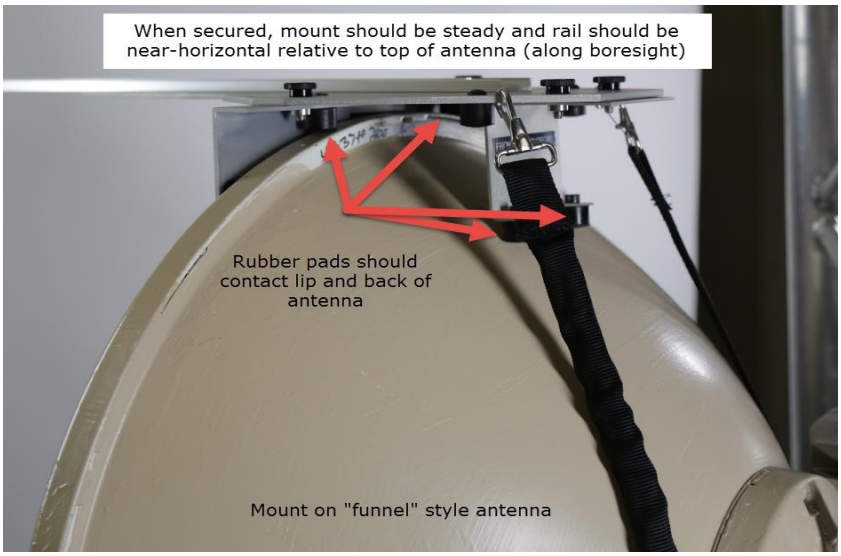


Figure 10

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 opposite side of 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 wide range of adjustment for various antenna diameters.

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 mount "roll". Adjust the mount to achieve a roll of +/-0.5°. ***See Figure 8***

ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW15/MW08 FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to the 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 approximately horizontal in reference to the antenna. Secure the bracket thumbscrews.

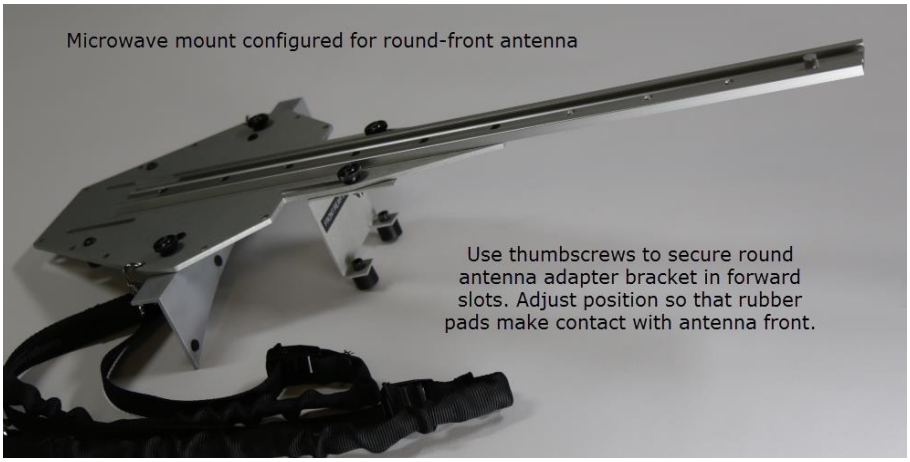


Figure 11

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 opposite side of 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 approximately horizontal in reference 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 achieve a roll of +/-0.5°. ***See Figure 8***

ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW15/MW08 FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to the 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***

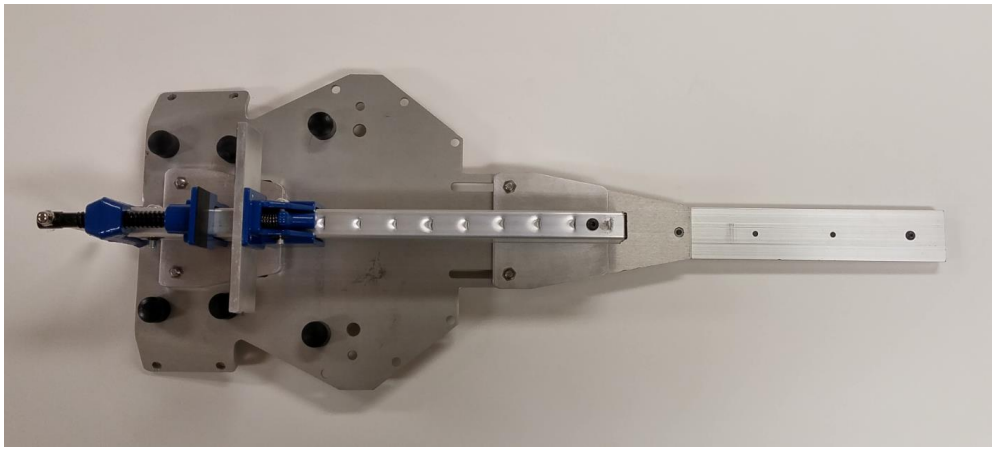


Figure 12

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***

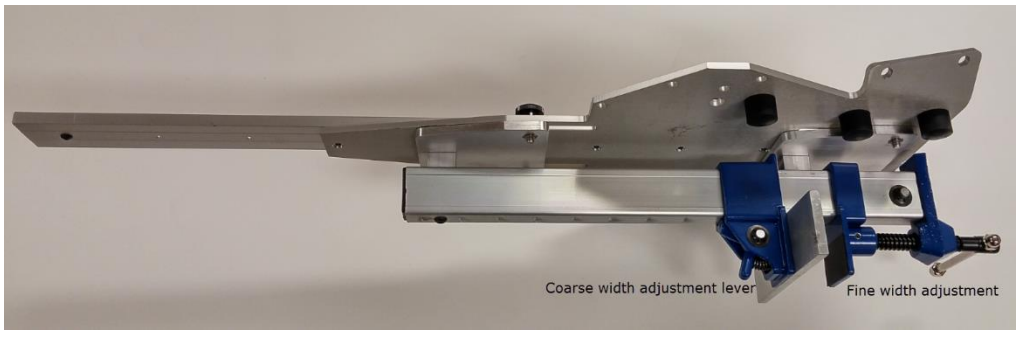


Figure 13

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 opposite side of 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 approximately horizontal in reference 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 achieve a roll of +/-0.5°. ***See Figure 8***

ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW15/MW08 FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to the secure the mount to the antenna

Using the Microwave Alignment System in the Field

Preparation before going to field

1) Ensure that the main MW15/MW08 unit(s) and tablet(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 MW15/MW08s simultaneously), proceed to **End-to-End Alignment** section on ***Page 25***.

Single-Ended Microwave Alignment	End-to-End Microwave Alignment
MW15/MW08 and tablet charged	Both MW15/MW08s and tablets 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
Targets determined by manual input	Targets determined by location of MW15/MW08s
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 25 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 35***

ALWAYS USE THE SAFETY LANYARD TO PROTECT MOUNT AND MW15/MW08 FROM ACCIDENTAL FALLS Note: The safety lanyard is NOT the same as the black elastic straps used to the secure the mount to the antenna

3) Slide the MW15/MW08 into the mount rail, but do not extend to end of rail. The MW15/MW08 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 Sunsight ruggedized tablet and allow to run for approximately 90 seconds.
5) Power on the MW15/MW08 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 tablet's homepage
7) Click "Scan for AATs"
    a. Available MW15/MW08 connections will be displayed upon completion of scan.

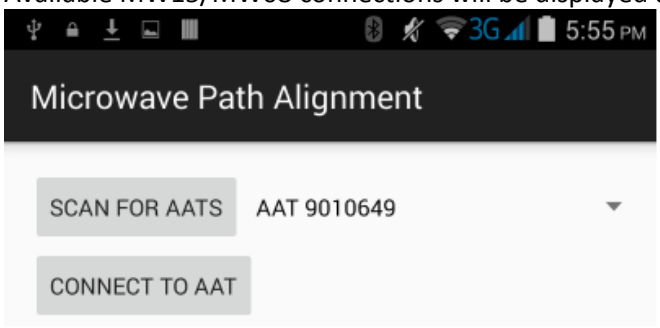


Figure 14

8) Using the drop-down menu, highlight the MW15/MW08 connection matching the serial number of the MW15/MW08 being used and click "CONNECT TO AAT." ***See Figure 14***
    a. MW15/MW08 serial number decal is located on the back of the unit and is formatted 90xxxxx
9) The app will open the MW15/MW08's website in an embedded browser. Use the app to navigate the MW15/MW08'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***

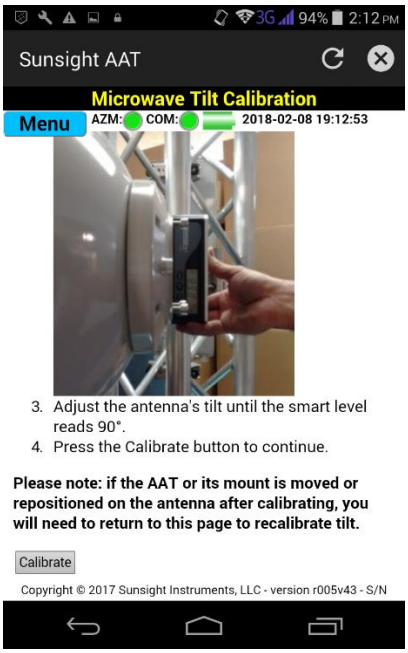


Figure 15

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 47). Otherwise, continue with Step 16 below. ***

16) Extend the MW15/MW08 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 MW15/MW08 has calculated azimuth.
18) Adjust the antenna to match the target azimuth and tilt.

a. Note that one or two tenths of a degree in azimuth is not critical.
b. Be sure to give the MW15/MW08 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 MW15/MW08 *only***.** Reports may be generated later.
    b. Tap "**Save Report & End Alignment**" to save the results to the MW15/MW08 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 MW15/MW08. No alignment report will be available if this option is selected.

NOTE: Single-Ended Microwave Alignment reports may be collected from the MW15/MW08 at any time. All reports remain on the MW15/MW08 until the user manually deletes an individual report, or clears the MW15/MW08 internal memory. See **Notes regarding MW15/MW08 report generation and retrieval** - *Page 46*

21) The Single-Ended alignment is now complete.
22) Power down MW15/MW08 and tablet 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 tablet or MW15/MW08.
2) Charge the MW15/MW08 and tablet prior to long term storage.
3) Be sure to turn off data/phone plan, if applicable, to conserve costs. This can also be accomplished by turning off the tablet(s).

END OF SINGLE-ENDED ALIGNMENT PROCEDURE

Manual Microwave Alignment Report
Sunsight Test

Sunsight Instruments
125 Candace Drive
Maitland FL 32751
321-244-9443

	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

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 MW15/MW08s

NOTE: End-to-End Alignment requires cellular network access for both tablets. GSM-compatible 3G SIM cards must be installed and activated in both tablets. Cellular network coverage is required. Sunsight strongly recommends all users visit the carrier's retail store - not a reseller - for SIM installation and activation.

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 35***
2) Power on the Sunsight ruggedized tablet and allow to run for approximately 90 seconds.
3) Power on MW15/MW08 and allow unit to boot up. Completed boot sequence is denoted by the battery LED illuminating and a flashing blue AZM light.
4) Slide the MW15/MW08 into the mount rail, but do not extend to end of rail. The MW15/MW08 carry handle and power button should face the back of the antenna.
5) Click the Sunsight **Microwave Path Alignment App** icon on the tablet's homepage
6) Click "Scan for AATs"
    a. Available MW15/MW08 connections will be displayed upon completion of scan.
7) Locate the MW15/MW08 connection matching the serial number of the MW15/MW08 to be used and click "CONNECT TO AAT." ***See Figure 14***
    a. MW15/MW08 serial number decal is located on the back of the unit and is formatted 901xxxx
8) The app will open the MW15/MW08's website in an embedded browser. Use the app to navigate the MW15/MW08's website.
9) When both teams are ready, enter the user's Log In information on the Microwave Alignment page on each tablet. 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 tablets. ***

***** If capturing the antenna Above Ground Level (AGL) height, please see Using the Rangefinder…** *(Page 47).* **Otherwise, continue with Step 10 below. *****

10) Extend MW15/MW08 out on the mounting rail until it clears any overhead obstructions.

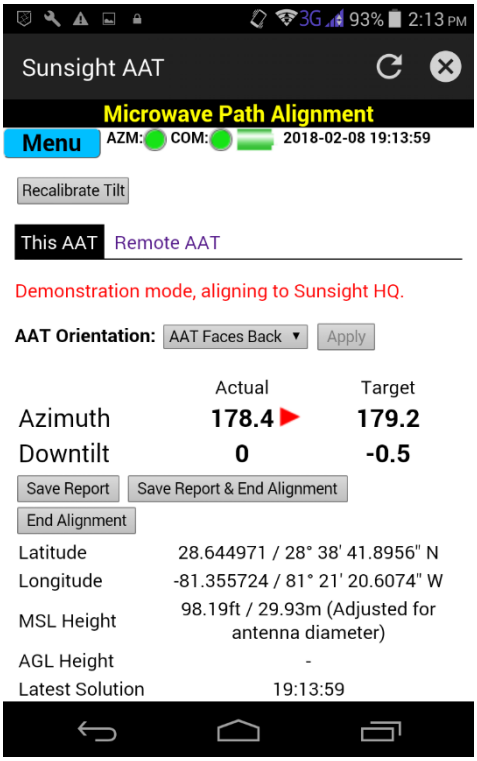


Figure 16

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 MW15/MW08s 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 MW15/MW08 is solid and not flashing. A solid blue LED indicates that the MW15/MW08 has calculated azimuth.
15) Adjust the antenna to match the target azimuth and tilt. Be sure to give the MW15/MW08 adequate time – up to a minute - to "settle" on an azimuth after making small adjustments. The user may click the "Remote MW15/MW08" tab to see the alignment status of the remote (opposite end) MW15/MW08.
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***

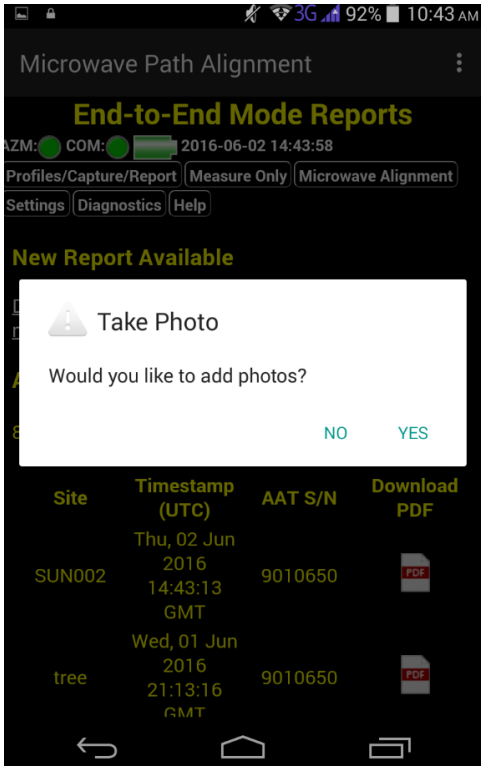


Figure 17

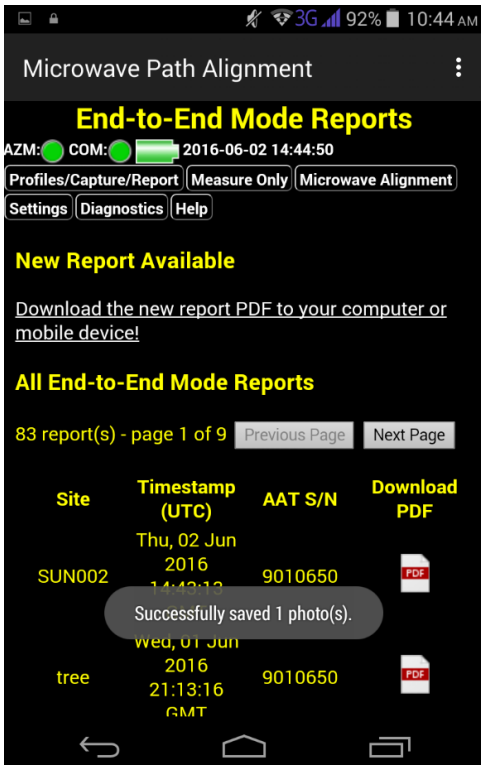


Figure 18

18) The PDF alignment report, including any site photos taken in Step 16, is saved to the cloud on the internet, ***not in the MW15/MW08***. The user may save a copy of the report to the tablet 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 tablet and MW15/MW08 and secure for transport.
20) The end-to-end alignment is now complete.

After returning from the field

1) Retrieve reports from tablet or from the cloud account. Charge the MW15/MW08 and tablets 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 patent pending at the time of this writing._

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	
Licensee 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	


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

Aligning RF Cellular Panel Antennas – MW15 only

Using the Microwave Path Alignment Kit to align RF cellular panel antennas (MW15 only)

Each half of the MW15 Microwave Path Alignment Kit may also be used independently for RF Cellular Panel Alignment with the included standard panel side mount.

NOTE: MW08 kit does not include the AAT standard panel side mount and is not intended for use on RF Cellular Panel Antennas.

To perform RF Cellular Panel Alignment work, the user must have the following:

1. The MW15 base unit
2. The Sunsight ruggedized tablet (P/N 4200) or other user-supplied Handheld Controller
3. The standard panel side mount, or specialty mount (Ericsson AIR series, Nokia FASB, etc.)
4. Target alignment data from RFDS or similar (optional, required for Profile Mode)

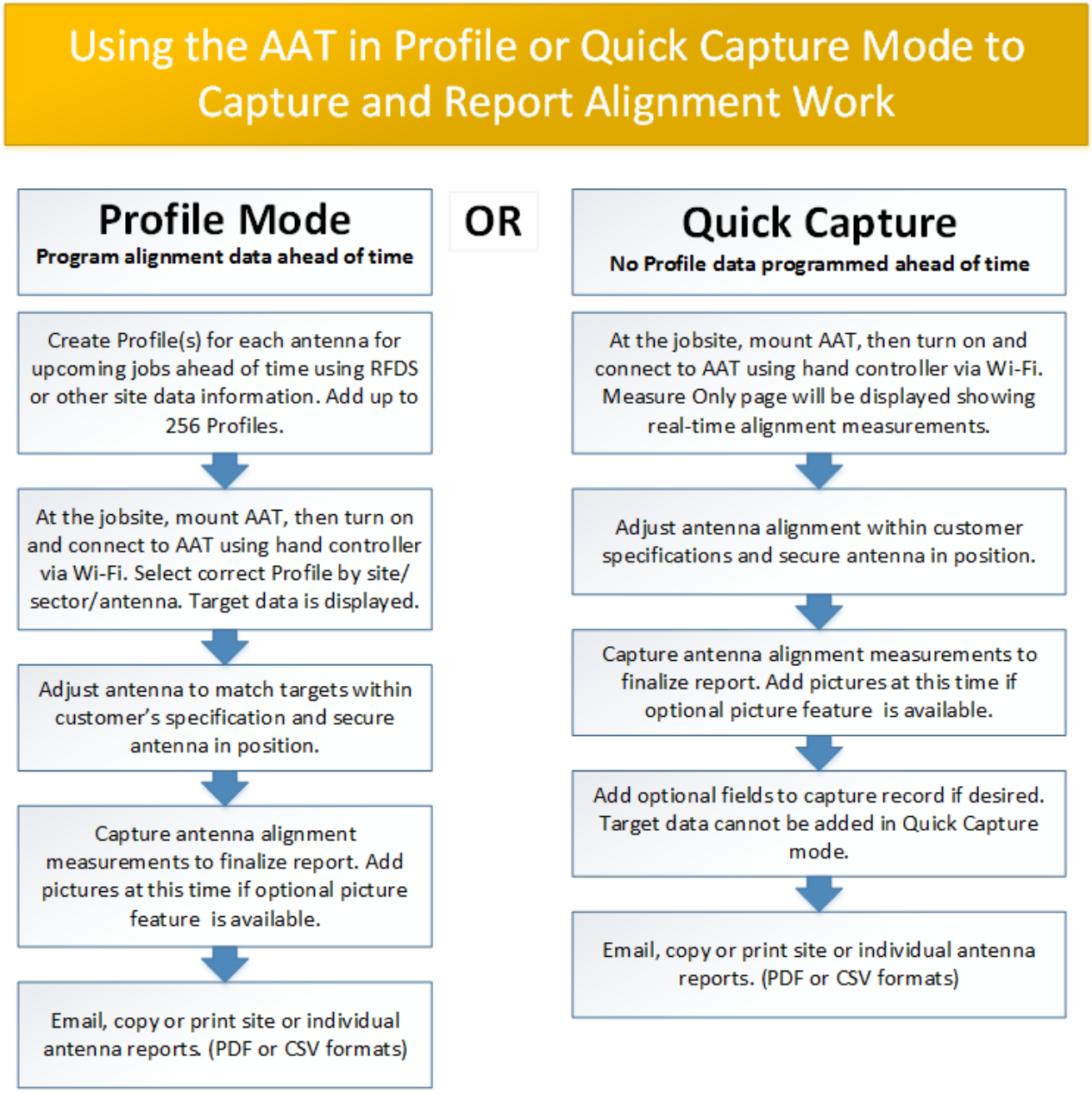
*****Ensure both the MW15 and Sunsight ruggedized tablet (or user-supplied Handheld Controller) have sufficient battery charge prior to arrival at jobsite*****

*****Embedded photo feature requires use of the Sunsight ruggedized tablet. Embedded photo function will not be available with user-supplied Handheld Controllers*****

Connect the tablet to the MW15 Wi-Fi hotspot:

1. Power on the Sunsight tablet
2. Power on the MW15.
3. Tap the "**Sunsight AAT**" app on the tablet desktop.
4. Tap "**Scan for AATs**"
5. Highlight the appropriate MW15/MW08 serial number from the dropdown list.
6. Tap "**Connect to AAT**"
7. The app will automatically open the MW15 user interface.

Select between Profile and Quick Capture Mode based on the following flowchart:



Typical RF Panel Work Flowchart

Order of Operations

1) Charge the MW15 and Handheld Controller.
2) Power on the MW15 and Handheld Controller.
3) Connect the Handheld Controller to the MW15 Wi-Fi hotspot. **See *Page 33 & 34***
4) Create profiles for antennas to be aligned - optional. **See *Page 37***
5) Run the MW15 at ground level at the job site and verify azimuth acquisition (blue **AZM** LED solid).
6) Power off the MW15 before climbing. This will save time on the tower.
7) Secure mount to the antenna to be measured. **See *Page 35***
8) Secure the MW15 to its mount.
9) Power on the MW15 and Handheld Controller.
10) Connect the Handheld Controller to the MW15 Wi-Fi hotspot.
11) Align the antenna and capture data. **See *Page 37 - 40***
12) Generate reports. **See *Page 44***

Connecting the Handheld Controller to the MW15

Sunsight Ruggedized tablet (P/N 4200)

NOTE: Embedded photos in reports requires use of the Sunsight Ruggedized tablet (P/N 4200). This feature is not available for user-supplied devices.

1) Power on the Sunsight tablet
2) Power on the MW15/MW08.
3) Click the "**Sunsight AAT**" app on the tablet desktop.
4) Click "**Scan for AATs**"
5) Highlight the appropriate MW15/MW08 serial number from the dropdown list.
6) Click "**Connect to AAT**"

Android and Sunsight IP67 Smartphone

1) Power on the MW15.
2) Power on and enable Wi-Fi on the Android device being used to communicate with the MW15. See device User's Manual for device-specific instructions. For most Android devices:
    a. Click "**Settings**"
    b. Click "**Wi-Fi**"
    c. Enable Wi-Fi, if necessary.
    d. Choose network "AAT 901xxxx" where the x's represent the serial number of the MW15.
    e. Once connected, the green Link LED on the MW15 keypad will illuminate.
3) Log in to the MW15 by clicking the **AAT** shortcut on the Android's (if purchased with MW15) homepage, or by opening a web browser and navigating to **192.168.0.50**.
4) NOTE: If the Android device is taken out of the broadcast range of the MW15 Wi-Fi, the device may automatically attempt to connect to another Wi-Fi network or the cell network. This feature may be disabled by the user, if desired. See device owner's manual for more information.

iOS devices (iPhone and iPad)

1) Power on the MW15.
2) Power on the iOS device to be used with the MW15.
3) On the iOS device, click "**Settings**"
4) Click "Wi-Fi" and enable, if necessary.
5) Choose network "AAT 901xxxx" where the x's represent the serial number of the MW15.
6) Log in to the MW15 by opening a web browser and navigating to **192.168.0.50**.
7) NOTE: If the iOS device is taken out of range of the MW15/MW08 Wi-Fi broadcast, the device may automatically attempt to connect to another Wi-Fi network or the cell network. This feature may be disabled by the user, if desired. See device owner's manual for more information.

Using the MW15 Menu

When logged into the MW15, the user may select various options by clicking or tapping the **Menu** button

Profiles/Capture/Report

- View profiles and captures currently stored in the MW15
- Create new profiles - *Page 37*
- Capture data to existing profiles - *Page 38*
- Generate reports - *Page 44*

Measure Only/Quick Capture

- View real-time alignment data
- Perform Quick Captures - *Page 41*

Microwave Alignment

- Choose between Single-Ended and End-to-End Microwave alignment modes - *Page 19 (Single-Ended) or Page 25 (End-to-End)*

Settings

- Select MW15 website text and background colors
- Select metric or US height units
- Select Latitude and Longitude display – Degrees Minutes Seconds or Decimal format
- Owner Information – Owner information will be included on every jobsite report generated by the MW15/MW08
- User Logins – select to require authentication to access the MW15 and store user-created credentials
- Clear All Data – erases Owner information and user-created credentials
- Firmware Update – update the MW15/MW08 with new firmware downloaded from www.sunsight.com
    - ❖ NOTE: Firmware update will erase reports currently stored on the MW15. Be sure to generate all reports from the tool prior to updating firmware!

Diagnostics

- Use this page for GPS diagnostics

- Cycle Slips, Satellites, and Signal to Noise should all display OK or Excellent.
- Any indicator of Poor generally requires repositioning of the MW15 for GPS signal optimization.

File Management

- Upload .AAT file to the tool – Upload site information to the MW15 using proprietary encrypted format. Advanced users only
- Download .AAT file from the tool for record keeping.
- Use FTP to transfer files between the MW15 and a computer – Upload and download .AAT files directly to/from the MW15 internal memory. Advanced users only.
- Erase All Contents – erases all site data from the MW15 internal memory

Tilt/Roll Calibration

- View date of last calibration
- Recalibrate the MW15 tilt and roll sensors
- See Page 49 or visit https://www.sunsight.com/index.php/training for calibration check and recalibration instructions.

Help

- View the Quick Start Guide for cellular panel alignment. The Quick Start Guide, as well as the Microwave Path Alignment Kit instructions and RF Panel Alignment instructions are also available for download at www.sunsight.com.

Aligning Standard RF Panel Antennas

The following mounting instructions are valid for all flat-backed RF cellular and Microwave antennas.

NOTE: Due to its physical size, the MW08 is not suitable for RF panel alignment and does not include the RF panel antenna side mount

1) Ensure MW15 and Wi-Fi device batteries are sufficiently charged prior to field use.
2) Secure the MW15 panel side-mount to the antenna to be measured. The grips and strap buckle will be perpendicular to the backplane of the antenna. ***See Figure 19***
    a. Ensure mount is positioned as high on the antenna as possible. **THIS IS CRITICAL!**
    b. Loop mount strap around antenna, then under mount crossbar. ***BE SURE STRAP IS POSITIONED UNDER CROSS BAR!***
    c. Feed strap end into ratchet buckle, then pull slack from strap.
    d. Use the ratchet buckle to tighten strap. 2 – 3 clicks is usually sufficient to secure mount. ***DO NOT OVERTIGHTEN!***
    e. Ensure mount sits square on back/side of antenna. Adjust mount position as necessary.

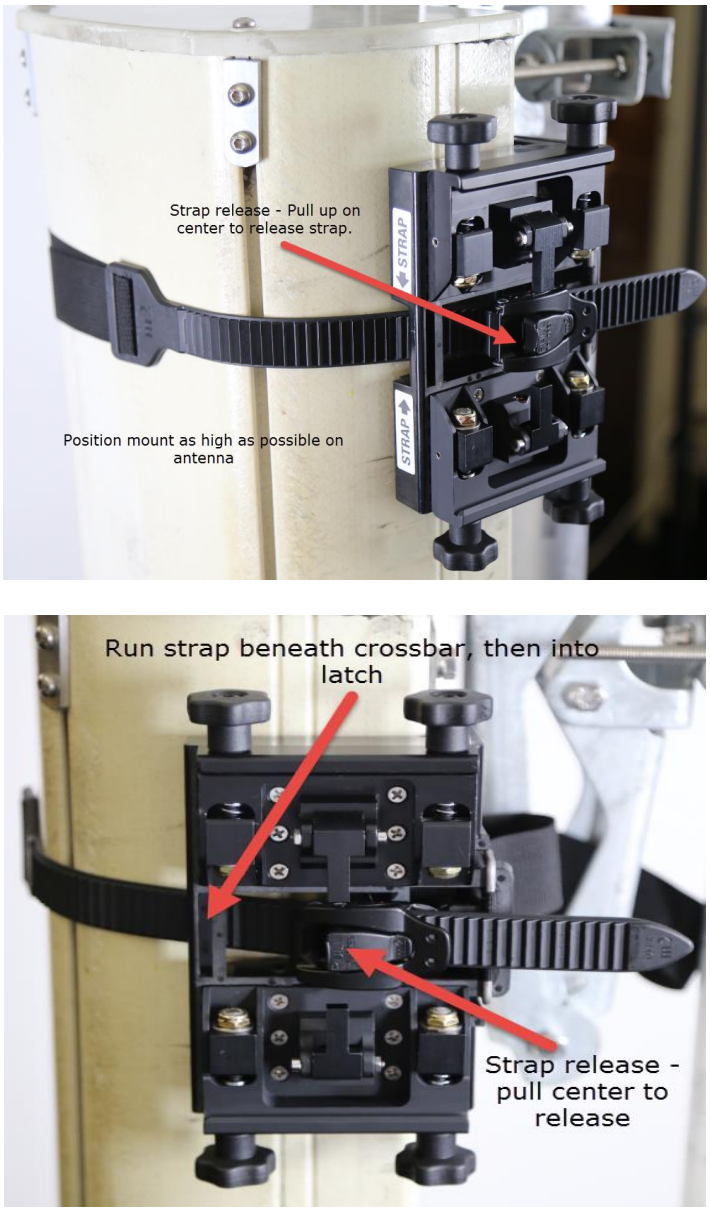


Figure 19

3) Secure MW15 to mount by positioning upper lip of mounting rail on back of MW15 into mount grip, then rotate MW15 into to security latch. User should feel MW15 “click” into position. Tighten both mount thumbscrews.
4) Secure MW15 and mount to structure with the included safety lanyard. Attach lanyard to MW15 handle and through provided loop in mount strap. ***See*** ***Figure 20***

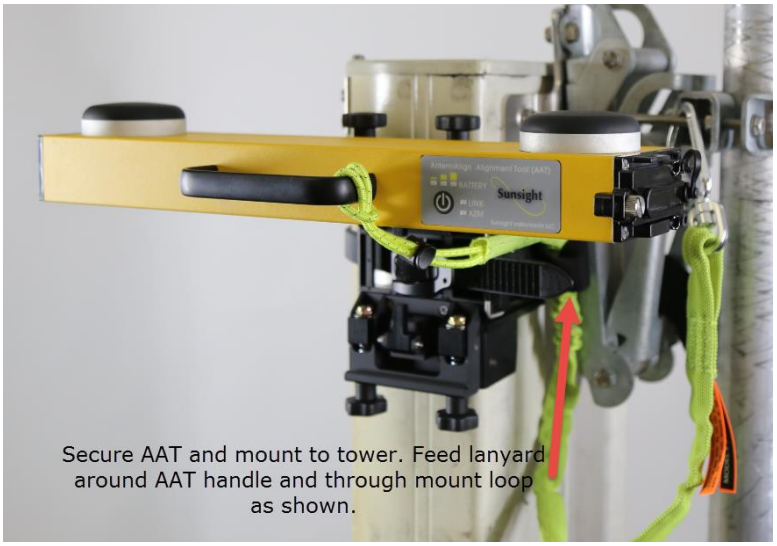


Figure 20

ALWAYS USE THE INCLUDED SAFETY LANYARD TO PROTECT MOUNT AND MW15/MW08 FROM ACCIDENTAL FALLS

5) Power on the MW15.
6) Power on and enable Wi-Fi on the Handheld Device being used to communicate with the MW15.
7) Log in to the MW15 – ***See Page 33 for device-specific instructions.***

Capturing Alignment Data

To capture alignment data, the user may choose to:

a. Create a new profile to capture alignment data
b. Capture data to a previously created profile
c. Use the "Quick Capture" feature

Creating a New Profile to capture alignment data:

a. Click or tap the **Menu** button, then select **Profiles/Capture/Report**
b. Click or tap the **New Profile** button. ***See Figure 21***
c. Input Site, Sector and Antenna Position.
d. Input target data provided in the RFDS for the job site.
e. Input any desired optional information (antenna S/N, notes, etc.)
    i. Optional fields may be modified or added after capture.
    ii. ******Required fields and target values may not be modified once a profile has been created******
f. Click or tap either **Submit** button available at the top and bottom of page to save the data. ***See Figure 22***
g. The MW15 will validate and store the information input by the user, then site information will be displayed on-screen.

h. To add additional antennas to a jobsite, click or tap the **Clone** button, changing Sector, Antenna Position and Target data as necessary. In this way, the user can complete all data input for an entire site before climbing.

i. Always click the Submit button to save information to the MW15!

j. Proceed to **Capturing data to a previously created profile**

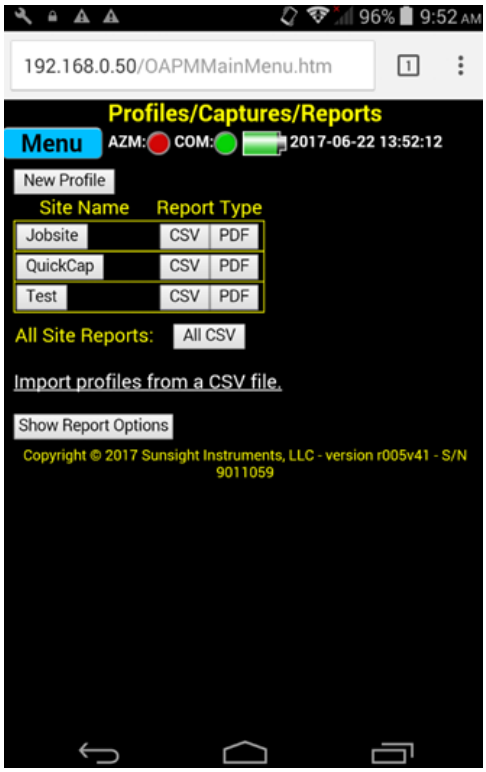


Figure 21

The user may perform as many captures to a specific profile (antenna) as desired. The reports generated by the MW15/MW08 will always display *only* the ***First*** - "As you found it" - and ***Final*** - "As you left it" - captures stored to a profile. This allows the user to capture the alignment of an antenna prior to work being performed, and again after aligning the antenna without the need to create separate profiles for "before" and "after" work.

Capturing data to a previously created profile

1) Click or tap the Menu button, then select **Profiles/Capture/Report**.
2) Click or tap the jobsite button to be captured. ***See Figure 21***
3) Click or tap the **Prev Profile** and **Next Profile** buttons to scroll through available antenna positions stored under the jobsite.

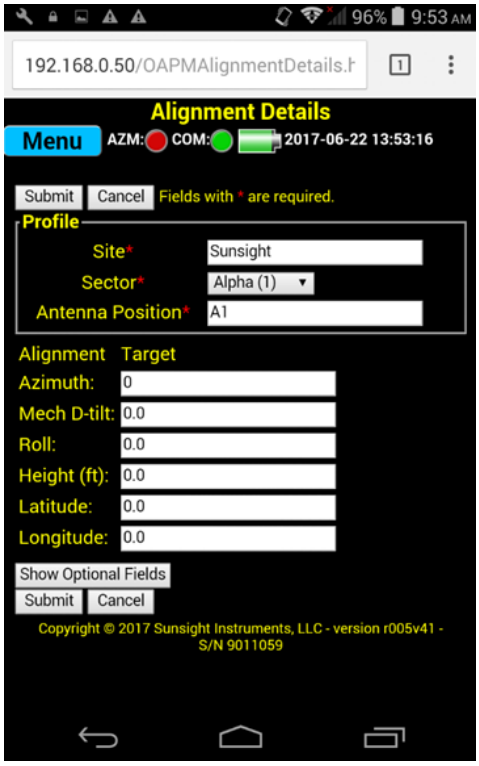


Figure 22

4) Click or tap the **Full Capture** button to capture all alignment data or select **Scope Capture** to capture azimuth only.

    i. NOTE: The **Scope Capture** function is intended for use with the Sunsight Azimuth Scope Kit, and will record azimuth only.
    ii. NOTE: Selecting **Scope Capture** will not allow tilt, roll or height measurements to be saved, although these measurements will still be displayed on-screen!

5) At the top of the page, ensure Orientation is correct. Click the **Apply** button to save any change to Orientation. ***See Figure 23***

    i. Orientation is as viewed from behind the antenna. The handle side of the MW15/MW08 is considered the front of the device. Example: If, from behind the antenna, the MW15/MW08 handle points left, orientation must be set to "MW15/MW08 Faces Left."
    ii. Incorrect orientation will result in azimuth values +/- 90° or 180° above or below expected. Recheck orientation.

Figure 23

6) Align "Actual" measurements on-screen to displayed target values.

   i. If capturing AGL height, refer to section - **Using LASER rangefinder (LRF) to capture Above Ground Level (AGL) height (*Page 47*)**

   ii. If no target values were input during profile creation, refer to RFDS for targets.

7) Select the desired capture delay time by clicking or tapping the appropriate button. ***See Figure 23***

   i. Extended delay time may be used to allow climber time to remove his/her weight from antenna boom, or in instances of heavy wind buffeting.

8) Review captured data displayed on-screen.

9) Click or tap the **Save** button to save captured data to the MW15.

   i. If captured data does not agree with target data, the user may choose to **Reject** the capture and perform ***Steps 6 - 8*** to capture new measurements.

*Add photos to the capture record**

Available only with the Sunsight Ruggedized tablet (P/N 4200) and using the Sunsight app

After the capture has been saved, the user will be prompted to add photos.

1. Select "Yes" to add photos to the capture or "No" to continue.

2. Users may add up to two photographs per capture.

a. NOTE: If performing "First" and "Final" captures on an antenna, only the second, or "Final," set of photographs will be saved to the report.

3. When generating reports, photographs stored to the capture record will render with all alignment data embedded in the photo.

10) Repeat ***Steps 3 – 8*** for all antennas to be aligned under selected jobsite.

Using the "Quick Capture" feature

a. Click or tap **Menu**, then select **Measure Only**.

b. If capturing AGL height, refer to section - **Using LASER rangefinder (LRF) to capture Above Ground Level (AGL) height**

c. On the live measurements page click or tap the **Quick Capture** button.
d. After the timer countdown, captured information will be displayed.
e. Click or tap the **Next** button to input site information and save the capture to the MW15 (***See Figure 25***) or select **Reject** to return to the live measurements page to begin again.
f. Input **Site**, **Sector** and **Antenna Position**.
    i. NOTE: Target alignment data cannot be input when using the Quick Capture feature
g. Click or tap either **Submit** button located at the top and bottom of the page to save the captured data.

*Add photos to the capture record**

****Available only with the Sunsight Ruggedized tablet (P/N 4200) and using the Sunsight app****

i. After the capture has been saved, the user will be prompted to add photos.
    1. Select "Yes" to add photos to the capture or "No" to continue.
    2. Users may add up to two photographs per capture.
        a. NOTE: If performing "First" and "Final" captures on an antenna, only the second, or "Final," set of photographs will be stored to the report.
    3. When generating reports, photographs stored to the capture record will render with all alignment data embedded in the photo. ***See Figure 24*** for examples.

11) Power down MW15 and Handheld Controller. Remove the mount from the antenna by lifting the ratchet strap buckle release. ***See Figure 19***
12) Secure all hardware for transport.


Capture Timestamp: 2017-06-27 19:17:28 (UTC)
Site: Sunsight
Sector: Alpha (1)
Ant. Pos.: A2
Azimuth: 0 (GPS)
Downtilt: 0.2
Roll: 0.0
Latitude: 28.644820
Longitude: -81.355575
AGL Height: 5 ft
MSL Height: 103.7 ft

Figure 24 Photo examples from MW15/MW08 reports

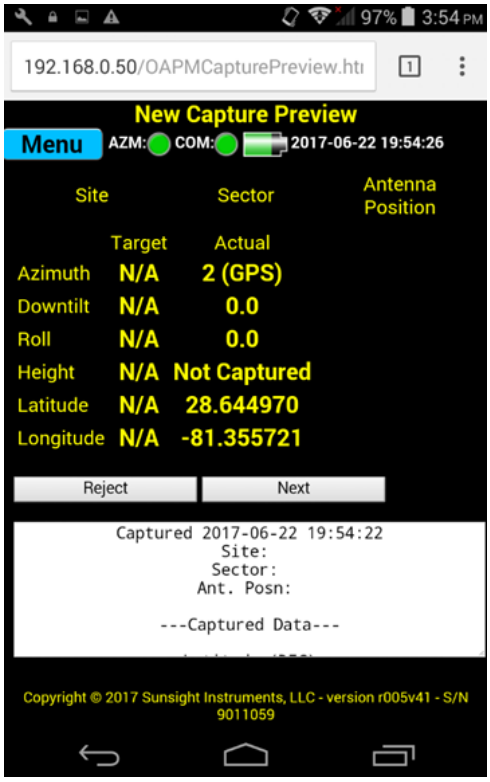


Figure 25

After returning from the field

1) Retrieve reports (PDF or CSV) from the Wi-Fi device or alignment tool. See **Generating reports from the MW15/MW08** below.
    a. Note: Job Site Reports may be generated and emailed* directly from the job site.
        i. *Network access required to email reports.
2) Charge the MW15 and Wi-Fi device prior to long term storage.

Generating Reports from the MW15

1) Power on the MW15. If already connected to the MW15, skip to ***Step 3***.
2) Power on and enable Wi-Fi on the device being used to communicate with the MW15. See User's Manual for device-specific instructions.
    a. For most Android devices:
        i. Click "**Settings**"
        ii. Click "**Wi-Fi**"
        iii. Enable Wi-Fi, if necessary.
        iv. Select Wi-Fi hotspot **AAT 901xxxx**
        v. Once connected, the green Link LED on the MW15 keypad will illuminate.
        vi. NOTE: If the Android device is taken out of range of the MW15 Wi-Fi broadcast, the device may automatically attempt to connect to another Wi-Fi network or

the cell network. This feature may be disabled by the user, if desired. See device owner's manual for more information.

b. For Windows operating systems:
   i. Ensure Wi-Fi is enabled.
   ii. Click the Wi-Fi icon in lower right computer screen.
   iii. Select Wi-Fi hotspot **AAT 901xxxx**
   iv. Click "Connect"
   v. Once connected, the green Link LED on the MW15 keypad will illuminate.

c. For iOS devices (iPhone and iPad)
   i. Power on the MW15.
   ii. Power on the iOS device to be used with the MW15.
   iii. On the iOS device, click "Settings"
   iv. Click "Wi-Fi" and enable, if necessary.
   v. Choose network "AAT 901xxxx" where the x's represent the serial number of the MW15.
   vi. Once connected, the green Link LED on the MW15/MW08 keypad will illuminate.
   vii. NOTE: If the iOS device is taken out of range of the MW15 Wi-Fi broadcast, the device may automatically attempt to connect to another Wi-Fi network or the cell network. This feature may be disabled by the user, if desired. See device owner's manual for more information.

3) Log in to the MW15 by clicking the **AAT** shortcut on the Android's (if purchased with MW15) homepage, or by opening a web browser and navigating to **192.168.0.50**.
   a. Google Chrome is recommended, but any web browser may be used.
4) Click or tap **Menu**, then select **Profiles/Capture/Report**.
5) Locate the site name for the report to be generated. ***See Figure 26***
6) Select information to be included in the site report by clicking **Show Report Options**.
   a. Latitude/Longitude, Tilt, Roll, AZM, and AGL are defaulted to "On."
   b. Individual options may be enabled or disabled by clicking the checkbox next to the option.
   c. WGS84 is the standard Latitude/Longitude format. If the unit is equipped with optional grids (British National Grid, French Lambert II, etc.), one additional grid may be selected for inclusion in the site report.
7) The user may choose from two download formats:
   a. Click **PDF** to download and save a PDF version of the captured data. This is the simplest method of report generation – ***See Step 8***
   b. Click **CSV** to save the report in **C**omma **S**eparated **V**alues format – to export capture information to a spreadsheet, such as Microsoft Excel – ***See Step 9***
8) Selecting PDF allows the user to download the site report in PDF format.
   a. If using Google Chrome, selecting **PDF** will automatically download the report to the Wi-Fi device's **Downloads** folder.
   b. Other browsers may require input from the user to Open or Save the PDF. The user *must* save the PDF to the Wi-Fi device in order to keep a local copy.

9) Selecting **CSV** allows the user to download capture information in a format compatible with Microsoft Excel and similar spreadsheet programs.
    a. Selecting CSV in Google Chrome will automatically download the file to the Wi-Fi device's **Downloads** folder.
    b. Other browsers may require input from the user to Open or Save the CSV file. The user *must* save the CSV file in order to keep a local copy.

Figure 26

Notes regarding MW15 report generation and retrieval:

- All stored capture data remains in the MW15 internal memory, even after reports are generated.
- Reports may be generated repeatedly and on multiple Wi-Fi devices, if desired.
- Capture information is only deleted if the user deletes an individual profile or selects the **Erase** function located at the bottom of the MW15 **File Management** internal web page.
- As the MW15 creates a backup database file every time a modification is made (profile added, capture performed, etc.), it is recommended that the internal SD card be erased periodically using the **Erase** function, located on the **File Management** page.

- Adding photographs to the reports will increase the amount of space used on the internal SD card and will necessitate more frequent SD card erasure.

Using LASER rangefinder (LRF) to capture Above Ground Level (AGL) height

1. Connect LRF cable to LRF and MW15/MW08 (cable connector at the end of MW15/MW08 under round plastic cap). Note that the pins are small, so use care not to damage the cable. ***See Figure 27***

    a. Connect the right-angle connector end to the LRF and the straight connector to the MW15/MW08.

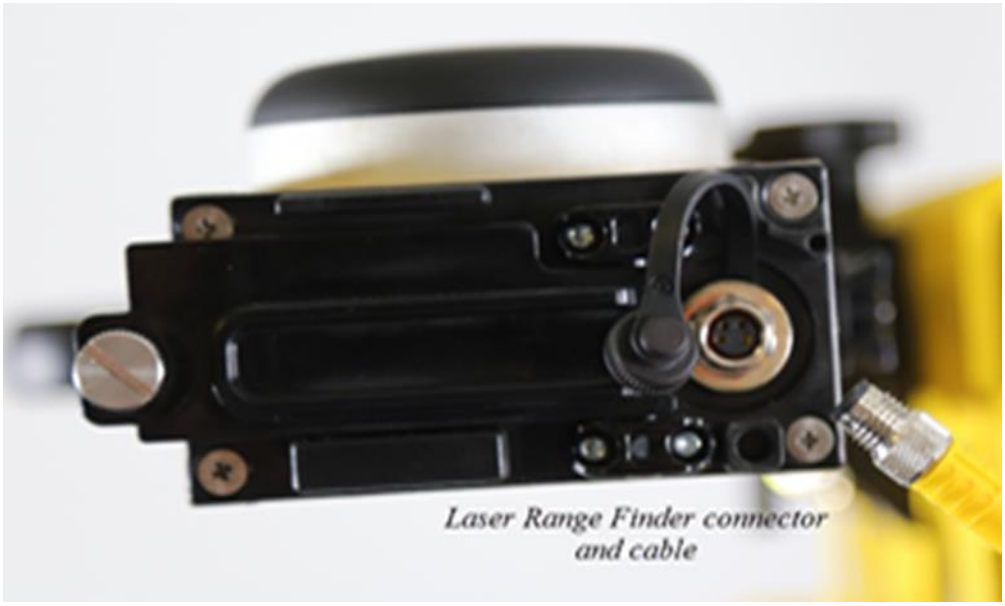


Figure 27

2. Once the cable is connected, look through the eyepiece and point the LRF down and at the target (solid object at ground-level). Press “Fire” to power on the LRF, values should appear in viewfinder. Verify the LRF is in VD mode. Press the Mode button until VD is displayed if not in VD mode.

3. Position the LASER rangefinder at the antenna radiation center and pointed towards the ground. Press and hold the “Fire” button on top of the LRF until the height is displayed. Verify the height result is displayed on the Measure page. Note that the height is only saved for the current measurement session. Restarting an alignment session will delete the AGL height. ***See Figure 28***

Figure 28

4. Remove cable/LRF and stow in a safe place. Note that the height is only saved for the current measurement session. Restarting an alignment session will delete the AGL height.

5. Return to **Capturing alignment data to a previously created profile *Step 6*** **or** Using the Quick Capture Feature to continue RF Panel Alignment.

Checking tilt and roll calibration

Sunsight strongly recommends that users periodically check the tilt and roll calibration of the MW15/MW08's internal sensors. The frequency with which these checks should be performed will depend on how often the MW15/MW08 is used and how it is cared for, but calibration checks should be performed monthly, at a minimum. ***The MW15/MW08 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 MW15/MW08 on a **flat** surface.
- Power on and log in to the MW15/MW08.
- 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 MW15/MW08 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 MW15/MW08 is calibrated
- If measurements are not as described above, within +/- 0.1°, calibrate the MW15/MW08's tilt and roll sensors by following the prompts on the Tilt/Roll Calibration page.

Troubleshooting

- Checking current firmware version
  - ✓ Log in to the MW15/MW08 (***See Pages 33 & 34***). Scroll to the bottom of any MW15/MW08 webpage, where the user can find the MW15/MW08 serial number and firmware version currently installed.
- The MW15/MW08 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 your Handheld Controller is connected to Wi-Fi hotspot **AAT 901xxxx**, where the x's represent the serial number of the MW15/MW08. Serial number decals are located on the back of the unit, next to the mounting rail.
  - ✓ With the Handheld Controller connected to the MW15/MW08's Wi-Fi hotspot, open a web browser and navigate to **192.168.0.50**
- The MW15/MW08 will not display azimuth
  - ✓ GPS is line-of-sight technology and, as such, both GPS antennas at the top of the MW15/MW08 must have as clear a view of the sky as possible.
  - ✓ The MW15/MW08 should always be mounted as high on the antenna to be measured as possible.
  - ✓ Use the indicators on the MW15/MW08's **Diagnostic** page to help determine optimal placement.

Use and care of the Sunsight MW15/MW08

- The MW15/MW08 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 MW15/MW08 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 MW15/MW08 so as to eliminate or minimize physical obstructions.

- The MW15/MW08 and its accessories are weather resistant, not water-proof! Do no immerse or submerge the MW15/MW08 in liquid of any type. All access doors and caps must be in good working order and secured while the MW15/MW08 and its accessories are in use, especially in inclement weather.

- Do not store the MW15/MW08 or its accessories in a wet case. Allow the case(s) to air dry prior to storing the MW15/MW08 and its accessories.

- The MW15/MW08 housing is fabricated of aluminum for durability, but still contains highly sensitive electronic components. Avoid sharp impacts and drops.

- The MW15/MW08 and its accessories contain no user-serviceable components. Do not attempt to disassemble the MW15/MW08 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 MW15/MW08 at: https://www.sunsight.com/register-aat/. Your information is never shared or sold and is used only by Sunsight to track user updates.

For questions regarding use or care of the MW15/MW08 and its accessories, please contact Sunsight Instruments Technical Support. Live technical support is available Monday – Friday from 9:00am to 6:00pm Eastern.

support@sunsight.com

1-321-244-9443 x2

Glossary

- **AAT** – The Sunsight Instruments **A**ntennAlign **A**lignment **T**ool is a self-contained measuring device that can be used to measure azimuth, tilt, roll, latitude, longitude, and height of the object it is attached to. The primary use of the AAT is to provide and record the necessary measurements to allow a user to align devices (examples: cellular panel and microwave antennas). In this document, the AAT will be referred to as MW15/MW08, MW15 or MW08.
- **Capture** - A capture is the action of recording measurements to the MW15/MW08. 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.
- **Downtilt** – See "Tilt"
- **Embedded Website** - The MW15/MW08 is accessed through its Embedded (built-in) Website. Using the Android tablet included with the MW15/MW08, use the Sunsight app to access the MW15/MW08 Embedded Website
  OR
  Using a Wi-Fi enabled device's web browser, enter the MW15/MW08's web address to access the MW15/MW08's website. All input and output to and from the MW15/MW08 is accessed in this way. See "Handheld Controller" below.
- **GPS and GLONASS** - GPS and GLONASS, also referred to as GNSS, are both satellite-based positioning systems that are used by the MW15/MW08 to determine exact latitude and longitude of the MW15/MW08. Also, and most importantly, the satellites are used to determine the azimuth for the MW15/MW08.
- **Handheld Controller** – The MW15/MW08 can be accessed by most any smartphone, tablet or laptop supporting standard Wi-Fi (802.11b/g/n). Connect the Wi-Fi device to the MW15/MW08 as you would any access point, or "hot spot". Then, using a web browser on the device, type in the MW15/MW08's web address to access the MW15/MW08's embedded website. All input and output to and from the MW15/MW08 is accessed in this way.
- **Plumb** – See "Roll"
- **Profile** - A Profile is a set of target alignment data including the site name, sector, and antenna position. Profiles can be input in advance of doing tower work to minimize data entry on the tower.
- **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 (multiple antennas in one report).
- **RF Panel Antenna** - An RF panel antenna is an antenna used for broadcasting cellular signals to and from 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.
- **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.
- **Wi-Fi Enabled Device** – See "Handheld Controller"