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Rough Pointing

Installer adjusting elevation using fine EL tool

- The rough pointing process consists of the following general steps:

1. Access SCC to enter the installation parameters http://169.254.0.1 . Click on the advanced icon to access the installation tab. The HN9X00 automatically advances to the pointing mode.
2. Insert the DAPT device in line with the receive IFL near the antenna.
3. After DAPT logs the voltage it will allow installer to select short or long scintillation filter. **Note: Scintillation filter described on next slide**
4. The DAPT will now display receive Signal Quality Factor (SQF).
    - For DAPT navigation, see slides 39-44
5. With fine AZ/EL (azimuth/elevation) tool installed on dish coarse point the antenna to the highest Signal Quality Factor (SQF) for both azimuth and elevation. (for instructions on installing fine AZ/EL tool please refer to ka-band assembly video)

Rough Pointing – Scintillation filter

- Scintillation is a short-term random amplitude fading and phase change that can occur due to changes in the density of the atmosphere.

- Using DAPT's button number 2, installer can switch between filters while aiming to smooth out the scintillation effects of atmospheric conditions on Ka-band signal.

  When the IDU receives the voltage message, the HN9X00 advances to the Point state, in which the antenna can be coarse- and fine-pointed. Once in the Point state, you can select one of two filters to support pointing. The SNR (short noise ratio) filter is normally used to initially locate the satellite, but it can also be used for pointing when little scintillation exists.

  If the SQF readings on the DAPT display vary significantly and don't "settle down" readily, it is usually an indication of high scintillation. Although normally used to peak the beacon SQF after the satellite has been found, the LNR (long noise ratio) filter can also be used during conditions with high levels of scintillation.

Fine Pointing - 1

- Fine pointing or dithering is the process of more accurately pointing the antenna at the satellite. The squinter is used to finely align the antenna and lock it down before proceeding with validation. During fine pointing, you can easily change the position of the squinter, making it easy to accurately determine the best pointing position for the antenna.
- Fine pointing is always critical to the operation of the equipment

IMPORTANT: Squinter position should be horizontal or vertical using the bubble levels even when the reflector's position is skewed.

⚠ CAUTION

Because you will be close to the feed horn when adjusting the squinter during the pointing validation tests, it is likely that the beacon signal will be lost for short periods of time. Be careful that such signal loss last no longer than 10 seconds. If the beacon signal is lost for more than 10 seconds, you will need to revert to coarse pointing mode by pressing **Back** to return to SQNT AZ1 State.

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Fine Pointing - 2

- **FINE POINTING PROCEDURE**

1. Fine point the antenna using the squinter tool by placing squinter tool over feed horn in the azimuth position and measure SQF.
2. Rotate the squinter tool 180 degrees and take another SQF measurement.
3. Determine the desired position by splitting the difference in SQF measurements.
4. Move the antenna to the desired position and tighten the lock down securing bolts.
5. Rotate the squinter tool 90 degrees for elevation, measure SQF and repeat steps.

NOTES

- Antenna is first peaked as done on current Ku band terminal equipment.
- Squinter is attached to feed horn. The squinter drops overall signal about 1 dB, but effectively “moves” the focal point (left, right, up, down) depending on how the squinter is installed.
- Readings taken during squinting take advantage of antenna roll-off at edge of antenna lobes. Therefore, a small pointing error becomes a much larger error when squinting.
- By reducing the squint error in pairs of readings, the antenna is pointed more accurately.
- If the error is too large, the feedback indicates the antenna must be moved to correct the error.
- When fine pointing Ka antennas, SQF at peak flattens and is “in the noise” caused by downlink scintillation. Alternative pointing technique is required to meet pointing accuracy requirement.

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DAPT Pointing Walkthrough - 1

- The following steps describe the rough-pointing process:

1. Return to the ODU and install the DAPT in-line with the low-noise block (LNB) converter on the Rx IFL. When connected, the DAPT powers up and runs a self-test. Upon successful completion of this test, the software version and health status appear on line 1 of the DAPT display. Line 2 displays the current IFL voltage, as shown.

   Note: If the DAPT detects a startup failure, **SelfFAIL** appears on line 1 of the display. This message is most likely an indication of a faulty or defective DAPT.

   The following message appears briefly while the measured IFL voltage is transferred to the IDU:

When the IDU receives the voltage message, the HN9X00 advances to the Point state, in which the antenna can be coarse- and fine-pointed. Once in the Point state, you can select one of two filters to support pointing. The SNR filter is normally used to initially locate the satellite, but it can also be used for pointing when little scintillation exists. Scintillation is a short-term random amplitude fading and phase change that can occur due to changes in the density of the atmosphere. If the SQF readings on the DAPT display vary significantly and don't "settle down" readily, it is usually an indication of high scintillation. Although normally used to peak the beacon SQF after the satellite has been found, the slow filter can also be used during conditions with high levels of scintillation.

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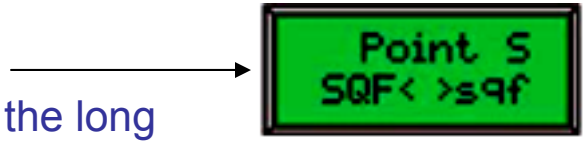
DAPT Pointing Walkthrough - 2

2. Choose either the long or short time constant filter by pressing the Filter Toggle button (button 2). Each press toggles the selection.
3. Press **Advance**. The DAPT displays the message:



   "**S**" indicates the short filter. Press **Toggle** to switch to the long filter. The left value in row 2 is the maximum SQF number; the value at right is the current value.
4. Using the appropriate sized wrench for the antenna, adjust the elevation and the azimuth on the antenna until you achieve the highest possible value.
5. When you have adjusted the azimuth and elevation as close as possible to the maximum SQF value, proceed with fine pointing.

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DAPT Pointing Walkthrough - 3

- The following steps describe the fine-pointing process:
  1. Place the squinter on the feed horn in either of the two azimuth positions and wait for several seconds for the SQF reading to settle on a value. (Length of time required is a function of which filter you use.)
  2. Rotate the squinter 180 degrees on the feed horn to the opposite azimuth position and check the reading.

  Note: If using the short filter, you must wait at least 3 seconds at each dither point. If you do not wait before recording the reading, the pointing signal may not have reached its steady-state value, causing pointing error. If you use the long time constant filter, you should wait at least 15 seconds to take a reading.

  3. Compare the two SQF readings. They should be as close as possible; preferably within 2 to 3 SQF points. Continue to take pairs of azimuth readings until the two azimuth numbers are within tolerance.
  4. Repeat steps 1 through 3 for the two elevation positions.

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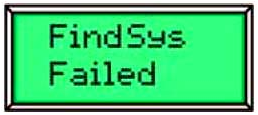
DAPT Pointing Walkthrough - 4

5. When the pair of elevation readings matches, lock down the antenna azimuth.

   Note: Because slight movement of the antenna occurs during lockdown, always measure the elevation readings after locking down the azimuth. When this second pair of elevation readings matches, you can lock down the elevation.

6. If the following message appears in the DAPT display before the pointing process is completed, press **Advance** to return to Point mode.



7. Remove the squinter from the feed horn and press **Advance**.

   Note: During this phase, it may be necessary to flip the polarizer on the ODU. If a polarization change is needed, the DAPT display reads: Tx -Pol Left (or Right) indicating which pol setting to use

8. Flip the polarizer as described in the HN9X00 Operations and Maintenance manual. While polarizer is switching, press **Advance** to proceed to Pointing Validation.

   Notes: If you lose the beacon signal while flipping the polarizer, press **Back** to return to coarse pointing. In the validation state, you again place the squinter over the antenna feed horn. The DAPT display lets you know which squinter position to use for each step.

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DAPT Pointing Walkthrough - 5

Upon completion of the previous phase, the DAPT display reads:

This records the center value or the SQF value without the squinter on the feed horn.

1. Press **Advance**. The DAPT display shows a Wait message for approximately 15 seconds, then reads:

2. Place the squinter tool on the feed horn in either of the two azimuth positions and press **Advance**.
3. The DAPT display reads **Wait AZ1** while the IDU performs the first azimuth measurement. (This process could take up to 15 seconds. When the reading is complete, the DAPT display reads:

4. Rotate the squinter 180 degrees on the feed horn to the opposite azimuth position and press **Advance**.
5. The DAPT display reads **Wait AZ2** while the IDU performs the second azimuth measurement. (This process could take up to 15 seconds, depending on which filter you are using.). When the measurement is complete, the DAPT display reads:

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DAPT Pointing Walkthrough - 6

6. Press **Advance** to proceed.
7. Repeat steps 2 through 6 for the two elevation positions.

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8. When the difference between the two elevation measurements is within 15 SQF points, press **Advance**. The DAPT display reads:

9. When the DAPT display reads:

Remove the squinter from the feed horn and press **Advance**.

10. Press **Advance** for Yes or Button 2 to return to Pointing Validation mode. If you pressed **Advance**, the DAPT prompts you for confirmation that you want to save the results, with the message:

11. Press **Advance** to save the pointing validation results or **Back** to return to the previous state. If you press **Advance**, the DAPT display reads:

12. Press **Advance** to complete the pointing process, or **Back** to restart Validation. If you press **Advance**, the DAPT display reads:

CAUTION

Do not disconnect the DAPT while the HN9X00 downloads. Doing so will prevent the software from downloading properly.
When the download is complete, the DAPT display reads:

The procedures above outline the basic pointing process. However, there are a number of messages that you may encounter other than those discussed in the previous sections.

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Exit HN9X00 Pointing Mode

- Upon completion of pointing validation, proceed with HN9X00 commissioning process

Note: Details on commissioning process are discussed in Module 4 Commissioning