# Radio Frequency Systems

## ACU MAINTENANCE GUIDE

### MODELS: A20, X20, X20H, X20-B, I20-H, I20-B

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# Antenna Control Unit Maintenance Guide

## SUMMARY

# Antenna Control Unit Maintenance Guide

## CAUTION

Please read this manual before proceeding with the ACU replacement.

1. Only qualified personnel are allowed to change ACUs of an antenna.
2. RFS ACU devices are only compatible with RFS antennas.
3. The appearance of the ACU and the antenna depicted in the figures are only for reference and may differ from the actual ones.

## 1. SCOPE

This document describes the operations to follow for:

- Replacing on-site, an ACU device on an antenna, by a new one, or
- Maintaining on-site, an ACU device that its firmware must be upgraded.

This procedure is applicable for the RFS products that are listed herein-after:

- ACU-A20-S, ACU-A20-SR
- ACU-I20-H12A, ACU-I20-H12B, ACU-I20-H12C
- ACU-I20-B1, ACU-I20-B2, ACU-I20-B3, ACU-I20-B4, ACU-I20-B5, ACU-I20-B6, ACU-I20-B7, ACU-I20-B8
- ACU-X20, ACU-X20H
- ACU-X20-B5, ACU-X20-B6, ACU-X20-B7, ACU-X20-B8

## 2. REQUIREMENTS

The required equipment for maintaining or configuring an ACU device on-site is given in Table 1.

**TABLE 1: EQUIPMENT LIST**

| Item | Equipment / Installation Tools | |
|---|---|---|
| 1 | **Case 1: Replacing a defective non-site-sharing ACU device**<br>A new ACU device, with its factory presets (i.e. default factory settings)<br>**Case 2: Upgrading the firmware of an ACU**<br>For an ACU-20 model, to plan:<br>• 1 device per band<br>• 1 AISG cable – ref. CA003-7 (Length is 30 cm) for daisy-chaining the ACU devices.<br>It typically means:<br>• 2 ACU for a DualBand antenna + 1 AISG cable for chaining both the devices<br>• 3 ACU for a TriBand antenna + 2 AISG cables for chaining the devices<br>• 4 ACU for a QuadBand antenna + 3 AISG cables for chaining the devices<br>For the other ACU families, there is no specific recommendation<br>**Case 3: Replacing a defective site-sharing ACU device**<br>A new ACU and CFG file of the antenna with the desired sharing mode<br>**Case 4: Changing the configuration of a static site-sharing ACU device**<br>A new STATIC configuration SHA file defined for the specific antenna model |  <br>  <br>  <br>  |

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| | | |
|---|---|---|
| 2 | **Antenna Line Configurator (PC /NEM /Adaptor) PC:**<br>Ensure that the USB drive and CP210X device drive are installed on the computer.<br>The NEM-ALD -W application software is installed. |  |
| 3 | **Adaptor: PA-USB/485-1**<br>Used for COMPUTER USB port and ACU communication protocol adapter. |  |
| 4 | **Full link:**<br>Use the USB port of the adapter to connect to the USB port of the computer.<br>Use the AISG port of the adapter to connect to the AISG port of the ACU.<br>Connect the power supply using the power cable port of the adapter. |  |
| 5 | **AISG cable**<br>This is used for connecting the adaptor to the AISG port "**IN A**" (or "**IN 1**") of an ACU device.<br>**NOTE:** Never connect the AISG cable to the AISG port "**IN B**" (or "**IN 2**") of an ACU device to maintain or to configure |  |
| 6 | **Wrenches**<br>A pair of screws allows the ACU device to be fixed on the antenna. Two types of screws exist: it depends on the ACU type. Please, refer to the Table 2 for getting the screw type for the ACU to dismantle and to replace.<br>**NOTE:** For the ACU-A20 family, a 5 mm Allen wrench is required in addition to the Cruciform/Torx wrenches | **Cruciform head**  <br>**Torx T20 head**  |

**TABLE 2: WRENCH TYPE PER ACU MODELS**

| Family | Overview of the Device | ACU Model | Wrench Type |
|---|---|---|---|
| A20 |  | ACU-A20-S<br>ACU-A20-SR |  |
| I20-H |  | ACU-I20-H12A<br>ACU-I20-H12B |  |
| |  | ACU-I20-H12C |  |
| X20 and X20H |  | ACU-X20<br>ACU-X20H |  |
| I20-B |  | ACU-I20-B1 |  |
| |  | ACU-I20-B2 up to ACU-I20-B8 |  |
| X20-B |  | ACU-X20-B5 up to ACU-X20-B8 |  |

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## 3. MAINTAINING AN ACU DEVICE

### 3.1: Flowchart of the Operations

The operations to follow for maintaining an ACU device are listed in Figure 1. The maintenance splits into 2 cases:

- **Case 1 (Figure 1 – a):** the hardware of a non-site-sharing ACU device of an antenna is out-of-order and must be replaced on-site by a new non-site-sharing ACU.
- **Case 2 (Figure 1 – b):** the firmware of an ACU device of an antenna must be upgraded on-site to take advantage of new features.
- **Case 3 (Figure 1 – c):** the hardware of a site-sharing ACU device of an antenna is out-of-order and must be replaced on-site by a new site-sharing ACU.
- **Case 4 (Figure 1 – d):** the sharing profile of a static site-sharing ACU device of an antenna needs to be switched to a different sharing profile.

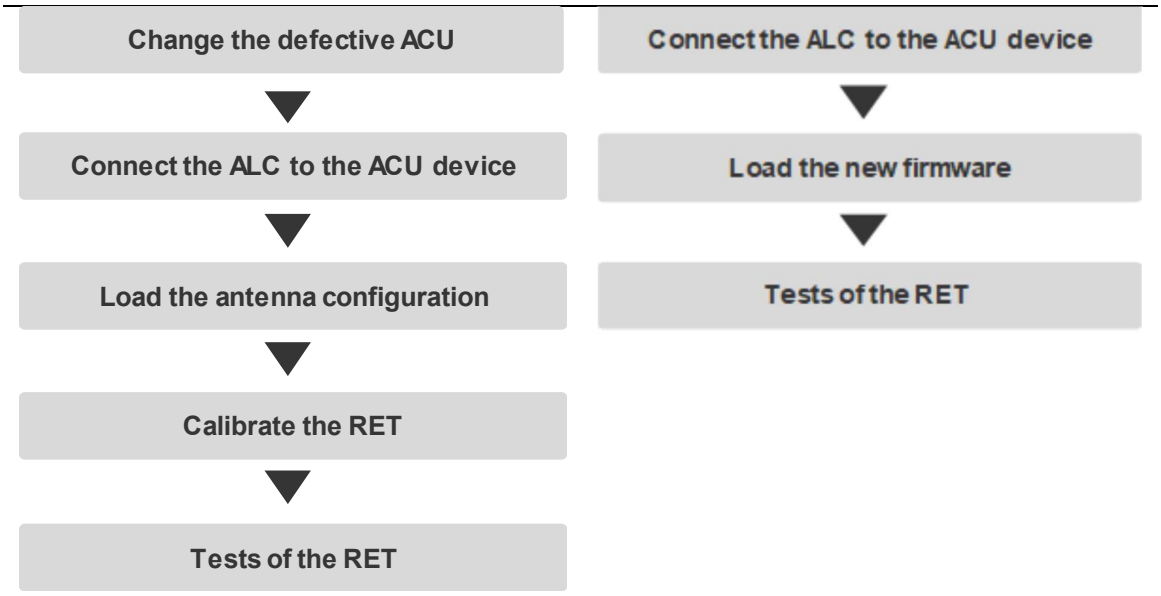


**Figure 1:** Flowchart for maintaining a non-site-sharing ACU

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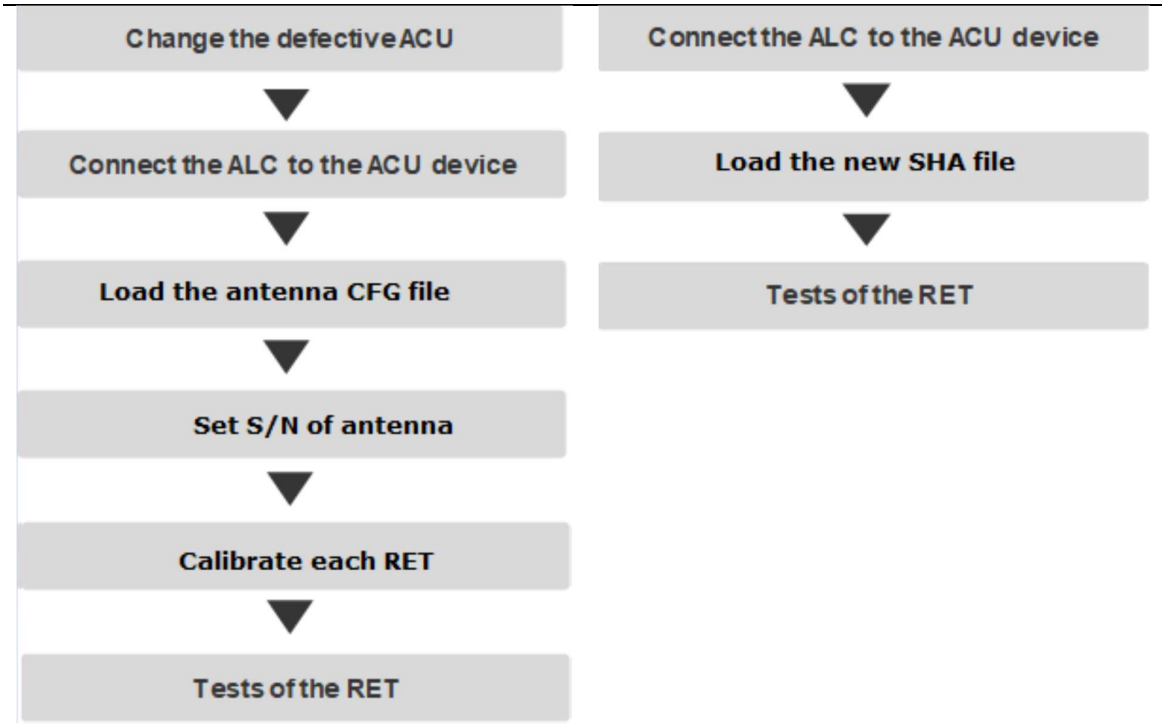


c) Replacing a defective site-sharing ACU d) Changing sharing profile

**Figure 1:** Flowchart for maintaining a site-sharing ACU

### 3.2: Replacing an ACU on-site

In the scope of on-site change of a defective ACU, the following sections describe how to proceed. Due to physical and mounting differences of the family ACU-A20, compared to the other ACU families, the connection procedure falls into 2 parts: one is the ACU-A20 family (§3.2.1), one for the other ACU families (§3.2.2).

#### 3.2.1: Replacing an ACU that belongs to the ACU-A20 Family

- Untighten the (2) M4 screws **[2]** the ACU-A20 **[1]** by using a cruciform wrench (Figure 2 – a),
- Once the defective ACU has been removed, check if the hexagonal mechanism **[4]** (Figure 2 – b) is not locked, by using a 5 mm Allen wrench,
- Mount the new ACU to the antenna as depicted in Figure 2 – a,
- Tighten the (2) M4 screws progressively and alternatively,
- Connect the AISG cable **[3]** to the port "IN",
- For a monoband antenna, do not remove the black cap from the female AISG port of the ACU device. For a multiband antenna, several ACUs are plugged into the antenna are daisy-chained with an AISG cable of 30 cm length (Figure 1 - c).

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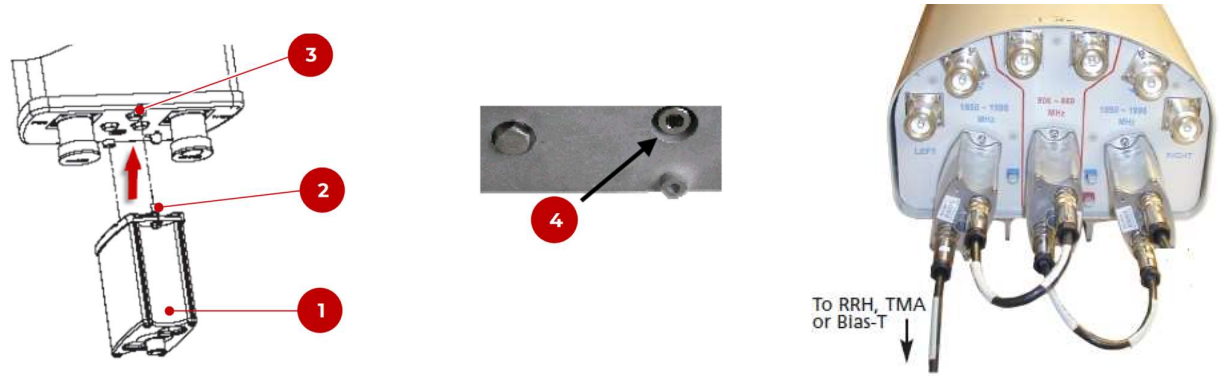


a) Components of the ACU device b) Hexagonal ACU interface c) Multiband and daisy-chaining

**Figure 2:** Steps for replacing an ACU-A20 device

### 3.2.2: Replacing an ACU that does NOT belong to the ACU-A20 Family

- The ACUs of the families ACU-I20-H, ACU-I20-B, ACU-X20-B, ACU-X20, ACU-X20H are flush mounted to a bottom end cap of an antenna (as depicted in Figure 3, the bullet **[O]** highlights an ACU's panel of AISG connectors).

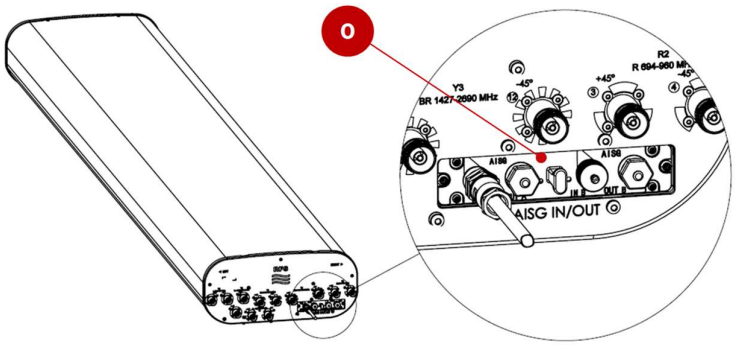


**Figure 3:** Location of the ACU on an antenna

- Remove the AISG cable(s) **[1]** (Figure 4 - a) from the AISG connector(s).
- Untighten the 2 screws **[3]** (Figure 4 - a) progressively and alternatively, by maintaining the ACU through the **[2]** handle. The type of those screws depends on the ACU model. Please refer to Table 2 for using the appropriate wrench (cruciform or Torx).
- Use the handle **[2]** for removing the defective ACU device **[4]**.
- Mount the new ACU device [3] to the antenna and maintain the device through its **[2]** handle.
- Tighten the 2 screws progressively and alternatively.
- Plug the AISG cable(s) **[1]** .

**NOTE**: If there is only one primary AISG cable to plug: ALWAYS USE THE PORT "**IN A**" (or "**IN 1**").

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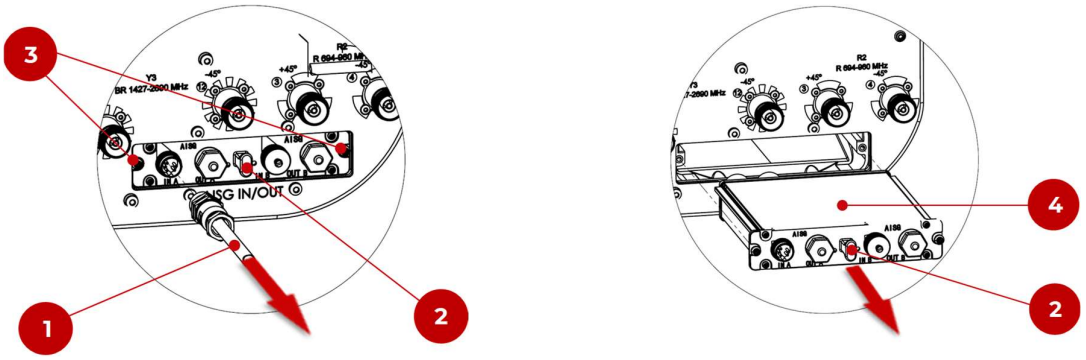


a) Components of the ACU device

b) Removing the ACU device

**Figure 4:** Visual location of the ACU on an antenna

### 3.3: Operate NEM software to connect to ACU devices

This section describes how to program the new ACU that has been installed on-site on an antenna. It needs to use (PC+adaptor): the Antenna Line Configurator , listed in Table 1 (item 2). This procedure applies to every ACU family and is divided into 5 steps, as depicted in the flowchart in Figure 5. The ACU-A20-S is chosen as an example for describing those steps.

**NOTICE**: Installation and use of NEM software, please refer to NEM-ALD-W User's Manual.

It is available at https://www.rfsworld.com/articles/technical-support/nem-ald-w-users-manual

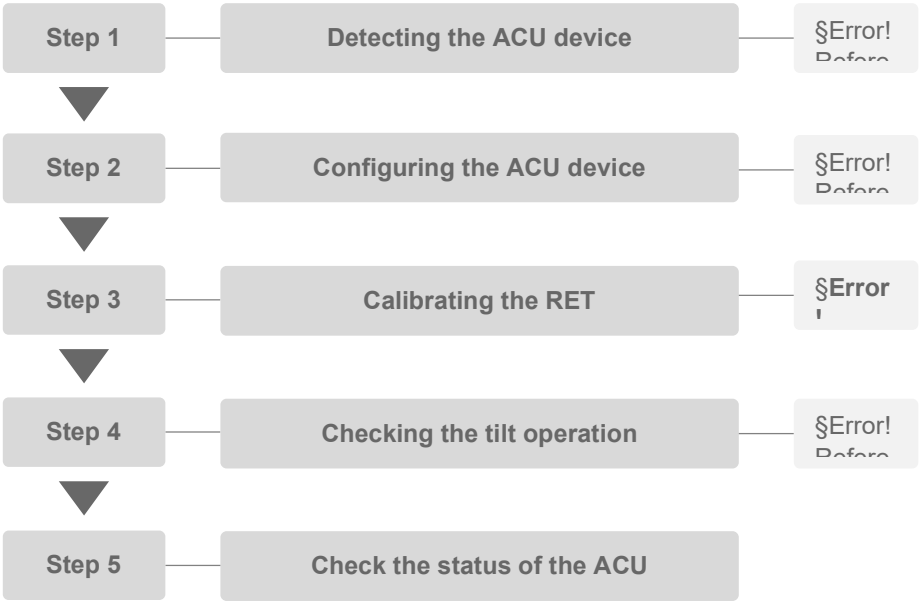


**Figure 5:** Flowchart for programming an ACU device

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### 3.3.1: Checking link lines

The adaptor device has to be connected to the AISG port "IN" for an ACU of the ACU-A20 family, or "**IN A**" (or "**IN 1**") for every ACU device, excluding the ACU-A20 family. Once the adaptor is plugged into the ACU, And the NEM software is opened on the computer:

- Please refer to NEM-ALD-W User's Manual page 8.
- Check that the RFS ACU is detected:
    - Please check the port used by NEM software.
    - Check whether the adaptor power supply is normal.
    - Check that the adapter is properly connected to the ACU.
    - If nothing is still detected, replace the ACU device with a new one.

### 3.3.2: Configuring the ACU device

This step allows you to load the antenna configuration to the ACU device. A preparation step (§3.3.2.1) must be done before going on-site: it consists in recovering the antenna configuration files to upload on-site to the ACU device. Once done, the antenna configuration can be done on-site, as described in §3.3.2.2.

#### 3.3.2.1: Preparation Step

This step allows a user to get the antenna configuration files that have to be uploaded to an ACU device on-site. **IT MUST BE DONE BEFORE GOING ON-SITE**.

- Load the *.acu* or *.sha* of the antenna. Those files are included in the RFS Datapack, and can also be downloaded from the RFS website at: https://www.rfsworld.com/articles/technical-support/ret-antenna-configuration-files

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#### 3.3.2.2: Loading the Antenna Configuration (ACU) Files to all ACU Devices

This section describes how to upload the antenna configuration (ACU) file to an ACU device:

- Please refer to NEM-ALD-W User's Manual page 28.
  - Each RET unit requires an ACU file.
  - Calibration is required for each RET after loading a new ACU file.

#### 3.3.2.3: Loading the Antenna Firmware File to all ACU Devices

This section describes how to upload the antenna firmware file to an ACU device:

- Please refer to NEM-ALD-W User's Manual page 22 - 23.
  - After the download, the software version changes to the target version.

#### 3.3.2.4: Loading the Antenna CFG & SHA Files to a site-sharing ACU Device

This section describes how to upload the configuration and sharing files to a site-sharing ACU device:

- Please refer to NEM-ALD-W User's Manual page 22 - 23.
  - Calibration is required for each RET after loading a new CFG file.
  - The SHA file can be applied to any single RET unit and it will be applied to the entire antenna.
  - A Reset is required to apply the new SHA file.

### 3.3.3: Calibrating the RET

Every time an *.acu* file or a *.cfg* file is uploaded to an ACU device or a new ACU is installed, a calibration of the RET must be done, in order to make the motor to record the station of the hard limits 'min' and 'max'. If a calibration is not performed, this might lead to an alarm "**Motor Jam**" if a tilt operation is requested.

- Please refer to NEM-ALD-W User's Manual page 29.

### 3.3.4: Checking the Tilt Operation

Once the calibration has been done, it remains to check if a tilt operation is able to be ordered:

- Please refer to NEM-ALD-W User's Manual page 29.

## 4. FAQ

**Message:** **"Motor not calibrated"**

**Solution:**
- Attempt to calibrate again the RET,
- Enter a tilt value for requesting a tilt change

**Message:** **"Motor Jam"**

**Solution:**
- Check if the ACU has the proper antenna configuration file,
- Calibrate again the RET with the NEM,
- Enter a tilt value for requesting a tilt change

**Message:** **The motor does not work**

**Solution:**
- Check if the PC->adaptor->AISG cable is properly connected to the ACU,
- Check if the ACU is detected by the ALD,
- If nothing is detected, change the ACU device by another one, then retry.

## About RFS

Radio Frequency Systems (RFS) delivers the end-to-end RF solutions and expert services needed to evolve wireless and broadcast networks today and tomorrow. Our cables, connectors, antenna systems and RF conditioning products are based on more than 120 years of experience delivering cutting-edge RF solutions and industry firsts. As a result, our solutions are recognized globally for their innovation, superior performance and unmatched quality.

As an ISO-compliant company with global operations, we bring our customers world-class engineering and manufacturing skills backed with comprehensive local support services. Our customers know they can rely on our expertise and commitment to excellence from initial design to final delivery and beyond — whether they're looking to support 5G, deploy small cells, empower smart cities or improve indoor coverage in the most challenging locations.


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