Accel-RF Instruments Corporation

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Shutdown and Startup of the AARTS System Hardware

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Accel-RF Corporation specializes in the design, development, manufacture, and sales of accelerated life-test/burn-in test systems for RF and Microwave semiconductor devices. This manual describes the performance of the AARTS LifeTest software code. For more information contact:

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1 Description

From time to time there is a need to completely remove power from the Accel-RF (ARF) AARTS systems for such events as installation or maintenance of the UPS, moving the system, accommodating facilities shutdown events, etc… This document describes the proper way to de-power and power up the system to minimize problems.

ARF recommends leaving the system powered up at all times. Certainly during a life test run it must be powered by definition. However, even when a test is not being performed it is better for the hardware to remain powered at all times. This reason for this relates to system stability. The specifications for system performance are only valid after the system has been powered for 24 hours. The electronics in the system, particularly those related to measurement accuracy are temperature dependent. Due to the density of electronics it takes some time for the entire system to thermally stabilize after power up.

Further, there are long-term drift effects that also play a role. After the system has had power cycled many of the calibration parameters, most notably the Bias Current Offsets on legacy PCU boxes must be recalibrated. RF components are another set of devices that experience notable annealing effects and longer term drift issues. Hence, performing a new RF calibration is also recommended after cycling power.

1.1 Removing Power

There should be nothing that will be permanently damaged by powering down items in the wrong sequence. However, there is a preference to the power down sequence:

1) Turn OFF the LifeTest program and deboot Windows.

2) For RF systems, turn OFF any external power supplies associated with the drain voltage of the SSPAs. While the SSPAs have protection circuitry built in to avoid presenting drain voltage to the SSPA devices when no gate voltage exists, there is no reason to tempt fate; hence, this step is performed first.

RF systems delivered in 2016 or later are equipped with SSPA modules that are integrated into the DUT chamber. For these systems types, there are individual drain bias switches on the rear panel of the DUT chamber. Open the back door of the system and locate the “SSPA Enable” eight-position DIP switch. Set all eight switches to the off state.

There are usually one or more rack mount power supplies that may be accessed from the front of the rack that provide drain power to the SSPAs (note: the power supply could be mounted inside the front of the rack and hidden by a false cover – if any questions exist contact ARF before proceeding). The gate voltage supplies are created using internal power bricks typically found inside the “RFU/SSPA Power Supply Chassis” or “AARTS Power Supply Chassis”.

There is an ON/OFF button on the drain power supplies (not the main power button) for removing power. Note: the front panel is often locked to prevent accidental tampering – if so, there will be a key lock symbol on the front panel above the key that must be pressed for unlocking. Be sure to turn the power supply OFF using the front panel enable key before powering down using the main ON/OFF (black) toggle switch. Repeat process for all SSPA drain power supplies.

2) For RF systems in which a Pulser card exists, remove all fixtures. This prevents the fixtures from attempting to draw power from the computer directly, or the hubs. The system contains an internal power supply that overrides the USB power source, but only when it is powered.

For DC systems, or legacy RF systems that do not contain Pulser cards, the fixtures may be left in place.

3) For systems containing PCUHCU boxes, turn the black ON/OFF switch to the OFF (down) position on each individual module prior to removing power from the box itself.

The PFC module is in the far-right slot of the chassis. After the PCUHCU bricks are powered down, turn off the black switch on the PFC module.

If the PFC does not have a power switch, the PFC will be ON until the PDU breakers are de-powered (next step). Due to the high power capability of the PCUHCU power supplies, there are typically three phases delivering AC power to the PCUHCU box. The PDU map should show exactly which breakers affect each PCUHCU. Once the ON/OFF switches on the PCUHCU bricks are OFF, the order in which the AC breakers are removed is not critical.

4) Power down the rest of the system using the PDU breaker switches, usually located on the front of the rack near the floor. Start by powering down breaker #1 and then power down the rest in ascending order.

5) Disable the facility mains power. If a UPS is present power the output OFF.

1.2 Powering Up

There should be nothing that will be permanently damaged by powering up items in the wrong sequence. However, there is a preference to the power up sequence:

1) Turn ON the mains power. If a UPS is present power the output ON.

2) Turn ON the PDU breakers (usually located on the front bottom of the rack) one at a time starting with the highest numbered breaker and then work down to breaker #1 last.

3) Power ON the computer/monitor.

4) Power ON the SSPA drain supplies (note: see step 2 in the Powering Down section for more description). First, power ON the main ON/OFF button, then enable the output. The

voltage and current readings should be reasonable for the devices present in the SSPA (e.g. 12V at 30A might be reasonable for a 10- to 20-W 8-CH SSPA). If a lock out function exists on the front panel, enable it.

For systems with SSPAs integrated in the chamber(s), enable the DIP switches on the rear panel to turn on the individual drain biases. Once finished, visually inspect the LED indicators in the top floor of the chamber where the SSPA modules slide in. The LEDs should all be green nominally, but sometimes come up in the disabled state. If any of the LEDs are red, press the recessed "SSPA Reset" button located on the rear of the chamber next to the SSPA Enables switches. This should enable the SSPAs and turn all LEDS green.

5) For fixtures containing Pulser cards, reinsert the fixtures. For DC systems and RF legacy fixtures that contain no Pulser cards the fixtures need not have been removed in the power down sequence.

6) For RF systems, recalibrate the RF Power Meter manually using its front panel controls.

7) For systems containing PCUHCU boxes, once the PDU breakers are turned ON the PFC brick should be powered; hence, the LEDs on the front and/or the internal fans on that brick should be active. If not, do not attempt to power up the individual PCUHCU bricks. Once the PFC is powered, turn the black ON/OFF switch to the ON (up) position. Upon power up the LEDs on the front of the box will flash in a particular order. The last flashes indicate which bias type are detected in which bias slot. For most systems, that means there will be one flash in "CHxB1" position (bias1 detected), and two flashes in the "CHxB2" slot (bias2 detected). Upon completion of the LED cycling the unit should be ready for access.

8) Start the LifeTest program. Verify that no problems exist upon initialization (i.e. all boxes are detected and no instruments fail to be initialized). Note: the LifeTest software will display warning messages a problem is detected. If so, contact ARF for further instructions.

9) Let the system stabilize for 24 hours.

10) For legacy PCUs, recalibrate the entire Bias Current Offsets for all channels for both Bias1 and Bias2 using the PCU Calibration Form. Note: the newer PCUHCU boxes do not need to be recalibrated. If the system has been de-powered for more than a few weeks to a month, other PCU calibrations may also be required. Contact ARF for instructions on how to determine whether that is required.

11) For RF systems, using the RF Calibration Form recalibrate the RF input/output sections of the system.

12) The system is now ready for use.