



-PLUS upgrade for the RAM and SNAP systems

Rev 01262023 TG

1. Introduction

A RAM or SNAP measurement system generates many analog signals that need to be monitored or acquired, and requires the intensive use of an oscilloscope. The –PLUS upgrade adds an integrated oscilloscope module and all of the necessary hardware and software for viewing and acquiring RF waveforms. This upgrade removes the need for an external oscilloscope and greatly expands the capabilities of the system. When combined with the software API this upgrade opens up many possibilities for measurement automation and customized routines.

This document provides information on the hardware and software components of the –PLUS upgrade. Supporting documentation and white papers are being written for release in 2023, and further support is available by contacting RITEC directly.

2. Components of the –PLUS upgrade

The upgrade consists of both hardware and software components designed to not only incorporate an internal oscilloscope module, but to make the handling, viewing, and acquisition of waveforms seamless. This section provides a description of the hardware and software components of the upgrade.

Software upgrade – GUI (graphical user interface)

The software upgrade represents a substantial upgrade in the visualization and management of RF waveforms. The -PLUS upgrade offers an internal oscilloscope and signal selector.

FIGURE 2.1 shows a screen capture of the upgraded GUI. In addition to the controls and tabs for the standard SNAP items, control and display tabs have been added for the oscilloscope. This provides one integrated interface for viewing and controlling the system.

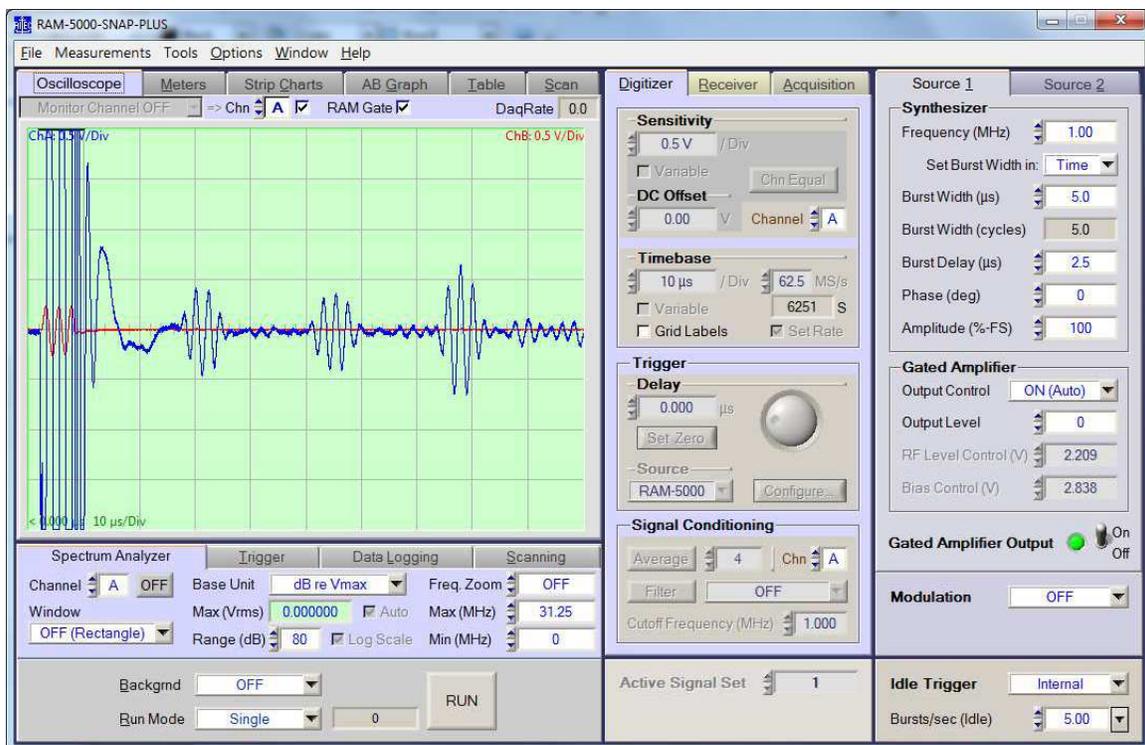


FIGURE 2.1: Upgraded GUI for the SNAP system with integrated oscilloscope support. The Oscilloscope Tab provides viewing and manipulation controls for the digitized waveforms, and the Digitizer tab provides controls for the digitizer settings.

The Oscilloscope tab can also be undocked and viewed as a separate window which can be resized and manipulated for viewing convenience; a screen capture of this window is shown in FIGURE 2.2. The tabs on the right hand side offer full control of the acquisition and display parameters, as well as options for filtering and averaging.

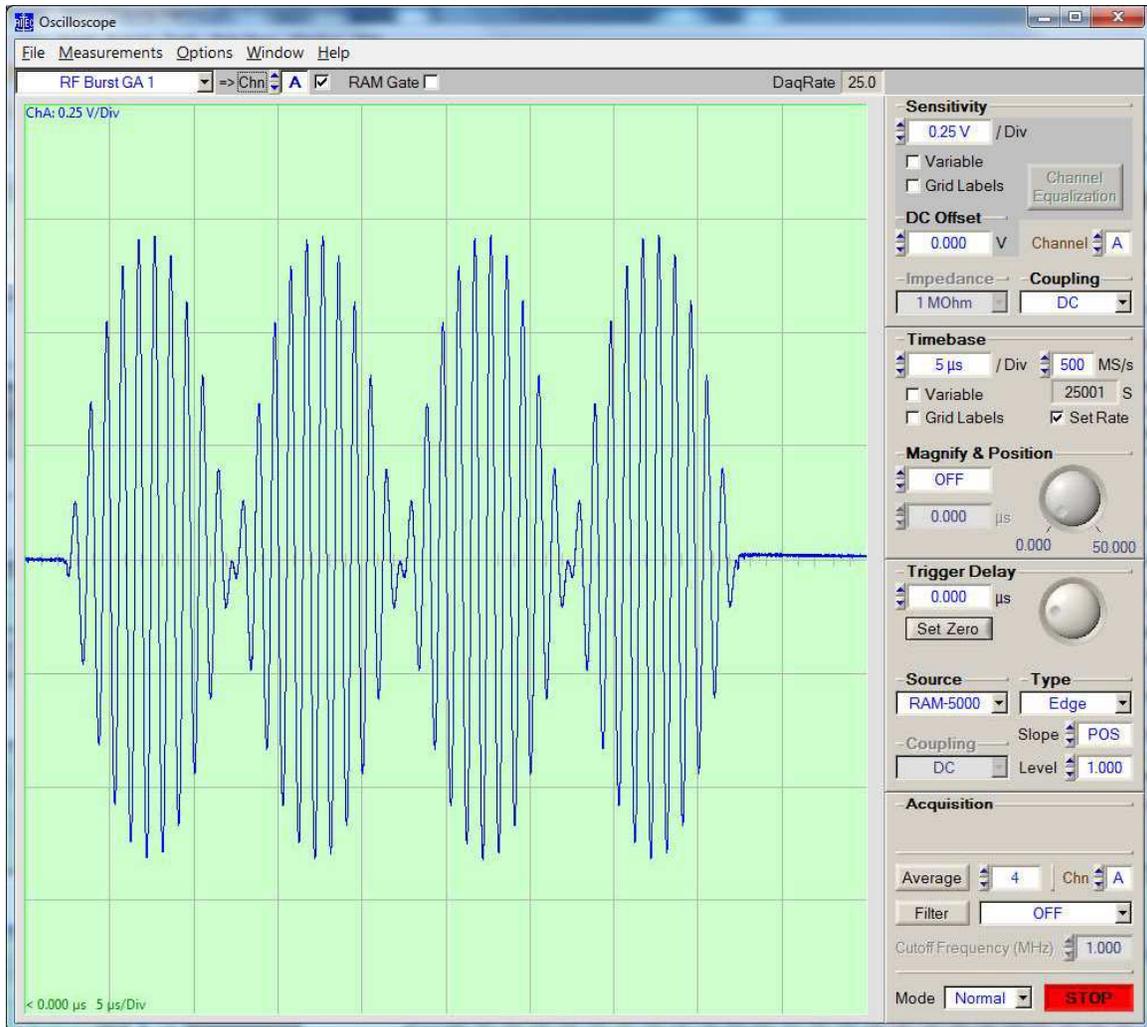


FIGURE 2.2: Upgraded GUI for the SNAP system with integrated oscilloscope support. The Oscilloscope window can be undocked and resized for viewing convenience. All acquisition parameters are available on the tabs on the right, as well as filtering and averaging options.

One of the most substantial upgrades to the software is the improved handling of acquired waveforms. Individual waveforms can be acquired and saved into formats, such as .csv, which can be easily imported into any graphing and analysis program. Groups of waveforms can be acquired and streamed into files, and then viewed after the fact. FIGURE 2.3 shows a screen capture of waveforms that have been streamed and are being viewed afterwards. Individual waveforms from the stream can be viewed and exported. The streaming is a very powerful feature and allows the user to capture sequences of waveforms during an event or during a SNAP parameter scan.

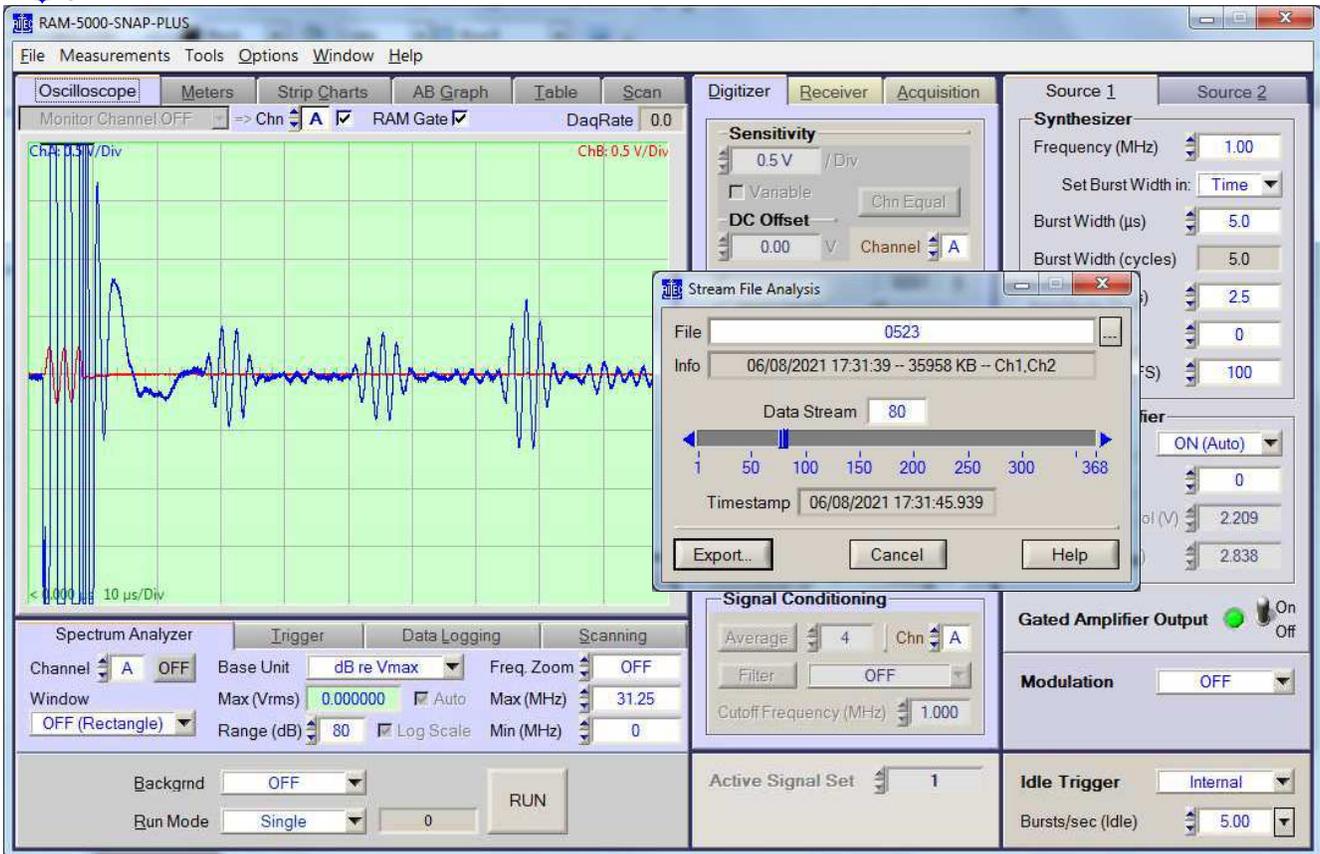


FIGURE 2.3: Stream viewer feature of the upgraded GUI. This allows the user to capture a sequence of waveforms and then view after the fact. Each waveform has a timestamp, and individual waveforms can be exported.

Hardware upgrade - Multiplexer module use and capabilities

The SNAP system generates many analog signals that need to be digitized for analysis, or at least need to be monitored occasionally. Previously, the user needed to select which signals to digitize by connecting a BNC cables to the appropriate connectors on the front or rear panel. To view different signals, the user had to switch cables by hand. Now, with this upgrade the user can select which signals to digitize and view entirely by software control. FIGURE 2.4 shows the dialog box on the GUI that allows the user to select which signal to send to each channel of the oscilloscope.



FIGURE 2.4: Signal selector dialog for the PCI oscilloscope card in the upgraded GUI.

For additional control and monitoring, 4 additional signals can be selected and routed to 4 BNC connectors on the rear panel. The selector dialog for this is shown in FIGURE 2.5. These signals can be viewed and digitized with a separate external oscilloscope or digitizer (not supplied) if desired.

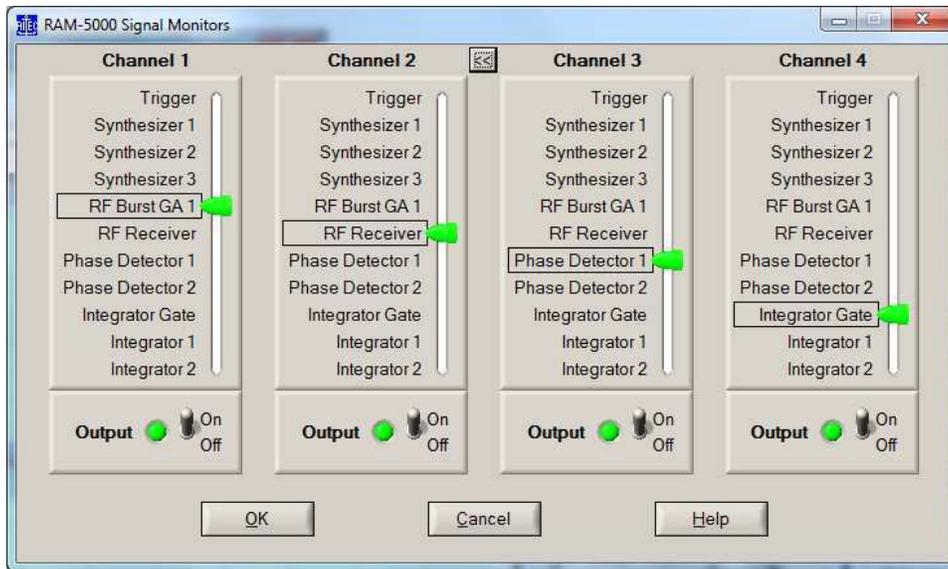


FIGURE 2.5: Signal selector dialog for external outputs in the upgraded GUI.

Software upgrade – API (applications programming interface)

The software upgrade also includes an updated API, with drivers for Labview and MATLAB included. This allows the user to write their own acquisition and control programs and routines for customized



measurements and analysis. Drivers for use with C based languages (C, C++, and C#) and Python are available upon request.

3. Advanced waveform measurements with RSC-OSC-AU

This is an additional software module that can be added to the upgrade of the system. It provides additional measurement and analysis capabilities to the GUI program, including the ability to view the FFT of the selected waveforms. A screen capture of this is shown in FIGURE 3.1. In this example, the combine function is being used to excite a transducer at 1.0 and 1.1 MHz simultaneously. The digitizer is being used to acquire the RF Burst monitor signal 1, and the FFT of the signal is being viewed as well.

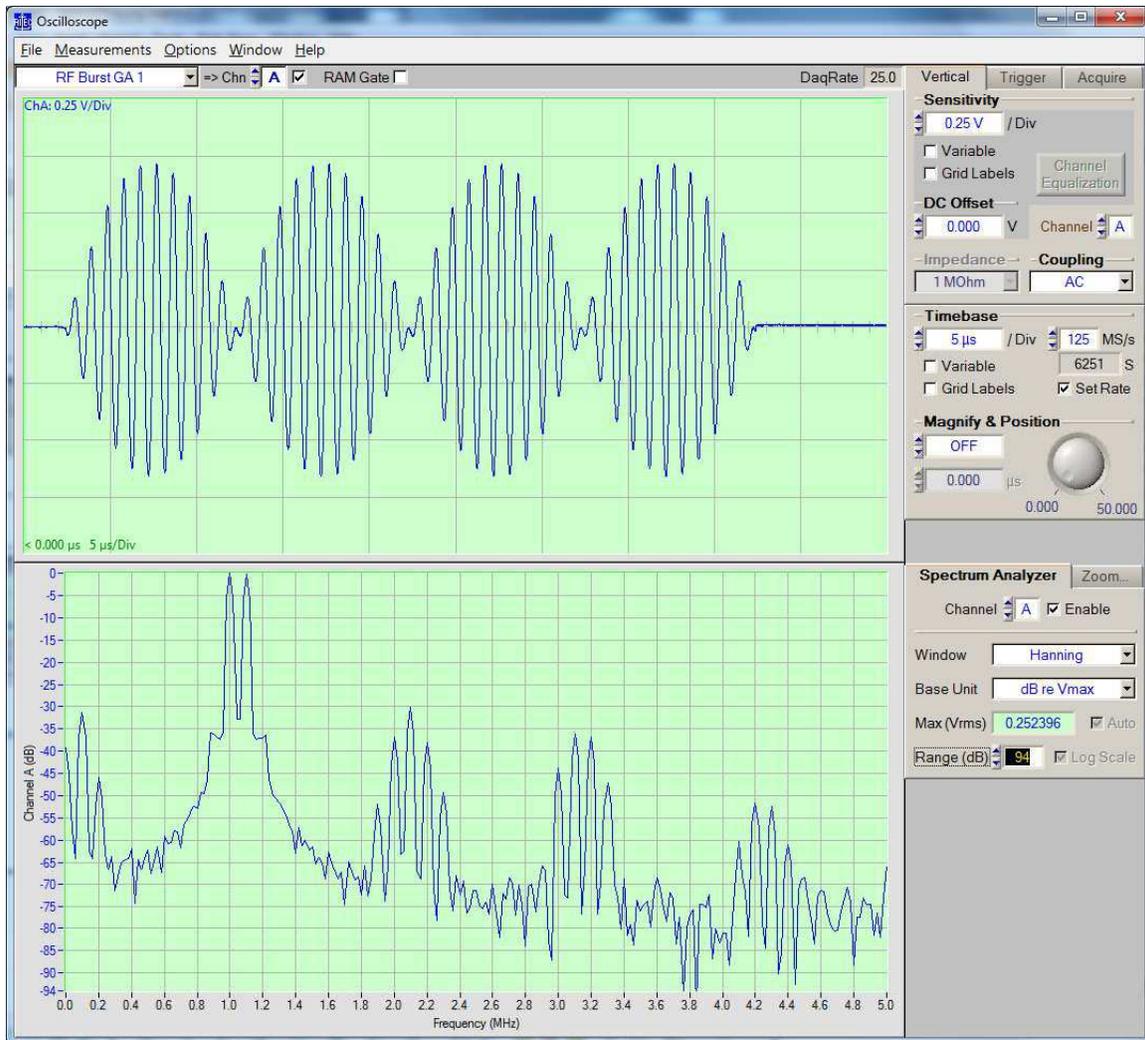


FIGURE 3.1: FFT based signal analyzer available with the option RSC-OSC-AU. The top signal is the RF Burst monitor for simultaneous excitation at 1.0 and 1.1 MHz. The bottom signal is a FFT of the RF burst monitor.

The spectrum display includes deep settings to control the frequency resolution and other parameters, such as windowing functions, vertical scaling, and frequency limits.



4. Adding the –PLUS upgrade to fielded systems

This upgrade can also be offered on existing systems:

- The software upgrade can be done remotely and does not require in-person access to the customer's computer.
- The hardware upgrade requires work on the customer's RAM/SNAP frame, and should be done at either RITEC or a representative's office.

The general steps for the hardware upgrade are:

1. Installation of the oscilloscope module (behind the front panel of the unit)
2. Installation of the signal selector module, RM-168A (into the card cage)
3. Changing out of some of the cables with special harnesses for the signal selector module.
4. Changing cables and adding labels or button covers on the rear panel.
5. Changing cables and adding labels or button covers on the front panel.

For upgrades to existing systems, please contact RITEC for guidance on pricing and instructions.