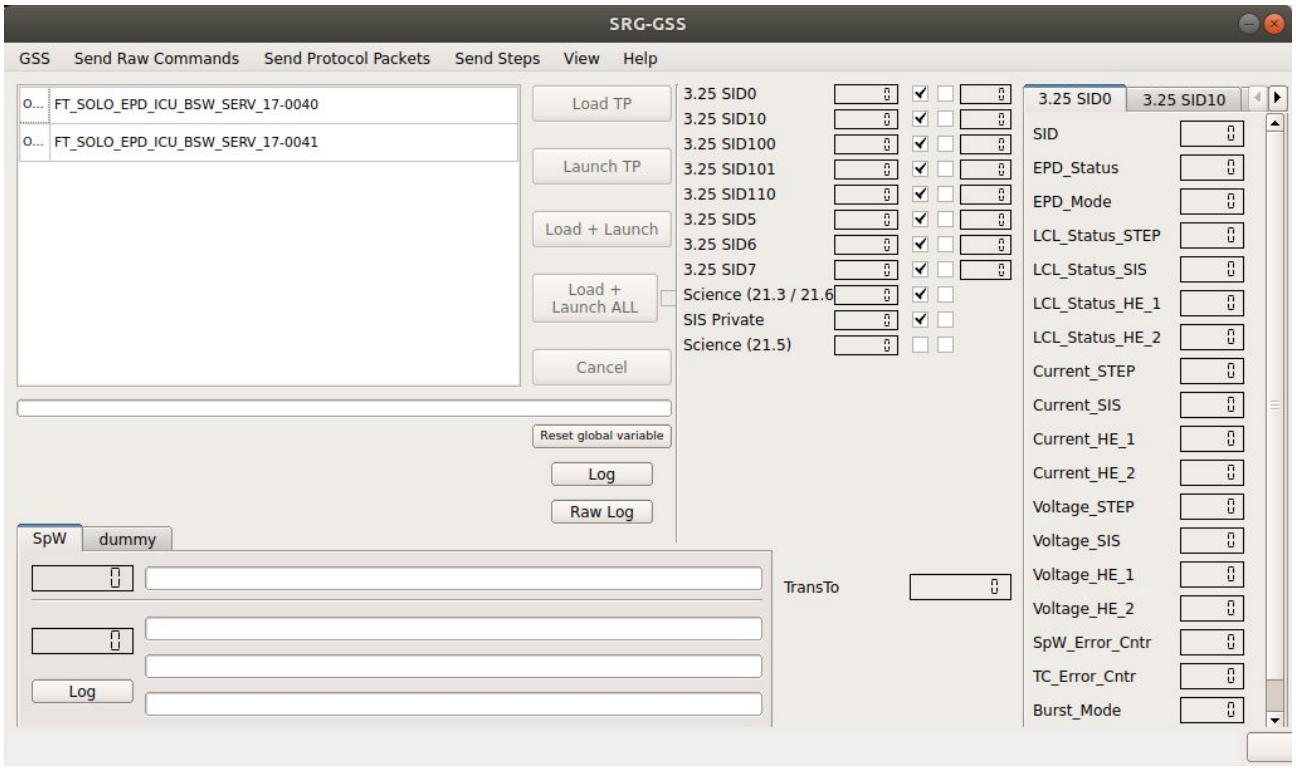


SRG-GSS User Manual

Issue 1 Revision 1

17/09/2020

Index

Purpose

GSE (Ground Support Equipment) is the equipment used for ground operations. In space context, this acronym names a group of tools, equipment and software for development, testing and verification of the different parts of the system in development – such as spacecraft and instruments.

For most of the projects, a different GSE structure is done for every project. As this is always compulsory for the hardware, software can run in very different equipment machines, so it can be done to be used in many different systems, using configuration files.

This Manual is applicable from SRG-GSS version 3.7.1.2.

Requirements

Hardware drivers

SRG-GSS can use serial ports in all platforms. However, it supports STAR-Dundee SpW-USB brick (only for Windows x86 systems) and STAR-Dundee SpW-USB MK2 brick (only for Windows x86 and Windows x86_64 systems) due to driver limitations.

Default text editor

SRG-GSS will use OS default application for opening text files both with *txt*, *ini* and *xml* extensions. It is recommended to install Notepad++ in Windows as it supports tabs but it is not compulsory.

Installation and First Launch

Windows (32/64) bits

Installation

You need the file ***SRG_GSS_$VERSION_WIN.zip***

1. Uncompress *SRG_GSS_$VERSION_WIN*
2. Go to the folder *SRG_GSS_$VERSION_WIN*

First Launch

3. Run ***srg_gss.exe***

Ubuntu (32/64) bits

Installation

You need the file ***SRG_GSS_PACK_$VERSION_UBU_$XX.tar.gz***, where $XX is 32 or 64 depending on your system.

1. Uncompress *SRG_GSS_$VERSION_UBU_$XX*
   ```
   tar -xf SRG_GSS_$VERSION_UBU_$XX.tar.xz
   ```
2. Go into the extracted folder
   ```
   cd SRG_GSS_$VERSION_UBU_$XX
   ```
3. Install SRG-GSS (you will be prompted for super-user password)
   ```
   ./install_srg_gss_linux.sh
   ```
   3.1. If you need virtual ports, install it (you will need apt-get)
   ```
   sudo ./install_virtual_ports.sh
   ```
   3.2. If you don't have libstdc++6, get it with apt-get
   ```
   sudo apt-get install libstdc++6
   ```

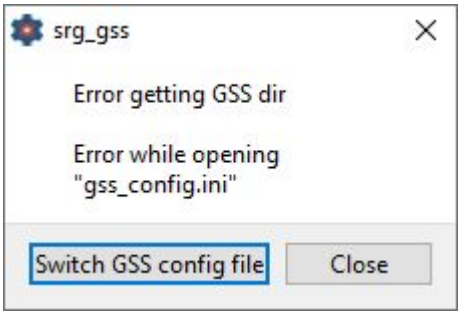
First Launch, testing application was properly installed

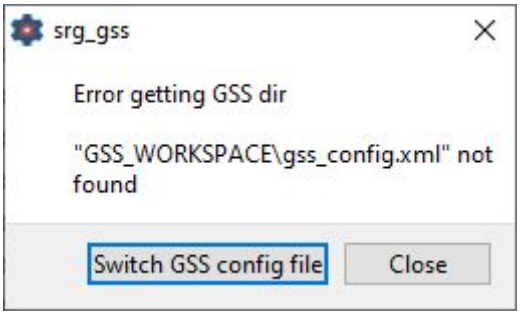
4. Start virtual socket service
   ```
   ./virtual_socket_start.sh
   ```
5. Run SRG-GSS
   ```
   ./srg_gss.sh
   ```
   5.1. After first time launched, you can pin SRG-GSS to the launcher
   5.2. If you want to test in with the icu_emu
   ```
   ./icu_emu.sh
   ```
6. When finished, stop virtual socket service
   ```
   ./virtual_socket_stop.sh
   ```

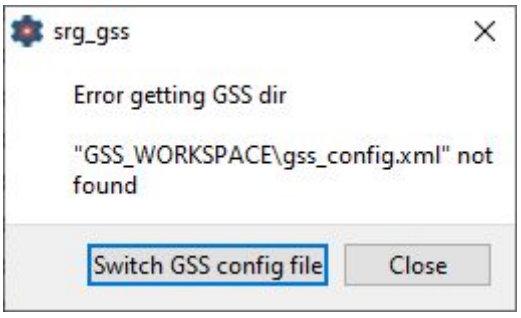
SRG-GSS initialization process

SRG-GSS relies on a XML configuration file. Its location is configured in a file called *gss_config.ini*. This initialization file can be located in the same folder as the SRG-GSS executable file or in *srg_gss* user folder. This folder is automatically created inside the user *home* folder. If both a *gss_config.ini* exist in SRG-GSS executable folder and in *srg_gss* user folder, the first one is used.

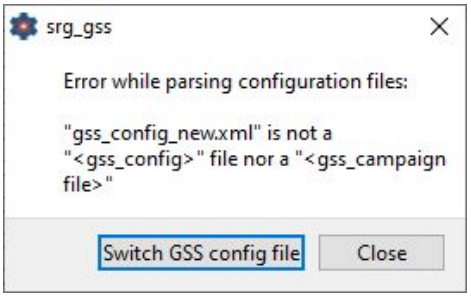
If *gss_config.ini* or selected SRG-GSS configuration XML file are not located, you will be prompted to switch for a valid SRG-GSS XML configuration file.



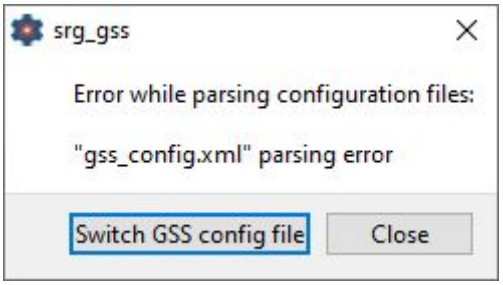




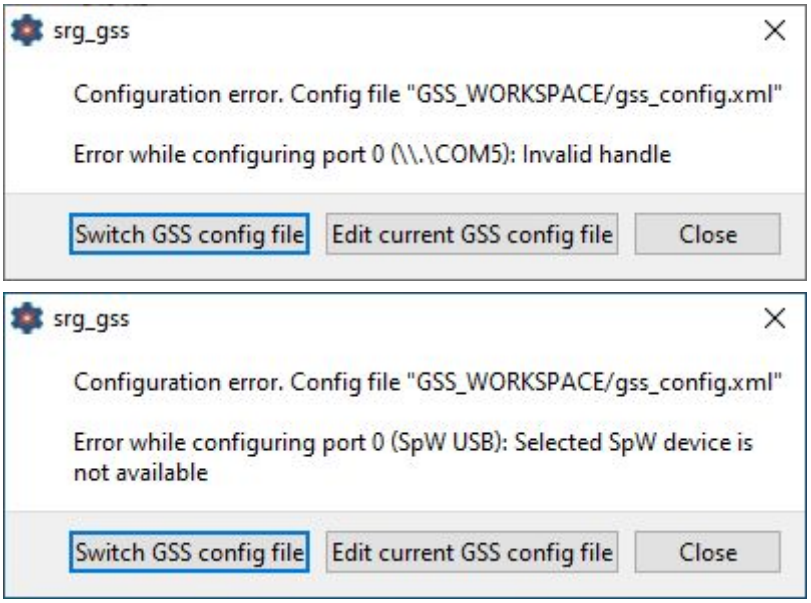
Besides, you will be prompted to choose another file if the selected XML file is not a valid SRG-GSS XML configuration file.



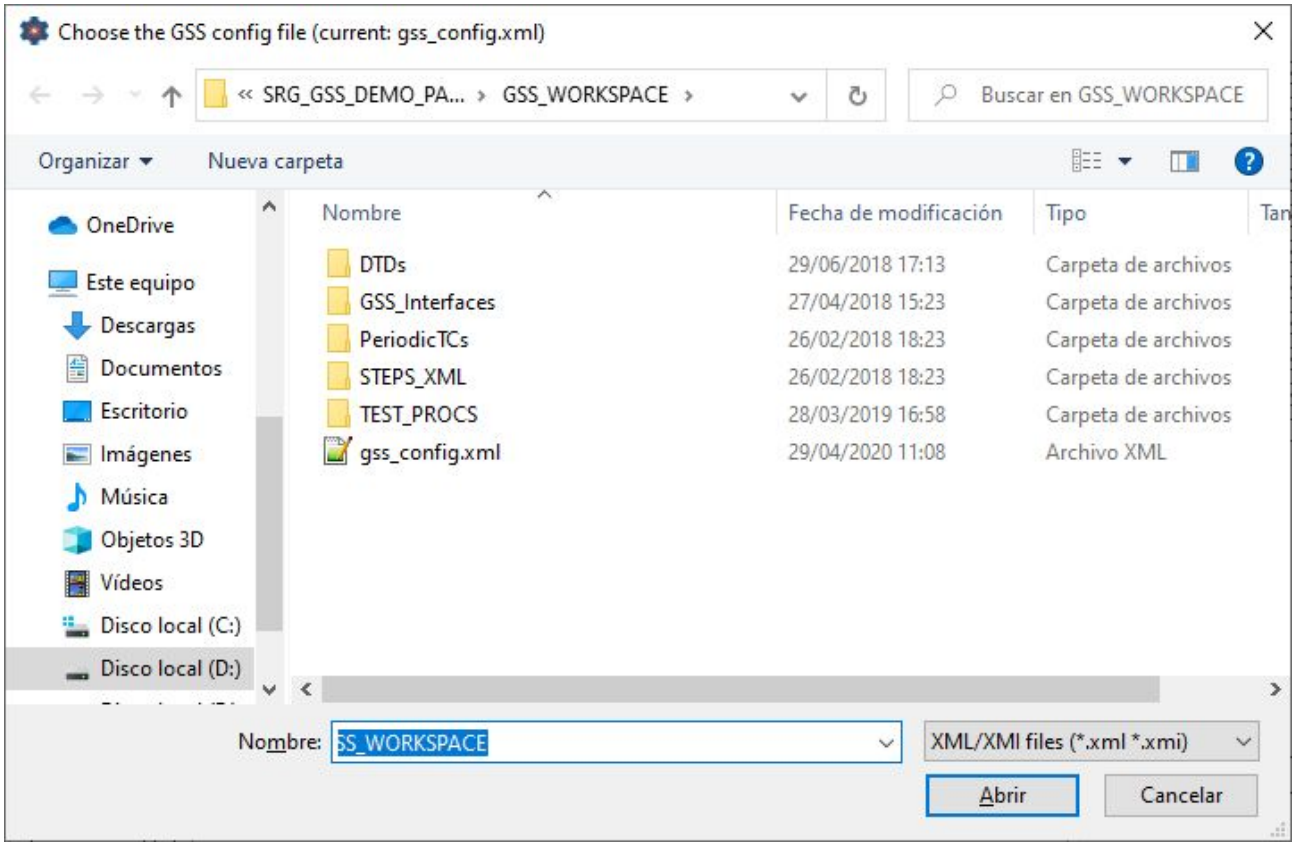
First of all this XML file structure is checked. If the format is not correct, it will show an *Error while parsing*.



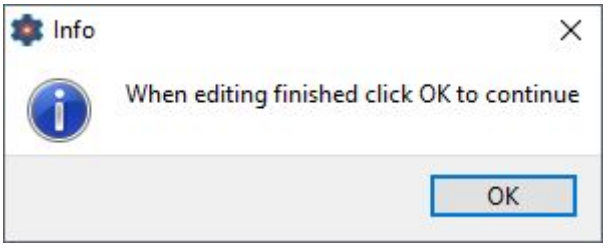
When SRG-GSS initializes it checks if all ports are available. If any of them can not be opened, SRG-GSS will prompt a *Configuration error*.



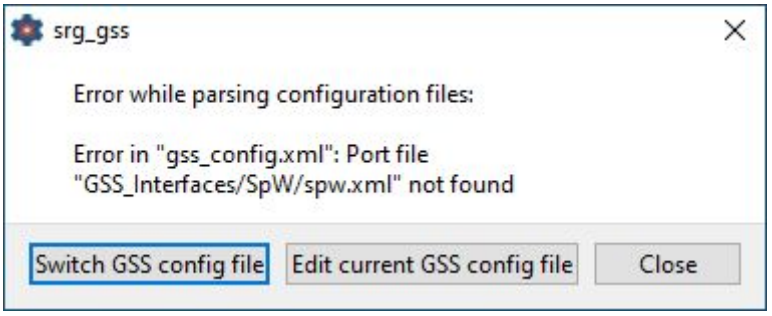
In both of the above error cases, you will be prompted to switch to another SRG-GSS XML configuration file or to edit the current one.
The first option *Switch GSS config file* allows you to choose any XML file using the *Choose the GSS config file* dialog, but keep in mind it must be a valid SRG-GSS XML configuration file.



Using the second option *Edit current GSS config file* you can edit currently selected XML file. It will be editable in default text editor, and SRG-GSS will prompt to click OK after desired changes are done.

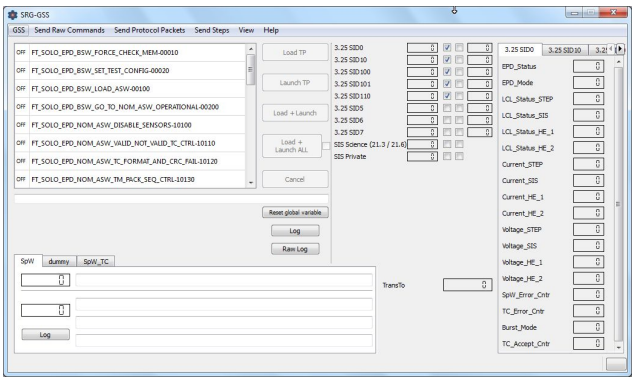


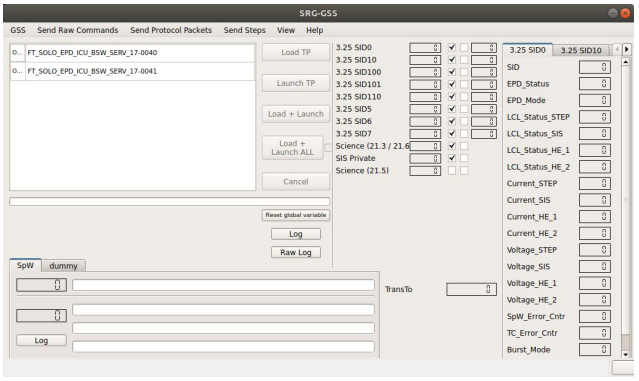
If there is any error while parsing SRG-GSS XML configuration file, SRG-GSS will prompt the *Configuration parsing error* with the same *Switch/Edit* options.

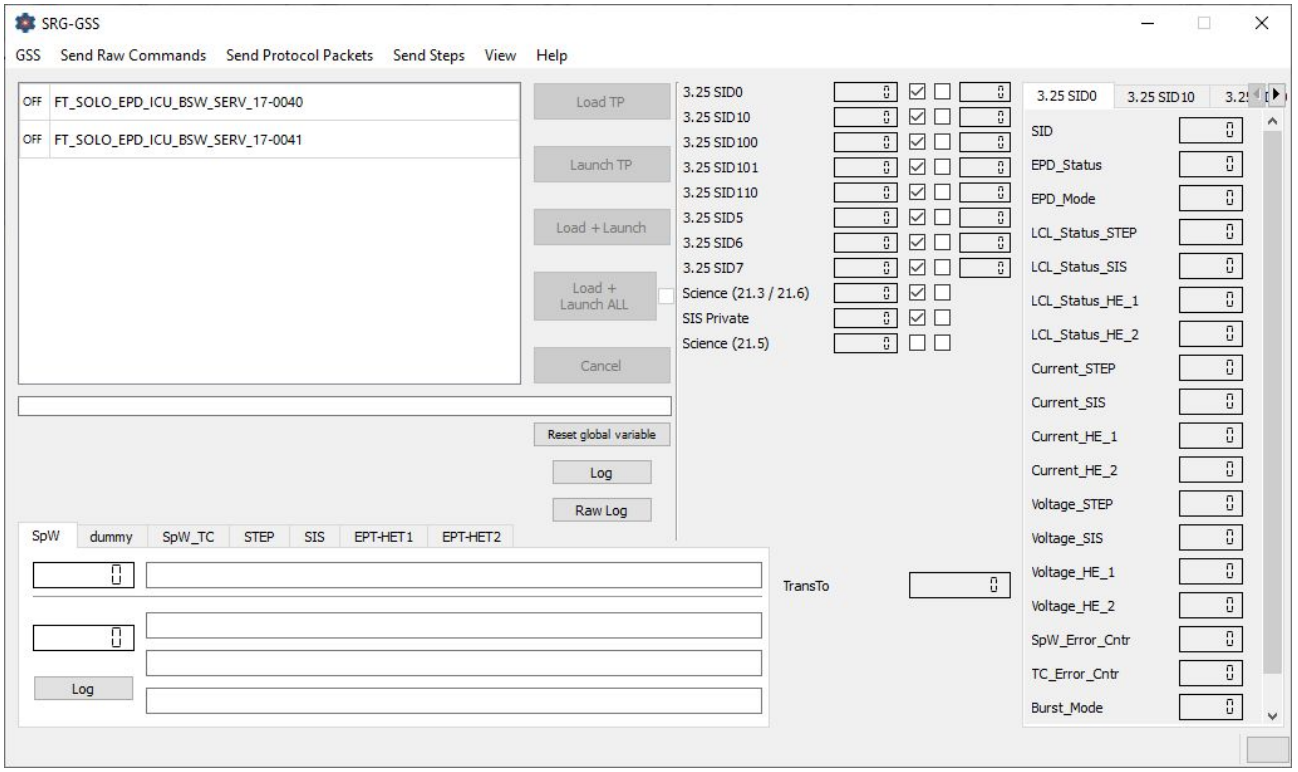


SRG-GSS GUI

Main dialog of SRG-GSS GUI is shown in the images below.



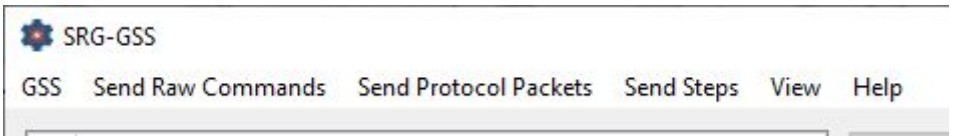




Several big different areas comprise the GUI. They are the Menu Bar, the Test list and buttons, the Port information tabs, the Special Packets counters and Monitors, the Special structured packets and the Status bar. See appropriate section to learn about each part.
Main dialog of SRG-GSS GUI is launched only after parsing SRG-GSS XML configuration file and configuring external devices and internal options successfully.

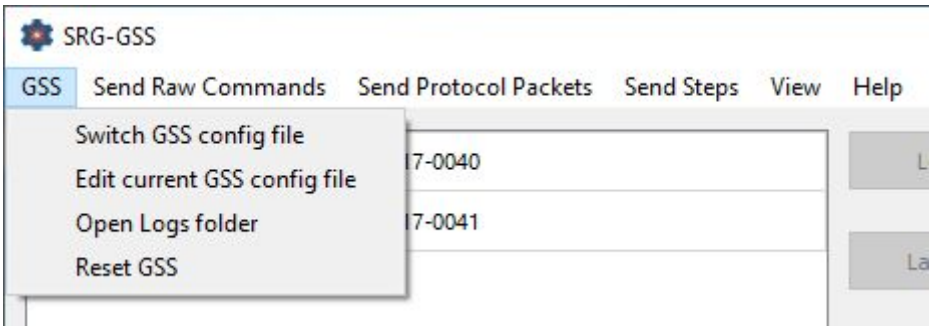
Menu Bar

SRG-GSS Menu Bar contains several menus which make test debugging easier.



GSS

From leftmost to right, the first menu is named *GSS*, as it contains options regarding SRG-GSS configuration, which are useful to change the scenario without exiting SRG-GSS.



Switch GSS config file

This menu option allows the user to look for another SRG-GSS XML configuration file and switch to it, using the same *Choose the GSS config file* dialog as in initial configuration.

Edit Current GSS config file

This menu option launches the default editor for editing the current SRG-GSS XML configuration file.
When finished, the edited SRG-GSS XML configuration file is not automatically reloaded. You must use the *Reset GSS* menu option (See below).

Open Logs folder

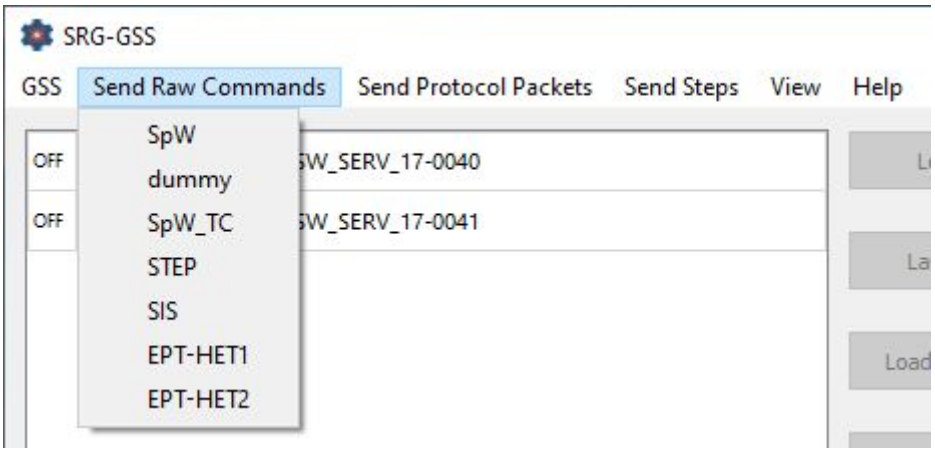
This menu option launches default system explorer at the main logs folder. This folder is located in the SRG-GSS executable file or *srg_gss* user folder, depending on the location of the *gss_config.ini* file. Thus this option gives you access with a single click to all logs folders, current and past, created when using current SRG-GSS configuration file folder.

Reset GSS

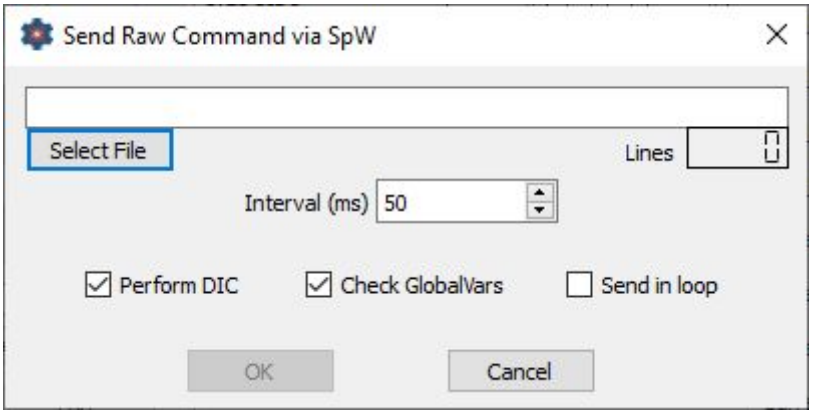
This menu option resets SRG-GSS, reloading all configuration from SRG-GSS XML configuration file. This option can be used with the previous one *Edit Current GSS config file*, or if current SRG-GSS XML configuration file has been modified in another way.

Send Raw Commands

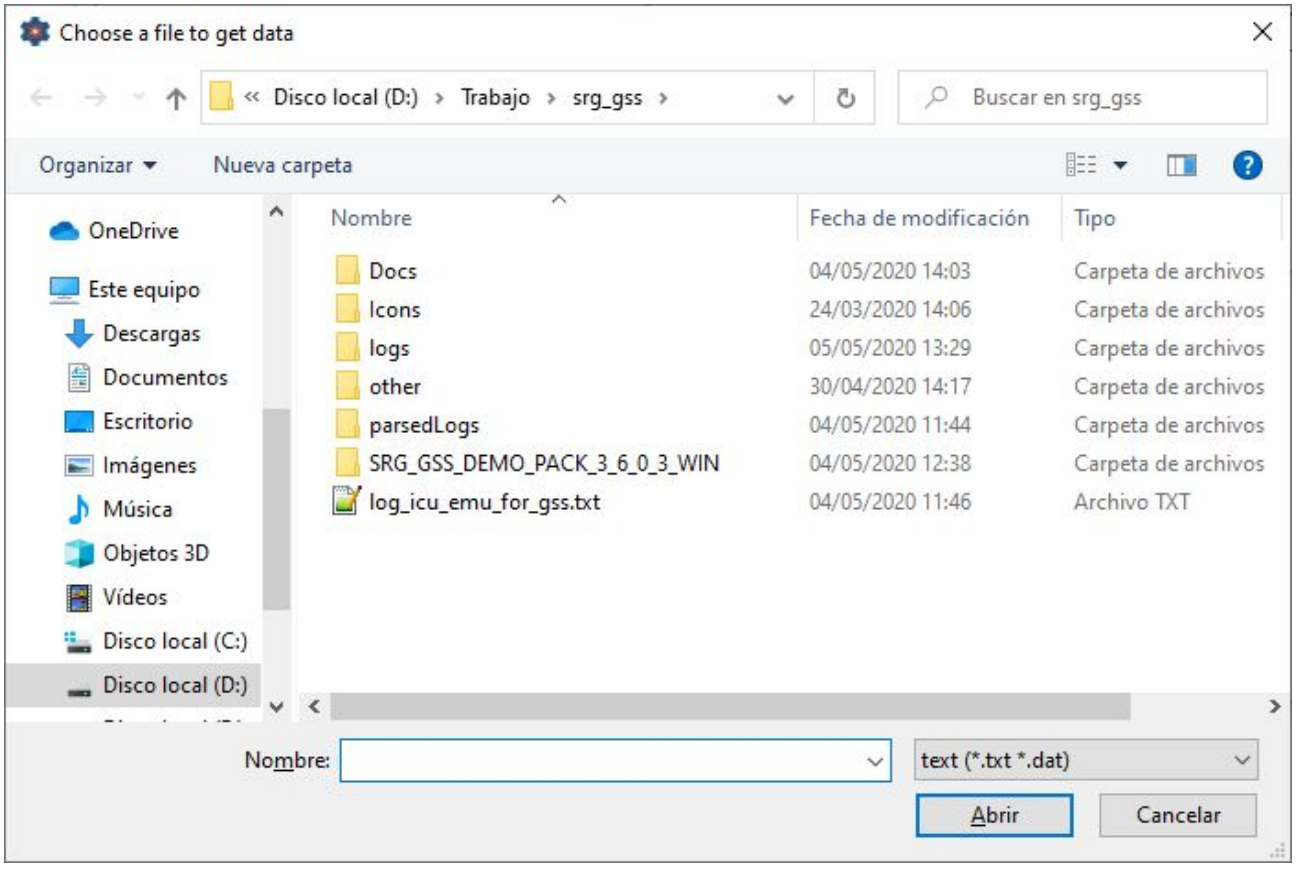
This menu shows several options, one for each one of the different interfaces configured in the SRG-GSS XML configuration file.



When clicked, the *Send Raw Command* dialog is shown for the selected interface.



To choose a file, you must click *Select File*, and when the file is loaded, the number of lines (commands) will be shown in the *Lines* display.

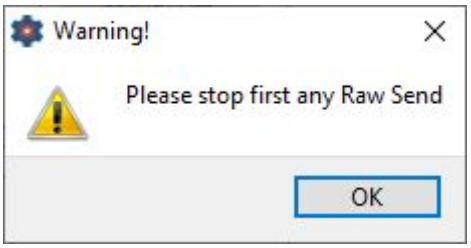


File must be a plain text file containing as many commands as desired, one in each line. For commenting in raw files you can use “#” character. When a line begins with “#” it is skipped and treated as a comment. When there is a “#” in the middle of a line, no data is read after the “#”.

There are several configuring options. The *Perform DIC* option is used to perform DICs (Data Integrity Check) such as a CRC or checksum. Any DIC must have been defined for that interface in XML files. If this option is checked, no DIC data must be provided – e. g. if command length is 16 bytes including a CRC, line length in Raw Command file must be 14 bytes. SRG-GSS will calculate the CRC for all commands (lines) in file.

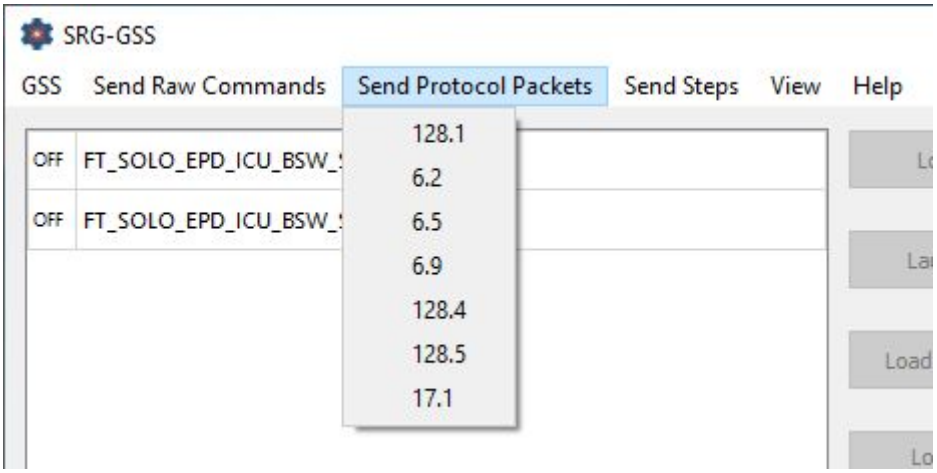
The *Check GlobalVars* option forces Global Variables to be checked. They must have been defined in XML files, such as number of sequence number or time to be distributed.

Minimum interval time delay between 2 consecutive packets can be chosen in milliseconds, using the *Interval (ms)* field. It is only applicable when there is more than one non-commented line or when the *Send in loop* option is checked. This option sends all the commands in the file continuously using the interval time. When the last file command is sent, the first one is sent again, after waiting for the interval. If this option is checked you must cancel the Raw sending using the cancel button. Otherwise you will be prompted to do so.

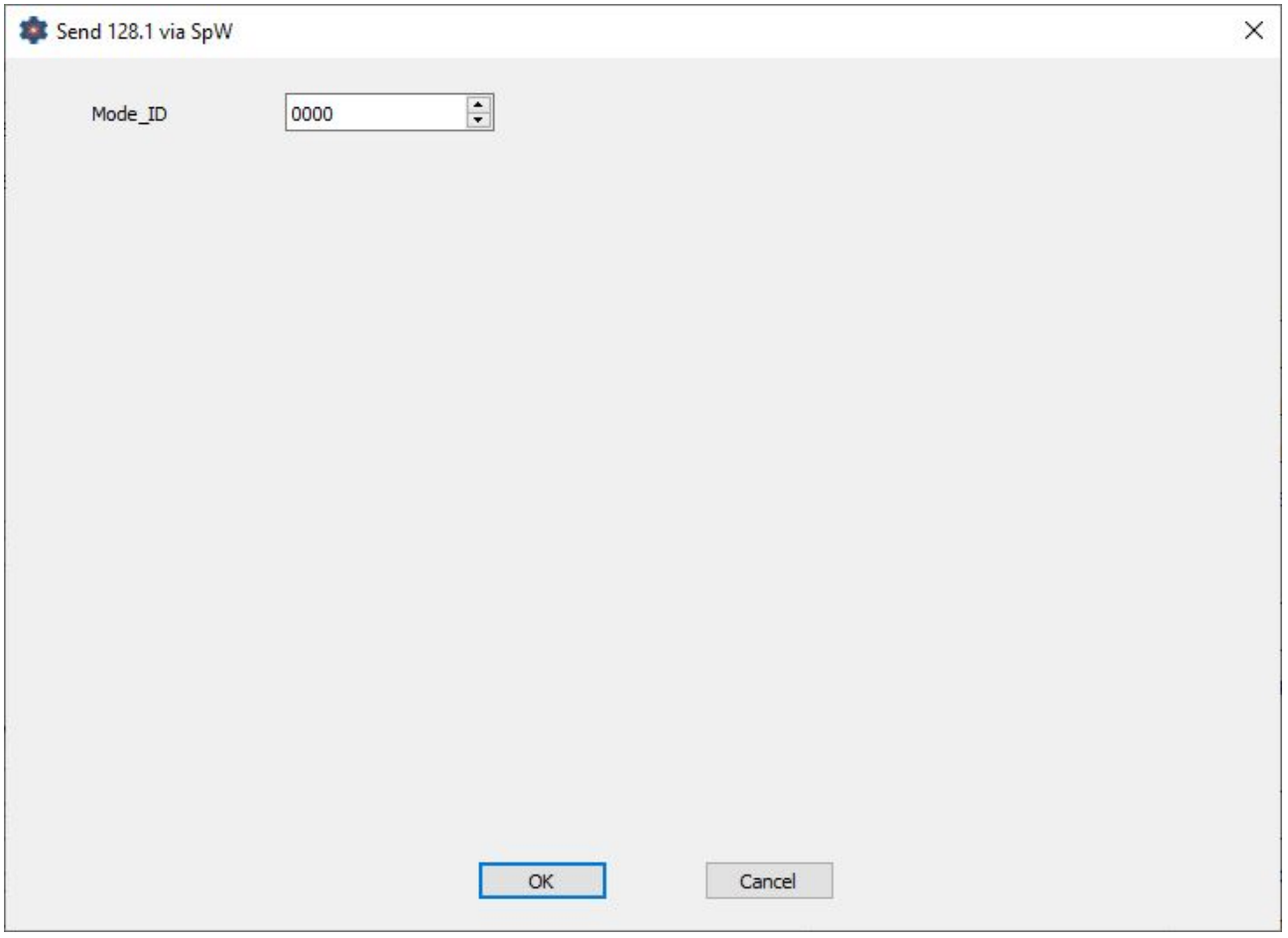


Send Protocol Packets

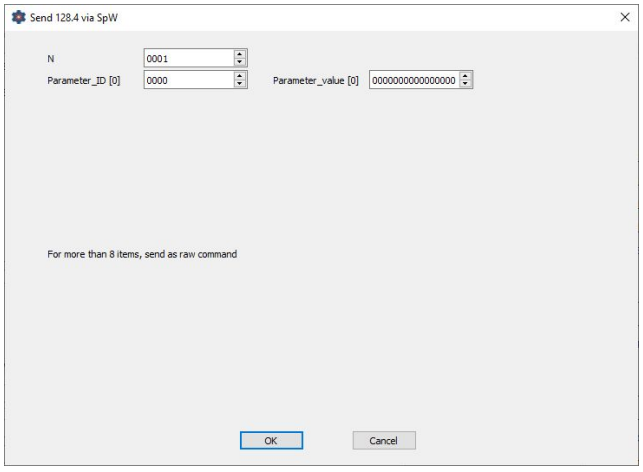
This menu shows several options, one for each one of the different protocol packets configured in the SRG-GSS XML configuration file.

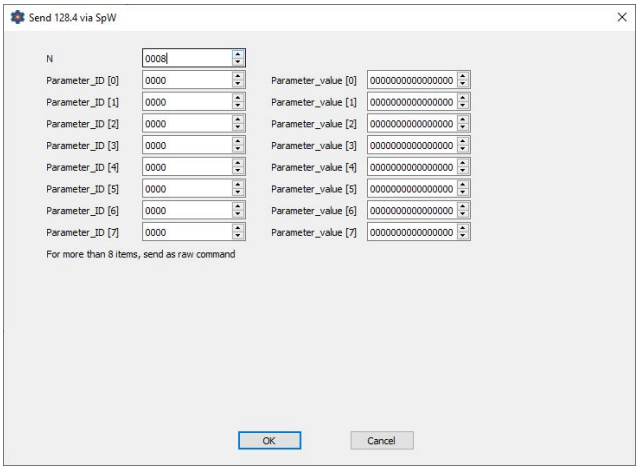


For each Protocol Packet, you can select the value of the fields. If the packet has no fields it will be sent directly.



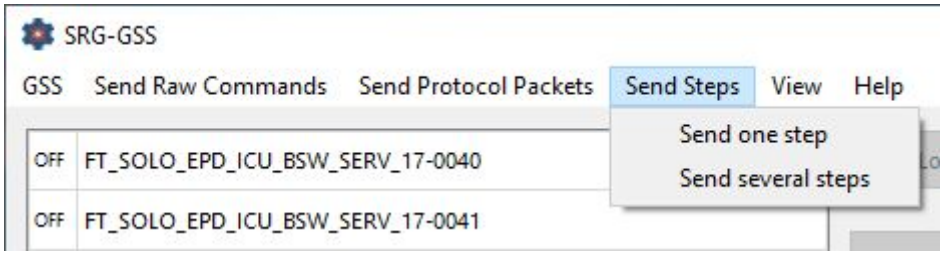
If the packet has an array field, you can send up to 8 items. For more than 8 items, you will have to send the packet a Raw Command.





Send Steps

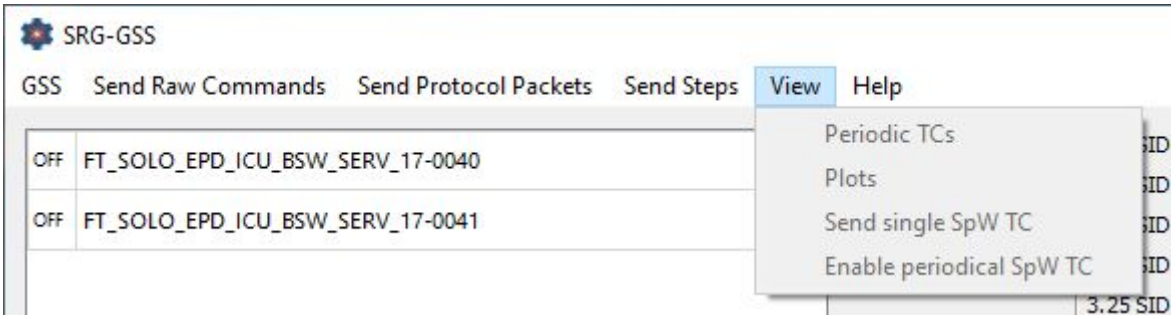
This menu shows only 2 options, both for sending steps as defined in test procedures. Both of them need a file to perform the action, but the files needed are very different.



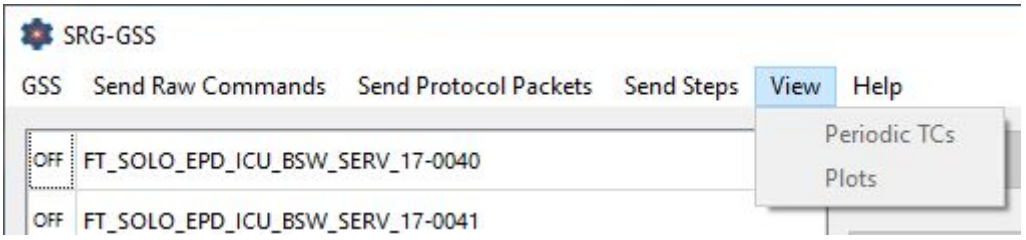
For the *Send one step* option, you must choose an XML file in the SRG-GSS step format file.
For the *Send several steps* option, you must choose a plain text file which contains a list of the steps number you want to launch separated by semicolons, including a semicolon after the last step number.

View

This menu is named *View* because it can launch several useful dialogs which are not shown by default, as they are configurable in XML files.

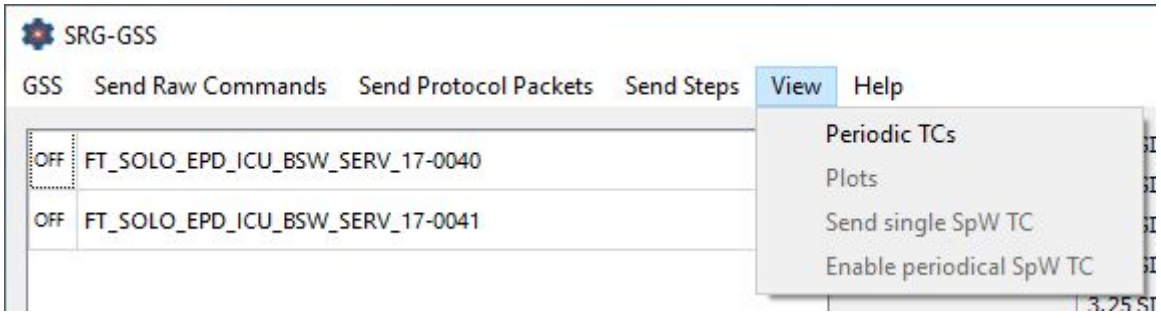


The Ubuntu version and the Windows version without SpW don't show the two last options, which are related to SpaceWire Timecodes (SpW TCs), which are only configurable when the SpaceWire port is available.

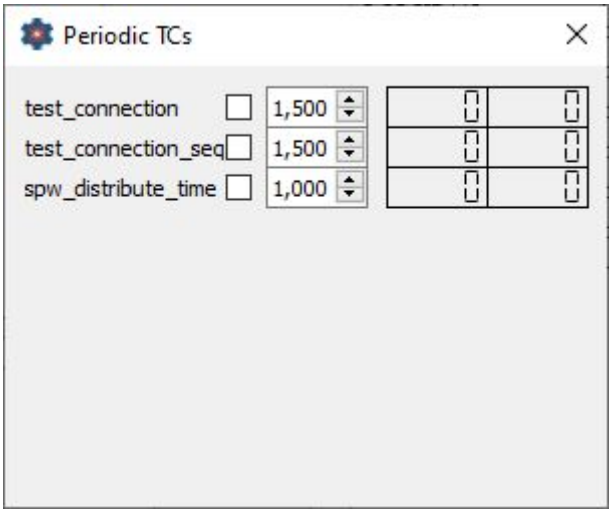


Periodic TCs

When at least one Periodic TC is configured in XML, this menu option can be selected.



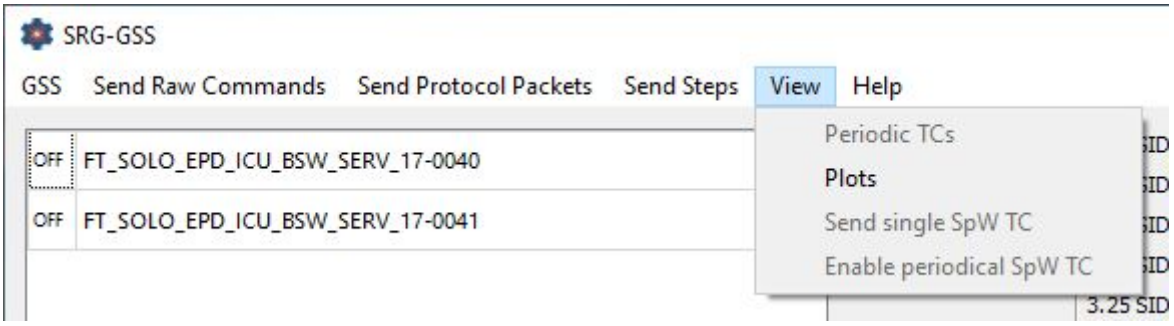
This is the Periodic TCs window dialog.



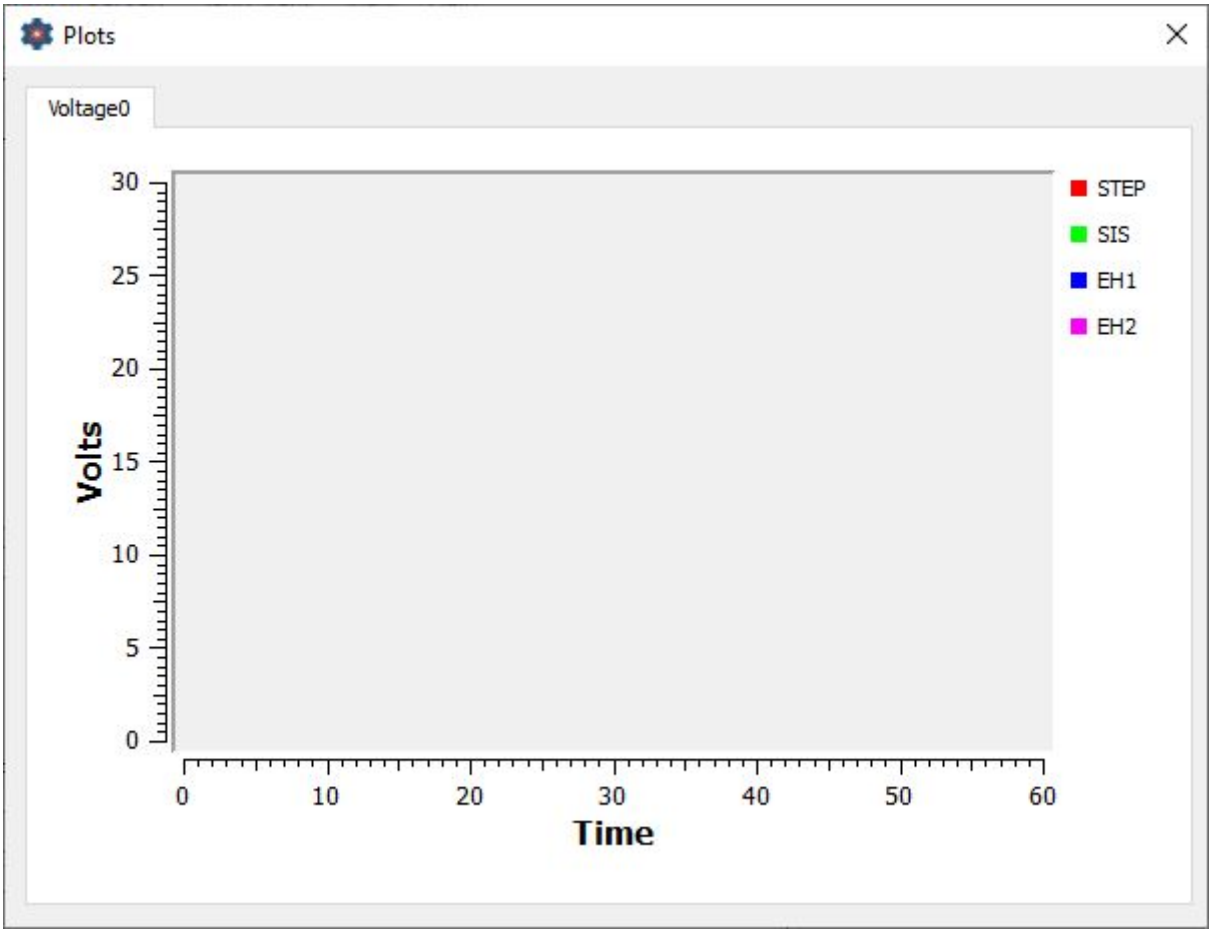
All of the Periodic TCs (configured in XML files) have the same options. The check box after Periodic TC name enables or disables TC, which will be launched at the rate chosen at the number selector just right to the check box, which stores seconds. By default it shows XML defined rates, but users can change it using the arrows (with 0,500 second step both up and down). Minimum available rate is 0,500 seconds.
The number displays shows the number of Periodic TCs sent and the last real rate. When a Periodic TC being sent is stopped, its counter will be resetted, so if it restarted again, it will start at 0.
You can close this Periodic TC window dialog after started or stopped wished Periodic TC as any enabled Periodic TC will be sent in the background, counters still working.

Plots

When configured in SRG-GSS XML configuration file, GSS can show information from a defined field in a plot into a chart. The *Plots* option in the *View* menu is then enabled.

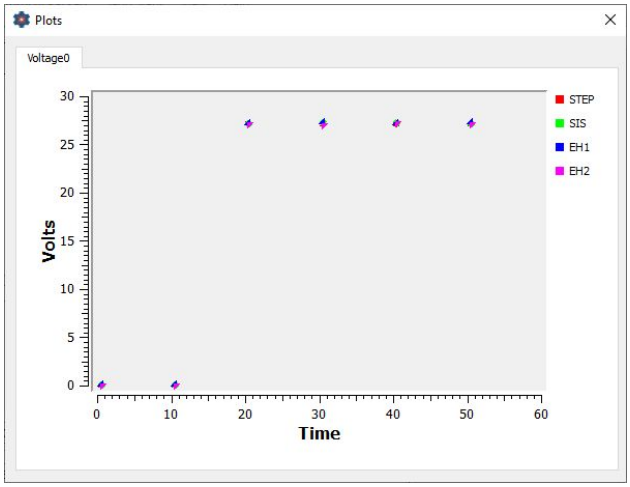


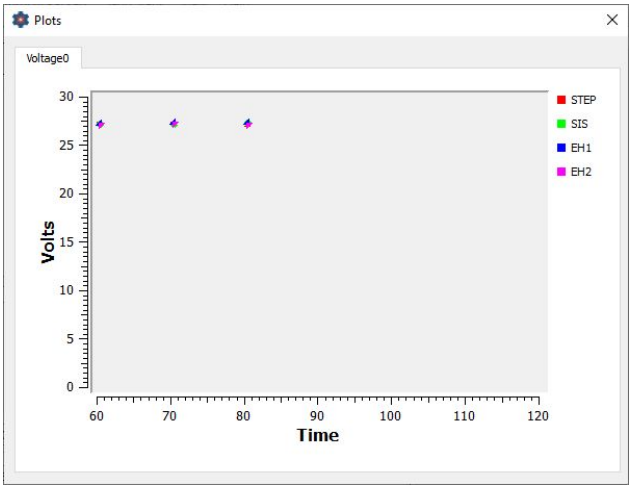
Nevertheless, the *Plots* window dialog is shown by default when configured when GSS is opened, but it can be closed any time and then opened back using the menu.



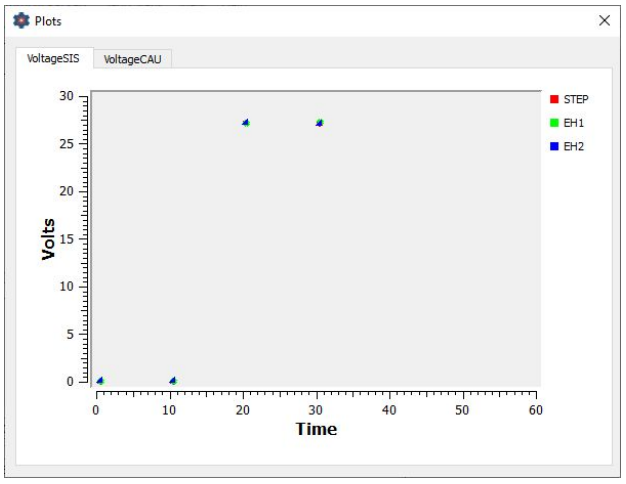
You can configure the Unit and Maximum Value for Y-Axis in SRG-GSS XML configuration file – *Volts* and 30 in the example above. For the X-Axis, the unit is always Time in seconds, and the default Maximum Value is 60s, but it is automatically updated to the next 60 seconds range when necessary.

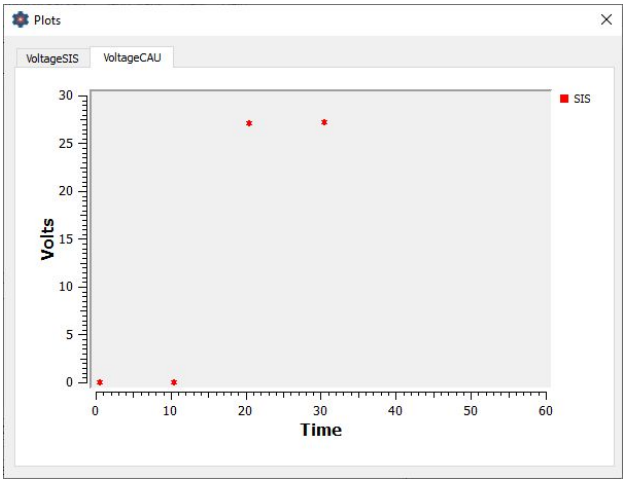
You can close the *Plots* window when you want, they will be updating internally, so when you open the *Plots* window again, the Time will be the current one, not the one when closed.



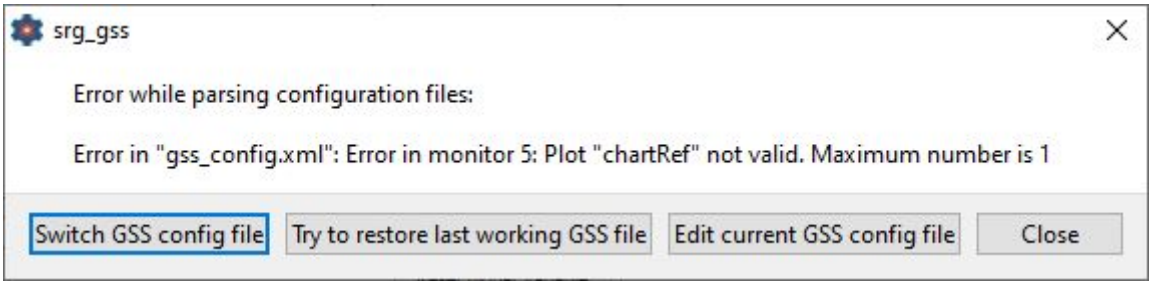


In the *Plots* window there is a tab for every Chart defined, but a Chart can contain several Plots.



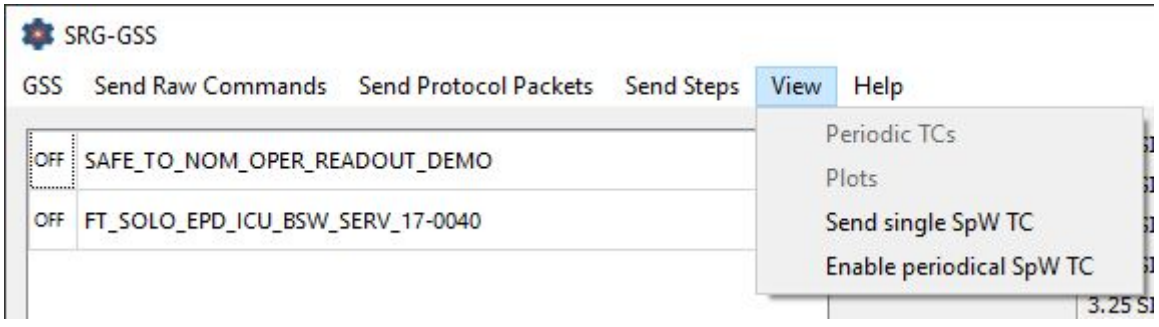


If you configure a wrong Chart in XML you will be prompted at the initial configuration process.



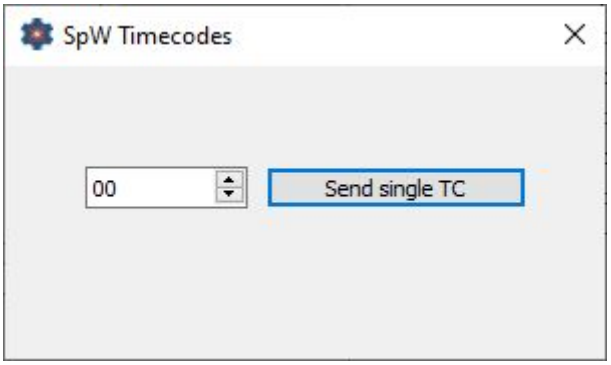
SpaceWire TimeCodes

When a SpaceWire device has been configured in SRG-GSS XML configuration file, SRG-GSS can be used for sending a single SpaceWire TimeCode (SpW TC) or for enabling / disabling periodical ones. Spacewire devices are only available in Windows systems due to driver limitations.

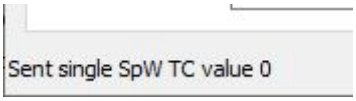


Single SpW TC

Single SpW TC dialog can be used by clicking the *Send single SpW TC* menu option. You can only select the raw value (from 0 to 63, both included) to be sent.

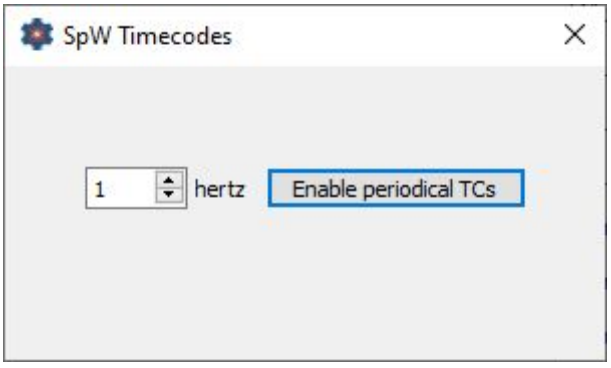


When timecode is successfully sent, this GSS user is notified in status bar and in log file.

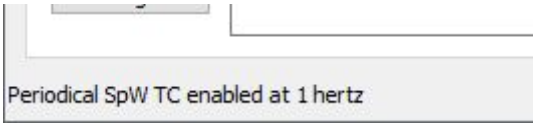


Periodical SpW TC

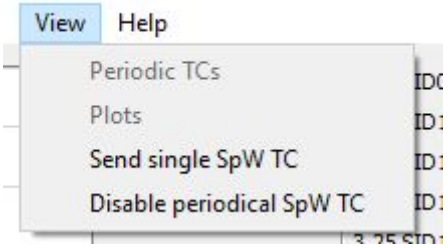
This other SpW option can be performed by using the *Enable periodical SpW TC* menu option. It is quite simple too, as it allows to choose only the desired period (using Hertz), and it will automatically start.



When periodical SpW TCs are enabled a message is shown in SRG-GSS status bar and log file too.



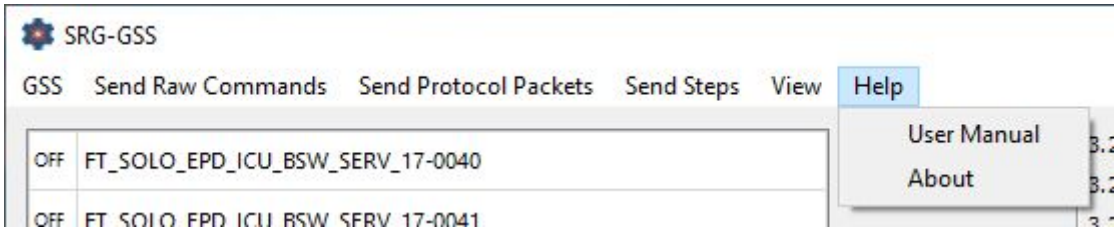
Also, the menu option text will change to *Disable periodical SpW TC*.



When disabled, it is also notified in status bar and log file.

About

The last menu option is *About*, and it is related to additional info about SRG-GSS.

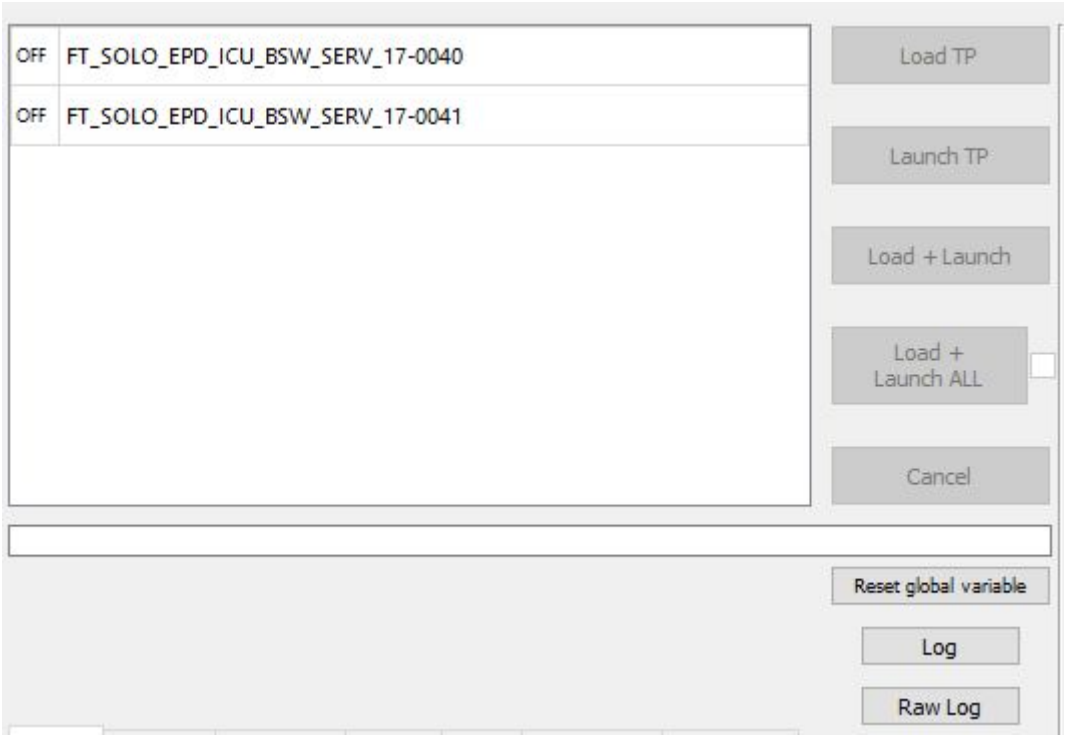


The first option *Help* is a link to this same Manual. The other one *About* opens a new dialog showing SRG-GSS current version and logos.

Test list and actions

This area of SRG-GSS main dialog has two different parts:

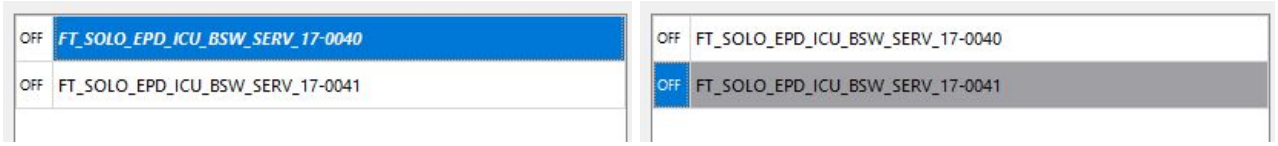
- The Test list contains all the Test procedures defined in SRG-GSS XML configuration file.
- The Test actions contain several buttons for load and launch the test procedures.



Test List

The Test list has two columns. The rightmost one shows all test names as defined in SRG-GSS XML configuration file. By double clicking a test name, selected test procedures XML file is opened using the default text editor.

The other column is useful for enabling / disabling all procedures. When a test procedure is disabled, it will be skipped when *Load + Launch ALL* mode is being performed (see below). A simple click on the OFF button located near the test name will disable this test. When double-clicking off column, all test enabling states will be toggled – i. e. all enabled tests will be disabled, and all disabled tests will be enabled. When any test is disabled, all the line background will become grey.



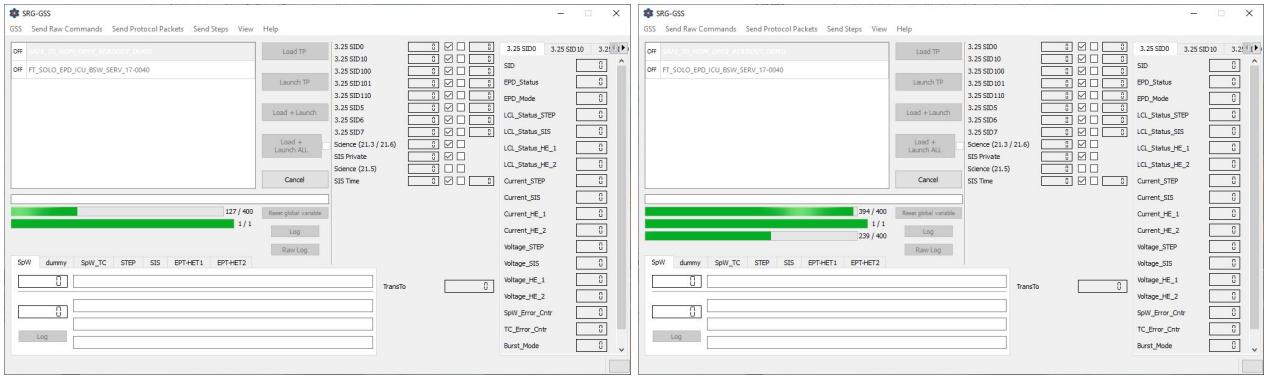
When you perform a simple click on any test it will become selected, the font will become bold and italic. Be careful about that, as you can scroll the test list and move up and down using the arrows in the keyboard, but both of these actions won't change the currently selected test procedure.

Test Buttons

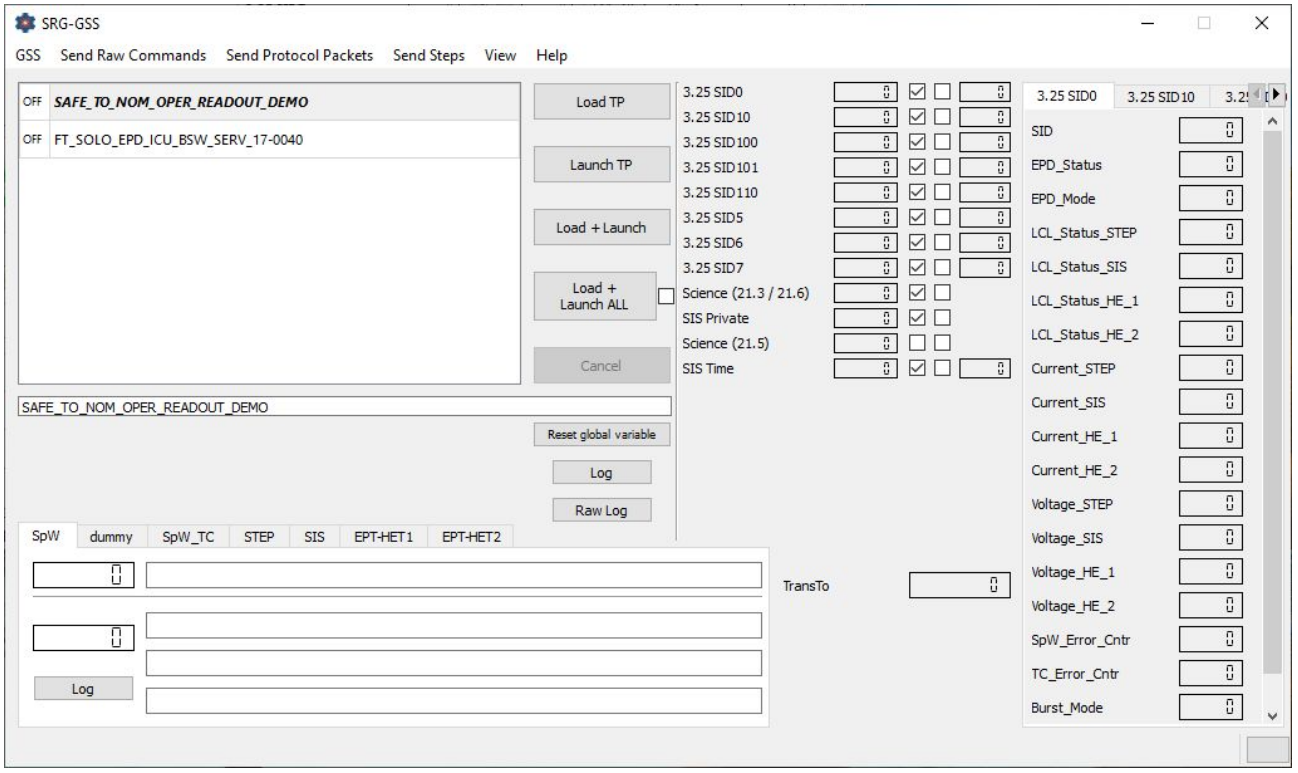
Load TP

The *Load TP* button is used to load a test procedure in SRG-GSS memory to keep it ready to be launched. It is a good practice to load the test procedure before launching it in the development process.

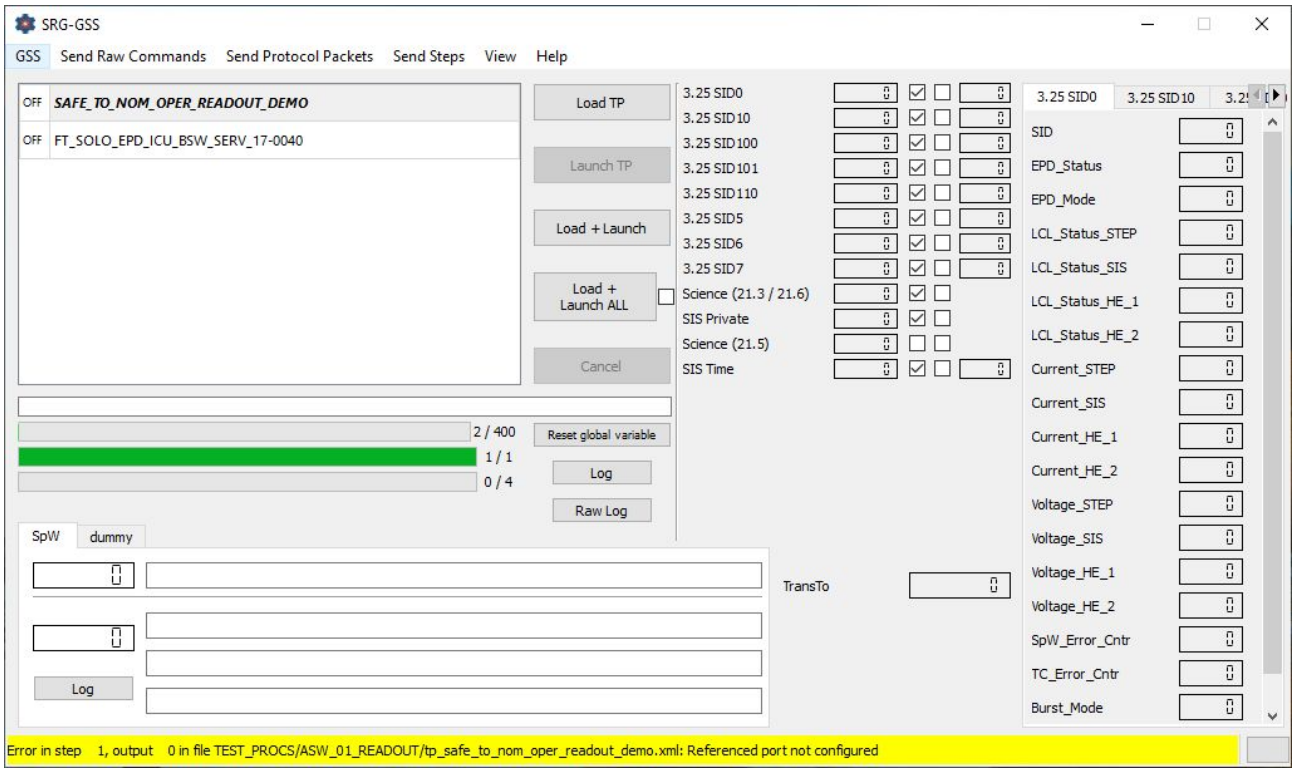
When a test procedure is being loaded, you will see several progress bars. The most top bar is the Steps bar, as it shows which *step* is being loaded now. The second bar is Inputs bar, and it shows which *input* is being loaded now. Finally, you may see a third bar, Outputs bar, which shows which *output* is being loaded now. As outputs are not compulsory, you may not see this third bar for all test procedures.



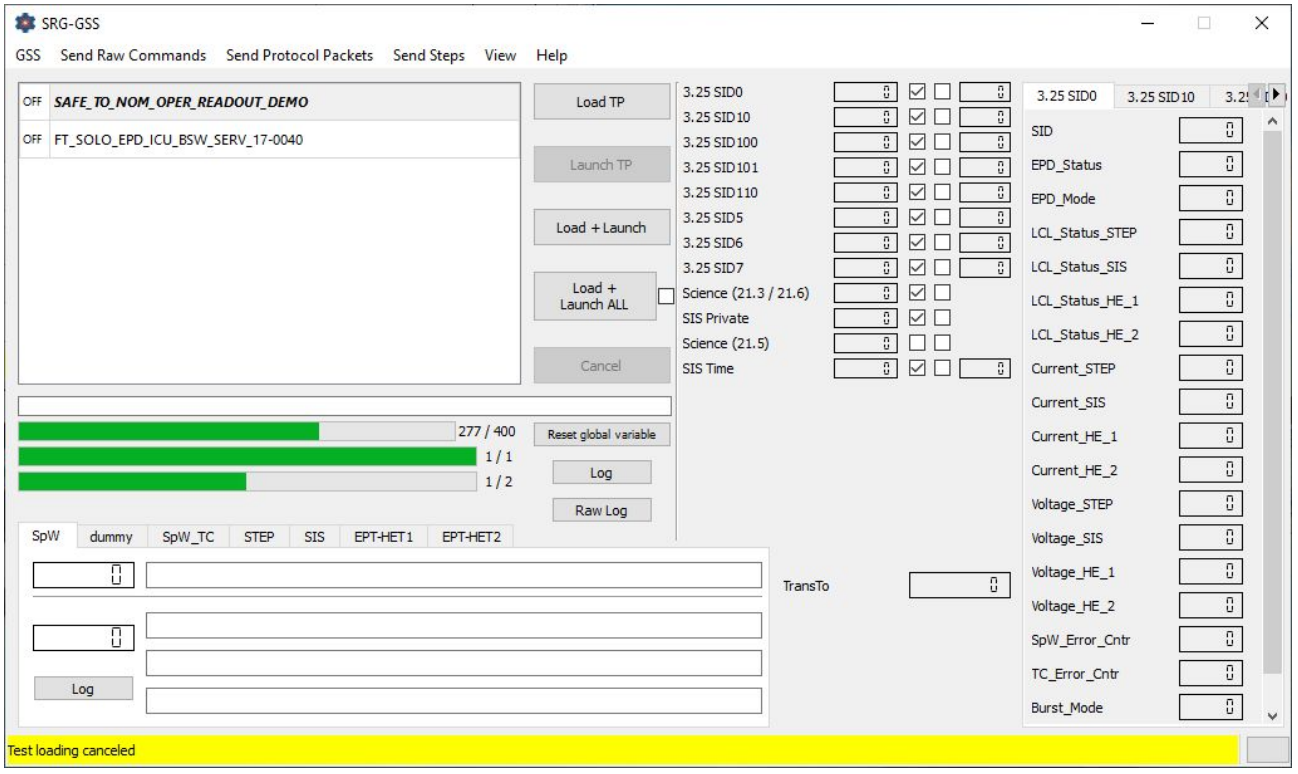
When a test is fully and correctly loaded, all progress bars will disappear, and the Test Procedure name will be shown in the Current Test Procedure Field.



If test loading fails, progress bars will stop, and you will see the reason in the Status Bar below with a yellow background.



Likewise, if test loading is canceled, progress bars will stop, and Status Bar will show canceled with a yellow background.



Launch TP

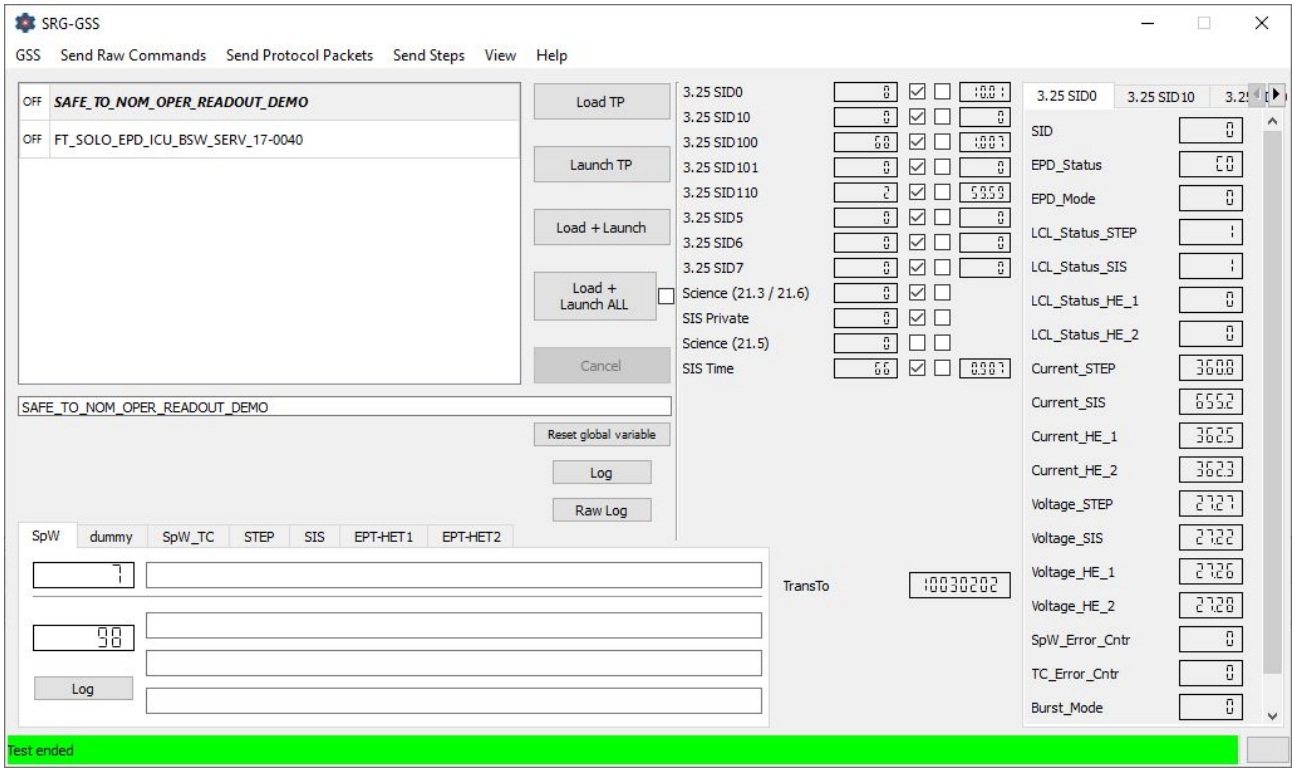
The *Launch TP* button is used to launch a test procedure already loaded in SRG-GSS memory. You can launch a test procedure only when it has been loaded first. Once loaded, you can launch the test procedure as many times as you want.

When a test procedure is being launched, you will see several progress bars.

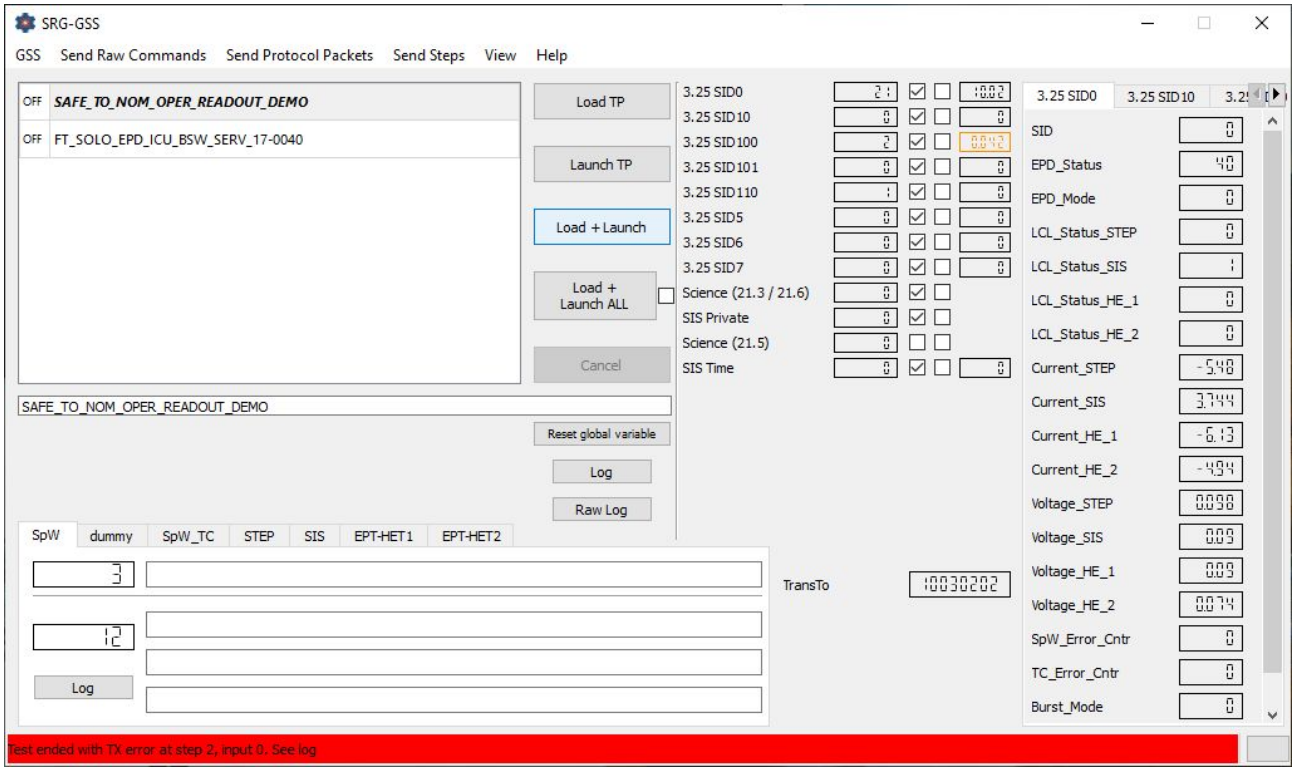
- The 2 most top bars are Tx Step and Input bar. They show the last *input* sent and which *step* does that *input* belong to.
- The 2 most bottom bars are Rx Step and Outputs bar. Similarly, they show the last *output* received and which *step* does that *output* belong to. As outputs are not compulsory, these 2 most bottom bars are not shown always.

When a Tx Step is reached, you will see its name in Status bar. If any input has to wait several seconds after an output to be sent, you will see the seconds countdown in the Status bar.

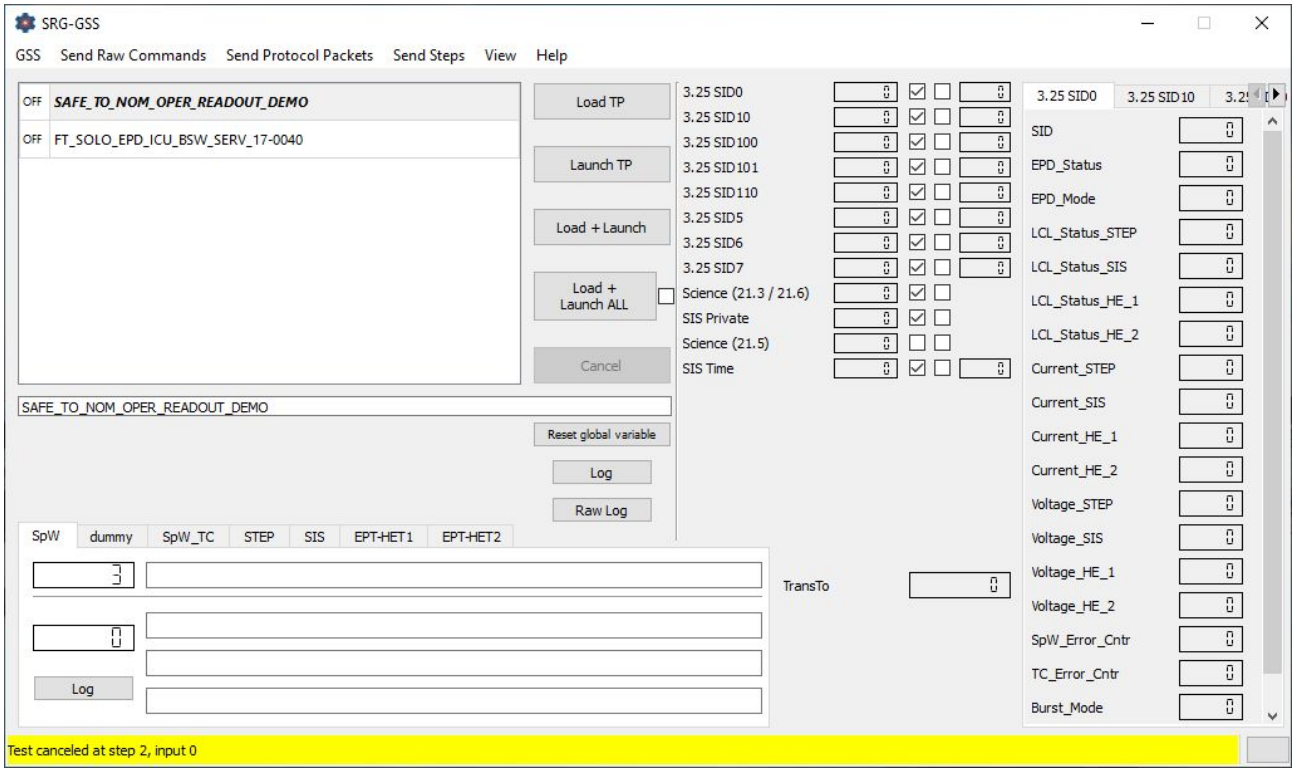
When the test procedure is finished correctly you will see a message in Status Bar with a green background.



If a test does not finish correctly, progress bars will disappear, and you will see the reason in the Status Bar below with a red background.

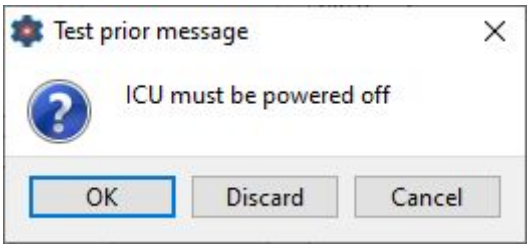


Finally, if test launching is canceled, progress bars will disappear, and Status Bar will show canceled with a yellow background.

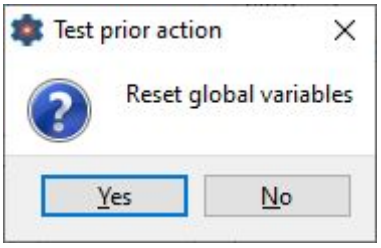


If a procedure that is going to be launched has a “req” attribute in the SRG-GSS XML configuration file, you will be prompted with a *Test prior message* window dialog reminding you which requirement has to be fulfilled **before** starting the test procedure.

You can click on *OK*, assuming you have just fulfilled the requirement, *Discard*, same as OK, but it won’t prompt you again, and *Cancel*, if you don’t want to start the test procedure.



Likewise, if the procedure to be launched has a “reqAction” attribute in SRG-GSS XML configuration file, you will be prompted with a *Test prior message* window dialog asking you whether the action must be performed (click *Yes*) or not (click *No*). In any case, test procedures will be started. Currently, only action available is *Reset Global Variables*. See below the section which talks about the button with the same name.



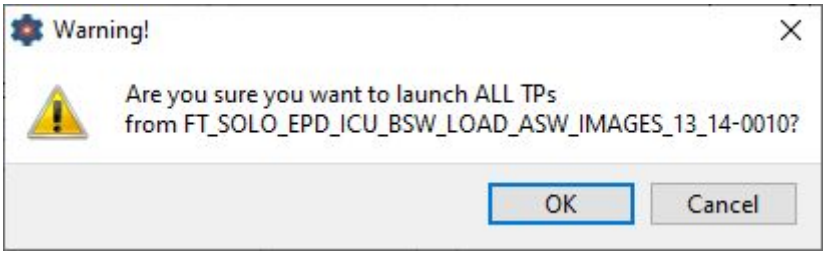
Load + Launch

The *Load + Launch* button is used to load a test procedure in SRG-GSS memory and then launch it. It performs a Load phase and a Launch phase, with the same information shown. This option is useful for performing a single test procedure which you have previously debugged and you want to launch it.
All options and warnings in Load and Launch sections are applicable here.

Load + Launch ALL

This button is used to load all test procedures in SRG-GSS memory and then launch it. This option is useful for performing all test procedures, assuming you have previously debugged all of them and you want to launch them in the final test flowchart.

You will be prompted to confirm all this option.



When started, *Load + Launch ALL* button text will become italics, and the checkbox next to it will be checked.

If you want to stop *Load + Launch ALL* procedures without canceling it, you uncheck this checkbox, and after the next procedure is finished, the whole process will stop.
If you cancel all procedures a yellow message will be shown in status bar shown you have cancelled All and not only one procedure

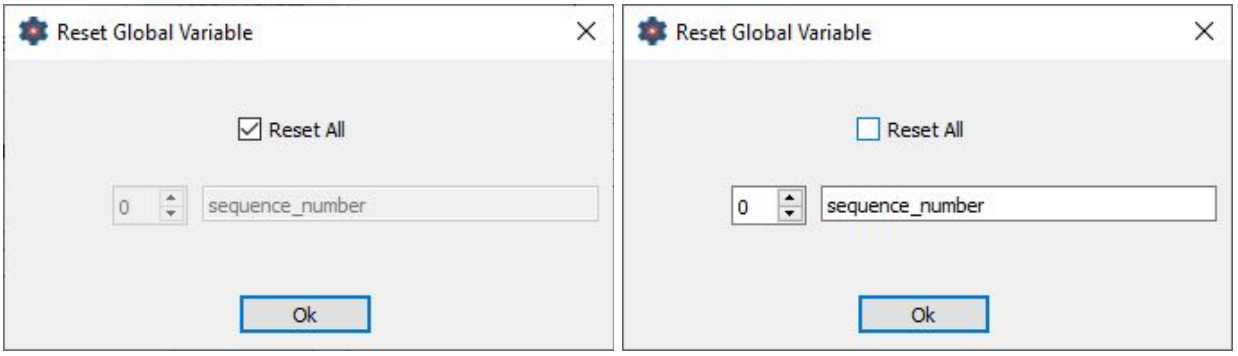
Cancel

This button cancels all current test procedure load or current test procedure launch processes.

Other

Reset global variable

This button resets – i. e. sets to zero – requested Global Variable. This Global Variables configured in SRG-GSS XML configuration file. You can choose to *Reset All* or, when unchecking this option, select only one Global Variable to be reset.



Log

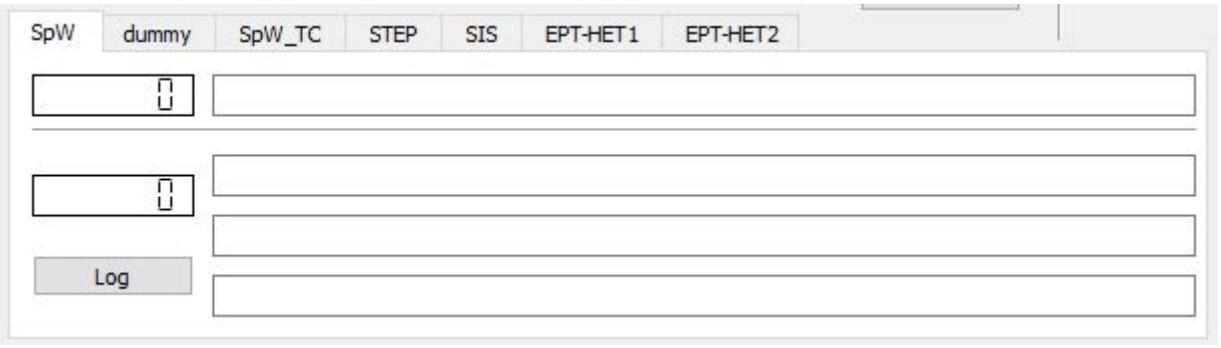
This button opens the SRG-GSS current main log using the default text editor. Main log shows all packets sent and received – including not expected ones, test procedures loaded and launched with their steps, and the status of the test output filters.

Raw log

This button opens the SRG-GSS current raw log using the default text editor. In raw log appear all packets sent and received in raw format with a timestamp related to locale computer time.

Port information tabs

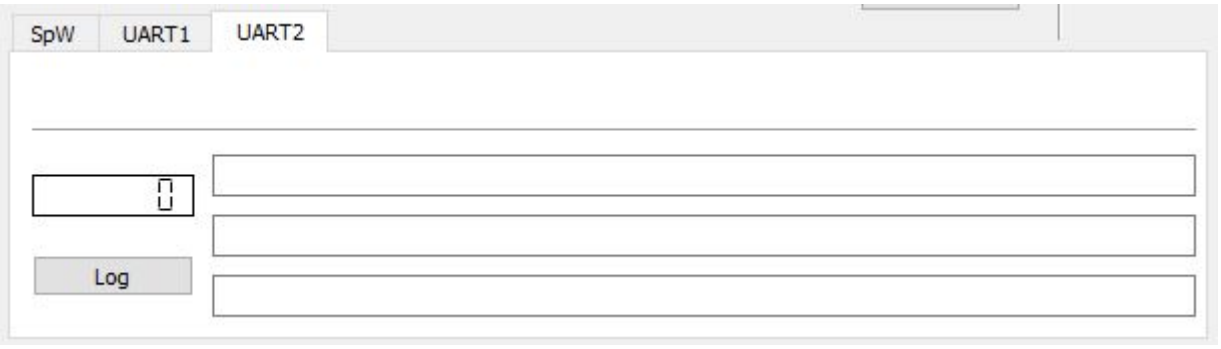
This area contains several tabs – one for each port configured in SRG-GSS XML configuration file.



Each of the tabs contain information about transmitted and received packets which are not part of a test procedure. There are several differences depending on how the port has been configured, from the connected device point-of-view: *In* (only sending), *Out* (only receiving) and *In/Out* (both sending and receiving).

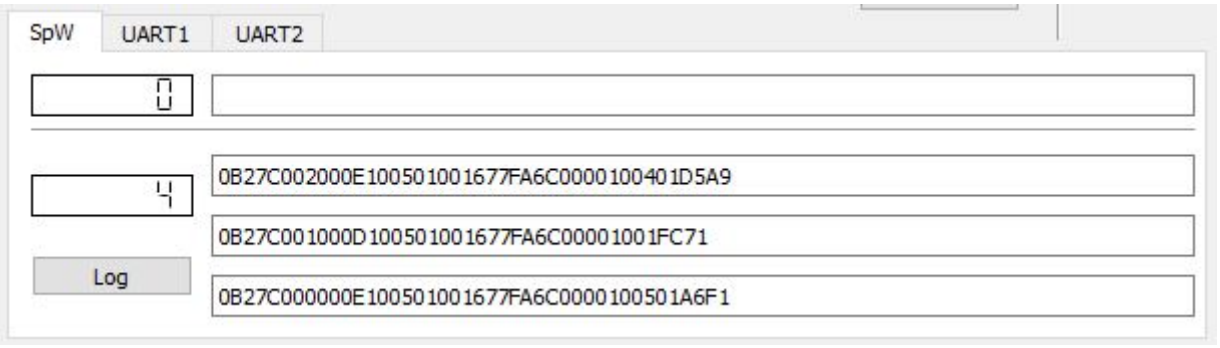
The Log buttons appear no matter the port type. This button must not be confused with the main Log buttons, as the Log buttons appearing in tabs open its SRG-GSS current port log using the default text editor. Every port log shows all packets sent and received in its own port – including not expected ones, test procedures loaded and launched with their steps, and the status of the test output filters only if they have been sent and received in this port.

If tab port is an *In* port, only one counter and a text field are displayed, above the splitting line. It shows the number of packets sent since the last packet counter reset – including the ones in test procedures – and the last packet sent to that device.



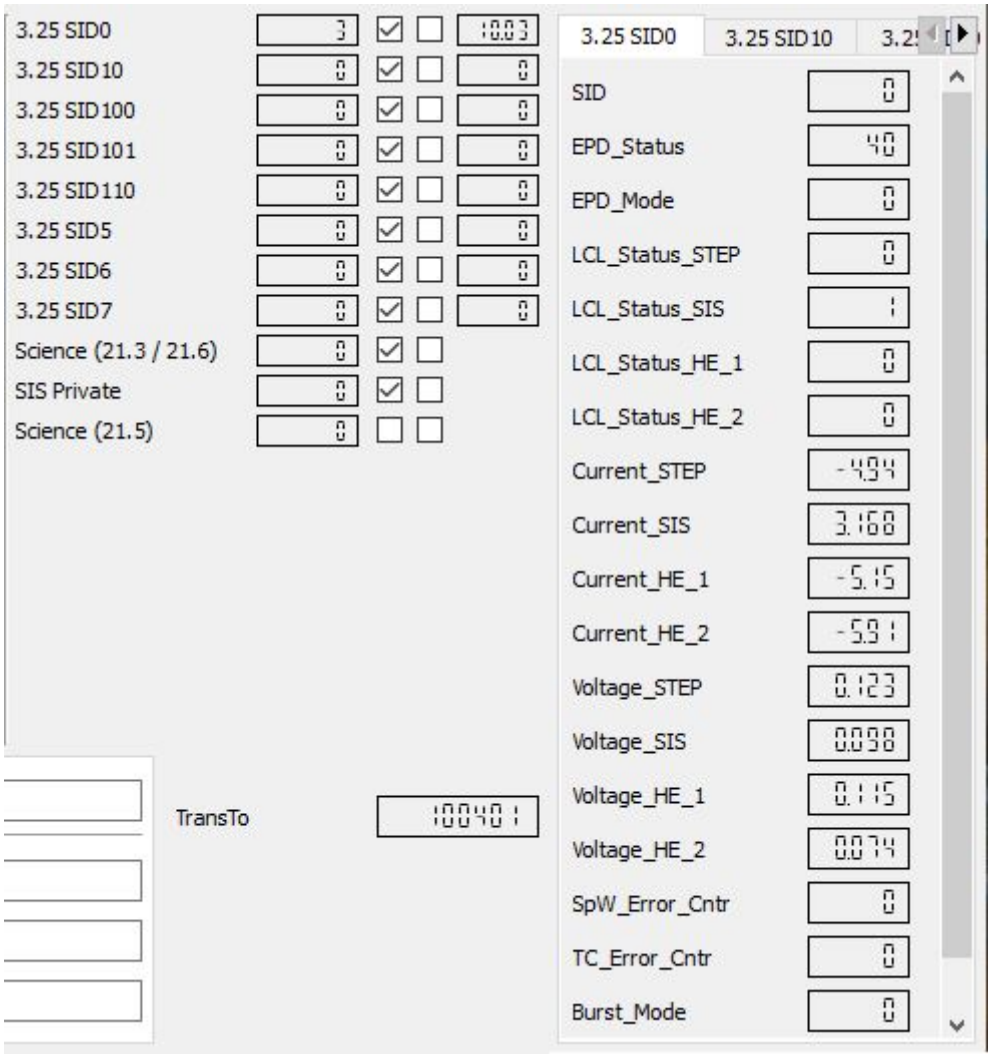
If tab port is an *Out* port, there is also only one counter, but 3 text fields displayed, all of them below the splitting line. The counters show the number of packets received since the last packet counter reset – including the ones in test procedures – and the last 3 packets

received from that device. Newer packets will be shown in the top text field, thus moving downwards old packets.
When this is an *In/Out* port, the tab shows both counter and all 4 text fields, split by the splitting line. Remember all packets are shown only if they are sent or received outside a test procedure.



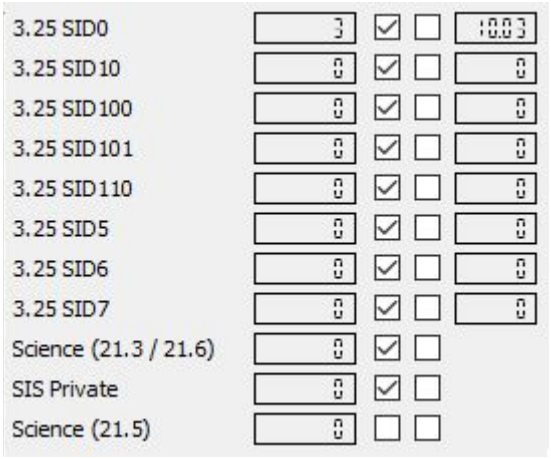
Special Packets and Monitors

This area contains Special Packets and *alarmVal* Monitors defined in SRG-GSS XML configuration file.



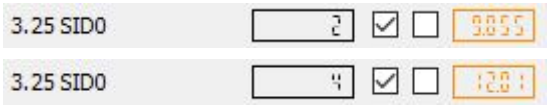
Special Packets counters

The top part of this area is the Special Packets area, containing general information of the Special Packets defined in SRG-GSS XML files.



- The Special Packet name, as defined in the XML file, is shown leftmost.
- The first counter display, the nearest to the name, is the *Special Packet Counter*, and it counts the number of Special Packets received.
- The checkbox on the left is the *Special Packet Enabled* checkbox, and it enables and disables whether Special Packet must be processed. If not enabled and received, it will be received as an unexpected packet.
- The checkbox on the right is the *Special Packet Print* checkbox, and it enables and disables whether the current Special Packet must be printed in Logs. All enabled, all Special Packets with Print checkbox enabled will be printed in the main log file and in the port log file whose port has been received.
    - This option is useful to avoid printing all periodic Special Packets, as most of them don't provide useful information for testing.
    - However, it is not recommended to enable Special Packet Print when performing a test campaign, as all packets – including Special ones – are always written with a timestamp in the Raw Log file.
    - It is recommended to enable Special Packet Print only when its information is useful for current test procedure.
- The rightmost counter display, located rightmost, is the *Special Packet Period Counter*. When a Special Packet is defined as periodic, this counter will display the time interval between the last 2 Special Packets received.

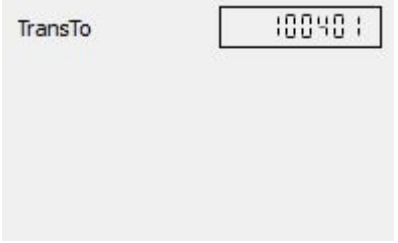
    - If the last time interval between the last 2 Special Packets received is bigger than maximum value or smaller than minimum value defined in the SRG-GSS XML configuration file, this value will be shown in orange color.



    - If the last Special Packet period is smaller than 1 minute and no packet of this kind has been received within 1 minute, or the period is bigger than 1 minute and no packet has been received within 2 times the maximum period, time from last packet received will be shown in red color in *Special Packet Period Counter*. This only applies if the Special Packet has been received at least once.

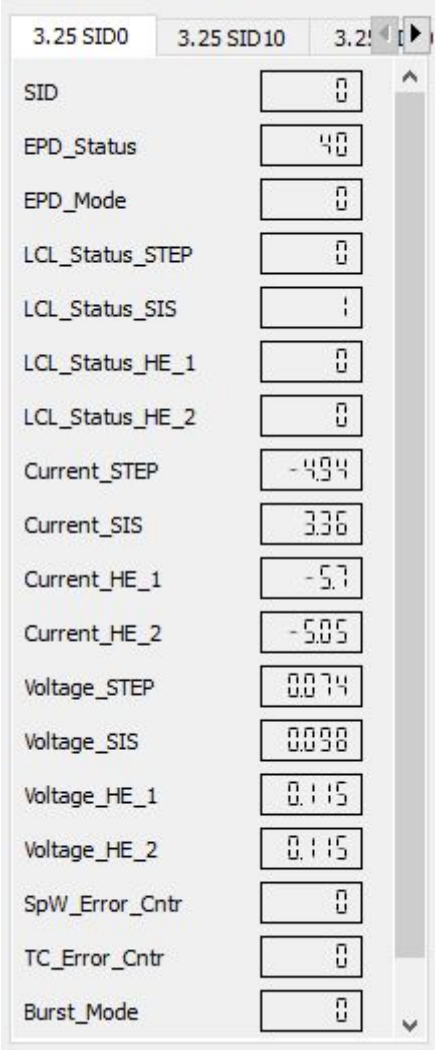
Monitors

Below the Special Packets counters is located the *alarmVal* Monitors area. You can define up to 4 *alarmVal* Monitor in the SRG-GSS XML configuration file as any other filter. Then when a received packet which fulfills the Monitor filter criteria, the GlobalVar value attached to Monitor in the SRG-GSS XML configuration file will be shown here.



Special Packets field information

Each Special Packet defined in the SRG-GSS XML configuration file has its own format, defined in its own SRG-GSS XML format file. All Special Packets comprise several fields, and the contents of all these fields are shown in this area, which is located at the rightmost of the GUI.



Packet information is shown in hexadecimal values by default, but a formula can be defined in the SRG-GSS XML format file using a slope-intercept form. All the *Current* and *Voltage* values in the picture above have been defined using formulas.

Status Bar

This area contains the Status Bar and the clear button.

Status Bar can show several types of information, see different sections for examples. Apart from default background color, it can be turned green (when test procedure passed), green (when test is canceled or when an unexpected packet is received) or even red (when there is an error, like test filter not compliant or a read/write error).

Clear Button

The Clear Button is located rightmost on the Status Bar. It works differently depending on clicked one or double-clicked.

- A simple click clears Status Bar, rolling back default background color and clearing any text message shown.
- When double-clicked, it clears Status Bar, but also clears Special Packet structure information and resets both port tabs and Special Packets counters. It doesn't remove the loaded test procedure if any.

Command line options

SRG-GSS can be launched from a command line terminal with several options.

srg_gss [-a | -t *test_name*] [-c *config_file*]

Command line options are:

-t *test_name*, --test=*test_name*
: Automatically launches required test *test_name*, which must be in the test list of the currently configured XML configuration file. If the test is finished successfully, SRG-GSS will be closed automatically.

-a, --test-all
: Automatically launches ALL tests in the currently configured XML configuration file. If all tests are finished successfully, SRG-GSS will be closed automatically.

-c *config_file*, --config=*config_file*
: Uses another configuration file named *config_file* instead of default *gss_config.ini*. Configuration file must be located in the SRG-GSS executable folder or in the *srg_gss* user folder.