



Master Graphical User Interface (GUI) User Guide

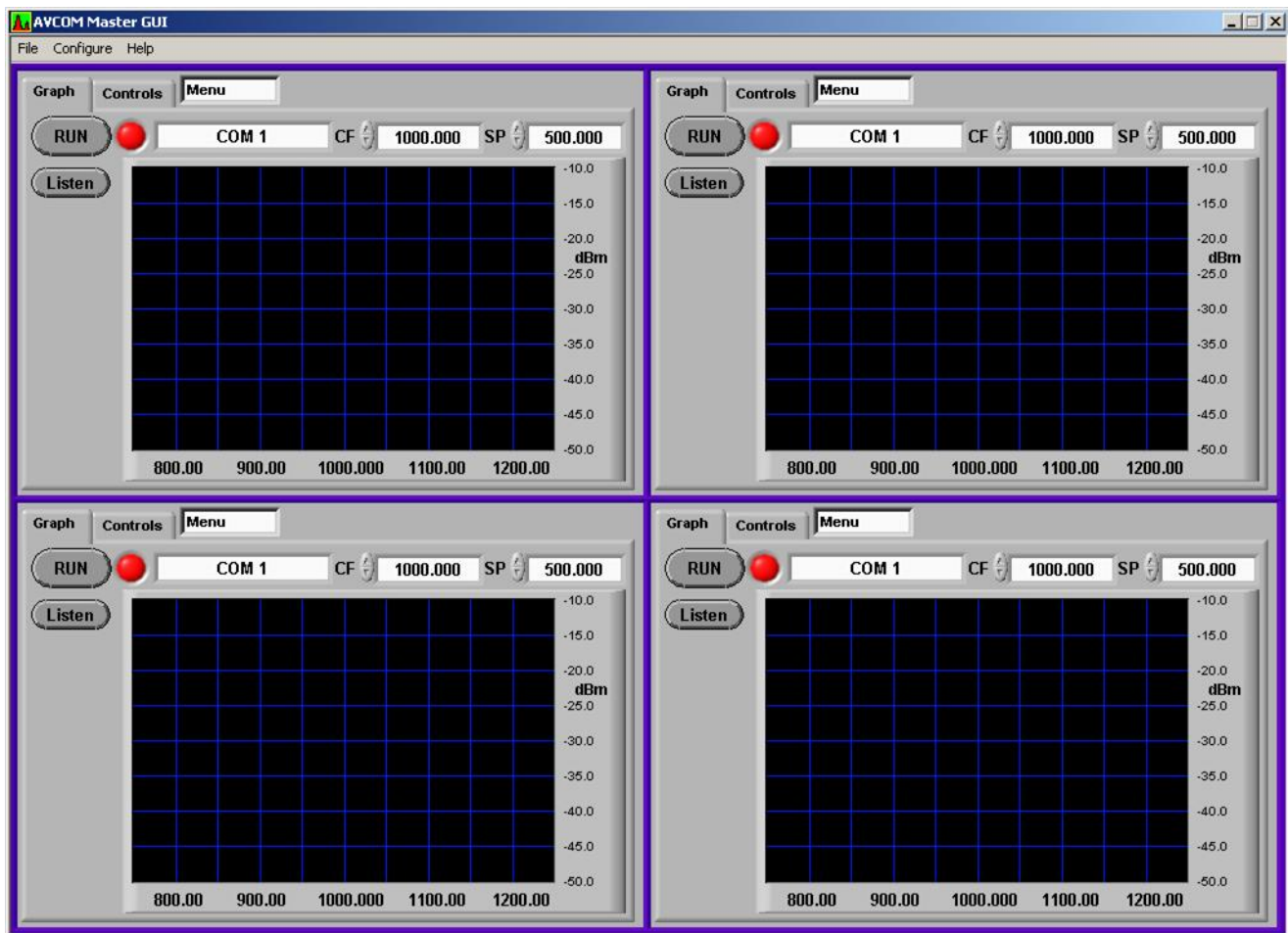


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1. GENERAL OVERVIEW

This manual provides general information on the installation, setup, and use of the GUI software.

The GUI can connect and remotely control analyzers in one of three ways:

1. Directly to a PC via serial cable or ethernet crossover cable
2. In an internal network
3. Across networks through the internet.

The images in this manual are taken from the MasterX4 (1024x768) v2.8, which is sized to show four spectrum analyzer sessions in a 1024x768 monitor window. Other Master GUIs will operate identically but have a different number of session windows or be sized for different monitors.

2. ANALYZER NOTES

- Before the GUI can be used to remotely control **PSA** and **MSA** series spectrum analyzers you must go into the analyzer's Menu 5 and either turn **SCOM ON** or **REMOTE ON**.
- If you see **SCOM** then you have the new ethernet hardware and will use the "LAN" connection type discussed in **Section 6.2**.
- If you see **REMOTE ON** then you have what is known as a "SitePlayer" ethernet device discussed in **Section 6.3**. SitePlayer devices were used in **RSA** and **most PSA** models until June 2007, in the **MSA-4570** until March 2008, and in the **PSA-37XP** until April 2008. The networking capabilities of the SitePlayer are limited to direct ethernet connection with a crossover cable and in small networks. Larger networks with more data traffic tend to cause the SitePlayer to lockup. If you have a SitePlayer model, please call AVCOM to get your analyzer upgraded to the new ethernet hardware.
- The **PSA-37XP** has no remote control capabilities and can only show the waveform in the GUI.
- **A 9-wire serial cable is required if you are using serial connection type.**

3. GUI INSTALLATION

3.1 INSTALLATION. Install the GUI by running the self-extracting executable from disc or the AVCOM download page. The GUI will install by default to C:\Program Files\Avcom of Virginia\MasterX4 (1024x768) vXXX.

****NOTE**** Some company's internet security policies will prevent the GUI installation and it is known that a few will change the GUI's support file attributes to **READ ONLY**. If you experience problems installing the GUI or modifying GUI menus, check the attributes of the GUI's support files such as *sap.gui*, *sess.gui* and *loof.gui* or contact your IT department.

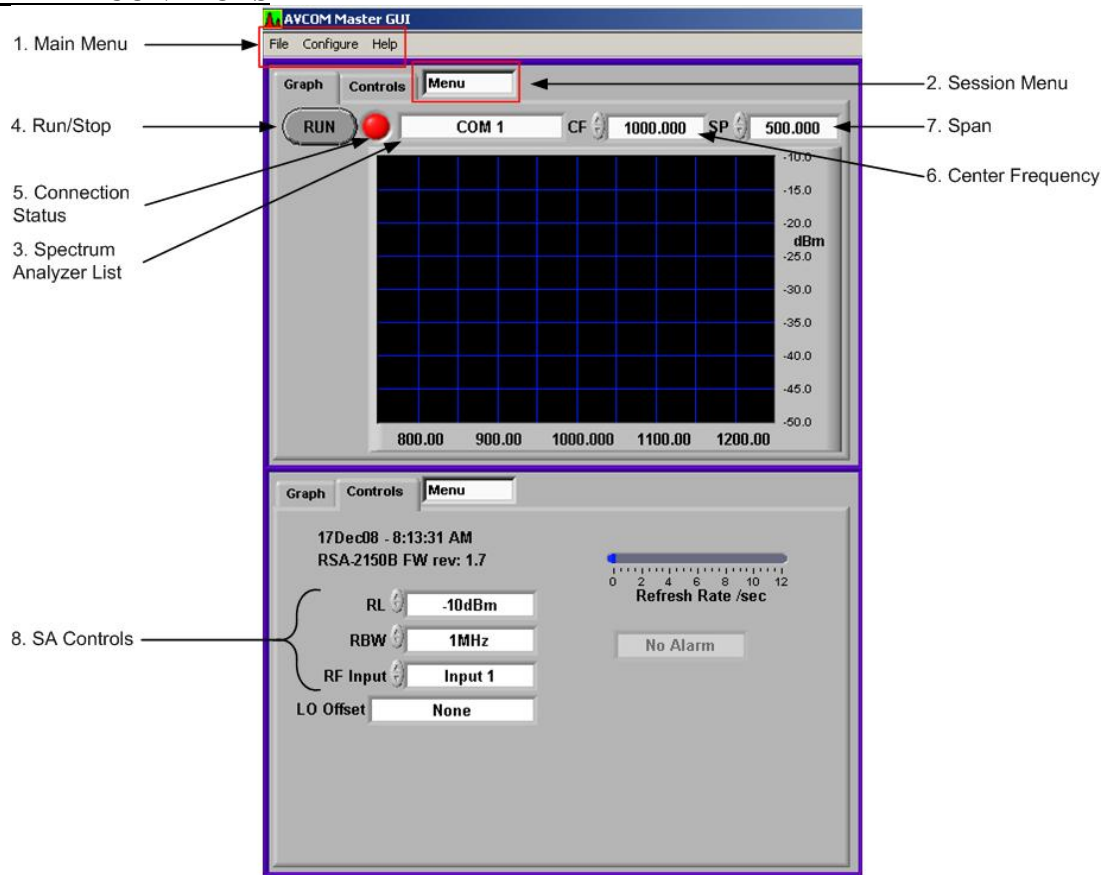
3.2 GUI START-UP. Run GUI by going to Start>Programs>AVCOM>MasterX4 (1024x768) vx.x.x.

3.3 RUNNING THE GUI

- If the SA is connected to the PC serial port 1 then select "COM1" in the SA List and Run to connect.
- For direct ethernet connection via crossover cable AND you have just received the SA from AVCOM then the SA's IP is **192.168.118.242** and port is **26482**. Set the PC's network adapter's IP to **192.168.118.xxx (anything other than 242)** and select "LAN Default" in the SA List, then Run to connect.
- If you are unsure of the SA's IP and/or port parameters then see section 4 for configuring the analyzer's ethernet connection and section 5 for creating a new item for the analyzer in the SA List.

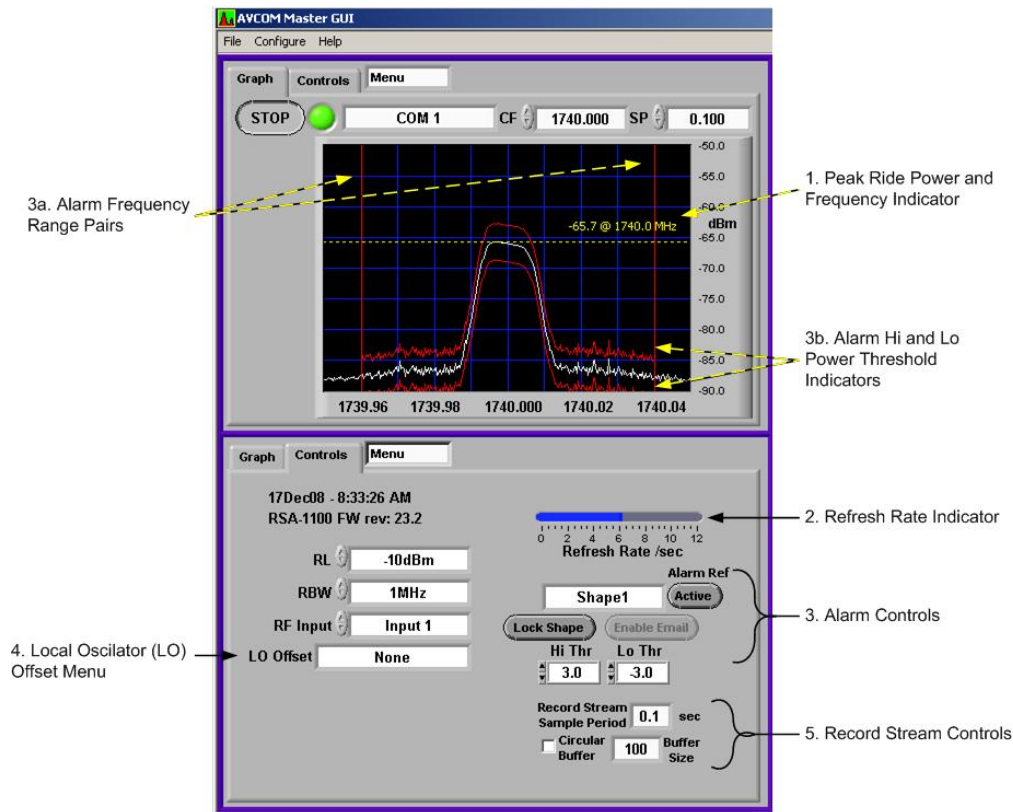
4. GUI CONTROLS

4.1 PRIMARY CONTROLS



1. **Main Menu** - Used to access functions that apply to all sessions.
2. **Session Menu** - Used to access functions that only apply to that GUI window.
3. **Spectrum Analyzer List** - Menu of spectrum analyzers to connect to. Add/Modify/Delete items in Configure>SA List on the Main Menu as well as its Presets and rename RF Inputs.
4. **Run/Stop**-Used to initiate or stop communications with the analyzer.
5. **Connection Status**-Red = not connected, Yellow = attempting to connect, Green = connected.
6. **Center Frequency (CF) Controls**- Used to set the desired CF.
7. **Span Controls**-Used to set the desired span.
8. **SA Controls**:
 - a. **RL** - Menu for selecting reference level.
 - b. **RBW** - Menu for selecting resolution bandwidth.
 - c. **RF Input** – Menu that allows user to select the RF input for multiple input units. This is only shown at startup and when connected to an analyzer with that option.

4.2 ADVANCED CONTROLS



1. **Peak Ride** Indicators – Turn on or off in Signal Analysis>Peak in the Main Menu. Select from “None”, “Ride”, or “Hold”
2. **Refresh Rate** Indicator – Displays the waveforms per second received from the SA. This rate will vary depending on the network connection, PC CPU and the Desired Refresh Rate set in Configure>Miscellaneous in the Main Menu. The Desired Rate can be reduced from the default of 12 (per second) to conserve CPU resources or limit network data traffic. Refresh rates as low as 1 every 20 seconds is allowed.
3. **Alarm** Controls – Used to select from one to four shape alarms when running.
 - Drag the Alarm Frequency Range Pairs (3a) to cover the range desired and ignore unwanted spectrum.
 - The Hi and Lo Threshold indicators (3b) will move as you adjust the Hi and Lo Thresholds. Set active signal filtering to prevent false alarms.
 - If email alerts are needed then set your email parameters under Configure> Alarm Email Alerts before selecting Enable Email
 - Select Lock Shape to lock the frequency and power tolerances and prevent them from changing.
4. **Local Oscillator Offset** Menu – Used to display all of the frequencies in the actual frequency seen at the antenna or any intermediate stage of the RF path. Customize the menu for your needs in Configure> LO Offset from the Main Menu on the network connection, PC CPU and the Desired Refresh Rate set in Configure>Miscellaneous on the Main Menu. The Desired Rate can be reduced from the default of 12 to conserve CPU usage or network traffic.
5. **Record Stream** Controls – Used to set the Record Stream properties to record an active waveform. Start by going to Menu>Display>Record Stream while running.

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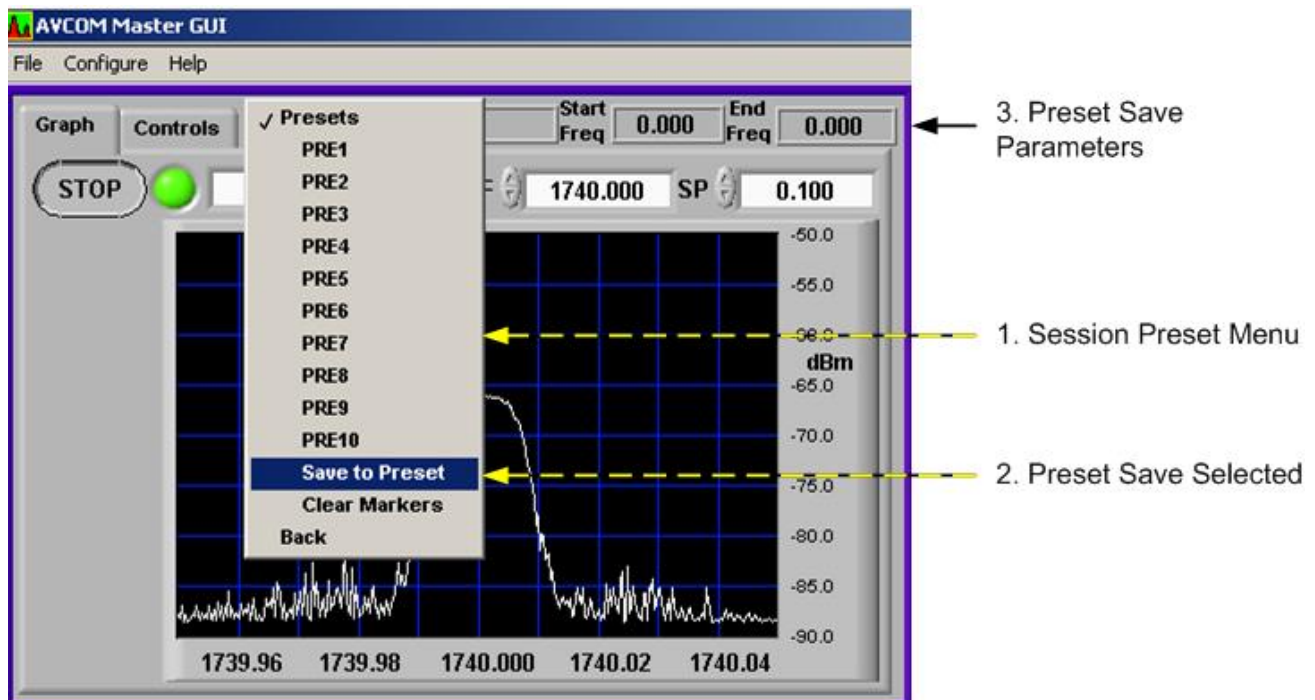
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4.3 PRESETS

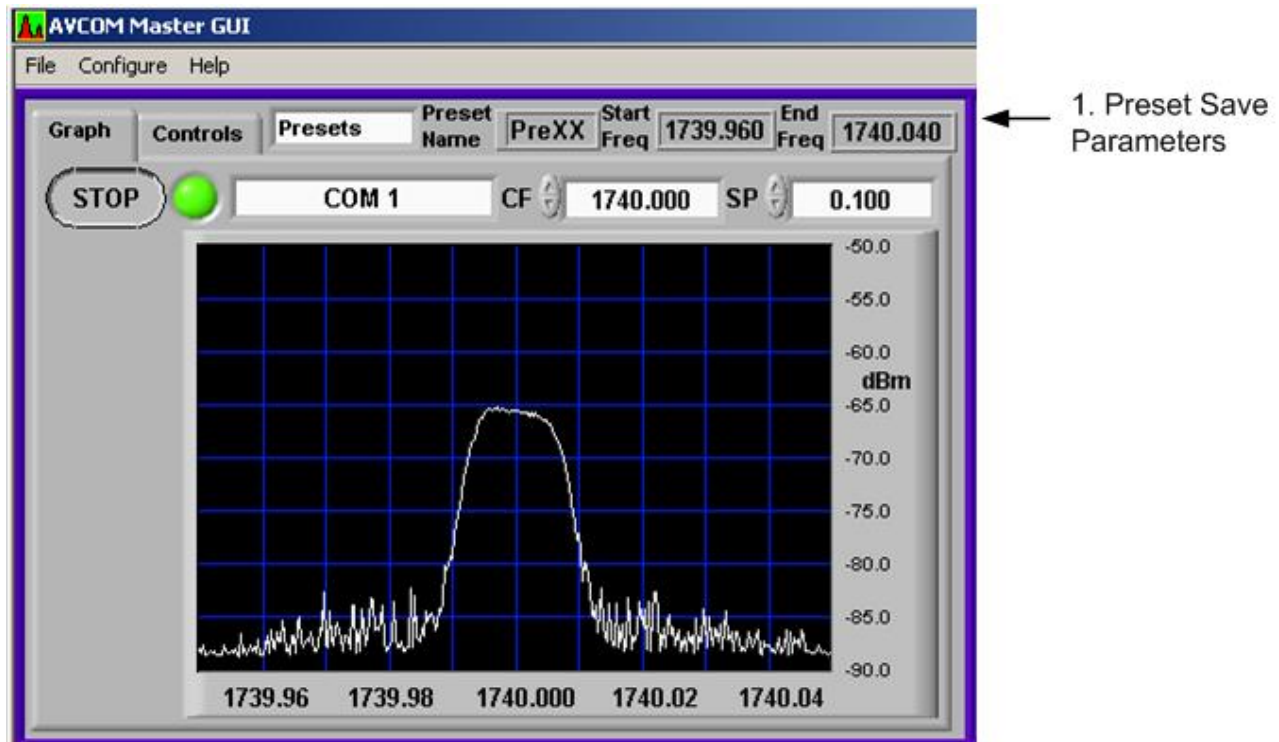
Presets allow you to show carrier markers and rename the Presets to meaningful names.

Customize your Presets in **Configure>Spectrum Analyzer List>Presets tab** or from the main GUI panel according to the following process:

1. **Acquire the signal** with CF, Span, RL, RBW and LO Offset desired.
2. **Select Save to Preset (2)** in the session menu (1). The Preset Save Parameters (3) will appear.

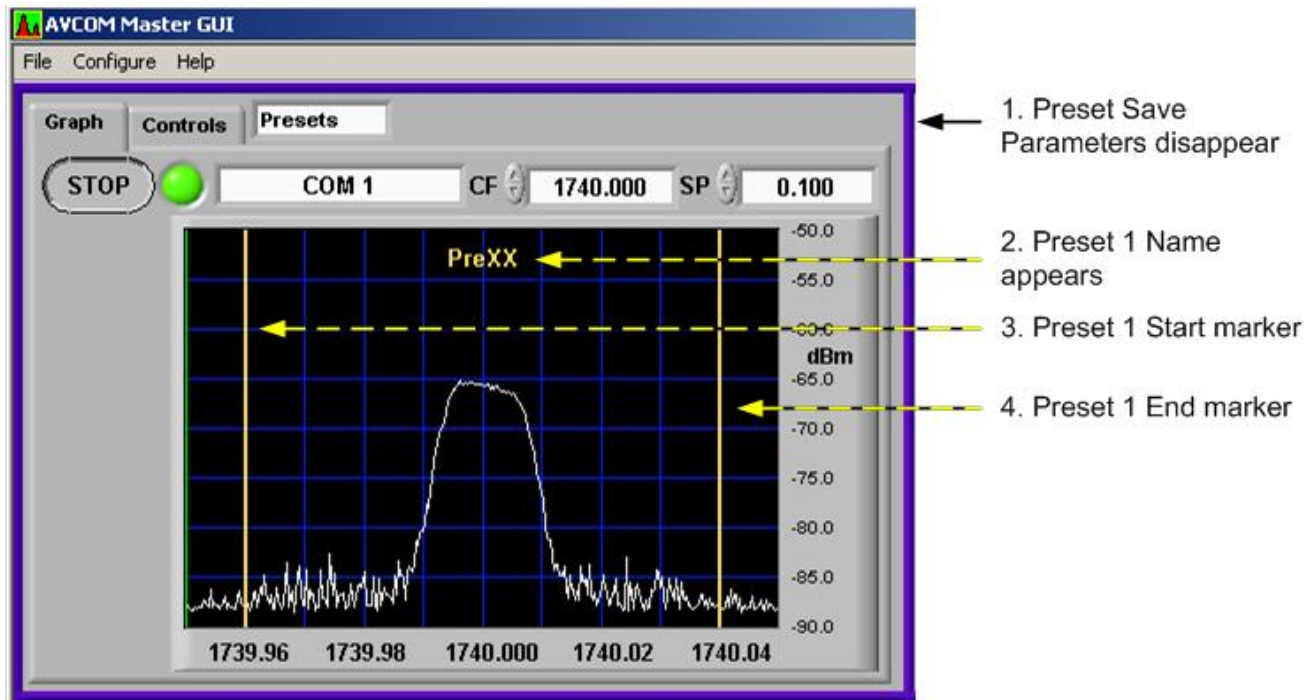


3. Enter the Preset Name and the Start and End Frequency values where you want the channel markers to appear.

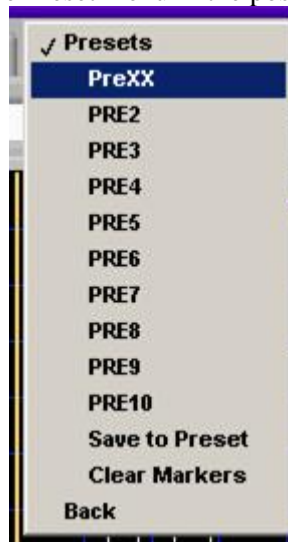


4. Select which Preset you want to save the parameters to in the session Preset menu.

5. The **Preset Save** parameters (1) will disappear. The **Preset Name** (2) and **Start** (3) and **Stop** (4) markers will appear in the graph. The name in the graph will always appear between the Start and Stop markers.



The new Preset name will appear in the Preset menu in the position selected.

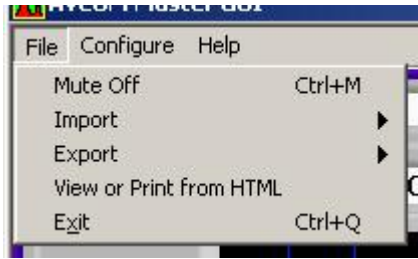


Remember that these markers and preset names are assigned to the spectrum analyzer selected in the SA List menu. Selecting a different analyzer will make these presets go away and any presets and active markers assigned to the new analyzer will appear.

6. Select **Clear Markers** from the menu to remove the markers from the graph. Up to 10 Preset markers can be shown but as the markers get closer together, as when the Span is increased, the preset name will disappear.

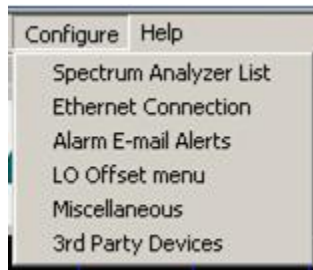
4.4 GUI MAIN MENU

4.4.1 FILE



- There are shortcuts available for Run/Stop, Mute, and Exit.
- Import and Export allow the user to share GUI files used for the SA List and LO Offset Menu.
- When Tips are turned on, information about controls will be shown when the pointer hovers over them.
- Create JPG and HTML are two options for capturing a screen shot of the GUI and saving it to file or printing.

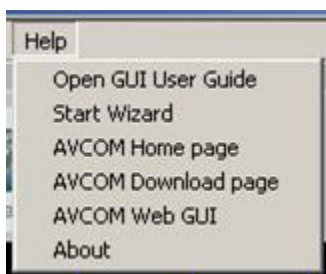
4.4.2 CONFIGURE



1. **Spectrum Analyzer List** – Lets you Add, Modify, or Delete analyzer and their connection parameters from the SA List. See Section 5 for more details.
 2. **Ethernet Connection** – Finds spectrum analyzers on your network and configures their ethernet parameters. See Section 4 for more details.
 3. **Alarm E-mail Alerts** – Set your email parameters before using Alarms. An email will be sent when an alarm condition is reached.
 4. **LO Offset** – Customize the LO Offset menu.
 5. **Miscellaneous** –
 - a. Runtime automatically stops the SA after a set runtime has elapsed or Stop Time automatically stops the SA after a set time and date has passed.
 - b. Desired Refresh Rate can be reduced to conserve CPU or network traffic if necessary. Maximum network traffic is normally less than 40kbps.
 - c. The AVCOM GUI Network controls allow multiple GUIs to be networked together to view and control a single SA.
 - d. Start Running Automatically on Startup determines whether the GUI will start running or not on the selected SA when the GUI opens.
- 3rd Party Devices** – Lets you configure and control other manufacturers such as Quintech SRR and SRX switches and MRF matrixes if you have purchased a license from AVCOM. Contact AVCOM for pricing or if you need us to support other devices.

****NOTE**** It is known that a few company's internet security policies will change the GUI's support file attributes to **READ ONLY**. If you experience problems modifying the GUI's Spectrum Analyzer List or LO Offset menu, check the attributes of the GUI's support files such as *sap.gui*, *sess. gui* and *loof. gui* or contact your IT department.

4.4.3 HELP



1. **Open User Guide**
2. **Start Wizard** – Runs the wizard to help you connect to your SA and configure your SA List.
3. **AVCOM Home page** – If connected to the internet, opens the AVCOM home page for product information.
4. **AVCOM Download page** – Opens the download page for GUI and other downloads.
5. **AVCOM Web GUI** – Opens the AVCOM Web GUI, which allows multiple remote users to view and control the same spectrum analyzer from within a web browser.
6. **About** – Displays GUI version and AVCOM contact information.

4.4.4 SESSION MENU

Each window has its own Session Menu whose features only apply to that window. The menus are arranged in a structure as follows:

❖ Menu – Top level menu

A. Display

- **Clear active signal** removes the active (white) waveform from the graph if not running.
- **Clear stored signal** removed the red waveform from the graph.
- **Save Single** stores the active (white) waveform to a .AVC file.
- **Display Single** recalls a saved .AVC file and displays it in a red waveform along with the filename, CF, Span, and RL.
- **Record Stream** stores the active (white) waveform to a .STR file. It is disabled when not running. Record Stream control parameters are shown in the Controls tab and allows you to set the sample period and opt for circular buffer and buffer size.
- **Play Stream** recalls a saved .STR file and displays it in a red waveform. Play Stream control parameters are shown in the Controls tab. Frame shows the current waveform being displayed and also allows you to fast forward or reverse by dragging the slider. The slider will wrap to frame 0 when the last waveform is reached. Play Slow/Fast controls the playback rate.
- **Zoom In/Out** allows the CF and Span to be quickly changed by left-clicking the mouse cursor within the graph area. If the cursor is left-clicked and released *without moving the cursor* between click and release then the GUI zooms *out* by doubling the Span and changing the CF to the frequency where you clicked. If the cursor is *clicked and dragged then released* the Span is zoomed *in* and the CF is the center of the drag range.

B. Presets

The GUI supports up to 10 user-defined presets that are assigned to individual analyzers in the SA List. Each preset stores:

- a. Center Frequency
- b. Reference Level
- c. RBW
- d. Span
- e. Start and End frequency markers

C. Signal Analysis

- **Measurements**
 - **Show Delta** – Green Delta measurement points can be dragged to the location of your choice on the waveform and the power and frequency difference is calculated. Delta markers are reset if reference level is changed.
 - **Show Pointer** – When selected and the mouse is left-clicked within the graph, the frequency and power at the pointer is shown.
 - **SNR (Peak – Min)** – Calculates the “Signal to Noise” difference between the displayed signal peak and minimum values.
 - **Show -3dB** – The GUI determines the signal peak and then the difference between the -3dB down frequency points on each side of that peak and shows them with dotted yellow lines. The peak is not shown unless you select Peak Ride as well.

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- **Peak** – Ride continuously calculates the peak power level of the waveform and the frequency at that point. Hold maintains the peak level measured. None clears the indicator.
- **Carrier ID** – Compares the active signal to all stored Save Single (.AVC) and Record Stream (.STR) files in the selected folder and calculates a Percent Match. Best results are achieved when the active signal is seen with the same CF, Span, RL, and RBW parameters as how the signals were saved.

D. Signal Processing

- **Filter** – Averages the displayed waveform over the last four to 16 waveforms
- **Persistence** - Finds and holds the maximum or minimum amplitude for each point on the graph. Envelope Persistence shows both the maximum and minimum amplitude for each point with a dotted yellow line.

E. Configure is only shown at GUI startup and when connected to a SA with LNB Power.

- **LNB Power** allows LNB 13V and 18V to be turned on or off
- **22kHz** – allows LNB 22kHz signal to be turned on or off.

5. SPECTRUM ANALYZER SETUP

5.1 SERIAL CONNECTION

Connect the spectrum analyzer directly to the user's PC using the straight female-female DB-9 serial cable provided. **A 9-wire serial cable is required for operation.** Select "COM 1" from the "Spectrum Analyzer List" then Run to establish connection.

If a port other than COM 1 is being used, a new Serial Connection Profile will need to be added (see section 6.1).

5.2 ETHERNET CONNECTION

Connect the spectrum analyzer directly to the PC's ethernet port using a crossover ethernet cable or through a switch or router with straight cables. The GUI contains a configuration tool for configuring the spectrum analyzer's ethernet settings under Configure>Ethernet Connection and allows ethernet configuration in direct or from within your LAN.

Ethernet configuration changes via both serial and ethernet are supported. **A 9-wire serial cable is required for operation.**

5.2.1 ETHERNET CONFIGURATION

After selecting Configure>Ethernet Connection from the GUI's main menu, the following will appear:

AVCOM LAN/WAN ConfigTool v1.1
Of Virginia Inc. For configuring the ethernet controller in your AVCOM Spectrum Analyzer

Select Network Adapter (This will update IP Address and Subnet Mask information)
Dell TrueMobile 1300 WLAN Mini-PCI Card

Connection Type
☐ COM Port
☒ Ethernet

Existing IP Address: 192.168.118.242

Scan For Devices Query and Import Current Settings

Connection Settings
New IP Address:
New Connecting Port: 26482
Baud Rate: 115200
Serial Settings: 8 data, no parity, 1 stop, no flow control

☐ Set Gateway (Advanced)
☐ Change HTTP Port (Advanced)

Notes:
1. If the gateway parameters are not compatible, then you must use serial connection to change the SA's IP and/or gateway parameters. Set the gateway ONLY if necessary.
2. "Query and Import Current Settings" will allow you to see current settings before modifying.
3. Internet Security Software may prevent this tool from working properly (including Windows built-in firewall). It is recommended to disable any internet security software prior to using.
4. Consult your network administrator for valid IP parameters.

Your IP Address:
Your Subnet Mask:
Analyzer MAC Address:
Ethernet Firmware Version:
Status: Input values or leave defaults

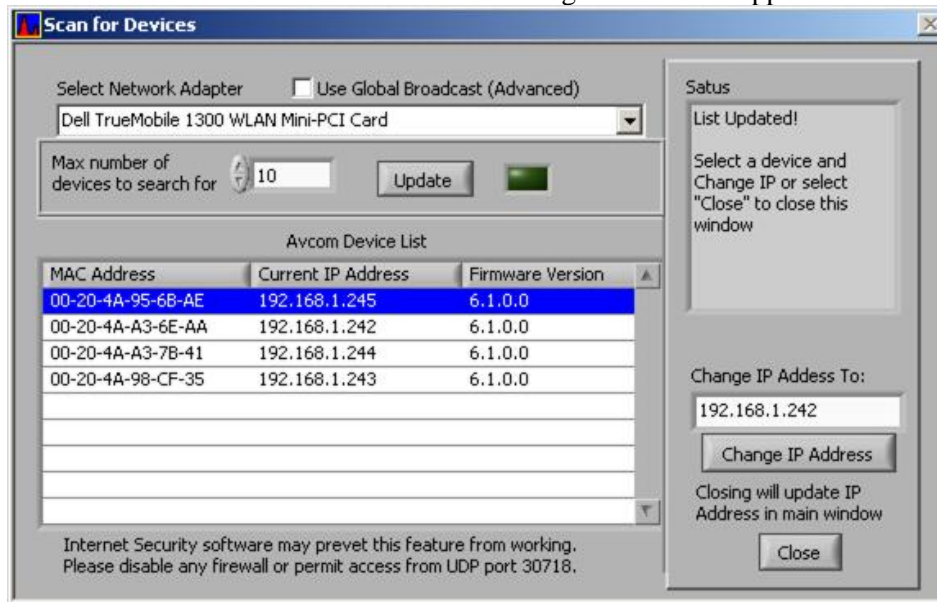
Save Settings to Analyzer
Reset to Defaults
Exit

To configure the spectrum analyzer via COM Port connection:

1. Select **COM Port** in Connection Type and input the applicable **COM Port #**. **A 9-wire serial cable is required for operation.**
2. Select **Query and Import Current Settings** to pull in the parameters that are currently loaded in the spectrum analyzer. Power cycle the SA when prompted to do so in Status.
3. Under **Connection Settings**, enter the new IP address and Port. Do not change the Baud Rate or Serial Settings.
4. Select **Save Settings to Analyzer**. Power cycle the SA when prompted to do so in Status.

To configure the spectrum analyzer via ethernet connection:

1. Select **Ethernet** in Connection Type.
2. If known, enter the IP of the SA you want to configure. Else select the network adapter to scan and then select **Scan For Devices**. The following window will appear:



After finding all analyzers on the selected Network Adapter, highlight the IP of the SA you want to configure and then enter the new IP in **Change IP Address To:** Then select **Change IP Address**. Select **Close** to return to the ConfigTool.

3. Select **Query and Import Current Settings** to read the parameters that are currently loaded in the spectrum analyzer that was selected in Scan for Devices.
4. Under **Connection Settings**, enter the new IP address and Port. Do not change the Baud Rate or Serial Settings.
5. Select **Save Settings to Analyzer**.

CAUTION: If the Spectrum Analyzer and PC TCP/IP and/or Gateway parameters are not compatible, a serial cable must be used to configure the spectrum analyzer.

NOTE1: Advanced settings are available for setting the Gateway and changing the HTTP Port. However, most networks will not require changing either of these settings. Please contact your network administrator for support with these functions.

NOTE2: Internet Security software may significantly impact the user's ability to use the web configuration. The user may first need to disable or grant full permissions to any installed internet security or firewall software and may also need to "unblock" the Window's built-in firewall when using Window's XP SP2 or later.

6. MANAGING SPECTRUM ANALYZER LIST PROFILES

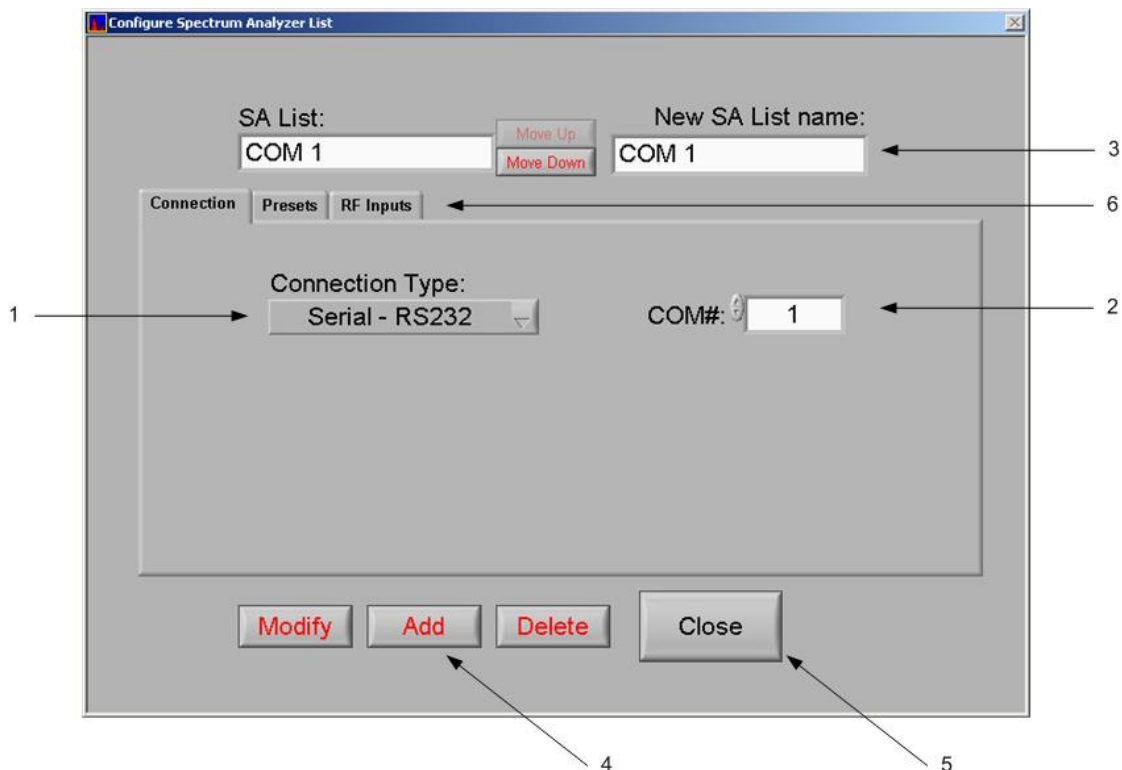
To add additional spectrum analyzer profiles, select Configure>Spectrum Analyzer List from the Main Menu.

****NOTE**** It is known that a few company's internet security policies will change the GUI's support file attributes to **READ ONLY**. If you experience problems modifying the GUI's Spectrum Analyzer List check the attributes of the sap.gui file or contact your IT department.

6.1 SERIAL CONNECTION PROFILE

1. Select "Serial" from the Connection Type drop down menu.
2. Enter the appropriate COM port.
3. Type in a name for the new serial profile.
4. Click "Add" to add the new profile name to the saved profiles list.
5. Click "Close" to return to the Main GUI.
6. Presets may be set and RF Inputs renamed in those tabs if desired.

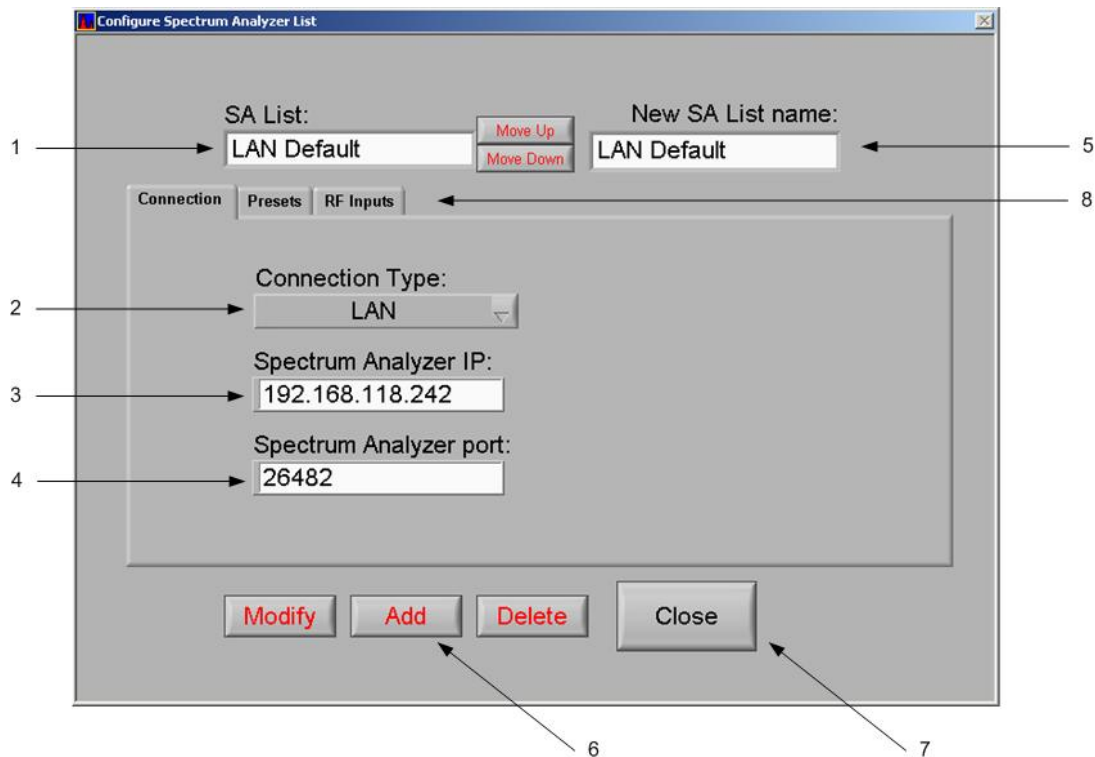
NOTE – "Modify" can be used to change an existing profile



6.2 ETHERNET CONNECTION PROFILE

1. Select “LAN Default” from the SA List menu .
2. Select “LAN” in the Connection Type menu.
3. Enter the IP address for the spectrum analyzer. Shown is the default IP as shipped from the factory.
4. Enter the port for the spectrum analyzer. Shown is the default port as shipped from the factory.
5. Type in a name for the new ethernet profile.
6. Click “Add” to add the new profile name to the saved profiles list.
7. Click “Close” to return to the Main GUI.
8. Presets may be set and RF Inputs renames in those tabs if desired.

NOTE – “Modify” can be used to change an existing profile.



Before the GUI can connect and control a portable spectrum analyzer (PSA models) go to the analyzer’s Menu 5 and set **SCOM ON**. RSA models require no local setup besides applying power.

6.3 LAN-SitePlayer Connection Type

This type of ethernet connection applies to most AVCOM spectrum analyzers manufactured prior to June 2007. The MSA-4570 was manufactured with SitePlayer until March 2008 and PSA-37XP was manufactured with SitePlayer until April 2008. The SitePlayer model uses UDP broadcasting and therefore requires additional IP and Port parameters that are shown when “SitePlayer” is selected as the Connection Type.

Before the GUI can connect and control a SitePlayer analyzer be sure to go to the analyzer’s Menu 5 and set **REMOTE ON**.

7. AVCOM GUI Network

AVCOM GUI v2.8.1 has a new feature that allows multiple GUIs to connect to the same AVCOM spectrum analyzer (SA) simultaneously through a central GUI acting as the server as shown in Figure 1. The arrowed lines indicate the direct lines of communication.

Unlike the Web GUI method which requires licenses to be purchased, this method only requires that all users have at least GUI v2.8.1 or later. However, the Web GUI allows the use of web browsers by the remote clients while the AVCOM GUI Network depends on traditional applications installed on the remote PCs. Currently up to (10) Remote GUIs are supported. Contact AVCOM for more information.

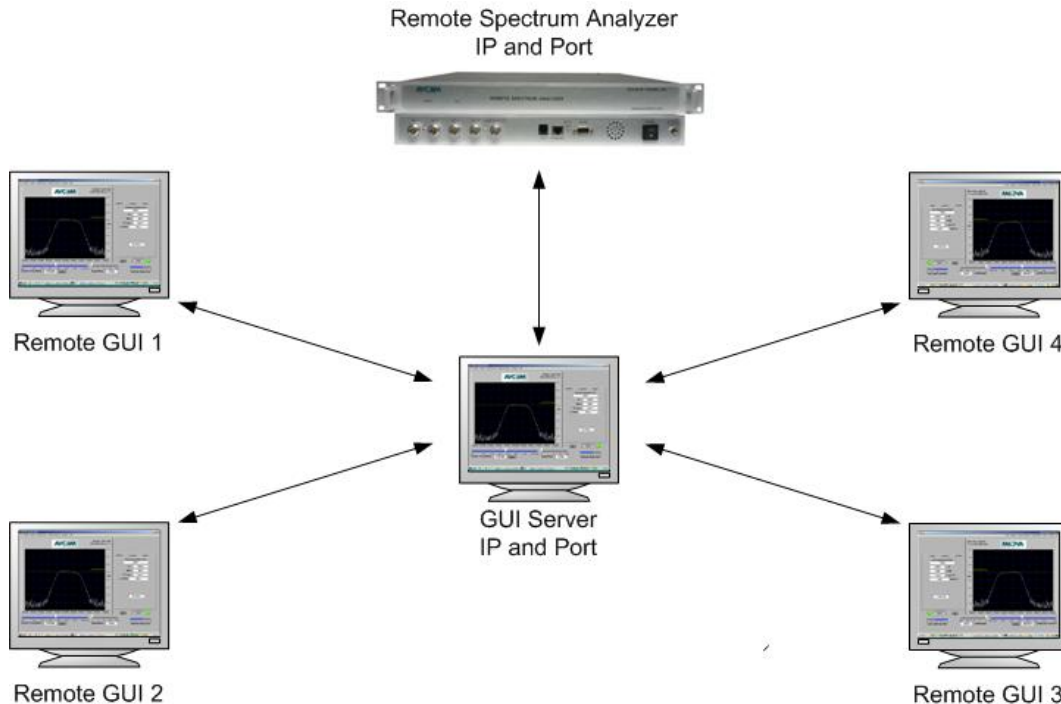


Figure 1

GUI Network Instructions

1. Install AVCOM GUI v2.8.1 or greater on the Remote GUI and GUI Server computers. Note that the GUI Server computer does not require any special server software installed on it other than the AVCOM GUI.
2. In all of the Server and Remote GUIs, go into Configure>Miscellaneous on the Main Menu, as shown in Figure 2, and select AVCOM GUI network.
 - a. You must enter a User Name to make changes to the other parameters.
 - b. "Only Lead GUI grants Control?" is a mode where only one of the GUIs should have Lead GUI check box selected. In this mode, whenever a GUI that is not the Lead GUI wants to change the SA parameters they must request control permission from the Lead GUI. These request messages are sent

- automatically from the requesting GUI to the Lead GUI. If “Only Lead GUI grants Control?” is not selected, then each GUI can take SA control immediately without any permissions from other GUIs.
- c. “Control Time” is the period that SA control is given before automatically turning off. “Control Time” can be left at the default value or your organization may decide on a different time period from 15 – 120 seconds.
 - d. Close the Configure Miscellaneous window.

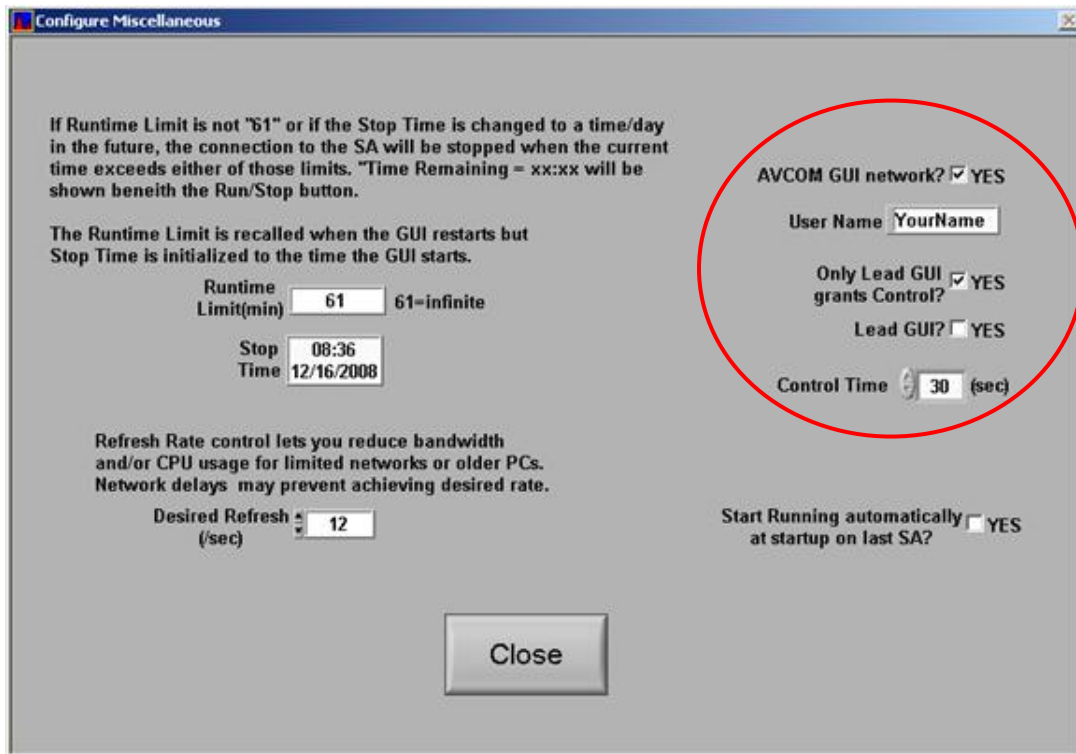


Figure 2

3. When you return to the main GUI window the Control button in the Listen state will have appeared beside the Center Frequency control as shown in Figure 3.



Figure 3

4. The GUI Server has to create a Spectrum Analyzer List profile for the SA by going into Configure>Spectrum Analyzer List on the Main Menu and following the instructions in the GUI User Guide. NOTE: port forwarding may need to be done on your network so that the SA’s port is routed to the SA’s IP. Contact your IT department for help.

5. To create a Spectrum Analyzer List profile for the Remote GUIs first determine the IP of the GUI Server. Contact your IT department for help.
6. Determine the GUI Server port for each of the SAs by the following: The GUI Server listens for Remote GUIs on a port relative to the how the GUI Server is connected to the SA.
 - a. If the GUI Server is connected to the SA by ethernet then it will listen on a port equal to the SA's ethernet port minus 100. For example, if the SA's port is 26482, then the GUI Server listens on port 26382 for all Remote Client connections.
 - b. If the GUI Server is connected to the SA by serial connection then the GUI Server will listen on an ethernet port equal to 26400 plus the Com port #. For example, if the SA is on COM1 then the GUI Server listens on port 26401 for Remote Client connections. If the SA is on COM2 then the GUI Server listens on port 26402.
7. Now that you have determined the GUI Server's IP and Port for each SA, the Remote GUIs need to create a Spectrum Analyzer List profile for the GUI Server and the particular SA using the GUI Server's IP and Port. Port forwarding must be done on your network to forward the GUI Server's port to the GUI Server's IP. Contact your IT department for help.
8. You are now ready to run. Power on the SA and open the GUI in the Remote and Server PCs. In the GUI Server select the new SA List item for the SA and watch it run. In the Remote GUIs select the SA List item for the GUI Server and the Remote GUI should display the signal as if it were connected directly to the SA.
9. When any GUI wants to change the SA parameters of Center Frequency, Span, etc., select "Listen" (Figure 3) and if "Lead GUI Grants Control?" is selected from Configure>Miscellaneous on the Main Menu, and your GUI is not the Lead GUI then the "Listen" button will change to a yellow "Request" state indicating a control request has been sent to the Lead GUI. The Lead GUI can either grant or deny control. If control is granted then your "Request" button will change to a "Control" button as shown in Figure 4. If the Lead GUI denies control then your "Request" button will immediately revert to "Listen". If "Lead GUI Grants Control?" is not selected then the "Listen" button will immediately change to "Control".

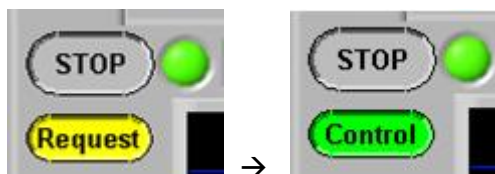


Figure 4

When the Control Time elapses Control will turn off automatically. Only one GUI should have Control On at a time. If more than one has it on then the SA waveform will jump around as the conflicting commands are

sent to it.

****Important Note**** If any of the Remote GUIs do *not* have the Multi-GUI sharing turned on they *will still be able to connect to the server and will* cause SA Control conflicts when another GUI turns on Control since more than one GUI has control.

8. TERMS AND CONDITIONS

Only the following terms and conditions apply to the sale and delivery of the goods reflected herein. The products manufactured by AVCOM OF VIRGINIA INC., (hereafter referred to as AVCOM) are subject to the following conditions and are subject to change without prior written notice at AVCOMS' sole discretion. All implied warranties, if any, terminate 1 year from the date of the original purchase.

9. LIMITED WARRANTY POLICY

AVCOM warrants to the original purchaser that this product shall be free from defects in materials and workmanship upon delivery. AVCOM additionally warrants that product, used under normal service conditions, shall be free from defects in materials and workmanship for a period of 1 year**. The warranty policy includes:

- Labor cost and replacement of original parts and components.
- Repair cycle time of 21 business days upon return of unit to the factory Customer Service Center.

AVCOM shall not be liable for cost of repairs or replacement of parts or components due to physical damage, product misuse or abuse and unauthorized modifications or repair.

To receive In-Warranty service, the defective product must be received no later than the specified warranty period by contacting AVCOM's Customer Service center for a Return Material Authorization (RMA) number. Information needed to process the RMA includes the Model number, Serial number, date and place of purchase. For an RMA number contact AVCOM Service Center at PHONE: (804)-794-2500 or FAX (804) 794-8284. No product will be accepted by AVCOM that does not have an RMA number.

** Extended warranty terms are available. Please contact Avcom of Virginia for details.