

Omniscope Technical Reference

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This technical reference covers the use of Omniscop and its various tools and features. It is assumed that the reader has already installed and activated Omniscop. For instructions on installing Omniscop, please refer to the Omniscop Manual.

Omniscop's software is not intended to run without the hardware connected. This guide may be difficult to follow without first connecting the hardware. Some features described in this document may require an additional subscription.

Top Menu

Connect

USB is the only valid connection option for now. A **Cloud** connection will be available in the future, which will allow a technician to connect remotely to an RV-C network using a temporary access code granted by the RV owner.

Modules

Run Unlisted Module and **Run Selected Module** are duplicates of options found in the lower right pane. They will be addressed in that section.

Open External Module Folder opens a browser window where the user can browse to an unlisted module.

Quick Script offers building blocks to quickly build scripts for programming and product development.

Network Monitor offers a technician a birds-eye view of the network traffic. Each Source Address is assigned a unique color and arranged in numerical order on a grid of 256 squares. Below this grid is a real-time graphical tally of RV-C messages. This shows all messages on the RV-C network color-coded by Source Address.

On the right side of the window, the Network Monitor displays overall traffic and traffic for a specific device, when selected from the grid. Modules can be opened using the Run Module button, but a device must be selected from the grid first.



Network Monitor

Send Reboot Command offers a quick way to reboot a device. A device must first be selected from the list below.

Options

Updates: Omniscope may be set to update automatically or the user can update manually by selecting Update Now. When automatic updates are selected, Omniscope will attempt to update on the first run of the day.

Keys: Keys are used to activate Omniscope or certain modules or subscriptions within Omniscope. The user may add keys or change the key-file folder.

Connection Options: In most cases, USB Adapter Type should be set to OB. However, older Omniscope

hardware may need to be set to FT. Data Rate should be set to 250 kbps for RV-C.

Advanced Options: Mute Mode allows a technician to suppress messages from Omniscope. This should not be used during normal Omniscope operation but can be helpful when trying to isolate or analyze specific message types on the network. Echo Tool Transmissions to Modules allows messages sent by Omniscope to be seen in network logs. Support Legacy DM1s and Show Phantom Devices allow non-compliant messages and devices to be seen. A Phantom Device is one which does not properly identify itself, and thus may not always be visible on the network, but may still be generating traffic.

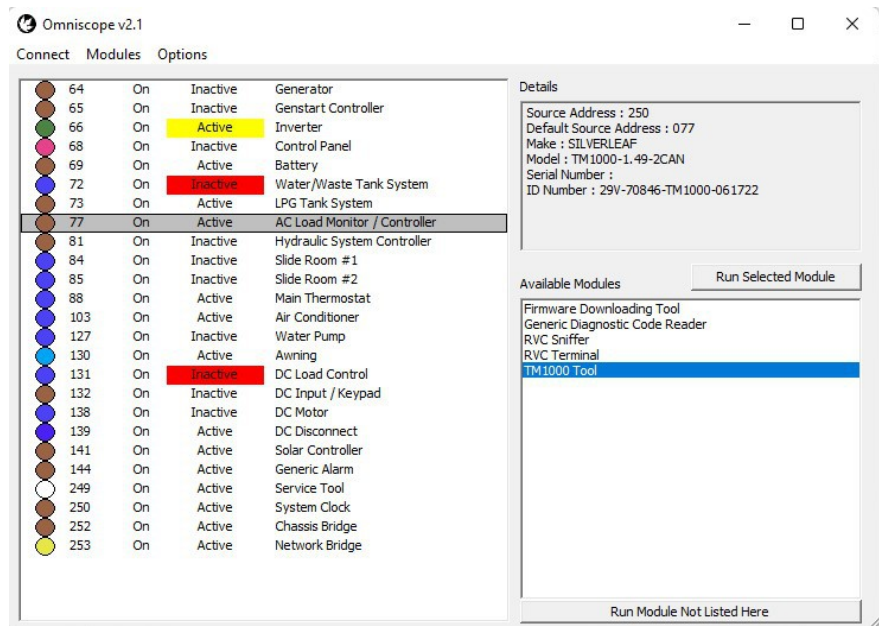
Main Window

Device List

The left pane of the main Omniscope window lists all of the devices seen on the network. Note that in most cases there will be more devices than nodes. This is because any given node device can report as several different virtual devices. Put another way, a single hardware module with a single Source Address (hereafter referred to as SA) can perform more than one function and have more than one Default Source Address (hereafter referred to as DSA). You may, for instance, find a hardware module that functions as both an awning controller and a lighting controller. In such a case, the module would have a single SA and two DSA's. To clarify in such cases, Omniscope color-codes all devices on the list by the SA. Note that these colors are consistent with those used in the Network Monitor. Since a color is statically assigned to a specific SA, it is possible for the color of a particular device to change on subsequent power-ups or on other networks. This can happen when there is more than one device trying to claim an address within the same range of addresses.

Details

In the example seen here, there are 11 devices listed which all come from a single hardware device. Because they are all coming from SA 250, they are all preceded by a brown dot. Clicking on one of these devices displays more detailed information in the upper right **Details** pane of the window, including SA, DSA, Make, Model, Serial Number, and ID Number. Note that each of the devices preceded by a brown dot in this case would have identical information in this pane, except for the DSA.



Main Omniscope Window

Available Modules

Because each of the devices of the same color come from the same SA, clicking on any one of those devices will bring up the same list of software modules in the **Available Modules** pane. In this case, our device (SA 250) acts as a Genstart Controller, among other things. If a technician needed to change a setting related to the Genstart Controller, the relevant tools would be listed in the Available Modules pane even if the technician selected Solar

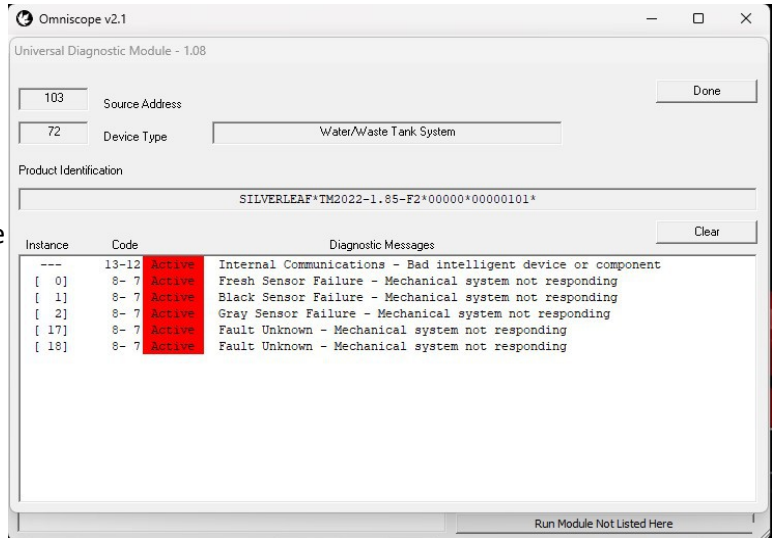
Controller from the device list. Some common modules will be presented in detail later.

Generic Tools

Generic Diagnostic Code Reader

Looking again at the device list, we can see the DSA for each device in the second column. Continuing to the right, each device also has an On/Off and Active/Inactive status. Some devices may have their status highlighted in either yellow or red, indicating a warning or fault status, respectively. Double-clicking on the **Generic Diagnostic Code Reader** in the Available Modules pane will open a new window displaying additional information about the warnings or faults. The relevant device must first be selected in the Device List.

In this example, we can see several faults relating to the Water/Waste Tank System. In this example, this is a function of the SilverLeaf TM-2000. Notice in the upper left corner of the window that the SA and DSA are listed again, followed by the Product ID. All of the faults seen here were caused by a loss of communication with the tank sensors.

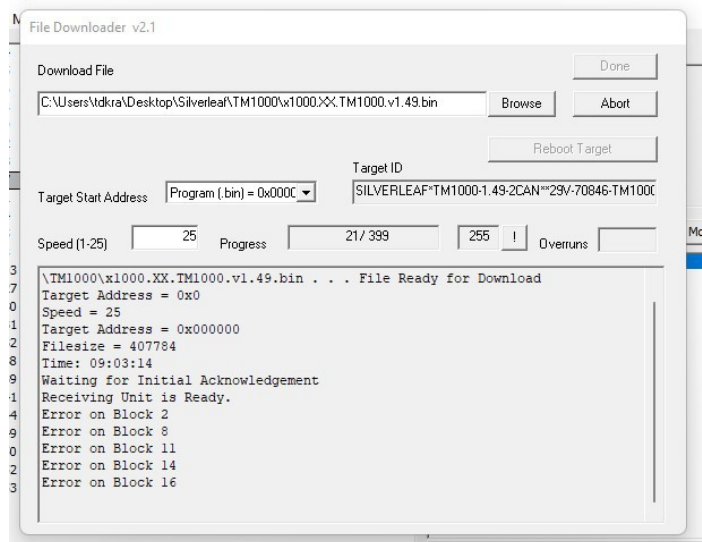


Generic Diagnostic Code Reader

Firmware Downloading Tool

Many SilverLeaf products, including nearly all of the recent products, can receive firmware updates through Omniscopes. This is accomplished by sending proprietary messages over the network. Firmware is broken into many small packets and broadcast one at a time and stored in cache until the receiving product has all packets. All other modules will continue to function normally during this process. Because of this, there will be an increase in network collisions, but RV-C devices are designed to handle these collisions without conflict. These collisions do, however, prolong the programming process. When convenient, it can be helpful to unplug or otherwise disable other modules in order to reduce traffic on the network. This can shorten the programming process significantly.

Upon opening the **Firmware Downloading Tool**, you will find a text field for entering the path of the new firmware file. Click the Browse button and navigate to the file you wish to upload. Below this field is a Target Start Address option. This has been used for product development in the past but has no application for the technician. Continuing



Firmware Downloading Tool

downward, you will see a Speed setting. The default value of 25 will usually produce the fastest results. There may be cases, however, when high network traffic causes excessive collisions. In such cases, selecting a lower speed can actually improve the programming speed by reducing the number of collisions.

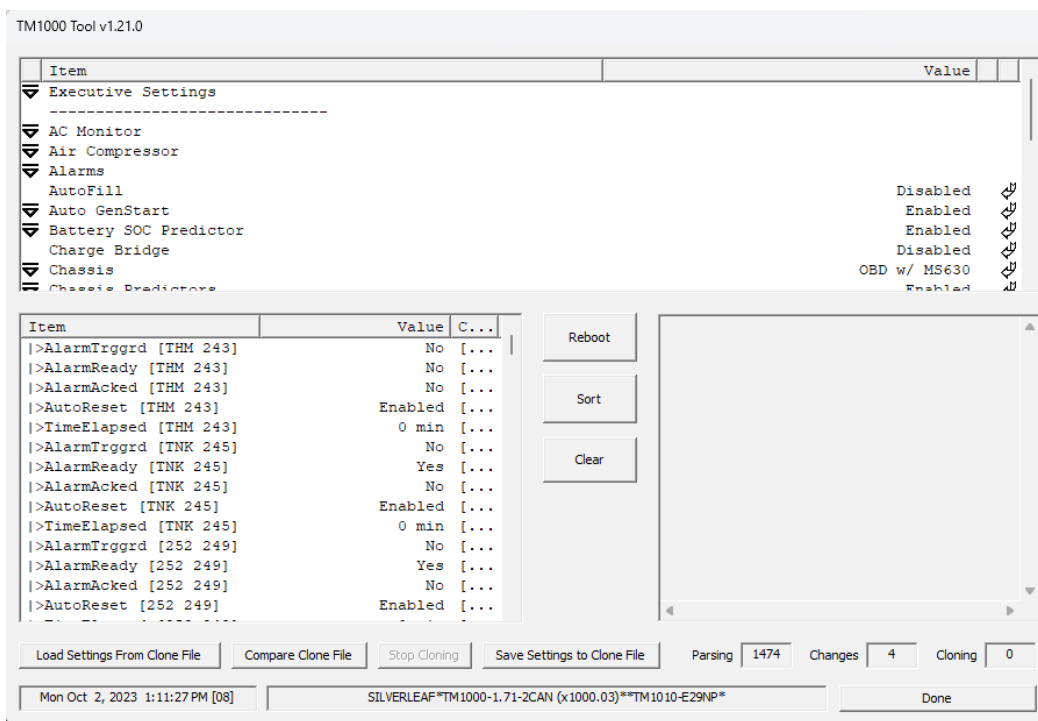
Once the file to be uploaded is selected, Press the Start button. The progress counter will display the number of blocks successfully programmed and the total number to be sent. During the programming process, you will see “Error on block xxx”. This is normal and simply means that there was a network collision while sending that block. The program will keep trying until that block succeeds. If there is an excess of collisions, you may want to decrease the speed or disable one of the other devices on the network. You may also see “Timeout on block xxx”. This is also normal. As before, the program will keep trying until it succeeds.

Once all blocks have been sent, the programmed device will transfer the new firmware to permanent storage and you will see “Download has succeeded”. At this point, you will need to reboot the module by pressing the Reboot Target button. Returning to the main Omniscope window, you will now see the updated firmware version in the Details pane.

Device-Specific Tools

Each SilverLeaf device has its own tool for cloning and configuration. Because the operating parameters and settings are different for each device, there is no single tool that will work for every device. There are also tools for products made by other manufacturers. If you don't have the tool you need, contact SilverLeaf for availability.

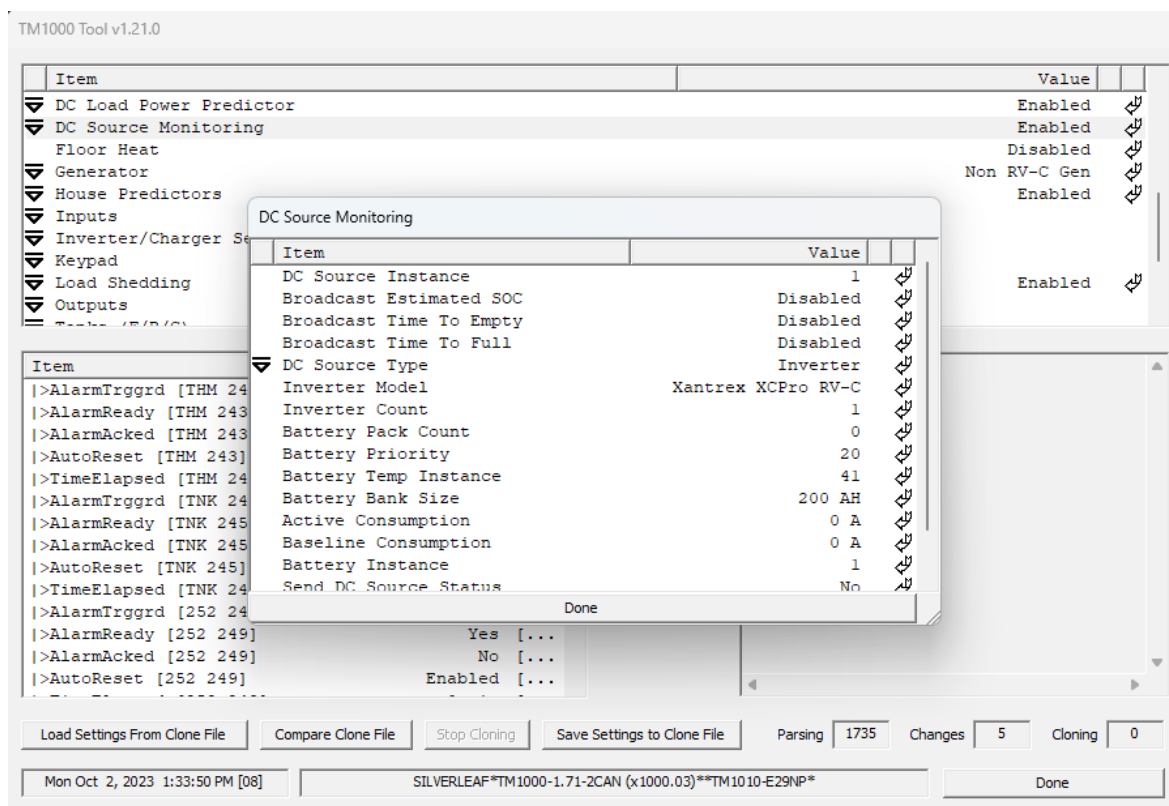
After selecting a device in the Device List, an associated tool will likely be listed in the Available Modules pane. If it is not, you can navigate to the desired module by pressing Run Module Not Listed Here. If the module in question is expected to show up in the Available Modules pane, remedies are described below in the **Modifying .RVC Files** section.



TM1000 Tool

Because of the scope of differences between device-specific modules, we will not attempt to cover the tools in their entirety. Instead, we will focus on items that are common to all device-specific tools. It will be the task of the technician to become familiar with the various settings available within each tool, though a SilverLeaf technician will be happy to help locate a specific setting.

Though there are a few deviations, especially among tools created for other manufacturers, we will present the most common format for these tools. Upon opening a device-specific tool, you will see three panes. The top pane contains all of the configurable settings access. All settings are organized in hierarchical drop menus, which can be opened by clicking on the arrow next to the group of settings. Opening a group will bring up a new window with additional drop menus and individual settings which may be changed.



Changing Settings in a TM1000 Tool

To change a setting, double-click on the setting value and enter the desired value. Some settings may have a set of selectable values. After changing a setting, it is often necessary to reboot the device in order to see the changes.

The lower left pane is an RV-C Sniffer for the device, which displays all data points that the device is broadcasting. When searching for a specific datum, it may help to press the Sort button to list the data alphabetically. The lower right pane is a message window, which is mostly used for displaying cloning progress and results. A Clear button is also included, which wipes the Sniffer pane clean, meaning that whatever data is displayed after that is fresh.

Along the bottom of the window are four buttons related to cloning a device. Unless the module has custom settings or the customer is requesting custom settings, it is usually best to load a factory clone file rather than changing individual settings. A clone file will overwrite any custom settings that may exist. Modules such as the TM1000 or TM1010 may have settings that should not be overwritten, such as generator hours. In such cases, it

is a good idea to make a note of these settings before cloning so that they can be adjusted afterward.

Cloning a Device

Cloning a device means loading a list of settings all at once. A clone file is a simple text file which can be opened and edited in a text editor like Notepad. Though it is not usually advisable to use modified clone files, they can be useful in some circumstances. We will cover this in the **Modifying Clone Files** section.

To clone a device, press the Load Settings From Clone File button. A file explorer window will open to allow you to navigate to the clone file you wish to load. Once you click Open, the file explorer window will close and the cloning process will begin automatically. The lower right pane of the tool will display the progress. If the clone file was created with a different version of the tool, you may see some errors. This is because certain settings may have been added or removed depending on the tool version. When this happens, it is a good idea to look through the errors to make sure none of the invalid or missing settings are relevant. As an example, you may be working on a unit that does not have automatic shades, which have consequently been removed, but the clone file was created prior to that change. In this case, you will see several errors because of missing shade settings.

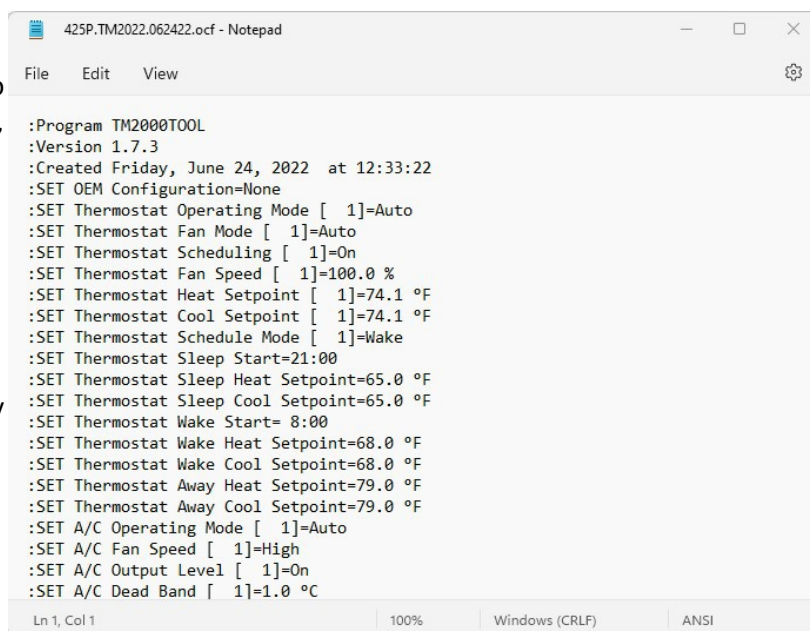
During cloning, it is normal for the subject module to reboot several times. In many cases, this goes unnoticed, but it can be a source of concern when cloning an HVAC controller, as the air conditioners will cycle on and off multiple times. Once the cloning process has completed, the lower right pane will display a Pass or Fail message.

At times it may be useful to determine the differences between a clone file and the current settings on a module. This can be accomplished by pressing the Compare Clone File button. As before, a file browser window will open and you will be able to select a clone file. After opening the file, the tool will step through the clone file line by line but without writing any of the settings to memory. The lower right pane will display the progress and show which settings are mismatched. For clarity, it will also display the value currently in memory and the value taken from the clone file for each of the mismatched settings.

If you have made changes to a setting in the module, you can also back up those settings by creating your own clone file. This is accomplished by pressing the Save Settings to Clone File button. You will be asked to name the new file in a file explorer window. After pressing Open, all current settings will be written to the new clone file. If you wish to verify that the new file was saved properly, you can use the Compare Clone File function on the file you just created.

Modifying Clone Files

There may be times when a technician wants to directly modify a clone file. Since it is a simple text file, this can be done very easily through a basic text editor such as Notepad. Though it is usually advisable to save a new clone file from the tool rather than directly editing, there are a few exceptions. For instance, you may want an alternate clone file that skips the Generator Run Time setting so that you



```
425P.TM2022.062422.ocf - Notepad
File Edit View
:Program TM2000TOOL
:Version 1.7.3
:Created Friday, June 24, 2022 at 12:33:22
:SET OEM Configuration=None
:SET Thermostat Operating Mode [ 1]=Auto
:SET Thermostat Fan Mode [ 1]=Auto
:SET Thermostat Scheduling [ 1]=On
:SET Thermostat Fan Speed [ 1]=100.0 %
:SET Thermostat Heat Setpoint [ 1]=74.1 °F
:SET Thermostat Cool Setpoint [ 1]=74.1 °F
:SET Thermostat Schedule Mode [ 1]=Wake
:SET Thermostat Sleep Start=21:00
:SET Thermostat Sleep Heat Setpoint=65.0 °F
:SET Thermostat Sleep Cool Setpoint=65.0 °F
:SET Thermostat Wake Start= 8:00
:SET Thermostat Wake Heat Setpoint=68.0 °F
:SET Thermostat Wake Cool Setpoint=68.0 °F
:SET Thermostat Away Heat Setpoint=79.0 °F
:SET Thermostat Away Cool Setpoint=79.0 °F
:SET A/C Operating Mode [ 1]=Auto
:SET A/C Fan Speed [ 1]=High
:SET A/C Output Level [ 1]=On
:SET A/C Dead Band [ 1]=1.0 °C
Ln 1, Col 1 100% Windows (CRLF) ANSI
```

Inside a Clone File

can clone a TM1000 without overwriting the generator hours. This cannot be done from the tool because it automatically saves the Generator Run Time setting to the clone file. With the clone file open in a text editor, you can either remove the line with that setting or tell the tool to ignore that line by typing `[#` at the beginning of the line.

Once you have made the necessary changes, save to a new file and choose a name that indicates that it is modified. Be aware that the above example will cause an error during the cloning process because the tool is looking for the setting which you have removed.

RVC Sniffer

Each of the device-specific tools has a built-in RVC Sniffer, but there is also a standalone RVC Sniffer tool. This tool is able to display more data at once because the technician can enlarge the window, making it easier to find a specific datum or set of data. It also has the ability to export the data to a text file for analysis. As with the tool-bound Sniffer, the standalone Sniffer has buttons for Sort and Clear.

RVC Terminal

Each SilverLeaf device has an RVC Terminal, which allows a technician to send commands directly to a device. It is beyond the scope of this document to list each available command, but upon opening the RVC Terminal, typing `?` will bring up a list of available commands for that module. One thing worth noting is that some modules have data-logging ability. Typing `log` will print the entire log, which can be excessive and, in many cases, too long for the terminal to display entirely. Instead, you may want to limit the lines printed by typing `log-100` to display only 100 lines from the log.

Run Module Not Listed Here

If the desired tool is not listed in the Available Modules pane, pressing **Run Module Not Listed Here** will open a file explorer window which will allow you to browse to the desired tool. This is the same function as the **Run Unlisted Module** option in the Modules tab at the top of the Omniscopes main window.

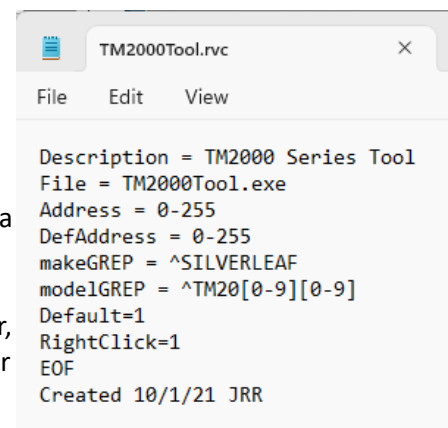
Run Selected Module

Clicking on Run Selected module opens the currently highlighted module from the list of available modules. This is the same action as double-clicking on a module in the list.

Modifying .RVC Files

A `.rvc` file is a text file that tells Omniscopes what devices should be associated with a particular tool. Each tool has its own `.rvc` file, which has the same name as the tool but with a suffix of `.rvc` rather than `.exe`. Both files must be placed in the same folder within the Omniscopes directory. If a tool does not show up in the Available Modules pane, it may be because the associated `.rvc` file is missing or incorrect. The best option in this case would be to contact a SilverLeaf technician to get the correct file. However, if a technician is working in an area with no access to email or poor cellular reception, the `.rvc` file can be created or modified.

If the desired tool is not shown in the Available Modules pane, open a file



```
TM2000Tool.rvc
File Edit View
Description = TM2000 Series Tool
File = TM2000Tool.exe
Address = 0-255
DefAddress = 0-255
makeGREG = ^SILVERLEAF
modelGREG = ^TM20[0-9][0-9]
Default=1
RightClick=1
EOF
Created 10/1/21 JRR
```

Inside a .RVC File

explorer and browse to the Omniscop directory. The tool's .exe file will likely be located either in the top Omniscop folder or in the SilverLeaf Tools folder. If the file is missing, you can make a copy of a similar .rvc file for another tool and rename it to match the target tool. Then, open the new file in a text editor and modify the parameters. In most cases, you will only need to change the lines **Description**, **File** and **modelGREGP**. Description can be anything you want it to be, but File must match the name of the tool exactly.

The modelGREGP line may include a set of wildcard characters, but these are not necessary if you only want to associate the tool with a specific variation of a device. In the example here, the line reads **modelGREGP = ^TM20[0-9][0-9]**. This allows the tool to be associated with any variant of the TM2000, including the TM2020 and TM2022. The wildcard characters specify that the last two characters of the model name may match any number from zero to nine. To specify a more limited set of wildcard characters, replace the 0-9 with the desired options, such as **modelGREGP = ^TM202[014]**. You can also write it as **modelGREGP = ^TM2020** if you only want the tool to be associated with the TM2020. When modifying an existing .rvc file, you may wish to retain the original value on one of these lines in case you make a mistake or want to be able to revert it to the original value. In such cases, you can make a duplicate line for editing and disable the original line by typing **!#** at the beginning of the line. Omniscop will then ignore that line.

Service Tool

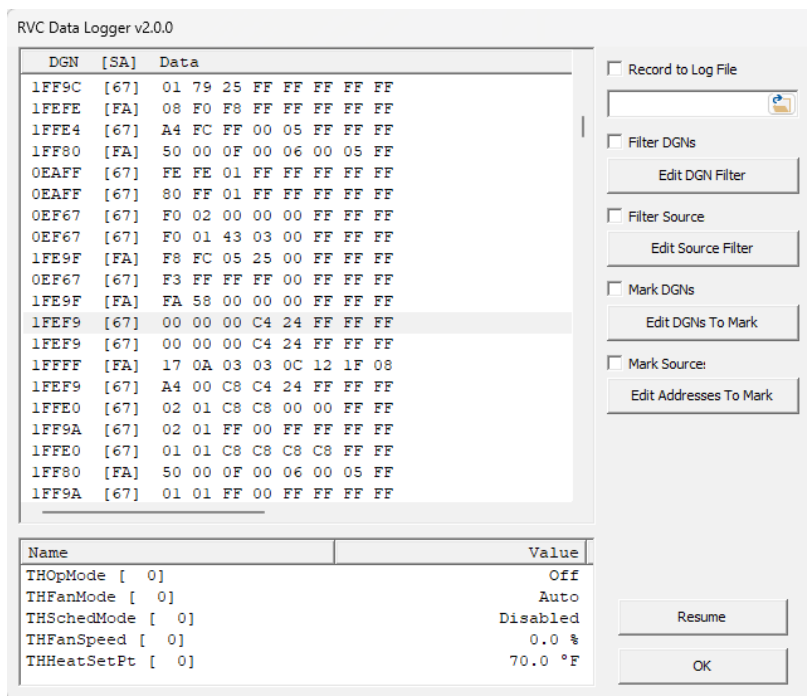
On the Device List in the Main Omniscop Window, you will find a device called **Service Tool**. In a sense, the Service Tool is treated as a separate device encompassing the entire network, with its own unique set of tools. As expected, these tools affect the entire network, with the exception of the RVC Sniffer, which acts as a Sniffer for Omniscop itself. **Some tools or features may require an additional subscription.**

RVC Datalogger

The **RVC Datalogger** gives the technician the ability to view, analyze, filter, and export all traffic on the network.

The top left pane of the Datalogger shows all messages in their raw Hex form along with the DGN and SA. Clicking on one of the messages will parse the data and display it in the lower pane. Because of the speed at which messages are sent, it can be difficult to follow the data. For this reason, there is a Pause/Resume button in the lower right corner.

To record the traffic to a log file, first click the Browse button in the upper-right text field and assign a name to the new log file. Once a file has been created, click the Record to Log File check box. The Datalogger will automatically write all incoming messages to the log file until the Record to Log File check box is unchecked or the tool is closed. A companion tool, the Datalog Playback Tool, can be used to view and analyze a previously



RVC Datalogger

recorded log.

Since we are often only interested in specific messages or data from a specific device, the Datalogger allows the technician to filter traffic by DGN's or by SA's. This simply requires the technician to click the box marked Filter DGNs or Filter Source. By default, none will be selected, so you will need to click on Edit DGN Filter or Edit Source Filter and choose one or more of the options. Once you have selected the desired DGN or SA, only the traffic matching those parameters will be displayed.

You can also mark DGN's or SA's using the same process with the corresponding check boxes and buttons. This will highlight the matching DGN in the display pane.

Datalog Playback Tool

The **Datalog Playback Tool** allows the technician to view and analyze a previously-recorded log file from the RVC Datalogger. At the top of the Datalog Playback tool is a text field and a Browse button for selecting a **.log** file for analysis. When the file opens, the tool will display all messages contained in the file. Double-clicking on a message will open a parser window displaying the data contained within the message.

A series of check boxes in the upper-right corner of the tool allow the technician to use the tool as a simulator. After checking the Run box, click on any of the messages in the display pane to begin playing the log. Check the Transmit button to transmit each of the messages onto the RV-C network, if Omniscopie is connected to the network. By default, the tool will only play through the log once. To replay the log indefinitely, check the Loop box. In some cases, relevant messages are not transmitted frequently enough for the purposes of a simulation, so it is often useful to check the Fast box, which will speed up the rate at which the tool steps through the messages in the log. Checking the Sim Receive box will cause Omniscopie to only transmit the log to itself and not broadcast onto the RV-C network.

Simple Message Sender

The Simple Message Sender is a tool for directly broadcasting RV-C messages. This tool is not typically used for diagnostic purposes and is better suited to product development. Its use requires an extensive understanding of RV-C programming, which is beyond the scope of this document.



Simple Message Sender