



**Technician Manual**  
**v2.3**



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## Installation

Before File installation, see the important note on pg.6 under the heading: “Starting Omniscope.”

### *File Installation*

Omniscope does not require a special installation program. The files should just be copied to a folder named “Omniscope.” Other folders will be added to this over time such as additional “Scripts”, “Clones” and “BINs” --for creating a 'copy' of a units' settings for use later and for software (**binary**) files you download when updating a Box or screened-unit\*\*.

#### **Method A:**

From CD: Copy the “Omniscope” folder to [C:\](#) --Not to your desktop or “My Downloads” --When you need phone help in the future, it will be very difficult if the system is not in the right place.

#### **Method B:**

Install from the internet by downloading the files directly to the folder “C:\Omniscope.” This internet distribution is compressed. What happens when clicking on the link depends on your Windows version and browser.

1. If it pops up a box giving some options, choose the default of “Open with Explorer” then wait a bit for the download to start and for the next step. Next a window opens showing a single, decompressed, file folder. Copy that folder to your C:\ drive. You're mostly done. --or--
2. If, when clicking on the download link, the download starts but minimizes, its likely dropping it automatically in your Downloads portion of your 'Documents.' Your browser may have a link at the bottom of the window showing its progress and link. Click that link to be taken to the compressed folder.

Click on that file “Omniscope\_CD\_Image(date).zip” either with a <right click> and selecting *Extract All* or Select it and press the Top Bar menu item “*Extract.*” Choose a location of “C:” (or “Windows C:\”), select “*Extract All*” as a folder named “*Omniscope.*” The goal is to have an Omniscope folder here: C:\Omniscope

Finally, create a “shortcut” for Omniscope from the C:\Omniscope folder.

#### **For the Desktop:**

<Right-click> on the Omniscope Shortcut (located now in C:\Omniscope) and select <Create Shortcut>

Next, Copy the shortcut to your desktop. You may rename it.

#### **For your Task Bar:**

<Right-click> on the Omniscope Shortcut and select <Pin To Task Bar> This is a great way to always have it available, without having to minimize or hunt around.

\*\* “*Screened Unit*”: Any Silverleaf product with display ie Glass Dash, HMS360/365, VMS440...

### **Driver and Key Installation**

Before you can use Omniscope you must first install the USB driver for the adapter. Plug the USB-to-RV-C adapter into the USB port of your laptop. Within a few seconds the computer should detect the adapter and start the “Add New Hardware” wizard. The wizard will prompt you for the location of the driver file. Click on the Browse button and point the wizard to C:\Omniscope, or if you are installing from the CD you can use the driver files on the CD.

This may also be accomplished by running the App “Install\_Drivers.exe” **Reboot to finish.**

**Once rebooted** you're ready for the 'Key' entry. Note: Your key, a 26-character code, may have been pre-loaded with your included-CD, if so, no intervention is required. If it wasn't included—or if you've just downloaded the latest distro or are maybe starting over, the 'key' will need to be added manually. You'll know the key by its length and jumble of letters, symbols and numbers; its on the label located on the little black “Apox” box—the one with the USB cord.

To Add a key manually: Open the Omniscope program. If you're greeted with the error “No Adapter Found” return to the previous steps for installing the driver. [Call us if you get stuck here.](#) Otherwise, click on <Add Key> (top right corner) and type in the key. Type it in *exactly* then click <Add> then <Done>. Clicking <Done> first means you'll be re-entering the key :-/

The keys are all based on the serial number of the USB-to-RV-C adapter. If your shop is using multiple adapters, you can enter keys for all the different adapters on all the different computers so you don't have to worry about which computer is being used with which adapter. The keys are stored in a file called “key.txt” which can be shared among all the computers in the shop. Thus you can install OmniScope and its modules on any number of computers, as long as you have at least one valid adapter and the proper code.

*Lost your 'sticker' and don't know the code? Call us; we'll recreate it for you while on the phone.*

## Updates And Scripts

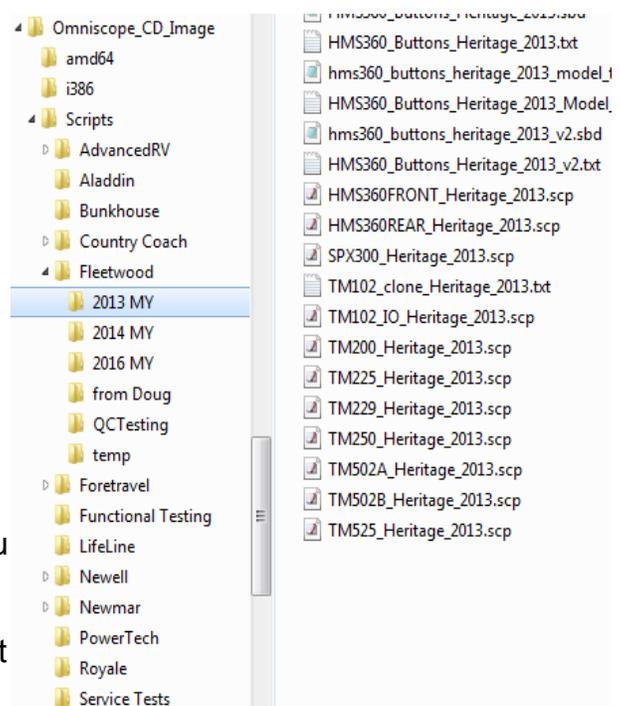
SilverLeaf deliberately designed OmniScope to make it as simple as possible to update the system and download new modules. To update any of the modules, scripts, or files, simply download or copy them into the C:\Omniscope folder you created. There are no other installation programs to run. Drop modules into the main Omniscope folder.

Manually drop Scripts into a folder this way:

C:\Omniscope  
 ...Coach (Fleetwood)  
 ... .. year (2013)  
 ...TM/VMS unit (ex. TM250)  
 ...Special Purpose (Tests) or unique script.

This way the Coach scripts are easy to find. Also, individual units' scripts and those for testing may be found quickly.

Its here where you'll also save a “Clone” for when you want to create a script to duplicate settings for a very specific coach or unit. This is also helpful for when, as in a HMS unit, the settings are tailored by the owner but must be the same at each Control Panel.



The ones shown, at right, are typical. More about this later on. First, an Introduction and Overview...

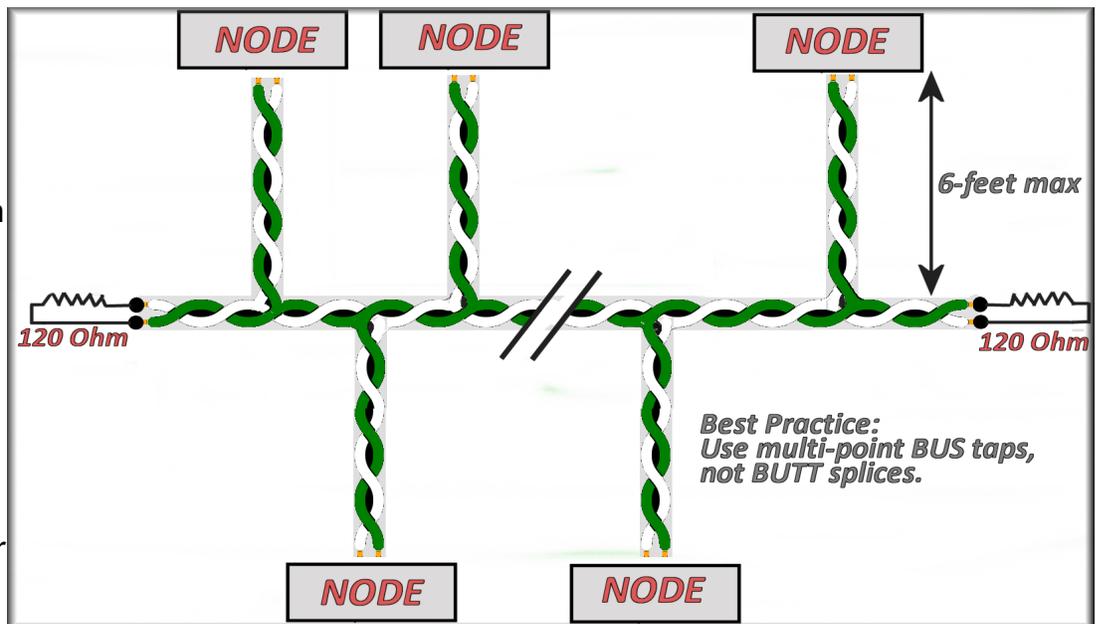
## Introduction to RV-C

The network or 'Can Bus' for RVs is called RV-C. It's a standard for RV appliances to talk to share information, provide diagnostic data, control and be controlled. It is a "peer" network, meaning every appliance (black box/ display), or "node", is equal in the eyes of the network. A typical network will consist of at least one or two control panels, one multipurpose controller, and any number of appliances such as inverters, generators, and slide rooms. All the data is shared digitally using a single pair of wires.

These two wires form a "bus", connecting each node. The "trunk" of the bus may be quite long, but the "drops" (lines from trunk to node) are limited to no more than six feet in length. At each end of the trunk is a 120 ohm resistor connecting the two data lines. These resistors absorb any "ringing" on the bus.

Each factory RV-C-equipped coach should include a nine-pin circular connector, located either under the dash or in the utility bay. This connector allows the service tool to tap into the network and become another node in the system.

*In the event one wasn't added, a 'T' or bus-tap must be used to 'tap in.'*



**Helpful Hint:** When you do an RV-C conversion, include one or two of these sockets to make installation and maintenance easier. You will likely see this coach again; make it easier now.

Once connected, the service tool can send commands and ask for data from every node in the system. *At this point, you may want to skip directly to "Starting Omniscope." ...otherwise...*

Nodes send commands and messages in small packets. Each packet can contain several pieces of data - for example, temperature, current, and voltage. Each packet is identified by a Parameter Group Number, or PGN, and you can determine the contents of the packet by looking up the PGN in the RV-C documentation. Some PGNs are unique to a certain type of product - e.g. Slide Rooms use a PGN called SLIDE\_STATUS. Some PGNs are common to all products - e.g. the PRODUCT\_ID PGN is universal to all RV-C devices. For the most part you don't need to know the details of the PGNs to troubleshoot a network. It's the software's job to parse these packets of data into meaningful values on your screen.

One of the most important PGNs, which is common to all RV-C nodes, is the DM1, or Diagnostic Message. This message is sent by all nodes to communicate general operating status and whether any problems have been detected.

Each node has a Source Address, which is used simply to make sure no two nodes talk at the exact same time. But a node may have more than one function - e.g. an inverter/charger is both an Inverter and a Charger. These multifunction nodes may display multiple DM1 messages. For example, the Charger may be Off, while the Inverter is On and displaying a Low DC Voltage warning. Each DM1 is distinguished by a DSA, or Default Source Address, which shows which function is being described in the message.

## Starting OmniScope

This is an advanced tool capable of helping the technician troubleshoot, service and configure RV-C based equipment. Make sure you understand the potential outcome before making changes with the Omniscope.

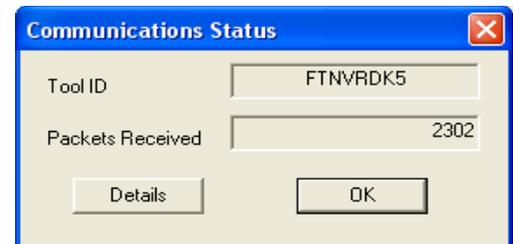
Plug in the USB-to-RV-C adapter into the PCs' USB port. When starting the program you may see "Tool Not Responding" message. This can be caused merely by unplugging the adapter unexpectedly, and is not necessarily a real problem as the program often can find the adapter on a second try. If it can't, the program will abort. Make sure the adapter is plugged in and try again.

### Checking The Adapter

The adapter has four LEDs, two green, two red. When you first plug it in you should see just one green LED flashing. If not, then the unit is not receiving 12Vdc power - check the cable and the port for problems.

Once the OmniScope program has initialized the adapter, rapid flashing will stop. Instead the LEDs will start flashing with each data packet that it sends and receives on the data bus. *If you have not yet plugged the adapter into the RV diagnostic port there should be an initial few flashes and not much else.* When you plug it into the RV you should start seeing lots of activity.

You can verify this by clicking the Statistics button in the OmniScope program. This should bring up a box showing two items. The Tool ID is an eight-digit serial number for the adapter. Packets Received is the number of packets seen so far on the network. This number should be constantly increasing. If not, exit the program and start again just to be sure the problem wasn't the tool initialization. If it still doesn't work, you must start troubleshooting the physical wiring.

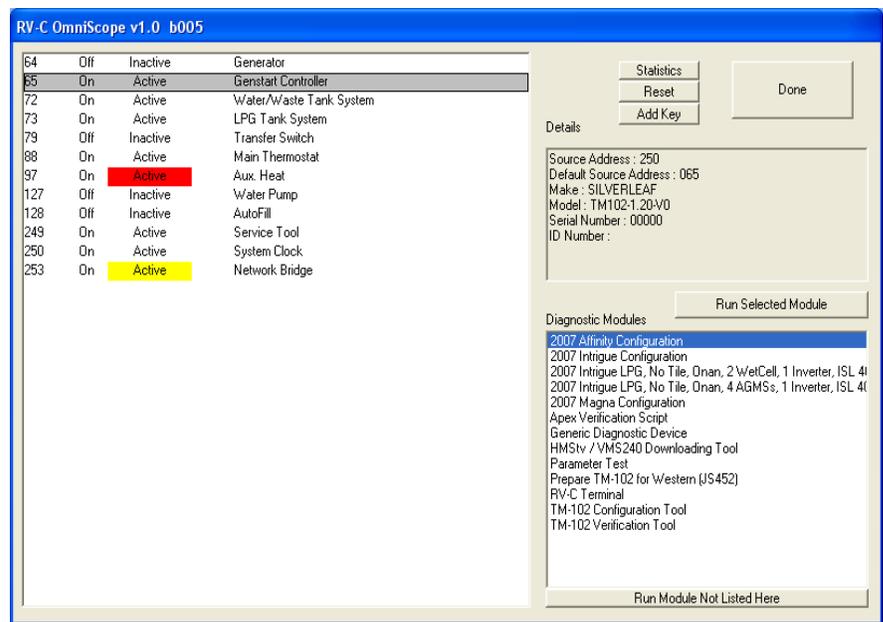


### Running the OmniScope Program

OmniScope itself is a very simple program. It merely provides a general overview of the status of the nodes on the network, and it provides a way to run other programs called "modules". It's the modules that do most of the real work - OmniScope itself is simply a starting point.

The OmniScope screen shows three boxes. On the left is the "Device List" - a list of every "device" that has been detected. Keep in mind that one node may include several functions - each function will show up as a different device.

For each device OmniScope lists the DSA, or Default Source Address. This code merely identifies the function of the device - e.g. generator or inverter. Next it lists the general operating status, "On" or "Off", and "Active" or "Inactive". For example, the charger may be "On" but "Inactive" if no AC power is available for charging. The status may be highlighted in red or yellow if some sort of problem is being reported by the device.



The Device List (left side) will always include at least one item: the Service Tool itself.

To the right of the Device List is a Details box. If you click on any device, the Details box will provide additional information on that item. It will show the actual Source Address of the device, and more importantly it will show whatever Product Identification information the device will provide. This may include manufacturer, model, and serial number.

In the lower right is the Module List. This box shows all the modules available as identified in your Omniscope directory--and that might apply to that particular device. For example, clicking on a *Control Panel* a SilverLeaf HMS365 control panel may present at the right side with such modules as the *Universal Diagnostic Device*, *RV-C Terminal* and the *HMS360/365 Configuration Tool*. Clicking on an *Genstart Controller* (TM102) would bring up a different list of modules though would still include an RV-C Terminal. Many tools are universal and very useful.

### The Reset Button

Clicking this button will clear out the Device List and cause the program to start over again. This is occasionally useful when disconnecting and reconnecting nodes, and when switching RVs.

### Quitting

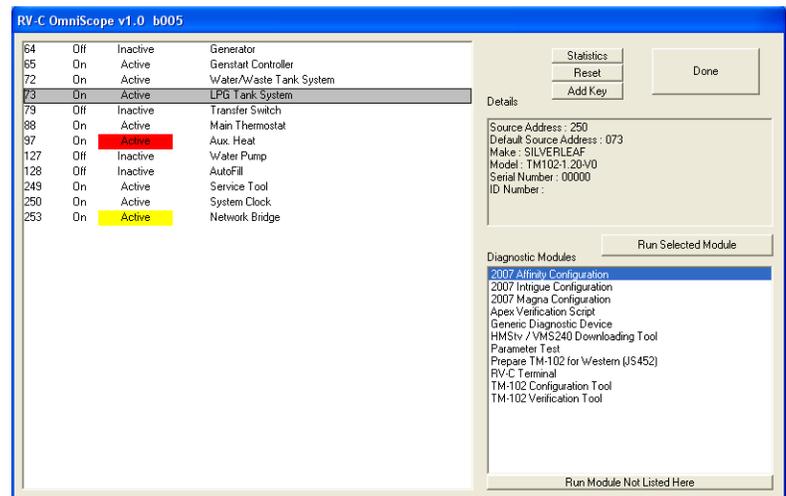
To quit, click the “Done” button. However, the button will not be accessible ( 'greyed out' ) if there are any modules still open. You must exit all other modules before OmniScope will let you shut it down. ***In the event—though rare—the remaining open module is hidden or can't be closed, use the keyboard shortcut: Alt+F4 to close the process “OmniScope.exe”*** Restart the Omniscope program and continue otherwise normally.

## Running Modules

When you select a device from the Device List, the Module List will show all the modules that are installed on the computer that are relevant to that device. Double-click on any module, or select a module and click on the “Run Selected Module” button.

Modules can be either scripts or full-fledged programs. A program can have almost any conceivable purpose, and each such program should have its own instructions. The only limitation placed on a program module is that the program must be shut down before you shut down OmniScope. You can run more than one program at a time, and simply Alt-Tab or click the task bar to switch between different program modules.

If the module you need is not listed in the Module List, make sure the desired target device is selected in the Device List. Then click on the “Run Module Not Listed Here”. This will bring up a standard Windows File Selection dialog, and you can select the desired program (“.exe”) or script (“.scp”). If you do not select a device before starting the program or script, the module may not run properly.



## Running Scripts

A script may act like a devices' settings crib-sheet or a mini-utility though it's not really an independent program. Only one script can be run at a time, and running a script does not open a new, separate program. A script is a set of instructions to be processed by OmniScope, typically the instructions are RV-C commands to configure or test devices on the network.

Simple scripts often run automatically, with little or no intervention from the user. The script will start by opening the Script Execution window. The top left box in this window provides information on the status of the script execution. The script writer may include various messages to provide feedback for the user.

The script may include pauses, where the script will wait for you to accomplish something and/or click a button, enter a term or name or just hit 'Enter' after a message is displayed. The Abort button will end the script. The Continue button will cause the script to resume processing. While the script is running you can click Abort to stop the script mid-stream.

Some scripts may include commands that require a specific response from the target device. In this case you may see the Retry button activate, meaning that the device has not responded as expected and you have the option of trying the command again. Clicking on Continue will cause the command to be skipped.

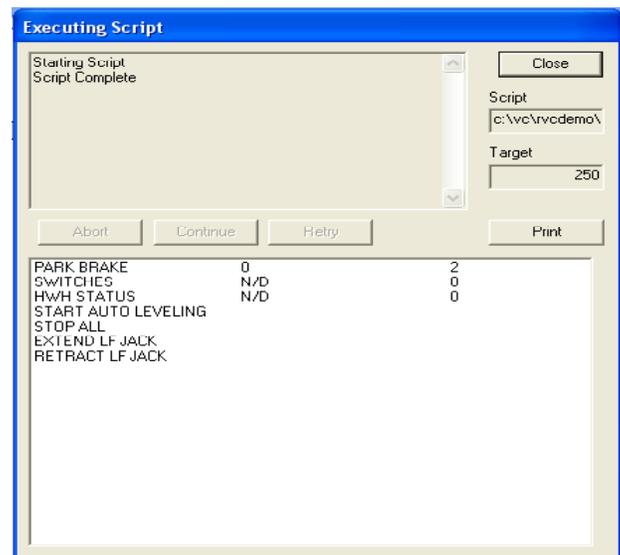
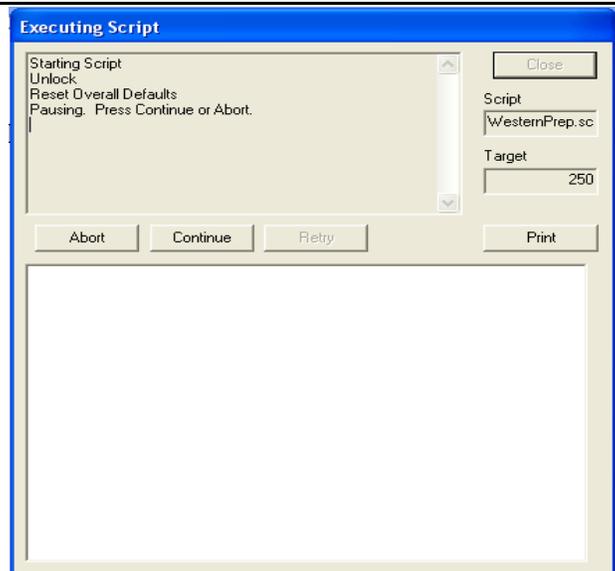
When the script is complete click on Close to close the window and return to the main OmniScope screen. Clicking on Print will print the contents of the status window to the default printer.

Some scripts require more intervention from the technician. Scripts can include menus. For example, a configuration script for a certain model of RV may require you to choose various options such as the model of generator or the floor plan of the RV.

Scripts can also feature displays of live network data. The box at the bottom of the Script Execution box is the "Monitor List". Scripts may put data items in that box, and the data items will continuously update with the latest values that appear on the network. Two numbers will appear next to the name of the data item. The number in the middle is the current value. This can be "N/D", or "No Data", meaning that the data item has not been detected on the network. It can also be "Err", meaning that the device sending the datum is registering some problem with the data item.

The number on the right is the number of times the datum has been seen on the network. Normally this should continuously count up. The speed depends on the type of data, and can vary from ten times per second to once every five seconds. In some cases the data is only provided on an "as needed" basis.

The Monitor List can also include lines with no numbers. These lines are actually "buttons" than can be double-clicked to trigger specific commands. The effect depends on the intentions of the script-writer. This technique is often used to provide a way to test various system functions, such



as starting the generator or leveling the RV.

A note on '**BatteryTest\_v1\_1.scp**' This tool is used to load-test a battery bank, revealing its actual Amp-Hour capacity. Like other modules, its opened by pressing the button "Run Module Not Listed Here" then navigating to the `c:\omniscopescripts\service tests` folder. Give the file a couple clicks in order to start or initiate it. Its important to note that this is not intended to be a comprehensive systems or inverter test, just battery capacity. Before the test begins, the secondary inverter needs to be, in fact, manually disabled. When the script prompts the tech to enter Script Parameters, this may include the Coach VIN/ SN or client; just something to make the file name unique.

When finished, it will a printable/ exportable text with complete test results. Afterwards, unplug any 'loads' added—such as a space heater or anything plugged in just for this test.

Special Scripts: Should you find yourself in need of a special testing 'program' —such as the Capacity/ Amp-Hour test, give us a call and explain how it should work. We may be able to devise such a tool.

The details of writing scripts is beyond the scope of this manual.

## **Specialty Modules and how to use them**

There's a collection of tools here which every tech will find indispensable. These Tools/ Modules are in a constant cycle of review for improvement. As such, expect to see these updated regularly. For example:

"RV-C Sniffer" See whats being broadcast; voltages, charge rate, temperatures, valve status...everything. Handy after a repair to check your work. Note: Has a Snapshot feature!

"Downloading Tools" Only used for dropping new software onto Silverleaf devices.

"Universal Diagnostics Device (module)" will display current errors and great for troubleshooting.

"RV-C Terminal" is used to send out commands and receive, essentially, hidden information such as a log file. With this you can dig into the specifics of a device or status.

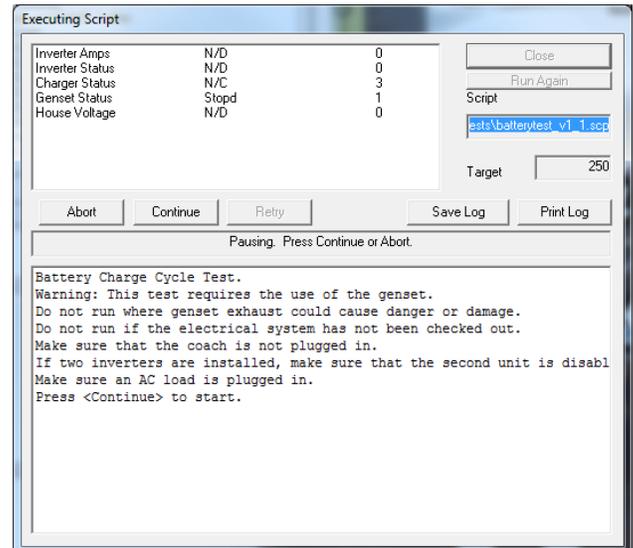
"Configuration Tool" -Need to change tank monitors or Inverter type? Start here. Most every device has a Config Tool and can often be used to 're-script' or clone a box.

### ***RV-C Sniffer***

This presents real-time traffic as 'sniffed' off the RV-C bus. It will also give the number of each message, allowing the viewer to see a struggling of faulty device. It also reveals any errors currently broadcasted and includes the ability to take a (text file) snapshot.

### ***Downloading Tools***

These are Software Programming specific and not usable for general use. With practice and experience one may order additional cabling and software to program our devices. This, however, is not for the average tech as there's a significant learning curve, even for the brightest. If you feel your business would benefit from being able to fully and completely service our equipment, give a call so that we may move forward with you.



## Universal Diagnostic Module

The Universal Diagnostic Module can be used to troubleshoot any RV-C device, regardless of the make or manufacturer. All devices that are fully RV-C compliant provide basic troubleshooting information that this module can display and interpret.

It is important to select the proper target device before starting this program. The module will provide information only for the selected device.

The module displays the Source Address for the target device, along with the Device Type (or DSA). The Device Type indicates generally what type of product the module is looking at. Note that sometimes a product may include several different devices. For example, a generator may include a “Generator” (DSA 64) and a “Genstart Controller” (DSA 65). One of these devices may be malfunctioning while the other is functioning fine. Or, one may have a problem linked to the other.

The module also displays the full Product Identification. This is a long string of letters and numbers separated by asterisks, and indicates the manufacturer, product model, and may include serial numbers as well. The details are up to each manufacturer.

The main window shows the diagnostic information, as provided by the device in the DM1 diagnostic message. The first three values, shown in brackets, shows the general status of the device. First, whether the device is On or Off. Second, whether it is Active or Inactive. Third, whether the device is in a “Yellow” or a “Red” fault condition.

The distinction between On/Off and Active/Inactive varies among devices, but most devices are either Off, On and Inactive, or On and Active. On and Active means it is fulfilling its designed purpose at this moment. On and Inactive means it is not producing anything at the moment, but it is prepared to do so at any appropriate moment - it is “standing by”. And Off means it will not do anything without some intervention (usually, but not always, from the user). Note that an item that is Off likely still has power - otherwise it couldn't tell the network that it was off.

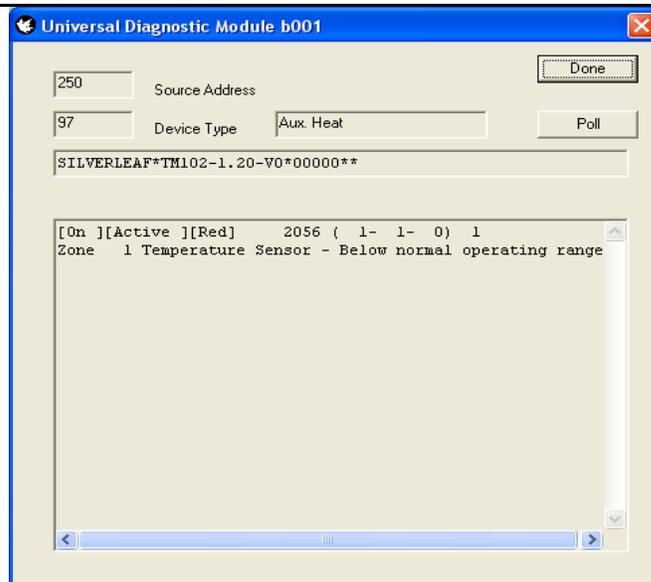
Generally “Yellow” faults are situations which can be remedied with only basic intervention, or have negligible effect on the operation of the device. A typical “Yellow” fault is low battery levels for an inverter. “Red” conditions are more serious, and generally require attention from a technician. These guidelines are subjective, of course, and manufacturers may interpret them differently.

The next item displayed is a number called the SPN, or “Suspect Parameter”. This number has two different forms, and the module shows both forms. In the raw form the SPN is just a number - in the example above it is 2056. In the parsed form it is a series of three numbers - in the example those numbers are 1, 1, and 0.

The interpretation of these numbers depends on the product. Most manufacturers provide a table of the SPNs for their device, and that table will indicate the proper form for that device. The distinction relies on whether the device is designed to allow multiple “instances” on the network. The parsed form allows the table to show which specific device the fault applies to. The raw form is used for products that can't have more than one installation on the RV.

Regardless of the form, the purpose of the SPN is the same. It identifies what component of the device is malfunctioning. For example, in a generator the SPN might refer to the oil pressure or tachometer. In a slide room the same SPN might refer to a proximity switch. Every different device has its own list of potential SPNs.

The last number (1, in our example), is the Failure Mode, or FMI. This number is universal



among all devices, and identifies the general nature of how the SPN is bad. For example, an FMI of 1 means “Below Normal Operating Range”, which would be a serious fault if the SPN is Oil Pressure.

Fortunately, the module automatically looks all this data up in its own tables, and provides the interpretation on the next line. This interpretation is general to all manufacturers, so it will not necessarily use the exact same terms as the manufacturer's documentation.

Normally the diagnostic information is sent automatically. If the device is not responding properly, clicking on the Poll button will request updated information from the device.

## Configuration Tools

### Warning:

Most configuration tools allow the tech 'back door' access to functions and settings deemed too specialized or dangerous for the casual user-owner to manage. These range from battery charge-bridge and GenStart to Tank monitoring, heater and burner controls to network addressing. Each of these may operate in real-time and a mistake or 'bad' setting has the potential to create havoc at best, confusion for other techs and damage to the equipment **and people** at worst. Do not change a setting unless you are sure of an appropriate, measurable outcome.

That said, the various configuration tools are set up uniquely, depending on the equipment they modify or manage. Many contain an option to “Save for Cloning”. Think of this as a way to 'fall-back' to prior settings or migrate the setup on a given Silverleaf box to its replacement or another coach. This is common when like-coaches are available for troubleshooting; a given unit in a known-good coach may be cloned and that newly created (txt) file can be used to overwrite a unit with known or suspected bad settings. Use this tool often, save the setting this way before troubleshooting. Plan-ahead for success.

## RV-C Terminal

This module is used to send messages and receive information such as a log or “records” file. Typing *help* on the command line will bring up a list of terms you can then use. Here's the most used and useful, along with some pointers:

all	= display CAN status
adc	= display analog counts
actinv	= display active inverter
batt	= display battery status ( Its just a snapshot )
can	= display CAN status
cbridge	= display chargebridge status
charger	= display charger status
clock	= display real-time clock
dev	= display device list
erase	= clear diagnostic messages <b>**WARNING**</b> This deletes the TM102 log file! <--
exec	= display executive status
ffmem	= initialize NVRAM
flash	= display flash status
gen	= display genstart status
io	= display I/O status
j1939	= display J1939 parsing info
log	= display diagnostic records. <b>log -50</b> = 50 records. Don't type the word by itself !
mem	= display memory size

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nrec	= display number of diagnostic records <i>Usually thousands long, Use this with log</i>
nvrnram	= display NVRAM content
onan	= display onan status
outback	= display outback status
parse	= parse RV-C message
peek	= display memory contents
port	= display I/O port status
reset	= reset NVRAM to factory defaults
send	= send RV-C message
ser	= display serial status
surge	= display surgeguard status
tank	= display tank status
therm	= display thermometer status ( If none are connected, expect an empty space )
ver	= display TM102 version
? or help	= display this help

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## Warranty

### **THIS WARRANTY IS EXPRESSLY LIMITED TO VERIFIABLE RETAIL BUYERS OF SILVERLEAF ELECTRONICS OMNISCOPE and OMNITOOLS.**

SilverLeaf Electronics Inc. Omniscope is warranted against defects in materials and workmanship for one year (12 months) from date of delivery. You, the owner, shall be responsible for and must prepay any shipping expense for return of the Product. This warranty does not cover any Omniscope tool that has been abused, altered, used for a purpose other than that for which it was intended, or used in a manner inconsistent with instructions regarding use. The sole and exclusive remedy for any Omniscope tool found to be defective is repair or replacement, the option of Silverleaf. In no event shall Silverleaf be liable for any direct, indirect, special, incidental or consequential damages (including lost profit) whether based on warranty, contract, tort or any other legal theory. The existence of defect or misuse shall be determined by Silverleaf Electronics Inc. in accordance with procedures established by Silverleaf Electronics Inc. No one is authorized to make any statement or representation altering the terms of this warranty.

#### **INDEMNIFICATION**

Purchaser agrees to indemnify, defend, and hold Silverleaf Electronics Inc. and its personnel harmless from any claim arising out of or related to the Product or its use, installation, or service.

#### **EXCLUSION OF CONSEQUENTIAL, INCIDENTAL, AND OTHER DAMAGES**

Silverleaf Electronics Inc. Shall not be liable for any incidental or consequential damages for breach of any warranty, whether resulting from the use, misuse, or inability to use the product or from defects in the product or from the negligence or other tort of Silverleaf Electronics Inc.. This exclusion covers, without limitation, damages for loss of use, revenue or profit, cost of capital, cost of substitute equipment, additional costs incurred by purchaser, and claims by purchaser's customers or other third parties.

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