LSI

Log Sync Interface user guide

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VR Avionics
www.vravionics.com

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Operation

Overview

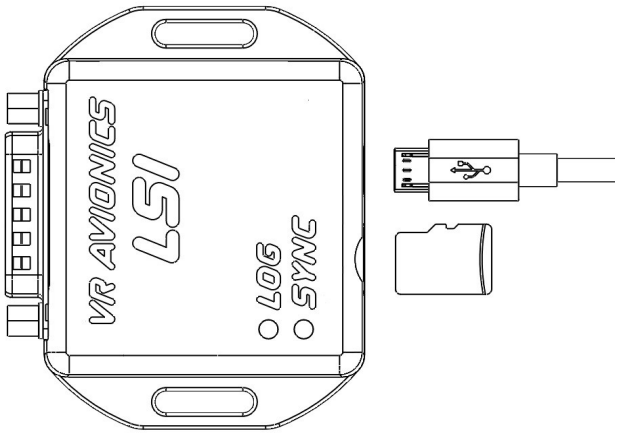
The LSI is a handy accessory that logs, synchronizes, and interfaces with all CAN bus-equipped VR LRUs.

VR Avionics line-replaceable units (LRUs) constantly stream operational information over CAN bus and the LSI will relay this information in real time to any connected PC, laptop or smart phone via USB. Our SetView software, as well as applications from other vendors, can then present the streamed data as dashboard/operator instrumentation in the form of gauges and annunciation lights.

The LSI will also capture and log all the streamed information to a memory card – a micro SD card in this case. This card can be left in the LSI without much worry of running out of memory space, and should something of interest have occurred during an earlier flight, you can then extract the card and inspect the log file again using our SetView application.

The LSI further assists with general maintenance and support tasks when connected via USB. Thereby you can not only record the streamed information live on your device, but view and adjust configuration settings, update firmware, perform diagnostic tests, and synchronize history with any connected LRU.

Besides an electrical connector, one slot for a micro SD card, and one slot for a USB cable, the LSI comes equipped with LOG and SYNC lights to provide additional feedback.



Required Software & Drivers

The LSI works with our Windows-based SetView application. You can download it from our website (vravionics.com). This manual describes LSI operations when running **LSI version 2.2** firmware, or later. It comes bundled with SetView version 1.6.3.1, or later.

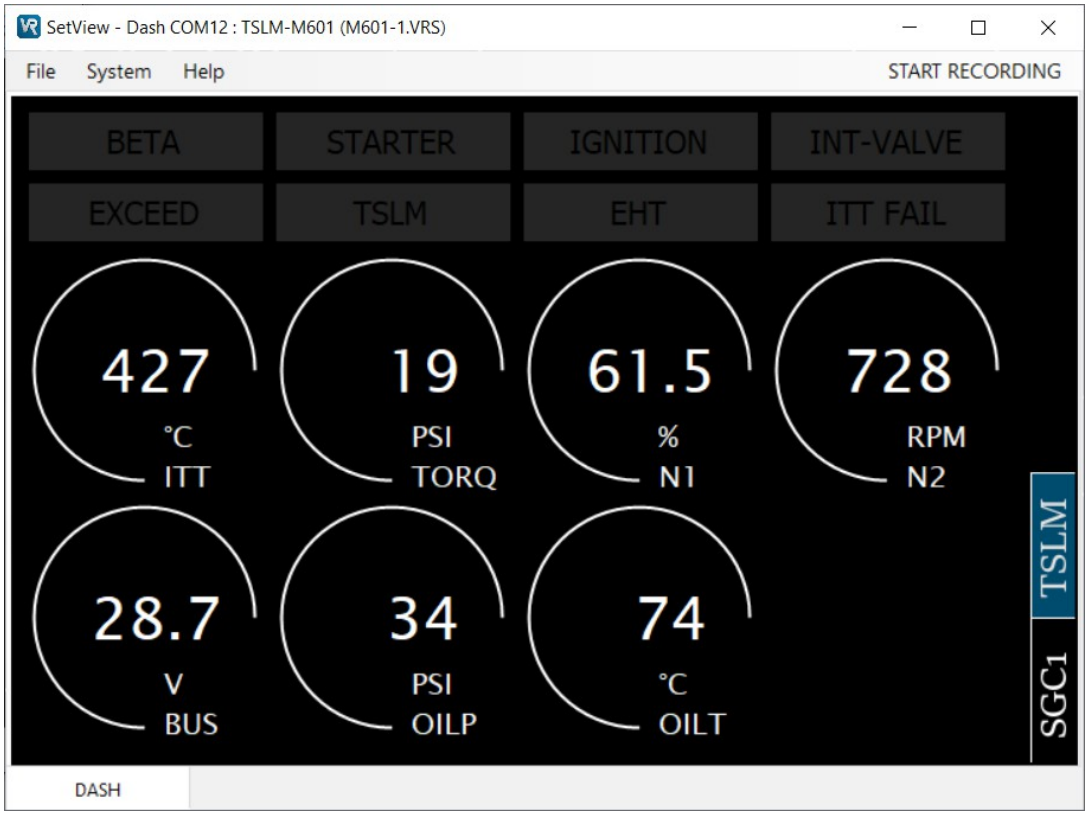
SetView connects to the LSI via USB cable using a virtual serial port driver. If the serial (COM) port does not show up in SetView (or Windows for that matter), you must install the following driver on your PC:

Universal Windows Driver for USB Interfacing to the LSI

Click on the link above to download the driver zip file to your PC's Downloads folder. When complete, double-click on the file to open it in Windows File Explorer. Click on the Extract All button to extract (unzip) the contents into a new folder. From this folder, double-click on CP210xVCPInstaller_x86.exe if you have 32-bit Windows, or CP210xVCPInstaller_x64.exe if you have 64-bit Windows. Then follow the instructions until the driver installation is complete.

Dashboard Instrumentation

The LSI relays operational CAN bus data of LRUs to by streaming it via USB (serial port) in a format that not only SetView understands, but commercial software applications from other vendors. On SetView it presents as shown below. The tabs on the bottom right gives the connected LRUs to switch between.



Commercial applications such as **RealDash** (realdash.net) allows you to design your own custom dashboard similar to what's shown below. Appendix A provides the specifics of the protocol used.

Logging to Memory Card

To log operational data, you need a FAT32 formatted micro SD card with enough free space and the following folder structure:

- Root folder named “LSI”,
- Folder named “LOG” within the “LSI” folder

If you want to temporarily disable logging at any point while leaving the card in the LSI, you can do so by renaming the LOG folder to something different, such as “#LOG”, and when you want to resume logging, again rename it back to “LOG”.

Only when a FAT32 formatted micro SD card with the prescribed folder structure is present in a powered LSI will logging be performed. The LOG light will indicate whenever logging is in progress.

The LSI will create a new log file inside the LOG folder at power-up and continue to log all operational data of all selected VR LRUs to the file until power-down. Specific LRUs must be selected for logging via the Selected Unit to Monitor & Log and Select Another Unit to Monitor & Log configuration settings.

Each log file is named LOG#####.VRL where ##### constitutes a number from 0 to 99999. This number corresponds to an LSI configuration setting called Log File Incremental Reference Number. This number automatically increments with each new power-up.

To view any log file, open SetView and select File → Open Log File... from the top menu. Then browse to the log file you want to view and select Open.

General Maintenance Support

Connect your Windows PC (laptop, desktop, or tablet) to the LSI via USB cable to perform the maintenance support tasks described in the following sections. The LSI accepts a micro USB type B plug.

On the PC, our SetView software and serial port driver should be installed. Plugging in the USB cable will introduce a new COM port (for example “COM5”). After starting up SetView make sure this new COM port is selected by clicking on the top menu System → Serial Port.

With the correct COM port selected in SetView, and the LRU system powered (including the LSI), the Dash panel should appear on SetView similar to that shown under Dashboard Instrumentation.

A tab will appear (in the lower right side) for each VR LRU present on the CAN bus. You can click on these tab(s) to select and view other LRU Dash instruments.

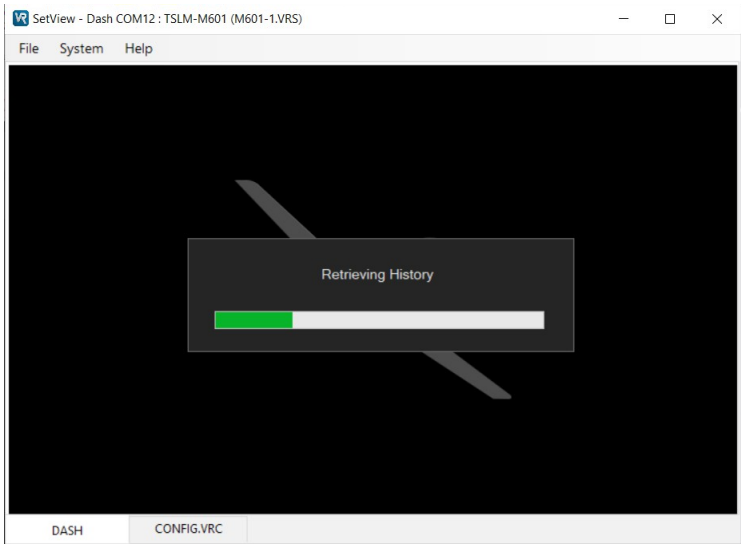
From here maintenance tasks may be performed as described in the next sections.

Synchronizing

To check whether the LSI or LRUs connected to it are running the latest available firmware for them, or to retrieve recorded history logs from LRUs such as the TSLM to your PC, you can perform a synchronize task by selecting from the top menu System → Synchronize.

You will be prompted on whether you want to update firmware should it not be the latest available version.

History logs will also be retrieved from any LRU that have logged something in the past.

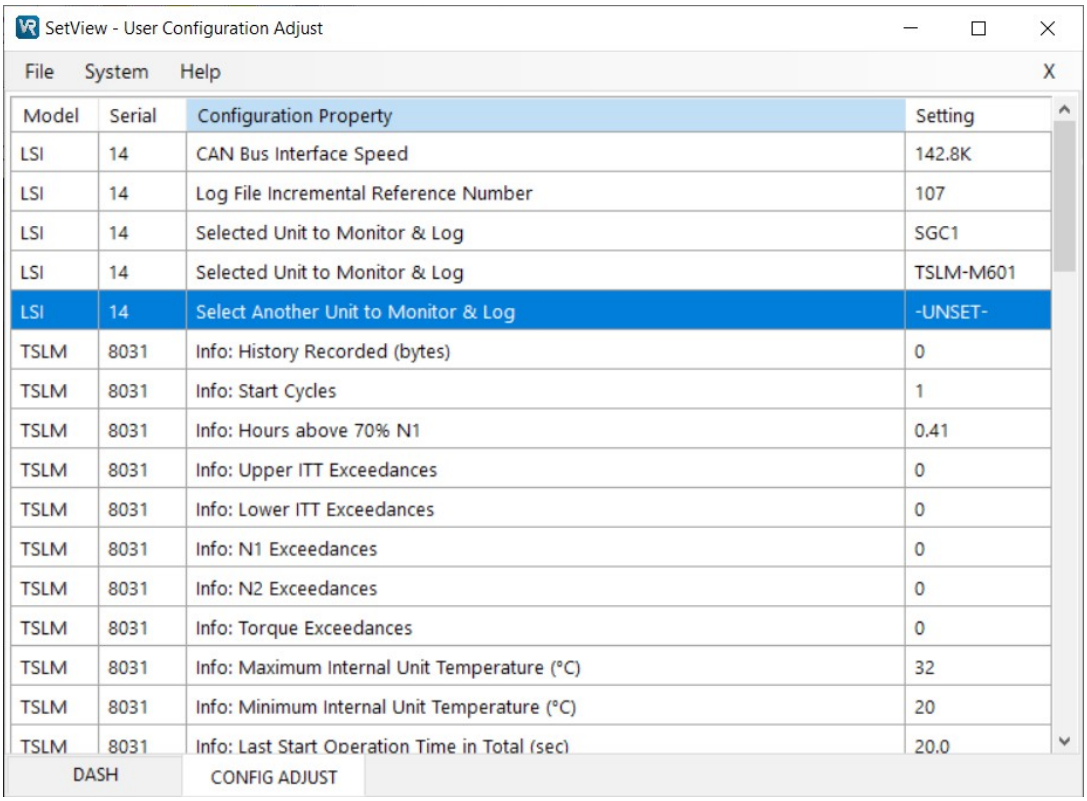


Adjusting Configuration

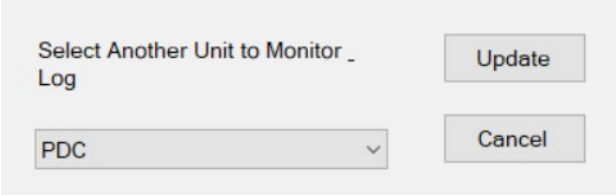
To make adjustments to the configuration settings of any LRU (including that of the LSI), select from the SetView top menu:

System → Adjust Configuration

The example below shows the configuration adjust tab for a LSI with connected TSLM.



You may double click on or scroll to the setting you want adjusted and hit enter. The example below shows it done for selecting another unit to monitor and log on the LSI.



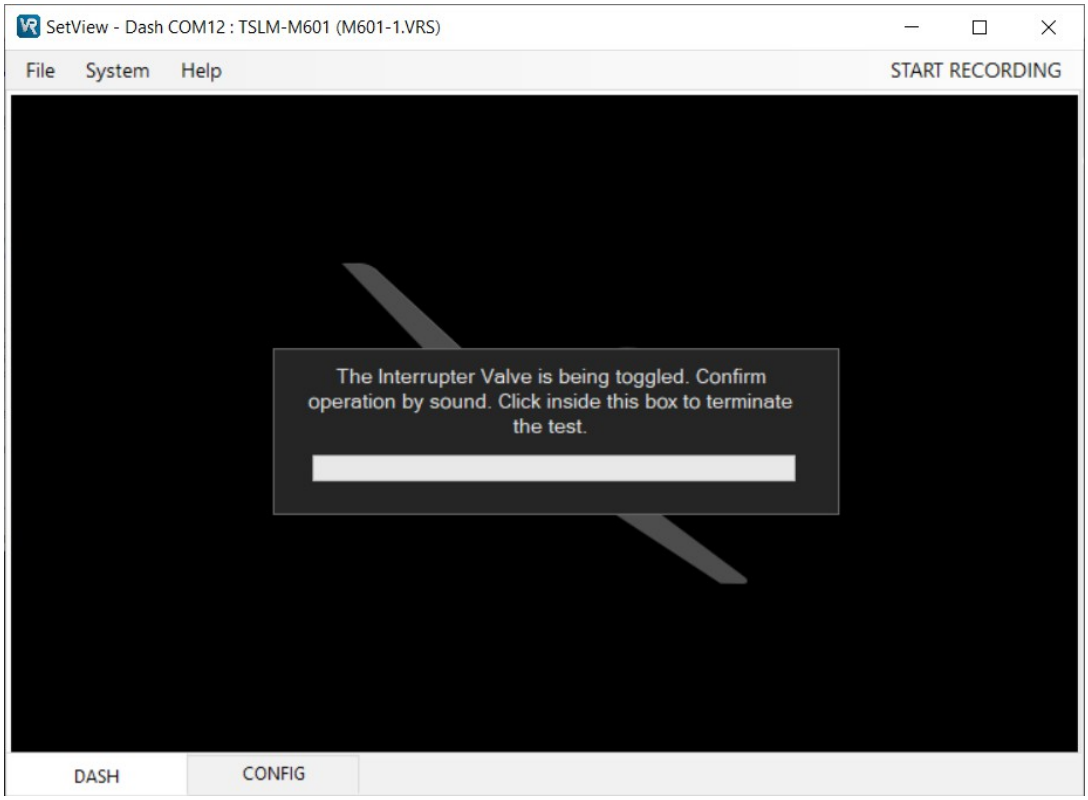
Doing Diagnostic Tests

To perform a diagnostic test for a particular LRU, ensure this LRU's tab is selected on the bottom right side of the Dash panel in SetView (see example in previous section).

Now select the diagnostic test you want performed from the SetView top menu:

System → Diagnostic Function → (test you want performed)

The example below shows a diagnostic test being performed on the interrupter valve via a TSLM.

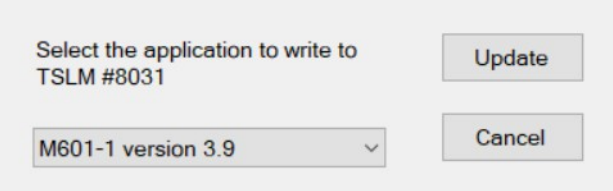


Updating Firmware

To update LRU firmware (or change the application running on it), select from the SetView top menu:

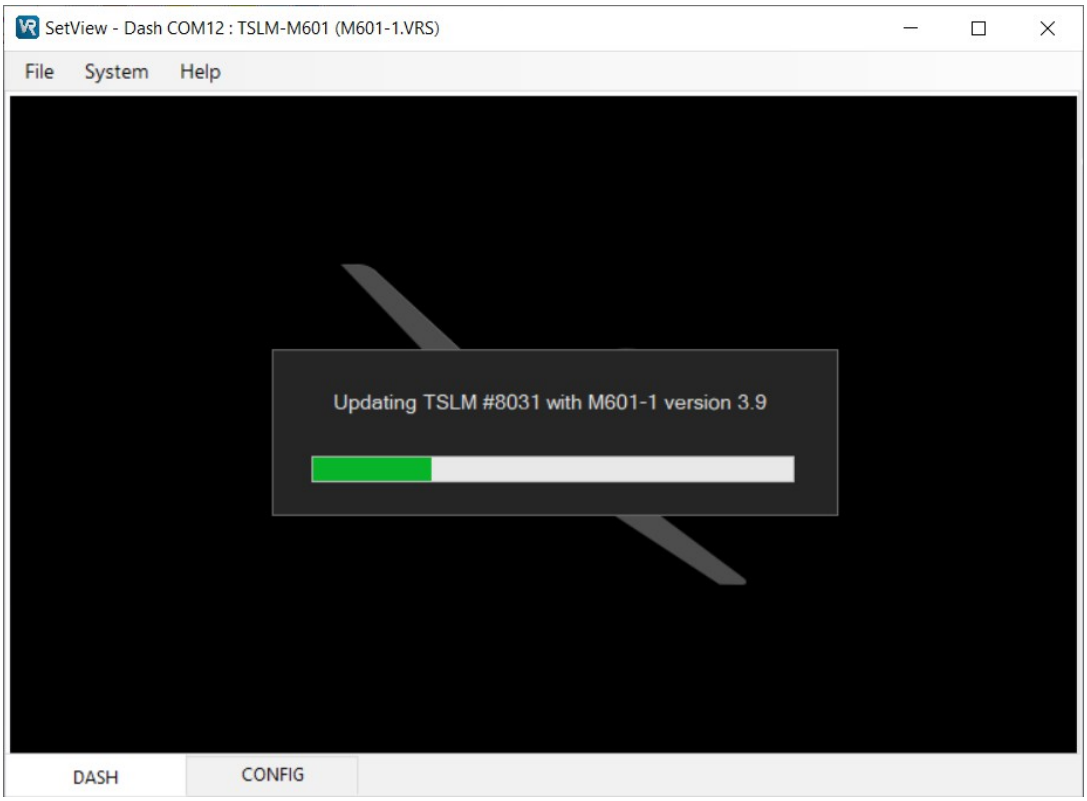
System → Change Application

Starting with a dialog box asking whether to update the LSI firmware, subsequent dialog boxes will ask the same for those LRU's. Below is an example of a dialog box for a TSLM with serial number 8031:



Click Update to update, and Cancel to skip updating specific LRU firmware.

The example below shows the progress bar to expect after clicking “Update” to a dialog box.



When the process of doing or skipping updates have been completed for each connected LRU, the Dash panel (similar that shown here) should again appear.

Power-up Access Method

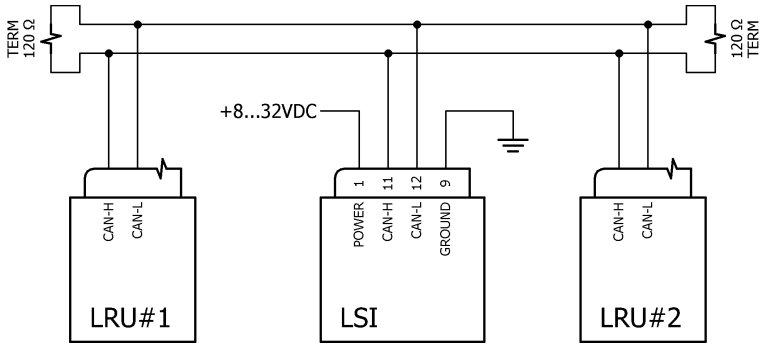
Should you struggle to perform a synchronize, adjust configuration, or change application in the normal way while the system is powered, there is an alternate method that you can try called the power-up access method. It goes as follows:

- Ensure the system (all LRUs and LSI) is unpowered.
- Select what you want to do from the System menu..
  - sychronize, adjust configuration, or change application.
- Wait a second and turn power to the system on.
- Complete the task you have selected and exit if required when done.

Installation

Electrical Connection

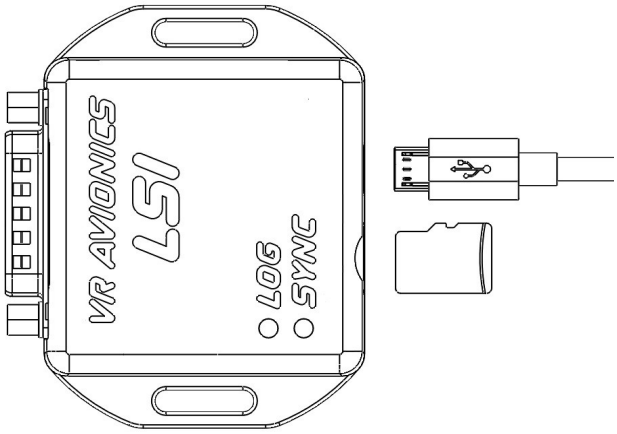
Electrical connection of the LSI is via only four wires – power and ground as well as the two CAN bus lines, CAN-H and CAN-L. It works from 12V or 24V aircraft electrical systems and draws very little current. The circuit below shows how to hook up the LSI to any theoretical system.



The pins used for CAN-H and CAN-L are specified in each LRU's operational and installation manual.

Mounting Considerations

The LSI can be mounted anywhere that is convenient to reach, whether to plug in a USB cable or to insert (or extract) a micro SD card. Since the unit is housed in a plastic enclosure, locations exposing it to excessive heat should be avoided.



Configuration

The LSI have adjustable configuration settings that determine how it functions. These settings can be accessed by Windows laptop or PC running our SetView software connected via USB cable to the LSI. These settings can be viewed by performing from SetView a "Synchronize", and adjusted by performing an "Adjust Configuration" operation (as described earlier).

LSI Settings

#	Configuration Setting	Minimum	Maximum	Factory
1	CAN Bus Interface Speed	0	4	0
2	Log File Incremental Reference Number	0	99999	0
3	Selected Unit to Monitor & Log	See description below..		
4	Select Another Unit to Monitor & Log			

CAN Bus Interface Speed

This sets the speed in Kbps (kilo bits per second) of the CAN bus interface. Options are as follows:

Setting	CAN Bus Speed (Kbps)
0	142.8 (default)
1	125
2	250
3	500
4	1000

For LRU's to communicate with each other all of them need to run at the same speed.

Log File Incremental Reference Number

This sets the number (#####) in the log file name (shown below) for the next time logging is performed. Note that this number is automatically incremented after a new log file was created, meaning this setting typically does not need any adjustment.

LOG#####.VRL

For example, if this number is 123, the next log file name will be LOG00123.VRL

Selected Unit to Monitor & Log

This setting (or group of settings) selects which VR Avionics LRUs to include for monitoring to SetView as well as logging to SD card. There can be up to 14 LRUs selected where each will have it's own configuration entry. Such settings are added via the "Select Another Unit to Monitor & Log" setting described below. To remove or deselect any LRU, assign it to -UNSET-. Note that only VR Avionics LRUs hereby selected can be seen on a SetView Dash and will be logged to SD card.

Select Another Unit to Monitor & Log

Through this setting the user adds VR Avionics LRUs to include for monitoring to SetView as well as logging to SD card. It will be marked -UNSET- until an LRU is assigned, whereafter a new "Selected Unit to Monitor & Log" will appear above it. If all 14 LRU slots are full, this setting will disappear.

Troubleshooting

Should you experience problems with LSI operations the following sections may help you resolve them.

What to Expect

- After power-up both LOG and SYNC lights should light up momentarily then go out.
- When the LSI is actively logging streamed data from at least one LRU, the LOG light will be lit (turned on) and blink (momentarily turn off) every second.
- When performing any general maintenance support task, both LOG and SYNC will be turned on except for the following cases:
  - While retrieving history during a Synchronize task, only the SYNC light be lit (on).
  - While doing a Diagnostic Test task, the SYNC light will briefly turn on directly after initiating the test, and directly after terminating the test.

Not Showing SetView Dashboard

If you don't see the dashboard showing instruments for an LRU (as shown here):

- Check that both the LRU and the LSI is powered with at least 10 Vdc.
- Check that the USB cable is plugged into your PC (laptop, desktop, or tablet) and the LSI. Also check that this introduces a new serial (COM) port to SetView under System → Serial Port. Ensure this serial port is selected (tick mark).
- Check that the CAN bus network is implemented as described under Electrical Connection.
- Check that both the LRU and the LSI's CAN Bus Interface Speed are set to the same speed.
- Check that there is a Selected Unit to Monitor & Log with your LRU's name (eg. PDC) assigned.
- To adjust the configurations you may need to do a through the power-up access method.

Not Logging to SD Card

If the LSI is not logging to an inserted SD card as evidenced by the LOG light not lighting up and blinking every second (as described here):

- Connect the LSI to a SetView PC and get it to show a dashboard for the LRUs you want to log. If you experience problems, perform the **Not Showing SetView Dashboard** troubleshooting checklist.
- Check that the SD card is properly formatted and the required folder structure is in place as described under Logging to Memory Card.
- Check that the Log File Incremental Reference Number setting is assigned a valid number.
- To adjust the configurations you may need to do a through the power-up access method.

Appendix A – Streamed Data

Interface Specifics

Baud Rate	1000000
Data Bits	8
Stop Bits	1
Parity	None

Protocol Packet Format

Each packet represents a standard frame CAN bus message received from one or more connected LRUs.

Description	Bytes	Details
Header	1	0xAA (marks start of packet)
Frame Length	1	Lower Nibble (4 bits) – Frame Data Length (in bytes) Upper Nibble (4 bits) – 0xC
Frame Identifier	2	First Byte (8 bits) – Bits 1 to 8 of Standard Frame ID Second Byte (8 bits) – Bits 9 to 11 of Standard Frame ID
Frame Data	0 - 8	Standard Frame Data 0 to 8 bytes
Footer	1	0x55 (marks end of packet)

An example of a standard frame CANbus message with:

ID = 0x123 and Data = 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88

The packet data will be:

0xAA 0xC8 0x23 0x01 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88 0x55

Each VR Avionics LRU sends operational information via one or more standard frame CAN bus message that have unique identifiers and frame lengths. You can find it in their respective manuals along with how each bit (or group of bits) represents a specific parameter.

You can also find XML files defining the CAN bus message specifics of each LRU on our website:

http://www.vravionics.com/support/

Files in this format can be pulled into applications such as **RealDash** to realize custom dashboards.