

V-MUX[®] Diagnostics v1.3.3

User Manual

V-MUX[®] Diagnostics v1.3.3

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Introduction:

The **V-MUX[®] Diagnostics** kit and software are designed for easy troubleshooting and reprogramming of the Weldon V-MUX multiplex system.

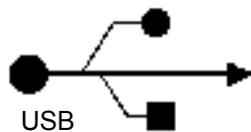
Host Computer Requirements:

A Microsoft **Windows[®]** based computer host. Non-Windows computers are not supported.

Host Operating System: Microsoft WindowsXP[®], Windows Vista[®]

NOTE: **V-MUX Diagnostics** may be incompatible with Windows 95, 98, ME, or NT due to poor USB hardware support. These versions are not recommended.

Host Hardware: 800 MHz processor speed. 512 MByte RAM memory. 100 MByte free drive space. USB port.



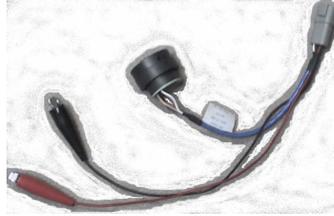
TIP: Look for this official logo to identify and locate the USB port on any computer.

V-MUX Diagnostics Kit for USB #6131-0000-00:

Includes a USB transceiver with data cables, tools, software, and carry case. A one-time USB driver set-up is required to operate this kit with a computer. See page 8.



Carry case



One-on-one hook-up for Hercules node

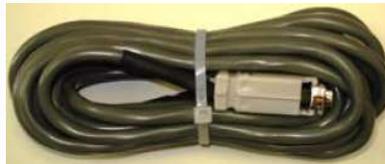
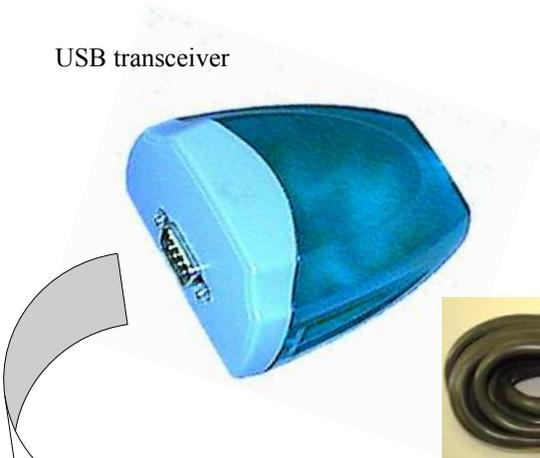


One-on-one hook-up for Mini and Gateway nodes.

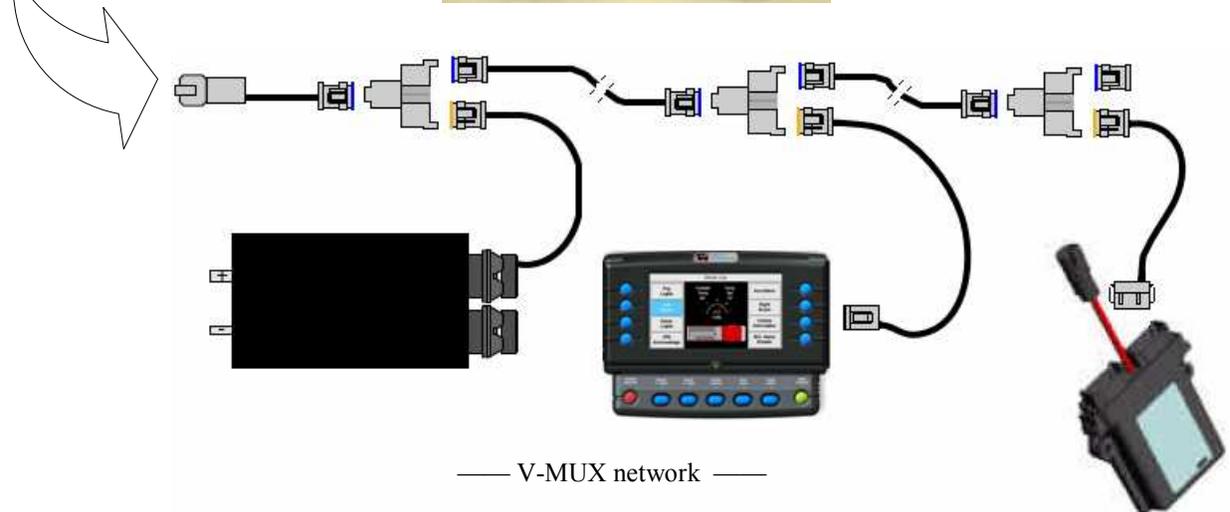


Two pin extractor tools:
(1) 20-22 AWG — RED
(1) 16-18 AWG — BLUE

USB transceiver



Two data cables:
(1) USB to computer
(1) 4-pin to truck



— V-MUX network —

Installing the Diagnostics software from the CD-ROM or USB thumb drive:

Insert the included CD-ROM disk or a plug-in USB thumb drive. Windows will usually assign to it the default drive letter of “D:” or “E:”.

The Diagnostics installation program is located in a folder named “**VMuxDiagnosticsv1.3.3_install**”. (The current version is “1.3.3”).

There are three files inside of this folder:

- 1) setup.exe
- 2) Setup.Lst
- 3) V-MUX Diagnostics.CAB

The first file, “setup.exe” is the installer.

Run “**D:\0S90-1300-00\VMuxDiagnosticsv1.3.3_install\setup.exe**”, or similar. The Windows Installation Wizard will begin. Follow all prompts.

Once the Downloader is installed, Windows will assign it an icon link on the Start Menu

Start → All Programs → V-MUX Software → V-MUX Diagnostics



The installed path to the Diagnostics program is by default:

C:\Program Files\V-MUX Software\V-Mux Diagnostics\V-MUX Diagnostics.exe

It is best to keep this path as is.

Installing Diagnostics from the Weldon web site:

All V-MUX software may always be accessed for free from Weldon's on-line V-MUX support page.

www.weldoninc.com or www.v-mux.com

The image shows a screenshot of the Weldon website. At the top left is the Weldon logo, a stylized 'W' with a flame, followed by the text 'WELDON A DIVISION OF AKRON BRASS'. Below the logo is a navigation menu with the following items: 'Team', 'Products', 'V-MUX Files' (circled in red), 'What's New', 'Contacts', 'Company Info', and 'Warranty & Repairs'. To the right of the menu is a large image of a white bathtub with a circular inset showing a control panel with a digital display showing '9:14'. Further right are two circular insets showing a yellow school bus and a white fire truck. At the bottom right of the bathtub image is the text 'New Products' with two circular insets showing red and white textured surfaces. At the bottom of the page is a black banner with a PDF icon, the text 'New PDF Catalog', and 'Click Here For Download Options'. To the right of the banner is a small image of a red catalog cover. At the very bottom of the page is the text 'Weldon & Akron Brass Company are ISO 9001: 2000 Registered Companies'.

Click on the link “V-MUX Files”. Most of the support files are archived with a “.zip” filename and require an unzipping utility to access them.

First-time only USB driver set-up:



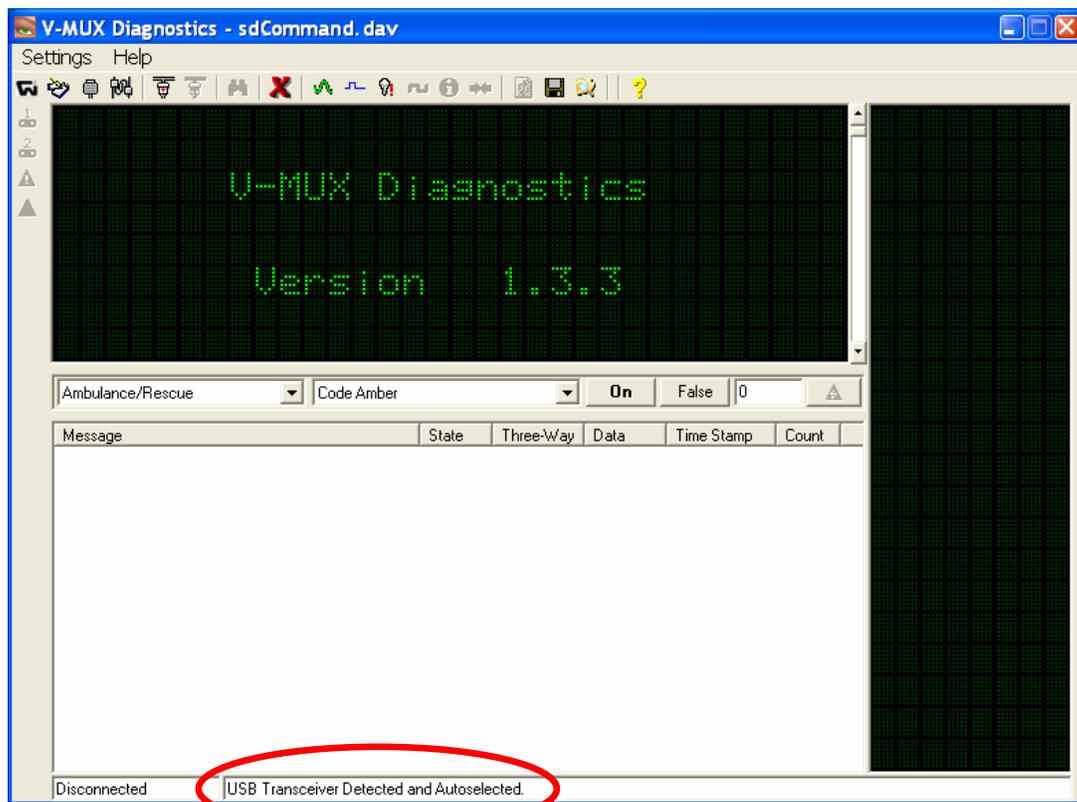
The first time the USB transceiver box is plugged into the computer, the Windows Hardware Wizard will recognize it as a new device and install the necessary USB driver software. **Appendix A** of this manual reviews the driver installation process.

Additionally, the document “**USB Transceiver Setup.pdf**” covers driver installation in even greater detail. It is available on the install medium (disk or thumb-drive) and also from the Weldon on-line V-MUX support page.

Verifying the USB driver installation

- 1) Plug the USB cable into both the V-MUX Transceiver and the computer’s USB port
- 2) Start V-MUX Diagnostics (after the transceiver is plugged in)

Start → All Programs → V-MUX Software → V-MUX Diagnostics:



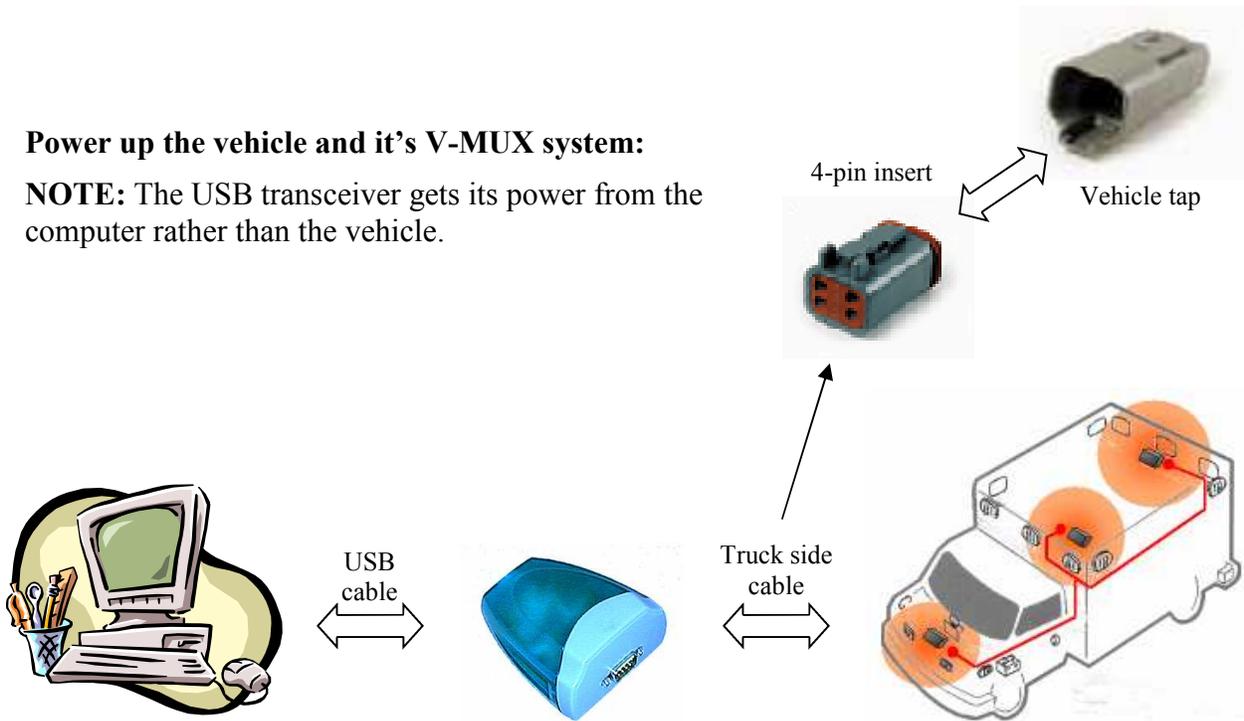
- 3) Verify that “**USB Transceiver Detected and Autoselected**” is indicated at bottom.

If the USB is not detected, exit the Diagnostics program completely, unplug the USB cable and repeat from step 1. Review “**USB Transceiver Setup.pdf**” for step-by-step troubleshooting help.

Connecting the V-MUX Transceiver and cables:

Power up the vehicle and it's V-MUX system:

NOTE: The USB transceiver gets its power from the computer rather than the vehicle.



Plug the cable 9-pin end into the USB transceiver box.
Plug the cable 4-pin end into the vehicle network port .
See vehicle OEM instructions for port location.

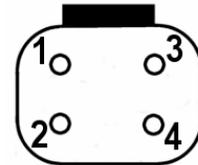
Pin assignments on the 4-pin:

Pin 1 = comms A (white)

Pin 2 = comms B (green)

Pin 3 = ground (black)

Pin 4 = +12 VDC power (red)



NOTE: Pins 3, 4 are obsolete for USB and may no longer be used.

V-MUX Diagnostics -- Getting Started

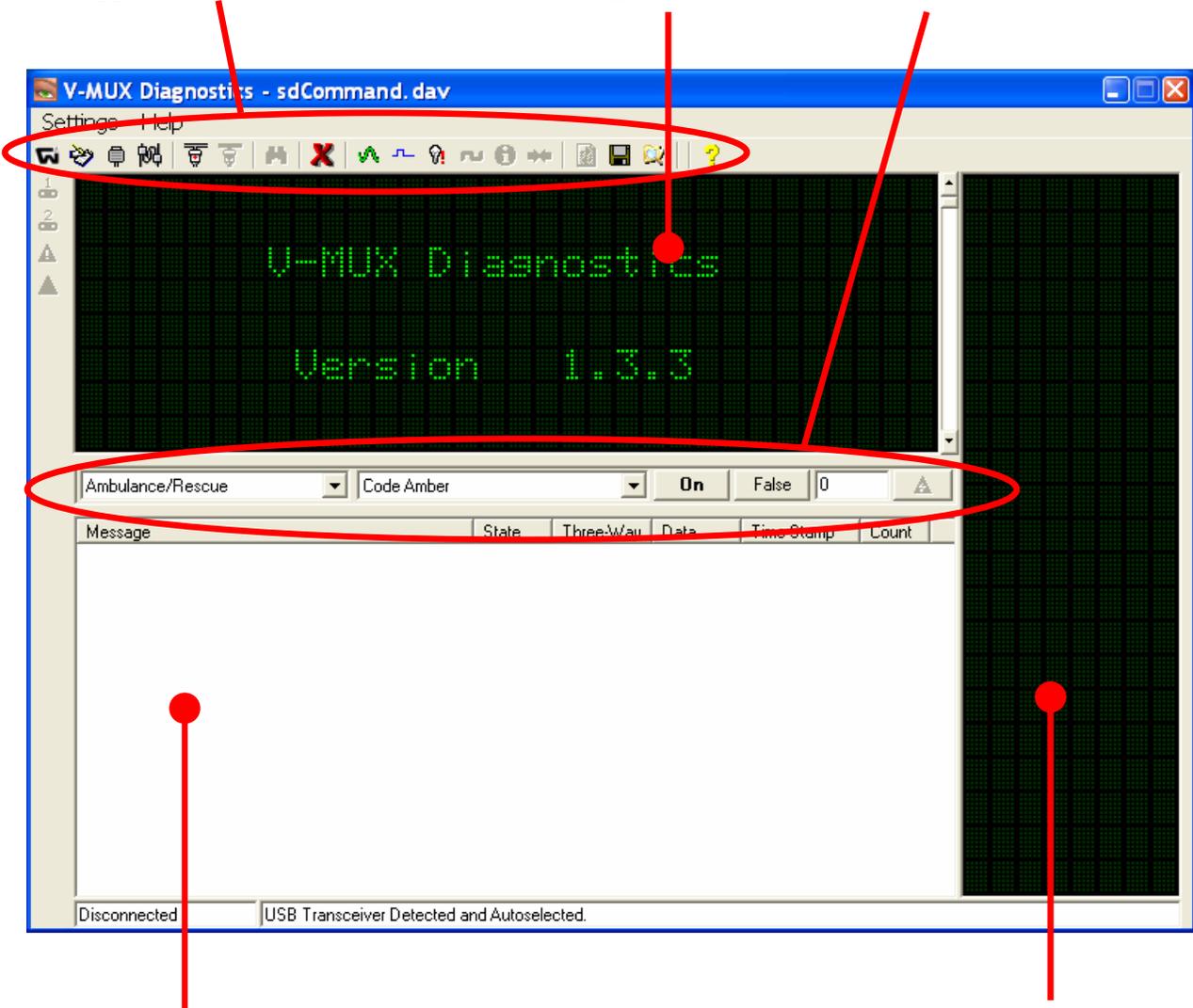
Launch V-MUX Diagnostics from the Windows Start button



Start → All Programs → V-MUX Software → V-MUX Diagnostics

The Diagnostics window is divided into a number of regions, or areas:

- 1) Upper Menu and Toolbar area
- 2) Analog Sensor Data area
- 3) Command Action area



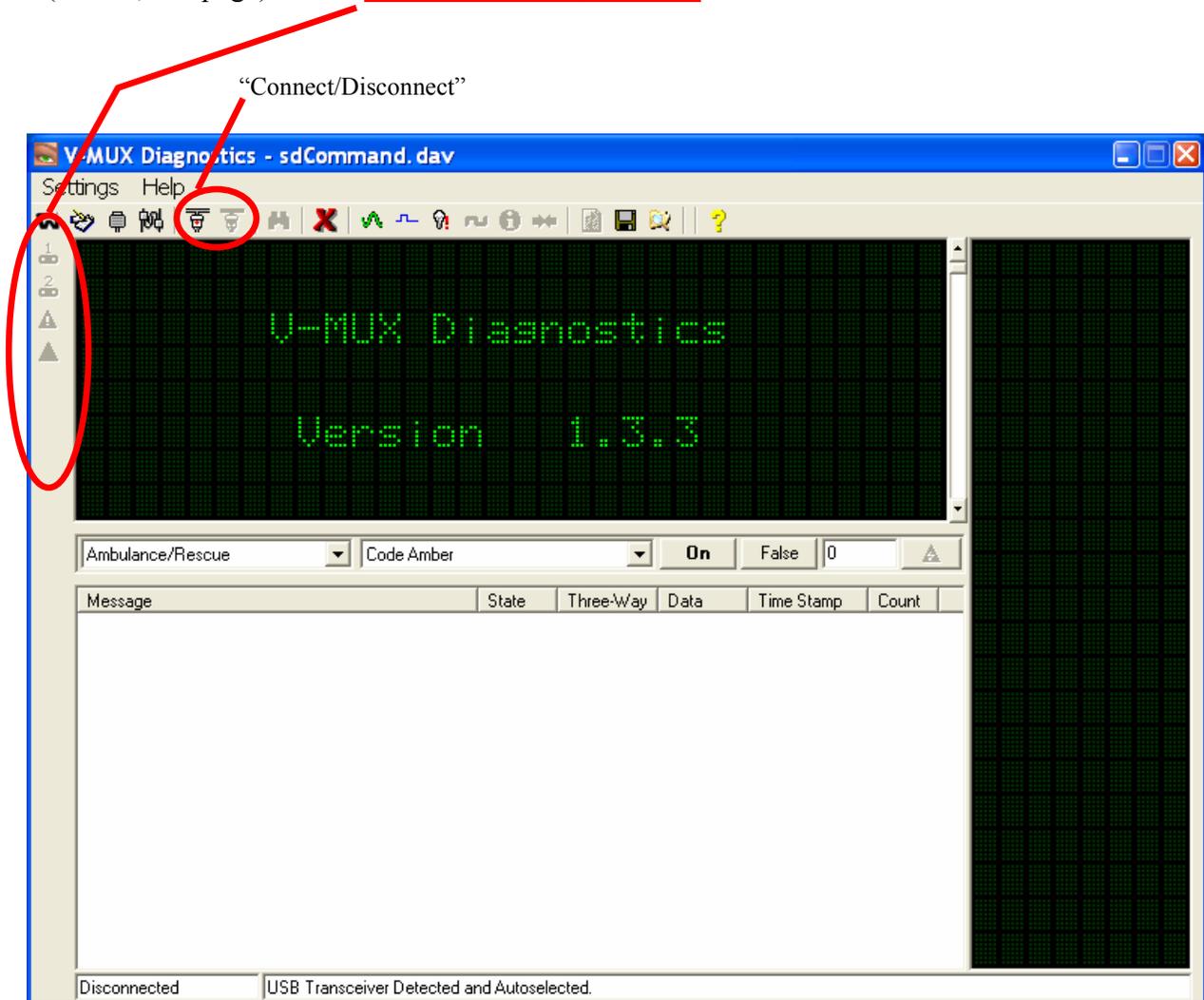
4) Message List area

5) Load Management area

Getting Started -- Connect to a live V-MUX System

Click the “Connect”  icon — fifth icon from the left along the top toolbar row.

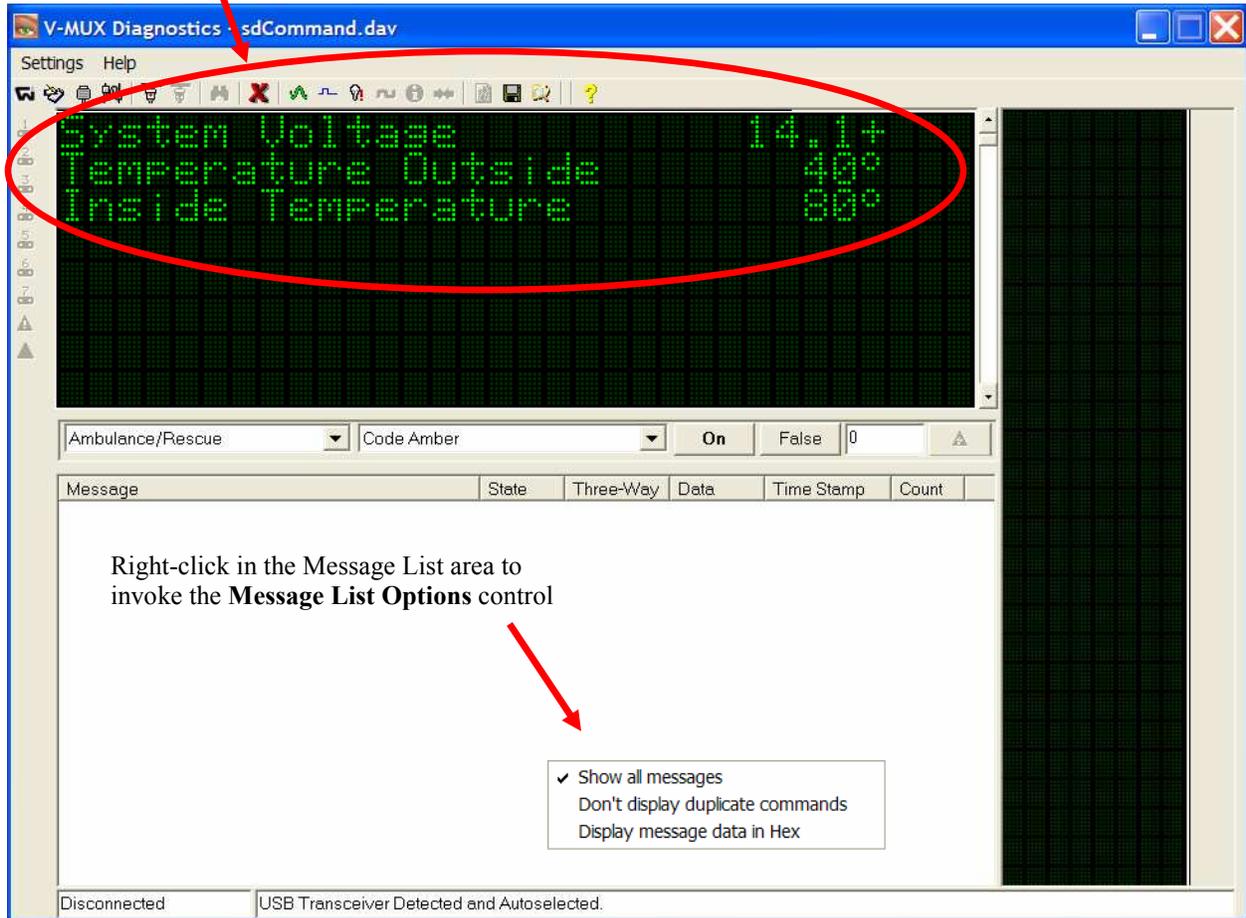
A live V-MUX system will be recognized by Diagnostics through a series of automatic PINGS and node PING REPLIES, which will be listed in both the V-MUX message list area (Area 4, last page) and an **icon based listing of nodes** on the left side.



If nothing happens, try manually pinging the live System with the “PING”  icon (ICON 7). If nothing still happens, check the physical cable hook-up and the USB port selection.

Screen Layout -- Analog sensor data

Analog sensor data from all V-MUX nodes is continuously updated and displayed in the top viewing area. “System Voltage” is by definition the node voltage measured at the Node #1 location.



It is possible to display the analog sensor data within the Message List area by selecting “Show all messages” in the Options control, as is shown above.

Screen Layout -- Load Management

Load Shedding is set for each output channel when the V-MUX System is designed for the vehicle.

The pre-defined voltage thresholds begin at 12.5 Volts and continue downwards in increments of 0.4 Volts. Each of the node Load Managers report to Diagnostics the particular voltage region they are currently experiencing.

Load Management area
Nodes 1-16
N indicates "Node #"
L = "Load Shed region"

Load Shed voltage regions defined

1: 12.5 V	}	Load Shed region 1 (12.5-12.1 V)
2: 12.1 V		
3: 11.7 V	}	Load Shed region 2 (12.1-11.7 V)
4: 11.3 V		
5: 10.9 V	}	Load Shed region 3 (11.7-11.3 V)
6: 10.5 V		
7: 10.1 V	}	Load Shed region 4 (11.3-10.9 V)
8: 9.7 V		
	}	Load Shed region 5 (10.9-10.5 V)
	}	Load Shed region 6 (10.5-10.1 V)
	}	Load Shed region 7 (10.1-9.7 V)

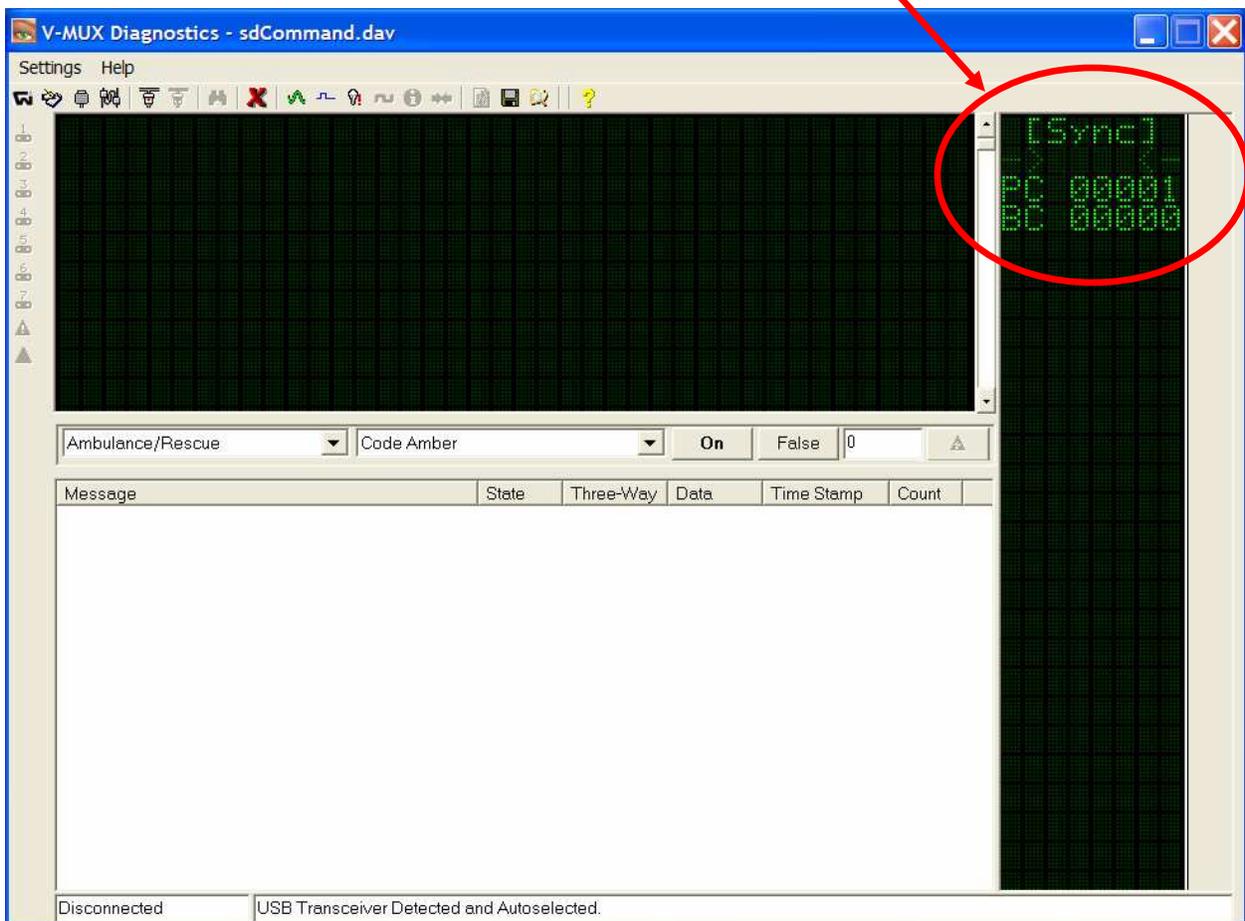
amp Count

Screen Layout -- Network Traffic

Node 1 generates a “**Synchronize**” network command and periodically broadcasts it about every 2.5 seconds. The purpose of the synchronize command is twofold:

- 1) It coordinates warning light flash patterns between separate nodes so that alternating ON/OFF lights are precisely synchronized with each other.
- 2) It indicates that network data traffic is transmitting normally. If any node fails to hear the “Sync” it will repeatedly transmit a distress message “VM_OUT_OF_NETWORK”.

The “Sync” indicator is in the upper right viewing area.



Just below the “Sync” update are the “**Data Collisions**” monitors (“PC” and “BC”). Any lost data is noted in this area. A low number of collisions are acceptable as long the counter stops incrementing within a few seconds of the disturbance. But if the PC or BC collisions counter keeps incrementing without stop then a network investigation is necessary.

Screen Layout – Receiving V-MUX messages -- The Message List area

All V-MUX network messages are listed in the lower viewing area. By default all messages are displayed from top-down as they are received.

Message	State	Three-Way	Data	Time Stamp	Count
↔ Ping	Off	False	1	10:07:39.35	16
↔ Node Ping Reply	On	False	1	10:07:39.48	7
↔ Ping	Off	False	2	10:07:39.48	17
↔ Node Ping Reply	On	False	2	10:07:39.59	8
💡 Door Cab Left	On	False	1	10:08:19.92	1
💡 Door Cab Left	Off	False	1	10:08:24.27	2

A V-MUX message contains many separate pieces of information:

“**Message**” shows the message **Command** that has been received. There are four general types:

Switch events – A switch or button has changed state (ex: ON/OFF)

Sensor warnings – A sensor has passed some warning threshold (ex: LOW VOLTAGE)

Logical events -- The current state of the vehicle requires a change in System behavior (ex: EMERGENCY MODE forces headlights to operate in WIG-WAG MODE)

System queries – Requests for information (ex: PING)

The “**State**” indicates commands that turn devices ON/OFF. Not every message needs to toggle this way. For instance, as shown above, PING and NODE PING REPLY are handled by the network in only one way, so ON or OFF are irrelevant. In such cases the State field is simply ignored.

To the left of the message line the  and  icons indicate ON and OFF.

The Message List area – The Data Field and other fields within a Message:

Data:

Carries additional message information, often the identity of the node sending the message..

Example: The DOOR CAB LEFT messages shown below (ON and OFF) indicate “1” in the data field because the door switch is an input for node #1. If the number “12345” appears in the data field, it means that the Command does not come from any physical switch but instead from a logical event, also called a “free command”

Three-way:

Used with devices that will be turned ON/OFF from more than one switch; otherwise this field is ignored.

Message	State	Three-Way	Data	Time Stamp	Count
↔ Ping	Off	False	1	10:07:39.35	16
↔ Node Ping Reply	On	False	1	10:07:39.48	7
↔ Ping	Off	False	2	10:07:39.48	17
↔ Node Ping Reply	On	False	2	10:07:39.59	8
💡 Door Cab Left	On	False	1	10:08:19.92	1
💡 Door Cab Left	Off	False	1	10:08:24.27	2

Time stamp:

Every message gets an associated time stamp based on the computer clock. The time basis is the clock’s previous midnight hour 00:00:00.

Count:

Displays the running count for how many times this message has appeared during the current Diagnostic session

The Command Action area-- Composing and Sending Messages Manually:

To send a message:

- 1) Select the Command Category (left pull-down menu) and the Command (middle pull-down menu).
- 2) Set the state to ON or OFF for the output device.
- 3) If necessary, set the three-way field. (This field is usually ignored and may be set to 'False'.)

Set three-way to TRUE to toggle the selected command. Three-way is necessary for devices which will be turned ON/OFF from more than one switch. For instance, an ambulance driver may wish to turn ON the interior lights from the front seat of the vehicle, then OFF from the rear.

- 4) If necessary, set the data field. (This field is usually ignored and may be set to '0')

Example: Send [Category = V-MUX, Command = VFD Luminance, ON, FALSE, data = 25] to dim the VFD two-line display to 25% brightness level.

- 5) Send the message from the blue icon at the far right side of the Action area.

Command Categories (pull-down menu)	V-MUX commands (within category)	State (ON/OFF)	Three-way (TRUE/FALSE)	Data	Click to Send message
Ambulance/Rescue	Code Amber	Off	False	0	

- Ambulance/Rescue
- Analog Devices
- Auxiliary Power
- Chassis
- Cruise Functions
- Directional Stick
- Door Switches
- Emergency Commands
- Exterior Lighting
- HVAC
- Hydraulic Functions
- Interior Lighting
- OEM Proprietary
- Options
- Override Commands
- Pump Commands
- Slide Outs
- Tank Commands
- Vista
- V-MUX
- Warnings Devices

21 Command categories:

NOTE: One category, **V-MUX Internal**, is NOT listed by default and should only be used by experienced troubleshooters. To enable Internal Commands see **ICON 3** in the **TOOLBAR** section of this guide.

Selecting and Mounting Nodes:



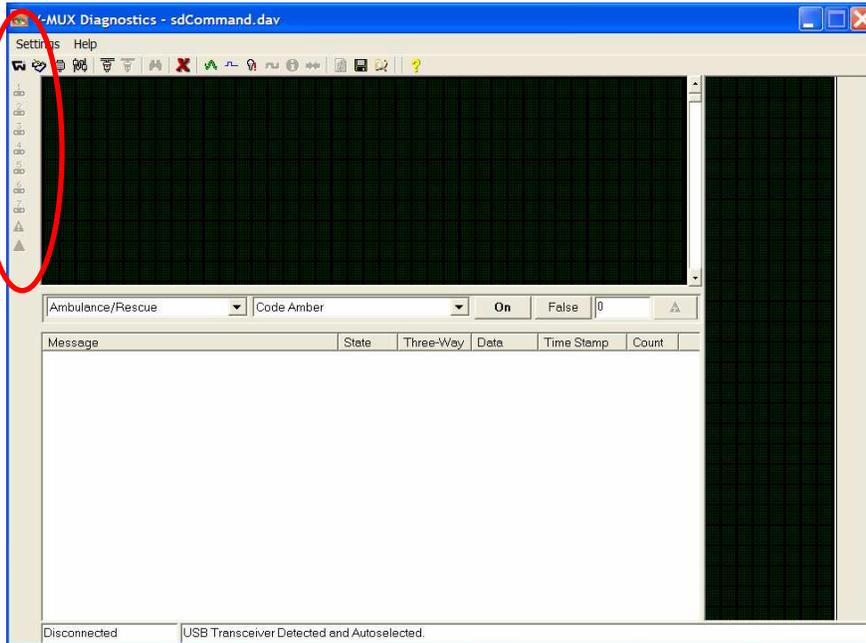
“Mounting” a node lets Diagnostics gather information from that specific node.

Select the desired node from the live status bar on the left side and click the **mount node icon** at the bottom of the node status bar.

At any time you can PING the mounted node.

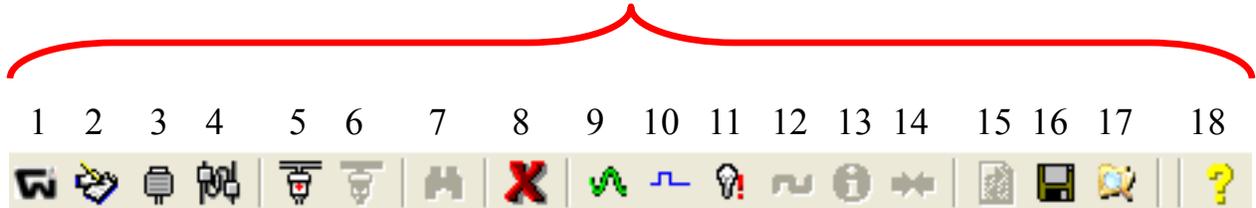
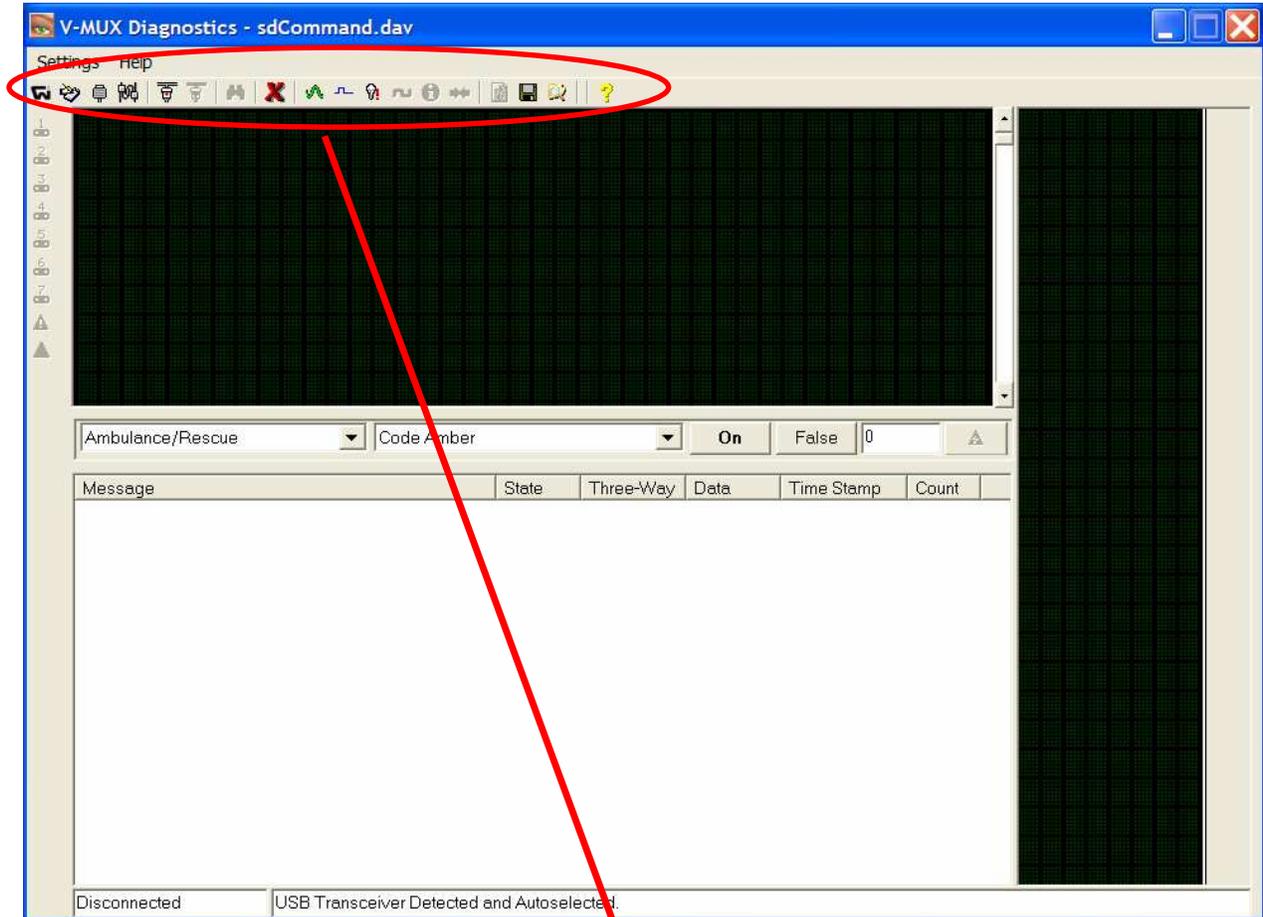


“Unmount” the selected node to finish



Diagnostics TOOLBAR – In Depth and Advanced Features:

How to use icons 1-18 to change settings, gather V-MUX data, and use advanced features:

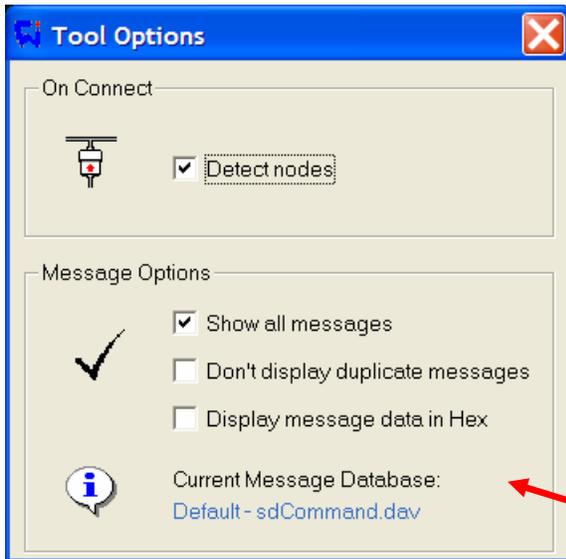


ICON 1)



Diagnostics Tool Options Settings:

Invokes a Tool Options pop-up window with three fields: **On Connect**, **Message Options**, and **Current Message Database**.



On Connect: Detect nodes – checked by default. Sets Diagnostics to automatically ping for live nodes upon each connect.

TIP: Right clicking in the Diagnostic Message List area will give quick access to these same three options.

Message Options: (3 options)

- 1) **“Show all messages”** – Enables V-MUX analog sensor traffic in the Message List area. Not checked by default.
- 2) **“Don’t display duplicate messages”** – If checked, Messages of the same Command will overlay the previous Message.
- 3) **“Display message data in Hex”** – The data part of a message will be shown in hexadecimal (base-16) instead of decimal (base-10). Hex format is used when interpreting error codes.

Current Message Database

The OEM can provide a design specific database (ex: **ColumbusPumpers.dav**).

Diagnostics can extract and save a database file from the live V-MUX nodes.

See page 23 (toolbar icon 4) on how to select a specific database file.

ICON 2)



Logging:



Select the **Generate Log** function to create and save a log of the Diagnostics session.

The log file may be accessed by clicking on Icon 17,  , to “**Explore Diagnostic’s Log Directory**”.

The log directory is simply a Windows sub-folder of the Diagnostics directory. It is named “**Diaglogs**”.

Log files can be identified by a standard naming syntax:

Example -- **2007-03-21_03-52-29P.txt**

The file format is as follows, based on the computer internal clock:

2007-03-21 means this file was created on March 21, 2007

03-52-29P means the computer clock was at 3:52:29 PM.

Each log file will get a unique date and time for the name. The log file format is text based and can be opened with Windows **Notepad** or any other text editor.

The log file is useful for situations in which it is necessary to capture a time-stamped record of a V-MUX event (or non-event).

Example: The vehicle door ajar beacon operates haphazardly and it is suspected that one or more magnetic door switches are faulty or mis-aligned. A logged V-MUX Diagnostics session while the vehicle is driven can capture each door switch event and write it to the log file for later investigation.

ICON 3)  **Network Options:**

“V-MUX Communications Parameters”

(V-MUX 2000 or V-MUX 98):

All V-MUXed vehicles produced from the year 2000 are of type “V-MUX 2000”. Do not select V-MUX 98 unless told to do so by Weldon.

“Allow V-MUX Internal Commands”

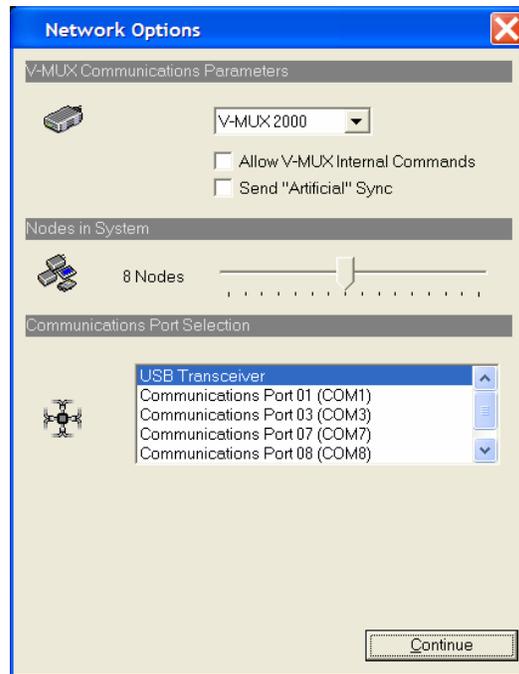
Select this for access to the V-MUX commands that relate to basic system utilities and memory access.

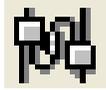
WARNING: Certain internal commands can erase the memory of a V-MUX node.

“Send ‘Artificial’ Sync” - Used when a Node #1 in network is not available.
(Example: On a test stand)

“Nodes in System” Sets the number of nodes Diagnostics will Ping for upon connecting.

“Communications Port Selection” – If the USB drivers are properly installed and the V-MUX transceiver is plugged into the USB port prior to starting Diagnostics, this field will auto-select **“USB Transceiver”**.





ICON4) Select System:

Select a vehicle specific Diagnostics database if desired.

Available V-MUX Systems:

“sdCommands,dav” is the default database.

Diagnostics can provide a vehicle specific database file. At right is a specific database for vehicle “**04357-Columbus**”.

System Information:

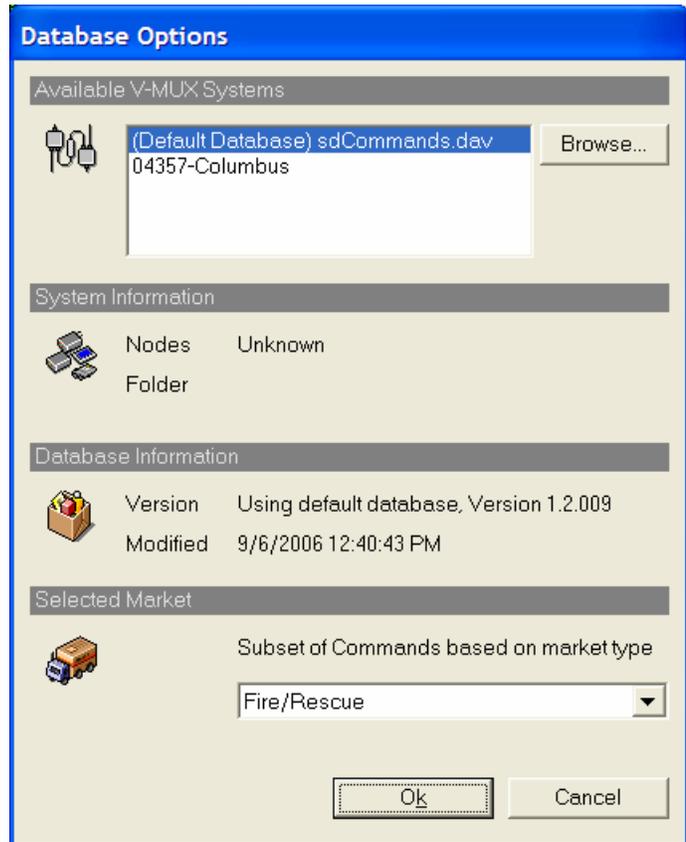
Shows node count and file path in the V-MUXed vehicle system.

Database Information:

Shows the OEM design version number of the database and when it was last modified.

Selected Market:

Use **Fire/Rescue** unless otherwise instructed by vehicle OEM or Weldon



ICONS 5 & 6) Connect and Disconnect:



Upon connection one or more nodes will reply to PING Commands. Diagnostics will activate the vertical node status bar and highlight all PING REPLY nodes, up to the limit of 16. (Nodes may also be manually pinged with the Ping Nodes ICON 7 -- see below.)



ICON 7) Ping Nodes:

Re-pings nodes up to the number of nodes set in Network Options (ICON 3).

ICON 8) Clear Message List: *X*

Deletes the current text in the upper window (Analog Sensor Data) and the lower window (Messages). It does **not** clear out the right side window (Network traffic and Load Management info).



ICON 9) Display Analog Data:

Sets the top viewing area to display Analog Sensor Data (see Page 12).



ICON 10) Display the Node Specific Input List:

Lists the programmed inputs of a specific V-MUX node from that node's database. It is also possible to extract the listing from the live node's Application Memory by using the **“Get Info”** button

The input list will only be displayed if the node is selected and mounted



Input Information for Node 1 (Hercules)

- Input 1 (i1-p34)
- Input 2 (i2-p35)
- Input 3 (i3-p17)
- Input 4 (i4-p18)
- HL Highbeam (i5-p19)
- Door Cab Left (i6-p20)
- Door Cab Right (i7-p8)
- Batt Comp Sw (i8-p21)
- Park/Neutral (i9-p33)
- A/C Request (i10-p16)
- Ignition (i11-p6)

Get Info

Input Command: Unavailable
Switch Type: Unavailable
On State: +Batt or Ground
Three-Way Switching: Unavailable

Ambulance/Rescue Code Amber On False 0

Message	State	Three-Way	Data	Time Stamp	Count
---------	-------	-----------	------	------------	-------

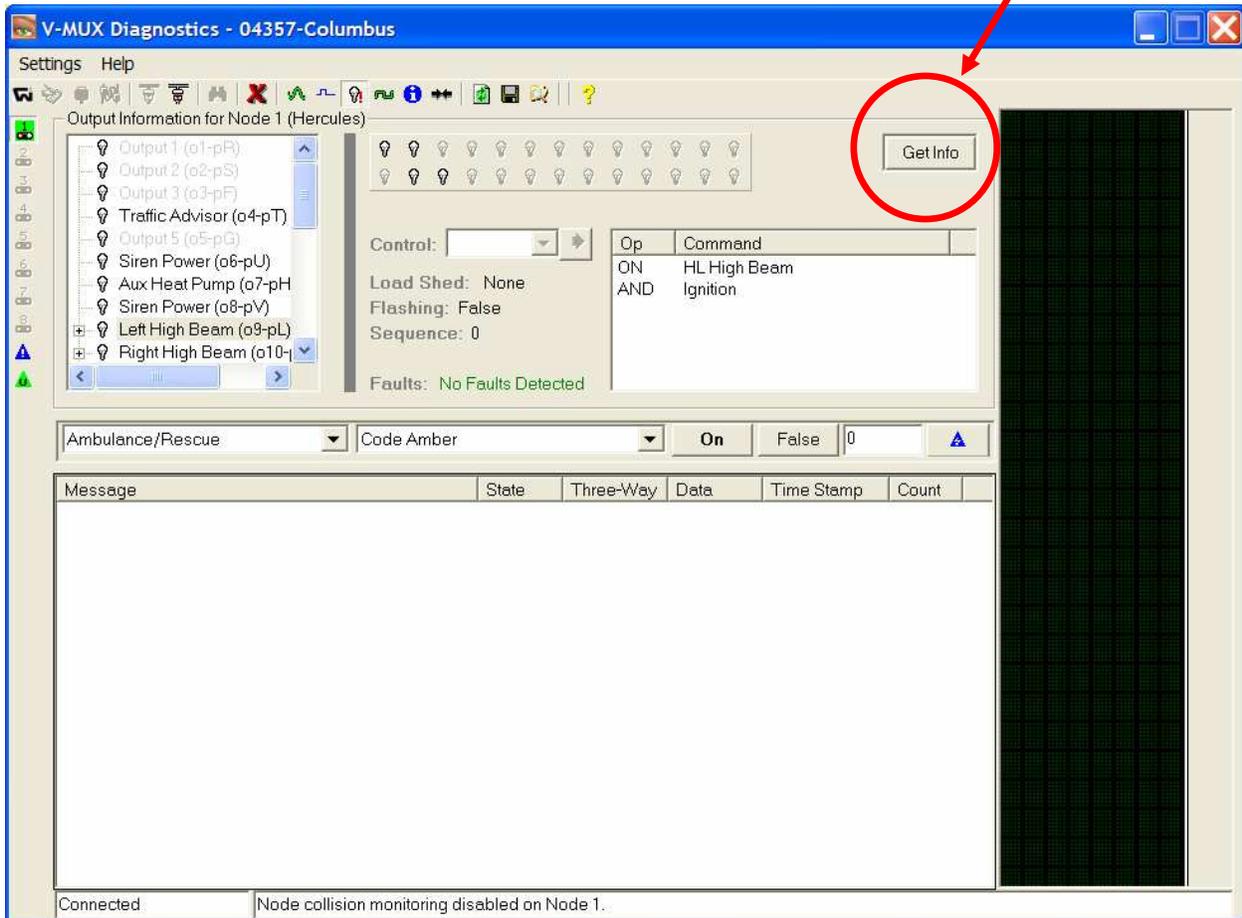
Connected Node collision monitoring disabled on Node 1.



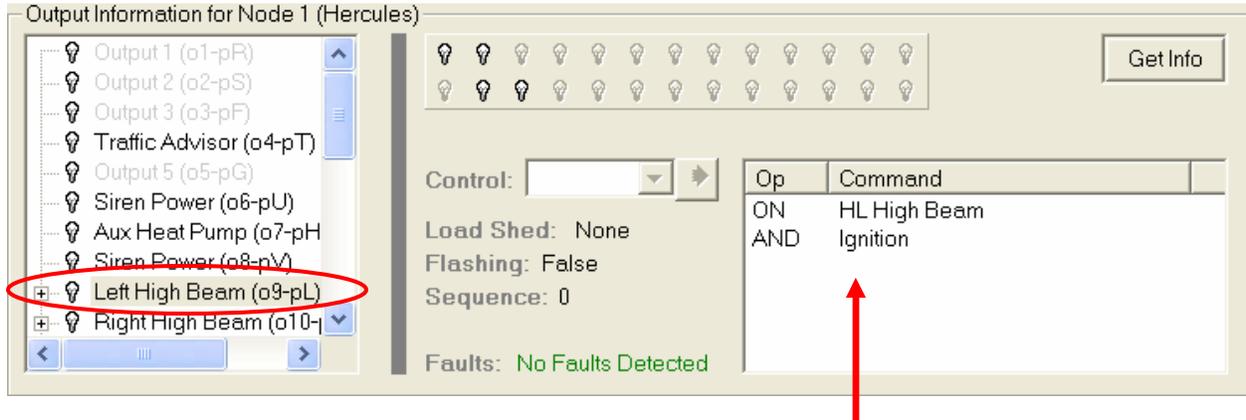
ICON 11) Display the Node Specific Output List:

Lists the programmed outputs of a specific V-MUX node from that node's database. It is also possible to extract the listing from the live node's Application Memory by using the **“Get Info”** button

The output list will only be displayed if the node is selected and mounted



ICON 11) The Node Specific Output List



Example

Left field: Selected Output channel

“Left High Beam”
(O9-pL) = channel 9, pin L

Right field:

Command Logic for Selected Output

Output channels and the Command Logic ‘ON’ relationships:

A selected Output on the left side indicates its Command Logic relationships on the right side.

Exceptions:

- 1) If a Hercules modulated fan channel (1, 2, 15, 16) is controlled from a Vista Climate Control Node, the node lists the output as being unused.
- 2) Permanently ON outputs are highlighted in yellow and have an ON light bulb icon.

 Map Light (o3-pF)

Node Specific Output List

Direct PWM Control: Hercules modulated output channels 1, 2, 15, 16 and Mini4x12 modulated output channels 1à12 are set up for Direct Control. Diagnostics allows two methods of direct control:

1) Direct control ON/OFF by icon. Click the icon.

2) Direct control 0-100% by data field

Output Information for Node 1 (Hercules)

Output 1 (o1-pR)
Output 2 (o2-pS)
Output 3 (o3-pF)
Traffic Advisor (o4-pT)
Output 5 (o5-pG)
Siren Power (o6-pU)
Aux Heat Pump (o7-pH)
Siren Power (o8-pV)
Left High Beam (o9-pL)
Right High Beam (o10-pL)

Control: [Dropdown]

Load Shed: None
Flashing: False
Sequence: 0

Op	Command
ON	HL High Beam
AND	Ignition

Faults: No Faults Detected

Output faults:

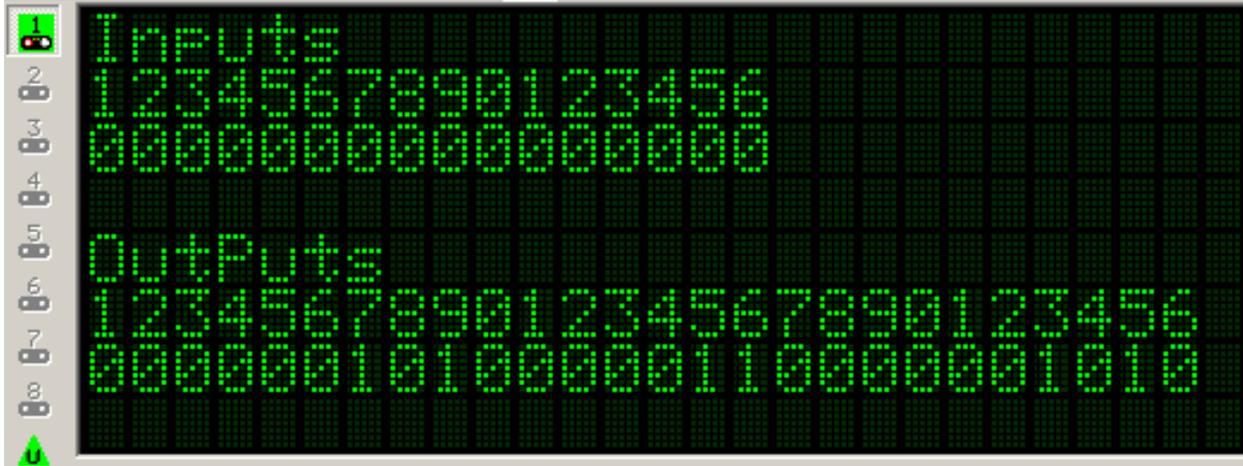
For channels which use Over-current/Under-current monitoring.

NOTE: Not every channel will have diagnostic monitoring enabled.



ICON 12) Input and Output flags for a mounted node:

NOTE: Selected node must be mounted and refreshed.

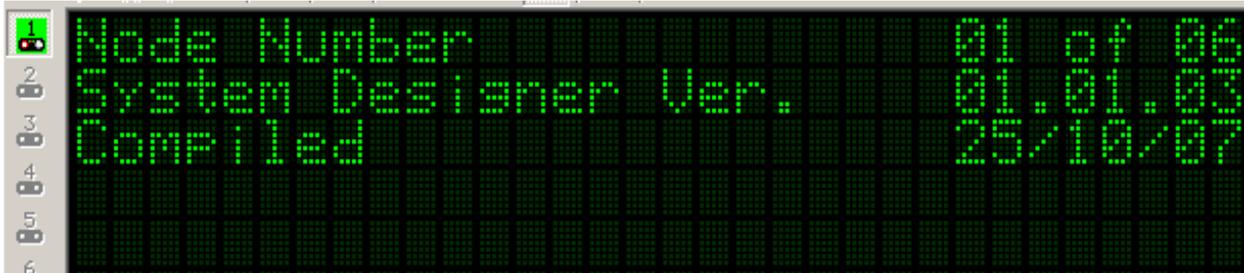


Indicates in real time the ON/OFF status of all channels for the selected node. (0=FALSE, 1=TRUE)

ICON 13) Flash information from a mounted node:



NOTE: Selected node must be mounted and refreshed.



Retrieves program information from the mounted node.

The selected node number.

The V-MUX System Designer version that created the node program.

The date that the node's program was compiled (created) on.

The node's operating system (Embedded code) version.

ICON 14) Monitor Node Collisions from a mounted node:



NOTE: Selected node must be mounted and refreshed.

Monitors loss of data reported by the mounted node. Once the **node collisions monitor** is active there is a small rotating pipe (|) to the right of the “NC”.





ICON 15) Refresh Node Information (to Create a database):

Creates a database file for the V-MUXed vehicle. Database files are created one node at a time by selecting the node number and then clicking ICON 14. (Node 1 is the default.)



ICON 16) Save Current System:

Saves the database file created above with ICON 14 (Page 31).



ICON 17) View Log Files

Accesses the Diagnostics Log files which were created by ICON 2 (Page 21).

ICON 18) About:



 WELDON A DIVISION OF AKRON BRASS	V-MUX Diagnostics	Version 1.3.3
Click here for Database information		
www.weldoninc.com	www.v-mux.com	
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V-MUX System Report Documents:

The entire V-MUX electrical design as created by the vehicle OEM can be put into document form for reference. The Microsoft Excel® spreadsheet program is used to create these documents. Two main reference documents will be created for you to use:

The Input/Output Nodal Specification

The Nodal Relationships Specification

Document 2, the Relationships Spec, is the more useful of the two for troubleshooting Command Logic.

Inputs: Both **Digital** (switches = ON/OFF) and **Analog** (sensors = 0-5VDC range) are listed.

Node: The live node number associated with this page is shown.

Location: Indicates where in the vehicle the node is located.

Ch#: The Weldon V-MUX channel number.

Pin #: The harness pin assignment on the terminating Deutsch end connector.

OEM Wire: The harness wire identifier.

Command: The V-MUX message command that will be issued when the switch is thrown.

Qty: NOT CURRENTLY USED. Will always be blank.

Type: Switch type; momentary, latching, normally open, normally closed.

Comments: Anything of importance the OEM designer wants you to know.

Mini4x12 Example: 4 switch inputs, 1 analog sensor input, 1 analog System Voltage.

Digital Inputs			Node 1	Location: Right-Mid			
Ch #	Pin #	OEM Wire	Command	Pin #	Qty	Type	Comments
1	3		E Emergency Master			Latching N/O	
2	2		E Primary			Latching N/O	
3	10		E Secondary			Latching N/O	
4	4		Turn Signal Right			Latching N/O	
Analog Inputs							
Ch #	Pin #	OEM Wire	Command	Pin #	Value Range		Comments
1	N/A		Unassigned		0	188	
2	1		Unassigned		0	255	

V-MUX Report Documents (continued):

Outputs: Hercules node (High capacity = +12 VDC, 10.5 Amp/channel, channels 1-16

Low capacity = +12 VDC, 2 Amp/channel, channels 14-24

Low ground = GND , 2 Amp/channel, channels 25, 26)

Mini4x12 node (Medium capacity = +12 VDC, 7.5 Amp/channel)

Priority Shedding: Indicates the voltage level this output channel will Load Manage OFF at.

Relationships: Indicates the logical relationship a set of one or more input commands must have to cause the output channel to turn ON.

High Capacity Outputs			Node 1		Location: Center-Front
CH #	Pin #	OEM Wire	Name	Priority Shedding	Relationships
1	R		Output 1	No Shed	(None)
2	S		Output 2	No Shed	(None)
3	F	LHF/SP380	HIGH IDLE	No Shed	<ON> Auto Throttle <AND> Park Brake <AND> Ignition <AND> <NOT> PTO Switch (Hot Shift) <AND> <NOT> Service Brake
4	T	LHT	L SIDE DC SCENE	2 (12.1 V)	<ON> Ignition <AND> Scene Left <AND> Park Brake
5	G	LHG	R SIDE DC SCENE	2 (12.1 V)	<ON> Ignition <AND> Park Brake <AND> Scene Right
6	U		Output 6	No Shed	(None)
7	H	LHH/WT118	PTO REQUEST	No Shed	<ON> PTO Switch (Hot Shift) <AND> Ignition <AND> Park Brake <AND> Park/Neutral
8	V	LHV	WARN FRONT ROCKER	No Shed	<ON> E Emergency Master
9	L	LHL/SP323/SP	L LT BAR RED RELAY	No Shed	<ON> E Emergency Master <AND> E Front Lightbar Red
10	B	LHB/SP324/SP	R LT BAR RED RELAY	No Shed	<ON> E Emergency Master <AND> E Front Lightbar Red
11	M	LHM/SP325/SP	PTO ENGAGE SOLENOID	No Shed	<ON> PTO Switch (Hot Shift) <AND> Park Brake <AND> Park/Neutral <AND> Ignition
12	C	LHC/SP326/SP	REAR DIRECTIONAL LIGHT	2 (12.1 V)	<ON> E Emergency Master <AND> Park Brake
13	N	LHN/SP327/SP	LT BAR CLEAR RELAY	No Shed	<ON> E Emergency Master <AND> E Front Lightbar Red <AND> <NOT> Park Brake
14	D	LHD/SP328/SP	MARS LIGHTS RELAY	0 (No Load)	<ON> E Grill Lights <AND> <NOT> Park Brake
15	O		Output 15	No Shed	(None)
16	P		Output 16	No Shed	<ON> E Emergency Master <AND> E Strobes Low
Low Capacity Outputs					
CH #	Pin #	OEM Wire	Name	Priority Shedding	Relationships
17	Q	LHO/SP329/SP	OPTICOM RELAY	No Shed	<ON> E Emergency Master <AND> E Front Lightbar Red <AND> <NOT> Park Brake
18	E	LHP/SP330/SP	WW STROBE SUPPLY	No Shed	<ON> E Emergency Master <AND> E Strobes Low
19	A	LLA	AC LOAD MGT RELAY	1 (12.5 V)	<ON> Ignition
20	J		Output 20	No Shed	(None)
21	W		Output 21	No Shed	(None)
22	X		Output 20	No Shed	(None)
23	K		Output 23	No Shed	(None)
24	7		Output 24	No Shed	(None)

Appendix A: USB Driver Installation:

Driver installation instructions: V-MUX® Transceiver for USB

Included with your USB transceiver kit:

- One USB to V-MUX transceiver box.
- One setup disk with transceiver device drivers and Downloader. (Microsoft® Windows 98, XP.)
- One USB cable. Connects USB side of transceiver to user's computer.

One V-MUX cable. Connects V-MUX side of transceiver to Diagnostics tap in vehicle.

NOTE: Windows 95,NT did not originally support USB and have no USB transceiver drivers. These drivers are only tested for Windows 98, XP. Windows ME, 2000 are not currently tested but probably will work.

The included USB cable has two molded ends, each distinctly shaped.

Plug the square-shaped end into your USB transceiver box.

Plug the flatter, more rectangular end into the computer's USB port.

NOTE: there is a connection icon on the flat end to aid in the proper orientation of the cable into the USB port. The icon usually must point upward at the USB port, or match a corresponding icon printed at the port if sideways.

First time users:

Windows (when running)should auto-detect the first new USB hardware item. (There will be two altogether.)

"Found new hardware: USB TO RS-422/485 ADAPTER"

The Found New Hardware Wizard should pop up.

Do you have your USB transceiver drivers on the included setup disk?

--- Place your driver setup disk in its proper drive -- A:\ floppy drive or the CD-ROM drive.

--- Select "Install the software automatically (Recommended)".

--- Click "Next>". Windows will scan for the correct files and auto-install them.

OR

Are your USB drivers in a different sub-directory because they were saved or downloaded to there?

Windows may not be able to find them automatically.

--- Select "Install from a list or specific location (Advanced)".

--- Click "Next>".

--- Select "Search for the best driver in these locations."

---**Are your USB drivers saved somewhere on your own A:\ floppy or CD-ROM disk?**

----- Select "Search removable media (floppy, CD-ROM...)" Windows will search throughout those disks.

---**Do you know the correct path (maybe on the hard drive) to where your USB drivers are saved?**

-----Select "Include this location in the search:" Use the Browse button to navigate to the correct directory.

-----When Windows sees the USB drivers' directory it will auto-install them.

Windows should next auto-detect the second new USB hardware item.

"Found new hardware: USB Serial Port"

The Found New Hardware Wizard should pop up for the second install.

Repeat the above procedure as before.

After the initial installation the driver settings should remain permanent.

If you have any problems with this setup please call Weldon Technologies
(800) 989-2718 -- V-MUX® support on extensions x219, x260, x303

Appendix B: V-MUX Internal Commands:

Ack – Acknowledge to clear Load shed, Analog Warnings and Diagnostic errors on the VFD.

Download Code– ****DANGER**** Tells a node to INVALIDATE its own memory and wait for new programming.

Download Data – NOT USED , OBSOLETE

Invalidate – NOT USED, OBSOLETE

Mount – Puts selected node into a one-on-one state, this will allow you to extract certain types of information from the node. MOUNT must precede the DOWNLOAD CODE command.

Set Load Level – Use this command with a mounted node to set the Load shed level to any desired value – even though the actual voltage level is ok. Type the desired load level into the Data Byte click the send to set the load level.

Pause System – Pauses the system so that it will not send commands.

Resume System – Resumes the system after pause.

PC Random Send – Test command used for purposely creating collisions. Disabled in production code so it will not do anything if you use it.

Commands that begin with “Get” require you to mount the node you want to extract information from. The Node the Data Field of the Data Transport Command.

Get Command Array –Returns the value of all commands that are turned ON in the system. The command array is an internal array of all the commands available to the system. The value that returns will be a sum of all the positions. Value range is 0-1024.

Get Input Array – Extracts the status of the input array for the node you are mounted to. The value will be the sum of all the inputs turned on for that node.

Get Output Array – Returns the sum off all the outputs that are turned on for the node you are mounted to.

Get Flash Data – Returns the flash information in the data field. The Get Flash Info  icon on the top tool bar is recommended; this will return information in the upper window that is already formatted.

Get Protocol Errors – NOT USED

Get Collisions – Retrieves the total number of collisions that have occurred on the network.

Get Buffer High – Retrieves the highest position that the receive buffer has reached. The buffer has 20 positions. If the number returned in the data field is 20 you should check the buffer overflows. Use GET ALL MAIL STATS for more information.

Get Buffer Overflows – If the Buffer High position reaches 20 then you can expect to see a number returned in this request. If the Buffer High is below 20 you should not see any value other than 0 returned.

Get Command Checksum – This command will return the checksum value of the command array.

Appendix B: V-MUX Internal Commands (Continued):

Get Load Level – Returns the load-shed level from the node you have mounted.

Get Embedded Version – Returns the embedded code (operating system) version a node is running.

Get All Mail Stats – Using this command while mounted to a node will receive the network stats for that node. The request will go out to the node and the node will transport the network information back via the Data Transport command. The network information will be in the following order with values for each item in the data byte.

Inbox high: The inbox has 20 positions; a value >20 usually means a network problem.

Inbox overflows: This represents the number of times Inbox high has exceeded 20.

Outbox high: This also has 20 positions and should always be a value lower than 20.

Outbox overflows: This represents the number of time the Outbox has exceeded 20.

Messages received: A running total of the number of messages that have been received.

Messages sent: A running total of the number of messages that have been sent.

Get TP and Set TP – Used for debugging problems with Weldon test code; TP = Test Point. For Weldon use only.

Nodes transmit inter-System information to one another using the following commands.

Data Transport – This is the command that a node uses to transport data; for instance, a node uses this command to reply answers to your “Get” requests. Using this command from the PC will do nothing.

VM Sync – This command syncs all the nodes together; the nodes are synced in order to maintain patterns for flashing lights. Node 1 sends the Sync command every few seconds, if the other nodes on the network do not hear a Sync command they will start broadcasting an “Out of Network Message.” You can observe this in the Diagnostics lower window.

VM Load Shed – This command is used for the nodes when transmitting the load shed values to each other. It is updated on the right side of the Diagnostics software

VM Request for Command Checksum- A node that has been out of network or has had protocol errors uses VM Request for Command Checksum.

VM Diagnostics – The nodes to transmit their diagnostic messages use this command.

