

neoVI FIRE 2

Multi-Protocol Vehicle Network Interface



User's Guide

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Version History

Version Number	Date	Description / Major Changes
1.0	2016/01/06	Initial release.
2.0	2016/06/10	<p>Revised package contents.</p> <p>Added photos of FIRE 2 in box and accessories.</p> <p>Removed mention of certain features that have not yet been implemented.</p> <p>Added note on avoiding problems with third-party USB cables.</p> <p>Rewrote section on included cables and options.</p> <p>Added pictures of new cable options.</p> <p>Added new images of cable connectors.</p> <p>Updated software install screenshots.</p> <p>Expanded hardware hookup diagram section</p> <p>Revised existing hardware hookup diagram and added new ones for all OBD cable options.</p> <p>Rewrote instructions for cable connection to correspond to new cables.</p> <p>Added many new pinout tables for new cables and connectors, and converted section on cable pinouts to chapter due to size.</p> <p>Added cable signal mapping tables to show signal correspondence between connector pins on each cable.</p> <p>Added contact information for international ICS offices.</p>
2.1	2016/10/10	<p>Corrected miscellaneous I/O hardware connections.</p> <p>Corrected several pinout tables and clarified that the neoVI FIRE 2 does not support J1850 or J1708.</p> <p>Updated contact information for international ICS offices.</p>

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1 Introduction and Overview

1.1 Introduction

Thank you for purchasing an Intrepid Control Systems neoVI FIRE 2 multi-network vehicle network interface. The FIRE 2 is Intrepid's fourth-generation general purpose interface tool, providing access to multiple channels of CAN, LIN and other vehicle networks. The FIRE 2 can be used to monitor and transmit on networks, to create custom simulations for network analysis and troubleshooting, and for standalone logging based on precise specifications.

The FIRE 2 provides numerous *evolutionary* improvements over the very successful original neoVI FIRE, including more CAN channels, greater performance, more robust case and connectors, far larger script space, the ability to download data from the included SD card over USB, and support for a wider input voltage range. It also adds new *revolutionary* features to the world of vehicle networking tools, such as support for CAN FD, Automotive Ethernet and DoIP, individual multi-color network activity LEDs, USB device hosting, and much more.

1.2 Package Contents

Your neoVI FIRE 2 package includes both hardware and software.

Hardware

You should receive the following:

- The neoVI FIRE 2 network interface device.
- A microSD card for data logging (already installed in the unit).
- A USB microSD card reader.
- An industry standard USB "A/B" cable to connect the FIRE 2 to a PC.
- A μ DB-9 to DB-9 conversion cable.
- A FIRE 2 Ethernet Cable Adapter.
- Your choice of OBD cable from among five options (details are in Section 2.5).

You will also receive a "Getting Started" card to help you get going quickly with your device.

The FIRE 2 is packaged using a special cardboard insert with a plastic sheet molded over it to hold it securely during shipment. Figure 1 shows how the device will appear in its box after removing the "Getting Started" card.



Figure 1: neoVI FIRE 2 in its Protective Insert.

Lift up the plastic sheet, remove the FIRE 2, and then fold back the cardboard upon which it rested. Underneath you will find the cables and other accessories listed above. Please remove, unwrap and inspect all of the contents, an example of which is shown in Figure 2.

If anything is missing or damaged, please contact Intrepid for prompt assistance, using the information in Chapter 8. Detailed instructions for attaching the cables to your hardware are provided later in the document.

Note: While the USB cable in the FIRE 2 package uses industry standard connectors and pinouts, not all USB cables are the same. To ensure reliable operation, please use the cable included with the FIRE 2. If you need to replace the original, be sure not to use one longer than 6' (2 m) or you may experience problems with your hardware. If necessary, contact Intrepid for a replacement.



Figure 2: neoVI FIRE 2 Package Contents. Starting top center with the FIRE 2 itself and going clockwise: μ DB-9 to DB-9 conversion cable; USB cable; microSD card reader; FIRE 2 Ethernet Cable Adapter; neoVI-OBD-1 cable. The software/driver CD can be found in the center. Note that the OBD cable you receive may differ from the one shown here.

Software

In the FIRE 2 package you will find a software/driver CD containing:

- A copy of Intrepid's Vehicle Spy vehicle network software.
- Drivers for the neoVI FIRE 2.
- An API install kit containing the neoVI Explorer utility for configuring the device.
- Documentation materials.

Intrepid's Vehicle Spy (often abbreviated as *VSpy*) is the "Swiss army knife" of automotive networking tools. It allows you to easily monitor and transmit on vehicle networks, and includes capabilities for ECU simulation, data acquisition, scripting, diagnostics, data analysis and much more.

The neoVI FIRE 2 and Vehicle Spy are designed to work together hand in hand, and we recommend purchasing a *VSpy* license to go along with your new hardware. If you did so, then a full copy of the software will be included on the software/driver CD. If you did not purchase

Vehicle Spy, a trial version of the program will be provided instead, which allows access to VSpy's basic features.

It is also possible to control the neoVI FIRE 2 from within other software using one of the APIs that the device supports.

1.3 Operational Overview

The neoVI FIRE 2 is a compact but powerful hardware tool for working with vehicle networks. Its operation can broadly be broken down into three categories: network interfacing; data acquisition and logging; and simulation and scripting.

Vehicle Network Interfacing

One primary function of the neoVI FIRE 2 is to act as an interface between vehicle networks and a standard PC. Using the provided cables, you can connect the neoVI FIRE 2 to either a bench test setup or an actual vehicle, and monitor live network activity. All channels are captured simultaneously, and are hardware time-stamped with great accuracy. Data is transferred by the neoVI FIRE 2 from attached networks over a USB connection, where it can be viewed in software such as Vehicle Spy.

Data Acquisition and Standalone Logging

The FIRE 2 enables the acquisition of data from networks with precise control over collection parameters. It is designed to operate not just when connected to a PC, but also in standalone mode, running independently within a vehicle. You can write custom scripts that run in real time, logging data to the included microSD card. This data can later be downloaded to the PC for analysis, and this can be done conveniently over USB without the need to remove the card.

Simulation and Scripting

The neoVI FIRE 2 not only allows you to receive data from vehicle networks, but also to transmit on them. Using Vehicle Spy or other software you can define transmit messages with custom data and send them manually or on a schedule of your choosing. You can also write intelligent scripts that implement arbitrary logic, and compile them into *CoreMinis* that run within the device itself. This functionality allows you to create specialized test scenarios, and to simulate ECUs and gateways. It is also possible to reflash ECUs using data from the FIRE 2's microSD card.

1.4 Summary of Key Features

With the neoVI FIRE 2, we've fit a lot of power and functionality into a tough little package. To give you an idea of how much you can do with the FIRE 2, here's a summary of the device's most important design, construction, operational and performance features.

Construction, Controls and Cabling

- Compact design: 5.5" x 3.5" x 1.5" (14 x 9 x 4 cm).
- Light weight: less than 12 oz (340 g).
- Solid anodized aluminum case.
- Thick rubber end boots for shock protection.
- Ruggedized metal connectors.
- Cable interfaces on sides for easier connections.
- Multiple cable options for vehicle networks, including Ethernet, DoIP and OBD-II.
- Top membrane interface with network and logger status LEDs and two pushbuttons.
- Ability to control LEDs and pushbuttons in custom scripts.

Power and Performance

- Fourth-generation neoVI architecture, offering over ten times the performance of earlier devices.
- Memory updated to 32 MB and on-board flash to 64 MB, allowing much more space for scripting and buffering.
- Field-upgradeable firmware.
- Support for 4.5V to 40V input power.
- Built-in five-second uninterruptible power supply to ensure graceful shutdown on power loss.
- Ability to configure device and download SD card data on the desktop using only USB power.
- Lower power consumption than earlier generation devices.

Network Interfaces and Features

- 6 dedicated DW CAN channels (ISO 11898-2): 5 Dual Wire HS CAN, 1 Dual Wire MS CAN.
- 2 selectable CAN channels: 2 additional Dual Wire HS CAN, or 2 Single Wire SW CAN, or 2 Low Speed Fault Tolerant LSFT CAN (ISO 11898-3).
- All Dual Wire CAN channels have CAN FD support.
- Initial support for non-ISO CAN FD, with ISO CAN FD upgrade included when it is available.

- Software-programmable CAN termination.
- 4 LIN channels.
- 2 MISC I/O channels, which can be configured as analog / PWM.
- Software-configurable CAN and LIN channel enables/disables, baud rates and other parameters.
- 10/100 Ethernet with low power mode and activation line.
- Ethernet link usable for DoIP/XCP, or to connect to Automotive Ethernet (BroadR-Reach / 100BASE-T1) network through Intrepid RAD-Moon (sold separately).
- Real-time clock for 64-bit message timestamping.

Logging and Simulation

- Fully-programmable scripting and standalone logging functionality.
- SD card logging of all traffic.
- Software-configurable sleep mode.
- Low power modes.
- Comatose support; device wakeup can be triggered by all 12 CAN transceivers, all 4 LIN channels, by USB or by the membrane keypad.

PC Interface and SD Card Support

- High-speed isolated USB connection protects PC from potential damage.
- Support for microSD cards up to 128 GB in size.
- Data can be unloaded from the microSD card via USB without the need to remove the card, or via the included card reader.
- Download speeds of up to 3.2 MB/s.
- Firmware-based SD card presence and card door detector.

Advanced Features

- Device control by external software using three open APIs: neoVI DLL, SAE J2534, and TMC RP1210 A/B.
- USB host slot for hardware expandability, such as powering a RAD-Moon or using a neoVI MIC microphone/trigger pendant.

1.5 Hardware and Software Requirements

Only a small amount of hardware is required to use the neoVI FIRE 2:

- A vehicle network, either within an actual vehicle or in a test bench environment.
- A DC power supply capable of providing 4.5V to 40V of DC power, with a nominal current of 250 mA at 12V. Your network setup must include wiring capable of providing this power on pin 25 of a female DB-25 connector that connects to a FIRE 2 cable; see Chapter 7 for pinout details.
- A PC with an open standard USB 2.0 (or higher) port. You can use a USB hub, but we recommend that this be a powered hub to ensure that sufficient power is provided.

Additional hardware may be required for some uses of the device:

- Interfacing to a BroadR-Reach (100BASE-T1) Automotive Ethernet network requires an Intrepid RAD-Moon or similar media converter device.
- Additional cables may be needed, depending on the nature of the network to which the neoVI FIRE 2 is being connected.

Intrepid's Vehicle Spy Professional is recommended for use with the FIRE 2, and provides everything you need to set up your hardware and use all of its capabilities. The setup program for VSpy will also install the necessary drivers for your FIRE 2. If you do not have a VSpy license, you can use the Vehicle Spy trial version for basic network interfacing and driver setup. Drivers can also be set up using the API kit installer. All of this software can be found on the disc that comes with the FIRE 2, or if necessary, can be downloaded from the Intrepid web site at <http://www.intrepidcs.com>. Installation instructions can be found in Chapter 3.

Please refer to the Vehicle Spy documentation for its more specific PC hardware and operating system requirements and recommendations. Note, however, that Vehicle Spy will run on most modern Windows-based PCs.

2 A Tour of neoVI FIRE2 Hardware

Let's now take a short tour of the neoVI FIRE 2's hardware. We'll examine the device from all sides, showing its external components and explaining what each does. This will help you become more familiar with the unit so you can more easily set up, configure and use it.

Like many Intrepid products, the neoVI FIRE 2 is designed so that all of its connectors are located on its sides, making the device easier to use in cramped quarters. We'll refer to these as the *left side* and *right side* of the unit, as oriented when facing the device with its top label text readable.

 **Warning:** The neoVI FIRE 2 is a complex device that does not contain any user-serviceable parts. Do not attempt to open the case of the neoVI FIRE 2 unless specifically instructed to do so by an Intrepid Control Systems technician, or you risk possible injury or damage to the unit.

2.1 Case and Overall Design

The neoVI FIRE 2 is enclosed in a sturdy black-anodized metal case. The device has been designed and tested for in-vehicle use, and is operational in a temperature range from -40°C to +85°C. An overall view of the neoVI FIRE 2 can be seen in Figure 3.

Connectors and ports are often a point of failure with hardware devices. To ensure that the neoVI FIRE 2 provides you with years of reliable service, Intrepid has ruggedized the physical interfaces on the device by using reinforced metal connectors.

To further protect the device against bumps and drops, it has cyan-colored rubber bumpers on both ends. These bumpers are removable, but there is no need to do this under normal circumstances, and we recommend that you leave them in place.



Figure 3: Overview of the neoVI FIRE 2.

The bottom of the neoVI FIRE 2 contains useful reference information, including the device serial number, pinouts of its HD-26 and μ DB-9 connectors, and Intrepid's contact information (Figure 4). Pinouts for all FIRE 2 connectors and cables can be found in Chapter 7.



Figure 4: neoVI FIRE 2 Bottom View. Note that the FIRE 2's miscellaneous I/O channels are "EMISC 1" and "EMISC 2". (The "MISC DIO 5" and "MISC DIO 6" entries will be removed in future FIRE 2 label printings.)

2.2 Left Side Interfaces and Connectors

The left side of the neoVI FIRE 2 contains two components: the HD-26 connector and a set of red and green LEDs (Figure 5).



Figure 5: neoVI FIRE 2 Left Side View.

HD-26 Network Interface Connector

This male, high-density, 26-pin D-subminiature connector is the primary means by which the neoVI FIRE 2 interfaces with vehicle networks. One of two network interface cables is connected to this port, enabling CAN, LIN and Ethernet messages to be passed between the network and the FIRE 2. This connector also provides primary power to the device.

Green and Red Status LEDs

You can determine the status of the neoVI FIRE 2 by observing the blink pattern of these two LEDs. The patterns here will be identical to those seen in the keypad button LEDs on the top membrane panel (explained in Section 2.4). The membrane LEDs will usually be more convenient to use, but the traditional side panel LEDs have been preserved for those who are accustomed to them from working with the original neoVI FIRE.

2.3 Right Side Interfaces and Connectors

This side of the neoVI FIRE 2 contains most of its connectors, ports and slots (Figure 6).



Figure 6: neoVI FIRE 2 Right Side View.

USB “B” Connector

This is the “square” connector for USB devices that use detachable cables. (The standard “rectangular” connectors found on PCs are “A” connectors, which is why the cable supplied with the neoVI FIRE 2 is often called a “USB A/B cable”.)

μDB-9 (Micro DB-9) Connector

This connector carries LIN and miscellaneous I/O signals to and from the FIRE 2. A micro DB-9 was used to allow the device to be made more compact; a provided cable converts from this smaller connector to the standard DB-9 commonly used in the automotive industry.

USB Host Port

The USB “A” connector allows the FIRE 2 to act as a USB host, so other devices can plug into it. Please see Section 6.2 for more details.

microSD Slot and Cover

This slot holds the microSD card that stores data logged or captured by the neoVI FIRE 2. It is protected by a metal cover that prevents accidental ejection of the card and protects the slot from dirt and debris.

You can download the contents of the installed microSD card over USB, or for larger data sets, remove the card and use the provided external card reader.

Micro-SIM Slot and Cover

This slot can be used to hold a Micro-SIM card. Like the microSD card slot, it is covered with a metal plate to protect it and the device.

2.4 Membrane LED Display and Keypad

One of the neoVI FIRE 2's many improvements over the original neoVI FIRE is the addition of a membrane LED display and keypad on top of the unit (Figure 7). The membrane contains 10 LEDs that provide immediate visual feedback about the status of the device, and two keypad buttons that can be used to toggle the indicator mode and for other functions.



Figure 7: neoVI FIRE 2 Membrane LED Display and Keypad.

All of the LEDs and buttons are also scriptable: the buttons can be used for user input, and the LEDs can be set to provide information from a CoreMini program running in the FIRE 2.

Keypad Buttons and LEDs

There are two keypad buttons on the neoVI FIRE 2's top membrane: one with a blue computer icon located near the top left, and one with a white car icon located near the bottom right. Pressing either button toggles the meaning of the 8 RGB LEDs on the membrane as follows:

- **Blue Button (Top Left):** When pressed, activates the “blue set” of LED meanings: each RGB LED shows the status of the network whose name appears in a blue label *above* it. This set is active in the image in Figure 8.
- **White Button (Bottom Right):** When pressed, activates the “white set” of LED meanings: each RGB LED shows information about a network or FIRE 2 function based on the white icon or label *below* it.

The buttons themselves also contain red and green LEDs, which flash in the same pattern as the red and green LEDs on the left side of the device (see Section 2.2). The illuminated

LEDs show which set of indicator meanings is active, and may also be more convenient for monitoring general device status than the left-side LEDs.

The green and red status LEDs here, and on the side of the neoVI FIRE 2, show information about it through a number of flash patterns, which are described in Table 1.

Flash Pattern	Description
Green LED flashing rapidly; red LED off	FIRE 2 is powered on but offline.
Green and red LEDs flashing rapidly in alternating sequence	Device is powered and online with a PC running Vehicle Spy or other software.
Red LED flashing rapidly; green LED off	FIRE 2 is running a CoreMini script.
Red LED flashing at constant rate; green LED flashing intermittently	VehicleScape Standalone Logging is active; the flash rate of the green LED reflects the rate at which data is being logged.
Green LED flashes three times slowly, red LED flashes once, then cycle repeats	FIRE 2 is in bootloader mode. This normally occurs when new firmware is being flashed to the device. See Section 4.2 for more details.

Table 1: FIRE 2 Green/Red LED Flash Patterns.

Network/Logger Status RGB LEDs

The membrane contains 8 RGB (full color) LEDs in two rows of four. The meaning of each LED changes depending on whether the upper left blue button has been pressed or the lower right white button, so the 8 LEDs actually indicate a total of 16 separate status conditions. To find the current meaning of each LED, check whether the white button or blue button has its LEDs flashing, and then refer to the label of the corresponding color (described below).

Interpretation of RGB LED Colors

These are “RGB” LEDs because they contain separate red, green and blue elements. For networks, each indicates a different aspect of the device’s overall status:

- **Green:** Device is transmitting messages on this channel.
- **Blue:** Device is receiving messages on this channel.
- **Red:** Device is detecting errors on this channel.

It is possible for more than one LED component to be lit, producing the following results:

- **Green+Blue (Cyan):** Device is transmitting and receiving on this channel.
- **Green+Red (Yellow):** Device is transmitting and detecting errors on this channel.
- **Blue+Red (Magenta):** Device is receiving and detecting errors on this channel.
- **Green+Blue+Red (White):** Device is transmitting, receiving and detecting errors on this channel.

Figure 8 shows a photograph of the top membrane of a FIRE2 in active use, with the blue set of status indicators active, meaning that transmissions are occurring on five channels and errors on one.

As a further cue to network activity, the intensity of these LEDs is proportional to the amount of traffic on the corresponding network. Slower traffic on a network will cause the network's LED to flash more dimly, while heavy traffic will cause the LED to be brighter. Note that the blink rate remains the same regardless of traffic level.



Figure 8: neoVI FIRE 2 Membrane LED Display and Keypad Showing Active LEDs. In this image, the blue set of LED meanings is active, as indicated by the green LED being lit within the blue computer icon in the top left corner (this LED alternates between green and red when the device is online). The other LEDs thus mean that the neoVI FIRE 2 is active and transmitting on the HSCAN1, HSCAN2, MSCAN, HSCAN3 and HSCAN4 channels (in use these all flash a few times per second.) Note that the LED for HSCAN4 is actually yellowish; it is flashing both a bright green and a dim red to indicate errors while transmitting on the HSCAN4 channel.

“Blue Set” LED Status Indicators

Table 2 lists the blue labels on the FIRE 2 membrane interface, and describes the meaning of the LED associated with each when the blue set is selected (top left keypad button flashing). The LEDs are listed from top to bottom, left to right, as seen looking at the membrane in its usual orientation.

Label	Description
HSCAN1	Transmit / receive / error status of HS CAN channel 1
HSCAN2	Transmit / receive / error status of HS CAN channel 2
MSCAN	Transmit / receive / error status of MS CAN channel
HSCAN3	Transmit / receive / error status of HS CAN channel 3
HSCAN4	Transmit / receive / error status of HS CAN channel 4
DoIP	Transmit / receive / error status of Ethernet channel
LINS	Status of all LIN channels
CAN7	Transmit / receive / error status of HS CAN channel 6, SW CAN channel 2, or LSFT CAN channel 1, depending on CAN mode selected (see Section 4.5)

Table 2: FIRE 2 Top Membrane Blue Set LED Meanings.

“White Set” LED Status Indicators

Table 3 lists the white labels/icons on the FIRE 2 membrane interface, and describes the meaning of the LEDs for each when the white set is selected (bottom right keypad button flashing). Again the LEDs are listed from top to bottom, left to right.

Label/Icon	Description
	CoreMini script active
	Disk (solid state drive) activity
	Data being uploaded
Trg	Logging a triggered collection after the trigger condition has activated
	GPS lock (using neoVI MIC2, available later in 2016)
A	General purpose, user-programmable
HSCAN5	Transmit / receive / error status of HS CAN channel 5
CAN8	Transmit / receive / error status of HS CAN channel 7, SW CAN channel 1, or LSFT CAN channel 2, depending on CAN mode selected (see Section 4.5)

Table 3: FIRE 2 Top Membrane White Set LED Meanings.

2.5 Standard Cables and Cable Options

As mentioned in Section 1.2, the FIRE 2 ships with several standard cables, as well as one of five optional OBD cables that was selected when the device was ordered. We'll now illustrate these cables and describe each one's use. Connector pinouts and cable signal tables for this hardware can be found in Chapter 7 (except for the USB cable, which is industry standard).

USB “A/B” Cable

This is a standard cable is used to connect PCs or other hosts to USB devices that do not have integrated cables (Figure 9). The detachable cable makes the FIRE 2 easier to transport than would be the case if it were built in, and also allows the cable to be easily replaced if it is ever damaged.



Figure 9: USB “A/B” Cable.

μ DB-9 (Micro DB-9) to DB-9 Cable

As mentioned in Section 2.3, a μ DB-9 connector was used on the FIRE 2 to allow it to be made smaller. This is a “straight-through” cable that adapts the smaller connector to the regular DB-9 used in automotive applications. The cable can be seen in Figure 10, while a close-up of the special μ DB-9 connector is in Figure 11.



Figure 10: μ DB-9 (Micro DB-9) to DB-9 Cable



Figure 11: Close-up of μ DB-9 Connector. This connector attaches to the mating connector on the neoVI FIRE 2, adapting it into an industry-standard DB-9 connector.

FIRE 2 Ethernet Cable Adapter

This special cable “breaks out” the HD-26 connector on the left side of the neoVI FIRE 2 to three connectors that are used to communicate with vehicle networks. The cable is illustrated in Figure 12, while the network interface connectors are described further below.



Figure 12: FIRE 2 Ethernet Cable Adapter. This cable allows the FIRE 2 to connect to vehicle networks and receive its primary power input.

DB-25 Connector

This is the main vehicle network interface connector, carrying CAN, LIN and Ethernet messages, as well as providing power to the FIRE 2 from the network (Figure 13). As we'll see later in the manual, it is also used to connect an additional cable for OBD applications.

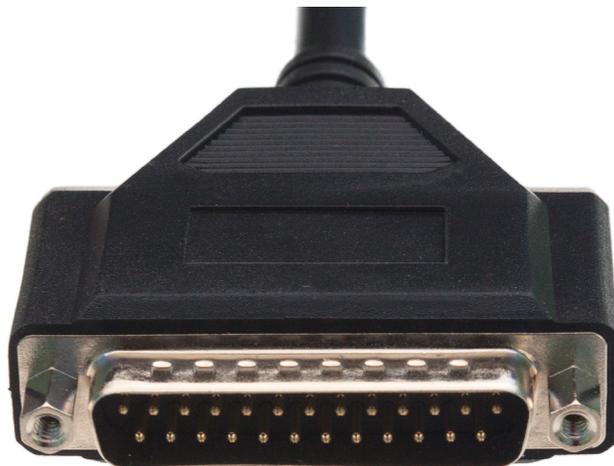


Figure 13: DB-25 Connector. This connector carries main network traffic and primary DC power to the FIRE 2.

DB-9 Connector

This connector carries 4 LIN channels for LIN applications (Figure 14).



Figure 14: DB-9 Connector. This industry-standard connector carries LIN traffic.

RJ-45 Connector

This female RJ-45 socket is used to attach a standard Ethernet cable for Automotive Ethernet and DoIP applications (Figure 15).



Figure 15: RJ-45 Socket.

OBD Cables

The FIRE 2 comes with your choice of one of five OBD cables, which are used to interface the device to a vehicle or bench OBD port. Four of these cables attach to the DB-25 connector on the FIRE 2 Ethernet Cable Adapter (Figure 13), while the fifth actually takes the place of that cable, connecting directly to the FIRE 2.

See Section 3.3 for hookup diagrams that show how to connect all of these cables to the FIRE 2 and your network or bench.

neoVI-OBD-1 Cable

This cable, which has a red OBD-II connector, is used primarily for General Motors vehicles. It can be seen in Figure 16.



Figure 16: neoVI-OBD-1 Cable.

neoVI-OBD-MULTI Cable

This cable has a standard black OBD-II connector and is suitable for use with the vehicles of most OEMs. It is pictured in Figure 17.



Figure 17: neoVI-OBD-MULTI Cable.

neoVI-OBD-MULTI Right Angle Cable

This is the same as the neoVI-OBD-MULTI cable but terminates with a right-angled OBD II connector for vehicles where this is required. A picture of the cable is shown in Figure 18.



Figure 18: neoVI-OBD-MULTI Right Angle Cable.

neoVI FIRE/RED J1939 Cable

This cable terminates in a round 9-pin Deutsch connector for use in commercial vehicles (Figure 19).



Figure 19: neoVI FIRE/RED J1939 Cable.

FIRE 2 OBD Cable with DoIP Support

This special cable attaches to the FIRE 2's HD-26 connector in place of the regular FIRE 2 Ethernet Cable Adapter. It contains DB-25, DB-9 and OBD-II connectors wired for DoIP use, and is illustrated in Figure 20.



Figure 20: FIRE 2 OBD Cable with DoIP Support.

3 Hardware and Software Setup

In this chapter we will explain the steps necessary to set up your neoVI FIRE 2 to work with a vehicle network. This will include explaining how to install the required software and drivers, connect cables between the FIRE 2 and the network, and link the unit to a PC.

Note that because vehicle and test bench setups will vary, we can only show a typical case here. You may need to alter these instructions to suit your particular needs.

3.1 Vehicle Spy and Driver Installation and Setup

It is possible to install your hardware and software in either order. However, the neoVI FIRE 2 requires special drivers to function properly, which are installed automatically by the included software setup programs. If you connect the hardware before the drivers are installed, it will not work correctly. For this reason, we recommend installing the software first.

As mentioned earlier, a full licensed version of Vehicle Spy is recommended in order to allow you to get the most from your neoVI FIRE 2. If you purchase Vehicle Spy, its installer will be included on the software disc that comes with the device; if not, a more limited trial version will be provided instead.

 **Note:** A separate driver installer is provided for those who will be interfacing to the neoVI FIRE 2 using its API, rather than using Vehicle Spy. Please see Section 3.2 for details.

Installing Vehicle Spy (Professional or Trial)

The installation process is very similar for both the full and trial versions, though there may be some slight differences between the figures in this document and what you see on your screen. Vehicle Spy 3 uses an automated installer, which will do most of the work for you. Simply follow the instructions below to set up the program on your computer.

1. **Load the Software and Documentation Disc:** Put the disc that came with your neoVI FIRE 2 into the optical drive of your computer. A few seconds later, the ICS software installation menu should appear on your computer screen, as shown in Figure 21.

 **Note:** On some computers this window may not appear automatically. If this occurs, start Windows Explorer, navigate to the disc's letter under *Computer*, and then double-click the file *icsAutoPlay.exe* to open the menu.



Figure 21: neoVI FIRE2 Software Install Dialog Box.

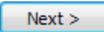
From this menu you can start installing Vehicle Spy 3, install the API support files, and access videos, documentation and online support materials.

2. **Start Vehicle Spy 3 Installation:** Click *Vehicle Spy 3 Install*.
3. **Select Language:** Select your preferred language, and then click to proceed. (For the remainder of these directions, we will assume that English has been used.)

The Vehicle Spy 3 setup wizard will now start, displaying a welcome screen as shown in Figure 22 (though the exact version number is likely to differ from the one seen here).



Figure 22: Vehicle Spy 3 Setup Wizard Welcome Screen.

4. **Start Vehicle Spy 3 Setup Wizard:** Click  to start the setup wizard.
5. **Review and Accept License Agreement:** Review the license agreement, and assuming its terms are acceptable, select *I accept the agreement*, then click  (Figure 23).

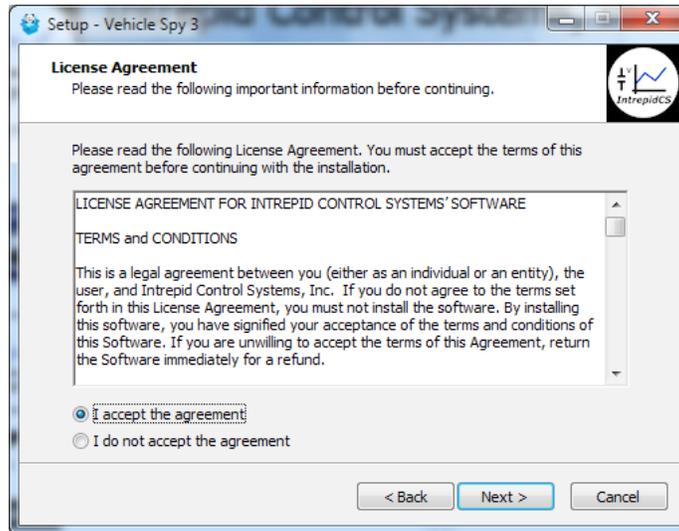
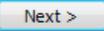


Figure 23: Vehicle Spy 3 License Agreement.

6. **Select Installation Type:** We are doing a new installation so simply click  to continue.
7. **Select Destination Location:** Choose where you want to install Vehicle Spy 3 (Figure 24). We normally recommend using the default location. Click .

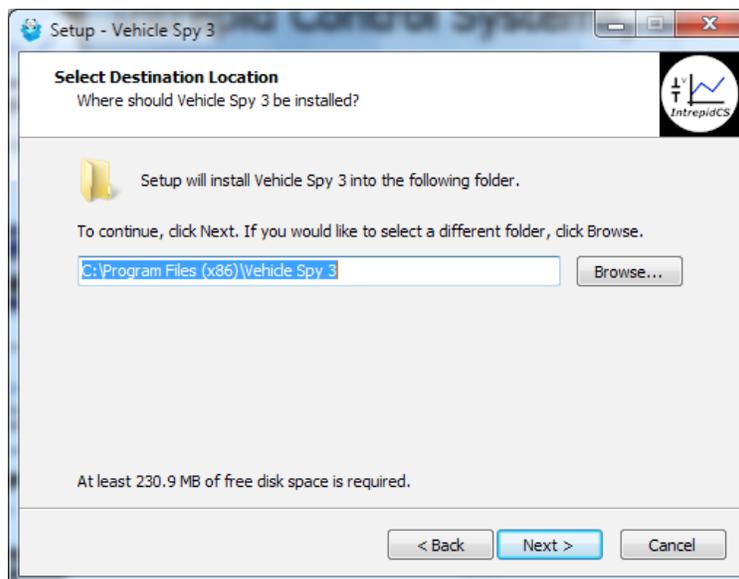


Figure 24: Choosing the Destination Location.

8. **Select Data Directory Location:** Next, choose where you want Vehicle Spy 3 to store its data files. We recommend sticking with the provided default, `C:\IntrepidCS\Vehicle Spy 3` (Figure 25). Click to continue.

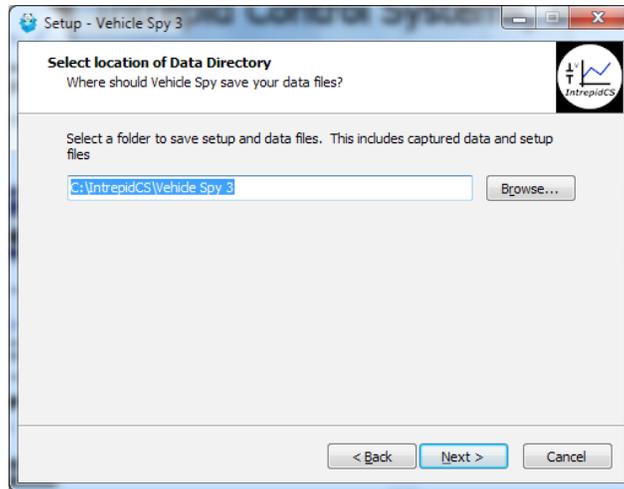


Figure 25: Selecting the Data Directory Location.

9. **Select Start Menu Folder:** Choose where you want your Windows shortcuts for Vehicle Spy 3 to reside. Again, the defaults are generally fine here, though you can change them if you wish. Click to proceed.
10. **Select Additional Tasks:** The one option here is to create a desktop icon for Vehicle Spy 3, which is selected by default. Uncheck the box if you do not wish to have this icon created, then click .

You have now provided all of the information the wizard needs to install Vehicle Spy 3. Your selected options will be displayed in a review box, as shown in Figure 26.

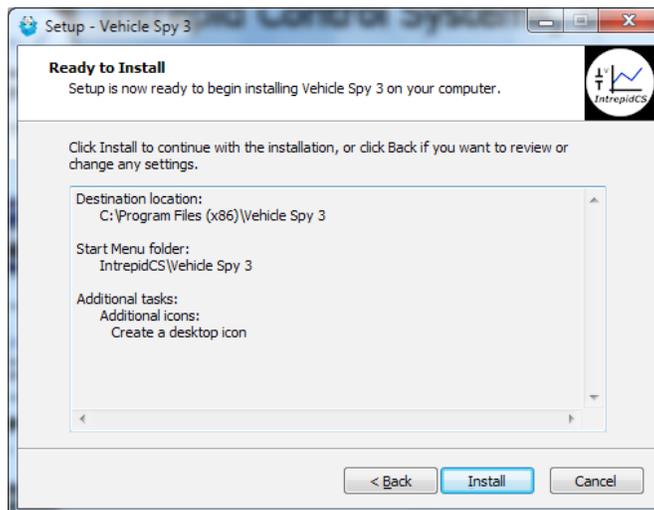


Figure 26: Installation Options Review.

- 11. Review Installation Options and Begin Installation:** Ensure that the options you have chosen are correct, and then click .

The wizard will now begin installing Vehicle Spy 3. A window will appear showing you the progress of the installation (Figure 27).

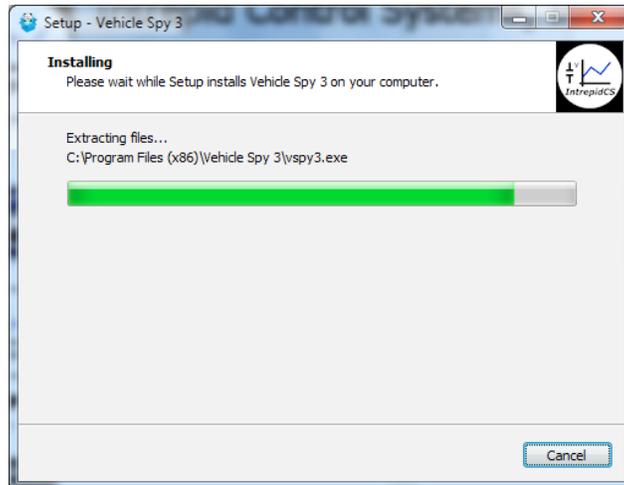


Figure 27: Installing Vehicle Spy 3.

After completing installation of the software itself, the wizard will automatically install various drivers required by Vehicle Spy 3 and the neoVI FIRE 2. The first install will be guided by the VCP Driver Installer.

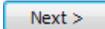
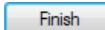
- 12. Install VCP Drivers:** Click  to begin installing the first set of drivers. This will usually take only a few seconds, and when completed, a message will appear like the one in Figure 28. Click  to complete this initial driver installation process.



Figure 28: VCP Driver Installation Complete.

Next, support files for Microsoft Visual C++ 2010 and 2005 will be installed, if they are not already on the computer. This happens automatically, and you may briefly see a dialog box like the one in Figure 29. Many systems already have these files, however; if that is the case, a message may appear telling you that they are already present; just hit to continue.

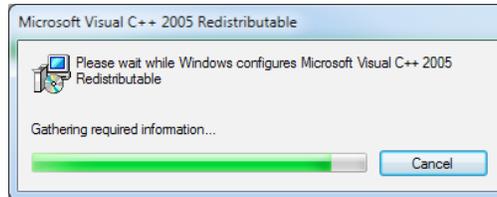


Figure 29: Installing Support Files for Microsoft Visual C++ 2005.

The WinPcap installer will start next. This is a special support program that allows Ethernet traffic on a PC to be captured and displayed by Vehicle Spy 3. You will see a window similar to the one shown in Figure 30.

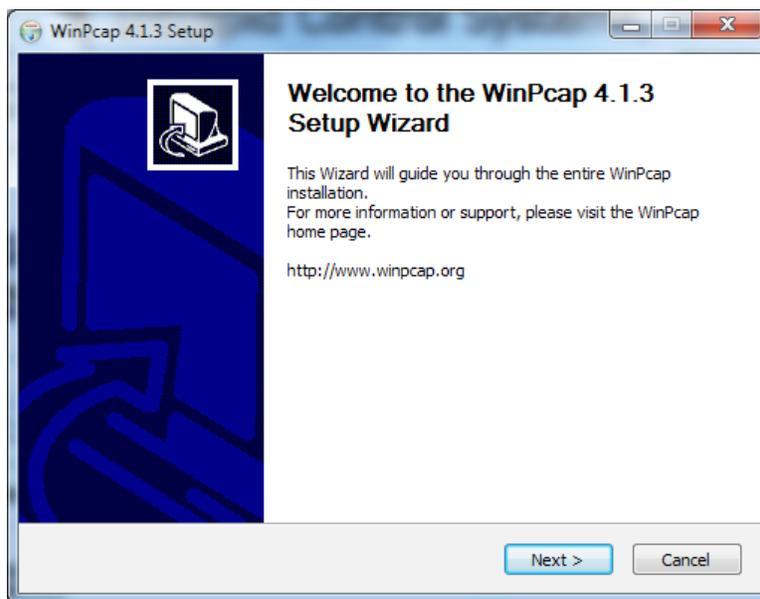


Figure 30: WinPcap setup wizard.

13. **Install WinPcap:** Click to start the installation process. Review the WinPcap license agreement and click if you are willing to abide by its terms. Leave the box on the next screen checked so that WinPcap starts automatically, and click . After a few seconds a message will appear saying that the installation is complete; click to exit this installer.

The setup wizard will now install SMSC LAN9500 device drivers. This only takes a few seconds and requires no user intervention; you may see a dialog box on the screen like the one in Figure 31.

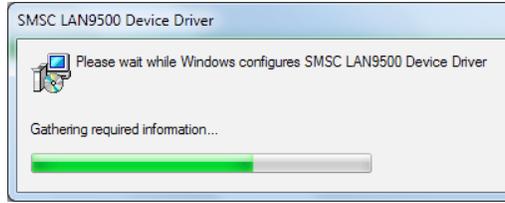


Figure 31: SMSC LAN9500 device driver installation.

Another ICS driver installer dialog box will now appear, similar to the first one.

14. Install ICS Port Drivers: Click to begin installing the ICS port drivers.

At this point you may receive a prompt from Windows like the one shown in Figure 32. Please click to authorize driver installation.

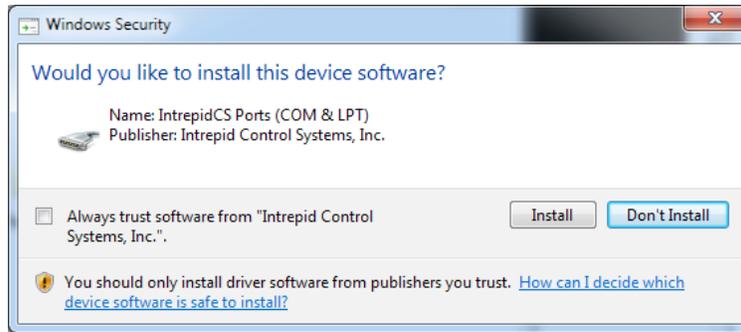


Figure 32: Windows Security Dialog Box.

Once installation begins, it will take only a few moments, and when completed, a message will appear like the one in Figure 33.

15. Complete Port Driver Installation: Click to exit this part of the install.



Figure 33: Port Driver Installation Complete.

You will now see a window similar to Figure 34, indicating that the setup process is complete.

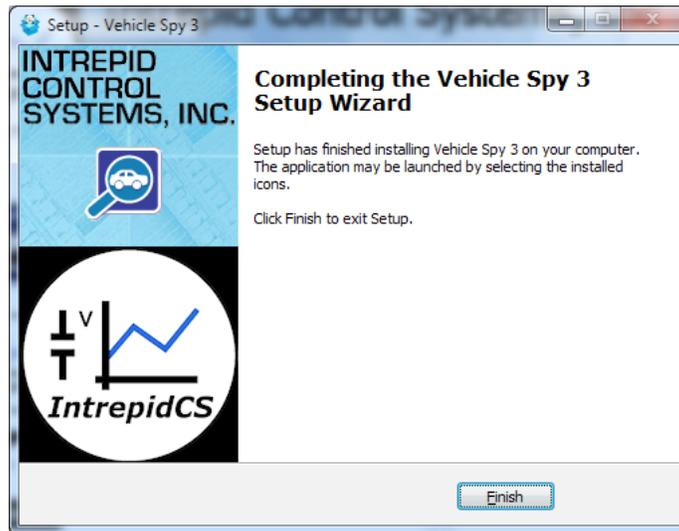
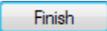


Figure 34: Vehicle Spy 3 Setup Complete.

16. **Exit the Setup Wizard:** Click .

Congratulations, you're done!

3.2 Driver and API Support File Installation and Setup

If you plan to use the neoVI FIRE 2 without Vehicle Spy 3, you will need to install drivers and support files to allow the hardware to be accessed via its API. Please follow the steps below.

All of these files are installed automatically with Vehicle Spy 3, so if you followed the instructions in Section 3.1, you can skip the directions here.

1. **Load the Software and Documentation Disc:** Insert the disc that came with your neoVI FIRE 2 into the optical drive of your computer. A few seconds later, the ICS software installation menu should automatically appear on your computer screen, as shown in Figure 35.

 **Note:** On some computers this window may not appear automatically. If this occurs, start Windows Explorer, navigate to the disc's letter under *Computer*, and then double-click the file *icsAutoPlay.exe* to open the menu.



Figure 35: neoVI FIRE2 Software Install Dialog Box.

2. **Start Support File Installation:** Click *RP1210 J2534 Intrepid API Install*.
3. **Select Language:** Select your preferred language, and then click to proceed. (We will assume that English has been used.)

The setup wizard for the ICS API and driver kit will now start, displaying a welcome screen as shown in Figure 36. (The version number you see may be different from the one shown here.)

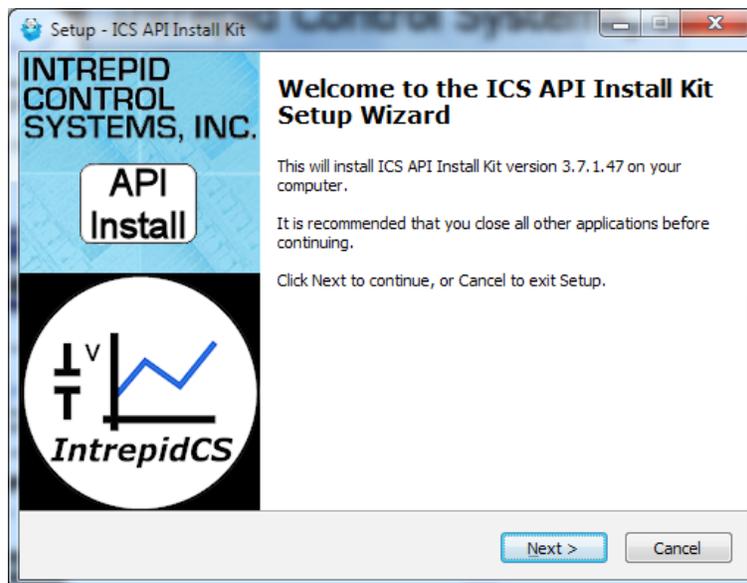
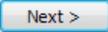


Figure 36: API and Driver Setup Wizard Welcome Screen.

4. **Start API and Driver Setup Wizard:** Click  to start the setup wizard.
5. **Review and Accept License Agreement:** Review the license agreement, and assuming its terms are acceptable, select *I accept the agreement*, then click  (Figure 37).

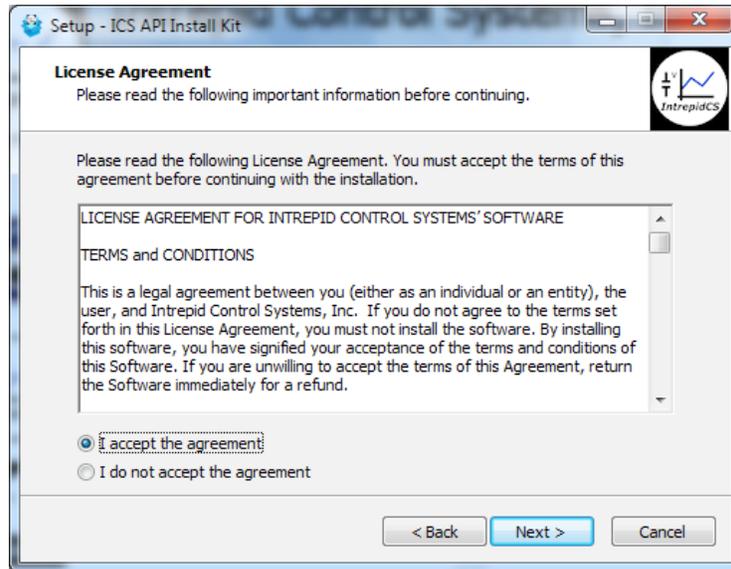
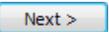


Figure 37: API and Driver File License Agreement.

6. **Select Installation Type:** We are doing a new installation so simply click  to continue.
7. **Select Destination Location:** Choose where you want to install Vehicle Spy 3 (Figure 38). We normally recommend keeping the default location. Click .

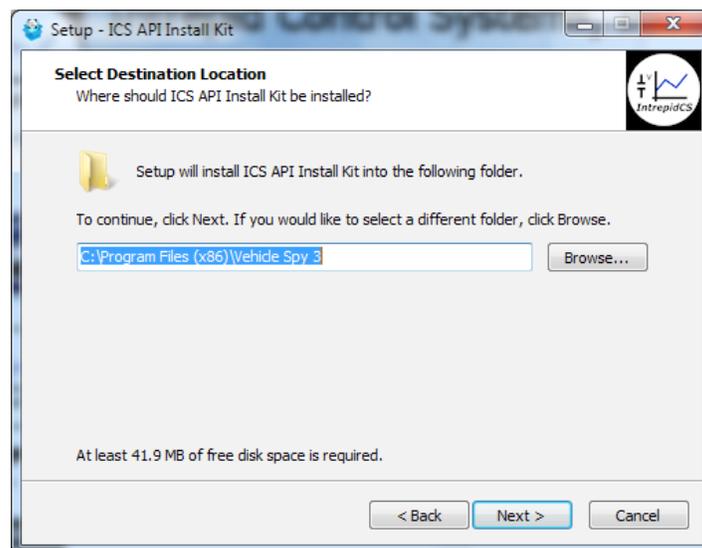


Figure 38: Choosing the API Kit Destination Location.

You have now provided all of the information the wizard needs, and it will display a summary as shown in Figure 39.

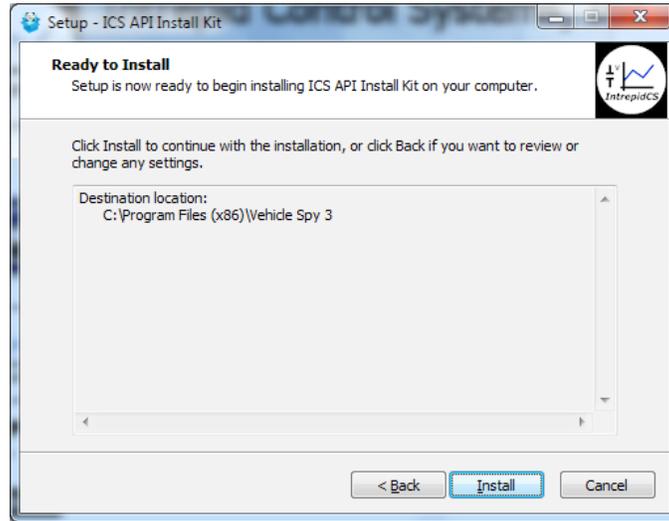


Figure 39: API Installation Options Review.

- 8. Review Installation Options and Begin Installation:** Ensure that the options you have chosen are correct, and then click .

The wizard will now begin installing Vehicle Spy 3. A window will appear showing you the progress of the installation (Figure 40).

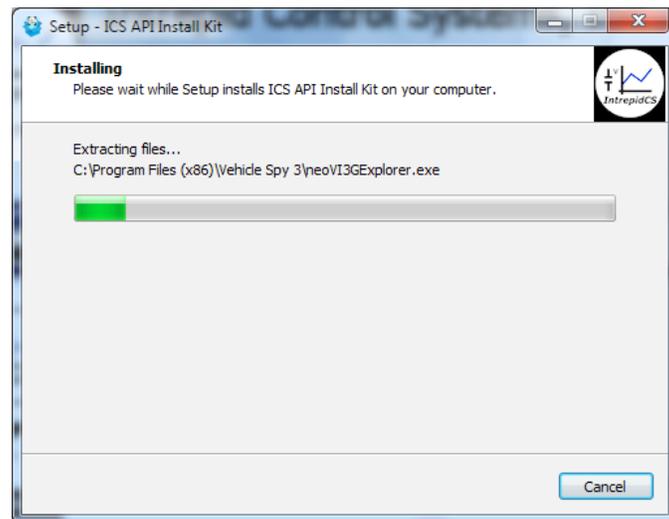


Figure 40: Installing API and Drivers.

After completing the basic setup, the wizard will automatically install various drivers required by the neoVI FIRE 2. The first install will be done by the VCP Driver Installer.

9. **Install VCP Drivers:** Click to begin installing the first set of drivers. When completed, a message will appear like the one in Figure 41. Click .

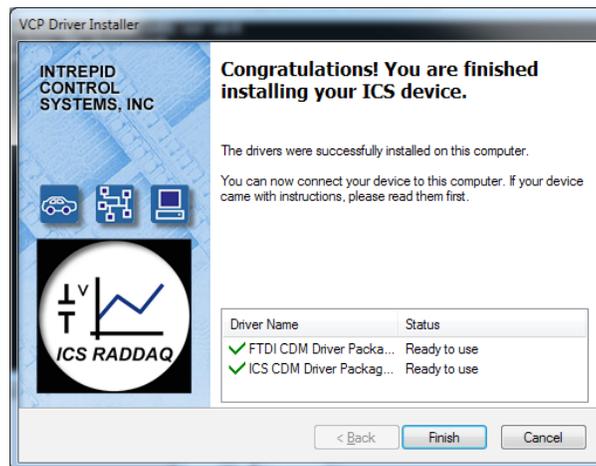


Figure 41: VCP Driver Installation Complete.

Next, support files for Microsoft Visual C++ 2010 and 2005 will be automatically installed, if they are not already on the computer. You may briefly see a dialog box like the one in Figure 42. If a prompt appears saying the files are already installed, hit to continue.

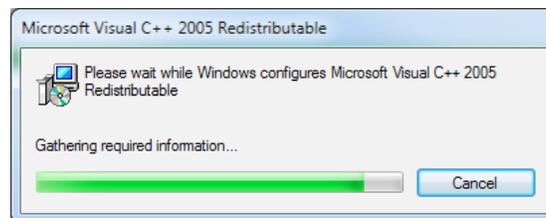


Figure 42: Installing Support Files for Microsoft Visual C++ 2005.

Another ICS driver installer dialog box will appear now.

10. **Install ICS Port Drivers:** Click to begin installing the ICS port drivers. If you see a Windows dialog like the one in Figure 43, click to authorize installation.

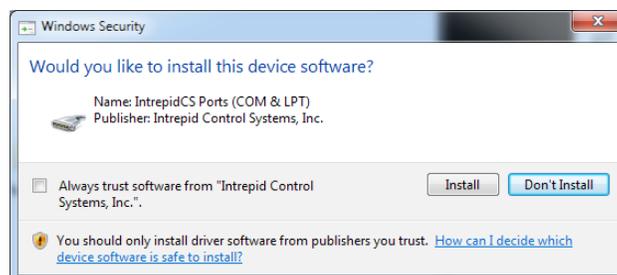


Figure 43: Windows Security Dialog Box.

Once installation begins, it will take only a few seconds, and when completed, a message will appear like the one in Figure 44.

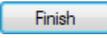
- 11. Complete Port Driver Installation:** Click  to exit this part of the install.



Figure 44: Port Driver Installation Complete.

You will now see a dialog box like the one shown in Figure 45, indicating that the setup process is complete.



Figure 45: Vehicle Spy 3 Setup Complete.

- 12. Exit the Setup Wizard:** Click .

Congratulations, you're done!

3.3 Hardware Hookup Diagrams

Hookup diagrams show you at a glance how to physically connect your neoVI FIRE 2 to vehicle networks and your PC. Below you will find first a hookup diagram for using the FIRE 2 without an OBD cable, and then five additional ones showing the connections for each of the OBD cable options discussed in Section 2.5.

Four of the OBD cables—the neoVI-OBD-1, neoVI-OBD-MULTI, neoVI-OBD-MULTI Right Angle, and neoVI FIRE/RED J1939—are connected to the DB-25 of the FIRE 2 Ethernet Cable Adapter and then attach to an OBD port on a vehicle or network test bench. The fifth, the FIRE 2 OBD Cable with DoIP Support, replaces the FIRE2 Ethernet Cable Adapter.

Basic Hardware Hookup Diagram

Figure 46 shows the basic hardware configuration of the neoVI FIRE 2, with the USB cable connecting the device to the PC, and the FIRE 2 Ethernet Cable Adapter and μ DB-9 to DB-9 cables linking it to vehicle networks.

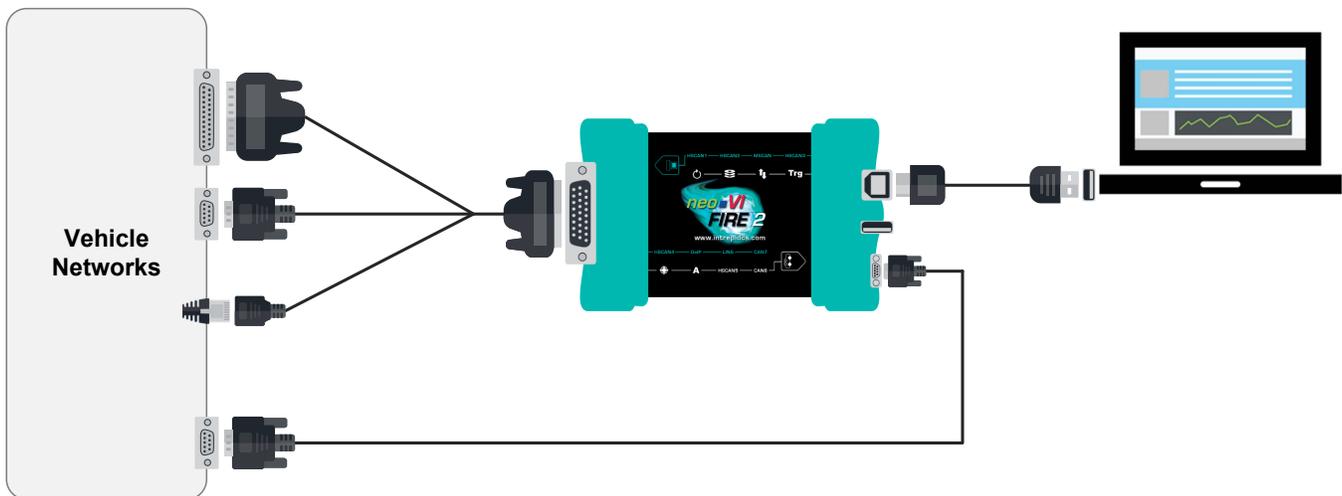


Figure 46: Basic FIRE 2 Hardware Hookup Diagram. This diagram shows basic connections with no OBD cable.

OBD Hardware Hookup Diagram - neoVI-OBD-1 Cable

In Figure 47 you can see the basic hardware setup from Figure 46 but with the addition of the neoVI-OBD-1 cable.

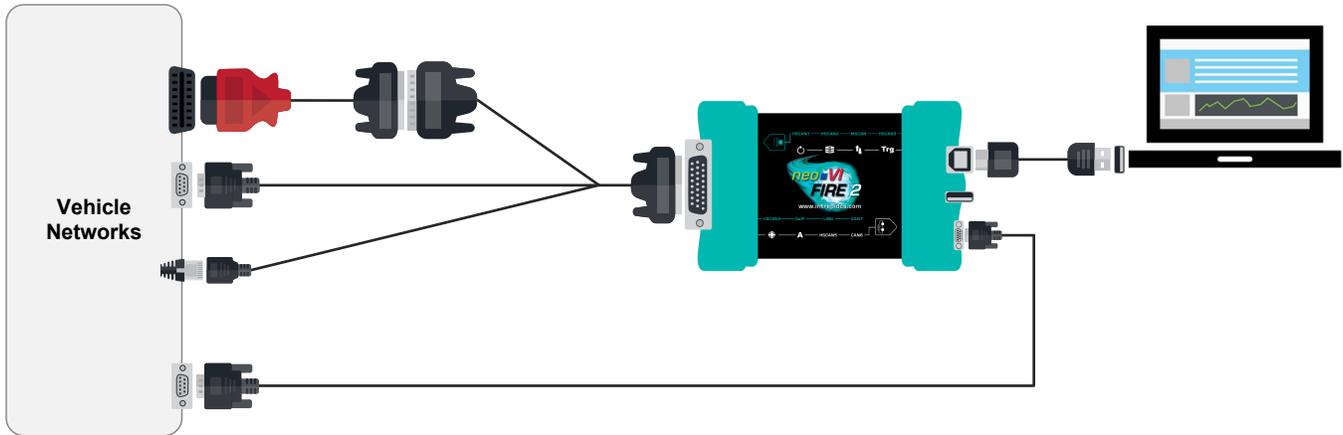


Figure 47: FIRE 2 Hardware Hookup Diagram with neoVI-OBD-1 Cable.

OBD Hardware Hookup Diagram - neoVI-OBD-MULTI Cable

Figure 48 shows the hardware setup using the neoVI-OBD-MULTI cable.

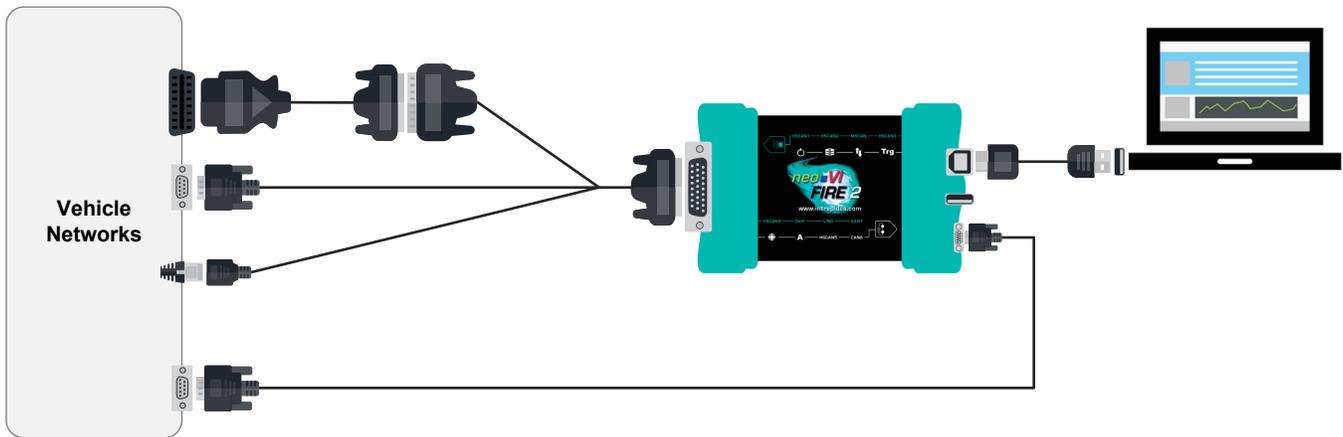


Figure 48: FIRE 2 Hardware Hookup Diagram with neoVI-OBD-MULTI Cable.

OBD Hardware Hookup Diagram - neoVI-OBD-MULTI Right Angle Cable

The hardware setup for the neoVI-OBD-MULTI Right Angle cable is the same as that of the neoVI-OBD-MULTI, except the OBD connector is at a right angle to the cable for use where this is convenient (Figure 49).

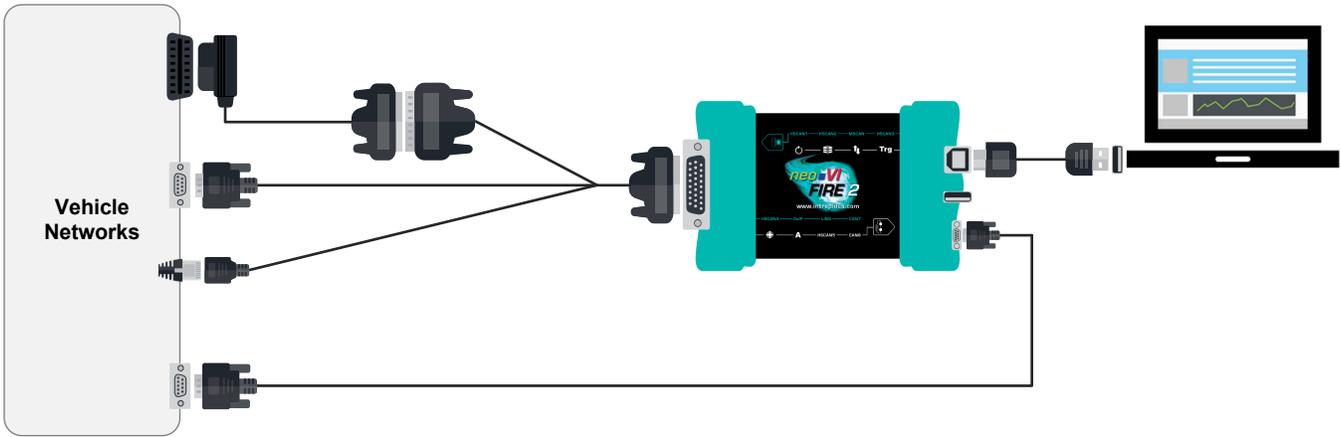


Figure 49: FIRE 2 Hardware Hookup Diagram with neoVI-OBD-MULTI Right Angle Cable.

OBD Hardware Hookup Diagram - neoVI FIRE/RED J1939 Cable

Figure 50 shows the setup when using the neoVI FIRE/RED J1939 cable for OBD.

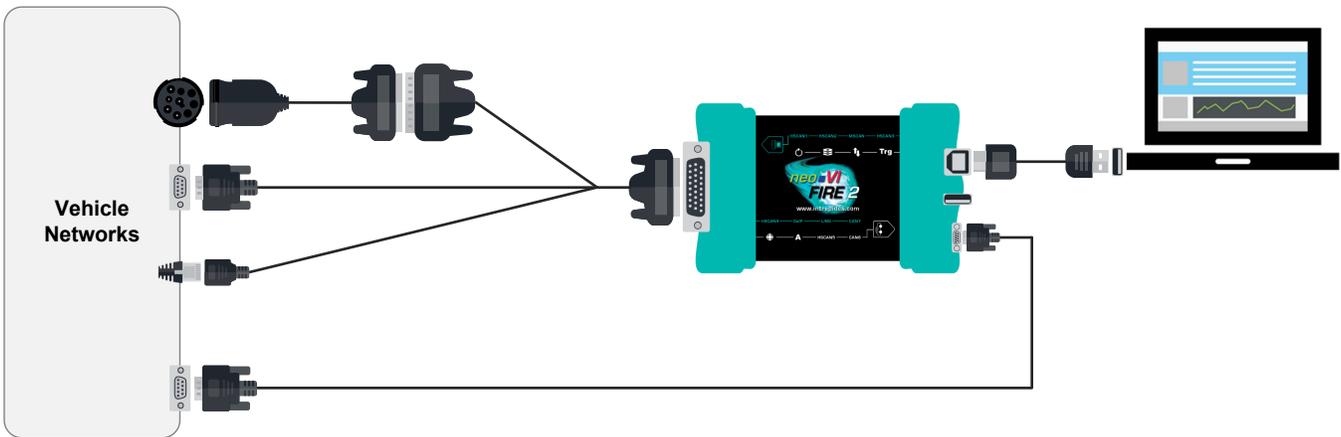


Figure 50: FIRE 2 Hardware Hookup Diagram with neoVI FIRE/RED J1939 Cable.

OBD Hardware Hookup Diagram - FIRE 2 OBD Cable with DoIP Support

The special FIRE 2 OBD Cable with DoIP Support replaces the FIRE 2 Ethernet Cable Adapter as shown in Figure 51.

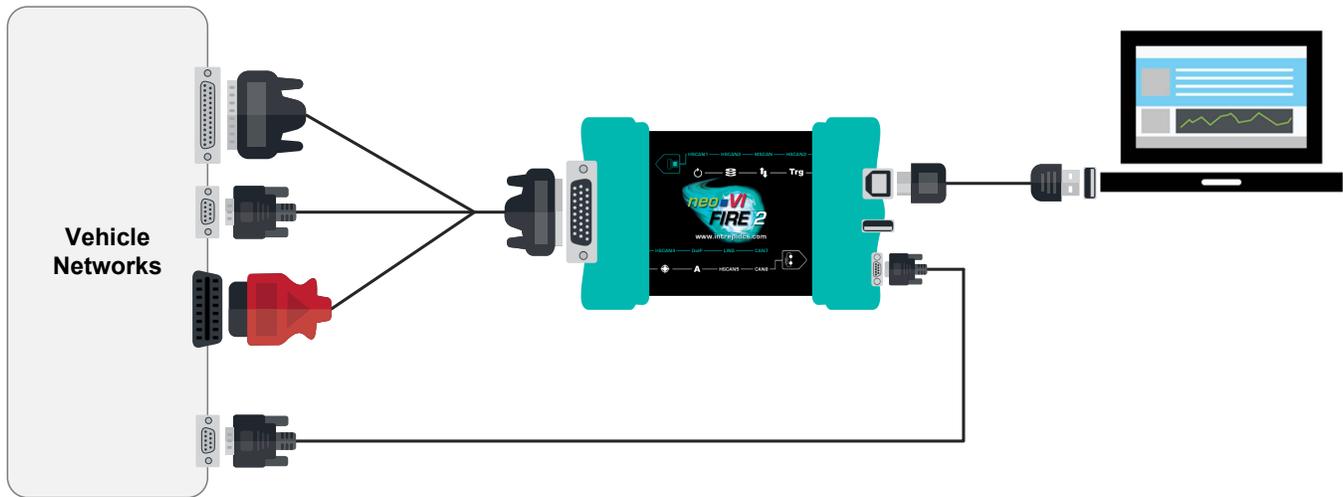


Figure 51: FIRE 2 Hardware Hookup Diagram with FIRE 2 OBD Cable with DoIP Support.

3.4 Vehicle Network and Power Connections

Two connectors on the FIRE 2 are used to attach it to vehicle networks. The HD-26 connector on the left side of the device provides primary power input to the neoVI FIRE 2 and also carries most of the network channels. This is also where your OBD cable is attached, either directly or indirectly. The μ DB-9 connector on the other side of the device carries LIN and miscellaneous I/O channels, which you may or may not need depending on your application.

The connection steps are listed in a specific order chosen to make the process intuitive, and to prioritize the power connection so you can verify quickly that the FIRE 2 is operational. However, the steps can be performed in any order you find convenient.

HD-26 and OBD Cable Connections to FIRE 2

The connections made here will depend on which OBD cable, if any, you are using with the FIRE 2.

If you are using no OBD cable, or any OBD cable other than the FIRE 2 OBD Cable with DoIP Support:

1. **Attach FIRE 2 Ethernet Cable Adapter to HD-26 Connector:** Attach the HD-26 female connector on the network interface cable to the HD-26 male connector on the neoVI FIRE 2. Tighten the thumbscrews so the cable remains securely attached (Figure 52).



Figure 52: Connecting the HD-26 Cable Connector to the neoVI FIRE 2.

- 2. Attach OBD Cable to DB-25 Connector on FIRE 2 Ethernet Cable Adapter (OBD Use Only):** Connect the female DB-25 connector of your neoVI-OBD-1, neoVI-OBD-MULTI, neoVI-OBD-MULTI Right Angle or neoVI FIRE/RED J1939 cable to the male DB-25 of the FIRE 2 Ethernet Cable Adapter (Figure 53).



Figure 53: Attaching the DB-25 Connector of an OBD Cable to the DB-25 on the FIRE 2 Ethernet Cable Adapter.

- 3. Attach DB-25, DB-9, RJ-45, J1939 and/or OBD-II Connectors to Vehicle Network:** Attach the connectors from the FIRE 2 Ethernet Cable Adapter and your OBD cable (if using) to their mating halves on your network, then secure them in place.

As soon as you connect the device supplying power to the cable attached to the neoVI FIRE 2, the device should boot up. You will recognize this by green LEDs beginning to flash in a quick and regular pattern on both the side of the device next to the HD-26 connection, and in the upper left corner of the top membrane interface. If the LEDs do not start flashing, please see Chapter 8 for assistance.

μDB-9 to DB-9 Cable Connection to FIRE 2

We'll now continue with the μDB-9 connector on the other side of the FIRE 2, using the special μDB-9 to DB-9 cable that comes with the device. This connection carries LIN and miscellaneous I/O channels for networks that require them; if they are not relevant to you, the next two steps can be skipped.

- 4. Attach μDB-9 Connector FIRE 2:** Attach the μDB-9 end of the cable to the female μDB-9 connector on the FIRE 2 and secure it in place (Figure 54).
- 5. Attach DB-9 Connector to Vehicle Network:** Attach the standard DB-9 end of the cable to the appropriate mating connector in your vehicle network.

The neoVI FIRE 2 should now be fully connected to your vehicle or bench network.



Figure 54: Connecting the μDB-9 Cable Connector to the neoVI FIRE 2.

3.5 PC Connection

Now we will connect the FIRE 2 to the PC. This can be done either directly to a USB 2.0 (or higher) port on the computer, or indirectly through a USB hub.

The neoVI FIRE 2 can draw up to the USB standard maximum of 500 mA through its USB connection. All computers should be able to supply this amount of current, however, unpowered USB hubs may not be able to do so, especially if they have multiple devices connected to them. If you experience difficulties with the FIRE 2 when using an unpowered hub port, but the device works when connected directly to a PC USB slot, you probably need to use the PC slot or a powered hub.

1. **Attach USB “B” Connector to FIRE 2:** Insert the square “B” connector on the supplied USB cable into the matching receptacle on the right side of the FIRE 2 (Figure 55).



Figure 55: Connecting the USB Cable to the neoVI FIRE 2.

2. **Attach USB “A” Connector to PC or USB Hub:** Attach the standard rectangular USB connector to your PC or USB hub.

Upon making the USB connection, you may notice messages within Windows informing you that drivers are being installed. These were in fact actually installed when you ran Vehicle Spy or the API installation utility, but are configured the first time the device is attached. If you see error messages associated with drivers at this point, please contact Intrepid for assistance.

4 Device Configuration

Your neoVI FIRE 2 ships from the factory ready to use with its default settings. However, its operation can also be customized to your exact needs by adjusting dozens of parameters that control its internal hardware and firmware. In this chapter, we'll show you how to manage and fine-tune your neoVI FIRE 2, including enabling and disabling networks, adjusting baud rates, turning on or off specific features, and much more.

4.1 Starting and Using neoVI Explorer

The *neoVI Explorer* utility allows you to connect to, manage and configure all of your Intrepid Control Systems hardware, including the neoVI FIRE 2. It is supplied both as an integrated feature of Vehicle Spy, and as a standalone program.

This section will describe general features and the basics of using neoVI Explorer, so you will understand the utility well when we get into settings specific to the FIRE 2.

Starting neoVI Explorer from within Vehicle Spy

There are several ways to open neoVI Explorer from within VSpy. These are probably the two easiest, since they are accessible at all times:

- **Menu Item:** Click the *Setup* menu and then select *Hardware*.
- **Hardware Setup Button:** Click the  button located in the main Vehicle Spy toolbar just under its menu (Figure 56).



Figure 56: Starting neoVI Explorer from within Vehicle Spy.

Note that you cannot start neoVI Explorer when Vehicle Spy is online (even if in simulation mode). If you attempt to do so, VSpy will prompt you to either go offline and launch neoVI Explorer, or remain online and return to Vehicle Spy.

Starting neoVI Explorer as a Standalone Program (with Vehicle Spy Installed)

If you want to work with your neoVI FIRE 2 without opening Vehicle Spy, you can launch neoVI Explorer directly. Open the Start Menu, navigate to the *IntrepidCS* folder, then under the *Vehicle Spy 3* subfolder, select *neoVI Explorer* (Figure 57).

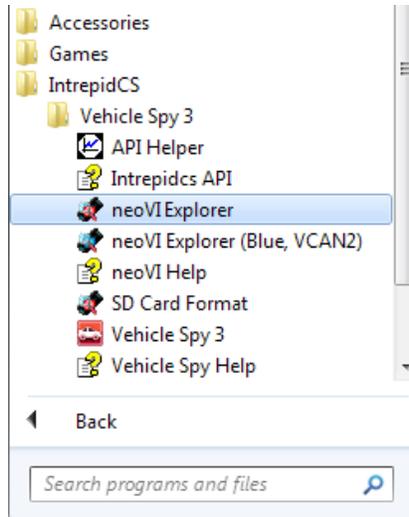


Figure 57: Starting neoVI Explorer Directly with Vehicle Spy 3 Installed.

Starting neoVI Explorer as a Standalone Program (API Kit Installed)

If you installed the API kit and support files instead of Vehicle Spy, you can run neoVI Explorer from the Start Menu using the same basic process as described above. The only difference is the name of the subfolder, so you will navigate to the *IntrepidCS* folder, then open the *ICS API Install Kit* subfolder, and finally select *neoVI Explorer* (Figure 58).

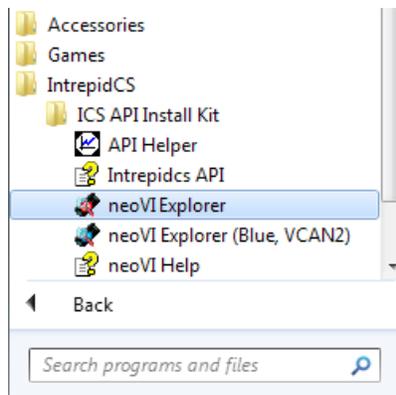


Figure 58: Starting neoVI Explorer as a Standalone Program from the API Kit.

Connecting to the FIRE 2

When neoVI Explorer loads, it will start up with the first hardware device it can find selected in the menu pane on the left. You should see your neoVI FIRE 2 listed here, along with its serial number, which begins with “CY”. If you don’t see the FIRE 2, but do see other Intrepid devices, be sure to scroll down to look for it. If it is still not visible, either its drivers have not been installed correctly or it is not powered properly; please refer to Chapter 7 for assistance.

To manage your FIRE 2, click on its entry in the navigation pane (if it is not already highlighted) and then press the *Connect* button. After successfully connecting to the device, you will see a “thumbs up” icon next to the device’s name, and checkmarks will appear next to currently-enabled networks in the explorer area on the left. You should also see a message in the message box on the right saying **neoVI FIRE2 CYxxxx settings have been read**. This tells you that neoVI Explorer has loaded the current settings from the FIRE 2. The information in the upper right-hand part of the window is device-specific and described in Section 4.2. The screen as a whole should appear similar to that shown in Figure 59 (but note that the version number shown at the bottom may be different).

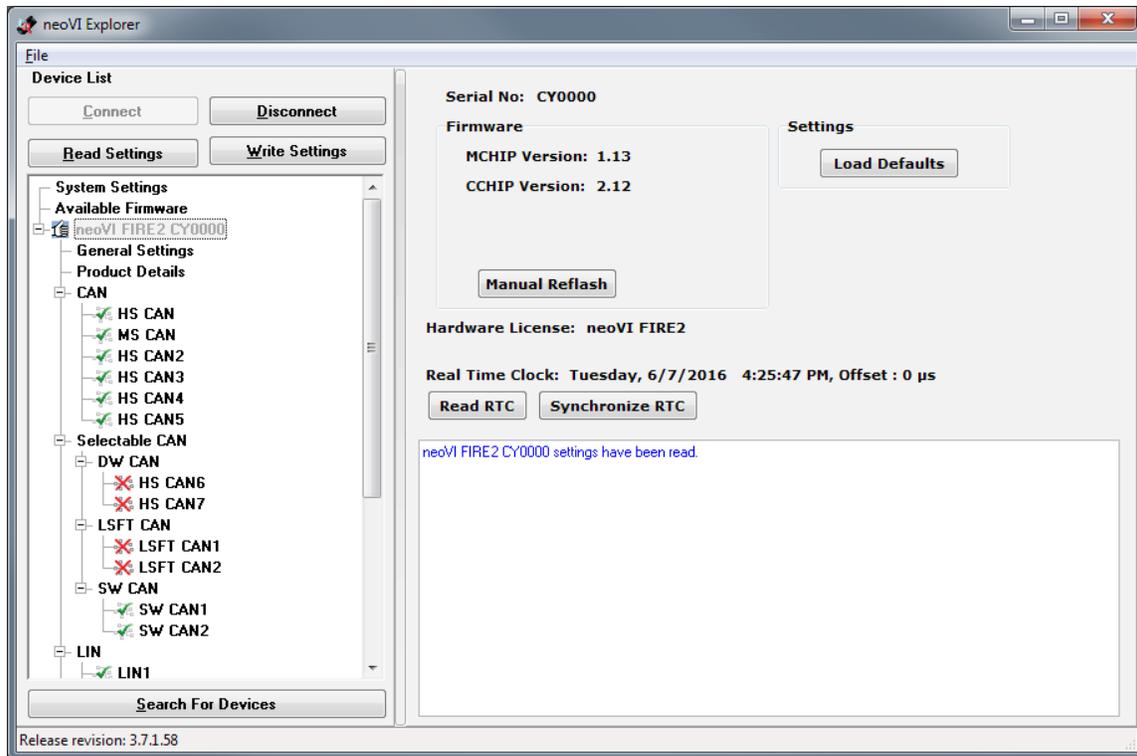


Figure 59: Typical neoVI Explorer Window After Initial Connection to the neoVI FIRE 2.



Note: It is possible to click on various parameter groups at any time, but they will not show valid data until you connect to the device. Remember also to connect to the device before making changes, or those alterations will be erased when you do connect and the settings in the hardware are loaded.

Writing and Reloading Settings

To avoid potential problems, neoVI Explorer will not save any changes to device parameters until you instruct it to do so. This is done by pressing the *Write Settings* button, which will

update the parameters within the firmware in your FIRE 2. If you make changes you do not want to keep, pressing the *Read Settings* button will reload the settings stored in the device, wiping out any modifications made in neoVI Explorer that had not yet been saved.

Reloading Device Defaults

To return all settings to factory defaults, press the *Load Defaults* button. This is convenient if many changes have been made and written to the firmware in the past, and you want to start over with a clean slate.

Note that pressing this button actually writes the defaults to the device first, and then reloads them automatically, so you do not need to also press *Write Settings*. You will see messages in the message area telling you that defaults have been sent to the device and then read from it.

Disconnecting from the FIRE 2

Press the *Disconnect* button to tell neoVI Explorer that you are done working with the FIRE 2. This step is actually optional, because neoVI Explorer will disconnect from any connected devices when you exit the program.

Searching for Devices

If you attach new hardware to your PC after starting neoVI Explorer, press the *Search For Devices* button at the bottom left of the dialog box to prompt the program to scan for new hardware you can manage.

Exiting neoVI Explorer

Like any Windows program, you can close neoVI Explorer by clicking the “X” in the top right corner, or pressing the Alt+F4 key combination.

4.2 System Settings and Firmware Updates

The top two entries in the explorer window on the left side of neoVI Explorer contain system-wide settings that apply to all hardware devices, and information related to firmware updates.

System Settings

Click here, and in the right-hand pane you will see four settings that you can enable or disable (Figure 60):

- **Enable Server:** Turns on the neoVI Server feature, a background program that allows your hardware to be used by multiple applications at the same time.
- **Enable Low Latency:** This is an advanced setting for applications where fast response is needed after transmission.

- **Enable Slave VNET Settings:** This setting is used for the FIRE 2 VNet module used with a neoVI Plasma or Ion, and can be ignored for the neoVI FIRE 2.
- **Enable Auto Update:** When enabled, both neoVI Explorer and Vehicle Spy will automatically update firmware. If this box is not checked, firmware must be updated manually. (See below for details.)

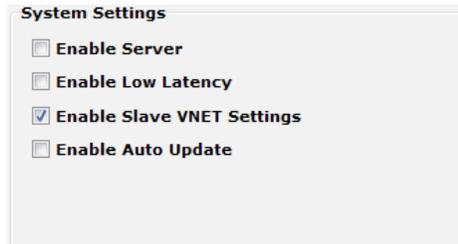


Figure 60: neoVI Explorer System Settings Pane

Available Firmware

This is an informational page that shows which firmware versions are available in this version of neoVI Explorer for various Intrepid products. Some devices have multiple firmware programs that control different aspects of their operation; in the case of the FIRE 2, these are called *MCHIP* and *CCHIP*.

You normally won't need to look in this area, because as we'll see in Section 4.3, neoVI Explorer shows you the current and available firmware versions for your FIRE 2 when you connect to it.

Updating Firmware

Firmware is essentially software that runs hardware, and is required to enable the many capabilities of your neoVI FIRE 2. New versions of firmware are created regularly by Intrepid's engineers to implement new features and correct problems that have been identified.

If you have *Enable Auto Update* on—which is the default, and is recommended—then you don't really need to worry about firmware updates. Each time you connect to your neoVI FIRE 2 in neoVI Explorer or go online with it in Vehicle Spy, the firmware will be checked, and if a newer version is available, the device will immediately be updated. You will see dialog boxes on the screen showing you the progress of this operation, which takes only a few seconds; an example is shown in Figure 61.

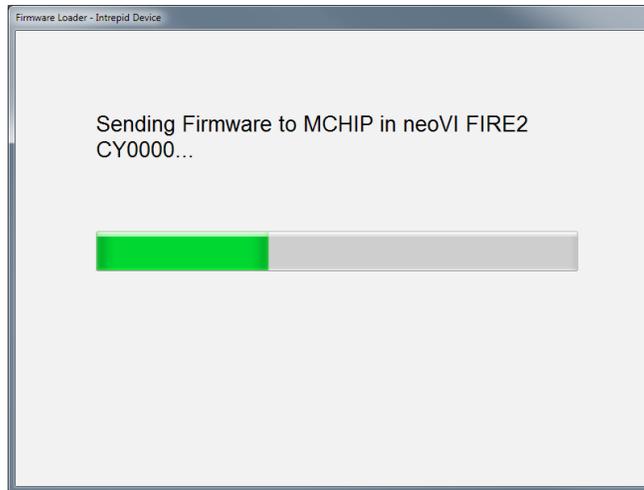


Figure 61: Firmware Download Message Box.

If you do not have automatic updates enabled, you control when your firmware is updated. When new firmware is available, you will be notified on the initial connection screen, as shown in Figure 62. Simply press the *Manual Reflash* button to update the firmware. Again, you will see messages as both the CCHIP and MCHIP firmware programs are sent to the device, and a message will appear in the message box on the right to tell you that the process has completed.

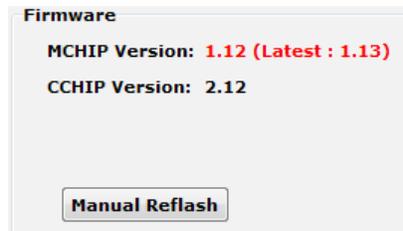


Figure 62: neoVI Explorer Firmware Message Box and Manual Reflash Button.

Note that while firmware updates are in progress, the device will be in bootloader mode, indicated by a “three green, one red” LED flash sequence. This will stop when the update is complete. Also, even if only one of the firmware components has a new version, both will be updated to ensure internal consistency in the FIRE 2.

4.3 General Settings and Product Details

These two areas of the neoVI FIRE 2's parameter setup provide information about the device and allow you to perform a few basic maintenance tasks.

General Settings

After connecting to the device you will see basic information about it in the right-hand pane of the window (Figure 63):

- The device's serial number.
- The firmware versions currently in the device, and an indication if new firmware is available.
- A message showing that the hardware license for the device was recognized.
- A current readout of the FIRE 2's real-time clock.

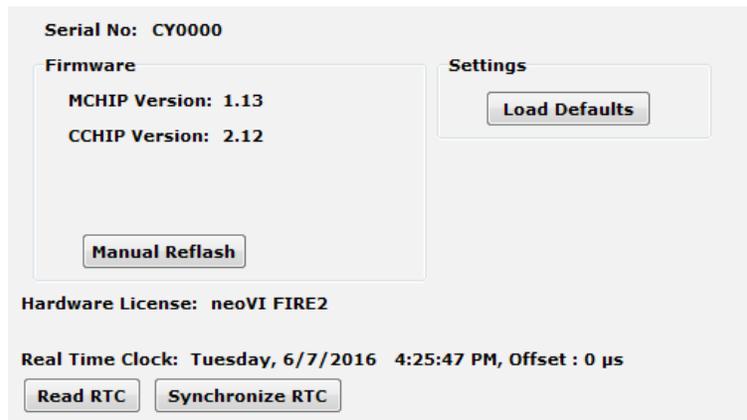


Figure 63: neoVI Explorer neoVI FIRE 2 General Settings

This information can be displayed again at any time by clicking the FIRE 2's name in the explorer navigation window, or the *General Settings* entry immediately below it.

The versions of the MCHIP and CCHIP firmware for the FIRE 2 will each be shown in black if they match the firmware versions within neoVI Explorer. If they do not, the current version and the newest available version will be shown in red to help you notice that an update is available, as seen in Figure 62. Section 4.2 provides more information on firmware updates.

There are four buttons on this screen. Two of them, *Load Defaults* and *Manual Reflash*, were described in Section 4.2. The *Read RTC* button will reload the device's internal time clock, while *Synchronize RTC* will set the device's clock to the same value as that of the PC.

Product Details

This is an informational area that provides technical data on the FIRE 2's hardware and internal setup. You will generally only need this if requested by Intrepid in order to facilitate support or troubleshooting. You can use the *Copy To Clipboard* button to copy all of the information to the Windows Clipboard, so you can then paste it into an email or file.

4.4 Standard CAN Networks (HS CAN 1-5 and MS CAN)

This area of neoVI Explorer is used to enable, disable and configure the six standard dual wire CAN networks in the FIRE 2: High Speed CAN channels 1 to 5 (HS CAN and HS CAN2-5) and the Medium Speed CAN channel (MS CAN). Each channel has an entry under the “CAN” group (which cannot be clicked itself). The current status of each channel is shown next to its name; a green checkmark indicates that the channel is enabled, while a red X means it is disabled. Figure 64 shows an example of the CAN channels area, with MS CAN and HS CAN4 currently disabled, and the other channels enabled.

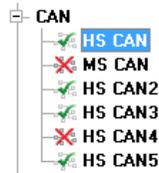


Figure 64: neoVI Explorer CAN Group.

All six of these channels have the same parameters, which can be configured using the controls in the right-hand pane; the default settings are shown in Figure 65.

Figure 65: neoVI Explorer Standard CAN Parameters with Default Settings.

Enabled

Place a checkmark in this box to enable the channel, or clear the checkmark to disable it. When disabled, all of the other parameter controls are disabled (grayed out).

Specify by Baud

This is a master control that determines whether the operation of the channel is controlled by a numeric baud rate, or is calculated from lower-level timing parameters. When checked, the *Baud Rate* and *CAN FD Baud Rate* drop-down boxes are enabled and the various *TQ*, *Sync* and *BRP-1* entries are disabled. When unchecked, this is reversed.

Specifying by baud rate is the default, and is recommended except for advanced users with special requirements.

Baud Rate

When *Specify by Baud* is selected, choose a baud rate for the channel from the drop-down box below. The default value is 500000.

CAN Timing Settings

When *Specify by Baud* is deselected, the operation of the CAN channel is based on these five settings: *TQ SEG1*, *TQ SEG2*, *TQ Prop*, *Sync*, *BRP-1*. These settings are for advanced users and normally should be left at their default values.

CAN FD Baud Rate

When *Specify by Baud* is selected, choose a baud rate for the data phase of CAN FD messages. The default value is 2000000.

CAN FD Timing Settings

When *Specify by Baud* is deselected, use these settings (*TQ SEG1*, *TQ SEG2*, *TQ Prop*, *Sync*, *BRP-1*) for the data phase of CAN FD messages. These parameters are for advanced users and normally should be left at their default values.

Mode

The operating mode of the channel; choose from one of these four options:

- **Normal:** Normal operation (default).
- **Disable:** Channel is disabled.
- **Listen Only:** This channel only receives messages, with no transmissions, and also no error frames generated nor acknowledgments sent.

Transceiver

The operating mode of the CAN transceiver:

- **Auto:** The transceiver is automatically controlled by the CAN logic for the channel (default).
- **Enabled:** The transceiver is always enabled.
- **Disabled:** The transceiver is disabled.

Bit Rate Calculator

Press this button to launch the Intrepid Bit Timing Calculator.

4.5 Selectable CAN Networks

The 7th and 8th of the FIRE 2's CAN channels are user-selectable: they can be set as additional High Speed (dual wire) CAN channels (HS CAN6 and HS CAN7), as Low Speed Fault Tolerant CAN channels (LSFT CAN and LSFT CAN 2), or as Single Wire CAN channels (SW CAN and SW CAN 2). Both channels must be set to the same mode (so you cannot have HS CAN6 and SW CAN at the same time, for example). The selectable CAN channel group in neoVI Explorer can be seen in Figure 66.

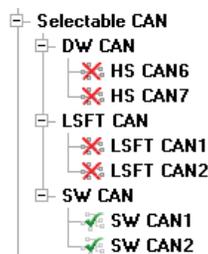


Figure 66: neoVI Explorer Selectable CAN Group.

Selectable CAN Mode

The master control for these channels can be found by clicking on *Selectable CAN*. On the right hand side you will find a drop-down box; choose *DWCAN*, *LSFTCAN* or *SWCAN* depending on which CAN variant you want for these two channels (Figure 67). *SWCAN* is the default.

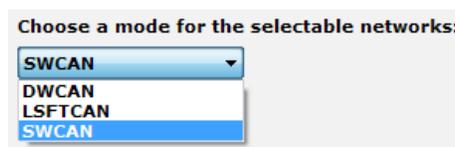


Figure 67: neoVI Explorer Selectable CAN Mode Control.

Based on your selection, neoVI Explorer will automatically enable the corresponding two channels in this group and disable the other four. You can manually override the enabled channels if, for example, you only want one of the two. You cannot, however, override the disabled channels, as they are physically disconnected within the device when your selection is made. (If you listen closely after changing the selection here and clicking *Write Settings*, you may even hear a relay click as the change is made in the hardware.)

DW CAN (HS CAN 6 / HS CAN 7)

When *DWCAN* is selected, two additional High Speed CAN channels are turned on. Their parameters are identical to the six standard CAN channels described in Section 4.4, and are configured in the same way.

LSFT CAN (LSFT CAN / LSFT CAN 2)

When *LSFTCAN* is selected these two channels are enabled. They have the same basic settings as the standard CAN channels (Figure 68), except that there are no CAN FD settings (since CAN FD is not supported on LSFT CAN). The default baud rate for LSFT CAN channels is 125000.

The screenshot shows the configuration window for LSFT CAN1. The settings are as follows:

- Enabled:**
- Baud Rate:** 125000 (dropdown menu)
- Specify by Baud:**
- TQ SEG1:** 13
- Sync:** 3
- TQ SEG2:** 7
- BRP-1:** 15
- TQ Prop:** 0
- (Clock is 42 MHz)**
- Mode:** Normal (dropdown menu)
- Transceiver:** Auto (dropdown menu)
- Bit Rate Calculator:** Button
- Advanced Options:**

Figure 68: neoVI Explorer LSFT CAN Parameters with Default Settings.

SW CAN (SW CAN / SW CAN 2)

With *SWCAN* chosen under *Selectable CAN*, the Single Wire CAN channels are enabled. These have the same settings as the standard CAN channels, with the following changes (Figure 69):

- No CAN FD section (CAN FD is not supported on these channels).
- The *Transceiver* drop-down box has additional options: *High Voltage* and *High Speed*.
- The *High Speed Auto Switch* option tells the channel to switch to high speed mode upon receipt of a specific message.
- The default baud rate is 33333.

Figure 69: neoVI Explorer SW CAN Parameters with Default Settings.

4.6 LIN Networks (LIN1 to LIN4)

This section of the FIRE 2 explorer tree allows you to enable, disable and configure its four LIN channels, LIN1 to LIN4. Each channel has an entry under the “LIN” group (Figure 70). As with the CAN channels, a green checkmark indicates that a particular channel is enabled, while a red X means it is disabled.

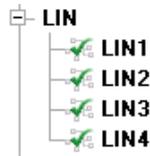


Figure 70: neoVI Explorer LIN Group.

All of these channels have the same parameters, which can be seen in Figure 71. In this image we have selected the *Advanced Options* checkbox to display its options (described below).

Figure 71: neoVI Explorer LIN Parameters, with Default Settings and Advanced Options Displayed.

Enabled

Place a checkmark in this box to enable the channel, or clear the checkmark to disable it. When disabled, all of the other parameter controls are disabled (grayed out).

Baud Rate

Select a baud rate for the channel; the default is 10417.

Mode

This option is currently not used and should be left at the default of "Normal Mode".

Master Resistor On

Enable this option for the neoVI FIRE 2 to act as the master on the specified LIN bus.

Advanced Options

Click this checkbox to reveal two additional options:

- **Master Slave Interval:** The time between the master ID and the first slave byte, in bits (default 0).
- **Verbose Error Reporting:** When checked, break errors and other error messages from the LIN driver are displayed.

4.7 MISC IO

This section contains parameters controlling the neoVI FIRE 2's miscellaneous I/O channels. Reporting parameters can be found within the main "MISC IO" entry, while others are contained in two subordinate panels in the explorer navigation tree.

Reporting Parameters

These parameters allow you to control reporting related to miscellaneous I/O channels (Figure 72):

- **Report on Period:** Enable this option and select a time interval to turn on periodic reporting.
- **Report GPS Coordinates:** Check this box to enable GPS support.
- **Report on Change:** Check the boxes of the channels for which you want detected value changes to trigger a report.
- **Analog Threshold:** Set the analog threshold percentage value (default is 10%).

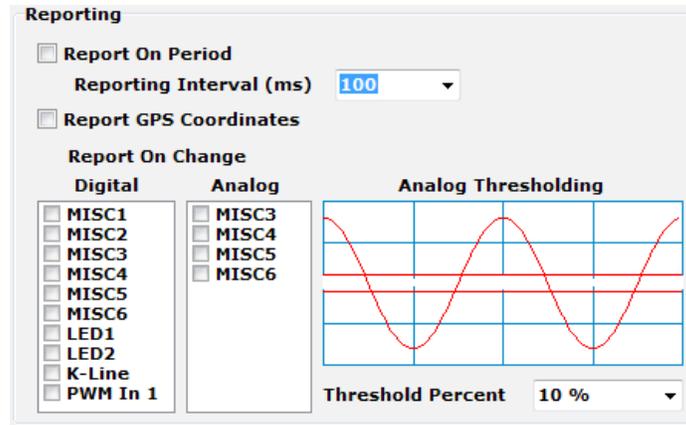


Figure 72: neoVI Explorer MISC I/O Reporting Parameters

Initial Values

In this section you can select the operating mode of each I/O channel (Figure 73). Each can be set as a digital input, as a digital output that is initially off, or as a digital output that is initially on.

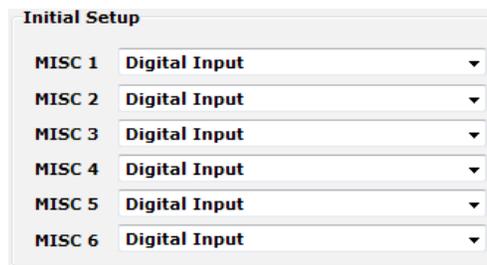


Figure 73: neoVI Explorer MISC I/O Initial Channel Configuration

Advanced Analog Settings

The one option here allows you to control how often each channel is sampled.

4.8 Other Parameters

In addition to the network-specific parameters described above, there are a number of additional option sets that you can use to tailor the operation of your FIRE 2 (Figure 74).



Figure 74: neoVI Explorer Additional Parameter Groups.

ISO 15765-2

This page contains one setting: *IFS Shift Register* (Figure 75). Changing this from its default value of 0 causes time to be added to the Inner Frame Spacing of USDT frames transmitted by CoreMini scripts running in the FIRE 2. The number entered is multiplied by 6.4 μ s to determine the time offset. The allowed range is -1563 to 1563.

IFS Shift Register

0 X 6.4us = 0 us

This value is added to the received Inner Frame Spacing for USDT frames transmitted from CoreMini. Each increment represents 6.4us. Range: -1563 to 1563.

Figure 75: neoVI Explorer IFS Shift Register Parameter for ISO 15765-2.

Text API

These parameters control the operation of the text API that can be used to operate the neoVI FIRE 2 using third party software. Please contact Intrepid if you require assistance with using the API.

Text API

None

UART1

RS232/UART2

HS CAN Tx ID: 1fffffff Rx ID: 1ffffffe 29 Bit ArbIDs

HS CAN 2 Tx ID: 1fffffff Rx ID: 1ffffffe 29 Bit ArbIDs

MS CAN Tx ID: 1fffffff Rx ID: 1ffffffe 29 Bit ArbIDs

HS CAN 3 Tx ID: 1fffffff Rx ID: 1ffffffe 29 Bit ArbIDs

Figure 76: neoVI Explorer Text API Parameters.

Network Enables

This area provides more options for controlling the enabling and disabling of individual networks within the FIRE 2 (Figure 77). The main display contains a scrollable list with checkboxes that can be set or unset to enable or disable each network. These are equivalent to the Enable checkboxes found in the parameter areas for the corresponding networks.

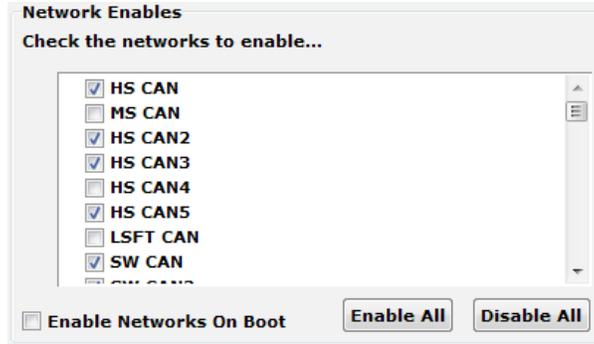


Figure 77: neoVI Explorer Network Enable/Disable Parameters.

Enable Networks on Boot

Normally, the neoVI FIRE 2 will not acknowledge messages on a network unless it is online with that network or running a CoreMini script. When this option is enabled, the device always acknowledges frames on all enabled networks.

Enable All

Enables all networks. Note that this may include enabling networks that are mutually exclusive (such as SW CAN and LSFT CAN). If you use this option, be sure to disable networks that should be off, so the device remains in a valid configuration.

Disable All

Disables all networks.

Performance Tests / USB Performance

Under *Performance Tests* is a single area called *USB Performance*. Here you will find a test to check the performance of the FIRE 2's USB connection (Figure 78). When *Enable Performance Blast Test* is checked, the FIRE 2 sends high-speed traffic over the USB connection to the PC.

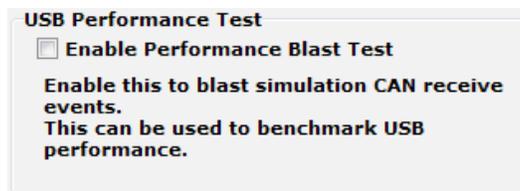


Figure 78: neoVI Explorer USB Performance Test.

5 Core Feature Operation

Now that we have completed installing and configuring our hardware and software, we are ready to use the neoVI FIRE 2. As discussed at the start of this guide, you can do a lot with this little box, and in this chapter we show you just some of the many applications of the FIRE 2.

Each of the sections contains an example application, and where possible, step-by-step instructions are provided for those who wish to duplicate the results on their own device. The goal of this chapter is specifically to assist those who are new to Intrepid hardware and software, and so simplified examples are provided. Advanced users may wish to skim or even skip this chapter. Note that some sections of this chapter will be written in future updates of the manual.

The examples use Intrepid's Vehicle Spy 3 Professional, the ideal tool for working with your FIRE 2. Due to the complexity of Vehicle Spy, we only describe the basics necessary for the examples; for full details on this powerful software tool, please see the separate Vehicle Spy documentation.

5.1 Monitoring Conventional Vehicle Networks

The most basic use of the neoVI FIRE 2 is to monitor the activity on conventional vehicle networks such as CAN or LIN. Once the device is connected to the network and correctly configured, this is actually very easy to do, assuming you have the right software. In our example we will show how the neoVI FIRE 2 can monitor CAN traffic on a bench network using Vehicle Spy 3.

Assuming that your network already has CAN messages being transmitted by other devices, we can monitor that traffic with these simple steps:

1. **Launch Vehicle Spy:** Start Vehicle Spy by double-clicking its icon or selecting it from the Windows Start Menu.
2. **Select neoVI FIRE 2:** On the *Logon Screen*, select the neoVI FIRE 2 if it does not already have a checkmark next to it. To do so, right-click the device name and choose *Select Hardware* (Figure 79).

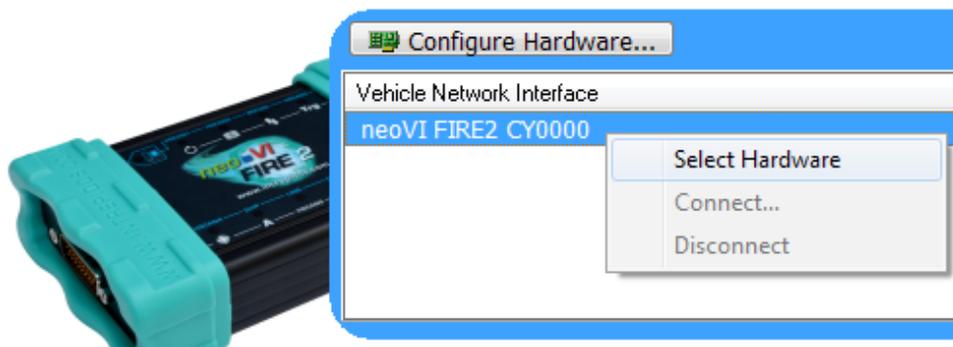


Figure 79: Selecting the neoVI FIRE 2 from the Logon Screen of Vehicle Spy.

3. Go Online: Press the blue arrow button in the top left corner of Vehicle Spy.

The program will go online and automatically switch to *Messages View*, showing you the incoming traffic. An example can be found in Figure 80, which shows CAN messages that are being transmitted to the FIRE 2 by another network interface tool. By default, identical messages will be grouped together; if you prefer to see the messages in chronological order, press the *Scroll* button located just above the message display.

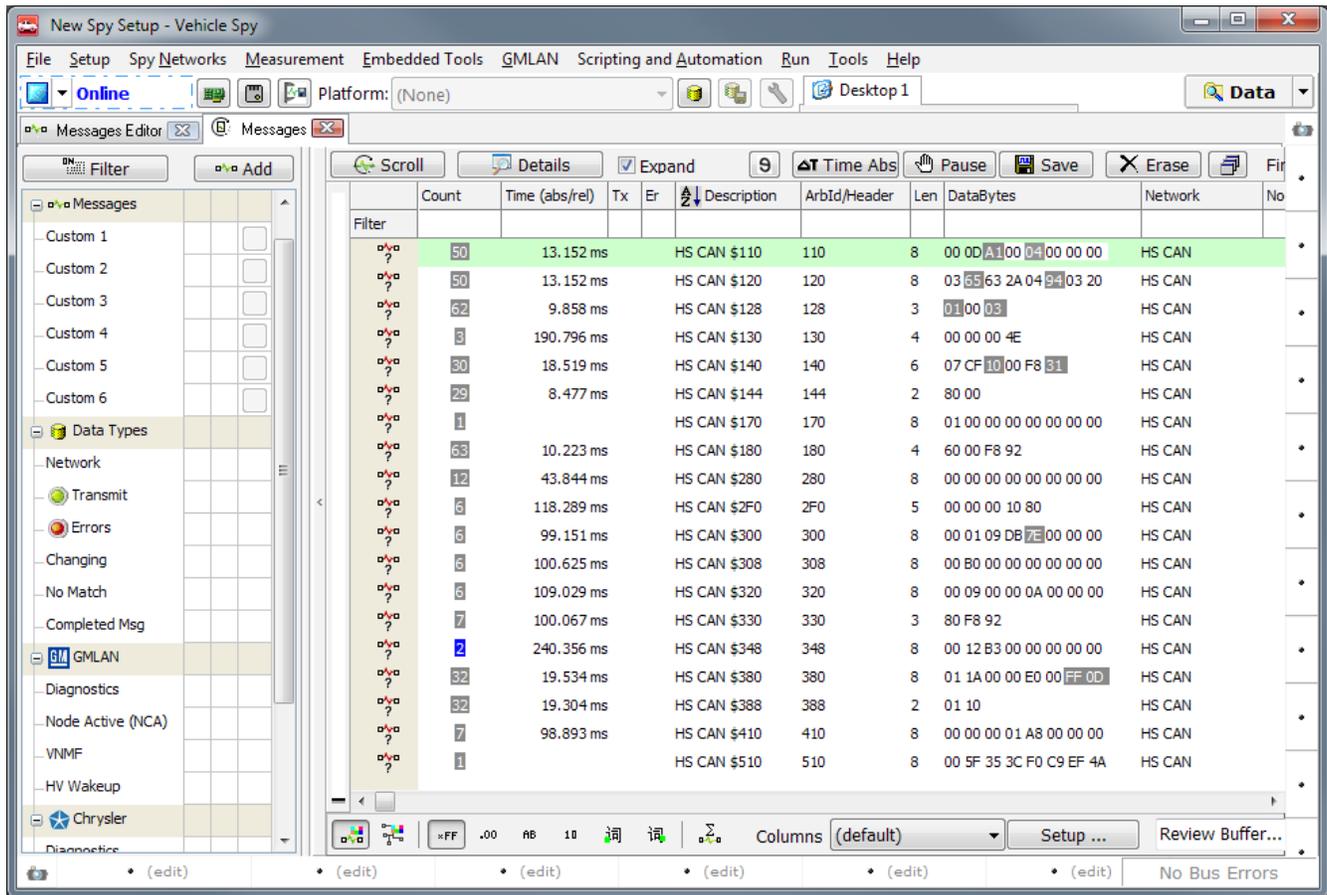


Figure 80: Monitoring Message Traffic in Vehicle Spy Using the neoVI FIRE 2.

Notice that the CAN messages are shown in their raw form, with arbitration IDs and data bytes. If you have a database matching the message traffic being monitored, you can load it into a platform and Vehicle Spy will decode the messages and show the signals within each. For details on how to accomplish this, please consult the Vehicle Spy documentation.

5.2 Transmitting on Conventional Vehicle Networks

In addition to monitoring network traffic with the neoVI FIRE 2, we can also easily generate and transmit traffic of our own. We'll show how this is done by creating and then transmitting a custom CAN message on the HS CAN channel.

First, make sure the neoVI FIRE 2 is connected to your vehicle network. Then follow these steps to create and transmit a message:

1. **Launch Vehicle Spy:** Start Vehicle Spy by double-clicking its icon or selecting it from the Windows Start Menu.
2. **Select neoVI FIRE 2:** On the *Logon Screen*, select the neoVI FIRE 2 if it is not already selected: right-click the device name and choose *Select Hardware* (see Figure 79).
3. **Load Messages Editor:** Select *Messages Editor* from the *Spy Networks* menu.
4. **Select Transmit Messages:** Click the *Transmit* button, found in the blue bar.
5. **Create Transmit Message:** To the right of the drop-down box that currently says “HS CAN”, click the **+** button.

Vehicle Spy will generate a new HS CAN transmit message called “Tx Message HS CAN 1”, preset with default values. The program window should now appear similar to Figure 81.

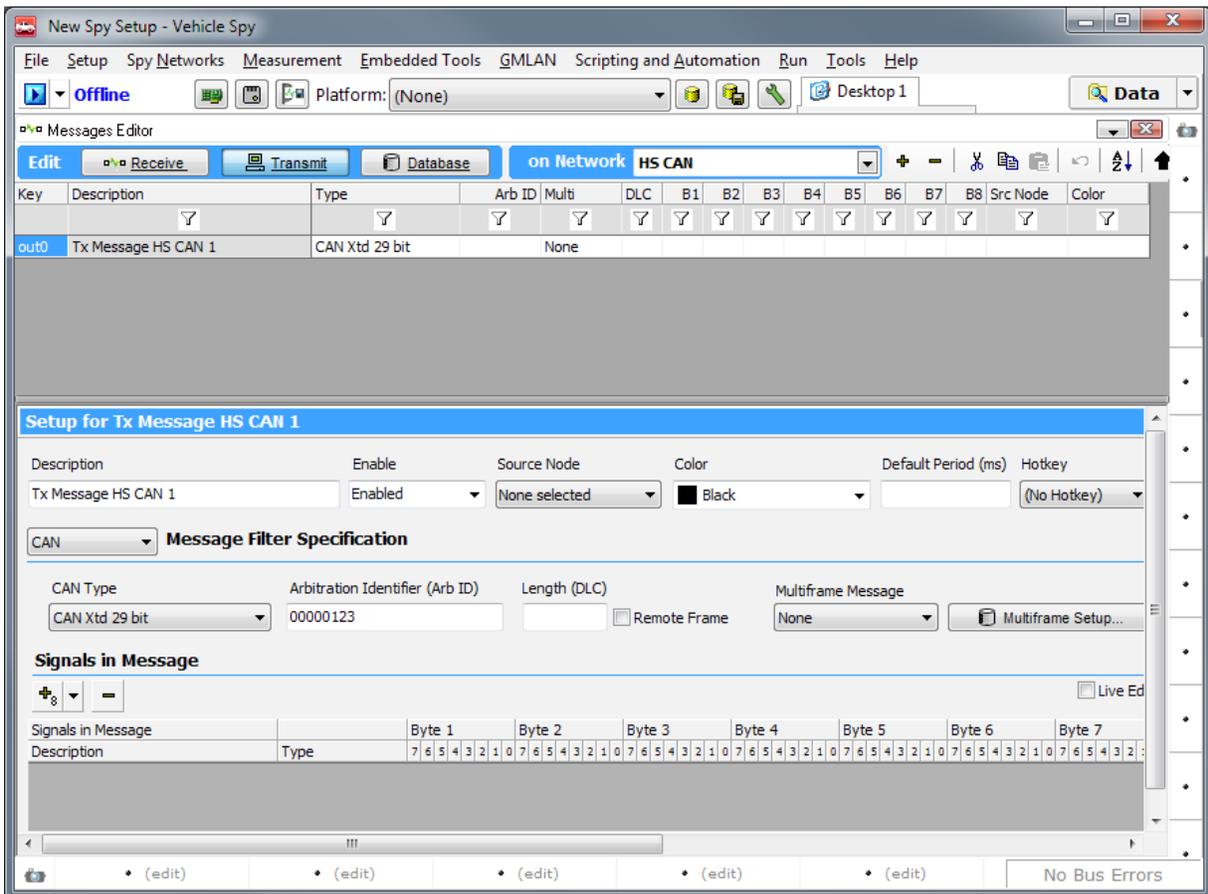


Figure 81: A Default Transmit Message Created in Vehicle Spy.

Next, we will change the default message by assigning an arbitration ID to it, and then adding a signal and renaming it.

6. **Set Message to Arbitration ID 123:** Under the *Arb ID* column for the message, enter the value “123”.
7. **Add Message Signal:** In the middle of the screen, find “Signals in Message”; just below this click the  button. A signal called “Signal 0” is created.
8. **Rename Message Signal:** Under the *Description* column, double-click “Signal 0” and change the name to “Engine Speed”.

With these changes, the message should now appear as seen in Figure 82.

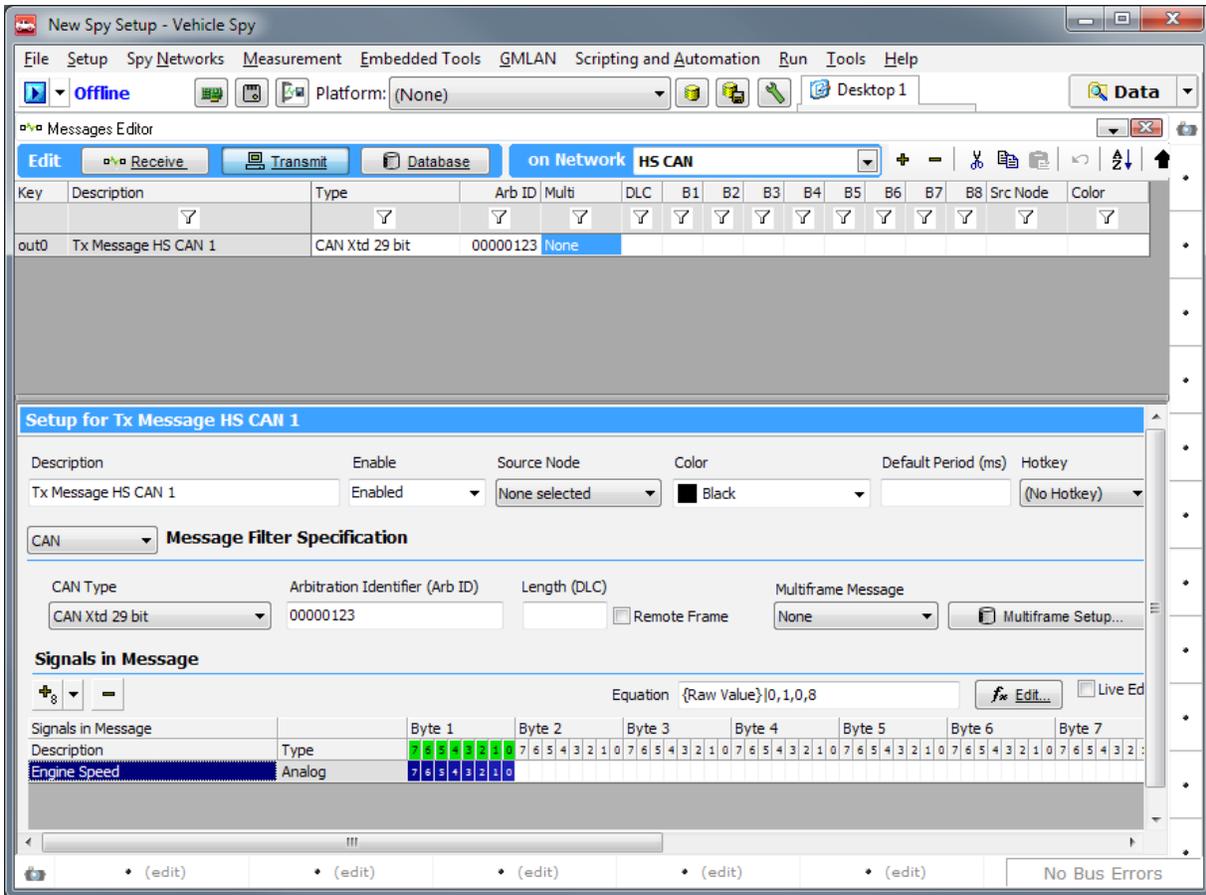


Figure 82: Vehicle Spy Transmit Message with Arb ID and Named Signal.

We'll now use the *Tx Panel* to specify a simple static value to send in that signal, and then instruct Vehicle Spy to transmit the message periodically.

9. **Load Tx Panel:** Select *Tx Panel* from the *Spy Networks* menu.
10. **Select Message:** Click on “HS CAN Message 1” under *Description* on the left side of the screen.
11. **Select Transmission Rate:** The message by default is set to “Periodic” transmissions, but the rate says “None”. Double-click in this field, scroll down and choose “0.100”.

12. **Set Signal Data Value:** On the right side of the screen, double-click under *Value* for the *Engine Speed* signal, and enter “207”. (You may need to first move the vertical divider bar that separates the two halves of the Tx Panel, by clicking on it and dragging it to the left.)

The *Tx Panel* in Vehicle Spy should now appear similar to Figure 83. Our custom message is ready to transmit.

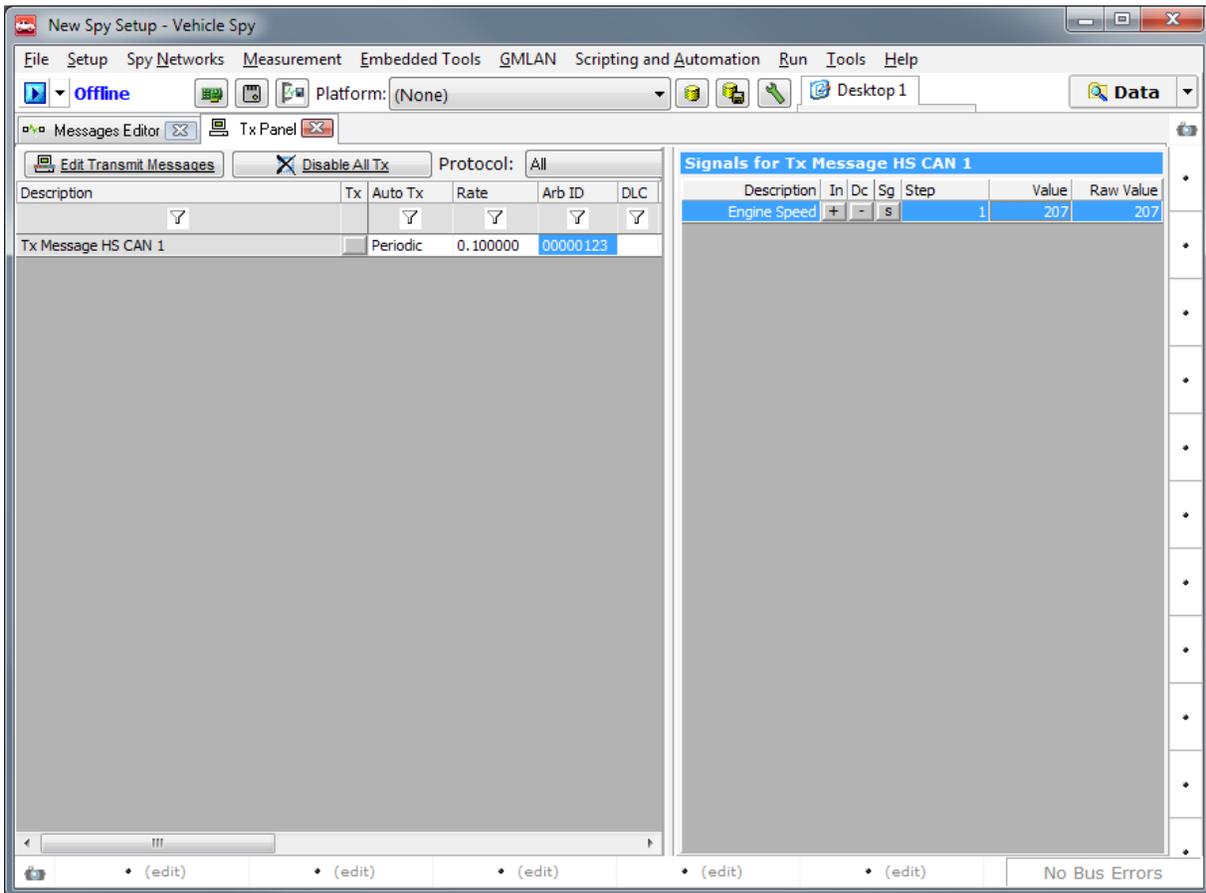


Figure 83: Vehicle Spy Tx Panel with 100 Millisecond Periodic Rate Set and Signal Value Assigned.

Let's now switch to *Messages View* and go online to see our message being transmitted on the CAN network.

13. **Switch to Messages View:** Select *Messages* from the *Spy Networks* menu.
14. **Go Online:** Press the blue arrow button in the top left corner of Vehicle Spy.

You should now see a new “Message HS CAN 1” message show up about every 100 ms (Figure 84). Notice the green dot under the *Tx* column, which labels this as a transmitted message.

15. **Expand Message:** Press the + sign to the left of “Message HS CAN 1”.

Vehicle Spy shows you the *Engine Speed* signal with the value we set in both decimal (207) and hexadecimal (0xCF).

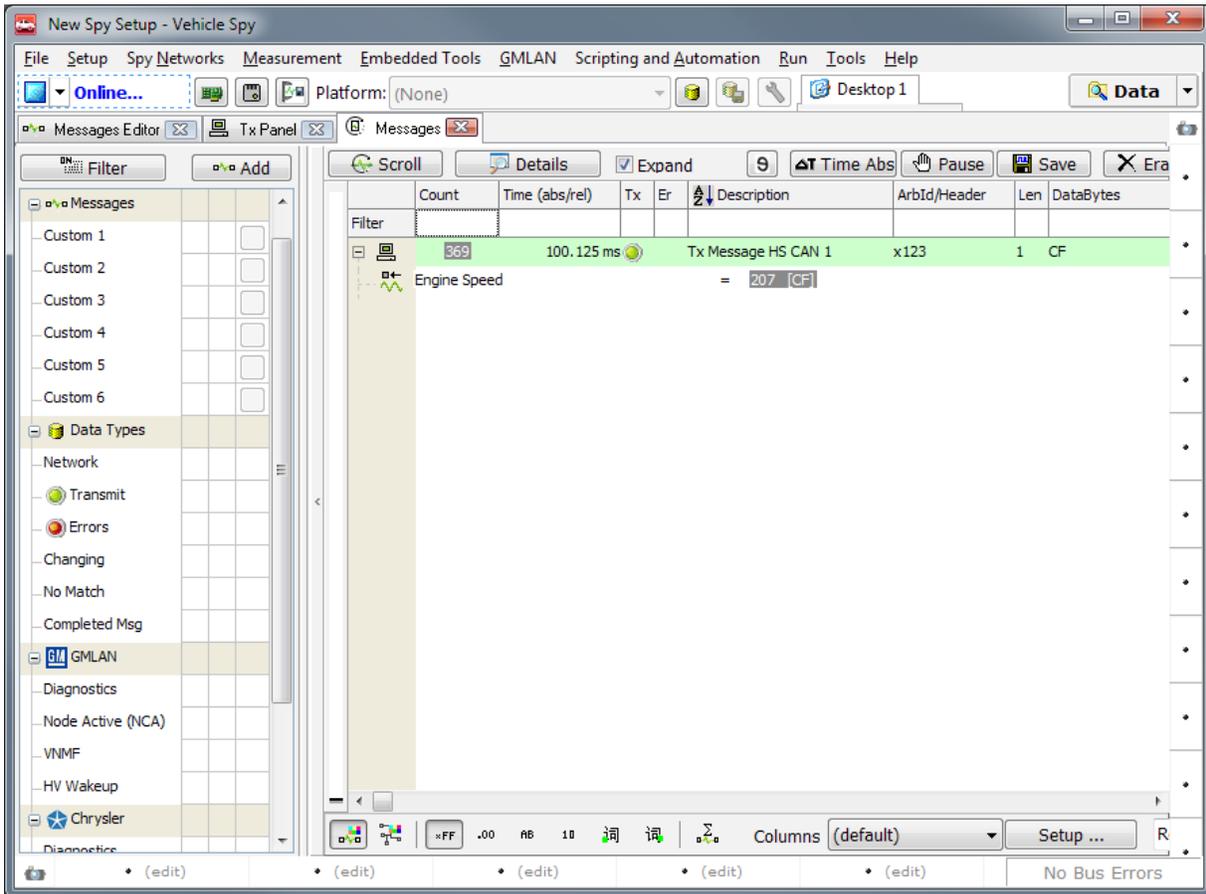


Figure 84: Vehicle Spy Messages View Showing Custom Transmitted Message and Signal.

Naturally, in a real example we would want to create a more realistic depiction of engine speed. This can be done in a variety of ways in Vehicle Spy, such as writing a function block program to describe engine behavior and control message transmission.

5.3 Interfacing to Automotive Ethernet (BroadR-Reach / 100BASE-T1)

The neoVI FIRE 2 can be used to monitor and transmit on a BroadR-Reach (100BASE-T1) Automotive Ethernet network, with the help of a device that changes the BroadR-Reach PHY into the standard 10/100 Ethernet PHY used by the FIRE 2. Intrepid sells an inexpensive tool for this exact purpose, called the RAD-Moon media converter.

Figure 85 shows the neoVI FIRE 2 hookup diagram of Figure 46 modified to illustrate a typical Automotive Ethernet application. The RJ-45 jack on the FIRE 2 network interface cable is connected to the RAD-Moon's RJ-45 jack using a standard Ethernet cable. The BroadR-Reach ECU or network is connected to the RAD-Moon's Mini50 connector on the other side of the

converter. Power for the RAD-Moon is provided via the USB host slot on the FIRE 2, allowing the FIRE 2 to power the RAD-Moon on or off as needed.



Figure 85: neoVI FIRE 2 Hookup Diagram for Automotive Ethernet Using RAD-Moon Media Converter.

5.4 Using the Ethernet Interface for DoIP and XCP

This section will be detailed in a future version of this manual.

5.5 Using Miscellaneous I/O Channels

This section will be detailed in a future version of this manual.

5.6 Standalone Logging

This section will be detailed in a future version of this manual.

5.7 CoreMini Scripting

This section will be detailed in a future version of this manual.

6 Advanced Features

In this chapter we provide additional information on some of the neoVI FIRE 2's new and advanced features.

Note that some of these features are not yet currently implemented in the neoVI FIRE 2, but their capabilities will be provided in future firmware upgrades, at which time this manual will be updated to explain their use.

6.1 neoVI API

The neoVI FIRE 2 comes with support for a full API that allows you to control the device from other software packages or custom-written software. For instructions on using the API, please consult its documentation on the Intrepid website at: <http://www.intrepidcs.com/support/ICSDocumentation/neoVIDLL/neoVIDLLhelpdoc.html>.

6.2 USB Host

The neoVI FIRE 2 comes with a USB host port that allows other devices to be plugged into it (see Figure 6 in Section 2.3). Due to the difficulties associated with driver development, this port is intended for specific devices rather than general purpose use. It is especially designed to work with devices such as the Intrepid neoVI MIC microphone/trigger pendant, or the RAD-Moon (as seen in Section 5.3).

7 Reference: Connector Pinouts and Cable Signal Mappings

This section contains complete pinouts for the connectors on the neoVI FIRE 2, as well as those on the network interface cables used to attach to it. For your convenience, tables are also provided that show the mappings of signals between pin numbers on the connectors of each network cable.

Note that the USB cable is industry standard and not covered here.

7.1 neoVI FIRE 2 Connector Pinouts

We'll start with the pinouts for the connectors on the neoVI FIRE 2 itself.

HD-26 Connector Pinout

A list of pin assignments for the HD-26 connector can be found in Table 4, with pin numbering for the connector illustrated in Figure 86.

Pin #	Name	Description
1	ETH TX+	Ethernet transmit channel, positive
2	HS CAN 4 L	High Speed CAN channel 4, low
3	HS CAN 5 L	High Speed CAN channel 5, low
4	HS CAN 1 L	High Speed CAN channel 1, low
5	MS CAN L	Medium Speed CAN channel, low
6	HS CAN 2 L	High Speed CAN channel 2, low
7	HS CAN 3 L	High Speed CAN channel 3, low
8	HS CAN 6 L / LSFT CAN L	High Speed CAN channel 6, low / Low Speed Fault Tolerant CAN channel 1, low
9	ETH TX-	Ethernet transmit channel, negative
10	GND	Ground
11	ETH RX+	Ethernet receive channel, positive
12	HS CAN 4 H	High Speed CAN channel 4, high
13	HS CAN 5 H	High Speed CAN channel 5, high
14	HS CAN 1 H	High Speed CAN channel 1, high
15	MS CAN H	Medium Speed CAN channel, high
16	HS CAN 2 H	High Speed CAN channel 2, high
17	HS CAN 3 H	High Speed CAN channel 3, high
18	HS CAN 6 H / LSFT CAN H / SW CAN 2	High Speed CAN channel 6, high / Low Speed Fault Tolerant CAN channel 1, high / Single Wire CAN channel 2
19	V BATT	DC Input Power
20	ETH RX-	Ethernet receive channel, negative
21	HS CAN 7 L / LSFT CAN 2 L	High Speed CAN channel 7, low / Low Speed Fault Tolerant CAN channel 2, low

Pin #	Name	Description
22	ISO K/LIN 1	LIN channel 1
23	LIN 2	LIN channel 2
24	LIN 3	LIN channel 3
25	ETH ACTIVATE	Ethernet activation line
26	HS CAN 7 H / LSFT CAN 2 H / SW CAN	High Speed CAN channel 7, high / Low Speed Fault Tolerant CAN channel 2, high / Single Wire CAN channel 1

Table 4: neoVI FIRE 2 HD-26 Connector Pinout.

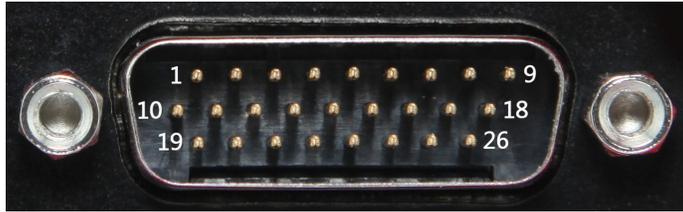


Figure 86: neoVI FIRE 2 HD-26 Connector Pin Numbering.

μDB-9 Connector Pinout

The pinout for the μDB-9 connector on the FIRE 2 can be seen in Figure 87 and Table 5. Note that the I/O channel numbering (which skips 3 and 4) is designed to ensure backward compatibility with the original neoVI FIRE.

Pin #	Name	Description
1	LIN 1	LIN channel 1
2	LIN 2	LIN channel 2
3	LIN 3	LIN channel 3
4	LIN 4	LIN channel 4
5	GND	Ground
6	N/C	No connection
7	N/C	No connection
8	EMISC 1	Enhanced miscellaneous I/O channel 1 (analog or digital with PWM and 0-40V support)
9	EMISC 2	Enhanced miscellaneous I/O channel 2 (analog or digital with PWM and 0-40V support)

Table 5: neoVI FIRE 2 μDB-9 Connector Pinout.



Figure 87: neoVI FIRE 2 μDB-9 Connector Pin Numbering.

7.2 FIRE 2 Ethernet Cable Adapter Connector Pinouts and Signal Mapping

The primary cable for connecting the FIRE 2 to vehicle networks has four connectors: HD-26, DB-25, DB-9 and RJ-45. The HD-26 connector mates to the HD-26 on the FIRE 2 and uses the same pinout shown in Table 4; the others are described below, followed by a signal mapping table.

DB-25 Connector Pinout

Table 6 lists the pins of the DB-25 connector on the FIRE 2 Ethernet Cable Adapter.

Pin #	Name	Description
1	HS CAN 7 H / LSFT CAN 2 H / SW CAN	High Speed CAN channel 7, high / Low Speed Fault Tolerant CAN channel 2, high / Single Wire CAN channel 1
2	N/C	No connection
3	HS CAN 6 H / LSFT CAN H / SW CAN 2	High Speed CAN channel 6, high / Low Speed Fault Tolerant CAN channel 1, high / Single Wire CAN channel 2
4	HS CAN 6 L / LSFT CAN L	High Speed CAN channel 6, low / Low Speed Fault Tolerant CAN channel 1, low
5	MS CAN H	Medium Speed CAN channel, high
6	MS CAN L	Medium Speed CAN channel, low
7	HS CAN 7 L / LSFT CAN 2 L	High Speed CAN channel 7, low / Low Speed Fault Tolerant CAN channel 2, low
8	ISO K/LIN 1	K-Line channel 1 / LIN channel 1
9	N/C	No connection
10	N/C	No connection
11	N/C	No connection
12	N/C	No connection
13	GND	Ground
14	HS CAN 1 H	High Speed CAN channel 1, high
15	HS CAN 1 L	High Speed CAN channel 1, low
16	HS CAN 2 H	High Speed CAN channel 2, high
17	HS CAN 2 L	High Speed CAN channel 2, low
18	HS CAN 4 H	High Speed CAN channel 4, high
19	HS CAN 3 H	High Speed CAN channel 3, high
20	HS CAN 3 L	High Speed CAN channel 3, low
21	HS CAN 5 H	High Speed CAN channel 5, high
22	HS CAN 5 L	High Speed CAN channel 5, low
23	HS CAN 4 L	High Speed CAN channel 4, low
24	N/C	No connection
25	V BATT	DC Input Power

Table 6: FIRE 2 Ethernet Cable Adapter DB-25 Connector Pinout.

DB-9 Connector Pinout

Table 7 contains the pinout for the DB-9 connector on this cable.

Pin #	Name	Description
1	LIN 1	LIN channel 1
2	LIN 2	LIN channel 2
3	LIN 3	LIN channel 3
4	ETH ACTIVATE	Ethernet activation line
5	GND	Ground
6	N/C	No connection
7	N/C	No connection
8	N/C	No connection
9	N/C	No connection

Table 7: FIRE 2 Ethernet Cable Adapter DB-9 Connector Pinout.

RJ-45 Connector Pinout

The pinout for the RJ-45 (Ethernet) connector on this cable can be found in Table 8.

Pin #	Name	Description
1	ETH TX+	Ethernet transmit channel, positive
2	ETH TX-	Ethernet transmit channel, negative
3	ETH RX+	Ethernet receive channel, positive
4	N/C	No connection
5	N/C	No connection
6	ETH RX-	Ethernet receive channel, negative
7	N/C	No connection
8	N/C	No connection

Table 8: FIRE 2 Ethernet Cable Adapter RJ-45 Connector Pinout.

Cable Signal Mapping

For easy reference, Table 9 shows the mapping of signals for the FIRE 2 Ethernet Cable Adapter, by pin order on the HD-26 that connects to the FIRE 2.

Signal Name	Signal Description	HD-26 Pin #	DB-25 Pin #	DB-9 Pin #	RJ-45 Pin #
ETH TX+	Ethernet transmit channel, positive	1			1
HS CAN 4 L	High Speed CAN channel 4, low	2	23		
HS CAN 5 L	High Speed CAN channel 5, low	3	22		
HS CAN 1 L	High Speed CAN channel 1, low	4	15		
MS CAN L	Medium Speed CAN channel, low	5	6		
HS CAN 2 L	High Speed CAN channel 2, low	6	17		
HS CAN 3 L	High Speed CAN channel 3, low	7	20		
HS CAN 6 L / LSFT CAN L	High Speed CAN channel 6, low / Low Speed Fault Tolerant CAN channel 1, low	8	4		
ETH TX-	Ethernet transmit channel, negative	9			2
GND	Ground	10	13	5	
ETH RX+	Ethernet receive channel, positive	11			3
HS CAN 4 H	High Speed CAN channel 4, high	12	18		
HS CAN 5 H	High Speed CAN channel 5, high	13	21		
HS CAN 1 H	High Speed CAN channel 1, high	14	14		
MS CAN H	Medium Speed CAN channel, high	15	5		
HS CAN 2 H	High Speed CAN channel 2, high	16	16		
HS CAN 3 H	High Speed CAN channel 3, high	17	19		
HS CAN 6 H / LSFT CAN H / SW CAN 2	High Speed CAN channel 6, high / Low Speed Fault Tolerant CAN channel 1, high / Single Wire CAN channel 2	18	3		
V BATT	DC Input Power	19	25		
ETH RX-	Ethernet receive channel, negative	20			6
HS CAN 7 L / LSFT CAN 2 L	High Speed CAN channel 7, low / Low Speed Fault Tolerant CAN channel 2, low	21	7		
ISO K/LIN 1	LIN channel 1	22		1	
LIN 2	LIN channel 2	23		2	
LIN 3	LIN channel 3	24		3	
ETH ACTIVATE	Ethernet activation line	25		4	
HS CAN 7 H / LSFT CAN 2 H / SW CAN	High Speed CAN channel 7, high / Low Speed Fault Tolerant CAN channel 2, high / Single Wire CAN channel 1	26	1		

Table 9: FIRE 2 Ethernet Cable Adapter Signal Mapping.

7.3 neoVI-OBD-1 Cable Connector Pinouts and Signal Mapping

This OBD cable contains a DB-25 connector that mates to the DB-25 on the FIRE 2 Ethernet Cable Adapter and an OBD-II / J1962 connector for your vehicle or bench.

DB-25 Connector Pinout

Table 10 shows the pinout of the DB-25 connector on the neoVI-OBD-1.

Pin #	Name	Description
1	SW CAN	Single Wire CAN channel
2	N/C	No connection
3	N/C	No connection
4	N/C	No connection
5	MS CAN H	Medium Speed CAN channel, high
6	MS CAN L	Medium Speed CAN channel, low
7	ISO L	ISO 9141-2 L-Line
8	ISO9141/K/LIN1	ISO 9141-2 K-Line / LIN channel 1
9	N/C	No connection
10	N/C	No connection
11	N/C	No connection
12	N/C	No connection
13	GND	Ground
14	HS CAN 1 H	High Speed CAN channel 1, high
15	HS CAN 1 L	High Speed CAN channel 1, low
16	HS CAN 2 H	High Speed CAN channel 2, high
17	HS CAN 2 L	High Speed CAN channel 2, low
18	N/C	No connection
19	HS CAN 3 H	High Speed CAN channel 3, high
20	HS CAN 3 L	High Speed CAN channel 3, low
21	N/C	No connection
22	N/C	No connection
23	N/C	No connection
24	N/C	No connection
25	V BATT	DC Input Power

Table 10: neoVI-OBD-1 Cable DB-25 Connector Pinout.

OBD-II / J1962 Connector Pinout

Table 11 contains the pinout for the OBD-II / J1962 connector on this cable.

Pin #	Name	Description
1	Discretionary (SW CAN)	Single Wire CAN channel
2	J1850 +	J1850 line, positive
3	Discretionary (MS CAN H)	Medium Speed CAN channel, high
4	Chassis GND	Chassis Ground
5	Signal GND	Signal Ground
6	Discretionary (HS CAN H)	High Speed CAN channel, high
7	ISO9141/K/LIN1	ISO 9141-2 K-Line / LIN channel 1
8	Discretionary	Discretionary
9	Discretionary (ALDL)	Assembly Line Diagnostics Link
10	J1850 -	J1850 line, negative
11	Discretionary (MS CAN L)	Medium Speed CAN channel, low
12	Discretionary	Discretionary
13	Discretionary	Discretionary
14	Discretionary (HS CAN L)	High Speed CAN channel, low
15	ISO L	ISO 9141-2 L-Line
16	VBATT	Unswitched Vehicle Battery Positive

Table 11: neoVI-OBD-1 Cable OBD-II / J1962 Connector Pinout. The table shows standard signals for the OBD-II connector; this includes J1850, which is not supported by the NEOVI FIRE 2.

Cable Signal Mapping

Table 12 contains the mapping of signals for the neoVI-OBD-1 cable. The signal names for both connectors are shown and the table is based on the OBD-II connector's pin order.

OBD-II Pin #	OBD-II Signal	DB-25 Signal	DB-25 Pin #
1	Discretionary (SW CAN)	SW CAN	1
2	J1850 +	N/C	2
3	Discretionary (MS CAN H)	MS CAN H	5
4	Chassis GND	N/C	N/C
5	Signal GND	GND	13
6	Discretionary (HS CAN H)	HS CAN 1 H	14
7	ISO9141/K/LIN1	ISO9141/K/LIN1	8
8	Discretionary	N/C	N/C

OBD-II Pin #	OBD-II Signal	DB-25 Signal	DB-25 Pin #
9	Discretionary (ALDL)	HS CAN 3 H	19
10	J1850 -	HS CAN 3 L	20
11	Discretionary (MS CAN L)	MS CAN L	6
12	Discretionary	HS CAN 2 H	16
13	Discretionary	HS CAN 2 L	17
14	Discretionary (HS CAN L)	HS CAN 1 L	15
15	ISO L	ISO L	7
16	VBATT	VBATT	25

Table 12: neoVI-OBD-1 Cable Signal Mapping.

7.4 neoVI-OBD-MULTI (Regular and Right Angle) Cable Connector Pinouts and Signal Mapping

These two cables have the same pinouts and signal mappings, as they differ only in the physical construction of the OBD-II connector.

DB-25 Connector Pinout

Table 13 shows the pinout of the DB-25 connector on the neoVI-OBD-1.

Pin #	Name	Description
1	N/C	No connection
2	N/C	No connection
3	N/C	No connection
4	N/C	No connection
5	MS CAN H	Medium Speed CAN channel, high
6	MS CAN L	Medium Speed CAN channel, low
7	ISO L	ISO 9141-2 L-Line
8	ISO9141/K/LIN1	ISO 9141-2 K-Line / LIN channel 1
9	N/C	No connection
10	N/C	No connection
11	N/C	No connection
12	N/C	No connection
13	GND	Ground
14	HS CAN 1 H	High Speed CAN channel 1, high
15	HS CAN 1 L	High Speed CAN channel 1, low
16	HS CAN 2 H	High Speed CAN channel 2, high

Pin #	Name	Description
17	HS CAN 2 L	High Speed CAN channel 2, low
18	N/C	No connection
19	HS CAN 3 H	High Speed CAN channel 3, high
20	HS CAN 3 L	High Speed CAN channel 3, low
21	N/C	No connection
22	N/C	No connection
23	N/C	No connection
24	N/C	No connection
25	V BATT	DC Input Power

Table 13: neoVI-OBD-MULTI Cable DB-25 Connector Pinout.

OBD-II / J1962 Connector Pinout

The pinout for the OBD-II / J1962 connector on this cable can be found in Table 14.

Pin #	Name	Description
1	Discretionary	Discretionary
2	J1850 +	J1850 line, positive
3	Discretionary	Discretionary
4	Chassis GND	Chassis Ground
5	Signal GND	Signal Ground
6	CAN H	High Speed CAN channel, high
7	ISO9141/K	ISO 9141-2 K-Line
8	Discretionary	Discretionary
9	Discretionary	Discretionary
10	J1850 -	J1850 line, negative
11	Discretionary	Discretionary
12	Discretionary	Discretionary
13	Discretionary	Discretionary
14	CAN L	High Speed CAN channel, low
15	ISO L	ISO 9141-2 L-Line
16	VBATT	Unswitched Vehicle Battery Positive

Table 14: neoVI-OBD-MULTI Cable OBD-II / J1962 Connector Pinout. The table shows standard signals for the OBD-II connector; this includes J1850, which is not supported by the NEOVI FIRE 2.

Cable Signal Mapping

Table 15 contains the mapping of signals for the neoVI-OBD-MULTI regular and right angle cables. The signal names for both connectors are shown and the table is based on the OBD-II connector's pin order.

OBD-II Pin #	OBD-II Signal	DB-25 Signal	DB-25 Pin #
1	Discretionary	HS CAN 3 H	19
2	J1850 +	N/C	N/C
3	Discretionary	MS CAN H	5
4	Chassis GND	N/C	N/C
5	Signal GND	GND	13
6	CAN H	HS CAN 1 H	14
7	ISO9141/K	ISO9141/K/LIN1	8
8	Discretionary	N/C	N/C
9	Discretionary	HS CAN 3 L	20
10	J1850 -	N/C	N/C
11	Discretionary	MS CAN L	6
12	Discretionary	HS CAN 2 H	16
13	Discretionary	HS CAN 2 L	17
14	CAN L	HS CAN 1 L	15
15	ISO L	ISO L	7
16	VBATT	VBATT	25

Table 15: neoVI-OBD-MULTI Cable Signal Mapping.

7.5 neoVI FIRE/RED J1939 Cable Connector Pinouts and Signal Mapping

This cable converts the neoVI DB-25 connector to a 9-pin Deutsch connector for use in commercial vehicles.

DB-25 Connector Pinout

Table 16 contains the pinout of the DB-25 connector for this cable.

Pin #	Name	Description
1	N/C	No connection
2	N/C	No connection
3	N/C	No connection
4	N/C	No connection
5	MS CAN H	Medium Speed CAN channel, high
6	MS CAN L	Medium Speed CAN channel, low
7	N/C	No connection
8	N/C	No connection
9	N/C	No connection
10	N/C	No connection
11	N/C	No connection

Pin #	Name	Description
12	N/C	No connection
13	GND	Ground
14	HS CAN H	High Speed CAN channel, high
15	HS CAN L	High Speed CAN channel, low
16	N/C	No connection
17	N/C	No connection
18	N/C	No connection
19	N/C	No connection
20	N/C	No connection
21	N/C	No connection
22	N/C	No connection
23	N/C	No connection
24	N/C	No connection
25	V BATT	DC Input Power

Table 16: neoVI FIRE/RED J1939 Cable DB-25 Connector Pinout.

Deutsch 9-Pin Connector Pinout

The pinout for the Deutsch connector on this cable is found in Table 17.

Pin #	Name	Description
1/A	Ground (-)	Ground
2/B	Battery (+)	Battery Power
3/C	CAN High (+)	High Speed CAN channel 1, high
4/D	CAN Low (-)	High Speed CAN channel 1, low
5/E	CAN Shield	CAN shield
6/F	J1708 (+)	J1708 channel, high
7/G	J1708 (-)	J1708 channel, low
8/H	CAN2 High (+)	High Speed CAN channel 1, high
9/J	CAN2 Low (-)	High Speed CAN channel 1, low

Table 17: neoVI FIRE/RED J1939 Cable Deutsch 9-Pin Connector Pinout. The table shows standard signals for the Deutsch 9-pin connector; this includes J1708, which is not supported by the NEOVI FIRE 2.

Cable Signal Mapping

Table 18 contains the mapping of signals for the neoVI FIRE/RED J1939 cable. The signal names for both connectors are shown and the table is based on the Deutsch 9-pin connector's pin order.

Deutsch Pin #	Deutsch Signal	DB-25 Signal	DB-25 Pin #
1/A	Ground (-)	GND	13
2/B	Battery (+)	VBATT	25
3/C	CAN High (+)	HS CAN H	14
4/D	CAN Low (-)	HS CAN L	15
5/E	CAN Shield	N/C	N/C
6/F	J1708 (+)	N/C	N/C
7/G	J1708 (-)	N/C	N/C
8/H	CAN2 High (+)	MS CAN H	5
9/J	CAN2 Low (-)	MS CAN L	6

Table 18: neoVI FIRE/RED J1939 Cable Signal Mapping.

7.6 FIRE 2 OBD Cable with DoIP Support Connector Pinouts and Signal Mapping

This special OBD cable replaces the FIRE 2 Ethernet Cable Adapter and contains HD-26, DB-25, DB-9 and OBD-II connectors. The HD-26 connector mates to the HD-26 on the FIRE 2 and uses the same pinout shown in Table 4; the other connectors are described below, along with a signal mapping table.

DB-25 Connector Pinout

Table 19 lists the pins of the DB-25 connector on this cable.

Pin #	Name	Description
1	HS CAN 7 H / LSFT CAN 2 H / SW CAN	High Speed CAN channel 7, high / Low Speed Fault Tolerant CAN channel 2, high / Single Wire CAN channel 1
2	N/C	No connection
3	HS CAN 6 H / LSFT CAN H / SW CAN 2	High Speed CAN channel 6, high / Low Speed Fault Tolerant CAN channel 1, high / Single Wire CAN channel 2
4	HS CAN 6 L / LSFT CAN L	High Speed CAN channel 6, low / Low Speed Fault Tolerant CAN channel 1, low
5	HS CAN 5 H	High Speed CAN channel 5, high
6	HS CAN 5 L	High Speed CAN channel 5, low
7	N/C	No connection
8	ISO K/LIN 1	K-Line channel 1 / LIN channel 1
9	N/C	No connection
10	N/C	No connection
11	N/C	No connection

Pin #	Name	Description
12	N/C	No connection
13	GND	Ground
14	HS CAN 4 H	High Speed CAN channel 4, high
15	HS CAN 4 L	High Speed CAN channel 4, low
16	HS CAN 2 H	High Speed CAN channel 2, high
17	HS CAN 2 L	High Speed CAN channel 2, low
18	N/C	No connection
19	HS CAN 3 H	High Speed CAN channel 3, high
20	HS CAN 3 L	High Speed CAN channel 3, low
21	N/C	No connection
22	N/C	No connection
23	N/C	No connection
24	N/C	No connection
25	V BATT	DC Input Power

Table 19: FIRE 2 OBD Cable with DoIP Support DB-25 Connector Pinout.

DB-9 Connector Pinout

Table 20 contains the pinout for the DB-9 connector on this cable.

Pin #	Name	Description
1	LIN 1	LIN channel 1
2	LIN 2	LIN channel 2
3	LIN 3	LIN channel 3
4	ETH ACTIVATE	Ethernet activation line
5	GND	Ground
6	N/C	No connection
7	N/C	No connection
8	N/C	No connection
9	N/C	No connection

Table 20: FIRE 2 OBD Cable with DoIP Support DB-9 Connector Pinout.

OBD-II / J1962 Connector Pinout

Table 21 shows the pinout for the OBD-II / J1962 connector on the cable.

Pin #	Name	Description
1	MS CAN H	Medium Speed CAN channel, high
2	N/C	No connection
3	ETH TX+	Ethernet transmit channel, positive
4	N/C	No connection
5	GND	Ground
6	HS CAN H	High Speed CAN channel, high
7	N/C	No connection
8	ETH ACTIVATE	Ethernet activation line
9	MS CAN L	Medium Speed CAN channel, low
10	N/C	No connection
11	ETH TX-	Ethernet transmit channel, negative
12	ETH RX+	Ethernet receive channel, positive
13	ETH RX-	Ethernet receive channel, negative
14	HS CAN L	High Speed CAN channel, low
15	N/C	No connection
16	VBATT	DC power input

Table 21: FIRE 2 OBD Cable with DoIP Support OBD-II / J1962 Connector Pinout.

Cable Signal Mapping

Table 22 shows the mapping of signals for the FIRE 2 OBD Cable with DoIP Support, ordered by pin number on the HD-26 that connects to the FIRE 2.

Signal Name	Signal Description	HD-26 Pin #	DB-25 Pin #	DB-9 Pin #	OBD-II Pin #
ETH TX+	Ethernet transmit channel, positive	1			3
HS CAN 4 L	High Speed CAN channel 4, low	2	15		
HS CAN 5 L	High Speed CAN channel 5, low	3	6		
HS CAN 1 L	High Speed CAN channel 1, low	4			14
MS CAN L	Medium Speed CAN channel, low	5			9
HS CAN 2 L	High Speed CAN channel 2, low	6	17		
HS CAN 3 L	High Speed CAN channel 3, low	7	20		
HS CAN 6 L / LSFT CAN L	High Speed CAN channel 6, low / Low Speed Fault Tolerant CAN channel 1, low	8	4		
ETH TX-	Ethernet transmit channel, negative	9			11
GND	Ground	10	13	5	5
ETH RX+	Ethernet receive channel, positive	11			12
HS CAN 4 H	High Speed CAN channel 4, high	12	14		
HS CAN 5 H	High Speed CAN channel 5, high	13	5		
HS CAN 1 H	High Speed CAN channel 1, high	14			6
MS CAN H	Medium Speed CAN channel, high	15			1
HS CAN 2 H	High Speed CAN channel 2, high	16	16		
HS CAN 3 H	High Speed CAN channel 3, high	17	19		
HS CAN 6 H / LSFT CAN H / SW CAN 2	High Speed CAN channel 6, high / Low Speed Fault Tolerant CAN channel 1, high / Single Wire CAN channel 2	18	3		
V BATT	DC Input Power	19	25		16
ETH RX-	Ethernet receive channel, negative	20			13
HS CAN 7 L / LSFT CAN 2 L	High Speed CAN channel 7, low / Low Speed Fault Tolerant CAN channel 2, low	21			
ISO K/LIN 1	LIN channel 1	22	8	1	
LIN 2	LIN channel 2	23		2	
LIN 3	LIN channel 3	24		3	
ETH ACTIVATE	Ethernet activation line	25		4	9
HS CAN 7 H / LSFT CAN 2 H / SW CAN	High Speed CAN channel 7, high / Low Speed Fault Tolerant CAN channel 2, high / Single Wire CAN channel 1	26	1		

Table 22: FIRE 2 OBD Cable with DoIP Support Signal Mapping.

8 Support Contact Information

If you have a problem you cannot resolve on your own, feel free to contact ICS for assistance at one of our offices.

8.1 ICS United States Headquarters

Our primary support personnel can be reached at our American headquarters in the Detroit area, using the following contact information:

- **Phone:** (800) 859-6265 or (586) 731-7950, extension 1.
- **Fax:** (586) 731-2274.
- **Email:** icssupport@intrepidcs.com

Intrepid's normal support hours are from 8 am to 5 pm, Monday to Friday, United States Eastern time. If you require assistance outside standard business hours, feel free to contact us and a member of our support team will get back to you as soon as possible.

8.2 ICS International Offices

European Union Office

For support in the EU, please contact Intrepid's Germany office:

- **Phone:** +49 721 6633703 -4.
- **Fax:** +49 721 6633703 -9.
- **Email:** icsgermany@intrepidcs.com

Japan Office

Intrepid's office in Yokohama can be reached as follows:

- **Phone:** +81-(0)45- 263-9294.
- **Mobile Phone:** 080-8884-0111.
- **Fax:** 045-263-9296.
- **Email:** kharukawa@intrepidcs.com

Korea Office

In Korea, use the following contact information:

- **Phone:** +82 31 698 3460.
- **Fax:** +82 31 698 3461.
- **Email:** icskorea@intrepidcs.com

China Office

Intrepid's Shanghai office can also be reached by phone, fax or email:

- **Phone:** +86 4006151011.
- **Fax:** +86 021-51330271-601.
- **Email:** icschina@intrepidcs.com

We can also be contacted in Shenzhen:

- **Phone:** +86 0755-82723212.
- **Email:** icschina@intrepidcs.com

India Office

In India, please use this contact information:

- **Phone:** +91 +97 66 44 55 33.
- **Email:** sbhagwat@intrepidcs.com

Australia Office

Our Australian office can be reached as follows:

- **Phone:** 03 9466 4948 (international callers: +61 3 9466 4948).
- **Email:** icsaustralia@intrepidcs.com