# HERCULES

## USER MANUAL

**Version 4 Series**

Microport®
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## IMPORTANT NOTICE

**When using this manual, please remember the following:**

- This manual may be changed, in whole or in part, without notice.
- Dearborn Group Inc. assumes no responsibility for damage resulting from any accident – or for any other reason – which occurs while the Hercules Software is in use.
- No license is granted – by implication or otherwise – for any patents or other rights of Dearborn Group Inc., or of any third party.



Recent manual revision history for this version:

| | |
|---|---|
| Mar. 28, 2005 | (Minor updates) |
| Jan. 3, 2005 | (Updated content to version 3.5.2) |
| Jan. 16, 2006 | (Updated content to version 4.0) |
| June 10, 2006 | (RM – Corrected content and formatting of version 4.0) |

# TABLE OF CONTENTS

# 1. Introduction

The software package is a 32-bit Windows based application for advanced network analysis and interaction with in-vehicle network system. Using this software with a GRYPHON® or S-CAT hardware interface, you can monitor, receive, filter, transmit and edit CAN frames, as well as frames from
other protocols (e.g., LIN, SJA1000, J1850, J1939) over a variety of communication links. You can also access the Hercules database for industry standard translation of these frames.

You interact with the translation database of Hercules, where frame definitions are stored and retrieved, in order to decode received frames and encode frames for transmission.

Hercules software currently supports up to six channels (only 4 channels are available when connecting to the S-CAT hardware) using a PC computer via a point-to-point connection.

## *1.1 Document organization and format*

**Section 1 – Introduction –** Summarizes the contents of the manual and provides references to related documentation and technical support.

> **NOTE:** The following chapters, if read sequentially, provide a step-by-step guide to preparing for executing, recording, and analyzing a monitoring session. Each chapter includes figures and illustrations to help you understand the procedures used with this software.

**Section 2 – Installation –** Covers the software and hardware necessary to successfully install and operate the Hercules tool, including the required operating environment, installation instructions, and main menu overview.

**Section 3 – Getting Started –** Describes the procedure to configure your hardware and databases.

**Section 4 – Configuration Menu –** Describes the procedure to properly set up and configure the Hercules software.

**Section 5 – Display Menu –** Presents the display formats (monitors/views) available for the viewing of CAN frames (as well as other protocols) and Hercules tool status.

**Section 6 – Filter Mode Menu –** Describes the function of filtering frames and how to enable and disable filters.

**Section 7 – Monitoring Menu –** Describes the procedure for initiating an online monitoring session and identifies the various features enabled and disabled by main-menu option selections.

**Section 8 – Playback Menu –** Describes the procedure for playing back a previous monitoring session.

**Section 9 – Diagnostics Menu –** Describes the procedure for accessing and utilizing services available to the Diagnostic View.

**Section 10 – View Menu –** Shows the Tool Bar and Status Bar options for work within the application.

**Section 11 – Language/Window Menu –** Describes the options for languages and types of views of monitors.

**Section 12 – Help Menu –** Has Hercules Help Topics, feature to update firmware, and also displays which version of the Hercules Software is installed in the computer.

## *1.2 Typographical convention*

The following typographic convention is used in this document.

**Arial bold** An option, button, check box or field – either in a table, window or dialog.

***Arial bold-italic*** The title of a window, dialog, menu or table.

**`Courier bold`** A command or keyboard keystroke to be selected.

## *1.3 Technical support*

In the U.S., technical support representatives are available to answer your questions between 9 a.m. and 5 p.m. EST. You may also fax or e-mail your questions to us. Please include your [voice] telephone number, for prompt assistance. Non-U.S. users may choose to contact their local representatives.

Phone: 886-6-275-3783

Fax: 886-6-237-5031

E-mail: 2business@microport.com.tw

Web site: **www.microport.com.tw**

## *1.4 Supplemental documentation*

The following documents contain additional Hercules-related information.

**Diagnostic References**

| | |
|---|---|
| GMLAN ENHANCED DIAGNOSTIC TEST MODE SPECIFICATION - GMW 3110 | Version 1.5 |
| Communications between vehicle and external equipment for emissions-related diagnostics – Part 5: Emissions –related diagnostic services | ISO15031-5 |
| Diagnostics on controller area network (CAN) – Part 3: Implementation of diagnostic services | ISO 15765-3 |

# 2. Installation

Before installing the Hercules software, verify that your computer has the minimum hardware specifications to permit using the program. See the following section for detail about the required operating environment.

## *2.1 Required operating environment*

The minimum recommended operating environment for the Hercules software consists of the following components:

- Personal computer – 533 MHz or faster
- 256 MB RAM (minimum)
- 1 GB of hard drive space (minimum)
- XP and Windows 2000 with latest Service pack installed
- Dearborn Group hardware interface
- Ethernet card capable of 10MB-per-second data transfer (or faster)
- Null Ethernet (crossed) cable

**NOTE: Hardware interface refers to Dearborn Group's GRYPHON® family of hardware (including S-CAT)**

## *2.2 Installation instructions*

The Hercules installation program will ask you to uninstall a previous version of the Hercules or S-CAT software prior to installing a more recent version. When ready, follow these steps:

1. Start Windows.
2. Insert Hercules CD-ROM into your PC computer CD-ROM drive.
3. Click **Start | Run**.
4. Type D:\Hercules\INSTALL_Hercules.EXE
5. (If "D" is your PC's CD-ROM label; otherwise, replace "D" with the correct letter for your CD-ROM drive).
6. Follow the instructions that appear on the screen.

7. When prompted for a TCP/IP configuration, click **Next** to choose the default settings or
enter the IP address of the hardware to which you will connect. Section 3.2.1.2 describes how to change these settings.

| | |
|---|---|
| IP Address: | 192.168. 1. 1 |
| Port No: | 7000 |

Continue following the directions on the screen.

After installation, two icons will appear on the Windows desktop – *Hercules* and *Hercules Compiler*. To run the Hercules application, double-click the ***Hercules*** icon.

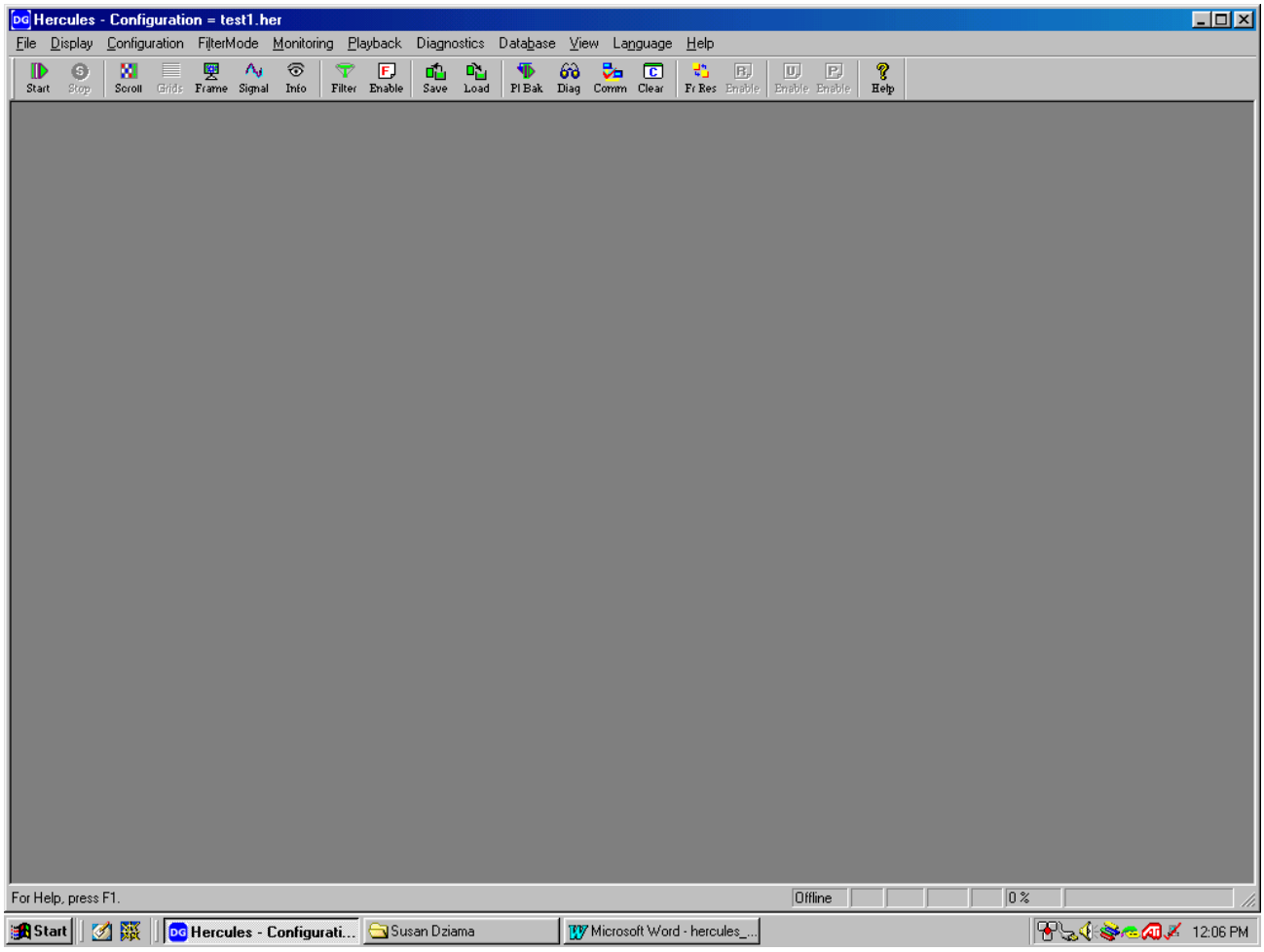
For point-to-point connections, apply power to the hardware prior to booting your laptop to guarantee proper IP assignment.

# 3. Getting Started

After installation, two icons are added to the Windows desktop – Hercules and Hercules *Compiler*. The Hercules icon launches the main application, while the Hercules *Compiler* starts the advanced programming and compiler program. The Hercules *Compiler* program is also accessible from within the Hercules program.

## *3.1 Main Menu Overview*

When you first start Hercules, a window appears with the menu bar at the top. The toolbar is immediately underneath the menu bar. The remainder of the window will be gray. As a first time Hercules user, you should follow the procedures outlined in the following sections of this manual.

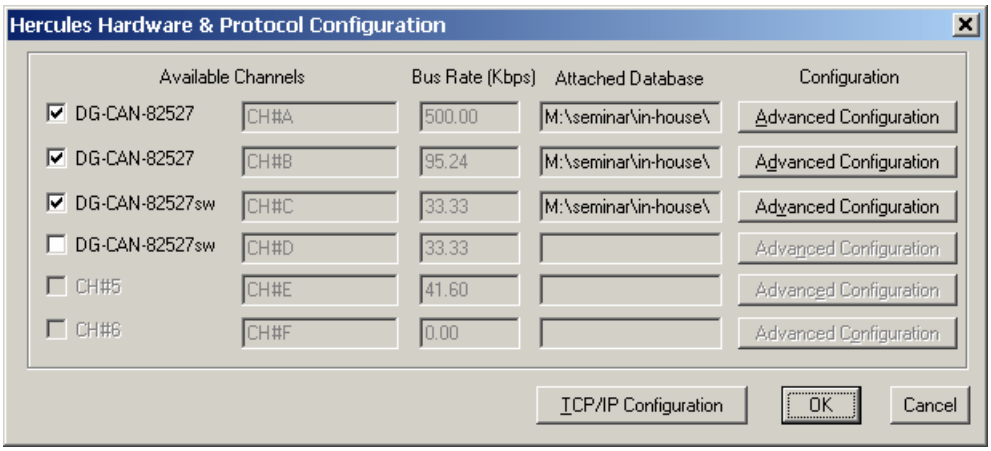


The icons on the toolbar contain some of the same commands available in the menus. As you proceed through the manual, remember that right-clicking in boxes and columns will display menus
to make selections. Also keep in mind that some applications within the software only work when in ONLINE or OFFLINE mode.

**NOTE: If you are a first-time Hercules user, follow this manual in the order the information is presented. The topics presented in this manual are not in the same sequence as the topics in the menu.**

## *3.2 Initializing the hardware*

Before beginning an online monitoring session, you need to prepare the hardware interface, as described in the hardware interface manual. Two areas need to be configured: the Ethernet
(TCP/IP) connection and the network interface(s). Select the **Configuration** menu, followed by the **Hardware Configuration** command to display the following dialog.




### 3.2.1 Configuring the Ethernet interface

#### 3.2.1.1 Power up sequence

For the Ethernet connection to work properly, it is recommended that you first apply power to the hardware unit before powering up your PC. Here the recommended procedure:

1. Confirm that both your PC and hardware are off.

2. Apply power the hardware unit. Wait approximately one minute, during which time you should hear two “beeps” from the unit (one beep after about five seconds and a second beep after about 40 seconds).

   **NOTE: It is important to wait until you have heard both “beeps” from the hardware unit before attempting to enter ONLINE mode. The hardware unit is not ready for communication until its power has been fully cycled (as indicated by the second
   “beep”). The newer S-CAT2 does not beep.**

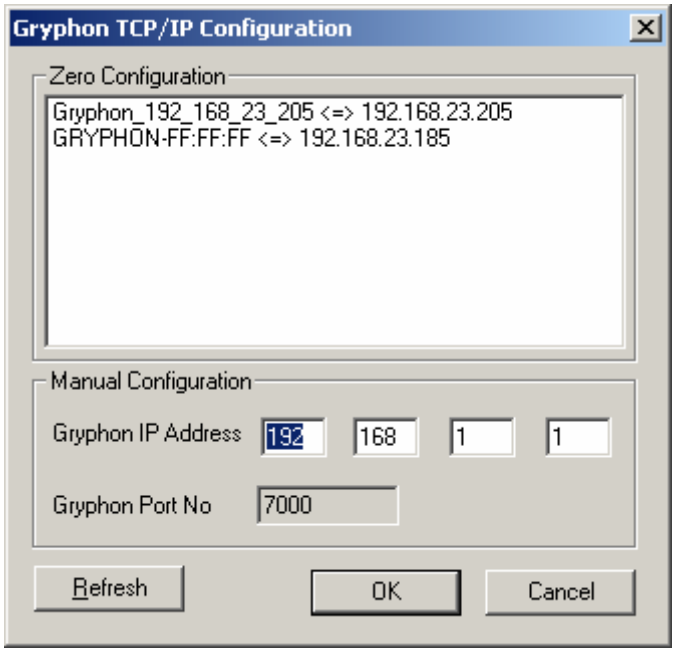
3. Apply power to your PC and start Hercules. Configure your hardware settings properly to support communication with the hardware unit. Set the Hercules tool to ONLINE mode by selecting **Start** from the **Monitoring** menu, or by clicking **Start** on the main toolbar. A message briefly appears stating that Hercules is trying to connect to the hardware.

When this message disappears, Hercules will be ONLINE (if your hardware is correctly configured). Proceed with your monitoring session, transmitting and viewing frames – and selecting various Hercules features.

If an error message appears, confirm that all hardware connections are secure, and that the hardware configuration of the hardware unit is correct, repeating steps 1 – 3. If the hardware unit still fails to respond, refer to the appropriate troubleshooting guide in the hardware installation manual.

#### 3.2.1.2 TCP/IP Configuration

To configure the TCP/IP connection, select the **Configuration** menu, followed by the **Hardware Configuration** command to display the **Hercules Hardware & Protocol Configuration** dialog. Click **TCP/IP Configuration** to display the following dialog.




**Zero Configuration** – scans the network for devices (Gryphon/S-CAT/S-CAT2) and displays the available devices. When a device is selected from the list, its IP address will be displayed next to **Gryphon IP Address** under ***Manual Configuration***.

Zero Configuration scanning can occur under the following conditions:

=> Upon Opening the "**Gryphon TCP/IP Configuration**" dialog.
=> Upon clicking the "**Refresh**" button.

**Gryphon IP Address** – the IP Address of the Hardware to which Hercules will be connected. The IP Address will default to 192.168.1.1 if no device is online, otherwise it will communicate with a user specified IP Address.

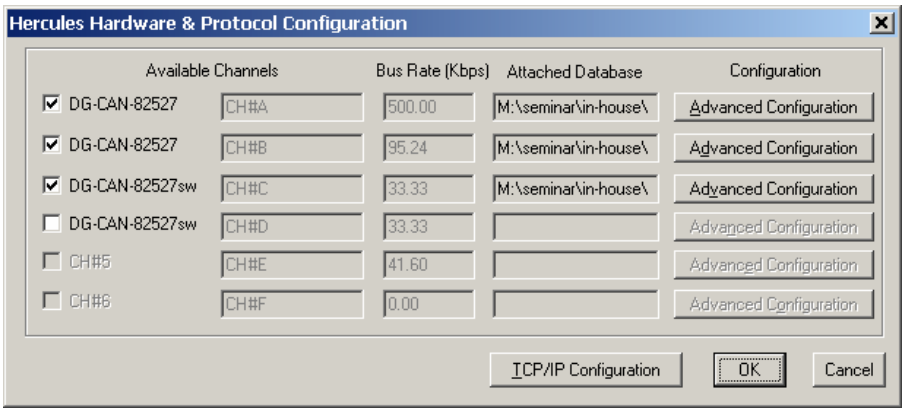
**Gryphon Port No** – the Port No. of the Hardware in which Hercules communicates with devices. Currently the default value is 7000.

**Refresh** – scans the network to list the available devices (Gryphon, S-CAT and S-CAT2).

When all the correct values are entered, click "OK" Button. Hercules will attempt to connect to the user specific device and returns to the "Hardware Configuration" dialog. If successful it will enable the available channels, otherwise a warning message is displayed.

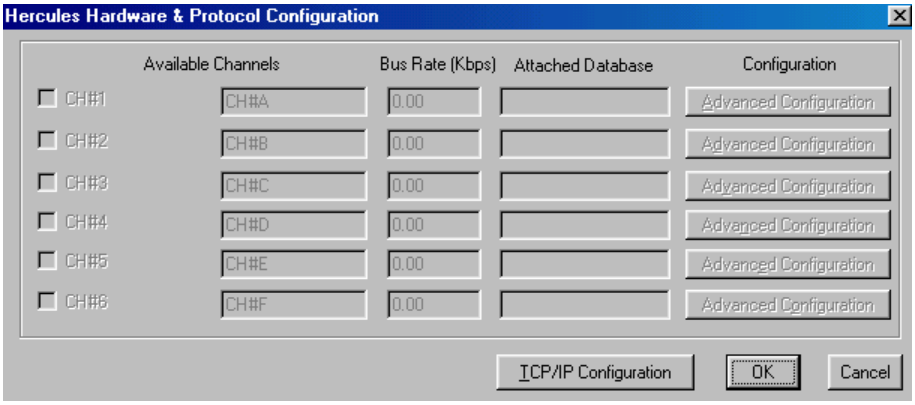
### 3.2.2 Configuring the network channels

Hercules provides up to six network channels and checks the hardware to verify how many and what types are available. To do this, click **Configuration | Hardware Configuration** to see the following dialog.




If your software and hardware are properly installed, you will see the channels available for
transmission. (The check boxes on the left will be available for selection.)

If the hardware is not properly connected, the dialog will appear as follows:

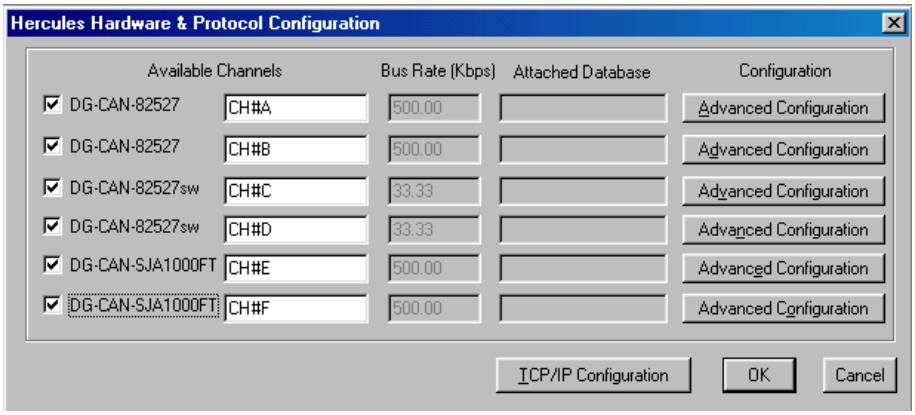



The check boxes on the left are not available for selection. If this is the case, you will need to check the TCP/IP configuration (see section 3.2.1.2).

In the **Hercules Hardware & Protocol Configuration** window, select the channels you wish to use by selecting or clearing each option.

Channel names can also be assigned by typing the name in the box that you wish to represent that channel (a maximum of 12 characters are permitted). This label will be used as reference in other applications in the software. Channel names can be edited only when no windows are open.

**NOTE: Only the following characters are permitted for channel names: letters "a-z" or "A-Z", numeric digits "0-9", the ampersand "&", and the underscore "_".**




The channel's current Bus Rate (in Kpbs) and Attached Database will be displayed. To change the database, refer to section 3.3.3, Associate Database. For *Bus Rate* changes, click **Advanced Configuration.** A specific **Advanced Configuration** dialog will appear for each Gryphon network module.

**NOTE: Refer to appendix A for additional information on the network modules.**

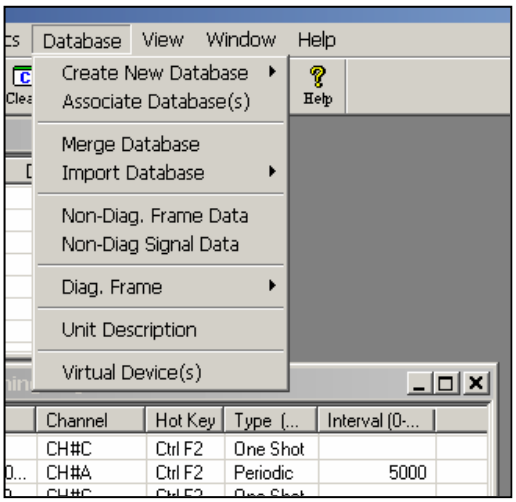
## *3.3 Database Menu*

The Hercules program uses databases as the source of decoding messages transmitted and received on the networks. It also stores and retrieves frame definitions to decode received frames and encode frames for transmission. Once you have started Hercules, you may select a translation database that is used during your session. The database translates protocol frame data into user- defined views.

When you first start Hercules, a default database (default.mdb) file is loaded by the hardware. It is an empty, read-only database and will not let you work with specific frames. To enable the Hercules program features, you must open an existing database or create a new database.

Select a database (.mdb, or Microsoft Access Database) file by using one of the following *Database* menu commands:

**Create New Database –** allows you to set up and save a new (customized) database, by first defining a name, type (Intel, Motorola (backward) or GM-Monarch/Motorola (forward), and location
for your new database (.mdb) file, and then adding frames to that file.




See section 3.3.1 for definition of these types. Once selected, the type cannot be changed.

**Associate Database –** allows you to work with a previously created and saved database.

**Merge Database –** allows you to merge existing Hercules databases into a single Hercules database. This option also allows previous versions of Hercules/S-CAT to be converted to the current version.

**Import Database –** allows you to import customized UEF (*GM Universal Export Format*) databases and Vector Informatik databases (.txt or .dbc files) for use within Hercules applications.

Once you have a saved database active (opened), most of the features of Hercules are enabled. You can now configure Hercules to send and receive protocol frames, as well as select a monitor.

Below is a chart of the database formats and corresponding protocol(s), for reference. An example is included immediately following the chart.

If you wish to proceed from this point, refer to *section* 3.3.2 Create New Database, or one of the other options to select a database.

### 3.3.1 Database Formats and Protocol

| Database Format | Translation Format | Protocol |
|---|---|---|
| GM-Monarch / Motorola (forward) | Big Endian, Start Bits 7-0 | CAN, LIN, J1850 |
| Motorola (backward) | Big Endian, Start Bits 0-7 | CAN, LIN |
| Intel | Little Endian, Start Bits 7-0 | CAN, LIN, J1939 |

**Example:**

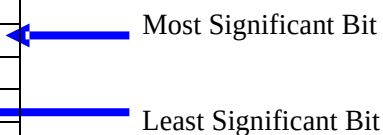
Assume the following:
zero referenced bits and bytes
start byte=2
start bit=0
length=16

**8 byte CAN Message with the following contents:**

| Byte0 | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0xAA | 0xBB | 0x00 | 0x00 | 0x00 | 0x00 |

**GM-Monarch Interpretation**

| | Bit # | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Byte# | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

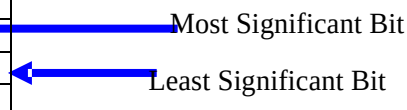



**Decoded Value:**

| Binary | Hex | Decimal |
|---|---|---|
| 010111011 00000000 | 0x5B00 | 23296 |

**Motorola Interpretation:**

| | Bit # | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Byte# | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

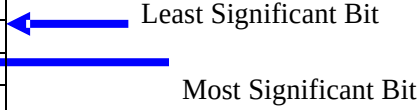



**Decoded Value:**

| Binary | Hex | Decimal |
|---|---|---|
| 10101010 10111011 | 0xAABB | 43707 |

**Intel Interpretation:**

| | Bit# | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Byte# | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

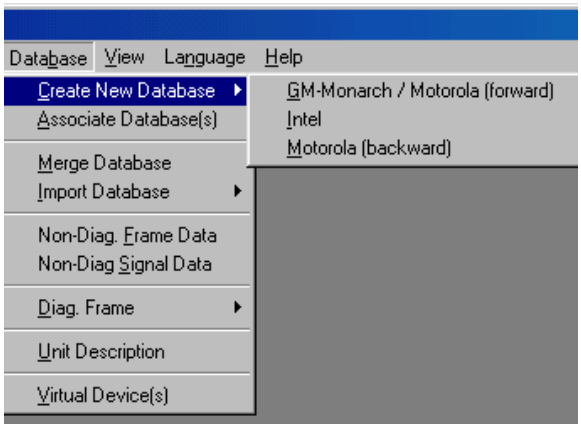


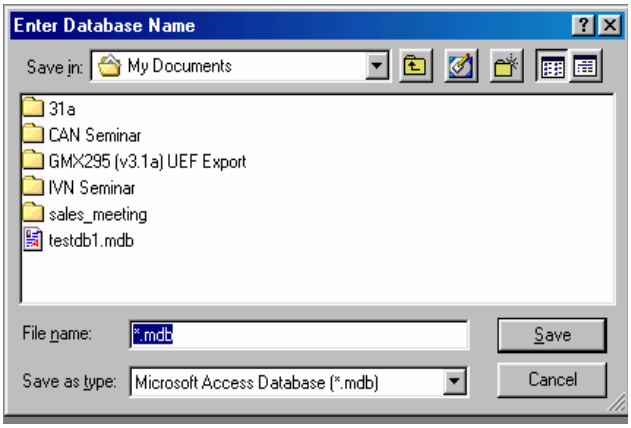

**Decoded Value:**

| Binary | Hex | Decimal |
|---|---|---|
| 10111011 10101010 | 0XBBAA | 48042 |

### 3.3.2 Create New Database

You can create a new database by saving a new (customized) database either in GM- Monarch/Motorola (forward), Intel, or Motorola (backward) data format for CAN-STD (Standard) or CAN-EXT (Extended) frames. See section 3.3.1 for description. Other protocols, such as J1850, have their own formats and interpretations and will automatically be ready to use in Hercules format
via the Hercules software. To create a database, select the **Database** menu, followed by the
**Create New Database** command, as shown below.



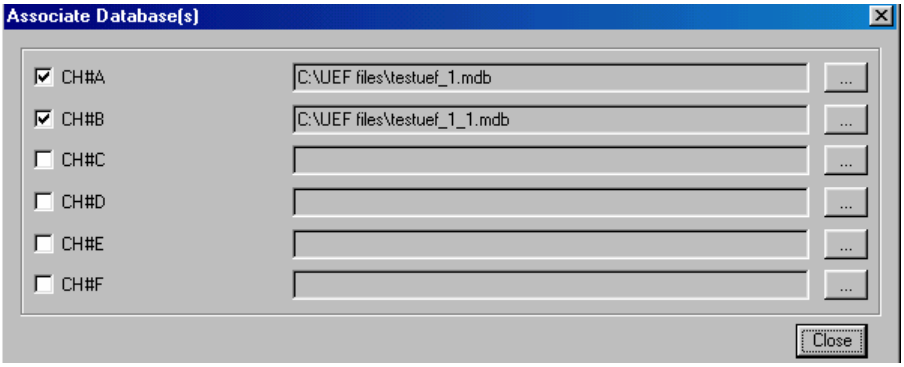




Once you have created a database and have saved it, you are ready to check your hardware configuration. You may also need to associate, merge, import, or convert previous-version databases, as described in the following sections.

### 3.3.3 Associate Database(s)

*Associate Database(s)* lets you work with a previously created and saved database to interpret frames on assigned channels. You may select different databases for each channel or a single database may be assigned to all the channels. You should associate a database to each channel to which it applies.

1. To access an associate database, select the **Database** menu, followed by the **`Associate Database(s)`** command to display the following dialog.



**To ensure that you have the channels that you need for the monitoring session, please read through Section 3.2, Hardware Configuration.**

2. To associate the database, click on the (…) button to the far right of a channel. A window will appear to choose a database(s) from the files. Make your selection, and it will appear in the long gray box, as displayed in the above window. To enable your selection, select the check box to the left of the channel name.

Once you have associated one or more database(s), you are now ready to check your hardware configuration, unless you also need to merge or import other databases for use in the monitoring session.

**NOTE: An example J1939 database can be loaded from the following folder location:**

`C:\Program Files\Hercules\j1939.mdb`

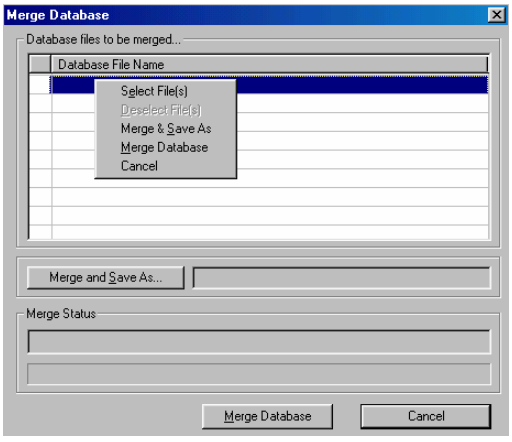
### 3.3.4 Merge Database

The Merge Database feature will join previously created Hercules databases into a single database file. To merge databases, follow the following steps:

1. Click the first unused field and a gray box (…) will appear. Click (…) and the Select
Database File box will open.

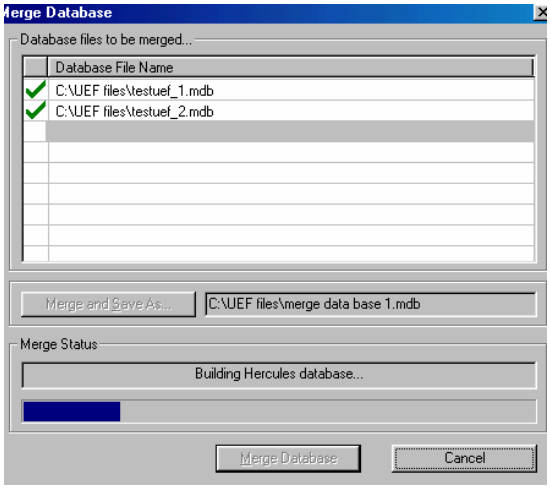
or

Select the first row in the **Merge Database** window and right-click to display the following menu. Click the **`Select File(s)`** command to open the **Select Database File** dialog.




From here, you can select the files you wish to merge together.

2. Once you have selected the databases to be merged, click **Merge and Save As**. You will then be asked to enter the database name. Once the file name is saved, you will be returned to the **Merge Database** window.




3. The final step is to click **Merge Database** at the bottom of the window. The program will begin joining the databases you have selected, and the blue progress bar indicates the Merge Status is updating. Checkmarks will also appear next to each database to indicate whether each database was merged successfully.

Once the updating is complete, a message will appear to indicate if the database(s) were successfully merged. If an error occurs while merging databases (i.e., duplicate frames, signal overlaps, etc.), a message describing the error will appear and the merging process will terminate.
If two or more databases have duplicate frames, the software will only read one of the frames, so no duplication will be sent during transmission.

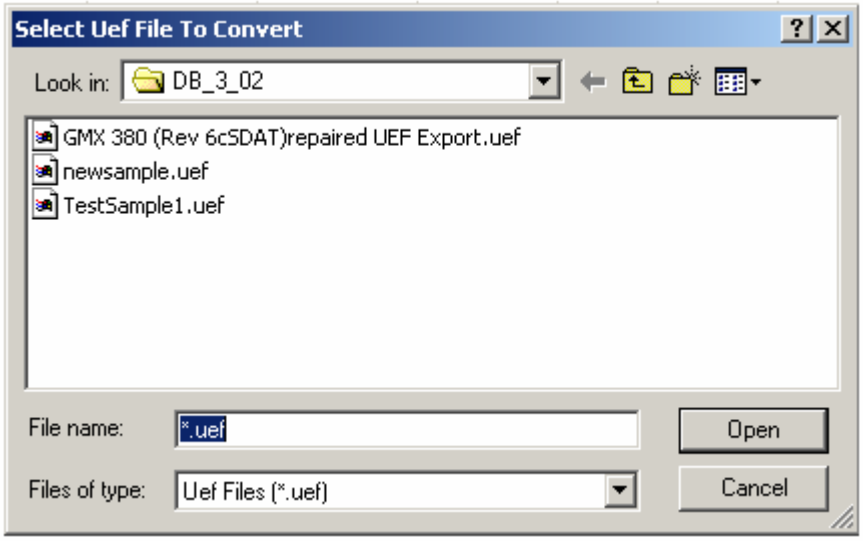
### 3.3.5 Import database

This feature is used to import several types of databases into Hercules. The following sections describe these database types.

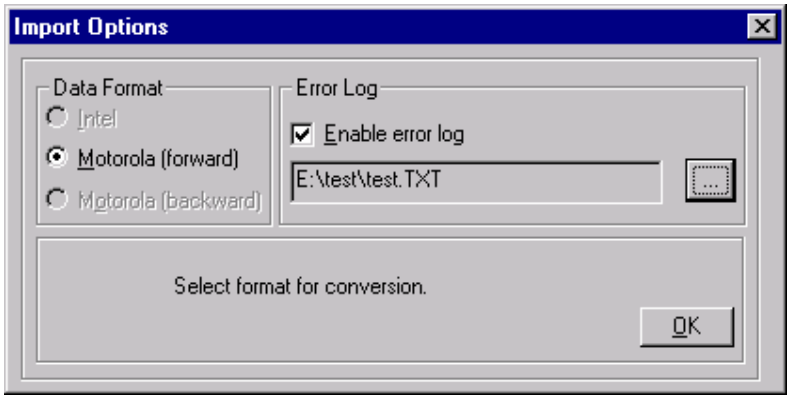
#### 3.3.5.1 Import database from UEF file

GMLAN's Universal Export Format (UEF) is an output file from their GMLAN Monarch database. Hercules imports this file type directly into a Hercules .mdb database file. The output will be one file for each network designated in the database. Use the following steps to import and convert a UEF database.

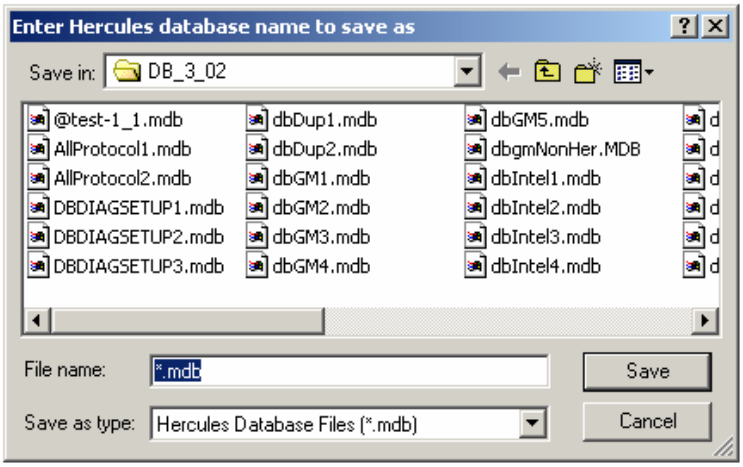
1. Select the UEF file name to import and click **Open**.




After parsing the information from the UEF file has completed, the *Import Options* dialog for UEF conversion is displayed. It also allows the user to configure an error log file.




2. The *Enter Hercules database name to save as* dialog appears. Enter the file name for the new imported Hercules database file and click **Save**.



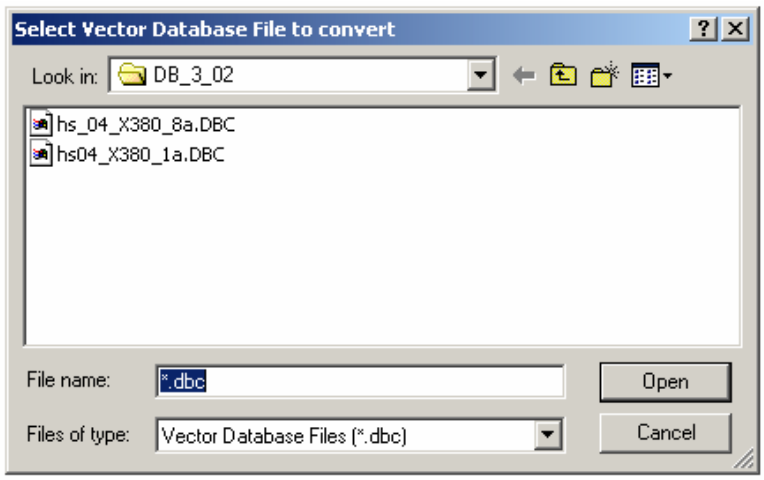

3. Hercules will parse the UEF file and begin importing its information into the specified
Hercules database(s). If the file contains information for more than one network (i.e., LSCAN, HSCAN) multiple files will be created, one for each channel. (Typically for GMLAN applications, HSCAN messages will be saved as **`filename1.mdb`** and SWCAN messages
as **`filename3.mdb`**.

When the importing process has finished, a prompt will inform you if the file(s) was generated successfully.

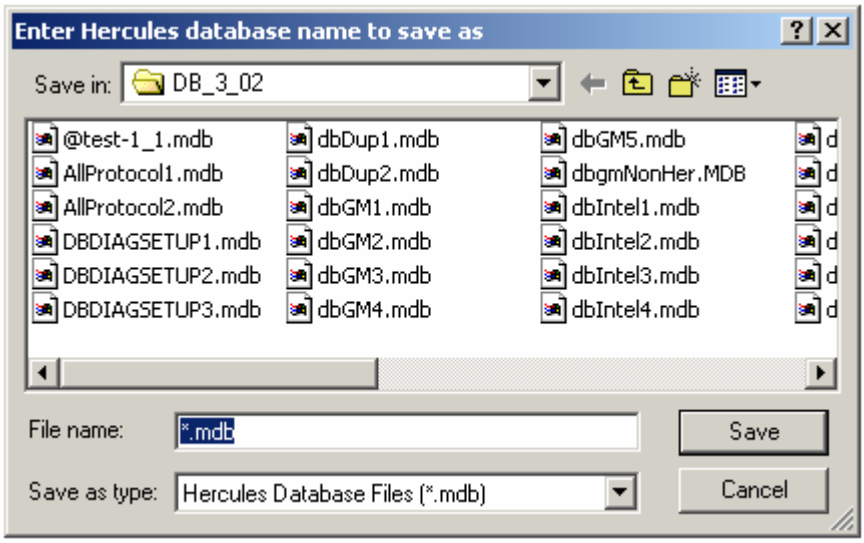
#### 3.3.5.2 Import Database from Vector Database (DBC)

You can use a database from a Vector .dbc. file, but it first needs to be converted to Hercules
(.mdb) format. Use the following steps to import and convert a DBC file database.

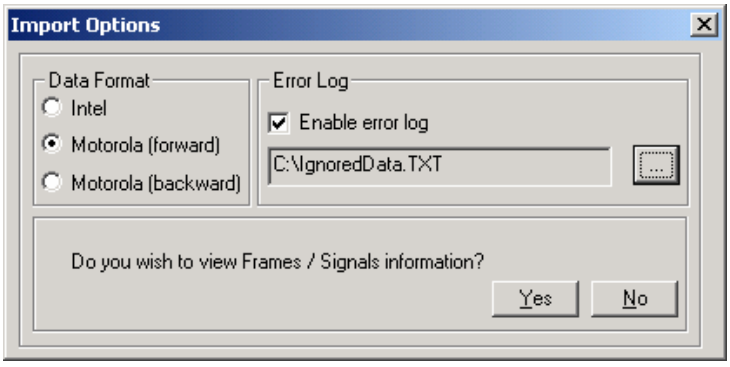
1. Select the .dbc file name and click **Open**.



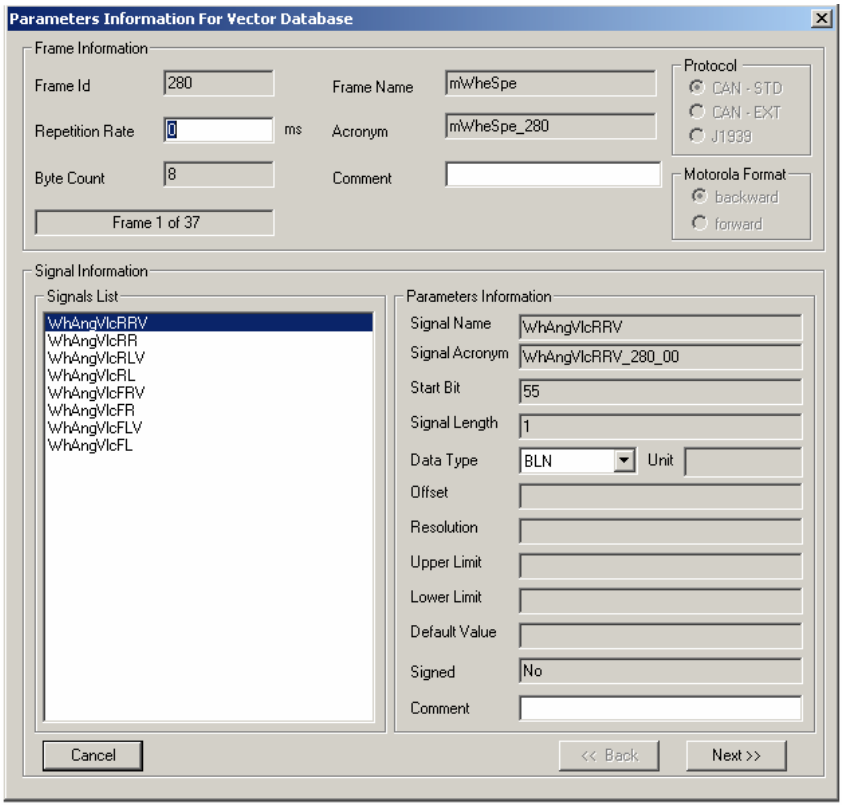
2. The *Enter Hercules database name to save as* dialog appears. Enter the file name of the new Hercules database file to be created and click **Save**.




3. An *Import Options* dialog appears.




Choose the desired options for *Data Format* and *Error Log*. To import the file, click the appropriate button in the *Do you wish to view Frames / Signals information?* box. If you click **No**, Hercules automatically imports the database. If you click **Yes**, you will be required to confirm the data type for each item in the signal list by clicking **Next >>** to continue.

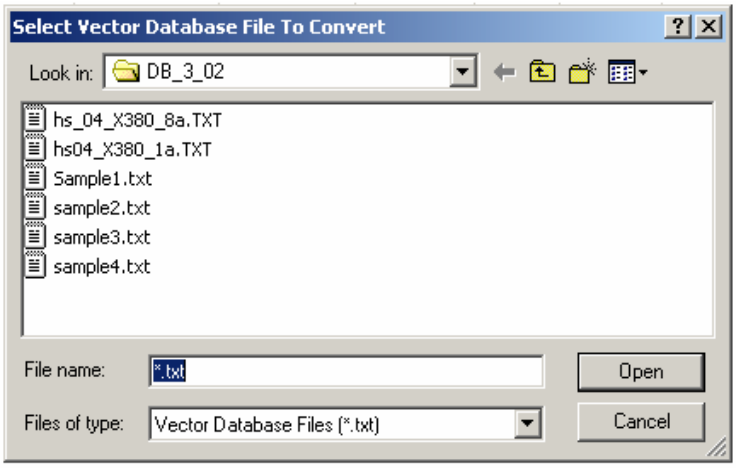



When the importing process has finished, a window will appear to alert you if the process was successful.

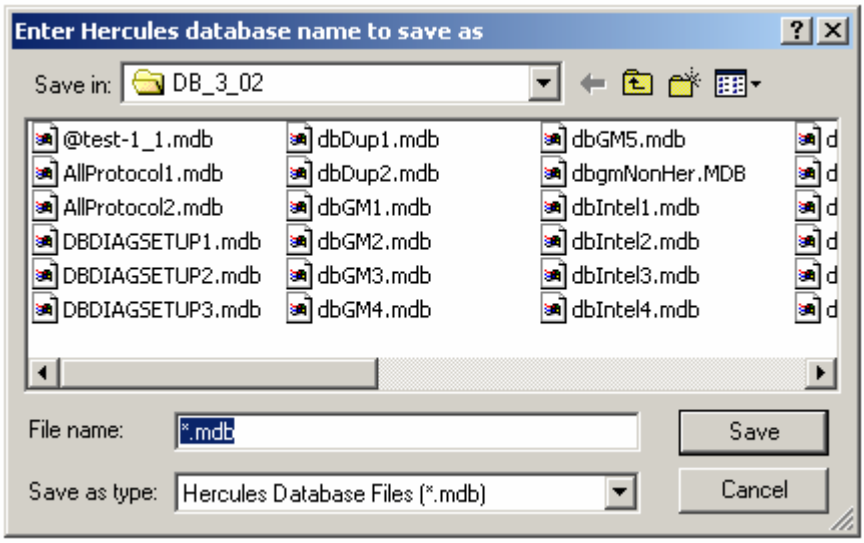
### 3.3.5.3 Import Database from Vector database (TXT)

You can use a database from a Vector .txt file, but it first needs to be converted to Hercules (.mdb) format. Use the following steps to import and convert a TXT file database.

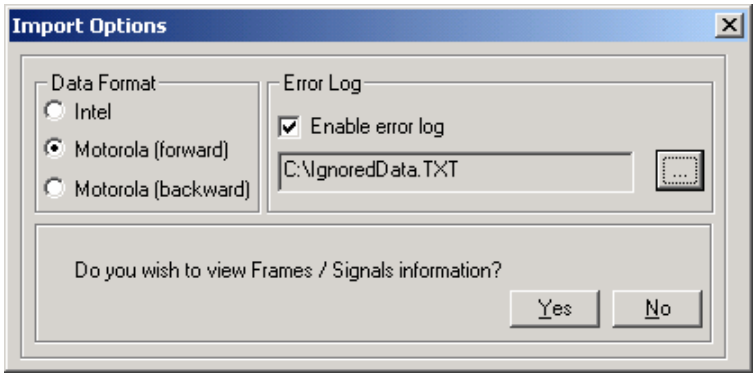
1. Select the database text file (.txt) and click **Open**.



2. The *Enter Hercules database name to save as* dialog appears. Enter the file name of the new Hercules database file to be created and click **Save**.



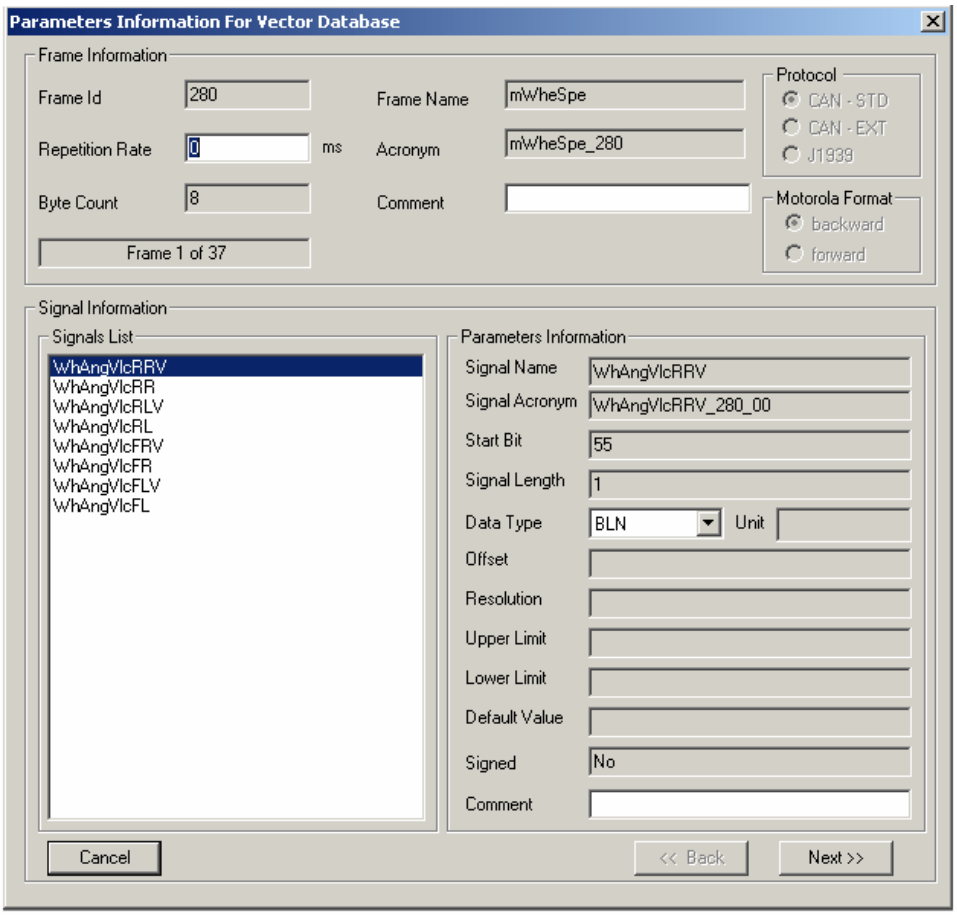

3. An *Import Options* dialog appears.




If the Vector Database File (*.txt or *.dbc) contains mixed signal data formats, you can select the *Data Format* as **Intel**, **Motorola (forward)** or **Motorola (backward)**.

Select the **Enable error log** box to view the import errors.

If you click **No**, Hercules automatically imports the database. If you click **Yes**, you will be required to confirm the data type for each item in the signal list by clicking **Next >>** to continue.



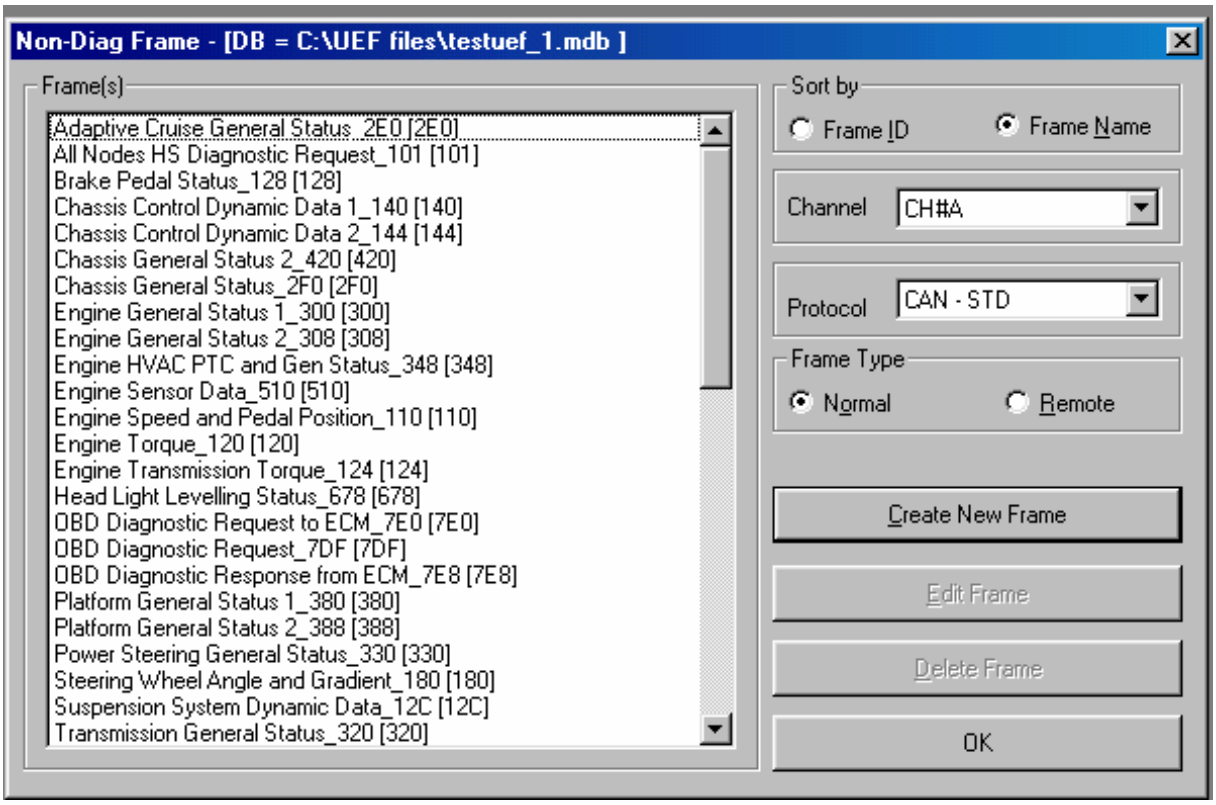

When the importing process has finished, a window will appear to alert you if the process was
successful.

### 3.3.5.4 Convert Database

To convert a previous-version database, simply select the database from the files, and the Hercules software will convert the file, from a previous Hercules version, to the current Hercules .mdb database format. Multiple databases will be created; one for each channel existing in the previous database.

### 3.3.6 Non-Diag Frame Data

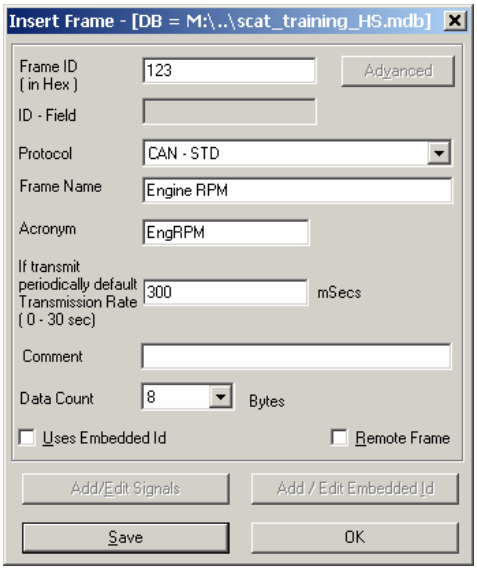
The Non-Diagnostic Frame Data table lets you create new database frames, or to edit or delete existing frames. To view or create frames in this window, select a **Channel** and **Protocol** in the *Non-Diag Frame* dialog.




To delete a frame from the database, **select** it in the *Frame(s)* box and click **Delete Frame**. For frame creation and editing instructions, refer to the sections that follow.

#### 3.3.6.1 Create a new frame

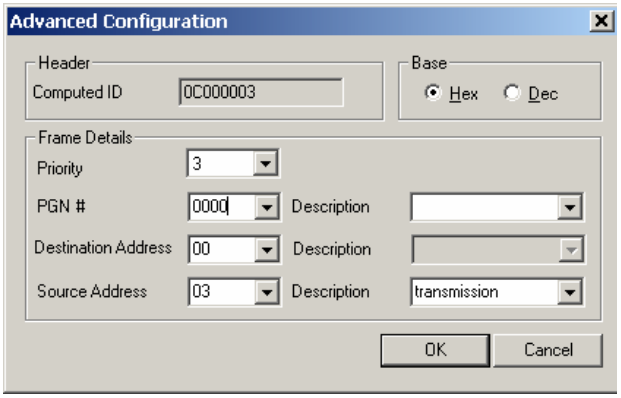
To add a new frame to the database, **select** a *Protocol* and *Channel* in the *Non-Diag Frame* window. Click **Create New Frame**. Enter the correct values for the following *Insert Frame* dialog. A diagnostic response *Frame ID* can also be entered into the database.



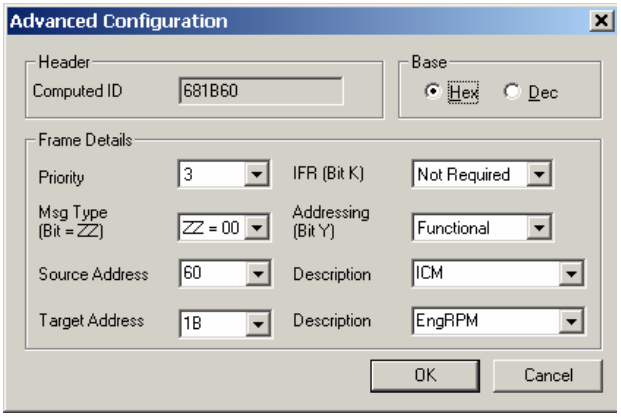

| FIELD | DESCRIPTION |
|---|---|
| **Frame ID** | Hexadecimal value of the Frame ID or header for the message. The diagnostic response frame ID can be entered in this field. |
| **Advanced** | Becomes enabled for specific protocols to help create IDs. See further information in this section. |
| **Protocol** | Click arrow to select:<br>• CAN-STD – standard (11-bit) CAN<br>• CAN-EXT – extended (29-bit) CAN<br>• J1850-1H (VPWM) – one-byte header, DCX<br>• J1850-3H (VPWM) – three-byte header, GM Class 2<br>• J1850-3H (PWM) – three-byte header, Ford SCP<br>• J1939-250 Kbps (Truck & Bus)<br>• LIN |
| **Frame Name** | Message name. |
| **Acronym** | Usually a shortened string of the *Frame Name*. It is used by the other applications in the software to identify the message to the user. |
| **Transmission Rate** | Default message-sending rate for a periodic message. |
| **Comment** | User defined information. |
| **Data Count** | Number of data bytes. |
| **Uses Embedded (Secondary) ID** | Dependent on application selected. It allows the user to define multiple first bytes with their specific definitions for the remaining data. |
| **Remote Frame** | Enables CAN remote frame. |

Once you click **Save**, you will be able to access *Add/Edit Embedded (Secondary) Id* (if this option was selected) and/or *Add/Edit Signals*. See section 3.3.7 for information on how to edit signals.

### Advanced button (J1939 / J1850)




For CAN-EXT, the **Advanced** button will help configure the CAN ID for *J1939* or GMLAN 29-bit CAN. (This is configurable under Global options, section 4.10). For *J1939* protocol, an **Advanced Configuration** window will appear to configure the *Priority*, *PGN#*, *Destination Address* and *Source Address* separately. The *Computed ID* automatically gets constructed and displayed in the box. You can also save the descriptions for both *Source* and *Destination Addresses* in the database so that you can select them in the future.




For **J1850-3H (PWM) or J1850-3H (VPWM)** protocols, the **Advanced Configuration** dialog is used to configure *Priority*, *Message Type*, *Source Address*, *Target Address*, *IFR Required* (K bit) and *Addressing* (Y bit) separately. The *Computed ID* automatically gets constructed and displayed in the box. You can also save the descriptions for both *Source* and *Destination Addresses.*

Completing the *Frame Details* will generate the *Computed ID* for the *Header*.

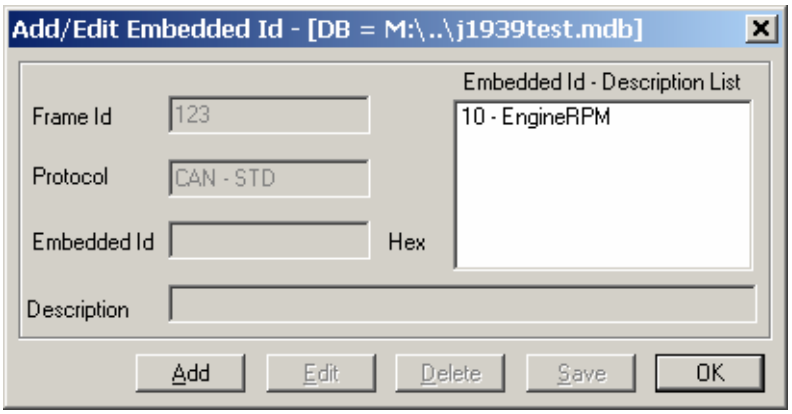
When finished, click **OK** and the *Computed ID* will get updated to the *Frame ID* box of the *Insert Frame* window.

### Add/Edit Embedded (Secondary) ID button

The *Add/Edit Embedded ID* option allows you to enter in interpretations based on the first byte in the data field. You will need to enter in Embedded (Secondary) IDs before entering signals.

**Note:** Embedded IDs is the term used for CAN, while J1850 uses the term Secondary ID.

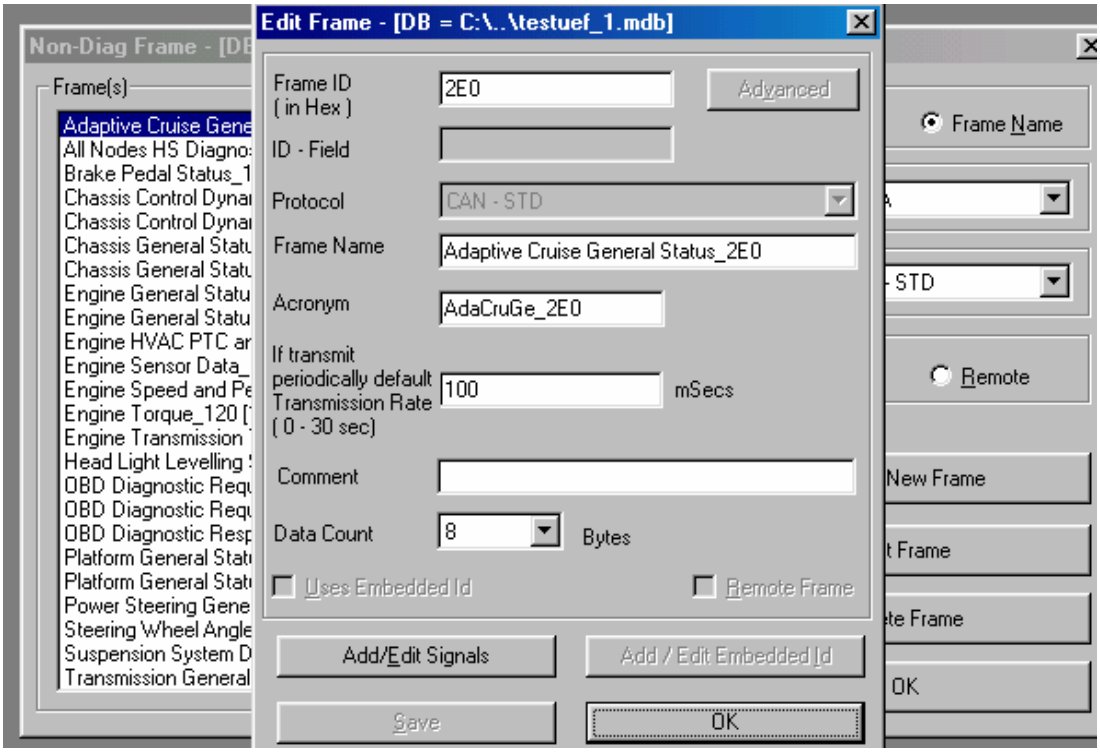
- To enter an embedded or secondary ID, click **Add/Edit Embedded Id** to display the *Add/Edit Embedded Id* dialog.
- Next click **Add**. Enter the hex value for the *Embedded (Secondary) Id* along with a description, then click **Save**. The information will appear in the white box on the right.
- When finished, click **OK** to return to the *Insert Frame* box.




#### 3.3.6.2 Editing an Existing Frame

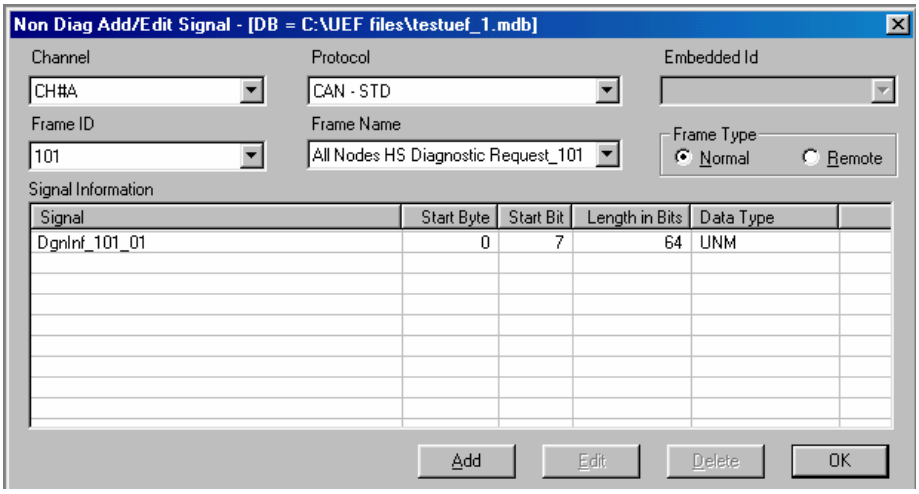
Select the desired frame in the *Frame(s)* window and click **Edit Frame**.

You may now edit the fields as shown. To *Add* or *Edit Signals*, see the next section.




### 3.3.7 Non-Diag. Signal Data

The **Non-Diagnostic Signal Data** feature allows you to view and modify frame information at the signal level. You may access the *Add/Edit Signal* window from the *Database* menu in two ways: select **Non-Diag Signal Data**, or select **Non-Diag Frame Data | Edit Frame | Add/Edit Signals**. The following dialog will appear.



To view the signal list:

- Select the appropriate *Channel, Protocol* and *Frame Id* (*Name*) of the message. The *Frame Name and Frame ID* are associated in the database.

- If you entered in **Embedded (Secondary) IDs** (see section 3.2.8.1) that option will be enabled.

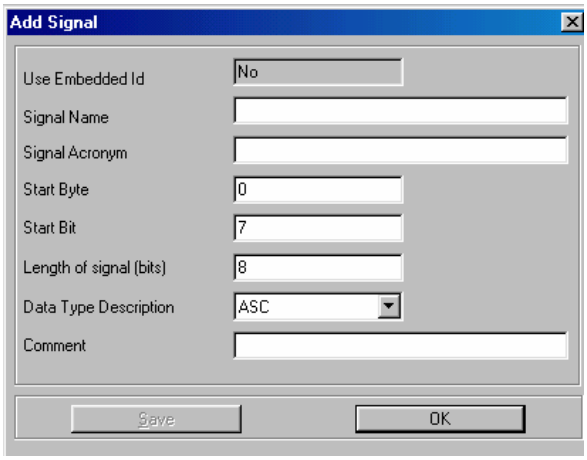
- If *Protocol* is a CAN variant, then the *Frame Type* option will be selectable between a *Normal* or *Remote* frame.

- If you entered Secondary IDs for *J1850-3H (PWM)* or *J1850-3H (VPWM)* networks, the Q and C bit will get created and saved as signals in the database.

To add / edit signals to the list:

- To Add: Click **Add** and the *Add Signal* box will appear.

- To Edit: Select the signal, and click **Edit**. The *Add Signal* box will appear.




You will be prompted to supply the following signal information. The format for the bottom portion of *Add Signal* dialog will vary, depending on the data type you have selected.

| FIELD | DESCRIPTION |
|---|---|
| **Signal Name** | Name of the information. |
| **Signal Acronym** | A shortened description on the signal to be referenced in other applications in the software. |
| **Start Byte** | The byte in which the signal information begins (see *section 3.3.1* for more information). |
| **Start Bit** | The bit in which the signal information begins (see *section 3.3.1* for more information). |
| **Length of signal (bits)** | Number of bits. |
| **Data Type Description** | The list of data types follows. Selection changes here will cause different boxes to appear, prompting for required information. |
| **Comment** | User defined information. |

When you have made all your additions and changes, **Save** the signal configuration.

> **NOTE:** After selecting **Save**, you may be prompted to provide more information (as in the case of a *State-Encoded Decimal* signal for which you need to specify and **Insert** appropriate values and interpretations).

Once you have returned to the **Non Diag Add/Edit Signal** window, you may repeat the procedure outlined above to work with other signals. You may also delete a particular signal by selecting it and clicking **Delete**.

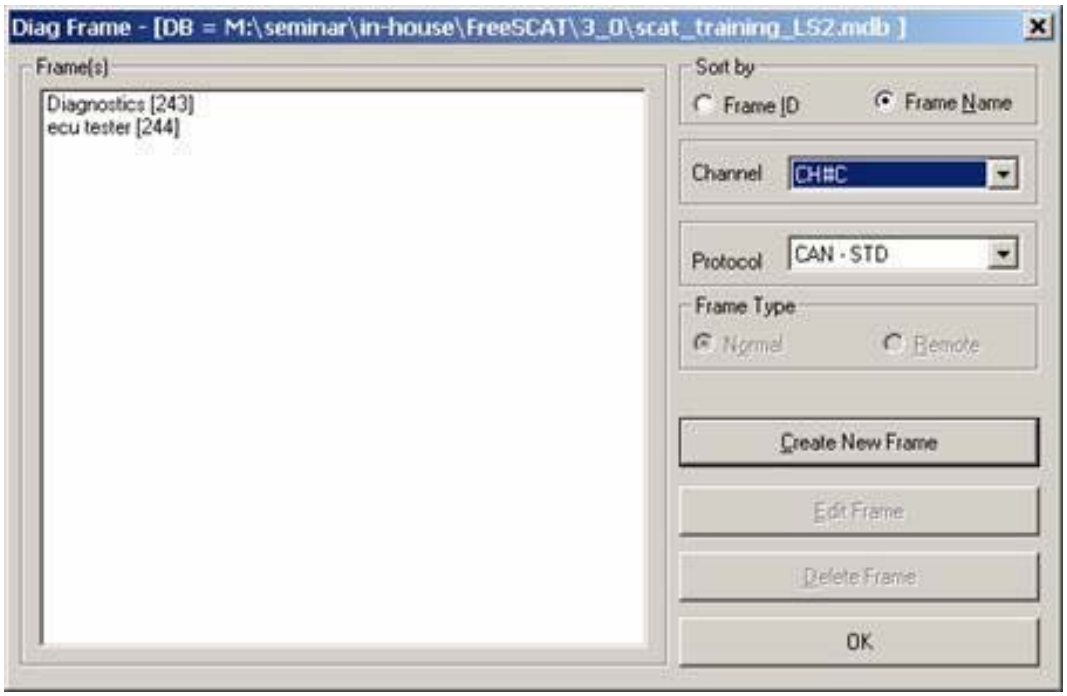
| Data Type Descriptions | | |
|---|---|---|
| **Value** | **Description** | **Example** |
| **BMP** | Bitmapped Picture - A packeted parameter type format in which the parameters have only two logic values. | None. |
| **ASC** | ASCII – one byte represents one text character | 'A' = $41 |
| **BLN** | Boolean – encodes data that contains binary parameters, such as bits or flags | True = 1<br>False = 0 |
| **ENM** | Enumerated – data can take one of several states, such as Day of week or Wiper mode. | $0 = Neutral<br>$1 = Lift<br>$2 = Dive |
| **BCD** | Binary Coded – used to report decimal data in hexadecimal encoded bytes. Only 0-9 characters are used in the upper and lower nibble. | Typically - $25 = 37; BCD - $25 = 25 decimal |
| **SNM** | Signed Numeric – signals are represented in 2's complement. If the most significant bit is set to 1, then the value is negative and the absolute value of the number is found by taking the 2's complement. | Rear Right Door Anticipated Electrical Load (8 bits)<br>Range = -128 to 127 A, E = N*1<br>If decimal value 100 = $64<br>If decimal value (-100):<br>positive value 0110 0100<br>flip bits 1001 1011<br>add one 1001 1100 = $9C |
| **UNM** | Unsigned Numeric – used for continuous range, such as temperature and speed. E = engineering units, N = number of bits to encode. | Accelerator Effective Position<br>E = N* 100/255<br>Chime Volume Request<br>E = N*12.5 + 12.5 |
| **SFP** | Signed Floating Point – representation of floating point arithmetic always includes a leading sign value. | None. |

### 3.3.8 Diag. Frame

You may enter diagnostic frame information at two levels by selecting one of the two available menu options: *Diag Frame Physical Address* or *Diag Frame Functional Address*.

### 3.3.8.1 Diag. Frame Physical Address

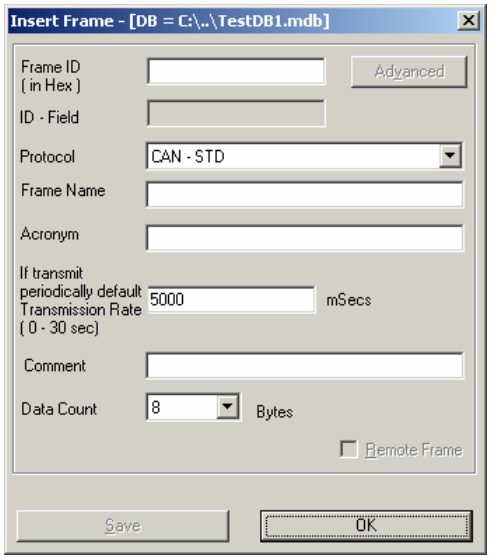
The *Diagnostic Frame Physical Address* option launches the following *Diag Frame* window. This utility is only used to create, edit, or delete the frame IDs used in physically addressed diagnostics. (The diagnostic services are configured under *Diagnostics* | *Setup Diagnostic Configuration*.)




To view or create frames in the *Diag Frame* dialog:

- First select a **Channel** then a **Protocol** to the right of the *Frame(s)* box. The Frame(s) box displays the frames sorted by *Frame ID* or by *Frame Name*.
- To delete a frame from the database, select it in the *Frame(s)* box and click **Delete Frame**.
- To Create and Edit frame IDs, click on the respective boxes in the *Diag Frame* dialog. Make your changes in those boxes and be sure to **Save** them.

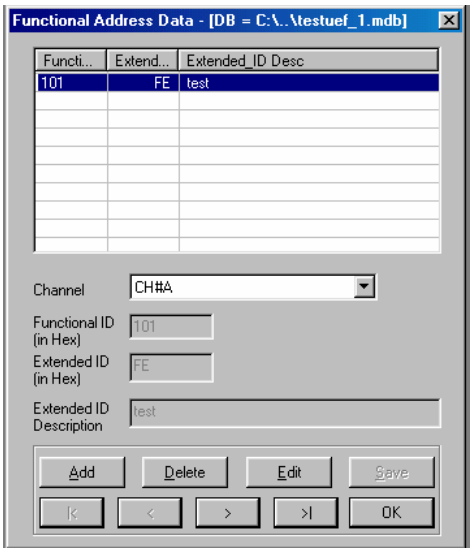
Click the **Create New Frame** button to display the *Insert Frame* dialog.




This permits selecting a frame data count of zero when adding a new frame to the database.

### 3.3.8.2 Diag. Frame Functional Address

This menu option opens the following dialog.



The *Functional ID* and *Extended ID* information listed in this window is used to configure and enable diagnostic services. The table lists all available functional and extended IDs. In the bottom portion of the window, you may *Add, Delete*, or *Edit* entries, (using the corresponding command buttons). You may use the following buttons to move through the entry list.

**|<** **moves to the first (top) entry in the list.**

**<** **moves backward (up) one entry.**

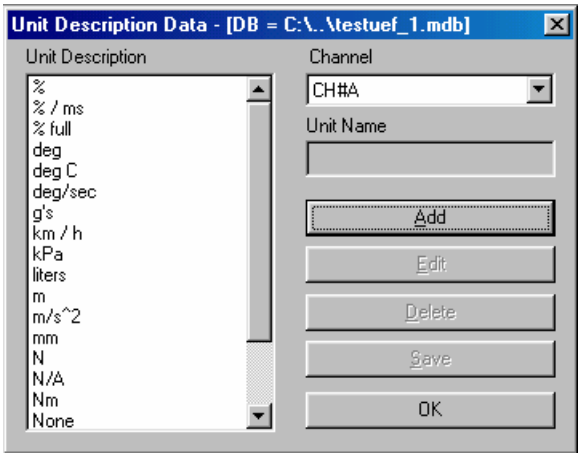
**>** **moves forward (down) one entry.**

**>|** **moves to the last (bottom) entry in the list.**

The editing boxes in the middle portion of the window list *Functional ID* and *Extended ID / Description* values for the entry currently selected. To change these values, click **Edit** and type the new values into the appropriate editing boxes. To save the new values to the database, click **Save**.
To close the window without saving your changes, click **OK** and return to the main Hercules screen.

### 3.3.9 Unit Description

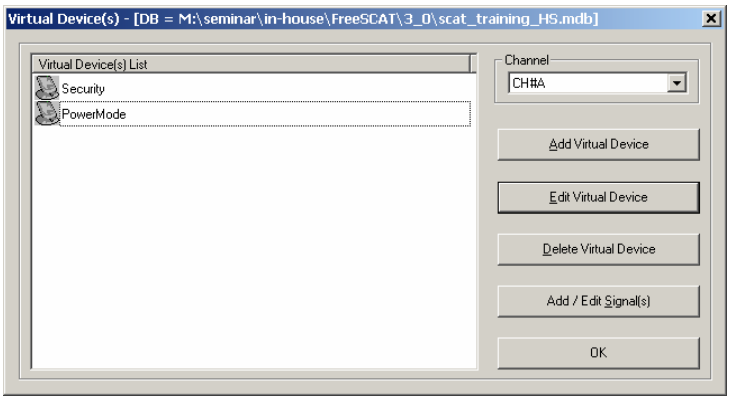
You may customize a menu of unit types from which to select units for individual signals. To do so, select **Unit Description** and the following dialog will appear, listing all available unit types.




To add a new unit type to the list, click **Add**, supplying a *Unit Name* in the box provided, and then click **Save** (or you may click **OK** to exit the window without saving your changes). You may edit or delete a listed unit type by selecting it and clicking **Edit** or **Delete**. Click **Save** to activate your new list configuration and save it to the database. Click **OK** to exit.

### 3.3.10 Virtual Device(s)

Virtual Devices are a GMLAN specific application. This option allows you to view all the signals associated with a specific virtual network in one location. During a UEF import (see section 3.3.5) these signals will be imported to this application as well. Once located here, these signals also become selectable in other applications in the software. The following is the main configuration box
for virtual devices.

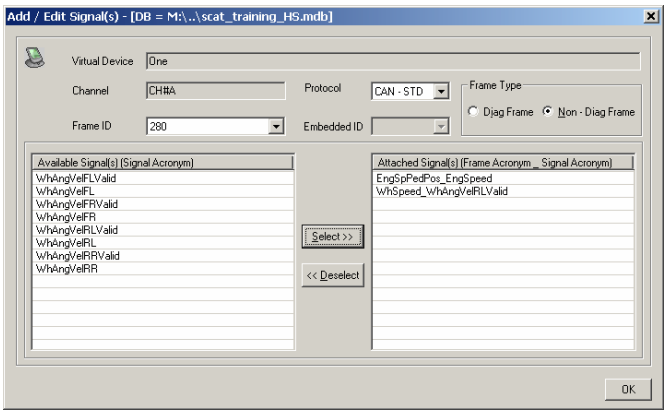



To create a new virtual device:

- Select the Channel to associate with the Virtual Device(s) chosen. You can add, edit, or delete virtual devices, as well as add and edit signals. Once you have made any changes, click **OK** to continue the set-up. When a listed virtual device is selected, the *Edit Virtual Device* button, *Delete Virtual Device* button and *Add/Edit Signal(s)* button will be available
  for use.

To add / edit signals:

- Select the desired Virtual Device in the *Virtual Device(s) List* and click **Add/Edit Signal(s)** to display the following dialog.



- Select the *Protocol* and *Frame ID* to display the list of signals available for the message.
- Select the desired signal in the *Available Signal(s)* list on the left, and click **Select>>**. The signal name is copied to the *Attached Signal(s)* list on the right.
- To delete signals from the list, select the signal name in the *Attached Signal(s)* list on the right and click **<<Deselect**. The signal name is removed from the list.
- Click **OK** when finished.

# 4. Configuration Menu

The Configuration menu lets you select and store configurations for all major Hercules settings and functions. This includes message transmission, reception, filtering, triggering, and hardware settings.

The commands and options in this menu will let you set, modify, and save all Hercules hardware and frame format configurations. If you wish to use a previously saved configuration, you may load it at this time. Select the **File** menu, followed by the **Load Configuration** command to open the appropriate configuration (.her) file. You may create a new set of configurations by following the instructions provided in the sections below.

This section describes each of the features accessed from the *Configuration* menu and lists the steps to set their configurations.

**Once all configurations are set, proceed to Section 5 where you will select Monitors.**

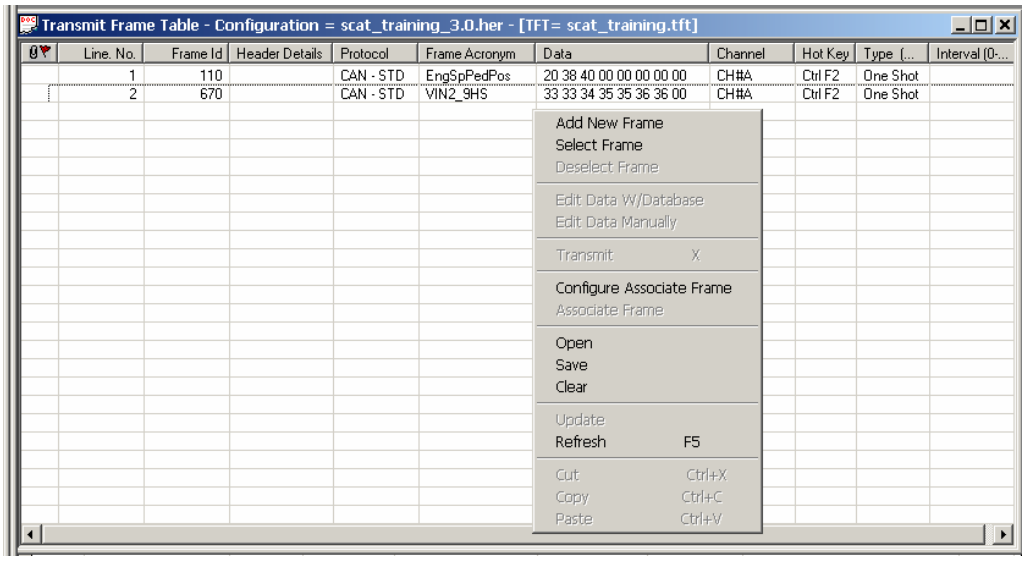
## *4.1 Transmit Frame Table (TFT)*

The *Transmit Frame Table* (TFT) is a list of messages that you may want to send on the network. Many of the other functions utilize the messages listed on the table. It supports two methods of frame transmission: manual and triggered. Manual transmissions (either one-shot or periodic) are initiated by pressing **"hot-key"** combinations on your computer keyboard that are assigned to frames in the *Transmit Frame Table* (TFT). Triggered transmissions occur in response to conditions specified in other Hercules software features, such as the *Frame Responder*.

The *Transmit Frame Table* is used to select and configure database frames for transmission (up to 400 per table).

**NOTE: Only one Transmit Frame Table may be open at one time.**

To access the *Transmit Frame Table*, select the **Configuration** menu, followed by the **Transmit Frame Table** command. When you select this table, a *TxFm* menu item is added to the menu bar, directly to the right of the *Display* menu. It lists the commands needed to format and use the table. You may also right-click in the **Transmit Frame Table** window to access the menu.

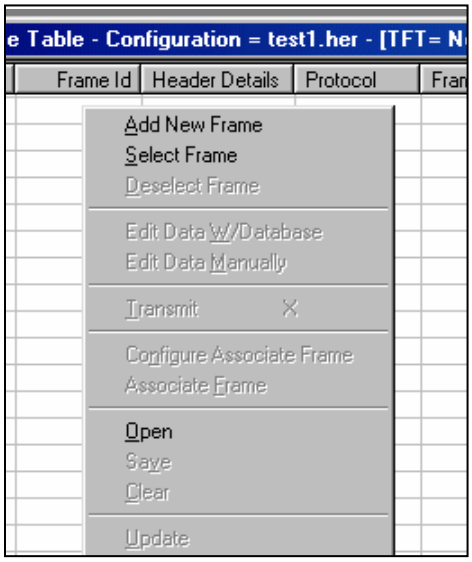



The other options that are available in the menu are *Cut, Copy*, and *Paste*.

### 4.1.1 Selecting frames for transmission

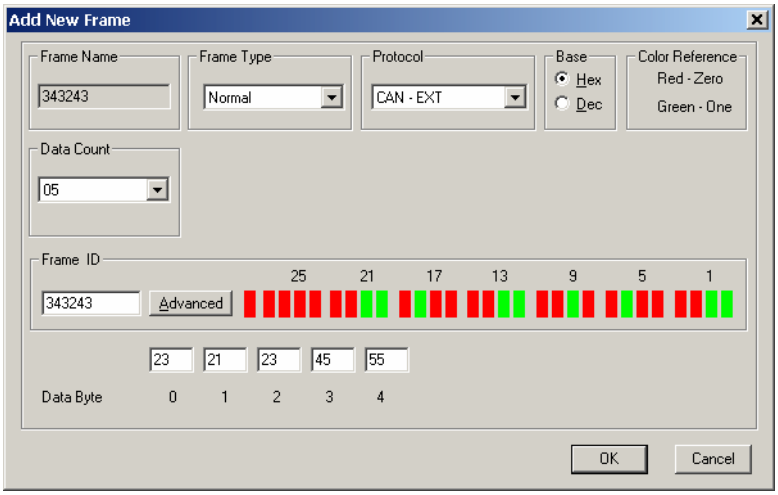
On the *TxFm Table* menu, you may **Open** a previously saved table (.tft file) or **Select** frames for a new table of frames you wish to transmit.

There are two ways to add messages to the *Transmit Frame Table – Add New Frame* and *Select Frame*. **Add New Frame** lets you construct messages from raw hex, while **Select Frame** lets you select messages from the databases associated in Hercules.




Use the following steps to *Add New Frame*.

1. Right-click your mouse on a **blank cell** in the table, or click **Add New Frame** on the *TxFm Table* menu to display the *Add New Frame* dialog.

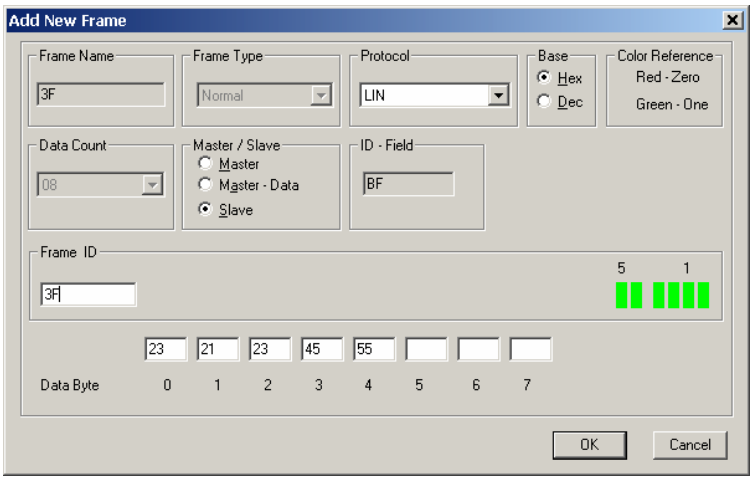



2. Select the appropriate **Protocol** and, if supported, select the **Frame Type**. *Frame Type* is dependent on the module type, and most will only display **"Normal"**. A few exceptions are:

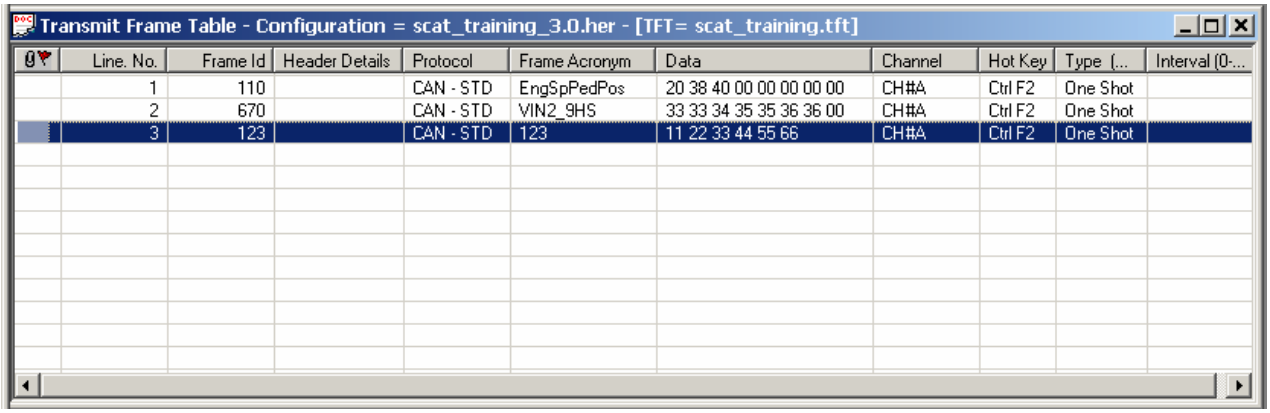
   **DG-CAN-SJA1000** – Normal or Remote message selected as "Remote" will have a flag designator in the left-most column.

   **DG-CAN-82527SW** – Normal or High Voltage.

For the LIN protocol, a box will appear prompting for *Master*, Master-Data or *Slave*. The *Frame ID* will designate the *Data Count*.



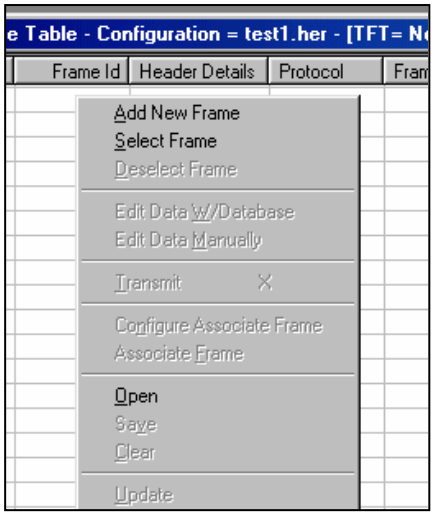

3. Type in the *Data Count*, *Frame ID* and *Data* and click **OK**. You should be returned to the *Transmit Frame Table* window and see your frame added to the list, as shown below. For J1850, CAN-EXT, and J1939 protocols, the **Advanced** button provides assistance in programming the Frame ID (or Header).



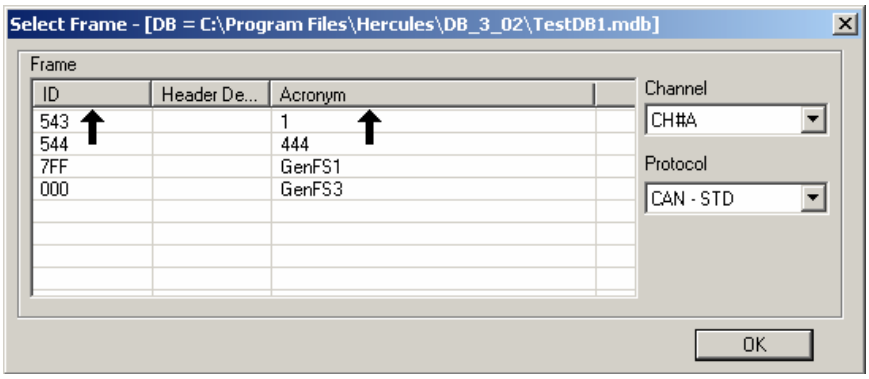

| Line. No. | Frame Id | Header Details | Protocol | Frame Acronym | Data | Channel | Hot Key | Type (... | Interval (0-... |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 110 | | CAN - STD | EngSpPedPos | 20 38 40 00 00 00 00 00 | CH#A | Ctrl F2 | One Shot | |
| 2 | 670 | | CAN - STD | VIN2_9HS | 33 33 34 35 35 36 36 00 | CH#A | Ctrl F2 | One Shot | |
| 3 | 123 | | CAN - STD | 123 | 11 22 33 44 55 66 | CH#A | Ctrl F2 | One Shot | |

4. Repeat steps 1 - 3 for each frame you wish to add to the list. If you wish to delete a particular frame from the table, select that frame's entry; click **Deselect** (on the *Transmit Frame Table* menu). Standard Windows commands – *Cut*, *Copy* and *Paste* are all available.

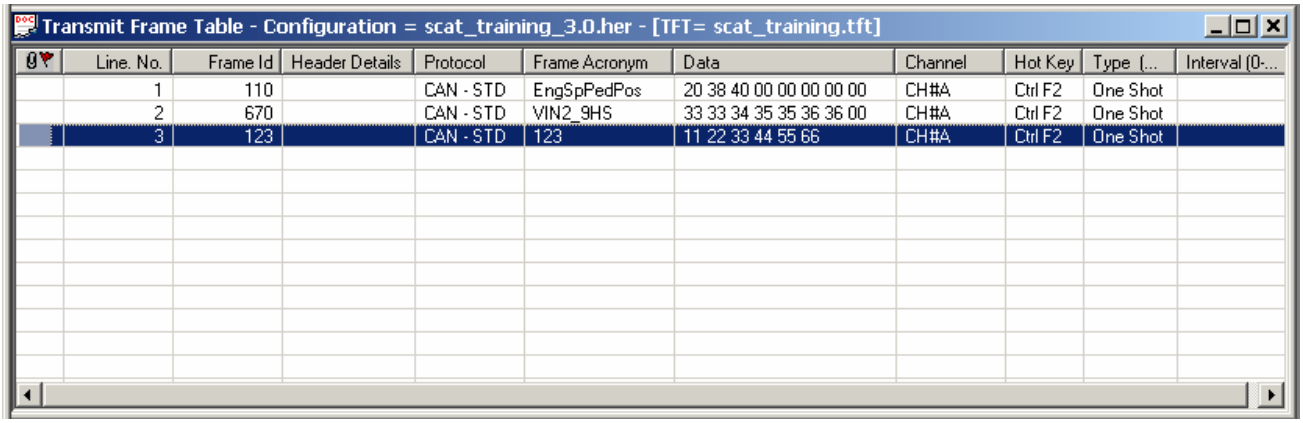
To use *Select Frame*, perform the following steps:




1. Right-click in a blank cell of the table, or click **Select Frame** on the *Transmit Frame Table* menu to display the *Select Frame* dialog. The user can sort content by clicking on the *ID* or *Acronym* column header.




2. First select the *Channel* and *Protocol*, then select the appropriate message and click **OK**. You are returned to the *Transmit Frame Table* window with your frame added to the list, as shown below.

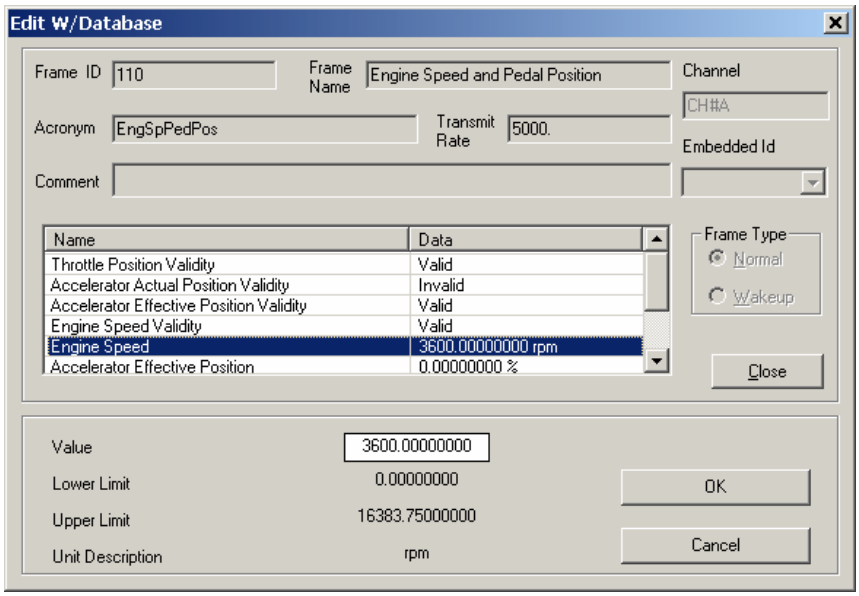



3. Repeat steps 1 and 2 for each frame you wish to add to the list. If you wish to delete a particular frame from the table, select that frame's entry then click **Deselect** on the *Transmit Frame Table* menu.

### 4.1.2 Editing data in frames

Once your message is in the *Transmit Frame Table*, you may specify or edit data values for a particular frame. (If you used the *Add New Frame* option the data may already be complete.) There are two commands to access the data: **Edit Data W/DataBase**, and **Edit Data Manually**.

To access either screen type, select the message, right-click and select the appropriate command. *Edit Data Manually* utilizes the same *Edit Manually* dialogs described in the previous section. *Edit Data W/DataBase* will display the following dialog.

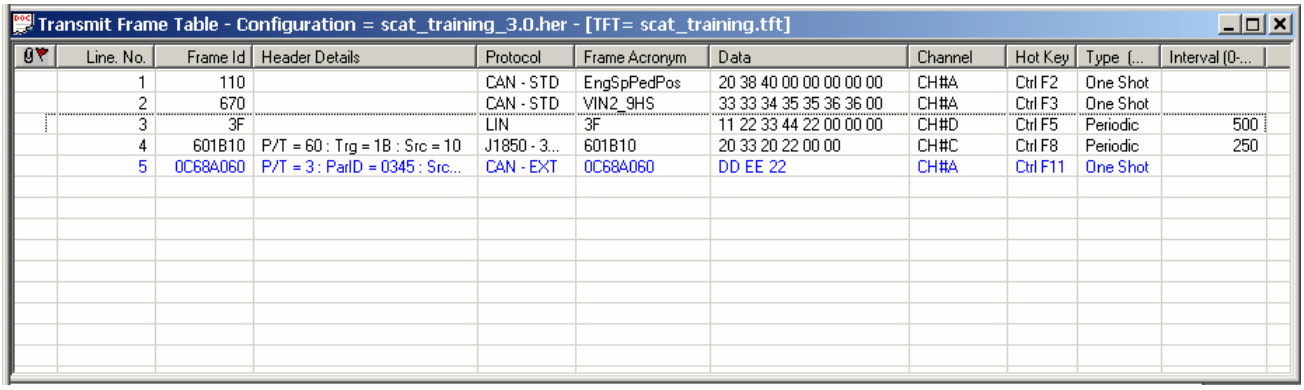


To update data, select the data line and double-click the signal. This will expand the lower part of the dialog with a prompt to enter a new value. Click **OK** to update the field with the new value. Once complete, click **Close** to return to the *Transmit Frame Table*. The data values you just provided will now appear in the *Data* field.

### 4.1.3 Assigning Transmission Channels, Hot Keys, Types

The Transmit Frame Table has two types of information: non-configurable from this screen, and configurable. The non-configurable information was supplied from the previous sections:

- **Line no** – a sequential count of the number of frames
- **Frame Id** – the hex value supplied in set up
- **Header Details** – a breakdown of the Frame Id, dependent on protocol type
- **Protocol** – the network message type
- **Frame Acronym** – translated from the database or a repeat of the Frame Id
- **Data** – see section 4.1.2 and section 4.1.3 for configuration




| Line. No. | Frame Id | Header Details | Protocol | Frame Acronym | Data | Channel | Hot Key | Type (... | Interval (0-... |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 110 | | CAN - STD | EngSpPedPos | 20 38 40 00 00 00 00 00 | CH#A | Ctrl F2 | One Shot | |
| 2 | 670 | | CAN - STD | VIN2_9HS | 33 33 34 35 35 36 36 00 | CH#A | Ctrl F3 | One Shot | |
| 3 | 3F | | LIN | 3F | 11 22 33 44 22 00 00 00 | CH#D | Ctrl F5 | Periodic | 500 |
| 4 | 601B10 | P/T = 60 : Trg = 1B : Src = 10 | J1850 - 3... | 601B10 | 20 33 20 22 00 00 | CH#C | Ctrl F8 | Periodic | 250 |
| 5 | 0C68A060 | P/T = 3 : ParID = 0345 : Src... | CAN - EXT | 0C68A060 | DD EE 22 | CH#A | Ctrl F11 | One Shot | |

The remaining fields may be edited from this screen by clicking on the field and scrolling down to select your preference.

**Channel** – The default Channel setting for frames in this table is CH#A. To change this
setting to another channel, click on the Channel cell for the frame entry you wish to edit. The cell will become a drop box that allows you to select any of the configured channels.

**Hot Key** – A hot-key is a key or key combination on your computer keyboard that you press to initiate some type of functionality, such as using the Start command (F9) to initiate the transmission of a particular frame from the active Transmit Frame Table. You may assign each frame, or a particular group of up to 16 frames, its own hot-key. To do so, select the desired frame in the Transmit Frame Table and select one of the 36 predefined hot-key combinations in the drop box that appears. Frames can also be transmitted by left-clicking the mouse on the selected frame from the Transmit Frame Table during an ONLINE monitoring session.

The default hot-key setting for all frames is *Ctrl-F2*. The following are other available hot-key combinations: *Ctrl-F3* through *Ctrl-F12*, and *Ctrl-A* through *Ctrl-Z* (either uppercase or lowercase letters produce the same action). The hot-key combinations ***Ctrl-B***, ***Ctrl-C*** and ***Ctrl-T*** are reserved; they have already been assigned to Hercules' **"clear buffer"**, **"copy"** and **"trigger on"** functions, respectively. The combination ***Ctrl-F4*** is also reserved.

The following table contains a list of the hot keys used in Hercules.

| No | Hot Keys | Functionality |
|---|---|---|
| 1. | P | Pause |
| 2. | Ctrl + B | Clear Buffer |
| 3. | Ctrl + C | Copy |
| 4. | Ctrl + T | Trigger On |
| 5. | Ctrl + V | Paste |
| 6. | Ctrl + X | Cut |
| 7. | F1 | Help |
| 8. | F9 | Start (go online) |
| 9. | ESC | Stop (go offline) |
| 10. | Ctrl + F4 | Close Window |
| 11. | X (on TFT) | Transmit |
| 12. | F5 | Refresh |
| 13. | Alt + F4 | Close Application |
| 14. | Ctrl + F2 | TFT Hot Keys |
| 15. | Ctrl + F3 | TFT Hot Keys |
| 16. | Ctrl + F5 | TFT Hot Keys |
| 17. | Ctrl + F6 | TFT Hot Keys |
| 18. | Ctrl + F7 | TFT Hot Keys |
| 19. | Ctrl + F8 | TFT Hot Keys |
| 20. | Ctrl + F9 | TFT Hot Keys |
| 21. | Ctrl + F10 | TFT Hot Keys |
| 22. | Ctrl + F11 | TFT Hot Keys |
| 23. | Ctrl + F12 | TFT Hot Keys |
| 24. | Ctrl + A | TFT Hot Keys |
| 25. | Ctrl + D | TFT Hot Keys |
| 26. | Ctrl + E | TFT Hot Keys |
| 27. | Ctrl + F | TFT Hot Keys |
| 28. | Ctrl + G | TFT Hot Keys |
| 29. | Ctrl + H | TFT Hot Keys |
| 30. | Ctrl + I | TFT Hot Keys |
| 31. | Ctrl + J | TFT Hot Keys |
| 32. | Ctrl + K | TFT Hot Keys |
| 33. | Ctrl + L | TFT Hot Keys |
| 34. | Ctrl + M | TFT Hot Keys |
| 35. | Ctrl + N | TFT Hot Keys |
| 36. | Ctrl + O | TFT Hot Keys |
| 37. | Ctrl + P | TFT Hot Keys |
| 38. | Ctrl + Q | TFT Hot Keys |
| 39. | Ctrl + R | TFT Hot Keys |
| 40. | Ctrl + S | TFT Hot Keys |
| 41. | Ctrl + U | TFT Hot Keys |
| 42. | Ctrl + V | TFT Hot Keys |
| 43. | Ctrl + W | TFT Hot Keys |
| 44. | Ctrl + X | TFT Hot Keys |
| 45. | Ctrl + Y | TFT Hot Keys |
| 46. | Ctrl + Z | TFT Hot Keys |

**TFT Hot Keys Type (Periodic/One Shot) / Interval –** Each frame in the *Transmit Frame Table* is identified as a *One Shot* frame or a *Periodic* frame. A *One Shot* frame is transmitted one time when you press its hot-key combination in online mode. Several one-shot frames may be assigned to a particular hot-key combination, in which case all of those frames will be sent when the assigned hot-key combination is pressed.

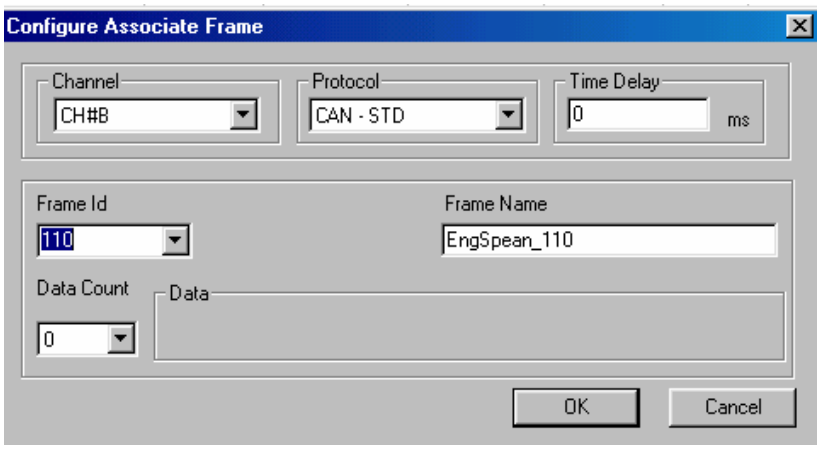
A *Periodic* frame transmission is initiated the same way, but the frame is sent continuously at a user-specified interval. Successive pressing of that hot-key combination will alternately enable and disable the periodic transmission of that frame. In the corresponding Interval cell a pre-defined value from the database will appear. Therefore, click on that value to change it to the interval (in milliseconds) at which you would like the frame to be transmitted. The interval rate must be between 1 and 30,000 milliseconds (30 seconds).

At any point while online, double clicking on a message will transmit it one shot on the network
(regardless of its designation as periodic or one shot).

### 4.1.4 Associate Frame

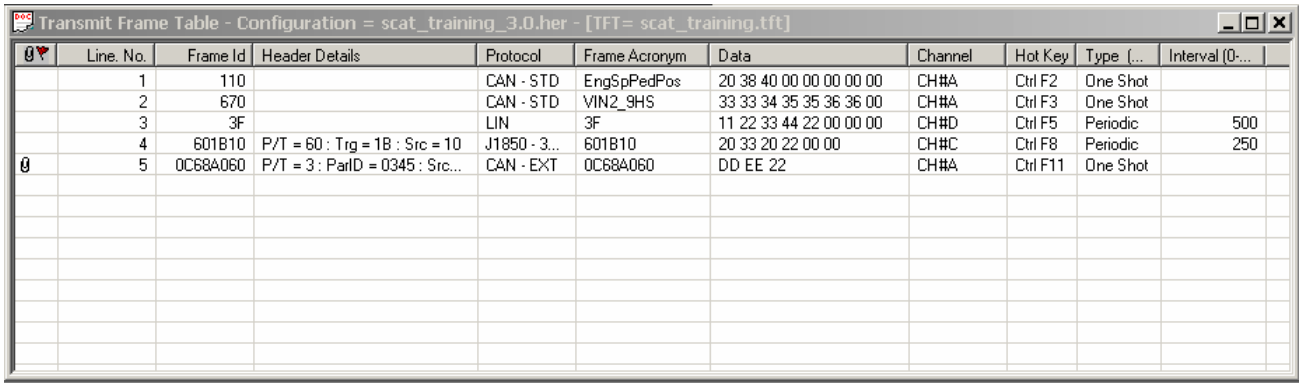
Associate Frame is a function that will let you define a single message that can then be
"associated" to a message(s) in the *Transmit Frame Table*. The *Associate Message* is sent on the network before the message listed in the *Transmit Frame Table*. To use this function:

1. Right-click on your frame choice, and select the **Configure Associate Frame** command to display the following dialog.




2. Select the *Channel* and *Protocol* on which to send the *Associate Frame*. Select the **Frame ID**, **Frame Name** and **Data Count**. You can also delay the time in which the second message is sent by entering in a value for the *Time Delay*. Click **OK**.

3. Next after selecting the message in the Transmit Frame Table, right-click and select the **Associate Frame** command. Once associated, this frame will appear in the *Transmit Frame Table* with a **"paperclip"** icon in its far-left column (see below: the last message has an associated frame). Now whenever the *Transmit Frame Table* message is sent on the network, it will be preceded by the *Associate Frame*.




| | Line. No. | Frame Id | Header Details | Protocol | Frame Acronym | Data | Channel | Hot Key | Type (... | Interval (0-... |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 110 | | CAN - STD | EngSpPedPos | 20 38 40 00 00 00 00 00 | CH#A | Ctrl F2 | One Shot | |
| | 2 | 670 | | CAN - STD | VIN2_9HS | 33 33 34 35 35 36 36 00 | CH#A | Ctrl F3 | One Shot | |
| | 3 | 3F | | LIN | 3F | 11 22 33 44 22 00 00 00 | CH#D | Ctrl F5 | Periodic | 500 |
| | 4 | 601B10 | P/T = 60 : Trg = 1B : Src = 10 | J1850 - 3... | 601B10 | 20 33 20 22 00 00 | CH#C | Ctrl F8 | Periodic | 250 |
| | 5 | 0C68A060 | P/T = 3 : ParID = 0345 : Src... | CAN - EXT | 0C68A060 | DD EE 22 | CH#A | Ctrl F11 | One Shot | |

### 4.1.5 Saving Transmit Frame Table Configurations

Once you have set up your *Transmit Frame Table*, you may save it (under its current file name or as a new file) for future use. To do so, select the **Save** command from the *TxFm Table* menu and specify the desired location for your file. The table configuration will be saved as a .tft file.

### 4.1.6 Transmitting frames

Once in online mode (i.e., once you have pressed the **F9** or clicked **Start** in the *Monitoring* menu), you can initiate a transmission of frames from the Transmit Frame Table by double-clicking that frame's entry in the *Transmit Frame Table*, or by pressing the hot-key combination for the frame(s) you wish to transmit. To do so, hold down the **Ctrl** key and press the other key designated in the hot-key combination of the frame. Another way to transmit a *one-shot* frame is by selecting the frame in the *Transmit Frame Table* and selecting the **Transmit** command from the *TxFm Table* menu (or simply **double-click** the message).

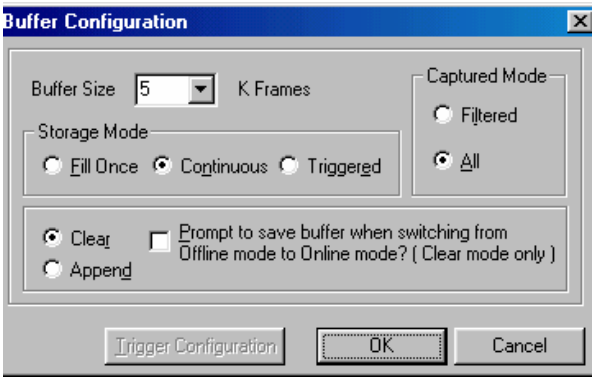
To halt all frame transmission activity and return to offline mode, select the **Stop** command from the *Monitoring* menu, or press the **Esc** key. To halt transmission of one particular frame only, toggle its hot-key combination. This toggling will alternately initiate and halt transmission of that *particular frame*. To resume frame transmission, select the **Start** command from the *Monitoring* menu (or press the F9 key), and press the hot-key combination for the frames you wish to transmit.

### 4.1.7 Transmit Frame Table Online Editing

If you wish to specify or edit data values for a particular frame while online, select the entry of that frame. By selecting the **Edit Data Manually** option, editing of the selected frame data byte will be available. Editing of Frame IDs can be for one-shot frames as well as for the periodic frames provided they are not currently being transmitted. After editing Frame data for a periodic frame that
is currently being transmitted, select the **Update** option from the *TxFm Table* menu to update the data values being transmitted.

## *4.2 Buffer Configuration*

Once you have initiated frame transmission, Hercules uses a buffer to store incoming protocol frames it receives. Several storage modes can be accessed in the *Buffer Configuration* dialog that appears when you select the **Buffer Configuration** command in the *Configuration* menu.




**Buffer Size –** By selecting the appropriate value in this list, you can select the number of frames (between 1K and 999K) from which the buffer will capture its data.

**Captured Mode –** The capture mode determines which frame data is captured for storage in the buffer. You may select one of two modes to capture data during your session:

| | |
|---|---|
| **`Filtered`** | fills the buffer with data according to conditions specified in the *Filter Table;* |
| **`All`** | captures all buffer data, regardless of *Filter Table* settings. |

**Storage Mode –** One of the following three methods may be used to store data in the buffer once it has been captured:

| | |
|---|---|
| **`Fill Once`** | stores frames in the buffer until it is full and then returns the program to off- line mode. (This mode is based upon the buffer size setting.) |
| **`Continuous`** | stores frames on a FIFO (first in, first out) basis until frame transmission is stopped, providing you with the most recent data received on the bus. |
| **`Triggered`** | stores frames continuously (see *Continuous*, above) until a trigger occurs, at which point frames are stored according to the trigger configuration (see section 4.3). |

**Trigger Configuration –** This button will be enabled if you have selected the *Triggered* buffer storage mode; it moves you to the *Trigger Configuration* window (see section 4.3, below), for setting parameters specific to the Triggered buffer storage mode.

**NOTE:** In ONLINE mode, the “hot-key” combination Ctrl-T can be used to (manually) trigger the logging of information in the buffer.

**Clear / Append options –** These options allow you to dictate what happens to the buffer's contents once you have viewed them and wish to return to online mode. By default, this feature is set to **Clear** mode, which means that the buffer is cleared each time you return to ONLINE mode and initiate a new monitoring / transmission session.

You may save a buffer's contents to a .txt file for later viewing, by clicking **Save** in the *Offline Buffer View*. If you select **Clear** mode, you may also request that you be prompted to save current buffer contents any time you attempt to return from the offline to the online mode. By selecting **[√]** the box beside this option (next to "Clear" in the *Buffer Configuration* window), you ensure that you will be reminded to save the current buffer contents before returning to the online mode.

If you prefer that the buffer contents NOT be deleted when you return to online mode, you may request that buffer information from subsequent monitoring (online) sessions be appended to the current buffer contents. In *Append* mode, the buffer's contents are not automatically deleted when you return to online mode. Instead, any information recorded to the buffer once you return to online mode is appended to the end of the *Offline Buffer View* display.

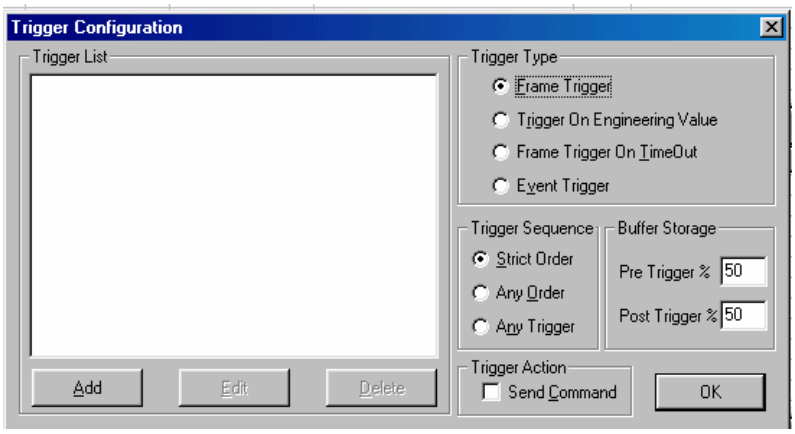
You may also clear the buffer manually by selecting the **Clear Buffer** (CTRL-B) command in the *Monitoring* menu, or click **Clear Buffer** on the main toolbar.

## *4.3 Trigger Configuration*

The *Trigger Configuration* menu is only accessible if you have selected the **`Triggered`** buffer storage mode (see section 4.2, above). Once you have selected the *Triggered* mode, you will need
to define the conditions that will trigger the storage of information in the buffer. If, in online mode, a received frame's pattern matches what is defined by the trigger configuration you have specified, the trigger will occur and initiate the storage of information to the buffer or transmit a command on a specified channel.

Once triggers occur based on the sequence specified, and the buffer has captured the frames according to the *pre* and *post* percentage values, the software automatically switches into offline mode.

You may access the *Trigger Configuration* dialog by selecting the **`Trigger Configuration`** command from the *Configuration* menu or in the *Buffer Configuration* window. The following dialog will appear:




### *Trigger Type*

**Frame Trigger –** stores frames continuously until a specified frame occurs, at which point frames are stored according to the pre and post trigger percentages.

**Trigger on Engineering Value –** stores frames continuously until a specified frame, set at engineering values or range specified for a signal, occurs, at which point frames are stored according to the pre and post trigger percentages.

**Frame Trigger On TimeOut –** stores frames continuously until a trigger occurs. Once the trigger occurs, the trigger waits for the specified amount of time. If another message occurs on the bus, which fits the trigger configuration, then the trigger timer is reset and the buffer will continue to fill. Once the frame has not appeared within the timeout value then the frame trigger on timeout will occur.

**Event Trigger –** stores frames continuously until a specified Event occurs, at which point frames are stored according to the pre and post trigger percentages.

### *Trigger Sequence*

You can specify *Strict Order / Any Order / Any Trigger* condition for the set of triggers that are configured. You can change the order of the configured triggers by using the **Cut**, **Copy**, and **Paste** commands provided through the short-cut menu.

**NOTE:** Paste occurs above the selected item.

**Strict Order –** If selected, all the trigger conditions in the trigger list must satisfy the order they have been specified, then only Hercules should indicate the trigger. It is an AND condition for all triggers with the order specified.

**Any Order –** If selected, the trigger conditions for all the configured triggers must satisfy in any order. Then, Hercules should trigger. This is an AND condition for all triggers, but no order is specified.

**Any Trigger –** If selected, Hercules should trigger if any one of the trigger conditions is satisfied. It is an OR condition for all triggers.

### *Buffer Storage*

In triggered storage mode, buffer storage space is apportioned according to the following parameters:

**Pre Trigger % –** percentage of the buffer to be reserved for storage of frames received before a trigger occurrence.

**Post Trigger % –** percentage of the buffer to be reserved for storage of frames received after a trigger occurrence.

### *Trigger Action*

When the **Send Command** option has been selected, Hercules will extend the dialog to display additional data entry fields so you can specify which Gryphon command to send to the hardware. The following Gryphon commands are supported (for more information on these commands, see the *Gryphon Hardware and Communication Manual*):

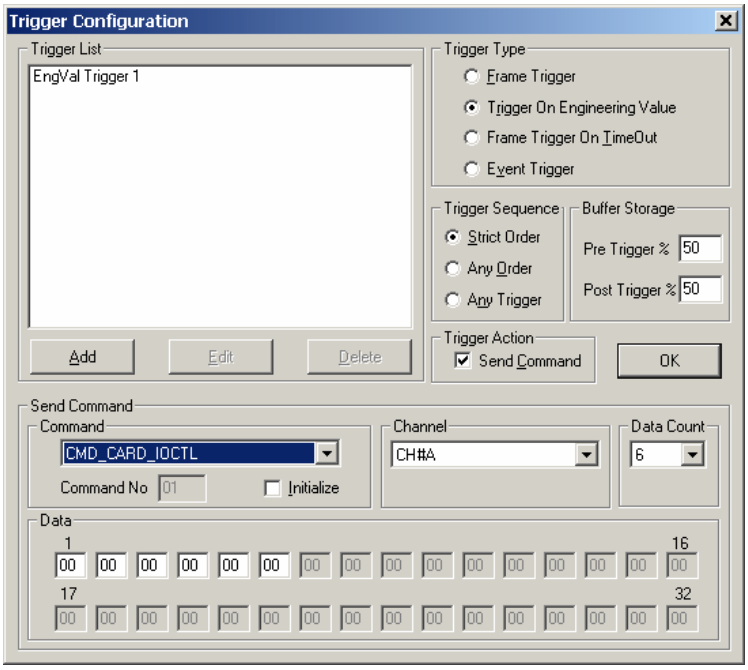
**CMD_INIT –** used to initialize the specified channel.

**CMD_CARD_IOCTL –** used to access generic I/O functions and channel specific I/O functions.

**CMD_CARD_SET_SPEED –** used to establish the speed characteristics of the specified channel.

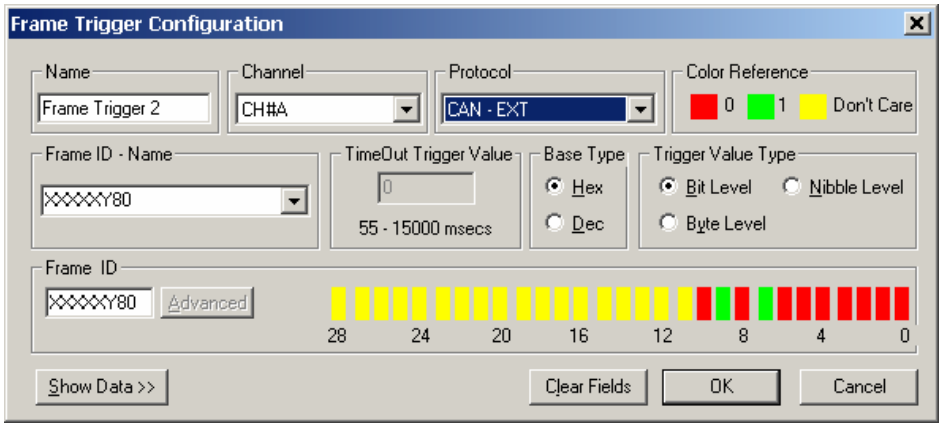
**OTHER –** used to specify a command ID other than one of those listed above. Specify the *Command Number* and *Channel* on which the COMMAND has to be sent. Add data to the COMMAND in the *Data* section (refer to Gryphon Manual for COMMANDS) by first specifying the *Data Length* in the combo box. Data Length varies from 0 to 32 bytes with respect to the COMMAND that is selected for transmission.

### 4.3.1 Frame Trigger (On TimeOut) Configuration




*Frame Trigger* and *Frame Trigger on TimeOut* have the same configuration screen, except one field – *TimeOut Trigger Value*. Triggers occur on the specified Frame ID or have the ability to identify specific bits or nibbles in a selected signal and determine whether they meet the user-specified conditions (=, <, >, <>, <=, >=) necessary for the trigger to occur.

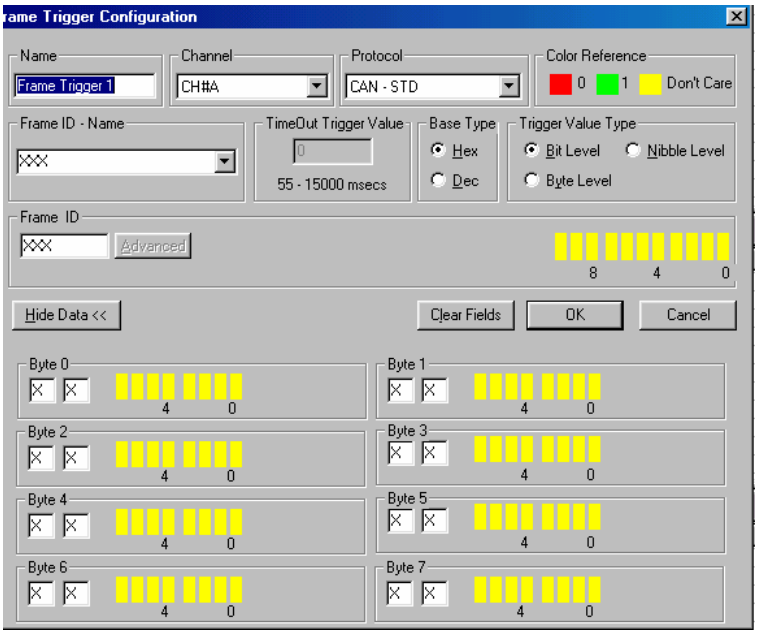
For *Frame Trigger on TimeOut*, the trigger does not occur as long as the defined trigger message is continuously received with the specified timeout. Once the frame does not arrive during the time specified, then the trigger is set.



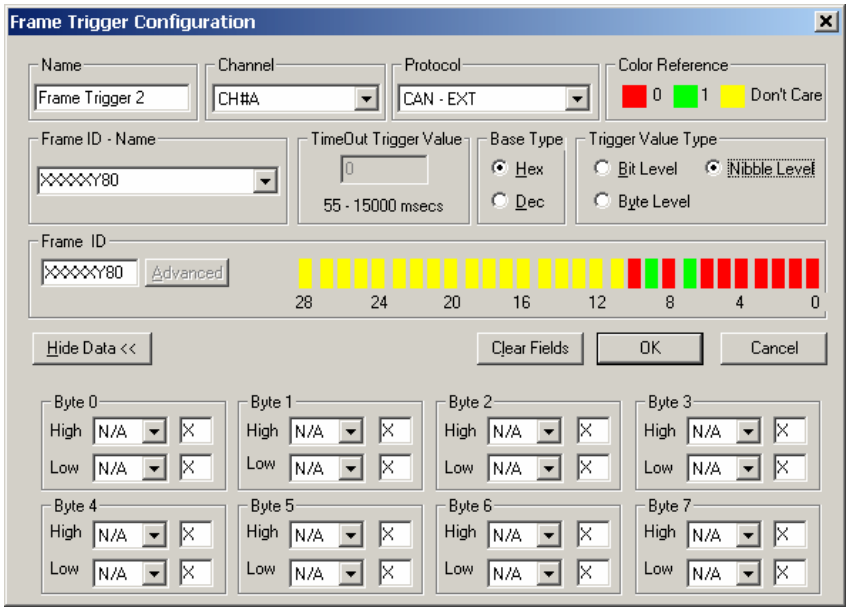
- **Name** – user defined name for the trigger.
- **Channel** – designated trigger-causing-frame channel, must be currently configured.
- **Protocol** – the supported protocols as supported by the Channel type.
- **Frame ID-Name** – selects identifier from the database.
- **TimeOut Trigger Value** – the time in milliseconds to set the trigger if the trigger message does not re-appear. This is enabled only for Frame Trigger On TimeOut.
- **Base Type** – specify hexadecimal (HEX) or decimal (DEC) format for window information.
- **Trigger Value Type** – within this function there are three types of trigger for the data: Bit Level, Nibble Level and Byte Level. They are explained below.
- **Frame ID / Advanced** – allows you to specify a frame ID value (for a trigger-causing frame) manually, either by entering a number into the (white) boxes on the left, or by shading
(clicking) the corresponding bit boxes to their right. The *Advanced* button is made available to construct the identifier / header for specific network types.
- **Show Data / Hide Data** – clicking this button expands the window to include data boxes to specify data values in manually, allowing you to define triggering conditions. The display will vary depending on the *Trigger Value Type* selected.

**For the LED-type boxes, red indicates a '0', green indicates a '1', and yellow indicates a 'don't care'.**

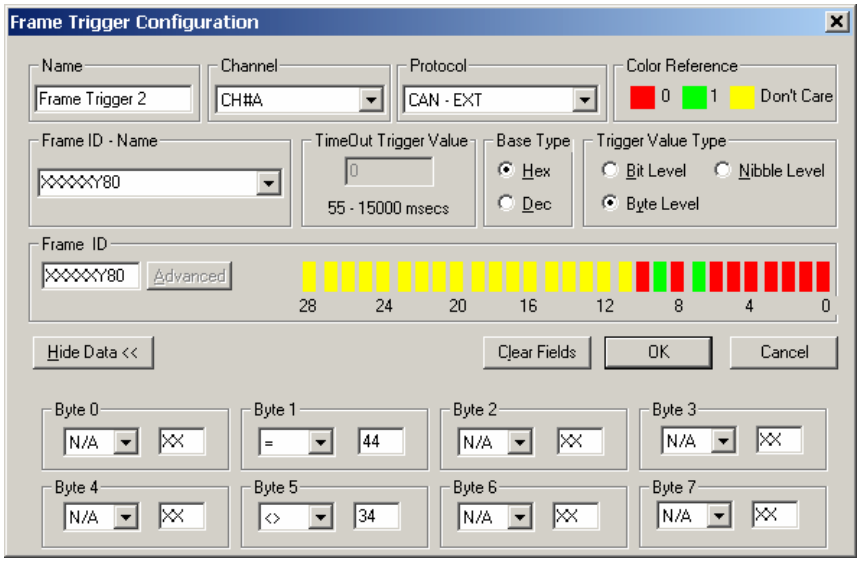
**Bit Level** – allows you to select values for individual bits




**Nibble Level** – allows you to determine whether data meets user-specified conditions (=, <, >, <>, <=, >=) necessary for causing the trigger to occur. Individual operators are available for each nibble.

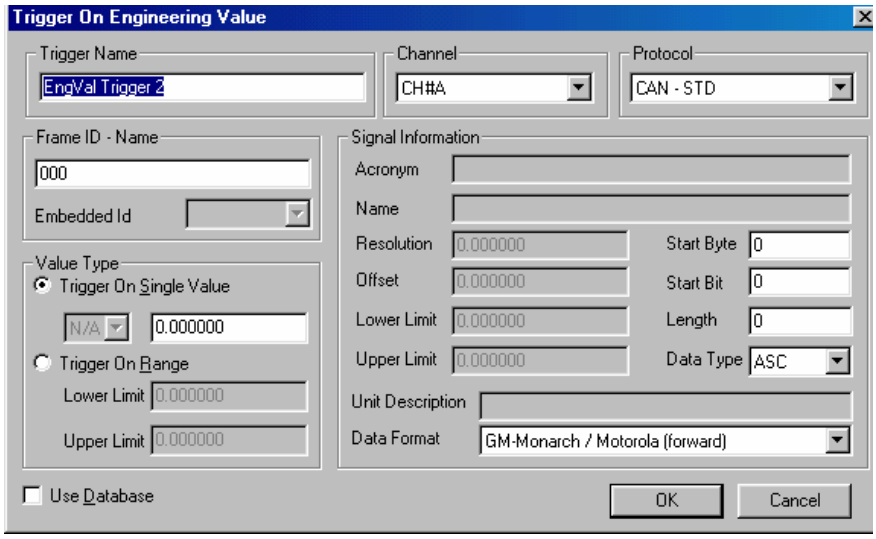


**Byte Level** – allows you to determine whether data meets user-specified conditions (=, <, >, <>, <=, >=) necessary for causing the trigger to occur. Individual operators are available for each byte.



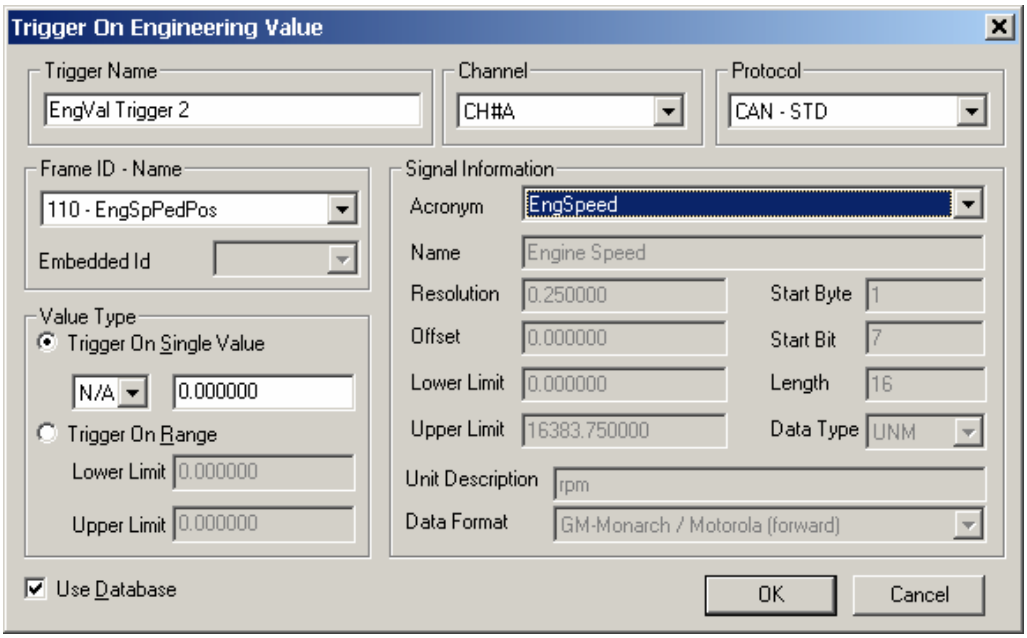

## 4.3.2 Trigger On Engineering Value Configuration

*Trigger On Engineering Value* lets you enter engineering values to set the trigger. The values can be accessed from the database or added manually. If this trigger type is selected the following dialog is displayed.



- Enter in the *Trigger name*, *Channel* and *Protocol*.
- In the bottom left corner select **Use Database** for **on** (selected) or **off** (not selected).

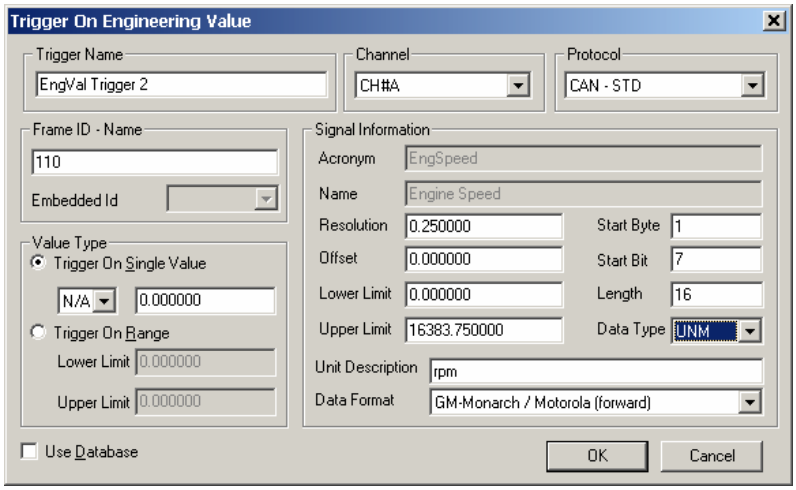
### *Use Database*




- Select the **Frame ID – Name** and **Acronym** (under *Signal Information*). Most of the information under *Signal Information* will not be accessible, but displays the information about that signal.

- Under *Value Type* select **Trigger On Single Value** or **Trigger On Range**. If *Trigger On Single Value* is selected, choose your operand and enter the value. If *Trigger On Range* is selected, enter the values for the **Lower Limit** and **Upper Limit**.

***Use Database Unchecked (not selected)***

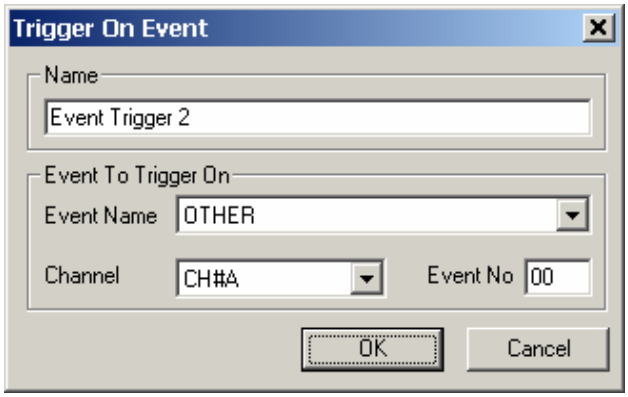



- Select the **Frame ID – Name** and choose your **Data Type** (under *Signal Information*).
  Depending on the *Data Type* selected, different options will become available. Enter appropriate information for the data type.

- Under *Value Type* select **Trigger On Single Value** or **Trigger on Range**. If *Trigger On Single Value* is selected, choose your operand and enter the value. If *Trigger On Range* is selected, enter the values for the **Lower Limit** and **Upper Limit**.

### 4.3.3 Event Trigger

For *Event Trigger*, you can select one of several events to use for your event trigger. The following dialog is the configuration screen for this trigger. You need to create a user defined *Name*, select the *Event to Trigger On*, then select the *Channel*.



The following events are supported:

- Bus OFF
- Bus WARN
- Bus OK
- Bus Form Error
- Wakeup mode
- CRC Error
- RX Overflow
- ACK Error
- Bit-1 Error
- Bit-0 Error
- OTHER
- ANY

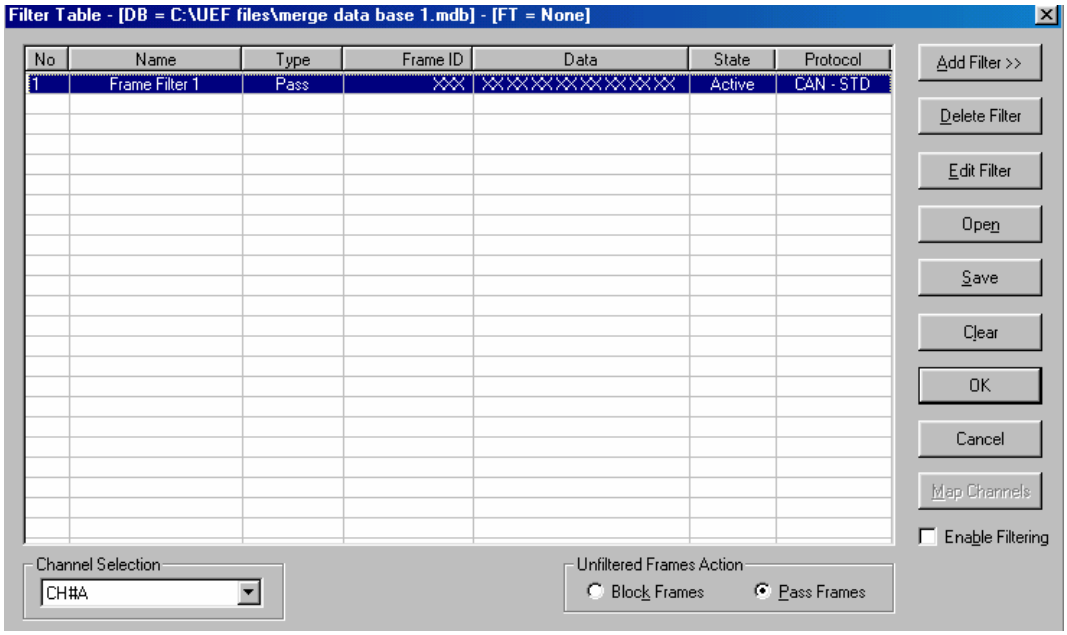
If **OTHER** is selected, an event number must be supplied in the *Event Number* box.

## *4.4 Hardware Configuration*

Once you have started up the Hercules program and selected a database, and before you attempt to configure your *Transmit Frame Table* or other Hercules features, you should check to see that the appropriate channels have been enabled and configured properly – Hardware Configuration is located in section 3.2. This step is assumed to already have been completed by the time you get to this point.

## *4.5 Filter Table*

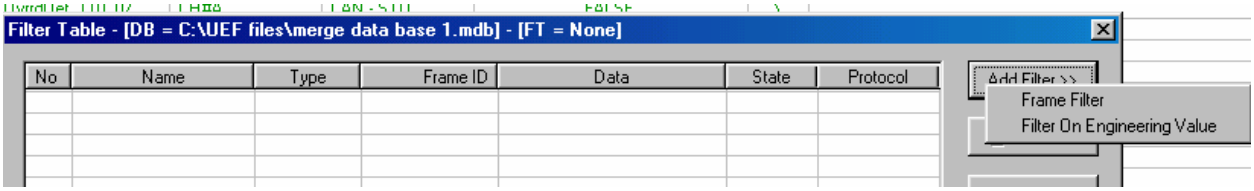
When you are in filter mode (i.e., when you have selected **`Filter ON`** from the *Filter Mode* menu), the *Filter Table* governs frame traffic in Hercules. All features of Hercules are dependent on the passage and blockage of received frames as dictated in this table. Up to 50 frames per channel can
be listed in the table; selection and configuration of these frames are described in the following sections. The *Filter Table* allows you to add, delete and edit filters, along with opening and saving *Filter Table* files. By selecting the **Configuration** menu, followed by the **Filter Table** command, the following table is displayed.



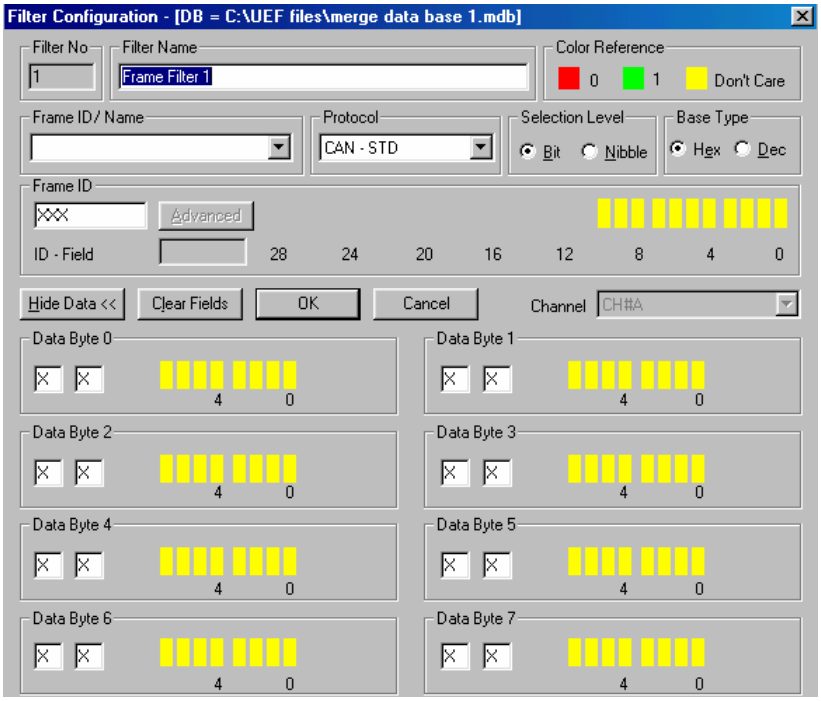

### 4.5.1 Adding to the Filter Table

Once in the *Filter Table* dialog, you have the option of opening a previously saved table configuration (click **Open**), or creating one manually.

To add filters to the table, first make your Channel Selection (in the lower left-hand corner of the window). Then click Add Filter (in the upper right-hand corner of the window). The following popup menu will appear.



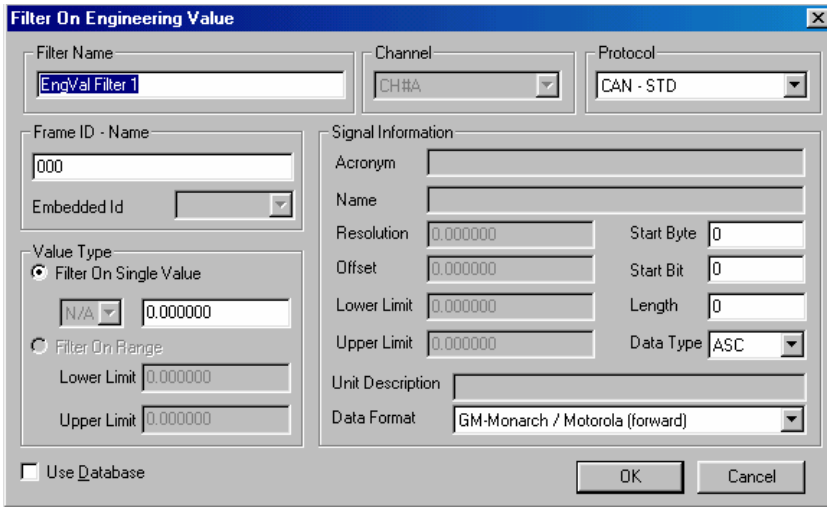

Selecting *Frame Filter* will prompt you to put the information in raw hex value, while *Filter on Engineering Value* allows selection of information from the database. If *Frame Filter* is selected the following dialog will appear.



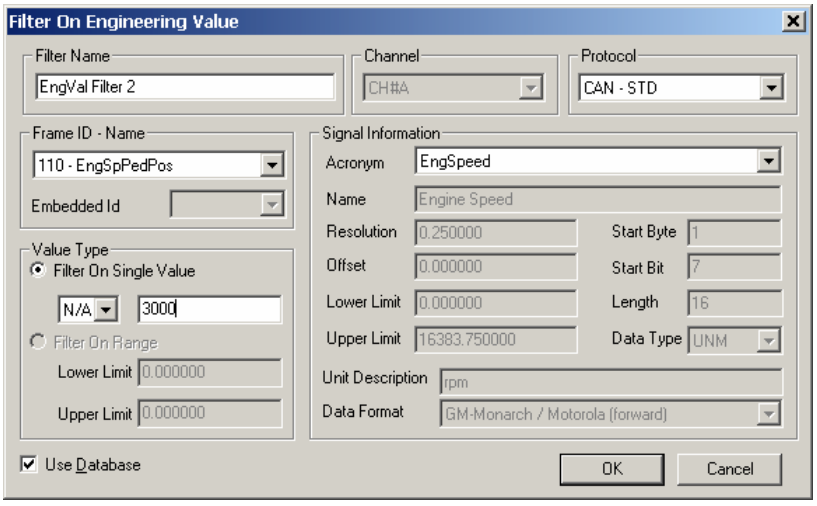

- **Filter Name** – user defined name for the trigger.
- **Frame ID / Name** – selects identifier from the database.
- **Protocol** – the supported protocols as supported by the Channel type.
- **Selection Level** – selects how data is filtered – bit or nibble.
- **Base Type** – specify hexadecimal (HEX) or decimal (DEC) format for window information.
- **Frame ID / Advanced** – lets you specify a frame ID value (for a trigger-causing frame)
  manually, either by entering a number into the (white) boxes on the left, or by shading
  (clicking) the corresponding bit boxes to their right. The Advanced button is made available to construct the identifier / header for specific network types.
- **Show Data / Hide Data** – clicking this button expands the window to include data boxes to specify data values in manually, allowing you to define triggering conditions. The display will vary depending on the Base Type selected.

**For the LED-type boxes, red indicates a '0', green indicates a '1', and yellow indicates a 'don't care'.**

For *Filter on Engineering Value*, the following dialog will appear. You will have the option of using the database for quick access to the information, or to enter in the encoding data manually.

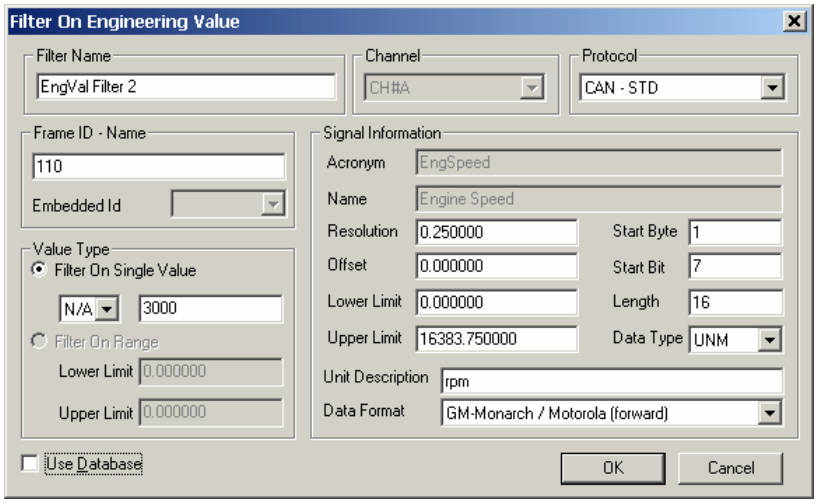



### *Use Database*



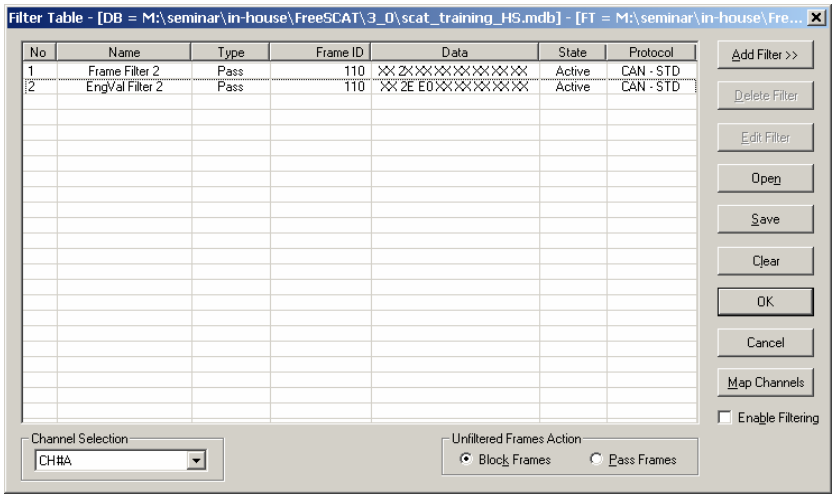

- Label the filter under **Filter Name**. Select the **Protocol.**
- Select the **Frame ID – Name** and **Acronym** (under Signal Information). Most of the information under *Signal Information* will not be accessible, but displays the information about that signal.
- Under *Value Type*, **Filter On Single Value** should be selected. Choose your operand and enter the value. Click **OK** to return to the Filter Table.

### *Use Database Unchecked (not selected)*




- Label the filter under **Filter Name**. Select the **Protocol**.
- Select the **Frame ID – Name** and choose your **Data Type** (under *Signal Information*). Depending on the *Data Type* selected, different options will become available. Enter the appropriate information for the data type.
- Under Value Type **Filter On Single Value** should be selected. Choose your operand and enter the value. Click **OK** to return to the *Filter Table*.

## 4.5.2 Other Filter Table Configurations



Use this window to delete or edit any entered filters, open filters, save filters, clear filters, or **Map Channels**. Once you have generated a list of filters in the *Filter Table*, specify if you want the table to **Block** or **Pass** any frames not meeting conditions specified in your *Filter Table* entries.

In addition, you should verify the information in the following fields, for each filter you have entered in the table.

**Type**

Click on an entry in this column and select your preferences on the list that appears to identify the filter as a **Pass** filter or a **Block** filter. If you identify the filter as a **Pass** filter, all frames that meet the criteria you have specified in that table entry will have permission to pass through the filter. If you identify the filter as a **Block** filter, all frames meeting the criteria will be blocked by the filter and not allowed to pass through for display or analysis.
(The default *Filter Type* setting for individual frames is **Pass**.)

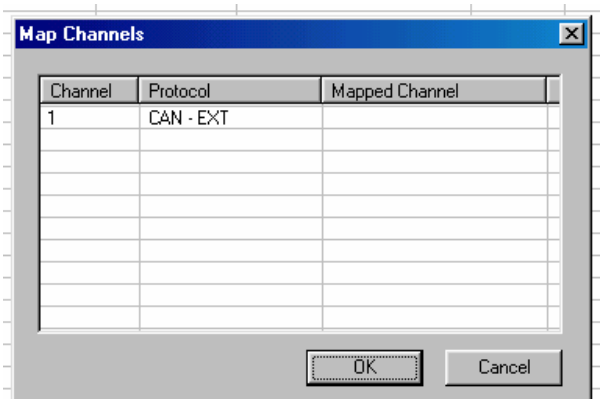
**State**

The default setting for the state of frames listed in the *Filter Table* is always *Active*. However, if you wish to deactivate any frame filter(s) for a particular monitoring session, you may do so by clicking each relevant frame's *State* column entry and selecting **Inactive** in the list that appears. If you have deactivated a particular filter, it will be ignored once you are performing monitoring in **On Filter** mode; all *Active* filters will be honored.

If you wish to delete a filter from your *Filter Table*, you may do so by selecting it and clicking **Delete Filter**. Only ONE filter table may be active at any given time.

For each filter, the values for both the *Type* and *State* fields can be changed. Click on the Filter and field you wish to configure:

The *Map Channels* dialog realigns filters to channel types, only after opening a filter file (whereas Buffer Maps only work after opening buffer (.rft) files). You can choose this option if you want to work with either a filter table file that has been created with different hardware configuration or to modify your filter table if you have chosen different hardware configuration.



### 4.5.3 Saving and Loading Filter Table Configurations

Once you have opened or created a Filter Table, you can save it (under its current file name or as a new file) for future use. To do so, click Save in the far right portion of the screen, and specify the desired name and location for your table. The table configuration is saved as an .rft file. The Open button will load that table for use in future monitoring sessions.

### 4.5.4 Enabling and disabling the filter mechanism

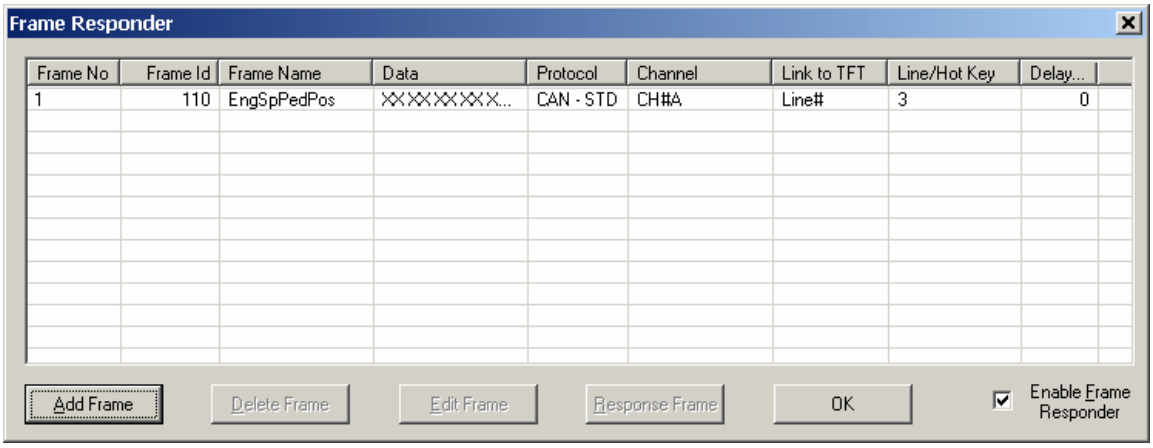
During a monitoring session, you can turn the filtering mechanism **ON** or **OFF**. You may select ( ; ) or clear (†) the *Enable Filtering* box in the *Receive Frame Filter Table* window, or you may click the appropriate selection on *the Filter Mode* menu.

When the *Filter Table* is enabled (i.e., in **Filter ON** mode) any other monitor screens will receive frames only after being processed by the filter table. This means that certain database frames, although available for selection in particular monitoring modes, will not appear in those monitors if they are subject to blocking by active filters.

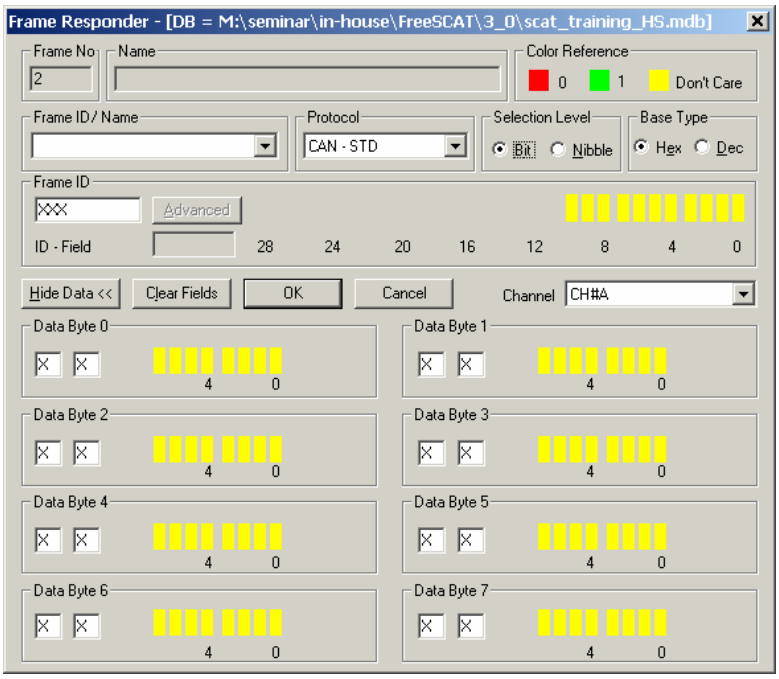
The Filters may be activated or deactivated while online, by selecting **Filter Mode** menu, followed by the **Filter ON/Filter OFF** command or clicking **Filter Enable** on the main toolbar.

## *4.6 Frame Responder*

The Frame Responder triggers a single or multiple frame transmission(s) in response to a received frame meeting certain user-specified criteria. When the conditions (up to 32) specified for a particular received frame are met, any associated response frames are transmitted through their respective hot-key combinations. Select the **Configuration** menu, followed by the **Frame Responder** command to display the *Frame Responder* dialog.



1. You can create a hot-key or line-number link to any frame listed in the active *Transmit Frame Table*. To do so, identify desired receive frame conditions in the *Frame Responder* table by clicking **Add Frame** and configuring the following items.




- **Protocol** – the supported protocols as supported by the Channel type.
- **Section Level** – selects how data is filtered – bit or nibble.
- **Base Type** – specify **HEX** (hexadecimal) or **DEC** (decimal) format for window information.
- **Frame ID / Advanced** – allows you to specify a frame ID value (for a trigger-causing frame) manually, either by entering a number into the (white) boxes on the left, or by shading (clicking) the corresponding bit boxes to their right. The *Advanced* button is made available to construct the identifier / header for specific network types.
- **Show Data / Hide Data** – clicking this button expands the window to include data boxes to specify data values in manually, allowing you to define triggering conditions. The display will vary depending on the *Base Type* selected.

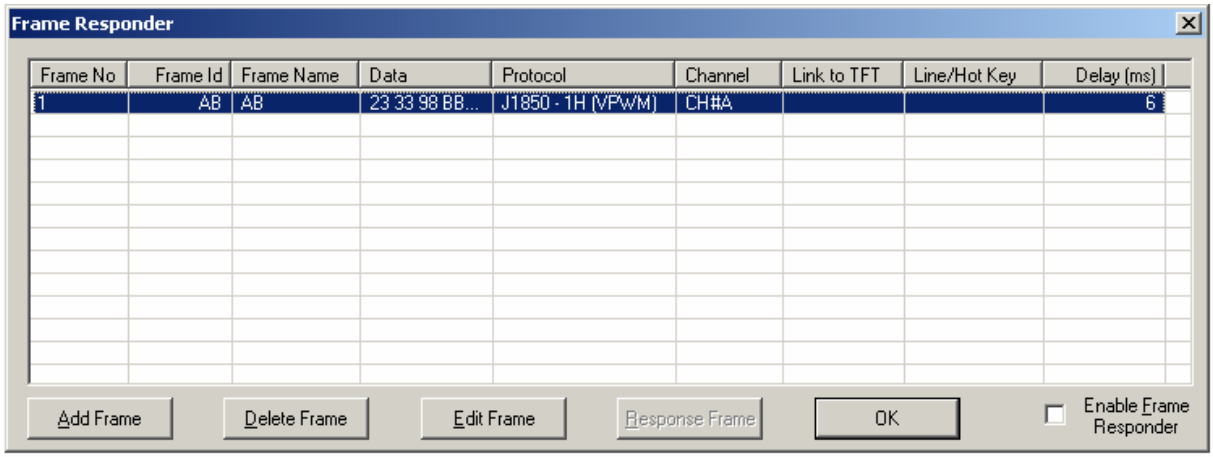
**For the LED-type boxes, red indicates a '0', green indicates a '1', and yellow indicates a 'don't care'.**

2. In the Frame Responder Table, select the **Channel** to receive the message on by clicking in the *Channel* field and scrolling down to your selection.

3. Click in the **Link to TFT** field. Your choices are: **Line#** or **HotKey**. If you select *Line#*, only one message will be sent as a response. If you select *HotKey* then all messages on the TFT linked to that hotkey will be sent as a response.

   **NOTE:** Frames designated as "periodic" will transmit as periodic.

4. To enter the designated hot-key or line number of the response message for transmission, select frame and click Response Frame. This will display the following dialog.



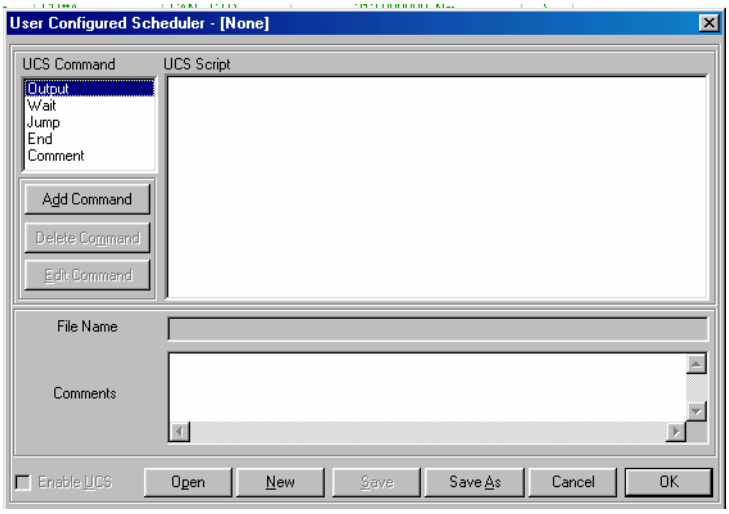

Select the desired item and click **OK** to return to the *Frame Responder* dialog.

5. If desired, you may enter a delay from 0 to 30,000 ms. The delay value is internally converted into an integer multiple value and rounded up in multiples of 10. For example, entering a '7' is internally converted to '10'. An '11' is converted to a '20', and so on.

6. To activate the configured Frame Responder for an online monitoring session, you must enable it by selecting the **Enable Frame Responder** check box in this window or in the *Global Options* window (accessed from the bottom of the *Configuration* menu).

## *4.7 UCS (User-Configured Scheduler)*

The User Configured Scheduler (UCS) is a feature that transmits frames from the active Transmit Frame Table (TFT) as instructed by a user-defined sequence of commands. Up to 300 command lines can be included in a UCS file. The following operations are supported by the UCS.




**Output** – Used to identify a frame for transmission, specifying the number of times you
would like it sent and specify a transmission rate (in milliseconds). See section 4.7.1.

**Wait** – Used to define a delay between preceding and subsequent operations (command lines). See section 4.7.2.

**Jump** – Used to specify a jump to another command line (Output, Wait, Jump, or End)
identified by the symbolic JUMP name you have assigned it. See section 4.7.3.

**End** – Used to specify the last line of a UCS command sequence. See section 4.7.4.

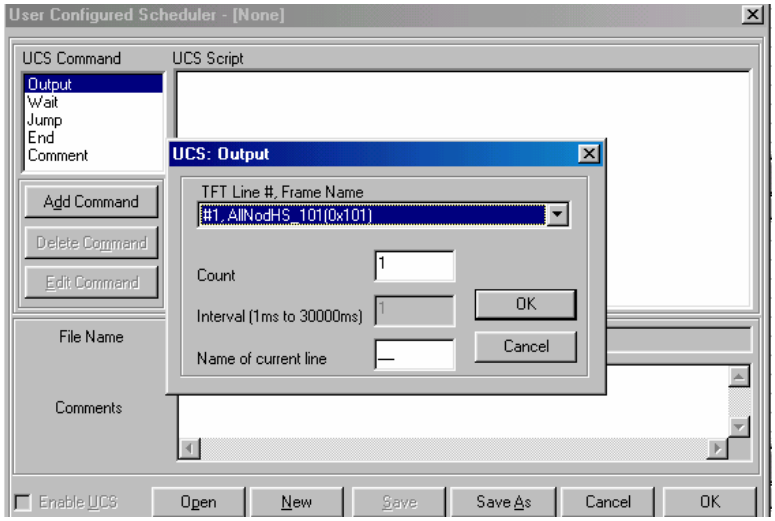
**Comment** – Used to insert a personal reminder of up to 50 characters. See section 4.7.5.

To create a UCS command sequence, first make sure you have an active *Transmit Frame Table* loaded. Then select the **User Configured Scheduler** command from the *Configuration* menu. This will open a *User Configured Scheduler* (UCS) dialog that lets you configure a UCS sequence using the commands described in the following sections.

### 4.7.1 Output command

The *Output* command instructs the scheduler to transmit a specified frame from the active *Transmit Frame* Table. To insert an output command in a UCS script, select **`Output`** in the *UCS Command* list box, and click **Add Command** below the box. A *UCS: Output* window (shown below) will appear.

**NOTE:** If you assign an OUTPUT command a count of 1, you must immediately follow the OUTPUT command with a WAIT command (see section 4.7.2).




From the TFT Line #, *Frame Name* drop box at the top of this window, select a TFT frame (frames that have been added to the TFT) from the options listed. Once you have selected a frame, enter the following values in the appropriate boxes.

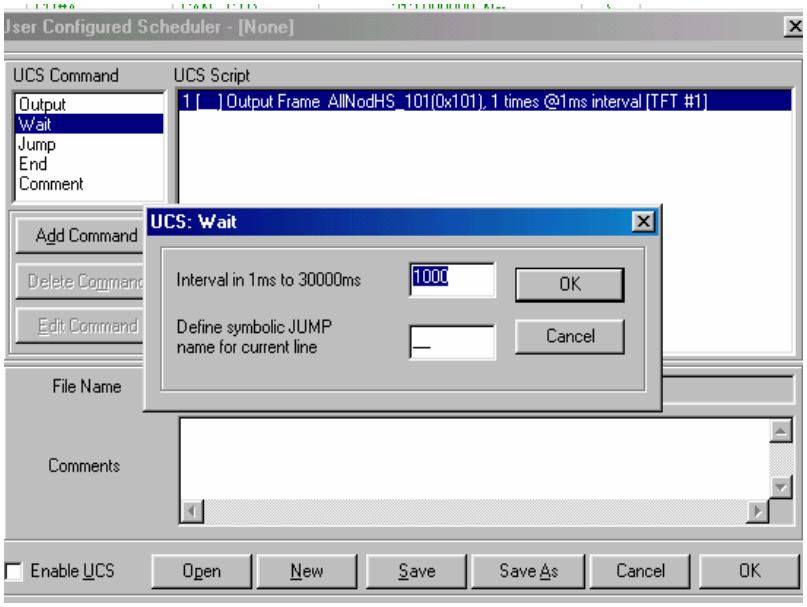
| FIELD | DESCRIPTION |
|---|---|
| **Count** | The number of times you would like the specified frame to be sent (a *Count* value of **1** disables the Interval box below). |
| **Interval** | The desired interval, in milliseconds, between transmissions of the specified frame (*Interval* box disabled if *Count* = 1). |
| **Name of Current Line** | A user-specified name (two characters) for this command line in the UCS sequence, to be used by any "Jump" commands referring to it, (e.g., "_A" in this example). |

Click **OK**. The output command you just defined will be inserted just below the currently selected script line in the *UCS Script* window (or as the first command there if you have not yet inserted any other command lines).

### 4.7.2 Wait command

The *Wait* command instructs the scheduler to insert a time delay between preceding and subsequent operations. To create a delay between the execution of two commands, select the script line just above the place you would like to insert the delay.

Select **Wait** in the *UCS Command* list box, and click **Add Command** below the box. *A UCS: Wait* window (shown below) will appear.




**NOTE:** A **WAIT** command must follow any **OUTPUT** command with a count of **1**. There must be at least one *WAIT* command between an *OUTPUT* command and a *JUMP* command (see section 4.7.3).

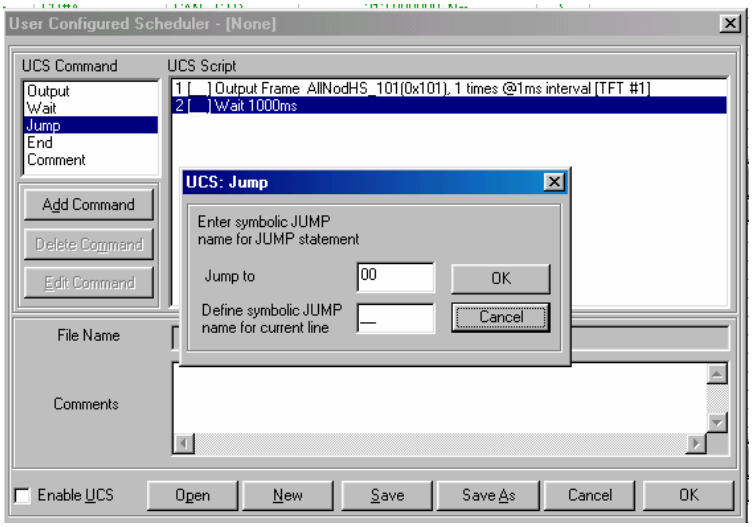
Enter the following values in the appropriate boxes:

| FIELD | DESCRIPTION |
|---|---|
| **Interval** | The desired interval, in milliseconds, between execution of the last operation specified and the next operation. |
| **Symbolic JUMP name** | A user-specified name (two characters) for this command line in the UCS sequence, to be used by any "Jump" commands referring to it, (e.g., "_B" in this example). |

### 4.7.3 Jump command

The Jump command instructs the scheduler to jump to another command line (identified by the symbolic JUMP name you have assigned it). To insert a jump in your UCS command sequence, select the script line just above the place you would like to insert the jump.

Select **Jump** in the *UCS Command* box, and click **Add Command** below the box. *A UCS: Jump* dialog (shown below) will appear.




Enter the following values in the appropriate boxes:

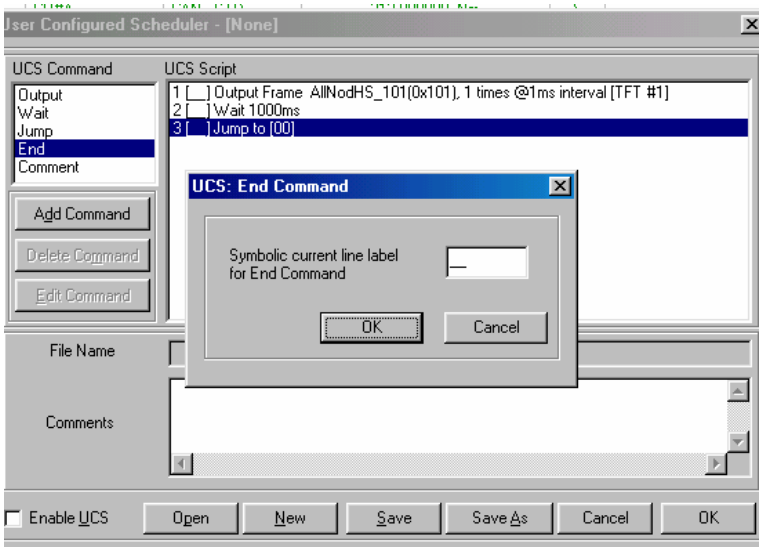
| FIELD | DESCRIPTION |
|---|---|
| **Jump to** | The user-assigned *Symbolic JUMP name* of the command line to which you wish the scheduler to jump (e.g., "_A," the number assigned to the first line in our current example). |
| **Symbolic JUMP name** | A user-specified name for this *Jump* command line in the UCS sequence, to be used by any "Jump" commands referring to it, (e.g., "_C" in the current example).<br>**NOTE:** COMMENT commands are not assigned Symbolic Jump names; therefore, a COMMENT line may NOT be the destination of a JUMP command. |

### 4.7.4 End command

The *End* command signifies the final line of a UCS command sequence. To indicate the end of
UCS sequence, select the last line of script in the *UCS Script* box.

**NOTE:** Every UCS sequence must include an END command.

Select **End** in the *UCS Command* box, and click **Add Command**.

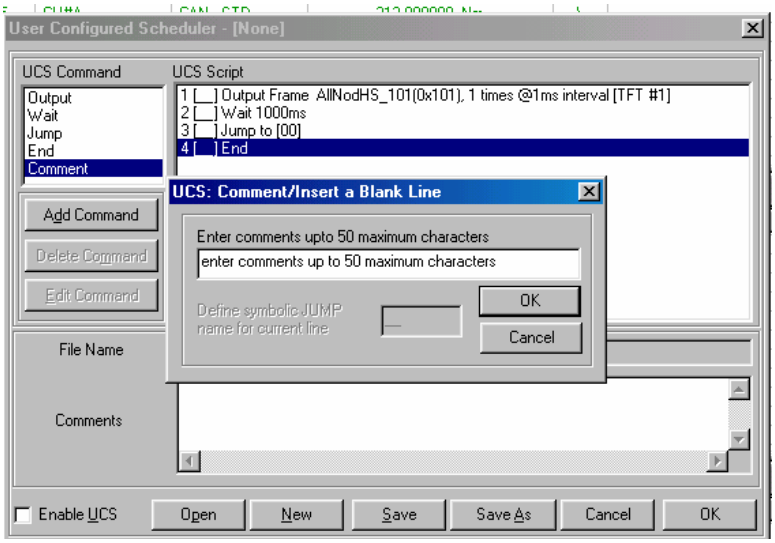



Specify a line label for your *End* command, and click **OK**. An *End* line with the label you have
specified will be added to the end of your UCS Script command sequence.

### 4.7.5 Comment command

The *Comment* command lets you insert a personal reminder (or a blank line) as a line of script in your sequence. To insert a comment into your command sequence, select the script line just above the place you would like the comment line to appear.

Select **Comment** in the *UCS Command* list box, and click **Add Command**. A **UCS: Comment/Insert a blank line** dialog (shown below) will appear.



You may leave the comment line blank or enter a message up to 50 characters in length. Click **OK** and the comment line will be inserted in the *UCS Script* window as a personal note. The comment is ignored by the scheduler.

### 4.7.6 Editing UCS Script commands

Once a command line has been added to the *UCS Script* window, you may delete it by selecting the line and clicking **Delete Command**. To change the values listed in a command line, select the line and click **Edit Command**. A configuration window appropriate to that particular command type (e.g., "*UCS: Output*") will appear. (See preceding sections for descriptions of the values required for each command type.) Make the desired changes to the values listed, and click **OK** to save these changes.

### 4.7.7 Opening, creating, and saving .ucs files

You may load a previously saved .ucs file by clicking the **Open** button in the lower left corner of the *User Configured Scheduler* window and selecting the file you wish to open. To create a new UCS file, click **New**.

Once you have created or opened a .ucs file, you may add, edit, and delete the contents, as described in the previous sections. Click **Save** to save changes to an existing file, or click **Save As**
to create a new .ucs file at your specified location. Click **OK** to return to the main Hercules screen.

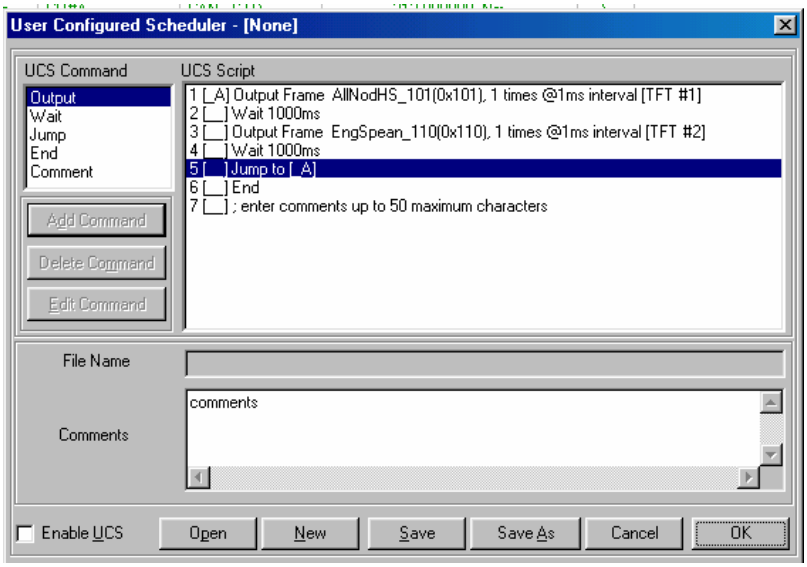
> **Note:** Always save your script files to a hard drive on your PC computer.

### 4.7.8 Enabling the UCS

To activate a configured UCS for an online monitoring session, you must enable it by selecting (**;**) the *Enable UCS* check box in the bottom of this window, or in the *Global Options* window (accessed from the bottom of the Configuration menu). Then click **OK**.

### 4.7.9 UCS example

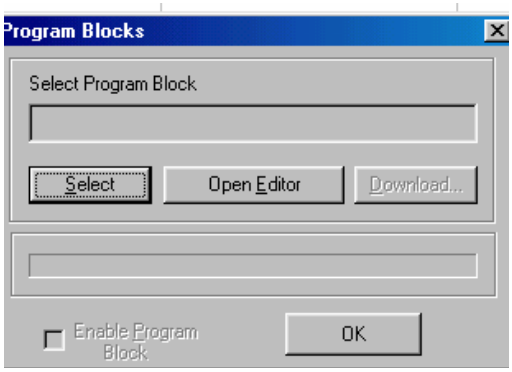
The UCS script shown below instructs the UCS to transmit frame 101 one time, at a one- millisecond interval, and to wait an additional second. It then instructs the UCS to transmit frame
110 one time, at a one-millisecond interval, and to wait an additional second. The "jump" command instructs the UCS to jump to the first line (_A), thus creating a transmission loop which will continue until monitoring is halted (i.e., until the user returns the Hercules tool to offline mode).


User Configured Scheduler - [None]
UCS Command
UCS Script
Output
Wait
Jump
End
Comment
1 [_A] Output Frame AllNodHS_101(0x101), 1 times @1ms interval [TFT #1]
2 [__] Wait 1000ms
3 [__] Output Frame EngSpean_110(0x110), 1 times @1ms interval [TFT #2]
4 [__] Wait 1000ms
5 [__] Jump to [_A]
6 [__] End
7 [__] ; enter comments up to 50 maximum characters
Add Command
Delete Command
Edit Command
File Name
Comments
comments
Enable UCS
Open
New
Save
Save As
Cancel
OK

## 4.8 Program Blocks

Hercules has a program editor and compiler that you can use to develop and compile custom event handler applications for use with the tool. These applications are ANSI C code and are executed in response to seven specific events. Program blocks are created in the *Hercules Program Block Editor and Compiler*. For complete instructions for creating, compiling, and saving program block applications, refer to the *Hercules Program Block Editor and Compiler Manual.*

Once compiled and saved as a Hercules binary (.*out*) file, a program block can be downloaded to the hardware interface. To download a saved .out file, select the **Program Blocks** option on the *Configuration* menu to open the following dialog.




Click **Select** to display the *Open* dialog. Locate and **select** the .out program file you wish to download, and click **Open**. Click **Download** in the *Program Blocks* window.

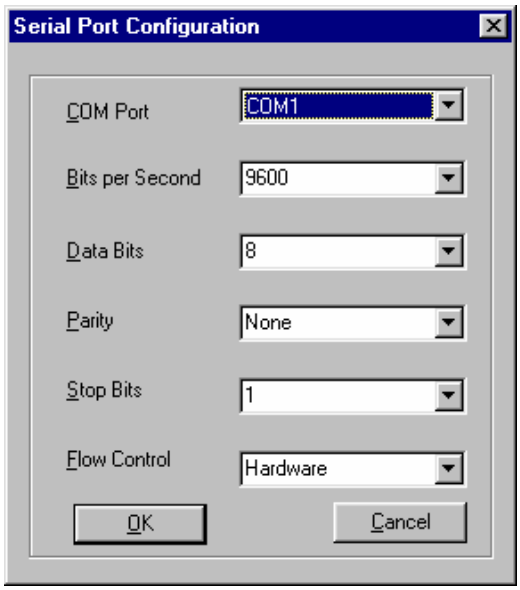
The progress bar will fill as the file is downloaded. When the download is finished, click **OK**. Enable the program block by **selecting** ( ; ) the *Enable Programming Block* check box in the bottom of this window. You can also make this selection later in the *Global Options* dialog accessed from the *Configuration* menu (see section 4.10). Click **OK**.

Open an **Information View** (from the *Display* menu) so that you will be able to view the status of your program block. Messages will show based on keys or events chosen in the dialog from
"Select".

Once you have initiated an ONLINE monitoring session, i.e., selected **Start** from the *Monitoring* menu or the main toolbar, the *Information View* should indicate the successful execution of your program block.

## 4.9 Serial Port Configuration

The *Serial Port Configuration* command in the *Configuration* menu lets you set the following parameters for communication with modules connected to the COM ports of Hercules. Serial Port Configuration is used with Program Blocks.

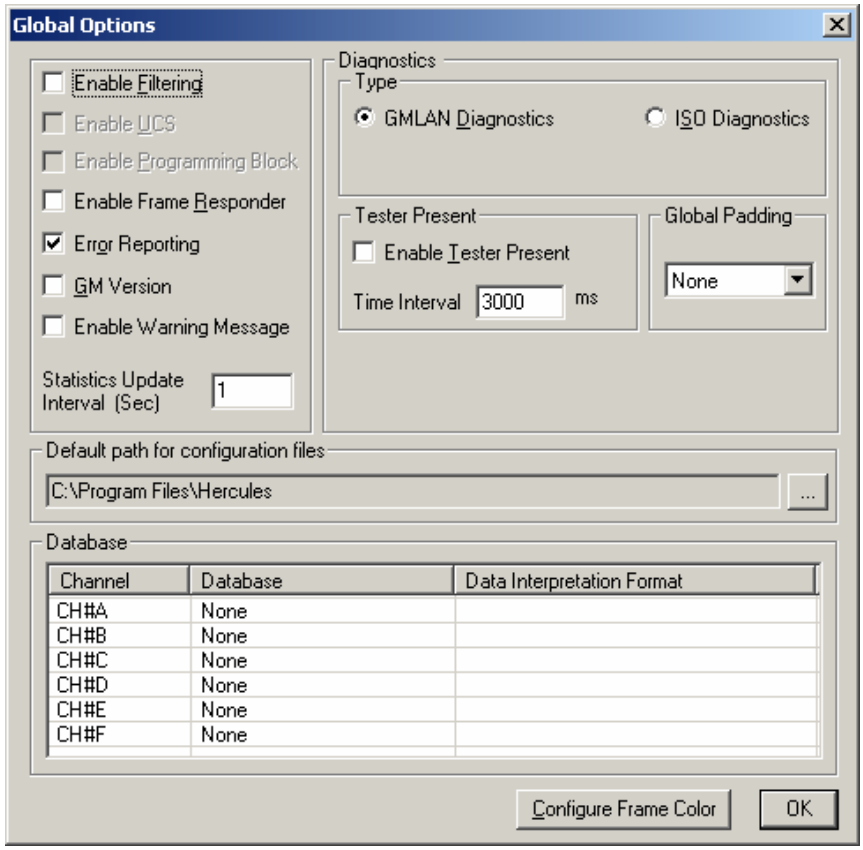



| FIELD | DESCRIPTION |
|---|---|
| *COM Port* | The communication port to which the window's settings apply |
| *Bits per Second* | The baud rate for the selected COM port: **9600**, **19200**, **38400**, **57600**, or **115200** bits per second. |
| *Data Bits* | The number of data bits (**4**, **5**, **6**, **7**, or **8**) in frames sent over the selected COM channel. |
| *Parity* | The parity setting for the selected COM channel: **Even**, **Odd**, **None**, **Mark**, or **Space**. |
| *Stop Bits* | The stop bits set for the selected channel: **1**, **1.5**, or **2**. |
| *Flow Control* | The method of flow control for the selected COM port: **Hardware**, **Xon/Xoff**, or **None**. |

Once you have finished configuring the settings of a COM port, you may activate it by clicking **OK**.

## *4.10 Global Options*

*Global Options* lets you **enable** or **disable** the filtering, frame responder, UCS, and program block features for a monitoring session. The default setting for menu options is *disabled* (box cleared: †). To enable a feature from this list, **select** ( ; ) the appropriate box. A feature is only available for selection if it has been configured for the current monitoring session.




By selecting **Error Reporting**, any errors in transmission will appear in the *Information View* (see section 5.2.2).

If you select **GM Version**, you need to exit and restart Hercules to activate the format. This will allow 29-bit CAN IDs to be translated with the GLMLAN interpretation. GM uses the data in a different manner and will actually split it up into parts, as can be seen in the *Header Details* column.

By selecting the **Enable Warning Message** check box, you will be informed of values that are changing in the hardware for communication between users.

*Statistics Update Interval (Sec)* will update the bus values every “nnn” seconds (where “nnn” is the vale you type into this field).

**NOTE:** only integer values are permitted in the range 1-999.

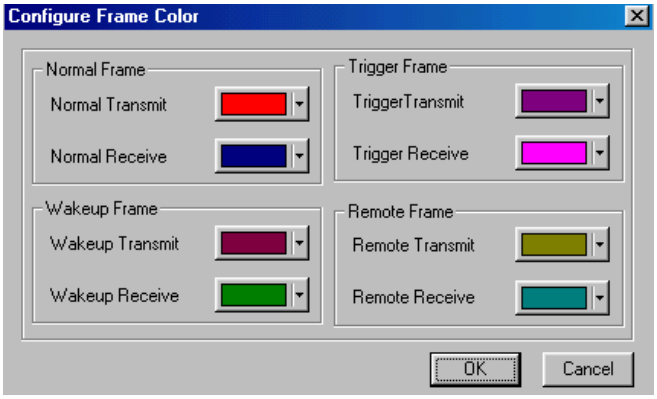
The *Default path for configuration files*, if **selected**, will save all files to a common location. It also displays the current Database format if a database is open. (The format cannot be modified from this dialog screen.)

For Diagnostics, you can select between *GMLAN Diagnostics* or *ISO Diagnostics*. This will change the services available in the *Diagnostic* menu.

By selecting the **Enable Tester Present** check box, you are selecting the tester present message to be sent with all services. Selections will be enabled for all services globally (by referring to *Global Options*, you can enable all of the actions above in one window, rather than going to each window in the software and enabling the actions there). On CAN, **Global Padding** is selectable for the frames being sent. The software will automatically add 00, FF or nothing when sending the message.

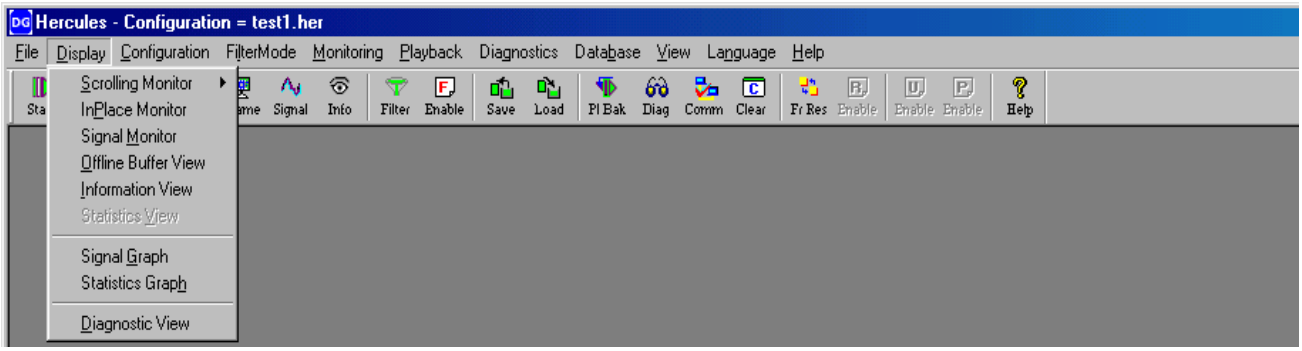
Database paths (if any databases are selected) are display only path(s), they cannot be edited.

At the bottom of the *Global Options* dialog is a button to **Configure Frame Colo**r. This dialog lets you choose the colors for each of the frame types that are displayed in the *Scrolling Monito*r and *Offline Buffer View*.



# 5. DISPLAY Menu

The *Display* menu lets you select a monitor or viewing format to view protocol frame traffic and (in the case of the listed "views") to access various special monitoring functions.




Once you have activated a database and completed all configurations for your session, you are ready to select from the available display formats for the viewing of protocol message traffic. Message traffic from all active channels will be displayed on the selected monitor(s), although frames displayed – and the information provided for those received frames – will vary, depending
on the settings selected for each active monitor/view.

**Once monitors and views have been selected, you may either begin the monitoring session, or you may proceed to Section 6 if you wish to set the Filter Mode.**

Each of these monitor window types (*Scrolling, InPlace, and Signal*) is illustrated and described in section 5.1.

> **NOTE:** Most menu options are accessible only when Hercules is in OFFLINE mode, (i.e., when the STOP option has been selected from the *Monitoring* menu).

The following four special views are also available:

| | |
|---|---|
| **Offline Buffer View** | (for offline viewing of frames captured in the Hercules buffer). |
| **Information View** | (for the viewing of login and hardware status). |
| **Statistics View** | (for analysis of busloading and frame transmission statistics). |
| **Diagnostic View** | (for analysis of functions executed from the *Diagnostics* menu). |

These views are shown and described in section 5.2.

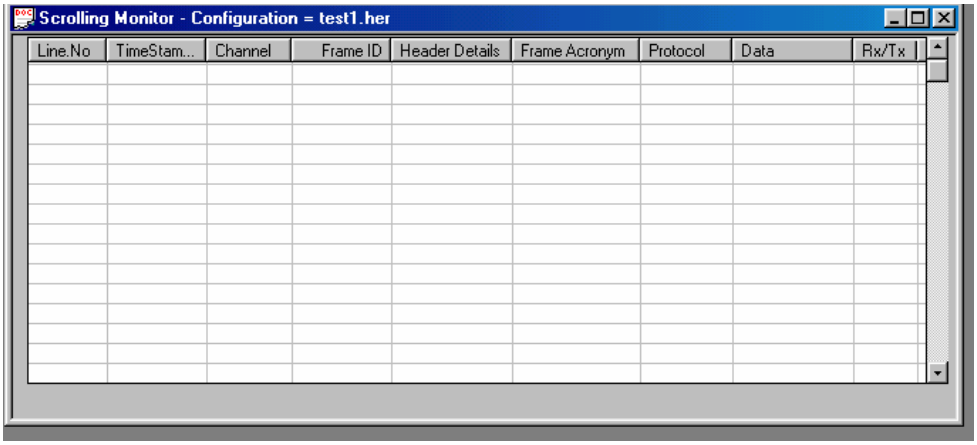
## *5.1 Selecting a Monitor*

There are three different monitor types that are available for displaying frame information: *Scrolling Monitor, In-place Monitor*, and *Signal Monitor*. These monitors can operate simultaneously. When you select a monitor, a menu appears directly to the right of the *Display* menu. It lists the commands needed to format and use the monitor. You may also **right-click** in the table to access the menus. Also appearing will be a *Window* menu with two arrangement options (*Cascade* and *Tile*) for the simultaneous display of multiple monitors.

The *Scrolling Monitor* records all bus traffic, where as the *In-place Monitor* displays only the messages with certain frame ID and the *Signal Monitor* displays signals specific to certain frames.

### 5.1.1 Scrolling Monitor

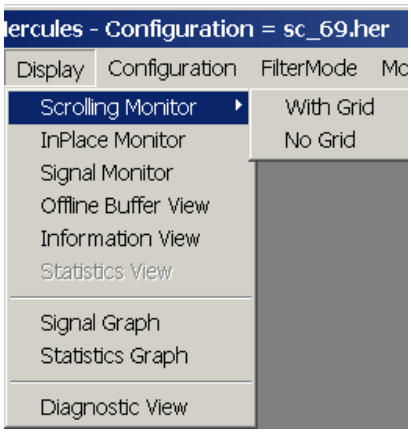
The *Scrolling Monitor* captures all bus traffic and displays frames continuously, scrolling them on a "first-in, first-out" (FIFO) basis. The monitor displays the following fields:




- **Line No** (line number)
- **TimeStamp (µs)** in *absolute* or *relative* time format (in 10 ms resolution). Format changes go into effect only after monitoring has been stopped and re-started.
- **Channel** (channel ID)
- **Frame ID** (CAN/protocol identifier)
- **Header Details** shows frame details of GMLAN EXT-CAN, J1939 and J1850 frames
- **Frame Acronym** (predefined frame acronym from database, appears only if listed in an active database)

- **Protocol** (frame type: if using CAN frames, Standard or Extended CAN, respectively)
- **Data** (data bytes)
- **Rx/Tx** (frame type: *Receive*, *Transmit*, *Trigger Frame*, *High-Voltage Receive**, *High-Voltage Transmit**, or *Remote Transmit*, *Remote Receive* respectively)

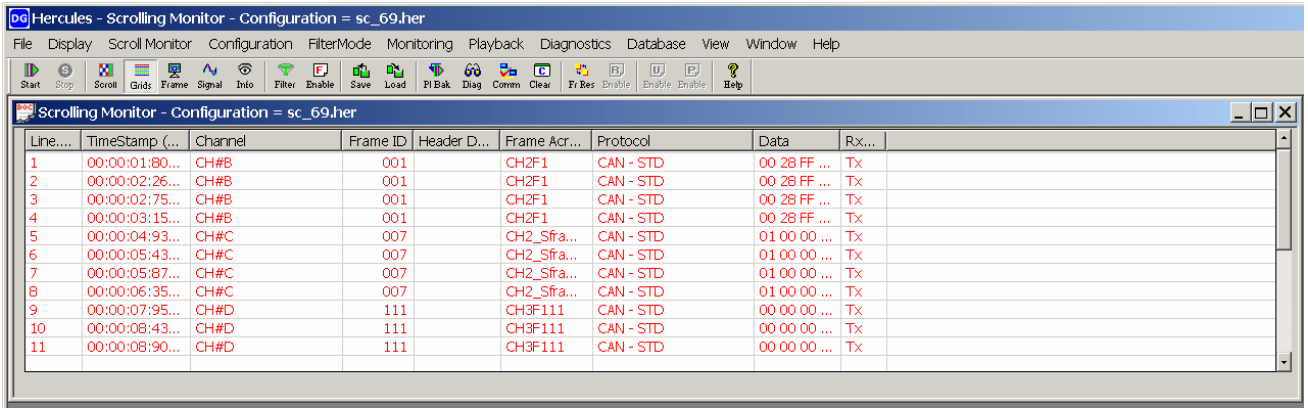
**NOTE:** High-voltage, wake-up frames are used only in single-wire CAN.



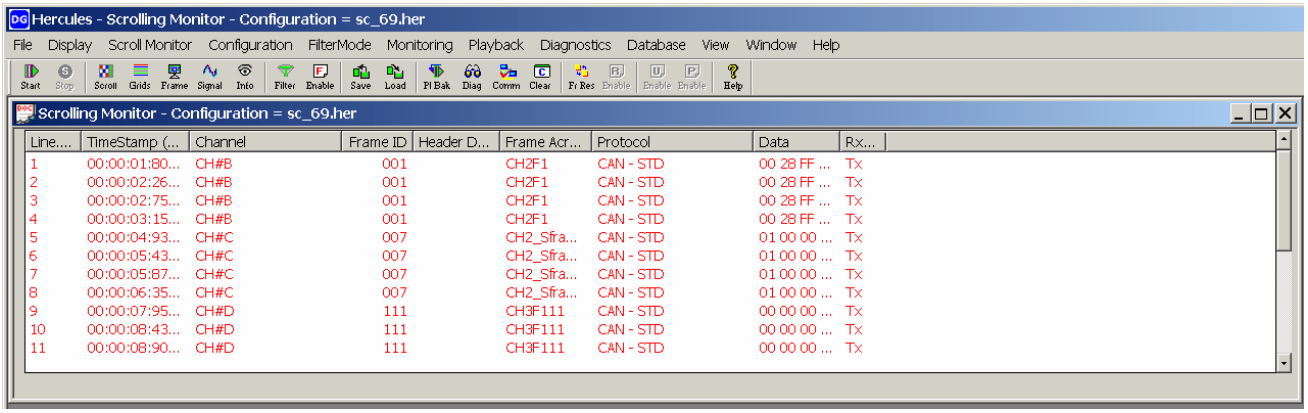

You can use this monitor with or without grid lines. To access this option select the **Display** menu, followed by the **Scrolling Monitor** command. Choose either the **With Grid** or **No Grid** Option.

Once the monitor is open, you can enable or disable the grid lines by toggling the **Grids** button on the main toolbar. Here are examples with and without grids.

### With Grids example



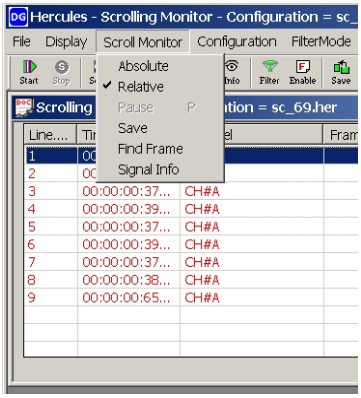
## Without Grids example




When you have established a connection to the hardware and it is exchanging frames with
Hercules, you can begin viewing the frames by clicking the **Start** command on the *Monitoring* menu (or by pressing the **F9** key on the keyboard).

To halt the monitoring of these frames and return to OFFLINE mode, click the **Stop** command on the *Monitoring* menu, or press the **Esc** key. You may then use the Scrolling Monitor's scroll bar or your keyboard's **Page Up** and **Page Down** keys to navigate the display.

The Scroll Monitor menu displays the following options:

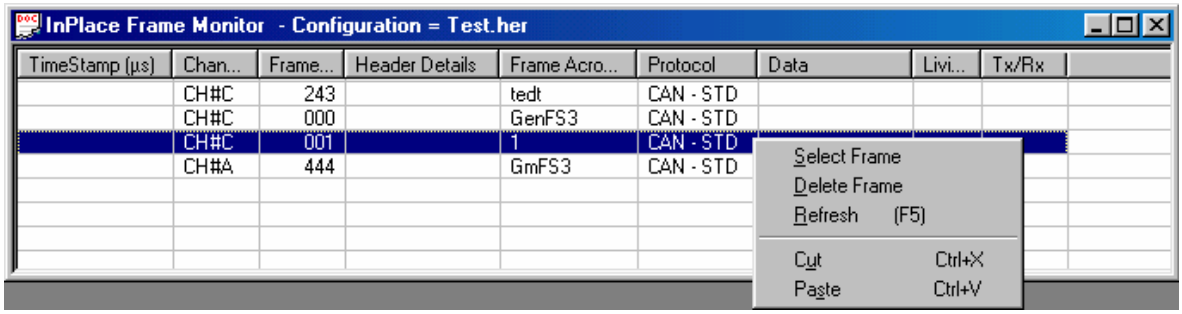



- **Absolute** or **Relative** – *Absolute* timestamp is with respect to the start of the online monitoring. *Relative* timestamp is with respect to the previous message.
- **Pause** – Stops messages from scrolling in the monitor, but continues to log in the background.
- **Save** – In OFFLINE mode the messages in the monitor can be saved to a file.
- **Find Frame** – Searches the monitor for specified message IDs and / or data.
- **Signal Info** – Decodes the selected message into engineering units if defined in the database.

### 5.1.2 InPlace Monitor

*InPlace Monitor* allows you to choose particular frames (up to 50) for viewing by selecting their frame IDs from the database. While offline, you may enable or disable each frame for update. Each frame selected will appear in a fixed position in the window.

**NOTE:** To make changes to the InPlace Monitor table, you must be in OFFLINE mode.

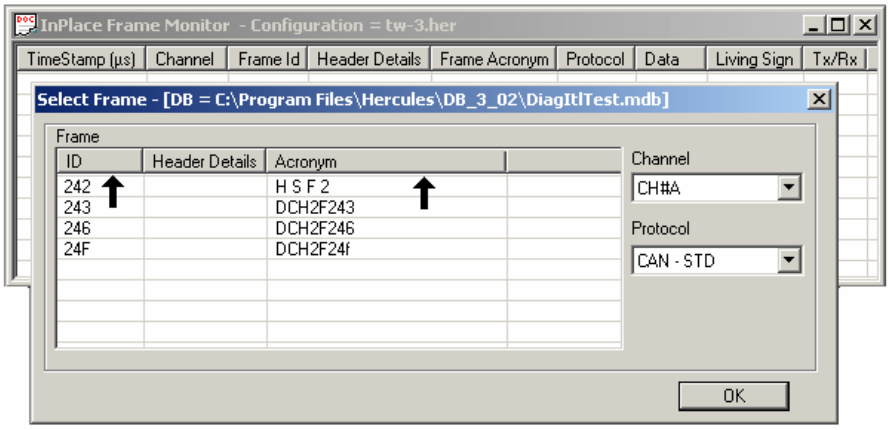



- **TimeStamp** (µs)
- **Channel** – (channel ID)
- **Frame ID** – (CAN identifier)
- **Header Details** – shows frame details of GMLAN EXT-CAN, J1939 and J1850 frames.
- **Frame Acronym** – predefined frame acronym from database, appears only if listed in the active database.
- **Protocol** – frame type, if using CAN frames: *Standard* or *Extended* CAN, respectively.
- **Data** – (data bytes)
- **Living Sign** – animated: toggles between "/" and "\" each time the frame is received
- **Tx/Rx** – frame type: *Transmit*, *Receive*, *Trigger Frame*, *High-Voltage Transmit* High- Voltage Receive**, *Remote Receive*, or *Remote Transmit*, respectively.

  ***** High-voltage, wake-up frames are used only in single-wire CAN

To access the *InPlace Monitor*, select the **Display** menu, followed by the **InPlace Monitor** command. When you select this view, an *InPlaceView* menu appears directly to the right of the *Display* menu. It lists the commands to format and use the table. You may also right-click in the table to access the commands. To select database frames for viewing, perform the following steps:

1. Double-click a blank line in the *InPlace Frame Monitor* table, or click **`Select Frame`** on the *InPlaceView* menu. A **Select Frame** dialog displays frame IDs and frame acronyms from the database. To sort content, click on the **ID** or **Acronym** column header.



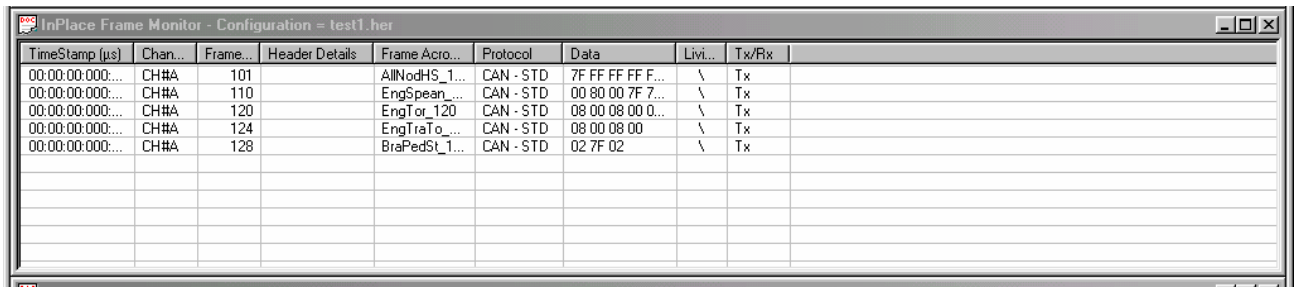

2. Select a *CAN/protocol* channel. If using CAN, select a *CAN* type: Standard (**CAN-STD**) CAN or Extended (**CAN-EXT**) CAN.

3. Select one of the frames you would like to add to the monitor list, and click **OK**. You are returned to the *InPlace Monitor* table with an entry for the selected frame.

4. Repeat steps 1 through 3 for each frame (up to a total of ten) that you wish to add to the monitor. To remove a frame from your list, select the frame's entry in the *InPlace Frame Monitor* window; click **DeSelect Frame** in the *InPlaceView* menu, or on the menu that appears when you **right-click** in the **InPlace Monitor** window.

**Reminder:** frame list changes must be made in OFFLINE mode.

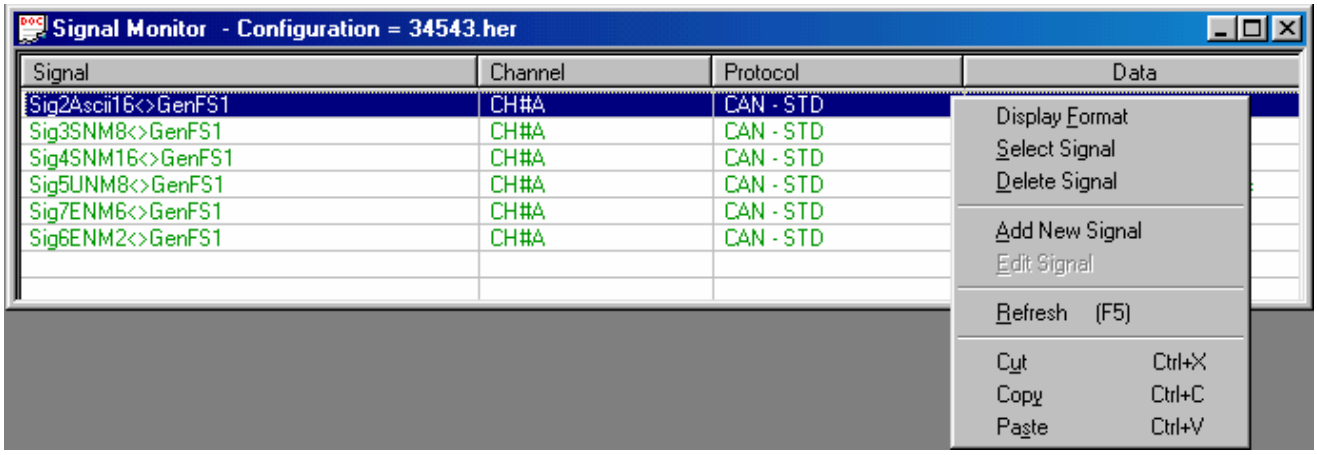
When you have established a connection to protocol modules exchanging frames with Hercules, you may begin viewing these frames by clicking **Start** (or pressing the **F9** key on the keyboard).
To halt the monitoring of these frames and return to OFFLINE mode, click **Stop** or press the **Esc** key on the keyboard.



### 5.1.3 Signal Monitor

The **Signal Monitor** lets you select and display individual signals from the tool database. (A signal is a predefined interpretation of one or more bytes of protocol frame data. This monitor displays up to 50 signals from various received frames. The *Signal Monitor* window displays the following information for each selected signal:

> **NOTE:** In the FILTER ON mode, the *InPlace Monitor* and *Signal Monitor* will not process any frames or signals that do not pass through the active filters, even though the database allows the selection of these frames and signals.

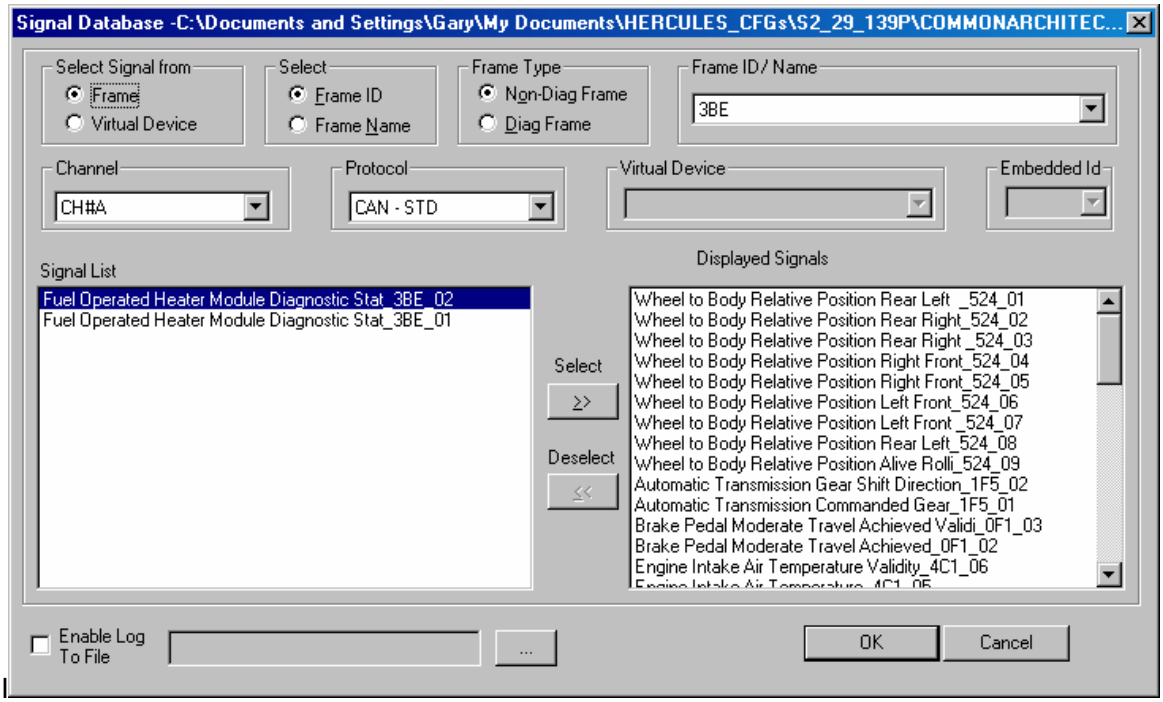



- **Signal** – the name of the signal
- **Channel** – Channel ID
- **Protocol** – frame type in use; if using CAN frames, STD or EXT, *Standard* and *Extended* frames, respectively
- **Data** – in specified format: Hexadecimal, Decimal, Binary, Engineering Units, Interpretations or Strings
- **Living Sign** – animated character: toggles between "/" and "\" each time the signal is received

When you select the **Signal Monitor**, a *Signal Monitor* menu is added beside the *Display* menu, and a *Signal Monitor* window appears on your screen. To select database signals for monitoring, use the following steps.

1. Double-click a blank line in the *Signal Monitor* table, or click the **Select Signal** command on the *Signal Monitor* menu (or on the menu that appears when you **right-click** in a blank line on the table) to display the *Signal Database* dialog.

2. Select a *Protocol Type*: If using CAN frames, Standard (**STD**) CAN or Extended (**EXT**) CAN; and a *Channel*. Also, select either **Frame** or **Virtual Device**, depending upon the source from which the signals are retrieved.




3. To select a database frame from which to choose your signal, first click the radio button beside **Frame ID** or **Frame Name**, identifying the format in which you can view the frame list. (The *Frame ID/Name* box to the right of this option should show database frame options in the format you have selected, by name or by ID).

4. Specify a *Frame Type*: **`Non-Diag Frame`** (non-diagnostic) or **`Diag Frame`** (diagnostic). For diagnostic frames, you will also need to select the appropriate *Embedded IDs*.

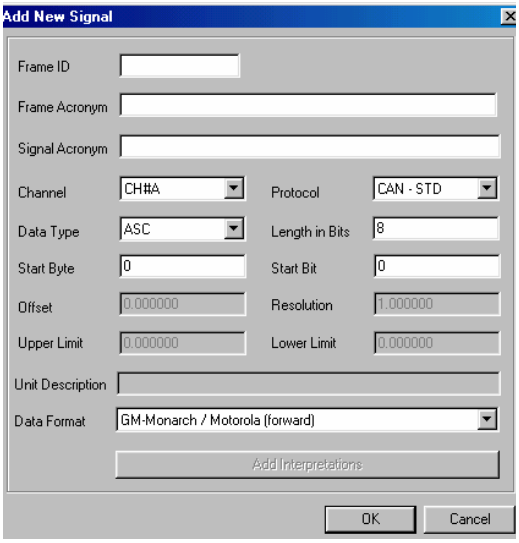
5. Scroll through the frames listed in the *Frame ID/Name* drop box until you find the desired item. **Click** on it. The signals for that frame will appear in the *Signal List* box in the left portion of the window.

6. Select the name of the signal you would like displayed on the signal monitor, and click **Select** (**>>**). That signal name will be copied to the *Displayed Signals* box (your list of selected signals *from all channels*) to the right. To remove a signal from your list, select that signal, and click **Deselect** (**<<**). That signal name is removed from the *Displayed Signals* box.

**NOTE:** Only 50 signals may be saved to a *Signal Monitor* window. If the *Displayed Signals* box contains more than 50 signals, a warning message "More than 50 signals cannot be selected for Signal Monitor" appears.

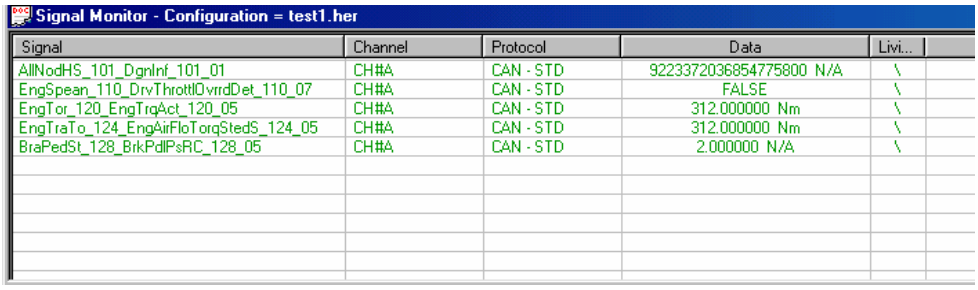
7. Repeat step 6 for any other signals you wish to add to your *Displayed Signals* list. Once you have selected all your desired signals for the frame listed, you may return to the *Frame ID/Name* drop box to select another frame from the database. Repeat step 6 for each of the frame signals you would like displayed on the *Signal Monitor*. By checking the "Enable Log
to File" check box, you allow the application to store data for future review. Signals from the *Signal Monitor* will be saved in decoded engineering units.

8. To add a signal manually, **right-click** in the *Signal Monitor* window and select the **Add New Signal** command to display the following dialog.

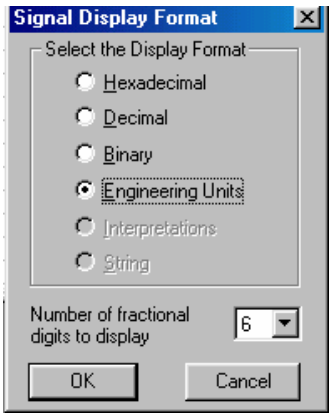



Enter all necessary data into the dialog and click **OK**. Your new signal will appear in the *Signal Monitor* window.

9. When the *Displayed Signals* list box contains all the signals to be displayed, click **OK** to exit and return to the *Signal Monitor* window. Once a signal appears in the *Signal Monitor* window, you may confirm or change its display format. Select the signal's entry and select the **Display Format** command on the *Signal Monitor* menu (or the menu that appears when you **right-click** in the *Signal Monitor* window).



A *Signal Display Format* dialog appears, providing you with these options. The options enabled depend on the data type of the selected signal. You can also vary the number of digits displayed after the period with the *Number of fractional digits to display* option.




You can log the signal engineering data to a file by selecting the **Enable Log to File** check box. Click **Browse** (**…**) and select a text file (with .txt extension). This file logs the signal data along with the timestamp.

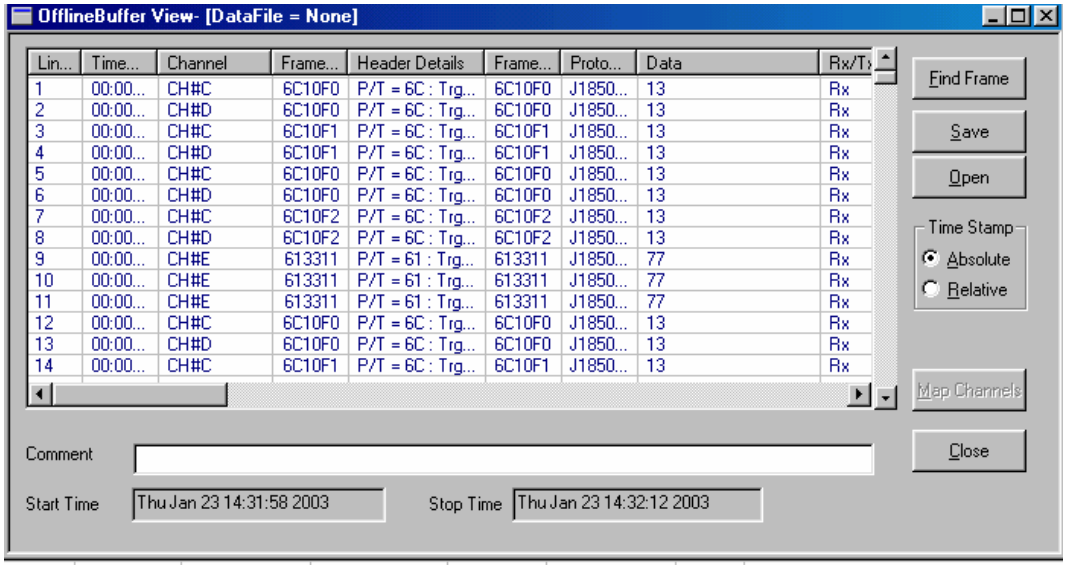
When you have established a connection with the hardware exchanging frames with Hercules, you may begin viewing these signals by clicking the **Start** command in the *Monitoring* menu (or by pressing the **F9** key on the keyboard). To halt monitoring these frames and return to OFFLINE mode, click the **Stop** command in the *Monitoring* menu, or press the **Esc** key. You may also use the *Start* and *Stop* buttons on the main toolbar.

## *5.2 Selecting Special Views*

In addition to the three standard online monitors, Hercules is equipped with four additional views to monitor special information: buffer contents (*Offline Buffer View*), hardware status/traffic (*Information View*), busload statistics (*Statistics View*), and diagnostic information (*Diagnostic View*).

### 5.2.1 Offline Buffer View

Offline Buffer View is available only in the OFFLINE mode. It is used after a monitoring session to save, review and playback the buffer's contents. Select the **Playback** menu, followed by the **Select Buffer** command to display the *OfflineBuffer View* window. For each frame recorded, the following information appears in the *Offline Buffer View* table.



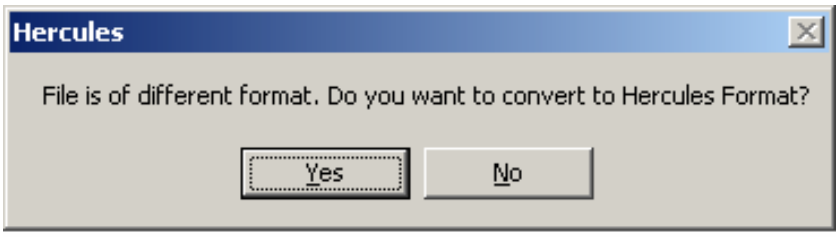

- **TimeStamp** (µs) – (1 ms resolution)
- **Channel** – (channel ID)
- **Frame Acronym** – (predefined frame acronym from database, appears only if listed in the active database)
- **Header** – shows frame details of GMLAN EXT-CAN, J1939 and J1850 frames
- **Frame ID** – (Protocol identifier)
- **Protocol** – (identifies frames)
- **Data** – (data bytes)
- **Tx/Rx** – (frame type: Transmit, Receive, Trigger Frame, High-Voltage Transmit* High- Voltage Receive*, Remote Transmit, or Remote Receive respectively)

***** High-voltage, wake-up frames are used only in single-wire CAN.

The storage of frames in the buffer starts automatically each time you select the **Start** command in the *Monitoring* menu, overwriting any information present in the buffer. Therefore, if you wish to view the content of a monitoring session's buffer later and/or to send them back out over the bus, you must first save them. To save the contents in an *OfflineBuffer View* table, add any personal reminders you would like to include in the white *Comment* box; then click **Save**.

Select a file type: Text or ASCII (.**TXT**), Binary (.**BIN**), or Data (.**CSV**: comma-separated-variable). TXT and CSV files are ideal for offline analysis of buffer information—they are easily imported into applications such as Excel, or other spreadsheet programs. BIN files are designed for the playback of a buffer's contents over connected networks.

> **NOTE:** To import Vector files (.asc) and CAT files, type {***.***} in the file name box and press **Enter** to display all files. Select the desired import file and click **Open**. The Hercules dialog is displayed. Click **Yes** to import the file.



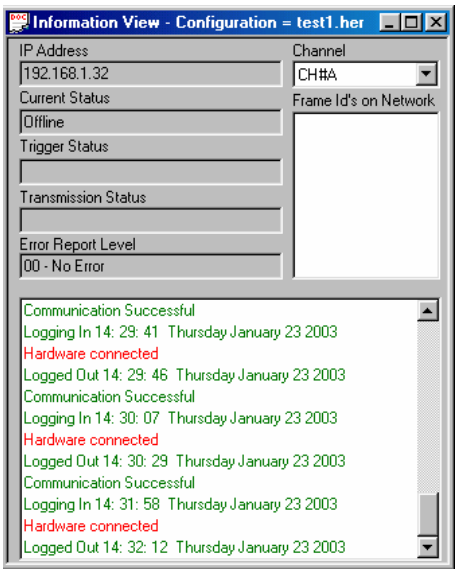

Specify a name and location for your file, and click **Save**. Once you have saved your file, it is ready for export to other applications (in the case of TXT and CSV files) or for playback over the network (in the case of BIN files). You can also view the file contents later by using **Open** in this view. When you open a previously saved buffer file, with *Map Channels* option, you can load the frames on to a different channel of the same protocol.

To clear the current buffer, select the **Clear Buffer** command from the *Monitoring* menu, or click **Clear Buffer** on the main toolbar.

> **NOTE:** Timestamps may be displayed in *Absolute* or *Relative* values. **Absolute** or **Relative** – *Absolute* timestamp is with respect to the start of the online monitoring. *Relative*
> timestamp is with respect to the previous message.

### 5.2.2 Information View

The *Information View* window contains current login status and hardware activity (e.g., mode, trigger status, transmission status, error messages, etc.)

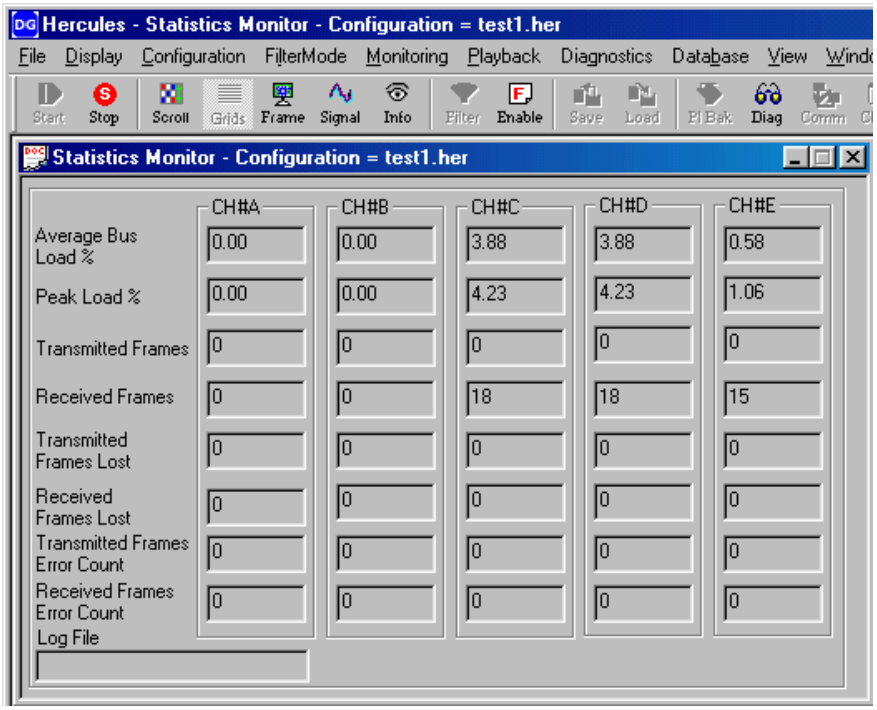



This window can receive information from any combination of active channels. It displays all
information sent from any active program blocks. It also provides the IP address of a connected Gryphon, error level set on SJA1000 CAN card, and IDs of the frames that are transmitted/received on each channel. This window also displays available channels and frames selected for transmission.

### 5.2.3 Statistics View

The Statistics View is only available in the ONLINE mode and will only display the statistics for the configured channels. To reset all the values in the window to zero and begin a new tally of statistics, **right-click** on the *Statistics* window, then click **Reset**. This view updates itself periodically
to display the latest statistics information as long as Hercules is connected to the hardware interface. The default update interval time is 1 second. **Right-click** in the window below and select the *Log File* command to save the average busloads for future use. With Hercules OFFLINE, the log file can be viewed in a text editor such as Windows Notepad only after you go back and **right click** in the *Statistics View* window, select **Log File** and then **uncheck** *Select Log File* box.

**NOTE:** This feature is not available for the DCX (J1850) module.

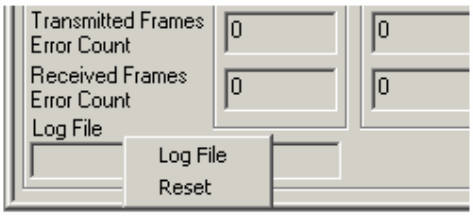



| FIELD | DESCRIPTION |
|---|---|
| **Average Bus Load %** | The average bus load on the channel over a specific period of time. |
| **Peak Load %** | The highest bus load during the averaging period. |
| **Transmitted frames** | The total frames transmitted on a channel by the device driver since Hercules monitoring was enabled. |
| **Received frames** | The total frames received on a channel by the device driver since Hercules monitoring was enabled. |
| **Transmitted Frames Lost** | The total transmitted frames dropped by the device driver since Hercules monitoring was enabled. |
| **Received Frames Lost** | The total received frames dropped by the device driver since Hercules monitoring was enabled. |
| **Transmitted Frames Error Count** | The total transmit frame errors since Hercules monitoring was enabled. |
| **Received Frames Error Count** | The total receive frame errors since Hercules monitoring was enabled. |
| **Log File** | The file used to store information. Right-click slightly above the Log File text box to display an options menu. |

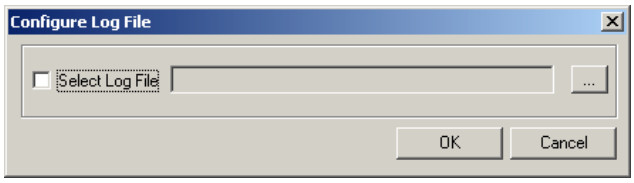
#### 5.2.3.1 Log File

You can save the Statistics Monitor data to a Log File.

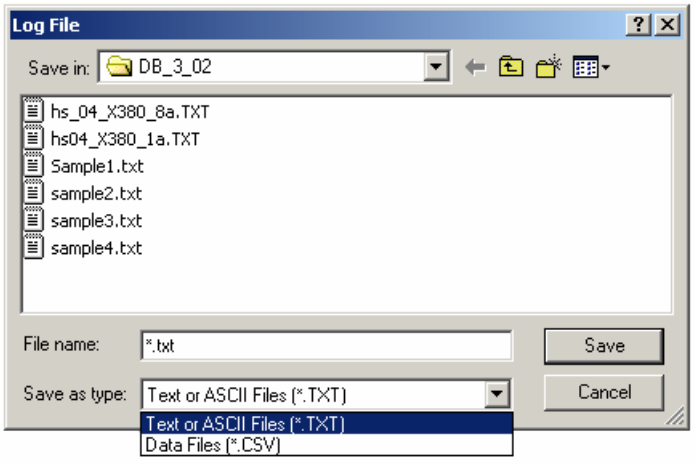
1. **Right-click** slightly above the *Log File* text box to display a Pop-up menu containing the *Log File* and *Reset* options.




2. Click the **Log File** option to display the *Configure Log File* dialog.




3. Click the **Browse** button (**…**) to display the *Log File* dialog.

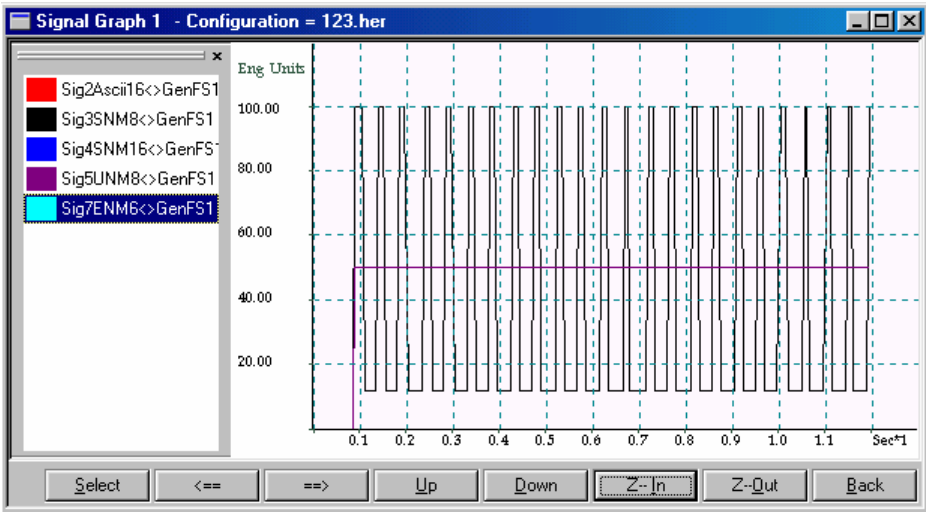



4. Select the desired file type (TXT or CSV) and folder location. Enter the desired file name and click **Save**.

### 5.2.4 Signal Graph

This is a graphic representation of the signals that are defined in the *Signal Monitor* window. To display this graph, select the **Display** menu, followed by the **Signal Graph** command. The *Signal Graphs* window is displayed. The data used in this graph is automatically converted into, and displayed in, engineering units. The resolution of this scale is set at 5 divisions for each grid value
to permit identifying a 1 unit signal value change. A maximum of 5 signals for each channel are permitted. Four graphs with five signals per graph are the maximum amount when in a monitoring session. The number of graphs permitted will depend on your hardware set-up and how many channels have been selected.

**NOTE:** This feature is not available for the DCX (J1850) module.




To move the visible graph area, position the mouse pointer in the graph window. **Press** and **hold** both the *Shift key + Left mouse button* while moving mouse to move the graph on both the horizontal and the vertical axes.

To Zoom into an area, position the mouse pointer in the graph window. Click and hold the left mouse button while dragging to create a bounding box that represents the zoomed area. This zoom box is used to identify both the location and the extent of an enlarged (or zoomed) view. The selected zoom view will fill the graph window content, with the x, y axes appropriately scaled. Zoom
is applied as soon as the zoom area is selected. You can click the **Back** button to undo the zoom.

The following buttons are available in the *Signal Graph* window. The following is a description of each button and its purpose.

**Select** – Used to select signals graphed by the *Signal Graph* window. Click **Select** to display the *Configure Signal Graphs* window. Select the desired signals in the *Signal Monitor Signals* list and click **Select>>**. Complete all applicable fields in this window and click **OK**.

**<==** – Incrementally shift the entire *Signal Graph* window horizontally to display previous time based graph data. This action occurs each time this button is selected but ceases when the beginning of the time scale (zero) appears. To automatically repeat this action, **press** and **hold** the **`left arrow`** key on the computer keyboard.

**==>** – Incrementally shift the entire *Signal Graph* window horizontally to display subsequent time based graph data. This action occurs each time this button is selected. To automatically repeat this action, **press** and **hold** the **`right arrow`** key on the computer keyboard.

**Up** – Incrementally shift the entire *Signal Graph* window vertically to display higher engineering unit axis based graph data. This action occurs each time this button is selected but ceases when the beginning of the time scale (zero) appears. To automatically repeat this action, **press** and **hold** the **`U`** key on the computer keyboard.

**Down** – Incrementally shift the entire *Signal Graph* window vertically to display lower engineering unit axis based graph data. This action occurs each time this button is selected but ceases when the beginning of the time scale (zero) appears. To automatically repeat this action, **press** and **hold** the **`D`** key on the computer keyboard.

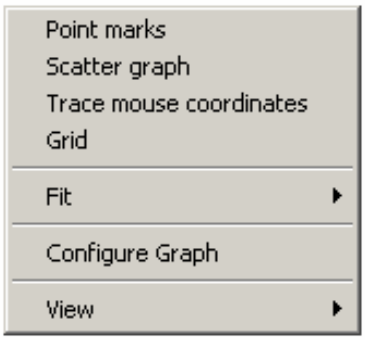
**Z-In** – Incrementally compresses both the time and engineering units scale in the *Signal Graph* window. This action occurs each time this button is selected. To automatically repeat this action, **press** and **hold** the letter **`I`** key on the computer keyboard.

**Z-Out** – Incrementally expands both the time and engineering units scale in the *Signal Graph* window. This action occurs each time this button is selected. To automatically repeat this action, **press** and **hold** the letter **`O`** key on the computer keyboard.

**Back** – Discards recent change and restores previous changes made to the *Signal Graph*. Stores the last 200 changes made to the Graph.

#### 5.2.4.1 Options:

In addition to the buttons, several options are available. **Right-click** in the *Signal Graph* window and this will display the following options menu.



The following options are available and are described below.

**Point marks** – When selected (i.e., checked), the *Signal Graph* window will display points in the graph line where each signal occurred. When not selected, no points will display. Point marks are not shown by default.

**Scatter graph** – When selected, the *Signal Graph* window will display points only. The graph line connecting the points will not be visible. When not selected, the *Signal Graph* window will display data as dictated by any other selected option.

**Trace mouse coordinates** – When selected, the mouse pointer will include a constantly visible mouse pointer status box which will display the current mouse pointer position in x, y axis format and in engineering units. When not selected, no mouse pointer status box will be visible. This tool is useful to precisely identify where the item of interest appears on the signal graph.

**Grid** – When selected, the *Signal Graph* window will display grid lines that correspond to major x, y axis points in the window. When not selected, no grid lines are displayed. Grid lines are not shown by default.

**Fit** – When selected, three choices are available: *Width, Height*, and *Page*. When *Width* is selected, the existing graph data is scaled to fit into the entire horizontal width of the available *Signal Graph* window. When *Height* is selected, the existing graph data is scaled
to fit into the entire vertical height of the available *Signal Graph* window. When *Page* is selected, the existing graph data is scaled to fit into the entire *Signal Graph* window and is the equivalent to selecting both the Width and Height choices.

**Configure Graph** – When selected, the *Configure Graph* window is displayed and contains two tabs: the *General* tab and the *Graphs* tab. The *General* tab is used to define the range
of the graph coordinates (where x1 and y1 are in the lower left corner, x2 is the lower right corner, and y2 is in the upper right left corner). It also provides the following selections: *Point Marks* (previously described), *Mouse coordinates* (previously described in Trace Mouse Coordinates) and *Axis* (previously described in Grid). The *Graphs* tab provides a list
of the signal sources and three buttons: *Color*, *Show/Hide* and *Show all*. To change the color graphed by a signal source, **click** the signal source to select it and **click** the Color button to display the *Color* window. Choose the desired color for the selected signal source then click **OK**. To hide a signal currently visible on the graph, **click** the signal source to select it and click **Hide**. To show a signal currently not visible on the graph, **click** the signal source to select it and click **Show**. To show all signal sources which are currently not visible
on the graph, click **Show all**.

**View** – This option lets you display or hide the graph list in the left side of the window. **Unselecting** the *Graph List* choice will hide the list and allow more graphic data to be displayed. **Selecting** the *Graph List* choice will display the list of signals with reduced graphic data visible in the window. When visible, the Graph List can be undocked and moved to another area. Move the mouse pointer to the two horizontal lines at the top of the Graph list. **Press** and **hold** the left mouse button and drag it to the desired location. To dock the Graph List, move it to the left side of the *Signal Graph* window.

#### 5.2.4.2 Configuring and using the Signal Graph

Here are the steps to configure and use the Signal Graph feature.

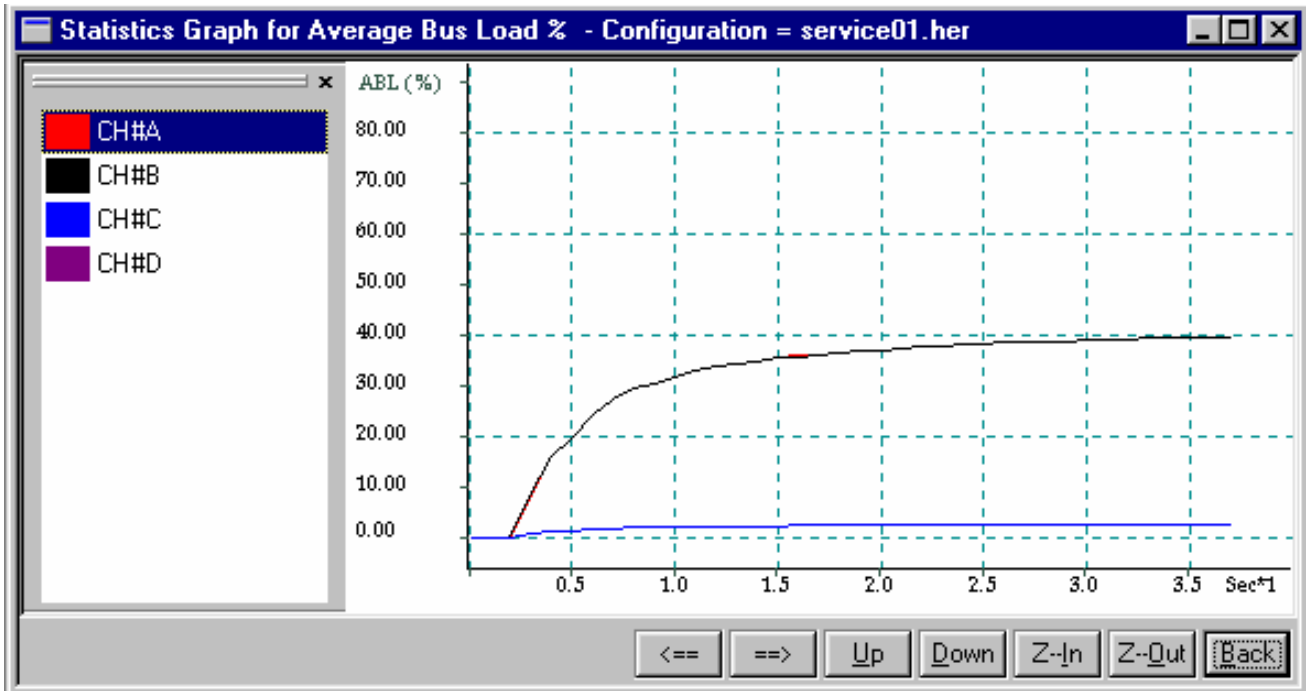
1. Check the hardware configuration. Select the *Configuration* menu, followed by the **Hardware Configuration** command. Verify that the applicable channels are selected and properly configured. Verify that the correct Gryphon IP address and port number are specified in the *TCP/IP Configuration*. Verify that the correct bus rate is selected.
2. Associate the desired database. Select the *Database* menu, followed by the **Associate Database** command. Verify that the desired databases are associated with the selected channels.
3. Display a *Scrolling Monitor* window. Select the **Display** menu, followed by the **Scrolling Monitor** command (either *With Grid* or with *No Grid*).
4. Display a *Signal Monitor* window. Select the **Display** menu, followed by the **Signal Monitor** command.
5. While in the *Signal Monitor* window, select one or more signals to add to the *Signal Monitor* window. The signal source can be from an existing database or from a signal that you manually create.

   To select one or more signals from an existing database, **right-click** in this window and select the **Select Signal** command. This displays the *Signal Database* dialog. Complete all applicable fields in this dialog to display the available signals in the *Signal List*. From the *Signal List*, select the desired signals to be displayed (for a maximum of 20 signals) and click **Select>>**. Click **OK** to close this dialog.

   To manually add one or more signals (for a maximum of 20 signals), **right-click** in this window and select the **Add New Signal** command. This displays the *Add New Signal* dialog. Complete all applicable fields in this window to define the signal and click **OK**.
6. Display the **Signal Graphs** window. Select the **Display** menu, followed by the **Signal Graph** command. Click **Select** to display the *Configure Signal Graphs* window. Confirm that the correct channel and protocol are selected. From the *Signal Monitor Signals* list, select the desired signals to be graphed and click **Select.** Click **OK** to close this window.
7. Click **Start**. Also refer to previous topics that describe the buttons and options available for the *Signal Graph* window.

### 5.2.5 Statistics Graph

This graph shows the average busload on each channel. It plots values from the *Scrolling Monitor* window. This graph is only available in ONLINE mode. To display this graph, select the **Display** menu, followed by the **Statistics Graph** option. The resolution of this scale is set at 5 divisions for each grid value to permit identifying a 1 unit signal value change. *The Graph for Average Bus Load %* window is displayed. You must be transmitting or receiving frames to see activity in the *Statistics Monitor* window.




To move the visible graph area, position the mouse pointer in the graph window. **Press** and **hold** both the **Shift key + Left** mouse button while using the mouse to move the graph on both horizontal and vertical axes.

To Zoom into an area, position the mouse pointer in the graph window. **Click** and **hold** the *Left* mouse button while dragging to create a bounding box that represents the zoomed area. This zoom box is used to identify both the location and the extent of an enlarged (or zoomed) view. The selected zoom view will fill the graph window content, with the x, y axes appropriately scaled. Zoom
is applied as soon as the zoom area is selected. You can click the **Back** button to undo the zoom.

The following buttons are available in the *Statistics Graph* window. The following is a description of each button and its purpose.

**<==** – Incrementally shift the entire *Statistics Graph* window horizontally to display previous time based graph data. This action occurs each time this button is selected but ceases when the beginning of the time scale (zero) appears. To automatically repeat this action, **press** and **hold** the **`left arrow`** key on the computer keyboard.

**==>** – Incrementally shift the entire *Statistics Graph* window horizontally to display subsequent time based graph data. This action occurs each time this button is selected. To automatically repeat this action, **press** and **hold** the **`right arrow`** key on the computer keyboard.

**Up** – Incrementally shift the entire Statistics Graph window vertically to display higher
engineering unit axis based graph data. This action occurs each time this button is selected but ceases when the beginning of the time scale (zero) appears. To automatically repeat this action, press and hold the U key on the computer keyboard.

**Down** – Incrementally shift the entire *Statistics Graph* window vertically to display lower engineering unit axis based graph data. This action occurs each time this button is selected but ceases when the beginning of the time scale (zero) appears. To automatically repeat this action, **press** and **hold** the **D** key on the computer keyboard.

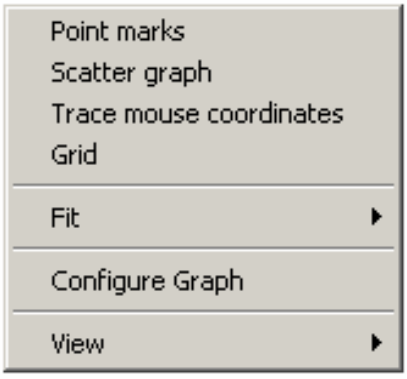
**Z-In** – Incrementally compresses both the time and ABL (%) scale in the *Statistics Graph* window. This action occurs each time this button is selected. To automatically repeat this action, **press** and **hold** the letter **I** key on the computer keyboard.

**Z-Out** – Incrementally expands both the time and ABL (%) scale in the Statistics Graph window. This action occurs each time this button is selected. To automatically repeat this action, **press** and **hold** the letter **0** key on the computer keyboard.

**Back** – Discards recent change and restores previous changes made to the Signal Graph. Stores the last 200 changes made to the Graph.

#### 5.2.5.1 Options:

In addition to the buttons, several options are available. **Right-click** in the *Statistics Graph* window to display the options menu.




The following options are available. A description of each option and its purpose follows.

**Point marks** – When selected (checked), the *Statistics Graph* window will display points in the graph line where each signal occurred. When not selected, no points will display. Point marks are not shown by default.

**Scatter graph** – When selected, the *Statistics Graph* window will display points only. The graph line connecting the points will not be visible. When **not** selected, the window will display data as dictated by any other selected option.

**Trace mouse coordinates** – When selected, the mouse pointer will include a constantly visible mouse pointer status box which will display the current mouse pointer position in x, y axis format and in ABL (%). When not selected, no mouse pointer status box will be visible. This tool is useful to precisely identify where the item of interest appears on the *Statistics Graph* window.

**Grid** – When selected, the *Statistics Graph* window will display grid lines that correspond to major x, y axis points in the window. When not selected, no grid lines are displayed. Grid lines are not shown by default.

**Fit** – When selected, three choices are available: *Width, Height*, and *Page*. When **Width** is selected, the existing graph data is scaled to fit into the entire horizontal width of the available *Statistics Graph* window. When **Height** is selected, the existing graph data is scaled to fit into the entire vertical height of the available *Statistics Graph* window. When **Page** is selected, the existing graph data is scaled to fit into the entire *Statistics Graph* window and is the equivalent to selecting both the **Width** and **Height** choices.

**Configure Graph** – When selected, the **Configure Graph** window is displayed and contains two tabs: the *General* tab and the *Graphs* tab. The *General* tab is used to define the range of the graph coordinates (from x1, y1: lower left hand corner to x2, y2: upper right hand corner). It also provides the following selections: **Point Marks** (previously described), **Mouse coordinates** (previously described in *Trace Mouse Coordinates*) and **Axis** (previously described in *Grid*). The *Graphs* tab provides a list of the signal sources and three buttons: **Color, Show/Hide** and **Show all**. To change the color graphed by a signal source, **click** the signal source to select it and click the **Color** button to display the *Color* window. Choose the desired color for the selected signal source then click **OK**. To hide a signal currently visible on the graph, **click** the signal source to select it and click **Hide**. To show a signal currently not visible on the graph, **click** the signal source to select it and click **Show**. To show all signal sources that are currently not visible on the graph, click **Show all**.

**View** – This option lets you display or hide the graph list in the graph window. **Unselecting** the *Graph List* choice will hide the list and allow more graphic data to be displayed horizontally. **Selecting** the *Graph List* choice will display the list of signals with horizontally reduced graphic data visible in the window. When visible, the *Graph List* can be undocked and moved to another area. Move the mouse pointer to the two horizontal lines at the top of the *Graph List*. **Press** and **hold** the *Left* mouse button and drag it to the desired location. To dock the *Graph List*, move it to the left side of the *Signal Graph* window.

#### 5.2.5.2 Configuring and using the Statistics Graph

Here are the steps to configure and use the Statistics Graph feature.

1. Check the hardware configuration. Select the **Configuration** menu, followed by the **Hardware Configuration** command. Verify that the applicable channels are selected and properly configured. Verify that the correct Gryphon IP address and port number are specified in the *TCP/IP Configuration*. Verify that the correct bus rate is selected.

2. Associate the desired database. Select the **Database** menu, followed by the **Associate Database** command. Verify that the desired databases are associated with the selected channels.

3. Display a *Scrolling Monitor* window by selecting the **Display** menu, followed by the **Scrolling Monitor** command (either *With Grid* or *No Grid*).

4. Display the *Statistics Graph* window. Select the **Display** menu, followed by the **Signal Graph** command.

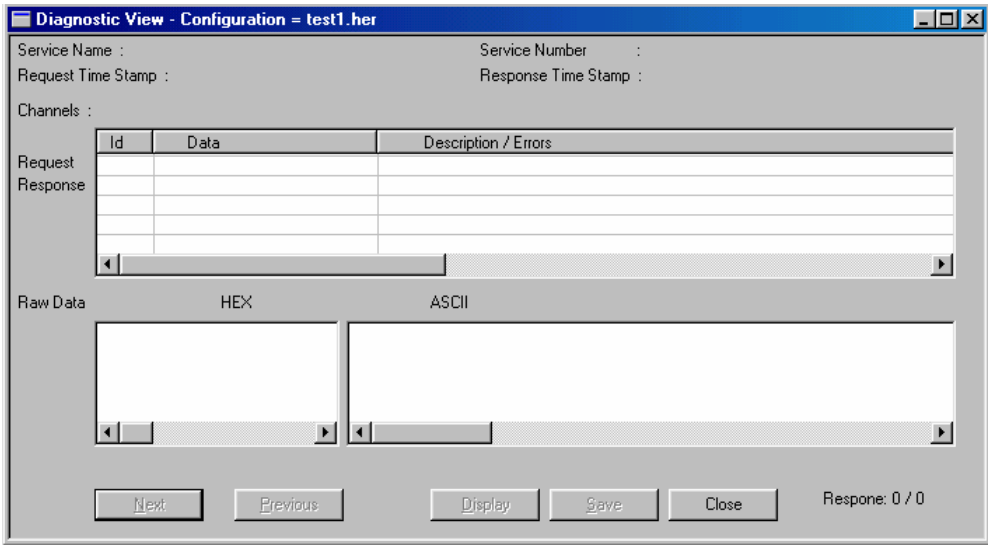
5. Click **Start**.

6. Display the *Statistics Monitor* window. Select the **Display** menu, followed by the **Statistics View** command.

7. **NOTE:** You must be ONLINE to access the *Statistics View* command. Also refer to the previous topics that describe the buttons and options available for the *Statistics Graph* window.

### 5.2.6 Diagnostic View

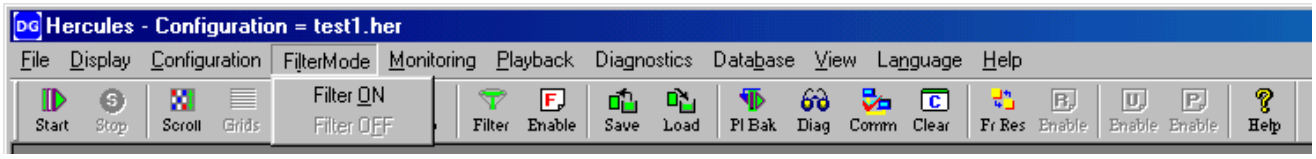
The *Diagnostic View* can be used during or after a diagnostic session to interpret packet information exchanged during execution of diagnostic services or during a diagnostic session. Select the **Display** menu, followed by the **Diagnostic View** command to display the following window.



This view displays the diagnostic service information (request packets and response packets) for diagnostic services executed via the *Diagnostics* menu. Based on the menu option selected, the appropriate protocol diagnostics service will be executed. A dialog displays the diagnostic service information, the request packets, and the response packets. Based on the request and response packet information, appropriate text and errors are displayed. *Diagnostic* services must first be specified and enabled in an active *Diagnostic Configuration* (see Section 9: *Diagnostics Menu*). The interpretation of packet information for each diagnostic service is available only in the OFFLINE mode.

To select a frame ready for transmit, **right-click** on the blank **Request Response** box in the *Diagnostic View* window. Responses from the ECUs will be sent back in bytes in this same box. You can now **Save** this configuration, and all information will be saved under your named (.txt file), appearing in Notepad format. A Hex and ASCII dump of the raw data is also displayed in the *Raw Data* box in the *Diagnostic View* window.

# 6. Filter Mode Menu

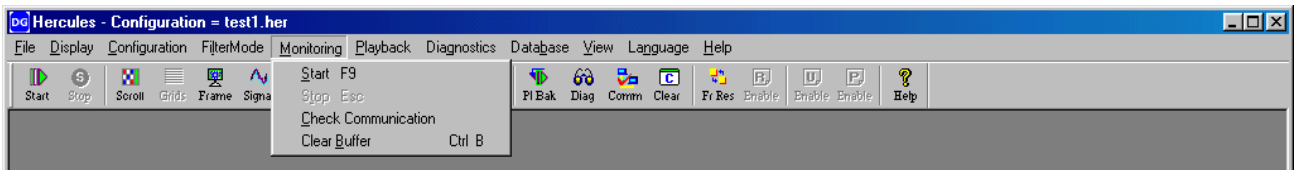



The *FilterMode* lets you activate (**select** the **Filter On** command) or deactivate (**select** the **Filter Off** command) the filtering mechanism for a monitoring session, once filtering has been enabled in the *Filter Table* or the *Global Options* window (accessed from the **Configuration** menu). The filtering mechanism will let you pass or block certain frames, based on conditions you specify in the *Filter Table*.

The filtering mechanism governs frame traffic throughout Hercules. Therefore, if filtering has been enabled, a monitor will receive frames once the *Filter Table* has processed them. Further, any frames blocked by the active filters will not be received.

Information about how to set up filters is described in Section 4.5.

# 7. Monitoring Menu




The *Monitoring* menu lets you put Hercules in ONLINE or OFFLINE mode (i.e., to **Start** or **Stop** the monitoring of frames). Monitor types for the viewing of received frames can be selected from the *Display* menu. Most configuration tasks require that you put Hercules into OFFLINE mode (i.e., **Stop** frame monitoring) before you can perform them. The Hercules current mode (ONLINE or OFFLINE) is indicated in the bottom boxes of the main Hercules screen.

If you wish to enable the Hercules filtering mechanism, frame responder, or user-configured scheduler – or a program block application – for a monitoring session, you must first configure the feature for use. Then you must enable the feature by selecting ( ) its box in the **Global Options** window (accessed from the *Configuration* menu).

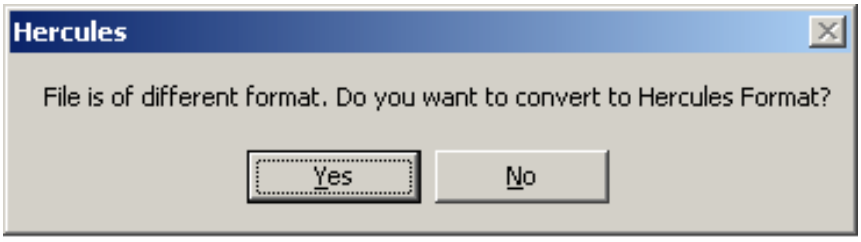
The remaining commands in the *Monitoring* menu, **Check Communication** and **Clear Buffer**, let you test communication with Hercules and clear the current buffer of its contents. To view these operations, you must have an *Information View* or *Offline Buffer View* open, respectively.

# 8. Playback Menu

The *Playback* feature lets you recreate a frame transmission session by "playing" a saved buffer content back onto the bus, with respect to frame timestamps. Frames from a loaded buffer file are transmitted at an interval equivalent to those marked by the timestamps from the original session, and the *Playback* window lists the number of frames transmitted. You may play back the contents of a current buffer or a previously saved buffer file by following the directions in this section.

> **NOTE:** Transmit and receive message playback works for all protocols. But the J1850-3H PWM (HBCC card) only plays back transmit messages.

To open a saved buffer file, select the **Display** menu, followed by the **Offline Buffer View** command to display the *OfflineBuffer View* window. Click **Open** in the *Offline Buffer View* window, and **`Select`** your previously saved **(`.txt`, `.csv`,** or **`.bin`**) buffer file. To import Vector files
(.asc) and CAT files, type "***.***" into the file name box and press **Enter** to display all files. Select the desired import file and click **Open**. The Hercules dialog is displayed. Click **Yes** to import the file.




You can also use the **Select Buffer** option to directly open the *OfflineBuffer View*. The content of the file should now appear in the *OfflineBuffer View*, where you may view *Absolute* or *Relative* timestamps by selecting the appropriate options to the right of the view. A description of the *Offline Buffer View* is in Section 5.2.1.


Select the **Playback** menu, followed by the **Start Playback** command to display the *Playback* window. You can choose either **Play Continuous** (playback will continue until you click **Stop Playback**) or **Play Once** option (buffer will be played back only once) for buffer playback. Once you select a playback method, playback occurs, but is not seen on a monitor. However, it will tell you how many frames were transmitted.

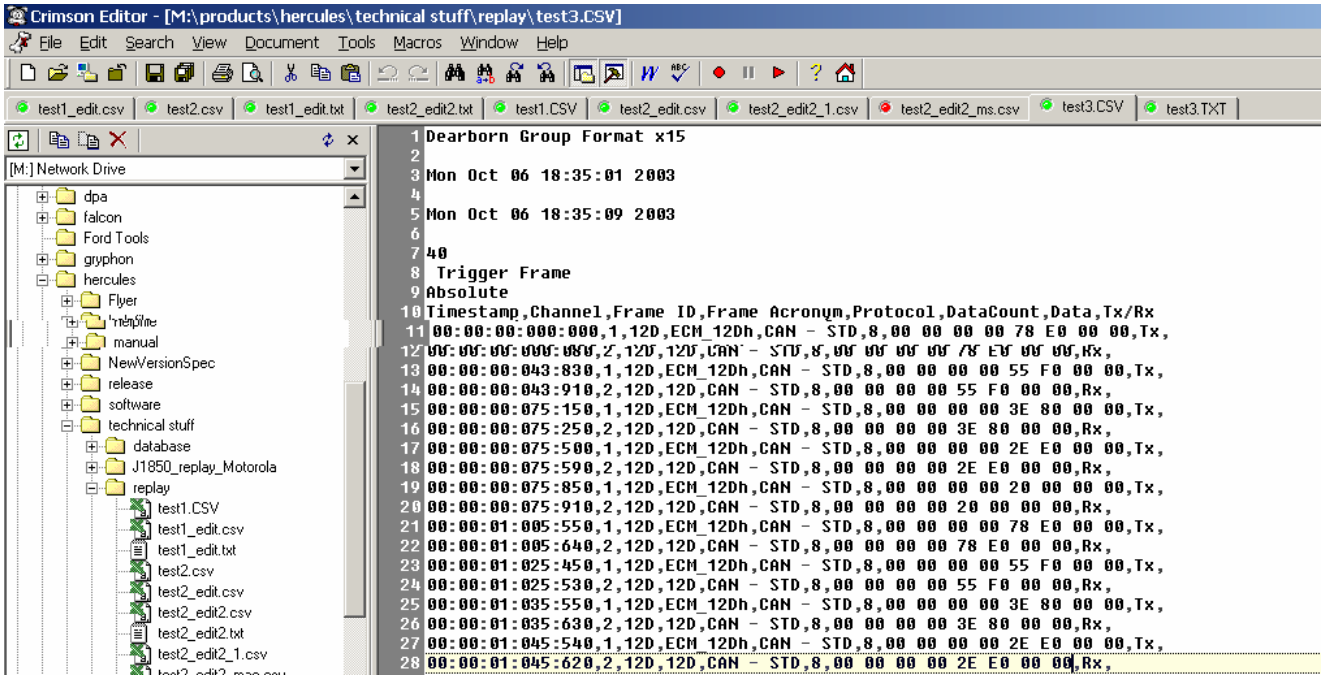
You will see the number of frames that are being transmitted as *Start Playback* toggles to *Stop Playback* and then returns to **Start Playback** when the playback is complete. The number that appears in the *FramesTransmitted* box should be equal to the number of frames stored in the original buffer file.

> **NOTE:** An error message will appear beside the *Playback* window if you have no information stored in the active buffer. Click **OK** in this Hercules window and open a saved buffer.

## *8.1 Editing Playback Files in Excel (CSV) format*

If the .CSV file is imported into Microsoft Excel and then saved, the required specific formatting is lost. However, this can be corrected using a text editor. The following illustrations show details about the required file format. Specifically, in the required file format, the first six lines do not contain extra commas. Also, a comma is at the end of each message line (TX or RX).

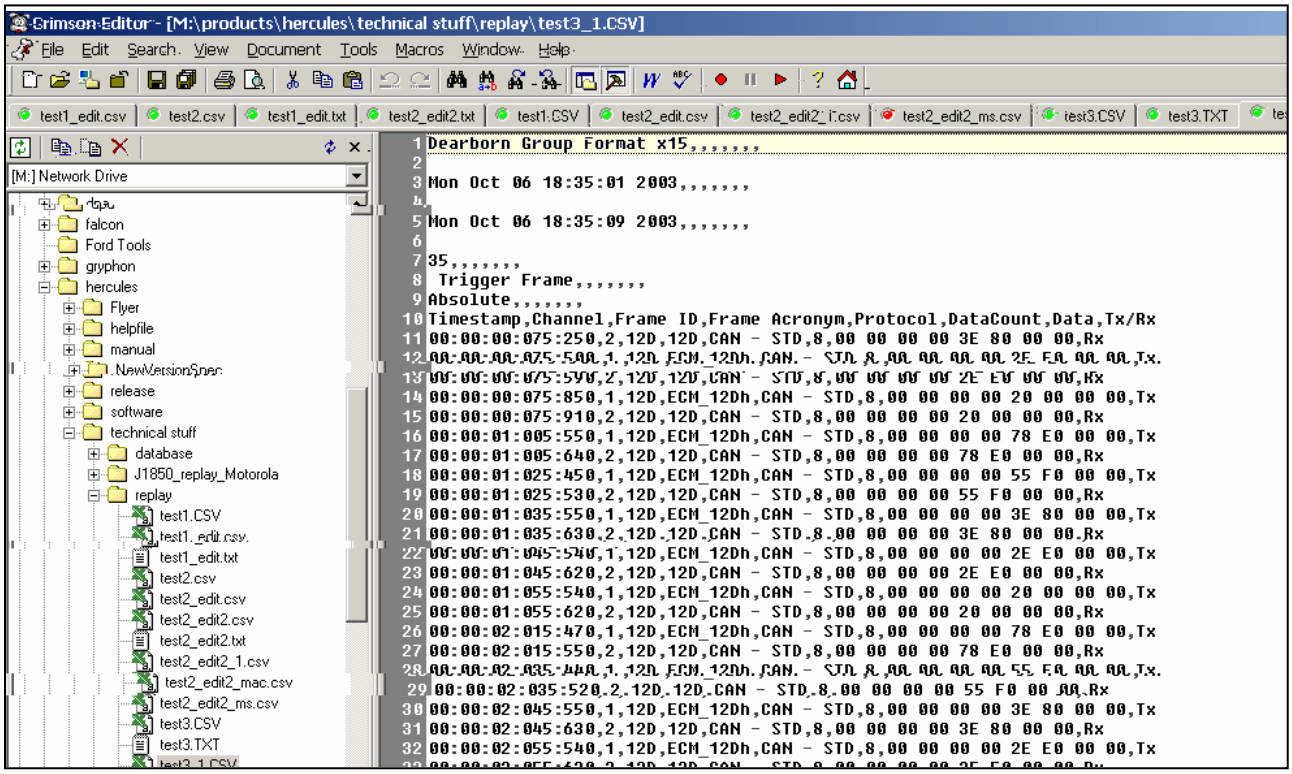
### 8.1.1 Required File Format




### 8.1.2 File Format saved by Excel (CSV)

The saved Excel file in CSV format contains the following differences:

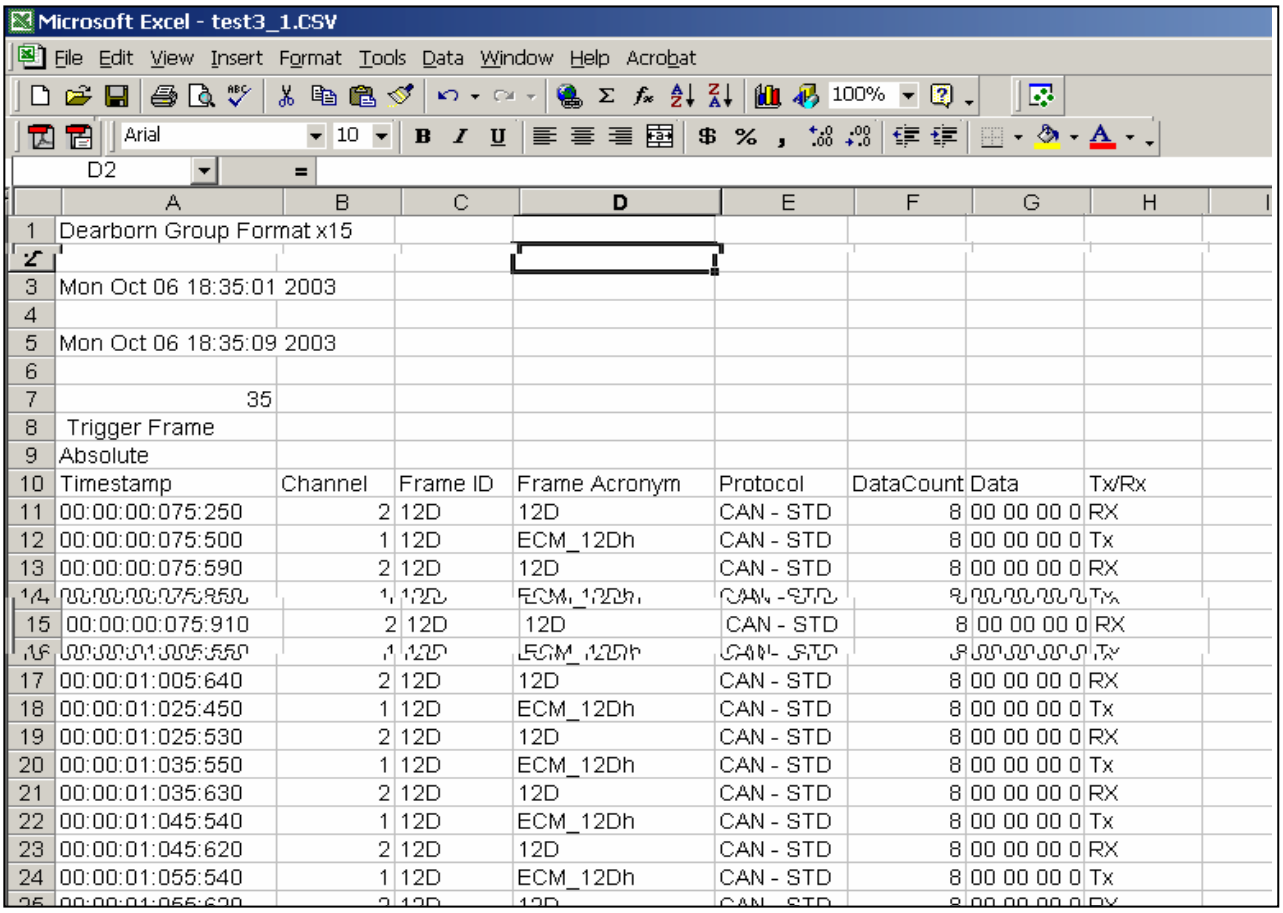
1. Extra commas at the end of the first six lines.
2. Missing comma after each message line (TX or RX).




Once changed, the file will work. The editing must be done in an editor program using a
Search/Replace (Tx with Tx, and Rx with Rx,) to correct.

### 8.1.3 Creating New Files within Excel and saving as (CSV)

The file needs to contain the above information. Frame Acronym is a required column that will repeat the Frame ID information.



Microsoft Excel - test3_1.CSV

File Edit View Insert Format Tools Data Window Help Acrobat

Arial 10 100%

D2 =

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Dearborn Group Format x15 | | | | | | | |
| 2 | | | | | | | | |
| 3 | Mon Oct 06 18:35:01 2003 | | | | | | | |
| 4 | | | | | | | | |
| 5 | Mon Oct 06 18:35:09 2003 | | | | | | | |
| 6 | | | | | | | | |
| 7 | 35 | | | | | | | |
| 8 | Trigger Frame | | | | | | | |
| 9 | Absolute | | | | | | | |
| 10 | Timestamp | Channel | Frame ID | Frame Acronym | Protocol | DataCount | Data | Tx/Rx |
| 11 | 00:00:00:075:250 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 12 | 00:00:00:075:500 | 1 | 12D | ECM_12Dh | CAN - STD | 8 | 00 00 00 0 | Tx |
| 13 | 00:00:00:075:590 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 14 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 15 | 00:00:00:075:910 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 16 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 17 | 00:00:01:005:640 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 18 | 00:00:01:025:450 | 1 | 12D | ECM_12Dh | CAN - STD | 8 | 00 00 00 0 | Tx |
| 19 | 00:00:01:025:530 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 20 | 00:00:01:035:550 | 1 | 12D | ECM_12Dh | CAN - STD | 8 | 00 00 00 0 | Tx |
| 21 | 00:00:01:035:630 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 22 | 00:00:01:045:540 | 1 | 12D | ECM_12Dh | CAN - STD | 8 | 00 00 00 0 | Tx |
| 23 | 00:00:01:045:620 | 2 | 12D | 12D | CAN - STD | 8 | 00 00 00 0 | RX |
| 24 | 00:00:01:055:540 | 1 | 12D | ECM_12Dh | CAN - STD | 8 | 00 00 00 0 | Tx |
| 25 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

# 9. Diagnostics Menu

Diagnostic services are supported for two CAN specifications – ISO 15765 and GMLAN 3110
(version 1.5) – as well as J1979 support for J1850 networks. Only one version is available at a time. To view the current diagnostics type chosen (GMLAN Diagnostics or ISO Diagnostics), select the **Configuration** menu, followed by the **Global Options** command.

To use the diagnostic functions on this menu, you must have *Diagnostic* frames available in the active database.

## *9.1 Setting up or Loading a Diagnostic Configuration*

The first step in accessing diagnostic functions for use during a monitoring session is to load a previously saved Diagnostic Configuration or to set up a new one.

When you first start Hercules, a default *Diagnostic Configuration* file (default.cfg) is loaded. It is an empty, read-only file, and you must use the **Save Diagnostic Configuration** command in the *Diagnostics* menu in order to save any changes you wish to make. Each subsequent time Hercules
is loaded, it uses the last saved configuration (.cfg) file.

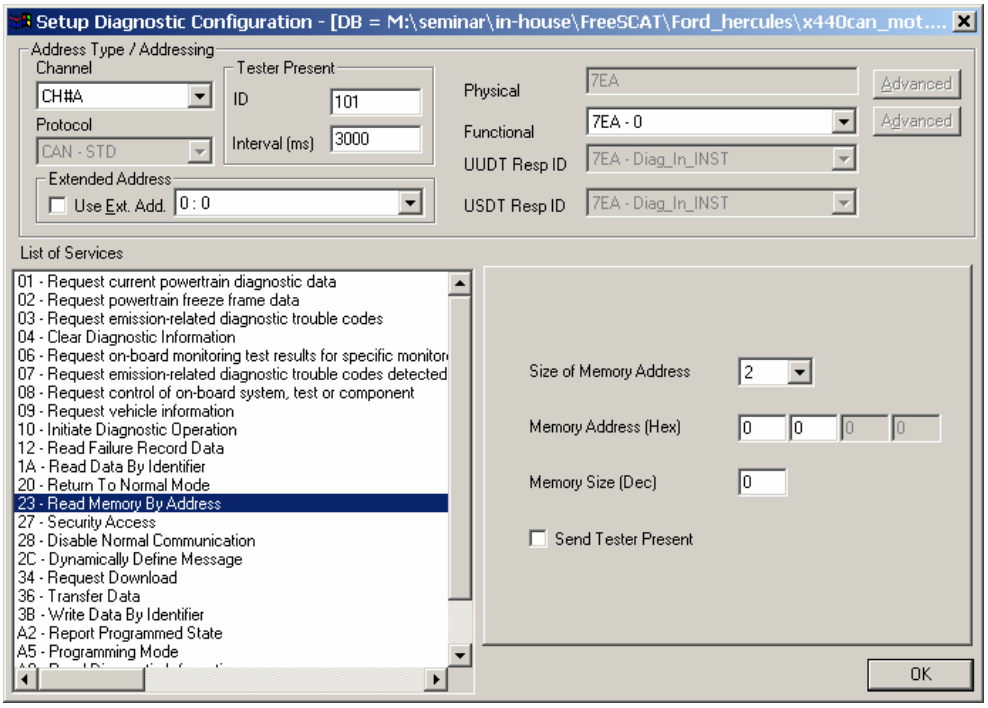
To load a previously saved configuration for use, select the **Diagnostics** menu, followed by the **Load Diagnostic Configuration** command and select the appropriate saved .cfg file. Diagnostic files are also saved and loaded with the **.her** configuration.

A blank configuration file called “new.her” is available. This file can be loaded using the **Load Configuration** option. This file is located under the Hercules folder where Hercules is installed. If the Hercules software program is installed in C:\Program files, this file is installed in C:\Program Files\Hercules.

### 9.1.1 Setting up a GMLAN Diagnostic Configuration

To set up a new diagnostic configuration for GMLAN, use these steps.

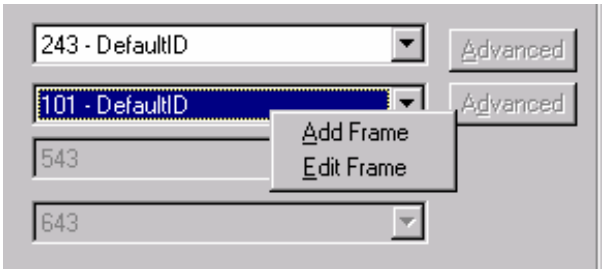
1. Select the **Diagnostics** menu, followed by the **Setup Diagnostic Configuration** command to display the following dialog. (Assumes **GMLAN Diagnostics** is selected in **Global Options)**.




2. Select the appropriate **Channel** for the diagnostic frame you wish to reference.

3. Setup up the *Tester Present* by entering the **ID** and **Interval**. (The *Time Interval* may have also been specified under *Configurations* > *Global Options*.) If **Send Tester Present** is checked (☑) in the Service Configuration area, the Tester Present message will be sent with the specified ID at the given interval.

4. To set up the *Functional* or *Physical* identifier used, you can do one of two things – use the drop down arrow for those IDs previously entered (see section 3.3.8) or **right-click** on the mouse while on the field to enter new values. Please note that 01 through 09 are ODBII services and therefore only Physical addressing is allowed. The *UUDT Response ID* and *USDT Response ID* are pre-determined by GMLAN and do not need to be configured.




5. If Extended Address is used, click the box to enable. You can select only those Identifiers that were previously setup. Please see section 3.3.8 for details on how to do this.

6. Now by clicking on each individual service in the List of Services, the Service Configuration area will change. For detailed information about specific services, please consult the GMLAN ENHANCE DIAGNOTICS TEST MODE SPECIFICATION – GMW3110 or the ISO 15765 specification.

#### 9.1.1.1 GMLAN Implementations for Select Services

Timeouts, for both physically and functionally addressed services, have been implemented for the following diagnostic services:

- 1A (Read Data By Identifier)
- 3B (Write Data By Identifier)
- A9 (Read Diagnostics Information)

The Diagnostics view will stop updating responses for these services on time out and display the message "Diagnostic Service Timeout" in the Diagnostic View window.

The initial time out value is set to 10000 milliseconds (10 seconds) and is user configurable. This value is located in the 'DGHERCULES.INI' file (located in the Windows or WINNT folder) on your computer. Users can modify this value by modifying the parameter "TimeOutValue" under the section [DIAGNOSTICS] in the "DGHercules.ini" file.

For further diagnostics configuration in the '.INI' file, contact DG Technical Support.

#### 9.1.1.2 New GMLAN Service Implementations

The following GMLAN services have been implemented as described in GMLAN Enhanced
Diagnostic Test Mode Specification GMW 3110 (version 1.5):

**ReadDataByParameterIdentifier ($22) service**

The purpose of the ReadDataByParameterIdentifier service is to allow a tester access to ECU data by requesting one or multiple Parameter Identifier(s) (PID). This service is to be used during the development of a device and for special test conditions. It is not intended to be used in lieu of service $AA for manufacturing and/or field service diagnostics.

The PID interpretation is ONLY applicable for OBD PID ranges. The enhanced PID interpretation will not decode in the ASCII window.

**DefinePIDByAddress ($2D) service**

The purpose of the $2D DefinePIDbyAddress service is to provide the ability to map ECU variables to a dynamic Parameter Identifier (PID) using ECU memory addresses. The resulting PID defined by this service can then be requested via diagnostic service $22 or diagnostic service $AA.

This service ($2D) supports defining a single PID per request (multiple PIDs can be defined in a given ECU, using multiple requests).

This service is intended for use during the development cycle of a device in order to allow access to data that may not be available via another diagnostic service. This service is only intended for use in engineering development. It will not be used in field service applications.

**GMLAN diagnostics ID ranges**

The following GMLAN diagnostic ID ranges are supported.

$241 – $25F – USDT Request
$541 – $55F – UUDT Response
$641 – $65F – USDT Response

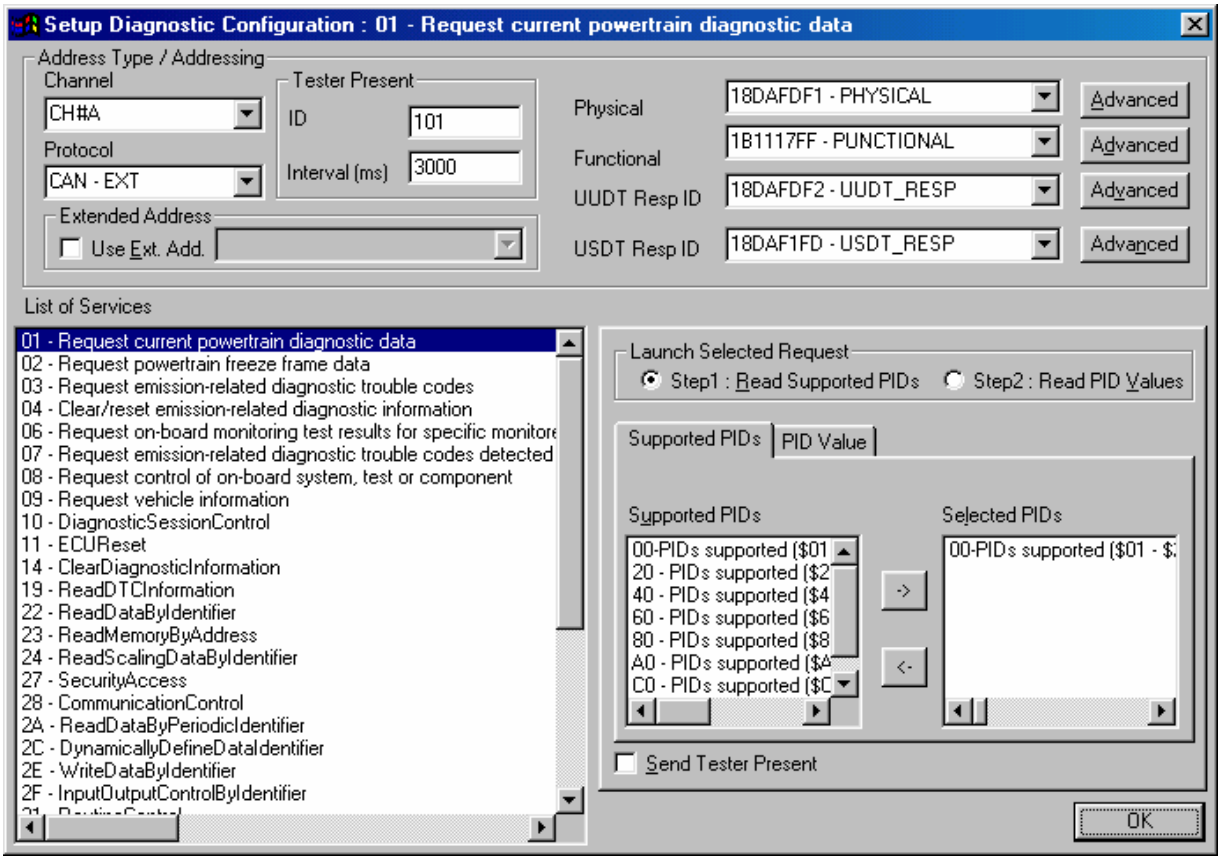
**Recommended BTR settings for Hercules and S-CAT**

| | BTR0 | BTR1 |
|---|---|---|
| HS DW | $80 | $2B |
| SW normal (33.3 Kb/s) | $4F | $1B |
| SW HS (83.3 Kb/s) | $47 | $18 |

### 9.1.2 Setting up an ISO Diagnostic Configuration

To set up a new diagnostics configuration for ISO15765, perform the following steps.

1. Select the **Diagnostics** menu, followed by the **Setup Diagnostic Configuration** command to display the following dialog. (Assumes **ISO Diagnostics** is selected in **Global Options**).

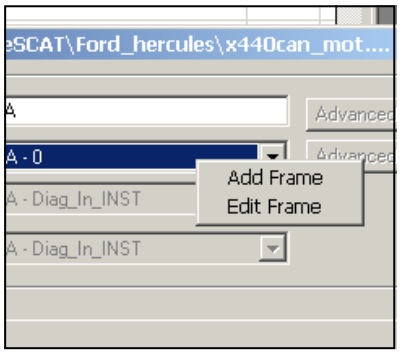



**General Diagnostic Configuration Screen**

2. Select the appropriate **Channel** and **Protocol** for the diagnostic frame that you wish to reference.

3. Setup up the *Tester Present* by entering the **ID** and **Interval**. (The Time Interval may have also been specified under *Configurations* > *Global Options*.) If **Send Tester Present** is checked in the Service Configuration area, the Tester Present message will be sent with the specified ID at the given interval.

4. To set up the *Functional* or *Physical* identifier used, you can do one of two things – use the drop down arrow for those IDs previously entered (see section 3.3.8) or right mouse click while in the field to enter new values. Please note that 01 through 09 are ODBII services and therefore only Physical addressing is allowed. The *UUDT Response ID* and *USDT Response ID* are configured in the same manner.



5. If Extended Address is used, click the box to enable. You can select only those Identifiers that were previously setup. See section 3.3.8 for details on how to do this.

6. Click **Advanced** to display the *Advanced Configuration* dialog. Either of two dialogs may appear – a *29-bit CAN* dialog or a *J1850* dialog.

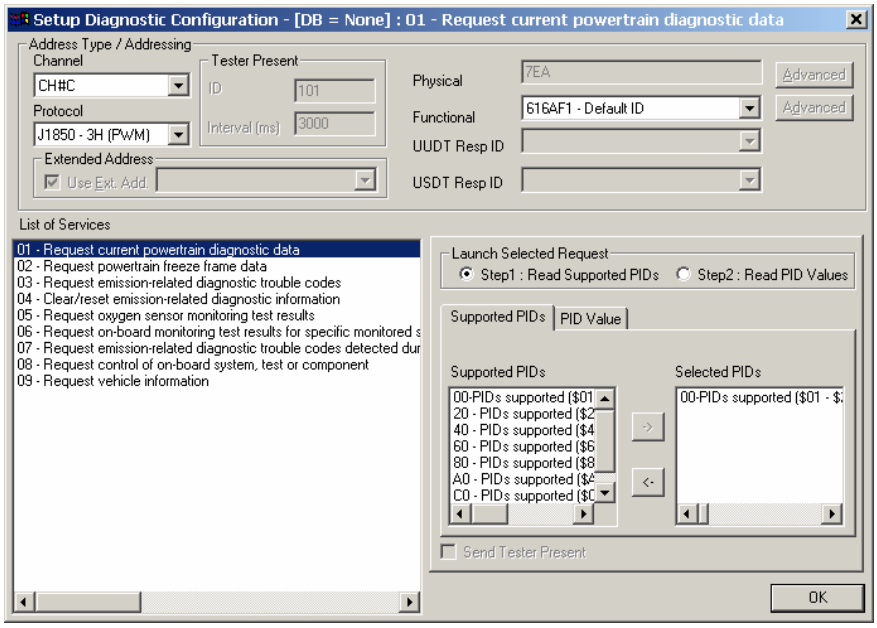


7. Now by clicking on each individual service in the List of Services, the Service Configuration area will change. For detailed information about specific services, please consult the ISO 15765 or ISO 14229 specifications.

### 9.1.3 Setting up J1979 Diagnostics

To set up a new configuration for J1979 diagnostics, perform the following steps.

1. Select the **Diagnostics** menu, followed by the **Setup Diagnostic Configuration** command to display the following dialog. (Assumes *ISO Diagnostics* is selected in *Global Options*).



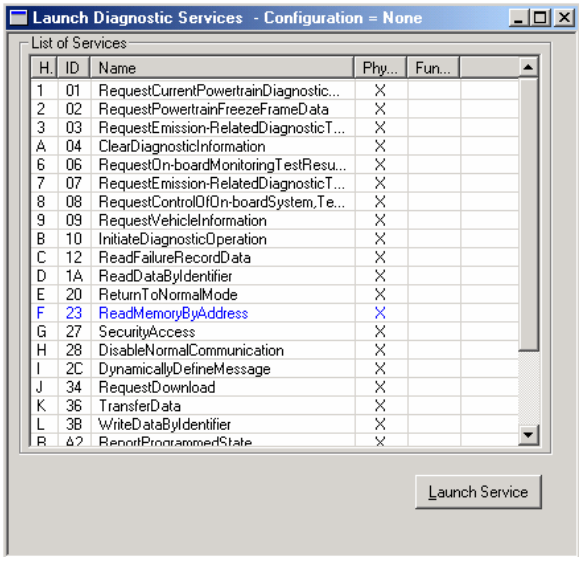

2. Select the appropriate **Channel** and **Protocol** for the diagnostic frame that you wish to reference.

3. To select the **Functional** identifier use the drop down arrow for those Ids previously entered (see section 3.3.8).

4. Now by clicking on each individual service in the *List of Services*, the Service Configuration area will change. For detailed information about specific services, consult the SAE J1979 specification.

## *9.2 Launch Diagnostic Services*

To setup or load a configuration, you must be in the ONLINE mode. To send diagnostic requests, select the **Diagnostic** menu, followed by the **Launch Diagnostic Services** command to display the following window.




This window lists all available services that can be sent on the bus for transmission. Frames can be transmitted *physically* or *functionally*, by clicking the desired field next to the service. If sent physically, the transmission will be addressed to one node (one receiver). If sent functionally, the transmission will send the same message to all nodes present on the network.

To send the service, **select** the service and either **click** *Launch Service*, or **double-click** the
*message,* or **press** the *hotkey* listed in the left most column.

## *9.3 Utilizing diagnostic services*

The results of the diagnostic services can be seen (and saved) in the *Diagnostic View* or DPIDs can be viewed in the *Signal Monitor*.

To start an online session, click **Start** in the toolbar. Select the **Diagnostics** menu. The service(s) you configured should be enabled on this menu. Click on the *name* of the service you wish to activate.

Select the **Display** menu, followed by the **Diagnostic View** command. This view displays the packets exchanged during online execution of the selected diagnostic service.

To save all the service sent with their responses in a simple text file, click **SAVE** and enter your desired file name.

> **A Special Note Regarding Errors:** In a multi-frame response, if the ECU request is delayed 200 ms or more, the hardware will generate a USDT: TIMEOUT ERROR. If the ECU sends a response in improper sequence, the hardware generates a USDT: SEQUENCE ERROR.

## *9.4 Simple Diagnostic Tutorial*

Hercules diagnostics is comprised of services. These services are request messages sent by tools for responses from devices. Basically, the tools make requests and ECUs send responses. Sometimes these requests are generically sent on the bus with "technically" no destination, but some device is programmed to respond. These are called a *functionally addressed message*. Other requests are sent on the bus to a specific ECU (or address). These are *physically addressed messages*. The result is requests/responses that are formatted as either functionally or physically addressed messages.

There are two types of diagnostics – *Legislated* and *Enhanced.* The Legislated diagnostics are those services which are specified by governments and must be present. Enhanced diagnostics are not required and are used mainly for repair or service functions. Typically, Legislated services are functionally addressed, while Enhanced are physically addressed. However, there may be exceptions.

For some services, it is required that the ECUs remain in the diagnostic mode. This is done by sending a **Tester Present** message on the network at a given time interval. The ECU looks for that message to be present in order to remain in the diagnostic mode The ECU will timeout (revert to normal mode) if the message is not present on the bus.

For Diagnostics on CAN (ISO 15765), there is a way to break up large chunks of data into CAN size frames. This process is called *Unacknowledged Segmented Data Transfer* (USDT). After the message is split up, the last frame may not fill up the entire eight bytes. So padding is required – that means to fill all unused bytes. This padding could be all 00's, all FF's, or random values. This is very important, because ECU designers will program those devices to only consume 8 byte messages and ignore shorter messages. So even if the data is valid, that ECU might ignore it simply because of the data length.

### 9.4.1 Hercules Support

Hercules currently contains support for:

**CAN**

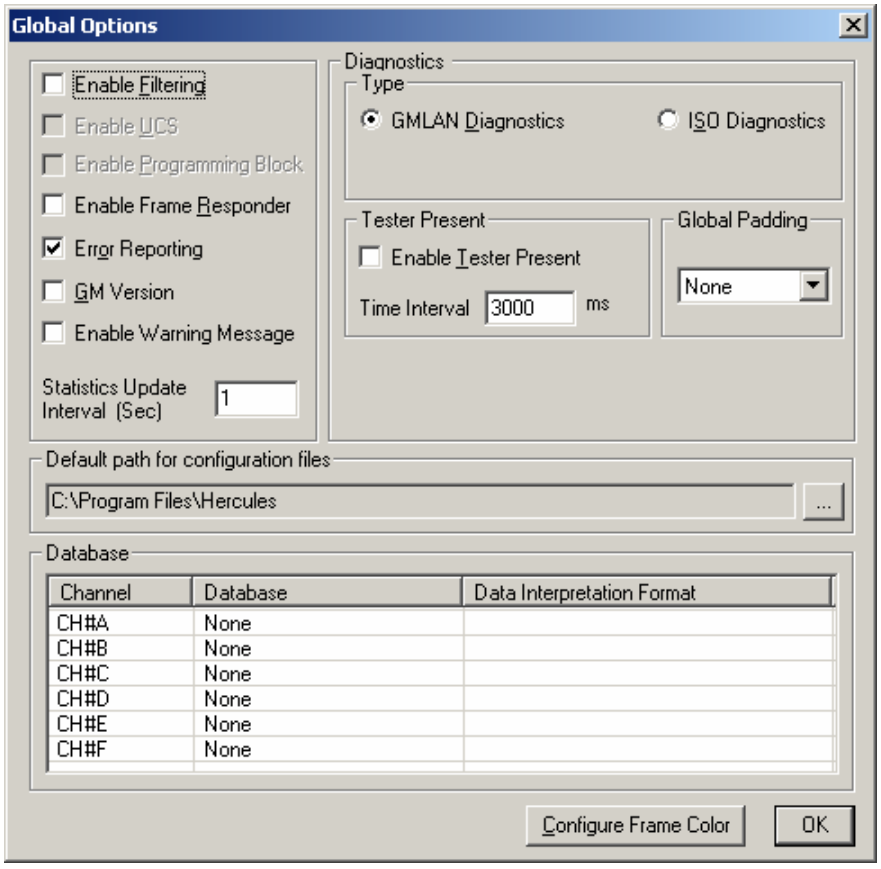
- SO 15765 with ISO 14229 services
- GMLAN 3110 with ODBII legislated services

**J1850**

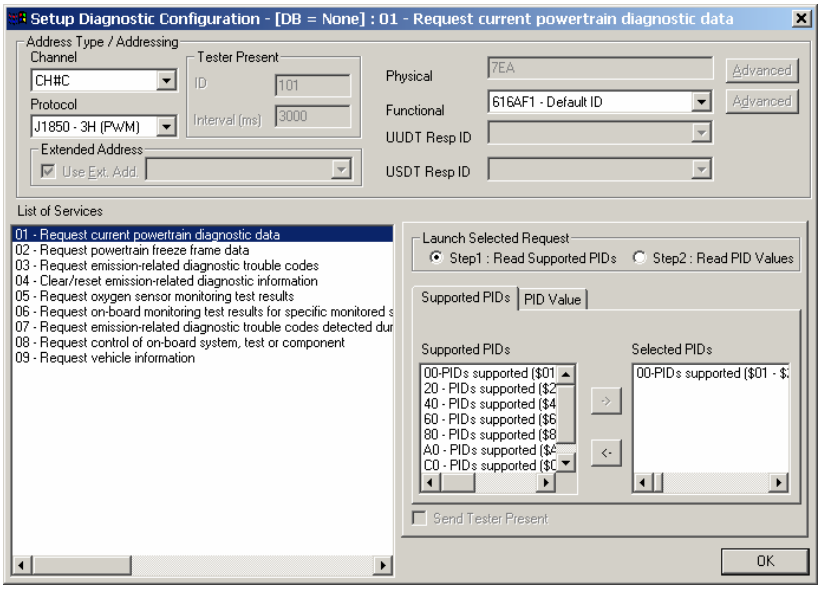
- J1979 Services

Under the Configuration *Global Options*, Hercules supports:

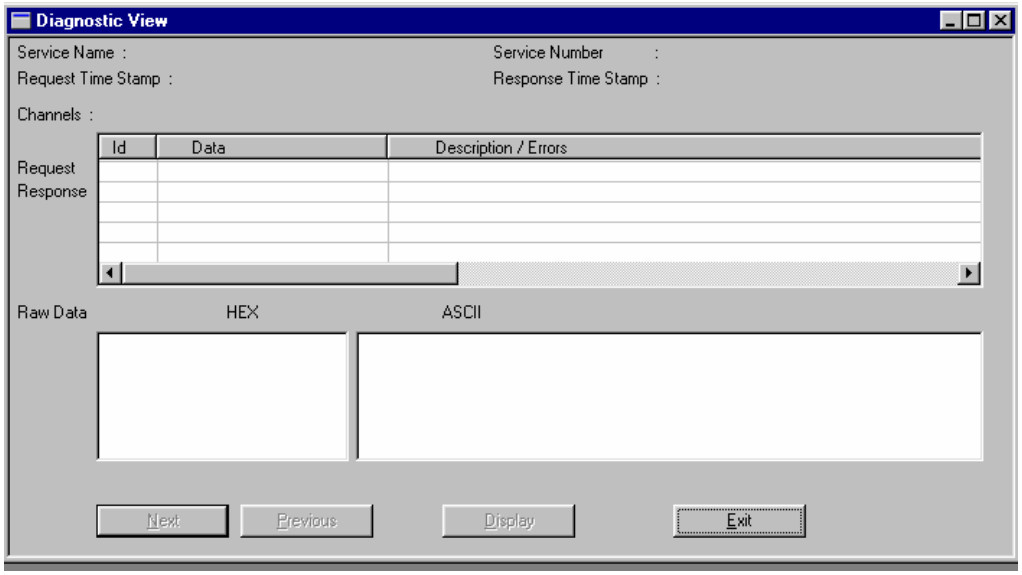
- Enabling Tester Present message for all services
- Setting the Tester Present message time interval
- Global Padding: None, All 00s, All FFs



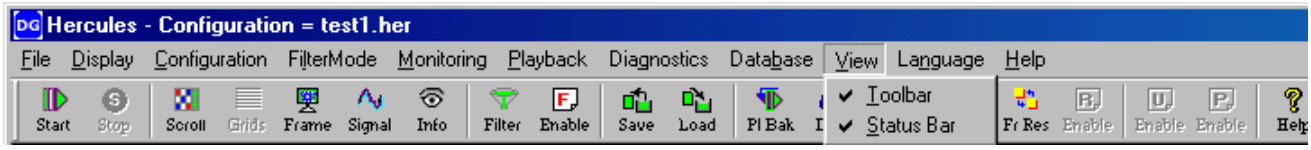

Hercules supports decoding P-codes, C-codes, PIDs, etc. from the appropriate diagnostic services. (All of this information is held in a Windows INI file, so it is quickly editable if needed.)



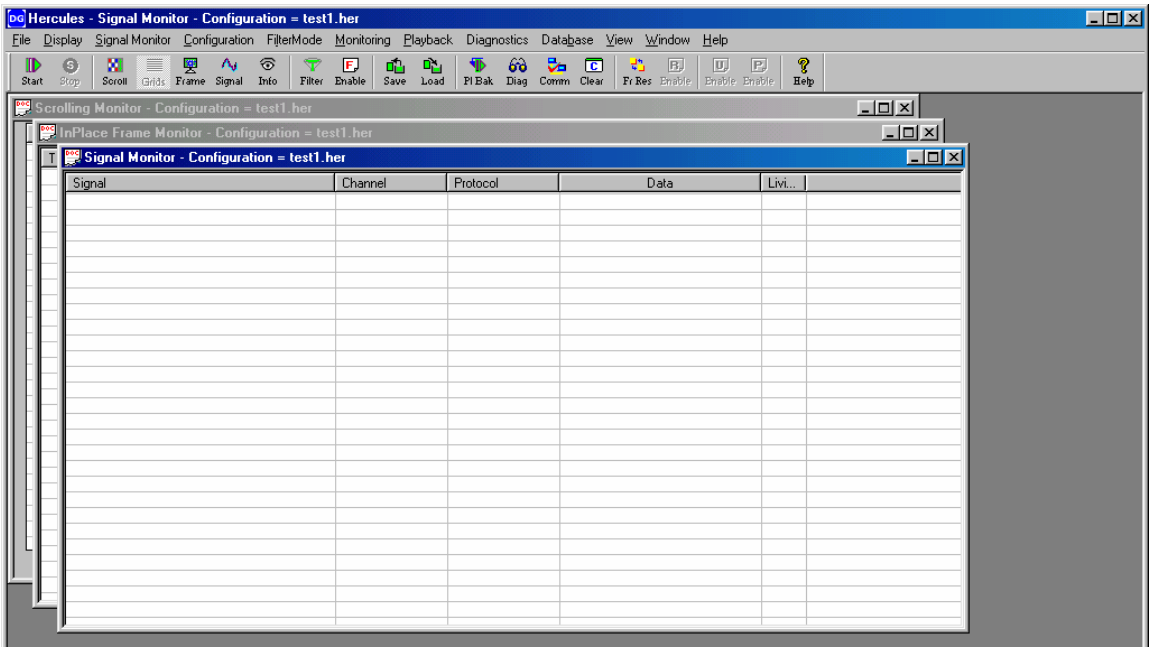
The Display for the Diagnostics services is the *Diagnostic View*. Requests will be listed along with their matched response. Errors are also displayed. This information can be saved in a text file.



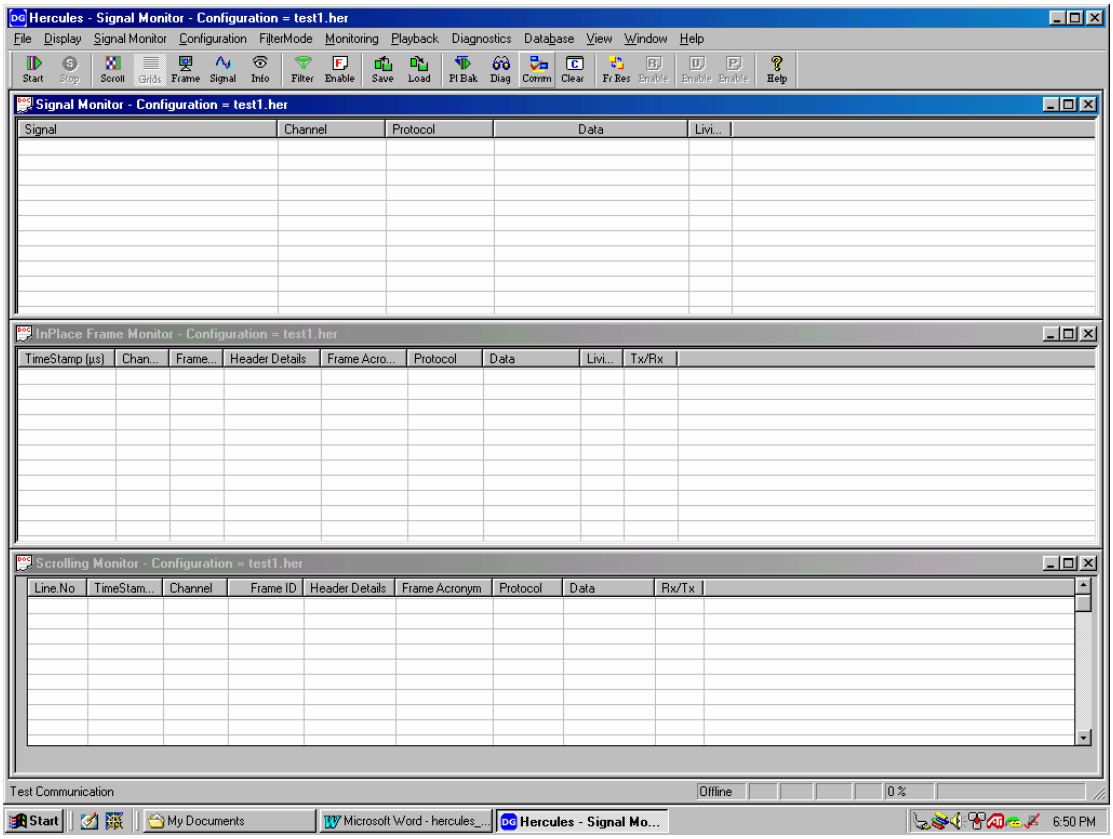

# 10. View Menu




The View menu lets you select the following screen options: *toolbar* and/or the *status bar*. A check mark appears beside the selected option. If one or more monitors have been selected, a *Window* menu will also appear next to the *View* menu (which toggles from *Language Menu*), and you can select either a **Cascade** or **Tile** view, as shown below.

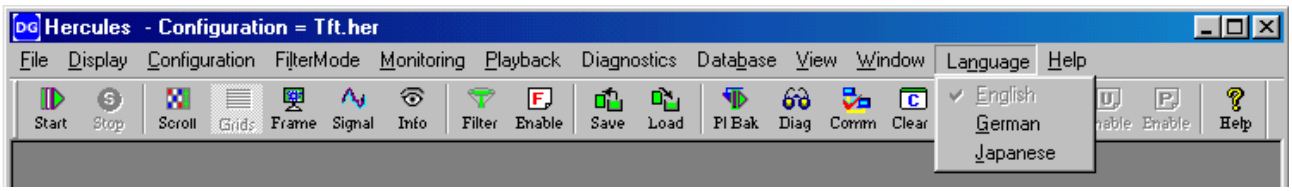



**“Cascade” View of Monitors**




**“Tile” View of Monitors**

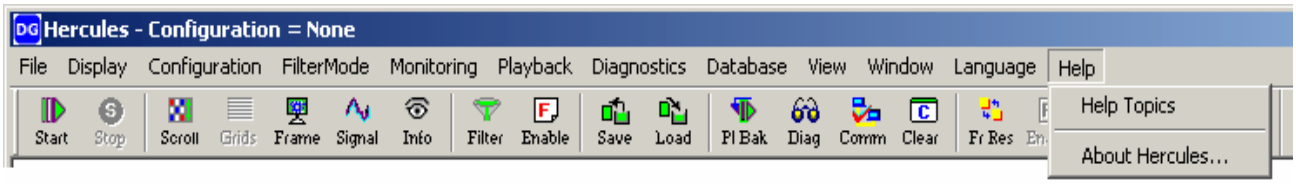
# 11. Language Menu




The **Language** menu lets you select *English*, *German* or *Japanese* as the language for menu
option viewing. It is only accessible when no other windows (e.g., monitors, views, tables, etc.) are opened. If any of these windows are opened, the Language menu will not be visible.

# 12. HELP Menu

The Help menu gives you access to Hercules-specific information. The following options are available; *Help Topics*, *Update Firmware* and *About Hercules*.




## *12.1 Help Topics*

Select the **Help Topics** option to start the Adobe Acrobat reader and display the Hercules documentation in PDF format.

> **NOTE:** Both the Adobe Acrobat reader and the Hercules documentation PDF files must be available.

Context-sensitive help is also available for most Hercules operations. For example, with focus on an open Transmit Frame Table, pressing **F1** will display the Transmit Frame Table topic.

## *12.2 About Hercules*

Selecting the **About Hercules** option displays a window that identifies the version number of Hercules, the Gryphon firmware version, and lists any database and configuration files currently loaded.

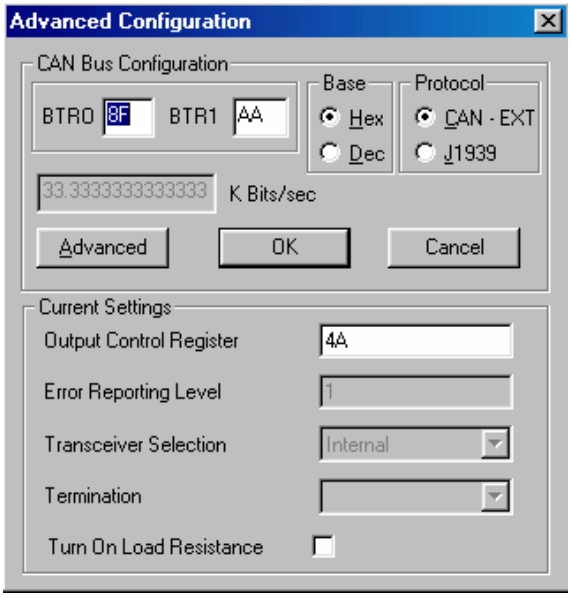
# A. Appendix A: Supported Hardware Modules

**NOTE: The following hardware modules must be installed to display their corresponding dialog screen.**

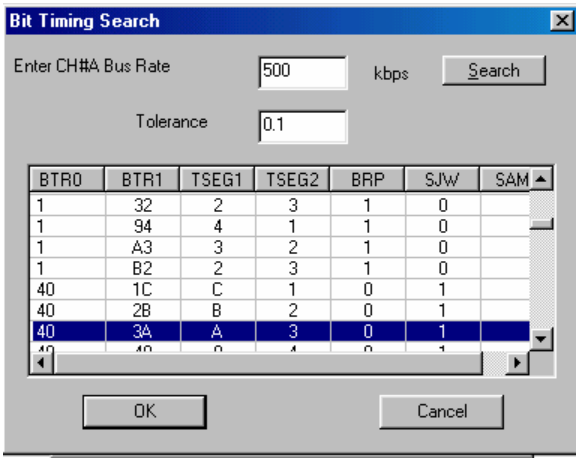
## *A.1 CAN 82527 modules*

DG-CAN-82527 uses an ISO 11878-2 physical layer, while DG-CAN-82527sw has a single wire
(J2411) physical layer.

The DG-CAN-82527 and DG-CAN-82527sw (single-wire physical layer) modules have the same configuration box. Click **Advanced Configuration** to display the following dialog.




To change a channel's bus speed, you can provide the proper *BTR0* and *BTR1* values for the rate you desire or click **Advanced** to have Hercules help you select BTR values. (BTR = Bit Timing Register – See CAN Specification for details or Intel's 82527 specification). Click **Advanced** to display the **Bit Timing Search** dialog.




Type the desired bus speed in the *Enter CH#X Bus Rate* box, along with the *Tolerance*, then click **Search**. Then scroll down and select the desired speed. Click **OK** to return to the **Advanced Configuration** dialog. The new bus speed will appear in the *K Bits/Sec* box (below the *BTR* box).

- The *Base* section lets you view the values in hexadecimal (*HEX*) or decimal (*DEC*).

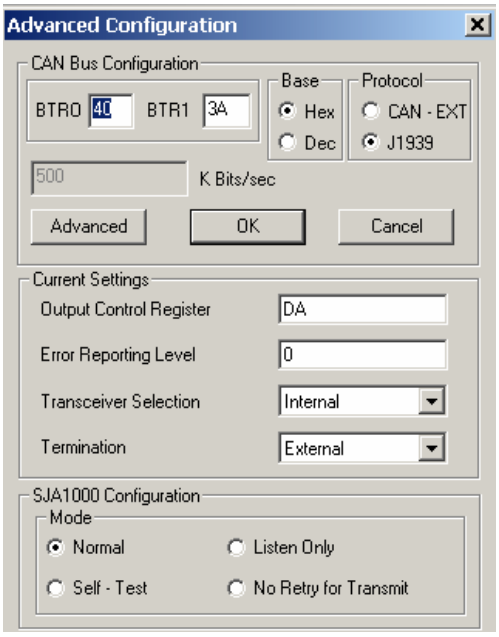
- The *Protocol* section lets you decide how to interpret 29-bit CAN messages defined in the database. If you select *J1939*, then all 29-bit message IDs will be decoded as per the SAE standard. If *CAN-EXT* is selected, then message ID will be decoded only if the GMLAN option is selected under **Global Options** (see section 4.10).

- The *Current Settings* section is specific to the physical interface. The *Output Control Register* is the value to put in the 82527 bus configuration register. This value should not be changed, unless you are using an external transceiver or have a clear understanding of the interface. The *Error Reporting Level* section is currently not configurable. The *Transceiver Selection* lets you choose between using the *Internal* (on-board) transceiver or an *External* transceiver. Consult the hardware manual for details on this application. *Termination* lets you choose between internal and external termination resistor. The *Turn On Load Resistance* check box is only available when the Single Wire CAN channel is selected.

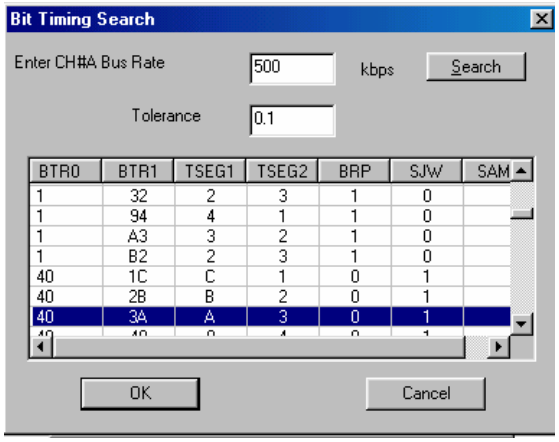
  **NOTE:** Selection of CAN or SW CAN is achieved by enabling the channel (see section 3.2, *Initializing the hardware*).

## *A.2 CAN SJA1000 modules*

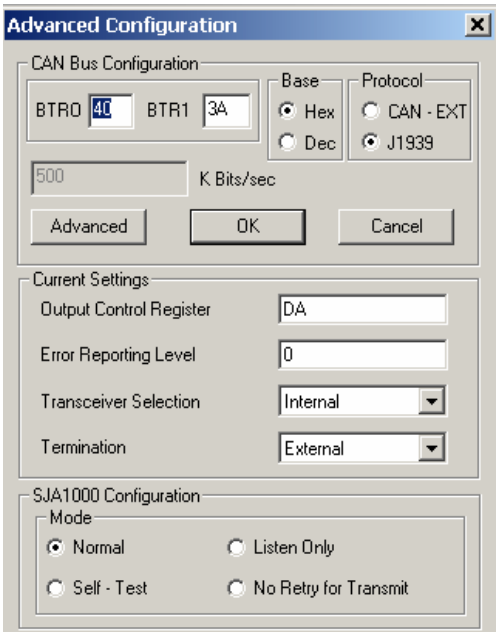
The DG-CAN-SJA1000 (ISO 11892-2 physical layer), GM Single Wire CAN (SAE J2411) and the DG-CAN-SJA1000FT (fault tolerant physical layer) modules have the same configuration box. Click **Advanced Configuration** to display the Advanced Configuration dialog.




To change a channel's bus speed, you can manually enter the proper *BTR0* and *BTR1* values for the rate you desire or click **Advanced** to have Hercules help select BTR values. Click **Advanced** to display the following dialog.




Type the desired bus speed in the *Enter CH#X Bus Rate* box, along with the *Tolerance*, and then click **Search**. Then scroll down and select the desired speed. Click **OK** to return to the **Advanced Configuration** dialog. The new bus speed will appear in the *K Bits/Sec* box (below the *BTR* boxes).




- The *Base* section lets you view the values in *Hex* (hexadecimal) or *Dec* (decimal).

- The *Protocol* section lets you decide how to interpret 29-bit CAN messages defined in the database. If you select *J1939*, then all 29-bit message IDs will be decoded as per that SAE standard. If *CAN-EXT* is selected, then message ID will be decoded only if the GMLAN option is selected under **Global Options** (see section 4.10).

- The *Current Settings* section is specific to the physical interface.

- The *Output Control Register* is the value to put in the Phillips SJA1000 output control register. This value should not be changed unless you are using an external transceiver or clearly understand the interface.

- *Error Report Level* will let you select what level you want to see errors displayed in the Hercules **Information View**. The *Error Reporting Level* is configurable. One data byte is used and the values may be logical Ored. The following error reporting values are supported:

  0 No error reporting

  1 Report bus warning and bus error (all other error types)

  2 Report data overrun

  4 Report arbitration lost

- *Transceiver Selection* list box lets you choose between using the *Internal* (on-board) transceiver or an *External* transceiver. Consult the hardware manual for details on this application.

- The SJA1000 module has an on-board termination of 120 ohms. This is selectable on / off via the *Termination* option.

- The SJA1000 Configuration lets you select one of four modes:

  *Normal* – the regular configuration.

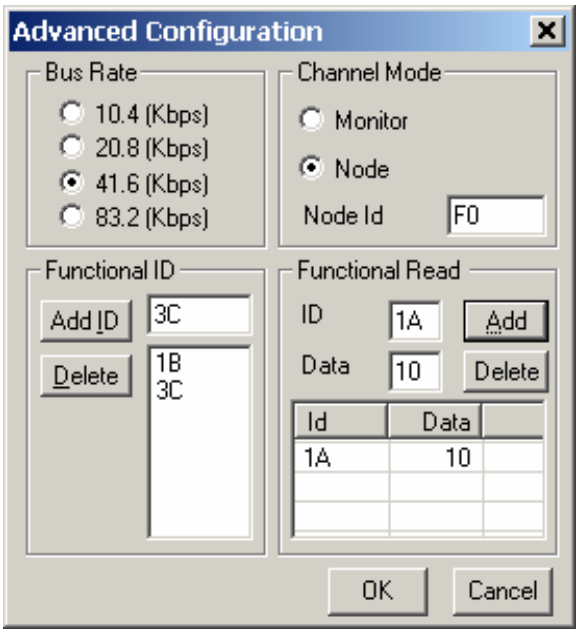
  *Self-Test* – the channel sends an ACK after each messages it transmits on the CAN
  bus. This allows the channel to be the only device on a CAN network.

  *Listen Only* – no data is transmitted and now ACKs are sent in response to received messages. All other data on the bus is received as normal.

  *No Retry for Transmit* – all subsequent message transmissions are attempted only once. If arbitration is lost or if a bus error occurs, the message is not transmitted.

## *A.3 HBCC (Ford SCP) module*

The DG-HBCC module is a single channel SAE J1850 PWM interface that supports the Ford SCP network. Hercules supports configuring the module to send Physical, Functional and Functional Read IFRs. Click **Advanced Configuration** to display the following dialog.



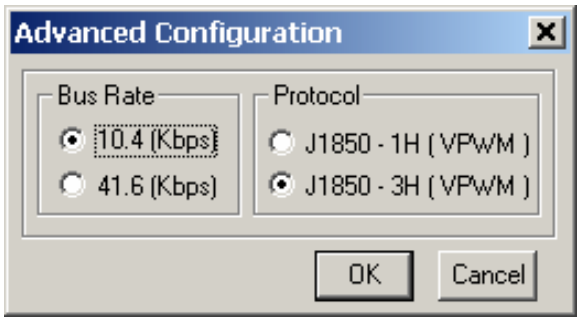

- The *Bus Rate* section can be configured to 10.4, 20.8, 41.6, or 83.2 Kbps. The default is 41.6 Kbps.

- The *Channel Mode* section lets you select Monitor (no IFRs will be sent), or *Node*. If *Node* is selected, the *Node Id* field will contain the Source ID Hercules is using. The module will automatically send IFRs to physically addressed messages to the displayed ID.

- If *Node* is selected, the *Functional ID* and *Functional Read* sections become available. To set up *Functional IDs*, simply type the ID in the first box, click **Add ID**, and the value will appear in the box. For *Functional Read*, type the *ID* and *Data* in the fields, and then click **Add**. The values will appear in the box.

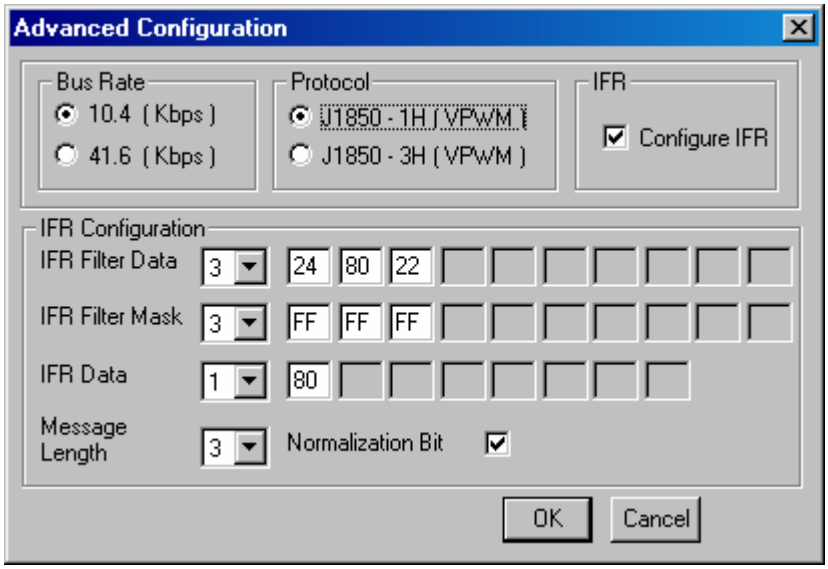
## *A.4 DLC (GM Class 2 / J1850 VPW) module*

The DG-DLC module is an SAE J1850 VPW interface that supports GM's Class 2 and SAE J1979 VPW. Hercules supports the *Bus Rate* of 10.4 or 41.6 Kbps. The standard rate is 10.4 Kbps. The Protocol can be configured to be viewed as one-byte (*1H*) or three-byte (*3H*) headers. Click **Advanced Configuration** to display the following dialog.




## *A.5 DCX (J1850 VPW) module*

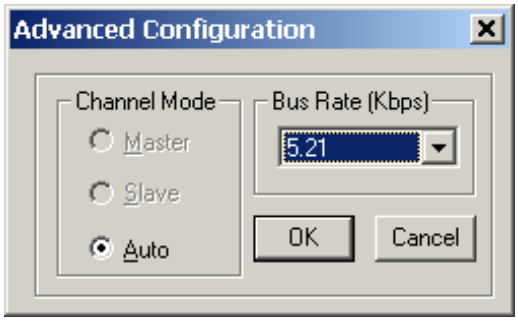
The Dearborn Group DCX module is an SAE J1850 VPW interface that supports DaimlerChrysler and GM J1850 networks. The Hercules software supports configuring the module to send IFRs to pre-configured messages. Click **Advanced Configuration** to display the following dialog.




- The *Bus Rate* can be configured for 10.4 or 41.6 Kbps. The default speed is 10.4 Kbps.
- The messages can be displayed as one-byte (*1H*) or three-byte (*3H*) headers in the monitors.
- If you select the **Configure IFR** check box, the *IFR Configuration* options will become available. *IFR Filter Data* are ANDed with the *IFR Filter Mask* to decide what bits should be set in order to send the IFR Data. *IFR Data* are the number of bytes that the module should wait to receive before sending the *IFR Data*. The *Normalization Bit* must be used. Select the *Normalization Bit* box to enable.

## *A.6 LIN 1.2 module*

The Dearborn Group LIN module is a Local Interconnect Network (LIN) interface. The Hercules software supports auto-configuring or manual selection of the *Bus Rate*. Click **Advanced Configuration** to display the following dialog.



## *A.7 LIN 2.0 module*

The Dearborn Group LIN module is a Local Interconnect Network (LIN) interface. The Hercules software supports auto-configuring or manual selection of the *Bus Rate*. Click **Advanced Configuration** to display the following dialog.