FLiM Configuration Utility User Guide

FCU Version 1.4.7.42 to 1.4.7.58

A Guide to Configuring Merg CBUS Modules in FliM mode

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updated

T. Calnun-Pratt November 2024

Table of Contents.

FLiM Configuration Utility (FCU)

1. Introduction

The FLiM Configuration Utility (FCU) is a Windows program for configuring MERG CBUS modules in FLiM mode. The utility is primarily intended as a mechanism for managing all the Node Events, Node Variables and Node Numbers. The information is retained in an XML database, several such databases can co-exist, although only one database can be open at any one time. It is possible to switch between databases during one session. This issue of the document refers to the utility from version 1.4.7.29. The current release is 1.47.58. See the Help menu option for the version. This document describes the facilities that the FCU provides for managing a configuration. A companion document, the FCU Guide to CBUS Modules provides details on how to set up and configure the CBUS modules.

2. Installation

The program is provided as a zip file, FlimUtility<n>.zip where <n> is the version number. This file must be unzipped into a well-known place on the hard drive, perhaps directly in your user folder. This makes it easier to install any updates in the future. To install a later version, delete the files and folders that were installed previously but not those created in My Documents, then unzip the new zip file to the same place. The program, as does any .NET based software, requires the Microsoft CLR (Common Language Runtime) to be installed, the installation process will install this from the Microsoft website if necessary.

Unzipping will create a FlimUtility folder and sub-folders. Once unzipped, open the FlimUtility folder and double-click setup.exe to start the installation process. Note that the installation process will install an Icon on the Desktop.
When the installation process is complete, the program will start up with the dialogue shown in Figure 1. Type in a suitable name for your first configuration and click OK.

When first run, the FCU will create a new folder in the My Documents folder or equivalent, depending on the version of Windows. This folder is called flimConfig. Three additional folders are created under this folder, Configs, Logs and Processors, these folders hold the configuration files, log files and the Processor definition file.

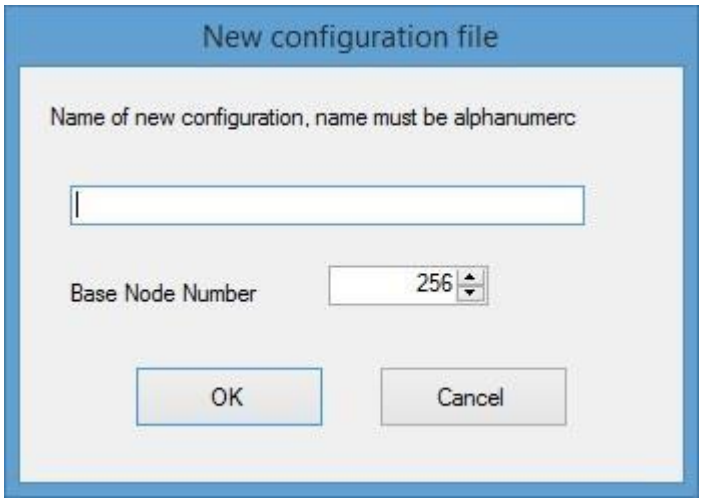


Figure 1. New Configuration File

The new configuration name is entered in the text box, the maximum length of a configuration name is 32 characters, and the name will turn red when this limit is reached. The “Base Node Number” option changes the node number from which the FCU starts to allocate node numbers to new nodes. The default is 256 but can be any value from 128 up to 4032. The value increments/decrements in steps of 64 when the up/down arrows are clicked. This allows different configurations to have different ranges of node numbers. The number is displayed in the Status Bar as Base Node No. The Base Number can be changed later from the Settings Menu.

A second dialogue box may then open like Figure 2 if there are any COM ports available on your PC. Many modern PCs, especially laptops may not have COM ports.

At this point, there will be no connection to a CBUS system, so if the dialogue does open, the serial port for connection to the CANUSB4 will not be shown. If the dialogue box does open, make a note of which serial ports are shown, so the new port for connection to the CANUSB4 can be identified when the Utility is next run with the CANUSB4 connected. For now, select Cancel and then Exit on the main window. You can uninstall the Utility from the windows Control Panel - Add/Remove Programs.

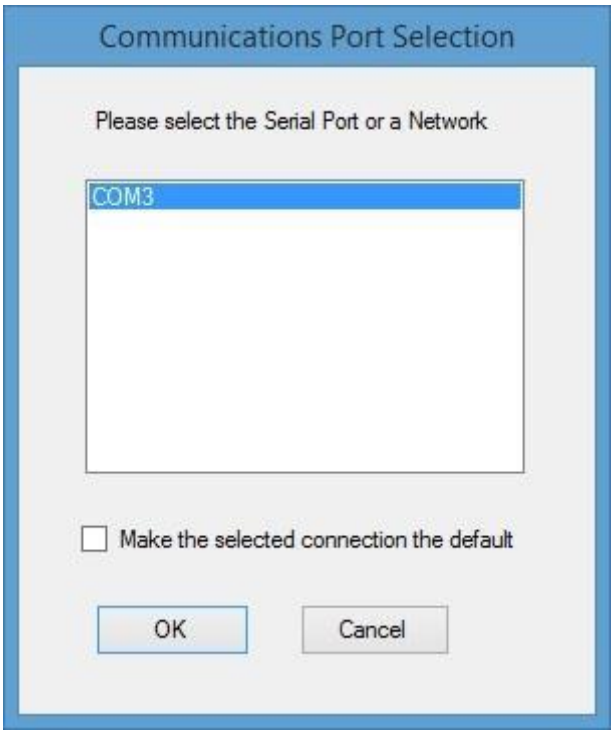


Figure 2. Available Serial Ports

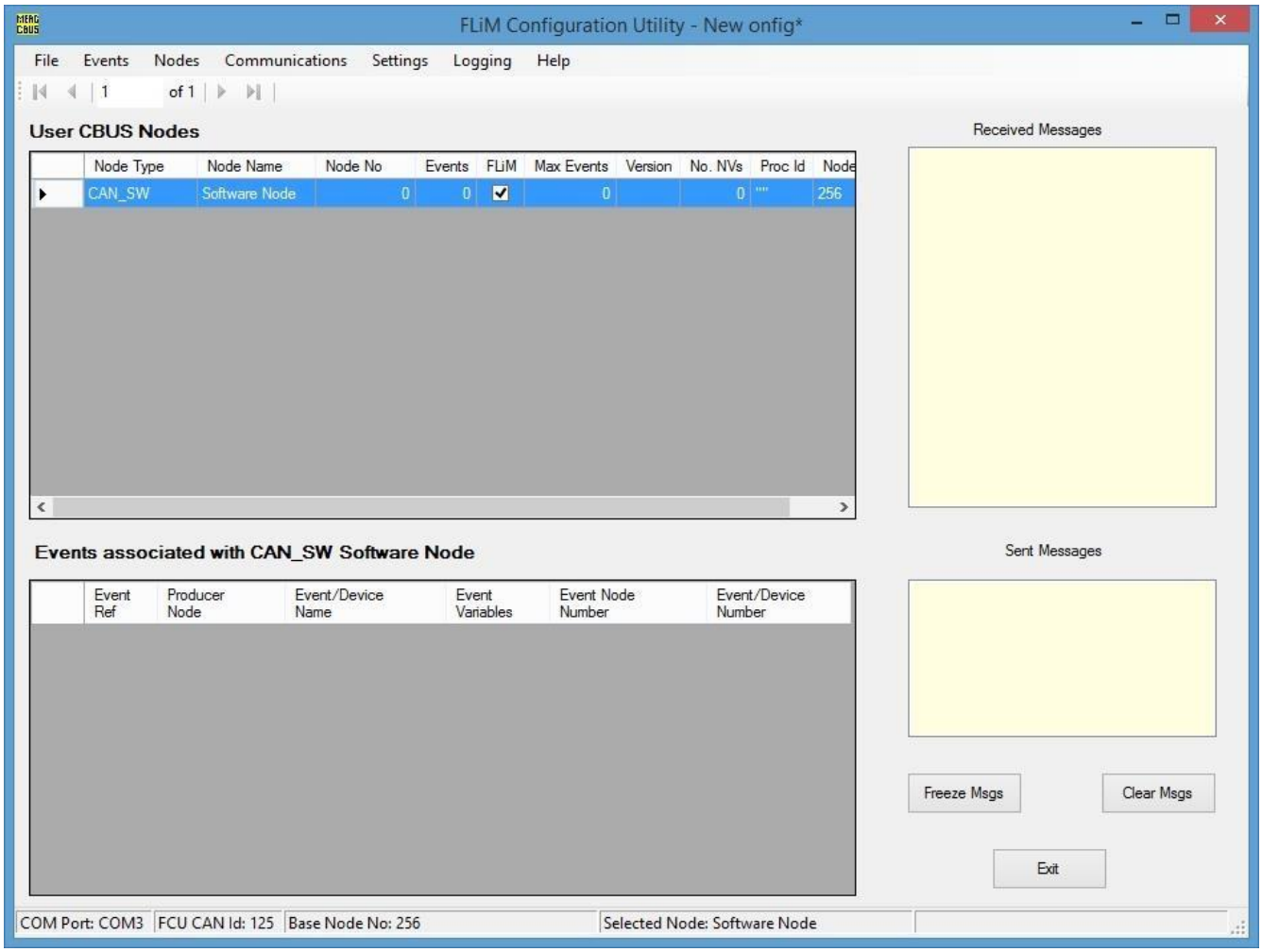


Figure 3. FCU Initial Screen

3. Connecting to the CBUS Network

3.1 Connecting using USB/RS232

The preferred method of connecting to the CBUS network is to use the CANUSB4, the CANRS is not recommended as it is not fast enough to keep up with all the messages, although it can be used for initial experimenting if desired. Details for installing the CANUSB4 and the device driver that may be needed can be found on the MERG CBUS website. Note, Windows 7 will automatically download and install the FTDI device driver when the CANUSB4 is first connected. The CANUSB4 must be installed according to the instructions supplied with the kit

Connect the CANUSB4 to a free USB port. It can draw power from the USB or the CBUS network selected by an onboard jumper. If using the Network for power switch on the CBUS system. It is necessary to switch on the network before starting the utility as Windows will not find the COM port until the USB interface is active. You can however open the COM port from the Settings menu if the port was not opened when the Utility started. If the CANUSB4 is powered from the USB, Windows should always find the COM port.

Start the utility by double-clicking the Desktop Icon. If you defined a configuration when the utility was installed, then this configuration is opened as it is the only one that exists. If in the future more than one configuration is defined, then a dialogue like the one shown in Figure 4 will be displayed. The dialogue lists all the available configurations, select the one required and click OK.

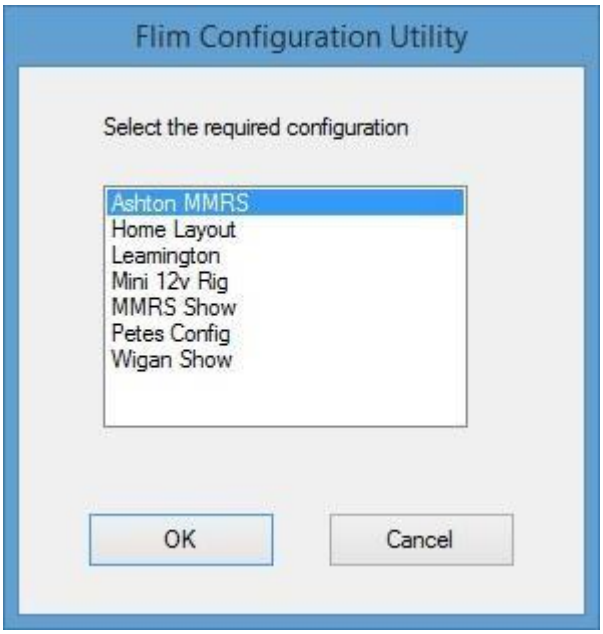


Figure 4. Available Configurations

A second dialogue box then opens requesting the COM port to use for the connection as shown in Figure 2 on page 5. This time, as the CANUSB4 is now connected, an additional COM port should be visible in the list. Select this COM port.

Note that the dialogue box will not open if there are no COM ports available, some modern computers do not have COM ports. If this is the case, you will only see the dialogue shown in Fig 2 when the CBUS network is powered and connected to the PC.

If you forgot to power up your CBUS network, you could do this after the Utility has started. You can open the COM port from the Communications menu item.

If you wish to always use the same COM port, if it exists, every time the FCU is started, then set the check box in the dialogue.

3.2 Connecting using Ethernet

It is possible to connect to a CBUS network using an Ethernet connection. This connection can be provided by either a Rocrail CANGC1e Ethernet board or by using the Merg CANEther-t board. Ethernet connections are not supported by default as most Users will probably still use a USB connection. To enable Ethernet support, choose the Communications/Enable Ethernet menu item. When this option is set the Open Communications Dialogue will also show any Ethernet connections that have already been defined, see Figure 5 below. A new Ethernet connection is added using the Communications/Add Network menu, see Section 5.4

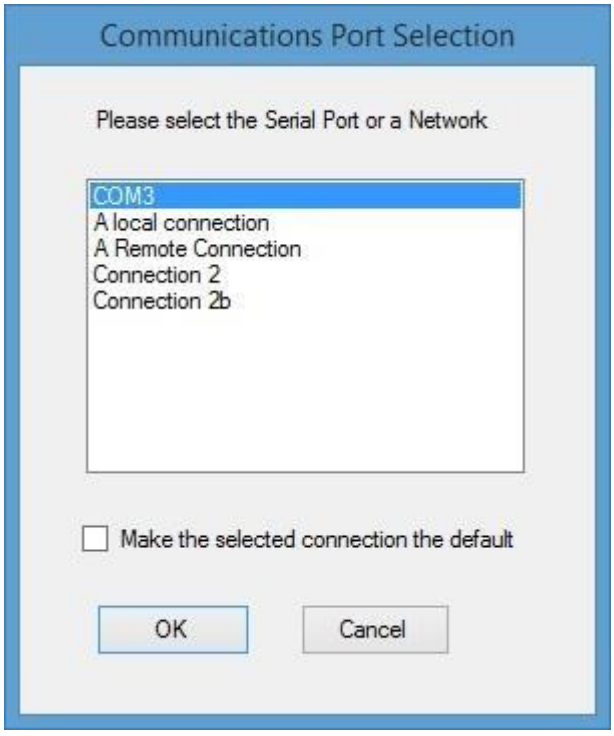


Figure 5. Open Comms with Ethernet

Available COM ports and Ethernet connections will be shown in the list. If the connection is to become the default, click the check box.

Select a COM or an existing Ethernet connection in the dialogue to use that connection. In the dialogue above, A ***local connection*** and ***A Remote Connection*** are existing Ethernet connections.

4 A Tour of the Main Window.

Figure 6 below shows the main window of the utility with a configuration loaded. The name of the configuration is shown in the title bar. There are four main areas in the window, two data grids and two list boxes. The upper data grid is the Node Grid, the lower data grid is the Event Grid which displays all events associated with the Node selected in the Node Grid. When first run, the FCU window size is set to 800x560, this may be adjusted with the resize handles which appear when the mouse hovers over the edge of the window. The FCU retains the new screen size and will use this size the next time the program is run

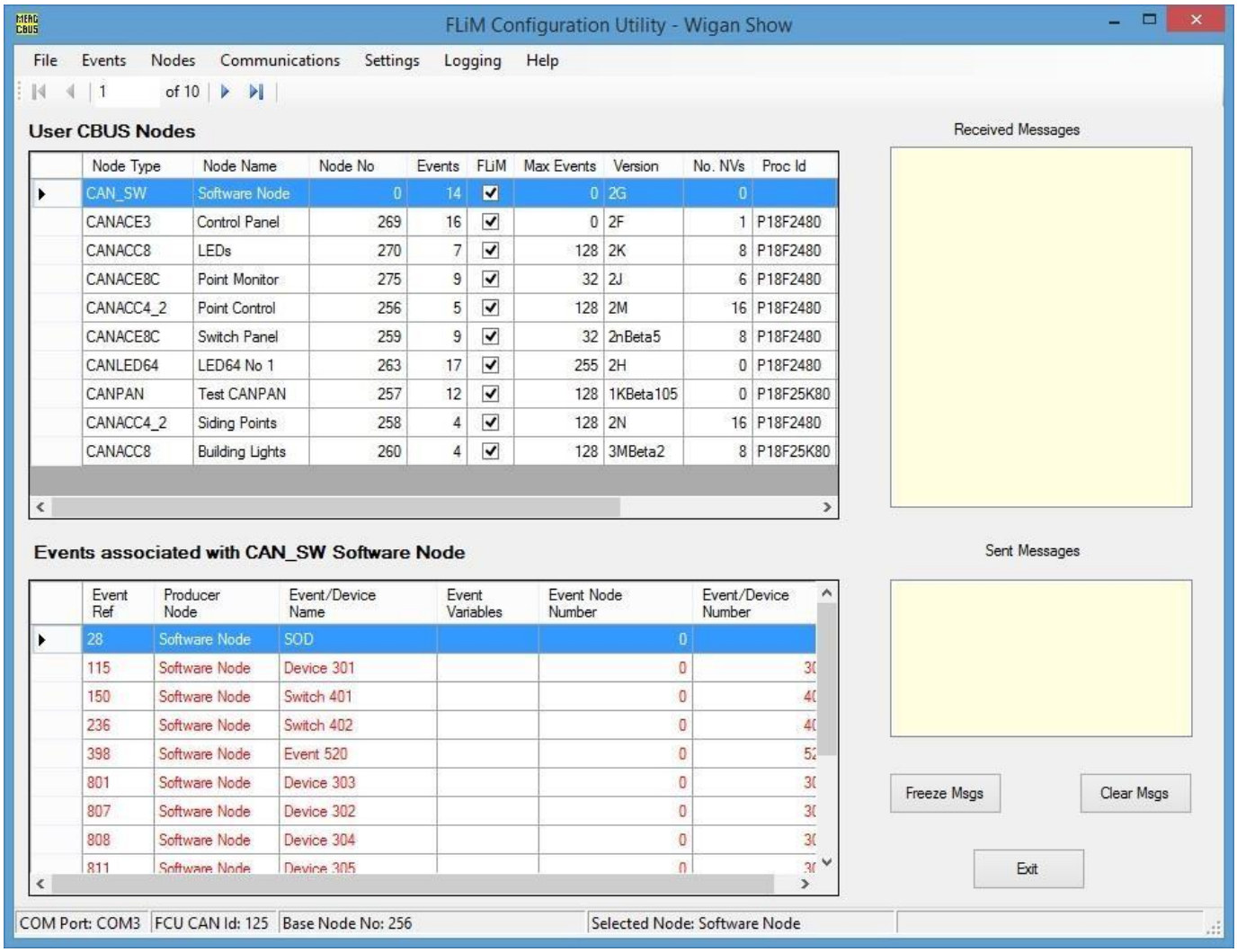


Figure 6. The Main Screen of the Utility

4.1 The Node Data Grid

The upper data grid shows all the Nodes. The information displayed shown is

1. The Node type
2. The name of the Node
3. The Node number
4. The number of events associated with this Node, both produced and consumed 5. A check box showing whether the Node is in FLiM mode.
6. The maximum number of events the node supports.
7. The firmware version number.
8. The number of Node Variables the node uses.
9. The processor type of the board.
10. The Node Variables for the Node, displayed as a hexadecimal string.
11. The CAN Id of the Nodes if this is enabled. See the Settings menu item for more information.

The grid can be scrolled both horizontally and vertically to reveal more data. The VCR style controls below the Menu Bar can also be used for scrolling through the Node Grid. The grid can be sorted by either the Node Name, Node Number or CAN Id if shown by clicking the relevant column header. The sort toggles between ascending and descending. The node selected in the grid will change when the grid is sorted.

If the mouse enters a Node Vars cell containing a value, a tool tip is displayed showing the meaning of this value.

The Max Events, Version and No. NVs columns are updated when the Node properties are read, when a Node is reprogrammed, or when a new Node is introduced.

4.2 The Event Data Grid

The lower data grid displays all the events for the node selected in the upper grid. Events produced by the selected node are shown with red text, events consumed by the node are shown in black text and short events consumed by the node are shown in green. The information displayed is.

1. The event reference, an arbitrary unique number for this event
2. The Name of the Node generating the event
3. The Event Name
4. The Event Variables for the event.
5. The Event Node, the node number of the Node which generates this event.
6. The value generated by the Event Node. This can be an event number or device number if the event is a short event. See section 6 for more information on short events.

The Event Grid is used to control the editing, teaching, sending and deletion of events, all these facilities will be described later. As with the Node grid, the Event grid can be scrolled to reveal more events. The Event Grid can be sorted by clicking the column header of either the Event Node Name column, the Event Name column or the Event Node column.

If the mouse enters an Event Values cell containing a value, then a tool tip will open showing the meaning of the value displayed.

4.3 The Received Messages List Box

This list box displays all the CBUS messages received by the utility. A vertical scroll bar will appear when the number of messages exceeds the box size. The number of messages in the list box is displayed above the list. The list is automatically scrolled to show the last message added which is highlighted.

4.4 The Sent Messages List Box

This list box displays all the CBUS messages generated and sent by the utility, as with the Received List Box, a scroll bar will appear when the number of messages exceeds the size of the box. The number of messages is displayed above the list. The list is automatically scrolled as described above.

The settings menu can be used to change the display to show decoded messages, select Interpret Msgs in the Settings menu item to change between decoded and non-decoded messages for both List Boxes. If the option to display non-decoded messages is selected, then a message may be copied from either list box to the Debug Mode panel message text box using drag/drop. See Section 5.6 for the use of Debug Mode.

The Clear Msgs button below the list boxes will remove all the messages from the boxes and resets the number displayed to zero. The Freeze Msgs button stops the two list boxes from being filled, the text in the button toggles between Freeze Msgs and Unfreeze Msgs, clicking the button again resumes filling the list boxes.

The Exit Button below the Clear Messages button can be used to close the Utility, the User is prompted to ask if any changes should be saved.

4.5 The Status Bar

The status bar shows the Communications Port for the connection, the Base Node number, the current value of the CAN Identifier used by the FCU, the name of the currently selected node and, if a node has been selected for event teaching, then the name of the node.

5. The Menu Bar

The Menu Bar has seven main menu items described below.

5.1 The File Menu

The file menu contains the following options.

New - creates a new configuration.

Open - Opens a configuration, the active configuration is closed.

Save - Saves the current configuration.

Save As - Saves the current configuration as a new configuration. The new configuration becomes the active configuration.

Delete Config - deletes a configuration, the active configuration cannot be deleted.

Recreate Config – recreates a configuration by interrogating all the nodes on the network. See section 7.4 for more information.

Print, Page Set-up, Print Preview are all implemented as the usual Windows facilities.

- Print produces a human readable summary of the current database.
- Print Preview will give an on-screen preview of the printout

Note that the FCU assumes that the printed output is for A4 or similar sized paper. If you wish to use any special formatting or other paper size, then use Print to File and then print the document with a suitable word processor.

Print to File - Produces the same output as Print but writes it to a user selected file. The default file type is RTF which allows formatting information to be held in the file, most word processors including WordPad can open and print RTF files. The file type is selected in the drop-down box below the file name, this can be set to either rtf or txt. Check that the correct file type is set before closing the dialogue. Print to File is the preferred method for printing a configuration.

Exit - closes the program, the User is asked whether changes to the configuration should be saved if changes have been made.

5.2 The Events Menu.

Teach - teaches an event to a node. The event selected in the Event Grid is the target event.

Learn - used by the utility to learn an event that may be difficult or impossible to generate externally. Only producer type nodes can learn an event. These events may then be subsequently taught to consumer nodes. This facility is particularly used to introduce "Device" events and feedback events for nodes that produce them.

Note the FCU automatically learns events by monitoring the CBUS traffic. Very few events have to be learnt manually.

Copy, Copy Actions, Teach All See Section 8.5 for details on these three options

Send – sends the currently selected event. A dialogue box will open asking whether the event should be sent as an On or Off event.

Delete - Deletes an event from the configuration and from the Node.

Edit Name - Allows the name of the event to be changed.

This option is only available when a producer node is selected.

5.3 The Nodes Menu.

All actions of the Nodes Menu operate on the currently selected Node in the Node Grid. The menu items visible and enabled will depend on the selected node

Edit Node Name – allows the local name of the selected node to be changed.

Read Properties – reads the properties of the Selected Node, a SLiM node, a CANCAB node or a CANCMD node. You can only read the properties of a 1st generation SLiM node if it has been updated to the recommended minimum firmware level, see Appendix 2.

If the Selected Node option is chosen, then the properties of the node selected in the Node Grid will be displayed. Note that the node selected in the Node Grid can be a SLiM producer node known to the Utility. The Max Event, Version and No. NVs columns in the Node Grid will be updated when the properties are read.

If either the CAB or CMD Properties option is chosen, then the Utility will determine whether more than one of the node type is connected, if only one is detected then its properties will be displayed otherwise a list of the detected nodes will be displayed, note they will all be either CANCAB or CANCMD depending on which option was selected.

If the SLiM Properties option is chosen a dialogue box opens as shown below, Figure 7

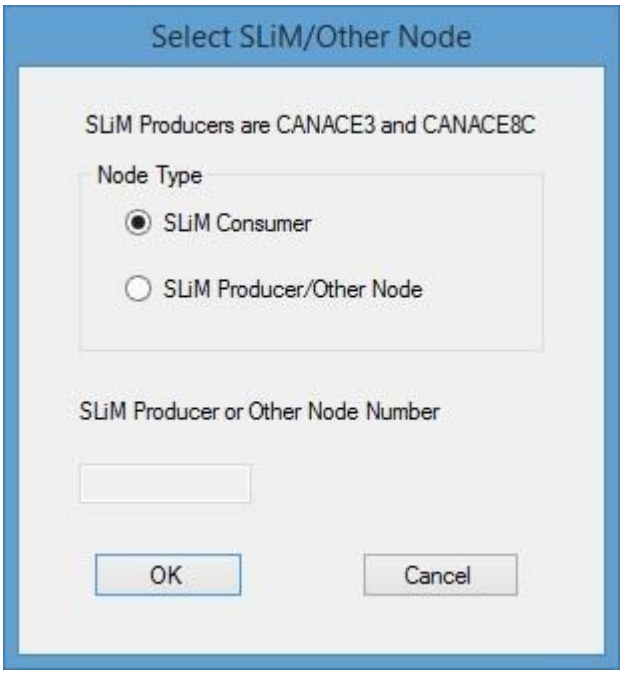


Figure 7

The SLiM Consumer option is the default, so if the target SLiM node is a consumer just click OK. If the target SLiM node is a producer or any other node then click the SLiM Producer option and enter the node number of the node in the text box, then click OK.

If the SLiM consumer option is chosen, the Utility will determine whether one or more consumers are present, if more than one is detected a list of the detected nodes will be displayed, if only one is detected then its properties will be displayed. This check depends on having the minimum recommended PIC firmware as defined in Appendix 2 or later installed.

Read Nvs – reads the Node Variables from the node and adds them to the Node Grid display.

This option is only enabled if the selected node has any Node Variables

Update Nvs – allows the Node Variables to be changed, this option is only available if the Node Variables have been previously read. Node Variables can also be updated by double-clicking the node in the Node Grid.

Write NVs – Writes all the Node variables back to the Node. This is intended for use when a replacement node is introduced, allowing the NVs to be sent to the replaced node.

Read Events – reads and displays all the events from the selected node and compares them with the database. If the database and node do not agree, the database may be updated.

Write Events – clears any events from the Selected Node and writes the events contained in the database to that node. This allows any new or repaired node to be brought back to its operational state. When reintroducing a replacement or repaired node, you must assign the original node number to the node for this option to work.

Delete All Events – deletes all events from the node and from the database. Note it does not delete events generated by the node, only the events actioned by the node.

Add Output Names – Only displayed when some consumer nodes are displayed. This opens the Output Names dialogue.

CAN ID Enumeration - starts the CAN ID enumeration sequence in the selected node.

Set CAN ID – for expert users only, allows the CAN ID of the selected node to be explicitly set. See the Settings Menu for information on adding the CAN Id column to the Node Grid.

Add New SW Node – adds a new software node to the database. This option is intended for users of control software, e.g. JMRI, where the control software can act as an event producer and therefore has a Node Number.

Remove Node– removes the node from the database, deletes all events associated with the node and releases the node number. You can also remove a node permanently by pressing the Push Button until the green LED lights.

Program PIC – allows programming of the PIC for the Selected Node, a SLiM node, a CANCAB node or a CANCMD node, see section 10 for full details. Note that a SLiM producer node, or a CANCMD node, if present in the Node Grid can be chosen as the selected node.

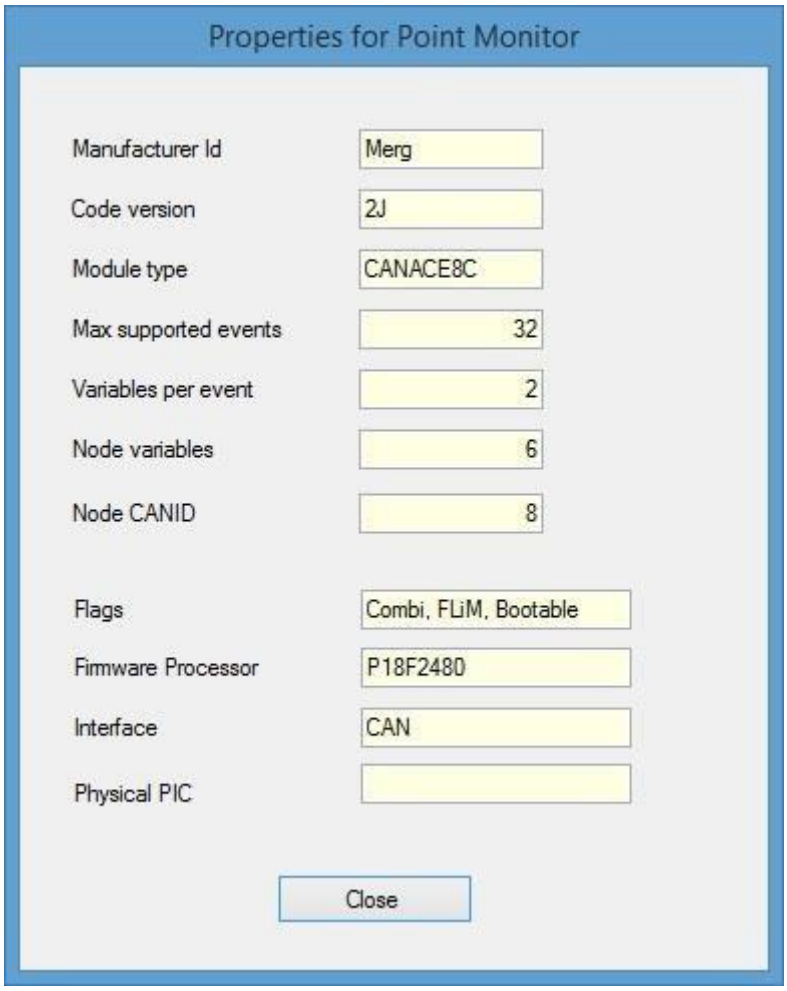


Figure 8. Example of Node Properties

The number of items displayed depends on the number of properties the node supports.

5.3.1 Teaching Node Variables.

Node variables are taught by selecting the target node in the Node Grid and either double-clicking the node entry or by the selecting the Nodes/Update NVs menu option. The Node Variables must be read before they can be taught.

5.4 Add Output Names.

Select the Nodes/Add Output Names menu item to open the dialogue box, output names are just for documentation purposes, the names entered appear in the event teaching dialogues. This facility is available for CANACC4, CANACC4_2, CANACC5, CANACC8, CANSERVO8, CANSERVO8C & other newer module types. The output names also appear in the printed copy. Note that an output name cannot exceed 18 characters, you cannot enter more than 18 characters, the text colour changes to red when 18 characters have been reached as a visual guide, see Fig 9.

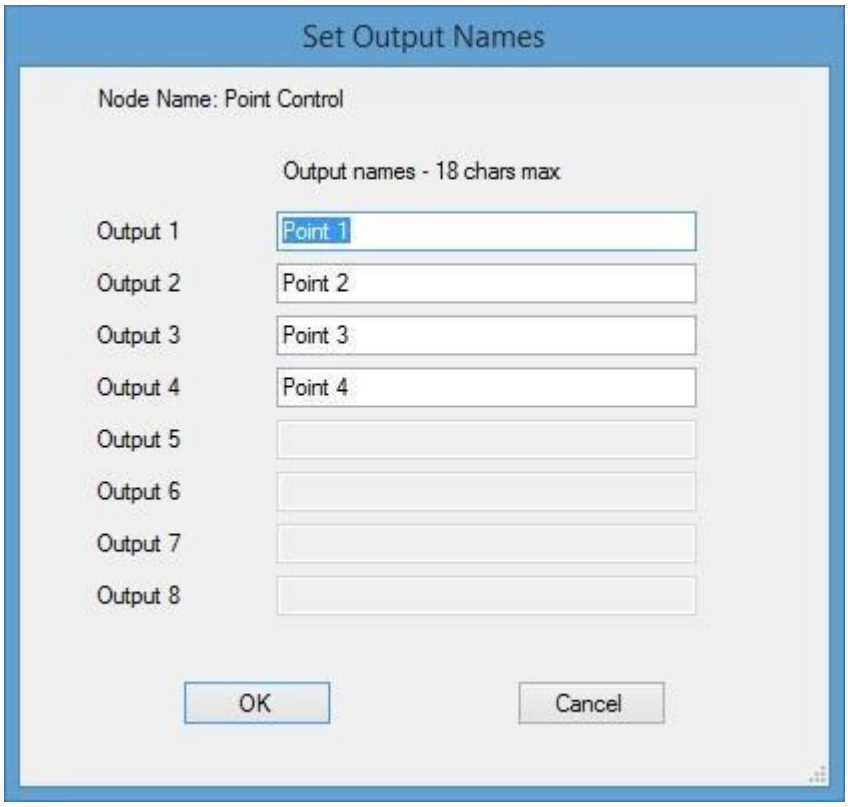


Figure 9. Add Output Names

5.5 The Communications Menu.

Start Comms - this option is only available if no communication port is open. This allows a communication port to be opened if the CBUS system is powered after the program was started.

Stop Comms - this option is only available if a communication port is open, it allows a different communication port to be selected by closing the current communication port and then opening a different communication port.

Enable Ethernet – Ethernet is not enabled by default, if you wish to use an Ethernet connection then choose this option. This will allow an Ethernet connection to be added and selected in the Open Port Dialogue, see Figure 5 and section 3.2. When Ethernet is enabled, the following three sub-menu items are available. Ethernet support is automatically enabled if any Network connections have been added.

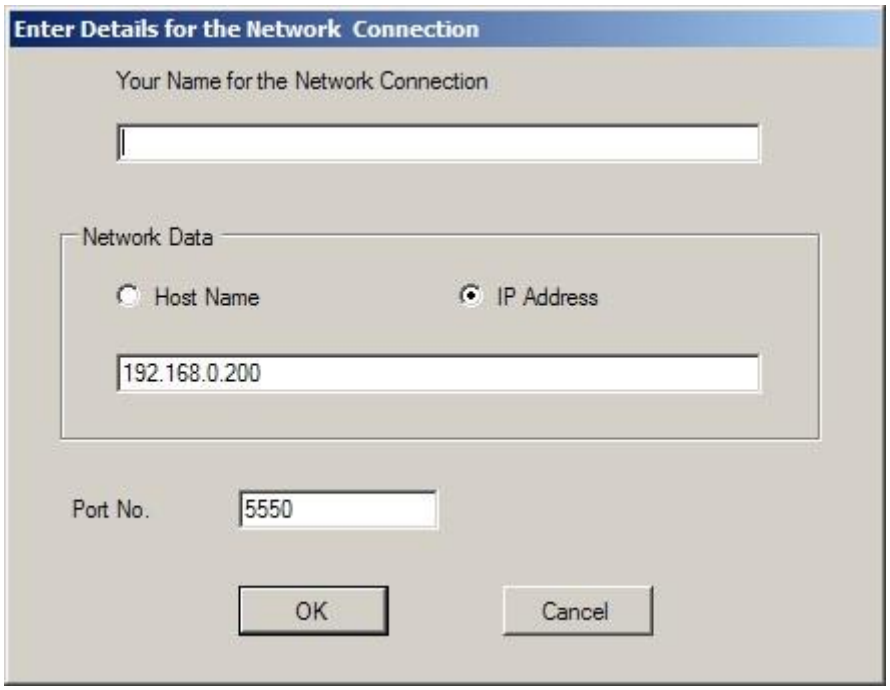


Figure 10. New Network Dialogue

Add Network - This menu item allows a new Ethernet network connection to be defined. The dialogue box shown in Fig 10 will be displayed.

Enter a suitable name for the connection, this name will be retained and will be shown in the Communication Port Selection dialogue.

The default IP Address and Port No are correct for the Rocrail CANGC1e and the Merg CANEther modules. If you wish to connect to a network using its Host Name then click ***Host Name*** and replace the IP Address with the Host Name. Change the port number if necessary, the default value is the port number for both the CANGC1e and the CANEther

Edit Network – This option allows the details of an existing connection to be modified. The dialogue shown in Fig 10 opens showing all the current connections. Select the connection to edit and click OK. When a connection is selected, right-clicking the entry will display a tooltip giving details of the connection.

The dialogue shown above opens with the connection details already displayed. Edit any of the fields and then click OK. If you change the name of the connection, then this is added as a new connection and the original connection is retained.

Delete Network – This option allows an existing connection to be deleted. A dialogue box will open showing all the current connections. Select the connection to delete and click OK. You cannot delete the current connection. When a connection is selected, right-clicking the entry will display a tooltip giving details of the connection.

Find\Show Ethernet Connections - This will on first use show as Find Ethernet connections, this causes the FCU to search for connections on any network connected to the PC. Once run the menu changes to Show Ethernet Connections. This displays any connections found.

5.6 The Settings Menu.

Set CAN Id – Allows the CAN identifier used by the FCU to be changed. All FLiM modules connected to a CAN bus segment have a unique identifier including any software connected via RS232 or USB. The default value for the FCU is 125 but this may be changed to any value between 120 and 127. The change is permanent and persists across software reloads.

All Merg FLiM CBUS modules have a self-enumerated CAN Id between 1 and 99.

Note: In SLiM mode, only producer nodes have a CAN Id.

If you are using a CANCAN module to connect two CAN segments, note that the CAN Id is not propagated across the CANCAN, a module's CAN Id will be the CAN Id of the CANCAN on the other CAN segment.

Set Event Node – this only appears if no Event Node is currently in use and the selected node is a consumer node. The selected node becomes the Event Node and its name is displayed in the status bar. An Event Node can also be selected by right-clicking in the Node Grid for the target consumer Node.

Clear Event Node – this only appears if an Event Node is currently in use. It resets the event node, so allowing another Event Node to be selected. The Event Node can also be reset by right clicking its entry in the Node Grid. See Section 8.2.2 for a description on how to use the Event Node.

Advanced – This option has four sub-menu options, **Debug Mode**, **Use Generic Dlgs, Set FCU Root Folder & Reset FCU Root Folder.**

Debug Mode – When selected, indicated by a check mark, a small panel appears below the Event Grid with a text box and two buttons. You enter a CBUS message in the text box as a hex string and click the Send button to transmit the message on the network. Alternatively, if you click the Receive button the message is sent to the FCU for testing. Note that the message entered in the text box is just the CBUS message, the FCU will add the CAN header for sent messages. When Debug Mode is selected, messages from either of the message list boxes can be copied by using drag/drop to the CBUS message text box provided that **Interpret Msg**s is not selected.

Use Generic Dlgs – This option is intended for use by firmware developers and setting of some variables. The dialogues displayed for event and NV updating will be the FCU generic dialogues and not the bespoke ones. This allows the firmware to change the number of EVs and NVs and be tested.

Set FCU Root Folder – When selected, this allows the User to change the default folder the FCU uses to hold the configurations and other data. An option is given asking whether the Configs folder should be copied to the new Configs folder.

Reset FCU Root Folder – This option resets the FCU root folder to the default. No files are copied back to the default folder.

Interpret Msgs – This option changes how received and sent messages are displayed in the two message list boxes. The default is Off, and the CBUS messages are displayed as a raw CBUS message. However, if a message is selected in either list box, then a tool tip will open showing the decoded message.

If the option is On, then decoded messages are written to the list boxes. A check mark appears next to the menu item when it is On, changing the option will clear the two list boxes. The tool tip feature is disabled when the option is On. The setting is preserved over software reloads

Trace All Messages - This option when enabled, indicated by a check mark next to the menu item, will permit all CBUS messages to be added to the Received messages list box including messages generated by the DCC CBUS modules. The default is not to display these DCC related or CAN Id enumeration messages. Click the option to change the setting. The setting is preserved over software reloads.

Set Base Node – changes the Base Node Number that the FCU uses to allocate node numbers. The next auto-allocated Node Number will be the next free number starting from the Base Node Number. Changing the Base Node Number does not affect any existing Node Numbers, it only affects any new nodes.

Show CAN ID Column – The CAN Id Column in the Node Grid is hidden by default. For most Users, it contains no useful information. Reading a Node's properties will add the CAN Id of the Node to the CAN Id column.

5.7 The Logging Menu.

Start Logging – This option enables logging. The log contains all the received and sent messages plus internal activity within the utility. This option is disabled whilst logging is active

Stop Logging – This stops the current logging activity. This option is disabled while logging is inactive.

Comment – This option is only enabled while logging is on and allows a comment to be entered in the log file.

The log file is created as FlimLogddmmmyyhhmm.txt where ddmmmyyhhmm is the date and time the log was created. Log files are created in the FlimConfig/Logs folder.

5.8 The Help Menu.

This menu contains three sub-menus.

Info – Displays basic information about the current configuration.

Configs – Lists all the available configurations with the date each was last updated, sorted in date order, most recent first

About – Displays copyright information.

5.9 Right-Clicking the Node Grid

Right-clicking the Node Grid results in a pop-up menu appearing with one or more of the following options. Note that the options apply to the currently selected node in the Node Grid.

Read Properties	Alt P
Read NVs	Alt R
Write NVs	Alt W
Read Events	Alt E
Write Events	Alt V
Set Event Node	Alt S
Clear Event Node	Alt C
Edit Node Name	Alt N

The actual options that appear in the pop-up menu will depend on the selected Node. The pop-up menu will not appear if the selected node is a software node. It is essential that the correct Node is selected before choosing an option from the pop-up menu. Each menu option also has a short cut key that may be used to perform the selected action.

Double-clicking a node in the Node Grid will open the Update NVs dialogue.

6 Events.

Among the many CBUS message types, there is a group that is very relevant to configuring node behaviour. This group contains messages that are termed Events. Event messages are generated by producer nodes and are actioned by consumer nodes. Events come in two forms known as Long Events and Short Events (aka Device Events), although they are the same size, 5 bytes including the code byte, the opcode. The CANACE3, CANACE3C, CANACE8C CANPAN, CANCOND8C and CANTOTI will generate Long Events by default. The CANSERVO8C/ CANMIO-SVO and the enhanced CANACC5/8s will not generate any events until taught to do so. All producer modules must be taught to generate Short Events. The CANPAN is configured differently to other modules that generate events from switches, see the FCU CBUS Modules Guide for full details.

The opcode is the first byte in the event message and has the values for ACON (Accessory On), ACOF (Accessory Off) for Long Events and ASON (Accessory Short On) and ASOF (Accessory Short Off) for Short Events. After the opcode byte there are two bytes which contain the node number of the producer node and two bytes which contain the event number. For Long Events, this defines message, however for Short Events, the final two bytes contain a Device Number, not an Event Number. Consumer nodes ignore the node number bytes in the ASON and ASOF messages, replacing it with zero meaning that many producer nodes can generate the same Short Event. Note that Short Events will still contain the producer Node Number in the event, but this is purely for diagnostic purposes.

Device Numbers are allocated by the User and refer to any entity that can be attached to CBUS nodes, from a simple turnout, a signal or a track occupancy detector to a complex route setting, each of these can be a device with their own unique device number. As consumer nodes ignore the producer node number in the message, any producer node can send the same Device Event to a particular device when sent as a Short Event, the consumer only needs to be taught to respond to the Device Event once, irrespective of how many producers can generate the event message.

Producer nodes must be taught which Short Events they can send, the Short Event is associated with, for instance, a switch, or an input or a servo. Because Short Events have an assumed producer node number of zero, (remember the consumer nodes replace the node number in the message with zero), they must be declared to the FCU before they can be used by any producer or consumer node. This is where the Software Node is used, it has a node number of zero, and so all events associated with the Software Node will have a zero-node number, and therefore will be Short Events. All Short Events must be learnt by the Software Node before they can be taught to another node.

Short Events can be taught to any of the producer module types. Example when teaching a CANPAN to generate a short event, the Short Event is associated with one of the switches attached to the CANPAN. For a CANINP, a Short Event is associated with one of the inputs, so when the state of the particular input changes, the CANINP will generate a Short Event, not the default Long Event.

Certain modules have to be taught all events they generate, they do not generate any events at all until taught, unlike the other producer modules. They can be taught to generate either Long Events or Short Events. For the CANMIO-SVO there are three events associated with each servo, so the CANMIO-SVO can

generate a total of 24 different events, either as an On event or an Off event. The CANOUT can generate up to 8 events, one for each output, these events can be any mixture of Long or Short Events.

The CANCAB can also generate both Long and Short Events, however it does not need to be taught any events. Long Events are generated by pressing a function key, this produces an event with the event number equal to the function key number. The node number is set to the default node number for all CANCABs. Short events are generated by pressing the Enter Key, the display will show AC=, the device number is then keyed in using the keypad and Enter is pressed to send the event. Unlike the accessory modules, the CANCAB puts zero in the node number field of the Short Event message, whereas the accessory modules place their own node number to this field.

7 The Software Node

The Software Node is a special node that always exists, its node number is 0 and it cannot be deleted. The default name for the Node is “Software Node” but it can be edited like any other node name.

The main purpose is to support the teaching of Short Events. Short Events all have an implied Node Number of zero in the event number. Short events are triggered in the target node using the two special short event commands for switching the event on and off. The target node ignores the Node number part of the event number and replaces it with zero. However, this implies that when a Short Event is taught, the node number part of the event number must be zero, this is where the “Software Node” is used as its node number is pre-set to zero. An event associated with the “Software Node” is introduced using the Events/Learn menu option, only the event number and name is required. These events are used just like any other event, they can be taught to consumer nodes and deleted.

Short events are used for addressing devices. A device can be any output or input connected to a node. Device numbers are unique within the total network. This means that all event producers can send an event to the same device by sending a short event containing the device number. Note that this means that a consumer node only needs teaching one short event that can then be used by any event producer including any software control programme.

Event producers can also be taught to send a short event when an input state is changed, software can also poll for the state of any input by sending a poll request with the device number in the message. This can be used by control software to determine the state of the device without having to know where it is connected.

To use Short Events, make a list of all your devices, with their names and allocate a unique number to each device. Make sure the Software Node is selected in the Node Grid, then for each Device Event, select Events/Learn and enter the device name and device number in the dialogue box. Repeat this for all your devices. When all the devices have been added to the Software Node, each event can be taught to the relevant nodes, both producers and consumers. The easiest method is to display all the events in the Event Grid, and then scroll the Node Grid until the target node is visible then 'drag and drop' the event onto the target node. This will open the relevant event teaching dialogue for the target node. Complete the settings in the dialogue and then click OK to teach the event to the node. See section 8.2.1 for more on drag and drop event teaching. You should now test the events to make sure they have the intended effect, see section 8.3 for details on testing events.

Please refer to the FCU Guide to CBUS Modules for details on how to teach events to the switches for the CANACE3, CANACE3C and CANPAN modules.

Another use of the Software Node allows an event to be introduced into the system that can be used for testing and learning, there is no need for any other producer node, so the simplest system with just one CANMIO and a CANUSB say, can be used to play with the utility and become familiar with its facilities. When these events are finished with, they can be deleted from any target nodes just like normal events.

Additional software nodes can be created using the Nodes/Add New SW Node menu option. This enables the utility to recognise events that may be generated by other software systems, for instance by JMRI. You do not need to add JMRI as a node if it only generates Short Events.

7.1 Start of Day

Most producer can be taught to respond to a Start of Day event. The CANPAN also supports Start of Day Events but please refer to the CANPAN section in the FCU Guide to CBUS Modules for full details. The CANACE3C can also be taught to generate a Start of Day Event. There is nothing special about the actual event used as a start of day event, any event may be used, but it should be reserved for this purpose and not used for any other activity. There can be several different Start of Day events if deemed necessary, so allowing different sections of the network to respond to different events. The CANACE8C and CANINP will each respond with 8 events indicating the current state of each of the 8 inputs.
The CANSERVO8C/CANMIO-SVO will respond with an event for each servo with an event indicating the current servo position. This does assume that servos have been taught to generate events, only servos that have been taught will respond. The enhanced CANACC5, CANACC8 & more recent modules will respond with an event for all outputs that have been taught to generate an event. Care must be taken to avoid the situation where the responses to a start of day event trigger further start of day responses, potentially leading to a never-ending sequence of responses. The responses from the CANACE3C and CANPAN will depend on how the switches have been configured.

8 Using The FCU

There are three scenarios that need to be considered.

A new system where all the modules are in SLiM mode with their green LEDs lit.

An existing FLiM system which you now would like to be managed by the utility

Upgrading an existing SLiM System where the producer nodes Node Numbers need preserving.

Connect the CAN_USB to a USB port on your computer and switch on all the power supplies for the CBUS network. Start the utility from the desktop icon. If you installed the utility as described in section 2, then you will already have a configuration, although it currently only contains the software node. The utility will load this configuration as it is the only one available. If you do not have a configuration, a dialogue box as shown in Figure 1 will be displayed where you should enter a suitable configuration name.

8.1 A New System

There are three types of CBUS module, event producers, event consumers and combi modules.
Producer modules should be configured first as all the events that they generate can be easily learnt by the utility. Start off with all the switch input modules.

Do one module at a time, press the push button until the green LED goes out then release the PB, the dialogue box shown in Figure 11 will be displayed. The yellow LED will flash until the node is allocated a Node Number using the dialogue box, it will then stop flashing and light permanently.

The Node Type will show the module type, and the Allocated Node Number field will show which node number has been allocated. Node numbers start by default at 256 for FLiM systems and they are allocated sequentially. You may change the Allocated Node Number if you wish, but this facility is intended for upgrading a SLiM system where the SLiM Node Number is to be retained, or for re-introducing a node that may have been removed for repair or upgrade.

If the Node Number does not already exist, then the Node is added to the database with the selected Node Number. If the Node does exist and is the same type as the new node, you will be asked to confirm the node number. An error is generated if the existing node is not the same type as the new node.

Enter a name by which this module will be known in the box and click OK. The node will now be shown in the Node Grid.

The next step is to read the module node values (NV's) and properties using the FCU menu or by right clicking on the node itself in the upper left window.

Now repeat this process for all other producer modules.

At this point all the producer nodes have been introduced to the system, to safeguard against any failure, select File/Save to save the information collected so far. It is always a sensible precaution to save the configuration at regular intervals.

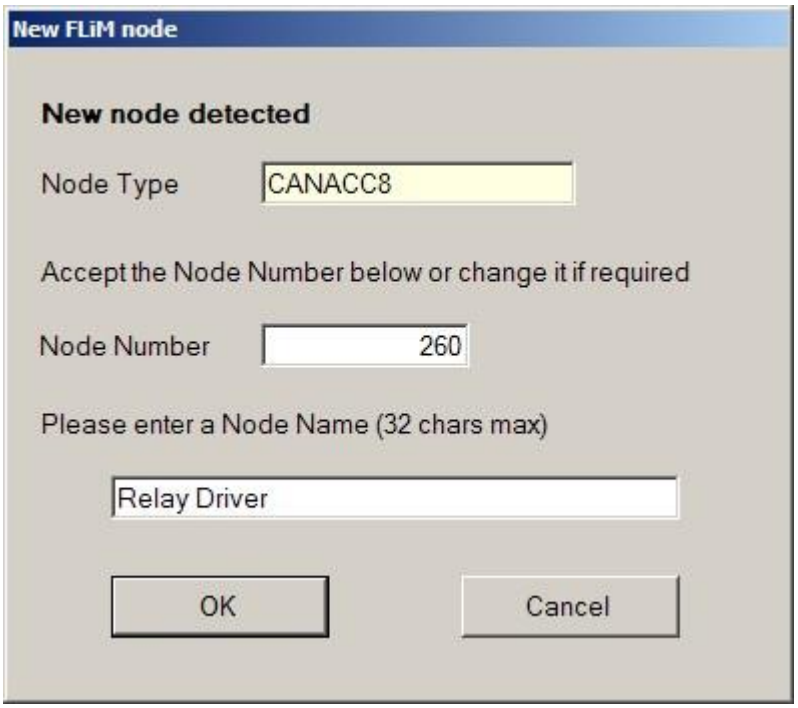


Figure 11. New Node Dialogue

8.1.1 Configuring the Nodes.

You should now configure any nodes linked to switches so the node will know how the switches are to be set up and used. Refer to each module's section in the modules guide.

Repeat this process for all the remaining producer modules where required .

Now either operate the switch which generates the start-of-day event or select the event in the Event Grid of the module that is generating it. Teach this to all the producer modules as required. Then choose Events/Send form the menu bar. A dialogue box opens asking whether this is an On or Off event, select ON than click OK, or right click and select 'Send On'

At this point, most of the events that your system can generate have been learnt by the utility, select File/Save to save all the data. Note that route setting events for CANACE8Cs/CANINP's will not be learnt until the event itself is generated, or they can be introduced using the Events/Learn menu option.

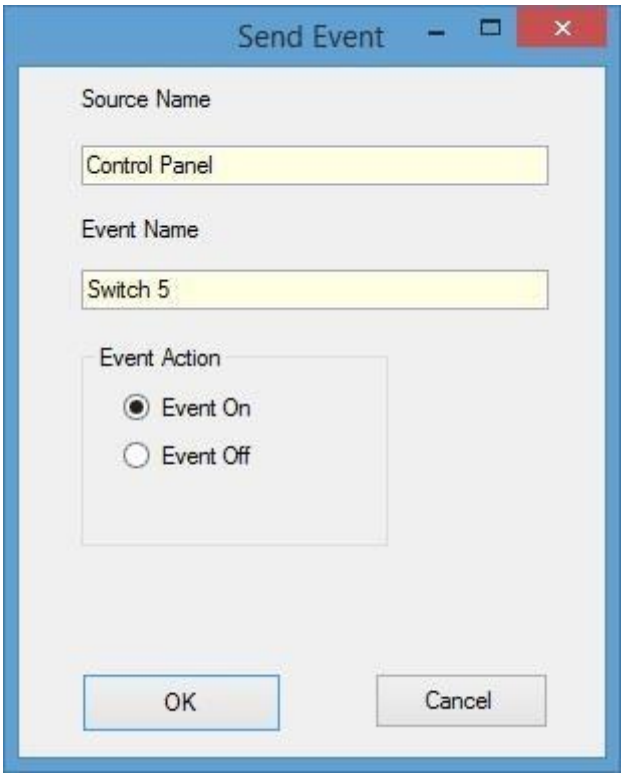


Figure 12

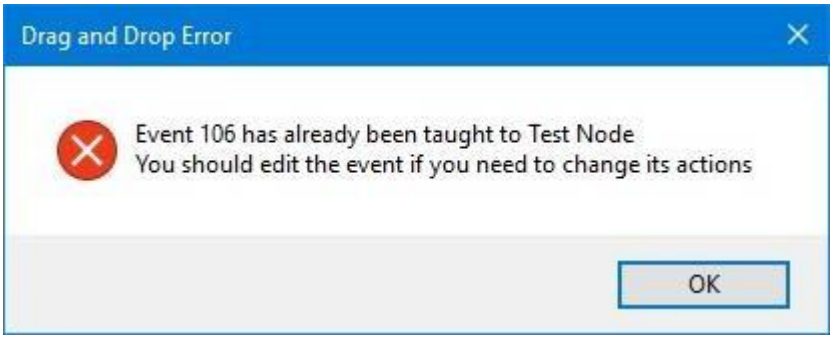
Now introduce all the remaining modules in the same way as before, do one module at a time. All these modules are consumers and must be taught the events they should respond to and how they should respond.

Note that if you are upgrading a SLiM system, then you should just accept the proposed Node Number as SLiM consumers do not have a Node Number.

8.2 Teaching Events.

Now all that remains to be done is to teach all the consumer nodes their events. Teaching events is a simple process. There are three different ways to teach a node an event, which method you use is down to personal preference at the time. All teaching methods end with a dialogue box specific to the node type.

When teaching an event to a Node, if that event already exists in the Node then the following Message Box will be displayed. You will not be able to teach the event.



8.2.1 Drag & Drop

The first method was described above and uses 'drag and drop'. Select the node which generates the target event. Then scroll the Node Grid until the target Node is visible, taking care not to change the selection. Now scroll the Event Grid until the target event is visible, position the mouse pointer over the required event and press and hold the left mouse button and drag the event to the target node in the Node Grid. When over the target node, release the mouse button, a dialogue box will open allowing the event actions to be specified. The dialogue box style varies with the node type, complete the popup dialogue and click the OK button to teach the Node the event.

8.2.2 Using the Event Node

The second method allows a target node to be preselected for event teaching. Several events may then be taught to this node in rapid succession. The target node must be a consumer node. To select the target node, either right-click the Node Grid and select Set Event Node from the pop-up menu or select the Node in the Node Grid and then select the Settings/Set Event Node menu option. In either case the name of the Event Node is displayed in the Status Bar.

Then select the required source node and double click the target event in the Event Grid. The relevant dialogue box for teaching the event will open. Set up the event actions in the dialogue and click OK, the event will then be taught to the target node. Repeat this process until all the events have been taught, selecting other source nodes as required. When all the events have been taught, right-click the Node Grid and select Clear Event Node menu option in the pop-up menu or select the Settings/Clear Event Node menu option.

8.2.3 Using the Events/Teach Menu

The action of this menu option depends on whether the selected node is a consumer or producer of events. Nodes which both produce and consume events are treated as producer nodes.

If the selected node is an event producer, then select the target event in the Event Grid and then select Events/Teach menu item. A dialogue will open, see Figure 14, so the target consumer node for the event can be selected. This method must be used to teach a consumed event to a combi node, either a CANACE8C or a CANSERVO8C

If the selected node is a consumer, then when Events/Teach menu item is selected, a dialogue as shown in Figure 15 will be opened. Select the producer node and the event and click OK. In both cases, the relevant event teaching dialogue will open for the target node type.

8.3 Testing Events

After an event has been taught, its operation may be tested by sending the event. This can be achieved by right clicking the event in the Event Grid and selecting either Event On or Event Off from the pop-up menu or by selecting the event in the Event Grid and then choosing Events/Send from the menu bar. A dialogue box is opened as shown in Fig 12, select Event On or Event Off as appropriate and click OK.

To edit an event, select the event in the Event Grid and right click the event with the mouse. Select Edit Event from the pop-up menu or double click on the event entry itself.

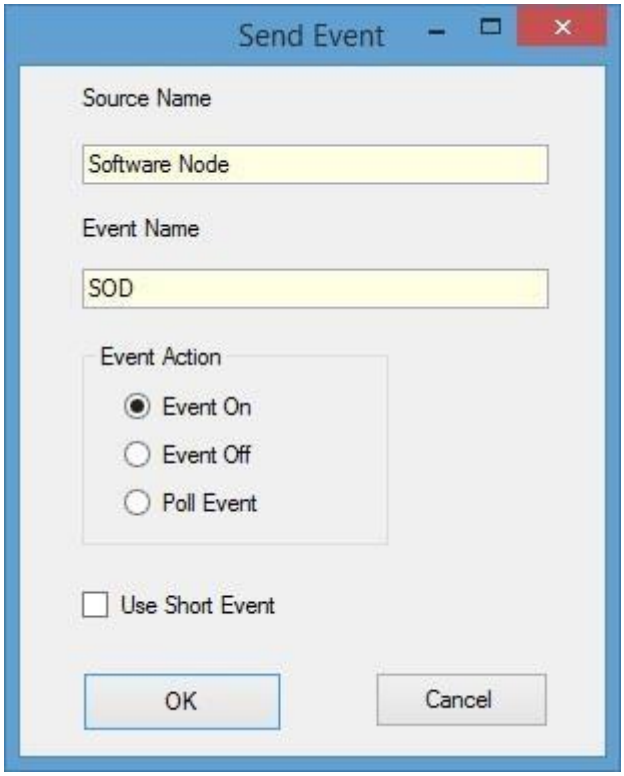


Figure 13. Enhanced Send Event Dialogue

If the event source node is the software node, then an enhanced dialogue is shown, see Figure 13. In this case there is an option to send a poll request and to send the event as a short event. Note that poll

requests are always sent as short requests. Right clicking a software node event in the Event Grid also allows the event to be sent as a poll request or short event.

If the Event action is not correct, right-click the target event in the Event Grid and select Edit Event from the pop-up menu to correct the event actions. This will re-open the dialogue and allow the event action settings to be changed. Click OK to update the event actions in the node.

8.3.1 Editing an Event

Important! Do not use “drag and drop” or any other event teaching procedure to edit an event, this will erase any existing event actions, always right click the target event in the Event Grid and select Edit Event from the pop-up menu or double click the event itself.

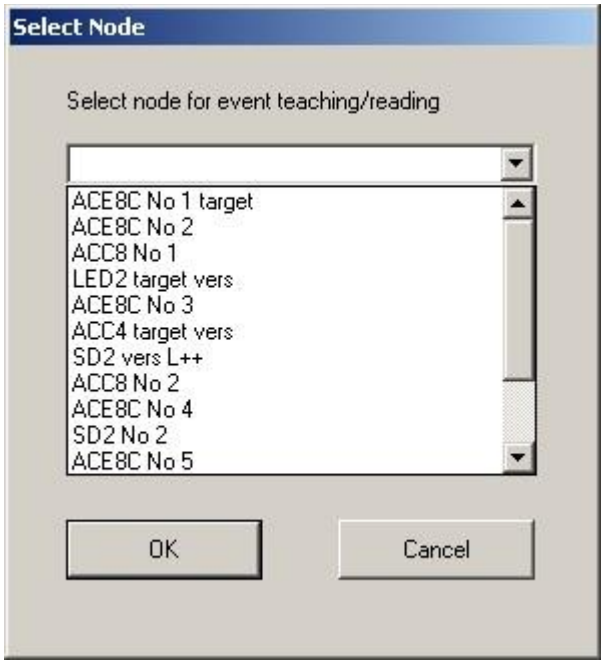


Figure 14. Select Node Dialogue

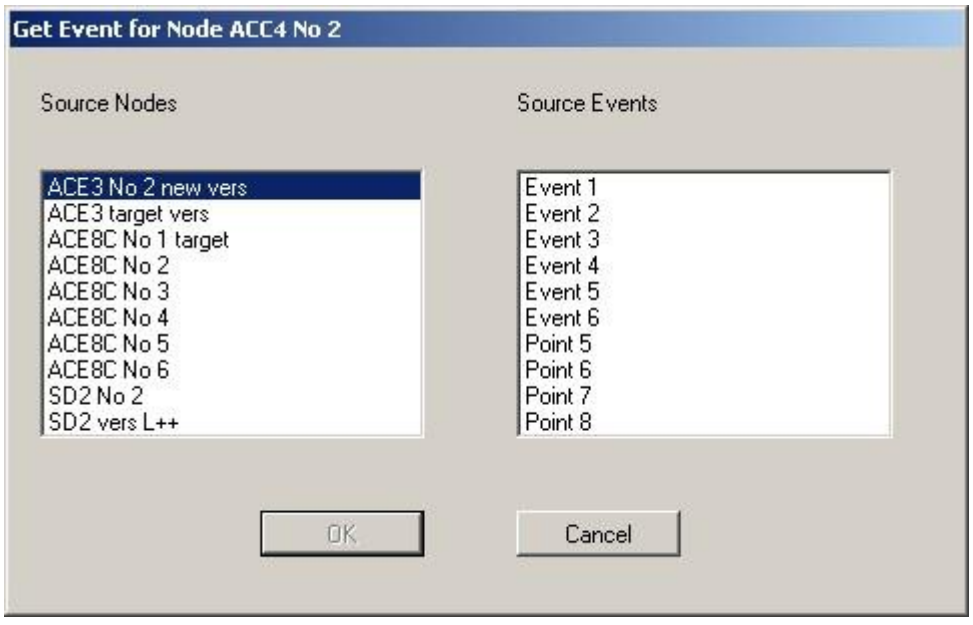


Figure 15. Event Selection

8.4 An Existing system

With an existing FLiM system, all the Nodes already have their node numbers set, and all consumers have been taught their events. It is only necessary for the utility to learn of these nodes' numbers and events.

If all the 1st generation nodes on the CBUS network are Version 2 firmware (see Appendix 2) or above or 2nd generation modules, then the Files/Recreate Config menu item can be used to cause the FCU to interrogate the network to find all the nodes, node variables, events and properties and create a configuration. Note that the created configuration will not have meaningful Node names or Event names, the FCU creates these names from the node number and event number. However, the names can be edited after the configuration has been created. Only the event names for producer nodes need editing, the new name will automatically be propagated to event consumers that use the event. A new configuration is created, and a dialogue box is opened requesting the new configuration name, see Figure 1.

For 1st generation systems that have not been upgraded to version 2 firmware, proceed as follow. As with a new system, start with the event producers and then introduce the consumers. The mechanism for introducing an existing node, not known to the utility, is to momentarily press the PB on the module PCB. If the node number already exists, then a message box will be displayed. If the node being introduced is a new node and not an existing node then you must click No, close the Utility and remove the node as there are conflicting Node Numbers, see Appendix 3 for more information on maintaining the CBUS network integrity.

If the node is the correct existing node, then click Yes to allocate a new Node Number to the Node, otherwise click No to retain the existing Node Number.

If the node is unknown, a message box will be displayed with a message indicating that an unknown node number has been detected and asking if this node number is to be retained. Click the Yes button, The New Node dialogue box will open, see Figure 11, fill in the local node name for the node and click OK. The node has now been introduced and should be visible in the Node Grid.

Repeat for all the remaining nodes until all the nodes have been introduced. Now for each node in turn select Nodes/Read NVs to read each nodes Node Variable settings, and then do the same for the node properties. Not all node types have Node Variables, the utility will display a message box if a node does not support Node Variables.

For each switch input module, operate all the switches to introduce the events produced by the nodes. Each module will respond with several events depending on which events have been learnt. For all input module nodes with a start of day event, (identified with an all 0's in the Event Values column), select this event and select Events/Send, select Event On in the dialogue box and the OK. The module should respond with all the events it generates.

Repeat this procedure for any other producer modules which have a different start of day event.

For all other consumer nodes, select each node in turn and select Nodes/Read Events. The events read will be displayed in a list box and an option to update the configuration will be offered, click the Update button. The utility now knows about these events.

8.4.1 Reallocating Node Numbers

If the PB is pressed momentarily on an existing node, then the dialogue shown in Figure 16 opens. If the indicated node is the correct node click OK. The New Node Dialogue will open with a proposed Node Number, see Figure 11. The Node Name is already set to the name of the target node. Click OK to proceed with the node number reallocation. If the node is a consumer node, the node number is updated in the database and the new number is sent to the node.

If the target node is a producer or combi node, a new node is created with the new node number and all the events generated by the old node are copied to the new node. All events used by consumer nodes generated by the old node number are updated to reflect the new node number. Finally, the old node is deleted from the database.

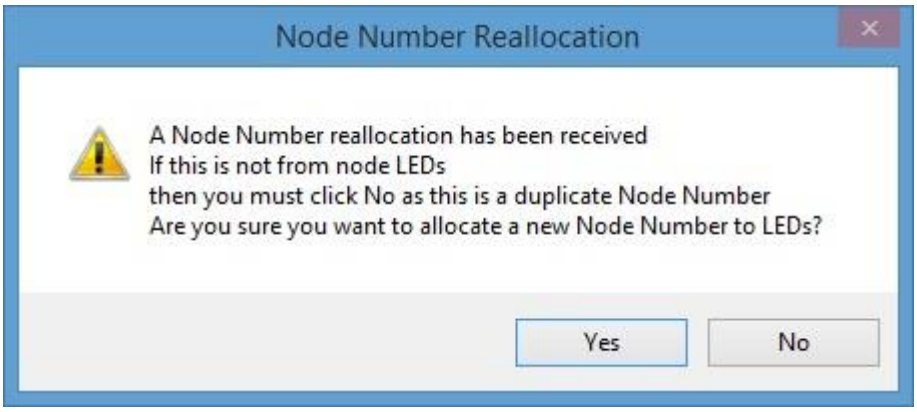


Figure 16 Node Number Reallocation

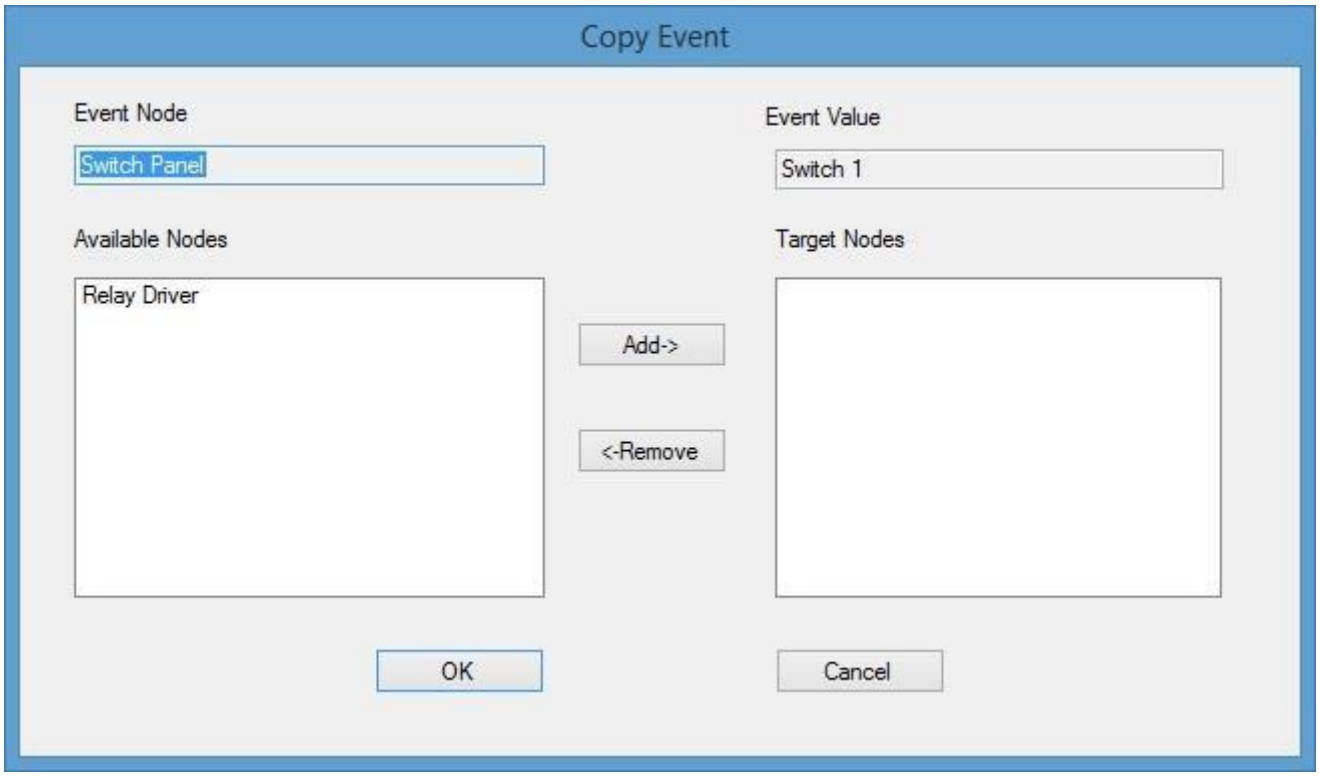


Figure 17. Copy Events Dialogue

8.5 Copying Events, Event Actions and Teach All

Events can be copied from any consumer node to any other nodes of the same node type. Select the Node which contains the event to be copied in the Node Grid and then select the target event in the Event Grid. Now select the menu item Events/Copy, a dialogue box like the one shown in Fig 17 will open

Select each node in turn in the left-hand Available Nodes pane that you wish to copy the event to and click the Add button, the node will be transferred to the right-hand pane. Repeat this for all the nodes that you want to copy the event to. If you want to remove a node from the Target Nodes pane, select the node and click the Remove button

When you have selected all the required nodes, click OK. The event will be taught to all the selected nodes with the event actions. You can modify the actions if needed by selecting the node you wish to modify in the Node Grid and then double-clicking the event you wish to modify in the Event Grid.

You can also copy event actions from one event in any consumer node to any other event in any other nodes of the same type. Select the Node that contains the event actions you wish to copy and select the target event in the Event Grid. Then select the menu item Events/Copy Actions. A dialogue box like the one shown in Fig 18 will open. A list of all the events that can be modified will be shown in the upper pane. Copy any events whose actions you want to modify to the lower pane by selecting the event and clicking the Add button. You can remove an event from the lower pane by selecting the event and clicking the Remove button. Click OK to update the actions of all the selected events.

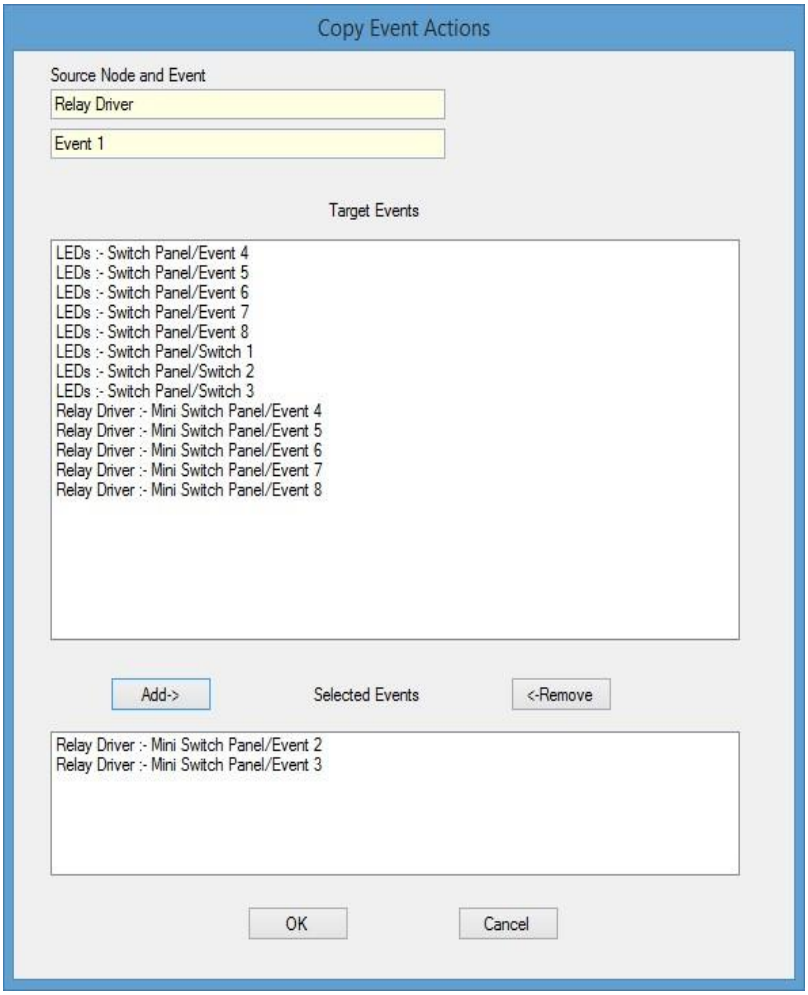


Figure 18. Copy Event Actions Dialogue

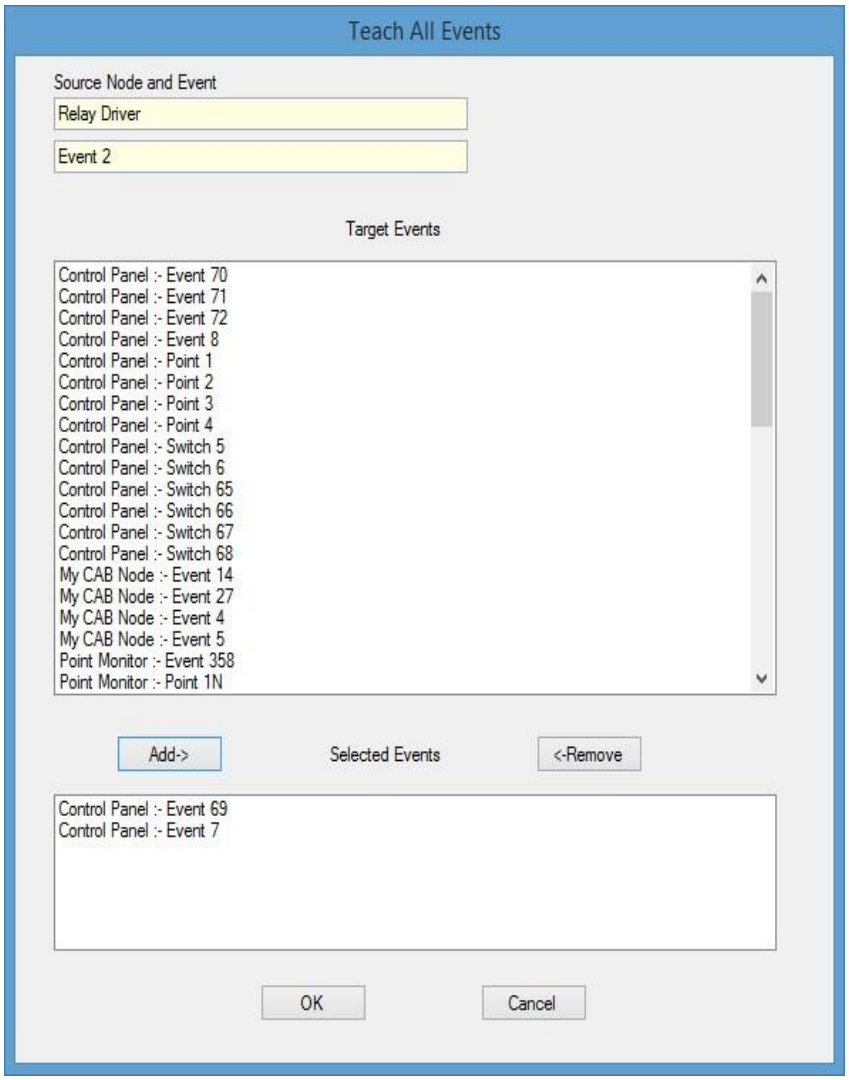


Figure 19. Teach All Dialogue

The Teach All menu option allows many events to be taught to a selected node in one operation. Select the target node in the Node Grid and then select the event in the Event Grid whose actions you wish to use for all the events to be taught. The dialogue shown in Fig 19 opens. Select each required event in turn in the upper pane and click the Add button, the event will be added to the lower pane. If you change your mind, select the event in the lower grid and click the Remove button.

When satisfied with your choice, click OK, all the select events will be taught to the target node. After all events have been taught, their individual event actions can be edited by double clicking the event in the Event Grid.

9.0 Events

9.1 Testing Events

After the events have been taught to the consumers, any event can be tested by selecting the event in the Event Grid and selecting Events/Send or by clicking the right-hand mouse button on the target event and selecting Event On or Event Off from the pop-up menu as required, see Figs 12 and 13. If the source node is the Software Node, then the event can also be sent as a Short Event, select Short On or Short Off as appropriate.

If the event does not do what is required on any particular consumer node, select the node in the Node Grid and then double click the offending event in the Event Grid. Do not use “drag and drop” to edit an event. The module specific dialogue will open allowing the actions of the event actions to be modified. Click OK to teach the new event actions.

Note that to edit an incorrect event, any node selected for Event Teaching in the Node Grid must be deselected first to allow the incorrect event to be edited. If a node is selected for Event Teaching it will be shown in the Status Bar.

It is important that existing events are edited by right clicking the event in the Event Grid and then selecting Edit Event from the pop-up menu. Do not use any of event the teaching procedures described in Section 8.2 to edit an event as the existing settings will be lost.

9.2 Deleting Events

The action of deleting an event from the Events/Delete menu item depends on the Node selected in the Node Grid. If the selected Node is a consumer node, then the selected Event is deleted from that node. However, if the selected Node is a producer node and the selected Event is produced by that node then all instances of the event will be deleted in all consumer nodes and for the producer node.

Note that if the deleted event is detected again by the utility, then the event will be added again to the events generated by the producer node. For instance, if a start of day event is sent to CANINP nodes, then each CANINP node responds with all 8 events. If any of these events had previously been deleted, then they will be reinstated, for future use if required.

All events generated by producer nodes which are detected by the utility are always added to the database if they do not exist. The database is thus always up to date as far as possible with all generated events, even if they aren't currently used by any consumer nodes.

10 Upgrading a SLiM System to FLiM

When upgrading a SLiM system, the Node Numbers of any producer nodes can be retained to avoid having to re-teach all the consumer modules. This information is not saved by the node when you press the PB!

Upgrading a consumer module retains the events the nodes have been taught and these events will contain the current SLiM Node Number of the source node, so to avoid having to teach all the consumers again, you can re-use the SLiM Node numbers of the producer nodes.

Before you start, make sure you know all the SLiM Node Numbers of the producer nodes, it is absolutely essential that you have a record of these Node Numbers so you can re-enter them in the New Node dialogue box (see fig 11). Change the proposed node number to the SLiM node number.

The utility will check as far as possible that your choice of Node Number is suitable. If the Node Number does not exist, then the new Node Number is accepted. If the Node does exist, because events generated by the node have previously been detected, a check is made on the module type of the existing node to ensure it is the same as the new node. A message Box is then displayed asking you to confirm that the new node number is correct. It is an error if the node types mismatch.

You must introduce all the producer nodes first, keeping their SLiM Node Numbers.

Having introduced all the producer nodes, do all the consumer nodes one at a time, accept the proposed Node Number as SLiM consumers do not have a node number. When all the consumer nodes have been introduced, select each node in turn in the Node Grid and the select Nodes/Read Events to read all the events from the node. These events will be added to the database, both for the consumer node being read and for any producer node that generates the event.

Note that any event which has an unknown source node number will be ignored, that is why all the producer nodes must be added first.

Note: You must set the Node Variables for all your CANACE3 modules to correspond to your SLiM settings, see Appendix 1 for more information. If you change the settings from that used in SLiM mode, you may find that the event numbers have changed.

11 Programming a PIC

The Nodes/Program PIC menu has a sub-menu allowing either the Selected Node, a SLiM node, a CANCAB node or a CANCMD node to be selected for programming. Select the required option to start the re-programming operation. If either a CAB node, a CMD node or a SLiM consumer node is selected, the Utility will attempt to check whether more than one such node is attached to the network, this check relies on all the selected node types having the firmware described in Appendix 2 or later so will not be a fool proof check until all the nodes have been updated. The net effect of these changes to the PIC firmware is that SLiM producer nodes do not need disconnecting from the network and SLiM consumer nodes only need disconnecting if programming another SLiM consumer node. A SLiM producer node or a CANCAB node may be selected in the Node Grid, note that if more than one CANCAB exists, only the target CANCAB must be connected to the network.

From the recommended minimum level firmware for the CBUS modules, SLiM consumer nodes will only accept a Boot command if the Node Number is zero. SLiM producer nodes must be addressed with their SLiM node number. A dialogue box is displayed asking for information about the target SLiM node, see Figure 20. See Read Properties for more detail on this dialogue box.

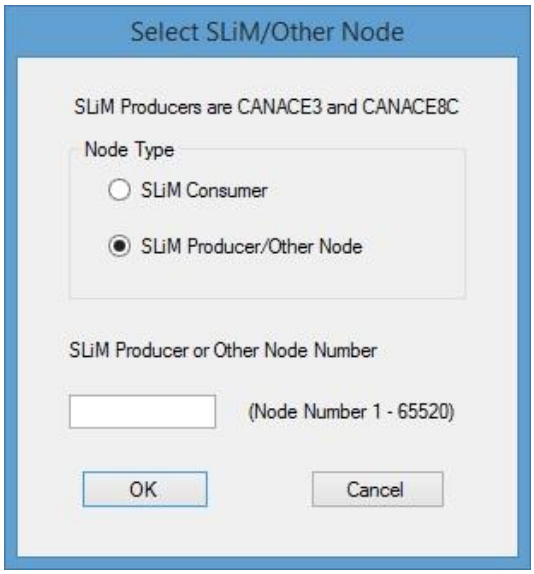


Figure 20. SLiM Node Selection

When programming CANCAB or CANCMD nodes, all other CANCAB or CANCMD nodes must be disconnected from the network as all CANCAB nodes and all CANCMD nodes have the same node number, 65535 and 65534 respectively. Note that if a CANCMD has been set to FLiM mode, it can be selected in the Node Grid in the same way as other FLiM mode nodes.

An important message box appears, Figure 21, with instructions to disconnect all SLiM nodes from the CBUS network. Earlier SLiM nodes ignore the Node Number in the Boot command that initiates the reprogramming process so must be disconnected before programming starts. This box will always be displayed even if you have the recommended minimum firmware level installed in your nodes, you may ignore it if you know it is safe to continue.

Click “Yes” to continue programming or “No” to abort.

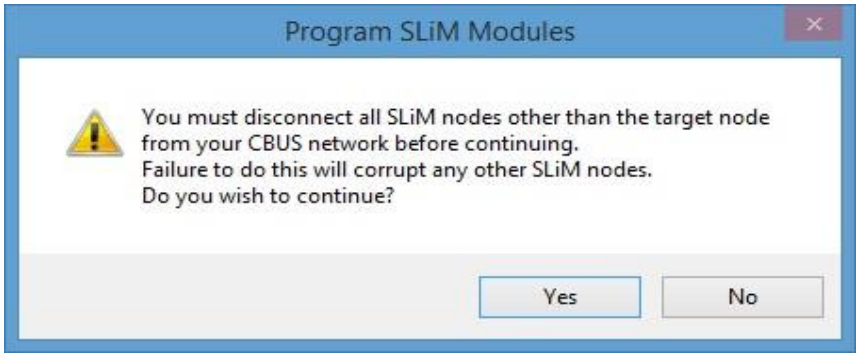


Figure 21. An Important Message

IMPORTANT: If you have any SLiM nodes with earlier firmware than the recommended minimum level then you must disconnect all such SLiM nodes before reprogramming any FLiM, CAB or CMD nodes. If you are unsure, disconnect all SLiM nodes.

Note: The CAN_USB is not a SLiM module even though it has a green LED, it must not be removed from the network.

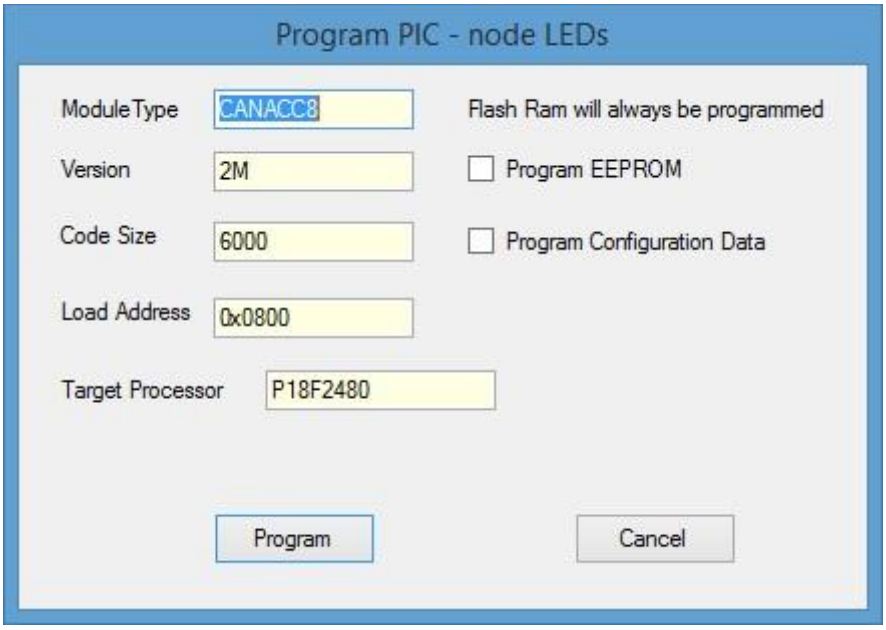


Figure 22. Program PIC Dialogue

If “Yes” was clicked in the message box shown in Figure 21, an Open File Dialogue box will then be displayed, navigate to the folder containing the target Hex file, select the Hex file and click “Open”.

Either dialogue as shown in Figure 22 above or a message box as shown in Figure 23 below will be displayed.

11.1 Reprogramming the same module type

The dialogue box shown in Figure 22 appears if the Hex file is for the same module type as the existing Node.

To just update the code and preserve all settings, the two check boxes should be cleared. This will preserve all the FLiM settings including Node Number and event data.

If you wish to return the Node to a virgin SLiM state, click program EEPROM to erase all data in the EEPROM.

Program Configuration Data is optional, it is only really necessary if the new version of the code changes the settings, refer to the MERG website Wiki for any release information regarding the new Hex file.

Click Program to start programming, a progress bar is displayed while programming is in progress.

11.2 Reprogramming a different module type

If you have selected a Hex file of a different type to the existing Node, Figure 23 is shown, this does allow the PIC to be completely reprogrammed to a different module type.

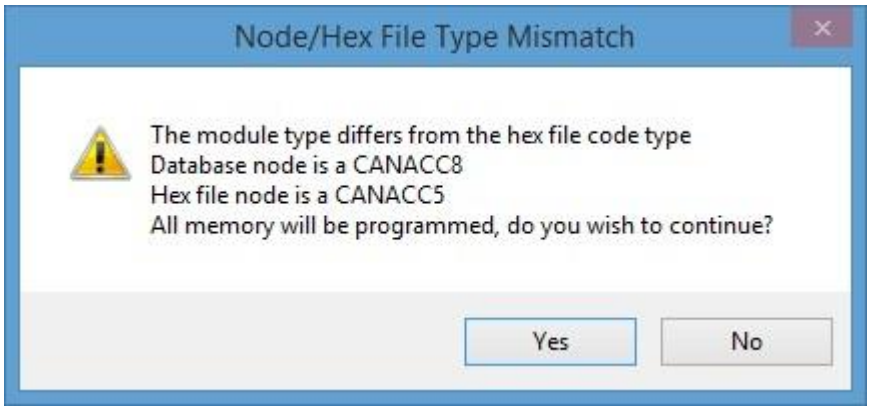


Figure 23. PIC Code Mismatch

If that is the requirement click “Yes” to start the reprogramming, all memory is reprogrammed, and the module will be in a virgin SLiM state when the programming is complete. A progress bar is displayed while programming is in progress. At the end of programming the existing Node is deleted from the database as it no longer exists.

Otherwise click “No” to abort the programming.

On successful completion of programming a message box is displayed stating that programming completed successfully.

If an error is detected, a message box is displayed indicating the error. The target node is not reset and remains in Boot mode. Currently the only error is a checksum fail reported by the target node.

If you attempt to program a node where the target node and the new firmware are for different type of PIC than the message box, then

Figure 24, shown below is displayed. The FCU will indicate that the new firmware is not compatible with the existing hardware, for instance, you are warned if attempt to program a 2480 PIC with code for a 25K80 PIC however it is permissible to program code for a 25K into a 26K PIC

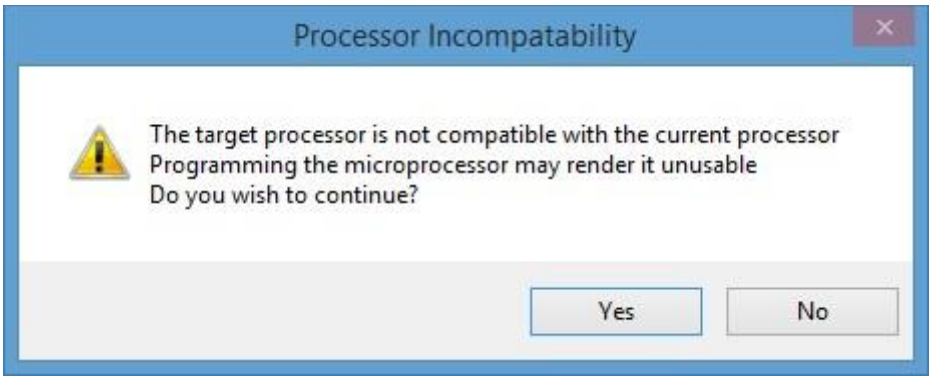


Figure 24. PIC Processor Incompatibility

11.3 Programming CANCAB modules

The CANCAB can have several language variants. The basic version is British English but the language can be changed by Bootloading a different language module. These language modules are normal HEX files but just contain the data for the various messages used by the CAB.

When loading a message module, the dialogue box similar to the dialogue box shown in Figure 22 but note the load address has changed and the options to program the EEPROM and Configuration Data are now disabled.

11.4 Reprogramming Problems and Issues.

There are two main reasons for PIC reprogramming to fail, the target PIC does not contain the Bootloader or the pic fails to return from bootloader mode

If a message box is displayed with the following message “The command Check Boot Mode timed out” then check the following. Are both LEDs lit on the target board, if they are both lit then the PIC is still in bootloader mode.

If the reprogramming appears to be running successfully but a failure is reported at the end, then the target most likely detected a checksum fail. This may be caused by a problem on the CBUS itself. The target node remains in Boot mode. You may retry the reprogramming as the fault may be intermittent. Note that a checksum error can be caused if any 5v DC supply is routed with the CAN wiring. If you get checksum errors check you’re wiring and separate the 5v and CAN wiring, this applies especially to the CANACE8C. You should consider upgrading all modules to use 12vdc where this is possible.

It can also be caused by messages coming from other modules whilst the programming is taking place. If the problem persists, try disconnecting all other modules first.

11.5 Upgrading the ACC4

Note that ACC4 exists in two variants, the original version for 15v AC powered PCBs and the new version for 12v DC powered PCBs. The code for these two variants are not backwards compatible, you cannot program an ACC4_2 with ACC4 code, please ensure you load the correct version for your PCB type. However, the original ACC4 hardware can be reprogrammed with ACC4_2 software. The node type will be changed to CANACC4_2 in the Node Grid if you update an original ACC4 with ACC4_2 PIC code.

For the original 15v AC powered version the file name is of the form ACC4_x.HEX

For the newer 12v DC powered version the file name is of the form ACC4_2x.HEX

Where 'x' in the above names is the code version

See Appendix 2 for more information on PIC code versions.

Appendix 1 CANACE3 Node Variables

The node variable for this module establishes the mode of operation for the row / column combinations. It can have values from 0 to 5

0 All row / column intersections produce an ON / OFF event. ON when connection made, OFF when broken. Events numbered 1 to 128.

1 Adjacent rows produce event pairs for push button (PB) operation. Odd numbered rows to column produce an ON event when made, even numbered rows produce an OFF event when made. Events numbered 1 to 64.

Note: Modes 0 and 1 correspond to the SLiM modes with the jumper to 0V (Mode 0) and jumper to +5V (Mode 1)

2 Rows 1 to 4 when connected to columns (1 to 16) produce ON / OFF events when made / broken as for mode 0. Events numbered 1 to 64.

Rows 5 to 8 work with push button pairs as in mode 1. Events numbered 65 to 96.

3 Rows 1 to 4 when connected to columns (1 to 16) produce ON / OFF events when made / broken as for mode 0. Events numbered 1 to 64.

Rows 5 to 8 produce ON events for every ‘make’ connection for use with single PBs, each producing an ON event only. Events numbered 65 to 128.

4 Rows 1 to 4 produce event pairs for push button (PB) operation.

Odd numbered rows to column produce an ON event when made, even numbered rows produce an OFF event when made. Events numbered 1 to 32.

Rows 5 to 8 produce ON events for every ‘make’ connection for use with single PBs, each producing an ON event only. Events numbered 33 to 96.

5 All row / column intersections produce an ON event only when made. Events numbered 1 to 128.

The above modes allow a control panel to be arranged in different ways depending on whether toggle switches, PB pairs or single PBs are required. The default mode is 0.

Extracted from Mike Bolton's EV_NVs.doc

Appendix 2 PIC Code Versions

Minimum Recommended Firmware Level for 1st gen modules

The minimum recommended versions of the PIC firmware are as shown below. All the code can be downloaded from the Merg Software Download pages in the Merg Wiki website.

Module	Version	Source File
CANACC4	P	ACC4_p.asm
CANACC4_2	2F	ACC4_2f.asm
CANACC5	U	ACC5_u.asm
CANACC8	U	ACC8_u.asm
CANACE3	T	ACE3_t.asm
CANACE8C	W	ACE8C_w.asm
CANLED2	R	LED2_r.asm
CANLED64	P	LED64_n.asm

The HEX files have the same name as above except the file name extension is replaced with .HEX. You will need the .HEX files to reprogram the PIC.

When upgrading an ACE3, you should reprogram both Flash and EEPROM memory if you have version H or earlier as the method of generating events changed significantly after version H. After upgrading you will need to reintroduce the node by pressing the PB as it will be in SLiM mode. Just reallocate the original node number when the Utility detects the node.

Note the event numbers generated by the switches do not change, but don't forget to set the Node Variable to its correct setting.

Version 2 PIC Firmware

A new set of CBUS firmware has been released, this release is designated Version 2, all the modules have been updated to include new functionality that allows the FCU to recreate a configuration by interrogating the CBUS network. Also in this release, the CANACC4_2, CANACC5, CANACC8 and CANSERVO code have all been enhanced to allow these modules to support 128 events.

Note that the original CANACC4 code has not been updated and is not supported in Version 2, users CANACC4 should update with CANACC4_2 firmware which will run in the original CANACC4 hardware

All the latest firmware can be found from the Software Downloads page on the Merg website Wiki.

Appendix 3 Maintaining the CBUS Network Integrity

The integrity of the CBUS network is maintained by ensuring all Nodes connected to the network have unique Node Numbers. When creating a network with new modules, the Utility maintains this integrity by allocating a unique Node Number to each Node as it is introduced.

When upgrading a SLiM system to FLiM, the original SLiM system must have had Node Number integrity otherwise it could not have operated correctly. SLiM consumers do not have Node Numbers and these will be allocated by the Utility as required.

Problems may arise, however, when a Node is introduced which already has an allocated Node Number and if this Node Number is already in use by an existing Node. This will compromise the integrity of the network, prevent correct operation of the attached Nodes and could lead to the database being corrupted. If the Utility detects a potential Node Number conflict, the message box shown in Figure 16 will be displayed.

When introducing an existing Node, if you are not sure whether its Node Number is unique, you should reset the new Node to SLiM mode before adding it to the network. To do this, press the Push Button until the yellow LED turns off and the green LED lights. Do not do this whilst the Utility is active because pressing the PB sends a request to release the Node Number. If this Node Number exists in the database, it would be deleted along with all its events, so you must exit the FCU before resetting a new Node to SLiM mode.

This also applies to introducing any SLiM Producer Nodes, as these have Node Numbers set on the switches and links. The CANACE3 particularly only has Node Numbers 1 to 4 available to it in SLiM mode, so if a CANACE3 exists on the network with one of these node numbers, then the new Node cannot retain the same Node Number.

Any pre-configured consumer nodes should also have their events deleted before adding to the network. For most modules, this can be achieved by adding the “Unlearn” link on the PCB switches and then applying power to the module. See the relevant module documentation for full details.

Appendix 4 Relationship between LED numbers and the 'D' connector pins

Both the CANLED2 and the CANLED64 number the LEDs from 1 to 64. The LEDs are driven by a 16 x 4 matrix, 16 columns and 4 rows. LEDs 1-16 are on Row 1, LEDs 17-32 are on Row 2 etc. The columns for each Row are connected as described below.

'D' Pin **Column**	**Row 1 pin 10**	**Row 2 pin 11**	**Row 3 pin 12**	**Row 4 pin 13**
2	1	17	33	49
3	2	18	34	50
4	3	19	35	51
5	4	20	36	52
6	5	21	37	53
7	6	22	38	54
8	7	23	39	55
9	8	24	40	56
21	9	25	41	57
20	10	26	42	58
19	11	27	43	59
18	12	28	44	60
17	13	29	45	61
16	14	30	46	62
15	15	31	47	63
14	16	32	48	64

The Row columns indicate how the LEDs are connected to the 'D' connector pins, the LED number is shown in the corresponding Row column.

Appendix 5 Short Cut Keys

The following short cut keys have been added to some of the menu items.

Events Menu

Teach Alt T

Learn Alt L

Delete Alt D

Nodes Menu

Read Properties	Alt P
Read NVs	Alt R
Write NVs	Alt W
Read Events	Alt E
Write Events	Alt V
Set Event Node	Alt S
Clear Event Node	Alt C
Edit Node Name	Alt N

Settings Menu

Interpret Msgs	Alt I
Trace All Messages	Alt M