

User's Handbook for IC4

Part no.
667/HB/20168/000

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Table 1 - Issue History

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1 Introduction

IC4 is a windows based configuration tool for the Siemens STxxx series of traffic controllers.

IC4 has a series of screens where configuration data is entered. This information is validated and compiled into the required format for the controller. A PROM can then be generated ready for installation into the controller or can be downloaded to the controller directly.

An optional 'emulator' can be provided which enables the configuration data to be fully tested on the PC. This facility allows the controller firmware to run on the PC and the user to interact with the controller through a series of windows.

A security dongle, programmed with purchased privileges, is supplied by Siemens and must be fitted to the PCs parallel or USB port in order to use IC4; additional privileges are required for using the emulation capabilities. If no dongle is fitted IC4 will not run.

If only basic functionality (downloading/uploading of configuration data to/from a controller, printing and viewing configuration data) is required then IC4 Lite can be used without the requirement of having a dongle fitted.

Online help is available by pressing F1 or selecting the Help menu option.

1.1 Hardware

1.1.1 PC Requirements

CD-ROM Drive for installing IC4.

1 USB port for the Siemens Dongle.

An additional USB port if PROM programming is required.

Required free disk space is approximately 60 MB.

Disk space per configuration is a Max 0.5MB and typically less than 0.2MB (200kB)

Windows XP (32 bit), Vista (32 bit) or Windows 7 (32 or 64 bit) is required as the operating system.

1.1.2 PROM Programmer

Automatic features have been built into IC4 for the following PROM programmers, ELAN C4, ELAN 5000, Dataman S4 and Dataman Pro USB. This allows IC4 to use programmer control codes for the PROM programmers to automate the PROM blowing process.

A manual PROM programming process can be used with other PROM programmers provided that:

1. The PROM programmer can accept INTEL HEX format files downloaded to them.
2. The PROM programmer and/or IC4 can be set up with the same communications speed etc to communicate with each other.

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1.2 Installation

1.2.1 Software CD and Internet download (where available)

Insert CD or open the folder in which the downloaded and extracted installation media was placed. If Autorun is enabled the Siemens Welcome screen will be displayed. If it does not appear simply run the Welcome.exe application at the root of the installation media. From the welcome screen you can **Install IC4**, read the **IC4 Information**, read the **IC4 Handbook**, read the **Vista Notes** (relating to IC4 operation with Vista), **Browse CD** or view other Siemens Product **Handbooks**.

1.2.2 Creating a Shortcut

Find IC4.exe using windows explorer or 'Find Files' option from the start menu. Select the IC4.exe using the right mouse button. A menu will be displayed with an option to 'Create a Shortcut', select this and then place the resultant shortcut on the desktop (if not automatically placed there).

1.2.3 Get at IC4 from the Start menu

From Start->All Programs, IC4 can be started by navigating to Siemens plc->IC4.

1.2.4 Dongle

The parallel or USB dongle must be connected to the PC on which the software is to be used.

1.3 Creating a New Configuration

The following defines the typical sequence of events when creating a new configuration.

1. From the IC4 [File](#) menu select [New](#). This displays all the configuration templates that exist on the PC. By default the following templates are provided:


eblank	Blank template containing no data (controller type to be selected)
eminimum	2 Phase simple configuration (controller type to be selected)
UkLargeCase 800	2 Phase simple configuration in a large case ST800 cabinet
UkLargeCase 900	2 Phase simple configuration in a large case ST900 cabinet
UkLargeCase 900 ELV	2 Phase simple configuration in a large case ST900 ELV cabinet
UkNoCase 800	2 Phase simple configuration with no outer case for ST800 series controllers
UkNoCase 900	2 Phase simple configuration with no outer case for ST900 series controllers
UkNoCase 900 ELV	2 Phase simple configuration with no outer case for ST900 ELV series controllers

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Note: For ST700 and ST750 pedestrian configurations it is recommended that one of the standard configurations is used as the starting point.


Select the appropriate template and the first configuration screen is displayed.

- As each screen is displayed configure the appropriate information and step-on to the next screen using the **>** button. Help is provided on each screen by pressing F1 and if any errors are detected in the configuration data specified, appropriate messages are displayed.


It is recommended that you save the data at regular intervals by clicking on the  button. Always perform a save prior to any compilation or print options.

The first save that is performed has to be a **Save As** using the  button. This then prompts the operator to specify the filename where the configuration data is to be stored.

Note: All compile options are disabled until a first save is performed.

- Once all the appropriate configuration data has been entered perform an **I/O and H/W Allocation**  button. This will generate the hardware required to build this controller.

The items list has to be inserted into the special instruction screen together with any other wiring information. This is achieved by selecting the **Item List** button whilst editing the special instructions. The controller items list is then inserted onto the current special instructions page.

- If the controller **Emulation** option is available this can be used to test the configuration. Selecting the  button compiles the data and starts the emulation package. Testing can then be performed. If any bugs are found the emulator can be stopped, appropriate changes made and the emulator restarted.

- Once the configuration test has been completed a PROM has to be generated. If you are in edit you must **Close** the configuration.

Prior to generating the final PROM the configuration should be up issued to issue 1. This is achieved by requesting a **File Edit**. This displays the name and reason for change dialogue where the up-issue button should be pressed. Once in edit go to the special instructions screen and change configuration PROM item to indicate the appropriate issue. Request a **Compile Conditioning and Translation** to build the final set of PROM data.

The configuration data should then be saved and the edit session closed.

- A blank 64K byte PROM is required (27512) for the configuration data. Ensure that the PROM programmer is connected to the correct com port on the PC and the correct PROM programmer type has been selected from the **Options** menu.

Select the **Program PROM** menu option and a dialogue is displayed where you must select the configuration data file you wish to transfer to the programmer. The PROM blowing sequence is automatic. Refer to section 6.1 PROM Programming if problems are encountered during the PROM generation.

- Then if required produce a print of the final full numeric issue of the controller configuration.

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1.4 Procedure to Create a New Template

If you have a number of standard facilities it is possible to create your own templates which can be used as the start point for each configuration. Create a new configuration using the procedure defined above except once all the appropriate default configuration data has been specified, select the [File / Save as Template](#) menu option. This causes a dialogue to appear where you can specify the required template name to be specified. Once the name has been entered press the [Save](#) button. The configuration edit session should then be closed.

Now when a [New](#) configuration is requested the newly created template will appear in the list of possible default configuration files.

Note:

An EM number has to be specified on the General Junction data administration screen during the edit process. This number is automatically removed when a file is saved as a template.

1.5 Troubleshooting Questions (Q?) and Recommendations (R?)

R1 IMPORTING DATA FROM IC3 or LINSIG:

After importing data from an IC3 configuration or LINSIG files you should always step through all screens using the > button on the IC4 toolbar. This will a) allow you to check that all data is correct, and b) validate the data as each screen is left.

R2 AFTER AN EMULATION:

After a successful emulation, if it is required to blow a PROM, it is recommended that both a Conditioning compilation and Translation are completed. This ensures that the latest data is present in the PROM file. You will be warned when blowing a PROM if the data is more recent than the PROM file.

Q1 Why do I get an error Page [x] line [y] Missing STORE (=) operator which points to the very bottom of conditioning?

A1 The FIN statement is no longer required in special conditioning. If it is present the following error occurs during compile - "Page [x] line [y] Missing STORE (=) operator", with the "Page [x] line [y]" pointing at the FIN. N.B. If you are on the special conditioning page, double clicking on the conditioning error message line in the error view (button "!"), takes you to the line with the error. During an IMPORT from IC3 files the FIN should be removed. However if the FIN is not actually at the end, e.g. there are comments / text after it (in the original IC3 file) it will not be removed and the above error occurs on compilation in IC4.

Q2 When I step OFF the UTC screen, why does it indicate that there is something wrong with the reply bit " CC' " that I have used before?

A2 THE ' CHARACTER is no longer an accepted character in an input name, therefore if an ' has been appended to a signal name to make it different from a standard / default signal name e.g. CC' in UTC, this must be changed to be another alpha numeric character e.g. CCR. (This is most relevant when data is imported from a previous IC3 Configuration).

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Q3 Why do I have no SPECIAL INSTRUCTIONS after importing an IC3 configuration?

A3 During an import of IC3 data, the import of the special instructions are not Imported as they generally contain details which are / were particular to the T200 / T400 configuration and thus would not be relevant to an ST800 or ST700 configuration. However if there are some instructions that are required from the old configuration e.g. details of the functioning of some special conditioning, then the following can be done to import them.

On the special instruction form / page select "Open File".

On the file open box select Files of type - All Files (*.*)

Navigate around until the IC3 .PRN file is found for the appropriate EM (e.g. e12345.PRN). NB it may be necessary to select the detailed file view using the "Details" button, (furthest right on file open toolbar) to ensure it is the .PRN file that is selected.

Once the appropriate .PRN file has been highlighted either double click on it or press open, and it should be opened in a text editor. You can now cut and paste the relevant details from the old configuration into the new configuration.

Q4 When I open the configuration why does it open on a screen for a facility that I have not configured and warn me of such when I step off the screen?

A4 When any existing configuration is opened it opens at what was recorded as the last screen in use. However, with the insertion of extra screens for new facilities, what was the last screen may have moved. Thus, the configuration may open on a screen for a facility that is not used, and a warning is issued just to ensure that if the facility is required you have the option to configure it. However if the facility is not required then once saved, the configuration reverts to normal.

Q5 I have just opened a configuration and there were warning / error messages telling me that it failed to find a match for some data items. It then reported a possible data corruption and/or that the configuration has been produced on a later issue of IC4?

A5 If you are not using the latest issue of IC4 and are opening a configuration which was not produced on your configurator, then the configuration you are opening may have been produced on a later issue of IC4. In that case it may have data (new facilities added), which the old configurator will be unable to understand / load (reporting the errors). The configuration can still be used although it is recommended that, once loaded, you save it temporarily to a different file name. Print it out, visually check the data and then test it under emulation. Once convinced it is correct it can be saved back as the original file name to maintain continuity.

Q6 On starting my emulator I do not get any picture on the toolbar buttons and/or signal heads?

A6 Reinstall IC4 or use the Repair functionality from (Add/Remove) Programs.

Q7 I have tried to emulate my configuration / and or tried the configuration in a controller and it fails to load / fails to start-up?

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- A7 Using the handset check to see if the reason is a compatibility fault, i.e. FLF21:255. If it is then the configuration may have been translated for the wrong issue of controller firmware. In order that IC4 can create configurations for all versions of the controller that are available, there is a field on the 'General Junction Data -Administration' screen called 'Controller and Firmware Type'. This field allows the user to choose which issue of firmware they are going to translate the configuration for. If an issue is chosen here, e.g. 'ISS 7', then the controller firmware issue (which can be found using the handset command PIC) must be the same or higher than that chosen on the configurator. If not then data may be included in the configuration PROM / binary file that is for new facilities only supported on later issues of firmware, making it incompatible with the controller firmware you have, and leading to the error. The solution is either to reduce the issue shown in the field on IC4 ('General Junction Data -Administration' screen called 'Controller and Firmware Type'), or upgrade your firmware in the controller.

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2 File

2.1 New

This creates a new configuration file from a template. (**Note:** All template files have a file extension of .8TP). See Section 1.4 for details on how to generate a template.

2.2 Open

This option displays a window enabling the required configuration file to be selected for editing. One of two different windows is displayed.

If the Preview issue from the View menu is disabled then the following dialogue is displayed:

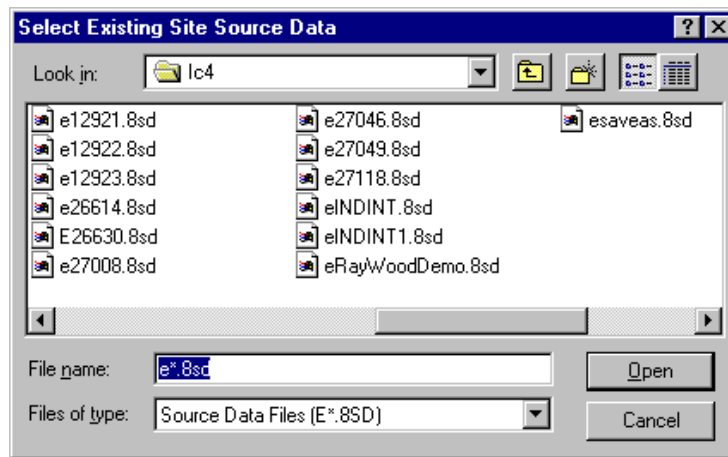


Figure 1 - Open Dialog

If the Preview Issue from the View menu is enabled then the following dialogue is displayed:

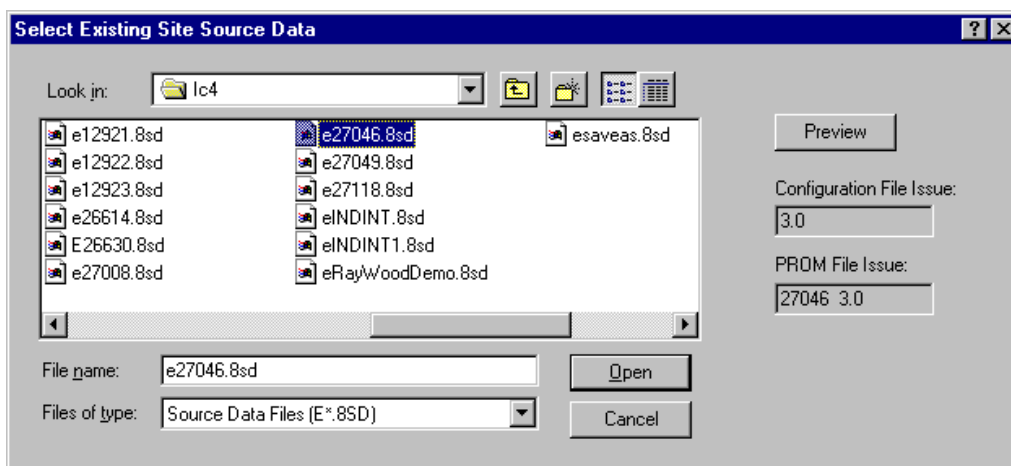


Figure 2 - Open Dialog with Preview

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If you select a configuration file and activate the 'Preview' button then the file issue is displayed in the 'configuration File issue' box and the issue PROM file (CIC handset command) is displayed in the 'PROM File Issue' box.

2.3 Print

The printout generated by IC4 has the same format and layout as the screens viewed during the edit process.

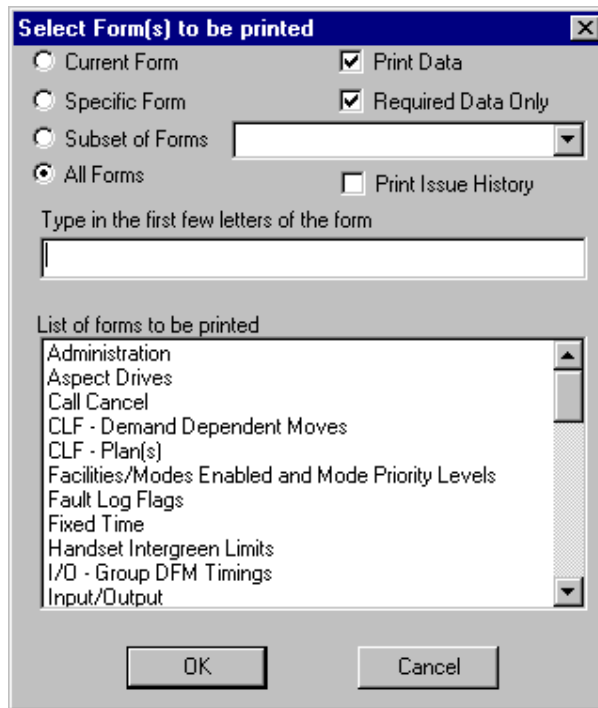


Figure 3 - Print Form

2.3.1 Print Data

Print Data

Enabling this option means the data associated with the configuration is printed. This option is only disabled if you require a print that does not include any data (i.e. a blank page).

Required Data Only

It is recommended that this option is always enabled. It reduces the overall size of the print such that only screens where data has been entered are printed. (e.g. if only 2 CLF plans are configured then the screens associated with the other plans is not printed).

Print Issue History

Enabling this option means that the name and reason for change information is also included in the print.

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2.3.2 Form List

This list shows the titles of the forms that are to be printed due to the options selected.

2.3.3 Form Selection

Current Form

Enabling this option prints the current screen being viewed. The title of the screen to be printed is shown in the 'list of forms to be printed' window.

Specific Form

Enabling this option allows one particular form to be printed. Once this button has been selected the required form must be selected from the 'list of forms to be printed' window.

Subset of Forms

Enabling this option prints the specified group of screens. The titles of the screens to be printed are shown in the 'list of forms to be printed' window.

All Forms

Enabling this option enables all screens to be printed.

2.3.4 Printing in Progress

This view is displayed whilst IC4 is spooling the configuration data to the printer.

2.4 Printer Setup

When an IC4 session is started the default system settings for the printer are used. Changing the options to alter the format of the IC4 apply until the IC4 session is ended.

It is recommended that the printer is set up for portrait printing with 2 pages per A4 sheet of paper.

2.5 Save as Template

This option is used to create default templates that can be used as the start point for any new configuration. Hence this template can contain any fixed data which applies to all configurations.

A new configuration is created in the normal way and the required default data is set up. Then use the 'Save as Template' to save the file with the required name and an 8TP file extension. When the File New option is selected the template just created will appear as one of the available templates.

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3 Options

3.1 Controller Communications

The controller communications protocol options are pre-set in this option and cannot be changed. The only field that can be changed is the port number. Ensure the port selected is the one that the controller cable is plugged into.

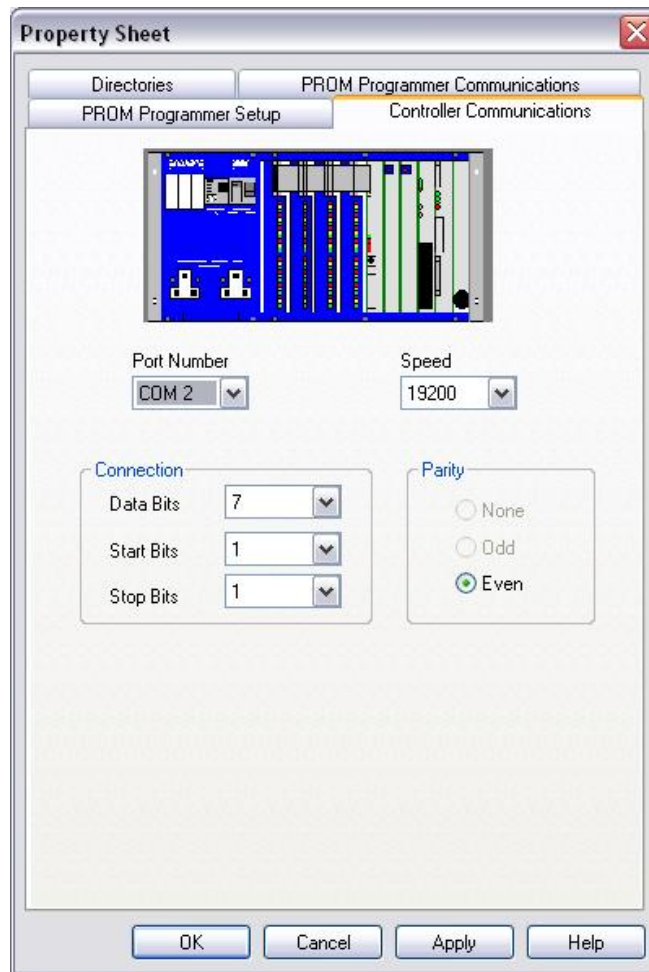


Figure 4 - Controller Communications

3.2 Directories

Each of the following paths can be modified by either clicking on the appropriate path button to browsing through all existing directories or entering manually. If new directories are required then these must be created outside the IC4 application.

3.2.1 Working Path

This path should be set to the directory where the IC4 application (IC4.exe) and associated files reside.

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3.2.2 Archive Path

When a configuration is to be archived the path indicated here is the default one. Set this directory to the area where configurations are normally archived.

3.2.3 Data Path

This path indicates where all the IC4 configuration files reside.

3.2.4 Emulator Path

This path indicates where all the IC4 Emulators reside.

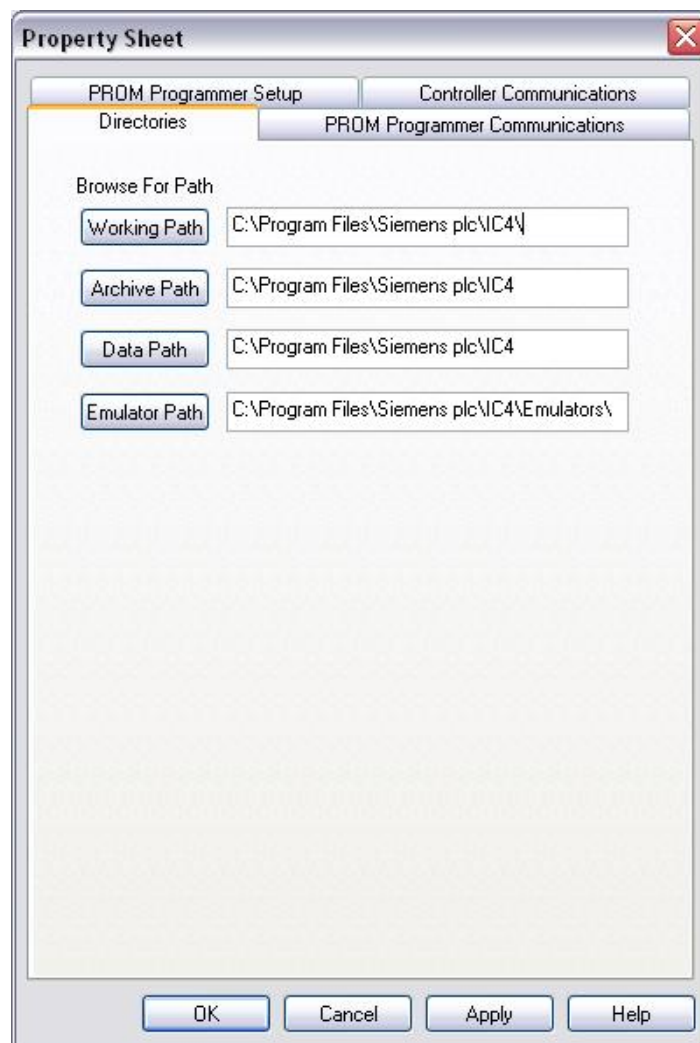


Figure 5 – Directories

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3.3 PROM Programmer Communications

This option specifies the communication protocol to the PROM programmer. Set the parameters to match the programmer being used and ensure the port selected is the port that the PROM programmer cable is plugged into.

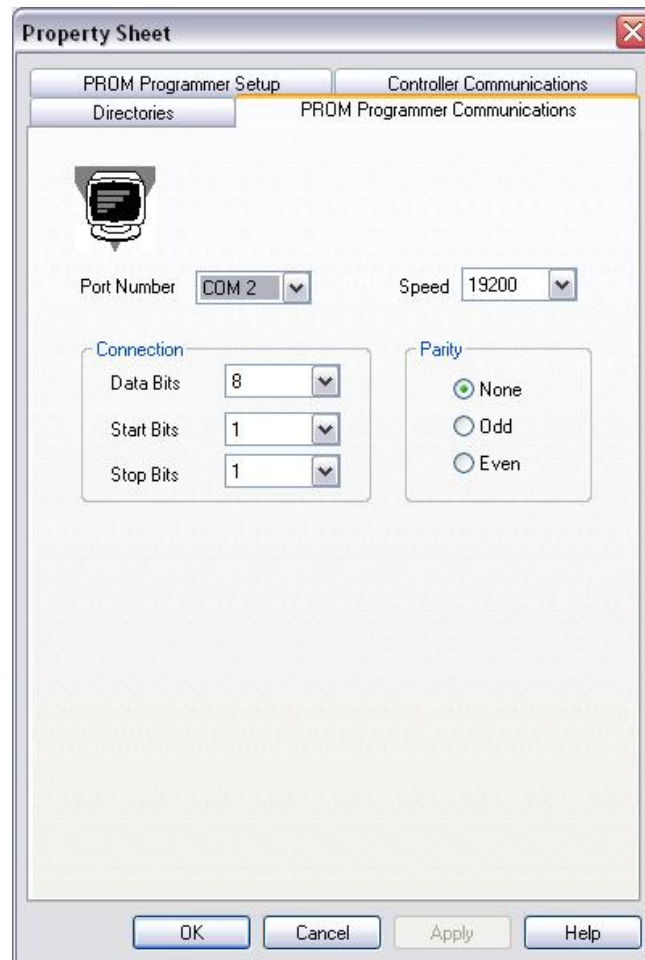


Figure 6 - PROM Programmer Communications

3.4 PROM Programmer Setup

This option configures the interface to the PROM programmer. PROM programming is an automatic process where IC4 sends a series of commands to the programmer and expects certain pre-defined responses from the programmer.

Four different programmer types are supported by IC4:

- Dataman 40Pro (USB)
- Dataman S4 (RS232)
- Elan C41 (RS232)
- Elan series 5000 (RS232)

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3.4.1 USB Interface Programmer Setup

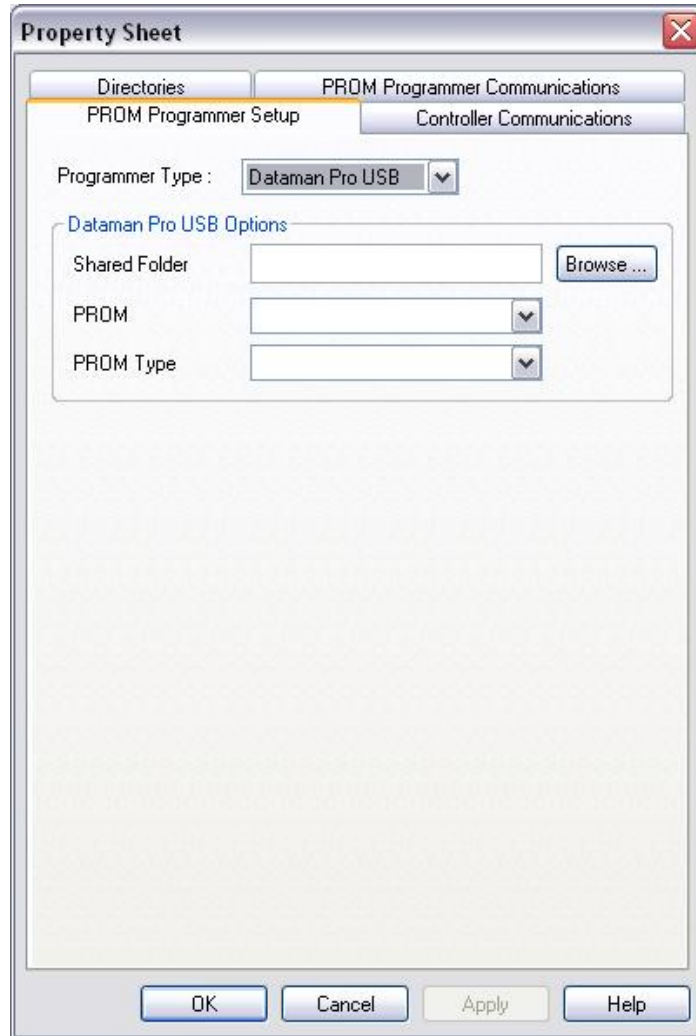


Figure 7 - PROM Programmer Setup

3.4.1.1 Programmer Shared Folder

Click on the 'Browse' button and a dialog box will be displayed to allow the user to select a folder. This folder will be used to hold a temporary copy of the PROM data file (*.8BN) while it is being sent to the PROM programmer. The specified folder could for example be C:\DatamanShare or any other folder at the user's discretion.

3.4.1.2 Programmer Pro Manufacturer

Select the manufacturer of the PROM from the list.

3.4.1.3 Programmer Pro PROM Type

Select the PROM type from the list.

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3.4.2 RS232 Interface Programmer Setup

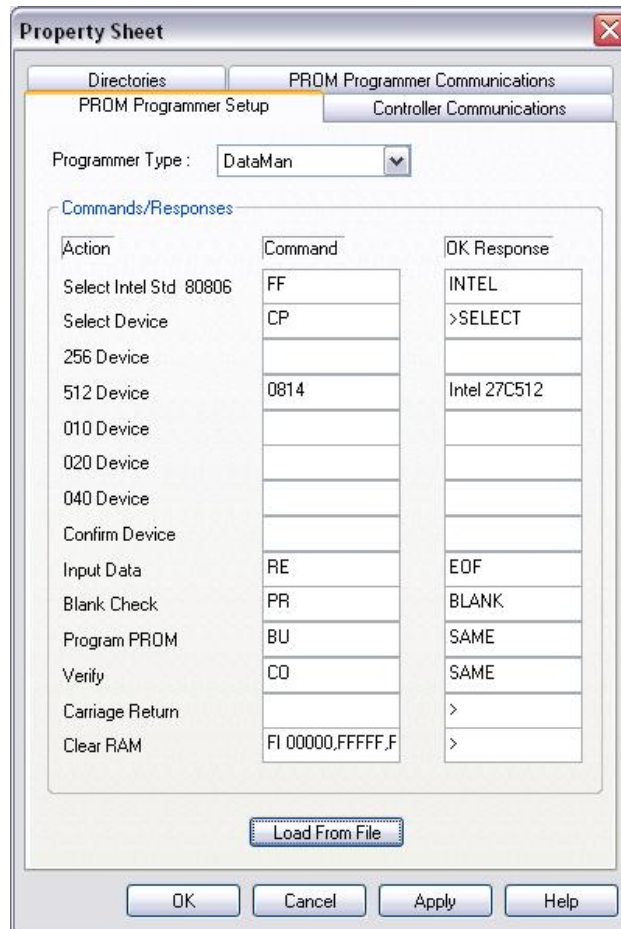


Figure 8 - RS232 Interface Setup

3.4.2.1 Programmer Commands and Responses

This data is initialised by selecting the 'Load From File' button. The data indicates the commands and expected responses during the programming sequence. The data is not normally changed.

3.4.2.2 Programmer Load from file

On activating the button you are prompted to select the required file.

Default files exist to initialise the commands and responses for each of the 3 RS232 PROM programmer types supported.

- A DATAMAN.txt
- An ELAN C41.txt
- An ELAN 5000.txt

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4 View

4.1 Toolbar

Enabling/Disabling this option shows/hides the main toolbar at the top of the IC4 window.

4.2 Edit Bar

Enabling/Disabling this option shows/hides the edit tool bar at the top of the IC4 window.

4.3 Status Bar

Enabling/Disabling this option shows/hides the status bar at the bottom of the IC4 window.

4.4 Preview - Issue

This option enables and disables the ability to determine the issue of a file before you open it. See File open in Section 2.2 for further details.

4.5 Errors

This displays the View Errors window to inform of any screen validation, compilation or translation errors.

4.6 Issue History

This displays the View Issue History window that displays the name and reason information for the previous configuration edits.

4.7 Language

From this menu the language IC4 is displayed in can be selected. The language can only be changed when IC4 does not have a configuration open.

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5 Build Process

5.1 Build All

This option goes through the three parts of the build process sequentially, that is Hardware Allocation, Compile Conditioning and Translation.

5.2 Emulate

This is an option available in the IC4 configurator where the configuration data entered can be tested on the PC without the need to generate a PROM. When using this menu option, the user will be prompted to select the version of emulator to use for the emulation session. The different versions of emulator are differentiated by firmware type and revision.

If this emulation feature is invoked from the emulate toolbar button, the emulator firmware version, will be automatically selected if possible, based on the admin screen firmware setting.

5.3 IO Allocation

5.3.1 General Notes

After all configuration data has been entered, the required controller hardware must be generated. This will consist of an items list which details the hardware components required, and an IO cabling list. An example section of an items list follows and the structure is common across all controller types:

ITEM	DRAWING NUMBER	DESCRIPTION	QTY	TOT	REMARKS
1					
2	667/1/33900/010	ST900 Cabinet UK 1.5KVA 8ph wired 8ph - Grey			
3	667/1/33900/020	ST900 Cabinet UK 2KVA 24ph wired 32ph - Grey			
4	667/1/33900/011	ST900 Cabinet UK 1.5KVA 8ph wired 8ph - Black			
5	667/1/33900/021	ST900 Cabinet UK 2KVA 24ph wired 32ph - Black			
6					
7					
8	667/1/33900/900	ST900 Rack UK 8 Phase wired 8 phase		1	
9	667/1/33900/901	ST900 Rack UK 24 Phase wired 32 phase			

Controller cabling lists are controller specific and hence refer to the controller specific sections which follow for details.

The data relating to the hardware build is stored as part of the special instruction data (itemlist.txt). There is a Start and End marker (see example in section 5.3.3.2); the information between these markers is replaced each time hardware allocation is executed.

If you manually change any data between the start and end markers, the start and end markers should be removed. This means each time the hardware allocation is executed the modified items list does not change. However this results in two items lists existing (new one and modified one); the modified item list quantities should be changed (if required) to reflect the new data. The new items list should then be deleted.

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5.3.2 IO Compilation Sequence

During IO compilation, the following questions are always asked:

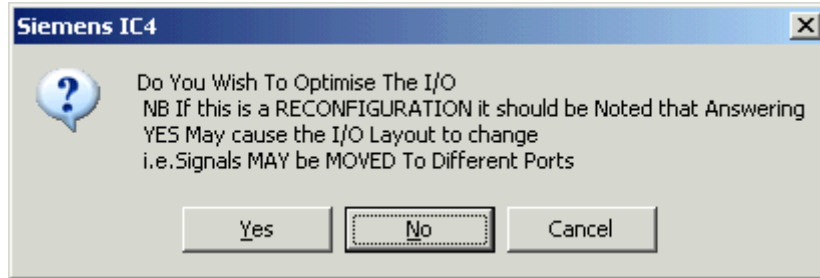


Figure 9 - IO Optimisation

Where the response will perform the following tasks:

- Yes Optimise IO to use as minimal number of IO boards as possible. Note this option will move all IO lines and may modify the IO board layout on ST900 series controllers. This should only be performed if really required.
- No Do not move any IO lines/boards as a result of this hardware allocation. All lines will remain in situ and no optimisation will take place.
- Cancel Cancel the hardware allocation request.

Normally you should answer 'NO' as the controller I/O is dynamically allocated during the edit process. The only time you may wish to optimise would be if I/O has been removed and hence moving some of the I/O could reduce the amount of hardware required.

If the allocation has been performed from outside of an Edit then the following question is asked. You should click on 'Yes' to save the new hardware details in the Special Instructions page of the configuration data.

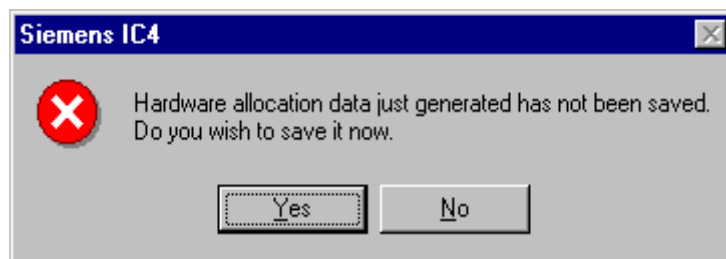


Figure 10 - Non Edit IO Allocate Save Data

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5.3.3 Hardware Allocation

5.3.3.1 ST700/ST750/ST750ELV

For these controllers, the I/O cabling is calculated (For ST700 and ST750 see section 5.3.3.2; For ST750 ELV see section 5.3.3.3), but the quantities on the items list are not.

The I/O cabling details and a copy of an appropriate standard controller items list are inserted into Special Instructions when the 'Insert Items List' button is clicked, but the quantities on the Items List need to be entered manually.

5.3.3.2 ST800

For the ST800, the I/O cabling is calculated as well as component quantities on the items list. Note that, the requirement for some items cannot be determined from the configuration alone and therefore their quantities on the items list will have to be manually entered.

The following is an example of an ST800 IO cabling list:

```

;>(*A*G*I*S*)"Marker for Start Of Auto Inserted items DO NOT DELETE"
Board      Pos.   Skt   Port  Type  Line      Cable  Block
CPU        A     E     0     I     00 - 07   100    1TBG
IO1        B     B     2     I     16 - 23   103    1TBJ
IO1        B     E     4     O     32 - 39           1TBK
IO1        B     C     3     I     24 - 31   103    1TBL
IO1        B     D     5     O     40 - 47           1TBM

<Items lists are detailed here>

;*"Marker for end Of Auto Inserted items DO NOT DELETE"(*A*G*I*E*)
    
```

Figure 11 - ST800 IO Allocation Example

Where each column has the following meaning:

Column	Description
Board	The board identifier for which this port entry relates.
Pos.	Position of card in the rack, where A=left-most (reserved for CPU Card).
Skt	Socket/plug identifier on the I/O card.
Port	The port number of this entry.
Type	Whether this port is an input (I) or output port (O).
Line	The lines numbers which are served by this port.
Cable	Variant of the I/O cableform to be used.
Block	The position within the cabinet where the card's associated

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	terminal block should be placed.
--	----------------------------------

Table 2 - ST800 IO Allocation Detail

5.3.3.3 ST900/ST900 ELV

The results of a hardware allocation for ST900 series controllers is similar to ST700/ST800 controllers, except the IO cabling list is modified for ST900 IO.

Once the Compile IO menu item has been invoked, the following message may be displayed:



Figure 12 - ST900 Manual Allocation

This message indicates that some IO cards could not be allocated within the cabinet and these will have to be manually allocated by referring to the special instructions for this task. This is due to the limited number of mounting points for IO cards within the ST900 cabinet assembly.

An example of an ST900 IO cabling list follows:

60105

Card Type	Rack Posn	Addr.	Port	Type	Line	Term Posn
Serial IO 24/16 (UTC)	1 I/O1	1	0	I	000 - 007	1 I/O1
Serial IO 24/16 (UTC)	1 I/O1	1	1	I	008 - 015	1 I/O1
Serial IO 24/16 (UTC)	1 I/O1	1	2	I	016 - 023	1 I/O1
Serial IO 24/16 (UTC)	1 I/O1	1	3	O	024 - 031	1 I/O1
Serial IO 24/16 (UTC)	1 I/O1	1	4	O	032 - 039	1 I/O1
Serial IO 24/4 (SDE)	1 I/O2	2	5	I	040 - 047	1 I/O2
Serial IO 24/4 (SDE)	1 I/O2	2	6	I	048 - 055	1 I/O2
Serial IO 24/4 (SDE)	1 I/O2	2	7	I	056 - 063	1 I/O2
Serial IO 24/4 (SDE)	1 I/O2	2	8	O	064 - 067	1 I/O2
Serial IO 24/4	2 I/O1	3	9	I	072 - 079	2 I/O1
Serial IO 24/4	2 I/O1	3	10	I	080 - 087	2 I/O1
Serial IO 24/4	2 I/O1	3	11	I	088 - 095	2 I/O1
Serial IO 24/4	2 I/O1	3	12	O	096 - 099	2 I/O1
Intelligent Backplane 16/0	Rack	4	13	I	104 - 111	1 LT3
Intelligent Backplane 16/0	Rack	4	14	I	112 - 119	1 LT3
Serial IO 24/4	2 I/O2	5	15	I	120 - 127	2 I/O2
Serial IO 24/4	2 I/O2	5	16	I	128 - 135	2 I/O2
Serial IO 24/4	2 I/O2	5	17	I	136 - 143	2 I/O2

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```

Serial IO 24/4          2 I/O2          5    18  O    144 - 147    2 I/O2
Serial IO 24/4          S.I.            6    19  I    152 - 159    S.I.
Serial IO 24/4          S.I.            6    20  I    160 - 167    S.I.
Serial IO 24/4          S.I.            6    21  I    168 - 175    S.I.
Serial IO 24/4          S.I.            6    22  O    176 - 179    S.I.
CPU
i >
    
```

<Items lists are detailed here>

Figure 13 - ST900 IO Allocation Example

Where each column has the following meaning:

Column	Description
Card Type	The card type to which this entry relates. This is typically a serial IO card variant (EG 24/16 or 24/4) or an Intelligent Backplane. Note that some entries will contain a (UTC) or (SDE) identifier, this indicates that UTC and SDE IO will be placed on these cards respectively.
Rack Posn	The position within the cabinet where this board should be fitted.
Addr	The card address of this board. This should also be set on the IO board itself using the 'address switch'.
Port	The port number for which this entry relates
Type	Whether this port is an input or output port
Line	The lines numbers for which this port relates. These correspond to the line numbers (DET No) present on the IO screen.
Term Posn	The position within the cabinet where the card's associated terminal block should be placed. In the case of ST900 serial IO cards, this will be the same as the Rack Posn as the terminal block is contained on the card itself.

Table 3 - ST900 IO Allocation Detail

5.4 Modifying the IO Card Map

5.4.1 Manually

The IO card configuration can be manually changed by moving to the IO → Input/Output screen and clicking the 'Manual Map Optimisation' button. This will open the 'Manual IO Map Optimisation' dialog where the desired card types can be configured and moved. The following screen is an example:

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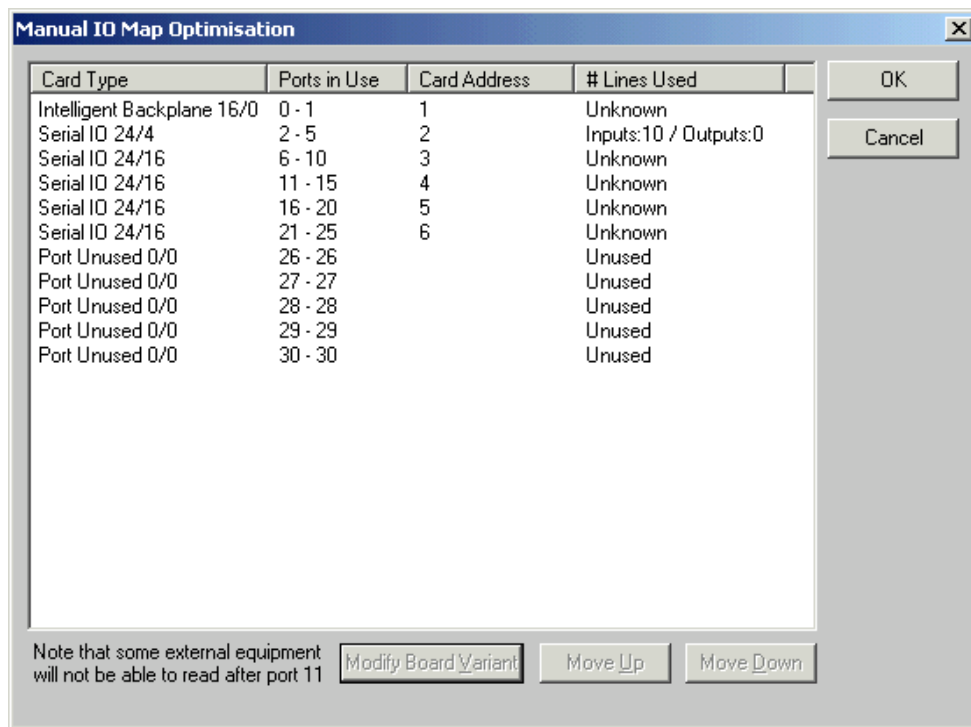


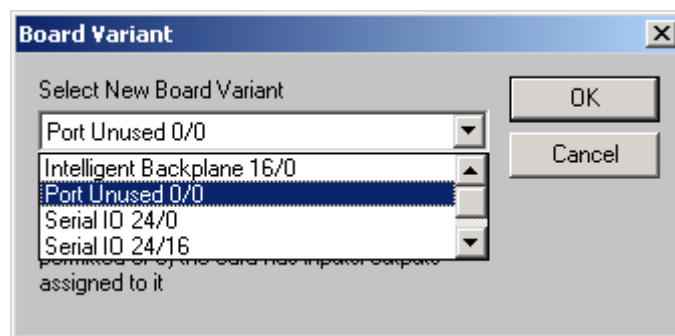
Figure 14 - Manual IO Map Optimisation

5.4.1.1 Moving a Card

The relative position of a card can be moved by selecting the entry in the list and clicking 'Move Up' or 'Move Down'. The card will swap positions with the previous/next card and the card addresses/line numbers will be modified to reflect the new card positions. **Note:** some older external equipment may not be able to be able to read past port 11.

5.4.1.2 Modifying a Card Type

The card type can be modified by selecting the relevant entry and clicking 'Modify Board Variant', where the 'Board Variant' dialog will be displayed.



This dialog allows the changing of the board variant to be used at this position in the IO map. A list of possible board variants will be displayed. Note that the list will only contain the possible transitions. The list is populated by the following rules:

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1. A card can only be expanded if enough unused ports directly follow the card to be expanded. For example an upgrade from Serial IO 24/0 cannot be upgraded to a Serial IO 24/16 unless 2 Unused ports directly follow (unused ports can however be manually moved into position)
2. A card can only be changed to another different card type (E.G Serial IO to Intelligent Detector backplane) by first being changed to 'Port Unused'
3. The Serial IO card currently used for Integral OTU (UTC) IO allocation cannot be downgraded to a 24/4 or 24/0

The following IO card types are permitted for an ST900 series controller:

Card Type	Description
Serial IO 24/16	A serial IO card with 24 input lines and 16 output lines.
Serial IO 24/4	A serial IO card with 24 input lines and 4 output lines.
Serial IO 24/0	A serial IO card with 24 input lines and 0 output lines. Although this card does not physically exist this card type is selected when it is desirable to not use any output lines.
Intelligent Backplane 16/0	A 16 line input backplane for Siemens loop detector cards.
Port Unused 0/0	Indicates this port and associated line numbers are not in use.

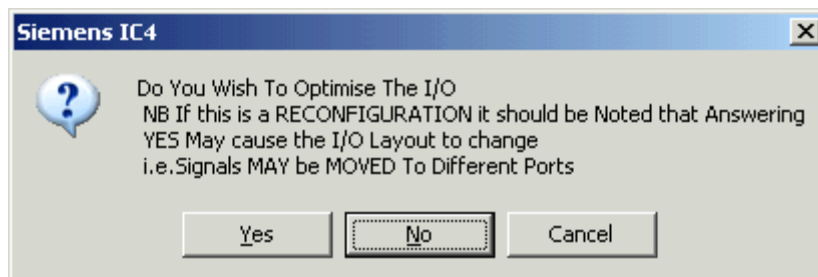
Table 4 - IO Map Card Types

Once a configuration is in use this should be the only way the IO card map should be modified manually, otherwise automatic allocation may perform undesirable IO card moves.

5.4.2 Automatically

Automatic IO card allocation can be used at the start of a new configuration and will attempt to automatically order and select the correct IO card variants depending on what IO lines are in use.

Automatic allocation can be invoked selecting 'Compile IO' and selecting 'Yes' in response to the IO optimisation prompt:



For the ST900, automatic allocation will attempt to allocate in the following order from port 0-30:

- 1) Allocate any external SDE/SA card
- 2) Allocate any Intelligent detector backplanes required

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- 3) Allocate any 24/16 Serial IO required
- 4) Allocate remaining ports as 24/4 Serial IO cards
- 5) Remaining ports are set as unused

5.4.3 Moving Lines to/from Backplanes/Serial IO cards

5.4.3.1 Moving

To move an IO line to or from a backplane, select an already existing IO line via the IO screen and clicking 'Move to Backplane'. If a suitable free line is available, the line will be moved and placed at the first available suitable line. Note that it is not possible to move IO lines with either the UTC flag set or External SDE.

If no free Intelligent Detector Backplane/Serial IO lines are available the following prompt will be displayed:



Figure 15 - Move to/from Backplane Failure

See section 5.4 for details on how to modify card types to resolve this scenario.

5.4.3.2 Notes on Adding IO Lines

When adding IO lines please take note of the following considerations:

- 1) IO lines can be added manually from the IO screen on both Intelligent Detector Backplanes and Serial IO cards.
- 2) IO lines added via other screens, EG the Call Cancel screen, are only added to serial IO cards and NOT Intelligent Detector backplanes. Therefore if there are no remaining Serial IO lines (even if there are other Intelligent Detector Backplane lines available), the add IO line will fail, however the line will still exist on the secondary screen. Manually adding the line after this step will not have the correct linking between the IO screen and the secondary screen.

Scenario 2) is common in the case where a configuration consists of only Intelligent Detector Backplanes and no serial IO cards. This scenario can be resolved by the performing the following actions:

- Remove the IO line created on the secondary (EG Call Cancel) screen
- Return to the IO screen, and manually add the line to the Intelligent Detector Backplane
- Return to the secondary screen and re-enter the signal name. This will ensure that the correct linking between the IO lines/screen exists

It is also possible to temporarily create a Serial IO card and then manually move the IO lines to an Intelligent Detector Backplane by using the 'Move to/from Backplane' button on the IO screen.

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5.5 Special Conditioning

The special conditioning data entered during the configuration process must be compiled before generating the configuration PROM. This option scans through the conditioning and if errors are detected the appropriate error messages are displayed.

5.6 Translate Configuration Data

This process compiles all configuration data entered into the correct format for generating the PROM. If errors are found these must be corrected before a PROM can be generated. Warnings may be generated which are intended to inform the operator that something may be wrong/missing but the data is not critical to the controller operation. It is recommended that all warnings are cleared before generating the PROM.

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6 Program

6.1 PROM

Once the configuration data has been translated, a single PROM is required for the controller. To produce the PROM a PROM programmer must be connected and the communication protocol set-up correctly.

After placing a blank 27512 PROM in the programmer, select the required PROM data file (The translated data is held in a file called <filename>.8bn). The programming sequence is automatic and manual intervention should not be required.

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7 Data

7.1 Archive

Configuration data is held in the directory indicated by the working path. This data should be archived to a safe place on a regular basis in case the PC fails and hence data is lost.

It is recommended that the Configuration is archived once the PROM has been generated.

When archiving the data you can either select specific file(s) or all files prior to a date. See “Cut-off Date” below for further details.

Cut-off Date Option

The Cut-Off date is initialised to one week prior to the current date. This can be modified as required or deleted to leave a blank field if specific file(s) are to be archived.

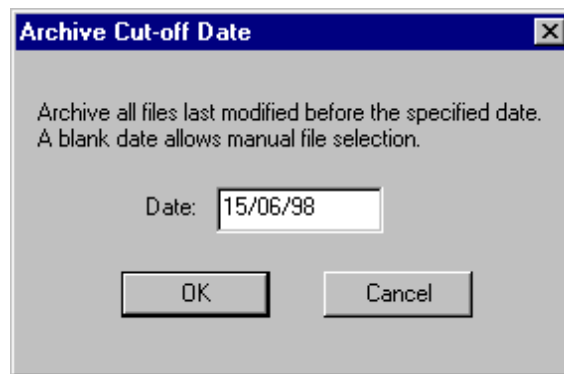
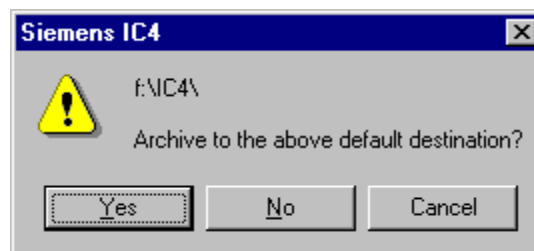


Figure 16 - Archive Cut-off Date

All the configuration files that were last modified before the specified date are selected for archive. The files are displayed so that the operator can confirm they are the expected files.

Specific File(s)

A window is displayed listing all the configuration files in the working directory. Select the required file(s). Once the configuration files have been selected, the operator is then prompted to confirm the directory where data is to be archived; as shown below. (This defaults to the Archive Path.)



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Figure 17 - Archive Data Path Check

To change the path, click on No and select the required directory as prompted. On completion of the archive the operator has the option to delete the configuration files.

7.2 Delete

Configuration file(s) can be deleted via this option. Before the file is deleted IC4 checks whether a copy of the configuration is held in the archive area (as indicated by the archive path).

7.3 Export

Future Facility, not yet implemented.

7.4 Import

Configuration data can be imported from either **Linsig** or **IC3** files, thus reducing the amount of data that must be entered.

7.4.1 Linsig Files

The following data is imported from Linsig:

- Number of Streams/Phases and Stages
- Phases in stages
- Phase descriptions
- Phase Types
- Phase Minimum, Maximum and Intergreen times
- Phase Delays
- Prohibited moves (VA mode)


7.4.2 IC3 Files

All Data is imported from IC3 except

- CLF
- Lamp Monitoring
- Export Signal Sequence data

When this option is selected a window is displayed where the required file to import must be selected. Use the **Files of type** options to change the files displayed to be either IC3 (e*.ans) files or Linsig (*.dat) files.

Select the required files then click on the OPEN button. This will import the data and start then IC4 editor.

On entering edit select the  button which indicates whether any errors were detected during the import process.

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The special conditioning is now incorporated as part of the edit process. This can be compiled during the 'edit' process.

7.5 Recover

Data, which has been archived, can be restored back to the working area.

The file(s) to be recovered can be selected via a File Open dialog.

Once the configuration files have been selected, the operator is then prompted to confirm that the directory where data is to be recovered is as shown below. (This defaults to the working path.)

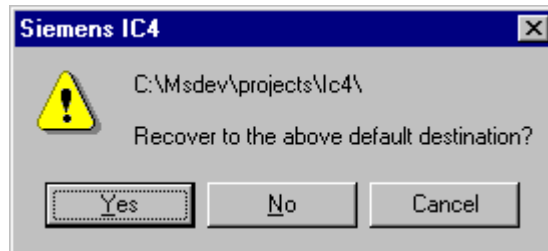


Figure 18 - Recover Data Path Check

To change the path click on No and select the required directory, as prompted.

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8 Controller

8.1 Retrieve Configuration

This option enables the configuration data to be retrieved from a controller and saved on the PC hard disk.

To complete this option, follow the series of instructions provided on the screen. This requires the operator to be able to obtain level 2 handset access. At the end of the retrieve sequence the operator is informed whether it was successful. If it was, the operator is prompted to specify a filename where the retrieved configuration data is to be stored. The default name supplied is based on the controller EM number. Either use this name, or specify a new name.

Once the configuration data has been retrieved it can be modified via the IC4 edit option and then subsequently sent back to the controller.

Notes:

1. The controller's 'retrievable' configuration data is automatically stored in the configuration PROM (for controller firmware issue 4 or later) when the PROM is programmed.
2. The PC must be connected to the controller handset port via a suitable serial cable. Ensure the correct PC serial port is set up; see Options - Controller Communications in Section 3.
3. The data retrieved is a copy of the original configuration data used to create the PROM and does not include any data that has been subsequently modified via the handset, this is in contrast to the view differences described in section 8.3.
4. Controller firmware issue 5 or later must be fitted to the controller to perform the Retrieve operation.
5. The PC does not need a dongle fitted to perform the Retrieve operation.

8.2 Send Configuration

This option enables new configuration data to be sent to the controller via the handset serial port. This allows the configuration data to be updated without the need to burn a new configuration PROM.

To complete this option follow the series of instructions provided on the screen. This requires the operator to be able to obtain level 2 handset access and enter the Level 3 initialisation commands.

Prior to selecting this option the required configuration data must have been entered and a compile / translate performed (i.e. the same as if a PROM was to be burnt). This creates a file in the required format for transmitting to the controller.

Notes:

1. The controller signals must be switched off via the manual panel to enable successful transmission of the configuration data.
2. Controller firmware issue 5 or later must be fitted to the controller to perform the Send option.
3. IC4 does not need a dongle fitted to perform the Send option.

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8.3 View Differences

Once a controller has been configured by IC4 many items of configured data can be altered "on the street" via a handheld maintenance terminal. The View Differences dialogue box enables the combined handset altered/configured data from the controller to be compared with the original configuration that was downloaded to the controller, or even a modified version of it.

Selecting View Differences from the Controller Menu displays the Select Configuration File browser which lists all of the IC4 configuration files held in the data directory (specified via the Options\ Data Path menu). Select the configuration that you wish to compare with, i.e. that matches the configuration of the controller you are or have been connected to, and then click the Select Config button. If you do not have the configuration and are connected to a controller, you can click the Retrieve Config button. The View Differences window is then displayed:

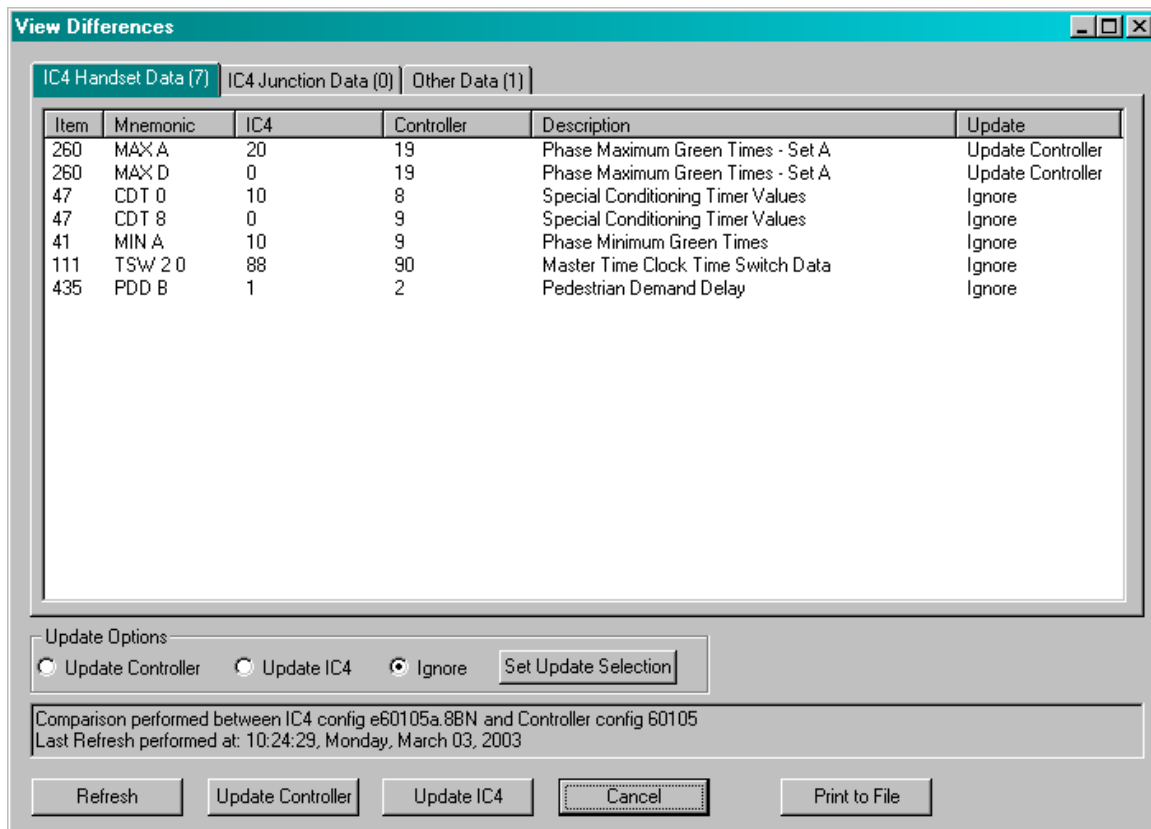


Figure 19 - View Differences

If a Refresh has previously been performed for the configuration selected, and the files that are produced as a result of this are located in the same folder as the configuration being compared against, any differences will be displayed; as shown above. If not, no differences will be shown and the status bar text near the bottom will indicate this. Either locate the files and move into the data folder (as defined by the data path in Options - Directories) or connect to a controller and perform a Refresh.

There are three 'Tabs' which are available for displaying differences, click on each one to view those differences. The number in brackets after the title on each tab indicates the number of differences for that tab.

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8.3.1 Updating the Controller/IC4

Each difference listed in the IC4 Handset Data window can be dealt with in one of three ways:

- 1) Downloaded to the controller (Update Controller), i.e. the value listed in the IC4 column is sent to the controller and is treated as if it had been updated using a handset command.
- 2) Merged into IC4 (Update IC4), i.e. the value listed in the Controller column is put into the IC4 .8SD file and saved.
- 3) Ignored.

To mark an item for updating in either direction perform the following steps:

- 1) Select the item by clicking on the Item number (left column). Multiple items can be selected by using the Shift or Control keys in conjunction with the mouse pointer, e.g to select multiple items that are all next to each other in the list, click the first Item, hold down the Shift key and then click the last item in the range. Or to select multiple items that are not next to each other click the first Item, hold down the Control key and then select any other Items required.
- 2) Use the buttons in the Update Options group of buttons to determine in which direction the update is required to be.
- 3) To actually perform the Update, select either the Update Controller button or the Update IC4 button. The Update could be performed from a different PC if required.

Some items cannot be updated in IC4 in certain circumstances and are explained in section [8.3.13 Problem Items](#).

Notes:

- 1) The view differences facility was added to the controller firmware at issue 19. Hence this option will only work on controllers with this or a later issue of firmware installed.
- 2) If IC4 Lite is to be used to perform the Update Controller, ensure that the files are copied to the data area in the IC4 Lite folder.
- 3) A dongle is not required to be fitted to the PC to perform the View Differences operation.
- 4) If performing an Update IC4 and an Update Controller on data which shares the same handset command/item number, perform the Update IC4 first and then the Update Controller. See View Differences - Update Controller Button for a further explanation.

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8.3.2 Select Configuration File

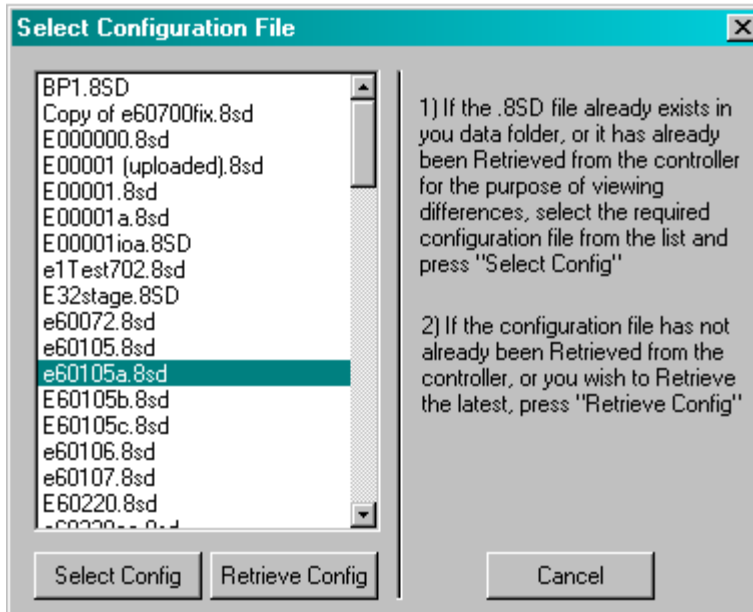


Figure 20 - View Differences For File

The files which are displayed in this list are all of the *.8SD files which reside in the 'data' folder, as defined in IC4 Options, Data Path.

If you do not have the original file and are connected to the controller, select Retrieve Config to upload it. After it has uploaded it will appear in the list, and can then be selected from the list by clicking on the filename and then the Select Config button. Once the View Differences window is open, select 'Refresh' to upload all the data that is needed to perform the comparison of the IC4/Controller data.

8.3.3 Difference List

The differences will be displayed in this part of the window. The columns are :

- Item* The unique number that IC4 and the Controller both use to identify each type of data. Usually, each handset command has a defined Item number.
- Mnemonic* The handset command.
- IC4* The data value that is stored for this command by IC4 (or default data obtained from the controller if the item has not been configured by IC4).
- Controller* The data value that is stored for this command in the Controller.
- Description* The description of the item that is different.
- Update* If the difference has been marked for Update, the direction will be shown here.

To Update IC4 or Controller, select one or multiple items from the list and then use the Update Options to make your choice of direction.

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8.3.4 IC4 Handset Data Tab

Handset Data that may be modified via the maintenance terminal and differ from those held in the IC4 configuration file selected. The Controller and IC4 data can be 'synchronised' by using the Update Controller and Update IC4 buttons.

If there are any differences listed in the IC4 Junction Data tab, the Update Controller button will be disabled to prevent this function being carried out.

8.3.5 IC4 Junction Data Tab

Parameters and timings that cannot be modified via the maintenance terminal which differ from those held in the IC4 configuration file selected. Differences in this tab indicate that the configuration downloaded to the controller is not exactly the same as the file selected e.g. the basic/fixed configuration data (e.g. Prohibited Move) has been modified since it was downloaded to the controller. In these circumstances the controller cannot be updated from the View Differences window and the Update Controller button will be disabled on the IC4 Handset Data tab to prevent this function being carried out.

8.3.6 Others Tab

Data which can only be modified by a maintenance terminal and are not configured with IC4, which differ from the controllers default values. This data is overwritten with default values whenever a configuration is downloaded to the controller and must be manually re-entered via a maintenance terminal.

Some Handset Commands have further information available as they are more complicated, see Problem Items.

8.3.7 Refresh Button

The Refresh button initiates communication with the controller to upload the configured/handset altered data to the PC. If the controller firmware is an issue that does not permit uploading (issue 18 or lower) a failure message is displayed and the process aborted. If the EM number of the configured controller data differs from that of the selected IC4 configuration file a warning message appears but the procedure may be continued if required. Any differences between the data from the Controller, and the IC4 configuration selected when selecting the View Differences option, are displayed in the three tabs, depending on the type of data.

Notes:


- 1) The PC must be connected to the controller handset port via a suitable serial cable. Ensure the correct PC serial port is set up, see options - controller menu
- 2) When a Refresh is requested, there are a few fundamental functions that are checked to make sure they are identical, before the Refresh is allowed to proceed. These are - Item 518 Number of Phases, Item 541 Number of Stages, Item 543 Number of Streams, Item 514 Number of Ports and Item 767 Lamp Sequence Set For Each Phase. If any of these items in IC4 are not identical with those in the controller, the Refresh process will not proceed, and an error message will be displayed.

8.3.8 Update IC4 Button

Use this to merge any differences marked Update IC4, into the IC4 Controller configuration file.

After the Update IC4 process has completed, a new comparison will automatically be performed with the latest data stored from the Controller, therefore causing all the items that were successfully merged into

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IC4 to be removed from the list of differences. A list of these merged items will be stored with the configuration, and can be viewed by clicking the Merge Log toolbar button , when editing the configuration.

8.3.9 Update Controller Button

Use this to send any differences marked Update Controller, to the Controller. A dialog box will be displayed requesting that the user enters the level 2 handset command. After this has been correctly entered, a message will be displayed requesting that the users presses the level 3 access button, which must be done before acknowledging the message by clicking OK.

After the Update Controller process has completed, a Refresh will be carried out automatically, which will obtain the latest data from the Controller and compare it with IC4, therefore causing all the items that were successfully downloaded to be removed from the list of differences.

Note:

If one difference is selected for Update Controller, but there are other differences within the same Item (e.g. MAX A and MAX B differences displayed, but only MAX A selected for Update Controller) then both differences would be sent to the controller. However the Update IC4 process does allow individual differences within an Item to be updated, so if some differences within the same item have been marked to update both IC4 and the Controller, the Update IC4 option should be performed first.

E.g.	Item 260 MAX A	Update Controller
	Item 260 MAX B	Update IC4

In the above example, if the Update Controller button is selected first, both differences would be updated in the Controller and therefore the MAX B difference would no longer remain and could not be updated in IC4. However, if the Update IC4 button is selected first, the MAX B differences would be updated in IC4, which would leave the MAX A difference, which could then be updated in the Controller by selecting Update Controller. View Differences - Level 2 command

Enter the Level 2 command and click OK. It can be entered in upper or lower case.

8.3.10 Print to File Button

All differences listed will be written to a file. This will be the filename of the configuration but with an extension of '.8TX'. This file will be saved to the data folder, as defined by the Data path in Options - Directories.

8.3.11 Update Options

Select one or multiple items from the list and then select either the Update IC4, or Update Controller radio button. If an item is already marked to be updated, but then it is decided that it is not to be updated, select the Ignore radio button. Then select the Set Update Selection button to actually set the direction for the selected items. The direction will be indicated in the Update column.

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8.3.12 Select Multiple Items

Single items are selected by a single click on the item required. Multiple items in a group can be selected by single clicking on the first item, then holding down the Shift key and selecting the last item in the group. Multiple separate items are selected by single clicking on the first item, then holding down the Control key and single clicking on each of the other items required.

8.3.13 Problem Items/Error Messages

Firmware Type and Issue

This item may appear on both the 'Junction Data' tab as well as the 'Other' tab.

MPA 1 and MPA 2 - Manual Panel Allocations

As these are not configured by IC4, they cannot be updated in IC4 by using the Update IC4 facility. They are always set to 255 in IC4 and if they have been changed on the handset will always show a difference.

TSD and TSH - Special Days and Holiday Periods

These have been made read only as the controller cannot process an Update of this item at present. It can be updated in IC4 using the Update IC4 facility.

SAT - SDE Assessor Type

If this difference appears on the 'Others' tab for no apparent reason, it could be because the SDS command has been set to SA Type. IC4 would force a SAT value of 4, but the controller does not store a value of 4, unless the SAT command has been entered to specifically set it to 4. Therefore a difference will be shown with IC4 data = 4 and Controller data = 1, 2 or 3.

IFS - CLF Influence Stage

If this item has been updated in IC4 using the Update IC4 process, and no corresponding data has been updated for the IFN command - CLF Group Influence, IC4 will not translate the IFS data so the difference will re-appear. The configuration can be manually updated and the relevant data entered into the Group Influence field, note that the Influence Stage data that was updated by the Update IC4 process will have been saved in the configuration.

IPS, DGP, DFS, DFA, IPX

These would not be able to be updated using Update IC4 in the rare circumstance that the IC4 configuration is modified from a Hardware Type of T700, to T800. This could mean that differences occurring on lines 92-95 are no longer valid and would be prevented from being updated in IC4.

FIX, LFT - Fixed and Linked Fixed Time.

If the configuration is using Linked Fixed Time, the difference will always show using the FIX handset command as both the commands share the same storage.

CKA/CKR - BST Advance and Retard dates

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The items will always appear in the list of differences for a controller once they have been set up. If a new configuration is put into the controller, they will still remain as this data is stored separately from other Handset entered data.

PDR (PB800 firmware only), PDE, PRI, PRE

These items can be changed to any numeric value in the controller. Any non-zero value entered in the controller will enable the facility, however in IC4 this item is a tick box so if enabled is stored as 255. Therefore if, for example a '3' is entered at the controller and in IC4 the box is unticked, and then the value '3' is used to 'Update IC4', IC4 will tick the box to enable the facility. But the difference will re-appear in the View Differences list because IC4 will have a value of '255', and the controller will store a value of '3'.

8.3.14 RLM format

In the following examples the sensor arrangement is as shown below, with Phases A and B in stream 0, and C and D in stream 1.

On-Board Sensors				On-Board Sensors			External Sensors			
Sensor\ Phase	Type	Bulb Wattage		Sensor\ Phase	Type	Bulb Wattage	Sensor\ Pin	Drive	Type	Bulb Wattage
1 \ A	None	40		17 \ Q	As Seq.	40	33 \ b14	A	As Seq.	40
2 \ B	None	40		18 \ P	As Seq.	40	34 \ z16	B	As Seq.	40
3 \ C	None	40		19 \ S	As Seq.	40	35 \ z14	C	As Seq.	40
4 \ D	None	40		20 \ T	As Seq.	40	36 \ z12	B	As Seq.	40
5 \ A	As Seq.	40		21 \ U	As Seq.	40	37 \ b14		Reg. Sign	7
6 \ A	As Seq.	40		22 \ V	As Seq.	40	38 \ z16		Reg. Sign	7
7 \ C	As Seq.	40		23 \ W	As Seq.	40	39 \ z14		Reg. Sign	7
8 \ C	As Seq.	40		24 \ X	As Seq.	40	40 \ z12		Reg. Sign	7
9 \	None	40		25 \ Y	As Seq.	40	41 \ b14		Reg. Sign	7
10 \ W	As Seq.	40		26 \ Z	As Seq.	40	42 \ z16		Reg. Sign	7
11 \ K	As Seq.	40		27 \ A2	As Seq.	40	43 \ z14		Reg. Sign	7
12 \ L	As Seq.	40		28 \ B2	As Seq.	40	44 \ z12		Reg. Sign	7
13 \ M	As Seq.	40		29 \ C2	As Seq.	40	45 \ b14		Reg. Sign	7
14 \ N	As Seq.	40		30 \ D2	As Seq.	40	46 \ z16		Reg. Sign	7
15 \ Q	As Seq.	40		31 \ E2	As Seq.	40	47 \ z14		Reg. Sign	7
16 \ P	As Seq.	40		32 \ F2	As Seq.	40	48 \ z12		Reg. Sign	7

Figure 21 - LMU Sensors Example

8.3.14.1 Example 1 - Number of RLM sensors reduced on a stream

The following difference is produced when, on a dual Pedestrian configuration the command RLM 0:3 is changed to RLM 0 = 2 i.e. the number of RLM sensors for stream 0 are reduced from 3 to 2.

Item	Mnemonic	IC4	Controller	Description	Update
774	RLM sen33	1	0	RLM Enabled Flag for Each Sensor	

Figure 22 - RML Sensor Difference Example 1

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The sensors are disabled, starting from the highest sensor number and working back towards the lowest. As only traffic phases are monitored, the first sensor to be disabled (and therefore show as a difference) for stream 0 is sensor number 33.

8.3.14.2 Example 2 - Stream 1 signals disabled (i.e. convert a dual configuration to a single)

The following differences are produced when, on a dual Pedestrian configuration the command RLM 1:3 is changed to RLM 1 = 0 i.e. the signals on stream 1 are disabled.

Item	Mnemonic	IC4	Controller	Description	Update
774	RLM sen7	1	0	RLM Enabled Flag for Each Sensor	
774	RLM sen8	1	0	RLM Enabled Flag for Each Sensor	
774	RLM sen35	1	0	RLM Enabled Flag for Each Sensor	
872	RLM 1	n	0	Stream Disabled by the RLM Command (e.g. RLM...	

Figure 23 - RLM Sensor Difference Example 2

The last difference indicates that stream 1 has been disabled. The other differences show which sensors have been disabled as a result of this, so starting from the end sensor number 35 is the first to be disabled, followed by 8 and then finally 7.

8.3.15 Error Messages Explained

1. *Some data which is required for the comparison is missing from the data that was uploaded during the last 'Refresh' process. Therefore the comparison may not be complete, and a 'Refresh' should be performed once connected to the controller, to ensure all differences are detected.*

This message appears if an Update IC4 has been performed, and as a result of the update the item in IC4 is now shorter than it was previously. The comparison process now needs some 'Default' data from the controller that it did not need when it did the comparison during the last Refresh, so the item in question cannot be compared and the comparison will not compare any further items,. A Refresh needs to be performed in order to be sure that all differences have been found. An example of this is CDT Conditioning Timers, for which IC4 only translates the number of timers configured.

2. *The Number of Used IO Ports, Phases, Stages and Streams and the Lamp Sequence Set for each Phase have been compared and do not match, therefore no further comparison of handset data will be performed. However, the item(s) name(s) which differ can be viewed by selecting the 'Junction Data' tab.*

This check is performed before a Refresh or Update Controller is attempted, in order to check that the configuration has at least these basic items identical to those in the controller.

3. *The IC4 Handset Data from the controller is different now, than it was the last time a Refresh was performed. Please perform a Refresh, to re-compare the IC4 Handset Data stored in the controller with the IC4 Handset Data stored in IC4.*

The CRC of the controller data is compared to that of the data about to be downloaded, before an Update Controller is attempted, to make sure that no data in the IC4 configuration has been changed since the last Refresh was performed.

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4. *A facility/configuration item exists in IC4, but is not recognised by the controller. Please refer to IC4 Help for further information.*

This could occur if a new facility has been configured by IC4, but the controller firmware does not support the new facility. This would only happen if the user selects a newer firmware issue in IC4 than the controller actually contains. The user can still use the Update IC4 facility to update any modified handset items.

8.3.16 Status Bar

The first line shows the filename of the IC4 configuration selected for comparison, and the EM number obtained from the CIC string from the controller during the last Refresh. The second line shows the date/time that the last Refresh was performed.

8.3.17 Update from Different PC

The configuration/timing files can be transferred to another PC (which must have Version 9 or later of either IC4 or IC4 Lite), to either have the differences merged into IC4, or to update the controller. In order to do this all the necessary files must be copied to the PC that will be performing the Update IC4/Controller. The files required are <configno>.8SD, .8BN, .8DD, .8JD, .8TD and .8UD. These files need to be copied to the folder on the PC that the IC4 Data Path is set to in Options/Directories. Care must be taken not to delete the 8DD, .8JD, .8TD and .8UD files from the hard disk as they can only be recreated by connecting to a controller again.

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9 Help

9.1 About IC4

This screen shows the build version of IC4 together with free memory and hard disk space.

9.2 Help Topics

This displays the IC4 help file, where you can navigate or search all help topics.

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10 Edit Toolbar Buttons

10.1 File Save

This option saves the configuration data being edited to the PC hard disk using the current name.

10.2 File Save as

Selecting this option enables the current configuration to be saved to the PC hard disk with a new name.

10.3 File Close

This closes the current configuration file being edited.

10.4 Last Screen

Selecting this option moves to the previous required screen in the configuration process.

10.5 Go to specific screen

Selecting a specific screen can either be achieved using the go to list shown below or using the Navigator.

The go to list shows the screens required for the current configuration. The screens shown depend on the facilities enabled.

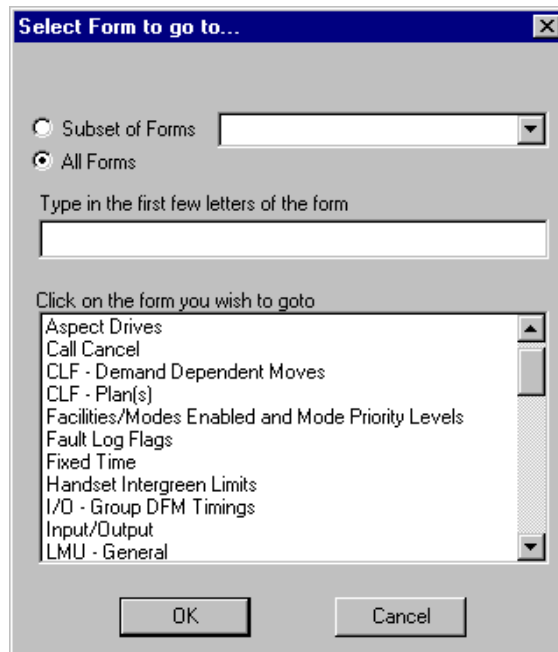


Figure 24 - Go To Form

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10.6 Go to Last Screen

Selecting this option moves to the last screen that was being viewed. This enables the toggling between 2 screens.

10.7 Next Screen

Selecting this option moves to the next required screen in the configuration process.

10.8 View Error Messages

Selecting this option displays a window that shows any current error messages.

The data associated with the current screen is validated before the error message window is displayed. Any messages displayed are intended to be self-explanatory.

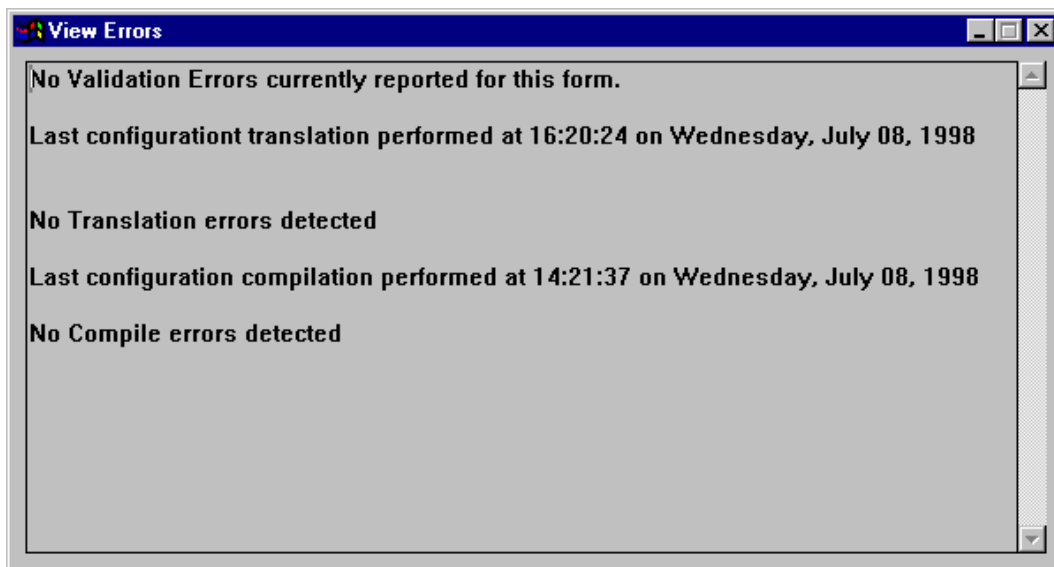


Figure 25 - View Errors Window

10.9 View Import Messages

If configuration data has been imported from Linsig or IC3 then this window contains details of whether the data import was successful and whether any errors/warnings were detected.

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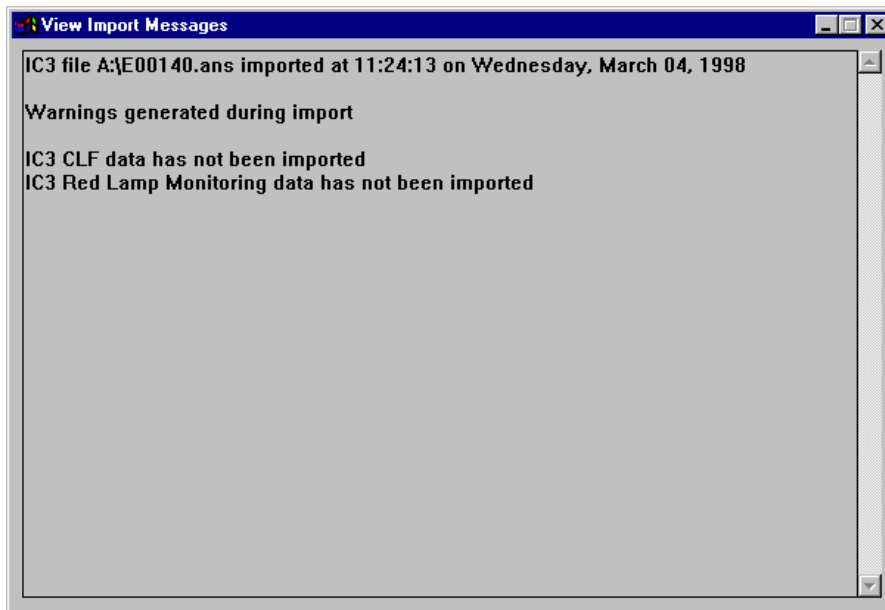


Figure 26 - View Import Message Window

10.10 View Merge Log

Each time the Update IC4 process is performed, an entry will be made into this log which displays the date and a list of the differences that were merged. Any failures are also listed.

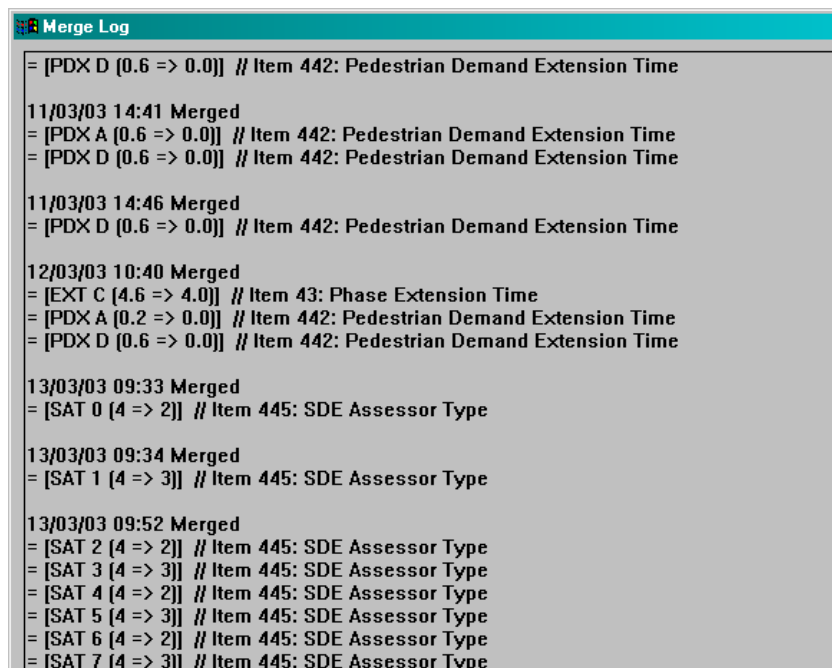


Figure 27 - View Merge Log Window

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11 Editing Configurations

11.1 Name and Reason

Whenever the operator requests a configuration to be edited the following window is displayed. This enables the engineer to indicate why the configuration is being edited.

Once issue 1.0 of the configuration has been generated the Engineer's name and Reason for edit must be entered before leaving this screen - prior to this the fields are optional. (Note: This information may be printed along with the configuration data.)

The Issue/Version information is stored in the configuration PROM (handset command CIC).

Once testing is complete the 'Up-Issue' button should be activated which changes the configuration issue to the next full issue and resets the version to 0 (i.e. 6.3 below would become 7.0).

Figure 28 - Name and Reason Form

Issue Number

When an 'Up-Issue' is performed this number is incremented.

Version Number

This is incremented each time any configuration data is modified (except the special instructions) hence the special instructions can be modified without affecting the PROM issue (CIC command).

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Edit Number

Each time a configuration is edited the Edit number is incremented. This is reset to 0 the first time the configuration is up-issued to issue 1.0.

11.2 Screen Navigator

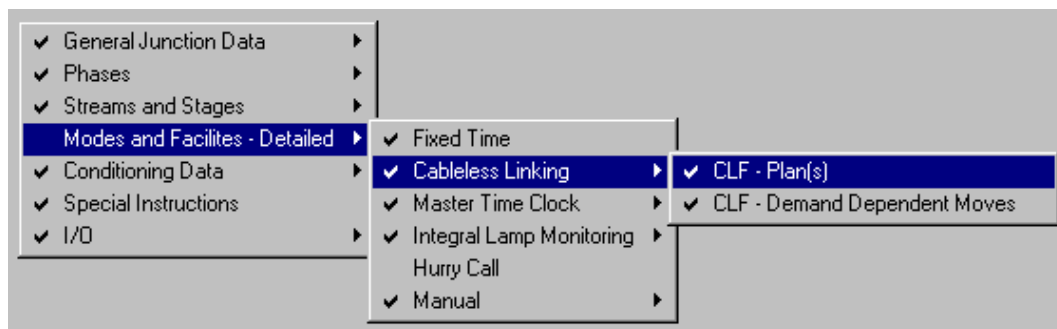
The easiest way to move around the IC4 screens is to use the inbuilt 'navigator' that is available during the configuration edit process.

Using the right mouse button, click on the background of the current screen. This displays the top level menu. Moving the mouse highlights different facilities and if a lower level menu exists then this is automatically displayed. When the required screen is highlighted, click with the left mouse button to display the screen.

The example below shows how the CLF plans screen would be selected.

A is added to the menu when a screen is visited - the example below indicates the Hurry call screen has not been visited during edit.

A symbol indicates that another menu box exists below the current one.



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12 Special Conditioning

12.1 Special Conditioning Technical Description

Following is a more technical description of how the special conditioning functions, but it is not necessary to read this in order to understand how to write special conditioning.

The Special conditioning package on the Controller is a program that interprets data as instructions in a simulated processor.

The data items within that space may be accessed as individual bits or as combinations of bits within a byte. The items are transferred from the data space to the top of a stack of working variables. The two items at the top of the stack may be logically combined by standard Boolean functions (AND, OR, XOR), the result replacing the two items at the top of the stack. The single item at the top of the stack may be inverted, duplicated, tested and stored. Testing and storing an item removes that item from the top of the stack. If after testing an item a false answer results, the simulator skips a number of bytes of data before resuming interpretation. When storing items they may be logically combined with the item already occupying that address space. In order to ease the task of generating the logical operations a high level language has been designed which translates Boolean type logical expressions into the instructions and data items needed to implement them.

12.2 Special Conditioning Basic structure

Special conditioning is written in a relatively high level language and the functions which can be performed in that language are described below. There are a number of spare storage locations called scratchpad bits available to conditioning and 96 conditioning timers

In special conditioning, the term TRUE is used to mean active and FALSE to mean inactive.

The basic forms of statements and terms available within the language are as follows:-

CONDITION

IFT <expression> THN <block 1> ELS <block 2> END

or

IFT <expression> THN <block 1> END

where

IFT = IF the expression following gives a True result

THN perform statements in <block 1>

ELS perform the statements in <block2> as far as END.

If <block 1> is terminated by END then no <block 2> exists. The statements contained in the blocks may themselves contain complete Condition statements (i.e. nesting of code)

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(where <block> is a section of special conditioning containing statements and expressions).



ASSIGNMENT

<expression> = <result>

The value (TRUE or FALSE) obtained by evaluating <expression> is stored as the <result>.

Note:- TRUE = Logical '1' and FALSE = Logical '0'



ROUTINE

RUN<nn>

Used to load and start timing one of the conditioning timers. The timer in question is specified by the number <nn> where nn must lie between 0-95.

Note:- To run a conditioning timer it should only be written to on one '200mS' controller cycle. If it is written to on more than one cycle it will just keep re-loading with its configured value, and therefore will not time off.

e.g. IFT TIP10.NOT(CNDTMA0) THN
 RUN<0>
 END

Timer will only be started (RUN) if the input is present and the timer is NOT already active. This may also be implemented using a flag, set on the first pass through the run condition.



DUPLICATE

The ':' symbol may be used anywhere within an expression, (except within the EQL and GRT structures) after an identifier or sub-expression to duplicate everything to the left of the ':' for use on a following line. The duplicated expression or sub-expression can be recalled on a following line by using a "*" as defined below. Note:- No. of ":"s must equal no. of "*"s following.

The duplicate would normally be used where a certain expression is required to be stored into several results.

e.g. TRUE:: = LCPHA ; Permanent Demand for Phase A
 * = LCPHB ; Permanent Demand for Phase B
 * = LCPHC ; Permanent Demand for Phase C

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COMMENTS

Comments may be added to the expressions to clarify operation. A comment is any text following a ";" on one line. Anything may be put after the ";" comment marker for the rest of that particular line.

If a conditioning file line starts with a ";>" (a semi-colon followed by an >) the line will NOT be compiled and will also NOT be printed.



EXPRESSIONS

Expressions consist of 'identifiers' and 'operators'. The identifiers consist of names of input and output signals and of names of conditioning mnemonics.

e.g. CNDTMA0 = Conditioning Timer 0 Active Status.

PHASED = True if Phase D is at green.

STAGE1 = True if controller is in Stage 1 green.

In addition the symbol '*' may be used to reference the last /previous item after which the duplicate symbol (:) has been placed.



RESULT AND STORE

The result follows a store (=) in an assignment. The value of the expression that precedes the Store operator (=) is stored into the result that follows.

The result is actually an identifier (e.g. 'LCPHA' - latched demand for phase A or 'SCRT0' - Scratchpad).

There are 3 different methods of storing an expression value into a result as follows:-

STORE

<expression> = <result>

The expression value is stored directly into the result replacing the current value of the result. This is normally used where the result (a certain identifier) is only written to once in the special conditioning and the value of the result will always be the same as the value of the expression.

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If the same resulting identifier appears in more than one assignment then the last assignment in the conditioning file would override all previous ones.

e.g.

STAGE1 = SCRT0 ; Stage 1 active sets scratchpad

STAGE2 = SCRT0 ; Stage 2 active sets scratchpad

In the above example when STAGE1 becomes active a logical '1' is stored into SCRT0 but immediately after, the conditioning reads STAGE2 which is inactive (if STAGE1 is active) and a logical '0' is stored into SCRT0. Therefore, STAGE1 active will never set the scratchpad (SCRT0) but if STAGE2 is active it will because it is the last assignment storing to SCRT0 in the conditioning file.

The solution to this problem would be to include STAGE1 and STAGE2 into the same assignment (i.e. STAGE1 + STAGE2 = SCRT0).

WARNING:- 'STORE'ing a logical '0' to something that is set to a logical '1' by a normal controller process will reset it.

ORSTORE

<expression>=+<result>

The expression value is logically OR'ed with the current value of the resulting identifier. This is normally used to latch the result in a true sense (i.e. logical '1'). Once the expression has ORSTORE'd a logical '1' into the result, then the value of that result will never be reset by that expression. If there are other assignments where different expressions are ORSTORE'd to the same resulting identifier then these will also never reset the result.

Take the example used above but using ORSTORE this time:-

e.g. STAGE1 = +SCRT0 ; Stage 1 active sets scratchpad

STAGE2 = +SCRT0 ; Stage 2 active sets scratchpad

In this example either STAGE1 or STAGE2 active will set the result (SCRT0) to a logical '1'. SCRT0 will then remain at a logical '1' until it is reset by some other different type of assignment or in the case of something like a demand until the Firmware resets it.

Note:- ORSTORE should always be used when writing to demands or extensions for phases/stages in the special conditioning (i.e. once the expression value becomes true the demand (result) is latched true. It will then only be reset at the appropriate time by the firmware.

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ANDSTORE

<expression>=.<result>

The expression value is logically AND'ed with the current value of the resulting identifier. This is normally used to reset a result to a logical '0' (i.e. generally to reset a result that has previously been ORSTORE'd to a logical '1'). The only time that the result will be reset is when the value of the expression is a logical '0', a logical '1' ANDSTORE'd will have no effect on the value of the result.

Re-arranging the example used for ORSTORE will provide a good example for ANDSTORE:-

e.g.

STAGE1=+SCRT0 ; Stage 1 active sets scratchpad

NOT (STAGE2)=.SCRT0 ; Stage 2 active resets scratchpad

In this example when STAGE1 becomes active SCRT0 will be set to a logical '1' as before. STAGE2 is inactive but inverted by the NOT, therefore its value is also a logical '1' which as detailed above will have no effect when ANDSTORE'd to SCRT0.

SCRT0 will only be reset when STAGE2 becomes active because the expression value will then be a logical '0' due to the NOT and as detailed above a logical '0' ANDSTORE'd will reset the result (SCRT0) back to a logical '0'.

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The following table shows the relationship between expression value, current result value and final result value for the three different methods of storing:

Current Value of Result	Storing Method	Value of Expression	Final Value of Result
0	STORE	0	0
1			0
0	(=)	1	1
1			1
0	ORSTORE	0	0
1			1
0	(=+)	1	1
1			1
0	ANDSTORE	0	0
1			0
0	(=.)	1	0
1			1

Figure 29 - Storing Method Results

12.3 Special Conditioning Error Messages



Illegal continuation

\$ has not been used correctly to continue code onto next line.



Illegal character

An incompatible character has been entered, e.g. %



Line too long

A line is over 128 characters long.

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Incomplete conditioning statement

The structure of the line being compiled is incorrect

E.g. PHASEA+=SCRT0



IFT/THN/ELS/END nesting error

The number of IFT, THN and END's must match



Duplicate nesting error or too many duplicates

The number of colons does not equal the number of asterisks entered or more than 14 have been entered.



Bracket nesting error

The number of opening brackets does not equal the number of closing brackets.



Unknown operand XXX

A mnemonic that is not a controller recognised one (see special conditioning mnemonics) and that is not a specified input or output signal has been entered. XXX details the unknown item.



Operand XXX must begin with 1 or 2

The INC, DEC or LOD operand has been used incorrectly. These are only valid for use with scratch bytes.



Extended ID XXX is a read only item

The mnemonic XXX can only be read, you cannot write to it.



Timer number out of range

only 96 special conditioning timers are available



Unknown operator XXX

an unrecognised operator (XXX) has been used, see special conditioning operators for list of allowed operators



Command Sequence invalid

Typically two operators have been entered when there should only be one e.g. ++

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Too many conditioning items

8000 words of conditioning space is available and the code generated has exceeded this limit.



Bracket/duplicate nesting depth too great

A maximum of 14 levels of brackets nesting are allowed



Missing STORE (=) operator

An equals sign (=) was expected on this line but has not been found.



Byte identifier not allowed in this context

This indicates that one of the following identifiers is used illegally. RTCTOD, RTCMIN, RTCSEC, RTCDYS, RTCWKS, PRVPLN, CURGRP, MODE, must all be used with GRT or EQL immediately after them, i.e. RTCTOD GRT <4>, and none of them can be used with . (OR), + (AND), / (NOT) immediately in front of them. They have to be enclosed in brackets or at beginning of a line, i.e., LCPHA . RTCTOD GRT <4> (NOT ALLOWED) must be, LCPHA . (RTCTOD GRT <4>) or, RTCTOD GRT <4> . LCPHA



Failure writing conditioning

An error has occurred writing the code to the PC memory.



Byte operand required

A bit operand has been used wrongly (e.g. SCRTO) where a byte value is required (e.g. MODE).



Error opening extended ID's system file EXTID_800.txt

Check whether that system file EXTID_800.txt exists on the hard disk and has not been deleted. If problem continues install IC4 again.



Error creating PROM image

The special condition code generated has not been written to the PROM file successfully, if fault continues contact Systems Support



Specified Firmware Issue does not support operand

The firmware issue specified on General Junction Data Administration form does not support the conditioning operand being used.

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Unknown error

Any other error conditioning that does not fall into one of the above categories.

12.4 Special Conditioning examples



Influence the effects of inputs provided that these are routed through special conditioning.

; Detector loop AX only demands Phase A

; when controller is not in Stage 2.

NOT(STAGE2).AX=+LCPHA

Note:

In this example the detector loop name AX should have been entered as a miscellaneous input and should not be entered directly on the VA demand screen.



Simulate inputs

; Input to Hurry Call if not on phase F green.

NOT(PHASEF).HC1=SCRT0 ;

Note:

In this example HC1 should have been entered as miscellaneous input on the I/O screen, On the Hurry call screen enter *SCRT0, (internally derived signal) which indicates special conditioning will simulate the hurry call input. When HC1 is active and Phase F is not green the conditioning sets SCRT0, which is the input for the Hurry Call



Create output signals

; Amber leaving of Phase B sends output signal

; LINK to remote controller.

FROMB=LINK

Note:

In this example the Output name LINK should have been entered on I/O screen. The output signal LINK would be active for the 3 second duration of Phase B amber leaving period.



Prevent Phases and Stages

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; Prevent Stage 3 if while there is no demand for Phase G.

NOT(LCPHG)=PRVST3



Make modes unavailable

; Disable manual mode when the handset is not plugged in

NOT(DSRACC):=MNCONT

*=MSCONT

Note:

In this example DSRACC is active when the handset is plugged in, so when it is inactive we wish to disable manual mode which is done by setting MNCONT and MSCONT active. MNCONT is disable manual mode operative and MSCONT is disable manual mode selected, and both must be set active to disable manual mode.



Write to certain fault logs

; Input signal FAULT from remote controller sets FLF27 to 255.

FAULT=1CN1FLF

Note:

In this example the detector loop name FAULT should have been entered as a miscellaneous input. When FAULT is active it sets 1CN1FLF active which is the conditioning mnemonic for all bits of FLF27 (i.e. sets it to 255).



Monitor controller states and operation

; If the controller is in the VA switch position and in VA mode

; insert permanent extensions for phase D

IFT SSVA.(MODE0 EQL<2>) THN

TRUE :=EXOD

*=EXCD

END

Note:

In this example SSVA is active when V.A. is selected on the Manual Panel and (MODE0 EQL<2>) reads V.A. mode active for Stream 0. EXOD and EXCD both have to be active to insert

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extensions from conditioning. EXOD is extension loops occupied for Phase D and EXCD is extension loops clear for Phase D.



Insert Phase/Stage demands

; Detector loop CP inserts an unlatched demand for Phase C

CP=+UCPHC

Note:

In this example the detector loop name CP should have been entered as a miscellaneous input. When detector loop CP is active it inserts an unlatched demand for Phase C. If unlatched demands are to be read in special conditioning then the code for reading them must appear after any code which writes to them as the firmware resets unlatched demands at the beginning of each conditioning cycle.



Hold Intergreen (All Red) Extensions

All Red loops AR1 and AR2 extend all red extension unit 1

(AR1+AR2)=IGEO1

(AR1'+AR2')=IGEC1

Note:

In this example AR1 and AR2 should have been entered as miscellaneous inputs. While either AR1 or AR2 is active the All Red period between certain predefined stages for All Red Extension Unit 1 will be extended. The conditioning mnemonics IGEO1 and IGEC1 must both be set active to extend All Red Unit 1 and note that these must NOT be ORSTORED. IGEO1 is Intergreen Extension Loops occupied for Unit 1 and IGEC1 is Intergreen Extension loops clear for Unit 1. The AR1' and AR2' signal names must be used to write to the extension loops cleared mnemonic.

Extend all red special conditioning for units 1 to 3

AR1+AR2+AR5 = IGEO1 ; unit 1

(AR1'+AR2'+AR5') = IGEC1

AR1+AR3 = IGEO2 ; unit 2

(AR1'+AR3') = IGEC2

AR4 = IGEO3 ; unit 3

(AR4') = IGEC3

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12.4.1 Special Conditioning Generating Extensions

Generating Vehicle Extensions and all red extensions using Special conditioning

When Vehicle Green or All Red extensions are to be generated using special conditioning the following procedure must be used. The detector name must first be entered during edit.

When special conditioning is then generated the same name as entered during edit should be used to write to the extensions loop occupied conditioning mnemonic. When writing to the extension loop cleared mnemonic the same signal name as entered during edit should be used with the addition of the ' ' character after the signal name.

For example:

Generating vehicle extensions for Phase A with detector name AX1

Conditioning must be as follows:

AX1+=EXO A ; Phase A extension loop occupied

AX1'+=EXCA ; Phase B extension loop cleared

Generating All Red extensions for intergreen extension unit 1 via detector names AR1 and AR2

Conditioning must be as follows:

AR1+AR2=IGEO1 ; All Red unit 1 loop occupied

AR1'+AR2'=IGEC1 ; All Red unit 1 loop cleared

Note:

For integral OTU's the inputs do not come from an external source and the " ' " suffixed signals do not exist and must not be used.

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