



***CBREEZE* Software Manual**

06 April 2000

GFK-1818

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Warning

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Manufacturer's Name: Horner Ireland Ltd.
Manufacturer's Address: Unit 1, Centrepont, Centre Park Road, Cork, Ireland

Declares that the products Models: IC300TIU101, IC300TIU111, and IC3500TIU201
Conforms to the following EMC standards:

EMC: EN 55 022, Radiated and Conducted Emissions
EN 50 082-1, RF, EFT/EFB, ESD Immunity

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Date: 31 Mar 1999

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CHAPTER 1: INTRODUCTION

1.1 Scope

CBREEZE is a easy-to-use Windows™-based software. The software user's guide is contained in this manual. (See Section 1.4 for initial software installation procedures.)

A basic level of understanding of Microsoft Windows technology and operation is assumed. The manual assumes that the user is familiar with Windows 95, Windows 98 or Windows NT.

Contact your dealer for more information.

Note: The Help File in the Software contains similar information to this manual.

1.2 Equipment Needed

- a) Software Installation CD.
- b) A PC Windows 95™, Windows 98™ or Windows NT®.
- c) Approximately 15.7 MB of available hard disk space.
- d) TIU050/10X/11X/20X Interface Unit.
- e) PC to TIU Programming Cable HE693CBL232 or equivalent (Operator Station Hardware Manual GFK-1819).

Software Installation Instructions

- a) Start your Windows™ Operating System.
- b) Insert the Software Installation CD.
- c) The Software should begin installing automatically, if not continue to next step.
- d) Click the Windows **Start** menu button and then click **Run**.
- e) The **Run** dialog box appears.
- f) Type **D:\setup (CD Drive letter assumed to be D:)**. Click **OK**.

1.3 Upgrade Revision Software & Firmware

1.3.1 General

To avail of any new features that are included in this new release on units that were purchased previous to this release, both software and firmware require updating by the user. Any new unit will be set-up for the latest version released.

1.3.2 Software Upgrade

To update the software requires that the user install the new version of software from the installation CD. You may install the new software over any previous version installed. See section 1.4 Software Installation Instructions.

To update existing projects simple open the project from the newly installed version of the software. Once the project is saved to disk the update is complete. For backup reasons we recommend that you save the new version of your project in a different location or under a different file name.

1.3.3 Firmware Upgrade

The following steps assume that a project or configuration is loaded to the Operator Station and that the user is running the latest version of software.

- a) Upload the project/configuration from the unit.
- b) If a customised character set is loaded to the unit then upload the character set also.
- c) Choose AE from main menu Configure/Communication Settings.

- d) From File menu choose Update TIU Operating System. (See Updating Operating System for more details).
- e) From File menu choose Update TIU Protocol. If you are updating from firmware version 2.00 or later then you just have to update to the latest protocol file. However if you are updating from firmware version 1.24 or earlier you must update to a Upgrade.1xx protocol file first, then update to the latest firmware revision. See Note. (See updating protocol for further information).
- f) Choose Download Character Sets to TIU from File menu.
- g) Choose Download Project to TIU from File menu.

Note: When updating the operating system file the screen may go blank after the protocol file is complete. Continue with the procedure as described and the display will recover.

CHAPTER 2: GETTING STARTED**2.1 Self-Test**

Power up the unit with the **UP** and **ENTER** keys pressed at the same time. The unit enters a self-test mode. The self-test consists of the following four checks:

2.1.1 Contrast Band

This test allows the user to set the lower and upper limits of contrast. Adjust the lower limit using the **UP** or **DOWN** key and press **Enter** when done. Do the same for the upper limit.

Note: Self test - The contrast band adjustment is only available on Tiu1xxs.

2.1.2 Display Test

The display test continuously blinks all pixels on (black) to off. Look for any pixels stuck on or off. Exit this test by pressing and holding any key for approximately two seconds.

2.1.3 Keyboard Test

As each key is pressed, an indication ******* appears above that key. In the case of units with a numeric keypad, press the key and a message appears indicating the key press. Check for keys indicating multiple presses or not reporting presses. Exit this test by pressing and holding any key for approximately two seconds.

2.1.4 RAM Test

Test either segment 0000 or segment 1000 (on the TIU100/110) of the RAM. The segment 1000 test performs a base 3 repeating test. This test detects shorted address lines and damaged memory bits. The segment 0000 test performs a Read-Modify-Write test on each byte of RAM, detecting damaged memory bits. Exit this test by selecting **DONE**.

2.1.5 Serial Loop-back Tests

Tests the PC port and the Serial Port in each of its three modes for serial loop-back. Pre-made plugs are required to link the pins of a particular port. This takes the following form:

Port Tested	Product	Type of Connector	Pins to Short
PC (J2)	TIU100/110	Pin male D link connector	pin 2 to pin 3
RS-232 (J3)	TIU100/110	13-pin phoenix connection	pin 6 to pin 8
RS-422/485 (J3)	TIU100/110	13-pin phoenix connection	pin 2 to pin 4 and pin 3 to pin 5.
Current Loop	TIU100/110	13-pin phoenix connection	pin 1 to 9, pin 10 to 11 and pin 12 to 7
PC	TIU050/101/102/103/111/112/113/200/201/203	Pin male D link connector	pin 2 to pin 3
RS-232	TIU050/101/102/103/111/112/113/200/201/203	8-pin phoenix connection	Pin 5 to pin 7
RS-422/485	TIU050/101/102/103/111/112/113/200/201/203	8-pin phoenix connection	Pin 1 to pin 3, Pin 2 to pin 4
NOTE: current loop is not installed on standard models, as such a standard model will fail the current loop-back test. Current Loop is <u>not</u> an option on the TIU050/101/102/103/111/112/113/200/201/203.			

After starting the test, the OK counter begins to count up. Exit this test by selecting **DONE**.

2.2 Selecting the Automation Equipment (AE)

The following points are covered in this section:

- a. Connecting a PC to the TIU050/10X/11X/20X;
 - b. Choosing the AE connected to the TIU050/10X/11X/20X
 - c. Selecting the protocol to be used.
1. Install the **CBREEZE** software on your PC (if not already done). Double-click on **CBREEZE** Software icon; and the default screen shown below appears.



Figure 2.1 - Default Screen

2. From **Configure**, pick **Select Terminal Type** and choose the model.
3. Connect the TIU050/10X/11X/20X (**PC Port**) to a serial port (COM1, 2, 3 or 4) on the PC. From the **Configure** menu, choose **PC Comms Port** and the applicable Comm port.
4. Connect power (+24VDC) to the TIU050/10X/11X/20X. Power-up the unit. The type of protocol currently installed is displayed in the lower half of the screen during power-up.
5. If the AE is different than the protocol currently installed on the TIU050/10X/11X/20X, a new protocol must be loaded.

- From the **Configure** menu, click **Communication Settings** and select manufacture of the AE, followed by the type. The default setting for this equipment will be displayed in the window. Click **OK** to accept.
- If the default setting does not match the communications settings of the AE, select the appropriate **Baud Rate**, **Parity**, **Data Bits**, **Stop Bits** and **Communication Mode**. Also, if applicable, enter the appropriate **Target Node ID**. See figure 2.2.

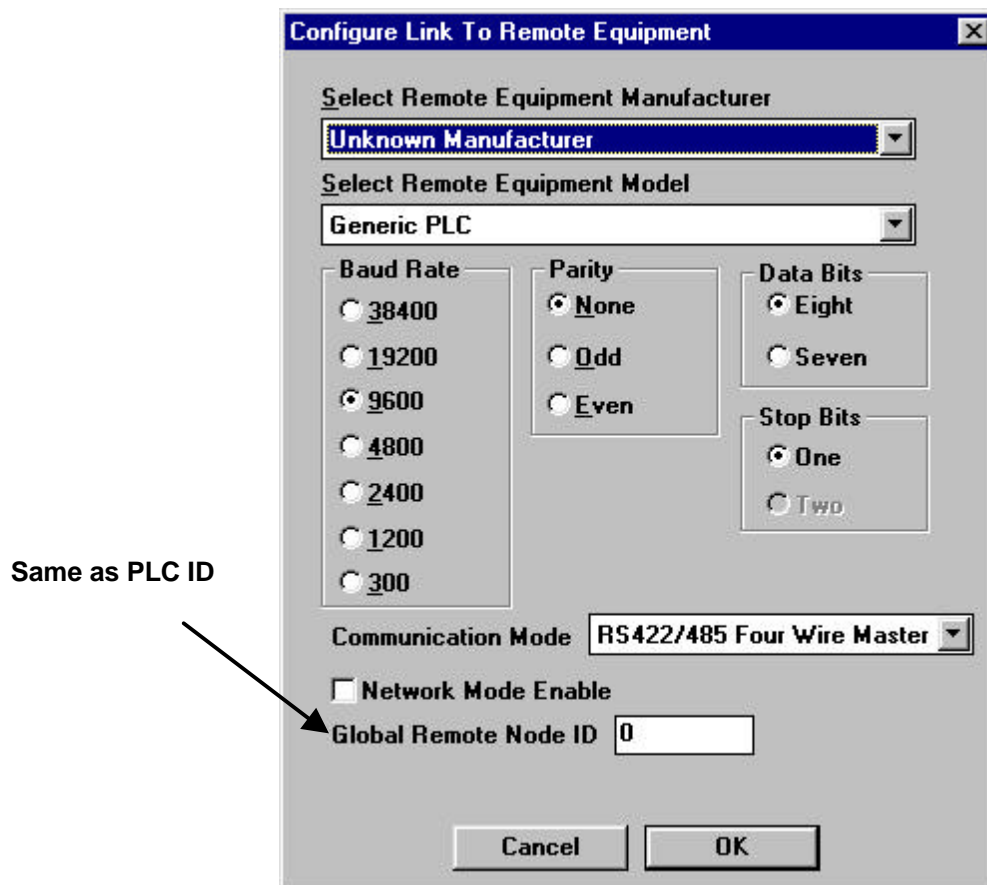


Figure 2.2 – AE Configuration Box

Note: If connecting the TIU to a number of devices on the AE port (i.e. a multidrop system) then the Network mode enable box should be ticked, and the node id required will need to be entered whenever an automation equipment reference is required.

Note: If connecting the TIU to a single device on the AE port then the network mode enable box should be unticked and the node ID for the single device entered as the global remote ID. All references to AE equipment registers will now assume the global remote ID number entered here.

To update the protocol, select **File**, then **Update TIU Protocol**. The protocol file names take the general form: - {plc_type}_r{release number}.{ser}
Where AE type is a prefix dependent on the protocol, release number is currently 4 and {ser} is 0xx for Tiu050, 1xx for Tiu1xx and 2xx for Tiu2xx.

Note: Prior to release 4, protocol file names were of the form: - {plc_type}.{type} where type was LOS for Tiu050 BOS for Tiu1xx and GOS for Tiu2xx. Dependant on the protocol and terminal type selected the standard windows file open box will be displayed with the filename selected accordingly. Select the protocol file you wish to download.

The appropriate protocol file for previously selected the automation equipment will be displayed in the file name window. Select the folder name for the appropriate terminal type (0xx for Tiu050, 1xx for Tiu1xx and 2xx for Tiu2xx). Click **OK**. A “**SYSTEM SHUTDOWN**” message appears on the TIU050/10X/11X/20X.

2.3 Proving Communications

Connect the TIU050/10X/11X/20X to the automated equipment using the cable drawing provided.

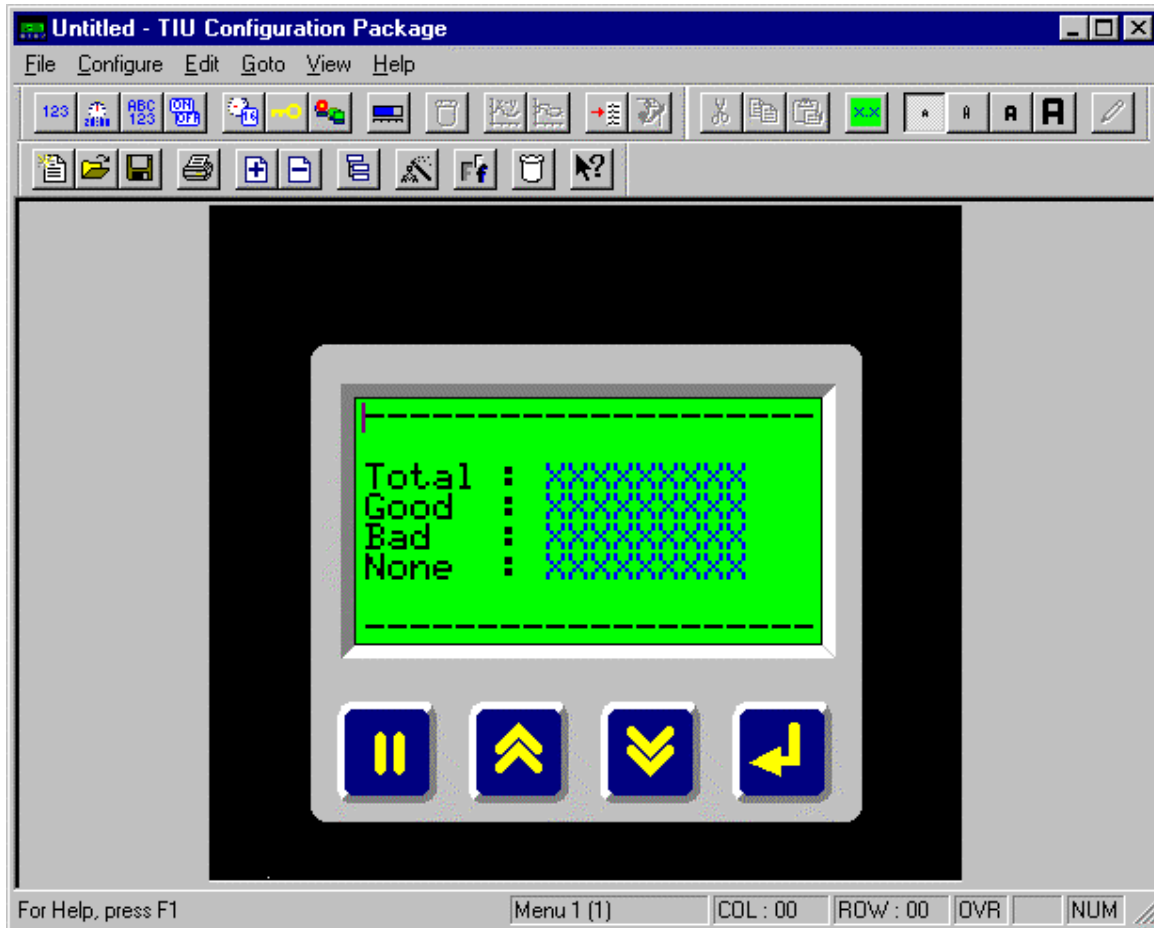



Figure 2.3 – Start-up Menu

The following steps verify communications between the TIU050/10X/11X/20X and the automation equipment. The figures shown here are for the TIU100. Methods are exactly the same for the all products in the TIU range.

1. Click on the Wizards Icon  in the tool bar and choose **Comms Stats**. The display should then look like figure 2.3.

Note: The TIU050/10X/11X/20X only communicates if an embedded data is put on the screen

2. The settings can be saved. To do this, select **Save Project As** from **File**. Enter a file name and click **OK**.
3. Download the project to the TIU050/10X/11X/20X. To do this, from the **File** menu select **Download Project to Tiu**. A status bar appears indicating the progress of the download. On the TIU050/10X/11X/20X Display Screen, "**SYSTEM SHUTDOWN**" appears. A message of "**Transfer Complete**" appears when the data has been successfully downloaded.

Note: If the error "**Link Failed**" appears, check the cable connection between the PC and TIU050/10X/11X/20X.

4. After the transfer, the TIU050/10X/11X/20X resets itself and the correct automation equipment type is shown temporarily on the Display Screen.
5. On the Display Screen, the "GOOD" number of communications should be equal to the "TOTAL" number of communications. The content of the embedded data, on the top line, depends on the existing data in that register of the PLC.

2.4 Icon Descriptions

The TIU050/10X/11X/20X software main screen is shown in Figure 2.4. Along the top are several short cut icons. Many are standard Windows™ icons, some however, are special function.

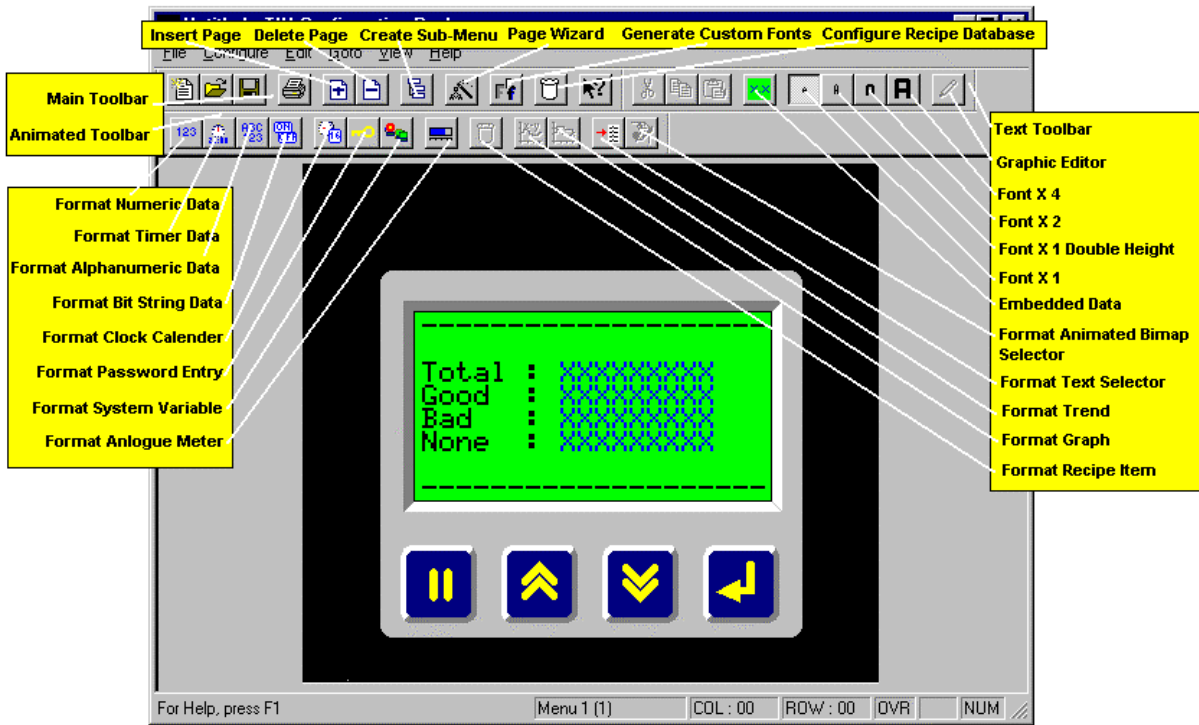


Figure 2.4 – TIU050/10X/11X/20X Software Screen

2.5 Up/Down Keys

Left clicking on the “Up” and “Down” keys on the project window has the same effect as “Up” and “Down” key presses (i.e., scroll up/down through the current menus). Right clicking on the “Up” and “Down” keys on the project window have the same effect as Ctrl-Page Up and Ctrl-Page Down key presses (i.e., enter sub menu, and leave sub-menu, respectively). If a sub-menu does not exist a message appears saying “This page does not have a sub-menu, would you like to create one?” See Creating a sub-menu later in this manual.

2.6 Key Symbols

The symbols for the four keys can be added to display pages using the PC function keys F2-F5. The keys are assigned as follows:

1. F2 = PAUSE
2. F3 = UP
3. F4 = DOWN
4. F5 = ENTER

CHAPTER 3: ABOUT PROJECTS

3.1 Scope

This chapter describes the procedure for configuring the TIU050/10X/11X/20X. This includes loading, saving, downloading, uploading, verifying and updating the protocol.

3.2 About TIU Terminal

This new feature allows the programmer to see what version level the connected terminal is at and how it is configured. The information give is;

- a. Operating System Version Level
- b. Firmware Version Level
- c. Protocol Version Level
- d. Remote Equipment Manufacture
- e. Remote Equipment Model

This can be used as a useful diagnostic tool when updating operating system and firmware. From the main menu click Help/About TIU Terminal, a window similar to Figure 3.1 appears.

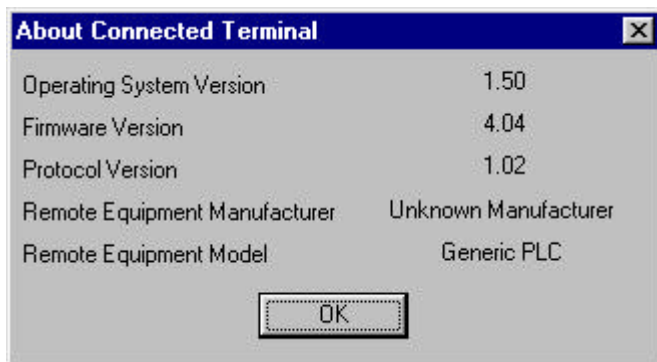


Figure 3.1 About TIU Terminal Configuration

3.3 Creating a New Project

1. Select **N**ew from the **F**ile menu.
2. The following prompt window appears:

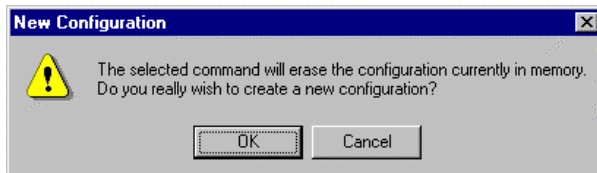


Figure 3.2 – New Project

3. Click **OK**.

3.4 Opening a Project

1. Press the "open folder" icon on the program display screen or select **Open Project** from the **File** menu.
2. Select the proper file name from the list of available projects (with "cmc" extension).
3. Click **OK**.

3.5 Saving a Project

1. If the project has been previously saved during the current session, press the "floppy" disk icon on the program display screen or select **Save Project** from the **File** menu
2. If this is the first time saving this project to a file, select **Save Project As** from the **File** menu.
3. Enter the file name and destination. Click **OK**.

3.6 Downloading a Project

Prior to the download the software checks if following conditions are correct: -

- a) The correct TIU terminal is connected to the PC.
- b) The correct Protocol file is loaded to the terminal.
- c) The current revision operating system and firmware revision.

Note: If the message "**Link Failed**" appears, check the cables connecting the PC to the unit.

Note: If the message "This Terminal is fitted with the incorrect PLC protocol. Load the correct protocol before loading the configuration into the terminal". The project and the terminal are not set-up for the same protocol. If the project is correct then download the correct protocol file to the TIU.

1. Select **Download Project** from the **File** menu. A status bar appears; indicating the download is in progress.
2. After the project has been downloaded, the message "**Transfer Complete**" appears.
3. After the transfer, the TIU050/10X/11X/20X resets itself.
4. The downloaded project now runs.

3.7 Uploading a Project

1. Select **Upload Project** from the **File** menu.
2. A status bar appears; indicating the upload is in progress.

Note: If the message "**Link Failed**" appears, check the cables connecting the PC to the unit.

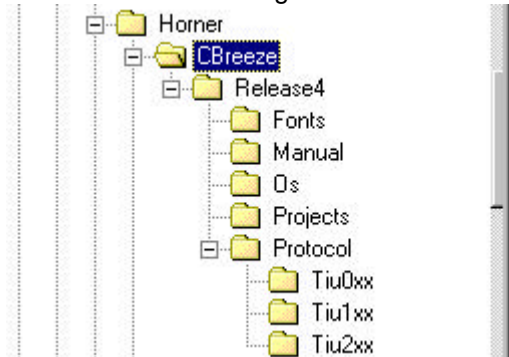
3. After the project has been uploaded, the message "**Transfer Complete**" appears.

3.8 Verifying a Project

1. Select **Verify Project** from the **File** menu.
2. A status bar appears indicating verification progress.
3. The Verify will stop at all reported errors

3.9 Updating the Protocol

When the software is installed the user decides where the main CBREEZE folder resides. During installation the following folders are created: -



In the protocol directory 3 folders are created, TIU0xx, TIU1xx and TIU2xx. The protocol files for the different terminal are loaded into these folders. The protocol files for the TIU050 are loaded into Tiu0xx, the protocol files for the TIU10X are loaded into Tiu10x and the protocol files for the TIU20X are loaded into Tiu20x.

The name of the protocol file is broken up into three sections, the protocol, the main software revision and the terminal type that protocol file is for.



Example

snp_R4.1xx

This is the protocol file for release 4 software for the GE FANUC PLC, for the TIU10X

df1_R4.2xx

This is the protocol file for release 4 software for Allen Bradley PLC, for the TIU20X

To Update Protocol File

1. Set Terminal Type
2. Set the required Automation Equipment in Communications Settings
3. Select **Update TIU Protocol** from the **File** menu.
4. Select the folder of the terminal you have connected to the PC. The correct file will appear for the terminal type selected and the Automation Equipment selected. Select that file and click OK.
5. A status bar appears indicating download progress.
6. After the transfer, the TIU050/10X/11X/20X resets itself. The correct PLC type is displayed on the TIU050/10X/11X/20X.
7. Next, the project loaded runs.

3.10 Updating the Operating System

1. There is a different operating system file for each terminal type. Therefore select terminal type first and the software will request the correct file name for the current terminal type selected.
2. Select **Update Operating System** from the **File** menu.
3. Choose the updated file with the "BIN" extension. The operating system files are stored in the OS folder under the CBREEZE folder. Only the correct file name will be displayed. Click **OK**.
4. A status bar appears indicating download progress.
5. During the download process, TIU050/10X/11X/20X displays the message "**SYSTEM SHUTDOWN**".

3.11 Printing

The software has printout capability. To print, select **Print** from the **File** menu or click on the **Print** icon. The system parameters (# of menu pages, # of alarm pages, # of status pages, PLC type, port settings, communication configuration, and PLC station number) and all of the pages are printed.

The printer set-up is selecting **Printer Setup** from the **File** menu. The printer set-up screen is shown in Figure 3.3.

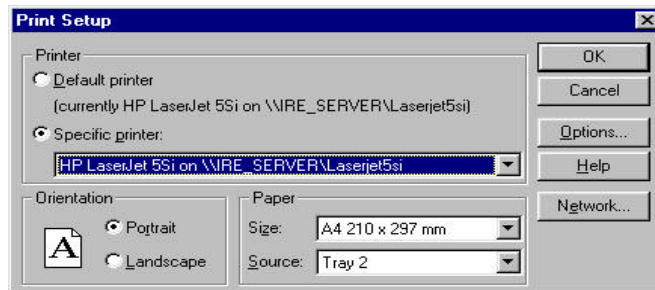


Figure 3.3 – Printer Set-up Box

3.12 To Insert a New Page

1. Click on the Insert Page Icon or from **Edit** choose **Insert Page**.
2. Pages can either be **Insert After Current Page** or **Insert Before Current Page**. Also, select the number of pages to be inserted. Click **OK**.

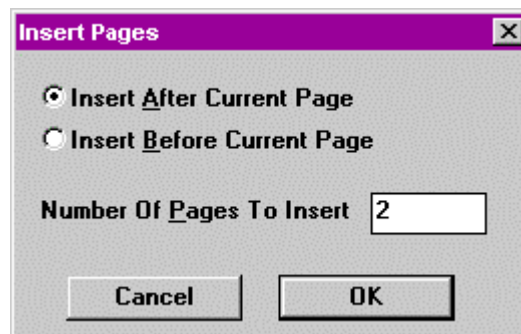


Figure 3.4 – Insert Pages Message

3. If the user goes to the last page of the project and clicks on the down key the a messages appears saying "There are no more pages in this menu, do you want to create some?" If the OK button is pressed the above insert menu pages appears.

3.13 Default Page Type

(TIU20X Only)

With the TIU20X series there are two types of pages.

- a. Text Page
- b. Graphic Page

The **CBREEZE** Software may be set-up to create either type of page by default or alternatively the software can be set up to display a prompt asking which type page is to be created every time a page or pages is inserted. (**Prompt On Page Creation**).

Text Page

A text page in the TIU20X is similar to the normal page created with the TIU10X/11X, i.e. the same functions that are available on the TIU10X/11X are also available on a **Text Page** of the TIU20X. To use the extra graphic features of the TIU20X a Graphic page must be created.

Graphic Page

A graphic page can be used to display all the features of the Text Page plus the extra features available for a Graphic Page. See chapter on **Graphic Editor** for further details of features available.

3.14 Download/Upload Character Set (Not available with the TIU050)

After new characters have been created with the character generator, these characters must be downloaded to the TIU. Conversely, an existing character set in the TIU can be uploaded.

3.14.1 To **Download** a Character Set:

1. Select **Download Character Set to TIU** from the **File** menu. A status bar appears; indicating the download is in progress.

Note: If the message "Link Failed" appears, check the cables connecting the PC to the unit.
--

2. After the project has been downloaded, the message "Transfer Complete" appears. The new character set is now loaded to the TIU.

3.14.2 To **Upload** a Character set from the TIU:

1. Select **Upload Character Set** from the **File** menu.
2. A status bar appears; indicating the upload is in progress.
3. After the project has been uploaded, the message "Transfer Complete" appears.

3.15 Select Terminal Type

This software package supports the project of multiple Operator Stations (TIUs).

3.15.1 To select the Operator Station Terminal Type:

1. From **Configure**, pick **Select Terminal Type** and choose the model.
2. Choose the model or TIU being used. The screen changes to show the model just selected.

3.16 Delete a Page

1. Go to the page to be deleted. Click on the Delete Page icon or from **Edit** choose **Delete Page**.
2. The current page is deleted and the next page is displayed.

3.17 Font Size (Not available with the TIU050)

There are four different Font Sizes: Normal, Double Height, Double Size (x2) and Four Times Size (x4). The size of an entire line is set, individual words on a line cannot have a different size than other words.

3.17.1 To change/set the Font Size of a line:

1. Click somewhere on the line to be adjusted.
2. Click on the desired **Font** icon. The size of the entire line is adjusted. Any characters beyond the right border of the screen are maintained but not displayed in the **CBREEZE** software or on the TIU.

3.18 Key Mapping

The keyboard can be mapped to PLC automation equipment along with the currently displayed page number. This enables keys to be used in Jog/Instantaneous action modes. Sending the page number allows the automation equipment to qualify the key states sent to ensure that the function only operates on the **correct** page. The page number is written to the specified data register, **Page Mapping**, and the keys are mapped into the next contiguous data register, **Key Mapping**.

3.18.1 To enable key mapping:

1. From the **Configure** menu, select **Keyboard Mapping**.
2. Check the **Enable** box.
3. Choose the **Register Type** and the **Map Page To Register**. Click **OK**.

The **Configure Key Mapping** screen displays the data type, the active page number (from which the keys are active) and the keyboard mapping bits.

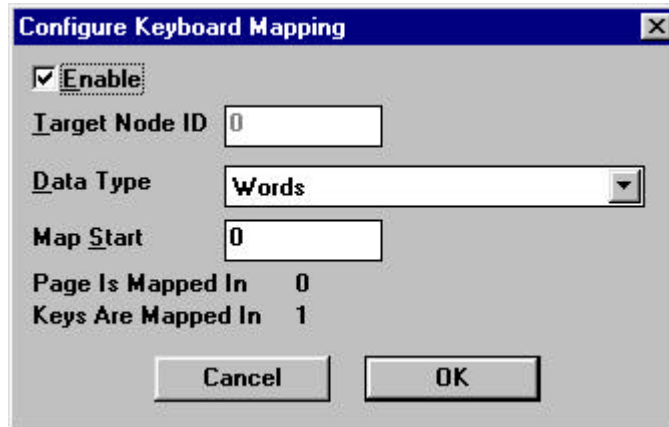


Figure 3.5 - Configure Keyboard Mapping Box

3.19 Function Keys

The TIU050/10X/11X/20X support function keys to be assigned in the project. The **Up**, **Down**, **Pause** and **Enter** key can be configured as function keys however are defined on a per page basis. Due to the fact that the keys may have other functions allocated to them the following restrictions are placed on the allocation of functions to these keys:

1. The **Pause** key is available for mapping on **status pages, alarm pages, and menu pages** with no editable embedded data, and which are not part of a submenu, and which do not have a submenu.
2. The **Enter** key is available for mapping on **status pages, alarm pages and menu pages**, except the first menu page.
3. The **Down** Key is available for mapping on **status pages** and on the last page of a sub menu.
4. The **Up** Key is available for mapping on **status pages** and on the first page of a sub menu. (It is used for scrolling purposes on menu pages that are not the first in a submenu, and on alarm pages.)

Along with the **Up**, **Down**, **Pause** and **Enter** keys, the alphanumeric keypad on the TIU050/11X/20X can also be assigned functions in the **CBREEZE** software. These function keys can be programmed on all page types and menus.

The Configure Function Key Screen lists the available function keys on each page. See Figure 3.6.

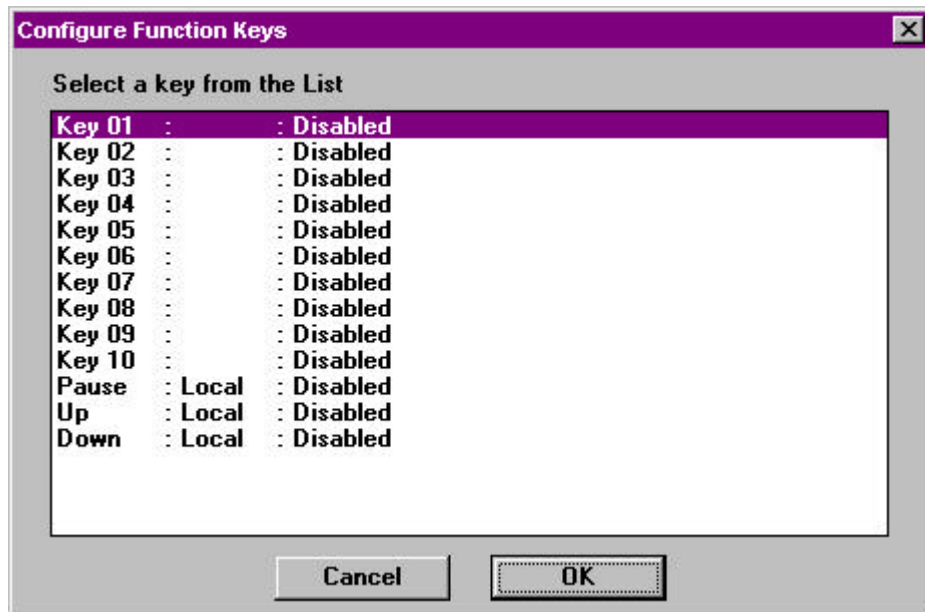


Figure 3.6 Configure Function Keys for the TIU

Double Click on the key to be programmed. Each key maybe programmed as a **Global** or **Local** function key. Programmed as a **Local** function, the key will only complete the function in the present page only. Programmed as a **Global** function, the key will perform the function on every page of the project, provided it is not overridden on a particular page with a local function.

Note: The **Up**, **Down**, **Pause** and **Enter** keys can only be programmed as **Local** Function Keys.

The **Key Actions** for both **Local** and **Global** are:

1. Disabled
2. Push Button
3. Preset Register
4. Display Page
5. Ramp Register
6. Set Bit
7. Clear Bit
8. Invert Bit
9. Execute Maths

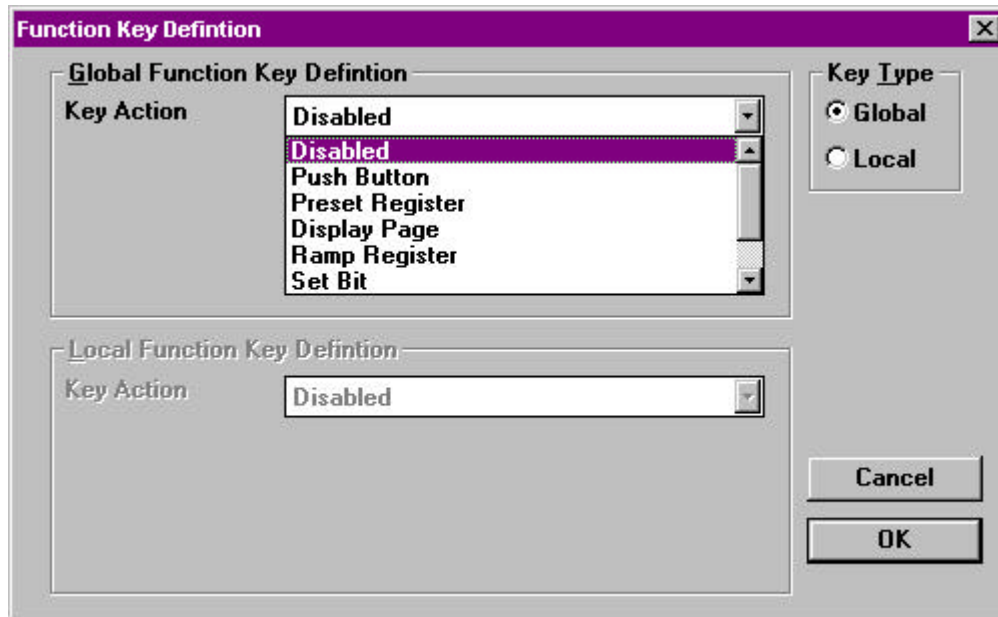


Figure 3.7 Function Key Definition

1. **Disabled**

Default setting, change to any other of the setting to enable function key.

2. **Push Button**

Sets the register chosen in the **Location** and **Set Data type** to the value in the **Value** field while the button is pressed. The register is reset when the button is released.

3. **Preset Register.**

Sets the register chosen in the **Location** and **Set Data type** to the value in the **Value** field.

4. **Display Page**

Displays the specified page in the **Page Number** field.

5. **Ramp Register**

Increases the value of the **Data Type** or register type specified under the **Location** field by the value entered in the **Value** field.

6. **Set Bit**

Sets the bit specified in the **Bit** field of the **Location**, of the **Data Type** or register type to "1".

7. **Clear Bit**

Sets the bit specified in the **Bit** field of the **Location**, of the **Data Type** or register type to "0".

8. **Invert Bit**

Toggles the bit specified in the **Bit** field of the **Location**, of the **Data Type** or register type.

9. **Execute Maths**

Executes mathematic function beginning at the specified line number.

3.19.1 *Function Key LEDs on TIU20X*

Function Key F9 – F18 have corresponding LEDs above or below the function key, indicating if the function is programmed or not. These LEDs light up when the corresponding Function Key is programmed to execute a function. When the function key is programmed as a Global Function Key then the LED is lit up constant as the user goes through the programmed menu screens, on the terminal. When the function key is programmed as a Local Function Key then the corresponding LED is only lit when the page in which the local function is programmed is displayed on the terminal.

NOTES


CHAPTER 4: EMBEDDED DATA

4.1 Scope

On the TIU050/10X/11X up to 8 embedded data fields may be placed on each page. On the TIU20X up to 64 embedded data fields may be placed on each page. Embedded data types are numeric (monitor or editable), alphanumeric (monitor only on the TIU10X, editable on all other models), timer (monitor or editable), bit status (monitor or editable), system variable (monitor only), password (entry only in operation), Horizontal Fill, Text Selector, Recipe item, and Clock Calendar. **Many of the sections in this chapter contain specific instructions that are intended to serve as examples only.**

Note: If range checking is enabled, then increments and decrements are only allowed between the maximum and minimum ranges.

There are 4 ways to embed data onto the screen.

- a. Double click the Display window area.
- b. Click the Embed Data icon 
- c. Chose Edit/Embedded data from the menu.
- d. Press Shift and Enter Keys together.

If you double click the display window area or click the Embed Data icon the following screen appears (Fig 4.1). From this the programmer can pick which type of data they wish to embed.

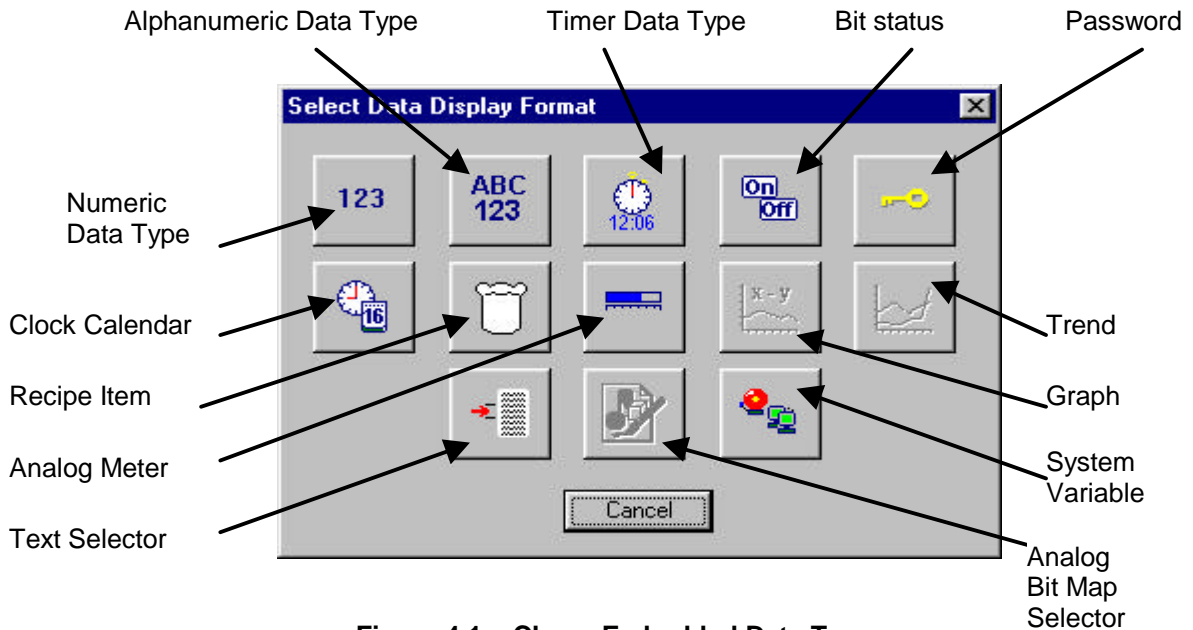


Figure 4.1 – Chose Embedded Data Type

4.2 Numeric Data

4.2.1 Scope

This section describes the Numeric Data functions available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Numeric Data.

From the Embedded data list select **Numeric Data**, the screen shown in Figure 4.2 appears.

The screenshot shows a dialog box titled "Configure Numeric Embedded Data". It is divided into several sections:

- Remote Data Source:** Includes a "Remote Node ID" field with the value "0", a "Data Type" dropdown menu currently showing "Words", and a "Location" field with the value "0".
- Display Format:** Features a dropdown menu showing "XXXXXX" and four radio button options: "16-Bit" (selected), "32-Bit", "Unsigned" (selected), and "Signed".
- Edit/Write:** Contains a single checkbox labeled "Enabled".
- Range Checking:** Includes a checkbox for "Enable", and two input fields for "Minimum" and "Maximum", both containing the value "0".
- Scaling:** Includes a checkbox for "Enable", and four input fields: "TIU Minimum" (0), "TIU Maximum" (65535), "Remote Minimum" (0), and "Remote Maximum" (65535).
- Attributes:** Contains a checkbox for "Flashing".

At the bottom of the dialog are three buttons: "Change Type", "Cancel", and "OK".

Figure 4.2 – Numeric Data Type Box

1. Select a **Data Type** (register or other) and enter a number for the **Location** (100 for example).

Note: For numbers 0-65535, use **16 Bit Unsigned** format. For numbers 0-999999999, use **32-Bit Unsigned** format. When 32-bit is selected two contiguous registers are read from the AE if the AE register specified is a 16 bit register. The first register read contains the low word and the second register contains the high word. The data source register specifies the first of two registers. Where the AE register is a 32 bit register, for example on A MOOG PSC100, only a single register is read.

2. If **16 Bit** and **Signed** is chosen from Format, then numbers -32768 TO 32767 may be utilised.
3. The signed, 32-Bit format for numbers -999999999 to 999999999 may be selected by clicking on **32-Bit** and **Signed**.

4.2.2 To edit numeric data:

1. Check the **EditWrite** box.
2. To enable range checking, check the **Range Checking** box and enter a **Maximum** and **Minimum** range number (100 and 5 for example).

4.2.3 To change data registers contents from the TIU050/10X/11X/20X:

1. Press the **Pause** key to select the data field for editing. The selected field becomes highlighted.
2. To increment the data, press the **Up** key.
3. To decrement the data, press the **Down** key.
4. On Terminals TIU050/11X/20X the numeric pad may be used as an easier way to enter data.
5. To enter the data to the PLC, press the **Enter** key. If range checking is active, then increment and decrement are only allowed between the maximum and minimum ranges.

4.3 Alphanumeric Data

4.3.1 Scope

This section describes the Alphanumeric Data functions available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Alphanumeric Data.

From the Embedded data list select **Alphanumeric Data**, the screen shown in Figure 4.3 appears.

The screenshot shows a dialog box titled "Configure Alphanumeric Embedded Data". It contains the following fields and controls:

- Remote Data Source:**
 - Remote Node ID: 0
 - Data Type: Words (dropdown menu)
 - Location: 0
- Display Format:**
 - Number of Characters: 16
- Edit/Write:**
 - Enabled:
- Attributes:**
 - Flashing:

At the bottom of the dialog are three buttons: "Change Type", "Cancel", and "OK".

Figure 4.3 – Alphanumeric Data

4.3.2 To embed alphanumeric data:

1. Select **Data Type**. Enter a number for the **Location** (100 for example).
2. Enter the **Number Of Characters** to be displayed. One character is a byte (8 bits). To have 10 characters, five registers are read.

4.4 Timers

4.4.1 Scope

This section describes the Timer functions available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Timers.

From the Embedded data list select **Timers**, the screen shown in Figure 4.4 appears.

Configure Timer Embedded Data

Remote Data Source

Remote Node ID: 0

Data Type: Words

Location: 0

Display Format: 16-Bit MM:SS

Edit/Write

Enabled

Range Checking

Enable

Minimum: 00:00:00

Maximum: 00:00:00

Scaling

Enable

TIU Minimum: 0

Remote Minimum: 0

TIU Maximum: 65535

Remote Maximum: 65535

Attributes

Flashing

Change Type Cancel OK

Figure 4.4 – Timers

4.4.2 To monitor Timers on the TIU050/10X/11X/20X.

1. Select a **Data Type**, and enter **Location** number.
2. Select a timer format under **Format**. Table 6.1 shows the available timer format. A 32-bit timer reads two contiguous registers.
3. Check the **Edit Enable** box to allow for the editing of the time format.
4. Check the **Range Checking** box to enter a **Maximum** and **Minimum range**.
5. Range checking can be entered in SECONDS; MINUTES, SECONDS; or HOURS, MINUTES, SECONDS.

4.4.3 To edit the data field:

1. While displaying the appropriate page, press the **Pause** key to select the data field for editing. The selected field becomes highlighted.
2. To increment the data, press the **Up** key.
3. To decrement the data, press the **Down** key.
4. To enter the day to the PLC, press the **Enter** key. If range checking is active, then increment and decrement are only allowed between the maximum and minimum ranges.

Table 4.1 – Configurations for Timer Format

16-Bit MM:SS	12 Hour	Minutes & Seconds
16-Bit HH:MM:SS	12 Hour	Hours, Minutes & Seconds
16-Bit MM:SS_T	12 Hour	Minutes, Seconds & 10th of Seconds
16-Bit HH:MM:SS_T	12 Hour	Hours, Minutes, Seconds & 10th of Seconds*
16-Bit HH:MM	12 Hour	Hours & Minutes.
32-Bit MM:SS	24 Hour	Minutes & Seconds
32-Bit HH:MM:SS	24 Hour	Hours, Minutes & Seconds
32-Bit MM:SS_T	24 Hour	Minutes, Seconds & 10th of Seconds
32 Bit HH:MM:SS_T	24 Hour	Hours, Minutes, Seconds & 10th of Seconds
32-Bit HH:MM	24 Hour	Hours & Minutes
* up to a maximum of 1:49:13.5		

4.5 Bit Status

4.5.1 Scope

This section describes the bit status functions available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Bit Status.

1. From the Embedded data list select **Bit Status**
2. Select the **Data Type** (%I for example). **Select Token Pair** (“OFF”/”ON” for example).
3. Enter a number for the **Location** (register or other, 10 for example).
4. If a word **Data Type** is chosen, enter a **Bit Number** in the range of 0-15 under **Format**. If bit 0 is off, then “OFF” is displayed. If bit 0 is on, then “ON” is displayed.
5. To modify a token pair, select the token pair to be modified.
6. Click **Edit Tokens**.
7. Enter the “ON” and “OFF” descriptions (up to 10 characters) in the **Enter Bit On Token** and **Enter Bit Off Token** boxes.
8. After being modified, the modified token pair can now be selected as normal.

Configure Bit Status Embedded Data

Remote Data Source

Remote Node ID: 0

Data Type: Words

Location: 0 Bit Number: 0

Display Format

"OFF"/"ON"

16-Bit 32-Bit Edit Tokens

Edit/Write

Enabled

Attributes

Flashing

Change Type Cancel OK

Figure 4.5 – Configure Bit Status

4.5.2 To select the data field for editing:

1. From the appropriate page, press the **Pause** key. The selected field becomes highlighted.
2. To turn the bit off or on, press the **Down** key or the **Up** key and press "**Enter**" to send the data to the PLC.

4.6 System Variables

4.6.1 Scope

This section describes the system variables available in the TIU050/10X/11X/20X. Use the instructions as follows to embed system variables.

There are six different types of system variables. To embed system variables:

1. From the embedded data list select **System Variable**.
2. Select a system variable type under **Select System Variable** in the **Format** section.
3. Click **OK**.

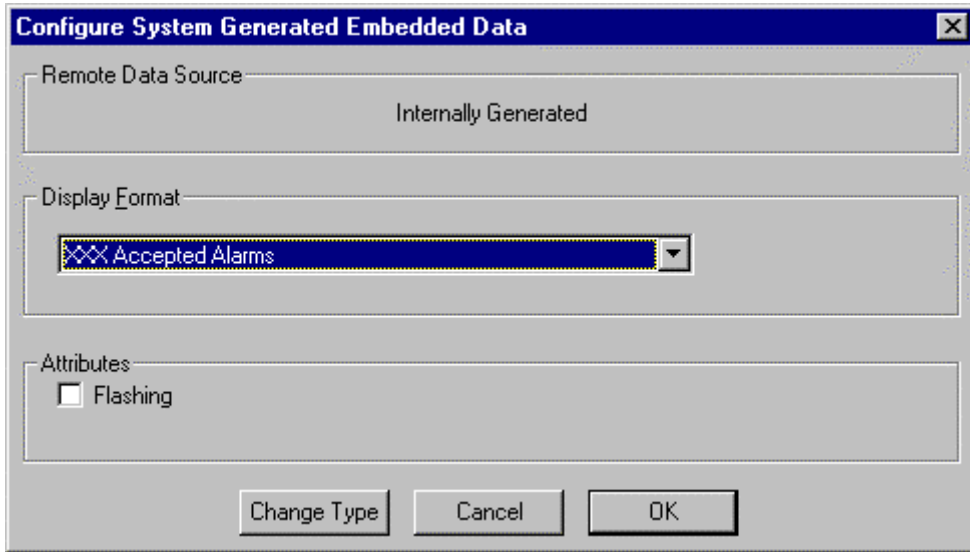


Figure 4.6 – Configure System Variable

4.7 Passwords

4.7.1 Scope

This section describes the Password function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Password.

4.7.2 To password protect a sub-menu:

1. From the embedded data list select **password**. A series of question marks appear on the screen. Click **OK**
2. Select **Create SubMenu** from the **Edit** menu. Enter the number of pages, you then have the option of password protecting the submenu.
3. There are two types of security access on sub-menus.
 - Simply one password to enter the sub-menu
 - Authority Level Mode

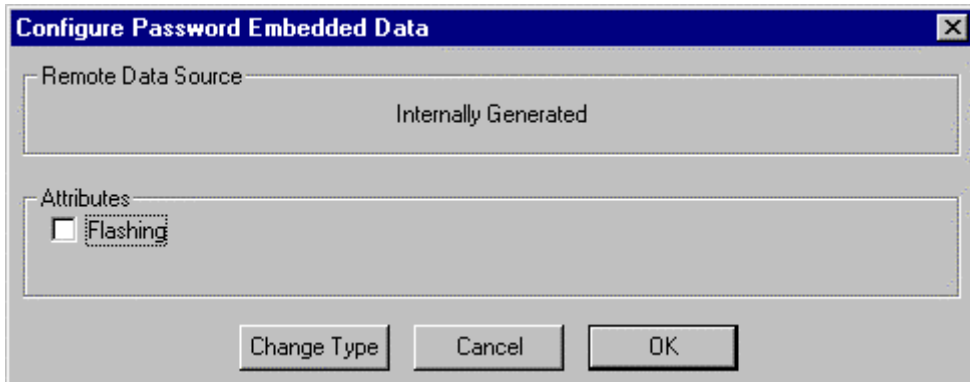


Figure 4.7 – Configure Password

The Authority Level Mode allows the programmer to give security levels to each sub-menu. Click Authority Level Mode and then enter the Authority Level to that sub-menu. Each Level can be given an individual password.

The screenshot shows a dialog box titled "Create SubMenu". At the top, there is a "Number Of Pages" field containing the number "1". Below this, there are two checked checkboxes: "Password Protect" and "Authority Level Mode". Under the "Authority Level Mode" checkbox, there is a "Level" field containing the number "0". Below this is a section titled "Authority Levels" which contains eight rows, each with a label (Level 0 through Level 7) and a corresponding input field, all containing the number "0". At the bottom of the dialog are "Cancel" and "OK" buttons.

Figure 4.8 – Configure Password Authority Mode

4.7.3 To enter the password from the TIU050/10X/11X/20X:

1. In the appropriate page, press the **Pause** key. The selected field becomes highlighted.
2. Enter the password by incrementing or decrementing the data field, by pressing the **Up** or **Down** key respectively.
3. Press the **Enter** and **Up** keys simultaneously.
4. The data must be equal to the pass code in order to enter into the sub-menu.

4.8 Analog Meters

4.8.1 Scope

This section describes the Analog Meters function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Analog Meters.

An area of the display can be horizontally filled to create an analogue meter or gauge. The height of the block is fixed at the height of the current text line. To create a horizontal fill:

1. From the embedded data list select **Analog Meters**. Select the **Data Type** and **Location** under **Data Source**.
2. Type the **Number of Characters** under **Format**. The maximum width of the block is determined by the width of the page and the character size.
3. Select the **Maximum** and **Minimum** range. Minimum and maximum values define empty and full scale, respectively.

Configure Analog Metering Embedded Data

Remote Data Source

Remote Node ID: 0

Data Type: Words

Location: 0

Display Format

Number of Characters: 12

16-Bit 32-Bit

Unsigned Signed

Range

Minimum: 0

Maximum: 0

Attributes

Flashing

Change Type Cancel OK

Figure 4.9 – Configure Analog Meters

Note: Only 16-bit registers may be read from the PLC. Only linear scaling is supported.

4.9 Text Selector

4.9.1 Scope

This section describes the Text Selector function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Text Selector.

Text Tables are available in the TIU050/10X/11X/20X **CBREEZE** software. There are 250 available text tables for use and they may be numbered from 1 to 250. Each text table may have up to 256 entries (numbered 0 to 255). Entries within each table may be called up by using the selected PLC register. When the ID of the entry is called up in the PLC register, the text string (entry) is displayed. The text strings are automatically forced to the width of the longest text string in the table (selected table). Strings are automatically left justified. Text tables are typically used in situations where the operator desires a visual message when some event (such as a value change in a register) occurs.

Example: A PLC is controlling a process that manufactures one of four drink types: Cola, Lemonade, Orange Juice, and Apple Juice.

The PLC has a register that contains the value of “6” when Cola is being made, “8” when lemonade is being made, “12” when Orange Juice is being made and “24” when Apple Juice is being made. A Text table can be created with four entries, 6, 8, 12 and 24, with the text for these items being the four products. Now, the PLC register can be monitored and the appropriate text inserted into a page on the TIU050/100/110.

A **maximum** of 64kBytes can be used by all of the text tables.

4.9.2 Edit Text Tables

Text tables can be edited from the TIU050/100/110. To choose the Text Selector function:

1. Select **Text Selector** embedded data list.
2. Select a **Data Type** and choose a number for the **Location**. The value in the Location (register or other) determines the text string (entry) number displayed (see 6.11).

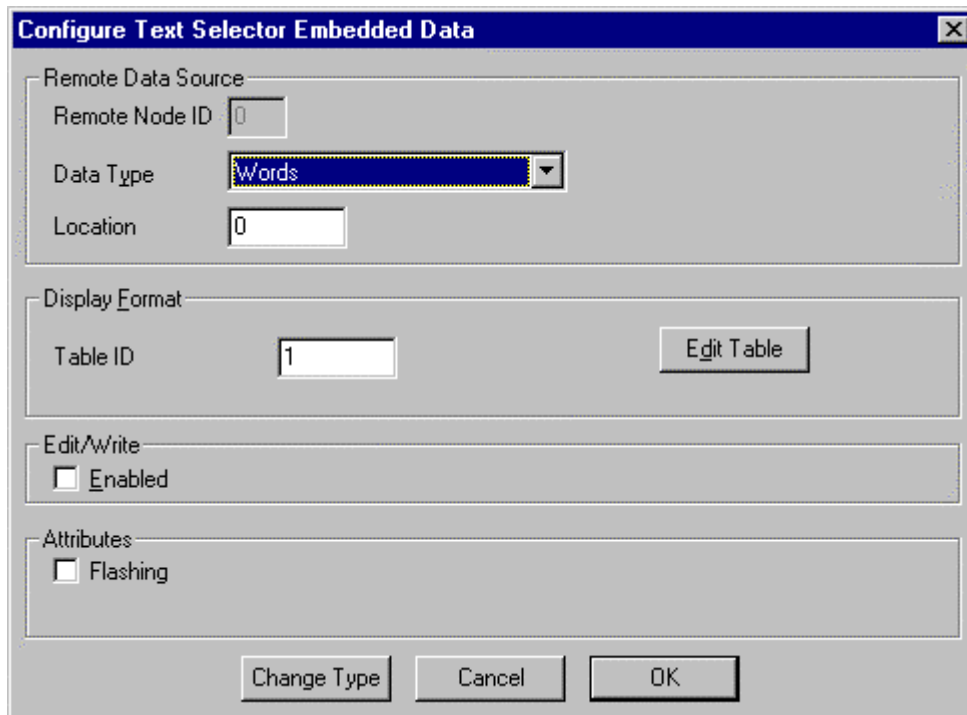


Figure 4.10 – Configure Embedded Data

3. Select a text **Table ID** number (1-250).
4. If you want the ability to edit the text string from the TIU050/10X/11X/20X, click the **Edit Enable** box.
5. To create/edit/delete entries, click the **Edit Table** button.
6. A Text Table box appears and the user has the ability to **Add**, **Delete**, and **Edit** text strings.

4.9.3 To Add a Table Entry

1. Click Add Figure 4.11 is displayed.
2. The field ID is automatically the next the available number in the table. This can be changed by typing in the number required or incremented using the up and down buttons to the right of the field.
3. In the text field enter the text corresponding to that field ID.
4. The size of the font which the text will be displayed can then be set to the character set sizes 6 x 8 or 12 x 16.
5. The programmer can enter the customised character generator by clicking edit font, see Chapter on Character Generator for further details.

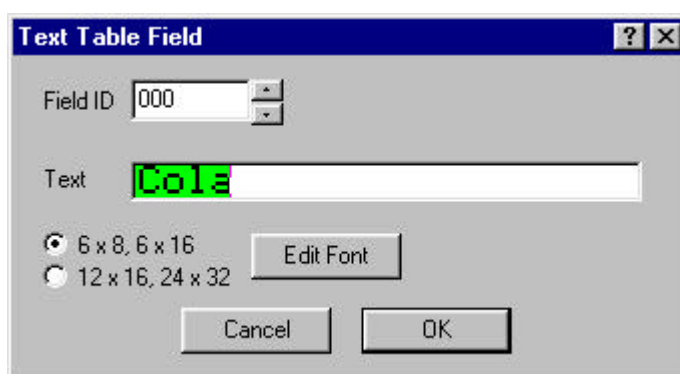


Figure 4.11 – Text Table Field Entry

Text tables can be called in 3 different modes, **Decimal**, **Binary** and **Hexadecimal**. This refers to the format of the data in the register calling the text table. Also in Binary mode multiple text table entries can be displayed the user can then scroll between these text table entries, or set the Auto Scroll option to let the TIU to automatically scroll between all the selected entries.

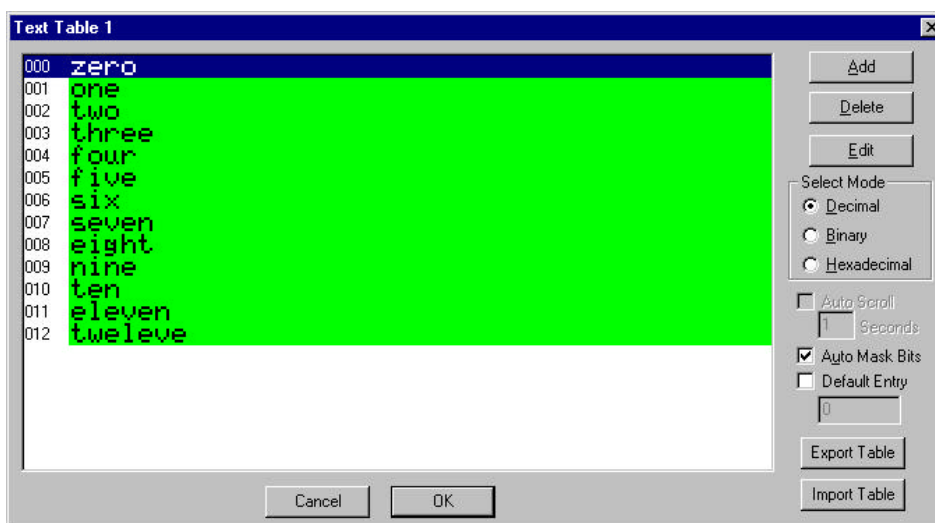


Figure 4.12 – Edit Text Table Entries

4.9.4 To edit a text table from the TIU050/10X/11X/20X

1. Select the text string field by pressing the **Pause** key.
2. Move up or down the list using the **Up** and **Down** keys.
3. Press the **Enter** key to select the desired text string.

4.9.5 To Export/Import a Text Table

a. Export

1. Click the **Export** button.
2. Enter the location of the file.
3. Enter the name the file the text table is to be exported to.

b. Import

1. Click the **Import** button.
2. Click on the file to be imported.

4.9.6 Auto Mask Bit

The Auto Mask function allows the programmer is a function, which allows the programmer to mask off a specified number of bits in a register. When the Auto Mask Bit is selected an extra field appears in the Configure Text Selector Embedded Data window called Bit Offset. This field contains the number of bits to be masked off beginning with the first bit of the register.

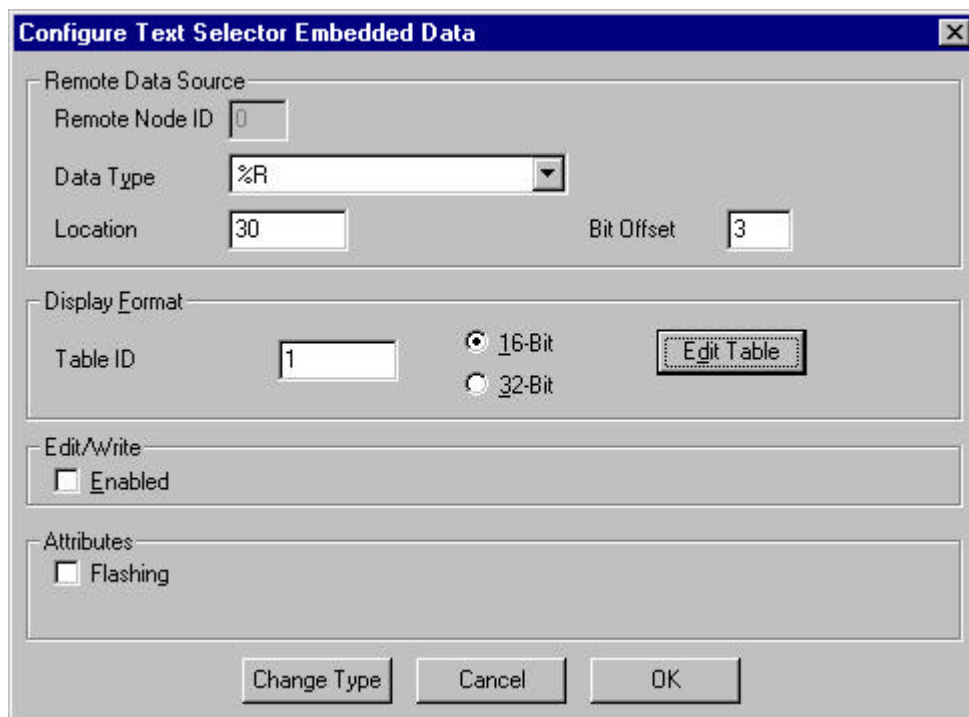


Figure 4.11 – Bit Off Set field

4.9.7 Default Text Table Entries

If an undefined value is entered into the text table entry field (i.e., a value that has **not** been assigned in any text table), then one of two different things happen.

- a. If the user has assigned a value to the **Default Entry** in the Text Table box, then that entry number is displayed. This value is assigned by first checking the box next to **Default Entry**, then entering a number in the box below.

- b. If the box is unchecked and a default entry has not been selected, then a series of asterisks (corresponding to the longest entry in the text table) are displayed.

Example: There are four entries in the text table. These four entries have numbers of 23, 24, 54 and 67. The text in these entries is as follows:

```
23 - Cola
24 - Soda Water
54 - Apple Juice
67 - Orange Juice
100 Undefined
```

If an undefined value is entered (e.g. 97) then "*****" is shown. If a default entry has been selected, i.e., 100 (any number can be used), then the text corresponding to 100, "**Undefined**" is displayed.

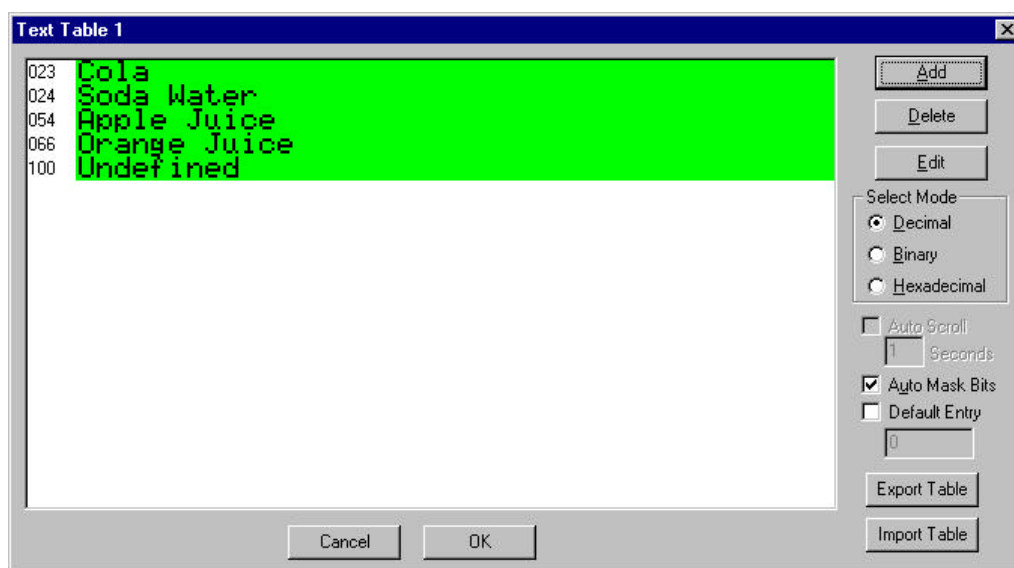


Figure 4.12 – Text Table 1

4.10 Clock Calendar

4.10.1 Scope

This section describes the Clock Calendar function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Clock Calendar.

If the TIU050/100/110 has been fitted with the real-time clock feature, then the time and/or date can be embedded as data. To embed the time and/or date:

1. Select **Clock Calendar** under embedded data list.

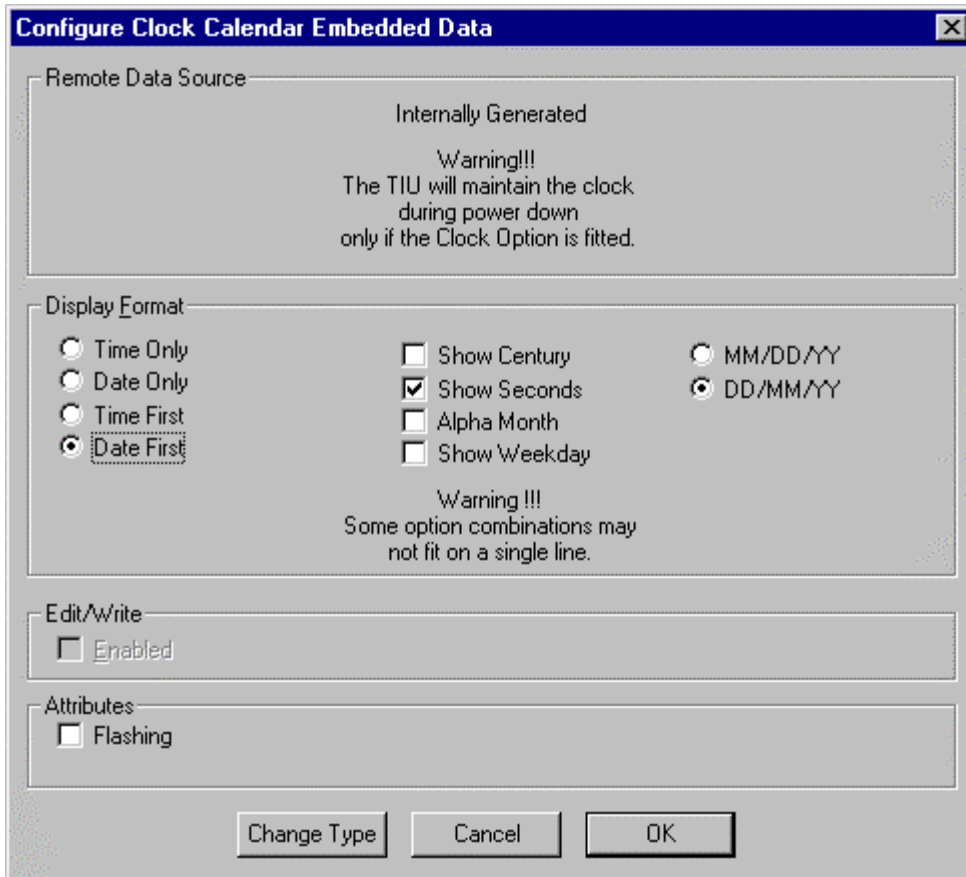


Figure 4.13 – Configure Clock Calendar Data

2. Choose the Format of the time and/or date to be displayed on the TIU050/10X/11X/20X. Click **OK**.

4.10.2 Clock Calendar Mapping

It is also possible to map the clock calendar (time and date) information to the automation equipment. To do this:

1. From **Configure**, chose **Clock Calendar Mapping**.
2. Click **Enable**. Select the **Data Type** (register or other) and first register (or other) for the **Map Start**. Click **OK**.
3. The mapping is displayed in the **Map** field (see Figure 4.14).

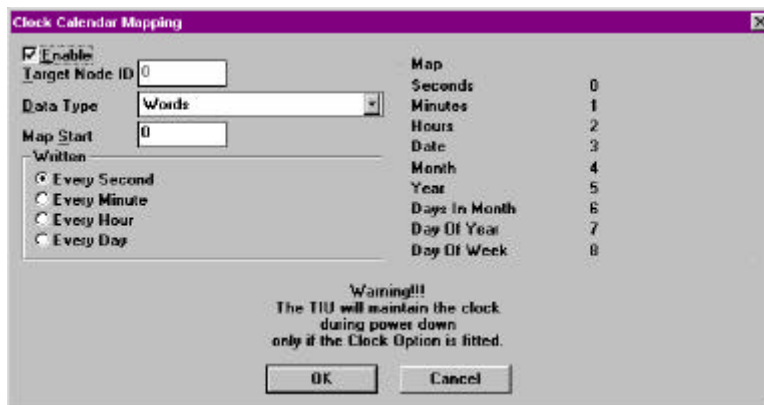


Figure 4.14 – Clock Calendar Mapping

4.11 Menu Timeout

4.11.1 Scope

This section describes the Menu Timeout function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Menu Timeout.

The Menu Timeout is a useful safety feature. This forces the TIU050/10X/11X/20X back to the first (main) menu page after a set time period. For example, the TIU050/10X/11X/20X is on an input menu page, after 30 seconds of no activity, the TIU050/10X/11X/20X reverts back to the non-input (safety) main menu page. To set the timeout:

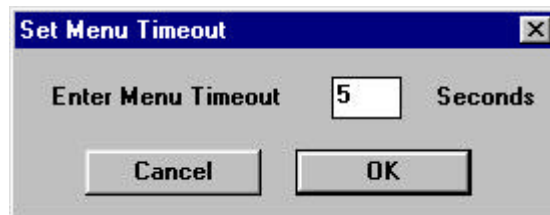


Figure 4.15 – Set Menu Timeout Box

From the configuration menu, select **C**onfigure, then **M**enu **T**imeout. A timeout is set in **A**LL menu and sub-menu pages. Time-outs in each screen may be inhibited from the **E**dit menu. To disable the Timeout function, set the time to 0 seconds.

4.12 Flashing Characters

4.12.1 Scope

This section describes the Flashing Characters function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Flashing Characters.

The user may have flashing characters on any line and on any type of page in the project. There are two different ways that flashing characters are implemented.

- a. In the embedded data screen, under **Attributes** check the box for **Flashing**.
- b. The other way to create flashing characters is to use the "TAB" key when you are creating the project. Flashing is toggled by line using the "TAB" key (current line the cursor is on). In this case, the entire line flashes.

Note: Flashing can not be enabled or disabled conditionally.

4.13 Set the Real-time Clock

4.13.1 Scope

This section describes the Set the Real-time Clock function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Set the Real-time Clock.

The Real-time Clock is not a standard feature on all TIUs. The Real-time Clock is set from the PC's clock. To automatically set the Real-time Clock from the PC's clock:

Connect the TIU to the PC.

From File, choose Set Clock. The PC's time is downloaded to the Unit

4.14 Scaling

4.14.1 Scope

This section describes the Scaling function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Scaling.

Embedded Fields can be Scaled to convert register values from the AE into real-world numbers.

4.14.2 To enable Scaling:

1. From the Embedded Data screen, click **Enable** in the **Scaling** box.
2. Enter the **TIU Minimum**, **TIU Maximum**, **Remote Minimum** and **Remote Maximum**.
3. After configuring any other fields, click OK.

The **TIU Minimum** and **Maximum** refer to the minimum and maximum values to be displayed on the TIU. The **Remote Minimum** and **Maximum** refer to the minimum and maximum values produced by the AE.

Example. Scaling can be used to convert the drive speed in RPM to a conveyor's speed in m/min. This scaling could then be taking the gearbox and all the other mechanical factors into account. The maximum speed of the drive may be 1450, but the actual maximum speed of the conveyor is 100 m/min. Therefore, the Scaling configuration is as follows:

TIU Minimum	0 (m/min)
TIU Maximum	100 (m/min)
Remote Minimum	0 (RPM)
Remote Maximum	1450 (RPM)

4.15 Page Wizard

4.15.1 Scope

This section describes the Page Wizard function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Page Wizard.

The Page Wizard is a short cut for building pages to set or view the internal real-time clock or view communication statistics.

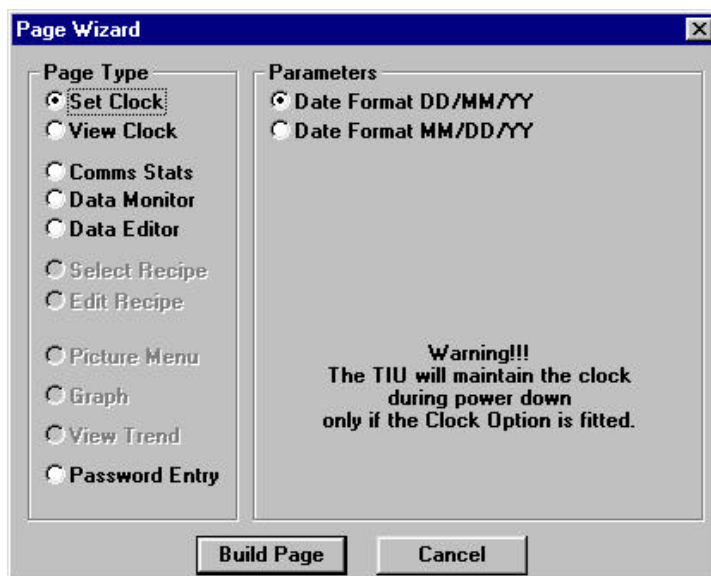


Figure 4.16 – Page Wizard

4.15.2 To use the Page Wizard:

1. Move to or insert a page that is to be built.
2. Click the Page Wizard icon or from **Configure**, choose **Page Wizard**.
3. Click on the **Page Type** to be built and chose the particular **Parameters** to be displayed on the TIU. Click **Build Page**.

4.16 Graphing (Not available with the TIU050)

4.16.1 Scope

This section describes the Graphing function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Graphing.

This features graphs up to two plots of 21 contiguous registers. Plot 1 is the lower byte of the register and plot 2 is the upper byte of the register. The graph is updated continuously. The actual update time depends on the equipment connected to the TIU, and communication speed. The data structure is as follows:

Offset +0 Offset +1 Offset +2 . . . Offset +21
Points **Data 1** **Data 2** . . . **Data 21**

Points HIGH Byte = Number of point for plot 2
LOW Byte = Number of points for plot 1

Definitions: 0 = do not plot;
 1 = plot first 11 registers on X-axis using 10 pixels per register;
 2 = plot 21 registers on X-axis using 5 pixels per register;
 >2 = assume 2.

Data HIGH Byte = Data for plot 2, plotted with a dotted line
LOW Byte = Data for plot 1, plotted with a solid line
The scale of the Y-axis is 0 to 29. Values greater than 29 or negative values are plotted full scale.

4.16.2 To Embed a Graph:

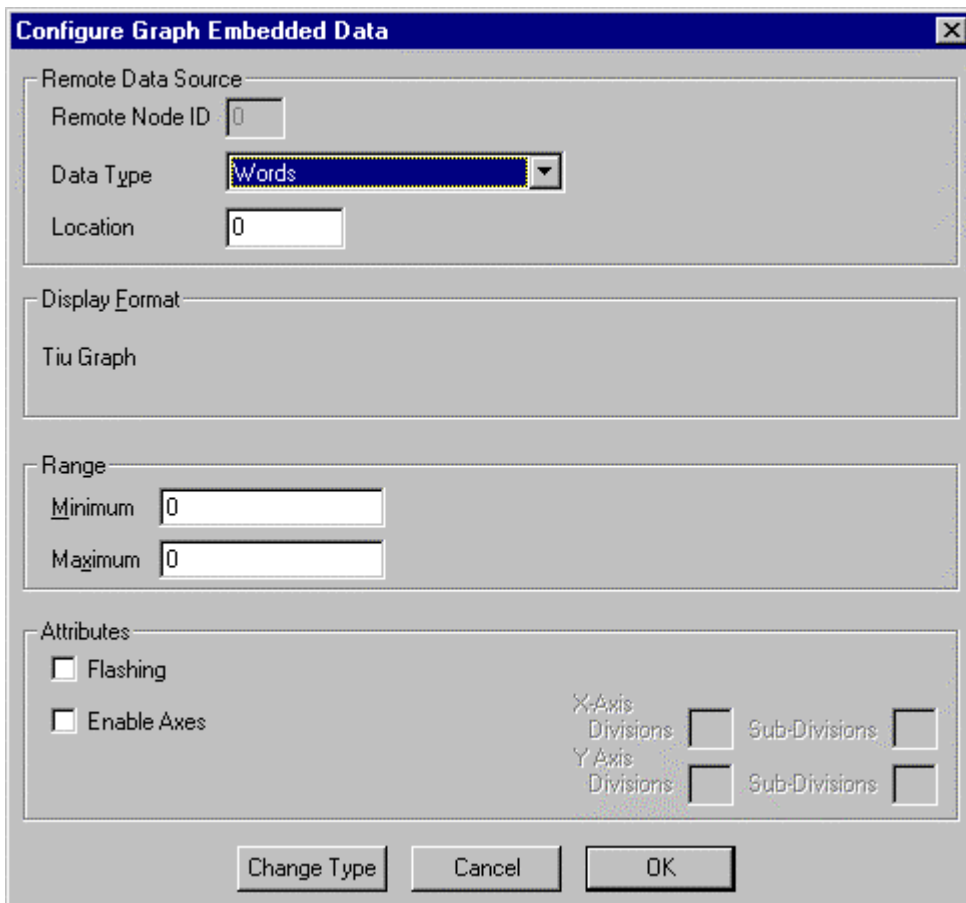


Figure 4.17 Embedding A Graph

1. Select **Embedded Data** from the **E**dit menu
2. Select **Graph** under **Type**.
3. Select a **Data Type** (register or other) and a **Location** (this is the First Data register).
4. Enter the number of points on the Graph, the number of points equals the number of data registers required.

5. Click **OK**.

4.16.3 *Enable Axes*

When this option is selected the X and Y-axes of the Graph is displayed on the TIU11X/TIU20X when the project is downloaded.

Note: The graph uses up 3/4 of a menu or submenu page and as such overwrites whatever data is on that page.

4.17 Trending (Not available with the TIU050)

4.17.1 *Scope*

This section describes the Trending function available in the TIU050/10X/11X/20X. Use the instructions as follows to embed Trending.

This features continuously plots up to two registers (channels) versus time. The maximum update rate depends on the equipment connected to the TIU, and communication speed.

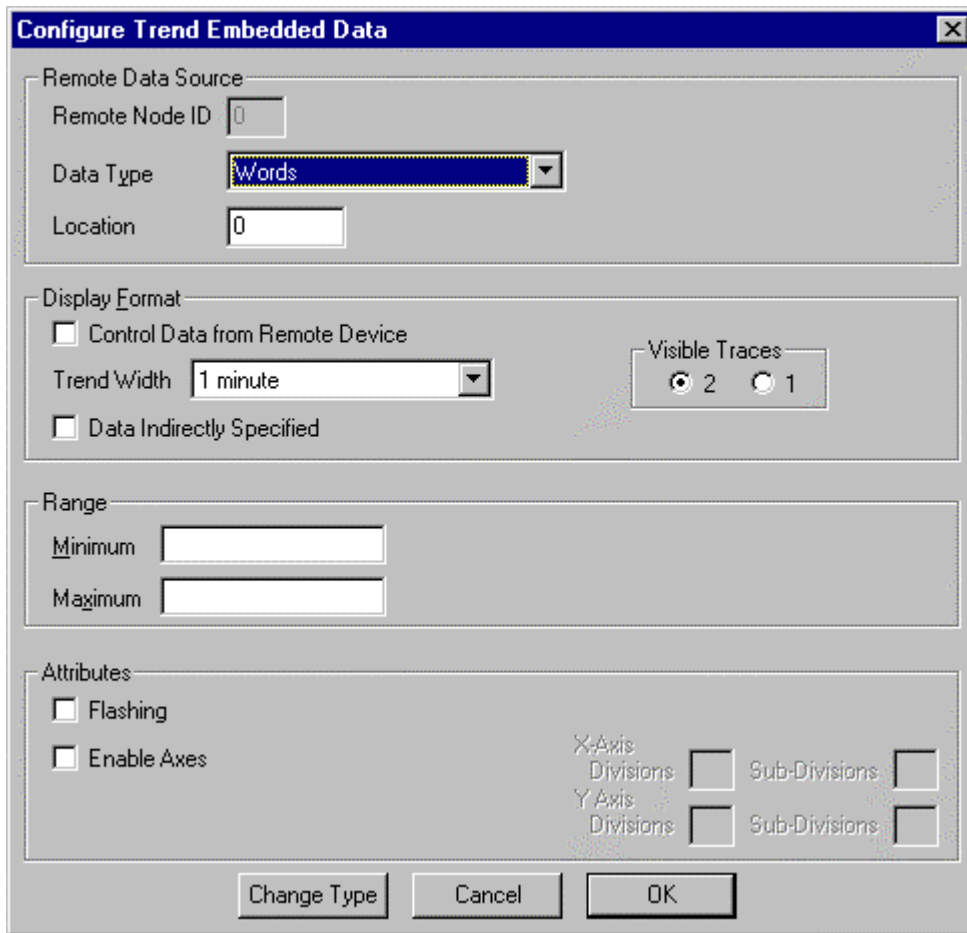


Figure 4.18 Embedding A Trend

4.17.2 *Enable Axes*

When this option is selected the X and Y-axes of the Trend are when the project is downloaded.

4.17.3 Data Indirectly Specified.

This option allows the programmer to indirectly specify the register which contains the data for the trend, i.e. the contents of the register, which is specified in the Location section of the Remote Data Source, specifies the register that contains the data for the trend.

4.17.4 Control Data from Remote Device

This option allows the programmer to control the set-up of the trend from registers stored in the automation equipment. The structure for setting up the trend is described further in this paragraph.

The data structure is as follows:

Offset +0	Offset +1	Offset +2	Offset +3	Offset +4	Offset +5
Time Base	Ch. 1 Scale	Ch. 1 Data	Ch. 2 Scale	Ch. 2 Data	Width
Time Base	0 = maximum update rate; 1 = 1/10s per plot X = X/10s per plot, up to X=10				
Scale	Maximum value of Y-axis for that channel; if 0 channel is not plotted.				
Data	Raw register values. Negative values are plotted at full scale.				
Width	Number of samples across the display 100 = 1 pixel per plot 50 = 2 pixels per plot 25 = 4 pixels per plot 10 = 10 pixels per plot Any other value, the nearest to the above 4 is used.				

If the Control Data from Remote Device option is not clicked then the trend is set-up as follows.

The Time Base is set by the Trend Width.

The scale is set by the Minimum and Maximum Range

The data for the first trace is taken from the register specified or indirectly specified in the **Location** field

The data for the second trace is taken from the following register specified or indirectly specified in the **Location** field.

Note: When Control Data from Remote Device is selected, the data to set-up the structure of the trend is only read once, when you first go onto a screen where the trend is embedded. The data for the trend is read continuously.

4.17.5 To Embed a Trend

1. Select **Embedded Data** from the **Edit** menu
2. Select **Trend** under **Type**.
3. Select a **Data Type** (register or other) and a **Location**.
4. To display axes with the graph, click the **Enable Axes** under **Format**.
5. Click **OK**.

Note: The trend uses up 3/4 of a menu or submenu page and as such overwrites whatever data is on that page.

CHAPTER 5: CHARACTER GENERATOR

5.1 Scope (Not available on the TIU050)

The **CBREEZE** software allows the user to edit, create and display on the TIU10X/11X/20X special characters. These characters may be company logos, special symbols or multilingual, non-standard KEYBOARD characters such as Ω, é, °, © or ±.

Note: The character set for the font double height is scaled automatically from the 8x6-character set. The character set for the font x4 is scaled automatically from the 16x12-character set.

Within each character set are up to 256 characters, however, not all these characters are usable and/or editable by the user.

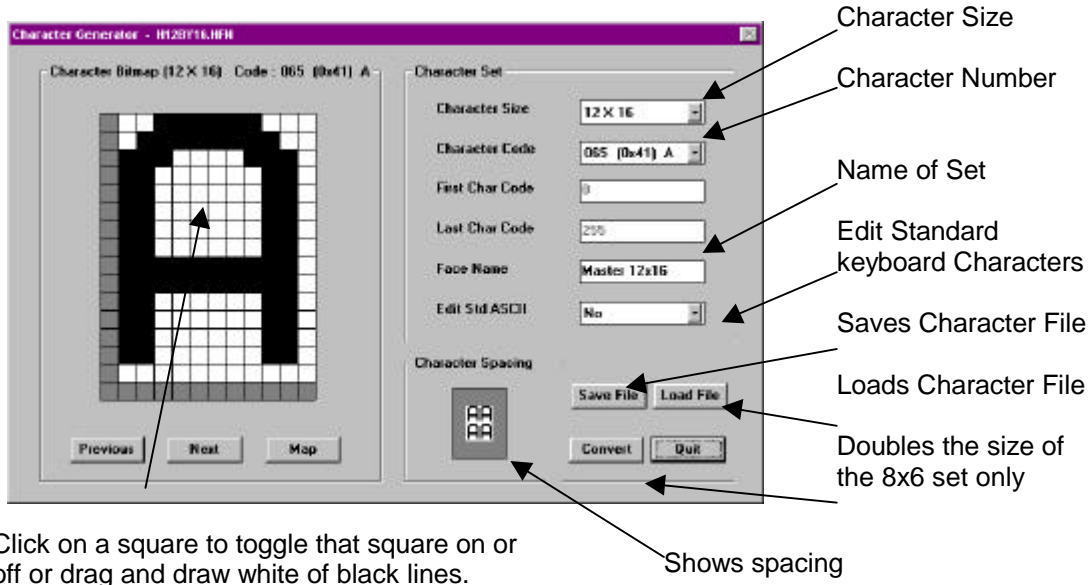
Table 5.1 – Make-up of a Character Set	
Characters 0 to 31	System characters – not useable or editable
Characters 32 to 127	Standard keyboard characters – useable and editable although it is not recommended the user edit these characters.
Characters 128 to 160	Editable and useable characters. This is the area of the character set for use.
Characters 161 to 255	Extended keyboard characters – useable and editable although it is not recommended the user edit these characters.

5.2 To Insert a Special Character:

1. Place the pointer on the display where the character is to go.
2. Press <Ctrl> <Enter> or by clicking right mouse button. Click on the character in the Character Map (see Figure 5.2) to be inserted.

5.3 To Create Or Edit a Character:

1. From **Configure** on the menu bar, choose **Fonts**. The screen in Figure 5.1 appears.



Click on a square to toggle that square on or off or drag and draw white or black lines.

Figure 5.1 - Character Generator Screen

2. Under **Character Set**, choose the **Character Size** to be edited. Beside **Set Name**, enter a name that describes this set.
3. Click on **Map** to show the total character set. The screen in Figure 5.2 appears. The first four rows are the standard keyboard characters, which should not be edited. The fifth row is editable and useable. The lower three rows are the extended keyboard characters, which should not be edited. Click on the character to be edited or blank box to create a character.

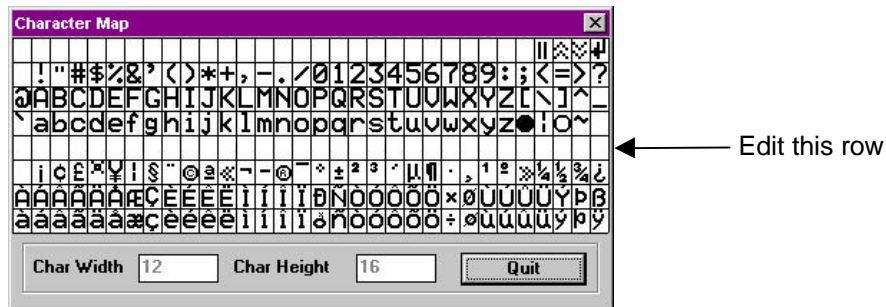


Figure 5.2 – Character Map

NOTE: Standard and Extended keyboard character are editable; however, this must be done with caution as it effects how characters are displayed on the TIU050/100/110, i.e., changing “4” to • causes all 4’s from the PLC to be displayed as •. 454 is displayed as •5•.

4. Under the **Character Bitmap** (see Figure 5.1), click on a square (pixel) to toggle that square on or off. The grey area is the space between characters and these squares should not be turned on.
5. Go to step 3 to edit the next character.

6. Once all the characters have been created or edited, click **Save File**. Choosing **Yes** over-writes the current character file. Choosing **No** gives the option to save this character set under a new file name.

Note: It is possible to double the size of an 8x6-character set. To do this click on the **Double** button. It is not possible to half the size of a 12x16-character set. It is recommended that the 8x6-character set be created first and then doubled.

5.4 International Keyboards

The **CBREEZE** software supports various international keyboard layouts. However, if the standard or extended keyboard characters are edited or deleted, the pressed key may appear different or not at all. The following keyboard layouts are supported:

Danish	German (Standard)
Dutch (Belgium)	Italian (Standard)
Dutch (Standard)	Norwegian
English (All)	Spanish (Modern Sort)
Finnish	Swedish
French (Standard)	

NOTES

CHAPTER 6: RECIPES

6.1 Scope

Recipes allow the user to send or update multiple registers simultaneously. For example, it may be desired to run a motor at two different settings for two different applications.

- a. Speed of 1000RPM, minimum frequency of 500Hz, acceleration rate of 1000 s/100Hz and deceleration rate of 2000 s/100Hz;
- b. Speed of 500RPM minimum frequency of 400Hz, acceleration rate of 500-s/100Hz and deceleration rate of 1500 s/100Hz.

Recipes enable the user to download all the fields (four in this example) at the same time without editing each individual field.

A maximum of 63 fields and 1024 records are supported by the database. The total storage available to the database is 64 kBytes. The number of bytes currently in use can be obtained from the main **CBREEZE** help menu under About **CBREEZE**.

6.2 To Enable Recipes:

1. From **Configure**, select **Recipes**. Enter the **Recipe Name**, **Number of Records in the Database** and **Number of Fields in Record**. The number of Records and Fields can be changed later. Click **OK**.

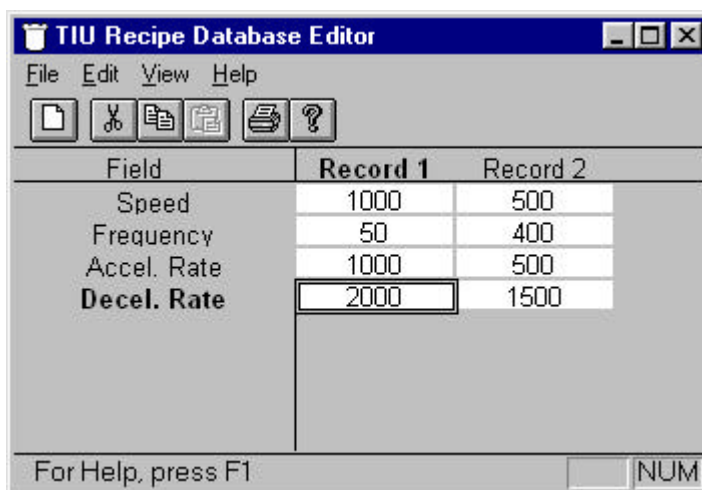



Fig 6.1 Database Editor Window

2. The **TIU Recipe Database Editor** appears. Set the number of *Records* (different settings) and *Fields* (parameters).
3. Edit the *Fields* and *Records* as desired.
4. From **File**, select **Exit** to leave the Recipe Editor.

6.3 To Edit Recipe Fields and Records:

1. Open the Recipe Editor by clicking on the Recipe icon  on the Toolbar or from **Configure/Recipes**.
2. Left click on the *Field* to be edited. Enter the **Ingredient Name**, **Type Remote Data Source** (register) and **Format** in the same manner as Embedded Data. Enable **Scaling** if desired.
3. Left click on the *Record* to be edited. Enter the value and click **OK** or press <Enter>.
4. From **File**, select **Exit** to leave the Recipe Editor.

6.4 Editing Ingredient Properties

An ingredient, or field, in the database corresponds to a value which will be loaded to a specified location either internal to the TIU or in the connected automation equipment.

Figure 6.2: - Ingredient Properties

Each field has the following properties: -

a) Ingredient name

An alphanumeric string that is used to specify which field in a recipe is being edited. The string may be up to 30 characters in length.

b) Type

Currently recipe data fields may be formatted as numeric, timer, alphanumeric or bit.

c) Remote data source

The register to which the recipe field data will be transferred when the recipe is selected for loading. Where the type is specified as alphanumeric it refers to the first register of a contiguous block where the number of characters in the alphanumeric string defines the block size. (block length = (2 x (characters + Refer to the alphanumeric embedded data section for more details on how an alphanumeric string is stored.

d) Format

Additional data to specify the format of the data field dependant on its type.

e) Range checking

Optionally set limits on numeric and timer data, which are applied when the operator modifies the data from the keypad.

f) Scaling

Where the data is formatted as numeric or timer data, and the data is mapped to the automation equipment, scaling allows an offset and multiple data transformation to occur prior to sending.

6.5 To Edit Recipe Data

Double click on the field to be edited. If the data is a bit status it will toggle, otherwise the following prompt will appear: -

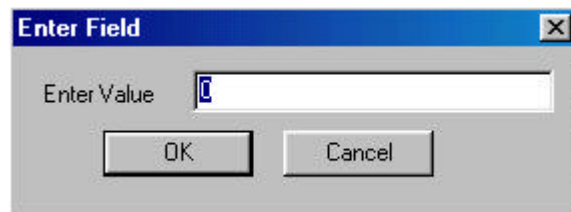


Figure 6.3: - Edit Data

Enter the data required for the field

6.6 To Rename a Record

1. Double click on the record name

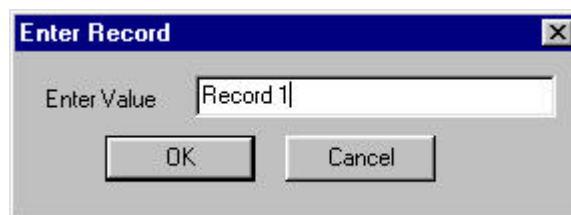


Figure 6.4 – Record Name

2. Type in the new record name
3. Click OK.

6.7 To Embed a Recipe on a Menu Page

When embedding a recipe item on a menu page the following box is displayed.

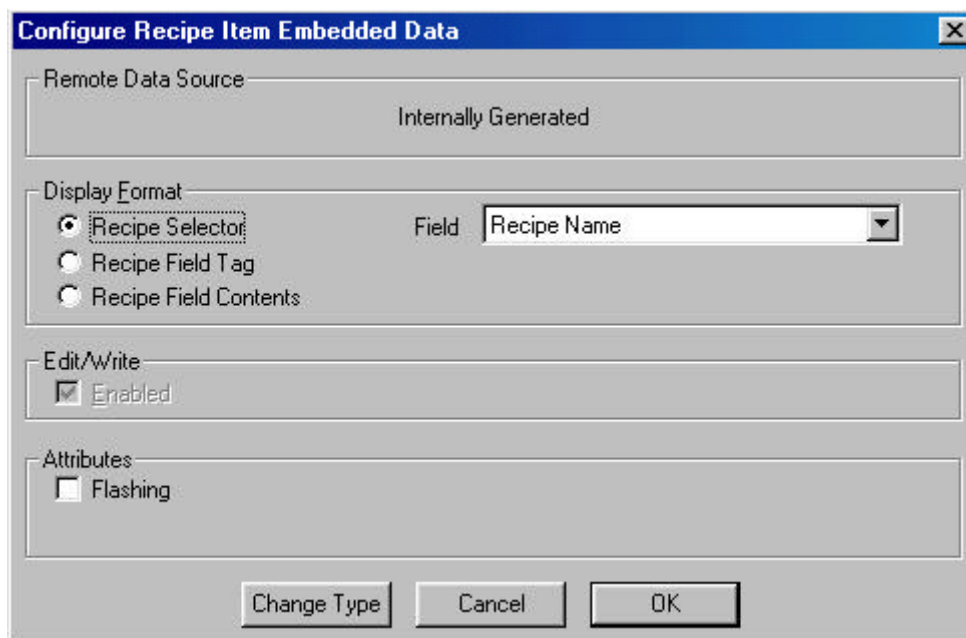


Figure 6.5 - Embed Recipe Item

The three format types are, -

a) Recipe Selector

The Recipe Selector field allows the user to select a recipe from the database.

The recipe selector requires a field to be selected from the database, typically this will simply be the record name.

The recipe selector initially displays the contents of the specified field within the first record in the database. The operator will be able to scroll through the records in the database to select the record on which he wants to operate. When the required record is found, the Enter key is pressed and the desired record is selected.

The recipe selector is used either on it's own, in which case the page is a recipe selection page and upon selecting the record the contents of that record are transferred to the TIU internal registers and/or the automation equipment. Otherwise the recipe selector is used in conjunction with a recipe field tag and a recipe field contents embedded data field, in which case the page is a recipe editing page used to modify the values loaded by the specified record when selected.

- Recipe Name will allow the user to edit the contents of each Item of the displayed Record; the Record name will be displayed.
- If one of the Items is selected then the user can edit the contents of each Item of the displayed Record; the Record number will be displayed.

b) Recipe Field Tag

If the Recipe Field Tag is embedded on the menu page then the Item Name of the record selected for that menu page will be displayed. The recipe field embedded data must always be used in conjunction with both a recipe selector and recipe field contents embedded field. If all three recipe embedded data types are on screen the page is used for editing a recipe. Initially when a page is displayed the recipe field tag will be blank. It remains blank until a recipe has been selected using a recipe selector field. At this point the first recipe field is selected for editing and the name of this field is displayed as the recipe field tag. As the operator enters each recipe item, the recipe field tag moves on to the next field tag until all fields in the recipe have been modified or accepted.

c) Recipe Field Contents

If the Recipe Field Contents is embedded on the menu page then the contents of the current Item, of the record selected for that menu page, will be displayed. The recipe field contents embedded data must always be used in conjunction with both a recipe selector and recipe field tag embedded field. If all three recipe embedded data types are on screen the page is used for editing a recipe. Initially when a page is displayed the recipe field tag will be blank. It remains blank until a recipe has been selected using a recipe selector field. At this point the first recipe field is selected for editing and the name of this field is displayed as the recipe field contents. Once all the fields in the record have been accepted the modified record is written to flash memory in the terminal. Note that to send the contents of the newly modified record to the automation equipment and/or the TIU internal registers the operator must call up a recipe selection page and select it in the normal manner.

Pressing the pause key at any point during the editing sequence will abort data editing, and cause any changes to the recipe data already made to be ignored. The flash memory is only updated if all fields are accepted with the Enter Key.

Because of the precise nature of the combinations in which the recipe embedded fields must be used in order to achieve a specified function it is recommended that the page wizard is always used to build recipe operation pages!

Note: A recipe item can be manually embedded on a menu page however for best results when embedding a recipe item on a screen see the Page Menu Wizard for Recipe Items. This can always be edited afterwards.

6.8 Importing and Exporting Data from a Recipe

Recipe tables can be imported or exported. Files can be imported or exported as comma delimited (*.csv) or as print files (*.prn). Other file types may be viewed but may not load properly.

Note: Only *Records* are exported and imported, the *Field* names are not.

Note: If the table size that the data has been imported into is smaller than the table it was imported from, then not all of the data is displayed.

Note: Only one Record column can be selected per project at any time.

NOTES

CHAPTER 7: TUTORIAL

7.1 Scope

This chapter contains instructions for using several of the OS features. The projects in this chapter serve as examples and are not to be taken literally for all applications. After following this tutorial, the user should have a better understanding of how the OS operates.

7.2 Menus

The OS supports a total of 300 pages divided between menu and sub-menu, alarm and status pages. The following points are covered in this section:

1. Menus can have sub-menus.
2. Sub-menus can have sub-menus.
3. There may be up to 8 embedded data per page.
4. Embedded data can be displayed-type or entry/editing-type.
5. Sub-menus can be password protected.

Additional menu pages may be created by selecting **Insert Page** from the **Edit** menu or by selecting the “+” icon from the icon menu to the right of the Display screen. Selecting **Delete Page** from the **Edit** menu or by selecting the “-” icon will delete the displayed page.

The next menu page may be selected by clicking the “Down” key or by selecting the **Next Page** from the **Goto** menu. The previous menu page may be selected by clicking the “Up” key or by selecting **Previous Page** from the **Goto** menu.

Example: The OS is used to monitor the temperature of a furnace and indicate the heater or a fan is ON or OFF. This example uses a Hitachi H-252 series PLC, but is applicable to any PLC with modifications.

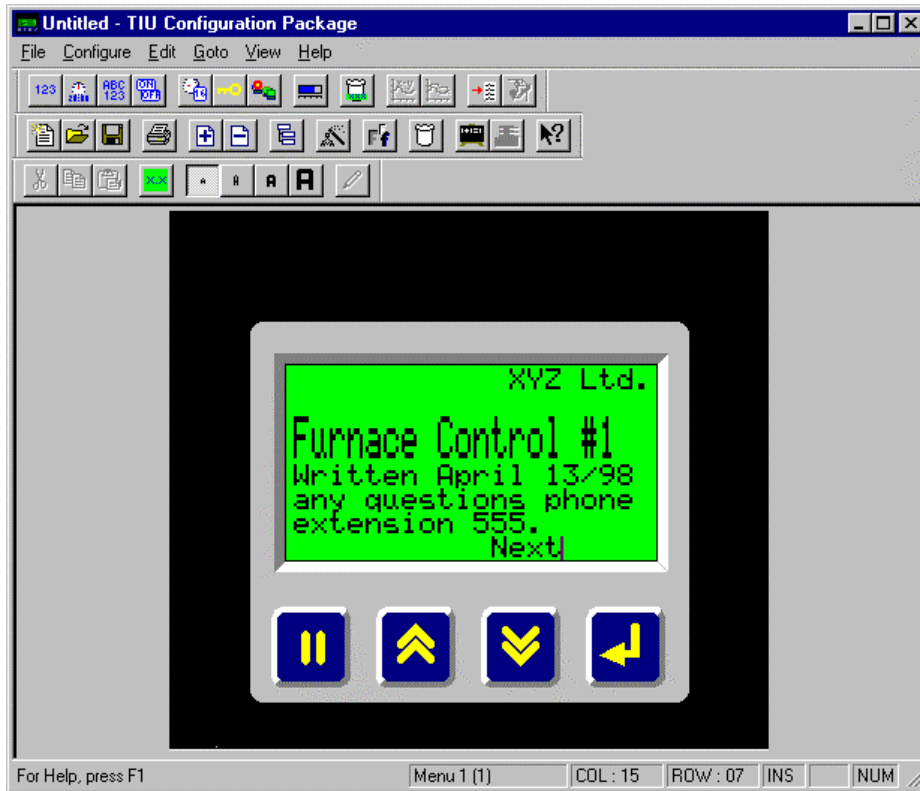


Figure 7.1 – Menu Page 1

1. **Communication Settings** from **Configure**. Select the applicable automation equipment being used, in this example a Hitachi H-series is used. Click **OK**. Update the Protocol if required
2. Menu Page 1 shows some explanatory details about the program and should look like figure 7.1. For "Furnace Control #1" on line 3, click on the font double height icon at the beginning of the line.
3. Click on the Insert Page Icon. Choose **Insert After Current Page**. Click **OK**.

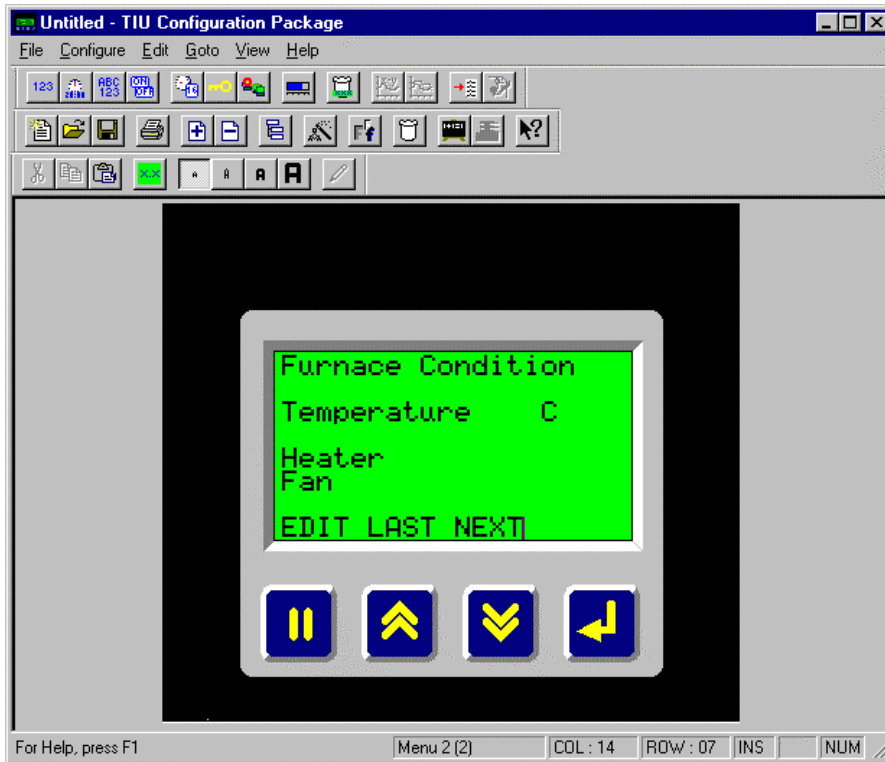


Figure 7.2 – Menu Page 2

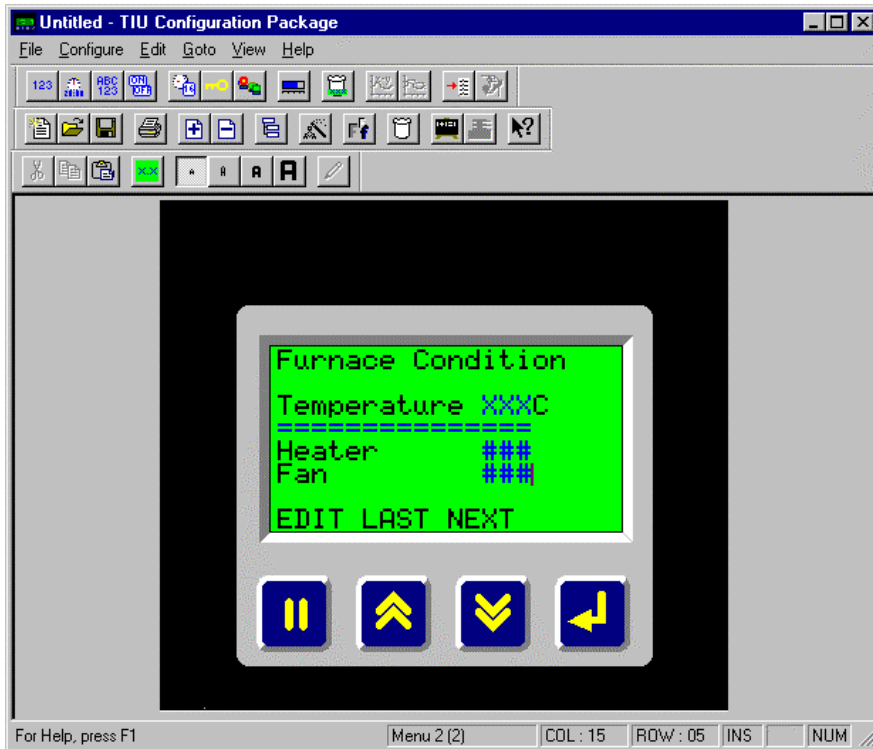


Figure 7.3 – Menu Page 2

1. Enter the text as shown in Figure 7.2.
2. Place the cursor one space to the right of "Temperature" and embed a **Numeric Data** in WR-REGISTERS **Location** 10. Select "**XXX**", **16-Bit, Unsigned**. Click **OK**. Correct "C" position.
3. On the first space of the fourth line, click the embed icon. Choose **Analog Meter**, WR-REGISTERS and **Location** 3. Under Format, enter 15 for characters, 760 for **Maximum** and 0 for **Minimum**. Click **OK**.
4. Place the cursor 6 space to the right of "Heater" and embed a **Bit Status** in Y-REGISTERS, **Location** 100, **Select Token Pair** Format, "OFF"/"ON." Click **OK**.
5. Place the cursor 9 spaces to the right of "Fan" and embed a **Bit Status** in WR-REGISTERS, **Register** 10, **Select Token Pair** Format, "OFF"/"ONFF", **Bit Number** 1. Click **OK**.
6. After embedding the data, the screen looks like Figure 7.3.

Under the **File** menu, click **Download Project**.

The temperature is displayed digitally and as a bar graph by the horizontal fill. Also, it is shown whether the heater and fan are ON or OFF.

Note: For this example to work a thermocouple and relay module must be used to simulate temperature, heater and fan. Otherwise the latent values displayed will be blank or the values in the PLC registers.

7.3 Sub-Menus

Sub-menu pages branch off menu pages analogous to a sub-directory branching off a main directory of a PC. The OS supports a total of 300 pages divided between menu and sub-menu, alarm and status pages.

Example: Continuing from the example in Figure 7.2, one sub-menu is set up for the heater and one for the fan. Each sub-menu sets the temperature (within the furnace) at which the heater or fan turns ON/OFF.

Note: Ladder code needs to be written if this example is to work as anything more than an example.

1. Go to menu page 2. Under the **Create SubMenu** page, choose **2** for the **Number of Pages**. Be sure that the **Password Protect** box is unchecked. Click **OK**. The bottom middle cell should display Menu Page 2.1 (indicating a sub-menu).

2. After completing this, enter the text as shown on the first sub-menu page (as follows):

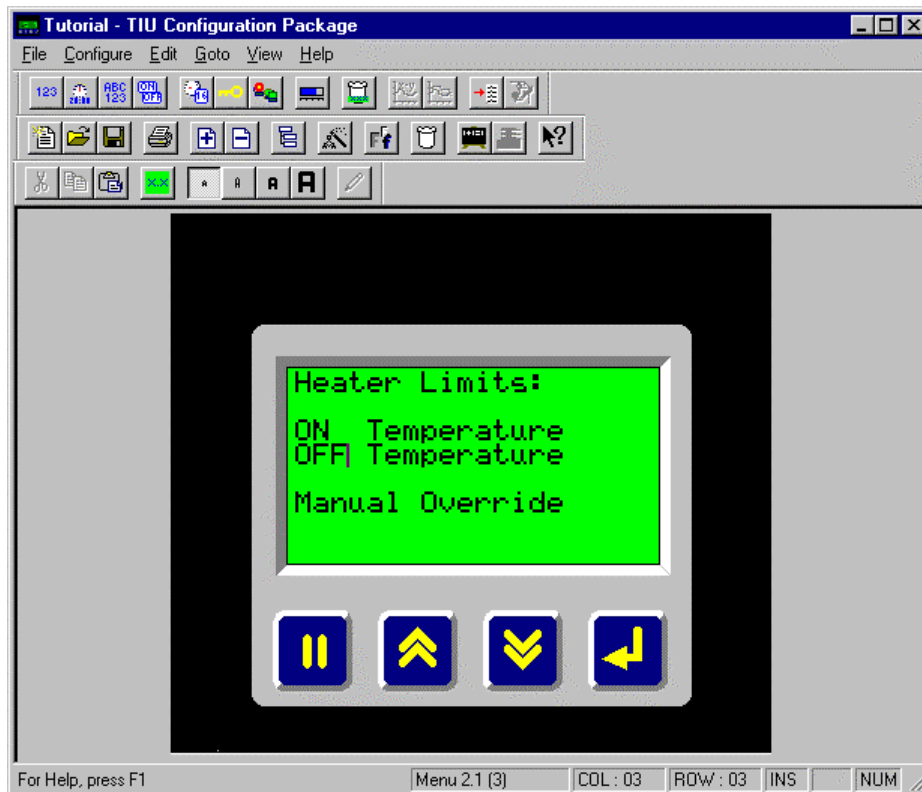


Figure 7.4 – Sub-Menu Page 2.1

3. Embed data one space to the right of "ON Temperature" by selecting **N**umeric for the **T**ype, WR-REGISTERS for the **D**ata **T**ype and **L**ocation 10. Under **F**ormat, select "XXX", **16-Bit U**nsigned and click on **E**dit **E**nable. Click **O**K.
4. Do the same as in step 3 for "OFF Temperature" but use **L**ocation 11.
5. On the sixth line, one space to the right of "Manual Override" embed a **B**it **S**tatus in WR-REGISTERS, **R**egister 10, **S**elect **T**oken **P**air Format, "OFF"/"ON", **B**it **N**umber 1, Click on **E**dit **E**nable. Click **O**K.

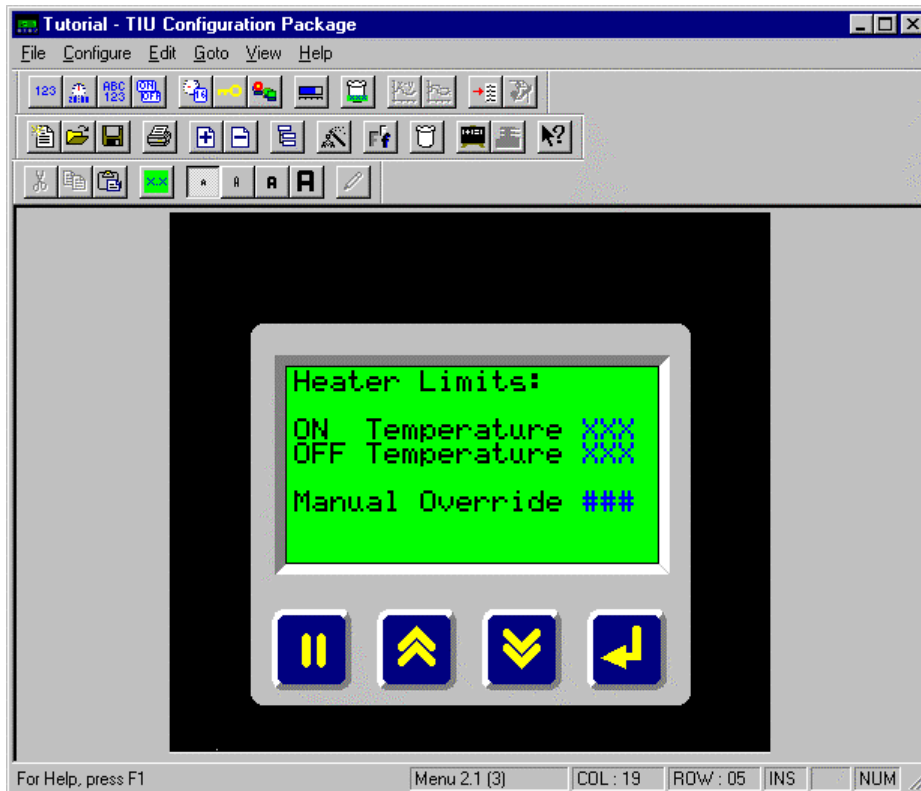


Figure 7.5 - Sub-Menu Page 2.1

6. Highlight the display screen, and select **C**opy from the **E**dit menu. Select **N**ext Page from the **G**oto menu. Select **P**aste from the **E**dit Menu. Change the “Heater” to “Fan” and Fan ON and OFF temperature registers to 20 and 21, respectively. Change the **B**it Number to 1 for the embedded data beside Manual Override.
7. Return to the parent menu by selecting **P**arent Menu from the **G**oto menu.

Under the **F**ile menu, you can **S**ave Project, then **D**ownload Project.
The Screen appears as in Figure 7.5.

7.3.1 To Enter A Sub-Menu On the OS:

1. To go into a sub-menu from the main menu, press the **P**ause key and the **D**own key at the same time.
2. To edit the data, press the **P**ause key. Press the **D**own key to decrement the data, the **U**p key to increment the data and the **E**nter key to enter the data.
3. Press the **P**ause key and the **U**p key to return to the parent menu or the **D**own key to go to the next sub-menu page.

7.4 Password-Protected Sub-Menus

7.4.1 Scope

This tutorial section of the manual covers how to create password-protected sub-menus.

Example: Continuing from the example in 7.2, one sub-menu is set up for the heater and another for the fan. Each sub-menu sets the temperature (within the furnace) at which the heater or fan turns ON/OFF. This is the same as the example in 7.3 except that the sub-menus are now password protected.

1. Create a new menu page by selecting **Insert Page** from the **Edit** menu.
2. Enter the text, as shown in Figure 7.6.

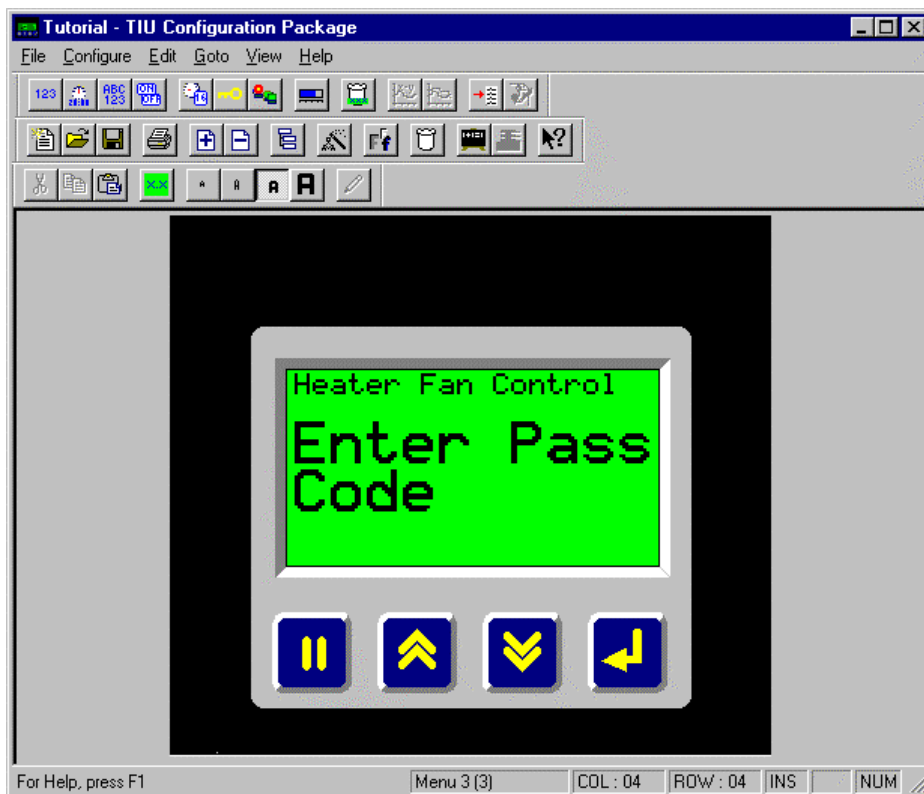


Figure 7.6 - Password Enter Screen

3. Place the cursor one space to the right of "CODE" and select **Embedded Data** from the **Edit** menu. Select **Password** for the **Type**. Click OK. Four question marks should appear beside the word "CODE".
4. Go to menu page 3. Select the **Modify SubMenu Properties**, and choose 2 for the **Number of Pages**. Check the **Password Protect** box, and enter a **Password** of "1234". Click OK. The bottom middle cell should display Menu Page 3.1 (indicating a sub-menu).
5. Follow steps 2 through 8 in 9.3.
6. **Save** and **Download Project** to the OS.

The resulting display screen on the OS appears as the screen shown in Figure 7.7 (with a code of 0000).

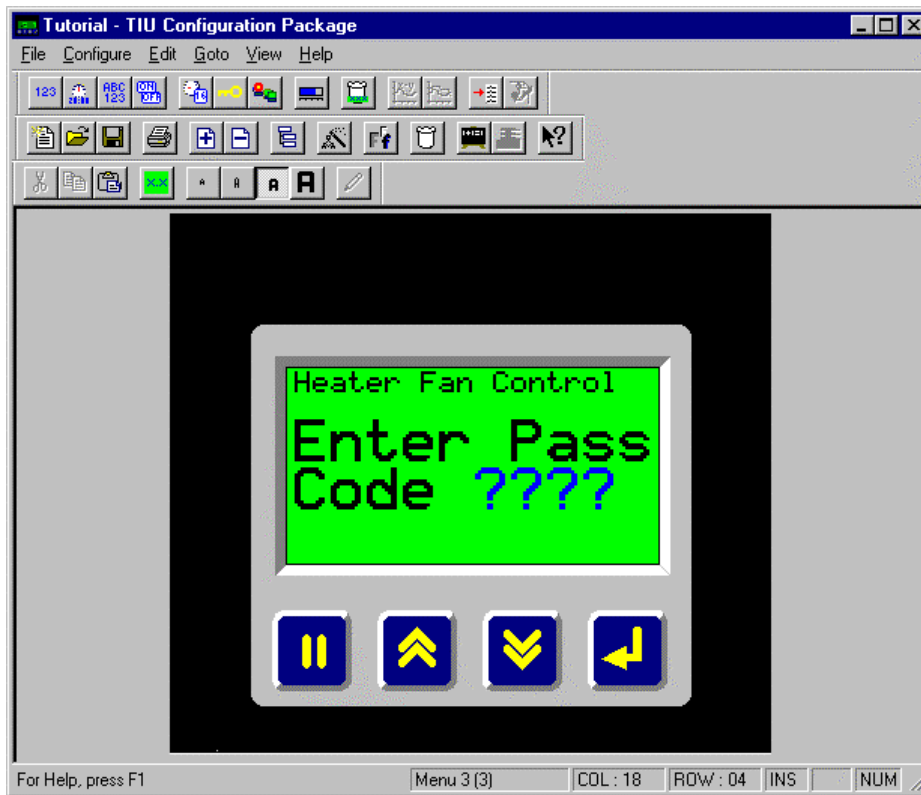


Figure 7.7 - Password Enter Screen

7.4.2 *To Enter the Sub-Menu:*

1. Press the **Pause** key to edit the Pass Code.
2. Press the **Up** key to increment the code, 1234 in this example (hold the key down for speed incrementing), the **Down** key to decrement the data and the **Enter** key to enter the data.
3. Press the **Pause** key and the **Down** key at the same time to select the sub-menu page. The sub-menu page is only selected if the Pass Code is correct.

7.4.3 *To Edit The data On The Sub-Menu Pages:*

1. Press the **Pause** key to select the field to edit.
2. Press the **Up** key to toggle or increment the field. Press the **Down** key to toggle or decrement the field. Press the **Enter** key to send the value to the PLC.
3. Press the **Pause** key to select the next field to edit.
4. Press the **Pause** key and the **Up** key at the same time to return to the parent menu.

7.5 Status

7.5.1 Scope

The OS can display STATUS information. For example, a status page can be displayed as COILS change (in real-time) in your PLC, i.e., the first Coil displays the first Status page, the second coil the second page and so on.

Status messages can have up to eight embedded data values per page. Up to 300 total pages are available split between Status, Alarms and Menu pages.

Two different modes are available for configuring status pages. These modes are the *Bit Mode* and the *Direct Mode*.

- *Direct Mode* reads only one register as a word from the PLC for the status page. If the value in this register is **zero** or **greater than the number of configured status pages in the system**, the main menu screen is displayed. Otherwise, the appropriate status screen is called up.
- *Bit Mode* works essentially the same, except that the screens are controlled by discrete bits instead of the full word register values.

NOTE: Status pages are only displayed when **MENU PAGE 1** is selected.

Example: The following example involves the OS connected to a GE Fanuc 90-30 PLC. It is applicable to any of the supported automation equipment (see 7.3) with substitutions made for the specific registering nomenclature, i.e., %Q is a discrete bit output. It is assumed the PLC is properly configured, the OS is properly connected to the PLC, both are powered up, and the **CBREEZE** software, TSW232, is running on the PC.

1. Select **Communication Settings** from the **Configure** menu. Select the automation equipment type you are using. For the example here, a "GE Series 90 SNP protocol" is being used. Click **OK**.
2. Insert a menu page after Menu Page 1 (refer to 7.2 for instructions). Place the cursor at the left on the first line. Click the double height icon. Type "Discrete Outputs:"
3. On the third line, type "Q1:". Click on the Embed Icon. Select **Bit Status** from **Type**; discrete output (in this example %Q) from **Data Type**; **Location 1**; leave **Token Pair** as "**OFF**"/"**ON**" and click **Edit Enable**. Click **OK**. See Figure 7.8.
4. Do the same for Q2, Q3 and Q4 on lines 4, 5 and 6, incrementing the Bit Number by one. These discrete outputs will simulate coils. Menu Page 2(2) should be the same as Figure 7.9.

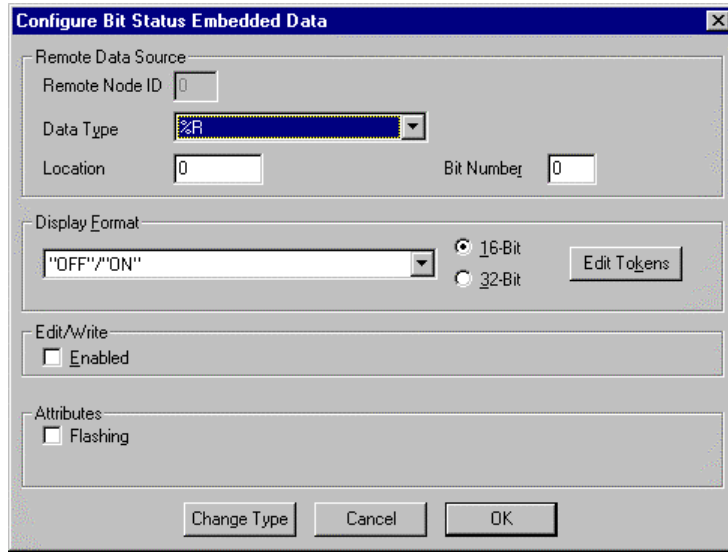


Figure 7.8 – Configure Embedded Data Box

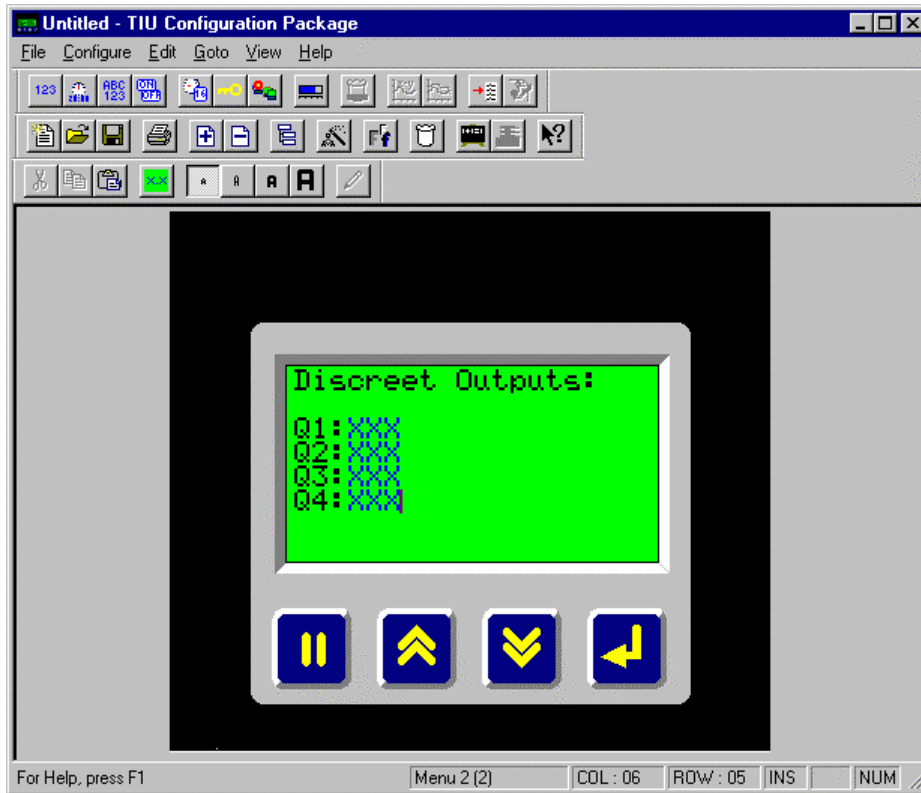


Figure 7.9 – Menu Page 2(2)

From **Configure**, choose **Status**. Click **Direct Mode**. From **Data Type** choose discrete output (%Q in this example); **Block Start** equals 1. The **Number of Status Pages** equals 4. Click **OK**.

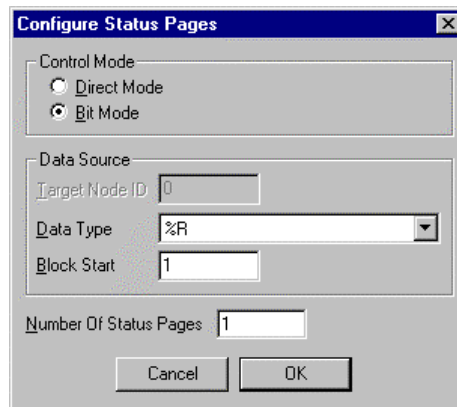


Figure 7.10 – Configure Status Pages

From **View**, choose **Status**. This displays the first of four status pages. On the third line, delete what is there and type “Status Page:” on the fourth line, click on the x4 icon and type “1” in the centre of the line. Status Page 1 appears as the screen in Figure 7.11. Highlight display screen, click **Edit** and **Copy**.

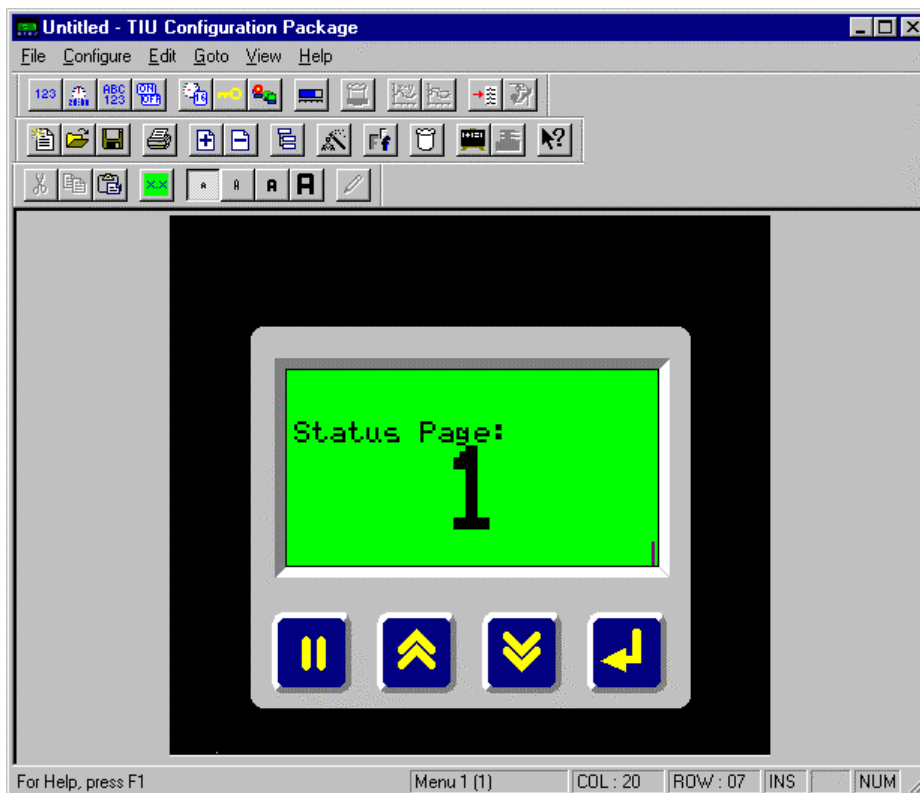


Figure 7.11 – Configure Status Pages

Click the down arrow icon on the project software to get to Status Page 2 of 4. Delete what is on the display screen, then from **Edit**, choose **Paste Page**. Change the "1" on line four to a "2." Do the same for pages 3 and 4.

From **File**, choose **Download Project**

On the OS, press the DOWN key to get to the Discrete Output page (as in Figure 7.8). Press the PAUSE key the toggle Q0: ON by pressing the UP key and ENTER key. Press the PAUSE key until nothing is highlighted (three times).

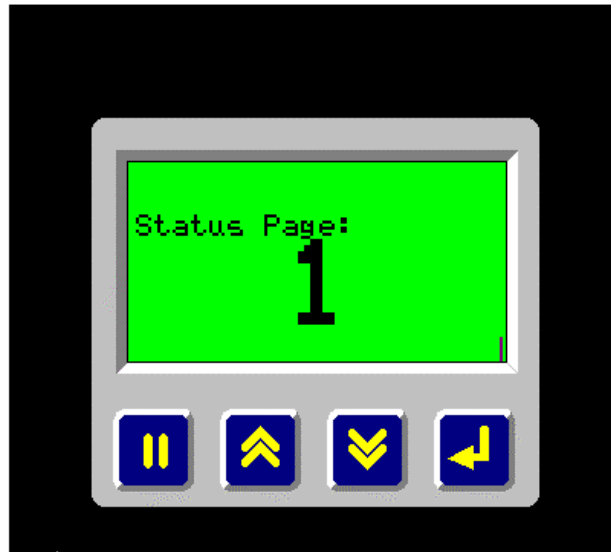


Figure 7.12 – Status Page 0

Press the UP key. The page shown in Figure 7.12 should be displayed.

Note: Status pages are only displayed from Menu Page 1.

5. Press the DOWN key and return to the Discrete Outputs page. Toggle Q1:OFF and Q3:ON. Return to Menu Page 1 by pressing the UP key. Now Status Page 4 is displayed. This is because Direct Mode is selected and the register is being read as a word, i.e., 0100 binary = 4.
6. Toggle Q1: ON, Q2: ON, Q3: OFF and Q4: OFF. Now Status screen 3 is displayed (0110B=3).
7. Toggle Q4: ON and all the other OFF. Now a screen with "Default Menu Screen" written on the second line is displayed. The OS is looking for Status Page 8 (1000B = 8), which does not exist, so the default screen is displayed.
8. In the **CBREEZE** software, choose **Status** from **Configure**. Click on **Bit Mode**. Click **OK**. Download the project to the OS.
9. Now Status Page 4 is displayed. In Bit Mode, the OS reads the register as discrete bits, not as a word, i.e., 1000 triggers Status Page 4, 0100 triggers Status Page 3, etc.

7.6 Alarms

7.6.1 Scope

The OS can display ALARM information as BITS change in your PLC (real-time). The active alarms can be accepted and then SCROLLED through. Up to 300 total pages are available split between Alarms, Status and Menu pages.

The OS also has an Alarm Acknowledge Table. This feature allows a set of bits to be written back to the PLC to indicate alarms that have been accepted by the user, but are still "ON" in the PLC table. These bits are in the same format as the "incoming" alarm bits. The acknowledgement bits are set when an alarm has been acknowledged, provided that the corresponding bit is still active in the alarm table. The acknowledgement bit is cleared when the corresponding alarm bit is cleared. Click the **Enable** box to use the Alarm Acknowledge Table.

Example: The TIU100 or 110 is connected to a GE Fanuc 90-30 PLC. Register %R20, bits 1, 2, 3 and 4 are the alarms. Register %R21, bits 1, 2, 3 and 4 is the acknowledgement table. The instructions below are a tutorial of how to use the Alarms on the OS.

1. Select **Alarms** from the **Configure** menu.

Figure 7.13 – Configure Alarm Box

2. Set the **Data Type** to %R. Enter the location of the **Block Start** as 20.
3. Enter the number of alarm pages in the **Number Of Alarms** box (4 for example). If the number of alarms is greater than 16, then the next PLC register is read.
4. Check the **Acknowledgement Table Enable** box. Set **Data Type** to %R and **Block Start** to 21. Click **OK**.
5. Insert a page (Page 2) after Page 1. Go to page 2. On the second line type "Alarm:" and embed %R20 beside. Make the embedded %R20 field **Numeric**, two digits and **Edit Enabled** with a **Range Maximum** of 15. This field acts as the alarms.
6. On the fourth line, type "Acknwldg Table:" and embed %R21 beside. Make the embedded %R22 field **Numeric** and two digits. This field holds the Acknowledgement table.
7. Select **Alarms** from the **View** menu. The bar at the bottom displays the alarm page selected.

The next alarm page can be selected by clicking the **Down** key or by selecting **Next Page** from the **Goto** menu. The previous alarm page can be selected by clicking the **Up** key or by selecting **Previous Page** from the **Goto** menu.

8. Enter text in Figure 7.14.

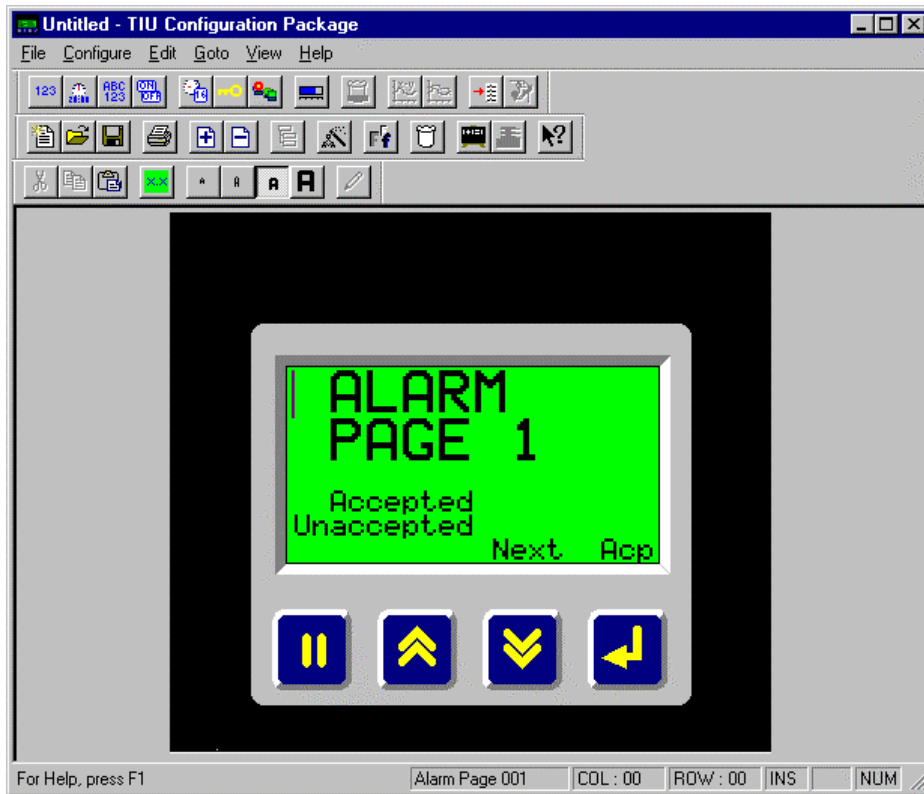


Figure 7.14 - Alarm Page 1 Screen

9. Place the cursor beside either "ACCEPTED" OR "UNACCEPTED" and select **Embedded Data** from the **Edit** menu or click the embedded data icon (X.X).
10. Select **System Variable** under **Type** and **XXX Accepted Alarms** or **XXX Unaccepted Alarms** under **Select System Variable** in the **Format** section.
11. Block the entire page. From the **Edit** menu, select **Copy** (or type <Ctrl-C>).
12. Page down to Alarm Page 2 of 4 using **Next Page** from the **Goto** menu. Paste Page 1 to Page 2 using **Paste** from the **Edit** menu (or <Ctrl-V>). Do the same for alarm page 3 and 4.

13. **Download Project** to the OS. Put your PLC in "RUN" mode.

On the OS:

Scenario 1: energise alarm 1. Go to page 2. Select the field beside "Alarm" by pressing the **Pause** key. Change the value to 1 and press the **Enter** key.

Action: Alarm Page 1 is displayed. The user presses **Enter**. The alarm page goes away and "Acknwldg Table:" (%R21) equals 1 indicating alarm 1 has been acknowledged.

Scenario 2: energise alarm 3. One page 2, change the Alarm field to 0, press **Enter**. The "Acknwldg Table:" field returns to 0 as well. Set the "Alarm" field to 4 (the OS read discrete bits for the alarms, so 0100 binary, i.e., bit 3 high equals 4 decimal).

Action: Alarm Page 3 is displayed. The user presses **Enter**. The alarm page goes away and "Acknwldg Table:" (%R21) equals 4 (i.e., bit 3 is high) indicating alarm 3 has been acknowledged.

Scenario 3: energise alarms 1, 2 and 3. One page 2, change the Alarm field to 0, press **Enter**. The "Acknwldg Table:" field returns to 0 as well. Set the "Alarm" field to 7 (the OS read discrete bits for the alarms, so 0111 binary equals 7 decimal).

Action:

- a. Alarm pages 1, 2 and 3 are active. Alarm page 1 is displayed as the first alarm. Until any alarms are accepted, the **Alarms Accepted** reads **000** and the **Alarms Unaccepted** reads **003**.
- b. The next Active alarm page can be selected by pressing the **Down** key on the OS. The last Active alarm can be selected by pressing the **Up** key on the OS.
- c. The **Active Unaccepted Alarms** can be accepted by pressing the **Enter** key on the OS. Only one alarm is accepted at a time. Once an alarm is accepted, the next alarm is displayed. Accept all 3 alarms.

Go to page 1. **Accepted Active Alarms** can be recalled by pressing the **Enter** key. **Accepted Active Alarms** are scrolled through with the **Up** key and the **Down** keys on the OS. Pressing the **Enter** key again returns display to page 1.

Note: Active Unaccepted alarms are displayed as a priority on any page.
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NOTES

CHAPTER 8: GRAPHIC EDITOR

8.1 Scope

The TIU Graphic editor is designed to be a simple Drawing and Graphic Editor to be used with the TIU20X. The TIU20X can have 2 types of pages, a **Text Page** and a **Graphic Page**. The text page works similarly to the menu pages on the TIU10X/11X. On Graphic pages, as well as all the features of the text page, also includes many other graphical features, such as; Shapes with 3 different backgrounds, bit maps and bit map animation.

All features are designed to be intuitive to the experienced user of Windows™ type applications. The following paragraphs describe most of the features available, however hopefully the user will find the software easy to use with some experimentation.

8.2 Draw Mode

Select a drawing mode by clicking on the appropriate button on the **Shapes Toolbar**, by choosing **Setting/Draw Mode** from the main menu. Before drawing the object choose the **Background Fill** (this maybe changed afterwards).

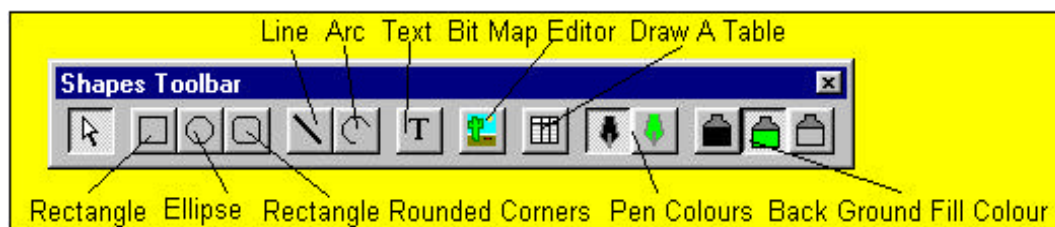


Figure 8.1 – The Shapes Toolbar

8.2.1 Selector



The selector tool may be used to select objects or groups of objects already created. Select an object by clicking on any part of the object. Set the properties of an object by double clicking on the object. To select all objects click Edit/Select All.

8.2.2 Rectangle



1. Select **Rectangle Draw Mode**.
2. Select the background and pen colour.
3. Move to a corner of the desired rectangle. Click and hold the left mouse button.
4. Drag the mouse to where the bottom right hand corner is to be located.
5. The **Draw Mode** returns to **Selector** as default
6. To edit the size of the rectangle click on the object, then click on one of the black dots around the object. Drag this dot around on the screen and the rectangle will change size automatically.

8.2.3 *Ellipse*



1. Select **Ellipse Draw Mode**.
2. Select the background and pen colour.
3. Move to a corner of the desired ellipse. Click and hold the left mouse button.
4. Drag the mouse to where the bottom right hand corner is to be located.
5. The **Draw Mode** returns to **Selector** as default
6. To edit the size of the ellipse click on the object, then click on one of the black dots around the object. Drag this dot around on the screen and the ellipse will change size automatically.

8.2.4 *Rectangle with Round Corners*



1. Select **Rectangle with Rounded Corners Draw Mode**.
2. Select the background and pen colour.
3. Move to a corner of the desired rectangle. Click and hold the left mouse button.
4. The **Draw Mode** returns to **Selector** as default
5. To edit the size of the ellipse click on the object, then click on one of the black dots around the object. Drag this dot around on the screen and the ellipse will change size automatically.

8.2.5 *Line*



1. Select **Line Draw Mode**.
2. Select the background and pen colour.
3. Move to a corner of the desired line. Click and hold the left mouse button.
4. Drag the mouse to where the second point is to be located is to be located.
5. The **Draw Mode** returns to **Selector** as default
6. To edit the size of the line and shape click on the object, then click on one of the black dots around the object. Drag this dot around on the screen and the line will change size automatically.

8.2.6 *Arc*



1. Select **Arc Draw Mode**.
2. Select the background and pen colour.
3. Move to a corner of the desired arc. Click and hold the left mouse button.
4. Drag the mouse to where the bottom right hand corner is to be located.
5. The **Draw Mode** returns to **Selector** as default.
6. To edit the size of the arc and shape click on the object, then click on one of the black dots around the object. Drag this dot around on the screen and the arc will change size automatically.

8.2.7 *Text Mode*

1. Select **Text Mode**.
2. The background on text mode is by default transparent (This can be edited later).
3. Click on the screen, this will become the top left-hand corner of the text box.
4. Drag the mouse to where the bottom right hand corner is to be located.
5. The Set Text window opens (Fig 8.2)

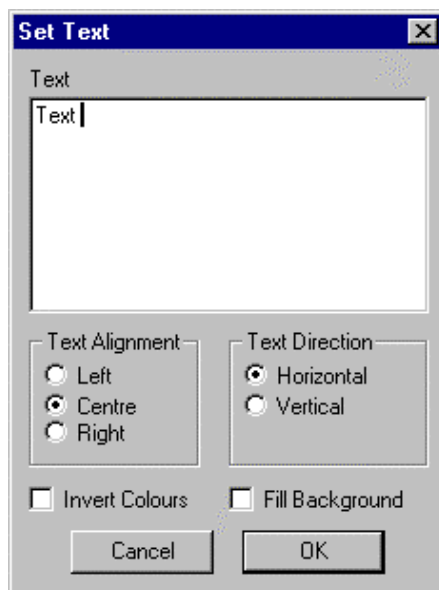


Figure 8.2 – Set Text

6. In the text box type the text to appear on screen.
7. The **Alignment** and **Text Direction** can be set, along with **Invert Colours** and **Fill Background**
8. The text is displayed in the original text area drawn, in an appropriate size font.
9. The **Draw Mode** returns to **Selector** as default
10. To edit the size of the font click on the object, then click on one of the black dots around the object. Drag this dot around on the screen and the font will change size automatically.

8.2.8 *Static Bitmap*

1. Select **Static Bitmap Mode**.
2. Click on the screen, this will become the top left-hand corner of the bitmap area.
3. Drag the mouse to where the bottom right hand corner is to be located. This will also set the size of the bitmap.

Note: once created the bitmap size can not be changed directly. To change the bitmap size, the bitmap image needs to be exported to a file, a new bitmap created the required size and the old bitmap image imported back from the file of the original bitmap image.

The Static Bitmap Editor opens (Fig 8.3)

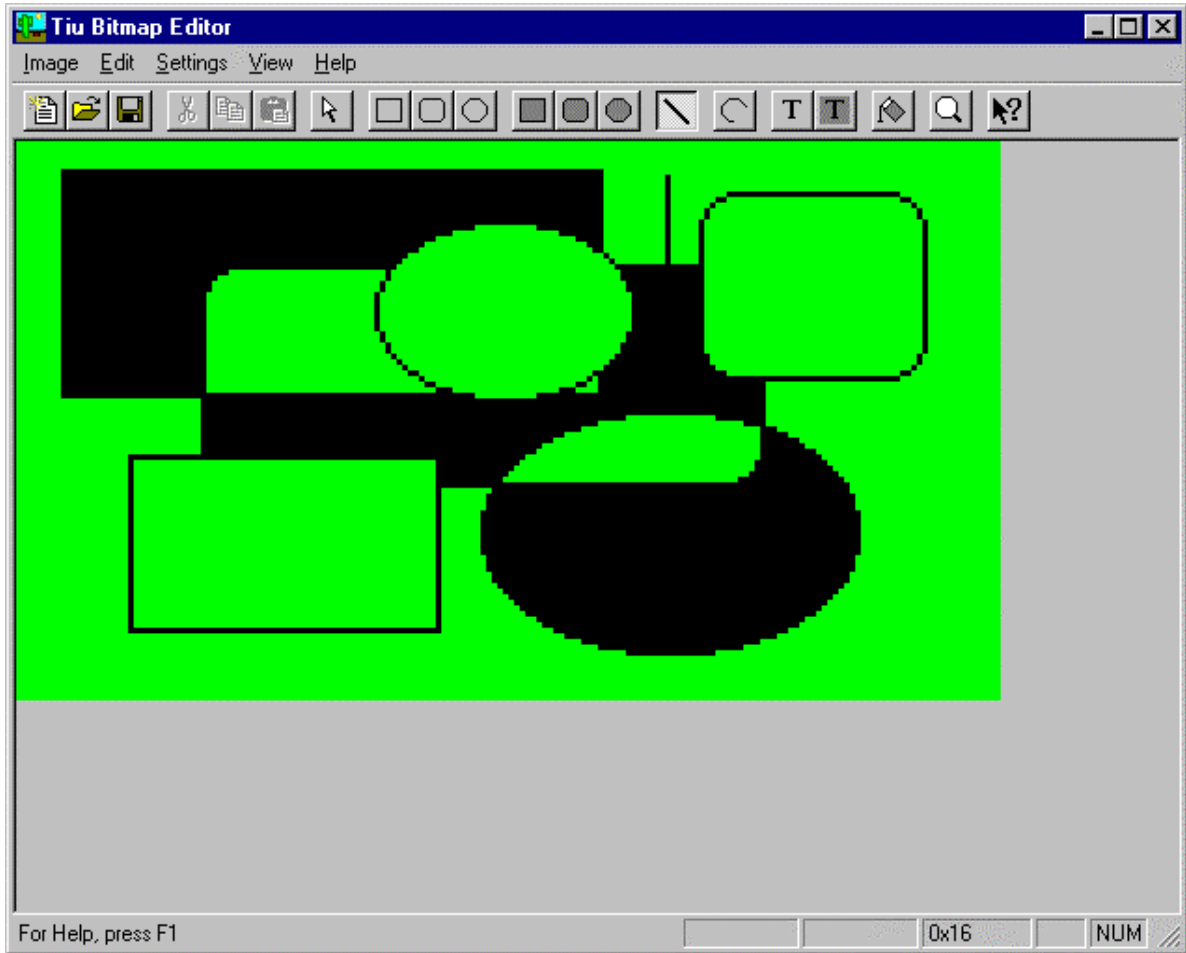




Figure 8.3 – Static Bitmap Editor

The tools available to draw shapes using the bitmap editor are very similar to the picture editor. The exceptions are as follows: -

- a. In Text mode only **Transparent** and **Opaque** are available for background fill. The font Size needs to set before beginning to type text, in **Setting/Font**.
- b. A Flood Fill Tool is available. Click the flood fill tool button  and then click in the area to be filled.
- c. Zoom option. Click the zoom tool button  then click on roughly the area to zoomed. A separate window appears displaying the zoomed area.
- d. Left mouse button acts as draw black on green, Right mouse button acts as draw green on black.

Note: The bitmap can be dynamically resized.

8.2.9 Table Mode



This tool allows you to easily draw the lines for a table and enter a Table Header. Once the table is created the number of rows and columns can not be edited directly. Boxes or lines may be added manually afterwards.

1. Select **Table Mode**.
2. Click on the screen, this will become the top left hand corner of the Table
3. Drag the mouse to where the bottom right hand corner is to be located. This sets the size of the table only.
4. The Table Creation windows open (Fig 8.4)

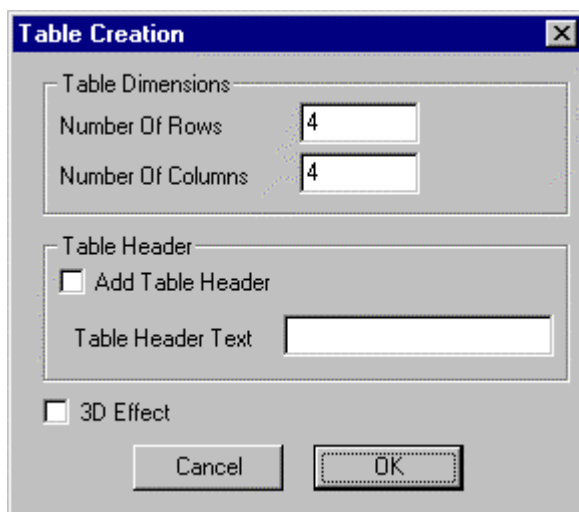


Figure 8.4 – Table Creation

5. Set the number of columns and rows you require.
6. Click on Add Table Header and enter Table Header Text if required.
7. The 3D effect adds an extra line on the right side of the table to give the effect of shadow.
8. Click OK to create table.
9. The table will then be drawn in the area specified at the beginning.
10. The **Draw Mode** returns to **Selector** as default.

8.3 Embedding Data on a Graphic Menu Page

8.3.1 Scope

The Embedded Data types are similar to the data types on text menu pages. All data types work the same as they do on a text page see Chapter on Embedded Data. The main difference is how the data type is embedded on the screen.



Figure 8.5 – Embedded Data

To Embed Data on the Screen

1. Choose the Embedded Data type you wish to embed.
2. Click on the screen, this will become the top left hand corner of the area the displayed data will take up.
3. The normal embedded data type window will appear. Set-up the embedded data type as required (See Chapter on Embedded Data).
4. Once the embedded data type is created it is displayed in the area defined earlier, in a font size appropriate to the size of the area.

8.3.2 Analogue Meter



Similar to the horizontal meter now added is a “Needle Meter” type Analogue Meter. It is embedded on the menu page similar to the Horizontal Meter.

To Embed an Analogue Meter on the Screen

1. Choose the Analogue Meter Data type.
2. Click on the screen, this will become the top left hand corner of the area the displayed data will take up.
3. The normal embedded data type window will appear. Set-up the embedded data type as required (See Chapter on Embedded Data).
4. Once the embedded data type is created it is displayed in the area defined earlier.

8.4 Animated Bit Map Selector

8.4.1 Scope

In a graphic page also includes the embedded data type Animated Bitmap Selector. The animated bitmap consists of a set of images, which are selected dependent on the value in a register. It is the pictorial equivalent of a text table.

8.4.2 To Embed a Animated Bitmap Selector



1. Choose the Animated Bitmap selector Embedded Data type.
2. Click on the screen, this will become the top left hand corner of the bitmap area.
3. Drag the mouse to where the bottom right hand corner is to be located.
4. The normal Animated Bitmap Selector data type window will appear (Fig 8.6).

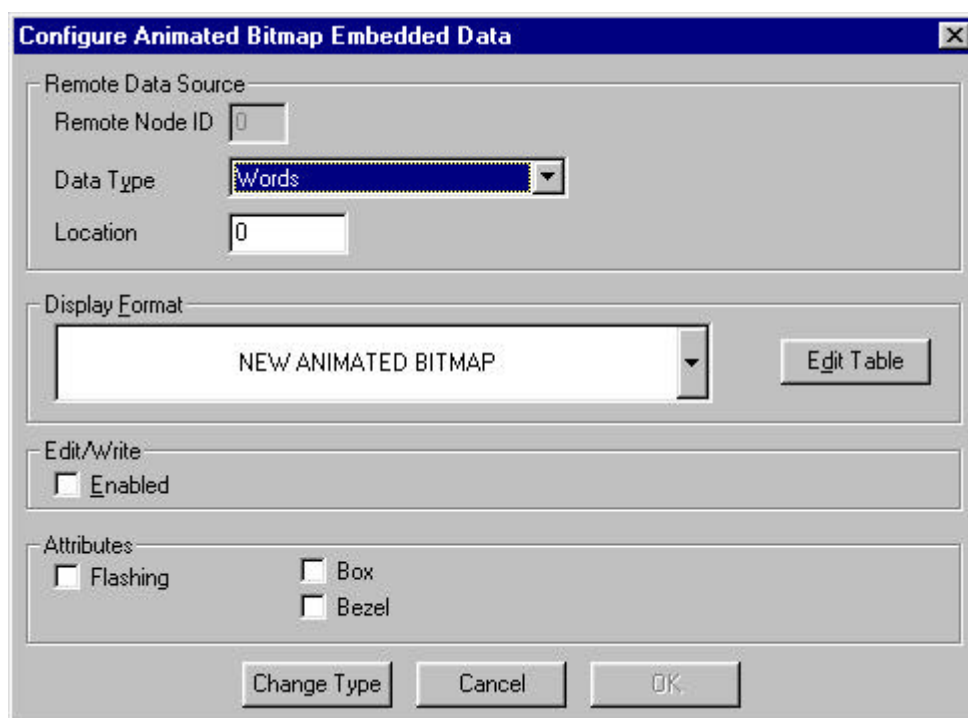


Figure 8.6 – Embedded Animated Bitmap Selector Windows

Chosse the **Data Type** and the **Location** of the control register of the bitmap selector.

5. Click on **NEW ANIMATED BITMAP**.
6. Click edit table and the size of the bitmap icon is displayed (Fig 8.7). The size of the bitmap icon can be changed now.

Note: Once created the bitmap size can not be changed directly. To change the bitmap size, the bitmap image needs to be exported to a file, a new bitmap created the required size and the old bitmap image imported back from the file of the original bitmap image.



Figure 8.7 – Set Bitmap Icon Size

7. Click OK to display the bitmap icon table.
8. A blank table will be displayed.
9. Click the **Add** button to display the Icon Editor (Fig 8.8).
10. Select a **Field ID** number (1-250).
11. Double click on the icon area in the centre of the screen. The Bitmap Editor opens the icon as a bitmap to be edited. The Icon is displayed with a checkered design as default. To **Clear** the bitmap choose **Image/Clear** from the main menu.
12. See Static Bitmap Editor for details on how to create graphic images in the bitmap icon.
13. Once the bitmap has been completed close the Bitmap Editor and the bitmap icon will appear in the Icon Editor.

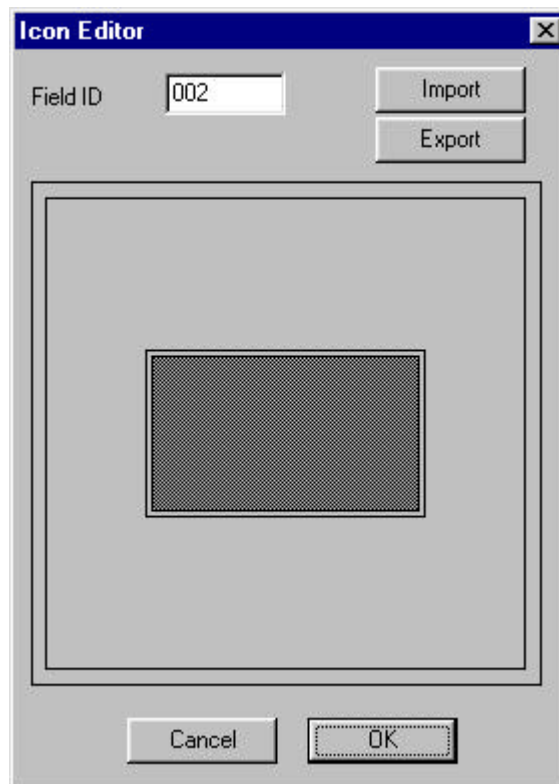


Figure 8.8 – Icon Editor

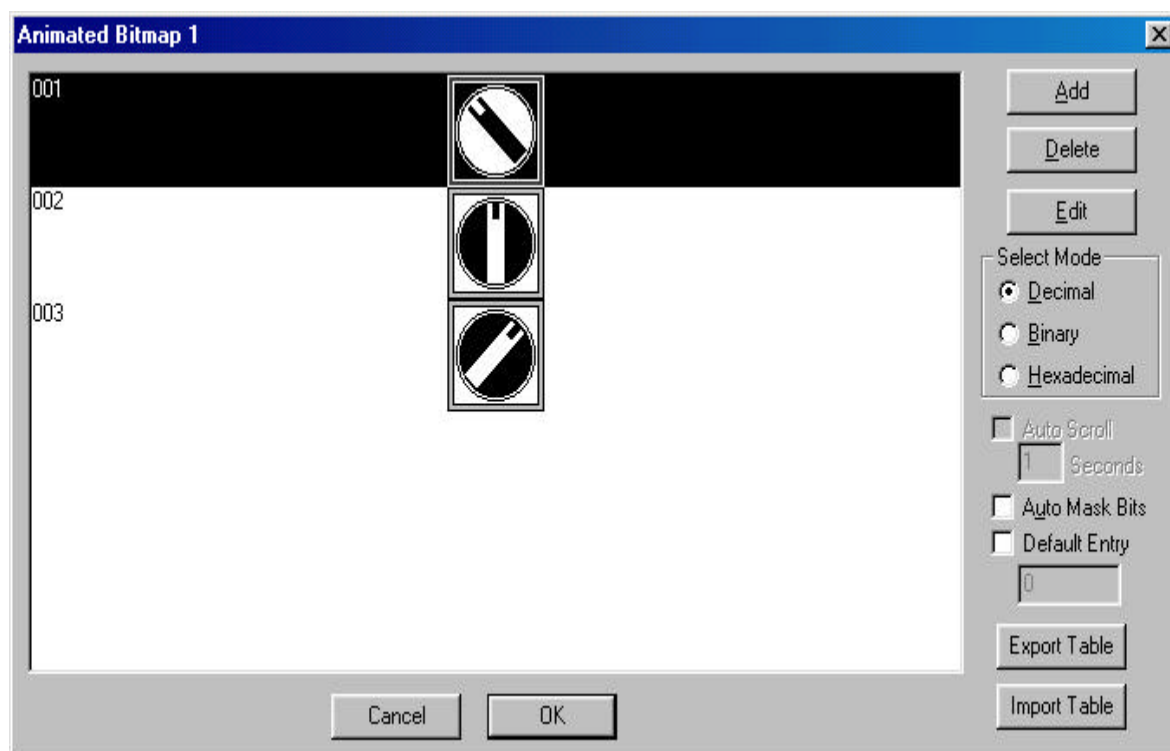


Figure 8.9 – Sample Animated Bitmap Selector Table

Bitmap tables can be called in 3 different modes, **Decimal**, **Binary** and **Hexadecimal**. This refers to the format of the data in the register calling the text table. Also in Binary mode multiple text table entries can be displayed the user can then scroll between these text table entries, or set the Auto Scroll option to let the TIU to automatically scroll between all the selected entries.

8.4.3 To Edit a Bitmap table from the TIU20X:

1. Select the text string field by pressing the **Pause** key.
2. Move up or down the list using the **Up** and **Down** keys.
3. Press the **Enter** key to select the desired text string.

8.4.4 To Export/Import a Bitmap Table

a. Export

1. Click the **Export** button.
2. Enter the location of the file.
3. Enter the name the file the text table is to be exported to.

b. Import

1. Click the **Import** button.
2. Click on the file to be imported.

8.4.5 *Default Bitmap Table ID Entries*

If an undefined value is entered into the Field ID table entry field (i.e., a value that has not been assigned in any bitmap table), then one of two different things happen.

1. If the user has assigned a value to the **Default Entry** in the Text Table box, then that entry number is displayed. This value is assigned by first checking the box next to **Default Entry**, then entering a number in the box below.
2. If the box is unchecked and a default entry has not been selected, then a blank bitmap is displayed.

8.4.6 Draw Attributes

The properties or **Attributes** of a shape can be set before or after the shape is drawn.

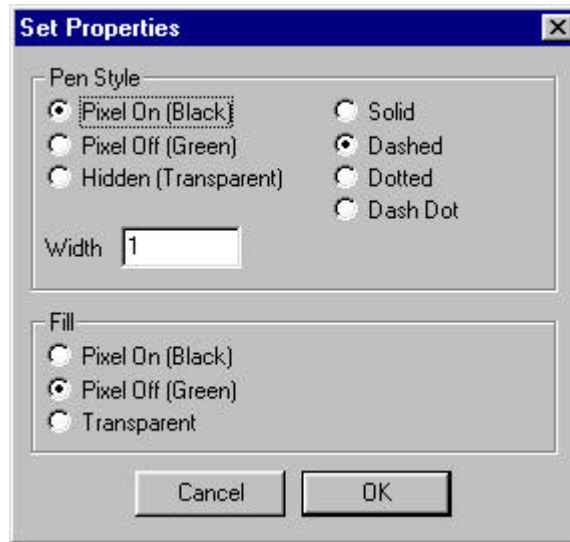


Figure 8.9 Draw Attributes

CHAPTER 9 : NETWORKING

9.1 Scope

The Operator Station (TIU) range supports 3 networking protocols. CsCAN, DeviceNet and Profibus. The DeviceNet/CsCAN Operator Station options are TIU101/111/201. The Profibus Operator Station options are TIU102/112/202. This chapter will explain how to configure the TIU units for network communication and the registers used.

9.2 CsCAN

The CsCAN network is based on the Bosch Control Area Network (CAN) and implements a protocol designed to take maximum advantage of the global data broadcasting capability of CAN. Using this network protocol, up to 64 Control Stations can be linked without repeaters, and up to 253 Control Stations can be linked by using 3 repeaters.

The available registers are;

Table 9.1 – CsCAN Network Registers

Type	Function	Description	Quantity	Retentive
%AIG	Network Analog Input	Specially defined analog inputs that come from the CsCan network protocol. Data is in words.	32	No
%AQG	Network Analog Output	Specially defined analog outputs that go to the CsCan network protocol. Data is in words.	16	No
%IG	Network Digital Input	Single bit registers that come from the CsCan network protocol.	64	No
%QG	Network Digital Output	Specially defined digital outputs that go to the CsCan network protocol.	64	No

9.2.1 Sending Data to the CsCAN Network

The TIU101/111/201 units contain a special set of registers called Global Network I/O, or simply Global I/O. Using the CsCan protocol these bits are automatically sent through the network to all other units on the network. Anyone unit can be made aware of the activities of any other unit on the network, and any one unit can send a signal to any or all other unit on the network.

The global 'I' registers contain an image of global 'Q' registers located in a different units connected to the network. The association between I registers and 'Q' registers is set at the destination unit.

Any 'I' register may be associated to one and only one 'Q' register, but that 'Q' register may be located in any other unit on the network. Any 'Q' register is broadcast on the network for any or all other units to use.

9.3 DeviceNet

9.3.1 DeviceNet Features Supported Using Operator Station Modules

It is important to determine the features that the Operator Station Modules support (when used in a DeviceNet network) *before* programming, configuring, and setting up the network.

9.3.2 Communication Method

Although the DeviceNet Specification provides for two methods of establishing communication, the Operator Station Modules implement only *one* of the methods, which is referred to as the **Predefined Master/Slave Connection Set**. This method provides communications typically seen in a Master/Slave relationship and uses a **DeviceNet Master/Slave** protocol.

The other method of communication is through the use of the **Unconnected Message Manager (UCMM)**. The Operator Station Modules do not currently support the UCMM method of communication.

9.3.3 *Message Class / Message Priority*

Both Explicit Messaging and I/O Connections are established using a message class known as **Message Group 2 Only**. In this message class, the message priority is determined solely by the network address of the individual nodes. The lower the node's address, the higher its priority.

9.3.4 *Types of Messages / Connections Supported*

The **Explicit Messaging** and **Polled Connection** features are supported. The following terms are defined per the DeviceNet Specification, Release (2.0), Volume I: DeviceNet Communication Model and Protocol.

Explicit Messaging: - Used in typical request/response-oriented networks. Explicit Messages are used to command the performance of a particular task and to report the results of performing the task.

Polled Connection: - Responsible for receiving the Master's Poll Command and returning the associated response.

Explicit Messaging is used for the transfer of small amounts of infrequently accessed data such as configurations or tuning.

The Polled Connection is used for data that is sent automatically between the slave and the DeviceNet Master (Scanner) without intervention. The DeviceNet Master sends a **Polled Command** to a DeviceNet Slave. Attached to the polled command is 32 words of data for the TIU to use. The DeviceNet Slave produces or sends a **Polled Response** back to the DeviceNet Master. (The **Polled Response** consists of 32 words of data.) All Operator Station modules monitor (or eavesdrop on) **Polled Response** messages on the network.

The Operator Station Modules do not currently support **Bit Strobed**, **Cyclic** and **Change-of-State** connections.

9.3.5 *Additional Feature available in Operator Station Modules*

The Horner extension of the DeviceNet protocol known as **Polled Snooping** is also provided. Polled Snooping is totally non-intrusive to DeviceNet traffic. The Operator Station Modules monitor (or eavesdrop on) all **Polled Response** messages on the network. The data in the **Polled Responses** can be used by the **CBREEZE** project in each of the Operator Station Modules. Their projects can make decisions based on the snooped data.

9.3.6 *DeviceNet Requirements*

The following requirements must be met to integrate Operator Station Modules into a DeviceNet network and to establish communications with a DeviceNet Master.

a. DeviceNet Node Address (MACID)

In order to communicate with a DeviceNet Master, a unique MACID must be assigned to each node on the network. Valid DeviceNet MACIDs are within the range of 0 - 63 inclusive (at least one master and 63 slave and/or master nodes).

b. DeviceNet Baud Rate

Each device connected to a DeviceNet network must be configured to operate at the same baud rate. The baud rate for the Operator Station Modules can be selected to be 125K, 250K or 500Kbaud. All devices on a DeviceNet must be configured to operate at the same baud rate.

The available registers are;

Type	Function	Description	Quantity	Retentive
%AIG	Network Analog Input	Specially defined analog inputs that come from the DeviceNet network protocol. Data is in words.	32	No
%AQQ	Network Analog Output	Specially defined analog outputs that go to the DeviceNet network protocol. Data is in words.	32	No

9.3.7 Horner Extension Snooped Slaves

Most controllers that support DeviceNet slave networking communication allow snooping. Snooping allows the controller to gather data from other slaves on a network as the master polls that slave device. Polled data sent from the slave to the master can be in one of two formats depending on the amount of data the slave needs to send to the master.

9.4 Profibus

Available Registers

Type	Function	Description	Quantity	Retentive
%AIG	Network Analog Input	Analog inputs. Data is in words.	32	No
%AQQ	Network Analog Output	Analog outputs. Data is in words.	32	No
%IG	Network Digital Input	Single bit input register.	64	No
%QG	Network Digital Output	Single bit output register	64	No

The Profibus utilise a Master-Slave type of communication with the TIUXX2 functioning as the slave device. Up to 32 devices (Master or Slave) can be connected in one segment without using repeaters or up to 125 devices can be connected using repeaters.

9.5 Configuring the TIU10X/11X/20X for Network Communication

9.5.1 Scope

The following procedure configures the Operator Station (TIU) to communicate on a CsCAN, DeviceNet or Profibus network

1. Select the terminal type from the edit menu.

Part Number	TIU Series	Network Type
TIU101	TIU100	CsCAN
TIU102	TIU100	Profibus
TIU103	TIU100	DeviceNet
TIU111	TIU110	CsCAN
TIU112	TIU110	Profibus
TIU113	TIU110	DeviceNet
TIU201	TIU200	CsCAN
TIU202	TIU200	Profibus
TIU203	TIU200	DeviceNet

2. From the main screen of the **CBREEZE** software select **Network** from the drop down **Configuration** menu.
3. The Configure Network Screen will be displayed for the appropriate terminal type chosen in step 1.

4. From the **Configure Network** screen select the node ID and the appropriate network protocol. If CsCAN terminal type TIUXX1 is chosen then network protocol CsCAN is displayed. If Profibus terminal type TIUXX2 is chosen then network protocol Profibus is displayed. If CsCAN terminal type TIUXX3 is chosen then network protocol DeviceNet is displayed
 5. Click On Enable Network.
 6. Set the Node ID for the Terminal in the specified network.
 7. Set the required Network Baud rate. For Profibus this is Auto Sensing.
- The available Network Registers are displayed under Register Type Tabs on the Configure Network Screen.

9.6 Programming Network Input

9.6.1 Network Input Registers IG & AIG

In terms of programming the Operator Station to receive data from the network, all input register are treated as Internal Registers on the terminal and are none retentive.

9.6.2 Configure Network Input Registers

To configure any network-input register, simply specify the source of the data.

Profibus

Because Profibus is a Master-Slave type communication only, i.e. no slave can communicate with another slave, the source of the data will always be the master device.

CsCAN

In CsCAN data is transmitted globally, therefore any other node on the network can be the source of the data.

DeviceNet

In the DeviceNet network the master device decides what data is sent to each slave device. However with the Horner Extension to the DeviceNet protocol, which allows each specified Snooped slave device to snoop on other specified Snooped slave devices. Therefore in DeviceNet network the master or any slave device that is specified as a Snooped Node can be the source of the data.

9.6.3 Configuring Network Input Registers for all Network Protocols

1. Choose the register type from the Configure Network window. Only available registers will be displayed
2. Double click the specific register to be configured.
3. The Configure Network Input window appears.
4. In the Data Source Box click the enable tick box.
5. Enter the node ID and register number of the data source.

This procedure will map the output registers from the data source into the input register of the Operator Station. This data can then be sent to registers on a device connected to the serial port of the Operator Station.

1. Click on the enable tick box in the Data Destination box.
2. Select the register type and the register location.
3. Chose the format of the data to be stored as.

If Transmission Timeout is not chosen then the data will be sent to the serial device every time the Input Register is updated. Else the frequency of which the data is sent to the serial device may be specified in 100 msec.

9.7 Programming Network Output

9.7.1 Network Output Registers QG & AQG

In terms of programming the Operator Station to send data to the network, all output register are treated as Internal Registers on the terminal and are none retentive. The value contained in this Internal Register is sent to the network. The network then reads this value the frequency of which depends on the type of network and how the network is set-up.

9.7.2 Destination of Output Registers

Profibus

Because Profibus is a Master-Slave type communication only, i.e. no slave can communicate with another slave, the destination of the data will always be the master device.

CsCAN

In CsCAN data is transmitted globally, therefore the destination of the data depends on which node wants the data, and is configured at the receiving node end.

DeviceNet

In the DeviceNet network the master device decides what data is sent/received from each slave device. However with the Horner Extension to the DeviceNet protocol, which allows each specified Snooped slave device to snoop on other specified Snooped slave devices. Therefore in DeviceNet network the master or any device that is specified as a Snooped Node can be the destination of the data.

9.7.3 Mapping Output Registers QG & AQG to a Serial Device.

All output registers maybe mapped to a device connected to the serial port of the Operator Station. From the Configure Network window chose the output register type to be mapped (QG or AQG). Double click the specific register to be mapped. The Configure Network Output appears.

Click the enable option.

Choose the register type from the list of available registers from the data type pull down menu.

Type in the Location of the specific register.

Choose the format the register is to be stored.

Type in the frequency the data is to be mapped in 100 msec.

NOTES

CHAPTER 10: MATHEMATICS**10.1 Scope**

The TIU10X/11X/20X now contains a Mathematic Interpreter. Up to 1024 lines of **Mathematic Statements** can be programmed into the terminal, and these can be split into function blocks which are called by the system as required. The function blocks are called on any of the following basis...

Table 15.1 – Call Methods	
Call Method	Description
Background Tasks	At regularly repeating intervals, definable down to 0.01 seconds
Scheduled Tasks	At a particular time (HH: MM) on specified days of the week
Function Key Presses	As function keys are pressed

10.2 System Registers

The available system registers are as follows: -

Table 15.2 – Register Names		
Description	Name	Available
Bit Input	SmartStack %I	Only if SmartStack Configured
Bit Output	SmartStack %Q	Only if SmartStack Configured
Word Input	SmartStack %AI	Only if SmartStack Configured
Word Output	SmartStack %AQ	Only if SmartStack Configured
Internal Word Register	Internal %R	Only if Maths Configured
Internal System Register	Internal %SR	Only if Maths Configured
Internal Bit Register	Internal %M	Only if Maths Configured
Network Word Output	Network %AQ	Only if Network Configured
Network Word Input	Network %AI	Only if Network Configured
Network Bit Output	Network %Q	Only if Network Configured
Network Bit Input	Network %I	Only if Network Configured

The Internal System Registers available are as follows: -

Table 10.3 – System Registers		
Name	Read / Write	Description
%SR01	R/W	Contains the current page ID
%SR02	R	Contains the state of the up/down/pause/enter keys.
%SR03	R/W	Contains the Global PLC Network Address
%SR04	R/W	Contains the current password
%SR05	R	Current edit variable 0 = none being edited, 1 = first editable variable active, etc.
%SR11	R	Contains the RTC seconds
%SR12	R	Contains the RTC minutes
%SR13	R	Contains the RTC hours
%SR14	R	Contains the RTC date
%SR15	R	Contains the RTC month
%SR16	R	Contains the RTC year
%SR17	R	Contains the RTC number of days in current month
%SR18	R	Contains the RTC number of the day in the year (eg. 1 st February = 32)
%SR19	R	Contains the RTC day of week
%SR21	R	Contains number of accepted alarms
%SR22	R	Contains number of unaccepted alarms
%SR23	R/W	Contains the total number of attempts to the PLC (Writing any values resets all comms counters)
%SR24	R/W	Contains number of good comms transactions
%SR25	R/W	Contains number of bad comms transactions
%SR26	R/W	Contains number of no comms transactions
%SR31	R	Can Status
%SR32	R	Can Test Result
%SR33	R	Can Off Count

10.3 Maths Functions

Maths functions may be used for a variety of purposes.

1. Maintaining Internal Variables
2. Controlling Database Operations
3. Generating Alarms

10.4 Execution of Maths Functions

Maths functions are called by starting at a specified line. The lines are processed consecutively beginning at the start line until a line with a *END* marker is processed, or the end of the maths listing is reached. Control may be switched using a GOTO statement in the function block or using any of the conditional statements, which will jump to another line or END marker.

10.5 Mathedit Windows Application

To view and modify the contents of the Mathedit Application, click the mathematics icon from the tool bar



, or choose Maths from Configure in the main menu, the Mathedit Application window appears (Fig 10.1).

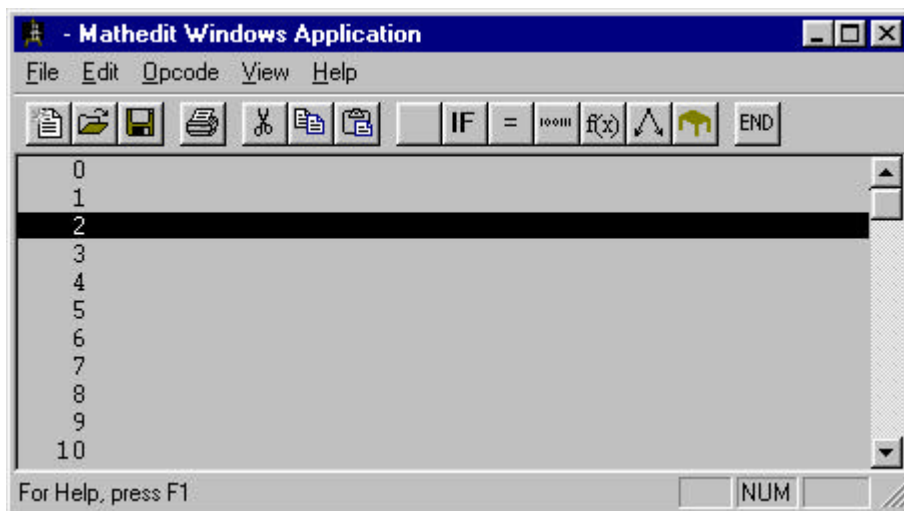










Figure 15.1 – Mathedit Application Window

10.6 Opcodes

The available operational statements are: -

- 1. No Operation 
- 2. Conditional 
- 3. Assignment 
- 4. Bit Operation 
- 5. Table Operation 
- 6. Function 
- 7. Control Flow 
- 8. Set End 

10.6.1 No Operation





This statement causes the line to do nothing. The statement shows as a blank line.

10.6.2 Conditional



This statement compares the contents of a local store register with either the contents of another local store register or a constant. After which an action is completed, depending on the result of the comparison.

The available Comparison Tests are:

- 1. Equal 
- 2. Not Equal 

- 3. Less Than <
- 4. Less Than or Equal <=
- 5. Greater Than or Equal >=
- 6. Greater Than >
- 7. And &
- 8. Or |

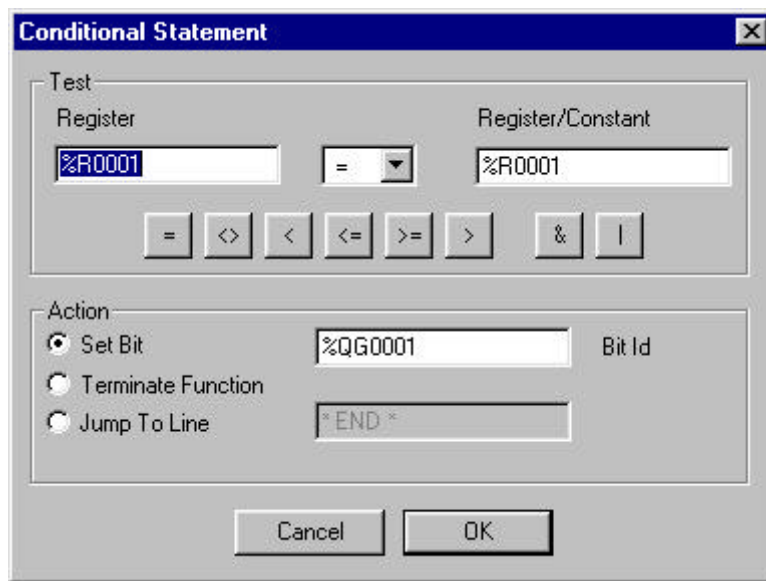


Figure 15.2 – Conditional Statement

Conditional Action

If the result of the test is true than the chosen action is executed.

Note: The **And** and **Or** statements are true if the result equals not zero.

- 1. Set Bit
Sets the bit in the specified Local Store Bit Register.
- 2. Terminate Function
Terminates the function. An **End** statement is put at the end of the line statement.
- 3. Jump To Line.
Jump to specified line number or **End**

10.6.3 Assignment



This statement assigns a value to the specified local register. The value of the register can be mathematically manipulated before storing it the local register.

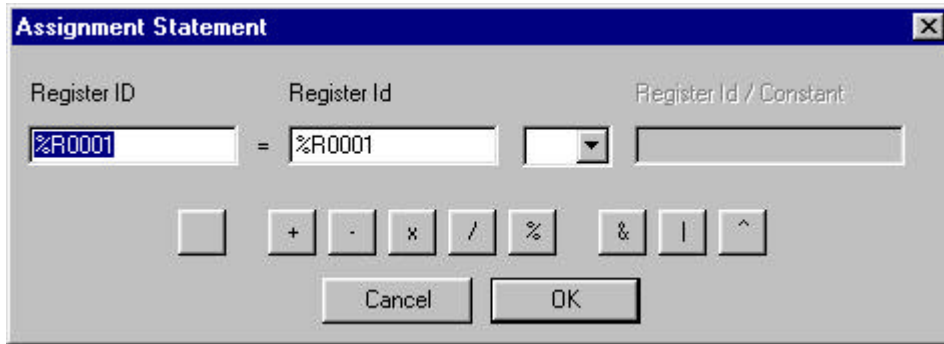


Figure 10.3 – Assignment Statement

The available mathematical functions are: -

1. Equal

This function makes one Register equal another register.

2. Plus

This function lets the programmer add the contents of a register to the contents of another register or constant and stores the result in the specified register.

3. Minus

This function lets the programmer subtract the contents of a register or constant from the contents of a register and stores in the result in the specified register.

4. Multiply

This function lets the programmer multiply the contents of a register by the contents of another register or constant and stores the result in the specified register.

5. Divide

This function lets the programmer divide the contents of a register by the contents of another register or constant and stores the result in the specified register.

6. Percentage

This function divides one integer register by the contents of another register or by a constant, and stores the remainder in the specified register.

E.g. register 100 contains 18


If %R101 = %R100 % 7 Then %R101 = Remainder(100 / 7) = 2.

7. And

This function lets the programmer AND the contents of a register with the contents of another register or constant and stores the result in the specified register.

8. Or 

This function lets the programmer OR the contents of a register with the contents of another register or constant and stores the result in the specified register.

9. Exclusive Or 

This function lets the programmer XOR the contents of a register with the contents of another register or constant and stores the result in the specified register.

Note: Indirection is allowed on the %R local registers, e.g. %R10 = %R(%R40) + %R(%41). If %R40 contain 100 and %R41 contains 11, then %R10 will be sum of the contents of %R100 and %R11.

10.6.4 Bit Operation



This operational statement can perform 4 different operations on a local bit register.

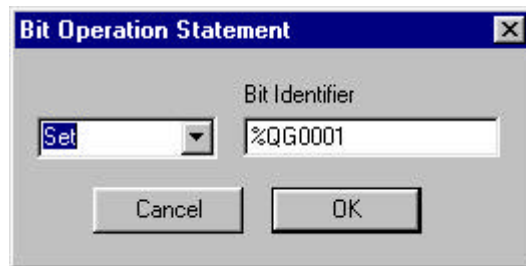


Figure 10.4 – Bit Operation Statement Window

1. Set

Changes the bit value to 1

2. Clear

Changes the bit value to 0

3. Invert

Changes the bit value to 1, if present value is 0, or changes the bit value to 0, if present value is 1.

4. Pulse

Sets the specified bit high for 1 second and clears it to go low.

10.6.5 Table Operation



This operation statement performs a number of operations on a specified table. As per figure 10.5 the table definition is defined as the number of local registers in the table beginning at the specified local register.

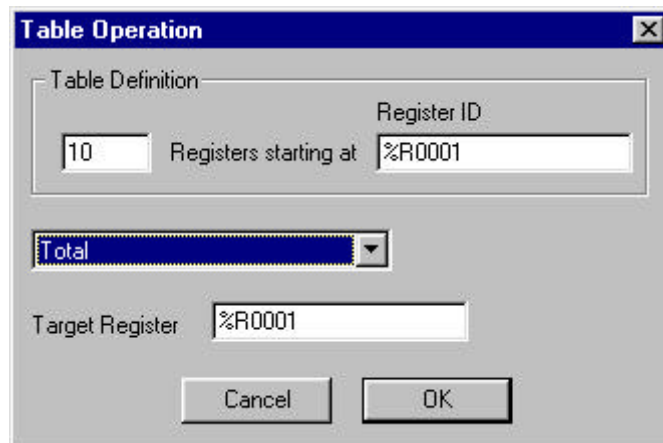


Figure 10.5 – Table Operation Window

The available operations are:

1. Total

This action sums the contents of the registers and stores the result in the target register.

2. Average

This action averages the contents of the registers and stores the result in the target register.

3. Maximum

This action searches the contents of the registers and stores the maximum value in the target register.

4. Minimum

This action searches the contents of the registers and stores the minimum value in the target register.

5. Move To

This action moves the contents of the registers in the table as a memory block, to a memory block beginning at the target register

6. Swap With

This action moves the contents of the registers in the table as a memory block, with a memory block beginning at the target register

7. Reset

This action resets the contents of each of the registers in the table to zero.

10.6.6 *Function*



This action performs a function on the contents of the specified action and stores the result in the same register or another specified register. The available functions are: -

Root

This function puts the square root of the contents of the first register in the second specified register.

ToBCD

This function converts the contents of the first register to Binary Coded Decimal and stores it in the second specified register.

FromBCD

This function converts the contents of the first register from Binary Coded Decimal and stores it in the second specified register.

10.6.7 *Control Flow*



This action allows the programmer to perform simple program flow commands within the mathematic function. The available commands are: -

1. Pause

This command allows the programmer to pause the mathematic function for a specified number of seconds.

2. Goto

This command allows the programmer to jump to a specified line number of the end of the function.

3. Gosub

This command is similar to the **Goto** command however when an **End** command is reached the program flow returns to line immediately after line where the Gosub command was executed.

10.6.8 *Set End*



This action denotes the end of a mathematic function.

10.7 Background Functions

The OS's background function facility allows the terminal to continually run up to 8 maths functions automatically, without operator intervention. These functions can be programmed to run repeatedly after a specified time interval or be executed once on initialisation of the terminal.

To program a background function, choose **Background Functions** from **Edit** menu, in the **Mathedit Application Window**. Figure 10.6 shows the background function set-up window.

Number	Enable	Restart Function	Frequency	Seconds	Unit	Call	Call Field
1:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	1
2:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	
3:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	
4:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	
5:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	
6:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	
7:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	
8:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Every	<input type="text"/>	Secs	Call	

Figure 10.6 – Background Function Set-up Window

10.7.1 To Program a Background Function

Enable one of the 8 background functions by clicking in the tick box next to the number of the background function.

1. Click **Restart Function** if the function is to be executed only on initialisation of the terminal.
2. In the **Seconds** field specify the time interval between executions of the function.
3. In the **Call** field, specify the function to be called, this is the line number where the function begins.

10.8 Schedule Functions

Scheduled Functions have been provided as a means of initiating functions on a time and day basis. There are 16 schedules available each of which specifies a time of day and day of the week at which a Maths Function is to be called.

To configure the scheduled functions for the TIU terminal select Scheduled Functions from the Edit menu.

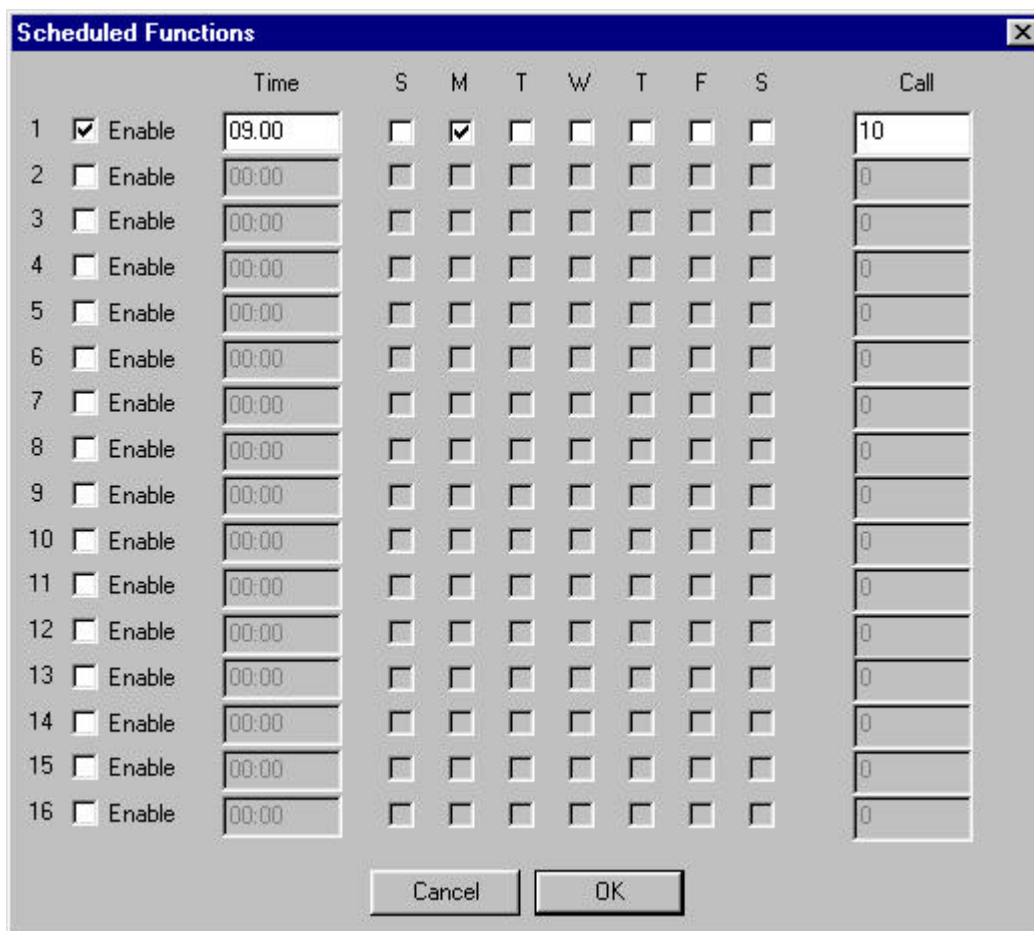


Figure 10.7 - Schedule Functions Window

10.8.1 To Set-Up a Schedule Function

1. Enable the schedule by clicking on the tick box corresponding to the schedule number.
2. In the **Time** enter the time of day at which the function is to be executed.
3. Click the day or days on which the function is to be executed.
4. In the **Call** field enter the mathematic function to be executed, this is the line number of the mathematic function.

10.9 Data Transfer Block

Local registers in the terminal can be mapped to registers in the automated equipment using the **Data Transfer Block** facility. The maths feature only allows internal data to be accessed. This is because it is not practical to continually fetch data from and send data to the AE as required whilst the maths is executing. In order to fetch data from the AE and Send data to the AE from internal registers it is possible to map blocks of data to and from the %R blocks to the AE. Data blocks may be read at a fixed interval

and data is written to the PLC whenever a value within the block changes. Maximum number of transfer blocks is 64.

10.9.1 To Add a Block Transfer

1. From the **Edit** menu choose **Data Transfer Block**.



Figure 10.8 – Data Transfer Block

2. Click on the **Add** button to add a Map Register Statement. Figure 10.9 illustrates the how the registers are mapped.
3. Enter the Data Type Register and Location of the AE registers.
4. Enter the block size or the number of registers to be mapped.
5. The registers maybe mapped in two directions, from the terminal to the AE or from AE to the terminal. Choose which transfer direction.
6. The **Period** is the time interval between data transfers. In the Period field enter how often the data is to be transferred.
7. Finally enter the first local register where the data is to be transferred to or transferred from.

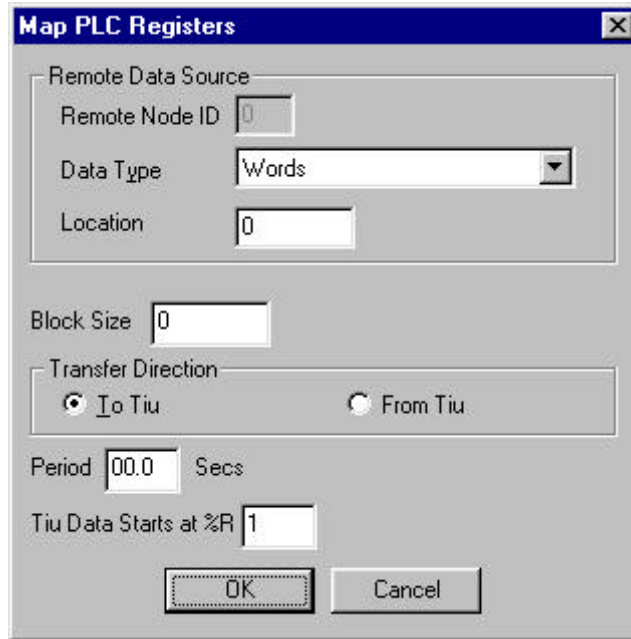


Figure 10.9 – Mapping PLC Registers and Local Registers

CHAPTER 11: SMARTSTACK ä

11.1 General

Now added to the TIU200 are the SmartStack™ modules from the OCS Range. The SmartStack system is a method of allowing I/O expansion on an HMI. A wide range of modules is available including Digital and Analogue.

11.2 Installing and Removing a SmartStack Module

The following section describes how to install and remove a SmartStack Module.

Caution: To function properly and avoid possible damage, do not install more than four Smart Stackä Modules per TIU20X.

a. Installing SmartStack Modules

1. Hook the tabs. Each SmartStack Module has two tabs that fit into slots located on the TIU20X. (The slots on the TIU20X are located on the back cover.)
2. Press the SmartStack Module into the "locked" position, making sure to align the SmartStack Module fasteners with the SmartStack receptacles on the TIU20X.

b. Removing SmartStack Modules

1. Using a Flathead screwdriver, pry up the end of the SmartStack Module (opposite of tabs) and swing the module out.
2. Lift out the tabs of the module.

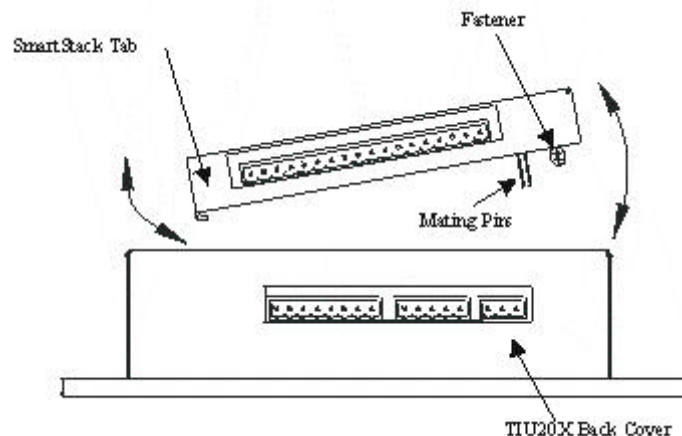


Figure 11.1 – Installing a SmartStackä Module in an OCS.

11.3 Configuring SmartStack Module

At this time the range of compatible SmartStack modules for the TIU range is as follows: -

Table 11.1 – SmartStack Modules	
Module	Description
IC300ADC110	4 channel Analog Inputs, Voltage (0-5vdc, +/-5vdc, 0-10vdc, +/-10vdc), 12 bit
IC300ASC100	ASCII BASIC: 3 ports, 64K program memory
IC300DIQ511	4 Channel 12/24 Vdc Digital Input Pos/Neg logic 4 Channel 12/24 Vdc Digital Output Neg logic
IC300DIQ512	4 Channel 12/24 Vdc Digital Input Pos/Neg logic 3 Channel Relay Output
IC300DIQ522	4 Channel 120 Vac Digital Input Pos logic 3 Channel Relay Output
IC300DIQ611	8 DC Inputs (12/24vdc, pos/neg logic), 8 DC Outputs (5/12/24vdc, 0.5A, neg logic)
IC300DIQ612	8 DC Inputs (12/24vdc, pos/neg logic), 6 Relay Outputs (250vac, 30vdc, 4.0A)
IC300DIQ622	8 AC Inputs (120 vac), 6 Relay Outputs (4.0A per point)
IC300MIX11	2 Channel voltage (+/- 10vdc) Inputs 2 Channel voltage (+/- 10vdc) Outputs

Click on the SmartStack Configuration icon or choose **SmartStack I/O** from the **Configuration** menu. From the Configure SmartStack I/O window, click on the pull down menu for the appropriate slot. The available modules are listed, choose the module to be installed.

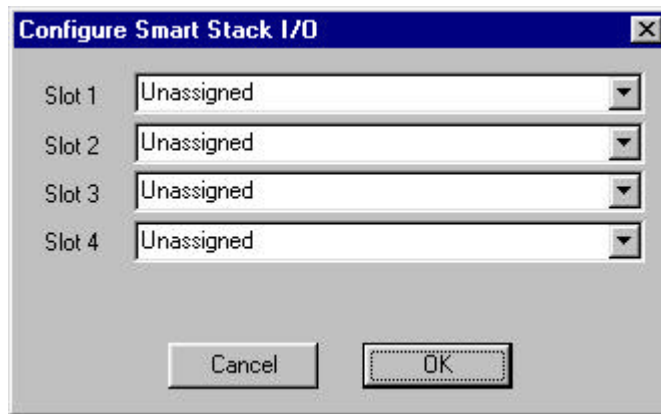


Figure 16.2 – SmartStack Configuration

NOTE: - After the project is downloaded to the TIU20X, on power up the TIU checks if the specified SmartStack module is inserted. If the module is not inserted the TIU will display "SmartStack I/O Error". Power down TIU and insert specified SmartStack module.

11.4 SmartStack I/O

The input and output of the SmartStack is handled within the local registers of the terminal. The local registers and therefore the I/O of the SmartStack is then analysed or manipulated within the Mathedit Application of the **CBREEZE** software. See chapter 10 for more information on the Mathedit Application.

11.5 Module Addressing

The base addressing for the slots are as follows: -

Slot	Base Address
1	00001
2	10001
3	20001
4	30001

The input and output register names and addresses are as follows: -

I/O Type	Address
Bit Input	%Innnnn
Bit Output	%Qnnnnn
Word Input	%AInnnnn
Word Output	%AQnnnnn
❖ nnnnn = the base address of the module ❖ The base address begins at nnnnX and is incremented by 1 to the last channel on the module. (X = 1 or 0 depending on the bit base numbering set-up under Configure/Bit Base Numbering, default is 1)	

All examples below assume Least Significant Bit for Internal References is set to 1.

E.g. the third bit of a Digital Input module in slot 3 would have the address of %I20003.

E.g. the fourth bit of a Digital Output module in slot 3 would have the address of %Q20004.

E.g. the third channel of an Analogue Input module in slot 4 would have the address of %AI30003.

Note: Digital Input modules can be read as words or bits by selecting the appropriate register type. Digital Output modules can be written to as words or bits by selecting the appropriate register type. The system will strip off any redundant bits within the word.

11.6 Displaying Data From SmartStack

Data from SmartStack modules can be embedded into a menu page in exactly the same way as other AE devices. Embed the data type as normal and select the Location from the range of "Smart I/O" register types shown in the pull down register table. The normal function can then be applied to the register value, i.e. Range Checking, Scaling etc.

Note: The numeric default settings for Analogue modules should be set to 16 bit and signed. Output data can be edited / scaled using the screen editor in the same way as a normal AE. Data to / from SmartStack can also be scaled or manipulated via the Maths.

Note: The numeric default settings for Analogue modules should be set to 16 bit and signed. Output data can be edited / scaled using the screen editor in the same way as a normal AE.

It is not possible to read and then modify Output types directly within a TIU system. If it is necessary to do this, it is better to use a System %R register within the Maths facility to manipulate and hold the "master value" then assign the actual value to a %AQ register. See Chapter 10 Mathematics on writing and calling maths functions.

Again, it is good practise to write to an Output type at only 1 point in the configuration.

```
5 %R0005 = %R0005 x 2
6 IF %R0005 > 128 GOTO 10
7 IF %R0005 = 0 GOTO 10
8 %AQ0001 = %R0005
9 %AQ10001 = %R0005
10 %R0005 = 1
11 GOTO 8
* FND *
```

Figure 11.3 – Math Example Word Output

11.7 Considerations for Shutting Down & Restarting a TIU20X with I/O

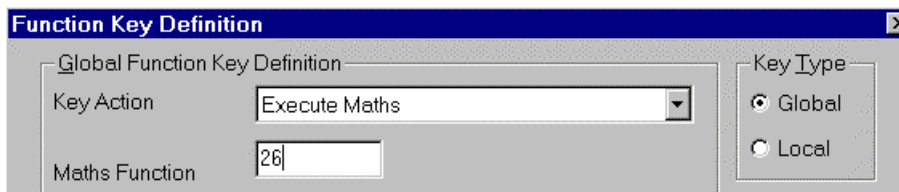
During a "shutdown" for downloading, it is possible to leave SmartStack outputs on. It is therefore important to make sure that all outputs are in a safe condition before this operation is carried out. For example, this could be implemented using a dedicated Function Key labelled SHUTDOWN to call a Maths function that set any SmartStack outputs to a safe state for shutdown.

During a restart either from a "Power Up" or from after a download, SmartStack outputs may not always be in the mode required. This situation could be overcome by calling a Restart Maths function to correctly initialise the SmartStack output modules.

Examples are shown below

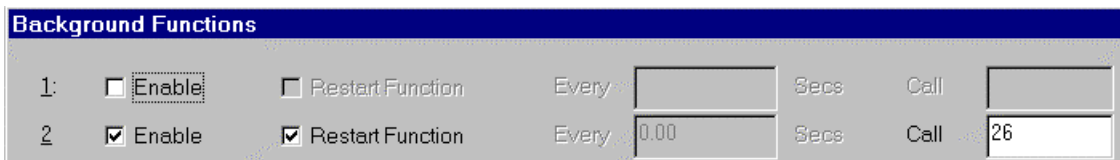
```
25
26 %AQ0001 = 7
27 %AQ10001 = 0
28 %AQ20001 = -8000
29 %AQ20002 = 8000
30
* FND *
```

Figure 11.4 – Math Example Set Outputs for Power Down



The dialog box is titled "Function Key Definition". It has a "Global Function Key Definition" section with a "Key Action" dropdown menu set to "Execute Maths" and a "Maths Function" text box containing "26". To the right is a "Key Type" section with two radio buttons: "Global" (selected) and "Local".

Figure 11.5 – Calling Math Function From Function Key



Background Functions						
1:	<input type="checkbox"/> Enable	<input type="checkbox"/> Restart Function	Every	<input type="text"/>	Secs	Call <input type="text"/>
2:	<input checked="" type="checkbox"/> Enable	<input checked="" type="checkbox"/> Restart Function	Every	<input type="text" value="0.00"/>	Secs	Call <input type="text" value="26"/>

Figure 11.6 – Calling Math Function from Background Function

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