



**CONTROL
TECHNIQUES**

CTIU

EASY INTERFACE

User Manual for the
CTIU050
CTIU100
CTIU110
CTIU200
And
CTIU Configuration Software

Second CT Edition
12 April 2000
(Issue 2.1)

Part Number SSP-2050-1100

Part of:

CTVISION

PREFACE

This manual explains how to use the Control Techniques PLC Operator Station products and **CTIU** software.

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About programming examples

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NOTE: The programming examples shown in this manual are illustrative only. Proper machine operation is the sole responsibility of the system integrator.

Declaration of EMC conformity

Distributor's Name: Control Techniques PLC.
Distributor's Address: The Gro, Pool Road, Newtown, Powys, UK SY16 3AJ

Declares that the products Models: CTIU050, CTIU100, CTIU110 and CTIU200

Conforms to the following EMC standards:

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

Supplementary Information:

The above conformity only relates to the products in a stand-alone capacity. The products are used as part of a system and are therefore classified as a component. As a component, the products are prohibited by EC regulations to carry a CE Mark for EMC conformity. Static discharge tests only apply to normal operation of the keyboards via the front panel. We would stress that the use of our products within your system, while helping to ensure compliance of your system to the same directives, do not necessarily guarantee that compliance will be achieved. We would also like to point out that the interpretation of the law concerning CE marking and its application to sub-assemblies and components is open to interpretation.

Date: 31 Mar 1999

Revisions to this manual

This version (**SSP-2050-1002**) of the *CTIU* software Version 4.10 for the Operator Station contains the following revisions, additions or deletions:

- a. Added chapter detailing firmware upgrade. Section 1.5
- b. Revised chapter on recipes.
- c. Section on trending revised as per customer request.
- d. Expanded the SmartStack chapter.
- e. Added section on analogue meters.
- f. Added section to text selector to include font size, and font editor.
- g. Added section in download project to mention protocol check prior to download.
- h. Changed TIU range specification table (Operating Temperature).
- i. Added section explaining folder layout, and protocol file name.
- j. Added new overlays for CTIU10X and CTIU11X.
- k. Moved Key Mapping 7.7 and Function Keys 7.8 to the About Projects 8.17 and 8.18.
- l. Revised operating temperature specifications in Table 1.2 (maximum temperature range). Also revised part numbers listed under weight and dimensions.
- m. Trending now available for the CTIU10X.
- n. Add description internal, network and system registers.
- o. Added sections on Control Techniques devices

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1. INTRODUCTION

1.1. General

The Operator Station (CTIU050/10X/11X/20X) is an Operator Station (OS) that provides extensive monitoring and control in an extremely small package. The Operator Station "OS" product line offers four distinct categories of products as described in Table 1.1.

Table 1.1 – Operator Station (OS) Product Line		
Model	Description	Part Number
TIU050: Text Only		
CTIU050-001	2 lines x 20 characters.	SSP-2050-0050
CTIU050-002	2 lines x 20 characters with Real Time Clock. (RTC)	SSP-2050-0055
TIU10x: Text / Semi-Graphics		
CTIU100-01	8 Lines x 20 Characters plus 128 x 64 pixels.	SSP-2050-0100
CTIU100-02	8 Lines x 20 Characters plus 128 x 64 pixels with RTC	SSP-2050-0105
TIU11x: Text / Semi Graphics with Numeric Keypad		
CTIU110-01	8 Lines x 20 Characters, 128 x 64 pixels & numeric keypad.	SSP-2050-0110
CTIU110-02	As CTIU110-01 plus RTC	SSP-2050-0115
TIU20X: Text / Full Graphics with Numeric / Function Keypad		
CTIU200	16 Lines x 40 Characters plus 240 x 128 pixels plus a Numeric keypad / Function keypad. Optional SmartStack I/O.	SSP-2050-0200

The front panel of the OS has a bright and clear display (LCD with adjustable back lit) and easy-to-use push buttons. On the back panel are communication ports for connection to automation equipment (programmable logic controller, drive, weighing equipment or other equipment) and a PC (IBM or compatible computer). Also located on the back panel of the OS are clearly displayed features such as power input, PC and PLC port, Tx and Rx LEDs.

The OS supports a variety of protocols. Various protocols can be downloaded through the PC port and stored in the unit's flash memory. The operating system can also be downloaded through the PC port.

The OS has a total of 300 menu and sub-menu pages (password protection available). Each page is capable of displaying up to eight embedded data items of the following types; numeric, alphanumeric, timer, bit status, Horizontal Fill, Text Selector, System Variable, Password, Clock Calendar, Data registers, Timer, Counter pre-sets and also internal bits in the automation equipment (AE) may be edited via the OS. Other features include display of status information and priority driven handling.

The CTIU100/110 is available with two non-standard features: 20mA current loop communication and a real-time clock (RTC). Both can be ordered at the time of purchase. The current loop can be re-fit by the user later. The RTC requires factor re-fit. The CTIU050 is only available with the real-time clock option.

The CTIU20X provides for the display of both text and full graphics and has a Numeric/Function Keypad.

It also allows the use of a wide range of SmartStack I/O options.

CTIU configuration package, Control Techniques' Windows™-based software, is easy-to-use. The software user's guide is contained in this manual. (See Section 1.4 for initial software

installation procedures.) All revisions of software from Version 1.34 can be obtained from your nearest Control Techniques Drive Centre

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

1.2. Equipment Needed

1. Software Installation CD.
2. A PC Windows 95™, Windows 98™ or Windows NT®.
3. Approximately 15.7 MB of available hard disk space.
4. CTIU050/10X/11X/20X Interface Unit.
5. PC to TIU Programming Cable (PN) SSP-2050-0900 or equivalent (See Fig 2.6).

1.3. Technical Specifications

Table 1.2 – Technical Specifications					
Parameter	Conditions	Min.	Typical	Max.	Units
Input voltage (V _I)		10	24	32	VDC
Typical power consumption CTIU050 CTIU10X CTIU11X CTIU20X	V _I = 24VDC V _I = 24VDC V _I = 24VDC V _I = 24VDC		130 130 130 350		mA
Inrush input current	V _I = 24VDC for 4ms		260		mA
Operating temperature CTIU050 CTIU10X CTIU11X CTIU20XA CTIU20XB or higher		0 0 0 0 0		50 50 50 45 50	°C
Storage temperature		-20		80	°C
Relative Humidity	(non-condensing)	5		85	%
Weight CTIU050 CTIU10X CTIU11X CTIU20X			320 370 470 1870	350 400 500 1900	g
Dimensions CTIU050 CTIU10X CTIU11X CTIU20X			179 x 111 x 60 121 x 105 x 38 172 x 105 x 38 282 x 194 x 62		mm
Cable Lengths † RS-232 RS-485		1		15 1500	m
IP rating	NEMA 4-12/IP65				
EMC Conformance	EN 55 022, Radiated and Conducted Emissions EN 61000-4-3, Radiated and Conducted RF Immunity ENV 50144				
† Cables beyond the maximum recommended length may create communication problems. Both ends of an RS-485 network must be properly terminated at 120Ω and grounded.					

1.4. Software Installation Instructions

1. Start your Windows™ Operating System.
2. Insert the Software Installation CD.
3. In Windows 95™, Windows 98™, or NT 4.0, click the Windows **Start** menu button and then click **Run**.
The **Run** dialog box appears.
4. Type **D:\software\disk1\setup (CD Drive letter assumed to be D:)**. Click **OK**.

1.5. Upgrade Revision Software & Firmware

1.5.1 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.

1.5.2 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.

1.5.3 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 Automation Device from main menu Configure/Communication Settings.
- d) From File menu choose Update TIU Protocol. If you are updating from firmware version 3.00 or later then you just have to update to the latest protocol file. However if you are updating from firmware version 2.00 or earlier you must update to a dummy protocol first, then update to the latest firmware revision. See Note.(See updating protocol for further information).
- e) From File menu choose Update TIU Operating System. (See Updating Operating System for more details).
- f) Choose Download Character Sets to TIU from File menu.
- g) Choose Download Project to TIU from File menu.

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

2. CTIU050

2.1. General

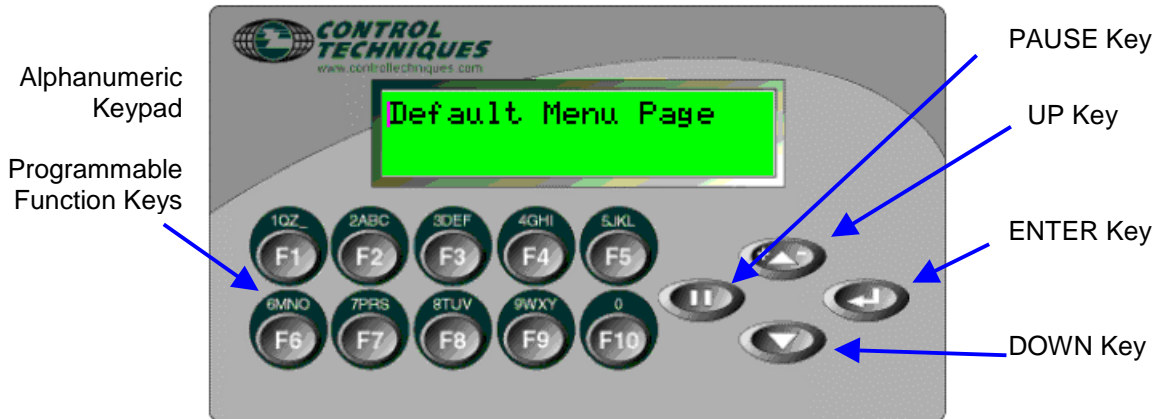


Figure 2.1 – Front View of CTIU050

2.1.1 CTIU050 Button Selection Actions

1. **PAUSE** key selects data for editing OR exits from data editing.
2. **PAUSE & DOWN** keys pressed together, enters sub menu pages.
3. **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
4. **UP** key selects the previous menu page, sub menu page, alarms, and increments data
5. **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
6. **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
7. **ALPHANUMERIC KEYPAD** and **PROGRAMMABLE KEYS** can be used to enter data or can be used to perform some pre-programmed action.

2.1.2 CTIU050 Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

2.2. CTIU050 Ports

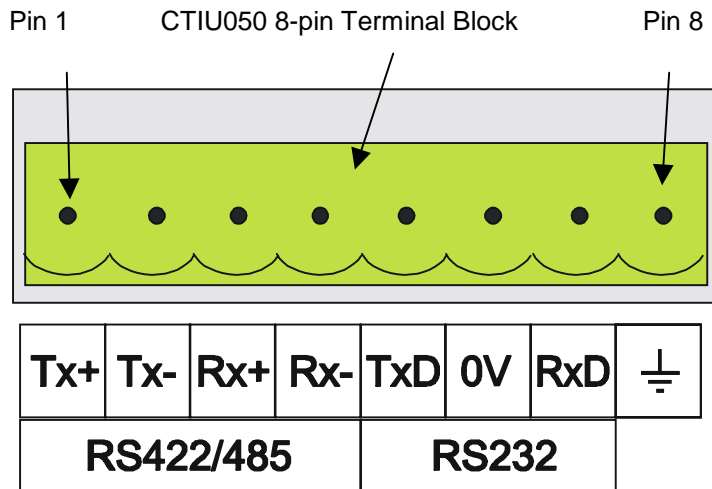


Figure 2.2 Automation Equipment Serial Port

2.2.1 CTIU050 Configuration of the RS-485 Port

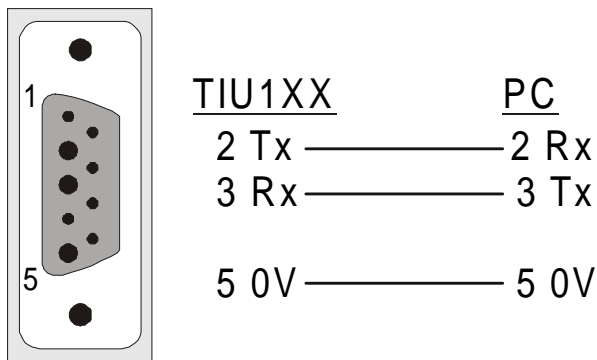


Figure 2.3 – PC Programming Serial Port
The Serial Pin connections for transmit (Tx), receive (Rx) and ground are displayed above.

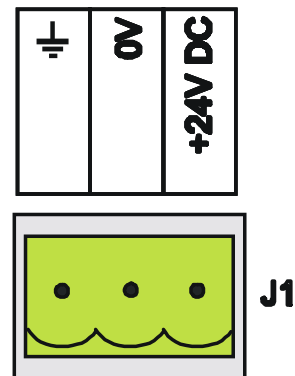


Figure 2.4 – Power Connector
Powered by +24VDC and Ground.

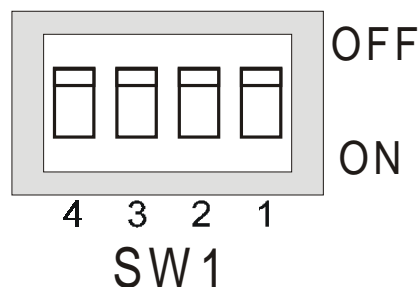


Figure 2.5 – Configuration Bank

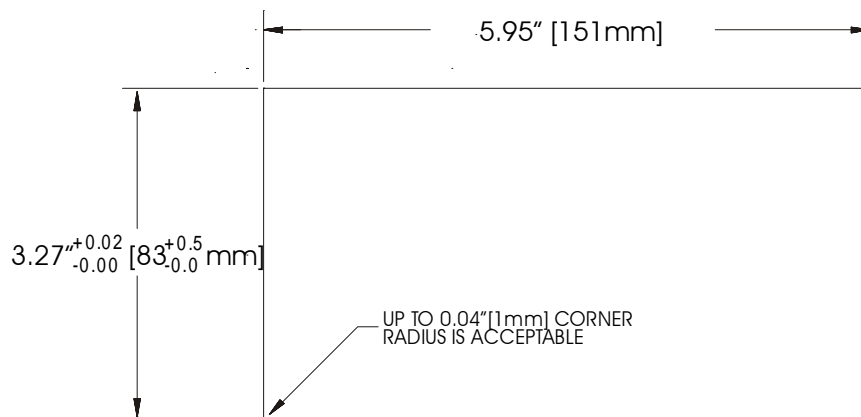
The configuration bank (shown in Figure 2.5) sets the parameters of the RS-485 port as described in Table 2.1.

Table 2.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This is only used if the CTIU050/100/110 is the last device at either end of the bus.

2.2.2 CTIU050 Dimensions



CTIU050 CUTOUT DETAILS

TOLERANCES ARE +/- 0.01" [0.3mm] UNLESS STATED OTHERWISE

Figure 2. 6 – CTIU050 Cutout

NOTES

3. CTIU100/101

3.1. General

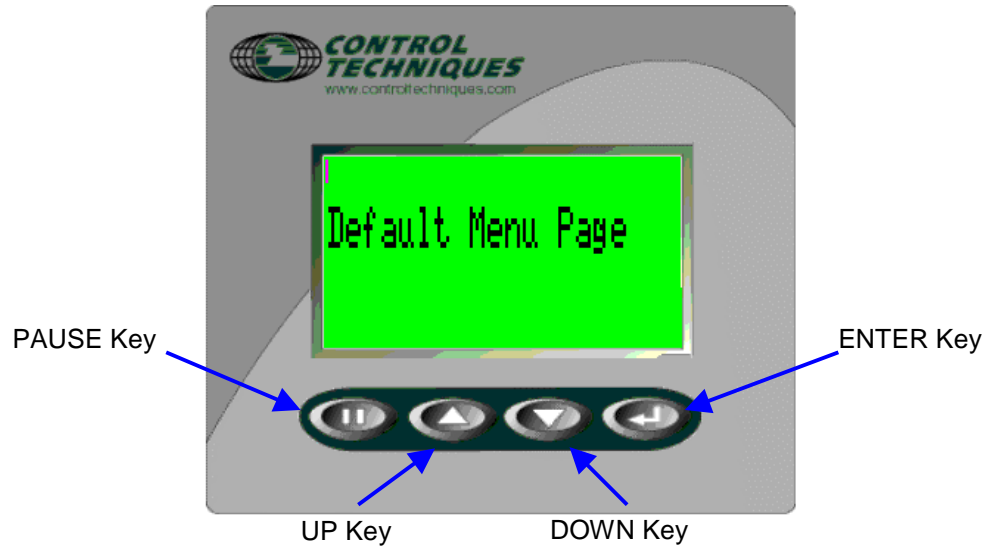


Figure 3.1 - Front View of CTIU100

3.1.1 CTIU100 Button Selection Actions

1. **PAUSE** key selects data for editing OR exits from data editing.
2. **PAUSE & DOWN** keys pressed together, enters sub menu pages.
3. **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
4. **UP** key selects the previous menu page, sub menu page, alarms, and increments data.
5. **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
6. **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.

3.1.2 CTIU100 Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

3.2. CTIU100 Rear View

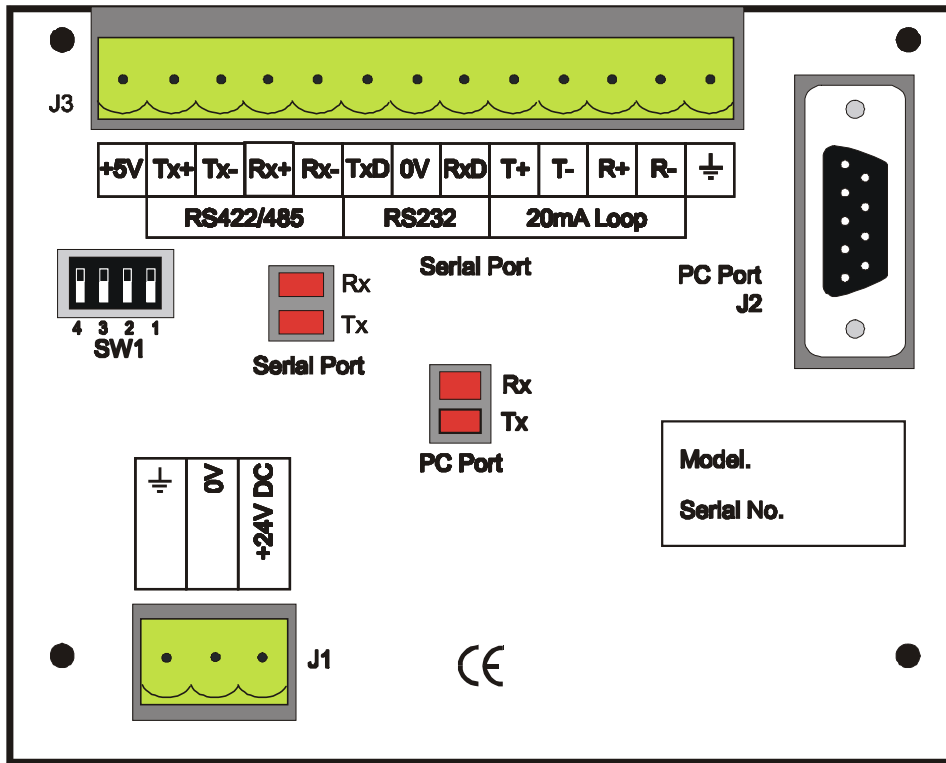


Figure 3.2 – Rear View of CTIU100/110

3.2.1 CTIU100 Ports

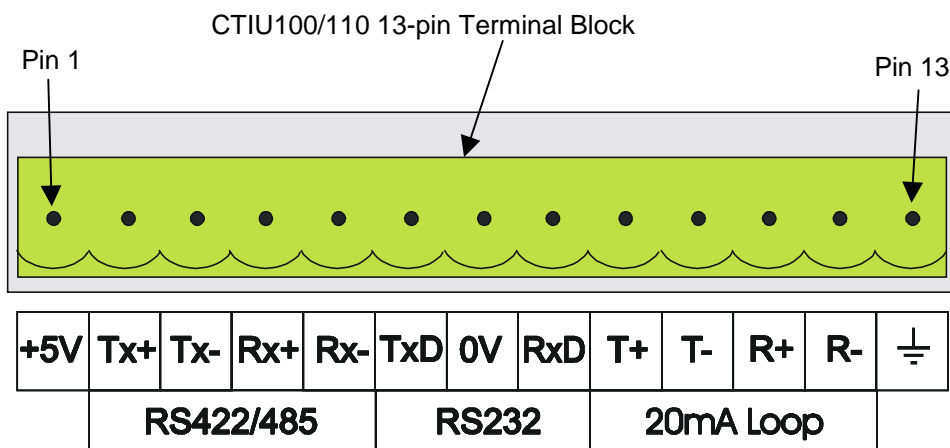


Figure 3.3 – Automation Equipment Serial Port

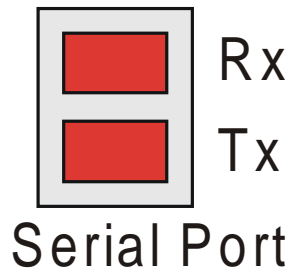


Figure 3.4 – Automation Equipment Port Receive & Transmit LEDs

The LED's flash when the CTIU100/110 is communicating.

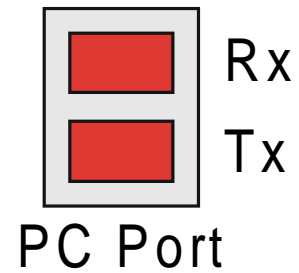


Figure 3.5 – PC Port Receive & Transmit LEDs

The LED's flash when the PC is communicating with the CTIU100/110

3.2.2 CTIU100 Configuration of the RS-485 Port

The configuration bank (shown in Figure 3.8) sets the parameters of the RS-485 port as described in Table 3.1.

Table 3.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

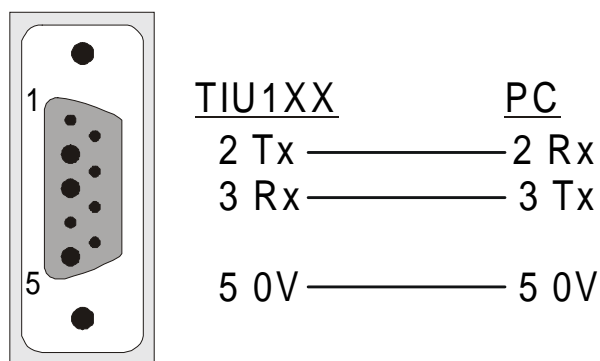


Figure 3.6 – PC Programming Serial Port

The Serial Pin connections for transmit (Tx), receive (Rx) and ground are displayed above.

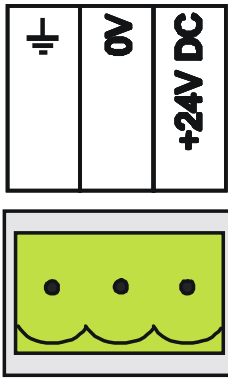


Figure 3.7 – Power Connector
Powered by +24VDC and Ground.

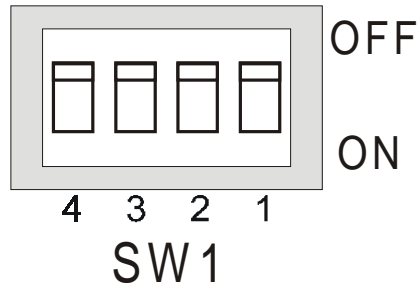
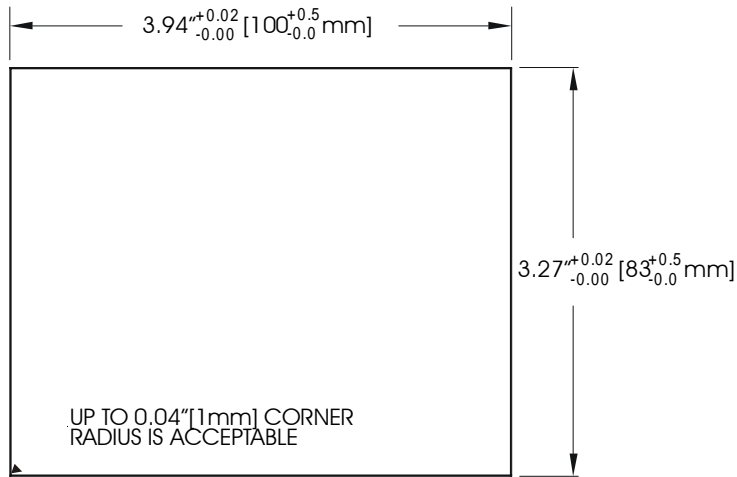


Figure 3.8 – Configuration Bank

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the CTIU050/100/110 is the last device at either end of the bus.

3.3. CTIU10X Dimensions



CTIU10X CUTOUT DETAILS

TOLERANCES ARE +/- 0.01" [0.3mm] UNLESS STATED OTHERWISE

Figure 3.9 – CTIU10X Cutout

4. CTIU110/111

4.1. General

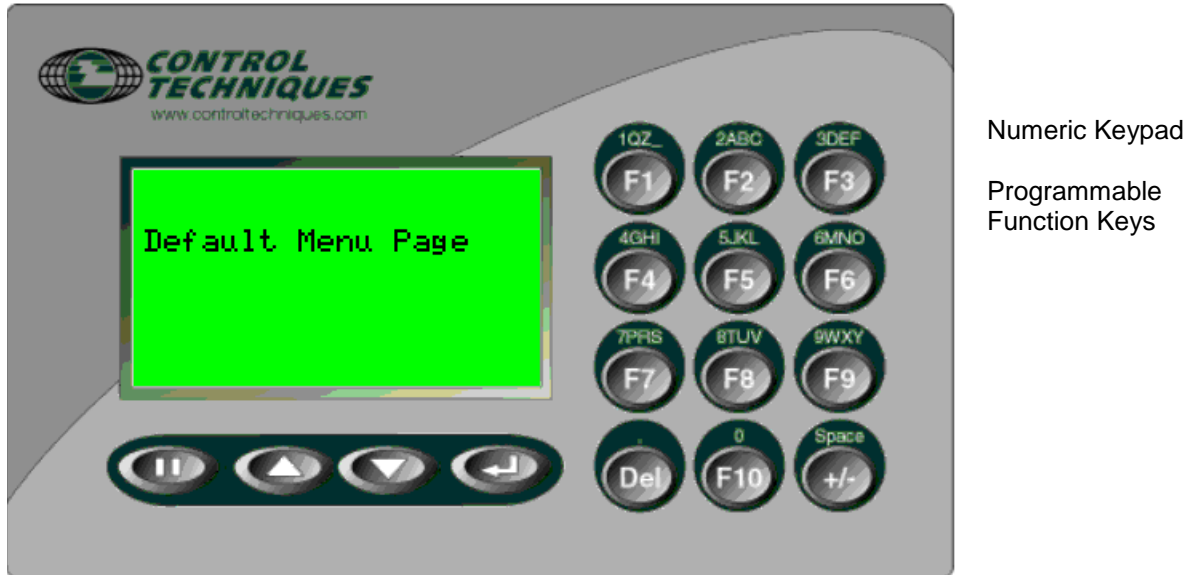


Figure 4.1 – Front View of CTIU110

4.1.1 CTIU110 Button Selection Actions

1. **PAUSE** key selects data for editing OR exits from data editing.
2. **PAUSE & DOWN** keys pressed together, enters sub menu pages.
3. **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
4. **UP** key selects the previous menu page, sub menu page, alarms, and increments data
5. **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
6. **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
7. **ALPHANUMERIC KEYPAD** and **PROGRAMMABLE KEYS** can be used to enter data or can be used to preform some pre-programmed action.

4.1.2 Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

4.2. CTIU110 Rear View

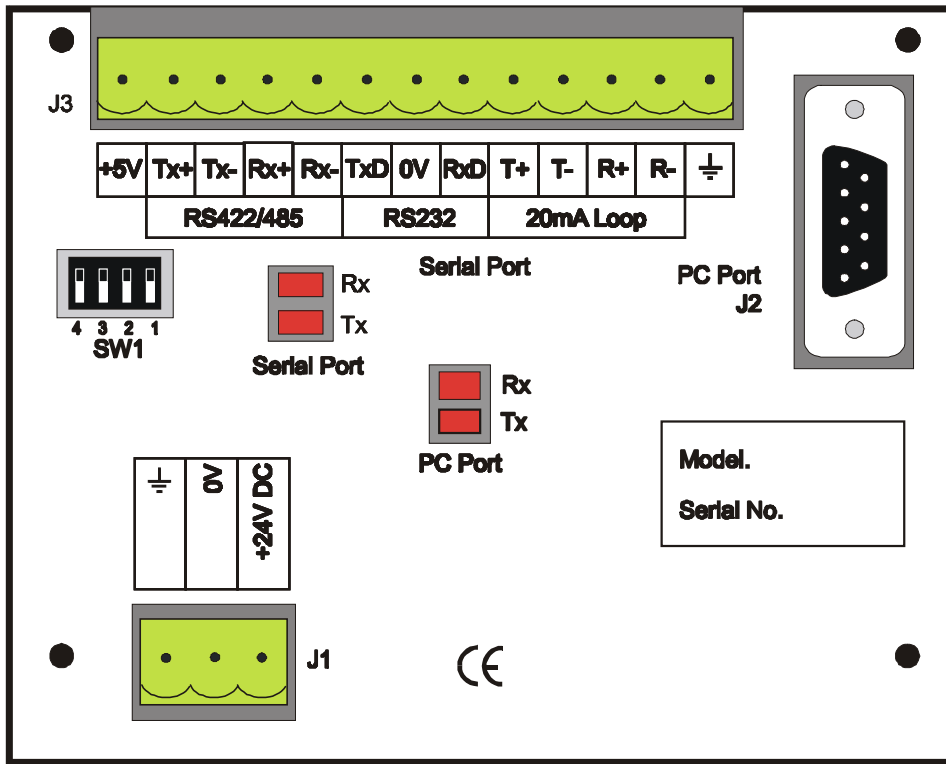


Figure 4.2 – Rear View of CTIU100/110

4.2.1 CTIU110 Ports

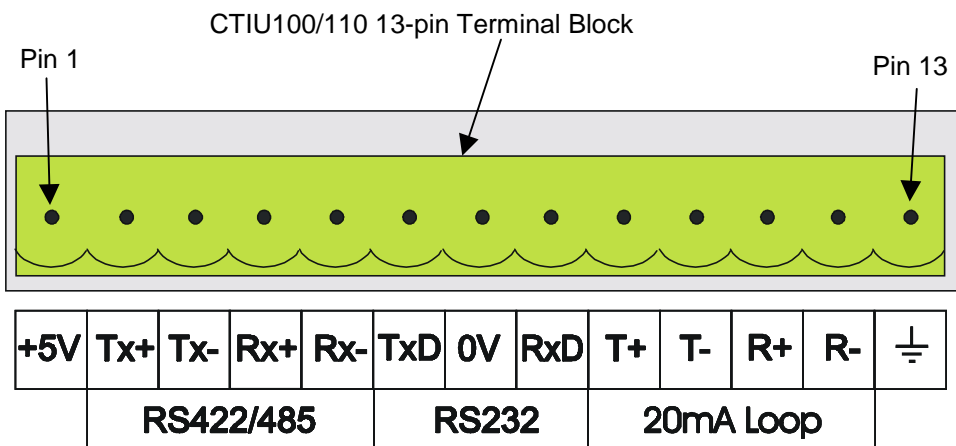


Figure 4.3 – Automation Equipment Serial Port

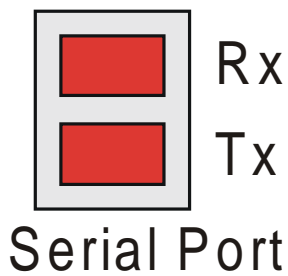


Figure 4.4 – Automation Equipment Port Receive & Transmit LEDs
The LED's flash when the CTIU100/110 is communicating.

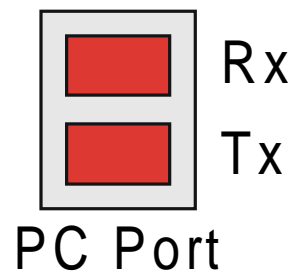


Figure 4.5 – PC Port Receive & Transmit LEDs
The LED's flash when the PC is communicating with the CTIU100/110

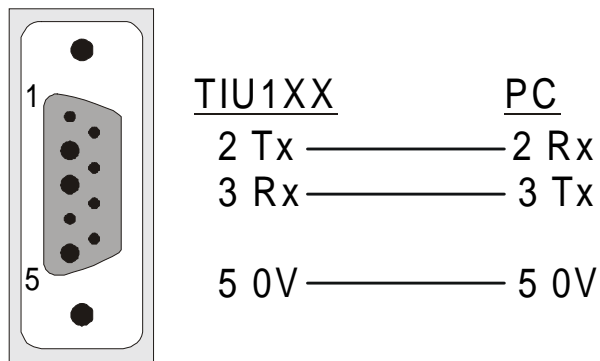


Figure 4.6 – PC Programming Serial Port
The Serial Pin connections for transmit (Tx), receive (Rx) and ground are displayed above.

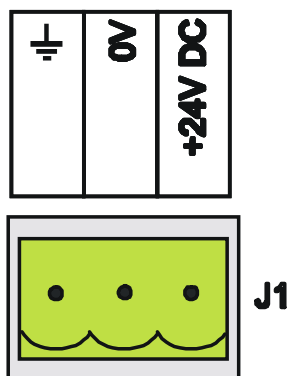


Figure 4.7 – Power Connector
Powered by +24VDC and Ground.

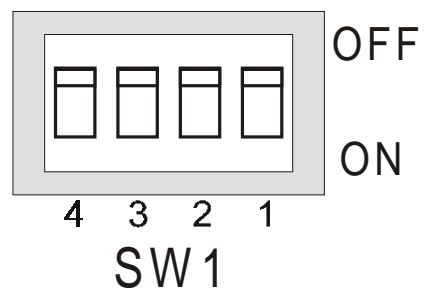


Figure 4.8 – Configuration Bank

4.2.2 CTIU110 Configuration of the RS-485 Port

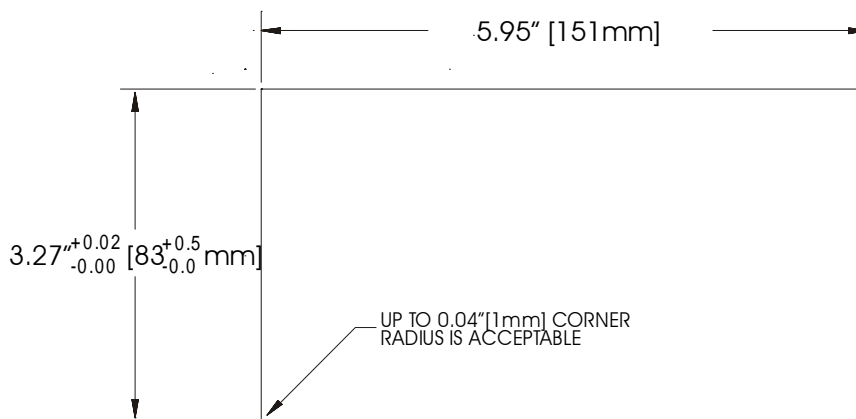
The configuration bank (shown in Figure 4.8) sets the parameters of the RS-485 port as described in Table 4.1.

Table 4.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the CTIU050/100/110 is the last device at either end of the bus.

4.3. CTIU11X Dimensions



CTIU11X CUTOUT DETAILS

TOLERANCES ARE +/- 0.01" [0.3mm] UNLESS STATED OTHERWISE

Figure 4.9 – CTIU11X Cutout

5. CTIU 200



Figure 5.1 – Front View of CTIU20X

5.1. 5.1 General

5.1.1 CTIU20X Button Selection Actions

1. **PAUSE** key selects data for editing OR exits from data editing.
2. **PAUSE & DOWN** keys pressed together, enters sub menu pages.
3. **PAUSE & UP** keys pressed together, exits sub menus to the parent menu pages.
4. **UP** key selects the previous menu page, sub menu page, alarms, and increments data
5. **DOWN** key selects the next menu page, sub menu page, alarms and also decrements data.
6. **ENTER** key sends data to the automation equipment, accepts alarms, and displays accepted alarms.
7. **ALPHANUMERIC KEYPAD** can be used to enter data
8. **PROGRAMMABLE KEYS** can be used to perform some pre-programmed action.

5.1.2 Contrast Adjustment

On menu page 1 (after the start-up screen), hold the **ENTER** key and press the **UP** or **DOWN** key to adjust the contrast. The contrast setting is stored and not lost after removing power.

5.2. CTIU20X Rear View

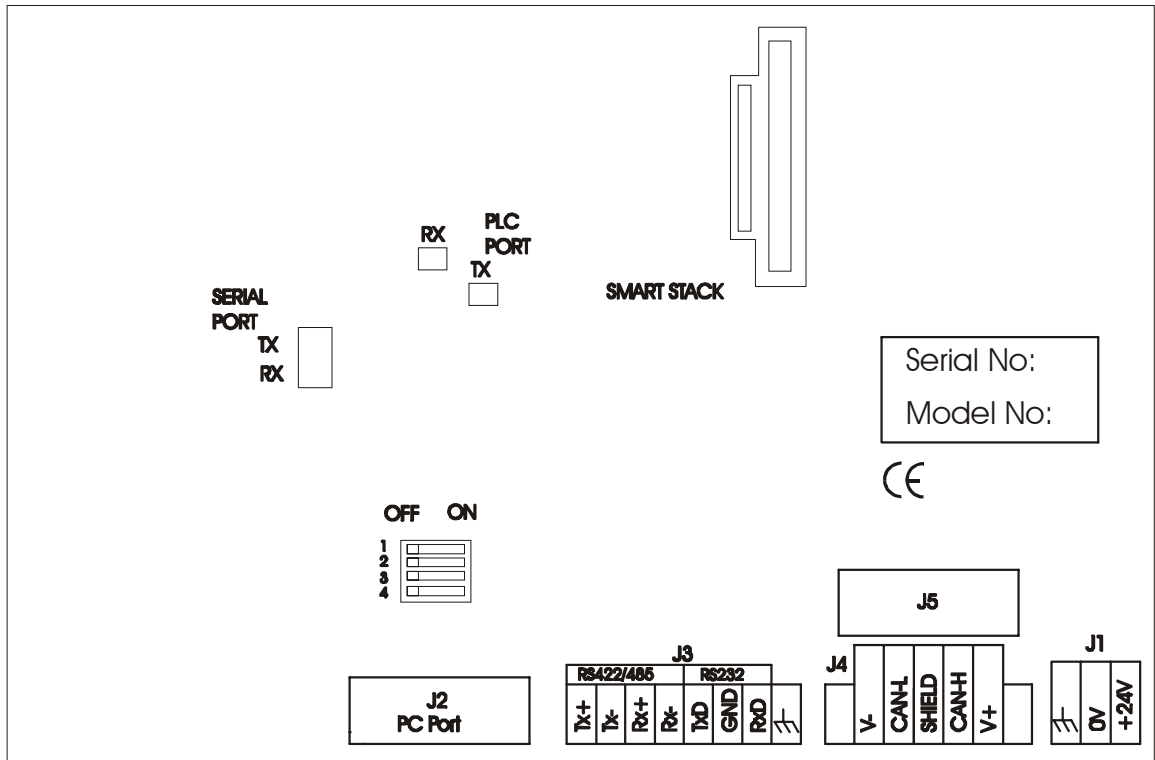


Figure 5.2 – Rear View of CTIU20X

5.2.1 CTIU20X Ports

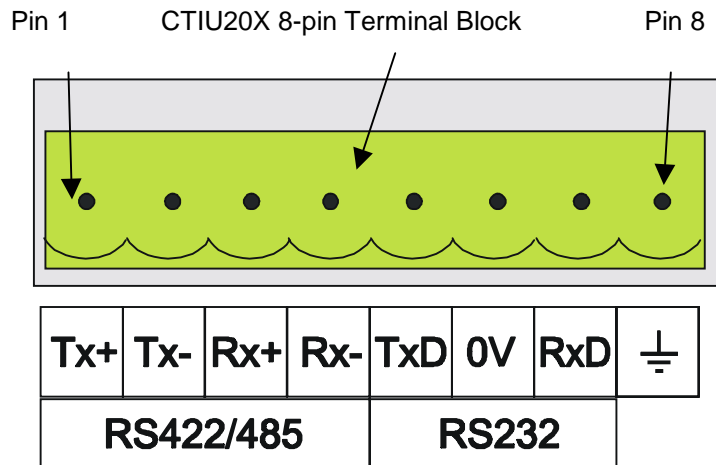


Figure 5.3 Automated Equipment Serial

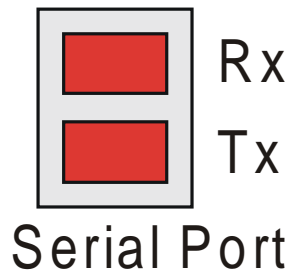


Figure 5.4 – Automation Equipment Port Receive & Transmit LEDs

The LED's flash when the CTIU100/110 is communicating.

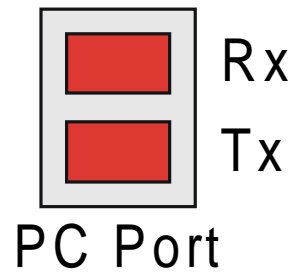


Figure 5.5 – PC Port Receive & Transmit LEDs

The LED's flash when the PC is communicating with the CTIU100/110

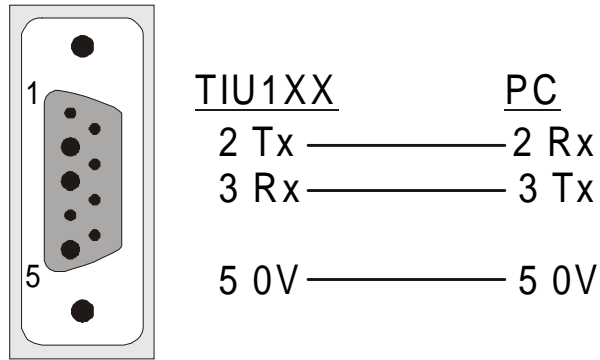


Figure 5.6 – PC Programming Serial Port

The Serial Pin connections for transmit (Tx), receive (Rx) and ground are displayed above.

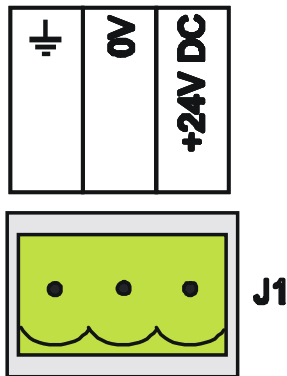


Figure 5.7 – Power Connector
Powered by +24VDC and Ground.

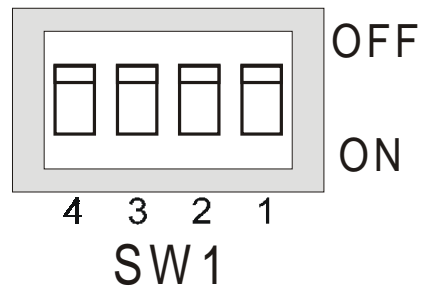


Figure 5.8 – Configuration Bank

5.2.2 CTIU20X Configuration of the RS-485 Port

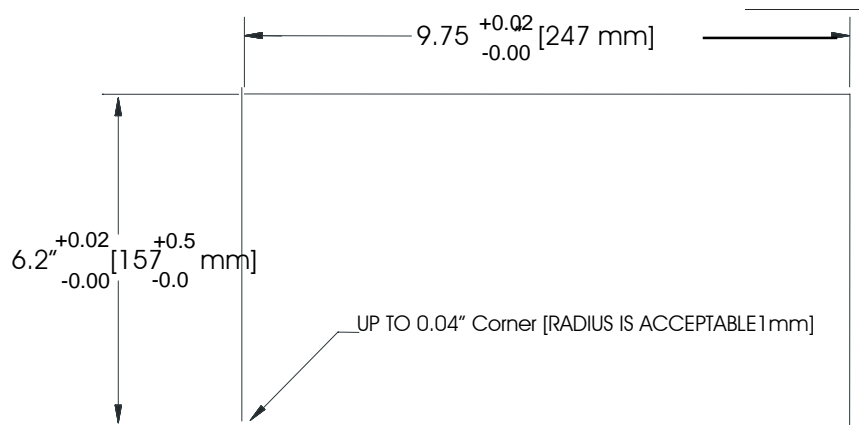
The configuration bank (shown in Figure 2.23) sets the parameters of the RS-485 port as described in Table 5.1.

Table 5.1 – Configuration Bank	
Switch 1	ON: Pull-up (must be used together with switch 3) OFF: no Pull-up
Switch 2	ON: 120Ω termination OFF: no termination
Switch 3	ON: Pull-down (must be used together with switch 1) OFF: no Pull-down
Switch 4	Reserved for future use
NOTE: Switch 1 and 3 must be used together. Either both pull-up and pull-down are used or neither is used.	

Pull-up and **Pull-down** switches are used to increase the signal level on the RS-485 bus. This is useful if there is a long bus and a significant amount of attenuation is anticipated.

Termination resistance of 120Ω must be placed across each end of the RS-485 bus. With switch 2 ON, a 120Ω resistance is placed across the bus. This should only be used if the CTIU050/10X/11X/20X is the last device at either end of the bus.

5.3. CTIU20X Dimensions



CTIU20X CUTOUT DETAILS

TOLERANCES ARE +/- 0.01" [0.3mm] UNLESS STATED OTHERWISE

Figure 5.9 – CTIU20X Cutout

6. COMMUNICATIONS

6.1. Connection of Control Techniques devices

6.1.1 4 wire RS422/485 to UD71, Mentor, UD70, MD29, CDE, MC204

The ANSI (with menus) protocol using 4 wire RS485 has been supported by most of Control Techniques' products since the introduction of Mentor II. The only recent products not supporting 4 wire are Diverter A and Commander SE.

The modbus protocol on the UD70 series MD29 and MD29AN also uses this connection. For multi drop connections simply connect the CT slave device connections in parallel.

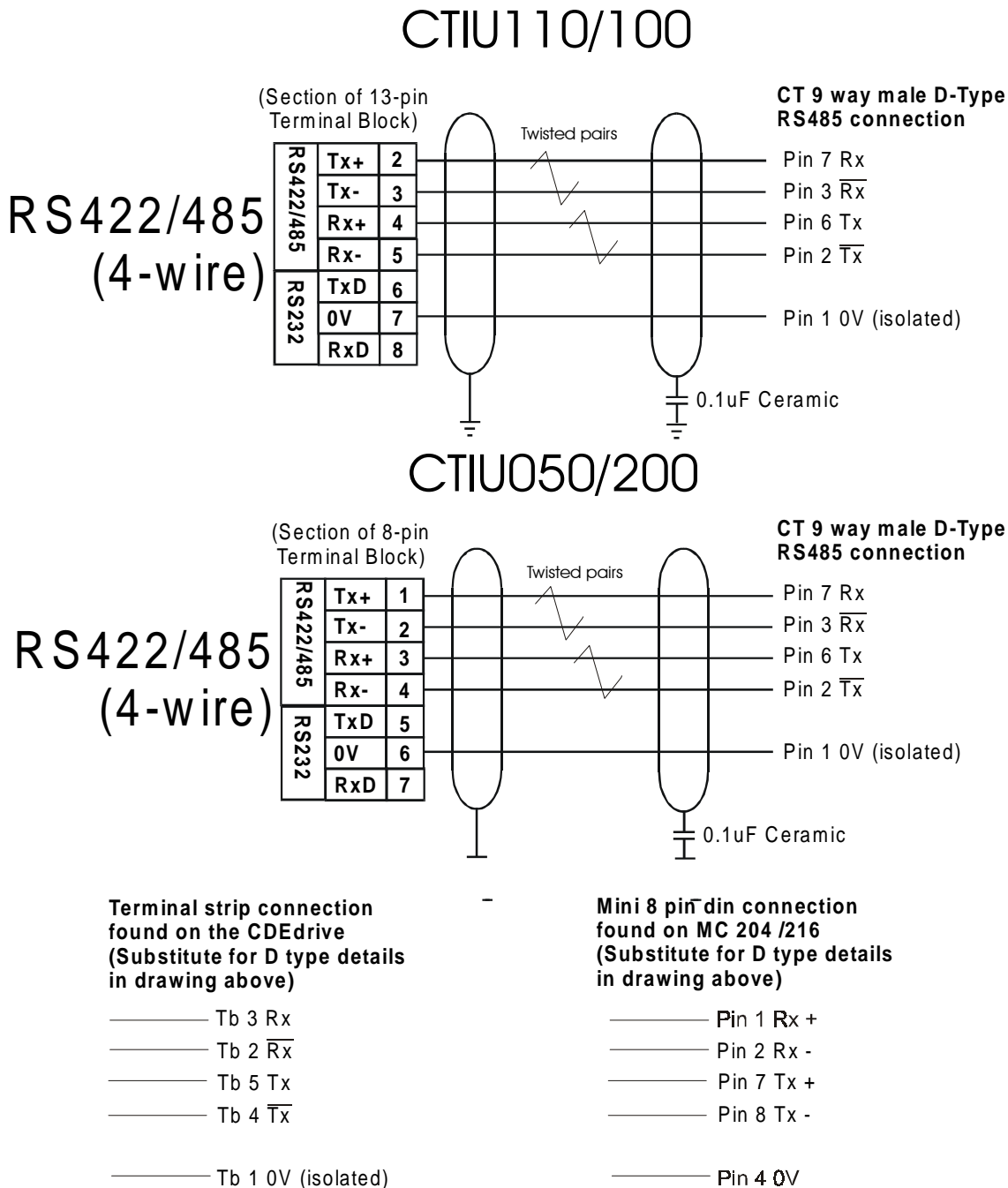
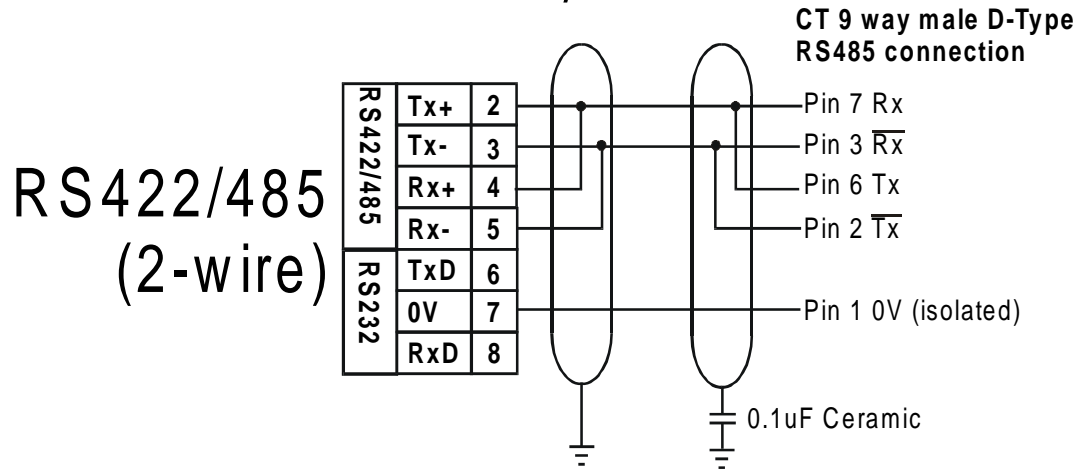


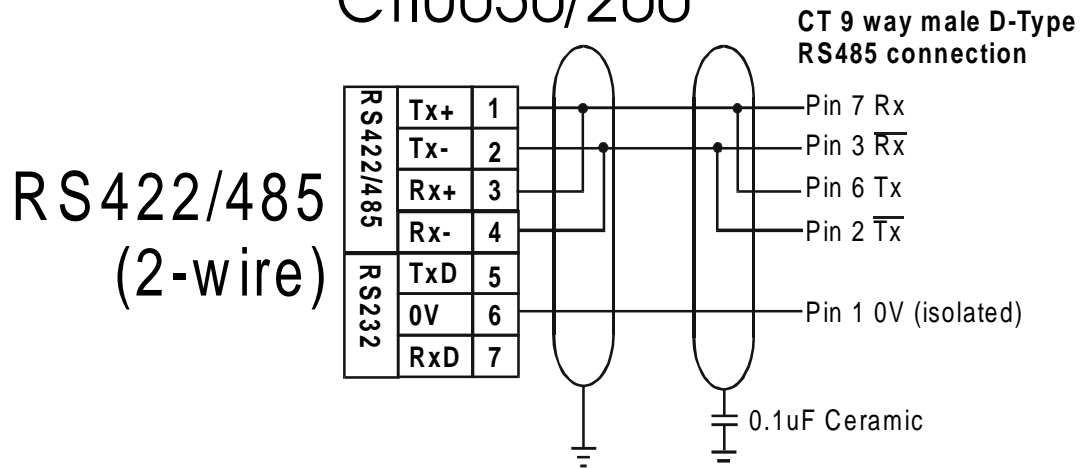
Figure 6.1 Wiring for CT devices using 4 wire RS422/485

6.1.2 RS-485 Two-Wire to UD7#, commander SE and Diverter A

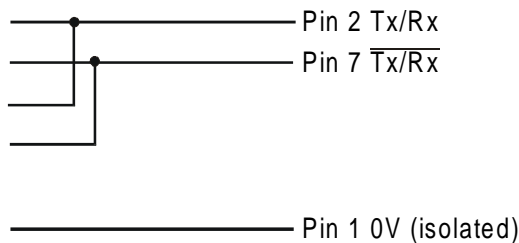
CTIU110/100



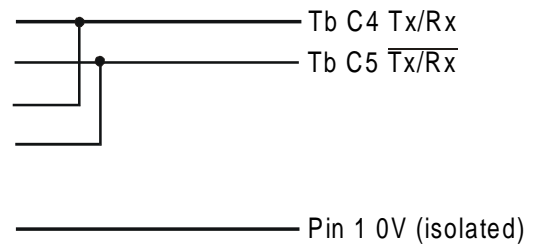
CTIU050/200



RJ45 connector on Commander SE
(Substitute this for the 9 way connections shown above)



Terminal strip on Diverter A
(Substitute this for the 9 way connections shown above)



This is the electrical standard for ANSI (with menus) protocol and Modbus using 2 wire RS485 & is supported by Control Techniques' more recent products.

6.1.3 RS232 to UD71, UD7#

This electrical connection is used by the ANSI protocol on UD71 when RS232 is needed. It is also used by the MD29MON protocol on the UD7# (not UD71), MD29 and MD29AN.

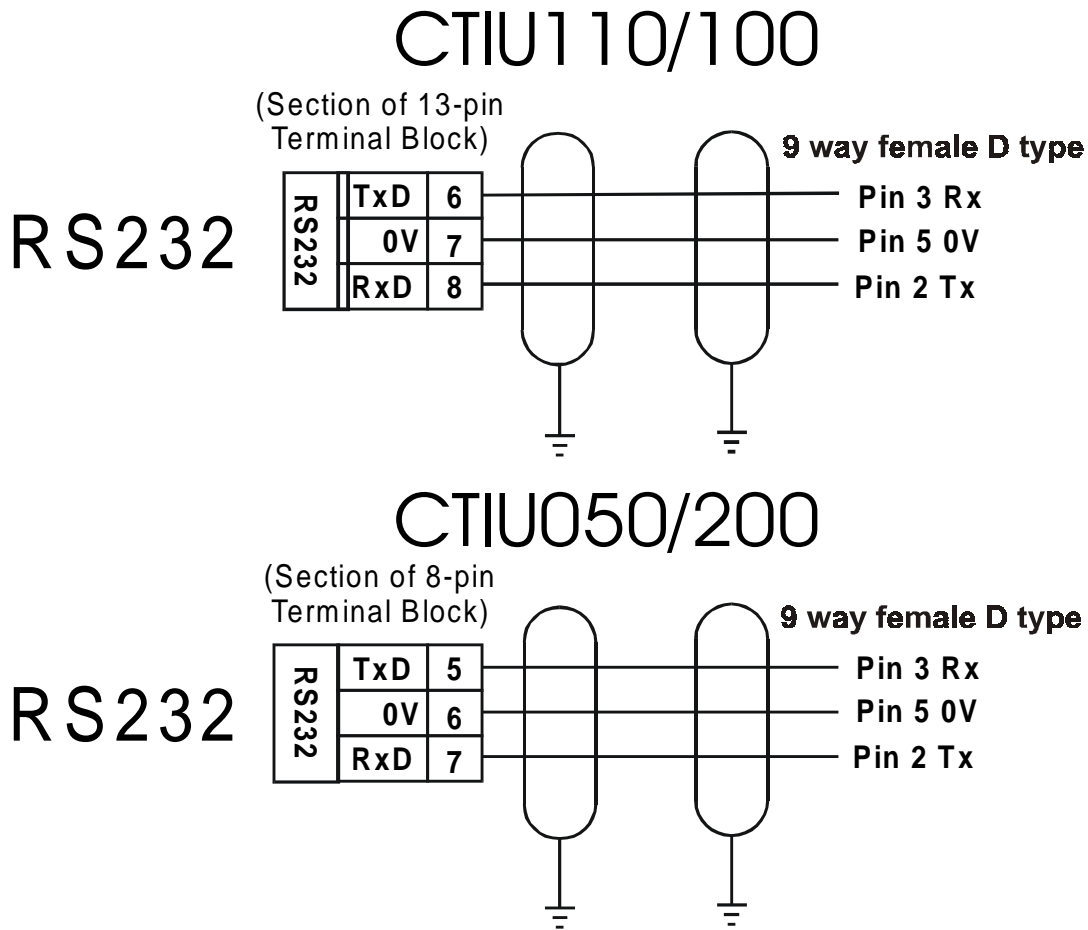


Figure 6.3 Wiring for CT devices using RS232

6.1.4 CTNet wiring guidance

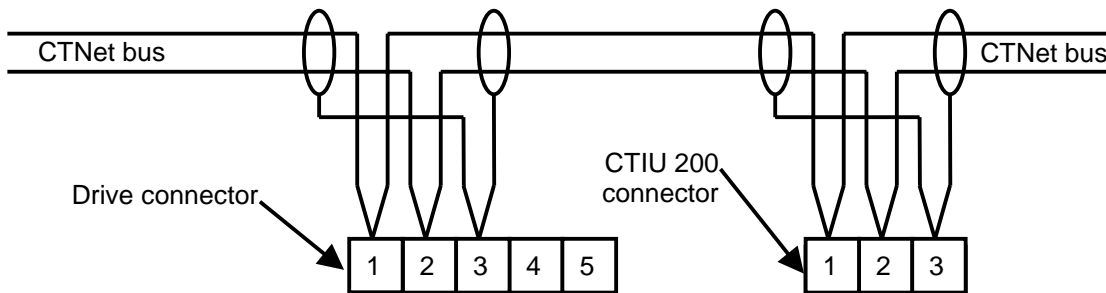


Figure 6.4 CTNet wiring

Refer to chapter 16 for fitting details of CTNet SmartStack adapter. This protocol & hardware is supported by MD29AN and UD75. A 78Ω termination resistor will be required between Tb1 & Tb2 if the CTIU is the last node on the bus. Refer to CTNet manual for further information on wiring, cable lengths etc.

6.1.5 **Recommended Automation Equipment Communication Cables**

Control Techniques recommends the following cables for drive and other automation equipment communications using RS485:

Belden No. 8105, 9807 or 9832 – General Purpose

Belden No. 8165 – Heavy Noise Environment

For CTNet a special tested cable is available from Control Techniques, with part numbers:

SSP-3000-0050	50m Reel
SSP-3000-0100	100m Reel
SSP-3000-0200	200m Reel

6.2. Control Techniques Device Setup & Usage Details

6.2.1 **Control Techniques ANSI comms protocol and the CTIU: Generalities.**

- ◆ The unit uses Unidrive address rules so group addressing is supported; this means that the default address (1) for mentor will not work with the unit. Mentors will need to be re-addressed to Unidrive legal numbers (11-19, 21-29, 31-39 etc).
- ◆ All parameters passed to and from the drive are handled by the CTIU as integers i.e. value 45.4 becomes 454 for reads (vice versa for writes) this is important when using the scaling facilities, text lookups etc. Usually numerical drive parameters should be accessed as signed 16 bit, (unsigned may be used if required but take care with range).
- ◆ When using the ANSI protocol, the unit can talk to 32bit virtual menus in the UD70 / MD29 but these will read as signed or unsigned 16 bit numbers – take care with the range used. Alternatively 32 bit access can be turned on in the embedded field dialog in which case the unit will look for 2 consecutive registers. treating the first as least significant 16 bits and the second as most significant 16 bits, these two are then combined to give a signed or unsigned 32 bit number. This feature cannot be used with menus 18, 19 & 20 as values are restricted to +/- 32000.
- ◆ When using the Modbus RTU or ASCII protocol only 16 bit transfers are supported by CT devices, The CTIU supports 32 bit transfers consequently do not select 32 bit transfers for any field on the CTIU when using Modbus.
- ◆ When using the MD29MON protocol or CTNet 32bit registers in the PLC or other virtual menu area will be read as 32 bit in a single transaction.
- ◆ Group broadcast may be used provided drive 1 in the particular group exists (Unidrive only).
- ◆ Global broadcast may be used by sending to address 0 provided drive 11 exists, Mentor broadcast is supported in this mode but the first drive must be address 11, other drives should follow Unidrive address rules. With care mixed (Unidrive & Mentor) networks can be supported for broadcast in this mode but all broadcast parameters should be integer.
- ◆ For CTNet communications using a CTIU 200 an optional CTNet SmartStack module is required.

6.2.2 **CTNet (UD75)**

Function	Parameter	Comments
Node address	#20.01	1 - 255
Speed (Kb/s)	#20.02	0 = 5 Mb/s, 1 = 2.5 Mb/s 312.5Kb/s

6.2.3 CTNet (MD29AN)

Function	Parameter	Comments
Node address	#14.05	1 - 255
Speed (Kb/s)	#11.01	0 = 5 Mb/s, 1 = 2.5 Mb/s 312.5Kb/s

6.2.4 Mentor drive

Function	Parameter	Comments
Node address	#11.11	Use Unidrive address rules (see note above)
Speed (Kb/s)	#11.12	0 = 4.8, 1=9.6
Mode	#11.13	Must be set to 1

6.2.5 MD29

Function	Parameter	Comments
Node address	#14.01	Uses Unidrive address rules
Mode	#14.02	1 = 4 wire ansi, 5 = 2 wire ansi, 13 = Modbus RTU 14 = Modbus ASCII.
Speed (Kb/s)	#14.03	Enter 1 st 2 digits of required speed (1 st only for speeds < 1000)

Parameters given for Mentor only, please check documentation for CDE, older MD29 capable CT drives are not supported

6.2.6 Unidrive + UD71

Function	Parameter	Comments
Node address	#11.23	Uses Unidrive address rules
Mode	#11.24	0 = 2 wire ansi, 1 = 4 wire ansi
Speed (Kb/s)	#11.25	0 = 4.8, 1=9.6, 2 = 19.2

6.2.7 Unidrive + UD7# (not UD71)

Function	Parameter	Comments
Node address	#14.01	Uses Unidrive address rules
Mode	#14.02	1 = 4 wire ansi, 5 = 2 wire ansi, 13 = Modbus RTU 14 = Modbus ASCII.
Speed (Kb/s)	#14.03	Enter 1 st 2 digits of required speed (1 st only for speeds < 1000)

6.2.8 Commander SE

Function	Parameter	Comments
Node address	#11.23	Uses Unidrive address rules
Mode	#11.24	0 = 2 wire ansi, 1 = Modbus RTU
Speed (Kb/s)	#11.25	0 = 4.8, 1=9.6, 2 = 19.2

6.2.9 CDE

Function	Parameter	Comments
Node address	#11.23	Uses Unidrive address rules
Mode	#11.24	0 = 4 wire ansi,
Speed (Kb/s)	#11.25	0 = 4.8, 1=9.6, 2 = 19.2

6.2.10 Dinverter

Function	Parameter	Comments
Node address	#b.23	Uses Unidrive address rules
Mode		Fixed 2 wire ANSI
Speed		Fixed at 4800

Menus a – f are not available to the CTIU.

6.3. MC204 / 216

Although an ANSI program is available for the MC controller, we recommend the use of Modbus protocol for the MC controller as it is simpler to set up.
To set up MODBUS RTU with MC2##

To set up the motion controller you need to execute 2 lines of basic.

```
ADDRESS = n
```

Where n is the number of the node

```
SETCOM(baudrate, databits, stopbits, parity, [port  
number], [control])
```

Parameters	Settings
baudrate:	1200, 2400, 4800, 9600, 19200 or 38400
databits:	7 or 8
stopbits:	1 or 2
parity:	0=none, 1=odd, 2=even
port number:	0, 1 or 2 (If not specified this parameter defaults to 0)
control:	On channel #1 XON/XOFF can be made active or disabled: active, 0=off. Setting value 4 activates the MODBUS RTU mode.
Note:	On power up the controllers always set the serial ports to 9600, 7, 2, even, XON/XOFF active.

Suggested settings:

```
ADDRESS = 1  
SETCOM(19200, 8, 1, 0, PORT_No, 4)
```

With MC204

For RS232 Port_No should be 1
For RS485 Port_No. Should be 2

Limitations:

MC204 and MC202 can only support the protocol at baud rates up to 19200.

Version 1.48 of the MC system file can only handle 16 bit-unsigned variables, the next version of the system file will fix this problem.

6.4. Other Automation Equipment (AE) Communications Connections

6.4.1 RS-232 Connection

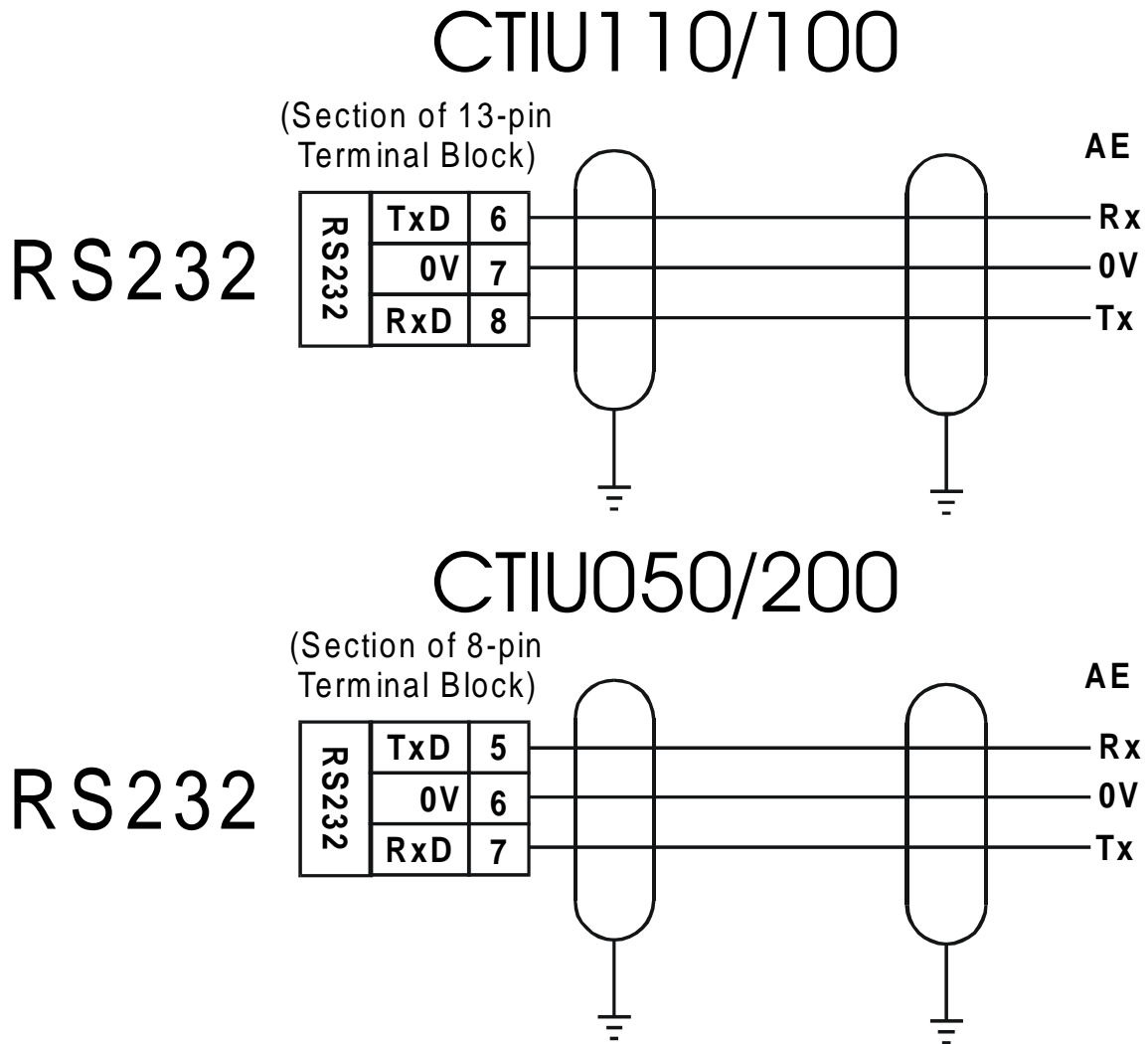
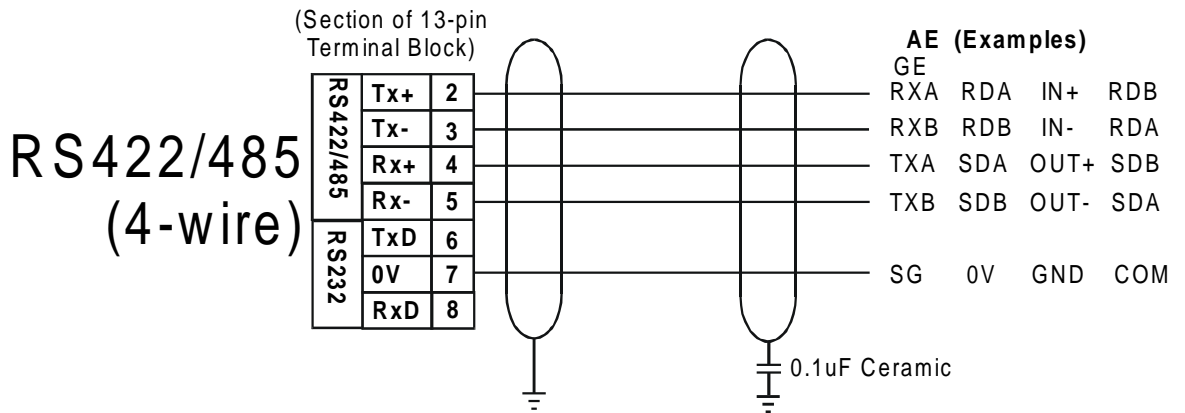


Figure 6.5 – RS-232 Connection for other equipment

Note: Ground Connections at Both Ends.

CTIU110/100



CTIU050/200

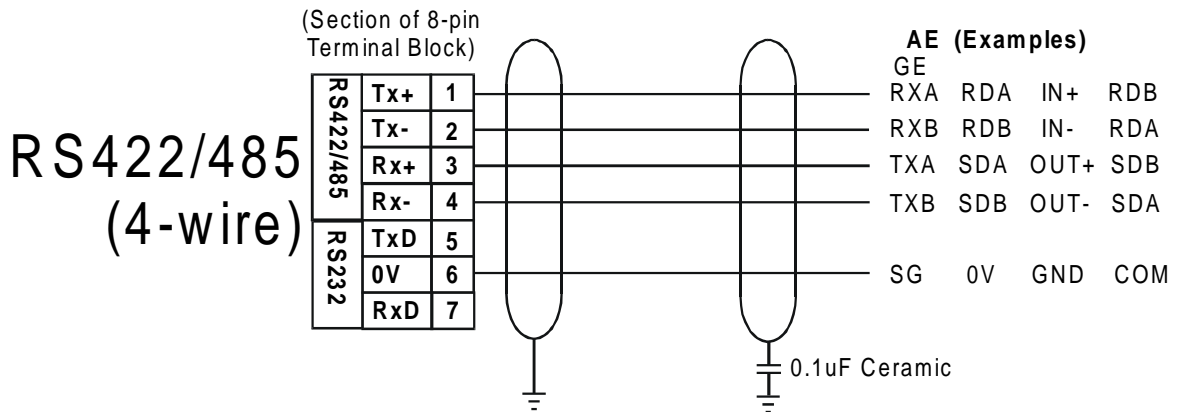
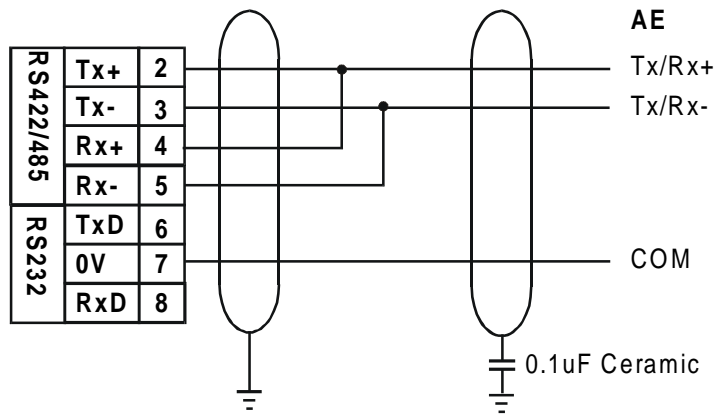


Figure 6.6 – RS-422/485 4

Note: The descriptions used by different manufacturers for RS-422/485 connections vary. Please refer to the automation equipment manufacturers own manuals for connection details.

CTIU110/100

RS422/485
(2-wire)



CTIU050/200

RS422/485
(2-wire)

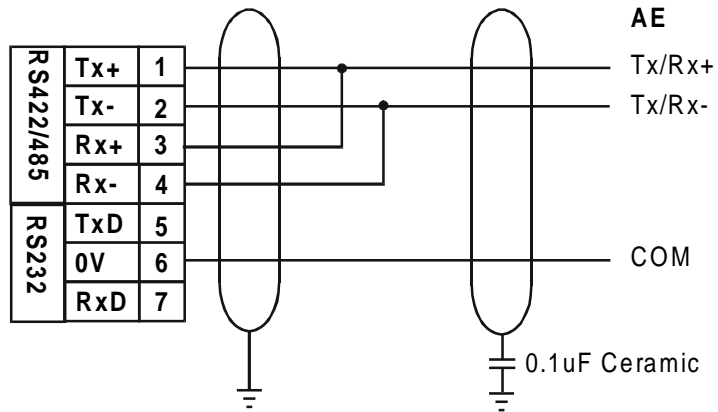


Figure 6.7 – RS-485 Two-

7. GETTING STARTED

7.1. 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:

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.

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.

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.

RAM Test

Test either segment 0000 or segment 1000 (on the CTIU100/110) 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**.

7.2. 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)	CTIU100/110	Pin male D link connector	pin 2 to pin 3
RS-232 (J3)	CTIU100/110	13-pin phoenix connection	pin 6 to pin 8
RS-422/485 (J3)	CTIU100/110	13-pin phoenix connection	pin 2 to pin 4 and pin 3 to pin 5.
Current Loop	CTIU100/110	13-pin phoenix connection	pin 1 to 9, pin 10 to 11 and pin 12 to 7
PC	CTIU050	Pin male D link connector	pin 2 to pin 3
RS-232	CTIU050	8-pin phoenix connection	Pin 5 to pin 7
RS-422/485	CTIU050	8-pin phoenix connection	Pin 1 to pin 3, Pin 2 to pin 4

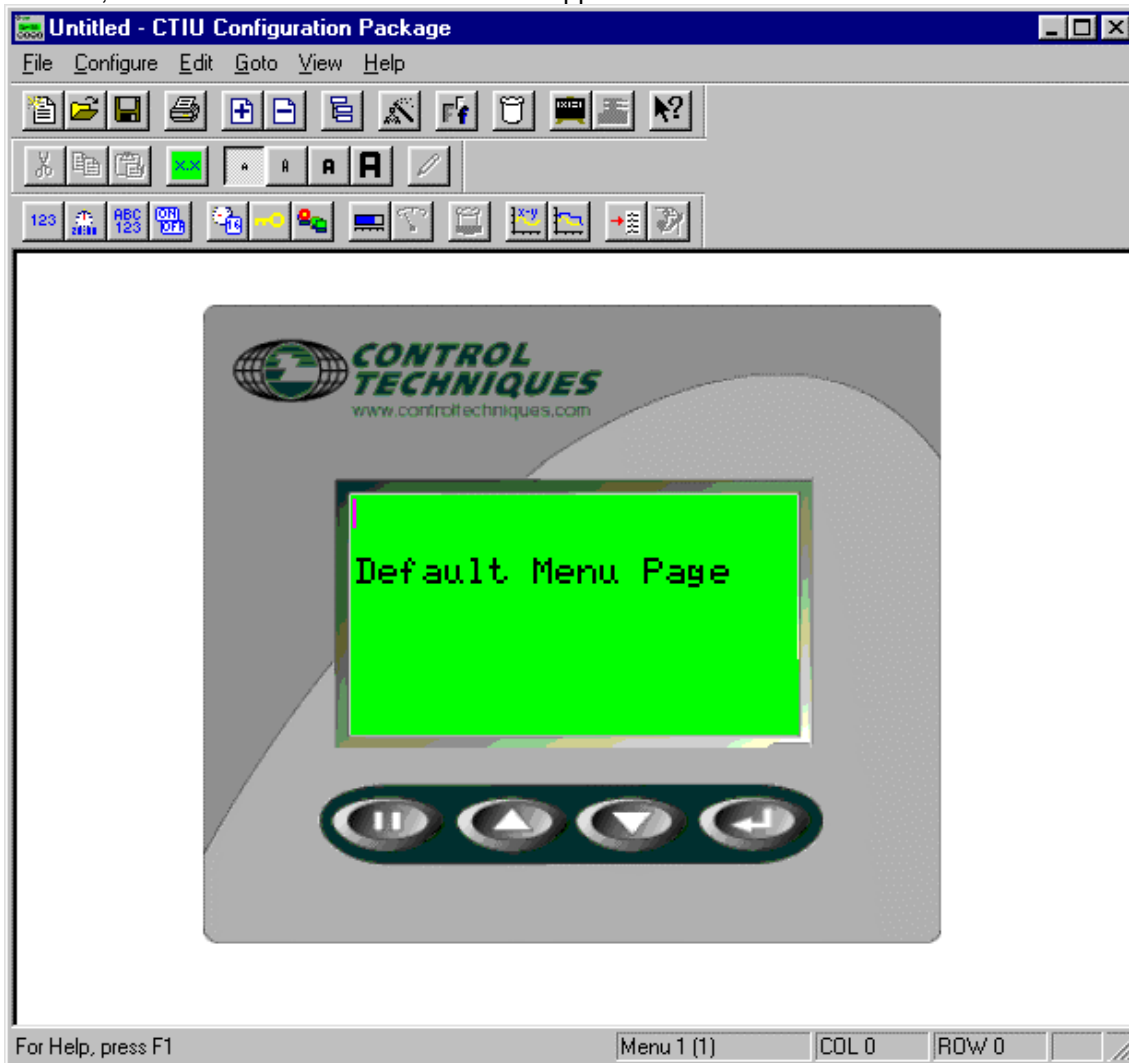
NOTE: current loop is not installed on standard models, as such a standard model will fail the current loop-back test. Current Loop is not an option on the CTIU050/20X.

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

7.3. Selecting the Automation Equipment

The following points are covered in this section:

- a. Connecting a PC to the CTIU050/100/110/20X;
 - b. Choosing the drive or PLC connected to the CTIU050/100/110/20X see also sec 6.2.
 - c. Selecting the protocol to be used.
1. Install the **CTIU** software on your PC (if not already done). Double-click on **CTIU** Software icon; and the default screen shown below appears.



2. From **Configure**, p **Figure 7.1 - Default Screen**
3. Connect the CTIU050/10X/11X/20X (**PC Port**) to a serial (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 CTIU050/10X/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 automation equipment is different than the protocol currently installed on the CTIU050/100/110/20X, a new protocol must be loaded.

6. From the **Configure** menu, click **Communication Settings** and select manufacture of the automation equipment, followed by the type. The default setting for this equipment will be displayed in the window. Click **OK** to accept.

7. ANSI
 If the default setting does not match the communications settings of the automation equipment, select the appropriate **Baud Rate**, and **Communication Mode** (see below, for CT equipment the **Parity, Data Bits, Stop Bits do not need to be changed**). See figure 7.2.
 CNet
 Simply select the Baud rate appropriate for the network you are going to connect t and the HMI node address for the CTIU unit. In most cases the default value of 255 will be appropriate and will only need to be changed if another unit is already using this address, Both
If you are connecting to a single node enter the appropriate **Global Remote Node ID** **leaving network mode unchecked**. For multidrop installations check the box and you will need to enter the required node for each embedded field on your display,

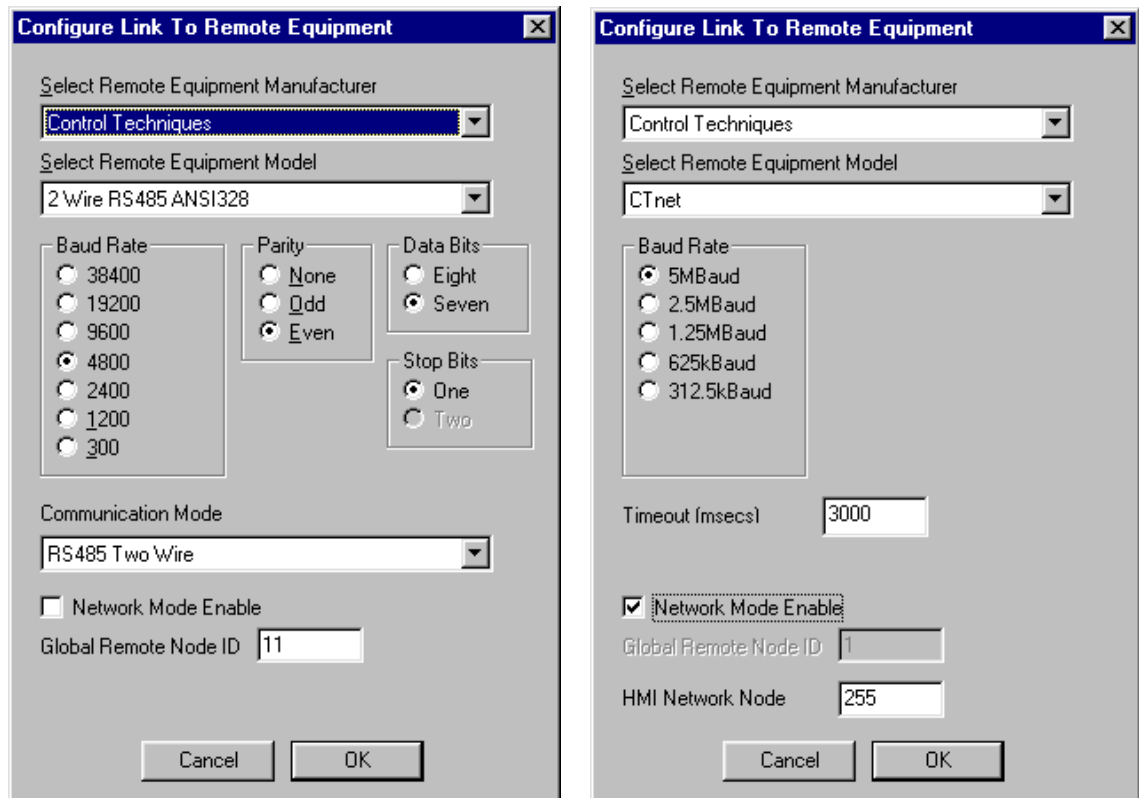


Figure 7.2 – AE Configuration Boxes showing ANSI & CNet setups

8. To update the protocol, select **File**, then **Update TIU Protocol**. The programming tool should select the correct folder for you. (Older versions did not select this folder automatically: the default path is C:\Program files\control techniques\CTIU\protocols\{0xx,1xx, or 2xx for 50, 100 or 200}). The appropriate file for the selected the automation equipment, will be displayed in the file name window. Click **OK**. A **"SYSTEM SHUTDOWN"** message appears on the CTIU050/10X/11X/20X.
9. **Once this is done you can change comms speeds, address etc without having to download the protocol again. These details are also downloaded with the screen configuration, and so can be easily changed.**

7.4. Details for setting up standard serial comms

7.4.1 Communication Mode settings available for standard serial comms.

The Tiu is capable of operating in a number of electrical standards and the communication mode selection box is used to indicate which should be used. The selection made effects only the electrical standard used to implement the serial link, not the data so transferred. i.e. selecting modbus and RS422/485 Four Wire (Tiu Slave) does not make the unit function as a modbus slave, merely as a master whose transmitters are turned off when not transmitting.

The modes supported are...

RS422/485 Four Wire (Tiu Master)

Both the RS422 transmitters and the receivers are permanently enabled. Choose this option where the connected device uses a four wire link and the Tiu is the master on the link.

RS232

Choose this option where a basic three wire RS232 link is required with no handshaking.

RS485 Two Wire

Here the RS422 transmitters are enabled only when the terminal is sending data. The receivers are switched off when transmitting but switched on at all other times. Choose this setting when using a two wire RS485 link

Current Loop

Here the current loop receiver and transmitter are permanently enabled. The current loop option requires a pair of current loop driver chips to be fitted to the terminal. Some terminals are not capable of upgrade. (Only Tui100 and Tiu110 are) Choose this setting when the device to be connected to has a current loop interface (Also described as 4-20 mA loop interface).

RS422/485 Four Wire (Tiu Slave)

The RS422 transmitter is enabled whenever data is being transmitted but the receivers are permanently enabled. Choose this option where the connected device uses a four wire link, but the Tiu is one of a number of slaves on the link.

RS232 With Active CTS

Here the RS422 Rx Input is treated as a clear to send. This is achieved by tying Rx+ (RS422) To 0V and feeding the CTS input into Rx- (RS485). Use RS232 transmit and receive as normal. Use this option where the slave device is slow and will switch off CTS to indicate it is not ready to accept data.

7.4.2 Protocol selection details for Control Techniques devices.

Devices not supported:

Any older CT drive not using a Mentor II style menu & parameter set, this includes

- ◆ All vector product prior to Unidrive
- ◆ Commander CD / CD2 open loop drives (the New Commander SE is supported)
- ◆ Mentor 1
- ◆ Spindax
- ◆ Dynamax
- ◆ Digitax
- ◆ Dominax
- ◆ Diverter B

Summary protocol details for supported devices are given below

Device	Protocols supported	baud rate range	Electrical mode
Mentor II	ANSI328	4.8 – 9.6 Kb/s	RS485
Md29	ANSI328, Modbus RTU, Modbus ASCII, MD29MON	0.3 – 38.4 Kb/s	RS485 (not MD29MON) RS232 (MD29MON only)
UD71	ANSI328	4.8 – 19.2 Kb/s	RS485, RS232
Other UD7#	ANSI328, Modbus RTU, Modbus ASCII MD29MON	0.3 – 38.4 Kb/s	RS485 (not MD29MON) RS232 (MD29MON only)
CDE	ANSI328	4.8 – 19.2 Kb/s	RS485
MC204 / 216	ANSI328, Modbus RTU	4.8 – 19.2 Kb/s	RS485, RS232
Diverter A	ANSI328 (2 wire only)	4.8 Kb/s	RS484 2 wire only
Commander SE	ANSI328 (2 wire only), Modbus RTU	2.4 – 19.2 Kb/s	RS484 2 wire only

Refer to chapter 6 for further setup details for CT devices

Where available you should choose Modbus RTU (it is more efficient than ANSI) which you will find in the Miscellaneous manufacturer section of the comms setup dialogue. Select 2 or 4 wire from the communications mode menu (2 wire Modbus with UD7# / MD29 is supported from V2.8 firmware onwards).

If you use ANSI in 4 wire mode (or RS232 with UD71) then choose ANSI 4 wire (On CTIU software prior to May 2000 this protocol is denoted as Unidrive or Mentor), from the remote equipment model menu in the dialogue. If you are using 4 wire this will also support the CDE. Then select either RS422/485 4 wire (TIU master) or RS232 in the communications mode menu.

If you use ansi in 2 wire mode then choose “2 wire RS485 ANSI 328” this supports all the 2 wire products. Then select RS485 2 wire in the communications mode menu.

7.4.3 Choice of data rate

The maximum data exchange rate available depends on the device in use and varies between 9600Kb/s up to 38400 Kb/s at the time of writing. With the recommended cable and correct installation the best choice of speed is the fastest available on the device. With UD70 & MD29 38400 is available but when the processor is heavily loaded for instance when running position control plus an extensive user control program there may not be enough resource in the second processor to service the serial port at this speed in which case use 19200Kb/s.

7.5. Proving Communications

Connect the CTIU050/10X/11X/20X to the automated equipment using the cable drawing provided.

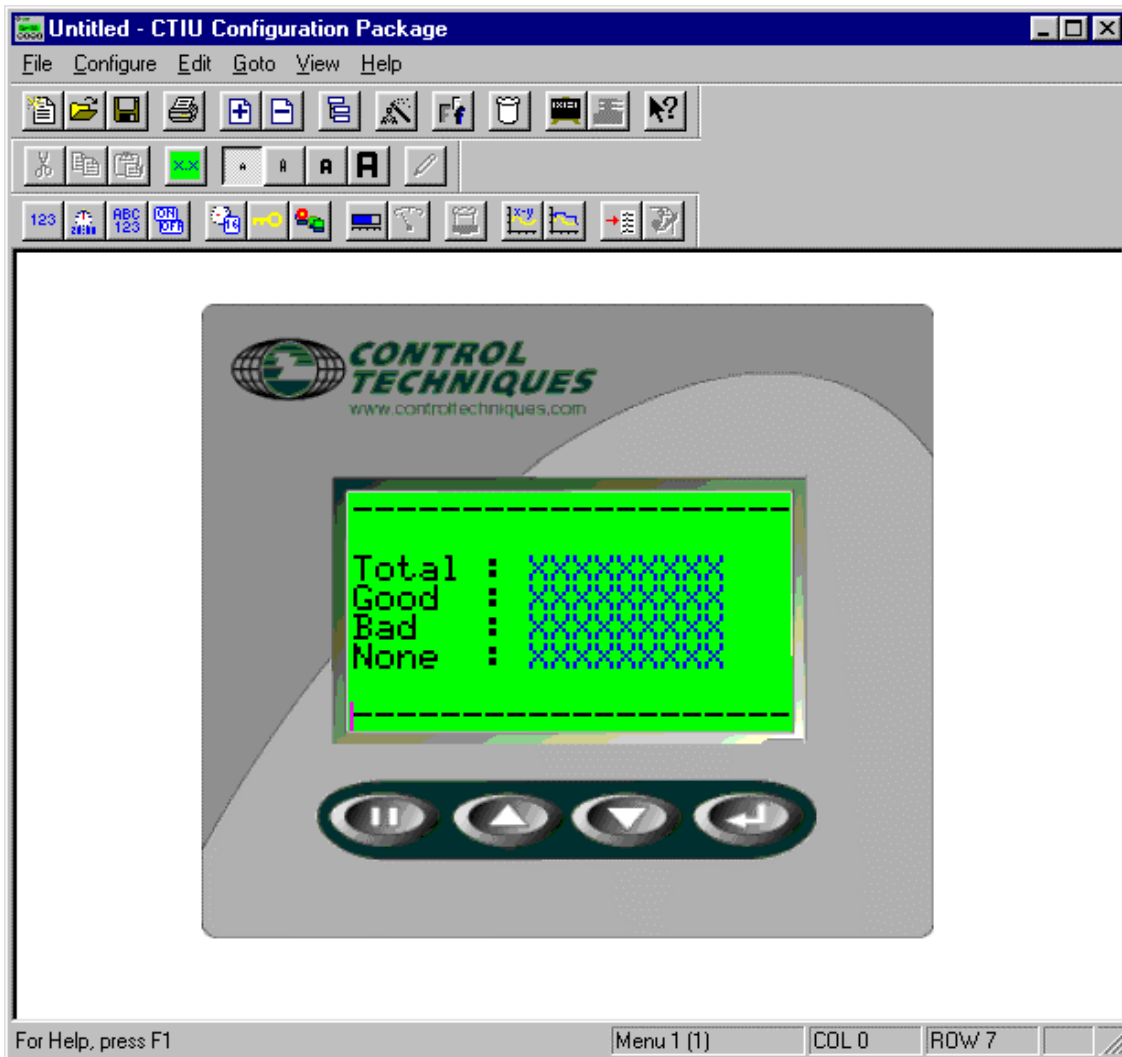


Figure 7.3 – Start-up

The following steps verify communications between the CTIU050/10X/11X/20X and the automation equipment. The figures shown here are for the CTIU100. 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 7.3. Move the cursor to the line of dashes at the bottom of the screen about 5 characters in and double click, your are presented with an array of pushbuttons, click the top left one, and the dialog below should open.

Figure 7.4 – Numeric data dialogue

Fill it in as shown. This will ensure that the CTIU polls the drive for data. Click Ok and you should have a screen looking like figure 7.5

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 CTIU050/100/110. To do this, from the **File** menu select **Download Project to Tiu**. A status bar appears indicating the progress of the download. On the CTIU050/10X/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 CTIU050/10X/11X/20X.

4. After the transfer, the CTIU050/10X/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.

7.6. Icon Descriptions

The CTIU050/10X/11X/20X software main screen is shown in Figure 7.4. Along the top are several short cut icons. Many are standard Windows™ icons, some however, are specific to the CTIU, these are labeled.

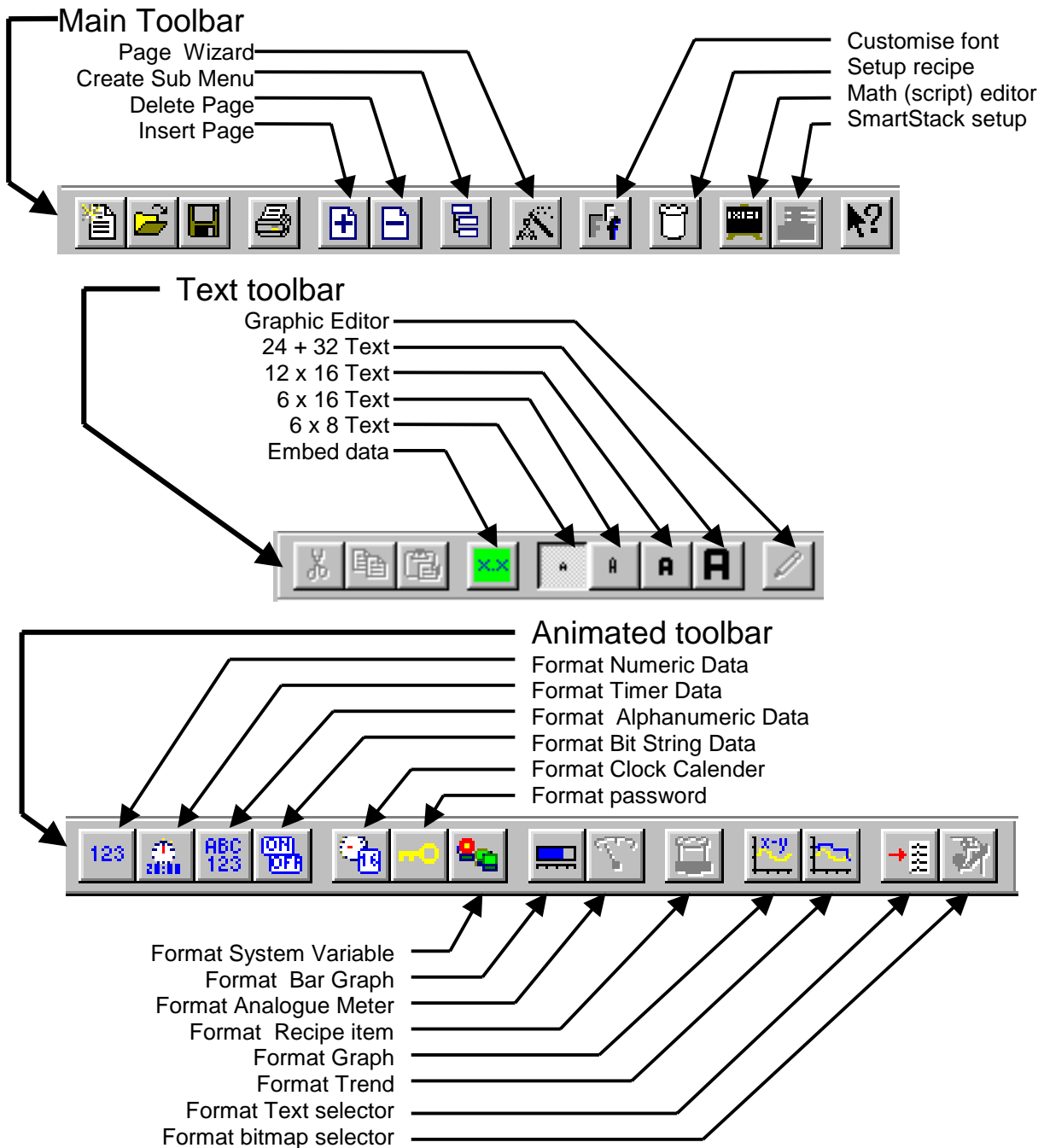


Figure 7.5 Toolbar icons

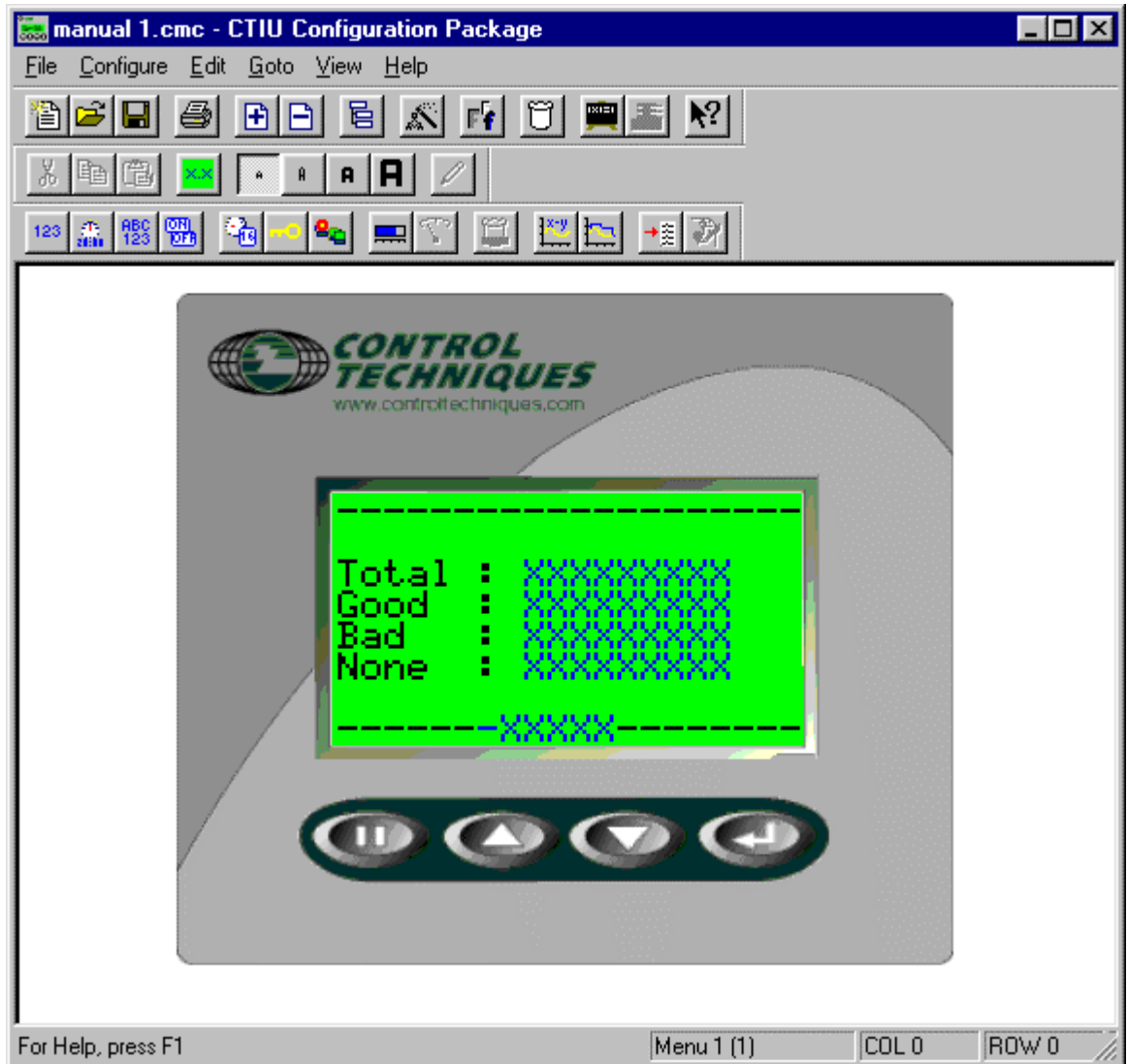


Figure 7.6 – CTIU050/100/110 Software Screen

7.7. 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.

7.8. 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

8. ABOUT PROJECTS

8.1. General

This chapter describes the procedure for configuring the CTIU050/10X/11X/20X. This includes loading, saving, downloading, uploading, verifying and updating the protocol.

8.2. 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 given 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 Fig 8.1 appears.

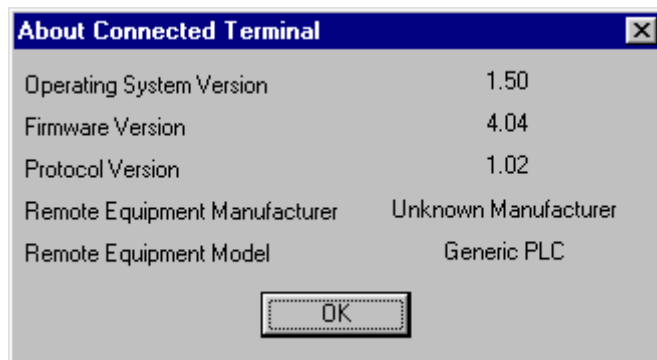


Figure 8.1 About TIU Terminal Configuration

8.3. Creating a New Project

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

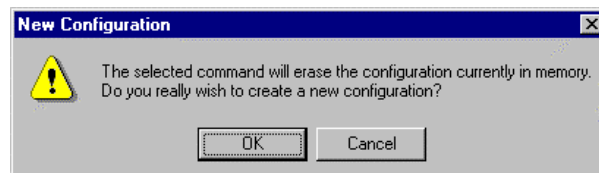


Figure 8.1 – New Project

3. Click **OK**.

8.4. 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**.

8.5. 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**.

8.6. Downloading a Project

8.6.1 General

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

- a) The correct TIU terminal is connected to the PC.
- b) Checks the correct Protocol file is loaded to the terminal.
- c) Checks 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 CTIU050/10X/11X/20X resets itself.
4. The downloaded project now runs.

8.7. 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.

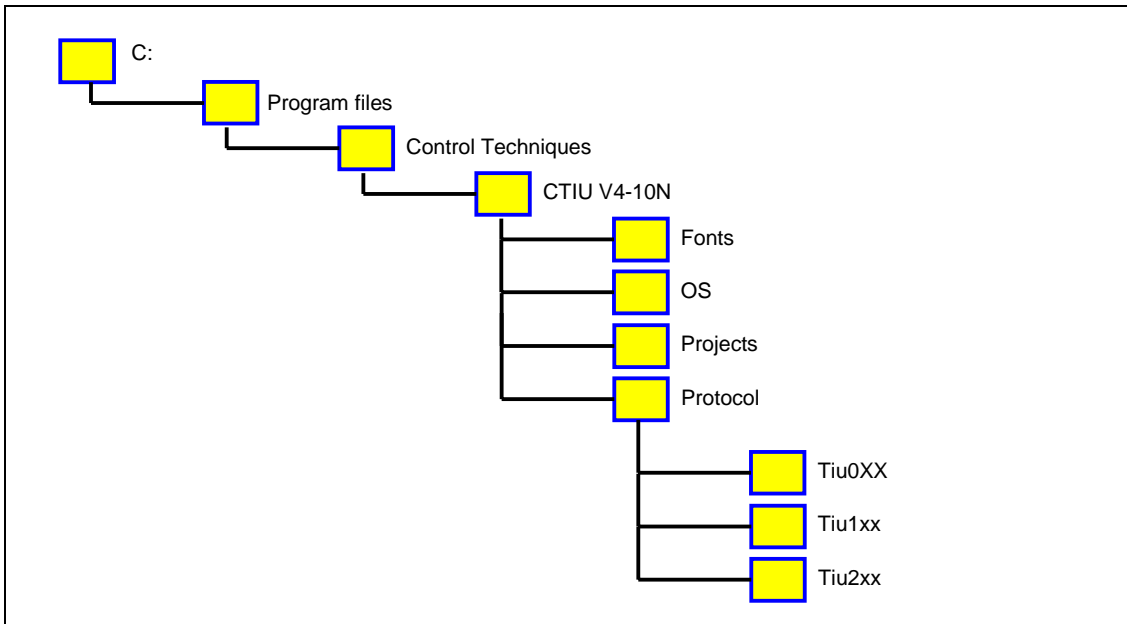
3. After the project has been uploaded, the message “**Transfer Complete**” appears.

8.8. Verifying a Project

1. Select **Verify Project** from the **File** menu.
2. A status bar appears indicating verification progress.

8.9. Updating the Protocol

When the software is installed the user decides where the main CTIU folder resides. The default structure when this manual was printed is:



8.9.1 Directory descriptions

- ◆ Fonts: Default store for CTIU font definitions
- ◆ OS: the 3 CTIU operating system files are stores here (auto selected by program)
- ◆ Projects: use this for your project files
- ◆ Protocol: the various drive & PLC communication protocol files are in here.
 - ◆ TIU0xx files for the CTIU50
 - ◆ TIU1xx files for the CTIU100/110
 - ◆ TIU2xx files for the CTIU200

8.9.2 Changing Protocols

In the protocol directory 3 folders are created, TIU0xx, TIU1xx and TIU2xx. The protocol files for the different terminal is loaded into these folders. The protocol files for the CTIU050 are loaded into Tiu0xx, the protocol files for the CTIU10X are loaded into Tiu10x and the protocol files for the CTIU20X are loaded into Tiu20x.

The name of the protocol file is broken up into three section, 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 CTIU10X

df1_R4.2xx

This is the protocol file for release 4 software for Allen Brabley PLC, for the CTIU20X

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 CTIU050/10X/11X/20X resets itself. The correct PLC type is displayed on the CTIU050/10X/11X/20X.
7. Next, the project loaded runs.

8.10. Updating the Operating System

1. Select **Update Operating System** from the **File** menu.
2. Choose the updated file with the "BIN" extension. Click **OK**.
3. A status bar appears indicating download progress.
4. During the download process, CTIU050/10X/11X/20X displays the message "**SYSTEM SHUTDOWN**".

8.11. Printing

The CTSW232 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 8.3.

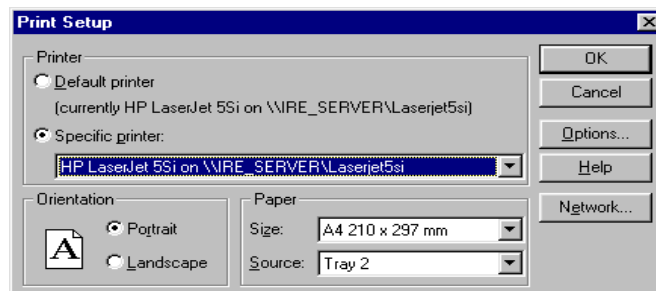


Figure 8.3 – Printer Set-up Box

8.12. 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**.

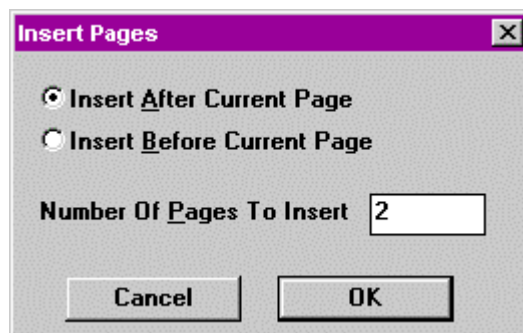


Figure 8.4 – Insert Pages Message

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.

Default Page Type

(CTIU20X Only)

With the CTIU20X series there are two types of pages.

- a. Text Page
- b. Graphic Page

The **CTIU** Software maybe set-up create either type of page by default or alternatively the software can be set up to display a warning message 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 CTIU20X is similar to the normal page created with the CTIU10X/11X, i.e. the same functions that are available on the CTIU10X/11X are also available on a **Text Page** of the CTIU20X. To avail of the extra graphic features of the CTIU20X a Graphic page must be created.

Graphic Page

On a page maybe 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.

8.13. Download/Upload Character Set (Not available with the CTIU050)

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.

8.13.1 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.

8.13.2 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.

8.14. Select Terminal Type

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

8.14.1 To select the Operator Station being used:

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.

8.15. 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.

8.16. Font Size (Not available with the CTIU050)

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.

8.16.1 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 **CTIU** software or on the TIU.

8.17. 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**.

8.17.1 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. For example, page 3 is intended to cause a jog forward when up key is pressed, jog back when down key is pressed, and home when the enter key is pressed.

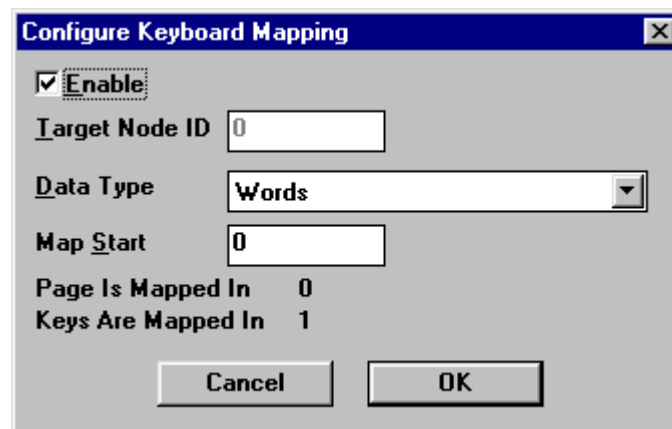


Figure 8.5 - Configure Keyboard Mapping Box

8.18. Function Keys

8.18.1 General

The CTIU050/10X/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 CTIU050/11X/20X can also be assigned functions in the **CTIU** 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 8.6.

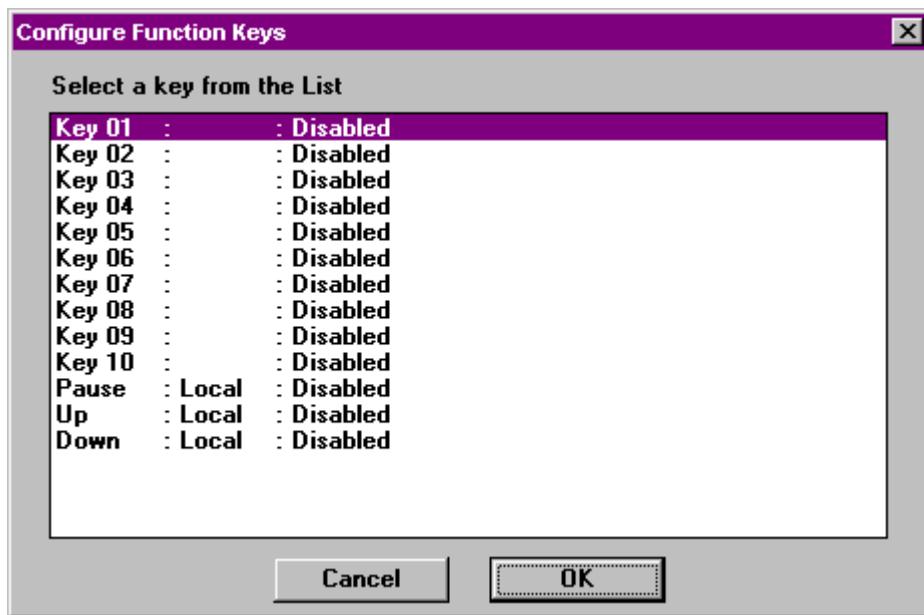


Figure 8.6 Configure Function Keys for the CTIU11X

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.

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

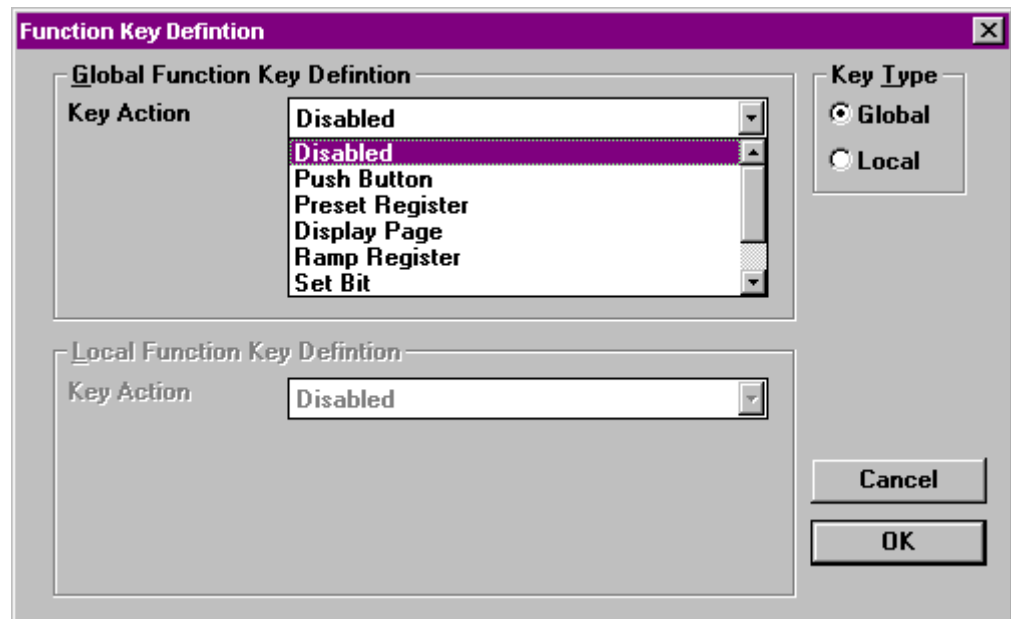


Figure 8.7 Function Key Definition

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.

NOTES


9. EMBEDDED DATA

9.1. General

On the CTIU050/10X/11X up to 8 embedded data fields may be placed on each page. On the CTIU20X 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 CTIU10X, 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.

- Double click the Display window area.
- Click the Embed Data icon 
- Chose Edit/Embedded data from the menu.
- 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 9.1). From this the programmer can pick which type of data they wish to embed.

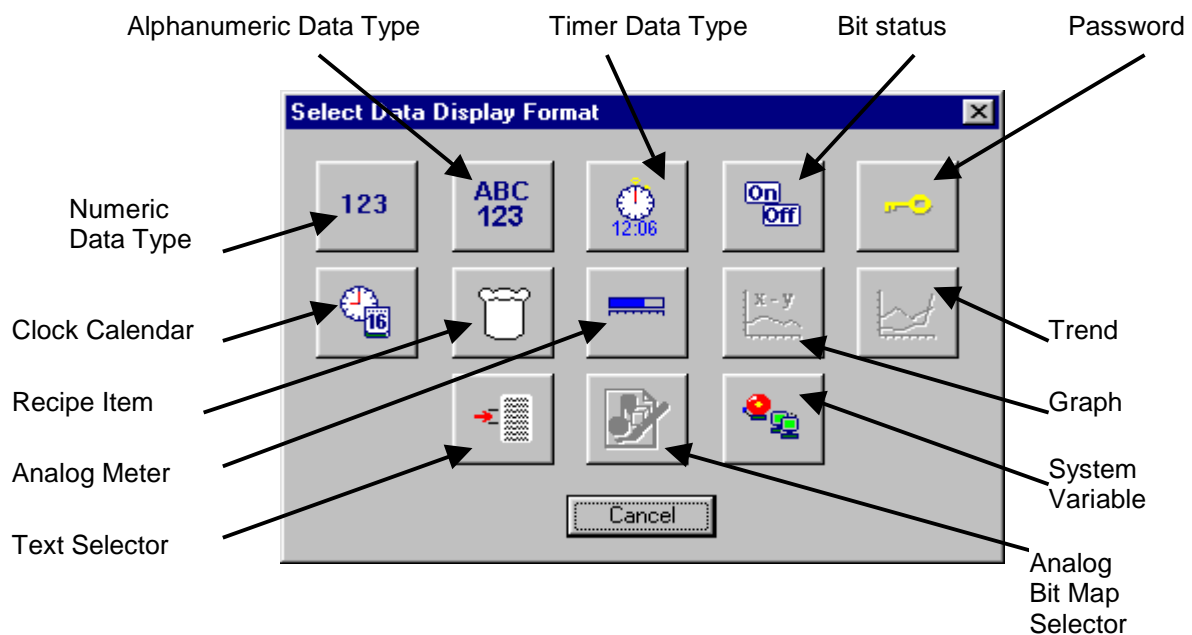


Figure 9.1 – Chose Embedded Data Type

9.2. Numeric Data

From the Embedded data list select **Numeric Data**, the screen shown in Figure 9.2 appears.

The screenshot shows the 'Configure Numeric Embedded Data' dialog box. The 'Remote Data Source' section includes 'Remote Node ID' (0) and 'Location' (0). The 'Data Type' is set to 'Words'. The 'Display Format' section has a dropdown menu showing a hex pattern, with '16-Bit' and 'Unsigned' selected. The 'Edit/Write' section has 'Enabled' unchecked. The 'Range Checking' section has 'Enable' unchecked, with 'Minimum' and 'Magimum' (sic) fields both set to 0. The 'Scaling' section has 'Enable' unchecked, with 'TIU Minimum' (0), 'TIU Maximum' (65535), 'Remote Minimum' (0), and 'Remote Maximum' (65535) fields. The 'Attributes' section has 'Flashing' unchecked. At the bottom are 'Change Type', 'Cancel', and 'OK' buttons.

Figure 9.2 – 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 automation equipment. 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.

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**.

9.2.1 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).

9.2.2 To change data registers contents from the CTIU050/10X/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 CTIU050/11X/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.

9.3. Alphanumeric Data

9.3.1 General

From the Embedded data list select **Alphanumeric Data**, the screen shown in Figure 9.3 appears.

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

- 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

Buttons at the bottom: Change Type, Cancel, OK.

Figure 9.3 – Alphanumeric Data

9.3.2 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.

9.4. Timers

9.4.1 General

From the Embedded data list select **Timers**, the screen shown in Figure 9.4 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

TIU Maximum: 65535

Remote Minimum: 0

Remote Maximum: 65535

Attributes: Flashing

Change Type Cancel OK

Figure 9.4 – Timers

9.4.2 To monitor Timers on the CTIU050/10X/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.

9.4.3 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.

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		

9.5. Bit Status

9.5.1 General

This section describes the bit status functions available in the CTIU050/10X/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 9.5 – Configure Bit Status

9.5.2 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.

9.6. 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**.

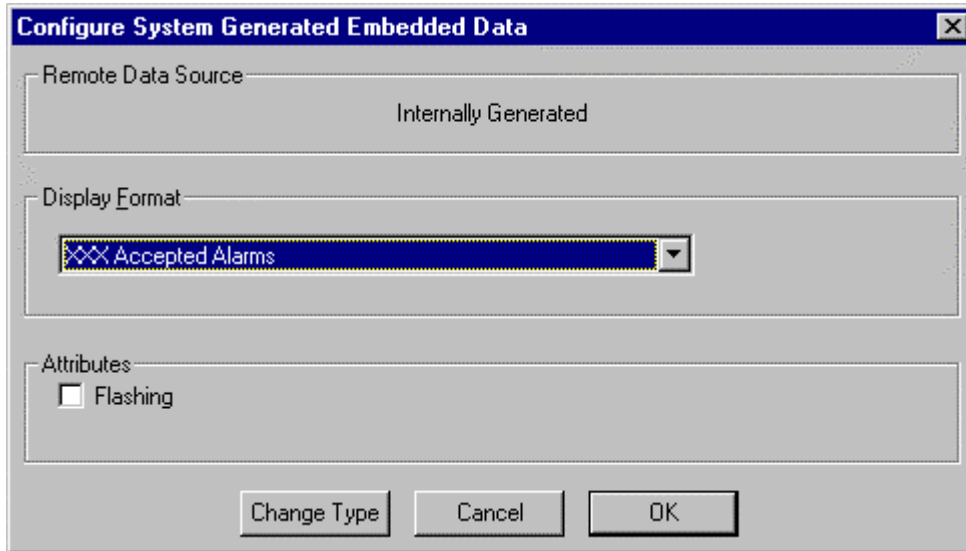


Figure 9.6 – Configure System Variable

9.7. Passwords

9.7.1 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

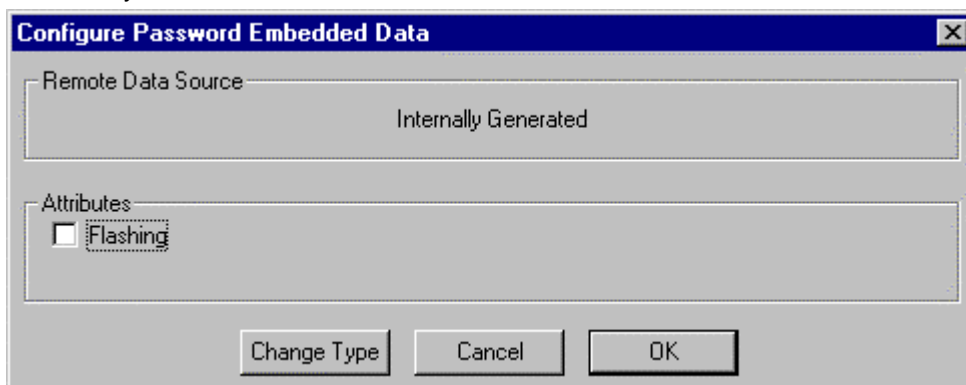


Figure 9.7 – Configure Password

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 'Create SubMenu' dialog box. At the top, the title bar reads 'Create SubMenu' with a close button. Below the title bar, there is a 'Number Of Pages' field containing the number '1'. Underneath, there are two checked checkboxes: 'Password Protect' and 'Authority Level Mode'. Below the 'Authority Level Mode' checkbox is a 'Level' field containing the number '0'. A section titled 'Authority Levels' 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 9.8 – Configure Password Authority Mode

9.7.2 To enter the password from the CTIU050/10X/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.

9.8. 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 9.9 – Configure Analog Meters

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

9.9. Text Selector

Text Tables are available in the CTIU050/10X/11X/20X **CTIU** 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 CTIU050/100/110.

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

9.9.1 Edit Text Tables

Text tables can be edited from the CTIU050/100/110. 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).

The screenshot shows a dialog box titled "Configure Text Selector 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:**
 - Table ID: 1
 - Edit Table button
- Edit/Write:**
 - Enabled checkbox (unchecked)
- Attributes:**
 - Flashing checkbox (unchecked)
- Buttons at the bottom: Change Type, Cancel, OK

Figure 9.10 – 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 CTIU050/10X/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.

To Add an Table Entry

1. Click Add Figure 9.11 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.

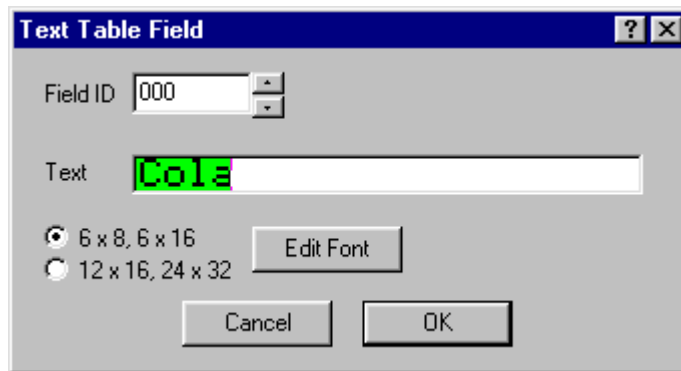


Figure 9.11 – Text Table Field Entry

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.

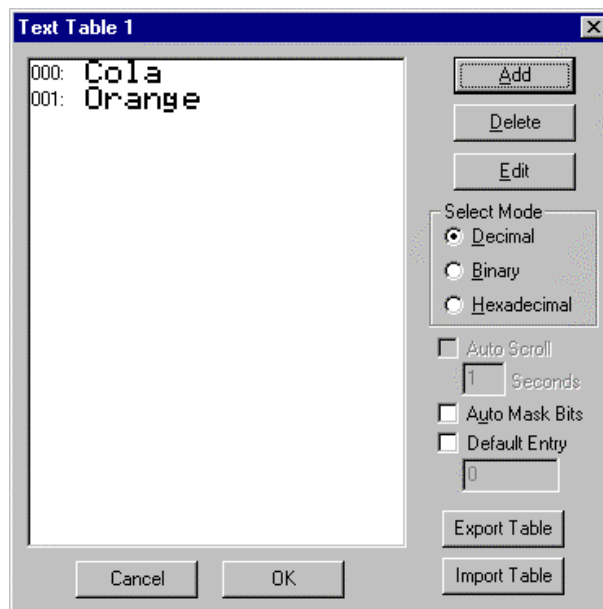


Figure 9.12 – Edit Text Table Entries

9.9.2 To edit a text table from the CTIU050/10X/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.

9.9.3 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.

9.9.4 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.

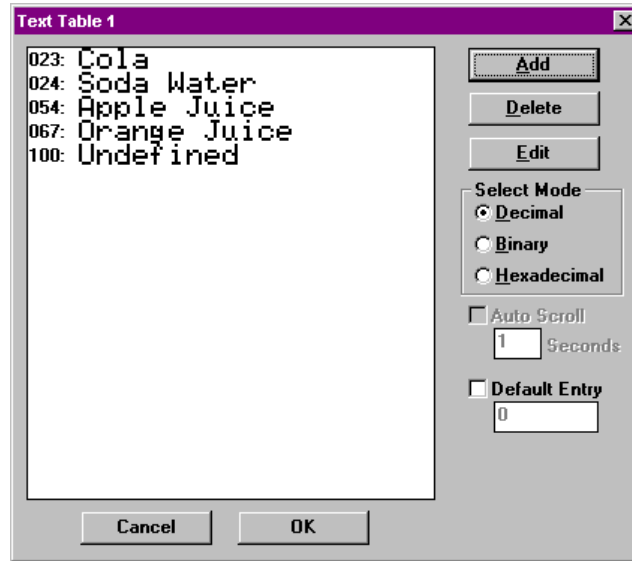


Figure 9.13 – Text Table 1

9.10. Clock Calendar

If the CTIU050/100/110 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.

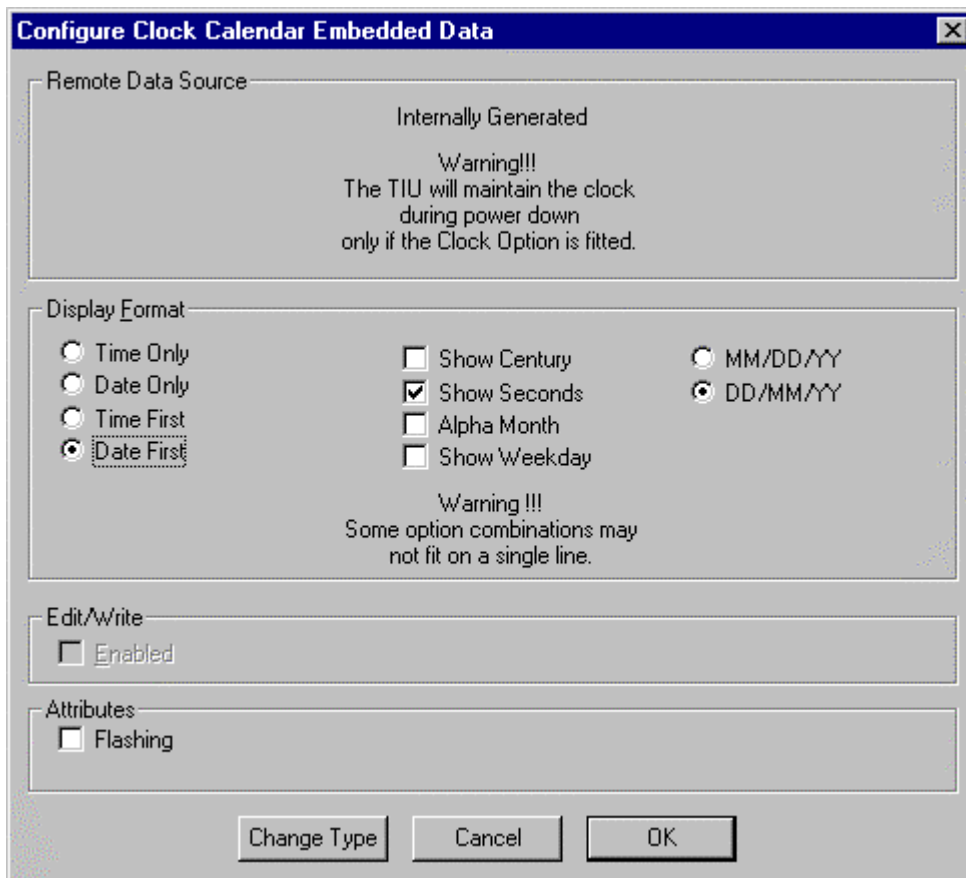


Figure 9.14 – Configure Clock Calendar

- Choose the Format of the time and/or date to be displayed on the CTIU050/10X/11X/20X. Click **OK**.

9.10.1 Clock Calendar Mapping

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

- From **Configure**, chose **Clock Calendar Mapping**.
- Click **Enable**. Select the **Data Type** (register or other) and first register (or other) for the **Map Start**. Click **OK**.
- The mapping is displayed in the **Map** field (see Figure 6.13).

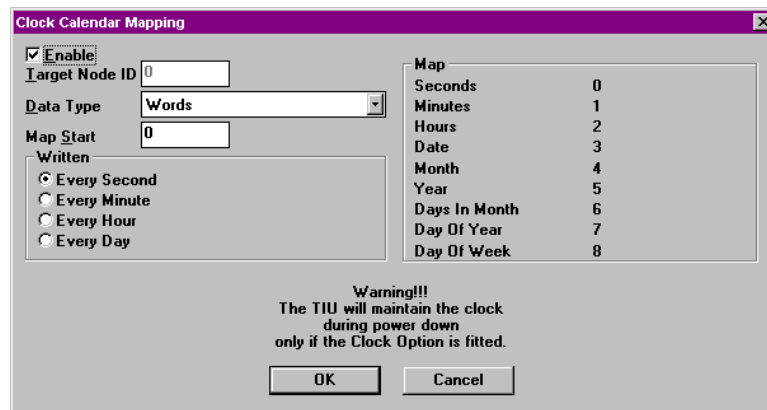


Figure 9.15 – Configure Clock Calendar Mapping

9.11. Menu Timeout

The Menu Timeout is a useful safety feature. This forces the CTIU050/100/110 back to the first (main) menu page after a set time period. For example, the CTIU050/100/110 is on an input menu page, after 30 seconds of no activity, the CTIU050/100/110 reverts back to the non-input (safety) main menu page. To set the timeout:

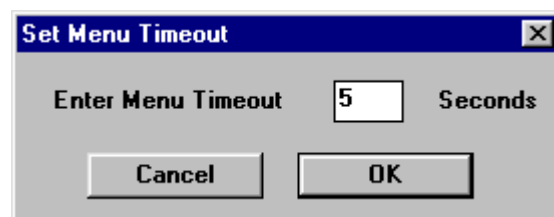


Figure 9.16 – Set Menu Timeout Box

From the configuration menu, select **Configure**, then **Menu Timeout**. A timeout is set in **ALL** menu and sub-menu pages. Time-outs in each screen may be inhibited from the **Edit** menu. To disable the Timeout function, set the time to 0 seconds.

9.12. 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.

- 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.

9.13. 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

9.14. Scaling

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

9.14.1 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)

9.15. 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.

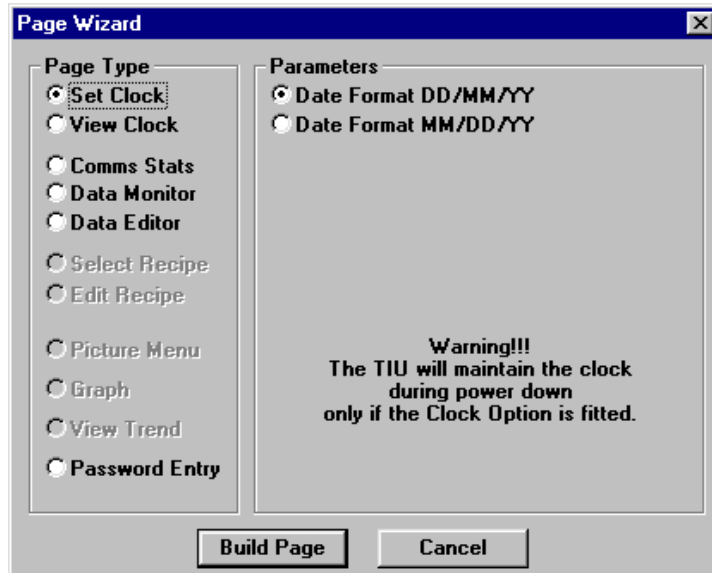


Figure 9.17 – Page Wizard

9.15.1 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**.

9.16. Graphing (Not available with the CTIU050)

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.

9.16.1 To Embed a Graph:

1. Select **Embedded Data** from the **Edit** 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**.

9.16.2 Enable Axes

When this option is selected the X and Y-axes of the Graph is displayed on the CTIU11X/CTIU20X 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.

Configure Graph Embedded Data

Remote Data Source

Remote Node ID: 0

Data Type: Words

Location: 0

Display Format

Tiu Graph

Range

Minimum: 0

Maximum: 0

Attributes

Flashing

Enable Axes

X-Axis Divisions X-Axis Sub-Divisions

Y-Axis Divisions Y-Axis Sub-Divisions

Change Type Cancel OK

Figure 9.18 Embedding A Graph

9.17. Trending (Not available with the CTIU050)

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 9.19 Embedding A Trend

9.17.1 Enable Axes

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

9.17.2 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.

9.17.3 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.

9.17.4 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.

NOTES

10. CHARACTER GENERATOR

10.1. General (Not available on the CTIU050)

The **CTIU** software allows the user to edit, create and display on the CTIU10X/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.

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.

10.2. 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 10.2) to be inserted.

10.3. To Create Or Edit a Character:

1. From **C**onfigure on the menu bar, choose **F**onts. The screen in Figure 10.1 appears.

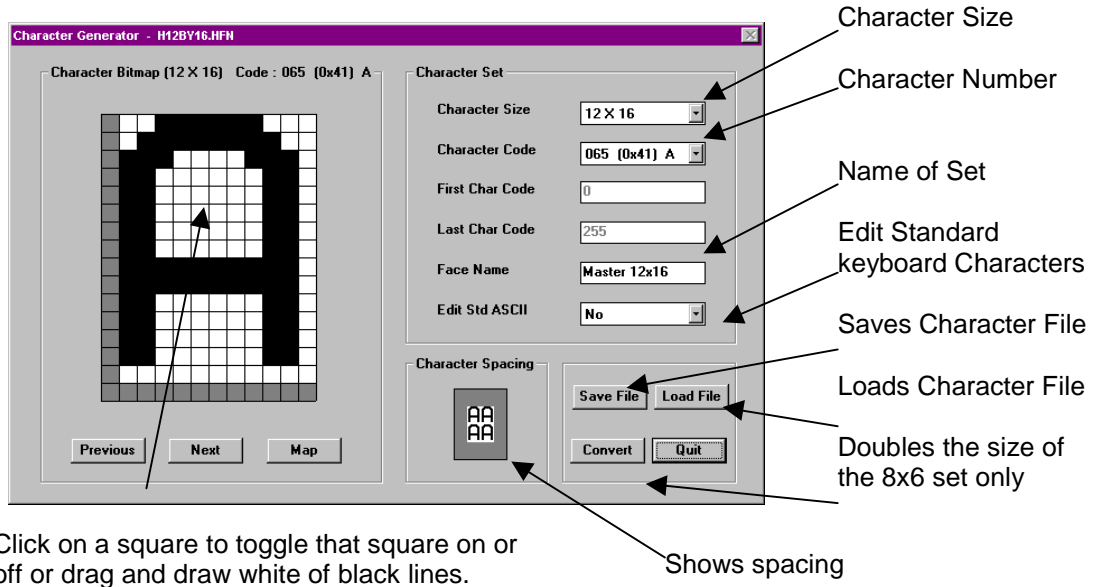


Figure 10.1 - Character Generator

2. Under **C**haracter Set, choose the **C**haracter Size to be edited. Beside **S**et Name, enter a name that describes this set.
3. Click on **M**ap to show the total character set. The screen in Figure 7.2 appears. The first four rows are the standard keyboard characters, which should not normally be edited. The fifth row is editable and useable. The lower three rows are the extended keyboard characters, which may also be edited if you do not need the characters. Click on the character to be edited or blank box to create a character.

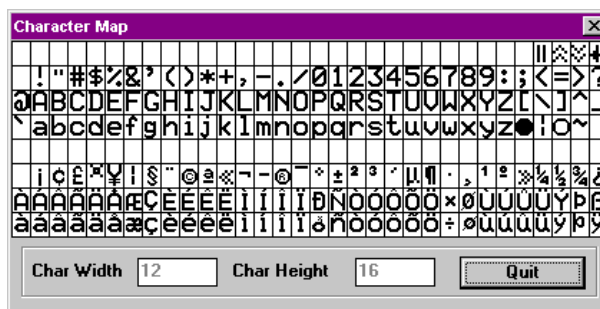


Figure 10.2 – Character Map

NOTE: Standard and Extended keyboard character are editable; however, this must be done with caution as it effects how characters are displayed on the CTIU050/100/110, i.e., changing "4" to • causes all 4's from the drive to be displayed as •. 454 is displayed as •5•.

4. Under the **Character Bitmap** (see Figure 7.1), 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.

10.4. International Keyboards

The **CTIU** 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

11. RECIPES

11.1. General

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

- a. Speed of 1000rpm, max torque 50%, acceleration rate of 100s 0 - max speed and deceleration rate of 200s 0-max speed;
- b. Speed of 500rpm max torque 40.0%, acceleration rate of 500s 0- max speed and deceleration rate of 150s max speed.

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

11.2. 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**.

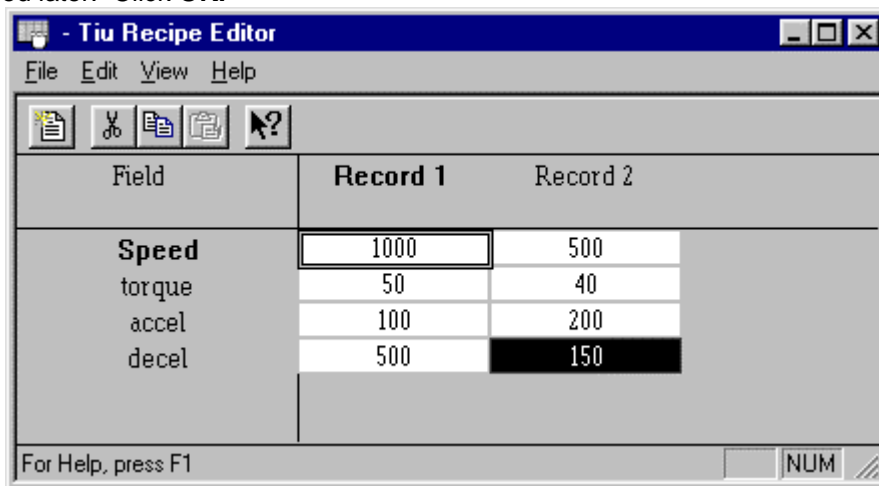



Figure 11.1 Recipe Database Editor

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.

11.3. 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 manor 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.

11.4. To Rename a Record

1. Double click on the record name

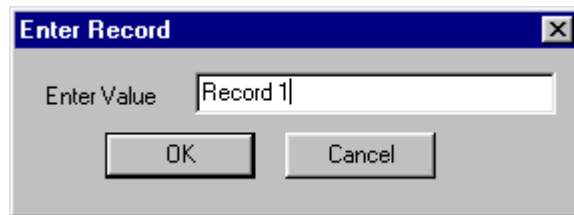


Figure 11.2 – Record Name

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

11.5. To Embed a Recipe Item on a Menu Page:

1. Select EMBEDDED DATA from the EEDIT menu.

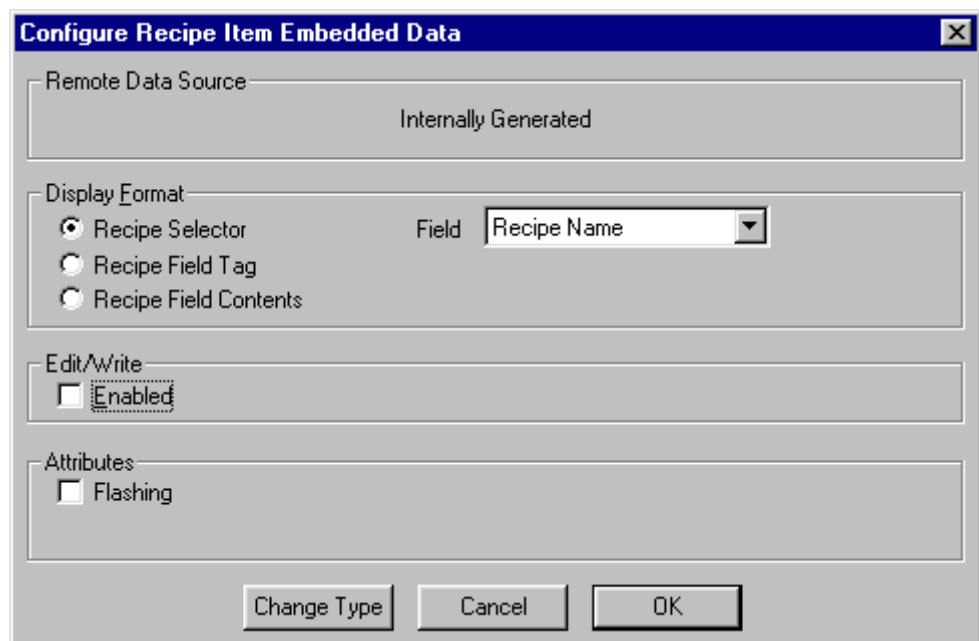


Figure 11.3 - Embed Recipe Item

2. Select RECIPE ITEM.
3. Select Display Format.

Recipe Selector

- 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.

Recipe Field Tag

If this is embedded on the menu page then the Item Name of the record selected for that menu page will be displayed.

Recipe Field Contents

If this is embedded on the menu page then the contents of the current Item, of the record selected for that menu page, will be displayed.

4. Click **OK**.

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.

11.6. 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

12. TUTORIAL

12.1. General

This chapter contains instructions for using several of the CTIU050/100/110 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 CTIU050/100/110 operates.

12.2. Menus

The CTIU050/100/110 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 **E**dit menu or by selecting the “+” icon from the icon menu to the right of the Display screen. Selecting **Delete Page** from the **E**dit 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 **N**ext Page from the **G**oto menu. The previous menu page may be selected by clicking the “**Up**” key or by selecting **P**revious Page from the **G**oto menu.

Example: The CTIU050/100/110 is used to monitor the temperature of a furnace and indicate the heater or a fan is ON or OFF. This example uses a UD70 controller in a Unidrive, but is applicable to any PLC with modifications.

12.2.1 *Steps involved in building configuration.*

1. **Select communication Settings** from the **C**onfigure menu. Select the applicable automation equipment being used, in this example a Control Techniques Unidrive 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 12.1. For “Furnace Control #1” on line 3, click on the font double height icon at the beginning of the line.



Figure 12.1 – Menu Page

3. Click on the Insert Page Icon. Choose **Insert After Current Page**. Click OK

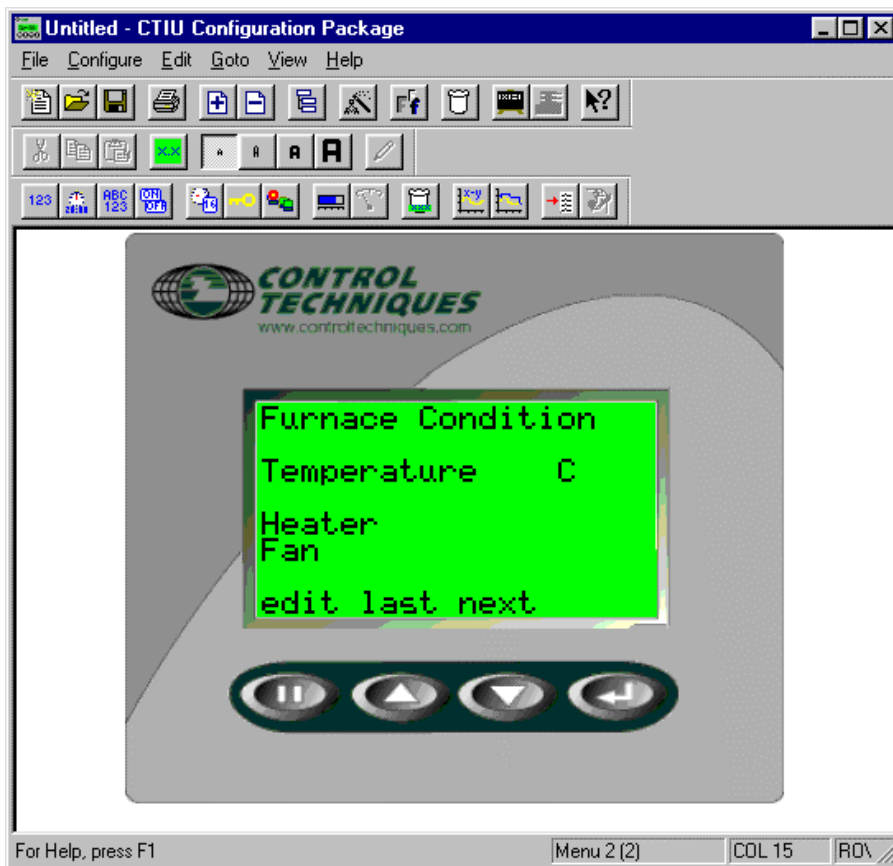


Figure 12.2 – Menu Page

4. Enter the text as shown in Figure 12.2.
5. Place the cursor one space to the right of “Temperature” and embed a **N**umeric **D**ata in drive PARMETERS **L**ocation 70.00. Select “**XXX**”, **16-Bit**, **U**nsigned. Click **OK**. Correct “C” position.
6. On the first space of the fourth line, click the embed icon. Choose **A**nalog **M**eter, drive PARMETERS **L**ocation 70.01. Under Format, enter 15 for characters, 760 for **M**aximum and 0 for **M**inimum. Click **OK**.
7. Place the cursor 6 space to the right of “Heater” and embed a **B**it **S**tatus in drive PARMETERS **L**ocation 70.02, bit number 0, **S**elect **T**oken **P**air Format, “OFF”/”ON.” Click **OK**.
8. Place the cursor 9 spaces to the right of “Fan” and embed a **B**it **S**tatus in drive PARMETERS **L**ocation 70.02, bit number 1, **S**elect **T**oken **P**air Format, “OFF”/”ONFF”, **B**it **N**umber 1. Click **OK**.

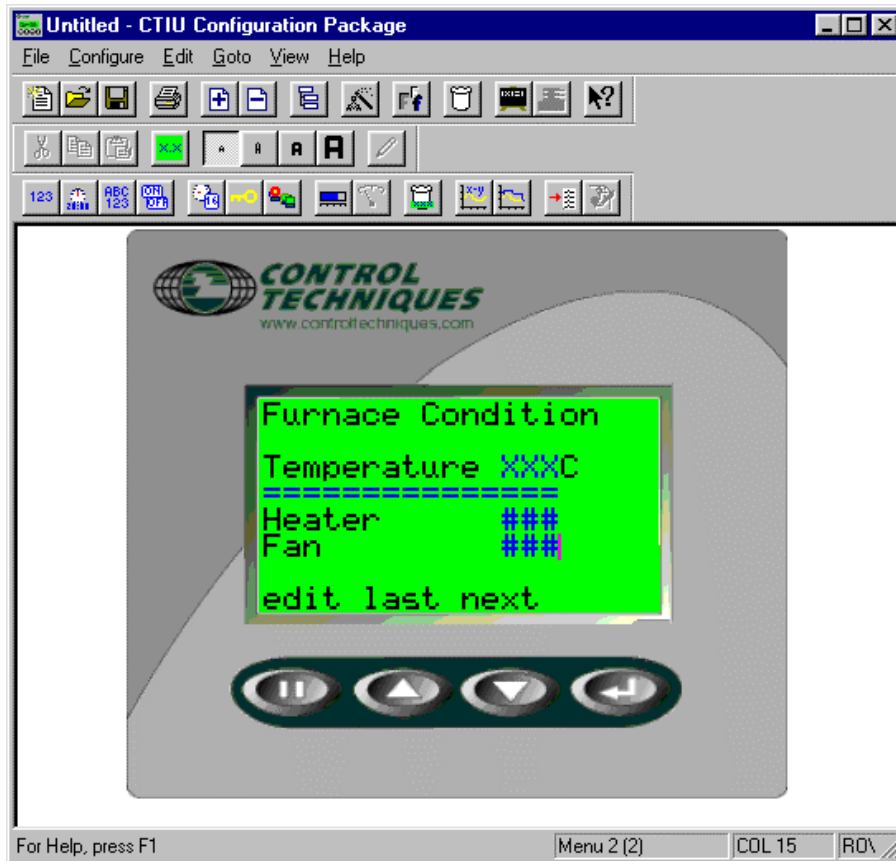


Figure 12.3 – Menu Page

9. After embedding the data, the screen looks like Figure 12.3.
10. 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 registers in the PLC area of the UD70 are used to simulate temperature, heater and fan.

12.3. Sub-Menus

Sub-menu pages branch off menu pages analogous to a sub-directory branching off a main directory of a PC. The CTIU050/100/110 supports a total of 300 pages divided between menu and sub-menu, alarm and status pages.

Example: Continuing from the example in Figure 12.2, 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):

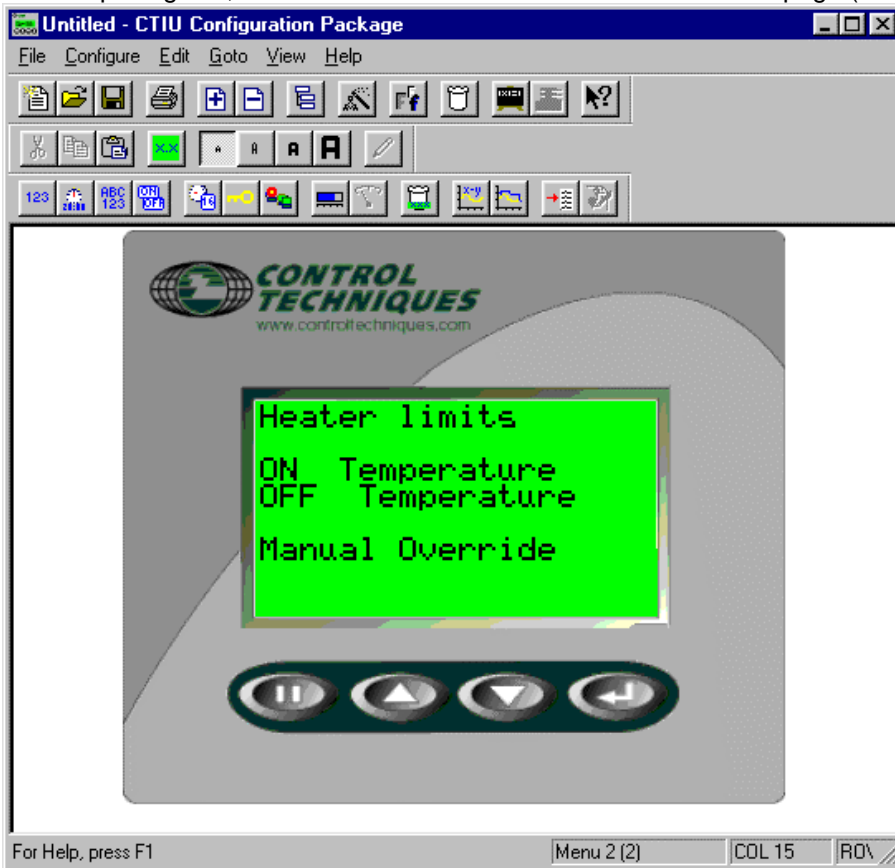


Figure 12.4 – Sub-Menu Page 2.1

3. Embed data one space to the right of “ON Temperature” by selecting **N**umeric for the **T**ype, drive PARAMETERS **L**ocation 70.03. 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 drive PARAMETERS **L**ocation 70.04, **S**elect **T**oken **P**air Format, “OFF”/”ON”, **B**it **N**umber **1**, Click on **E**dit **E**nable. Click **O**K.

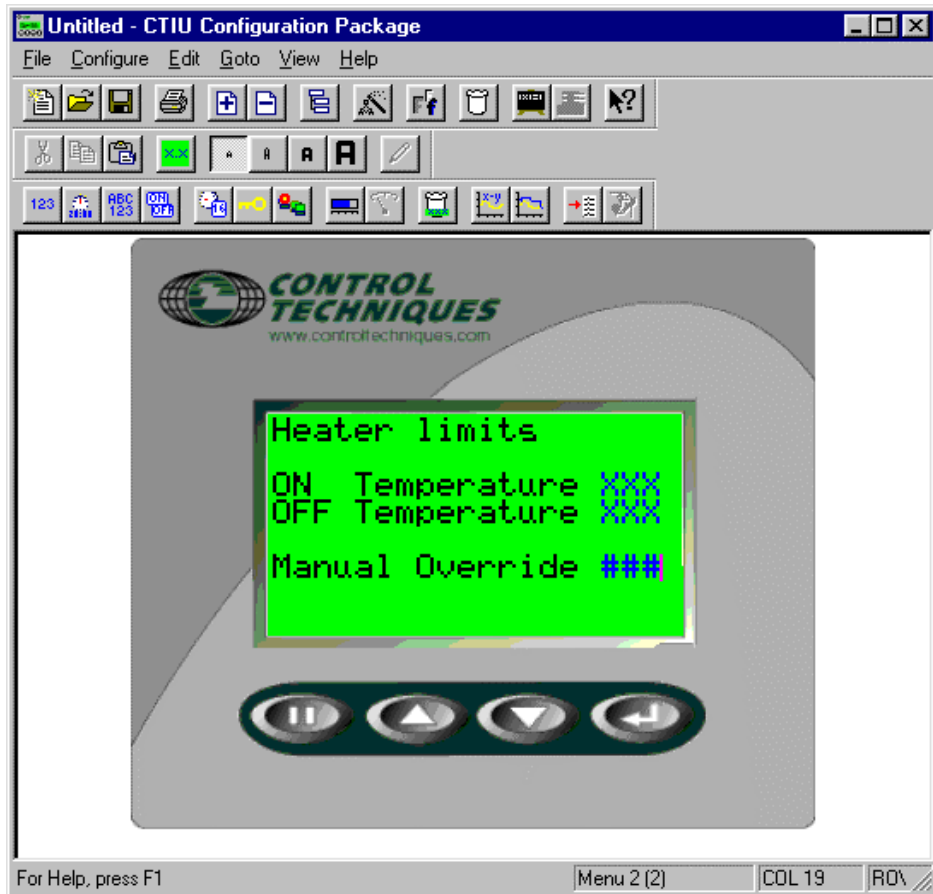


Figure 12.5 - Sub-Menu Page 2.1

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 70.05 and 70.06, respectively. Change the **Bit 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 12.5.

12.3.1 To Enter A Sub-Menu On the CTIU050/10X/11X/20X:

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.

12.4. Password-Protected Sub-Menus

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

Example: Continuing from the example in 12.2, 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 12.3 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 12.6.

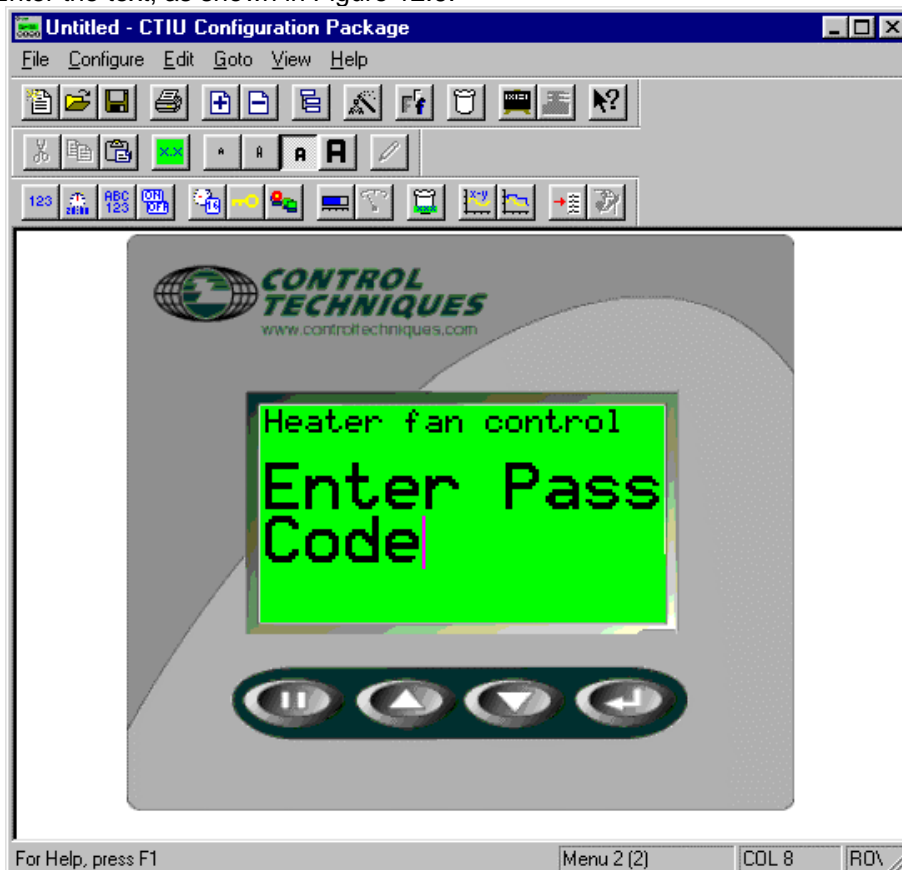


Figure 12.7 - Password Enter Screen

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 CTIU050/100/110.

The resulting display screen on the CTIU050/100/110 appears as the screen shown in Figure 12.7 (with a code of **0000**).

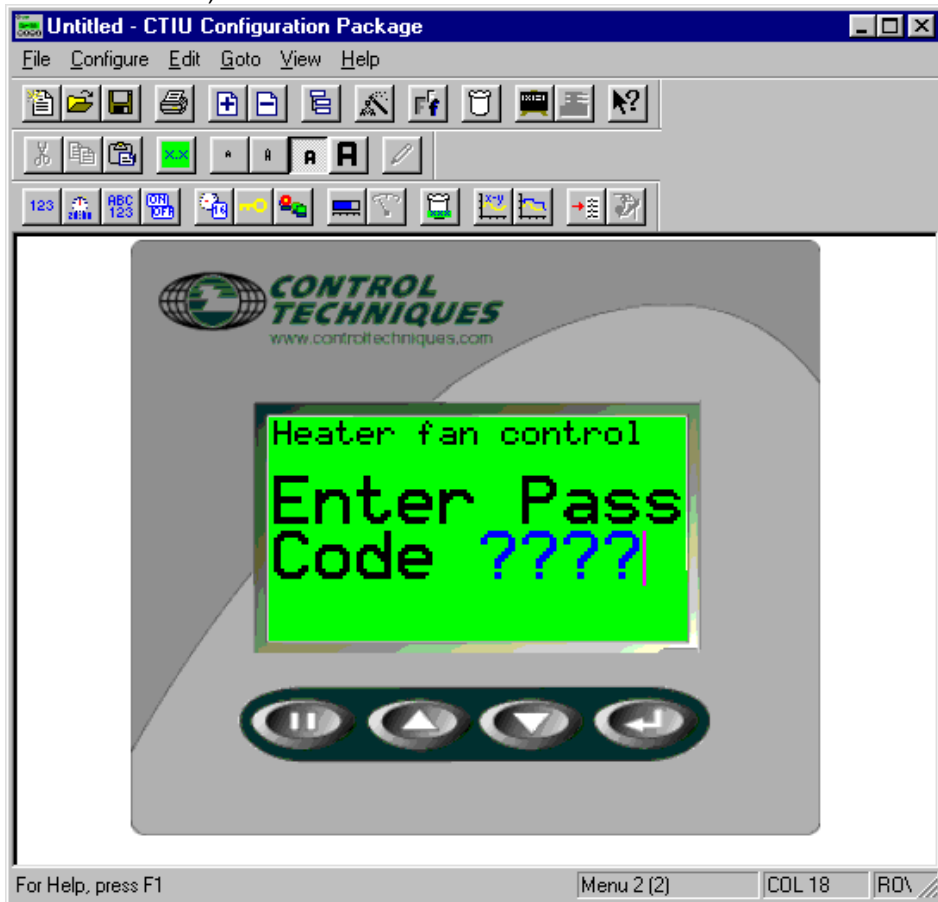


Figure 12.7 - Password Enter Screen

12.4.1 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.

12.4.2 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 drive.
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.

12.5. Status

The CTIU050/10X/11X/20X can display STATUS information. For example, a status page can be displayed as COILS change (in real-time) in your drive, 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 drive 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 CTIU050/10X/11X/20X connected to Unidrive & UD70. It is applicable to any of the supported automation equipment with substitutions made for the specific registering nomenclature, i.e., 70.00 is a 32 bit multipurpose register which can be mapped to the Beckhoff remote I/O. It is assumed the drive is properly configured, the CTIU050/10X/11X/20X is properly connected to the drive, both are powered up, and the **CTIU** software, 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 "Control Techniques Unidrive protocol" is being used. Click **OK**.
2. Insert a menu page after Menu Page 1 (refer to 12.2 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 "_R1%.0". Click on the Embed Icon. Select **Bit Status** from **Type**; Drive parameter from **Data Type**; **Location 72.01, bit number 0**; leave **Token Pair** as "OFF"/"ON" and click **Edit Enable**. Click **OK**. See Figure 8.8.
4. Do the same for _R1%.1, _R1%.2 and _R1%.3 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 12.9.

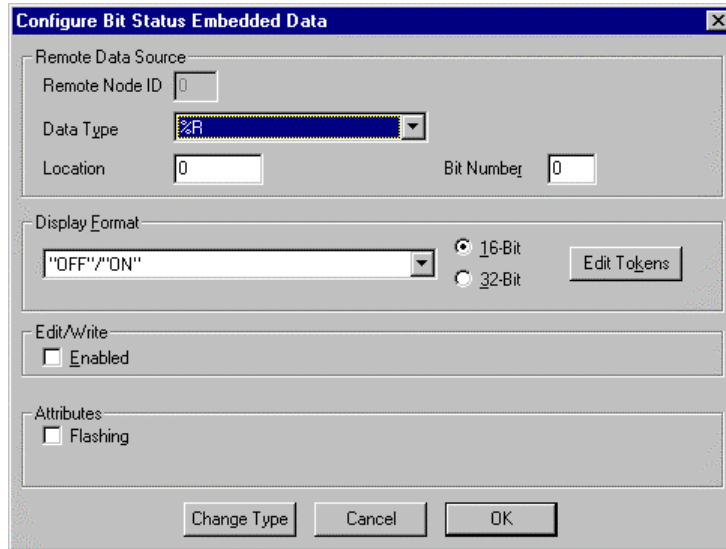


Figure 12.8 – Configure Embedded Data Box

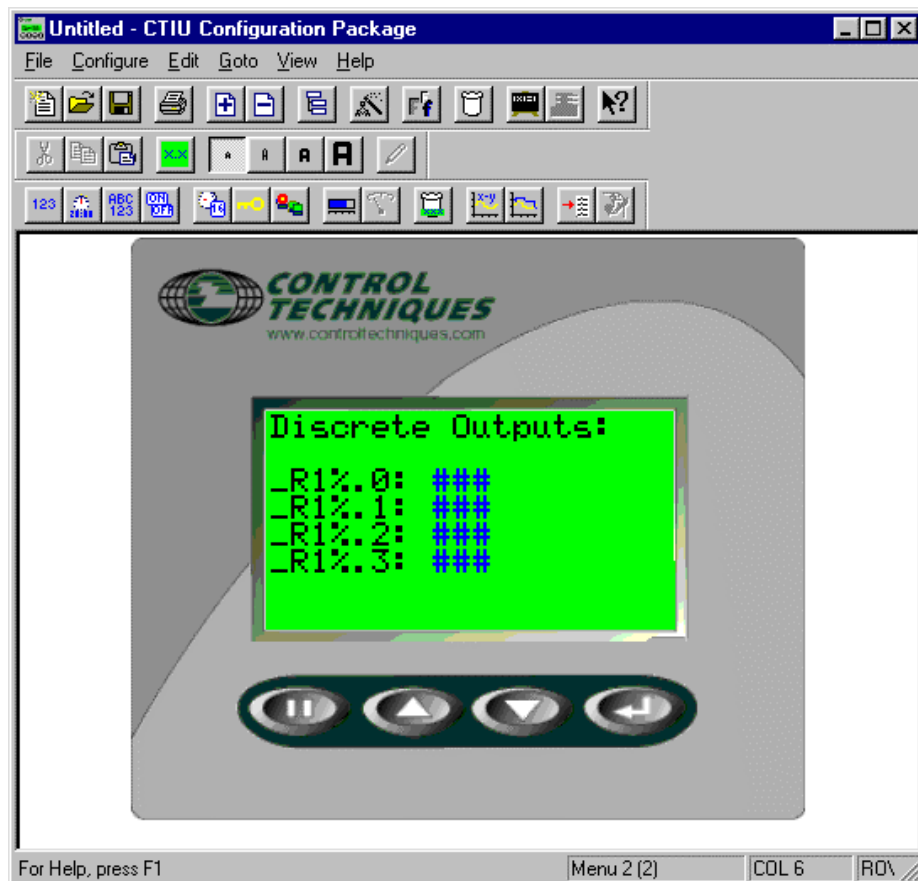


Figure 12.9 – Menu Page 2(2)

From **Configure**, choose **Status**. Click **Direct Mode**. From **Data Type** choose drive parameter (72.01; **Block Start** equals 0. The **Number of Status Pages** equals 4. Click **OK**.

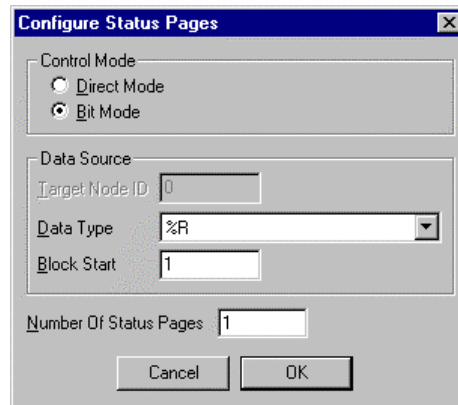


Figure 12.10 – Configure Status Pages

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 12.11. Highlight display screen, click **Edit** and **Copy**.

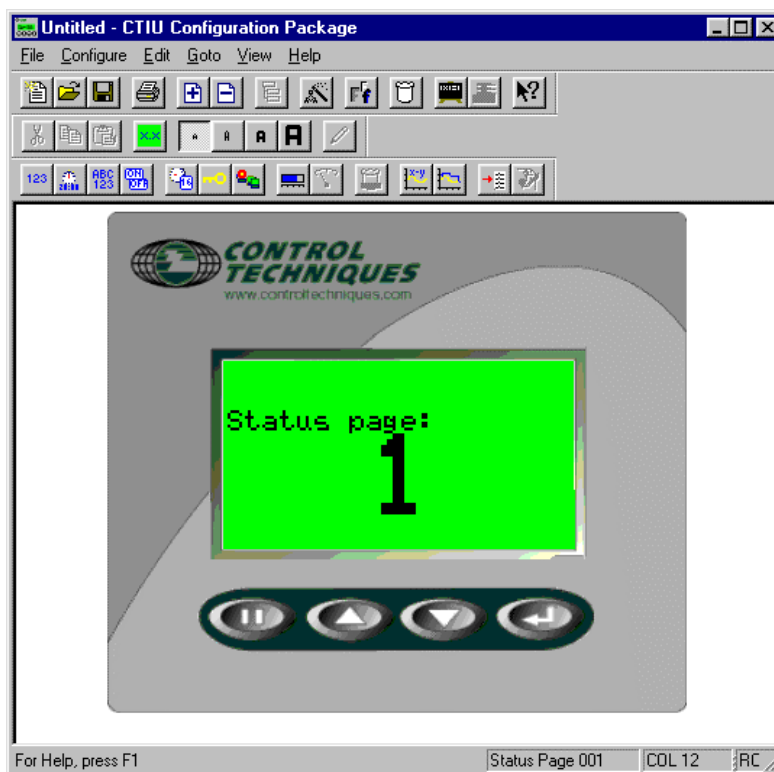


Figure 12.11 – Configure Status

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 **E**dit, choose **P**aste Page. Change the "1" on line four to a "2." Do the same for pages 3 and 4.

From **F**ile, choose **D**ownload Project

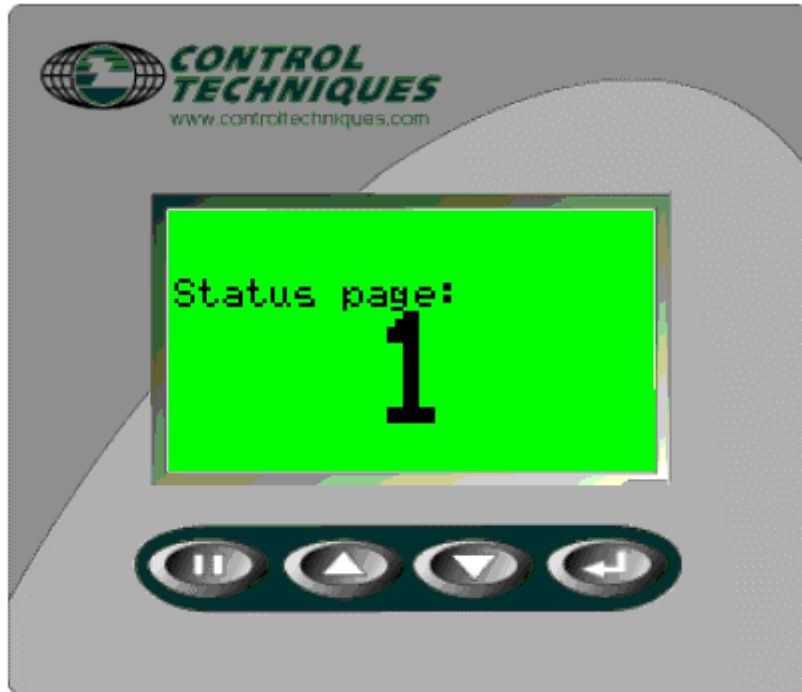


Figure 12.12 – Status Page 0

On the CTIU050/10X/11X/20X, press the DOWN key to get to the Discrete Output page (as in Figure 12.8). Press the PAUSE key the toggle bit 0: ON by pressing the UP key and ENTER key. Press the PAUSE key until nothing is highlighted (three times).

Press the UP key. The page shown in Figure 8.12 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 bit 1:OFF and bit 3: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 bit 1: ON, bit 2: ON, bit 3: OFF and bit 4: OFF. Now Status screen 3 is displayed (0110B=3).
7. Toggle bit 4: ON and all the other OFF. Now a screen with "Default Menu Screen" written on the second line is displayed. The CTIU050/100/110 is looking for Status Page 8 (1000B = 8), which does not exist, so the default screen is displayed.
8. In the **CTIU** software, choose **S**tatus from **C**onfigure. Click on **B**it Mode. Click **O**K. Download the project to the CTIU050/100/110.
9. Now Status Page 4 is displayed. In Bit Mode, the CTIU050/100/110 reads the register as discrete bits, not as a word, i.e., 1000 triggers Status Page 4, 0100 triggers Status Page 3, etc.

12.6. Alarms

12.6.1 General

The CTIU050/100/110 can display ALARM information as BITS change in your drive (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 CTIU050/100/110 also has an Alarm Acknowledge Table. This feature allows a set of bits to be written back to the drive to indicate alarms that have been accepted by the user, but are still "ON" in the drive 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 CTIU100 or 110 is connected to a Unidrive. Register _P20% AKA #70.20, bits 0 to 3 are the alarms. Register _P21% AKA #70.21, bits 0 to 3 are the acknowledgement table. The instructions below are a tutorial of how to use the Alarms on the CTIU050/100/110.

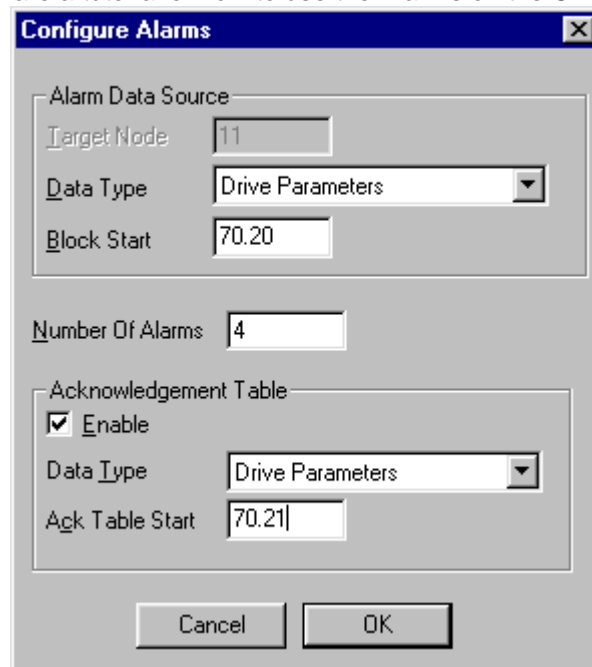


Figure 12.13 – Alarm setup

1. Select **Alarms** from the **Configure** menu.
2. Set the **Data Type** to drive parameters. Enter the location of the **Block Start** as 70.20.
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 drive register is read.
4. Check the **Acknowledgement Table Enable** box. Set **Data Type** to drive parameters and **Block Start** to #70.21. Click **OK**.
5. Insert a page (Page 2) after Page 1. Go to page 2. On the second line type "Alarm:" and embed #70.20 beside. Make the embedded #70.20 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 #70.21 beside. Make the embedded #70.22 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 12.14.

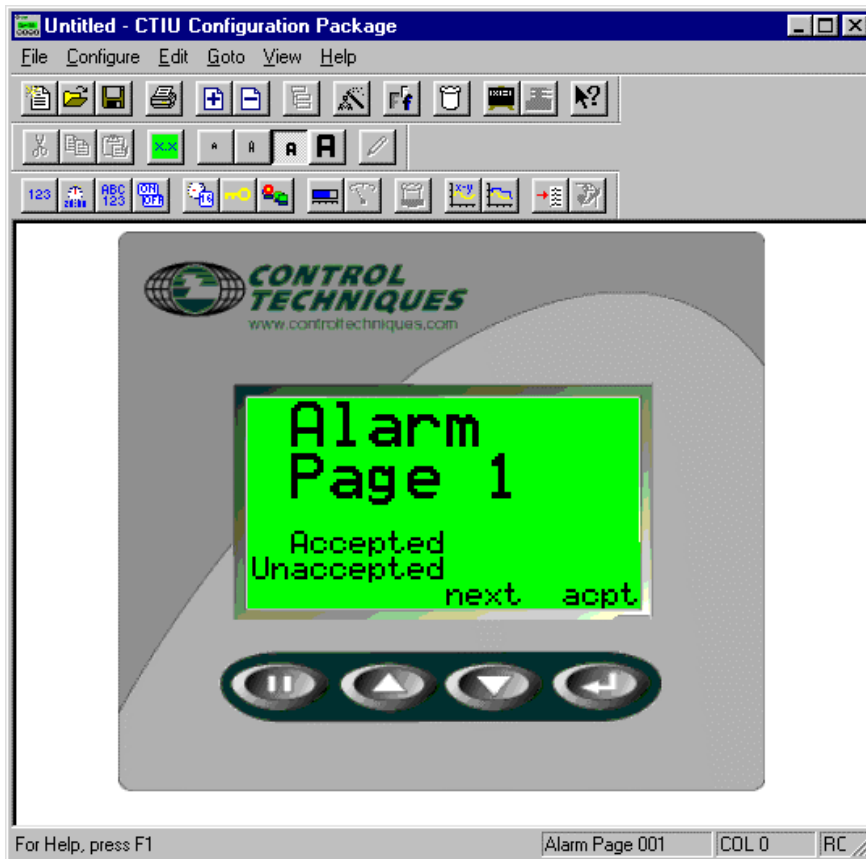


Figure 12.14 - Alarm Page 1 Screen

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 CTIU050/100/110. Put your drive in "RUN" mode.

On the CTIU050/100/110:

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:" (#70.21) 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 CTIU050/100/110 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:" (#70.21) 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 CTIU050/100/110 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 CTIU050/100/110. The last Active alarm can be selected by pressing the **Up** key on the CTIU050/100/110.
- c. The **Active Unaccepted Alarms** can be accepted by pressing the **Enter** key on the CTIU050/100/110. 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 CTIU050/100/110. Pressing the **Enter** key again returns display to page 1.

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

NOTES

13. GRAPHIC EDITOR

13.1. General

The TIU Graphic editor is designed to be a simple Drawing and Graphic Editor to be used with the CTIU20X. The CTIU20X can have 2 types of pages, a **Text Page** and a **Graphic Page**. The text page works similarly to the menu pages on the CTIU10X/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.

13.2. 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).

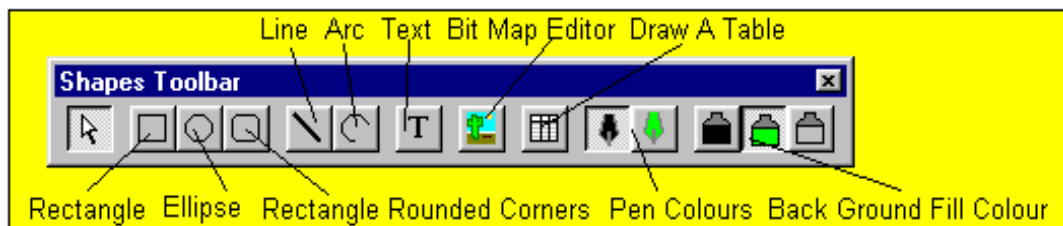


Figure 13.1 – The Shapes Toolbar

13.2.1 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.

13.2.2 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.

13.2.3 *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.

13.2.4 *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.

13.2.5 *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.

13.2.6 *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.

13.2.7 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 13.2)

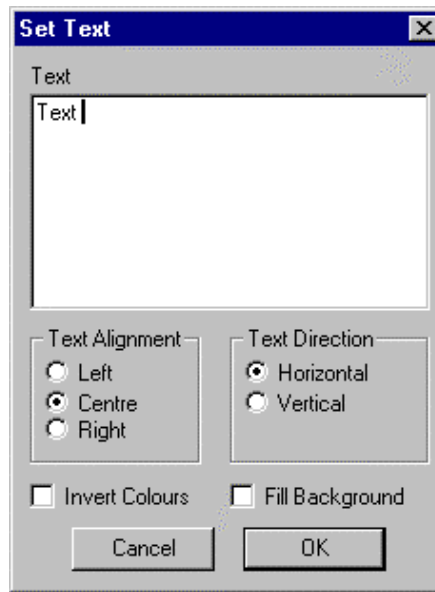


Figure 13.2 – Set Text

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.

13.2.8 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 13.3)

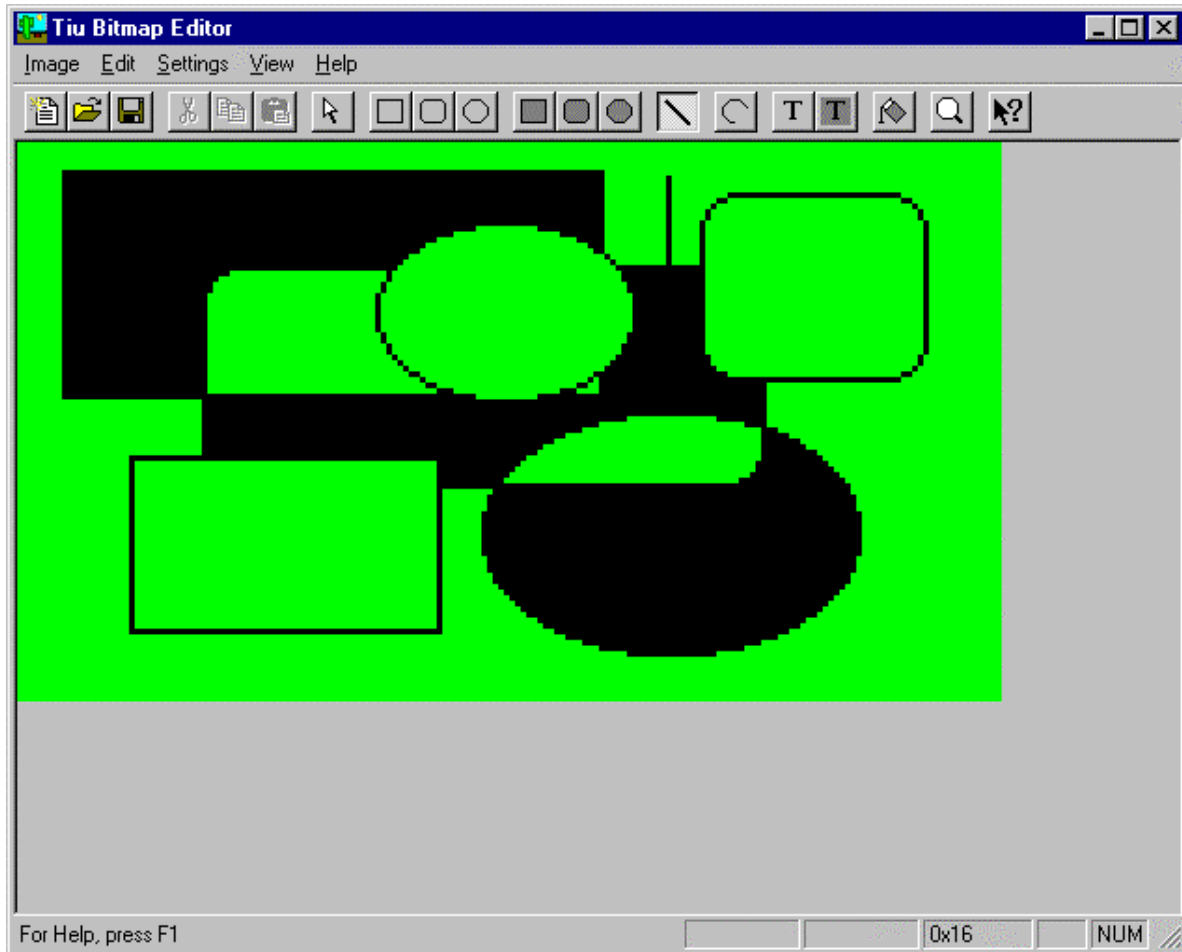




Figure 13.3 – Static Bitmap Editor

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.

13.2.9 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 13.4)

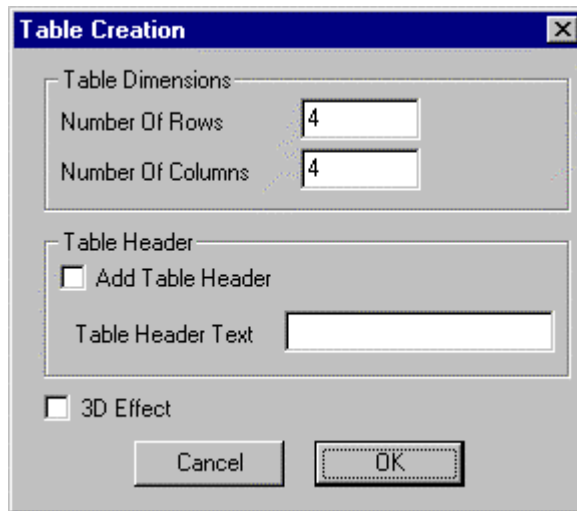


Figure 13.4 – Table Creation

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.

13.3. Embedding Data on a Graphic Menu Page

13.3.1 General

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 13.5 – 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.

13.3.2 Analogue Meter



Similar to the horizontal meter Control Techniques has added 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.

13.4. Animated Bit Map Selector

13.4.1 General

In a graphic page there is one extra embedded data type available, Animated Bitmap Selector.

13.4.2 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 13.6).

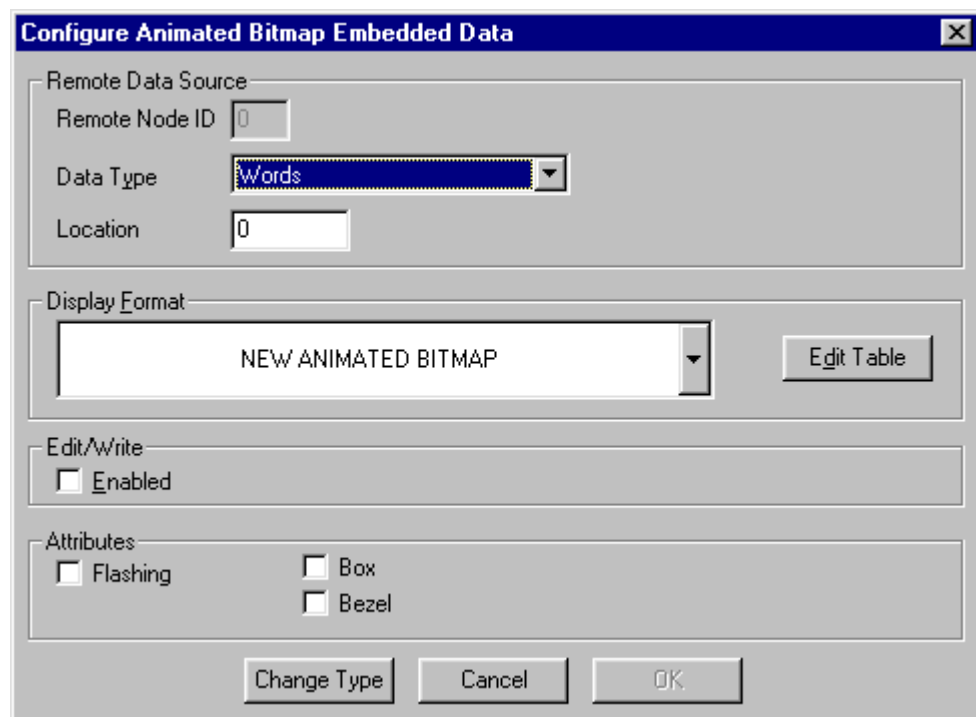


Figure 13.6 – Embedded Animated Bitmap Selector

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 13.7). 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.

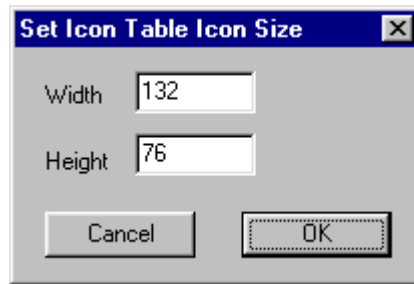


Figure 13.7 – Set Bitmap Icon Size

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 13.8).
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.

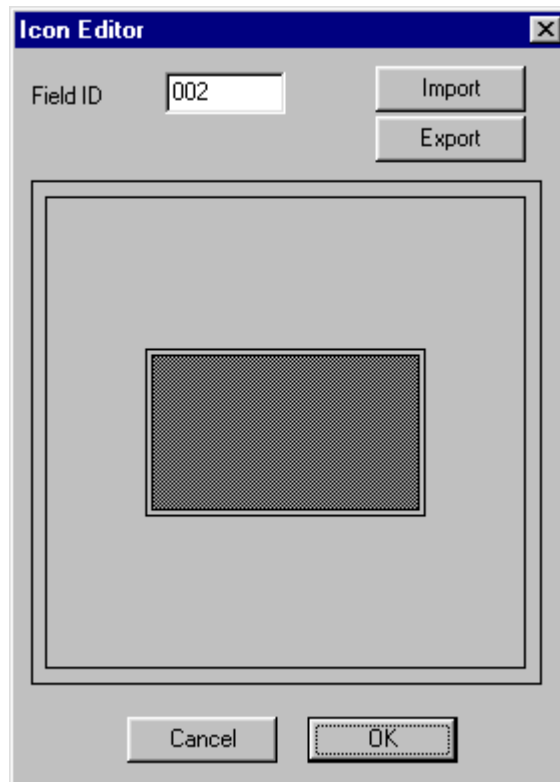


Figure 13.8 – Icon Editor

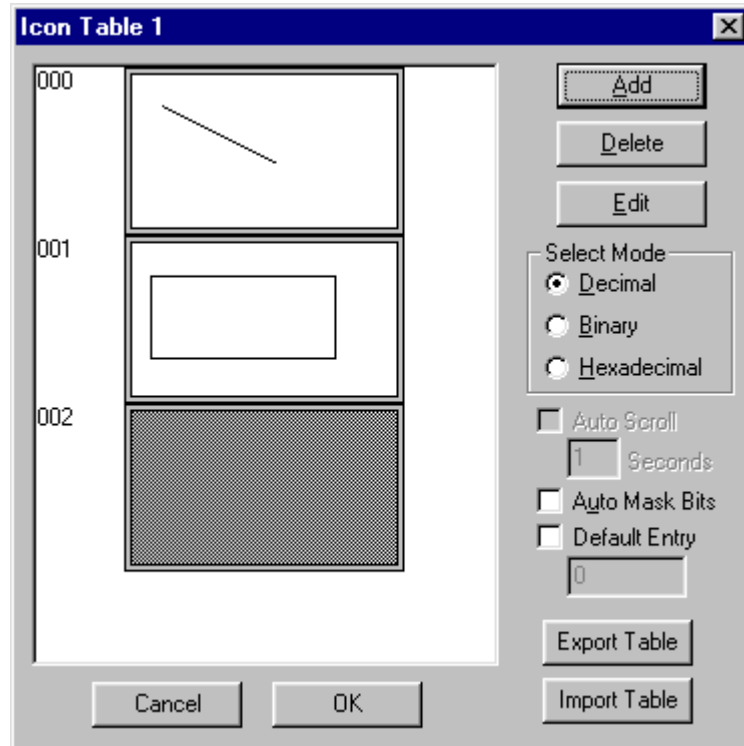


Figure 13.9 – Sample Animated Bitmap Selector

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.

13.4.3 To Edit a Bitmap table from the CTIU20X:

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.

13.4.4 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.

13.4.5 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.

13.4.6 Draw Attributes

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

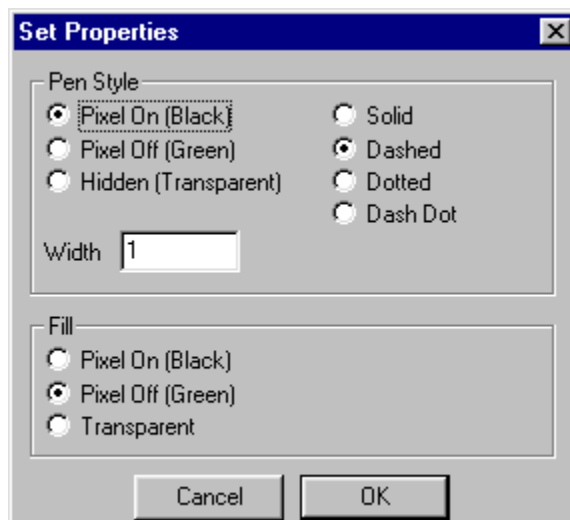


Figure 13.9 Draw Attributes

14. NETWORKING

14.1. General

There is now a networking option available with the CTIU101/111/201. These units support Device Net and CsCan network protocols. This chapter will discuss the registers used for network communication and how to configure the TIU units for network communication.

14.2. Network I/O

The CTIU101/111/201 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.

There are four (4) types of global registers available - %IG, %QG, %AIG, and %AQG. The model defines the type and number of global registers available in any given model.

The global 'I' registers contain an image of global 'Q' registers located in a different unit 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.

Table 14.1 - Registers

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

14.3. Configuring the CTIU101/111/201 for Network Communication.

- 16 From the main screen of the **CTIU** software select **Network** from the drop down **Configuration** menu.
- 17 From the **Configure Network** screen select the node ID and the appropriate network protocol.

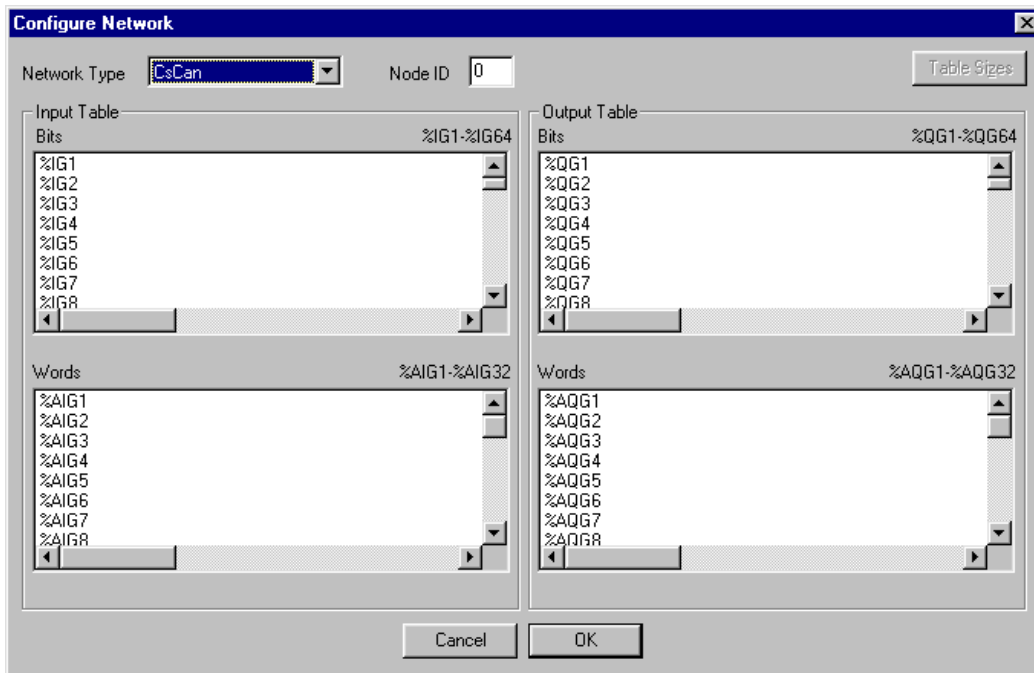


Figure 14.1 - Network Configuration (Read)

- From this screen the network inputs and outputs are also defined. To configure a unit to read a single bit register from the network, select a specific %IG register from the list, by double clicking on the name of the register. As per Figure 14.2 enter the network ID of the data source and the specific register (%QG) from that network ID.

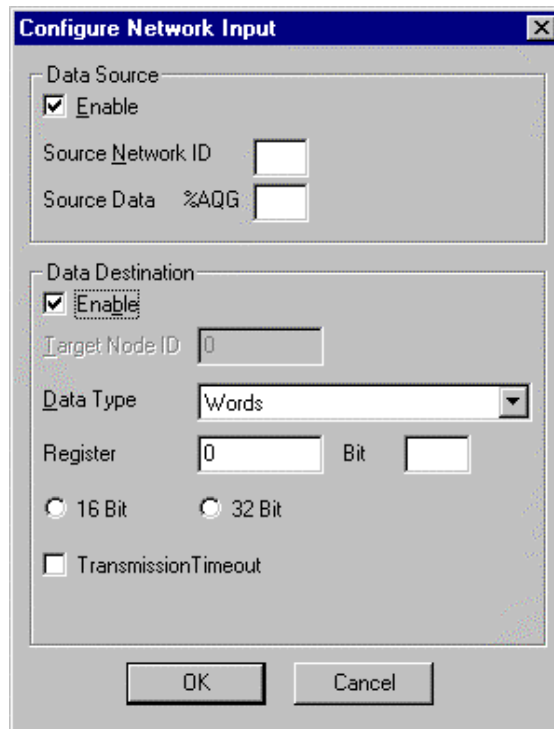


Figure 14.2 - Configure Network Input

- The data read from the %QG register can be directly sent to a specific register automation equipment. From figure 14.2 enable the **Data Destination** box and define the automation equipment register that %QG1 is to be sent to.

5. To configure units to write a single bit register to the network select a specific %QG register from the list as per Figure 14.3 by double clicking on the register name.

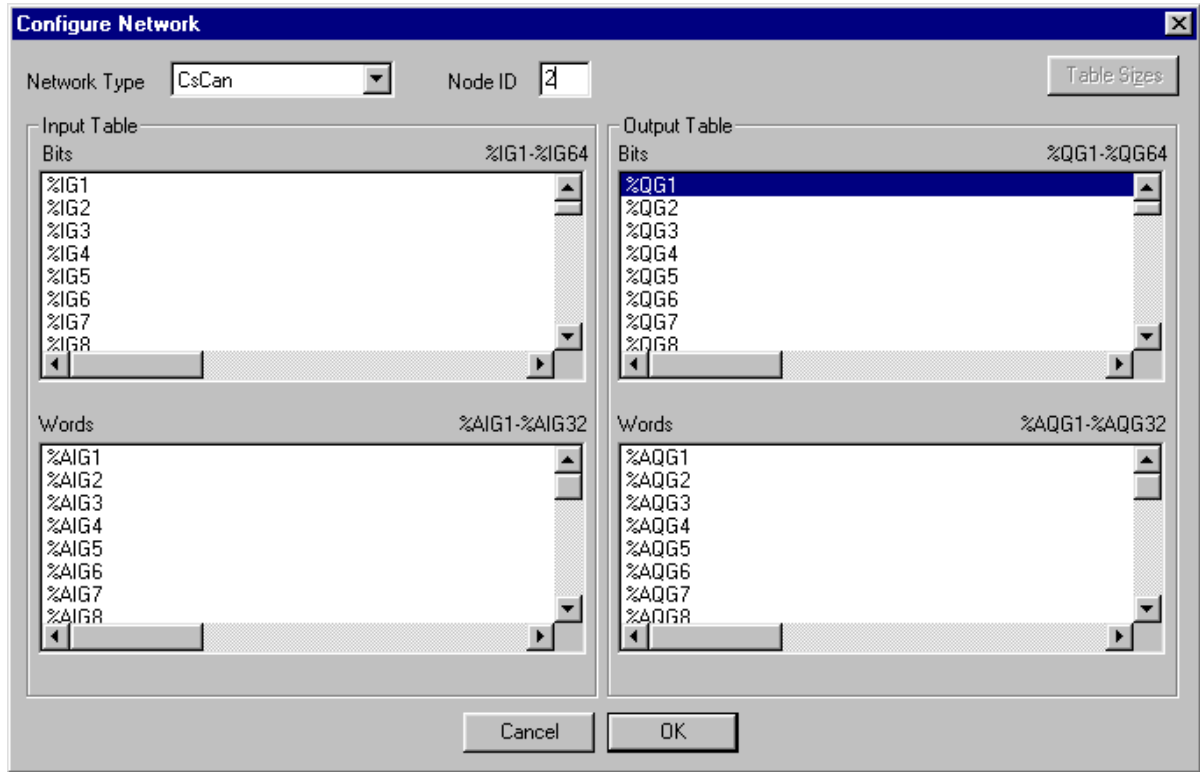


Figure 14.3 - Configure Network (Write)

6. From the **Configure Network Output** window (Figure 14.4) enable the **Data Source** box and define the automation equipment register that is to be outputted to the network. The **Scan Period** determines how often the network checks the value in the register for changes.

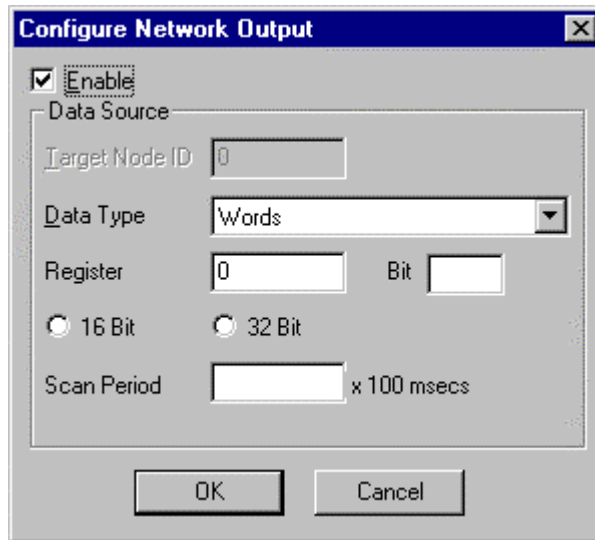


Figure 14.4 – Configure Network Output

7. Similarly the CTIU101/111/201 units support the transfer of words over the network. This is done using the %AIG registers for inputs and the %AQG registers for outputs.

15. MATHEMATICS

15.1. General

The CTIU10X/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...

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
Dialog Linkages	To initialise operator dialog sequences and also as keys are pressed in operator dialog sequences
One Shot Communications	On successful or failed one shot communications blocks

15.2. Internal & System Registers

The available internal registers are as follows: -

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 15.3 – 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 drive Network Address
%SR04	R/W	Contains the current password
%SR05	R/W	Contains the current edit status (V4.10n onwards)
%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 drive (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

15.3. Maths Functions

Maths functions may be used for a variety of purposes.


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

15.4. 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.

15.5. 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 15.1).

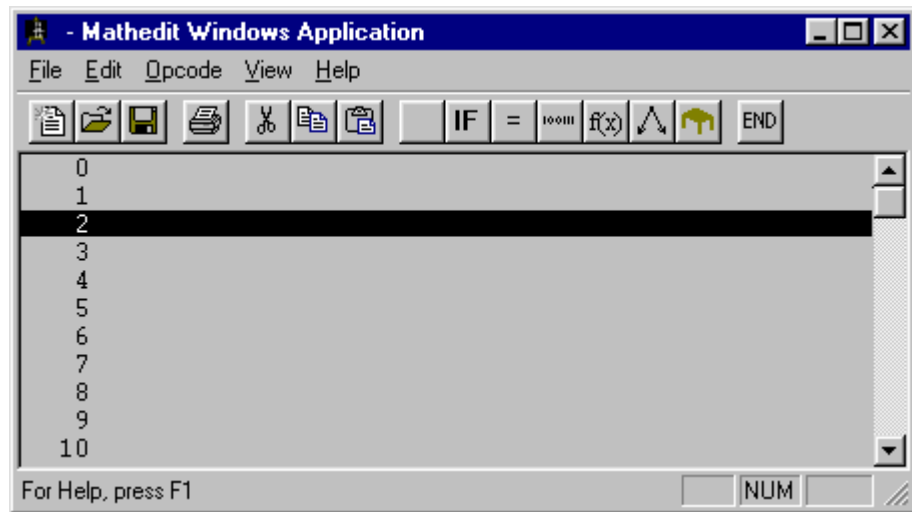










Figure 15.1 – Mathedit Application Window

15.6. 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 

15.6.1 No Operation



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

15.6.2 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

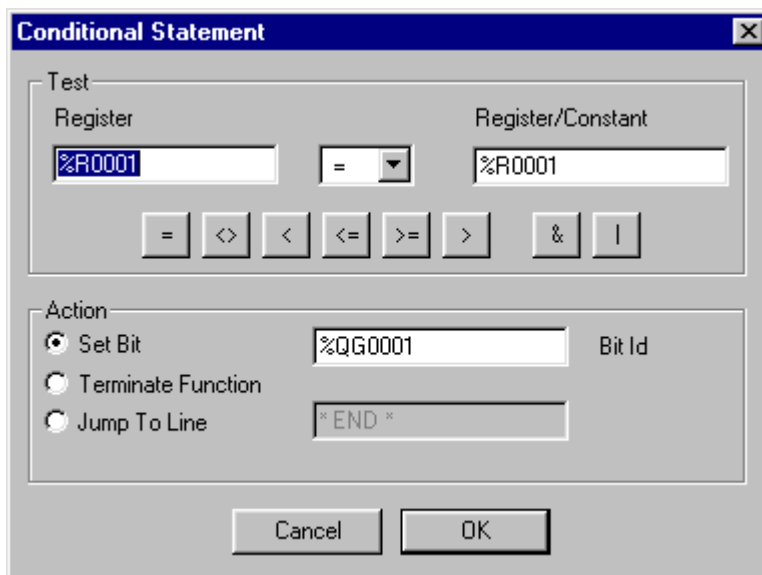


Figure 15.2 Conditional Action

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**

15.6.3 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.

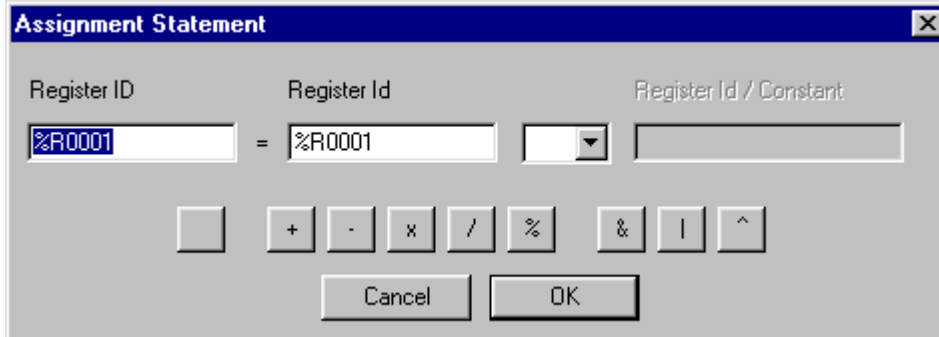


Figure 15.3 – Assignment Statement

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 lets the programmer multiply the contents of a register by the contents of another register or constant and stores the result as a percentage of the first register in the specified register.

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(%R41). If %R40 contain 100 and %R41 contains 11, then %R10 will be sum of the contents of %R100 and %R11.

15.6.4 Bit Operation



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

1. Set the bit
2. Clear the bit
3. Invert the bit
4. Pulse the bit

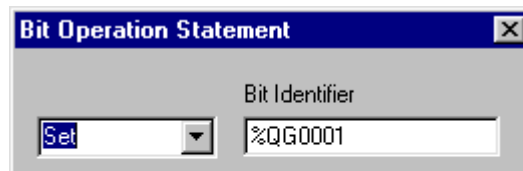


Figure 15.4 – Bit Operation Statement

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.

15.6.5 Table Operation



This operation statement performs a number of operations on a specified table. As per figure 15.5 the table definition is defined as the number of local registers in the table beginning at the specified local register.

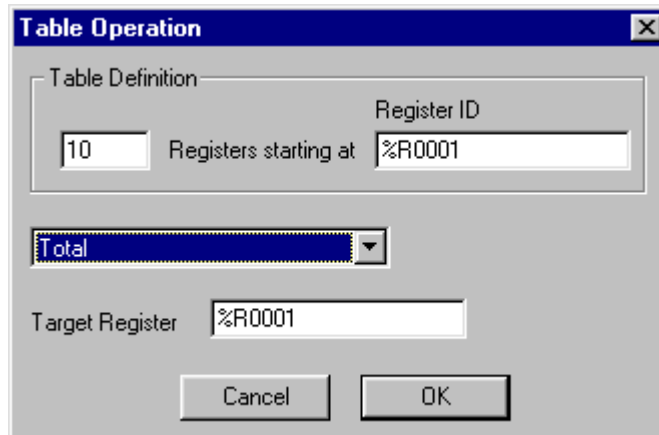


Figure 15.5 – Table Operation Window

The available operations are:

1. Total
2. Average
3. Maximum
4. Minimum
5. Move To
6. Swap With
7. Reset

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.

15.6.6 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.

15.6.7 Control Flow



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

1. Pause
2. Goto
3. Gosub

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.

15.6.8 Set End



This action denotes the end of a mathematic function.

15.7. Background Functions

The CTIU10X/11X/20X terminals 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 15.6 shows the background function set-up window.

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

Figure 15.6 – Background Function Set-up Window

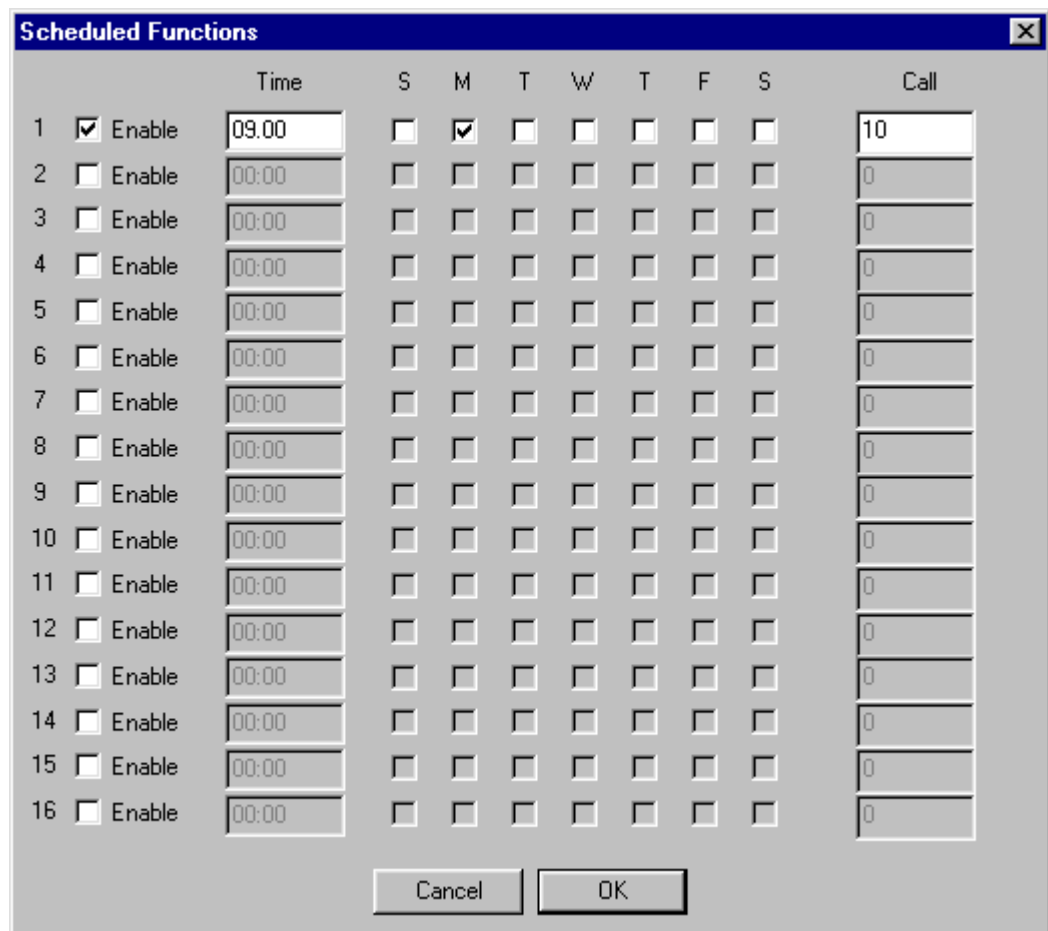
15.7.1 To Program a Background Function

1. Enable one of the 8 background functions by clicking in the tick box next to the number of the background function.
2. Click **Restart Function** if the function is to be executed only on initialisation of the terminal.
3. In the **Seconds** field specify the time interval between executions of the function.
4. In the **Call** field, specify the function to be called, this is the line number where the function begins.

15.8. 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.



	Time	S	M	T	W	T	F	S	Call
1	<input checked="" type="checkbox"/> Enable	09:00	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10
2	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
3	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
4	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
5	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
6	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
7	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
8	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
9	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
10	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
11	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
12	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
13	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
14	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
15	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
16	<input type="checkbox"/> Enable	00:00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0

Figure 15.7 - Schedule Functions Window

15.8.1 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.

15.9. Data Transfer Block

Local registers in the terminal can be mapped to registers in the automated equipment using the **Data Transfer Block** facility.

15.9.1 To Add a Block Transfer

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



Figure 15.8 – Data Transfer Block

2. Click on the **Add** button to add a Map Register Statement. Figure 15.9 illustrates the how the registers are mapped.
3. Enter the Data Type Register and Location of the automated equipment 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 automated equipment or from the automated equipment 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.

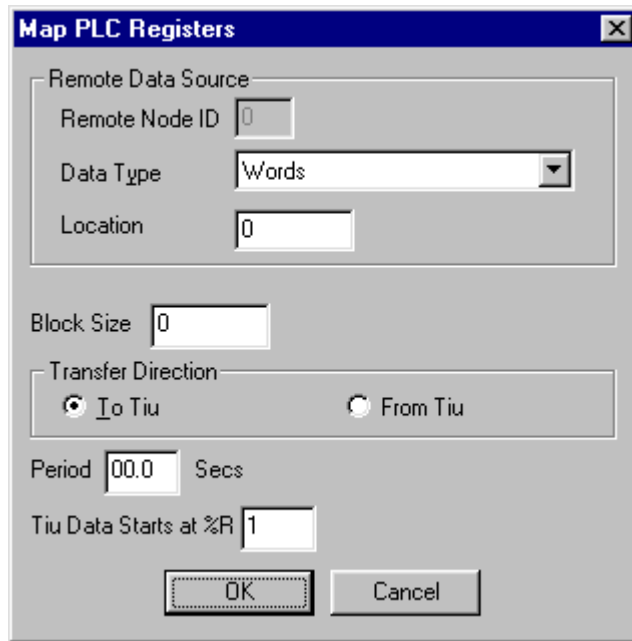


Figure 15.9 – Mapping PLC Registers and Local

16. SmartStack™

16.1. General

Control Techniques has now added the SmartStack™ modules to the CTIU20X range. The SmartStack system is a method of allowing I/O expansion on an HMI. As well as CTNet, a wide range of Digital and Analogue I/O modules is available.

16.2. 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 Stack™ Modules per CTIU20X.

a. Installing SmartStack Modules

1. Hook the tabs. Each SmartStack Module has two tabs that fit into slots located on the CTIU20X. (The slots on the CTIU20X 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 CTIU20X.

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.

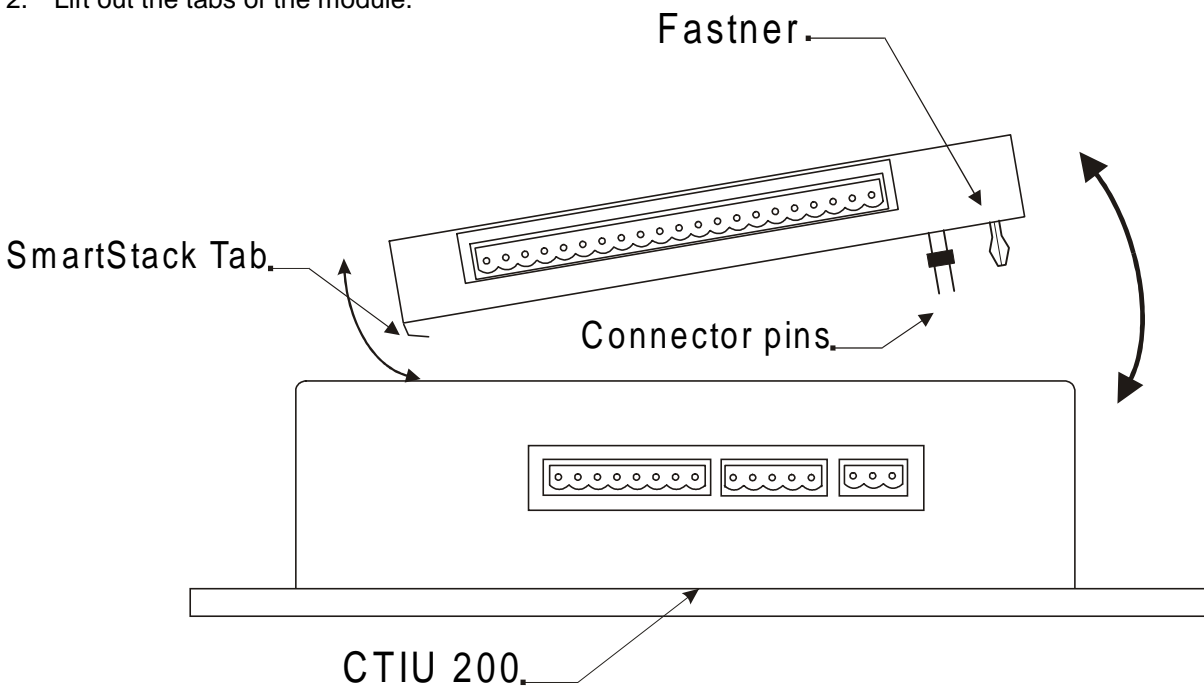


Figure 16.1 – Installing a SmartStack™ Module in an CTIU 200.

16.3. Configuring SmartStack Module

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

Table 16.1 – SmartStack Modules	
Module	Description
HE800ADC110	4 channel Analog Inputs, Voltage (0-5vdc, +/-5vdc, 0-10vdc, +/-10vdc), 12 bit
HE800DIQ511	4 Channel 12/24 Vdc Digital Input Pos/Neg logic 4 Channel 12/24 Vdc Digital Output Neg logic
HE800DIQ512	4 Channel 12/24 Vdc Digital Input Pos/Neg logic 3 Channel Relay Output
HE800DIQ522	4 Channel 120 Vac Digital Input Pos logic 3 Channel Relay Output
HE800DIQ611	8 DC Inputs (12/24vdc, pos/neg logic), 8 DC Outputs (5/12/24vdc, 0.5A, neg logic)
HE800DIQ612	8 DC Inputs (12/24vdc, pos/neg logic), 6 Relay Outputs (250vac, 30vdc, 4.0A)
HE800DIQ622	8 AC Inputs (120 vac), 6 Relay Outputs (4.0Aper point)

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.

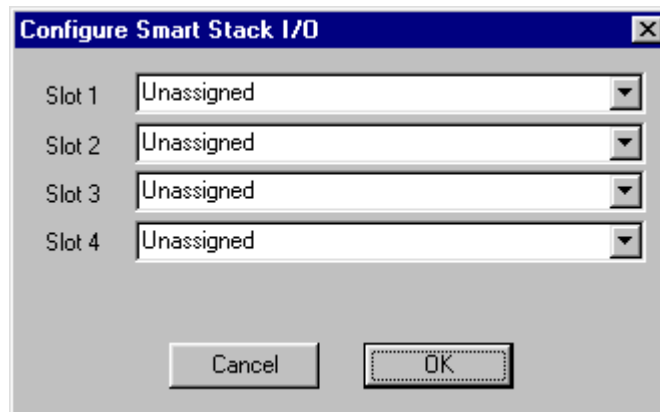


Figure 16.2 – SmartStack Configuration

16.4. 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 CTIU software. See chapter 15 for more information on the Mathedit Application.

16.5. 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	%I $nnnnn$
Bit Output	%Q $nnnnn$
Word Input	%A $Innnnn$
Word Output	%A $Qnnnnn$

❖ $nnnnn$ = 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.

16.6. Displaying Data From SmartStack

Data from SmartStack modules can be embedded into a menu page in exactly the same way as other Automation Equipment 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 15 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
* END *

```

Figure 16.3 – Math Example Word

16.7. Considerations for Shutting Down & Restarting a CTIU20X 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
* END *

```

Figure 16.4 – Math Example Set Outputs for Power

The dialog box 'Function Key Definition' has a title bar with a close button. It contains 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, the 'Key Type' section has two radio buttons: 'Global' (selected) and 'Local'.

Figure 16.5 – Calling Math Function From Function

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 16.6 – Calling Math Function from Background