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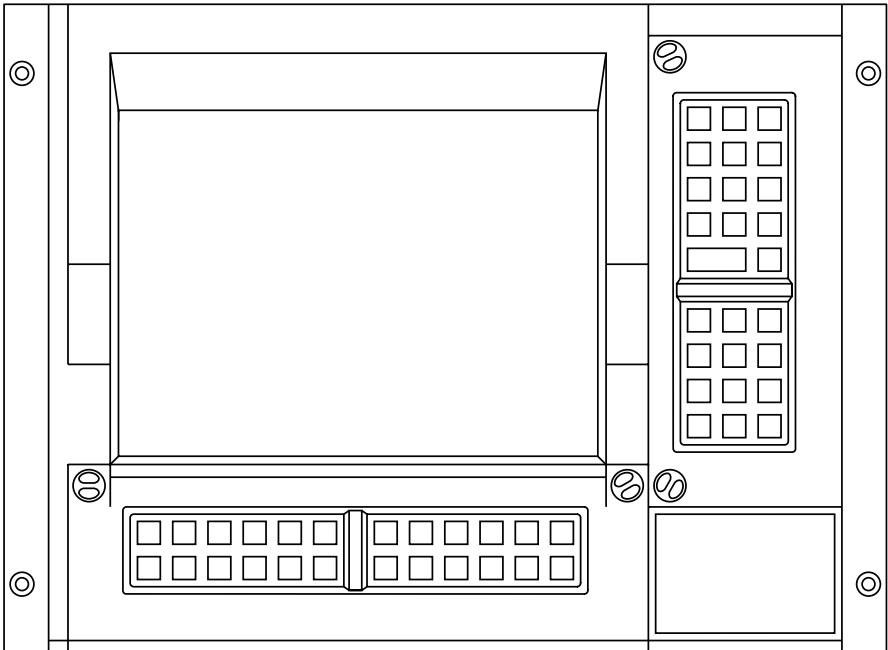
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1.1 Introduction

1.1-1 Introduction to the CCX 77 cell controllers

CCX 77 cell controllers are industrial microcomputers. They are mounted in 19" racks or can be built into a custom designed panel.

They are designed around a highly integrated system board (surface mount technology), integrating as standard, or via local extensions, all of the usual system functions. This means that all of the extension slots on the system bus are fully available for additional function boards.



The experienced user can, if he so wishes, refer directly to the table of operating characteristics in section 1.5.

1.1-2 CCX 77 basic elements

Microprocessor	The CCX 77 contains the 80486 microprocessor.
Dynamic RAM memory	A minimum of 16 Mb RAM memory is incorporated into the processor unit. This can be expanded to 64 Mb (see section 4.2).
CMOS user memory	A 128 Kb CMOS long-life battery backed RAM memory (3 to 5 years of operation) is used for storing small files using utility software supplied with the CCX 77.
Hard disk	A hard (fixed) disk unit stores data.
Diskette drive	A diskette drive accessible from the front panel takes standard 3"1/2 IBM format diskettes (1.44 Mb and 720 Kb).
Color monitor	The front panel comprises a 14" VGA color monitor, resolution 640 x 480.
Keyboards	A built-in operator keyboard provides 27 keys (numeric keypad and dual-function cursor keys) on the front panel vertical door and two sets of 12 function keypads (with dual alphanumeric marking) are located on the front panel vertical and horizontal doors of the CCX 77. These dedicated keyboards and any external keyboard connected can be locked-out by a keyswitch.
Time/date clock	A battery protected clock provides the current date and time.
RS 232C (COM1) port	A 9-pin male connector for an RS 232C serial link (to IBM PS/2 standard) is provided.
Parallel connection (LPT1)	A 25-pin female connector for a two-way parallel link (to IBM PS/2-CENTRONICS standard).
Series 7 port (COM2)	A 26-pin female connector for a dual standard serial link supporting RS 485 / 20mA current loop connection. Enables TSX 7 PLCs to be connected to a UNI-TELWAY bus.
Video output port	A 15-pin female connector for connecting a standard SVGA monochrome or color monitor.
Power supply	Power supplied via a 110 VAC or 220/240 VAC industrial supply (-15% + 10%), 50/60Hz, 170 VA.

CCX 77 basic elements (Cont.)

Software key slots	The CCX 77 cell controller has two slots for software protection key modules containing the user access rights to run proprietary Schneider program packages.
Extension slots	Two full-length IBM PC-AT standard extension slots are provided for extension cards such as the TSX MAP PC7 42M card (this reference refers to the card and the driver) for direct connection to a MAPWAY network.

1.1-3 CCX 77 extension elements

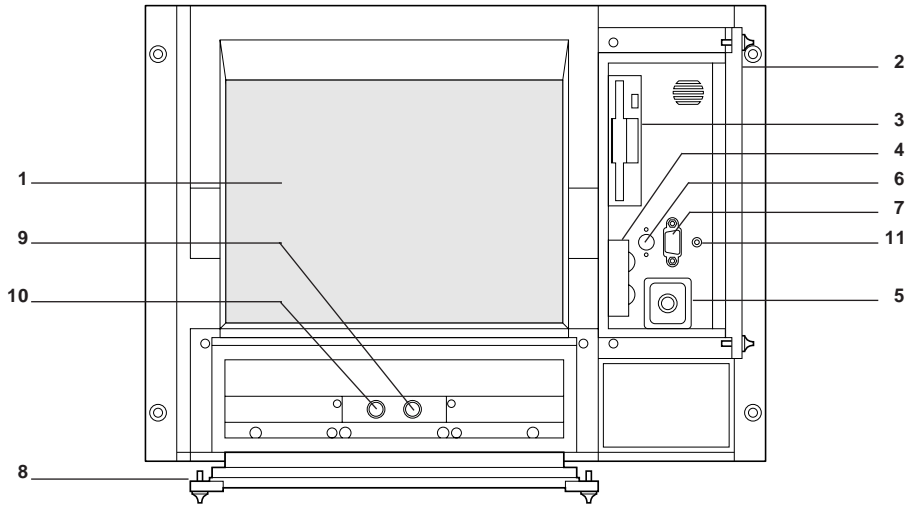
Dynamic RAM memory	A 16 Mb, 32 Mb memory extension card is available to increase total RAM capacity to 64 Mb.
Rechargeable batteries	Batteries ensure autonomous operation during a power break (up to 15 minutes depending on the configuration).
Optional cards	Two full-length extension slots accept IBM PC-AT (ISA bus) compatible optional cards.
Discrete outputs (ALF0 and ALF1)	Two relay outputs are available. These outputs may be used for indicating states or alarms (watchdog, temperature, programmable alarm, etc).

Note :

When using the rechargeable batteries, only the cell controller CPU and its peripherals (hard disk and diskette drive) are powered. The built-in VGA screen is not powered.

1.2 Physical appearance

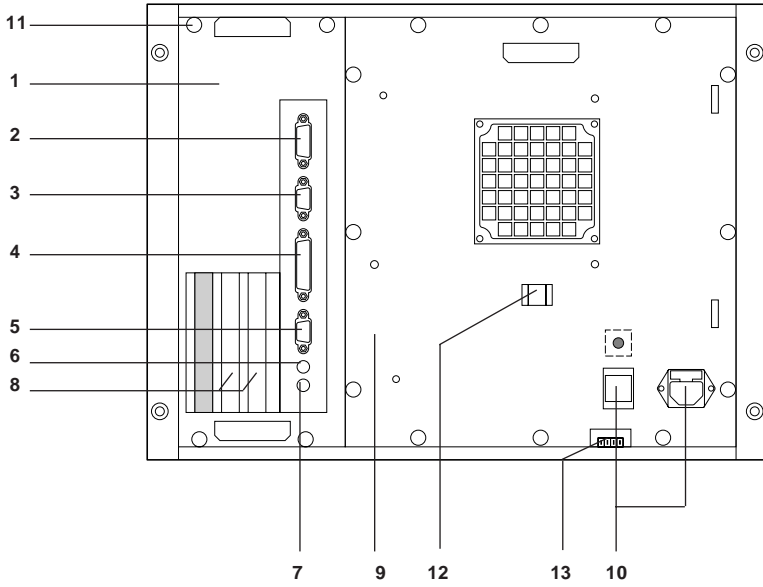
1.2-1 Front Panel



Front panel (cont.)

- 1 14" SVGA high resolution (640 x 480) color CRT screen.
- 2 27-key operator keyboard (numeric keypad and dual-function cursor keypad) mounted on the vertical door.
- 3 Diskette drive for 3"1/2 standard IBM format (1.44 Mb or 720 Kb) diskettes.
- 4 Slots for two software protection keys which provide access rights to Schneider software packages (TE90 standard).
- 5 Two-position key switch to enable or disable data entry and initiate actions from the keyboards (built-in or external).
- 6 PS/2 compatible extension keyboard connector (for front panel connection to the keyboard connector located on the back panel).
- 7 RS 232C serial port (COM1) (for front panel connection to the RS 232C serial port located on the back panel).
- 8 Operator keyboard comprising two sets of 12 sealed function keys (marked F1 to F12 and S1 to S12 with dual alphanumeric marking), mounted on the horizontal door panel.
- 9 Potentiometer for adjusting the screen brightness.
- 10 Potentiometer for adjusting the screen contrast.
- 11 Processor reset button that reboots the system.

1.2-2 Back panel

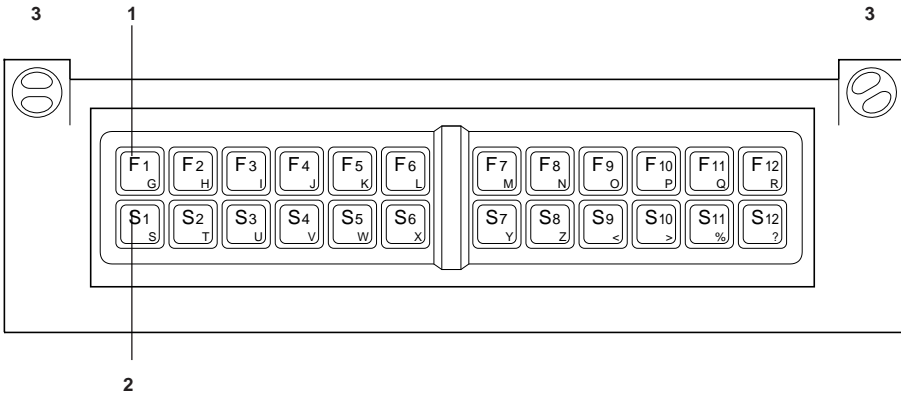


Back panel (cont.)

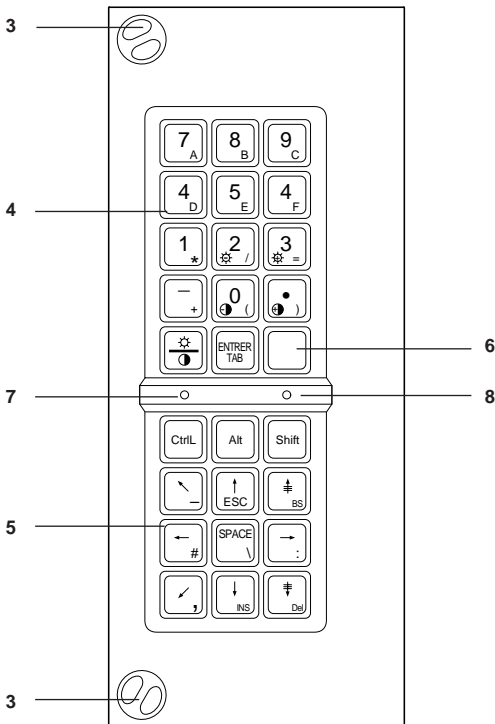
- 1 A drawer that is opened by from the back panel of the CCX 77 cell controllers, comprising the system electronics (motherboard and ISA bus). To fully remove this drawer, space equalling the depth of the system unit is required (470 mm).
- 2 15-pin, high density VGA video connector. This connector is normally used for the cable connecting the built-in video CRT screen. This cable can be disconnected, allowing the user to connect a third party external video monitor.
- 3 Isolated RS 485 / current loop serial port (COM2) with a 26-pin high density SUB-D female connector for connection to a UNI-TELWAY bus.
- 4 IBM PS/2 standard two-way parallel interface port (LPT1) (25-pin female SUB-D connector).
- 5 RS 232C serial interface port (COM1) (9-pin male connector). This connector is functionally equivalent to the one located on the front panel. It is normally used to connect the extension cable for the front panel connector, but this cable can be disconnected to allow direct connection to this port on the back panel. It is not possible to connect two cables simultaneously to the front and back panels.
- 6 PS/2 mouse port (micro-DIN connector).
- 7 Micro-DIN female connector for PS/2 compatible keyboard. This connector is functionally equivalent to the one located on the front panel. **Never connect two external keyboards simultaneously using the front and back panel connectors.**
- 8 Two IBM PC-AT (ISA bus) standard slots for full-length extension cards (these slots will accept a TSX MAP PC7 42M card for direct connection to a MAPWAY network). Each slot is provided with a cover to protect it when no extension card is present.
- 9 Power supply access cover also allows the user to access the battery back-up module and the AC supply protection fuse.
- 10 AC supply power receptacle for the power cord, fuse carrier and system On/Off switch.
- 11 1/4 turn quick locking screws for releasing the drawer from the rear.
- 12 Screw connector for product grounding,
- 13 Discrete outputs ALF0 and ALF1.

1.2-3 Keyboard

Horizontal keyboard



Vertical keyboard



-
- 1 Function keys F1 to F12 (corresponding to function keys F1 to F12 on the IBM compatible keyboard) and alphabetic keys.
 - 2 Function keys S1 to S12 (corresponding to Shift + function keys F1 to F12 on the IBM compatible keyboard) and alphanumeric keys.
 - 3 Keyboard retaining screws.
 - 4 Dual-function numeric keypad.
 - 5 Dual-function cursor keys.
 - 6 Key for accessing the second level of dual-function alphanumeric keys.
 - 7 Red indicator lamp showing hard disk activity.
 - 8 Green indicator lamp showing that the cell controller is powered-up and indicating power supply status (for more information on this indicator, see section 4.4-2).
 - 9 Adjustment key non-functional on these models.

The user can connect an external keyboard to CCX 77 cell controllers. This keyboard can be connected and disconnected under power. When an external keyboard is connected in addition to the internal keyboard, the user can utilize either set of keys without affecting the context (as long as only one keyboard is active at any one time).

Important

The keyboard language for CCX 77 cell controllers must be selected in the SETUP program (for further information, see section 5.2-7).

When using a CCX 77 for a Monitor 77 application, only the alphanumeric keys and the function keys F1 to F12 and S1 to S12 should be used.

1.3 Features specific to the CCX 77

1.3-1 Monitoring the Ambient Temperature

When the ambient temperature of CCX 77 cell controllers exceeds 50°C, the integral temperature probe triggers an audible and visible alarm (the red indicator lamp7 on the vertical door blinks). This alarm is also available via a relay output assigned to this task (by configuration). In order to avoid any damage to components, such as the hard disk, etc, the supply is automatically cut off if no action is taken within 2 minutes. Wait 20 seconds before powering-up again with the On/Off switch.

1.3-2 Discrete Outputs

CCX 77 cell controllers are fitted with two relay outputs which can have various functions depending on the configuration (SETUP program) :

ALF0 output

This output may be configured in one of two ways :

- Assigned to the user, in which case it can be controlled by program independently of the state of the machine, or
- Assigned to the system, in which case it reflects the state of an internal watchdog which is activated if there is a serious fault (stoppage of the processor or the internal clock).

ALF1 output

This output may be configured in one of three ways :

- Assigned to the user, in which case it can be controlled by program independently of the state of the machine, or
- Assigned to the temperature alarm, in which case the output is activated when an excessive temperature is detected inside the terminal (see section 1.3-1), or
- Assigned to the state of the power supply, in which case the output is activated when the terminal is operating with a battery which has fallen to 10% of its capacity.

1.3-3 Operational safety devices

Tamper-proof password

Each CCX 77 cell controller is fitted with an access control system which limits access to authorized persons only, via a tamper-proof password, even after disconnection of the internal battery.

Tamper-proof individual serial number

An tamper-proof individual serial number appears at every power-up. This serves as a deterrent to theft.

Specific rights of use for Schneider software

Each terminal has a slot for two TE90 standard Schneider software protection keys.

1.4 Operating systems and software utilities

1.4-1 Operating systems

CCX 77 cell controllers are supplied with pre-installed DOS and/or OS/2 and/or WINDOWS 95 operating systems. The functions of CCX 77 cell controllers are only guaranteed with software supplied by Schneider.

PC compatibility is not guaranteed in the event of using any other operating system than those supplied by Schneider.

These operating systems are also supplied on 3" 1/2 format diskettes, together with documentation. WINDOWS 95 is supplied on CD-ROM with a copy on the HD.

1.4-2 Schneider software utilities

Schneider software utilities are divided into three groups :

- The SETUP program, in ROM, displays the configuration parameters of CCX 77 cell controllers in English, and enables them to be changed by the user,
- A set of multilingual utilities for DOS supplied on a 3"1/2 diskette (T FTX LF TOS 5), including a SETUP program which operates in exactly the same way as the resident SETUP program,
- A set of utilities for OS/2 supplied on a 3" 1/2 diskette (T FTX LF TS2 52),

These utilities and their setup procedures are described in sections 5 and 6.

1.4-3 CCX 77 cell controller parts

On receipt of the terminal, the user is supplied with :

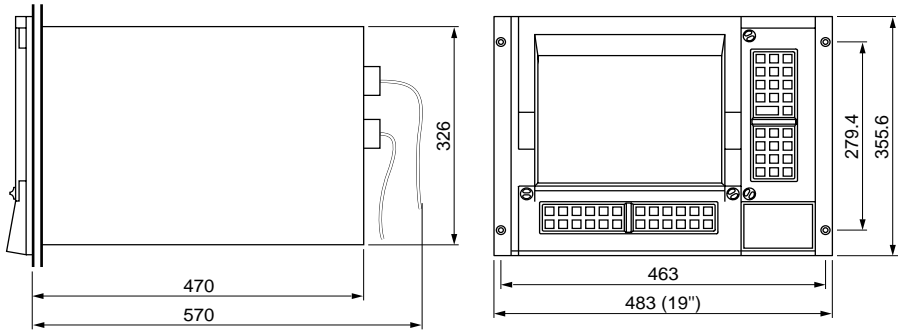
- Schneider BIOS and SETUP utilities resident in ROM,
- A hard disk which is formatted, depending on the configuration, with DOS and/or OS/2 and/or WINDOWS 95 operating systems and utilities installed.

1.5 Operating characteristics

Controller		CCX 77 45
Processor		DX5 133 MHz
Hard disk	Capacity	Depending on configuration
RAM memory	Standard	Depending on configuration
	Expandable to	64 Mb
Coprocessor		Integrated
Diskette drive		1 3 1/2 IBM standard format (1.44 Mb and 720 Kb).
Screen		14" SVGA high-resolution color, 640 x 480 or 800 x 600
Keyboards		27-key operator keyboard (dual-function numeric/cursor keypad) and 24-key operator keyboard (dual-function alphanumeric keys)
Output ports	Standard	RS 232C serial port (DB9 connector)
		Two-way parallel port (DB25 connector)
	Series 7	RS 485 serial link/current loop port
	Mouse	IBM PS/2 standard
	Video port	For VGA or SVGA external monitor
X-WAY network connection	MAPWAY	With TSX MAP PC7 42M extension card (full length)
	ETHWAY	With TSX ETH PC101M extension card (short length)
	FIPWAY	With TSX FPC10M extension card (short length)
Power supply	Standard	Via 110/127 V or 220/240 VAC industrial supply (depending on model), apparent power 170 VA
	Extension	Rechargeable batteries for autonomous operation during power breaks (up to 15 min).
Discrete outputs (ALF0 and ALF1)		2 channels (ALF0 and ALF1). 220 VAC / 0.25 A and 25 VDC / 1 A relay outputs.
Extension slots		2 full-length extension card slots (PC-AT and ISA bus compatible)
Operating systems		DOS and/or OS/2 and/or WINDOWS
Operational security		<ul style="list-style-type: none"> • Access via tamper-proof password • Tamper-proof individual serial number • Slot for Schneider software protection keys (TE90 standard)
Dimensions	dimensions	H = 355.6 mm L = 483 mm D = 470 mm
	weight	31 Kg
Environment		Hardware designed for use in industrial environments (mechanical shocks, temperature, electromagnetic interference)

1.6 Dimensions and mounting

Dimensions

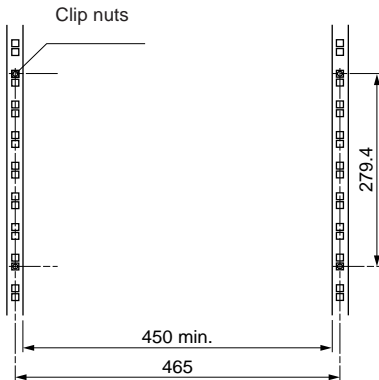


Reminder :

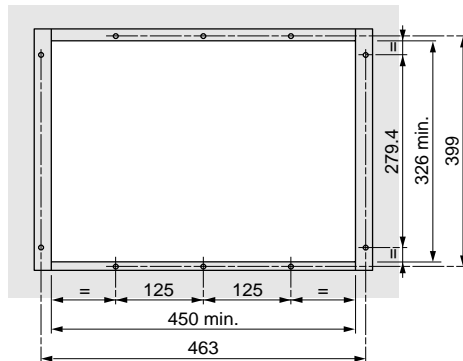
Removing the drawer from the rear panel requires space equal to the depth of the device (470 mm).

Mounting

19" rack mounting



Flush mounting

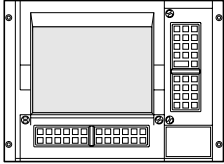
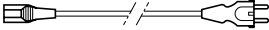




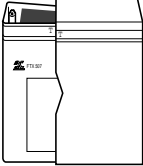





CCX 77 cell controllers must only be installed in consoles or control panels with a protection level of at least IP 54. They can be :

- Mounted in 19" racks (with four M6 CS, CHC, CMX retaining screws - through the front panel),
- Flush mounted (with four M6x18 - retaining screws through the front panel). To ensure complete dust and damp protection, add six M6x (12 + max. panel thickness) retaining screws - mounting is at the rear.

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2.1 Checking the equipment

Terminal	Accessories and software	Documentation and utilities
<p data-bbox="204 395 270 416">CCX 77</p> 	<p data-bbox="456 357 652 378">T FTX CA51 power cord</p>  <p data-bbox="529 485 580 505">Fuses</p>  <p data-bbox="425 541 537 561">TD 5 x 20 5A</p> <p data-bbox="571 541 683 561">TD 5 x 20 2A</p> <p data-bbox="425 644 525 665">Cable gland</p>  <p data-bbox="494 751 617 788">Dustproof filter for fan</p>  <p data-bbox="429 911 678 954">Guide for extension card (full-length IBM PC.AT standard)</p> 	<p data-bbox="804 437 934 480">User's manual T CCX DM 77F</p>  <p data-bbox="735 740 999 783">DOS software utilities One 3 1/2 diskette T FTX LF TDS5</p>  <p data-bbox="735 932 999 975">OS/2 software utilities One 3 1/2 diskette T FTX LF TS252</p> 
Depending on configuration		
<p data-bbox="640 1198 789 1219">Operating systems</p> <ul data-bbox="563 1257 693 1326" style="list-style-type: none">• DOS• OS/2• WINDOWS 95 		

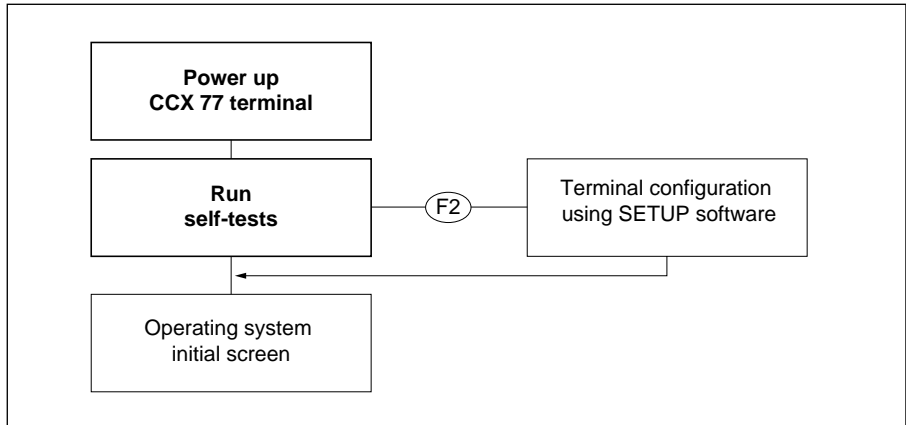
WINDOWS 95 is supplied on CD-ROM with a copy on the HD.

2.2 Powering up

2.2-1 Introduction

On power-up, CCX 77 cell controllers run a series of self-tests, then display one of the following :

- The first screen of the operating system used.
- An error message if no operating system is installed in the terminal.



2.2-2 Self-test screens

The cell controllers perform the following sequence of self-tests when first powered up, or during initialization (pressing on the pencil-point pushbutton RST, designated ⑩ in section 1.2-1) or when rebooting (by pressing <Ctrl>, <Alt> and). The tests are listed on the self-test screen as they are performed :

- Testing the base RAM memory : 639 Kb (640 Kb less 1 Kb reserved for BIOS).
- Testing the RAM memory reserved for the system : 384 Kb.
- Testing the expanded RAM memory : 15360 Kb or 31744 Kb or 64512 Kb.
- Testing the type of video : VGA.
- Testing the protected mode in the processor.
- Testing the keyboard.
- Testing the diskette drive controller.
- Testing the hard disk.
- Testing the math coprocessor.
- Testing the serial ports.
- Testing the parallel port.
- Testing the Cmos memory : 128 Kb.
- Testing the real-time clock.

Example of a self-test screen

```
T e l e m e c a n i q u e      CCX77 BIOS Vx.y Copyright 1997
...CHIPS 65540/545      VGA 32Kb BIOS V.2.6.0 Copyright (c) 1995
CCX77      Serial Number: 30171001
```

```
Base Memory      :    639 Kb OK
System Ram       :    384 Kb OK
Extended Memory  :  15360 Kb OK
Video type       :    VGA
Virtual mode     :    OK
Keyboard         :    OK
Diskette drive(s) :    1
Hard Disk (s)   :    1
Math Coprocessor :    1
Serial Port(s)  :    2
Parallel Port(s) :    1
User Cmos Memory :   128Kb
Real Time Clock  :    OK

Configuration    :    OK
```

```
***Press F2 key continuously to run SETUP***
```

Each time a self-test is performed, the configuration is saved to a permanent memory in order to compare the present configuration with the preceding configuration, (when the last self-test sequence was run). If the two configurations are different (for example, by the addition of RAM memory, etc), the operator should save the new configuration by pressing the F1 key.

If one of the tests is incorrect, a message (for example *Error*) is displayed on the line for the faulty element. In order to explain this message and to facilitate maintenance, additional data may also be provided in the *ERROR REPORT* window : (e.g. Keyboard Stuck Key : 21) and/or in the display line at the bottom of the screen.

T e l e m e c a n i q u e CCX77 BIOS Vx.y Copyright 1997 ...CHIPS 65545/545 VGA 32Kb BIOS V.2.6.0 Copyright (c) 1995 CCX77 Serial Number: 30171001	
Base Memory : 639 Kb OK System Ram : 384 Kb OK Extended Memory : 15360 Kb OK Video type : VGA Virtual mode : OK Keyboard : Error Diskette drive(s) : 1 Hard Disk (s) : 1 Math Coprocessor : 1 Serial Port(s) : 2 Parallel Port(s) : 1 User Cmos Memory : 128Kb Real Time Clock : OK	- ERROR REPORT - Keyboard Stuck Key : 21
Configuration : OK	

Display line _____

2.2-3 Messages associated with the sub-groups tested

x	Memory size or number of peripherals.
OK	Sub-group test correct.
Error	Sub-group test incorrect. Read the additional data, if present, in the ERROR REPORT window and on the display line (see following paragraphs).
Resident SETUP activated	Selection of SETUP (by pressing F2 during the self-tests) has been taken into account.
Checksum error	Configuration error. Use SETUP to correct this error. (Warning, some files may still be open).
Changed (VERIFY then strike F1 key)	The configuration has been modified (additional memory or peripheral). Press F1 for the terminal to accept the new configuration.

2.2-4 Report confirmation messages

These messages are displayed in the ERROR REPORT window.

When one of these messages appears, switch the terminal off for a few seconds and then switch it on again.

If the message reappears, please contact Schneider support.

Memory size error	Memory size error (memory has been increased or cannot be used). Please refer to SETUP to display the memory configuration or confirm the additional memory with F1.
Memory error addr (data)	RAM memory access error.
Low meg. chip select error	
Video subsystem error	SVGA video sub-system fault.
Keyboard stuck key xx	Key xx on the keyboard is blocked (stuck). Check whether this key was pressed accidentally. xx : corresponds to the code generated by the key (in hexadecimal)
System or keyboard error	Keyboard controller fault.
Keyboard clock fail	Communication error between the keyboard and the terminal.
Interface fail	Keyboard self-tests incorrect.

Keyboard test failure	Keyboard not present. Plug in the keyboard and reinitialize the system by pressing F1.
Diskette init error	Faulty diskette drive or controller.
Disk controller failure Disk C: Error test	Faulty hard disk.
User Cmos checksum error	Checksum error in the CMOS memory, parameters modified. Use SETUP to modify the parameters. (Warning, some files may still be open).
!!WARNING!! Replace battery	Change the time/date clock backup battery.

2.2-5 Messages shown in the display line

Resume = F1 key	Press F1 to continue. This automatically saves changes in configuration.
Resume = F1 key or Run SETUP = F2 key	Press F1 (for example, to save a change in configuration) or run SETUP using F2.
Press F2 key continuously to run SETUP	During power-up, keep F2 pressed down to run SETUP.
Password	Enter password.
OK	Password correct.
Invalid	Password incorrect.
Battery option ON Press any key to confirm!!!	Press any key to confirm terminal being powered by battery. If there is no confirmation within 10 seconds, the selection is that defined in SETUP : terminal switched off.
Boot fail ? [ENTER] to retry	Fault in system files on the diskette or hard disk. Diskette or hard disk not formatted. Insert a new system diskette in drive a: and press <Enter> to continue.
No boot sector ? [ENTER] to retry	The diskette inserted in a: or the hard disk, is not a system disk(ette). Insert a new system diskette in drive a: and press <Enter> to continue.

2.2-6 Error messages which stop the system

The following messages correspond to serious faults and cause the system to stop. If this occurs, contact Schneider support.

- **Err ITs controller - HALT**
- **Err. I/O 16 Bits - HALT**
- **Err Hot NMI - HALT**
- **Err Timer failure - HALT**
- **Err Timer interrupt failure - HALT**
- **Err 8042 last command not accepted - HALT**
- **Invalid product Type - HALT indicates that the configuration is invalid.**

Note

In the event of excessive ambient temperature (greater than 50° C) when the CCX 77 cell controllers are powered up, they automatically switch off.

Under normal operation, this fault is indicated by the hard disk indicator lamp blinking (designated (7) on the vertical keyboard, as described in section 1.2-3) and by an audible beep. The user then has two minutes to back up all files before system shutdown.

2.3 Inserting the software protection key modules

A software protection device with the appropriate right of use must be present when running Schneider programming and operation software. This right of use is contained in a key module supplied with the corresponding software.

The rights of use are handled by the following utility programs :

- KEY MANAGER, included in the XTEL-BASE software package for Schneider software that runs in the X-TEL or MINI X-TEL Software Workshop environment.
- UKEY included with Monitor 77 software.
- TSX TSC MG for Schneider software running under DOS.

CCX 77 cell controllers have slots for two software protection keys (TE90 standard).

Insertion procedure

- 1- Open the access door where the vertical keyboard is located (Figure 1)
- 2- Insert the key into the required slots (Figure 2).

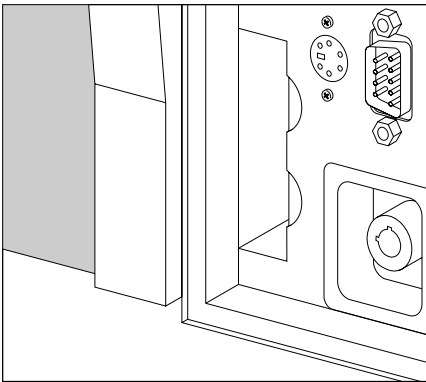


Figure 1

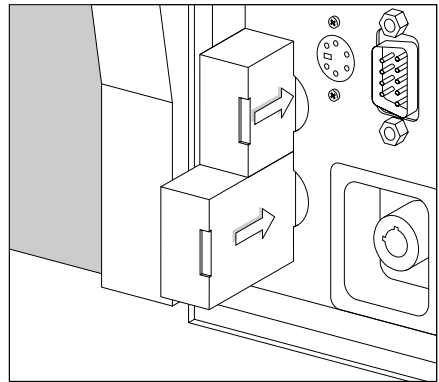
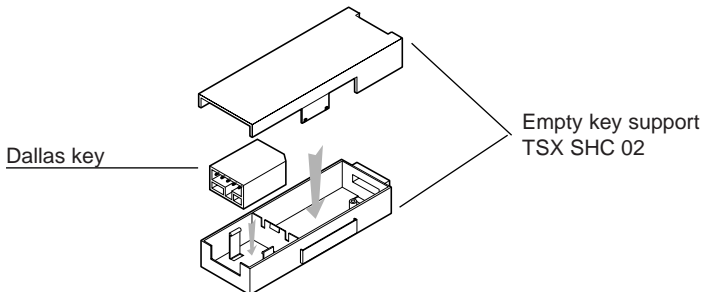
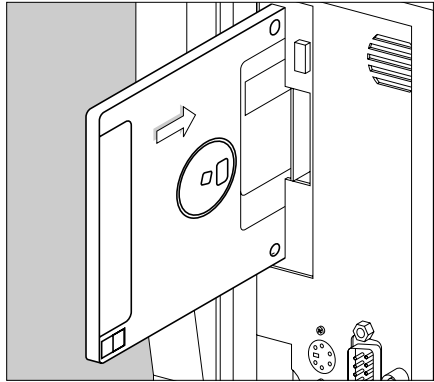
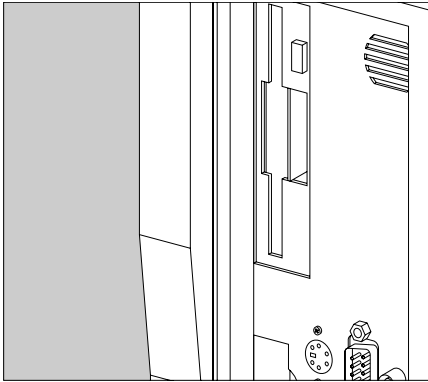


Figure 2

For MONITOR 77 software running under DOS, the software key (Dallas key) must be inserted into the empty key support (reference TSX SHC 02) as shown below :



2.4 Handling the diskettes



2.4-1 Precautions

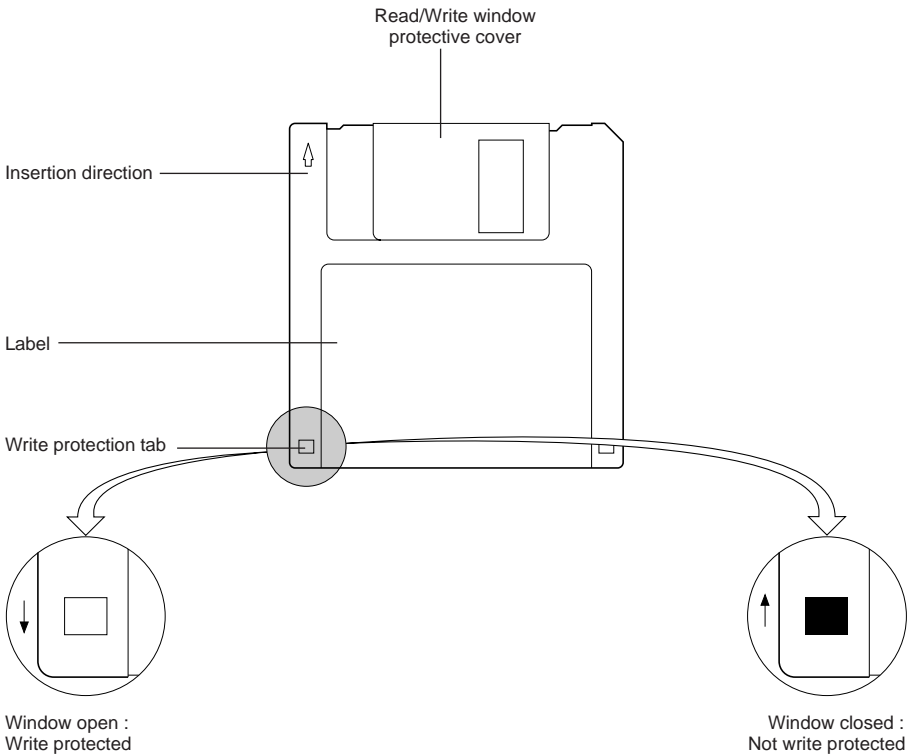
To ensure that diskettes are always read and written to correctly and to extend their useful life, the following precautions need to be taken :

- Store the diskettes in the shade and in away from extreme temperatures.
- Keep the diskettes in their original box or in a box made specially for this purpose.
- Do not clean the recording surface of any diskette. Cleansing products may render the contents of the diskette unreadable.
- Do not expose the magnetic surface by dismantling the diskette or by sliding open the metal protection plate.
- Do not touch the magnetic surface of the disk. Fingerprints prevent the data being read.
- Protect the diskette from dust and smoke.
- Do not place heavy objects on the diskettes.
- Do not use an eraser to remove the wording on labels. Particles of rubber may slide under the plastic cover.
- Keep diskettes well away from any magnetic source as this may destroy data.

2.4-2 Write-protecting diskettes

When a diskette is write-protected, it is impossible to add, modify or erase files. This prevents accidental deletion of data. On 3 1/2" diskettes a sliding plastic tab, located in one corner of the diskette, covers or uncovers a small "window". When the window is open, the diskette is write-protected.

To write once again, the protection tab should simply be pushed back to close the window.

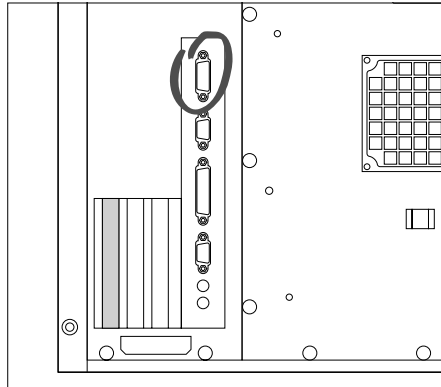


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3.1-3 Connecting an external video monitor	3/3
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3.1 Monitors

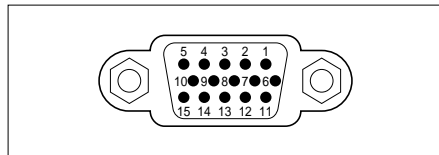
3.1-1 General

CCX 77 cell controllers include a 15-pin IBM PS/2 standard video connector. It will accept any kind of monochrome or Multisync. color monitors. It supports SVGA, VGA, EGA and CGA video outputs and can display up to 256 colors.



3.1-2 VIDEO (VGA) connector pin arrangement

Front view of the female connector. This connector is located on the back panel of the cell controller (designated (2) in section 1.2-2).



Pin number	Signal	I/O	Description
1	RED	O	Red
2	GREEN	O	Green
3	BLUE	O	Blue
4	Reserved	-	Reserved
5	Selftest	O	Self-test output
6/7/8	0 V	-	RGB ground
9	PLUG	-	Locating device
10	0 V	-	Ground
11/12	Reserved	-	Reserved
13	HSYNC	O	Horizontal synchronization
14	VSYNC	O	Vertical synchronization
15	NC	-	Not used

3.1-3 Connecting an external video monitor

The built-in display screen of CCX 77 cell controllers is normally connected to the processor unit via a cable fitted with a standard VGA connector. This cable is taken to the back panel of the cell controller (designated (2) in section 1.2-2).

The user must disconnect this cable (with the terminal switched off) so that an external video monitor can be connected to the video (SVGA) connector. Once this is done, the built-in screen is no longer used.

3.1-4 Connecting an additional video adapter card to a CCX 77

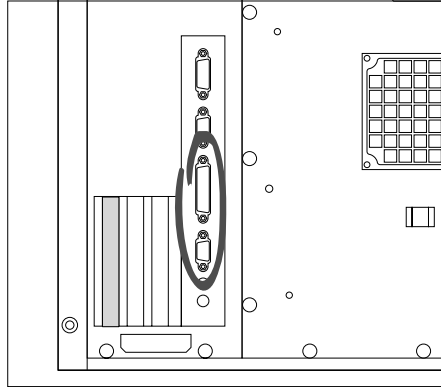
- Switch off the terminal.
- Pull the system drawer (designated (1) in section 1.2-2) out from the back of the cell controller.
- Install the third-party video adapter card in one of the two available extension slots (designated (8) in section 1.2-2). Refer to the documentation supplied with the adapter for setting up the software.
- Push the system drawer back into place.
- Connect the external monitor to the newly installed video adapter card.

Video cards on the ISA bus are detected automatically.

3.2 Printers

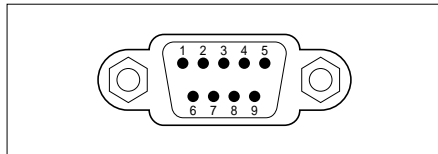
3.2-1 General

CCX 77 cell controllers connect to various kinds of serial printer with an RS 232C interface (9-pin connector) or parallel printer with a Centronics interface (25-pin connector). The appropriate printer driver software must be installed for the selected printer. A number of these printer drivers are included in the Schneider installation diskettes.



3.2-2 RS 232C (COM1) serial port connector pin arrangement

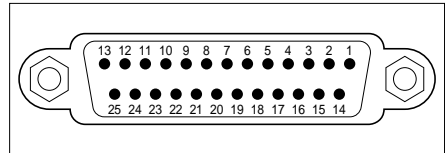
A male connector (front view). This connector is located on the back panel of the cell controller (designated (5) in section 1.2-2). There is also an extension of this connector on the front panel (designated (7) in section 1.2-1).



Pin Number	Signal	I/O	Description
1	DCD	I	Data carrier detected
2	RXD	I	Receive data
3	TXD	O	Transmit data
4	DTR	O	Data terminal ready
5	0 V	-	Signal ground
6	DSR	I	Data station ready
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	RI	I	Ring indicator

3.2-3 Centronics “//[←]→ (LPT1)” port pin arrangement

Female connector (front view). This connector is located on the back panel of the cell controller (designated (4) in section 1.2-2).

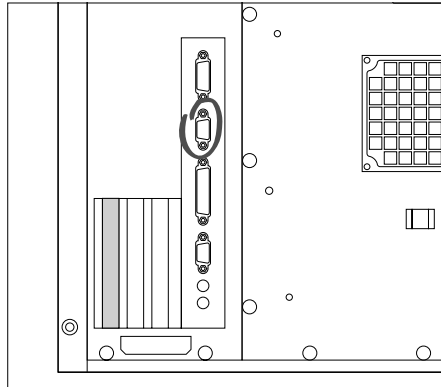


Pin Number	Signal	I/O	Description
1	-STROBE	O	Strobe
2	D0	O	Data bit 0
3	D1	O	Data bit 1
4	D2	O	Data bit 2
5	D3	O	Data bit 3
6	D4	O	Data bit 4
7	D5	O	Data bit 5
8	D6	O	Data bit 6
9	D7	O	Data bit 7
10	-ACK	I	Receipt acknowledgment
11	BUSY	I	Busy
12	PE	I	Paper end
13	SLCT	I	Select
14	-AUTOFEED	O	Automatic line feed
15	-ERROR	I	Error
16	-INIT	O	Printer initialization
17	-SLCTIN	O	Input selection
18/19/20	0 V	-	Signal ground
21/22/23	0 V	-	Signal ground
24/25	0 V	-	Signal ground

3.3 UNI-TELWAY / current loop (COM2) port

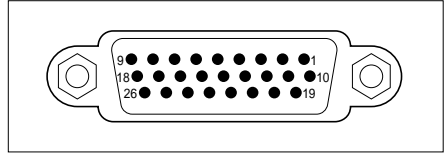
3.3-1 General

CCX 77 cell controllers have an RS 485/20 mA current loop (COM2) port for direct connection to a UNI-TELWAY bus.



3.3-2 COM2 port connector pin arrangement

High-density 26-pin Sub-D female connector (front view). This connector is located on the back panel (designated (3) in section 1.2-2).

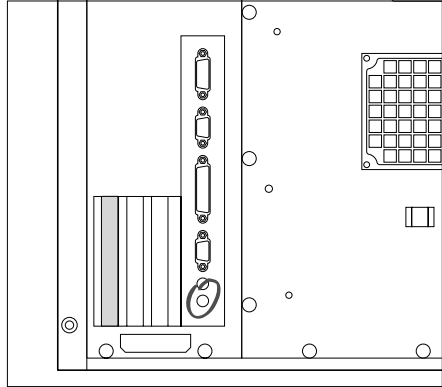


Pin Number	Signal	I/O	Description
1	0 VL	-	0 V RS 485
2	NC	-	Not used
3	0 V	-	0 V logic
4	N3	I	UNI-TELWAY address level 8
5	/ UTW	I	Used for UNI-TELWAY protocol
6	NC	-	Not used
7	- EMI	-	0 V Current loop transmission
8	+ REC	I	Current loop reception
9	+ EMI	O	Current loop transmission
10	D(A)	I/O	UNI-TELWAY line data
11	D(B)	I/O	UNI-TELWAY line data
12	NC	-	Not used
13	N1	I	UNI-TELWAY address level 2
14	N4	I	UNI-TELWAY address level 16
15	NC	-	Not used
16	0 VI	-	0 V Isolated current loop
17	- REC	-	0 V Current loop reception
18	+ 24VI	O	24 V Current loop output
19	0 VL	-	0 V RS 485
20	NC	-	Not used
21	N0	I	UNI-TELWAY address level 1
22	N2	I	UNI-TELWAY address level 4
23	NP	I	UNI-TELWAY parity
24	NC	-	Not used
25	- EMI	-	0 V Current loop transmission
26	+ REC	I	Current loop reception

3.4 Keyboards

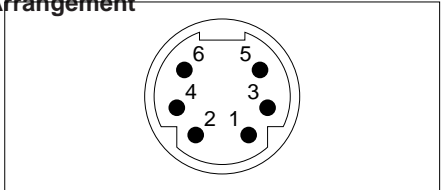
3.4-1 General

CCX 77 cell controllers support the use of an external IBM PS/2 compatible keyboard which has either a micro-DIN or DIN connector (it is connected using a DIN/micro-DIN adapter, reference T FTX KBA 5).



3.4-2 Keyboard "KBD" Connector Pin Arrangement

6-pin female micro-DIN connector (front view). This connector is located on the back panel (designated (7) in section 1.2-2). An extension connector is also taken to the front panel (designated (6) in section 1.2-1). A two-position keyswitch lets the user enable or disable data entry from the keyboard. This keyswitch is located on the front panel (designated (5) in section 1.2-1).



Pin number	Signal	I/O	Description
1	KDATA	I/O	Data
2	NC	-	Not used
3	0 V	-	Ground
4	5 V	-	5 VDC
5	KCLK	I/O	Clock
6	NC	-	Not used

3.5 Discrete outputs ALF0 and ALF1

3.5-1 Presentation

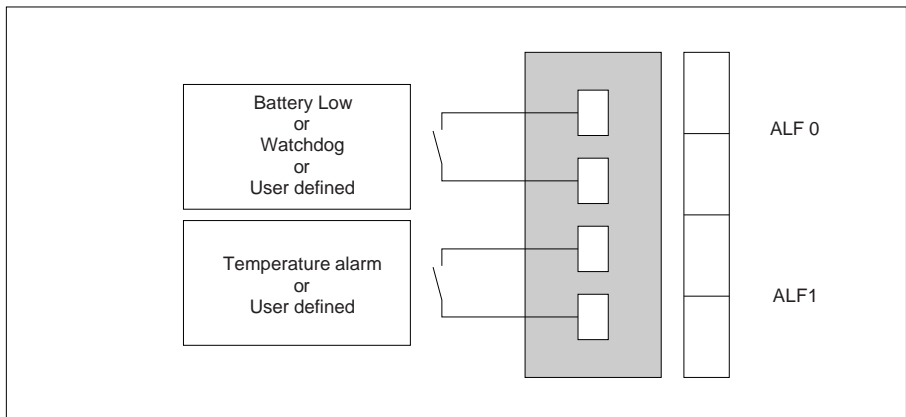
CCX 77 cell controllers are equipped as standard with two relay outputs.

These two Alarm Flag outputs ALF0 and ALF1 have the following characteristics :

- Nominal voltage for AC supply : 24 - 240 V.
- Nominal voltage for DC supply : 24 V.
- Nominal current for AC supply : 0.25 A (50 VA).
- Nominal current for DC supply : 1 A.
- Response time :
 - Make : 10 ms.
 - Break : 20 ms.

Assignment of these outputs is described in section 1.3-2. It has to be specified during configuration of the terminal, using the SETUP program (refer to section 5.2-5).

3.5-2 Connections



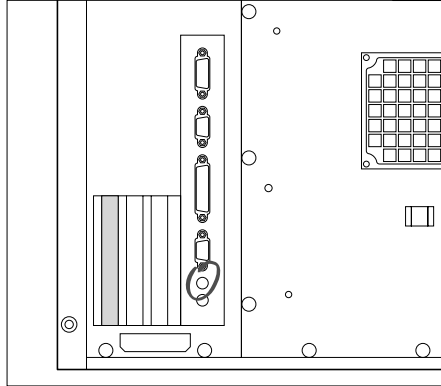
3.6 Mouse

3.6-1 General

Schneider offers a range of pointing devices as options (mouse or tracker ball) :

These pointing devices connect to the dedicated mouse port fitted with a standard IBM PS/2 serial link micro-DIN connector.

Instructions for setting up the various pointing devices are given in the operating systems Installation Manual.

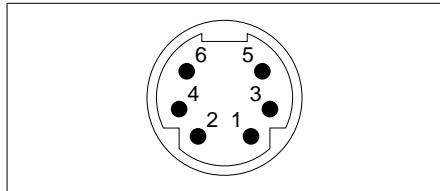


Important

Connecting or disconnecting a mouse while the cell controller is powered-up will cause the system to lock up. The system must then be rebooted.

3.6-2 Mouse connector pin arrangement

6-pin female micro-DIN connector (front view). This connector is located on the back panel (designated (6) in section 1.2-2).



Pin Number	Signal	I/O	Description
1	MDATA	I/O	Data
2	NC	-	Not used
3	0 V	-	Ground
4	5 V	-	5 VDC
5	MCLK	O	Real-time clock
6	NC	-	Not used

3.7 Using an external CD-ROM drive

Schneider recommends the use of a CD-ROM drive. To access further details about this recommendation, use Schneider's standard information server.

3.7-1 General connection principle

Most CD-ROM drives have a SCSI bus type connection. The FTX 517 interface on this bus is achieved either via a cable which converts signals from the parallel port into SCSI signals or by adding a SCSI card in the FTX 517 ISA bus.

3.7-2 General installation principle

All our CCX 77 cell controllers are supplied with OS/2, WINDOWS 3.x, DOS and/or WINDOWS 95 already installed. For each of these operating systems, the CD-ROM drive supplier should provide the drivers as required.

Under OS/2, installation is performed in two stages :

- Installation of the SCSI driver
 - A disk supplied under separate cover installs the driver ("install or setup" command) in the CONFIG.SYS file.
- Installation of the CD-ROM drive (connected drive)
 - Launch the OS/2 icon.
 - Launch the selective installation icon.
 - Launch the CD-ROM drive icon.

Select the "other drive" option at the bottom of the list if the drive you wish to install is not listed. Define the access path (for example, a:\OS2) in the "source directory" dialog box and follow the OS/2 instructions.

Note :

The majority of CD-ROM drive manufacturers provide a set of disks with their product which include a "read.me" file. This file contains the installation instructions.

Sub-section	Pages
4.1 Accessing internal extensions	4/2
4.1-1 Installation	4/2
4.1-2 Opening and removing the system drawer	4/3
4.1-3 Removing the back cover	4/5
4.2 Dynamic RAM memory extension	4/6
4.3 IBM PC-AT standard (ISA Bus) extension cards	4/7
4.4 Internal battery back-up	4/10
4.4-1 Introduction	4/10
4.4-2 Operation	4/11
4.4-3 Charging a new battery or a used battery after prolonged storage	4/12
4.4-4 Installation Procedure	4/13
This section ends at page	4/14

4.1 Accessing internal extensions

4.1-1 Installation

The CCX 77 cell controllers can accept Schneider and other commercially available IBM PC-AT standard extension cards.

The table below lists the various extensions together with any relevant Schneider references and indicates how to gain access to the system.

CCX 77 extensions		TE reference	Access	See section
Memory extensions	RAM 16 Mb	T CCX RAM 516	system drawer	4.2
Memory extensions	RAM 32 Mb	T FTX RAM 532	system drawer	4.2

Common extensions		TE reference	Access	See section
Internal battery back-up		T FTX CHG 5 and T FTX RBAT 5	back cover	4.5
Extension cards			system drawer	4.4

The remainder of this section gives instructions for :

- opening and removing the system drawer, see section 4.1-2,
- removing the back cover, see section 4.1-3.

4.1-2 Opening and removing the system drawer

Warning

Before attempting to remove the slide-out system drawer (designated ① in section 1.2-2), always switch the system off and disconnect all power cords and connection cables. Ensure that there is no diskette in the diskette drive.

Opening the system drawer

In order to install extensions on the motherboard and on the ISA bus, the slide-out system drawer must be opened.

- ① Unscrew the four designated screws (see figure 1 below).

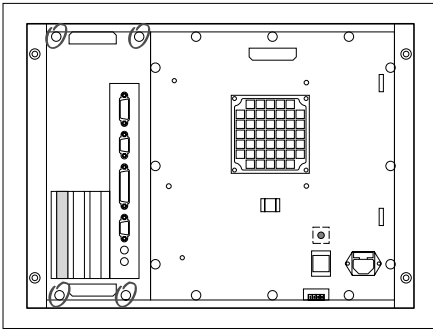


Figure 1

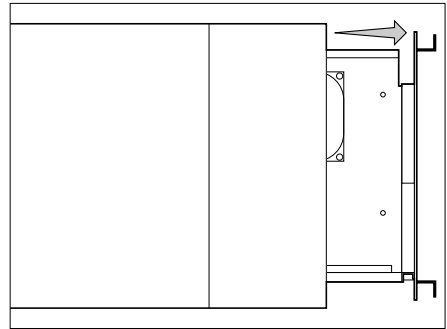


Figure 2

- ② Once released, slide out the system drawer (see Figure 2) until it reaches the stop.
- ③ The system motherboard and the extensions slots described in section 4.1-1 are now accessible (see figure 3).

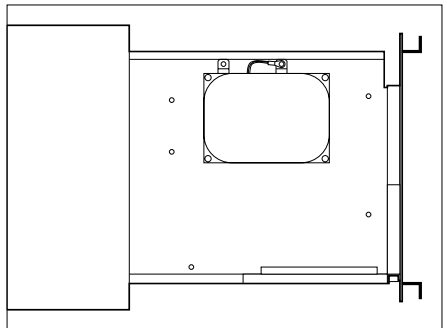
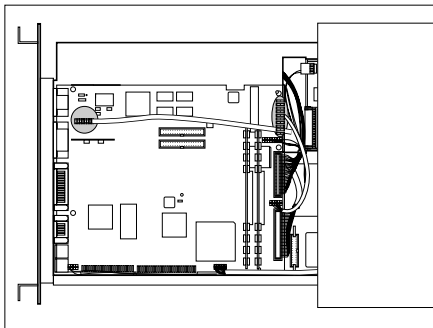


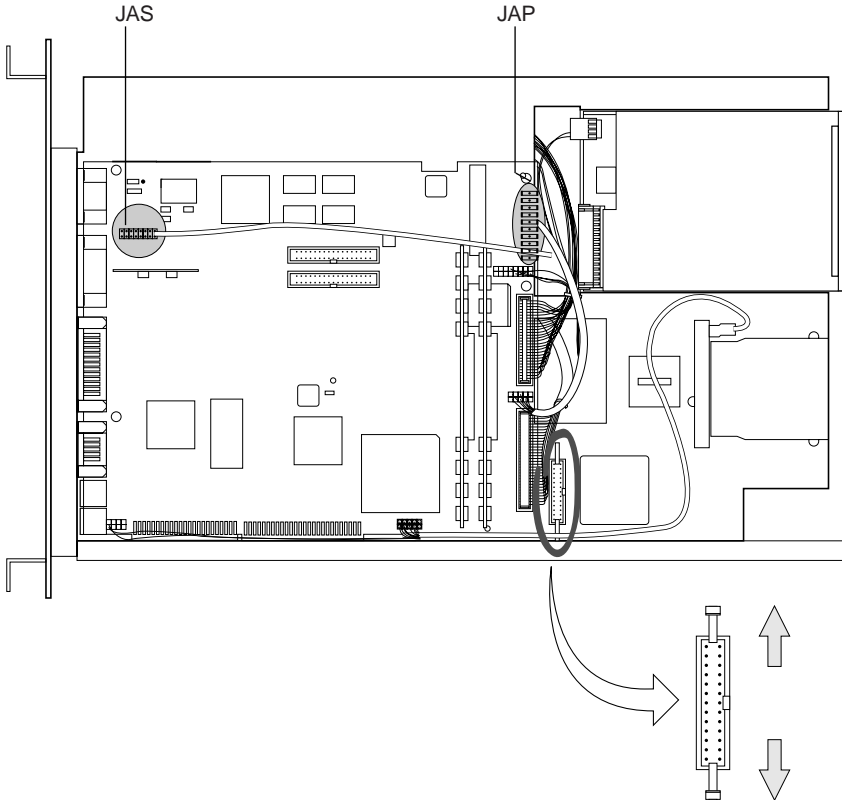
Figure 3

- ④ After installing the relevant extension card, close the slide-out system drawer by following the above procedure, in reverse order.

Removing the system drawer

If major servicing is required (replacing the real-time clock battery, replacing the system drawer, etc.), the user must completely remove the slide-out system drawer. To do this, proceed as follows :

- 1 Open the slide-out system drawer as described on the previous page.
- 2 Remove the connector (JAS) from the motherboard.
- 3 Remove the connector (JAP) from the motherboard.
- 4 Release then remove the connector located between the end of the motherboard and the real-time clock battery.
- 5 Press on the stop at the end of the sliding rail to fully release the system drawer,
- 6 Remove the system drawer.



- 7 Replace the system drawer, repeating the above procedure in reverse order **ensuring that all connectors are correctly inserted.**

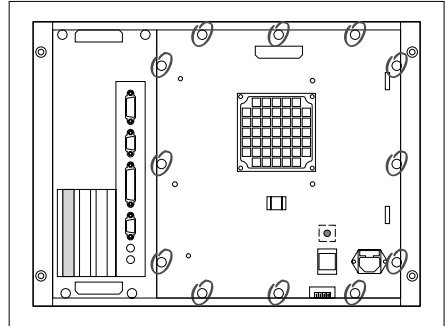
4.1-3 Removing the back cover

Warning

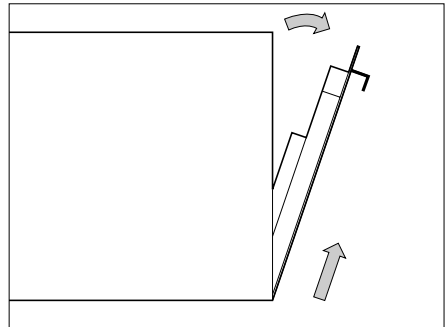
Before removing the back cover, always switch the system off and disconnect all power cords and connection cables.
Even though the cell controller is disconnected from the supply, avoid touching the picture tube and its related components as it remains charged with high voltage.

The back cover is removed as follows :

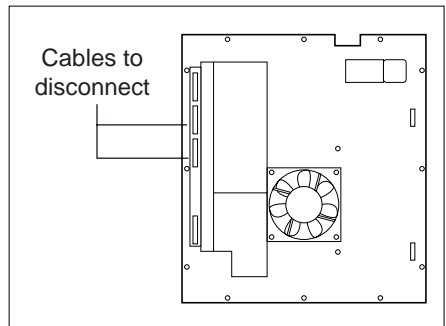
- ① Using a no. 2 cross-recess posidrive screwdriver, remove the 12 screws designated opposite.



- ② Lower the back cover, then slide it gently out of the holding groove at the bottom by lifting it gently without forcing it. To lay it flat, disconnect the two cables shown below.

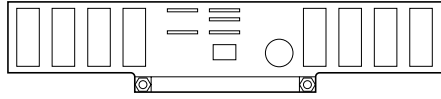


- ③ The extension slots described in section 4.1-1 can now be accessed.
- ④ Once the relevant extension card has been installed, replace the back cover by repeating the above procedure in reverse order, **ensuring that all connectors are correctly inserted.**



4.2 Dynamic RAM memory extension

The 16 Mb or 32 Mb memory extensions are supplied as a memory module card that mounts directly onto the motherboard.



The procedure for installing a memory extension module is as follows :

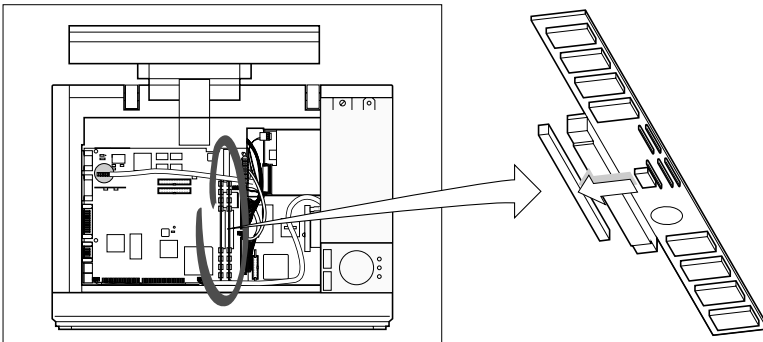
- 1 Open the slide-out system drawer (see section 4.1-2).
- 2 Insert the memory extension card in the dedicated connector provided, ensuring that it is the right way round (connector side on the right).

Warning

Handle the card with great care as its components are highly sensitive to damage by static electricity :

- Do not remove the card from its anti-static packaging until the very last moment.
- Hold the card by the edges of the printed circuit.

- 3 Ensure that both ends of the card are pushed in firmly.



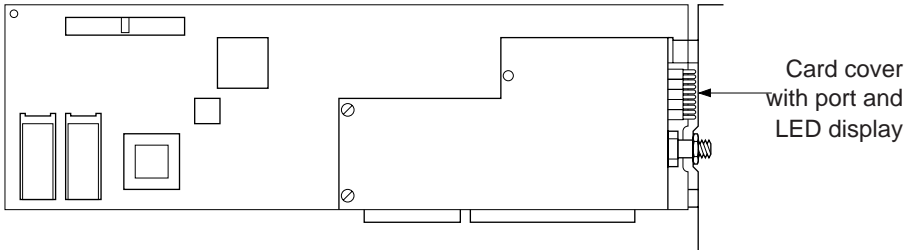
The system board is inserted into the right-hand connector labeled JM0.

- 4 Close the system drawer.

The additional memory is recognized by the system after power-up of the CCX 77 cell controller and pressing the F1 key (no declaration is required in the SETUP program).

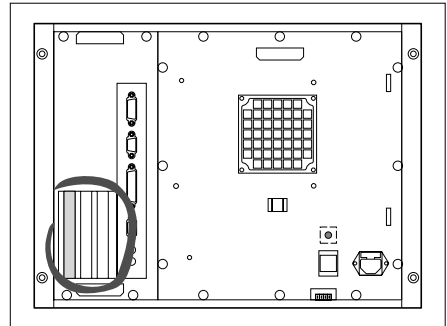
4.3 IBM PC-AT standard (ISA bus) extension cards

The CCX 77 cell controllers have two full-length IBM PC-AT standard (ISA bus) extension cards.



Each slot has an IBM PC-AT standard double connector (62 + 36 pins).

To install an extension card, the slide-out system drawer must first be removed. The back covers over the end of the slots (that can be removed if required for external connection) are accessible from the back panel.



Important

The maximum amount of power available to the ISA extension bus is limited making it impossible to install certain combinations of extension cards.

The tables provided in this section show :

- The current consumption of certain typical combinations of extension cards installed on the ISA bus of CCX 77 cell controllers.
- The current consumption of the various extension cards supplied by Schneider.
- The current consumption of some typical commercially available extension cards.

The total current consumption of all Schneider or third-party extension cards installed in the cell controller must not exceed the available current level.

Current levels available on the ISA bus

Products	RAM	Current levels available		
		+ 5 V	+12 V	-12 V
T CCX 77 45	16 Mb	3.7 A	0.46 A	40 mA
T CCX 77 45	16 Mb	3.5 A	0.46 A	40 mA

Current consumption requirements of Telemecanique extensions

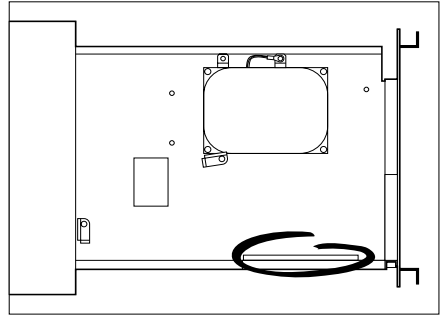
Schneider reference	Extension	Current consumption			
		+5 V	+12 V	-12 V	+35 V
T FTX CHG 5	Battery back-up				0.35 A
T FTX RAM 516	Memory extension	0.2 A			
TSX MAP PC7 42M	MAPWAY card	1.5 A			
TSX ETH PC 101	ETHWAY card	0.2 A	0.5 A		
TSX FPC 10	FIPWAY card	0.3 A			
T FTX KB 51	External keyboard	0.2 A			
T FTX RAM 512	External memory	0.2 A			

Current consumption requirements of commercially available extensions

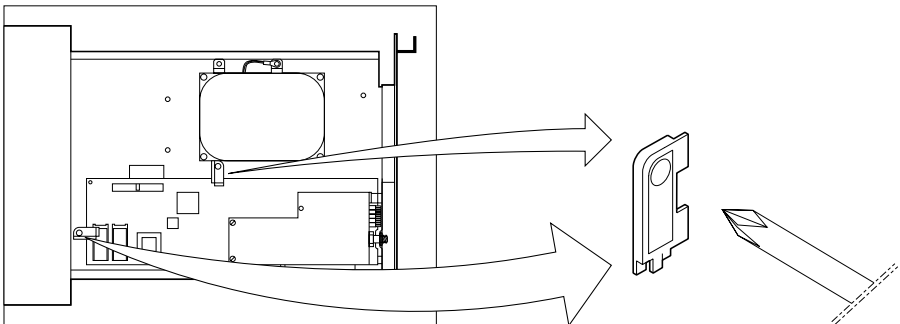
Product	Current consumption		
	+5 V	+12 V	-12 V
2-port RIC card (P/N 76X1013)	2.1 A		
RIC card 1 RS 232 ext (P/N 58X7285)	80 mA	0.1 A	50 mA
RIC card 1 RS 485 ext (P/N 58X7286)	0.12 A		
RIC Multiport card (P/N 33F8791)	2.3 A		
RIC 8-port 422 ext (P/N 53F2613)	1.3 A		
Ethernet card (3 COM)	0.8 A	0.5 A	
Token Ring card	1.4 A		

The extension cards are installed as follows :

- ① Pull out the slide-out system drawer (see section 4.1-2).
- ② Locate the two ISA bus extension slots and their connectors along the edge of the system drawer.
- ③ Take out the back cover for the slot to be used, after removing the retaining screw.



- ④ Insert the extension card, pressing it firmly into the connectors after making the necessary adjustments (*). It is recommended that extension cards be mounted starting with the slot located closest to the system chassis.
- ⑤ Clamp the back edge of the extension card into place using the retaining screw through the end plate.
- ⑥ Clamp the front edge of the extension card into place using the locking device and a no. 1 cross-recess posidrive screwdriver.
- ⑦ Clamp the top edge of the extension card into place using the adjustable locking device and a no. 1 cross-recess posidrive screwdriver.



- ⑧ Close the sliding system drawer.

(*) Perform any setting of dip-switches as described in the manufacturer's documentation.

4.4 Internal Battery Back-up

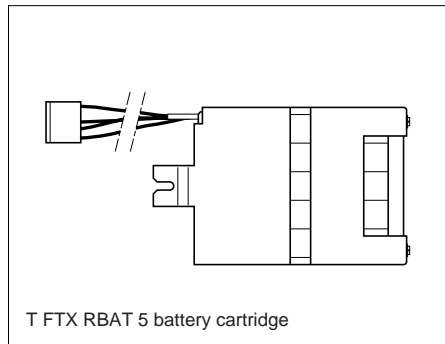
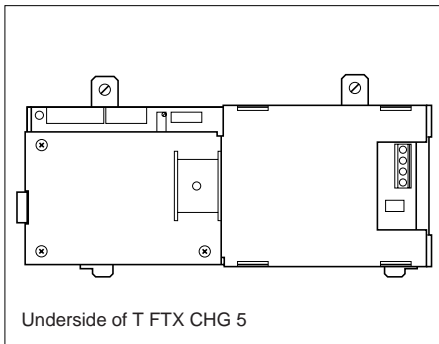
4.4-1 Introduction

The CCX 77 cell controller power supply unit is not affected by micro-cuts that do not exceed 20 ms.

For unreliable AC supply conditions, Schneider can supply an optional back-up device using internal batteries and a built-in charger. This device ensures autonomous operation for up to 15 minutes (depending on system configuration).

This device has two parts :

- A battery charger, reference T FTX CHG 5, for mounting on the cell controller chassis, accessible after removing the back cover.
- A battery unit, reference T FTX RBAT 5, to attach to the T FTX CHG 5 charger.



T FTX CHG 5 includes :

- A dual-rate battery charger (quick charge, trickle charge).
- A battery voltage monitoring device.
- A circuit to control the operating modes of the back-up option.
- A circuit to control the green PWR LED on the front panel of the cell controller.

Important

When operating from the battery back-up, the cell controller built-in display screen is not used.

4.4-2 Operation

Quick charge

Quick charge is activated every time the cell controller is powered-up.

- Charging time for a battery which is well charged : about 5 min.
- Quick charge current : $I = 350 \text{ mA}$.

Trickle charge

After charging, the battery charger switches automatically to trickle charge,

- Charge and trickle charge current : $I = 15 \text{ mA}$.
- Max. voltage threshold : $U = 30 \text{ V}$.

Threshold alarm

This is the threshold for detecting the end of the reserve power ($U = 22.5 \text{ V}$ or time $tf^* - 1 \text{ min}$). If power returns during the two protected supply phases, battery charging is reactivated, indicated by a long audible beep.

Supply cut-off

The supply cut-off comes into operation 1 min. after the threshold alarm is triggered unless the power returns in the meantime.

Resetting the power supply

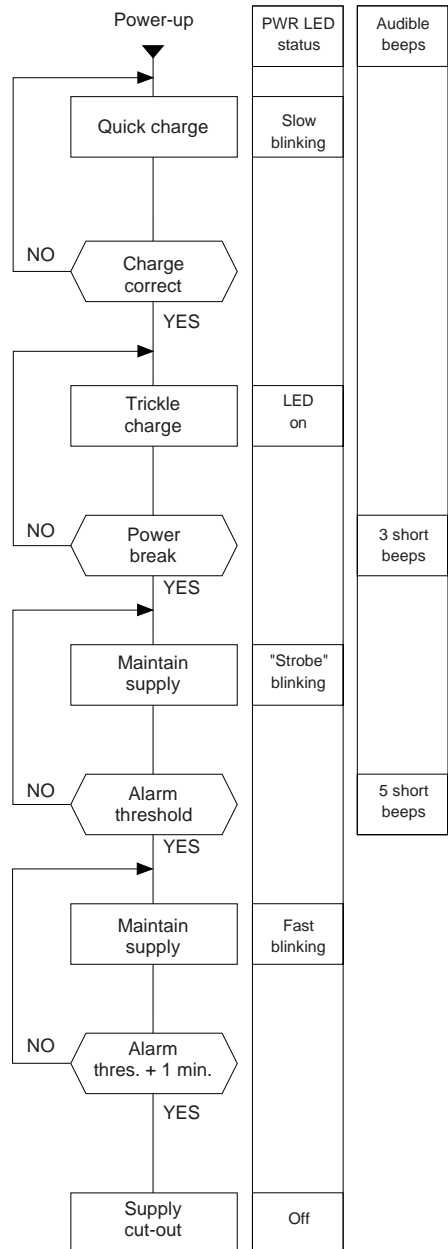
Two possibilities, depending on the situation :

- Time $\geq 20 \text{ sec.}$ after power-break : The power supply is automatically reset.
- Time $< 20 \text{ sec.}$ after power-break : Operate the On/Off switch, taking the 20 sec. period into account.

* tf = operating time limit, user defined from 1 to 15 minutes (see section 5.2-5).

AC power return

Indicated by a long audible beep.



4.4-3 Charging a new battery or a used battery after prolonged storage

The following procedure is recommended to reduce the time for required for charging the battery :

- Power-up the cell controller for at least one hour (in this case trickle charging is activated).
- Power-down the cell controller.
- Power-up the cell controller again within 10 seconds (this activates quick charging). The battery is then recharged completely in less than 3 hours.

Every time the cell controller is powered-up after this, operation is as described in section 4.4-2.

Note

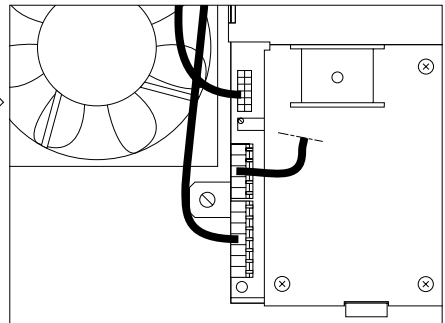
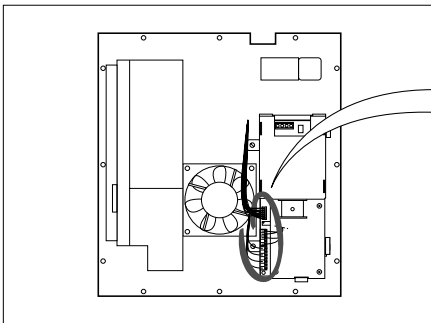
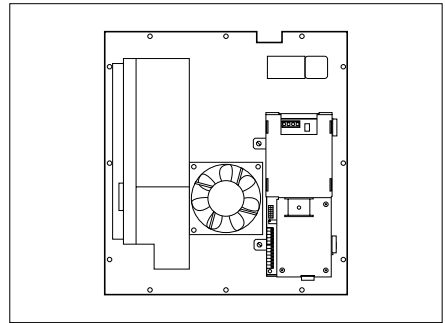
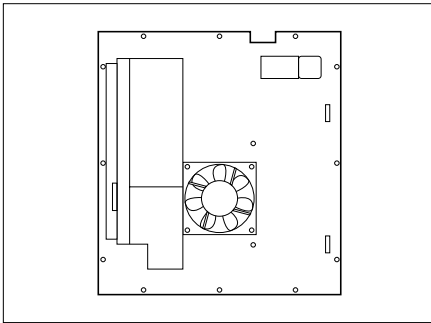
Effective autonomy of a battery depends on the charge-discharge cycle. In order to provide maximum autonomy, it is recommended that quick charging is followed by a few hours of trickle charging.

4.4-4 Installation procedure

• Installing the T FTX CHG 5

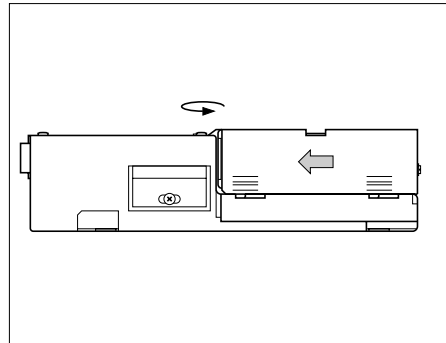
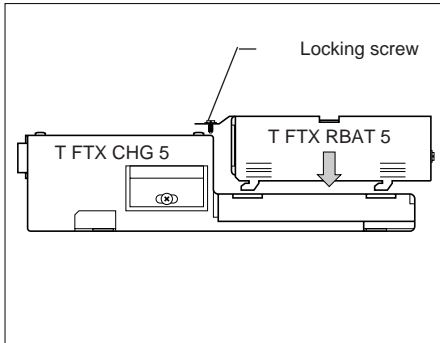
After unplugging the power cord, set the power switch to Off and remove the back cover (as described in section 4.1-3).

- ① Locate the two slots and the two inserts for mounting the T FTX CHG 5 on the cell controller chassis.
- ② Slide the lower two tabs on the T FTX CHG 5 into the two slots and screw the two upper screws firmly into the insets on the chassis.
- ③ Plug in the two connectors, one white and one black from the cell controller. Note the locating device on each connector.

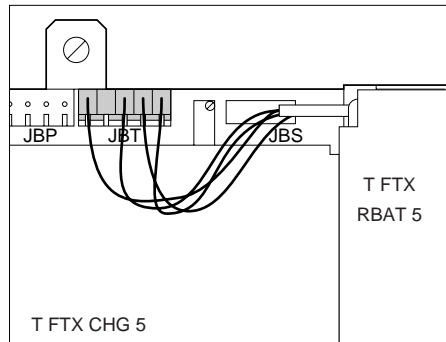
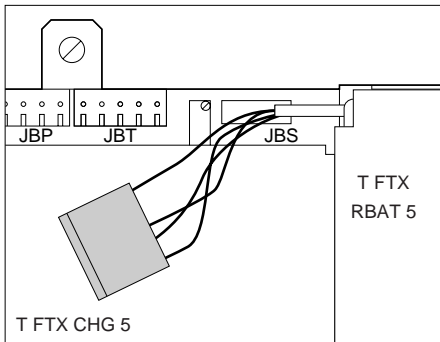


- **Installing the T FTX RBAT 5 battery unit**

- ① Position the T FTX RBAT 5 battery unit on the T FTX CHG 5 charger unit. Lock it into place using the screw at the top.



- ② Plug in the connector,



Warning

For safety reasons, installation of the battery protection device must be carried out with the CCX 77 cell controller power cord unplugged and the power switch in the Off position.

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5.2 Configuration utility (SETUP)	5/4
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5.1 Introduction to the DOS utilities

5.1-1 General

Schneider software utilities function under DOS (or in the OS/2 DOS or WINDOWS 95 compatibility box). They are divided into two groups :

- A SETUP program resident in ROM, displays the configuration parameters for the CCX 77 cell controllers and allows them to be altered. This software is in English only.
- A set of utilities supplied on a 3 1/2" diskette (reference T FTX LF TDS 5) containing the following :
 - SETUP.EXE, described in section 5.2, displays the configuration parameters for the CCX 77 cell controllers and allows them to be altered. This SETUP program performs the same functions as the one resident in ROM, but it is a multilingual version (French, English, German, Italian, Spanish).
 - VALIDWDG.EXE, described in section 5.3, activates the CCX 77 watchdog.
 - SPEED.EXE, described in section 5.4 is used to divide the speed of the processor by 2.
 - CMOS.EXE, described in section 5.5, backs up the files in the CCX 77 cell controllers' CMOS RAM memory.

5.1-2 Installation procedure

Important

Installing the utilities is only necessary if you need to install the operating system(s) yourself.

In this case, go to DOS and perform the following procedure.

When the prompt appears on the screen, it is necessary to :

- Insert the utilities diskette into a drive.
- Select the drive identifier where the diskette is located by typing, for example, A :
The prompt A:\> is then displayed.
- Commence the utilities installation procedure by typing the command INSTALL then press <Enter>.

The following message is then displayed :

Installation of SCHNEIDER utilities in progress ...

When installing under DOS, the program creates the C:\TE_TOOLS directory, where the SETUP.EXE, VALIDWDG.EXE, CMOS.EXE utilities are located, then modifies the Autoexec.bat startup file.

Note :

For installing drivers specific to the pointer tool, refer to the attached documentation.

When installation is complete, the following message is displayed :

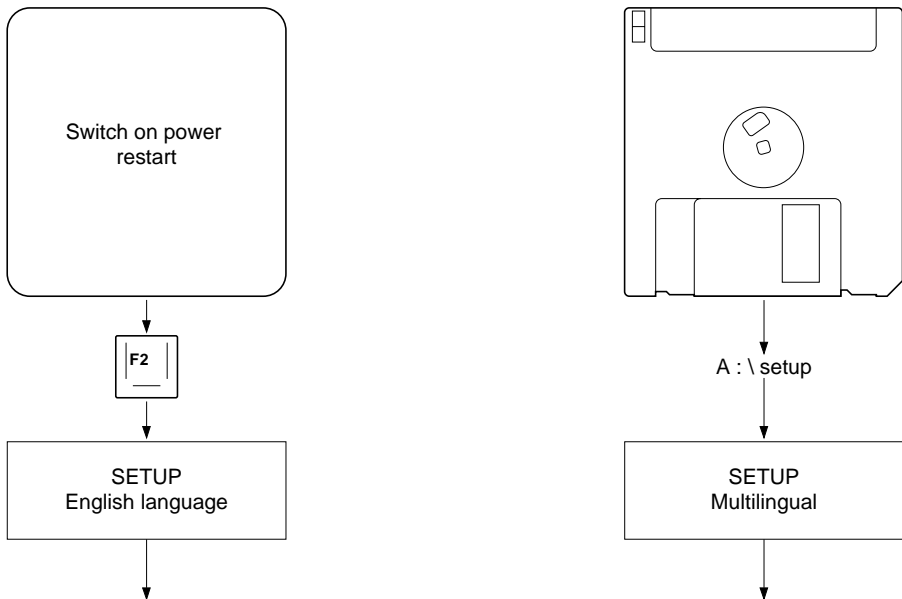
The installation of SCHNEIDER utilities is now complete. Remove the diskette and key Control-Alt-Suppr to reinitialize the machine.

5.2 Configuration utility (SETUP)

5.2-1 Accessing SETUP

SETUP may be accessed in one of two ways :

- By keeping F2 pressed down during the self-tests when the CCX 77 cell controllers are powered-up or rebooted. This method of access starts the SETUP program in the ROM memory. This version is in English only.
- Under DOS or in an OS/2 or WINDOWS 95 session by opening the DOS compatibility window, and running the SETUP.EXE file supplied on the T FTX LF TDS 5 Utilities diskette. This version is multilingual (French, English, German, Italian, Spanish).



When SETUP is started using the F2 key, the message ****RESIDENT SETUP ACTIVATED**** is displayed at the bottom of the screen.

If the terminal is already powered up, SETUP can be accessed by pressing F2 and then entering the password (if one is configured).

5.2-2 Layout of the screen

The setup screen is described below (some parameters may vary, depending on the hardware configuration) :

TELEMECANIQUE CCX 77 CONFIGURATION Version Ux.y	
BASIC CONFIGURATION	OPERATING CONFIGURATION
Memory Size : 16384 Kb	Operating Parameters
CMOS RAM Size : 128 Kb	Communication Ports
Drive A : 1,44 Mb	Select Front Keyboard language
Hard Disk : 2048 Mb	Language Selection
Video Interface : UGA	
Math Coprocessor : Present	
Serial Ports : 02	
Parallel Ports : 01	
Language : English	
Bios Version : U x.y	
Serial Number : 21222363	
Cursor Key : ↑, ↓, →, ← Select : Enter Exit : ESC Help : F1	

This screen has two windows :

- A BASIC CONFIGURATION window indicating accessories which are set-up. The parameters in this window cannot be modified,
- An OPERATING CONFIGURATION window which is used to modify the dynamic parameters of the cell controller :
 - Date, time, processor speed, password, etc.
 - Assignment of communication ports,
 - Configuration of front keyboard,
 - Language selection, determining the language used by all the Schneider utilities.

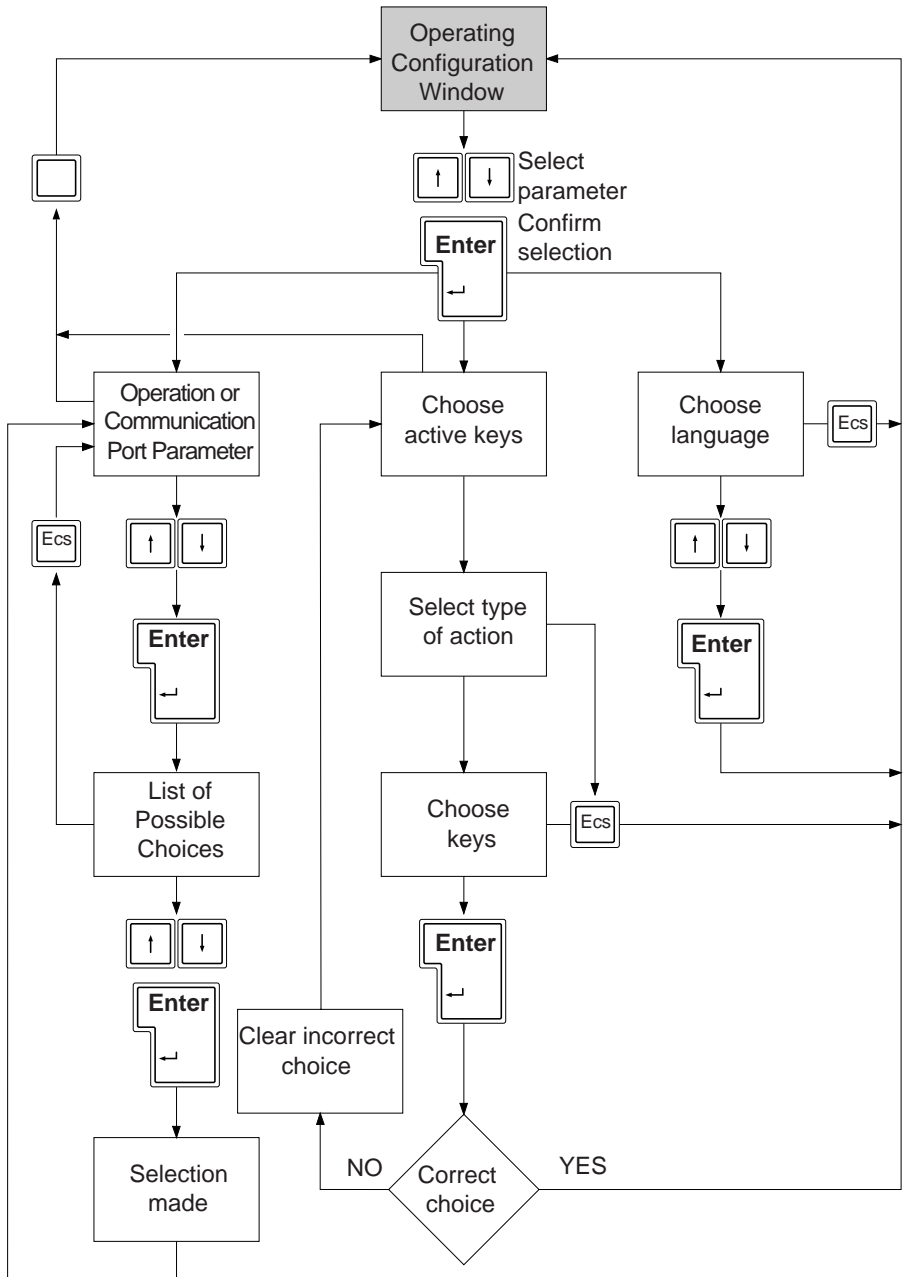
Keys to use

The two windows are accessed by the ← and → keys. The Cursor Up and Cursor Down keys are used to select the parameters within these windows.

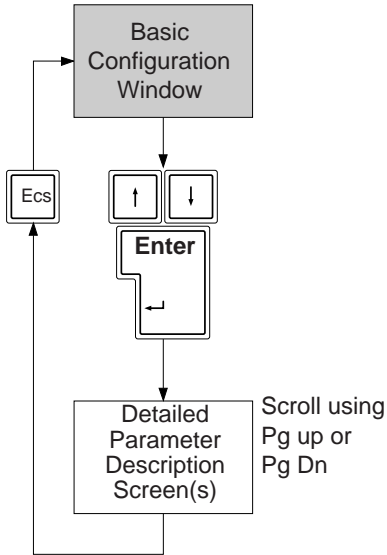
The <Esc> key is used to exit either from the current function or from SETUP.

F1, which can be pressed at any time, accesses a context related help file corresponding to the screen displayed and the subject selected.

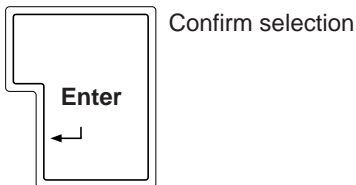
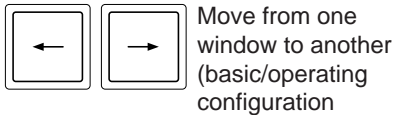
5.2-3 Operation overview



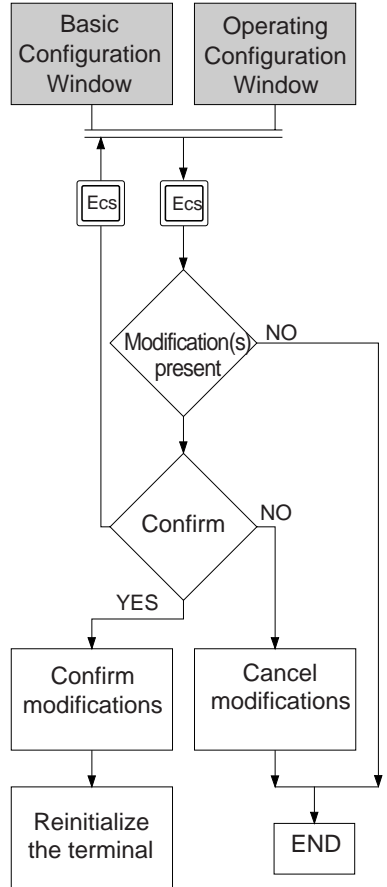
Operation overview (continued)



Key markings



Principle of confirmation



5.2-4 BASIC CONFIGURATION Window

The BASIC CONFIGURATION window provides information on the hardware configuration of the CCX 77 cell controllers :

- Size of the RAM memory,
- Size of the CMOS RAM memory,
- Diskette drive A,
- Hard disk,
- Video interface,
- Math coprocessor,
- Serial ports,
- Parallel ports,
- Dialog display language.

BASIC CONFIGURATION		
Memory Size	: 16384 Kb	
CMOS RAM Size	: 128 Kb	
Drive A	: 1,44 Mb	
Hard Disk	: 2048 Mb	
Video Interface	: VGA	
Math Coprocessor	: Present	
Serial Ports	: 02	
Parallel Ports	: 01	
Language	: English	
Bios Version	: Vx.y	
Serial Number	: 21222363	

A detailed description of any parameter in this window can be obtained by selecting the parameter and then pressing <Enter>, providing it has been configured.

Memory Size

Gives the total size of the RAM memory, as well as the distribution between memory installed on the system board and on an AT bus (ISA) extension card.

CMOS RAM Size

Gives the size of the CMOS RAM memory built into the CCX 77 cell controllers. This is a permanent memory for storing small files using CMOS.EXE on the utilities diskette reference T FTX LF TDS 5 (further information is given in section 5.5).

Drive A

Gives the capacity of the disk drive installed.

Hard Disk

Gives the capacity of the hard disk.

Video Interface

Gives the type of video interface.

Math Coprocessor

Shows whether the optional math coprocessor is installed.

Serial Ports

Gives the number of serial ports available and validated in the cell controller.

Parallel Ports

Gives the number of parallel ports in the cell controller.

Language

Gives the language used by all Schneider utilities.

Bios Version

Gives the Bios version installed in the cell controller.

Serial Number

Gives the serial number of the cell controller. This number is unique. It cannot be changed.

5.2-5 OPERATING CONFIGURATION window (Operating parameters)

The "Operating parameters" selection in the OPERATING CONFIGURATION window is used to modify the following functions :

- Date
- Time
- Assignment of Alarm Flag output ALF0
- Assignment of Alarm Flag output ALF1
- Password selection
- Self-test sequence on power-up
- Status of the CMOS RAM
- Back-up supply operation.

OPERATINGPARAMETERS	CAUTION !!!!
Date. 03/05/98 Time. 16:50:12 ALF0 digital output . User defined ALF1 digital output . User defined Password Absent Self-tests Quick CMOSRAMStatus. Checksum correct Optional Power supply Battery (Continuous)	The selections made by the user for the message display language, the time and date and the display settings take effect immediately. will only take effect All other selections when the CCX 77 is rebooted.

Important

The modified parameters, in reverse video, only take effect after exiting SETUP. Data relating to the time and date take effect immediately.

When a parameter is selected, a data entry window provides various choices or indicates the syntax to be used.

Date

Updates the date in the format shown.

Time

Updates the time in the format shown.

ALF0 digital output

The ALF0 digital output can be configured in two ways :

- User defined :
It can be controlled by program, independently of the state of the system,
- Watchdog :
For a CCX 77, it is configured so that an internal watchdog activates it if a serious fault occurs. The watchdog should then be activated by a program installed in the Autoexec.bat start file (see section 5.3).

ALF1 digital output

The ALF1 digital output can be configured in three ways :

- User defined :
It can be controlled by program independently of the state of the system,
- Temperature alarm :
It is activated on detection of excessive temperature inside the cell controller,
- Low battery :
It is activated when the cell controller is operating on battery back-up with a battery which is down to 10% or less of its capacity,

Password

This function defines (or cancels) a password of 3 to 8 alphanumeric characters. Once confirmed, the password is requested each time the cell controller is powered-up. After three unsuccessful attempts to enter the correct password, the cell controller must be powered-up again.

- Defining a password :
When no password is defined for the cell controller, type the password twice in succession.
- Modifying the password :
Type the old password and then type in the new one twice in succession.
- Deleting the password :
Type the old password, then press <Enter> twice.

If the user loses the password, contact Schneider support and have the following information ready :

- System location.
- The information that is displayed on-screen after three unsuccessful attempts to enter the password when powering-up the system :
 - Serial number
 - Random code number.

Schneider will provide a specific code for reinitializing the CCX 77 cell controllers and defining a new password. This specific code will not work if it is entered at a later date if the password is lost again.

Important

The password system makes use of the positions of the keys used and not their labels. Therefore it is strongly recommended that the type of keyboard is not changed after defining a password (e.g. the password "ZAZ" on a French keyboard corresponds to "WQA" on a UK-English keyboard). It is also necessary that the same keyboard should always be used to give, modify or define the password (for example, the internal or external keyboard)

Self-tests

This parameter selects the way the self-tests are carried out when the CCX 77 cell controllers are powered-up :

- Complete :
Tests the entire RAM memory,
- Quick :
Only tests the basic memory (640 Kb) and the system memory (384 Kb). This saves a great deal of time when running self-tests on a cell controller with a large RAM memory.

CMOS RAM status

Once confirmed, this function initializes the contents of the CMOS RAM memory in the event of an incorrect checksum.

An incorrect checksum indicates that at least one of the files in this memory is damaged. The CMOS.EXE utility on the T FTX LF TDS 5 Utilities diskette handles the files contained in CMOS RAM memory. See section 5.4 for more information on this utility.

Optional Power Supply**Battery**

The T FTX RBA T 5 battery back-up lets the CCX 77 cell controllers operate without an AC supply. The operating time on battery back-up can be selected from the following options :

- **Battery (continuous) :**
If there is a power break, the system automatically switches to the battery back-up. An audible alarm is sounded. The time available for independent operation depends on the operating mode of the cell controller and the extension boards installed. A second signal indicates that the battery is 90% discharged.
- **Battery (disabled) :**
If there is a power break, independent operation will continue for between 20 and 60 ms, depending on the hardware configuration of the cell controller. In this mode, the CCX 77 cell controllers can be powered-up without access to an external power supply. The self-tests then request user confirmation of power-up by pressing any key. If there is no confirmation, the terminal is automatically shut-down to conserve the battery.
- **Time limited :**
If a power break occurs, the battery back-up is used for the period specified (from 1 to 15 minutes). After this time, the CCX 77 cell controllers shut down. One minute before the end of the set time, an audible alarm sounds. If AC power returns during battery powered operation, a long beep is sounded and the battery goes back on charge.

Note : This option is not available when starting-up directly off the battery.

5.2-6 OPERATING CONFIGURATION Window (Communication ports)

Selecting "Communication Ports" from the OPERATING CONFIGURATION window lets the user modify the assignment of the different kinds of data link :

- RS 232 C
- RS 485 / CL20 (20 mA current loop)
- Parallel //

to the various communication ports available to the system :

- COM1
- COM2
- COM3
- COM4
- LPT1
- LPT2

COMMUNICATION PORTS		
Assignment of the built in ports :		
- RS 232 c	.	.COM1 (default)
- RS 485 / CL20 (PLC)	.	.COM2 (default)
- Parallel port address	.	.378h (default)
Communication mode selected for the RS485/CL20 (PLC) communication port :		
- Selected mode	.	.CL20

ASSIGNMENTS		
Port	Address	I n t
COM1	3F8	IRQ4
COM2	2F8	IRQ3
COM3	3E8	IRQ4
COM4	2E8	IRQ3

Mounted on the system motherboard, the CCX 77 cell controllers comprise the following ports :

- Two serial ports :
 - One RS 232C serial port, designated COM1 by default,
 - One designated COM2 port, to interface with Schneider PLCs :
 - Configured as an RS-485 serial port for connecting to a UNI-TELWAY bus,
 - Configured for current loop operation (CL 20) for connecting to other series 7 PLCs.
- One parallel port, designated LPT1 by default.

If necessary, additional communication ports can be installed on the ISA bus.

Important

Modified parameters, shown in reverse video, only take effect after exiting SETUP. A high numbered communication port may only be selected if lower numbered ports are also used (e.g. if COM3 is declared, COM1 and COM2 must already be used).

When selecting a parameter, an entry window shows the possible choices available.

RS 232 C

Designates serial port COM1 (selected by default) or COM3 as RS 232C data links.

It is also possible not to assign an RS 232C port (selection inhibited).

RS 485 / CL 20 (PLC)

Designates serial port COM2 (selected by default) or COM4 as RS 485 or CL 20.

It is also possible not to assign this port (selection inhibited).

Parallel port address

Designates parallel port LPT1 (selected by default) or LPT2 as a parallel data link.

It is also possible not to assign a parallel port (selection inhibited).

Note

Parallel port LPT1 must be declared in order to use MONITOR 77 supervision software or X-TEL or MINI X-TEL software workshops.

Selected mode

The Schneider PLC port (RS 485 / CL 20), when it is not inhibited, can be programmed for two communication formats :

- RS 485 for connecting to a UNI-TELWAY bus,
- Current Loop (CL 20) for connection to the programming port of series 7 PLCs.

5.2-7 OPERATING CONFIGURATION window (Front keyboard language)

This choice enables the internal keyboard language (front keyboard) to be adapted to the external keyboard language which is configured when the operating systems are installed. If this operation is not carried out, some keys will not correspond to their labels.

Keyboard layouts available include American, French, German, Italian, Spanish, English and Swedish.

Screen

SELECTION FRONT KEYBOARD LANGUAGE	
This selection is required for the good operation of the front keyboard. The selection must be the same as the keyboard choice for the operating system(s).	
US	: United States
FR	: FRançais
GR	: GeRmany
IT	: ITaly
SP	: SPain
UK	: United Kingdom
SV	: Swedish

5.2-8 OPERATING CONFIGURATION window (Language Selection)

The "Select language" choice in the OPERATING CONFIGURATION window lets the user select a language to use for displaying screen and messages for Schneider utilities. The language choices are English, French, German, Italian and Spanish.

Screen

LANGUAGE SELECTION
English : Select the country
Français : Sélectionner la nationalité
Deutsch : Wählen sie die nationalitat
Italiano : Selezionare la nazionalità
Espanol : Selectar la nacionalidad

Any modification to the language selected takes effect immediately.

Reminder : The SETUP program resident in ROM in the CCX 77 cell controllers is an exception. It is in English only.

5.2-9 Saving the Modifications

Once the modifications have been entered, they must be saved.

This is carried out using the basic SETUP screen, by pressing the following key sequence :

<Esc> : displays a confirmation screen :

- **<Y>** confirms the modifications, exits from SETUP and places the terminal in its normal operating mode.
- **<N>** cancels the modifications which were made and exits SETUP,
- **<Esc>** returns to the parameter selection display.

5.3 Utility for activating watchdog

The following command enables the internal watchdog to be activated which triggers the ALF0 output (see section 5.2-5).

Configuration must assign the ALF0 output to the watchdog in the "operating parameters" window of SETUP.

VALIDWDG

Activates the watchdog. When the CCX 77 is restarted, the watchdog is deactivated.

5.4 Machine slow down utility

The utility can be used under DOS, WINDOWS 95 and OS/2 to divide the frequency of the processor by 2 and therefore to reduce the machine performance. This can be useful when using old software which is not ideal for supporting very fast processors.

SPEED LOW

Divides the processor speed by 2.

SPEED NORMAL

The processor is operating at maximum speed.

5.5 Utility for saving files to CMOS memory

The following commands are used to read and write files to and from the 128 Kbyte RAM memory.

CMOS

Lists all the commands described below.

CMOS PUT <dosname> [<cmosname>]

Copies the file named (with its path) into the CMOS memory.

E.g. : C:\TE_TOOLS>CMOS PUT C:\PROJECT\OVEN.CAB OVEN.CAB

CMOS GET <cmosname> [<dosname>]

Copies the file from the CMOS memory into the file named (with its path).

E.g. : C:\TE_TOOLS>CMOS GET OVEN.CAB c:\PROJECT\OVEN.CAB

CMOS DEL [<cmosname>]

Deletes the file named from the CMOS memory.

E.g. : C:\TE_TOOLS>CMOS DEL OVEN.CAB

CMOS DIR

Lists the files stored in CMOS memory and gives the size of memory still empty (total of 131,072 bytes).

CMOS DEL *.*

Deletes all the files from the CMOS memory.

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6.2 Installation procedure	6/2
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6.1 Introduction to the OS/2 utilities

The OS/2 utilities diskette should be installed in CCX cell controllers used under OS/2 version • 2.x.

The TE/MS-OS/2 1.3 version already contains the functions provided by these utilities.

The role of the utilities is to supplement the IBM OS/2 operating system with functions specific to Schneider systems.

The utilities diskette should be installed BEFORE installing the software workshop (X-TEL or MINI X-TEL).

Note :

If the terminal is ready-installed, the contents of this diskette have already been installed in the factory, and the following procedure need not be followed.

6.2 Installation procedure

The OS/2 system should be installed BEFORE the utilities diskette. For the installation procedure, refer to the manual supplied with the OS/2 diskettes.

Then install the utilities :

- start the machine under OS/2 ;
- do not launch another application, as the cell controllers must restart to take into account the driver which has been installed ;
- open OS/2 session using the following commands :
 - on the desktop, open the OS/2 icon (by double-clicking) ;
 - in the "OS/2 - Icons" window, open the "invites" icon ;
 - in the "invites" window, open the "OS/2 full-screen" icon ;
- insert the "OS/2 TE TOOLS" diskette in drive A: ;
- commence the installation using the command :
a:INSTALL <Enter>
- when prompted by the program, reboot the system using the <Control> <Alt> keys.

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7.1 SVGA drivers

7.1-1 Introduction

WINDOWS 95 manages the SVGA modules of the CCX77 without the need for additional drivers.

This chapter describes the operation and installation of the software drivers supplied on the T FTX LF SVGA 517 diskettes.

Your SVGA adapter is based on the CHIPS SVGA Flat Panel/CRT controller and is fully compatible with the IBM VGA standard. This controller offers a large set of extended functions and higher resolutions. If you intend to use your SVGA adapter in standard VGA modes only, you do not need to install an SVGA driver. Since your VGA adapter is fully compatible, it does not require any special drivers to operate in standard modes.

The purpose of the software drivers described in this section is to take advantage of the extended features of the CHIPS SVGA Flat Panel/CRT controller.

Diskette n°1 : for DOS and Windows 3.1x utilities

Diskette n°2 : for OS/2 Utilities

Hardware Configuration

Some of the high-resolution drivers provided in this package will work only in certain system configurations. If a driver does not display correctly, try the following:

1. Change the display controller to CRT-only mode, rather than flat panel or simultaneous display mode. Some high-resolution drivers will only display correctly in CRT mode.
2. If a high-resolution mode is not supported on your system, try using a lower-resolution mode. For example, 1024x768 mode will not work on some systems, but 800x600 mode is supported on most.

These SVGA drivers support the following software applications in the filenames and resolutions listed :

Application	Filename	Resolution	Colors
Windows 95 Driver "Chips & Tech Accelerator"		640x480	16
		800x600	16
		1024x768	16
		640x480	256
		800x600	256
		1024x768	256
		640x480	64K
		640x480	16M
VESA 1.2	VESA.COM	800x600	16
		1024x768	16
		640x400	256
		640x480	256
		800x600	256
		1024x768	256
		640x480	32K
		640x480	64K
OS/2 accelerated drivers		640x480	256
		800x600	256
		1024x768	256
		640x480	64K
		640x480	16M
Windows 3.1x accelerated drivers	VIDGX4.DRV	640x480	16
		800x600	16
		1024x768	16
		1280x1024	16
	VIDGX8.DRV	640x480	256
		800x600	256
		1024x768	256
	VIDGX15.DRV	640x480	32K
	VIDGX16.DRV	640x480	64K
	VIDGX24.DRV	640x480	16M

7.1-2 Windows 3.x

These drivers are used for OS/2 WINDOWS sessions.

SVGA drivers are designed to work with Microsoft Windows Version 3.1x. You can install these drivers under Windows.

Driver installation - Windows Setup

- Step 1:** Install Windows as you normally would for a VGA display. Run Windows to make sure that it is working correctly.
- Step 2:** Place the T FTX LF SVGA 517 diskette 1/2 in drive A. In Windows Program Manager, choose **File** from the Options Menu. Then from the pull-down menu, choose **Run . . .**. At the **Command Line** prompt, type **A:WINSETUP**. Press the **<ENTER>** key or click **OK** to begin the installation. At this point the setup program locates the directory where Windows is installed. For proper operation, the drivers must be installed in the Windows subdirectory. Press **<ENTER>** to complete the installation. Once completed, a chipsCPL icon in the Control Panel allows you to select and load the installed drivers.

Another method of installing these drivers is through the **File Manager**. Click on **Drive A:**, and then double-click on **WINSETUP.EXE** to begin installation.

Changing Display Drivers from Windows

To change display drivers from Windows, select the **Windows Setup** icon from the **Main** window. You will be shown the current setup configuration. Select **Change System Settings** from the **Option** menu. Click on the arrow at the end of the **Display** line. You will be shown a list of display drivers. Click on the driver you want to select it. Then click on the **OK** button. Follow the directions to complete the setup.

Panning Drivers

Special panning drivers are provided to allow high-resolution modes to be displayed on a flat panel or CRT. These drivers will show a section of a larger screen, and will automatically scroll the screen horizontally and vertically when the mouse reaches the edge of the display.

7.1-3 OS/2

These drivers are designed to function with the OS/2 Version 3 and 2.1x operating systems.

Driver installation

Note

Always use the INSTxx.COM for the FIRST installation of the video device drivers. To change video resolutions, follow Step 4 below.

Windows drivers must be installed before OS/2 drivers to be able to use Windows applications in OS/2.

To install the drivers, follow these instructions:

- Step 1:** The system display must be set to VGA mode before installing the OS/2 SVGA drivers. Open an OS/2 full screen or windowed session.
- Step 2:** Place the T FTX LF SVGA 517 2/2 Diskette in drive A. Type **A:<ENTER>** to make this the default drive. Then type **INSTALL A: C: <ENTER>**. Once the Install Program is completed, do a system shutdown and reboot.
- Step 3:** After the system has rebooted, follow these instructions:
- **OS/2 Version 3**
Go to the System Setup folder and run Selective Install to install the new device driver and configure the video system. First, select Primary Display. From the list of **Primary Display Adapter Types**, select **CHIPS & TECHNOLOGIES 65545**. Click on **OK**. Click on **Install**. The source directory must be specified as A:\. Once the installation is complete, the system must be shut down and restarted for changes to take effect.
By default, your system will come with 640x480x256 screen resolution. This resolution can be changed from the SYSTEM icon. Once the resolution is changed, the system must be shutdown and restarted for the changes to take effect.
 - **OS/2 2.1x**
Open an OS/2 full-screen or windowed session. At the OS/2 prompt, type **DSPINSTL <ENTER>** to install the new device driver and configure the video system.
- Step 4:** Open the System icon. Select the desired resolution and do a shutdown. The new resolution will take effect after restart.

WIN-OS/2

Please note the following limitations regarding WIN-OS/2.

1. The WIN-OS/2 full screen session should be set to **Enhanced Capability**. The default setting is **Standard Mode**. If this setting is not changed, Windows will not run.
2. WIN-OS/2 should be started by selecting the WIN-OS/2 Full Screen Icon in the Command Prompts folder, or with the **WIN** command in a DOS Full Screen or OS/2 Full Screen session.
3. Do not start WIN-OS/2 in a DOS or OS/2 Window. The system does not support the enhanced video mode being used in a window, and therefore will not run.
4. When running WIN-OS/2, do not use ALT-HOME to switch a DOS or OS/2 Full Screen session to Windows. If this happens, do a system shutdown and reboot.

Driver diskette copy**Note**

Diskette copies of the OS/2 drivers must have a VOLUME LABEL that reads «CTDISP 1» in order to be an installable diskette.

To copy the T FTX SVGA 517 2/2 Diskette, follow these instructions :

- Step 1:** Copy all files on the T FTX SVGA 517 2/2 Diskette as you normally would onto another diskette.
- Step 2:** Place the diskette copy in drive A. At the C:\ prompt, type **LABEL A:CTDISP 1** to properly label your diskette. Then store your diskette copy in a safe place.

For proper installation of OS/2 drivers, all diskette copies must be properly labeled "CTDISP 1".

7.1-4 VESA

The Video Electronics Standards Association (VESA) has created a standard for a Super VGA BIOS Extension (VBE). This defines a standard software interface to allow application program to set and control extended video modes, such as 800x600 graphics, on video adapters from different manufacturers.

The VESA driver adds this Super VGA BIOS Extension to the VGA BIOS. Any application program which supports the VESA standard driver interface can be used with this driver. This VESA driver conforms to the VESA Super VGA Standard #VS891001.

Driver installation

Step 1: Place the T FTX SVGA 517 1/2 Diskette into drive A. Make A the default drive by typing **A:<ENTER>**. Run the INSTALL program by typing **SETUP <ENTER>**. Press any key to display a list of supported applications. Use the arrow keys to select VESA Driver Version 1.2 and press **<ENTER>**. Press the **<ENTER>** key to select **All Resolutions**, then press **<END>** to begin the installation. A default drive and directory path will be displayed. Use the backspace key to erase this and type in a directory that is in the directory path (such as **C:\BIN** or **C:\UTILS**). At this point you may be prompted to insert one of the other diskettes. After the files have been installed, press any key to return to the list of supported applications. Press **<ESC>** followed by **Y** to exit to DOS.

Step 2: To install the VESA driver, type either **VESA <ENTER>** or **VESA + <ENTER>** at the DOS prompt. The optional + command line parameter enables all of the available modes. Make sure that your monitor is capable of displaying these high resolution modes before enabling them.

7.1-5 Other screen drivers

Drivers for other applications such as AutoCAD 12, Lotus 1-2-3 and Symphony 1.0/1.1, Word 5.0 and 5.5, WordPerfect 5.0 and 5.1 are also available on the T FTX SVGA 517 1/1 diskette. Contact your dealer for more details on operating modes.

7.2 Software utilities

This chapter describes the operation and installation of the following software utilities supplied on the T FTX SVGA 517 1/2 Diskette.

7.2-1 The CHIPSCPL utility program

This utility program is designed to work with Microsoft Windows Version 3.1x.

Installing the utility

CHIPSCPL.CPL is a Windows based utility to select resolutions and color depth. It is a Control Panel **Application** with its own icon that is automatically installed when installing CHIPS Windows 3.1 drivers. The Control Panel icon is in the Main Windows group. To invoke the Control Panel Application, simply click on the icon. The resolution and number of colors of the driver take effect only after Windows is rebooted with the new driver.

How to use the utility

SIZE <ALT>+<S> allows you to select from the following resolutions :

- 640x480
- 800x600
- 1024x768
- 1280x1024 (resolution not available)

By selecting the resolution first, it will determine the allowable selections for color depth.

COLOR <ALT>+<O> allows you to select the number of colors from the following :

- 16 (4 bits per pixel)
- 256 (8 bpp)
- 32K (15bpp)
- 64K (16bpp)
- 16M (24bpp)

By selecting the color depth first, it will determine the allowable selections for resolution.

DISPLAY TYPE <ALT D> allows you to select the display type from the following :

- | | |
|----------------------------|------------------------------|
| - CRT only | <ALT>+<C> |
| - LCD (Flat Panel) only | <ALT>+<L> |
| - CRT and LCD (Flat Panel) | <ALT>+ |

DPI <ALT P> allows you to select a large or small font.

VERSION <ALT>+<V> displays version information about the current driver.

BIG CURSOR <ALT>+<G> allows you to select a big cursor for better visibility on the Flat Panel.

CURSOR ANIMATION <ALT A> allows you to select an animated cursor instead of the hour glass wait cursor.

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8.1 General

Each time the CCX 77 cell controllers are powered-up or rebooted a self-test sequence is automatically performed (see section 2.2-2). If one of the tests fails, an error message is displayed on-screen (see sections 2.2-3 to 2.2-6).

Depending on the type of message, the user should :

- Take the appropriate corrective action (correct the configuration, replace a defective battery, etc.), or
- Contact Schneider support.

The user can replace the following parts in CCX 77 cell controllers :

- Internal parts
 - Dynamic RAM modules for CCX 77 (16 or 32 Mb),
 - Extension boards
 - Battery charger unit
 - Battery cartridge module
 - Battery for real-time clock and CMOS RAM back-up
 - Power supply fuses.
- External parts
 - External keyboard
 - Power cord
 - Mouse
 - Cell controller/PLC or network connection cables.

8.2 User replaceable parts

The procedure for replacing selected internal parts is identical to that for installing them.

Relevant parts :

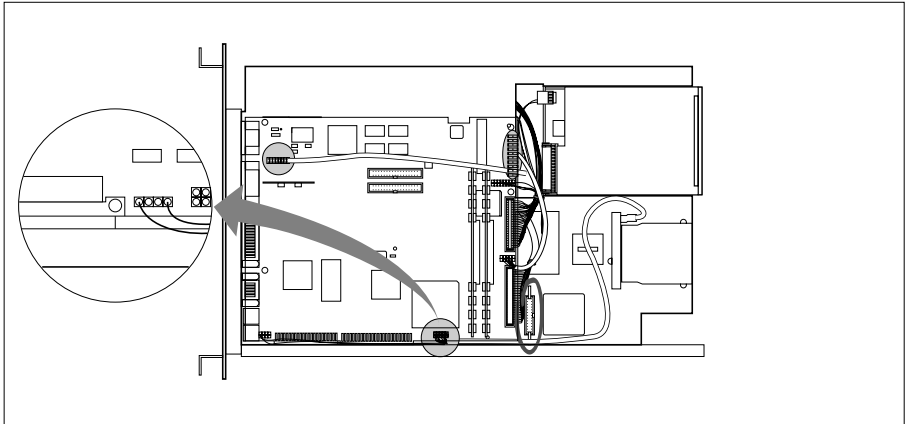
- Dynamic RAM modules for CCX 77, see section 4.2.
- Battery charger unit, see section 4.5.
- Battery cartridge module, see section 4.5.

For other parts, see the following sections.

8.2-1 Battery for T FTX BAT 51 real-time clock back-up

Replacement procedure :

- Remove the pull-out system drawer (see section 4.1-2).
- Disconnect the battery.
- Remove the battery from the chassis (it is held in place by a Velcro strip).
- Install the new battery and repeat the above procedure in reverse order to re-assemble.



After replacing the battery, ensure that the new battery is connected as quickly as possible (less than five minutes) after removing the old one to avoid loss of data from the CMOS RAM (128 Kb) and SETUP.

8.2-2 Power supply fuses

The AC power supply incorporates three fuses :

- Two fuses (TD 20x5 5A) located above the power cord receptacle. These fuses can be accessed once the power cord is unplugged and the fuse holder drawer pulled out (designated (10) in section 1.2-2).
- One fuse (TD 20x5 2A) located on the power supply unit. This fuse is accessible once the back panel is removed (see section 4.1-3).

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9.1 General

CCX 77 cell controllers have been developed to conform to national and international standards concerning industrial control systems and electronic equipment :

- Specific to programmable controllers : functional characteristics, immunity, durability, safety, etc. CSA 22.2 no. 142/UL 508,
- Immunity to electrostatic discharge : IEC 801.2 Level 4,
- Isolation : air and leakage distances : UL 508, NFC 20-040, IEC 664, VDE 110 b, etc.

9.2 Service conditions

9.2-1 Temperature

Normal temperature conditions

θ_A operation	5°C to + 50°C
θ_A storage	-25°C to + 70°C

θ_A : temperature of surrounding air

9.2-2 Relative humidity

Normal conditions

Relative humidity (without condensation)	20% to 95%
Altitude	0 to 2134 meters

9.2-3 Power supply

Nominal voltage	110 VAC	220/240 VAC
Power rating	170 VA	170 VA
Operating range	90 to 140 V	180 to 260 V
Frequency limits	47 to 63 Hz	47 to 63 Hz
Micro-cut	duration	20 ms
(typically)	repetition	1 Hz
Total harmonic distortion	10 %	10 %

9.2-4 Equipment sealing

Normal conditions

Front panel	IP 65
Other panels	IP 20

Reminder

CCX 77 cell controllers must be installed in enclosures or control panels with a protection level of at least IP 54.

