FO 8000
Fibre Optic Modem
Instruction Manual

P/N : 8000 601 786
Revision 10

Sales, Research & Development, Manufacturing :

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Warning :

The only purpose of this manual is to provide information and installation instructions

CXR reserves the rights to improve its products and specifications without notice.

CXR has made every effort to provide the best possible quality in writing this manual but cannot be held responsible for any damage, which could result from errors or improper description of the equipment, its characteristics and operation.

Please read and enforce the safety instructions of the safety and installation chapters.

The team at CXR Anderson Jacobson thanks you for choosing the FO8000 Fibre Optical Modem

We hope that this equipment will provide full satisfaction and in order to serve you even better, we thank you for returning the warranty card you will find at the end of this manual.

We also invite you to read the last part of this manual, which provides useful information on the warranty terms and conditions, which apply to your equipment.

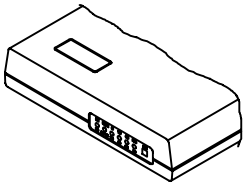
Content

Convention, range of product and options

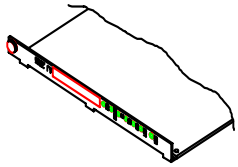
Several versions of the unit differ from the following characteristics:

- The type of Terminal interface: V28, V11, V35, 10BT, HUB, E1, 4E1, 4BRI, 2BRI, E2
- The type of power supply: 110 / 230 Vac internal or external, 48 Vdc, 5Vdc external
- The type of packaging: stand alone enclosure or rack mountable card
- The type of optical Fibre: Multimode 820 (1300 nm option), Single mode 1310 and 1550 nm connector ST (SC, FC in option)

These different versions are summarized on the following table. The same designations will be used throughout this manual to identify the differences between versions when applicable.



Desktop



Rack mountable card

Version	Interface
FO 8011-mmcz	X21-V11
FO 8011-mmcz-96	X21-V11 transparent mode
FO 8035-mmcz	V35
FO 80BT-mmcz	10 BaseT filtering bridge
FO 80HB-mmcz	Hub 4 ports
FO 80E1-mmcz	E1 / G704
FO 84E1-mmcz	4 * E1 / G704
FO 82BR-mmcz	2 * BRI
FO 84BR-mmcz	4 * BRI
FO 8028-mmcz	V28 / RS232
FO 80E2-mmcz	E2 / G703

The variants mmcz are:

Variant	MM	C	Z
Multimode 820 nm	M8		
Multimode 1300 nm (option)	M3		
Single mode Led 1310 nm (ST connector only)	SL		
	Z3		
Single mode Laser 1310 nm	Z5		
Single mode Laser 1550 nm			
Connector SC (option)		C	
Connector ST®		T	
Connector FC (option)		F	
External power supply 5 Vdc			V
Internal power supply 90 – 240 Vac			I
Internal 48 Vdc converter			C
Rack mount card AMS16			R

ST® is a registered trademark of AT&T

Default connector is ST . (SC and FC in option)

Example: The FO 8011 M3CI-E is a desktop version with internal 110 / 230 Vac power supply that provides an X21-V11 DTE interface DTE, fibre optic is Multimode at 1300 nm with SC connector in Export version.

X21-V11 and V35 cables are available as an option:

- V35: CXR reference CA.601.460
- X21-V11 (DB15): CXR reference CA.601.461

Important Information

Conformity Statement EC

Manufacturer name: CXR

Manufacturer address: rue de l'Ornette - 28410 ABONDANT - France

States that:

Product name: FO 8000

Complies with the following specifications:

Safety: EN 60950

EMC: EN 55022: - Class B
EN 50082-1

*The **CE** marking on this product indicates that it complies with 99/5/CE order dated April 7-1999*

Safety Instructions

The following accesses are referenced as SELV (Safety Low Voltage] in conformity with EN.41003 standards:

- 5 VDC Input of the FO 8000 desktop unit
- 48 VDC Input of the FO 8000 desktop unit
- Control: V24 - RS232 configuration port
- DTE - V11: V11-X21 interface of the FO 8011 unit
- DTE - V28 : V28 interface of the FO8028
- DTE - V35 : V35 interface of the FO8035
- DTE - 10BT : Ethernet interface of the FO80BT
- DTE - HUB : 4 port HUB Ethernet interface of the FO80HB
- DTE - E1 : E1 G 704 interface of the FO80E1
- DTE - 4E1 : four E1 G 704 interfaces of the FO84E1
- DTE - BRI: 2 or 4 ISDN S interface of the FO 82BR or FO 84BR unit
- DTE – E2 : E2 G 703 interface of the FO80E2

Desktop FO 8000 V:

The wall mount power supply adapter is the main switching element. Thus this plug must be installed close to the equipment and provided easy access.

To totally disconnect the equipment from the supply source we recommend you disconnect the power cord from the mains wall outlet. In order to comply with the safety regulations, it is imperative to use the accessories (power supply and cables) provided with the equipment. When access to the inside of the modem is necessary, it is imperative to disconnect the power adapter from the mains outlet.

Desktop FO 8000 I :

The power cord is the main switching element. Thus the mains outlet must be installed close to the equipment and provided easy access. In order to comply with the safety regulations, it is imperative to use the accessories (power supply and cables) provided with the equipment. When access to the inside of the modem is necessary, it is imperative to disconnect the power cord from the mains outlet. This is a Class 2 product as shows the symbol close to the mains socket; its earth connection is for functional purpose only.

Rack mountable card FO 8000 R:

The power switch located on the rear of the chassis is the only switching element, thus it must be fully accessible. The connection to the mains is achieved through the cable equipped with a male-grounded plug. Extract the card from the chassis when maintenance or servicing is required

For safety reasons, any operation on the equipment and particularly opening the desktop enclosure must be carried out by maintenance person qualified by CXR.

The equipment must imperatively be returned to CXR in any case of anomaly, fall, loss of performance, water exposure, power supply damage, …

Optical Fibre:
Class 1 Product
WARNING: Do not look directly into the aperture of the transmitting diode or the optical fibre.
The light beam which is emitted could cause permanent damage to your eyes.

Environment

The FO 8000 is designed for residential or light industrial use within the following environmental conditions:

- Storage Temperature 0 to 70 °C
- Operating Temperature: 0 to 45 °C
- Hygrometry: 0 to 90% without condensation
- Class: IP40
- Flammability: UL94-V0
- Equipment must not be exposed to excessive solar radiation
- Equipment must not be in contact with water. It must not be used near a water reserve or in a wet location.

Use

The FO 8000 is designed to be connected to a DTE G703/G704 compatible network or to a to an X21-V11 or V35 or V28 or to an Ethernet 10BT equipment.

- Nx64 KBPS DTE interface : from 64 KBPS to 2048 KBPS
- X21 and V35 DTE interface :
  - from 64 kBps to 2048 kBps by step of 64k
  - and 4096, 6144, 8192 kBps
- X21-V11 option 96:
  - Transparent mode from DC to 8448 MBPS
  - External clock from DTE. Both FO8011 are co directional.
  - External clock from DTE and Network clock to remote. Not codirectional, only one clock source.
- V28 – RS232 interface :
  - asynchronous up to 115200 Bps
  - synchronous up to 128000 Bps
- Ethernet bridge and 4 port Hub :
  - Ethernet 802.3
  - Frame buffer : 256
  - Mac address memory : 10.000
- Interface E1 and 4E1 G703-G704:
  - rate G703: 2048 Kbps +/- 50ppm
  - coding: HDB3
  - framing: 32 Time Slots - G704 compatible
  - receiver sensitivity: -40 dB
- Interface E2 G703:
  - rate G703: 8448 +/- 20 ppm (also operational at 2048 Kbps +/- 50ppm)
  - coding: HDB3
  - receiver sensitivity: -10 dB Short Haul
- BRI interface:
  - 2 or 4 ISDN S interface
  - Network or Terminal interface

Fibre Optic Link :

- Multimode 62.5/125µm 820 nm: budget 15 dB i.e. 4 kms @ 3dB/kms
- Multimode 62.5/125 µm 1300 nm : budget 12 dB i.e. 8 kms @ 1.5dB/kms (option)
- Single mode 9/125 µm 1310 nm Led : budget 14 dB i.e. 40 kms @ 0.35 dB/kms
- Single mode 9/125 µm 1310 nm Laser : budget 23 dB i.e. 65 kms @ 0.35 dB/kms
- Single mode 9/125 µm 1550 nm Laser : budget 29 dB i.e. 120 kms @ 0.23 dB/kms

Correct Disposal of the Product - Recycling

In compliance with the European rules for separate collection systems and Waste of Electric and Electronic Equipment, this marking shown on this product indicates that it should not be disposed with other household wastes at the end of working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes an d recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer were they purchased this product, or their local government office for details of where and how they can take this item for environmental safe recycling.

Business users should contact their supplier and check the term and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.

1. Introduction

- The FO 8000 is a fibre optic modem with different DTE interface X21/V11, V35, V28, 10 BaseT, E1, 4E1 (2048 KBPS), E1 (8448 KBPS) or 2BRI or 4BRI (2 or 4*192 KBPS) network access.

1.1. DTE Interface

The FO 8000 can be equipped with different types of interface:

- *X21/V11 or V35 interface*: for synchronous data transmission at speed of up to 8192 KBPS. Clock can be configured as internal, external or slaved. Most interface signals can be forced or activated when the connection is established.
- *X21/V11 option 96*: for synchronous data transmission at speed of up to 8448 KBPS.

When clock is in external mode and both local and remote FO are codirectional, the clock value must be very different, like 4096 kbps in upstream and 175 kbps in downstream. Most interface signals can be forced or activated when the connection is established.

When clock is not codirectional, one FO8011 must be in external mode (DTE) and the remote must be in network clock mode.

- *V28 interface*: for synchronous data transmission at speed up to 128000 Bps, for asynchronous data up to 115200 Bps. In synchronous mode clock can be configured as internal, external, or slaved. Most interface signals can be forced or activated when the connection is established.
- *10BT interface and HUB 4 ports*: The built-in Ethernet bridge filters the frames in accordance with their destination MAC address. Only frames with non-local MAC addresses are transmitted to the remote unit. The bridge can memorize up to 10.000 local addresses and process 15.000 frames per second.
- *E1 Interface:* for E1 G703 or G704 network access at 2048 kBps. Clock can be configured as internal, external or slaved.
- *4E1 Interface:* for four E1 G703 or G704 network access at 2048 kBps. Clock can be configured as internal, slaved or external (1 of 4 DTE port).
- *BRI interface*: to transport 2 or 4 ISDN S interfaces.

- *E2 Interface*: for E2 G703 at 8448 KBPS (or E1 G703 2048 KBPS). Clock is always in external mode. The local and remote FO80E2 are co directional, the clock value must be different.

1.2. Conditioning

The FO 8000 can meet all integration requirements either as a desktop or rack-mount unit with different power-supply configurations

- External power bloc: provides a regulated 5 VDC from the mains 110/230 VAC
- Internal power supply: the modem includes a 110/230 VAC - 5 VDC power converter which connects directly to the mains outlet via the supplied power cord
- Internal 48 VDC converter: the modem includes a 48 VDC power converter, which can be connected to a 48Vdc supply commonly available in telecom centers.
- Rack-mountable card: the 5 VDC required by the modem is supplied by the rack in which the card is inserted. The AMS 4 and AMS 16 chassis can be powered from 110/230 VAC or 48 VDC depending on the type of power module installed with provision for full redundancy

1.3. Configuration

The FO 8000 is configured via the serial control port set for VT100 emulation at 19200 BPS with data format of 8 bits, parity none.

The configuration is menu driven with on line help facilities. Only a few keyboard strokes will be required to set and save the FO 8000 parameters. These menus also initiate analog and digital test loops and display a status report and a bit error rate statistics.

Alternatively the modem can be configured using an AT command set which provides access to all modem parameters.

The FO 8000 card can also be configured by the CFIP controller card of the AMS16 chassis though its local VT100 mode or TCP-IP Telnet and SNMP management protocols

2. FIBRE OPTIC link

The FO 8000 supports two different fibre optic type : multi-mode or single mode fibre.

2.1. Multi-mode Fibre

This is the classic fibre optic cabling, the most commonly installed core is 62.5 micrometers and outer cladding size is 125 micrometers. The FO 8000 component are compatible with 62.5 and 50 micrometers core.

In multi-mode fibre, the FO 8000 uses two different wavelengths the 820 nanometer and 1300 nanometer. These wavelengths allow distance up to 8 kms between two FO8000.

In multi-mode fibre at 820 nanometer, the modal dispersion is not negligible, but the limit is greater than the fibre attenuation.

The attenuation of the beam is more important in the 820 nanometer than in the 1300 nanometer.

All the calculation of the budget and fibre distance are described in the next paragraph.

Typically the multi-mode fibre is orange.

2.2. Single-mode Fibre

Single-mode fibre uses a smaller core diameter of 9 micrometer and the cladding size is also 125 micrometer.

In single-mode fibre the FO 8000 supports also two different wavelength component, the first is 1310 nanometer and the second is 1550 nanometer.

The attenuation is close to the theoretical attenuation at 1550 nanometer.

Typically the single-mode fibre is yellow.

2.3. Calculation of the Budget and Fibre Distance

The F8000 is defined by the DTE Interface and the Fibre Optic Budget at the different wavelength.

The ***Fibre Budget*** is the difference between the receiver sensivity and the transmitter power.

On each wavelength, a ***fibre attenuation*** per kilometer is defined.

Between the two FO 8000 there are some ***connectors*** and ***splices***.

The connector attenuation is 1 dB, and splice attenuation is 0.05 dB.

A buffer is added into the calculation (2 dB).

$$\text{Distance} = \frac{\text{(Fibre Budget)} - \text{(Splice Loss)} - \text{(Connector Loss)} - \text{Buffer}}{\text{(Fibre Attenuation)}}$$

Example: In multimode fibre at 820 nm the attenuation is 3dBm/km, with two connectors (2 dB) and one splice (0.05 dB), the Fibre Budget of FO 8000-M8 is 15 dB.

$$\text{Distance} = \frac{15 - 0.05 - 2 - 2}{3} = 3.6 \text{ km (with margin)}$$

Example: In monomode 1310 nm attenuation is 0.3 dBm/km and the FO 8000-SL budget is 23 dB

$$\text{Distance} = \frac{14 - 0.05 - 2 - 2}{0.3} = 33 \text{ km}$$

This calculation is realized with the above values, but the actual loss in the fibre is better measured once the fibre is installed, generally it is impossible to know the number of connectors and splices.

2.4. Desktop version

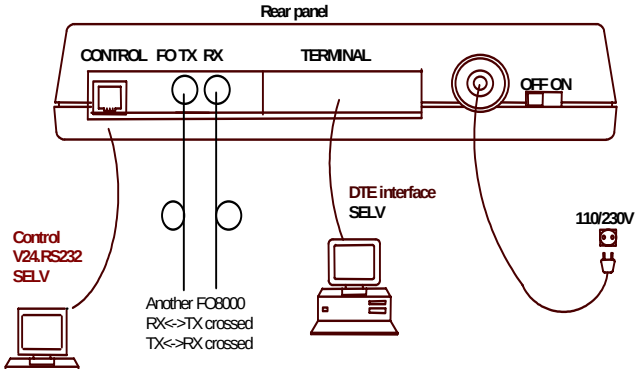
Accessories

- One RJ45-RJ 45 cable and one RJ45-DB9 converter (P/N: 7055031517) for the control port
- External power supply module when applicable .
- One DB25-DB15 cable as an option of the X21-V11 interface FO8011 version (P/N:CA601461).
- One DB25-V35 cable as an option of the V35 interface FO 8035 (P/N:CA601460).
- This user Manual

Connection

- Connect the modem as per the following drawing. View is from the rear.
- Ensure that the end face of the optical plugs are clean.
- Connect the fibre optic (type ST, SC, FC) : ensure that the optical input Rx and output Tx are connected to the other unit (crossover connection).
- The DTE terminal connector depends on the type of interface:
  - A DB25 socket for V28-RS232, X21-V11 and V35 interfaces,

- An RJ45 socket for 10BT, E1, E2.
- Two BNC for E2 and E1 interface in option (Transmitter near the fibre, Receiver near the power connector)
- Four RJ45 socket for 4E1 interface.
- Four RJ45 for the HUB interface.
- Four RJ45 for the 2BRI or 4BRI interface.



(*) 110/230VAC / 5VDC wallmount power supply or 110/230VAC or 48 Vdc cable as applicable.
(*) SELV = Safety low voltage

- For safety reasons it is imperative to use the accessories (power unit and cable) provided with the equipment.

Powering

The mains adapter / cord is the only switching device and therefore the mains outlet should be located close to the equipment and easily accessed

Once the FO 8000 has been connected, switch the ON-OFF switch to the « ON » position.

2.5. Rack mount version

Accessories

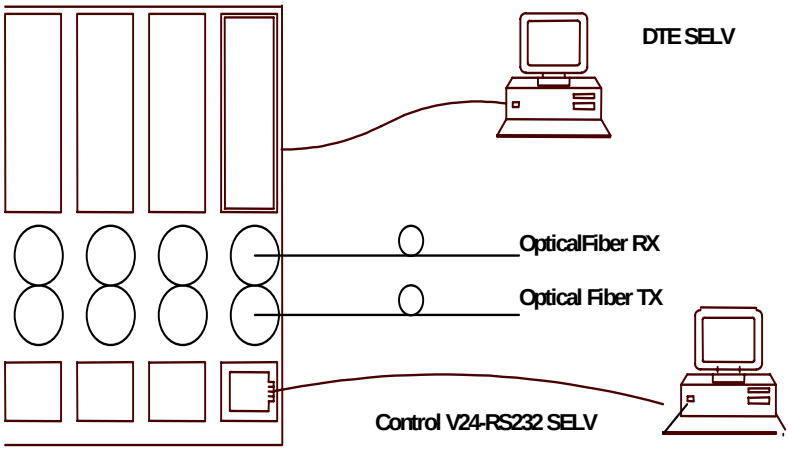
- One RJ45-RJ 45 cable and one RJ45-dB9 converter for the control port
- One DB25-DB15 cable as an option of the X21-V11 interface –FO 8011 version (P/N: CA 601 461)
- One DB25-V35 cable as an option of the V35 interface –FO 8035 (P/N:CA 601 460)
- This user Manual

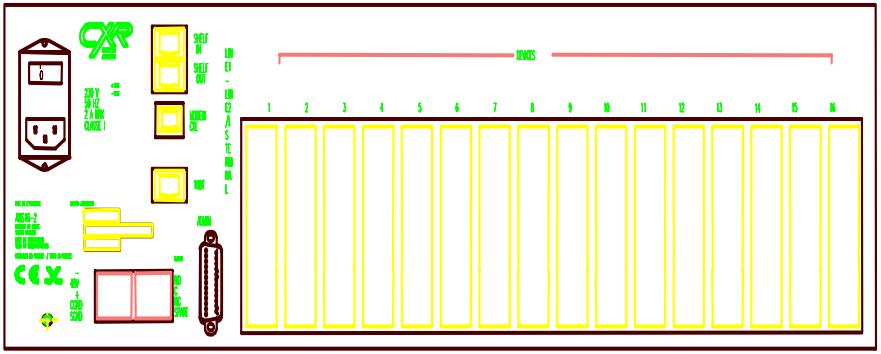
Installation

- Please also refer to the chassis user manual for the modem installation.
- Locate a free slot in the chassis and insert the FO 8000 card.

Connection

- Connect the FO 8000 at the rear of the chassis as per the following drawing.
- Ensure that the end face of the optical plugs are free of contamination.
- Connect the fibre optic (type ST, SC, FC) : ensure that one optical input Rx and one optical output Tx are connected to one another (crossover connection).
- The DTE terminal connector depends on the type of interface:
  - A DB25 socket for V28-RS232, X21-V11 and V35 interfaces,
  - An RJ45 socket for 10BT, E1, T1.
  - Two BNC for E1 in option, or E2 interface.
  - Four RJ45 for 4E1 interface.
  - Four RJ45 for the HUB interface.
  - Four RJ45 for the 2BRI or 4BRI interface.



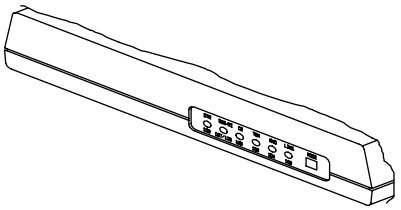


Powering

- The modem card connects to the chassis power supply when it is fully inserted. The chassis is powered on and off through the rear panel mains switch.
- Screw the unit front panel on the chassis to avoid any accidental power or connection loss

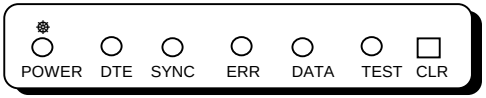
3. Front Panel, Display

This chapter describes the operation of the 6 LED indicators and the push button.



3.1. LED display

Six LED indicators and one pushbutton are installed on the front panel of the Desktop and rack mount unit. The LEDs display an indication on the status of the FO8000.



LED	Function
☸ / POWER	ON when the unit is powered BLINKING when the unit is powered and the control and configuration terminal is connected and provides an active DTR-108 signal to the control port
DTE	Shows that the terminal equipment is connected. C Signal for V11 interface, DTR signal for V28 and V35, E1 carrier for E1, E2 carrier for E2 card, link for 10BT and HUB, 4 carriers E1 simultaneous on each second for 4 E1 card, 4 synchronized access simultaneous on each second for 4 BRI card

LED	Function
SYNC	ON when the optical link is synchronized. BLINKING is case of loss of synchronization. OFF when optical link is not synchronized.
ERR	ON (red) in case of error. (like CRC error or HDB3/B8ZS/AMI code violation in E1 DTE) This LED is cleared by the push button (CLR) or by VT100 interface. AIS detection for E2 card.
DATA	Blinking when data are sent or received on the DTE interface.
TEST	ON (yellow) when the FO 8000 is in test mode.

3.2. The push button

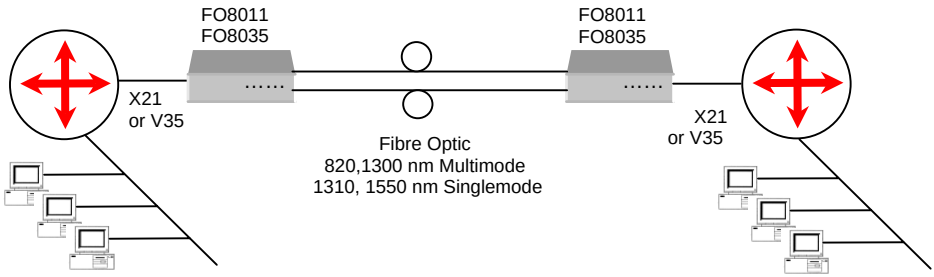
When pushed at power up, it forces the FO 8000 to enter in firmware download mode (Flash loader). The Power, DTE and TEST LED stay ON in this state.

4. Typical applications

This chapter describes the basic configuration of the FO 8000 in some typical applications.

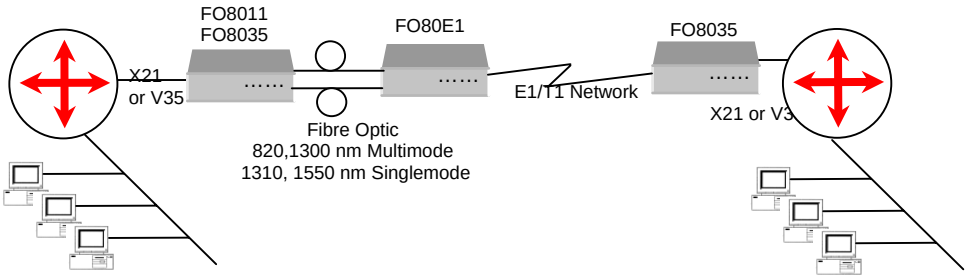
4.1. LAN to LAN connection

Two corporate LAN are connected together throw fibre optic link.



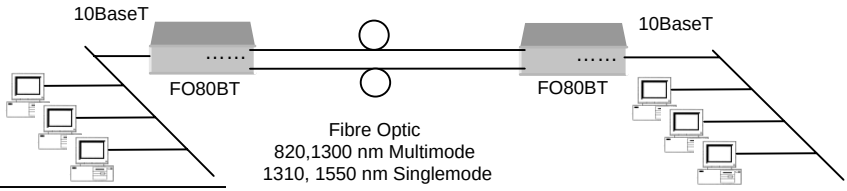
4.2. LAN to LAN connection via Fibre and E1/E1 network

Two corporate LAN are connected together through a fibre optic link and an E1 or T1 network access . The payload may be lower than 2048 KBPS (E1) or 1544 (T1) and provide lower network access cost (fractional E1 / fractional T1).



4.3. LAN to LAN bridging

Two FO 80BT provide an efficient bridging of two Ethernet networks and spare the use of routers of the previous connection scheme.



In case of problem or if the Ethernet frame do not comply with the IEEE 802.3 standard then the following AT parameters could be set on both FO 8000:

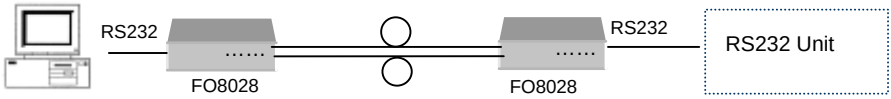
*F0: disables the MAC address filtering

*P0: disables the Padding bit deletion

These parameters are modifiable in the menu VT100.

4.4. V28 asynchronous or synchronous interconnection

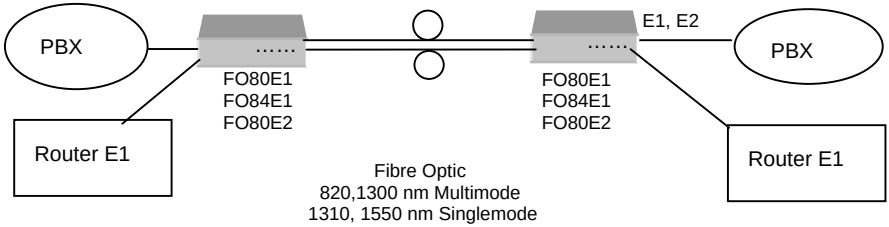
To control remotely a serial unit.



Fibre Optic
820,1300 nm Multimode
1310, 1550 nm Singlemode

4.5. E2, E1 or 4E1 PBX, Data interconnection

Interconnection of one or four E1 equipments with FO80E1 or FO84E1 modem.



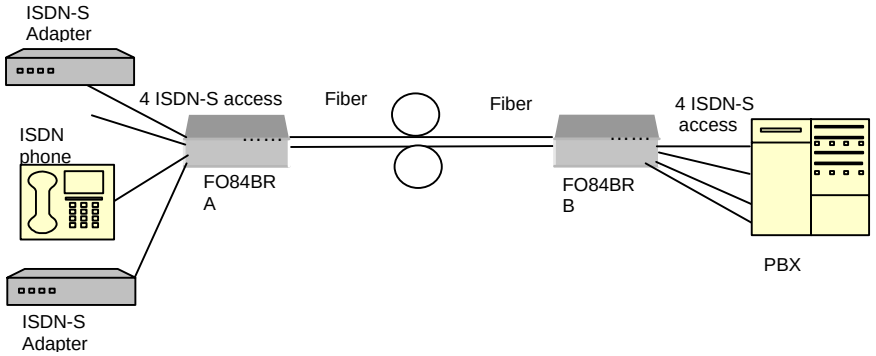
Fibre Optic
820,1300 nm Multimode
1310, 1550 nm Singlemode

With a FO80E2 local, the remote modem can be another FO80E2 or an FO8011 in transparent mode. The release software must be identical. Speed at 8448 or 2048 KBPS.

4.6. Terminal Adapter to PBX transport

A pair of FO84BR can transport up to 4 ISDN Basic Accesses. For example four Terminal Adapters are connected to a remote PBX , through two FO 84BR over a Fibre Optic.

The four B1+B2+D channels are transported. 2 Channels only for the FO82BR.



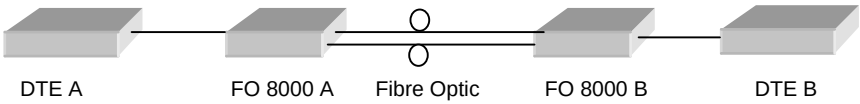
Timing Consideration

- If PBX is connected to the public telephone network and gives the master source timing. The FO84VBR “B” uses this clock and must be in DTE clock mode, then it sends its clock to the fibre, and the FO84BR “A” must be in Network clock mode. For a new installation, it’s better to connect the FO84BR B near the PBX in firstly.

4.7. Clock Mode

The fibre optical modem FO 8000 is used to carry data between two DTE interfaces.

The FO 8000 also carries the clock in most cases.



A – The DTE A equipment provides the clock in internal mode, and gives it to the FO 8000 and other DTE B (router V35 / V11, E1/4E1 network, V28-RS232, 4BRI) .

Type	DTE A	FO 8000 A	FO 8000 B	DTE B
A	Internal Clock	DTE Clock	Network Clock	Receive clock

B – Both equipments DTE A and DTE B receive the clock, the FO8000 A generates the clock for DTE A and transmits it to the other FO 8000 B and DTE B. (router V35/V11, network E1, V28-RS232, 10BaseT and HUB)

Type	DTE A	FO 8000 A	FO 8000 B	DTE B
B	Receive clock	Internal Clock	Network Clock	Receive clock

C – Both equipments DTE A and B gives the clock to the FO 8000 A, B . FO8000 A and B are in external clock. (E1 and 4E1 with 2 PBX sometimes)

Type	DTE A	FO 8000 A	FO 8000 B	DTE B
B	Internal clock	external Clock	external Clock	Internal clock

D – With FO84E1 all the DTE port clock must be isochronous.

E – With FO8011-96 and FO80E2 when the mode is codirectional the clock must be in external clock mode. The local and the remote FO are co directional. The upstream can be different with the downstream.

When the clock is not codirectional, one FO8011 must be in external, the other FO8011 must be in network clock.

Se chapter 10.1.4 and 10.1.5 for signals and explications.

5. Operation and Configuration

This chapter describes the FO 8000 operation through its Control port.

The FO 8000 must be connected to a VT100 compatible terminal or to a PC running a VT100 terminal emulation software that should be configured as follows:

- Speed: 19200 bps
- Data format: 8 bits
- Parity: none
- Stop bit: 1
- Emulation: VT100
- Flow control: none

The FO 8000 configuration can be made either in AT command mode or VT100 Interactive menu mode. The choice of mode is automatic: the AT command mode is activated when an “AT” or ”at” character string is received from the control port. The VT100 menu mode is started when the modem detects three consecutive carriage returns or “ENTER” characters.

The use of the VT100 mode offers valuable advantages such as simplicity and on line help.

The use of the AT commands allows writing configuration programs which can be saved out of the unit on a PC for instance and can also be protected with a password.

All the FO 8000 operation parameters can be modified and saved in either mode.

The detail of the AT command is described in another document. (Ref CXR : 8000 601 836)

5.1. Configuration Software MxCfg

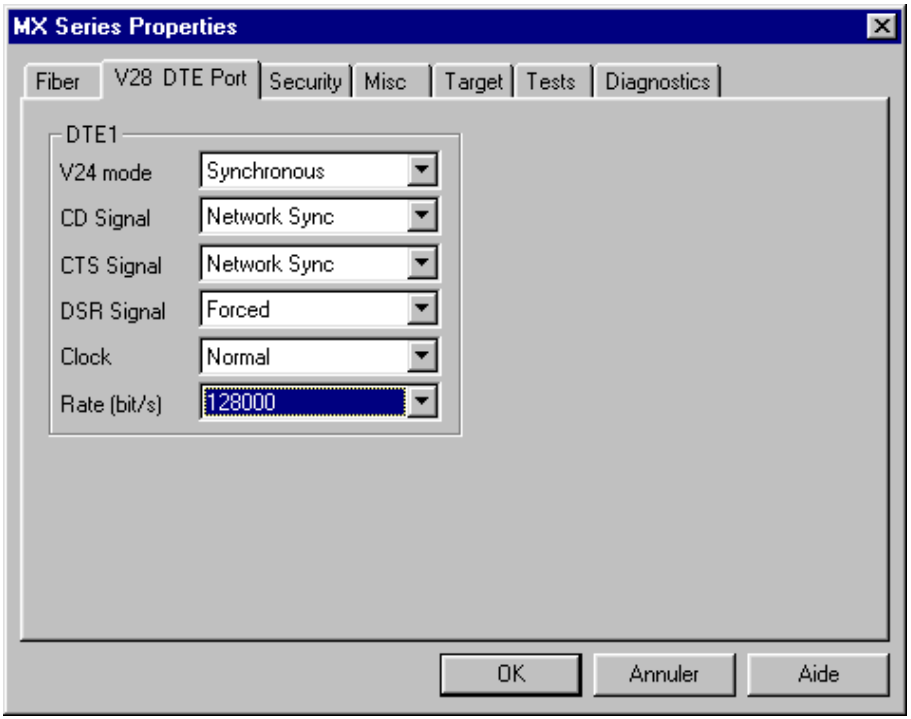
The configuration software Mxcfg allows:

- See the current configuration of FO8000
- Modify the parameters
- Save the new parameters
- The all the parameters in a file on your Laptop
- View the diags

Mxcfg run under Windows 95/98/NT/2000/XP.

To install Mxcfg, type “a:\Setup.exe” on the floppy disk or “\tools\french\mxcfg\setup.exe" on the CDROM.

For more information, or in case of problem see the help file (Button Help or the F1 touch).



5.2. Factory and User Configurations

The FO 8000 has 4 user definable configurations and one read-only factory configuration.

The configuration process consists in setting up the FO 8000 parameters for the application and then saving these parameters in the user memory. The active configuration must then be defined; it is activated even after a power shut-off.

Chapter 7 describes the various memories used by the unit.

5.3. VT100 Interactive Menus

The FO 8000 sends the VT100 menu pages when it detects three consecutive <CR> or 'ENTER' characters.

The possible choices are listed on the bottom line of the screen:

- 1 to 9 are valid options on the menu to start a sub-menu or to change a parameter value
- P or p: to return to the Previous menu
- Q or q: to Quit the VT100 menus and return to the AT command mode

Acknowledge your choice by Enter (or CR)

Some parameters should be selected in a revolving list which can be exited by the '#Abort operation#' choice in any need of aborting the current selection.

The arrow keys must be used in some menus. Some VT100 terminal emulation software may need some settings to allow the use of these keys (HyperTerminal,). The / * - + key may also be used in case of problem.

LEFT:	/	RIGHT:	*	UP:	-	DOWN:	+

First menu :

```
                              CXR - FO 8035
                                Main menu
                            Configuration "cxr*"
                           DTE=1984Kbps, CLK=INT


          1) Configuration
          2) Status and statistics
          3) Loop test
          4) Display and passwords
          5) Remote

-------------------------------------------------------------------------------
          Type your choice: 1 .. 4, Q(uit) and press RETURN
-------------------------------------------------------------------------------

                     FO8000 V1.06 - Dec 19 2001 - 0143CFD8
                              SN: 00009010 - 5001
```

The first menu provides access to the configuration, status and statistics displays and loop test sub-menus.

The item ‘display and passwords’ access to a submenu for the choice of passwords, language (English or French) and display mode

Press ‘Q’ to exit the VT100 menus and return to the AT command mode.

5.3.1. Menu 1 : Configuration

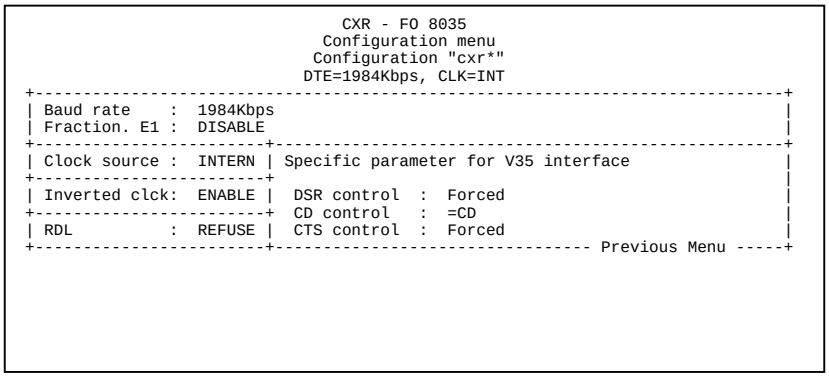
```
                              CXR - FO 8035
                            Configuration menu
                           Configuration "cxr*"
                          DTE=1984Kbps, CLK=INT


       1) View a configuration
       2) Edit a configuration
       3) Activate a configuration
       4) Remove a user configuration

-------------------------------------------------------------------------------
          Type your choice: 1 .. 4, P(revious) and press RETURN
-------------------------------------------------------------------------------
```

1. **View a configuration**: the arrows select the configuration to view, either the current configuration (Active), or the factory configuration (Factory), or one of the user defined configuration ([user n]).
2. **Edit a configuration**: the arrows select the model of configuration to use. Parameters are edited in a memory dedicated to editing: this memory could be then saved into a user memory, eventually the model one.
3. **Activate a configuration**: the arrows select the configuration that will be active when the unit will restart. It could be the factory or any user defined configuration. Warning: this option restarts the FO8000. The active configuration is spotted by an asterisk '*'. This operation must be confirm or aborted by a choice Yes / No.
4. **Remove a user configuration**: This option is displayed only if user defined configurations are stored in memory. The arrows select the configuration to be removed. The factory configuration becomes the active configuration at the next restart of the unit if the active configuration is removed. This operation must be confirm or aborted by a choice Yes / No.
5. **Save configuration**: this option is displayed after a configuration has been edited. The arrows select the user-defined memory where the edited configuration will be stored. This may overwrite an existing configuration, or define an empty configuration. In this case a name can be given to the configuration. This operation must be confirm or aborted by a choice Yes / No. Warning: the configuration does not become active when it is saved – see the previous option (3)

5.3.2. Menu 1.2 : Edit a configuration (except FO8011 option 96 and FO80E2)



Move the cursor on the value to modify with the arrows, then validate, next modify the value with the arrows, validate the new chose. To leave this screen , go to the Previous Menu and validate.

Here are all the parameters associated with all interfaces except with the F8011-96.

Baud Rate :

- Interface V35 and V11/X21 from 64 kbits/s to 2048 kbps by step of 64k and 4096, 6144, 8192 kbps.
- interface V28 synchronous from 1,2 kbps to 128 kbps.
- interface 10BaseT and Hub from 64k to 9344 kbps (chose the upper speed for higher performance, or chose a speed in accordance with the other modem in Fractional E1 or T1).
- Interface E1 or 4E1 at 2048 kbps.
- Interface V28 Asynchronous (transparent up to 115,2 kbps).
- Interface 4BRI 4 * 192 kbps (fixed)

Clock source :

- Internal clock : the transmission to the network is synchronized by the internal clock (based on a crystal oscillator in interface X21, V35, 10baseT, HUB, V28 synchronous, E1.
- External clock : clock is provided by the DTE and is sent to the remote unit. Apply on X21, V35, synchronous V28, E1 interface, 4E1, 4BRI interface (DTE1, DTE2, DTE3, DTE4 clock possibility)
- Network clock : the transmission to the network is synchronized by the clock recovered from the network receive path. (default value). In interface X21, V35, 10BaseT, HUB, V28, E1, 4BRI, 4E1.

Inverted clock :

- Data are generated on the falling edge of the clock for the X21, V35 and V28 interfaces (default behavior). However it's possible to select the rising edge of the clock.

RDL :

- Remote Digital Loop. This command enables or disables answer to RDL requested by the remote FO 8000 . Disable by default.

DSR Control:

- This parameter controls the activation of the DSR - 107 signal of the V35 or V28 interface. (forced: always active, follows the 108 / DTR signal of the interface, active when the FO8000 is synchronized on the fibre optic).

CTS control :

- This parameter controls the activation of the CTS - 106 signal of the V35 or V28 interface. (forced: always active, follows the 105 / RTS signal of the interface, active when the FO8000 is synchronized on the fibre optic).

CD control :

- This parameter controls the activation of the CD - 109 signal of the V35 or V28 interface. (forced: always active, active when the FO8000 is synchronized on the fibre optic).

I control :

- This parameter controls the activation of the I - 106 signal of the X21 interface. (forced: always active, follows the C signal of the interface, active when the FO8000 is synchronized on the fibre optic).

Ethernet Address Filtering:

- 10BaseT and HUB interfaces : this parameter enables or disables the frame filtering of the Ethernet local addresses. Default value is filtering.

Padding Comp :

- 10BaseT and HUB interfaces : this parameter enables or disables the discarding of Ethernet padding bits for the transmission between the FO 80BT. Padding bits are regenerated at the other side. Default value is on.

Sensitivity :

- E1, 4E1 and T1 interfaces : This parameter defines the network interface receiver sensitivity. It allows to select low sensitivity on short haul (-12dB for E1 or -30dB for T1) or an high sensitivity on(long haul (-43dB for E1 or -36 dB for T1). Default is Short Haul.

Bit E :

- E1, 4E1 interface : this parameter defines the G704 E bit activation on CRC error detection. Used only when unframed isn't validated.

CRC :

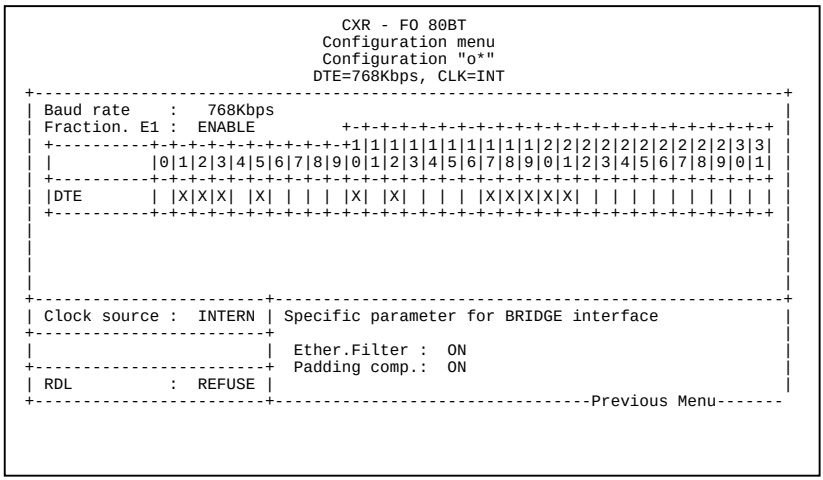
- E1, 4E1 interface : This parameter defines the G704 CRC4 (E1) or CRC6 (T1) i.e. ESF mode management. Used only when unframed isn't validated.

Unframed :

- Interface E1, 4E1 : No (31 TS) – Framed mode (G704)
- Interface E1, 4E1 : Yes (32 TS) – Unframed mode (G703 / 2048 kBps)

Fractional E1 / T1 :

- Interface V11, V35, 10BaseT, HUB only (not E1 or T1) . Timeslots can be extracted from a remote E1 / T1 FO unit to a V35, X21 or 10BaseT Interface.



Use left and right arrows (or / *) to place on the different Time Slot and arrows Up and Down (or - +) to change the selected line. Then return to the previous Menu and save the new configuration.

Mode BRI :

this parameter activates interfaces in Terminal mode (TE, LT-T) or Network mode (NT, LT-S)

- Terminal : connected to the PBX (DTE clock mode)
- Network : connected to the adapters or ISDN phones. (default value). Network clock mode)

5.3.3. Menu 1.2 FO8011-96, FO80E2: Edit a configuration

With this release only 5 parameters are used:

- Inverted clock: Data are generated on the falling edge of the clock for the X21 interfaces (default Disable). Rising edge of the clock (Enable).
- RDL : Refused or Accepted.
- I signal Indication: =C (local signal Control), =CD (fibre optic carrier), =Remote C (remote FO8011 Control signal), Forced (always ON)
- Clock source : External DTE1, or Network
- Codirectional: Yes or No:

- If Yes: clock source must be in external clock mode. External clock and data are transmitted through the fibre optic and the remote FO8000 send Receive clock and data. The pulsation between the receive and transmit in the fibre optic can be different.
- If No: one F08011 is in external clock mode and the remote FO8011 is in network clock mode. External clock and data are transmitted through the fibre optic and the remote FO8011 send clock and data, the remote product send the data with the FO8011 clock, in local the FO8011 send the data with the external clock. The local FO8011 introduce a FIFO to synchronize the receive data with the external clock (see chapter 10.1.5 for details).

```
                          CXR - FO 8011
                        Configuration menu
                        Configuration "o*"
                    DTE=Transparent, CLK=NWK


    1)  Inverted clock:   DISABLE
    2)  RDL           :   REFUSE
    3)  I Signal      :   =REMOTE C
    4)  Clock source  :   NET
    5)  Codirectional :   NO
```

5.3.4. Menu 2 : Status and statistics

The FO 8000 displays its operating parameters and connection statistics for evaluation of the transmission quality. See chapter 6 for more information.

5.3.5. Menu 3 : Loop Test

```
                          CXR - FO 80E1
                        Test & loop menu
                       Configuration "ooo*"
              DTE=2048Kbps, CLK=NWK, CRC=OFF, BIT E=OFF


    1) Start local loopback

    2) Start remote loopback

    3) Start local digital loopback
```

This menu allows loop test activation:

- Local analog loop
- Remote digital loop: request a loop to the remote FO 8000
- Local digital loop

See chapter Test in 6.2 for more details.

5.3.6. Menu 4 : Display and passwords

```
                              CXR - FO 80E1 - cxr
                            Display and passwords
                             Configuration "ooo*"
                    DTE=2048Kbps, CLK=NWK, CRC=OFF, BIT E=OFF


           1)  Language : English
           2)  Graphic char set : disabled
           3)  Led Mode      : On TX&RX
           4)  Auto-logout time limit : 15
           5)  Site name: cxr
           5)  Maintenance password
           6)  System manager password

-------------------------------------------------------------------------------
           Type your choice: 1 .. 6, P(revious) and press RETURN
-------------------------------------------------------------------------------
```

This menu allows to change user interface parameters: the language of the menus, the use of the graphic character set allowed by some VT100 emulators, the front panel Data LED mode, the inactivity time out (in minutes) on the control port (after this time the user is logged out), the passwords: the system manager level permits all functions and the maintenance level allows only to view configurations and status & statistics.

5.4. Remote control

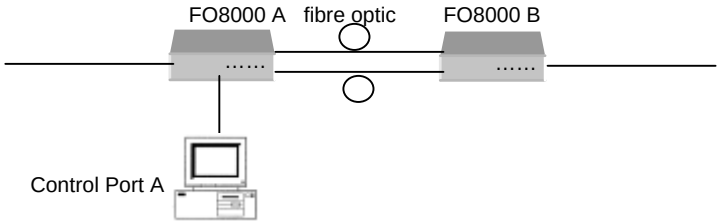
The remote B unit can be control from the main configuration menu of the A unit.

With The **ATO** command, the A modem take the control of the B modem and displays the screen of the remote modem F08000 B.

The **ATH** command ends this remote control session.

All remote control data are passed in an out band channel which does not slow or disturb the application data flow.

With the menu 5, it's possible to take the remote control too.



6. Diagnostics and tests

6.1. Diagnostics

```
                    CXR - FO 80E1  : Status & Statistics
             Configuration "ooo*" : DTE=2048Kbps, CRC=OFF, CLK=NWK
+-------------------------+-------------------------+-------------------------+
|  Fibre carrier  :  ON   | Uptime     0 d 00:30:14 |  DTE detected :  OFF    |
+-------------------------+-------------------------+-------------------------+
|  Status (E1)  Carrier : OFF       Sync : ON                                   |
|               CRC Sync : ON       Remote Alarm : OFF                          |
+-------------------------------------------------------------------------------+
|  Statistics                                                                   |
| +-----------+------------+-----------+-----------+-----------+-----------+   |
| |Sec. with  | Last 24hrs | Prev. hour| Cur. hour | Prev. 15m |  Cur. 15m |   |
| +-----------+------------+-----------+-----------+-----------+-----------+   |
| |NO FO Carr. |  00:00:00  |   00:00   |   00:00   |   00:00   |   00:00   |   |
| |NO Carr. E1 |  00:00:00  |   00:00   |   30:13   |   30:00   |   00:30   |   |
| |NO sync (E1)|  00:00:00  |   00:00   |   00:00   |   00:00   |   00:00   |   |
| | (nb errors)|     (0)    |    (0)    |    (0)    |    (0)    |    (0)    |   |
| |CRC Errors  |  00:00:00  |   00:00   |   00:00   |   00:00   |   00:00   |   |
| | (nb errors)|     (0)    |    (0)    |    (0)    |    (0)    |    (0)    |   |
| |Code violat.|  00:00:00  |   00:00   |   00:01   |   00:00   |   00:00   |   |
| | (nb errors)|     (0)    |    (0)    |    (19)   |    (0)    |    (0)    |   |
| |E BIT       |  00:00:00  |   00:00   |   00:00   |   00:00   |   00:00   |   |
| | (nb errors)|     (0)    |    (0)    |    (0)    |    (0)    |    (0)    |   |
| +-----------+------------+-----------+-----------+-----------+-----------+   |
+-- Reset errors led ------ Reset statistics -------------- Previous Menu -----
```

In the top of the screen we find the type of interface, the speed, and clock mode.
The status of the fibre link, the time since the power up, and the main information about the active configuration.

The FO 8000 shows an error statistics picture displayed in duration of error or number of errors.

Figures are provided for the last 24 hours, the previous hour and 15 minutes, and the current hour and 15 minutes, which show how the errors are distributed over time.

The time without fibre carrier, without the DTE carrier.

There are counters for E1/T1 coding violation, CRC errors, E bit active, and loss of Frame Alignment Signal (FAS).

There are time counters for E1/T1 carrier status, G704 frame status, and terminal status based on the X21 C signal, or the V35 RTS signal, or the 10BT link integrity signal..

4E1 Interface we see the four DTE port states: carrier, sync, crc, alarm.

```
+-------------------------+-------------------------+-------------------------+
|  Fiber carrier  :  ON   | Uptime     0 d 01:31:02 |  DTE detected :  O.O.   |
+-------------------------+-------------------------+-------------------------+
|  Status(4E1)  Carrier :  ON  OFF ON  OFF    Sync :          ON  ON  ON  ON    |
|               CRC Sync : ON  ON  ON  ON     Remote Alarm : OFF OFF OFF OFF   |
+-------------------------------------------------------------------------------+
```

4BRI Interface:

```
+-------------------------+-------------------------+-------------------------+
|  Fiber carrier  :  ON   | Uptime     1 d 01:17:10 |  DTE detected :  00..   |
+-------------------------+-------------------------+-------------------------+
|  Status(4BR)     DTE 1:  F7 Activat.       DTE 2:  F7 Activat.              |
|                  DTE 3:  F3 Deactiv.       DTE 4:  F3 Deactiv.              |
+-----------------------------------------------------------------------------+
```

DTE1 to 4: reports the state of the BRI link integrity: activated or synchronized, deactivated, not initialised.

FO8011-96 and FO80E2 Statistics:

```
                  CXR - FO 8011   : Status & Statistics
               Configuration "o*" : DTE=Transparent, CLK=NWK
+-------------------------+-------------------------+-------------------------+
|  Fiber carrier  :  ON   | Uptime     0 d 16:38:57 |  DTE detected :  ON     |
+-------------------------+-------------------------+-------------------------+
|  Status(V11)                                                                |
|       C = ON              I = OFF (=Remote C)         remote C = OFF        |
+-----------------------------------------------------------------------------+
|  Statistics      Frequence TCLK: 7679886 Hz - RCLK: 7679885 Hz
| +------------+-------------+-----------+-----------+-----------+-----------+ |
| |Sec. with   | Last 24hrs  | Prev. hour| Cur. hour | Prev. 15m |  Cur. 15m | |
| +------------+-------------+-----------+-----------+-----------+-----------+ |
| |NO FO Carr. |   00:00:00  |   00:00   |   00:00   |   00:00   |   00:00   | |
| |NO Signal C |   00:00:00  |   00:00   |   00:00   |   00:00   |   00:00   | |
| +------------+-------------+-----------+-----------+-----------+-----------+ |
+- Reset errors led ---- Reset statistics ------- Alarms ---- Previous Menu ---+
```

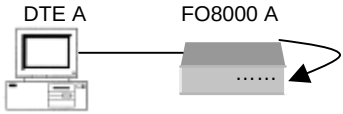
with this software release, the external and receive clocks are measured to indicate an approximate value a the frequency between the two senses.

With FO80E2 Statistics are No signal Fibre Optic, No E2 synchronization, and AIS detected.

6.2. Test

6.2.1. Local Analog Loop

The FO 8000 synchronizes to the carrier that it transmits on its line interface. This configuration provides a test of all the internal parts in the unit. This loop corresponds to an ITU-T V54 B3 loop..



Procedure :

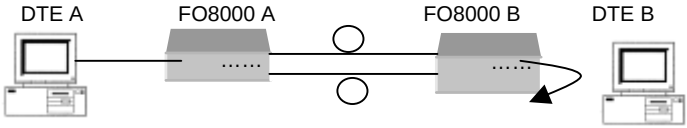
This loop is activated

- In the third menu of the VT100 interface,
- By the AT&T1 command

The loop is acknowledged by the TEST Led on the front panel.

6.2.2. Remote Digital Loop

The remote FO 8000 (B) sends back data received from the line which lets the terminal equipment (DTE A) test the data link up to the remote terminal point (DTE B). This loop corresponds to an ITU-T V54-B2 loop.



Procedure :

From location A, if the answer it RDL request is enabled on the FO8000 of side B

- In the menu 3 of the VT100 interface,
- By the AT &T2 command

From location B

- In the menu 3 of the VT100 interface,
- By the AT&T3 command.

7. Memory

The FO 8000 includes three different memories:

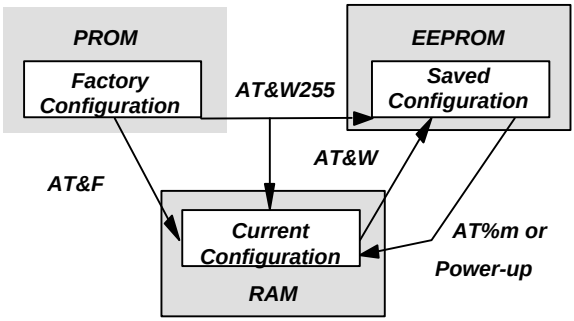
- **The Flash EPROM**, which permanently stores the factory configuration and the firmware
- **The RAM,** where the current configuration is
- **The EEPROM** is a non-volatile memory where the 4 user configurations are saved. The content of this memory is protected even when the unit is switched off.

At the first power-up or after a complete re-initialisation, the content of the three memories is the same and is the factory default configuration.

The **AT&Wn** command saves the current configuration in the non-volatile memory. All changes made by the user are saved as user configuration (n=0 to 3)

The last configuration saved by an **AT&Wn** command will be automatically loaded at the next reset or power-up.

These memory operations are described in the following drawing:



Memory Re-initialisation	**AT&W255 <RC>**
Memory save	**AT&W or AT&W1.. <RC>**
Loading of factory configuration w/o loss of the saved memory	**AT&F <RC>**
Loading of the user configuration	**AT%M0 , AT%M1.. <RC>**

8. Technical Characteristics

8.1. Transmission Modes

- Fibre Optic Link:
  - Multimode 62.5/125µm 820 nm: budget 15 dB i.e. 4 km @ 3dB/kms
  - Multimode 62.5/125 µm 1300 nm : budget 12 dB i.e. 8 km @ 1.5dB/kms (option)
  - Single mode 9/125 µm 1310 nm Led : budget 14 dB i.e. 40 km @ 0.35 dB/km
  - Single mode 9/125 µm 1310 nm Laser : budget 23 dB i.e. 65 km @ 0.35 dB/km
  - Single mode 9/125 µm 1550 nm Laser : budget 29 dB i.e. 120 km @ 0.23 dB/km
  - ST, FC, SC connector.

- E1, 4E1 Interface
  - G703 Rate : 2048 KBPS +/- 50ppm
  - G704 frame: 31 TS at 1984 KBPS
  - Coding : HDB3
  - CRC4
  - Receiver sensitivity : -40 dB
  - Transparent mode : 2048 KBPS

- 2BRI or 4BRI Interface:
  - 2 or 4 interfaces Rates : 192kBPS
  - channel B1, B2, D
  - Terminal or Network Mode
  - Clock : Network or Terminal 1,2,3,4 mode.

- Ethernet bridge and HUB interface :
  - Rates : 64 to 9344 KBPS
  - Ethernet 802.3 – 10 Base T
  - Frame buffer memory: 256
  - MAC address memory: 10.000
  - MAC address filtering: filtering or transparent bridge
  - Ethernet compression: padding bits suppression/regeneration:

- V11/X21 Interface:
  - Rates : 64 to 8192 KBPS
  - Signal I : forced or active when connected
  - Clock :Network, terminal or internal, normal or inversed edge.
  - Possible extraction with a remote FO80E1 (1 to 31 TS: 64k to 1984k)

- V11/X21 Interface option 96 – Opt 96 is a different software release :
  - Rates : DC to 8448 KBPS
  - Signal I : forced, active when connected, remote C, local C signal
  - Clock : Network or terminal, normal or inversed edge.
  - Codirectional: Yes or No

- V35 Interface:
  - Rates : 64 to 8192 KBPS
  - signal DSR, CD, CTS : forced or active when connected
  - Clock :Network, terminal or internal, normal or inversed edge
  - Possible extraction with a remote FO80E1 (1 to 31 TS: 64k to 1984k)

- V28 Asynchronous Interface:

- Rates : 0 to 115,2 kBPS
- signal DSR, CD, CTS : forced or active when connected

- V28 Synchronous Interface:
  - Rates : 0 to 128 kBps
  - signal DSR, CD, CTS : forced or active when connected
  - Clock :Network, terminal or internal, normal or inversed edge
- E2 Interface
  - G703 Rate : 8448 KBPS +/- 20ppm (ready for E1 2048 KBPS +/- 50ppm)
  - Coding : HDB3
  - Receiver sensitivity : -10 dB Short Haul
  - Transparent mode : 8448 and 2048 KBPS

8.2. General Characteristics

Size : L x W x H : 260 x 170 x 35 mm (Desktop).

Weight : rack card FO 8000 : 0,4 kg
Desktop with internal power supply: 0,7 kg
Desktop with external power supply : 0,6 kg + power supply: 0,45 kg

Maximum power consumption:

- 5 Vdc : 800mA
- Desktop with external power supply PVx :30 mA / 230Vac and 60 mA / 110Vac
- Desktop with internal power supply PIx : 30 mA / 230Vac and 60 mA / 110Vac
- Desktop with internal 48 Vdc converter - PCx : 150mA. / 48 Vdc

Operating temperature: 0°C up to 45°C.
Storage temperature: 0°C up to 70°C.
Hygrometry : 90% non-condensing
Compliant to European safety standards: EN60950.
Compliant to European EMC standard : EN 55022 (B) and EN 50082 –1

9. Troubleshooting

This chapter describes the operation phases of the FO 8000 and provides a diagnostic for most of the problems encountered during installation and operation..

9.1. Power up

Trouble	Check
Power-up phases do not progress	➢ The mains power plug, ➢ ON/OFF switch is on "ON" position ➢ Power is applied to the chassis, electrical continuity on the fuse receptacle ➢ ON or flashing of the LED ❁ on the front display
The FO 8000 does not answer the commands	▪ LED ❁ stays ON permanently. This LED flashes as soon as the unit detects the terminal on the control port (DTR signal) ▪ The CTRL plug at the terminal or PC used for the FO 8000 configuration. ▪ The terminal parameters:19,200bps, 8 data bits, 1 stop bit, no parity ▪ At power up and when a terminal is connected to the CTRL port (signal DTR), the FO 8000 sends a welcome message
The Fibre Optic Link integrity is down	▪ Verify the crossing between the two fibres modem. Rx<->Tx ▪ Clean the optic fibre and FO 8000 connector with a bomb of compressed air to suppress any dust on the optic contact. ▪ Any dust can degrade the transmission. ▪ Use two FO 8000 modems of the same type with the correct fibre (multi-mode or mono-mode)
The 10BT Link integrity is down	▪ Verify the cable between the FO 8000 and the HUB for pair polarity

If the trouble remains after the above verification, please contact your distributor or call CXR Hot Line

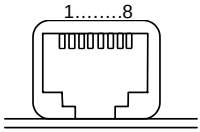
E-mail at: **support@cxr.fr**

Telephone: **+33 (0) 237 628 804**

10. Appendix

10.1. Appendix A – Wiring

10.1.1. Serial Control Port - RJ45

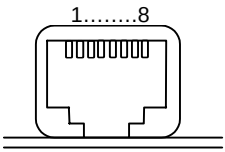


Pin #	Signal	I/O	Description	DB9
1	107 – DSR	OUT	Data set ready - permanent	6
2	109 - CD	OUT	Not used	1
3	108 - DTR	IN	Data terminal ready	4
4	102 - GND	-	Ground	5
5	104 - RXD	OUT	Received data by the terminal	2
6	103 - TXD	IN	Transmitted data by the terminal	3
7	106 - CTS	OUT	DCE ready to transmit	8
8	105 - RTS	IN	Terminal ready to transmit	7

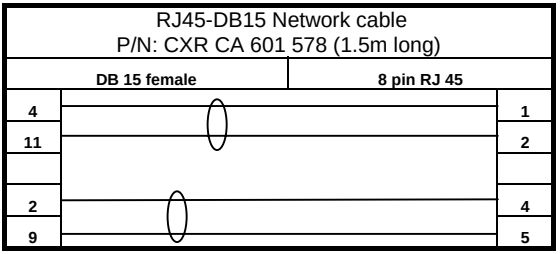
An adapter cable (P/N 7055031517) is provided to connect to the DB9 socket of most PC COM port

10.1.2. RJ45 - Line connector

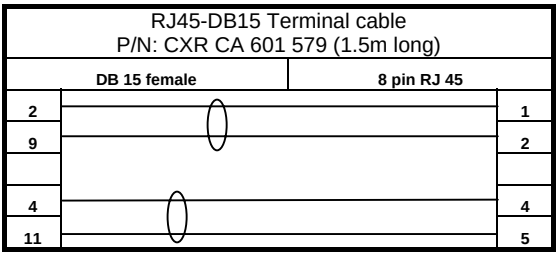
An RJ45 connector connects to the E1/T1 network. It is wired as described by the following picture :

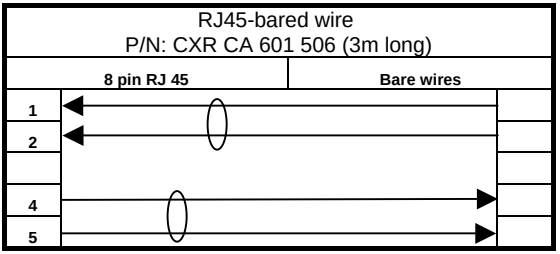


Pin	Signal	I/O	Description
1	RECV TIP	I	Receive
2	RECV RING	I	Receive
3	NC		
4	XMIT TIP	O	Transmit
5	XMIT RING	O	Transmit
6	NC		
7	NC		
8	NC		



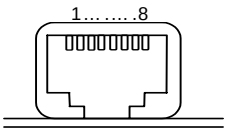
G703 cables are available on demand as an option to the FO 8000 :





10.1.3. 10 Base T Interface connector

An RJ45 female socket provides a connection for the terminal equipment. The connector is shown on the following drawing and the RJ45 socket of the 10BT bridge is wired as per the following table:



CAUTION: The bridge is polarity sensitive and the received pair must be wired with special care.

Pin	Signal	I/O	Description
1	Transmit +	Out+	**+** Transmit
2	Transmit -	Out-	-Transmit
3	Receive +	In+	+ receive
4			Not connected
5			Not connected
6	Receive -	In-	- receive
7			Not connected
8			Not connected

10.1.4. X21/V11 and V35 Interfaces connector & wiring

A DB25 female connector is used to connect the terminal equipment to the modem via an adaptation cable. The connector is wired as per the following table:

DB25 Pin	V11-X21 Signal	DB15 Pin	V35 Signal	V35 Pin	V28 - RS232 Signal DB25
1	Chassis GND	1	101 – P.GND	A	Chassis GND
2	TA (Transmit)	2	103 A – TXD A	P	TD
3	RA (Receive)	4	104 A – RXD A	R	RD
4	CA (Control)	3	105 – RTS	C	RTS
5			106 – CTS	D	CTS
6			107 – DSR	E	DSR
7	GND	8	102 – S.GND	B	
8	IA (Indication)	5	109 – CD	F	CD
9	SB (Clock)	13	115 B - RCK B	X	
10	IB (Indication)	12			
11	XB (DTE Clock)	14	113 B - XCK-B	W	
12			114 B – TCK B	AA	
13					
14	TB (Transmit)	9	103 B – TXD B	S	
15			114 A – TCK A	Y	TCK
16	RB (Receive)	11	104 B – RXD B	T	
17	SA (Clock)	6	115 A – RCK A	V	RCK
18			141 – LL	K	LL
19	CB (Control)	10			
20			108 – DTR	H	DTR
21					
22					
23					
24	XA (DTE Clock)	7	113 A – XCK A	U	XCLK (dte clock)
25			142 - TEST		TEST

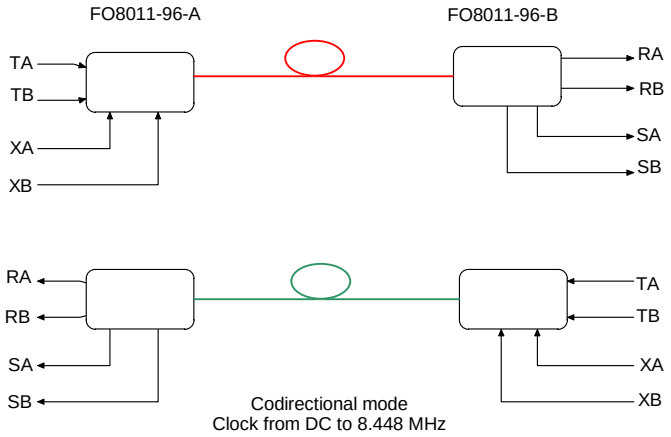
DB25 - X21 and DB25 - V35 adaptation cables are available on request as an option :

- DB25 male to DB15 female cable for X21-V11 interface. Part number: CA 601 461
- DB25 male to V35 female cable for V35 interface. Part number: CA 601 460.

10.1.5. X21/V11 Option 96 Interfaces connector & wiring

- Same Interface of the previous X21 chapter. DTE clock (XA, XB) are used with the transmit data (TA, TB), and Receive clock (SA, SB) are used with the receive data (RA, RB) for the co directional mode.

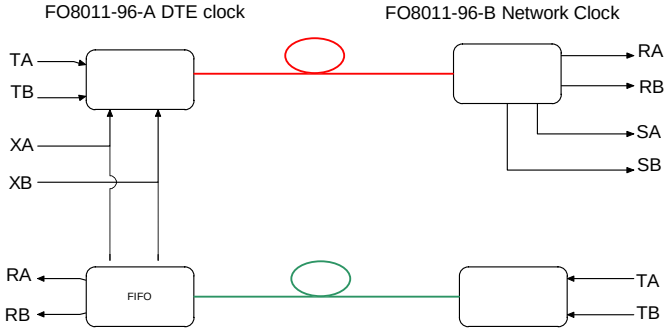
Codirectional and DTE clock mode:



Example Not codirectional mode, DTE clock mode and Network clock mode:

The FO8011-96-A sends the Receive data RA,RB synchronized with the External clock XA,XB, the FO8011-A introduces a FIFO to send its data.

On the remote side, the equipment connected to the FO8011-B must sent the data TA,TB on the falling edge of the clock RA,RB (with inverted clock disabled)

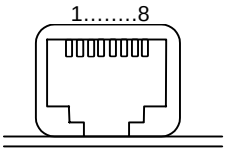


Not Codirectional mode
Clock from DC to 8.448 MHz

10.1.6. BRI Interface RJ45

One RJ45 female allow to connect terminal equipment.

Terminal and Network are different, see table below. In accordance with the (Network or Terminal) parameter, the DIP-SWITCH must be modified on the electronic card. See next chapter for the DIP-SWITCH parameters.



WARNING : cards are sensitive, and the parameters must be in accordance with the pin connector. The dip-switch on the card must be changed too.

Terminal Mode TE or LT-T			
Broche	**Signal**	**E/S**	**Description**
1			not connected
2			not connected
3	Send	S	Transmit line
4	Receive	E	Receive line

5	Receive	E	Receive line
6	Send	S	Transmit line
7			not connected
8			not connected

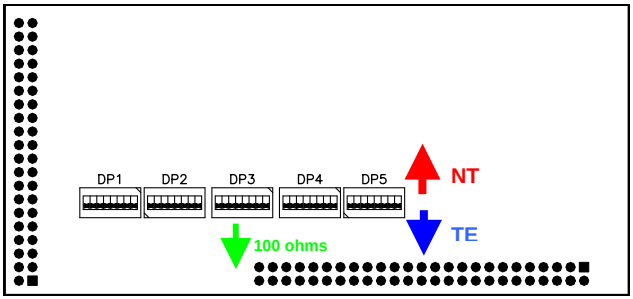
Network Mode NT or LT-S			
Broche	**Signal**	**E/S**	**Description**
1			not connected
2			not connected
3	Receive	E	Receive line
4	Send	S	Transmit line
5	Send	S	Transmit line
6	Receive	E	Receive line
7			not connected
8			not connected

10.2. Appendix B - Jumpers configuration

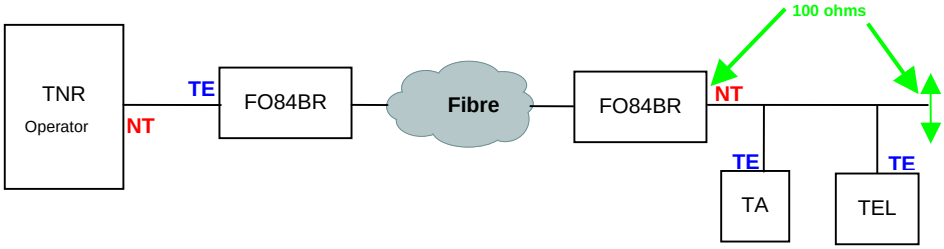
For user security reasons, any intervention on the equipment and more particularly opening the box must only be done by competent staff and the equipment must be imperatively disconnected from the power supply.

10.2.1. DIP SWITCH position on daughter card FO8xBR

FO84BR, FO82BR : DIP-SWITCH on daughter card	
	Position – Signification
DP1-2 DP4-5	➢ Put near connector : Terminal mode (LT-T or TE). ➢ Put far connector : Network mode (LT-S or NT).
DP3 in the middle	➢ Put near connector : validate ended resistor 100 Ohms. ➢ Put far connector : no ended resistor..

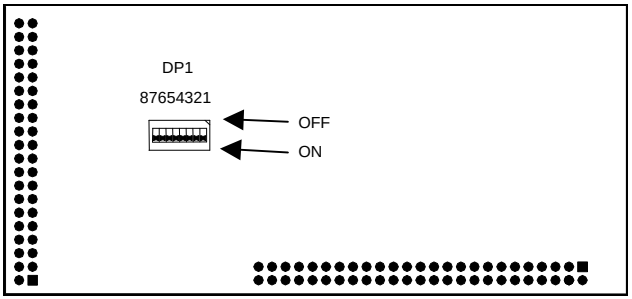


Configuration example :


TNR
Operator
NT
TE
FO84BR
Fibre
FO84BR
NT
100 ohms
TE
TA
TE
TEL

10.2.2. DIP SWITCH position on daughter card FO80E2

FO80E2 : internal DIP-SWITCH sur la carte fille	
Repère	**Position – Signification**
DP1	➢ 1 : OFF input 110 Ohms, ON 75 Ohms ➢ 2, 3, 4 : Not used ➢ 5 : ON To connect reference input to the ground of the card. ➢ 6 : ON To connect reference input to the earth ground. ➢ 7 : ON To connect the input BNC connector to earth ground (with 6 ON). ➢ 8 : ON To connect the output BNC connector to earth ground (with 6 ON).



10.3. Appendix C : Warranty, General Conditions

Material and software are warranted by CXR, transportation prepaid, for a period of one year from the shipping date, under the following conditions:

1. Material and software warranty:

Comes into effect only if the warranty card duly completed has been returned to CXR within one month from the delivery date.

2. Material:

- CXR will repair its equipment during the warranty period at no cost to the customer, provided the products have not be subjected to improper installation, accident, misuse, neglect or unauthorized alterations.

3. Software:

- When applicable, CXR guarantees the supports on which the software is stored, against any manufacturing defect under normal use and against wrong handling by the user and within the limits as defined by the technical services. Included in wrong handling are erasing of one or more files, formatting of one or more diskettes.
  On the other end no guaranty applies to the use and results of applications, which integrate the software. All risks to the application results and performances are the responsibility of the user and not CXR.

4. Documentation:

- The guaranty does not cover the use and content of the documentation. CXR has no responsibility as regards the maintenance, repair or replacement of the product documentation.

5. Technical support:

- CXR provides, free of charge, a telephone technical assistance during normal office hours, during one year from the date of delivery.

6. New product versions:

- CXR reserves the right to sell at any time, improved or modified software issues of its application software. The cost of the updates will be available from CXR.
- All the above is the only warranty given by CXR for its products and excludes any other warranty of any kind expressed or implied including but not limited to the proper character of marketing or particular use.

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- The application software can be used on only one machine at one time. Any modification, translation, de-assembling or publication of document from these products without previous written authorization from CXR is strictly forbidden

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- This license remains valid until cancellation and will be automatically voided without notice by CXR if the customer does not comply with the terms of the license. In case of cancellation, the customer will return immediately to CXR all documentation and products including copies and installations.

Warranty Card CXR SA

SENDER / USER:

Name

Company:

Address:

Material:

- ❒ **FO 8011**
- ❒ **FO 8035**
- ❒ **FO 8028**
- ❒ **FO 80E1**
- ❒ **FO 84E1**
- ❒ **FO 80E2**
- ❒ **FO 82BR**
- ❒ **FO 84BR**
- ❒ **FO 80BT**
- ❒ **FO 80HB**

Serial number :

Date of purchase :
Equipment purchased from :

We would also like to know your comments on the equipment you purchased in order to improve its quality and services..

The equipment was in good condition ?	❒ Yes	❒ No
Did you find the equipment easy to operate ?	❒ Yes	❒ No
Is the manual comprehensible and complete?	❒ Yes	❒ No
Do you have all necessary accessories for the product operation ?	❒ Yes	❒ No

Remarks :

Send to : **CXR SA - Quality assurance**
Rue de l'Ornette - 28410 ABONDANT - France

Or FAX to : **+33 237 628 801**