FO SERIAL
Fibre Optic Modem
User Manual

P/N: 8000 602 945
Revision: 03

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 Networks thanks you for choosing the FO SERIAL 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.
- The type of power supply: 110 / 230 Vac internal, 24-48 Vdc
- 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, SFP (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.

Version	**Interface**
FO SE11-mmcz	X21-V11
FO SE35-mmcz	V35
FO SE28-mmcz	V28 / RS232

The variants mmcz are:

Variant	MM	C	Z
Multimode 820 nm	M8		
Multimode 1300 nm (option)	M3		
Single mode Led 1310 nm	SL		
Single mode Laser 1310 nm	Z3		
Single mode Laser 1550 nm	Z5		
SFP connector	SFP		
Connector SC		C	
Connector ST®		T	
Connector FC (option)		F	
SFP connector			
Internal power supply 90 – 240 Vac			I
Internal 24-48 Vdc converter			C
Rack mount card AMS16			R

ST® is a registered trademark of AT&T

Example: The FO 8011 SLCI is a desktop version with internal 110 / 230 Vac power supply that provides an X21-V11 DTE interface DTE, fibre optic is Singlemode at 1310 nm with SC connector.

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 Anderson Jacobson

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

Product name: FO-SERIAL

The **CE mark** attests the conformity of this equipment to the main requirements of the R&TTE 1999/05/CEE European community (until June 12th 2016), and LVD 2014/35/UE – CEM 2014/30/UE (from June 13th 2016):

- For the user's safety: in compliance with the Directive 2006/95/EC (until April 19th 2016) and Directive 2014/35/UE (from April 20th 2016) as per EN.60950 standard
- For electromagnetic compatibility: in compliance with the Directive 2004/108/EC (until April 19th 2016) and Directive 2014/30/UE (from April 20th 2016) as per EN.55022 and EN.55024 standards.

Optical Fiber: caution on use with LASER or LED: EN 60825-2

Safety Instructions

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

- 24-48 VDC Input of the SERIAL desktop unit
- Control: V24 - RS232 configuration port
- DTE - V11: V11-X21 interface of the FO 8011, FO SE11
- DTE - V28 : V28 interface of the FO8028, FO SE28
- DTE - V35 : V35 interface of the FO8035, FO SE35

Desktop FO SExx 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 SExx 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 modem 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 modem is designed to be connected to a DTE X21/V11 or V35 or V28 equipment.

- X21 and V35 DTE interfaces :
  - from 64 kBps to 2048 kBps by step of 64k
  - and 4096, 6144, 8192 kBps
- X21 DTE interface :
  - 64 kBps with IEEE C37.94 standard transport
- V28 – RS232 interface :
  - asynchronous up to 115200 Bps
  - synchronous up to 128000 Bps

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
- SFP connector for SFP component Duplex, Simplex LC or Simplex SC

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 SERIAL is a fibre optic modem with different DTE interface X21/V11, V35, V28.

1.1. DTE Interface

The FO modem 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.
- *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.

1.2. Conditioning

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

- Internal 24-48 VDC converter: the modem includes a 24-48 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, AMS 8 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 Serial modem 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 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 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 modem 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 modem's components are compatible with 62.5 and 50 micrometers core.

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

In multi-mode fibre at 820 nanometers, 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 is 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 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 FO is defined by the DTE Interface and the Fibre Optic Budget at the different wavelength.

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

On each wavelength, fibre ***attenuation*** per kilometre is defined.

Between the two FO 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 single mode 1310 nm attenuation is 0.3 dBm/km and the FO 8000-SL budget is 23 dB $\text{Distance} = \frac{14 - 0.05 - 2 - 2}{0.3} = 33$ 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

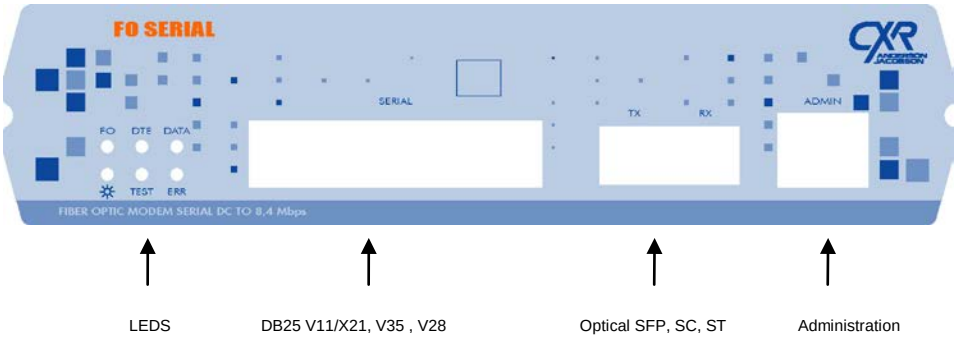
Accessories

- One RJ45-RJ45 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 FO 8011, FO SE11 version (P/N: CA601461).
- One DB25-V35 cable as an option of the V35 interface FO 8035, FO SE35 (P/N: CA601460).
- This user Manual

Connection

- Connect the modem as per the following drawing. Front panel for the FO SERIAL.
- Ensure that the end faces of the optical plugs are clean.
- Connect the fibre optic (type ST, SC, FC), or plug the SFP component: 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,

FO SERIAL with LEDs and connectors on front panel.



(*) 110/230VAC or 24-48 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

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, FO SE11 version (P/N: CA 601 461)
- One DB25-V35 cable as an option of the V35 interface –FO 8035, FO SE35 (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 SERIAL card.

Connection

- Ensure that the end faces of the optical plugs are free of contamination.
- Connect the fibre optic (type ST, SC, FC), SFP module: 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:

- o A DB25 socket for V28-RS232, X21-V11 and V35 interfaces,

Powering

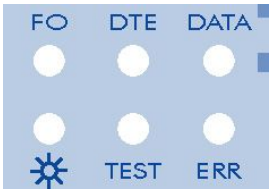
- The modem card connects to the chassis power supply when it is fully inserted. The chassis is powered on and off through the rear panel mains switch.
- Screw the unit front panel on the chassis to avoid any accidental power or connection loss

3. Front Panel, Display

This chapter describes the operation of the 6 LED.

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 FO-Serial.



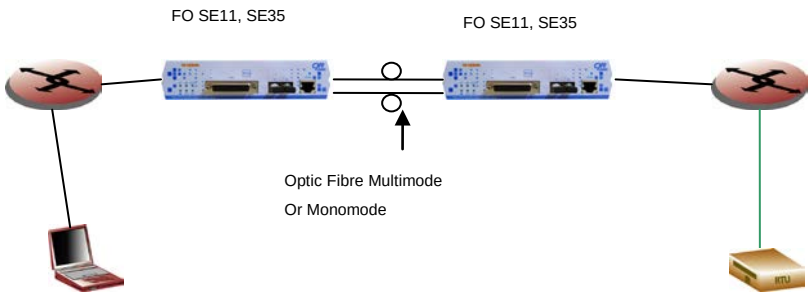
LED	Function
☸ / POWER	ON when the unit is powered BLINKING when the unit is powered and the control and configuration terminal is connected and provides an active DTR-108 signal to the control port
DTE	Shows that the terminal equipment is connected. C Signal for V11 interface, DTR signal for V28 and V35.
SYNC FO	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.
DATA	Blinking when data are sent or received on the DTE interface.
TEST	ON (yellow) when the FO 8000 is in test mode.

4. Typical applications

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

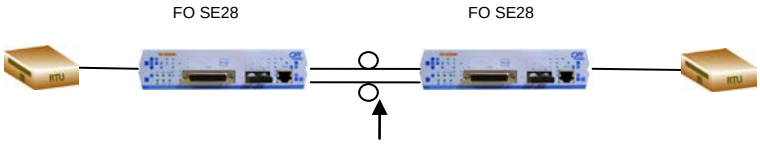
4.1. LAN to LAN connection

Two corporate LAN are connected together throw fibre optic link.



4.2. V28 asynchronous or synchronous interconnection

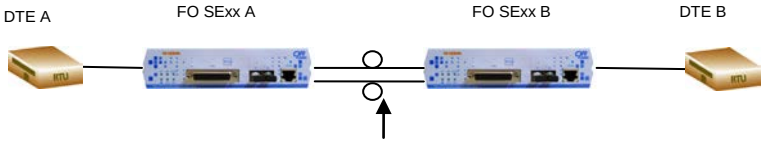
To control remotely a serial unit.



Optical Fibre Multimode
Or Monomode

4.3. Clock Mode

The fibre optical modem FO is used to carry data between two DTE interfaces.
The FO also carries the clock in most cases.



Fibre Optical Multimode
Or Singlemode

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

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

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

Type	DTE A	FO A	FO 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 A, B . FO A and B are in external clock.

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

See Chapter 10.1.4 for signals and explanations.

5. Operation and Configuration

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

The FO Serial 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 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 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

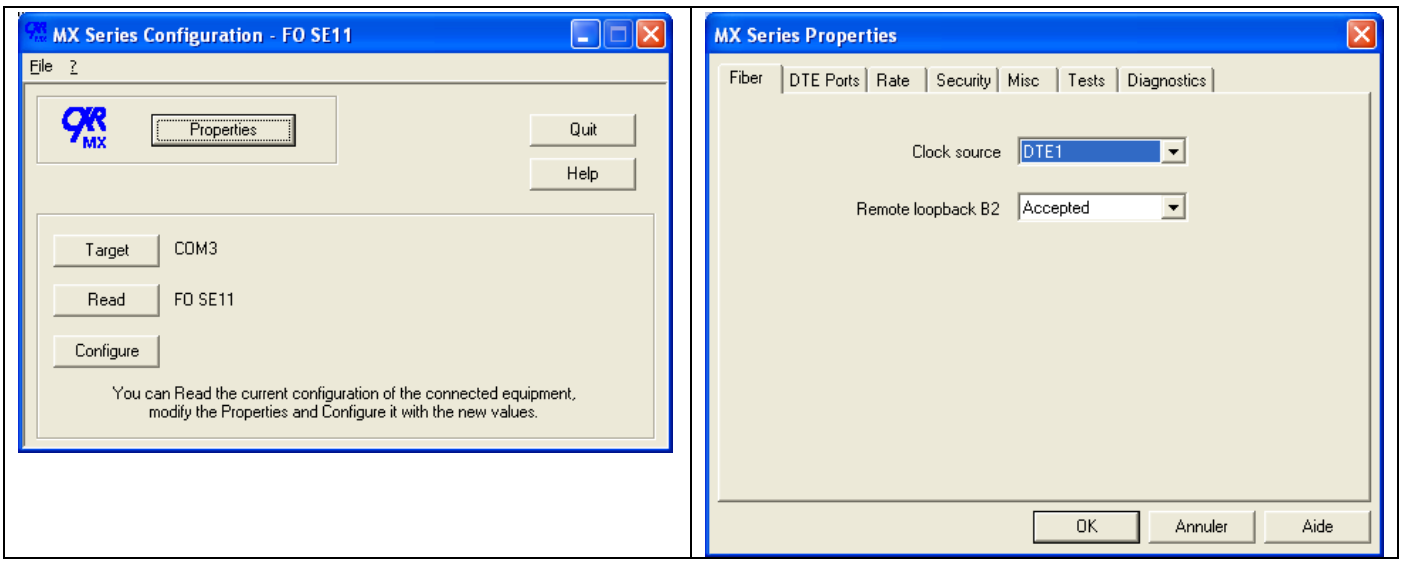
The configuration software Mxcfg allows:

- See the current configuration of FO
- 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 has 4 user definable configurations and one read-only factory configuration.

The configuration process consists in setting up the FO 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 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 SE35
                                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 V1.36 - Dec 19 2006 - 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

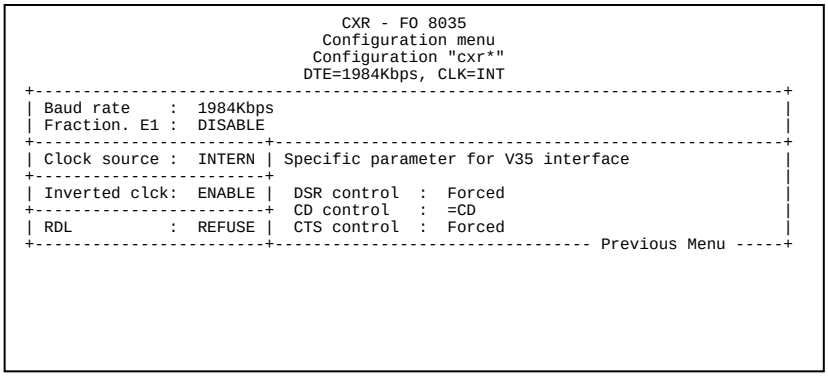
```
                              CXR - FO 8035
                           Configuration menu
                          Configuration "cxr*"
                         DTE=1984Kbps, CLK=INT


       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 FO. 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



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:1.2KBPS; 2.4K; 4.8K; 9.6K; 19.2K; 38.4K; 48K; 56K; 64K; 128KBPS.
- Interface V28 Asynchronous (transparent up to 115,2 kbps).

Fractionnal E1:

- Disable: chose the speed only
- Enable: with a remote framed fibre optic modem like an E1 modem, this parameter allows to choose the Time slot of the remote unit.
- C37.94: with this mode, and only at 64 kbps, the transport in the fibre optic used is the IEEE C37.94 protocol.

Clock source:

- Internal clock: the transmission to the network is synchronized by the internal clock (based on a crystal oscillator in interface X21, V35, V28 synchronous.
- External clock: clock is provided by the DTE and is sent to the remote unit. Apply on X21, V35, synchronous V28.
- Network clock: the transmission to the network is synchronized by the clock recovered from the network receive path. (Default value). In interface X21, V35, V28.

Inverted clock:

- Data are generated on the falling edge of the clock for the X21, V35 and V28 interfaces (default behaviour). 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 serial. 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 FO Serial 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 FO Serial 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).

5.3.3. Menu 2 : Status and statistics

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

5.3.4. Menu 3 : Loop Test

```
                              CXR - FO SE11
                            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
- Local digital loop

See chapter Test in 6.2 for more details.

5.3.5. Menu 4 : Display and passwords

```
                           CXR - FO SE11 - 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

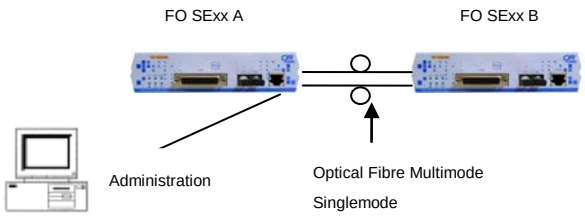
The remote B unit can be control from the main configuration menu of the A unit.

With The **ATO** command, the A modem take the control of the B modem and displays the screen of the remote modem F0 Serial 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 SE11   : Status & Statistics
+-------------------------+-------------------------+-------------------------+
|  Fiber carrier  :  OFF  | Uptime     0 d 03:41:18  |  DTE detected :  OFF    |
+-------------------------+-------------------------+-------------------------+
|  Status(V11)                                                                  |
|                C = OFF             I = ON  (Forced)                           |
+-------------------------------------------------------------------------------+
|  Statistics                                                                   |
| +------------+-------------+-----------+-----------+-----------+-----------+ |
| |Sec. with   | Last 24hrs  | Prev. hour| Cur. hour | Prev. 15m |  Cur. 15m | |
| +------------+-------------+-----------+-----------+-----------+-----------+ |
| |NO FO Carr. |   02:59:59  |   60:00   |   41:19   |   15:00   |   11:19   | |
| |NO Signal C |   02:59:59  |   60:00   |   41:19   |   15:00   |   11:19   | |
| +------------+-------------+-----------+-----------+-----------+-----------+ |
+- Reset errors led ---- Reset statistics ------- Alarms ---- 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 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.

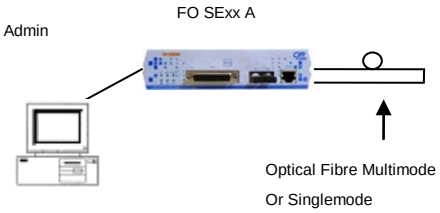
The time without fibre carrier, without the DTE carrier.

6.2. Test

6.2.1. Local Analog Loop

The FO 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:

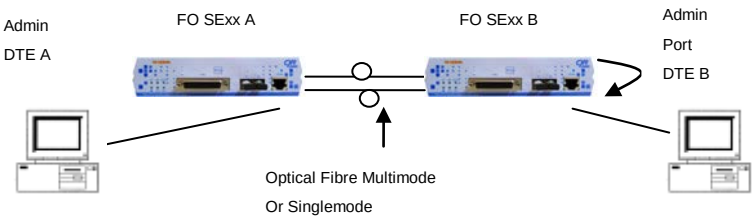


This loop is activated
- In the third menu of the VT100 interface,
- By the AT&T1 command

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

6.2.2. Remote Digital Loop

The remote FO (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 FO 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 includes three different memories:

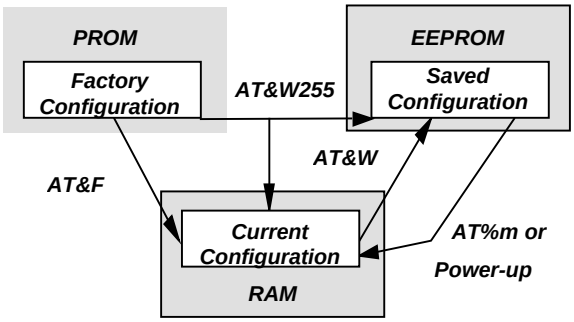
- **The Flash EPROM**, which permanently stores the factory configuration and the firmware
- **The RAM,** where the current configuration is
- **The EEPROM** is a non-volatile memory where the 4 user configurations are saved. The content of this memory is protected even when the unit is switched off.

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 or SFP connector.
  - Proprietary link, or standard IEEE C37.94 for the FOSE11 at 64k with this mode.

- V11/X21 Interface:
  - Rates: 64 to 8192 KBPS
  - Signal I: forced or active when connected
  - Clock: Network, terminal or internal, normal or inversed edge.
  - 64k with the standard IEEE C37.94 mode.

- 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

- V28 Asynchronous Interface:
  - Rates : 0 to 115,2 KBPS
  - signal DSR, CD, CTS : forced or active when connected

- V28 Synchronous Interface:
  - Rates : 1.2KBPS to 128 kBPS. (1.2KBPS; 2.4K; 4.8K; 9.6K; 19.2K; 38.4K; 48K; 56K; 64K; 128KBPS)
  - signal DSR, CD, CTS : forced or active when connected
  - Clock :Network, terminal or internal, normal or inversed edge

8.2. General Characteristics

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

Weight : rack card FO 8000 and FO SERIAL: 0,4 kg
Desktop with internal power supply FO 8000: 0,7 kg
Desktop with external power supply FO 8000: 0,6 kg + power supply: 0,45 kg
Desktop with internal power supply FO SERIAL: 1,25 kg
Desktop with external power supply FO SERIAL: 1,2 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 24-48 Vdc converter - PCx : 150mA. / 24-48 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 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 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 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 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 connector with a bomb of compressed air to suppress any dust on the optic contact. ▪ Any dust can degrade the transmission. ▪ Use two FO modems of the same type with the correct fibre (multi-mode or mono-mode)

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

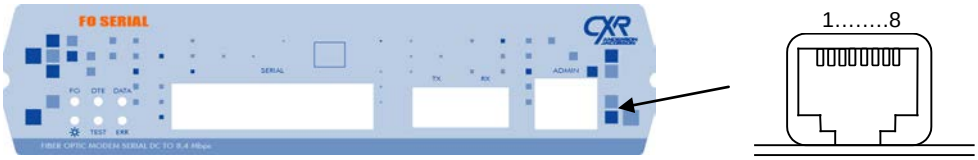
E-mail at: **support@cxr.fr**

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

10. Appendix

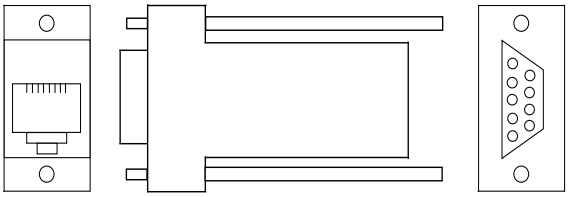
10.1. Appendix A – Wiring

10.1.1. Serial Control Port - RJ45



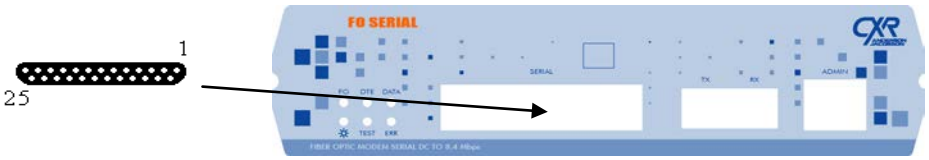
Pin #	Signal	I/O	Description	DB9
1	107 – DSR	OUT	Data set ready - permanent	6
2	109 - CD	OUT	Not used	1
3	108 - DTR	IN	Data terminal ready	4
4	102 - GND	-	Ground	5
5	104 - RXD	OUT	Received data by the terminal	2
6	103 - TXD	IN	Transmitted data by the terminal	3
7	106 - CTS	OUT	DCE ready to transmit	8
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. X21/V11 and V35 Interfaces connector & wiring

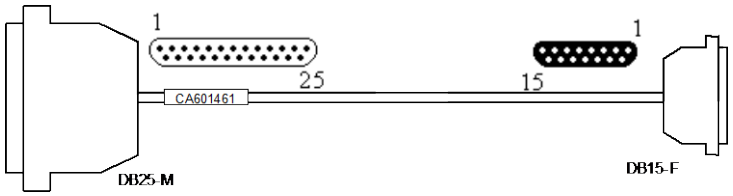
A DB25 female connector is used to connect the terminal equipment to the modem via an adaptation cable. The connector is wired as per the following table:



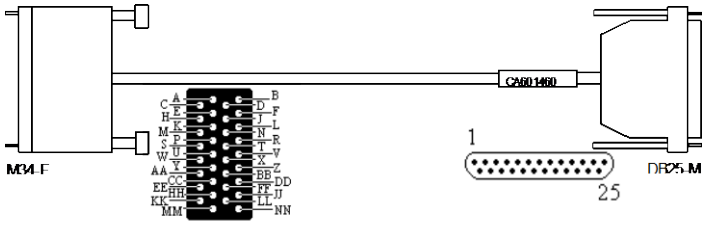
DB25 Pin	V11-X21 Signal	DB15 Pin	V35 Signal	V35 Pin	V28 - RS232 Signal DB25
1	Chassis GND	1	101 – P.GND	A	Chassis GND
2	TA (Transmit)	2	103 A – TXD A	P	TD
3	RA (Receive)	4	104 A – RXD A	R	RD
4	CA (Control)	3	105 – RTS	C	RTS
5			106 – CTS	D	CTS
6			107 – DSR	E	DSR
7	GND	8	102 – S.GND	B	
8	IA (Indication)	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.



10.2. 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 for FO SERIAL

By default, the FO SERIAL is configured in production in FOSE11, FOSE35, FOSE28 mode depending of the client order. But a technician can change the product by moving the jumpers. See configuration jumpers.

Jumper J15 connect ground and shield together.

Jumper J16 is unused.

INTERFACE			
JUMPER	**V28: FO SE28**	**X21-V11: FO SE11**	**V35 : FO SE35**
J1	Position 1-2	Position 2-3	Position 2-3
J2	Position 1-2	Position 2-3	Position 1-2
J3	Position 1-2	Position 2-3	Position 1-2
J4	Position 1-2	Position 2-3	Position 1-2
J5	Position 1-2	Position 2-3	Position 1-2
J6	Position 1-2	Position 2-3	Position 2-3
J7	Position 1-2	Position 2-3	Position 1-2
J8	Position 1-2	Position 2-3	Position 2-3
J9	Position 1-2	Position 2-3	Position 2-3
J10	Position 1-2	Position 2-3	Position 2-3
J11	Position 1-2	Position 2-3	Position 1-2
J12	Position 1-2	Position 2-3	Position 2-3
J13	Position 1-2	Position 2-3	Position 1-2
J14	Position 1-2	Position 2-3	Position 2-3
J18	Close	Close	Close
J19	Close	Close	Close
J20	Close	Close	Open
J21	Close	Open	Close

10.3. Appendix C : Warranty, General Conditions

Material and software are warranted by CXR, transportation prepaid, for a period of **two years** 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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