

OS4016\_U.DOC  
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 Issue 1.0

**PRODUCT – OS4016**  
**16 Channel E1 Fibre Optic MUX.**  
**USER MANUAL**  
**VERSION 1.0**  
**31 October 2001**

<b>Product: OS4016 \</b>		<b>Model:</b>	
<b>Serial Number:</b>		<b>JOB No :</b>	
<b>TEST</b>	<b>CRITERIA</b>	<b>RESULT</b>	
Power Supply	+10.5V, -10.5V		
Free Running Rate	34,368MHz ±100Hz		
PLL Voltage	Vdc @34,368MHz		
Jitter Acceptance	5UI @ 100Hz		
Frequency Tolerance	50 PPM		
All Indicators	Functional		
All Alarms	Functional		
B.E.R	No Errors in 8 Mins		
Optic TX Level	- dB		
Optic RX Level	- dB		
Power Budget	dB		

**Date:** ..... **Tested By:** .....

**USER MANUAL****1 PRODUCT DESCRIPTION 3**

- 1.1 GENERAL 3
- 1.2 BASIC SYSTEM DESCRIPTION 3

**2 FUNCTIONAL DESCRIPTION. 3**

- 2.1 RACK – 3U 19”RACK AND BACKPLANE 3
- 2.2 PSU – POWER SUPPLY. 3
  - 2.2.1 *Indications* 4
- 2.3 4xE1 MUX – 4 CHANNEL E1 TO E2 MUX. 4
  - 2.3.1 *Indications* 4
- 2.4 HSMUX – 4 CHANNEL E2 TO E3 MUX. 4
  - 2.4.1 *Dip Switch* 4
  - 2.4.2 *Indications* 4
- 2.5 OPTIC – OPTIC INTERFACE. 4
  - 2.5.1 *Indications* 5
- 2.6 MANAGEMENT – SYSTEM MANAGEMENT. 5

**3 PREPARATION FOR USE 5**

- 3.1 UNPACKING 5
- 3.2 CONFIGURATION OF THE LINKS 5
- 3.3 CONNECTING TO COPPER CABLES 5
- 3.4 FIBRE CONNECTION 5
- 3.5 INSTALLATION 6

**4 OPERATOR’S INSTRUCTION 6****5 MAINTENANCE INSTRUCTIONS 6**

- 5.1 FIRST LINE MAINTENANCE 6
  - 5.1.1 *Instrument and tools required* 6
  - 5.1.2 *Maintenance Procedure* 6

**6 SYSTEM CONFIGURATION 6**

- 6.1 PRODUCT STOCK CODE 6
- 6.2 SPARE PARTS 7
- 6.3 AVAILABLE OPTIONS 7

**7 SPECIFICATIONS 8**

- 7.1 ELECTRICAL CHARACTERISTICS 8
- 7.2 PHYSICAL CHARACTERISTICS 8
- 7.3 OPTICAL CHARACTERISTICS 8

**8 NOTES 8****9 CONTACT DETAILS 9**

# 1 PRODUCT DESCRIPTION

## 1.1 General

The OS4016 is a 16 Channel E1 Fibre optic multiplexer.  
The unit conforms to the ITU multiplexing format.

The unit is housed in a 3U '19" Rack'.

## 1.2 Basic System Description

The purpose of the Os4016 is for multiplexing of 16 tributary channels into a single high speed data stream that is encoded and transmitted over a high speed fibre optic link. Also for demultiplexing of the decoded data received from the high speed fibre optic link back to 16 tributary channels. Meets or exceeds industry specifications including ITU G703.

The unit conforms to both (ITU) G.742 and G.751 multiplexing format defined by the ITU. (Formerly known as CCITT)

The unit is of modular design and can be configured with different optic and PSU modules. The line interface units house 4 channels pre card. These cards are fully interchangeable and can be replaced separately providing ease of maintenance.

The unit is subdivided into six modules:

1. Rack – 3U 19" Rack Mechanics and Backplane.
2. PSU – Power Supply.
3. 4xE1 MUX – 4 Channel E1 to E2 Mux.
4. HSMUX – 4 Channel E2 to E3 Mux.
5. OPTIC – Optic Interface
6. MANAGEMENT – System Management.

### Features

- Crystal-less Jitter Attenuation.
- 75Ω and 120Ω I/O (selectable)
- High Transmit and Receive return loss.
- Simple Network Management available.

## 2 Functional Description.

### 2.1 Rack – 3U 19" Rack and Backplane

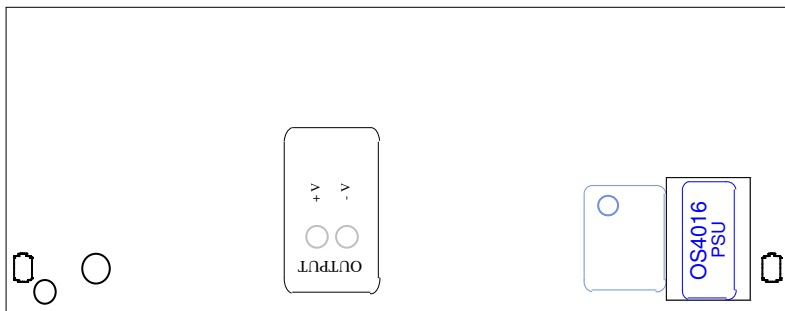
All the modules of the system are designed to fit into a 19" Rack.  
The modules slide into the rack and plug into a Backplane.

The Backplane interconnects all the modules and houses the E1- 75Ω and 120Ω connectors.  
These connectors are configurable by selection link.

If the link is present the channel is configured for 75Ω unbalanced and if the link is out the channel is configured for 120Ω balanced.

### 2.2 PSU – Power Supply.

The Power Supply for the system slides into the rack and connect on a 20pin edge connector on the Backplane.  
This power supply delivers power to all the modules in the system.

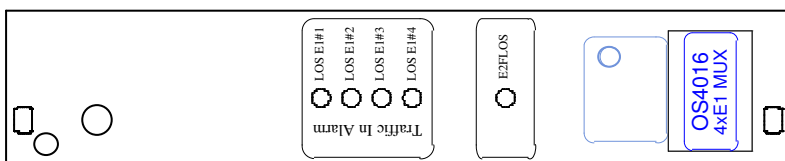


**2.2.1 Indications**

- +V Indicates that the Positive Output of the power supply is present.
- V Indicates that the Negative Output of the power supply is present.

**2.3 4xE1 MUX – 4 Channel E1 to E2 Mux.**

These modules house 4 E1 Line Interface units and an E1 to E2 MUX. The E2 signal generates to the HSMUX via the Backplane.

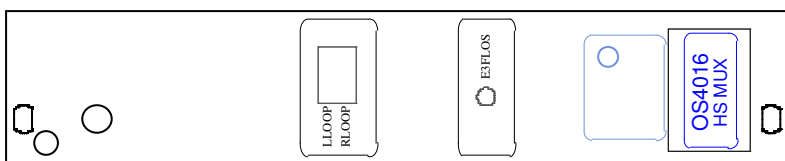


**2.3.1 Indications**

- LOSS E1 #1 – Indicates that incoming E1 signal number 1 not present.
- LOSS E1 #2 – Indicates that incoming E1 signal number 2 not present.
- LOSS E1 #3 – Indicates that incoming E1 signal number 3 not present.
- LOSS E1 #4 – Indicates that incoming E1 signal number 4 not present.
- E2FLOS – Indicates that there is a frame loss on the incoming E2 signal.

**2.4 HSMUX – 4 Channel E2 to E3 Mux.**

This module combines four E2 signals them into an E3 signal. This signal goes to the Backplane to be transmitted.



**2.4.1 Dip Switch**

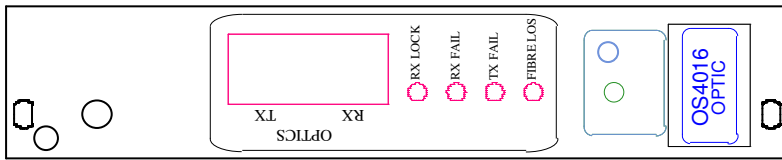
1. L Loop will the lock tributaries back to the source.
2. R Loop will loop the remote tributary back to the local inputs. This function is only functional if a signal is present at the remote tributary input. If no signal is present the remote unit will send AIS.

**2.4.2 Indications**

- E3FLOS – Indicates that there is a frame loss on the incoming E3 signal.

**2.5 OPTIC – Optic Interface.**

This module takes the E3 signal from the Backplane, encodes it and sends it to the remote system on fibre. The remote system intern sends a signal on fibre to the local unit. That signal is now received, decoded to an E3 signal and then fed back into the system.

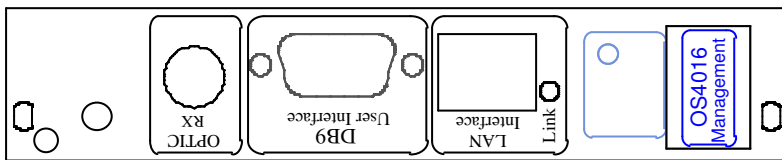


**2.5.1 Indications**

- RX LOCK – Receiver is locked onto the received signal.
- RX FAIL – No Signal is received.
- TX FAIL – Data transmission failed.
- FIBRE LOS – Fibre signal lost.

**2.6 MANAGEMENT – System Management.**

The management unit receives all the error messages from the various modules. These messages are then processed and sent out on a management interface witch is comprised of a normal DB9 RS232 Interface and an Ethernet LAN module.  
The System can be configured by using the DB9 connector or the LAN connected to the system.



**3 PREPARATION FOR USE**

**3.1 Unpacking**

Each OS4016 is shipped factory tested, and packed in a protective packaging. Inspect the packaging for any visual damage.  
The manufacturer is not liable for damage during shipment.

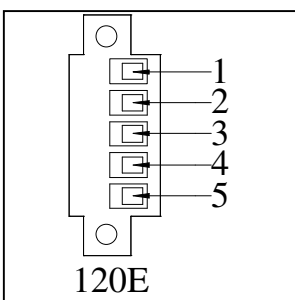
**3.2 Configuration of the Links**

The links are provided to configure the unit for the type of connector the user requires. The factory setting is 120 Ohm balanced.  
To configure a specific connector for 75 Ohm unbalanced the corresponding termination on the 4 x E1 Mux must be inserted and the ground link on the back plain inserted.

**3.3 Connecting to Copper Cables**

When connecting cables make sure of the configuration of the links.  
If the links for a specific channel is configured for 75E, connect the BNC connector.

If the links for a specific channel is configured for 120E connect the wires as described in the following description using the drawing as a reference:



- Input** - Connect the positive wire to no.1 of the connector and the negative wire to no.2 of the same connector.
- Screen** – connect the screen wire to no.3 of the 120E connector.
- Output** – Connect the positive wire to no.4 of the connector and the negative wire to no.5 of the same connector.

**3.4 Fibre Connection**

Carefully remove the optic connector covers and connect the fibre cables to the “TX” and “RX” connections as illustrated on the unit.  
Be careful not to bend the fibre in a small radius.

### 3.5 Installation

Ensure that the link loss over the fibre cable is within the power budget of the equipment. Confirm budget with test certificate on the front page of the manual. Allow at least 4 dB safe margin in power budget calculation.

## 4 OPERATOR'S INSTRUCTION

The unit needs no operator intervention to function.

If a fault arises, it is necessary to observe the alarm indications and to perform such procedures as first line maintenance as described in the proceeding chapter.

## 5 MAINTENANCE INSTRUCTIONS

No routine maintenance is required on this equipment.

### 5.1 First Line Maintenance

#### 5.1.1 Instrument and tools required

Optic power meter  
Multi-meter.

#### 5.1.2 Maintenance Procedure

When arriving at a suspect unit it is always necessary to ensure that the unit has been correctly coupled and to note the alarm conditions of the equipment.

First observe the power indicator.

If the power indicator is off, check the supply voltage.

Then check the mains fuse at the back of the unit underneath the mains plug. Replace a faulty fuse with those of the correct value only.

Check the alarm indicators.

If one or more of the "LOSS E1 " indicators are lid, that corresponding E1 input channel on the 4xE1 MUX is not connected or the data is not present.

If the "Optic RX Fail" indicators are lid the high-speed optic fibre receiver is receiving no data. Disconnect the fibre from the optic receiver connector and connect it to the optic power meter. If the input level is low the external equipment is not working or the fibre has been damaged.

If the "Frame Loss" indicator are lid the demultiplexer is not detecting a frame word from the data coming from the high-speed fibre optic receiver. This might be because of no or bad signal reception from the external equipment.

If all these tests have been done and the unit is still not operational the supplier must be notified. The unit must be returned to the supplier for repair.

Modules are interchangeable but care must be taken to power down before cards are swapped.

## 6 SYSTEM CONFIGURATION

### 6.1 Product Stock Code

OS4016 X X X/ X

Version  
Power supply  
Optic connector  
Optic option

## 6.2 Spare Parts

OX4016 [X X X]

\_\_\_\_\_ Spare Part

Spare Part	Description
A	Power Supply
B	4 Channel Line Card
C	Hi Speed Multiplex Card
D	Optic Interface
E	Management Interface

## 6.3 Available Options

Optic Option/ Connector	Wavelength/ Fibre Mode	Range	Budget distance	Connector
AB	850nm multimode	Short	2km	ST
BB	1300nm Multimode	Medium	7km	ST
CD	1300nm Singlemode	Long	20km	SC

## 7 SPECIFICATIONS

### 7.1 Electrical Characteristics

#### Power Supply

Power Connector -	3 Pin Mains Plug
Supply Voltage -	220VAC
Supply Current -	150 mA
Power Dissipation -	30 Watt (max)

### 7.2 Hi Speed Data Specifications

E2 Frame Format -	ITU G742 multiplexing format
E3 Frame Format -	ITU G751 multiplexing format
E3 Encoding Format -	CMI Encoded

### 7.3 Optical Characteristics

Connector -	ST or SMA
Transmission	
Wavelength -	850nm or 1300nm
Reception Wavelength -	850nm or 1300nm
Responsivity -	7 mV/μW Typical or 13mV/μW
Fibre Compatibility -	Multimode: 50/125 μm diameter Singlemode: 9/125 μm diameter
Minimum Receive Level -	-30dB
Transmission Level-	850nm multimode Short range -19dB 1300nm multimode Med Range -21dB 1300nm singlemode Long Range -14dB

### 7.4 Channel Line Characteristics

HDB3 Input/Output-Impedance -	Complies with CCITT ITU G703 standards. 75Ω Nominal Unbalanced 120Ω Nominal balanced
HDB3 Data Speed -	2048Kbits/Sec
Frequency Variation -	>100 ppm.
Jitter Tolerance -	>ITU recommendation G823 table 2/G823. >1.5 Unit Intervals for freq. 20 to 2400 Hz. >0.2 Unit Intervals for freq. 18kHz to 500kHz.
Jitter Transfer -	>ITU recommendation G742. >+0.5 dB for frequencies below 40Hz. >-20dB for frequencies above 400Hz.
Number of Channel -	16 in both directions.
Channel Frequency - Separation	Each Channel will sync. To it's own receive frequency within the limit of 50ppm.

### 7.2 Physical Characteristics

Overall Unit Dimensions -	Depth - 280 mm Width - 480 mm Height - 133 mm
Weight -	5 kg (max)

## 8 NOTES

Other Optic Options for single mode fibre available on request.

## **9 Contact Details**