



VCL-E1 (G.703) Fiber Optic Modem

User Manual

Warranty

This Orion product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Orion will, at its discretion, either repair or replace products, which prove to be defective. For warranty service or repair, this product must be returned to a service facility designated by Orion. The buyer shall prepay shipping charges to Orion and the company shall pay shipping charges to return the product to the buyer. However, the buyer shall pay all the shipping charges, duties and taxes for products returned to Orion from another country.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, the buyer-supplied firmware or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product or improper site preparation or maintenance.

Exclusive Remedies

The remedies provided herein are the buyer's sole and exclusive remedies. Orion shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract or any legal theory.

Notice

This manual contains information that is proprietary to Orion Telecom Networks Inc. No part of this publication may be reproduced in any form whatsoever without prior written approval by Orion Telecom Networks Inc.

Safety Warnings



The exclamation point within a triangle is intended to warn the operator or service personnel of operation and maintenance factors relating to the product and its operating environment, which could pose a safety hazard.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this instrument. No adjustment, maintenance or repairs should be performed by either the operator or the user.



QUALITY ASSURANCE PROGRAM

Orion's products are designed and manufactured under a strict Quality Assurance Program based on the ISO 9000:2008 philosophy and principles. Orion pays very special attention to its vendor development program which ensures an "end-product" of the highest quality at the most cost effective prices.

INDEX

Particulars	P. No.
Product Overview	4
Application Diagram	4
Technical Specifications	5
Electrical Interface (E1 Tributary)	5
Optical Interface Specifications - 850nm Multi Mode	5
Transmitter Optical Characteristics	5
Receiver Optical Characteristics	5
Optical Interface Specifications - 1310nm Single Mode	6
Transmitter Optical Characteristics	6
Receiver Optical Characteristics	6
Optical Interface Specifications - 1510nm Single Mode	6
Transmitter Optical Characteristics	6
Receiver Optical Characteristics	6
Front View	7
LED Indications	7
Pushbutton and Switch Indications	8
Rear View	9
AC Power Supply	9
-48V DC Power Supply	9
Optical Connection	10
E1 Connection	11
Bottom View	12
Time-slots selection for E1/FE1	12
Synchronization Clock Settings	14
E1/FE1 Impedance Selection	15
Ordering Information	16



Product Overview


The VCL-E1 (G.703) Fiber Optic Modem provides the user the capability to establish communication between two E1 / FE1 Interfaces over an optical fiber link.

It establishes a secure, long range data fiber link between routers, multiplexers and other E1 devices.

The primary application for the VCL-E1 (G.703) Fiber Optic Modem is to establish point-to-point fiber link at ranges longer than any copper modem can achieve. The clock options are Internal / External / Slave Clock - three clock mode option.



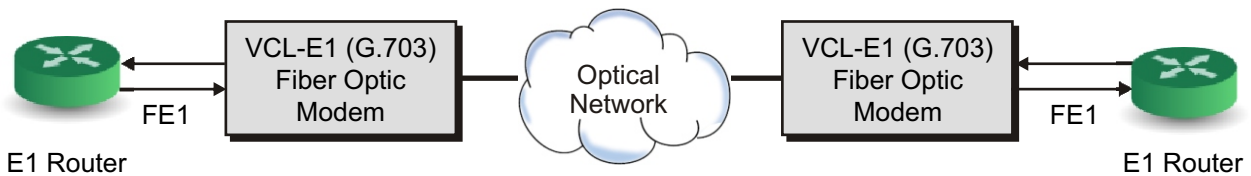
**VCL-E1 (G.703)
Fiber Optic Modem**



Safety Warnings !!!!

For Testing : Always Install Optical Attenuators.
For Distance of less than 10 Kms **Optical Attenuators** must be installed on the Optical Links. Otherwise, the Optics will be **Permanently Damaged.**

Application Diagram



Technical Specifications

Electrical Interface (E1 Tributary)

Number	1
Nominal bit rate	2048 Kbps
Bit rate tolerance	50 ppm
Termination Impedance	120 Ohms balanced / 75 Ohms un-balanced
Line code	HDB3
Frame structure	As per G.704
Electrical interface	As per G.703
Return loss at input port:	
51.2 KHz to 102.4 KHz	> 12 dB
102.4 KHz to 2048 KHz	> 18dB
2048 KHz to 3072 KHz	> 14 dB
Maximum Output Jitter	0.05UI
Maximum Input Jitter	
20Hz to 93 Hz	1.5UI
700Hz to 100KHz	0.2UI
E1 Connectors	RJ-45 / BNC
Permissible Attenuation	6 dB (max) @ 1024KHz

Optical Interface Specifications - 850nm Multi Mode

Transmitter Optical Characteristics

Parameter	Minimum	Typical	Maximum
Optical Data Rate		125Mb/s	
Center Wavelength	830nm	850nm	860nm
Output Spectral Width (RMS)			0.85nm
Average Output power	-10dBm		-3dBm
Output Optical Eye	Complaint with ITU-T G.957		
Connectors	FC		

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum
Optical Data Rate		125Mb/s	
Receive Sensitivity	-24dBm		
Maximum Input Power			-3dBm
Operating Wavelength	-10dBm	850nm	
Connectors	FC		

Optical Interface Specifications - 1310nm Single Mode**Transmitter Optical Characteristics**

Parameter	Minimum	Typical	Maximum
Optical Data Rate		125Mb/s	
Center Wavelength	1260nm	1310nm	1360nm
Output Spectral Width (RMS)			6nm
Average Output power	-15dBm	-12dBm	-8dBm
Output Optical Eye	Complaint with ITU-T G.957		
Connectors	FC		

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum
Optical Data Rate		125Mb/s	
Receive Sensitivity	-32dBm		
Maximum Input Power			-15dBm
Operating Wavelength	1100nm		1600nm
Connectors	FC		

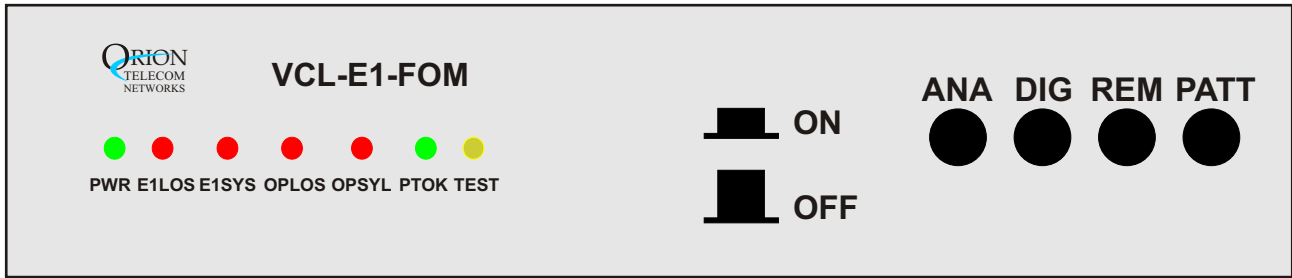
Optical Interface Specifications - 1510nm Single Mode**Transmitter Optical Characteristics**

Parameter	Minimum	Typical	Maximum
Optical Data Rate		125Mb/s	
Center Wavelength	1480nm	1550nm	1580nm
Output Spectral Width (RMS)			4nm
Average Output Power	-15dBm	-12dBm	-8dBm
Output Optical Eye	Complaint with ITU-T G.957		
Connectors	FC		

Receiver Optical Characteristics

Parameter	Minimum	Typical	Maximum
Optical Data Rate		125Mb/s	
Receive Sensitivity	-32dBm		
Maximum Input Power			-15dBm
Operating Wavelength	1100nm		1600nm
Connectors	FC		

Front View



LED Indications

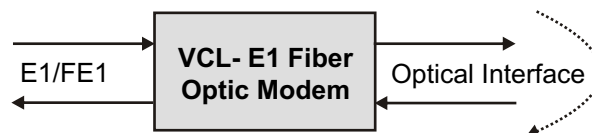
S. No.	LEDs	Color	Description
1	PWR	Green	ON indicates that input power supply is OK.
2	E1LOS	Red	ON indicates loss of E1 Signal at local site. Flashing indicates loss of E1 signal at remote site.
3	E1SYL	Red	ON indicates loss of E1 Frame at local site. Flashing indicates loss of E1 Frame at remote site.
4	OPLOS	Red	Optical link break alarm Solid RED indicates there is local alarm and flashing indicates there is an alarm at the remote end.
5	OPSYL	Red	No frame synchronization code is detected in the input signal of optical interface. Solid RED indicates an alarm of local end and flashing to indicate there is an alarm at the remote end.
6	PTOK	Green	Pseudo code normally detected.
7	TEST	Yellow	Local device or remote device in test mode.

Pushbutton and Switch Indications

Four push-button switches are available on the front panel. The switches are in “ON” mode when pressed and in OFF mode when released. They are respectively from left to right.

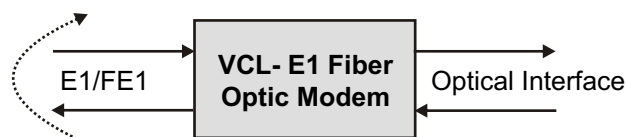
ANA: This switch initiates a internal loopback on the optical interface so that the E1/FE1 data being received from Tx Pins of E1/FE1 interface by the system is transmitted back to Rx Pins of the of the same E1/FE1 Interface.

This test may be used to verify the integrity of the E1/FE1 Data Interface connections.

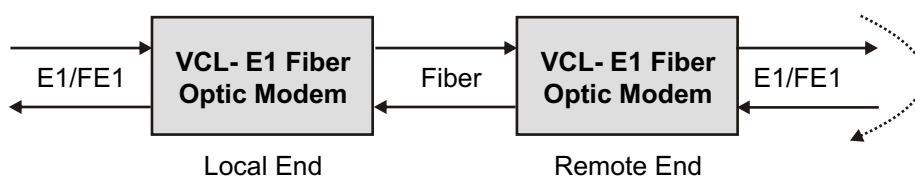


DIG: This switch initiates a internal loopback on the E1/FE1 Interface so that the data being received from the Tx Pins of optical fiber is sent back on the Rx Pins of optical fiber through the E1/FE1 Interface.

This test may be used to verify the integrity of the optical link.



REM: This switch initiates a loopback at the remote side. It may be used to verify the complete data link integrity between the local and the remote E1/FE1 Interface.



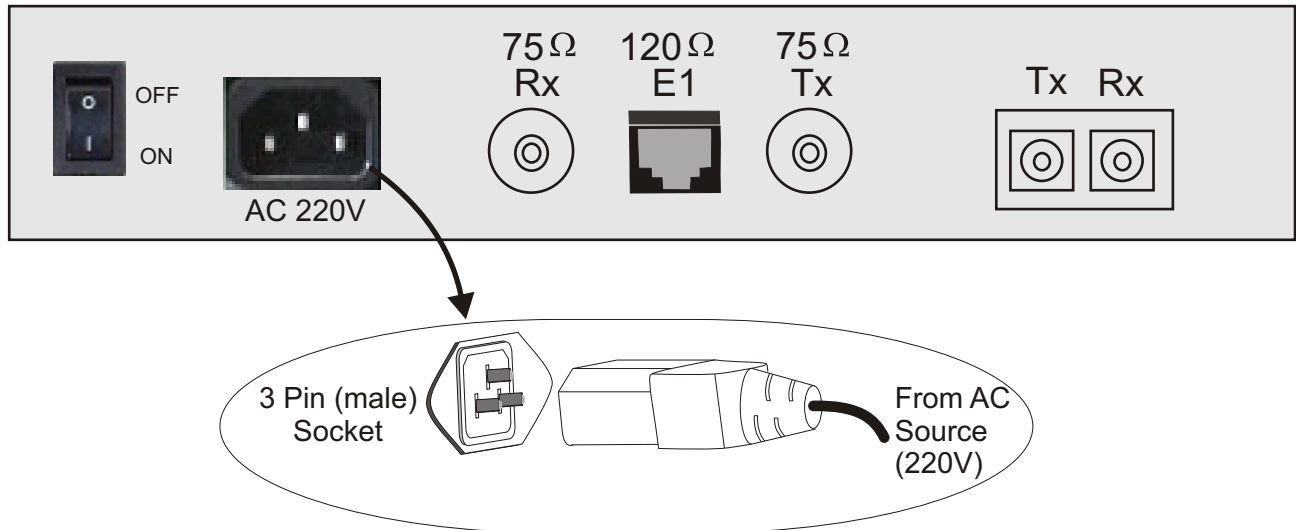
PATT: This switch initiates a data link integrity test by generating a pseudo-random pattern.

Important:

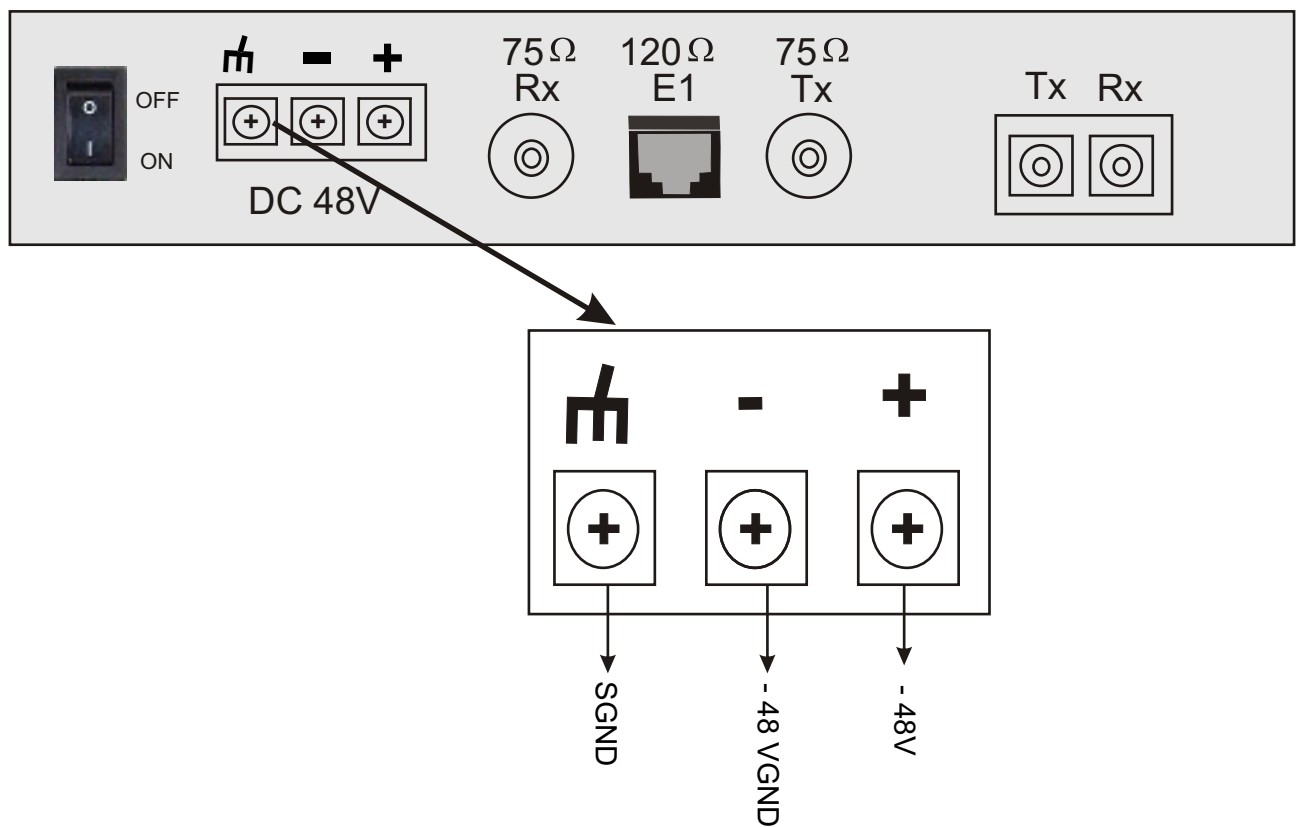
1. All switches must be in OFF condition during normal operations. Whenever a test switch is used to initiate a test, the normal communications shall be disrupted.
2. When PATT switch is used to do a data link integrity test please ensure that the far end in a loopback mode to complete the test circuit.

Rear View

AC Power Supply

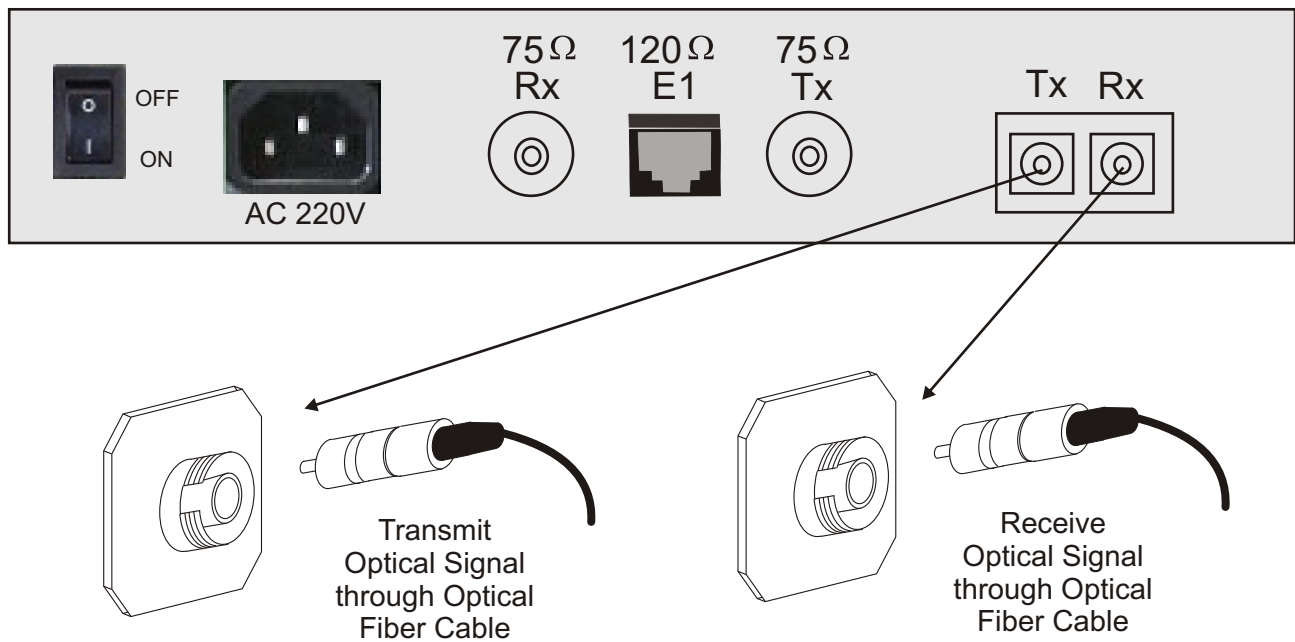


-48V DC Power Supply



Note: Please connect -48V DC supply to the system as shown in above figure.

Optical Connection

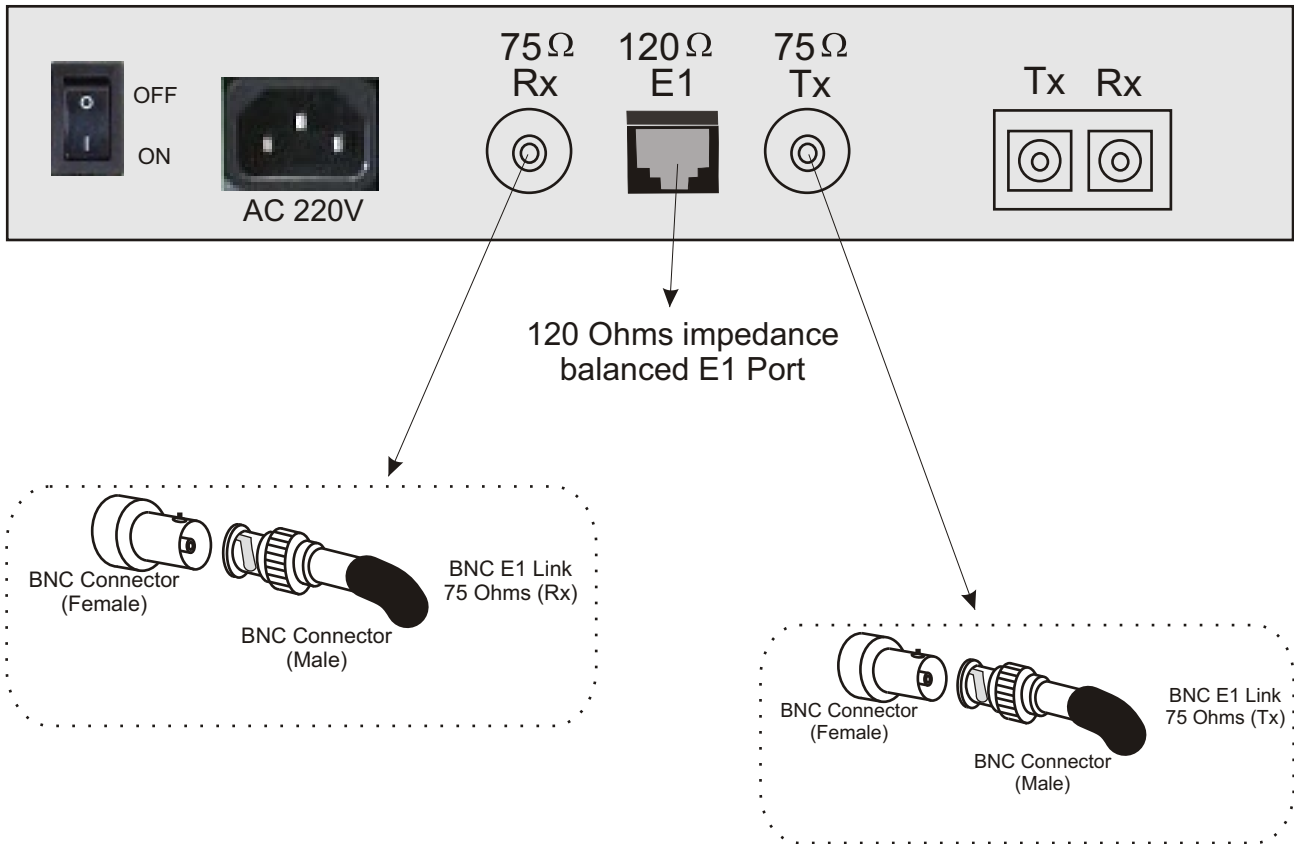


Note: Do not expose to the naked eye. Connect fiber cable to system when power is OFF.

Safety Warnings !!!!

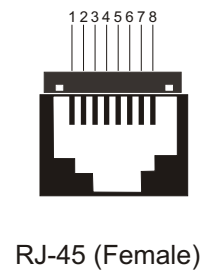
For Testing : Always Install Optical Attenuators. For Distance of less than 10 Kms **Optical Attenuators** must be installed on the Optical Links. Otherwise, the Optics will be **Permanently Damaged.**

E1 Connection



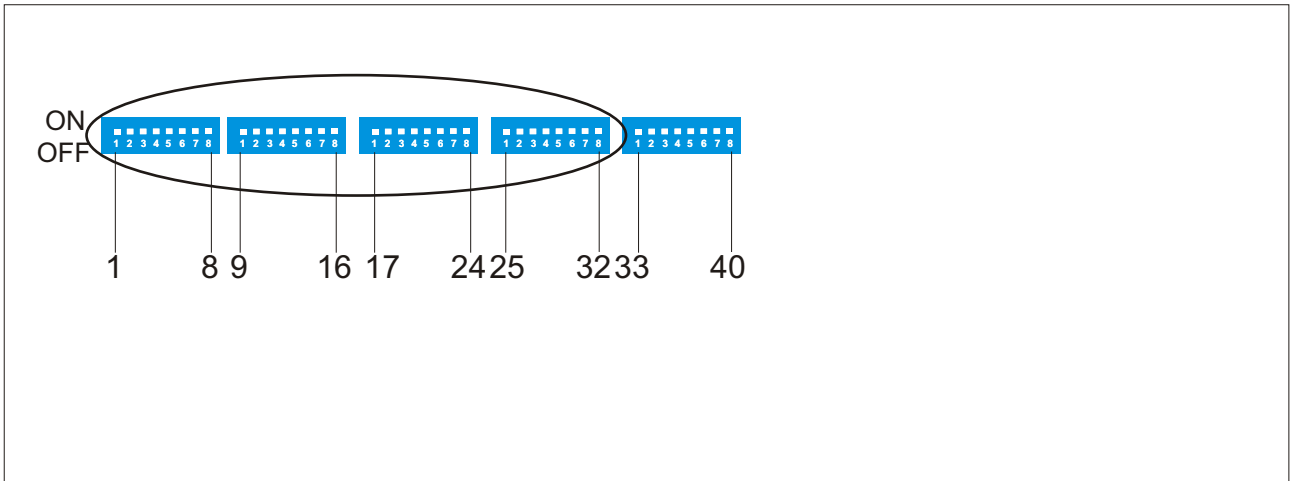
Pinouts of RJ-45 for E1 Interface

RJ-45 (Female) Pin #	Signal in RJ-45 (Female)
6	Rx Tip (Data In)
7	Rx Ring (Data In)
2	Tx Tip (Data Out)
3	Tx Ring (Data Out)



Bottom View

Time-slots selection for E1/FE1



There are total 40 DIP switches given the bottom of the equipment which shall allow the user to set the bandwidth, framing etc. The switch selection/switch numbering is from left to right with switch “1” being the 1st switch on the left.

There are three working modes of the E1 are:

- a) Framed (CCS/PCM31)
- b) Multi-framed (CAS/PCM30)
- c) Un-framed E1(transparent E1)

Working Mode	Switch Setting
Un-framed	All switches OFF
Framed (CCS)	Switch “1” OFF
Multi-framed (CAS)	Switch “1” ON

For “n”x64 bandwidth / time-slots selection, please use the switch settings / selection given in the following table.

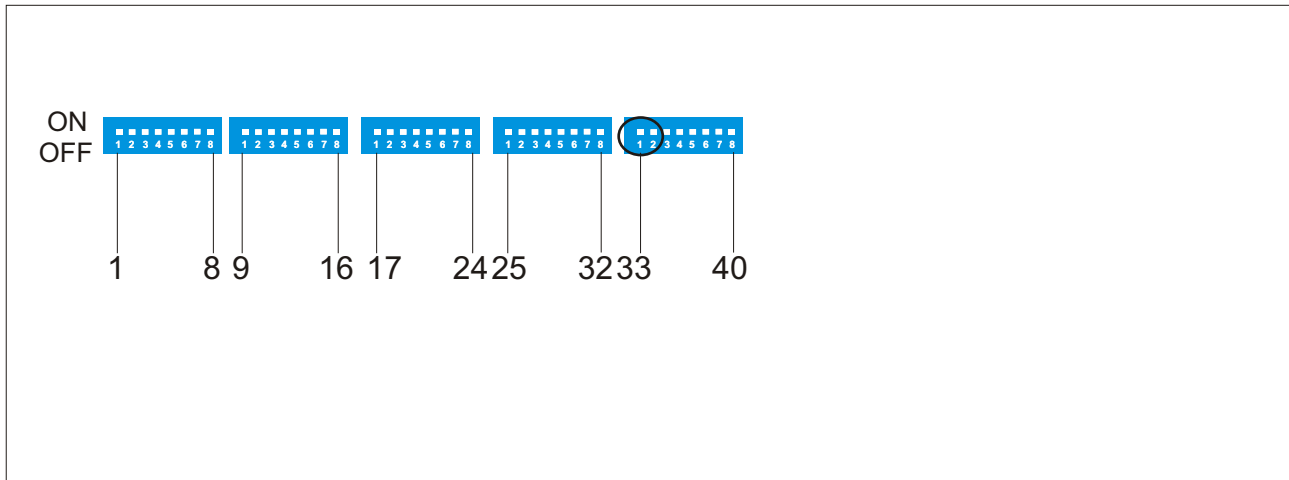
Bandwidth configuration/time-slots selection

Time-slots	Bandwidth	ON	OFF
1	64K	2	3 to 32
2	128K	2 to 3	4 to 32
3	192K	2 to 4	5 to 32
4	256K	2 to 5	6 to 32
5	320K	2 to 6	7 to 32
6	384K	2 to 7	8 to 32
7	448K	2 to 8	9 to 32
8	512K	2 to 9	10 to 32
9	576K	2 to 10	11 to 32
10	640K	2 to 11	12 to 32
11	704K	2 to 12	13 to 32
12	768K	2 to 13	14 to 32
13	832K	2 to 14	15 to 32
14	896K	2 to 15	16 to 32
15	960K	2 to 16	17 to 32
16	1024K	2 to 17	18 to 32
17	1088K	2 to 18	19 to 32
18	1152K	2 to 19	20 to 32
19	1216K	2 to 20	21 to 32
20	1280K	2 to 21	22 to 32
21	1344K	2 to 22	23 to 32
22	1404K	2 to 23	24 to 32
23	1472K	2 to 24	25 to 32
24	1536K	2 to 25	26 to 32
25	1600K	2 to 26	27 to 32
26	1664K	2 to 27	28 to 32
27	1728K	2 to 28	29 to 32
28	1792K	2 to 29	30 to 32
29	1856K	2 to 30	31 to 32
30	1920k	2 to 31	32
31	1984K	2 to 32	
32	2048K		ALL OFF

Note: Please note that switches (2 to 32) shall be set to ON position if selected to carry data, and to OFF position if left unused.

Please note that the time-slots selected to carry data must always be consecutive time-Slots.

Synchronization Clock Settings

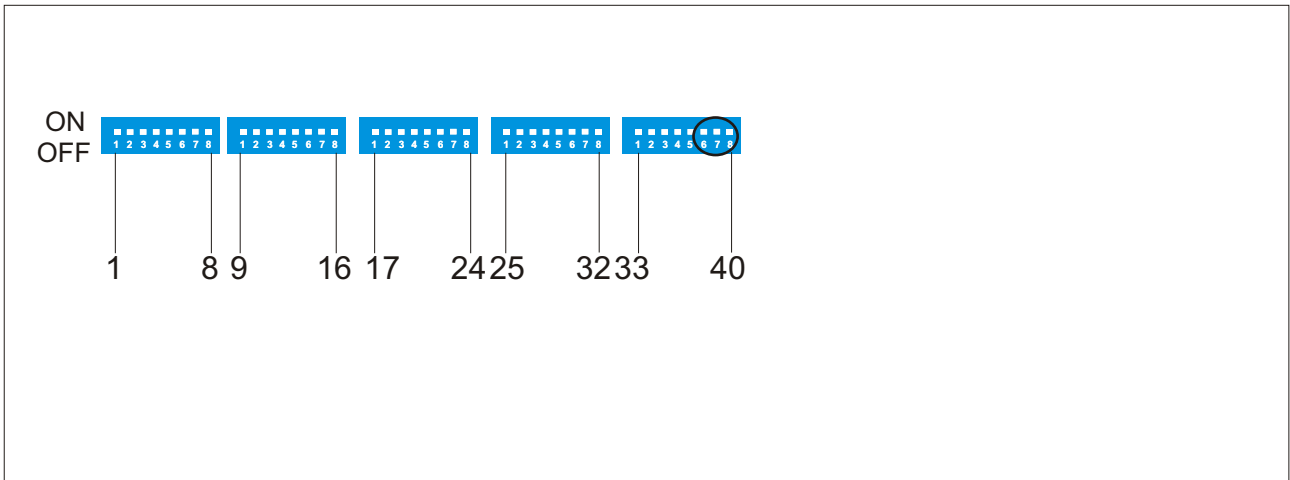


Switches number 33-34 will be used for selection of synchronization clock.

Switch No. 33	Switch No. 34	Synchronization Clock Settings
ON	OFF	System will work on its internal clock.
OFF	OFF	System will work on the loop-timed (extracted) clock from the equipment which is connected on E1/FE1 interface side.
ON	ON	System will work on the loop-timed (extracted) clock from the equipment which is connected on optical side.

Switches number 35-36 will be unused and always set on OFF condition.

E1/FE1 Impedance Selection



Switches number 37-40 will be used for impedance selection of E1/FE1 Port.

Switch No. 37	Switch No. 38	Switch No. 39	Switch No. 40	Impedance Selection of E1/FE1 Port
ON	ON	ON	ON	75 Ohms un-balanced.
OFF	OFF	OFF	OFF	12 Ohms balanced.

Ordering Information

Sr. No.	Product Description	Part No.
1	VCL-E1 (G.703) Fiber Optic Modem - 850 nm wavelength with AC power supply	VCL-E1 FOM-850-AC
2	VCL-E1 (G.703) Fiber Optic Modem - 850 nm wavelength with DC power supply	VCL-E1 FOM-850-DC
3	VCL-E1 (G.703) Fiber Optic Modem - 1310 nm wavelength with AC power supply	VCL-E1 FOM-1310-AC
4	VCL-E1 (G.703) Fiber Optic Modem - 1310 nm wavelength with DC power supply	VCL-E1 FOM-1310-DC
5	VCL-E1 (G.703) Fiber Optic Modem - 1550 nm wavelength with AC power supply	VCL-E1 FOM-1550-AC
6	VCL-E1 (G.703) Fiber Optic Modem - 1550 nm wavelength with DC power supply	VCL-E1 FOM-1550-DC

Note: Operation and maintenance of network equipment require professional knowledge and experience. We recommend the equipment to be managed only by qualified technicians. Should you require technical assistance please consult the provider, or contact our SUPPORT DESK at support@oriontelecom.com

Technical specifications are subject to changes without notice.
 All brand names and trademarks are the property of their respective owners.
 Revision 04, September 06, 2010.

ORION TELECOM NETWORKS INC.

16810, Avenue of Fountains, Suite # 108,
 Fountain Hills, AZ 85268, USA

Phone: +1 (480) 816 8672

Fax: +1 (480) 816 0115

E-mail: sales@oriontelecom.com

Website: <http://www.oriontelecom.com>