VALIANT COMMUNICATIONS LIMITED

VCL-E1 (G.703) Fiber Optic Modem

User Manual

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Warranty

This Valiant product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Valiant 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 Valiant. The buyer shall prepay shipping charges to Valiant 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 Valiant from another country.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, 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. Valiant shall not be liable for any direct, indirect, special, incidental or consequent damages, whether based on contract or any legal theory.

Notice

This manual contains information that is proprietary to Valiant Communications Limited. No part of this publication may be reproduced in any form whatsoever without prior written approval by Valiant Communications Limited

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 a 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

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

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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.**

CAUTION
ELECTROSTATIC SENSITIVE DEVICES

DO NOT OPEN OR HANDLE EXCEPT AT A STATIC-FREE WORKSTATION

Introduction

The VCL-E1 (G.703) Fiber Optic Modem provides the user the capability to establish communication between two E1 interfaces or between an E1/FE1 interface and a "n"x64 V.35 interface over an optical fiber link.

Front view

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

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.
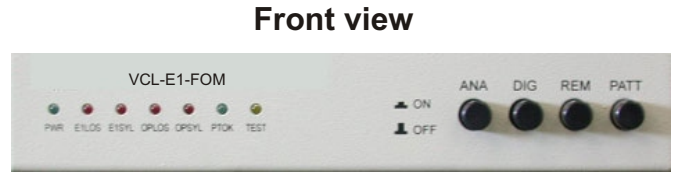
> **Safety Warnings !!!!**
>
> **For Testing : Always Install Optical Attenuators.**
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Application Diagrams

Network — FE1 — VCL- E1 (G.703) Fiber Optic Modem — Optical Fiber — VCL- E1 (G.703) Fiber Optic Modem — FE1 — ROUTER

Application -1

Network — FE1 — VCL- E1 (G.703) Fiber Optic Modem — Optical Fiber — VCL- E1 (G.703) Fiber Optic Modem — V.35 — ROUTER
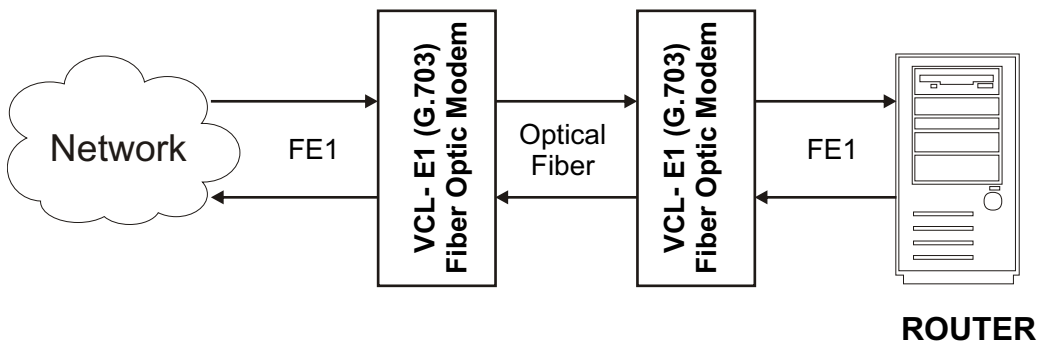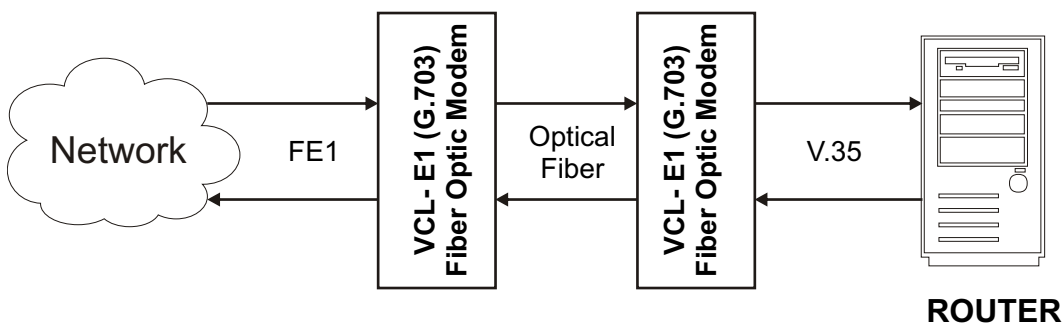
Application -2

Technical Specifications

Electrical Interface (E1 Tributary)

Number	1
Nominal bit rate	2048Kbps
Bit rate tolerance	50ppm
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 - 1550nm 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		

VCL-E1 (G.703)
Fiber Optic Modem

VCL-E1-FOM

● ● ● ● ● ● ●
PWR E1LOS E1SYS OPLOS OPSYL PTOK TEST

■ ON

■ OFF

ANA DIG REM PATT

● ● ● ●
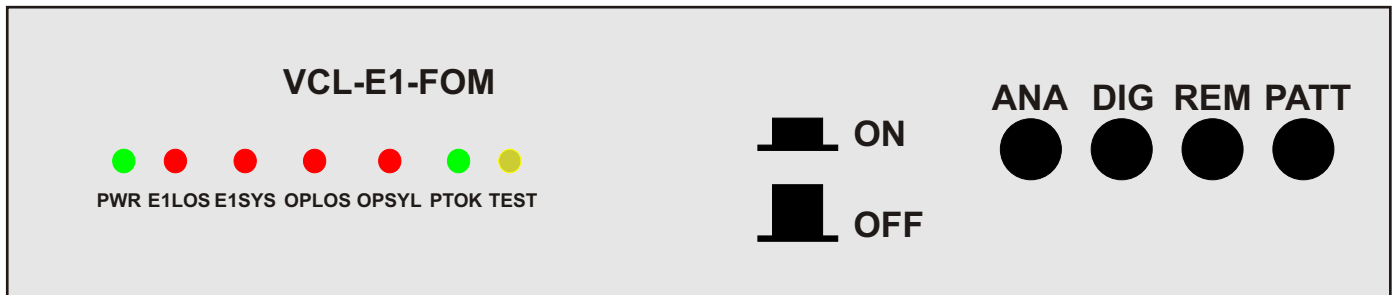
Front view of the shelf

LEDs 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; Constantly "ON" to indicate there is local alarm, and flashing to indicate there is an alarm at the remote end.
5.	OPSYL	Red	No frame synchronization code is detected in the input signal of optical interface. Constantly "ON" to Indicate 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.

VCL-E1 (G.703)
Fiber Optic Modem
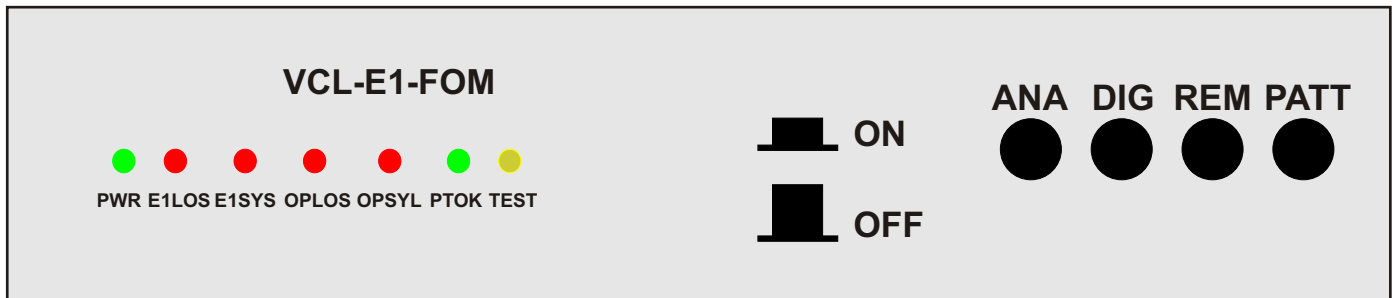
Front view of the shelf

Pushbutton and Switch Indications

Four push - button switches are available on the front panel. The switches are in "ON" mode when pressed or in OFF mode when released. They are respectively from left to right.
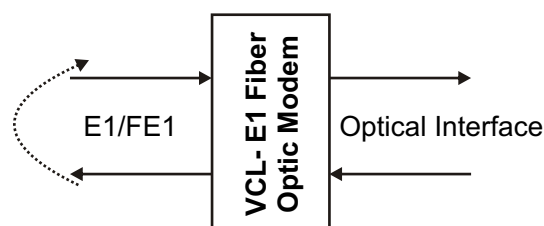
ANA: This switch initiates a internal loopback on the optical interface so that the E1/FE1 data being received (on Rx pins) by the system is transmitted back on the same E1/FE1 interface (on Tx pins).

This test may be used to verify the integrity of the E1/FE1 data interface connections.
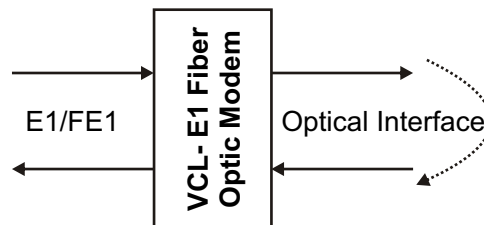
DIG: This switch initiates a internal loopback on the E1/FE1 interface so that the data being received on the optical (Rx) fiber is sent back on the optical (Tx) fiber through the E1/FE1 interface.

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.

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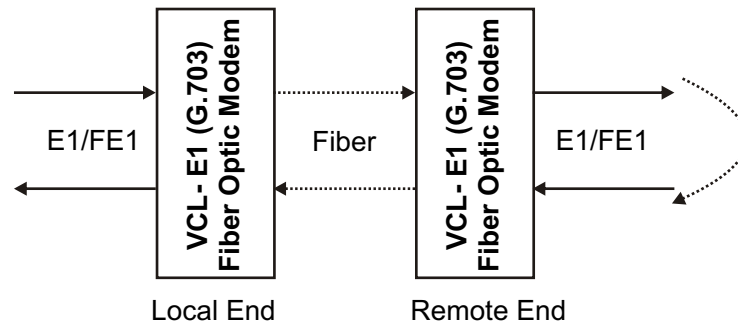
PATT: This switch initiates a data link integrity test by generating a pseudo random pattern.

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
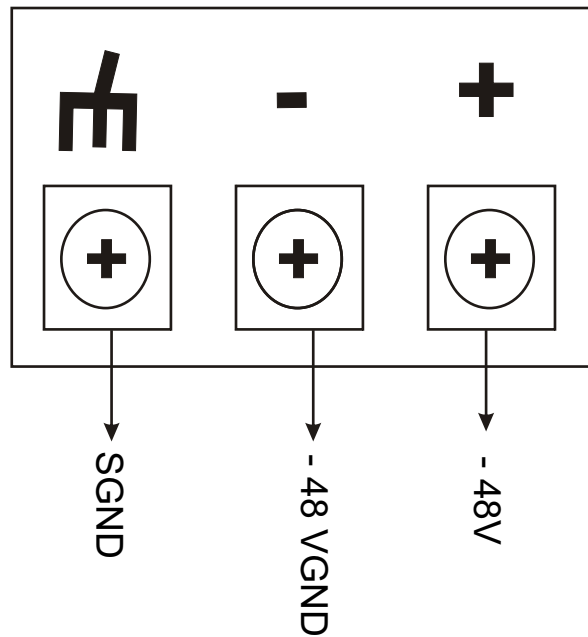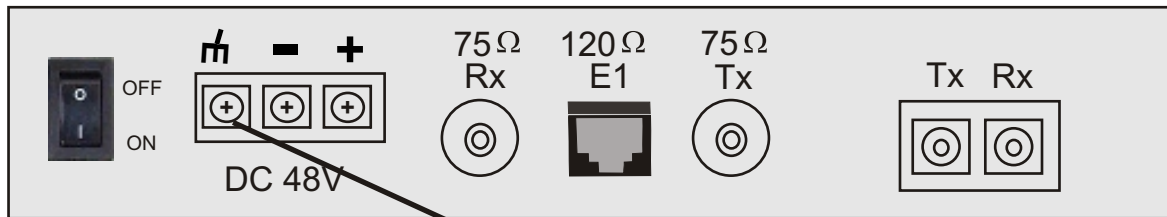
loopback mode to complete the test circuit.

VCL-E1 (G.703)
Fiber Optic Modem

Rear view with AC Power supply
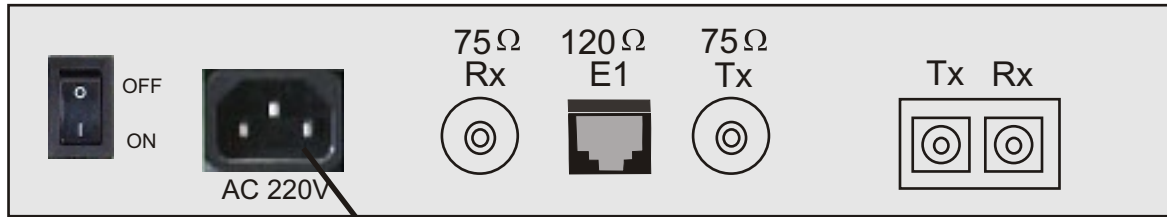
Connect AC Input
here

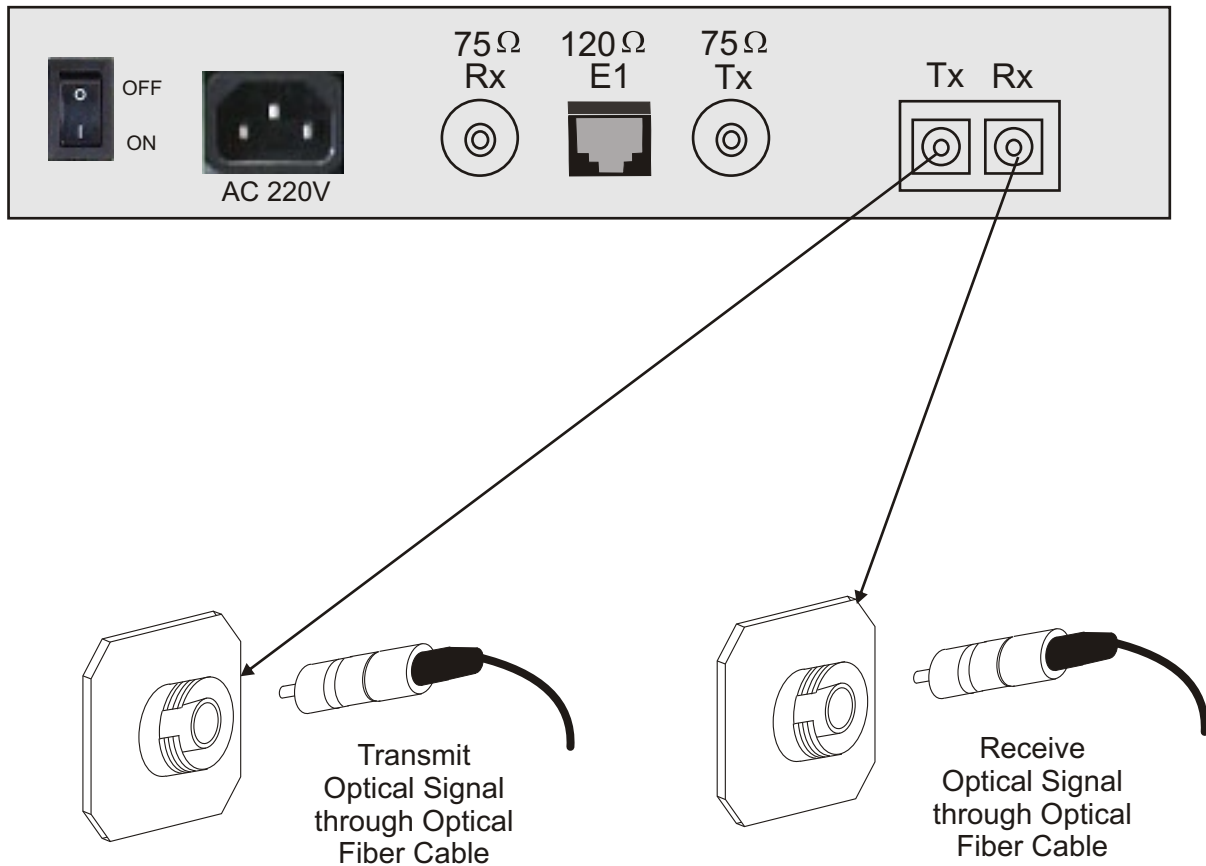## Rear view with -48 V DC Power supply

Note:

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

VCL-E1 (G.703)
Fiber Optic Modem

Rear view - Optical Connections

Transmit
Optical Signal
through Optical
Fiber Cable

Receive
Optical Signal
through Optical
Fiber Cable

Note: Do not expose to the naked eye.
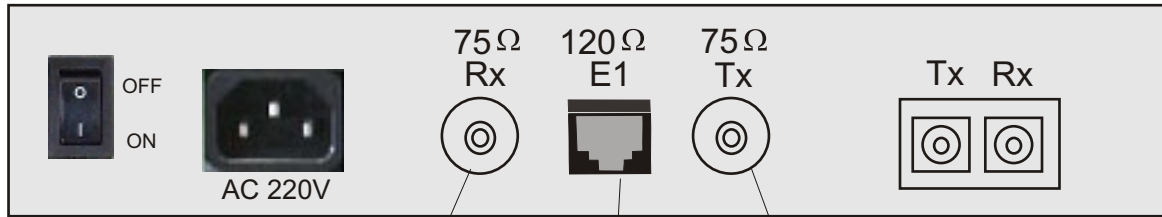Connect Fiber Cable to System
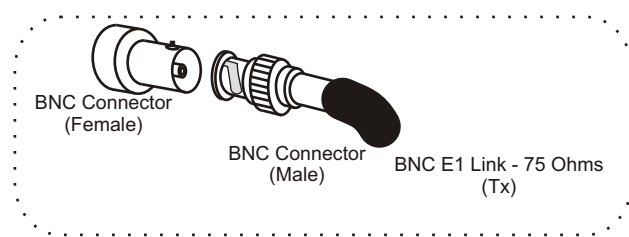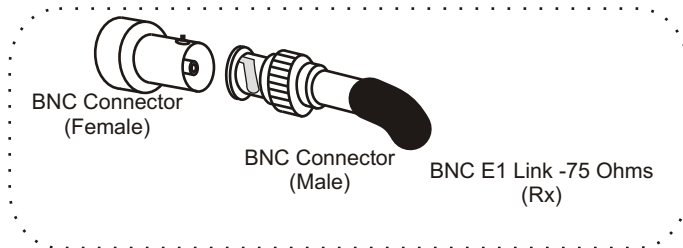When Power is OFF.

Safety Warnings !!!!

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VCL-E1 (G.703)
Fiber Optic Modem

Rear view - E1 Connections

120 Ohms impedance
balanced E1 Port

BNC Connector
(Female)

BNC Connector
(Male)

BNC E1 Link -75 Ohms
(Rx)

BNC Connector
(Female)

BNC Connector
(Male)

BNC E1 Link - 75 Ohms
(Tx)

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)

1 2 3 4 5 6 7 8
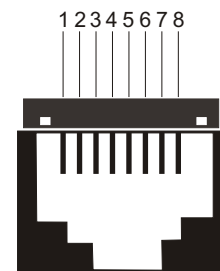
RJ-45
(Female)

Time-slots selection for E1/FE1

Bottom View of
VCL-E1 Fiber Optic Modem
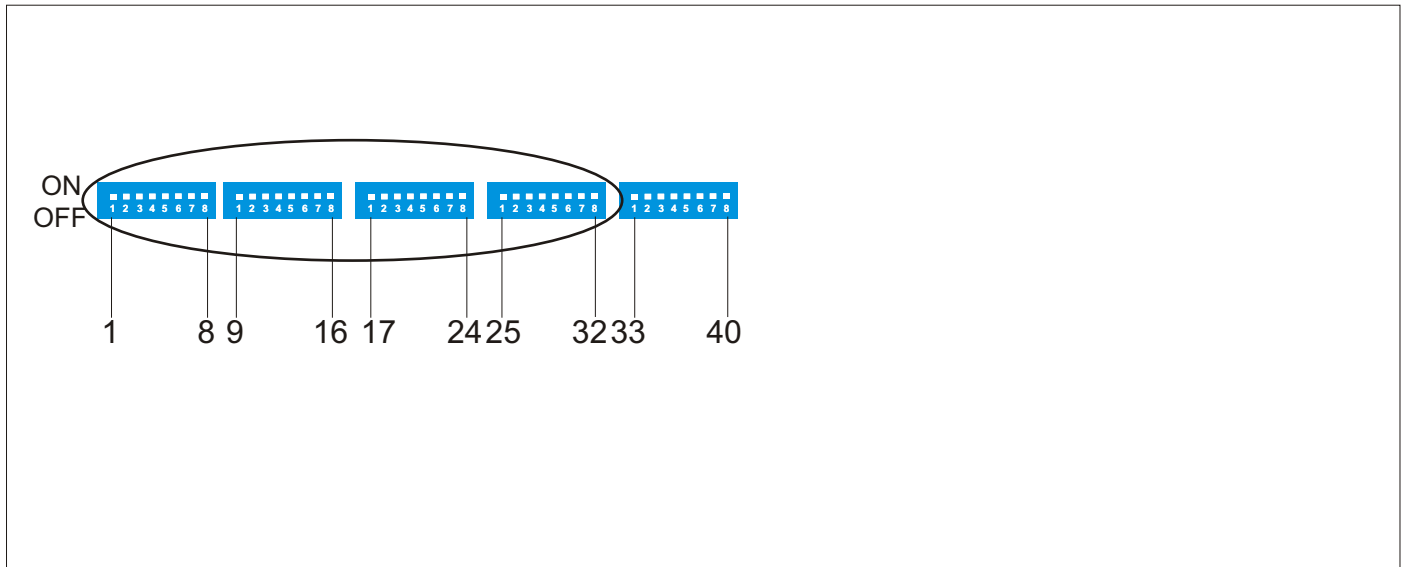
There are a total of 40 DIP switches which may be accessed at the bottom of each box which shall allow the user to set the bandwidth, framing etc.

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:

The switch position should be as follows:

| 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

Note1:
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.

Note2:
Please note that the time-slots selected to carry data must always be consecutive time-slots.

Syncronization Clock Settings

Bottom View of
VCL-E1 (G.703) Fiber Optic Modem
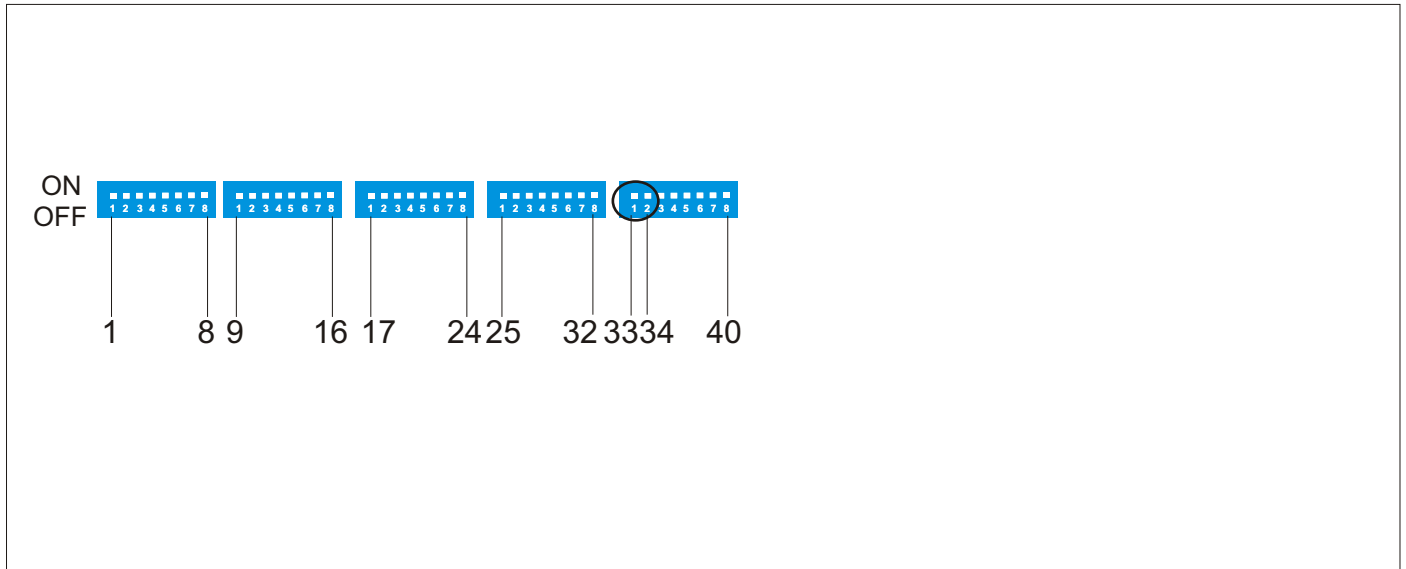
Switches number 33-34 will be used for selection of synchronization clock.

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

Bottom View of
VCL-E1 (G.703) Fiber Optic Modem
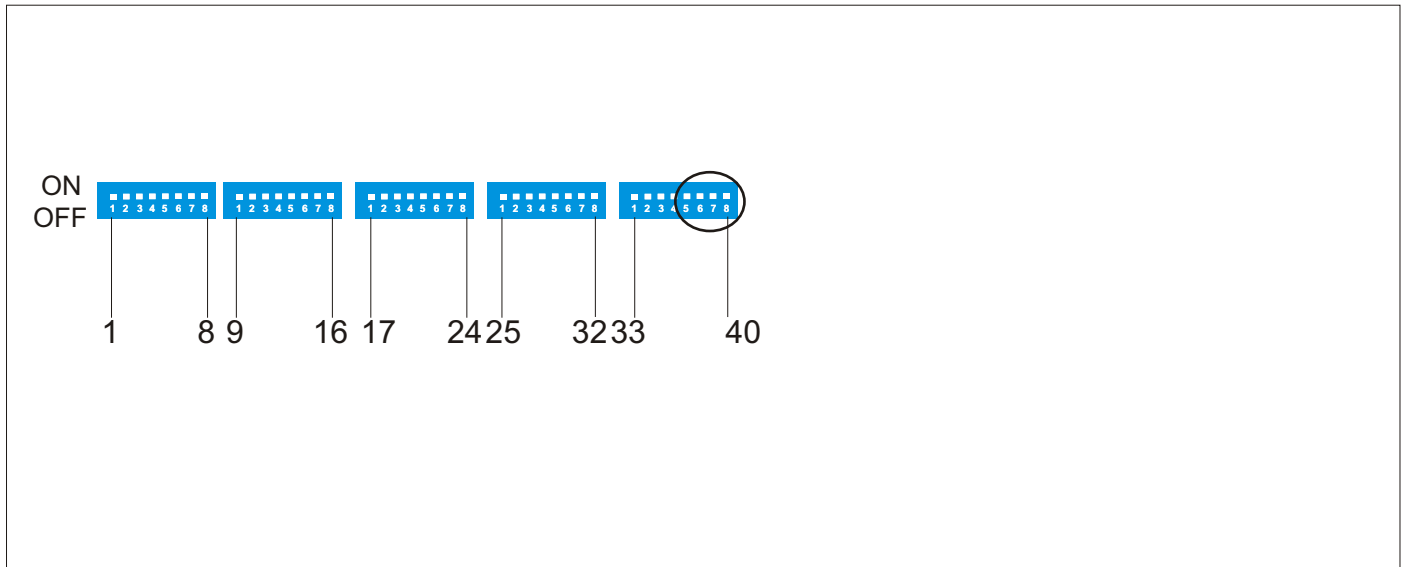
Switches number 37-40 will be used for impedance selection of E1/FE1 port.

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	120 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 - 1550nm 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

Technical specifications are subject to changes without notice.
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